LIST OF OPERATIONS IN SECTION III

Operation number	DESCRIPTION
	RECONDITIONING
GX. 100-3	Reconditioning an engine
GX. 112-3	Reconditioning a cylinder head.
GX. 311-3	Reconditioning the clutch housing of a pedal-operated clutch/torque converter clutch I. Replacing the thrust guide sleeve *(pedal operated clutch)* II. Replacing the stator sleeve of a gearbox with a torque converter
GX. 330-3	Reconditioning a gearbox (pedal-operated clutch)
♦ GX.ea. 330-3	Reconditioning a gearbox with a torque converter
GX. 372-3	Drive shaft reconditioning
GX. 391-3	Reconditioning a high pressure pump
GX. 412-3	Work on the front axle arm : I. Replacement of upper arm articulation bearings II. Replacement of lower arm « Fluid Blocs » (Anti-vibration bushes)
GX. 413-3	Reconditioning a swivel hub
GX. 422-3	Reconditioning a rear axle arm : I. Replacement of a wheel hub bearing or brake disc II. Replacing the arm hub bearings III. Replacing an anti-roll bar anchor cup
GX. 433-3	Reconditioning a suspension cylinder
GX. 442-3	Reconditioning a steering system
GX. 451-3	Reconditioning a brake unit *(front or rear)*
GX. 453-3	Work on a hydraulic brake control - Reconditioning a hydraulic brake control (brake valve)

OPERATION
GX. 100-3

RECONDITIONING AN ENGINE

SPECIAL TOOLS

TOOLS SOLD

1601-T : Spark-plug spanner

1671-T : Inertial extractor
(With 12 mm end fitting)

1683-T : Oil filter spanner (dia 76 mm)

1694-T : Mandrel for fitting front crankshaft seal
(sold in kit)

1696-T : Mandrel for fitting rear cranshaft seal
(sold in kit)

1699-T : Mandrel for gudgeon pin disassembly and assembly

2410-T : Stud extractor tool

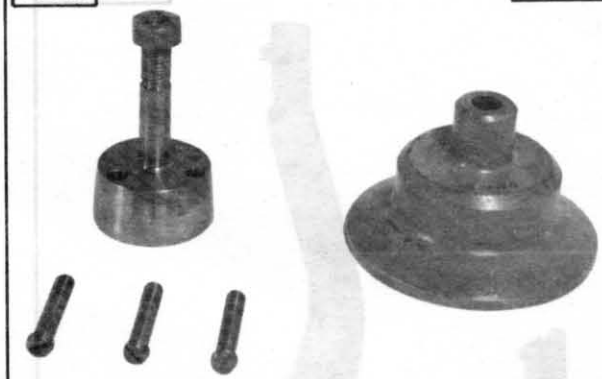
2473-T : Torque wrench (sold in kit 4006-T ter)

79-789

1601-T

79-788

1696-T



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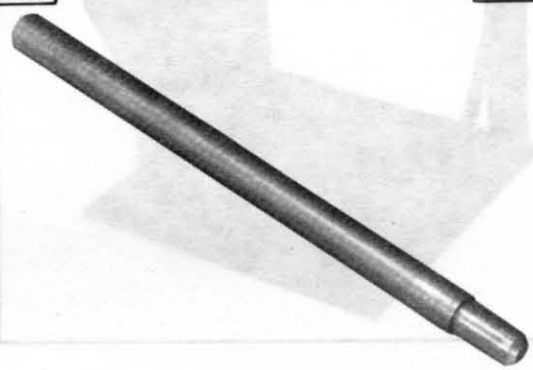
1671-T

79-966

1699-T

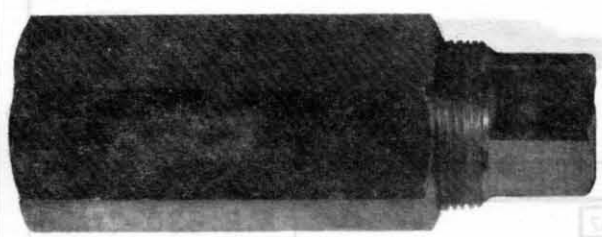


76-924

1683-T

12834

2410-T



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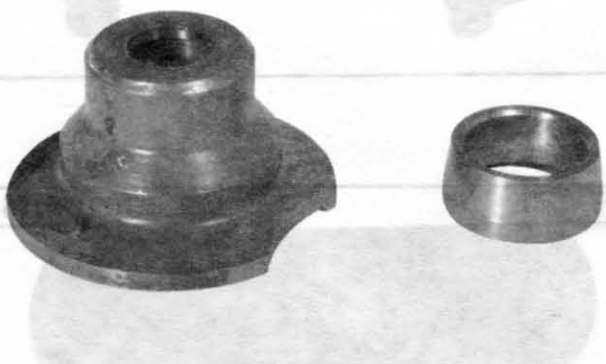
1694-T

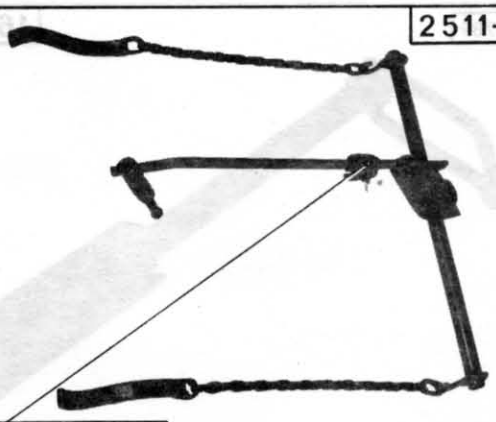


79-875

2473-T

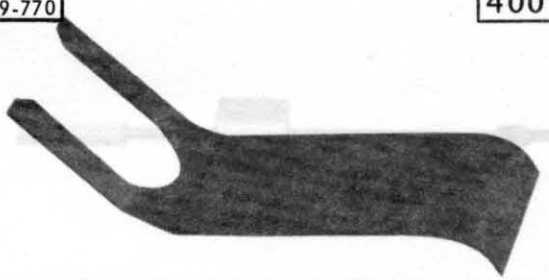
79-795 **2508-T**

79-798 **2511-T**



MR.630-44/14

79-770 **4001-T**



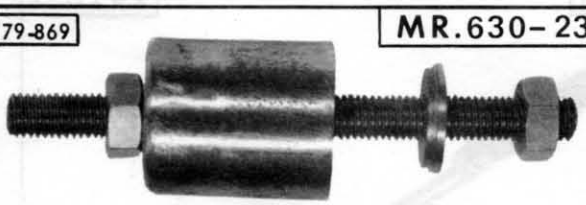
76-923 **3052-T bis**

79-877 **4006-T-(D)**

79-767 **MR.630-11/26**

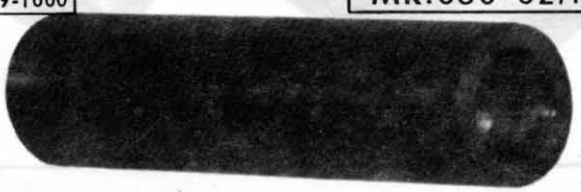
79-746 **MR.630-44/14**

79-869 **MR.630-23/9**



79-876 **MR.630-31/85**

79-1000 **MR.630-62/14**



TOOLS SOLD (cont.)

2508 : Engine bench support.

3052-T bis : Mandrel for fitting the self lubricating bush in the crankshaft.

2511-T : Sling

4001-T : Jig for fitting oil pump

4006-T (D) : Spanner for cylinder head nuts (13 mm A/F).

TOOLS NOT SOLD

MR. 630-11/26 : Special spanner for camshaft pulleys.

MR. 630-23/9 : Small end shell extractor.

MR. 630-31/85 : Mandrel for clutch disc alignment.

MR. 630-44/14 : Safety hook for sling 2511-T

MR. 630-62/14 : Swaging tool for by-pass valve

TIGHTENING TORQUE VALUES

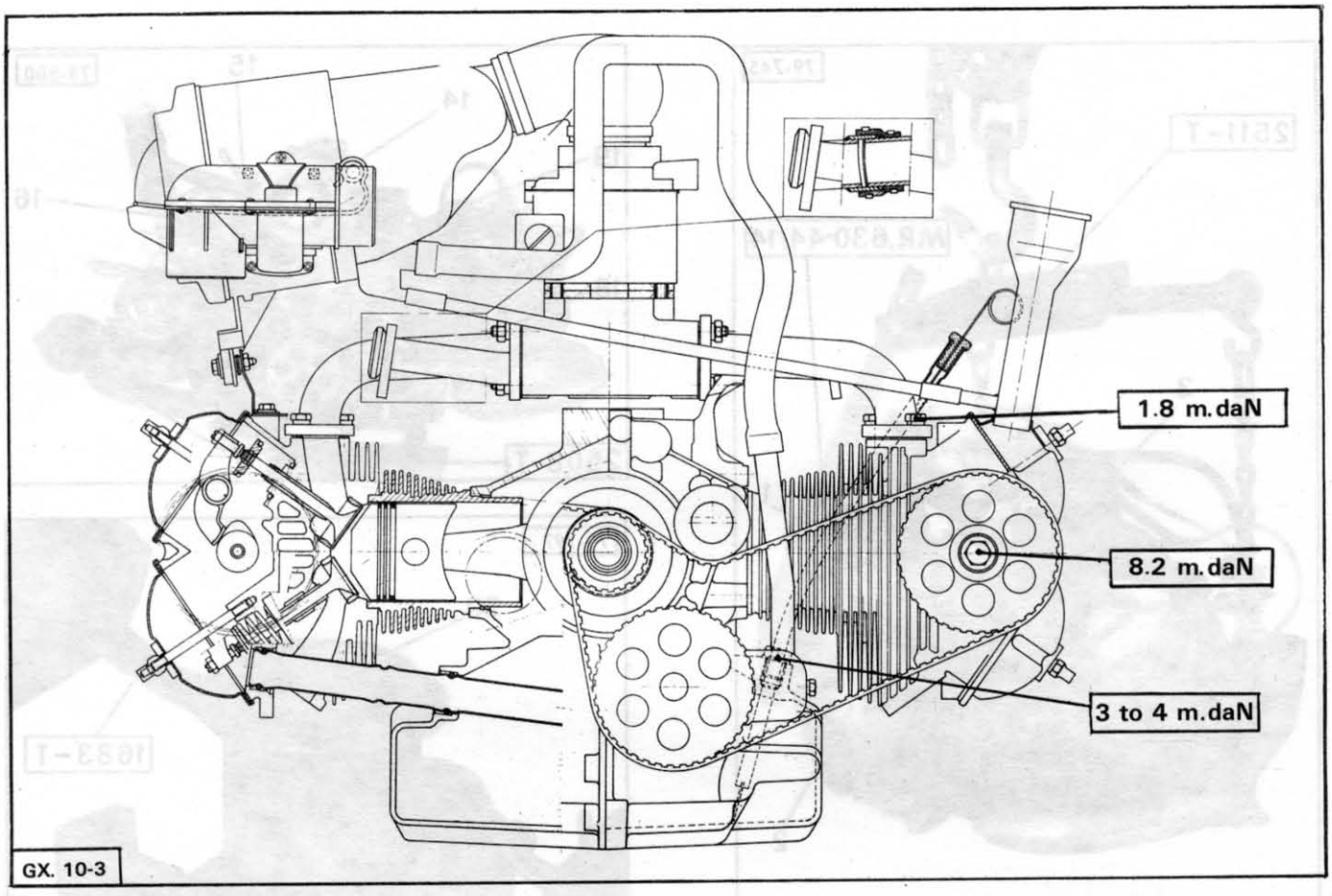
Mandatory values *(torque wrench) :*

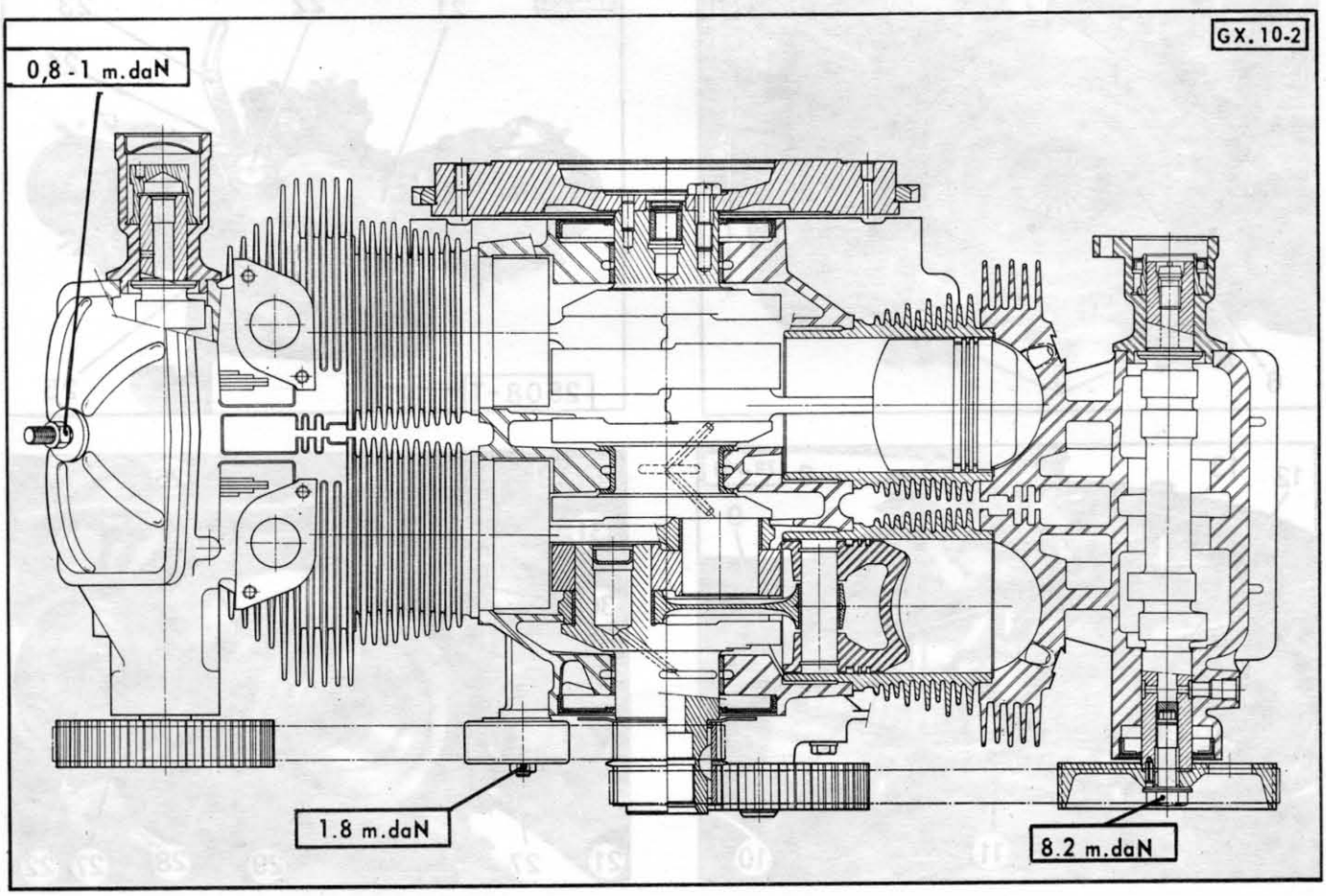
Tightening point	Torque (m.daN)
Crankshaft bearing nut :	4 to 4.5
Half-crankcase nut :	1.2 to 1.5
Cylinder head attachment screws { stage 1 :	0.8 to 1
Cylinder head attachment screws { stage 2 :	2 to 2.5
Lubrication pipe coupling screw :	1.8 to 2
Oil pressure switch :	2 to 2.5
Engine flywheel attachment screw *(grease threads and faces)*, with 3 spots of LOCTITE FORMETANCH between crankshaft and engine flywheel :	6.4 to 6.9
Clutch mechanism attachment screw :	1.8
Elastic mount attachment screw :	5 to 6
Starting dog lock-nut (grease face) :	22 to 24
Rocker arm shaft plug :	1.7 to 1.8

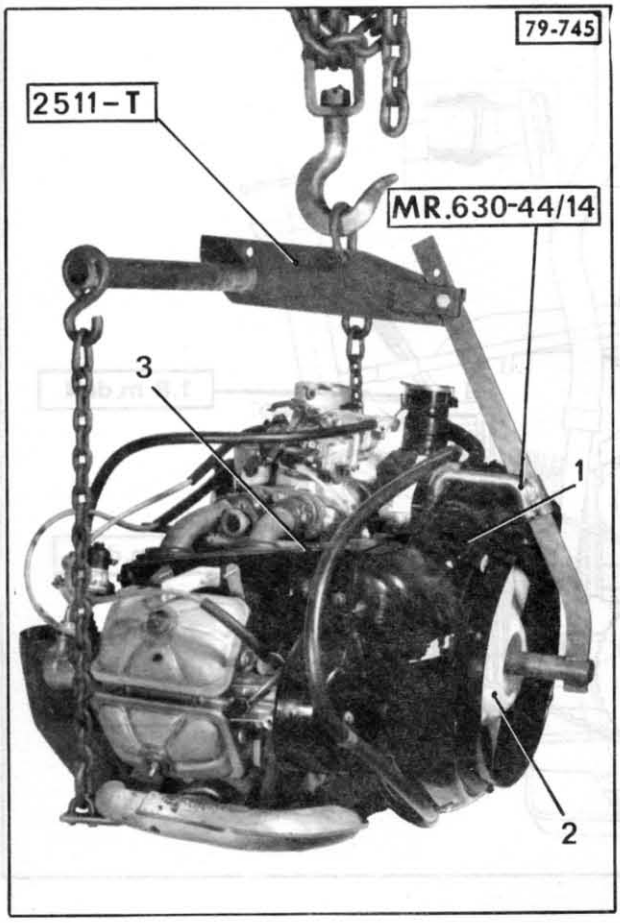
Recommended values :

Tightening point	Torque (m.daN)
Drain plug :	3.5 to 4.5
Thermal switch :	2.5 to 3
Oil pump bearing screw :	1.5 to 1.8
Inlet manifold attachment screw :	1.8
Cylinder head stud insertion (LOCTITE FRENETANCH) :	0.8 to 1
Oil filter screw :	1.4
Camshaft bearing nut :	1.5 to 1.8
Lubrication circuit plug (LOCTITE FRENETANCH) :	3.5 to 5
Camshaft bearing stud insertion (LOCTITE FRENETANCH) :	0.3 to 0.5
Exhaust flange nut :	1.5
Tensioner roller stud insertion (LOCTITE FRENETANCH) :	0.3 to 0.5
Filter cartridge attachment insert (LOCTITE FRENETANCH) :	1.3 to 2.2
Belt tensioner roller nut :	1.8
Oil cooler attachment screw :	1.8

Filter cartridge : bring the cartridge into contact with the crankcase, and do up half or three-quarters of a turn *(oil the seal)*.
Seal tightness between half-crankcases (LOCTITE FORMETANCH)


1.8 m.daN
8.2 m.daN
3 to 4 m.daN
GX. 10-3


GX. 10-2
0,8 - 1 m.daN
1.8 m.daN
8.2 m.daN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2511-T
MR.630-44/14
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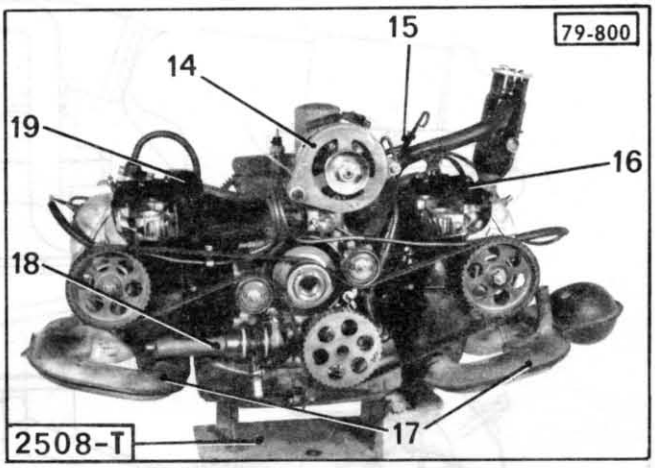
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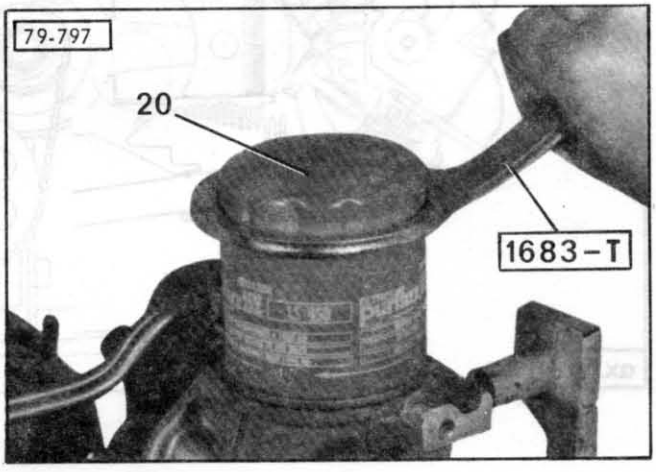
2508-T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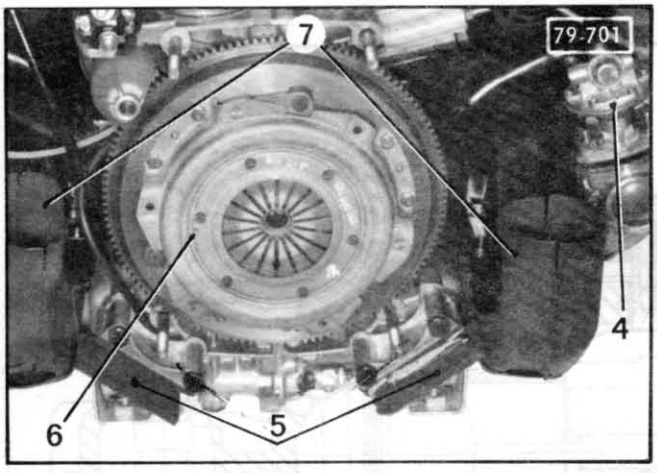
1683-T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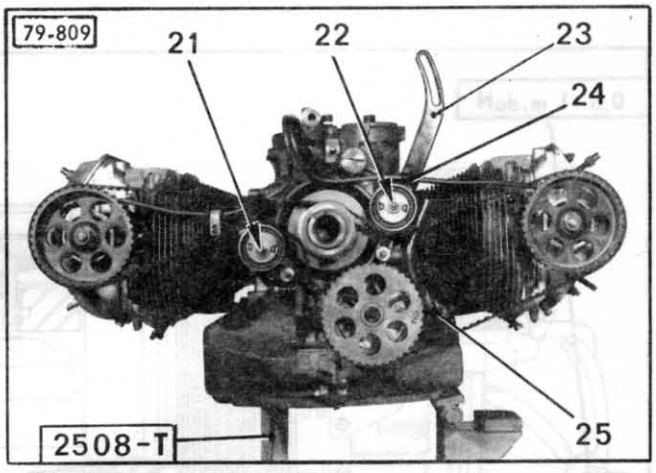
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2508-T
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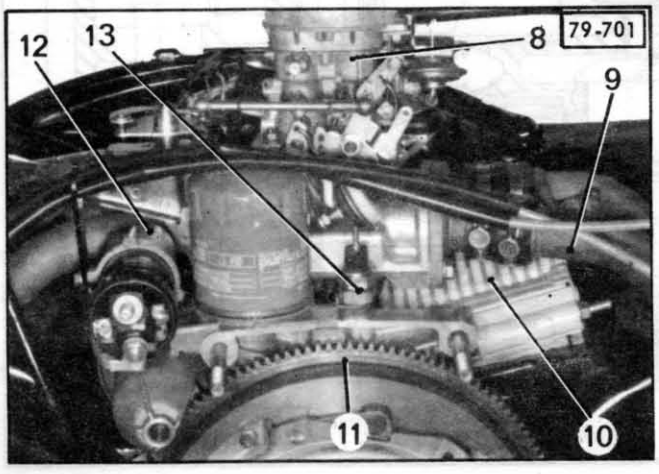
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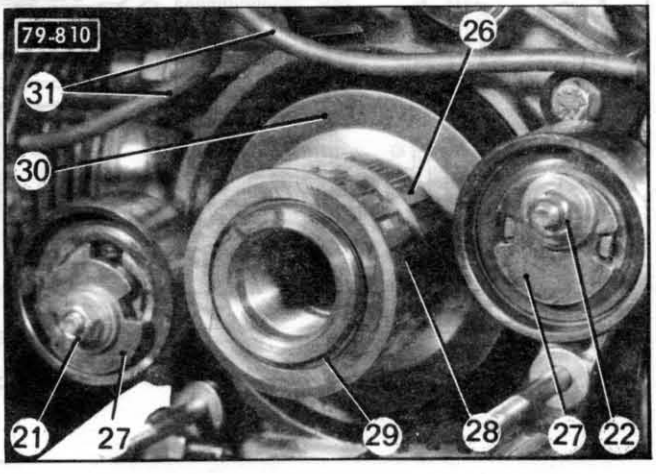
79-810
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RECONDITIONING AN ENGINE

I - DISMANTLING

1. Remove :
- clutch (6),
- elastic mounts (5).

2. Place the engine on support 2508-T.

3. Drain the engine oil

4. Remove :
- HP pipe,
- cooling duct covers (3),
- carburettor (8) and spacer, or carburettor/inlet and pipes (9),
- oil cooler (10),
- air cooler seal,
- starter motor (12),
- starting dog,
- fan (2),
- alternator belt,
- air manifold (1) and spacers,
- distributor, with protector and spark-plug leads,
- spark plugs,
- fuel pump (4) and spacer,
- alternator (4),
- oil pressure switch (13),
- HP pump (18),
- exhaust manifold (17),
- engine flywheel (11),
- cooling circuit pipes (16) and (19),
- heater ducts (7),
- oil dipstick guide tube (15),
- breather (25).

5. Extract oil cartridge (20), using tool 1683-T.

6. Remove the camshaft drive belts :
Slacken off nuts (21) and (22), compress tensioner rollers and disengage the belts.
Extract snap-ring (29) and disengage pinions (26) and (28) from the crankshaft.
Remove the key and protector plate (30).

7. Remove the tensioner rollers :
Undo nuts (21) and (22).
Remove the tensioner rollers *(keeping thrust plates (27))*.

8. Remove lubrication pipe (31) :
Undo the union screws on the left and right cylinder heads, and bracket (24).

9. Remove alternator tension device (23).

10. Remove the cam shaft pulleys :
Lock pulley (2) with tool MR. 630-11/26 .
Undo the nuts, and remove camshaft pulley (2).

11. Remove cylinder head covers (1).

12. Remove the cylinder heads :
Undo attachment nuts (4), (5) and (7) for each cylinder head.
Disengage :
- cylinder heads,
- oil return pipes (6),
- pipes (3) under cylinder.

13. Remove the cylinders :
Remove the 4 cylinders.

If the cylinders are to be re-used, index their respective positions.
Fit pieces of hose A on the cylinder head studs, to avoid scoring the pistons.

14. Remove the pistons :
- Remove the gudgeon pin stop rings located towards the outside of the engine at « a » and « b ».
- Extract the gudgeon pins unsing mandrel 1699-T
- Disengage the pistons **(place in their corresponding cylinders in the case of reassembly).**
- Remove pieces of hose **A.**

15. Extract the piston rings.

16. Remove the oil pump drive :
Undo five attachment screws (8).

Extract the pump drive, taking purchase on two diametrically opposed points on the pulley, to avoid damaging the pump bearings.

Extract O-ring seal (9).

17. Remove the HP pump control rod :
Disengage rod (10).

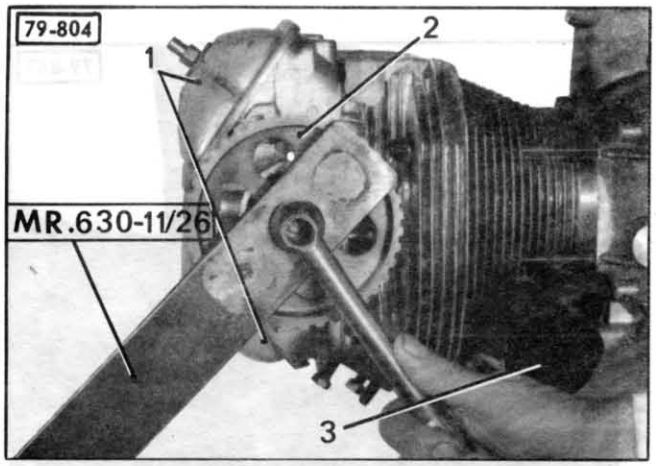
18. Remove the oil pump pinions :
Remove :
- face plate (11),
- pinions (12) and (13).

19. Position the engine with the left half-crankcase downwards.

20. Remove the right half-crankcase :
Undo :
- nuts (14),
- half-crankcases assembly nuts (➡).

Disengage right half-crankcase (15) and remove the half-bearings.

21. Remove the crankshaft :
Disengage the front and rear seal rings.
Remove :
- crankshaft/rod assembly (16),
- half-bearings (17), (18) and (19).


79-804
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MR.630-11/26
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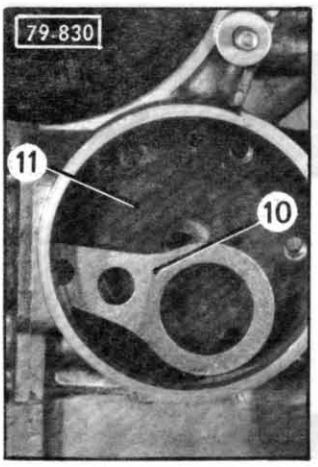
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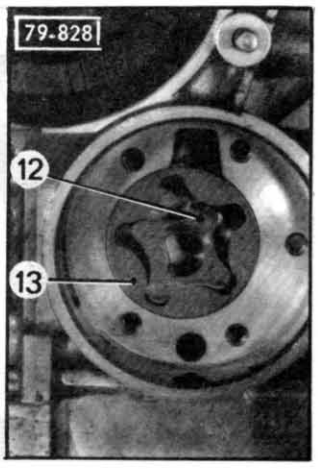
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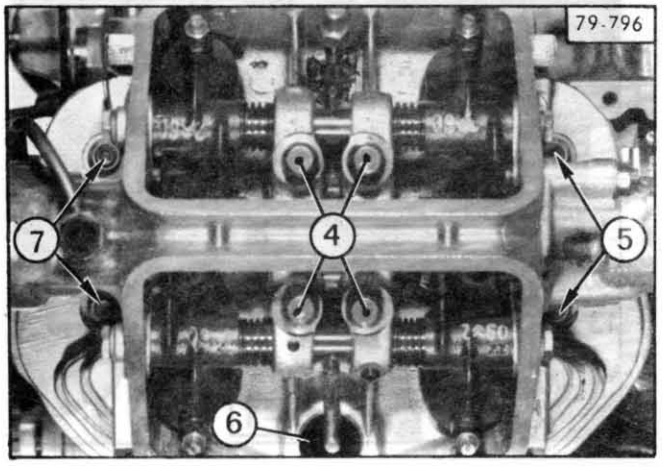
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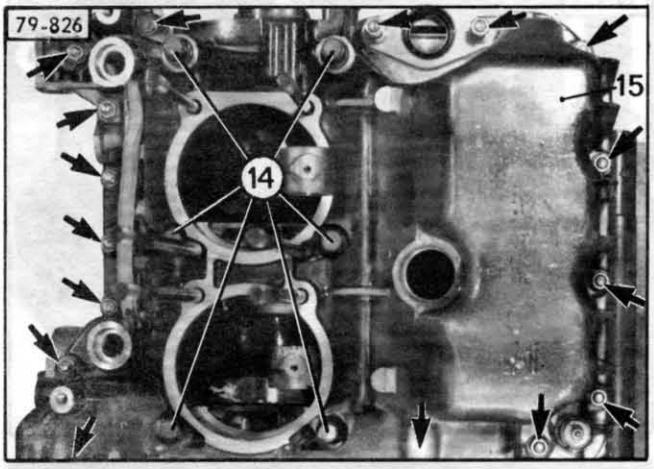
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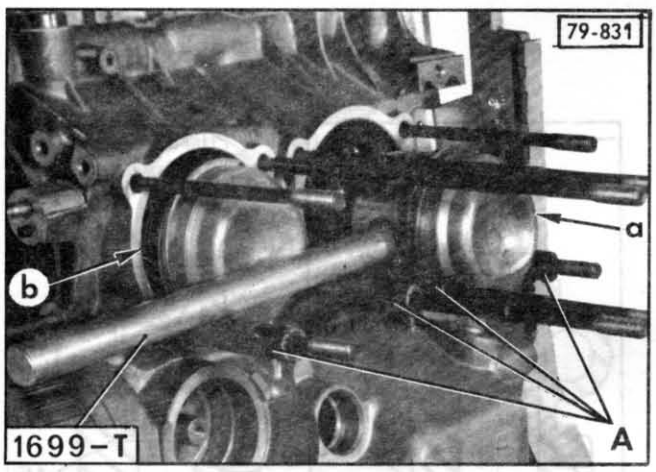
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1699-T
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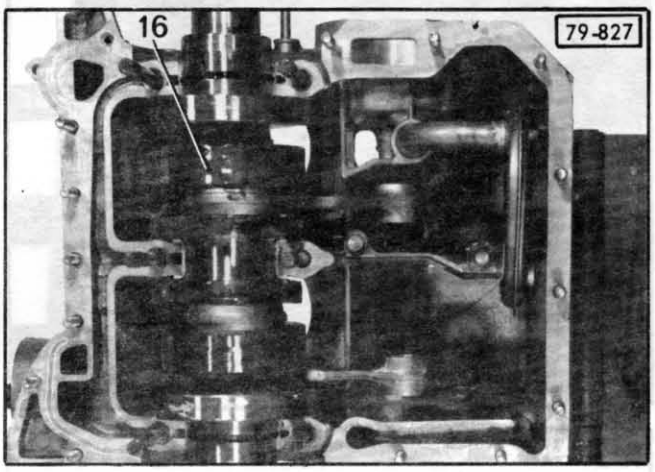
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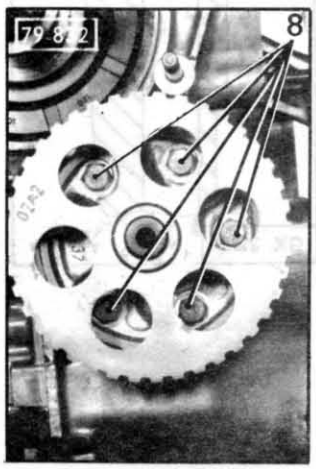
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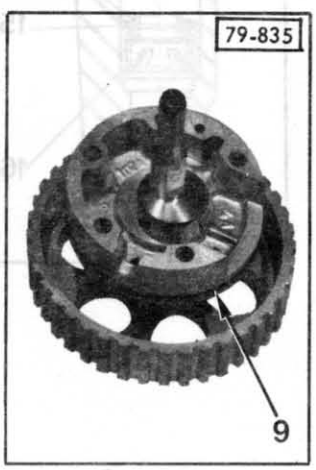
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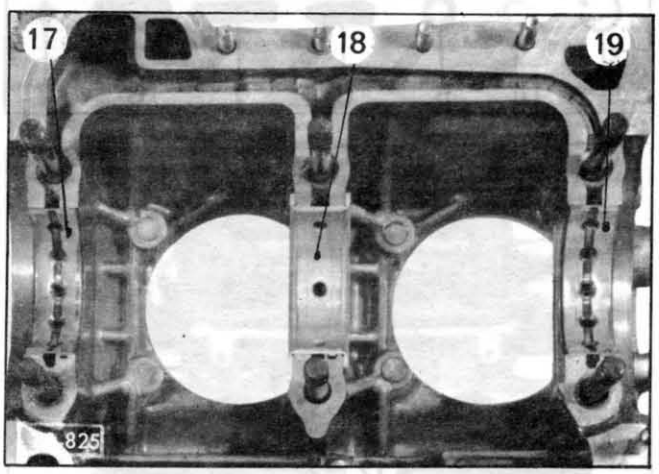
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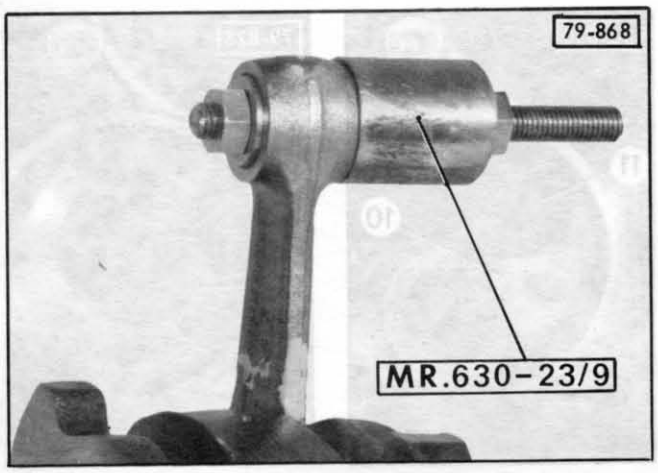
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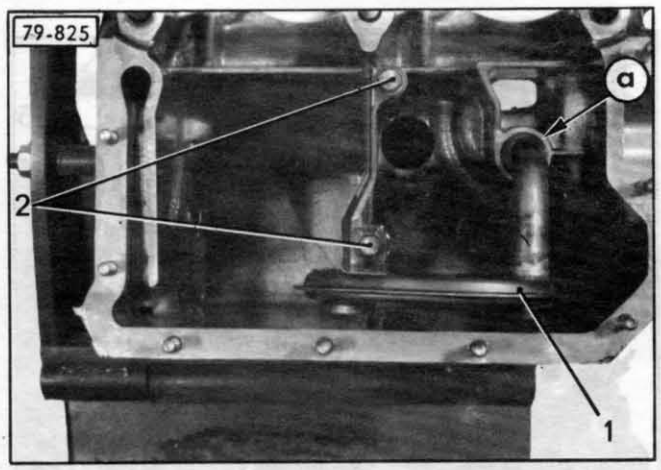
MR.630-23/9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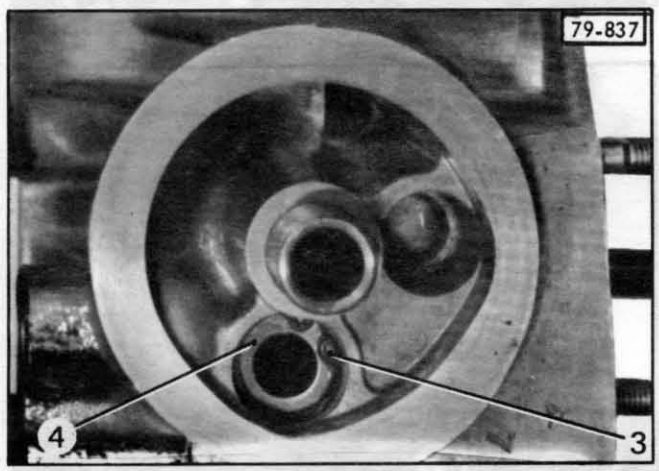
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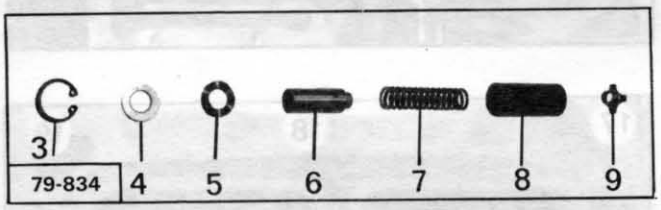
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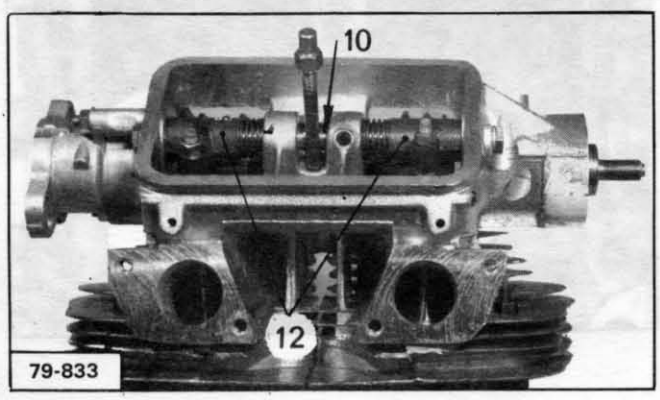
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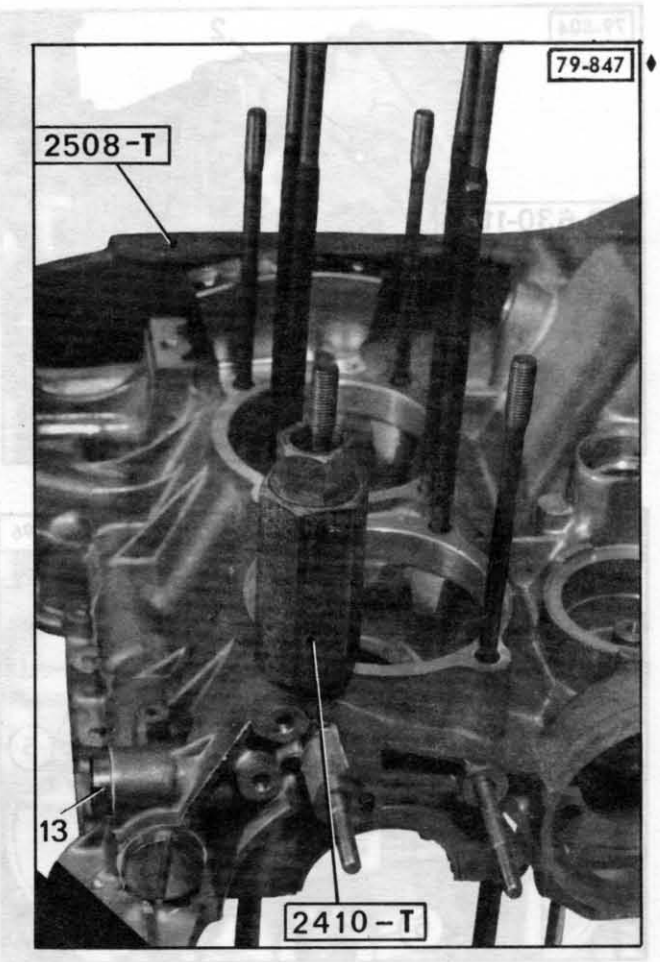
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2508-T
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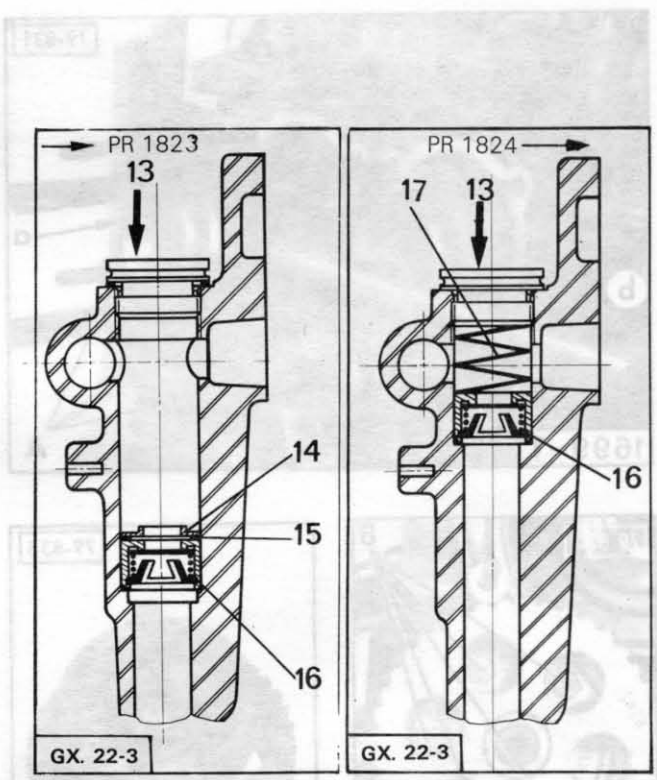
2410-T


PR 1823
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GX. 22-3
PR 1824
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GX. 22-3

22. Remove the small end shells, if necessary.

This delicate operation is not recommended, and can only be executed in a specialist workshop.
Use extractor tool MR. 630-23/9 .
See preparation on page 14.
Prepare small end of rods.

23. Remove the suction strainer :
Undo screw (2).
To facilitate removal, heat zone « a » of the crankcase surrounding the strainer pipe.
Disengage strainer (1).
Remove the pipe seal.

24. Remove the discharge valve :
Remove :
- circlip (3),
- washer (4),
- spring washer (5),
- piston (6),
- spring (7),
- sleeve (8),
- spring cup (9).

25. Extract the front and rear lubrication circuit plugs, and oil thermal switch.
If necessary :
→ *11/81 :* R.P. No. 1824
- plug (13),
- cup (14),
- washer (15) and valve (16).
- *11/81* → *:* R.P. No. 1824
- plug (13),
- spring (17) and valve (16).

NOTE : Fitting the new arrangement on a former crankcase is prohibited.

26. Remove the left half-crankcase from support 2508-T .

For replacement of the half-crankcases :
- **Extract the studs.**
- **Use tool 2410-T for the cylinder head studs. Position the tool at the base of the cylinder head.**

27. Strip down the cylinder heads (if necessary) :
Remove :
- rocker arm shafts (10),
- rocker arms (12),
- camshafts (11),
- valve springs,
- valves,
- seals.

28. Clean the parts :
→ *6/82 :* R.P. No. 2032

a) To ensure seal-tightness of the front and rear bearing blocks, the crankshaft incorporates a microturbine in each seal contact zone.

Do not use emery cloth on this zone, at the risk of causing an oil leak.

6/82 → *:* R.P. No. 2032

b) The seal-tightness of the front and rear bearing blocks is ensured by means of a microturbine on the lower lip of each seal.

Markings on seals for mandatory fittings :
Red inner lip, with the words « côté distribution » *(timing end)*.
Brown inner lip, with the words « côté volant » *(flywheel end)*.

NOTE :
- **Fitting a former seal (with no microturbine) on a new crankshaft (with no microturbine) is PROHIBITED.**
- **Fitting a new seal (with a microturbine) on a former crankshaft (with a microturbine) is permissible.**

c) For efficient cleaning of the oil cooler, dip it in a bath of cellulose thinner, for about one hour. Drain and dry off with a compressed air jet.

When replacing a con-rod, also replace the oil cooler and oil suction strainer.

II - PREPARATION

1. Prepare the cylinder heads :

a) If necessary, grind the valves and valve seats *(see Op. GX. 112-3)*

b) Lap the valves.

c) Fit the valves and valve springs.

d) Fit the camshafts.

e) Fit the seals.

f) Fit the rocker arms and rocker arm shafts.

2. Prepare the small ends (If necessary) :

Fit the small end shells.

NOTE :

This operation can only be carried out in a specialist workshop.

Shells sold by the Replacement Parts Department have a bore ground to a size approx. 0.05 mm less than the final dimension required.

Blank off holes « a » in the shell with grease or tallow.

Fit the prepared shell (using extractor tool MR. 630-23/9) so that the axis of the shell lubrication holes is perpendicular to the con-rod axis.

Ream the shell.

This delicate operation must be carried out with the greatest care.

The bore diameter to be obtained is :

$$22.005 \begin{matrix} +0.011 \\ -0.006 \end{matrix} \text{ mm}$$

In the absence of a plug gauge, use the new shaft to check bore diameter.

Blow compressed air through hole « b », to drive out grease and swarf.

Clean the shell bore.

3. Prepare the pistons :

One or two cylinder/piston sets cannot be replaced separately. The difference in weight between two pistons must not exceed a few grams, and the Replacement Parts Department only sells sets of four cylinder/piston pairs, which must not then be used separately.

4. Fit the piston rings :

Compression ring (1), scraper ring (2) and scraper-collector (3) are marked « TOP » (or « HAUT » or « H »), engraved on one of the faces close to the cut (Fig. **A**).

On assembly, ensure that this mark is oriented towards the top of the piston.

The groove in the scraper ring is equipped with splined pin (5). The grooves in the seal and compression rings have half-moons (4).

Badly fitted piston rings cause high consumption.

U-FLEX ring (3) Fig. B :
The U-FLEX ring, when free, has a bigger diameter than that of the piston, requiring the use of a piston ring collar.

If the same pistons are re-used, only replacing the piston rings, carefully clean the ring grooves, using a piece of worn piston ring (cut and ground).

If excessive play is found, the piston cannot be re-used.

5. Prepare the cylinders :

There are two classes of cylinder (different height), identified by paint spots of different colours (red or green). The two cylinders on the SAME SIDE of the engine must have the SAME COLOUR CODE (identical class).

Arrange the cylinders so that vanes **« e »** are positioned face to face after assembly on the engine.

6. Fit the pistons in the cylinders :

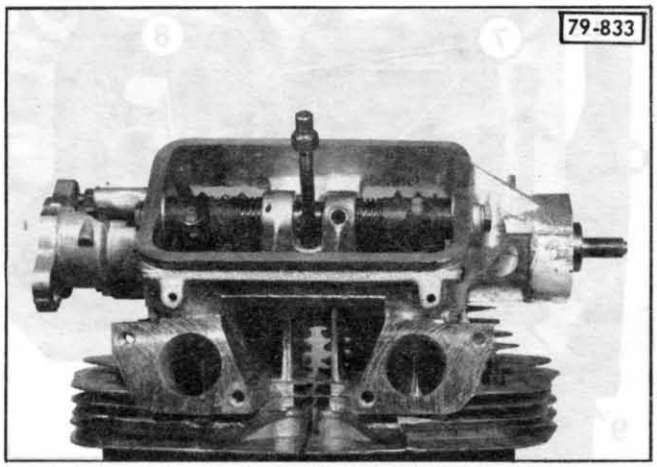
a) Assembly direction (1130 cc) :

Correct piston position is essential.

