MANUAL N° 810-2

FIRST SECTION

FIRST SECTION

REMOVAL and FITTING

PART TO BE CUT OFF

HOW TO USE THE MANUAL

CITROËN CAR CLUB N.S.W. INC. Common Seal

PRESENTATION

To facilitate the use of the manual, operations have been grouped in two volumes :

- Volume 1 contains :
  - the CHARACTERISTICS - ADJUSTMENTS - CHECKS

  This volume is essential to all workshops for repairs or overhauls.

- Volume 2 contains the operations usually carried out and concerning :
  - REMOVAL and FITTING
  - RECONDITIONING
  - ELECTRICAL, HEATING and AIR-CONDITIONING SYSTEMS
  - BODYWORK

The above volumes are sold separately. They are presented bound in blue Fibrex with a «MULTO» type mechanism to facilitate the insertion of amendments or the extraction of a particular operation required by the workshop.

COMPOSITION

Every volume comprises :

- the list of operations contained in the volume
- these operations filed in numerical sequence
- the list of all the tools mentioned in the operations and the manufacturing drawings for special tools which are not sold but are intended to be manufactured by the repair department itself.

OPERATIONS

The sequence of operations has been devised in order to obtain the best quality of work in the shortest possible time.

The numbering of the operations is made up as follows :

a) The code letter for the car : « G »

b) A number made up of three figures denoting the unit or its element

c) A figure code designating the type of repair :
- the figures 0 0 0 indicate the characteristics of the car
- the figures 0 0 indicate the characteristics of the unit
- the figure 0 indicates checks and adjustments
- the figures 1, 4, 7 indicate removal or fitting
- the figures 2, 5, 8 indicate dismantling or reassembly and
- the figures 3, 6, 9 indicate reconditioning.

The thumb-indexing which corresponds to the list of operations enables the particular operation to be found without difficulty.

TOOLING

Special tooling is denoted in the text by a number followed by the letter T.

These tools are sold by :
- Etablissements FENWICK, Department AMA, 24 Bd Biron - 93404 St-Ouen - FRANCE.

Additional tools of local manufacture are indicated in the text by a number preceded by the index MR : drawings for these tools appear at the end of the particular volume filed in numerical order.

TIGHTENING TORQUES

Torques are expressed in the following units :
- in metres Newton (mΛN) : the legal unit for measuring torque
- metre-kilogrammes (mkg), since torque wrenches at present in use are sometimes graduated in mkg :
  - 1 mkg = 9.81 mΛN (which may also be written mΛN or m.N.)
- in foot-pounds. (ft. lbs) converted at 7.22 ft. lbs = 1 m.kg.

The numbers corresponding to the torques are « rounded-off »

Examples : 2 mΛN = 0.2 m.kg = 1.4 ft. lbs
60 mΛN = 6 m.kg = 43 ft. lbs.

IMPORTANT : When a tightening torque figure is followed by the words « torsion spanner », the operation must OF NECESSITY be carried out with a torsion spanner.

ADVISORY SERVICE

For all technical information concerning these vehicles, please contact :

The Service Department,
Citroen Cars Limited,
Slough, Bucks, GB.

or : DEPARTEMENT TECHNIQUE APRES-VENTE,
ASSISTANCE TECHNIQUE
163 Avenue G. Clémenceau,
92000 NANTERRE - FRANCE

LIST OF OPERATIONS
IN THE FIRST SECTION OF THE MANUAL N° 810-2

Operations where the number is preceded by the letter « G » are common to all types of vehicles of the « GS » family.
Operations where the number is preceded by the letter « GE » or « GF » are specific to the five-or three-door versions of the « GS » Estate respectively.
Operations where the number is preceded by the letter « Gea » are specific to vehicles fitted with a Torque Converter.

CITROËN CAR CLUB N.S.W. INC. Common Seal

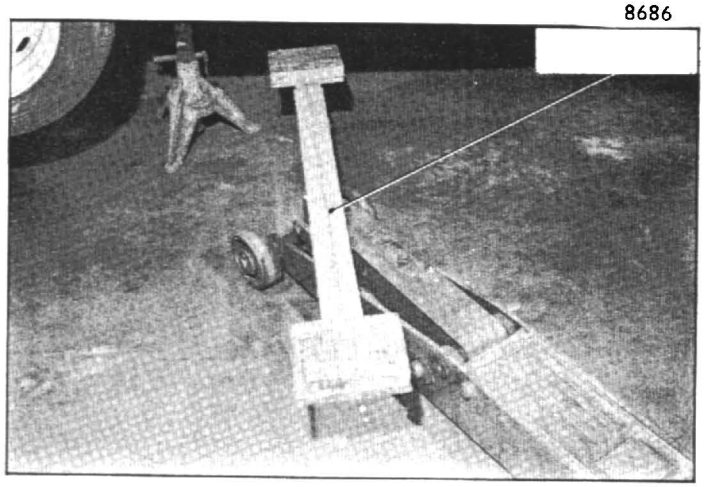
Operation Number	DESCRIPTION
	ENGINE - CARBURATION - IGNITION
G.100-1	Removing and fitting an engine-gearbox assembly
G.100-4	Removing and fitting an engine only
G.112-4	Work on cylinder heads :
	- Removing and fitting a rocker shaft or a rocker arm *(on the vehicle)*
G.122-4	Work on the timing :
	- Removing and fitting a driving belt, a tensioner or a timing gear
G.123-1	Removing and fitting a camshaft
G.222-1	Work on the oil pump :
	- Removing and fitting a pump drive (or seal) or an oil pump *(on the vehicle)*
	GEARBOX
G.330-2	Stripping down and assembling a four-speed gearbox
G.334-1	Work on the gear change :
	- Removing and fitting the gear lever
	- Removing and fitting the linkages
G.343-4	Work on gearbox drive outlet :
	- Removing and fitting a differential shaft, a bearing or a seal
	HIGH PRESSURE PUMP AND RESERVOIR
G.391-1	Removing and fitting a high pressure pump
	FRONT AXLE
G.412-1	Work on the front suspension :
	- Removing and fitting an upper suspension arm
	- Removing and fitting a lower suspension arm
G.413-1	Work on the swivel :
	- Removing and fitting a complete swivel assembly or a ball joint
	- Removing and fitting the bearing, seals or hub
G.414-1	Removing and fitting the front axle unit for exchange
	REAR AXLE
G.422-1	Removing and fitting a rear suspension arm
G.422-4	Work on the rear suspension arm
	- Removing and fitting bearings, a seal or a friction washer
G.423-1	Work on the rear wheel hub :
	- Removing and fitting a brake disc, a hub or a bearing
G.424-1	Replacing the rear axle unit
G.424-4	Replacing a suspension arm support tube

LIST OF OPERATIONS
IN THE FIRST SECTION OF THE MANUAL N° 810-2

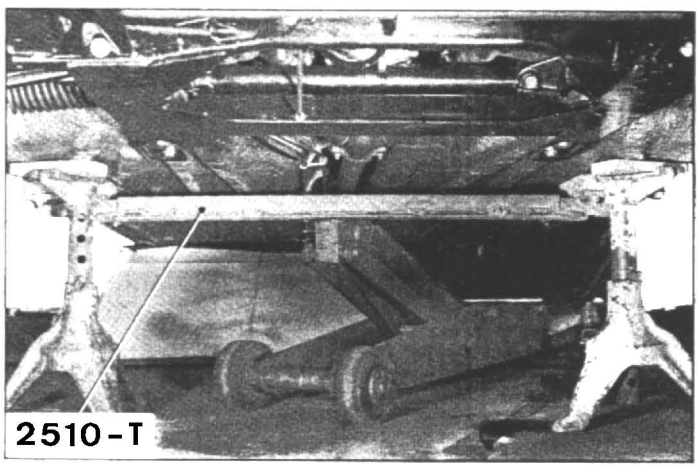
Operation Number	DESCRIPTION
	SUSPENSION SYSTEM
G.434-1	Work on the mechanical components of the suspension system : - Removing and fitting a front anti-roll bar or its bearings
G.437-1	Work on the height control system : - Removing and fitting an automatic front control system
	STEERING
G.442-1	Removing and fitting a steering system
	BRAKES
G.451-1	Work on the front brakes : - Replacing main brake pads - Removing and fitting a brake unit - Removing and fitting a brake disc - Replacing the emergency brake pads
	ELECTRICAL SYSTEM
G.560-1	Work on the windscreen wiper : - Removing and fitting a windscreen wiper motor - Removing and fitting a windscreen wiper mechanism
	TOOLS
	List of tools mentioned in the section
	Manufacturing drawings for tools not sold

REMOVING AND FITTING AN ENGINE-GEARBOX ASSEMBLY

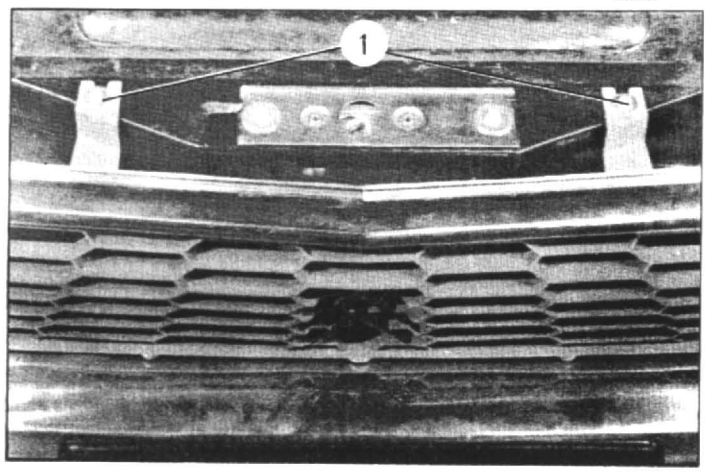
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REMOVAL

1. Chock up the vehicle :

Raise the vehicle to the *high position.* to allow a jack to be pushed underneath fitted with trestle support 2510-T.

Raise and prop the front of the vehicle *with the wheels off the ground* (see figure for arrangement of props).

Place the jack immediately below the rear seats.

2. Release the pressure in the suspension circuits :

With the engine stopped, place the vehicle height control lever *in the normal position.*

Slacken the pressure regulator bleed screw.

Place the lever *in the high position* and wait until the rear suspension has completely settled.

Check that there is no pressure in the front suspension system (cylinders free).
Otherwise operate the front height corrector.

Jack up the rear of the vehicle (underneath the rear seats).

3. Remove the front wheels and the spare wheel.

Disconnect the cable from the negative terminal of the battery.

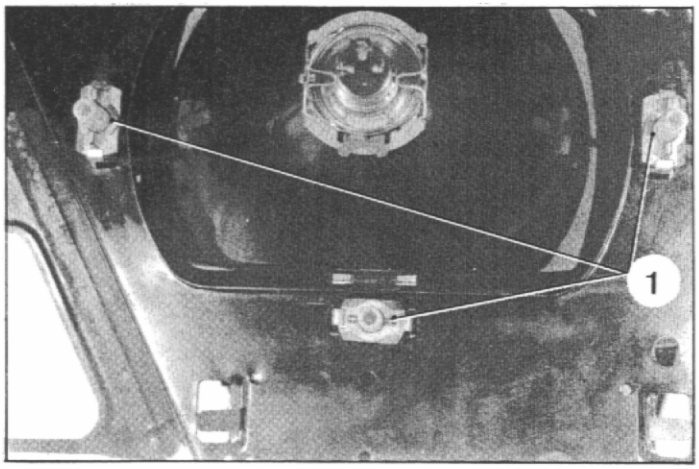
Remove the nut holding the stay on the bonnet.

Raise the bonnet fully without touching the upper panel and secure it in position, using a cord.

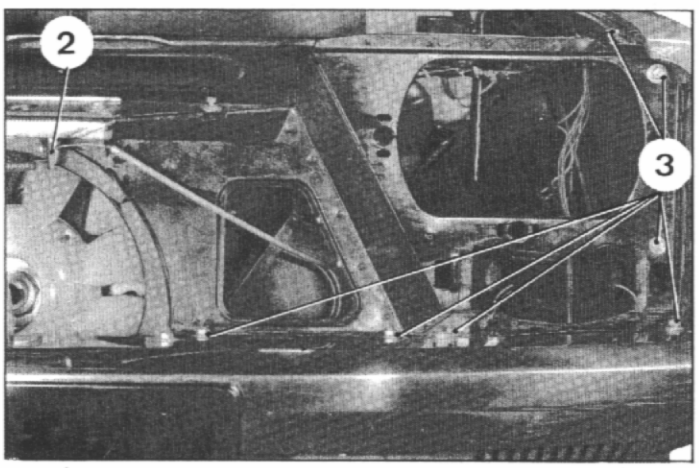
4. Remove the grille :

Slacken the bolts (1), remove the grille by pulling it upwards.

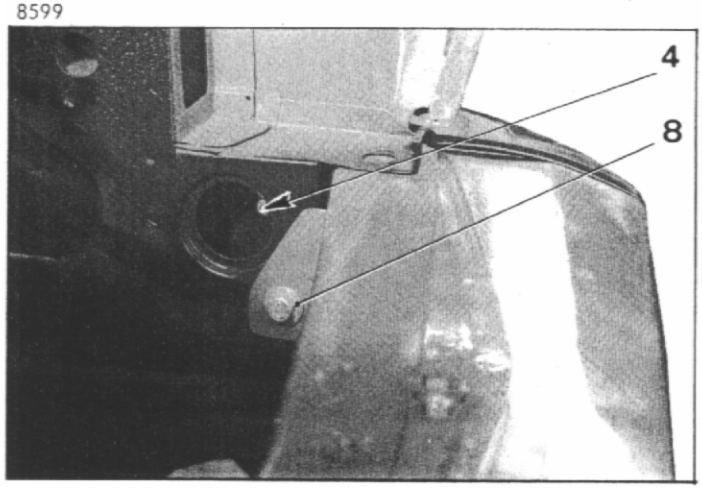
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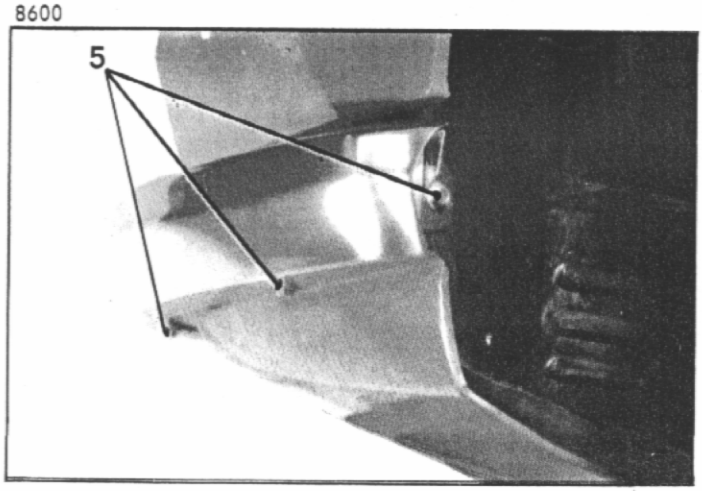
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5. Disconnect the electrical harness :

Remove the indicator lights.
Pull out the connectors from the headlights.
Free the harness from its brackets on the fan panel.
Disconnect the leads from the alternator and the horn.
Remove the rubber collar from the inlet tube to the air filter.

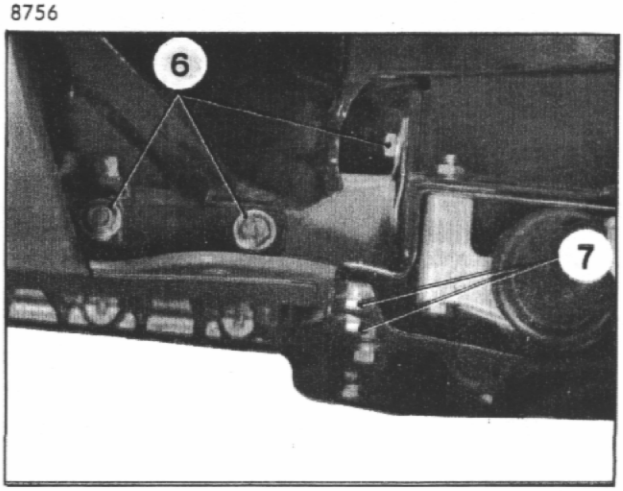
6. Remove the headlights :
Rotate the locks (1) holding the headlights and remove them.

7. Remove the fan panel.
Disconnect the control cable from the bonnet lock (2).
On each side. remove the bolts (3) holding the fan panel.
Remove the horn with its bracket.
Remove the fan panel.

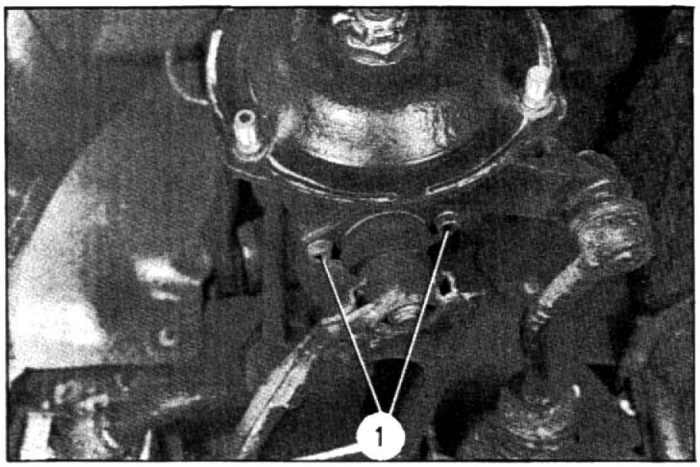
8. Remove the lower finishing panel :
On each side, remove :
- the nut (4) and the bolts (5) holding the lateral part of the bumpers.
- the bolts (7) holding the front of the plate protecting the anti-roll bar bearing.
- the bolts (6) and the bolt (8) holding the panel.

Remove the panel.

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9. Uncouple the drive shafts :

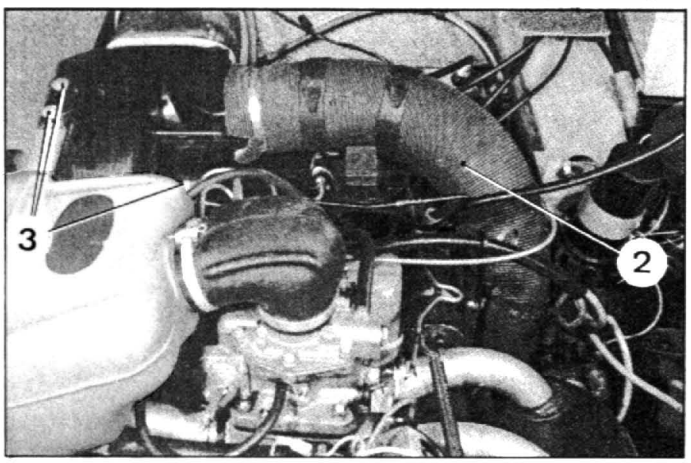
Remove the nuts holding the drive shafts on the differential shafts.
Remove the bolts (1) holding the ball joints of the lower suspension arms.
Release the drive shafts from the studs on the differential shafts.

10. Disconnect the electrical harness :

a) Disconnect the leads :
- from the distributor,
- from the engine oil pressure warning lamp,
- from coil to distributor (H.T. lead),
- from the starter motor,
- from the engine oil thermal switch
- from the reversing light contactor.

b) *For a vehicle fitted with a torque converter :* disconnect in addition :
- the leads from the electro-valve (on the clutch housing),
- the leads from the starter inhibitor switch (on the rear cover of the gearbox).

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11. Remove the spare wheel support.

12. Remove the heater distribution box :

Remove the fixing bolts (3) from the box.
Uncouple the control cable.
Remove the box with the hose (2).

13. Uncouple the flexible drive from the speedometer :

Remove the spring clip and withdraw the flexible drive.

14. Uncouple the emergency brake cables :

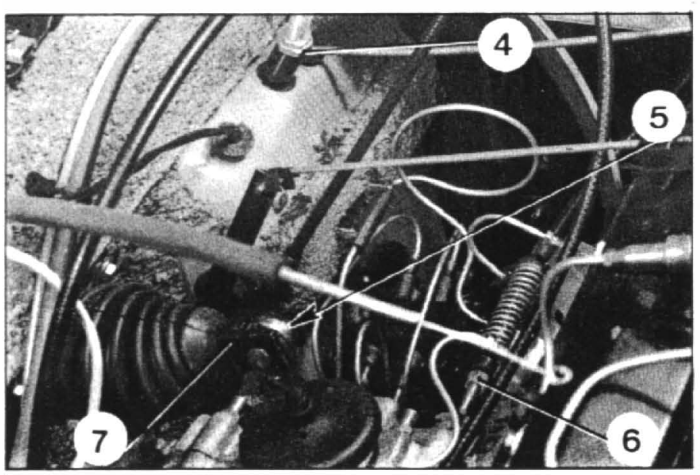
Remove the locknuts, the adjusting nuts (6) and release the cable ends from the brake units.

15. Uncouple the clutch cable :

Slacken the cable adjusting nuts (4) .
Release the cable from the clutch fork (from underneath the vehicle).

NOTE : If an assistant is available, have him depress the clutch pedal.
From underneath the vehicle, chock the clutch fork, have the assistant release the pedal and then release the cable end from the fork.

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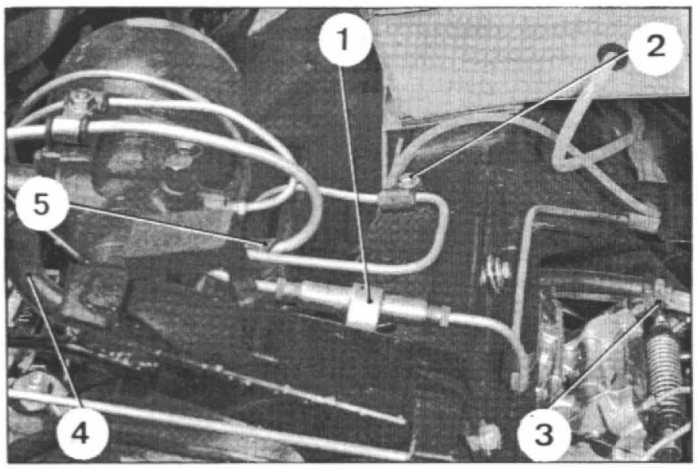


16. Uncouple the gear lever :

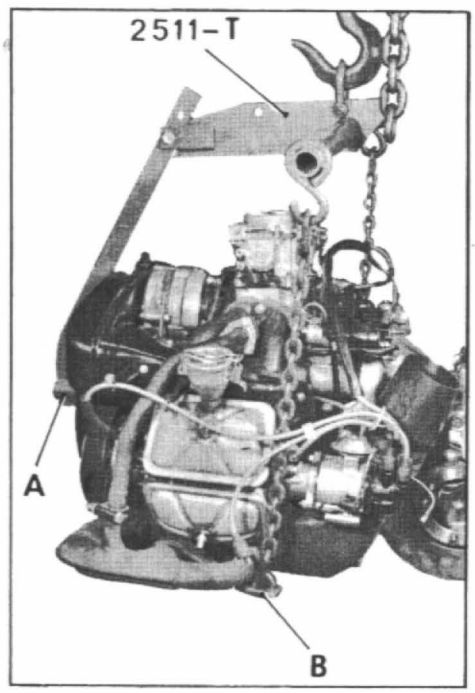
Remove the retainer (5) from the lever link pin.

Remove the pin and uncouple the gear lever (7).

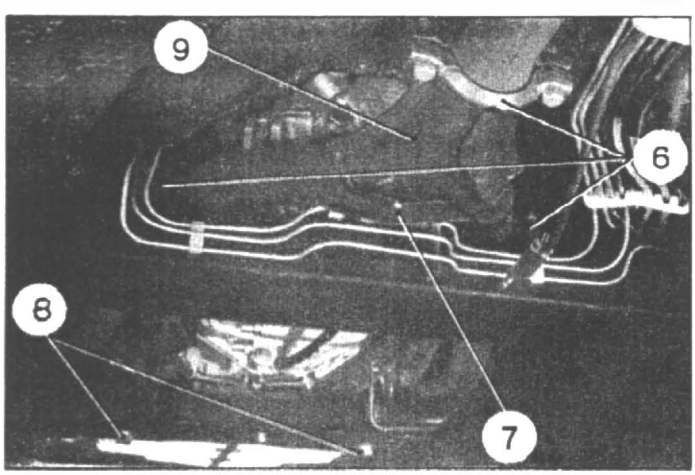
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17. Uncouple the carburettor controls :

Uncouple the control cable from the butterfly valves.
Uncouple the choke control.
Remove the bolts holding the cable sheath bracket on the clutch housing.

18. Disconnect the petrol feed :
Disconnect the flexible feed pipe from the pump.
(Blank the orifice using a 7 mm diameter bolt).

19. *For a vehicle fitted with a torque converter :*
Disconnect the flexible pipes from the converter oil cooler.

20. Disconnect the hydraulic pipes :
Disconnect the main feed pipe from the two-way union (1).

Remove the bolt (2) holding the tube bracket.

Unscrew the feed pipe for the front brakes and release it from the lefthand brake unit.

Remove the bleed screw (3) (blank off the orifice). *(Vehicles fitted with brake units, old model only).*
NOTE : If the bleed screw is not removed, it might be damaged when the engine-gearbox assembly is being removed.

Disconnect the return pipe (4) from the pressure regulator and remove the rubber collar (5) which holds this tube.

Disconnect the intake pipe from the high pressure pump. Release the pipe from the bracket on the righthand wheel arch.

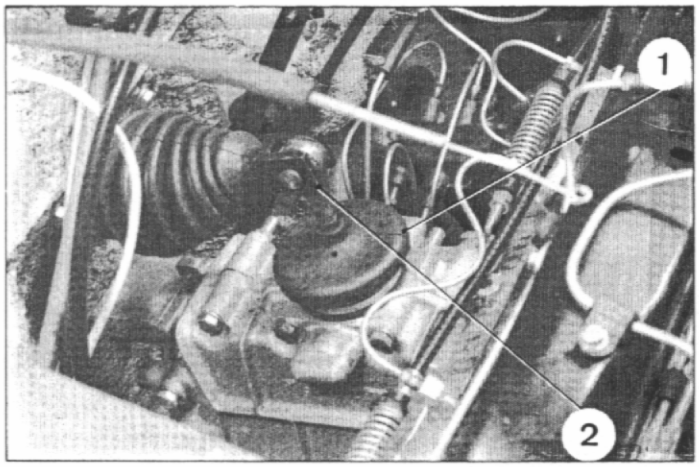
21. Disconnect the engine-gearbox assembly :

a) Bring up the lifting apparatus, fitted with the sling bracket 2511-T (see photograph for engagement of hooks A and B)

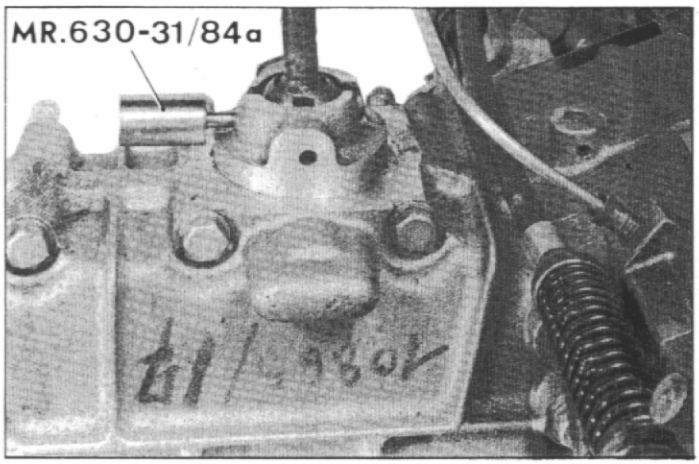
Tighten the chains without raising the engine.

b) Remove :
- the clamps (6) from the exhaust pipe,
- the bolt (7) holding the central exhaust pipe support on the gearbox housing,
- the Y-chaped connecting piping (9),
- the bolt holding the rear flexible mounting for the gearbox,
- the bolts (8) holding the front flexible mountings for the engine.

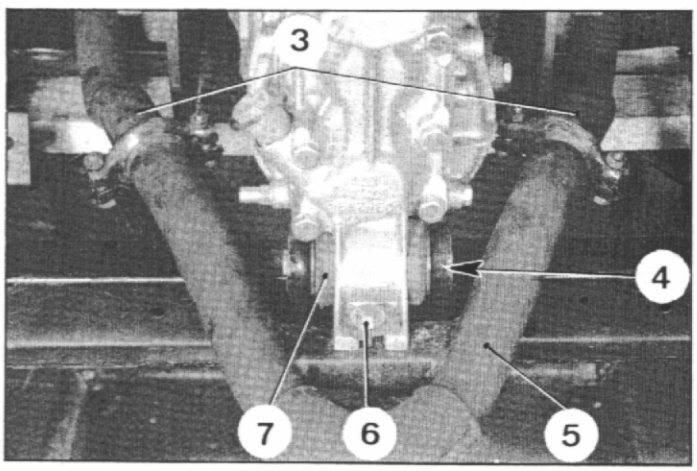
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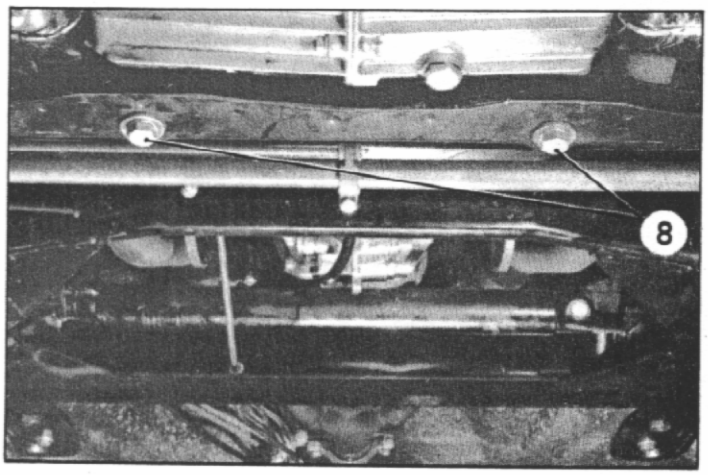
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22. Remove the engine-gearbox assembly :

a) Pull the engine-gearbox assembly gently forward and remove :
- the collar holding the dust cover (1) and release this by pulling it up,
- the lever (2) operating the fork shafts (remove the Mecanindus split pin holding the lever (2) to the ball joint, using the mandrel MR. 630-31/84 a).

b) Release the engine-gearbox assembly by pulling it forward.
CAUTION : Take care that :
- the distributor does not foul the left-hand wheel arch,
- the tube linking the brake units does not come in contact with the crossmember of the axle unit.

c) Remove the left and right exhaust connecting pipes.

FITTING

23. Fitting the engine-gearbox assembly :

a) Position the sling bracket 2511-T and place the assembly on the vehicle by passing the gearbox underneath the upper crossmember of the axle unit.
CAUTION ; Take care that :
- the distributor does not foul the left-hand wheel arch,
- the tube linking the brake units does not come in contact with the crossmember.

b) Fit :
- the lever (2) operating the fork shafts (insert the Mecanindus pin in the ball joint using the mandrel MR. 630-31/84 b),
- the dust cover (1) (tighten the collar).

c) Insert the rear flexible mounting (7) in the support on the axle unit.
Insert the bolt (4). Tighten the nut from 23 to 40 mΛN (2.3 to 4 m.kg) (toothed washer).

d) Fit the bolts (8) securing the front flexible mountings for the engine and tighten them to 40 to 45 mΛN (4 to 4.5 m.kg).

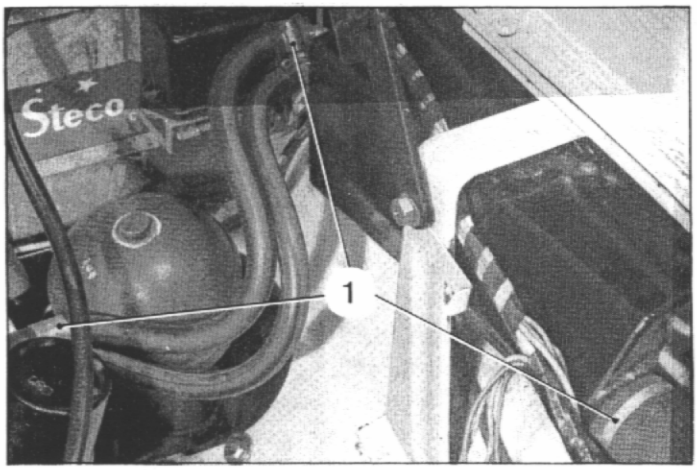
e) Connect up the tubes (3) to manifolds the left and righthand engine exhaust (do not tighten the clamps).

f) Remove the sling bracket 2511-T

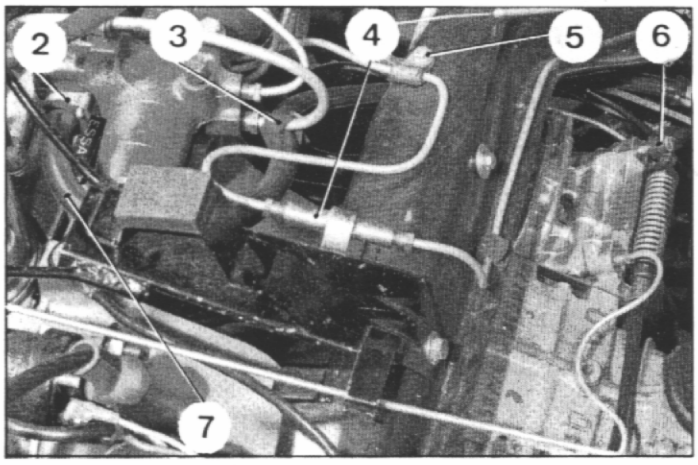
24. Fit the exhaust pipes :

Couple up the Y-shaped piping (5) to the connecting pipes (3) and the central exhaust pipe.
Fit the clamps.
Fit the sealing rings to the heater pipes.
Tighten the bolt and nut (6) (plate, spring and flat washer) fixing the Y-shaped piping (5) on the gearbox housing.

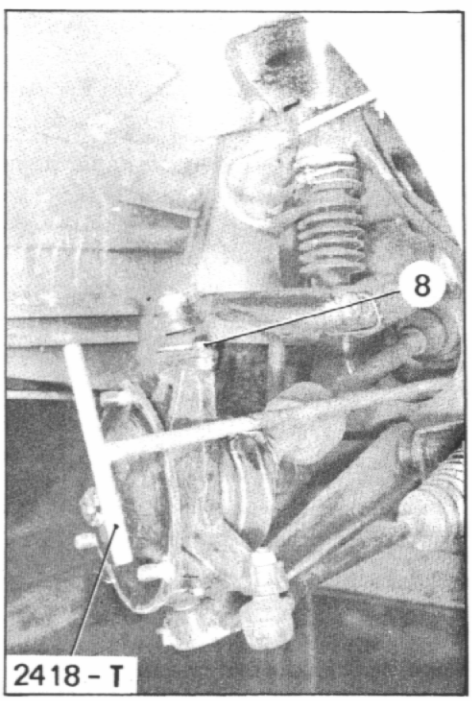
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25. *For a vehicle fitted with a torque converter :*
Connect up the flexible tubes to the converter oil cooler. Tighten the collars (1).

26. **Connect up hydraulic circuit pipes :**

Connect the main feed pipe to the two-way union (4) (new seal).

Insert the bolt (5) holding the clip.

Connect the feed pipe to the lefthand brake unit and the brake unit connecting tube if necessary (new seals).

Fit the bleed screw (6).

Connect up the flexible return pipe (7) to the pressure regulator and fix it using the rubber collar (3). Tighten the collar (2)

27. **Link up the gear lever :**
Insert the link pin for the levers.
Fit the retainer.

28. **Link up the drive shafts :**

Tighten the nuts coupling the drive shafts to the differential shafts (gearbox outlets) to 50 mΛN (5 m.kg) (key 2418-T).
Use MR.630-64/ 40 to hold the plate.
Link up the lower suspension arms to the swivels.
Tighten the bolts (8) to 18.5 mΛN (1.8 m.kg) (contact washer) (torque wrench).

29. **Connect up the emergency brake cables :**

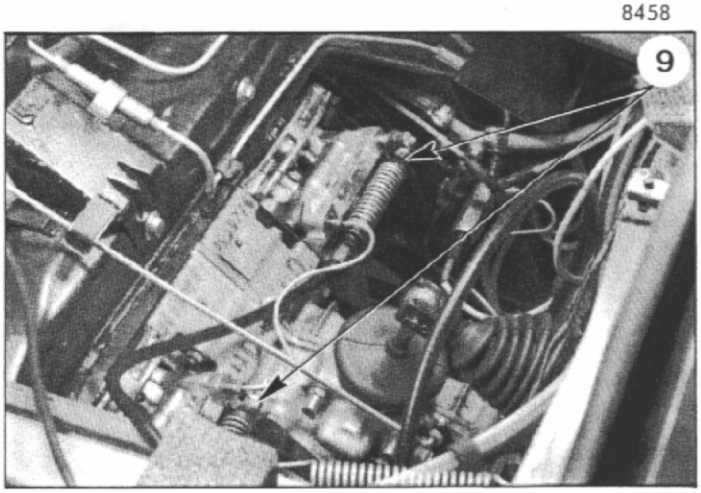
Fit the brake cables.
Tighten the nuts and locknuts (9).

30. **Adjust the emergency brake.**

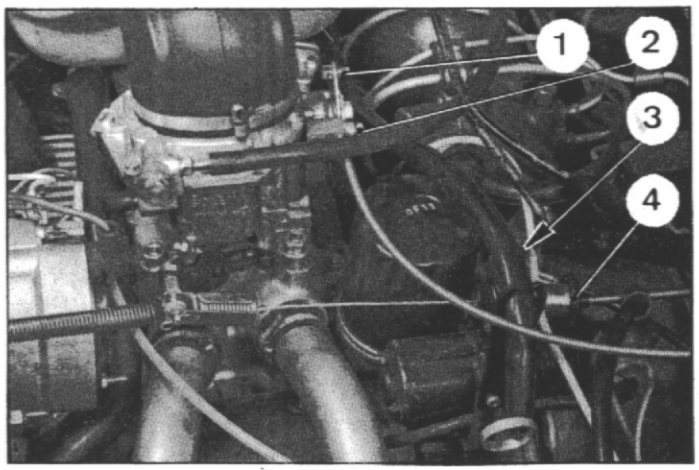
31. **Connect up the clutch cable :**
Connect the cable to the clutch fork.

32. **Adjust the clutch clearance.**

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33. Connect up the speedometer drive cable :

Insert the end of the cable in the gearbox drive socket.
Insert the stop pin.

34. Connect up the carburettor controls :

Fix the cable sheath bracket (3).
Connect up the butterfly valve cable.
Fit the sheath of the choke control into its support.
Lightly tighten the bolt (2).
Before tightening the cable stop screw (1), leave a clearance of 3 to 5 mm at the knob so that the choke is properly closed. If necessary, adjust the tension of the butterfly valve control cable using the bolt (4).

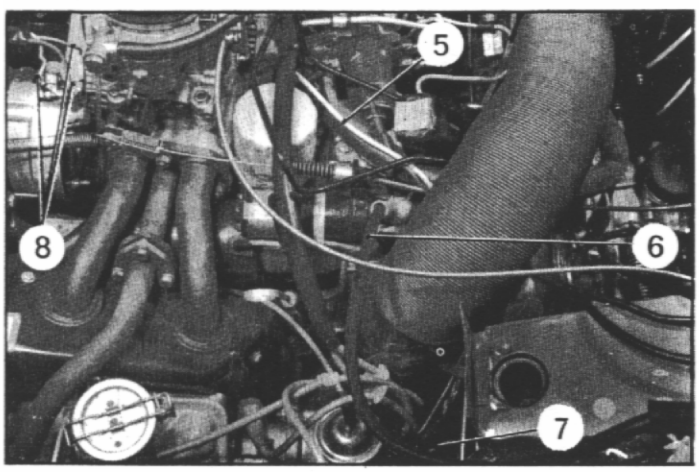
35. Install the spare wheel support and fix the hydraulic pipe.

36. Connect up the petrol feed :

Remove the blanking bolt.

Connect up the flexible feed pipe to the petrol pump.

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37. Connect up the electrical harness :

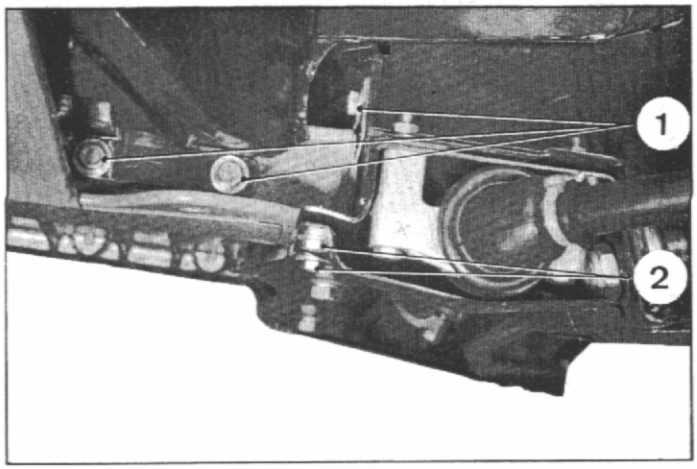
a) Connect :

- the lead (5) to the oil pressure warning lamp,
- the leads (6) to the starter motor (shakeproof washer),
- the lead (7) to the distributor,
- the leads (8) to the alternator,
- the high tension lead to the distributor,
- the lead to the oil thermal switch,
- the lead to the reversing light contactor.

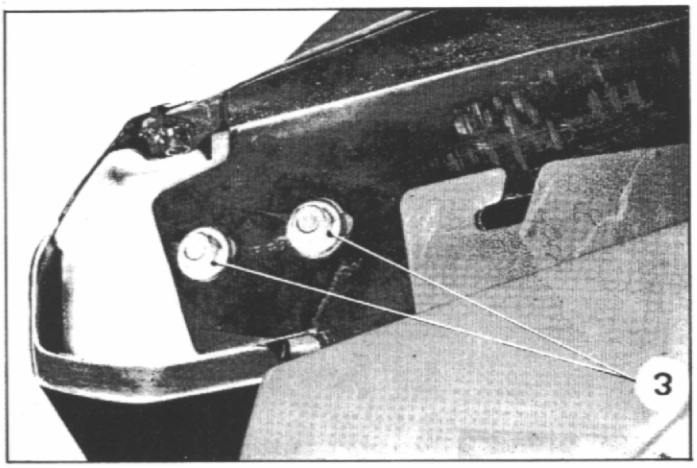
b) *For a vehicle fitted with a torque converter.*
Also connect :

- the leads to the electro-valve,
- the lead to the starter inhibitor switch.

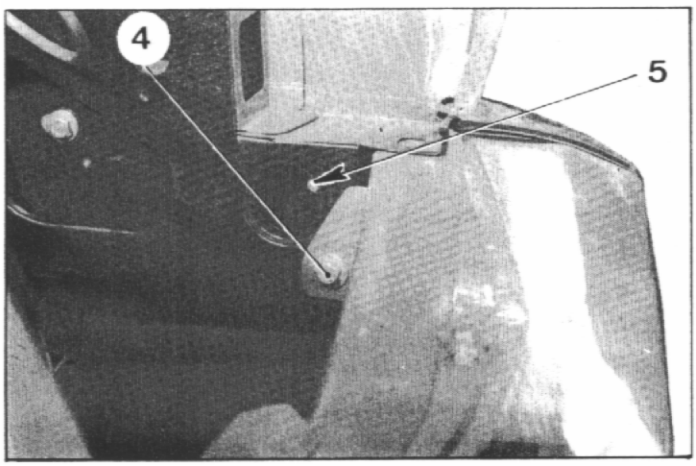
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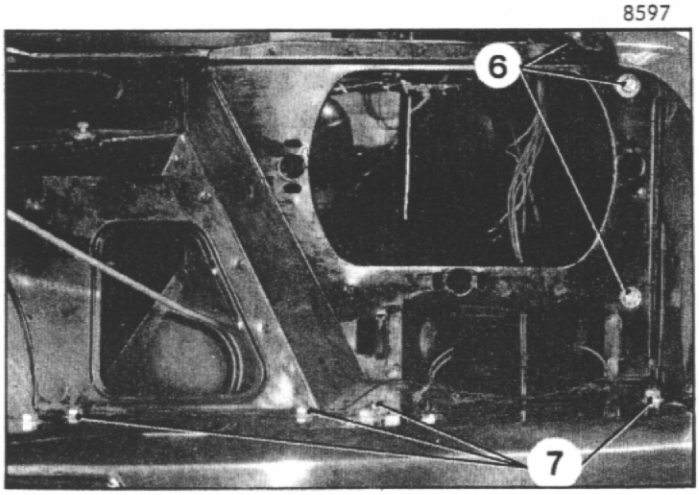
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38. Fit the lower finishing panel :

Present the panel and bumpers.

On each side :

- Fit (without tightening them) the bolts (1) and (2) (contact washer) on the axle unit.
- Fit the bolts (3) and (4) (contact washer).

Tighten all the bolts.

Fit the lateral parts of the bumpers :

On each side :

- Fit the nuts (5) and the bolts (8) (contact washer).
- Check the alignment of wing and bumper.

Finally tighten nuts and bolts.

39. Fit the fan panel :

Present the panel between the wings, with the top slightly inclined backwards.

On each side :

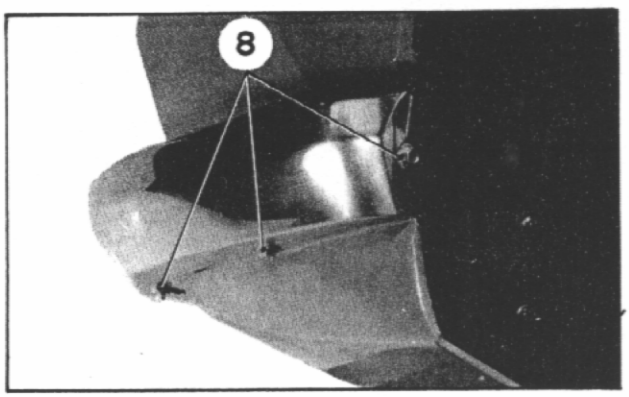
Fit (without tightening them) the bolts (6) and (7) (contact washer).

Finally tighten all the bolts.

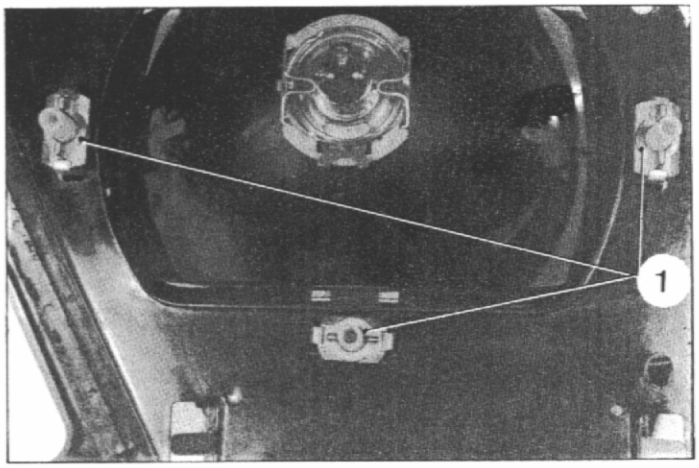
Fit the accelerator return spring.

Fit the horn with its bracket.

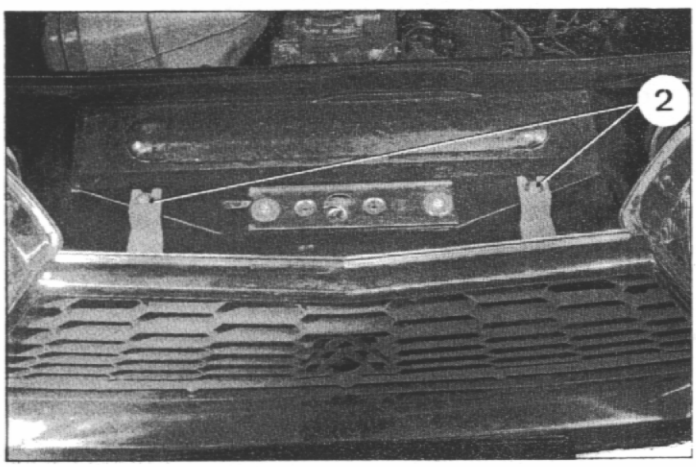
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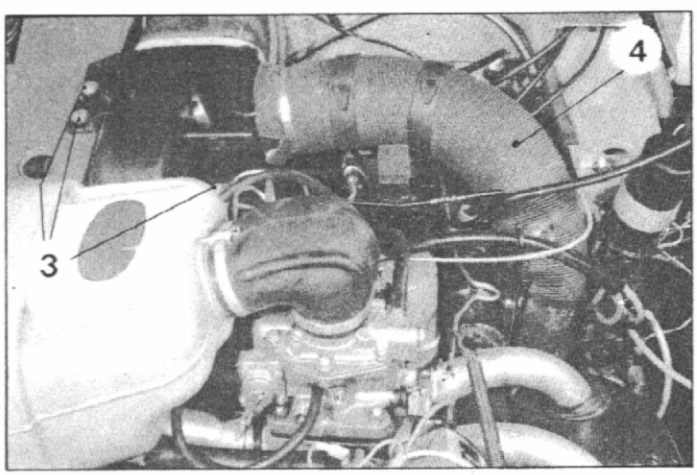
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40. Fit the headlights :

Position the headlights.
Insert the locking tabs (1) (turn to lock).
Fit the connectors on the headlight bulbs.
Connect up the horn.
Fit the electrical harness in the securing clips.

41. Fit the indicator lights :

Connect up the leads before fitting.
Fit the lights (push to lock).

42. Fit the bonnet lock control cable :

Check operation.

43. Fit the grille :

Insert the lower lugs into the slots.
Fit the upper brackets under the flat washers (2)
Tighten the bolts (contact washer).

44. Connect the cable to the negative terminal of the battery.

45. Check the oil levels.

46. Prime the high pressure pump :

a) Link up the flexible intake pipe to the filter tube of the hydraulic fluid reservoir.

Fill the pump by pouring L.H.M. liquid into the tube.

b) Slacken the pressure regulator bleed screw
Start up the engine and rapidly push the tube into the reservoir.

47. Retighten the pressure regulator bleed screw .
With the engine running, check that the unions in the hydraulic circuit do not leak.

48. Fit :

- the protective shield for the front height corrector,
- the front wheels.

Lower the vehicle to the ground.

49. Bleed the front brakes.

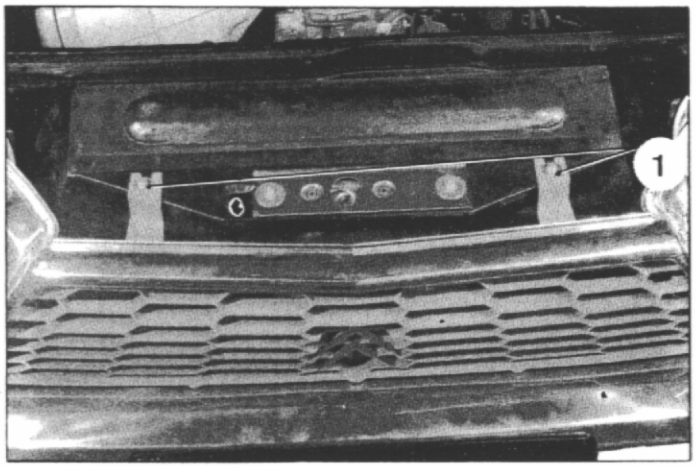
50. Fit the heater distribution box :

Tighten the fixing bolts (3) (contact washer).
Link up the heater pipe (4) to the lefthand heater duct.
Connect up the cable to the flap control lever.
Check that it operates correctly.

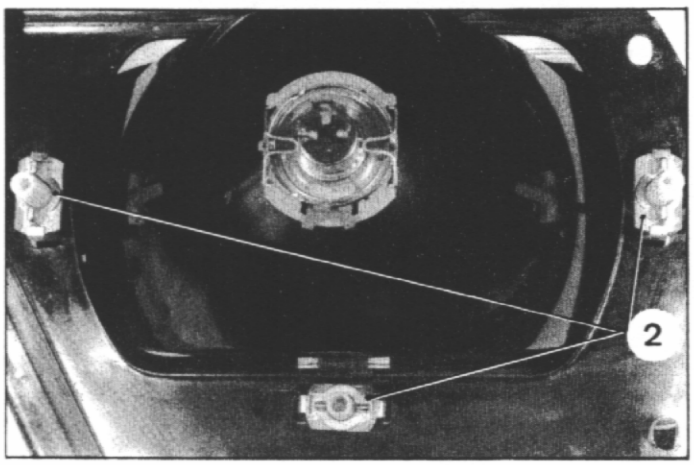
51. Fit the stay to the bonnet.
52. Replace the spare wheel.
53. Check the headlight adjustment.

REMOVING AND FITTING AN ENGINE ONLY

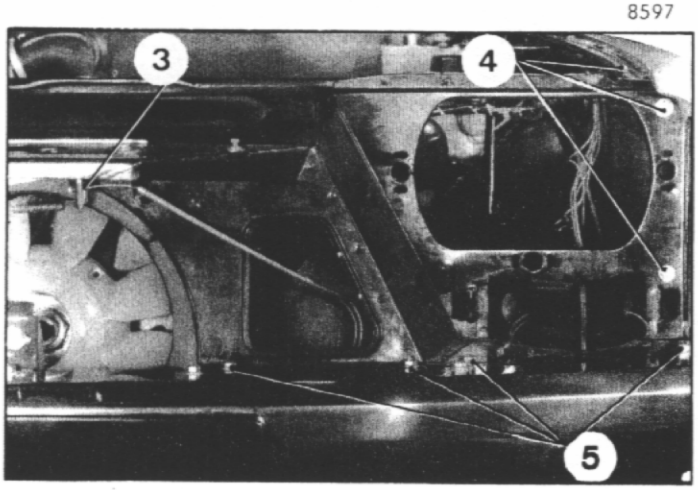
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Manual 810-2

REMOVAL

1. Chock up the vehicle :

Place the height control lever to « *high position* ». Chock up the vehicle at the front (with the wheels off the ground) and at the rear (jack fitted with support 2510-T).

Release the pressure.

2. Remove :

- the spare wheel,
- the nut holding the stay on the bonnet.

Raise the bonnet fully without touching the upper panel and secure it in this position, using a cord.

3. Disconnect the cable from the negative terminal of the battery.

4. Remove the grille :

Slacken the bolts (1) and remove the grille by pulling it upwards.

5. Disconnect the electrical harnesses :

- Unfasten the connectors from the headlight bulbs.
- Disconnect the horn lead.
- Remove the direction indicator lights.
- Release the harness from its clips on the fan panel.

6. Remove the headlights :

Turn the headlight locks (2) to remove them.

7. Remove the fan panel :

Disconnect the bonnet opening cable (3).

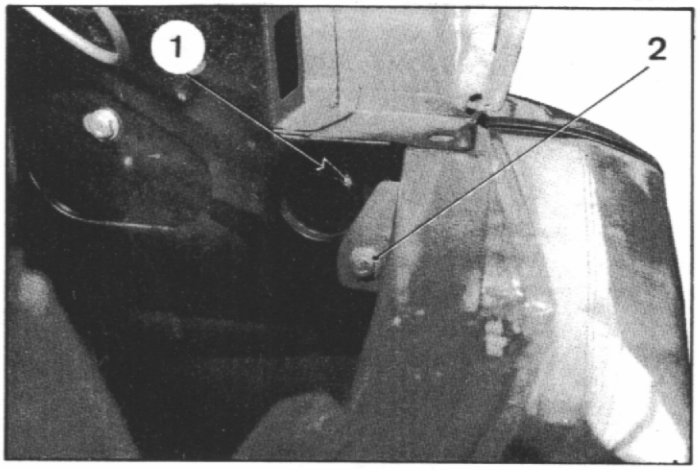
On each side :

Remove the bolts (4) and (5) from the fan panel.

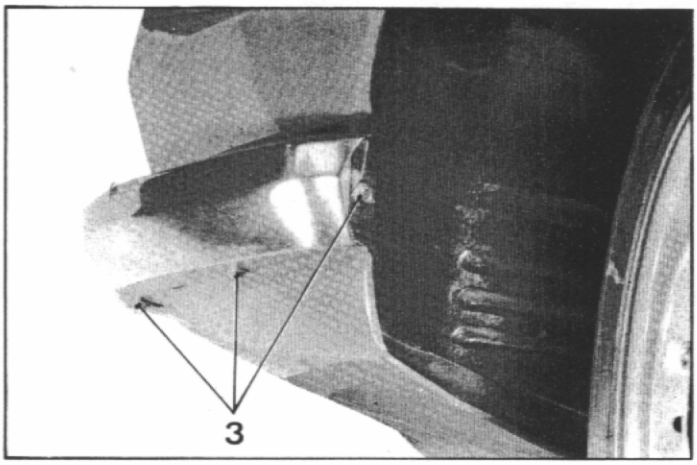
Remove the horn with its bracket.

Remove the fan panel.

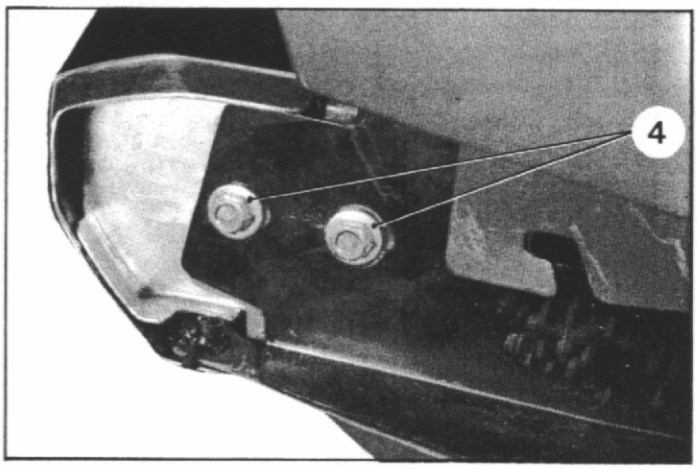
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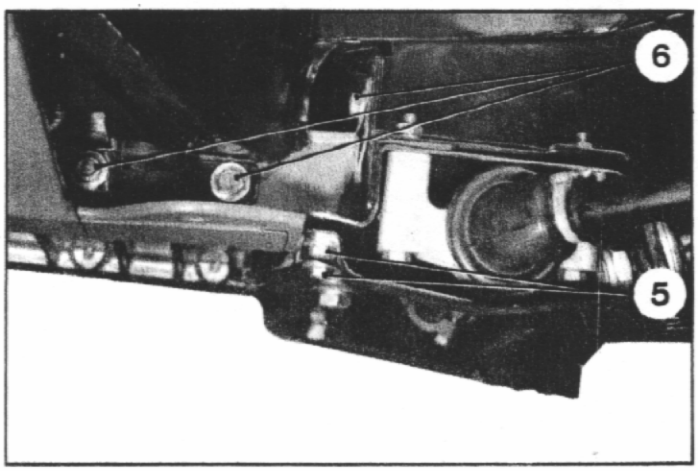
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8. Remove the lower finishing panel :

At each side :

- Remove the nut (1) and the bolts (2) and (3). Free the lateral part of the front bumpers.
- Remove the protective shield for the height corrector (righthand side only).
- Remove the bolts (4).
- Remove the bolts (5) securing the front of the anti-roll bar bearing protecting plate,
- Remove the bolts (6) holding the panel to the unit.
- Remove the panel.

9. Disconnect the carburettor controls :

Disconnect the throttle control cable.
Remove the bolts holding the sheath support on the pressure regulator.

10. Remove the heater distribution box :

Disconnect the cable from the control lever.
Remove the bolts (7) holding the box.
Remove the box together with the lefthand hose.

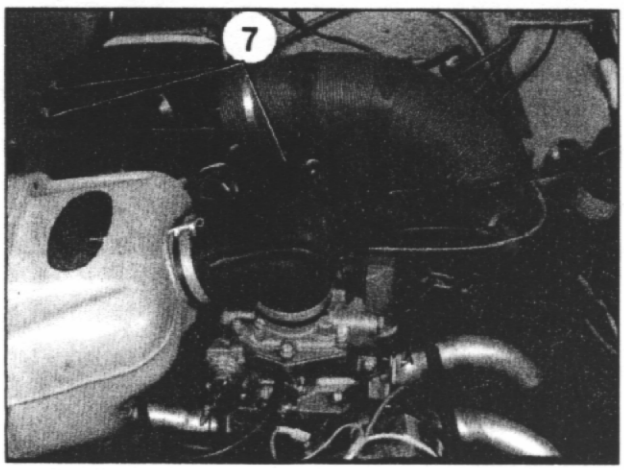
11. Remove the spare wheel support.

12. Disconnect the electrical harness :

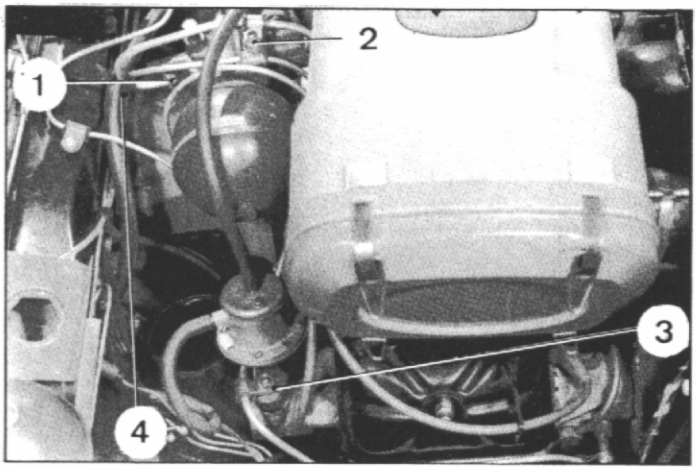
Disconnect the leads :
- from the distributor,
- from the oil pressure warning lamp,
- from coil to distributor (high tension lead),
- from the starter motor,
- from the alternator,
- from the oil thermal switch.

Release the harness and lay it on the left-hand extension arm.

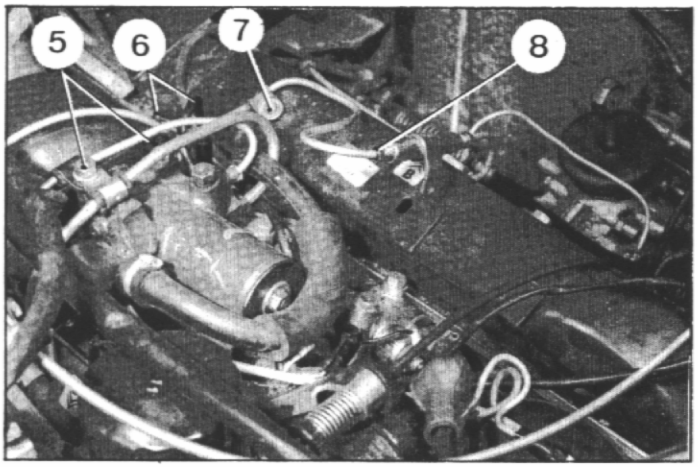
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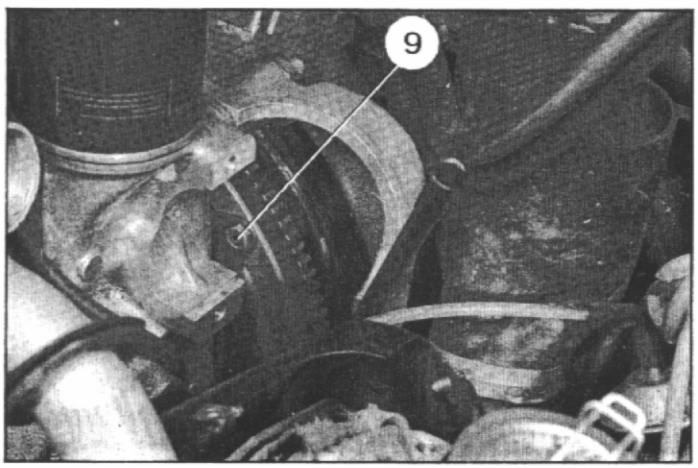
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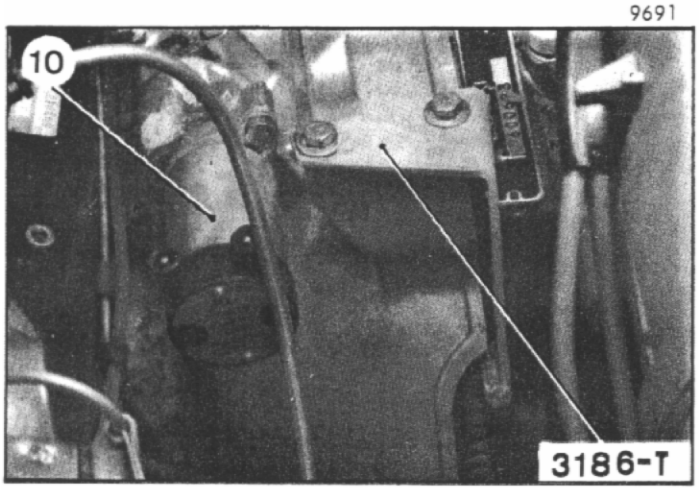
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13. Disconnect the hydraulic circuits :

Disconnect the flexible pump inlet pipe from the hydraulic reservoir.
Release this pipe from the clip on the wheel arch and remove the rubber collar (4). Disconnect the pipe (1) from the pressure regulator.
Remove the nuts (2) and (3) and free the clips from the tube (1).
Remove the tube (1) from the pressure regulator.

NOTE : Blank off the ends of the tubes.

14. For vehicles fitted with a torque converter :

a) *Remove the pressure regulator :*

Disconnect the pipe (8) (blank off the opening).
Remove the bolt (7).
Disconnect the leads (6) from the electro-valve.
Remove the bolts (5) holding the pressure regulator, release the latter and lay it on the righthand extension.

b) *Remove the starter motor.*

c) Disconnect the flexible hose which supplies air to the converter oil cooler.

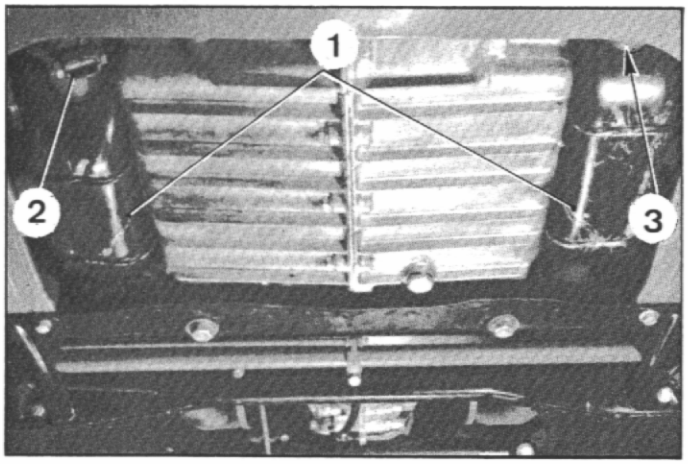
d) *Remove the three bolts (9) holding the converter drive plate.*

e) *Hold the converter using the bracket 3186-T fixed in the place of the pressure regulator.*

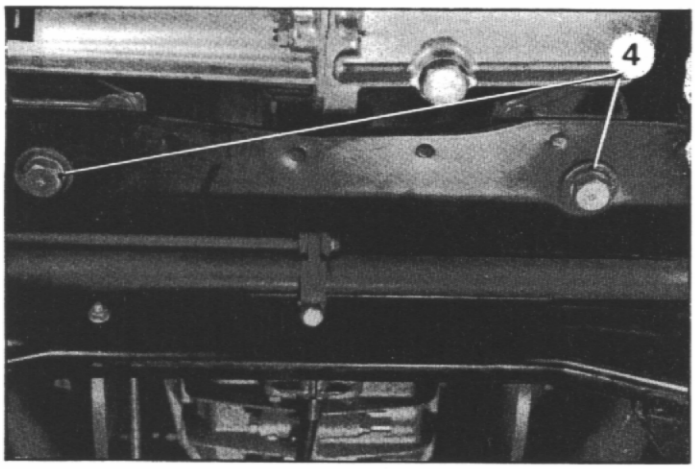
VERY IMPORTANT :

- It is essential to use the bracket 3186-T; otherwise the converter would not be held in position when the engine is removed.

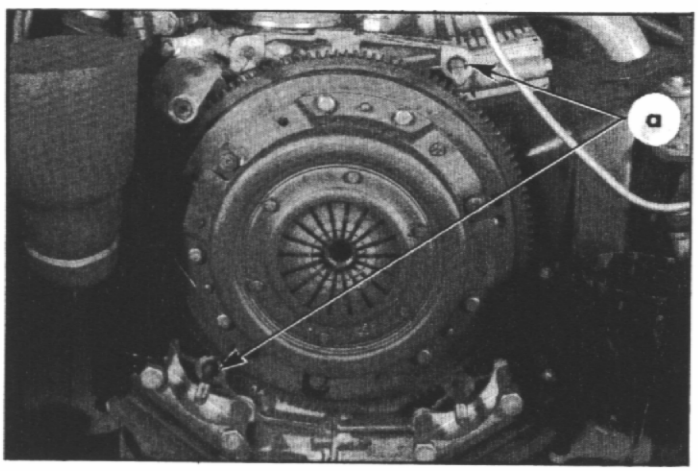
- *The electro-valve (10) must never be disconnected from the control distributor of the converter.*



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c) Clear the engine by bringing it forward.

CAUTION : Support the engine in such a way as to avoid any strain on the gearbox control shaft.
Ensure that the distributor does not foul the wheel arch.

FITTING

18. Make sure that the two centering dowels are in position in their housings on the engine casing at « a ».

Also make sure that the corresponding housings in the clutch casing are not damaged.

15. Disconnect the petrol feed :

Disconnect the petrol inlet pipe from the pump.

NOTE : Blank off the end of the pipe using a 7 mm diameter bolt.

16. Disconnect the exhaust pipes :

Remove the plates (1) from the lower heater ducts.
Remove the front connection collars (2) and (3) from the exhaust pipes.
Slacken the bolt of the central exhaust pipe support on the gearbox.

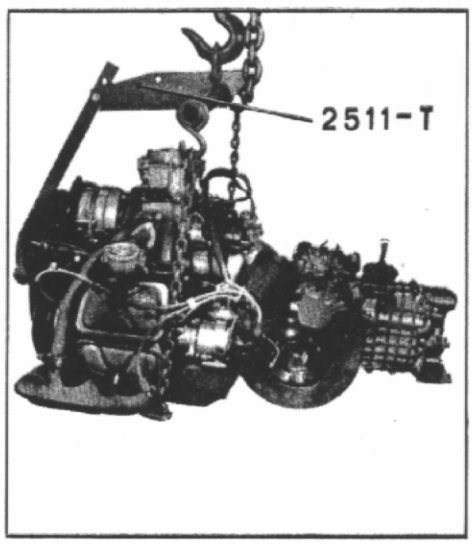
17. Remove the engine :

a) Bring up the lifting apparatus fitted with the sling bracket 2511-T (see photograph below). Remove the bolts holding the front flexible mountings (4).
Raise the engine-gearbox assembly until the clutch housing comes into contact with the upper crossmember of the axle unit. Chock the engine-gearbox assembly underneath the gearbox housing, taking care not to damage the clutch cable.

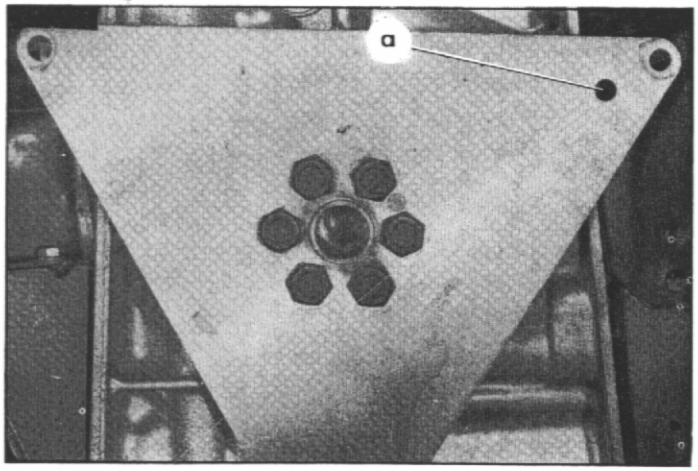
b) Using a key 1690-T, remove the four nuts from the studs holding the engine to the gearbox.

CAUTION : *Never disconnect the electro-valve from the control distributor of the converter.*

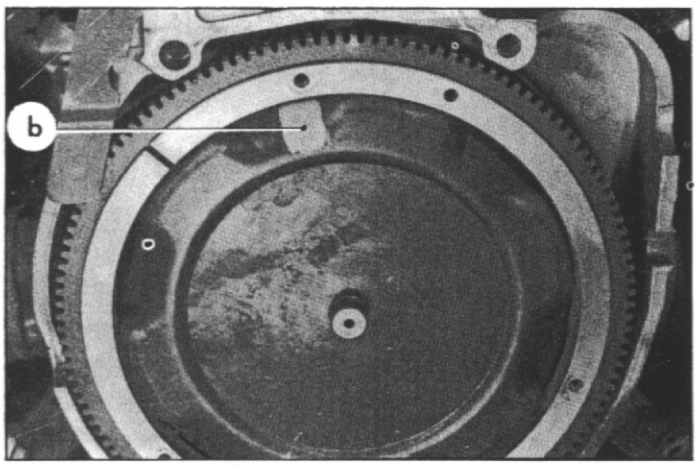
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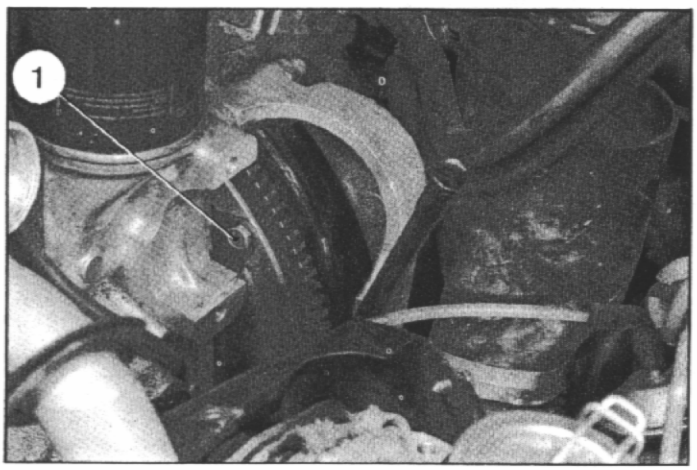


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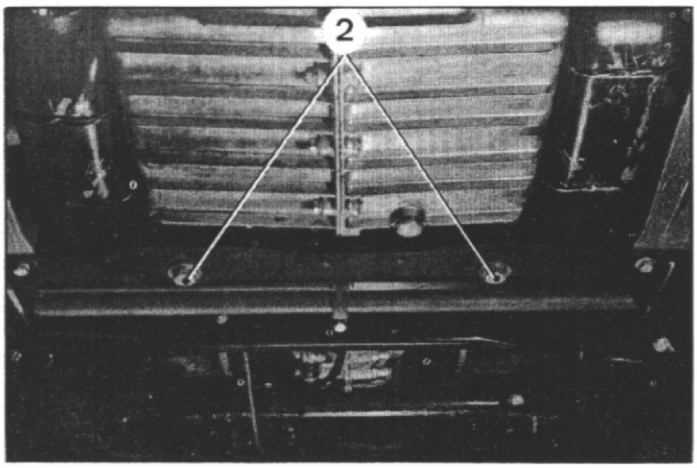


Manual 810-2

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19. Couple the engine to the gearbox :

a) *For vehicles fitted with a torque converter :*

- Before fitting, make sure that the hole « a » in the drive plate is opposite the painted mark « b » on the converter housing (ignition point mark).
- Smear the converter centering peg and its housing in the crankshaft with TOTAL MULTIS grease.
- Offer up the engine to the gearbox : engage the studs to bring the converter centering peg into its housing in the crankshaft.
- Tighten the nuts joining the engine to the gearbox (shakeproof washer) to 45 mΛN (4.5 m.kg) (key 1790-T).
- Tighten the three bolts (1) holding the drive plate to the converter to 20 to 23 mΛN (2 to 2.3 m.kg).
- Remove the bracket 3186-T.

b) *Vehicles fitted with a mechanical clutch :*

Engage a gear.

Offer up the engine to the gearbox, engage the studs to bring the center of the disk into contact with the drive shaft.

Turn the engine flywheel by hand to engage the splines.

Tighten the bolts holding the engine to the gearbox (shakeproof washer) to 45 mΛN (4.5 m.kg).

20. Install the engine-gearbox assembly :

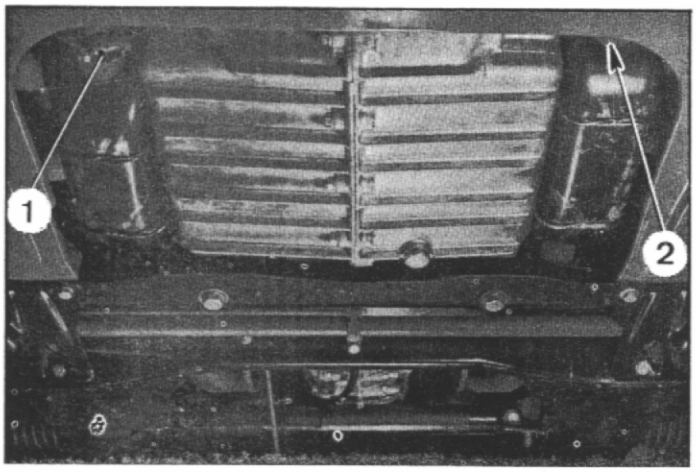
a) Slightly raise the engine-gearbox assembly and remove the chock from under the gearbox housing.

b) Lower the engine-gearbox assembly until the flexible mountings just touch the crossmember.

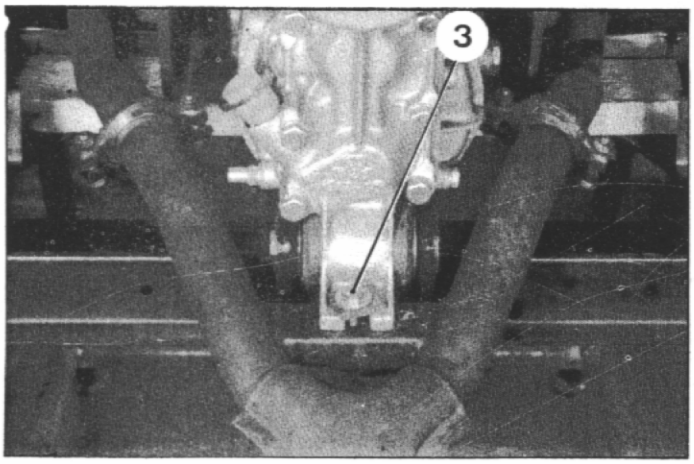
Fit the bolts (2) holding the flexible mountings and tighten to 40 to 45 mΛN (4 to 4.5 m.kg).

21. Fit the starter motor :

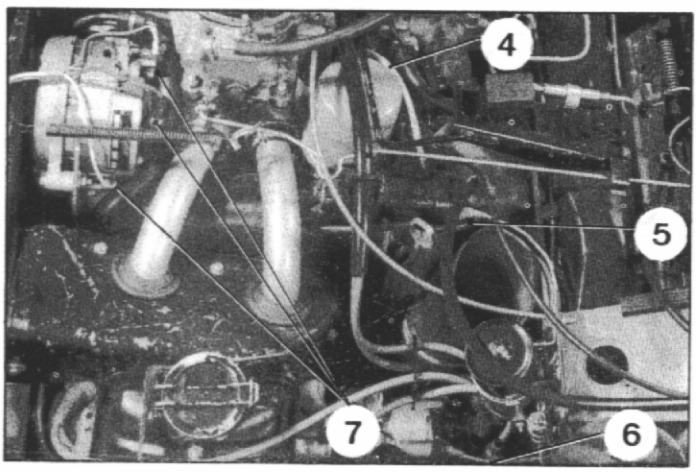
(For vehicles fitted with a torque converter).



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22. Connect up the exhaust pipes :

Fit and tighten the clamps (1) and (2) from 10 to 12 mAN (1 to 1.2 m.kg).

Tighten the bolt (3) of the central exhaust pipe support on the gearbox.

Fit the closing plates to the lower heater ducts.

Fit the sealing rings to the heater ducts.

23. Connect up the petrol feed :

Remove the blanking bolt and connect the petrol inlet to the pump.

24. Connect up the electrical harnesses :

a) Connect up the leads :
- to the oil pressure warning lamp (4),
- to the starter motor (5) (shakeproof washer),
- to the distributor (6),
- to the coil and distributor (high tension),
- to the oil thermal switch,
- to the alternator (7).

b) *Vehicles fitted with a torque converter :*

Connect the leads to the electro-valve on the control distributor of the converter.

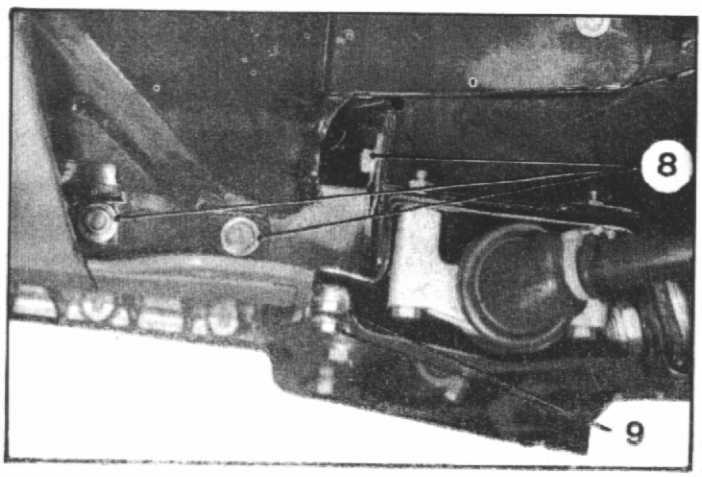
25. Fit the lower finishing panel :

Offer up the panel and bumpers..

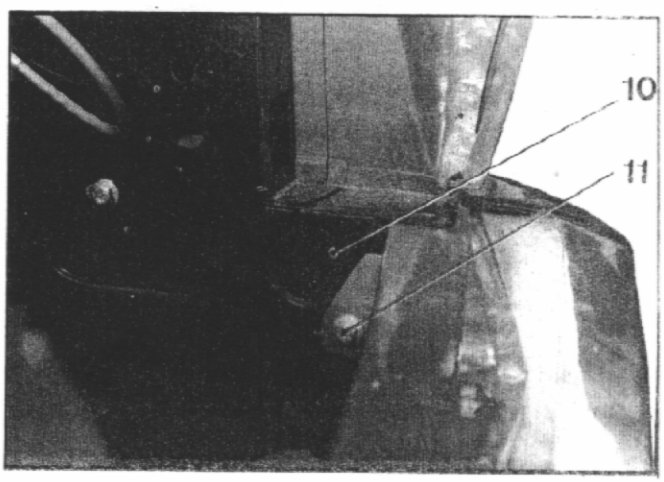
At each side; fit without tightening :
- the fixing bolts (8) and (9) on the unit (contact washer),
- the lateral parts of the bumpers,
- the bolts (10) and nuts (11) (flat and shake-proof washers).

Check that the clearance between the lateral parts of the bumpers and the wings is evenly distributed at each side.

Finally tighten all bolts.

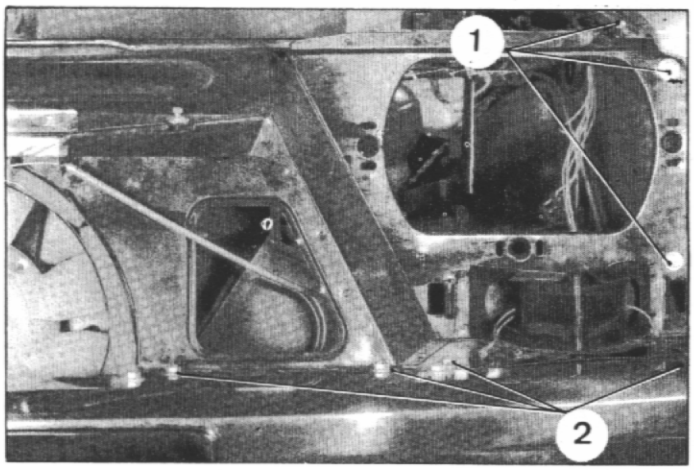


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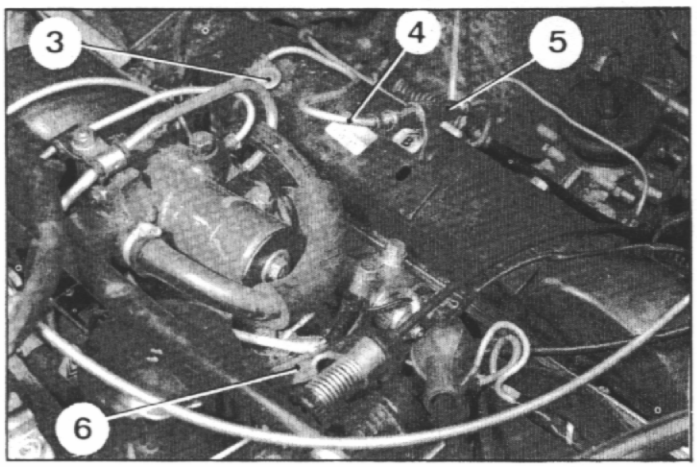


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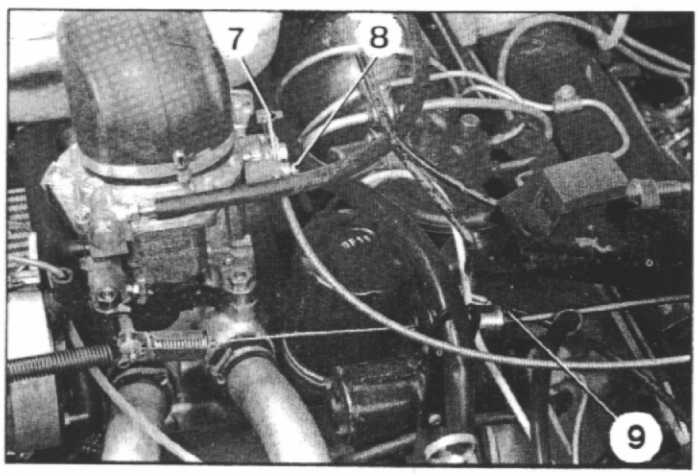
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26. Fit the fan panel :

Offer up the panel, slightly inclined to the rear.

On each side, fit without tightening :
- the upper (1) and lower (2) fixing bolts (contact washer).

Finally tighten all bolts.

27. Fit the horn with its bracket.

28. Fit the direction indicator lights and the head-lights :

Connect the leads to the indicator lights and install these.
Fit the bonnet locking cable.
Fit the headlights. Fit the locks and turn these to lock them.
Fit the connectors to the headlight bulbs.
Connect up the horn.
Fit the front electrical harness in the clips.

29. Fit the grille :

Engage the lower lugs into the slots.
Insert the upper brackets under the washers.
Tighten the bolts (contact washer).

30. Fit the pressure regulator :

(For vehicles fitted with a torque converter) :

- Fit the pressure regulator.
- Fix the pipe (4) to the union (5) (new seal).
- Tighten the bolts to 18 mΛN (1.8 m.kg).
- Fix the securing clip (3) of the main supply pipe.

31. Connect up the carburettor controls :

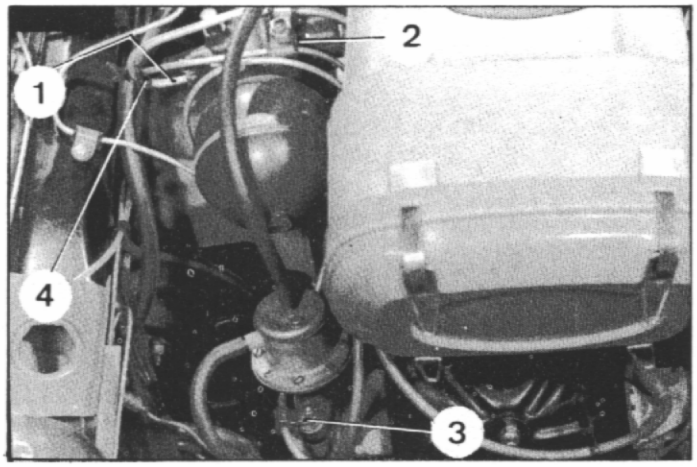
a) Fix the sheath support bracket (6).

b) Connect up the throttle cable.

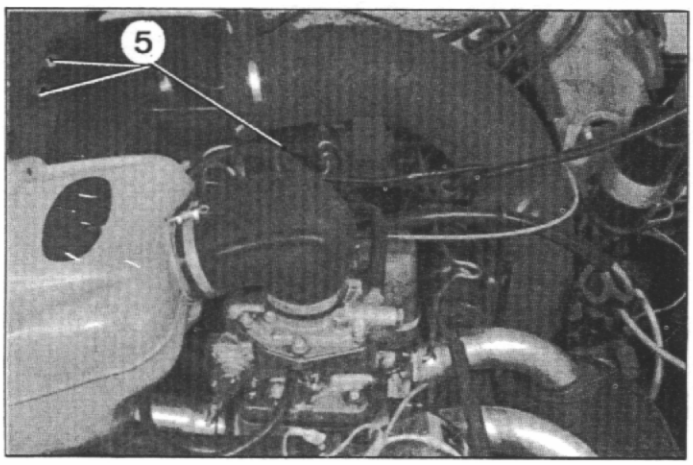
c) Insert the sheath of the choke control cable into its support.
- Lightly tighten the bolt (8).
- Before tightening the cable stop screw (7), leave a clearance of 3 to 5 mm at the knob so that the choke is properly closed.

d) If necessary, adjust the throttle cable tension using the screw (8).

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32. Fit the spare wheel support.
Fit the clip which holds the supply tube to the four-way union.

33. **Check the engine oil level.**

34. **Connect up the hydraulic circuits :**

Connect the feed pipe (1) to the pressure regulator (new seal). Fit the clips (2) and (3) and tighten the nuts (contact washer).
Connect the high pressure pump flexible inlet pipe to the tube of the hydraulic fluid reservoir.
Fit the rubber collar (4).

35. **Prime the high pressure pump :**

Connect the chassis cable to the battery.
Check that the pressure regulator bleed screw is loosened.
Take out the tube and fill it with hydraulic fluid.
Start the engine and quickly replace the tube in the reservoir. Fix it to the righthand wheel arch securing clip.
Tighten the bleed screw and check all unions for leaks.

36. Fit the heater distribution box.
Tighten the bolts (5).
Fit the lefthand heater hose.
Connect up the control cable to the lever.

37. Position the flexible hose which supplies air to the converter oil cooler.

38. Fit and tighten the nut holding the stay to the bonnet. Fit the spare wheel.

39. Lower the vehicle to the ground.

40. Start the engine. Allow it to warm up.
Check (and adjust if necessary):

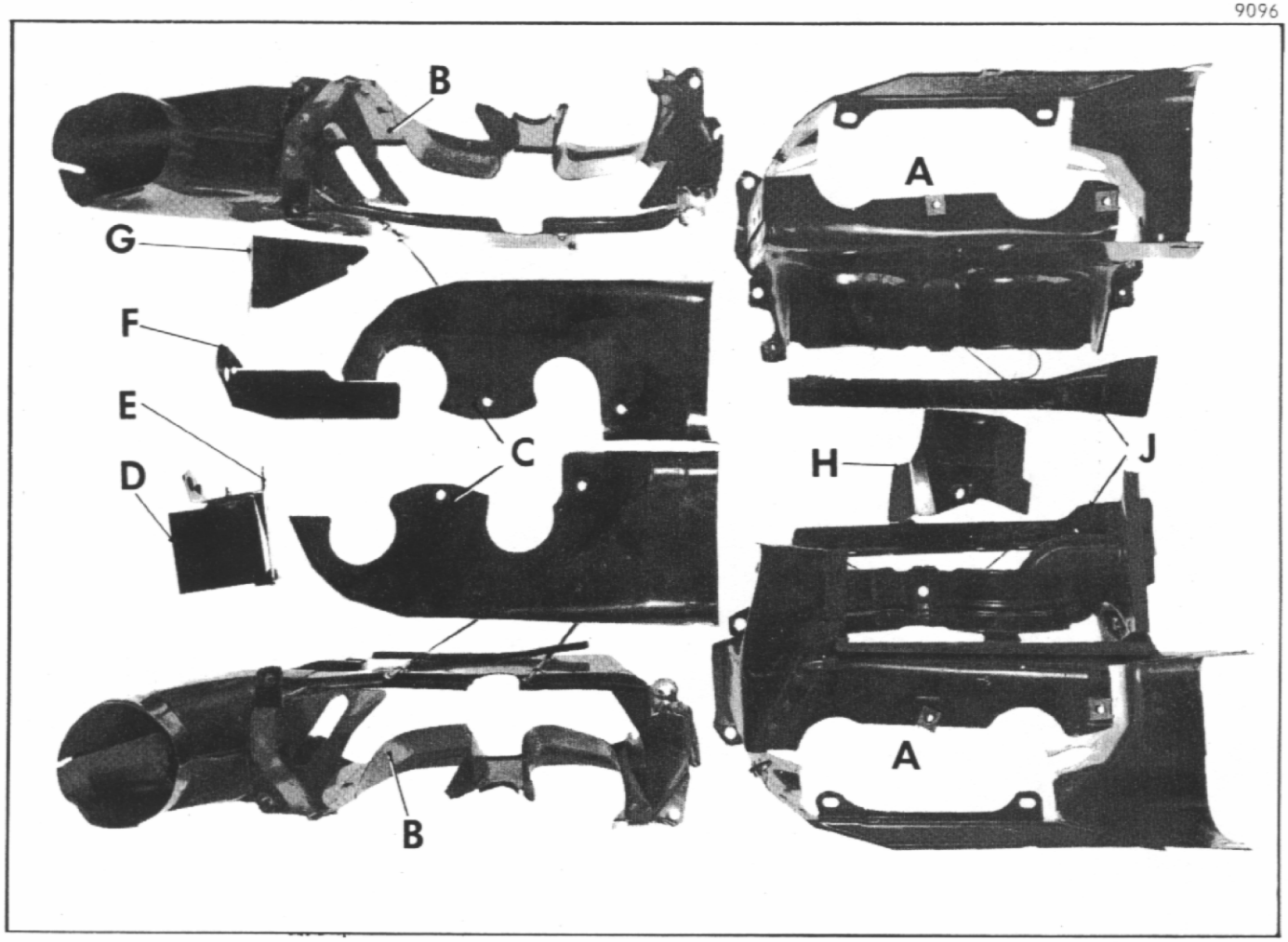
- the ignition point,
- the engine idling speed,
- the tightness of the exhaust pipe connections and hydraulic circuit,
- the headlights.

STRIPPING DOWN AND ASSEMBLING AN ENGINE

(For exchange or repairs)

Nomenclature of cooling ducts
Engine G.10 (1015 cc)

9096



A - Cooling ducts

B - Heating ducts

C - Duct covers

D - Deflector

E - Right-hand mounting plate

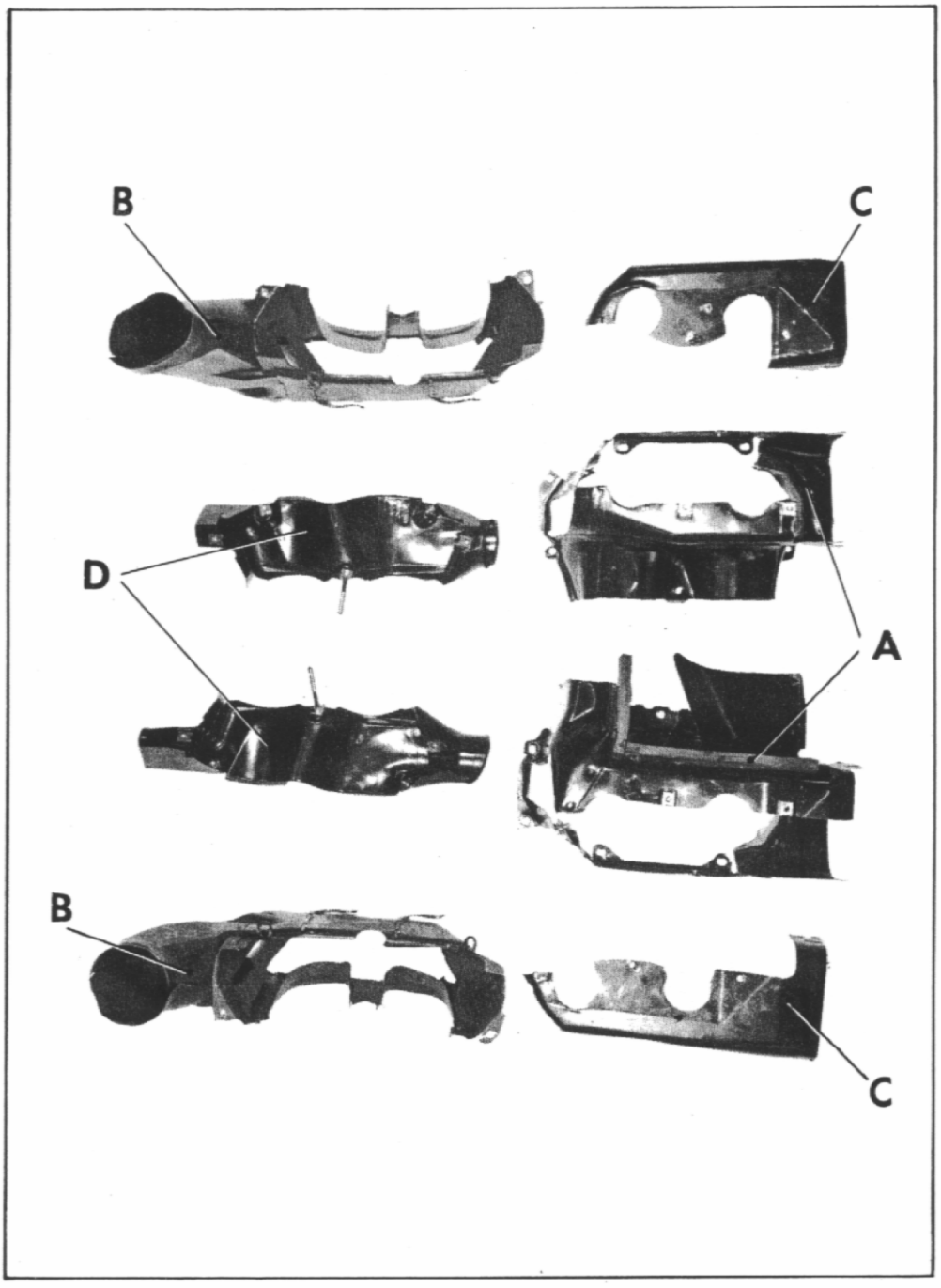
F - Left-hand mounting plate

G - Screen

H - Deflector, fitted towards fan cowl

J - Ducts under cylinders

Nomenclature of cooling ducts
Engine G.103 (1220 cc)



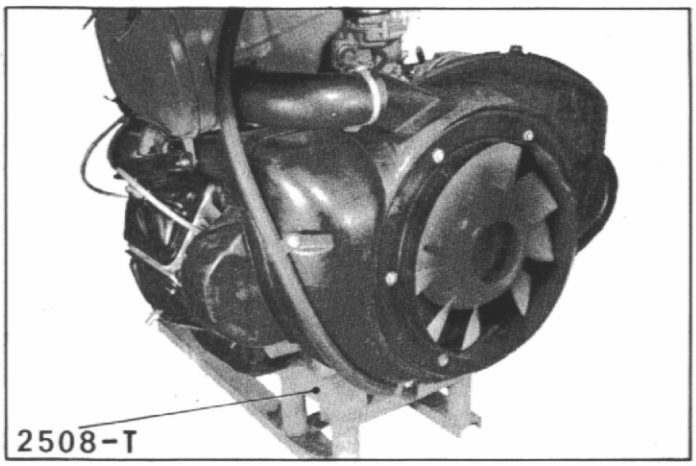
A - Cooling ducts

B - Heating ducts

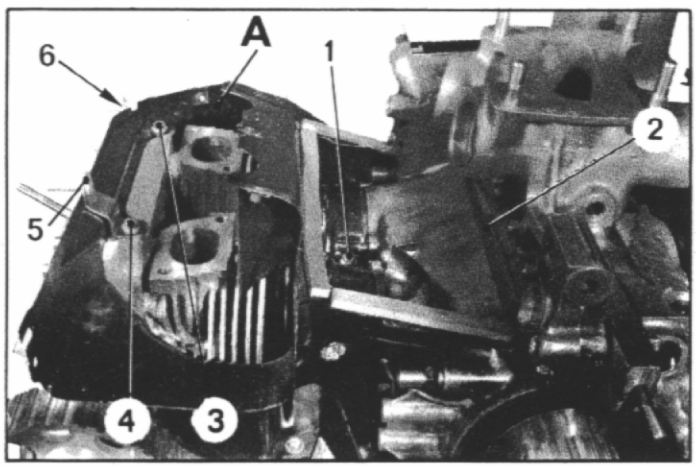
C - Duct covers

D - Ducts under cylinders

7915



Manual 810-2



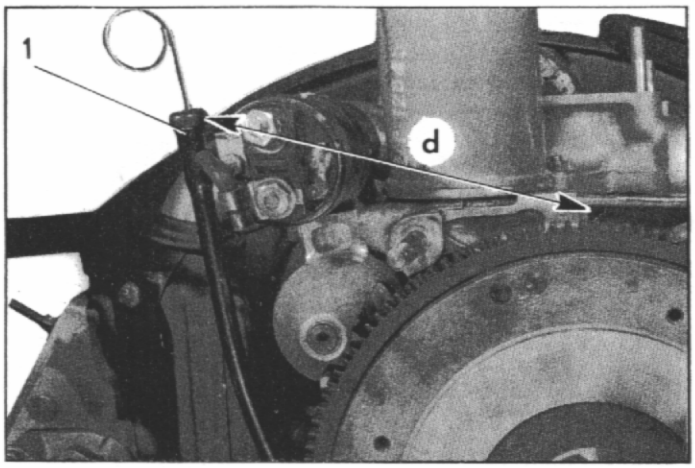
STRIPPING

1. Remove :
   - the clutch mechanism,
   - the flexible mountings.
2. Place the engine on stand 2508-T.
   Drain the oil.
3. **Remove :**
   - the high pressure pump pipes,
   - the air filter,
   - the carburettor and its spacer or the carburettor inlet chamber and pipe assembly,
   - the upper duct covers,
   - the induction pipes *(vehicles introduced up to August 30, 1972)*,
   - the oil cooler,
   - the air intake rubber seal for the cooler,
   - the starter,
   - the starting handle dog,
   - the fan,
   - the drive belt of the alternator,
   - the fan cowl and its spacers,
   - the distributor, its protective spacer and the sparking plug leads,
   - the sparking plugs,
   - the petrol pump and its spacer,
   - the fixing studs of the petrol pump,
   - the alternator and its tensioning rod,
   - the oil pressure switch,
   - the oil temperature thermal switch,
   - the high pressure pump,
   - the exhaust pipes,
   - the pipe fixing bolts,
   - the engine flywheel,
   - the heating pipes,
   - the front and rear deflectors (right and left hand side),
   - the ducts under the cylinders,
   - the cooling ducts,
   - the dipstick tube,
   - the breather pipe,
   - the assembly bolts for the engine-gearbox,

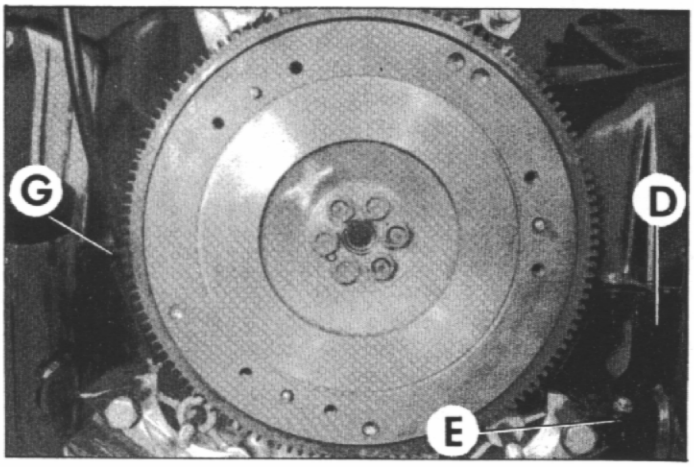
   NOTE : *Engine G.103 (1220 cc)*
   The under cylinder pipes D are removed for repairs only : they must be refitted prior to the fitting of the cylinder heads.
4. Clean the parts.

ASSEMBLY

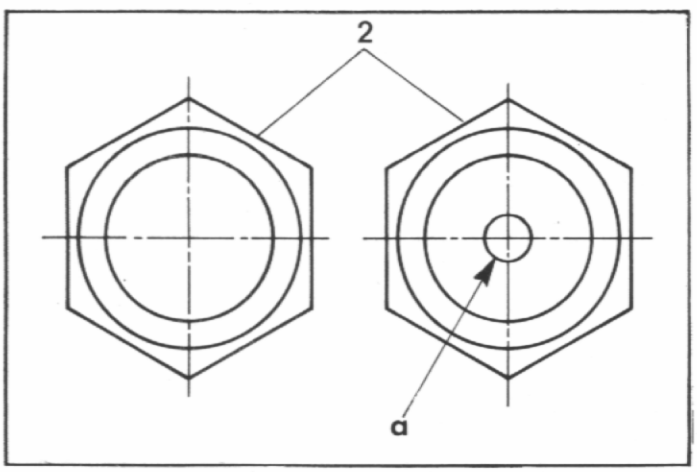
5. Fit the assembly fixing studs of the engine-gearbox.
   Tighten the studs to 10 to 15 mΛN (1 to 1.5 m.kg).
6. **Fit the cooling ducts A :**
   a) *Left-hand side :*
      Fix the duct on the engine casing.
   b) *Right-hand side :*
      Fit the brake unit (1) *(Engine G.10 (1015 cc)*
      Fix the duct on the right-hand cylinder head.
      Fit the bolt (3) (contact washer) in interposing (under the duct plate) the rear support (6) of the air filter.
      Fit the bolt (4) (contact washer) in interposing (under the duct plate) the front support (5) of the air filter *(Engine G.10, 1015 cc only)*.
      Tighten the bolts.
      Stick the seal (2) to the engine casing (BOSTIK 1410 or MINNESOTA).



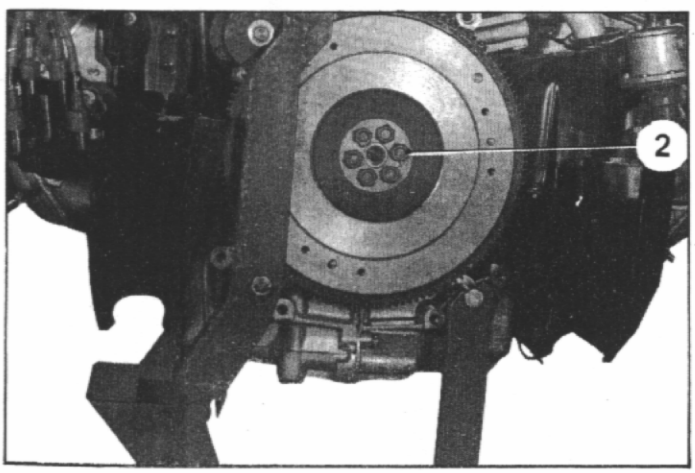
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G. 12-1



8649

7. Fit the breather tube :

Check the joint face on the engine casing.
Stick the seal to the breather tube (BOSTIK 1410 or MINNESOTA adhesive).
Fit the deflector onto the breather, the rounded side inwards.
Fit a new seal on the bolt.
Fit :
- the bolt in the breather,
- the spring on the bolt.

Fit the breather on the engine casing.
Tighten the screw to 5 to 7 mΛN (0.5 to 0.7 m.kg)
The breather pipe must not touch the cooling duct.

8. Fit the dipstick guide :

In fitting, position the concave portion of the guide towards the gearbox in such a way as to obtain d = 220 mm (distance between the engine casings seals and the end of the guide (1)).

9. Fit the heating ducts :

Fit the front right-hand deflector H.
Fit the rear left-hand screen G.
Fit the assembly of rear right-hand mounting plate E and deflector D.
Couple up heating ducts B (Contact washer under all screw heads).

10. Fit the flywheel (conventional clutch) or the diaphragm (torque converter) :

IMPORTANT : Fit new securing bolts (2) after each dismantling. The bolt heads must bear the mark « a » as shown in the figure opposite.

Tighten them (face and threads oiled) to 64 to 69 mΛN (6.4 to 6.9 m.kg). Use a torque wrench and tool 3064-T.E to immobilize the flywheel.

The diaphragm fixing bolts must be fitted with LOCTITE GX. 01 460 01 A.

11. Fit the petrol pump :

Tighten the studs on the bearing (the longest one outwards).

Fit the spacer.

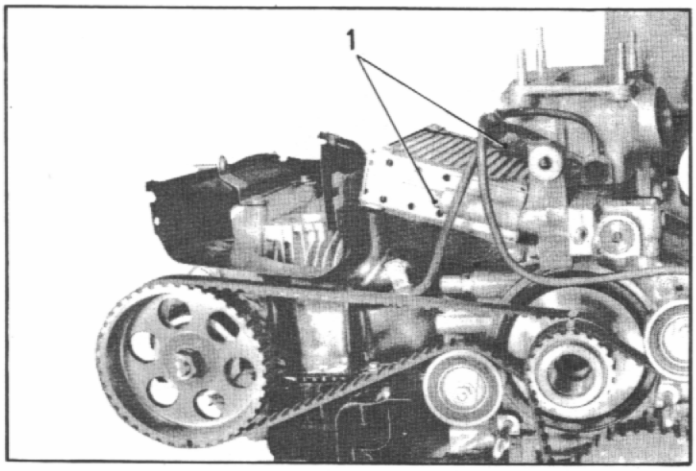
Fit the petrol pump.

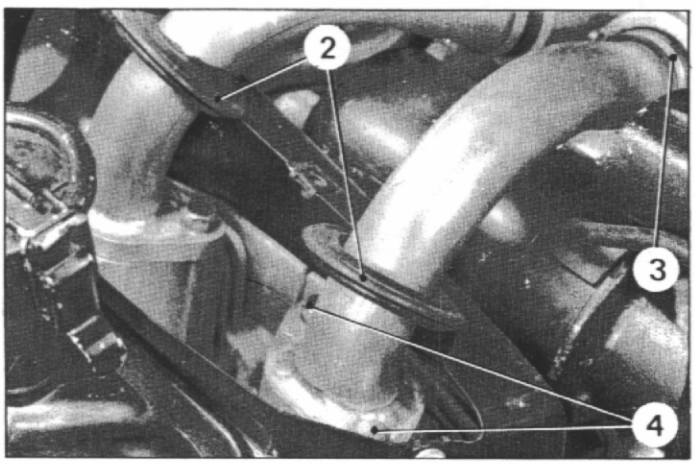
Tighten the nuts to 21 mΛN (2.1 m.kg) (contact washer).

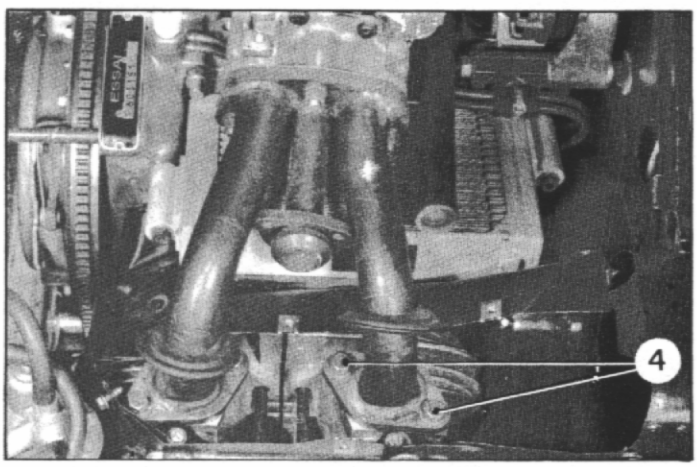
12. Fit the distributor :

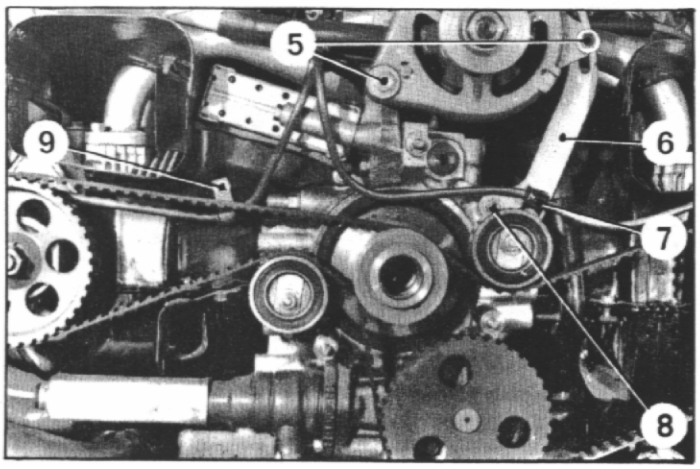
Fit the distributor protective spacer.

Fit the distributor. Lightly tighten the nuts (contact washer) (adjustment to be performed with the engine fitted on the vehicle).









13. **Fit the exhaust pipes :**
Fit the studs.
Fit new gaskets.
Fit the pipes.
Tighten the nuts to 15 mAN (1.5 m.kg).

14. **Fit the oil pressure switch :**
Fit a new seal on the pressure switch, tighten it to 22 mAN (2.2 m.kg).

15. **Fit the oil temperature thermal switch :**
Fit a new seal on the union, tighten it to 50 to 55 mAN (5 to 5.5 m.kg).
Fit a new seal on the thermal switch, tighten it to 25 mAN (2.5 m.kg).

16. **Fit the oil cooler :**
Fit new seals on each tube of the cooler.
Fit the cooler.
Tighten the bolts (1) to 18.5 mAN (1.8 m.kg).

17. **Fit the starter :**
Fit the starter on its mounting.
Tighten the fixing bolts to 18.5 mAN (1.8 m.kg) (contact washer).
The longest bolt fits in the upper bore.

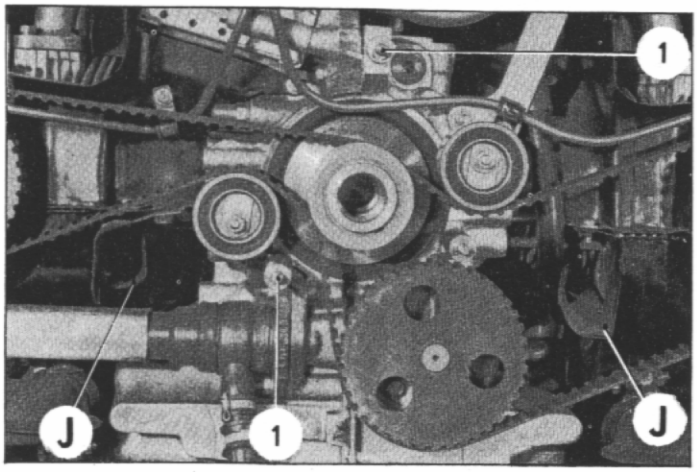
18. **Fit the inlet pipes or the carburettor inlet chamber and pipe assembly :**
a) Fit the rubber closing rings (2) on the pipes (if necessary).
b) Check the condition of the rubber seals and their positions (1 to 2 mm inside the end of the pipe). Smear with tallow. Tighten the collars (3).
c) Engage the pipes in the inlet chamber (if necessary).
Fit the new gaskets, cylinder head side.
CAUTION : Check that the gas passage hole of the seal corresponds with that of the cylinder head.
d) Tighten the bolts (4) to 18.5 mAN (1.8 m.kg) (thick washer).

19. **Fit the high pressure pump.**

20. Fit the alternator tensioner (6).

21. **Fit the alternator :**
Do not tighten the bolts (5) (flat washer under the head of the bolt and nut).

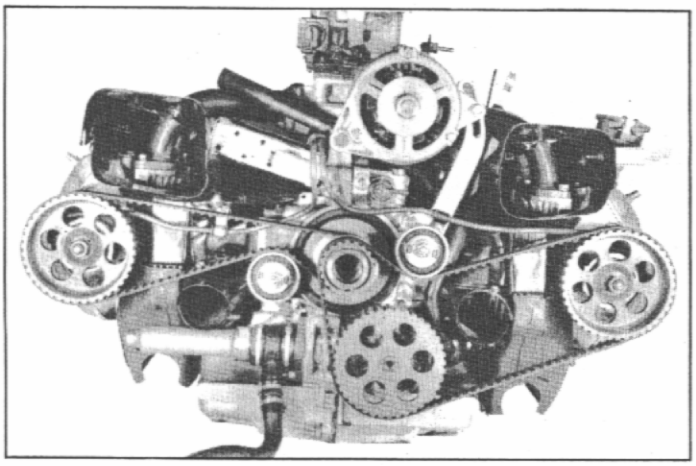
22. **Fix the cylinder head lubrication tubes :**
Fit the supports (7) and (9).
Interpose a rubber ring between the tube and the support.
Tighten the two fixing bolts (8) of the tensioner (6) and the fixing bolt of the support (9).



23. Fit the ducts beneath the cylinders :
Engine G 10 (1015 cm3).

Engage the ducts J on the oil return tubes of the cylinder heads.

REMARK : The upper part of the duct must be engaged between the third and fourth cooling fin of the cylinder, cylinder head side.



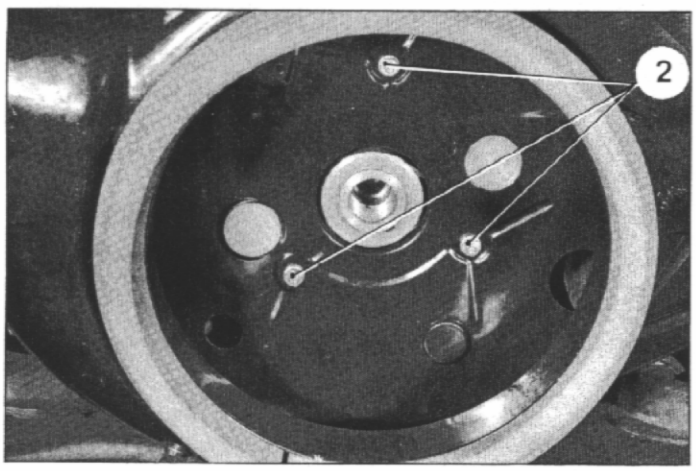
24. Fit the fan cowl :

Insert on each stud (1) a flat washer on each side of the spacer.

Engage the fan cowl on the studs.

Fit the flat washers.

Tighten the nuts (2).

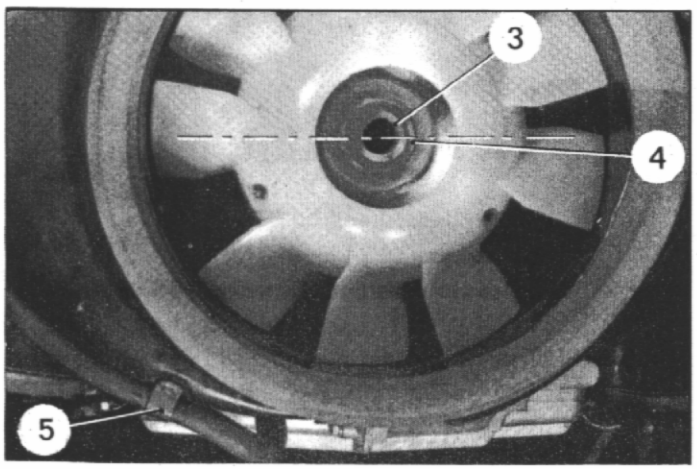


25. Fit the fan :

Fit the belt on the alternator pulley.

Engage the belt on the fan pulley.

Fit the fan on the crankshaft end.
Make sure that the thrust washer is in place.
Fit the starter dog (3) equipped with a lock nut (4) *(face and threads oiled)*.
Position it so that it is horizontal when the engine is at ignition point.
Tighten the nut (4) to 170 to 200 mN (17 to 20 m.kg) (torque wrench and extension MR. 630-17/1).
REMARK : The starter dog should have 4 to 5 mm of thread visible after the tightening of the nut.



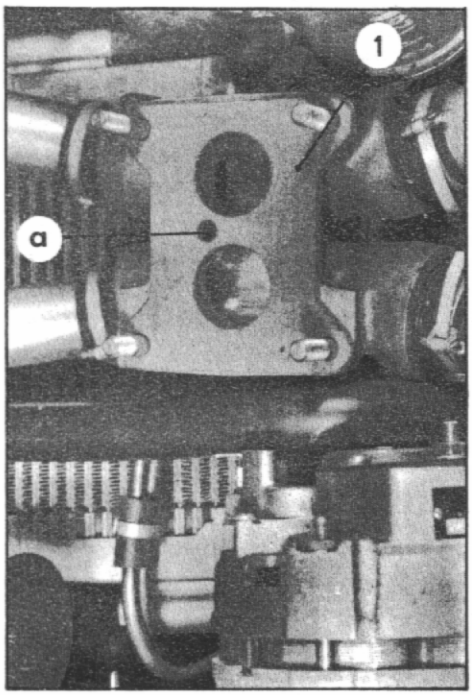
26. Fit the flexible feed pipe of the high pressure pump :

With the aid of clips (5) fit the flexible feed pipe on the fan cowl (contact washer).

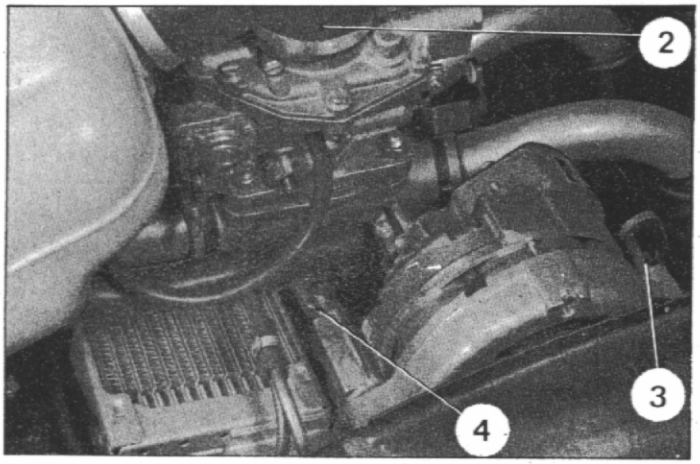
27. Fit the covers of the upper ducts :

Left-hand side : place the support of spark plug lead on the central fixing bolt.

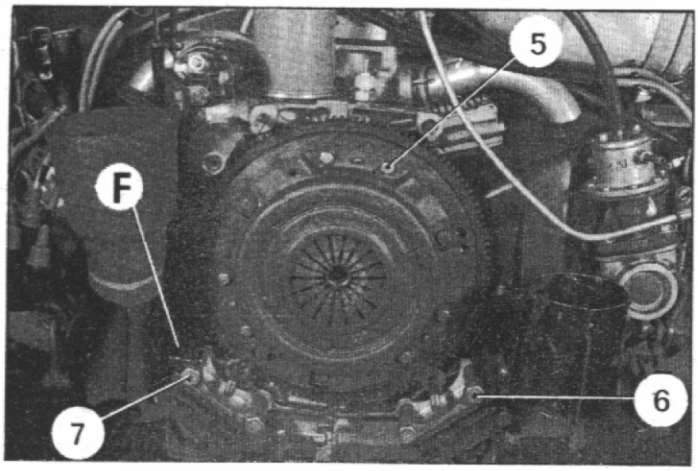
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28. Fit the carburettor : *(Vehicles produced up to August 30, 1972)*
Smear the two faces of the spacer (1) with LOWAC sealing compound.
Fit the spacer on the box, the hole « a » positioned on the right side.
Fit the carburettor.
Tighten the nuts.

29. Fit the intake silencer :
Fit a flat washer on each support.
Engage the feet of the silencer on the supports.
Fit the spacers.
On the front support, fit a flat washer and a support for a spark plug lead.
Tighten the nuts (contact washer).
Connect up the pipe (2) to the carburettor.
Tighten the collar.
Connect up the flexible pipe of the breather to the silencer.

30. Stretch the alternator belt.
Tighten the bolts (3) and (4).

31. Fit the spark plugs.
Connect the spark plug leads.

32. Remove the engine from its support 2508-T.

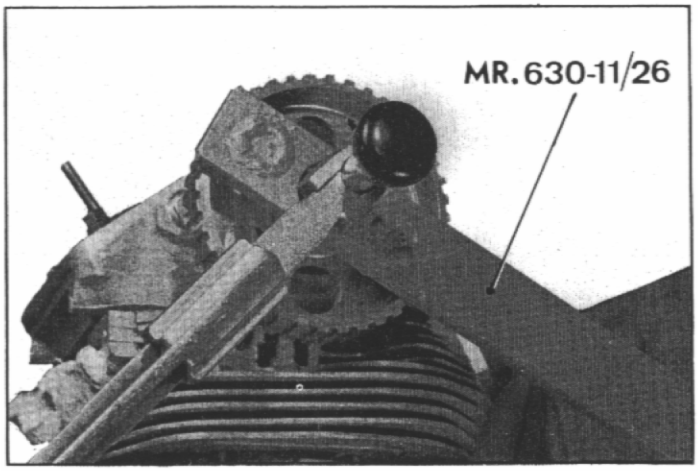
33. Fit the clutch :
Fit the clutch disc and mechanism.
Centre the disc with the aid of mandrel MR. 630-31/85.
Tighten the bolts (5) to 18.5 mAN (1.8 m.kg) (Shakeproof washer).

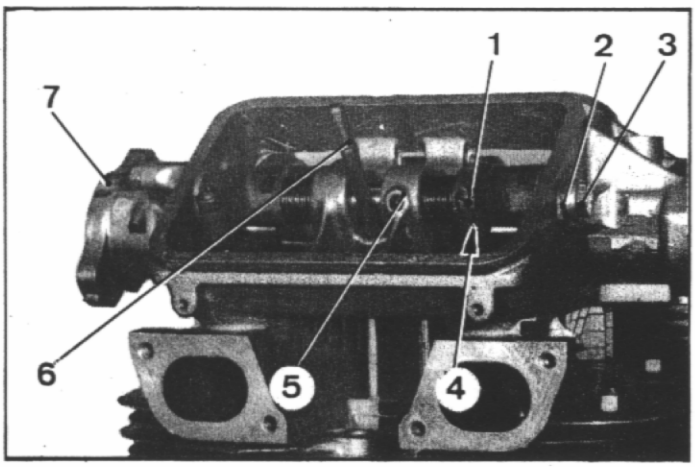
34. Fit the rubber mountings :
Fit the mountings. Fit the fixing bolts by placing :
- a flat washer under the head of bolt (6),
- a flat washer and the mounting plate F under the head of bolt (7).

Tighten the bolts to 50 to 60 mAN (5 to 6 m.kg).

35. Top up the engine oil.

OVERHAULING A CYLINDER HEAD.





DISMANTLING.

1. Place the cylinder head in a vice :
Use support MR. 630-34/31.

2. Remove the camshaft wheel :
Use tool MR. 630-11/26 to hold the wheel.

3. Remove the rocker shafts :

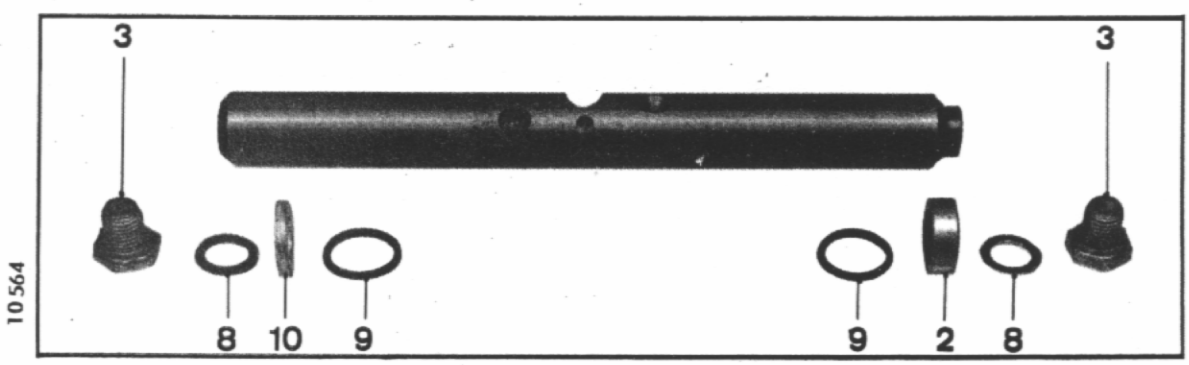
a) Slacken the adjustment screw (1) on the rockers under stress.

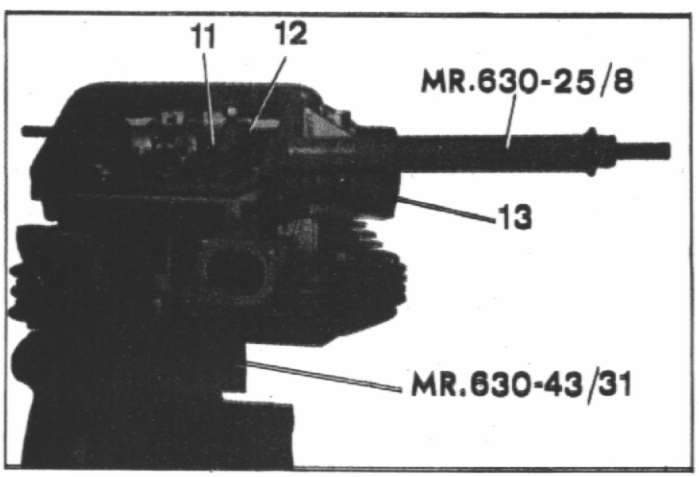
b) From each of the shaft extremities, remove :
- the blanking bolt (3) and its copper seal (8),
- the spacer (2) or (10),
- the O-ring seal (9).

c) Remove :
- the studs (6),
- the set screw (5) (3 mm Allen key).

d) Extract the shafts with the aid of tool MR. 630-25/8.
Take out :
- the rocker arms (12),
- the springs (11).

NOTE : *On vehicles produced up to 15 February, 1971 :*
Do not lose the cups (4) placed between the rocker arms, adjuster screws and the valve stems.



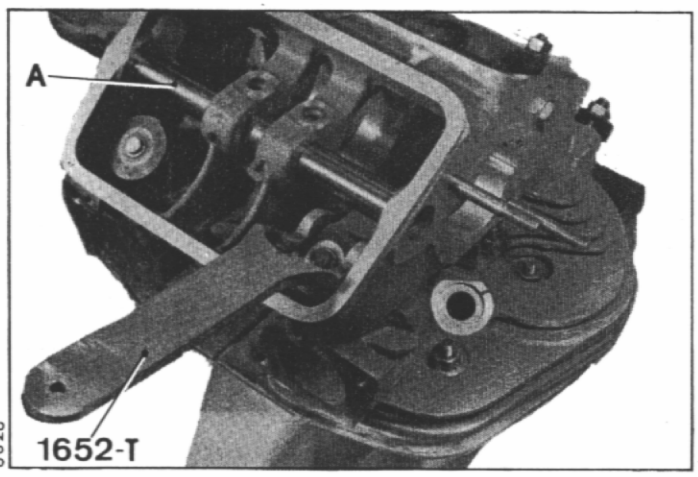


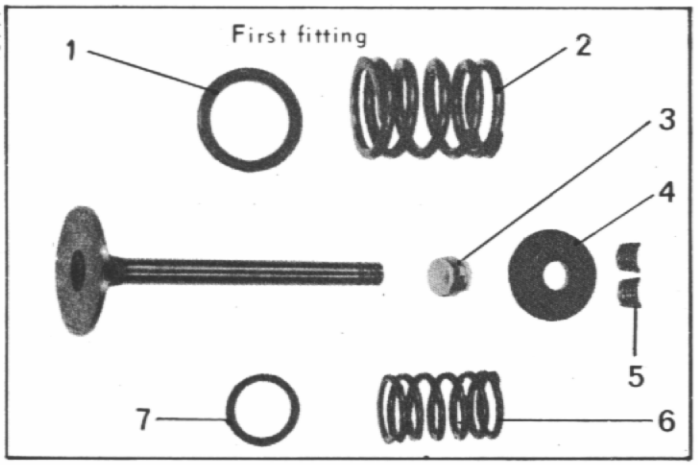
4. Remove the camshaft :

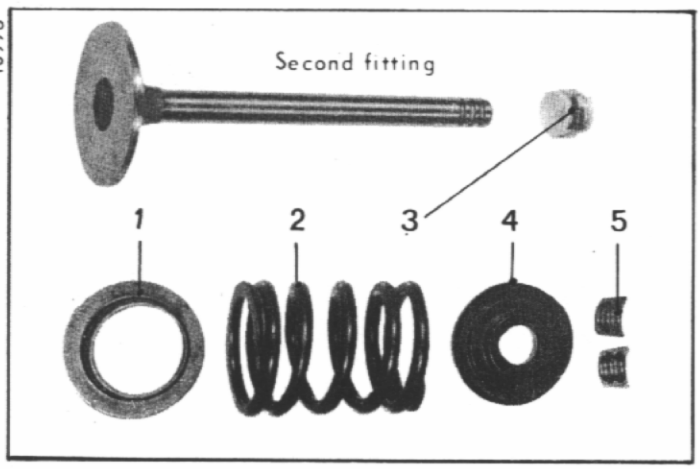
a) Remove the fixing nuts of the rear bearing (7).

b) Loosen the bearing (7) by tapping lightly with a mallet on the extremity of the camshaft and remove the assembly.
NOTE : The camshaft and the rear bearing form an assembly which cannot be dismantled.

c) Remove the front seal (13).







Guide	Diameter (mm)
Intake	8 $^{+ 0.030}_{+ 0.005}$
Exhaust	8.5 $^{+ 0.015}_{- 0.010}$

5. Remove the valves :

a) Fit successively a rod A (diameter 16 mm, length 270 mm) in place of each rocker arm shaft.
Compress the valve springs with the aid of tool 1652-T.

b) Remove :
- the split cotters (5),
- the cups (4),
- the springs (6) and (2),
- the thrust washers (1) and (7),
- the seals (3).

c) Remove the cylinder head from support MR. 630-43/31.
Remove :
- the valves,
- the rod A.

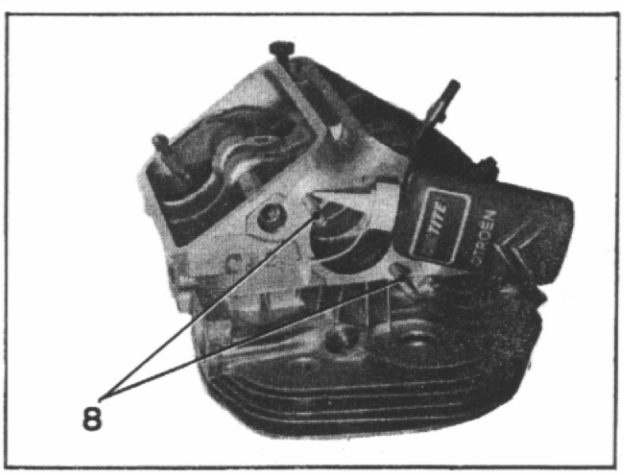
6. Clean the parts.

IMPORTANT : To assure tightness of the front bearing, each camshaft includes a micro-turbine machined on the bearing surface of the seal. Never destroy this micro-turbine. This could cause an oil leak.

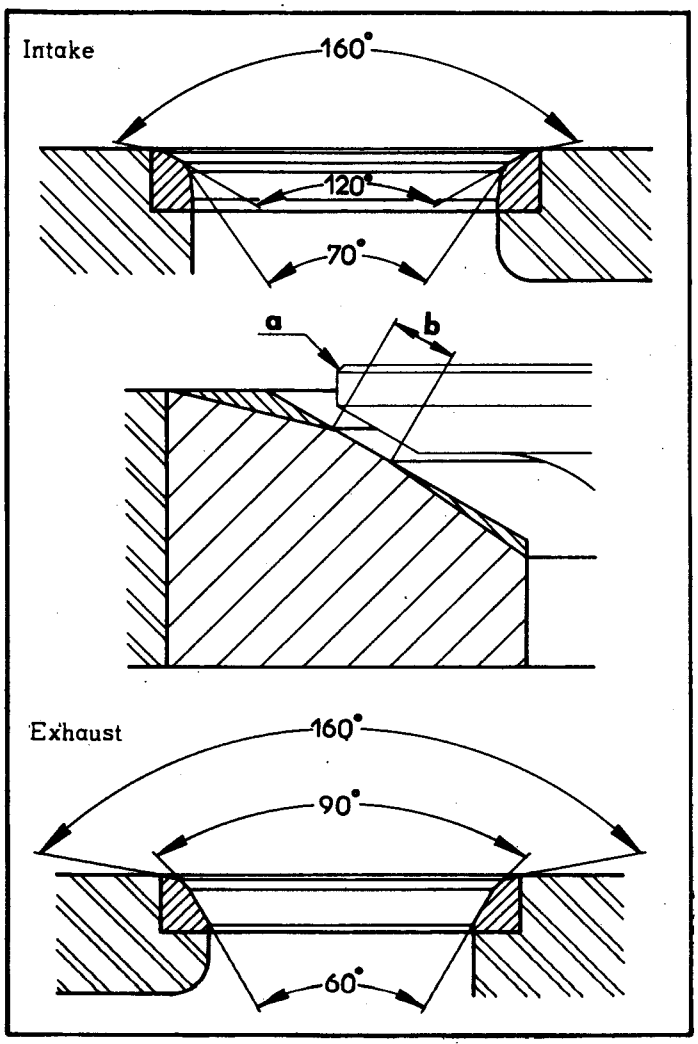
PREPARATION.

7. Case of cylinder head replacement :

IMPORTANT : The two fixing studs (8) of the rear bearing of the camshaft must be fitted with LOCTITE N° GX. 01 459 01 A.
Tighten them to 3 to 5 mAN (0.3 to 0.5 m.kg).



G. 11-1



Manual 810-2

DESIGNATION	VALVES	
	Intake	Exhaust
Angles (degrees)	120	90
Head dia (mm)	39	34
Stem dia (below head) (mm)	8 $^{-0.005}_{-0.020}$	8.5 $^{-0.021}_{-0.036}$
Length (mm)	97.5	93.3

8. Grind the valves :

Use a valve grinder :

a) Chamfer of valve heads :
Intake = 120°
Exhaust = 90°

b) Make a slight chamfer in « a » on the valve heads to smooth the edge.

9. Grind the valve seats :

Use the following emery wheels :

a) Intake valve seats :
- for the seat : 120° wheel,
- for the upper lead-in : 160° wheel,
- for the lower lead-in : 70° wheel.

b) Exhaust valve seats :
- for the seat : 120° wheel,
- for the upper lead-in : 160° wheel,
- for the lower lead-in : 160° wheel.

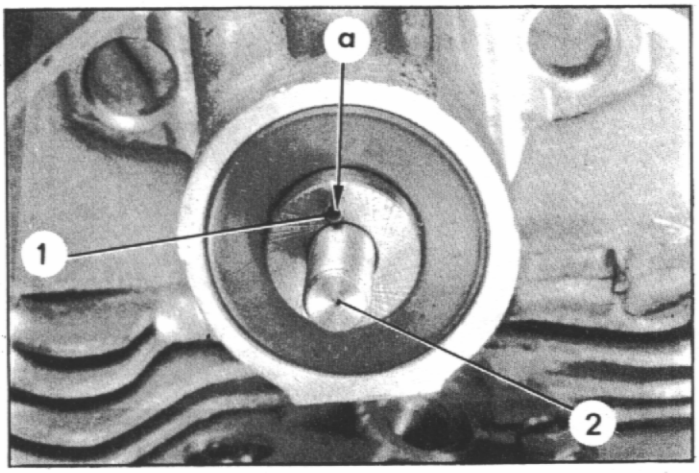
10. Grind the valves :

Use tool 1615-T.

Conditions :
- On the valve : the large diameter of the sealing surface must be equal to the large diameter of the head.
- On the seat : width « b » of the valve collar must be a maximum of :

Intake = 1.3 mm
Exhaust = 1.8 mm

7080

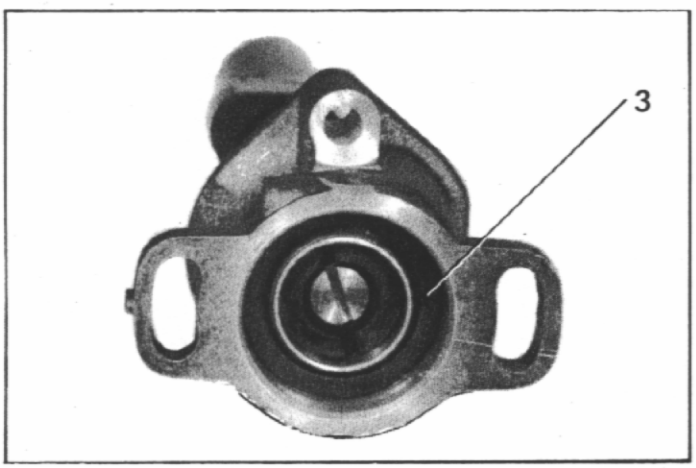


11. Carefully clean the cylinder head to eliminate any trace of emery in the gas passages.
Blow them and the lubrication piping out with compressed air.
If these are plugged up, soak the cylinder head in a bath of cellulose thinner for about an hour.
Repeat blowing operation.

12. **Check the calibration of the valve springs.**

Springs	Length under load (mm)	Load (kg)	Length under load (mm)	Load (kg)	Sense of winding
ENGINES G. 10 **2 springs**					
Outer	32	23.5 ± 2	24.5	50 ± 3	Left-hand
Inner	26.8	9.9 ± 0.9	19.3	21.1 ± 1	Right-hand
ENGINES G. 10 - G 103 **1 spring**	32	25.4 ± 2.5	24	59.6 ± 2	Left-hand

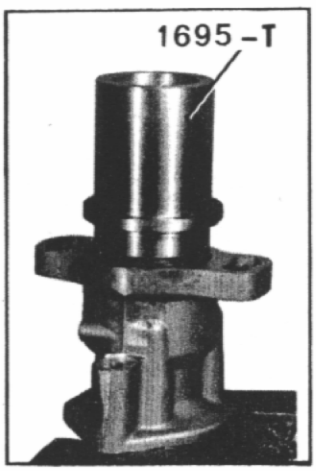
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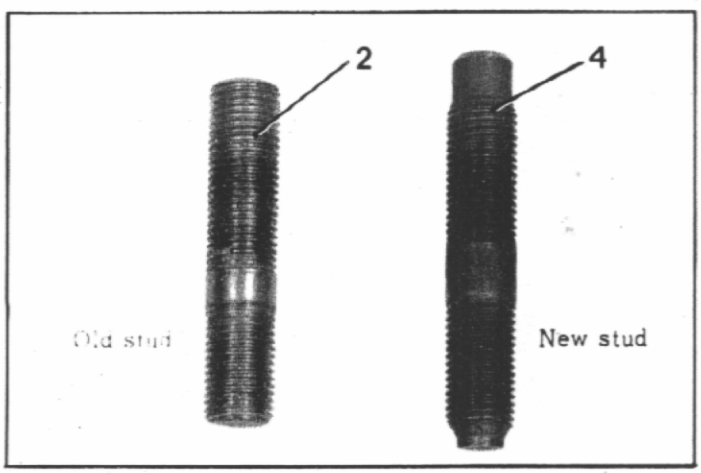
13. **Prepare the camshaft (case of the left-hand cylinder head) :**
a) *Rear bearing :* remove seal (3). Fit the new seal with the aid of tool 1695-T.
b) *Front end :* If necessary, replace the Mecanindus split pin (1) (Drive pulley). Fit it in positioning the slot « a » towards the outside of the camshaft.

14. **Case of replacing camshaft stud (2) :**
IMPORTANT : The fixing stud of the wheel must be fitted with LOCTITE GX. 01 459 01 A. Tighten it to 25 to 30 mAN (2.5 to 3 m.kg).
Vehicles produced since May 10 1971 : the camshaft and fixing stud (2) have been modified. It is not possible to fit a new stud (4) in an old model camshaft.

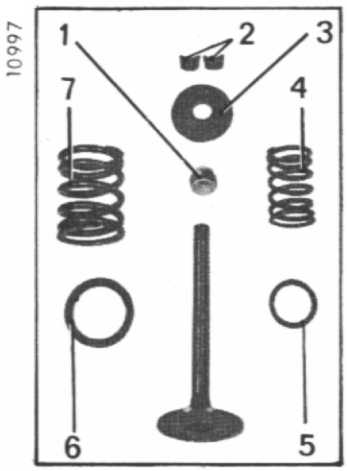
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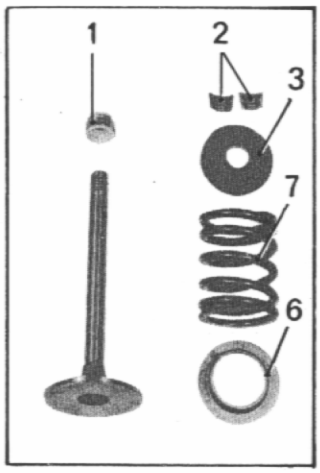


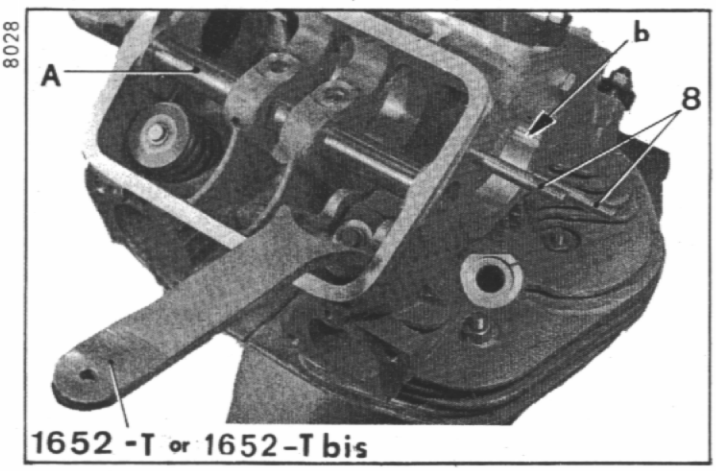
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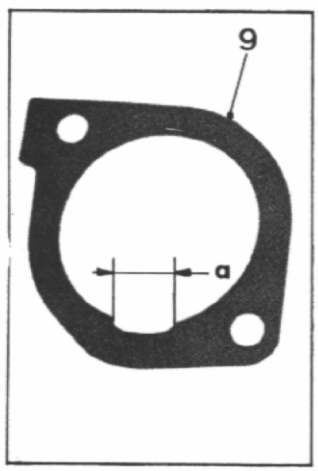


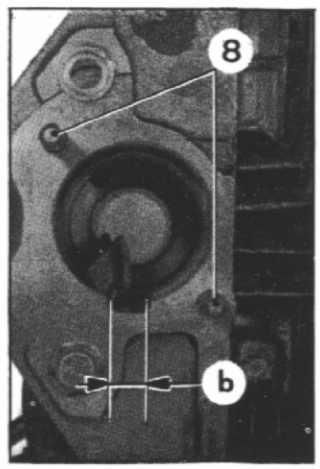
FORMER FITTING NEW FITTING

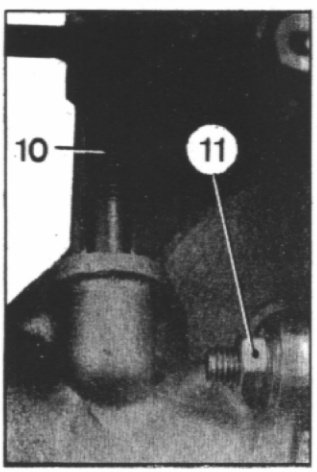


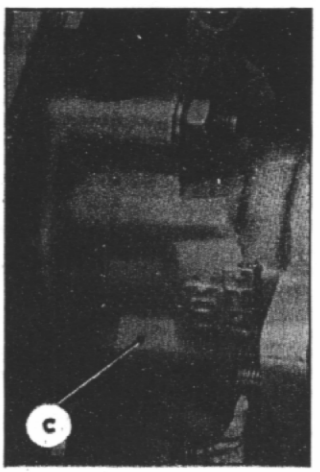












FITTING.

IMPORTANT : *It is not possible to fit the single valve spring on cylinder heads equipped fo two springs per valve.*

15. Fit the valves :

a) Oil the valve stems and guides.
Fit the valves.

b) Fix the cylinder head in the vice (support MR. 630-43/31).

c) Fit the seals (1).
(Change the seal at each dismantling).
CAUTION : Inner diameters of the seals (1) :
- exhaust = 8.5 mm
- intake = 8 mm
Slip the seal on to the valve stem until it is in stop position on the guide (use a tube with an inner diameter of 8.5 mm to complete fitting).

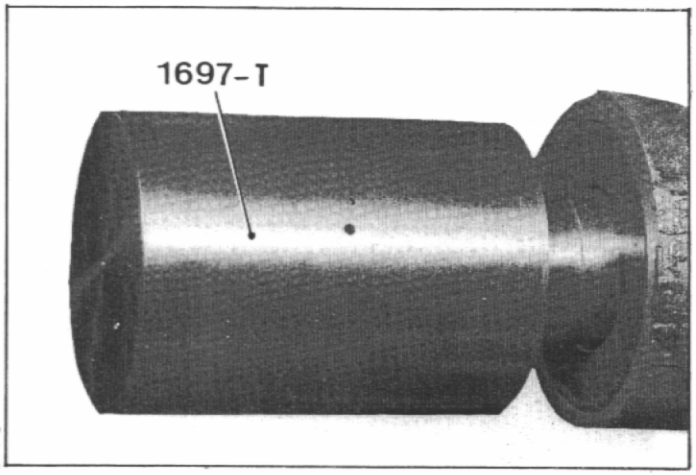
d) Successively fit the rod A (see paragraph 5a) in place of each rocker arm shaft.
Fit , as the case may be, on each of the valves :
- the thrust washers (5) and (6),
- the springs (4) and (7),
- the cup (3).
Compress the springs with the aid of tool 1652-T or 1652-T bis.
Fit the split cotters (2).
Remove the rod A.

16. Fit the camshaft :

a) Fit the paper seal between the rear bearing of the camshaft and the cylinder head.
Engage each seal (9) on the fixing studs (8) *by lining up notch « a » of the seal with groove « b » of the oil return of the cylinder head. Fit the seal « dry ».*
Oil the bearing surface of the front seal on the camshaft.

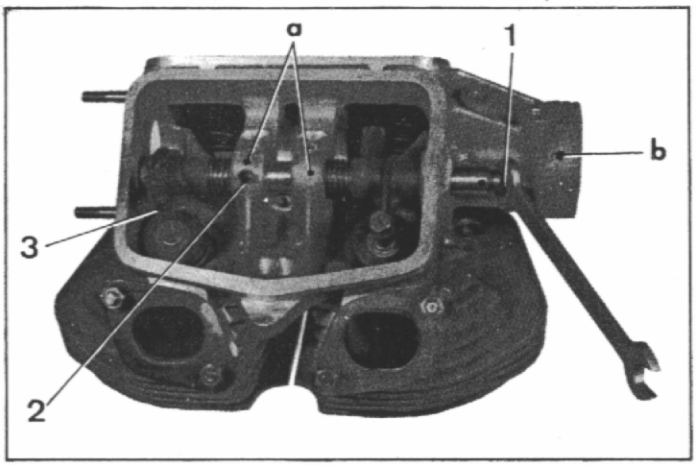
b) Engage the camshaft in the cylinder head.
IMPORTANT : *Position the rear bearing : boss « c » (oil return) must correspond with groove « b » of the oil return of the cylinder head.*
That is to say, it must be pointed towards the exhaust orifices.
(In the case of the right-hand cylinder head, this corresponds to positioning the fixing studs (10) towards the intake orifices).

c) Tighten the fixing nuts (11) (contact washer) to 15 to 18 mΛN (1.5 to 1.8 m.kg).



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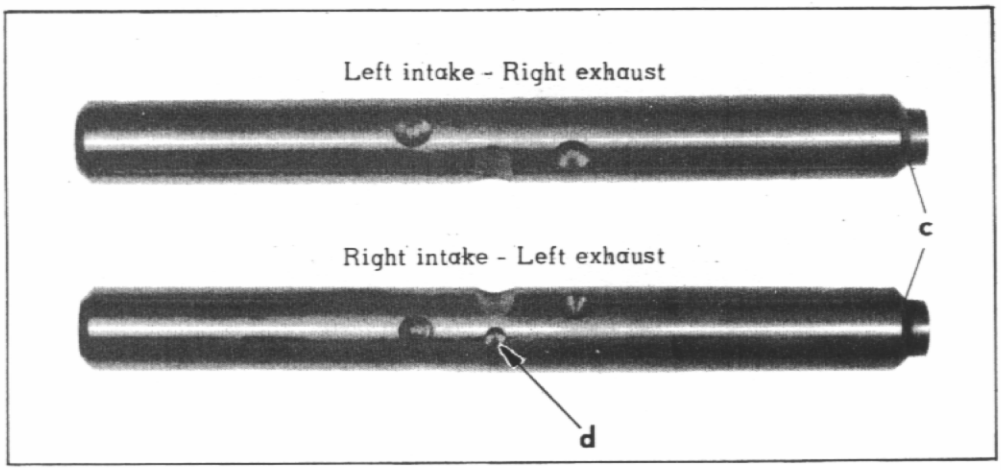
17. Fit the seal of the front bearing of the camshaft :
Use tool 1697-T.
NOTE : The seal must be fitted when the camshaft is in place. Otherwise, the will be damaged by the passage of the shaft.



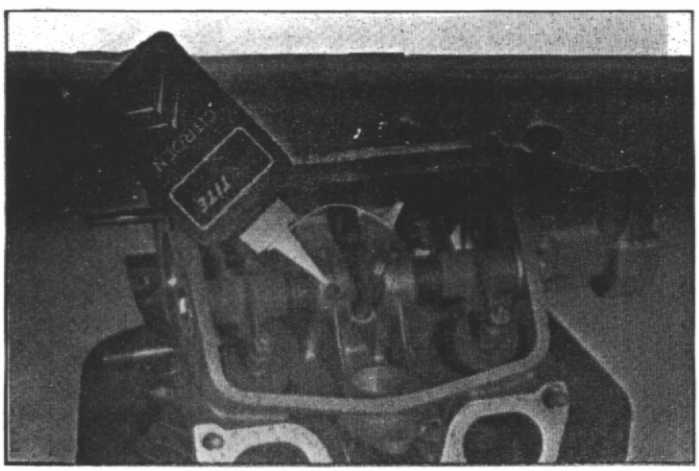
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18. Fit the rocker arms :
Case of vehicles produced up to February 15, 1971 :
Stick with grease the cups (3) on the ball and sockets of the adjusting screws of the rocker arms (if necessary).
Fit the rocker arms and their spring in the cylinder head.
NOTE : All the rocker arms and springs are identical. The springs should be resting on the central bearing « a ».

19. Fit the rocker arm shafts :
IMPORTANT : *Marking of the shafts :*
- The left-hand intake and right-hand exhaust shafts are identical and have no markings.
- The right-hand intake and left-hand exhaust shafts are identical and are marked with a blind hole « d ».
  This marking is very important for the correct positioning of the lubrication holes.