After fitting, the figure and letter « D » **(right)** or « G » **(left)** must be legible from the top. The arrow must point towards the **timing gear side** and the splined pin must point **upwards.**

b) 1300 cc :

The gudgeon pin is no longer offset in the piston. The stop pin at « c » for piston ring No. 2 must always point upwards. Compression ratio value 8.7 at « d » must be legible from the top.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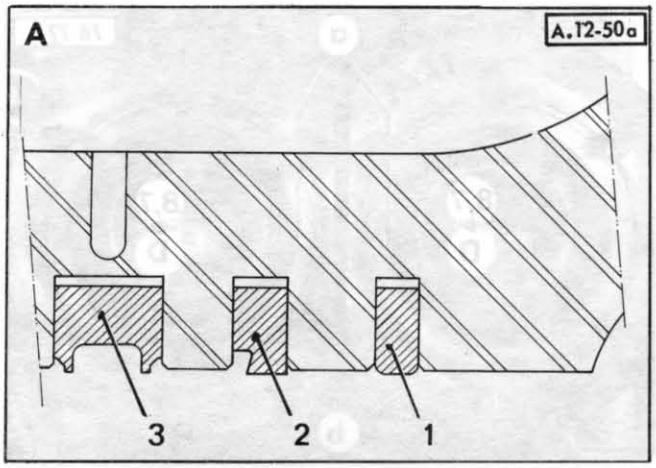
A
A.12-50a
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2
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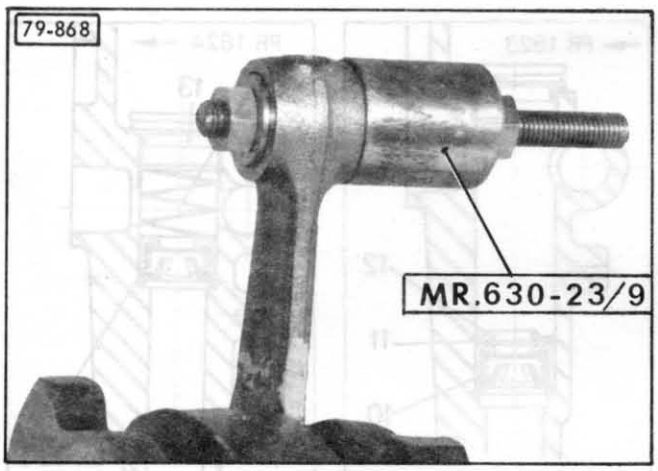
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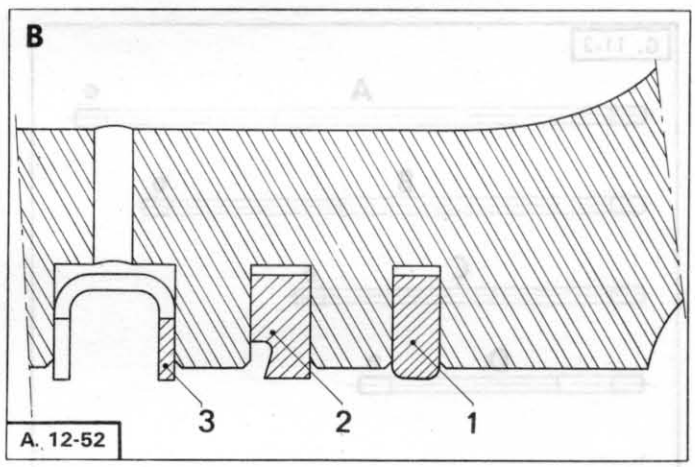
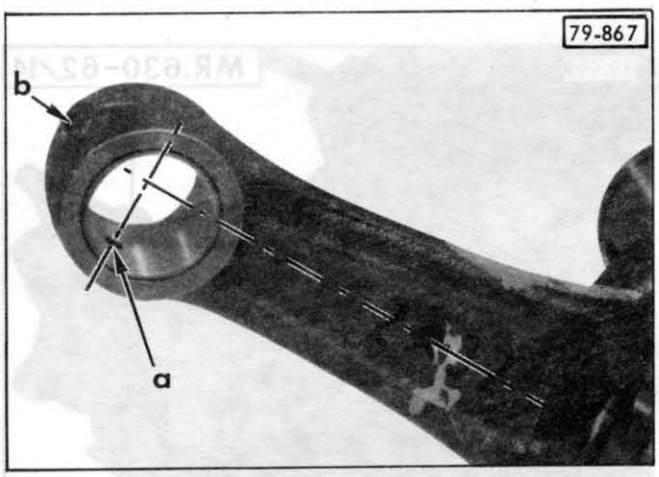
MR.630-23/9


B
3
2
1
A. 12-52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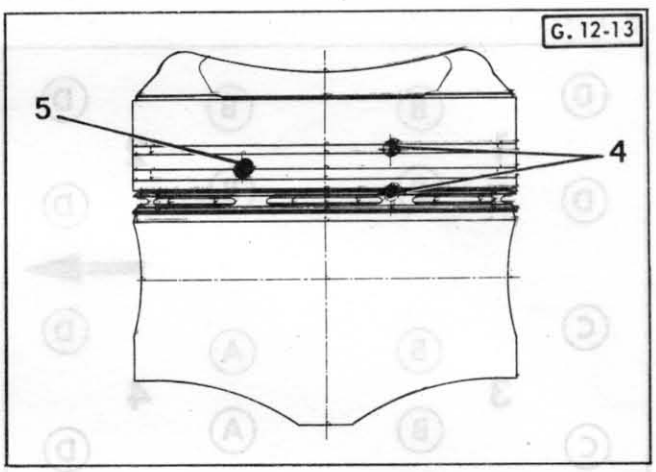
b
a


G. 12-13
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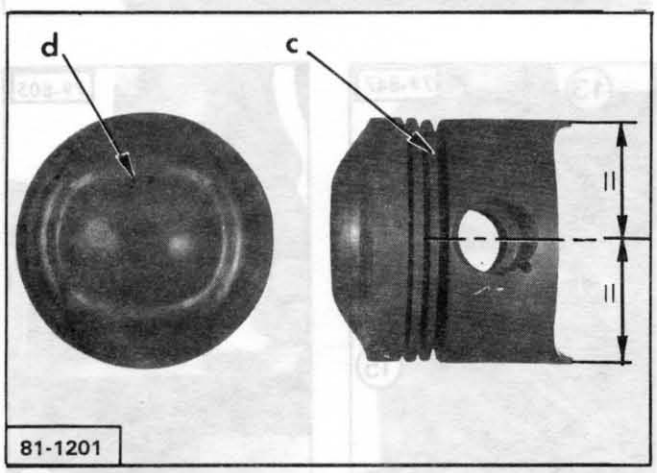
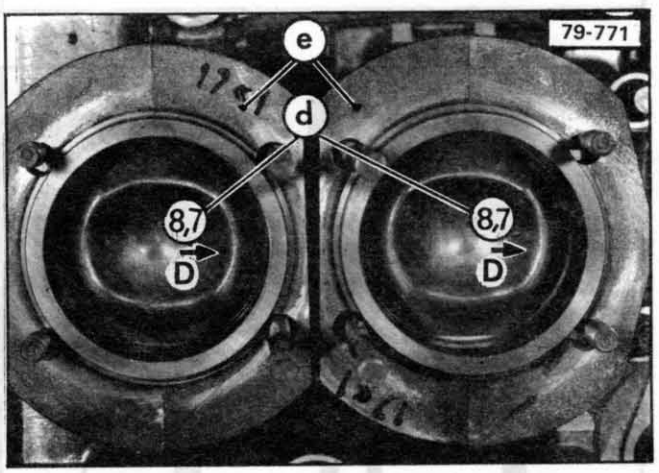

d
c
II
II
81-1201


79-771
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8,7
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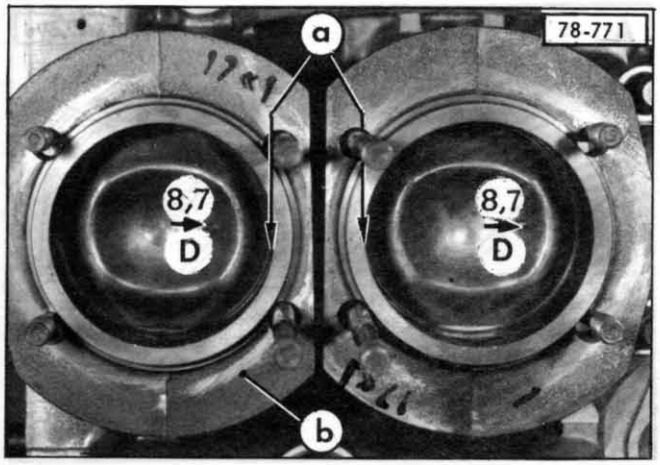
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a
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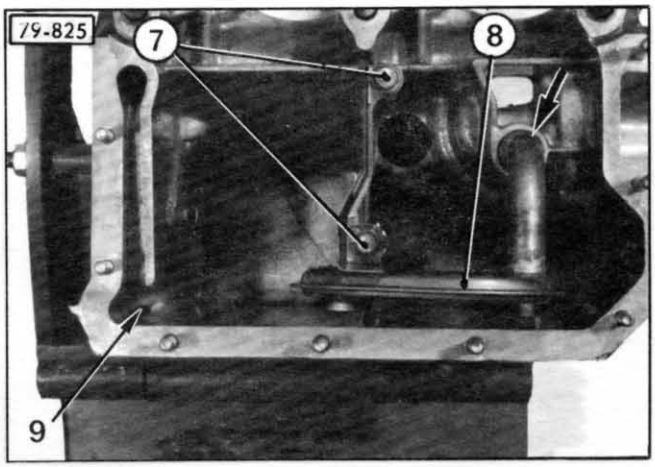
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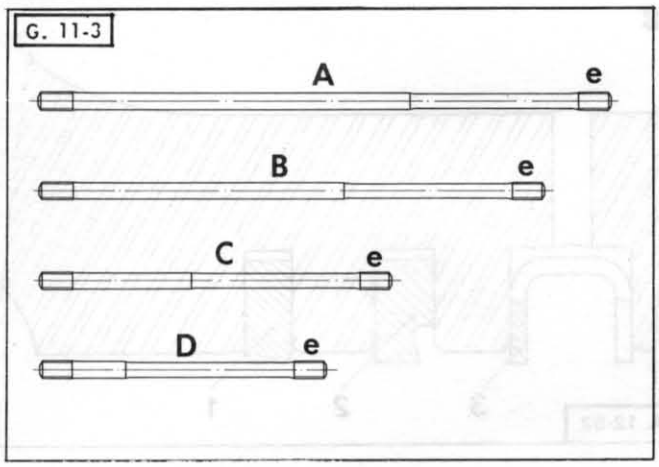
G. 11-3
A
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B
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C
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D
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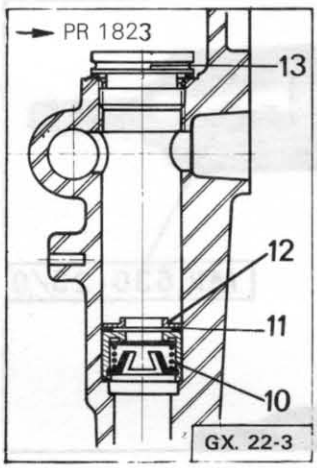
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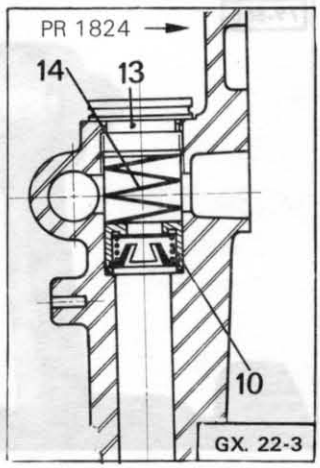
GX. 22-3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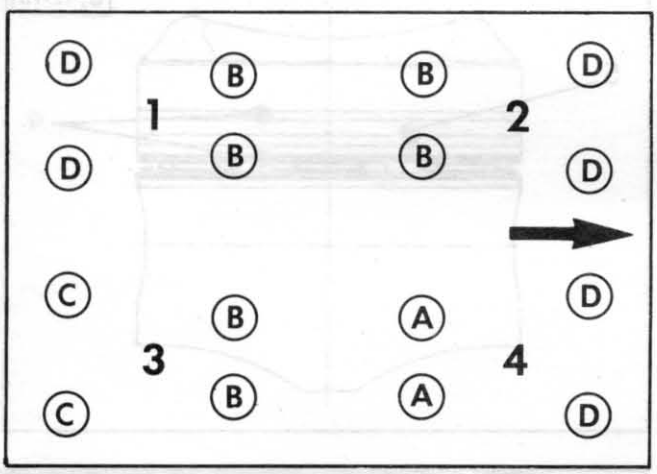
G. 11-3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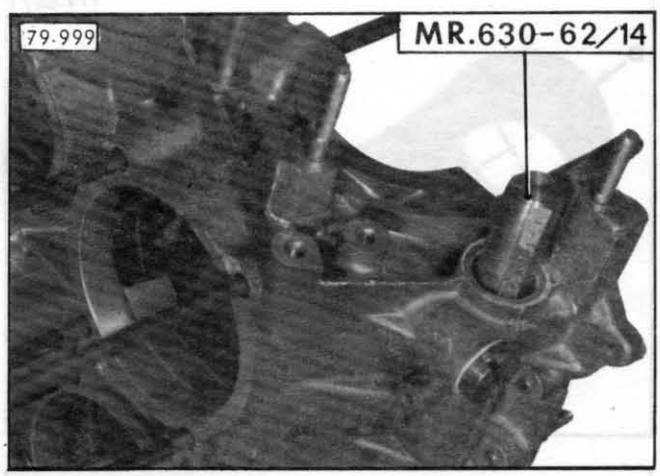
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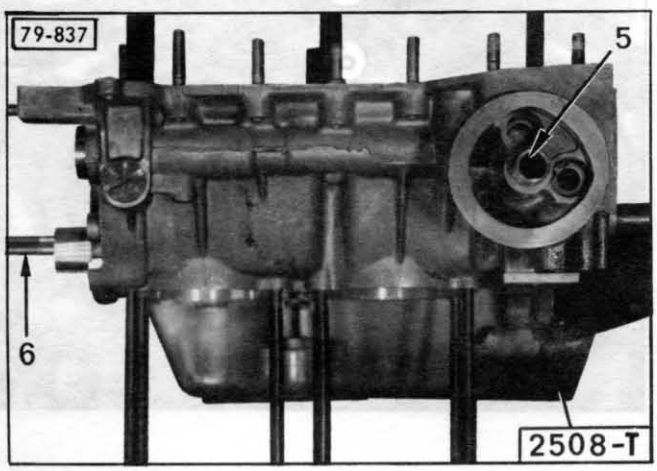
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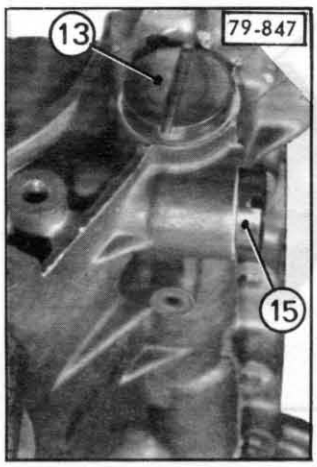
2508-T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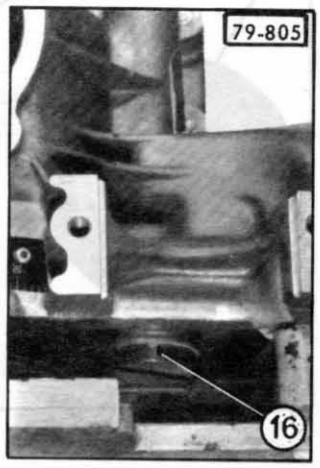

79-805
16

b) Before fitting the pistons :
Fit the gudgeon pin stop ring, which should be located at « a » on vane side « b ».
Position the ring gaps at 120° to each other.

c) Fit the pistons in the corresponding cylinders (indexed on dismantling).
Use a piston ring collar.
Engage each piston in the lower part of the cylinder.

d) Oil the gudgeon pin, and engage in the boss, without the stop ring (providing for passage of the small end).

7. Prepare the oil pump :
Check that the contact faces of the pump body show no traces of impact damage or scoring (engine end and cover end).

8. Replace the starter ring (if necessary) :
Drive out the starter ring using a riveting hammer.
Clean the contact surface of the crown wheel with the flywheel.
Heat the starter ring with a blow-torch, turning constantly to ensure even expansion (heat to approx. 200 to 250° C, until the metal is pale yellow in colour).
Position the new crown wheel **with the unmachined face towards the flywheel shoulder.**
Check the starter-ring run-out (max. 0.3 mm).

9. Prepare the distributor :
Check the condition of the points.
Replace if necessary.

10. Prepare the two crankcase halves :
a) Check the condition of the following :
- threadings,
- sealing surfaces (absence of impact damage and dirt).

b) For replacement of the two crankcase halves, fit :
- engine/gearbox coupling studs,
- cylinder head attachment studs, following the **arrangement indicated on the opposite page**

End « e » (shorter threaded portion) is inserted in the crankcase.

End « e » of each stud inserted in the right crankcase must be coated with LOCTITE FORMETANCH

Stud tightening torque : 0.8 to 1 m.daN

c) *The following parts must be fitted with LOCTITE FRENETANCH.*
- tensioner roller attachment stud (6),
  Tightening torque : 0.3 to 0.5 m.daN
- filter cartridge attachment insert (5),
  Tightening torque : 1.3 to 2.2 m.daN

d) Fit the drain plug *(with new seal)*
Tightening torque : 3.5 to 4.5 m.daN

III - FITTING

1. Place the left half-housing on support 2508-T.

2. Fit the oil suction strainer :
Fit the seal on the suction pipe of strainer (8).
Coat the end of this pipe with LOCTITE FRENETANCH and engage in its recess (➔) in the crankcase.
Tightening strainer attachment screws (7) to 1.4 m.daN

3. Fit the cooler by-pass valve :
Fit :
a) ⟶ *11/81 :*
- valve (10),
- washer (11),

Using tool MR. 630-62/14 , insert cup (12), striking moderately hard to fix the cup in the crankcase.

b) *11/81* ⟶ *:*
- valve (10),
- spring (14).

Fitting that new arrangement on a former crankcase is prohibited.

Coat the threads of valve plug (13) with LOCTITE FRENETANCH and insert (copper seal).
Tighten to 3.5 to 5 m.daN.

4. Fit the lubrication circuit plugs (14) and (15) :
Coat the plugs threads with LOCTITE FRENETANCH and insert (copper seal).
Tighten from 3.5 to 5 m.daN.

5. Fit the crankshaft :

a) Position shaft line half-bearings (1) in the left and right half-housings.
Check that the housing bores are clean, and that the half-bearing pins are correctly engaged in notches « a ».
Oil the half-bearings.

b) Fit the crankshaft :
Using a set of feeler gauges, check the lateral play of the crankshaft on the central bearing.
The value measured should be :
0.09 to 0.20 mm
(Play not adjustable)

6. Fit the right crankcase half :

Coat the sealing faces of the two crankcase halves with LOCTITE FORMETANCH.
Position the right crankcase half on the left crankcase half.
Fit bearing block stud attachment nuts (2) *(copper seal).*
Fit the crankcase-halves attachments (➡) *(flat washers).*

Tighten nuts (2) from 4 to 4.5 m.daN
Tighten nuts (➡) to 1.2 to 1.5 m.daN

7. Fit the front and rear bearing seals :

Fit new seals following any disassembly operation. Never fit the seals before assembling the two crankcase halves, at the risk of pinching the seals and causing an oil leak. Only fit seals supplied by the Replacement Parts Department.

NOTE : For the appropriate seal, refer to page 13, paragraph 28.

a) Oil the lip of rear seal (3), and insert using tool 1696-T.

b) Oil the lip of front seal (4) and insert using tool 1694-T and the starting dog.

8. If necessary replace the drive shaft alignment bush in the crankshaft :

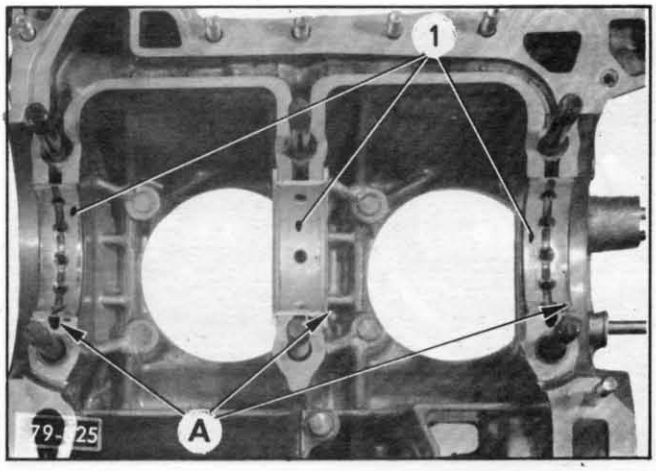
a) Extract the bush using tool 1671-T (fitted with 12 mm expandable head).

b) Fit the bush :
Soak the bush for about one hour in engine oil at ambient temperature.
Allow to drain.
Fit alignment bush (5). *The bush should be positioned 5 mm back from the crankshaft shoulder*
Use mandrel 3052-T bis to obtain this condition (after fitting the bush, disengage the mandrel by means of central screw « b »).

c) Fit seal (6).
Position the seal so that the face carrying the manufacturer's name and reference faces the outside of the engine.

9. Fit the discharge valve :

Fit :
- cup (13) *(with ears « c » in bottom of recess),*
- sleeve (12),
- spring (11),
- piston (10) (first oiling guide « d » at spring end),
- spring washer (9),
- washer (8),
- circlip (7).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A
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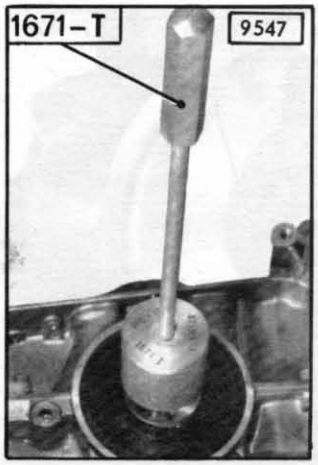
1671-T
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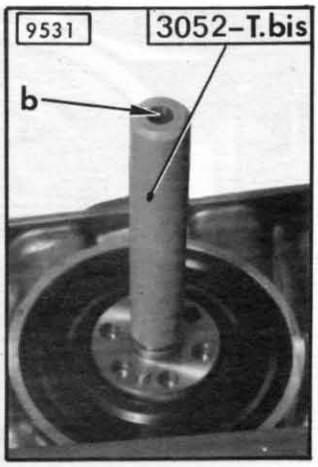
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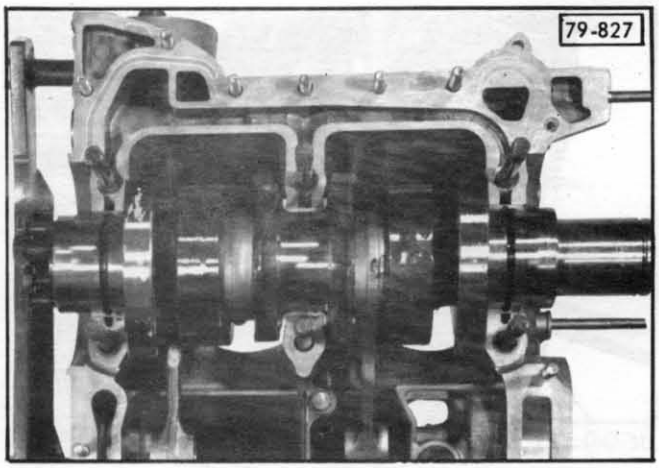
3052-T.bis
b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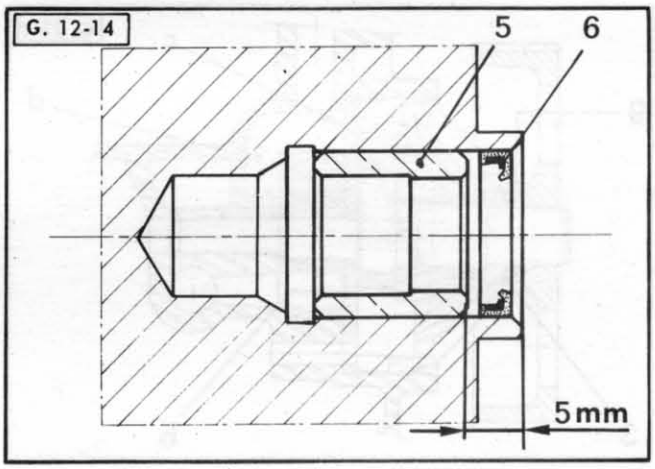
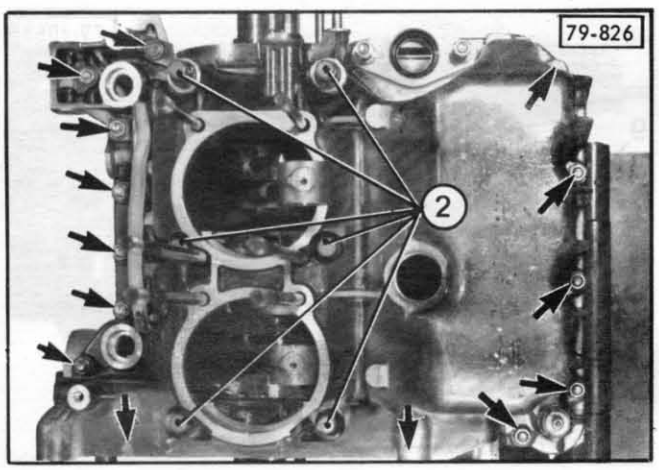

G. 12-14
5
6
5mm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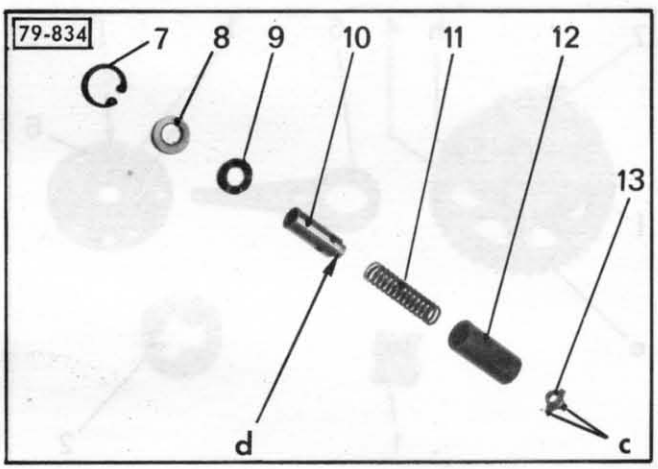
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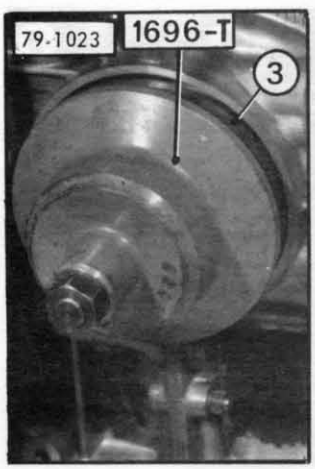
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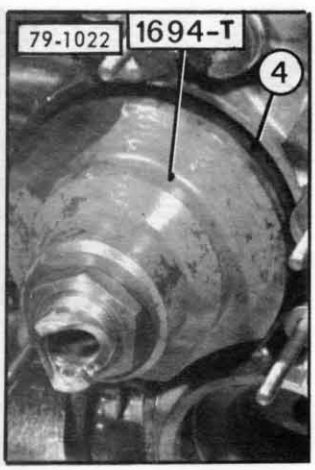
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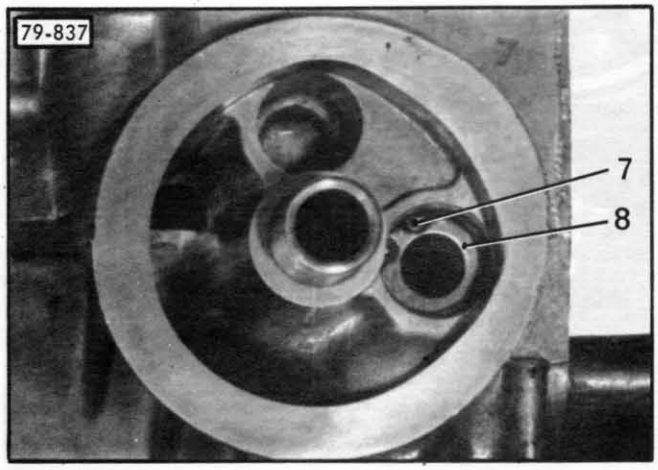
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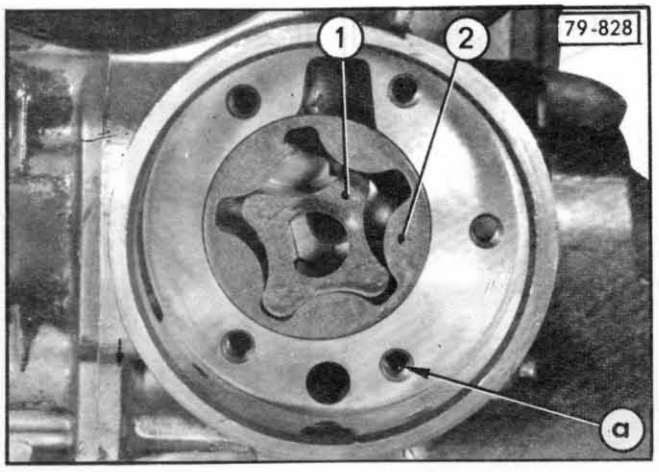
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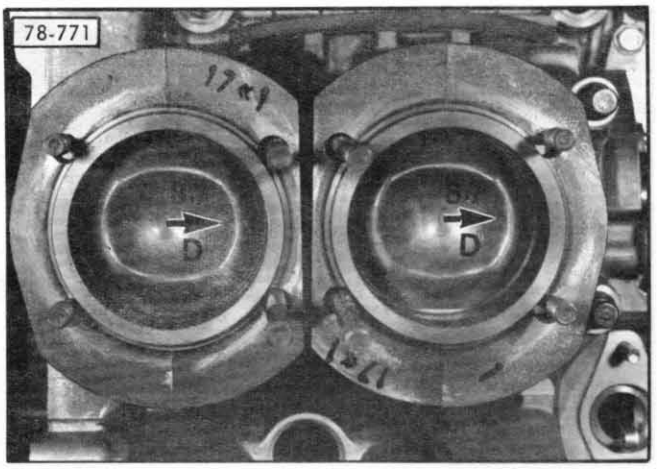
2
a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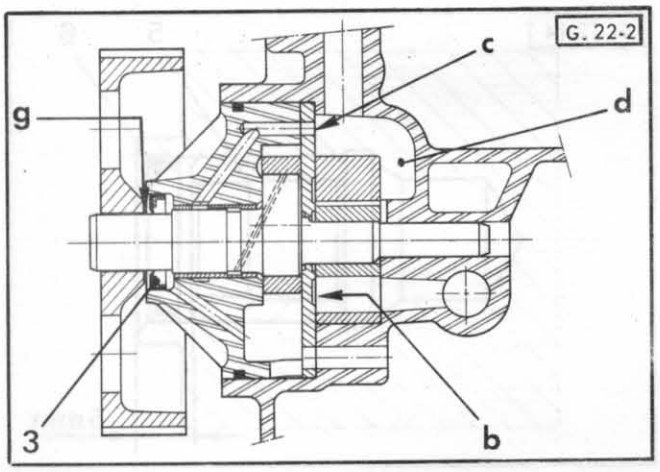
G. 22-2
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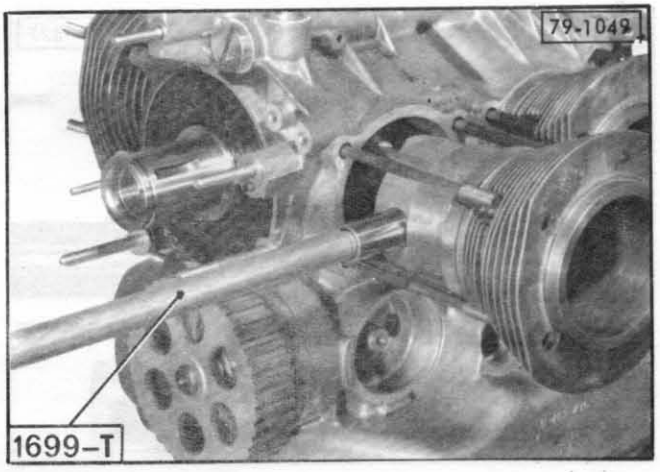
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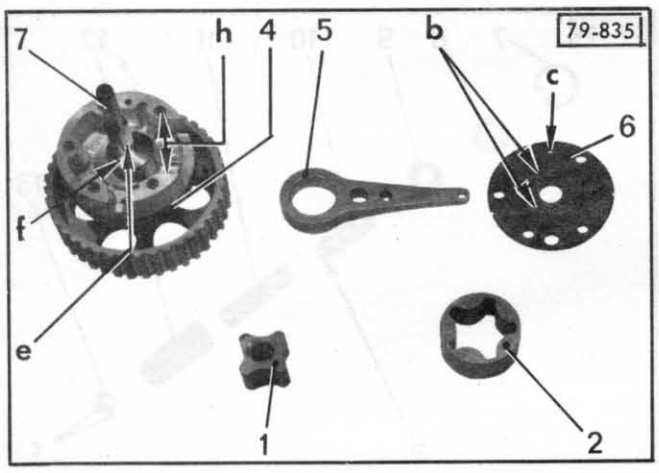
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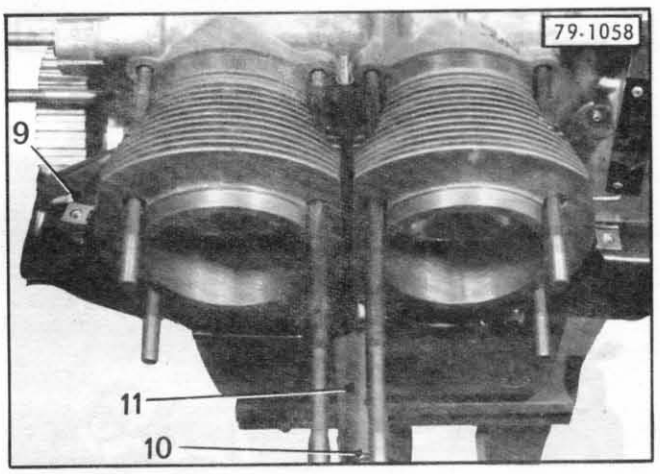
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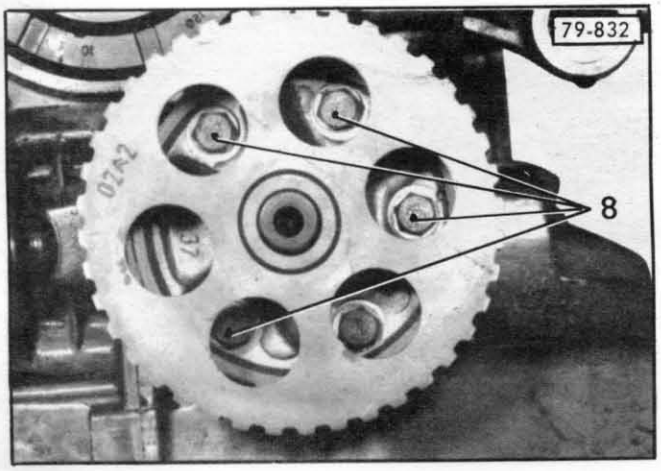
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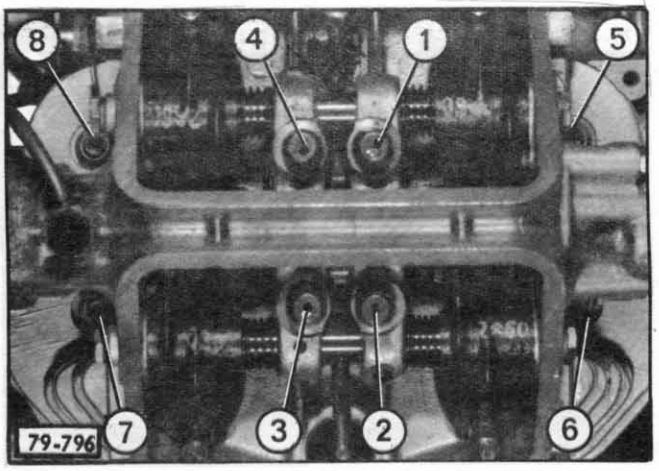
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10. Oil and fit oil pump pinions (1) and (2) :

Fit a guide stud temporarily at « a », to facilitate positioning of the plate and pump drive.

11. Fit face plate (6) :

Position the plate so that recesses « b » are towards the interior of the housing, and small hole « c » is opposite cavity « d » (delivery).

12. Fit HP pump control rod (5).

13. Fit the pump drive :

a) Fit new O-ring seal (4).
Oil shaft (7) and cam « f ».

b) Place jig 4001-T between the pulley and bearing at « g », so that seal (3) is no driven in.

c) Position the pump drive on the guide stud (orient control rod recess « h » towards the HP pump), and engage the shaft in the central pinion.
Rotate the shaft to engage drive flat « e » in the oil pump pinion.

d) Guide rod (5) so that it engages on drive mechanism cam « f ».
Fit screws (8) (spring washers).

Tighten opposite screws alternately, tightening by a fraction of a turn each time, until the pump drive is fully home.

Tighten screws (8) to 1.5 to 1.8 m.daN
Extract jig 4001-T.
Check that the pump drive rotates freely.

14. Fit the cylinders :

a) Oil the small ends.
Position the cylinder/piston assemblies on the con-rods.

CAUTION : Check correct assembly position (see page 14, paragraphs 5 and 6)
Complete fitting of the gudgeon pin with mandrel 1699-T

b) Fit the gudgeon pin stop rings.
Check that the rings are properly engaged in their grooves.

c) Oil the piston skirts, and the inside of the cylinders.

d) Engage the cylinders fully.

e) Fit ducts (9) under the cylinders.

15. Fit the cylinder heads :

a) Coat O-ring seals (10) on oil return pipes (11) with engine oil. Engage the longer ends in their recesses in the crankcase.

b) Rotate the crankshaft, to bring the key slot to the bottom, on engine dead centre.
Avoid rotating the crankshaft again before the belts are fitted.

Position the cylinder head, guiding oil return pipes (11).
Do up the nuts progressively (heavy gauge flat washers) and tighten temporarily **from 0.8 to 1 m.daN** starting at the centre.

c) Tighten down the cylinder heads.
Follow the tightening order indicated in the figure opposite.
Tightening torque : 2 to 2.5 m.daN
Use wrench 4006-T.D from kit 4006-T ter

16. Fit the camshaft pulleys :

The two camshaft pulleys are identical.

Engage a pulley on the end of each camshaft (setting pin)
Anchor the pulley with tool [MR. 630-11/26] and **tighten the nut** (flat washer) to **8.2 m.daN** (torque wrench.

17. Fit the alternator tension device.

18. Fit the lubrication system pipes :
Fit union screws (1) on the cylinder head lubrication pipes (fit new seals).
Tighten the union screws to 1.8 m.daN to 2 m.daN.
Fit the oil pressure switch *(new seal)*, and **tighten from 2 to 2.5 m.daN.**
Fix bracket (13).

Check that there is at least 5 mm play between the pipes and camshaft pulleys.

19. Fit the tensioner rollers :

The two tensioner rollers are identical.

a) If necessary, engage the guide roll pins in their holes.

b) Position tensioner rollers (2) and (5) with thrust plates (3) and (6) facing outwards.
Fit nuts (4) and (7) (contact washers), but do not tighten fully.

20. Fit the timing gear pinions on the crankshaft :
Fit :
- protective plate (12),
- crankshaft key,
- pinions (8) and (9),
- snap-ring (10).

Arrange pinions (8) and (9) so that collars (7) face the front of the engine.

21. Fit the timing gear belts :

Before fitting, check that the belts, pulleys, pinions and tensioner rollers show no traces of grease or oil. All belts fitted on the same engine must be from the same manufacturer.

a) Check that mark « a » (on cover (11) of pinions (8) and (9) is pointing upwards on engine dead centre.
Position marks « b », « c » and « d » on the camshaft pulleys and oil pump, as shown in the figure opposite.

b) Compress the tensioner rollers (see arrows).
Tighten nuts (4) and (7).

c) Fit the right belt, making its marks coincide with marks « a » and « d » so that (tensioner roller side) :

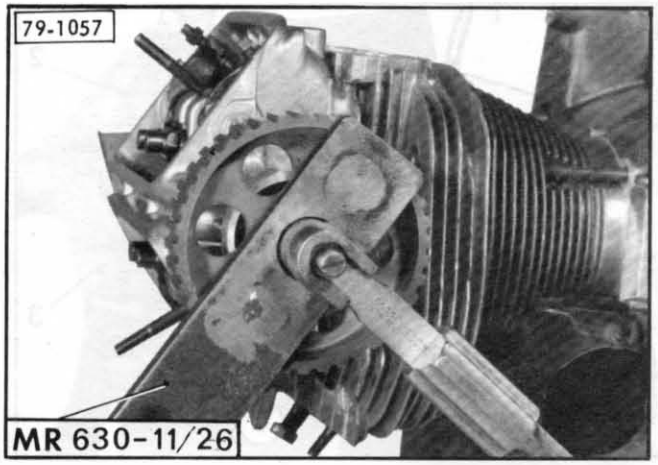
ad = 43 notches

d) Fit the left belt, making :
- the white marks coincide with « a »» and « b »,
- the yellow mark coincide with « c ».
In this position :

ab = 33 notches
ac = 25 notches

e) Release the tensioner rollers, and tighten nuts (4) and (7).

22. Tension the belts :
Rotate the crankshaft through 90° in the normal direction.
Slacken off nut (7) on the left tensioner roller, releasing the roller and **tightening again to 1.8 m.daN.**
Rotate the crankshaft one full turn in normal running direction, and repeat the same operation with nut (4) on the right tensioner roller.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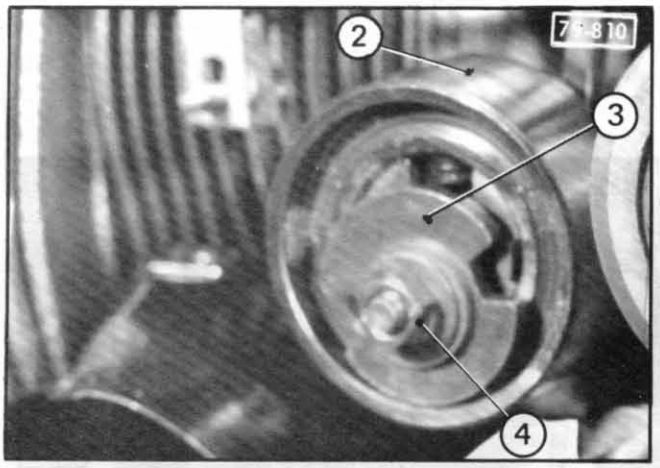
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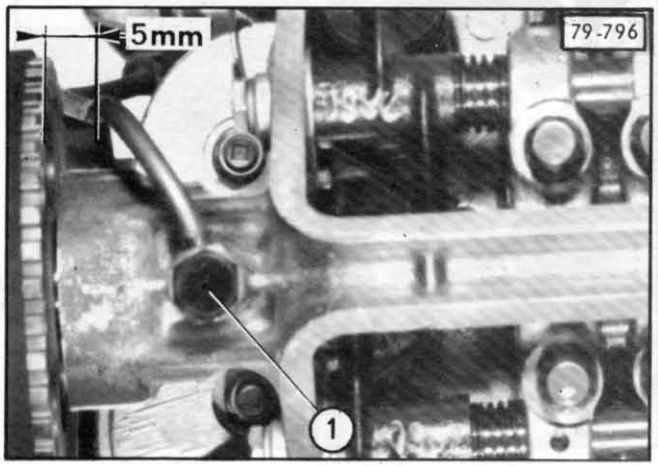
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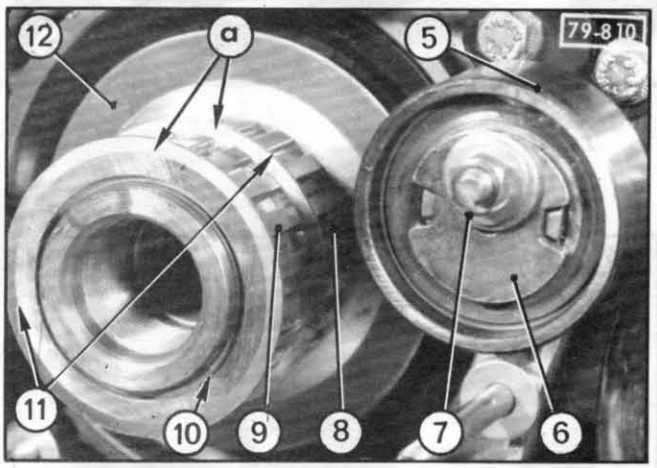
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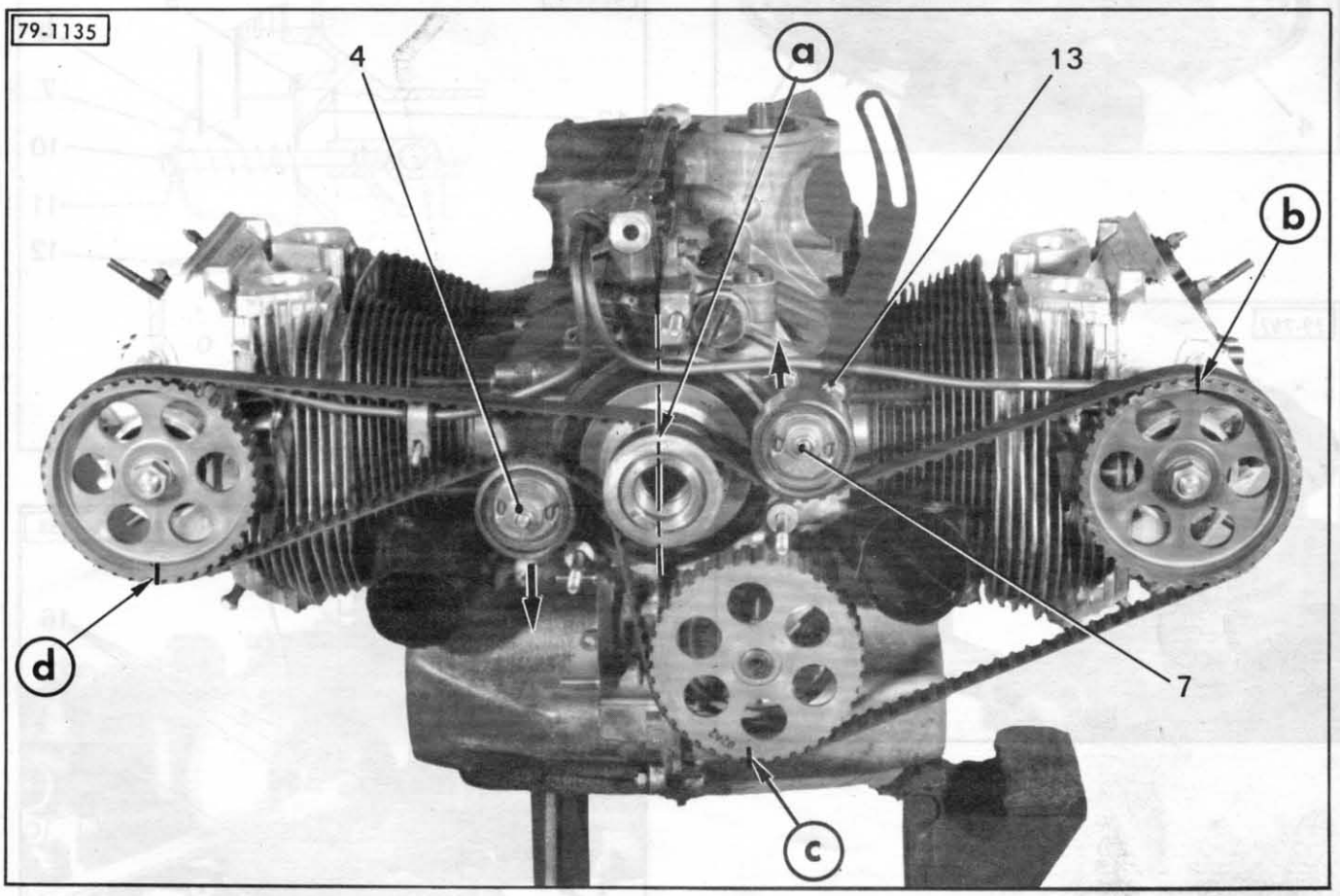
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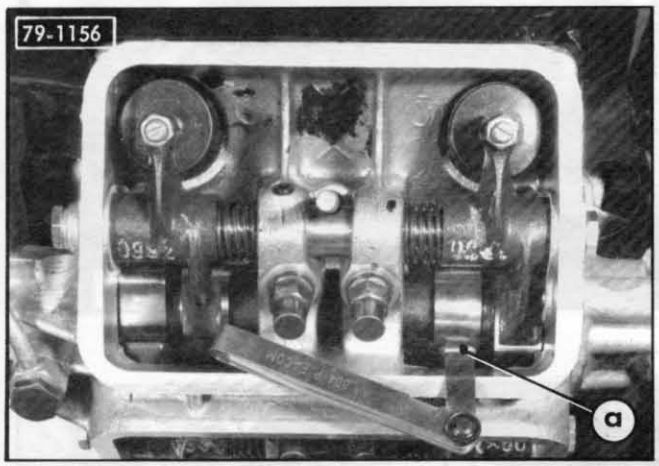
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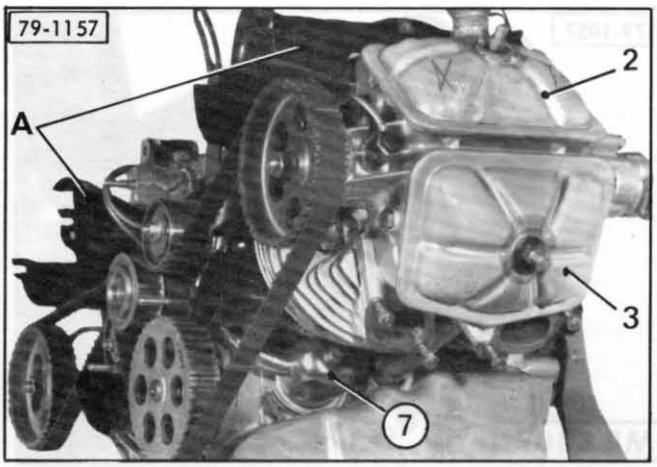
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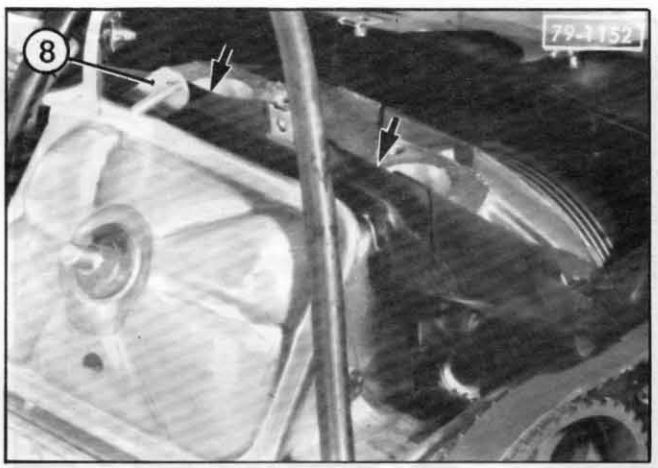
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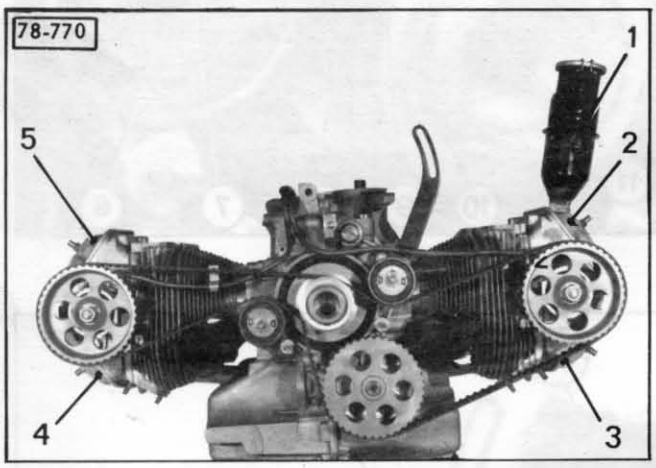
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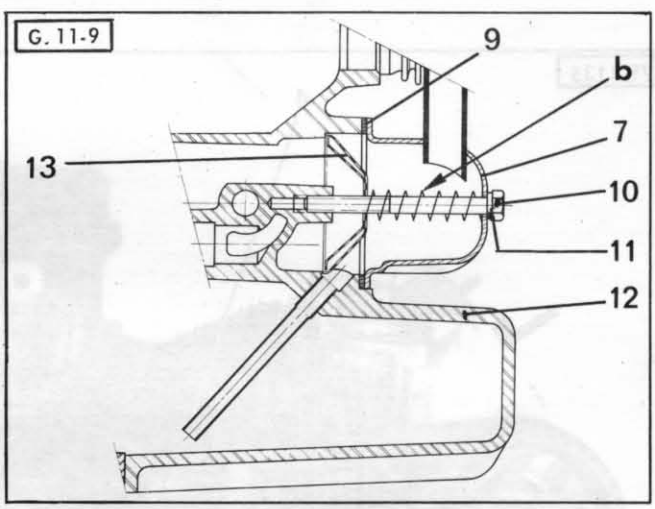
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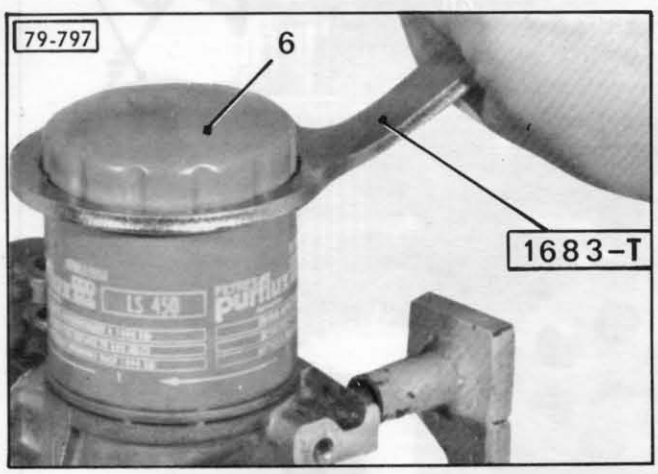
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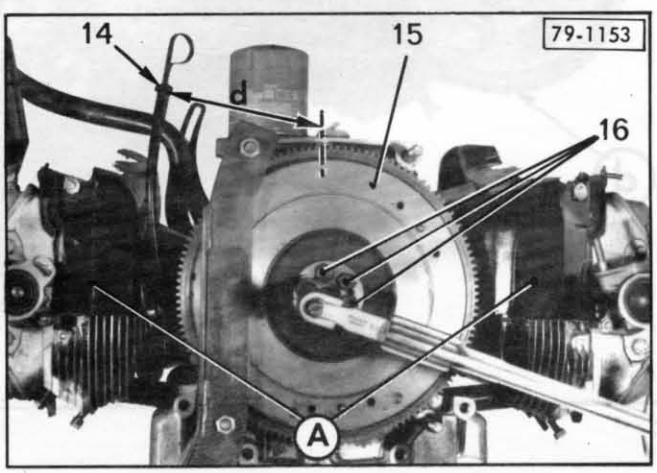
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23. Adjust rocker arm clearance :

Adjust each rocker arm in successsion, proceeding as follows :

a) Turn the engine arm over so that the heel of the rocker arm to be adjusted is *on the back of the corresponding cam* (valve fully closed).

b) *Adjust clearance between rocker arm heel and corresponding cam at « a ».*

Inlet/exhaust : 0.20 to 0.25 mm

24. Fit the cylinder head covers :

Carefully oil rocker arms, shafts and cams.

a) Check that there are no asperities on the sealing surfaces, which must be clean and dry.

b) Glue the seal to the cylinder head cover (BOSTIK 1400 or MINNESOTA F 19).
Carefully center the cylinder head covers.

Lower cylinder head covers (3) and (4) and upper covers (2) and (5) are different.
- Check correct assembly position.
- Cover (2) incorporating filler orifice (1), is mounted on the left.
- Incorrect fitting of the seals, bad alignment or an insufficiently tightened attachment nut, can lead to total oil loss.

Tighten the nut to 0.8 to 1 m.daN.

25. Fit oil filter cartridge (6) :

Oil the seal.
Insert the cartridge by hand, until it comes into contact with the engine housing.
Tighten by 1/2 or 3/4 of a turn, using spanner 1683-T .

26. Fit cooling ducts A :

a) *Left side :*
Assemble the upper and lower ducts, and fix the latter to the cylinder head.

b) *Right side :*
Fix the duct to the right cylinder head.
Fit screws (➡) (contact washer), inserting air filter (8) (under the duct sidewall).
Tighten the screws.
Glue the cooler unit seal to the carter (BOSTIK 1410 or MINNESOTA EC 1236).

27. Fit the breather :

Check the sealing surface on crankcase (12).
Glue seal (9) to breather (7) (BOSTIK 1410 or MINNESOTA EC 1236).
Fit grille (13).
Fit new seal (11) on screw (10).
Engage :
- screw (10) in breather (7),
- spring « b » on screw (10).
Position the breather on the crankcase, and tighten screw (10) to **0.5 to 0.7 m.daN**

The breather pipe must not touch the cooling duct.

28. Fit the oil dipstick guide tube :

On assembly, direct the curved part of the guide towards the gearbox, so as to obtain dimension d = 225 mm (distance betweeen sealing surface crankcase halves and the end of guide (4).

29. Fit the heater ducts :

Fit the heater ducts, couple to the cooling ducts.

30. Fit engine flywheel (15) :

Fit new attachment screws following any disassembly operations.

Put three spots of LOCTITE FORMETANCH between the crankshaft and engine flywheel (15).
Tighten screws (16) from 6.4 to 6.9 m.daN
(grease threads and face).
Use a torque wrench.

31. Fit the fuel pump :

Fit spacer (2).
Position fuel pump (1).
Tighten nut (3) to 2.1 m.daN (contact washer).

32. Fit the distributor :

Position the distributor cover and fit distributor (4).
Set in mid-slot, and tighten the nuts moderately (contact washer).

Final adjustment is made with the engine installed in the vehicle.

33. Fit the exhaust manifolds :

Fit new seals.
Position manifold (5).
Tighten the nuts to 1.5 m.daN.

34. Fit oil pressure switch (6) :

Fit a new seal.
Tighten from 2 to 2.5 m.daN.

35. Fit the oil cooler unit :

Fit new seals on the couplings of cooler unit (7).
Position cooler unit (7) and **tighten the screws to 1.8 m.daN.**

36. Fit the starter :

Position starter (8) on its support.
Tighten the attachment screws to **1.8 m.daN** (contact washer).
Longest screw (9) is inserted in the top hole.

37. Fit inlet manifolds to carburettor assembly A :

a) Check the condition of rubber sleeves **B**.
(→ 7/81).

b) Fit the left and right manifold assembly (leaving collars (10) loose).
Tighten the screw of the forward lug on the engine housings to 1.8 m.daN.
Fit new seals on the cylinder head end.

Check that the gas orifice in the seal corresponds to that in the cylinder head.

Tighten screws (→) to 1.8 m.daN (heavy gauge washers).

c) Tighten collars (10).

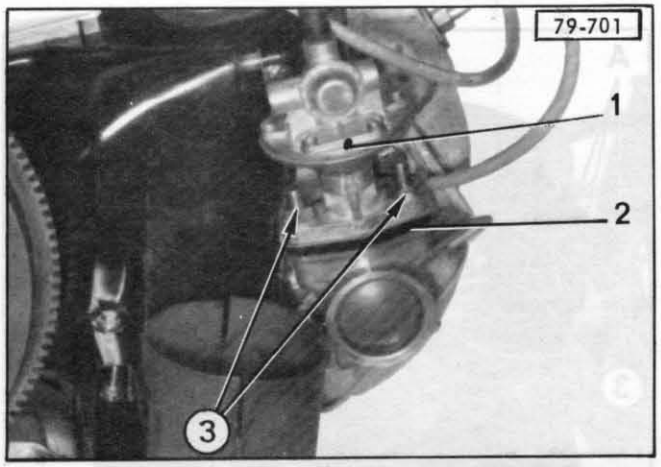
38. Fit high pressure pump (12).

39. Fit alternator (11) :

Do not tighten the screws (flat washers under screw head and nut).

40. Fit air manifold (14) :

Place a flat washer, spacer and second flat washer on each stud (13).
Engage the air manifold on the studs.
Fit spring washers, and tighten nuts (15).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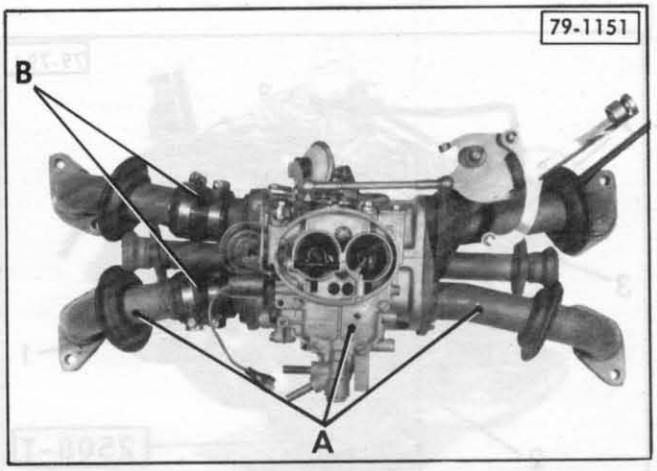
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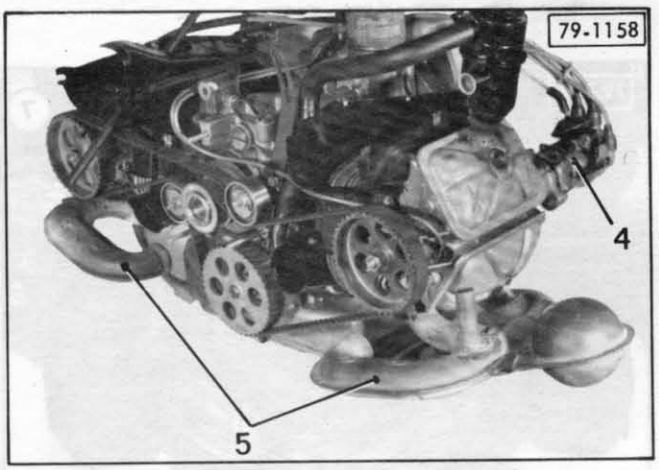
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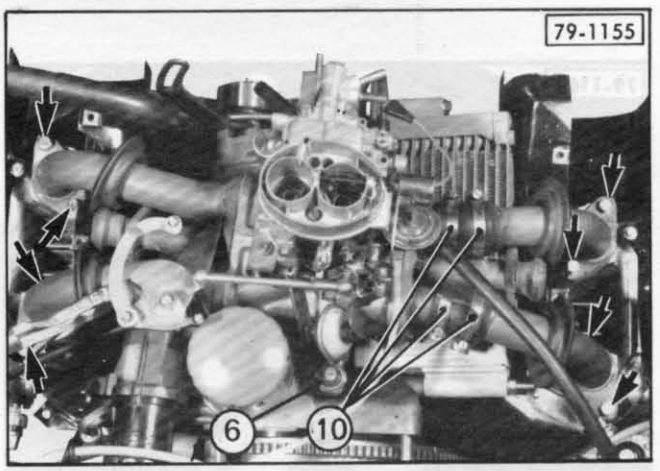
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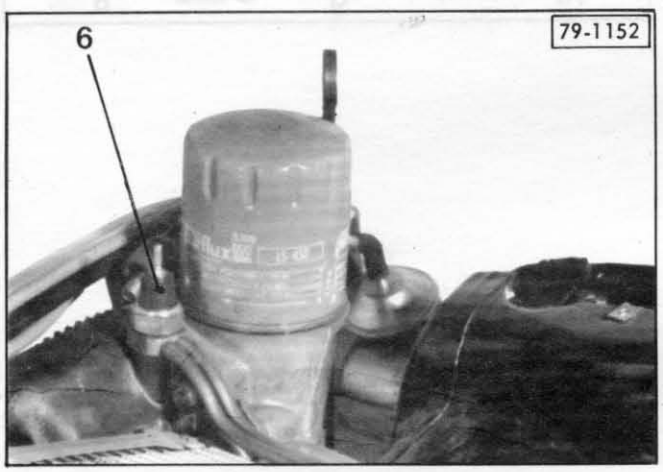
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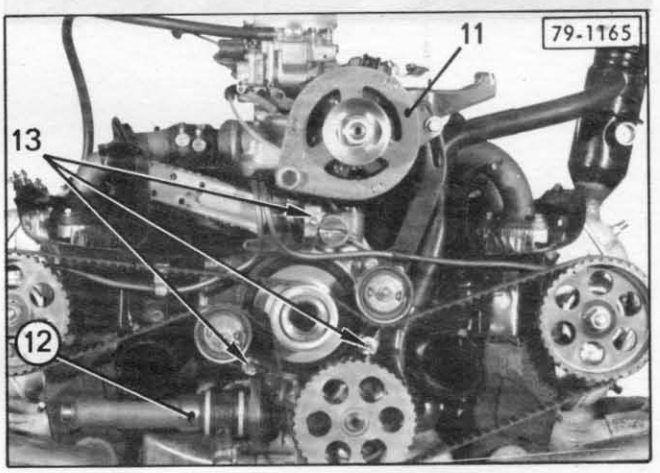
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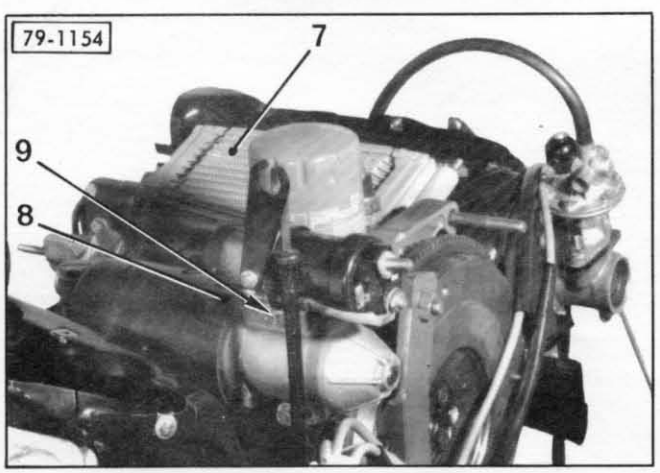
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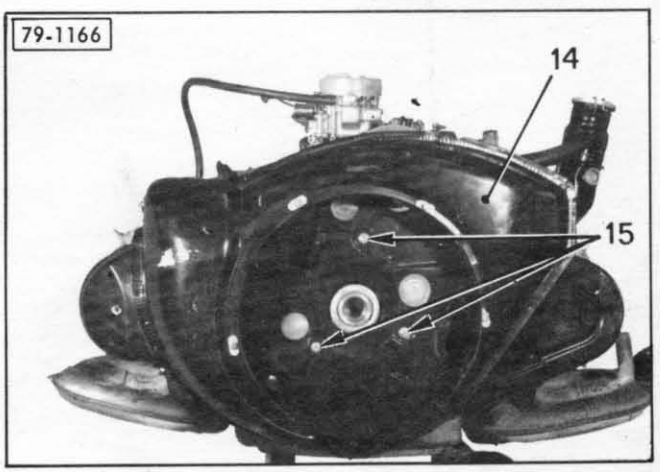
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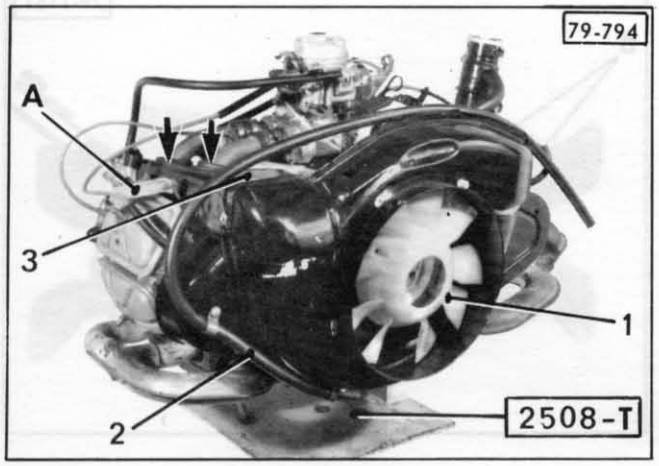
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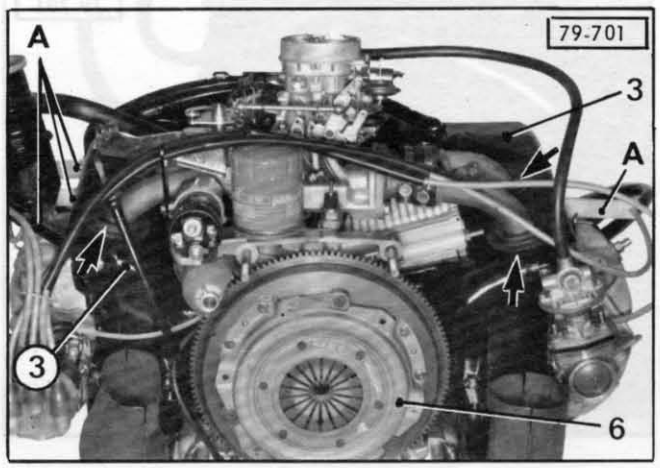
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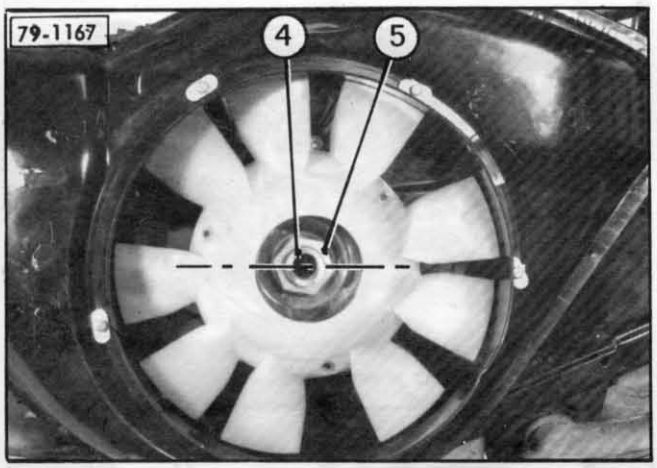
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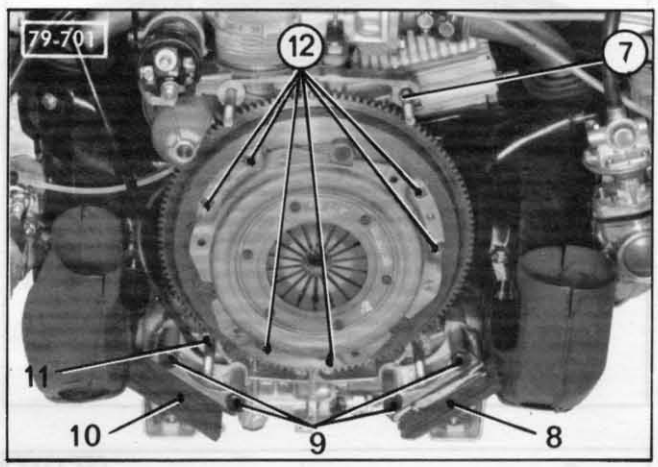
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41. Fit the fan :
PLace the belt on the alternator pulley.
Engage the belt on fan pulley (1).
Fit the fan.
Fit starter dog (4), equipped with a spring washer and lock-nut (5) *(grease threads and face).*
Position so that the starter dog is horizontal **when the engine is at ignition point.**
Tighten lock-nut (5) to 22 to 24 m.daN (torque wrench).

The starter dog should show 4 to 5 mm of threading after the nut is tightened.

42. Fit the high pressure pipe.
Fix intake pipe (2) to the air manifold.

43. Fit the covers for upper ducts (3) :
Fit plug lead support « a ».
Fit plugs (➡).

44. Tension the alternator belt.
Tighten the bearing and tension device screws.

45. Fit the spark plugs.
Connect the leads to the spark plugs.
Fill up with engine oil.

46. Remove the engine from support 2805-T.

47. Fit the clutch :
Position the clutch plate and clutch mechanism (6).
Center the plate using mandrel MR. 630-31/85
Tighten screws (12) to 1.8 m.daN (spring washer).

48. Fit the elastic mounts :

All elastic mounts fitted in the same vehicle must be from the same manufacturer.

Position supports (8) and (10).
Fit the attachment screws, inserting a flat washer under the head of each screw (9).
Tighten to 5 to 6 m.daN

49. Fit the two alignment fingers on engine/gearbox coupling studs (7) and (11).

NOTE : On the engines fitted with a rigid inlet manifold, a loosening and re-tightening operation must, without fail, be carried out on the manifold, **with engine cold.**
Tighten to 1.8 m.dN.

OPERATION
GX. 112-3

RECONDITIONING A CYLINDER HEAD

SPECIAL TOOLS

TOOLS SOLD

1615-T : Valve lapper

1652-T bis : Valve spring compression lever
(use with support MR. 630-43/31)

1695-T : Tool for fitting camshaft seal (distributor end)

1697-T : Tool for fitting camshaft seal

4024-T : Universal spring compression tool

TOOLS NOT SOLD

MR. 630-11/26 : Special for taking down and tightening camshaft pulleys

MR. 630-25/8 : Rocker arm extractor

MR. 630-43/31 : Vice support for cylinder head

TIGHTENING TORQUE VALUES

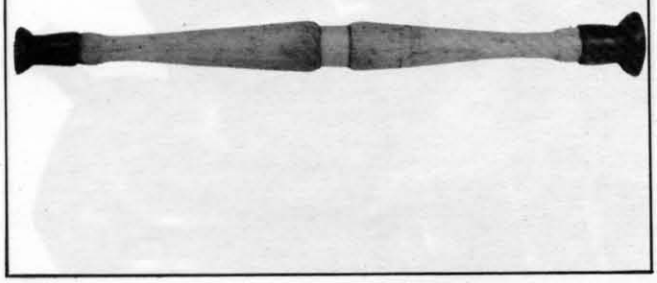
Mandatory values *(torque wrench) :*

Tightening point	Torque (m.daN)
Rocker arm shaft plug screw :	1.4 to 1.6
Camshaft pulley attachment nut :	8.2

Recommended values :

Tightening point	Torque (m.daN)
Insertion of camshaft rear bearing attachment stud :	0.3 to 0.5
Insertion of camshaft pulley attachment stud :	2.5 to 3
Camshaft rear bearing attachment nut :	1.5 to 1.8
Cylinder head cover attachment stud :	

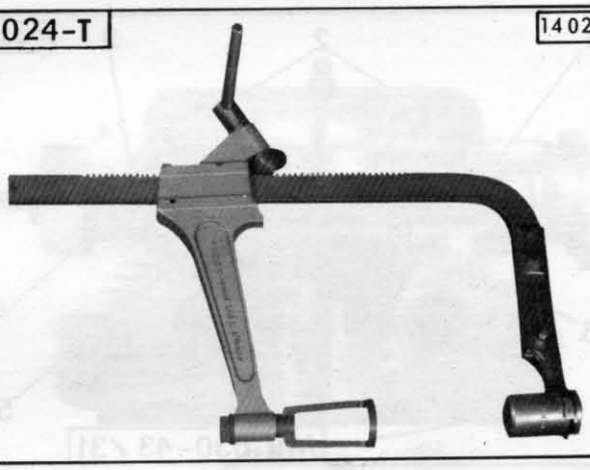
1615-T 79-799



1697-T 79-786

1652-T.bis 79-766

4024-T 14029



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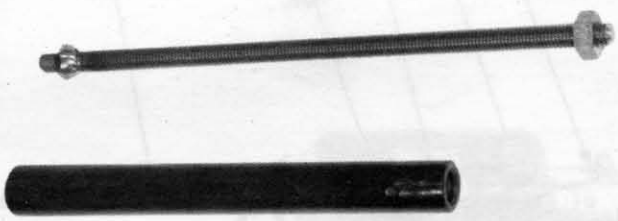
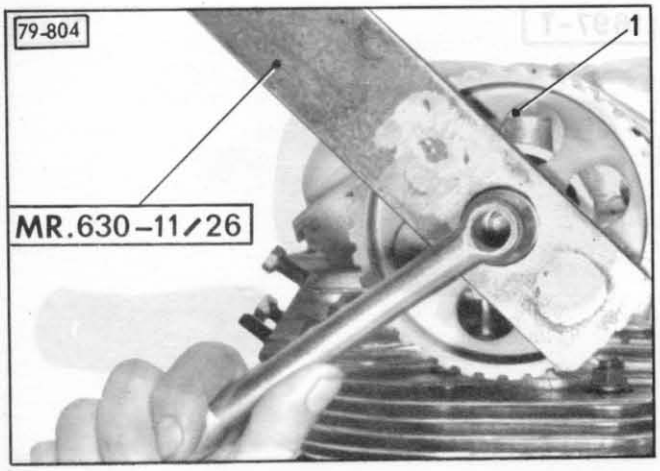


79-767 **MR.630-11/26**

MR.630-43/31 79-829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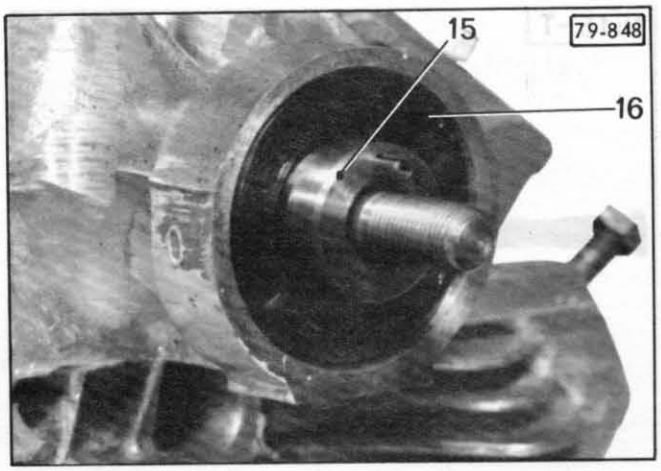
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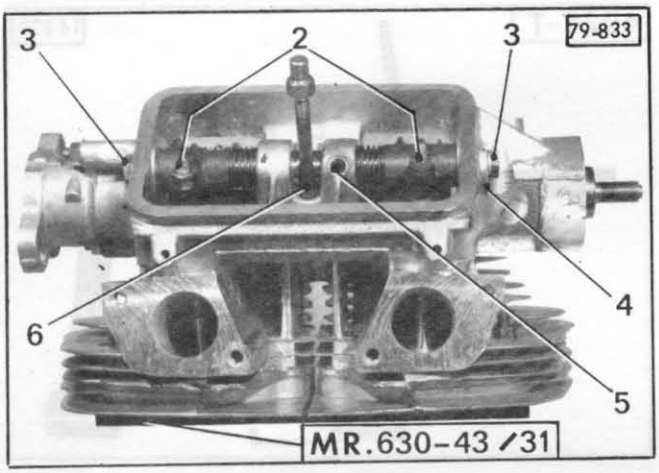
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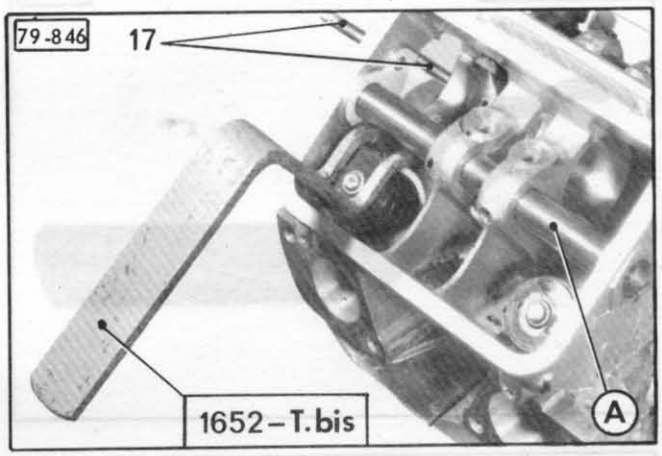
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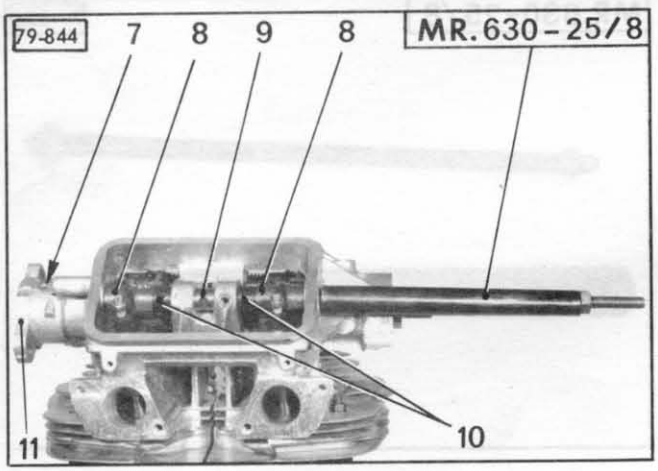
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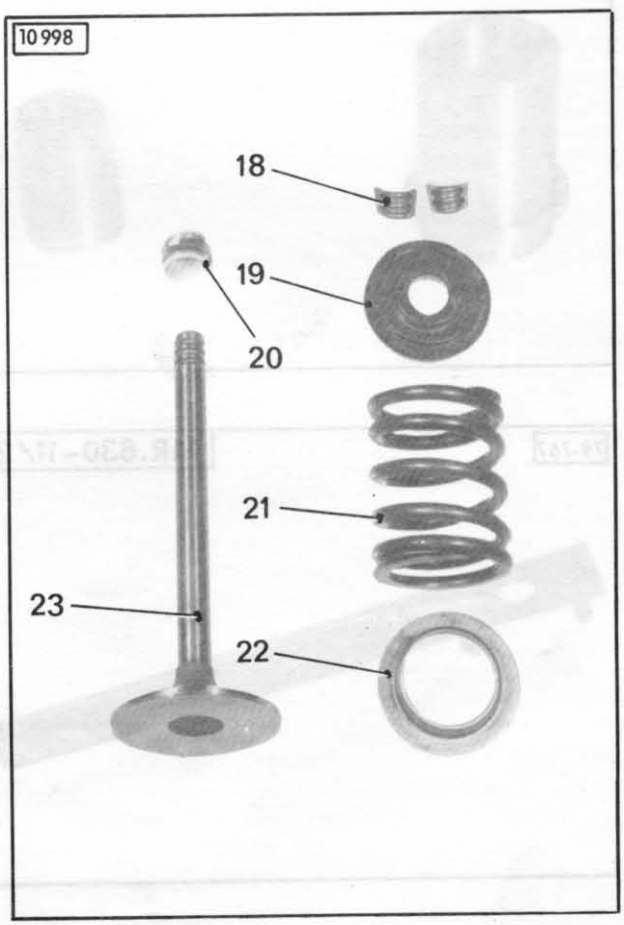
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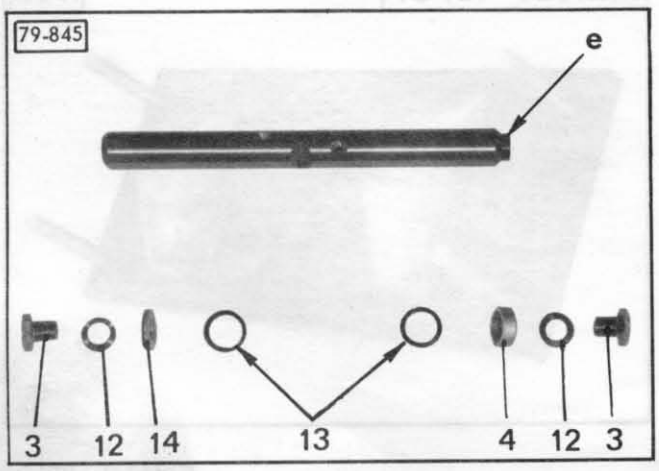
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RECONDITIONING A CYLINDER HEAD

DISMANTLING

1. Place the cylinder head in a vice :
Use support MR. 630-43/3

2. Remove the camshaft pulley :
Use tool MR. 630-11/26 to anchor pulley (1).

3. Remove rocker arm shafts (9) :

a) Slacken off adjustment screws (2) on the rocker arms.

b) At each end of the rocker arm shafts, remove :
- plug (3) and copper seal (12),
- spacer (4) or (14),
- O-ring seal (13).

c) Extract :
- studs (6),
- grub-screws (3) (3 mm Allen key).

d) Extract the shafts using tool MR. 630-25/8
Disengage :
- rocker arms (8),
- springs (10).

4. Remove the camshaft :

a) Undo attachment nut (7) for rear bearing (11).

b) Crack off bearing (11) tapping the end of camshaft (15) lightly with a mallet, and disengage the assembly.

The camshaft and rear bearing cannot be separated.

c) Remove front seal (16).

5. Remove the valves :

a) Fit stem A (diameter 16 mm, length 270 mm) in place of each rocker arm in succession.
Compress the valve springs using tool 1652-T bis

b) Disengage :
- half stop rings (18),
- cups (19),
- springs (21),
- thrust washers (22),
- seals (20).

c) Take the cylinder head off support MR. 630-43/31 .
Disengage :
- valves (23),
- stem A.

6. Clean the parts.

To ensure the seal-tightness of the front bearing, the camshaft has a micro-turbine machined in the seal contact zone.
Take care not to damage this micro-turbine, at the risk of causing an oil leak.

PREPARATION

7. For replacement of the cylinder head :

Two camshaft rear bearing attachment studs (17) must be fitted with LOCTITE FRENETANCH.
Tightening torque : 0.3 to 0.5 m.daN.

8. Grind the valve seats if necessary.
The seats must be ground to the angles shown on the opposite page.
A : inlet B : exhaust

9. Grind the valves :

	Valves	Angle (°)	Head dia. (mm)	Stem diameter (mm)	Length (mm)
1300	Inlet	90	38	$8\ ^{-0.005}_{-0.020}$	94.6
	Exhaust	90	35.7	$8.5\ ^{-0.021}_{-0.036}$	93.8
1130	Inlet	120	39	$8\ ^{-0.005}_{-0.020}$	97.4
	Exhaust	90	34	$8.5\ ^{-0.021}_{-0.036}$	96.3

b) Grind the valve contact angles to the values indicated.

c) Execute a slight chamfer at « a » on the valve heads, to break the angle.

10. Lap the valves :
Use valve lapping tool 1651-T.
Conditions :
- On the valve : the large diameter of the contact surface must be equal to the largest diameter of the head.
- On the seat : valve contact surface with « b » must have the following maximum values :

Inlet : 1 to 1.4 mm
Exhaust : 1.4 to 1.8 mm

11. Carefully clean the cylinder head to eliminate any trace of emery in the gas ducts.
Blow through the ducts and lubrication pipes with compressed air.
If the passages are obstructed, dip the cylinder head in a bath of cellulose solvent for about one hour. Blow through again with compressed air.

12. Valve spring setting :

Length under load (mm)	Load (kg)	Length under load (mm)	Load (kg)
32	25.4 ± 2.5	24	59.6 ± 2

13. Prepare the camshaft (left cylinder head) :

a) *Rear bearing :* Remove seal (1). Fit a new seal with tool 1695-T.

b) *Front end :* If necessary, replace roll split pin (4) (pulley drive). Fit a new pin, positioning slot « c » towards the exterior of the camshaft.

14. Replacement of camshaft stud (2) :

Pulley attachment stud (3) must be fitted with LOCTITE FRENETANCH
Tightening torque : 2.5 to 3 m.daN.

15. Fit the valves :

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

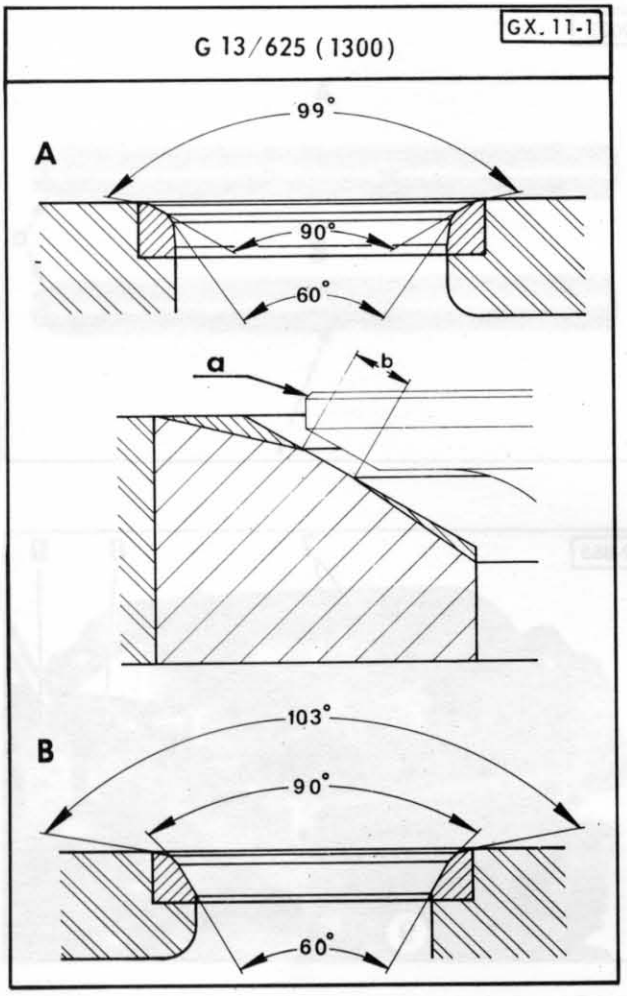
b) Fix the cylinder head in the vice, using support MR. 630-43/31.

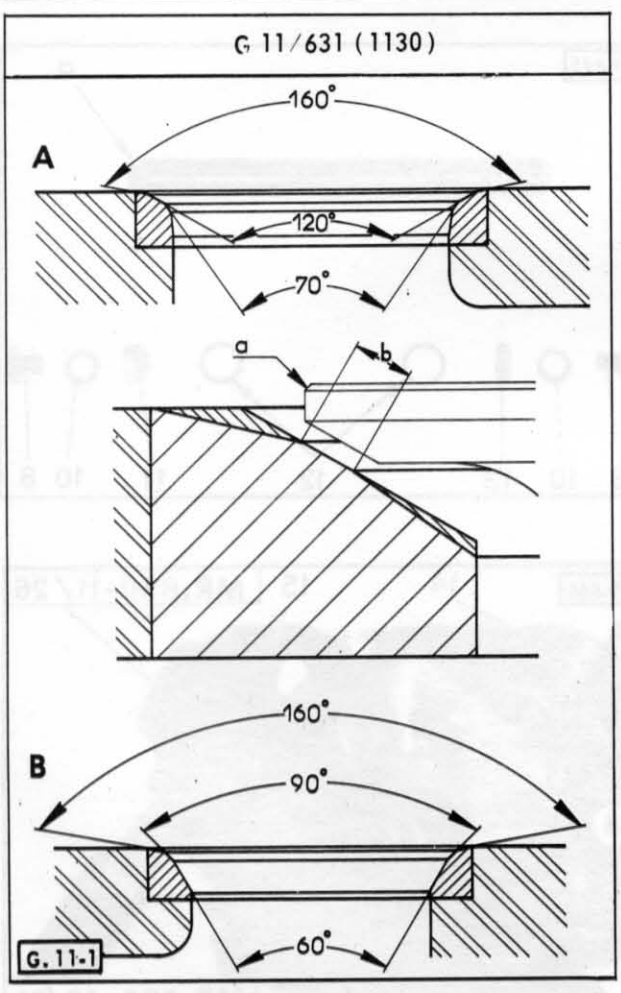
c) Fit seals (5) (new seals after any dismantling operation).

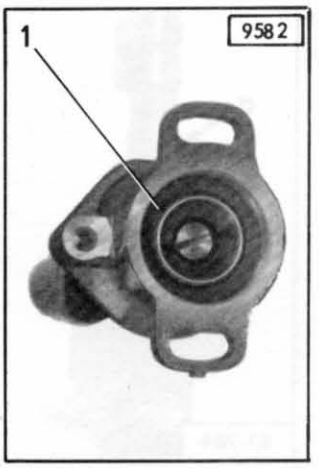
Seal (5) inside diameter :
- exhaust : 8.5 mm
- inlet : 8 mm
Slide seal (5) onto the valve stem, until it comes onto the guide (use a tube with inside diameter 8.5 mm to terminate insertion of the seal).

d) Fit stem D (see paragraph 5 a) in place on each rocker arm shaft in successsion. As appropriate, fit on each valve :
- thrust washer (9),
- spring (8),
- cup (7).

Compress the valve springs using tool 1652-T bis
Fit half stop rings (6).
Extract stem D.


G 13/625 (1300)
GX. 11-1
A
99°
90°
60°
a
b
B
103°
90°
60°


G 11/631 (1130)
A
160°
120°
70°
a
b
B
160°
90°
60°
G. 11-1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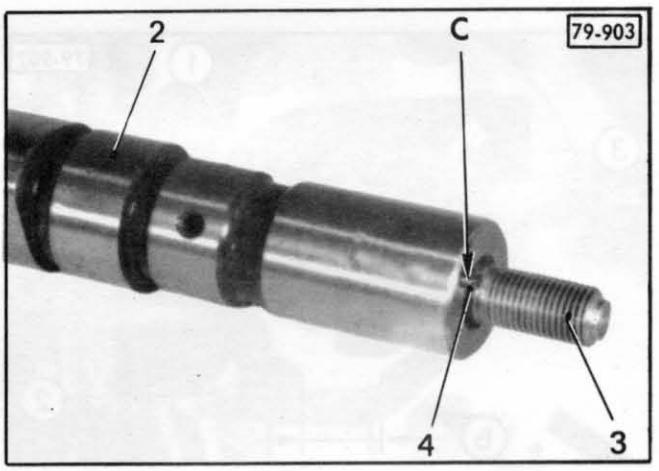
9601
1695-T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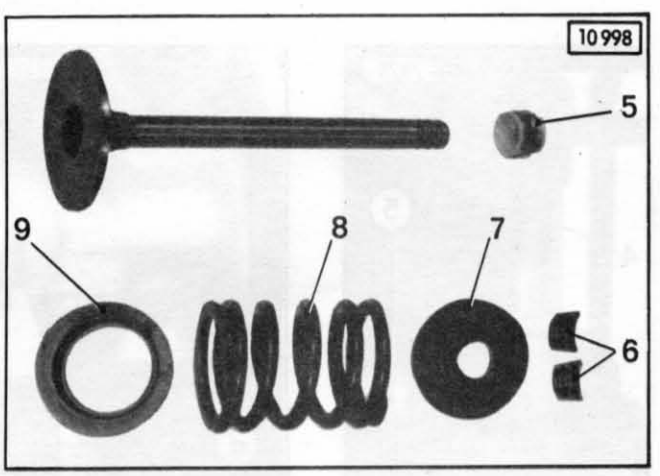
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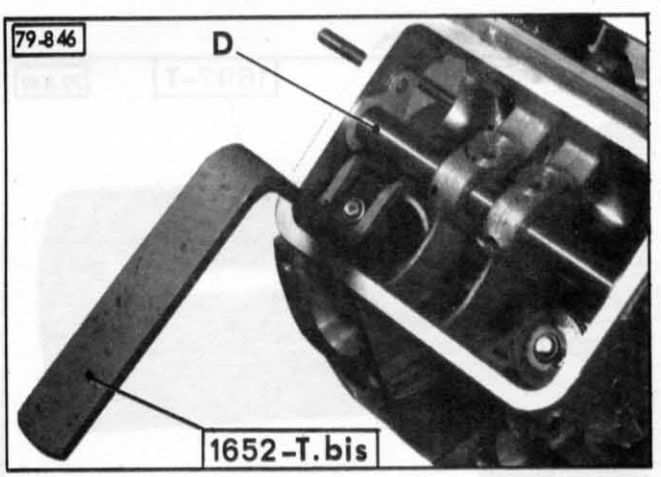
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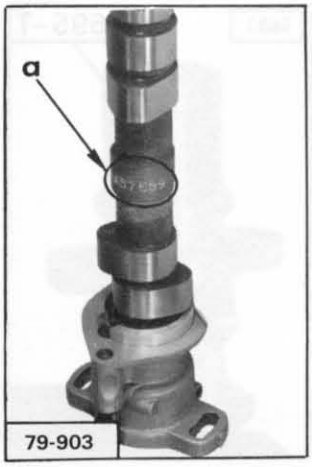
1652-T.bis


a
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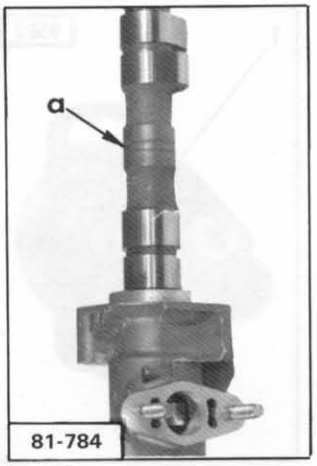
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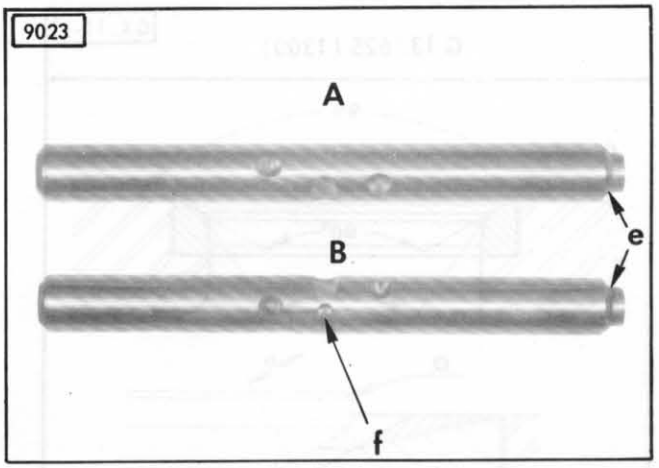
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A
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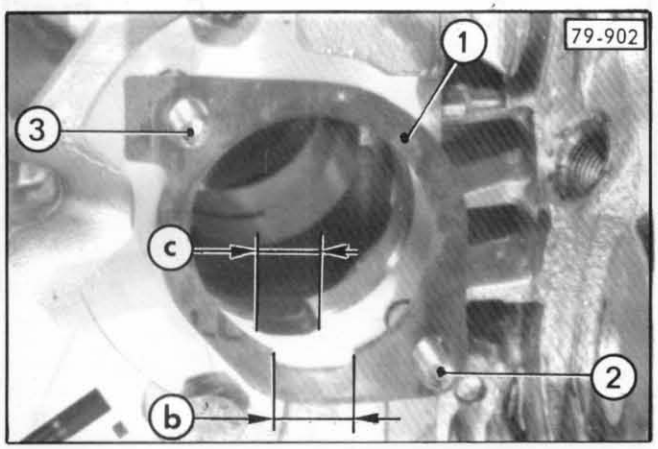
f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b
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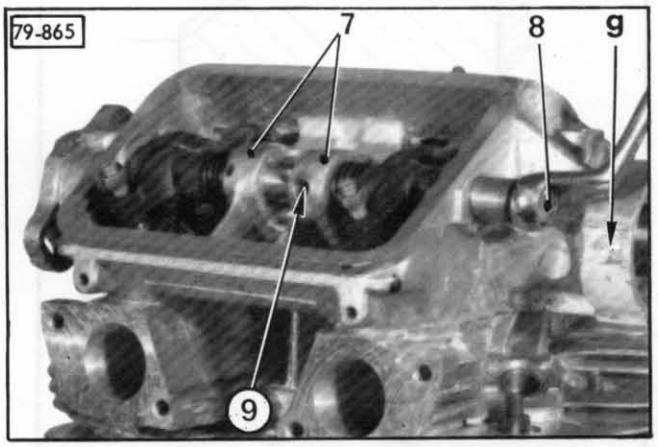
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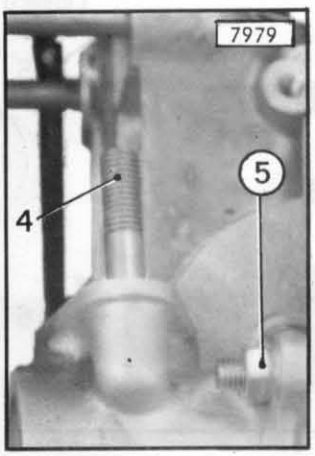
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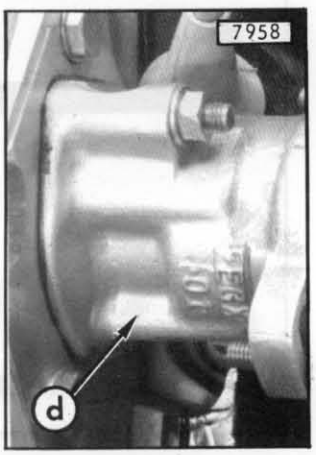
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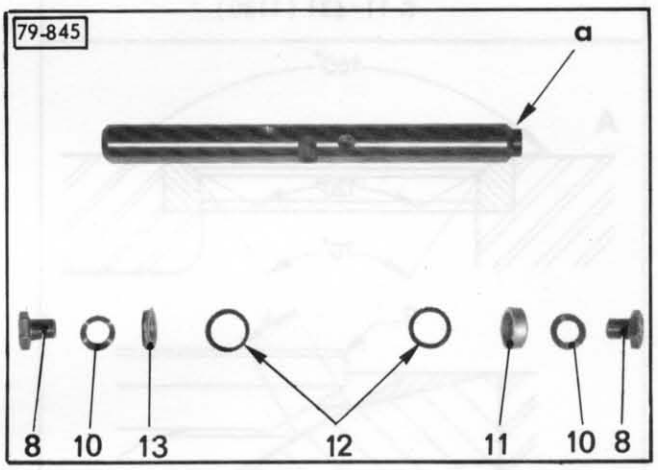
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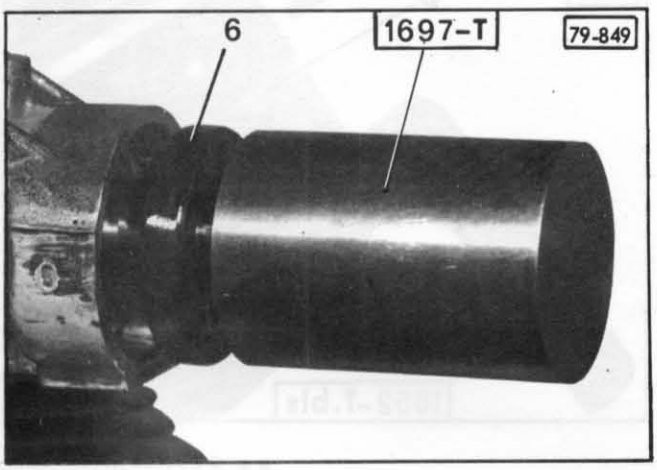
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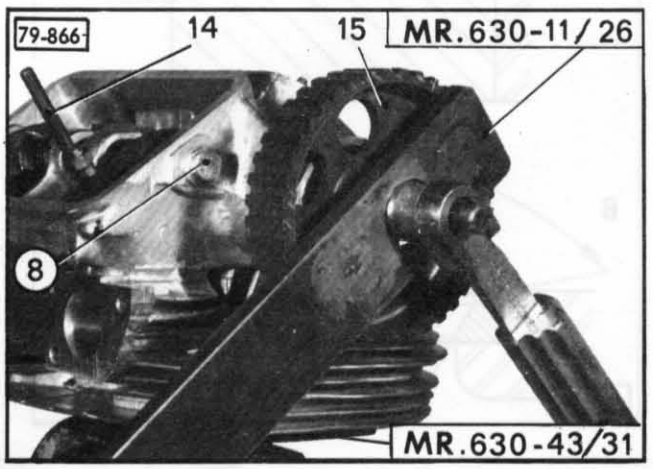
1697-T
79-849


79-866
14
15
MR.630-11/26
8
MR.630-43/31

16. Fit the camshaft :

a) **Camshaft identification (1300 engine only) :**
→ *7/81 :* . An identification number is stamped on each shaft at « a » :
- A 57 E 59 : left camshaft
- A 58 E 60 : right camshaft

7/81 → *:* 2 circular grooves at « a ».

b) Fit the paper seal between camshaft rear bearing and cylinder head :
Engage each seal (1) on attachment studs (2), *making slot « b » in the seal coincide with oil return groove « c » in the cylinder head, coating* the seal with LOCTITE AUTOFORM before fitting. Oil the contact surface of the front seal on the camshaft.

c) Engage the camshaft in the cylinder head.

Position the rear bearing : boss « d » (oil return) on the bearing should correspond with groove « c » in the cylinder head. It must therefore be directed towards the exhaust ports.

(In the case of the right cylinder head, this means that fuel attachment studs (4) must face the inlet ports).

d) Tighten attachment nuts (5) (contact washer) to **1.5 to 1.8 m.daN.**

17. Fit the camshaft front bearing seal :

Use tool 1697-T

Seal (6) must be fitted when the camshaft is in place. Otherwise the seal will be damaged during shaft assembly.

18. Fit the rocker arm shafts :

Shaft identification :

- Left inlet shaft and right outlet shaft A are identical, and are not marked.
- Right inlet shaft and left exhaust shaft B are identical, and can be identified by blind hole « f ». Identification of the shafts is essential for correct orientation of the lubrication holes.

a) Position the rocker arms and springs in the cylinder head.

All rocker arms and springs are identical. The springs must bear on central bearings (7).

b) Oil the shafts and engage in the cylinder head, with shoulder « e » towards camshaft front bearing « a ».
Temporarily fit plug (8) to orient the shaft and align the blind stop hole with grub screw (9).

Coat the threads of grub screw (9) with LOCTITE FRENETANCH before inserting.

Remove plug (8).
On each end of the shafts, fit :
- O-ring seal (12),
- spacer (11) or (13) *(spacer (11) is thicker, and is fitted on shoulder end « e ».*
- plug (8) and copper seal (10).

Tighten screws (8) to between **1.4 and 1.6 m.daN.** Fit cylinder head casing attachment studs (14), with the shorter threaded portion at the cylinder head end.

19. Fit the camshaft pulley :
Position pulley (15) (alignment pin on camshaft). Anchor the pulley with tool MR. 630-11/26, and **tighten the nut** (flat washer) to **8.2 m.daN** (torque wrench).

20. Take the cylinder head off support MR. 630-43/31

OPERATION
GX. 311-3

RECONDITIONING THE CLUTCH HOUSING OF A PEDAL-OPERATED CLUTCH/TORQUE CONVERTER CLUTCH

SPECIAL TOOLS

TOOLS SOLD

1671-T : Inertial extractor

4053-T : Tool for removing the thrust bearing guide-sleeve

I - REPLACING A THRUST BEARING GUIDE-SLEEVE

(Manual gearbox)

Gearbox removal is not required for this operation.

1. Remove the engine only *(see Op. GX. 100-4 in section II).*

2. Remove the left-hand brake disc.
(see Op. GX. 451-1, chapter V, section II).

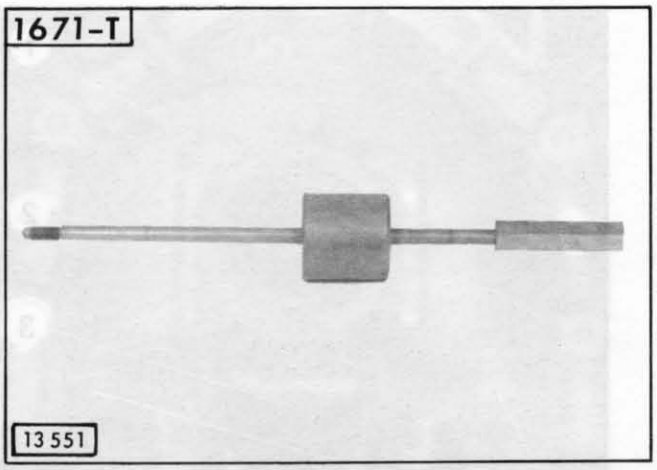
3. Remove the following :
- clip (1),
- thrust bearing (2),
- lock screw (3) on fork spindle (7),
- fork spindle (7),
- fork (4), spring (5) and anti-squeak bushes (6).

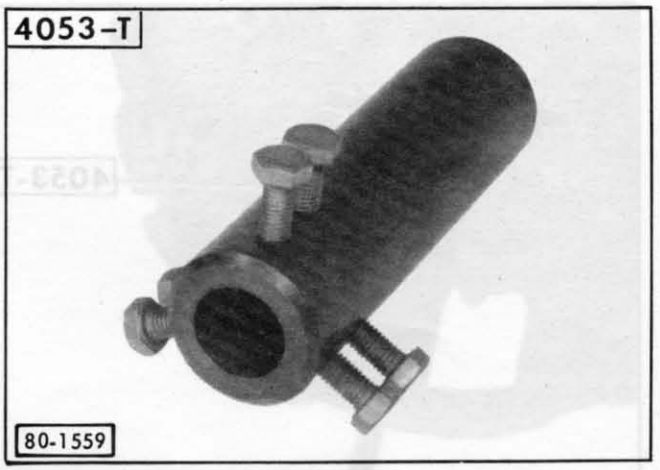
4. Remove the thrust-bearing guide-sleeve (8) :

Cap sleeve (8) with tool 4053-T fitted with inertial extractor 1671-T *(tool 4053-T should be in contact with the housing).*

Tighten screws (➔) on the sleeve and remove it.