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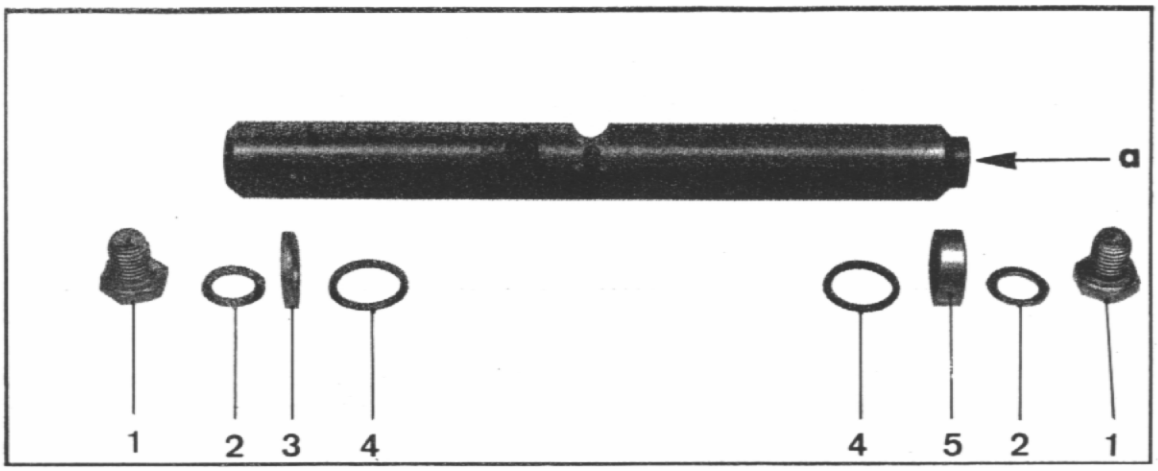


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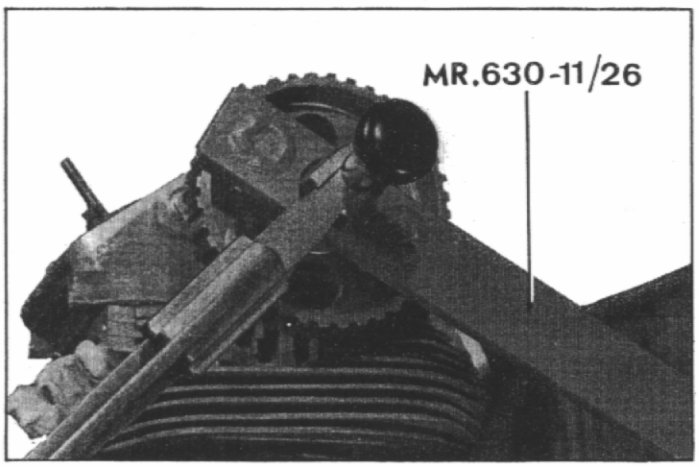
a) Oil the shafts and engage them in the cylinder head, the shouldered position « c » pointed towards the front bearing « b » of the camshaft.

b) Temporarily fit a blanking screw (1) to allow the positioning of the shaft and to make the blind hole correspond with the set screw (1).
IMPORTANT : The set screw (1) must be fitted with the threads smeared with LOCTITE N° GX. 01 459 01 A.
Remove the blanking screw (1).

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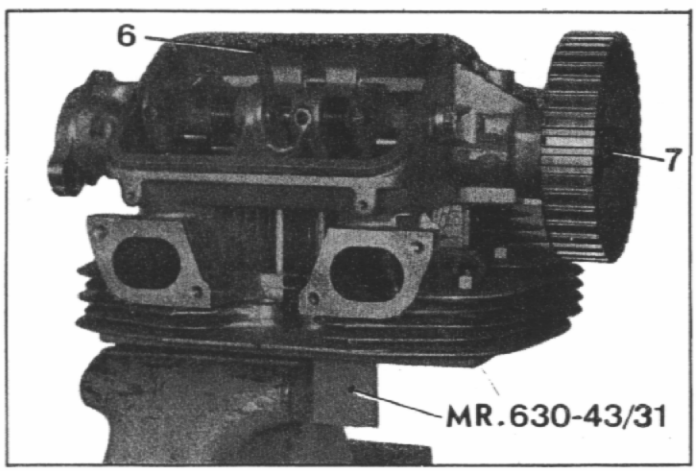


c) On each end of the shafts, fit :
- an O-ring seal (4),
- a spacer (3) or (5) *(the thickest spacer (5) on the shouldered end « a »),*
- a blanking screw (1) and its copper joint (2).

Tighten the bolts (1) to 17 to 18 mN (1.7 to 1.8 m.kg).

d) Tighten the fixing studs (6) of the cylinder head covers, the shortest threaded portion on the cylinder head side.

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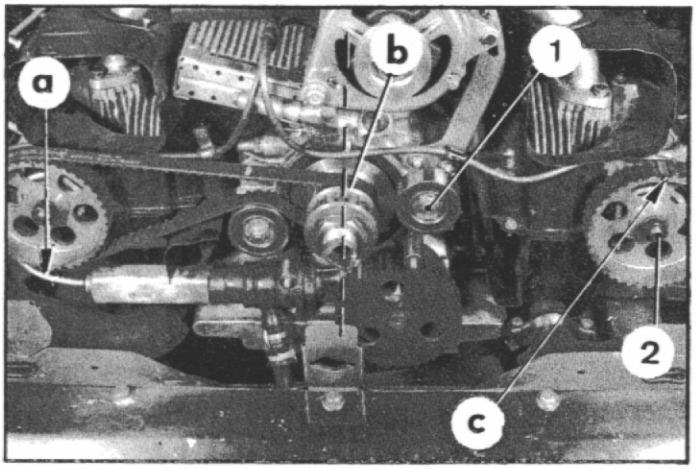
20. Fit the camshaft wheel :

Fit the wheel (positioning pin on the camshaft).

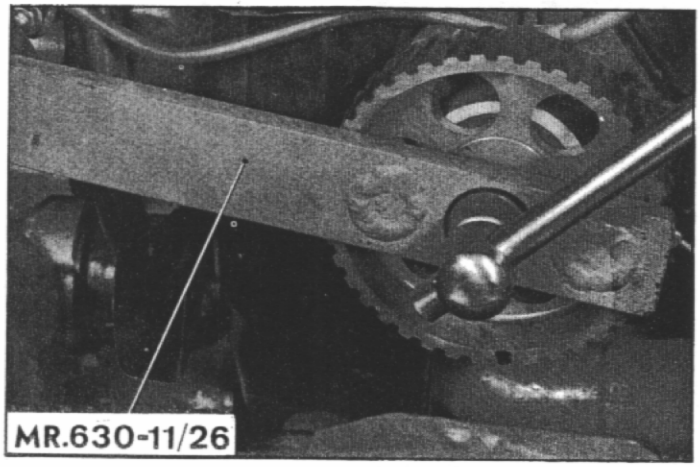
Immobilize the wheel with the aid of tool MR. 630- 11/26 and turn the nut (7) (flat washer) to 82 mN (8.2 m.kg) (torque wrench).

21. Remove the cylinder head from support MR. 630-43/31.

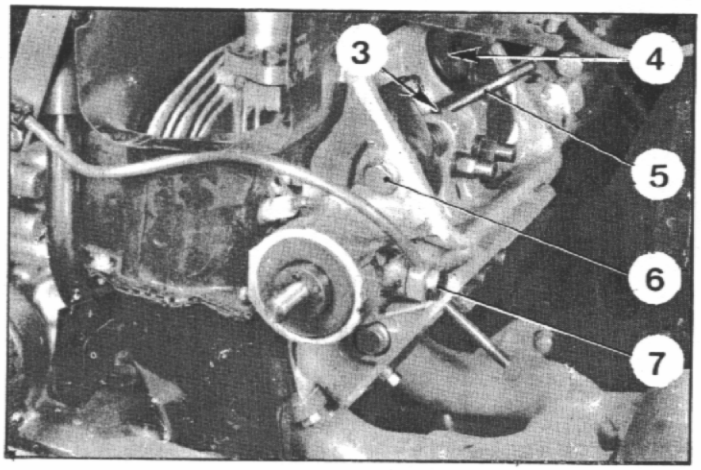
REMOVING AND FITTING A ROCKER SHAFT OR A ROCKER ON THE VEHICLE



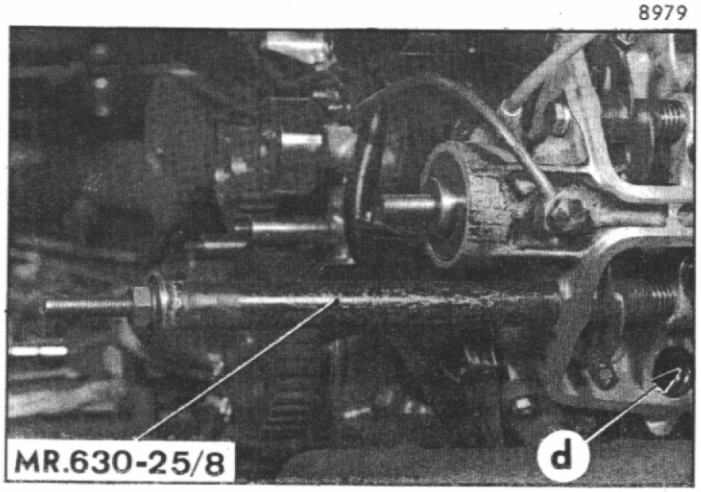
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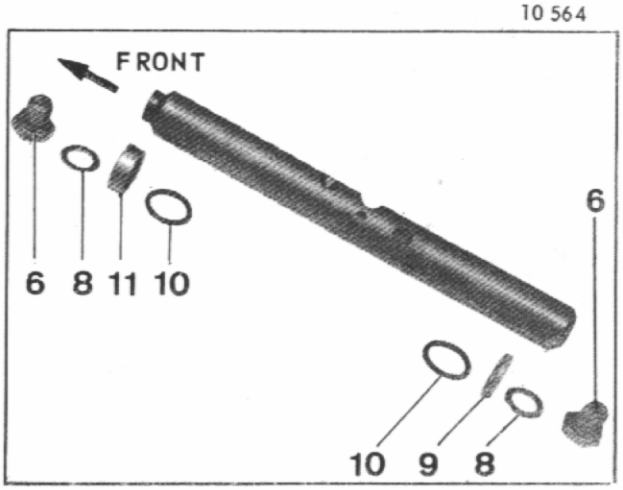
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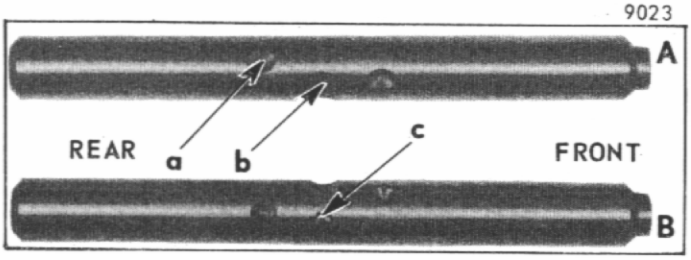
REMOVAL .

1. *Removing the intake valve rocker shaft :* remove the fan panel.
   Removing the exhaust valve rocker shaft : remove the bolt holding the front flexible mountings of the engine, and raise the engine-gearbox assembly.
2. **Remove the fan and the air intake.**
3. **Remove the camshaft wheel :**
   a) Rotate the crankshaft to bring the mark « b » (on the intermediate flange) and the marks « a » and « c » of the wheels into the position shown on the figure.
   NOTE : Take no account of the marks on the driving belts.
   b) Slacken the nut (1). Compress the roller tensioner to release the belt. Retighten the nut (1).
   c) Release the belt from the camshaft wheel.
   d) Remove the nut (2) (tool MR. 630-11/26) and remove the wheel.
   CAUTION : Do not rotate the crankshaft while the belts are not fitted.
4. **Remove the lower and upper cylinder head covers.**
   NOTE : For removing the exhaust valve rocker shaft, remove only the lower cylinder head cover. Blank off the hole « d » of the oil return to the cylinder head.
   Rotate the camshaft to release the intake or exhaust valve rockers and slacken them on the shaft (take care not to lose the push rod caps (4) where these exist).
5. **Remove the rocker shaft :**
   Remove the plug (6) at each end.
   Remove the grub screw (3) holding the shaft (3 mm Allen key).
   Remove the stud (5) and the connector bolt (7).
   Extract the shaft using the tool MR. 630-25/8.
   Remove the O-ring seals (10) the caps (9) and (11) and the copper seals (8).
6. **Remove the rocker arms and springs.**

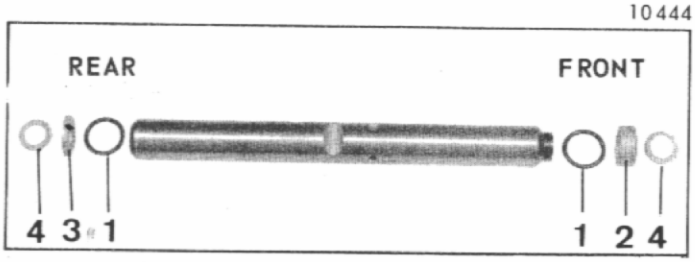
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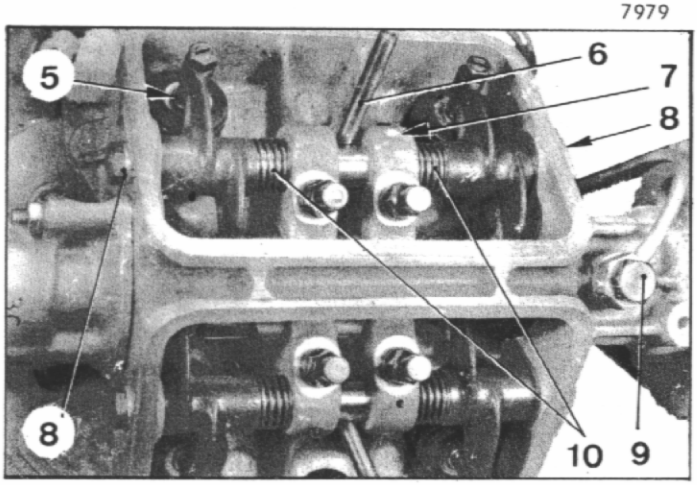
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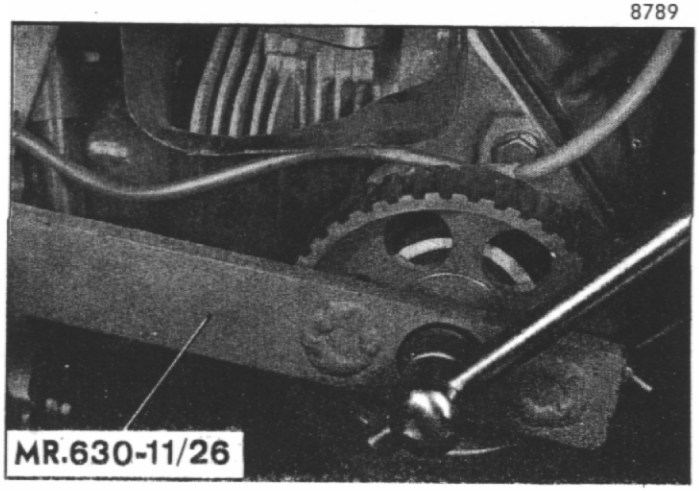
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FITTING.

NOTE : For identifying the rocker shafts, see the figure.

- *Shaft A without mark* = left intake or right exhaust.
- *Shaft B marked « c » (blind hole)* = right intake or left exhaust.

7. Fit the rocker arms :

Using grease, stick the caps (5) to the round-headed screws of the rocker arms (where these caps are fitted).

Place the rocker arms and springs (10) in the cylinder head (the springs (10) should be against the central bearing).

8. Fit the rocker shaft :

a) Screw a plug (8) *on the front end* of the shaft.

b) Grease the shaft and insert it in the cylinder head by its rear end.

c) Turn the shaft so that once it is fitted, the groove « b » (for the pin (6) and the cone « a » (for grub screw (7)) are correctly placed.

d) Complete the fitting by lightly tapping the front end of the shaft using a bronze drift.

CAUTION : When fitting, guide the springs and rockers.

e) Fit the stud (6) :
The shortest threaded end must be screwed into the cylinder head.

f) Fit the grub screw (7) :
Smear the threads with LOCTITE N° GX. 01, 459 01 A.

9. Fit the plugs (8) :

(If necessary, replace the plug used during fitting).

Fit *new* O-ring seals (1).

Fit *new* caps : the flat cap (3) is fitted at the rear and the hollow cap (2) « caps » the front end of the shaft.

Place the copper seals (4) at each end of the shaft.

Tighten the plugs (8) to 17 - 18 mAN (1.7 to 1.8 m.kg).

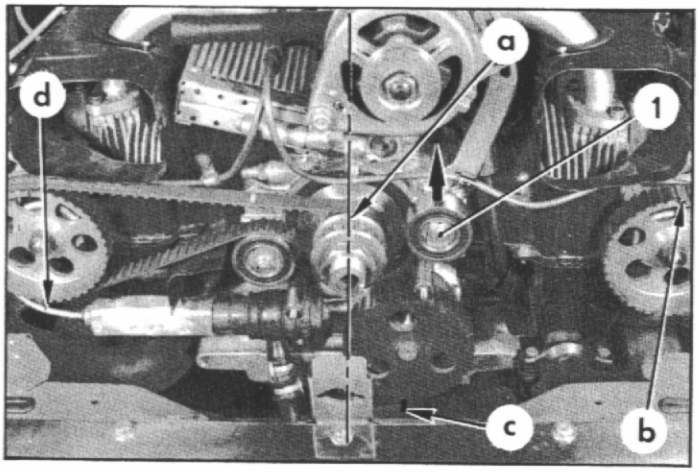
10. Fit the union screw (9) :

Replace the seals. Tighten to 18 - 20 mAN (1.8 to 2 m.kg).

11. Fit the camshaft wheel :

Tighten the nut to 82 mAN (8.2 m.kg).

(Hold the wheel using the tool MR. 630-11/26).



12. Fit the toothed belt :

a) Check that the marks on the crankshaft, camshaft wheels and the oil pump gear are positionned as shown in the above figure.

b) Fit the belt :
For the left-hand belt :
Offer the belt so that :
- the white paint marks on the belt coincide with the marks « a » and « b »,
- the yellow paint mark coincide with the mark « c » on the oil pump gear.

NOTE : Spacing of the marks on the belt :
ab = 32 steps *(engine G 10 (1015 cm3))*
ab = 33 steps *(engine G 103 (1220 cm3))*
ac = 25 steps *(engine G 10 and G 103).*

For the right-hand belt :
Offer the belt so that the paint marks on the belt coincide with the marks « a » and « b » such that :
ad = 42 steps *on tensioner side (engine G 10)*
ad = 43 steps *on tensioner side (engine G 103).*

c) Slacken the nut (1) so that the tensioner returns to its original position. Retighten.

13. Set the valve clearances (engine cold) :
Separately adjust the clearance between the tappet of each rocker and *the back of the corresponding cam.*
Intake and exhaust = *0.20 mm*

14. Tighten the two belts :
The marks on the crankshaft and the camshaft wheels must be positionned as shown in the figure.
Rotate the crankshaft through 90° in the normal direction of operation.
Slacken the nut (1) to release the left-hand tensioner roller and retighten it to 18.5 mΛN (1.8 m.kg).
Turn the crankshaft by one turn in the normal direction of operation and carry out the same operation for the right-hand tensioner roller.

15. Fit the cylinder head covers :
IMPORTANT : Carefully oil the cams as well as the tappets and round-headed screws of the rockers.

16. If necessary, tighten the bolts holding the front flexible mountings of the engine to 40 tp 45 mΛN (4 to 4.5 m.kg).

17. Fit the engine cooling air intake.

18. Fit the fan.
Fit the « starting dog » and its nut *(head face and threads greased).*
Tighten the nut to 170 to 200 mΛN (17 to 2 m.kg) (torque wrench and extension MR. 630-17/1).
Fit and centre the air intake cowl.

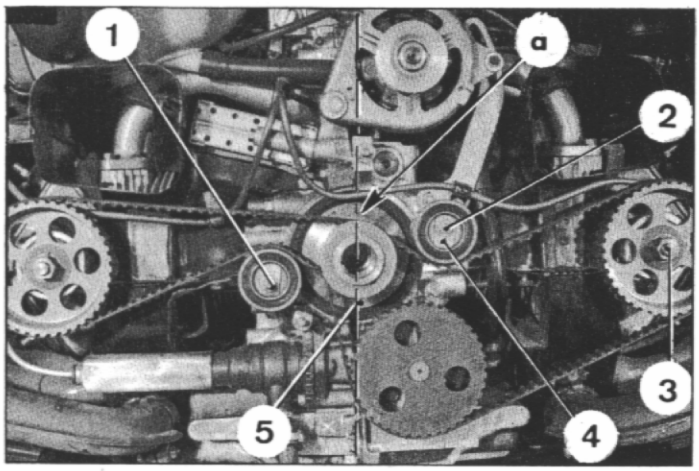
19. Fit the fan panel.

20. Check the headlamp adjustment.

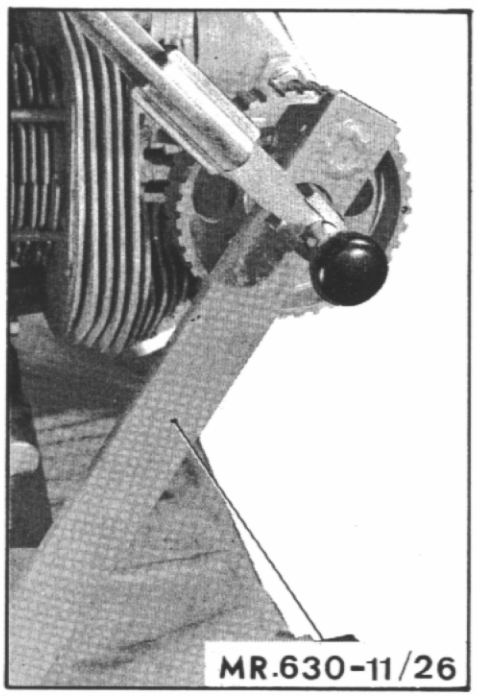
21. Check the engine oil level.

REMOVING AND FITTING A TIMING BELT, TENSIONER OR WHEEL

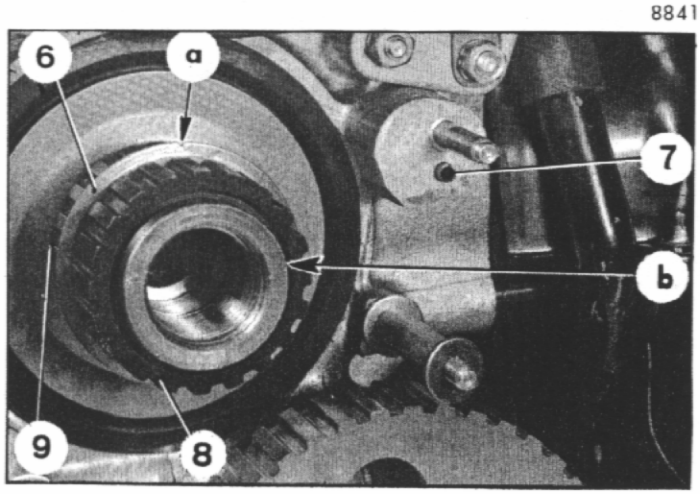
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Insert the Mecanindus guide pin (7) into its housing.
Fit the nuts (contact washer).

REMOVAL.

1. Remove :
   - the fan panel,
   - the air intake.
2. **Remove the belts :**
   a) *Set the timing :* Rotate the crankshaft to bring the mark « a » (on the intermediate flange (6)) on the engine centre line, upwards (see figure).
   IMPORTANT : *Leave the crankshaft in this position during the whole operation.*
   NOTE : To remove the right-hand belt, it is necessary to remove the left-hand belt.
   b) Slacken the nuts (1) and (2) on the tensioner rollers.
   - Remove the outer flange (5).
   - Release the left-hand belt by sliding it over the timing gears.

   Remove the right-hand belt in the same way.
3. **Remove the tensioners :**
   NOTE : To remove the tensioners only, it is not necessary to remove the belts.
   - Remove the nuts (1) and (2).
   - Remove the tensioners (Do not lose the bearing plates (4)).
4. **Remove the timing gears and wheels :**
   Remove the gears (8) and (9) and the intermediate flange (6) from the crankshaft (Do not lose the key)).
   Remove the nuts (3). Prevent the wheel from rotating by means of tool MR. 630-11/26.
   Remove the camshaft wheels.

FITTING.

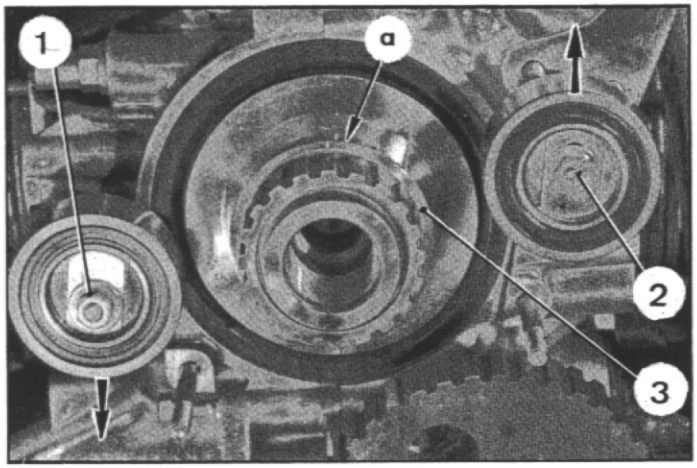
NOTE :
- the two camshaft wheels,
- the two crankshaft gears (8) and (9),
- the two flanges (5) and (6),
- the two tensioner rollers,

are identical.
IMPORTANT : Before fitting, make sure that the bolts, wheels, gears and tensioner rollers are completely free of grease or oil.

5. **Fit the timing wheels and gears :**
   a) Fit the camshaft wheels :
   Fit the wheel on each camshaft (positioning pin).
   Tighten the nut (flat washer) to 82 mAN (8.2 m.kg) (torque wrench) (use tool MR. 630-11/26).
   b) Fit the gears to the crankshaft :
   Fit the gears (9) and (8), interposing the flange (6) (key) on the crankshaft.
   CAUTION : Fit the gears so that :
   - *gear (8) has the groove « b » facing outwards,*
   - *gear (9) has the groove « b » facing the engine casing.*
6. **Fit the tensioners :**
   Fit the tensioners (bearing plate (4) to the outside).

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7. Fit the belts :

NOTE :

- the right-hand belt (the shorter) has two white paint marks at « a » and « d », so that :
  ad = 42 steps tensioner side *(engine G 10)*
  ad = 43 steps tensioner side *(engine G 103)*
- the left-hand has two white paint marks at « a » and « b » and a yellow paint mark at « c » so that :
  ab = 32 steps *(engine G 10)*
  ab = 33 steps *(engine G 103)*
  ac = 25 steps *(engines G 10 and G 103)*

a) *Set the timing :*
The mark « a » (engraved on the intermediate flange (3)) being on the engine centre line, facing upwards, position the marks « b », « c » and « d » of the wheels as shown in the figure.

b) Compress the tensioner rollers (direction of the arrows).
Tighten the nuts (1) and (2).

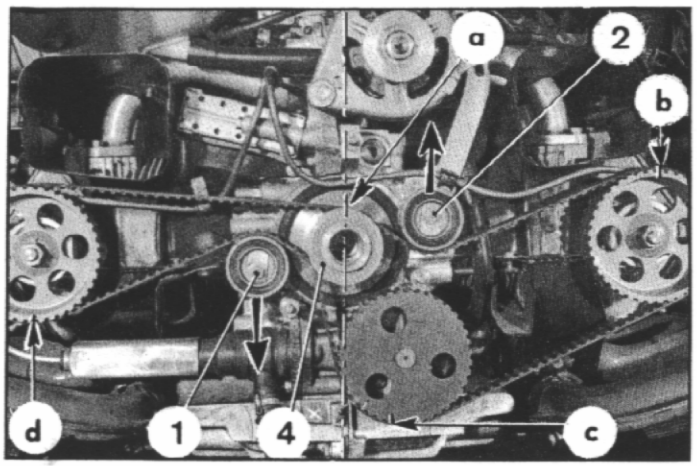
c) Fit the right-hand belt so that its marks coincide with the marks « a » and « d » such that :
ad = 42 steps tensioner end *(engine G 10)*
ad = 43 steps tensioner end *(engine G 103)*
(in this position, the mark « d » faces downwards).

d) Fit the left-hand belt so that :
- the white marks coincide with the mark « a » and « b »,
- the yellow mark coincides with the mark « c »

e) Fit the outer flange (4).

f) Release the tensioner rollers and tighten the nuts (1) and (2).

8683



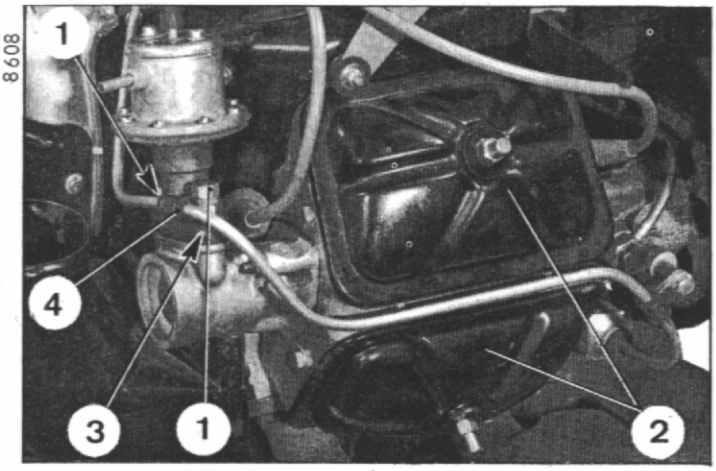
8. Tighten the belts :
With the marks on the crankshaft and camshaft wheels located as shown in the figure, turn the crankshaft through 90° in the normal direction of operation.
Slacken the nut (2) of the left-hand tensioner roller to release it and retighten to 18.5 m.kN (1.8 m.kg).
Rotate the crankshaft by one turn in the normal direction of operation and carry out the same operation for the right-hand tensioner roller.

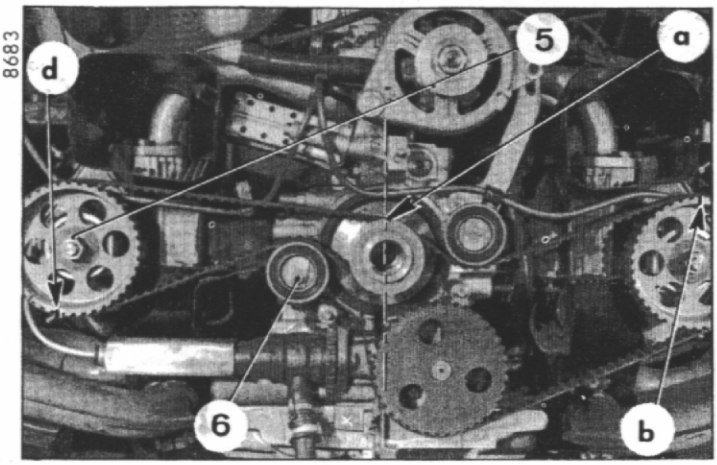
9. Fit the air intake and the fan.

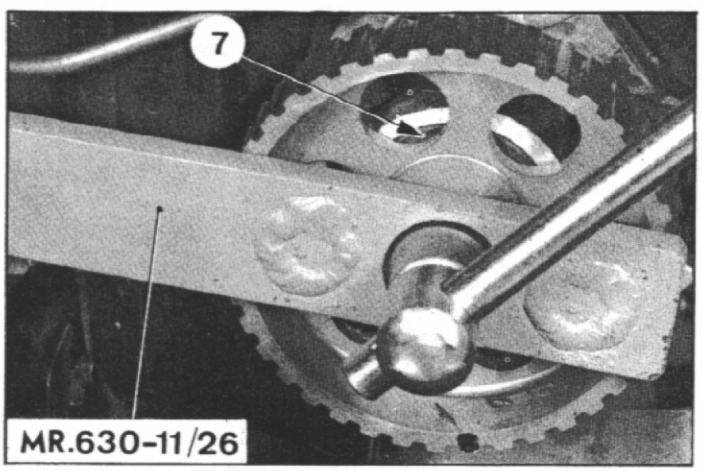
10. Tighten the fan :
Grease the threads of the « starting dog » and the back of the nut.
Tighten the nut to 170 to 200 m.kN (17 to 20 m.kg) (torque wrench and extension MR. 630-17/1).

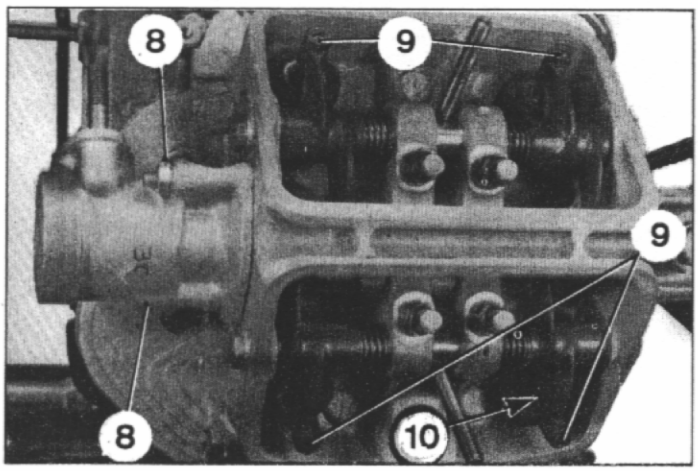
11. Fit the fan panel and check the headlamp setting.

REMOVING AND FITTING A CAMSHAFT ON THE VEHICLE









Manual 810-2

REMOVAL.

1. Remove :
   - the fan panel,
   - the bolts holding the front flexible mountings of the engine.

2. **Remove the fan and the air intake :**
   Use tool MR. 630-17/1 for removing the fan.

3. **Remove the cylinder head covers :**
   Remove the plug leads.

4. **Remove the petrol pump (or the distributor) :**
   a) *For the right-hand camshaft :*
   Remove the clip (4).
   Remove the nuts (1).
   Free the pump and the spacer (3).
   Remove the studs on which the pump is mounted.
   Move the engine as far as possible to the left (so that the camshaft can be passed between the heater duct and the axle unit).
   NOTE : For removing the right-hand camshaft, it is necessary to remove the preheater tube from the intake box (on engines so fitted).
   b) *For the left-hand camshaft :*
   Remove the distributor.

5. **Set the timing :**
   NOTE : Take no account of the paint marks on the timing belts.
   Turn the engine so that :
   - the mark « a » (on the flange between the two gears) faces upwards on the engine centre line,
   - the marks « b » and « d » on the wheels are in the position shown in the figure.

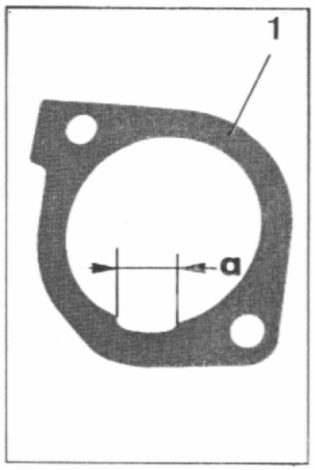
   CAUTION : *Do not rotate the crankshaft during the whole operation.*

6. **Remove the wheel from the camshaft to be replaced :**
   Slacken the nut (6) of the tensioner roller at the correct side.
   Remove the belt from the camshaft wheel.
   Remove the nut (5) (hold the wheel using the tool MR. 630-11/26).
   Remove the wheel.

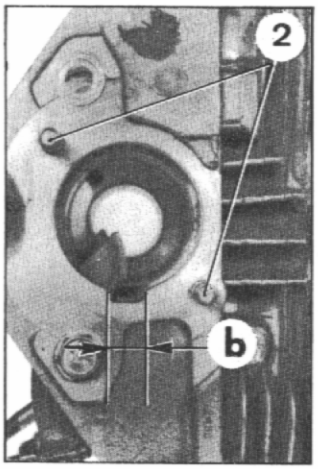
7. **Remove the camshaft :**
   Completely slacken the rocker ball-screws (9).
   CAUTION : *Do not lose the ball caps (10) where these are fitted.*
   Remove the nuts (8) holding the bearing.
   Use a mallet, lightly tap the end of the camshaft to free the bearing.
   Remove the camshaft, taking care not to foul the cams on the rocker heels.

8. **Remove the seal (7).**

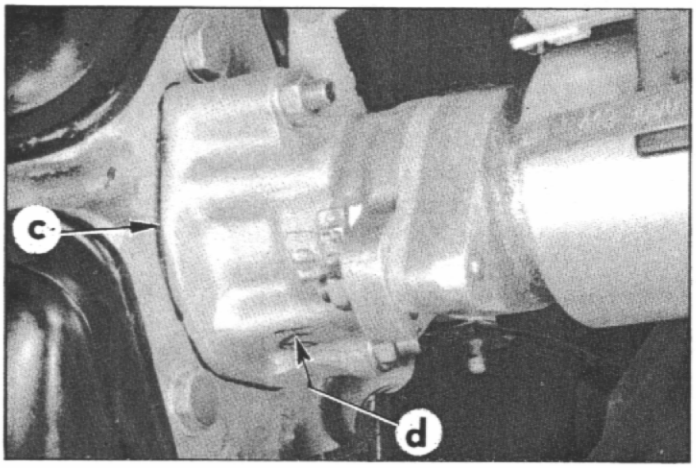
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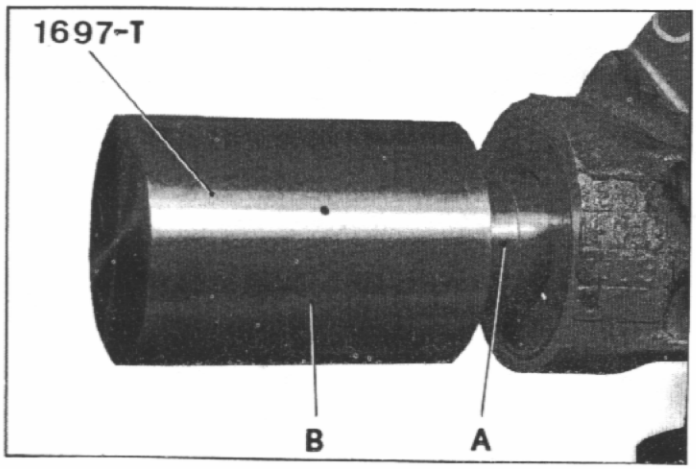
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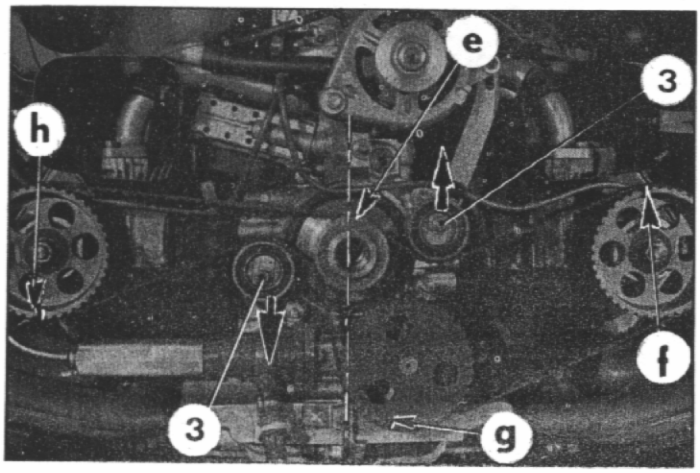
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FITTING.

9. Clean the bearing faces of the camshaft bearing housing and the cylinder head at « c ».
Oil the rings and the bearing.

10. **Fit the camshaft :**
a) Fit the paper seal between the rear camshaft bearing and the cylinder head :
Fit the seal (1) on the studs (2) *so that the groove « a » of the seal coincides with the oil return groove « b » of the cylinder head.* Fit the seal dry.
b) Engage the camshaft in the cylinder head.
IMPORTANT : *Position the rear bearing : the boss « d » (oil return) of the bearing must correspond with the groove « b » of the cylinder head. In other words, it must be facing the exhaust openings.*
For the right-hand cylinder head, this means directing the petrol pump mounting studs towards the intake openings.
c) Tighten the nuts (contact washer) to 15 – 18 mΛN (1.5 to 1.8 m.kg).

11. **Fit the front seal :**
Oil the front seal where it touches the camshaft.
Use the tool 1697-T : screw the inlet cone A on the stud at the end of the camshaft.
Oil the cone and offer up the seal (take care to fit it the right way round).
Complete the fitting of the seal by means of the cap B, tapping lightly until it comes up against the cone A.
Remove the tool.

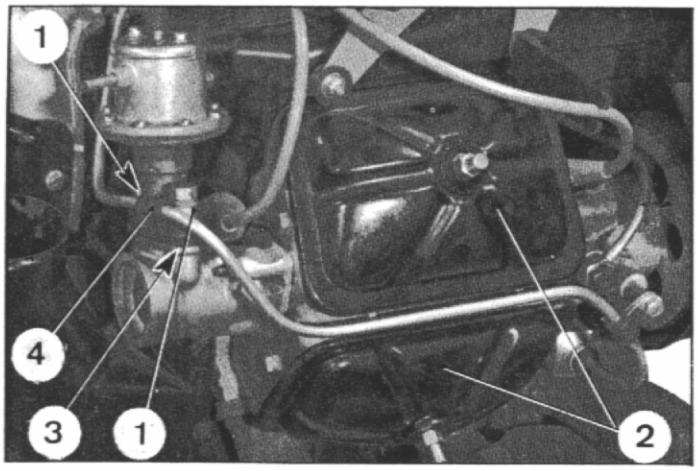
12. **Fit the camshaft wheel :**
Place the wheel on the end of the camshaft (be careful of the positioning pin on the shaft).
Fit the nut (flat washer) : Hold the wheel with tool MR. 630-11/26. Tighten to 82 mΛN (8.2 m.kg) torque wrench.

13. **Fit the toothed belt :**
a) Check that the timing is set as described in paragraph 5.
b) Compress the tensioner roller (or rollers) (direction of the arrows).
Tighten the nut (3) of the tensioner roller.
c) Fit the belt or belts :
Right-hand belt. Fit the belt so that :
- the two white paint marks coincide with the mark « e » on the crankshaft (on the intermediate flange),
- the mark « h » of the wheel so that :
eh = 42 steps tensioner end (engine G 10)
eh = 43 steps tensioner end (engine G 103)

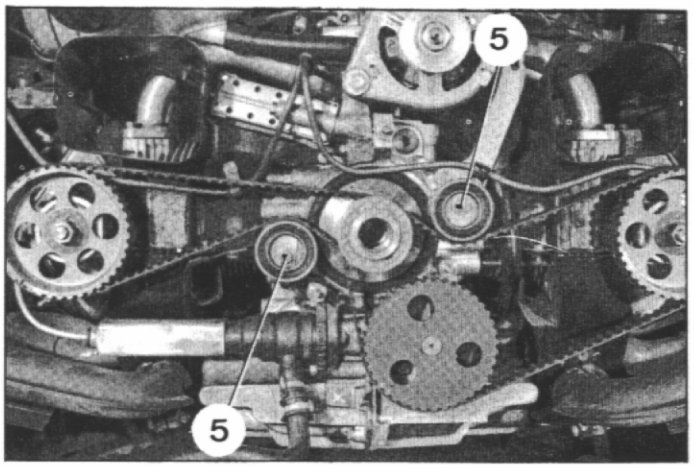
Left-hand belt. Fit the belt so that :
- the two white paint marks coincide with the marks « e » on the crankshaft and « f » on the wheel,
- the yellow paint mark coincides with the mark « g » on the oil pump gear :
ef = 32 steps tensioner end (engine G 10)
ef = 33 steps tensioner end (engine G 103)
eg = 25 steps tensioner end (engine G 10 and G 103).

d) Slacken the nuts on the tensioner rollers to release them and then retighten.

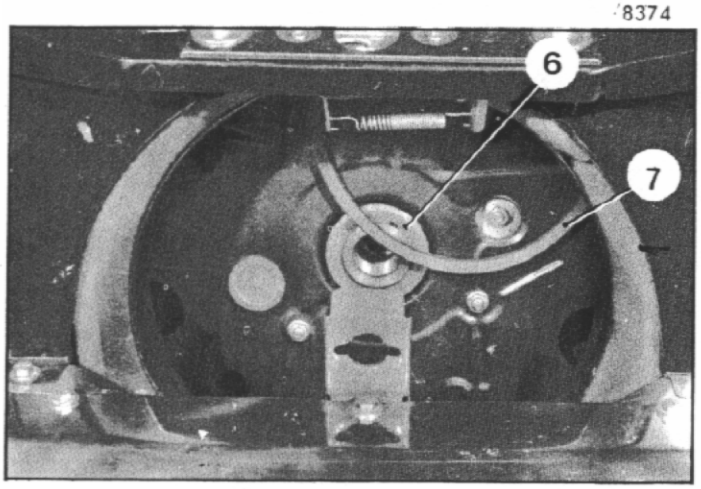
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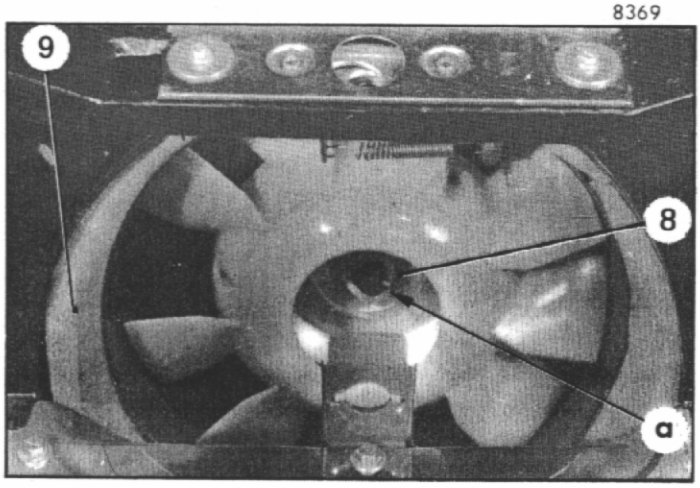
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14. **Set the valve clearances :**
Check that the ball caps are in position (where these are fitted).
Separately set the clearance between the heel of each rocker and the back of the corresponding cam.
Intake and exhaust = 0.20 mm

15. **Fit the cylinder head covers :**
IMPORTANT : *Carefully oil the cams.*
Fit the lower and upper cylinder head covers (2) (they are different). Tighten the nuts to 8 to 10 mAN (0.8 to 1 m.kg).
Fit the plug leads.

16. **Tighten the belts :**
Check that the timing is set as described in paragraph 5.
Rotate the crankshaft through 90° in the normal direction of operation.
Slacken the nut (5) on the left-hand tensioner roller in order to release it and retighten to 18.5 mAN (1.8 m.kg).
Rotate the crankshaft through one turn in the normal direction of operation and repeat the same operation for the right-hand tensioner roller.

17. **Fit the petrol pump (or the distributor) :**
a) *For the right-hand camshaft :*
Fit the petrol pump studs.
Fit the pump.
Fit the spacer (3) (dry fitting).
Offer up the pump (take care with orientation : see figure). Fit the clip (4). Tighten the nuts (1) (contact washer) to 21 mAN (2.1 m.kg).
b) *Left-hand camshaft :*
Fit the distributor (do not tighten the nuts ; setting will be carried out after replacing the accessory plate).

18. **Fit the engine cooling air intake.**

19. Fit the air intake cowl, *without tightening it.*

20. **Fit the fan :**
Check that the flange (6) is in position.
Offer up the fan and insert the alternator belt (7) in the pulley groove.
Fit the « starting dog » *(the « starting dog » and the nut must have the face and threads greased).*
With the engine at the point of ignition, the « starting dog » should be horizontal.
Check that about 5 mm of threads are visible at «a» after adjustment.
Tighten the lock nut (8) to 170 to 200 mAN (17 to 20 m.kg) (torque wrench and extension MR.630-17/1).
Centre the air intake cowl on the fan to give correct clearance at the blades. Tighten the bolts.
Glue the cowl seal (9) in position (COLFIX 180).

21. Fit the accessory support plate.

22. Tighten the bolts holding the front flexible mounting of the engine to 40 to 45 mAN (4 to 4.5 m.kg).

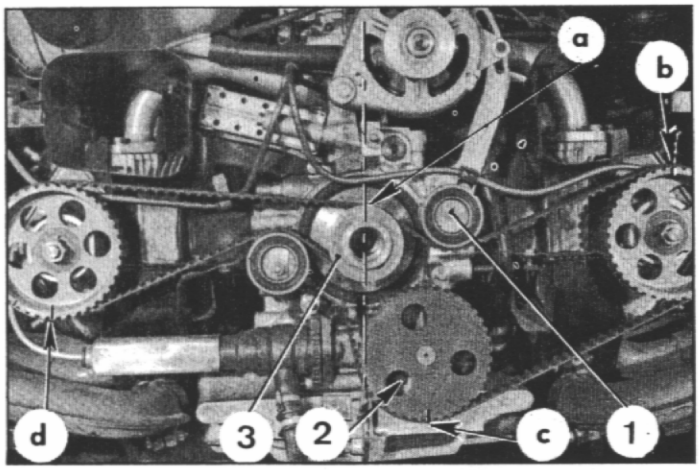
23. Replace the filter cartridge.
Drain the oil from the engine and fill up with new oil.

24. Check the setting of the distributor if necessary.

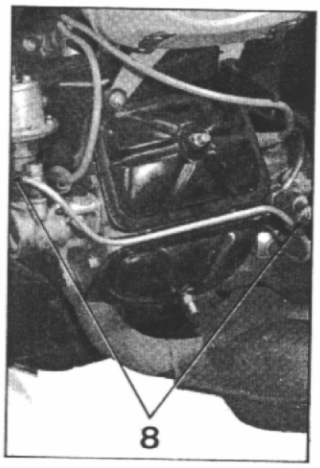
25. Check the headlamp setting.

REMOVING AND FITTING A PUMP DRIVE (OR SEAL) OR AN OIL PUMP ON THE VEHICLE

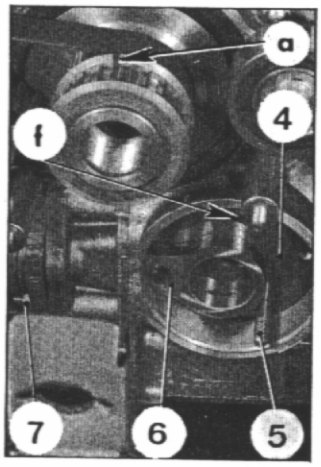
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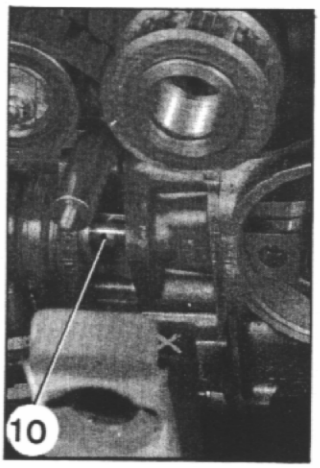


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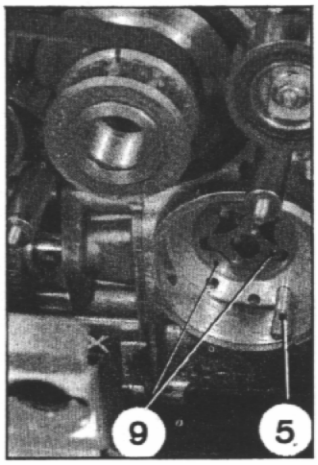


Manual 810-2

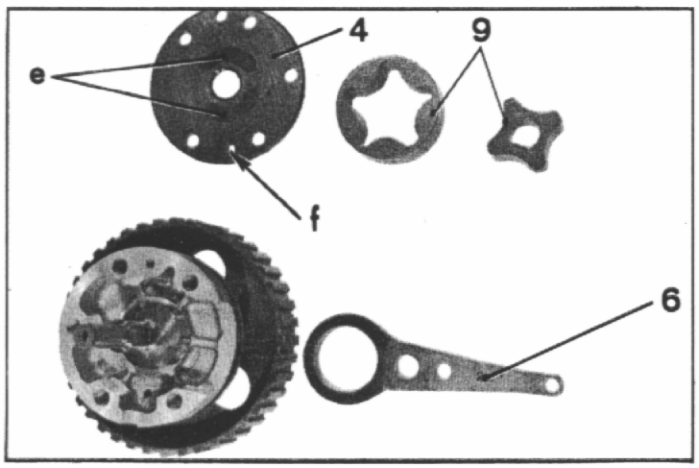
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REMOVAL.

1. Remove :
   - the fan panel,
   - the fan (extension MR. 630-17/1),
   - the air intake.

2. Slacken the pressure regulator bleed screw.

3. **Remove the left-hand timing belt :**
   a) *Set the timing :*
   Turn the engine so that the mark « a » (engraved on the flange between the crankshaft gears) faces upwards on the engine centre line.
   The marks « b, c, d » are then placed as shown in the figure.
   IMPORTANT : *Take account only of the marks engraved on the gears and wheels (and not of the painted marks on the belts).*
   b) Slacken the nut (1) on the tensioner roller.
   Release the outer flange (3) and remove the belt.

4. **Remove the oil pump drive :**
   Remove the five bolts (2).
   CAUTION : Extract the drive, by levering on two diametrically opposed points of the pulley to avoid damaging the pump bearing.

5. **Remove the high pressure pump control rod :**
   Remove the bolt holding the clips (8).
   Remove the nuts (7) holding the pump.
   Move the pump sufficiently to obtain access to the spindle (10) : drive out the spindle by hand (take care of the pump piston).
   Release the rod (6).

6. **Remove the oil pump gears :**
   Remove :
   - the closure plate (4),
   - the gears (9).

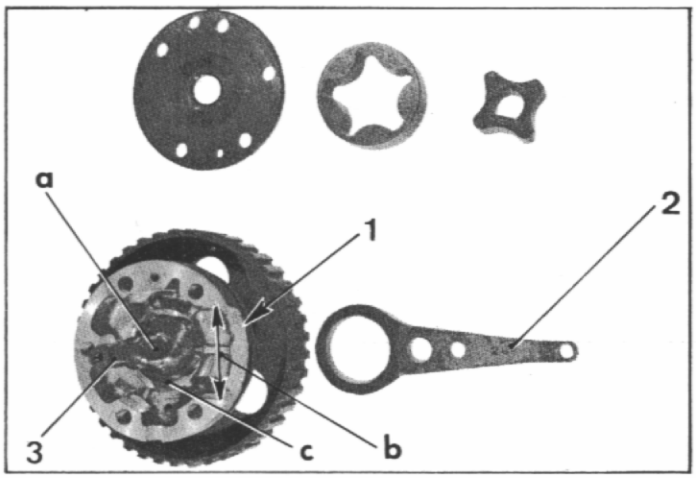
FITTING.

IMPORTANT : Make sure that the belts, tensioners or timing wheels are completely free of oil or grease.

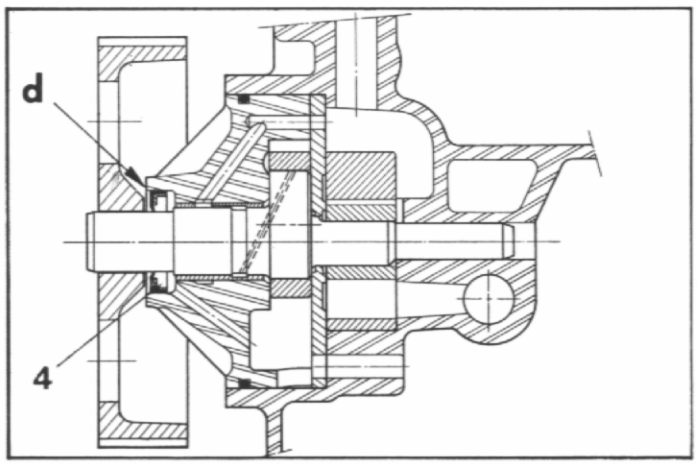
7. **Oil and fit the oil pump gears :**
   NOTE : On casings not fitted with a guide stud (5), it is recommended to fit one temporarily to assist positioning the plate and the pump drive.

8. **Fit the closure plate (4) :**
   The recesses « e » should be inside and the small hole « f » to the top.

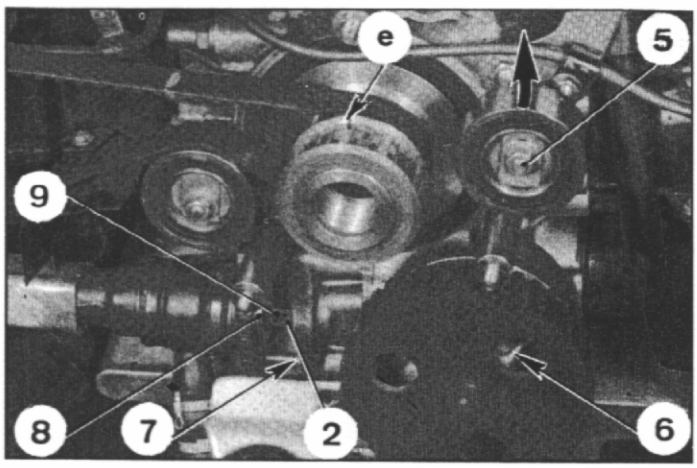
9. **Install the high pressure pump rod (6).**



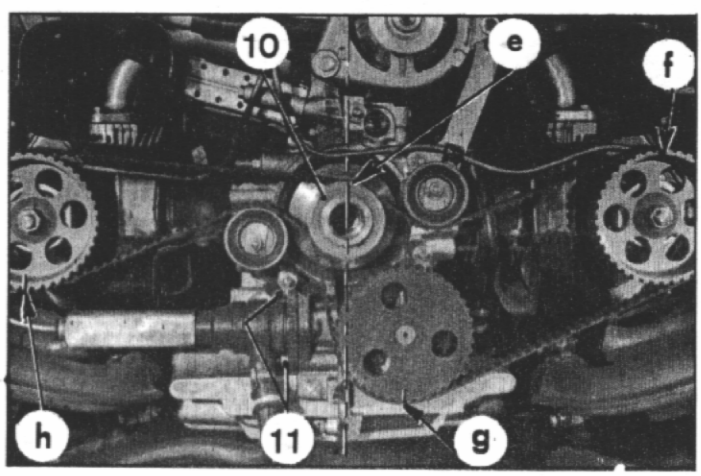
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G. 22-2



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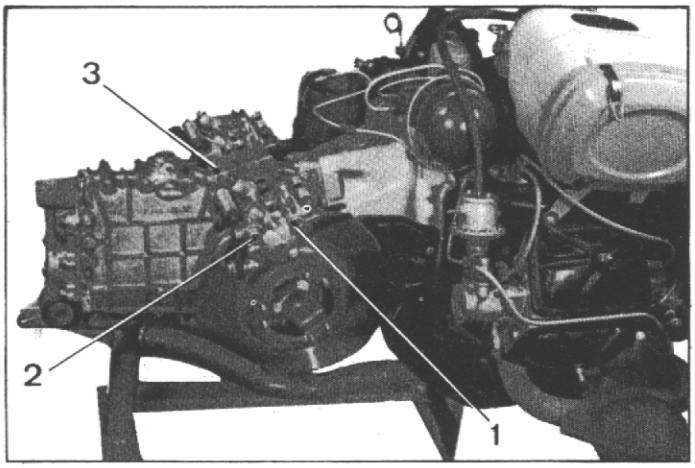
10. **Fit the pump drive :**
    a) Replace the O-ring seal (1).
    Oil the spindle (3) and the eccentric « c ».
    b) Place the shim 4001-T between the wheel and the bearing at « d » to avoid depressing the seal (4).
    c) Present the pump drive to the guide stud (the groove « b » for the rod should face the high pressure pump) and engage the spindle in the central gear.
    Turn the spindle so that the flat part « a » engages in the oil pump gear.
    d) Push the piston into the liner (8) of the high pressure pump and guide the rod (2) in order to engage it on the driving eccentric.
    Fit the bolts (6) (contact washer).
    CAUTION : Tighten the diametrically opposed bolts one after the other, a fraction of a turn at a time, until the pump drive is properly positioned.
    Tighten the bolts (6) to 15 - 18.5 mAN (1.5 to 1.8 m.kg). Remove the shim 4001-T.
    Check that the pump drive rotates freely.
11. **Install the high pressure pump :**
    If necessary, replace the O-ring seal (7).
    Release the piston (brass hook) and fit the spindle (9).
    Fit the pump, and tighten the nuts (11) (contact washer) at 12.6 to 14 mAN (1.2 to 1.4 m.kg).
    Fit the clips holding the high pressure pump tube.
12. **Fit the left-hand timing belt :**
    Raise the tensioner roller (direction of the arrow).
    Tighten the nut (5).
    a) *Set the timing :*
    Check that the mark « e » (engraved on the flange) is in the position described in paragraph 3 a).
    Position the marks « f » and « g » as shown in the figure.
    b) Fit the belt so that :
    - the two white paint marks on the belt coincide with the marks « e » and « f »,
    - the yellow paint mark on the belt coincides with the mark « g ».

    IMPORTANT : *Check the position of the marks by counting the number of teeth on the belt :*
    - ef = 32 teeth *Engine G 10 (1015 cm3)*
    - ef = 33 teeth *Engine G 103 (1220 cm3)*

    The marks in « e » and « g » must be separated by 25 teeth.
13. **Adjust the tension of the belts.**
    (See Op. G. 122-4).
14. Fit the flange (10) and the air intake.
15. **Fit the fan :**
    Fit the « starting dog » fitted with the nut *(face and threads greased)* so that the dog is horizontal when the engine is at the ignition point. Tighten the nut to 170 to 200 mAN (17 to 20 m.kg) (torque wrench and extension MR. 630-17/1).
    NOTE : The « starting dog » should have 4 to 5 threads visible after the nut has been tightened.

STRIPPING AND ASSEMBLING A GEARBOX

(for exchange or repair)



STRIPPING

1. Remove the calipers and the brake discs :

a) Remove :
- the connection tube (3),
- the main brake pads.

b) Release the rear fixing bolts (2)
Loosen the front bolt (1).
Tip the caliper upwards (be careful of the shim placed between the caliper and the gearbox casing).
Fit and tighten a nut (10 × 1.50) on the bolt (2) (to prevent the half-shells from separating from one another).
Remove the bolt (1).

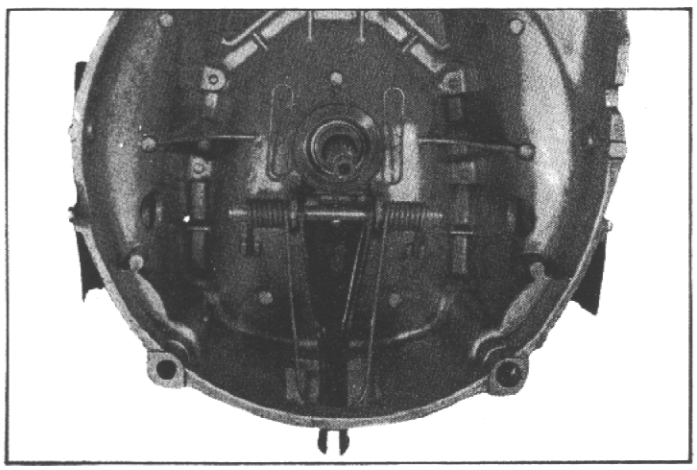
c) Remove the brake discs.

d) Remove the disc fixing studs.

2. Remove the clutch release and its control :

Remove :
- the thrust bearing,
- the clutch fork pin,
- the fork and its spring.

3. Clean the parts.



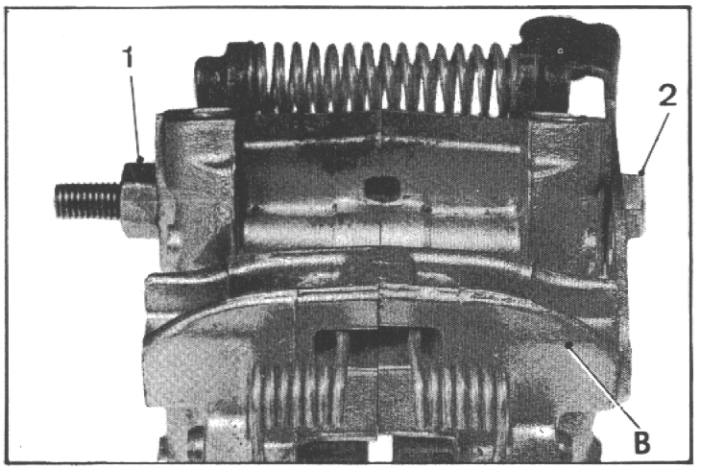
ASSEMBLING

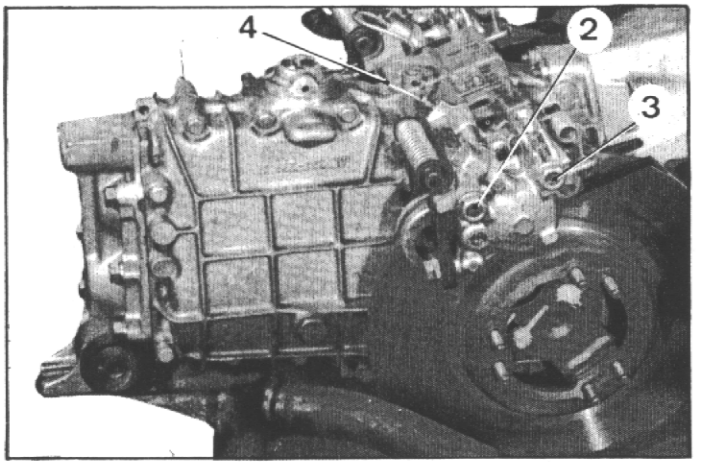
4. Fit the clutch release and its operating mechanism :

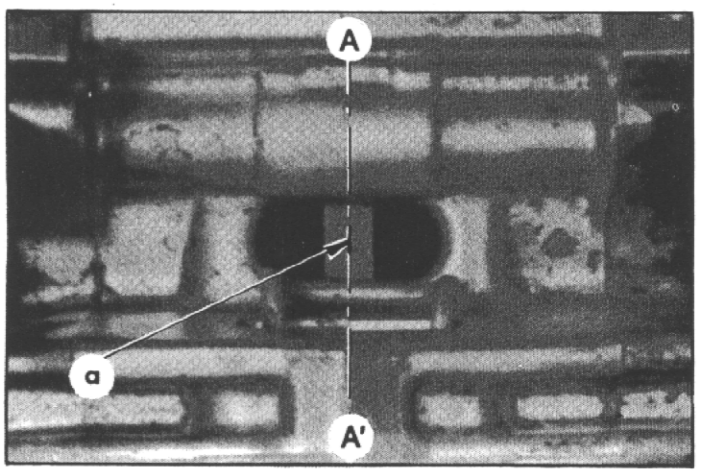
Fit the clutch fork and its spring. Fit the shaft and its stop screw.
Fit the thrust bearing and its fastener.

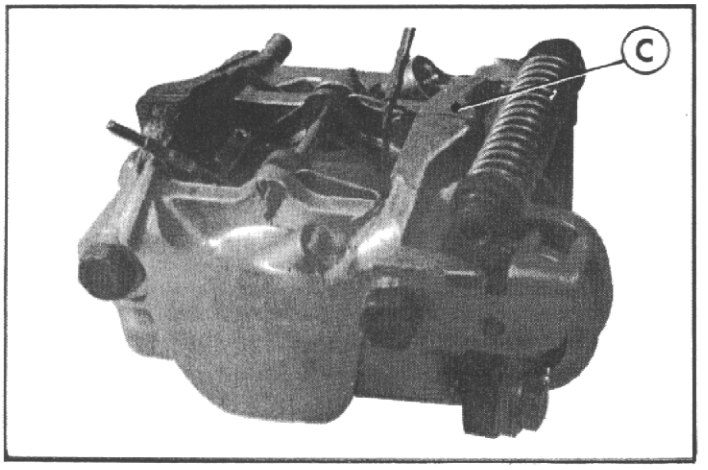
5. Fit the brake discs :

Fit the fixing studs, tighten them to 4 mAN (0.4 m.kg) and fit the brake discs.
Fit two fixing nuts of the discs by interposing the spacers to hold them in place. Tighten the nuts.









6. Fit the brake caliper *(Vehicles fitted with brake calipers first model B) :*

IMPORTANT : The shim (or shims) placed between the caliper and the gearbox serve to position the caliper in relation to the brake disc, it is necessary to check this position at each exchange of disc or caliper.

a) Check the condition of the bearing surface of the caliper on the gearbox housing. Remove burrs with a scraper.

b) Offer up the caliper completely assembled and fitted with an adjusting shim and emergency brake pads (the two half-shells have been assembled and tightened by the bolt (2) and nut (1) used in the dismantling).

c) Fit the front fixing bolt (3); screw it up without fully tightening (flat washer under the head).

d) Remove the nut (1). Pivot the caliper and tighten the bolt (2) (flat washer under the head) Check that the shim is correctly positioned.
First model B caliper :
Tighten the bolts to 45 to 50 mΛN (4.5 to 5 m.kg)
Second model C caliper :
Tighten the bolts to 60 mΛN (6 m.kg).

e) Make a marking « a » on the disc equidistant from the two faces.

Check that this marking is aligned with the joint faces A - A' of the two half-shells.

The displacement between these two faces should not exceed 0.5 mm. Otherwise, change the thickness of the shims placed between the brake unit and gearbox.

7. Fit the main brake pads.

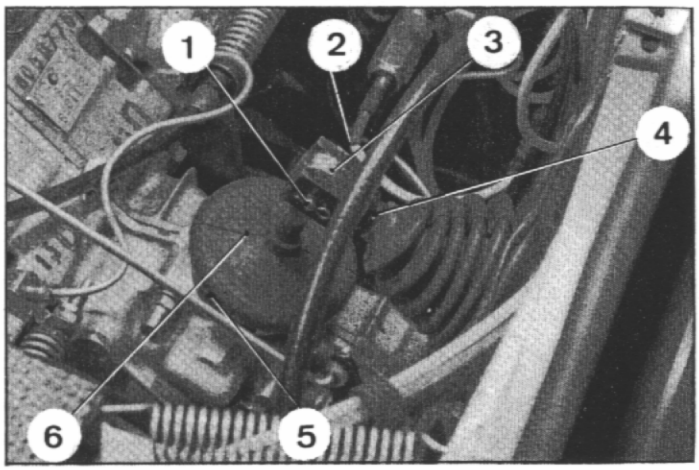
8. Connect up the connecting tube (4) of the brake calipers.
Tighten the connection to 8 to 9 mΛN (0.8 to 0.9 m.kg). (Fit new seals).

NOTE : Do not fit the fork operating lever which would interfere with the fitting of the engine-gearbox assembly on the vehicle.

9. Fit the brake caliper *(Vehicles fitted with second model C brake calipers) :*

The fitting is identical to that for the old models, but there is no shim placed between the brake caliper and the gearbox.

I. REMOVING AND FITTING A LEVER OPERATING THE SELECTOR FORK SHAFTS

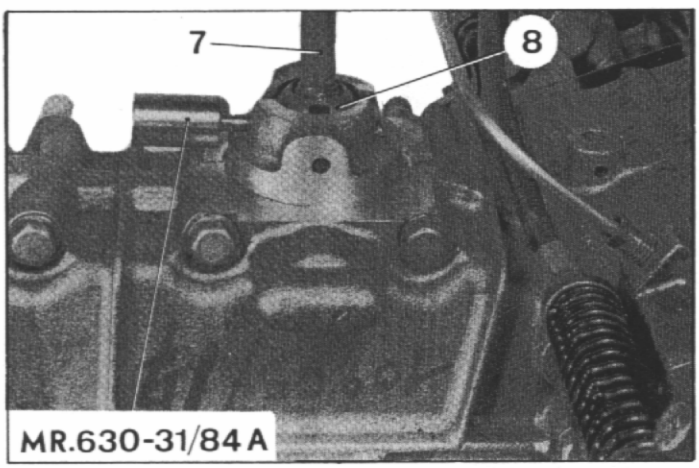


REMOVAL.

1. Remove the spare wheel.

2. **Disconnect the gear change tie-rod :**
Remove :
- the pin (1),
- the spindle (2),
- the collar (5).
Separate the tie-rod (4) from the ball joint (3).
Pull the dust excluder (6) upwards.

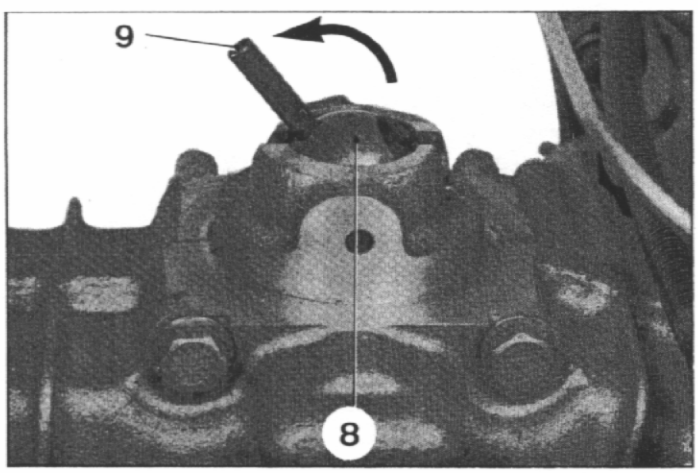
7025



3. **Remove the selector fork shaft operating lever :**
By means of tool MR. 630-31/84 a, remove the Mecanindus pin (9) linking the lever (7) to the ball joint.
Release the operating lever (7).
NOTE : The use of the tool MR. 630-31/84 a allows the pin (9) to be left in position on the ball joint (8).

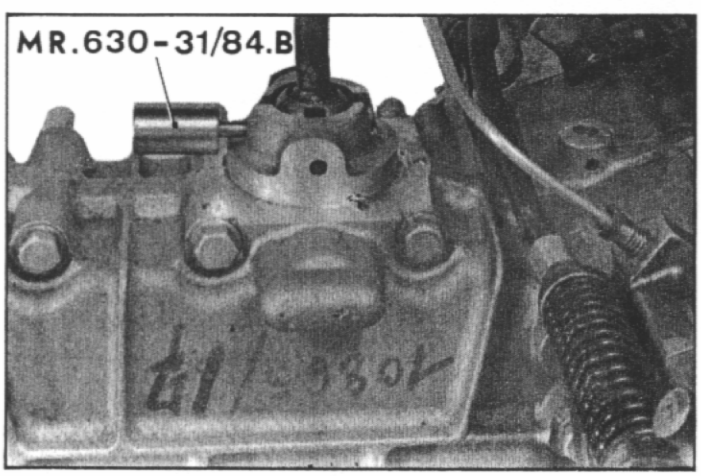
FITTING.

Manual 810-2



7024

4. **Fit the selector fork shaft operating lever :**
To facilitate positioning the Mecanindus pin (9) turn the ball joint (8) through 180° so that the pin is towards the rear (direction of the arrow).
Fit the lever to the ball joint (8).
Push the Mecanindus pin (9) once again to the front using the tool MR. 630-31/84 b until the body of the tool is bearing against the gearbox housing.
IMPORTANT : With the tool MR. 630-31/84 b it is possible to adjust exactly the position of the pin (9) in the ball joint (8).
If this position is incorrect, the pin might interfere with the movement of the ball joint and damage the gearbox housing.

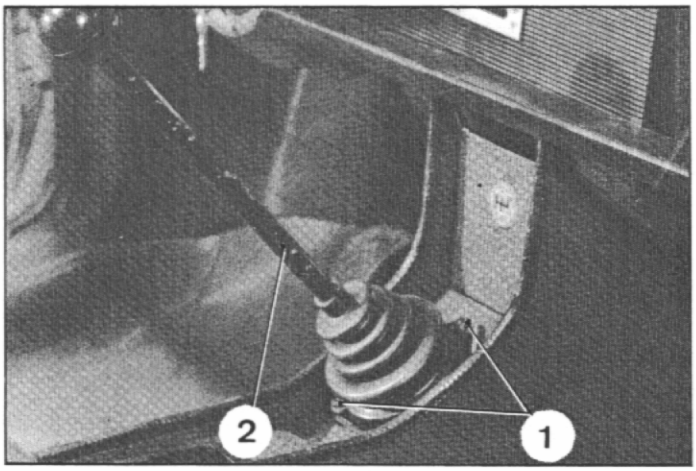


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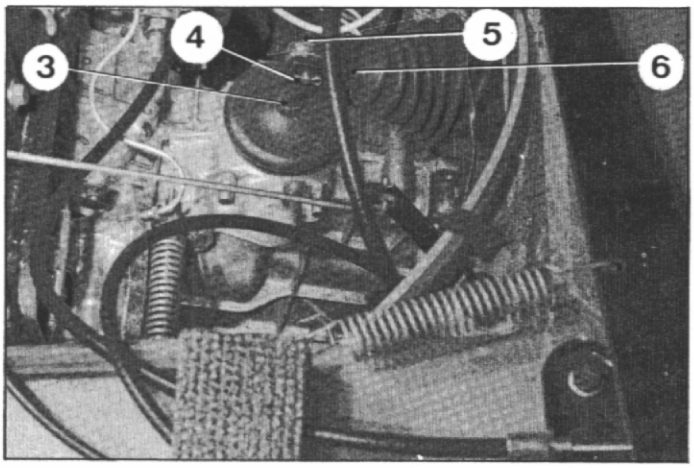
5. **Connect up the selector fork shaft operating lever to the tie-rod :**
Fit the tie-rod (4) into the ball joint (3).
Fit the spindle (2) and the pin (1).

6. Replace the spare wheel.

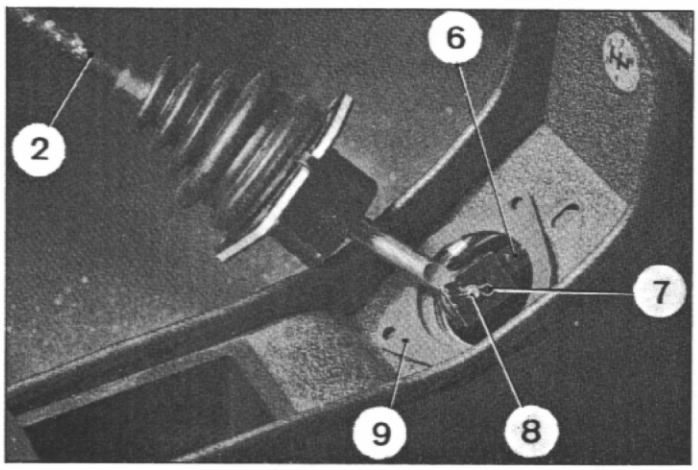
II. REMOVING AND FITTING A GEAR LEVER



8872



8447



9181

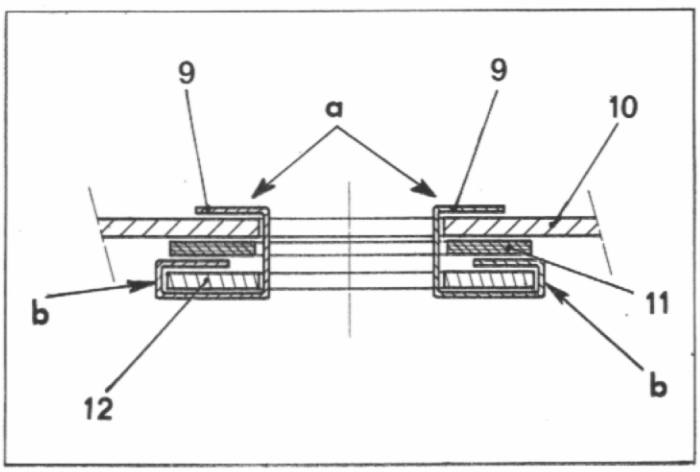
REMOVAL.

1. Remove the spare wheel.
2. On the gearbox :
   - Remove the pin (4) and the spindle (5).
   - Separate the tie-rod (6) from the lever ball joint (3).
3. On the central panel :
   - Remove the bolts (1) holding the casing to the panel.
   - Pull on the lever (2) in order to remove the pin (7) and the spindle (8).

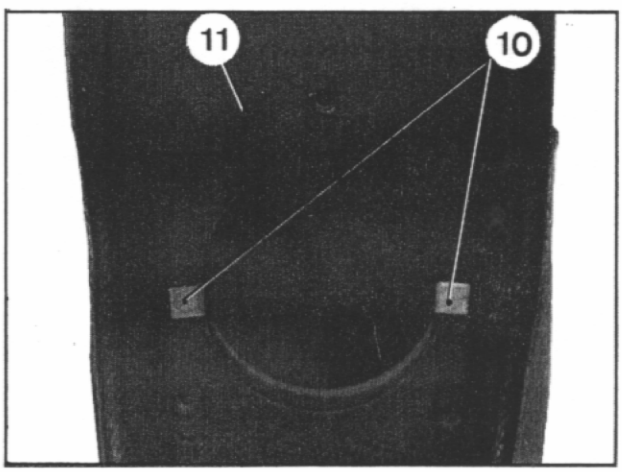
   Disconnect the tie-rod (6) from the lever (2).
   NOTE : The plate holding the casing remains in the central panel.
   To remove it, it is necessary to remove the panel.
4. Release the tie-rod (6) from the front.

FITTING.

5. **Prepare the plate holding the casing on the panel :**
   To facilitate positioning the casing, proceed as follows :
   a) Cut two strips (9) 10 mm wide and 40 mm long from 0.5 mm steel sheet.
   b) Bend the end « b » of each strip back over a length of about 10 mm.
   c) Through the hole in the panel, fit the lower seal (11) and the plate (12) holding the casing under the panel plate (10).
   Fit the bent back end « b » of each strip under the plate (12) as shown on the drawing.
   Bend the other end « a » over the panel plate (10) so as to hold the plate (12) and the seal (11) against the panel.
6. **Fit the tie-rod :**
   Place the rubber dust excluder over the tie-rod.
   Fit the tie-rod into the panel from the front.
   (engine compartment).

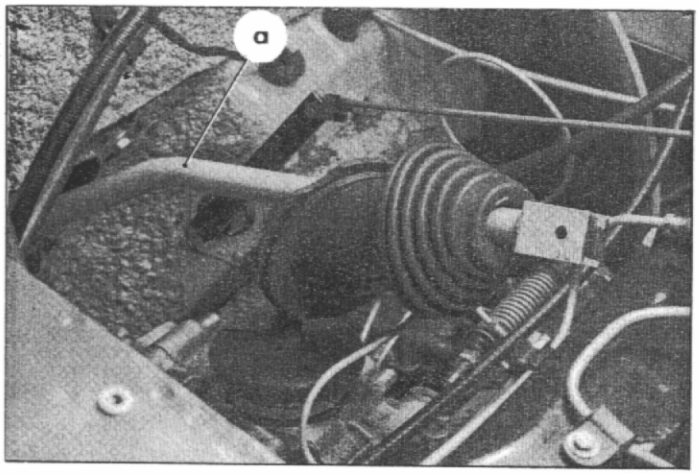


G. 33-12

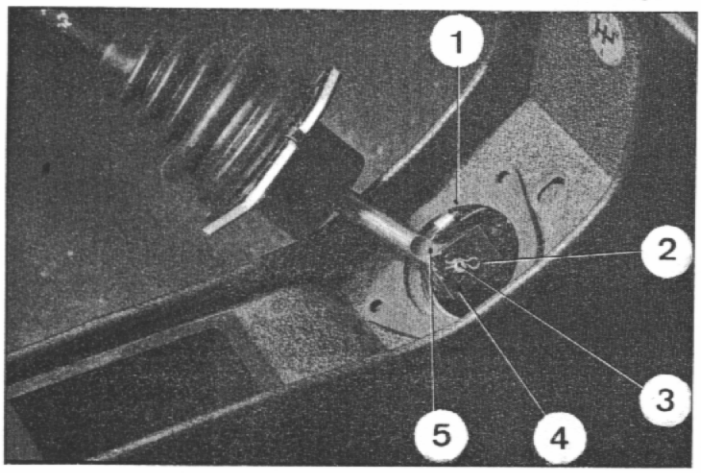


9134

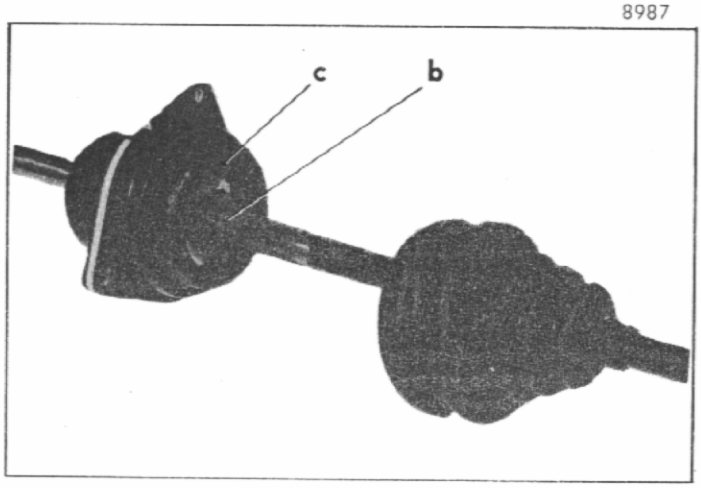
9182



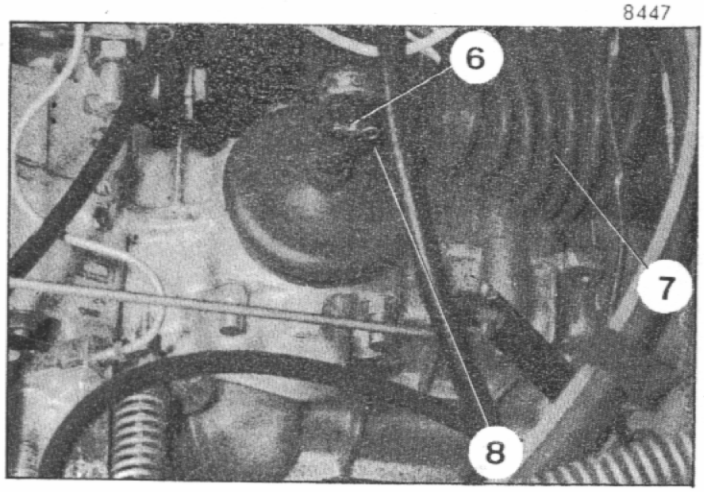
9181



8987



8447



7. Connect the tie-rod to the levers :

Check that the curved part « a » of the tie-rod faces upwards.

a) *Panel side :*
Fit the rubber seal (1) to the panel.
Engage the ball joint of the lever (5) into the yoke of the tie-rod (4).
Fit the spindle (3) and the pin (2).
CAUTION : *The reverse gear stop lug « b » must face to the right (on lever which are so fitted).*

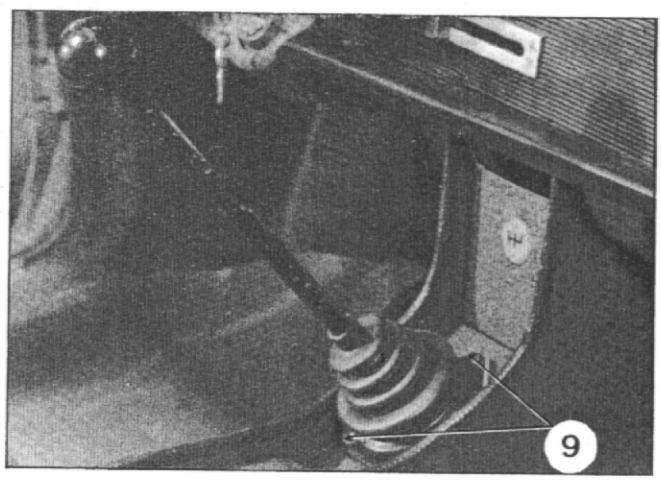
b) *Gearbox side :*
Fit the yoke of the tie-rod (4) into the ball joint of the selector fork shaft operating lever.
Fit the spindle (6).
Fit the pin (8).
Insert the dust excluder (7) into its housing behind the dashboard.

8. Fit the gear lever and casing assembly to the panel :

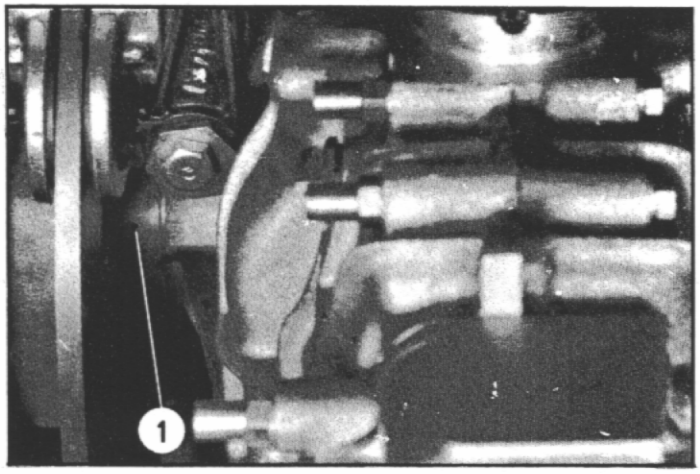
Turn the flat « c » of the casing to the right-hand side (reverse gear stop side).
Fit the casing into its housing on the panel.
Tighten the bolts (9).
Fit the dust-excluder to the casing.
Check that when second gear is selected, the gear lever does not touch the casing or the driver's seat.

9. Replace the spare wheel.

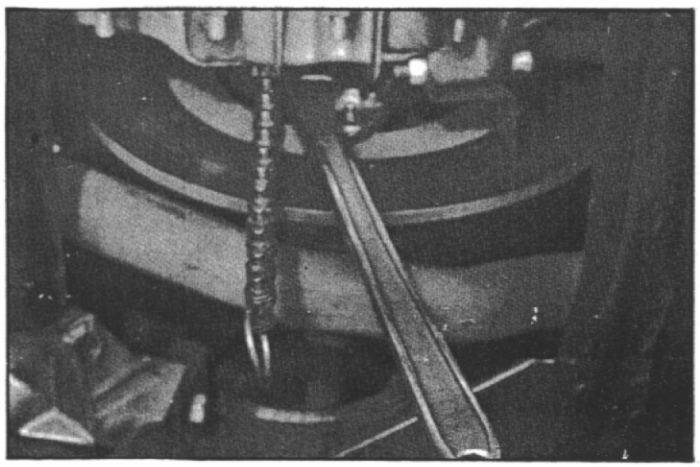
8872

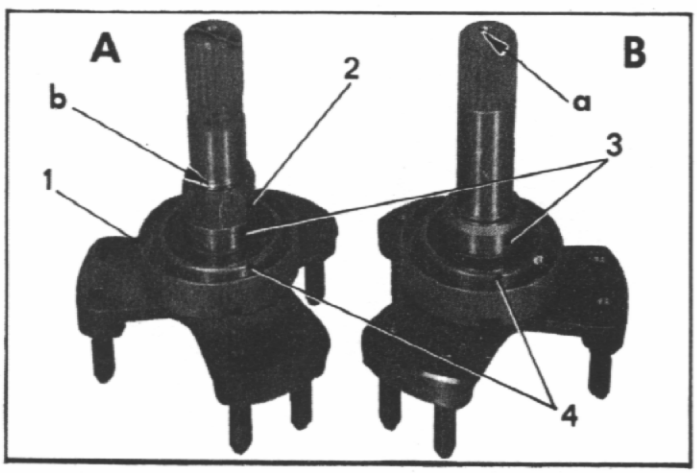


REMOVING AND FITTING A DIFFERENTIAL SHAFT
(or a bearing or seal)

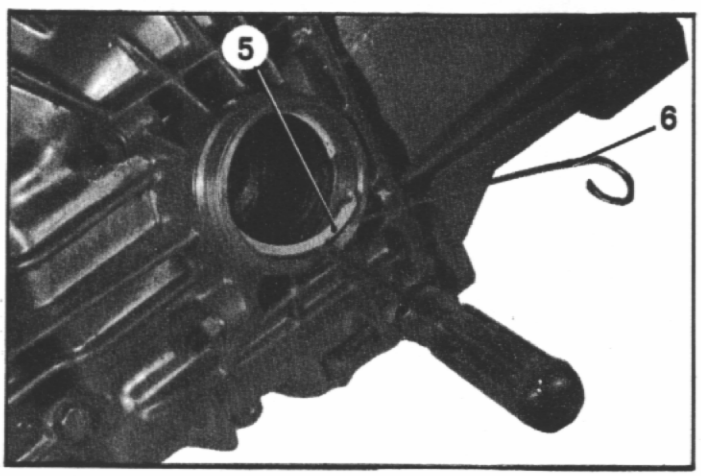


8611


9228



Manual 810-2
11244



11266

REMOVAL.

1. Remove the spare wheel.

2. Chock up the front of the vehicle with the wheels off the ground.

3. Disconnect the cable from the negative terminal of the battery.

4. Remove the brake disc.

5. From underneath the vehicle, slacken the ring nut (1) from the gearbox bearing (chain wrench).

6. Free the differential shaft.

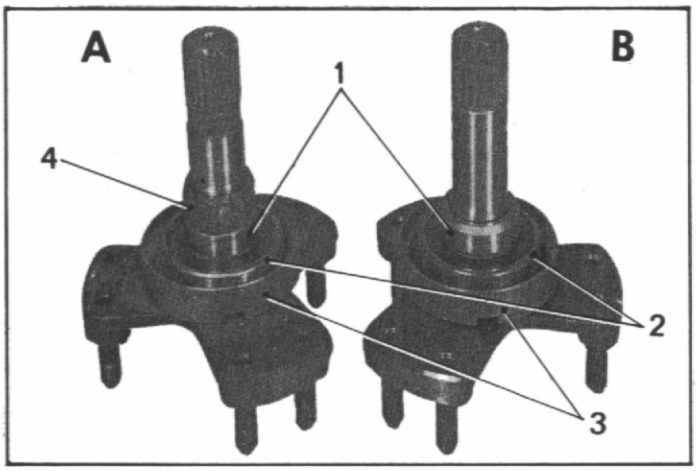
7. **Remove the sealing ring from the gearbox housing :**

a) *Gearboxes fitted with differential shafts with a nut (type A fitting).*
Free the ring by means of a screwdriver bearing on the collar of the gearbox bearing.

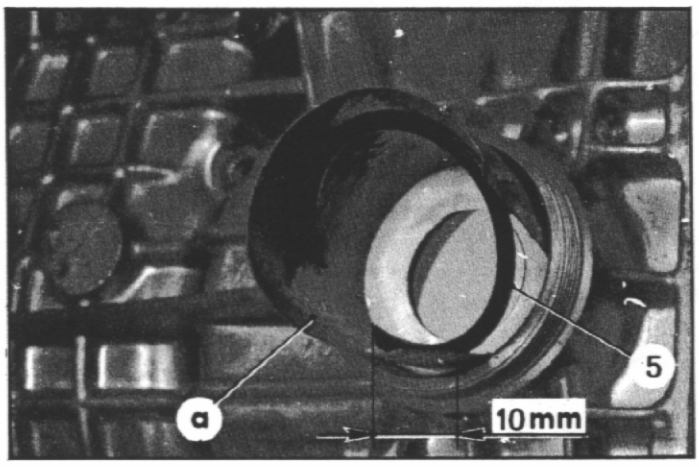
b) *Gearboxes fitted with differential shafts without nut (type B fitting).*
Remove the circlip (5).
Free the circlip from its recess after lifting it, using the tip of a screwdriver. Hold it with a hook (6) to complete the removal.
Press the sealing ring against the differential casing and release it by hand.

8. **Strip the differential shaft :**
Grease the visible part « b » of the threads *(type A fitting)* and remove the nut (4) : for this purpose use a universal extractor, bearing underneath the ring nut (1), as close as possible to the shaft.

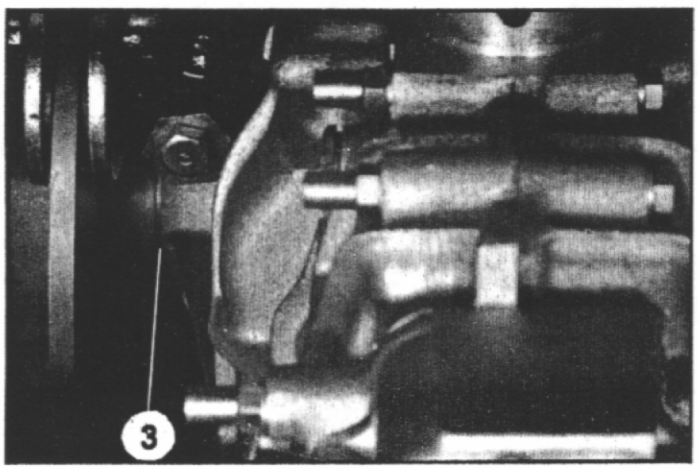
NOTE : The extractor should have central screw fitted with a ball to avoid damaging the end « a » of the shaft.



11244



11247



8611

FITTING.

9. Prepare the shaft :
Fit :
- the ring-nut (3),
- the seal bearing (2) (with a press, using a tube with internal diameter 26 mm, outside diameter 34 mm, length 120 mm),
- the ring (1).

IMPORTANT : The ring (1) (on which the seal bears) must show no trace of scratching or impact, otherwise it must be replaced.
Fit the nut (4) *(type A fitting)* and tighten it to 140 to 160 mΛN (14 to 16 m.kg).

10. Fit the differential shaft seal :
Grease the bore of the gearbox housing and the area around the seal.
a) *Gearboxes without bearing circlip :*
Fit the seal using the mandrel included in the kit 3184-T.
b) *Gearboxes with bearing circlip :*
Position the seal using a tube of external diameter 51 mm or a 36 mm socket wrench.
Push the seal as far as the circlip recess.
Insert the circlip (5) into the bore using a piece of foil « a » with the following dimensions :
- length = 150 mm
- width = 50 mm
- thickness = 0.2 mm

Use the tube or the socket wrench for positioning it.
Remove the foil and finish inserting the circlip and the seal by means of the mandrel used for gearboxes without circlips.
NOTE : For facilitating removal, the nose of the circlip should be 10 mm from the drain hole.

11. Fit the complete shaft :
Engage the splines of the shaft in those of the planet geqr. Strike lightly with a mallet to help position the bearing (2).
Tighten the ring-nut (3) to 60 to 100 mΛN (6 to 10 m.kg) (chain wrench).
IMPORTANT :*Output shaft with nut (type A fitting) : while tightening the ring, do not rotate the shaft (risk of damaging the lip of the seal).*
Lock the ring (3) by peening in the corresponding countersinking of the housing.

12. Fit the brake disc.

13. Check the oil level in the gearbox.

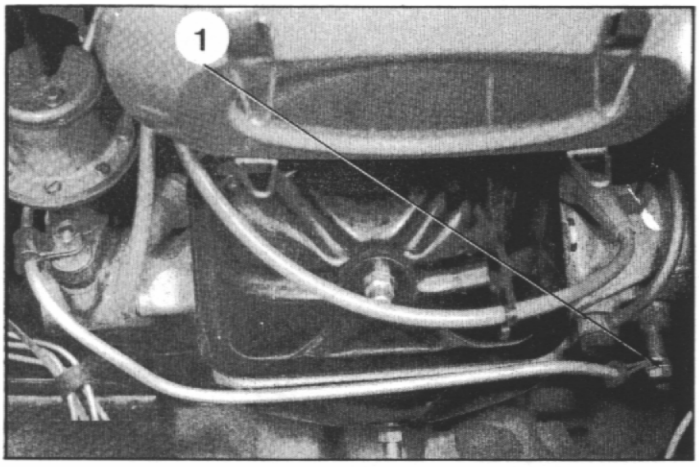
14. Lower the vehicle to the ground.

15. Connect the cable to the negative terminal of the battery.

16. Fit the spare wheel.

REMOVING AND FITTING A HIGH PRESSURE PUMP

8776

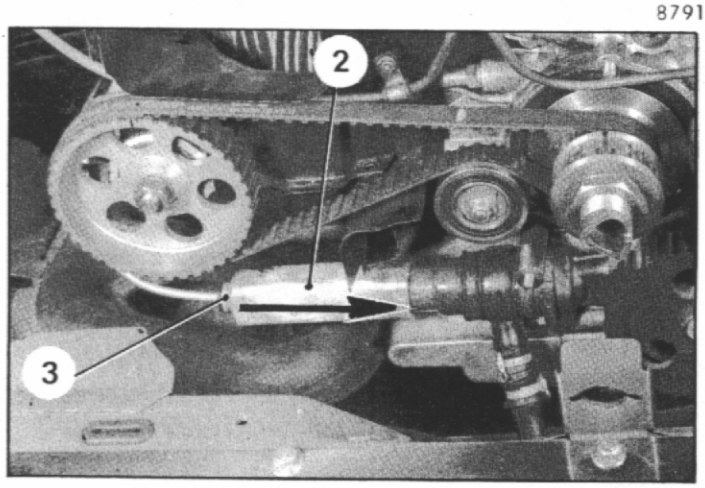


REMOVAL.

1. Remove the engine cooling air intake.

2. Open the pressure regulator bleed screw.

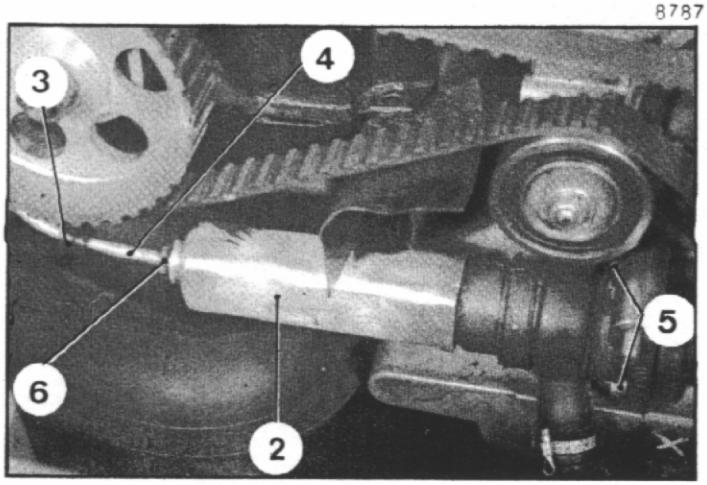
8791



3. Remove the bracket (1) holding the pump delivery pipe.

4. Free the ring (3) and push the protective cover (2) towards the engine (direction of the arrow).

8787

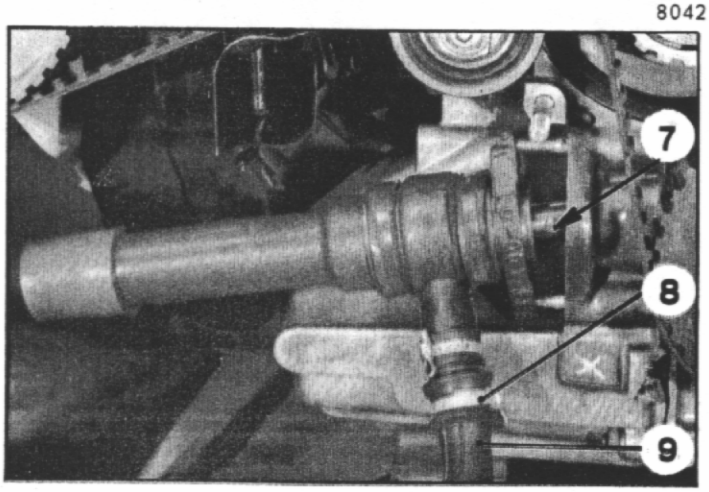


5. Slacken the union screw (6) and release the tube (4) without bending it.

6. Remove the pump :
Remove the nuts (5).
Gently pull the pump until the spindle (7) can be removed.

NOTE : If necessary, turn the engine to bring the driving rod to its top dead centre position.

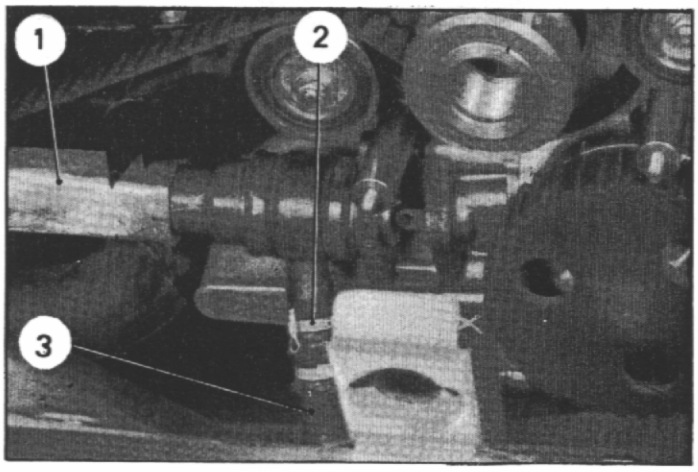
8042



7. Disconnect the flexible intake pipe :
- Slacken the collar (8),
- Free the flexible pipe (9) (tool 3903-T).

8. If necessary, remove the protective cover (2).

8796



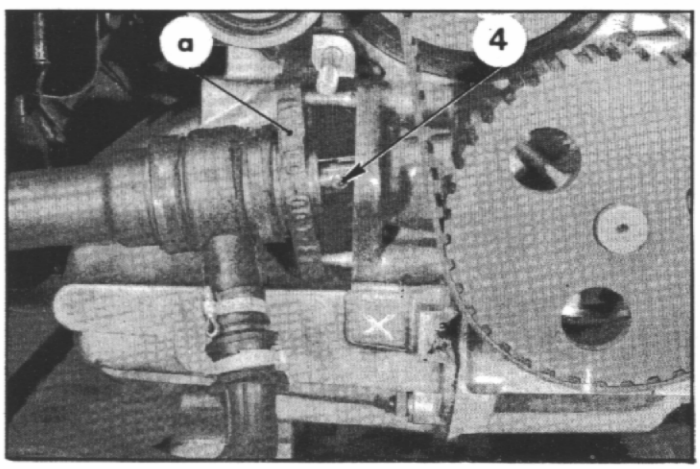
FITTING.

NOTE : During handling, hold the pump piston to prevent it from falling. Check that the bearing faces of pump and casing are clean. Change the O-ring seal between the pump and the engine casing.

9. Connect up the flexible intake pipe :
Fit the flexible pipe (3) to the connection.
Fit and tighten the collar (2).

10. If necessary, position the protective cover (1) on the pump body.

8042



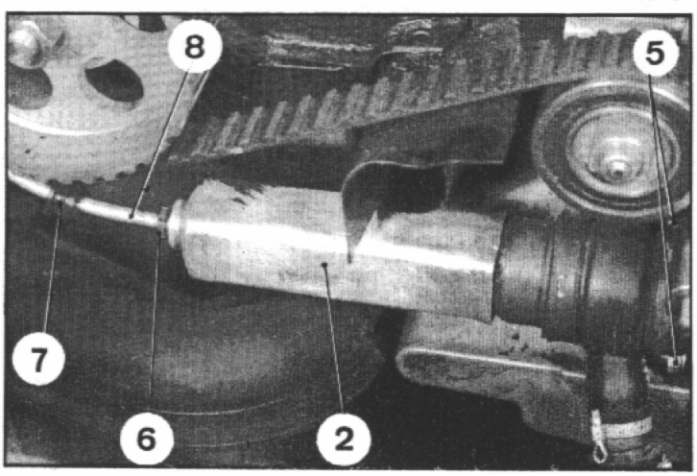
11. Place the pump on the lower mounting stud.
- Connect up the piston drive rod and fit the spindle (4).

NOTE : If necessary, turn the engine to bring the connecting rod to its top dead centre position.

CAUTION : Ensure :
- that the piston is correctly placed in the pump cylinder,
- that the O-ring seal is in place in the groove on the engine casing.

Fit the pump completely over the mounting studs (it should be possible to bring the base plate «a» up to the engine casing without forcing).
Tighten the nuts (5) to 13 to 14 mΛN (1.3 to 1.4 m.kg) (contact washer).

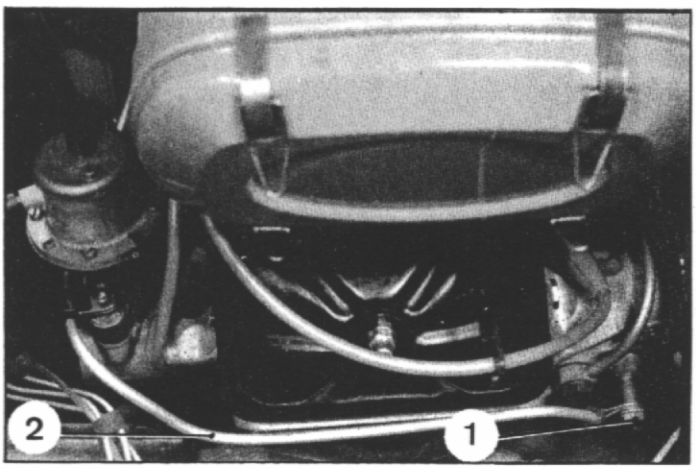
8787



12. Connect up the pump delivery pipe (8) (new seal).
Gently tighten the union screw (6).

13. Fit the ring (7) to the protective cover (1).
- Move the cover (1) on the pipe (8) so that the ring (7) can be fitted.
- Replace the cover (1) on the pump body ; the ring (7) should be in contact with the union screw (6).

8776



14. Fit the bracket (1) holding the pipe (2) on the cylinder head.

Tighten the nut (contact washer).

15. Fit the air intake.

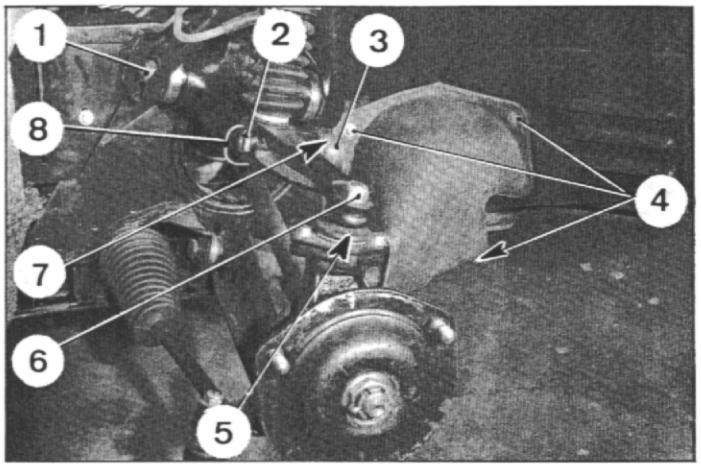
16. Prime the high pressure pump :

- Free the pipe from the hydraulic tank,
- Fill the high pressure pump with L.H.M liquid through the pipe,
- *Start the engine with the pressure regulator bleed screw slackened.*
- Rapidly replace the pipe in the tank.

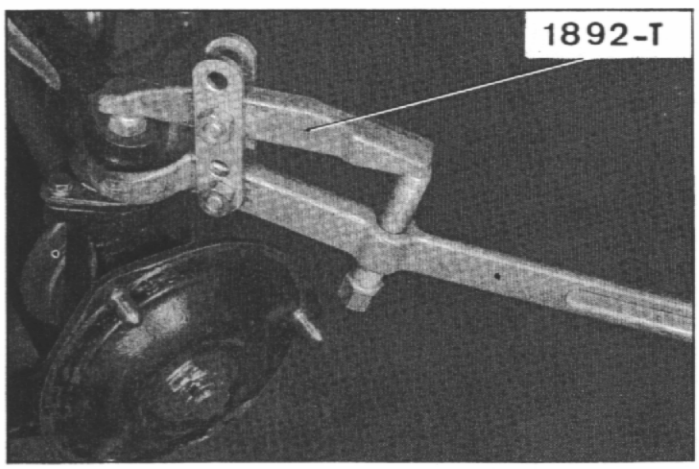
17. Tighten the pressure regulator release screw.

I. REMOVING AND FITTING AN UPPER SUSPENSION ARM.

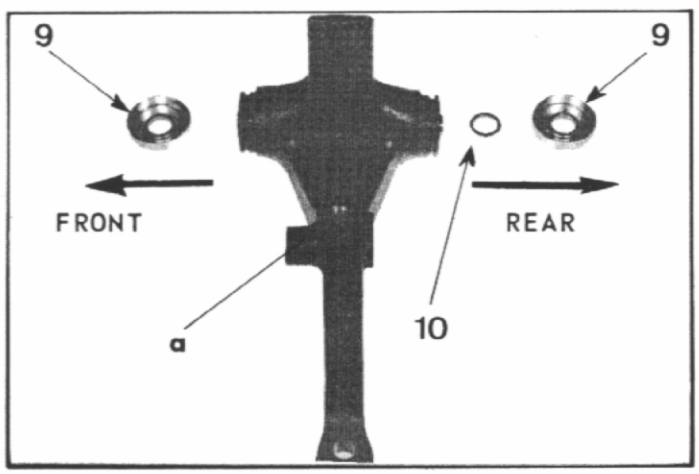
8441



9093



8876



REMOVAL.

1. **Chock up the vehicle :**
   Place the vehicle *in the high position* so that the jack can be pushed underneath.
   Support the front of the vehicle with *the wheels off the ground.*
2. **Release the pressure in the circuits :**
   Slacken the pressure regulator bleed screw.
   Place the height control *in the normal position.*
   Wait until the rear suspension has stabilized and then the lever *to the high position.*
3. Remove the wheel.
   If the work is to be done on the right-hand side, remove the three bolts (4) and the height corrector protection plate.
4. **Disconnect the anti-roll bar :**
   Slacken the castellated nut (2) by a few threads and tap its end sharply to free the ball joint (3).
5. Remove the pin (8).
6. **Disconnect the upper ball joint :**
   Slacken the nut (6) by a few threads.
   Release the ball joint using the extractor 1892-T.
   Remove the nut (6).
7. **Remove the arm :**
   - Remove the nut (1).
   - Drive out the swivel pin.
   - Free the arm.

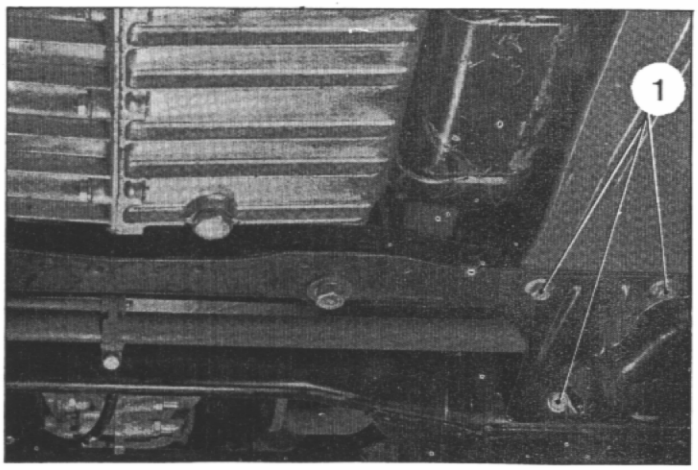
FITTING.

NOTE : The left-hand and right-hand arms are different. The boss « a » must face forward when the arm is fitted to the vehicle.

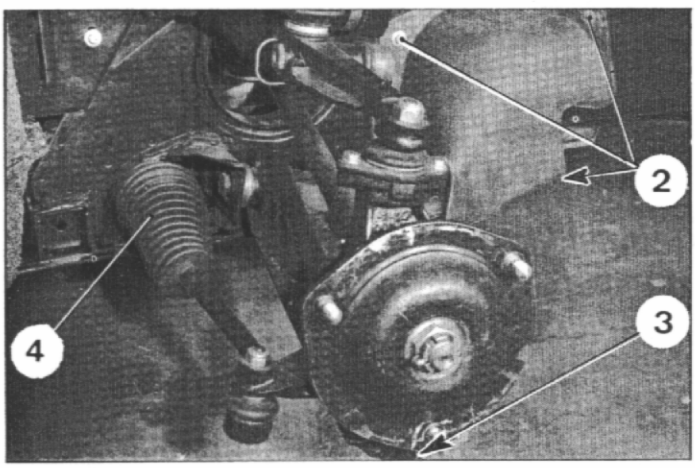
8. **Fit the arm :**
   Place the shim washer (10) at the opposite side to the boss « a » (stick it with grease).
   Fit the protective caps (9).
   Offer up the arm and engage the pin.
   Fit a new NYLSTOP nut.
   Tighten to 59 to 65 m\N (5.9 to 6.5 m.kg) (torque wrench).
   Check the swivelling of the arm (no play).
9. **Connect up the upper ball joint :**
   Check the rubber seal (5). If it is in poor condition, replace the ball joint assembly.
   Degrease the tail of the ball joint and its housing using a cloth soaked in solvent.
   Fit a new NYLSTOP nut and tighten it to 27 to 30 m\N (2.7 to 3 m.kg) (torque wrench).
10. **Couple up the anti-roll bar :**
    Check the rubber seal (7). If it is not in good condition, replace the linkage rod.
    Tighten the castellated nut (1) to 25 to 30 m\N (2.5 to 3 m.kg) (torque wrench).
11. Fit the pin (8).
12. *Right-hand side :* Fit the protective cover to the height corrector.
13. **Fit the wheel.**
    Lower the vehicle to the ground.

II. REMOVING AND FITTING A LOWER SUSPENSION ARM

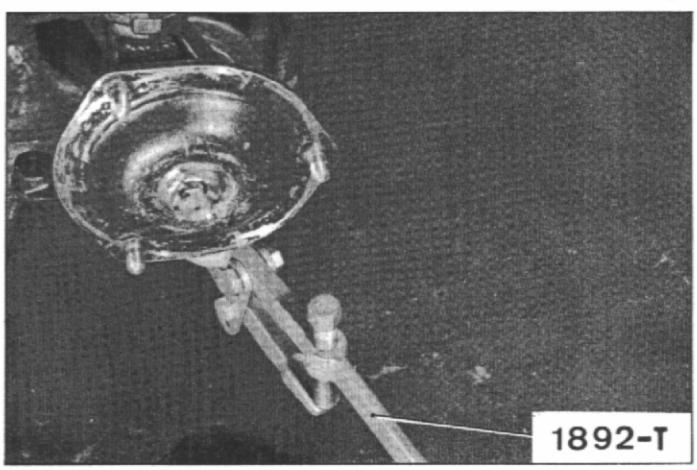
8536



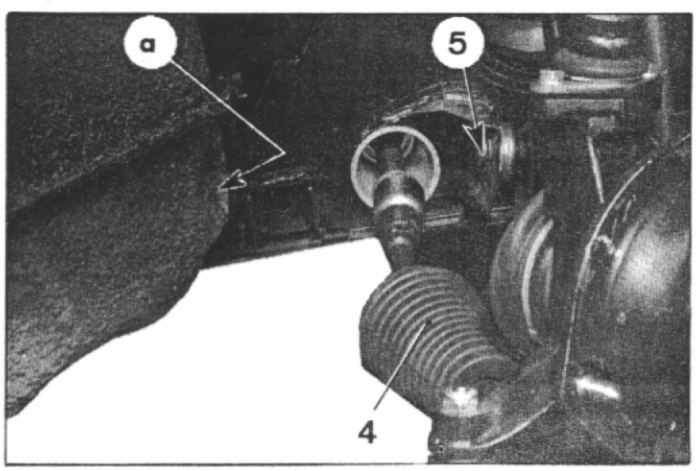
8441



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8455



REMOVAL.

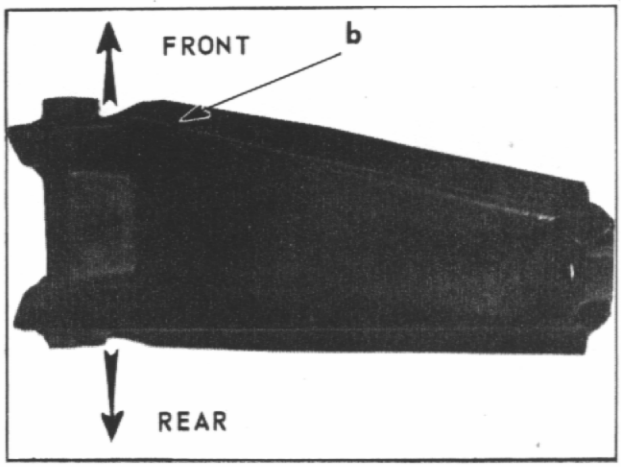
1. **Chock up the vehicle :**
   Put the vehicle *in the position* so that the jack can be put underneath.
   Chock up the front of the vehicle *with the wheels off the ground.*
2. **Release the pressure in the circuits :**
   Slacken the pressure regulator bleed screw.
   Place the height control *in the normal position.*
   Wait until the rear suspension has stabilized and then put the control lever *to high position.*
3. Remove the wheel.
4. Remove the three bolts (1) and the steel plate protecting the anti-roll bar bearing.
5. If the work is to be done on the right-hand side remove the bolts (2) and the height corrector protection plate.
6. **Disconnect the lower ball joint :**
   Slacken the nut (3) by a few threads.
   Unstick the ball joint using the extractor 1892-T.
   Remove the nut (3).
7. Slide away the bellows (4).
8. **Remove the suspension arm :**
   Remove the nut and then free the pin (5). If necessary, slightly bend the wheel arch at « a ».
   Remove the arm horizontally and then upwards.

FITTING.

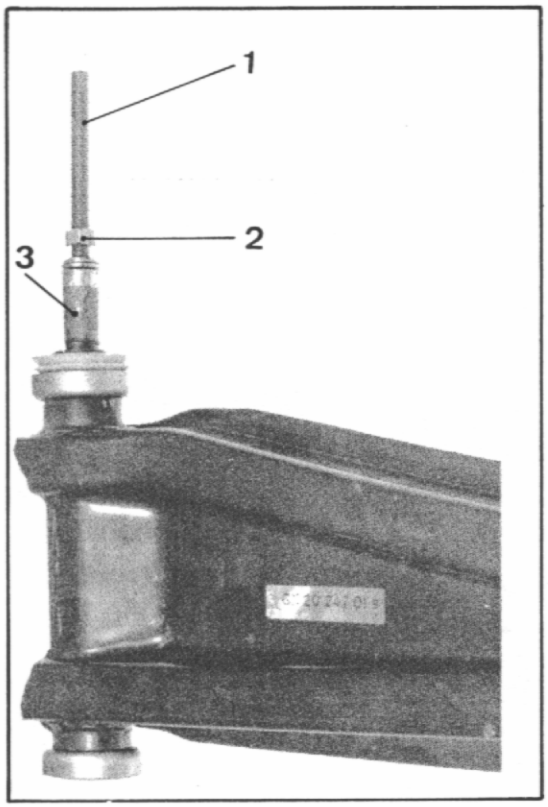
NOTE : The left-hand and right-hand suspension arms are different. The edge « b » must face forward when the suspension arm is on the vehicle.

9. **Fit the suspension arm :**
   Offer up the suspension arm.
   Fit the pin and a *new NYLSTOP nut.*
   Tighten it to 80 to 88 mAN (8 to 9 m.kg) (torque wrench).
10. **Connect up the lower ball joint :**
    Check the rubber seal. If it is in poor condition replace the ball joint assembly.
    Degrease the tail of the ball joint and its housing using a cloth soaked in solvent.
    Fit a *new NYLSTOP nut* and tighten it to 27 to 30 mAN (2.7 to 3 m.kg) (torque wrench).
11. **Position the bellows (4) (elastic collar).**
12. Fit the anti-roll bar bearing protection plate and tighten the bolts (1) (contact washer).
13. If the work is being done on the right-hand side : fit the protective cover for the height corrector. Tighten the bolts (2) (contact washer).
14. Fit the wheel.
15. Lower the vehicle to the ground.

8883



iii. REPLACING THE « FLUIDBLOC » BUSHES OF A LOWER SUSPENSION ARM.



1. Remove the suspension arm.

2. Remove the « fluidbloc » bushes :

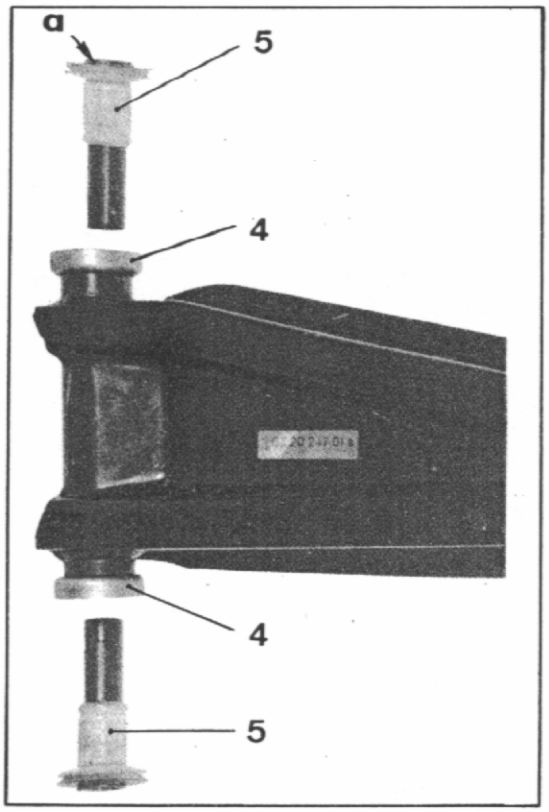
a) Clamp the arm in a vice (jaws).
NOTE : Use a 8 mm expanding pin (« Rawl » pin or similar type) to enable the bushes to be removed more easily.
Fit the pin with a threaded rod (1) and a nut (2).

b) Insert the pin into the bush.
Tighten the nut in order to open the two legs of the pin until the bush can be moved.

c) Pull on the rod while rotating the bush until the latter is completely withdrawn.

d) Disengage the pin (3) from the « fluidbloc » bush.

e) Proceed in the same way for removing the second bush.



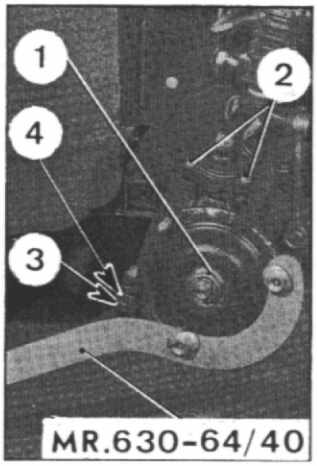
3. Clean the arm.

4. Grease the metal cups (4) and the thrust face of each « fluidbloc » bush (use TOTAL MULTIS grease).

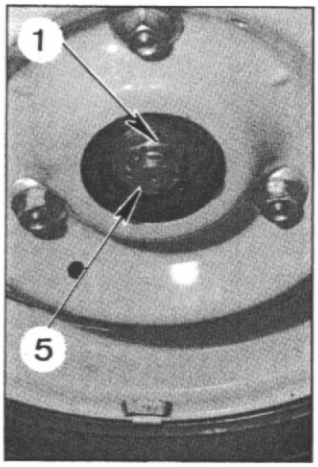
5. Fit the new « fluidbloc » bushes.
Complete the fitting by tapping on side « a » of each bush, using a mallet.

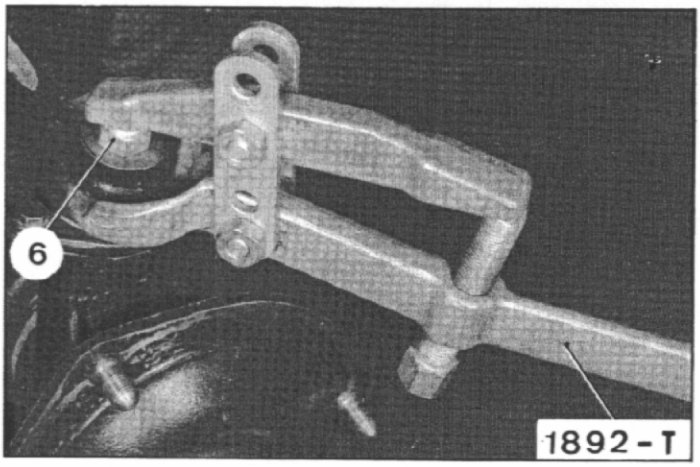
I. REMOVING AND FITTING A COMPLETE SWIVEL OR BALL JOINT (UPPER OR LOWER)

8443

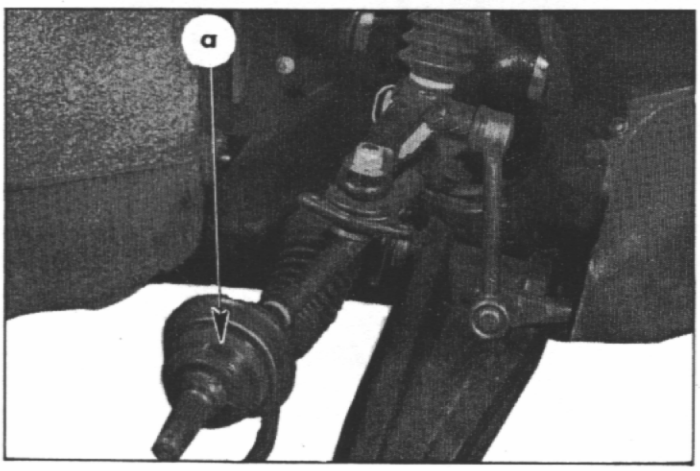


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8444



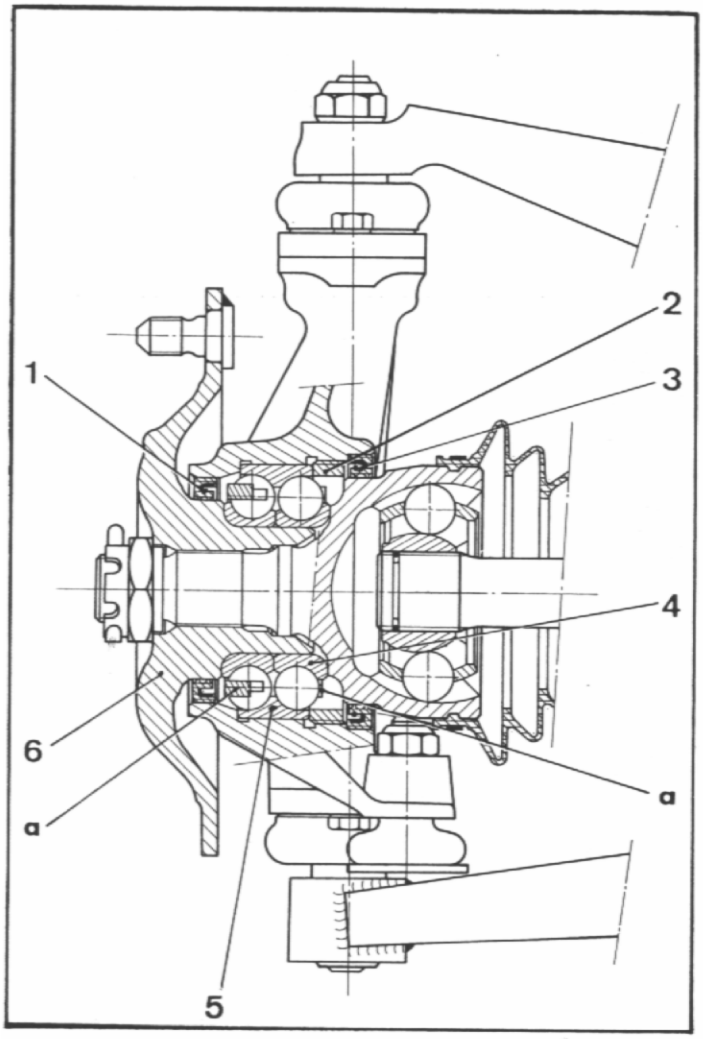
REMOVAL.

1. Put the vehicle *in the high position* so that the jack can be put underneath.
2. Remove :
   - the embellisher,
   - the pin (5),
   - the nut (1).
3. Chock up the front of the vehicle *with the wheels off the ground.*
4. Remove the wheel.
   NOTE : When the wheel has been removed, the nut (1) can be slackened using the tool MR. 630-64/40.
5. **Disconnect the steering ball joint (3) from the swivel :**
   Slacken the nut and use the extractor 1892-T.
6. **Remove the upper and lower ball joints (if necessary) :**
   Use the extractor 1892-T.
   Bear on the nut (6) previously slackened by a few threads.
7. **Remove the swivel :**
   Remove the bolts (2) holding the lower and upper ball joints.
   Push back the end of the drive shaft and free the swivel.
   CAUTION : *Do not pull on the drive shaft otherwise the ball joints will come out of the « tripod» transmission.*

FITTING.

8. **Fit the lower and upper ball joints :**
   Degrease the tails of the ball joints and their housings (using a cloth soaked in solvent).
   Replace the NYLSTOP nuts. Tighten them to 27 to 30 mAN (2.7 to 3 m.kg) (torque wrench).
9. **Fit the swivel :**
   Offer up the swivel and fix the lower ball joint.
   Tighten the bolts (contact washer) to 18.5 mAN (1.8 m.kg) (torque wrench).
10. **Fit the drive shaft :**
    Grease the surface « a » of the seal
    Fit the nut (1).
11. **Fit the upper ball joint :**
    Tighten the bolts (contact washer) to 18.5 mAN (1.8 m.kg) (torque wrench).
12. **Connect up the steering ball joint (3) to the swivel :**
    Check the rubber seal (4). If it is in poor condition replace the track rod assembly.
    Degrease the tail of the ball joint and its housing (cloth soaked in solvent).
    Replace the NYLSTOP nut and tighten it to 18 to 20 mAN (1.8 to 2 m.kg) (torque wrench).
13. Tighten the nut (1) (faces and threads greased) to 350 to 400 mAN (35 to 40 m.kg) (torque wrench).
    Use the tool MR.630-64/40. Pin the nut.
    NOTE : The nut (1) may be tightened with the wheel fitted and the vehicle on the ground.
14. Fit the wheel and lower the vehicle to the ground.

II. REMOVING AND BEARING, SEALS OR HUB.



G. 41-1

REMOVAL.

1. **Remove the swivel.**

2. **Remove the sealing ring (3).**

3. **Remove the ring-nut (2) :**
   NOTE : The ring-nut should only be removed when the bearing has to be replaced.
   Using a 4 mm drill, clear the peening locking the ring-nut.
   Fit the central part of the assembly 3321-T fitted with the key 3320-T. Position the bolt A.

4. **Remove the hub (6) :**
   Screw the extractor 1893-T in the place of the ring-nut.

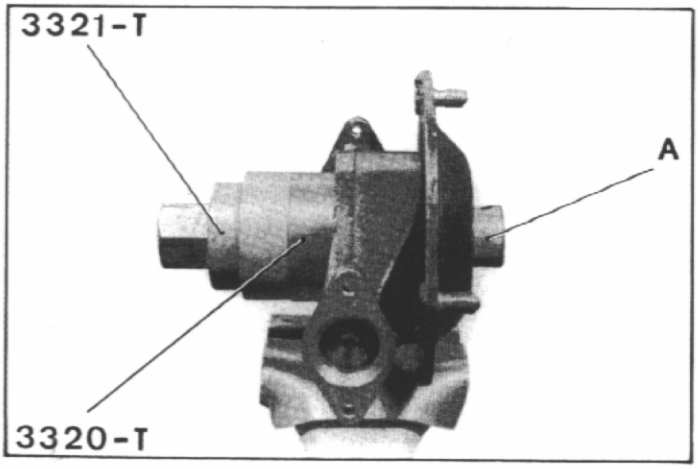
5. **Remove the sealing ring (1).**

6. **Remove the hub bearing.**

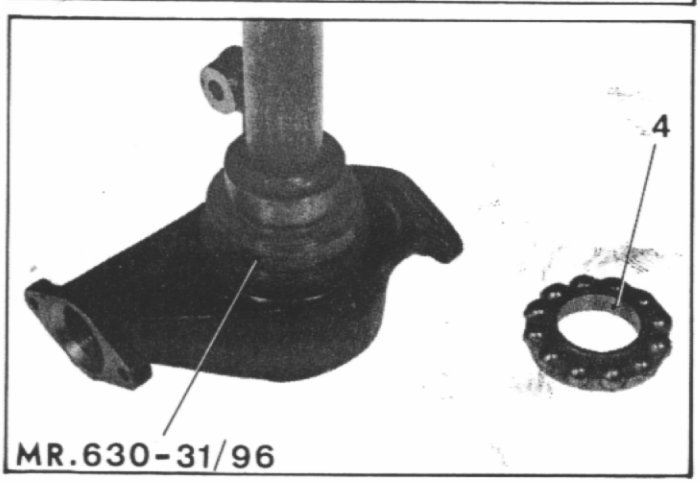
FITTING.

7. **Fit the hub bearing :**
   Smear the bearing with grease. Take out the inner race (4) and fit the bearing into the swivel, using a press and the mandrel MR. 630-31/96. The mandrel should bear on the outer race (5). Fit the inner race (4).
   CAUTION : The projecting part « a » of the ball races should face the outside of the bearing (see drawing).

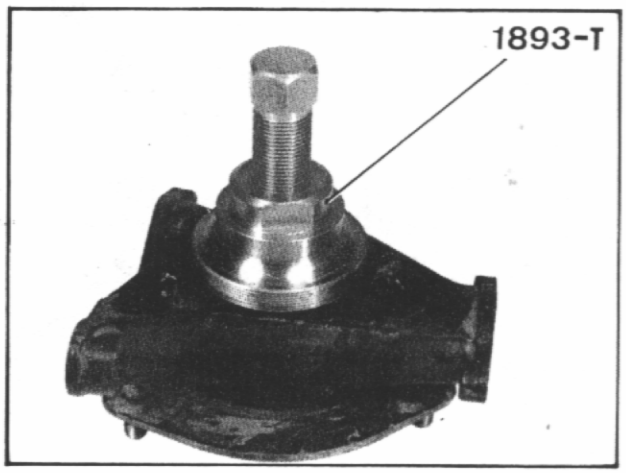
8. **Fit the ring-nut (2) :**
   Use the central part of the assembly 3321-T, fitted with the key 3320-T. Position the bolt A. Tighten the ring-nut to 400 tp 500 mΛN (40 to 50 m.kg) (torque wrench) and lock it by two blows with a punch at diametrically opposed points.



8897

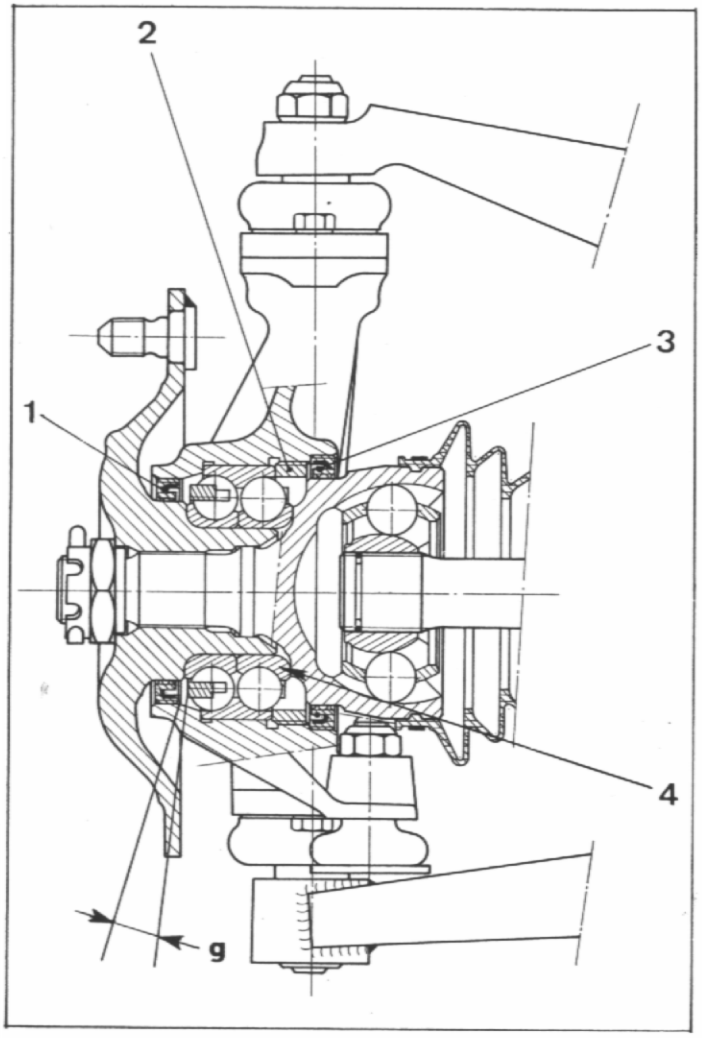


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G. 41-1



9. Fit the sealing ring (1) :

Use the mandrel MR. 630-31/97 to give the clearance « g » between the ring and the ball race.

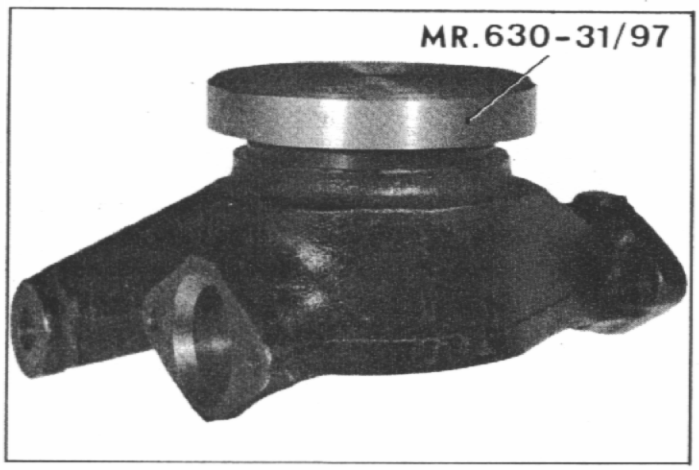
10. Fit the hub :

Grease the inner lip of the ring (1) and where it touches the hub (at « a »).

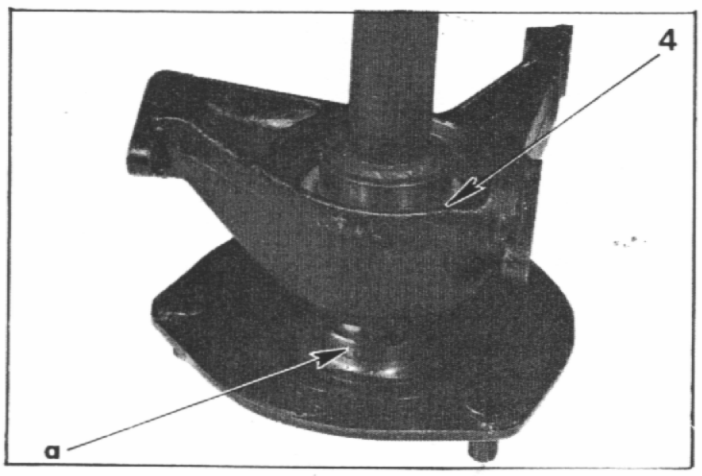
Fit the hub using a press bearing on the *inner ball race (4) of the bearing.*

11. Fit the sealing ring (3) :

Push this ring right home into its housing.

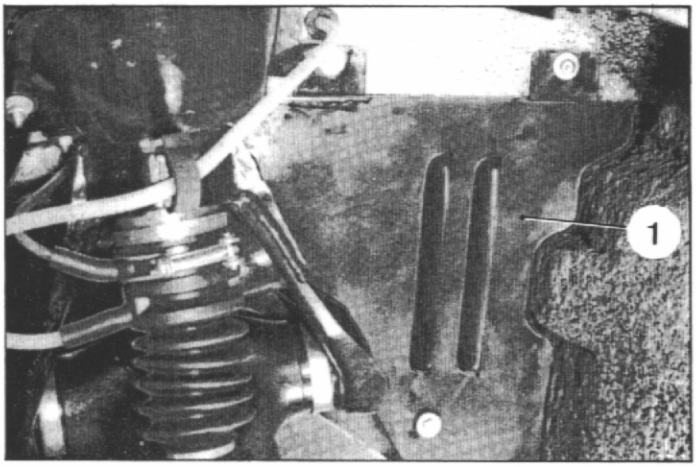


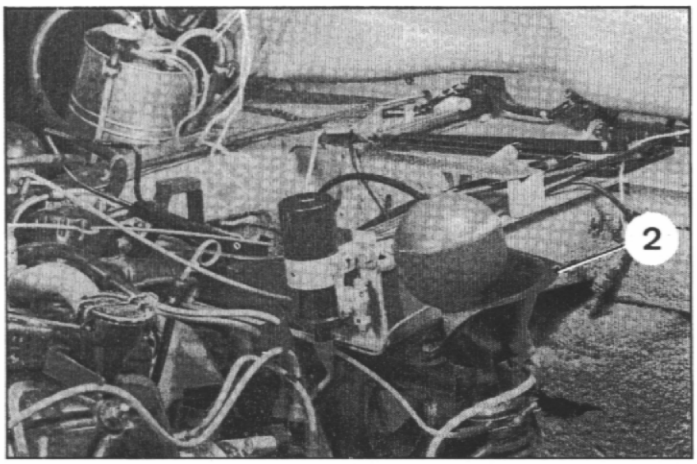
12. Fit the swivel to the vehicle.

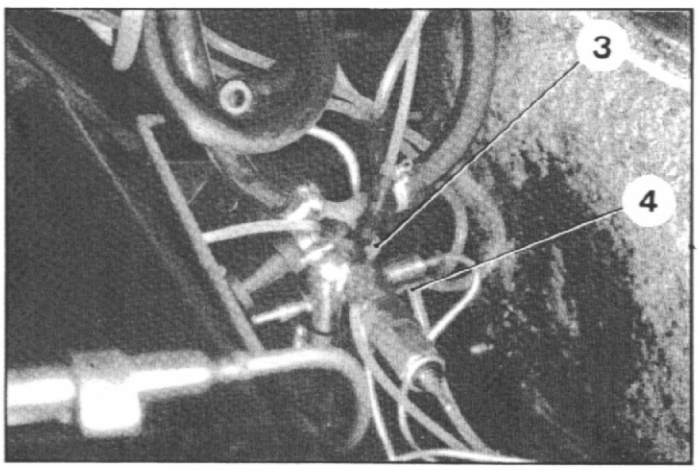


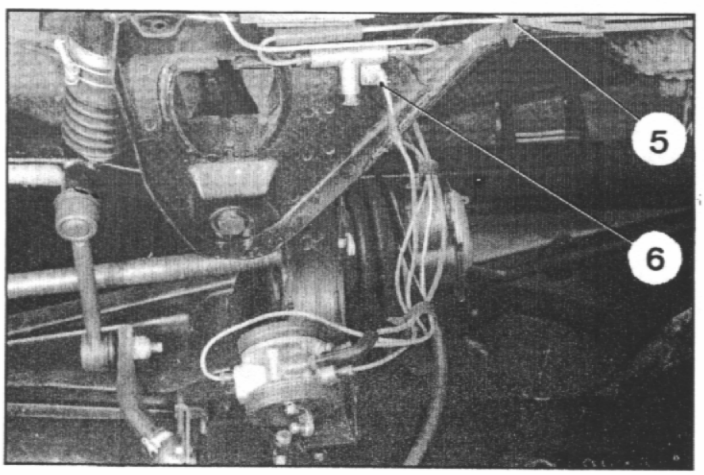
REMOVING AND FITTING A FRONT AXLE UNIT

(For exchange)









Manual 810-2

REMOVAL

1. Choke up the vehicle at the front with the wheels off the ground.

2. Slacken the release screw on the pressure regulator.
   Place the manual height control to *normal position.*

3. Remove the bolt holding the bonnet strut on the wheel arch.
   Raise the bonnet fully without touching the scuttle upper panel and secure it in this position, using a cord (protect the upper panel).

4. Remove :
   - the spare wheel,
   - the battery.

5. Disconnect the electrical harnesses supplying the headlights, the indicator lights, the horn, the alternator, the distributor and the lead for the oil pressure switch.

6. Remove the suspension spheres.
   Blank off each suspension cylinder with a plug.

7. Remove the front panel assembly and the lower front finishing panel.

8. **Remove the engine-gearbox assembly.**

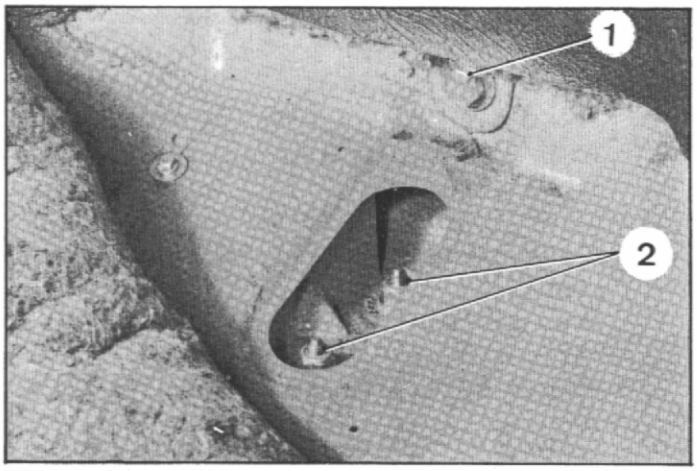
9. Remove the bolt holding the jointed shaft to the pinion of the steering box.

10. *On each side, remove :*
   - the plates (1) between chassis and axle unit,
   - the plates (2) protecting the suspension spheres.

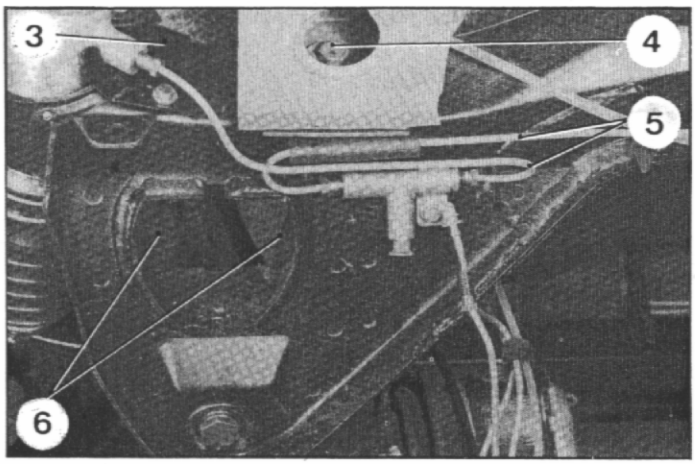
11. Remove the bolts (3) and (4) holding the four-way union and the union for the overflow return tubes.
   Uncouple the supply union (6) from the height corrector .
   Disconnect the overflow return tubes from the front suspension cylinders and clear them from the collars (5).

12. Remove :
   - the bolts holding the right-hand anti-roll bar bearing,
   - the linkage rod from the manual height control.

13. Remove the drive shafts.



9410



9409

14. Remove the axle unit :

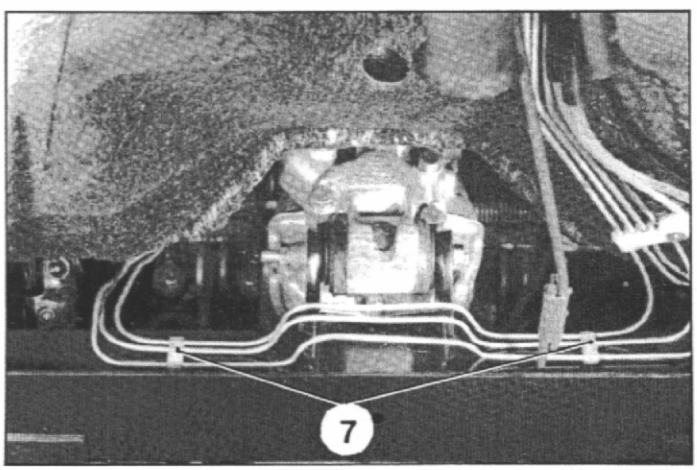
a) Place a jack, fitted with trestle support 2510-T, under the front unit.

b) Lift up the front carpet under the pedals, and at each side remove the rear fixing bolts (1) and (2) of the unit.
Remove the bolts (4) from the two front extensions.
Free the hydraulic pipes from their brackets.

c) Detach the unit from the chassis.

IMPORTANT : Mark the position of the shims placed between chassis and lower mounting at (1).

CAUTION : Hold the height corrector (8) so that it is not damaged when the suspension unit is removed.
Fix it to the extension after the unit has been taken away.

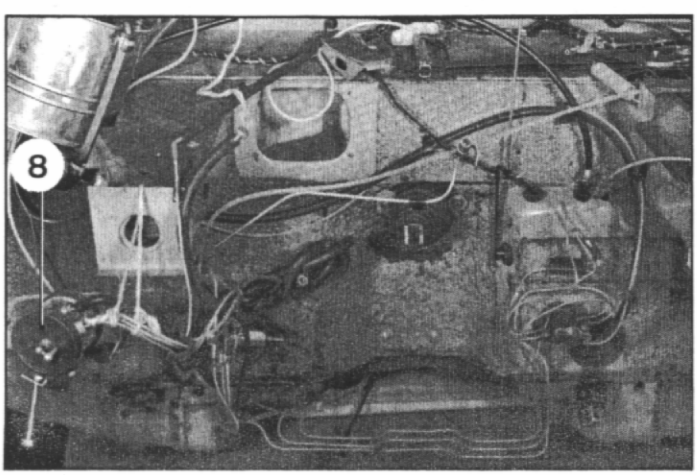


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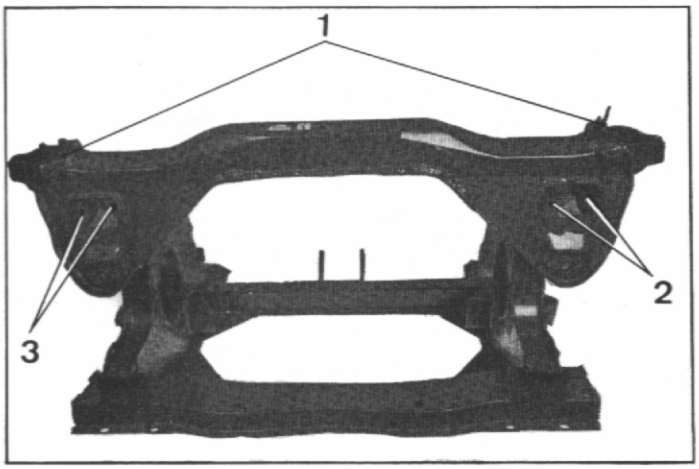
15. Strip down the axle unit :

Remove :

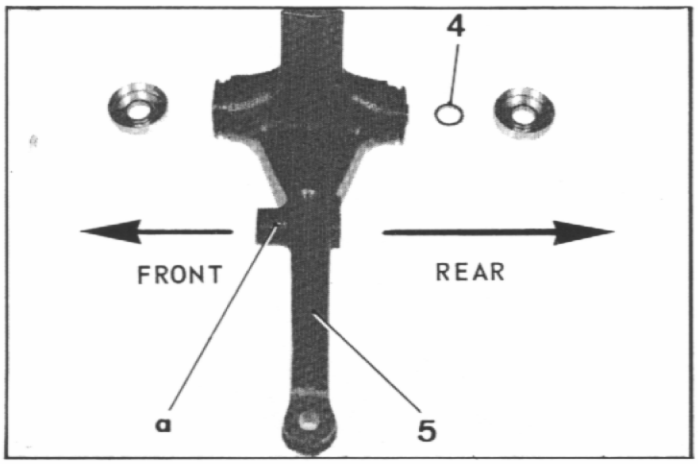
- the anti-roll bar,
- the automatic height control rod,
- the suspension arm and swivel assemblies,
- the track rods,
- the steering system,
- the brackets (3),
- the suspension cylinders,
- the travel stops (6),
- the pipes (5) and the three-way union,
- the brackets (7) of the hydraulic pipes,
- the spare wheel support



9415

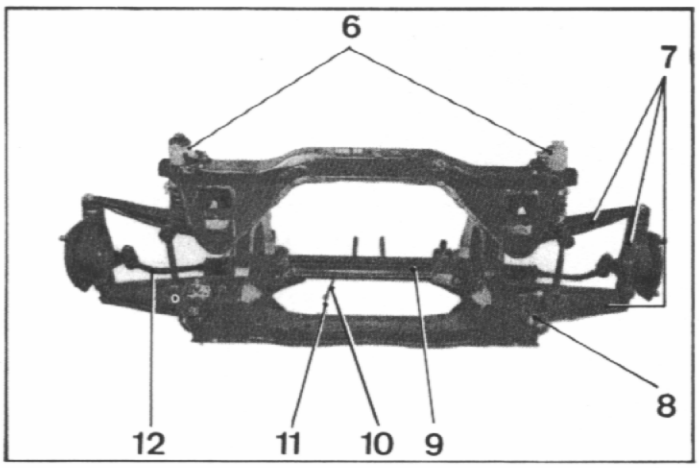


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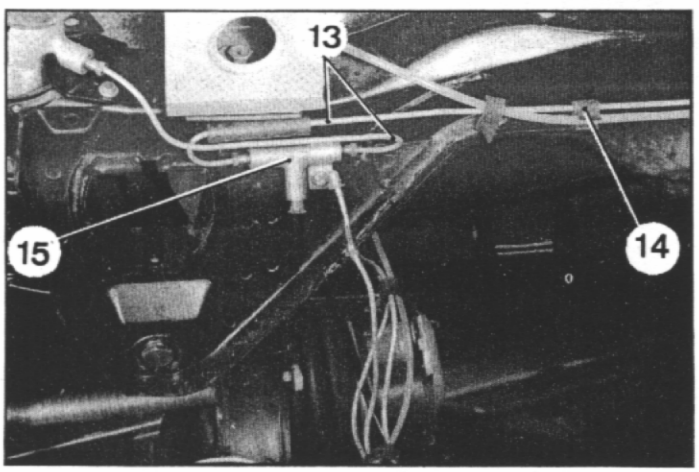


8876

Manual 810-2



9468



9409

PREPARATION

16. Assembling the axle unit :

a) Fit the travel stops (2) and (3) (using soapy water only).

b) Fit the suspension arm and swivel assemblies (7) and fit the pins :

- The threads on the pin holding the upper suspension arm (5) *must be directed towards the body* while that on the lower arm *must be directed towards the front of the vehicle.*
- The shim (4) should be placed on the opposite side to the boss « a ».
- Fit a new NYLSTOP nut on each pin.
- Tighten the nut on the upper suspension arm to 59 to 65 mΛN (5.9 to 6.5 m.kg). The nut on the lower arm should be tightened to 80 to 88 mΛN (8 to 8.8 m.kg) (torque wrench).
- Oscillate the suspension arms and check that there is no play where they are connected to the unit.