5. Degrease the new sleeve and its recess (9) in the housing with LOCTITE SUPER-CLEAN.


1671-T
13 551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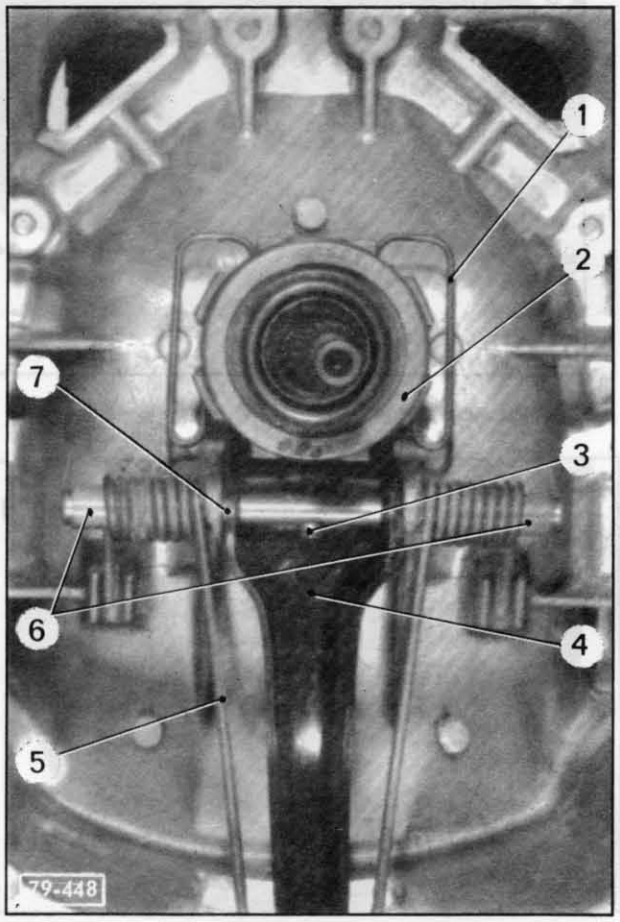
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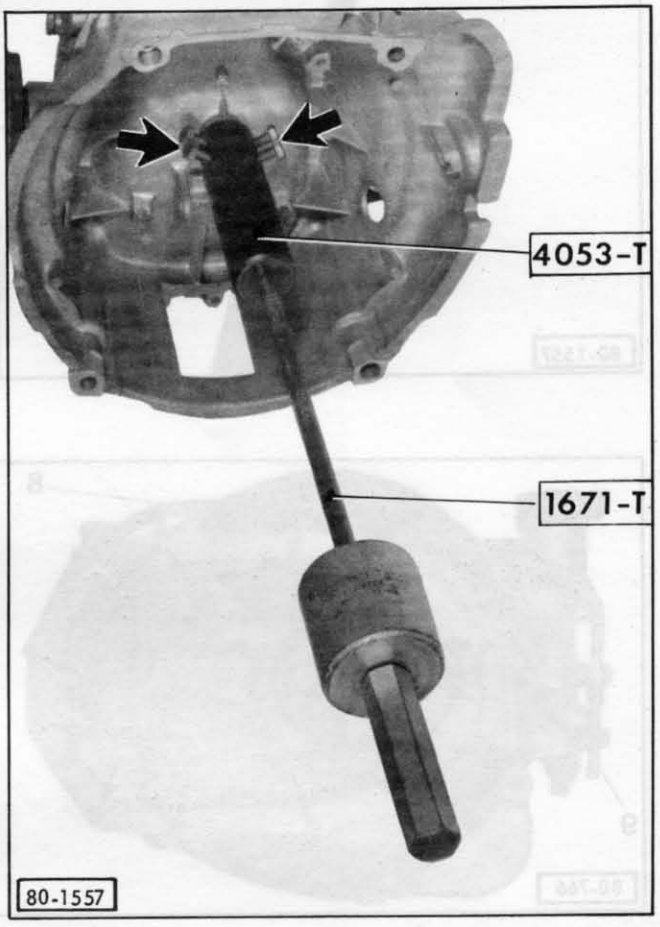
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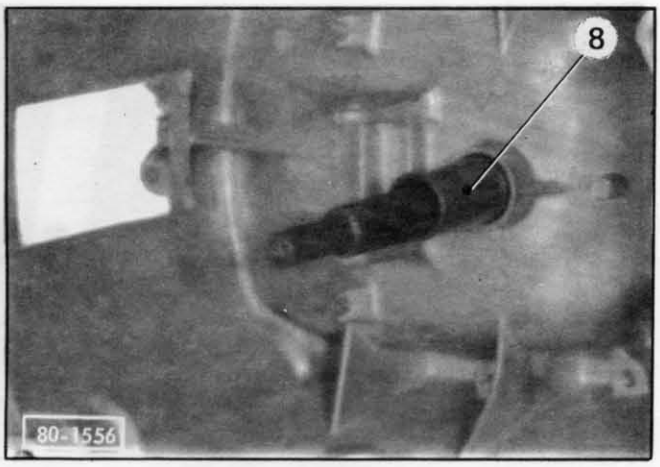
1671-T
80-1557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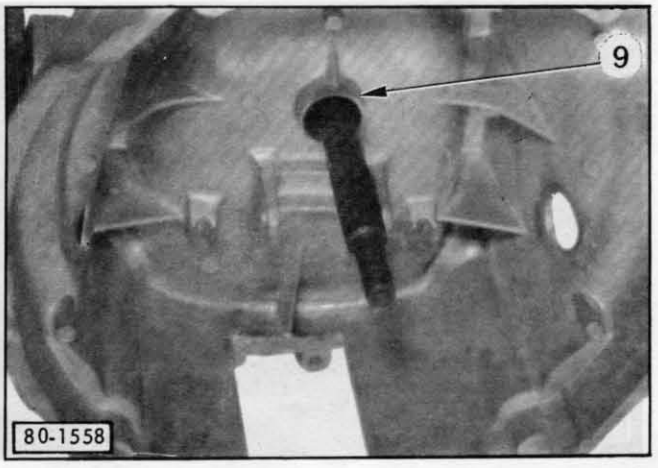
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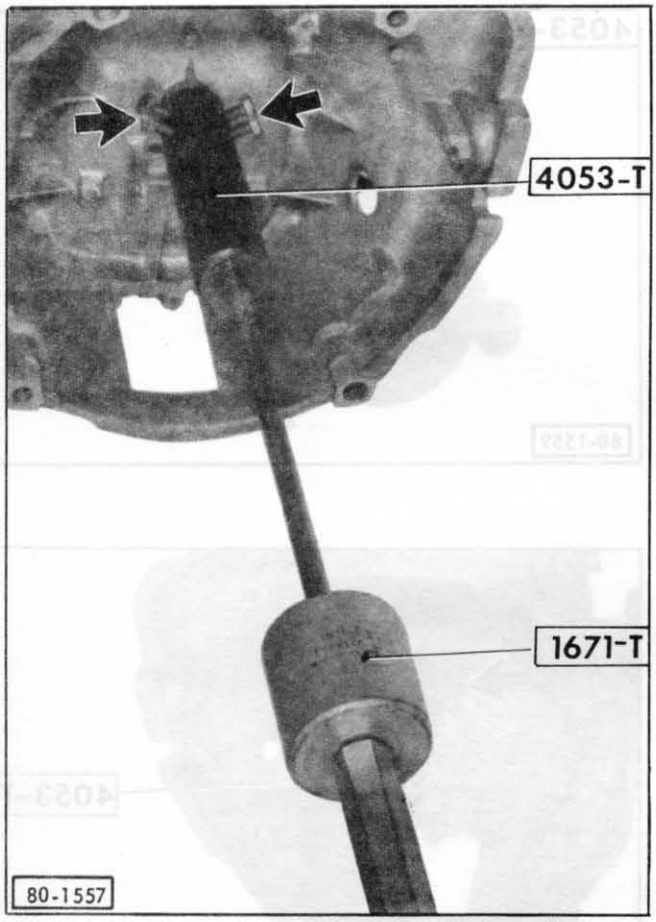
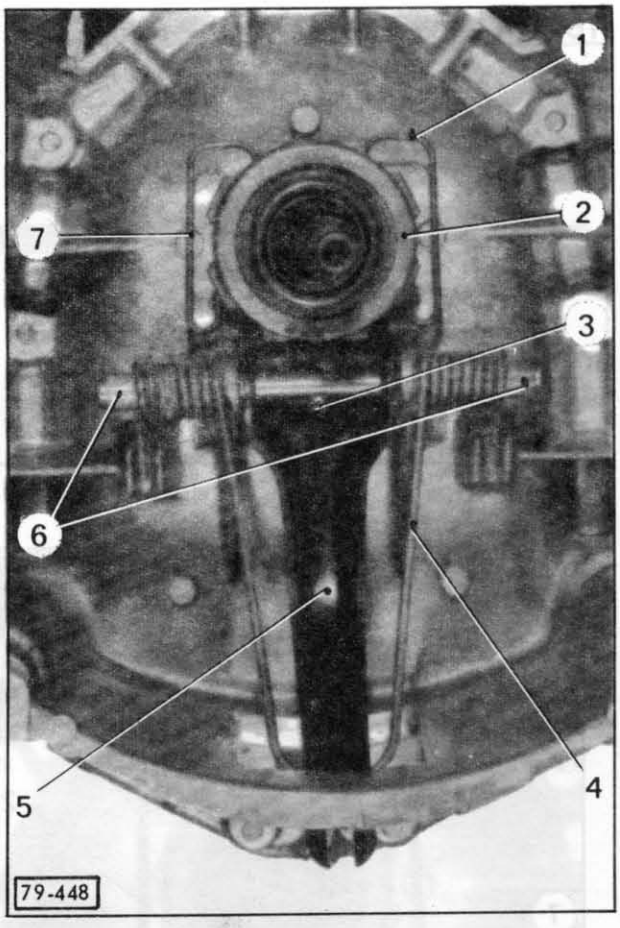

4053-T
1671-T
80-1557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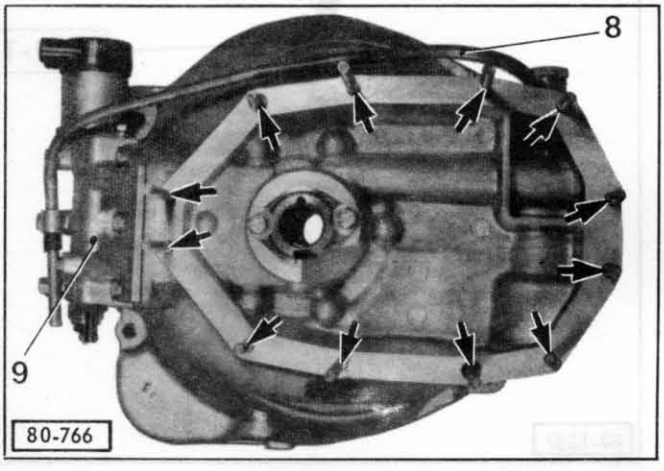
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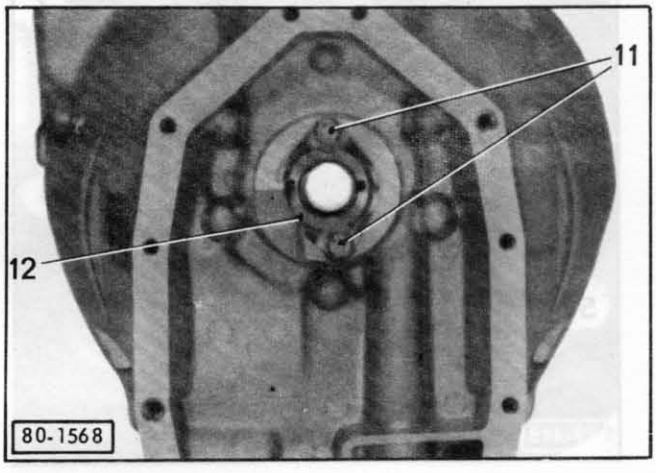
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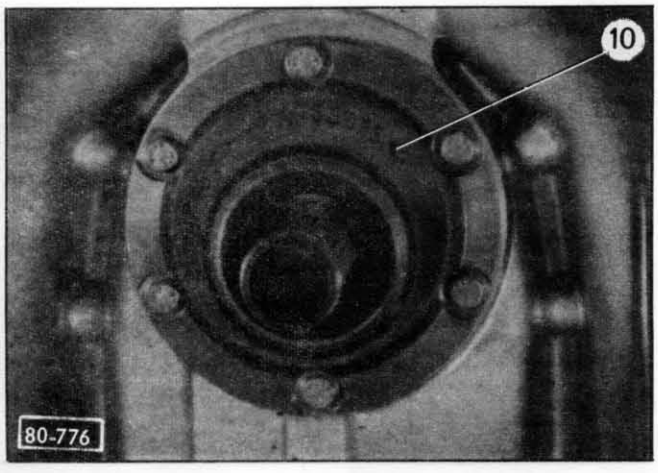
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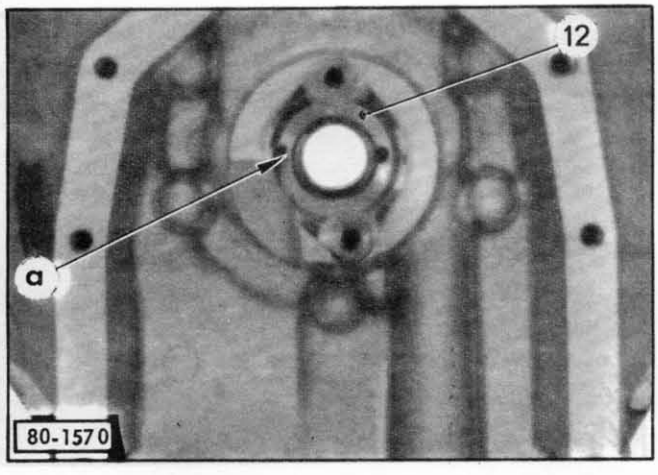

12
a
80-1570

6. Fit the thrust bearing guide-sleeve :

Smear the sleeve end *(end to be engaged in clutch housing)* with LOCTITE FRENBLOC.

Introduce the sleeve in tool 4053-T

Do not tighten screws (➡).

Introduce the sleeve in the housing, using inertial extractor 1671-T until tool 4053-T comes into contact with the clutch housing *(the protrusion of the sleeve is obtained by means of tool 4053-T).*

Remove the tool.

Wipe off LOCTITE traces on the sleeve.

A new thrust bearing should without fail be fitted once the thrust bearing guide-sleeve has been replaced.

Lubrication :
Using TOTAL MULTIS MS grease, fill the thrust bearing groove and smear the sleeve.

7. Fit the following :
- Anti-squeak bushes (6), spring (4), fork (5), fork spindle (2), screw (3), thrust bearing (1) and clip (7).

II - REPLACING THE STATOR SLEEVE OF A GEARBOX WITH TORQUE CONVERTER

The removal of the engine-gearbox assembly is required for this operation *(see Op. GX. 100-1 section II)*

1. Separate the converter housing from the gearbox.

2. Strip the converter housing :

Remove the following :
- distributor assembly (9),
- radiator return pipe (8),
- oil pump (10) *(mark its location in relation to the housing),*
- the oil strainer and its seal,
- studs (➡).

3. Remove the stator sleeve :
Remove :
- screws (11),
- sleeve (12) using a press.

4. Clean the converter housing.

5. Heat the converter housing up to 120° C approx.

6. Position the sleeve :
Take care to have recess « a » in the sleeve well positioned in relation to the corresponding machined area in the converter housing.

7. Re-assemble the converter housing :

Fit oil pump (1) with a new seal. Centre the pump by means of mandrel 1689-T
Tighten screws (2) **to 1.9 m.daN.**

Fit distributor (3). Its contact face should be smeared with LOCTITE FORMETANCH.
Tighten the attachment screws **to 1.2 to 1.7 m.daN.**

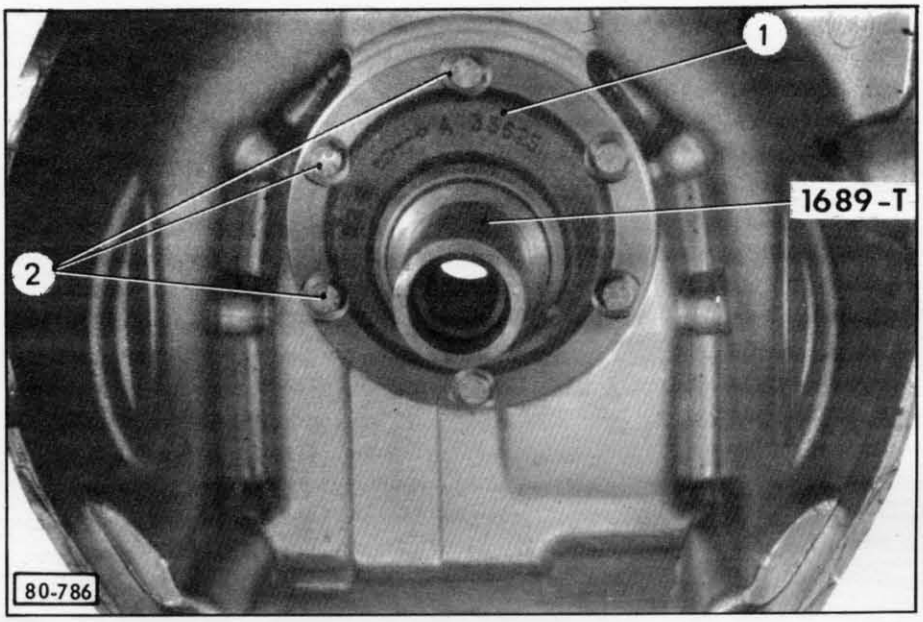
Fit radiator return pipe (7).

Fit attachment studs (6).

Fit oil strainer (4), **tighten it to 1 to 1.5 m.daN.**

Fit first motion shaft (5).

8. Couple the converter housing to the gearbox.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1689-T
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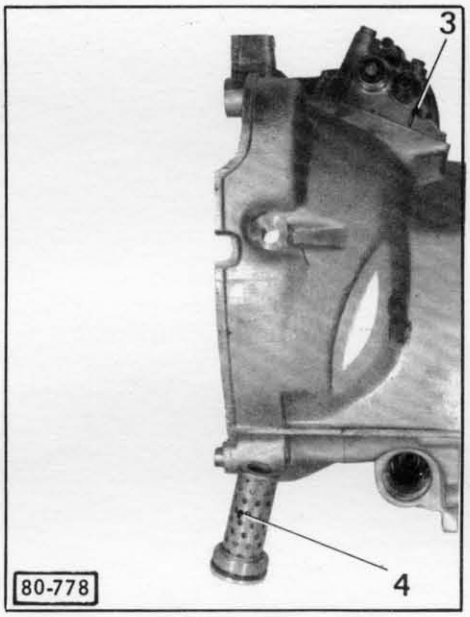
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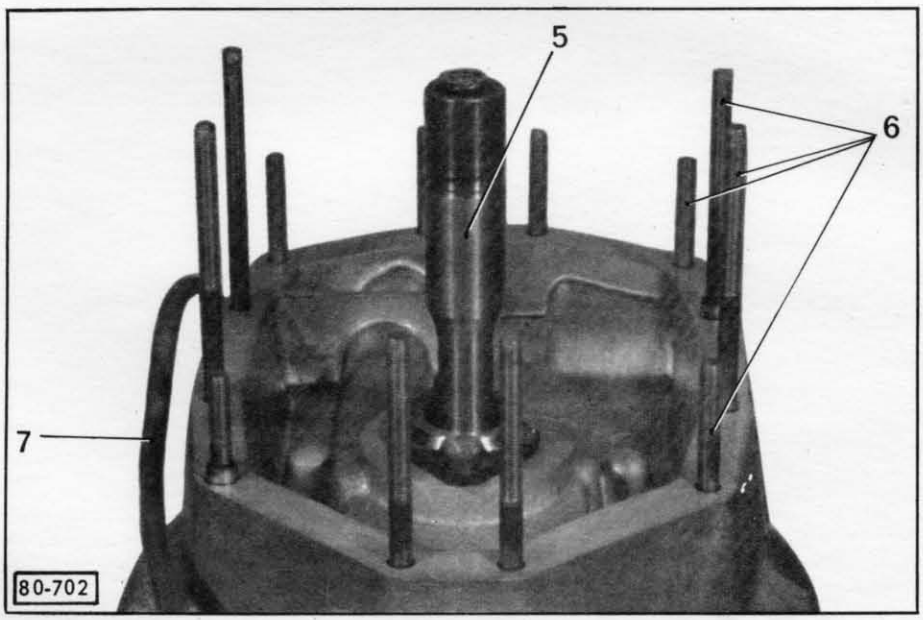
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OPERATION
GX. 330-3

RECONDITIONING A GEARBOX
(PEDAL-OPERATED CLUTCH)

SPECIAL TOOLS

TOOLS SOLD

2437-T : Dial gauge

3253-T : Snap ring pliers

Kit 3184-T bis : containing :

A : Dial gauge support
B : Dial gauge support
C : Cap
D : Mandrel
E : Mandrel
F : Dial gauge support
G : Mandrel
H : Stud

2400-T : Universal extractor

(used with stud H from kit 3184-T bis)

♦ This extractor can be fitted with four different types of hooks having the following references :
RK 1127 - RK 1329 - RK 1330 and RK 1331

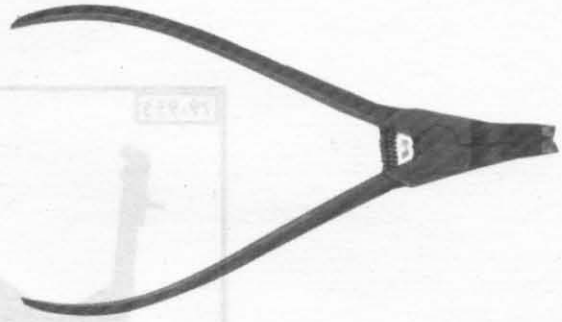
♦ **OUT 30 4055-T :** Pinchers for retarding dowels

2437-T

12 827

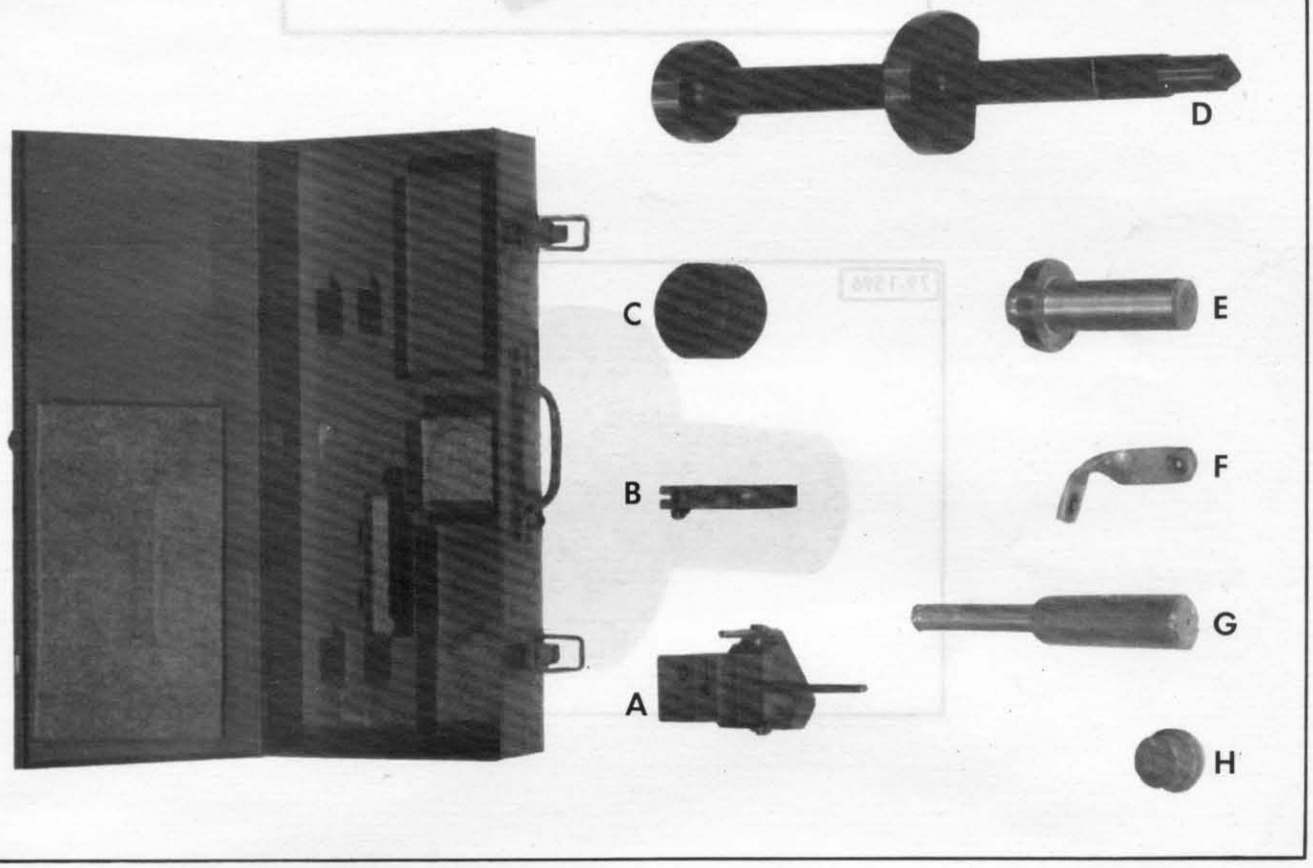
3253-T

12 763



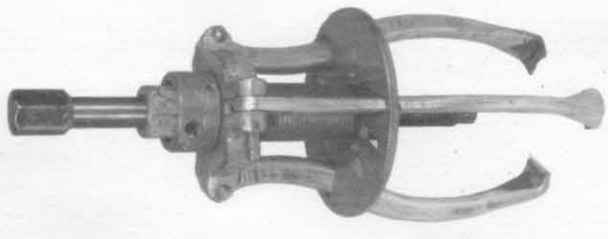
3184-T.bis

14 722



2400-T

12 762



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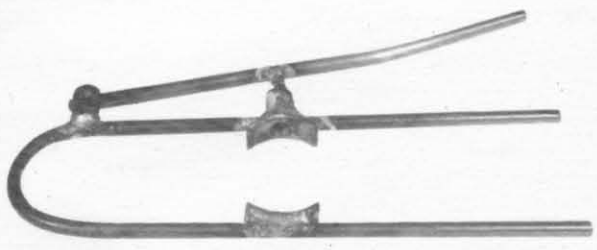
OUT. 30-4055-T



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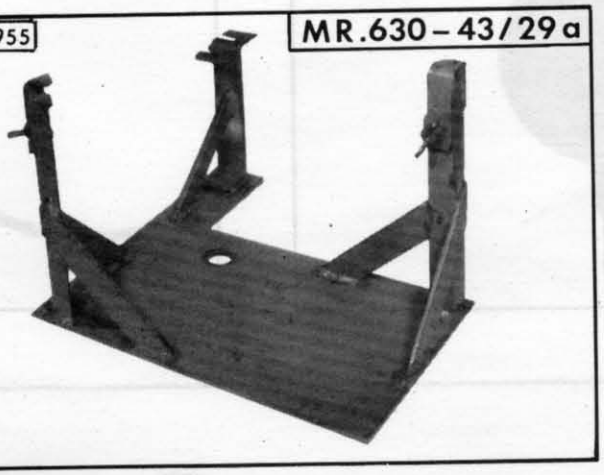

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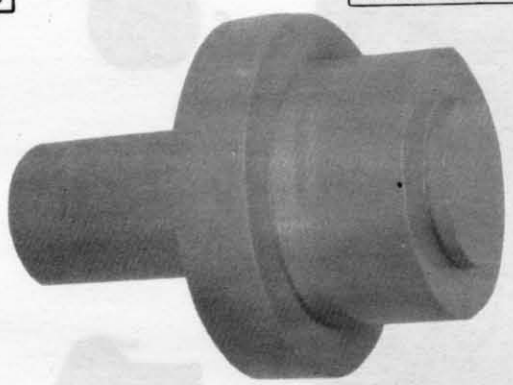
MR.630-33/8



TOOLS NOT SOLD

MR. 630-43/29 a : Gearbox bench support

MR. 630-33/8 : Mandrel for fitting gearbox drive-outlet seals

TIGHTENING TORQUE VALUES

Mandatory values *(torque wrench) :*

♦ - Bevel pinion nut : 4-speed : ..... **10 to 12 m.daN**
5-speed : ..... **22 to 25 m.daN**

- Primary shaft nut : ..... **6 to 7 m.daN**
- Rear cover attachment screws : ..... **2.5 to 3 m.daN**
- Differential crown wheel attachment screw : ..... **8 to 9 m.daN**

Recommended values :

- Gearbox drive outlet shaft threaded bushing : ..... **6 to 7.5 m.daN**
- Reversing light contactor : ..... **1.2 to 1.5 m.daN**

♦ - Half-casing assembly nuts and screws : ..... **1.3 to 1.5 m.daN**

♦ - Clutch housing assembly nuts : ..... **1.3 to 1.5 m.daN**

- Drain and filling plugs : ..... **3.5 to 4.5 m.daN**

RECONDITIONING A GEARBOX (PEDAL-OPERATED CLUTCH)

I - DISMANTLING

1. Drain the gearbox.

2. Place the gearbox on support MR. 630-43/29 a with the half-casing resting on the support.

3. Remove the gearbox output shafts :
Undo the ring nut, using pipe wrench (1).
Disengage output shaft (2) from the gearbox *(tapping with a mallet, if necessary).*

4. Remove *(if necessary) :*
- clip (4),
- stop (5),
- set screw (6) for fork shaft (8),
- fork (9), spring (3) and anti-rattle bushes (7).

5. Remove rear cover (13) :
Undo attachment screws (12) and (14), and disengage cover (13).

6. Remove clutch housing (10) :
Undo attachment nuts (11) and disengage housing (10).

7. Remove the right half-casing :

A - FOUR-SPEED GEARBOX

- Place a finger on plug (16) and extract pin (15).
- Remove plug (16).
- Undo assembly nuts and screws (17).
- Remove the right half-casing.

Prepare to catch the ball lock, ball joint guide and guide thrust spring, when they fall.

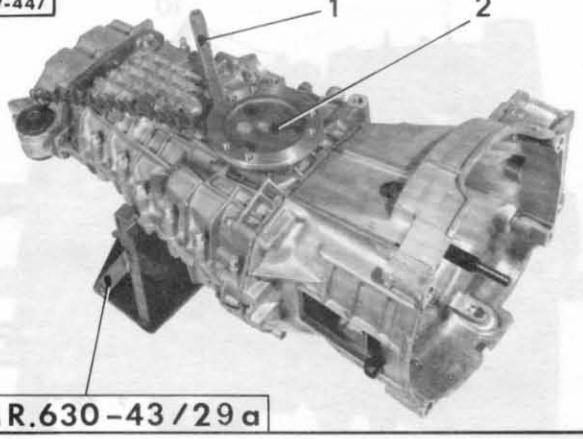
B - FIVE-SPEED GEARBOX

- Extract anchor pin (22) for 5th gear fork (21) *(place a set under the shaft to avoid damage to same).*
- Release and undo nut (19).

For this operation select 3rd gear by pushing the shaft of fork (23) and 5th gear by means of sliding gear (18).

- Remove the assembly comprising synchromesh hub (20) and sliding gear (18) with fork (21).
- Temporarily fit 5th gear synchromesh and nut (19), but do not tighten fully.
- Engage 3rd and 5th gears as before.
- Release nut (24).

79-447



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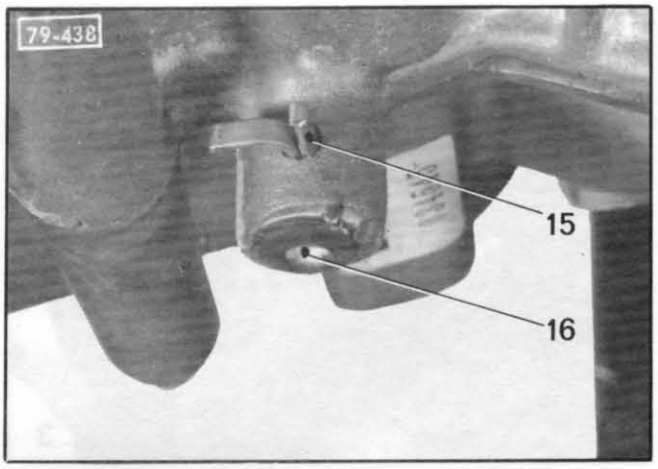

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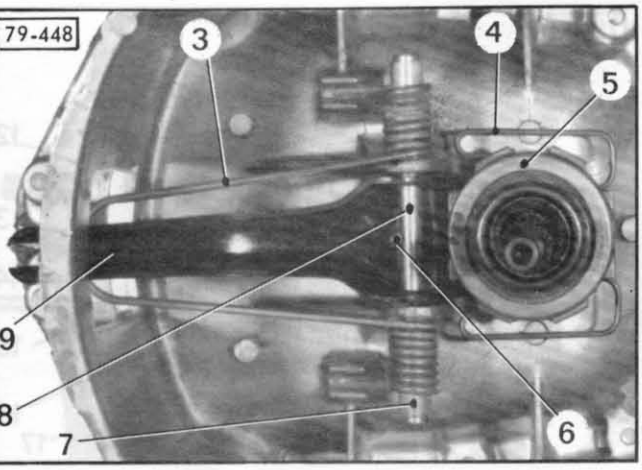

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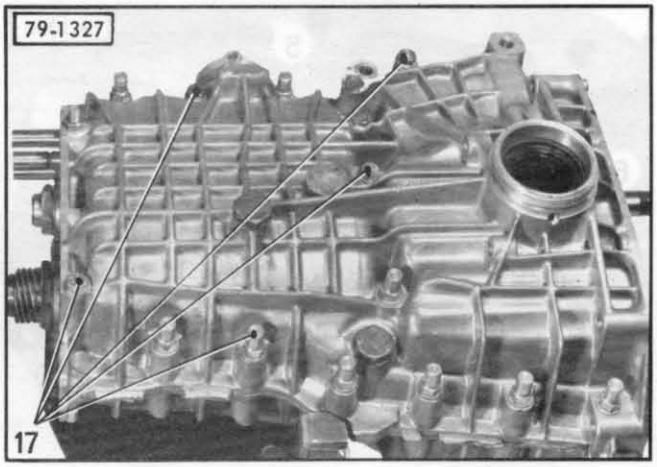

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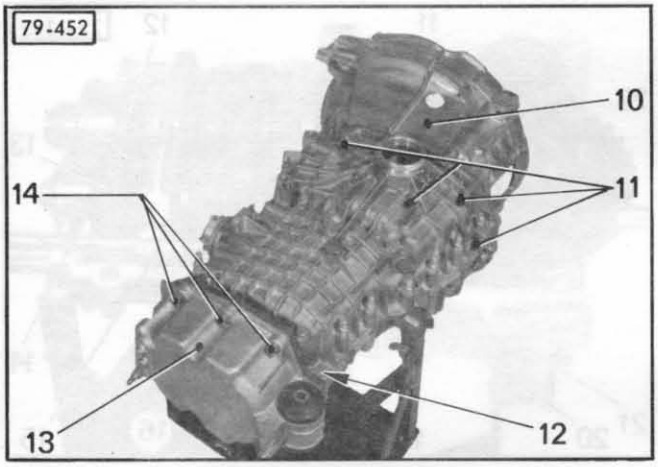

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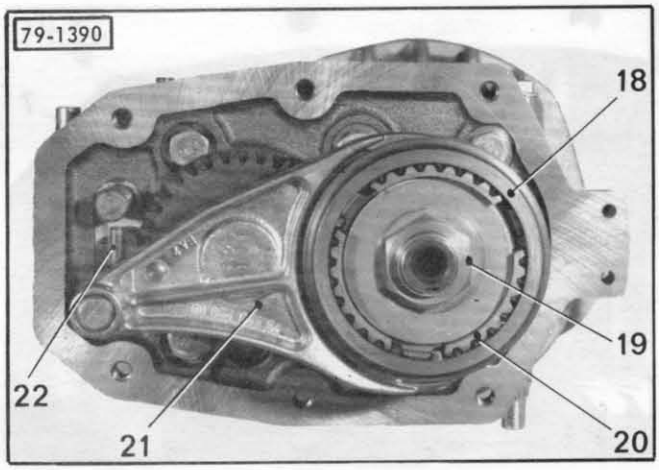

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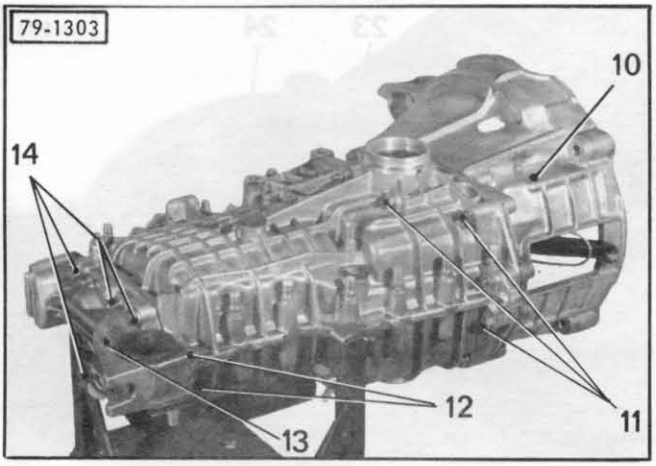

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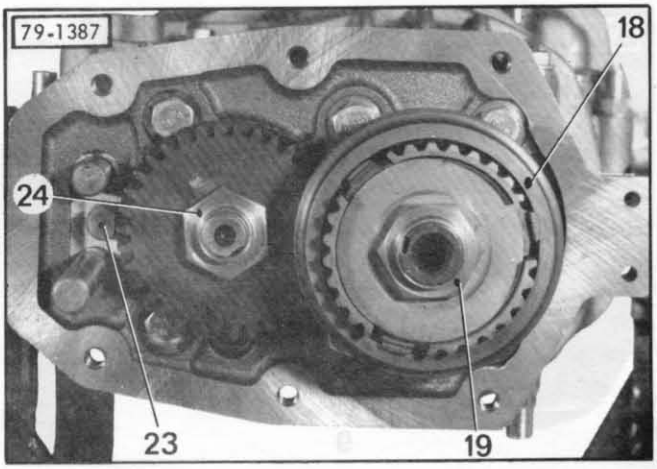

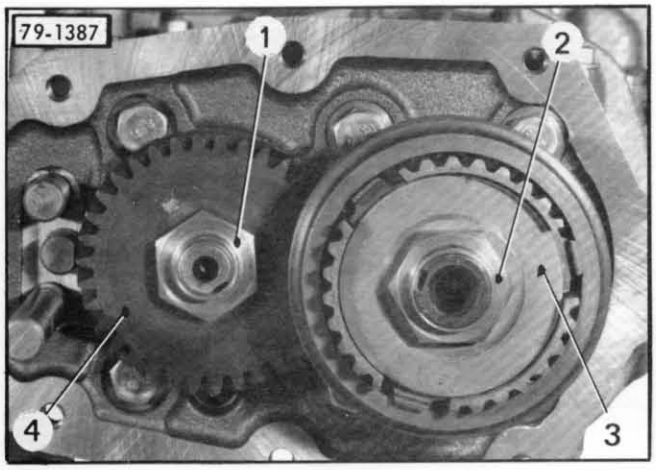
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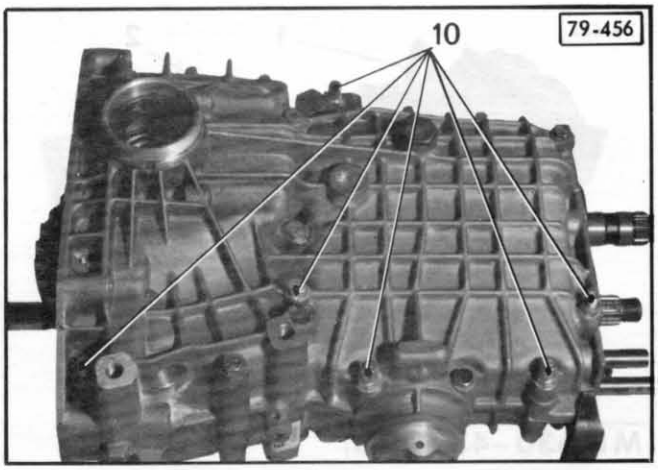
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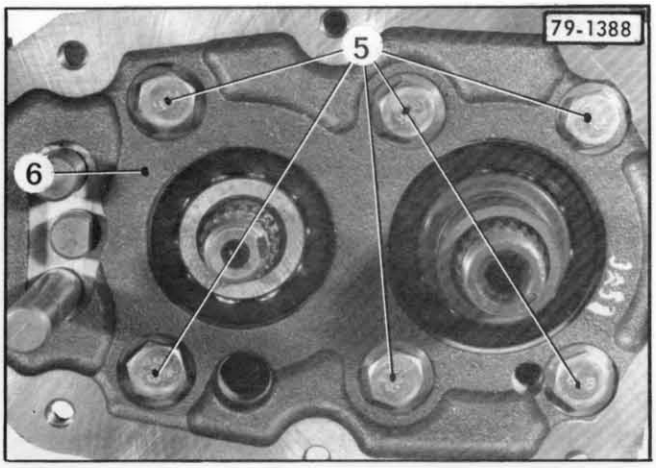
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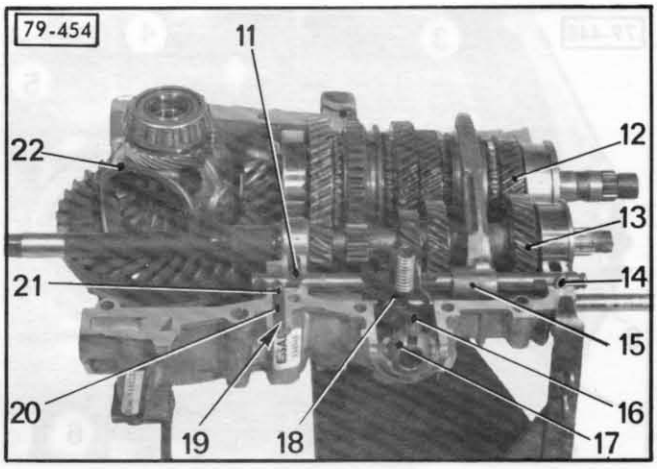
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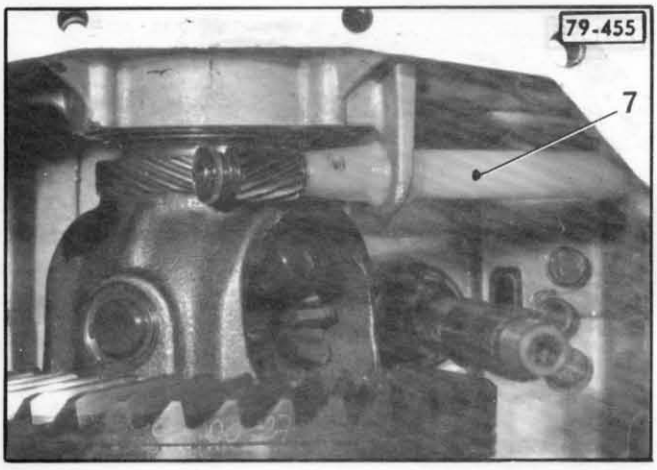
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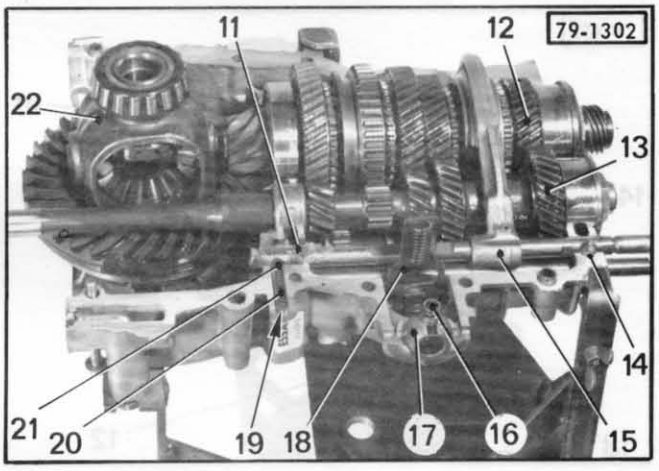
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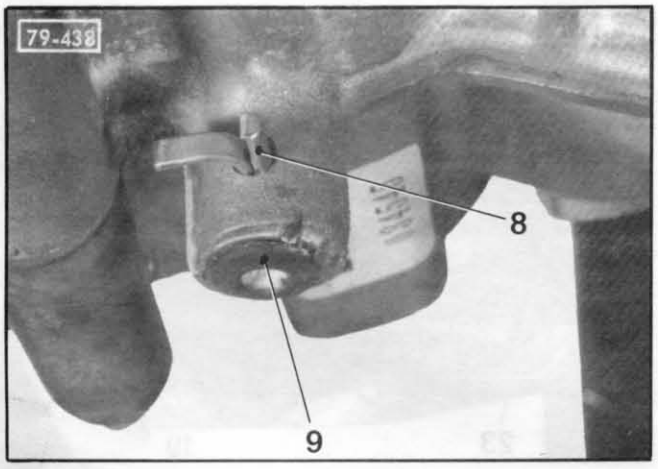
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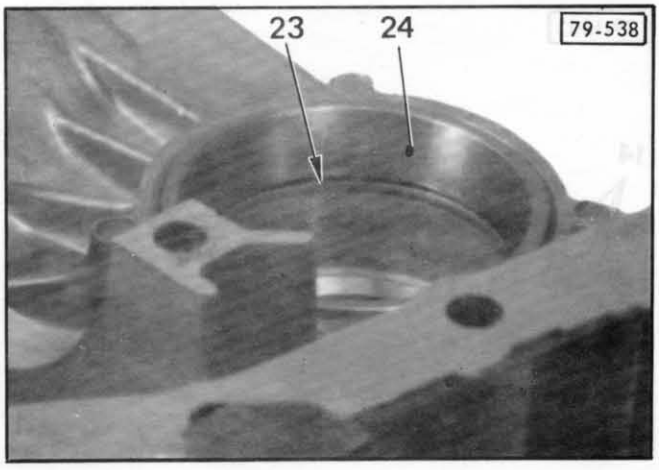
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- Remove :
  - nuts (1 and (2),
  - sychromesh hub (3),
  - 5th gear drive pinion (4),
  - driven pinion and spacer.

- Undo screws (5), and take down bearing thrust plate (6).

- Remove speedometer connector (7).

- Place a finger on plug (9), and extract pin (8).
- Remove plug (9).

- Undo assembly nuts and screws (10).
- Remove the right half-casing.

> Catch ball lock (11), swivel guide (16) and the thrust spring of guide (16) when they fall.

8. Remove :

- spring carrier plate (18),
- ball-joint (17),
- catch (14),
- spring (20), ball lock (21) and capsule (19),
- shaft and fork for 3rd/4th gear (15),
- ball lock under 3rd/4th gear fork shaft,
- primary shaft/drive shaft assembly (13),
- bevel pinion assembly (12),
- differential (22),
- outer bushes (24) for the differential bearings *(identify with corresponding bearing).*

> If the gearbox is dismantled for overhaul, without replacing the following :
>
> - casings,
> - crownwheel and pinion,
> - differential bearings,
> - differential.
>
> Index the position of adjustment shims (23), avoiding the need to readjust tooth engagement play.

II - STRIPPING DOWN GEARBOX ASSEMBLIES

1. Strip down the left half-casing :

If necessary, extract circlip (17) and seal (18).
extract pin (1), using a magnet.
Remove :
- shaft (3), reverse gear pinion (2) and spacer (4),
- shaft (7) and reverse gear lever (6),
- reversing light switch (10).

A - 4-SPEED GEARBOX

Remove reverse gear drive shaft (5) :
- Disengage the shaft rearwards, placing a finger over ball lock recess « a », to avoid the ball springing out.
- Extract the ball lock and spring.

B - 5-SPEED GEARBOX

Disengage 5th gear safeguard (11) as they jump
Disengage 5th gear safeguard (9) to the gear.

Catch plunger (12) and spring (11) as they jump out.

Disengage drive shaft (8) to the rear, placing a finger on ball lock recess « b » to prevent the ball springing out.
Extract the ball and its spring.
Extract pin (13) and drive shaft (8).

Do not remove shaft A under any circumstances

2. Strip down the right half-casing :

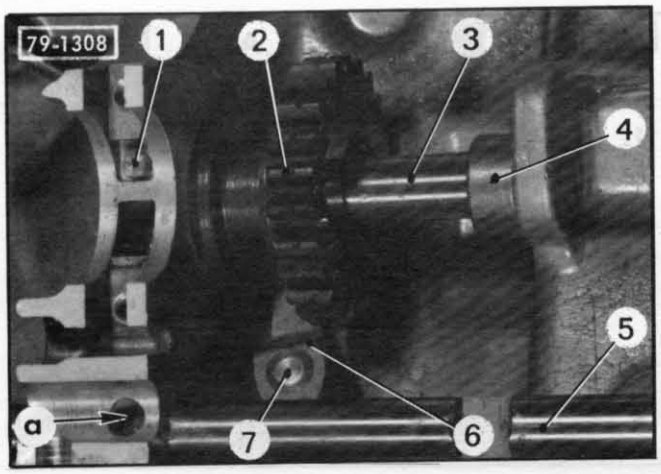
Remove :
- 1st/2nd gear shaft and fork *(place a finger over the ball lock orifice, to prevent the ball springing out).*

When extracting pin (16), place the assembly comprising shaft (15) and fork (14) against the rear shaft bearing, to avoid damage.

- Drain and level gauge plugs.
- circlip (17) and seal (18) if necessary.