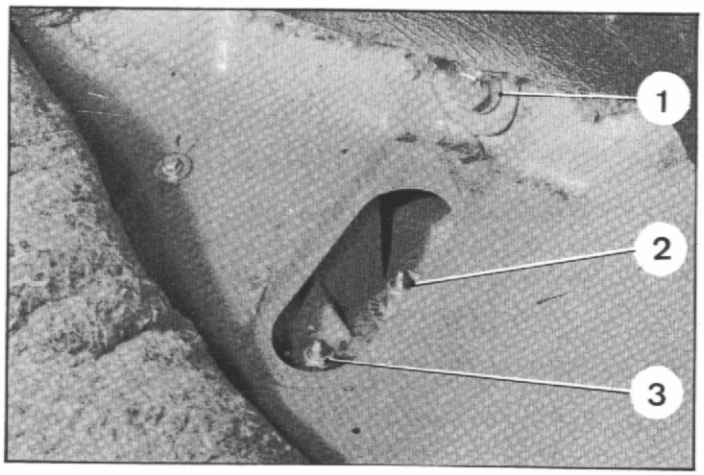
c) Fit the automatic height control rod (11). *Do not tighten the mounting flange on the anti-roll bar.*

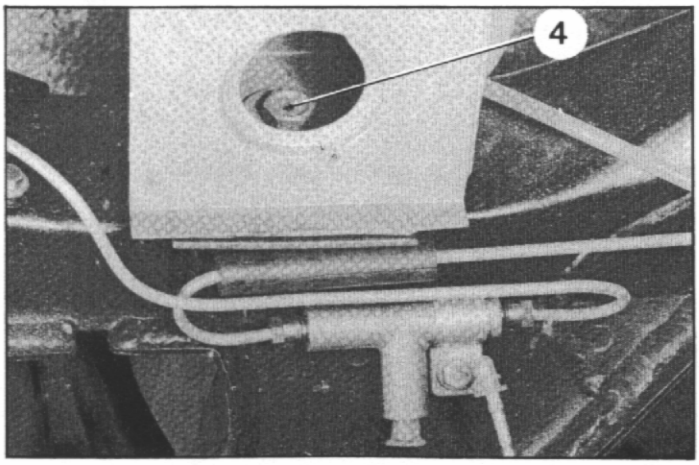
d) Fit :

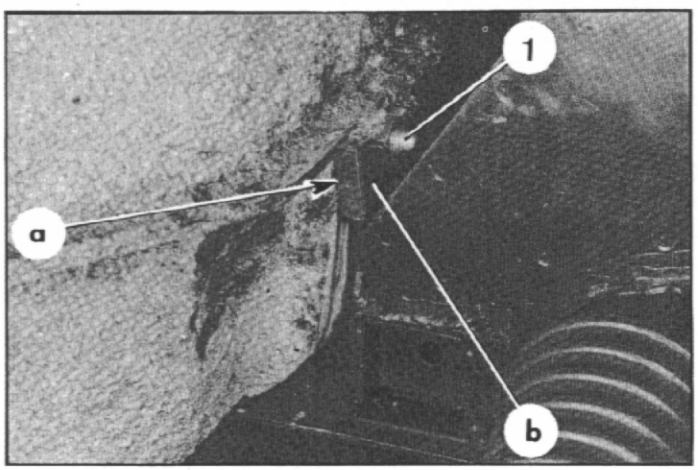
- the anti-roll bar (8),
- the steering system (9),
- the track rods (12),
- the suspension cylinders (6),
- the brackets (1) orientating the cylinders (contact washer),
- the lugs (14) holding the supply pipe to the left-hand cylinder,
- the three-way union (15),
- the feed pipes (13) to the suspension cylinders,
- the linkage (10) to the manual height control,

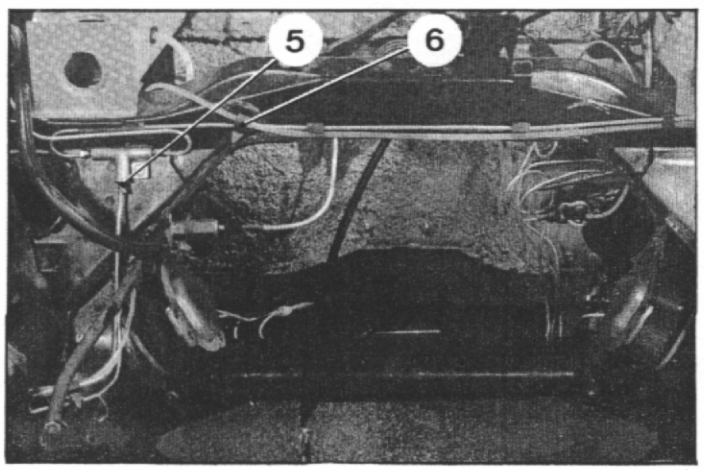
e) Adjust the position of the steering rack so as to give *equal clearance at each side of the housing.*

f) Fit the hydraulic pipe supports.









FITTING

17. Fit the axle unit to the vehicle :

a) Place the unit on a jack fitted with the trestle support 2510-T.
Bring the assembly under the chassis mounting points.

b) Set the steering wheel in the correct position : the arm should be on the left-hand side at an angle of 30° below the horizontal (in the « twenty to » position).
Engage the splines of the jointed steering column in the steering rack pinion without moving the steering rack (see paragraph 16 e).

c) Fit the mounting bolts to the unit.
At each side :
- Fit the bolts (2) and (4) by hand (flat washer under the bolt heads),
- Tighten the nut on the bolt (2) to 20 mΛN (2 m.kg).
- Fit the bolts (3) (flat washer on the head).
- Tighten the bolts (2), (3) and (4) to 45 to 50 mΛN (4.5 to 5 m.kg) and in the following order :
bolt (4), (2) and (3).

d) Adjust the stress on the brackets « b » at the lower unit mounting :
At each side :
- Place the necessary thickness of shims at the point « a » to give *a maximum clearance of 0.5 mm* (between brackets and shims) *before tightening the mounting bolts (1).*
(There are two thicknesses of shim : 1 and 2 mm).

NOTE : Replace the NYLSTOP nuts whenever the unit is removed.

18. Fit the front height corrector.

19. Adjust the lateral play on the bar.

20. Pre-set the front heights.

21. Connect up the manual height control.

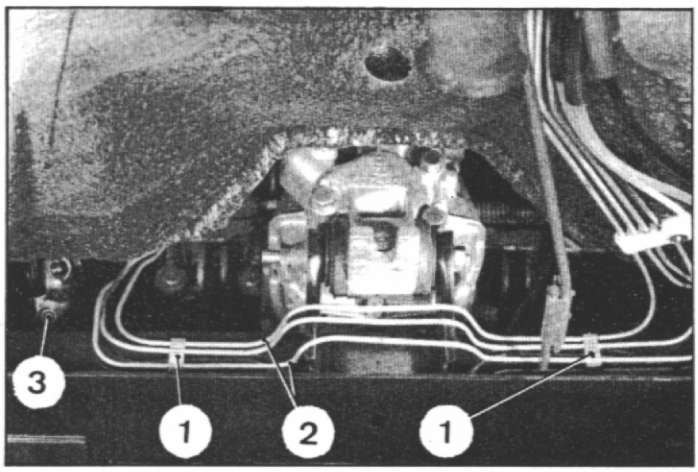
22. Connect up the overflow return pipes of the suspension cylinders.

23. Link up the union (5) (new seal).

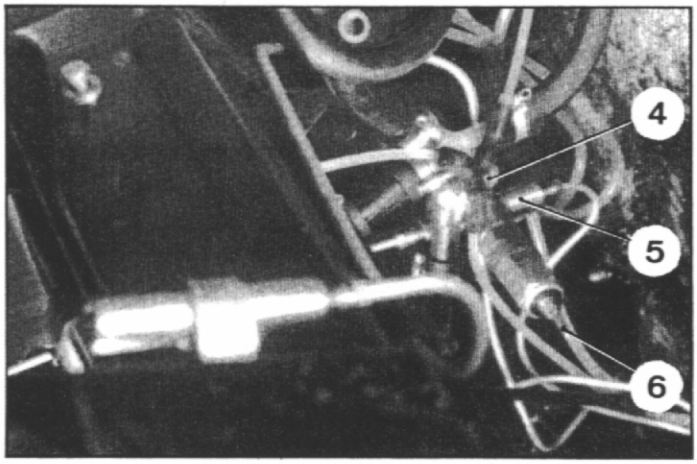
Tighten to 8 to 9 mΛN 0.8 to 0.9 m.kg).

Fit the rubber collars (6) holding the overflow return pipe and the vent pipe of the left-hand suspension cylinder.

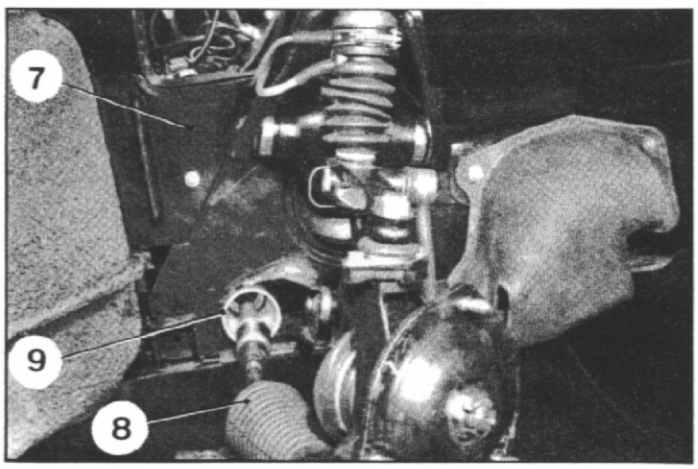
9022



9408



Manual 810-2



8455

24. Fit the bolt (3) (*new NYLSTOP nut each time*) and adjust the clearance between the steering column support tube and the stop ring for the steering column (1 to 1.5 mm).
Tighten the nut to 13 to 14 mΛN (1.3 to 1.4 m.kg)

25. Fit the four-way union (5) and the union for the pipes (4) (contact washer).

26. Fix the pipes (2) with the brackets (1).

27. *On each side, fit :*

- the plate protecting the suspension spheres,
- the plate (7) between chassis and unit.

28. Fit the spare wheel support block.

29. Connect the lead to the pressure contact (6).

30. Fit the engine-gearbox assembly :

31. Fit :
- the suspension spheres,
- the fan panel and lower finishing panel assembly.

32. Bleed the front brakes.

33. Fit the wheels and lower the vehicle to the ground.

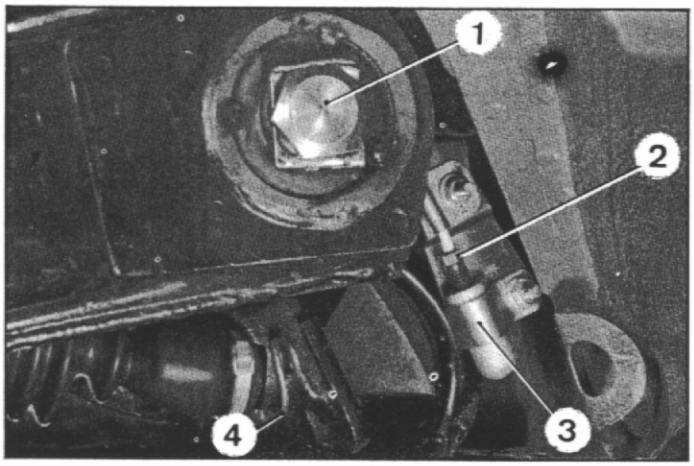
34. Check the toe-in of the front wheels :

Fit the bellows (8) on the plastic sheaths of the steering housing.

REMOVING AND FITTING A REAR SUSPENSION ARM.

REMOVAL.

1. With the suspension *in the high position*, place a jack under the rear of the vehicle.

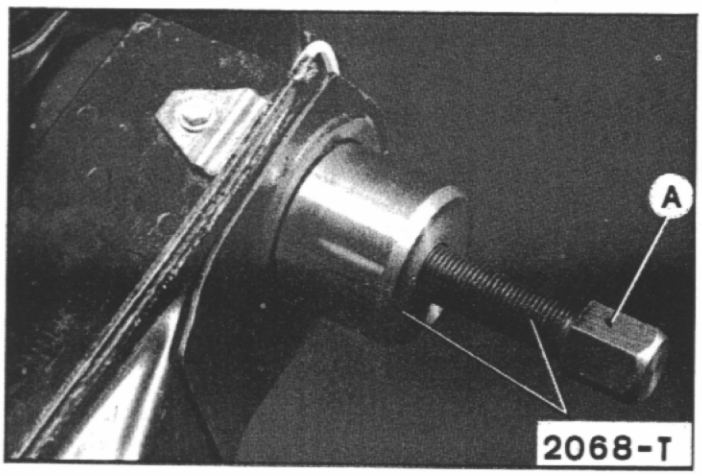


8735

2. **Lower the pressure in the circuits :**
   a) Slacken the bleed screw on the pressure regulator and put the height *into the normal position.*
   b) Wait until the rear suspension has stabilized and then put the control *into the high position* so that the vehicle settles completely.

3. Raise and chock the rear of the vehicle with the wheels off the ground.
   Remove the rear wheels.

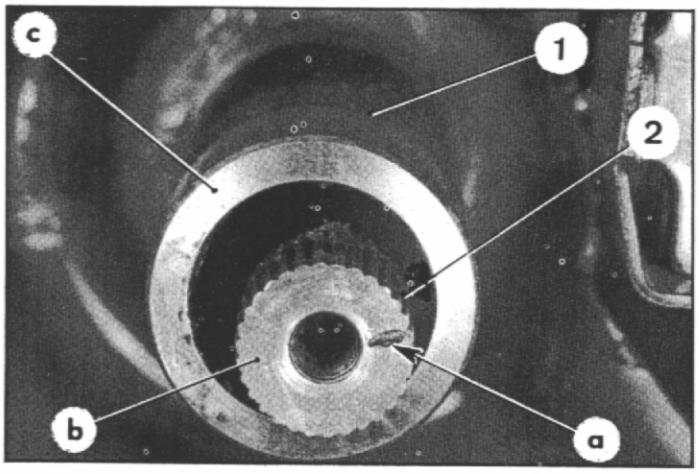
4. **Remove the suspension arm :**
   a) Remove the pin (4) and push back the piston rod of the suspension cylinder.
   NOTE : If there is still pressure in the suspension circuit, operate the manual control several times until the piston rod is free.
   b) Slacken the collar (3) and uncouple the union (2).
   Bend back the tab and remove the bolt (1).
   If appropriate, remove the shims from behind the lock-plate.
   c) Screw the assembly 2068-T in place of the bolt (1). Fit the extractor. Turn the bolt A to release the arm of the anti-roll bar.
   d) Remove the extractor and the arm.



9183

FITTING.

5. IMPORTANT NOTE :
   The two arms are fixed on the ends of the anti-roll bar : the distance between them on this bar determines their lateral play.
   This play is adjusted by means of shims placed behind the bolt lock-plate (1), *on one only of the two arms. The play must be reset whichever arm is removed* (with or without shims).

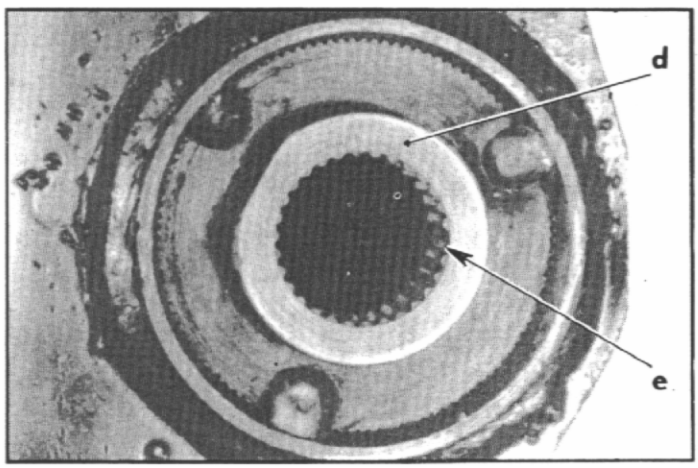


9266

6. If the bearing face « c » of the support (1) shows traces of binding, skim it slightly using a stone.

a) Carefully clean :
- the support tube (1),
- the bearing surfaces « b » of the anti-roll bar and « d » of the arm.

b) Grease (bearing grease) :
- the face « c » and the surfaces of the bearings on the support tube,
- the bearings of the arm hub.



9265

7. Case 1 : Fit the arm with no shims :

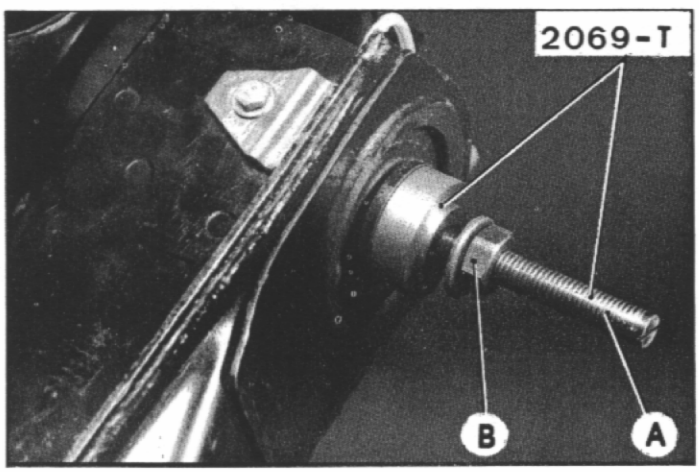
a) Engage the hub of the arm on the support-tube (1) and connect it to the anti-roll bar (2).
CAUTION : *The mark « a » on the bar (mark made by an electric scriber) must correspond with the mark « e » on the hub (one spline missing).*
NOTE : If the mark « a » is not visible, it is necessary to position the arms in relation to one another : *once fitted they must be in the same plane (without twisting the bar).*

b) Remove the stop bolt from the other arm on the anti-roll bar.

c) Position the tool 2069-T on the arm to be removed : tighten the bolt A in the anti-roll bar. *Fully tighten the nut B until the arm is in place,* (the face « c » of the support tube is then bearing on the friction washer placed in the arm hub). Remove the tool 2069-T.

d) Fit the stop bolt on the bar, together with its lock-plate.
NOTE : Smear the threads of the bolt and the lock-plate with CURTYLON.
Tighten the bolt to 18 to 20 m.kN (1.8 to 2 m.kg).
Bend over the tab.

e) *Set the lateral play of the arms, at the opposite side (see paragraph 8).*

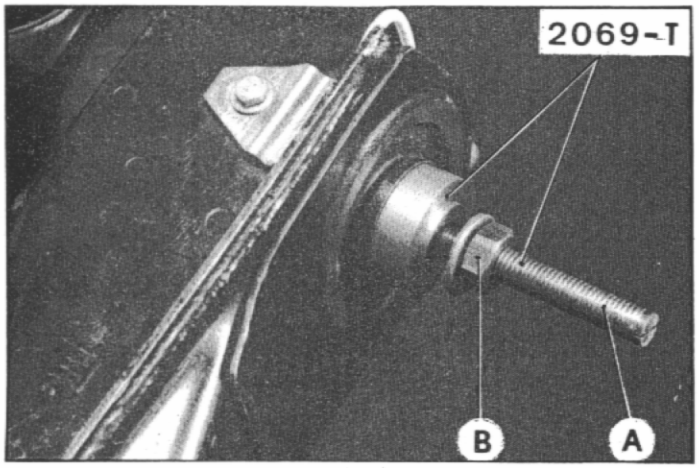


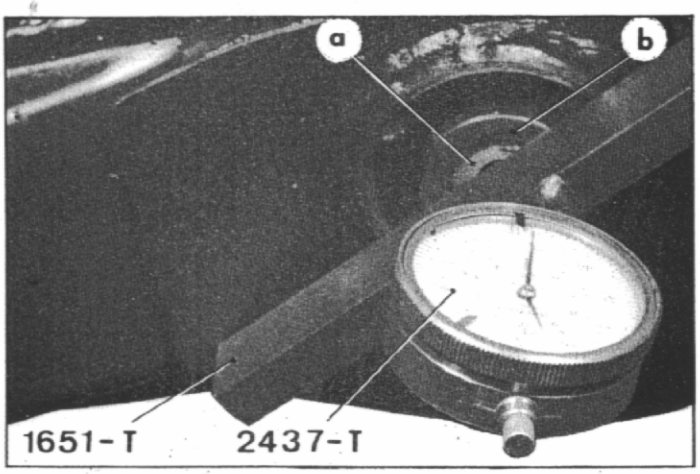
9184

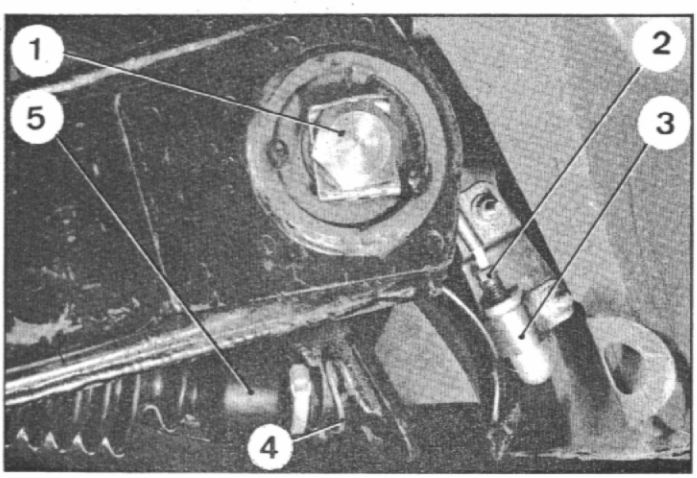
8. Case 2 : Fitting the arm with shims :

a) Engage the hub of the arm on the support tube (1) and connect it to the anti-roll bar as indicated in paragraph 7 a above.

b) Adjust the lateral clearance of the arms as described in the following paragraph.







9. Adjust the lateral play of the arms :
(see note in paragraph 5)

a) Position the tool 2069-T : tighten the central bolt A in the anti-roll bar.
Tighten the nut B while moving the arm :
CAUTION : *Stop tightening when the arm falls slowly under the action of its own weight.*
(the end of the support tube is then bearing on the friction washer in the hub of the arm, causing slight friction).
Remove the tool 2069-T.

b) Using a scale 1651-T, fitted with a dial jauge 2437-T, measure the distance between the face « b » of the arm hub and the face « a » of the bar.
This distance *increased by 0,05 mm* indicates the thickness of shims to be placed on the end of the bar.

c) IMPORTANT : Using the extractor 2068-T, bring the bar out by 2 to 3 mm :
Remove the extractor.

d) Place the shims on the end « a » of th bar and fit the tool 2069-T.
Tighten the nut B moderately until the shims are in contact with the end « a » of the bar.
NOTE : Never use the locking bolt (1) for this operation. Since the splines are very carefully machined, the bolt would be subjected to anormal stress.
Remove the tool 2069-T (be careful of the shims).

e) Fit the stop bolt (1) fitted with its lock-plate.
NOTE : Smear the threads of the bolt and the faces of the lock-plate with CURTYLON.
Tighten the bolt to 18 to 20 mΛN (1.8 to 2 m.kg). Bend over the tab.

10. Insert the rod (5) of the suspension cylinder. Fit the stop pin (4).

11. Couple up the connector (2) (new seal) and tighten the collar (3).

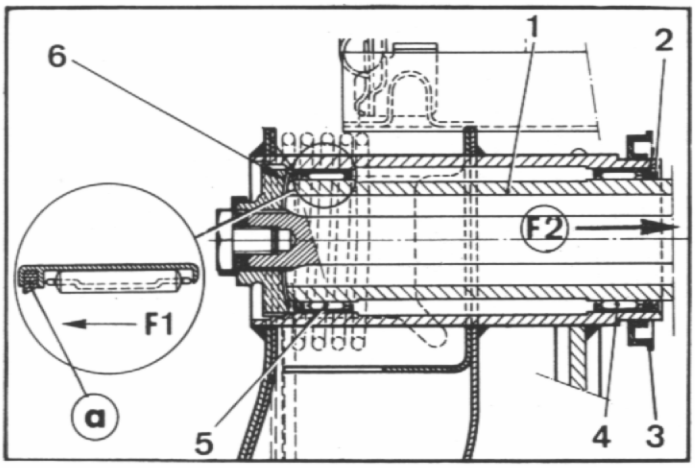
12. Start the engine. Tighten the pressure regulator bleed screw.

13. Bleed the rear brakes.

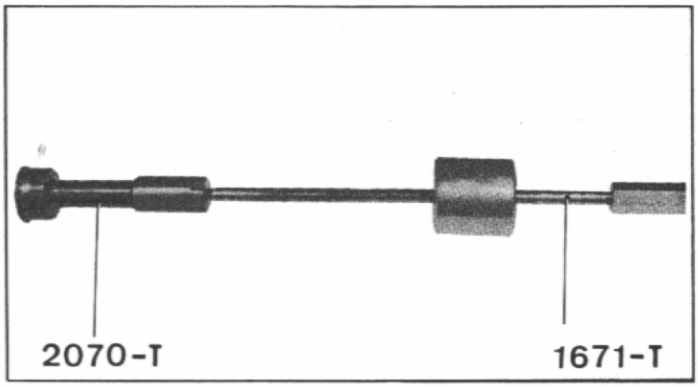
14. Fit the rear wheels and lower the vehicle to the ground.

REPLACING THE BEARINGS, THE SEAL OR THE FRICTION WASHER OF THE SUSPENSION ARM HUB

G. 43-2 c

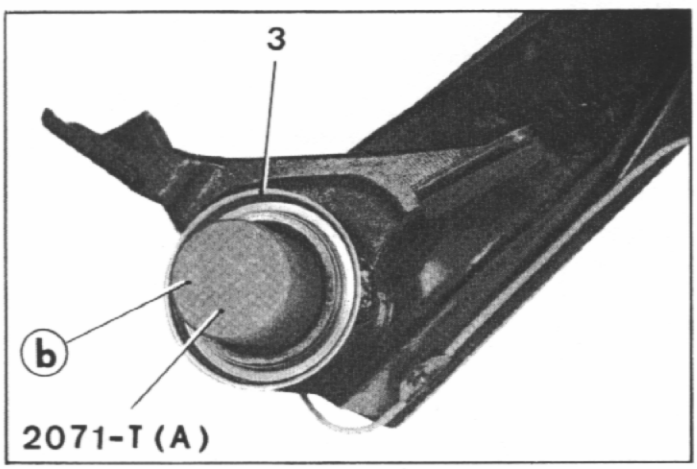


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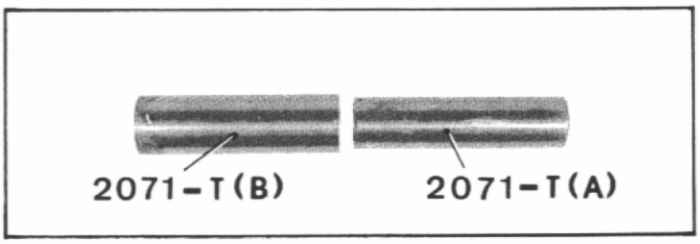


Manual 810-2

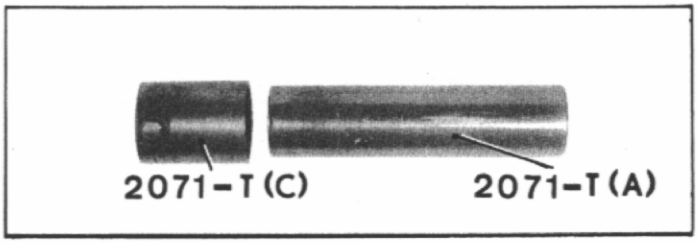
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11357



11356



REMOVAL

1. **Remove the suspension arm.**

2. If necessary, remove the deflector (3) of the arm hub.

3. **Remove the seal (2).**

4. **Remove the bearing from the hub :**

   Use an extractor 1671-T fitted with an end piece 2070-T.

5. **Remove the friction washer (6).**

FITTING.

6. Carefully clean the inside of the suspension arm hub and the support tube (1).
   Grease the bearing areas of the support tube.

7. **Insert the friction washer (6) :**

   Smear it with bearing grease on both faces and fit it into the hub.
   NOTE : When new, the friction washer is flat. Replace it each time it has to be removed.

8. **Fit the hub bearings :**
   IMPORTANT : These needle bearings are fitted with seals « a ». These must be fitted the right way round as shown on the drawing : the edge carrying the seal « a » must be placed in the direction of the arrow F1 for the bearing (5) and in the direction of the arrow F2 for the bearing (4).

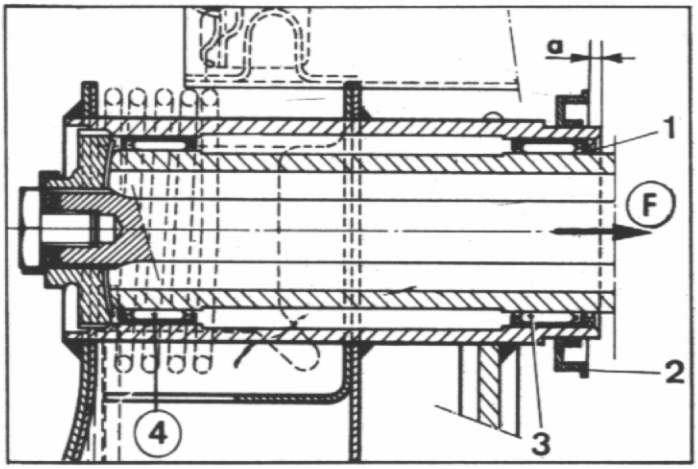
   a) Place the guide mandrel A (assembly 2071-T) inside the suspension arm hub. Fit the bearing (5) on the mandrel A *the correct way round as described above.* Push it using the socket B until it comes into contact with the end « b » of the mandrel.

   b) Proceed in the same way for fitting the bearing (4), using the socket C. *Once again, this has to be fitted the right way round as described above.*

NOTE : The correct position of the bearings is determined by the length of the sockets B and C.

c) Remove the assembly 2071-T.
Smear the needles of bearings (3) and (4) with bearing grease.

G.43-2c



9. Fit the seal (1) :

Put the face carrying the inscriptions towards the outside of the hub (direction of the arrow F) and push the seal until it is in contact with the bearing (3).

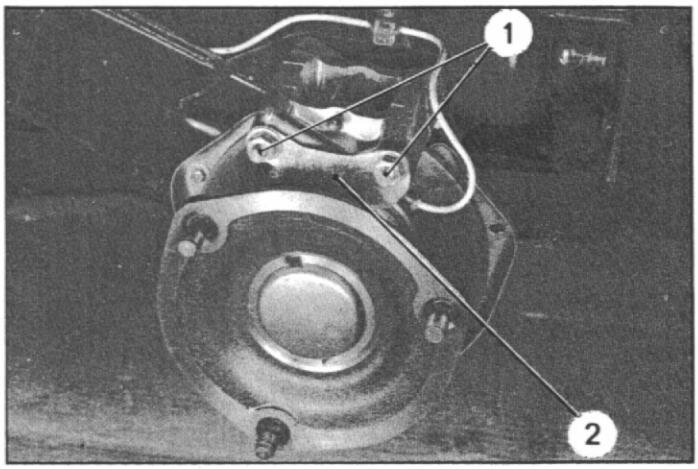
10. If necessary, fit the deflector (2) :
This must be inset with relation to the edge of the hub by :

$$a = 2 \text{ to } 3 \text{ mm}$$

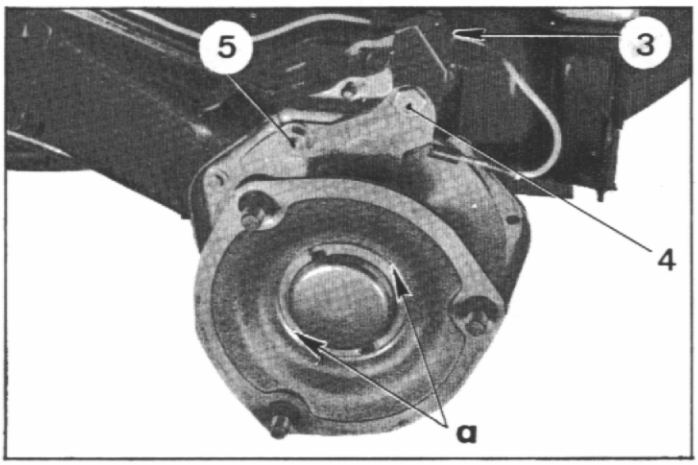
11. Fit the suspension arm.

REMOVING AND FITTING A BRAKE DISK, A HUB OR A BEARING.

8958

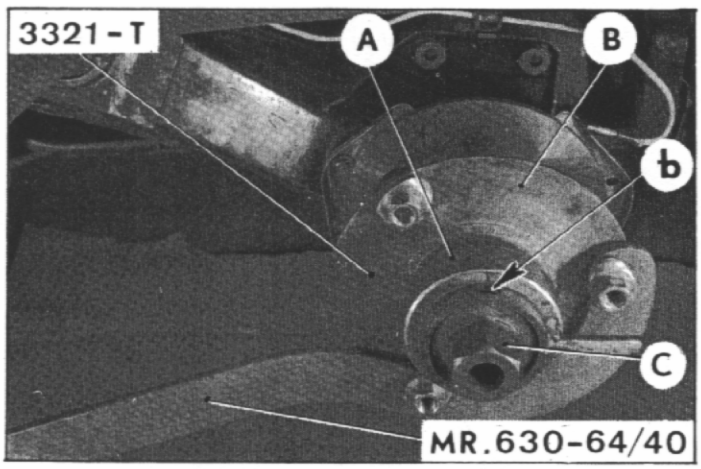


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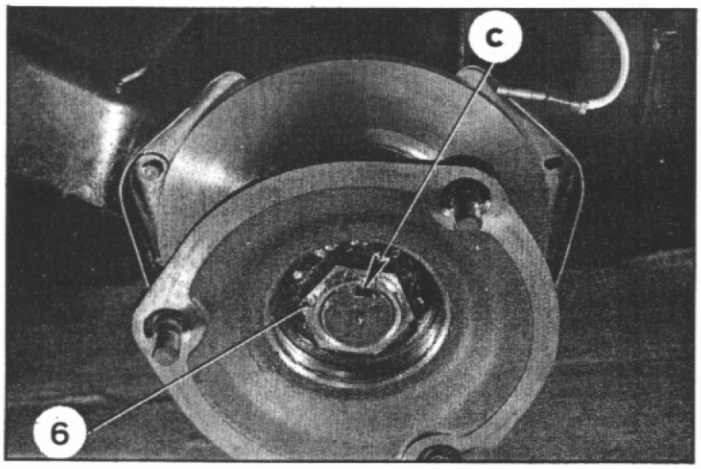


Manual 810-2

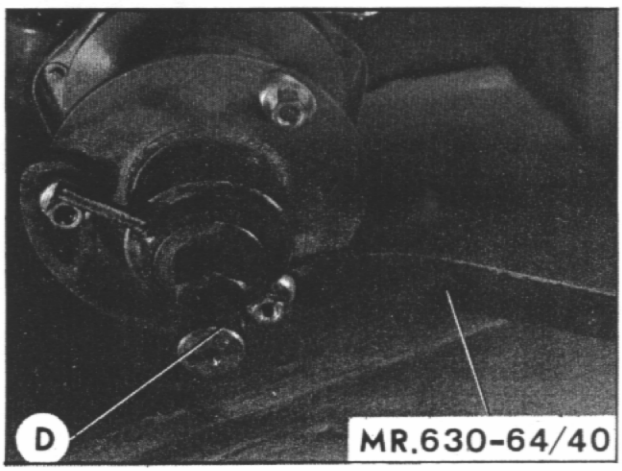
8967



8968



8969



REMOVAL.

1. Chock up the rear of the vehicle with the *wheels off the ground.*

2. Place the manual height control *in the normal position.*
   Slacken the pressure regulator bleed screw.

3. Remove the wheel.

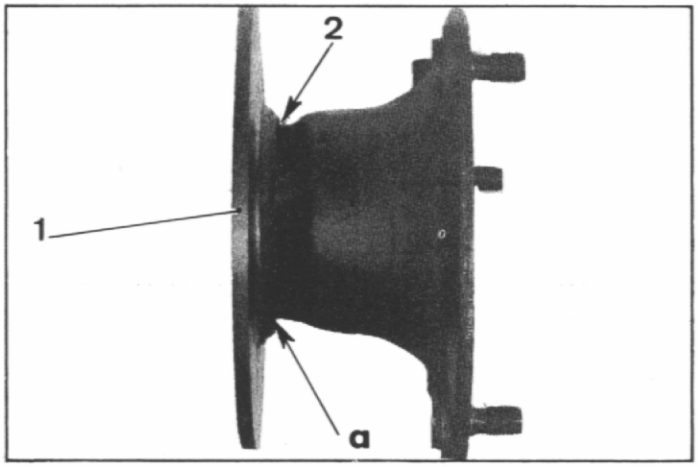
4. **Remove the caliper :**
   NOTE : To avoid separating the two halfs of the caliper, proceed as follows :
   - Disconnect the pipe (3).
   - Partly slacken the nuts (1) holding the caliper.
   - Remove the bolt (4) (bleed screw side). Lift the suspension arm to release it.
   - Swing the caliper then replace the bolt (4) and tighten the nut (be careful of the feed tube (3)).
   - Remove the other bolt (5).
   - Remove the caliper (2).

5. **Remove the ring nut :**
   Using a 4 mm diameter drill, remove the peening at « a » locking the ring nut.
   Use the assembly 3321-T and the key 3304-T.
   Fit the plate B to the hub.
   Hold the hub using the tool MR. 630-64/40.
   Position the key 3304-T and the end fitting C.
   Screw in the nut A but do not tighten.
   Place a sprag in the hole « b » to lock the end fitting C and the nut A.
   Unscrew the ring nut.

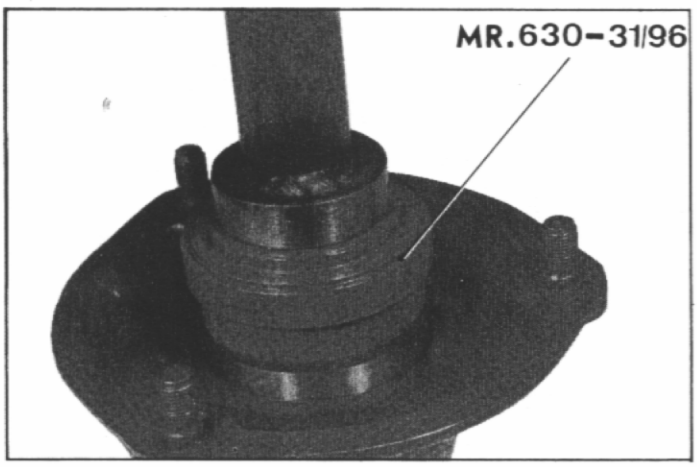
6. **Remove the nut (6) :**
   Using a cold chisel, remove the metal bent over at « c ».

7. **Remove the hub :**
   Repeat the same operation as for removing the ring nut, without the key 3304-T.
   Hold the assembly using the tool MR. 630-64/40 (see figure).
   Using the bolt D of the assembly 3321-T, extract the hub.

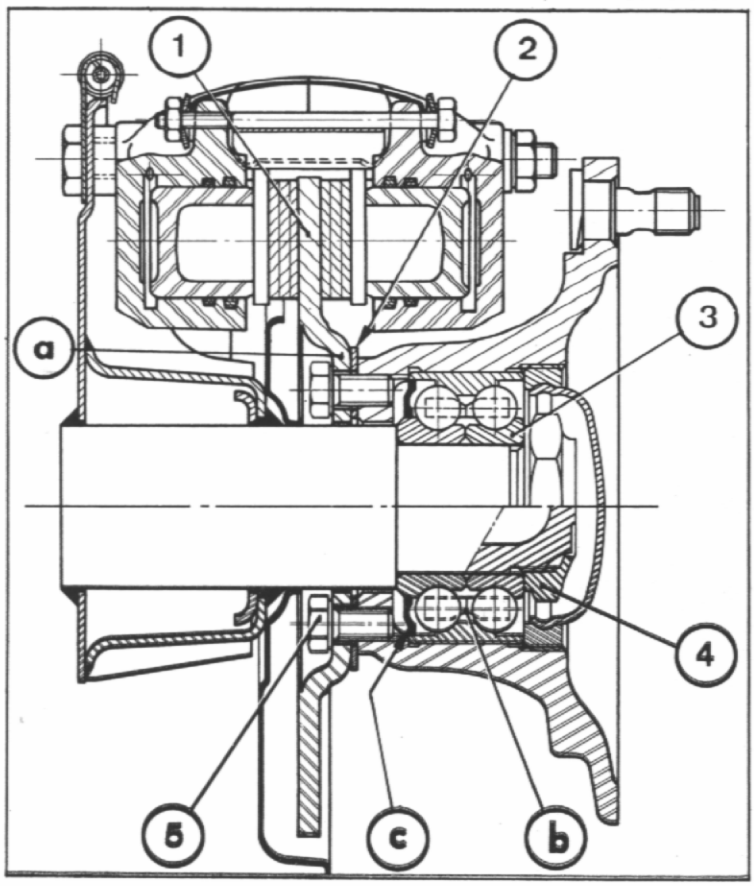
8990



9004



G. 45-3 b



8. Remove the brake disk :

Remove the bolts (5) (see drawing) and separate the disk (1) from the hub.

Do not lose the bearing plate (2).

9. Remove the hub bearing.

FITTING.

10. Fit the brake disk :

Offer up the disk to the hub.

CAUTION : The disk (1) must be fitted the right way round (see drawing) : the edge « a » must be at the hub side.

Interpose the bearing plate (2) between the disk and the hub.

Fit and tighten the bolts (5) to 45 to 50 mΛN (4.5 to 5 m.kg) (torque wrench).

11. Fit the bearing :

Remove the inner race (3) with its balls to allow access for the mandrel MR. 630-31 / 96.

Offer up the bearing (sealed side « c » facing the disk) to the hub.

Fit using the press.

12. Fit the hub :

Offer up the assembly to the stub axle.

Engage the bearing (without its inner race (3)) and start to position it by tightening the nut (4).

Remove the nut (4) and fit a spacer with inside diameter 37 mm, thickness 7 mm.

Refit the nut (4) and finish fitting the bearing.

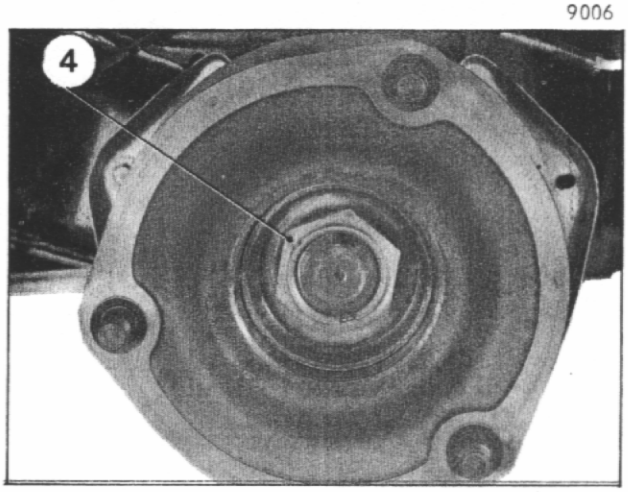
Fit the inner race (3) (with the face « b » of the nylon race to the inside. The faces « b » of the two races should face one another) (see drawing).

Fit a new nut (face and threads greased).

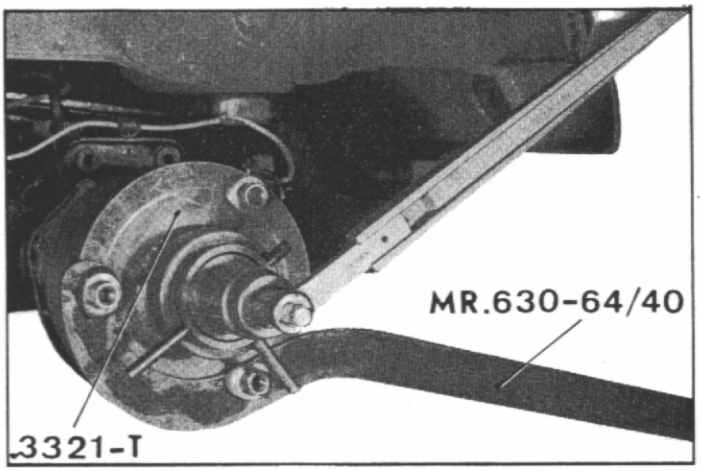
Tightening torque = 350 to 400 mΛN (35 to 40 m.kg) (torque wrench).

Using a mallet, bend the tab of the nut into the milled slot of the stub axle.

9006



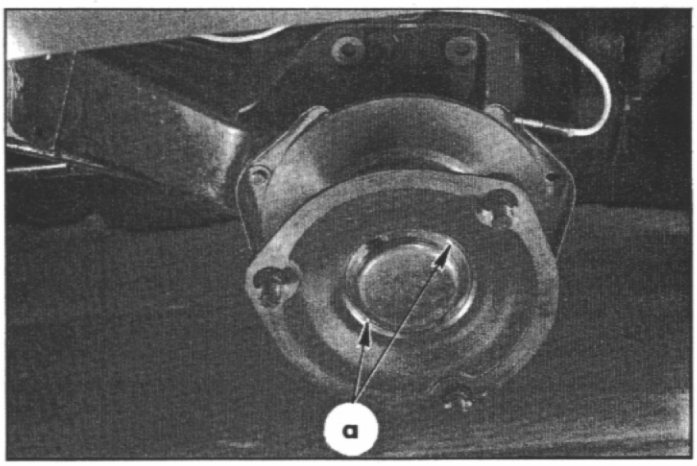
9008



13. Fit the ring nut :

Use the assembly 3321-T and the key 3304-T.
Hold the hub using the tool MR. 630-64/ 40.
Put bearing grease in the plug of the ring nut.
Fit the ring nut having *greased both faces and the threads.* Tighten to 350 to 400 mΛN (35 to 40 m.kg) (torque wrench).
Lock it in position by peening with a punch at two diametrically opposed points at « a ».

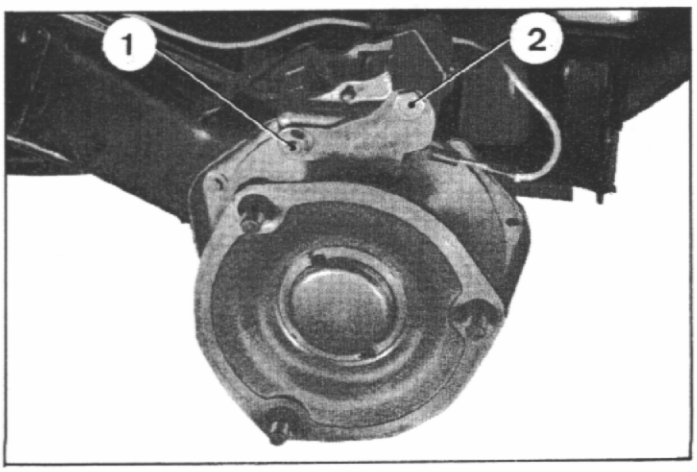
8966



14. Fit the brake caliper :

Offer up the caliper to the disk and carefully position the brake pads.
Fit the bolt (1) *with its head to the inside* and fit the nut without tightening it (contact washer).
Remove the other bolt (2) and swing the caliper to position it.
Refit the bolt (2) *with its head to the inside.*
Tighten the nuts (3) (contact washer) to 36 to 40 mΛN (3.6 to 4 m.kg) (torque wrench) (face and threads greased).

Manual 810-2

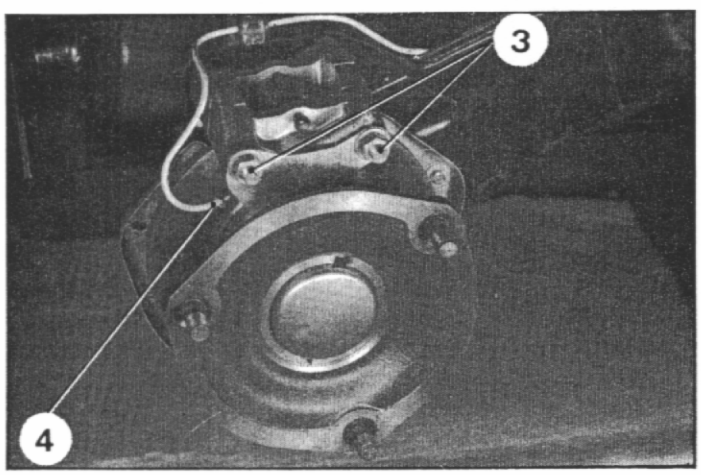


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15. Fit the union (4) :

Replace the seal.
Tighten the union to 8 to 9 mΛN (0.8 to 0.9 m.kg).

16. Start the engine.
Tighten the pressure regulator bleed screw.
Place the manual control *on high position.*
Where appropriate, move the rear suspension arms to cause the pressure to rise.
Bleed the caliper and check for leaks.

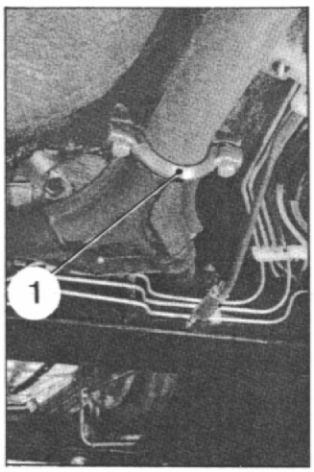


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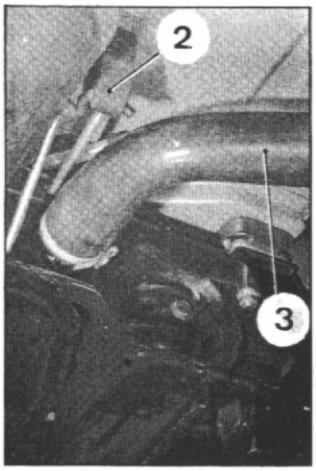
17. Fit the wheel.
Lower the vehicle to the ground.

REPLACING THE REAR AXLE UNIT

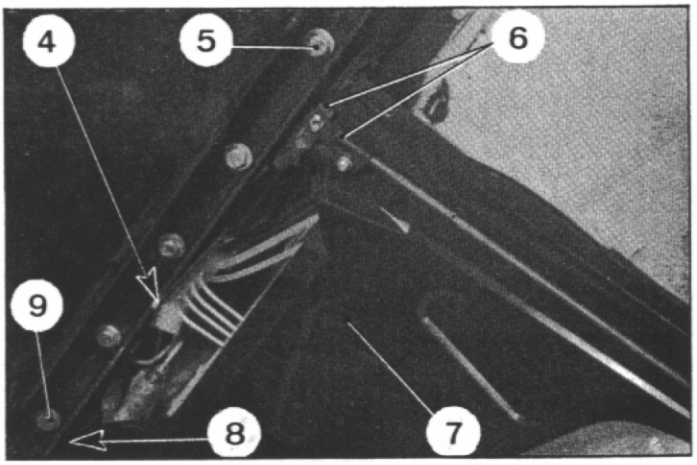
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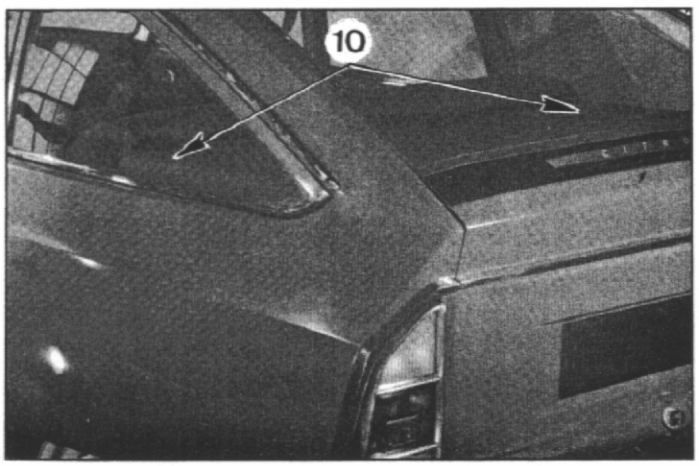
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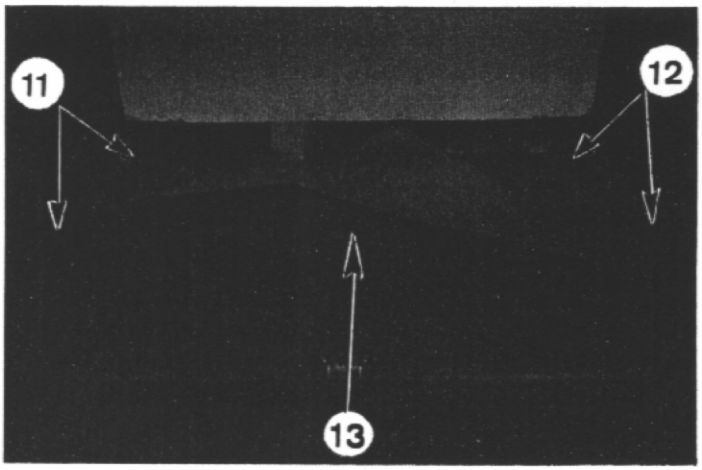
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Manual 810-2



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REMOVAL

1. Put the vehicle in the *high position* so that a jack can be put under the rear.

2. **Lower the pressure in the circuits :**
Slacken the screw on the pressure regulator and place the lever in the *normal position.*
Wait until the rear suspension has stabilized and then put the control lever in the *high position* until the vehicle settles completely.

3. Raise and chock the rear of the vehicle with the *wheels off the ground.*
Remove the rear wheels.

4. Disconnect the cable from the negative terminal of the battery.

5. **Remove the exhaust pipe and silencer assembly :**
Remove :
- the collar (1),
- the flexible supports (2).

6. **Disconnect the tank filling pipe (3) :**
Drain the tank if necessary.

7. *Underneath the vehicle :*
Disconnect the manual control rods (6).
Remove the two bolts (5) and (9) holding the protective plate (7).
Remove the bolt (4) holding the pipe bracket.
Disconnect the union (8).

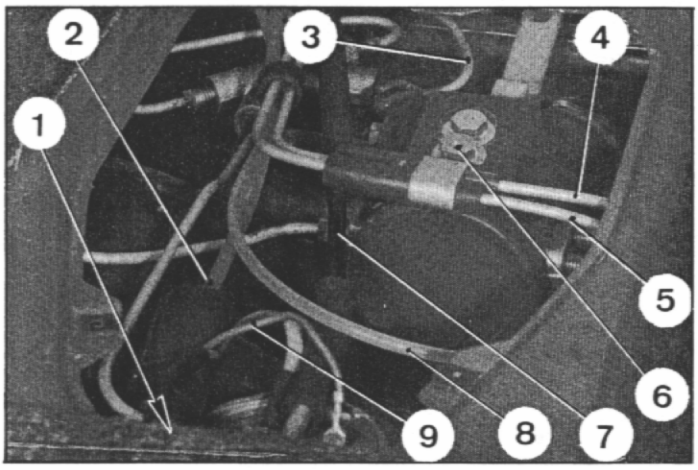
8. **Swing the rear seat forward :**
Slide the embellishers (10) towards the rear to uncover the upper mounting bolts and remove these bolts.
Swing the seat forward and chock it in that position.

9. In the boot, unstick the carpet at both sides to give access to the fastenings (11) and (12) of the suspension unit flexible mountings.

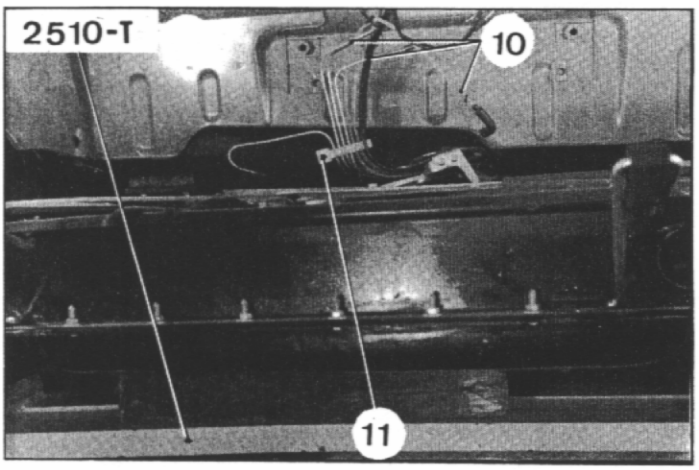
10. **Remove the axle unit :**

a) Remove the inspection plate (13) in the floor of the boot.

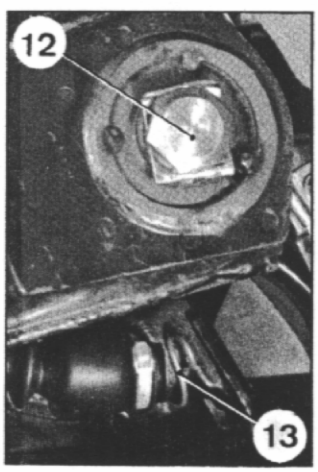
b) Place a jack, fitted with support 2510-T, under the suspension unit, equidistant between the spheres and the suspension arm swivels.
Remove the securing nuts (11) and (12).
Using a jack, lower the unit by no more than 10 cm, so that the different pipes can be disconnected through the inspection plate (13).



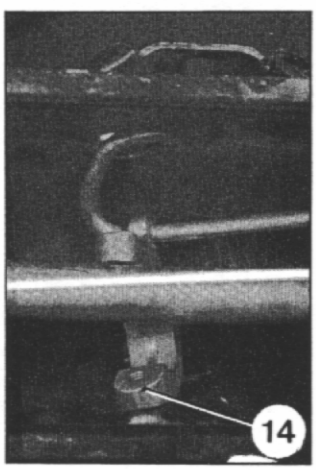
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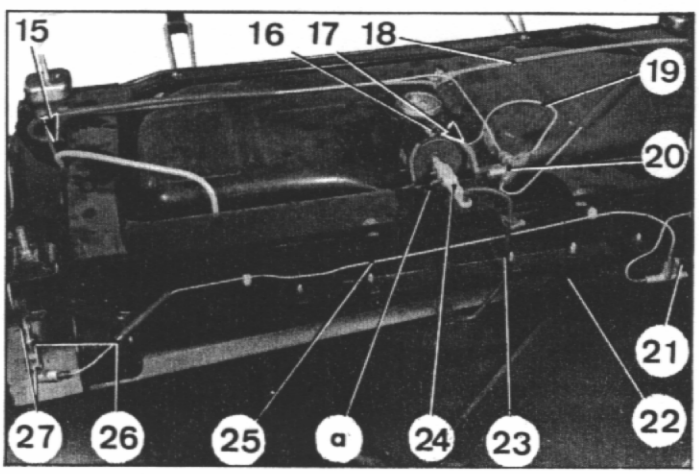
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c) Remove the bolt (6) from the collar holding the pipes.
Disconnect :
- the pipes (4) and (5) and the flexible pipe (8) from the corrector,
- the flexible pipe (2), from the overflow return union,
- the flexible pipe (7) from the petrol tank gauge unit,
- the tank vent pipe (1),
- the leads (9) from the petrol gauge,
- the tube (3) from the four-way.

d) Completely lower the suspension unit.

CAUTION : Make sure that the pipes (10) and the pipe support (11) do not foul the unit.

STRIPPING DOWN

11. Remove the brake feed pipe (25) :

Remove the bolt (21) holding the three-way union.
At each side, slacken the two collars (27) and the union (26).
Remove the pipe (25).

12. Remove the suspension cylinder feed pipe (19) :

Disconnect :
- the union (17) from the corrector,
- the unions (15) from each cylinder.

Remove the bolt holding the four-way union (20).
Remove the assembly consisting of pipe (19), the overflow return pipe (18) and the four-way union (20).

13. Remove the assembly consisting of support plate and torsion bar (23) :

Remove the bolts holding the plate and the bracket (22).
Remove the assembly.

14. Remove the corrector :

Remove the bolt (16).
Slacken the automatic control collar on the anti-roll bar, and free its end « a » from the lever (24).

15. *At each side :*

Remove :
- the pin (13) and detach the end of the rod,
- the bolt (12).

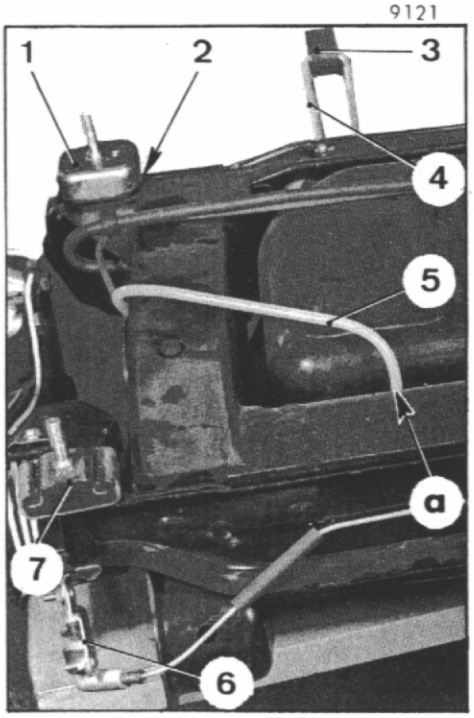
16. Remove one suspension arm only :

Remove the arm at the side where the lateral play shims are placed (do not lose them) using the extractor 2068-T.

17. Remove the other suspension arm and the anti-roll bar :

Remove the bolt from the clamp (14) holding the automatic control system.
Open out the clamp (14) to release the anti-roll bar.
Remove the assembly of arm and anti-roll bar.

9121



18. Remove the suspension cylinders :
At each side :

Remove the vent pipe (5).
Remove the bolt and collar holding the cylinder.

19. Remove the flexible supports (1) and (7) :
Do not lose the shims (2) and the brackets (6).

20. Remove the exhaust supports (4).

21. Remove the petrol tank.

22. Remove the travel stops.

23. Remove the clamps (12) and (13) and the plastic supports (10), (11) and (14).

BUILDING UP

24. Fit :
- the clamps for fixing the collars that hold the suspension cylinders,
- the clamps (12) and (13) for holding the tank.

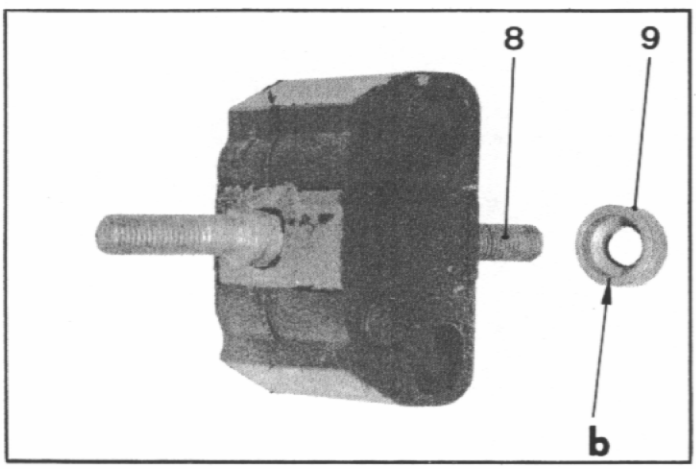
25. Fit the plastic supports (10), (11) and (14).

26. Fit the travel stops (using soapy water only).

27. Fit the petrol tank :

Tighten the bolts (contact washer).
Connect up the inlet pipe and fit the filter.

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28. Fit the exhaust supports :

Replace the rubber blocks (3) if necessary.
Fit the locking pin.

29. Fit the elastic supports :

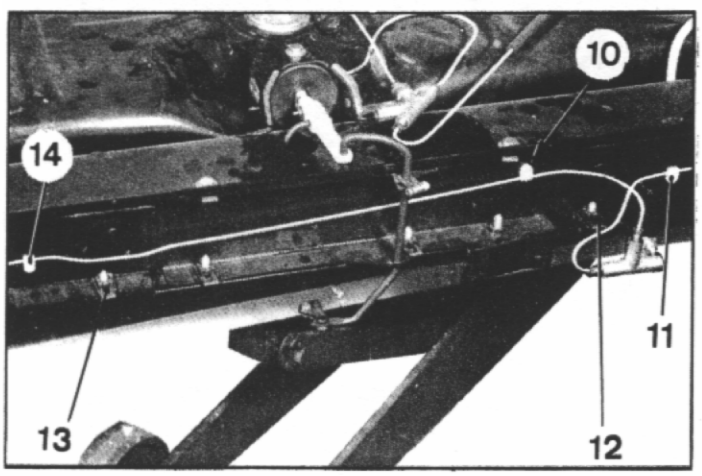
a) Fix the supports on the suspension unit :
- *Front supports (7) :* Place a bracket (6) and a contact washer under the nut holding each support on the unit.
- *Rear supports (1).* Fit :
  - a shim (2) under each support,
  - a spacer (9) and a contact washer under the nut holding each support on the unit.

NOTE : Do not tighten the nuts.

b) Fit a spacer (9) on each mounting stud (8) of the supports on the chassis.

NOTES :
- the greatest inside diameter « b » of the spacer (9) should face the flexible mounting.
- the spacers (9) of the front and rear supports are different.

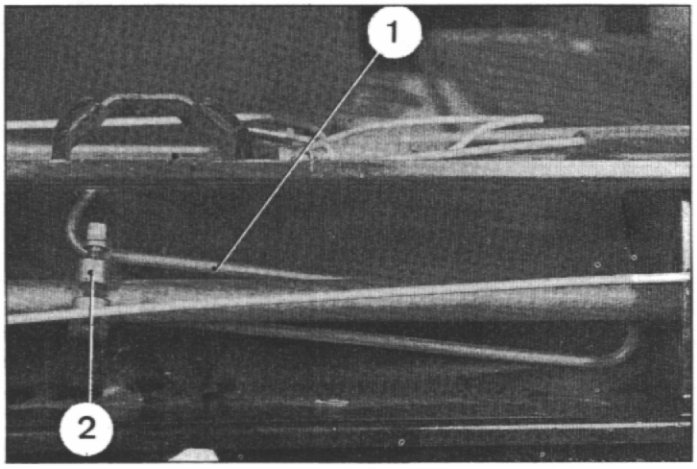
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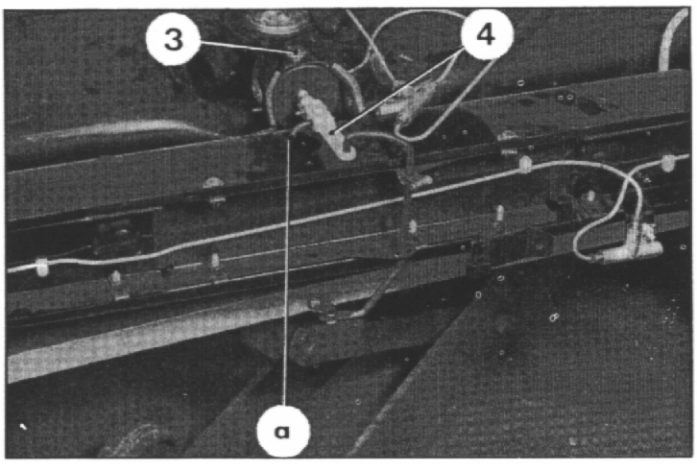
30. Fit the suspension cylinders :

Place the vent pipe (5) in the hole at « a » of the unit.

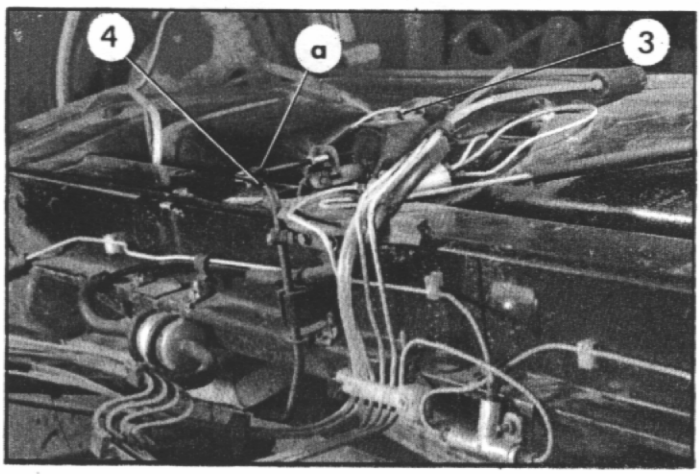
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31. Fit the suspension arms :

IMPORTANT NOTES :

A - Since the diameters of its ends are different, *the anti-roll bar must be fitted the right way round* (when the bar is removed).

right-hand side : 30 splines
left-hand side : 32 splines

B - Once assembled with the anti-roll bar, *the two suspension arms must have their centre lines in the same plane.*
To do this, the mark (electric scriber) at each end of the bar should coincide with the mark (spline missing) of the corresponding suspension arm.

a) *Fit the assembly of suspension arm and anti-roll bar :*
Place the automatic control rod (1) in the unit.
Engage the anti-roll bar in the unit, guiding the clamp (2). Position the suspension arm and fit the bolt to the collar (2).
Fit the locking bolt (smear the threads with CURTYLON) and its tab on the anti-roll bar.
Tighten the bolt to 18 to 20 mΛN (1.8 to 2 m.kg)

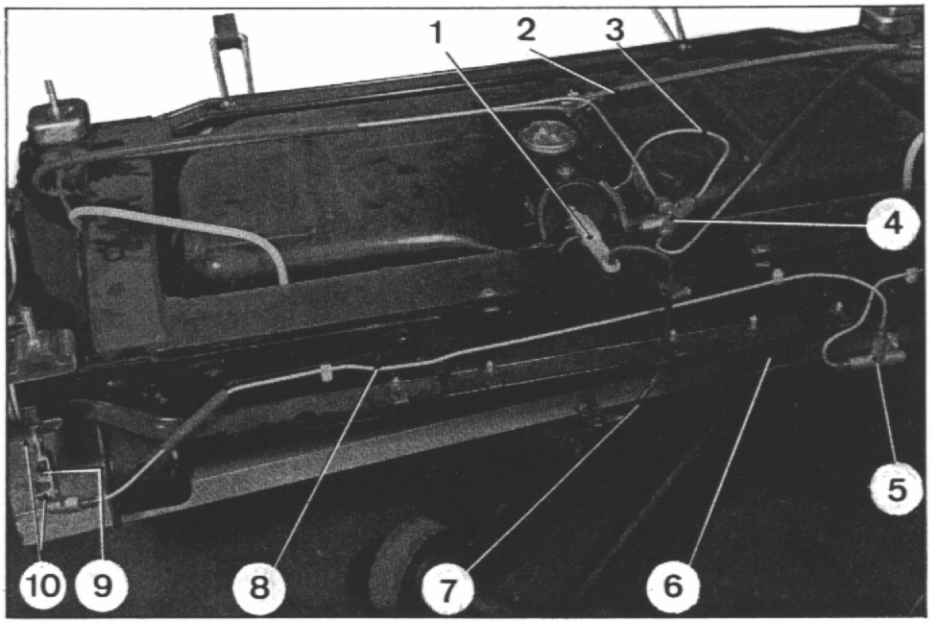
b) *Fit the suspension arm only :*
Position the suspension arm and engage it on the splines of the bar, so that the marks on the bar and the suspension arm coincide (see note B).

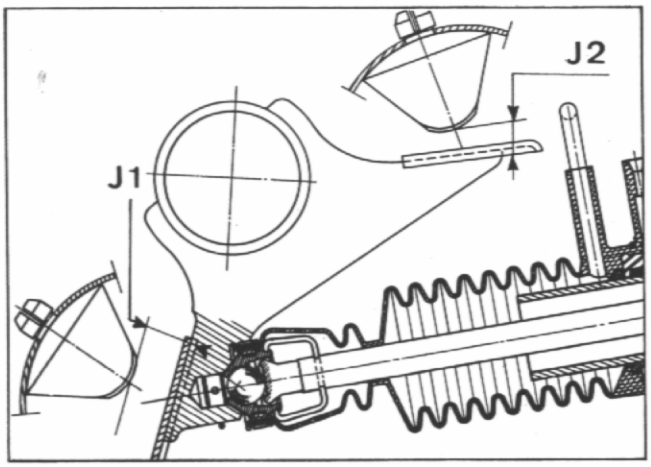
c) *Adjust the lateral play of the suspension arms.*
(see corresponding operation).

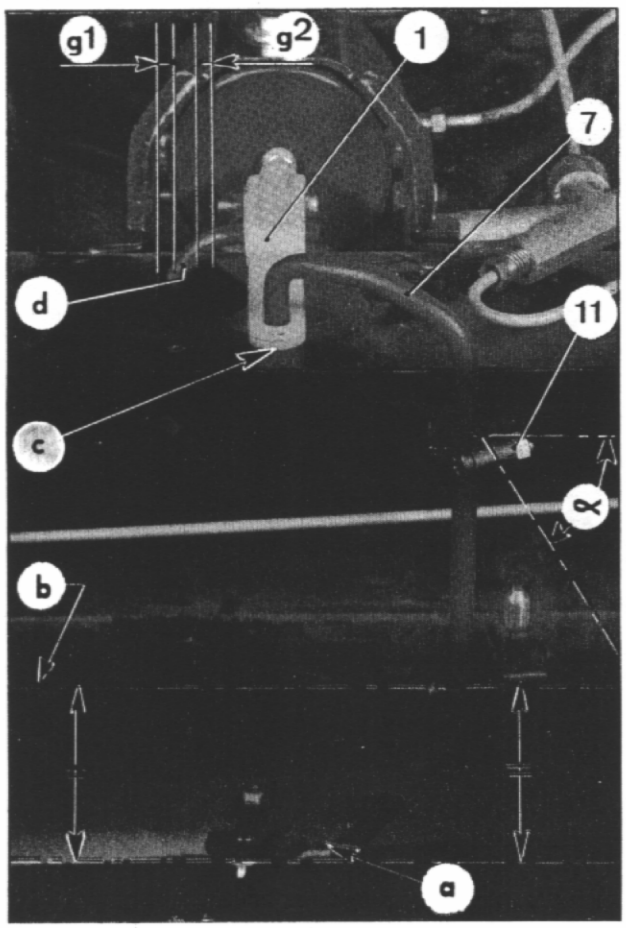
32. Fit the height corrector :

Fit the end « a » of the automatic control rod (1) into the lever (4).

Position the corrector at the centre of the mounting slot. Tighten the bolt (3) (contact washer).







Manual 810-2

33. Fit the assembly of support plate and manual control rod (7) :

Position the assembly by engaging the end of the rod (7) in the lever (1). Interpose the bracket (6) and tighten the bolts.

34. Fit the suspension cylinder feed pipe (3) :

Offer up the assembly of pipe (3); leakage return pipe (2) and the four-way connector (4).
Tighten the union by hand.
Connect the leakage return pipe (2) to the cylinder dust excluder.
Tighten the union to 8 to 9 mΛN (0.8 to 0.9 m.kg)
(Replace the seals).

35. Fit the brake feed pipe (8) :

Fix the three-way connector (5).
At each side :

- tighten the union (9) by hand,
- tighten the two collars (10),
- engage the pipe (8) in the plastic supports.

Tighten the union to 8 to 9 mΛN (0.8 to 0.9 m.kg)
(Replace the seals).

36. Preset the automatic height control :

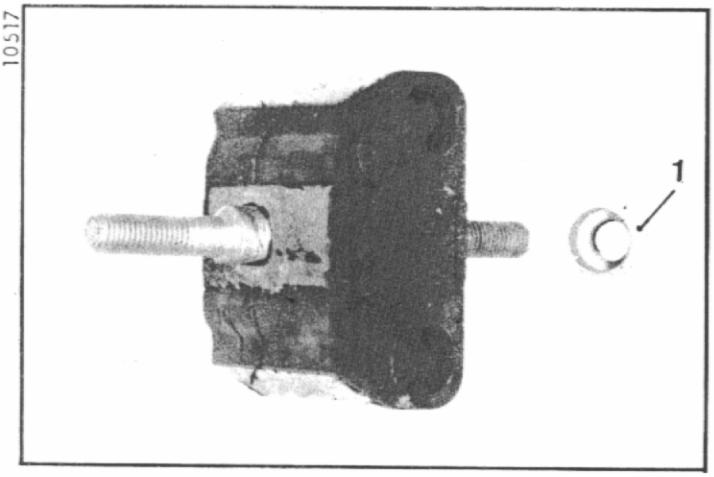
Using a jack, raise and support the suspension arms so that J1 = J2 (see drawing).
Check that the corrector is in the rest position, and tighten the collar on the anti-roll bar.
Make sure that the end « d » or the rod is positioned centrally in the hole in the unit (g1 = g2).

37. Set the position of the manual height control rod (7) :

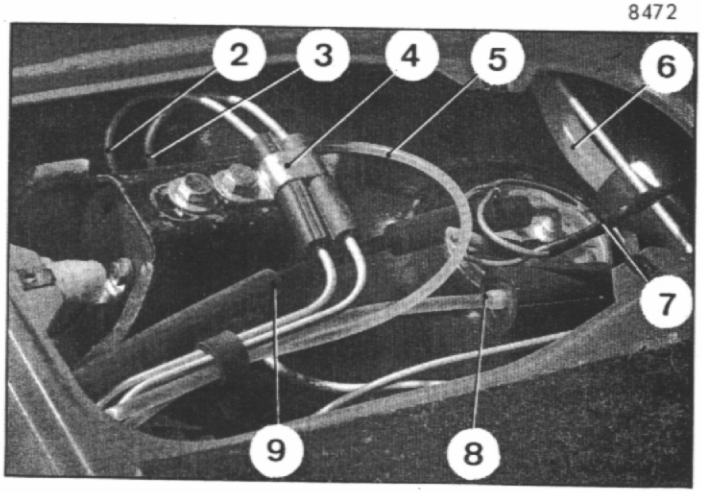
Adjust the collar (11) so that :

- the lower part « a » is parallel to the edge « b » of the plates of the unit.
- the upper end « c » projects not more than 1 mm beyond the lower face of the lever (1).
- the centre line of the collar (11) makes an angle $\alpha \equiv 45°$ to 60° with the edge of the unit plates.

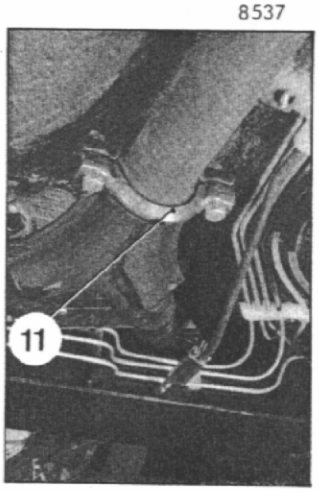
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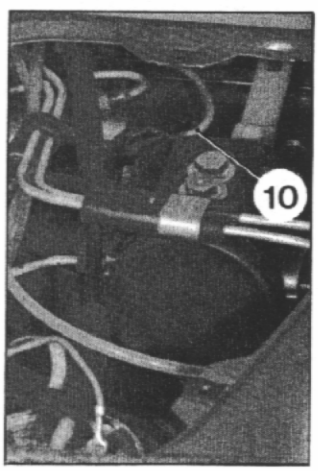
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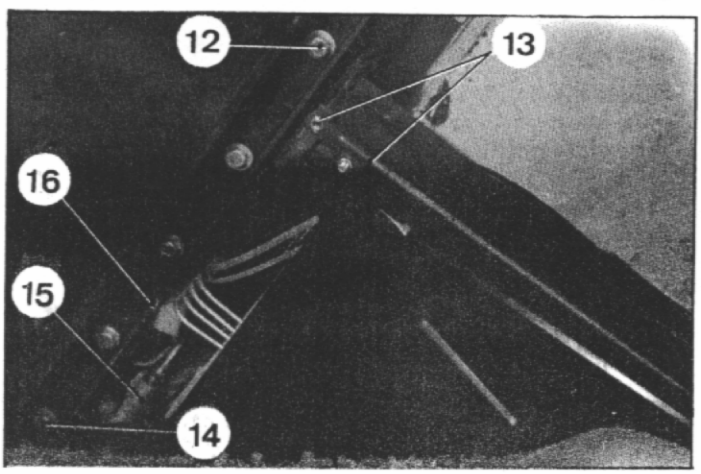
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FITTING

38. Offer up the axle unit :

a) Check that the spacers (1) are in position on the flexible support studs of the unit.

b) Using a jack fitted with a crossmember 2510-T, offer up the suspension unit to the chassis to within about 10 cm so that the different pipes can be positioned.

CAUTION : Carefully guide the hydraulic circuit pipes to avoid damaging them.

39. Connect up the hydraulic circuit pipes :

Connect the pipes (2) and (3) and the flexible pipe (5) to the corrector.
Connect the pipe (10) to the four-way union.
(Tighten the union by hand).
Connect :
- the flexible pipe (8) to the cylinder overflow return union,
- the flexible pipe (9) to the petrol intake pipe,
- the vent pipe (6) to the tank,
- the leads (7) to the petrol gauge.

Fit the collar (4) to the rubber sheaths.
Tighten the mounting bolt (contact washer).
Tighten the unions to 8 to 9 mΛN (0.8 to 0.9m.kg)
(Replace the seals).

40. Fit the axle unit :

Raise the unit and engage the studs of the flexible mountings into their chassis housings.
Fit the nuts holding the unit to the chassis (contact washer and thick washer).
Tighten the nuts on unit and chassis to 34 mΛN (3.4 m.kg).

41. *Under the vehicle :*

Connect the rear brake feed pipe to the three-way union (15). Tighten to 8 to 9 mΛN (0.8 to 0.9 m.kg). (Replace the seal).
Fix the pipes with the bracket (16). Tighten the bolt (contact washer).
Fit the protective plate. Tighten the bolts (12) and (14) (contact washer).
Connect up the manual control rods (13).

42. Fit the assembly of exhaust pipe and silencer :

Fit the flexible mountings of the silencer.
Fit the collar (11).

43. Connect up the petrol tank filler pipe.

Tighten the collar.

44. Connect the cable to the negative terminal of the battery.
Start the engine.
Tighten the pressure regulator bleed screw.
Check that all the unions are leak-tight.

45. Lower the vehicle to the ground.

46. Adjust the heights :

Front = 189 ± 10 mm Rear = 272 ± 10 mm

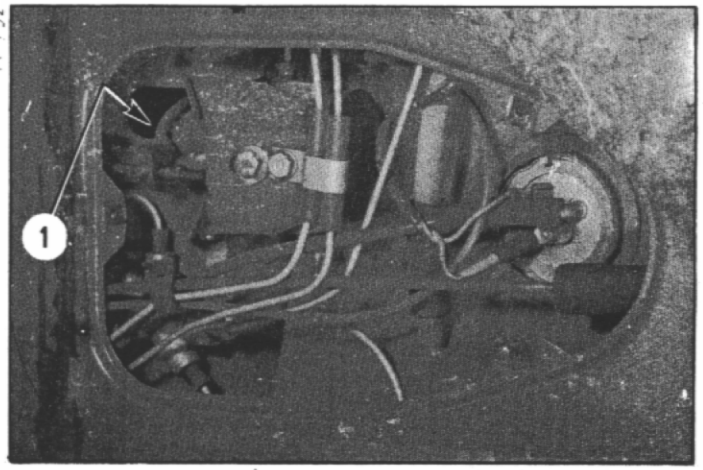
47. Check the operation and setting of the manual height control.

48. Bleed the rear brakes.

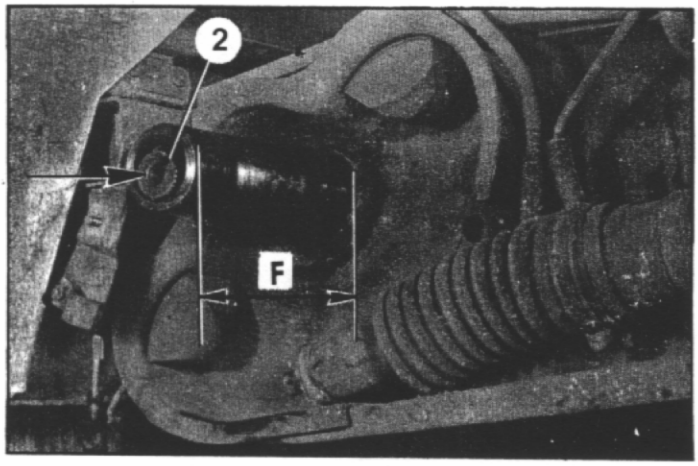
49. Fit the access plate to the floor of the boot.
Stick the carpet back in place on the boot walls.

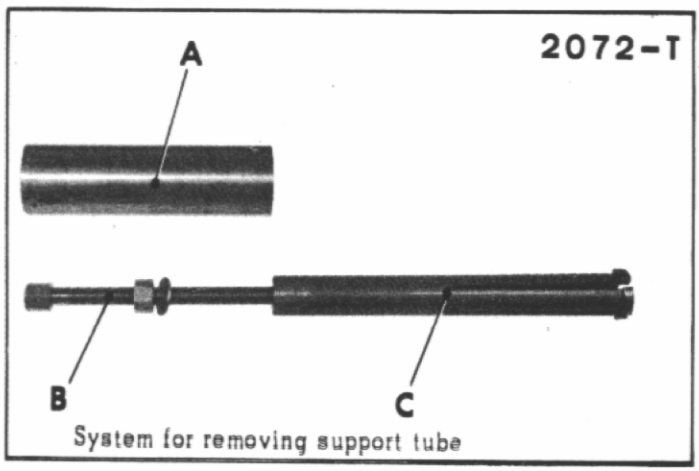
50. Fix the rear seat.

REPLACING A REAR SUSPENSION ARM SUPPORT TUBE.

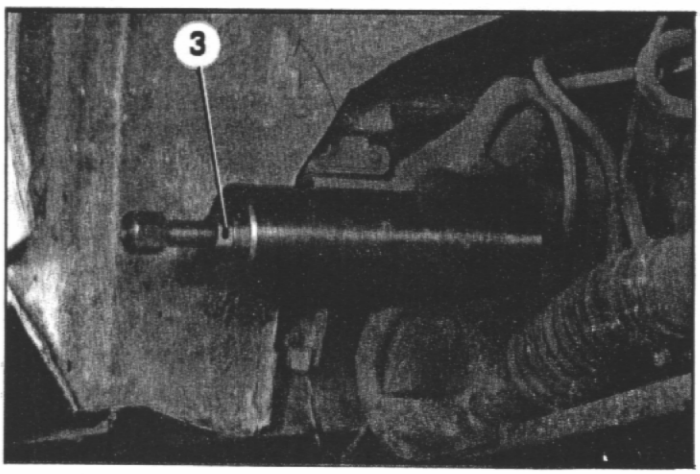


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System for removing support tube



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Manual 810-2

REMOVAL.

1. With the suspension in the high position, place a jack under the rear of the vehicle.

2. **Release the pressure in the circuits :**

   a) Slacken the pressure regulator bleed screw and place the manual height control *in normal position*.

   b) Wait until the rear suspension has stabilized and then place the control *in the high position* until the vehicle settles completely.

3. Raise and chock the rear of the vehicle with the wheels off the ground. Remove the wheels (MR. 630-64/40).

4. **Remove the rear suspension arm :**
   (See corresponding operation).

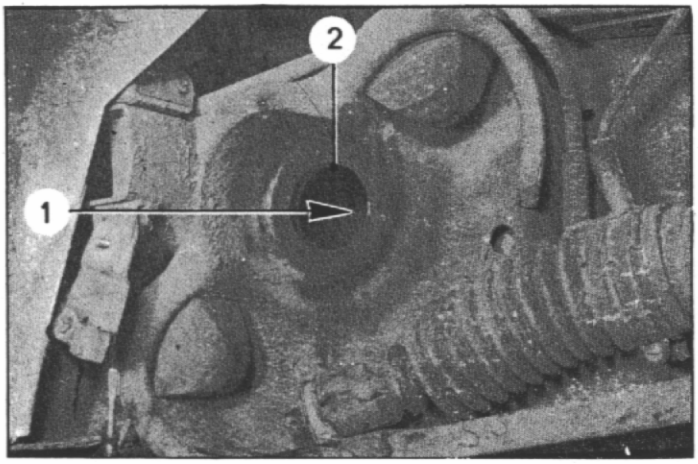
5. Remove the inspection plate on the floor of the boot.

6. Slacken by two or three turns the automatic height control bolt (1) on the anti-roll bar so that the bar can slide in the collar.

   CAUTION : The bolt must remain in place on the collar of the automatic height control.

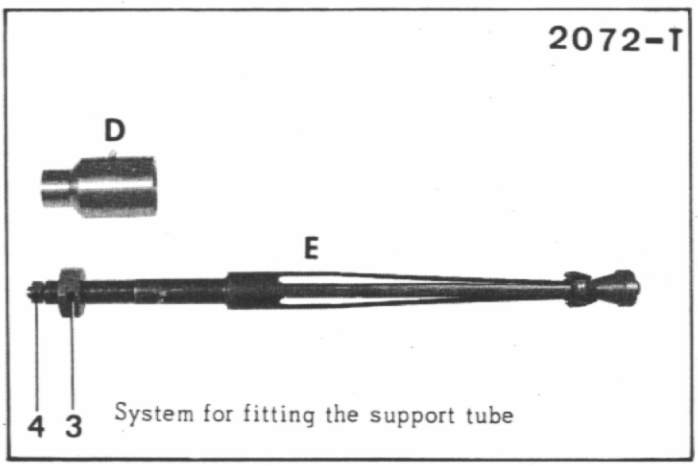
7. Move the anti-roll bar (2) in the suspension unit *(direction of the arrow)* so that the section **C** of tool 2072-T can be inserted.
   NOTE : To facilitate the subsequent positioning of the support tube, measure and note the distance « F » by which it projects.

8. **Remove the suspension arm support tube :**
   Fit the section **C** of tool 2072-T in the support tube.
   Fit the cap **A** over the tube.
   Screw the threaded rod **B** some 15 to 20 mm into the section **C** and push the assembly as far as it will go into the support tube until the dogs engage in the latter (sharp noise).
   Tighten the nut (3) so as to free the support tube from its housing in the suspension unit.



FITTING.

9. Clean the bearing surfaces (1) and (2) of the suspension arm support tube in the suspension unit.

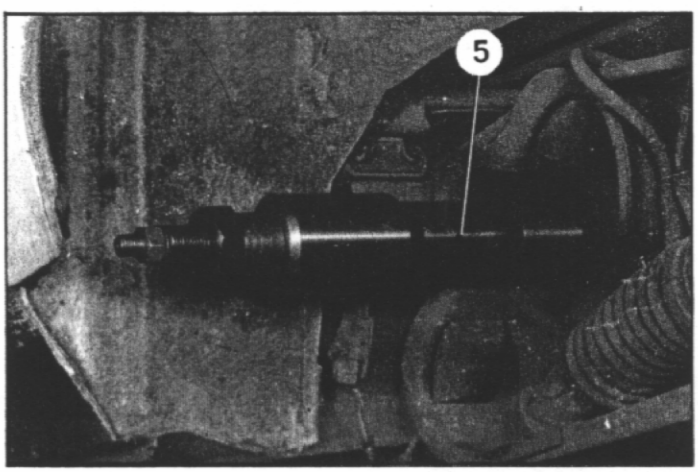


10 765 System for fitting the support tube

10. **Fit the support tube :**

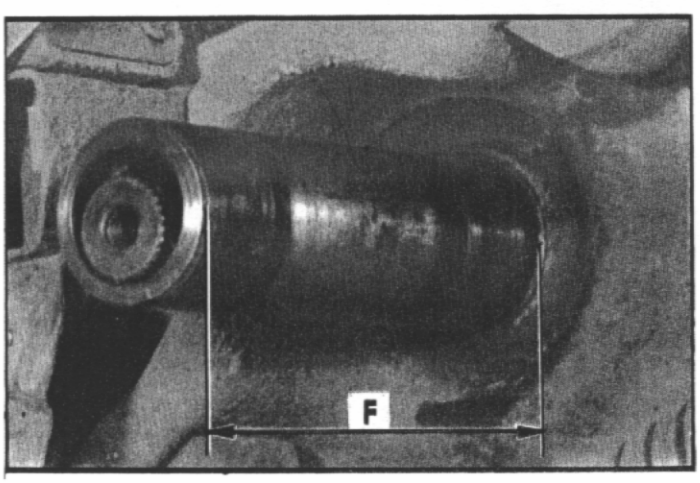
Fit a new support tube in the unit.
Insert the section **E** of the tool 2072-T into the support tube, after removing the nuts (3) and (4).
Fit the cap **D** and screw up the nuts (3) and (4) by a few threads.
Push the assembly as far as it will go into the suspension unit.
Screw the nut (4) fully home.
Hold the assembly centrally in the support tube and tighten the nut (3).

IMPORTANT : The tightening torque of the nut (3) remains fairly high during the whole operation of fitting the support tube (5) and becomes very high when the part is in position.



10 758

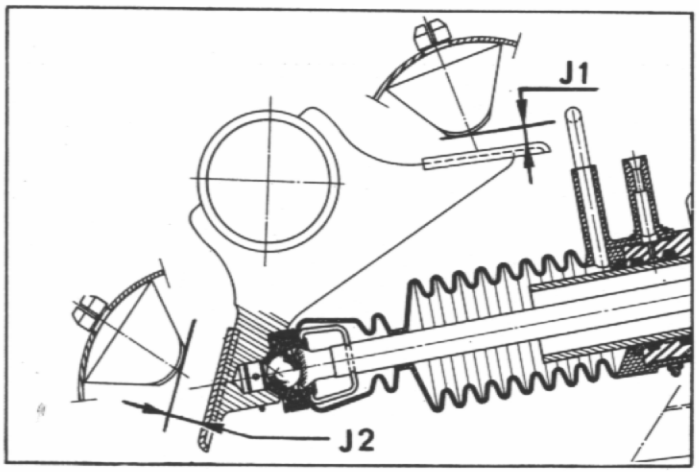
11. **Remove the cap D and measure the projected part F of the support tube. This distance should be virtually the same as for the support tube which has been removed.**
Remove the tool 2072-T and fit the anti-roll bar, without tightening the bolt holding the collar of the automatic height control.



10 754

12. **Fit the suspension arms and adjust the lateral play of the anti-roll bar** (*see corresponding operation*).

G. 43-3



13. Preset the automatic height control :

Using a jack, raise and support the suspension arms so that : J1 = J2 (see drawing).

Check that the corrector is in the rest position and tighten the automatic control linkage collar on the anti-roll bar.

14. Bleed the rear brake circuit.

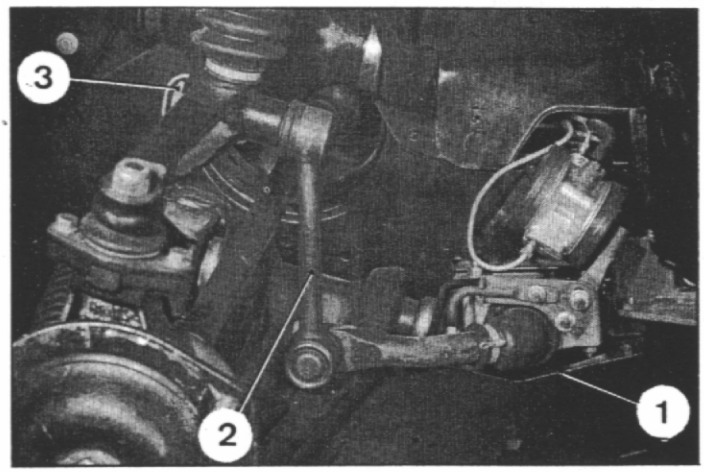
15. Fit the wheels and lower the vehicle to the ground.
Tighten the wheel nuts.

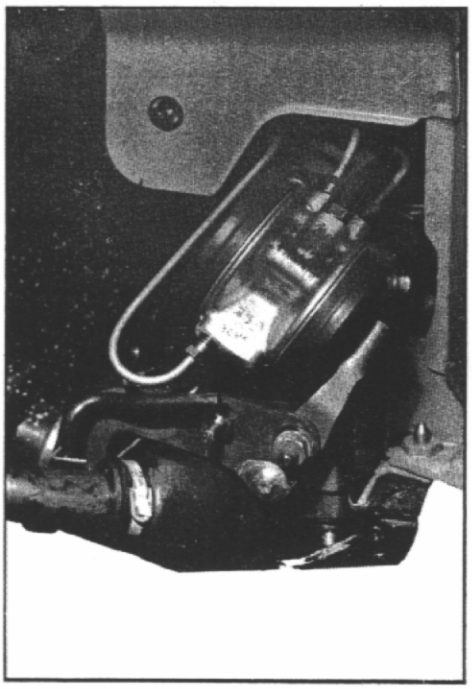
16. Check the rear height.

17. Fit the inspection plate to the floor of the boot.

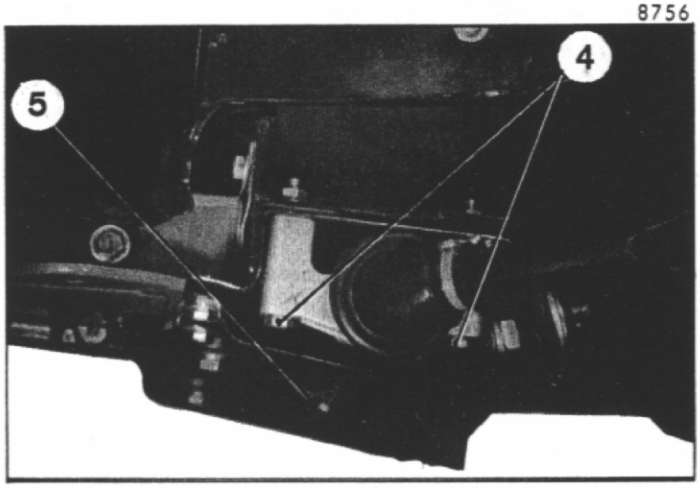
REMOVING AND FITTING A FRONT ANTI-ROLL BAR

8442





8756



REMOVAL

1. Place the height control to the *high position* so that a jack can be pushed under the vehicle. Chock up the front of the vehicle with *the wheels off the ground.*

   Slacken the bleed screw on the pressure regulator and place the manual control in the *normal running position.*

2. Remove the front wheels.

3. *On the right-hand side.* remove the protective housing for the height corrector

4. Remove the castellated nuts (3) and uncouple the connecting rods (2) from the upper suspension levers.

5. Remove the plates (1) which protect the anti-roll bar bearings.

6. Disconnect the automatic height control rod from the anti-roll bar : remove the bolt from the clamp (5) and open this out (the automatic control system should remain in position on the suspension unit).

7. Remove the bolts (4) holding the anti-roll bar bearings.

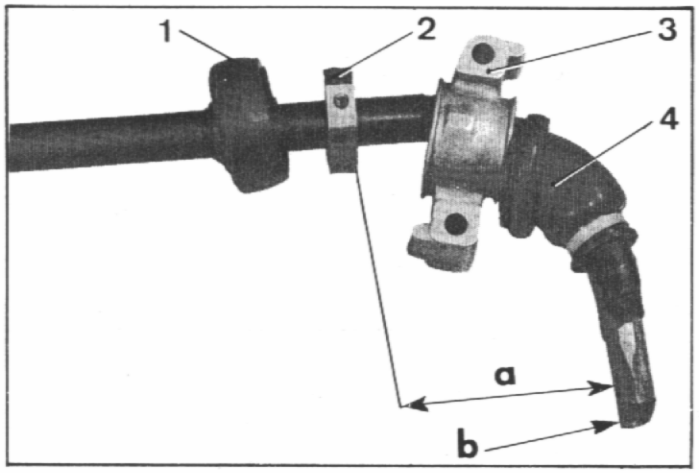
   Remove the assembly of bar and bearings.

   NOTE : Do not lose the plastic bearing of the automatic control rod, located in the right-hand bearing.

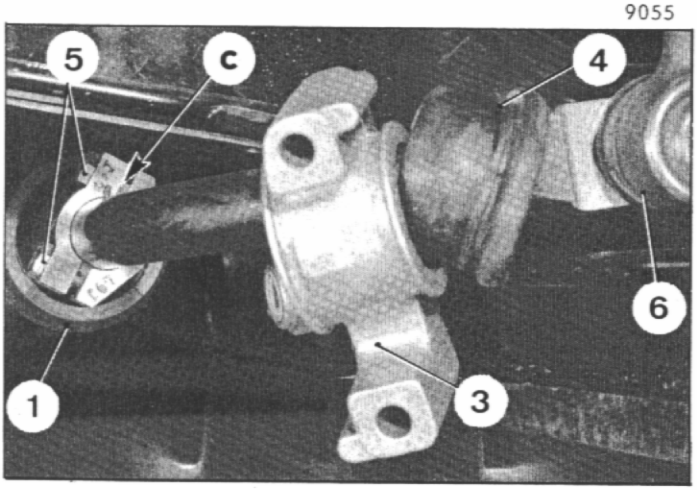
8. If necessary, disconnect the two connecting rods from the anti-roll bar. (Extractor 1892-T).

9. Strip down the anti-roll bar.

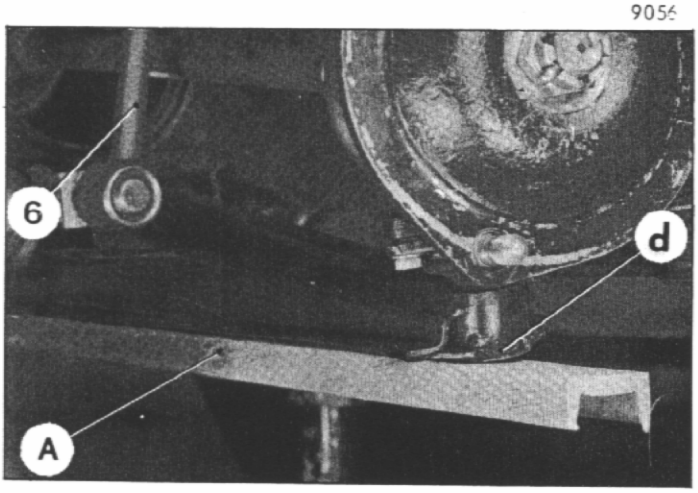
8952



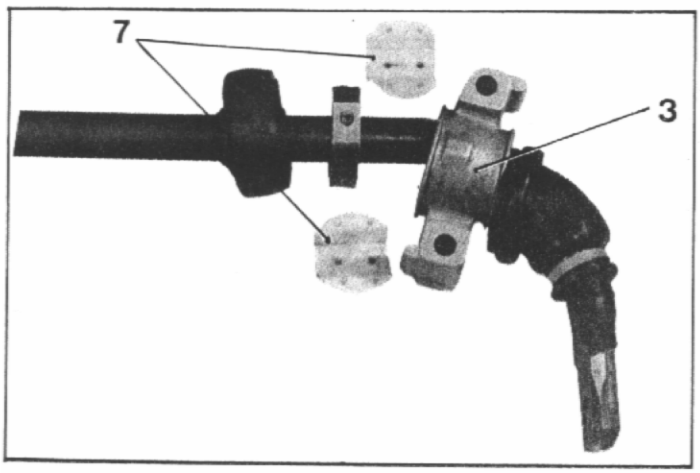
9055



9056



8952



FITTING

10. Prepare the anti-roll bar :

At each end of the bar :

a) Fit the inner dust exluder (1).

b) Fit the clamp (2) (the two clamps are identical).

Adjust the position of the clamp so that :

$$a = 93 \text{ mm}$$

(distance between the outer face of the clamp and the machined part « b » of the bar).

Orientate the clamp so that the heads of the bolts (5) face forward and that the section « c » of the half-clamps are perpendicular to the plane of the bar.

Fit the flexible washers (on bearings which are so fitted).

c) Fit the bearing (3).

NOTE : The bearings are different : the right-hand bearing has a housing for the plastic bearing of the automatic height control rod.

d) Fit the outer dust excluder (4).

e) Fit the connecting rod (6) (the left-hand rod differs from the right-hand one).

Tighten the nut to 55 to 70 mAN (5.5 to 7 m.kg).

11. Fit the anti-roll bar :

a) Adjust the position of the suspension arms : Place a jack fitted with a crossmember A (1.50 m length) and bearing under each lower end « d » of the wheel swivels).

Raise the assembly of suspension arms until the crossmember A bears against the underside of the suspension unit (at each side).

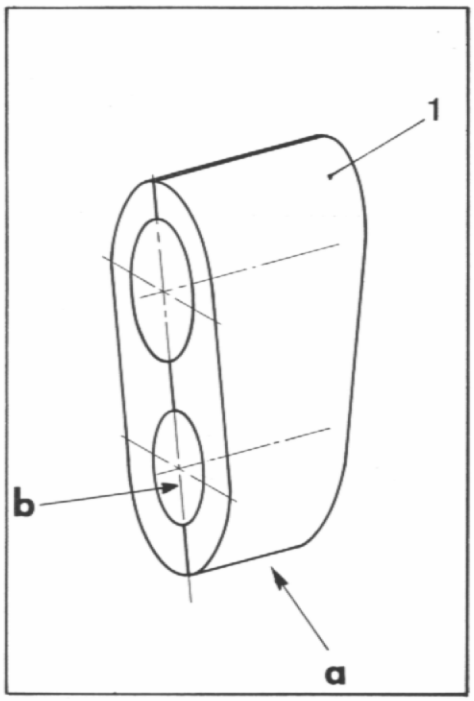
b) Offer up the anti-roll bar.

Couple the connecting rods (6) to the upper suspension levers.

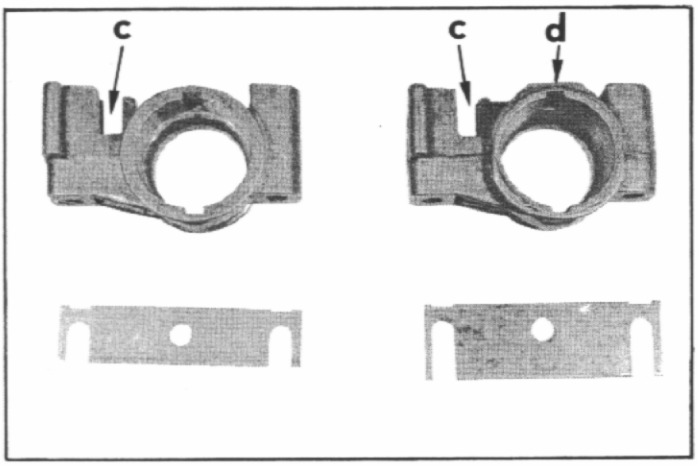
Tighten the nuts to 25 to 30 mAN (2.5 to 3 m.kg)

c) Fit the nylon shells (7) (grease the inside) in the bearings (3) of the bar.

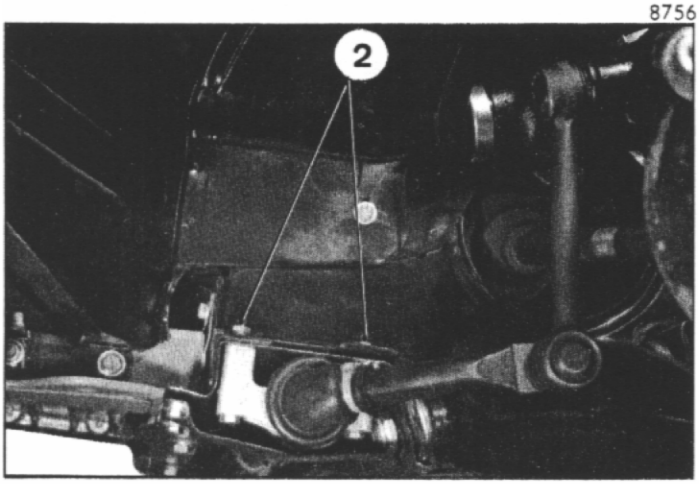
G. 43-10



10384



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d) *On the right-hand side,* fit the plastic shells on the automatic height control rod.

CAUTION : When the shells are joined together, the assembly (1) should be wedge shaped. The automatic control rod should be in the hole « b » (smallest diameter) situated near the thinnest end « a »).

Fit the bearing (1) into its housing of the right-hand bearing of the anti-roll bar : the thinnest part « a » should be at the bottom of the housing,

NOTE : If the bearing (1) is correctly put together, *it should be possible to fit it easily into its housing.*

12. Fix the anti-roll bar :

a) Raise the bar until it is possible to fit the bolts and nuts (2) (contact washer). Engage the nuts by a few threads only (so as to hold the bar, but avoiding that the bearings touch the unit).

Check that the bearing of the automatic control rod is in its housing.

b) Continue to raise the bar by its centre until one of the bearings comes into contact with the suspension unit.

CAUTION : If the other bearing does not touch the unit, insert shims between this bearing and the unit until *it can be fixed without any stress on the bar.*

Tighten the nuts (2) to 18 to 21 mΛN (1.8 to 2.1 m.kg).

NOTE :

On vehicles produced before *1st September 1971,* the bearings have no collar (at « d ») which grip the upper part of the rubber dust excluders.

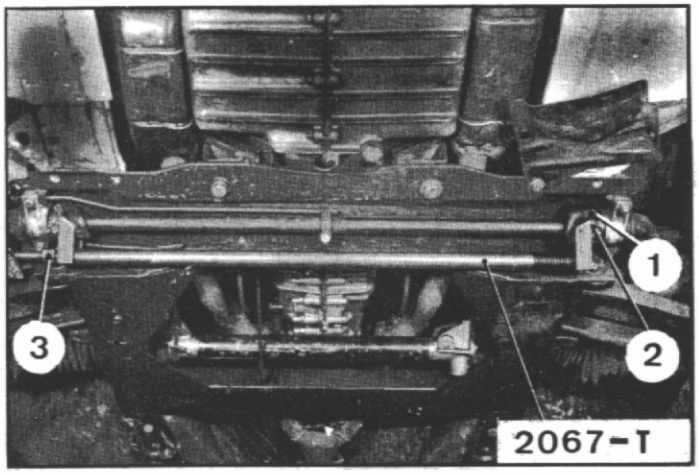
To facilitate subsequent fitting of the dust excluder, systematically interpose between each bearing and the suspension unit :

a) Two shims (GX. 20 230 01 A), if there is no shim under one or the other bearings.

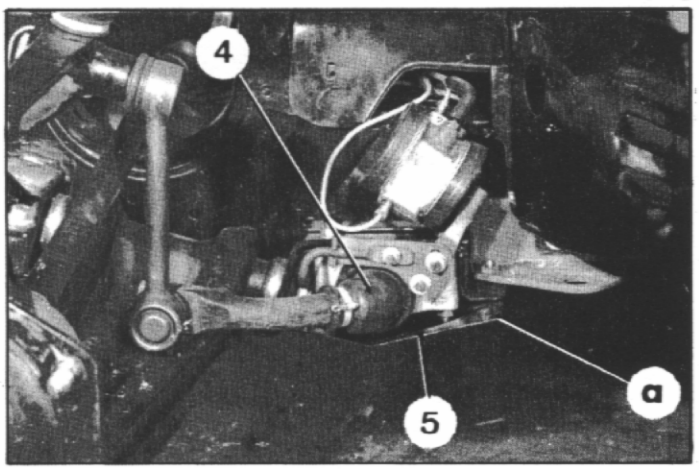
b) A single shim, if one shim is already under one of the two bearings.

There is only one type of shim (thickness 1 mm).

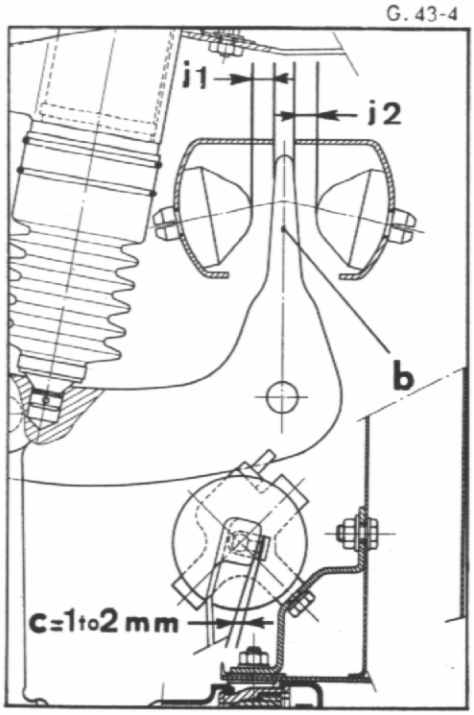
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G. 43-4



13. Prestress the bearing shells :

For this use tool 2067-T.

a) Slacken one of the bolts (1) of the collar (2).

b) Place the tool 2067-T up against the collar (2) Slacken the nut (3) so that the tool can exert a stress on the shells.

c) Tighten the bolt (1) to 10 to 11 mΛN (1 to 1.1 m.kg).

d) Remove the tool 2067-T.

e) Fit the dust excluders to the bearings.

14. Fit the dust excluders (4) to the bearings
(Do not twist them).

Fit :
- the locking ring at the bearing side.
- the collar at the bar side.

15. Fit the bearing protection plates (5)

Check that the anti-roll bar does not touch the bearing protection plates.

Otherwise add a flat washer between the plate and *the nuts at « a » only.*

16. Fix the automatic height control rod :

Connect the rod to the anti-roll bar.
Fit the bolt to the collar without tightening it.

a) Check that the manual control lever is in the *normal running position.*

b) Leave the suspension arm in the position described in paragraph 11.

NOTE : In this position the suspension arm stop levers « b » are halfway along their travel :

$$J1 = J2 \pm 2 \text{ mm}$$

c) Tighten the collar on the anti-roll bar to 8 to 9 mΛN 0.8 to 0.9 m.kg), checking that the ball joint on the corrector tie-rod is not clamped in the operating yoke.

$$c = 1 \text{ to } 2 \text{ mm}$$

17. Fit the corrector protective casing.

18. Remove the jack and the crosspiece.

19. Fit the front wheels.

20. Start the engine and tighten the bleed screw on the pressure regulator.

21. Lower the vehicle to the ground.

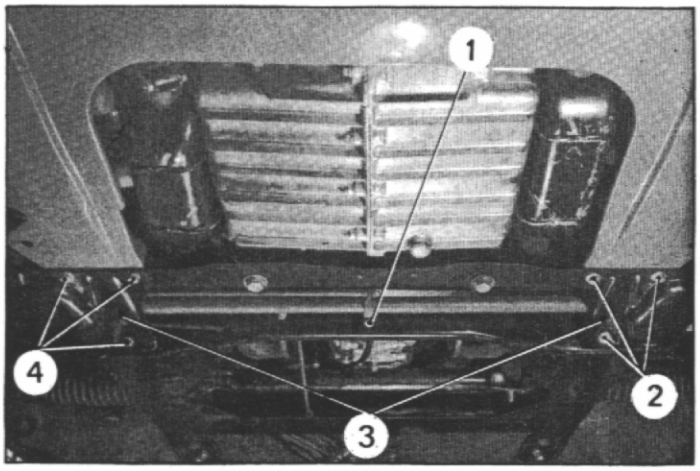
22. Check the heights and adjust if necessary.

front height = 189 ± 10 mm

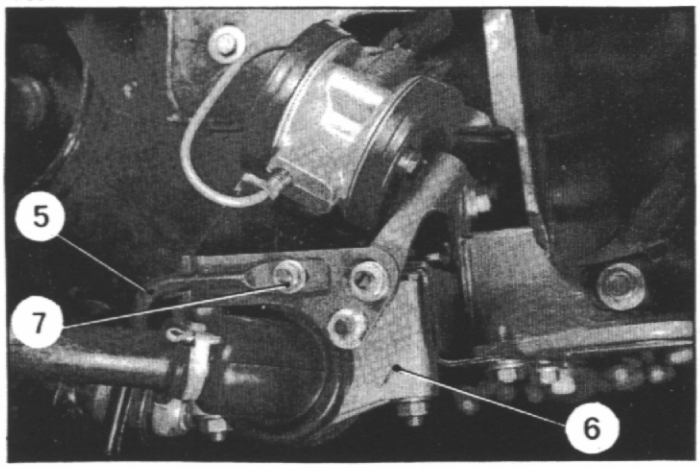
rear height = 272 ± 10 mm

REMOVING AND FITTING AN AUTOMATIC FRONT HEIGHT CONTROL

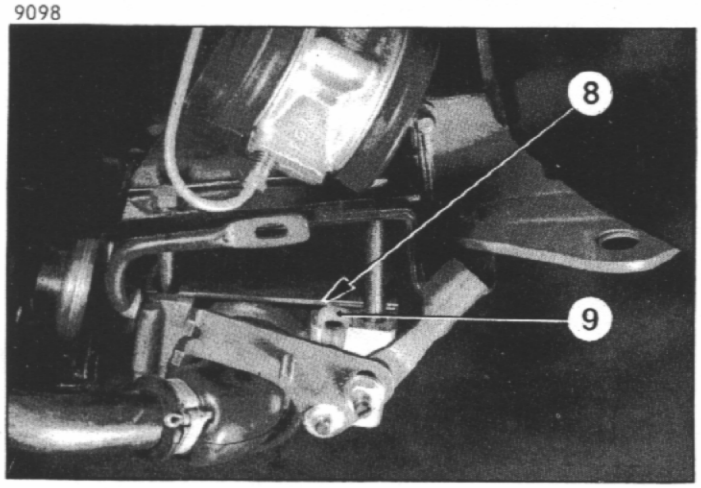
8536



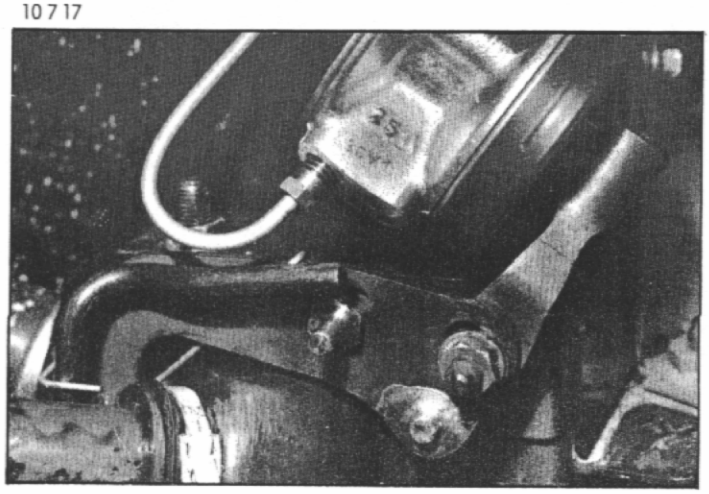
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9098



10717



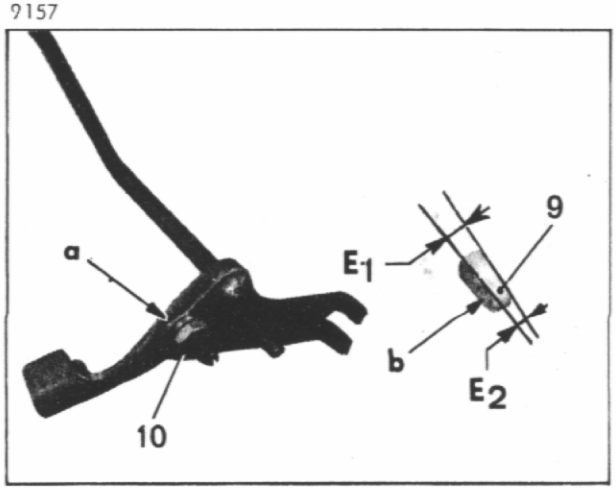
REMOVAL

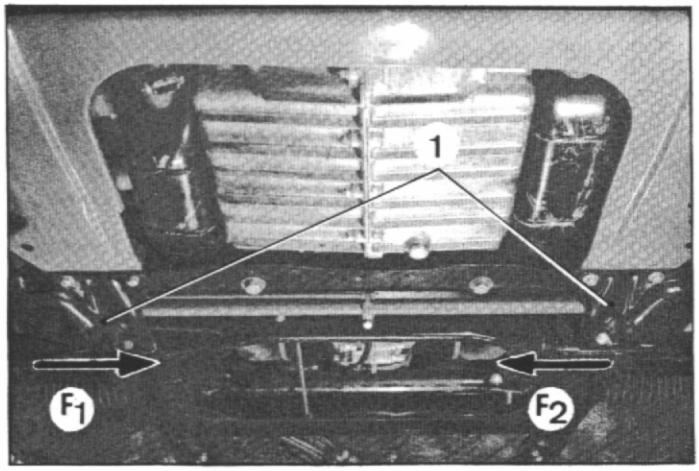
1. Chock up the front of the vehicle and remove the right-hand wheel.
2. **Remove the height corrector protective plate**
3. **Remove the protective plates (3) from the anti-roll bar bearings (right and left).**
   Remove the bolts (2) and (4).
4. **Remove the automatic control system.:**
   a) Slacken the bolt on the collar (1).
   b) Place the manual control in *normal position.* remove the nut (7) and disconnect the manual control (5).
   c) Disconnect the anti-roll bar bearings (6) *(right and left).*
   d) Remove the assembly of anti-roll bar and bearings downwards (do not lose the shims(8).
   IMPORTANT : The shims (8) may have been placed on the right or on the left, therefore they should be marked with that position.
   e) Remove the bolt (1) from the collar.
   f) Remove the automatic control system. Do not lose the bearing shells (9).

FITTING.

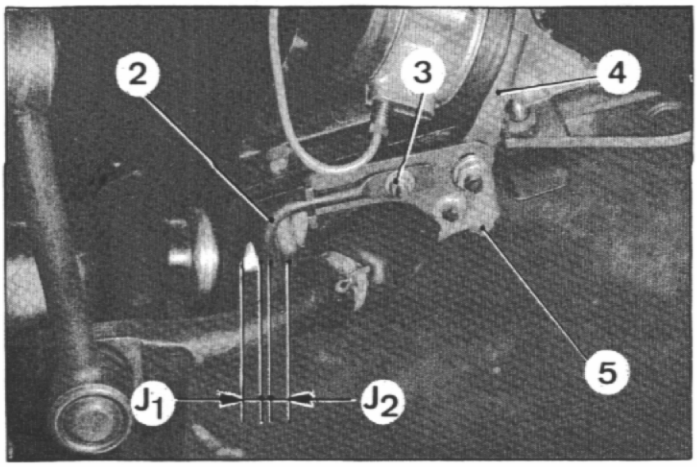
5. Check that the edges of the fix lever and the moving lever are in the same plane at « a ». Tighten the nut (10).
6. **Fit the automatic control system :**
   a) Offer up the system to the anti-roll-bar.
   b) Fit the bearing shells (9).
   IMPORTANT : When the two bearing shells are correctly assembled, *they should be wedge shaped (E1 > E2).*
   The narrowest end « E2 » should be at the bottom.
   The automatic control rod should be placed in the hole « b » (smallest diameter).
   c) Fit the bolt to the collar (1) *without tightening.*

9157

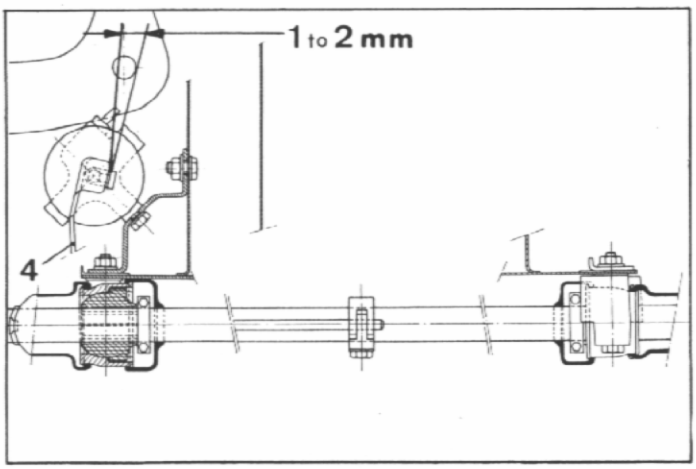




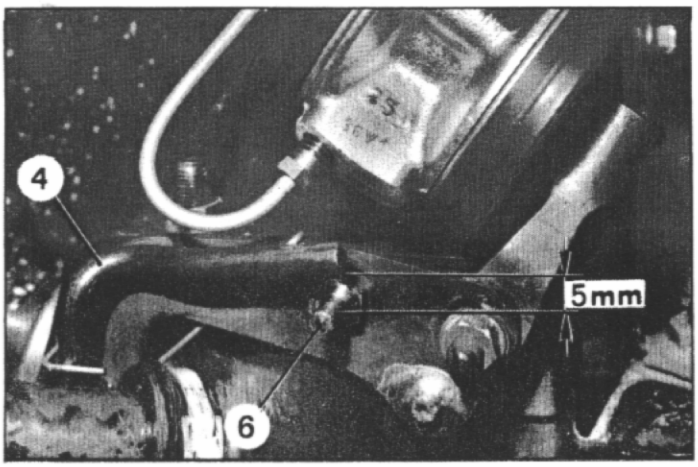
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G. 43-4



10 717

7. Fit the anti-roll bar bearings :

Place the shims under the bearing marked during dismantling.

Fit the nuts without tightening them (contact washer).

8. Adjust the lateral play of the anti-roll bar :

a) Adjust each bearing in turn as follows :

Press the hand on the bearing, exerting the force towards the center of the bar (direction of the arrow F1 or F2). While maintening this force, tighten the bolts (5) on the bearing to 18 to 21 mΛN (1.8 to 2.1 m.kg).

b) Check that there is no lateral play on the bar.

c) Bring the control lever (4) to the corrector ball joint and link up the manual control (2). Equalize the clearances (J1 = J2) *(old fitting).*

New fitting :

The lever (4) should not be in contact with the adjusting bolt (3). Leave a clearance of about 5 mm.

Tighten the nut (3) (contact washer).

9. Pre-set the automatic control system :

Using a crossmember A (1.50 m length) placed on a jack (See Op. G.434-1 page 2) lift the two semi-units, until the crossmember A comes in contact with the underside of the suspension unit.

Check that there is a clearance of 1 to 2 mm between the lever (4) and the corrector ball joint.

Tighten the collar of the automatic control system.

10. Fit the protective plates (1) to the anti-roll bar bearings :

Fit the bolts (contact washer).

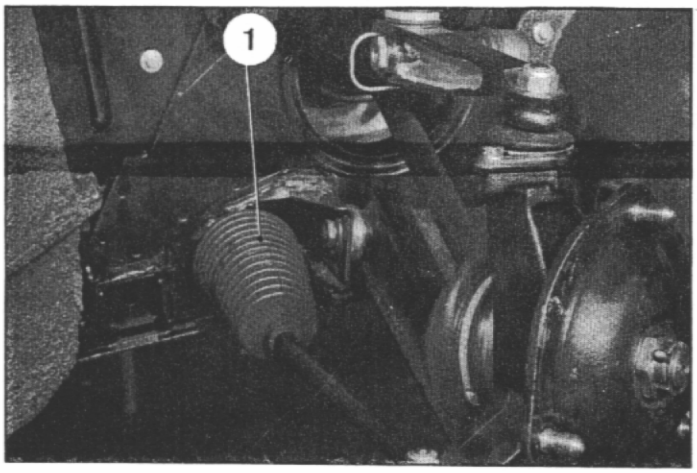
11. Check the setting of the front heights.

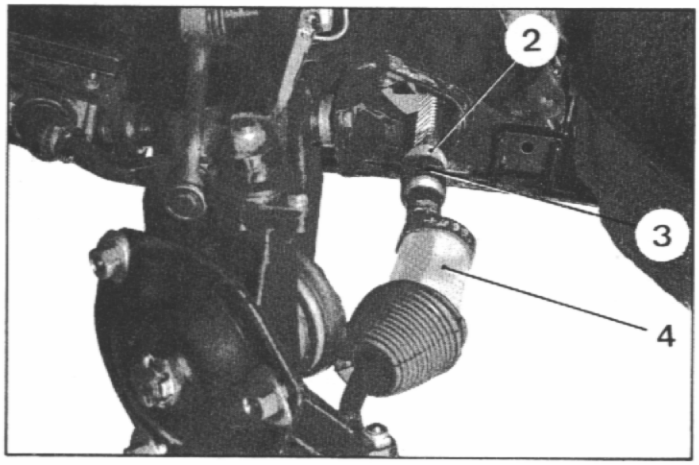
12. Check the setting of the manual control (front part).

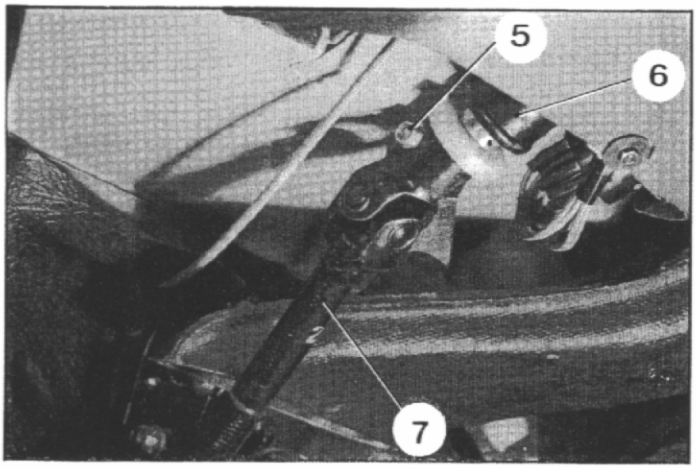
13. Fit the height corrector protective plate.

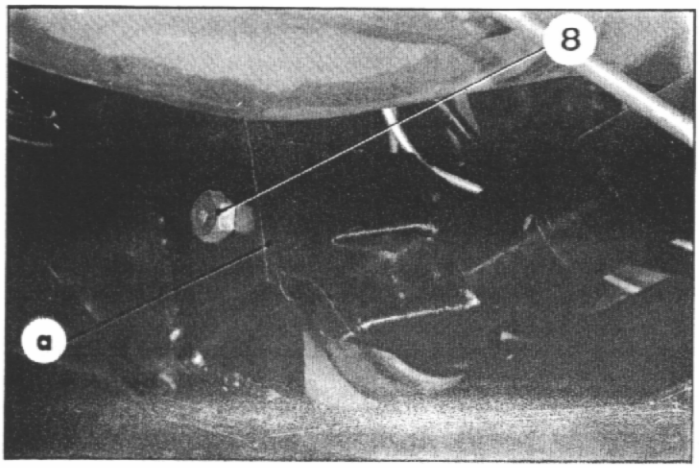
Fit the bolts (6).

REMOVING AND FITTING A STEERING SYSTEM.









REMOVAL.

1. Place the vehicle on blocks (front wheels off the ground).

2. Remove the front wheels.

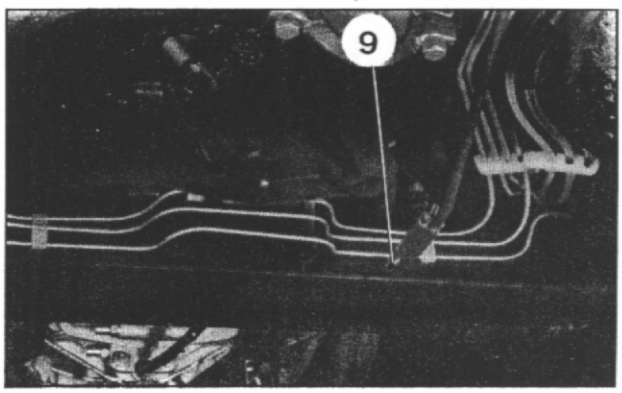
3. Move the bellows (1) out of the way.

4. **Disconnect the track rods :**
Unlock the tabs (2).
Unscrew the track rod ball joints (3) (16 mm key with 15° and 75° angle openings, such as FACOM N° 34). *Hold the rack still during this operation.*

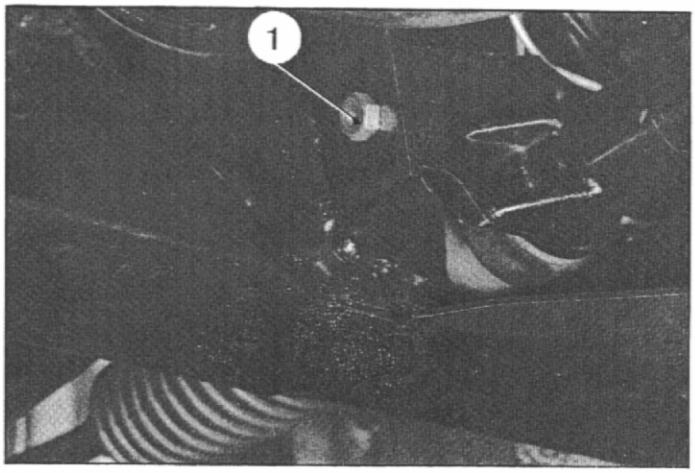
5. Free the plastic sheaths (4) from the rack.

6. **Remove the steering column and the jointed shaft :**
IMPORTANT : Since the ends of the jointed shaft are not identical, mark their positions before removing.
Remove the nut (5) holding the upper universal joint.
Slacken the nut holding the lower universal joint.
Free the steering column from the support tube (6).
Remove the jointed shaft (7).

7. **Remove the steering unit (pinion and rack assembly) :**
Remove the bolts (8) holding the steering on the front axle unit.
Remove the control rod (9) from the front height corrector (mark the position of the collar on the rod).
NOTE : The height settings are not modified by removing the control rod of the height corrector.
Free the steering box from its housing from underneath the vehicle.
If necessary, file down each side at « a ».



FITTING.



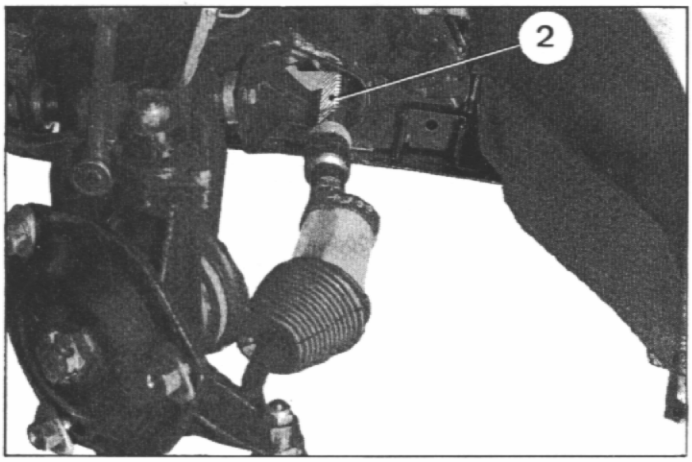
8. Fit the steering unit :

Fit the steering into its recess on the front axle unit. Tighten the bolts (1) to 36 to 40 mAN (3.6 to 4 m.kg) (bearing plate under bolt head).

9. Connect up the jointed shaft and the steering column :

CAUTION : Place the jointed shaft (6) in the position marked on removal. The ends are not identical : at the steering column end, the groove for the bolt (4) should give on the splines.

a) Engage the lower universal joint with the pinion.

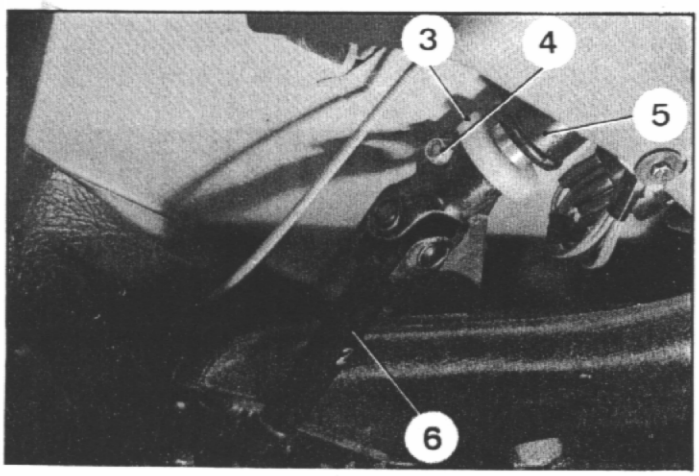


b) *Adjust the position of the rack (2) to give equal clearance at each side of the casing.*

c) Fit the steering column into the support tube (5).

d) Insert the plastic washer (3) and connect the steering column to the upper universal joint of the jointed shaft (6).

Before coupling up, the steering wheel should be orientated : the arm should be on the left-hand side, at an angle of about 30° below the horizontal (the « twenty to » position).
Fit the bolt (4) (new NYLSTOP nut whenever this bolt is removed).
Hold the jointed shaft (6) against the steering column and tighten the nut (4) to 13 to 14 mAN (1.3 to 1.4 m.kg).

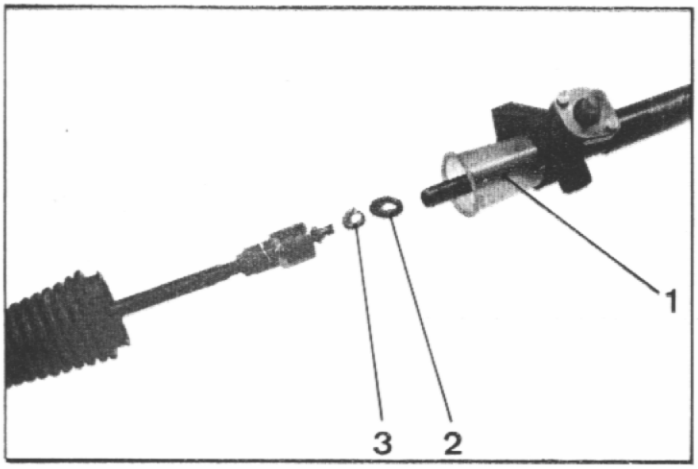


10. Adjust the clearance between the steering column and the jointed shaft :

a) Fit the lower universal joint of the shaft (6) to the pinion, to give a clearance of 1 to 1.5 mm between the washer (3) and the support tube (5). Tighten the nut to 13 to 14 mAN (1.3 to 1.4 m.kg) *(new NYLSTOP nut whenever the bolt is removed).*

b) Fit the bellows on the lower universal joint of the shaft (6).

8939



11. Connect up the track rods :

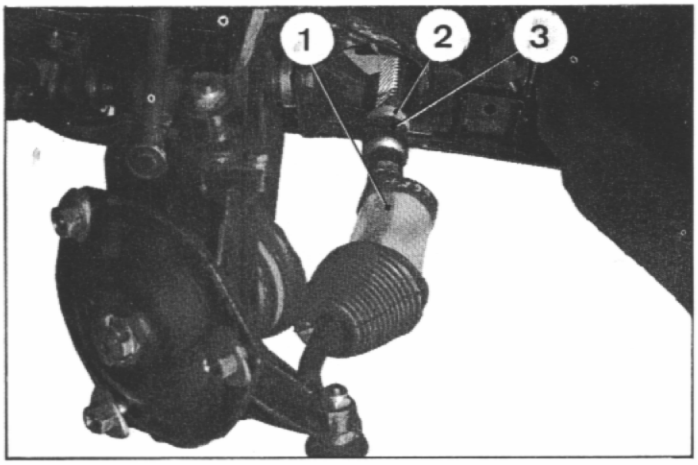
Fit the plastic sheaths (1) on the housing (elastic collars).

Screw the track rod ball joints fully home on the rack after interposing :
- the stop washer (2),
- the tab (3).

Hold the rack and tighten the ball joints to 36 to 40 m.kN (3.6 to 4 m.kg).

Using plier bend the tab back onto the flat of the ball joint.

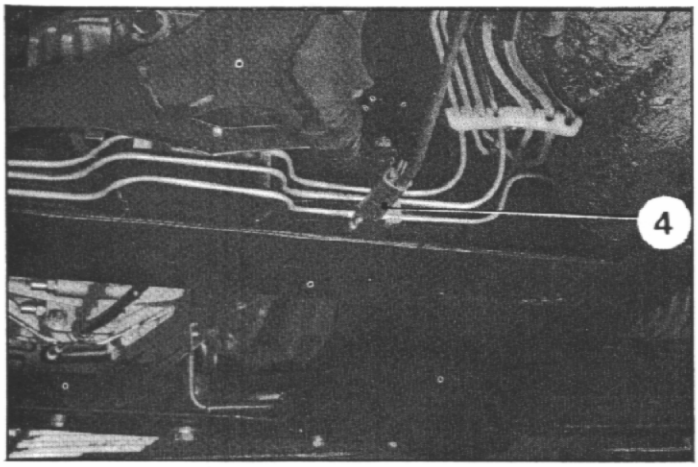
8755



12. Connect the control rod of the front corrector :

If necessary, operate the height control to adjust the marks made when the collar (4) was removed.

8537

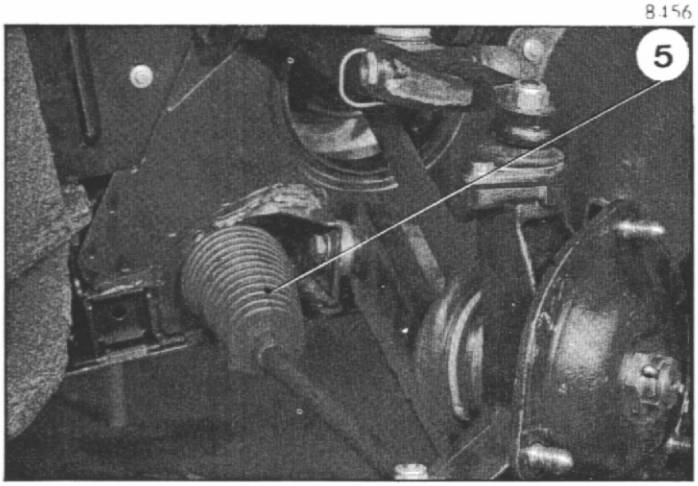


13. Fit the front wheels.

14. Lower the vehicle to the ground.

Check the toe-in of the front wheels :
0 to 2 mm with the suspension in the normal position.

8156



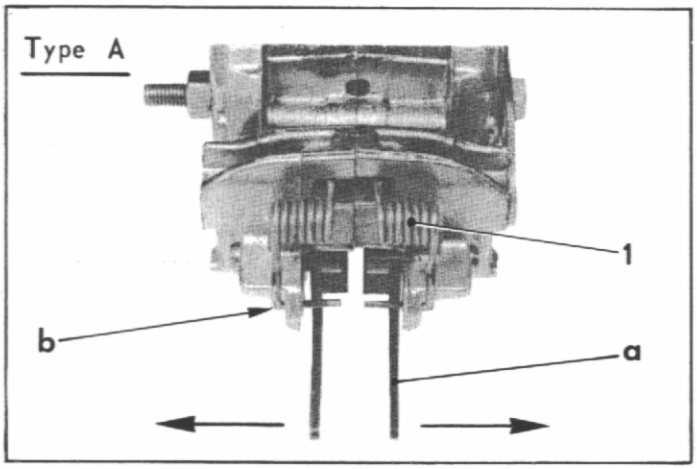
15. Place the bellows (5) over the plastic sheaths (1).

Adjust the position of the bellows (5) :

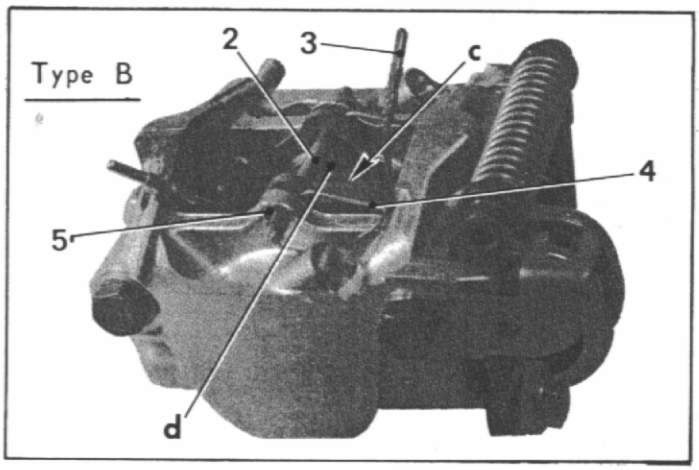
In the straight ahead position, their length should be : *155 ± 3 mm.*

I. REPLACING THE MAIN BRAKE PADS.

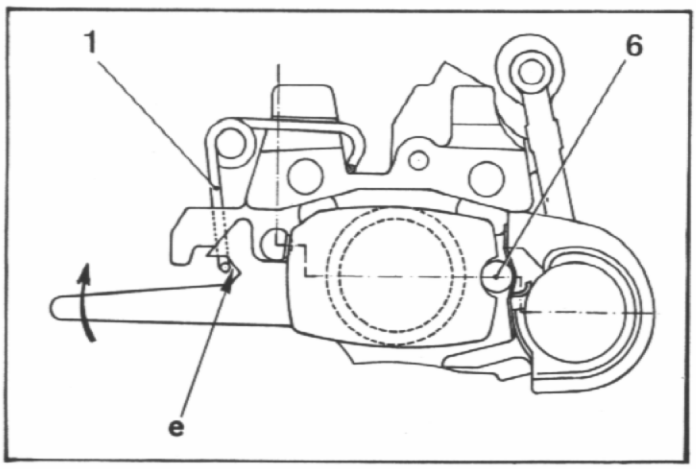
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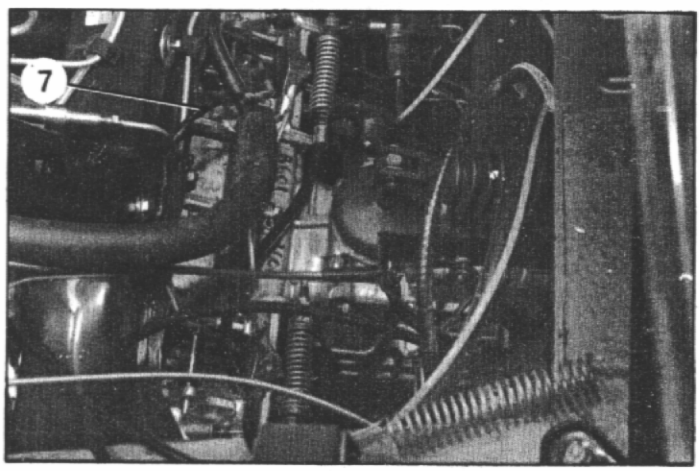
11 245



Manuel 810-2



G. 45-2



11 209

REMOVAL.

1. **Remove the heater distributor box :**
Remove the box with its hoses and place it to one side.

2. **Remove the pads :**
Vehicles fitted with old type brake calipers (type A) :
a) Push on the ends « a » of the pads with the hand to push back the pistons, as shown on the figure (arrows).
b) Disconnect the leads of the wear detector.
c) Pull on the end « b » of the pad springs : use a hook to pull the pad forward to release it.

3. **Remove the pads :**
(Vehicles fitted with new type calipers (type B)):
Push the pad at « c » with a screwdriver.
Remove the pin (5).
Push out the spindle (2).
Hold the pad by the wire (3) before this leaves the spindle,
Remove the spindle and the spring (4).
Remove the pads from above.
IMPORTANT : For even braking, the four pads should always be replaced together.

FITTING.

4. **Fit the pads :**
(Vehicles fitted with old type calipers),
Fit the pad into the caliper by pushing it as far to the rear as far as possible, so that the spigot (6) engages in the corresponding slot.
Lock the pad by raising its end so that the spring (1) engages in the notch « e ».

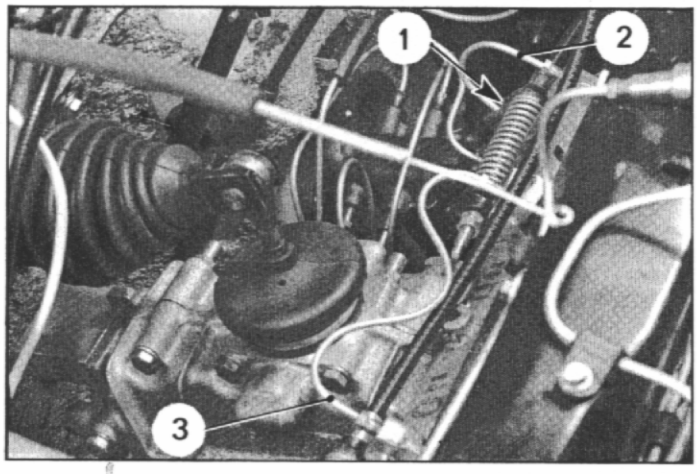
5. **Fit the pads :**
(Vehicles fitted with new type calipers)
a) Fit the pad at the side of the gearbox housing. Hold the pad with a hook inserted in the hole « d » of the pad.
b) Fit the spring (4).
c) Insert the spindle (2) into the brake caliper and into the upper hole of the pad after interposing the spring (4) below the spindle.
d) Repeat the same operation for the other pad.
e) Push home the spindle and fit the pin (5).
f) Connect the leads of the wear indicator (7).

6. Operate the brake pedal a few times and make sure that the pedal travel remains normal.

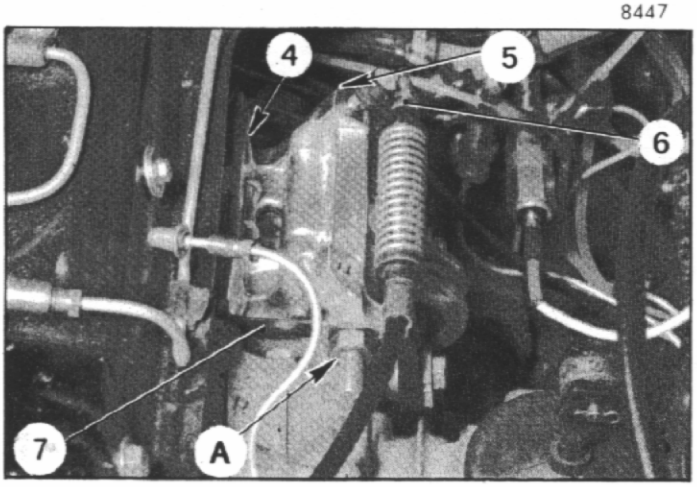
7. Fit the heater distributor box.

II. REMOVING AND FITTING A BRAKE CALIPER.

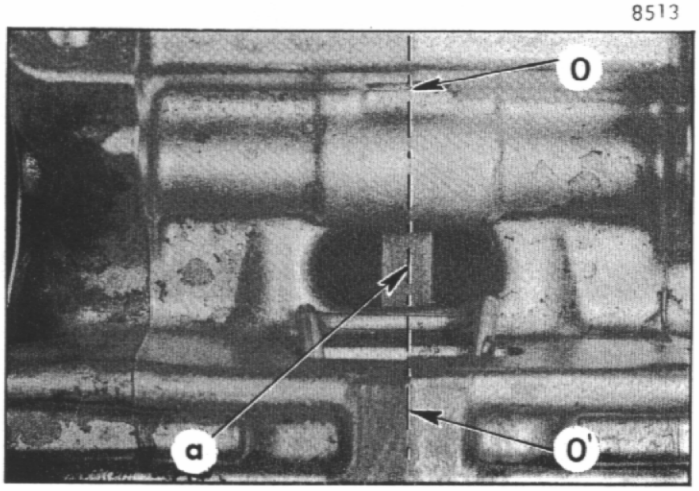
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8447



8513



REMOVAL.

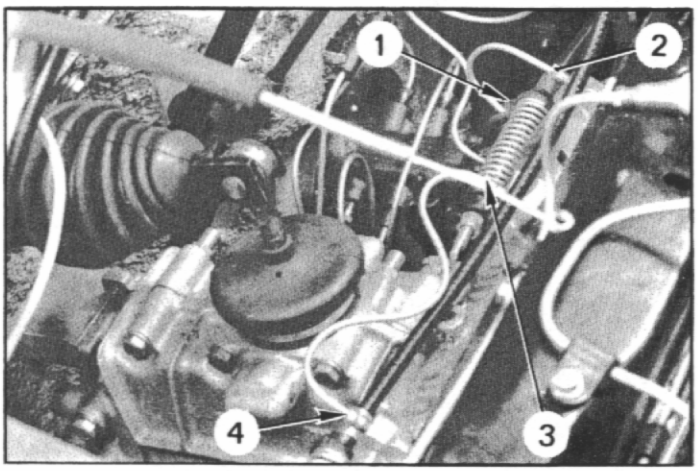
1. Place the manual height control *on high position.*
2. Slacken the pressure regulator bleed screw.
   Disconnect the cable from the negative terminal of the battery.
3. **Remove the caliper :**
   a) *On the right-hand side :*
      Remove the heater distributor box.
      Remove the box with its hoses and place it to one side.
      Uncouple the caliper connection pipe (3).
   b) *Left-hand side :*
      Uncouple the caliper connection pipe (3).
      Disconnect the feed pipe (2) and release it from the bracket (1).
   c) Partly slacken the bolts (4) and (5) which hold the caliper.
      Remove the rear bolt (5). Swing the caliper.
      Replace the bolt (5). Fit a nut A (10 × 1,50) so as to retain the two halves of the caliper.
   d) Disconnect the emergency brake cable.
      Remove the locknut and the nut (6).
   e) Remove the front mounting bolt (4) and remove the caliper.

FITTING.

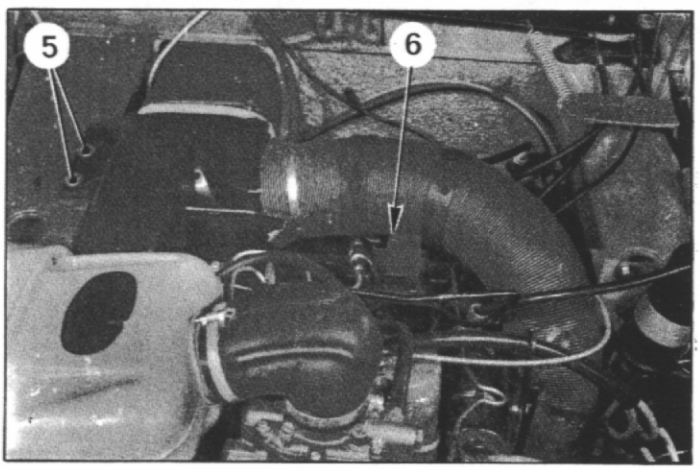
IMPORTANT : *Vehicles fitted with old type brake calipers only.*
The shim (7) located between the caliper and the gearbox is used for positioning the caliper with respect to the brake disk.
When exchanging a caliper, it is necessary to check this position. After fitting, carry out this check as follows :
Make a mark « a » on the disk equidistant from the two faces and check that this mark is aligned with the seal plane « O - O' » of the two halves of the caliper.
The difference between these two planes should not exceed 0.5 mm.