3. Strip down the primary shaft :

Remove drive shaft (21), expanding circlip (19).
Remove needle bearing (20).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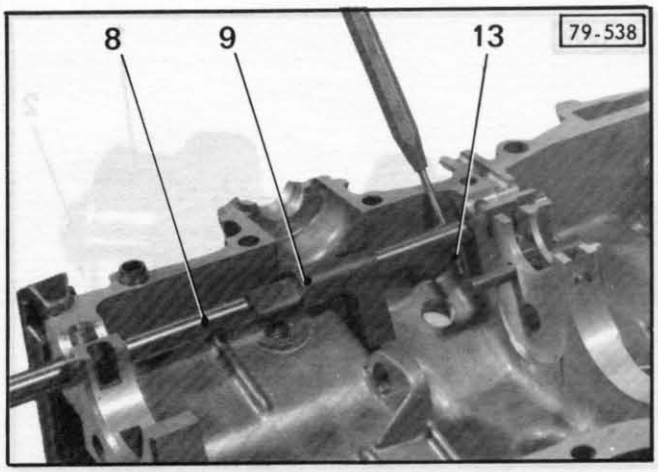
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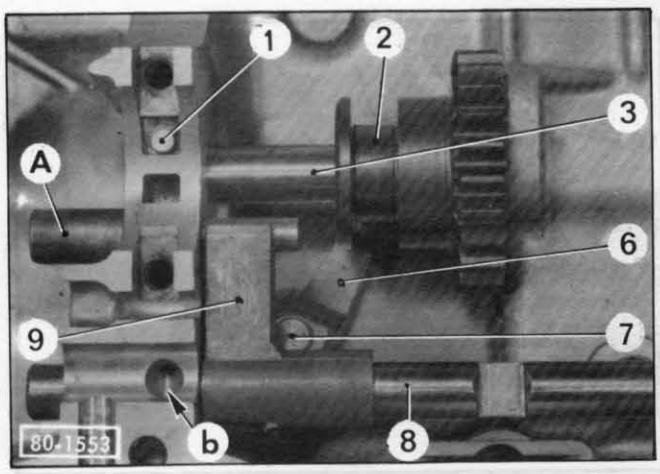
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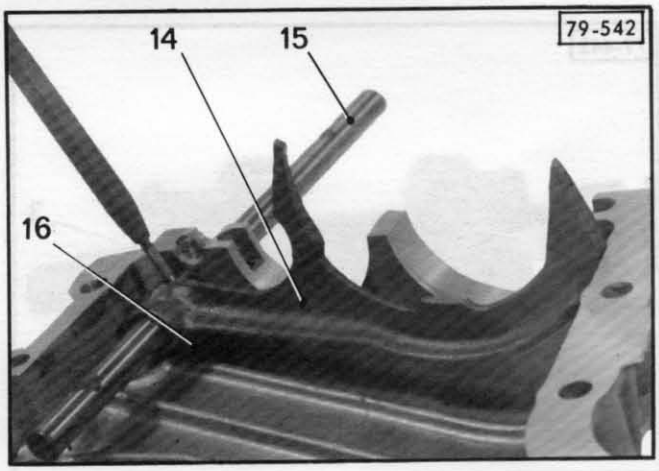
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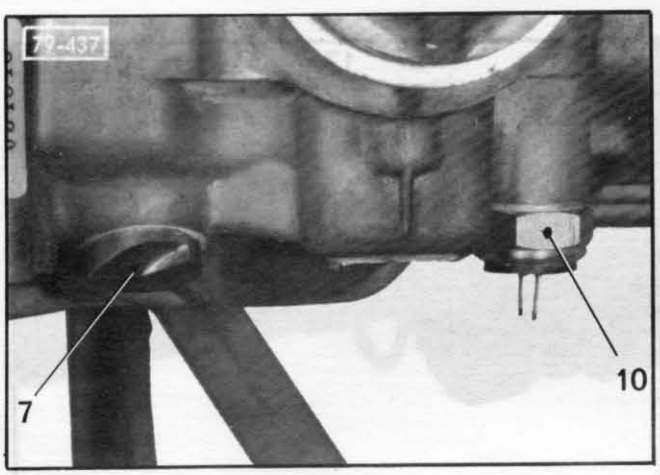
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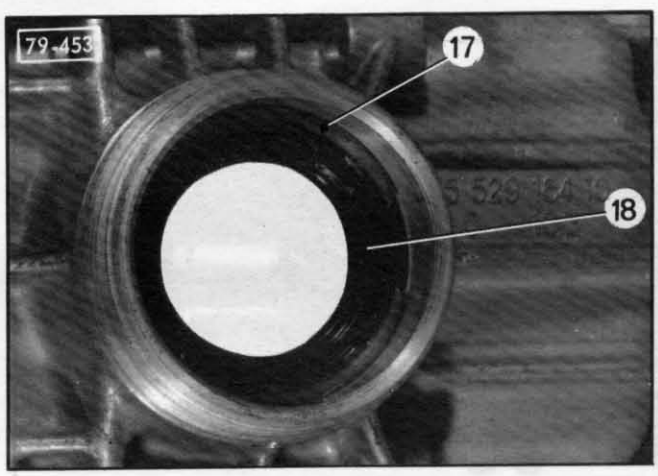
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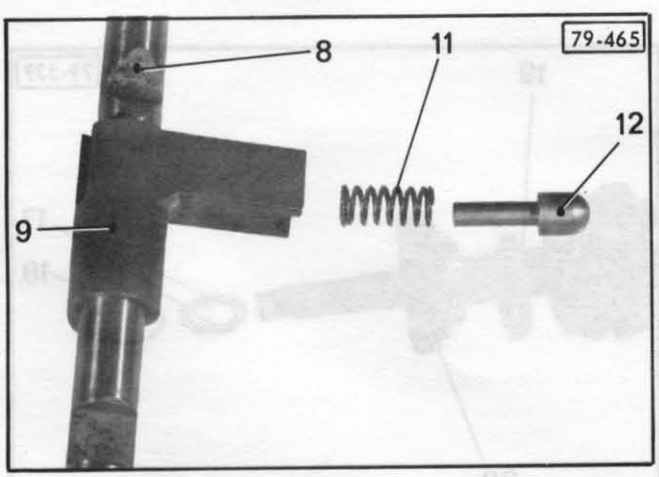
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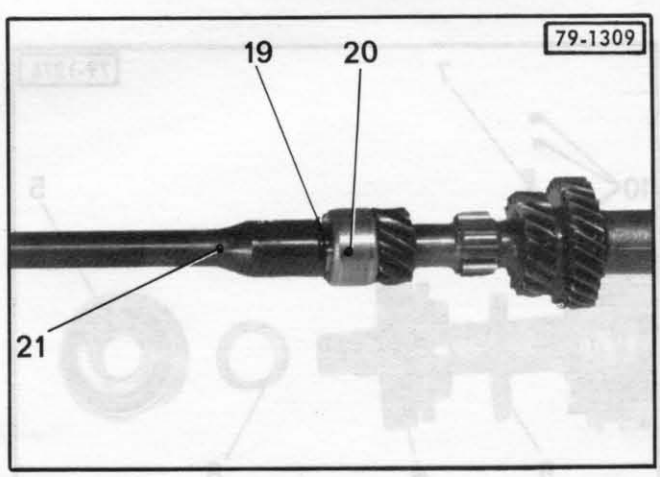
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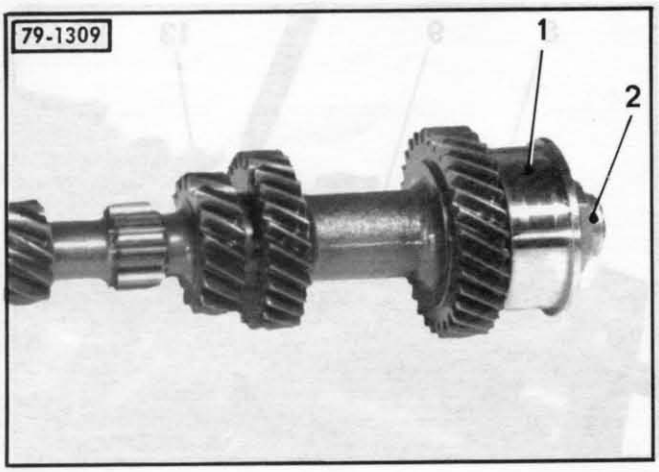
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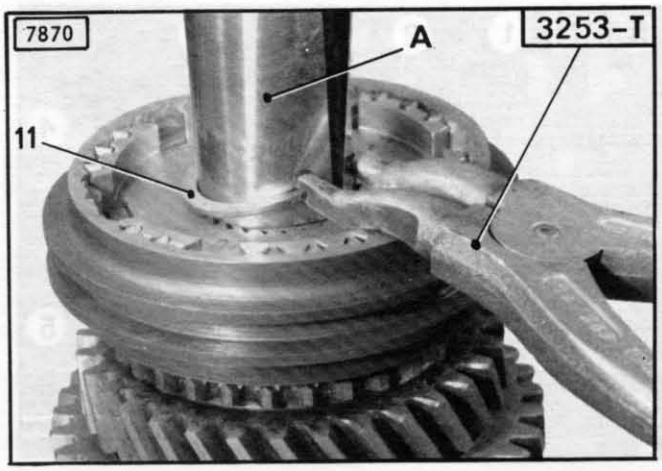
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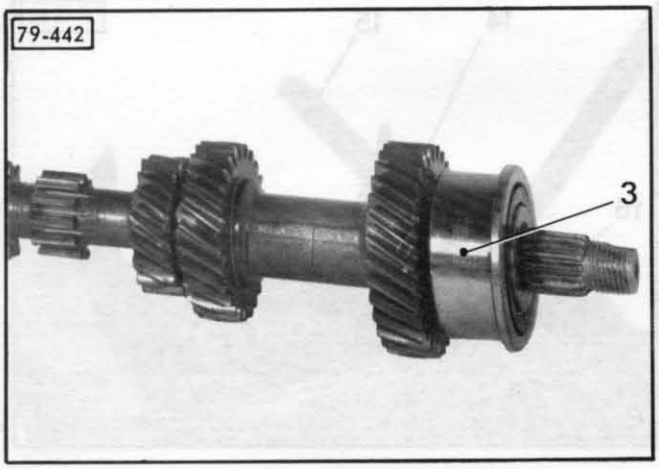
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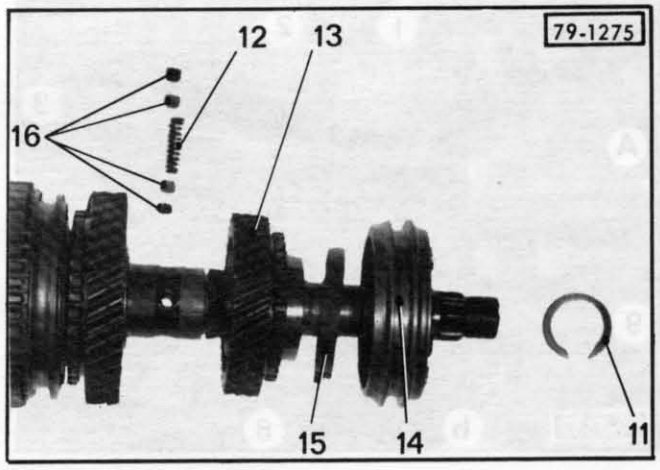
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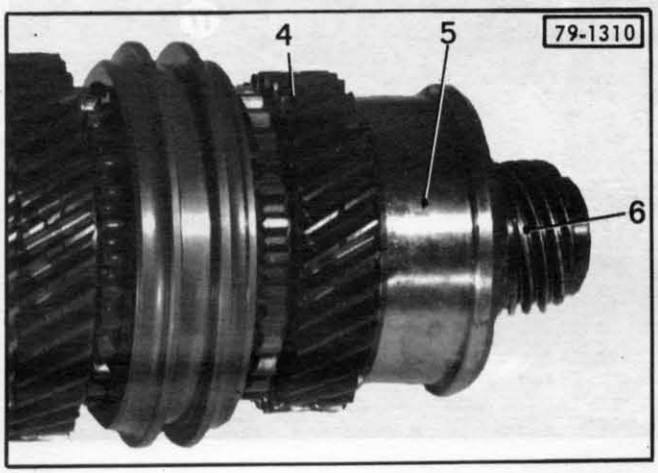
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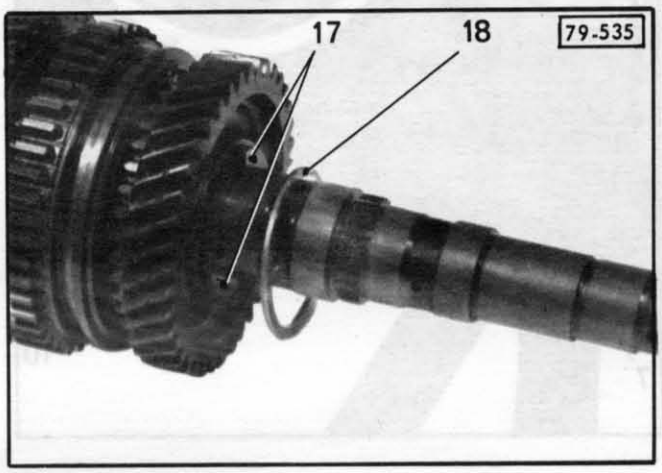
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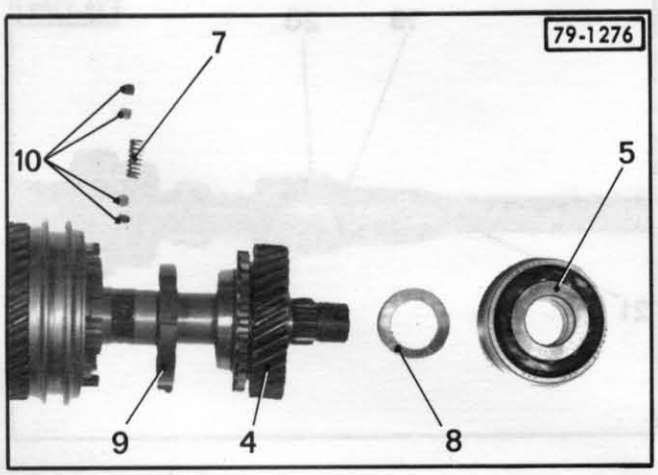
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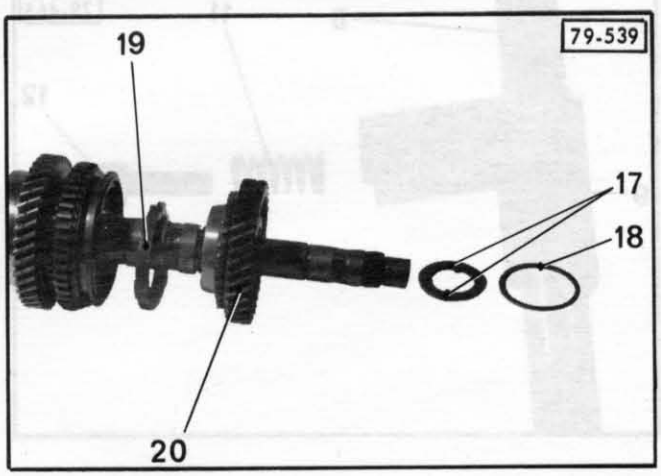
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A - 4-SPEED GEARBOX

Release and undo nut (2).
Extract bearing (1).

B - 5-SPEED GEARBOX

Extract bearing (3).

4. Remove the bevel pinion :

The contact surfaces of the gearwheels on the bevel pinion are threaded, and any trace of impact damage or scoring on these surfaces can cause binding of the parts when in operation. IT IS THEREFORE ESSENTIAL, to take the necessary precautions during disassembly.

A - 4-SPEED GEARBOX

Release and undo nut (6), then proceeding as for the five-speed box.

B - FIVE-SPEED GEARBOX

a) Remove :
- bearing (5),
- distance adjustment washer (8),
- 4th gear pinion (4) *(during disassembly, take care not to lose lock pins (10) and spring (7)),*
- 4th gear synchromesh ring (9).

If the gearbox is overhauled without replacing the following :
- casings,
- crown wheel and pinion,
- bearing (5).

Keep distance adjustment washer (8) to avoid the need for repeating the adjustment operation.

b) Remove stop ring (11).
For this purpose, wrap the end of the bevel pinion with sheet of foil « A » *(thickness 0.1 mm).*
Hold in contact with stop segment (11).
Open the ends of the stop ring slightly, using pliers 3253-T .
Slide the foil under the stop ring.
Remove stop ring (11), sliding over the foil.

c) Remove :
- 3rd/4th gear synchromesh hub and sliding gear assembly (14),
- 3rd gear synchromesh ring (15),
- 3rd gear pinion (13) *(during disassembly, do not lose lock pins (16) and spring (12).*

The 3rd gear and 4th gear synchromesh rings are identical. If these parts are not replaced, they must be kept paired with their existing pinions.

d) Remove :
- washer (18),
- two half-washers (17),
- second gear pinion (20),
- second gear synchromesh ring (19).

e) Extract stop ring (1) *(see paragraph b).*

f) Remove :
- 1st/2nd gear synchromesh hub and sliding gear (2),
- 1st/2nd gear synchromesh ring (3),
- 1st gear pinion (4).

The 1st and 2nd gear synchromesh rings are different. They must therefore be kept with their corresponding pinions.

The synchromesh rings are identified as follows :

A : 1st gear synchromesh ring :
- dissymetrical cone « a »,
- three bosses « d ».

B : 2nd gear synchromesh ring :
- symmetrical cone « b »,
- three bosses « d »

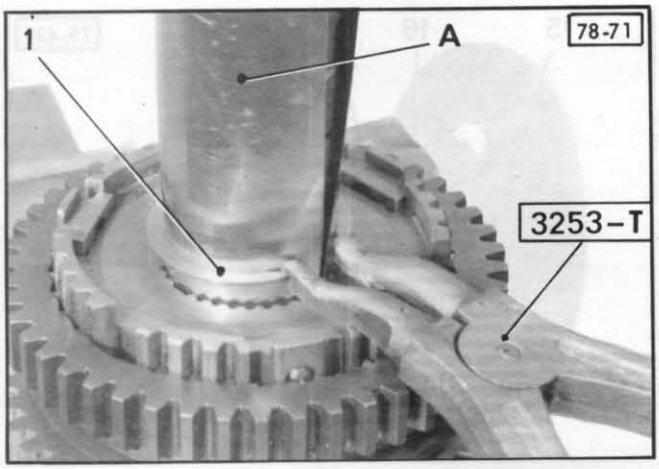
g) Remove :
- stop ring (6);
- bearing (5) *(disassembly in a press, using a tube with ID 50 mm, length 60 mm)*

5. Strip down the differential :

Remove :
- bearing (7) (use universal extractor 2400-T and stud H from kit 3184-T bis).
- circlip (9),
- shaft (8),
- two satellite gears (12),
- two planet gears (10),
- crown wheel (11).

6. If necessary, strip down the gearbox drive outlet shafts :

Remove :
- bush (15), bearing (14) and ring nut (13), using universal extractor tool 2400-T and taking purchase on ring nut (13).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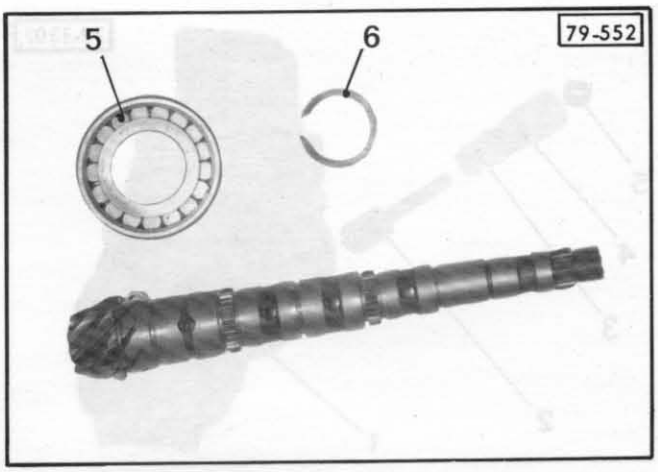
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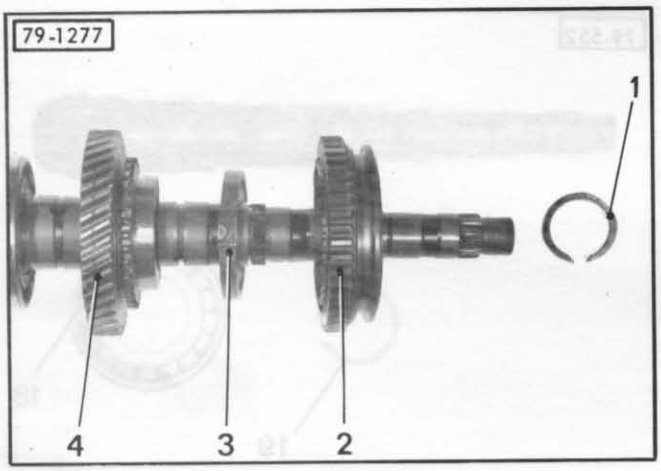
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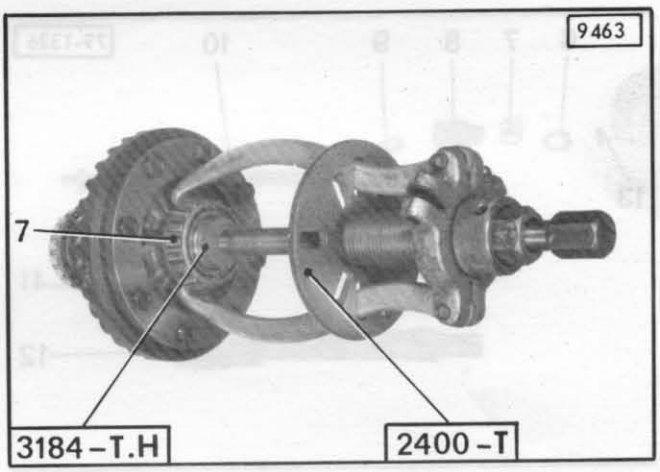
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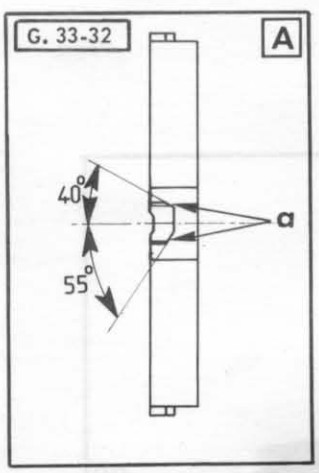
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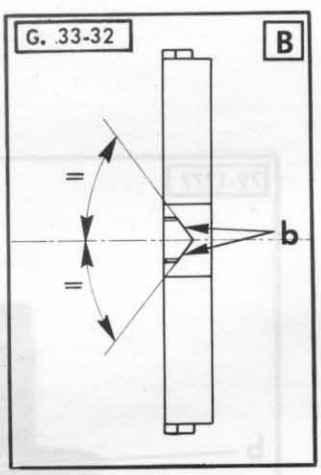
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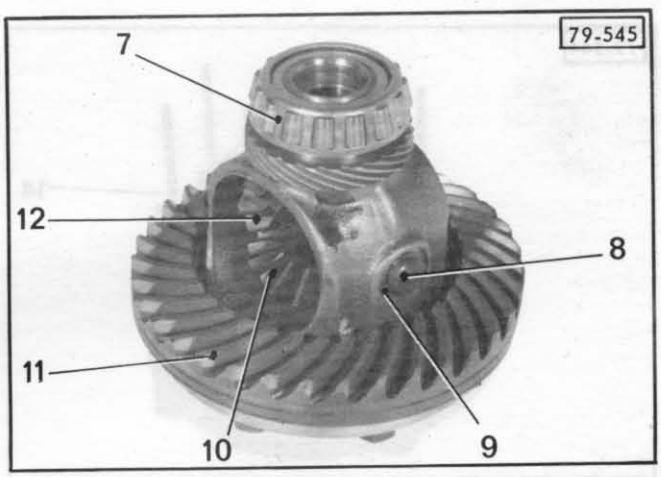
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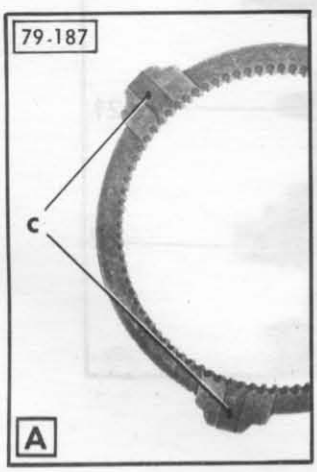
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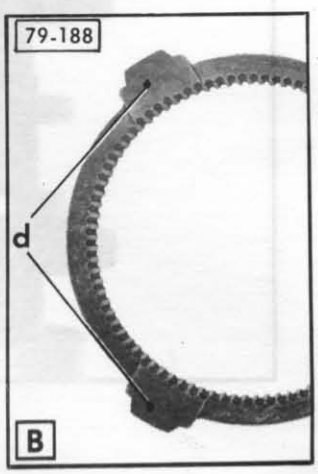
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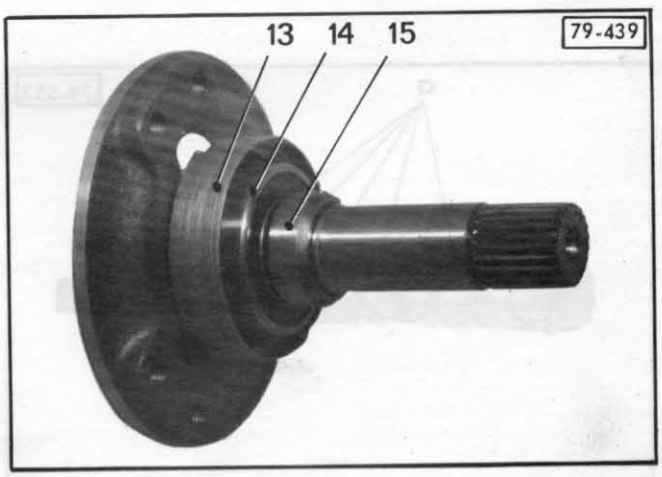
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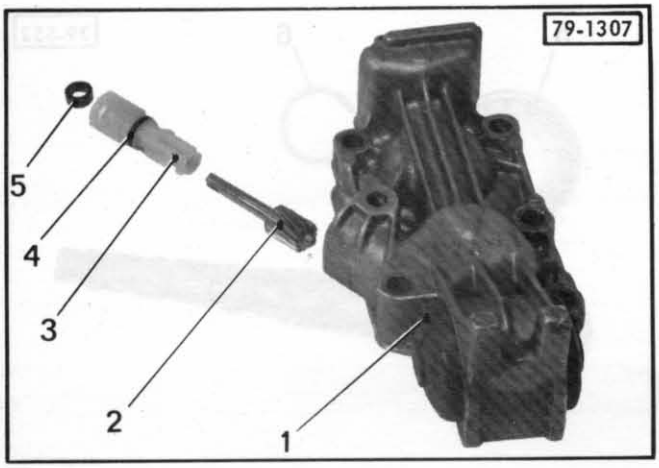
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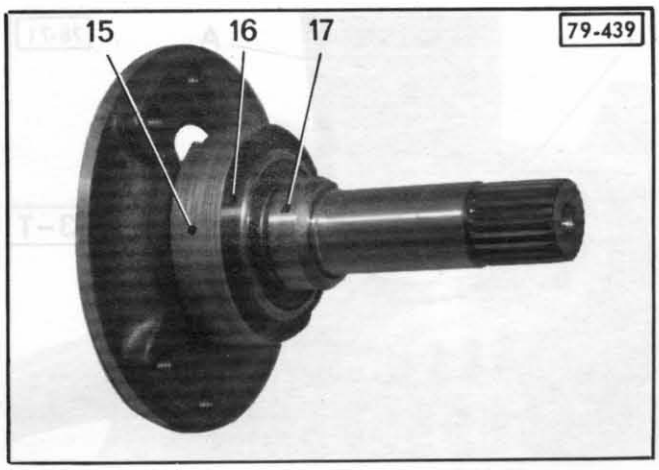
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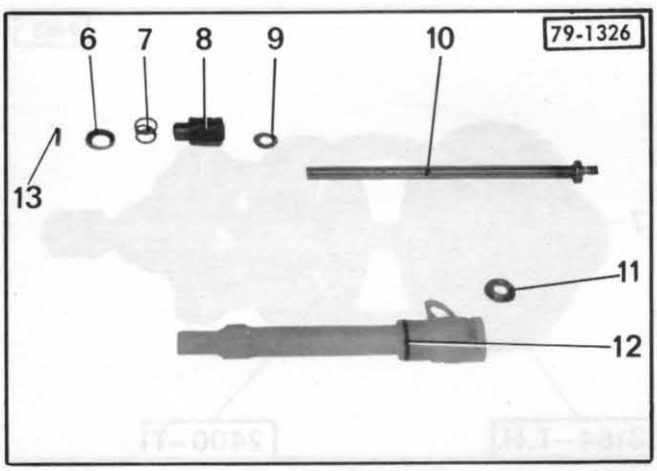
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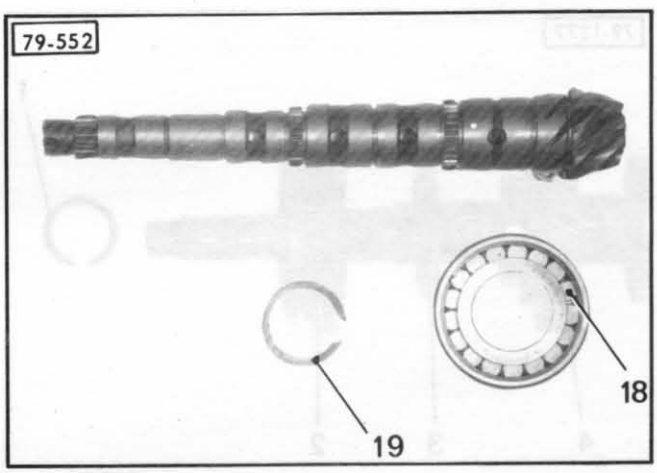
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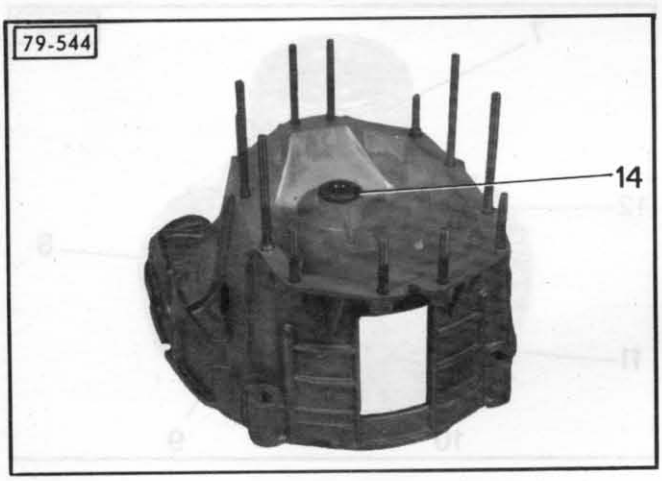
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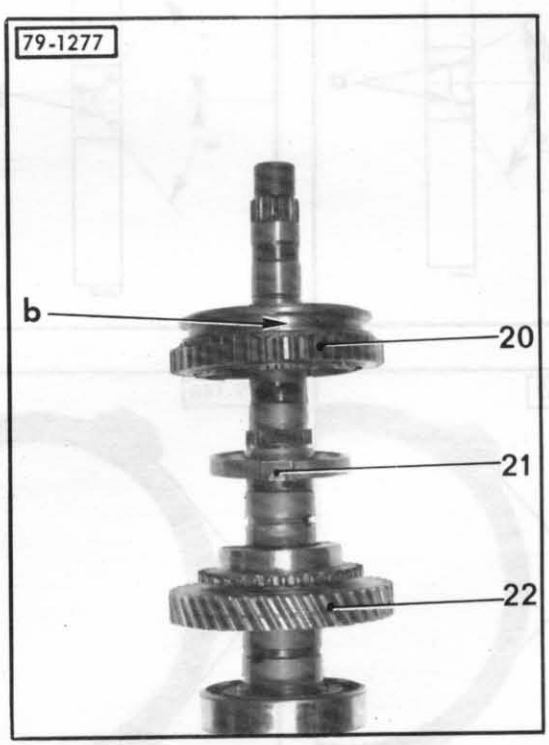
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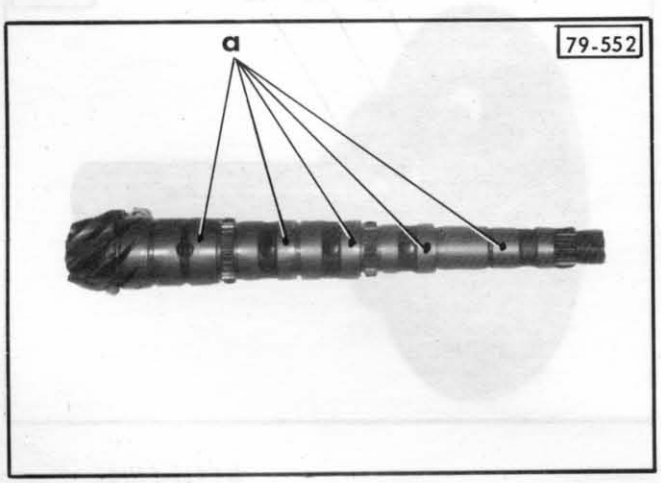
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7. *FOUR-SPEED GEARBOX*

Srip down the rear cover :

Disengage speedometer connector (3) from rear cover (1).

Disengage pinion (2).

Remove seals (4) and (5).

8. *FIVE SPEED GEARBOX*

Strip down the speedometer drive system

Remove :

- pin (13), by compressing spring (7),
- cup washer (6),
- spring (7),
- pinion (8),
- washer (9),
- shaft (10),
- spacer (11),
- seal (12).

9. If necessary, strip down the clutch housing :

Remove :

- studs,
- seal (14).

10. Clean the parts.

Machining of drive pinion surfaces « a » is strictly prohibited.

III - PREPARATION OF ASSEMBLIES

1. If necessary, prepare the gearbox drive outlet shafts.

On each shaft, fit :

- ring nut (15),
- bearing (16) and ring nut (17) *(assemble in a press, using a tube with ID 26 mm, length 120 mm).*

Ring nut (17) (in contact with the seal) must show no traces of cutting or scoring.

2. Prepare the drive pinion assembly :

Oil all parts before fitting :

a) Fit bearing (18) :

Assemble in a press, using a tube *(with ID 45 mm, length 220 mm).*

Fit stop ring (19) *(see paragraph b) on page 13)*

b) Fit :

- 1st gear pinion (22),
- 1st gear synchromesh ring (21) *(see paragraph 4, subparagraph f), page 14),*
- 1st/2nd gear synchromesh hub and sliding gear assembly (20).

A - FOUR-SPEED GEARBOX

Groove « b » at 1st gear pinion end.

B - FIVE-SPEED GEARBOX

Groove « b » at 2nd gear pinion end.

c) Adjust 1st/2nd gear synchromesh hub axial play.
Select stop ring (1) as sold by the Replacement Parts Department, giving **J1 = 0.05 mm max.**
The thickness of ring (1) ranges from **1.42 to 1.58 mm** (0.04 mm increments).

d) Fit stop ring (1) *(see paragraph 4, subparagraph b), page 13).*

e) Fit :
- 2nd gear synchromesh ring (5) *(see paragraph 4, subparagraph f, page 14),*
- 2nd gear pinion (4).

f) Adjust 2nd and 3rd gear pinion stop play.
Select half-washer (3) as sold by the Replacement Parts Department, giving :

J2 = 0.05 mm max.

The thickness of half-washers (3) must have the same ranges from **2.56 to 2.71 mm** (0.03 mm increments)

The two half washers (3) must have the same thickness.

g) Fit :
- two half-washers (3),
- washer (2).

h) Fit :
- lock pins (11) and spring (10),
- 3rd gear pinion (9) (use tool MR. 630-27/18),
- synchromesh ring (8),
- 3rd/4th gear synchromesh hub and sliding gear assembly.

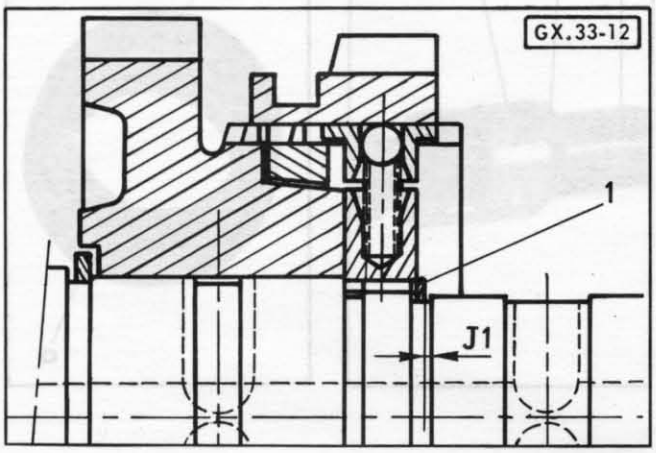
Synchromesh hub and sliding gear assembly (7) is symmetrical.

i) Adjust 3rd/4th gear synchromesh hub axial play.
Select stop ring (6) as sold by the Replacement Parts Department, giving :

J3 = 0.05 mm max.

The thickness of stop rings (6) ranges from **1.42 to 1.58 mm** (0.04 mm increments).

j) Fit stop ring (6) *(see paragraph 4, subparagraph b), page 13).*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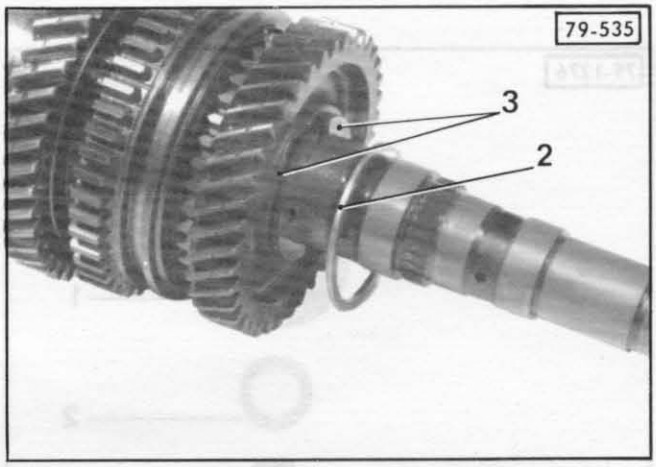
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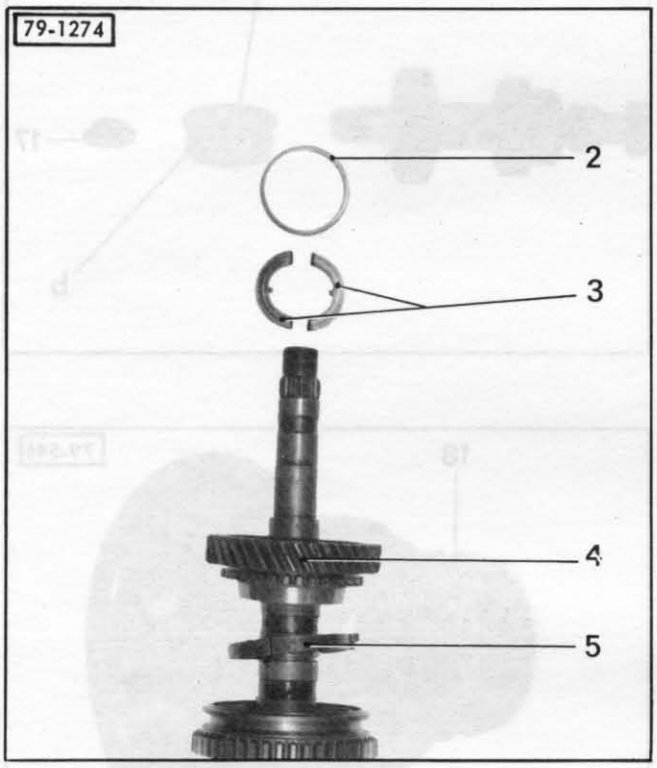
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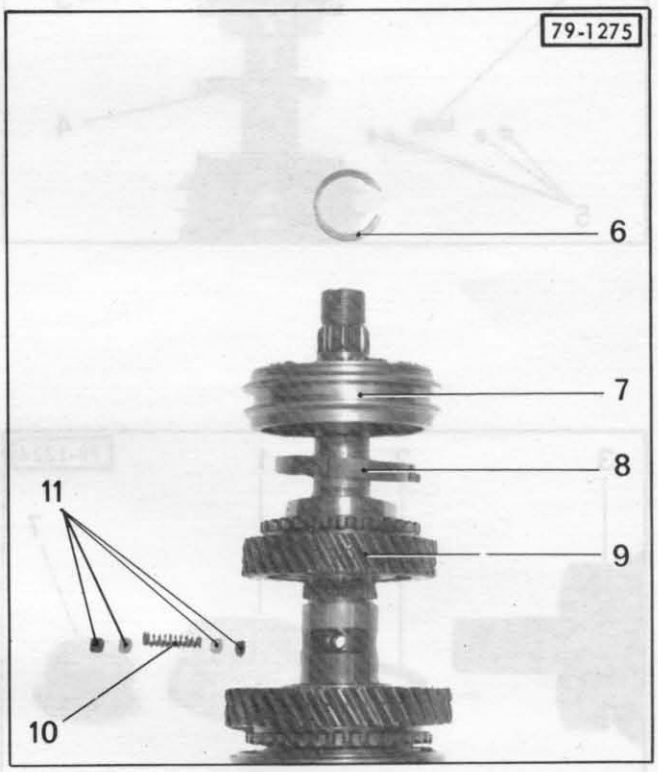
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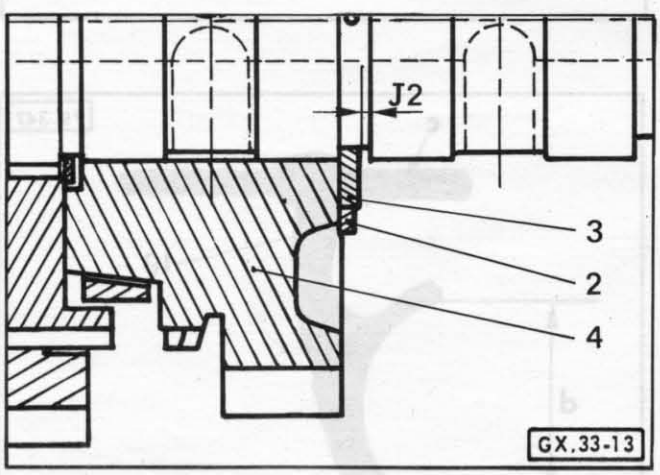
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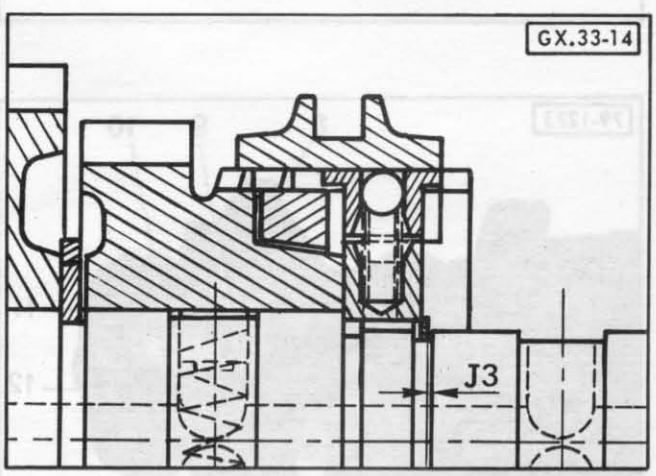
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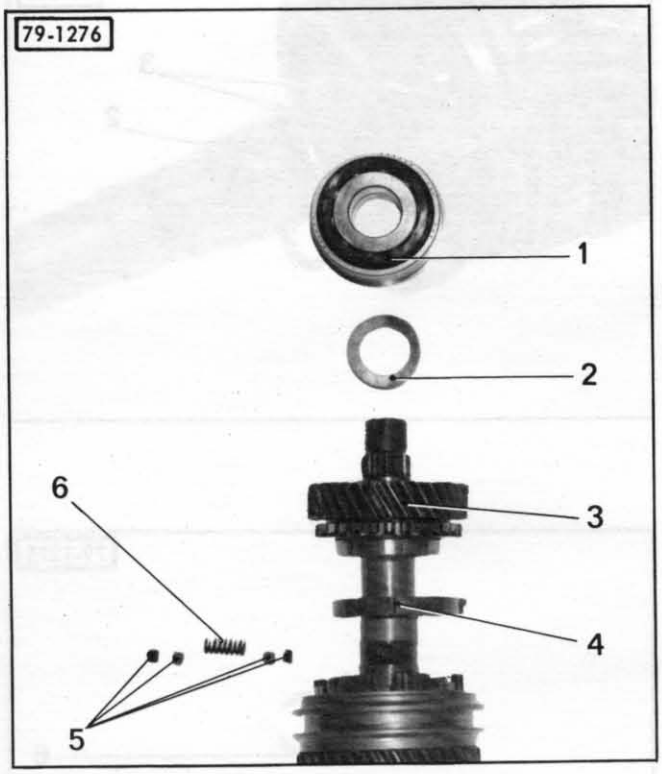
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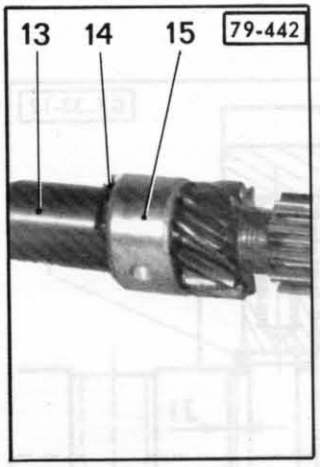
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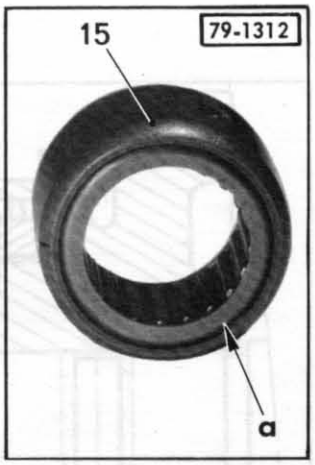
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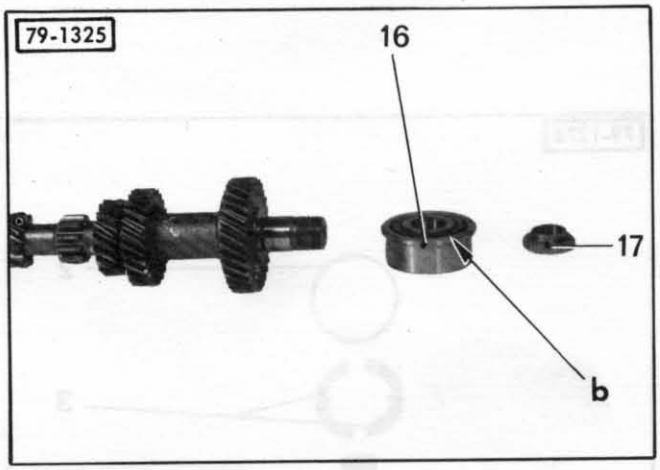
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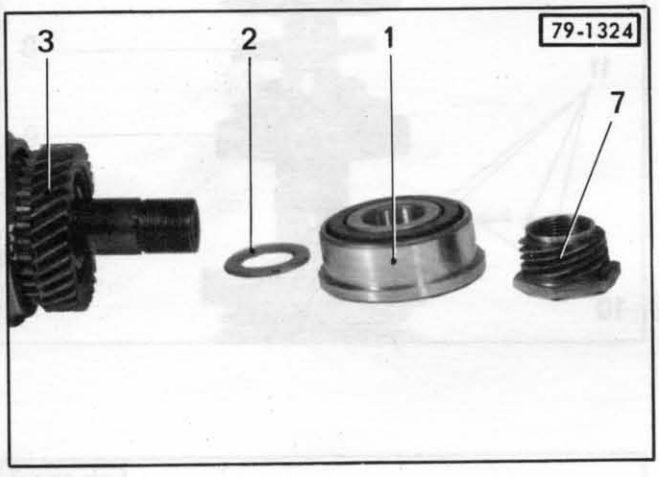
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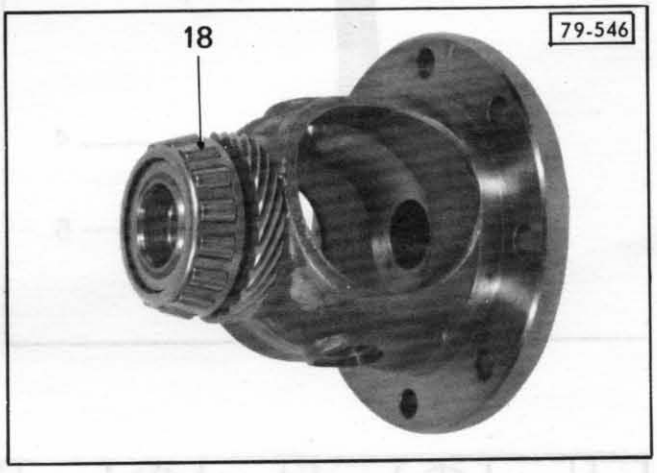
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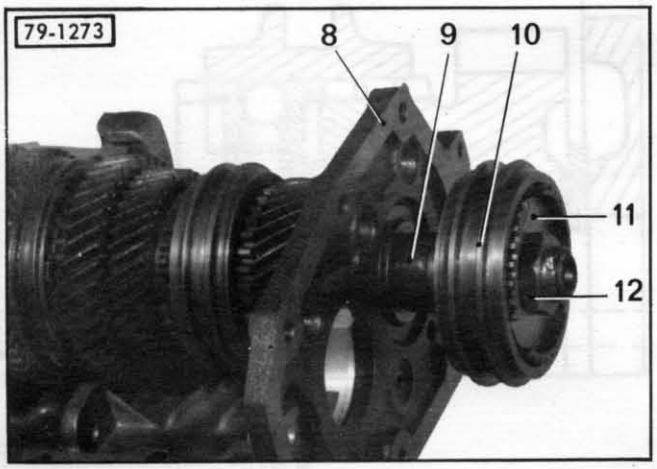
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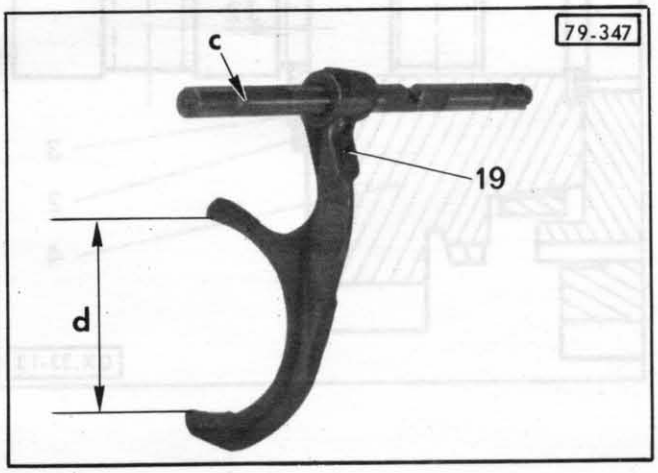
79-347
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d

k) Fit :
- spring (6) and retarding dowels (5),
- 4th gear pinion (3) with synchromesh ring (4) (use tool MR. 630-27/28),
- adjustment washer (2), *after measuring its thickness,*
- bearing (1).

A - 4-SPEED GEARBOX

♦ Fit nut (7) and tighten it **to between 10 and 12 m.daN** *without locking it (adjustment of crown wheel and pinion distance).*

B - 5-SPEED GEARBOX

For crown wheel and pinion distance adjustment only.
Fit :
- thrust plate (8),
- 5th gear pinion spacer (9),
- 5th gear synchromesh hub and sliding gear assembly (10),
- stop washer (11),
- nut (12); tightening it **to between 22 and 25 m.daN** *(do not lock).*

To tighten nut (7) or (12), hold the drive pinion in a vice (fitted with soft jaws), by means of the first gear pinion.
Clamp the 1st/2nd gear sliding gear.

3. Prepare the drive shaft/primary shaft assembly :

a) Fit needle bearing (15) *(face « a » towards the drive shaft).*

b) Couple drive shaft (13) to the primary shaft, slightly opening the ends of circlip (14).

A - 4-SPEED GEARBOX

Fit the ball bearing (16) *(shoulder « b » towards the rear).*
Tighten nut (17) to between 6 and 7 m.daN and lock.

B - 5-SPEED GEARBOX

Fit ball bearing (16) *(shoulder « b » towards the rear).*

4. Prepare the differential housing :

Fit bearings (18) in a press, using a tube with *ID 36 mm, OD 45 mm, and length 40 mm.*

Assembly of the differential is completed after adjustment of the crown wheel and pinion.

5. Prepare the 3rd/4th gear fork :

- Opening « d » in the 3rd/4th is smaller than that in the 1st/2nd gear fork.
- The 3rd/4th gear drive shaft is identified by flat « c » for its catch.

Fit stop pin (19).
Oil the shaft lightly, and grease the locking slots.

♦ 6. Prepare the clutch casing *(if necessary)*

a) Grease the housing bore and seal periphery.
Fit the seal *(with metal collar (5) visible on the stud side)*, using mandrel **G** from kit 3184-T bis.

b) Replace the thrust guide sleeve
(see Op. GX. 311-3).

c) Insert the assembly studs.
The studs are of 3 different lengths, and are arranged as follows :
- longest studs at (4) and (6),
- medium length studs at (3),
- shortest studs in other positions.

The shorter threaded part screwed into the clutch casing.

d) Check that alignment rings (1) and (2) are in position.

e) Fit anti-rattle bushes (10) in springs (11) *(collars face to face)*.
Oil shaft (12) slightly.
Engage shaft (12) in one port « a » in the casing, and then in the spring, fork and bearings.
Position the shaft and fit screw (9) (apply LOCTITE OLEOETANCH).
Position the two ends of spring (11) in contact with bosses « b » on the casing.
Fit stop (8) *(grease guide)*.
Fit strip (7), blocking the stop onto the fork.

7. Prepare the right half-casing :

The five locking balls (14) are identical. Springs (13) and (17) have the same length *(20 turns)*.
Spring (18) is shorter *(14 turns)*

a) Oil shaft (16) lightly, and grease locking slots « c ».

b) Engage shaft (16) in the rear bearing (with slot « c » at the differential end.

c) Engage 1st/2nd gear fork (15) on shaft (16).

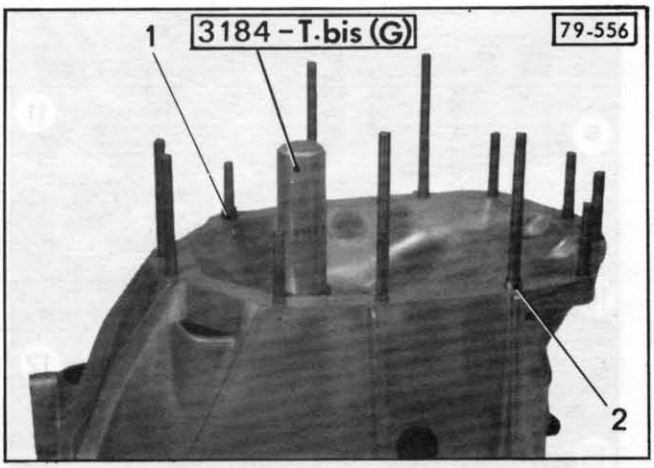
d) Fit stop pin (19) in the fork.

To insert the pin, place the shaft/fork assembly against the rear bearing, to avoid damage.

e) Grease spring (13) and ball (14) and insert in recess « d ».

f) Compress the ball and spring (using a 5 mm rod), and engage shaft (16) in its front bearing.

g) *FIVE-SPEED GEARBOX*
Fit the speedometer drive.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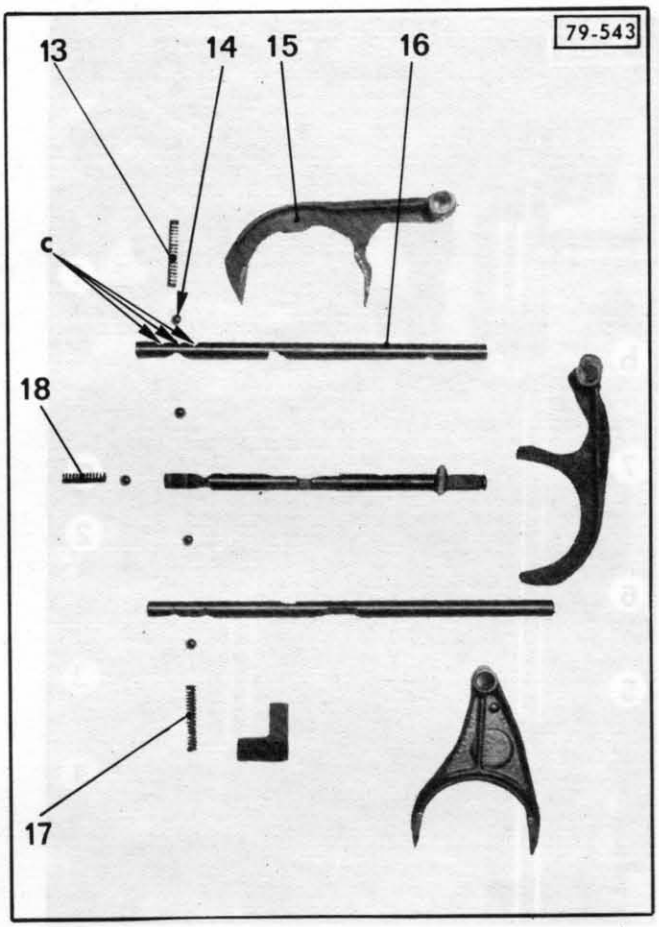
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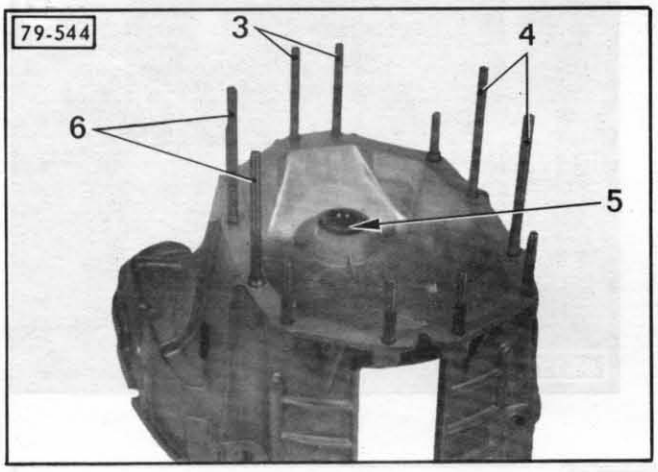
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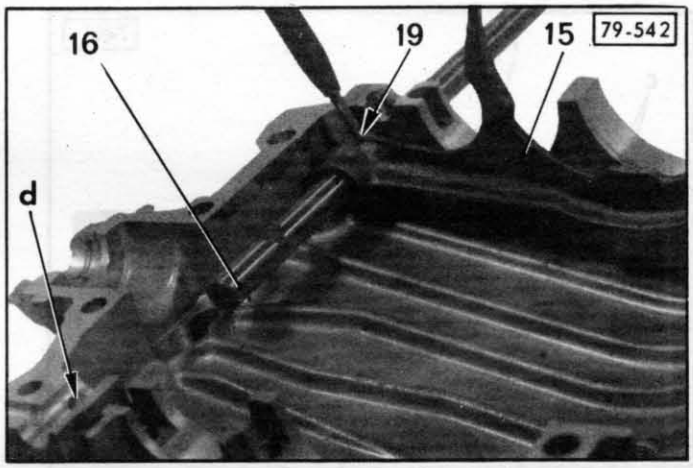
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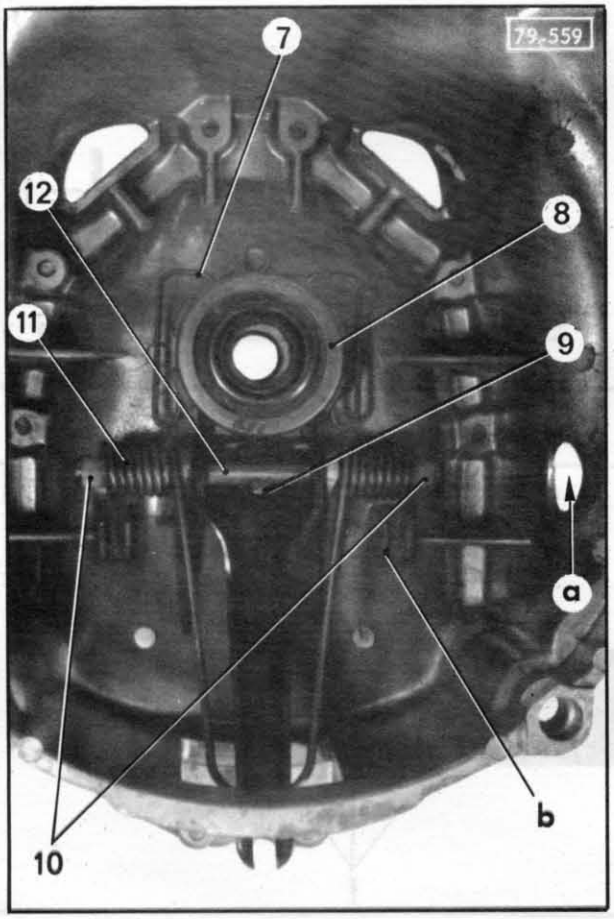
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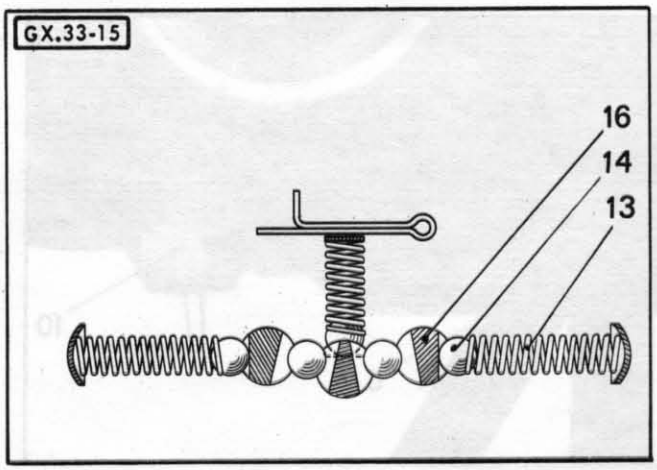
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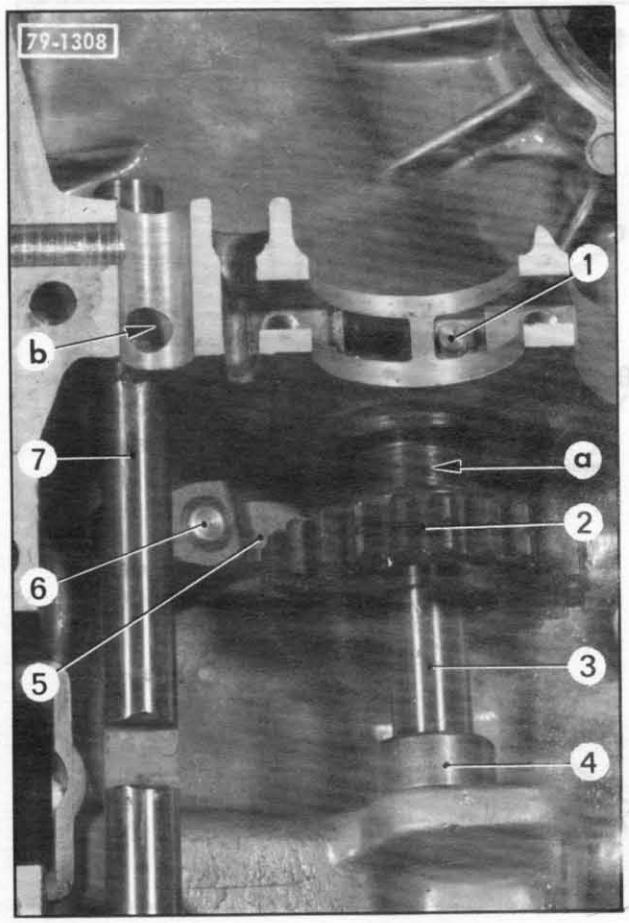
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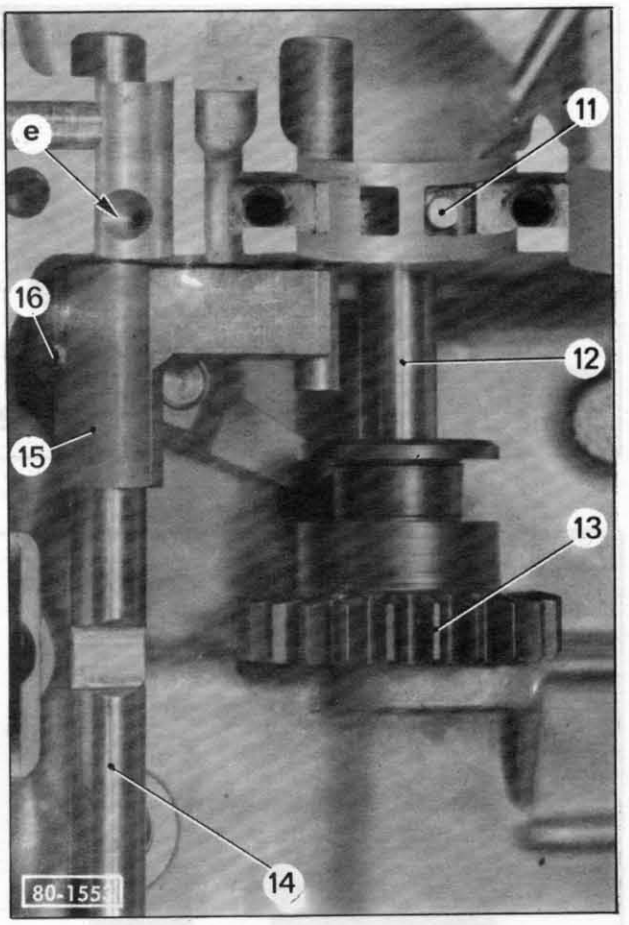
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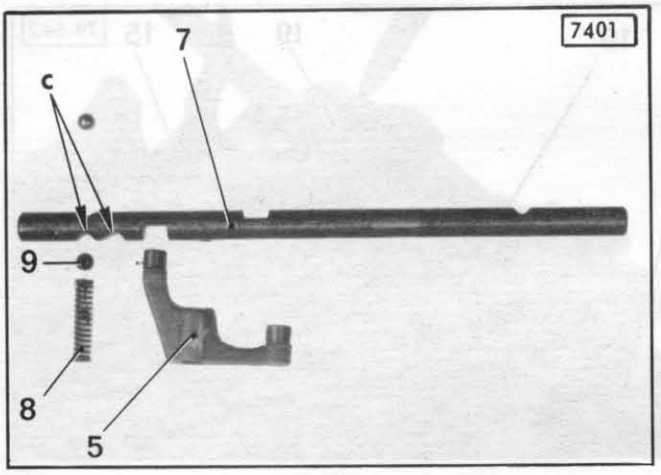
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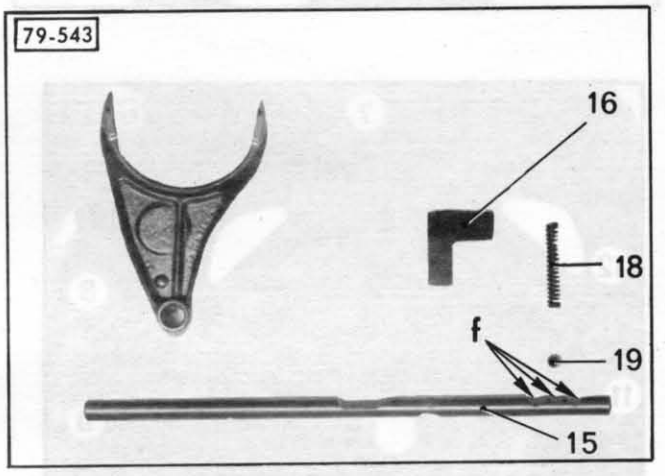
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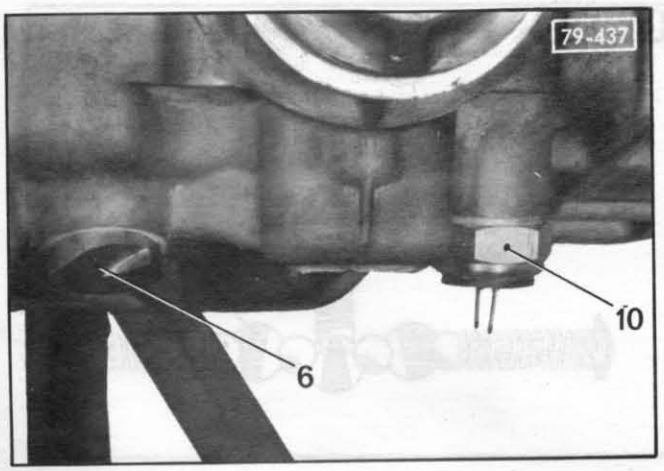
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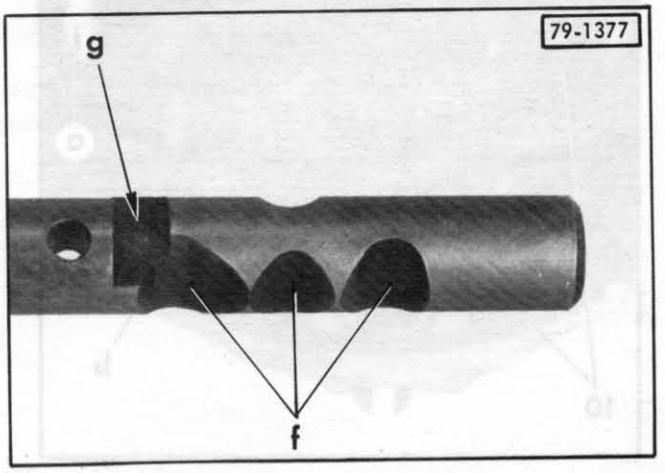
79-1377
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f

8. Prepare the left half-casing :

A. *FOUR-SPEED GEARBOX*

a) Oil shaft (3) and engage in the rear bearing *(stop slot at differential end).*

b) Fit :
- spacer (4),
- pinion (2) *(groove « a » on differential side).*

c) Complete assembly of shaft (3) and insert pin (1) fully home in its recess.

> Pin (1) should stand slightly proud, as it serves as a stop for the primary shaft needle bearing.

d) Oil drive shaft (7), and grease locking slots « c ».

e) Engage shaft (7) in the rear bearing *(locking slots « c » at differential end).*

f) Grease spring (8) and ball (9) and insert them in recess « b ».

g) Compress the spring and the locking ball *(using a 5 mm rod),* and engage the shaft in its front bearing.

h) Fit reverse gear lever (5).

i) Fit and tighten lever (6) to shaft (5).

j) Fit and **tighten reversing light switch (10) to between 1.2 and 1.5 m.daN**

B. *FIVE-SPEED GEARBOX*

a) Oil shaft (12) and engage in the rear bearing *(stop slot at differential end).*

b) Fit :
- pinion (13) (groove « d » on differential side),

c) Complete assembly of shaft (12) and engage pin (11) fully home in its recess.

> As for the 4-speed gearbox, the pin should stand slightly proud, as it serves as a stop for the primary shaft needle bearing.

d) Oil drive shaft (14) and grease locking slots « f ».

e) Engage shaft (14) in its rear bearing *(locking slots « f » at differential end).*

f) Engage the 5th gear safeguard (15) on shaft (14).

g) Insert pin (16) engaging it on the opposite side to slot « g ».
Leave the pin standing proud by 3 to 3.5 mm.

h) Grease spring (17) and ball (18), and insert them in recess « e ».

i) Compress the spring and the locking ball *(using a 5 mm rod),* and engage shaft (14) in the front bearing until hole « e » is blanked.

j) Fit plunger (4) and spring (3) in 5th gear safeguard (2).

k) Position pin (8) fully home in the safeguard recess.

l) Fully compress plunger (4), which should engage in slot « a » of shaft (1).

m) Complete assembly by pushing shaft (1), and bringing safeguard (2) onto locking shaft (5).

n) Fit reverse lever (6).

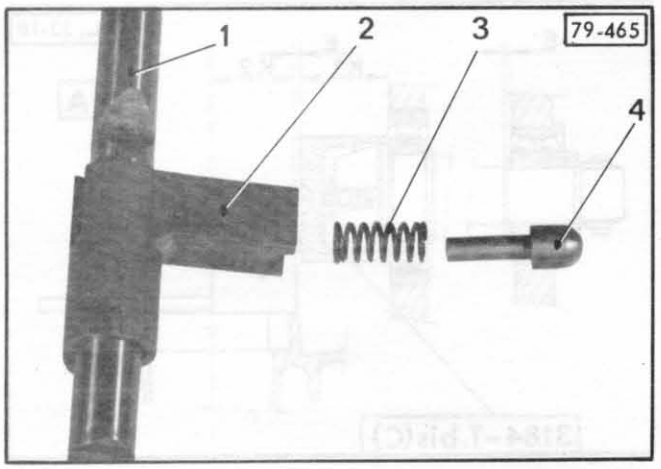
o) Fit and tighten lever (6) to shaft (7).

p) Fit and **tighten reversing contactor (9) to between 1.2 and 1.5 m.daN.**

9. Fit the gearbox outlet drive shaft seals, via the inside of the half-casing :

On each half-casing :

- Insert clip (11) in the bore, using sheet of foil **A** *(length 150 mm, thickness 0.2 mm and width 60 mm).*
- Grease the recess, and the periphery of seal (10).
- Position the seal, *with the marked face upwards.*
- Bring the seal onto circlip (11), using mandrel MR. 630-33/8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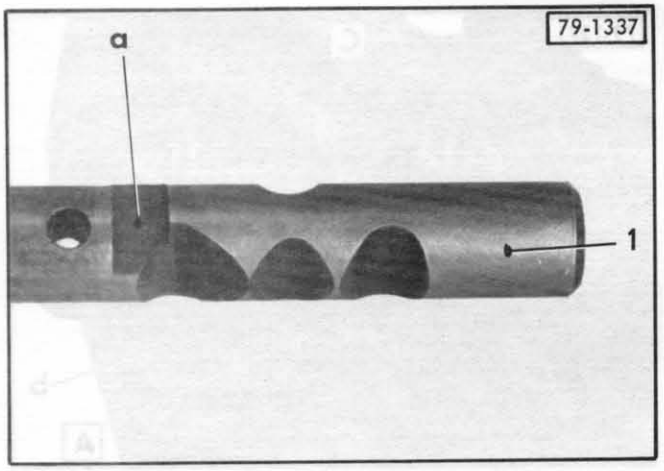
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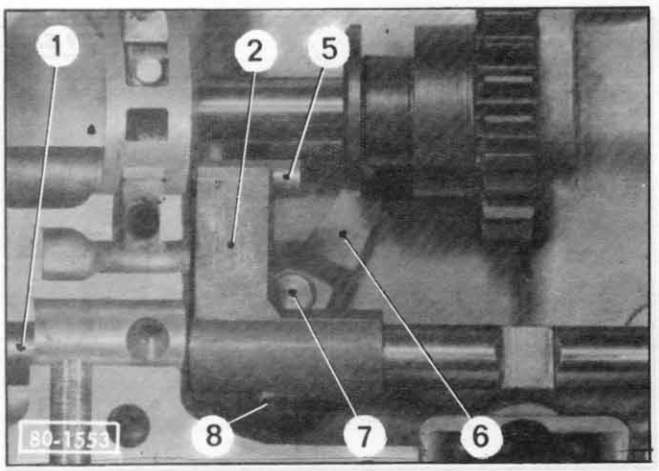
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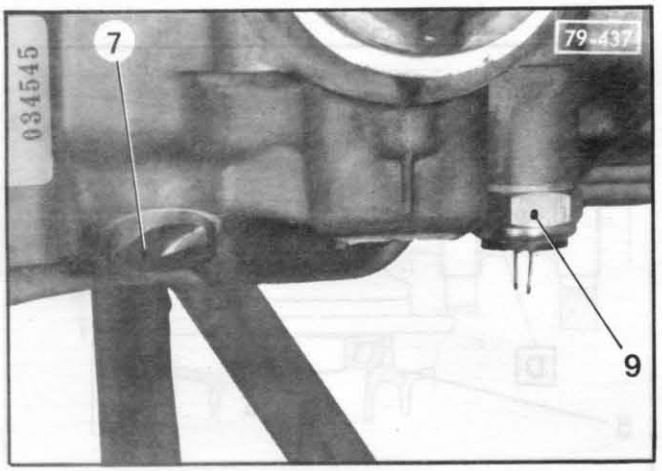
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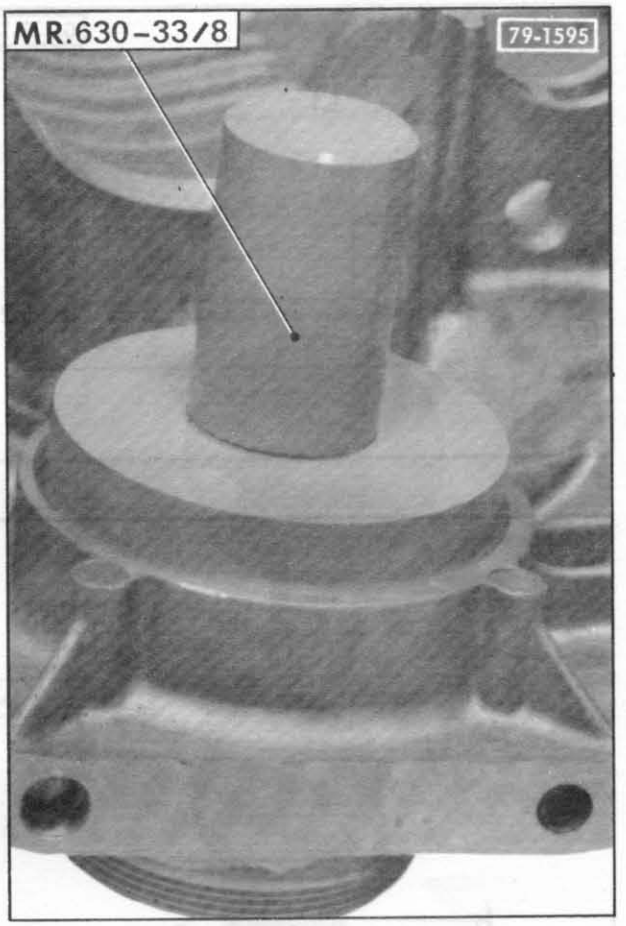
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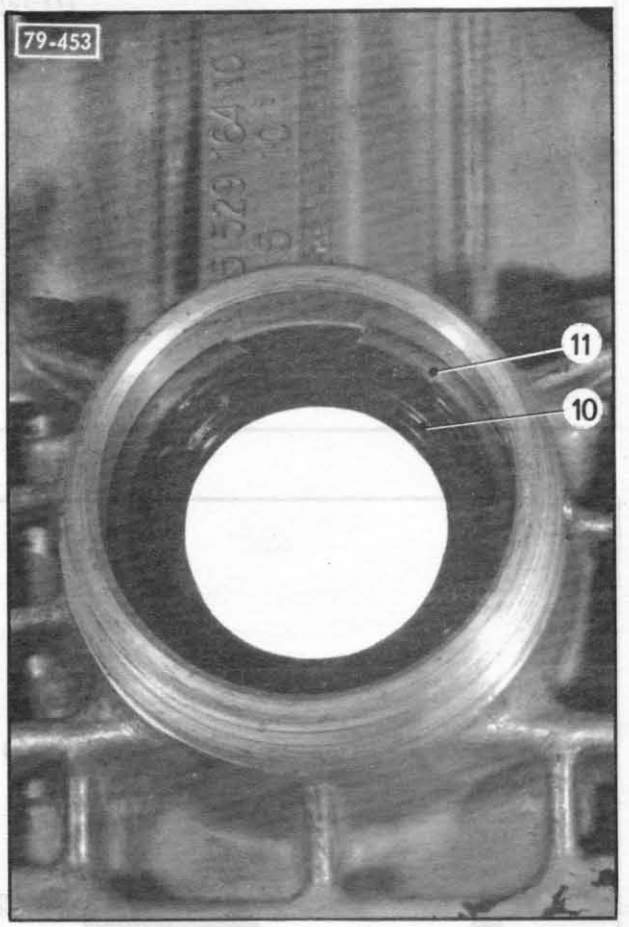
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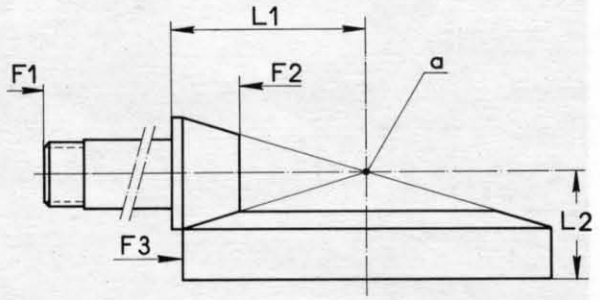
G. 33-13



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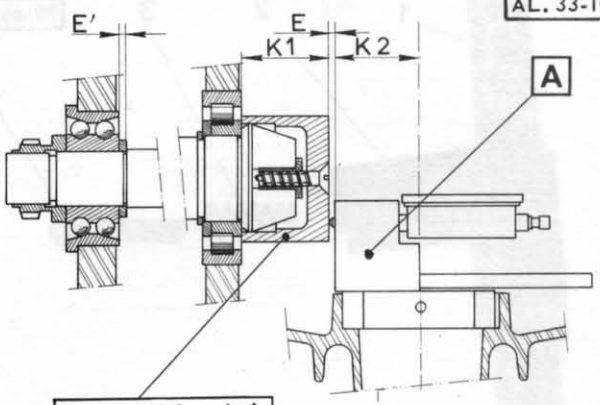

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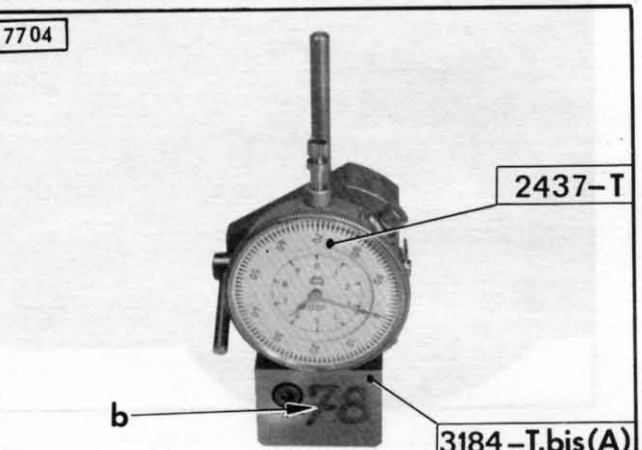

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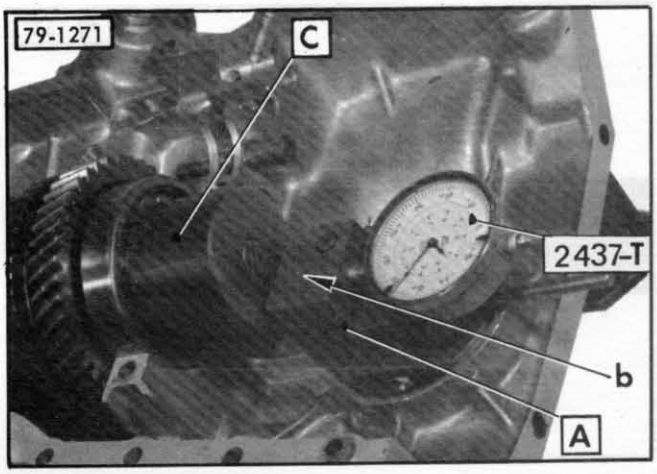

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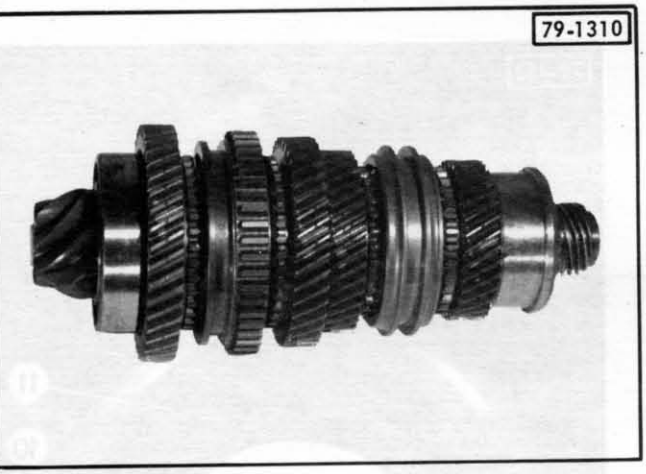

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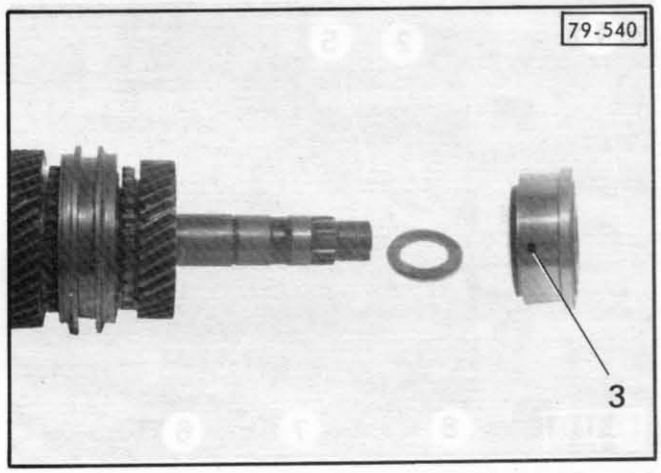

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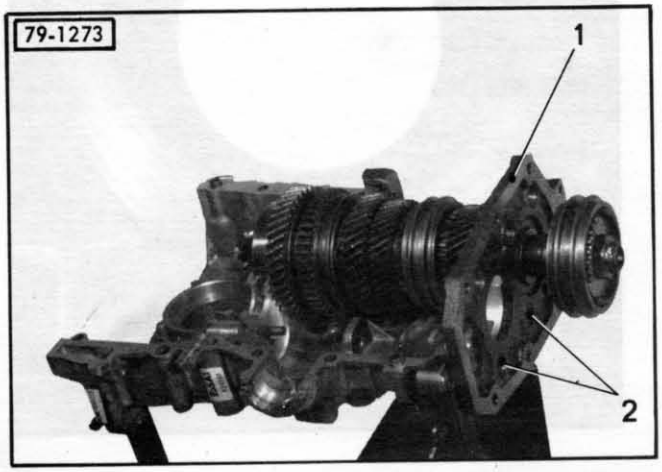

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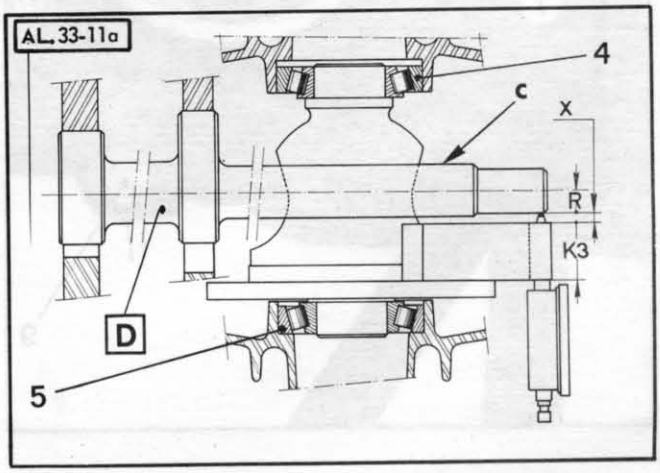


IV - ADJUSTMENT OF CROWN WHEEL AND PINION

The drive pinion and crown wheel are paired and identified by identical inscriptions engraved on face F1 or F2 of the drive pinion, and side F3 of the crown wheel.

Never unmatch a crown wheel and pinion set.

Two dimensions are also engraved on side F3 of the crown wheel.
Larger dimension L1 : distance from rear face of pinion to intersection point « a ».
Shorter dimension L2 : distance from crown wheel contact face on housing to intersection « a » of the crown wheel and pinion shafts.

1. Principle of crown wheel and pinion adjustment :
The drive pinion is positioned with respect to the differential shaft, and the crown wheel with respect to the drive pinion shaft, ensuring correct engagement of pinion and crown wheel.

2. Adjust the crown wheel and pinion distance, L1 :

a) Fit dial gauge [2437-T] on support [A] from kit [3184-T bis]
Calibrate the assembly on a calibration table, with the dial **O** mark opposite the large needle.
Index the position of the totalizer needle.

b) *Four-speed gearbox :*
Fit the drive pinion assembly in the left half-casing, and fix the rear cover with three screws.

c) *Five-speed gearbox :*
Fit the complete drive pinion assembly *(paragraph 2, subparagraph k or B, page 21).*
Fit thrust plate (1) by three screws (2).

d) Fit cap [C] and support [A] equipped with the calibrated dial gauge.

Cap [C] and support [A] with the dial gauge in the calibration position, correspond to distance K1 + K2 = 78 mm (dimension engraved on the support at « b »).

e) Pivot support [A] and block it as soon as the large needle changes its direction of rotation.

f) Turn the needles to the calibration position, then release slowly, counting the number of turns and the fractions of a turn.

Reading E + dimension engraved on support = L1.

g) **Calculate the difference between the dimension engraved on the pinion, and distance L1 measured,** and reduce or increase thickness **(E')** of the adjustment washer, as appropriate.

h) Replace the existing washer with that calculated at « g » above.

Four-speed gearbox :
Tighten the drive pinion nut to between **10 and 12 m.daN** and lock it by pin-bitting.

Five-speed gearbox
Fit bearing (3) only.

3. Adjust the position of the crown wheel :

a) Place left bearing ring (5) in its recess, **with no adjustment shim.**
Fit the differential housing, using mandrel [D] (end « c » engaged in the differential housing).
Fit the right half-casing and rear cover.
Check that the differential housing is in position, **and that ring (4) is in contact with the bearing rollers.**

b) Fit dial gauge **2437-T** on ruler **B** of tool kit **3184-T bis** and calibrate the assembly setting it between 8 and 9 mm.

The mandrel **D** and calibrated ruler **B** unit corresponds to a distance of **K3 + R = 35 mm, engraved on ruler B**

c) Place the ruler against the housing, pivot the unit and block it as soon as the large needle changes its direction of rotation.
Bring the needles back to the calibration position and release slowly counting the number of turns and fractions of a turn.

Distance engraved on ruler + reading X = distance between contact face and shaft. The difference between the distance engraved on crownwheel and the distance measured gives the theoretical thickness of shims.

d) Proceed in the same way for the right side.
Make sure the differential is in position, the right bearing ring **fully home in the housing** and the left bearing ring **in contact with the bearing rollers.**

4. Add the bearing preload :

This load is of : **0.05 mm** for both bearings
That is of : **0.025 mm** for each bearing.
Thickness of left side shim :
Theoretical left shim thickness + theoretical right shim thickness + 0.05 mm = **total thickness of shims to be fitted.**
Calculate the difference between the total thickness of the shims already chosen.
Total thickness of shims to be fitted − thickness of left shim to be fitted = **thickness of right shim to be fitted.**

V- FITTING

1. Fit the differential :

a) Fit the crownwheel **tightening screws (2) (grease face and threads) to between 8 and 9 mdaN.**

b) Fit :
- the two planet gears, holding them by means of the two gearbox output shafts.
- the two satellite gears, making sure they are in line with the satellite shaft and then removing the shaft.

Make sure the satellite gears are correctly positioned by rotating the planet gears.
Engage the satellite shaft and fit circlip (1).

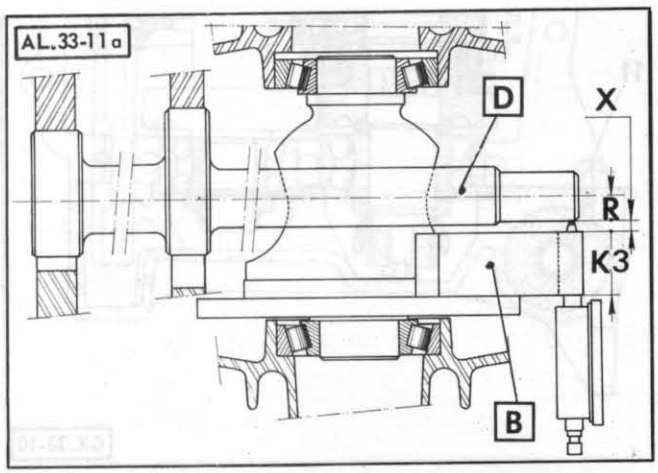
2. Fit the gear train unit :

Position the following in the left half-casing :
- the differential,
- the bevel pinion unit,
- the primary shaft unit, *turning needle bearing (3) so that the pin fits in the bearing stop slot.*
- needle bearing (3) is in position when slot « a » is in line with the half-casing joint face.

3. Checking the crownwheel and pinion tooth engagement play :

The tooth engagement play should be correct if the crownwheel and pinion have been carefully adjusted.

However, this value should be checked.
Fit the right half-casing and the rear cover.
Using support **F** from tool kit **3184-T bis** and dial gauge **2437-T**, measure the tooth engagement play which should be comprised **between 0.13 and 0.27 mm.**
Remove the dial gauge, the rear cover and the right half-casing.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K3
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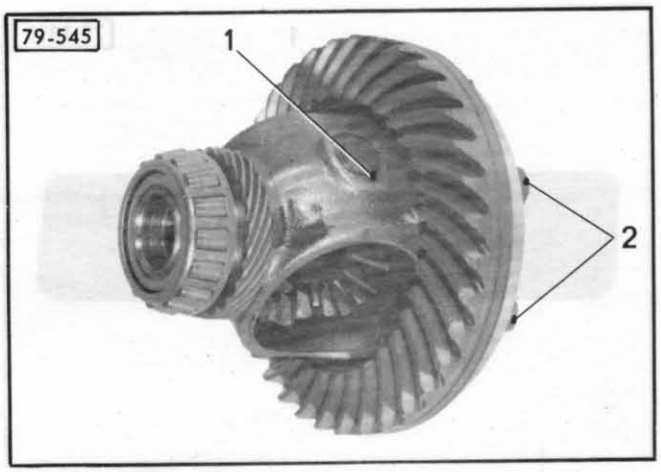
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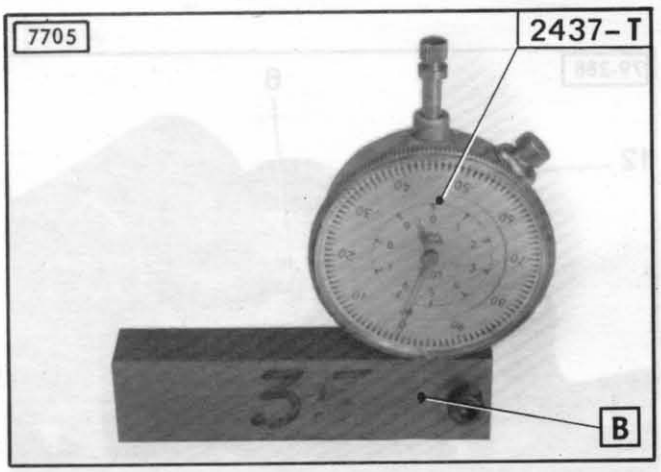
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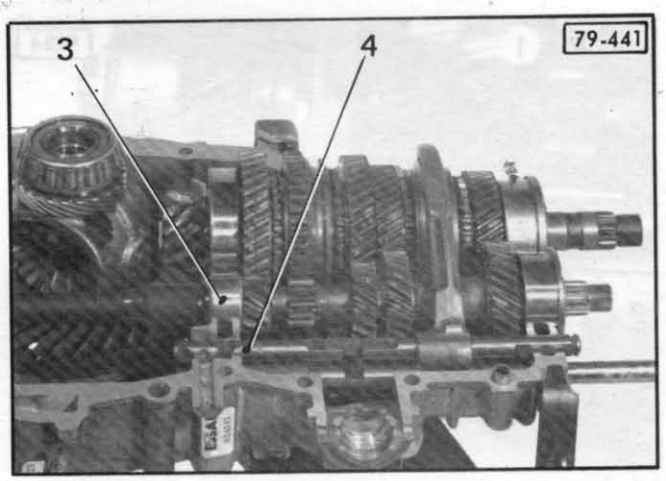
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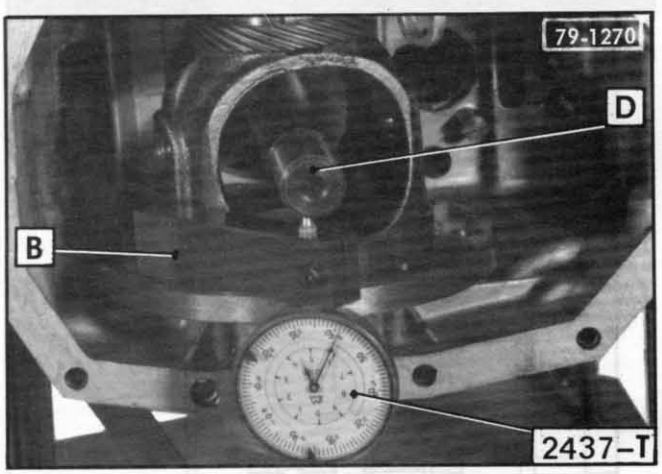
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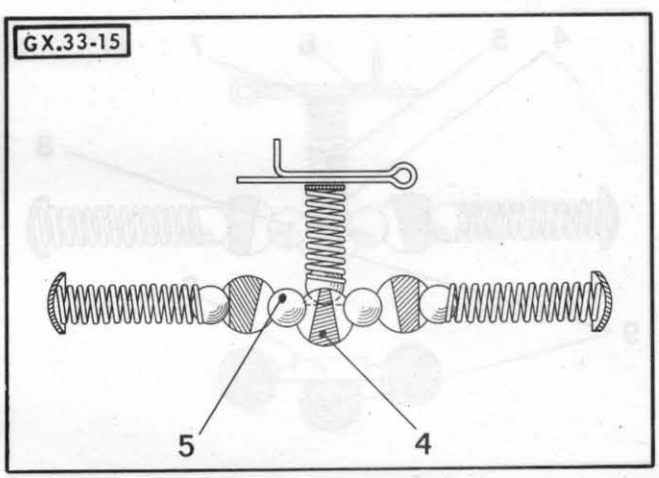
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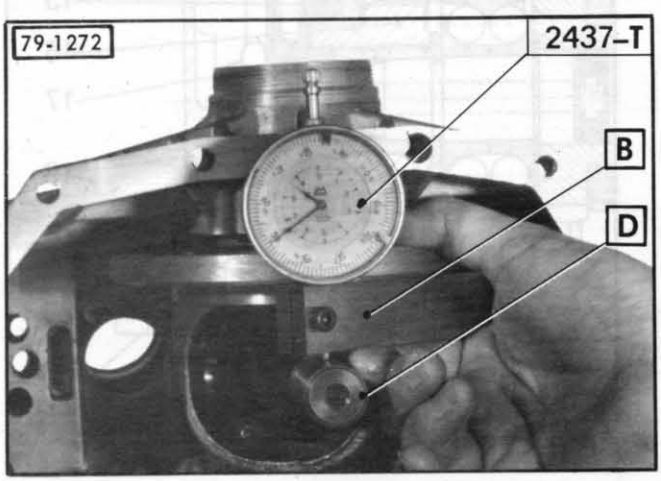
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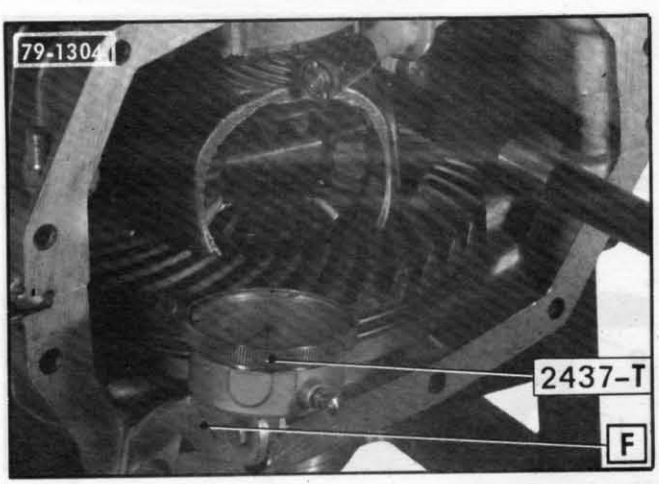
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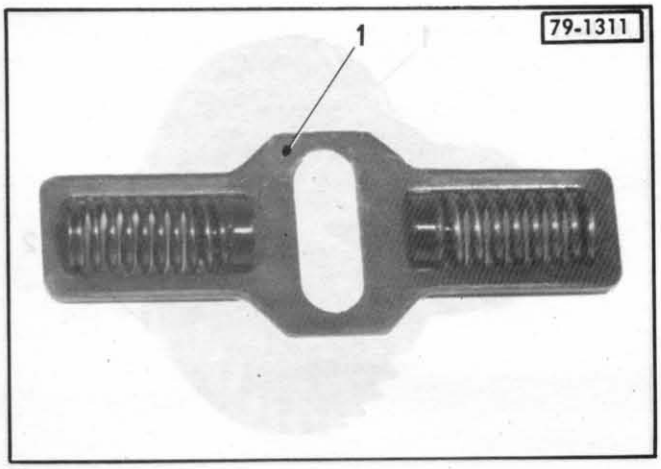
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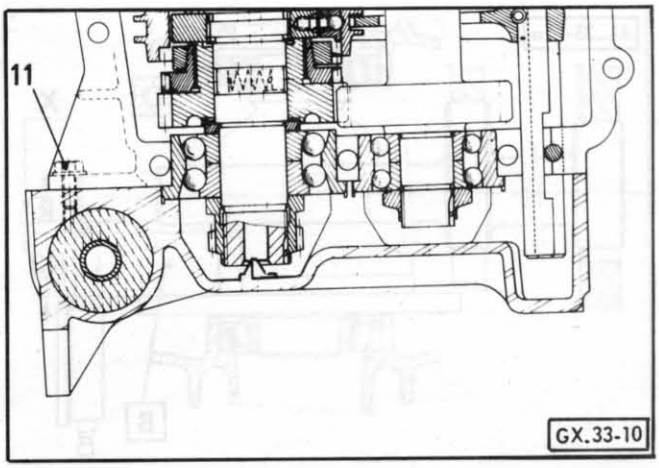
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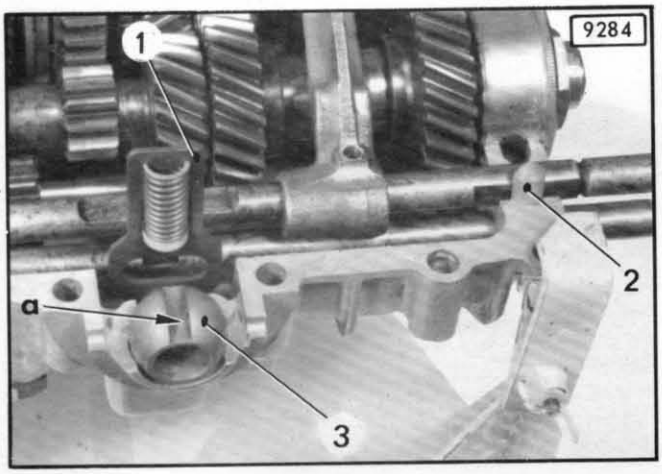
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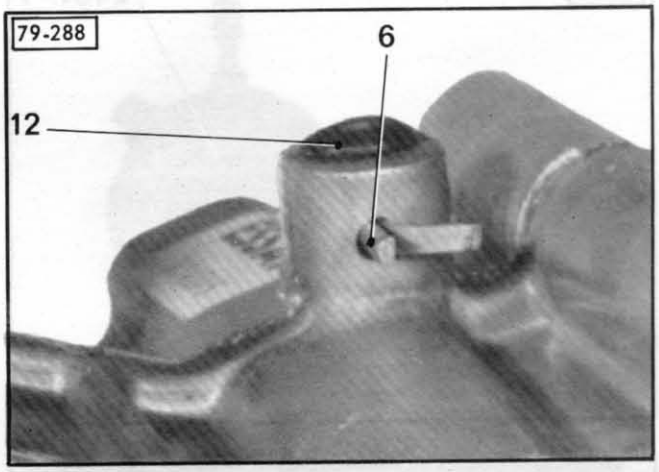
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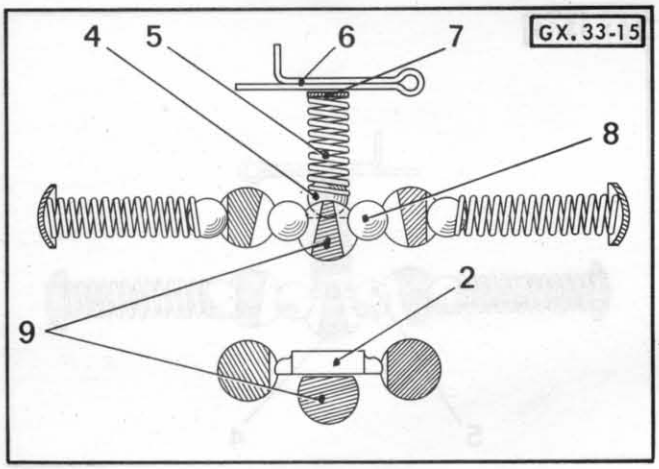
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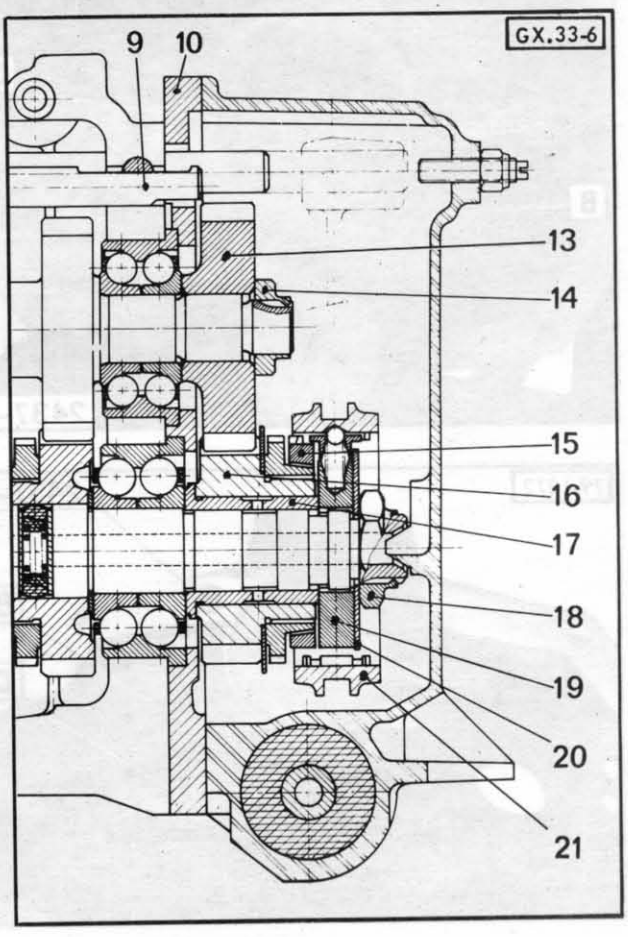
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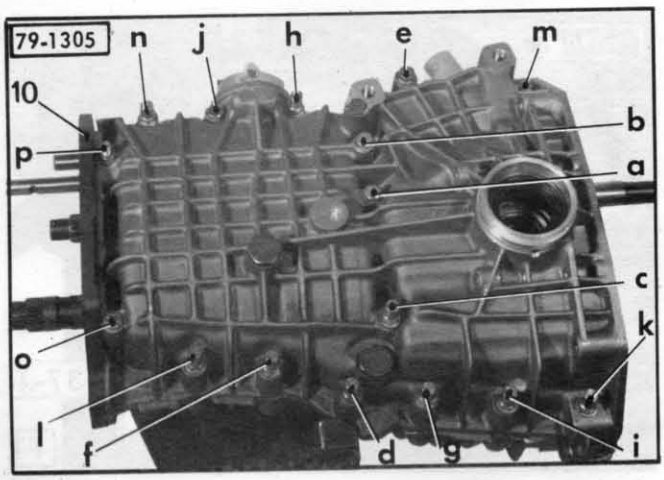
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4. Fit the right half-casing :

a) Fit :
- spring retainer plate (1),

> **Four-speed gearbox only :**
> The springs for plate (1) are different. Fit those with heavier gauge wire at the reverse gear pinion end (in left half-housing).

- control lever and swivel assembly (3) *(guide groove « a » on right half-casing side),*
- locking catch (2).

b) Stick locking ball (8), spring and ball-joint guide to the right half-casing with grease.

c) Coat the sealing surface with LOCTITE FORMETANCH.

d) Assemble the two half-casings.

e) Fit the screws (flat washers under screw head. The blind nuts **must** be fitted on the right half-casing side).
Do up the screws, but do not tighten fully.

f) *FOUR-SPEED GEARBOX :*
Fit the rear cover, coating the sealing surfaces with LOCTITE FORMETANCH, and do up the screws finger tight *(flat washers under screw heads).*

g) *FIVE-SPEED GEARBOX :*
Fit thrust plate (10) coating the sealing surface with LOCTITE FORMETANCH, and do up the screws finger tight.

h) Tighten the half-casing assembly screws fully.

Follow the tightening order indicated in the photo

Tightening torque : 1.3 to 1.5 m.daN

i) *FOUR-SPEED GEARBOX :*
Tighten :
- six rear cover attachment screws **2.5 to 3 m.daN**
- two screws (11) to between **0.3 and 0.5 m.daN.**

j) *FIVE-SPEED GEARBOX :*
Tighten the attachment screws for thrust plate (10) to between 2.5 and 3 m.daN.

5. Fit the clutch housing :
Coat the sealing surfaces with LOCTITE FORMETANCH.
Tightening torque : 1.3 to 1.5 m.daN *(flat washers)*

6. Fit :
- ball lock (4) and spring (5),
- capsule (7),
- pin (6),
- plug (12).

7. *FIVE-SPEED GEARBOX :*
a) Fit :
- 5th gear drive pinion (13),
- nut (14),
- spacer (17) and 5th gear driven pinion (16),
- hub/synchromesh sliding gear assembly (19) and bush (15),
- stop plate (20) and nut (18).

b) Select :
- 3rd gear by pushing shaft (9),
- 5th gear by means of synchromesh sliding gear (21).

c) Tighten and lock nut (1).
Tightening torque : 6 to 7 m.daN.

d) Remove :
- nut (3),
- hub/synchromesh sliding gear assembly (2) with stop plate (4).

e) Fit :
- simultaneously, 5th gear fork (5), ring and synchromesh assembly (2) *(the sliding gear identification groove « a » should be positioned towards the rear of the gearbox).*
- stop plate (4),
- nut (3).

f) Select 3rd and 5th gears *(see b, page 33).*

g) Tighten and lock nut (3).
Tightening torque 22 to 25 m.daN

h) Disengage 3rd and 5th gears.
Fit a new pin (6) (place a support under the fork shaft).