4. **Fit the brake caliper :**
   a) Check the state of the bearing surface of the calipers on the gearbox. Scrape off any burrs.
   b) Offer up the complete caliper, fitted with the original shim (7) *(old type caliper)* and the emergency brake pads. (The two halves of the caliper being assembled and held together by the bolt (5) and the nut A which were used during dismantling).
   c) Fit the front mounting bolt (4). Do not tighten it fully (flat washer on the right-hand side).
   d) Remove the nut A, swing the caliper and tighten the bolt (5) (flat washer on the right-hand side).
      Check that the shim (7) is in place *(old type caliper).*
      Tighten the bolts (4) and (5) to 45 to 50 mΛN (4.5 to 5 m.kg) *on old type calipers and* 60 mΛN (6 m.kg) *on new type calipers.*
5. **Fit the main brake pads.**
   (See corresponding operation).

8460



8367



6. Adjust the clearance at the emergency brake pads.

7. Connect up and adjust the emergency brake cable.

8. Connect up the feed pipes :

a) *Right-hand side :*
Fit the union (4).
(Replace the sleeve-seal)

b) *Left-hand side :*
Fit the unions (2) and (3).
(Replace the sleeve-seals).
Insert the pipe in the bracket (1).
Tighten the unions to 8 to 9 m.kg (0.8 to 0.9 m.kg).

9. Bleed the front brakes .
Connect the cable to the negative terminal of the battery.

10. Fit the heater distributor box :
Fit the bolts (5) (contact washer).
Tighten the bolt (6).

III. REMOVING AND FITTING A BRAKE DISC

Manual 810-2

8608



REMOVAL.

1. Place the front of the vehicle on blocks :
Place the height control *on the high position.*
Chock up the front of the vehicle with *the wheels off the ground* (behind the wheel arch).

2. Release the pressure in the circuits :
a) Slacken the pressure regulator bleed screw place the height control *in the normal position.*
b) Wait until the rear suspension has stabilized and place the control *to the high position :*
the rear suspension should settle completely.

3. Remove the brake caliper :
Do not disconnect the emergency brake cable.

4. Disconnect the drive shaft :
Remove :
- the wheel,
- the nuts and bolts (key 2418-T).

5. Remove the disc :
Remove the fixing studs.
Remove the disc from above.

FITTING.

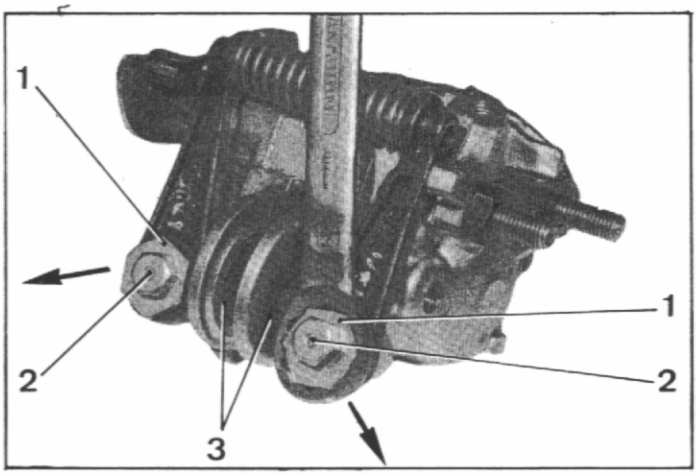
6. Fit the disc :
Offer up the brake disc and fit the studs on the differential shaft (shouldered part « a » to the outside).

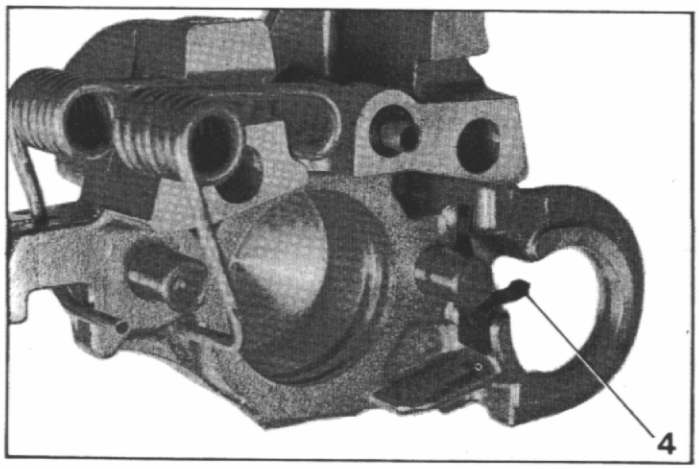
7. Connect up the drive shaft :
Tighten the nuts to 50 m.kg (5 m.kg)

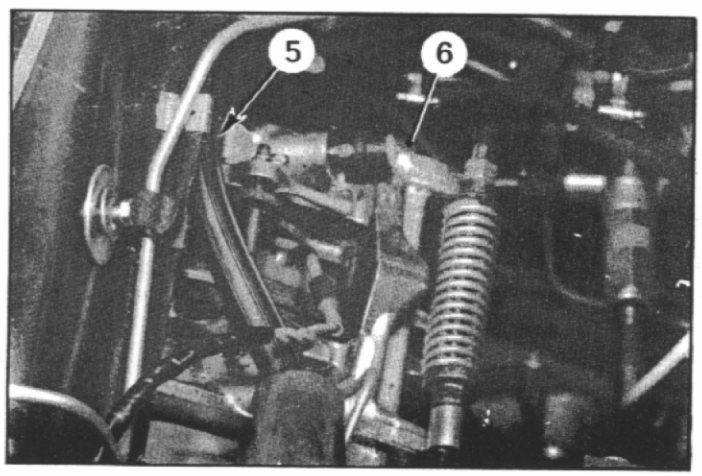
8. Fit the brake caliper.

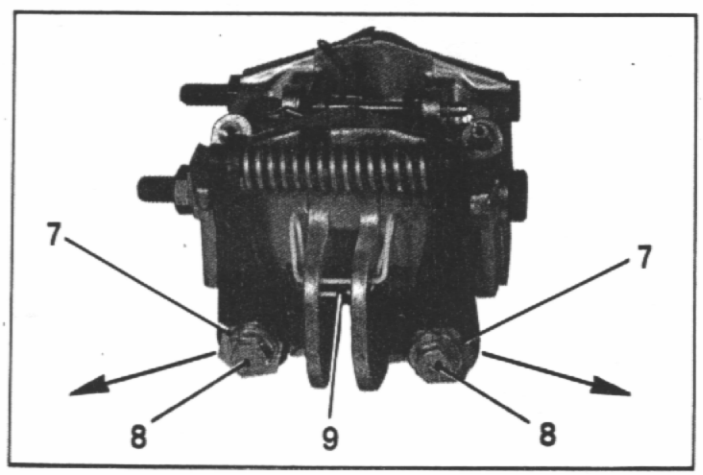
9. Lower the vehicle to the ground.

IV. REPLACING THE EMERGENCY BRAKE PADS









A. VEHICLES FITTED WITH OLD TYPE CALIPERS.

REMOVAL.

1. **Remove the brake caliper :**
2. Remove the pads (3) and slacken the bolts (2) on the eccentrics.

NOTE : For even braking, the four pads must always be replaced together.

FITTING.

3. **Fit the pads :**
   a) Turn the eccentrics (1) to position which gives the maximum clearance at the pads (direction of the arrows).
   b) Fit the pads (3).
   c) Check that the anti-noise springs (4) are properly positioned.
4. **Fit the brake caliper.**
5. **Adjust the pad clearance.**
6. **Adjust the emergency brake cables.**

B. VEHICLES FITTED WITH NEW TYPE CALIPERS.

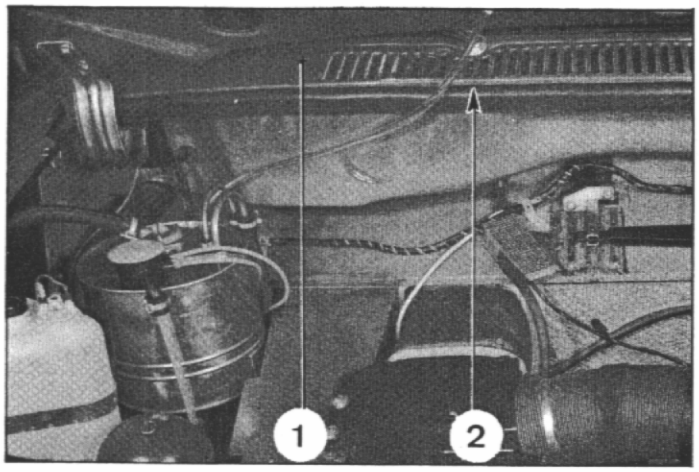
7. **Remove the pads :**
   Remove the heater distributor box.
   Disconnect the pipe from the caliper.
   Partly slacken the bolt (5).
   Remove the bolt (6).
   Disconnect the emergency brake cable.
   Swing the caliper towards the front of the vehicle.
   Slacken the bolts (8) and turn the eccentrics (7) to the position which gives maximum clearance at the pads (direction of the arrows).
   Hold the spring (9) and release the pads.
   Proceed in the same way for the other brake caliper.

FITTING.

8. **Fit the pad :**
   Lift the spring (9) and fit the pad to its support.
   (Repeat the same operation for the other pads).
9. **Replace the brake caliper.**
   Fit the bolt (6).
   Tighten the bolts (5) and (6) to 60 m.N (6 m.kg).
10. **Adjust the pad clearance.**
11. **Connect and adjust the emergency brake cables.**
12. Connect up the caliper pipe.
13. **Bleed the front brakes.**
14. Fit the heater distributor box.

I. REMOVING AND FITTING A WINDSCREEN WIPER MOTOR.

8366

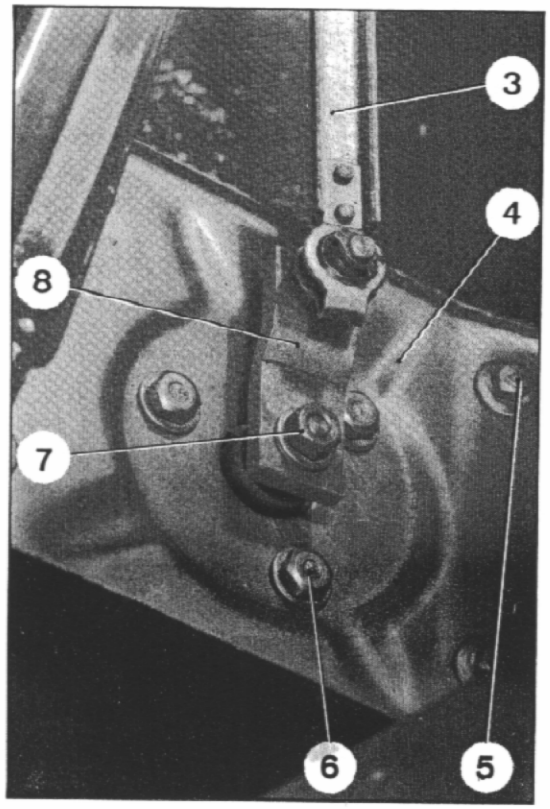


REMOVAL.

1. Disconnect the chassis cable from the negative terminal of the battery.
2. Remove the bonnet .
3. Remove the plate (1) from the ventilation intake after removing its seal (2).
4. Remove the nut (7) holding the crank and release this from the spindle of the windscreen wiper motor.
5. Remove the three bolts (6) holding the motor to its support plate (4).
6. Remove the four bolts (5) holding the support plate to the chassis.
7. Disconnect :
   - the windscreen wiper motor harness from the vehicle harness,
   - the motor earthing lead from the chassis.
8. Remove the support plate, then the motor and its electrical connections.

FITTING.

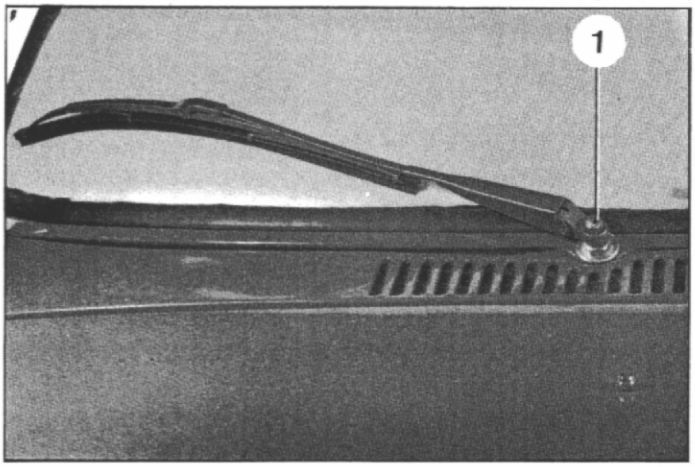
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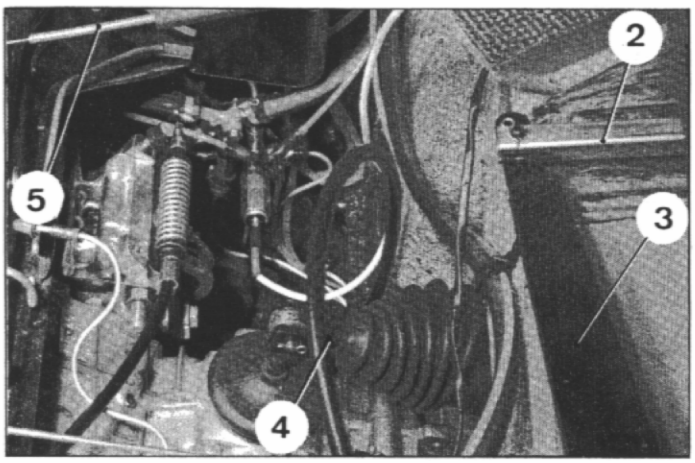
9. Fit the motor and its electrical connections into the ventilation air intake.
10. Fit the support plate (4) on the motor. Tighten the three bolts (6) (toothed washer) to 3.5 to 4 mAN (0.35 to 0.4 m.kg).
11. Fit the assembly of plate and motor to the chassis
    Tighten the four bolts (5) (toothed washer) to 5 mAN (0.5 m.kg).
12. Connect :
    - the motor electrical harness to the vehicule harness,
    - the motor earthing lead to the chassis (bolt holding the bonnet hinge).
13. IMPORTANT : *Before fitting the crank (8) to the motor, make sure that the latter is in the « automatic stop » position.*
    To do this :
    - Connect up the battery (negative terminal).
    - Switch on the ignition for about 5 seconds and then switch it off again.
    - Disconnect the battery (negative terminal).
14. *Fit the crank (8) on the motor spindle and in alignment with the connecting rod (3).*
    Tighten the nut (7) to 4.5 to 5 mAN (0.45 to 0.5 m.kg) (toothed washer).
15. Fit the ventilation air intake plate and its seal.
16. Fit the bonnet.
17. Connect the cable to the negative terminal of the battery.
18. Check the operation of the windscreen wiper.

8780

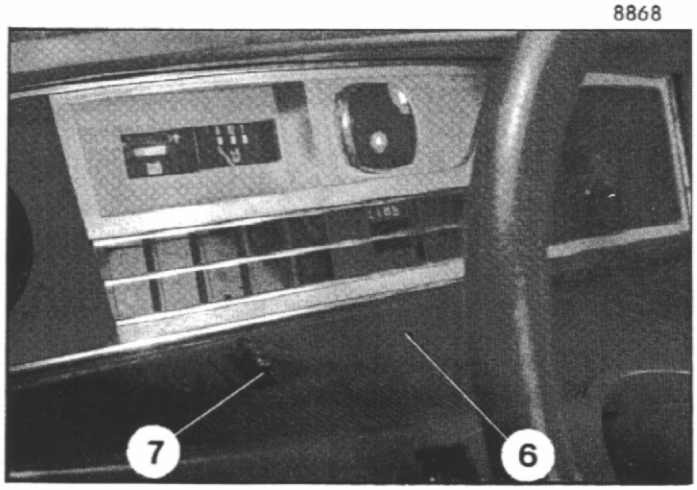
II. REMOVING AND FITTING A WINDSCREEN WIPER MECHANISM.



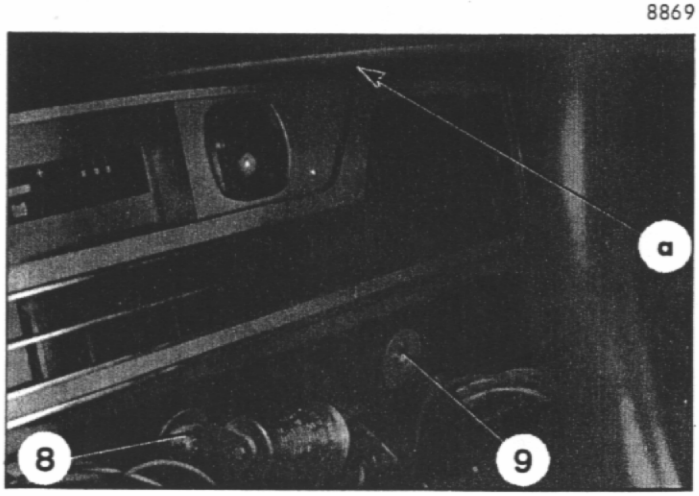
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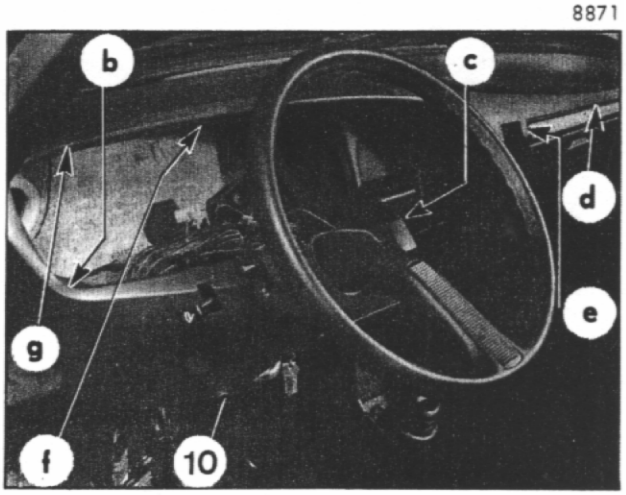
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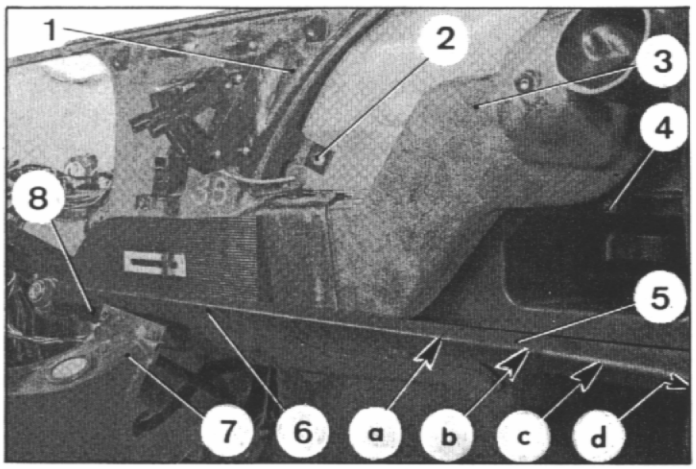
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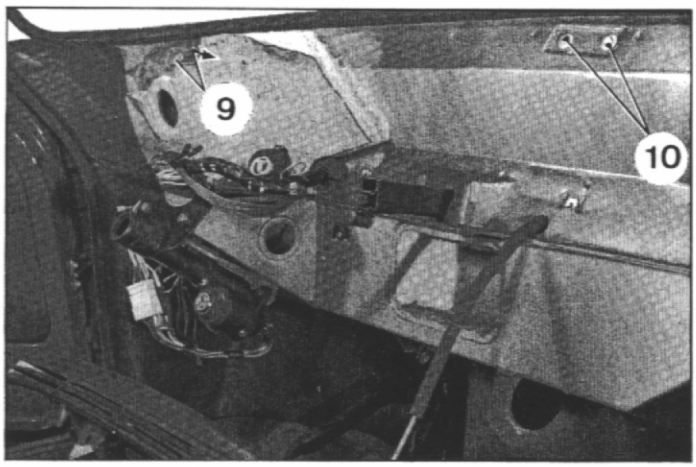
REMOVAL.

1. Disconnect the cable from the negative terminal of the battery.
2. Remove the bonnet lid.
3. Remove the ventilation air intake plate and its seal.
4. Remove the nut holding the crank and free this from the windscreen wiper motor spindle.
5. Remove the nuts (1) holding the wiper blade holders and free from their tapered splined shafts.
6. Disconnect :
   - the choke cable from the carburettor,
   - the operating cable (5) from the heater flap,
   - the emergency brake handle (2) from the operating lever (3),
   - the gear lever (4) from the selector fork operating lever,
   - the speedometer cable from the speedometer.
7. **Remove the instrument panel :**
   a) Remove the cover (6), push it forward in order to remove it from the back.
   Disconnect the leads from the switch or switches (7) (according to model).
   b) Remove the two bolts (8) and (9).
   Remove the panel from the dashboard : begin by pulling downwards on the right-hand and then on the left-hand side (press lightly at «a» on the dashboard, to facilitate the operation).
   c) Uncouple the connector or connectors (according to model) of the different leads on the panel.
   d) Remove the instrument panel.
8. **Remove the dashboard :**
   a) Remove the emergency brake handle.
   b) Remove the knobs controlling the heater and de-mister (pull them out).
   c) Disconnect all the electrical plugs.
   d) Remove the steering wheel.
   e) Remove the seven bolts holding the dashboard : at « b », « c », « d », « e », « f » and « g » and the bolt (10).
   f) Remove the dashboard.

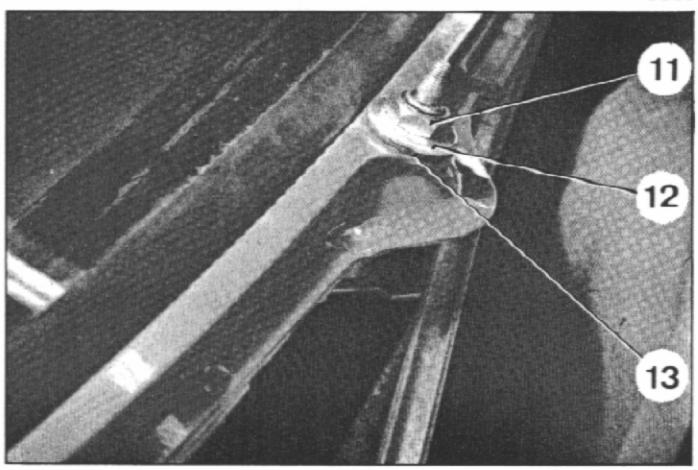
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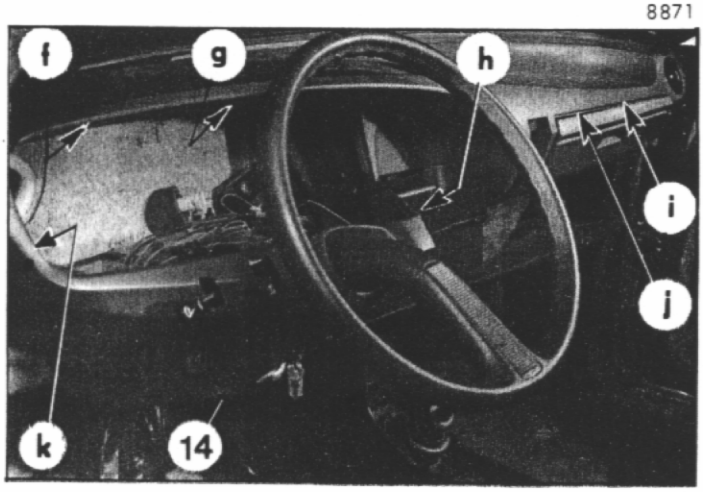
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9. Remove the shelf (5) by removing the six bolts : at «a», «b», «c», «d» and the bolts (6) and (8).

10. Remove the two bolts (4) and free the duct (3).

11. Remove the bolts holding the console (7) and pull it a little way to the rear.

12. Remove the four bolts (2) holding the pipe (1) and free it.

13. Remove the bolts (9) and (10) holding the windscreen wiper bearings on the dashboard.

14. Remove the nut (11) from each spindle, the cap washer (12) and the seal (13).

15. Remove the mechanism from the dashboard.

FITTING.

16. Fit the mechanism together with the crank of the windscreen wiper motor.

17. With the bearings placed on the dashboard plate : to each spindle fit the seal (13), the cap washer (12) and the nut (11). Temporarily tighten this by hand.

18. Fit the bolts (9) and (10) holding the bearings to the dashboard, without tightening (toothed washer).

19. Tighten the nuts (11) on the cap washer to 9 m.\N (0.9 m.kg).

20. Tighten the bolts (9) and (10) of the bearings to 3 to 3,5 m.\N (0.3 tp 0.35 m.kg).

21. Fit the pipe (1). Tighten the four bolts (2) (toothed washer).

22. Fit the duct (3). Tighten the two bolts (4) (toothed washer).

23. Fit the shelf (5). Tighten the six bolts at «a», «b», «c», «d», (6) and (8) (toothed washer).

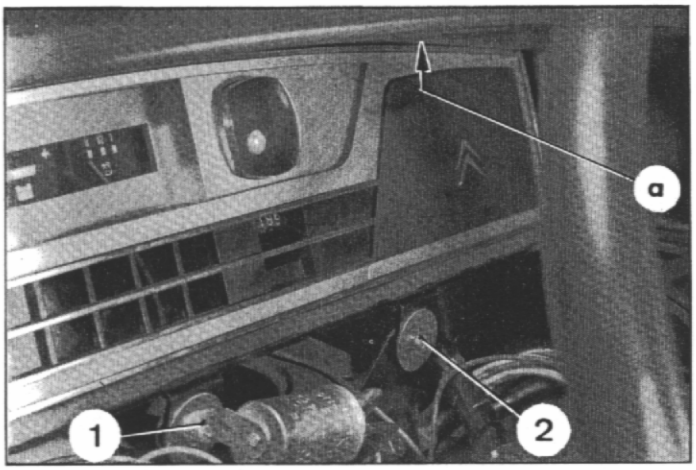
24. Fit the console and fix it in position.

25. Fit the dashboard.
Fit and tighten the bolts at «f», «g», «h», «i», «j», «k» and (14).
Connect the electrical harness to the different switches.

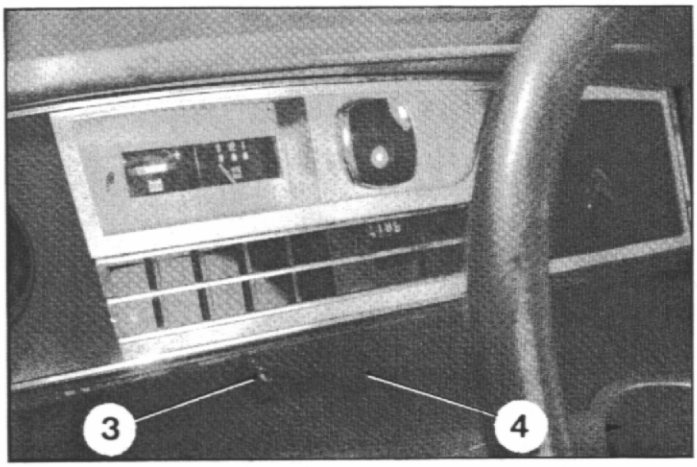
26. Fit the steering wheel.

27. Fit the emergency brake handle and the control knobs for the heater and de-mister.

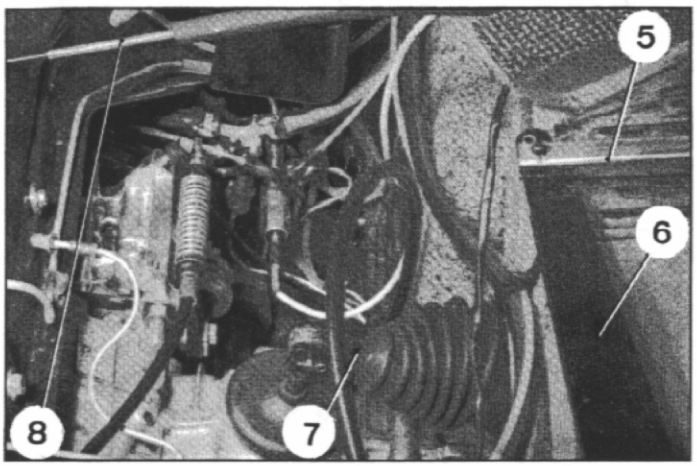
8869



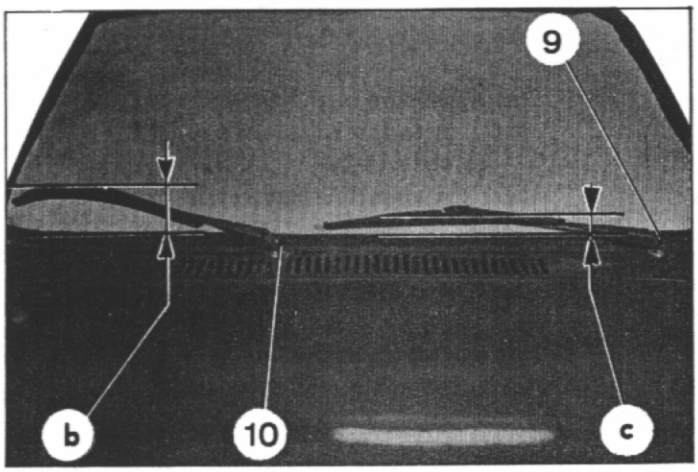
8868



8447



8780



28. **Fit the instrument panel :**

a) Offer up the panel, plug in the connector or connectors (according to model) and connect the leads.

b) Place the panel in its housing : incline the top of the panel towards the front of the vehicle to insert it under the cowl at « a ». Fix it in position using the two bolts (1) and (2), interposing the bracket of the flasher unit (see figure).

c) Offer up the fairing (4). Connect the leads to the switch or switches (3) (according to model or options fitted).
Fit the fairing (4) : insert it behind the instrument panel and then slide it towards the rear to lock it in position.

29. Connect up :
- the emergency brake rod (5) to the operating lever (6),
- the choke cable to the carburettor,
- the operating cable (8) to the heater flap,
- the gear lever (7) to the selector fork operating lever,
- the speedometer cable to the speedometer.

30. With the windscreen wiper motor *in the « automatic stop » position* (see page 1, same operation paragraph 13) :
Fit the crank (12) to the spindle of the windscreen wiper motor and *align it with the connecting rod (13).*
Tighten the nut (11) to 4.5 to 5 mAN (0.45 to 0.5 m.kg) (toothed washer).

31. Fit the windscreen wiper blades.
Position them as shown in the figure below so that :
b = 60 ± 10 mm and c = 35 ± 10 mm
Tighten the nuts (9) and (10) to 9 mAN (0.9 m.kg) (Spring washer).

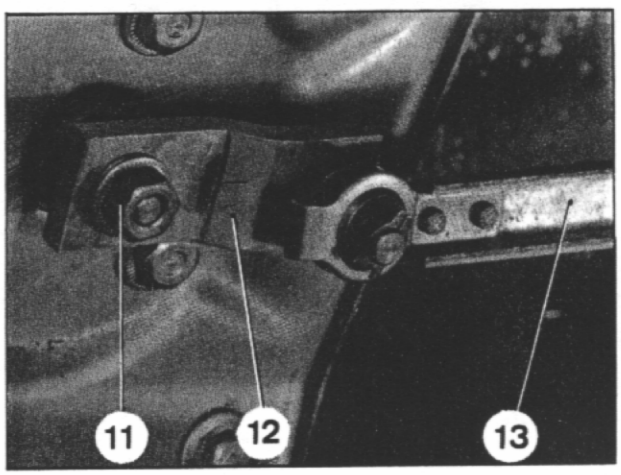
32. Fit the ventilation air intake plate and its seal.

33. Fit the bonnet.

34. Connect the cable to the negative terminal of the battery.

35. Check the operation of the windscreen wipers.

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LIST OF SPECIAL TOOLS MENTIONED IN THE FIRST SECTION OF THE MANUAL 810 - 2

DESCRIPTION	NUMBER Methods - Repairs	REFERENCE of tool on sale
Crossmember fot lifting vehicle		2510-T
(2) ENGINE		
Valve spring compressor		1652-T or 1652-T bis
Key for filter cartridge		1683-T
Tool for fitting seal to distributor drive		1695-T
Tool for fitting a camshaft seal		1697-T
Key for removing and fitting an engine with converter		1790-T
Stand for engine on work bench		2508-T
Sling for hoisting engine-geabox assembly		2511-T
Ring for fitting piston rings Engine 1015 cc		3010-T
Ring for fitting piston rings Engine 1220 cc		4007-T
Segment for adjusting centrifugal advance		3093-T
Key for tightening cylinder head nuts (for nuts 12 mm across flats)		3094-T
Key for tightening cylinder head nuts (for nuts 13 mm across flats)		4006-T.D + 4006-T.F
Key for carburettor (11 mm across flats)		3096-T
Tool for holding a camshaft wheel	MR. 630-11/26	
Extension series K. 210 (3/4" square) modified for removing fan nut	MR. 630-17/1	
Rocker shaft extractor	MR. 630-25/8	
Mandrel for fitting gudgeon pin		1699-T
Rod for setting distributor	MR. 630-51/70	
Union for checking engine oil pressure		3099-T
Shim for fitting oil pump drive		4001-T
Tool for holding flywheel		3064-T.E
(3) (4) CLUTCH - GEARBOX		
Key for nuts holding gearbox to engine		1791-T
Bracket for holding converter on gearbox		3186-T
Mandrel for extracting a pin or control lever from selector fork shafts	MR. 630-31/84 a	
Mandrel for fitting a pin or control lever to selector fork shafts	MR. 630-31/84 b	
Mandrel for centering clutch disc	MR. 630-31/85	
Shims for clutch drive contacts : - « minimum » shim : thickness 1.4 mm - « maximum » shim : diameter 1.5 mm		3112-T
(5) DRIVE SHAFTS		
14 mm ball joint key (length = 700 mm)		2418-T
Tool for fitting bellows	MR. 630-64/55	

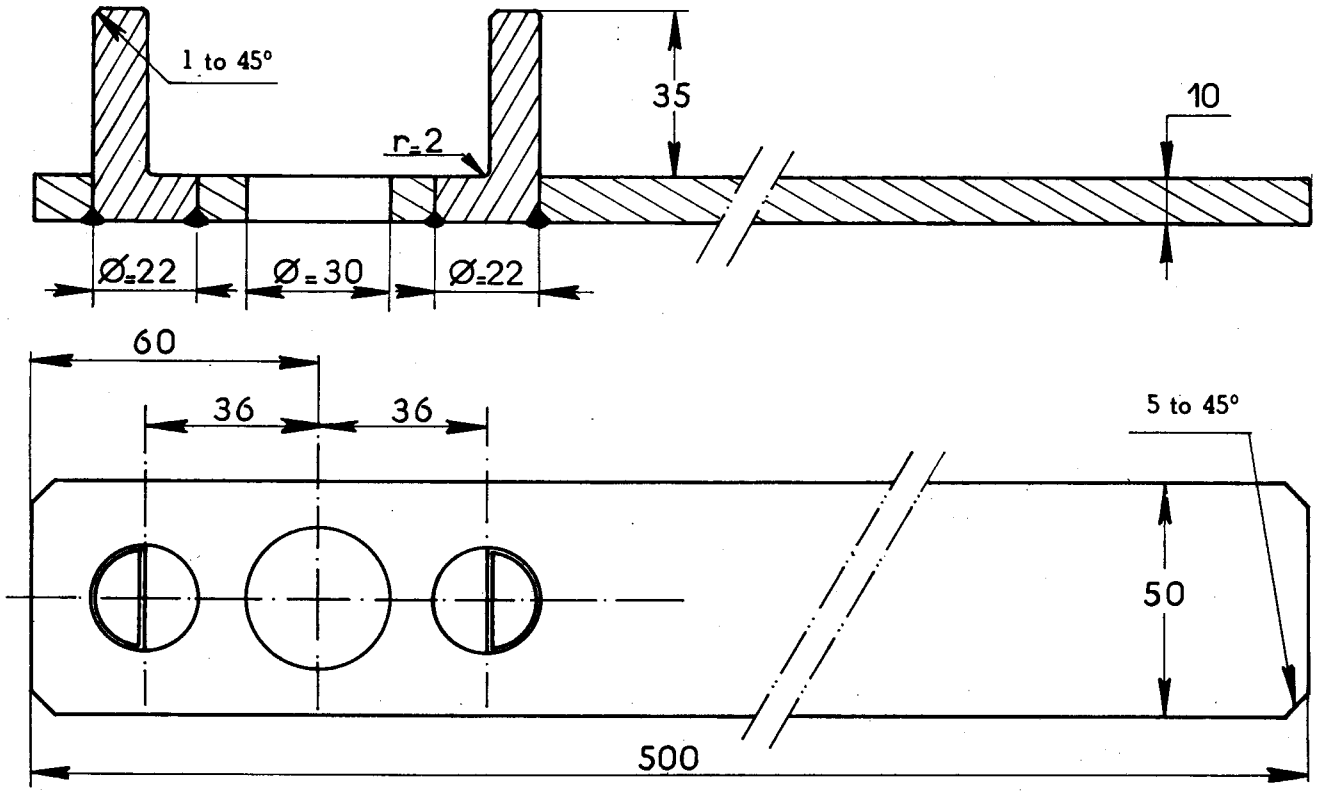
LIST OF SPECIAL TOOLS MENTIONED IN THE FIRST SECTION OF THE MANUAL 810-2

DESCRIPTION	NUMBER Methods - Repairs	REFERENCE of tool on sale
(7) (8) FRONT AND REAR SUSPENSION UNITS		
Ball joint extractor		1892-T
Front hub extractor		1893-T
Unit for adjusting stress on front anti-roll bar bearings		2067-T
Rear suspension arm extractor with nut		2068-T
Unit for fitting rear suspension arms		2069-T
Extractor for rear suspension arm bearings		2070-T
Mandrel and sockets for fitting rear suspension arm bearings		2071-T
Key for rear hub plug		3304-T
Key for front hub bearing nut		3320-T
Assembly for removing and fitting the front or rear hub nut		3321-T
Mandrel for fitting the front or rear hub bearing	MR. 630-31/96	
Mandrel for fitting the front hub seal	MR. 630-31/97	
Tool for holding the front or rear hub	MR. 630-64/40	
Tool for removing and fitting the support tube of the rear suspension arm		2072-T
(11) BRAKES		
Key for adjusting parking brakes		2115-T

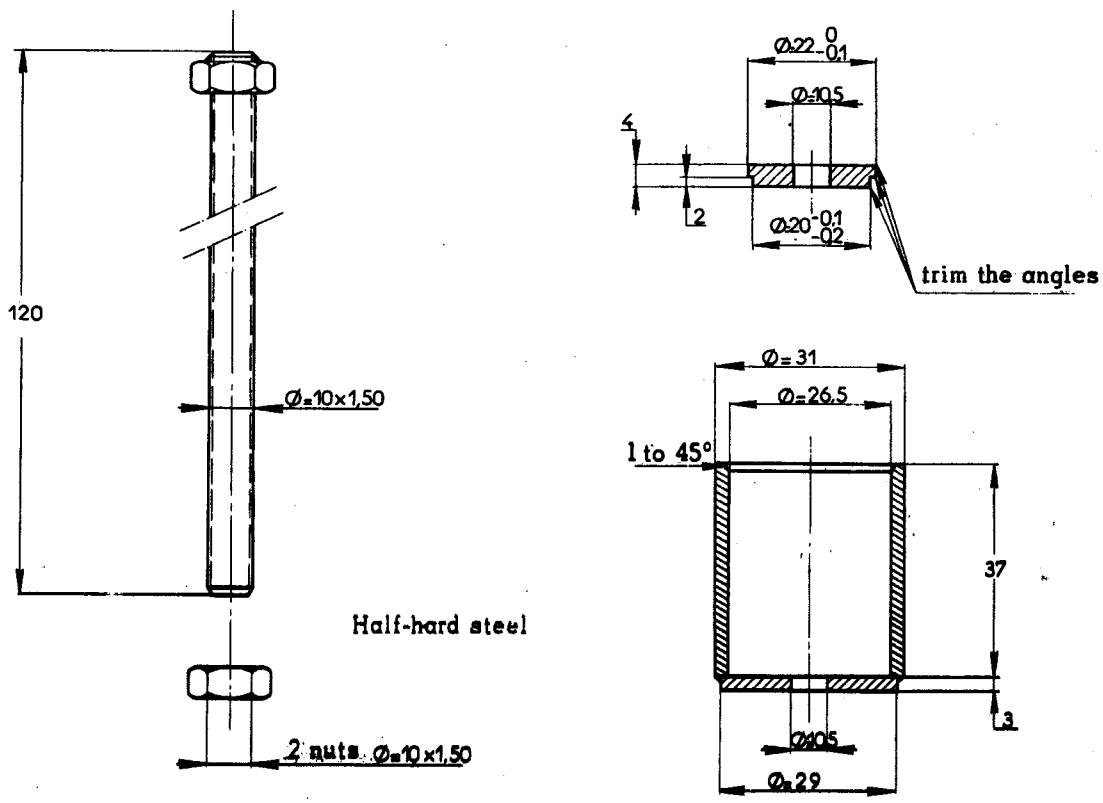
MR 630_11/26

MATERIAL : Flat iron 50 × 10

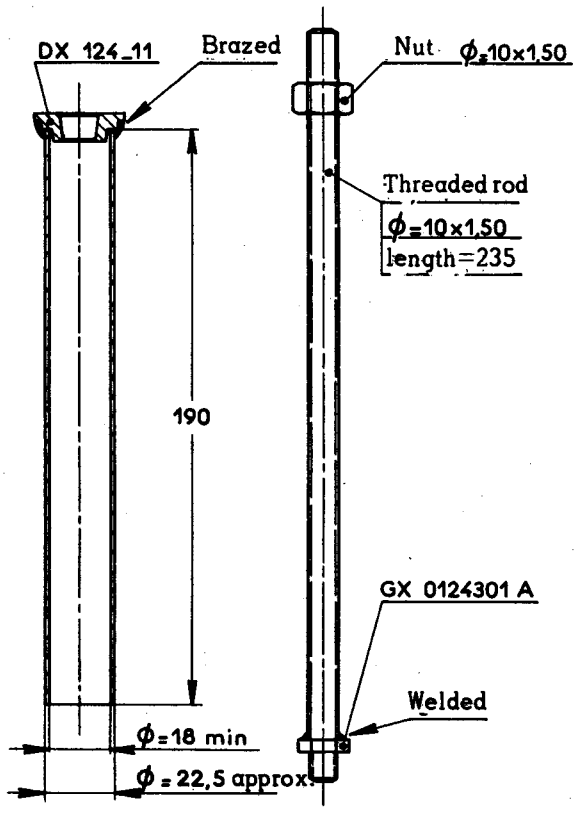
Drawn, diameter = 22



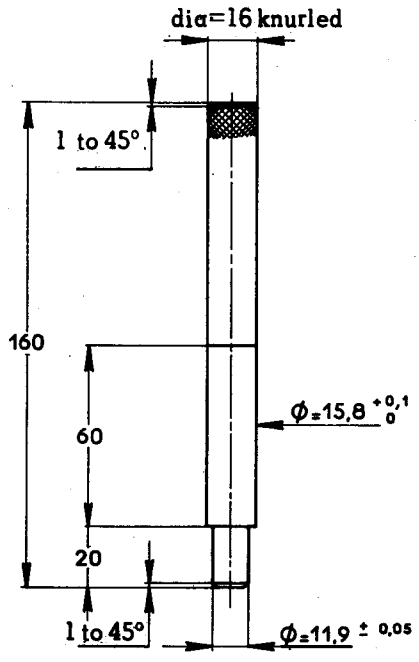
MR - 630 - 23/9



MR 630_25/8

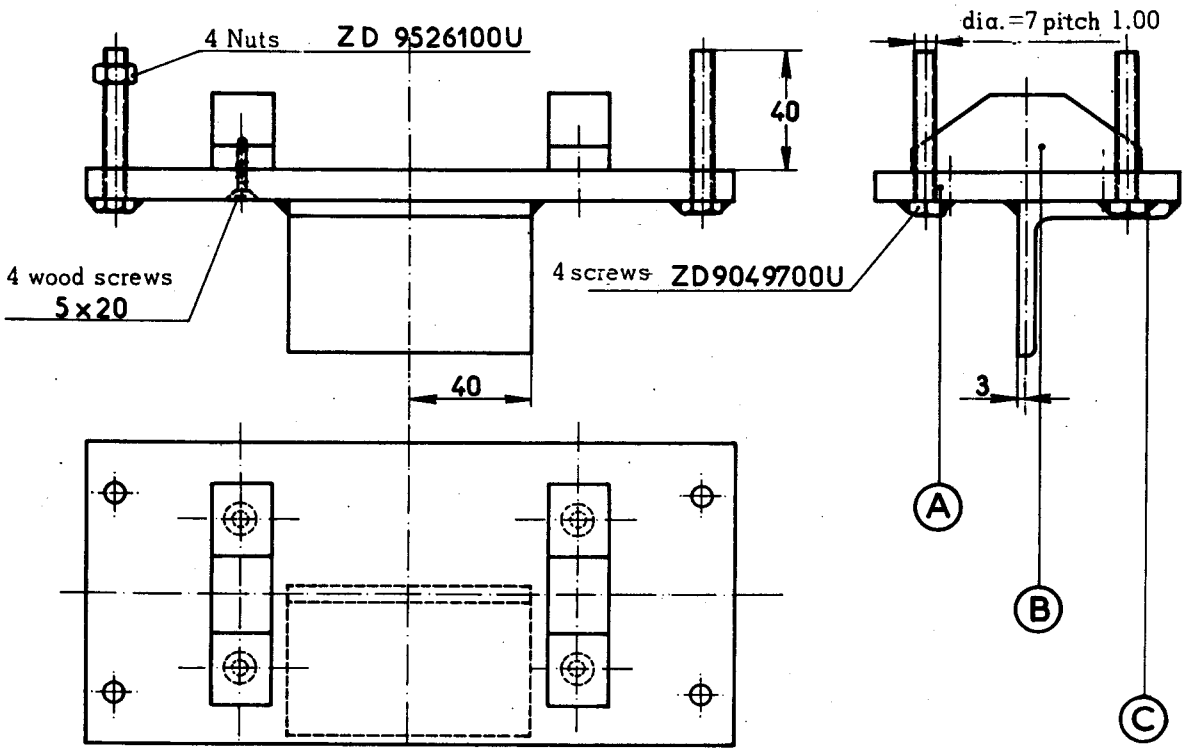


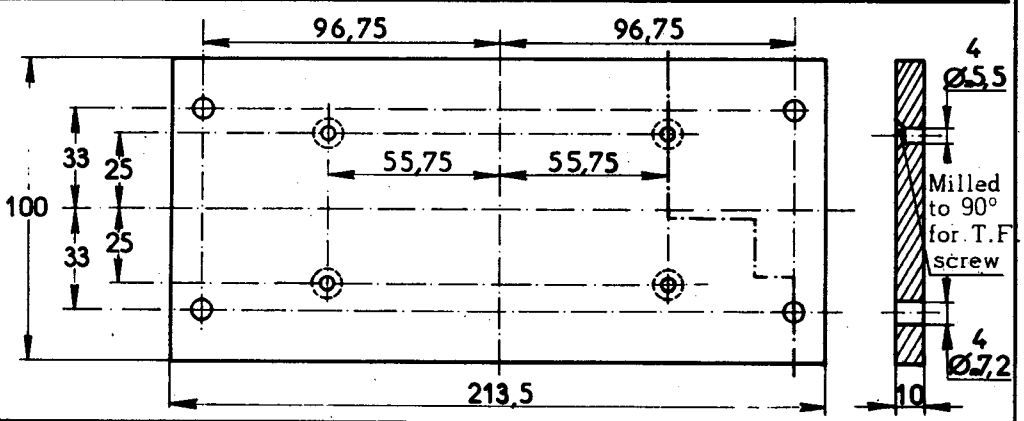
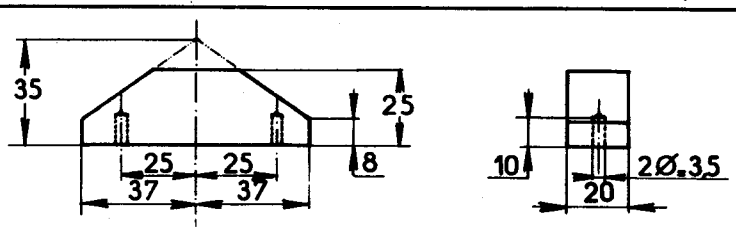
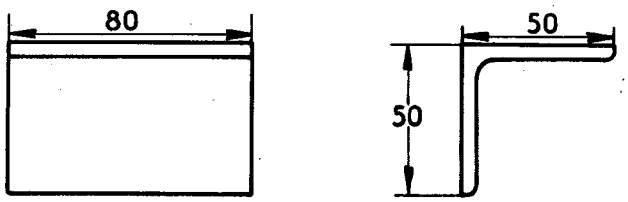
MR 630_31/85



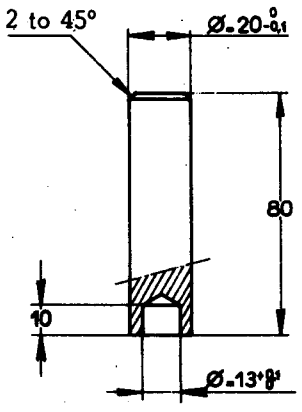
Half-hard steel

MR630-43/31



Rep.	Qty.	Mat.	Sizing	Sketch
A	1	Sheet metal thick. 10	100x213,5	
B	2	Hard wood	74x35x20	
C	1	Angle bar 50x50	L = 80	

MR 630.62/14

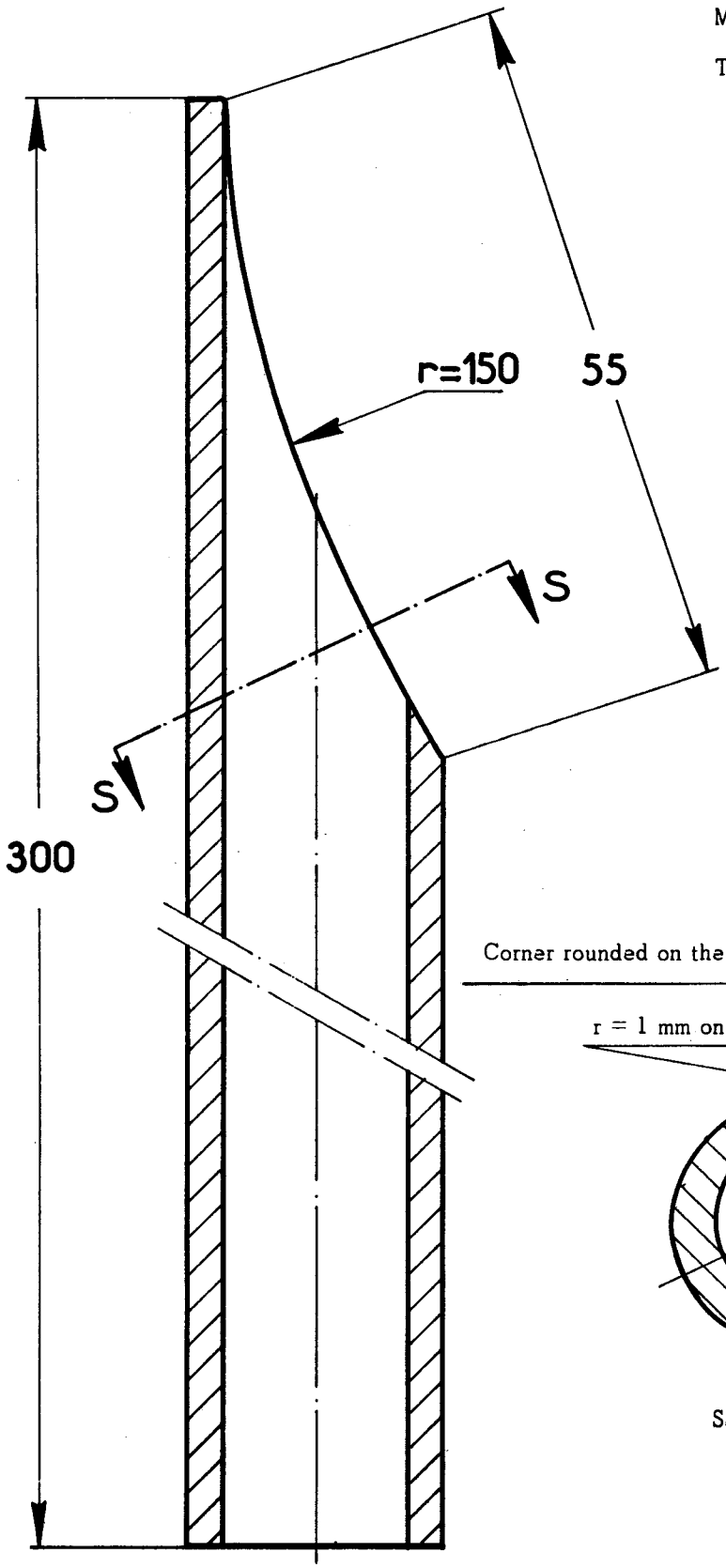


MATERIAL : Hard steel

MR 630-64/55

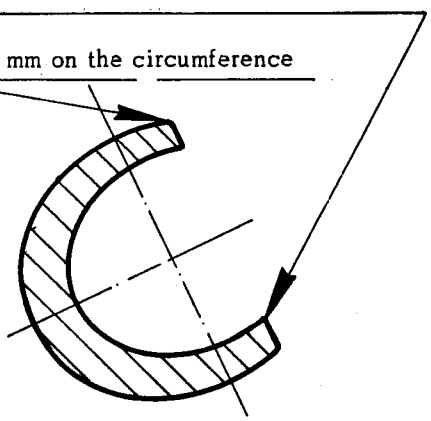
MATERIAL

Tube 15 × 21 mm



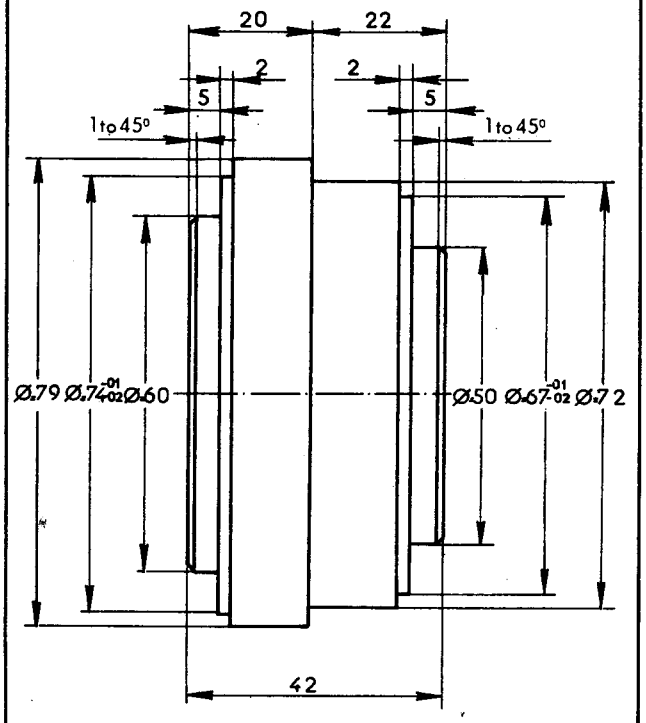
Corner rounded on the circumference

r = 1 mm on the circumference



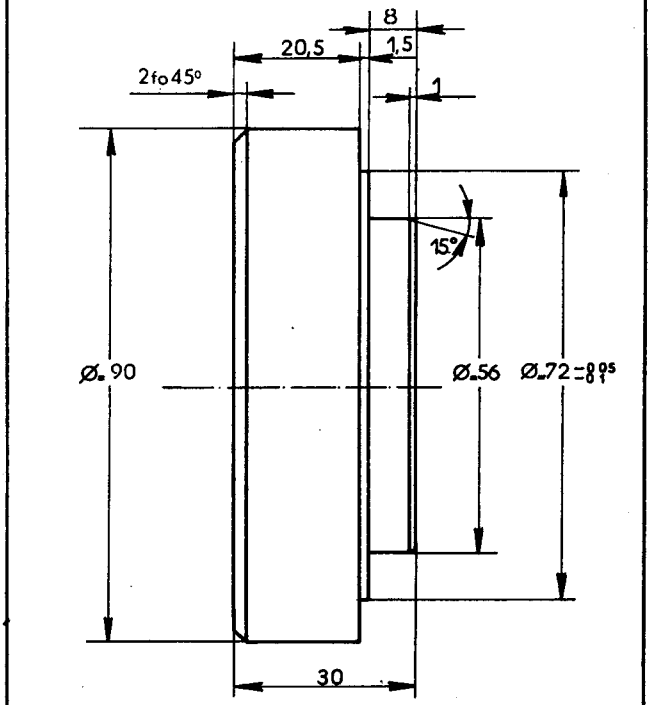
Section . S

MR 630_31/96



MATERIAL : semi-hard steel

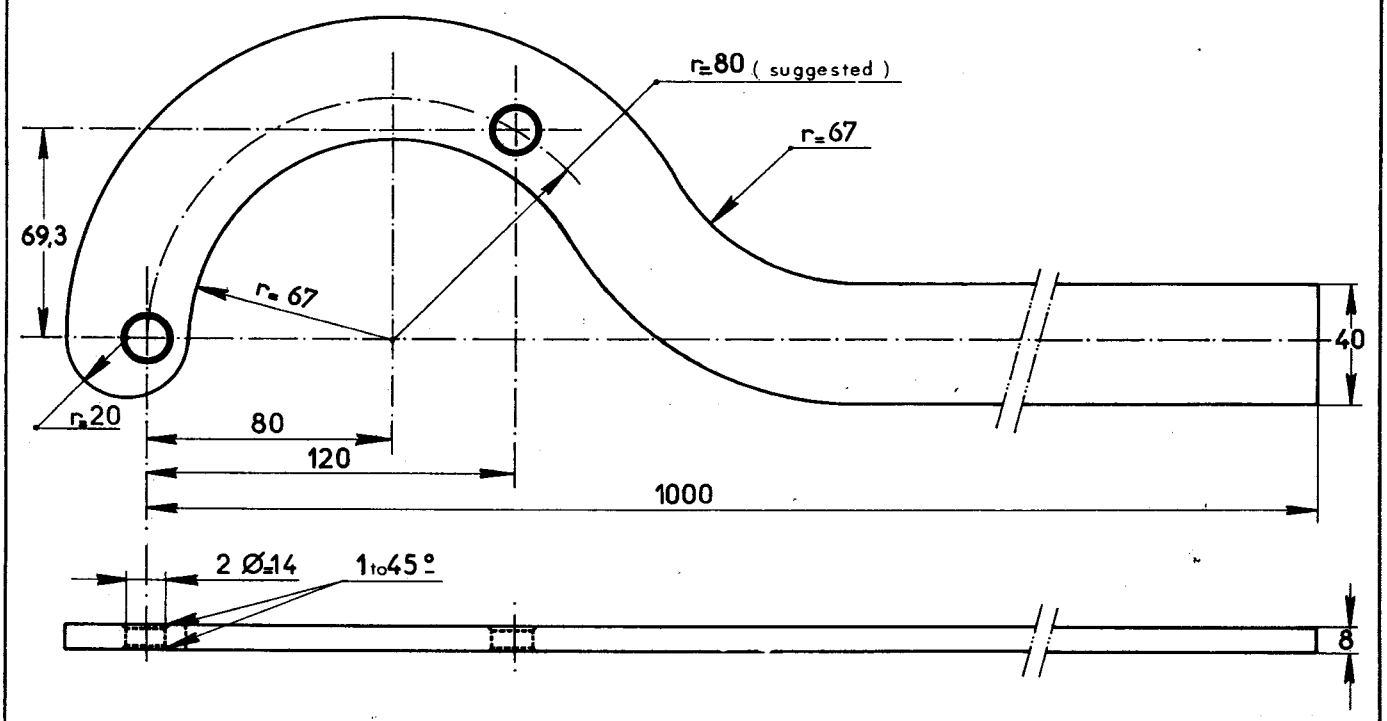
MR 630.31/97



MATERIAL : semi-hard steel

Manual 810-2

MR.630_64/40



MATERIAL : Flat iron 40 × 8 mm

Developed length 1200 mm

MANUAL N° 810-2

SECOND SECTION

SECOND SECTION

RECONDITIONING

PART TO BE CUT OFF

LIST OF OPERATIONS
IN THE SECOND SECTION OF THE MANUAL N° 810-2

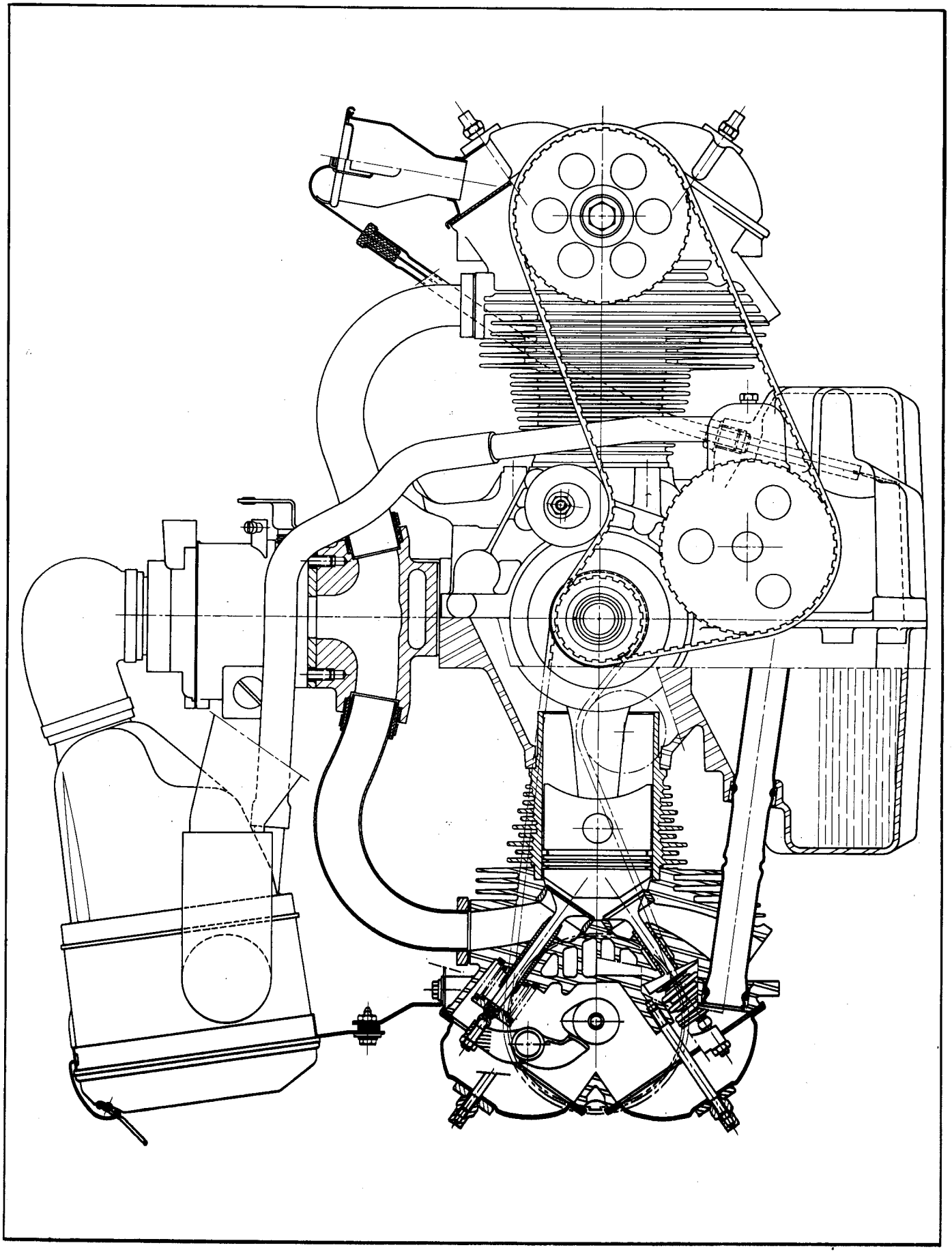
Operations where the number is preceded by the letter « G » are common to all types of vehicles of the « GS » family.
Operations where the number is preceded by the letters « GE » or « GF » are specific to the five-or three-door versions of the « GS » Estate respectively.
Operations where the number is preceded by the letter « Gea » are specific to vehicles fitted with a Torque Converter.

Operation Number	DESCRIPTION
	ENGINE
G.100-3	Overhauling an engine
G.100-5	Stripping down and assembling an engine
G.112-3	Repair of a cylinder head
	GEARBOX
G.330-2	Stripping down and assembling a gearbox (mechanical clutch)
G.330-3	Repair of a four-speed gearbox
Gea.330-3	Repair of a three-speed gearbox (torque converter)
	TOOLS
	List of special tools
	Manufacturing drawings for tools not sold

ENGINE

(Vehicles produced up to August 1972)

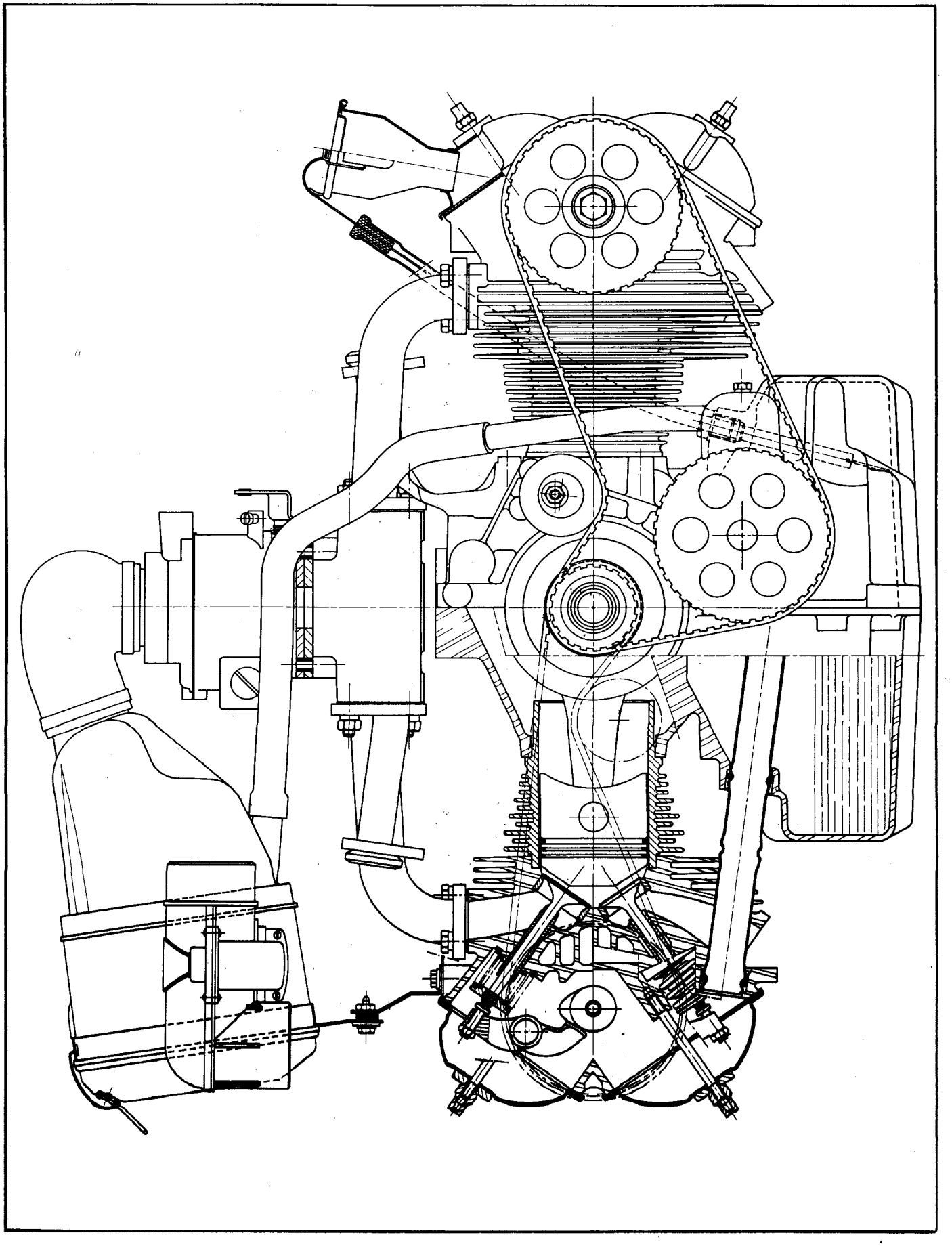
TRANSVERSE SECTION



ENGINE

(Vehicles produced from August 1972)

TRANSVERSE SECTION



ENGINE

HORIZONTAL SECTION

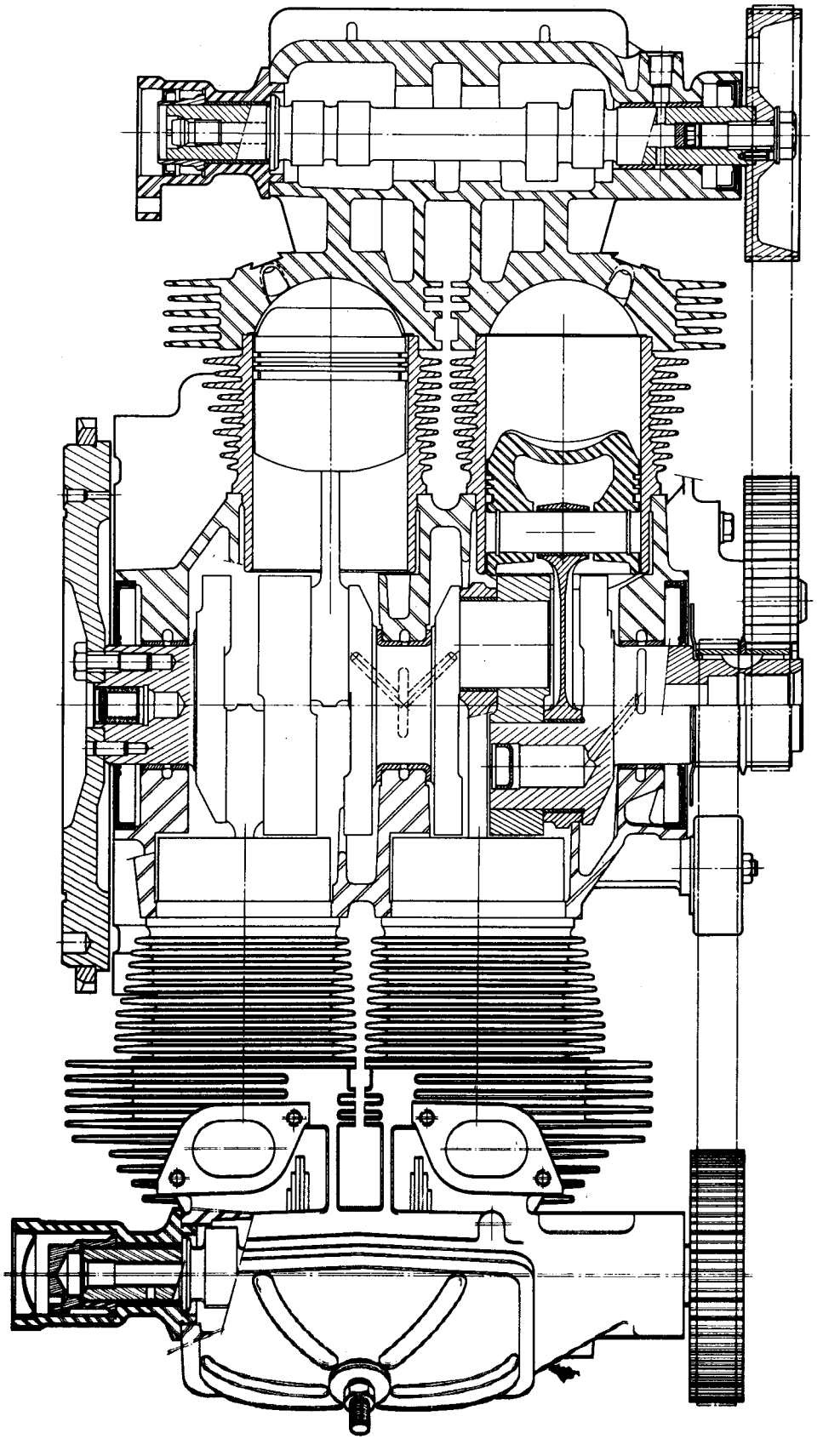


DIAGRAM OF LUBRICATION SYSTEM

(All types GX vehicles produced up to September 1971)

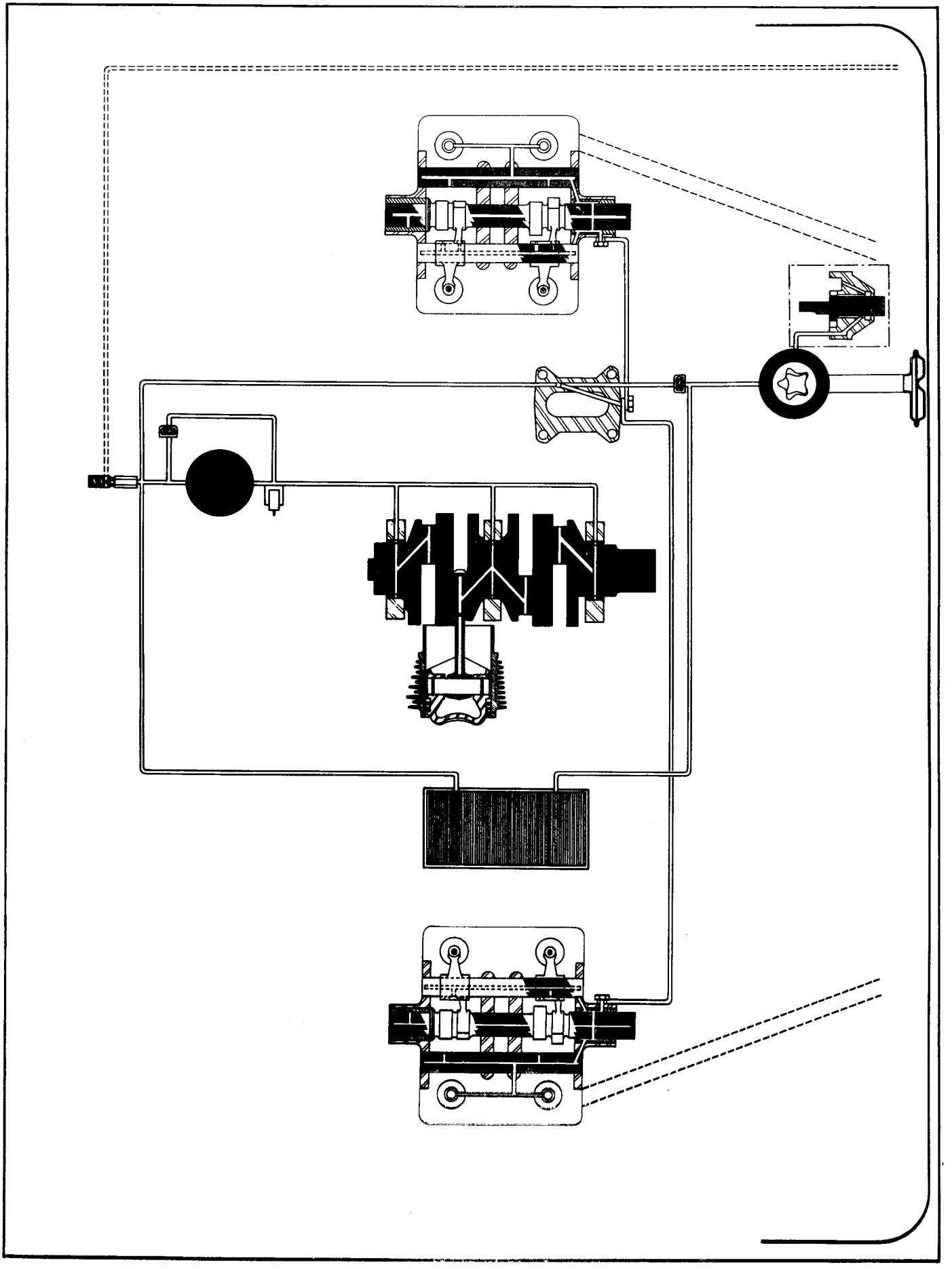
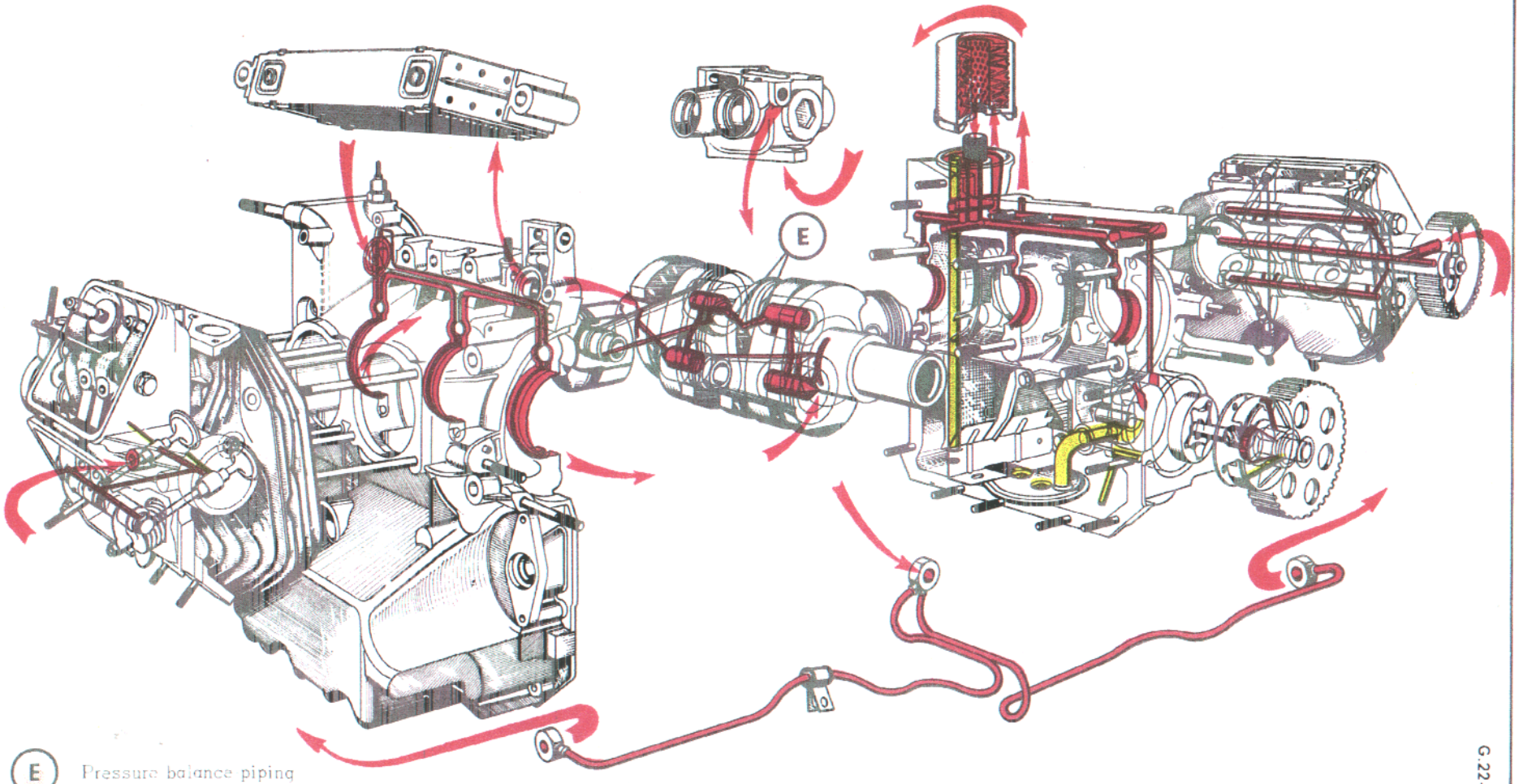


DIAGRAM OF LUBRICATION SYSTEM

(All types GX vehicles produced from September 1971 to August 1972)

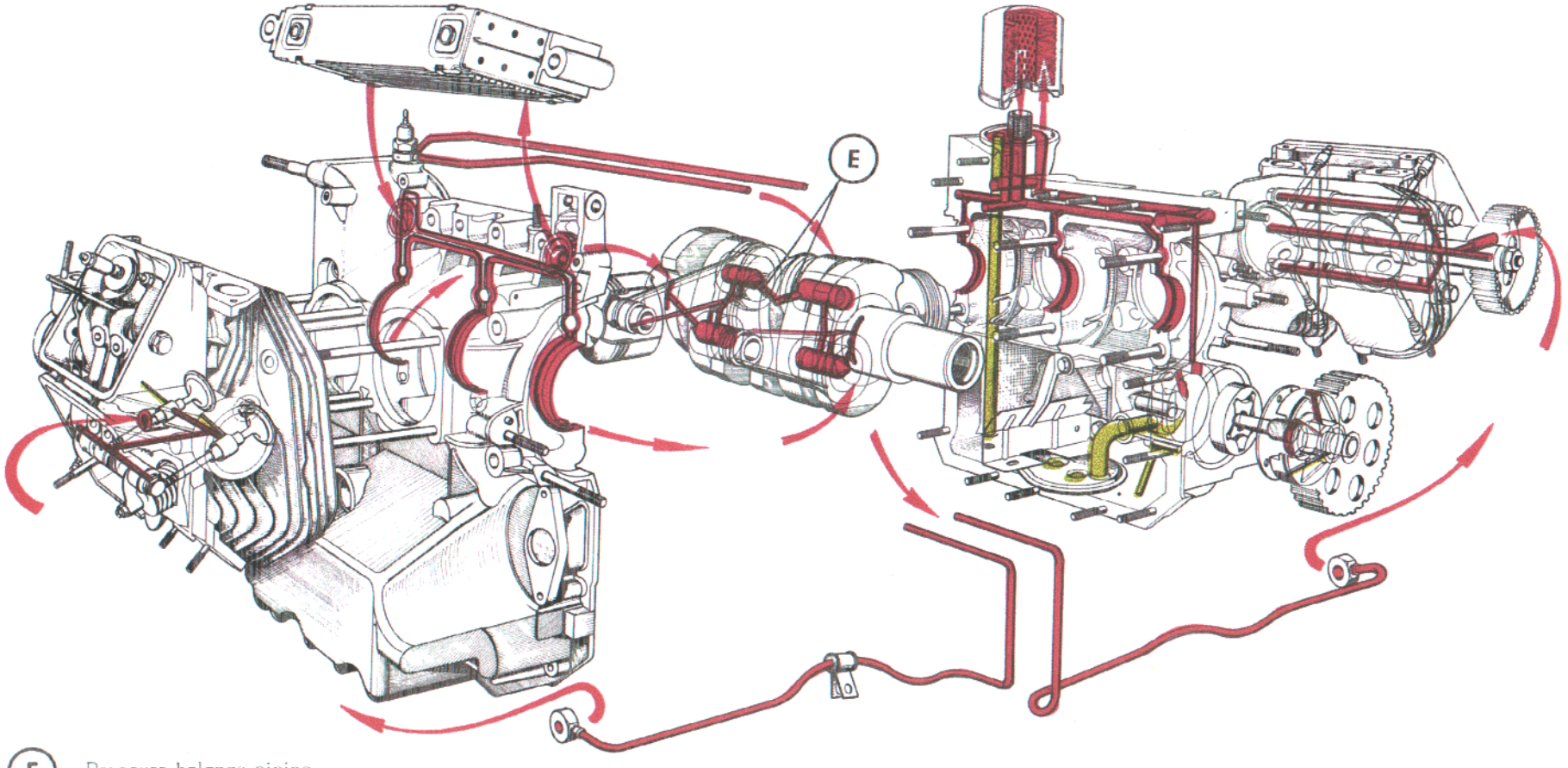


E Pressure balance piping

G-22-3

DIAGRAM OF LUBRICATION SYSTEM

(All types GX vehicles produced from September 1972)



(E) Pressure balance-piping

SPECIAL FEATURES

Engine casing :

Tightening torques

- Halves of engine casing nuts ..... 12 to 15 mΛN (1.2 to 1.5 m.kg)
- Bearing nuts ..... 34 to 45 mΛN (3.4 to 4.5 m.kg)
- Bolts fastening supports to engine casing (they must be the same brand of manufacturer) ..... 50 to 60 mΛN (5 to 6 m.kg)
- Nut securing dipstick guide ..... 30 to 40 mΛN (3 to 4 m.kg)
- Drain plug ..... 35 to 40 mΛN (3.5 to 4 m.kg)
- Oil pump bearing screw ..... 15 to 18 mΛN (1.5 to 1.8 m.kg)
- Screw or fixing nuts for inlet casing ..... 18.5 mΛN (1.8 m.kg)
- Cylinder head studs ..... 6 to 8 mΛN (0.6 to 0.8 m.kg)
- Oil strainer screw ..... 14 mΛN (1.4 m.kg)

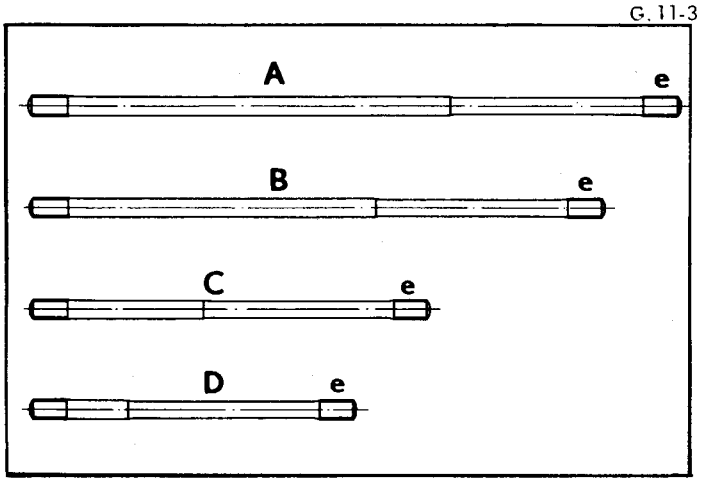
Cylinder head studs :

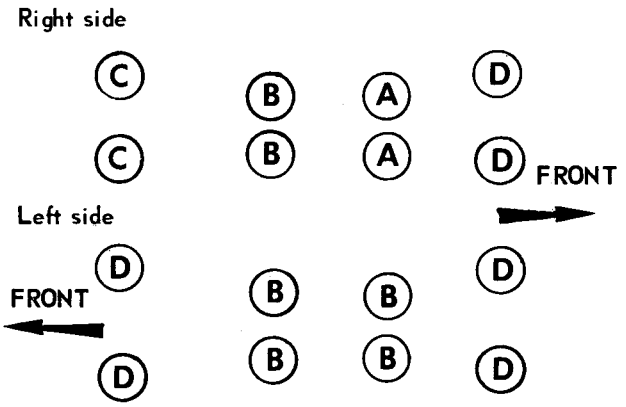
a) Four different lengths of studs :
Extremity « e » casing side *(shortest threaded length).*

b) Location of different studs on engine casing.

c) Length of different studs for G. 10 and G 103 engines

G.11-3





Manual 810-2

Crankshaft - connecting rods

- Flanged central bearing : Interior diameter : ..... 57.5 mm without marking *(First possibility)*
  57.4 mm : red paint marking *(Second possibility)*
  Overall total width : ..... $25.9 \begin{smallmatrix}+0.05\\0\end{smallmatrix}$ mm
  Bearing surface support width ..... 15.3 mm
- Front and rear bearings : Interior diameter ..... 57.5 mm : without marking *(First possibility)*
  57.4 mm : red paint marking *(Second possibility)*
  Total width ..... $20.8 \begin{smallmatrix}+0.05\\0\end{smallmatrix}$ mm
  Bearing surface support width ..... 16.05 mm
- Lateral play at the crankshaft of the central bearing (cannot be adjusted) ..... 0.09 to 0.20 mm

Do not interfere with the front and rear bearings of the crankshaft (micro-turbine)

- Bore of small end bushes (1015 cc) ..... $20{,}005 \begin{smallmatrix}+0.011\\-0.006\end{smallmatrix}$ mm
- Bore of small end bushes (1220 cc) ..... $22.005 \begin{smallmatrix}+0.011\\-0.006\end{smallmatrix}$ mm
- Lateral play of connecting rods ..... 0.13 to 0.18 mm

Flywheel :

- Maximum run-out of starter ring ..... 0.3 mm
- Orientation of starter ring : teeth entry towards gearbox

Tightening torques of fixing bolts :

- of the flywheel (face and threads oiled) or of the diaphragm *on converter vehicles* (LOCTITE N° GX. 01 460 01 A). Bolts to be replaced whenever dismantled by bolts with head marking ..... 64 to 69 mΛN (6.4 to 6.9 m.kg)
- Clutch mechanism ..... 18.5 mΛN (1.8 m.kg)

Cylinders

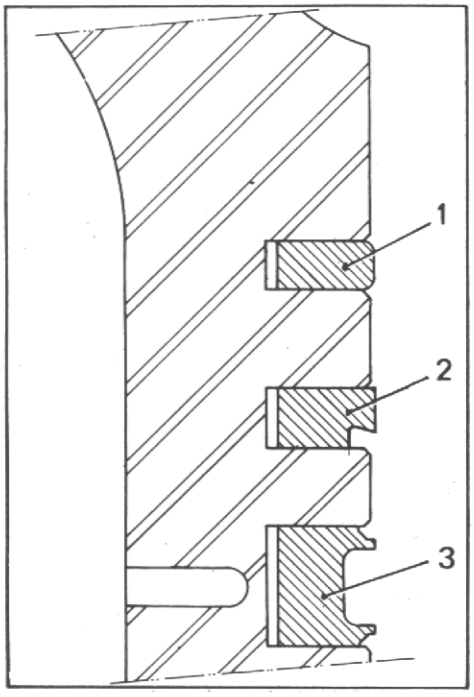
- Two types of cylinders according to their heights :

	Engine G.10	Engine G. 103
Red marking	75.78 to 75.80 mm	86.88 to 86.90 mm
Green marking	75.80 to 75.82 mm	86.89 to 86.92 mm

- Fitting : ATTENTION : *On the same side of an engine, it is imperative that the two cylinders be of identical type.*

Pistons - rings

A.12-50 a



Pistons :

- The gudgeon pins are floating
- Orientation of pistons :
  After fitting , the number showing the compression ratio should be legible.

Rings :

- The number (or maker's mark) should be uppermost.
- Order of fitting : (from the piston crown)
  - 1 - compression ring
  - 2 - scraper ring
  - 3 - oil ring -

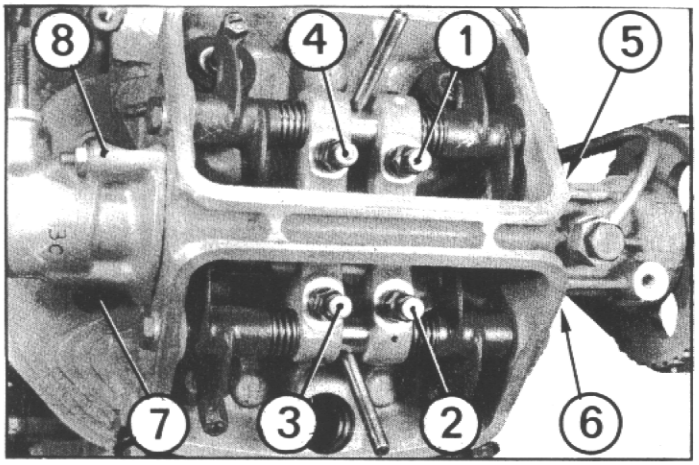
Tightening torques :

- Cylinder head nuts :
  1st tightening ..... 8 to 10 mΛN (0.8 to 1 m.kg)
  2nd tightening :
  - 12 mm bolts A/F ..... 16 to 18 mΛN (1.6 to 1.8 m.kg)
  - 13 mm bolts A/F ..... 20 to 25 mΛN (2 to 2.5 m.kg)
- Rocker cover nuts ..... 8 to 10 mΛN (0.8 to 1 m.kg)
- Rocker shaft blanking bolt ..... 17 to 18 mΛN (1.7 to 1.8 m.kg)
- Nuts on exhaust flange ..... 15 mΛN (1.5 m.kg)
- Camshaft bearing studs (fitted with LOCTITE N° GX. 01 459 01 A) 3 to 5 mΛN (0.3 to 0.5 m.kg)
- Lubrication joint screw ..... 18 to 20 mΛN (1.8 to 2 m.kg)
- Rocker shaft set screw ..... (3 mm Allen key) (fitting with LOCTITE N° GX 01 459 01 A)
- Intake flange screw ..... 18.5 mΛN (1.8 m.kg)
- Camshaft bearing bolts ..... 15 to 18 mΛN (1.5 to 1.8 m.kg)

Cylinder heads :

ORDER OF TIGHTENING FIXING BOLTS

7979



Distribution :

- End-float of camshafts (cannot be adjusted) ..... 0.05 to 0.15 mm
- Timing

THEORETICAL SETTING

With a clearance of 1 mm between rocker and valve at intake and exhaust :

		Engine G.10 (1015 cc)	Engine G.103 (1220 cc)
Advance intake opening	BTDC :	2° ± 1°30'	4°10' ± 1°30'
Retard intake closing	ABDC :	34° ± 1°30'	31°50' ± 1°30'
Advance exhaust opening	BBDC :	34° ± 1°30'	36°10' ± 1°30'
Retard exhaust closing	ATDC :	2°30' ± 1°30'	0°20' ± 1°30'

Tightening torques :

- Tensioning pulley nut ..... 18.5 mΛN (1.8 m.kg)
- Camshaft wheel nut ..... 82 mΛN (8.2 m.kg)
- Tensioning pulley stud ..... 3 to 5 mΛN (0.3 to 0.5 m.kg)

Rockers

- Valve clearances : *engine cold*
  Intake and exhaust ..... 0.20 mm
  Set each clearance separately when the heel of the rocker is on the back of the corresponding cam.
- Identification of the rocker shafts :
  - L.H. intake shaft identical to the R.H. exhaust shaft : unmarked
  - R.H. intake shaft identical to the L.H. exhaust shaft : Marked ..... blind end bore at the centre of shaft

Lubrication system

- Grade of oil ..... TOTAL Altigrade GTS 20 W 50 or GT 20 W 40
- Contents of casing : after dismantling ..... 4 litres
  after draining ..... 3.5 litres
  between minimum and maximum ..... 0.5 litre
- Oil pressure at 80 ± 5° C at 2000 rpm ..... 4.7 bars min.
  at 6000 rpm ..... 6.2 to 7 bars
- Pressure switch setting ..... 0.5 to 0.8 bar (7.1 to 11.3 psi)
- Thermal switch setting ..... 135 ± 3° C
- Relief valve spring setting
  free length ..... 58.5 mm
  length under load of 8.5 ± 0.4 kg ..... 33 mm
- « By-pass » valves setting :
  filter (white marking) ..... 0.9 to 1.15 bar (12.8 to 16.2 psi)
  cooler (green marking) ..... 1.8 to 2.5 bars (25.6 to 35.5 psi)
- Filter cartridge : Colour of fitting instructions appearing on filter body
  up to 1000 km (600 miles)... red
  above 1000 km (600 miles)... white
- *Fitting of an oil suction tube in the engine casing with* ..... LOCTITE N° GX. 01 460 01 A

Tightening torques :

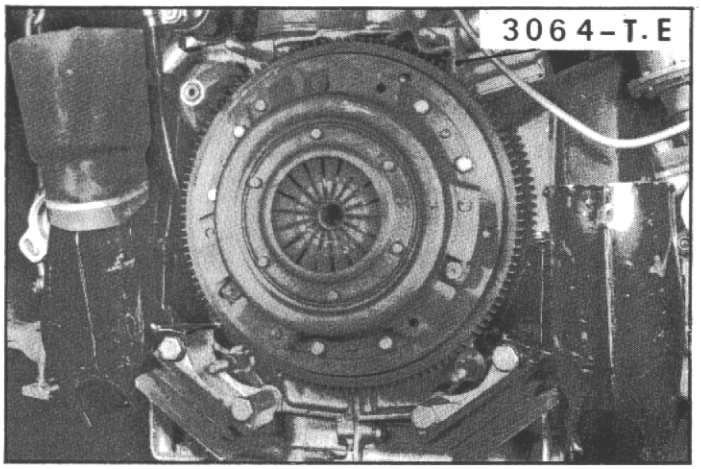
- Insert of filter cartridge (LOCTITE N° GX. 01 459 01 A) ..... 10 to 15 mΛN (1 to 1.5 m.kg)
- Oil cooler fixing screw ..... 18.5 mΛN (1.8 m.kg)
- « By-pass » valve plug of the cooler (LOCTITE N° GX. 01 459 01 A) ..... 45 to 50 mΛN (4.5 to 5 m.kg)
- Filter cartridge : bring cartridge close to casing contact and then tighten 1/2 to 3/4 of a turn (joint oiled)
- Oil pressure switch ..... 22 mΛN 2.2 m.kg)
- Union for oil thermal switch ..... 50 to 55 mΛN (5 to 5.5 m.kg)
- Oil thermal switch ..... 25 mΛN (2.5 m.kg)

Fan

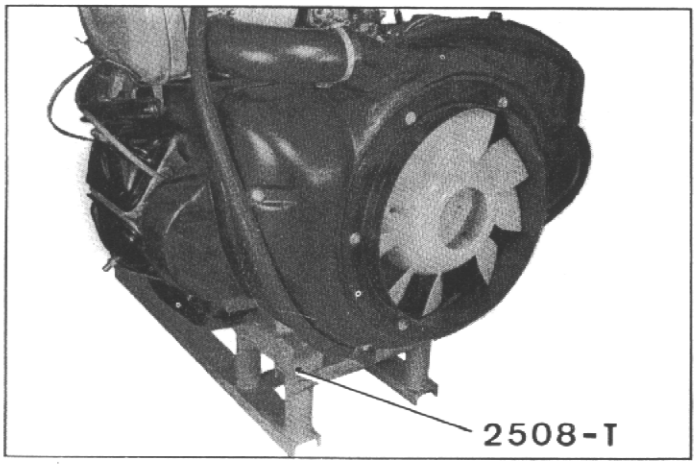
- External diameter ..... 290 mm
- Number of blades 9
- Adjustment of starter dog :
  a) *at TDC, line up starter dog horizontally*
  b) *projected portion of starter dog beyond lock nut after adjustment (approximately)* ..... 5 mm of thread cutting
- Tightening torque of lock nut (face and threads greased) ..... 170 to 200 mΛN (17 to 20 m.kg)

OVERHAULING AN ENGINE

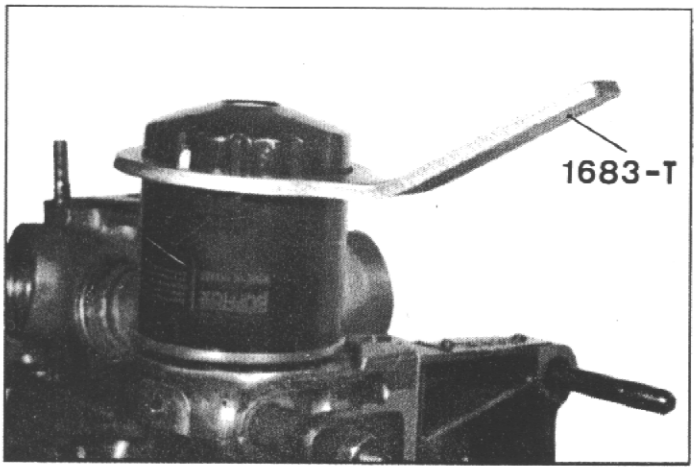
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9532



Manual 810-2

I. DISMANTLING

1. Strip down the engine.

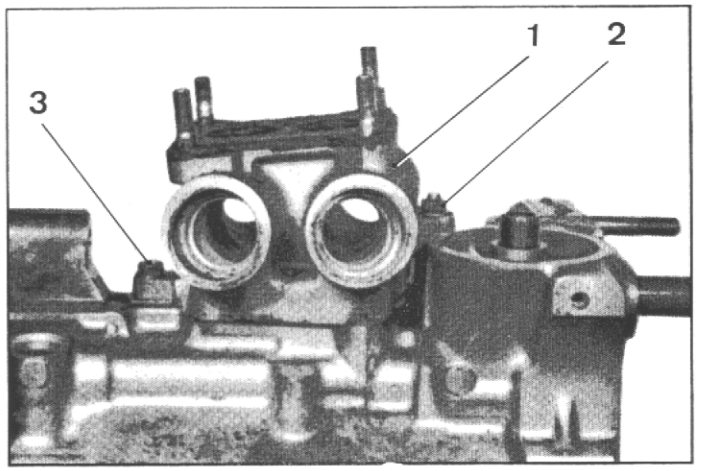
2. Remove :
- the clutch (use tool 3064-T.E to immobilize steering wheel).
- the front flexible mountings.

3. Place the engine on stand 2508-T.
Drain the oil.

4. Remove :
- high pressure pump tubes,
- the air filter,
- the carburettor and its distance piece or the carburettor-inlet chamber-and manifold assembly.
- the covers of the upper ducts,
- the inlet pipes (*vehicles produced up to August 30. 1972*).
- the oil cooler,
- the air intake rubber seal for the cooler,
- the starter,
- the starter dog,
- the fan,
- the drive belt of the alternator,
- the fan cowl and its spacers,
- the distributor, its protecting spacer and the spark plug leads,
- the spark plugs,
- the petrol pump and its distance piece,
- the petrol pump securing studs,
- the alternator and its tensioner,
- the oil pressure switch,
- the thermal switch for the oil temperature,
- the high pressure pump,
- the exhaust manifolds,
- the fixing studs for the manifolds,
- the flywheel,
- the heating ducts,
- the front and rear deflectors (right and left side),
- the ducts beneath the cylinders,
- the cooling ducts,
- the dipstick tube,
- the breather,
- the assembly studs for the engine-gearbox.

5. Remove the oil filter.

Use special wrench 1683-T.



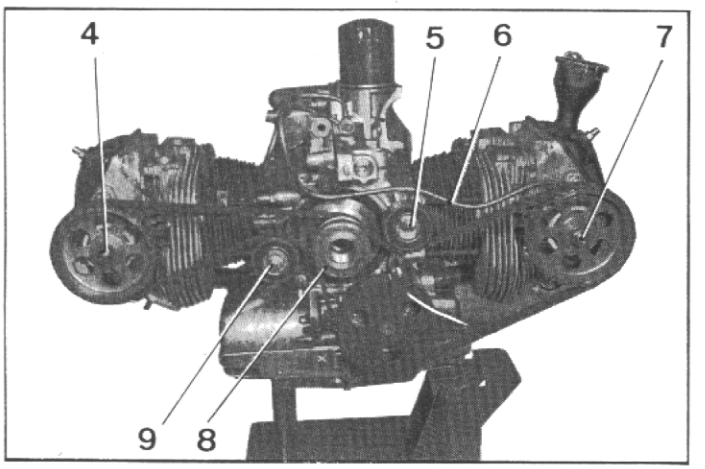
9533

6. Remove the lubrication pipe (6) :

Remove :
- the union-screws on the right and left cylinder heads and on the heater box of the carburettor,
- the oil pressure switch.

7. Remove the heater box (1) of the carburettor (according to fitting)

To do so, remove :
- the fixing bolt (3) and nut (2) of the heater box,
- the O-ring between the box and engine-casing



9465

8. Remove the camshaft drive belts :

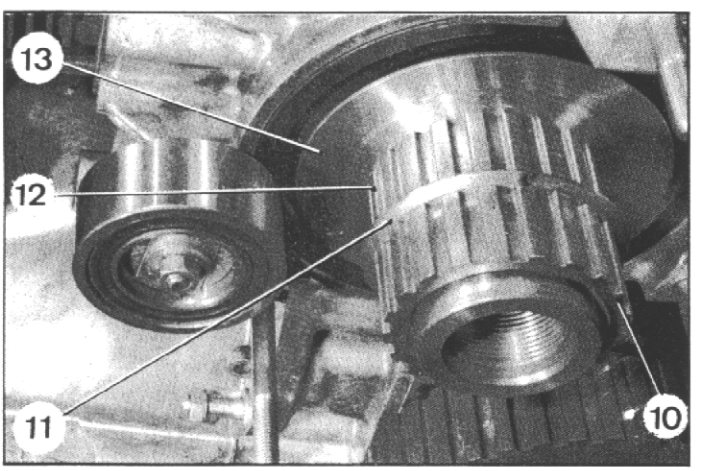
Remove the outer flange (8).
Loosen the nut (5), compress the tension roller and release the L.H. belt.
Release pinion (12) from the camshaft.
Remove the key.
Remove the protecting plate (13).

9. Remove the tension rollers :

Remove the nuts (5) and (9).

Release the rollers.

(Do not mislay the thrust plates (14).

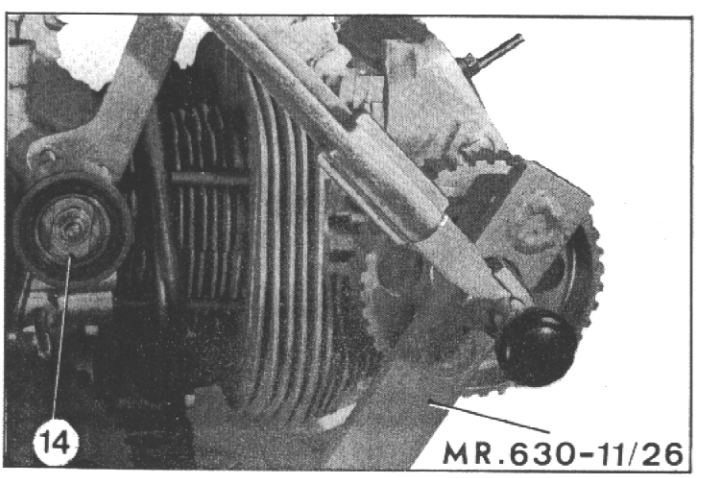


8036

10. Remove the camshaft wheels :

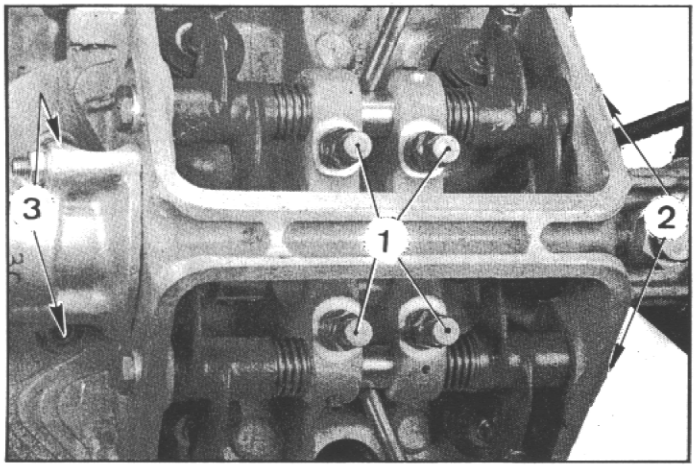
Block the wheel with the aid of tool MR. 630-11/26.

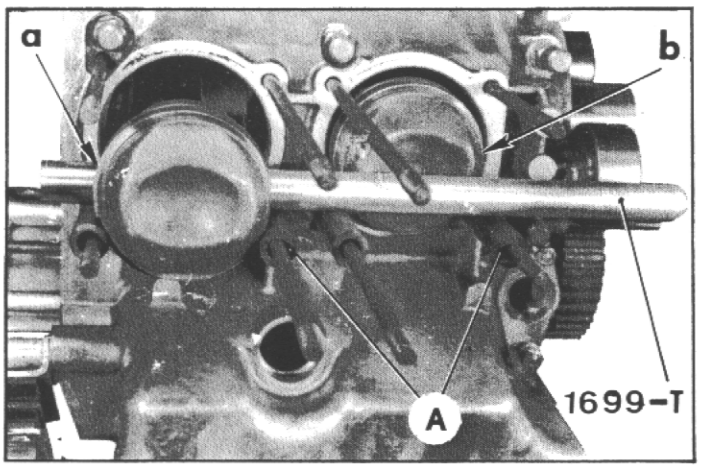
Remove the nuts (6) and (7) and the camshaft wheels.

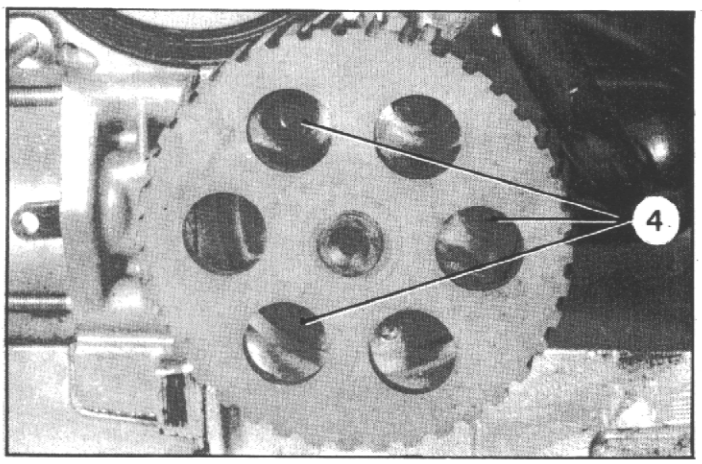


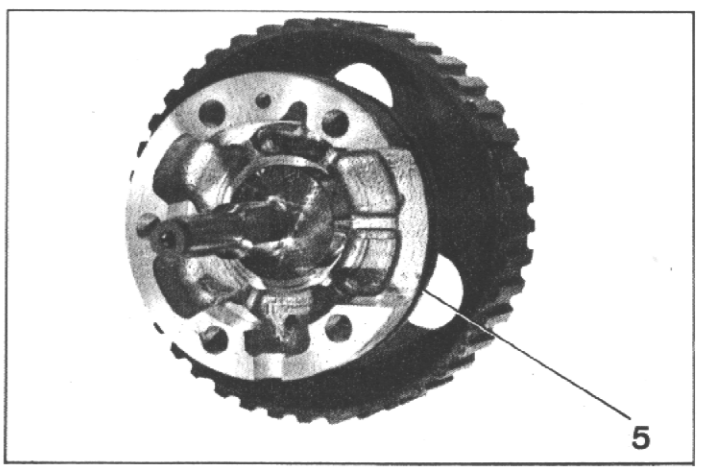
8029

11. Remove the cylinder head cover.









Manual 810-2

12. Remove the cylinder heads :

Remove fixing nuts (1), (2) and (3) of each cylinder head.
Release :
- the cylinder heads,
- the oil return tubes,
- the ducts beneath the cylinders (Engine G.103)

13. Remove the cylinders :

Remove the four cylinders.

NOTE :
Should the cylinders be used again, mark their respective positions.

Cap the studs with pieces of rubber tubing A to avoid scoring the pistons.

14. Remove the pistons :

- Remove the circlips situated towards the outside of the engine in « a » and « b »,
- Remove the gudgeon pin by hand using mandrel 1699-T.
- Release the pistons (place them in the corresponding cylinders if they are to be refitted)
- Remove the pieces of rubber tube A.

15. Remove the rings.

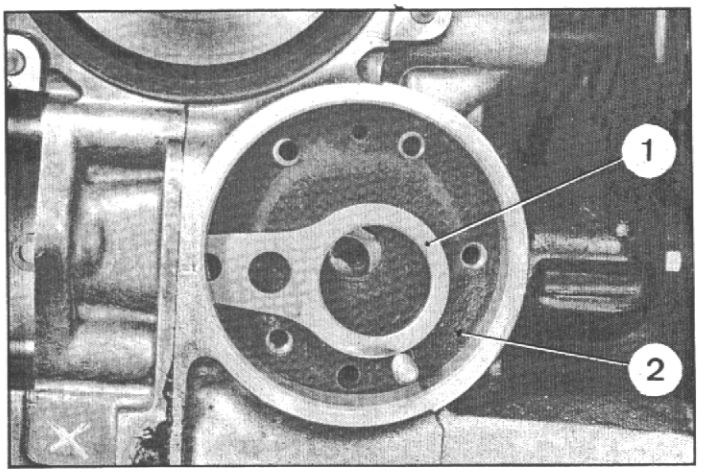
16. Remove the oil pump operating lever :

Remove the five fixing bolts (4).

CAUTION :

Remove the operating control in levering it on two diametrically-opposed points on the pulley to avoid damaging the pump bearing.

Remove the O-ring (5).



7999

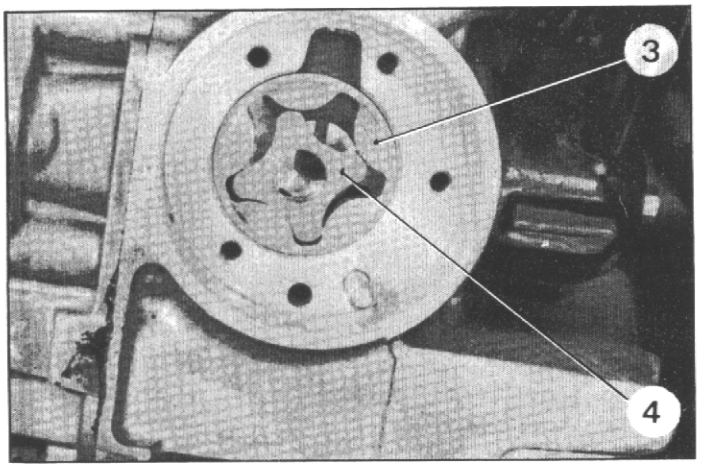
17. Remove the H.P. pump connecting rod :

Release the connecting rod (1).

18. Remove the oil pump pinions :

Remove :
- the cover plate (2),
- the pinions (3) and (4).

19. Place the engine as shown in the illustration with the L.H. half of the engine casing downwards.



8000

20. Remove the R.H. half engine casing :

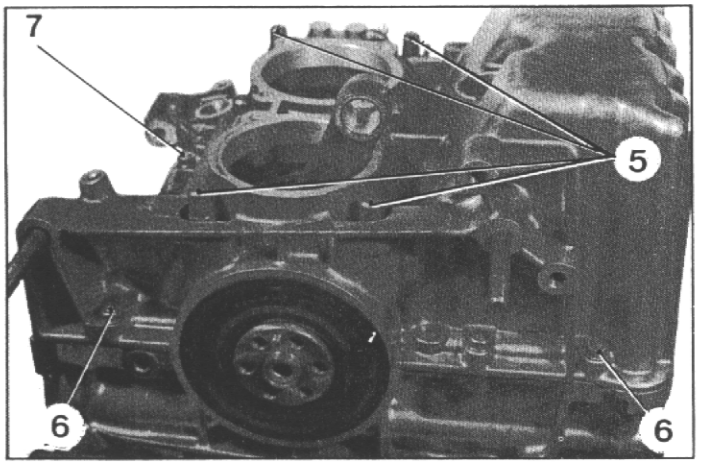
Remove :
- the nuts (5),
- the assembly nuts (6) and (7) of the half engine casings,

Release the R.H. half engine casing.

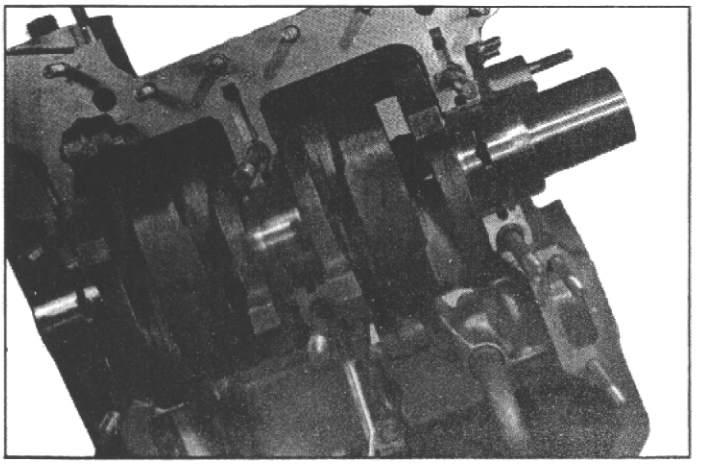
21. Remove the crankshaft :

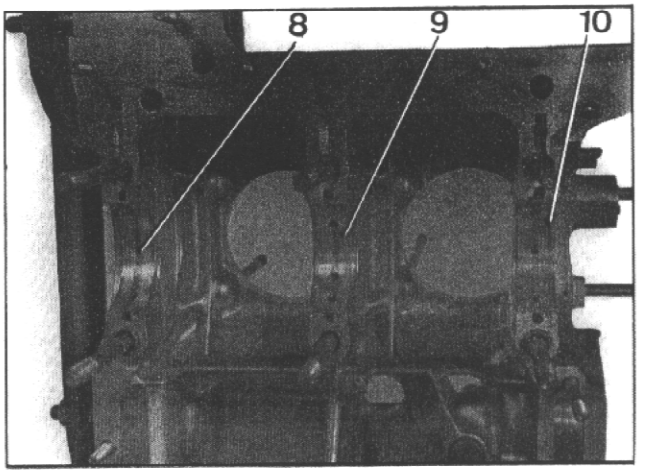
Release the front and rear seals.

Remove :
- the crankshaft-connecting rod assembly,
- the half bearings (8), (9) and (10).

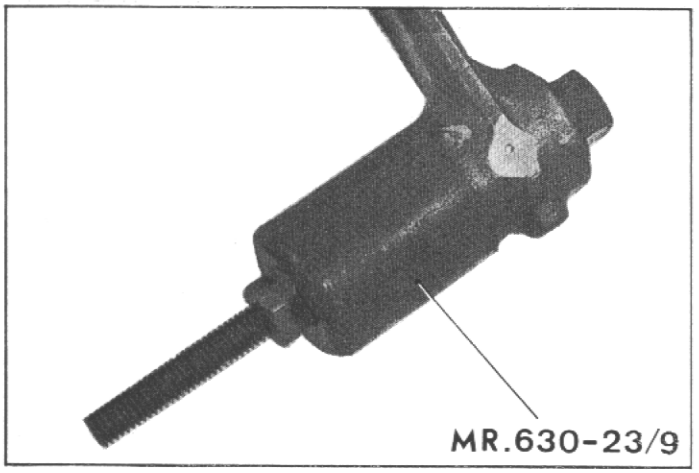


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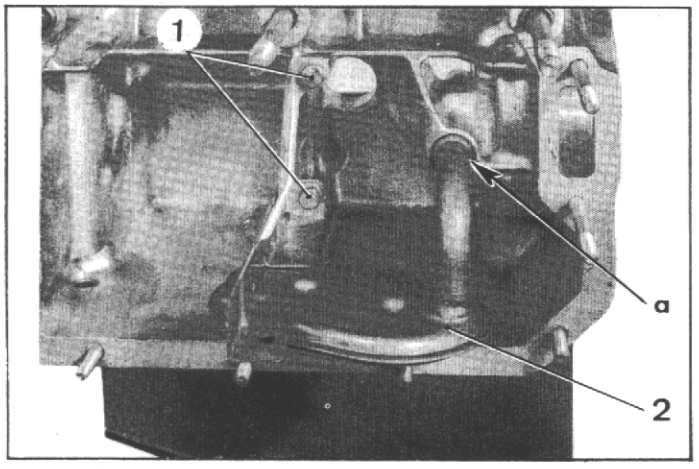
22. If necessary, remove the conrod small-end bushes

NOTE :

This delicate operation is not advised. It can only be performed in a specialized workshop. Use extractor MR. 630-23/9.

23. **Remove the intake strainer :**

Remove the bolts (1).
To facilitate removal, heat the engine housing in zone « a » surrounding the strainer pipe.
Remove the strainer (2).
Remove the sealing joint of the pipe.



24. **Remove the relief valve :**

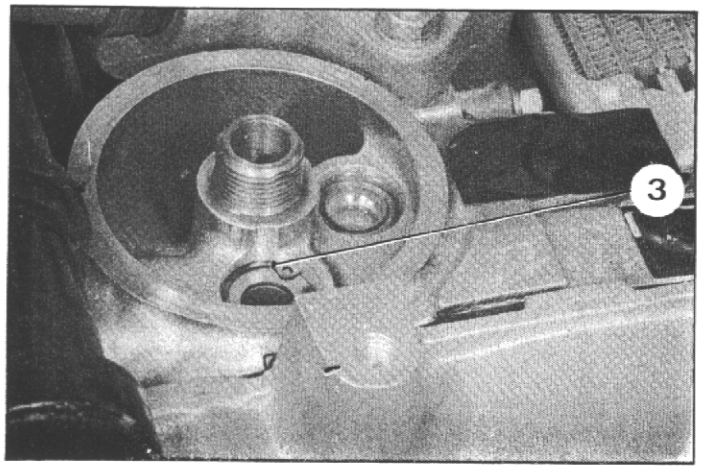
Remove :
- the circlip (3),
- the washer (4),
- the spring washer (5),
- the piston (6),
- the spring (8),
- the jacket (7),
- the spring cap (9).

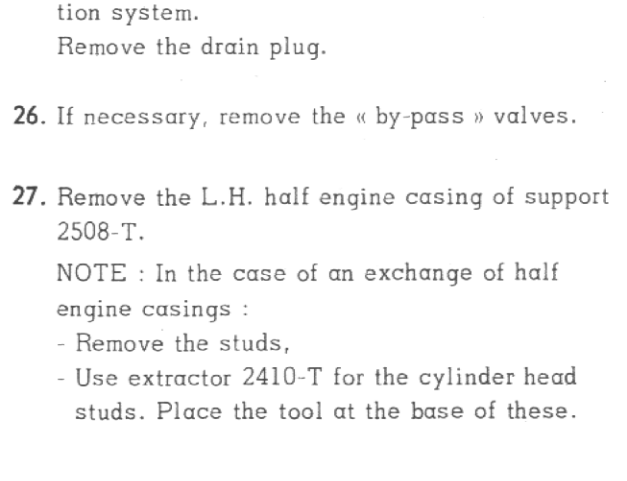
25. Remove the front and rear plugs of the lubrication system.
Remove the drain plug.

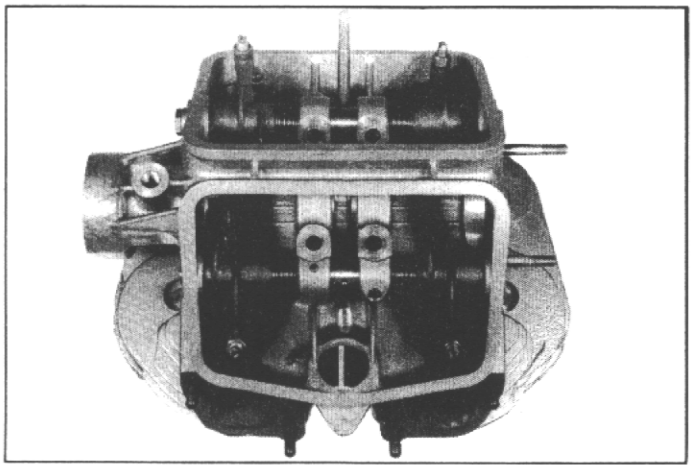
26. If necessary, remove the « by-pass » valves.

27. Remove the L.H. half engine casing of support 2508-T.

NOTE : In the case of an exchange of half engine casings :
- Remove the studs,
- Use extractor 2410-T for the cylinder head studs. Place the tool at the base of these.







28. Strip down the cylinder heads :

Remove :
- the rocker shafts,
- the rocker,
- the camshafts,
- the valve springs,
- the valves.

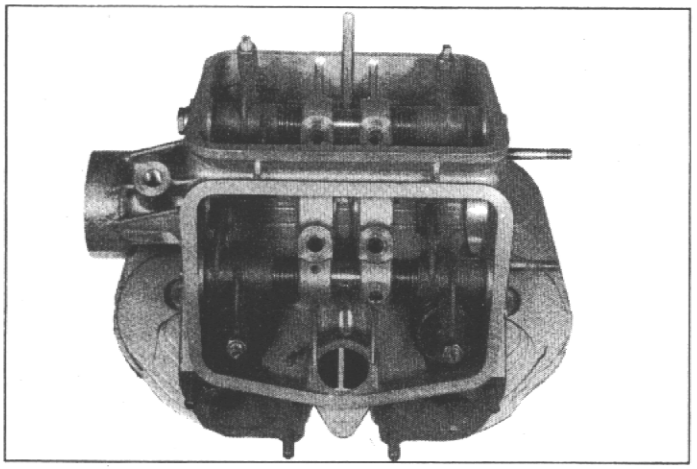
29. Clean the parts.

IMPORTANT NOTES :

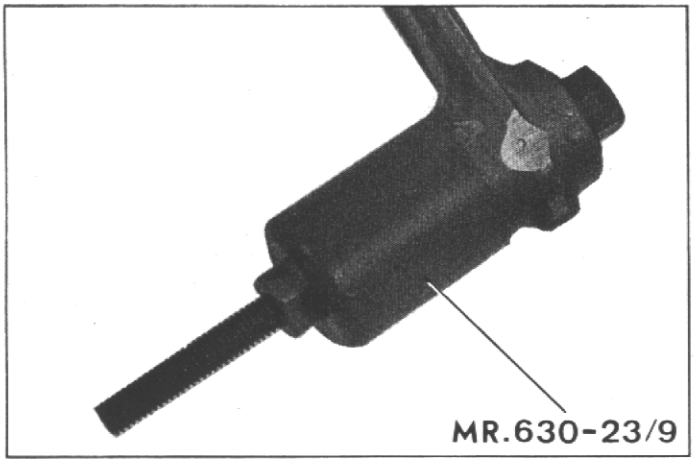
a) To ensure the sealing of the front and rear bearings, the crankshaft possesses a micro-turbine machined in each seal area. Never use emery cloth in this zone, otherwise an oil leak could occur.

b) To thoroughly clean the oil cooler, immerse it in a bath of cellulose thinner for about an hour. Allow it to drip and blow dry with compressed air.
However, if a bearing has been « run », replace the oil cooler and the oil intake strainer.

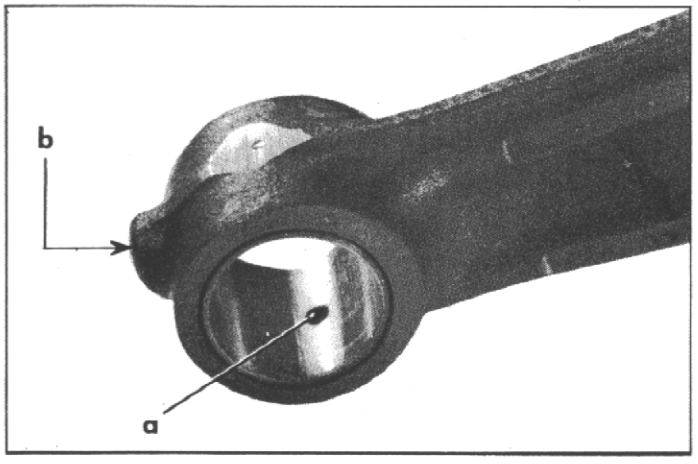
9032



4248



Manual 810-2



4250

II. PREPARATION.

1. Prepare the cylinder heads :

a) If necessary, grind the valves and their seats.
b) Lap the valves.
c) Fit the valves and their springs.
d) Fit the camshafts.
e) Fit the rockers and their shafts.

2. Prepare the connecting rod small-ends :
(If necessary).

Fit the bushes in the connecting rod small-ends.

NOTE :

This operation can be performed only in a specialized workshop.

The bushes sold by the Replacement Parts Departement have a ground bore about 0.05 mm undersize.

Blank the bores « a » with grease or tallow. Fit the prepared bush (extractor MR.630-23/9 so that the centre line of the lubrication holes in the bush is perpendicular to that of the connecting rod.

Ream the bush. This delicate operation must be carried out with the greatest care.

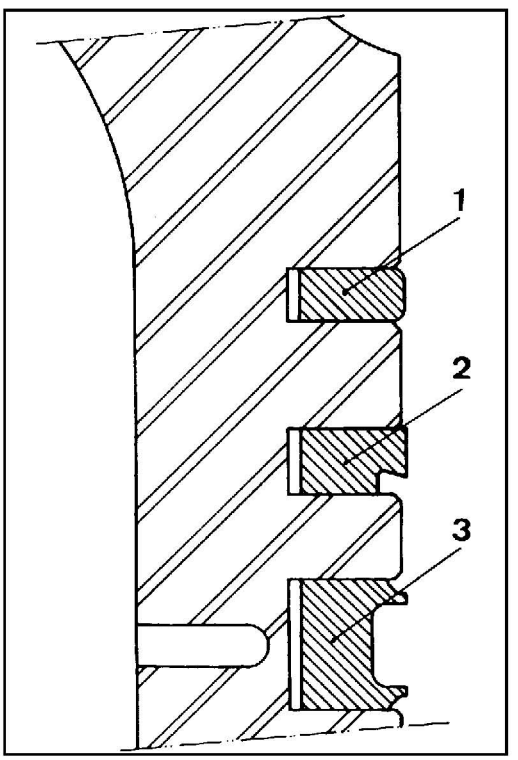
The bush should be reamed to :

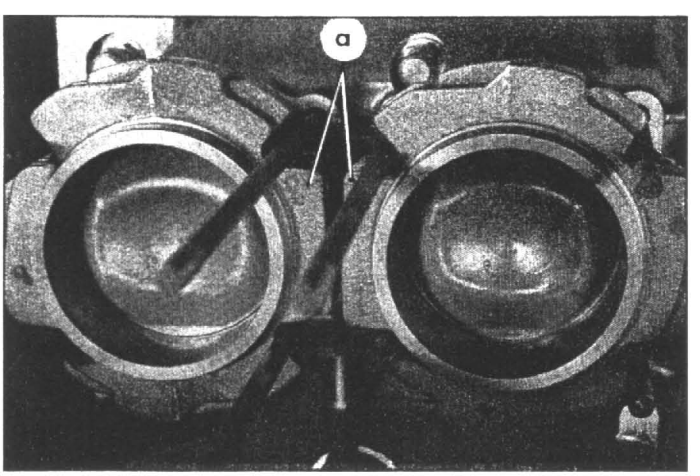
Engine G.10 (1015 cc)	Engine G.103 (1220 cc)
$20.005 \begin{smallmatrix} +\ 0.011 \\ -\ 0.006 \end{smallmatrix}$ mm	$22.005 \begin{smallmatrix} +\ 0.011 \\ -\ 0.006 \end{smallmatrix}$ mm

If a gauge is not available, use the new pin to check the bore.

Blow compressed air through bore « b » to remove any grease or swarf.

Clean the bore of the bush.





3. Prepare the pistons :

IMPORTANT :

It is not possible to separately replace one or two cylinder-piston sets.

Since the difference in weight between two pistons must not exceed a few grams, the Replacement Parts Department *only sells sets of four piston cylinder assemblies, which must not be fitted separately.*

4. Fit the rings :

The top compression ring (1), the scraper ring(2) and the oil ring (3) have a marking (HAUT, H or TOP) engraved on one of the faces near the gap.

In fitting, this marking must be positioned towards the upper part of the piston.

Badly positioned rings will cause excessive oil consumption.

IMPORTANT : *U-FLEX ring :*
In its free state, the U-FLEX ring has a diameter greater than that of the piston which necessitates the use of the 3010-T or 4007-T special fixture for fitting it to the piston.

NOTE :

If the same pistons are to be used again after only replacing the rings, carefully clean the grooves with the aid of a used ring (ground section).

However, if there is excessive clearance in the groove, the piston must be discarded.

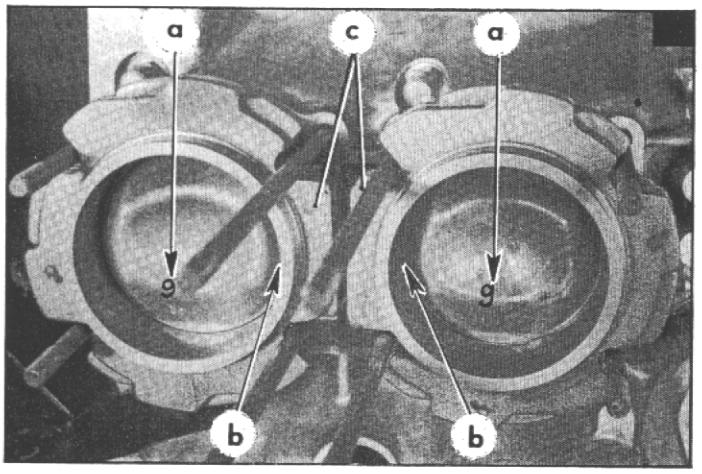
5. Prepare the cylinders :

CAUTION :

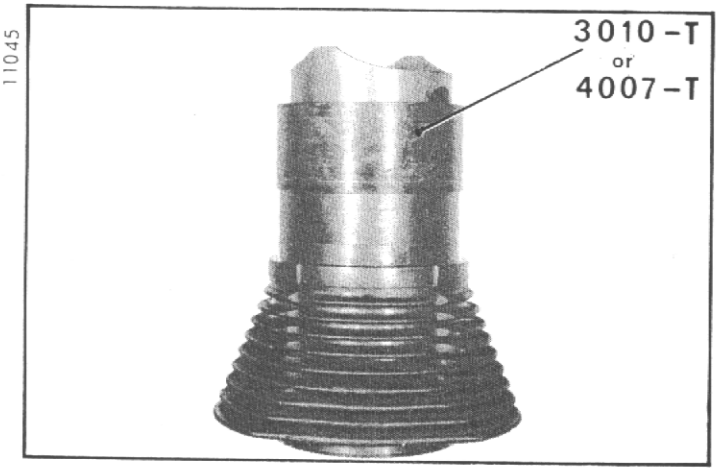
There are two classes of cylinders (different heights)marked by touches of different colours of paint (green or red).

Both cylinders fitted to **ONE SIDE** of the engine **MUST BE OF THE SAME COLOUR** (identical class)

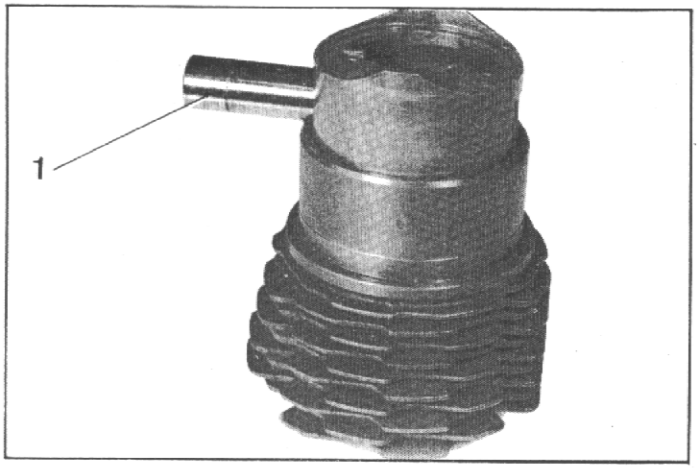
Place the cylinders in such a way that after fitting on the engine, the fins « a » are facing each other.



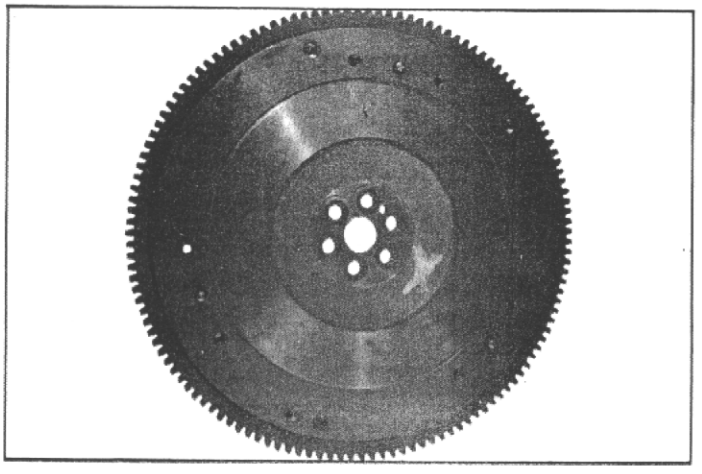
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8724



8002

Manual 810-2

6. Fit the pistons in the cylinders.

NOTE : Place the pistons in such a way that after fitting on the connecting rods, the figure at « a » (compression ratio : 9) is legible in situ.

a) Before fitting the pistons :
Insert the gudgeon pin circlip on the same side « b » as the fins « c ».
Position the piston ring gap at 120°.

b) Fit the pistons in the corresponding cylinders (marked when dismantling).
Use a 3010-T *(engine 1015 cc)* or 4007-T *(engine 1220 cc)* ring fixture: insert each piston in the lower part of the cylinder.

c) Partly insert the gudgeon pin (1) (oiled beforehand) into the boss (circlip not yet fitted) so as to provide a gap to enable the conrod small end to be fitted.

7. Prepare the oil pump :

Check that the sealing faces of the oil pump body are not damaged or scored (engine casing side and cover side).

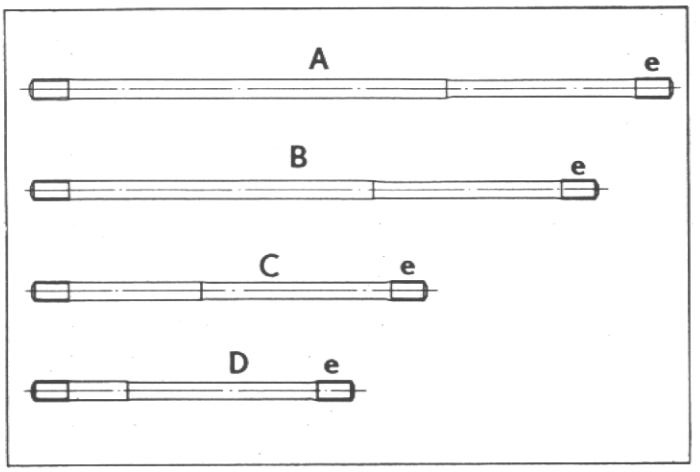
8. Replace the starter ring (if necessary) :

Drive out the ring with a mallet.
Clean the area of the ring which bears against the flywheel.
Heat the ring with a blow torch, moving it round the whole time to ensure an even expansion.
(around 200 to 250° C, colour : straw yellow).

Offer up the ring, with the teeth entry towards the gearbox.

Measure the run-out on the starter ring (0.3 mm maximum).

G.11-3



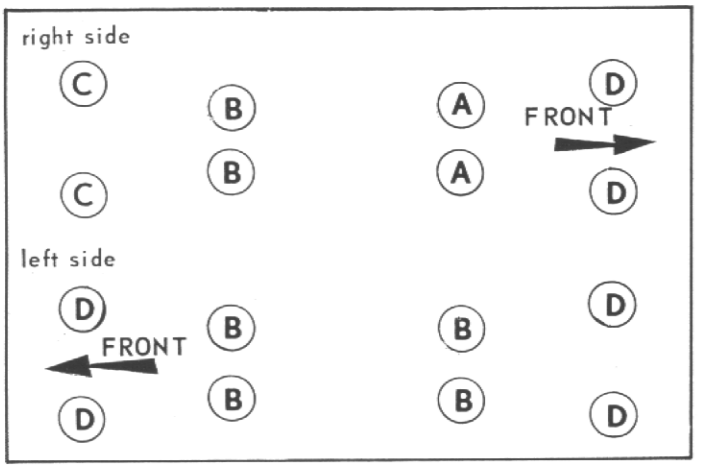
9. Prepare the contact breaker :

Check the condition of the contact points.

Change them if necessary.

10. Prepare the two halves of the engine casing :

a) Check the condition :
- of the various tapped holes,
- the joint faces (free from scores and perfectly clean).



b) If the two halves of the engine casing are being replaced, fit :
- the coupling studs of the engine-gearbox assembly,
- the cylinder head studs conforming to the layout shown opposite,
  Extremity « e » (shortest thread) must be inserted in the engine casing.

NOTE : The studs for engine G.103 (1220 cc) are longer than those for engine G.10 (1015 cc)

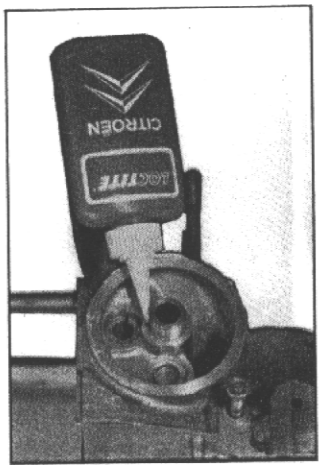
IMPORTANT : It is essential to coat with PLASTISOL the ends « e » of the bolts fitted on the R.H. half engine casing.

Tighten the bolts to 6 to 8 mAN (0.6 to 0.8 m.kg)

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8813

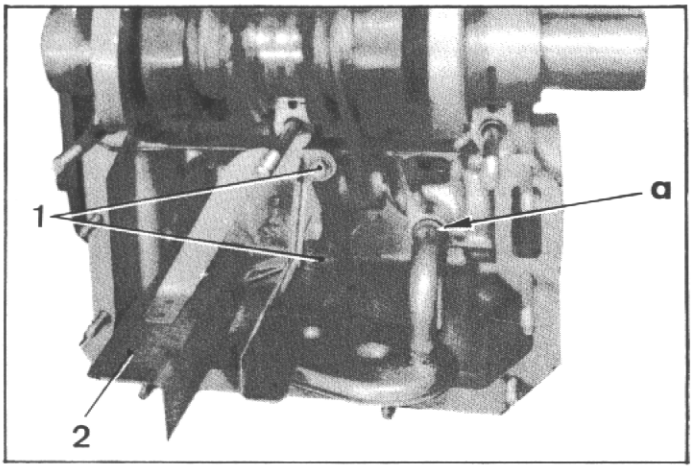


c) *It is essential to use LOCTITE N° GX. 01 459 01 A in fitting the following parts :*
- studs for the tension rollers,
- insert for the attachment of the filter cartridge.

Tighten to 10 to 15 mAN (1 to 1.5 m.kg).

d) Fit the drain plug (metallo-plastic sealing ring).
Tighten to 35 to 40 mAN (3.5 to 4 m.kg).

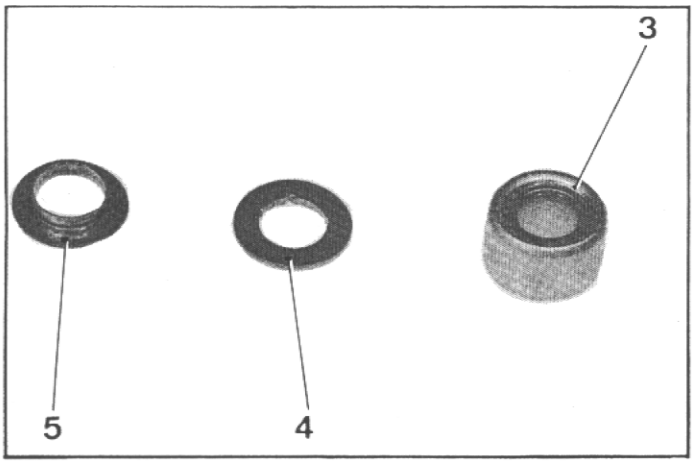
III. FITTING



1. Place the half engine casing on stand 2508-T.

2. **Fit intake oil strainer :**

Fit the seal on the intake pipe of the strainer. *Smear the extremity of the pipe with LOCTITE GX. 01 460 01 A* and insert in its housing « a » on the engine casing. Insert the anti-emulsion shield (2) between the engine casing and the intake strainer. Tighten the securing bolts of the strainer and the anti-emulsion shield to 14 mAN (1.4 m.kg).



3. **Fit the by-pass valves :**

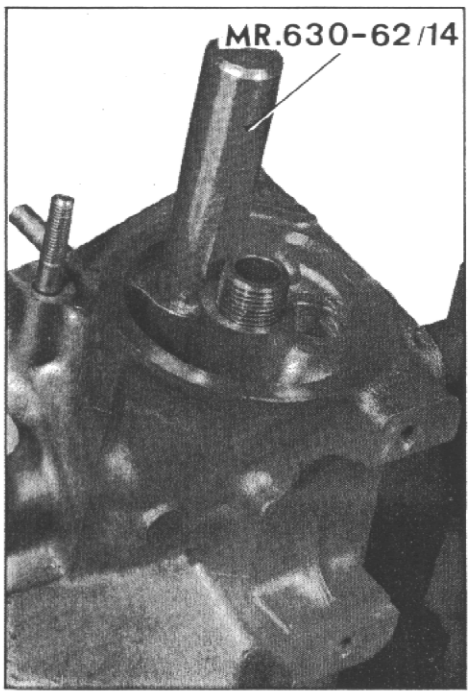
a) Cartridge by-pass valve (white mark) :
Fit :
- the valve (3),
- the washer (4).

Secure the cup (5) in the housing by tapping on it lightly, using tool MR. 630-62/14.

b) By-pass valve of the cooler (green mark) :
- proceed in the same way as described above.

Smear the plug threading with LOCTITE GX. 01 459 01 A and fit (copper joint).
Tighten to 45 to 50 mAN (4.5 to 5 m.kg).

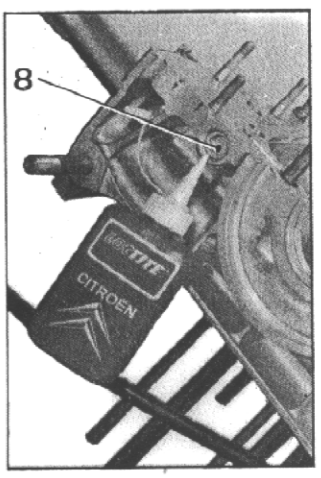
4. **Fit the plugs (6) and (8) of the lubrification system :**
Smear their threads with LOCTITE N° GX. 01 459 01 A and fit them (copper joint).
Tighten to 35 to 40 mAN (3.5 to 4 m.kg).



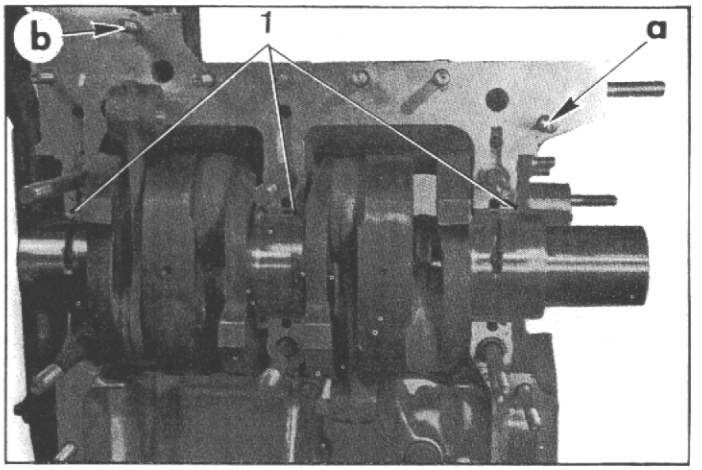
8734



8815



8814



8733

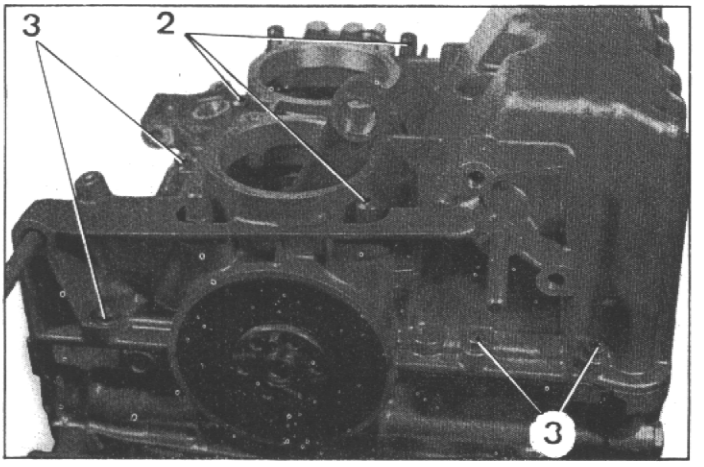
5. Fit the crankshaft :

a) Fit the bearing shells (1) into the left and right-hand casings.
Make sure that the bores of the engine casings are clean.
Make sure that the bearing shells are properly engaged in the locating pegs.

b) Fit the crankshaft.
Using a set of feelers, check the end-float of the crankshaft at the central bearing. This must be :

0.09 to 0.20 mm

(not adjustable).



9475

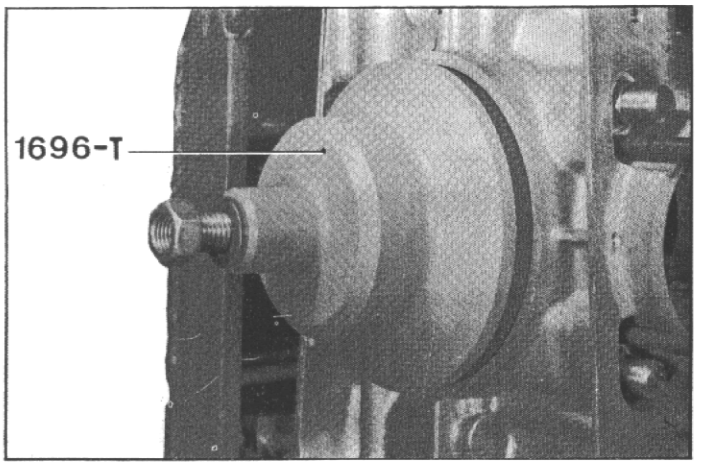
6. Fit the right-hand half engine casing :

Smear the assembly face of the R.H. half engine casing with MASTI-JOINT HD 37 (casing carrying the oil circuit).
Place the right-hand half engine casing on the left-hand half engine casing.
Fit the nuts (2)on the bearing studs (copper seal).
Fit the fixing nuts (3) of the half engine casings (flat washer).

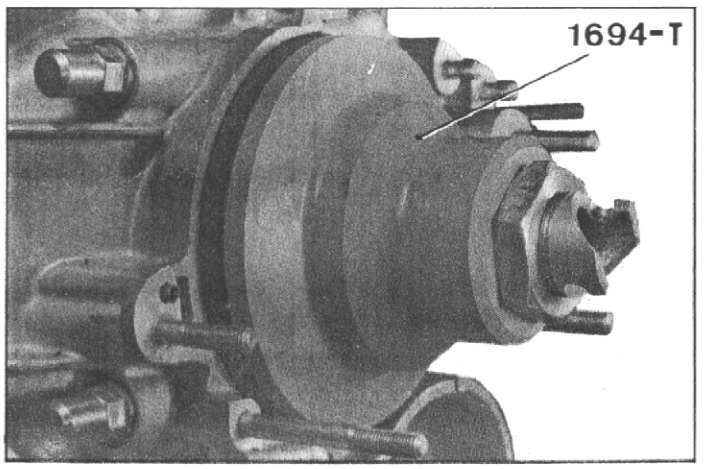
IMPORTANT : All the half engine casings assembly studs are equipped with standard nuts (3) with the exception of the following two upper studs :
- in « a » next to front crankshaft bearing seal,
- in « b » next to oil pressure switch.

This two studs must be equipped with cap nuts N° GX 09 245 01 A.

Tighten the nuts (2) to 34 to 45 mAN (3.4 to 4,5 m.kg).
Tighten the nuts (3) to 12 to 15 mAN (1.2 to 1.5 m.kg)



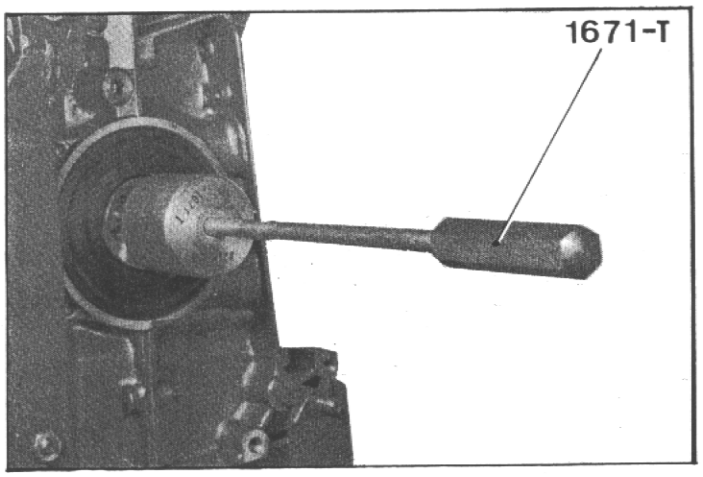
8996



7. Fit the front and rear bearing seals :

a) Oil the lip of the rear seal and fit it using tool 1696-T.

b) Oil the lip of the front seal and fit it by means of tool 1694-T.
NOTE : Fit only seals sold by the Replacement Parts Department.
IMPORTANT :
The seals must be renewed after each engine dismantling operation.
Never fit them before assembling the half engine casings as this would crush the seals and cause oil leakage.

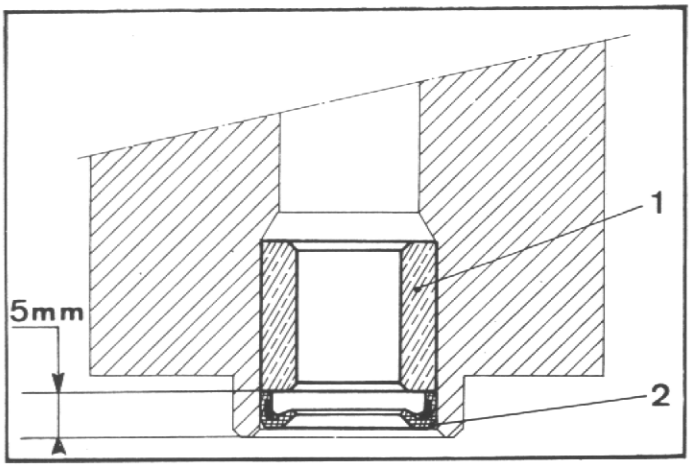


9547

8. If necessary, replace the centring bush of the main shaft in the crankshaft :

a) Remove it with the aid of extractor 1671-T (equipped with expanding end-piece of 12 mm in diameter).

b) Fit the bush :
Immerse this bush for about an hour in engine oil at ambient temperature.
Allow it to drip.
It must be recessed by 5 mm in relation to the crankshaft shoulder.
Use mandrel 3052-T bis to meet this requirement.
(After fitting the bush, free the mandrel with the help of its central screw in « a »).

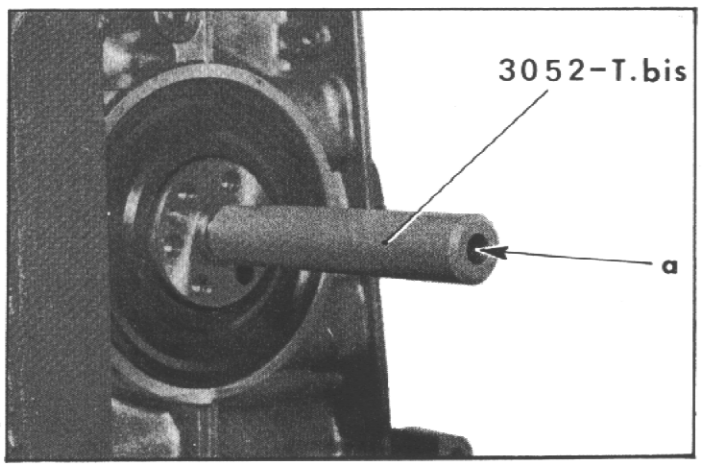


A. 11.1

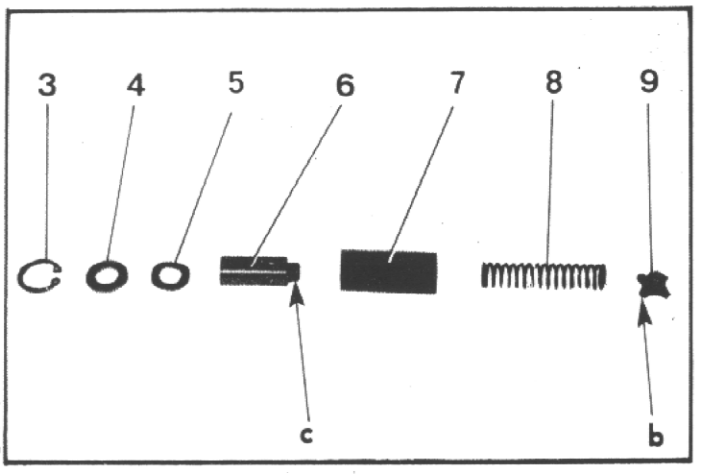
c) Fit the seal (2).
Position the seal : the face bearing the manufacturer's mark directed towards the outside of the engine.