8. *FIVE-SPEED GEARBOX*
Adjust the reverse gear stop :

a) Select reverse gear.

b) Measure distance L, between the face of the cover bearing on spacer (7) and the end of control shaft (8).

c) Smear screw (9) with LOCTITE FRENETANCH, fit it with its lock-nut (10) and position it.

d) Tighten stop-screw (9) so that :
L1 = L + 0.5 mm

e) Tighten lock-nut (10).

f) Fit the rear cover after having smeared the joint face with LOCTITE FORMETANCH.
Tighten :
- the six screws (11) **from 2.5 to 3 m.daN,**
- the two screws (12) **from 0.3 to 0.5 m.daN.**

9. Fit the gearbox drive outlet shafts :

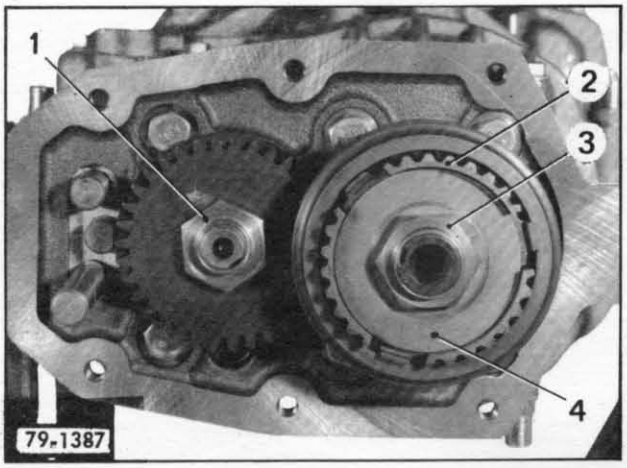
Check that the planet gears are correctly positioned, and that on assembly, the shaft teeth engage correctly in the corresponding planet gears *(when the two drive outlet shafts are turned by hand in the same direction, the differential crown wheel should be driven).*

a) Position shafts (13) (tap lightly with a mallet to position the bearing correctly).

b) **Tighten the ring nuts from 6 to 7.5 m.daN,** using a pipe wrench.

c) Lock the ring nuts, by pin-bitting in the corresponding recesses in the casings.

10. Fit the drain and level gauge plugs.
Tighten to 3.5 to 4.5 m.daN *(copper seal).*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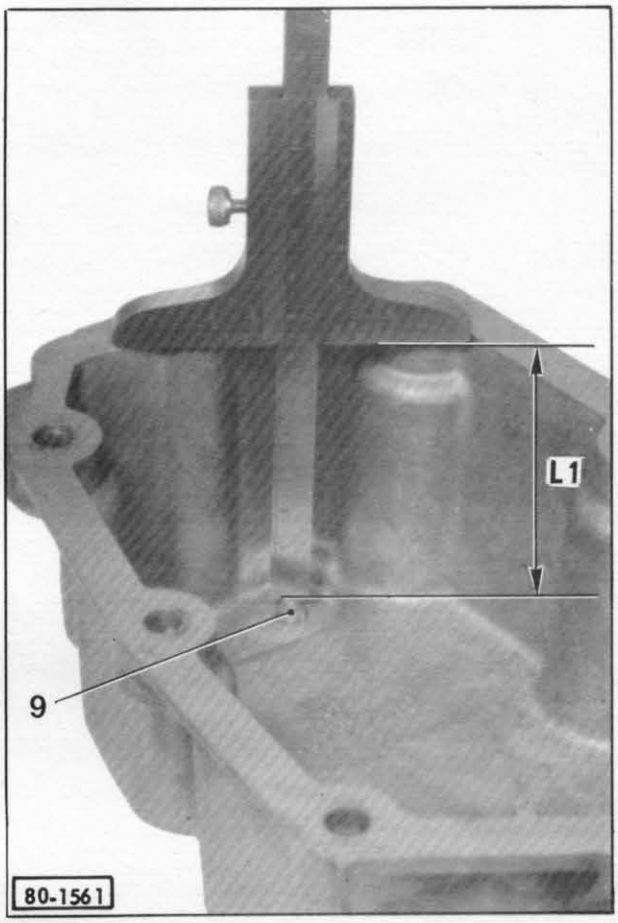
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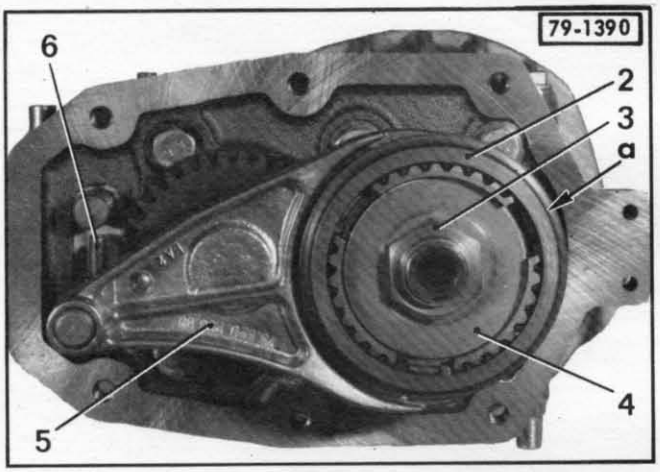
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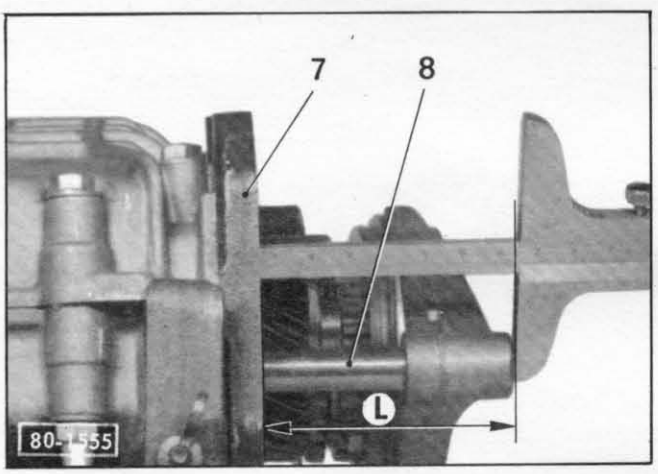
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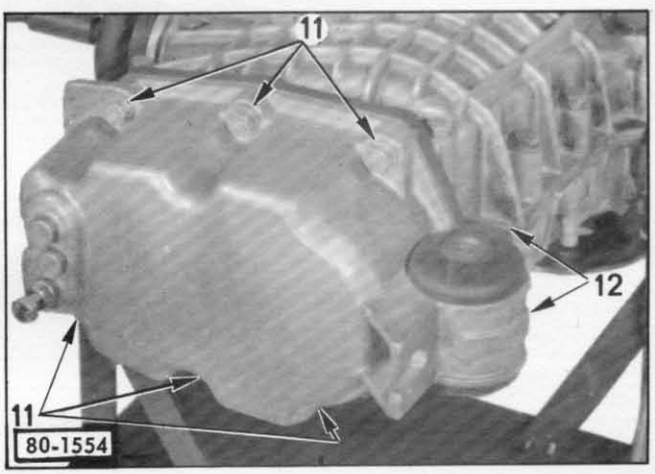
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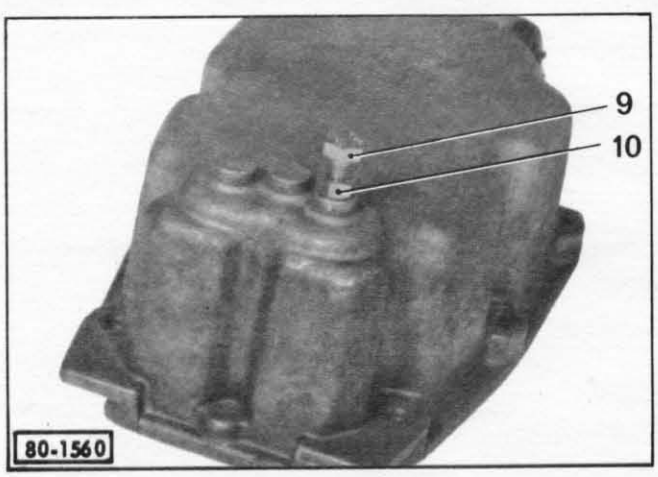
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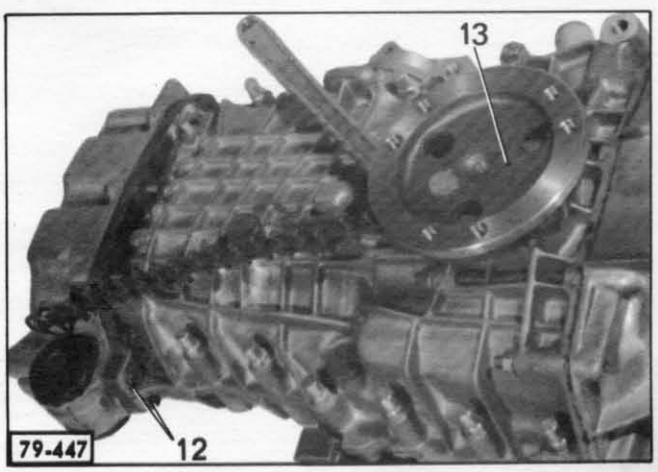
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OPERATION
GX.ea. 330-3

RECONDITIONING A GEARBOX WITH A TORQUE CONVERTER

SPECIAL TOOLS

TOOLS SOLD

KIT 3184-T bis :

use the following tools :

A : Dial gauge support

B : Dial gauge support

C : Cap

D : Mandrel

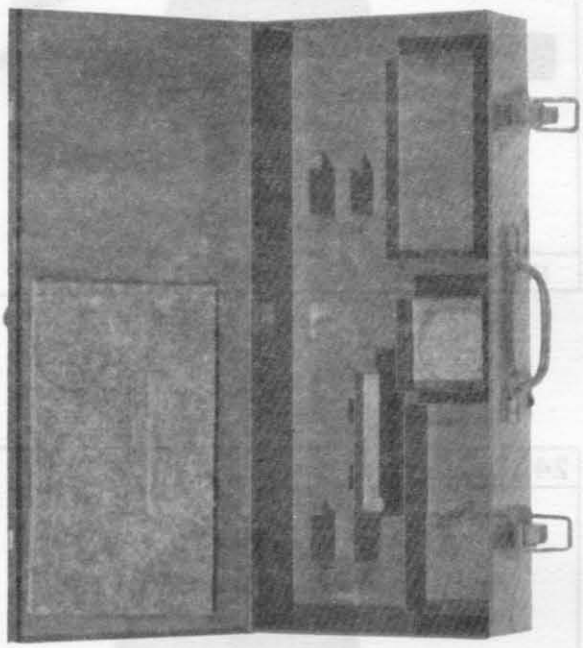
F : Dial gauge support

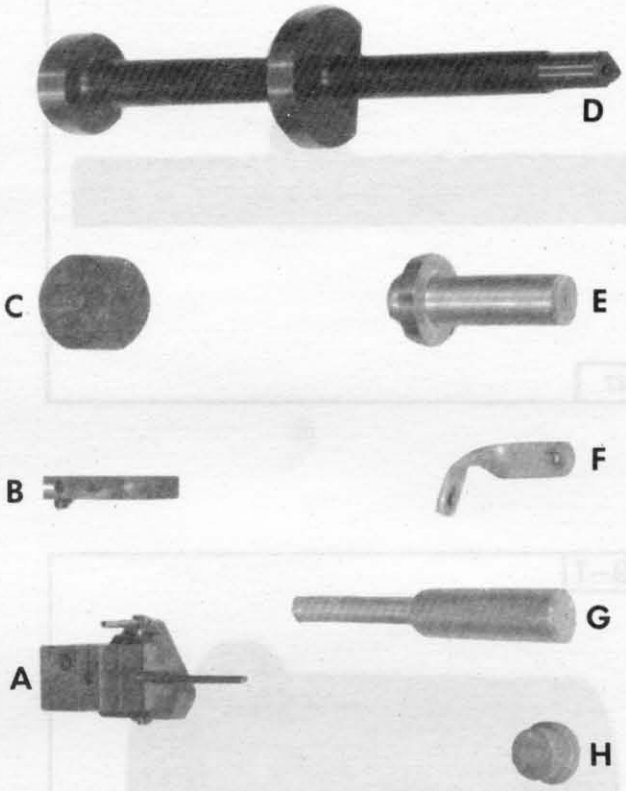
H : Stud

3186-T : Converter securing lug

3253-T : Snap ring pliers.

3184 - T.bis





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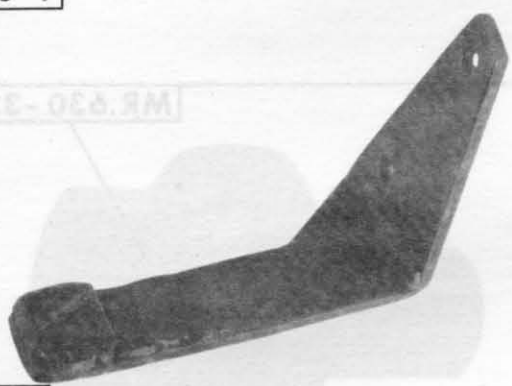

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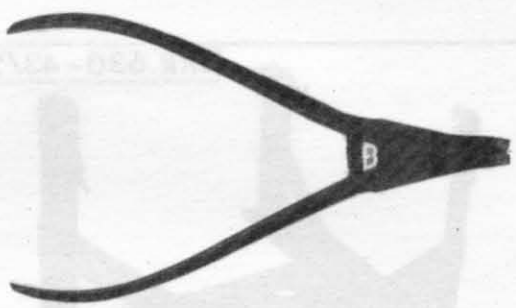

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1651-Tbis

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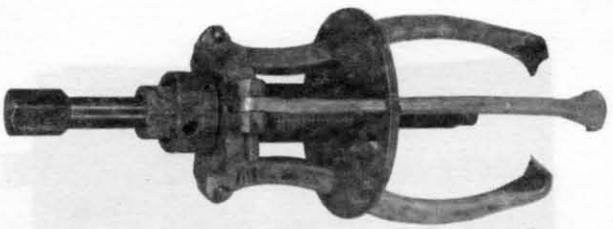
2400-T



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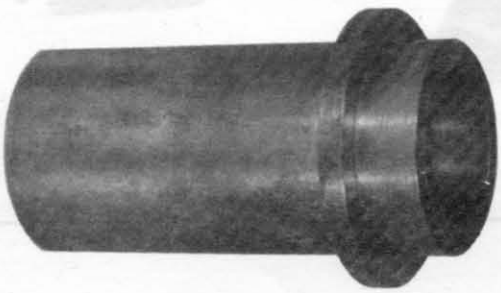

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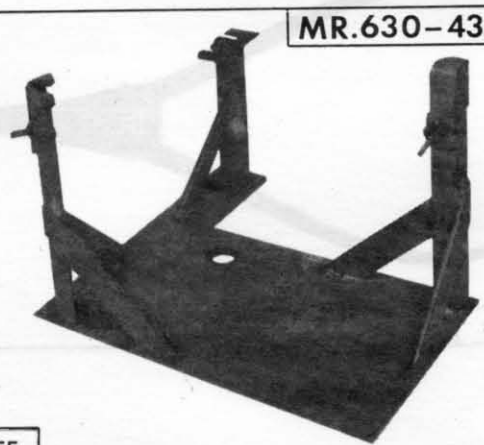
MR.630-43/29a



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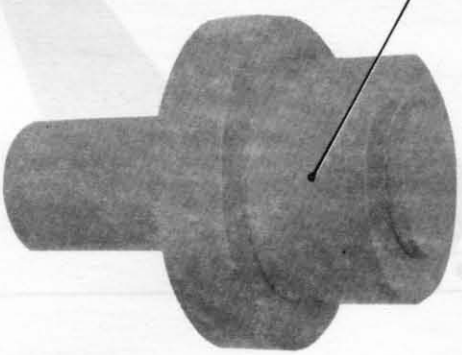


79-1596

SPECIAL TOOLS

TOOLS SOLD (continued)

1651-T bis : Ruler

1689-T : Mandrel for centering oil pump.

2400-T : Universal extractor *(to be used with stud* **H** *from kit 3184-T)*

2437-T : Dial gauge.

TOOLS NOT SOLD

MR. 630-43/29 a : Gearbox bench support

MR. 630-33/8 : Mandrel for fitting of gearbox drive outlet seals.

TIGHTENING TORQUES

Mandatory values *(torque wrench) :*

Tightening points	Torque in m.daN
Bevel pinion nut :	10 to 12
Primary shaft nut :	6 to 7
Rear cover attachment screws :	2.5 to 3
Differential crown wheel attachment screw :	8 to 9

Recommended values :

Tightening points	Torque in m.daN
Bush-nut for gearbox drive outlet shaft :	6 to 7.5
Reversing lamp contactor :	1.2 to 1.5
Half-casing assembly nuts and screws :	1.3 to 1.5
Converter housing assembly nuts :	1.3 to 1.5
Drain and filling plugs :	3.5 to 4.5

RECONDITIONING A GEARBOX WITH A TORQUE CONVERTER

I- DISMANTLING

1. Drain the gearbox.

2. Uncouple the gearbox from the housing-converter unit :

a) Make sure the converter securing lug **3186-T** is in place.

b) Place the gearbox on the support, in a vertical position, with the converter resting on the support

This will prevent the converter oil from flowing out during the operation.

c) Remove the nuts and washers securing the gearbox casing on the converter housing.
Withdraw the gearbox vertically from the housing/converter unit.

d) Remove control shaft (1). Do not loose the spring placed at « a ».

e) Remove the seal located between the gearbox and the converter housing.

3. Uncouple the converter housing from the converter :

Slide the converter/housing unit towards the edge of the support and remove securing lug **3186-T**.
Disengage housing (2) vertically from converter (3).

4. Remove the gearbox output shafts :

On each side :

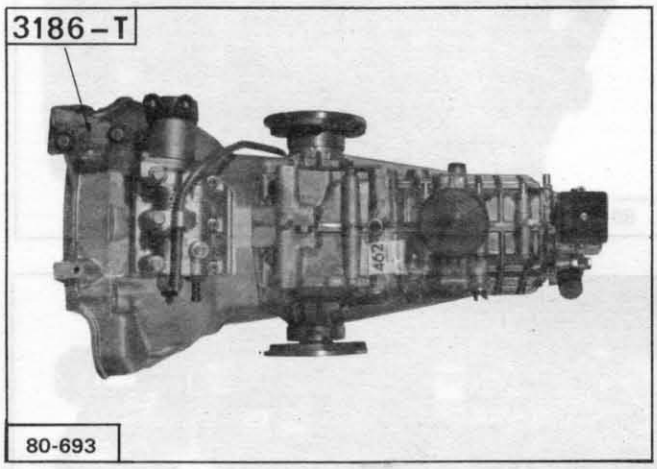
Place the gearbox on support **MR. 630-42/29 a** with the left half-casing resting on the support.

Untighten bush-nuts (5) using pipe wrench **A.**

Disengage the gearbox output shafts (4)
(tapping with a mallet, if necessary).

5. Remove the clutch control switch :

Remove :
- control switch body (6) and its cover (4 mm Allen key),
- seal (8),
- control switch baseplate (7) (4 mm Allen key).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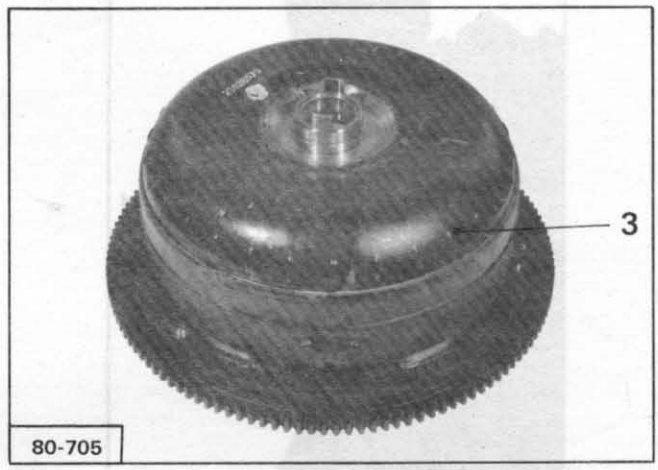
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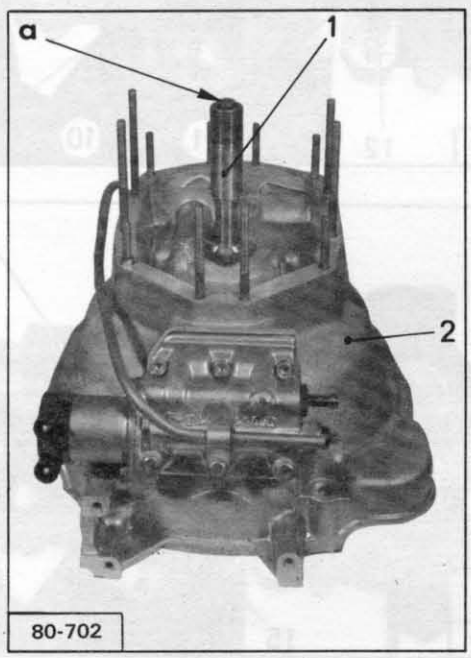
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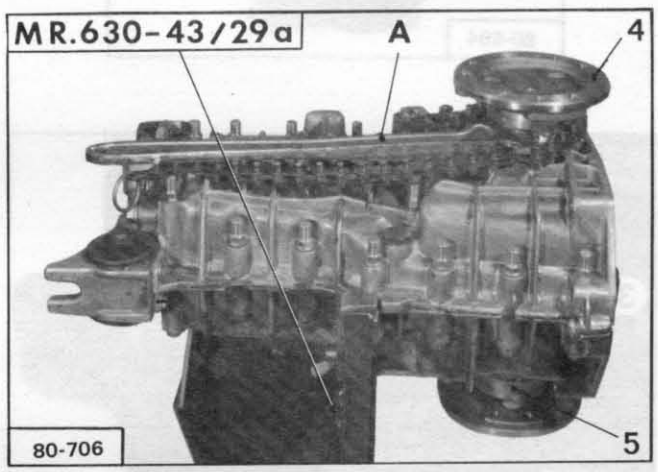
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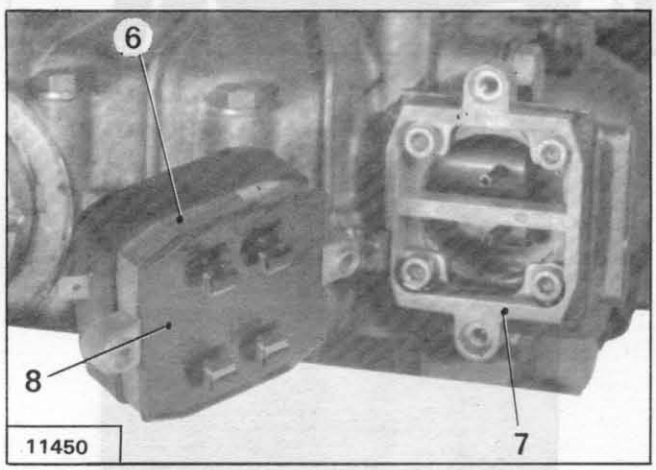
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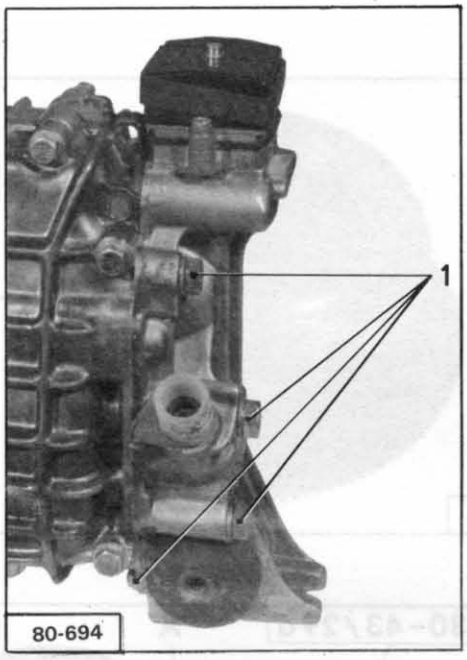
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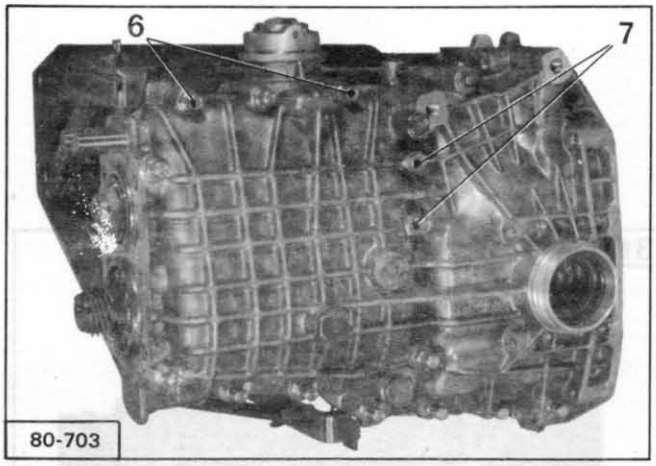
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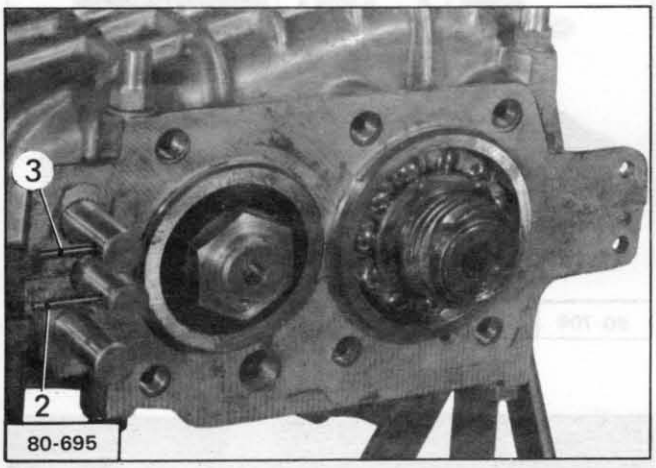
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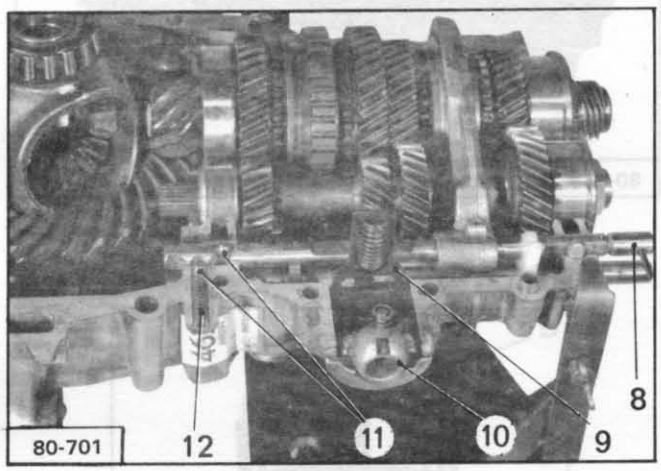
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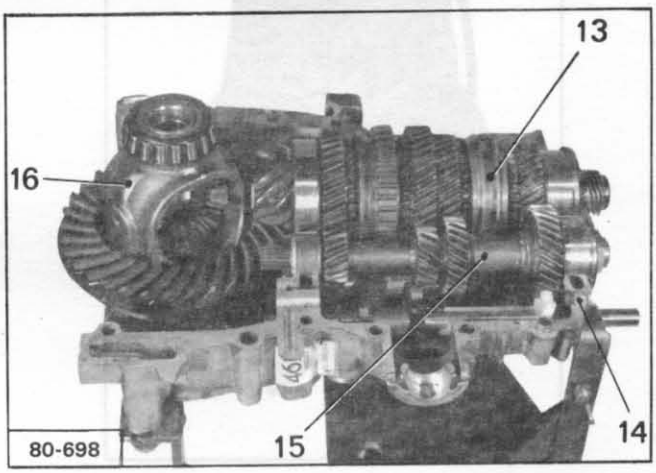
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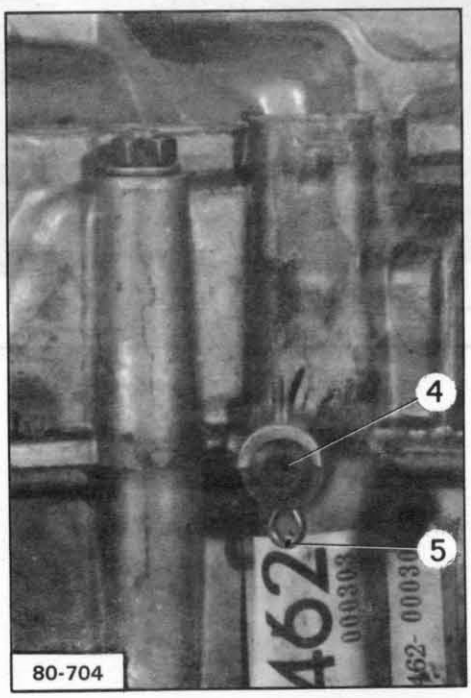
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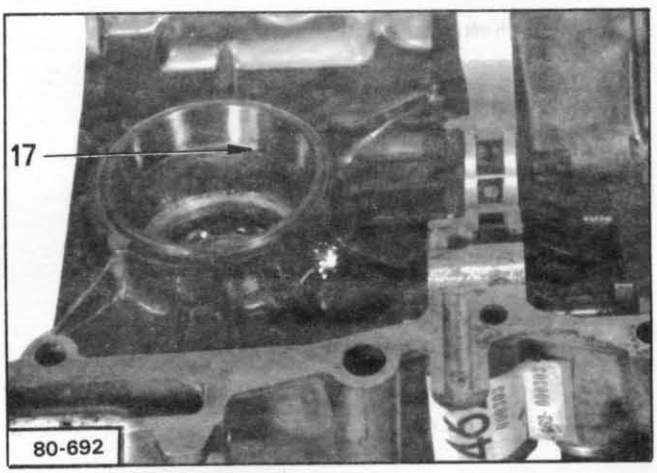
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80-692

6. Remove the rear cover :

Remove the rear cover securing screws (1).
Disengage the rear cover (be careful not to bend roll split pins (2) and (3) of the clutch switch control).
Put a finger on plug (4) and remove split pin (5).

7. Remove the right half casing :

Remove :
- half-casing assembly screws and nuts (6),
- central bearing assembly screws (7), (two screws on right half-casing side and one on left half-casing side),
- the right half-casing.

Prepare to catch locking balls (11), ball joint guide (10) and guide thrust spring when they fall.

8. Remove :

- ball joint (10),
- retainer plate (9) for draw-back spring,
- spring (12) and locking balls (11),
- selector fork shaft and 2nd - 3rd gear selector fork (8),
- interlock plunger (14).

9. Remove the gear train unit.

Remove :
- primary shaft (15),
- bevel pinion unit (13),
- differential (16),
- the locking ball under the 2nd-3rd gear selector fork,
- outer races of differential bearings *(mark down each differential bearing and its outer race).*

If removing the gearbox for an overhaul, without changing :
- the crankcases,
- the crownwheel and pinion,
- the differential bearings,

note the position of setting shims (17), it will avoid having to readjust the backlash.

II- STRIPPING DOWN THE GEARBOX UNITS

1. Strip down the left half-casing :

Remove shaft stop pin (1).
Drive the shaft out, using a bronze drift.
Remove reverse gear pinion (2) and parking brake lock (3).

2. Remove shaft (5) and parking locking cam (6) :

To carry out this operation :
- Move the shaft (5) - locking cam (6) unit all the way to the front.
- Drive out thrust pin (8) for spring (7).
- Place a finger over hole « a » and move shaft (5) - locking cam (6) unit all the way to the rear.
- Remove the locking ball and its spring.
  Tilt the locking cam (6) so as to bring pin (9) in a vertical position.
- Drive out pin (9).
- Remove :
  - spring (7),
  - parking locking cam (4),
  - reversing lamp switch cam (4),
  - shaft (5).

Remove reversing lamp switch.
Remove circlip (10) and seal (11), if necessary.

3. Strip down the right half-casing :

Remove 1st-Rev gear fork.
To carry out this operation :
- Move the axle and fork unit towards the rear placing a finger on hole « b » in order to prevent the locking ball from being thrown out from its housing.
- Remove the locking ball and its spring.
- Move the axle and fork unit so as to bring the fork against the gearbox housing and lift up the fork to allow withdrawing the pin.
- Drive the Mecanindus pin out.
- Withdraw the axle and the fork.
- Remove, if necessary, Mecanindus pins (12) controlling the clutch switch.

4. Strip down the primary shaft :

Remove the needle bearing.

NOTE : Inner race (13) is not interchangeable.

Hold the shaft in a vice fitted with soft jaws.

Remove :
- nut (15) (locked by metal peening).
- bearing (14).

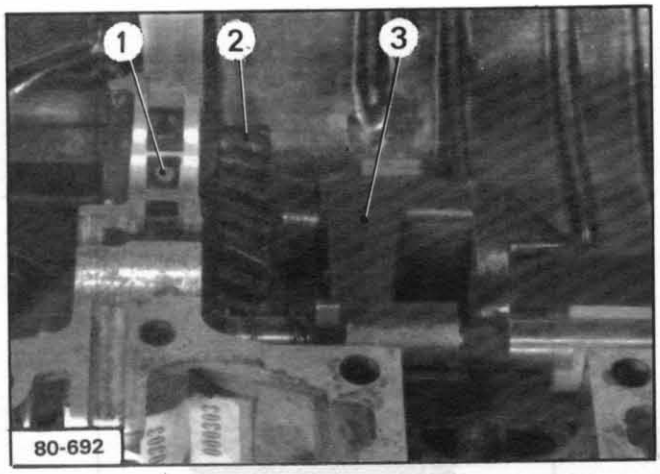
5. Strip down the bevel pinion :

The contact surfaces of the gearwheels on the bevel pinion having been treated, any impact or scoring trace on these surfaces can cause binding of the parts when in operation.

IT IS THEREFORE ESSENTIAL to take the necessary precautions when removing.

Hold the bevel pinion unit in a vice fitted with soft jaws, using either the reverse gear idling pinion or the 1st gear idling pinion.

Lock the pinion, held by the vice, on the shaft by moving the corresponding sliding pinion in the correct direction.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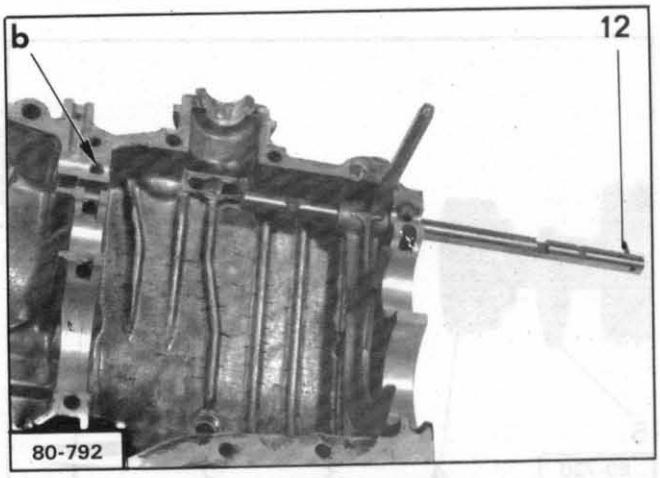
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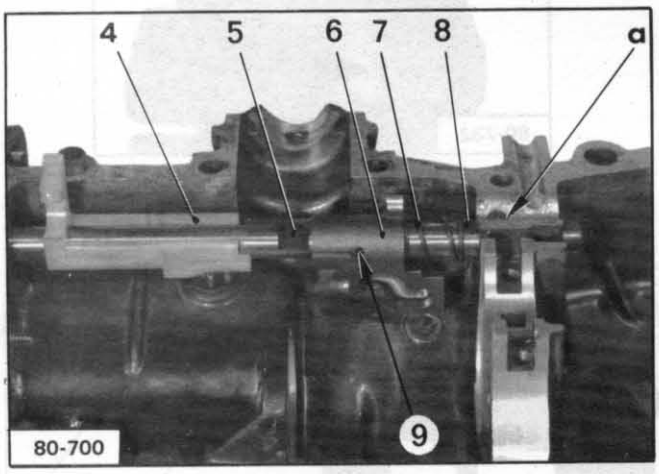
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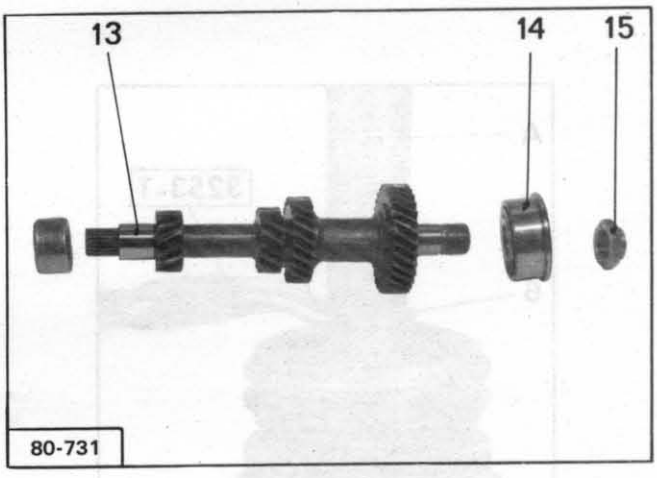
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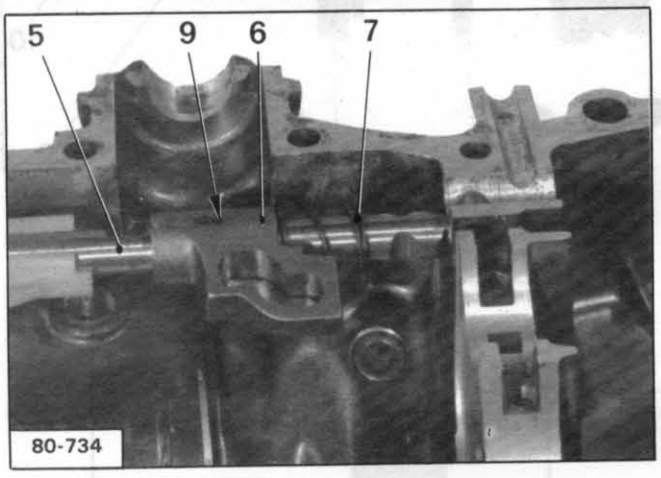
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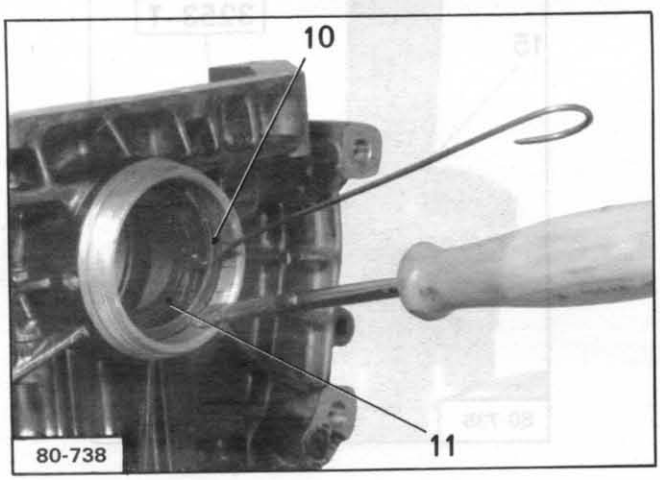
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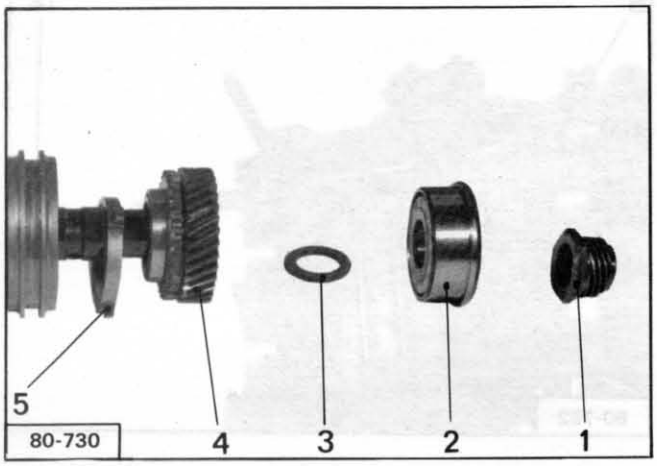
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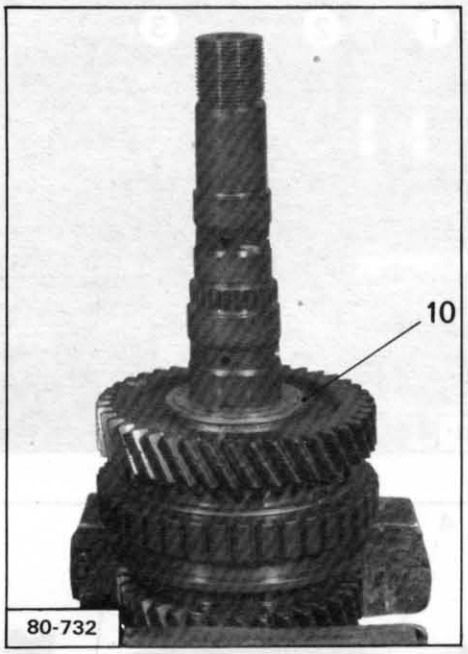
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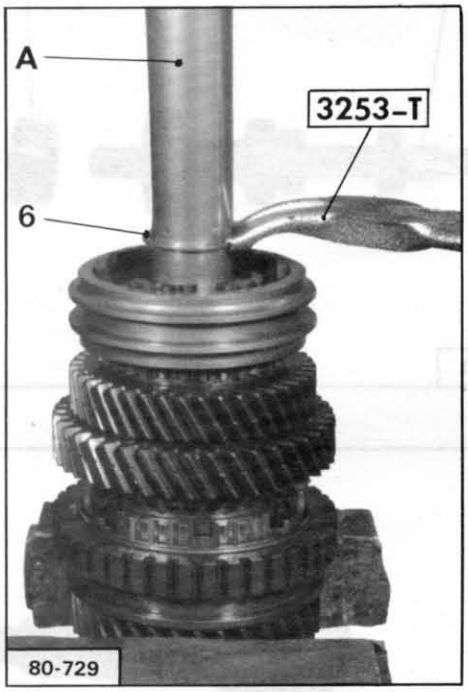
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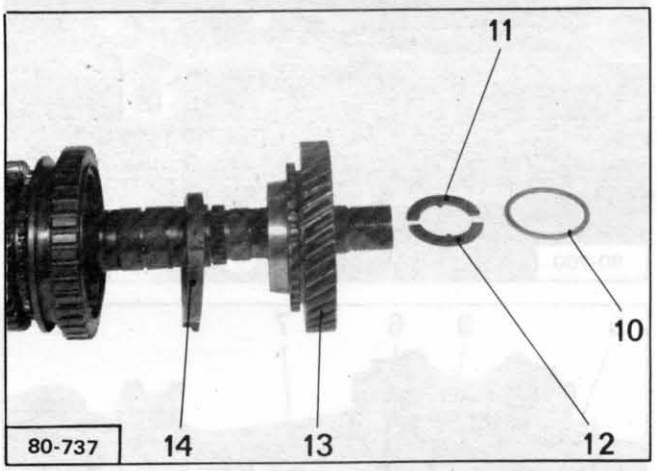
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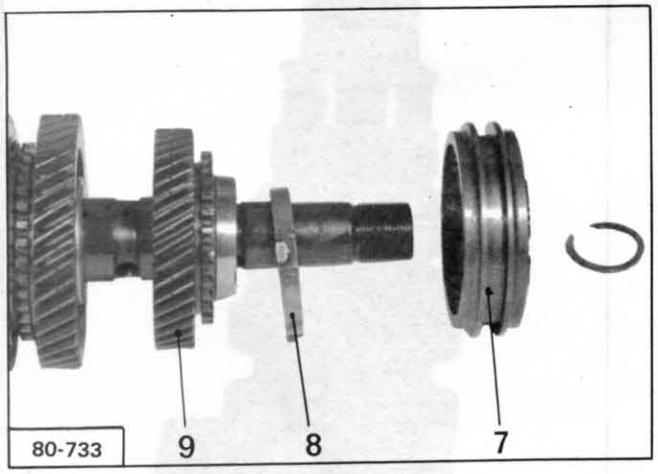
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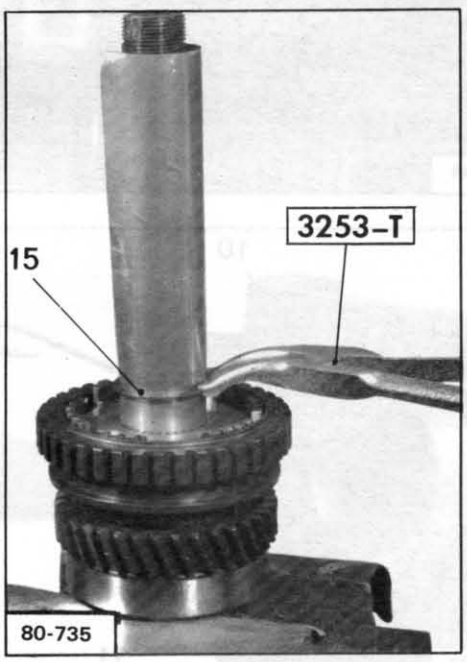
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6. Remove :
- nut-screw (1) (locked by metal peening),
- bearing (2),
- setting washer (3) for the crownwheel and pinion distance,
- 3rd gear idling pinion (4),
- 3rd gear synchro ring (5).

If overhauling the gearbox, without changing :
- the crankcases,
- the crownwheel and pinion,
- bearing (2)

keep setting washer (3), it will avoid having to readjust the crownwheel and pinion distance.

7. Remove locking ring (6).
Wrap the end of the bevel pinion with a sheet of metal foil **A** *(thickness = 0.10 mm)*.
Hold it against locking ring (6).
Slightly separate the ends of the ring using pliers **3253-T**.

Slide the foil under the ring.
Remove ring (6) by sliding it over the metal foil.

8. Remove :
- synchro hub and sliding pinion unit (7) for 2nd and 3rd gears,
- 2nd gear synchro ring (8),
- 2nd gear idling pinion (9).

The synchro rings for 2nd and 3rd gears are identical.
However, they must be paired with their corresponding pinions.

9. Remove the 1st gear idling pinion.

Withdraw washer (10) and remove the two half-washers (11) and (12).

Remove :
- 1st gear pinion (13),
- 1st gear synchro ring (14).

The synchro rings for reverse gear and 1st gear are identical.

However, if these parts are to be reused, they must be paired with their corresponding pinions.

These synchro rings are different from those fitted on a manual gearbox.

Place the bevel pinion unit in a vice fitted with soft jaws holding it by the bevel pinion.

Remove the locking ring (15) for the reverse and 1st gear synchro hub.

Do the same as for removing the locking ring for the 2nd and 3rd gear synchro hub. *(See paragraph 7).*

10. Remove :

- synchro hub and sliding pinion unit (1) for reverse and 1st gears,
- reverse gear synchro ring (12),
- reverse gear idling pinion (3),
- needle cage (4).

11. Remove :

- locking ring (5). (Take the same precautions as for removing the synchro hub locking rings), *(see paragraph 7, page 13)*,
- bearing (6), *using a press and a tube with an inner diameter = 5 mm and a length = 60 mm.*

The bevel pinion on gearboxes with a torque converter has no retarding dowels.

12. Dismantle the differential :

Remove :

- bearings (7). Use universal extractor **2400-T** and pad **H** of tool kit **3184-T bis**
- circlip (8),
- axle (9),
- both satellite gears (12),
- both planet gears (11),
- crown wheel (10).

13. Strip down the gearbox output shafts, if necessary :

Remove :

- ring (15),
- bearing (14),
- bush-nut (13)

using universal extractor **2400-T** resting on bush-nut (13).

14. Strip down the rear cover :

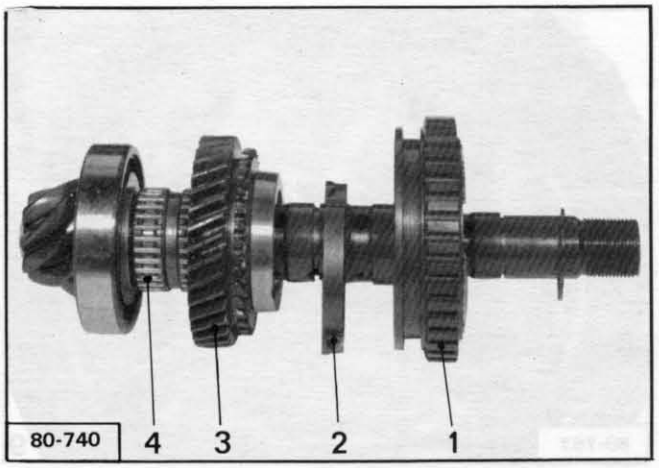
Disengage speedometer drive (17) from rear cover (18).

Disengage pinion (19).

Remove seals (16) and (20).