9. Fit the relief valve :

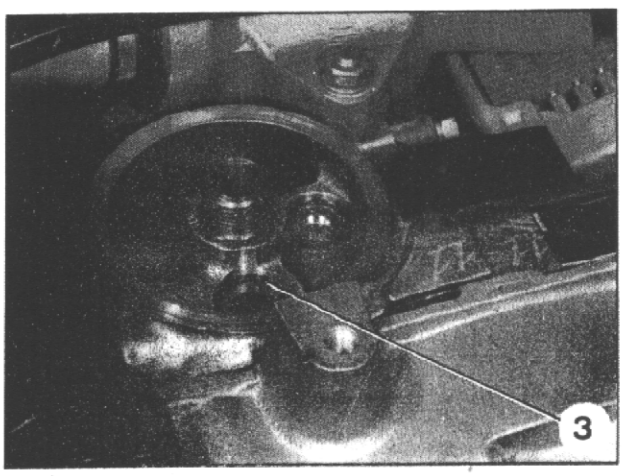
Fit :
- the cup (9) (the lugs « b » towards the bottom of the housing),
- the jacket (7),
- the springs (8),
- the piston (6) (after having oiled it and the guide « c » on the spring side),
- the spring washer (5),
- the washer (4),
- the circlip (3).



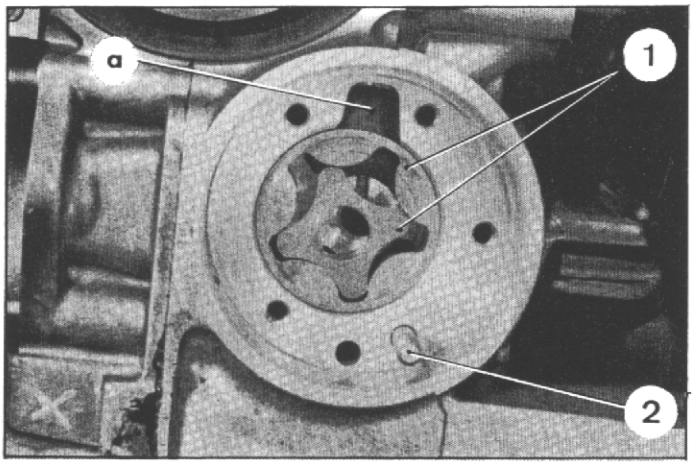
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8721



7939



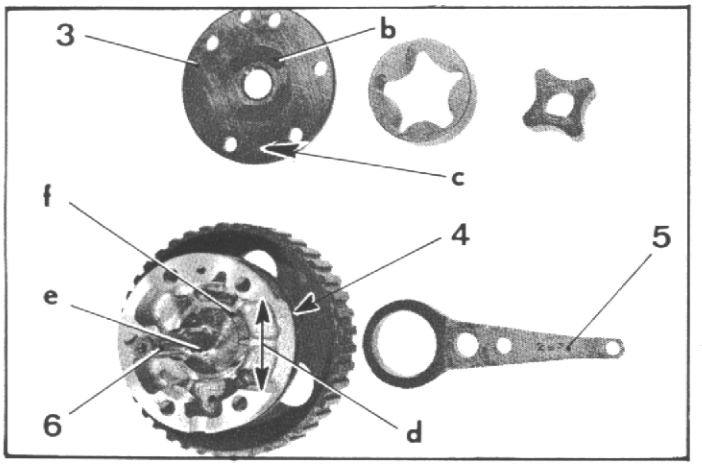
8000

10. Oil and fit the oil pump pinions :

NOTE : On the engine casings without guide studs it is recommended to temporarily fit them to facilitate fitting of the oil pump plate and operating mechanism.

11. Fit the cover plate (3) :

Position it so that the cavities « b » are place towards the inside of the engine casing and the small hole «c» opposite cavity «a» (compression).



8001

12. Fit the HP pump operating lever (5).

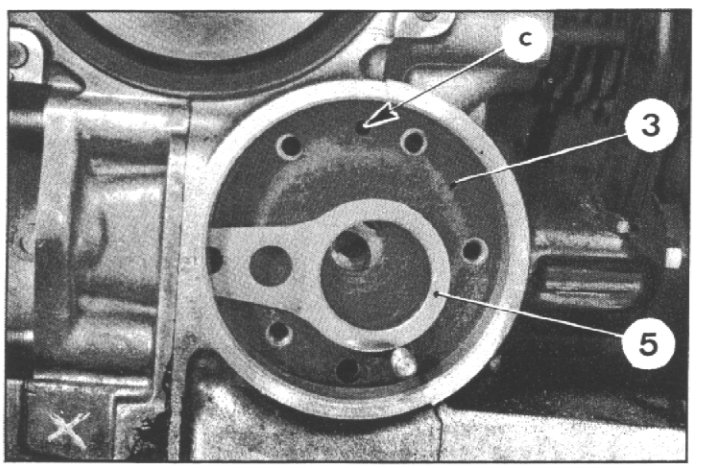
13. Fit the pump operating lever :

a) Replace the O-ring seal (4).
Oil the shaft (6) and eccentric « f ».

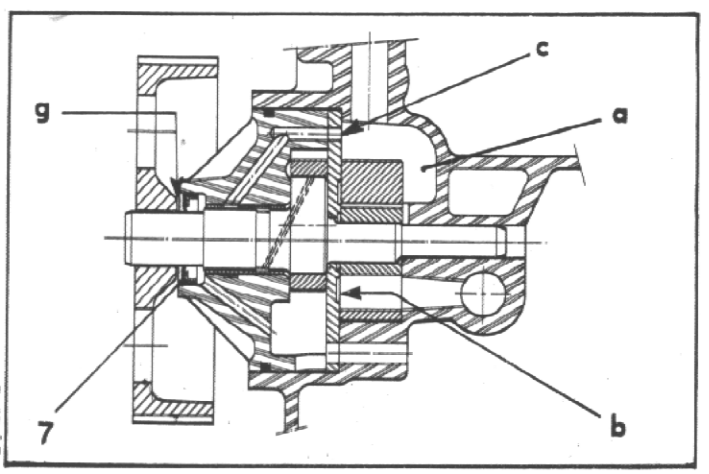
b) Place shim 4001-T between the wheel and the bearing in « g » to prevent squashing the sealing joint.

c) Offer up the pump operating lever to the guide stud (position the groove « d » of the connecting rod passage towards the HP pump) and engage the shaft in the central pinion.
Turn the shaft in order to engage the flat part « e » into the oil pump pinion.

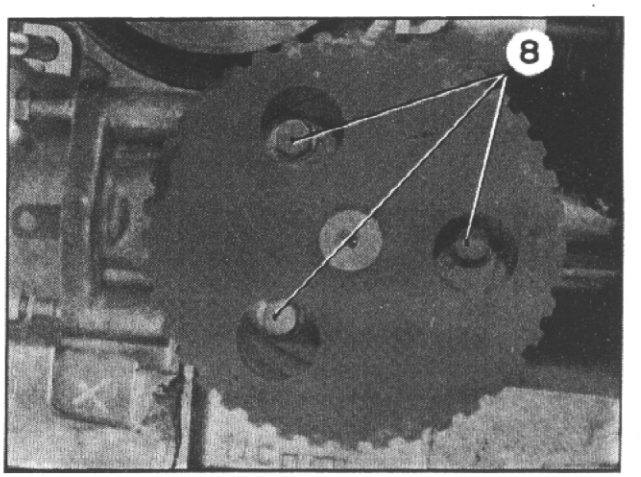
d) Guide the connecting rod (5) in order to engage it on the eccentric « f » of the control lever.
Fit the bolts (8) (contact washer).
CAUTION : Alternately tighten the diametrically opposed bolts by fractions of a turn until the complete fitting of the pump operating lever.
- Tighten the bolts (8) to 15 to 18.5 mAN (1.5 to 1.8 m.kg).
- Take out the shim 4001-T.
- Check that the pump control turns freely.



7999

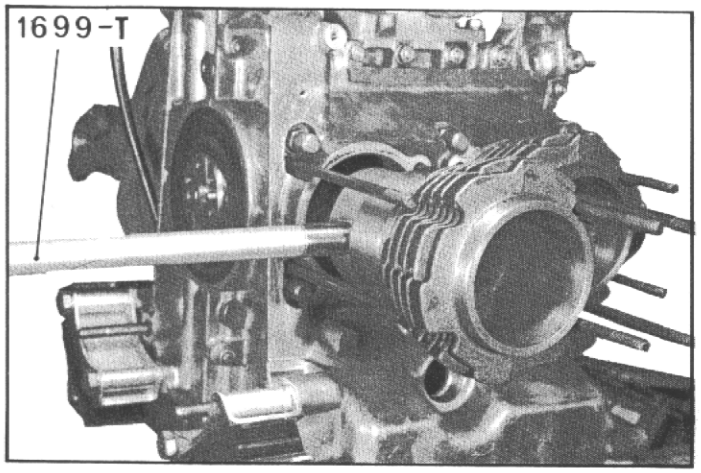


G_22-2

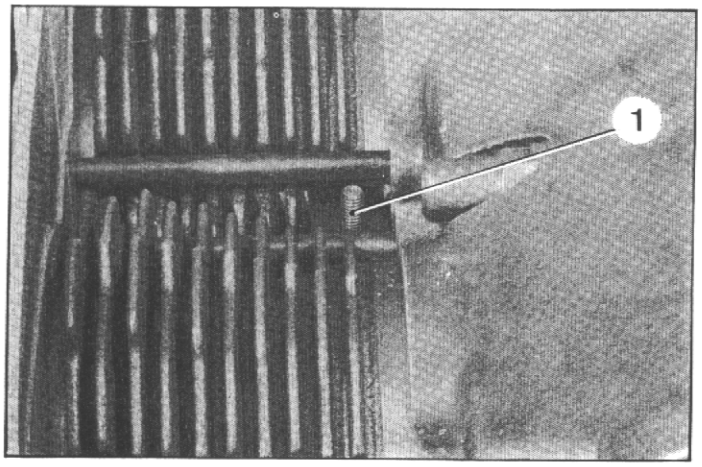


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8010

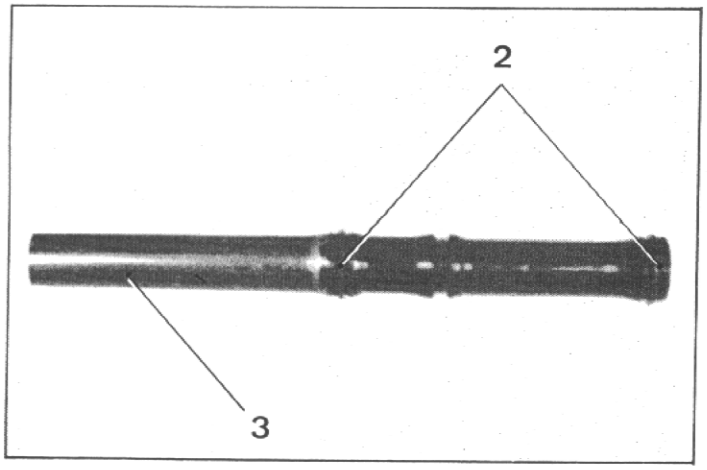


8036

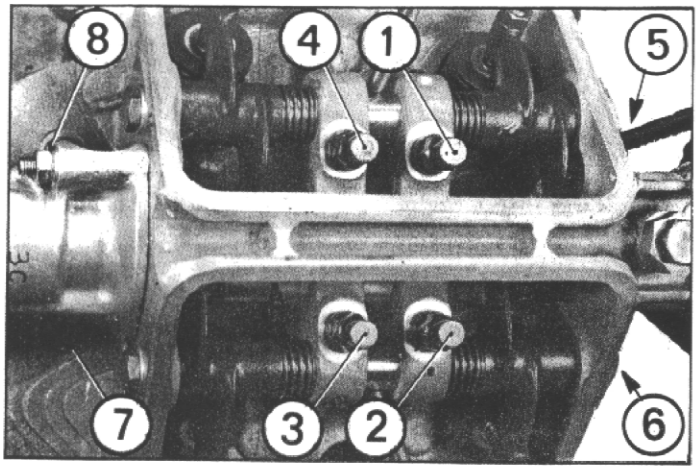


Manual 810-2

9033



ORDER OF TIGHTENING THE NUTS



7979

14. Fit the cylinders :

a) Oil the small ends of the connecting rod.

Offer up the cylinder/piston assembly to the connecting rods.

CAUTION : Direction of fitting (see pages 18 and 19, paragraphs 5 and 6).

Complete fitting of the gudgeon pin with the aid of mandrel 1699-T.

b) Fit the gudgeon pin circlips. Ensure that they are fully engaged in their grooves.

c) Oil the pistons and the inside of the cylinders.

Completely engage the cylinders.

Engine G.103 (1220 cc).:

Fit the pipes beneath the cylinders.

15. Fit the cylinders heads :

NOTE : Before tightening the R.H. cylinder head, position the cylinders to allow the brake unit to be fitted.

a) Lubricate the O-rings (2) of the oil return engine tubes (3) with engine oil.
Engage the longest ends into their engine casing housings.

b) Turn the crankshaft to bring the pistons to their mid-stroke position.

Offer up the cylinder head while guiding the oil return tubes (3).

Fit and screw up the nuts by hand (thick flat washer) and then temporarily tighten them to 8 to 10 mΛN (0.8 to 1 m.kg), beginning at the centre.

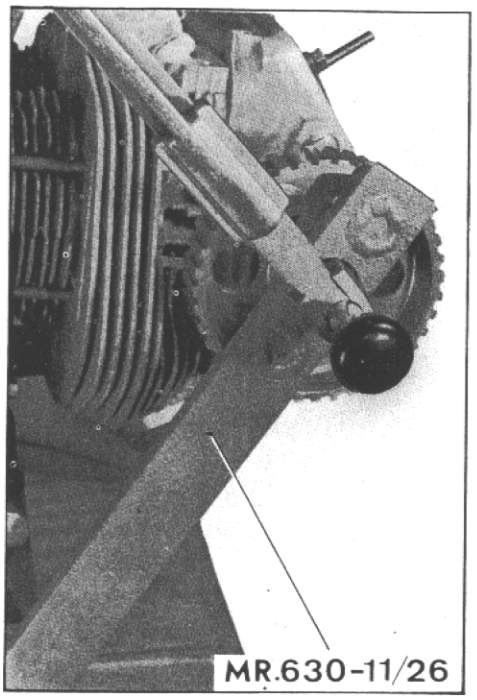
c) Tighten the cylinder heads :

Observe the tightening order shown in the illustration opposite :

12 mm nuts A/F = 16 to 18 mΛN
(1.6 to 1.8 m.kg)

13 mm nuts A/F = 20 to 25 mΛN
(2 to 2.5 m.kg).

Extended socket 3094-T or 4006-T.D.



8029

16. Fit the camshaft wheels :

NOTE : The two camshafts wheels are identical.

Engage one wheel on the end of each camshaft (setting pin).

Block the wheel with the aid of tool MR.630-11/26 and tighten the nut (flat washer) to 82 mΛN (8.2 m.kg) (torque wrench).

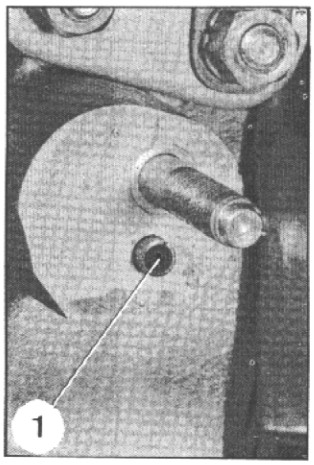
17. Fit the rollers :

NOTE : The two rollers are identical.

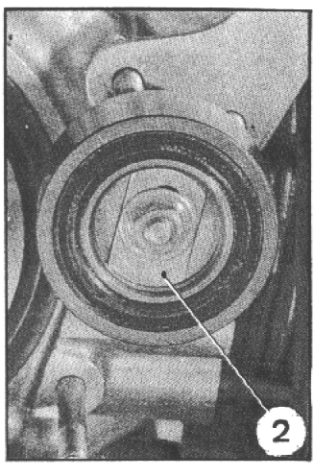
a) If necessary, engage the Mecanindus guide pins (1) in their housings.

b) Offer up the rollers (6) (support plate (2) outwards).

Fit the nuts (7) (contact washer) without tightening them.



8841

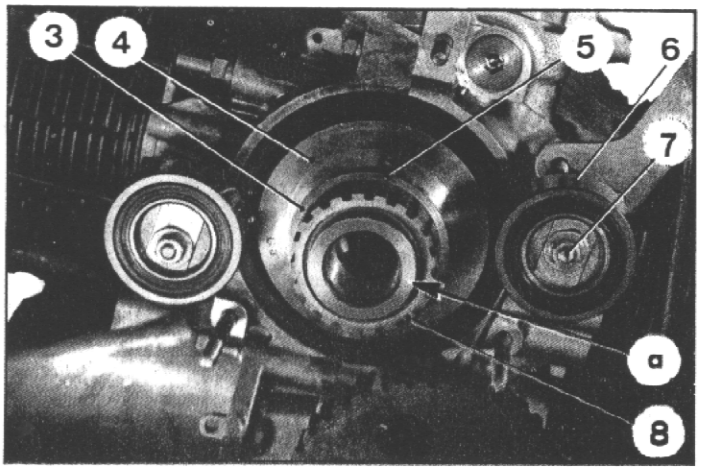


8030

18. Fit the timing gears on the crankshaft :

Fit :

- the protective plate,
- the key on the crankshaft,
- the pinions (5) and (8) after having interposed the intermediate flange (3).

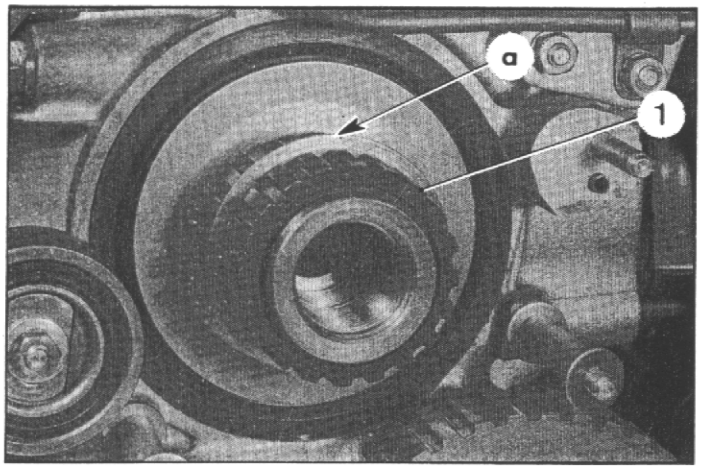


8030

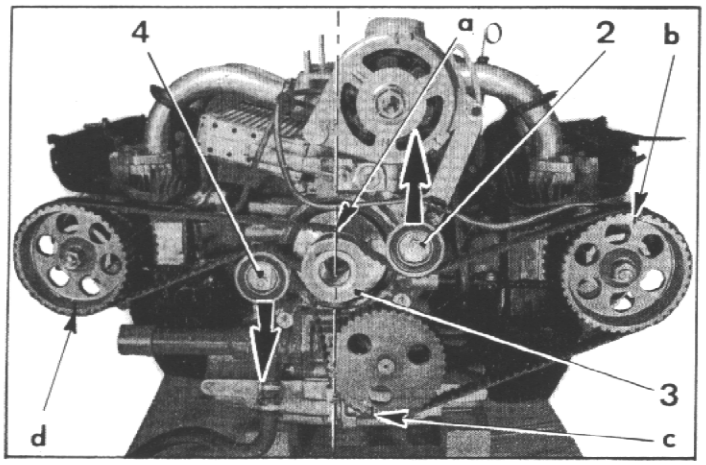
CAUTION :

Position the pinions so that groove « a » is placed outwards on the pinion (8) and towards the crankcase on the pinion (5).

8841



Manual 810-2



8046

19. Fit the timing belts ;

IMPORTANT : Before fitting, make sure that the belts, pinions and rollers show no trace of grease or oil.

NOTE : On a given engine, fit belts from the same supplier.

a) Turn the engine to bring the marking « a » (located on the intermediate flange toward the top of the centre line of the engine). Position the marks « b », « c » and « d » of the camshaft wheels and the oil pump as shown in the figure.

b) Compress the rollers (direction of the arrows). Tighten the nuts (2) and (4).

c) Fit the right belt so that its markings coincide with the markings « a » and « d » in such a way that :

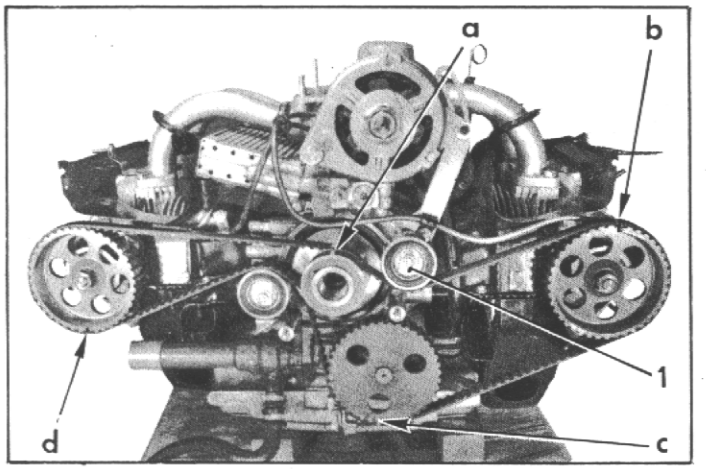
ad = 42 steps *tensioner side* (Engine G.10)
ad = 43 steps *tensioner side* (Engine G.103).
(in this position, the marking « d » is placed downwards).

d) Fit the left, in marking coincide :
- the white markings with markings « a » and « b »,
- the yellow marking with marking « c ».

In that position :
ab = 32 steps (Engine G.10)
ab = 33 steps (Engine G.103)
ac = 25 steps *(For the two types of engines)*

e) Fit the outer flange (3).

f) Release the rollers and retighten nuts (2) and (4).



8046

20. Adjust the valve clearance :

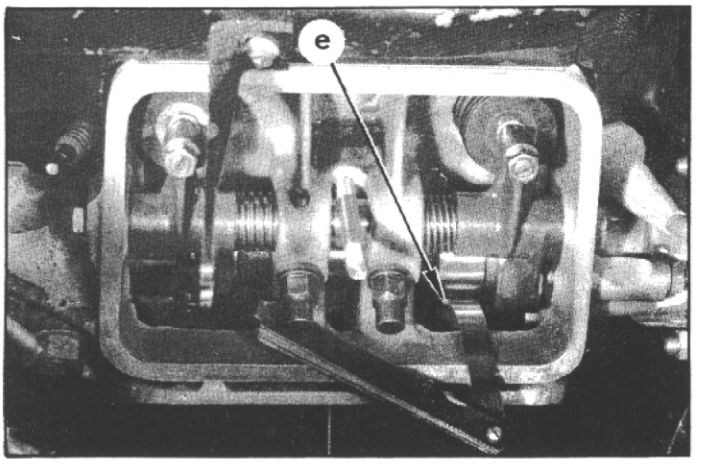
Successively adjust each of the rocker arms in the following manner :

a) Turn the engine so that the heel of the rocker to be adjusted is on the back of the corresponding cam (valve completely closed).

b) *Adjust the clearance between the heel of the rocker and the back of the corresponding cam in « e ».*
Intake - Exhaust = 0.20 mm.

21. Tension the belts :

With the crankshaft marking and camshaft wheels placed as in the illustration in the margin, turn the crankshaft 90° in its normal working direction.
Loosen nut (1) of the left-hand roller to release it and retighten it to 18.5 mAN (1.8 m.kg).
Turn the crankshaft one turn in its normal working direction and carry out the same operation on the right-hand.



8362

22. Fit the cylinder head covers :

IMPORTANT : Carefully oil the rocker arms, shafts and cams.

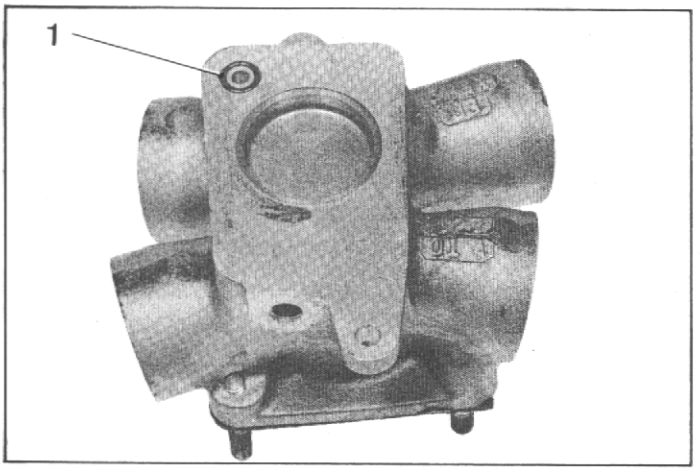
a) Ensure that there is no roughness on the joint faces which must be clean and dry.

b) Stick the seal on the cylinder head cover (BOSTIK 1400 or MINNESOTA F.19 adhesive)
Centre the cylinder head covers.

NOTE : The lower and upper cylinder head covers are different. Take care with the direction of fitting.
The cylinder head cover containing the filling orifice is fitted on the left-hand side.

CAUTION : Incorrect fitting of the gaskets, a poor centring or insufficient tightening of the fixing nut could lead to a total loss of the engine oil.

Tighten the nut to 8 to 10 mAN (0.8 to 10 m.kg).

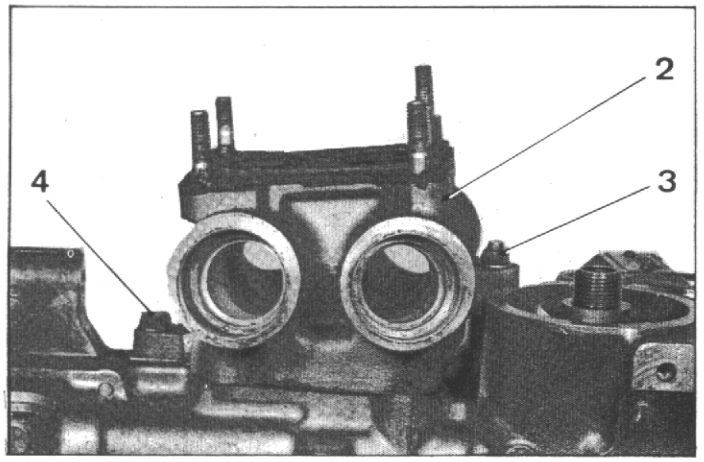


23. Fit the exhaust heater box of the carburettor or the pipe-intake manifold and carburettor assembly.

Fit the O-ring (1) in its housing.

Fit the box (2) or the pipe-intake manifold and carburettor assembly on the engine casing.

Tighten the nut (3) and bolt (4) to 18.5 mΛN (1.8 m.kg) (contact washer).



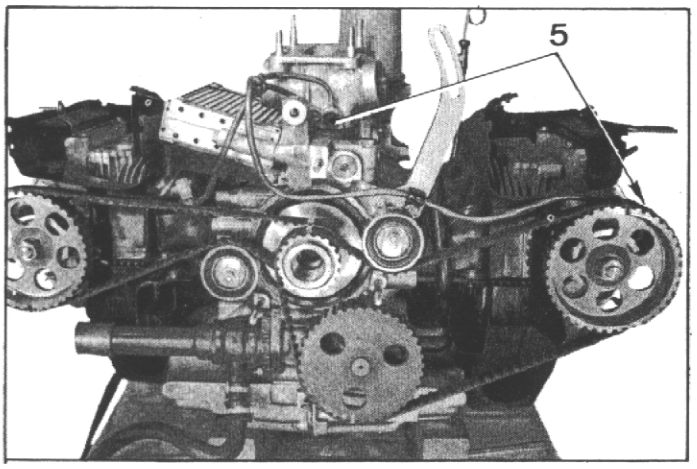
24. Fit the lubrication piping :

Fit the union screws (5) for the cylinder head lubrication pipes (replace the seals).

Tighten the union screws to 18 to 20 mΛN (1.8 to 2 m.kg).

Fit the oil pressure switch (replace the seal) and tighten it to 22 mΛN (2.2 m.kg).

IMPORTANT : Check that there is a clearance of 5 mm minimum between the piping and the camshaft wheels.

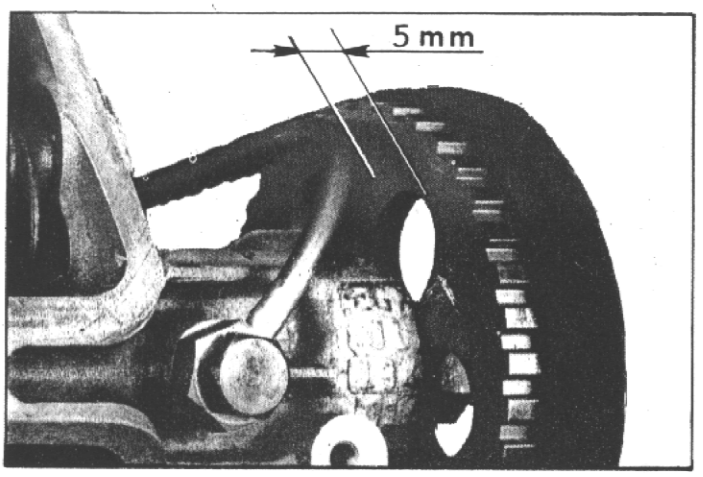


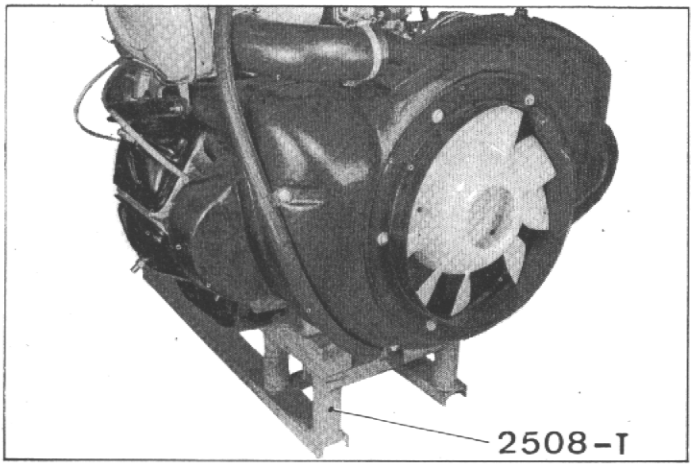
25. Fit the oil cartridge :

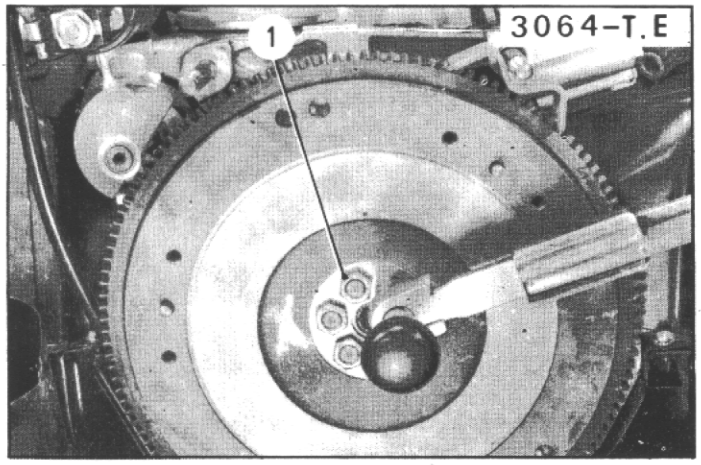
Oil the seal.

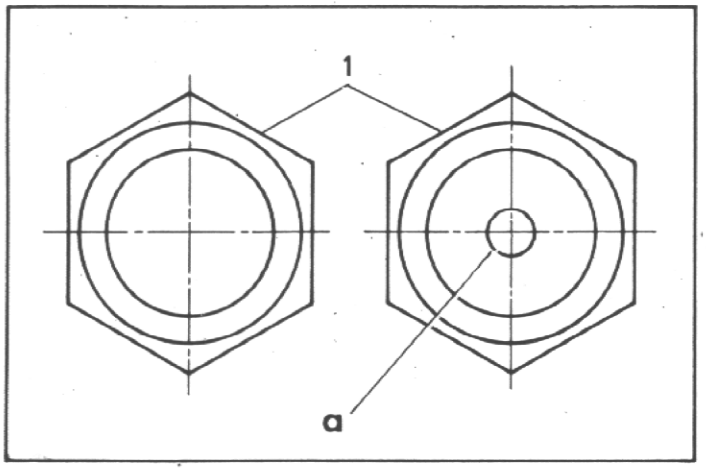
Fit the cartridge by hand until it comes into contact with the engine.

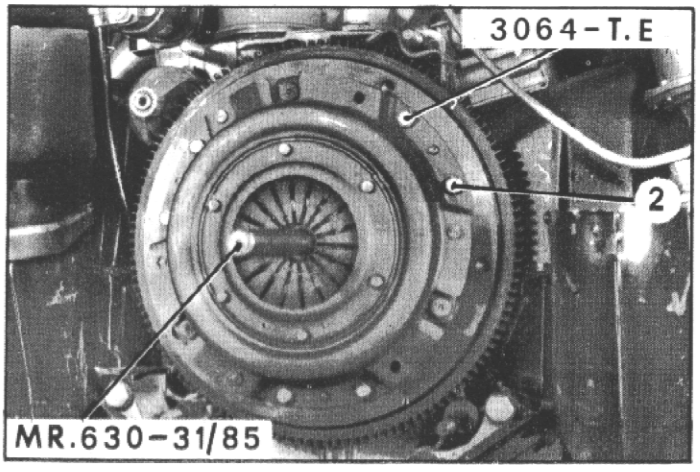
Then tighten it 1/2 to 3/4 of a turn (wrench 1683-T).











26. Assembling the engine :

Fit :

- the breather,
- the dipstick tube,
- the cooling ducts,
- the ducts beneath the cylinders,
- the front and rear deflectors (on the R.H. and L.H. side),
- the heating ducts,
- the exhaust manifold,
- the high pressure pump,
- the alternator and its tensioner,
- the petrol pump and its spacer,
- the sparking plugs,
- the distributor, its protective spacer and the sparking plug leads,
- the fan cowl and its spacers,
- the drive belt of the alternator,
- the fan,
- the starter dog,
- the starter,
- the oil cooler,
- the inlet pipes *(according to fitting)*
- the upper duct covers,
- the carburettor and its spacer *(according to fitting).*
- the air filter,
- the high pressure pump pipes.

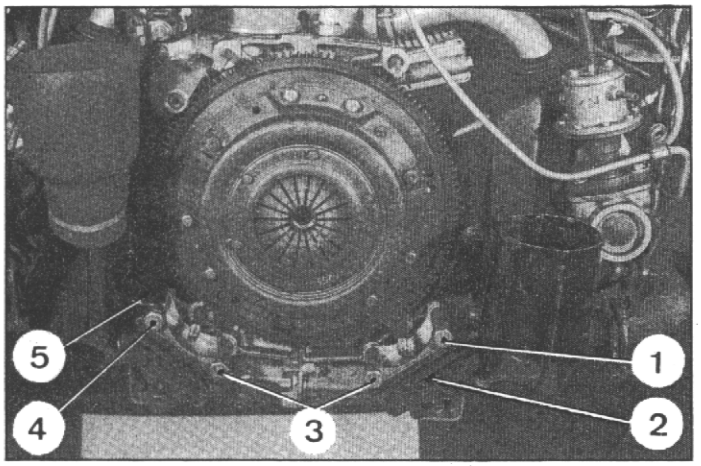
27. Fit the engine-flywheel (conventional clutch system) or the diaphragm (torque converter) :

IMPORTANT : Fit new fixing bolts (1) after each dismantling. It is essential that the heads of the bolts bear the mark « a » as shown in figure opposite.
The flywheel fixing bolts are fitted face and threads oiled.
The diaphragm fixing bolts are fitted with LOCTITE N° GX. 01 460 01 A.
Tighten them to 64 to 69 mAN (6.4 to 6.9 m.kg)
Use torque wrench and tool 3064-T.E to immobilize the flywheel.

28. Remove the engine from stand 2508-T.

29. Fit the clutch mechanism :

Fit the clutch disc and the mechanism.
Centre the disc with the aid of mandrel MR. 630-31/85.
Tighten the bolts (2) to 18.5 mAN (1.8 m.kg) (Shakeproof washer).



30. Fit the flexible mountings :

NOTE : The flexible mountings must be of the same manufacturer.

Fit the mountings (2).

Fit the fixing bolts (3) by placing :
- a flat washer under the heads of bolts (1) and (3),
- a flat washer and the plate (5) under the head of the bolt (4).

Tighten the bolts to 50 to 60 mAN (5 to 6 m.kg)

31. Fit the two centring bushes on the engine-gearbox coupling studs.

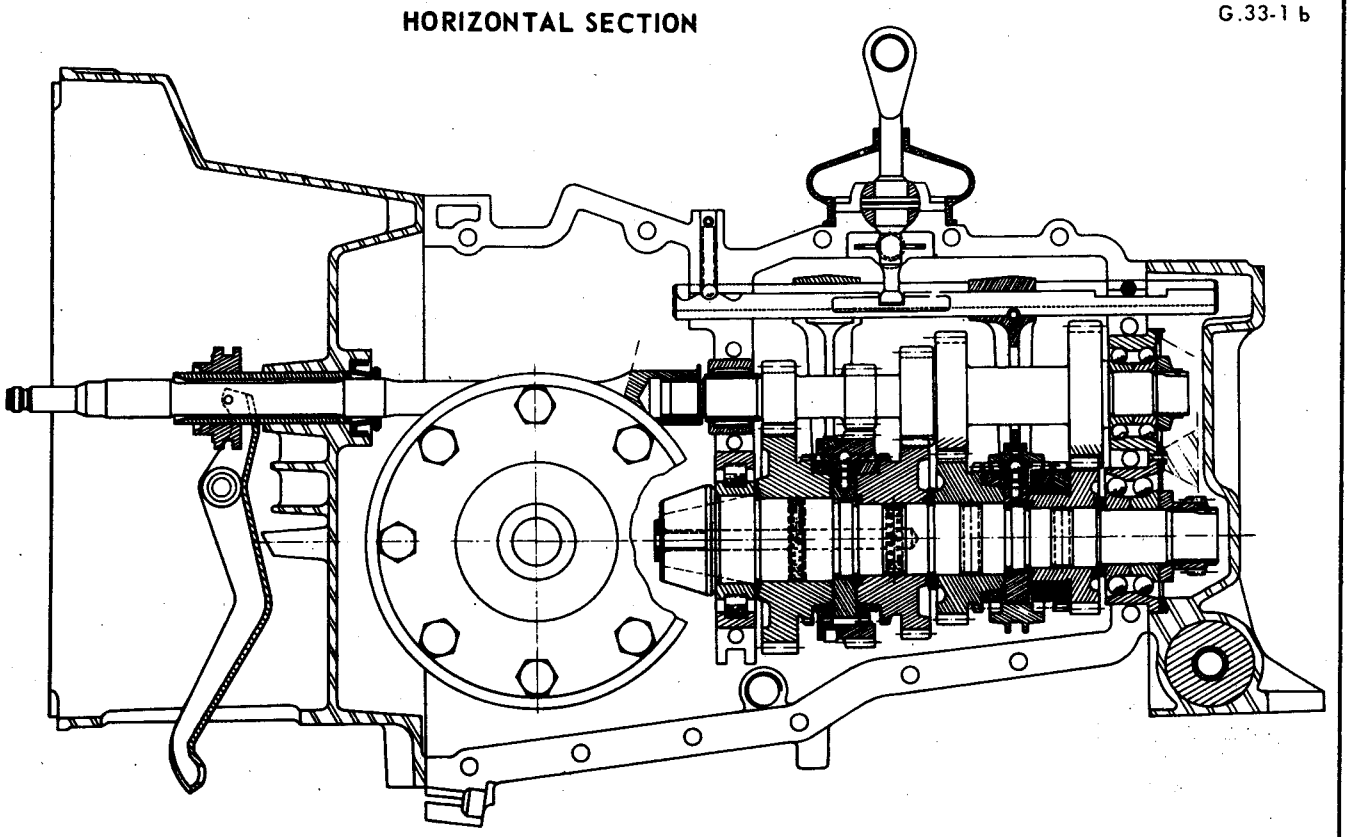
REMARKS :

After fitting the engine on the vehicle :

1°) Top up with oil.
2°) Adjust the strobe setting.
3°) Check the oil pressure.
4°) Adjust the idling speed.

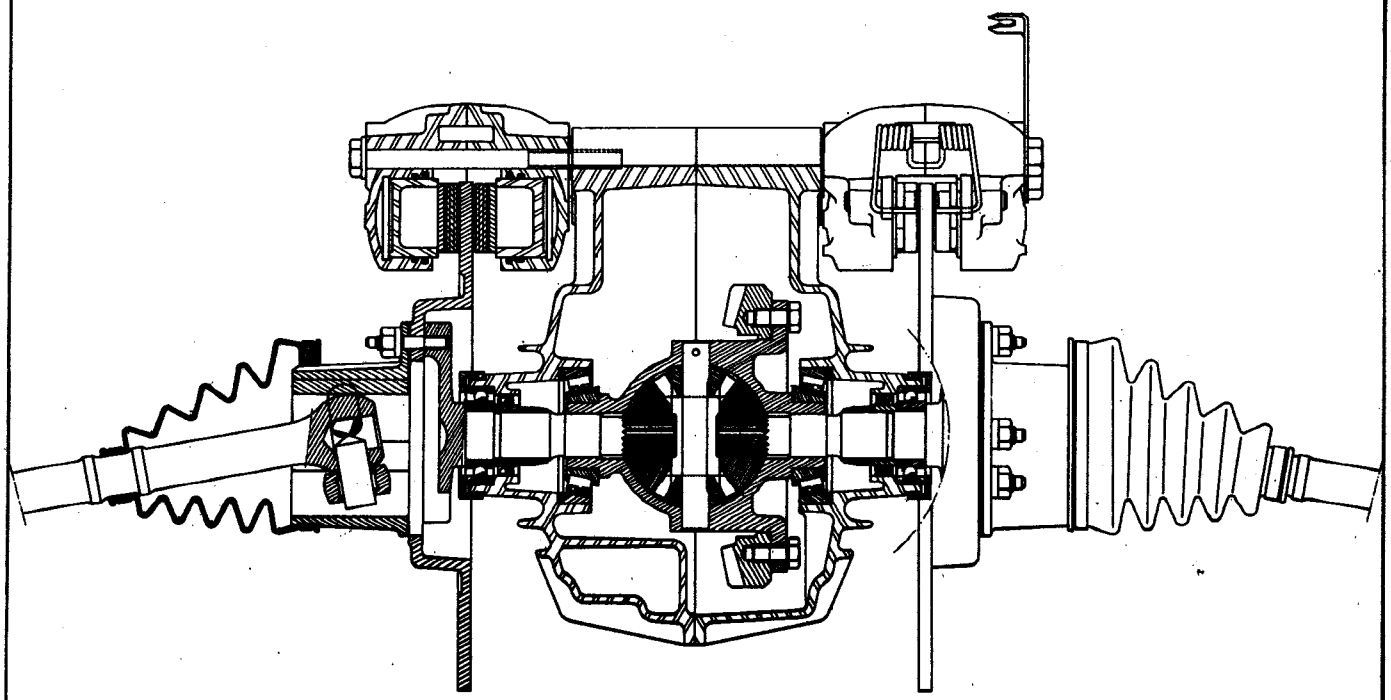
Vehicles equipped with a G. 10 Engine (1015 cc) (produced up to February 1973)

HORIZONTAL SECTION G.33-1 b



G.33-2 b

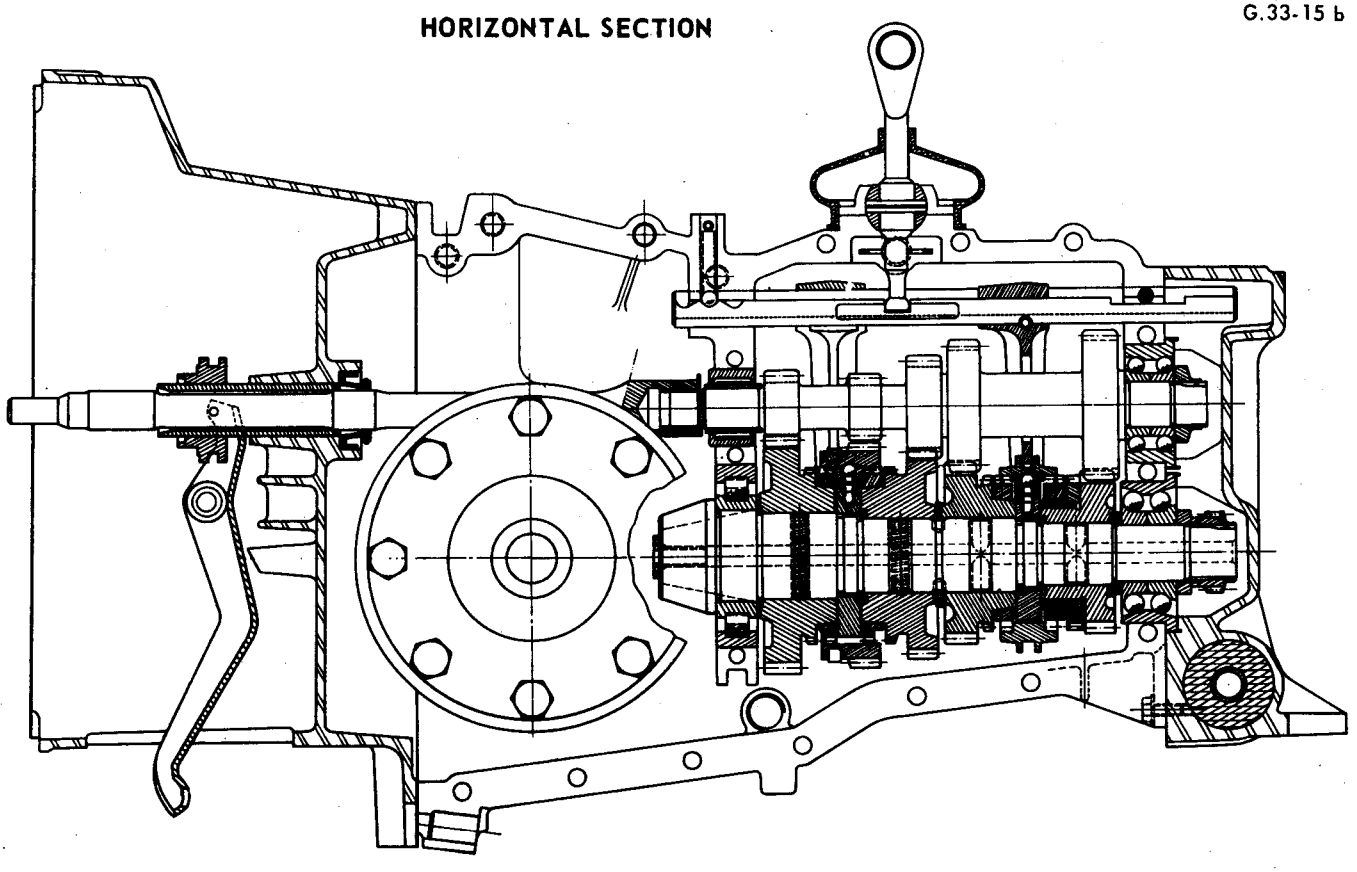
TRANSVERSE SECTION



Vehicles equipped with a G. 103 Engine (1220 cc)
Vehicles equipped with a G. 10 Engine (1015 cc) (produced since February 1973)

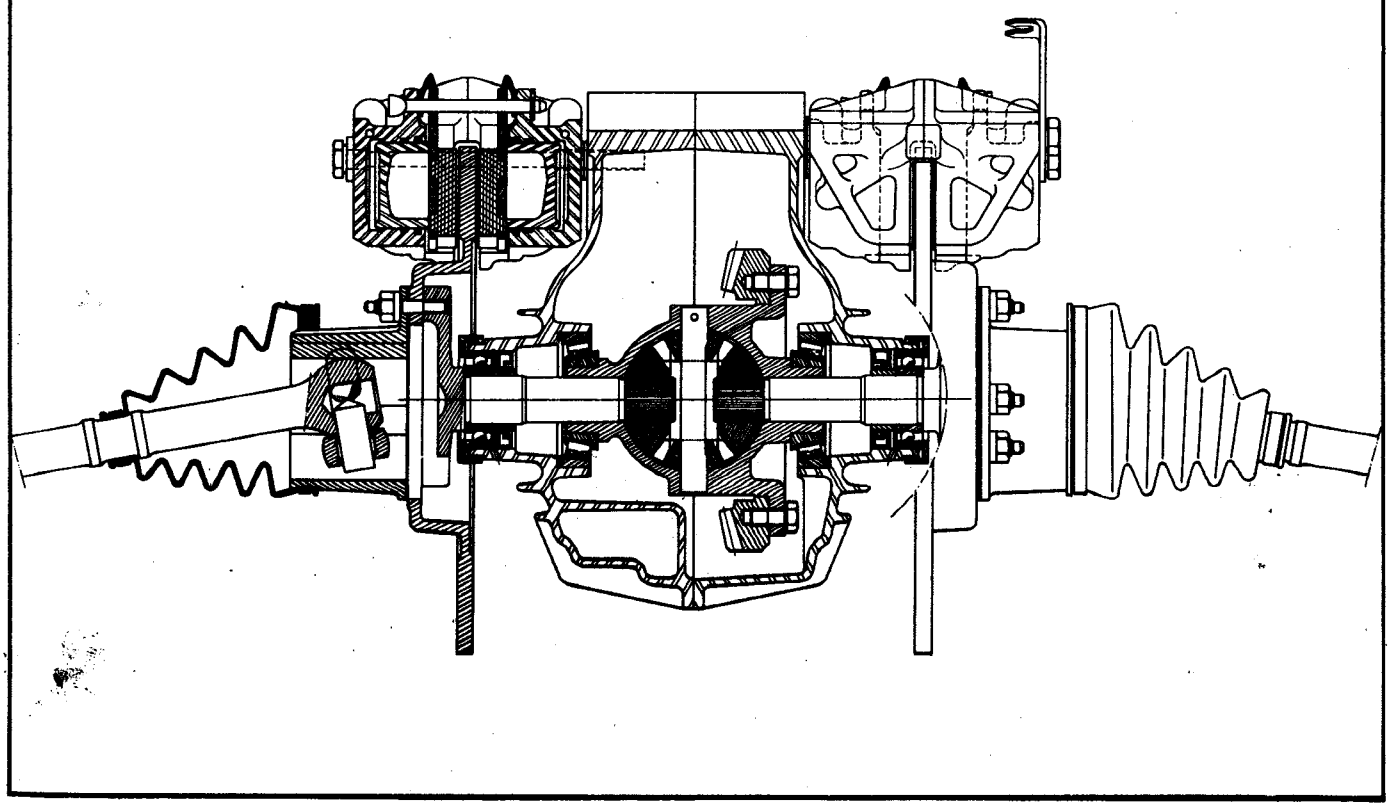
G.33-15 b

HORIZONTAL SECTION



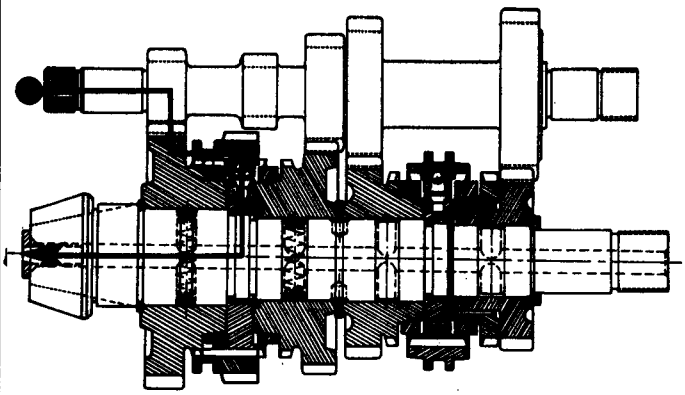
A.33-10

TRANSVERSE SECTION

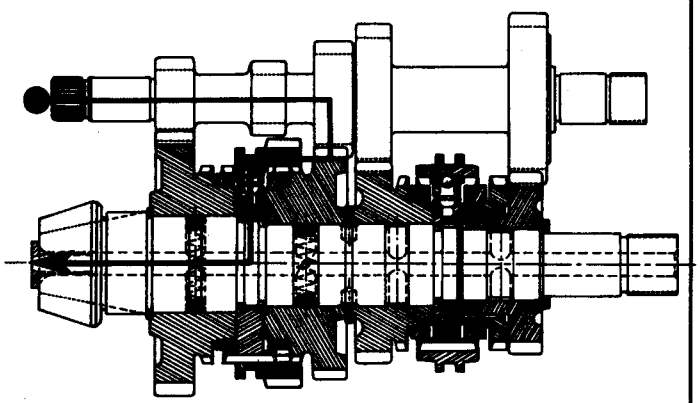


GEAR SEQUENCE

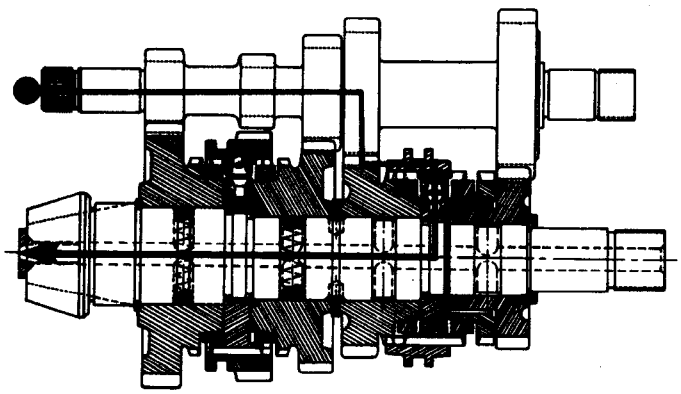
G. 33-4 c



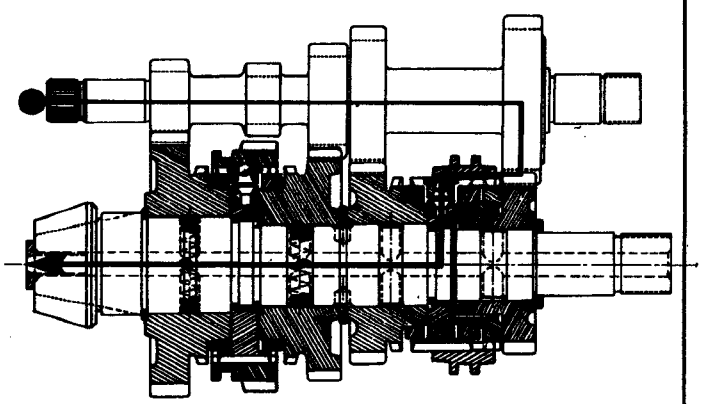
1st GEAR



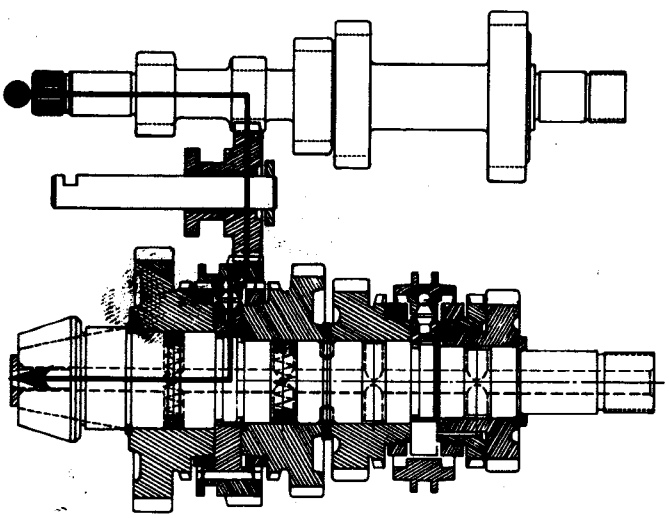
2nd GEAR



3rd GEAR



4th GEAR

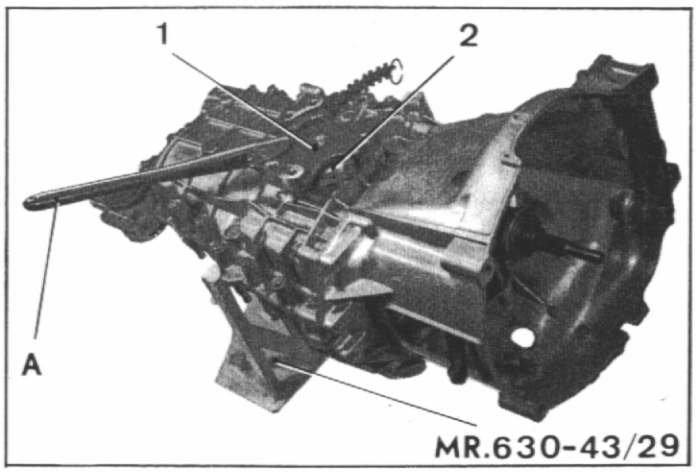


REVERSE GEAR

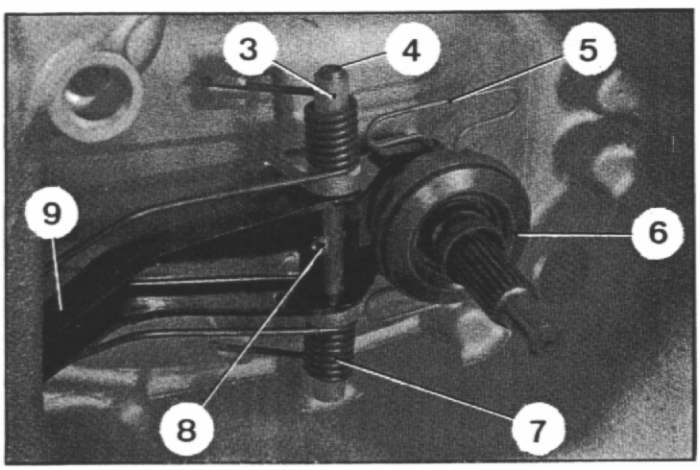
NOTE : The gears of the drive shaft are in constant mesh with the driven gears of the 1st, 2nd, 3rd and 4th gears.

OVERHAULING A FOUR-SPEED GEARBOX (MECHANICAL CLUTCH)

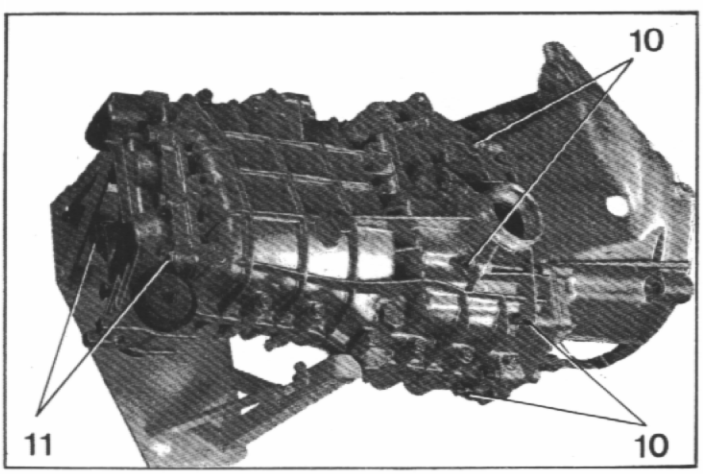
9168

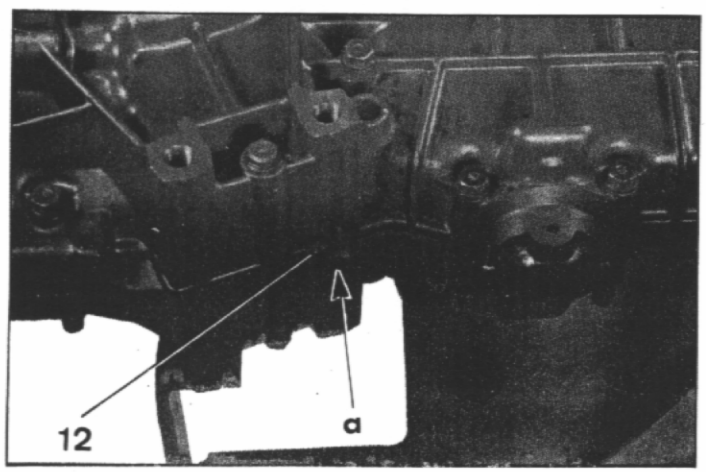


7229



Manual 810-2





I. DISMANTLING

1. Drain off the oil.
Place the gearbox on stand MR. 630-43/ 29 as shown in the photograph; the left-hand half engine-casing resting on the stand.

2. Remove the differential shafts from the gearbox :

On each side :

Loosen the ring-nut (2) with the aid of chain wrench A.
Release the differential shaft (1) from the gearbox equipped with the ring-nut (2) and the bearing (if necessary tap lightly with a mallet)

3. Remove the clutch thrust bearing and the control fork :

- Remove the spring clip (5).
- Remove the thrust bearing (6).
- Remove the stopscrew (8) of the fork pin.
- Remove the pin (4) by passing it through one of the vents of the clutch housing.
- Remove the spring (7), the anti-rattle bushes(3) and the fork (9).

4. Remove the rear gearbox cover :

Remove the fixing bolts (11) and release the cover.

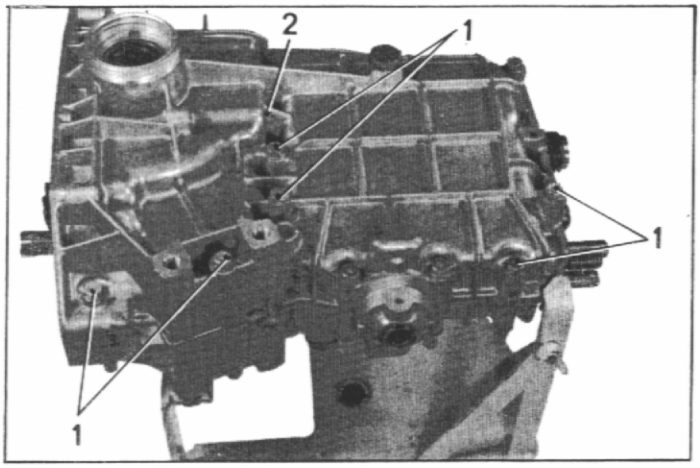
5. Remove the clutch casing :

Remove the fixing nuts (10) and release the housing.

6. Blank off the orifice « a » with a finger.

Remove the split pin (12).

Release the blanking pellet from orifice « a ».



9177

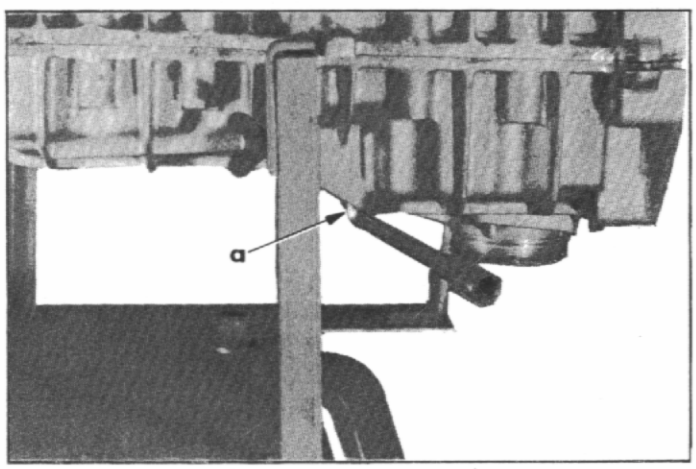
7. Remove the right-hand half casing of the gearbox :

Remove the fitting bolts and nuts (1) and (2).

As the case may be, the bolt (2) is located on the right-hand or left-hand casing in « a ».

Remove the right-hand half casing.

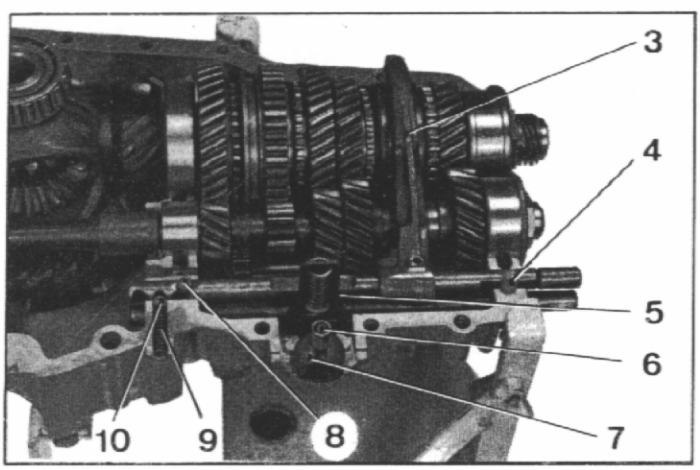
CAUTION : Care must be taken that the lock ball (8), the ball (and socket) guide (6) and the guide thrust spring do not fall down (recover these three parts).



7235

Remove :

- the plate (5) holding the return spring,
- the ball and socket (7),
- the plunger (4), the spring (9) and the lock ball (10).



9186

10. Remove the gear cluster assembly of the gearbox

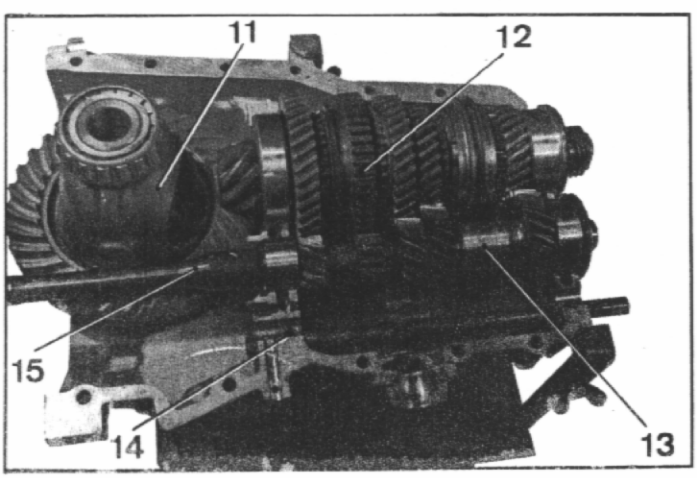
a) Remove :
- the shaft and fork (3) of the 3rd and 4th gear,
- the lock ball (14).

b) Remove the control shaft (15) and primary shaft (13) assembly,

c) Remove the bevel pinion assembly (12).

d) Remove the differential (11).

Remove the roller bearing outer races from the half casings. *Mark them with the corresponding bearings.*

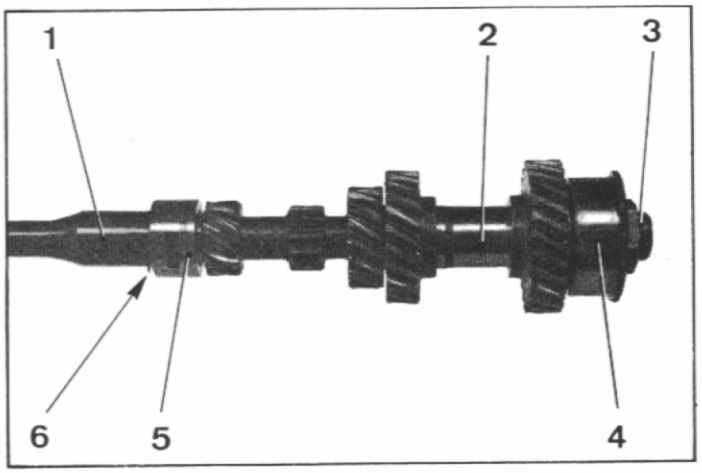


7573

IMPORTANT NOTE : If the gearbox overhaul does not entail changing :

- the gearbox casing,
- the crown wheel and pinion,
- the differential bearings,
- the differential casing.

mark the position of the adjusting shims to avoid having to re-set the backlash.



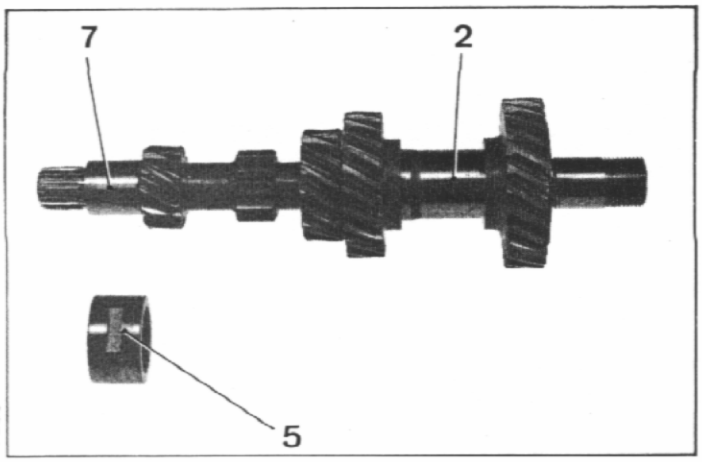
3. Strip down the control shaft/primary shaft assembly :

Remove the circlip (6) and uncouple the control shaft (1) from the primary shaft (2).

Remove :

- the needle bearing (5),
- the nut (3) (locked by peening)
- the bearing (4).

NOTE : The inner race (7) is not interchangeable.



4. Strip down the bevel pinion :

IMPORTANT : *The bearings of the wheels of 4th, 3rd and 1st gear on the bevel pinion have been subjected to a special surface treatment, and therefore any traces of scratches or blows on the bearings risk causing seizure of operating parts.*

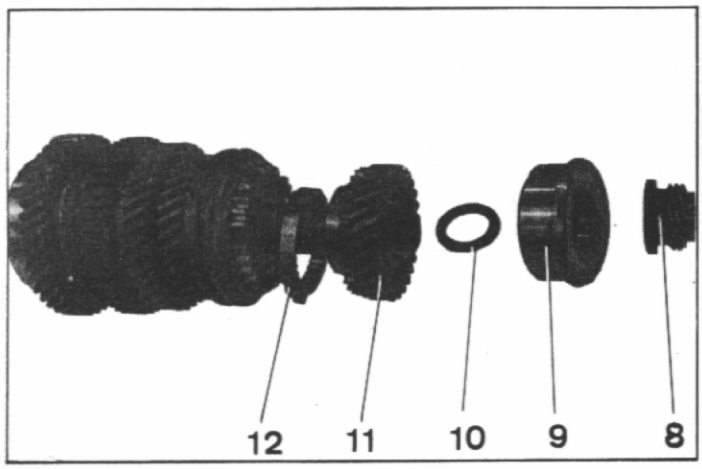
The necessary precautions should, therefore, be taken during the disassembly of the parts.

a) Remove :

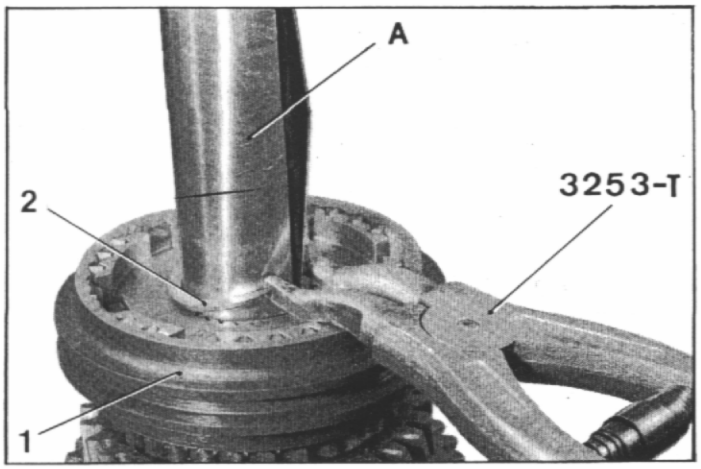
- the screw-nut (8) (locked by peening),
- the bearing (9),
- the adjusting shim (10) (conic distance),
- the idling pinion (11) of 4th gear,
- the synchro ring (12) of 4th gear.

NOTE : If the overhaul of the gearbox is to be performed without changing :
- the housing,
- the bevel gear,
- the bearing (9),

retain the adjusting shim (10) to avoid having to re-set the conic distance.

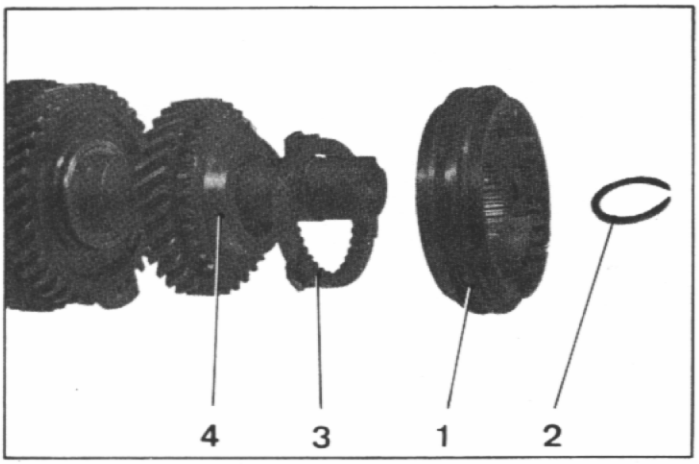


7870



b) Remove the stop ring (2) from the synchronizing hub (1) of 3rd and 4th gear. To do so :
- wrap the end of the bevel pinion with a sheet of foil A (0.10 mm thickness). Hold it against the ring (2). Slightly separate the ends of the ring with the aid of plier 3253-T. Slip the foil under the ring (2).
Remove the ring, sliding on the foil.

7293



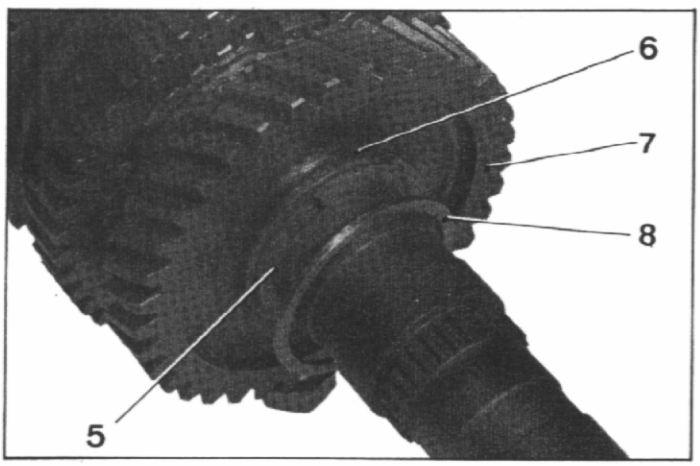
- Remove :
  - the synchronizing hub-sliding gear assembly (1) of 3rd and 4th gear,
  - the 3rd gear synchro ring,
  - the 3rd gear idling pinion (4).

NOTE : The 3rd and 4th gear synchro rings are identical.

However, if these parts are not renewed, they must be left matched with the corresponding pinions.

Manual 810-2

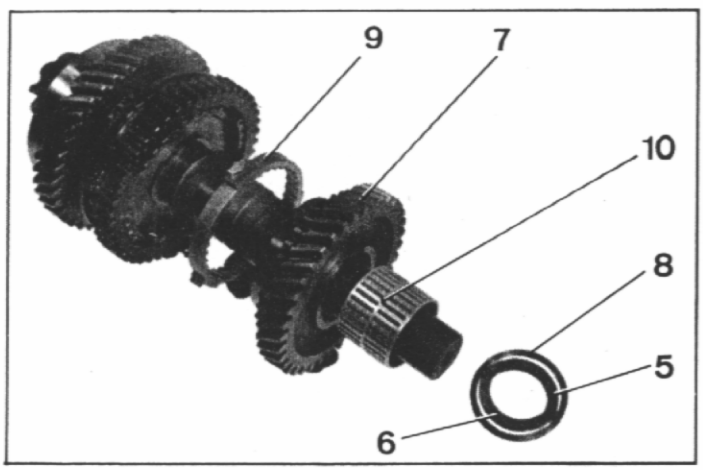
7305



c) Remove the 2nd gear idling pinion :

Release the washer (8) and remove the two half-washers (5) and (6).

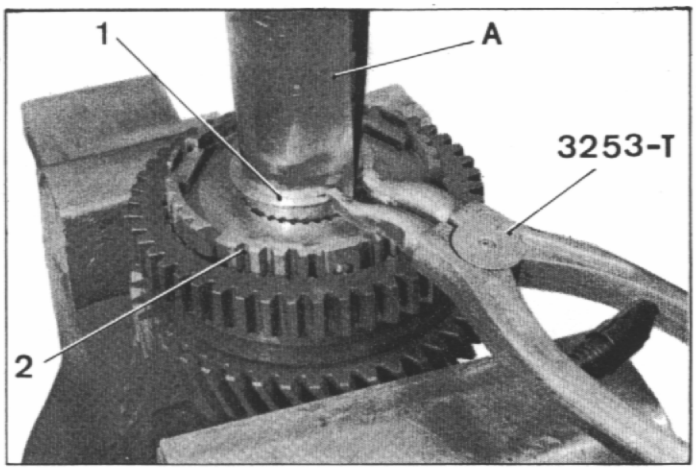
7569



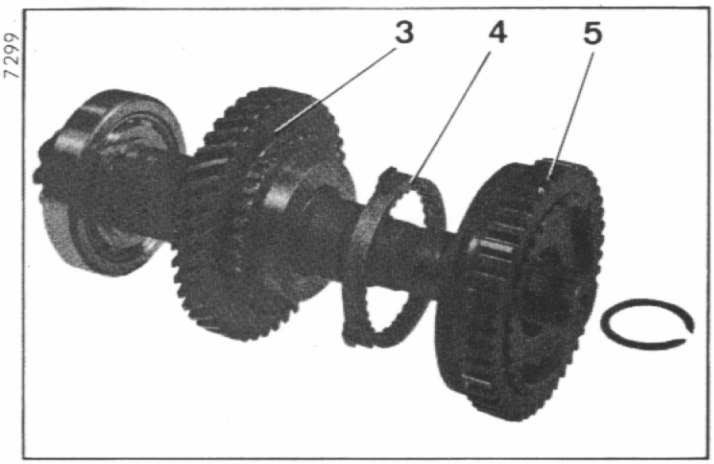
Remove :

- the 2nd gear pinion (7),
- the needle cage (10), or the dowel and their spring,
- the 2nd gear synchro ring (9).

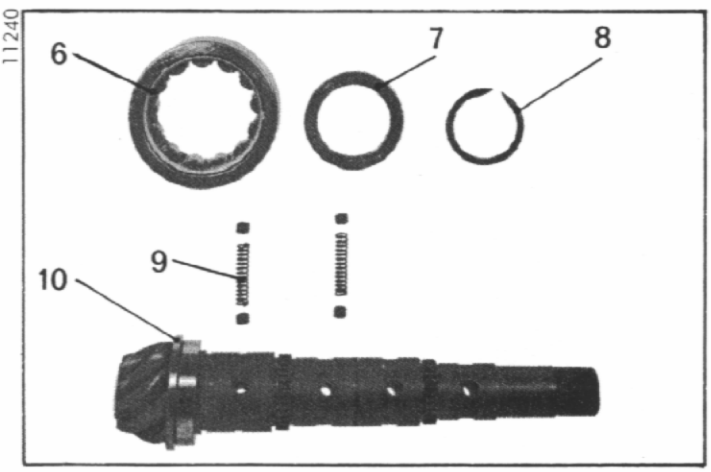
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d) Remove the stop ring (1) of the 1st and 2nd gear synchro gub (2). To do so :
Wrap the body of the drive pinion with a sheet of foil (0.10 mm thickness).
Hold it against the ring (1).
Slightly separate the ends of the ring with the aid of plier 3253-T. Slip the foil under the ring (1). Slide the ring and the foil along the body of the pinion.
Remove :
- the 1st and 2nd gear synchronizing hub-sliding gear assembly (5),
- the 1st gear synchro ring (4),
- the 1st gear idling pinion (3),
- the dowel pins and their springs (9)*(if fitted)*.

NOTE : The 1st and 2nd gear synchro rings are identical.
However, if these parts are not renewed, they must be left matched with the corresponding pinions.

e) If necessary, remove the front bearing of the bevel pinion. To do so :

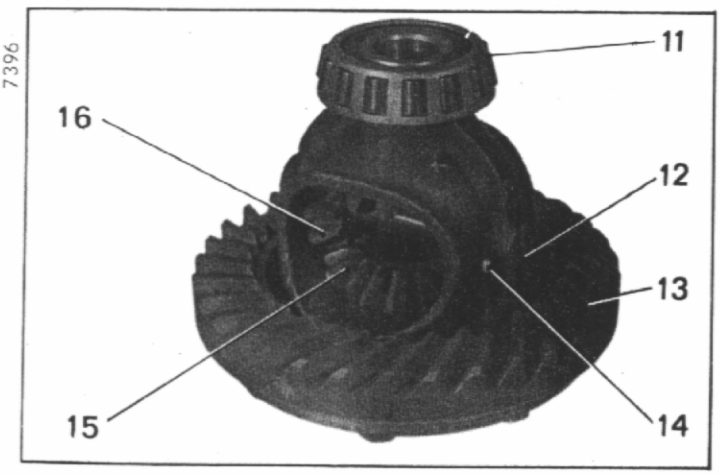
Remove :
- the stop ring (8),
- the thrust washer (7),
- the bearing (6).

Remove the inner ring (10) of the bearing press and tube (inside diameter = 50 mm, length = 60 mm).

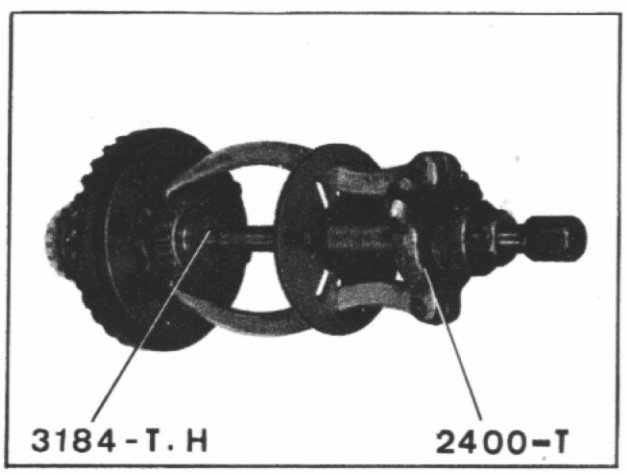
5. Disassemble the differential :

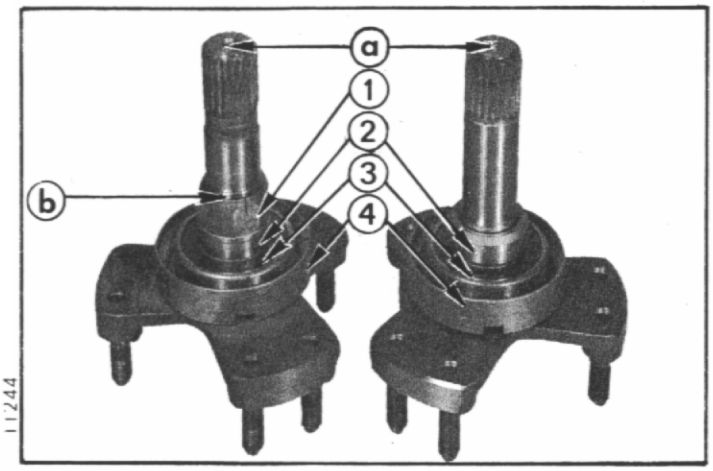
- Remove the pin (14) and clear the spindle (12).
- Release the satellite gears (16) and then the planetary gears (15).
- Remove the differential ring (13).
- Remove the tapered bearings (11) (Use the all-purpose extractor 2400-T and pad 3184-T.H).

7396

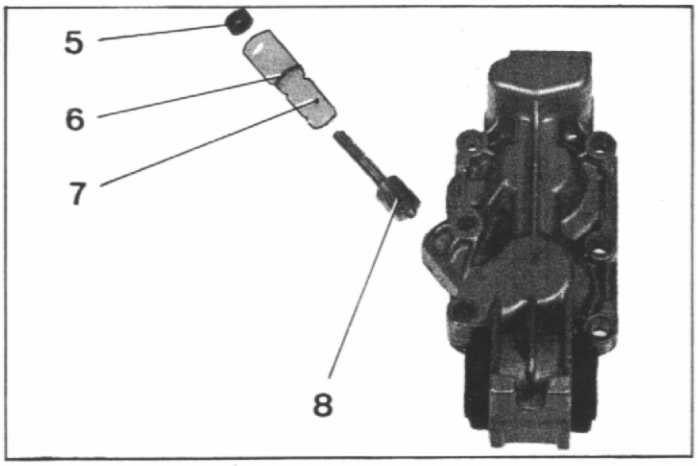


9463

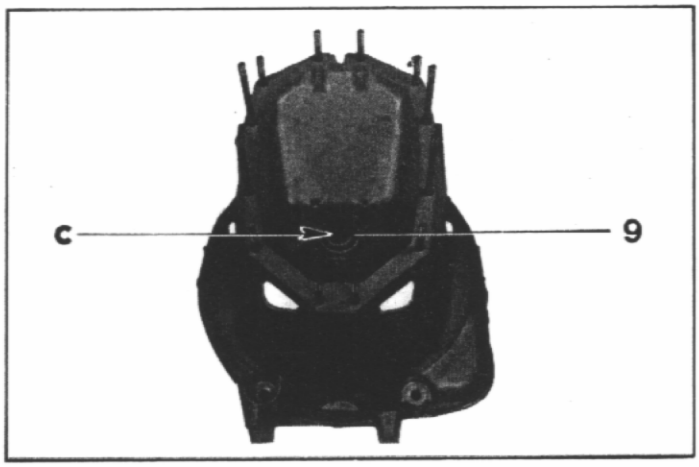




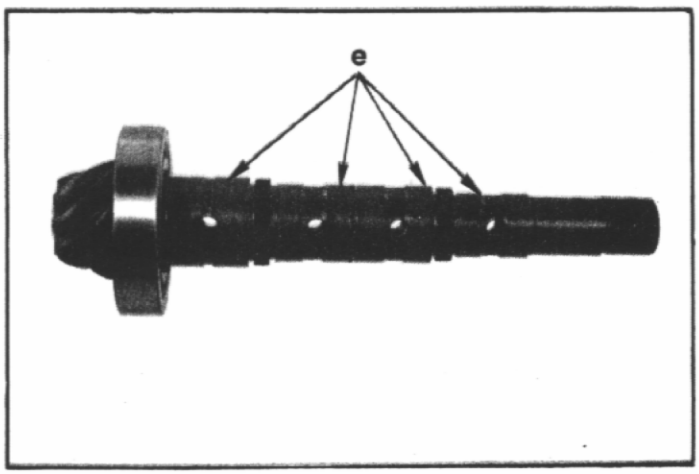
11244



9239



9188



11241

Manual 810-2

6. Strip down the differential shafts :

- Grease the visible portion « b » of the thread and remove the nut (1) (if fitted).
- Remove the bush (2).
- Remove the bearing (3) : use a universal extractor resting on the ring-nut (4) as close as possible to the shaft.

NOTE : The extractor used should have a central screw fitted with a ball to avoid damaging end « a » of the shaft.

7. Strip down the rear cover :

Release the speedometer socket (7) from the cover.
Uncouple the speedometer drive gear (8).
Remove joints (5) and (6).

8. Strip down the clutch housing :

Remove the studs (stud remover 2410-T).
Remove the seal (9) of the control shaft : insert the tip of a screwdriver under the metallic flange « c » of the joint and lever to free the joint from its housing.

9. Clean the parts :

IMPORTANT : The bearing surfaces « e » of the different gears on the bevel pinion should be free from defects.

CAUTION : Any grinding of these surfaces is strictly prohibited especially on the bearing surfaces of the 1st, 3rd and 4th gear wheels which have undergone special surface treatment.

III . PREPARATION OF THE ASSEMBLIES

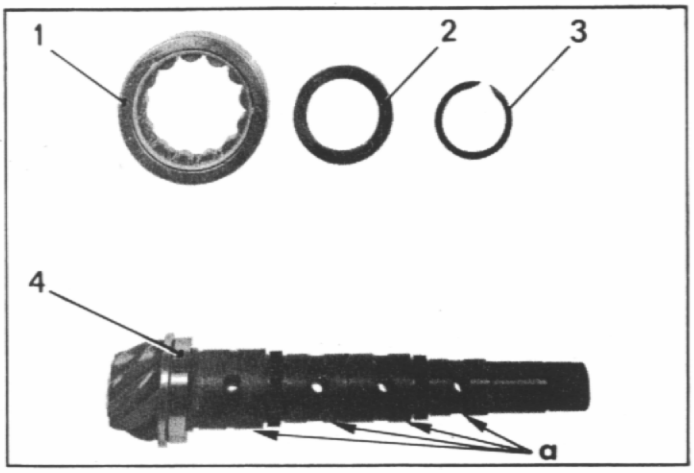
1. Prepare the differential shafts :

Fit on each shaft :

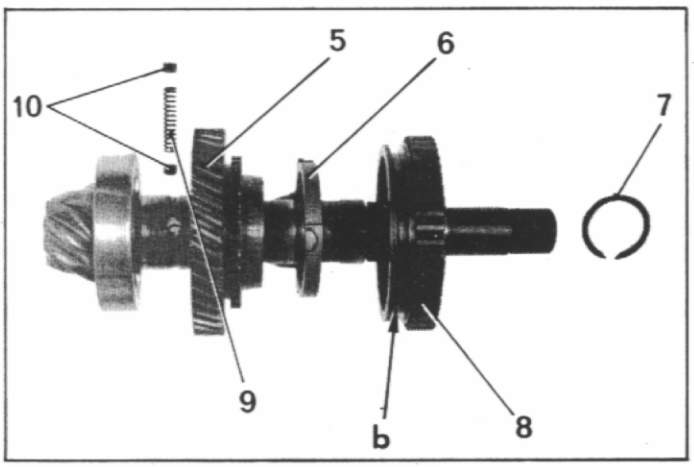
- the bush -nut (4),
- the sealed bearing (3) (fit the bearing on a press using a tube having an inside diameter of 26 mm, an outside diameter of 34 mm and a length of 120 mm),
- the bush (2).

IMPORTANT : The bush (2) (against which the seal bears) must not show any trace of scratches or damage. If it does, renew it.

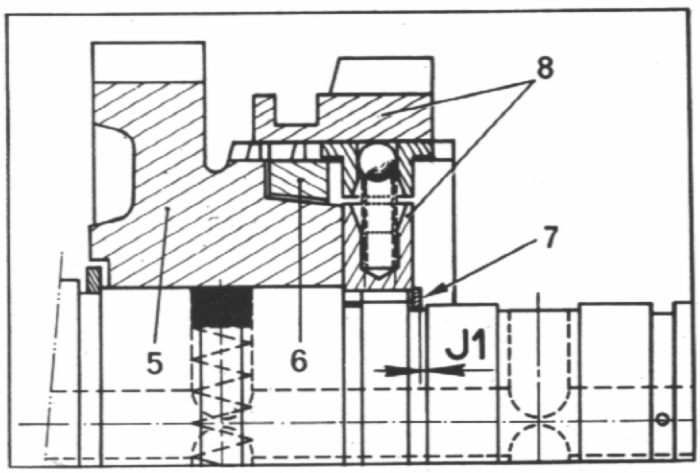
Fit and tighten the nut (1) to 140 to 160 mΛN (14 to 16 m.kg) (if necessary).



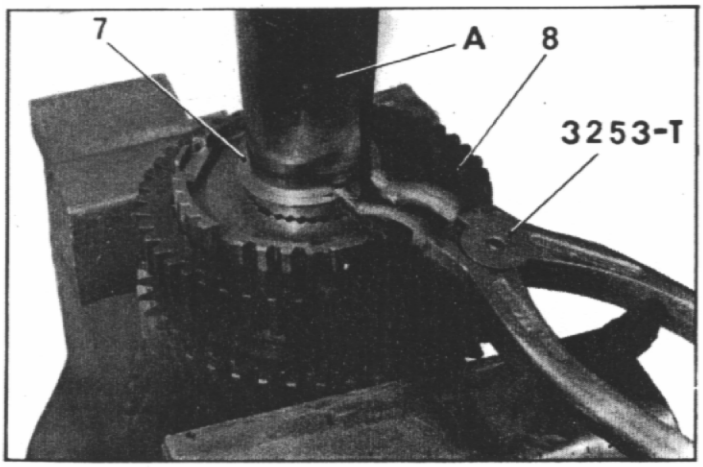
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G. 33-19



7871

2. Prepare the bevel pinion assembly :

IMPORTANT : *The bearing surfaces « a » of the wheels of the 1st, 2nd, 3rd and 4th gears on the shaft having been given a special surface treatment, all traces of scratches or damage risk causing seizure of operating parts.*
The necessary precautions should, therefore, be taken during disassembly of these parts.
Oil all parts before fitting.

a) Fit the roller bearing :
- Press fit the inner cage (4) with the aid of a tube (inside diameter = 45 mm, length = 220 mm).
- Fit the roller bearing (1) with the smallest bore of the roller cage on the gear tooth side of the pinion.
- Fit the thrust washer (2), *the face not showing any inscription on the roller side.*
- Fit the stop ring (3) with the aid of pliers 3253-T.

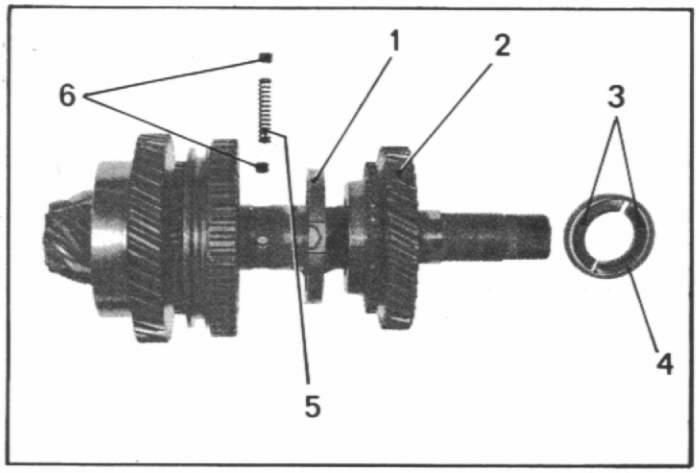
CAUTION : To avoid scoring the bearing surface of the 1st gear pinion, use a sheet of foil as indicated in paragraph d).

b) Fit :
- the retarding dowels (10) and their spring (9) *(if there are any),*
- the 1st gear pinion (5),
- the 1st gear synchro ring (6),
- the synchro hub-sliding gear assembly (8) of the 1st gear, *the groove « b » towards the 1st gear pinion.*

NOTE : *Since March 1, 1971,* the synchro rings and pinions of 1st and 2nd gears have been modified.
On the gearboxes produced prior to that date, the exchange of a ring entails the exchange of the corresponding pinion.

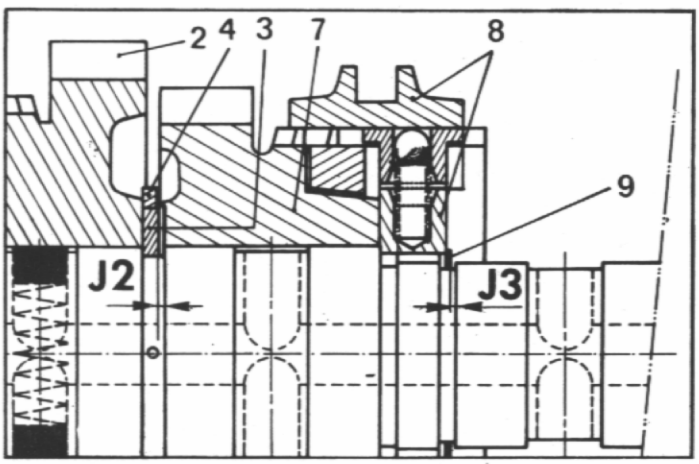
c) *Adjust the axial clearance of the synchro hub of 1st and 2nd gear :*
From the stop rings sold by the Spare Parts Department select the one which will give a maximum clearance **J1 = 0.05 mm** (a shim of 0.05 mm must not pass between the ring (7) and the side of the groove).
The ring thicknesses vary in steps of 0.04 mm.

d) Fit the stop ring (7) :
Wrap the body of the bevel pinion with a sheet of foil A (thickness = 0.10 mm).
With the aid of pliers 3253-T, slightly separate the ring ends (7). Engage it on the foil. Slide the foil and ring assembly until the ring can insert itself in its groove.



e) Fit :
- the 2nd gear synchro ring (1),
- the retarding dowels (6) and their spring (5),
- or the needle cage *(if there is one)*,
- the 2nd gear pinion (2).

NOTE : *Since March 1, 1971,* the synchro rings and pinion of the 1st and 2nd gears have been modified.
On gearboxes produced prior to that date, the exchange of a ring entails the exchange of the corresponding pinion.

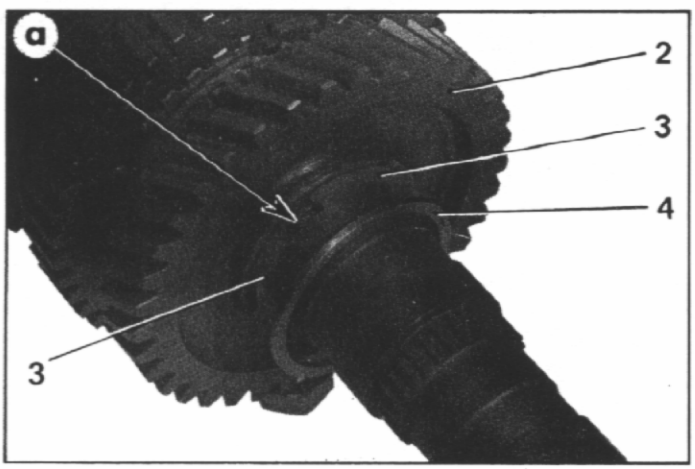


f) *Adjust the clearance of the thrust bearings of the 2nd and 3rd gear wheels by choosing the thickness of the adjusting half-washers (3).*

With the half-washers in place, there should be a maximum clearance **J2 = 0.05 mm** between the half-washer and the side of the groove (a shim of 0.05 mm should not pass).
The thickness of the half-washers is graduated in steps of 0.03 mm. Choose the thickest half-washer able to be fitted in the groove.

NOTE : The two half-washers must have the same thickness.

Fit the two half-washers (3) on both sides of the stop lug « a ».
Fit the washer (4).

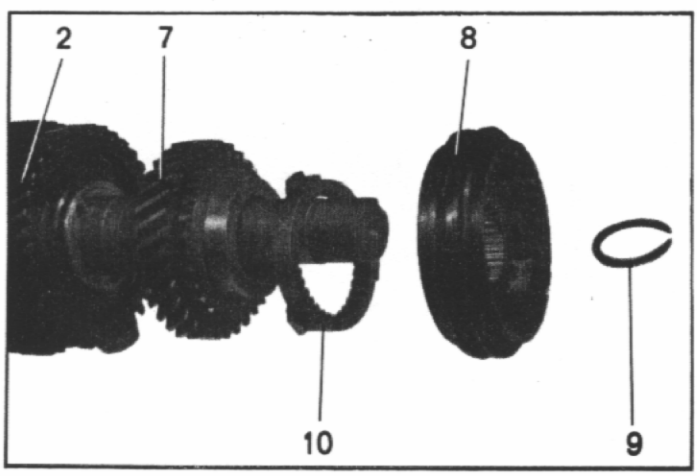


g) Fit :
- the 3rd gear pinion (7),
- the 3rd gear synchro ring (10),
- the 3rd and 4th gear synchro hub-sliding gear assembly (8).

NOTE : The assembly (8) is symmetrical.

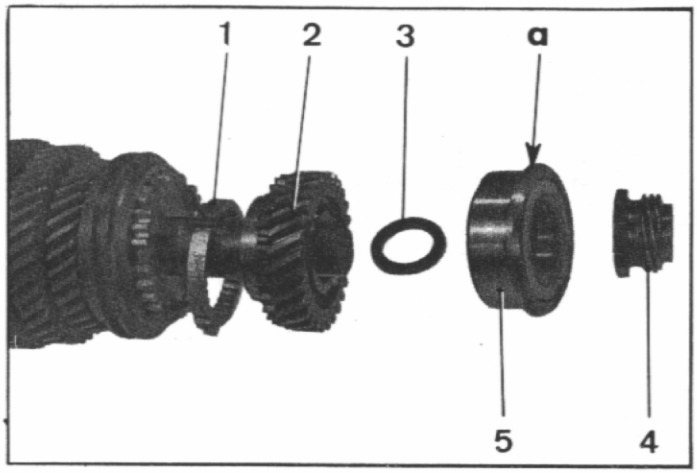
h) *Adjust the end clearance of the synchro hub of the 3rd and 4th gears :*
This clearance J3 must be a maximum of 0.05 mm.

Proceed in the same way as for the synchro hub of the 1st and 2nd gears.
(See paragraph c)).



i) **Fit the stop ring (9).**

Proceed in the same way as for the synchro hub of the 1st and 2nd gears.
(See paragraph d)).



7292

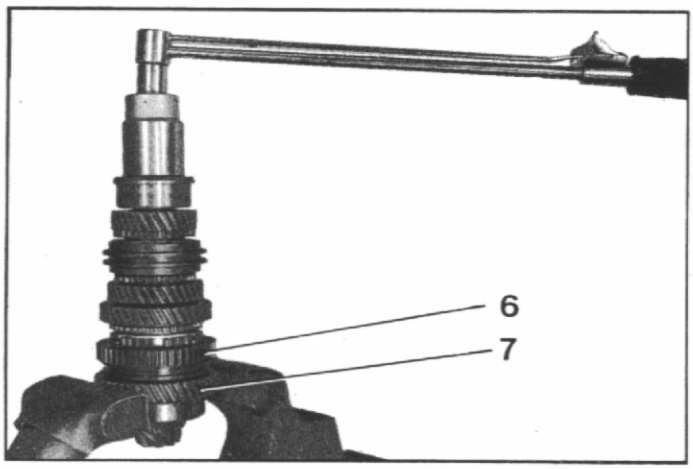
j) Fit :
- the 4th gear synchro ring (1) and pinion (2),
- an adjusting washer (3) of known thickness,
- the bearing (5), *the shoulder « a » pointed towards the rear of the bevel pinion,*
- the nut (4).

Tighten the nut (4) to 100 to 120 mΛN (10 to 12 m.kg) (torque wrench) *without knocking over the metal.*

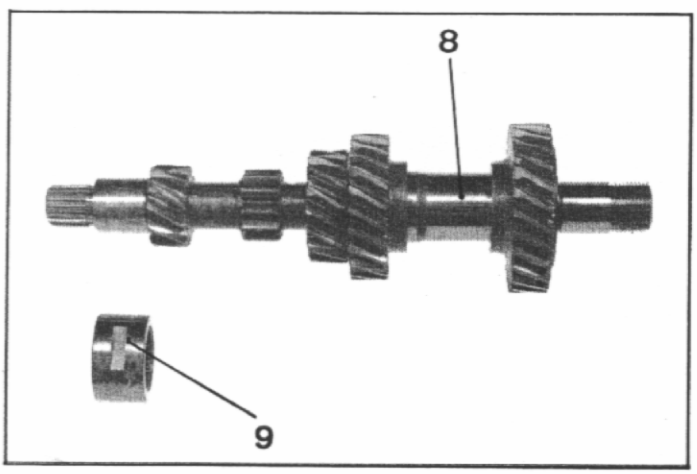
NOTE : To hold the bevel pinion still during this operation, clamp the first gear pinion (7) (interlocked with the bevel pinion by the slider (6) of the 1st and 2nd gears) in a vice fitted with soft jaws.

CAUTION : Never clamp the slider (6) of the 1st and 2nd gears in a vice.

IMPORTANT : For the conic distance adjustment operation of the pinion, it is imperative to fit an adjusting washer (3) and tighten the nut (4) with the torque wrench.



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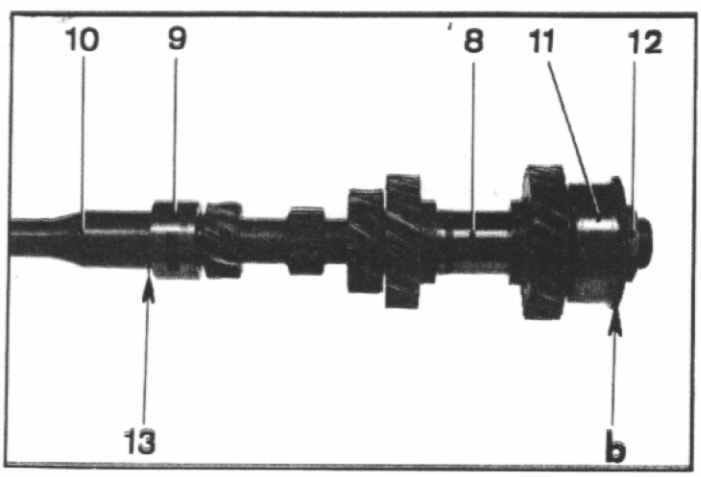
3. Prepare the control shaft primary shaft assembly :

a) Fit the ball bearing (11), *with the shoulder « b » pointed towards the rear.*

Hold the primary shaft by one of its pinions clamped in a vice fitted with jaws.

Tighten the nut (12) to 70 to 85 mΛN (7 to 8.5 m.kg) (torque wrench).

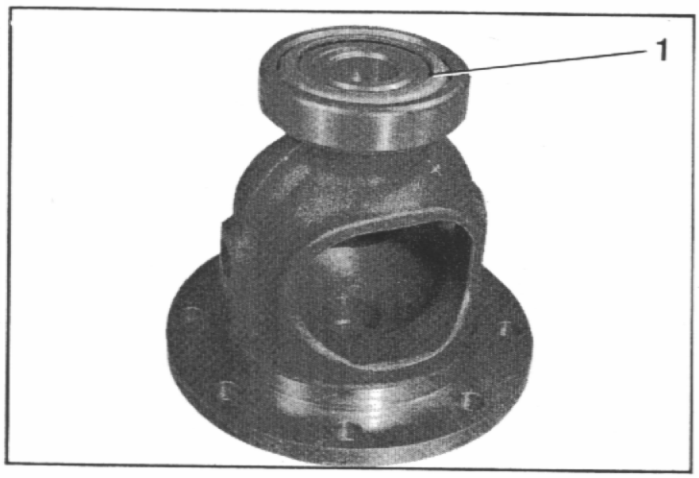
Lock the nut by bending back the metal in the groove of the shaft.

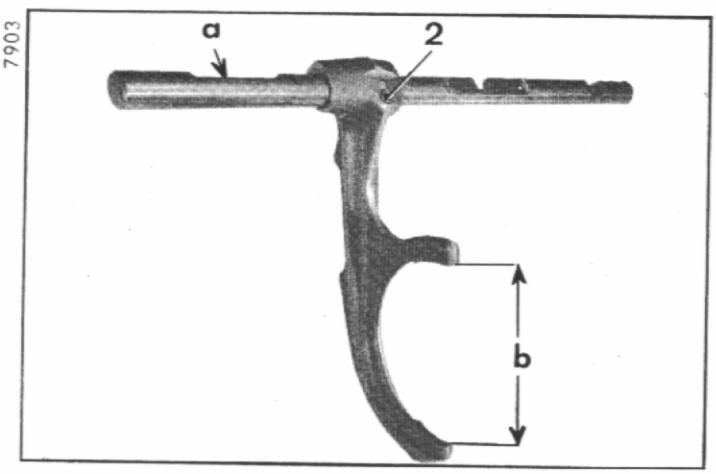


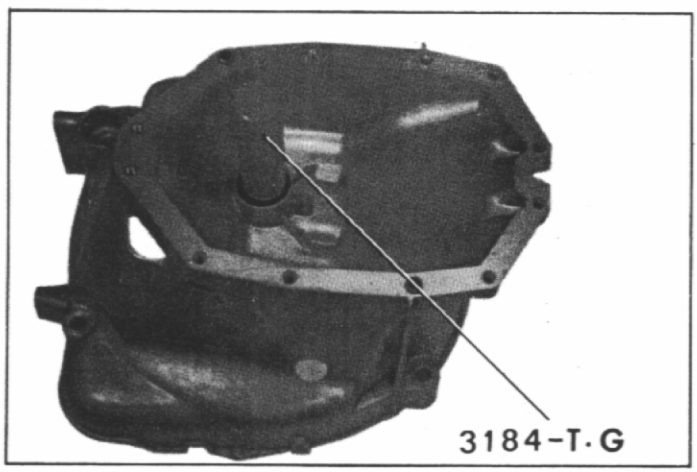
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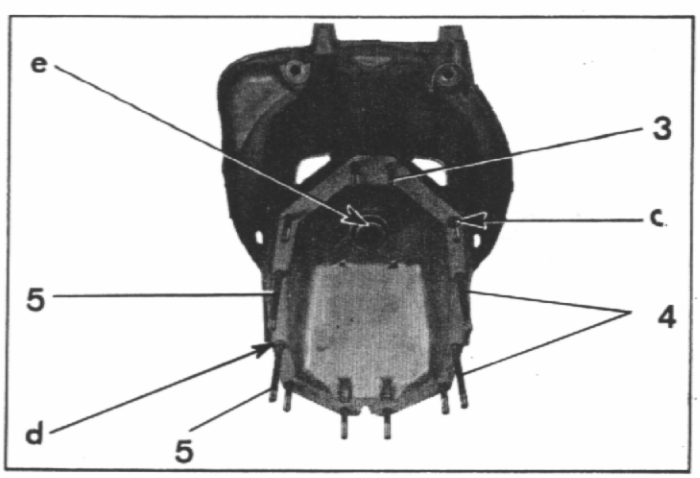
b) Fit the needle bearing (9).

c) Couple up the control shaft (10) to the primary shaft (8) by slightly separating the ends of the locking ring (13).









Manual 810-2

4. Prepare the differential casing :

Press fit the conical roller bearings (1) with the aid of a tube (inside diameter = 36 mm, outside diameter = 45 mm, length = 40 mm).

NOTE :
- Do not reverse the outer cages of the bearings,
- The differential casing should be completely fitted only after the adjustment on the bevel gear.

5. Prepare the 3rd and 4th gear fork :

NOTE :

- The opening « b » of the 3rd and 4th gear fork is smaller than that of the 1st and 2nd gear fork.
- The operating pin of the 3rd and 4th gears is recognizable by the flat part in « a » (interlock plunger passage).

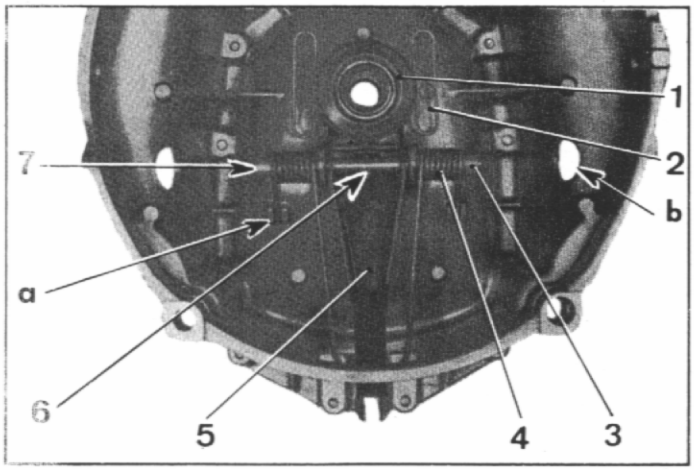
Couple up the fork to the pin (see illustration for positioning).
Fit the Mecanindus locking pin (2).
Lightly oil the spindle and grease the locking notches.

6. Prepare the clutch housing :

a) Fit the seal on the control shaft :
Smear the housing bore and the periphery of the seal with grease.
Fit the seal (metallic flange « e » visible on the studs side) with the aid of mandrel 3184-T.G and a mallet.

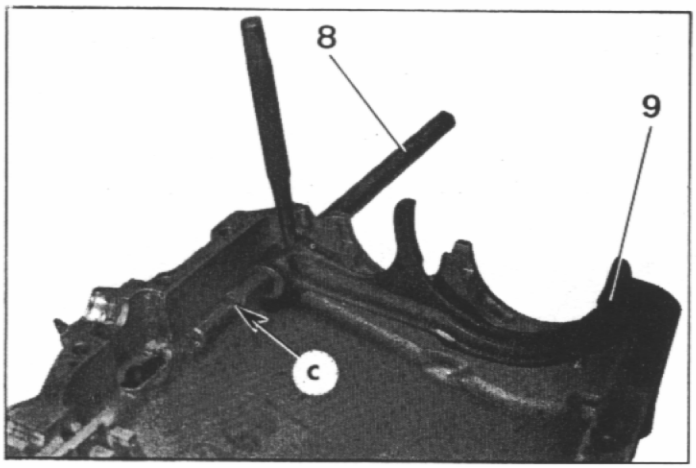
b) Fit the assembly studs (use tool 2410-T).
NOTE : The shortest threaded portion of the studs fits into the clutch housing.
The studs are of three different lengths,
Fit them in the following manner :
- in (4) and (5) : the four longest studs.
- in (3) : the average length stud,
- in the other locations : distribute the shortest studs.

NOTE : Make sure that there are two centring bushes present in « c » and « d ».



9242

c) Fit the clutch release fork and the thrust bearing :
Fit the two anti-noise bushes (3) in the coils of the springs (4), the shoulders placed face to face.
Lightly oil the pin (7).
Hold the fork (5) and its spring (4) in place.
Engage the pin (7) through one of the orifices « b » of the housing and then in the spring of the fork and its bearings.
Position the pin and tighten the bolt (6) (shake-proof washer).
Fit the two free ends of the spring (4) resting on the bosses « a » of the housing.
Fit the bearing (1) (support previously oiled).
Fit the spring clip (2) locking the bearing on the fork.



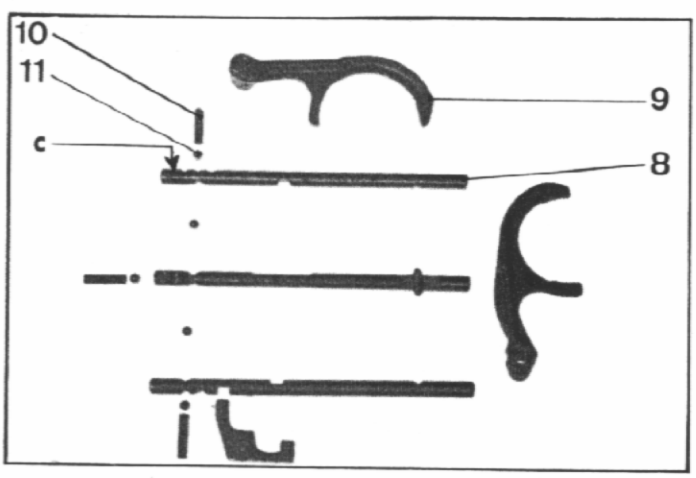
7869

7. Prepare the right-hand half housing :

- Lightly oil the spindle (8) and grease the locking notches.
- Engage the operating spindle (8) of the fork (9) of the 1st and 3nd gears in the rear bearing *(notches « c » towards the differential).*
- Engage the fork (9) on the spindle (8).
- Fit the Mecanindus locking pin of the fork (9) (5 mm diameter pin-punch).

NOTE : When fitting the locking pin, place the spindle and fork assembly against the rear shaft bearing to avoid damage.

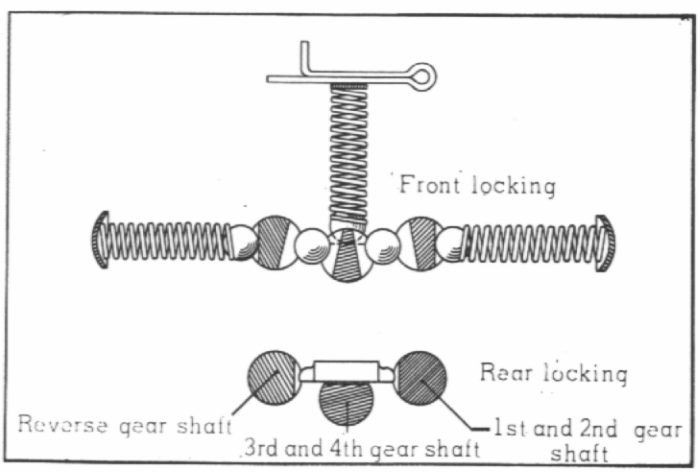
- Fit the locking spring (10) and ball (11) into their housing (greased beforehand).



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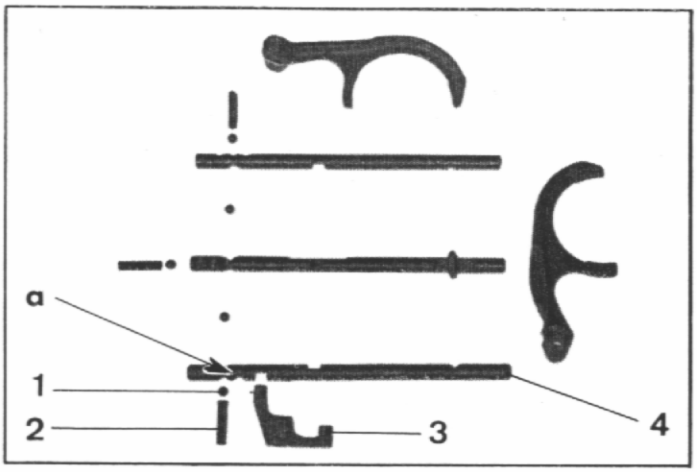
NOTE : The five balls and three springs of the locking device are identical.

- Compress the ball and the spring (5 mm diameter rod) and engage the spindle (8) in the front bearing.



G. 33-11

8. Prepare the left-hand half housing :



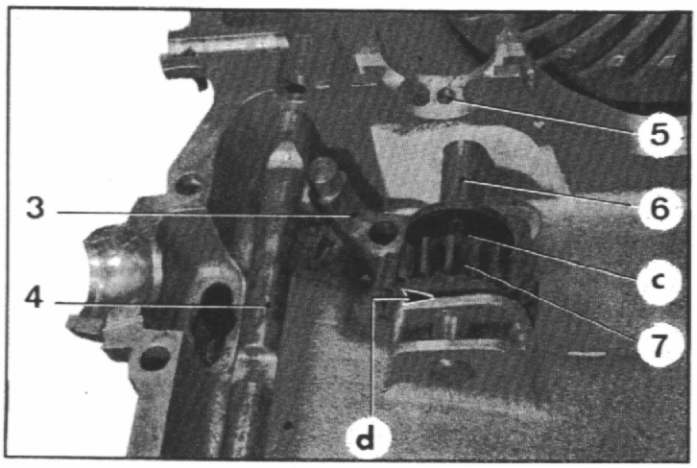
a) Fit the reverse idler pinion :
Oil the spindle (6), engage it in the rear boss : fit the stop notch towards the differential, perceptibly vertical.

NOTE : *On vehicles produced since April 1971* a spacer is inserted in « d » between the pinion (7) and the rear boss.

Offer up the pinion (7), *with the groove « c » towards the differential.*

Complete fitting the spindle (6) and engage the cylindrical pin (5) fully in its housing.

NOTE : The pin (5) which locks the needle bearing of the primary shaft must lightly protude beyond the thrust face of this bearing.

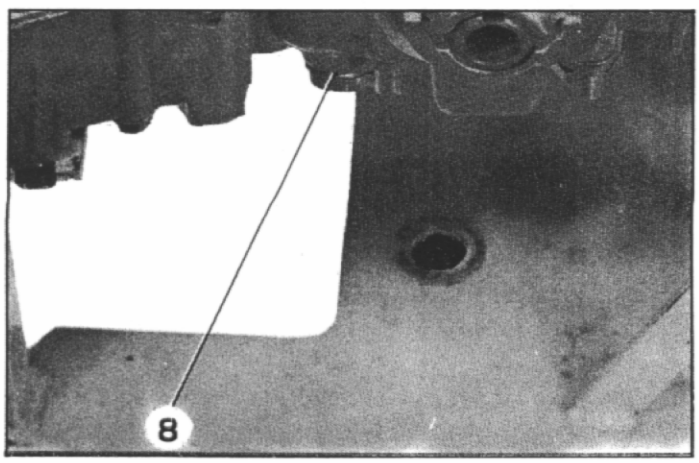


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Manual 810-2

b) Fit the spindle operating the reverse gear lever :

- Oil the operating spindle (4) and grease the locking notches.
- Fit the spring (2) and the ball (1) of the locking device (greased beforehand) into housing « b » (See Note paragraph 7).
- Engage the spindle (4) (*locking notches « a » towards the differential*) in the rear bearing.
- Compress the locking ball and spring (5 mm diameter rod) and engage the spindle (4) in the front bearing.



9167

c) Engage the reverse gear lever (3) under the spindle (6) and fit it in the groove of the pinion (7) and the groove of the spindle (4).

Fit and tighten the spindle (8) of the lever (3) (greased beforehand) to 27 to 33 m.N (2.7 to 3.3 m.kg).

9. Fit the seal on the differential shafts :

On each half housing : grease the bore of the housing and the periphery of the seal.
Offer up the seal in its bore, *the lip towards the inside of the box.*

a) *Gearbox without bearing circlip :*

Fit the seal with the aid of mandrel 3184-T.E (contained in the toolbox).

NOTE : After fitting, the seal is recessed by 3 ± 0.5 mm in relation to the thrust face of the differential shaft bearing.

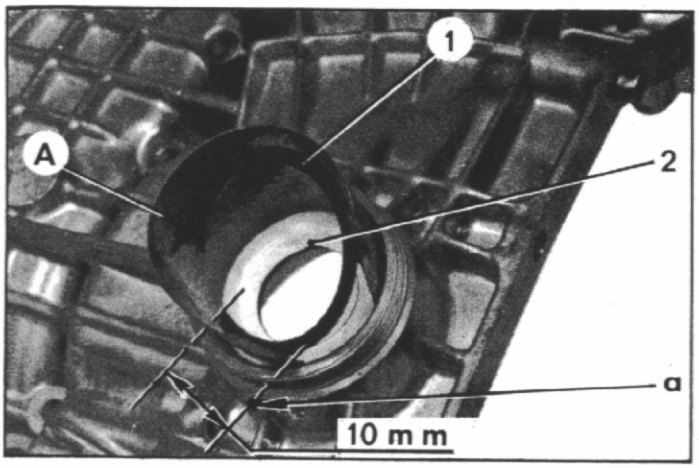
b) *Gearbox with bearing circlip :*

Fit the seal (2) with the aid of a tube, 51 mm diameter, or socket spanner 36 mm diameter.

Insert the seal up to the level of the circlip groove. Insert the circlip (1) into the bore using a sheet of foil A with a length of 150 mm, thickness 0.20 mm and width 60 mm. Use the tube or the spanner to complete the positioning.

Remove the foil and finish fitting the circlip and the seal with the aid of a mandrel used for gearboxes without circlip.

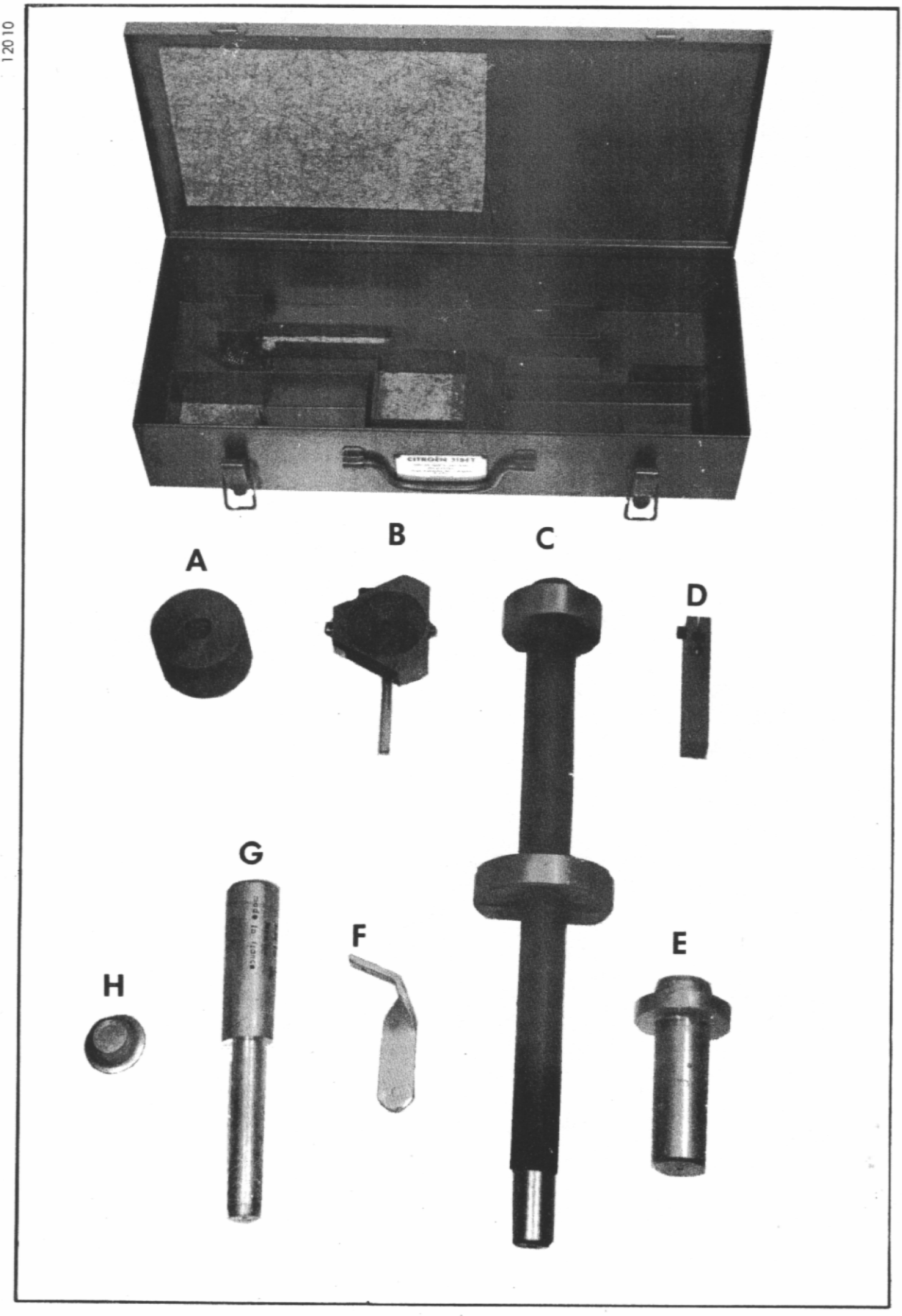
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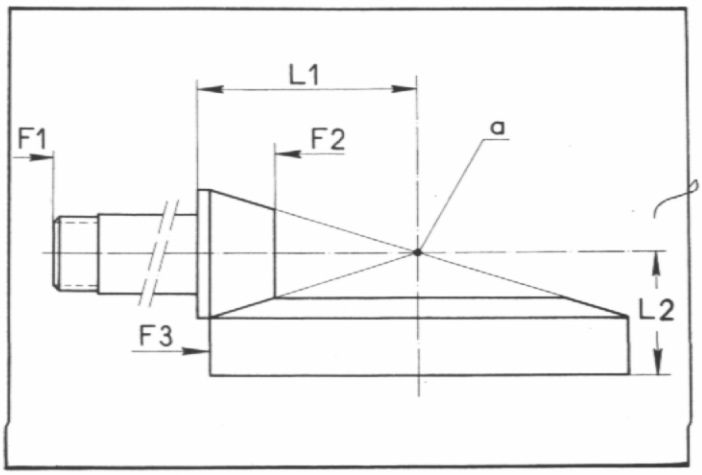
NOTE : After fitting, one of the edges of the circlip must be about 10 mm from the drain hole « a ».

TOOL BOX 3184-T

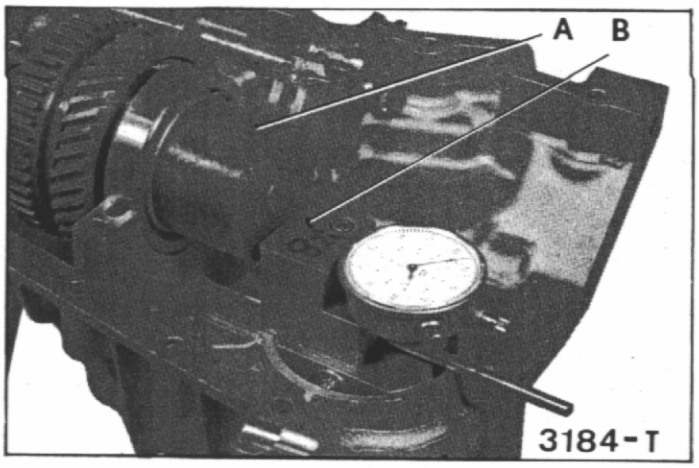
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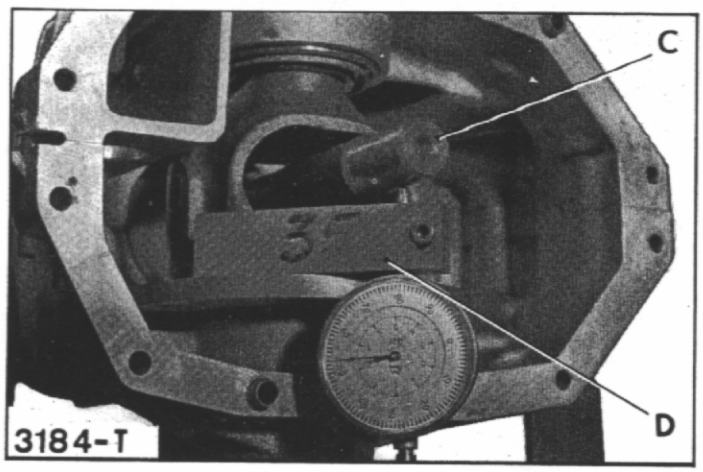


G. 33-13

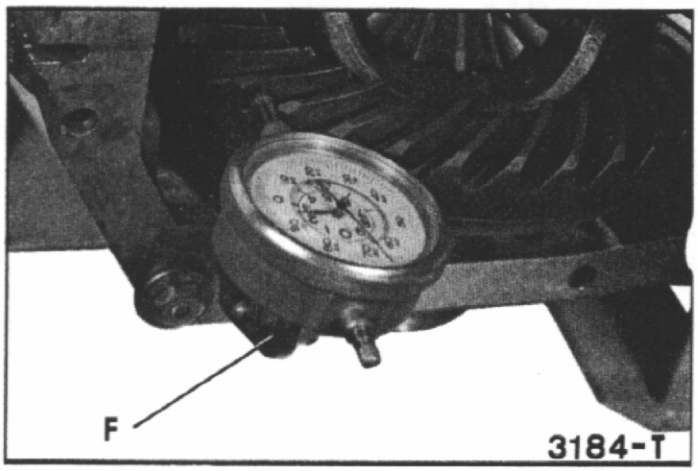


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IV. ADJUSTING THE CONIC DISTANCE OF THE BEVEL PINION.

NOTE : This adjustment is of the utmost importance. Giving the teeth the correct setting will ensure silence and long service from the crown wheel and pinion.

The bevel pinion and the crown wheel are paired and marked with identical inscriptions engraved with an electrical scriber on face F 1 of the pinion shaft and the side F 3 of the crown wheel (never separate a bevel coupling).

NOTE : On some couplings, the pairing mark of the pinion is engraved not on face F 1 but on face F 2 of the pinion.

1. Adjustment principle :

In addition to the pairing mark, two dimensions are engraved on side F 3 of the wheel.

The larger dimension (ex. 82.05) represents the distance L 1 from the intersection « a » of the bevel gear centre lines to the thrust face for the roller bearing on the bevel pinion.

The smaller dimension (ex. 40.00) represents the distance L 2 of the intersection « a » of the bevel gear centre lines to the thrust face of the crown wheel on the casing.

To obtain these dimensions, it is necessary to adjust the position of the pinion and that of the wheel with the aid of washers whose thicknesses are to be determined.

The adjustment of the conic distance should be made by using the adjusting fixture 3184-T together with dial gauge 2437-T.

To adjust the position of the bevel pinion, use cap A and dial gauge support B.

To adjust the crown wheel, use mandrel C and dial gauge support D.

To check the backlash, use the dial gauge support F.

AL. 33-10

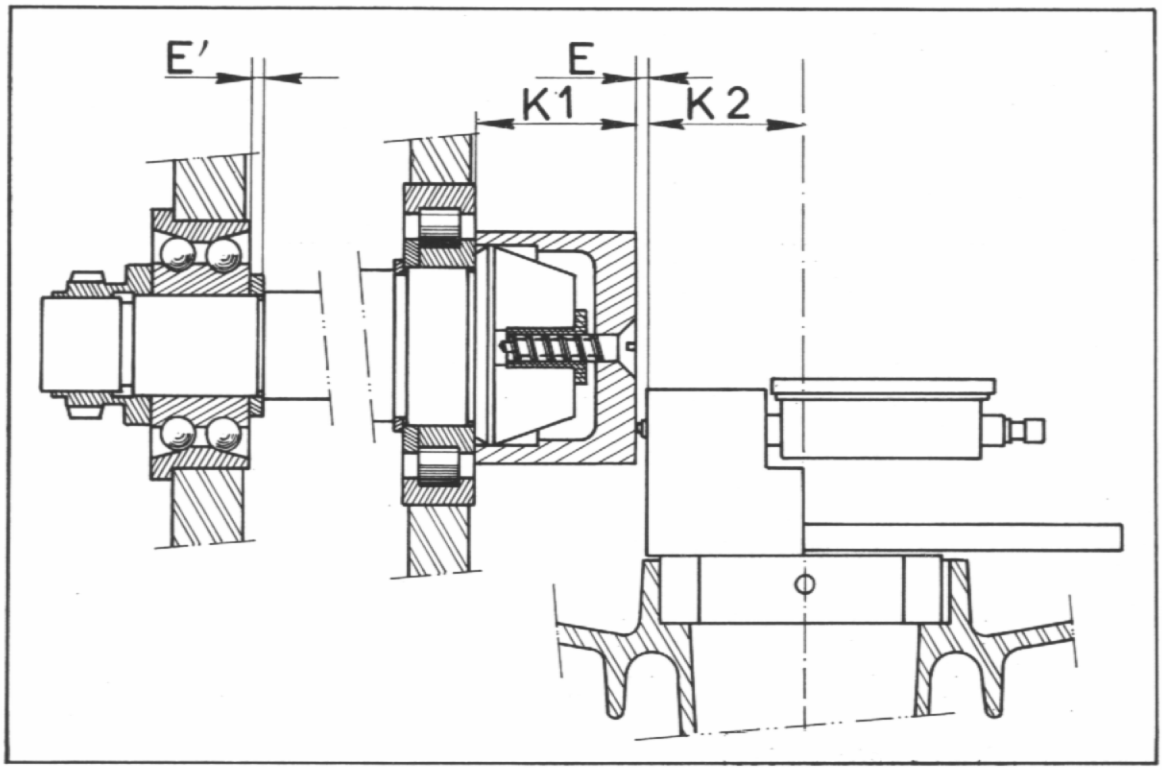


Figure 1

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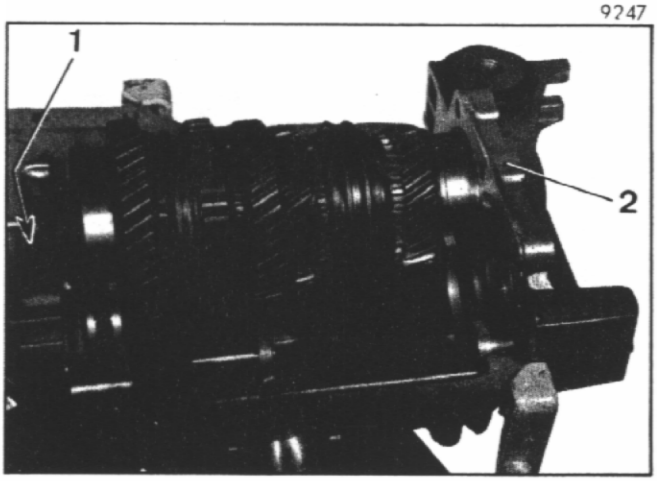


Figure 2

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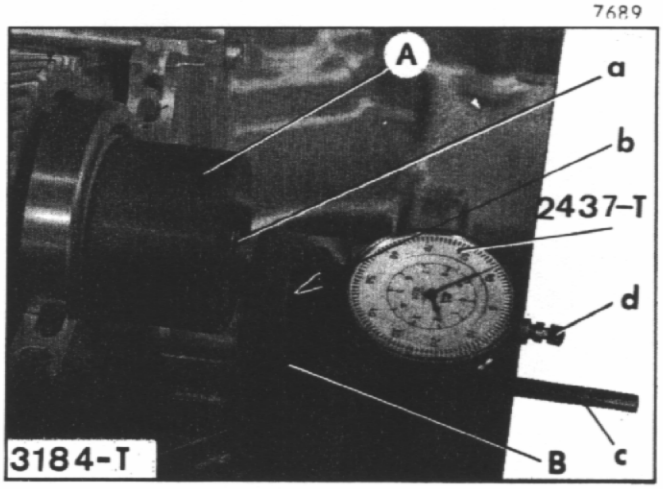


Figure 3

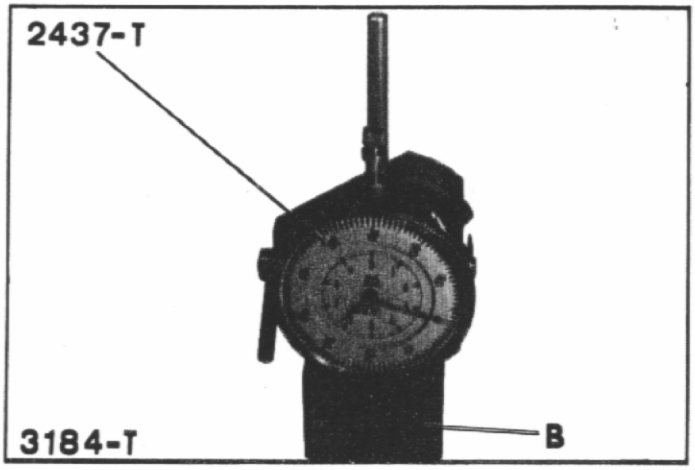


Figure 4

2. Adjusting the bevel pinion position :

a) Fit the bevel pinion and gear assembly in the left-hand half-casing. Fit the rear cover (2). Hold it in place with two bolts.
Note the larger dimension engraved on the crown wheel. It is for example : L1 = 82.00 mm.

b) Fit the cap A of assembly 3184-T as shown in figure (3). Hold in place with the screw « a » screwed into the plastic cap (1).

c) Carefully clean the differential bearing housing on the half-casing. : it should be free of any traces of blows or burrs (defects).

d) Fit dial gauge 2437-T on support B. Place the support on a surface-plate (see figure 4).
Bring the zero on the mobile dial opposite the large needle of the gauge. Mark the position of the integrating needle.
Example : integrating needle between 6 and 7.
The assembly of cap A and support B with the dial gauge in the calibration position corresponds to a distance K + K2 = 78 mm. This dimension is engraved on the support B at « b ».

e) Fit support B into the casing. Fully engage it in the bore of the differential bearing.
Using handle « c », pivot the support first in one direction and then in the other, and immobilize it at the exact point where the large needle change its direction of rotation.
Check the position of cap A : turn the bevel pinion : the gauge should show a maximum variation of 0.20 mm.
If not, change the position of cap A.

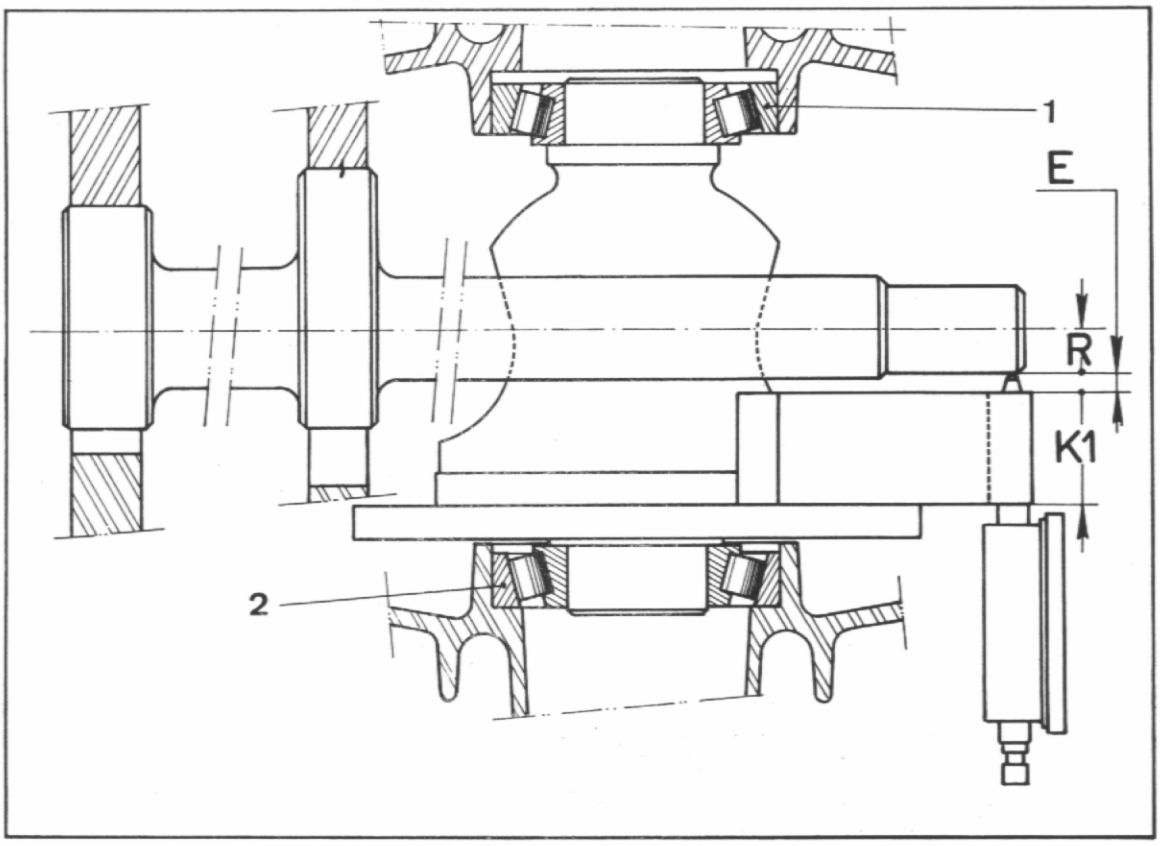
f) Ascertain the position of the bevel pinion :
Return the gauge needles to their calibration position (see paragraph d).
Example : integrating needle between 6 and 7 and large needle on zero.
Allow the dial gauge stem « d » to return slowly and count the number of revolutions and fractions of a revolution made by the large needle until the stem again contacts the cap.
Example : the large needle turns through 4.44 revolutions, therefore E = 4.44 mm.
The position of the bevel pinion is therefore : K1 + K2 + E or 78 + 4.44 = 82.44 mm
The pinion is too far from the differential centre line : 82.44 - 82 = 0.44 mm
It is, therefore, necessary to replace the existing washer by one of thickness greater than 0.44 mm.
Example : the existing washer has a thickness of 2.50 mm.
It must be replaced by another with thickness : E = 2.50 + 0.44 = 2.94.

NOTE :
If the distance read is smaller than the dimension engraved on the bevel pinion, the latter is too close to the differential centre line and it is, therefore, necessary to replace the existing washer by a thinner one.

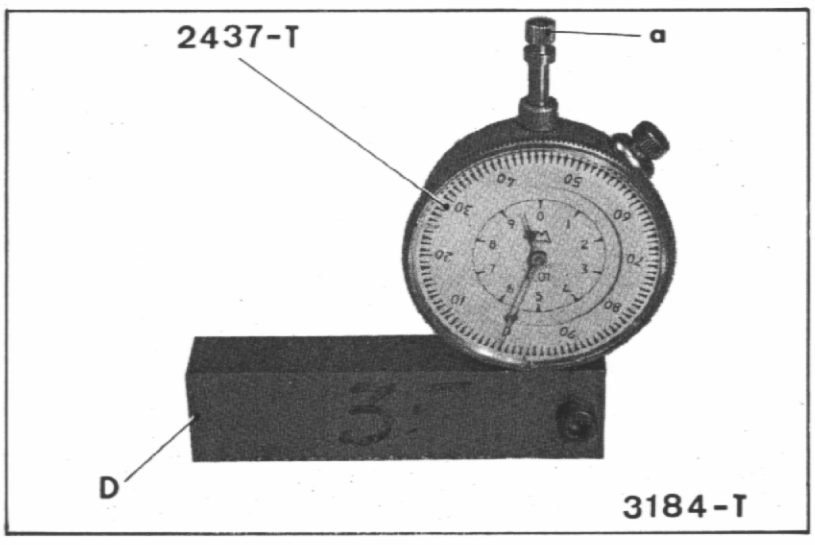
3. Remove the adjusting fixture, the rear cover and the crown wheel and pinion assembly.

4. Remove the nut from the bevel pinion.
Remove the bearing and the adjusting washer, replace it by a washer of known thickness.

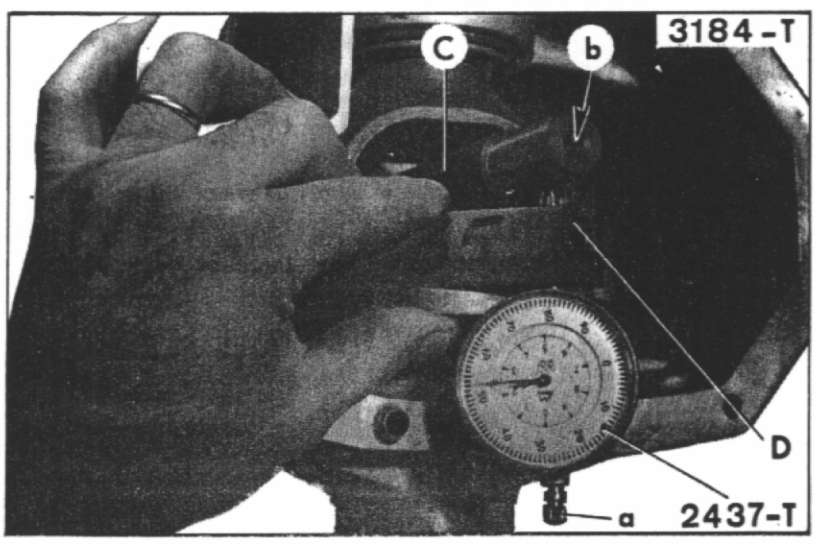
NOTE : The washers sold by the Spare Parts Department have thicknesses graduated in steps of 0.04 mm.
Choose a washer whose thickness comes closest to the value found.
Fit the bearing and the nut. Tighten to 100 to 120 mΛN (10 to 12 m.kg) (torque wrench).
Lock the nut by tapping over the metal into the groove of the shaft.



AL. 33-11 a



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5. Adjust the position of the crown wheel :

a) Adjustment principle : Using shims, it is necessary to arrange that :

- first, the distance between the bearing face of the crown wheel on the casing and the centre line of the bevel pinion equals that engraved on the side of the wheel, thus giving correct inter-tooth gap and contact area.

- secondly, a stress on the bearings to maintain the above settings under the action of the engine torque. This stress virtually corresponds to a pressure exerted on the bearing which is consequently forced inwards in its cages thus causing a displacement of the differential assembly expressed in millimetres. This must be taken into consideration in determining the thickness of the shims. It is evaluated at 0.025 mm per bearing, i. e., 0.05 mm for the two. In the adjustment operation, it is, therefore, necessary to take into account the casing recoil in determining the thickness of the left-hand shim (+ 0.025 mm) and the total stress on the two bearings (+ 0.05 mm) in determining the thickness of the right-hand shim.

b) Fit the outer cage (2) of the left-hand differential bearing in its housing (without shim).
Fit the differential casing .
Position the mandrel C with its end « b » engaged in the orifice of the casing.
Fit the outer cage (1) in its housing in the right-hand half casing (without shim).

NOTE : The bores for the bearing cages must be clean and free of all marks of blows (defects). These cages must slide freely.

- Fit the right-hand half casing.
- Fit the rear cover. Fit the bolts.
- Fit four of the fixing bolts of the half casings.
- Tighten the cover bolts and then those of the half casings.

NOTE : The fitting of the rear cover is necessary for positioning the half casings in relation to one another.

- Make sure that the differential casing is in place and that the outer cage (1) is in contact with the rollers of the bearing.

c) Calibrate the assembly of straight edge D and dial gauge.
Fit straight edge D with a dial gauge 2437-T, place it on a surface plate.. Adjust the gauge position so that it will operate between 8 to 9 mm.
Bring the zero of the mobile dial opposite the large needle.
Mark the position of the integrating needle.

Example : integrating needle between 8 and 9.
The assembly of mandrel C and straight edge D with dial gauge in calibration position corresponds to a distance :

$$K1 + R = 35 \text{ mm}$$

This dimension is engraved on one of the sides of the straight edge.

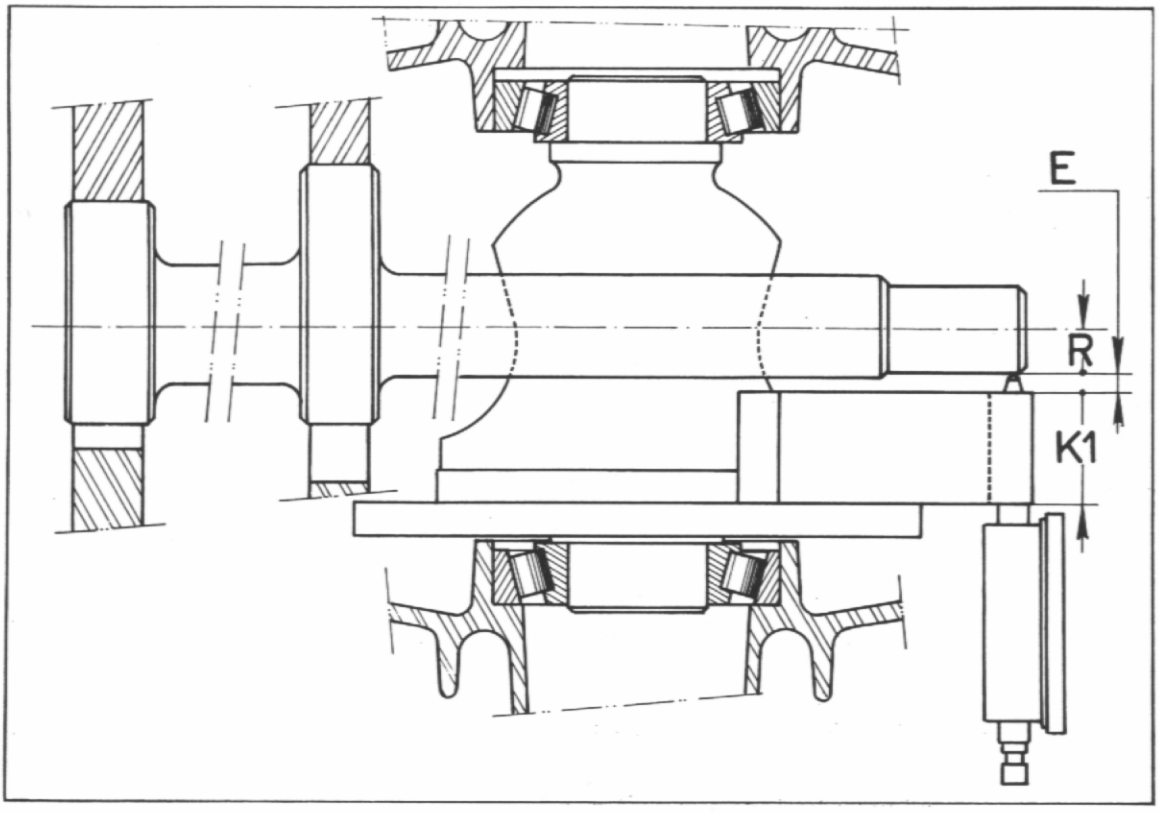


Figure 1

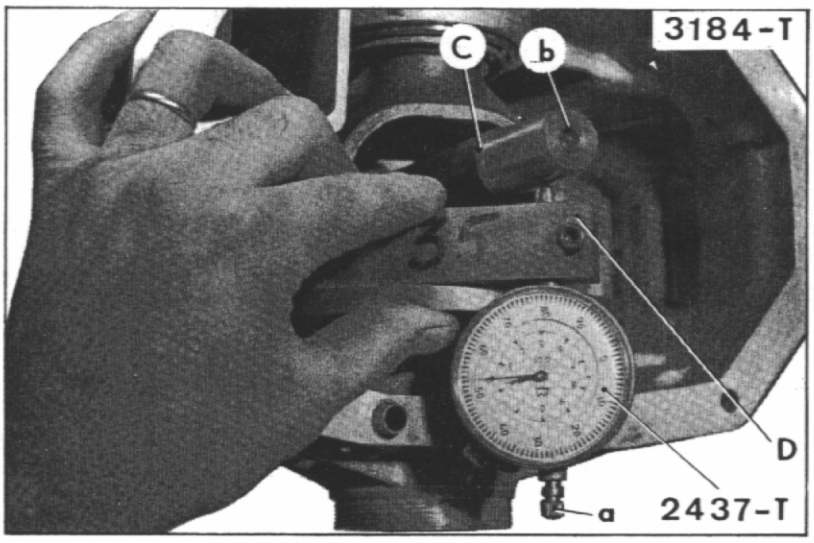


Figure 2

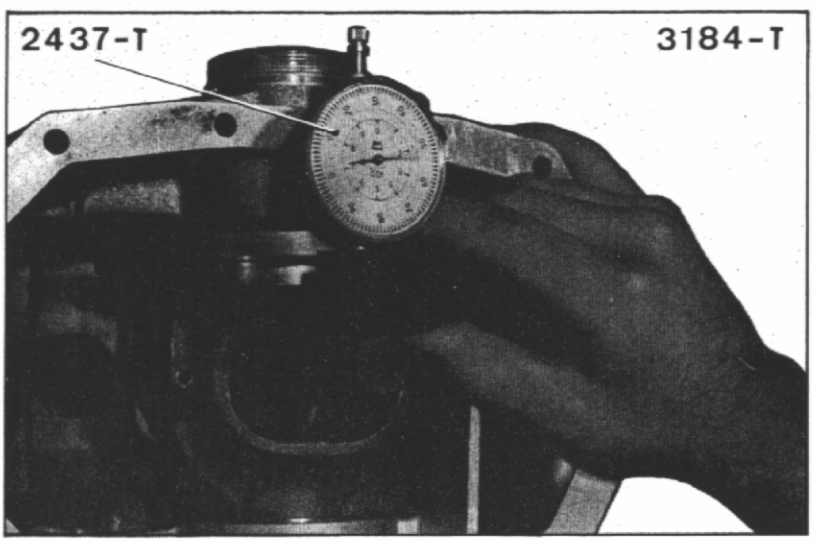


Figure 3

d) Fit straight edge D on the bearing face of the crown wheel on the casing, the dial gauge stem touching the end « d » of the mandrel.

Hold the straight edge against the casing and rotate the straight edge-casing assembly first in one direction, then in the other and immobilize it at the exact point where the large needle changes direction of rotation. Mark the position of the dial gauge needles. Pull on the spindle « a » of the gauge to bring the needles to the calibration position. Then, relase it slowly and count the number of revolutions or fractions of a revolution made by the large needle.

Example : The large needle turns through 7.46 revolutions, therefore : E = 7.46 mm.

The bearing face of the wheel is therefore at a distance from the bevel pinion centre line of :

35 + 7.46 = 42.46 mm

e) Ascertain the thickness of the shim to be placed in the left-hand half casing (see figure 2).

Note the dimension engraved on the crown wheel. For example, this dimensions is 40.00 mm.

To obtain this dimension would require a shim of :

42.46 - 40 = 2.46 mm

It is necessary to add 0.025 mm for the bearing stress. The shim must, therefore, have a thickness of :

2.46 + 0.025 = 2.485 mm

The adjusting washers are sold by the Spare Parts Department in steps of 0.05 mm; choose a washer whose thickness is nearest to the determined value : 2.50 mm.

f) Ascertain the thickness of the adjusting washer to be fitted in the right-hand half casing (see figure 3).

Release the gearbox from the support and place it on the work-bench *with the left-hand half casing uppermost.*

IMPORTANT : Make sure that the differential is in place, with the outer cage of the bearing resting on the shoulder of the right-hand half casing. Also make sure that *the outer cage of the left-hand bearing bears against the rollers.*

Check the calibration of the straight edge-dial gauge assembly.

Place straight edge D against the bearing face of the crown wheel on the casing, with the dial gauge touching the end « b » of the mandrel C.

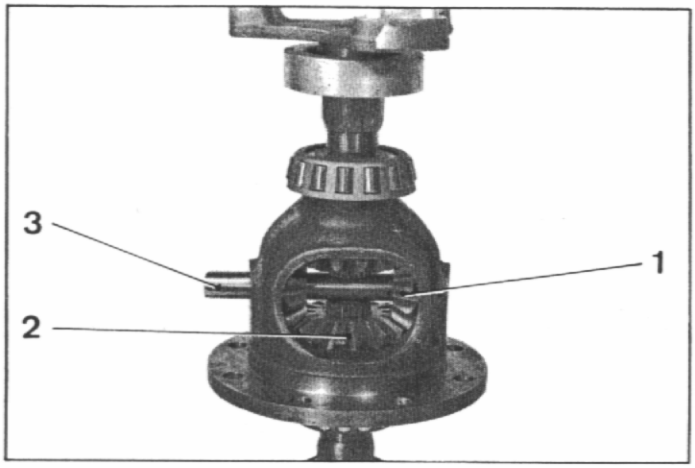
Hold the straight edge against the casing and measure as previously indicated for the left-hand side.
Example : The large needle turns through 2.45 revolutions, therefore, E = 2.45 mm.

The bearing thrust face of the crown wheel is, therefore, at a distance from the bevel pinion centre line of :

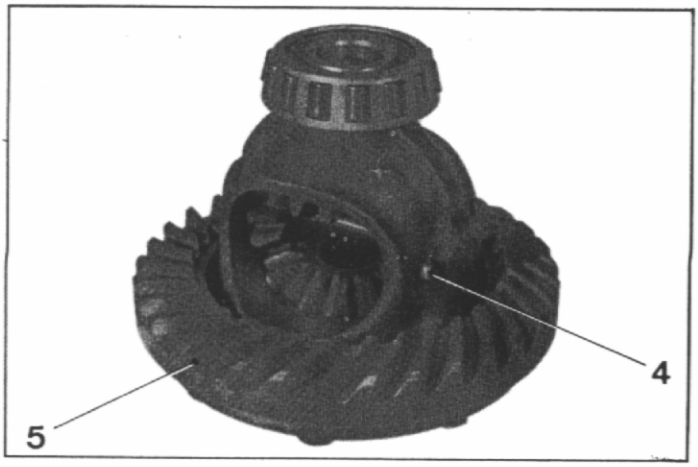
35 + 2.45 = 37.45

Ascertain the thickness of the adjusting washer to be fitted in the right-hand half casing :
The dimension engraved on the crown wheel being 40.00 mm to obtain this dimension would require a shim of : 40 - 37.45 = 2.55 mm without taking into consideration the bearing stress; the total thickness (left and right) of the shims would be 2.46 + 2.55 = 5.01 mm. With the stress of 0.025 per bearing, therefore 0.05 mm for the two bearings, the total thickness would be 5.01 + 0.05 = 5.06 mm.

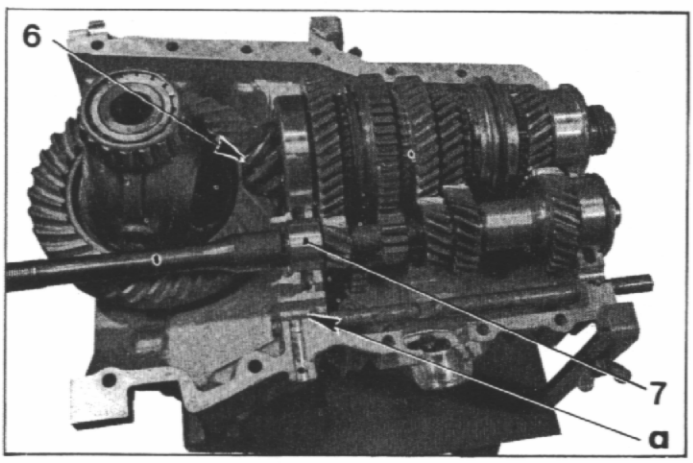
It has been determined that the left-hand side requires a shim of 2.50 mm. Therefore, the thickness of the shim to be fitted on the right-hand side will be 5.06 - 2.50 = 2.56. Since the shims are available in steps of 0.05 mm, choose a 2.55 mm shim.



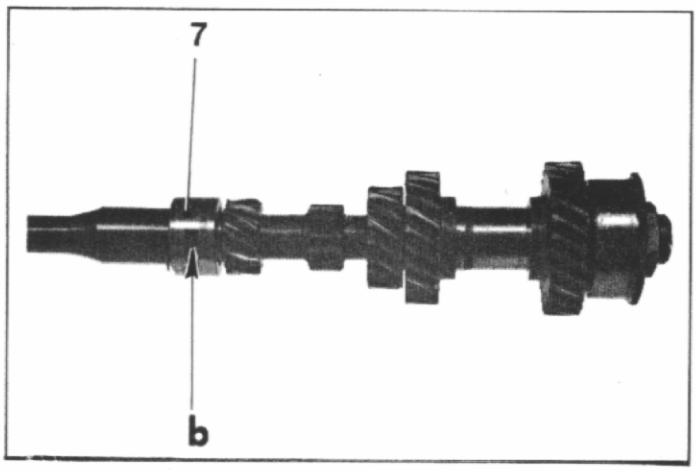
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V. FITTING.

1. Fit the differential :

a) Oil the parts. Fit :
- the two planet wheels (2) and hold them in place with the aid of the two differential shaft,
- the satellites (1) and engage the shaft while (3) correctly orientating the pin hole.

Fit the locking pin (4).

b) Fit the crown wheel (5) :
The 9 mm diameter fixing bolts must be fitted with LOCTITE GX. 01 460 01 A and tighten to 48 to 53 mΛN (4.8 to 5.3 m.kg).
The 10 mm diameter fixing bolts should have the face and threads greased. Tighten them to 80 to 90 mΛN (8 to 9 m.kg) (torque wrench).
NOTES :
- Do not fit washers under the bolt heads.
- For correct positioning of the wheel, successively tighten the diametrically opposed bolts.

c) Fit the differential in the left-hand half casing.

2. Fit the bevel pinion :

Check the condition of the plastic plug (6). Replace, if necessary.
CAUTION : Be careful not to introduce foreign bodies in the central hole of the pinion, which could reduce lubrication to the bearing surface of the 1st gear wheel.
- Check that the reverse gear intermediate pinion is in its « neutral » position.
- Fit the assembly in the left-hand casing.

3. Fit the drive shaft/ primary shaft assembly :

Fit the assembly in the left-hand half casing.
Turn the needle bearing (7) so that the end of the locking pin of the reverse gear intermediate spindle enters the locking notch in the bearing.

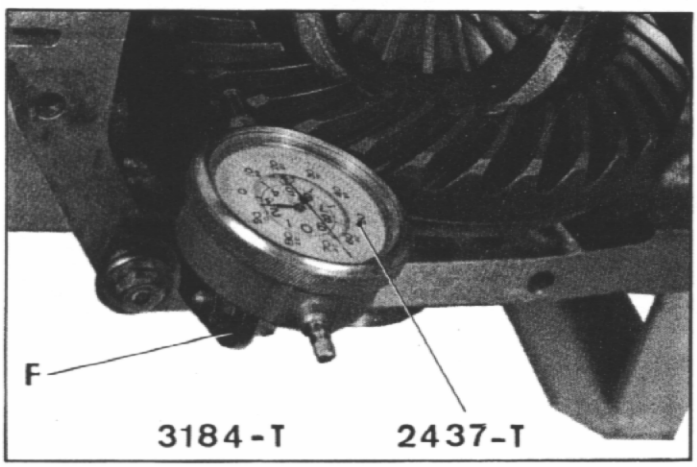
4. Fit the lock ball in its housing at « a » (grease beforehand).

NOTE : The five locking balls and three locking springs of the shafts are identical.

5. Checking the crown wheel to pinion backlash :

NOTE : If the adjustment of the conic distance has been carefully carried out, the backlash should be correct.
However, it is preferable to check it.

a) Fit the right-hand casing on the left-hand one (see that the 1st and 2nd gear fork is engaged in the groove of the corresponding sliding gear).
- Fit, but do not tighten, the four assembly bolts of the half casings.
- Fit the rear cover. Tighten the fixing bolts (the rear cover is necessary for the correct alignment of the two half casings).
- Tighten the four assembly bolts of the half casings.

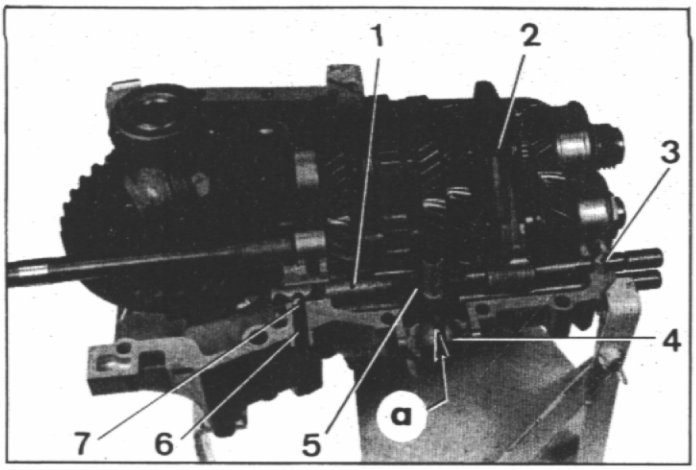


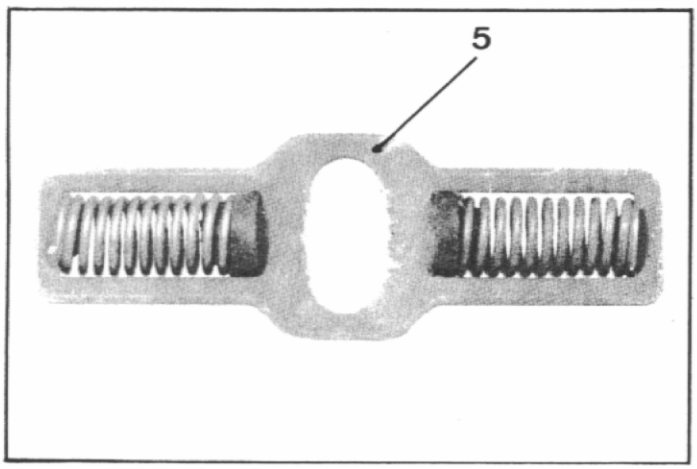
b) On the left-hand casing (as shown in the figure) fit the support F of the assembly 3184-T fitted with a dial gauge so that its moving stem rests perpendicularly on the flank of a tooth on the periphery of the crown wheel.
Measure the clearance by keeping the bevel pinion still, holding it by hand.
The backlash must be between 0.13 and 0.27 mm measured at the point of minimum clearance.

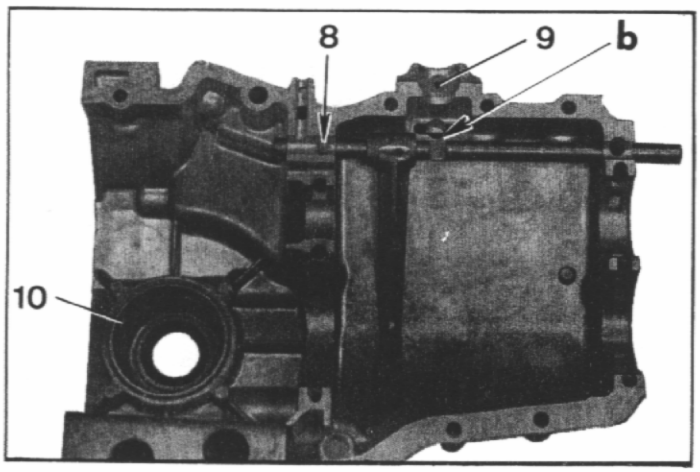
c) Measure and note the clearance on three teeth spaced at intervals of about 120°. Take the average of the three readings :
The difference between any two readings should not exceed 0.1 mm.
Otherwise, the wheel is out of true (it must be replaced)., or there is a foreign body between the crown wheel and the differential casing.

d) Remove :

- the dial gauge and its support,
- the rear cover,
- the right-hand half casing.







6. Fit the 3rd and 4th gear shaft and fork assembly :

- Lightly oil the shaft (1) and grease its locking notches.
- Check that the 3rd and 4th gear sliding gear is in its neutral position.
- Fit the shaft (1) and fork (2) assembly in the left-hand half casing by engaging the fork (2) in the groove of the sliding gear of the 3rd and 4th gear.
- Grease the ball (7) and spring (6) of the locking mechanism of the 3rd and 4th gear selector fork shaft.
  Fit them.
  NOTE : The five locking balls and three locking springs of the shafts are identical.
- Grease and fit the interlock plunger (3) of the shafts of 1st, 2nd and reverse gear.

7. Grease and fit spring holder plate (5).
NOTE :
Since January 3, 1972, the reverse gear locking device on the gear lever has been replaced by a mechanism in the gearbox.
The springs of the plate (5) are different : the one with thicker wire should be placed towards the reverse gear intermediate pinion (in the left-hand casing).
Grease the ball joint (4), fit it in the left-hand half casing *(the guide groove « a » placed towards the right-hand half casing).*

8. On the right-hand half casing :
- Stick the lock ball (8) in its housing with grease.
- Stick the spring and guide (9) of the ball joint in their housing with grease.

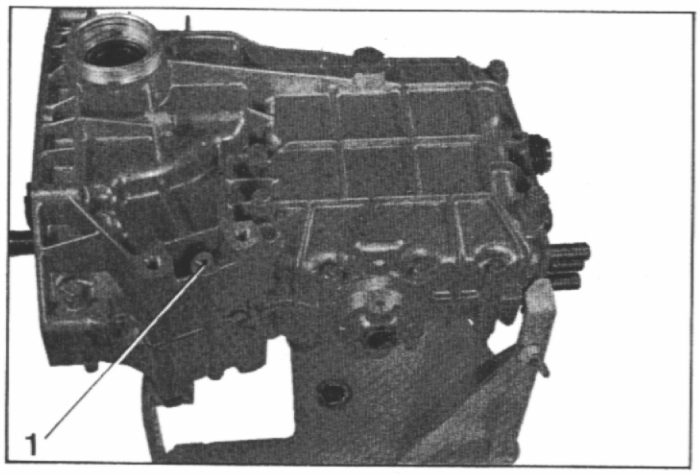
9. Smear the joint faces of the two half casings with sealing compound.
NOTE :
- Use only CURTYLON sealing compound (made by Societe CEFILAC - France)
- Only smear half the width of the joint face (the outer half) because sealing compound must not enter the casing.

10. Fit the right-hand half casing to the left-hand one :

Before fitting, check that the planet wheels are correctly positioned.

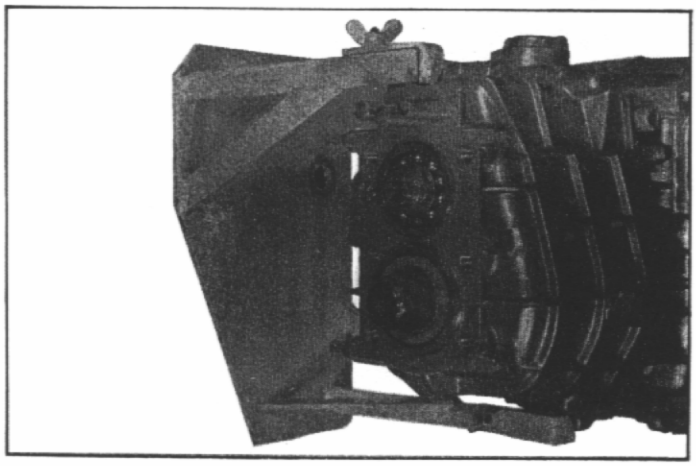
a) Fit the half casing.

b) During this operation, hold in place the outer cage (10) of the differential bearing and engage the 1st and 2nd gear fork in the groove of the corresponding sliding gear. Simultaneously, guide the plate into its housing « b » of the right-hand half casing and make sure that the guide (9) does engage in groove « a » of the ball joint (4).



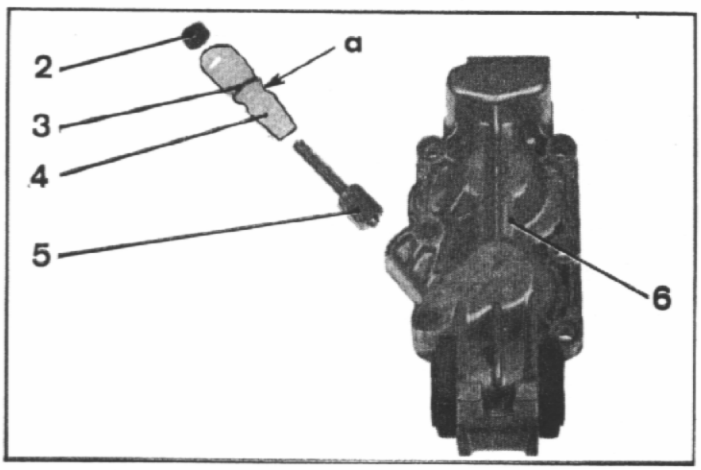
c) Fit the assembly bolts of the half casings (plain washers under the bolt heads and capnuts).

NOTE : The bolt (1) placed between the brake caliper mountings, is the only one with a normal hexagonal nut.



IMPORTANT : Fit the bolts but do not tighten them. Final tightening must be done after the rear cover has been tightened down.

11. Fit the rear cover :



a) Fit the rubber seal (2) and the O-ring (3) on the bearing (4).

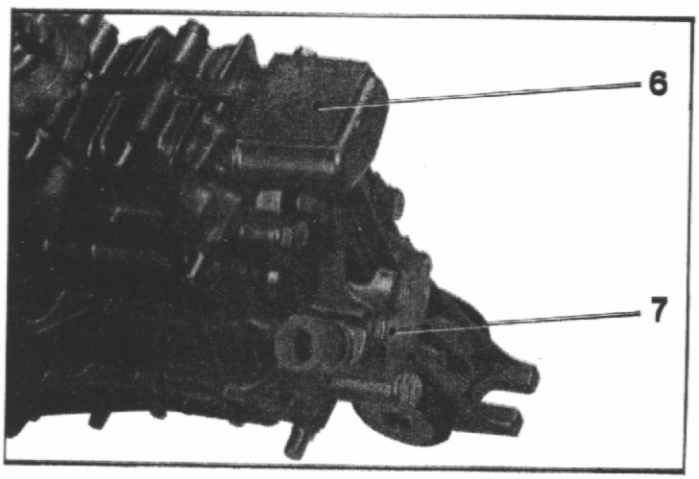
Fit the pinion (5) in the bearing (4).

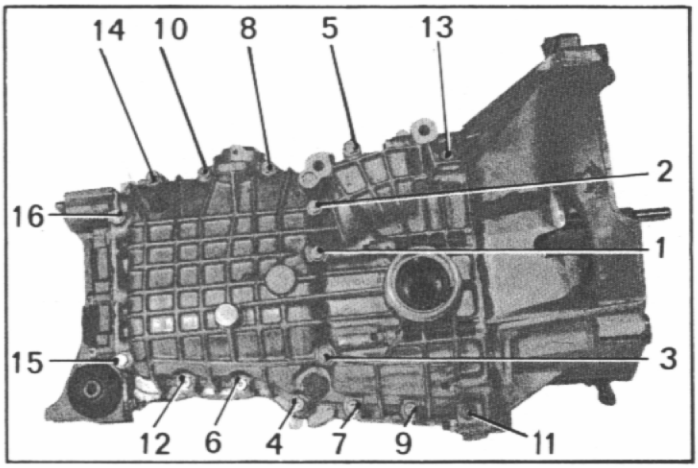
Fit the speedometer drive assembly into the cover (6) and orientate groove « a » to allow for fitting the bolt (7).

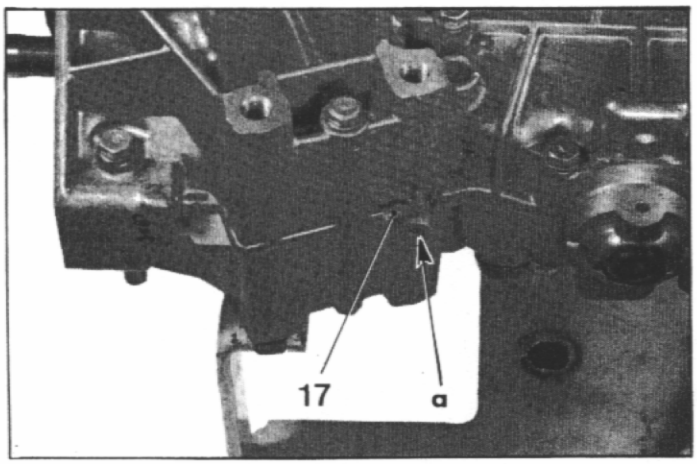
b) Smear the joint face of cover with CURTYLON compound.

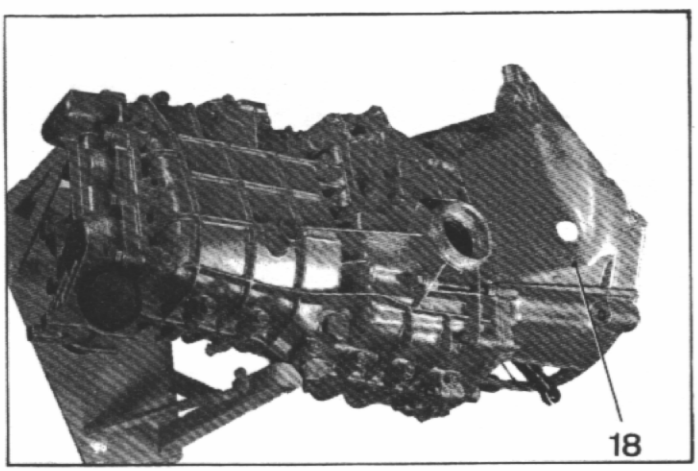
Fit the rear cover on the gearbox casing.

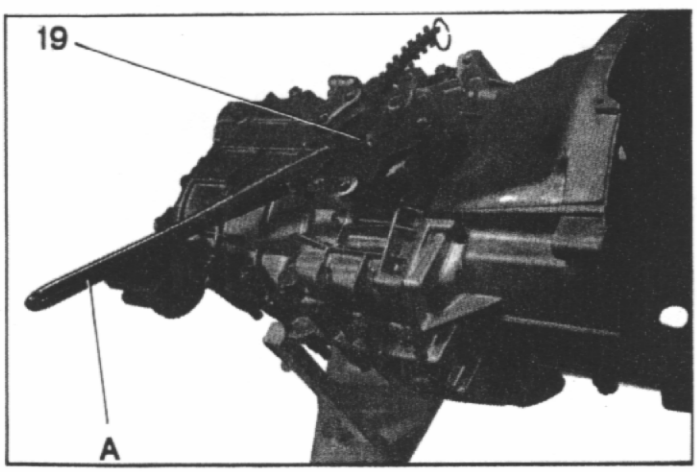
Fit the fixing bolts, tighten them to 25 to 30 mAN (2.5 to 3 m.kg) (plain washer under bolt head).











12. Finally tighten the assembly bolts of the half casings :

NOTE : The method for tightening these bolts is most important to ensure oil-tightness of the half casings.

a) Slightly loosen the bolts holding the rear cover on the right-hand half casing.

b) Finally tighten the assembly bolts of the half casings to 14 to 15 mΛN (1.4 to 1.5 m.kg)
IMPORTANT : Take care of the tightening sequence shown in the illustration.
(on some gearboxes, the bolt (3) may be on the left-hand half casing),

c) Retighten the bolts holding the rear cover on the right-hand half casing from 25 to 30 mΛN (2.5 to 3 m.kg).

13. Fit at « a » the expandible plug for the spring housing and the locking ball of the 3rd and 4th gear fork.
Compress the pellet and the spring (5 mm diameter rod) and fit the pin (17).

14. Fit the assembled clutch casing :

a) Smear the joint faces with CURTYLON compound.
(See note in paragraph 9).

b) Fit the casing (18) and tighten the assembly nuts (plain washer) to 14 to 15 mΛN (1.5 to 1.5 m.kg).

15. Fit the differential shafts :

VERY IMPORTANT : Make sure that the planet wheels are securely in place and that, when fitting, the splines of the differential shafts engage in the splines of the planet gears (by turning the differential shafts by hand in the same direction, the differential crown wheel should turn).

a) Fit the shafts (19) (tap lightly with a mallet to position the bearing).

b) Tighten the ring nuts with the aid of a chain wrench A to 60 to 75 mΛN (6 to 7.5 m.kg).

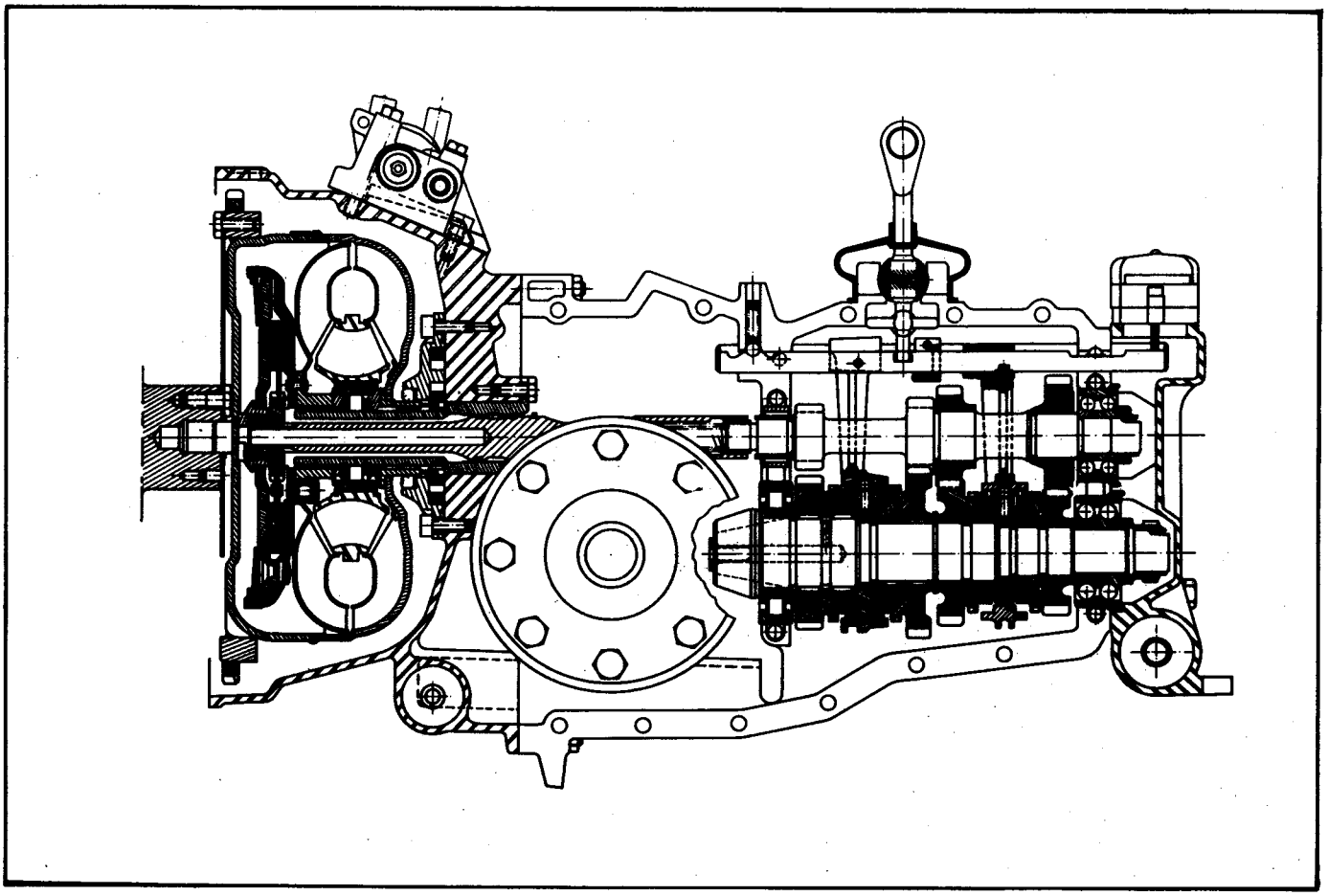
c) Lock the nuts by folding down the metal into the grooves machined in the casings.

16. Fit the drain, level and filler plugs *(blanking plug on « Confort » models)*. Tighten them to 35 to 45 mΛN (3.5 to 4.5 m.kg) (copper seal).

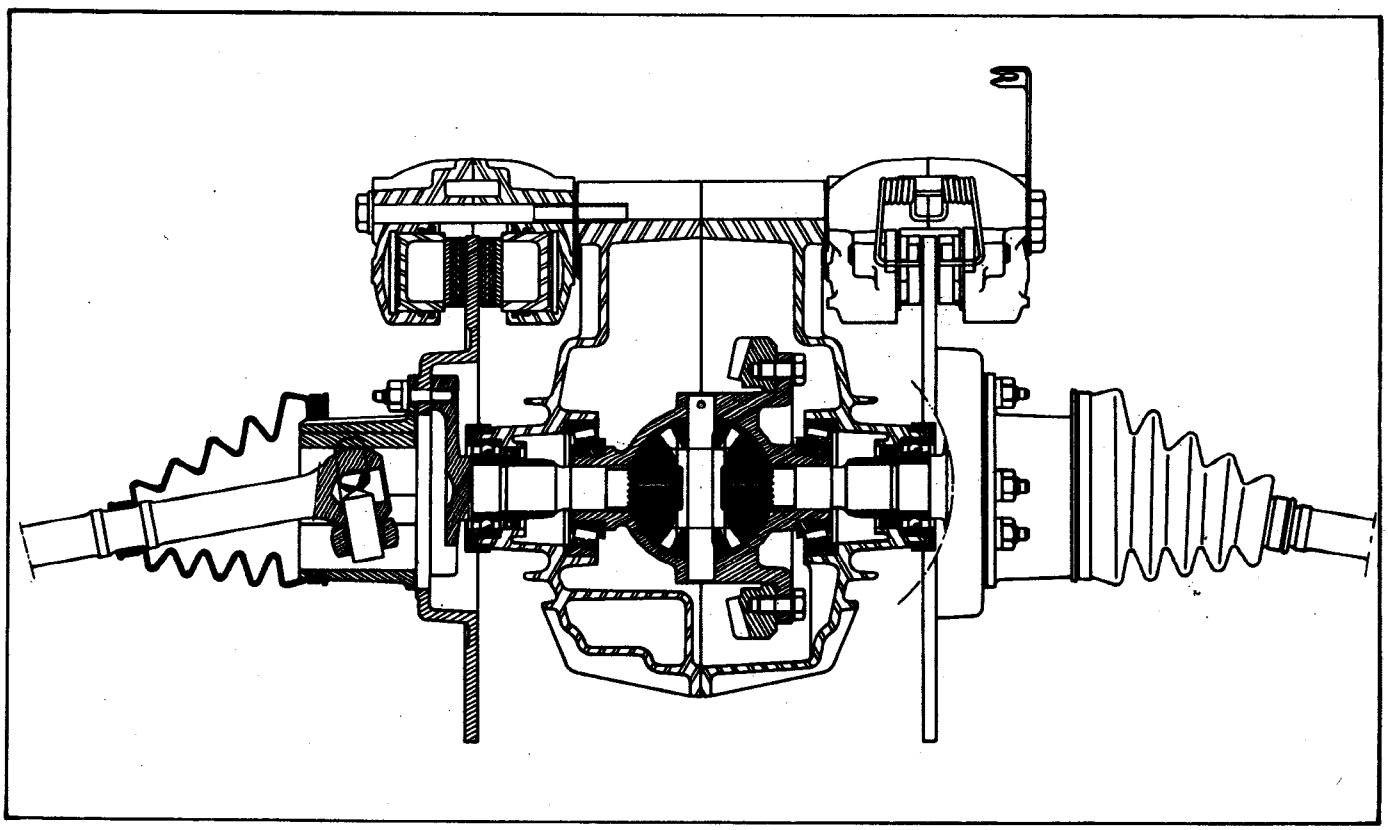
Fit the reversing light switch *(on « Club » vehicles)*. Smear the thread of the switch with MASTI-JOINT HD 37. Fit and tighten the switch to 12 to 15 mΛN (1.2 to 1.5 m.kg).

Vehicles produced up to September 1, 1972

LONGITUDINAL SECTION

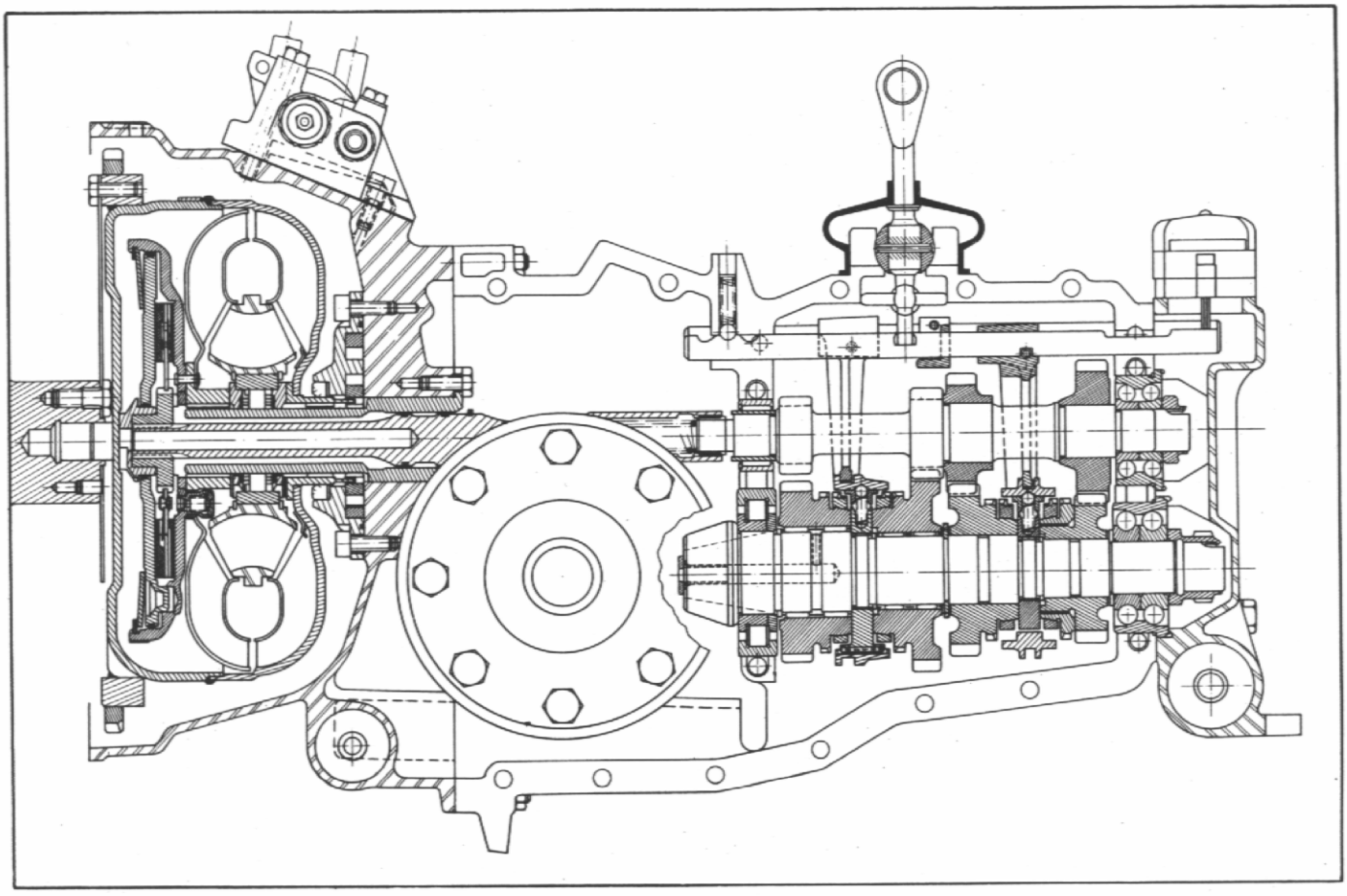


TRANSVERSE SECTION

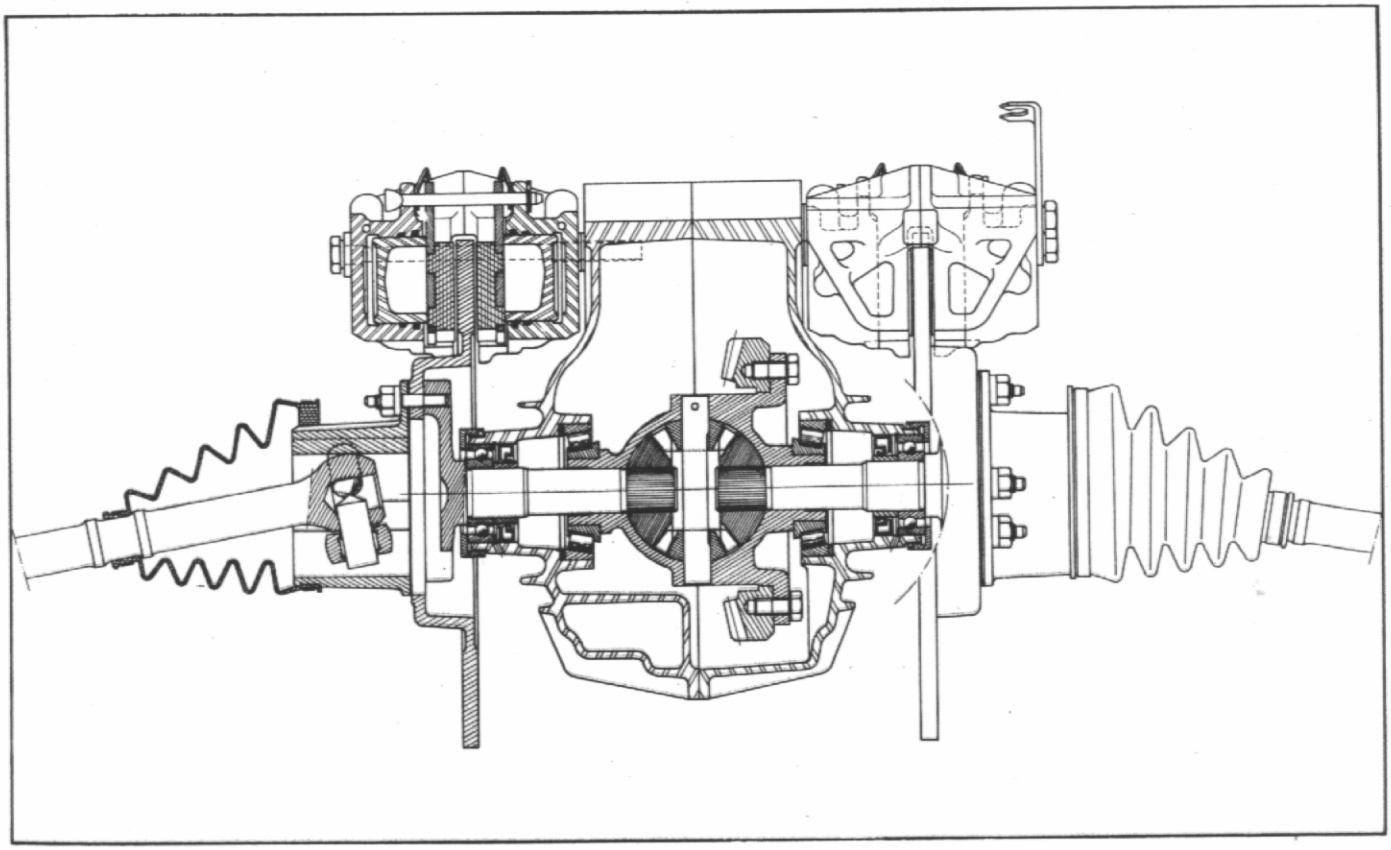


Vehicles produced since September 1, 1972

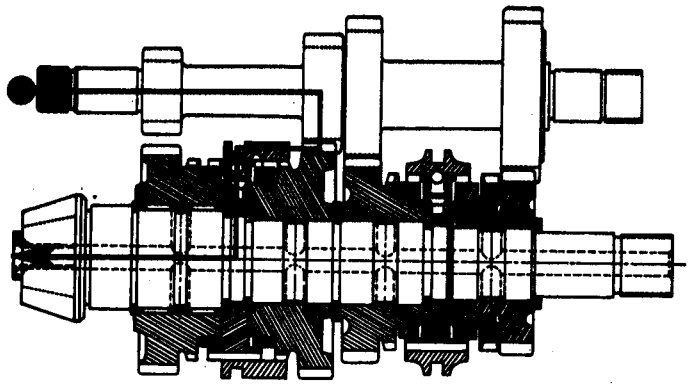
LONGITUDINAL SECTION



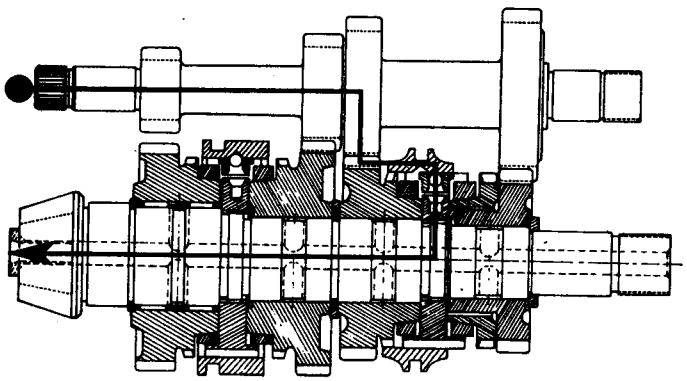
TRANSVERSE SECTION



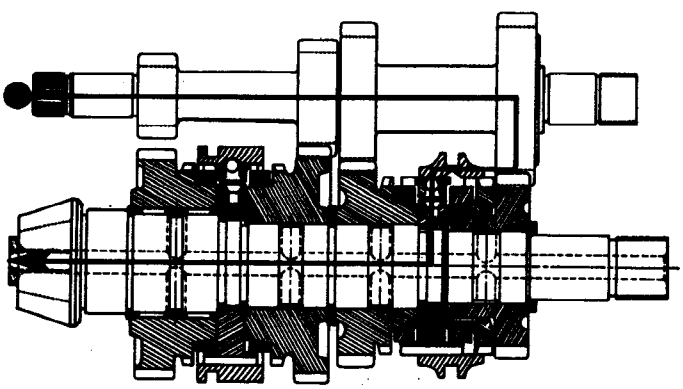
GEAR TRAIN



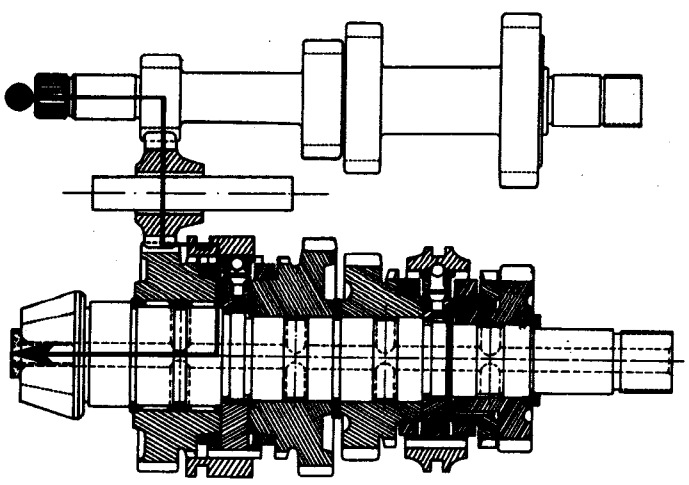
1st GEAR



2nd GEAR



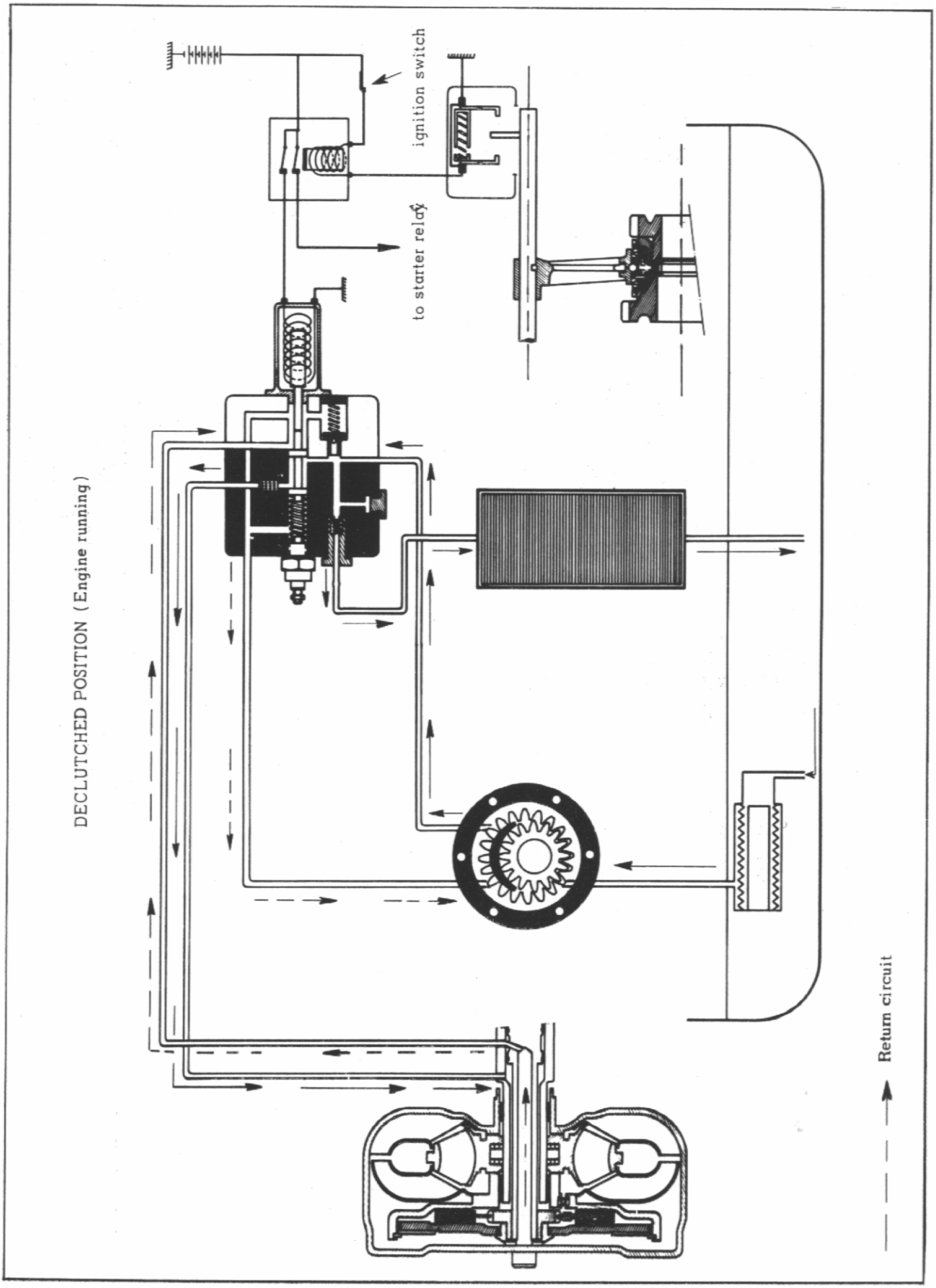
3rd GEAR



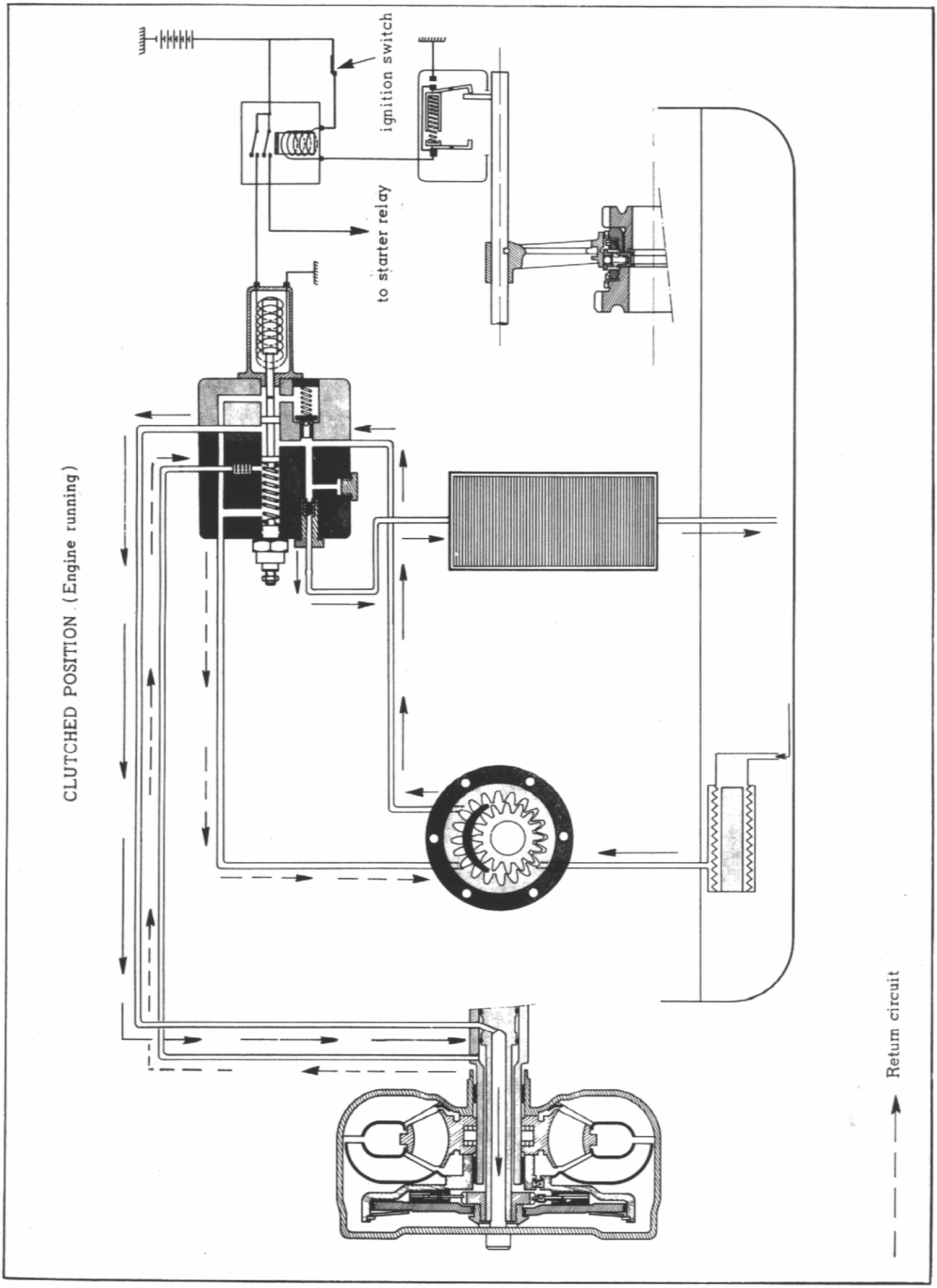
REVERSE GEAR

NOTE : The primary shaft pinions are in constant mesh with the driven gears of 1st, 2nd, 3rd and reverse gear.

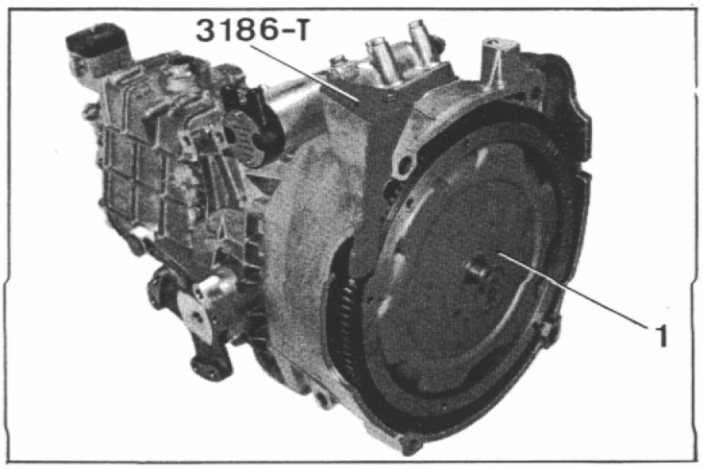
SCHEMATIC DIAGRAM OF A TORQUE CONVERTER



SCHEMATIC DIAGRAM OF A TORQUE CONVERTER



OVERHAULING A THREE-SPEED GEARBOX FITTED WITH A TORQUE CONVERTER



I. DISMANTLING

1. Drain the oil from the gearbox.

2. **Uncouple the gearbox from the casing and converter assembly :**

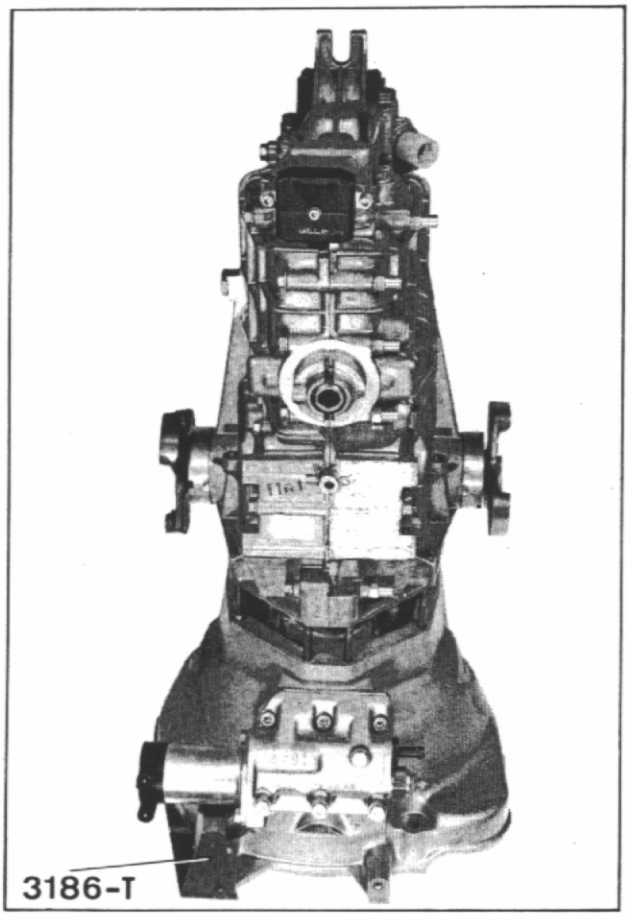
a) Make sure that there is a 3186-T bracket holding the converter.

b) Place the gearbox on the bench in a vertical position, with the converter resting on the bench.

NOTE : The converter being still full of oil it is advisable to proceed in this manner to prevent oil from flowing out during this operation.

c) Remove the nuts and washers holding the gearbox casing on the converter casing.

d) Remove the control shaft (2). Do not mislay the spring at « a ».

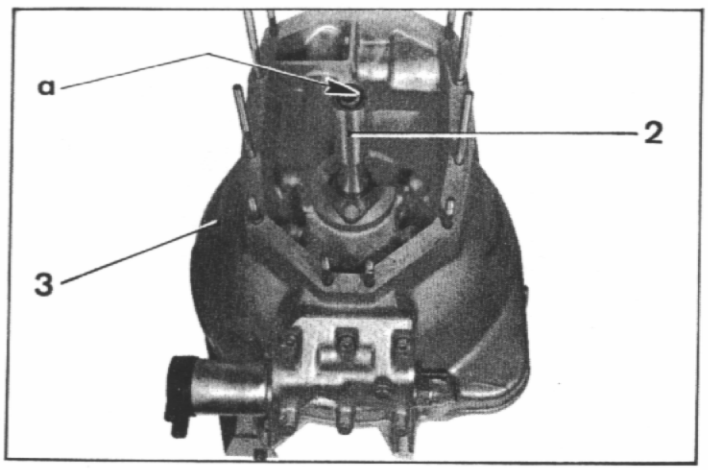


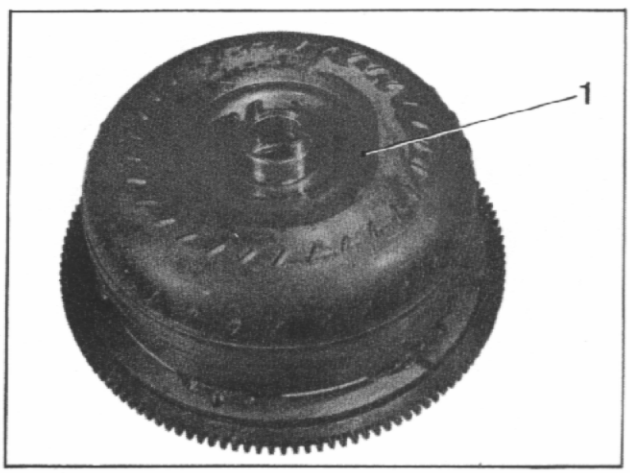
9651

3. **Separate the converter casing from the converter**

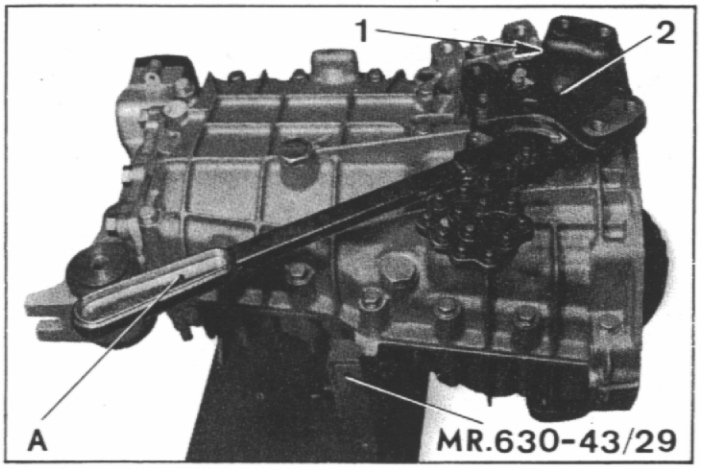
Slide the converter casing assembly towards the edge of the bench and remove the 3186-T bracket.

Vertically free the casing (3) from the converter (1).





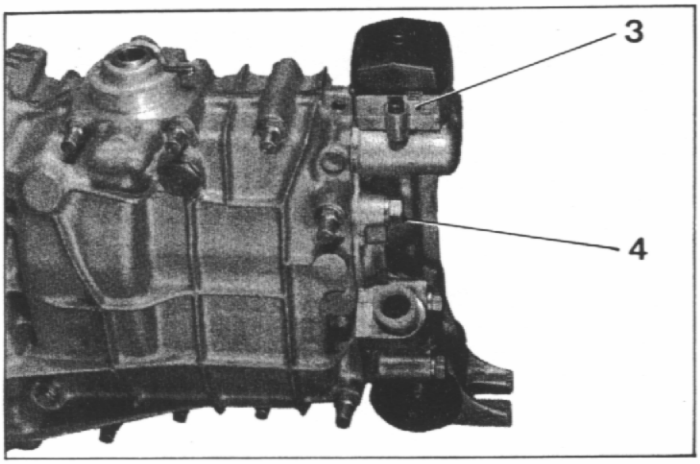
8075



4. Remove the differential shafts :

On each side :

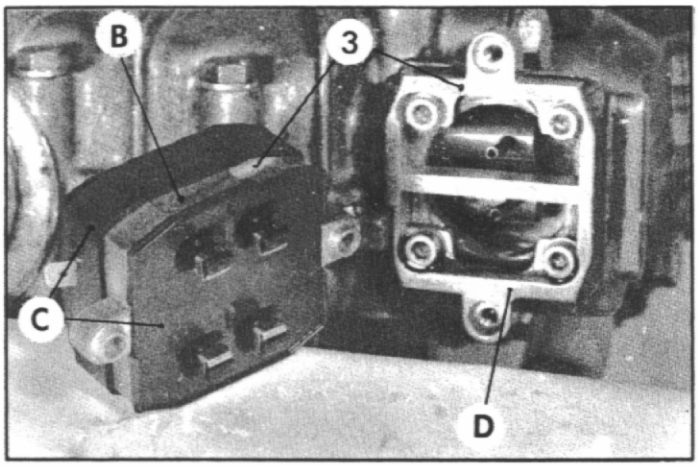
- Bend up the metal locking the ring nut (1).
- Fit the gearbox on support MR. 630-43/ 29 as shown in the illustration.
- Slacken the ring nut (1) using a chain wrench A.
- Release the shaft (2) complete with the ring nut and the bearing (if necessary tap lightly with a mallet).

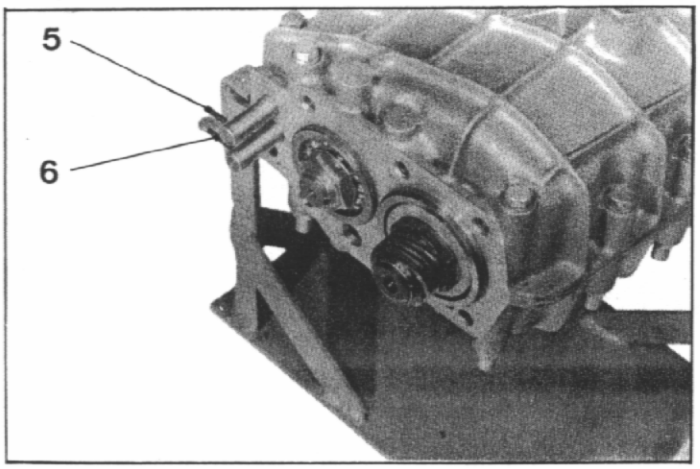


5. Remove the control-switch unit on gearbox :

Remove :

- the body B of the switch unit (3) fitted with its cover (4 mm Allen key),
- the rubber guards C,
- the switch unit base plate D (4 mm Allen key).

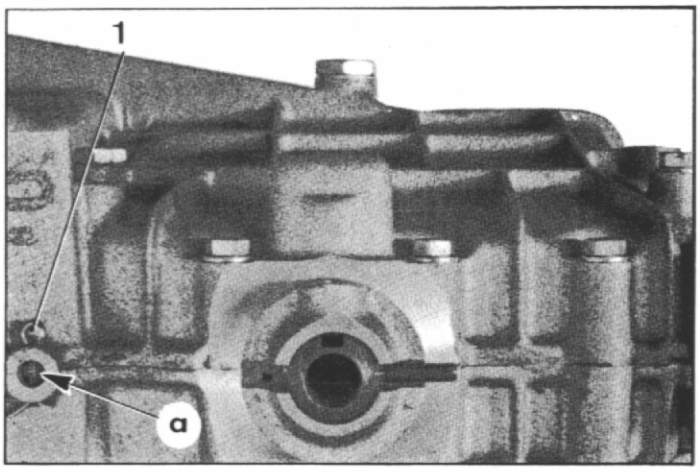




6. Remove the rear cover :

Remove the bolts (4) holding the rear cover.

Free the rear cover (be careful not to bend the Mecanindus pins (5) and (6) which operate the switch unit.



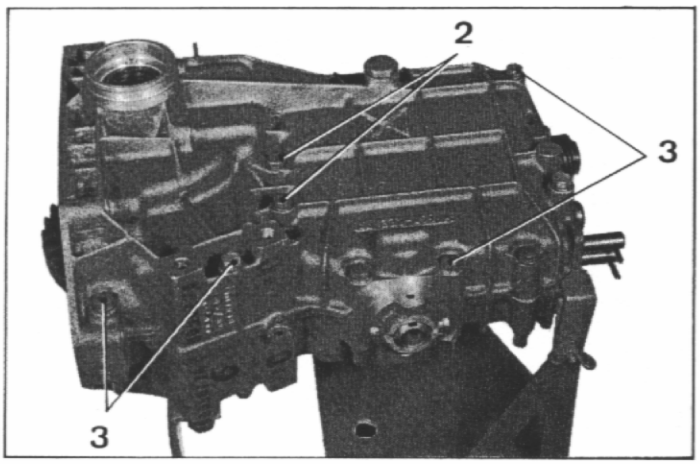
7. Close the orifice « a » of the 2nd and 3rd gear fork shaft locking mechanism with a finger.

Remove the split (1).
Remove the blanking pellet of orifice « a ».

8. Remove the right-hand half casing of the gearbox :

Remove the assembly bolts and nuts (3) of the half casings.
Remove the assembly bolts (2) of the central bearing (two bolts towards the right-hand half casing, one bolt towards the left-hand half casing).
Remove the right-hand half casing.

CAUTION : The spring (8) and guide of the ball joint will fall out (retrieve these two parts).



9. Remove :

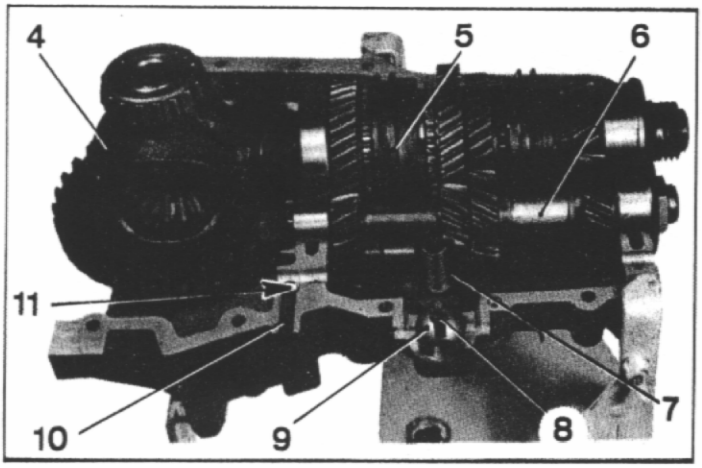
- the ball joint (9),
- the small plate (7) holding the return spring,
- the spring (10) and locking ball (11).

10. Remove the gears from the gearbox :

Remove :

- the primary shaft (6),
- the bevel pinion assembly (5),
- the differential (4).

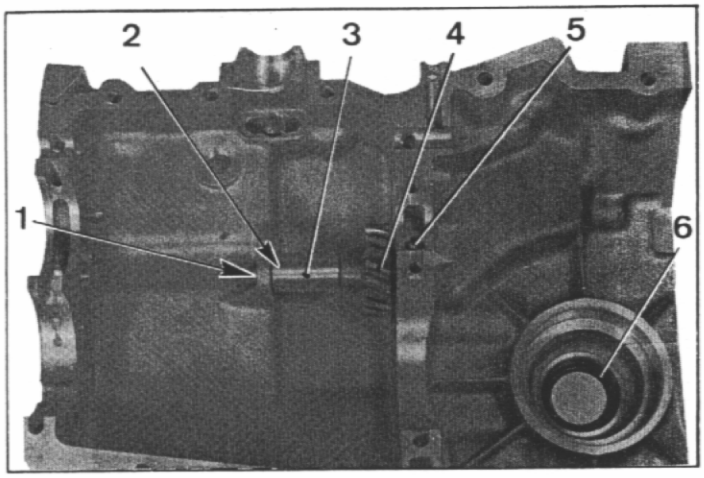
Remove the outer cages of the bearings in the half casings. *Mark them with the corresponding bearings of the differential.*

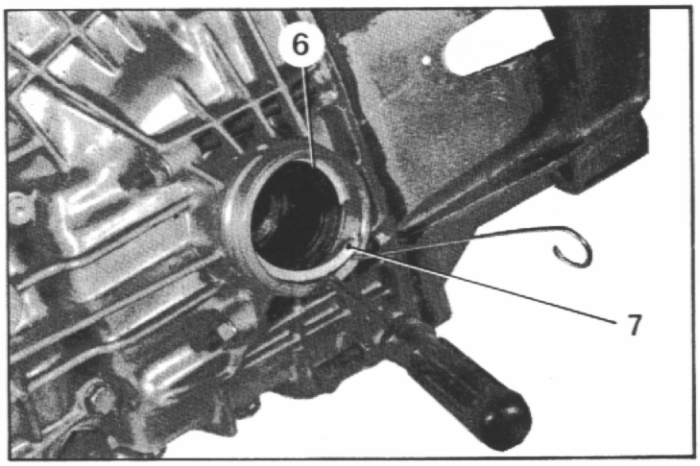


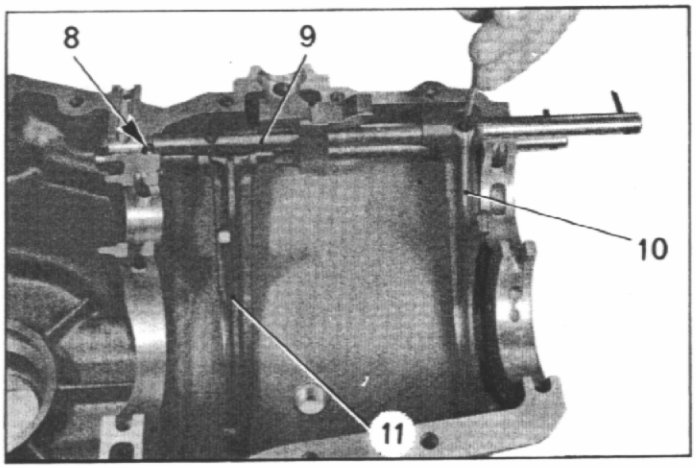
NOTE : If the gearbox is being dismantled for a overhaul without exchange of :

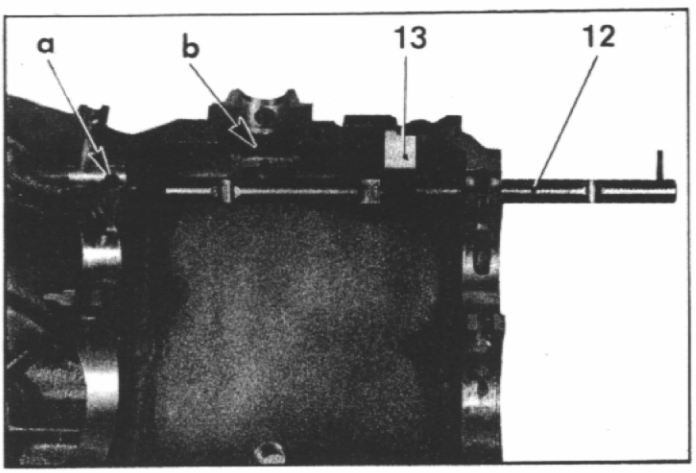
- the gearbox casing,
- the crown wheel and pinion,
- the differential bearings,
- the differential casing.

mark the position of the shims (left-hand or right-hand) to avoid having to reset the conic distance.









II. STRIPPING THE ASSEMBLIES

1. Strip the left-hand half casing :

a) Remove the cylindrical pin (5) locking the shaft (1).
Drive out the Mecanindus pin (2) holding the spacer (3) on the shaft (4 mm pin punch).
Drive out the shaft (1) with the aid of a bronze drift.
Remove the pinion (4) and the spacer (3).

b) If necessary, remove the circlip (7) from the output bearing.
Remove the seal (6).

c) Remove the filler cap (reversing light switch *on « Club » vehicles*).

2. Strip the right-hand half casing :

a) Remove the drain and level plugs.

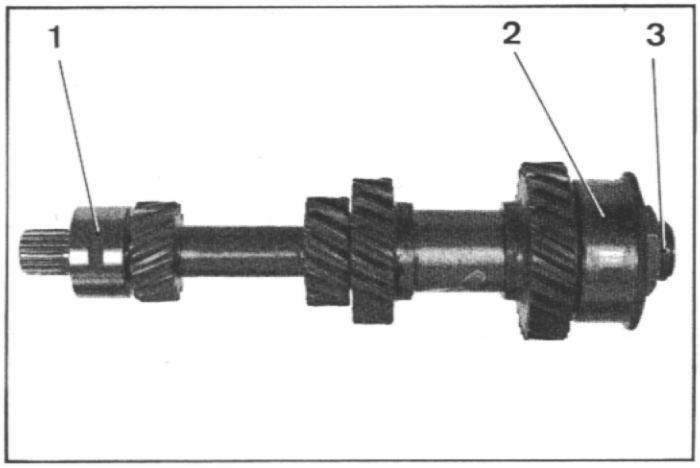
b) Remove the fork (10) of the 2nd and 3rd gear.
To do so :
- shift the shaft (9) and fork (10) assembly as far as possible towards the rear,
- drive out the Mecanindus pin holding the fork on the shaft (4 mm pin punch),
- free the shaft from the rear,
- remove the fork (10),
- remove the locking ball (8).

c) Remove the fork (11) of reverse gear and 1st gear. To do so :
- shift the fork (11) and shaft (12) as far as possible towards the front (differential end).
- drive out the Mecanindus pin holding the fork on the shaft (4 mm pin punch).
- move the shaft (12) towards the rear by placing a finger on orifice « a » to avoid losing the locking ball.
- remove this ball and its spring.
- remove the fork (11).

d) Remove the intermediate control lug (13) which operates the reverse gear shaft. To do this :
- shift the shaft as far as possible towards the rear so that the control lug comes to rest against the rear wall of the casing.
- drive out the Mecanindus pin holding the control lug on the shaft. Completely release the Mecanindus pin by shifting the lug (13) towards the front and by swinging it into the recess « b ».
- free the shaft (12) from the rear.
- remove the intermediate lug (13) operating the reverse gear shaft.

e) If there are any, remove the Mecanindus pins from the control switch on the shafts (9) and (12) (2 mm pin punch).

8281



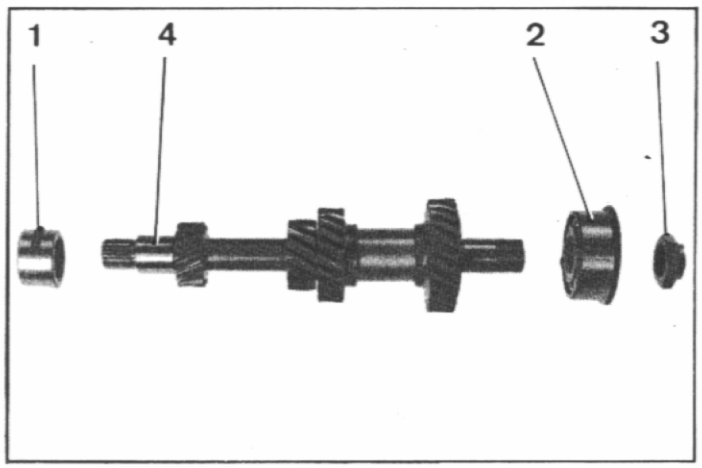
3. Strip the primary shaft :

a) Remove the needle bearing (1).

NOTE : The inner cage (4) is not interchangeable.

b) Fit the shaft in a vice equipped with jaws.
Remove :
- the nut (3) (locked with tab-washer) (29 mm spanner),
- the bearing (2).

8264

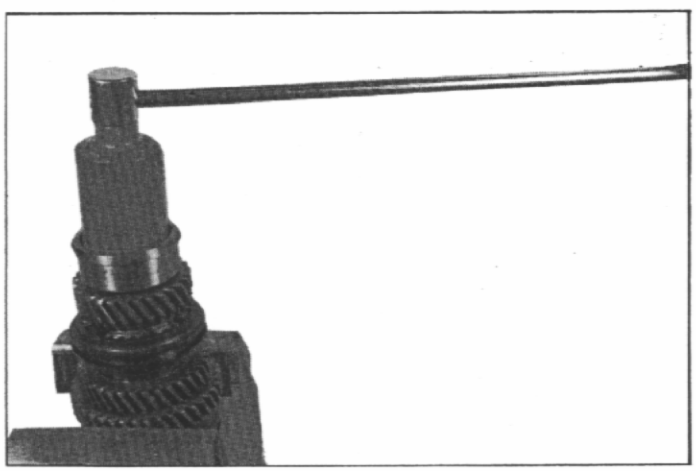


4. Strip the bevel pinion shaft :

IMPORTANT : *Since the bearing surfaces of the pinions of 2nd and 3rd gear on the shaft have been given a special treatment, all traces of scratches or damage risk causing a « seizure » of the operating parts. If these parts are to be reused, take all the necessary precautions during disassembly.*

a) Fit the bevel pinion assembly in a vice equipped with jaws, gripping either the reverse gear loose pinion or the first gear loose pinion.
Lock the bevel pinion rigidly with the pinion gripped in the vice by shifting the relevant slider in the appropriate direction.

8270

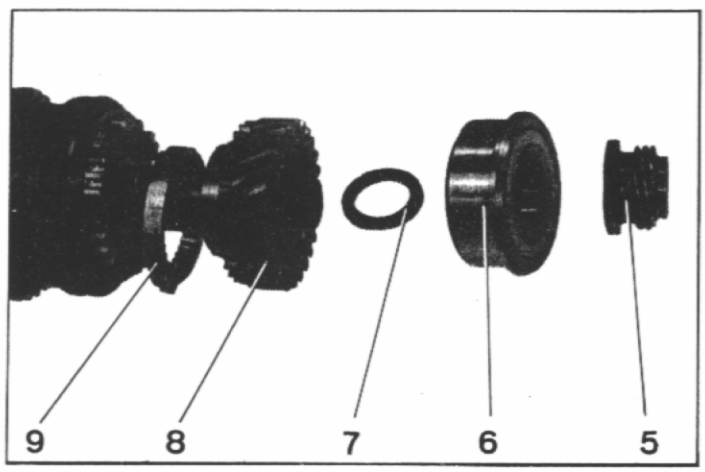


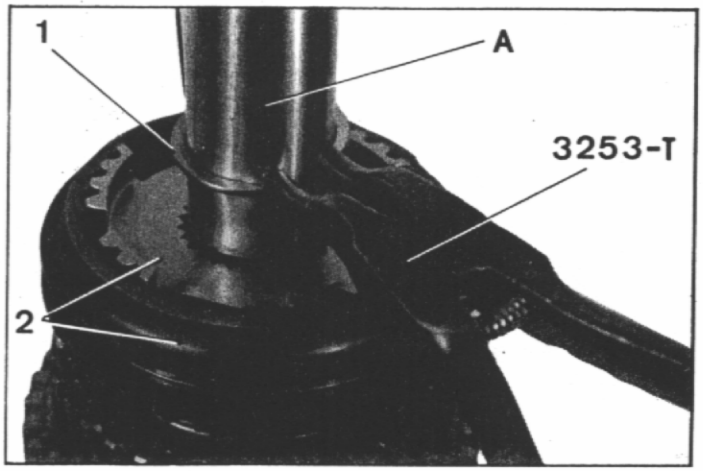
b) Remove :
- the hex.-head bolt (5) (locked with tab washer) (36 mm spanner)
- the bearing (6),
- the adjusting washer (7) for the conic distance
- the 3rd gear loose pinion (8),
- the 3rd gear synchro ring (9).

NOTE : If the gearbox is being overhauled without changing :
- the gearbox casing,
- the bevel pinion,
- the bearing (6)

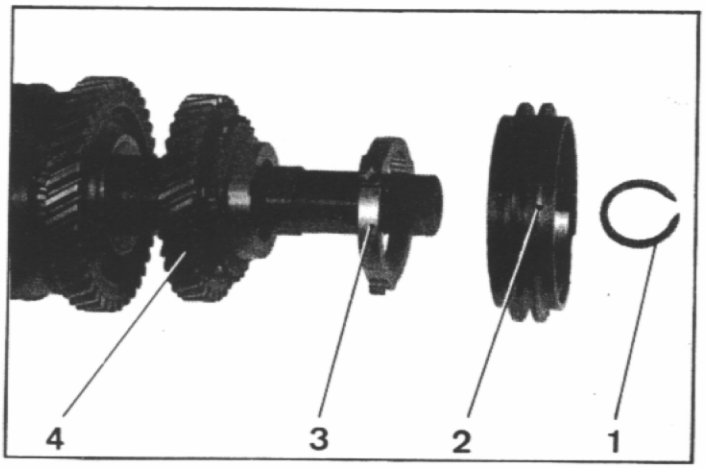
retain the adjusting washer (7) to avoid having to reset the conic distance.

7292



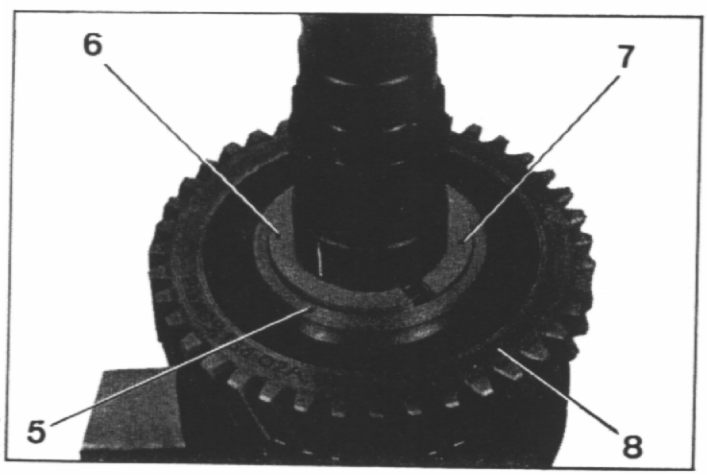


c) Remove the locking ring (1) from the synchro hub (2) of 2nd and 3rd gear. To do so :
- wrap the end of bevel pinion shaft in a sheet of foil A (0.10 mm thickness). Hold it against the ring (1). Slightly separate the ends of the ring with the aid of pliers 3252-T.
- slip the foil under the ring (1), remove the ring by sliding it one the foil.
- remove :
  - the 2nd and 3rd gear synchro,hub-slider assembly (2),
  - the 2nd gear synchro ring (3),
  - the 2nd gear slider (4).



NOTE : The 2nd/3rd gear synchro rings are identical.
However, if these parts are not replaced, they must be kept paired with the corresponding pinions.

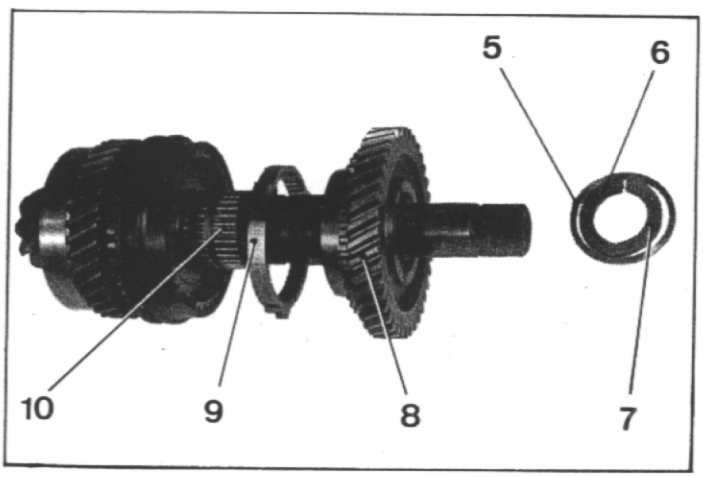
d) Remove the 1st gear loose pinion.
Release the washer (5) and remove the two half washers (6) and (7).
Remove :
- the 1st gear pinion (8),
- the 1st gear synchro ring (9),
- the needle cage (10).

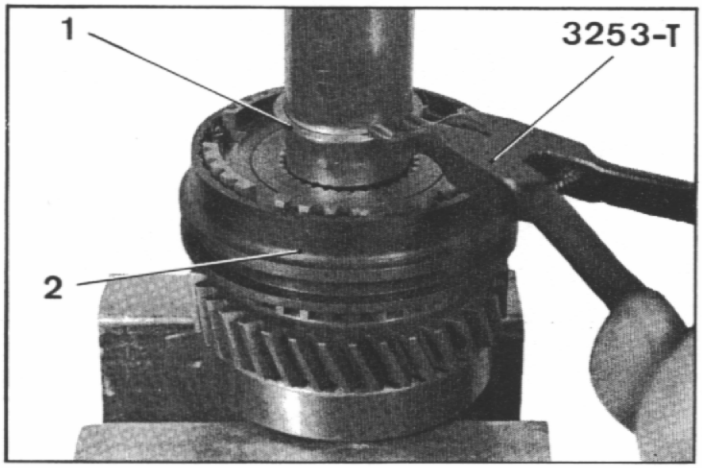


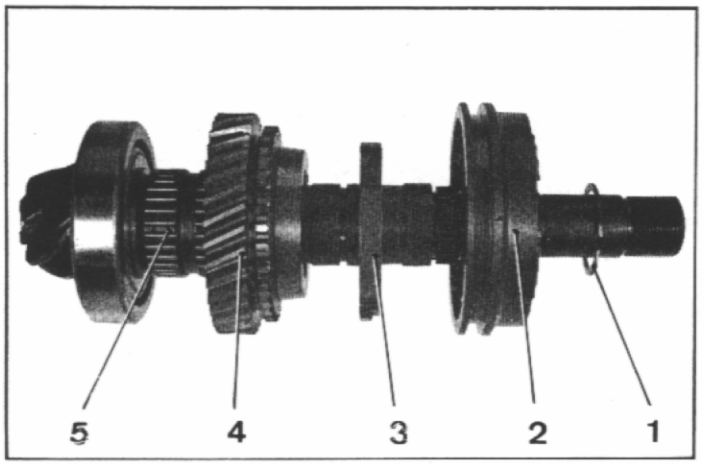
NOTES :

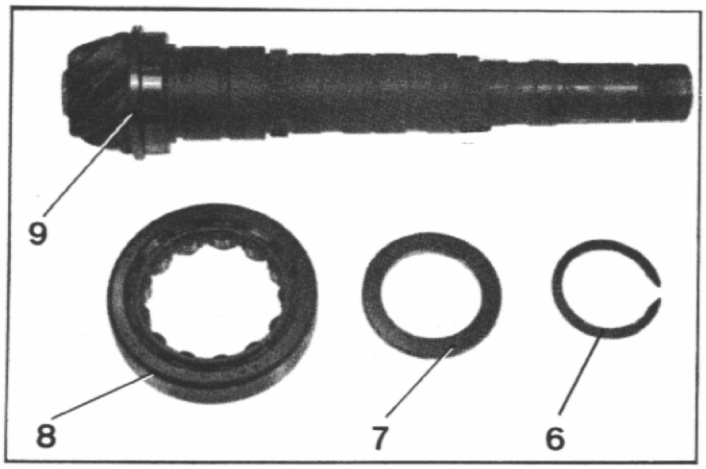
- The reverse and 1st gear synchro rings are identical.
  However, if these parts are reused, they must be kept paired with the corresponding pinions.

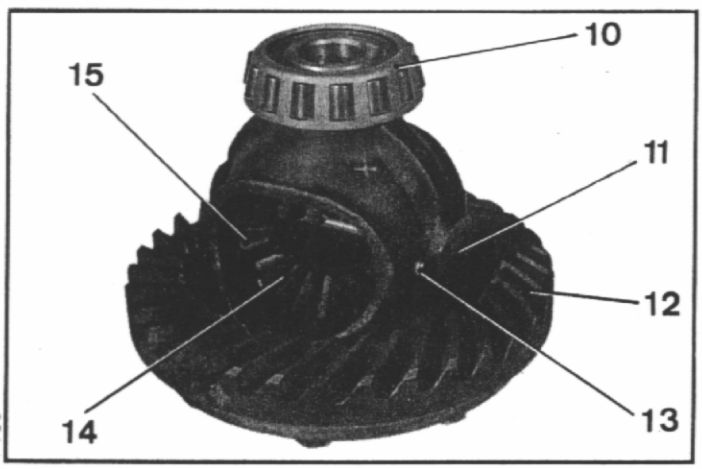
- These synchro rings are different from those fitted to the four-speed mechanical clutch gearbox.











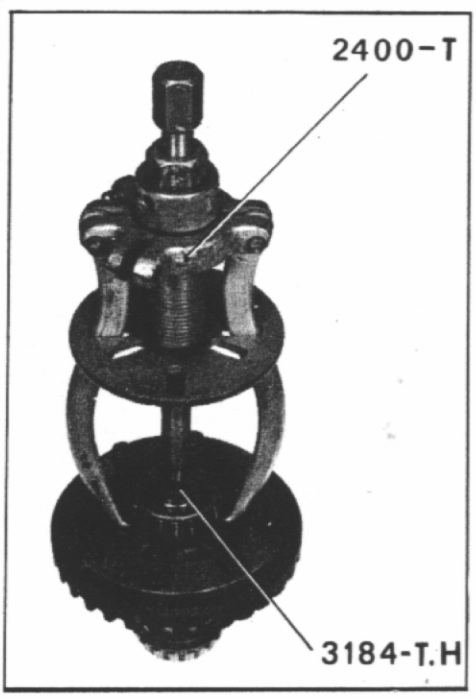
e) Remove the locking ring (1) from the reverse and 1st gear synchro hub; proceed in the same manner as for the removal of the locking ring of the 2nd/3rd synchro hub (paragraph c).
Remove :
- the reverse-1st gear synchro hub and sliding gear assembly (2),
- the reverse gear synchro ring (3),
- the reverse gear loose pinion (4),
- the needle cage (5).

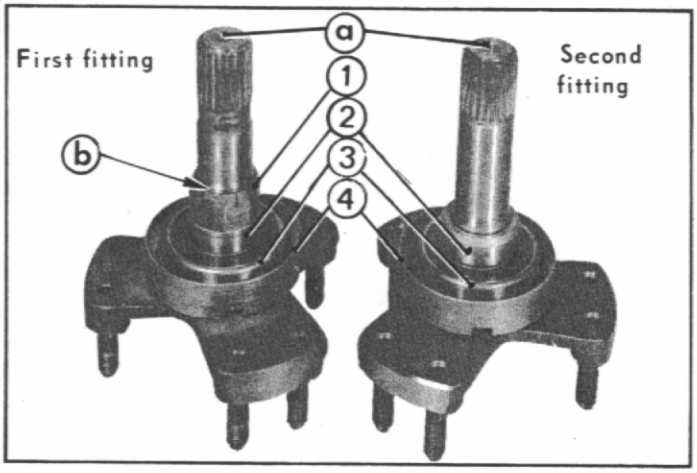
f) If necessary, remove the front bearing of the bevel pinion.
To do so :
Remove :
- the locking ring (6) (take the same precautions as for the removal of the locking rings from the synchro hubs (see paragraph c),
- the thrust washer (7),
- the bearing (8),
- the inner cage (9) of bearing (8),
Using a press and a tube 50 mm in diameter and 60 mm length.

NOTE : The bevel pinion of the converter gearboxes do not have retarding dowels.

5. Dismantle the differential :

Remove the pin (13) and drive out the shaft (11).
Remove the two satellite gears (15) and then the two planetary gears (14).
Remove the crownwheel (12).
Remove the bevel bearings (10) (use universal extractor 2400-T and pad 3184-T.H).



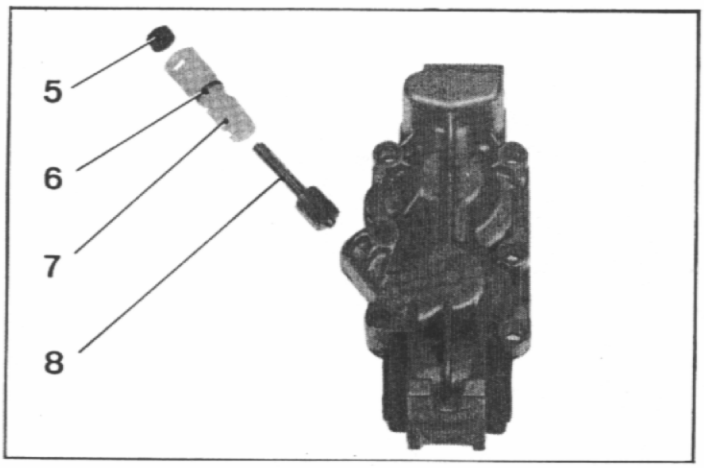


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6. Strip the differential shafts :

Grease the visible portion « b » of the thread.
Remove :
- the nut (1) (if fitted),
- the bush (2),
- the bearing (3) and the ring-nut (4) (using an extractor bearing under the ring-nut (4) as close as possible to the shaft).

NOTE : The extractor used should have a central screw fitted with a ball to avoid damage to end « a » of the shaft.



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7. Strip the rear cover :

Free the speedometer drive socket (7) from the casing.
Uncouple the pinion (8) from the socket.
Remove the seals (5) and (6).

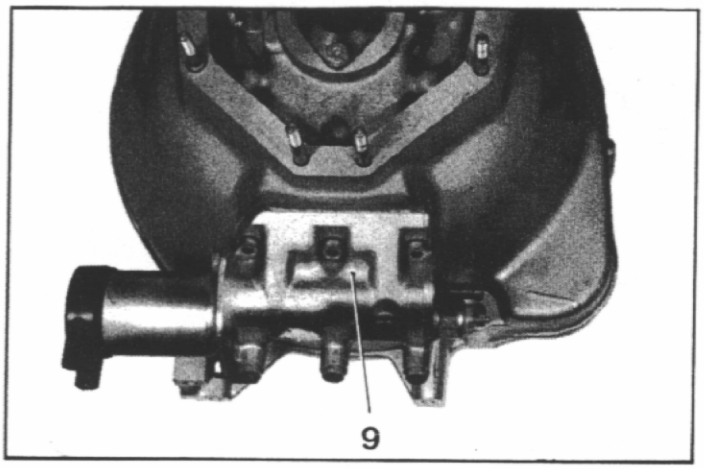
8. Strip the converter casing :

a) Remove the distributor assembly (9) (6 mm Allen key).

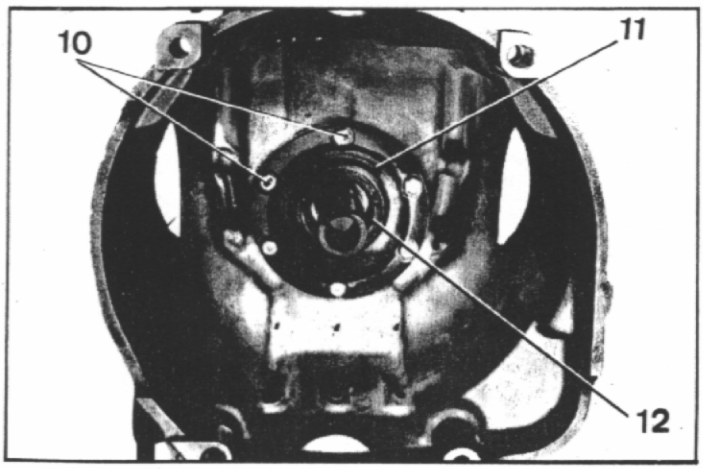
b) Remove the oil pump. To do this :
- mark the position of the pump in relation to the converter casing.

Remove :
- the bolts (10) holding the pump casing,
- the pump casing (11) and the pinions.

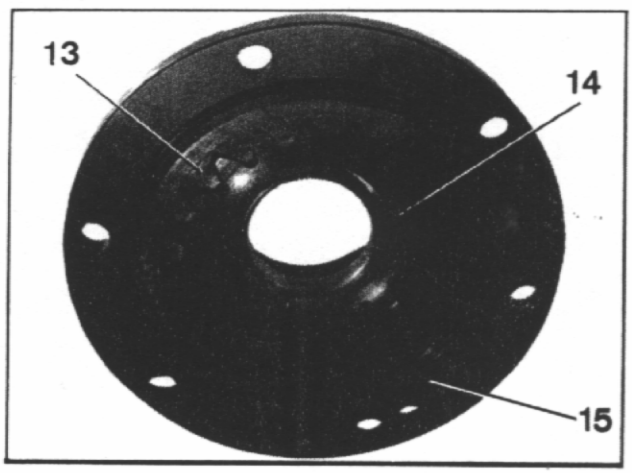
c) Remove :
- the pinions (13) and (14),
- the O-ring seal (15),
- the seal (12).



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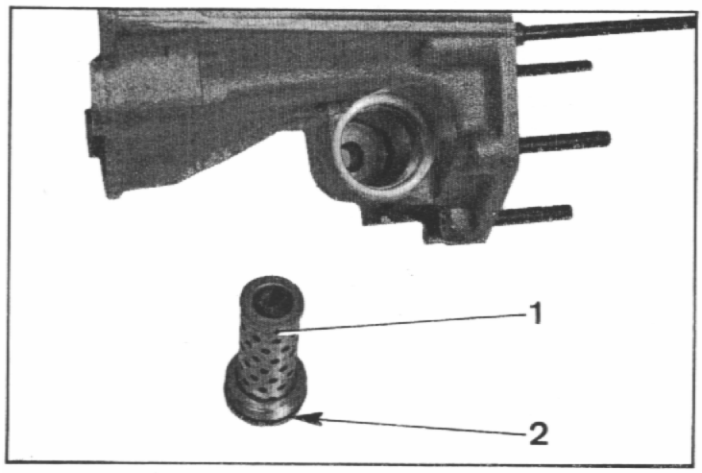


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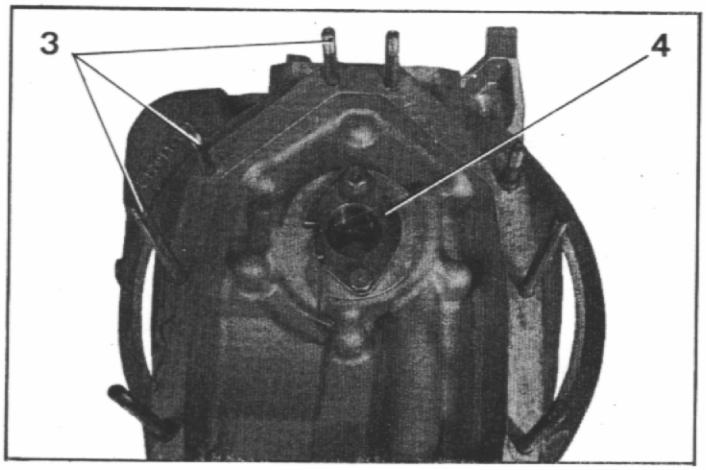


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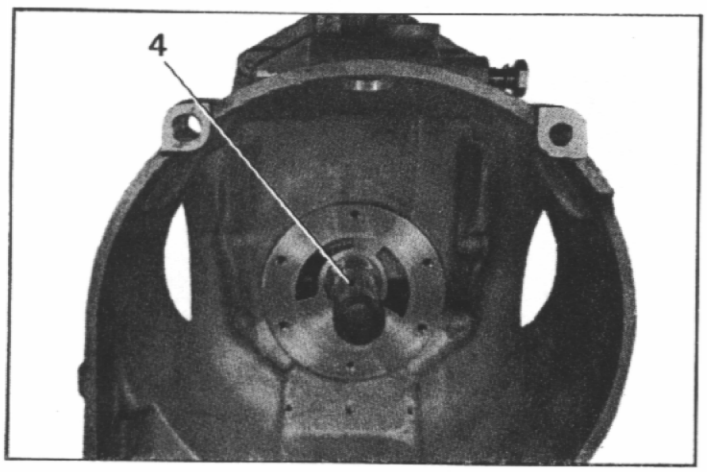
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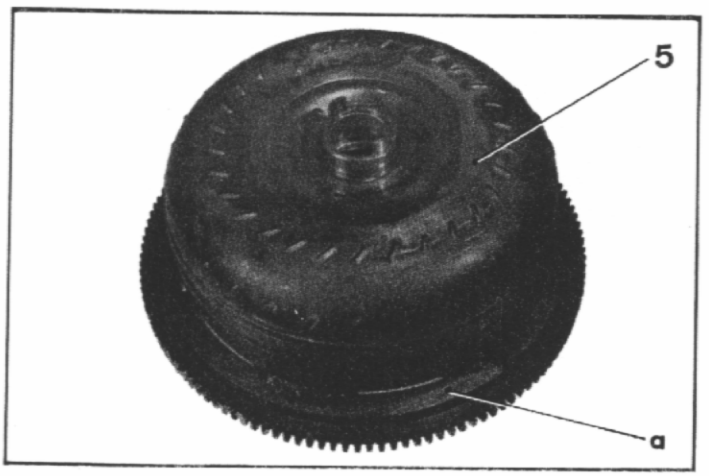
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Manual 810-2



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d) Remove the oil strainer (1) and free the O-ring seal (2).

e) Remove the studs (3) (stud extractor 2410-T). IMPORTANT : Never remove the stator sleeve(4) This part is not sold separately and can only be fitted in a repair workshop.

9. Drain the converter :

Turn the converter upside down over a vessel and allow to drain for several hours.

10. Remove the starter gear-ring (if necessary) :
To do so :

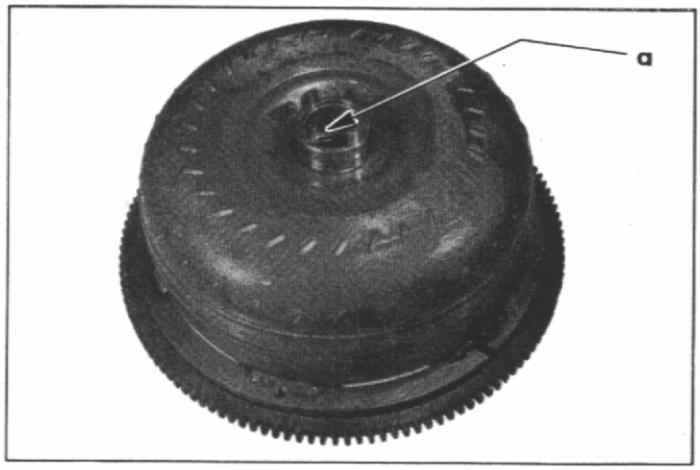
a) Turn the converter (5) the right way up so that the flange « a » rests on two planks at least 120 mm thick.
Drive out the starter ring with the aid of a caulking chisel while turning the converter on planks in order to never strike an overhanging blow on the starter gear-ring.

b) Fit the new starter gear-ring :
Turn the converter upside down and rest it on the planks.
Carefully clean the flange « a » at the location of the starter ring.
Heat the new starter ring using a blow-torch fitted with an 800 to 1000-litre jet.
Direct the flame towards the inside bore of the starter ring while continually rotating it so that expansion takes place uniformly.
Stop heating when the starter ring temperature reaches 200° C (pale straw colour).
Offer up the starter ring on the flange *the teeth entry towards the gearbox*. Perform this operation rapidly. Using a bronze drift if necessary.

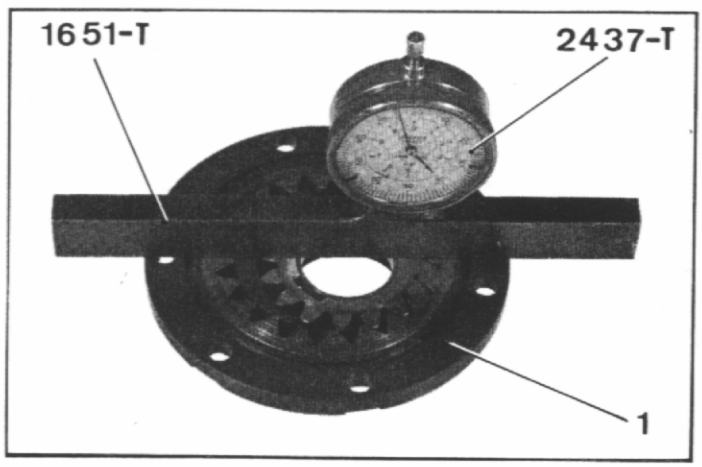
11. Clean the parts :

NOTES :

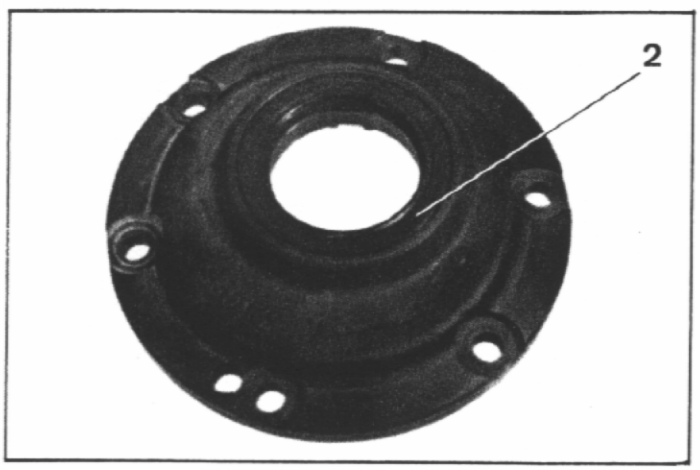
- The bearing surfaces for the different pinions on the bevel pinion shaft should be free from defects. These surfaces must not be given any treatment whatsoever.
- Blow through the oil passages in the casing with compressed air.
- Complete the cleaning of the joint faces with alcohol.



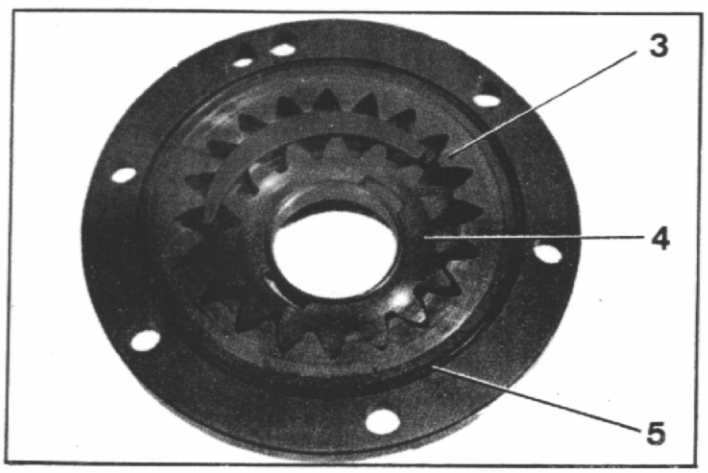
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III. PREPARING THE ASSEMBLIES.

1. Fill the converter with **TOTAL Fluid T oil** (this oil is used in the converter and the gearbox).

   NOTE : For this operation, rest the converter flat on the bench. Fill the converter through the orifice « a » in stages because the oil takes a certain time to percolate through the various parts of the converter.

   If the converter has been properly drained, it should take about 1.5 litre of oil. The converter must not be completely filled until after the gearbox has been fitted to the vehicle. (True oil capacity of the converter about 2.3 litres).

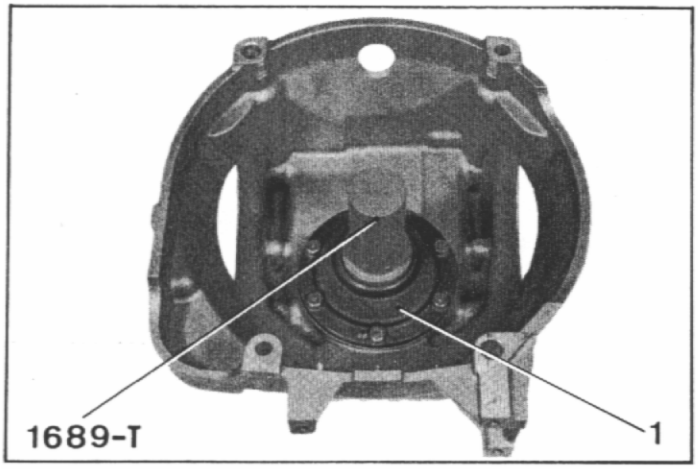
2. **Prepare the oil pump :**

   a) Check the lateral play of the gears : Fit the gears in the pump casing (1). Fit a dial gauge 2437-T on straight edge 1651-T and calibrate the assembly on a surface plate. Fit the calibrated assembly on the pump casing and measure the clearance between the bearing face of the casing and each of the gears (3) and (4). *This clearance must be between 0.03 and 0.06 mm.*

   b) Fit the seal (2). To facilitate fitting, smear the cover bore and the seal periphery with grease.

3. **Prepare the converter casing :**

   a) Fit the oil pump :
   - Oil the gears (3) and (4).
   - Stick the O-ring seal in its groove using grease.



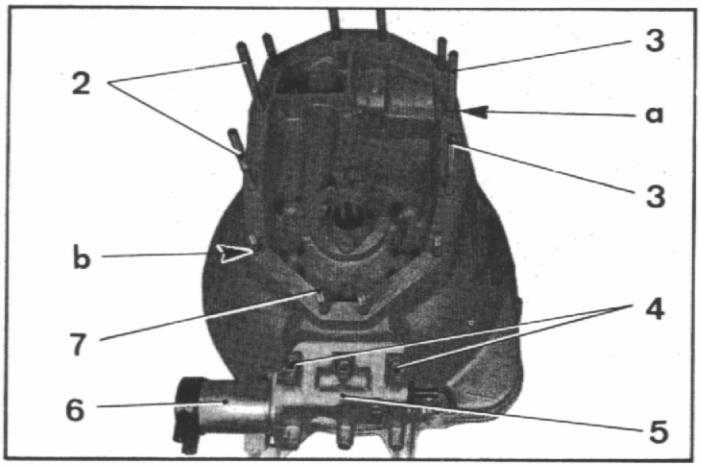
- Fit the oil pump (1) in the converter casing.
- *Centre the pump with the aid of mandrel 1689-T.*
- Fit and tighten the bolts holding the pump to 19 mAN (1.9 m.kg) (no washer under the head of the bolt).

b) Fit the distributor :

Smear the distributor joint face (5) with CURTYLON sealing compound.

Fit the distributor on the converter casing, the electromagnet (6) towards the right of the casing.

Fit and tighten the bolts (4) to 12 to 17 mAN (1.2 to 1.7 m.kg).



c) Fit the assembly studs (stud inserter 2410-T).

There are three different lengths of stud.

Fit them in the following way :

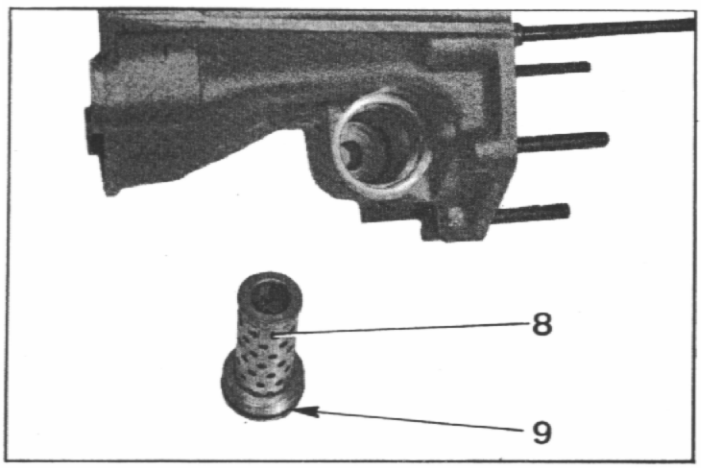
- at (2) and (3) : the four longest studs,
- at (7) : the medium length stud,
- in the other positions : the shortest studs

NOTE : Make sure that there are two centring bushes in « a » and « b ».

d) Fit the oil strainer :

Fit the O-ring (9) on the strainer (8).

Screw the strainer into its housing on the converter casing, tighten it to 10 to 15 mAN (1 to 1.5 m.kg).



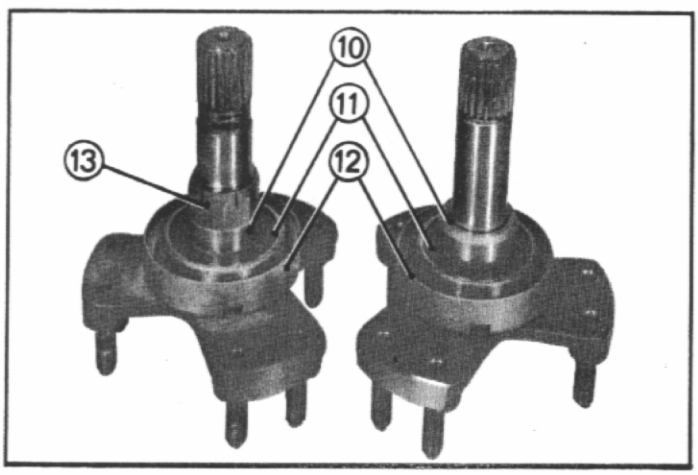
4. Prepare the differential shafts :

Fit on each shaft :

- the ring - nut (12),
- the bearing (11) (fit in a press using a tube with inside diameter 26 mm, outside diameter 34 mm, and length 120 mm)
- the bush (10).

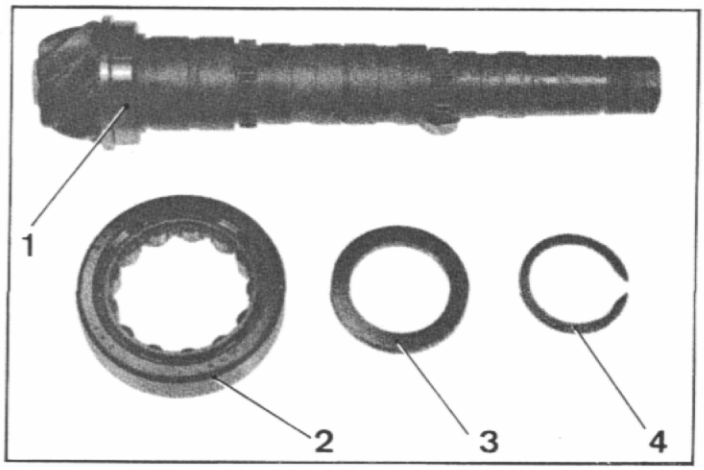
NOTE : This bush should not show any trace of scratches or damage. Otherwise, replace it.

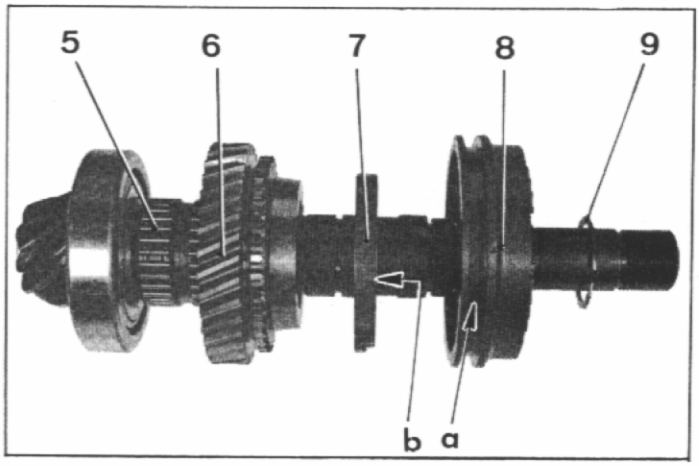
Fit and tighten the nut (13) to 140 to 160 mAN (14 to 15 m.kg) (if fitted).

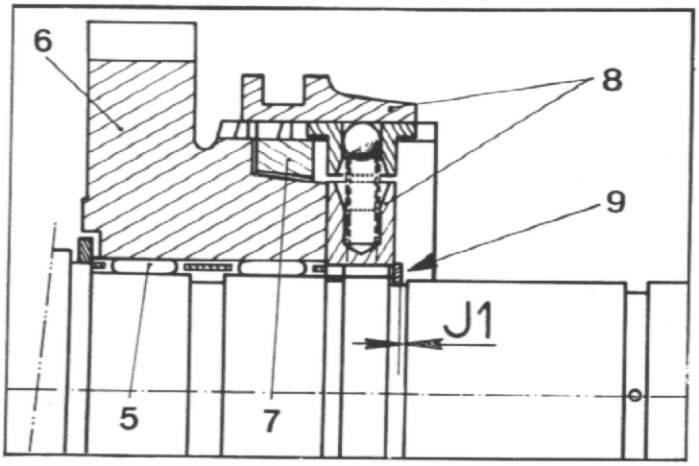


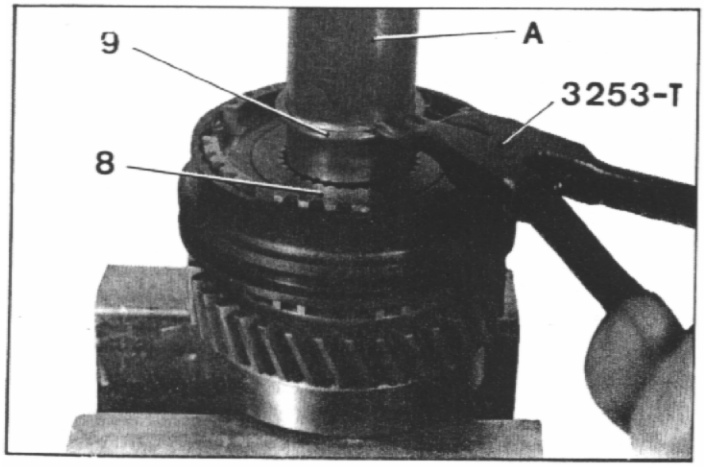
5. Prepare the bevel pinion assembly :

IMPORTANT : *The bearing surfaces for the 2nd and 3rd idling gears on the bevel pinion shaft have been given a special surfacing treatment, therefore any trace of scratches or damage risks causing « seizure » of the operating parts.*
It is, therefore, necessary to take the necessary precautions when fitting these parts.
Lubricate all the parts before fitting.









NOTE : The section of the ends of the stop rings is slightly relieved. Position the pointed part of the ends on the opposite side to the synchro ring so as to make it easier to remove the stop ring with circlip pliers 3253-T.

a) Fit the roller bearing :

Fit :

- on a press the inner cage (1) using a tube (inside diameter 45 mm, length 220 mm),
- the bearing (2) (the small diameter of the roller cage towards the pinion toothing)
- the thrust washer (3) (the face without markings towards the rollers),
- the stop ring (4) using pliers 3253-T, protecting the bearing surface for the reverse gear pinion with a sheet of foil (see paragraph d).

b) Fit :

- the needle cage (5),
- the reverse gear pinion (6),
- the reverse gear synchro ring (7),
- the reverse/1st gear synchro hub-sliding gear assembly (8) (groove « a » towards reverse gear pinion).

NOTE : The reverse/1st gear synchro rings are different from those of 1st and 2nd gear fitted on a four-speed gearbox.
They are marked with three equidistant bosses (120°) cast integrally (0.5 mm thickness) and fitted at « b » on the hub side face of the synchro.

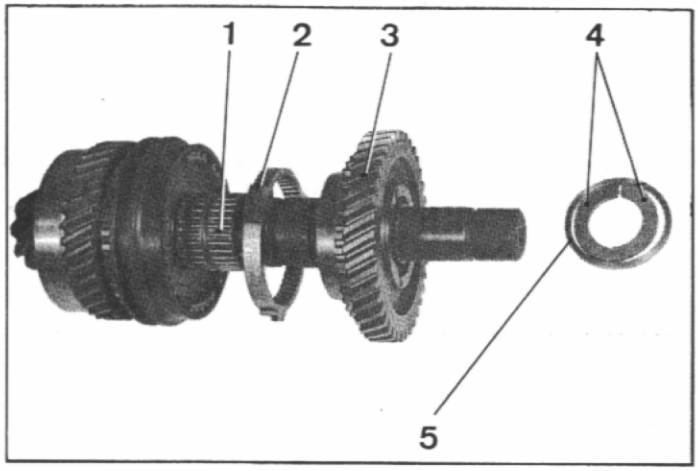
c) *Adjust the axial clearance of the reverse/1st gear synchro hub :*

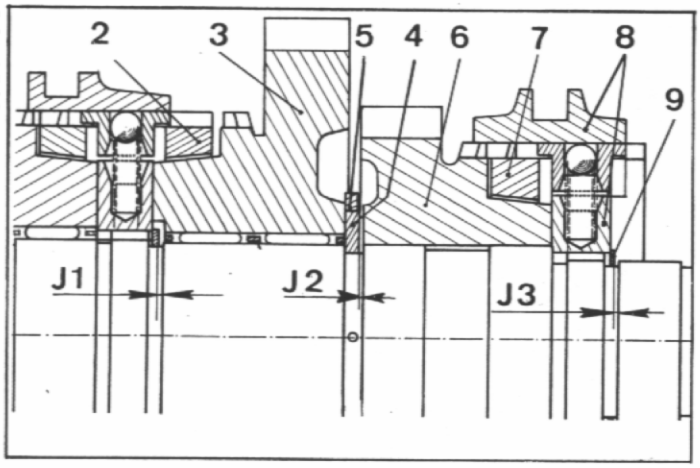
From the stop rings sold by the Replacement Parts Department, choose the one which gives a maximum clearance J1 = 0.05 mm (a 0.05 mm shim must not pass between the ring (9) and the side of the groove). The ring thicknesses are available in steps of 0.04 mm.

d) Fit the stop ring (9) :

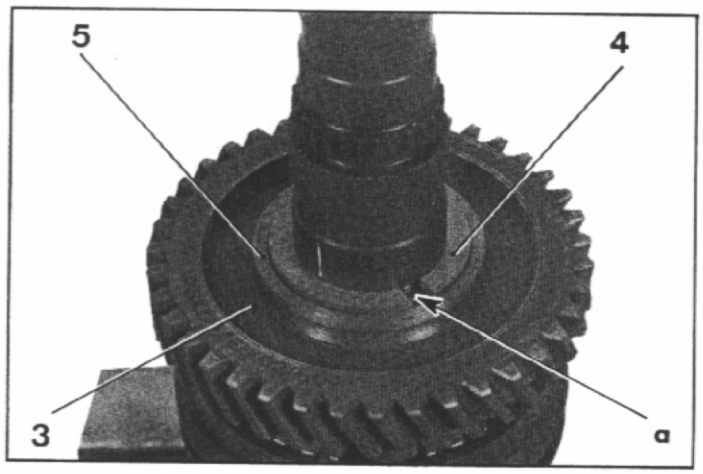
Wrap the bevel pinion with a sheet of foil A (thickness of 0.10 mm).

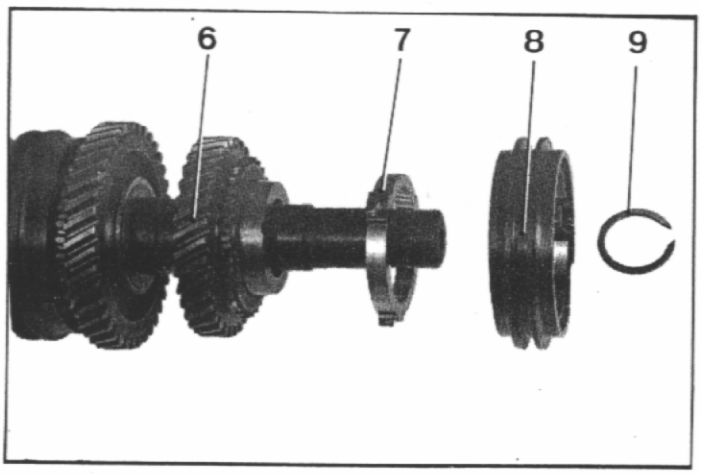
With the aid of pliers 3253-T, separate the rings ends. Engage the ring on the foil.
Slide the foil-ring assembly until the ring can enter the groove.





Manual 810-2





e) Fit :
- the needle cage (1),
- the 1st gear synchro ring (2) (See note paragraph 5 b),
- the 1st gear pinion (3).

NOTE : *Since March 1, 1971* the 1st and 2nd gear synchro rings and pinions have been modified.

On gearboxes produced prior to that date, the exchange of a ring will entail the exchange of the corresponding pinion.

f) *Adjust the clearance of the 1st and 2nd gear wheels by choosing the thickness of the half-washers (4) :*

With the half-washers fitted, there should be a *maximum clearance J2 = 0.05 mm* between the half-washer and the side of the groove. (A 0.05 mm shim must not be able to pass). The half-washers are available in steps of 0.03 mm; choose the thickest half-washers which will fit into the groove.

NOTE : The two half-washers must have the same thickness.

Fit the two half-washers (4) on both sides of the stop pin « a ». Fit the washer (5).

g) Fit :
- the 2nd gear pinion (6),
- the 2nd gear synchro ring (7),
- 2nd/ 3rd gear synchro hub-sliding gear assembly (6).

NOTES :
- The assembly (8) is symmetrical.
- See Note in paragrah e).

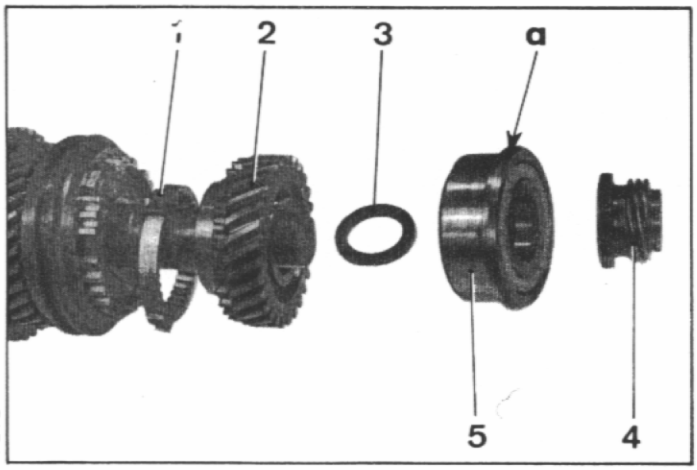
h) *Adjust the axial clearance of the 2nd/ 3rd gear synchro hub :*

There should be a *maximum clearance J3 = 0.05 mm.*

Proceed as for the 1st/ reverse gear synchro hub (see paragraph c).

i) Fit the stop ring (9).

Proceed as for the 1st/reverse gear synchro hub locking ring (see paragraph d).



7292

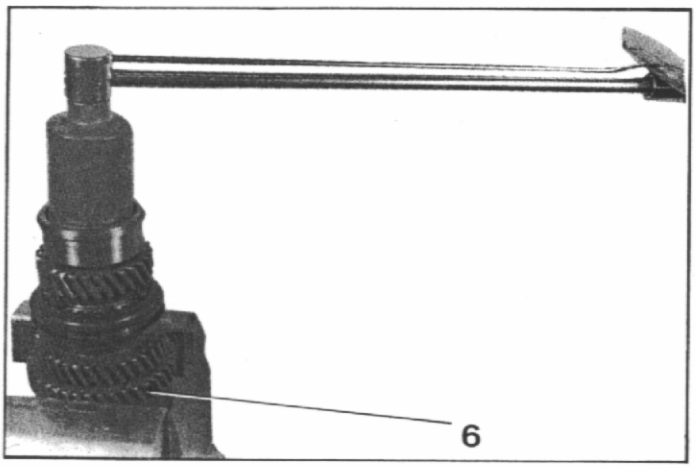
j) Fit :
- the 3rd gear synchro ring (1),
- the 3rd gear pinion (2),
- an adjusting washer (3) of known thickness,
- the bearing (5) (the shoulder « a » facing the rear of the bevel pinion),
- the hex.-head bolt (4).

Tighten the nut (4) to 100 to 120 mΛN (10 to 12 m.kg) (36 mm socket and torque wrench). Do not peen the nut.

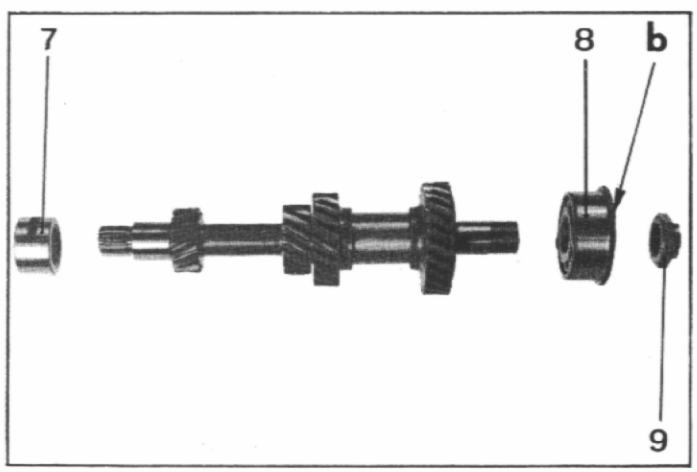
NOTE : To hold the bevel pinion during the operation, clamp in a jawed vice the 1st gear pinion (6) integrated with the bevel pinion shaft by the 1st/reverse gear slider.

CAUTION : Never grip the sliders in a vice.

IMPORTANT : Before proceeding to the conic distance adjustment, it is essential to fit an adjusting washer (3) and to tighten the nut (4) to the required tightening torque.



8270



8264

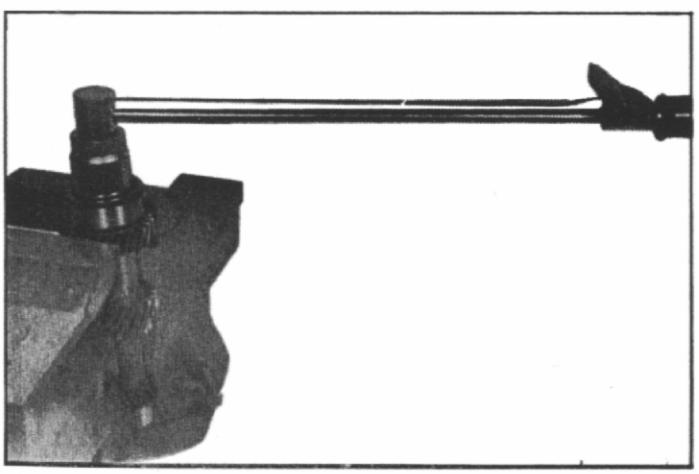
6. Prepare the primary shaft :

a) Fit the ball bearing (8) with the shoulder « b » towards the rear.

Hold the shaft by clamping one of its pinions in a vice fitted with jaws.

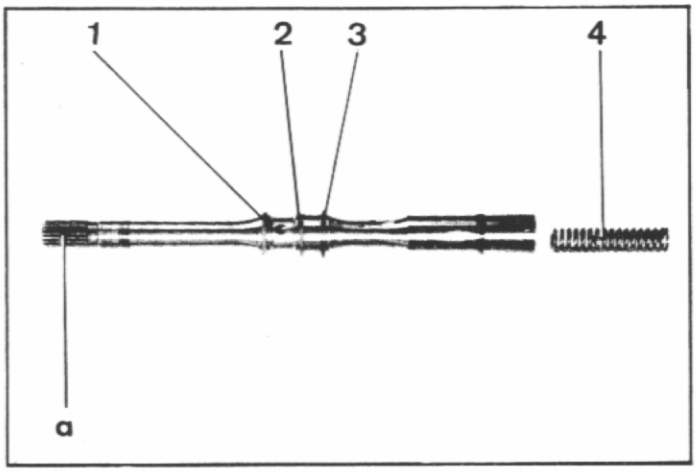
Tighten the nut (9) to 70 to 85 mΛN (7 to 8.5 m.kg) (29 mm key).

Lock the nut by knocking over the metal.


8271

b) Fit the needle bearing (7).

8282



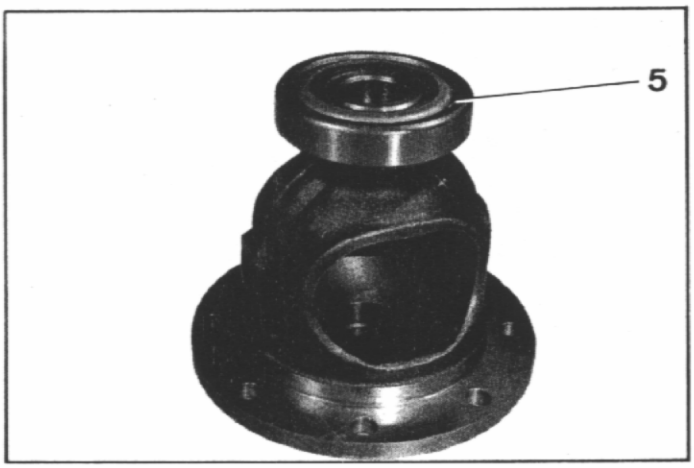
7. Prepare the control shaft :

Oil the seals (1) and (2), fit them on the shaft from the splined end of the shaft « a ».

Fit the circlip (3), replacing it if necessary.

NOTE : The spring (4) will only enter its housing when the shaft is fitted into the converter.

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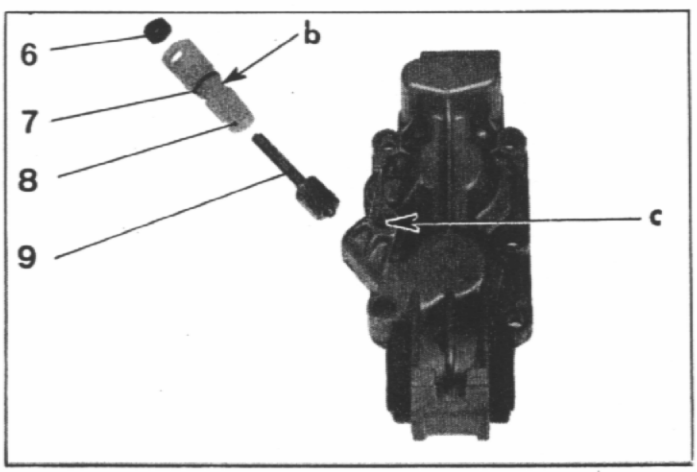
8. Prepare the differential casing :

Press fit the conical roller bearings using a tube (inside diameter = 36 mm, outside diameter = 45 mm, length = 40 mm).

NOTES :

- Do not invert the outer cages of the bearings.
- The differential casing must not be completely built up until after the crownwheel and pinion have been adjusted.

9239



9. Prepare the rear cover :

Fit the rubber seal (6) and the O-ring (7) on the speedometer drive socket (8) (new seals).

Engage the pinion (9) (shaft greased beforehand). in the socket (8).

Engage the speedometer drive assembly into the cover with the groove « b » of the socket (8) orientated for the screw at « c ».

10. Fit the seals of differential shafts :

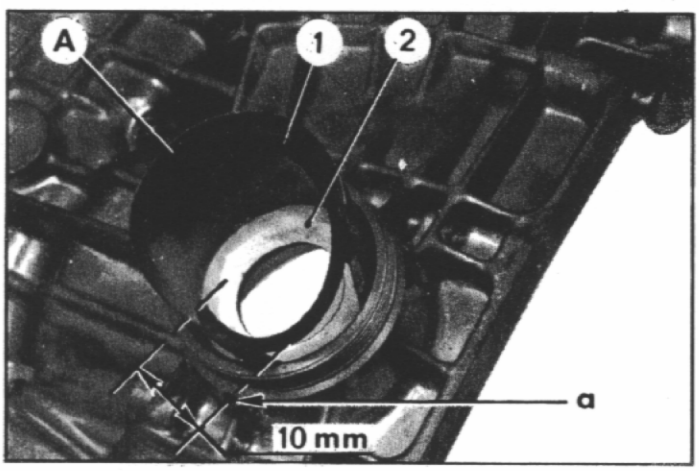
a) On each half casing : grease the casing bore and seal periphery. Offer up the seal in its bore, *with the lip towards the inside of the casing.*

b) *Gearbox without bearing circlip :*

Fit the seal using mandrel 3184-T.E (contained in tool box).

NOTE : After fitting, the seal is 3 ± 0.5 mm below the bearing face of the differential bearing.

c) *Gearbox with bearing circlip :*



Manual 810-2

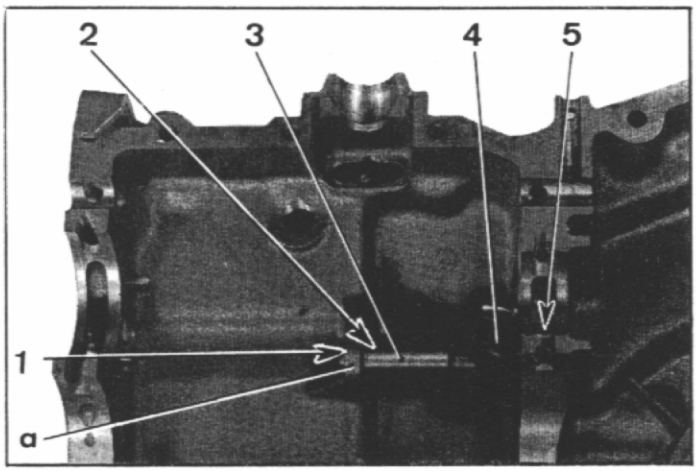
11247

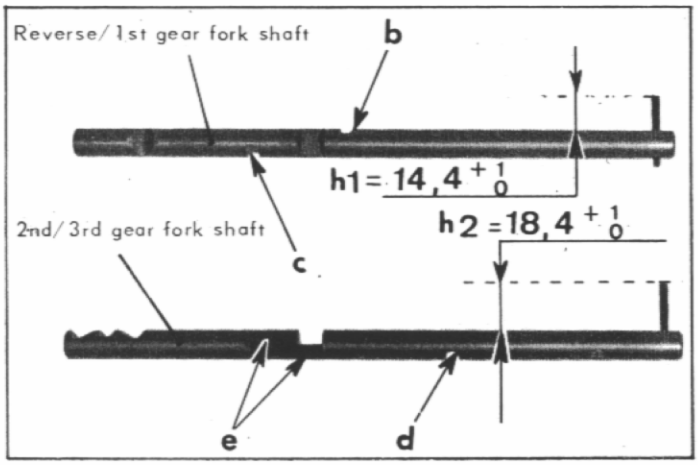
Fit the seal (2), using a 51 mm diameter tube or a 36 mm socket spanner.

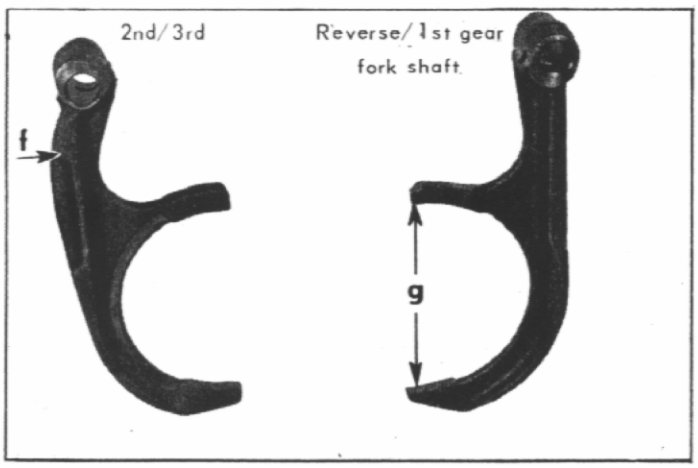
Press in the seal to the level of the circlip groove. Fit into the bore (1) the circlip using a sheet of foil A of length = 150 mm, width= 60 mm, and thickness = 0.20 mm. (Use the tube or the socket spanner to finally position the circlip).

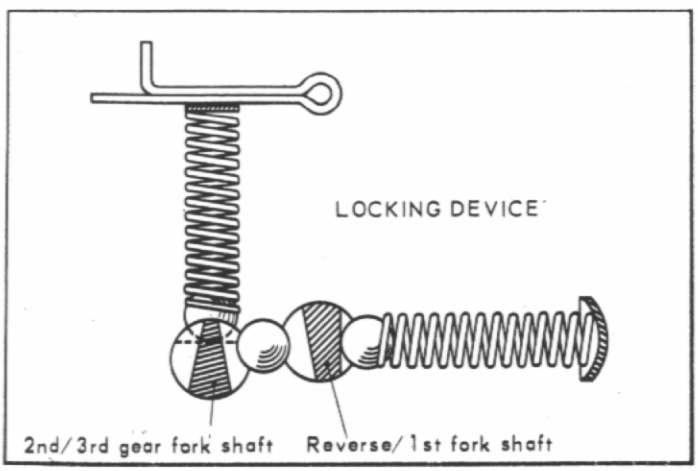
Remove the foil and position the circlip and seal with the aid of the mandrel used for gearboxes without circlips.

NOTE : After fitting, one of the ends of the circlip must be about 10 mm from the drain hole « a ».









11. Prepare the left-hand half casing :

Offer up the spacer (3) and the intermediate pinion (4) of the reverse gear in the half casing (see photo top left for positioning the spacer and pinion).

Oil the shaft (1). Support the spacer and pinion and engage the shaft (1) in boss « a » : the shaft end having the stop notch must be placed towards the differential.

Position the shaft so that the cylindrical pin (5) can be fitted.

NOTE : *The cylindrical pin (5) which locks the needle bearing of the primary shaft must stand slightly proud of the surface of this bearing.*

Fit the Mecanindus pin (2) which holds the spacer (3) on the shaft (1).

12. Prepare the right-hand half casing :

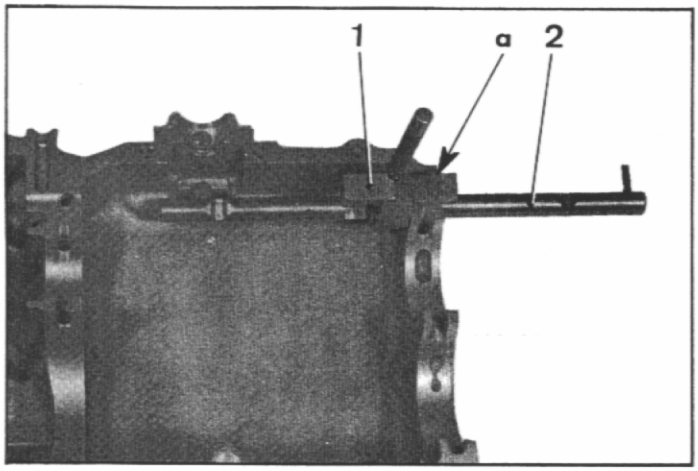
NOTES : Identification of shafts and forks :
- Shaft of reverse/1st gear fork : two notches for the fork locking pins at « b » and « c ».
- Shaft of 2nd/3rd gear fork : a single notch at « d » and two flats at « e ».
- Reverse/1st gear fork : distance « g » is greater than that on the 2nd/3rd gear fork which has a rounded rib at « f ».
- The three locking balls and springs are identical.

a) Fit the Mecanindus pins which operate the control switch unit on the fork shafts :
- Position the split of each pin perpendicular to the longitudinal axis of the fork shaft.
- Adjust the projection of each pin :
  - on the reverse/1st gear fork shaft :

$$b1 = 14.4 \begin{smallmatrix} +1 \\ 0 \end{smallmatrix} \ mm$$

  - on the 2nd/3rd gear fork shaft :

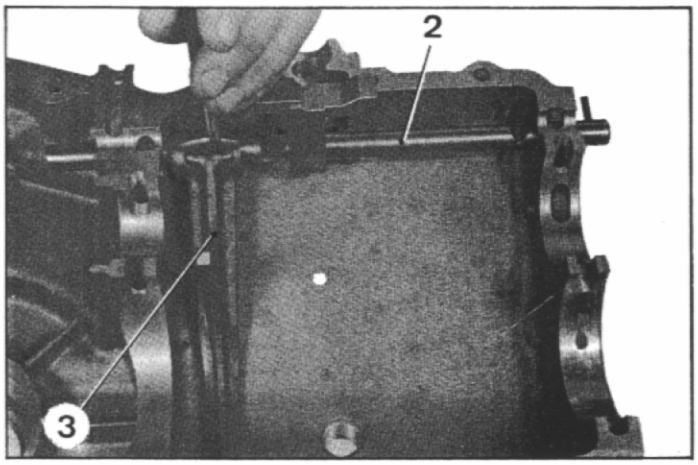
$$b2 = 18.4 \begin{smallmatrix} +1 \\ 0 \end{smallmatrix} \ mm$$



9549

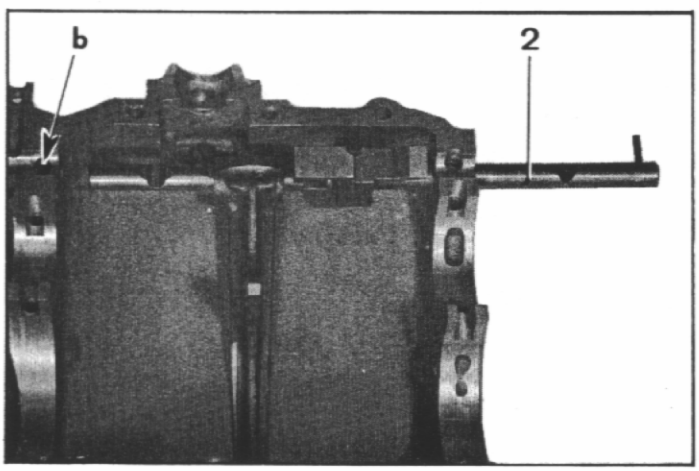
b) Fit the reverse/1st gear fork and shaft and the reverse gear operating lug :

CAUTION : *When fitting the Mecanindus pins which hold the lug or the fork on the shaft, hold the shaft-fork or shaft-lug assembly against one of the casing bearings to avoid bending the shaft.*



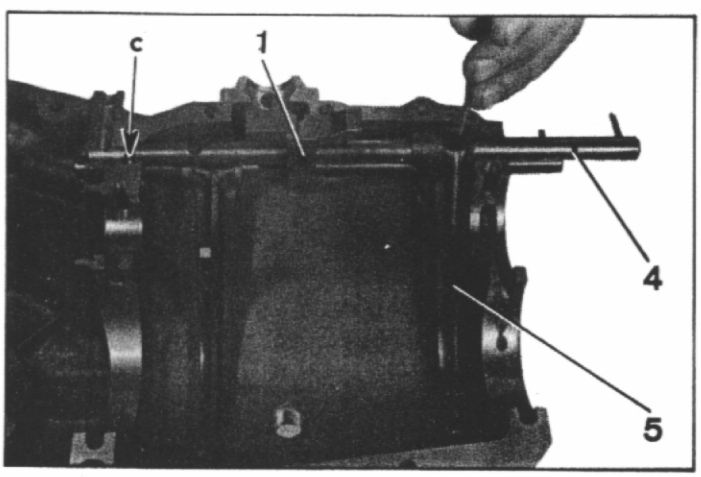
8240

- Engage the shaft (2) in the rear bearing of the casing.
  Engage the reverse gear operating lug (1) on the shaft (the lead-in « a » towards the rear of the casing).
  Fit the Mecanindus pin which holds the lug by holding the lug-shaft assembly against the rear bearing of the casing.
- Engage the reverse/1st gear fork (3) on the shaft (2).
  Move the shaft-fork assembly towards the front.
  Fit the Mecanindus pin holding the fork (3) against the front bearing of the casing.
- Move the shaft assembly (2), fork and lug towards the rear.
  Fit the locking ball and spring into their housing « b » (grease ball and spring beforehand).
  Compress the ball and spring (use 5 mm diameter rod) and insert the shaft (2) in the front bearing as far as « neutral » position.



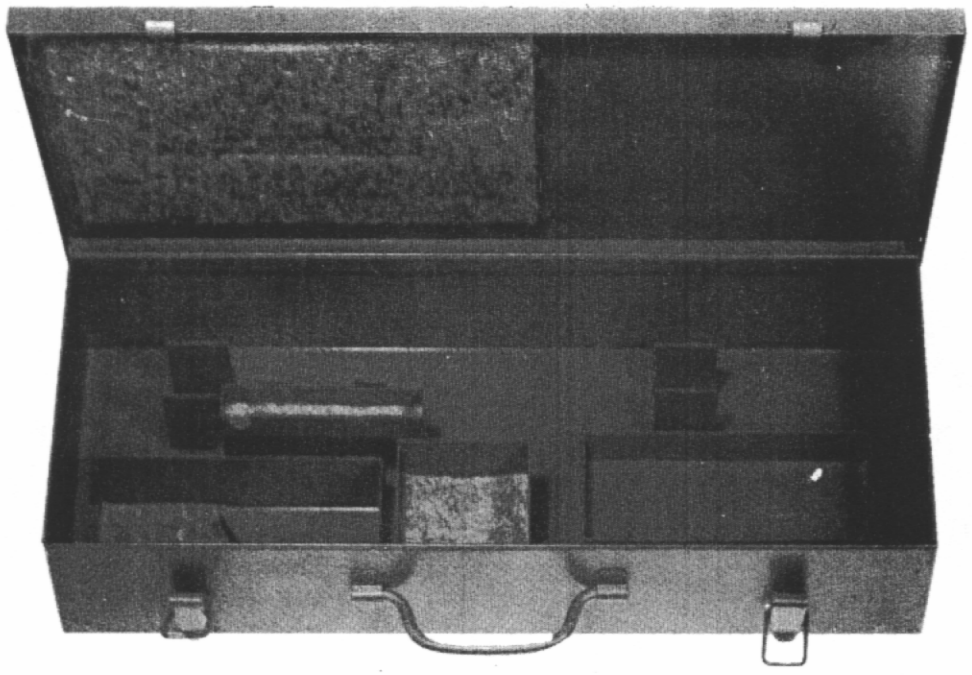
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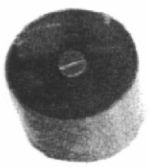
c) Fit the 2nd/3rd gear fork and shaft :
Grease and fit the ball between the reverse/1st gear shaft and the 2nd/3rd gear shaft at « a ».
Offer up the 2nd/3rd gear fork (5) in the casing.
Engage the shaft (4) in the fork (5) and then in the bore of the lug (1).
Fit the Mecanindus pin holding the fork (5) against the rear bearing of the casing.
Move the shaft (4) and fork (5) assembly as far as « neutral » position.

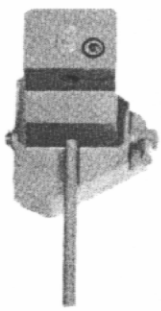


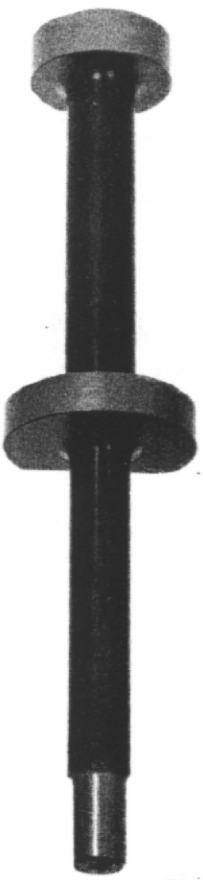
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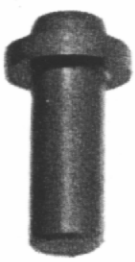
TOOLBOX - 3184-T











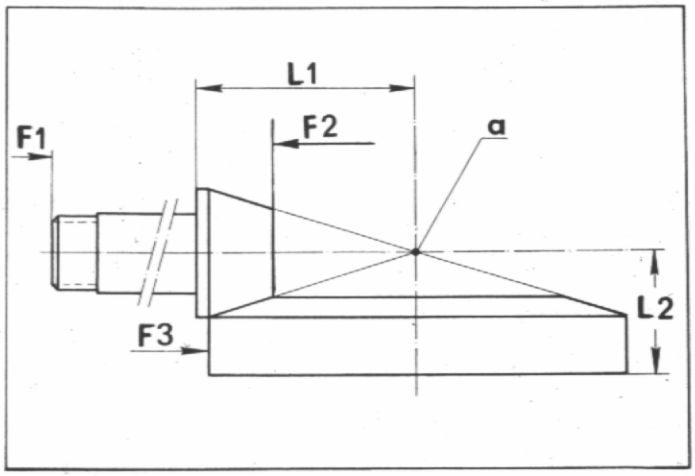


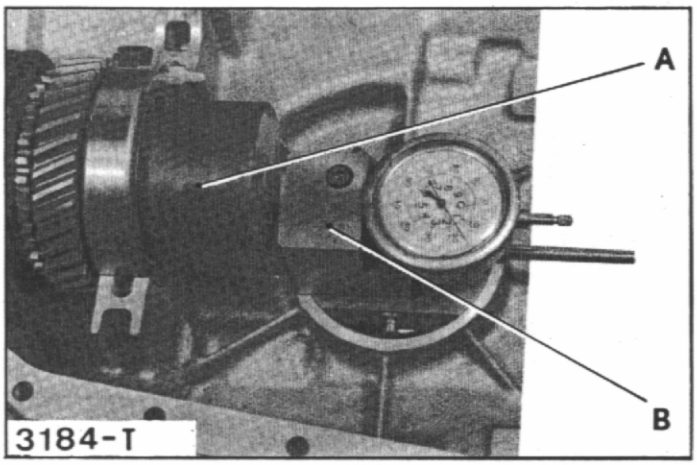


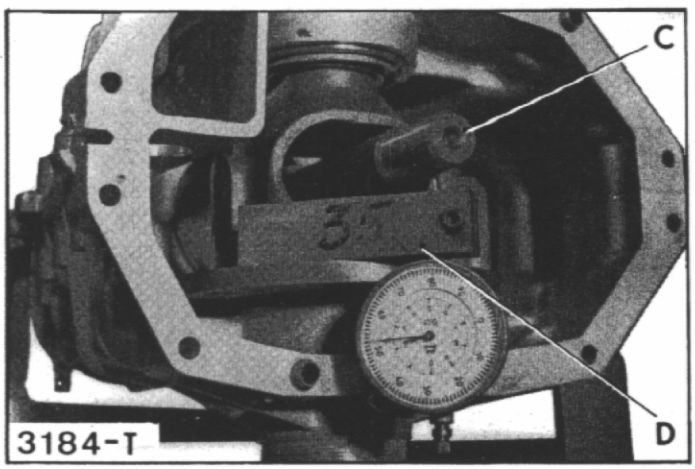
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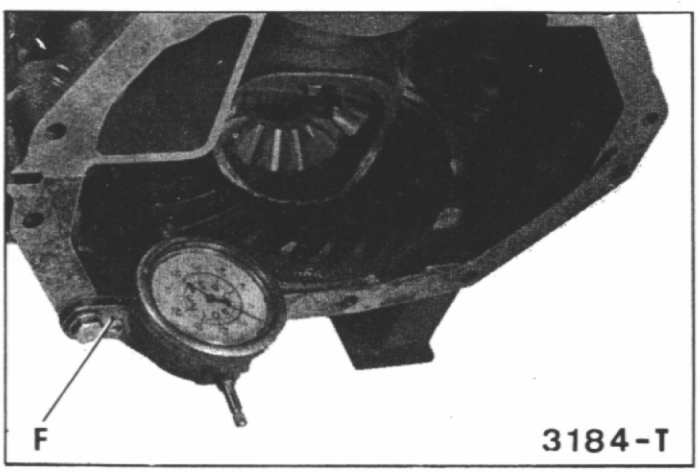
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IV. ADJUSTMENT OF THE CONIC DISTANCE.

NOTE : This adjustment is highly important. By correctly setting the contact area it ensures silent operation and long service from the crownwheel and pinion..
The bevel pinion and the crownwheel are paired and marked with identical inscriptions engraved with an electric scriber on face F1 of the pinion shaft and on side F3 of the crownwheel (never separate a bevel pinion from its crownwheel).

NOTE : On some couplings, the pairing mark of the pinion is engraved not on face F1 of the shaft, but on face F3 of the pinion.

1. Principle of adjustment :

In addition to the pairing marks, two dimensions are engraved on the side F3 of the crownwheel.

The larger dimension (example 82.05) represents the distance L1 from the intersection « a » of the differential centre lines to the thrust face for the bevel pinion bearing.

The smaller dimension (e. g. 40.00) is the distance L2 from the intersection « a » of the differential centre lines to the thrust face of the crownwheel on the casing.

To obtain these dimensions, it is neccessary to adjust the position of the pinion, then that of the crownwheel using adjusting washers whose thicknesses are to be determined.

It is essential that the conic distance should be adjusted using fixture 3184-T and dial gauge 2437-T.

For the adjustment of the bevel pinion position, use cap A and dial gauge support B.

For the adjustment of crownwheel position, use mandrel C and straight edge D of the dial gauge.

For checking the clearance between teeth use dial gauge support F.

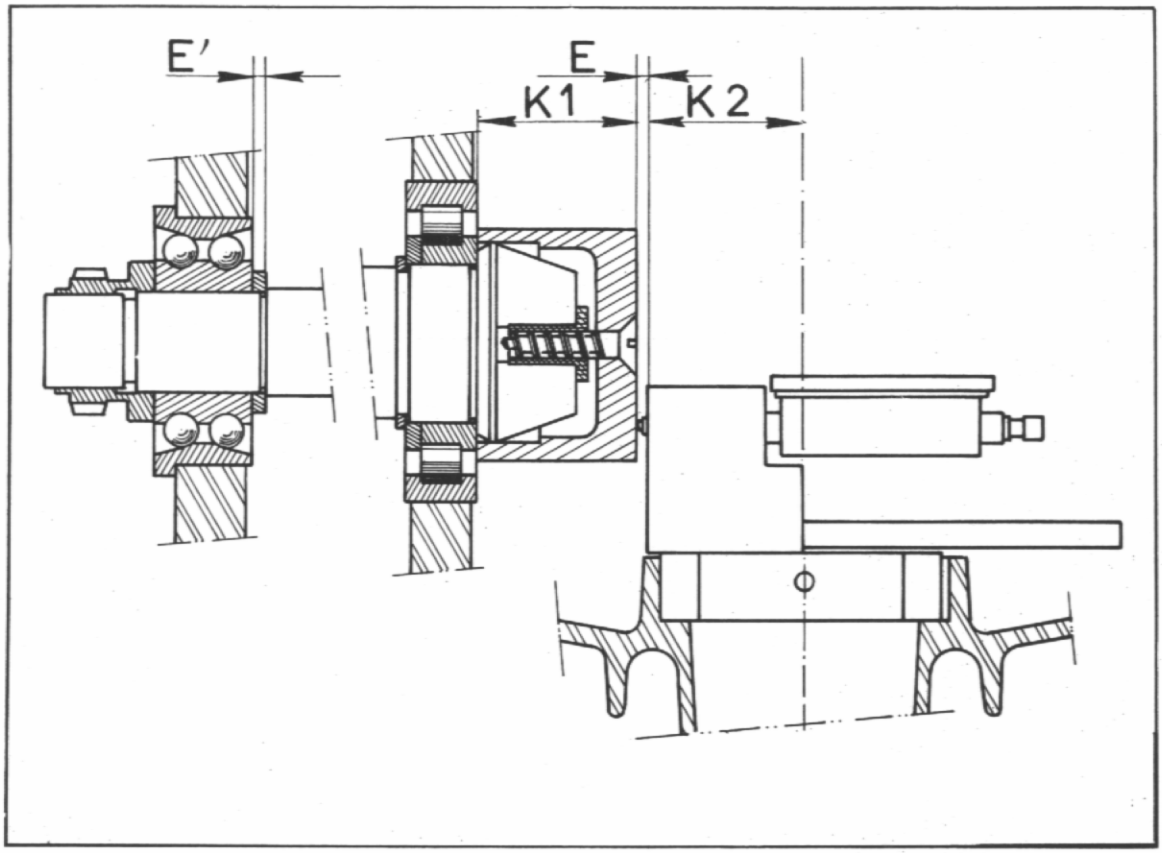


Figure 1

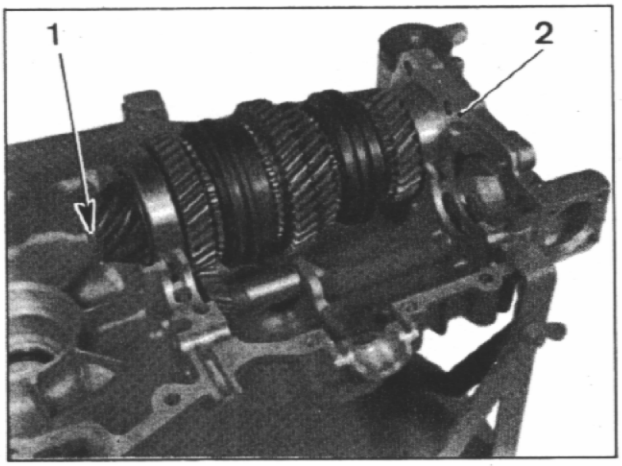


Figure 2

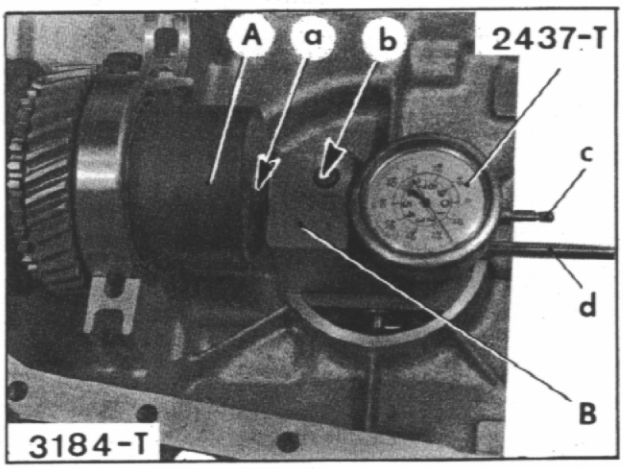


Figure 3

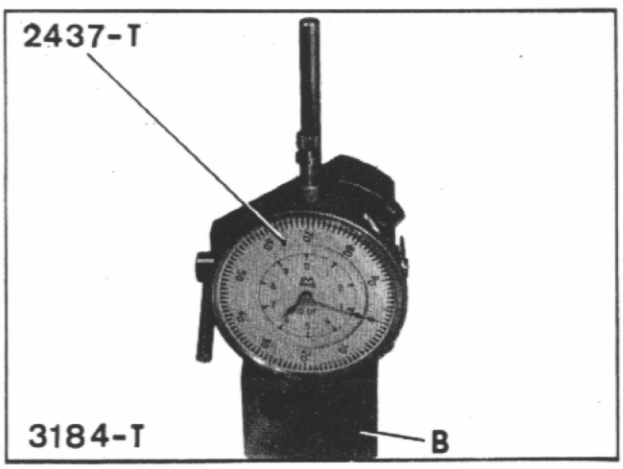


Figure 4

2. Adjustment of the bevel pinion position :

a) Fit the assembly of bevel pinion and gears in the left-hand half casing. Fit the rear cover (2). Hold with the aid of two bolts.
Note the larger dimension engraved on the crownwheel. For example : L1 = 82.00 mm.

b) Fit the cap A of fixture 3184-T as shown in figure 3. Hold it with the aid of bolt « a » screwed in the plastic gap (1).

c) Carefully clean the housing of the differential bearing in the half casing : it should be free of all traces of damage or burrs.

d) Fit a dial gauge 2437-T on support B. Place the support on a surface plate (see figure 4). Bring the zero of the moving dial opposite the large needle of the gauge. Note the position of the integrating needle.
Example : integrating needle between 6 and 7.
The assembly of cap A and support B with the dial gauge in the calibration position corresponds to a distance K1 + K2 = 78 mm. This dimension is engraved on support B at « b » (see figure 3).

e) Fit the support B in the casing. Thoroughly engage it in the bore of the differential bearing.
With the aid of handle « d » pivot support B first in one direction, then in the other and immobilize at the exact point at which the large needle changes direction.
Check the position of cap A : rotate the bevel pinion; the dial gauge should show a maximum variation of 0.2 mm
If not, modify the position of cap A on the pinion.

f) Determine the bevel pinion position. :
Bring the dial gauge needles back to their calibration position (see paragraph d).
Example : integrating needle between 6 and 7 and the large needle on zero.
Slowly release the moving rod « c » of the dial gauge and count the number of turns or fractions of a turn made by the large needle until the gauge stem touches the cap.
Example : the large needle has made 4.44 turns therefore E = 4.44 mm.
The position of the driving pinion is therefore :

K1 + K2 + E or 78 + 4.44 = 82.44 mm

The pinion is too far from the centre line of the differential by :

82.44 - 82 = 0.44 mm

It is therefore, necessary to replace the existing washer by another of thickness greater than 0.44 mm.
Example : the existing washer has a thickness of 2.50 mm.
It must be replaced by one of thickness : E' = 2.50 + 0.44 = 2.94 mm.

NOTE :
If the distance noted is less than the dimension engraved on the driving pinion, the latter is too close to the differential centre line and the existing washer must therefore be replaced by a thinner one.

3. Remove the adjusting fixture and dial gauge, the rear cover, the crown wheel and pinion and gear assembly.

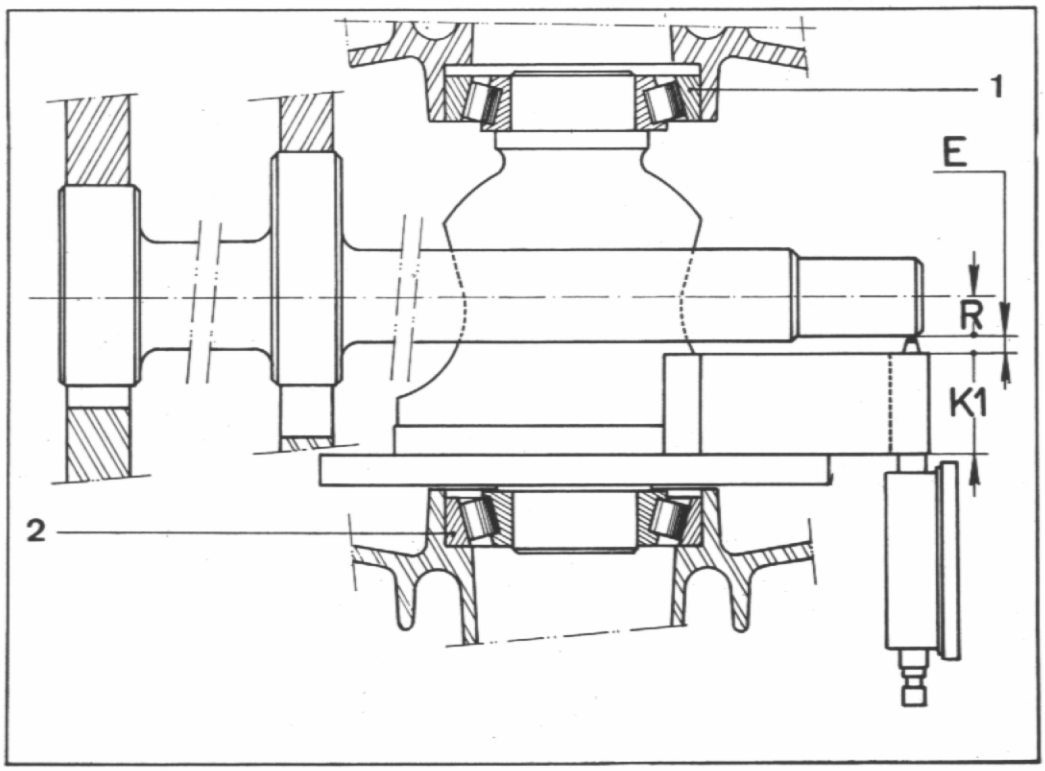
4. Remove the bevel pinion nut.

Release the bearing and the adjusting washer, replace it by the washer the thickness of which has just been ascertained.

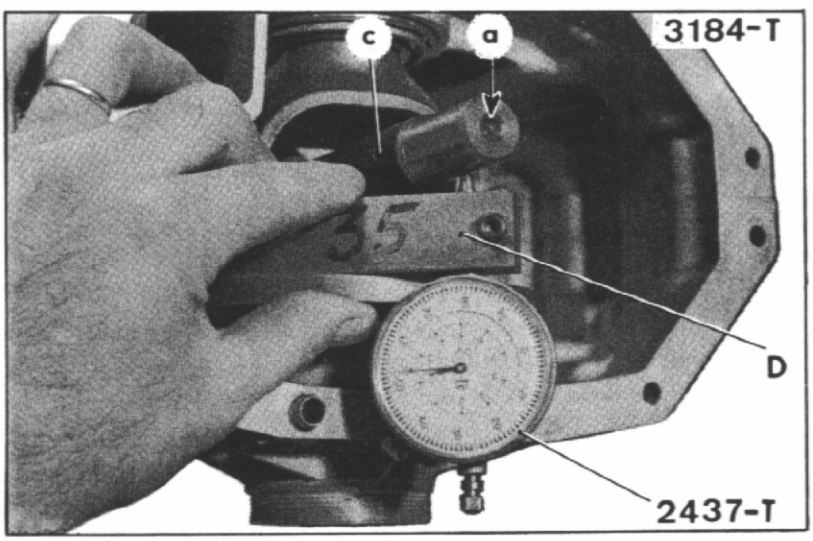
NOTE : The washers sold by the Replacement Parts Department have thicknesses graduated in steps of 0.4 mm. Select one, the thickness of which is nearest to the determined dimension.

5. Fit the bearing and the nut. Tighten the nut to 100 to 120 mAN (10 to 12 m.kg) (torque wrench).

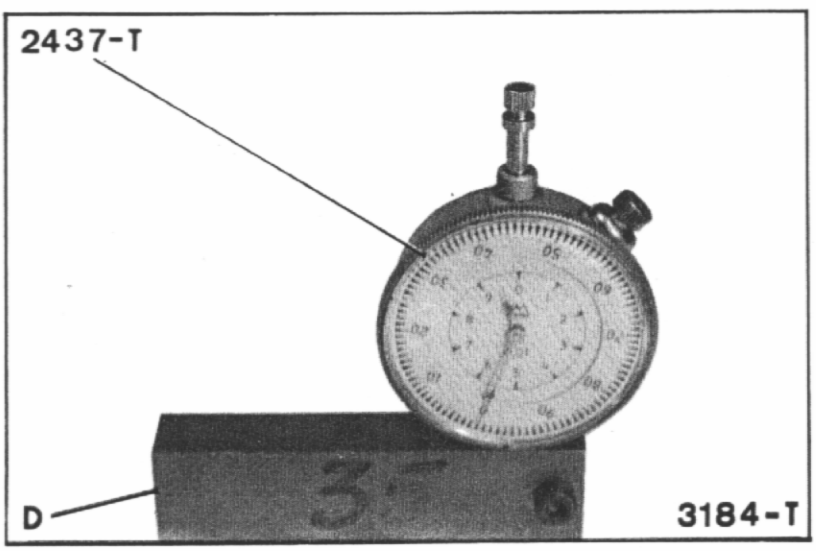
Lock the nut by peening.



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6. Adjust the crownwheel position :

a) Adjustment principle : Using shims, it is necessary to ensure :

- first that the distance between the crownwheel bearing face on the casing and the bevel pinion centre line is equal to that engraved on the side of the crownwheel which gives correct clearance between teeth and bearing surface area.

- secondly a stress on the bearings to conserve the preceding adjustment under the action of the engine torque. This stress corresponds in practice to a compression of the bearing in its bushes and therefore, to a displacement of the differential assembly which can be expressed in millimeters. This must be taken into account in determining the thickness of the shims. It is calculated at 0.025 mm per bearing and, therefore 0.05 mm for the two bearings. In the adjustment operation, allowance will therefore be made for the recoil of the casing in the determination of the thickness of the left-hand shim (+ 0.025 mm) and the total stress on the two bearings (+ 0.05 mm) in the determination of that of the right-hand shim.

b) Fit the outer cage (2) of the left-hand bearing of the differential in its housing (without shim).
Fit the differential casing.
Position the mandrel C with its end « a » engaged in the opening in the casing.
Fit the outer cage (1) in its housing in the right-hand half casing (without shim).

NOTE : The bores taking the bearing rings should be clean and free from defects or burrs. The cages must slide freely.

Fit the right-hand half casing.

Fit the rear cover. Fit the bolts but do not tighten.

Fit and hand tighten the fixing bolts.

Tighten the rear cover bolts and those of the half casings.

NOTE : It is necessary to fit the rear cover in order to position the half casings in relation to one another.

Make sure that the differential casing is in place and that the outer cage (1) is in contact with the rollers of the bearing.

c) Calibrate the straight edge-D-dial gauge assembly.

Fit straight edge D with a dial gauge and place on a surface plate. Adjust the gauge position so that it operates between 8 and 9 mm.

Bring the zero of the moving dial opposite the large needle.

Note the position of the integrating needle.

Example : integrating needle is between 8 and 9
The assembly of mandrel C and straight edge with dial gauge in the calibration position corresponds to a distance :

$$K1 + R = 35 \text{ mm}$$

This dimension is engraved on one of the sides of the straight edge.

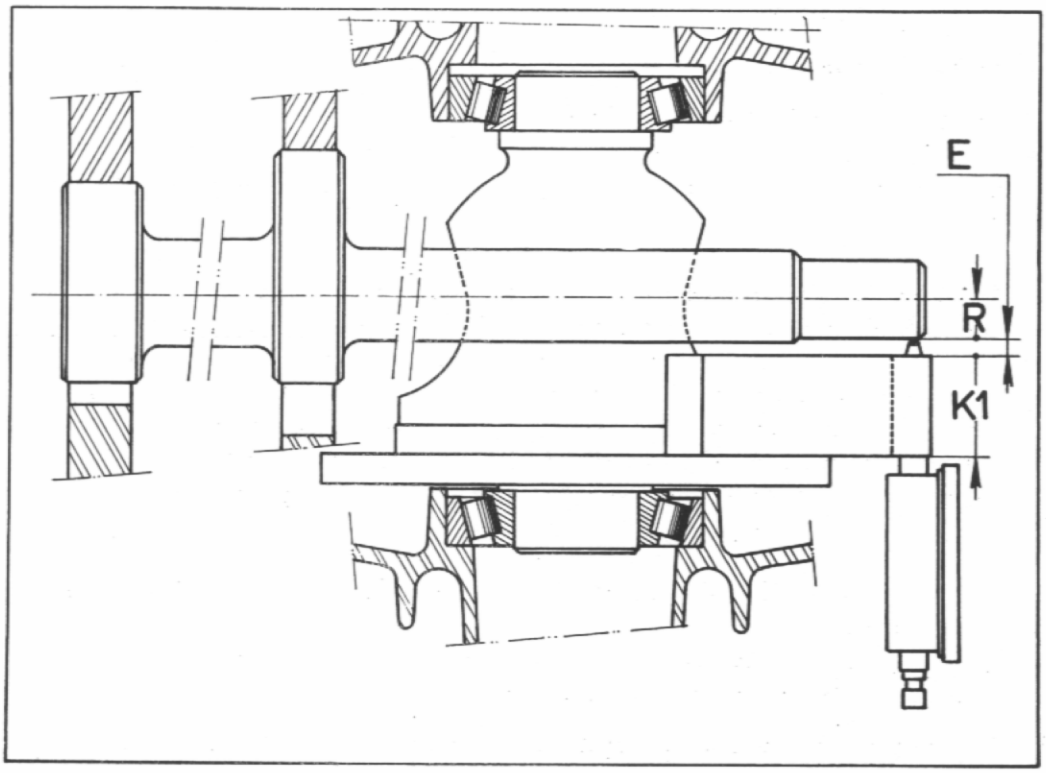


Figure 1

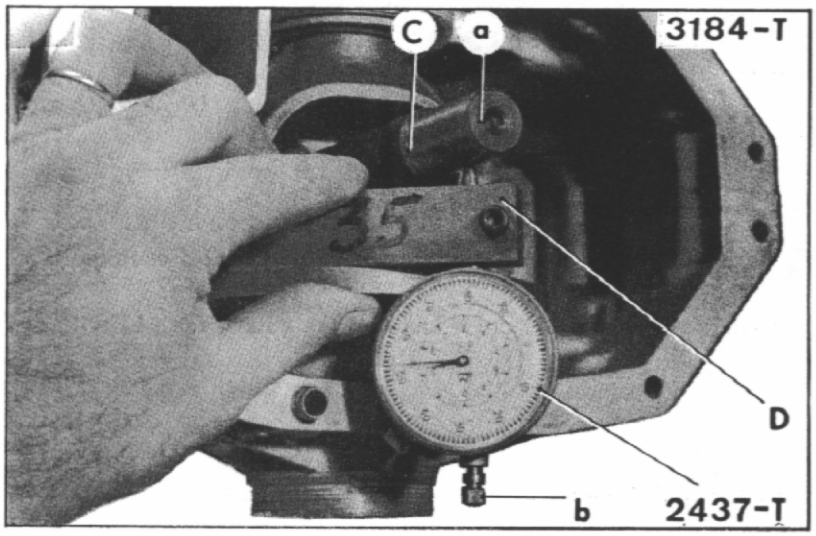


Figure 2

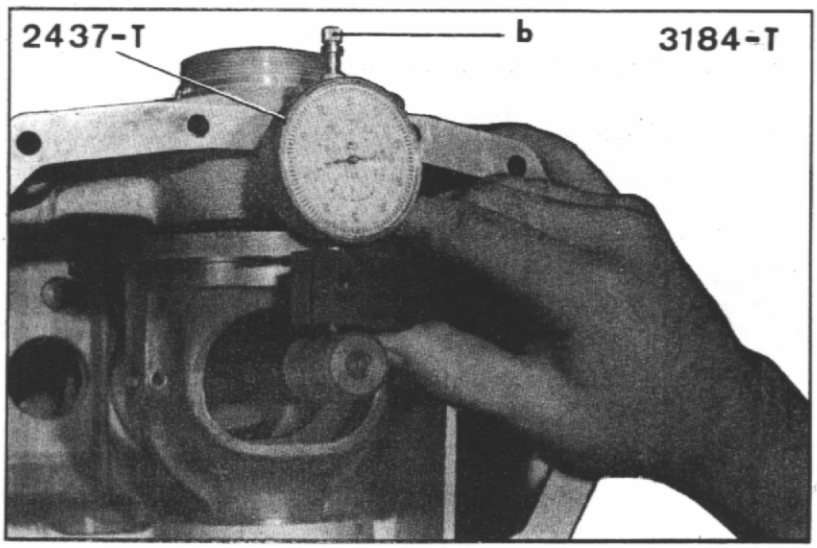


Figure 3

d) Fit the straight edge D on the bearing face of the crownwheel on the casing, the dial gauge stem touching the end « a » of mandrel C.

Hold the straight edge resting on the casing and rotate the straight edge-casing assembly in one direction and then in the other and immobilize it at the exact point at which the large needle changes direction. Take note of the position of the dial gauge needles. Pull on moving spindle « b » of the gauge to bring the needles to the calibration position. Then slowly release it, and count the number of revolutions or fraction of a revolution made by the large needle.

Example : The large needle has made 7.46 revolutions therefore E = 7.46 mm

The distance of the bearing face of the crownwheel from the bevel pinion centre line is therefore :

$$35 + 7.46 = 42.46 \text{ mm}$$

e) To determine the thickness of the washer to be fitted in the left-hand half casing (see figure 2) :

Note the dimansion engraved on the crownwheel. This distance is for example : 40.00 mm.

To obtain this dimension, it would be necessary to have a shim of :

$$42.46 - 40 = 2.46 \text{ mm}$$

It is necessary to add 0.025 mm for stressing the bearing. The shim should therefore have a thickness of :

$$2.46 + 0.025 = 2.485 \text{ mm}$$

The adjusting washers are sold by the Replacement Parts Department in steps of 0.05 mm. Therefore, choose a washer the thickness of which is nearest to the determined value of 2.50 mm.

f) Determining the thickness of the adjusting washer to be fitted in the right-hand half casing (see figure 3) :

Remove the casing from the support and place on the bench *resting on the right-hand half casing.*

IMPORTANT : Make sure that the differential is in place with the outer cage of the bearing resting on the shoulder of the right-hand half casing. Also make sure that *the outer cage of the left-hand bearing is resting on the rollers.*

Check the calibration of the straight edge-dial gauge assembly.

Fit straight edge D against the bearing face of the crownwheel on the casing, the dial gauge stem touching the end « a » of the mandrel C.

Hold the straight edge against the casing and proceed to measure as previously indicated for the left-hand side.

Example : The large needle has made 2.45 revolutions therefore E = 2.45 mm.

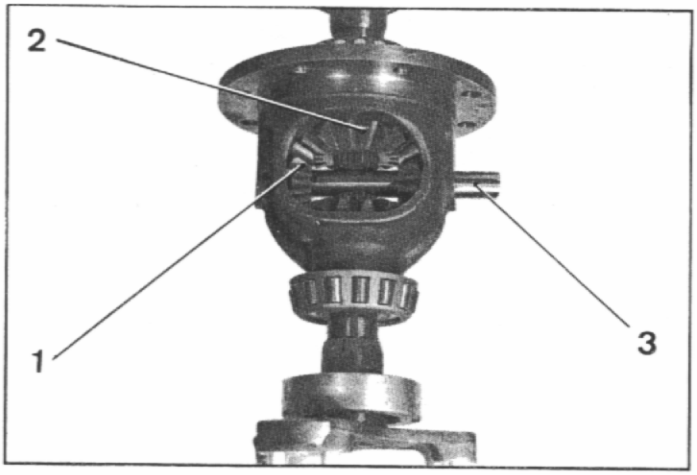
The distance of the bearing face of the crownwheel from the bevel pinion centre line is therefore :

$$35 + 2.45 = 37.45 \text{ mm}$$

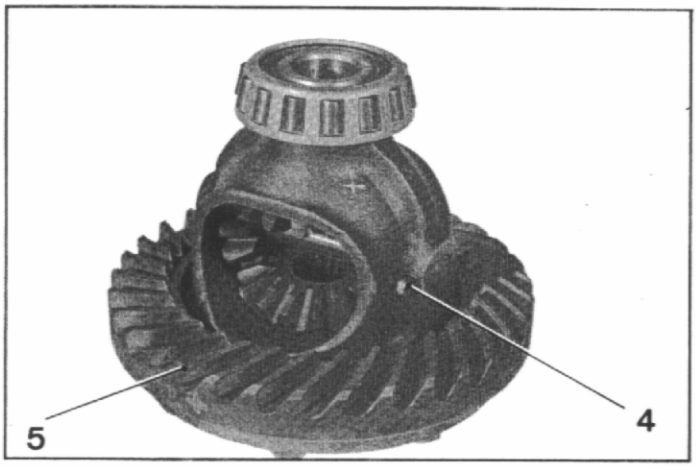
Determining the thickness of the adjusting washer to be fitted in the right-hand half casing.

The dimansion engraved on the crownwheel being 40.00 mm, to obtain this size would require a shim of $40 - 37.45 = 2.55$ mm without taking into account the bearing stress. The total thickness (on the left-hand and right-hand side) of the shims would be $2.46 + 2.55 = 5.01$ mm. With a stress of 0.025 mm per bearing, therefore 0.05 mm for the two bearings, the total thickness would have to be $5.01 + 0.05 = 5.06$ mm.

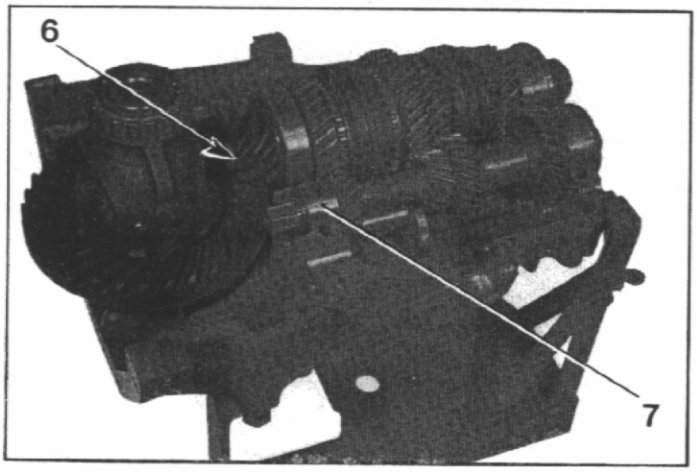
For the left-hand side the thickness of the shim as stated in paragraph « e » must be 2.50 mm. Therefore, the thickness of the shim to be fitted on the right-hand side will be $5.06 - 2.50 = 2.56$ mm. The shims on sale are in thickness steps of 0.05 mm; choose a shim with a thickness of 2.55 mm.



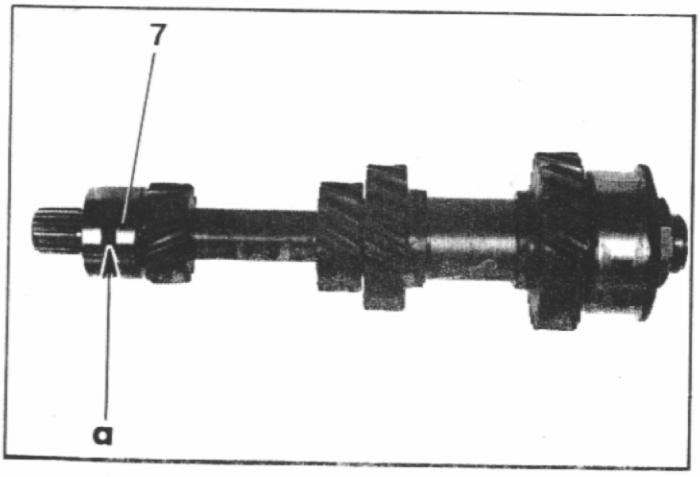
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V. FITTING

1. Fit the differential :

a) Oil the parts. Fit :
- the two planetary wheels (2) (hold them in place with the aid of the two differentail shafts),
- the satellite wheels (1) and engage the shaft (3), correctly positioning the hole for the pin.

Fit the locking pin (4).

b) Fit the crownwheel (5) :
The 9 mm fixing bolts must be fitted with LOCTITE GX 01 460 01 A and tightened to 48 to 53 mAN (4.8 to 5.3 m.kg) (torque wrench).

NOTES :
- Do not put washers under the bolt heads.
- To assure correct fitting of the crownwheel successively tighten the diametrically opposite bolts.

c) Fit the differential in the left-hand half casing.

2. Fit the bevel pinion assembly :

Check the condition of the plastic cap (6). Replace if necessary.

CAUTION : Be careful not to introduce any foreign bodies into the central hole of the bevel pinion which could interfere with the lubrication of the bearing of the reverse gear loose pinion.

Fit the assembly in the left-hand half casing.

3. Fit the primary shaft :

Fit the primary shaft in the left-hand half casing.

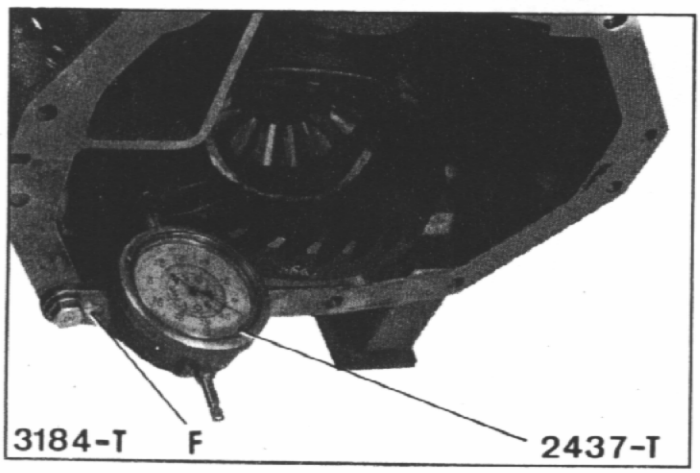
Turn the needle bearing (7) so that the end of the locking pin on the reverse gear intermediate shaft enters the groove « a » of the bearing.

4. Checking the crownwheel to pinion backlash :

NOTE : If the adjustment of the conic distance has been carefully carried, out, the backlash should be correct.

It is, however, preferable to check it.

a) Fit the right-hand half casing on the left-hand one. (Take care that the forks engage in the corresponding sliding gears).
Fit the four half casing assembly bolts but do not tighten them.
Fit the rear cover. Tighten the fixing bolts (rear cover is necessary for the correct alignment of the two half casings).
Fit and tighten the four half casing assembly bolts.

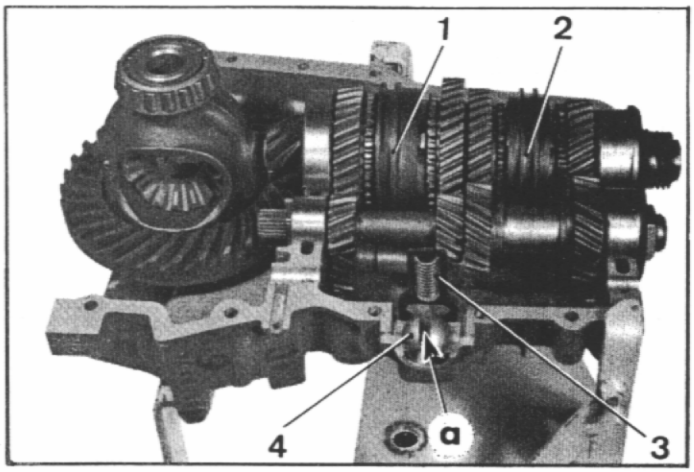


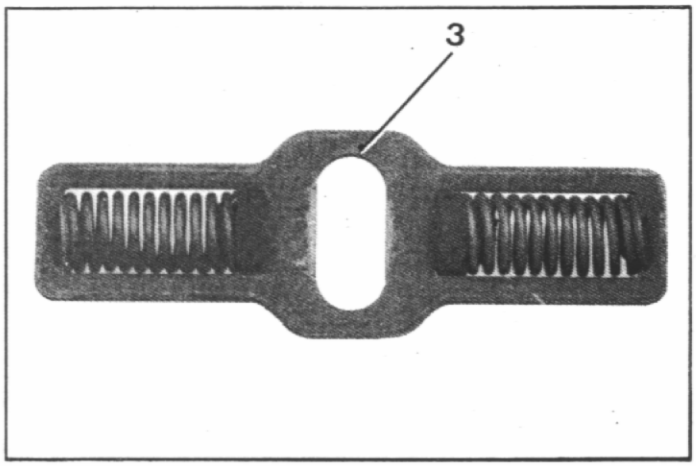
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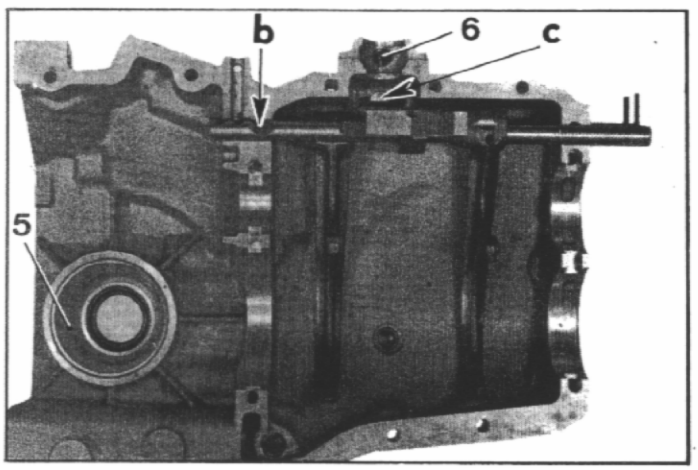
b) Fit (as shown in illustration) the support F of fixture 3184-T fitted with a dial gauge so that its moving stem bears perpendicularly against the flank of a tooth, on the crownwheel periphery.
Measure the clearance, immobilizing the driving pinion by hand.
The backlash must be between 0.13 and 0.27 mm measured at the point of minimum clearance.

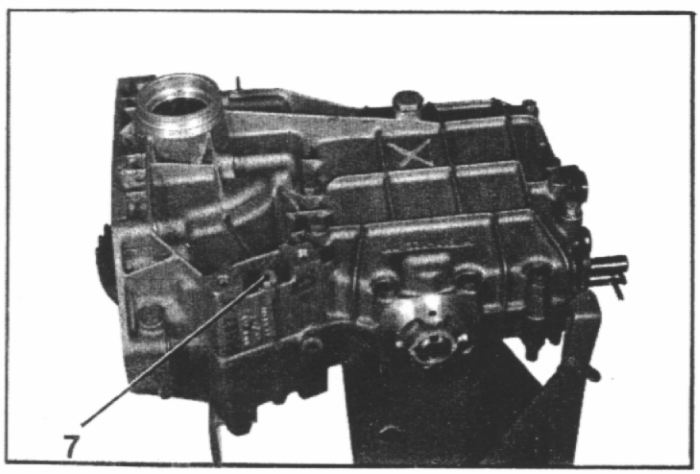
c) Note the clearance on three teeth spaced at about 120°. Take the average of the three measurements :
The difference between any two measurements must not exceed 0.1 mm.
Otherwise, the crownwheel is out of true (it must be replaced) or there is foreign body between the crownwheel and the differential casing.

d) Remove :
- the dial gauge and its support,
- the rear cover,
- the right-hand half casing.









5. Fit the right-hand half casing on the left-hand one :

a) Smear the joint faces of the two half casings with sealing compound.
NOTE :
Use only CURTYLON sealing compound (manufacturer Société CEFILAC - FRANCE).
Smear only half the width of the joint face (towards the outside), the sealing compound must not penetrate the inside of the casing.

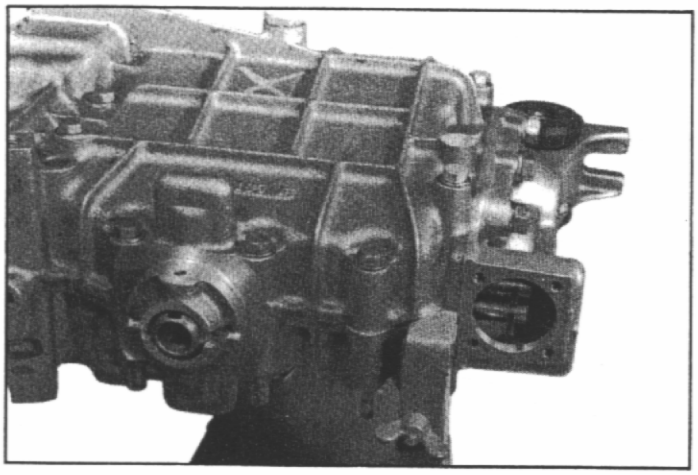
b) On the left-hand half casing :
Grease and fit the spring holder plate (3).
CAUTION : *Since January 3, 1972* the reverse gear locking device on the gear lever has been replaced by one in the gearbox.
The springs on plate (3) are different : the one with the largest diameter wire must be fitted towards the reverse gear intermediate pinion (in the left-hand half casing).
Grease and fit the ball joint (4) with the guiding groove « a » towards the right-hand casing side.
Temporarily fit a differential shaft to centre the planetary wheels.
Make sure that the sliding gears (1) and (2) are in the « neutral » position.

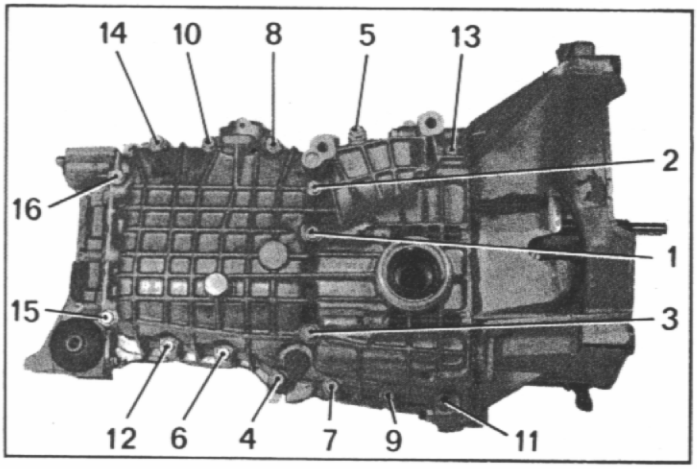
c) On the right-hand half casing :
Stick the spring and the ball joint guide (6) in their housing.
Make sure that the locking at « b » between the reverse/1st gear shaft and 2nd/3rd gear shaft is in place.
Also make sure that the forks are in the « neutral » position.

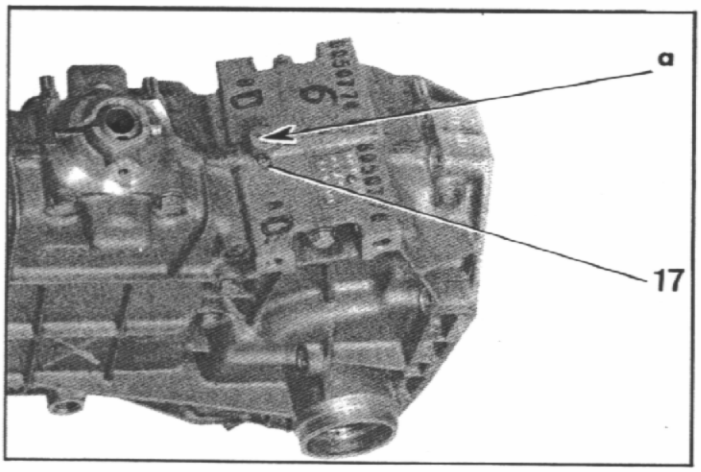
d) Fit the right-hand half casing on the left-hand half casing.
During this operation hold the inner cage (5) of the forks in the corresponding sliding gears.
At the same time, guide the spring holder plate into its housing « c » of the right-hand half casing, Make sure that the guide (6) enters the groove « a » of the ball joint (4).

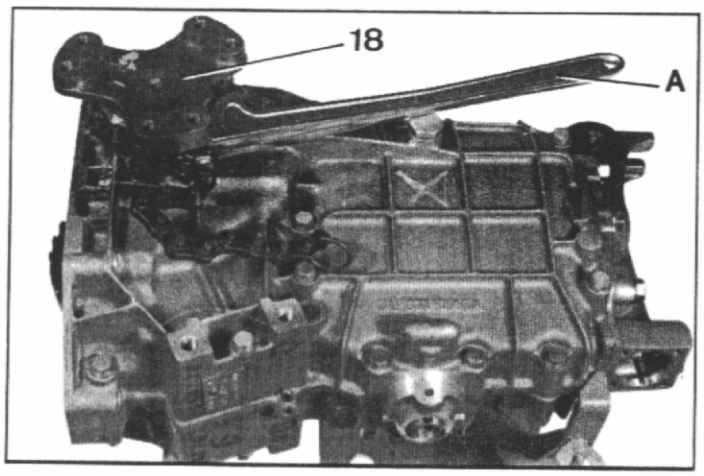
e) Fit the half casing assembly bolts :
Fit the assembly bolts, without tightening them, final tightening should be done after fitting the rear cover (plain washer under the bolt head and capnut).

NOTES :
- The bolt (7) placed between the brake caliper mountings is the only one with a normal hexagonal nut.
- Do not forget the bolt of the central bearing on the left-hand half casing side.









6. Fit the rear cover :

Smear the joint face of the rear cover with CURTYLON sealing compound.
Fit the rear cover on the gearbox casing.
Fit the assembly bolts, tighten them to 25 to 30 mΛN (2.5 to 3 m.kg).

7. Completely tighten the half casing assembly bolts :

NOTE : The method for tightening these bolts is most important to ensure oil-tighteness of the half casings.

a) Slightly slacken the bolts holding the rear cover on the right-hand half casing.
b) Finally tighten the half casing assembly bolts to 14 to 15 mΛN (1.4 to 1.5 m.kg).
IMPORTANT : Take care of the tightening sequence shown in illustration.
On some casings, the bolt (3) may be on the left-hand half casing.
c) Retighten the rear cover fixing bolts to 25 to 30 mΛN (2.5 to 3 m.kg).

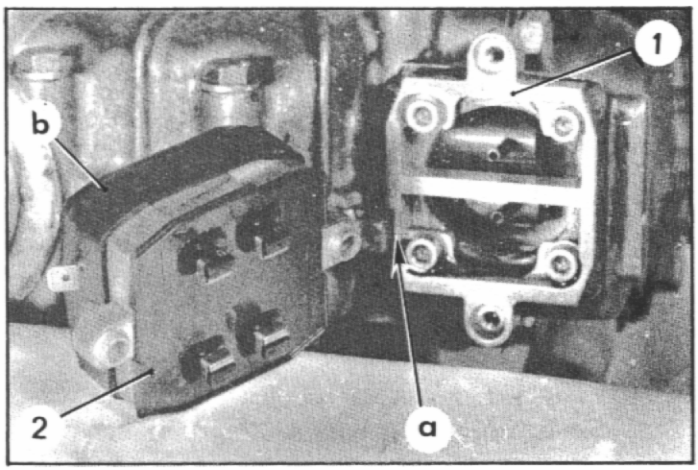
8. Fit the locking mechanism to the 2nd/3rd gear fork shaft :

At « d » position the locking ball and spring and the blanking pellet.
Compress the spring by pressing on the pellet (5 mm diameter rod) and fit the split pin (17).

9. Fit the differential shafts :

Make sure that the planetary gears are in place and that at the time of fitting the shaft splines engage in the splines of the planetary gears.
Fit the shafts (18) (tap lightly with a mallet to position bearing).
Tighten the ring-nuts, using a chain wrench A, to 60 to 75 mΛN (6 to 7.5 m.kg).
Lock the ring-nuts by peening.

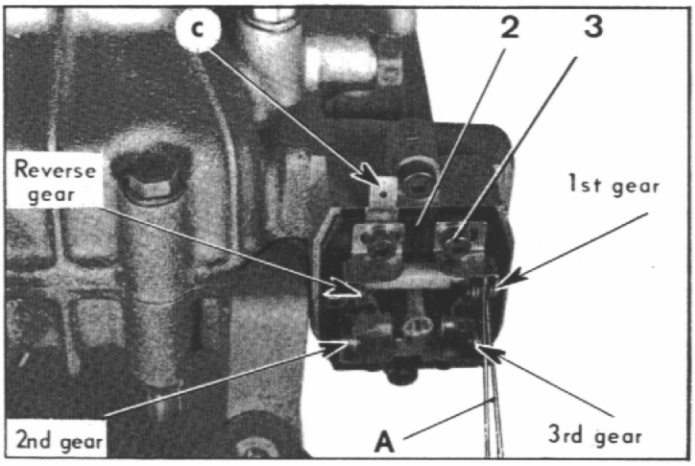
10. Fit and tighten the drain, level and filler plugs to 35 to 45 mΛN (3.5 to 4.5 m.kg) (copper seal).
Fit the reverse light switch *on « CLUB » vehicles* : smear the contactor threads with MASTI-JOINT HD 37. Tighten the contactor to 12 to 15 mΛN (1.2 to 1.5 m.kg).



11. Fit the control switch unit on gearbox (starter inhibitor switch) :

a) Smear the seal face of the switch base plate (1) with CURTYLON sealing compound.
Fit the switch base plate on the rear cover (with the slot « a » towards the front of the gearbox (4 mm Allen key).

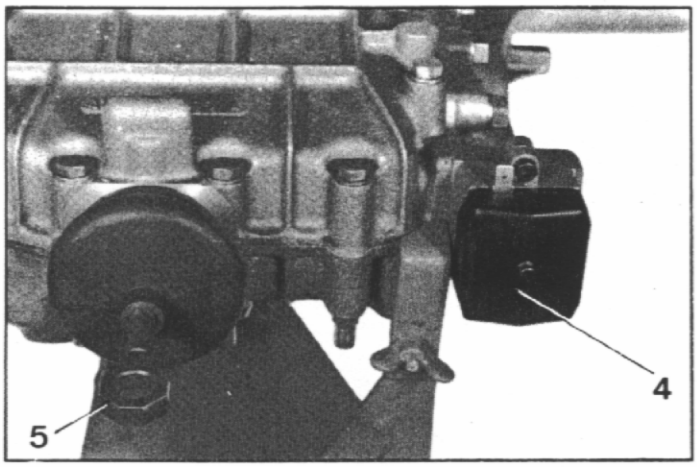
b) Engage the rubber seal (2) on the contact rods, with the heads towards the cover.
Fit the switch on the base plate (with the connector « c » towards the right-hand half casing (4 mm Allen key).

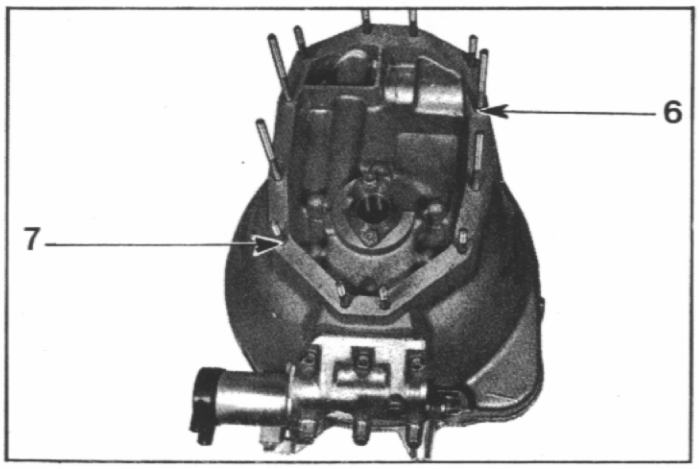


12. Adjust the switch points gap :

NOTE : For this operation, it is necessary to fit provisionally the gear lever, the gap of each point being adjusted with the corresponding gear engaged.
In « neutral » all the points should be closed.

Adjustment method :
- Use the lever (5) to engage a gear.
- Adjust the points gap to 1.4 ± 0.05 mm using a set of feelers A and shifting the moving point by means of screw (3). Moderately tighten the screw (3) (3 mm Allen key). Use the same method for the other gears.
- Fit the switch cover (4) (3 mm Allen key) and fit the elastic collar « b ».

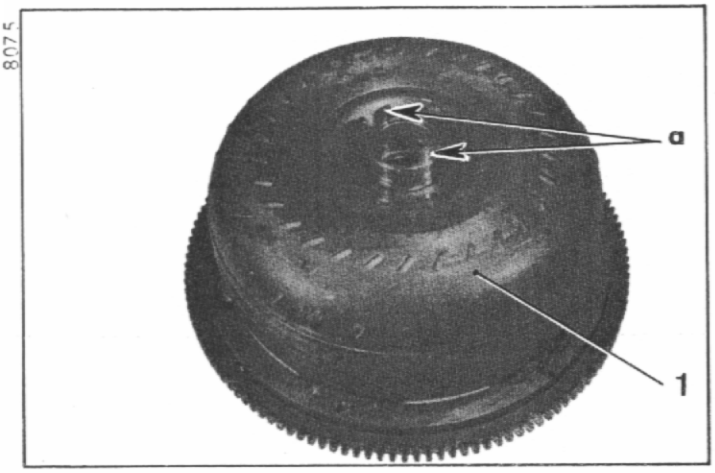




13. Fit the converter housing on the converter :

NOTE : The method of assembly given below is the best way of ensuring that the converter is properly fitted.

a) Check that the two locating dowels (6) and (7) are present.



8075

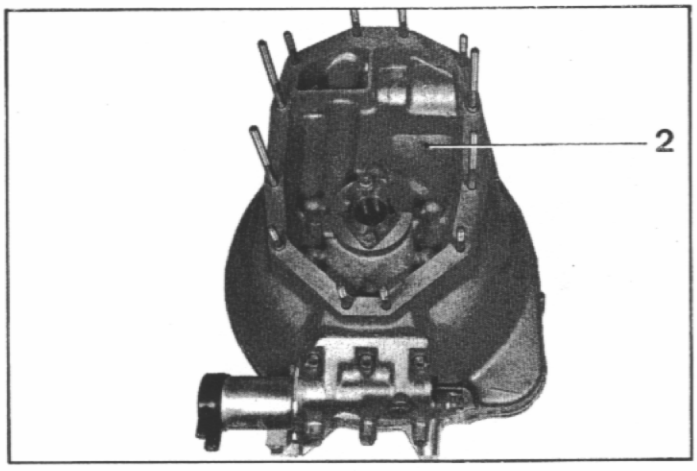
b) Place the converter (1) flat on the bench. Engage the casing (2) on the converter (Turn the converter so that the drive pins « a » engage in the corresponding notches of the pump gear.

14. Fit the control shaft :

Check that the seals (3) and (4) and the circlip (5) are present.

Engage the control shaft (7) in the rotor sleeve (8) and in the converter splines.

Fit the spring (6) in its housing at « b ».



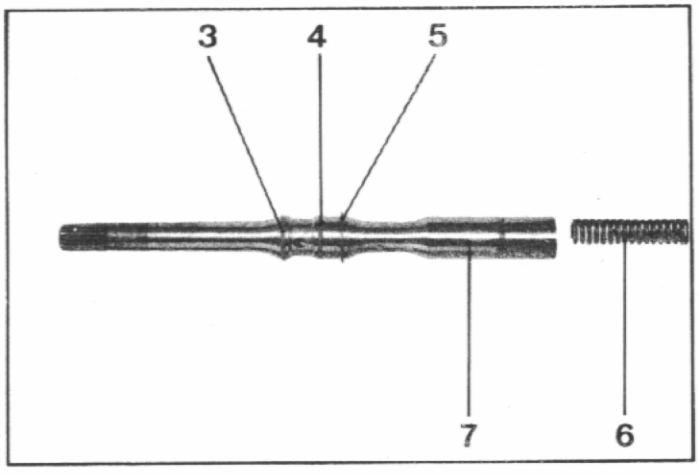
9645

15. Fit the converter holding bracket :

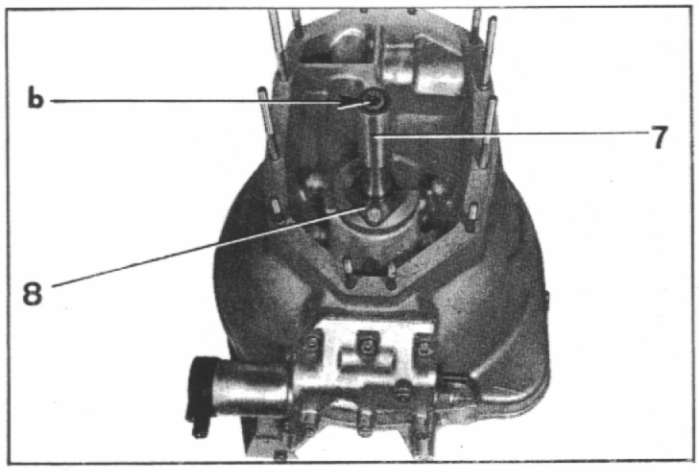
Slide the assembly of converter and casing towards the edge of the bench.

Fit the converter holding bracket 3186-T with the aid of two bolts (diameter 7 mm, pitch 1 mm).

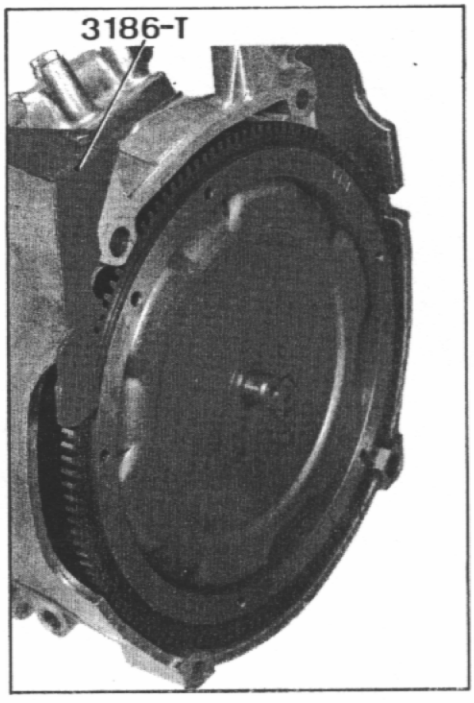
IMPORTANT : *The use of bracket 3186-T is essential : it prevents the dislocation of the converter which would block the engine-gearbox assembly and damage the driving pins « a ».*



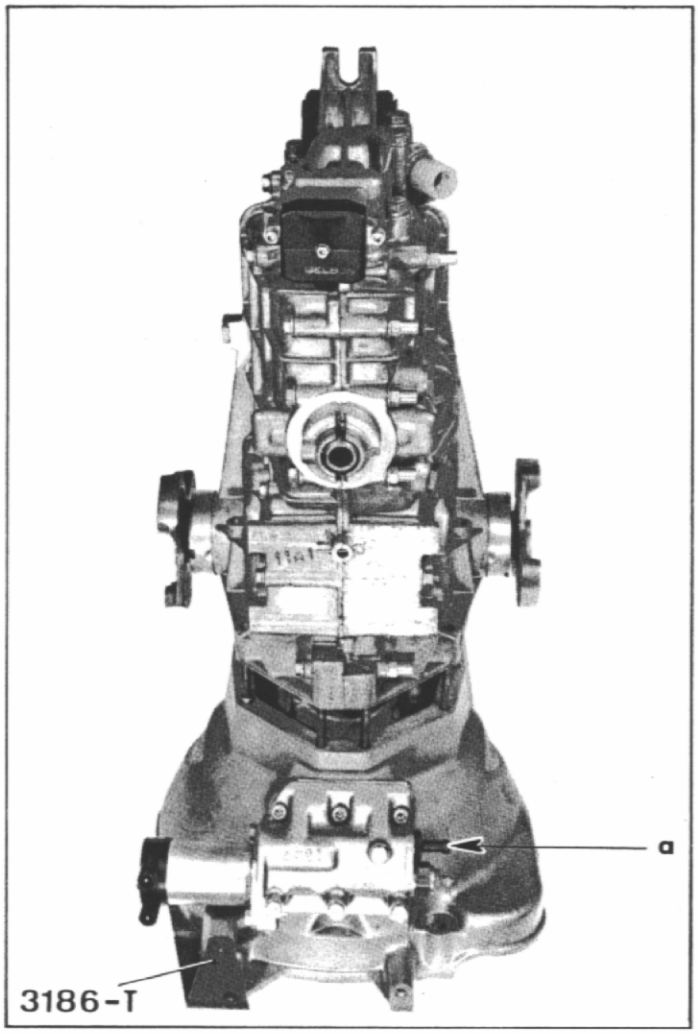
8282



9650



9652



16. Connect up the gearbox to the converter casing-converter assembly :

a) Offer up and vertically engage the gearbox in the converter casing studs.

NOTE : *If necessary, engage a gear using the temporarily-fitted lever and rotate the differential shafts so that the primary shaft splines engage in the corresponding ones of the control shaft.*

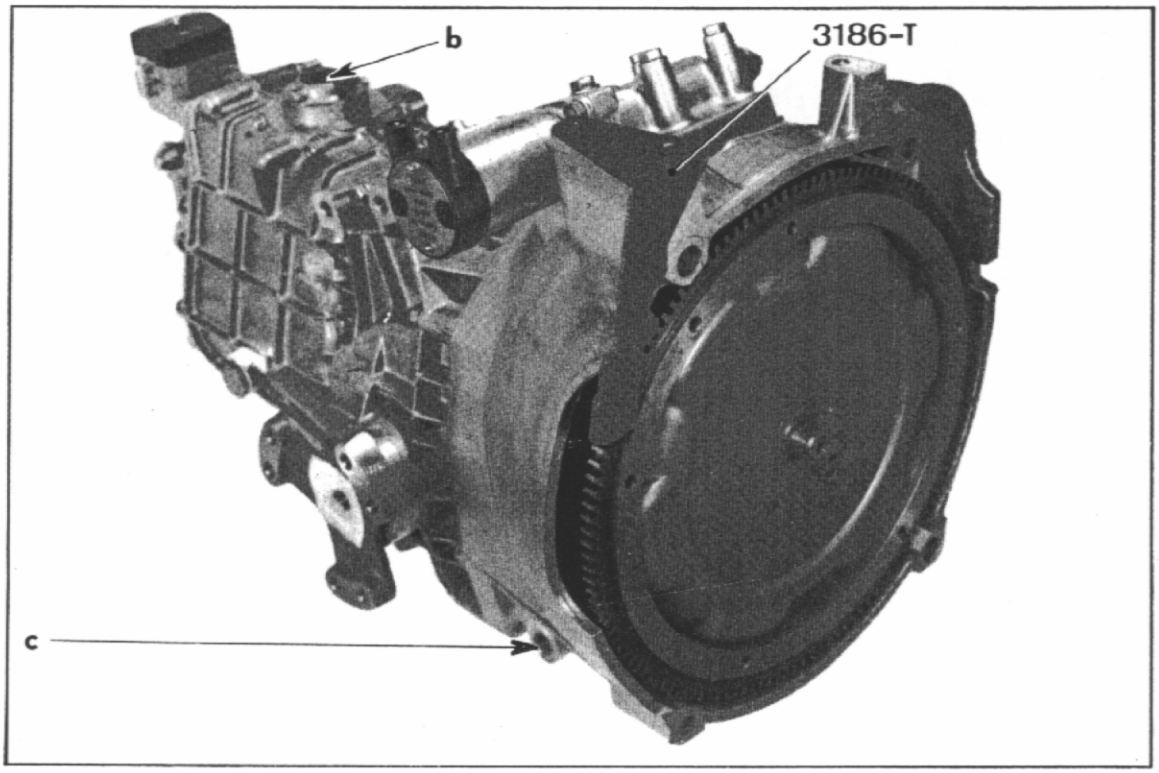
b) Fit the contact washers and the assembly nuts.

Tighten them to 14 to 15 mAN (1.4 to 1.5 m.kg)

Place the gearbox in a horizontal position.

Blank the orifice « b » of the ball joint with adhesive paper.

Blank orifices « a » and « c » of the oil exhaust and intake piping with rubber plugs.



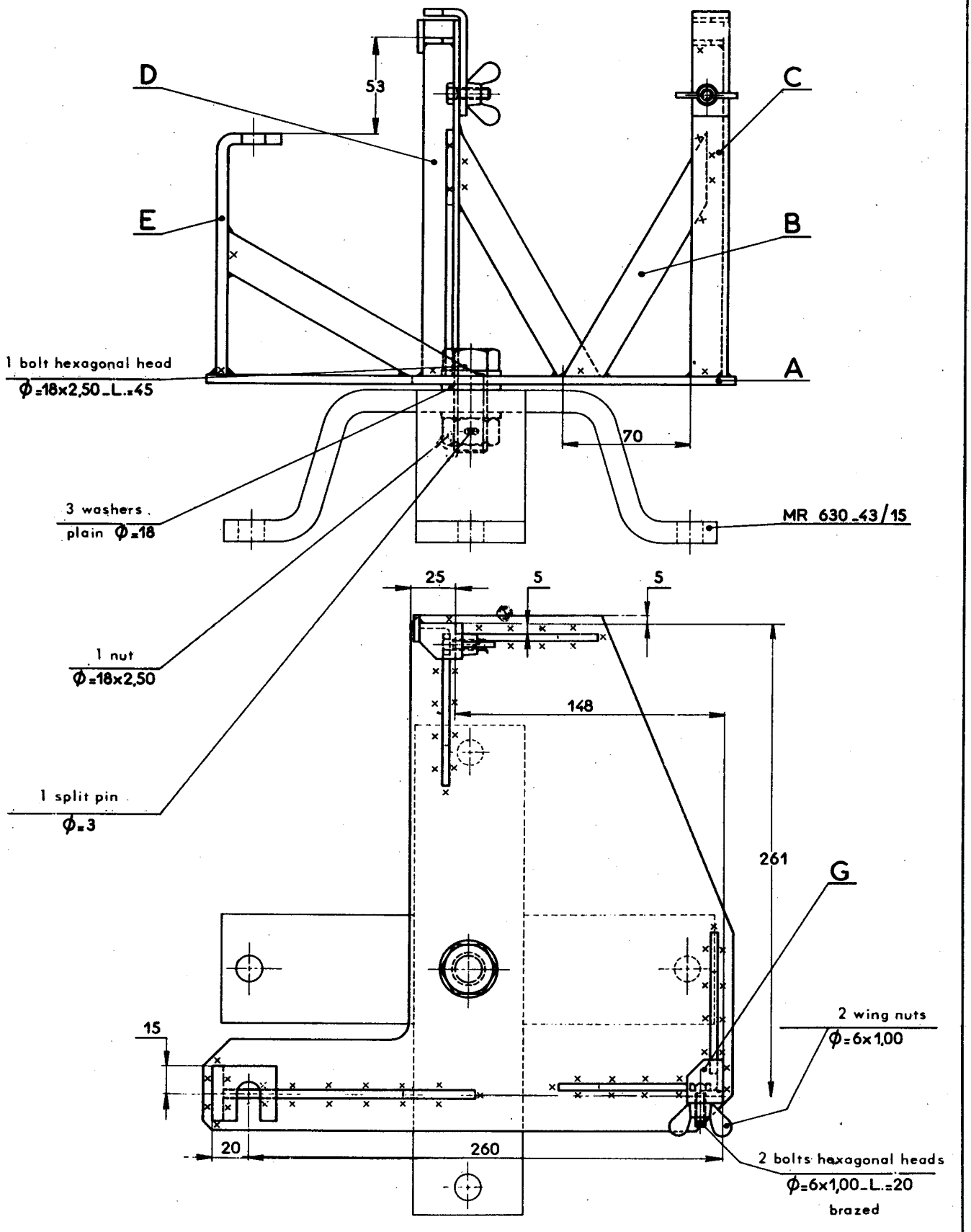
LIST OF SPECIAL TOOLS MENTIONED IN THE SECOND SECTION OF MANUAL N° 810-2

DESCRIPTION	NUMBER Repairs - Methods	REFERENCE of Tool on Sale
(2) ENGINE		
Spanner for cylinder head tightening (for nuts 12 mm across flats)		4006-T.D
Spanner for cylinder head tightening (for nuts 13 mm across flats)		4006-T.E
Valve grinder		1615-T
Valve spring compressor		1652-T or 1652-T bis
Extractor for crankshaft centring bush (equipped with a 12 mm diameter end piece)		1671-T
Spanner for removing filter cartridge		1683-T
Tool for fitting front crankshaft seal		1694-T
Tool for fitting spark generator seal		1695-T
Tool for fitting rear crankshaft seal		1696-T
Tool for fitting camshaft seal		1697-T
Cylinder head stud extractor		2410-T
Stand for engine on work-bench		2508-T
Piston ring fitting fixture *(Engine 1015 cc)*		3010-T
Piston ring fitting fixture *(Engine 1220 cc)*		4007-T
Mandrel for fitting crankshaft centring bush		3052-T bis
Special spanner for slackening and tightening camshaft pulleys	MR. 630-11/26	
Extractor for small end bush	MR. 630-23/9	
Extractor for rocker arm shaft	MR. 630-25/8	
Mandrel for centring clutch disc	MR. 630-31/85	
Mandrel for removing and fitting gudgeon pins		1699-T
Support bracket for holding cylinder head in a vice	MR. 630-43/31	
Shim for fitting oil pump		4001-T
Tool for crimping the by-pass valve	MR. 630-62/14	
Tool for holding flywheel		3064-T.E
(3) (4) CLUTCH - GEARBOX		
Stand for gearbox on work-bench	MR. 630-43/29	
Mandrel for centring converter oil pump		1689-T
Set of gauges for gearbox adjustment		3184-T
Extractor for removing differential taper bearings (used with pad 3184-T.H)		2400-T
Dial gauge		2437-T
Tool for holding in position torque converter on gearbox		3186-T
Circlip pliers		3253-T
Assembly for adjusting and checking torque converter		3112-T
This assembly consists of : - two shims for setting solenoid valve mechanism (max. diameter = 1.5 mm, min. diameter = 1.4 mm) - two unions for checking oil pressure		
Pad for removal of differential tapered bearings		3184-T.H

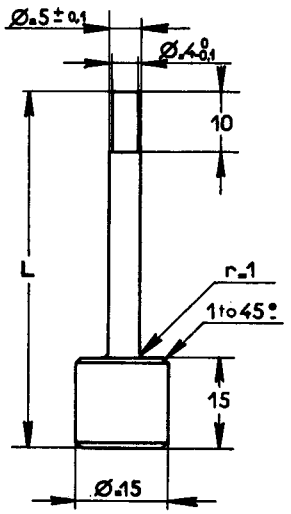
LIST OF SPECIAL TOOLS MENTIONED IN THE SECOND SECTION OF MANUAL N° 810-2

DESCRIPTION	NUMBER Repairs - Methods	REFERENCE of Tool on Sale
(7) (8) FRONT AND REAR AXLES		
Front hub extractor		1893-T
End-piece for extracting rear suspension arm bearing (to be used with 1671-T)		2070-T
Mandrel and two bushes for fitting rear suspension arm bearings		2071-T
Castellated socket (diameter = 75 mm) for two-slot nuts of front or rear hub bearings (used with 3321-T)		3304-T
Socket for front hub bearing nut		3320-T
Assembly for fitting and removing front or rear hub nut		3321-T
Mandrel for fitting front and rear hub bearings	MR. 630-31/96	
Lever for holding front or rear hub	MR. 630-64/40	
(9) SUSPENSION		
Union for bleeding height corrector		2218-T
Support for suspension cylinder		2293-T
Hydraulic test bench		3654-T
Tubular spanner for locking screw of height corrector jets	MR. 630-12/36	
Height corrector support	MR. 630-43/16	

MR 630_43/29


D
53
C
E
B
A
1 bolt hexagonal head
ϕ=18x2,50_L.=45
70
3 washers
plain ϕ=18
MR 630_43/15
25
5
5
1 nut
ϕ=18x2,50
148
1 split pin
ϕ=3
261
G
2 wing nuts
ϕ=6x1,00
15
20
260
2 bolts hexagonal heads
ϕ=6x1,00_L.=20
brazed

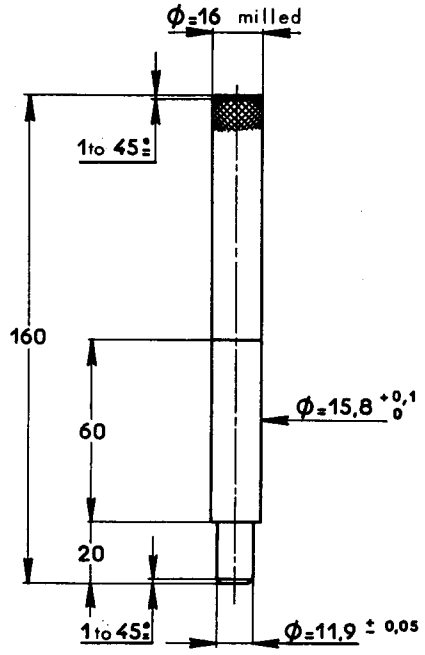
MR 630_31/84



1 Part. A; length 59 mm
1 Part B; length 37.5 mm

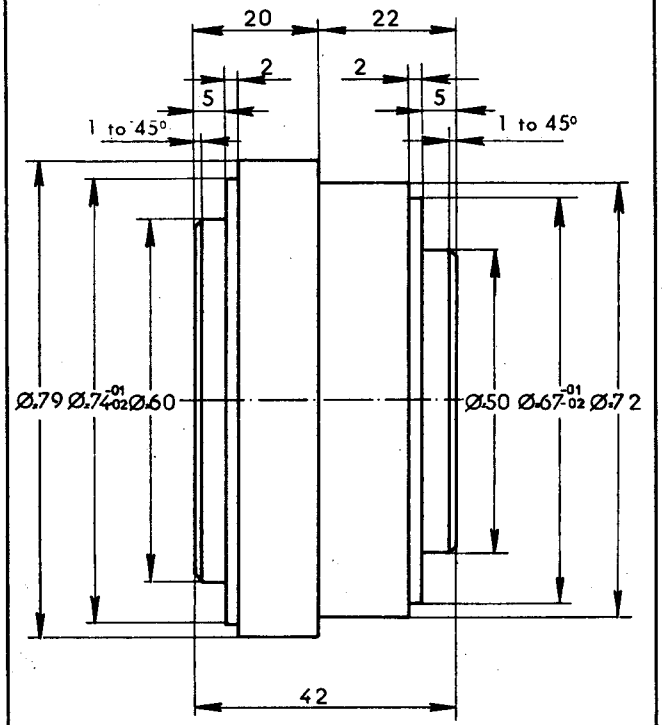
MATERIAL : semi-hard treated steel

MR 630_31/85



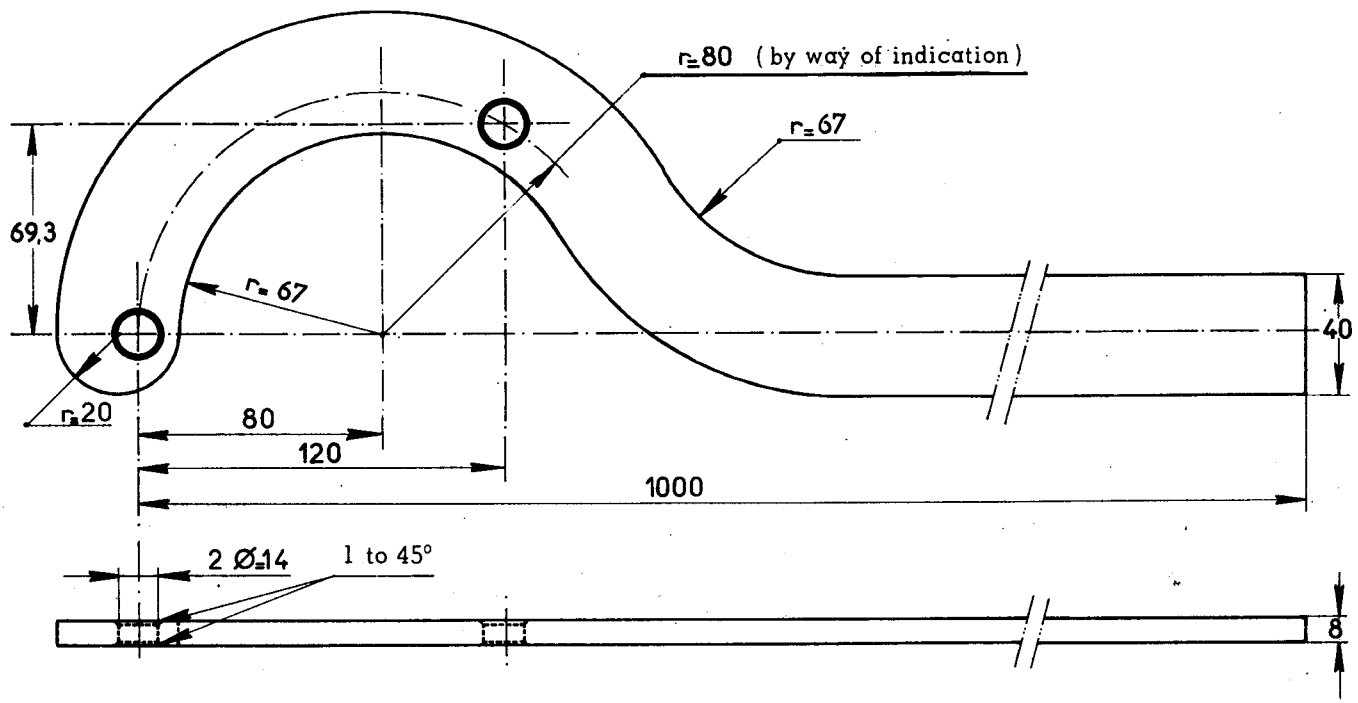
Semi-hard steel

MR 630_31/96



MATERIAL : Half-hard steel

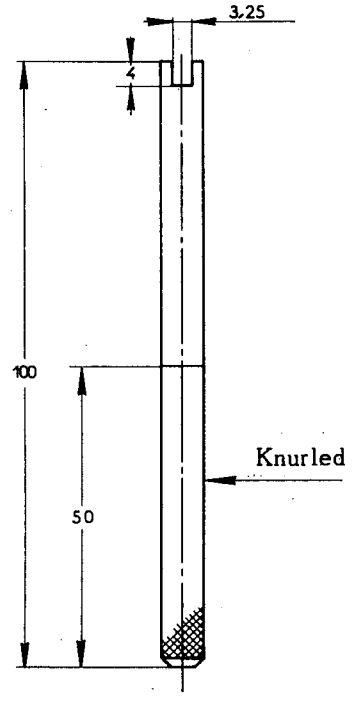
MR_630_64/40



Material : Flat iron 40 × 8

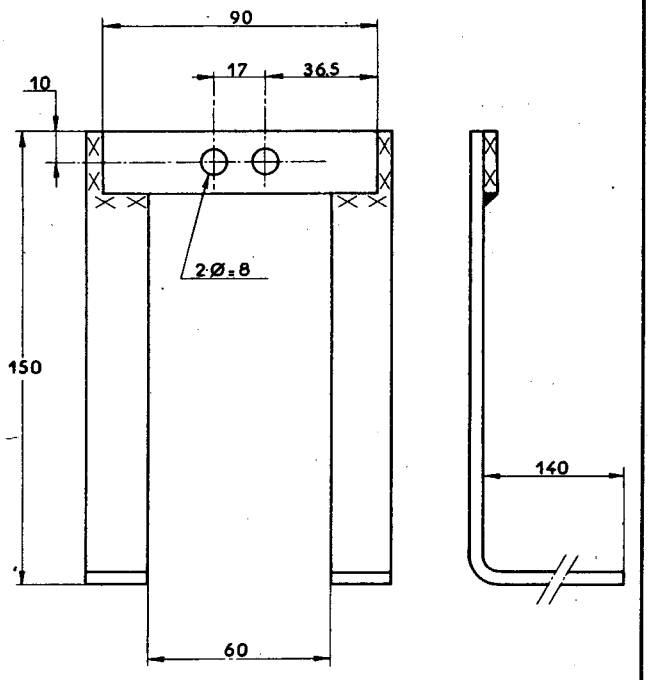
Developed length 1200

MR 630_12/36
ex. MR 1376_50



drawn dia = 7

MR 630-43/16
ex:MR 3053-260



Material : Flat iron of 20 × 4

MANUAL N° 810-2

THIRD SECTION

ELECTRICAL SYSTEM

THIRD SECTION

PART TO BE CUT OFF

LIST OF OPERATIONS
IN THE THIRD SECTION OF THE MANUAL N° 810-2

Operations where the number is preceded by the letter « G » are common to all types of vehicles of the « GS » family.
Operations where the number is preceded by the letters « GE » or « GF » are specific to the five-or three-door versions of the « GS » Estate respectively.
Operations where the number id preceded by the letter « Gea » are specific to vehicles fitted with a Torque Converter.

Operation Number	DESCRIPTION
	ELECTRICAL SYSTEM
G.532-3	Work on the alternator - PARIS-RHONE alternators - DUCELLIER alternators
G.533-3	Work on a starter motor - DUCELLIER starter motor - PARIS-RHONE starter motor

ALTERNATOR

I. VEHICLE INSTALLATIONS

A - *On vehicles all types without option :*

Alternator single-phase :

DUCELLIER 7540 A or 7540 B
or PARIS-RHONE A 11 M 7

B - *On vehicles all types with option :*

a) Alternator, three-phase :

DUCELLIER 7541 A or 7541 B *(until May 1971)*
or PARIS-RHONE A 11 R 1 *(until February 1973)*

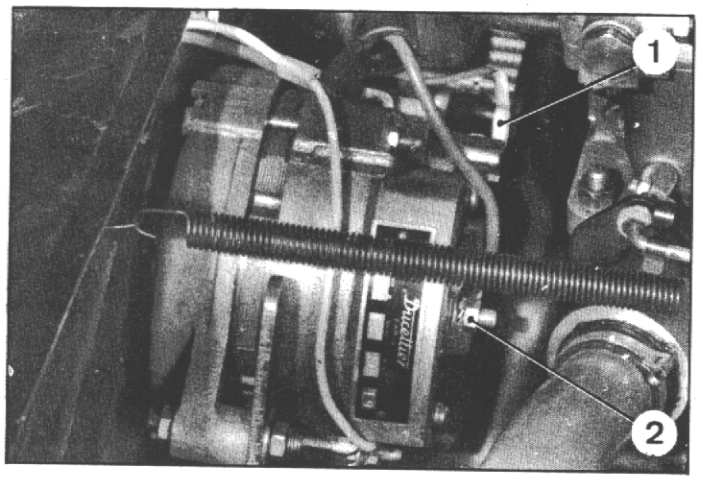
b) Alternator, single-phase :

DUCELLIER 7562 A *(from May 1972)*
or PARIS-RHONE A 12 M 5 *(from February 1973)*

II. CHARACTERISTICS

ALTERNATOR REFERENCES		7540 A or B A 11 M 7	7562 A	7541 A or B A 11 R 1
Voltage		14 V	14 V	14 V
Maximum current		30 A	35 A	37 A
Maximum output power		420 W	490 W	510 W
Begins to charge (when hot)	engine rpm	790 rpm	560 rpm	850 rpm
	alternator rpm	1400 rpm	1000 rpm	1500 rpm
Drive-ratio alternator/engine		1.77	1.77	1.77
Resistance of stator winding		7 ± 0.2 Ω	7 ± 0.2 Ω	7 ± 0.2 Ω
Minimum length of brushes (after wear)		10 mm	10 mm	10 mm
Tightening torque of pulley nut		40 mAN (4 m.kg) 29 ft.Ib	40 mAN (4 m.kg) 29 ft.Ib	40 mAN (4 m.kg) 29 ft.Ib
Direction of rotation (from driving end)		Clockwise	Clockwise	Clockwise

III. CHECK OF OUTPUT ON VEHICLE



8357

NOTE : The alternator output must be measured when running hot with full excitation.

The output check of the alternator must be carried out with a well-charged battery.

1. Connect the measuring instruments :

a) Disconnect the earth lead from the negative battery terminal. Disconnect the excitation lead (yellow end) from the terminal « EXC » (1) of alternator and the output lead (black end) from the terminal « + » (2) of alternator.

b) *Connect an ammeter in series and a rheostat in parallel with the charging circuit :*
For this purpose connect :
- The alternator terminal « + » (2) to the positive terminal « + » of the ammeter.
- The negative terminal « – » of the ammeter to the ring terminal of the disconnected output lead (black end).
- The rheostat between the negative terminal « – » of the ammeter and earth.

c) *Connect a voltmeter in parallel with the charging circuit.*
For this purpose connect :
- The positive terminal « + » of the voltmeter to positive terminal « + » of the battery.
- The negative terminal « – » of the voltmeter to earth.

Connect the earth lead to the negative terminal « – » of the battery.
Connect up a workshop tachometer.

2. Measure the output of alternator :
Start the engine and allow it to idle.

a) Alternator DUCELLIER 7540 A or B or PARIS-RHONE A 11 M 7 :
- Accelerate the engine up to about 1100 rpm and adjust rheostat to obtain voltage of 14 V, at which level the current should be 6 A.
- Increase the engine speed to about 2400 rpm and adjust rheostat to maintain 14 V. The current produced should be 22 A.
- Raise engine speed to about 4600 rpm. The current output should be 28 A for a voltage level of 14 V.

b) Alternator DUCELLIER 7541 A or B or PARIS-RHONE A 11 R 1 :
- Accelerate the engine up to about 1150 rpm and adjust rheostat to obtain voltage of 14 V, at which level the current should be 13 A.
- Increase engine speed to about 2550 rpm. For a voltage of 14 V (adjust rheostat) the current should be 31 A.
- Raise engine speed to about 4500 rpm. The current output should be 35 A for a voltage of 14 V.

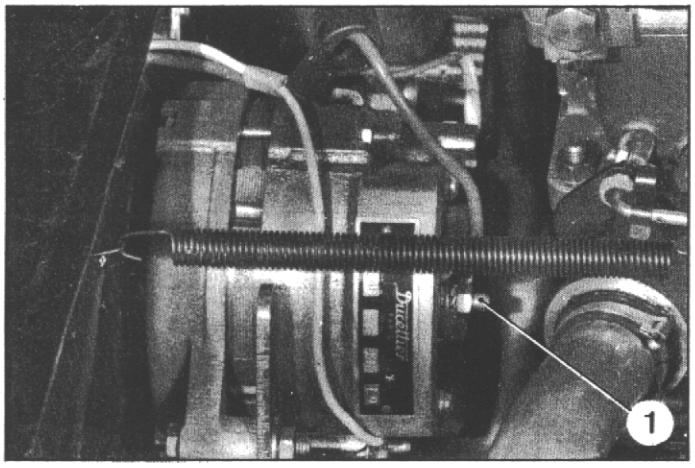
c) Alternator DUCELLIER 7562 A :
- Accelerate the engine to about 900 rpm and adjust rheostat to obtain voltage of 14 V, at which level the current should be 11 A.
- Increase engine speed to about 1700 rpm. For a voltage of 14 V (adjust rheostat) the current output level should be 26 A.
- Raise the engine speed to about 4500 rpm. The current output level should be 33 A for a voltage of 14 V.
- If these outputs are not obtained, check the drive belt and its tension. If this appears satisfactory have the alternator overhauled.
- Stop the engine.
- Disconnect the lead from the negative terminal of the battery. Remove the measuring instruments and connect the charging and excitation leads to the alternator.
- Connect the negative lead (from chassis) to negative terminal of the battery.

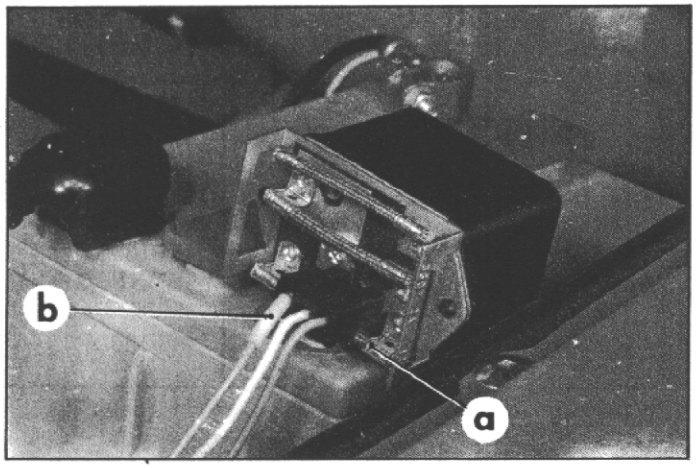
REGULATOR

CHARACTERISTICS

On vehicles of all types :
Single stage vibrating contact regulator.
One type only for the three types of alternator.

DUCELLIER : 8366 A
or PARIS-RHONE : AYC 213





CHECK OF THE VOLTAGE REGULATION

IMPORTANT : The leads to the regulator must be correctly connected. The side of the connector with the wire « b » *(yellow sleeve)* must be towards the centre of the regulator (as shown on figure).

NOTE : Checking the regulator must be carried out with a correctly charged battery.

1. Disconnect the battery earth lead.
2. Disconnect the output lead (black sleeve) from the positive terminal « + » (1) of the alternator.
3. Connect an ammeter in series and a rheostat in parallel in the charging circuit as follows :
   - positive terminal « + » of ammeter to the positive terminal « + » of the alternator.
   - negative terminal « - » of ammeter to the disconnected output lead (black sleeve)
   - the rheostat terminals between the negative terminal « - » of the ammeter and earth.
4. Connect a voltmeter in parallel with the charging circuit (fit the regulator on to the battery).
   - positive terminal « + » of the voltmeter to positive terminal « + » of regulator at « a » *(take care not to cause a short-circuit with regulator earth).*
   - negative terminal « - » of voltmeter to earth.
5. Connect the earth lead to the battery.
6. Connect a workshop tachometer.
7. Start the engine and allow it to idle.
8. Very briefly, switch off the ignition then on again (demagnetization of regulator).
9. Accelerate the engine to about 2800 rpm and maintain this speed during the check.
   Using the rheostat slowly increase the alternator output without ever reducing it.
   Note several values of the voltage, these should be within the range 13.8 to 14.4 V at a temperature of 20° ± 5°C.

   NOTE : The voltage varies inversely with the temperature by an average of 0.2 V per 10° C.
   If the above conditions are not satisfied, fit a new regulator.
10. Stop the engine.
11. Disconnect the earth lead from the battery and disconnect the measuring instruments.
12. Connect the output lead to the alternator.
13. Fit the regulator to its support and re-connect the earth lead to the negative battery terminal.

BATTERY

CHARACTERISTICS

Until 2/ 1972
Battery 12 V 150/ 30 Ah.
STECO : 2030 R
or TEM : 1540 TA
or FULMEN : AS 209 P
or TUDOR : 6 DK 54
Battery 12 V 175/ 35 Ah (Option FR- 20)
STECO : 2030 R

From 2/ 1972
Battery 12 V 200/ 40 Ah
STECO : 71 901
or FULMEN : AS 209 W

STARTER MOTOR

CHARACTERISTICS

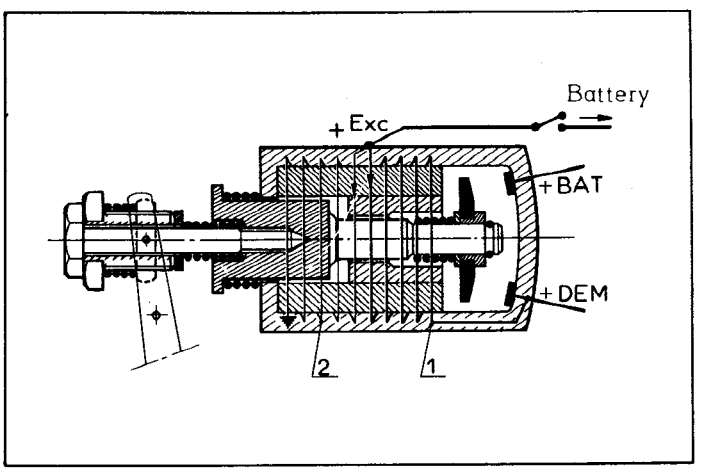
12 V solenoid starter with positive control, pre-engaged pinion type

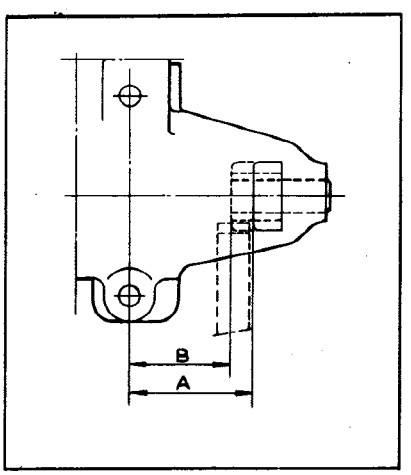
DESCRIPTION OF STARTER MOTORS	PARIS-RHONE D 8 E 103	DUCELLIER 6208 A until 12/1970 6208 B from 12/1970 until 3/1972	DUCELLIER 6217 from 3/1972 6217 B from 11/1972
Solenoid : Resistance of pull-in coil (1) (heavy-gauge wire winding connected in series with field coils) Resistance of hold-in coil (2) (light-gauge wire winding connected in parallel)	0.3 Ω 1 Ω	0.24 Ω 1.08 Ω	
Stator Resistance	0.011 Ω	0.0087 Ω	0.01 Ω
Rotor Min. dia. of commutator after machining	35 mm (1.378 in)	30 mm (1.181 in)	
Brushes Min. length after wear	7 mm	7 mm	
Starter pinion Adjustment: The starter pinion must assume the positions indicated on the figure Solenoid not energized Solenoid energized	 A = 47.7± 0.3mm B = 38.3 mm maxi	 0 A = 48.5 - 1,2 mm B = 37.5 mm maxi	

NOTE : The pull-in coil circuit (1) is earthed through the field coils, the rotor and the bushes.

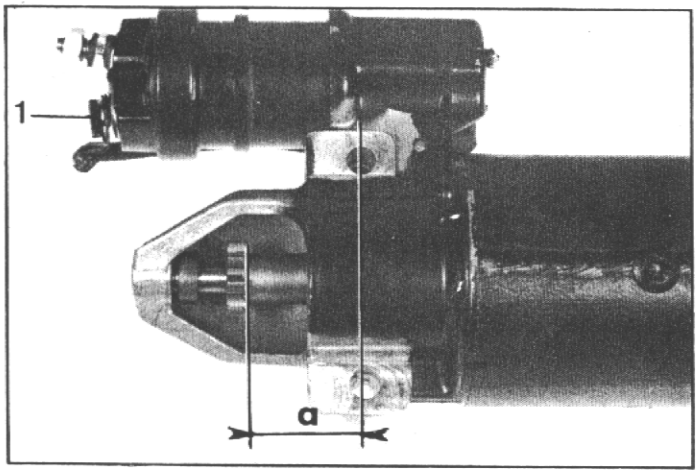
CHECKING THE STARTER MOTOR

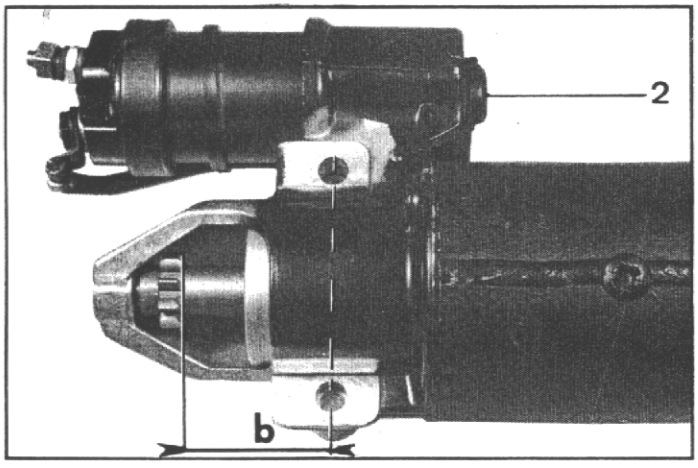
DESCRIPTION OF STARTER MOTORS	D 8 E 103	6208 A - 6208 B	6217 A or 6217 B
1. Check on car *(battery correctly charged)*			
a) Current taken with pinion locked (stall current)	350 A	260 A	320 A
b) Current taken during starting *(starter in use)*	90 to 110 A	90 to 110 A	90 to 110 A
2. Check on test bench :			
a) No-load current	50 A	42 A	50 A
b) Mean torque at 1000 rpm	5 mΛN (0.5 m.kg) 3.6 ft.lb	4 mΛN (0.4 m.kg) 2.9 ft.lb	5 mΛN (0.5 m.kg) 3.6 ft.lb
Current taken at this torque	220 A	200 A	240 A
c) Maximum power	625 W	460 W	610 W
Corresponding torque	3.5 mΛN(0.3 m.kg) 2.2 ft.lb	2.35 mΛN (0.2 m.kg) 1.5 ft.lb	3.5 mΛN (0.3 m.kg) 2.2 ft.lb
Current taken at this torque	170 A	150 A	180 A

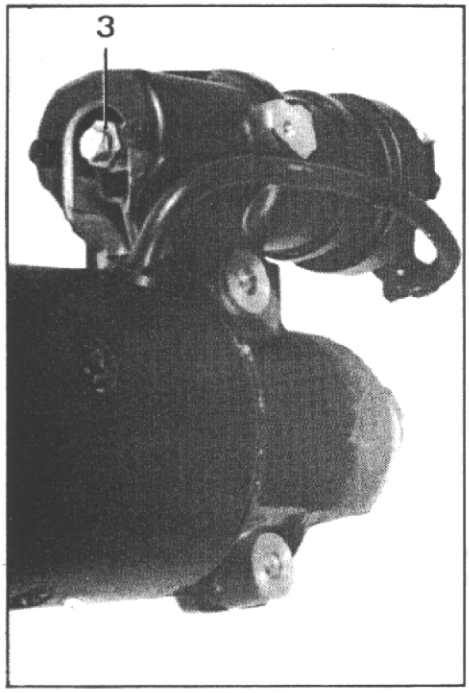




ADJUSTMENT OF DRIVE PINION ON A DUCELLIER STARTER MOTOR 6208 A, 6208 B, 6217 A or 6217 B







NOTE : This operation can only be carried out on a starter motor from the engine.

1. Remove the plastic plug (2).

2. Energize the solenoid. For this connect :

   a) The positive terminal of a 12 V battery to the supply terminal at the solenoid (flat blade connector).

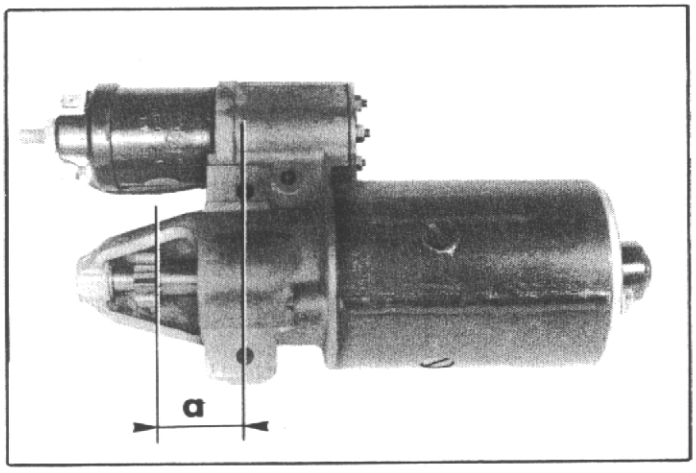
   b) The negative terminal of this battery to the terminal marked « DEM » (1).
   With the pinion then in the « engaged » position, measure *dimension « a » which should be 37.5 mm max.* (1.47 inches).

3. Disconnect the battery from the supply terminals of the solenoid and field coils.
   The pinion will return to occupy its free position.
   Measure *the dimension « b » which must be between 47.3 mm and 48.5 mm* (1.86 and 1.91 inches).

4. Obtain this measurement by operating the adjusting sleeve (3) on the solenoid.
   If these dimensions are not obtained the starter motor must be reconditioned.

5. Fit the plastic plug (2).

ADJUSTMENT OF DRIVE PINION ON A PARIS-RHONE D. 8 E 103 STARTER MOTOR



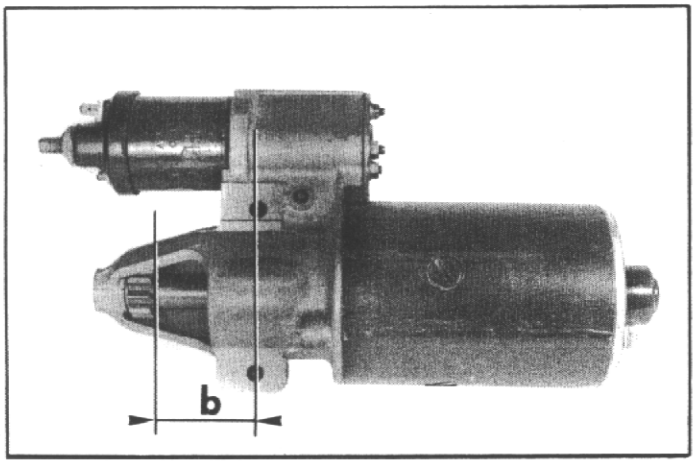
10170

1. Remove the starter motor.

2. Energize the solenoid. For this connect :

   a) The positive terminal of a 12 V battery to the blade terminal of the solenoid.

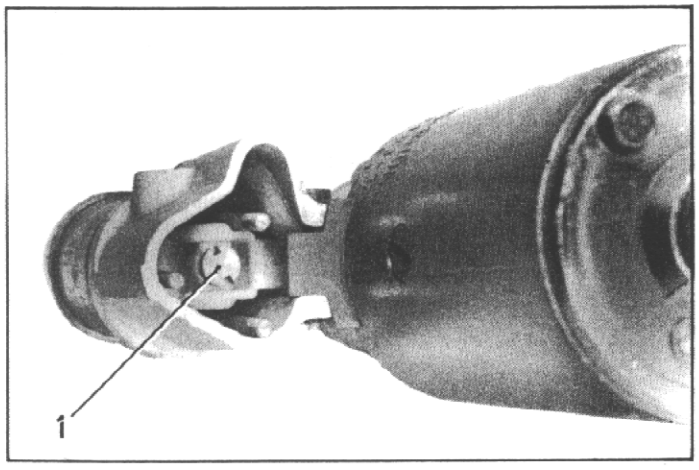
   b) The negative terminal of the battery to the field coil supply terminal « DEM ».
   With the pinion in the « engaged » position measure *the dimension « a » which should be 38.3 mm max.* (1.51 inches).



10171

3. Disconnect the battery from the supply terminals of the solenoid and field coils.
   The pinion will return to its free position.
   Measure *dimension « b » which must be between 47.4 mm and 48 mm* (1.86 and 1.89 inches).

4. Obtain this measurement by adjusting the sleeve (1) after having removed the solenoid securing flange.
   If these dimensions are not obtained, the starter motor must be reconditioned.

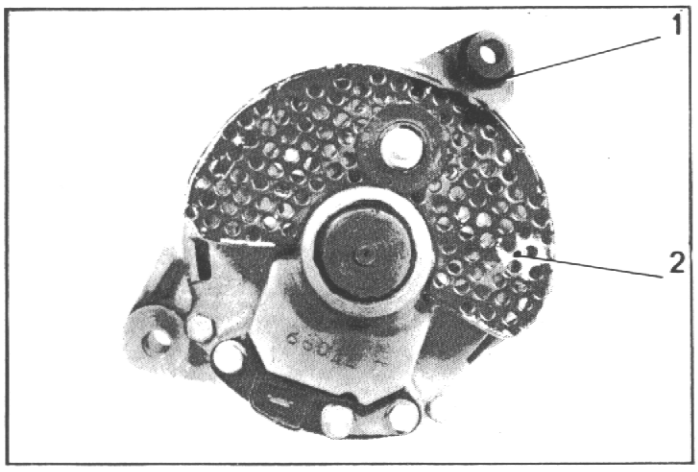


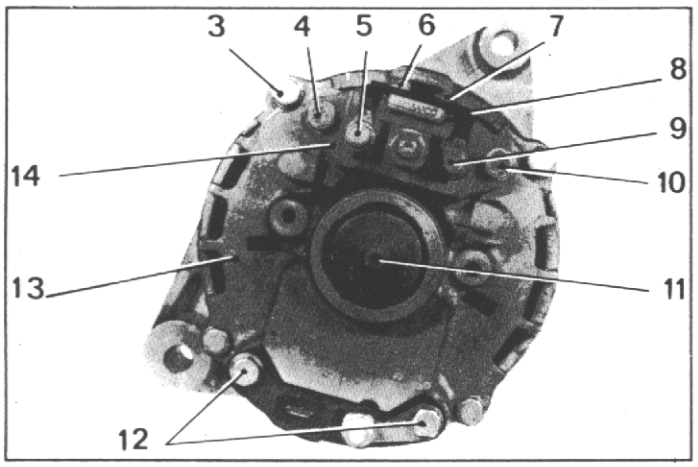
10173

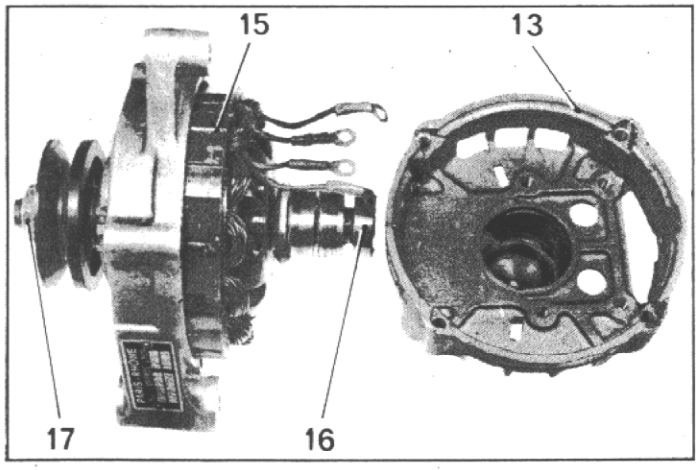
5. Fit the solenoid securing flange together with its gasket.

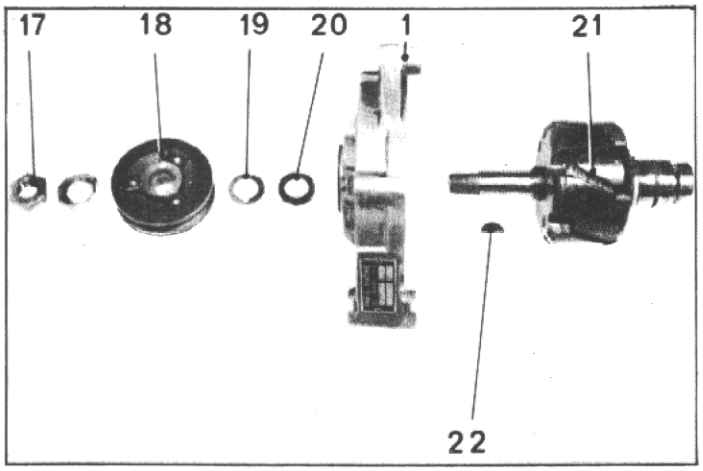
6. Fit the starter motor on the engine.

I. ALTERNATOR TYPE PARIS-RHONE A 11 . M 7



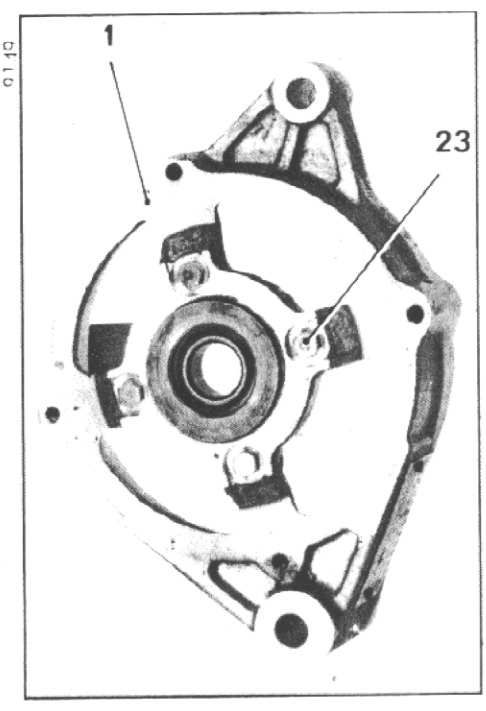




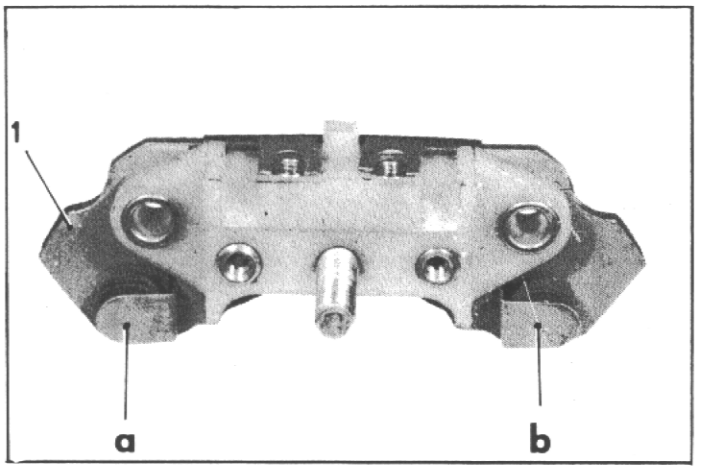


DISMANTLING.

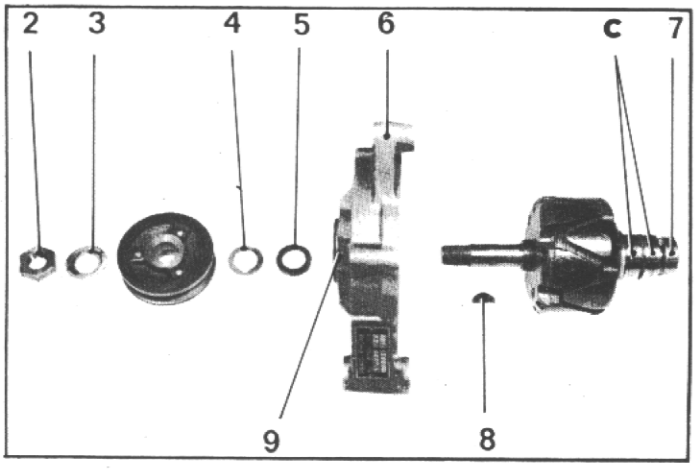
1. Remove the protective cover (2).
2. **Remove the diode support (14) :**
   Disconnect the stator output leads.
   - Remove the bolts (5) and (9).
   - Remove the bolts (6) and (7) and release the capacitor support plate.
   - Remove the two bolts (4) and (10) and release the diode support.
3. Remove the brush-holder by removing the two bolts (12).
4. Remove the plastic cap (11).
5. Remove the four end bracket assembly bolts (3).
   (Mark the position of the front and rear brackets in relation to one another).
   Separate the rear bracket (13) (commutator end) from the front bracket (drive end) - rotor and pulley assembly.
   Release the stator (15).
6. Remove the pulley nut (17). To do this, hold the pulley (18) by means of an old belt placed in its groove. Clamp in a vice the part of the belt not around the pulley.
   Release the pulley (18), the washer (19), the key (22), the spacer (20) and the rotor (21).
   Remove the rotor ball bearing (16).
7. Remove the ball bearing from the drive end bracket (1).
   - Remove the four bolts (23) holding the bearing retaining plate.
   - Release the bearing
8. Release the O-ring located on the inside of the commutator end bracket (13).
9. Clean the parts.



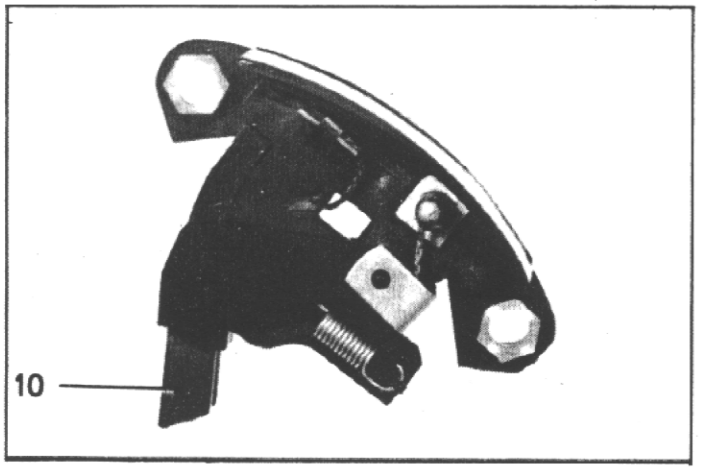
Manual 8 042



9144



9148



9145

CHECKING THE COMPONENTS.

10. Check the rectifying diodes :

a) Using a diode tester (follow instructions on notice accompanying apparatus.)

b) Using a 12 V battery and a test lamp :
Connect the « + » terminal of the battery to the diode support (1) with the test lamp in series.
Connect the « - » terminal of the battery to the diode support at « a » and then at « b ». the test lamp should come on.
Reverse the connections to the battery and repeat the same test : the lamp should not come on.
If these conditions are not satisfied, replace the support with the diodes.

11. Check the rotor :

a) *Check the insulation of the windings.* To do so : Apply 110 volts between bush « c » of the commutator and the earth with a 110 volts test lamp in the circuit. *The lamp should not light up.* If it does, the windings are earthed and the rotor must be replaced.

b) *Check the resistance of the windings* between the two bushes « c » of the commutator. This resistance should be 7 ± 0.2 Ω.

c) Clean the two bushes with a cloth soaked in trichlorethylene. Polish them if need be with very fine sand paper

12. Check the stator :

a) Check the insulation of the windings.
With a test lamp (110 volts) in series, apply 110 volts successively between the terminal of one of the two large output leads of the stator and the stator earth and then between the other large lead and earth. *The lamp should not light up.* If it does, the windings are earthed, and the stator must be changed.

b) Check the resistance of the windings, using a ohmmeter connected between any two phase output leads. The resistance values must be equal to within ± 5 % and should be of about 0.38 Ω.

13. Check the brushes (10) :
Check the operation of the springs.
The length of the brushes, when worn, must not be less than *10 mm.*
Otherwise, replace them.

14. Check the fuse.

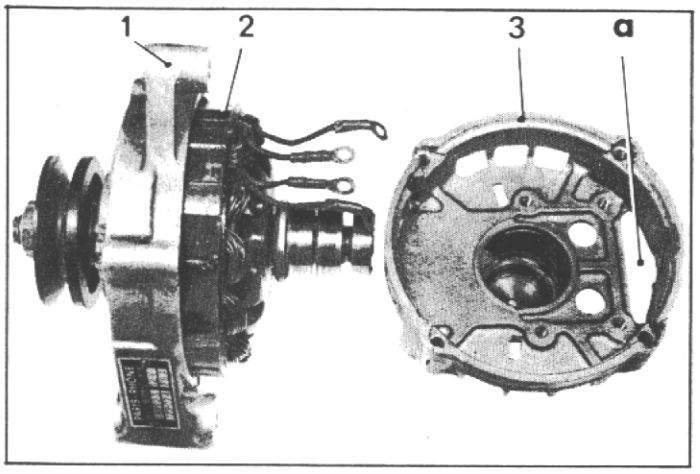
FITTING.

15. Fit the bearing into the drive end bracket (6). Fit and fix the ball bearing retaining plate with the aid of the four screws (9).

16. Fit the bearing (7) into the commutator and bracket.

17. Connect up the rotor to drive end bracket. Fit the spacer (5), the key (8), the washer (3) and the nut (2). Tighten the nut to 40 mΛN (4 m.kg), holding the pulley as described in paragraph 6.

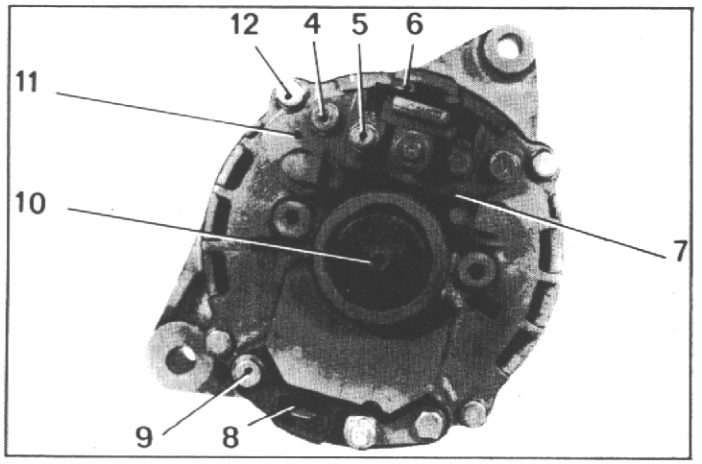
9147



18. Smear the O-ring with bearing grease and fit it into the commutator end bracket (3).

19. Connect up the stator (2) to the drive end bracket (1) making sure that it is correctly positioned. To do this, offer up the commutator end bracket (3), matching the marks made during dismantling ; the output leads must pass through opening « a ».

9142

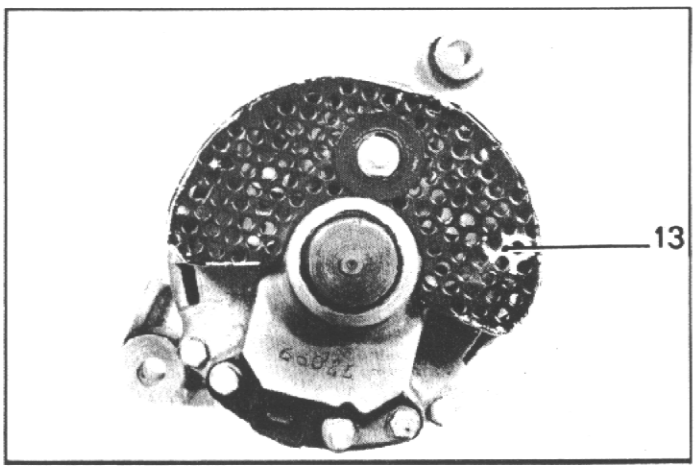


20. Completely link up the commutator end bracket.
Fit the four assembly bolts (12) (« Onduflex » washer).
Smear the threads with LOCTITE GX. 01 459 01 A.
Tighten them to 6 mAN (0.6 m.kg).

21. Fit the diode support (11). Tighten the two bolts (4) («Onduflex» washer).

22. Fit the fuse plate (7) and tighten down.

9141



23. Connect up the stator output leads.
Tighten the bolts (5) (« Onduflex » washer).
Place the capacitor support plate under the upper bolts (6).

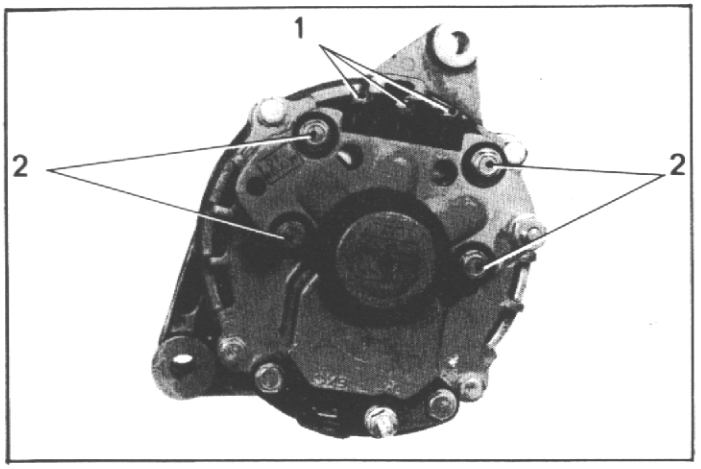
24. Fit the plastic cap (10).

25. Fit the brush holder (8) and fix in position with the two bolts (9).

26. Fit the protective cover (13).

II. ALTERNATOR TYPE PARIS-RHONE A. 11 . R. 1

9171



NOTES :
This alternator is dismantled and fitted in the same way as alternator A 11 . M 7.
The diode support (six rectifying diodes) is held by the four bolts (2).
The three-phase stator has three output leads connected to the diode support by the three bolts (1).

CHECKING THE COMPONENTS.

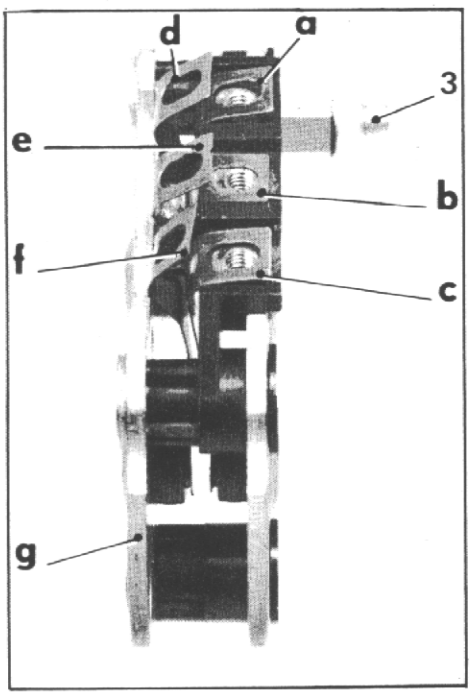
This checking is the same as for the components of the PARIS-RHONE alternator (see chapter I with the exception of the followings points) :

27. Check the rectifying diodes with the aid of a 12 volts battery and test lamp.
NOTE : The diodes cannot be disassembled ; if one of them is defective, replace the whole support.

a) *Checking the positive diodes :*
Connect the « - » terminal of the battery *through the test lamp* to the output terminal (3) on the support.
Connect up the « + » battery terminal in turn to the three strips of the positive diodes at « a », « b » and « c ».
The test lamp should light up.
Reverse the battery connections, the lamp should not light up.
Otherwise, the support must be replaced along with the diodes.

b) *Checking the negative diodes :*
Connect the « + » battery terminal with the test lamp in series to the diode support « d ».
Connect the « - » battery terminal in turn to the negative diode strips at « e», « f » and « g ».
The test lamp should light up.
Reverse the battery connection, the lamp should not light up.
If these results are not obtained, the support and the diodes must be replaced.

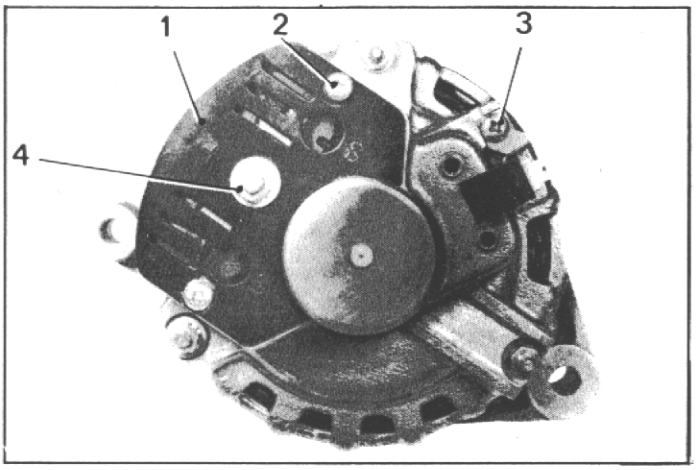
9172



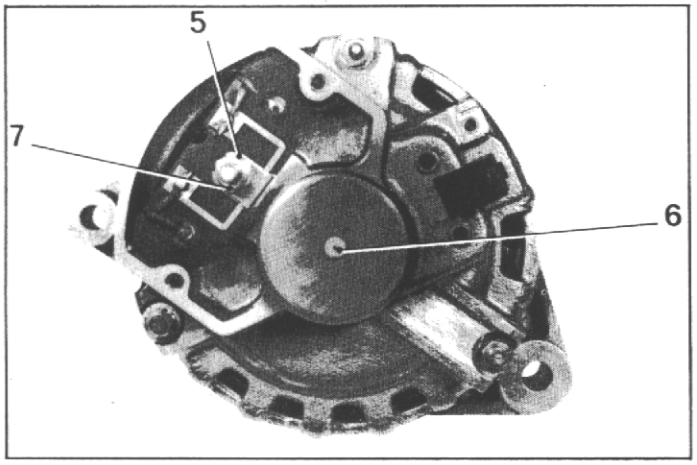
28. Check the stator :
The insulation is checked between any one of the output leads and the stator body. The phase balance is checked using an ohmmeter capable of measuring resistance values on the order of 1/10 Ω.
The resistance measured between the three output leads must not differ from another by more than ± 5 % and should be of about 0,22 Ω.

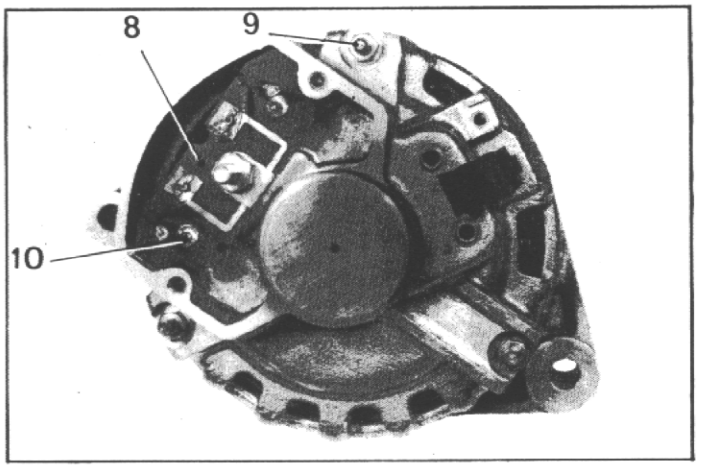
III. ALTERNATOR TYPE DUCELLIER 7 540 A, 7 540 B or 7 562 A

9193



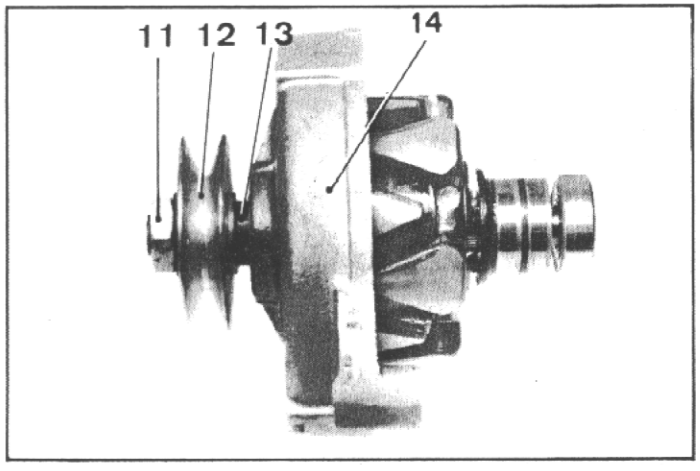
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9199



Manual 810-2

DISMANTLING.

1. Remove the protective plate (1).
   Remove the two screws (2), the nut (4) and its washers.

2. Remove the brushes (3).
   Remove the screw (3) holding the negative brush and the bolt of the positive brush located behind the plug.

3. With the aid of a soldering iron, unsolder the four output leads of the stator.

4. Remove the fuse plate (8).
   After unlocking it from the plate (5), remove the nut (7).
   Remove the fuse plate, after cleaning the output connections (10) of the two diodes with a soldering iron, if neccessary.

5. Remove the plastic cap (6).

6. Mark the two end brackets in relation to one another.

7. Remove the three bracket assembly bolts (9).

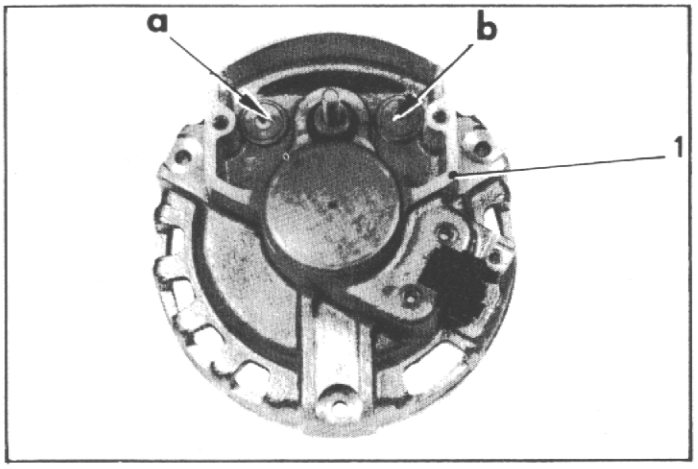
8. Separate the drive end bracket-rotor-pulley assembly from the commutator end bracket.
   Remove the stator.

9. Strip down the drive end bracket (14) :
   Remove the pulley (12).
   To do so :
   Remove the nut (11). Hold the pulley using an old belt fitted into its groove. Clamp in a vice the part of the belt not around the pulley.
   Remove the pulley, the spacer (13), the key and the rotor.

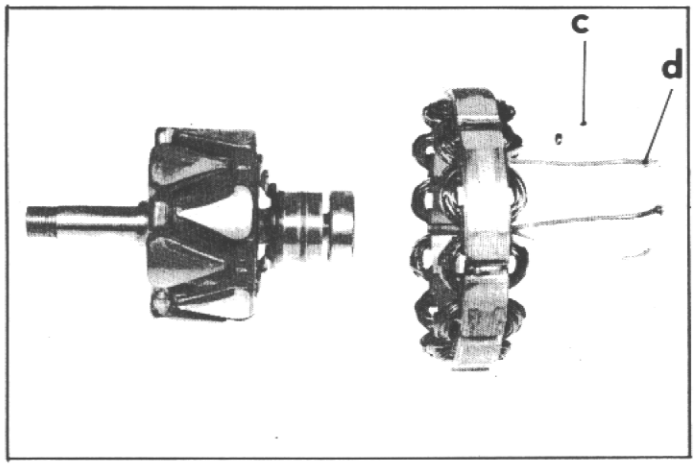
10. Remove the O-ring from the commutator end bracket.

11. Remove the ball bearings.
    Remove the rivets holding the front ball bearing retaining plate.

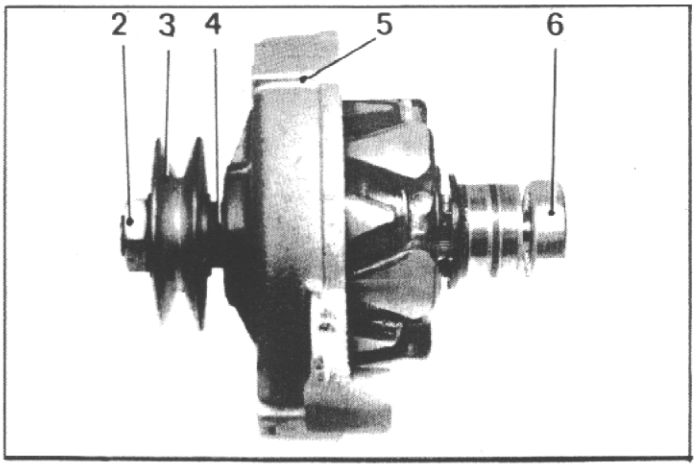
12. Clean the parts.



9197



9198



9199

CHECKING THE COMPONENTS.

13. Check the rectifying diodes :

a) Using diode tester (follow instructions on notice accompanying apparatus).

b) Using a battery and a 12 volts test lamp in series :

- Connect the battery « + » terminal to the bearing (1) with the test lamp in series.
- Connect the battery « - » terminal in turn to each diode output plug at « a » and « b ». *The lamp should light up.*
- Reverse the battery connection : *the lamp should not light up.*

If these results are not obtained, change diode-holder.

14. Check the rotor :

a) Check the insulation of the windings with a 110 volts test lamp in series, apply a 110 volts between one bush of the commutator and the rotor earth.
The lamp should not light up. If it does, the windings are earthed and the rotor must be replaced.

b) Check the resistance of the winding between the two commutator bushes. This resistance should be 7 ± 0.2 Ω.

c) Clean the two bushes with a cloth soaked in trichlorethylene. Polish them if need be with very fine sand paper

15. Check the stator :

- Check the insulation of the winding with a 110 volts test lamp in series, apply 110 volts in turn between the yellow lead « c » and the earth (frame) and then between the read lead « d » and the earth : *the lamp should not light up.* If it does, the windings are earthed and the stator must be replaced.

16. Check the brushes :

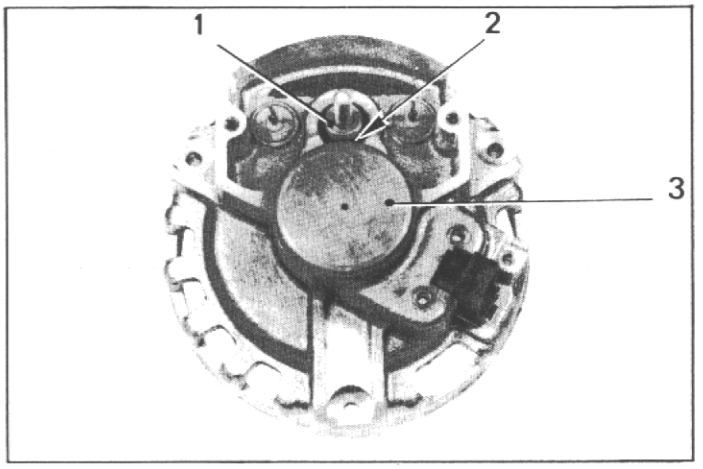
The minimum worn length should be *10 mm.* Otherwise, replace them.

17. Check the fuse plate.

FITTING.

18. Fit the bearing (6) on the rotor shaft.
Fit the other bearing in the front bracket (5),
Fit the retaining plate using new rivets.
Smear the two bearings with grease beforehand.

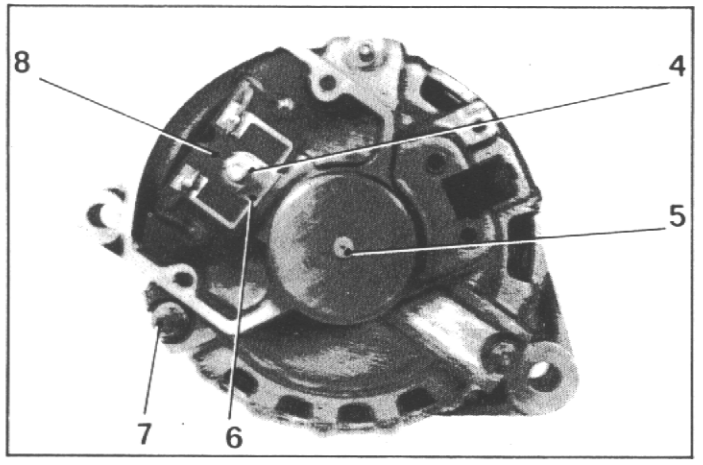
19. Connect up the rotor to the drive end bracket. On the shaft, fit the spacer (4), the key, the pulley (3), the « Onduflex » washer and the nut (2). Tighten the nut to 40 mΛN (4 m.kg) holding the pulley as indicated in paragraph 9.



20. Fit the O-ring into the bore of the diode-holder bracket.

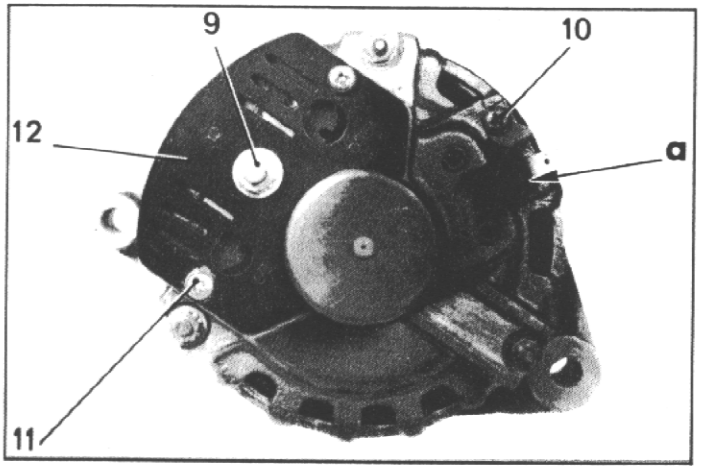
21. Link up the stator to the front drive end bracket after correctly positioning it. To do this, offer up the commutator end bracket so that the two marks made during dismantling are face to face.
Assemble the two end brackets with the three bolts (7).

22. Fitting the fuse plate (8) :
Make sure that the spacer (1) and insulating washer (2) are in position on the positive terminal of the alternator.
Fit the fuse plate, the locking tab (6) and the nut (4). Bend back the tab (6) to lock the nut (4).



23. Introduce the leads as shown in the illustration and solder them with a soldering iron.

24. Fit the plastic cap (5).



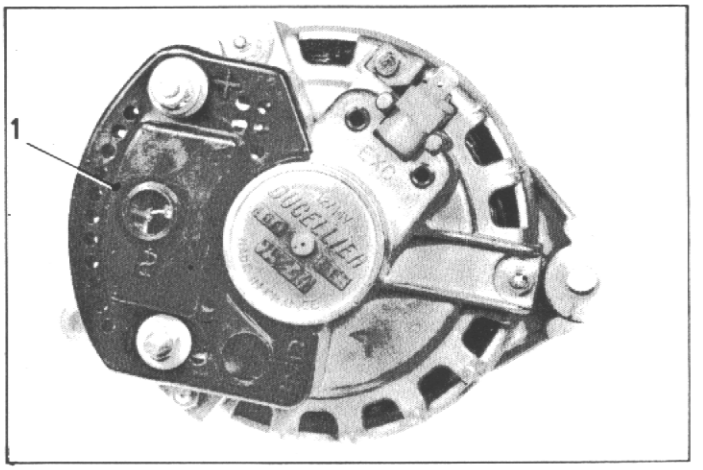
25. Fit the brushes.
Secure them with the screw (10) for the negative brush and the bolt at « a » for the positive brush.

26. Fit the protective plate (12).
Tighten the two screws (11) and fit the nut (9) (plain and lock washers)

27. Make sure the rotor turns freely.

IV. ALTERNATOR TYPE DUCELLIER 7541 A

9200



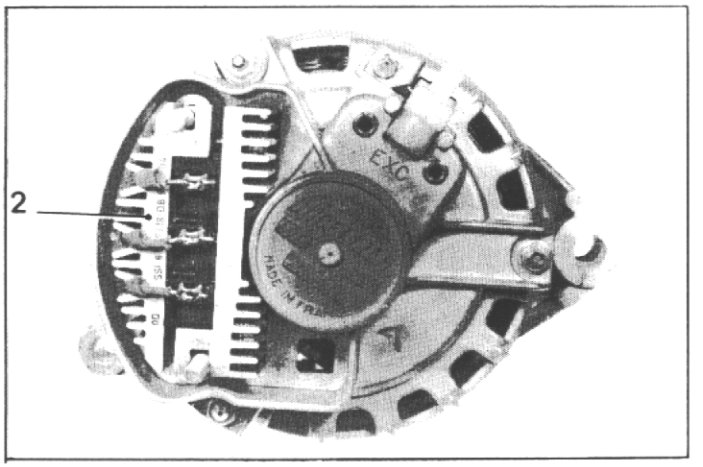
NOTES :
The dismantling operations on this alternator are the same as for alternator 7 540 A.
The alternator is fitted with a six-diode rectifier bridge.
To remove the latter :
- Remove the protective cover (1).
- Remove the three output leads of the three-phase stator.

When fitting, make sure that a grommet (4) and an insulating washer (3) are in position.

CHECKING THE COMPONENTS.

This check is the same as that done on the alternator 7 540 A except for the following points :

9201

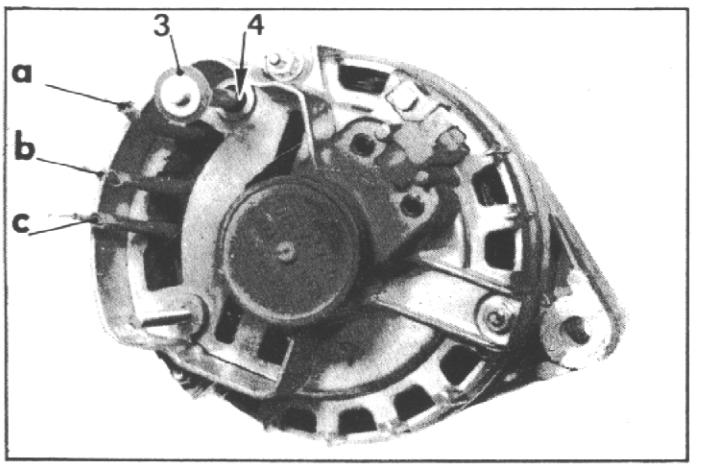


28. Check the rectifying diodes using a 12-volt battery and test lamp.
NOTE : The diodes are not on sale. If one of them is defective, the complete support (2) must be replaced.

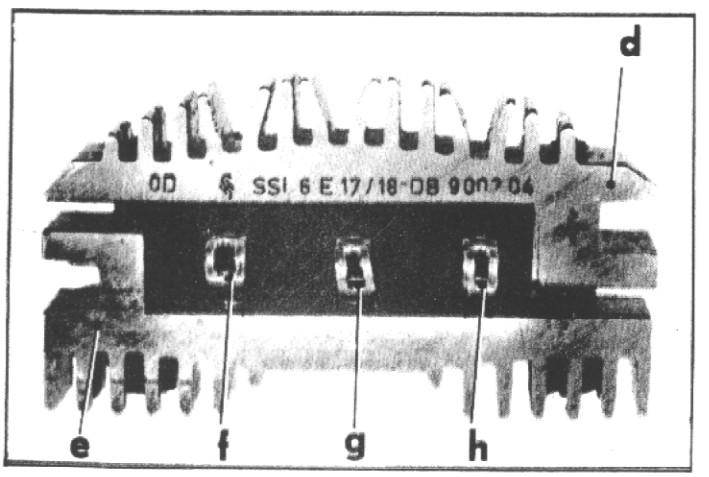
a) *Checking the positive diodes :*
With the test lamp in series, connect the « - » terminal of the battery to the part « a » of the diode support.
Connect the « + » terminal of the battery in turn to « f », g and h ». *The lamp should light up each time.*
Reverse the battery connection ; *the lamp should not light up.*
If these conditions are not met, the complete diode support must be replaced.

b) *Checking the negative diodes :*
With the test lamp in series, connect the « + » terminal of the battery to the part « e » of the support.
Connect the « - » terminal of the battery in turn to the « f, g and h ». *In each case the lamp should light up.*
Reverse the battery connection, *the lamp should not light up.*
If these conditions are not met, the complete diode support must be replaced.

9202

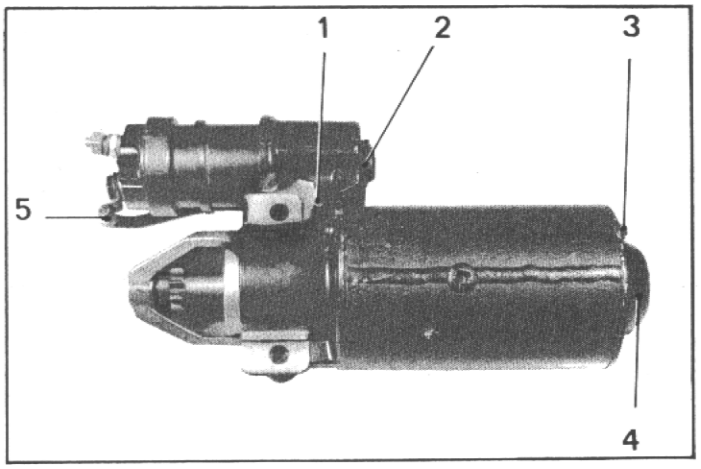


9203



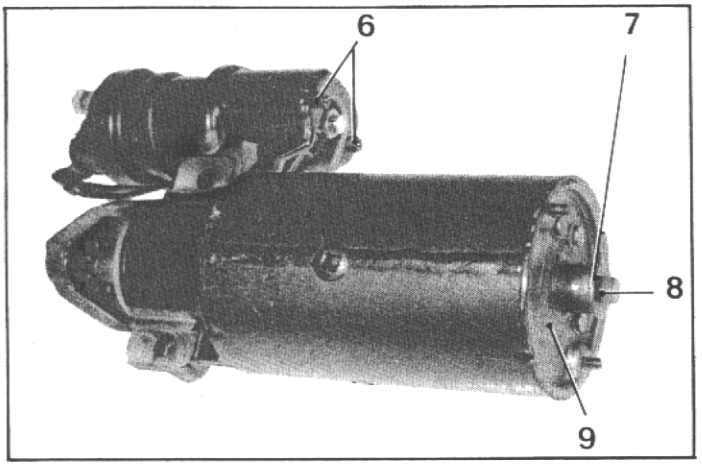
29. Check the stator :
The insulation check is done between any one of the « a, b or c » leads and the alternator earth *(diode bridge disconnected)*
The phase balance check is done with the aid of an ohmmeter capable of measuring resistances of 1 · 10 Ω.
The resistances measured between « a » and « b » and « c » or « b » and « c » *must be the same to within* ± 5 %.

I. STARTER MOTOR TYPE DUCELLIER 6208 A or 6208 B



DISMANTLING.

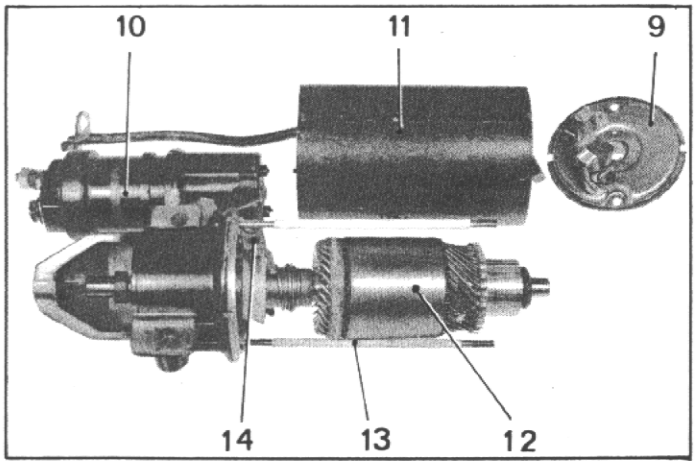
1. Disconnect the field coils supply lead (5).



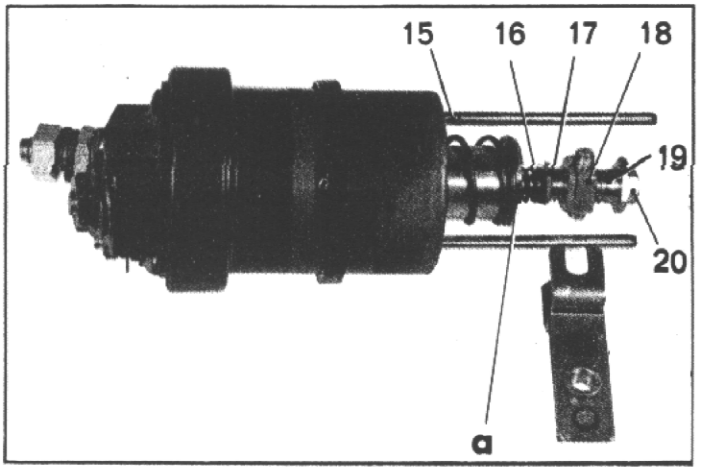
2. Remove :
   - the nuts (3) holding the bearing end plate,
   - the rear cover (4),
   - the plastic plug (2).

3. Drive out the fork hingepin (1).

4. Hold the drive gear and remove the bolt (8) and its steel washer (7).



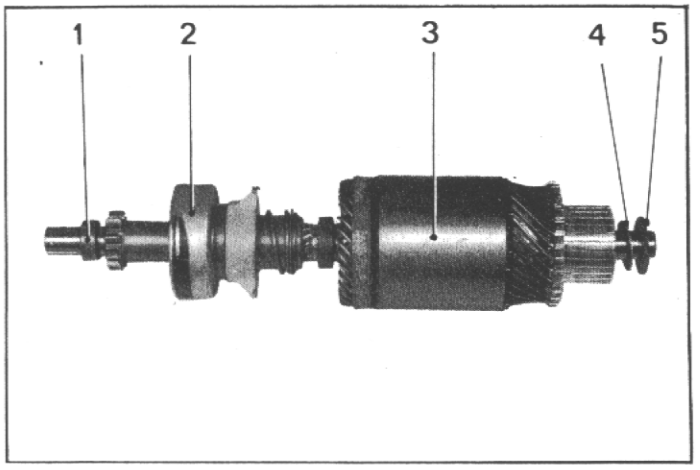
5. Remove :
   - the bearing end plate (9) and release the positive brush and its guide.
   - the yoke (11) from the two assembly rods (13),
   - the solenoid (10) after removing the two nuts (6),
   - the fork (14),
   - the armature (12).

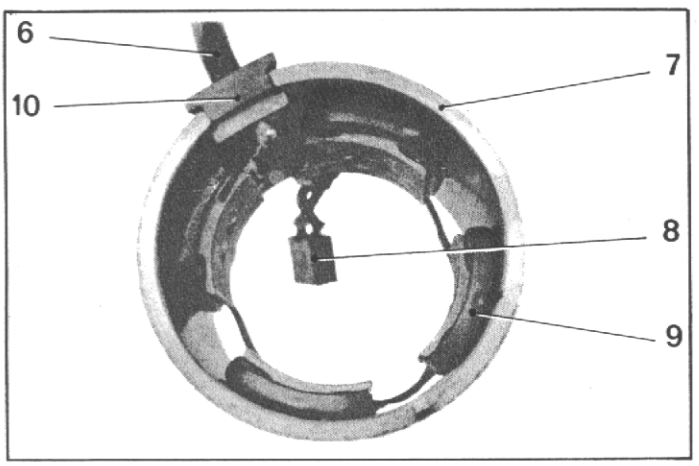


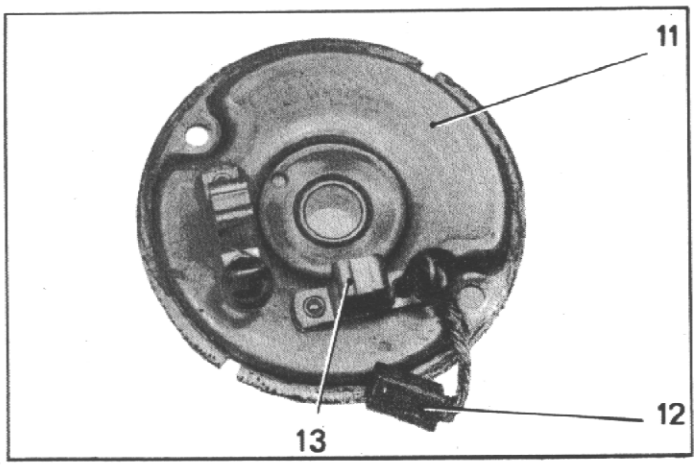
6. **Strip down the solenoid :**

Remove the two rods (15), the bolt (20) while holding the solenoid core by the two flats « a ».

Remove :
- the spring (16) and its washer (17),
- the adjustment sleeve (19) and its nut (18).







7. Strip down the armature (3) :

Remove :
- the celoron washer (5),
- the steel washer (4),
- the thrust bearing snap-ring (1),
- the thrust bearing (1),
- the driving gear (2).

8. Strip down the yoke (7) :

Unsolder (with a soldering iron) :
- the positive brush (8),
- the feed cable (6) to the field coils.

Remove the insulation piece (10).

Loosen the four bolts holding the pole pieces. Use a short screwdriver held in place by means of a bench press.

Remove :
- the field coils (9)
- the « Press-pahn » insulating material.

9. Strip down the bearing end plate (11) :

Check the insulation of the positive brush-holder in relation to the end plate using a 110 or 120 volts test lamp. If the lamp lights up, the brush-holder is badly insulated and the bearing end plate must be replaced.

Unsolder the negative brush (12) with a soldering iron.

10. Clean the parts.

FITTING.

11. Inspect the armature shaft in two « V » blocks or between points. *The maximum tolerated out of round is 0.15 mm.*

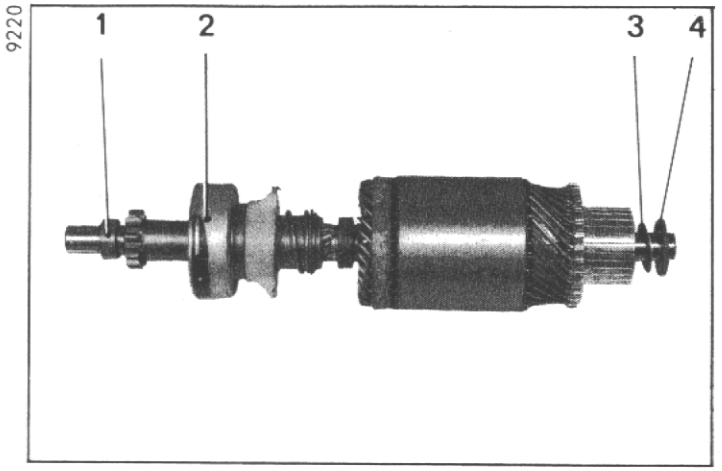
12. Check the armature on growl tester.

13. Skim the commutator. *The original diameter (32 mm) should not be reduced by more than 2 mm.*

After skimming, undercut the insulators between the segments of the commutator using a saw-blade thinned down to the same size as that of the insulation slots (0.70 mm), or a scraper.

14. Check the brushes for wear and ensure that they slide freely.

If they are less than 7 mm long, replace them.

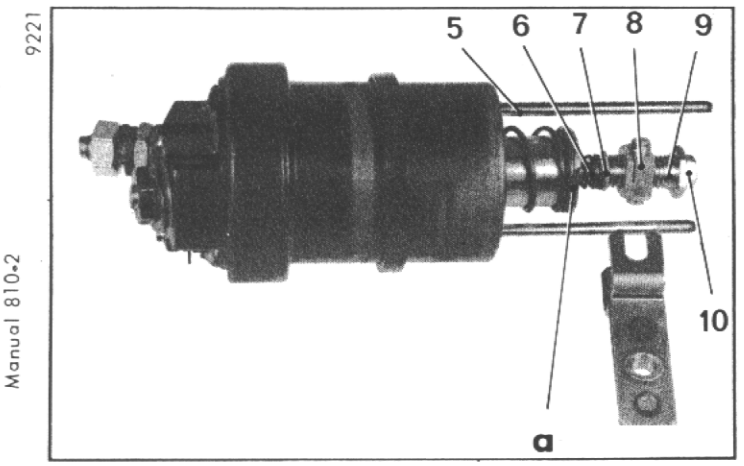


15. Check the solenoid :

a) Check the resistance of the primary winding using an ohmmeter connected between the solenoid supply terminal (flat strip) and the terminal marked « DEM ». *This resistance should be on the order of 0.24* Ω.

b) Check the resistance of the secondary winding using an ohmmeter connected between the solenoid supply terminal (flat strip) and the solenoid body. *This resistance sould be 1.08* Ω.

If these conditions are not satisfied, replace the solenoid.



Manual 810-2

16. Prepare the armature :

Fit the steel washer (3) and then the celoron washer (4) after oiling them.

Oil the splines (use very thin oil) and fit :

- the drive gear (2),
- the thrust bearing (1) and its stop-ring.

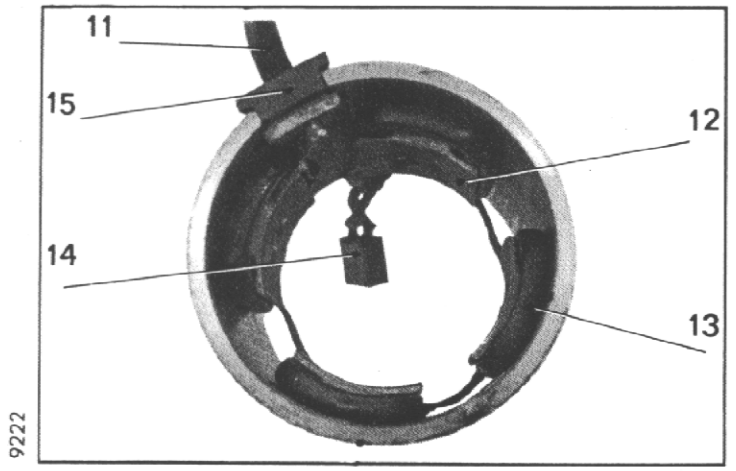
17. Prepare the solenoid :

NOTE : The bolt(10) should be replaced at each dismantling.

a) Fit on the bolt (10) :
   - the adjusting sleeve (9) and preset it halfway along its travel in the nut (8),
   - the celoron washer (7),
   - the spring (6).

b) Now screw the bolt (10) completely into the solenoid core holding the latter with the two flats « a ».

c) Fit the two rods (5).



18. Prepare the yoke :

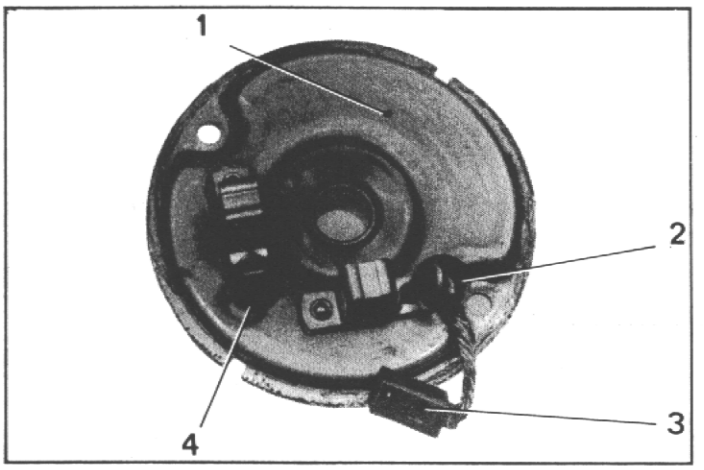
Fit the winding (13) into the yoke and position the pole pieces (12). Hold these in place with the aid of the four holding screws.

Fit the « Press-pahn » insulation under two windings and at the level of the feed cable connections (11) to the windings and the positive brush (14) to prevent a short circuit.

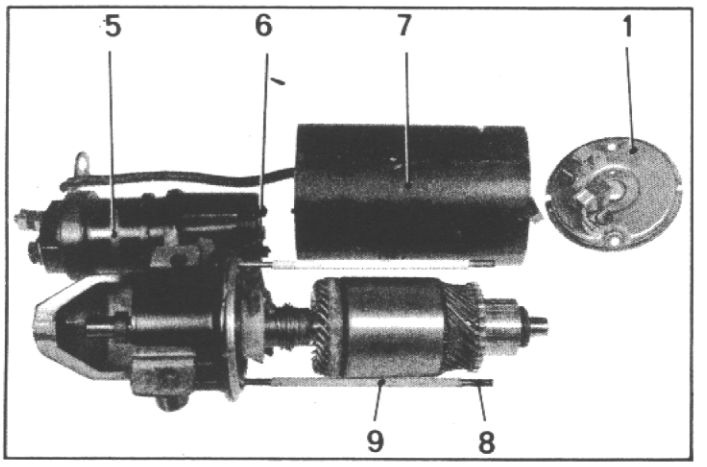
Position the pole faces horizontally and tighten the securing screws with a short screw driver held in place by a bench press.

Fit the insulation piece(15) and the feed cable (11) supplying the field coils.

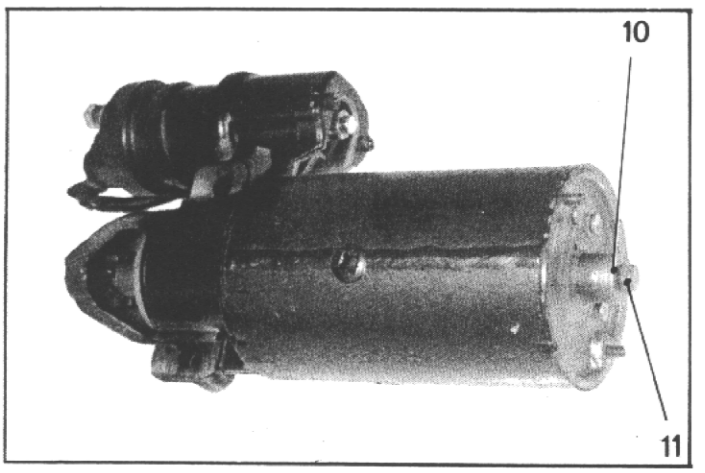
Solder the cable (11) and the positive brush (14).



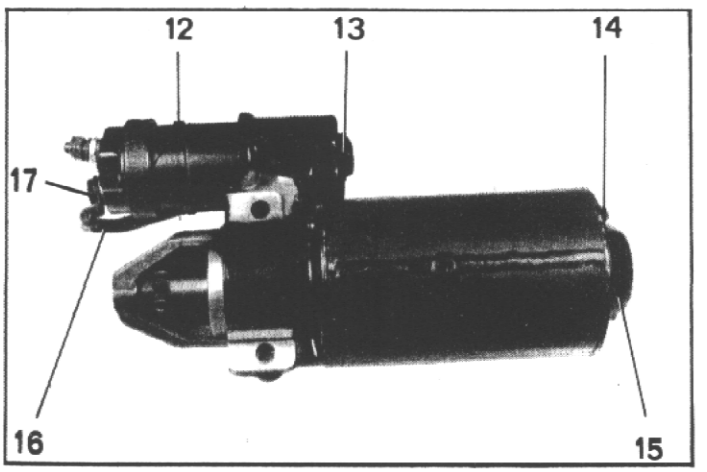
9223



9219



9214



9213

19. **Prepare the bearing end plate :**
Solder the negative brush (3).
Fit the springs (4) and (2).
Fit the negative brush (3) in its guide and hold (not fully driven home) in the guide with the aid of the end of the spring (2) flat against the brush.

20. Fit the solenoid (5) on the starter driving end.
Tighten the two nuts (6) (Shakeproof washer).

21. Fit the armature in the starter end and position the fork on the sliding gear and in the solenoid.
Engage the armature shaft in starter front bearing.
Fit the split pin into the fork hinge hole.

22. Ensure that the insulating sleeves (9) are in good condition and fitted over the two assembly rods (8).

23. Fit the yoke (7) over the two rods and orientate it correctly.

24. Offer up the bearing end plate (1) on the armature shaft.
Fit the positive brush in its guide and holding it (not fully driven home) with the aid of an end of the spring (4) flat against the brush to facilitate the passage of the brushes on the commutator.
Bring the end plate into contact with the yoke after releasing the brushes.
Fit the springs on the centre of the brushes in their guides.
Fit the steel washer (10) and tighten the bolt (11).
bolt (11).

25. Fit the cap (15) and tighten the two nuts (14) (Shakeproof washer).

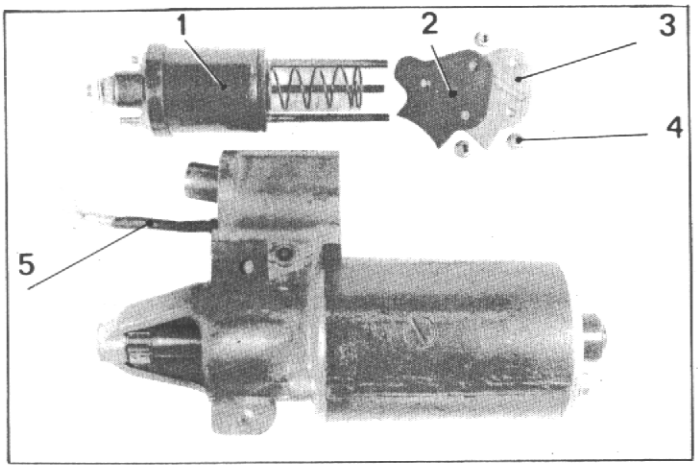
26. Connect the field coil cable to the terminal marked « DEM » (17). Place it in the groove of the retaining bush (12) on the solenoid.

27. **Adjust the travel of the starter drive.**

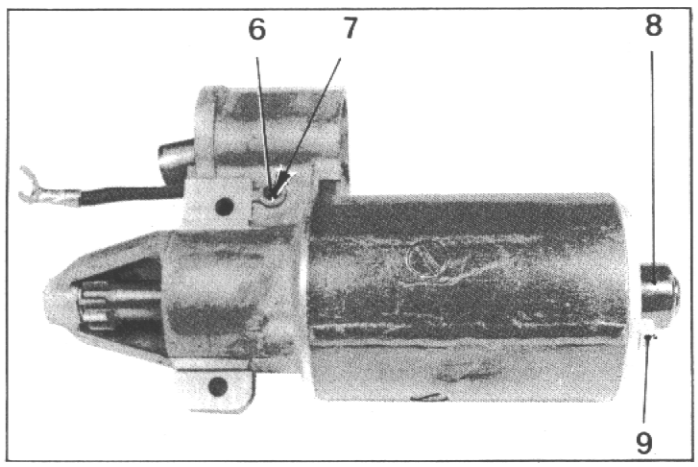
28. Fit the plastic plug (13).

II. STARTER MOTOR TYPE PARIS-RHONE D8 . E103

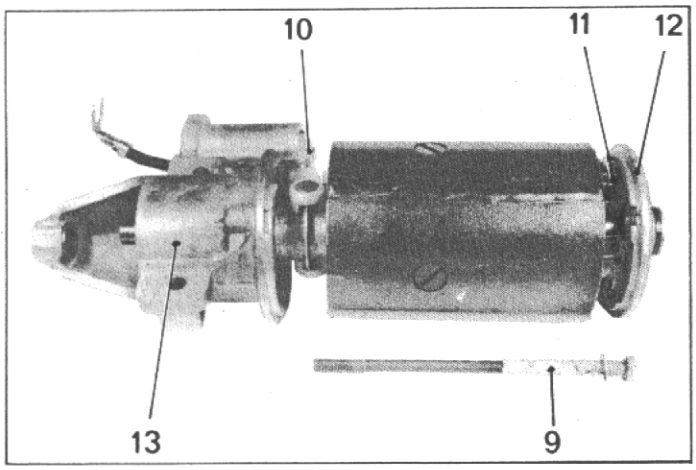
10172



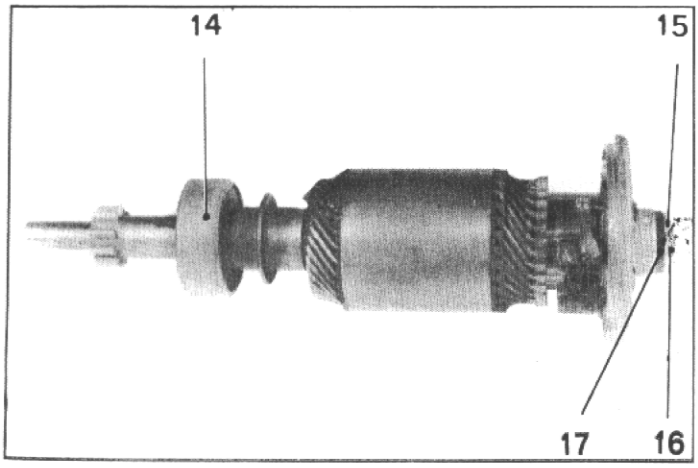
10174



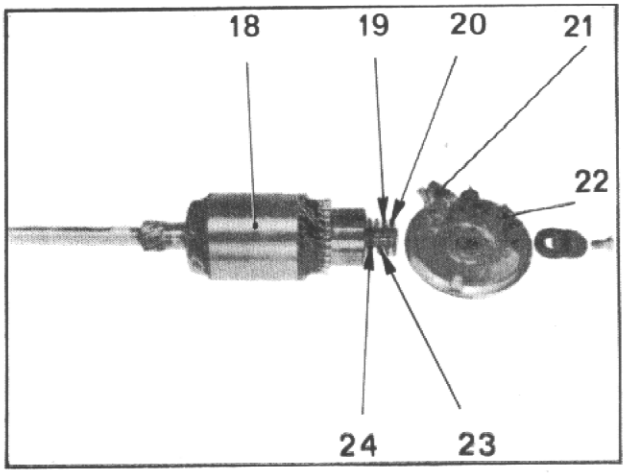
10175



10178



10179



DISMANTLING.

1. Remove the solenoid :
   Disconnect the field coil cable (5).
   Remove the three nuts (4) and release :
   - the clamp plate (3),
   - the fibre seal (2),
   - the solenoid (1).

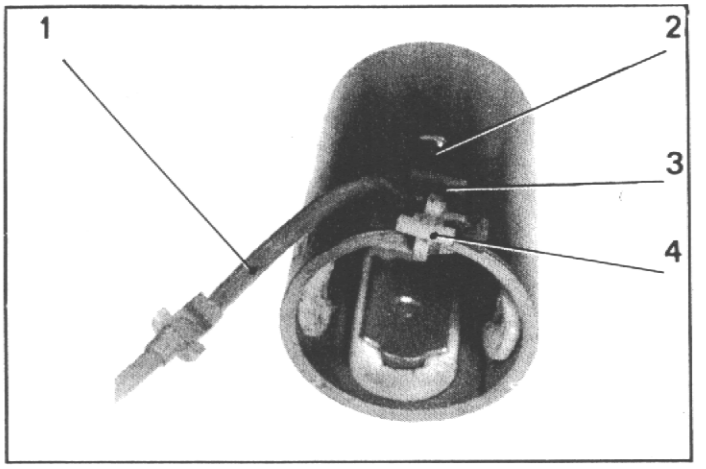
2. Pull off the plastic cap (8).

3. Drive out the hinge pin (6) of the operating lever and its support (7).

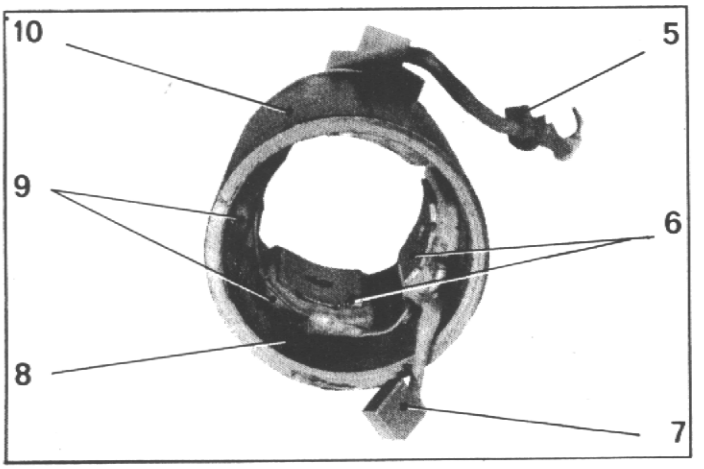
4. Remove the two assembly bolts (9).
   Partly separate the end plate, commutator end (12), from the yoke and lift the positive brush (11) from its guide.
   Remove :
   - the starter bearing, driving end (13),
   - the operating lever (10),
   - the end plate (12) commutator end, armature and starter drive assembly,
   - the starter drive (14).

5. Remove the end plate, commutator end, (12) from the armature (18).
   To do this, remove the bolt (16), the thrust washer (15), the friction washer (17).
   Release the end plate (12), the bakelite coated washer (20), the steel washer (19), the flexible washer (23) and the steel washer (24).

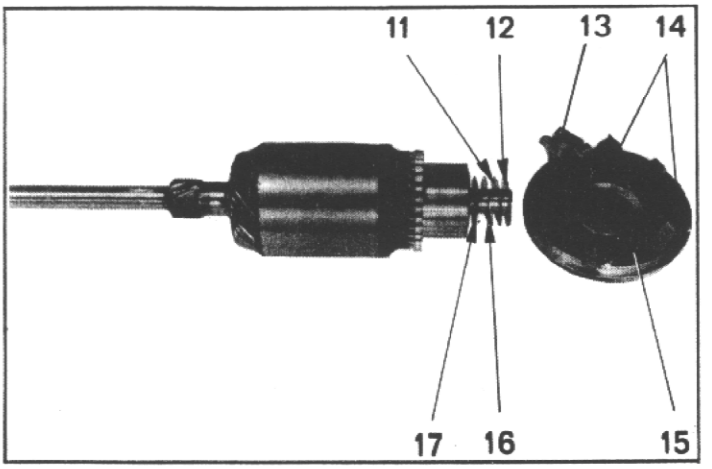
6. Strip the end plate, commutator end (12) :
   Unsolder the negative brush (21) :
   Clean the end plate and check the positive brush-holder insulation (22) using an ohmmeter or a 110 or 220 volts test lamp. If the lamp lights up, the positive brush-holder is badly insulated, and the end plate (12) must be replaced.



1C 177



10 176



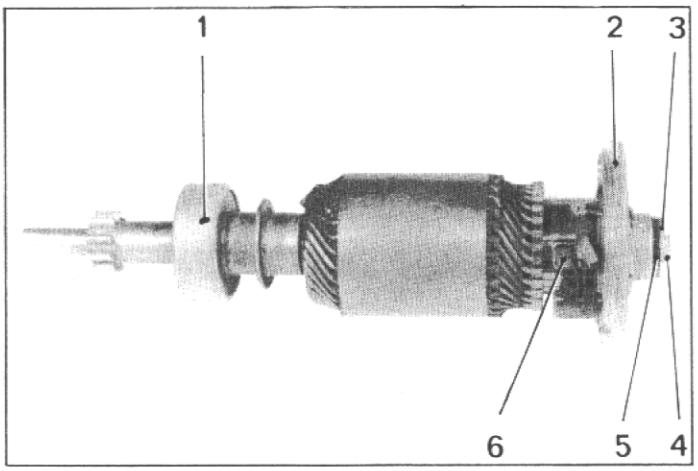
10 179

7. Strip the yoke (10).
Remove the polyamide clip (4) and the rubber seal (3).
Use a soldering iron to unsolder the field coil supply lead.
Remove the four screws (2) holding the pole pieces. Use a short wheel-operated screwdriver.
Remove the windings and the «Press -pahn » insulating material (8).
Unsolder the positive brush (7).
8. Clean the parts.

FITTING.

9. Inspect the armature shaft in two « V » blocks or between points. *The maximum tolerated out of round is 0,15 mm.*
10. Check the armature winding with a growl tester.

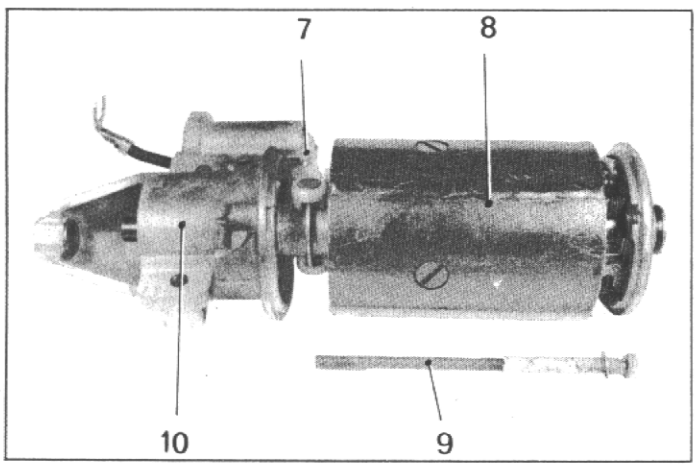
11. Skim the commutator.
The original diameter (36.5 mm) should *not be reduced by more than 1,5 mm.*
Undercut the insulators between the segments using a saw blade thinned down to the same width as that of the slots, or a scraper.
12. Check brushes for wear :
Nominal length = 14 mm.
Minimum worn length = 7 mm.
13. Check the heavy gauge wire winding of the solenoid using an ohmmeter connected between the excitation terminal of the solenoid (tag) and the opposite terminal. *The resistance must be 0.3 Ω.*
Check the light gauge wire winding. Connect the ohmmeter between the excitation terminal and the solenoid body.
The resistance must be 1 Ω.
If these conditions are not satisfied, change the solenoid.
14. Prepare the yoke :
Fit the field coils (9) in the yoke (10) and offer up the pole faces. Hold these in place with the help of four screws (2).
Fit the «Press -pahn » insulating material (8).
Position the pole pieces (6) longitudinally and tighten the securing screws (2) with a short wheel-operated screwdriver.
Solder the lead to the positive brush (7).
Solder the supply cable (1) fitted with its grommet (5).
Fit the rubber seal (3) and the polyamide clip (4).
15. Assemble the end plate (15).
Fit the springs (14).
Solder the negative brush (13).
16. Fit on the armature shaft the steel washer (17), the flexible washer (16) (end-float compensation) the steel washer (11), the bakelite coated washer (12), and the end plate (15).



17. Secure the end plate (2) on the end of the armature shaft.
Fit the friction washer (5) and the thrust washer (3). Tighten the bolt (4).
Fit the negative brush in its guide and bring the spring into contact with the brush.
Fit the plastic cap (17).

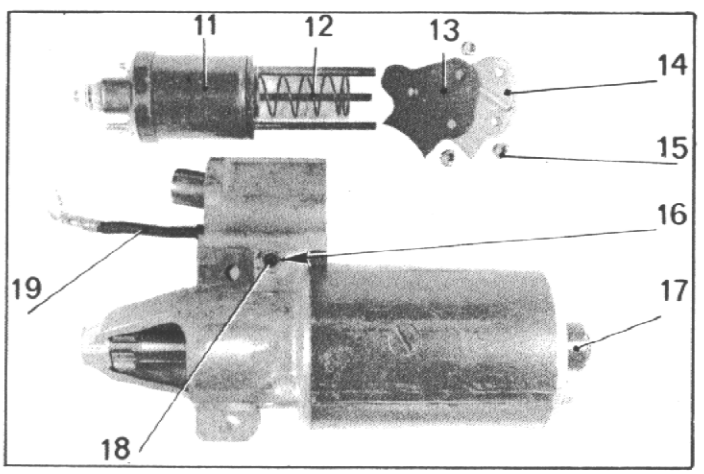
18. Oil the armature splines with « ANTAR RT 96 » grease and fit the starter drive (1).

19. Fit the armature into the yoke.
Fit the end plate (2).
Insert the positive brush into its guide and fit the spring.



20. Offer up the starter drive bearing (10) with the operating lever (7).
Position the latter on the starter drive (1).

21. Press the starter drive bearing (10) and the end plate (2) against the yoke (8).
Fit the assembly rods (9). (The rod with insulating tape (see illustration), placed between the two brush supports).
Tighten them to 8 to 11 mAN (0.8 to 1.1 m.kg).



22. Fit the support (16) for the operating lever hinge pin and the pin (18).

23. Fit the solenoid (11) equipped with its spring (12) and orientate it correctly.
Fit the fibre seal (13) and the clamp plate (14).
Tighten the nuts (15).
Connect the field coil supply cable (19).

24. **Check and adjust the starter drive :**

LIST OF SPECIAL TOOLS MENTIONED IN THE THIRD SECTION OF THE MANUAL 810-2

DESCRIPTION	REFERENCE of tool on sale
(2) CARBURATION	
Kit for checking fuel pump pressure	4005-T
(3) IGNITION	
Gratuated scale for setting distributor	3093-T

MANUAL N° 810-2

FOURTH SECTION

BODYWORK

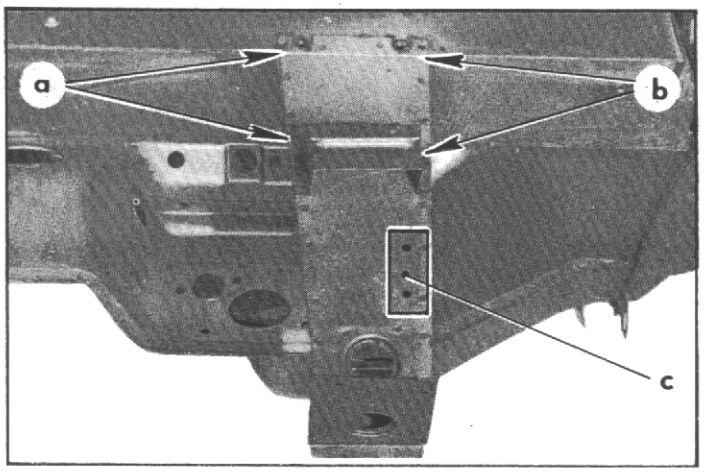
FOURTH SECTION

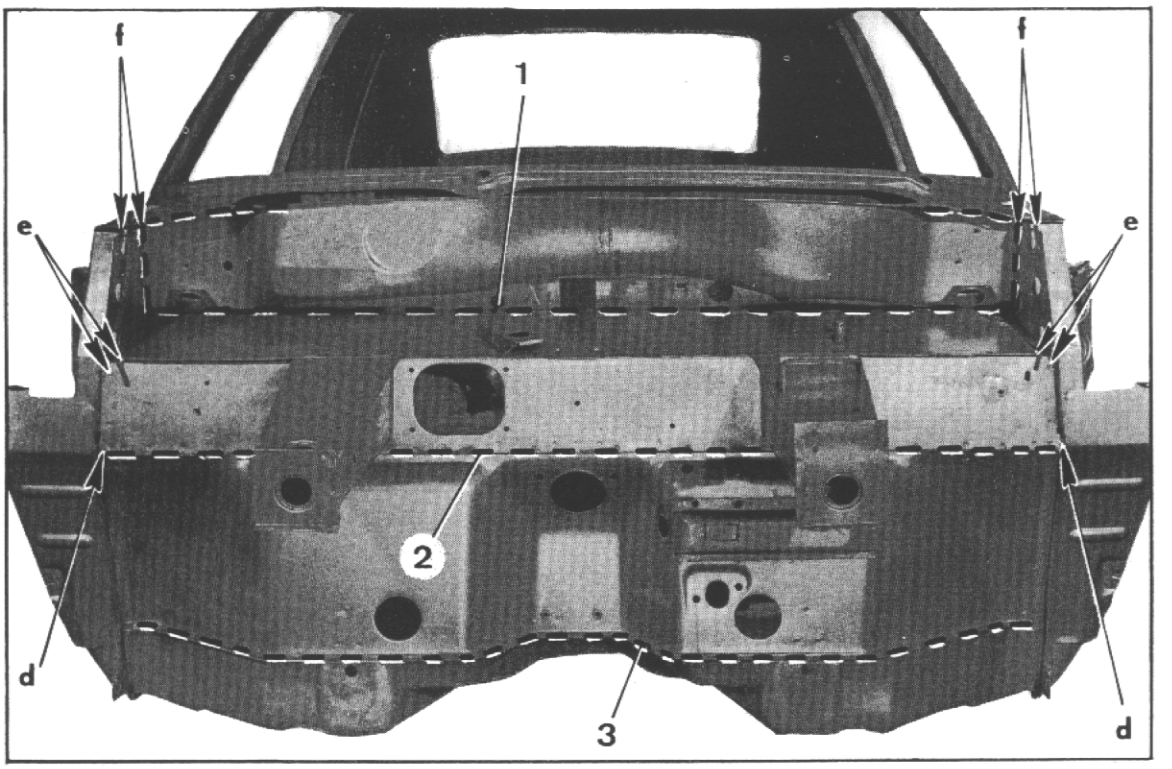
LIST OF OPERATIONS

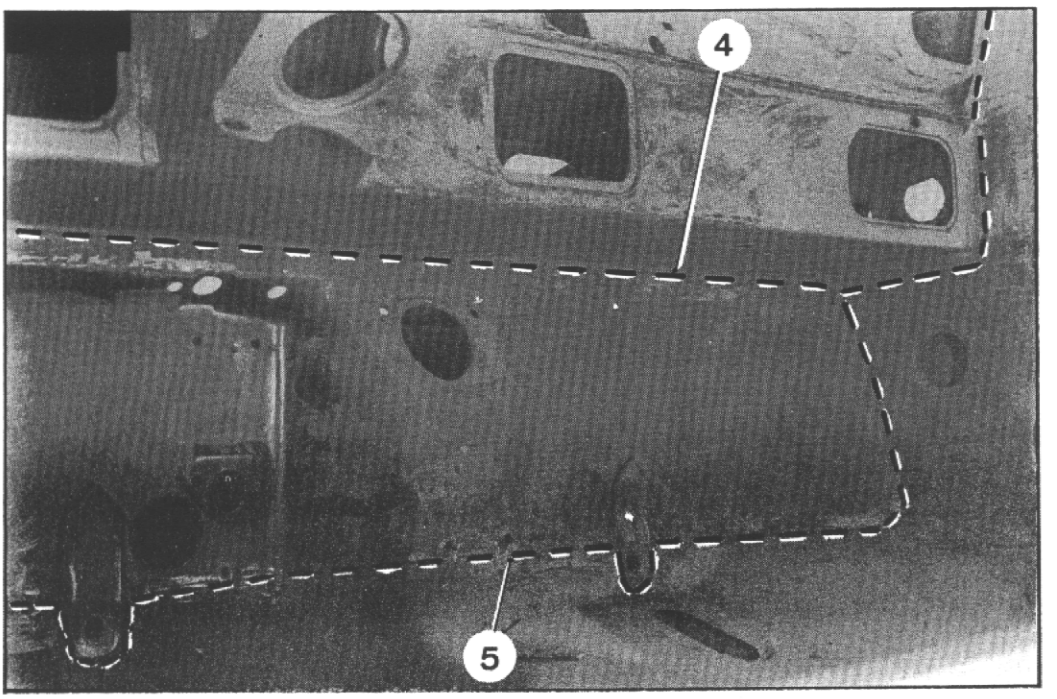
IN THE FOURTH SECTION OF THE MANUAL N° 810-2

Operations where the number is preceded by the letter « G » are common to all types of vehicles of the « GS » family.
Operations where the number is preceded by the letters « GE » or « GF » are specific to the five-or three-door versions of the « GS » Estate respectively.
Operations where the number is preceded by the letter « Gea » are specific to vehicles fitted with a Torque Converter.

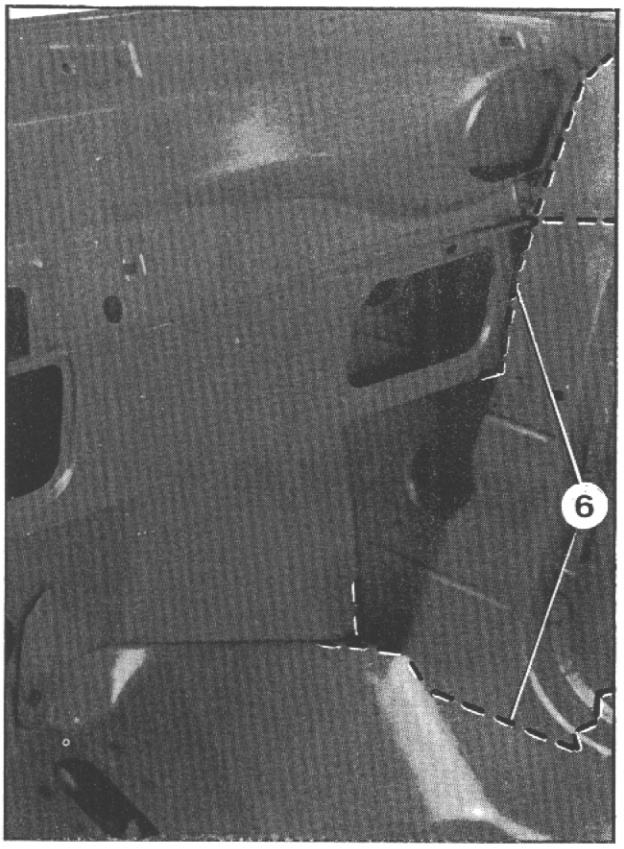
Operations Number	DESCRIPTION
	BODYWORK
G. 800-00	Body preparation - Sealing with sealing compound - Soundproofing
G. 800-0	Checking the body
	BODY PANEL WORK
GFv 961-4	Work on the side windows - Replacing a side window
G. 961-7	Work on the rear window - Replacement of the rear window
GE.961-7	Work on the rear tailgate - Replacement of a « bonded » tailgate window - Replacement of a « set-in » tailgate window

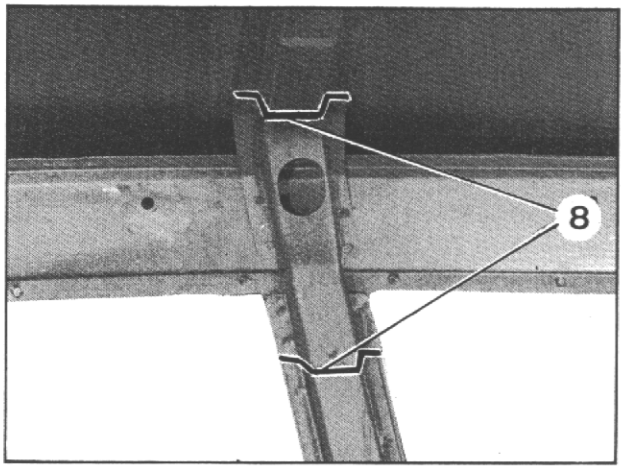

a
b
c
8223


f
f
1
e
e
2
d
3
d
9942


4
5
8224

8251





8216

Seal the seams and points as indicated below :

FRONT

- **Extensions :**

  On the left-hand side only : Blanck the holes at « c » (adhesive tape 80 × 25 mm).

  On each side : Join of plates at « a », « b » and « c ».

- **Line 1** : Junction of dashboard/ intake assembly with extension assembly.
  On each side : Junction of plates at « f ».

- **Line 2** : Junction of extension assembly with the lower body panel.

  On each side : Junction of the plates at « d ».

- **Line 3** : Junction of the lower body panel with the central chassis.

- **Line 4** : Junction of the lower body panel with the extension plate.

- **Line 5** : Junction of the lower body panel with the central chassis.

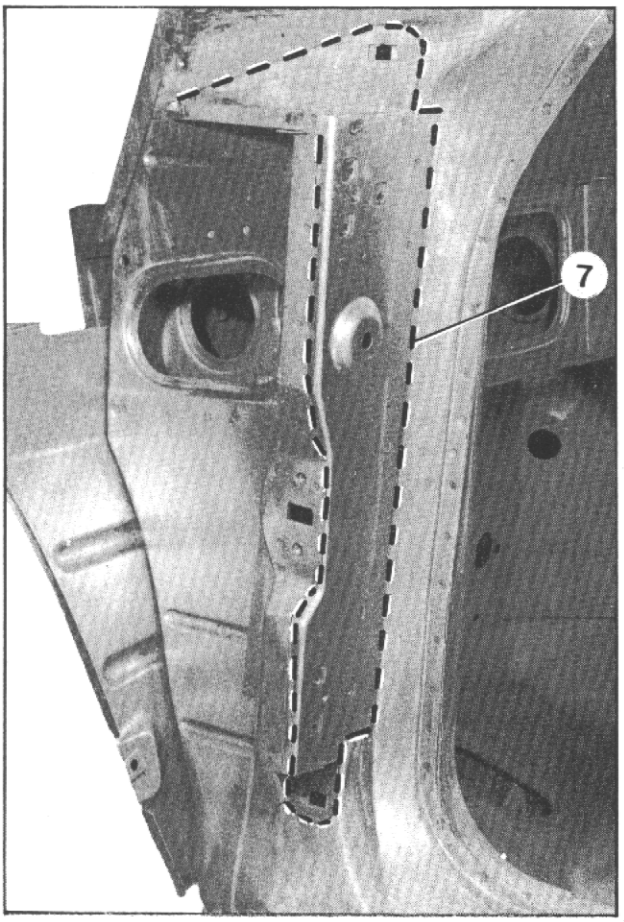
- **Line 6** : Junction of the front body panel with the side panel *on each side.*

- **Line 7** : Junction of the front pillar with the hinge support panel *on each side.*

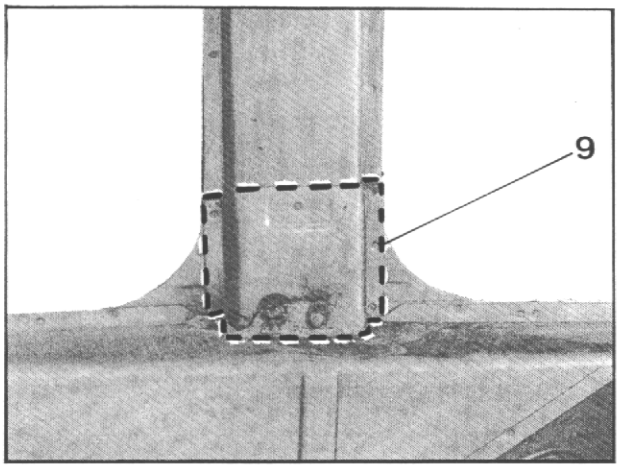
BODY

- **Line 8** : Junction of the centre pillar with the roof crossmember on the *inside and on each side.*

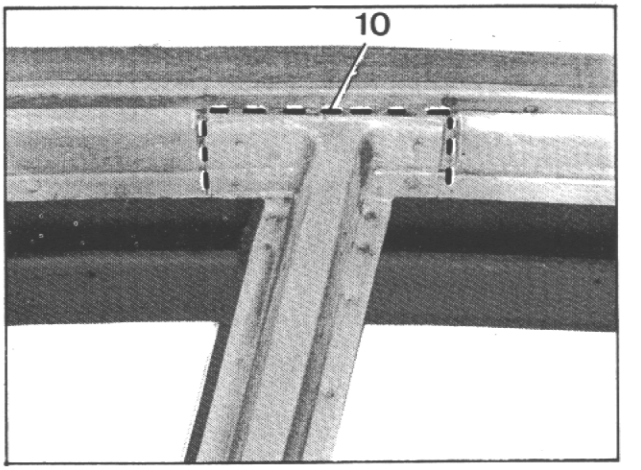
Manual 810-1



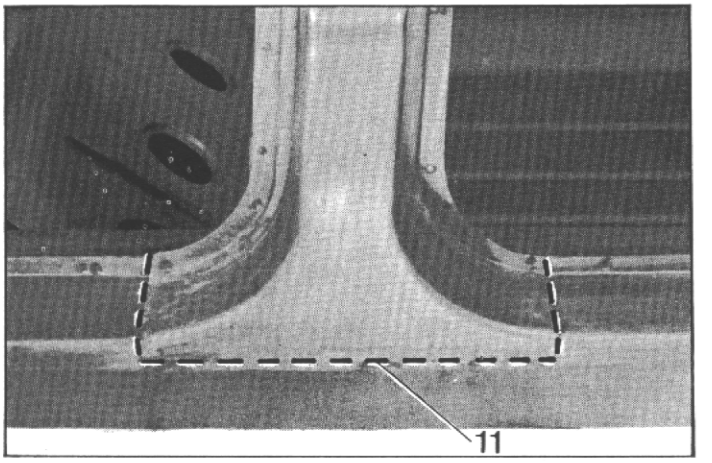
8220



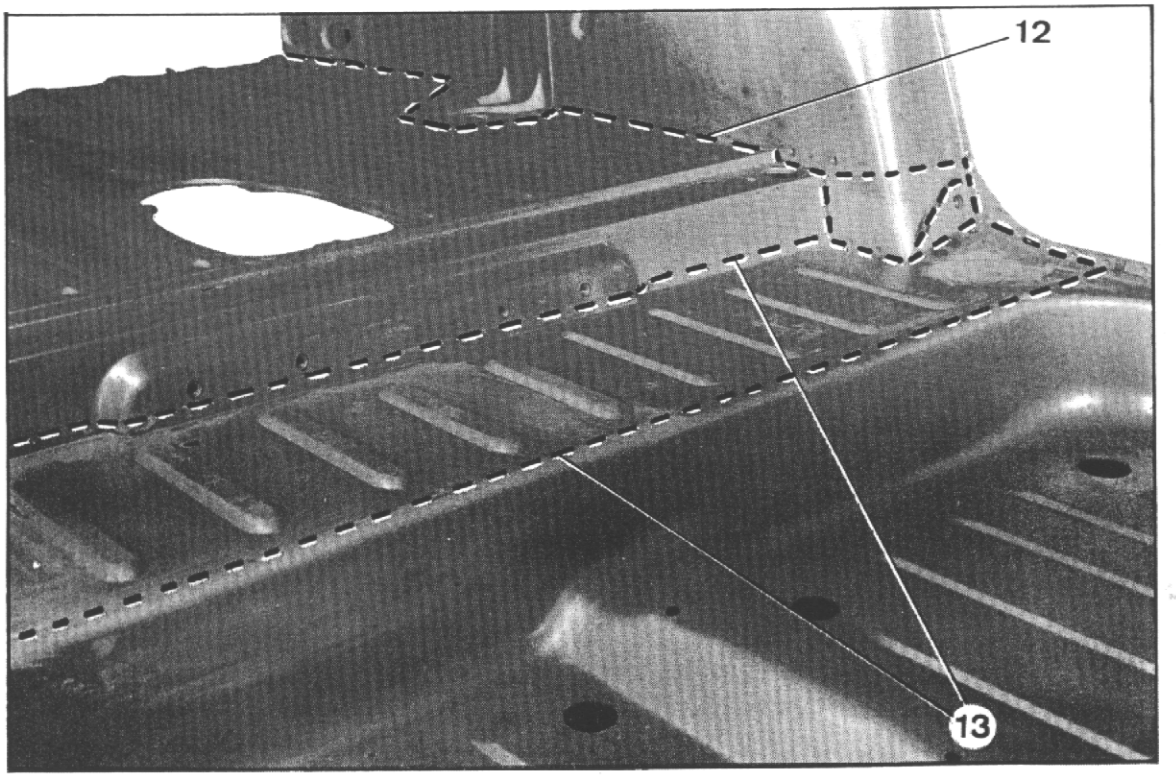
9217



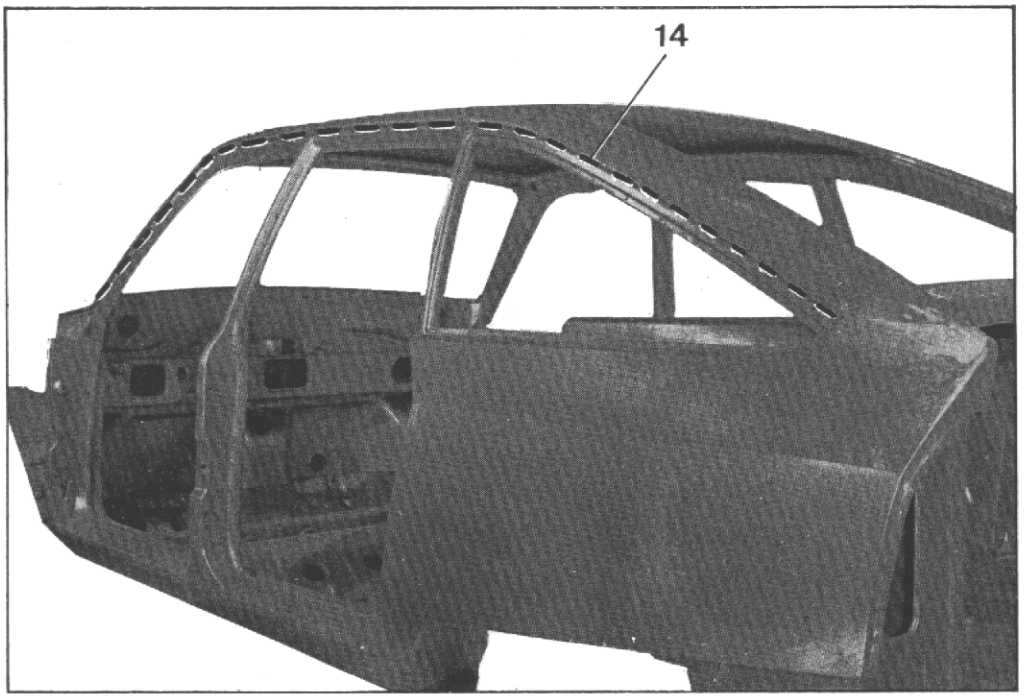
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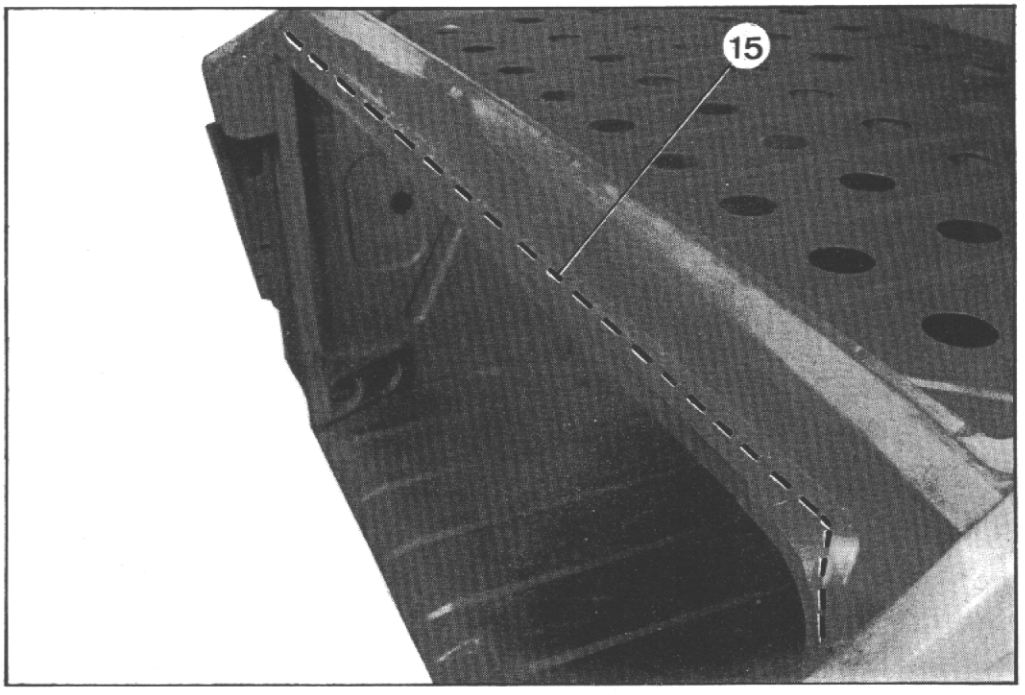
9219



9260



8209



8256

- **Line 9** : Junction of the central pillar with the underbody, *inside and on each side.*

- **Line 10** : Junction of the central pillar with the cantrail of the roof, *on the inside and on each side.*

- **Line 11** : Junction of the central pillar with the underbody, *on the inside and at each side.*

- **Line 12** : Junction of the wheel arch with the boot floor, *on each side.*

- **Line 13** : Junction of the boot bottom with the underseat crossmember.

- **Line 14** : Junction of the guttering rail with the roof panel, *on each side.*

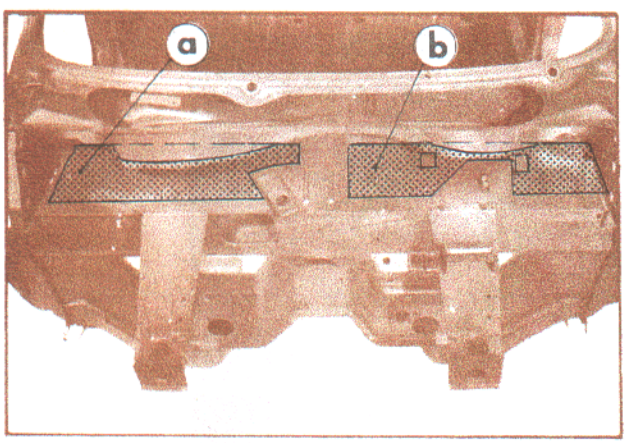
- **Line 15** : Junction of the rear parcel shelf with the lower roof crossmember.

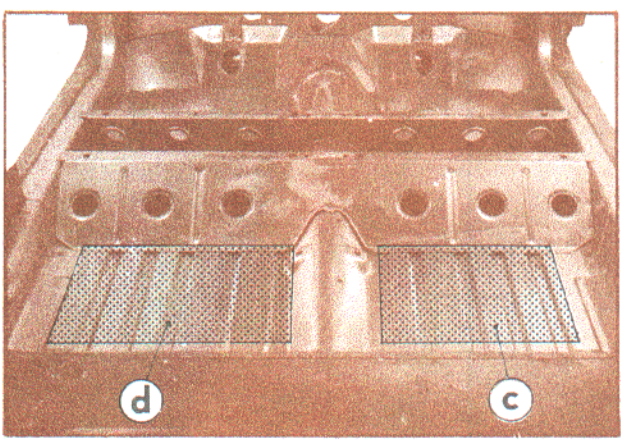
SOUNDPROOFING

I. SOUNDPROOFING MATERIAL IN PANELS

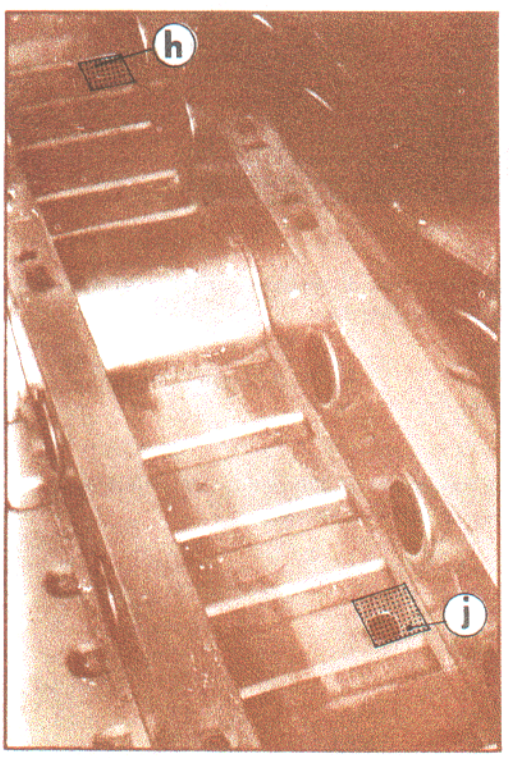
Fit soundproofing material in panels in the zones indicated in the illustration below.
Use only recommended products.

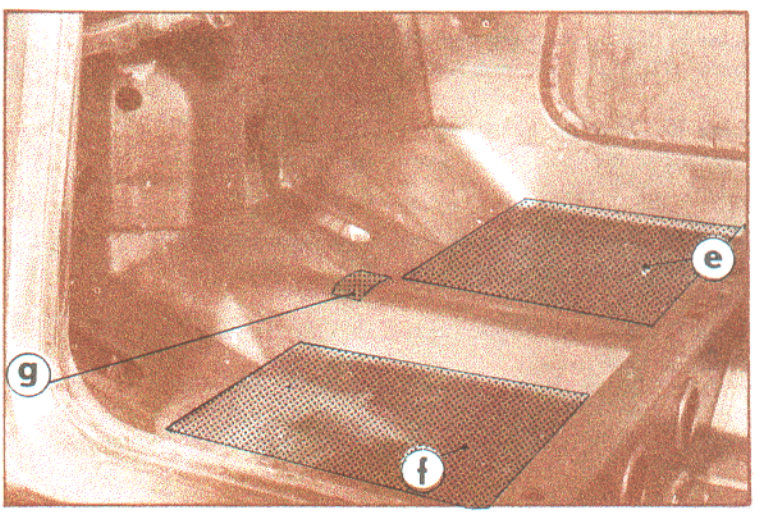
Mark	Approximate dimensions
a	200 × 550 mm openings not
b	200 × 570 mm included
c	450 × 450 mm
d	450 × 450 mm
e	360 × 450 mm
f	360 × 450 mm
g	80 × 80 mm
h	80 × 80 mm
i	80 × 80 mm





8223



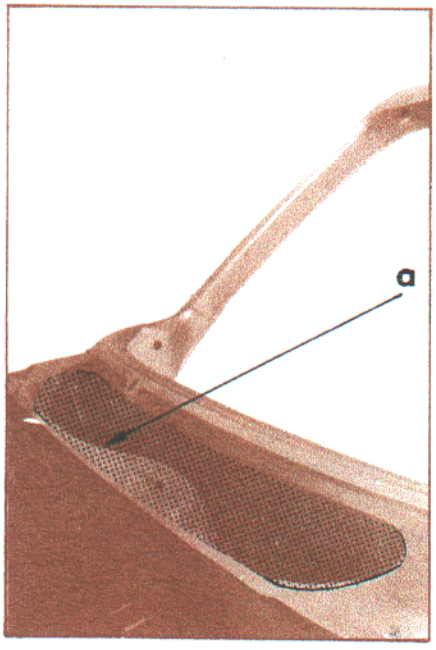


8310

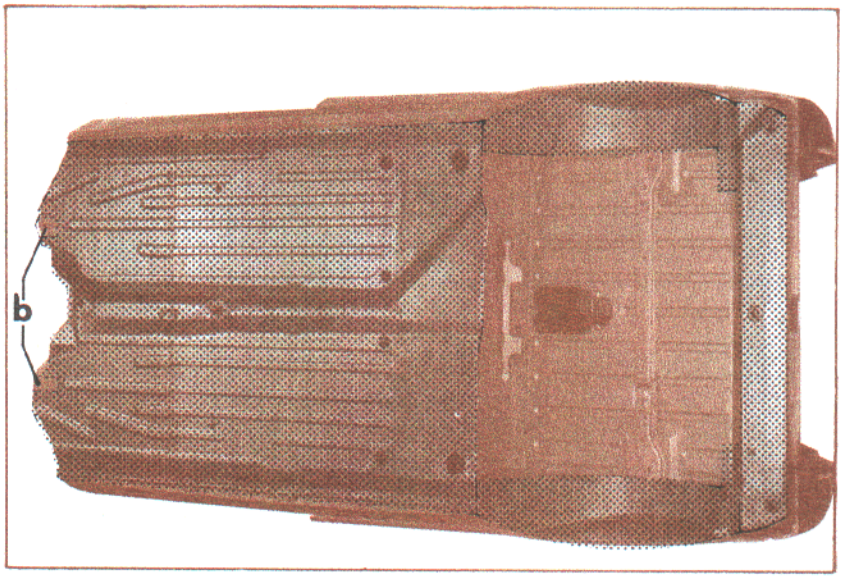
II. SEMI-LIQUID, SOUNDPROOF AND PROTECTIVE COATING

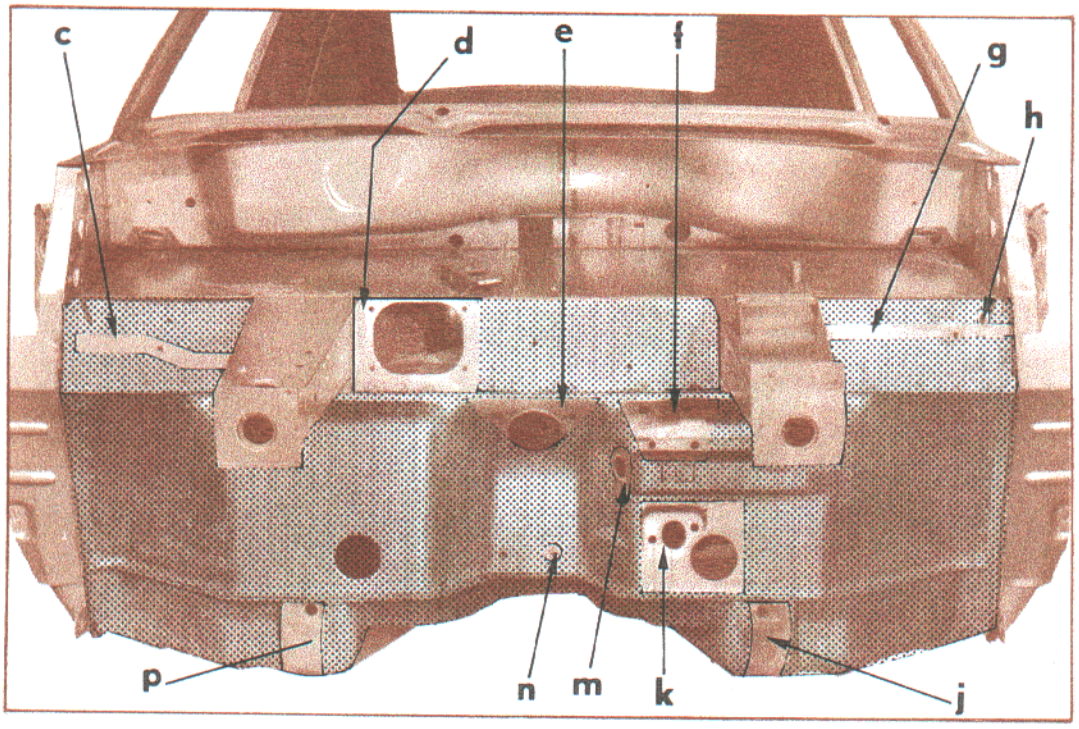
For this operation, use only recommended products.

8222



10651





Apply the soundproofing products on the shaded zones shown in the above illustration.

Figure 1 : The scuttle
Before application mask the area where the windscreen wiper motor fits at « a ».

Figure 2 : The underbody, the rear wheel arches and the rear crossmember
Before application, mask the areas « b » where the lower mountings of the front suspension unit fit.

Figure 3 : Front body panel
Before application, mask :

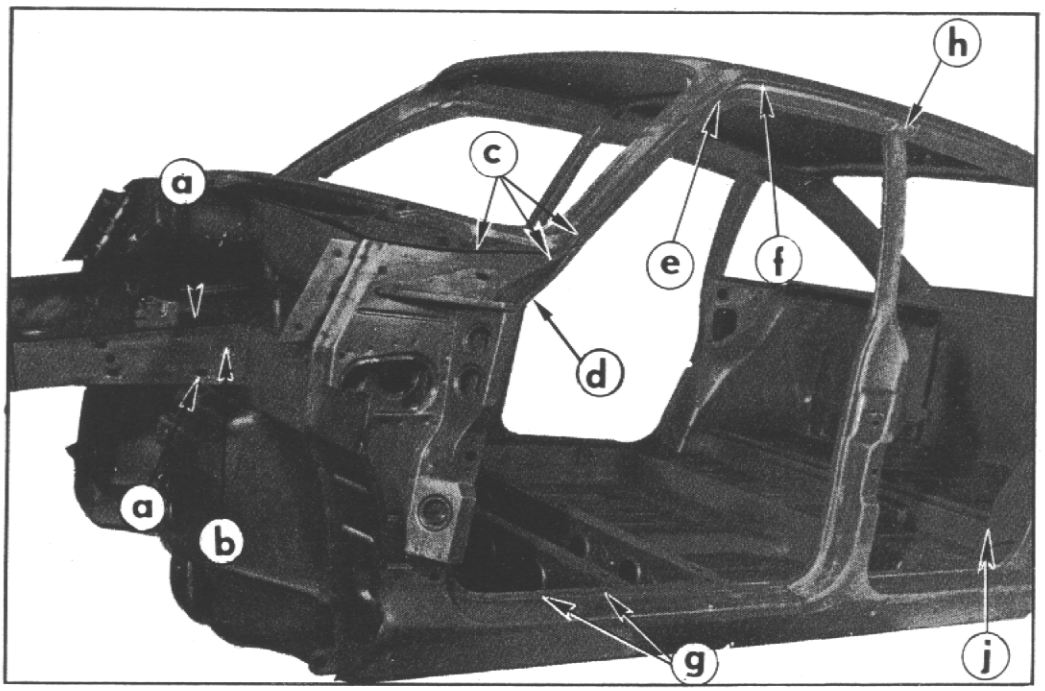
- the wheel arch mountings at « c » and « g »,
- the fan mounting at « d »,
- the gear lever opening at « e »,
- the foot pedal mounting at « f »,
- the opening for the bonnet control at « h »,
- the suspension unit mountings at « j » and « p »,
- the brake control valve mounting at « k »,
- the accelerator linkage opening at « m »,
- the access hole at « n ».

CHECKING A VEHICLE WITH ACCIDENT DAMAGE

When checking a vehicle with accident damage, the checks must be carried out in the following order :
- Visual check : finding the possible creases, distorsions, splits or twists on the body unit.
- Checking the geometry of the axles using an optical alignment device (without removing the mechanical components)
- Checking the front and rear axle units and the geometry of the body unit (removing the mechanical components)
- Checking the stripped body shell on the jig and possible straightening.

I. VISUAL CHECK

To facilitate finding the distorsions, they have been classed in area of impact in ascending order depending on the force of the impact.



Manual 810.2

A - FRONTAL IMPACT
The distorsions below are generally found on both sides of the body unit.

1. **Front extensions :** distorsions at « a » on the upper and lower faces, always accompanied by side distorsions at « b » near the scuttle.

2. **Lower windscreen crossmember :** indention at joint « c » with windscreen frame.

3. **Joint between windscreen frame pillar and front door pillar :** Longitudinal indentations in the form of small creases at « d » on the side panel, level with the upper corner of the door.

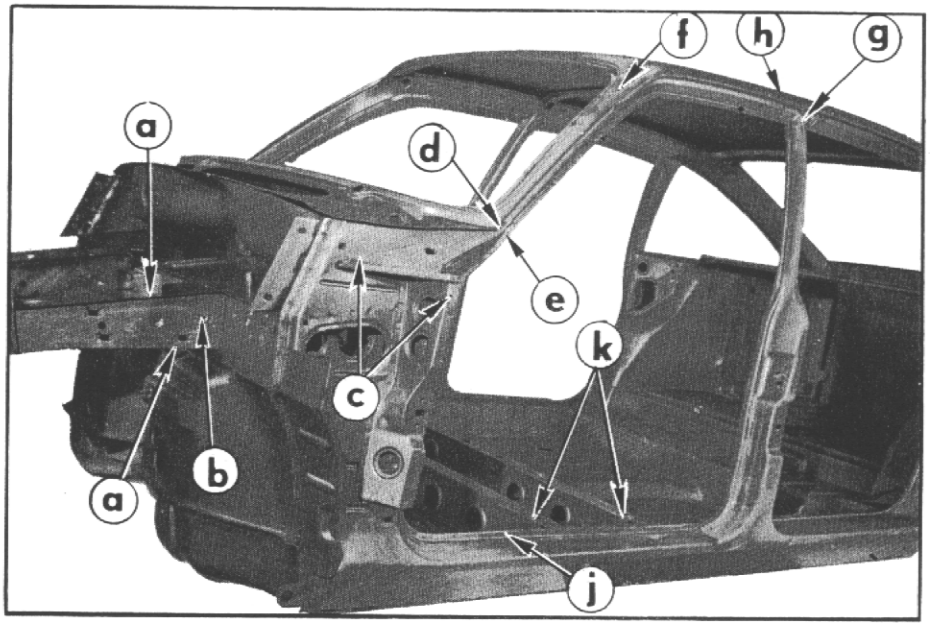
4. **Roof sidemember :**
Abnormal space between the upper part of the door, the windscreen pillar, and the sidemember. Creases at « e » and « f ».

5. **Body sidemember :** distorsions at « g » between the joint with front door pillar and first crossmember under seats.

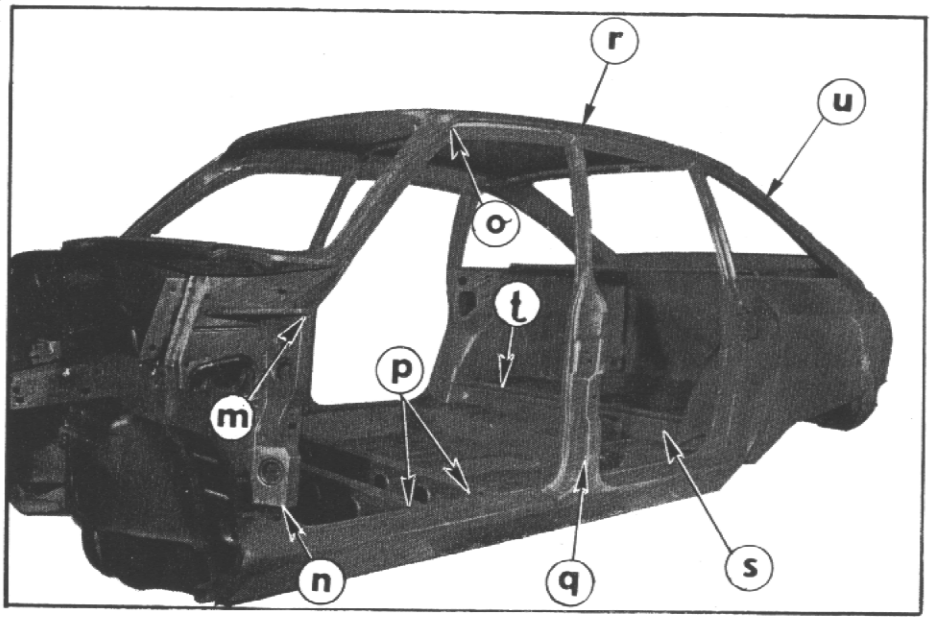
6. **Centre door pillar :** in the event of a strong impact, it may be separated from the roof crossmember at « h ».

7. **Heel board :** following a very severe impact, creases may appear at « j » on the heel board, situated under the rear seat.

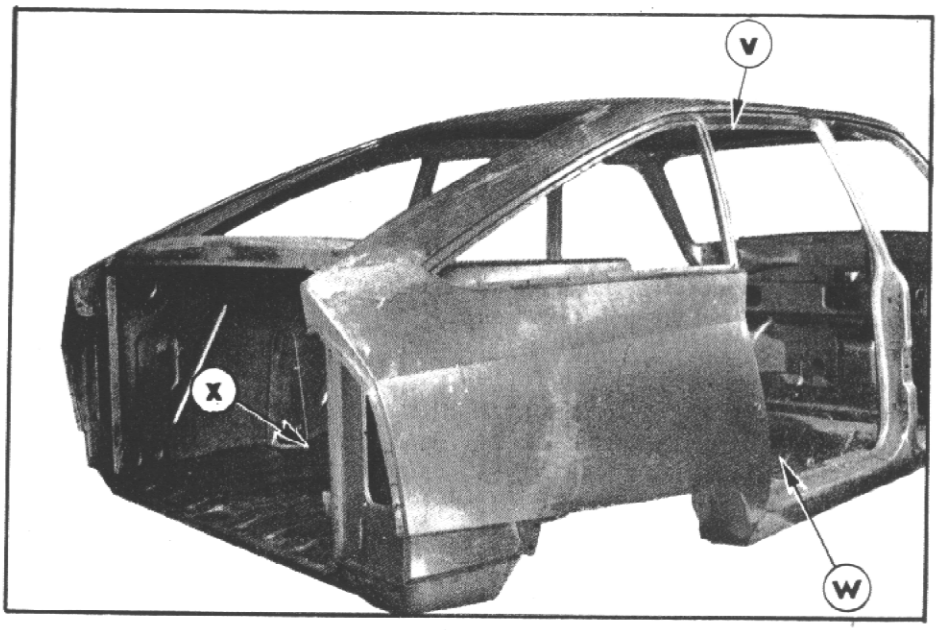
IMPACT FRONT 3/4



SIDE IMPACT



IMPACT REAR 3/4
AND REAR



B - IMPACT, FRONT 3/4

1. **Front extensions** : Distorsions at « a » on the upper and lower faces, always accompanied by side distorsions at « b » near the scuttle.
2. **Hinge support and front pillar** : Indentation and pushing back of front pillar at « c » : the door is no longer in line with the side panel.
3. **Lower windscreen crossmember** : Indentation at « d » of front pillar upper part. This produces a distorsion of the lower crossmember and the windscreen frame itself. Splitting on the outer face of the frame, at the bottom, at « e ».
4. **Roof sidemember and windscreen frame pillar** : Presence of indentations at « f » of the solder filling linking the windscreen frame to the roof. Abnormal space between front door upper part and roof sidemember.
5. **Joint between roof and central door pillar** : Distorsion of roof at « g » with dent and fracture of roof edge at « h ». This can sometimes loosen the central pillar.
6. **Body sidemember** : Large creases at « j » on the sidemember and at « k » on the crossmember beneath the seats.

C - SIDE IMPACT

1. **Front door pillar and body sidemember** : Indentation at « m » on front pillar and at « n » on sidemember, with creases on the roof at « o » and the crossmembers beneath the seats at « p ».
2. **Centre pillar and body sidemember** : Indentation at « g » on the pillar and the sidemember with creases on the crossmembers beneath the seats at « p », loosening the central door pillar from the roof sidemember and with creases at « r » on the roof in the region of the joint with the centre pillar.
3. **Rear door pillar and rear wing** : Indentation on rear pillar, wings and wheel arch, with folds on the heel board at « s », on the rear floor at « t » and inner wheel arch. Splitting of the side panel and the roof at « u » above the rear quarter light opening.

Manual 810-2

D - IMPACT 3/4 REAR OR REAR

1. **Joint between roof sidemember and rear pillar** : Creases at « v » about 10 cm (4") in front of rear pillar.
2. **Joint between body sidemember and heel board** : Creases at « w ».
3. **Rear floor** : Creases at « x » between securing points of rear axle unit.
4. **Various components** : Local distorsions on side panel, rear crossmember, wheel arch, rear lamp plate, lower crossmember for rear window frame, etc...

E - CONCLUSION

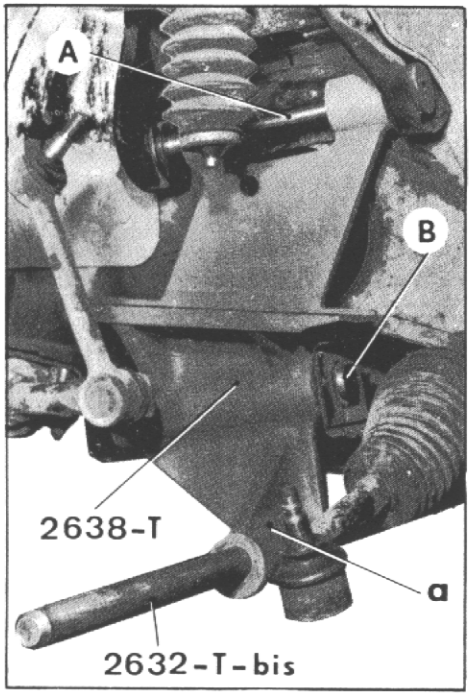
If a visual inspection reveals obvious indentations or creases at the places indicated above, a body jig must of necessity be used.
On the other hand, if there is some doubt as to the extent of the indentations or creases, it is then essential to check the geometry of the axles, then the front and rear axle units.

II. CHECKING THE GEOMETRY OF THE AXLES

Refer to : Operation G. 410-0 for the front axle

Operation G. 420-0 for the rear axle.

III. CHECKING FRONT AND REAR AXLE UNITS

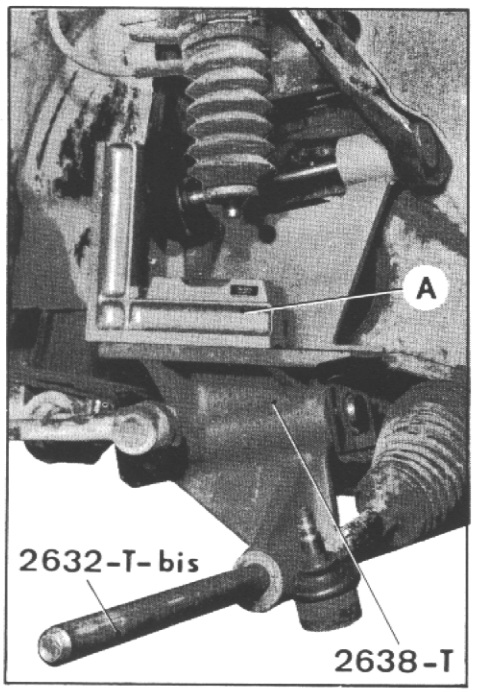


1. Checking the front axle unit :

a) Put vehicle on stands and on a flat horizontal surface, remove from each side :
- the upper and lower axle arms,
- the drive shaft.

b) On each side, offer up tool 2638-T at the securing points of the axle arms.
Fix it, using :
- an upper threaded spindle A : the knurled nut must be positioned towards the rear of the vehicle,
- a lower spindle B : **it must be free in its bore** and the head must be positioned towards the rear of the vehicle.

c) Introduce rod 2632-T bis into the lower bores « a » of the tools : **it must be able to turn and slide smoothly.**
If this is not so, the axle unit is buckled and must be replaced. However, as it is possible that the body itself is buckled, the body must be checked on a jig before fitting a new axle unit, this necessitates removing all the mechanical units (in this case, the checks in § 2 to 4 are not required).
IMPORTANT : In no circumstances must the axle unit be straightened.



2. Checking rear axle unit :

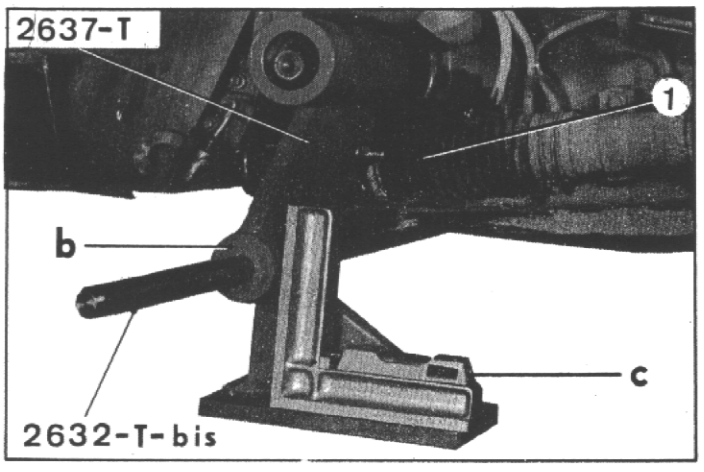
a) Put vehicle on stands and on flat horizontal surface, remove from each side :
- the axle arm,
- the forward suspension buffer.

b) On each side, position tool 2637-T on the axle arm shaft.

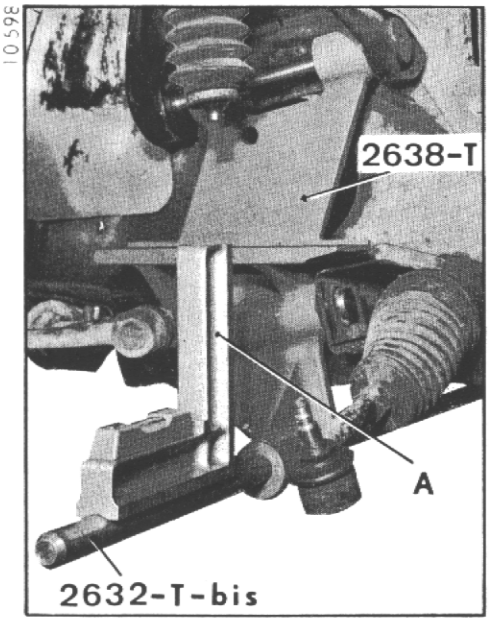
c) Position spirit level C on the foot of one of the tools 2638-T positioned at the front : adjust the bubble to « zero »

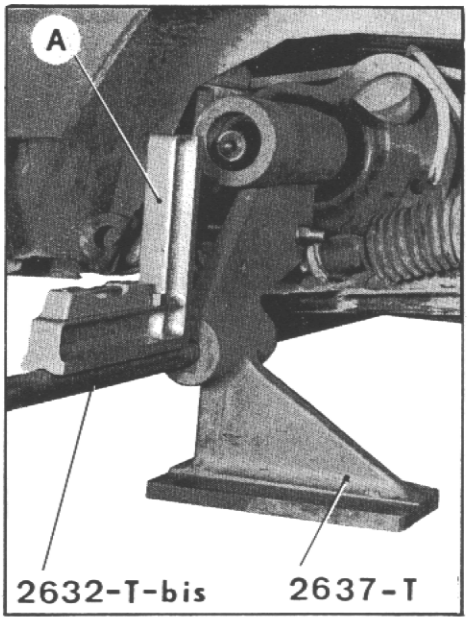
d) Position the spirit level C on the foot of each of the tools 2637-T positioned at the rear : using screw (1), adjust the position of each of them so that the spirit level bubble is at « zero ».

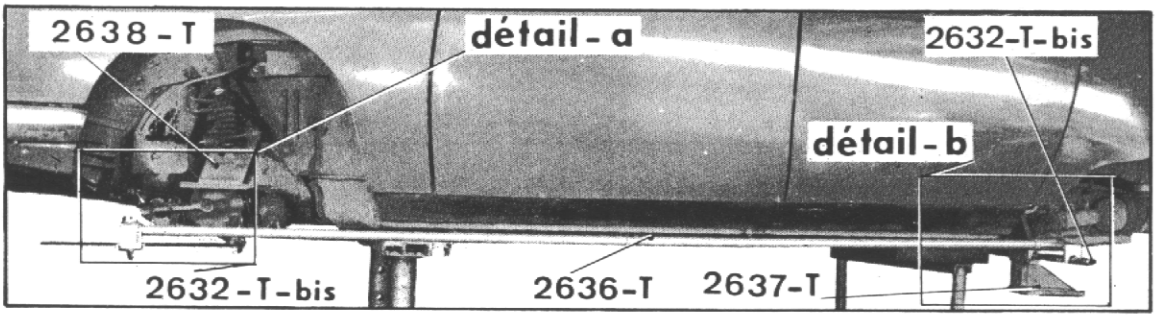
e) Introduce rod 2632-T bis in the lower bores « b » of tool 2637-T bis : **it must be able to turn and slide smoothly.**
If this is not so, the axle unit is buckled and must be replaced : in addition this will allow checks to be made to determine whether or not the body itself is buckled.

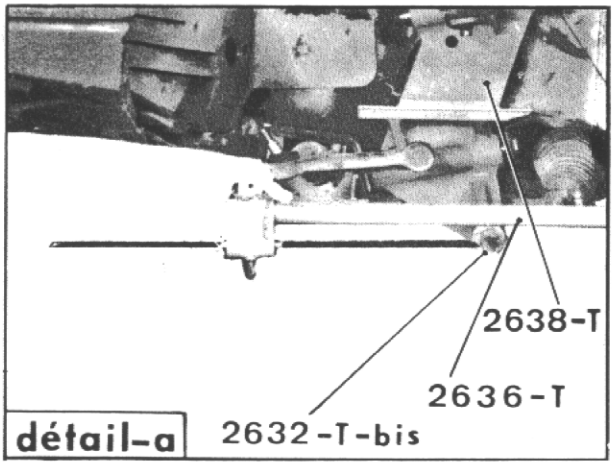


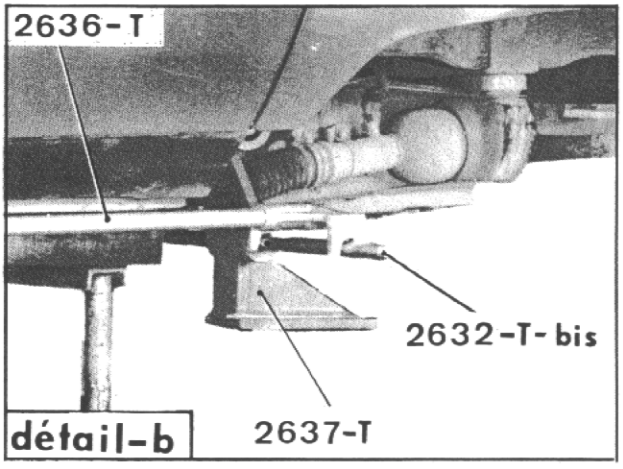
IMPORTANT : *In no circumstances must the axle unit be straightened.*











3. Checking for « twists » on the body :
NOTE : This check is to be carried out when checks on the axle unit have not revealed anything unusual.

a) Position the adjustable spirit level A on each of the rods 2632-T bis at the front and rear in succession.

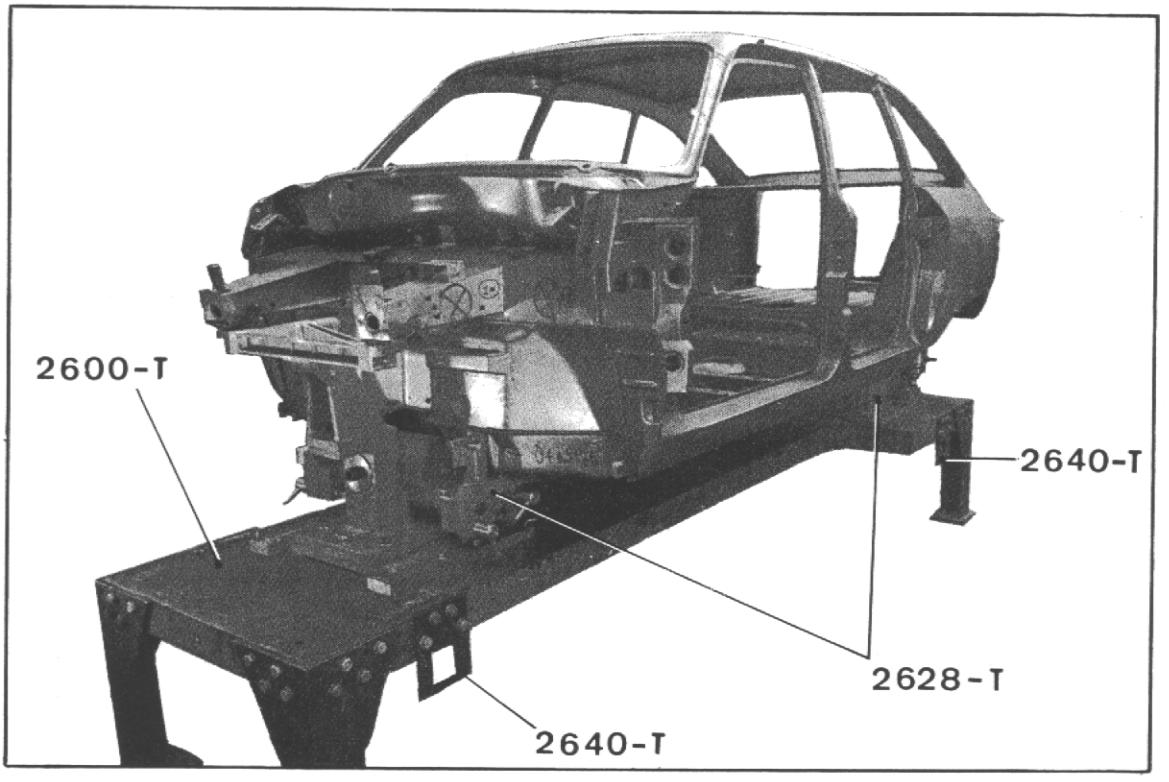
b) Check that the two rods are horizontal to within 0.25 % (e.g. with a 300 mm long spirit level the difference measured with feeler gauges must not exceed 0.75 mm).

4. Check that the axles are parallel :
Offer up gauge rod 2636-T successively on each side of the vehicle.

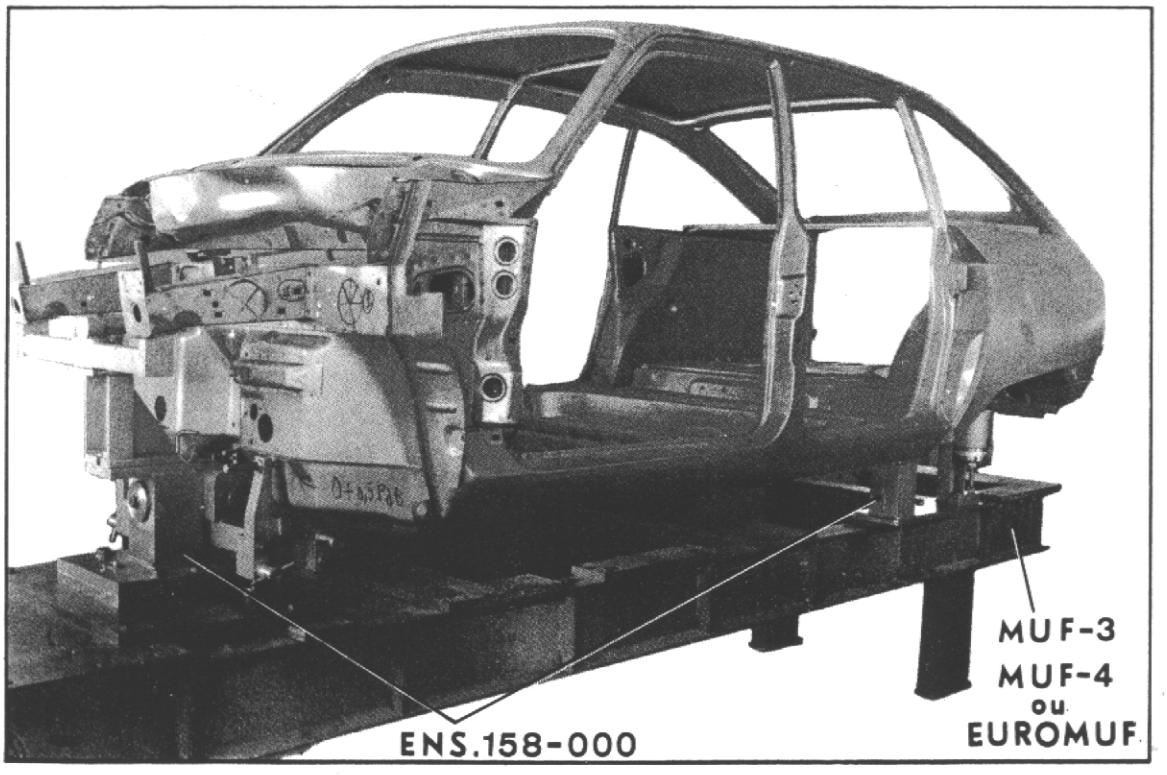
Position the foot of this gauge on one of the bars 2632-T bis and bring the adjustable end into contact with the bar at the other end of the car. Choose the side where the distance between the two bars is greater, and adjust the end-piece. Compare it with the other side : with the help of feeler gauges, take note of *the difference, which must not exceed 4 mm.*

NOTE : If the results of the last two checks are not correct, you must remove the front and rear axle units in order to be able to carry out the checks on the body jig.

IV - CHECKING A BODY ON A JIG

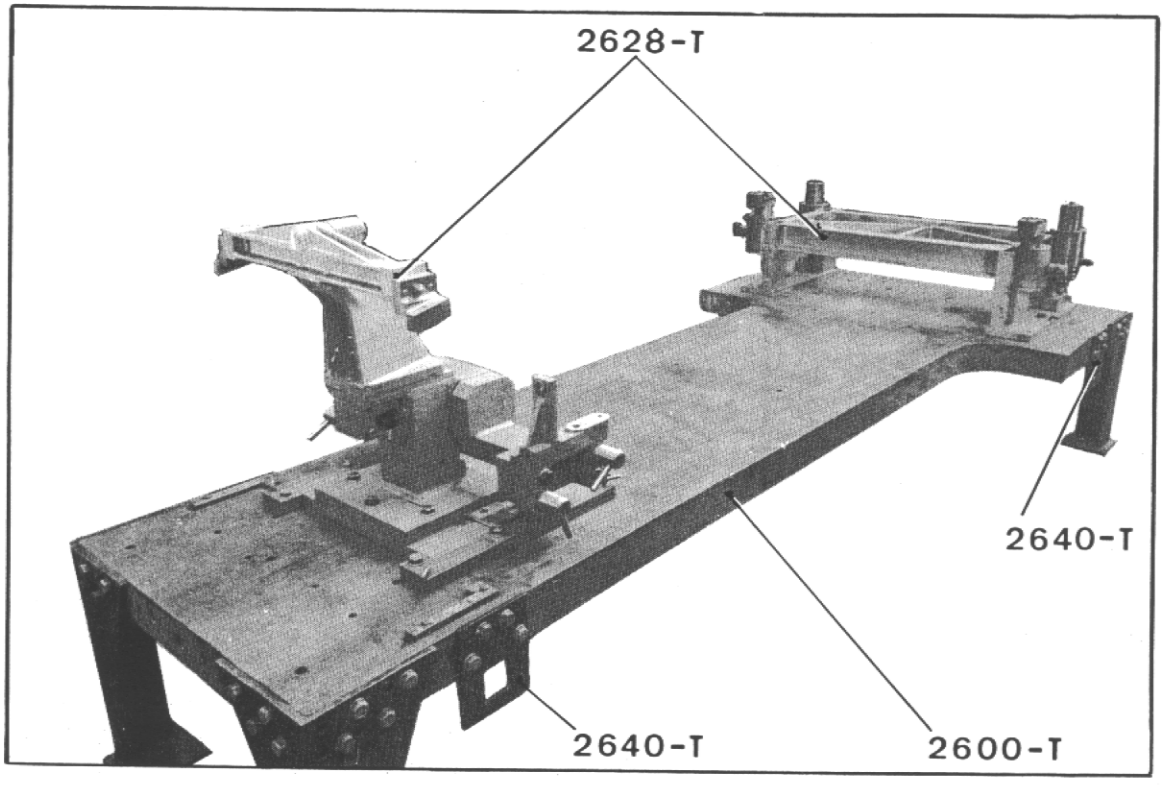


FENWICK : « GS » EQUIPMENT : 2828-T
ON JIG : 2600-T



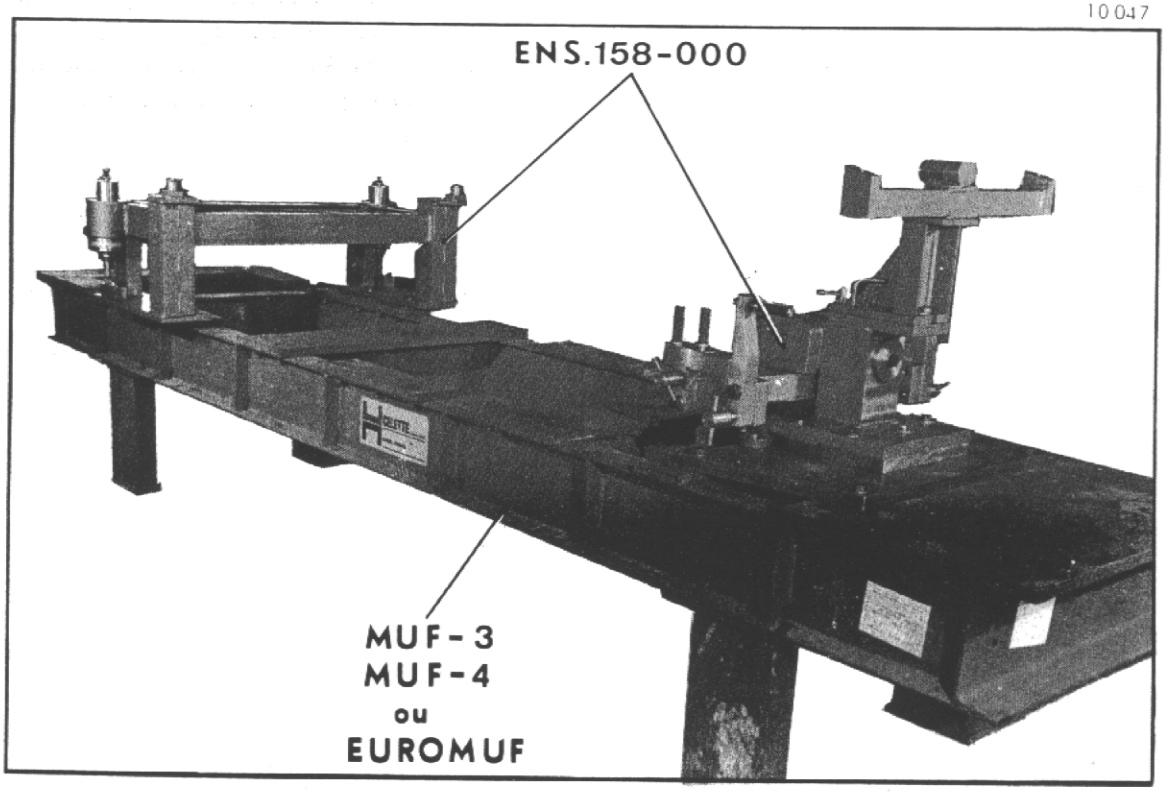
CELETTE : « GS » EQUIPMENT : ENS. 158-000
ON JIG : MUF, 3 MUF 4 or EUROMUF

FENWICK EQUIPMENT



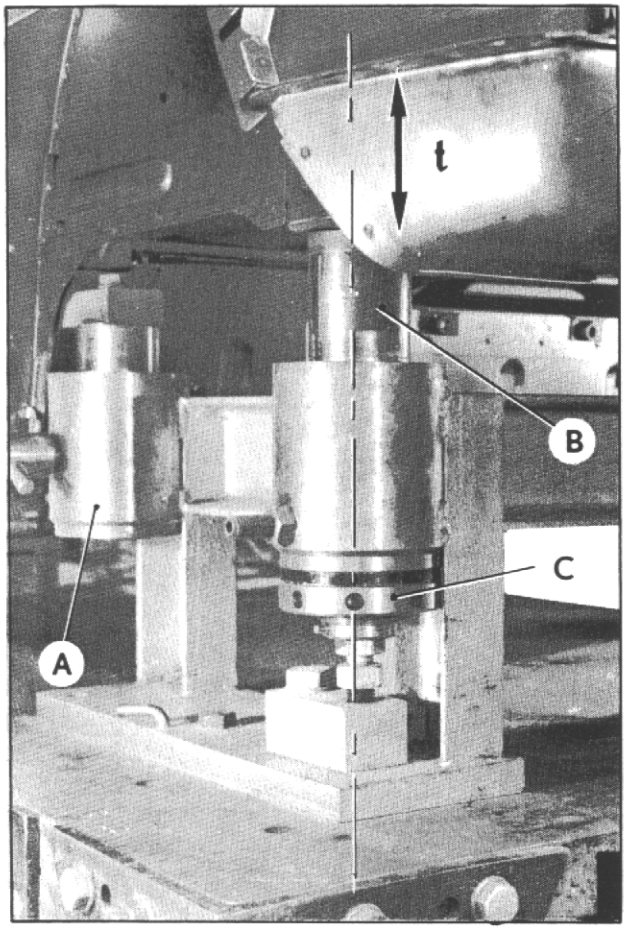
CELETTE EQUIPMENT

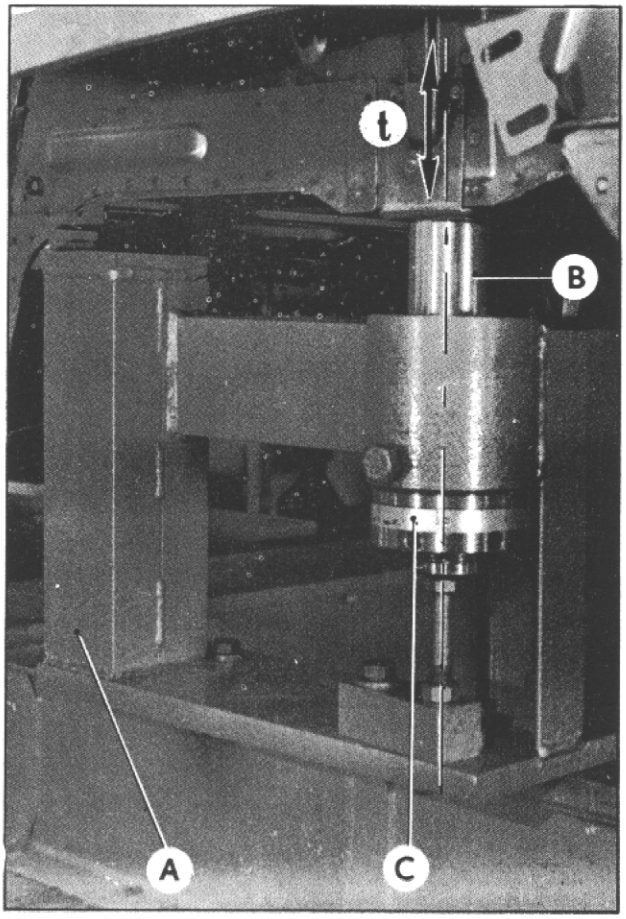
10047



DESCRIPTION

Both sets of equipment are made up of two assemblies (front and rear).
Their construction is such that jacks may be used to straighten the body while it is on the jig.



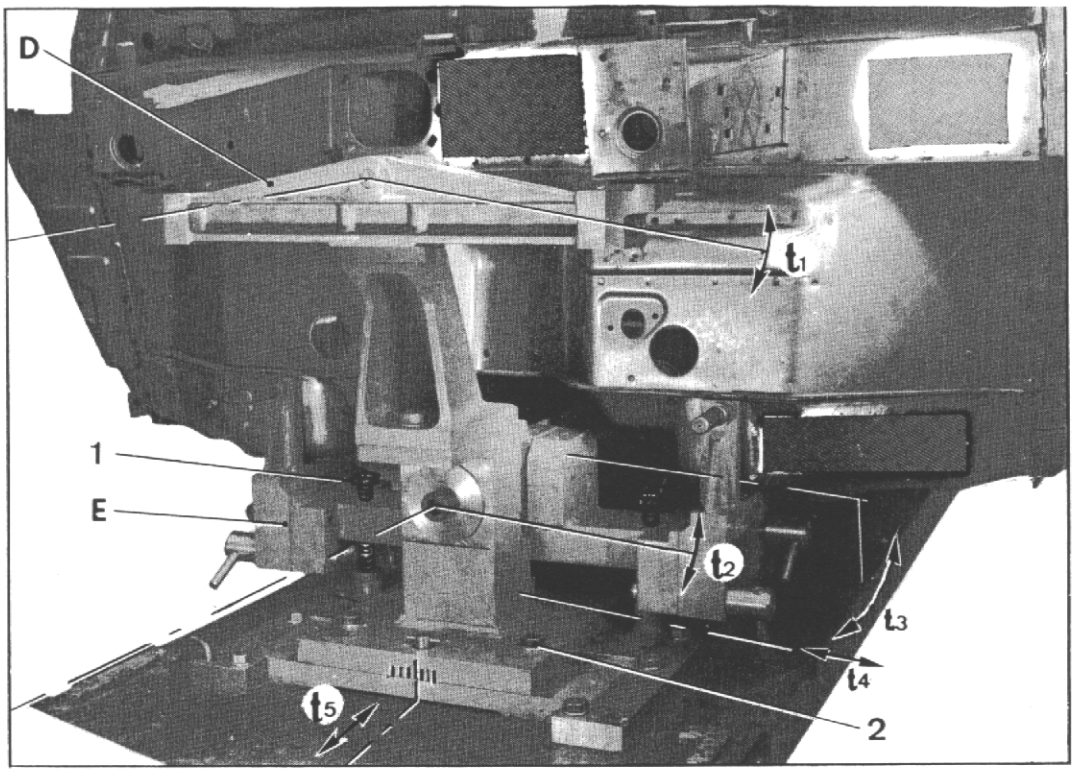


1. Rear assembly :

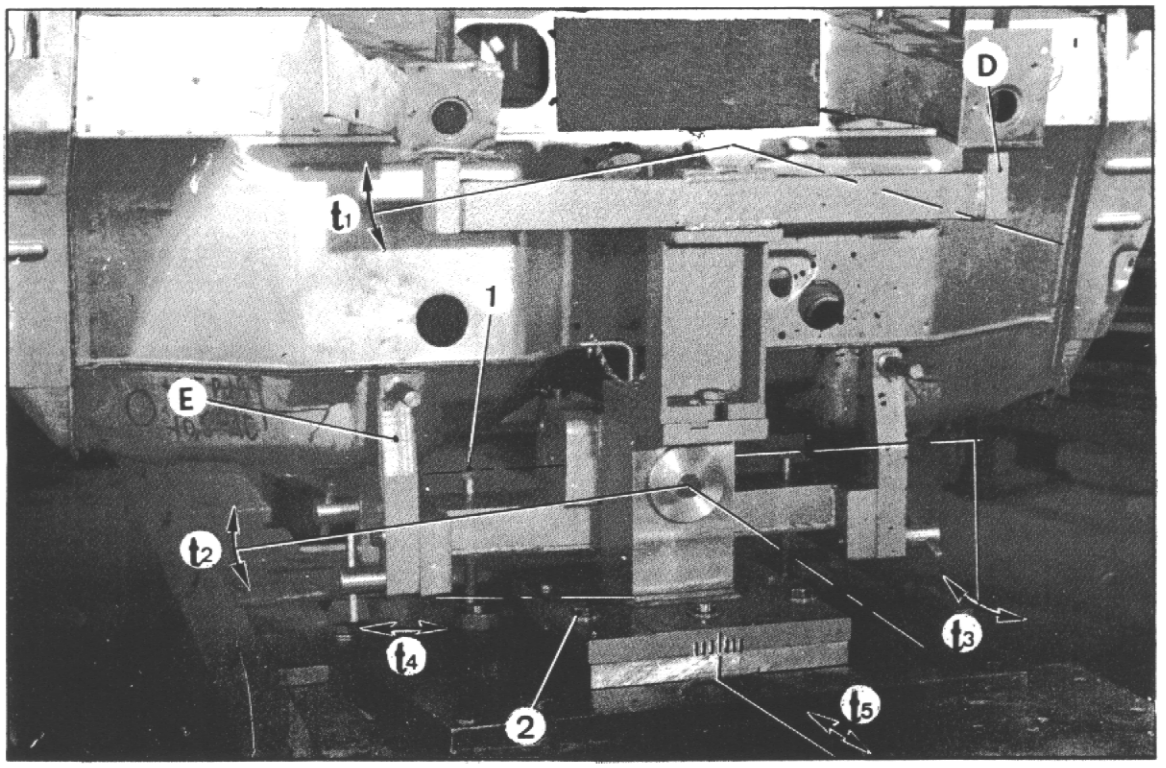
The body is held in position at four points which are the securing points for the rear axle unit :

- the two front points (bobbins or supports A) are fixed.
- the two rear points (pistons B) can move on a vertical centreline : a sliding gauge C, an integral part of each piston B, allows the position of the rear securing points to be checked within the limits of a permissible tolerance « t ». When the sliding gauge C is at « zero », piston B is at the « nominal dimension » : the piston may be lowered by 4.64 mm (sliding gauge at « – 4.64 ») or raised by 8.64 mm (sliding gauge at « + 8.64 »).

FENWICK

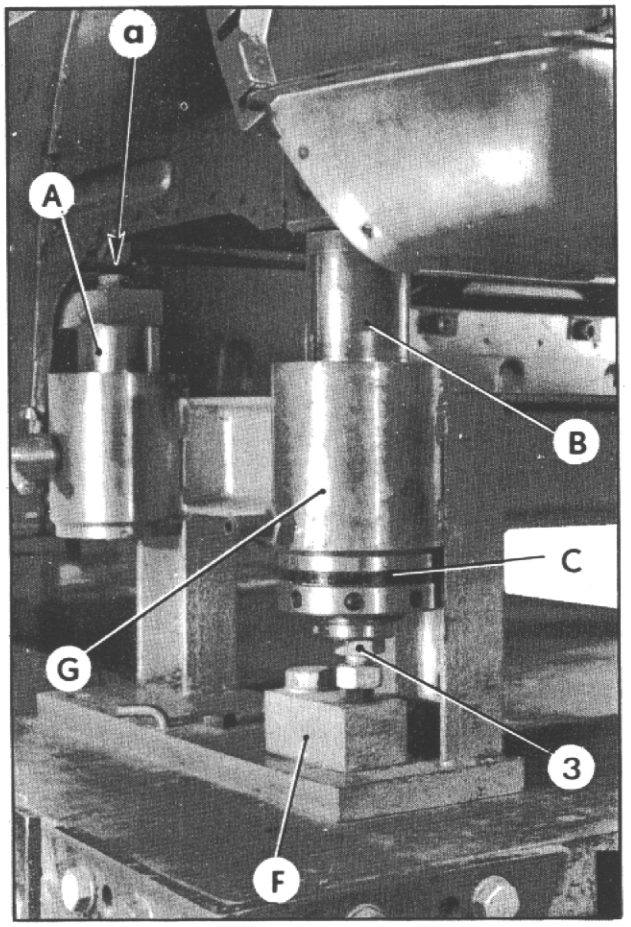


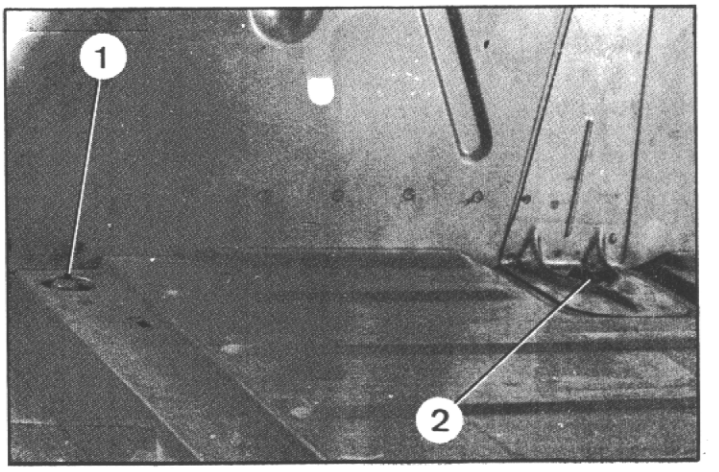
CELETTE

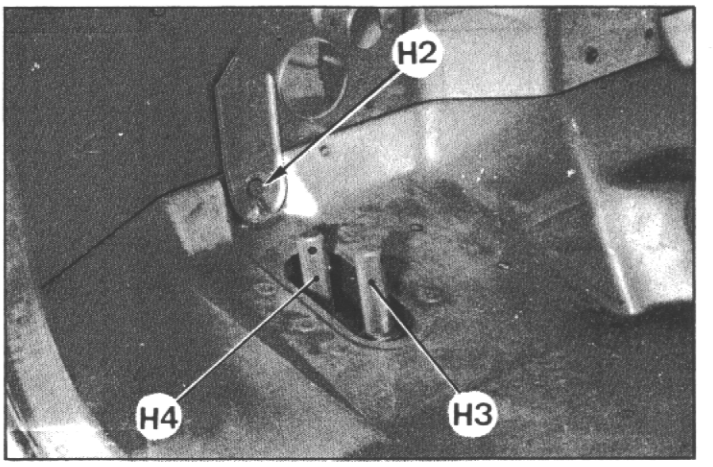


2. Front assembly : The body is located at eight points, which are the securing points of the front axle unit.
This assembly is movable with regard to the body jig and provides for :
- a fore-and-aft tolerance « t5 »,
- a sideways tolerance «t4»,

when the two screws (2) have been slackened.
Two supports on this assembly are movable, which allows in addition :
- for the upper securing points : - tolerance «t1» (transverse rocking of extension support D),
- for the lower securing points : - tolerance «t2» (transverse rocking of lower support E) when the two screws (2) have been entirely slackened)
  - tolerance «t3» (longitudinal rotation of lower support E).

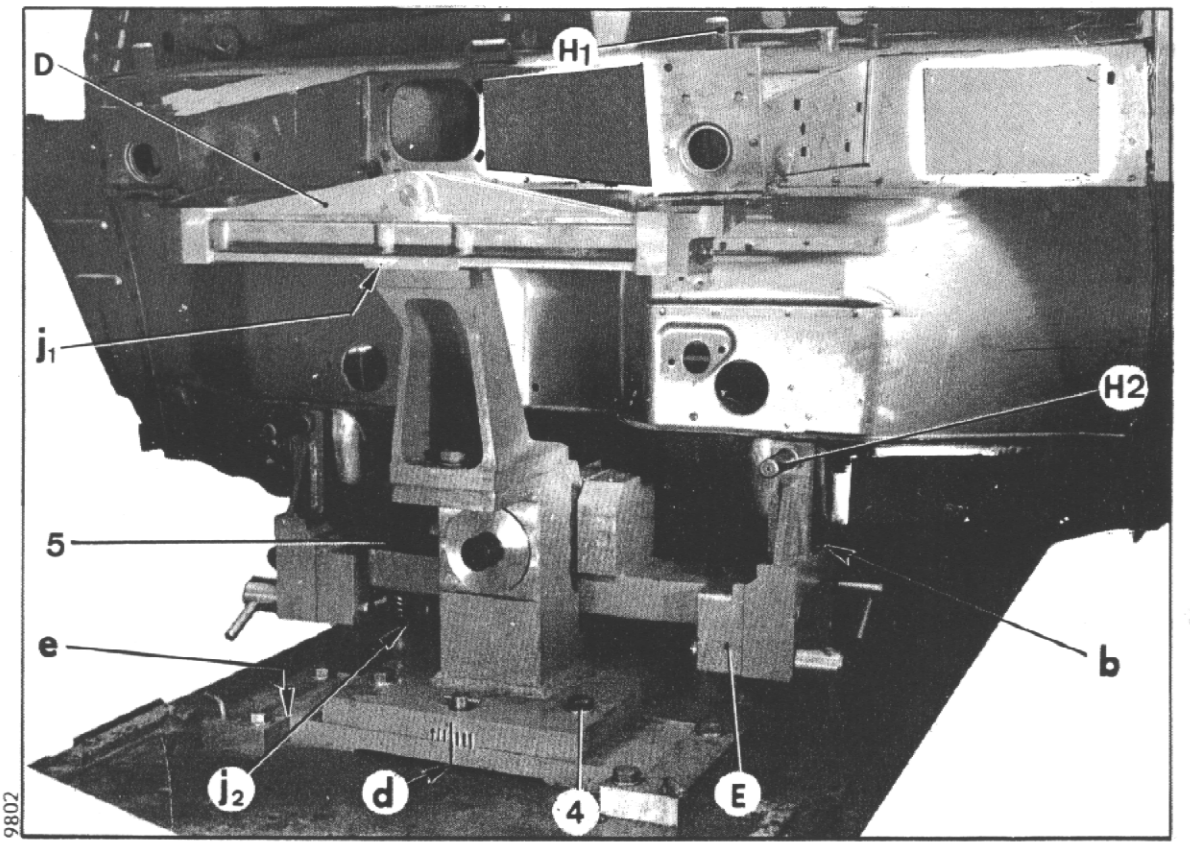






9804

FENWICK



9802

FIRST CASE : Slightly damaged body

1. Check rear securing points :

a) Lower pistons B of rear assembly as far as possible by operating the screws (3).

b) Offer up the body horizontally above the jig :
- Let it rest on the two front bobbins A (or supports) of the rear assembly.
- Engage the body at « a » on the centring dowels of the bobbins. **Do not fit the securing screws.**

c) Rest the body on the front assembly of the jig.

d) On each side of the rear assembly completely slacken sliding-gauge C.

e) *Check :*
- *that the body is in contact with each of the supports of the front assembly at « b ».*
- *that when operating the screw (3), each piston B can be brought INTO CONTACT with the intermediate crossmember : take care not to raise the body at « a ».*
- *that the sliding-gauges C can be tightened until they make contact with cylinders G,*
- *that the difference between the two distances shown by the sliding-gauges C is not greater than 4 mm.*

IF ONE OF THESE CONDITIONS IS NOT FULFILLED, THE BODY IS BUCKLED.

NOTE : Examples of possible readings on the sliding-gauges.
- If one of the gauges shows « - 2 », the other must not have a reading greater than « + 2 ».
- If one of the gauges shows « + 4 » the other must not have a reading less than « 0 », nor greater than « + 8 ».

2. Check the front securing points :

a) Slacken the two stop screws (4).
Slacken the two screws (5) to bring them to the stop in the high position (maximal tolerance «t2»).

b) On each side, position in order, rods H4, H3, H2 and H1.
NOTE : This rod must be able to be engaged or screwed in *by hand.*

c) Tighten again the two stop screws (4).

d) *Check :*
- *that ALL the H rods can be removed BY HAND*
- *that the clearance read at « j2» (on the right or on the left) is not more than FIVE TIMES the value read at « j1» on the same side.*

IF ONE OF THESE CONDITIONS IS NOT FULFILLED, THE BODY IS BUCKLED.
NOTE : **Never jack a body while it is held in position on support D of the extensions.**

SECOND CASE : Body damaged at the front

1. Fix the body on the rear assembly

a) Lower pistons B of rear assembly as far as possible by operating the screws (3).

b) Offer up the body horizontally above the jig :
- Let it rest on the two front bobbins A (or supports) of the rear assembly.
- Engage the body at « a » on the centring dowel pins of the bobbins.

c) Rest the body on the front assembly of the body jig.

d) Raise pistons B (screws (3)) to the «nominal distance »(sliding gauge at «zero»).

e) Fit the two screws at (1) and the two at (2).

2. Place the front assembly at the «nominal distance »:

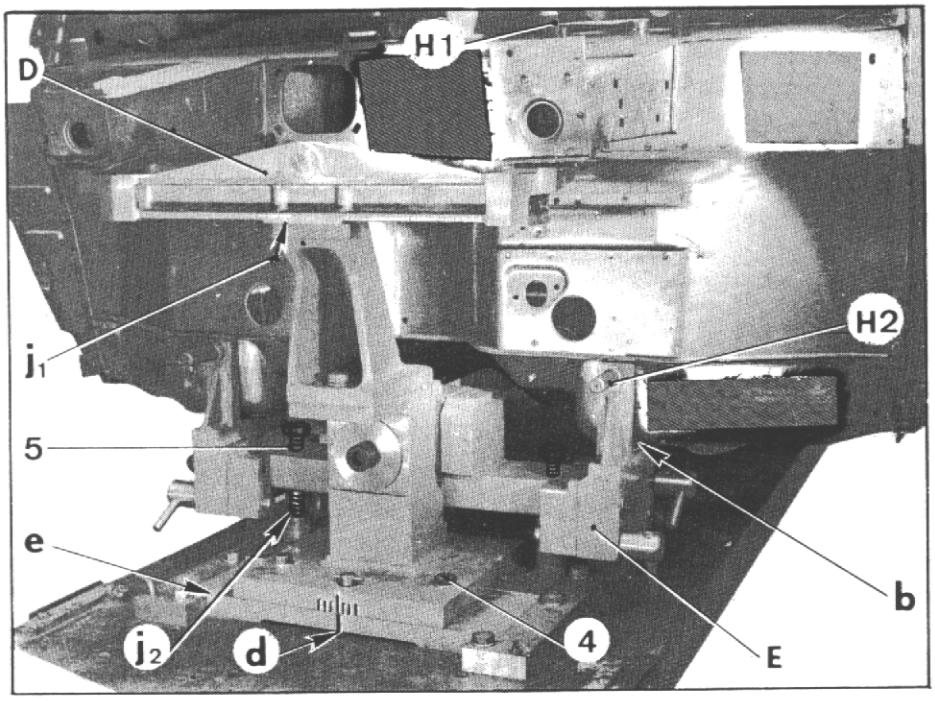
a) Remove the support D from the extensions. If necessary, remove one of the «brackets» of support E from the side on which the force is to be exerted.
Slacken the two stop screws (4).
NOTE : **Never «jack » a body while it is held in position on support D of the extensions.**

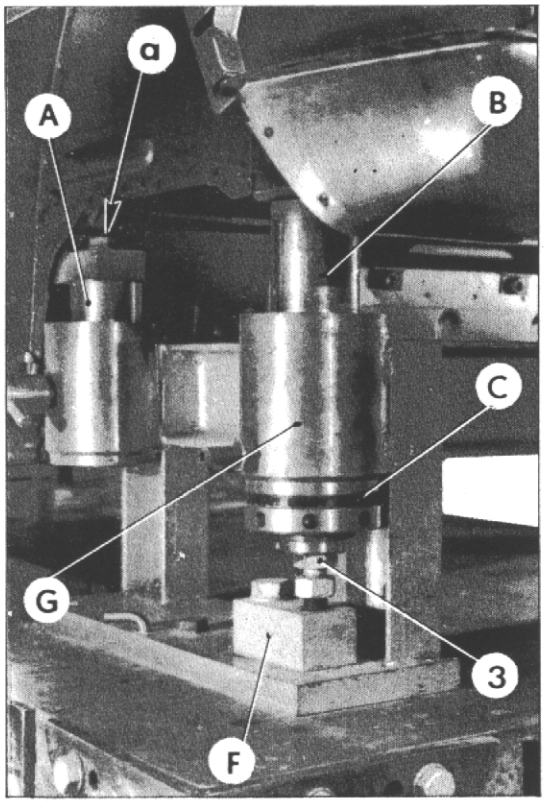
b) Locate the front assembly in the « middle » position of all the permissible clearances :
- *Side clearance « t4»:* the «zero» of the sliding-gauge at « d » must be in line with the fixed mark.
- *Longitudinal clearance « t5» :* on FENWICK body jig : position a 2 mm thick shim at each side at « e » on CELETTE body jig : the corresponding sliding-gauge must be in the «zero» position.
- *Rocking tolerance « t2» of lower support E :*
Slacken fully the two screws at (5).
Position a 2.7 mm thick shim at «j2» under one of the screws (5) and tighten the other in such a way to take up the remaining rocking clearance.
Withdraw the 2 mm thick shim and tighten this screw to take up the remaining rocking clearance of support E.
Tighten the two screws (4).

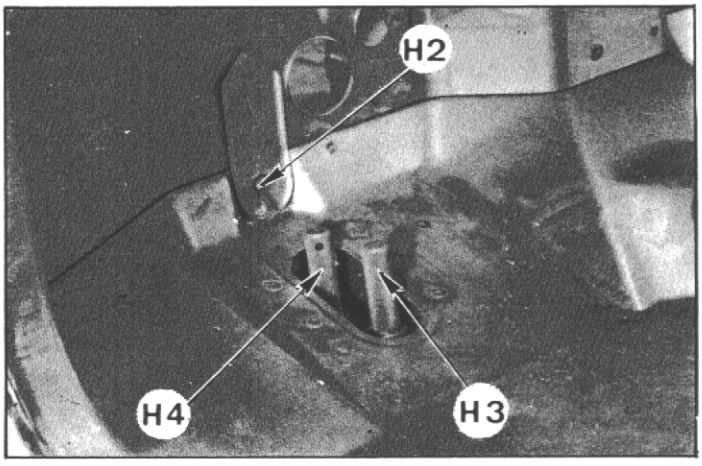
3. Straighten the body : « Jack » it until you can insert *in order* rods H4, H3 and H2 corresponding to the bracket which is still in position.
NOTE : The rods must be able to be inserted *by hand.*

4. Fix the bracket which has been removed.
Follow the instructions in paragraph 3 above.

5. Fit the support D for the extensions.
Check the extensions using rods H1.
Proceed as indicated in § 2d for the first case.







THIRD CASE : Body damaged at the rear :

1. **Position the front assembly at the « nominal distance » :**
   Proceed as indicated in § 2 b of the second case.

2. **Hold the body on the lower support of the front assembly with rods.**

On each side, position rods H4, H3 and H2 in order.
NOTE : These rods must be able to be inserted by hand.
Check the extensions using rods H1, proceeding as indicated in § 2 d for the first case.
Withdraw the rods after the check.

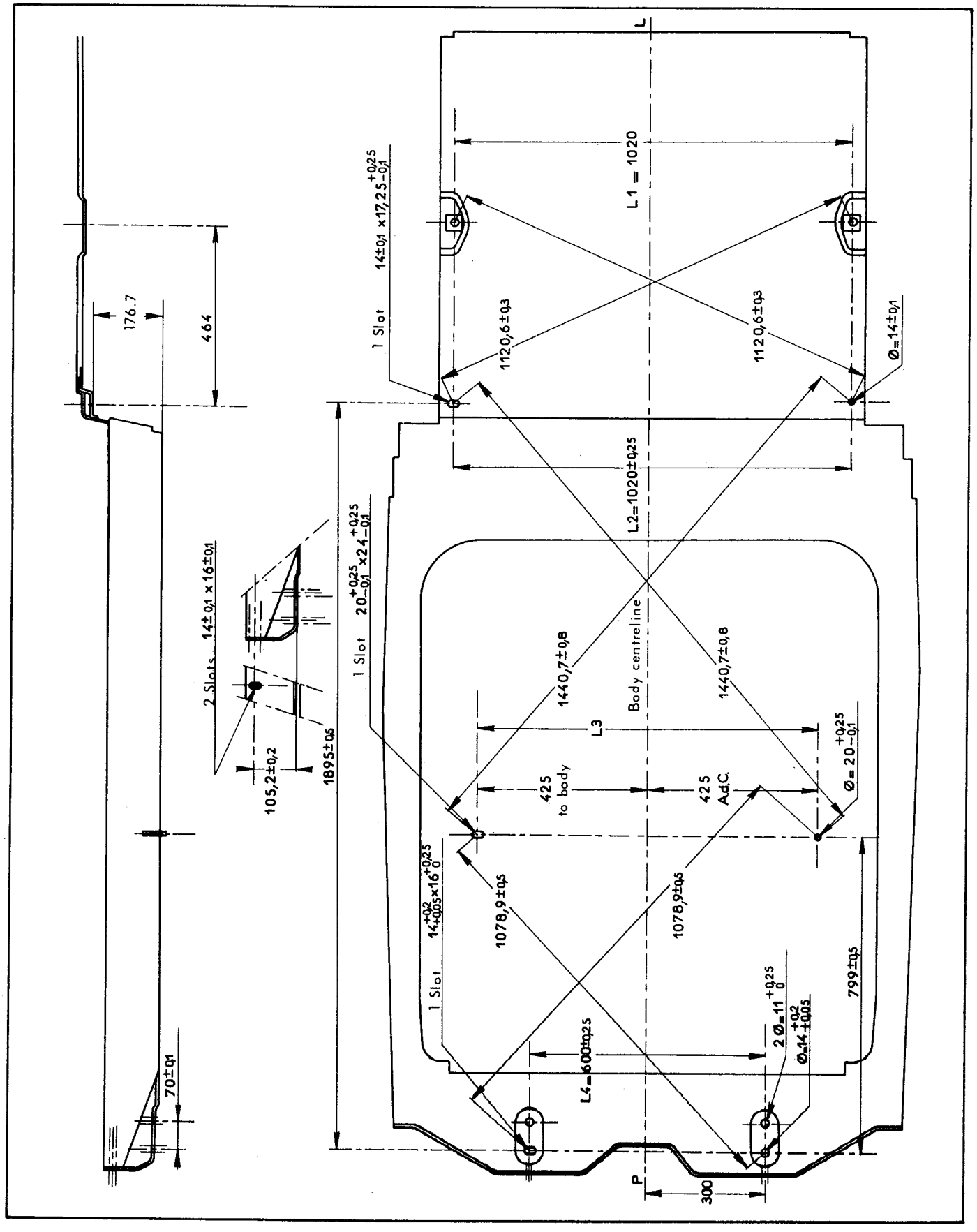
3. **Free the rear securing points :**
   Pivot shims F, and lower pistons B as far as possible.

4. **Straighten the body :** « Jack » it until you can check the rear securing points as indicated in § 1 on the first case.

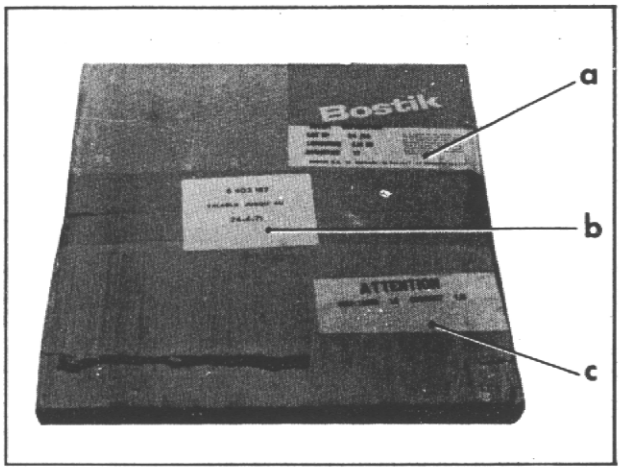
V - CHECKING THE DIMENSIONS OF A BODY

The basic diagram below is only a guide.

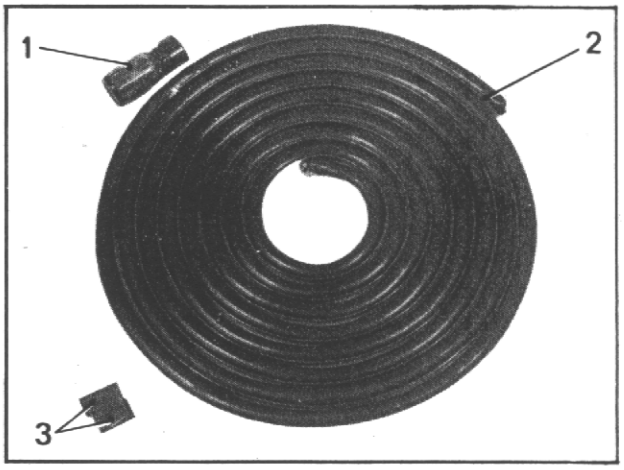
In no circumstances can it be used as a reference when re-assembling a body.



REPLACING A SIDE WINDOW



9417



Manual 810-2

PRODUCT USED

The product used for bonding a side window is an extruded neoprene strip containing a vulcanizing agent and built-in electrical resistor.
Vulcanization is achieved by passing an electrical current (see chapter MATERIAL USED paragraph b).
This product, manufactured by BOSTIK Company, is called SOLBIT.
It is available in two grades :

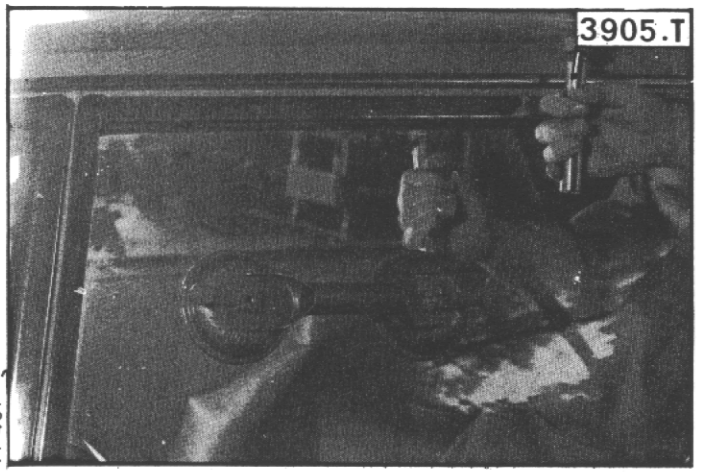
a) One, for manufacturing purposes, has a shelf life of only five weeks at ambient temperature, or for an unlimited period below 0°C.

b) The other, for repair purposes, has a shelf life or six months at ambient temperature.
The repair strip is sold by the Replacement Parts Department in cardboard cartons.
The three labels on the boxes indicate respectively :
Label « a » : the physical properties of the product (length, diameter, production date, etc..).
Label « b » : the Replacement Parts number and the date after which it must not be used.
Label « c » : vulcanizing time to be observed during fitting (one hour).
Inside the box there is :
- A SOLBIT strip (2) - A bottle (1) of primary liquid - 2 rubber blocks (3) - A strand of piano wire about 0.60 meter long - An instruction sheet.

EQUIPMENT USED.

a) **Standard tools :**
- Philips screwdriver
- A hammer
- A dolly
- A roll of adhesive paper
- Three lengths of piano wire (diameter 0.6 mm-length = 500 mm).

b) **Special tools :**
- A set of three straps 3822-T
- Two handles 3905-T
- A transformer delivering 27 V ± 1.5 V from voltages of 220 or 380 V ± 20 V.
- Two electric leads (cross-section = 4 mm2 length = 2.5 mm) (connection between transformer output and the SOLBIT strip).



11 461

REMOVAL

1. Clean the outside face of the glass with alcohol and position the handling suction cups.

2. **Remove the side window :**

a) Using a cranked screwdriver, perforate the SOLBIT strip to allow insertion of a piano wire (dia. = 6 mm, length = 500 mm) between the window glass and the rabbet.

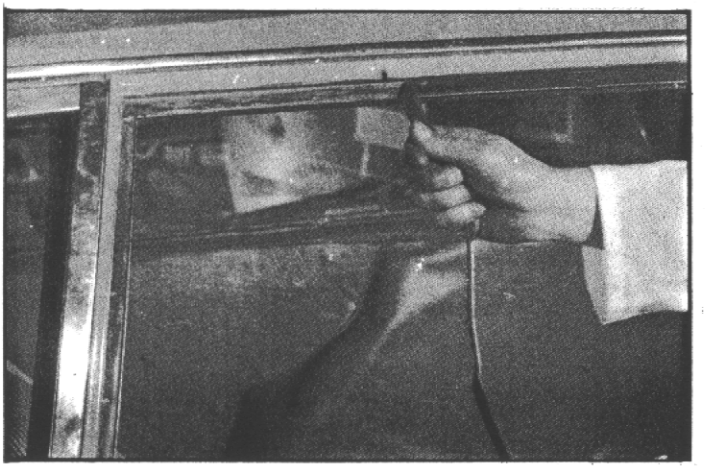
Fit the handles 3905-T on each end of this piano wire.

By alternately pulling and pushing, split the SOLBIT strip right round the periphery of the window.

NOTE :

The side window having been removed with its trim, use a spatula to raise the trim at each corner so that its base, embedded in the SOLBIT, will in no way interfere with the piano wire.

Carefully cut out the SOLBIT strip at the bottom of the glass to avoid damage to the side trim that covers the rabbet.



11 465

b) Remove the side glass with its trim.

PREPARATION

3. Remove the side window trimmings.

4. With a blade, remove the traces of SOLBIT adhering to :
- the glass,
- the rabbet,
- the trim.

NOTE : It is not necessary to completely strip the glass and the bottom of the rabbet, since the new SOLBIT adheres perfectly to the old. However, it is best to avoid too much excess thickness (rub them down if necessary).

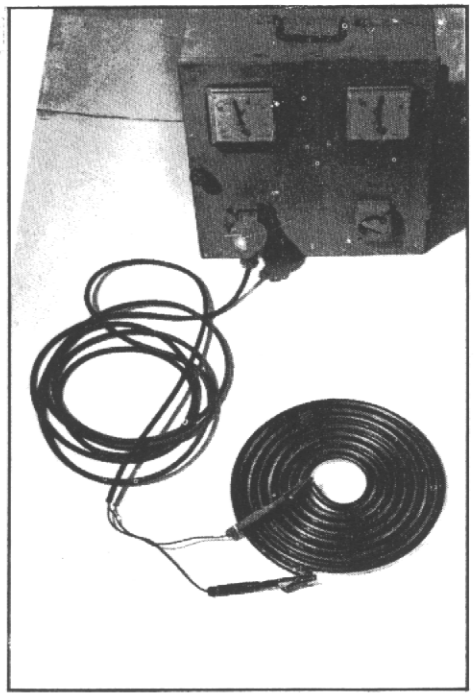
FITTING

5. Place the glass in its rabbet.
The clearance between the rabbet and the glass should not exceed 4 mm.
If necessary, once more drive out the bottom of the rabbet to obtain this condition.
Place the two rubber blocks at the bottom of the glass (stick them if necessary)

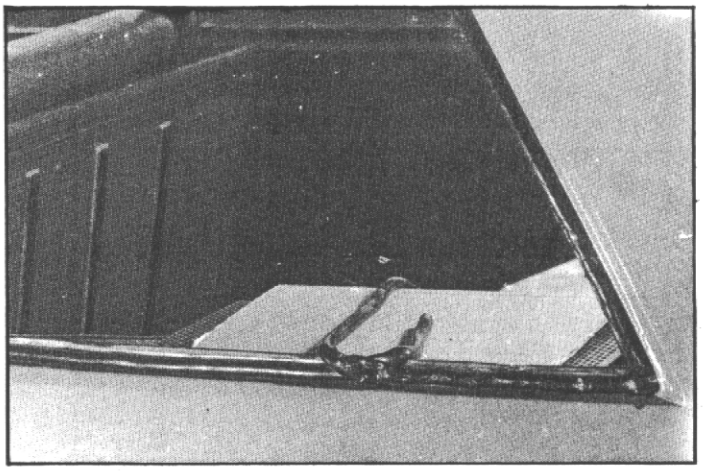
6. Carefully clean with alcohol :

- the rabbet,
- the periphery of the glass (inside face),
- the trim surround.

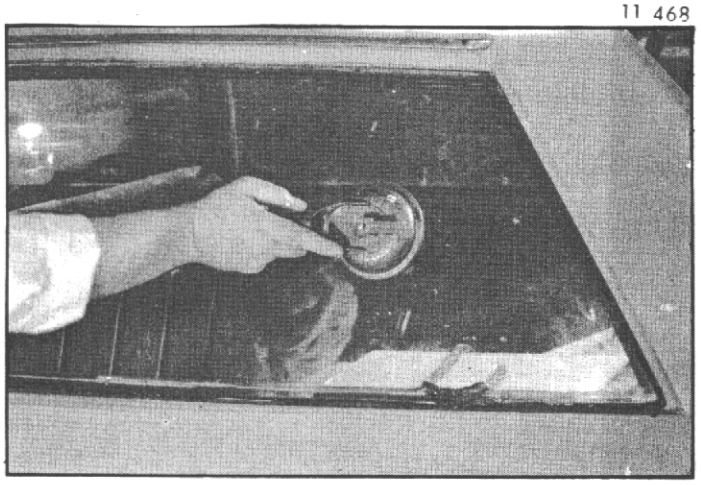
9510



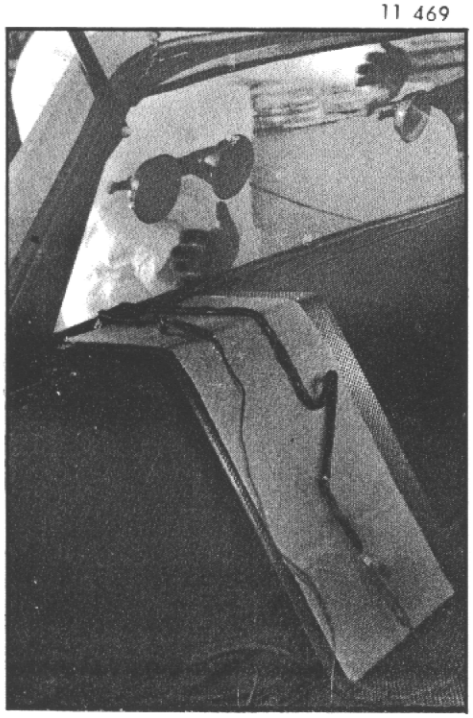
11 467



11 468



11 469



7. Using a thin paint brush, smear primary liquid on :
   - the rabbet,
   - the inner face of the glass along its entire periphery for a width of about 20 mm.

8. **Preheat the SOLBIT strip :**
   Connect up the ends of the resistor to the current source.
   Disconnect the resistor when the SOLBIT is soft and slightly sticky.
   (Continue surveillance - maximum time : three minutes).

9. **Fit the SOLBIT strip :**
   Fit the SOLBIT strip in the rabbet (Protect the inner boot trim from contact with the SOLBIT)
   Cross the ends of the SOLBIT strip at the rear bottom corner of the window opening.
   Hang the ends inside.
   Crush the joint, so as to avoid extra thickness of the SOLBIT strip.

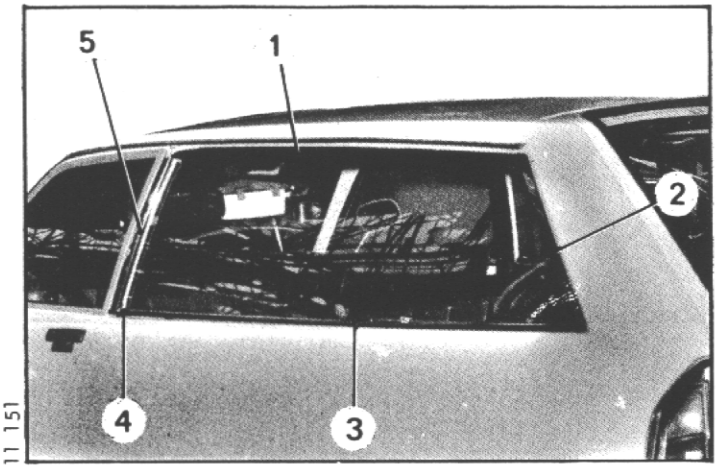
10. **Fit the glass :**

    Position the glass in its rabbet.
    It should rest on the two rubber blocks at the bottom.

11. **Heat the SOLBIT strip :**
    Connect the end of the SOLBIT strip to the current source.

12. Press all around the glass so that it takes up its final position and to allow the SOLBIT strip to flow in between the glass and the rabbet.
    Remove the rubber blocks fitted in paragraph 5.

IMPORTANT : **Let the SOLBIT strip heat for an hour. This time is essential for perfect vulcanization of the strip.**



11 151

13. Fit the trim :

Proceed with the fitting while the SOLBIT strip is vulcanizing.

Fit the trim in the following order :
- lower trim (3) with its end-piece (4),
- upper trim (1),
- front trim (5),
- rear trim (2).

14. Disconnect the ends of the strip.
After cooling, press the ends of the strip against the rabbet.

15. Remove any traces of primary liquid from the glass using alcohol.
If the bodywork has been marked by the SOLBIT strip dab at the spots using the free ends of the strip.
Wipe afterwards with a soft petrol-impregnated cloth.

REPLACING A REAR WINDOW

9316



REMOVAL

1. *Case of an electrically-heated window :* disconnect the supply leads.

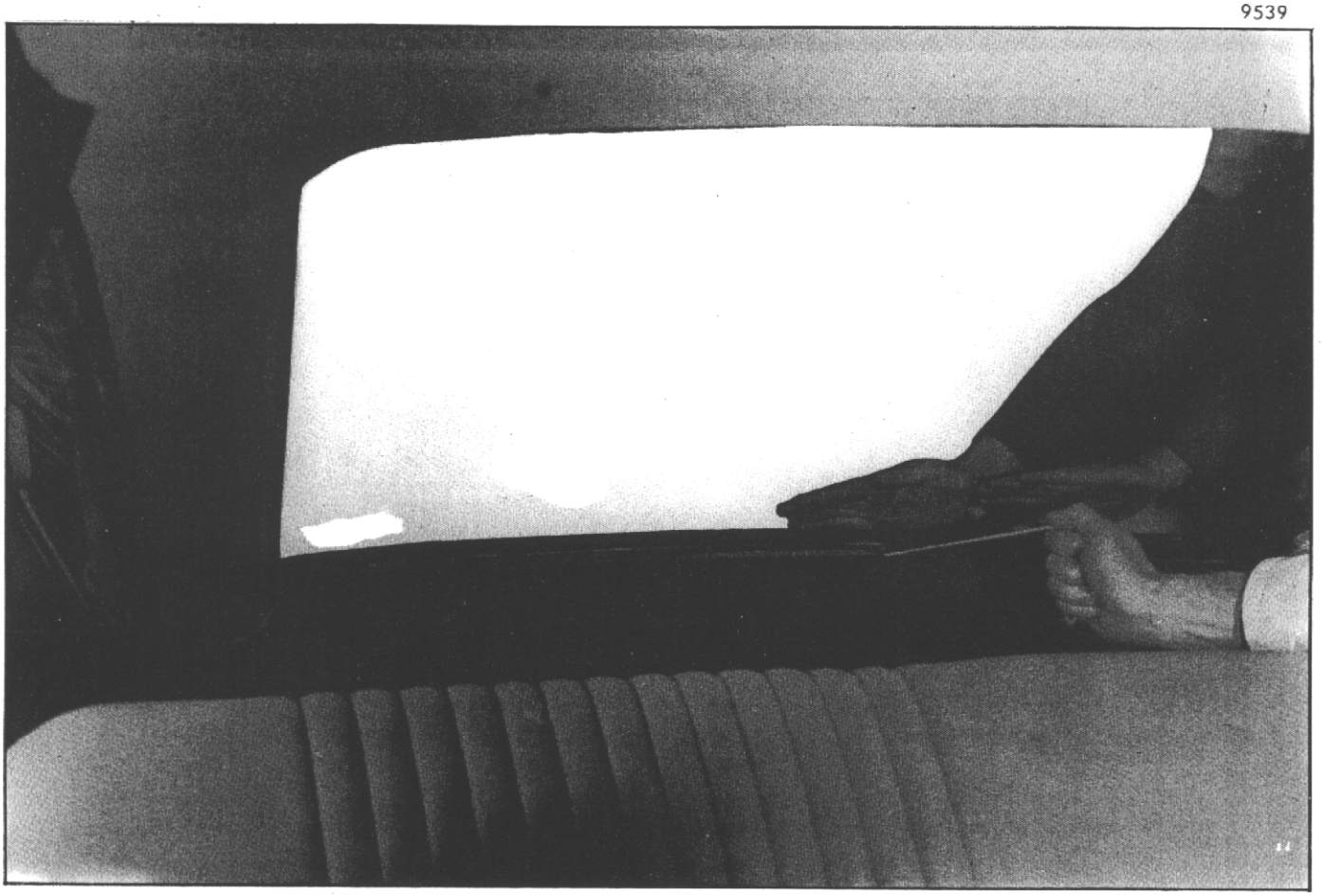
2. Lie on the rear seat with feet flat against a corner of the glass near the rubber sealing. Push on the glass until it is completely free.

3. Remove the sealing compound and carefully clean the rabbet of the opening.

4. Remove the glass sealing rubber.

5. Remove the seal trim *(on certain CLUB vehicles).*

9539



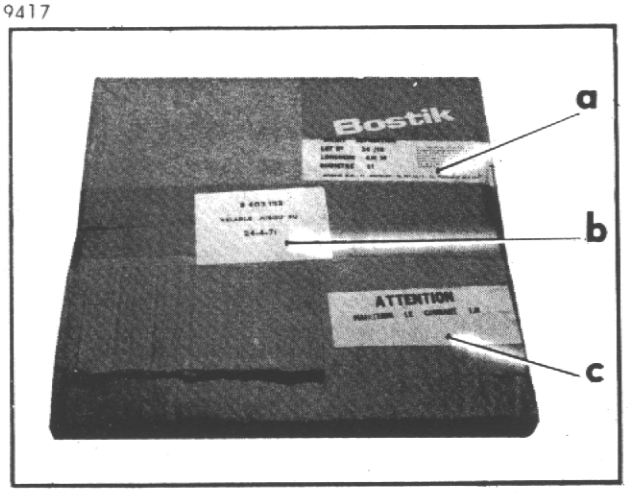
FITTING

6. Prepare the opening :
   Carefully clean the rabbet.
   Spread the sealing compound over a length of about 5 cm at the bottom two corners of the opening.
   In the case of an electrically-heated window : spread the compound in the same way at the height of the supply leads.
7. Fit the rubber sealing on the rear window glass.
8. Fitting the seal trim *on certain CLUB vehicles) :*
   Fit a small cord into the relevant groove of the rubber seal.
   Fit the two parts of the trim while pulling on the cord.
   Fit the seal cover.
9. Fit a small cord (dia. = 4 mm) smeared with soapy water, in the groove of the rubber. The ends of the cord must cross themselves in the middle of the lower portion of the glass.
10. Fit the glass in the opening with the ends of the cord towards the inside of the vehicle.
11. Press hard on the outside of the glass as close as possible to the rubber seal while an assistant inside the car draws on one of the cord ends (this serves to raise the inner lip of the rubber seal and allows the latter to be fitted on the rabbet). Continue to press all around the glass while removing the cord.
12. Complete fitting by tapping with a rubber mallet on the outside of the glass, all around it and as close as possible to the rubber seal.

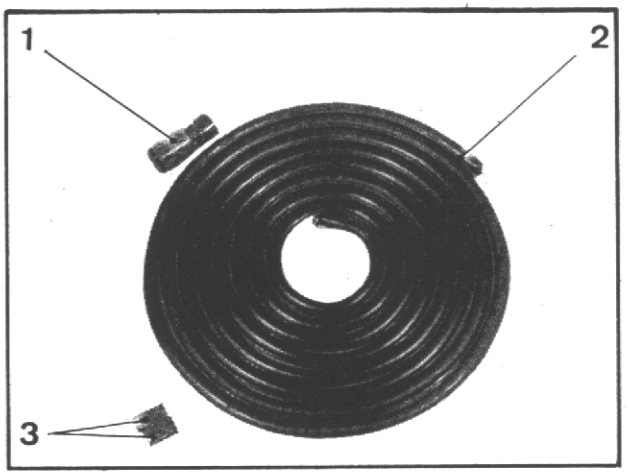
I. REPLACING A « BONDED » TAILGATE WINDOW

PRODUCT USED

9417



9283



The product used for bonding tailgate windows is an extruded neoprene strip containing a vulcanizing agent and a built-in electrical resistor.
The vulcanization is achieved by passing an electrical current (see chapter MATERIAL USED paragraph b). This product, made by the BOSTIK Company, is called SOLBIT.

The product comes in two grades :

a) The first, for manufacturing purposes, has a shelf life of five weeks at ambient temperature or an unlimited life below 0° C.

b) The second, used for repair purposes, has a shelf life of six months at ambient temperature.
The repair strip is sold by the Replacement Parts Department in cardboard cartons.
The three labels on the carton indicate respectively :
Label « a » : the physical properties of the product (length, diameter, production date, etc..).
Label « b » : the Replacement Parts number and the final date of **use which must never be exceeded.**
Label « c » : the vulcanizing time to be observed when fitting (one hour)
Inside the carton there is :
- A strip of SOLBIT (2) - A bottle (flask) of primary liquid - Two rubber blocks (3) - A length of piano wire about 0.60 meter in legth - An instruction notice

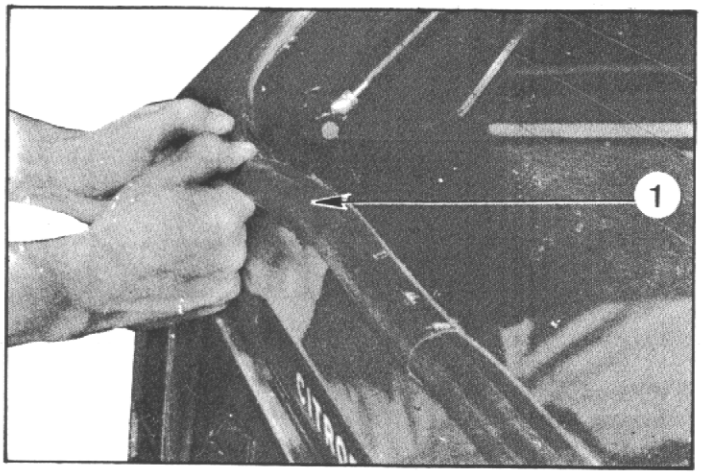
EQUIPMENT USED

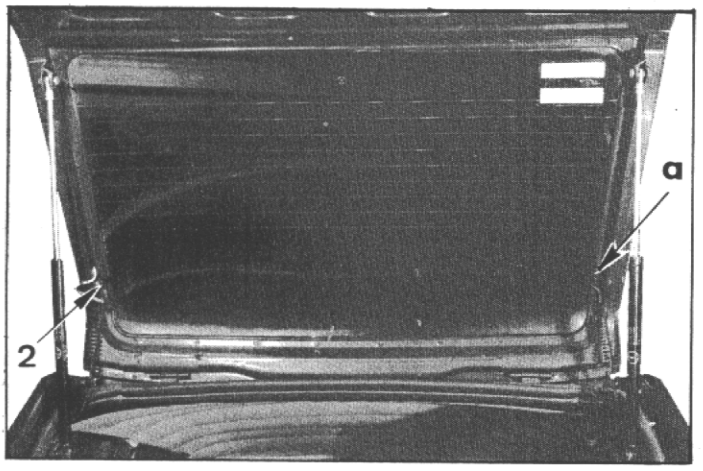
a) **Standard tools**

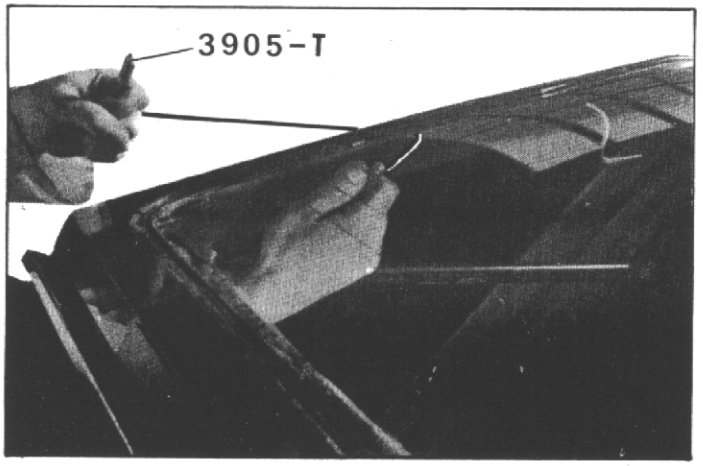
- Philips screwdriver
- A hammer.
- A dolly
- A roll of adhesive paper
- Three lengths of piano wire (dia. = 0.6 mm - length = 500 mm).

b) **Special tools**

- A set of three straps 3822-T
- Two handles 3905-T
- A transformer giving 27 V ± 1.5 V from voltages of 220 V or 380 V ± 20 V.
- Two electrical leads (cross-section ≡ 4 mm^2 length ≡ 2.5 m) (connection between the transformer output and the SOLBIT strip).







REMOVAL

1. Remove the finish rubber.
   Pull hard to free it from the glass.
   Do not re-use this rubber.

2. Disconnect the heating resistor lead at « a » and remove the bolt (2) holding the earth wire.

3. **Remove the tailgate window :**
   a) Protect the paint on the outside of the tailgate with adhesive paper.
   b) Using cranked screwdriver, make a small opening in the SOLBIT strip to allow insertion of a piano wire (dia. = 0.6 mm - length = 500 mm) between the glass and the rabbet.
   At each end of this piano wire fit the 3905-T handles.
   By alternately pulling and pushing cut the SOLBIT strip right round the glass.

   c) Remove the tailgate window glass.
   The use of suction cups will facilitate this operation.

PREPARATION

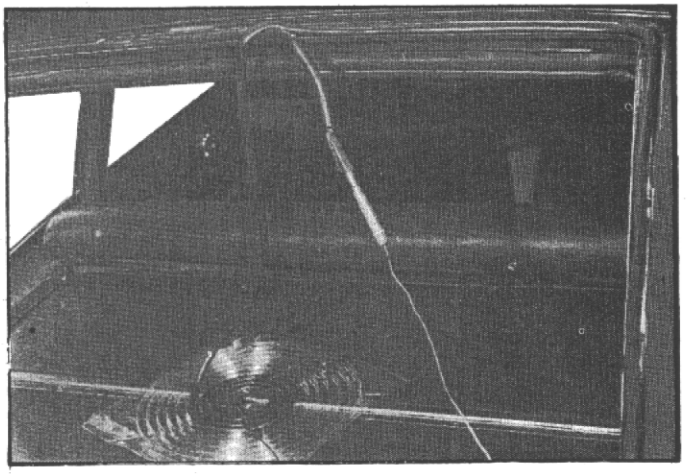
4. Using a knife, remove any traces of the SOLBIT strip adhering to the glass and rabbet.

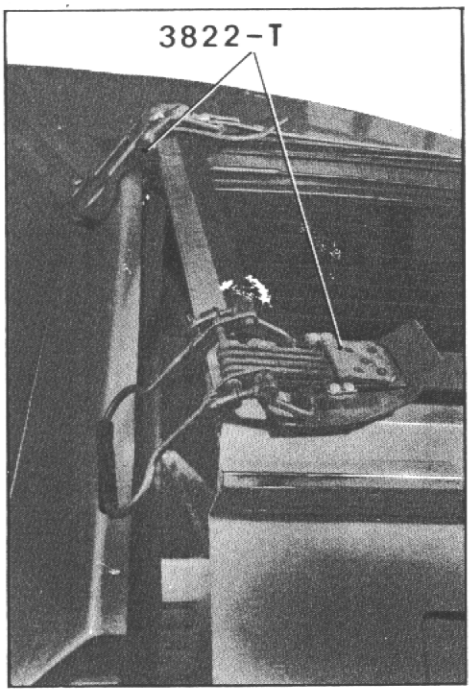
   If necessary, rub down the window rabbet.

NOTE : It is necessary to strip the glass and the steel completely since the new SOLBIT adheres perfectly to the old. However, it is wise to avoid too much extra thickness (rub them down if necessary).

5. Fit the new finish rubber on the tailgate glass, stick it if need be.

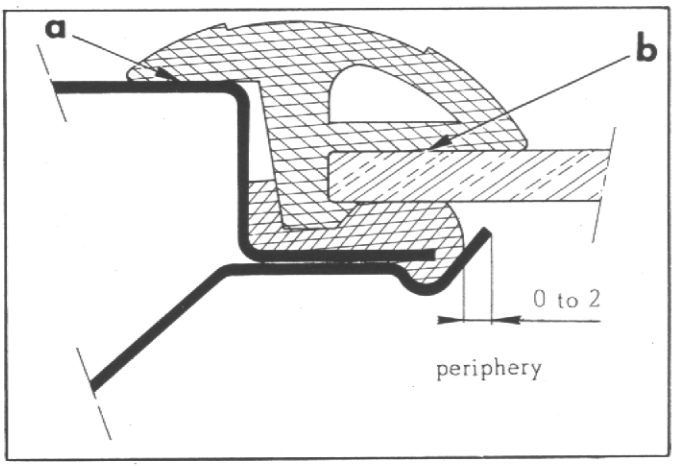
6. Carefully clean with alcohol :
   - the rabbet,
   - the periphery of the glass and the rubber (bonding area).

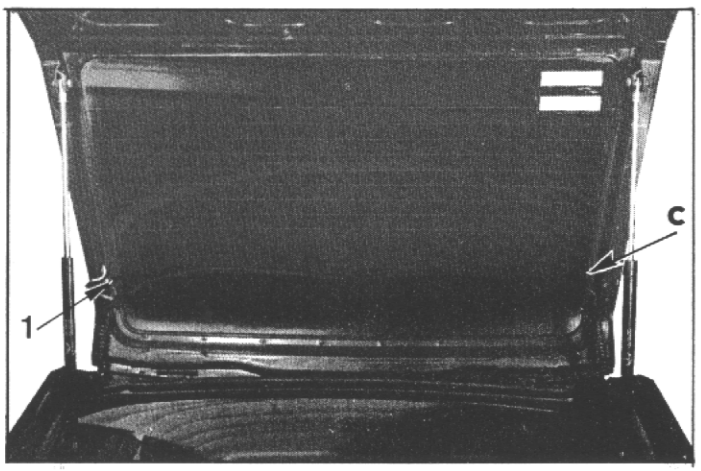




FITTING

7. Using a thin paint brush, apply primary liquid to :
   - the rabbet,
   - the inner face of the glass along its entire periphery over a width of about 20 mm.
   - the finish rubber.
8. **Preheat the SOLBIT strip :**
   Connect the ends of the resistor to a 24 volt current source.
   Disconnect the resistor when the SOLBIT is soft and slightly sticky.
   (continue surveillance, maximum time = three minutes).
9. Fit the SOLBIT strip in the rabbet, crossing its ends at the top at the centreline of the body.
   Hang the ends inside.
   Press down the junction to avoid too great a thickness of SOLBIT.
   Do not cut the SOLBIT strip to length.



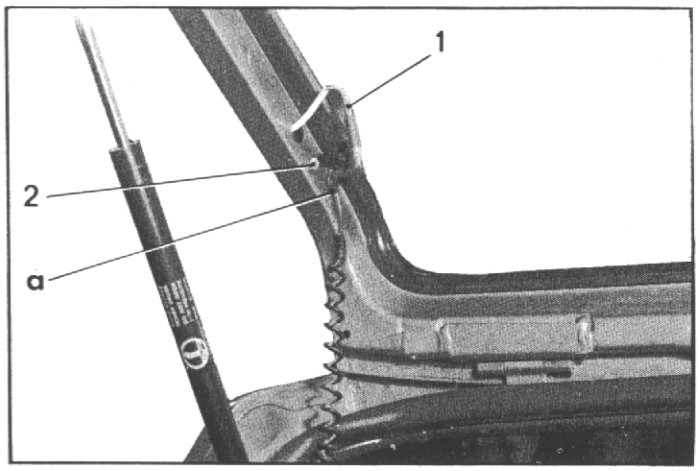


10. **Fit the glass :**
    Fit the glass with its finish rubber on the SOLBIT strip.
11. **Heat the SOLBIT :**
    Connect the ends of the SOLBIT strip to a 24 volt current source.
12. Press around the glass so that the glass assumes its definitive position and allow the strip to flow between the glass and the rabbet.
    Check that the finish rubber lies flat along the centre periphery at « a » on the rabbet and « b » on the glass.

IMPORTANT : **Let the strip heat for an hour. This time is essential to obtain perfect vulcanization of the strip.**

13. Disconnect the ends of the strip.
    Remove the two 3822-T straps.
    After cooling, the ends of the strip against the rabbet.
14. Use alcohol to remove all traces of primary liquid from the glass.
    If the bodywork has been marked by the SOLBIT strip, dab the spots with the free ends of the strip.
    Then, wipe with a soft petrol-impregnated cloth.
15. Connect the lead to the heating resistor at « c » and fit the bolt (1) holding the earth wire.

II. REPLACING A « SET-IN » TAILGATE WINDOW



11 545

REMOVAL.

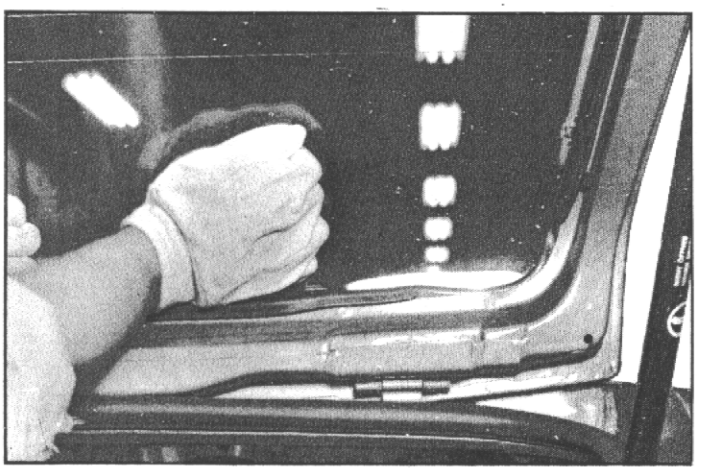
1. Disconnect the heating resistor lead and remove the earth wire bolt (2).
   Disconnect the lead (1) from the licence plate light and unfasten the conductors at « a » on each side of the tailgate window.

2. Using a spreader release the upper corners of the sealing rubber.
   Press on the glass to facilitate the passage of the rubber seal lip,
   End the removal while releasing completely the glass from the tailgate.

3. Remove the rubber sealing strip.

PREPARATION.

4. Remove the sealing compound and carefully clean the tailgate rabbet.
   If necessary, file down any welding ridges.
   If necessary, rub down the rabbet.



5. At each corner, fit a pellet of new compound drawn out to a length of about 50 mm.

FITTING.

6. Fit the tailgate window glass into its rubber seal.

7. Fit a small cord (dia. = 4 mm). smeared with soapy water, into the groove of the rubber seal. The ends of the cord should cross at the centre of the bottom of the glass.

8. Place the glass thus fitted into its opening, with the cord ends towards the inside of the vehicle.

9. Press hard on the outside of the glass as close as possible to the rubber seal while an assistant inside draws on one of the cord ends (this serves to raise the inner lip of the rubber and allows the latter to be fitted on the rabbet.

   Continue to press all around the glass and remove the cord.



10. Complete fitting by tapping with a rubber mallet on the outside of the glass, all around it and as close as possible to the rubber seal.

11. Connect the lead of the heating resistor and fit the earth wire bolt (2).
    Connect the leads (1) of the licence plate light and fasten on the tailgate at « a » (on each side).