15. Strip down the converter housing.

Remove distributor unit (21).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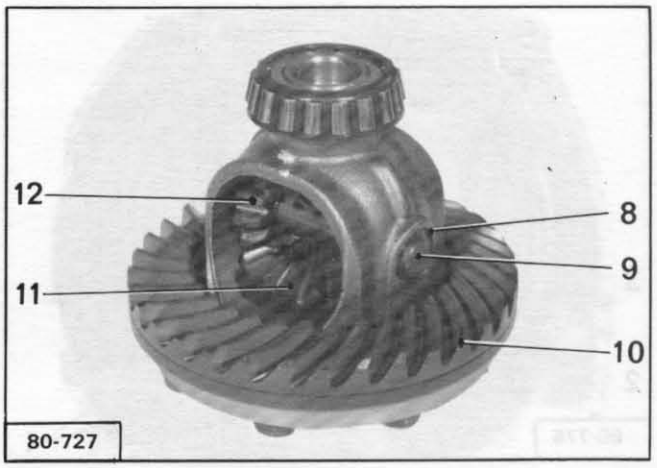
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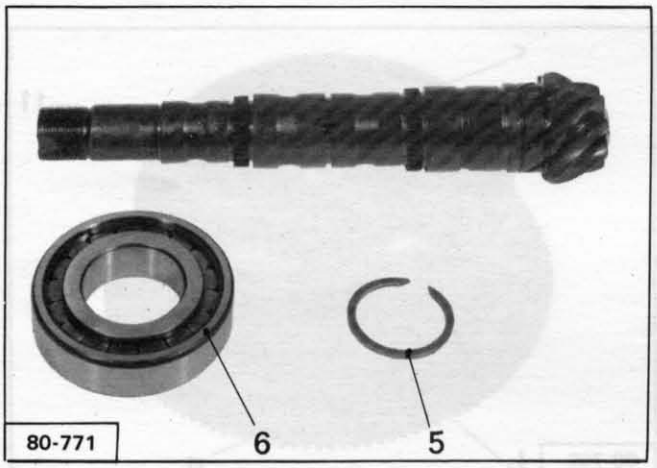
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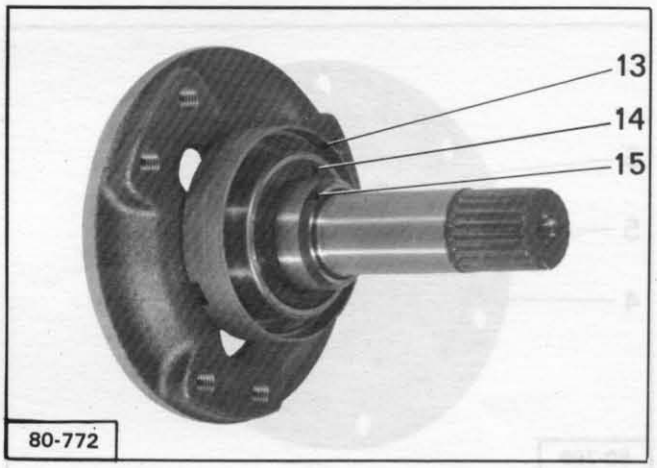
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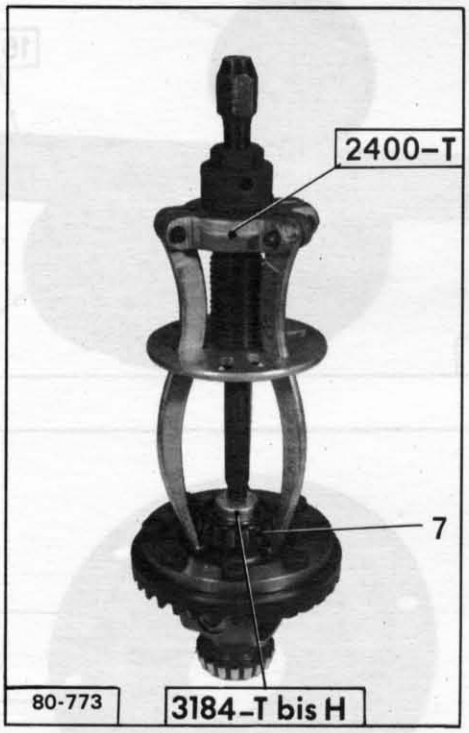
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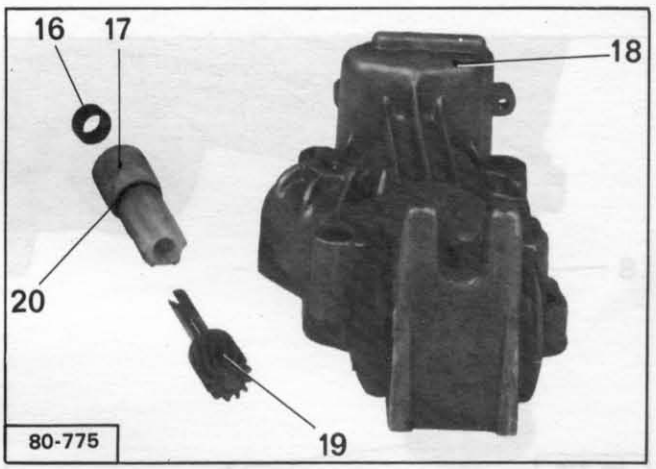
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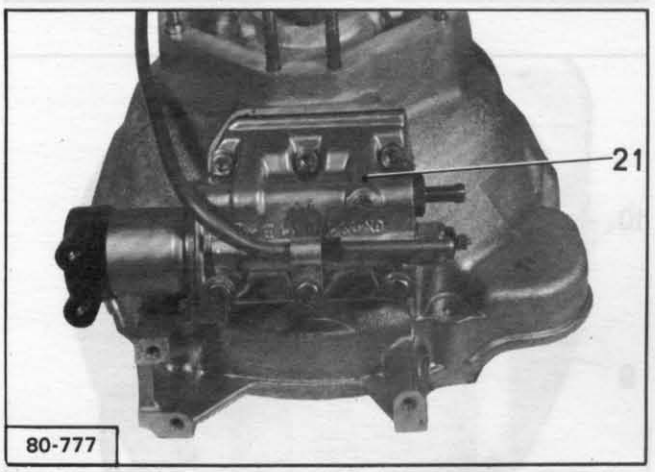
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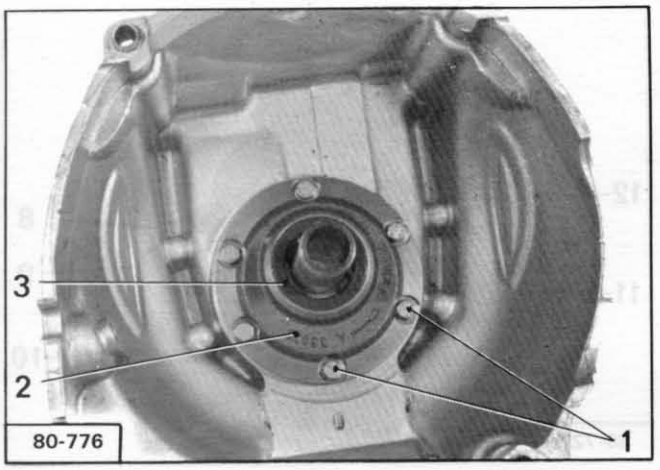
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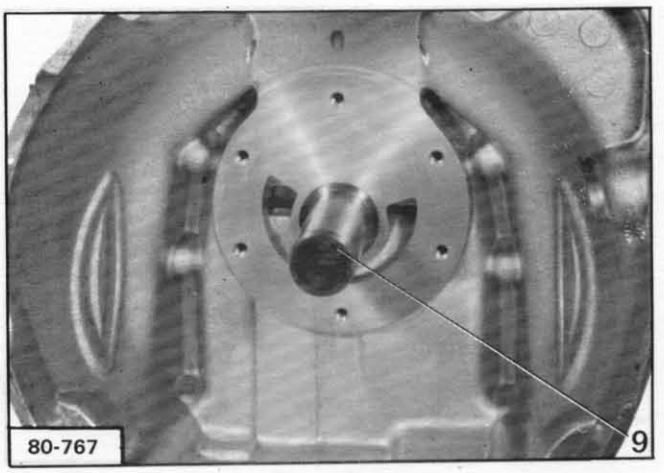
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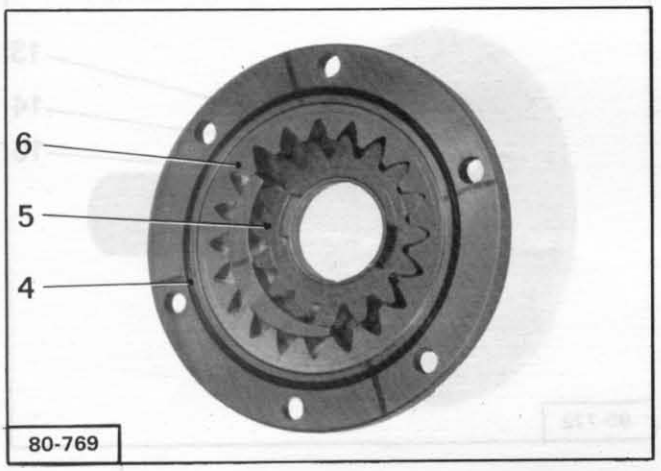
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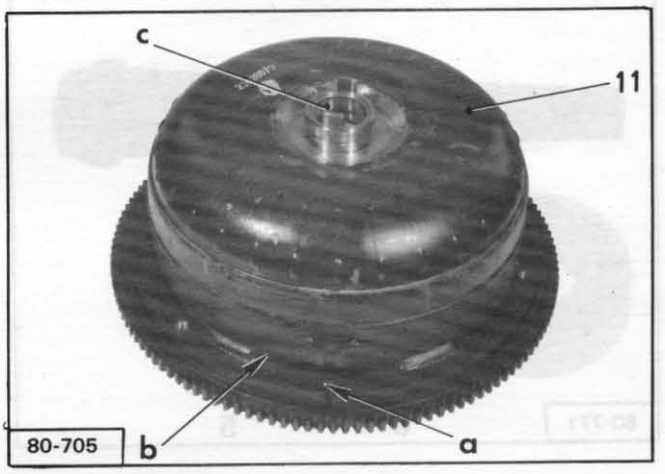
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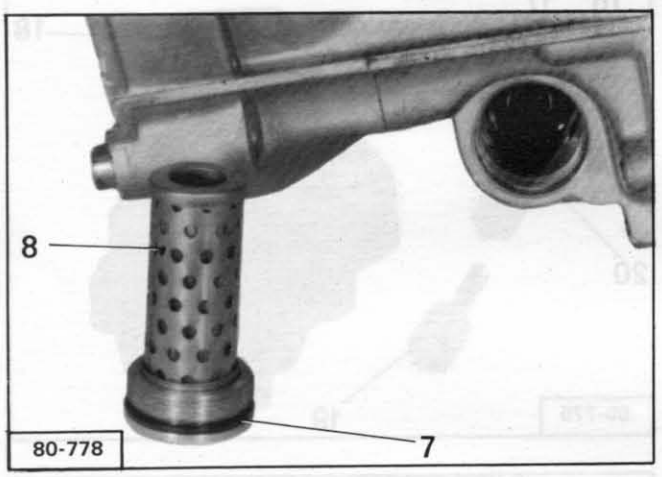
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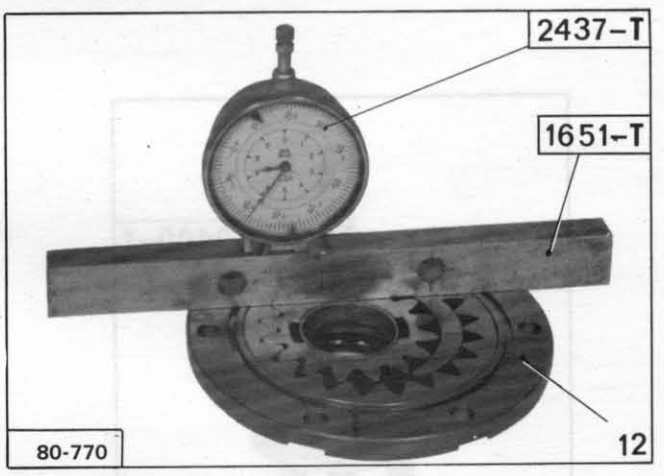
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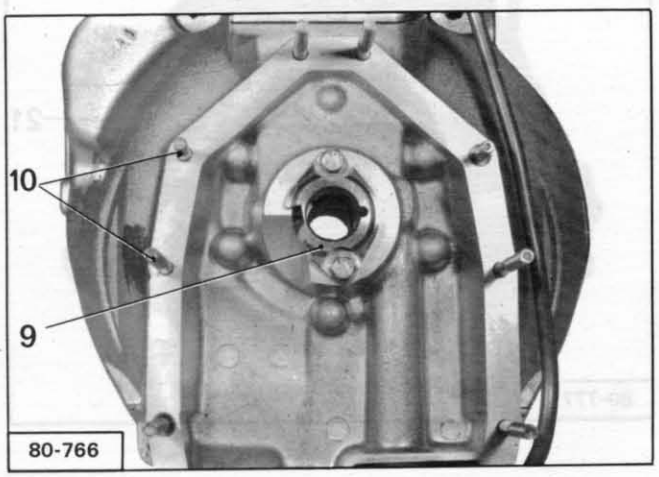
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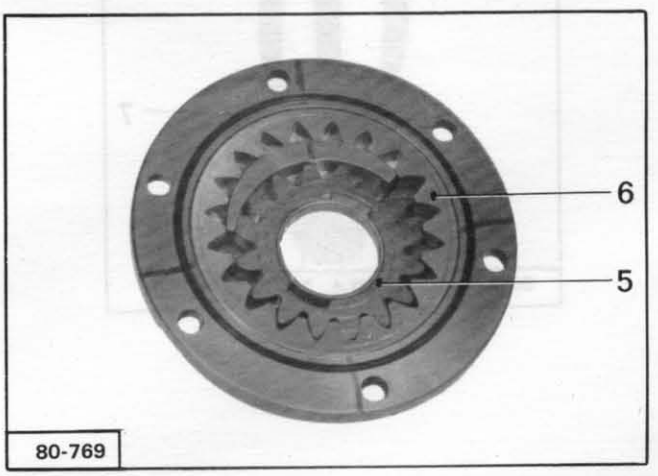
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16. Remove the oil pump :

Note the position of the pump in relation to the converter housing.
Remove :
- securing screws (1) of the pump casing,
- pump casing (2) and the pinions,
- pinions (5) and (6),
- o-ring seal (4),
- seal (3).

Remove oil strainer (8) and disengage o-ring seal (7)
Remove gudgeons (10), *if necessary.*

Remove stator sleeve (9), *if necessary : See Operation GX. 311-3.*

17. Drain the converter :

Turn converter (11) upside down above a sump and let it drain off for several hours.

18. Replace the starter gear ring, *if necessary :*

To carry out this operation :
Cut the gear ring with a saw opposite a slot « a » of flange « b » and drive it out.
Fit the new gear ring.
Place the converter on two wooden beams.
Carefully clean flange « b » where the gear ring comes into place.
Heat up the new gear ring using a welding torch fitted with an 800-to-1000-litre burner.
Direct the welding torch flame towards the inner bore of the gear ring, going round constantly in order to obtain a regular expansion.
Stop heating when the gear ring reaches a temperature of 200° C (straw coloured).
Position the gear ring on the flange, *with the unmachined side towards the flange shouldering.*
Carry out this operation quickly.
If necessary, finish off the positioning of the gear ring by using a bronze drift.

19. Clean the parts :

The bearings of the different pinions on the bevel pinion shaft must have no defects. **Any machining of the surfaces in any way whatsoever, is FORBIDDEN.**
Blow through the converter housing oil pipes with compressed air.
Finish cleaning the joint faces, using methylated spirit.

III- PREPARING THE ASSEMBLIES

Fill in the converter with TOTAL Fluide T oil
(this oil is the same for the converter and the gearbox)
To carry out this operation, lay the converter flat on the work bench.
Fill in the converter through hole « c » repeating the operation several times since it takes a certain time for the oil to be distributed in the converter.

If the converter has been drained off correctly, it should contain **1.5 litre of oil** approximately.
The complete filling can be done only once the gearbox is fitted on the vehicle (Real capacity of the converter : 2.3 litres approximately).

1. Prepare the oil pump :

Check the side clearance of the pinions.
Place the pinions in pump housing (12).
Fit dial gauge **2437-T** on a ruler **1651-T** and calibrate the assembly on a jig.
Place the assembly, once it is calibrated, on the pump housing and measure the clearance between the housing thrust face and each pinion (5) and (6).
This clearance must be comprised between 0.03 and 0.06 mm.

Fit seal (1). To make it easier smear the cover bore and the outside of the joint with grease.

2. Prepare the converter casing :

Fit the oil pump :
Oil pinions (2) and (3).
Secure the o-ring seal (4) in its groove, using grease.
Put oil pump (5) in its place in the converter housing.
Centre the pump using mandrel **1689-T .**

Fit the oil-pump fixing screws and tighten them to **1.9 mdaN** (no washer under the screw head).

Make sure the pump rotates freely by acting upon the driving notches.
If it does not, unscrew the pump attachments and recenter it using mandrel **1689-T** until the pinions can rotate freely.

3. Fit the distributor :

Fit the joint.
Place the distributor in its position on the converter casing with electromagnet (6) on the right of the casing.
Fit securing screws (7) and tighten them to **1.5 mdaN.**

4. Fit the assembly studs :

There are 3 different lengths of studs.
Place them as follows :
- at (8) : the 4 longer studs.
- at (9) : the medium size studs
- at other places : the shortest studs.

Make sure the two centering rings are in position at « d » and « e ».

Place o-ring seal (10) in strainer (11).
Make sure the rubber washer is in position at « f ».
Tighten the strainer in its housing in the converter casing **from 1 to 1.5 mdaN.**

5. Prepare the gearbox output shafts :

Position on each shaft :
- bush-nut (12),
- bearing (13), using a press and a tube (inner dia. = 26 mm, outer dia. = 34 mm, length = 120 mm),
- ring (14).

Ring (14) must show no traces of scoring or impact. If it does, change it.

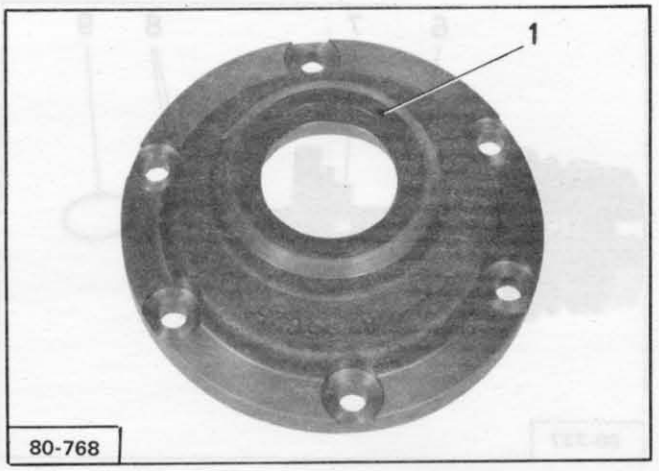
6. Prepare the bevel pinion unit :

Oil all parts before fitting.

NOTE : The locking ring ends are slightly chamfered. Position the locking ring with the pointed section of its ends away from the component to be held in position. This will make it easier to remove the locking ring with pliers **3253-T .**

Press-fit bearing (15) using a tube with inner dia = 45 mm, length = 220 mm.

Fit locking ring (16) using pliers **3253-T** and protecting the contact surface of the reverse gear pinion with a sheet of metal foil.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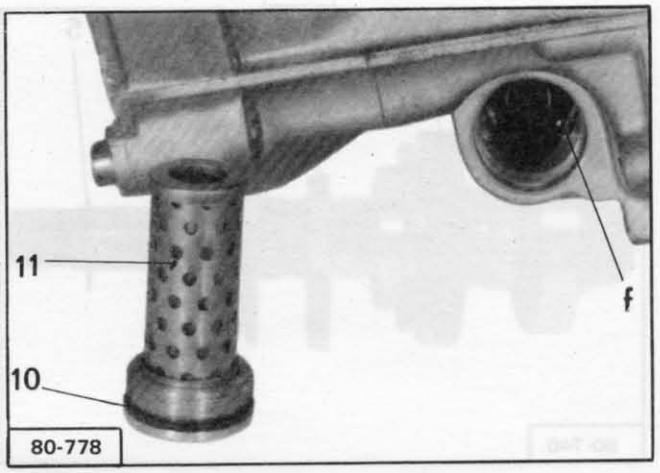
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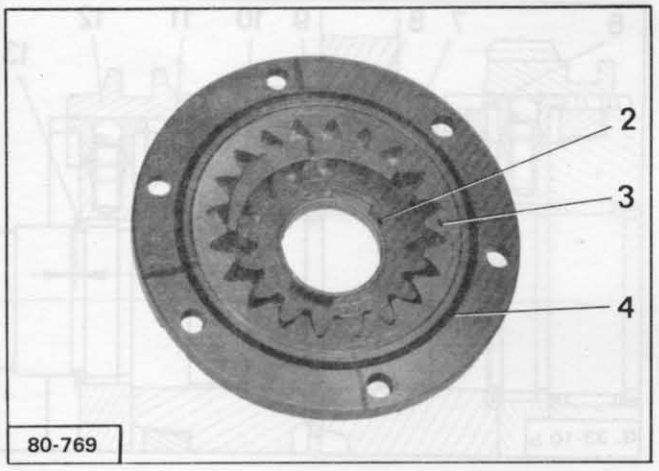
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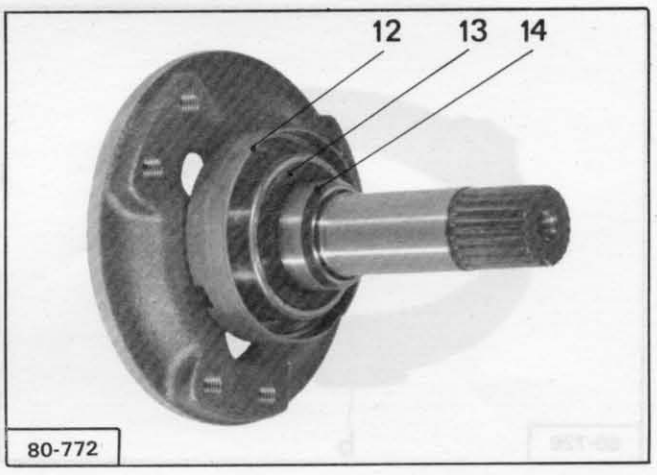
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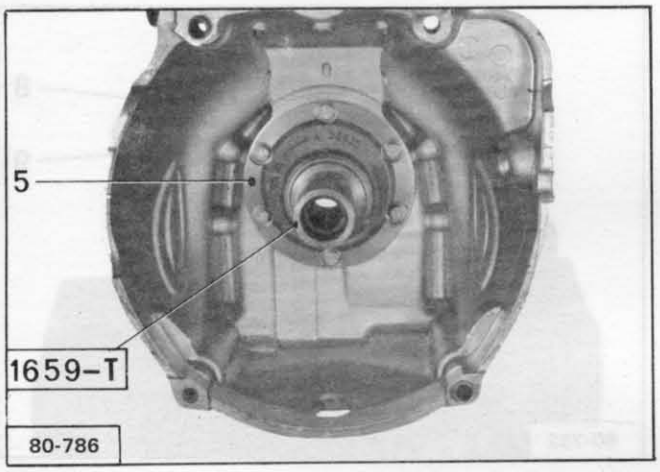
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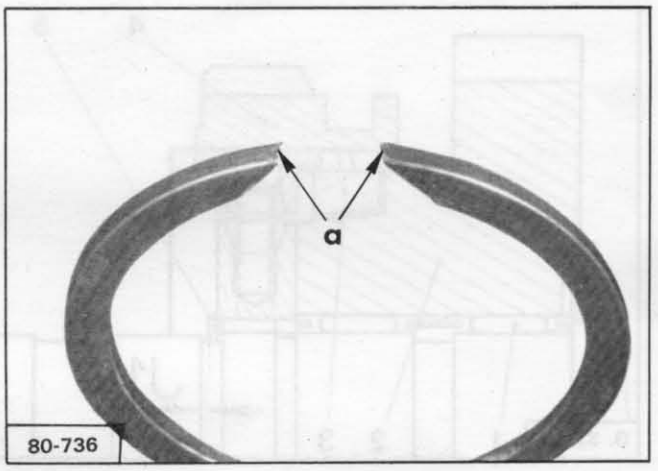
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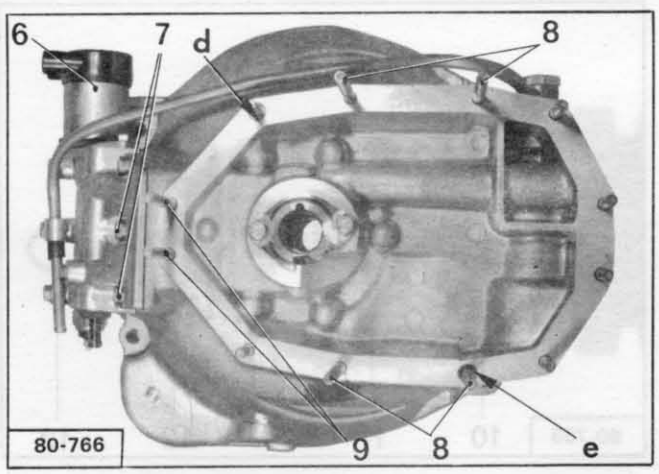
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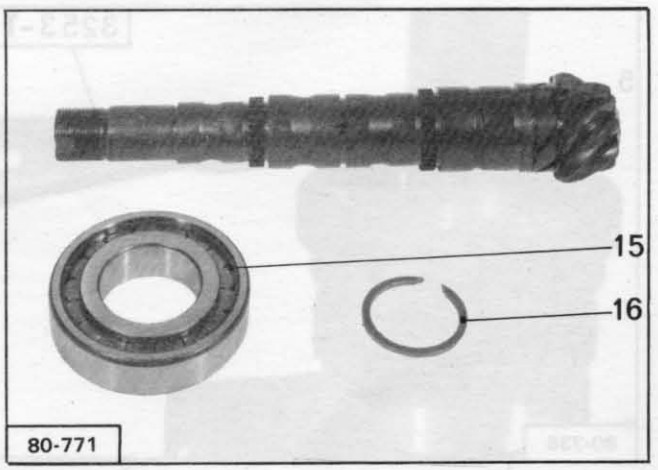
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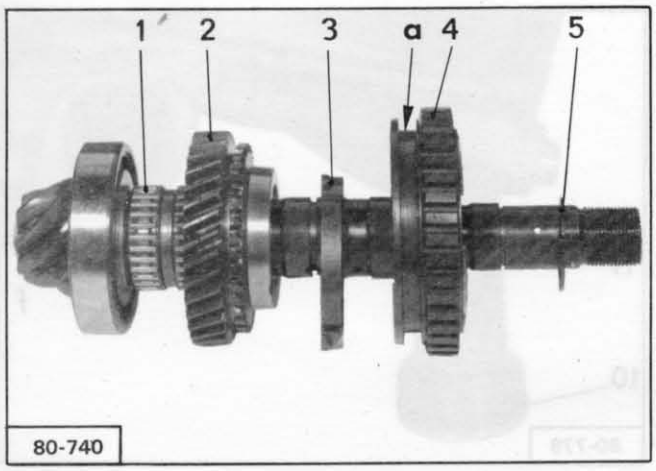
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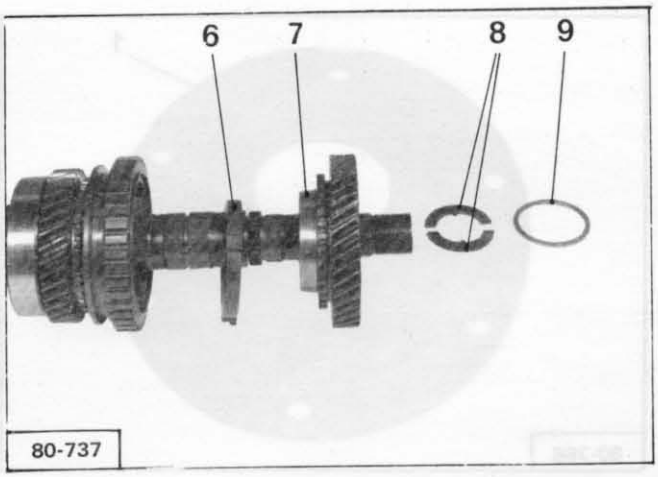
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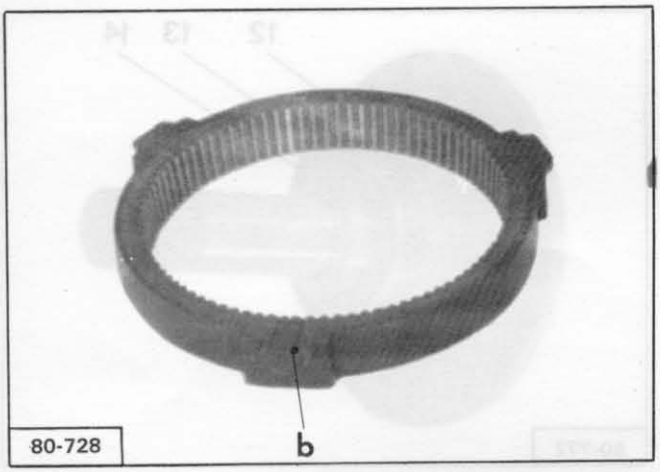
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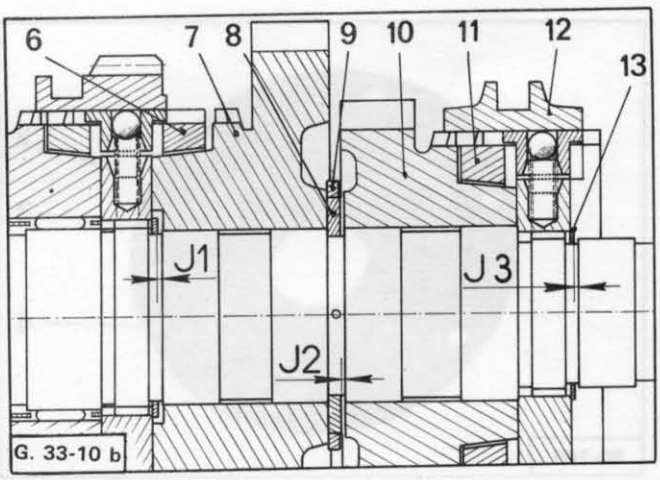
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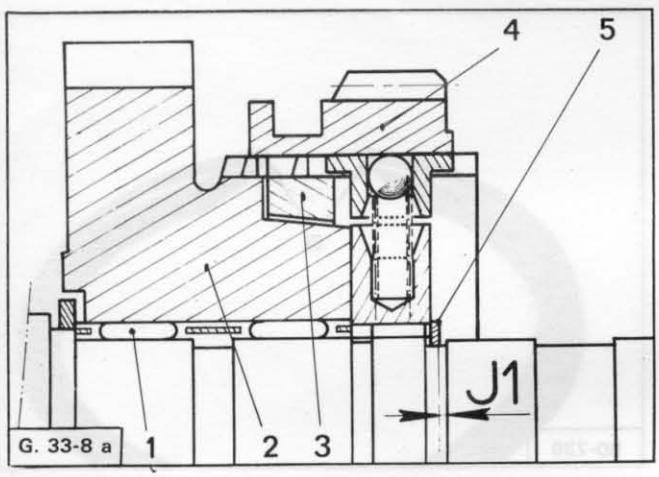
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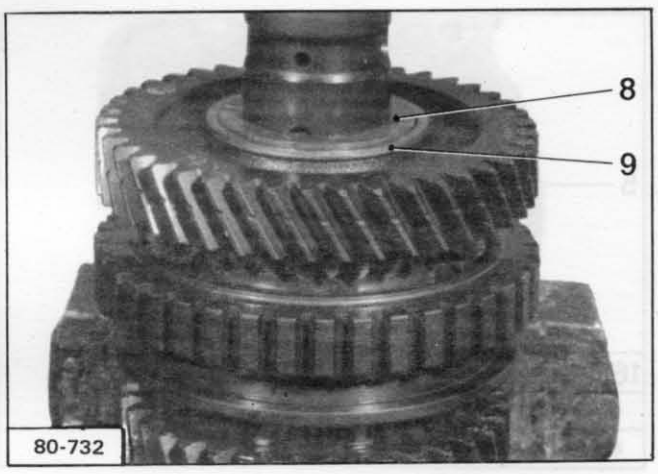
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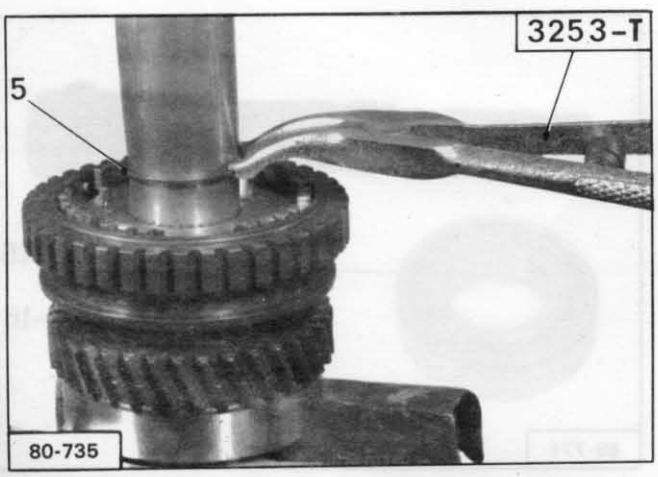
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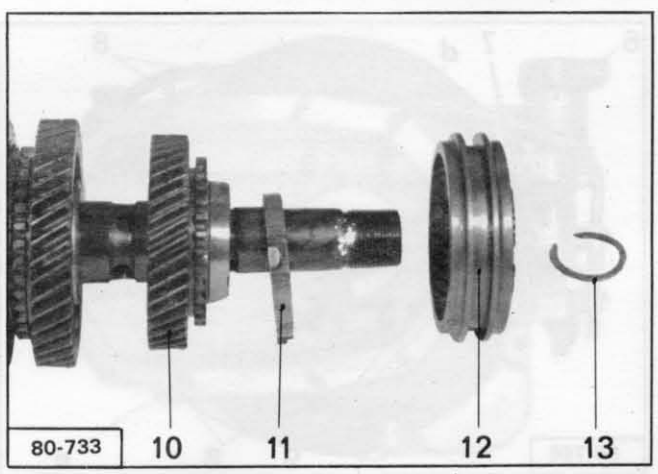
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Position the following :
- needle cage (1),
- reverse gear pinion (2),
- reverse gear synchro ring (3),
- synchro hub-sliding pinion unit (4) for reverse and 1st gears (with groove « a » on reverse gear pinion side).

The reverse and 1st gear synchro rings are different from those for 1st and 2nd gears fitted on manual gearboxes.
They are marked by three grooves « b » on large diameter face.

7. Adjust the fore-and-aft clearance of the 1st-reverse gear synchro hub.

Among locking rings (5) sold by the Replacement Parts Department, choose the one that will provide a clearance **J1 = 0.05 mm max.** The thickness of rings (5) ranges from 1.42 mm to 1.58 mm, with 0.04 mm increments.

Position locking ring (5).
Wrap the bevel pinion shaft with a sheet of metal foil (thickness = 0.10 mm). Use pliers **3253-T** .

Prise away the ends of the ring.
Slide it over the metal foil.
Slide the metal foil and ring assembly along the shaft until the ring can engage in the groove.

Position :
- 1st gear synchro ring (6),
- 1st gear pinion (7):

8. Adjust the clearance of the stop for the reverse and 1st gear wheels :

Choose among half washers (8) sold by the Replacement Parts Department the ones that will provide a clearance :

J2 = 0.05 mm max.

The thickness of half-washers (8) ranges from 2.56 mm to 2.71 mm, with 0.03 mm increments.

Both half-washers (8) must be of the same thickness.

Position :
- the two half-washers (8),
- washer (9).

Position :
- 2nd gear pinion (10),
- 2nd gear synchro ring (11),
- 2nd-3rd gear sliding pinion and synchro hub unit (12)

Unit (12) is symmetrical.

The 2nd and 3rd gear synchro rings are identical to the 3rd, 4th and 5th gear ones fitted on manual gearboxes.

9. Adjust the fore-and-aft clearance of the 2nd-3rd gear synchro hub :

Choose among locking rings (13) sold by the Replacement Parts Department the one that will provide a clearance :

J3 = 0.05 mm max.

The thickness of locking rings (13) ranges from 1.42 mm to 1.58 mm with 0.04 mm increments.
Position locking ring (13).
Proceed in the same way as for the locking ring for 1st-reverse gear synchro hub *(see paragraph 7).*

Position :

- 3rd gear synchro ring (1),
- 3rd gear pinion (2),
- setting washer (3), *after having measured its thickness*,
- bearing (5) (with shouldering « a » facing the rear of the bevel pinion),
- nut-screw (4).

Tighten nut-screw (4) from 10 to 12 mdaN. Do not peen the edge so as to allow adjusting the crown-wheel and pinion distance.

NOTE : During this operation, hold the bevel pinion in a vice fitted with soft jaws by using the reverse gear pinion (6) locked on the bevel pinion shaft by means of the 1st-reverse gear sliding pinion.

Never hold the sliding pinions in a vice.

10. Prepare the primary shaft :

Fit ball bearing (8) with shouldering « b » facing the rear.

Hold the primary shaft by gripping one of its pinions in a vice fitted with soft jaws.

Tighten nut (9) from **6 to 7 mdaN** and lock it.

Fit needle bearing (7) *with face « c » towards the mainshaft.*

11. Prepare the mainshaft :

Oil joints (10) and (11) and fit them on the shaft, one by each end.

NOTE : Spring (12) will be placed in its housing only when fitting the shaft in the converter.

12. Prepare the differential casing :

Fit tapered bearings (13) using a press and a tube (inner dia = 36 mm, outer dia. = 45 mm, length = 40 mm).

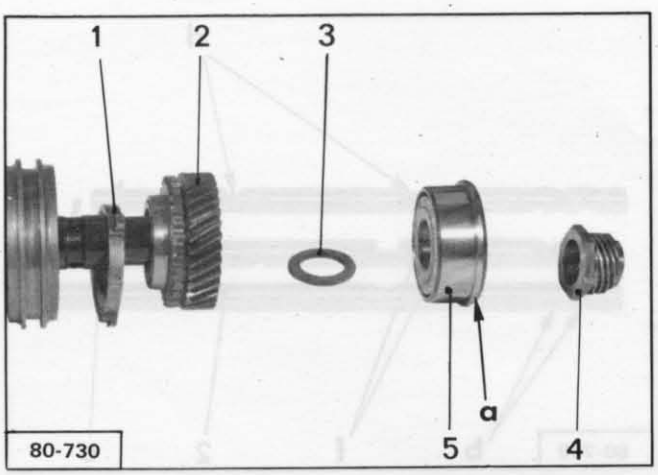
Do not invert the bearing outer rings.
The fitting of the differential casing will be through only once the crownwheel and pinion is adjusted.

13. Prepare the rear cover :

Position rubber seal (14) and o-ring seal (15) on speedometer drive bearing (17) *(new seals)*.

Fit pinion (16) *(pre-greased shaft)* in bearing (17).

Engage the speedometer drive unit in the cover, placing groove « e » of bearing (17) so as to allow the fitting of screw « f ».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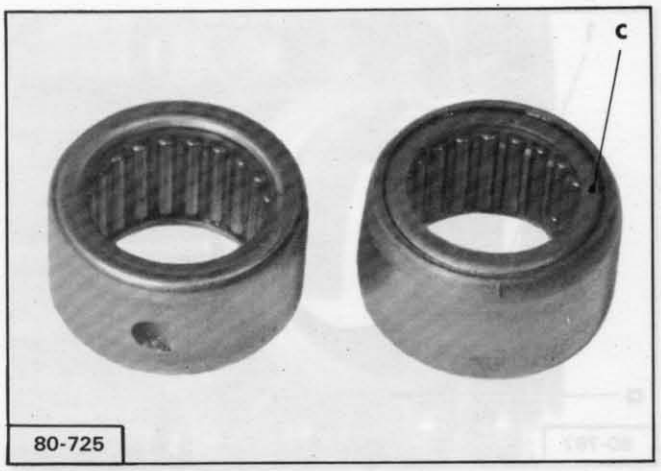
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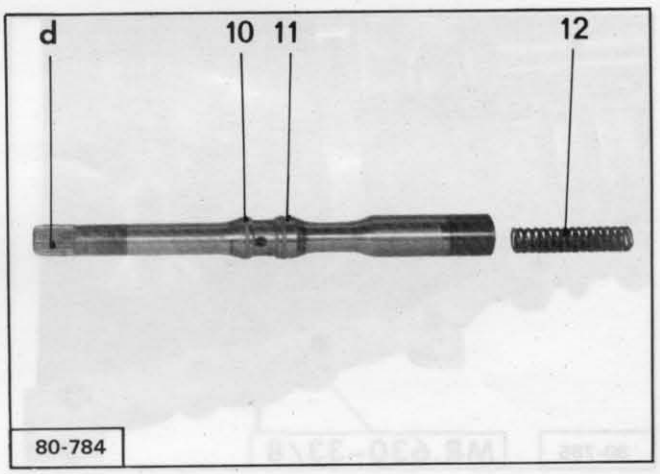
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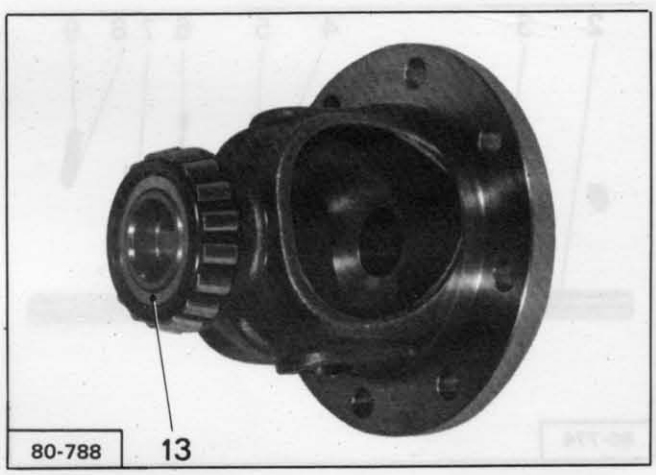
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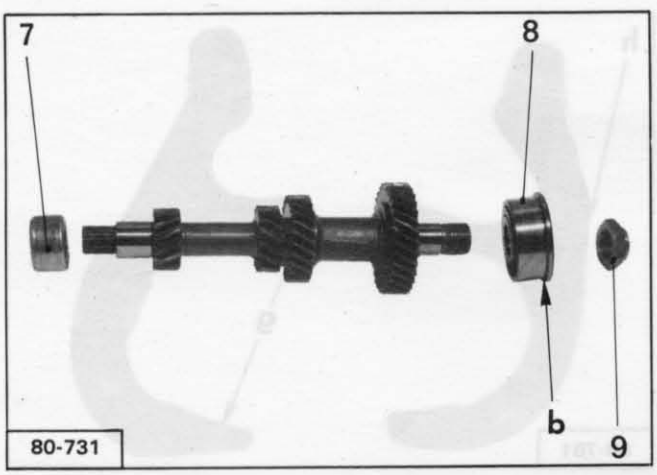
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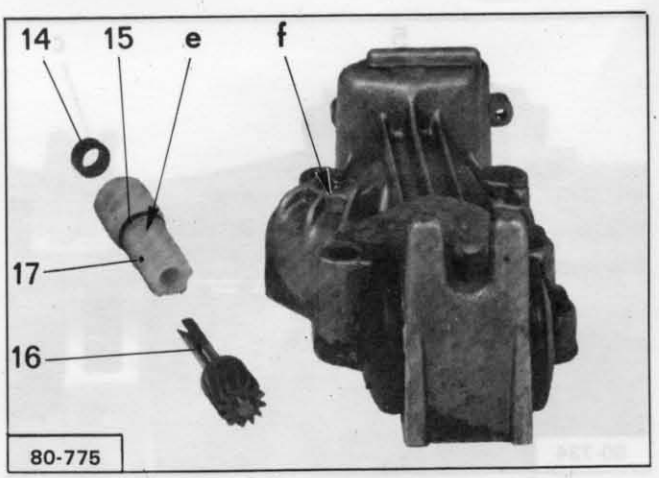
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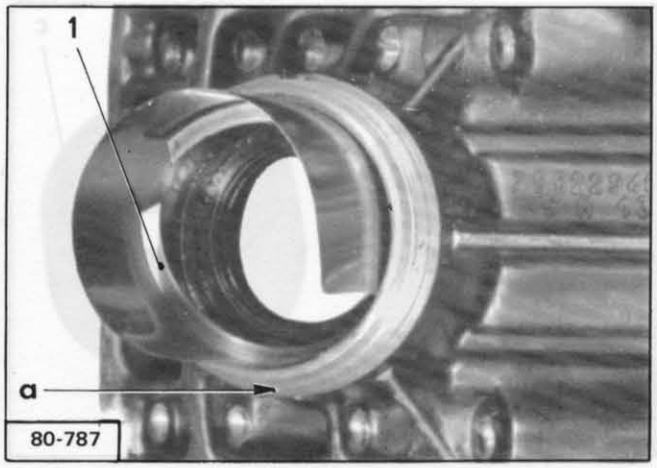
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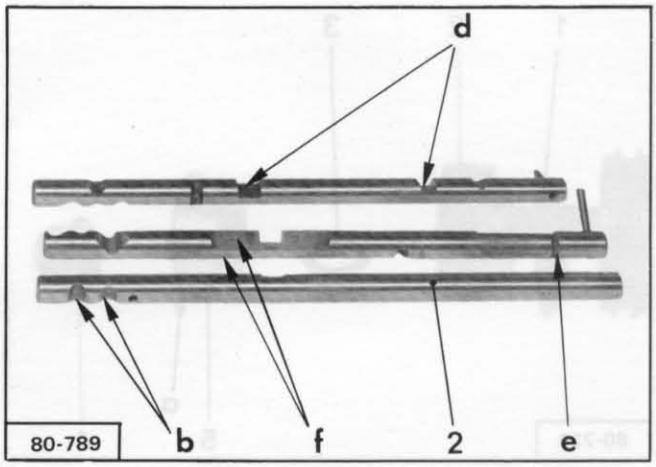
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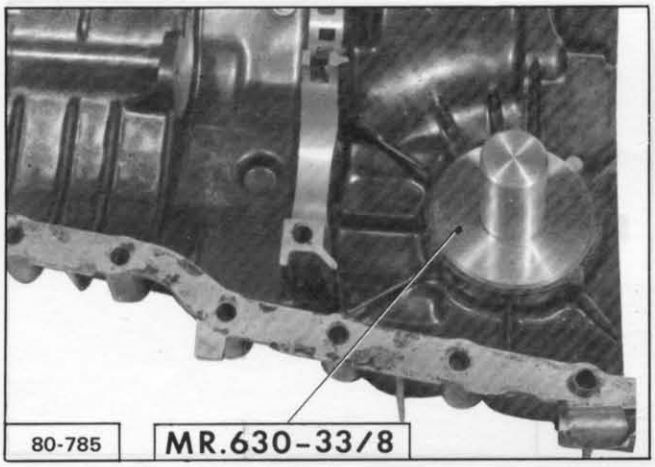
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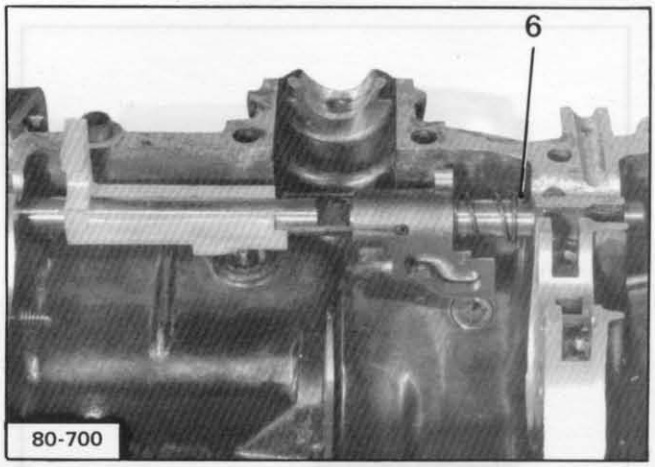
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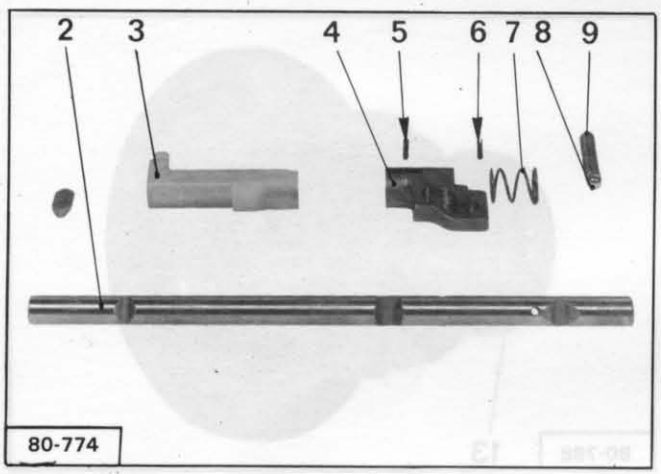
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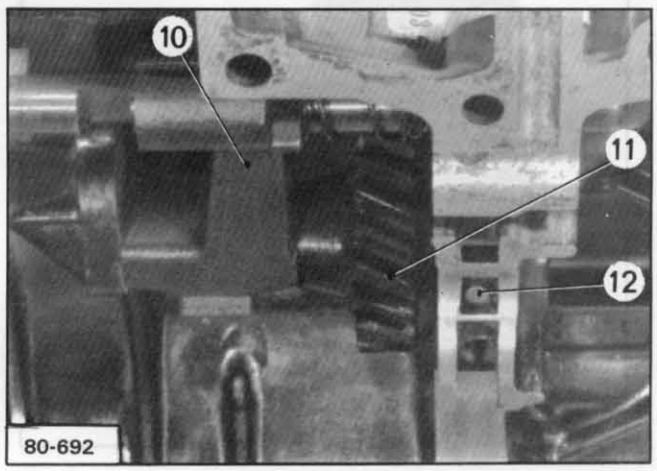
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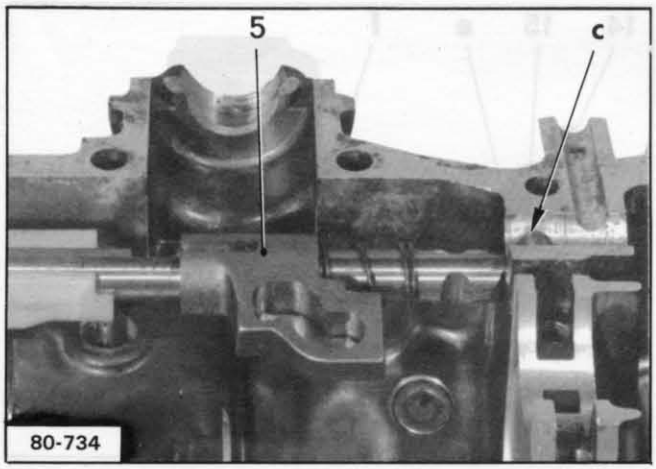
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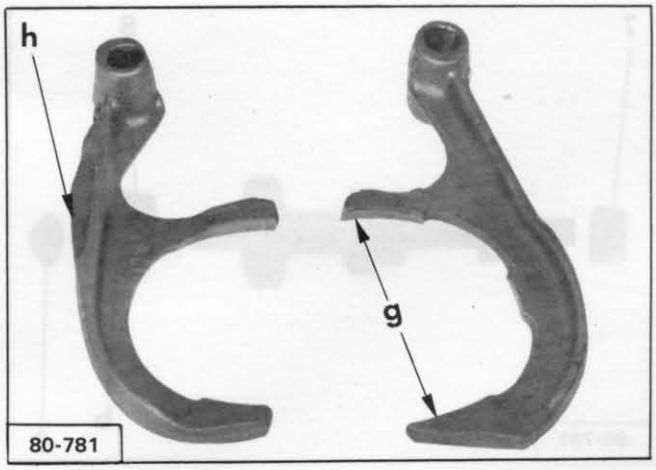
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14. Fit the seals on the gearbox output shafts (from inside the half-casings) :

On each half-casing :
Fit circlip (1) in the bore using a sheet of metal foil (length = 150 mm, thickness = 0.2 mm, width = 60 mm).
Once the circlip is fitted, one of its end should be at 10 mm approx. from draining hole « a ».
Remove the metal foil sheet.
Grease the seal housing and the outside of the seal.
Position the seal, *with the marked side facing outwards.*
Bring the seal against circlip (1), using mandrel **MR. 630-33/8** from inside the casing.

15. Prepare the left half-casing :

Oil shaft (2) and grease locking slots « b ».
Engage shaft (2) in the half-casing rear bearing.
Fit, one after the other, on shaft (2), reverse lamp switch cam (3), parking locking cam (4) and cam spring (7).
Fit pin (5) on shaft (2). To carry out this operation, shaft (2) must be engaged in the half-casing front bearing.
Remove shaft (2) from the front bearing and grease spring (9) and ball (8), before fitting them in their housing « c ».
Compress the ball and the locking spring (tube dia. = 5 mm) and engage shaft (2) in its front bearing.
Lightly compress spring (7) and fit pin (6).
Oil the reverse gear pinion shaft and engage it in the rear bearing *(with the stop slot on differential side).*
Fit the parking brake lock (10) and pinion (11).
Finish positioning the shaft and fit pin (12) fully home in its housing.

Pin (12) should slightly stand proud as it serves as a stop for the primary shaft needle bearing.

Fit reverse lamp switch and tighten it **from 1.2 to 1.5 mdaN**

16. Prepare the right half-casing :

Identifying the shafts and the selector forks :

- Parking brake control shaft : has no hole at its end for the fitting of a pin.
- Reverse and 1st gear selector fork shaft : has two slots at « d ».

  2nd and 3rd gear selector fork shaft : has a circular slot at « e » and two flats at « f ».
- Reverse and 1st gear selector fork : gap « g » is bigger than that of the 2nd-3rd gear selector fork which has a round rib at « h ».

The five balls and the two locking springs, each one in its half-casing, are identical (20 turns).

The third spring, which is fitted only once the half casings are assembled, is shorter (14 turns).

Fit the Mecanindus pins controlling the clutch switch, on the selector fork shafts.

Place the slot of each pin perpendiculary to the longitudinal axle of the selector fork shaft.

Adjust the protrusion of each pin :
- on the reverse and 1st gear selector fork shaft :

$$h1 = 14.4 \, {}^{+1}_{0} \text{ mm}$$

- on the 2nd and 3rd gear selector fork shaft :

$$h2 = 18.4 \, {}^{+1}_{0} \text{ mm}$$

Slightly oil shaft (2) and grease locking slots « a ».
Engage shaft (2) in the rear bearing.
Fit reverse and 1 st gear selector fork (3) onto shaft (2).
Fit selector fork stop pin (1).

When fitting the pin, place the shaft-selector fork unit against the rear bearing in order not to damage them.

Grease the spring and the locking ball and position them in their housing « b ».
Compress the ball and the spring (tube dia. = 5 mm) and engage shaft (2) in its front bearing.

IV- ADJUSTING THE CROWNWHEEL AND PINION

The bevel pinion and the crownwheel are paired and marked by identical inscriptions on face **F1** or **F2** of the bevel pinion and on side **F3** of the crownwheel.

Do not unmatch a crownwheel and a pinion set.

Two dimensions are also engraved on side F3 of the crownwheel.
Larger dimension L1 : distance between the rear face of the pinion and the crownwheel and pinion axles intersection point « e ».
Shorter dimension L2 : distance between the crownwheel thrust face on housing and the crownwheel and pinion axles intersection point « e ».

1. Crownwheel and pinion adjustment principle

The drive pinion is positioned with respect to the differential shaft and the crownwheel with respect to the bevel pinion, so as to ensure a correct fitting of the pinion and the crownwheel.

2. Adjusting the crownwheel and pinion distance L1

a) Fit dial gauge **2437-T** on support **A** from kit **3184-T bis**.
Calibrate the assembly on a calibration table, with the dial **0** mark opposite the large needle.
Note the position of the totalizing needle.

b) Fit the bevel pinion assembly in the left half-casing and fix the rear cover with 3 screws.

c) Fit cap **C** and support **A** (both taken out of tool kit **3184-T bis**) equipped with dial gauge **2437-T**.

The cap **C** and support **A** unit, with the dial gauge in the calibration position, corresponds to a distance of : **K1 + K2 = 78 mm,** engraved on the support at « c ».

d) Pivot support **A** and block it as soon as the large needle changes its direction of rotation.

e) Bring back the needles to the calibration position, then release slowly, counting the mumber of turns and fractions of a turn.

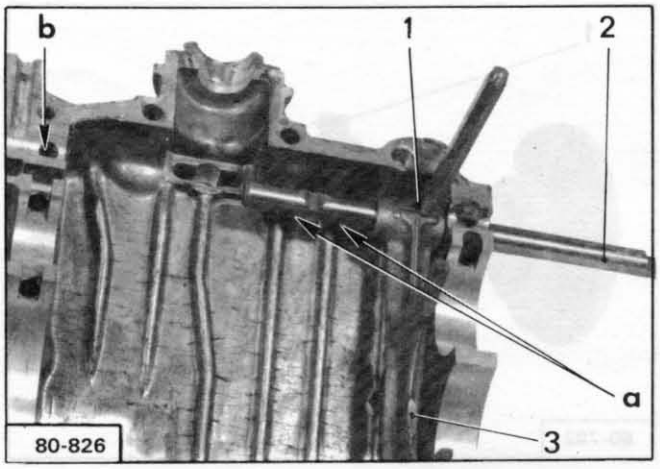
Reading E + distance engraved on support = *crownwheel and pinion distance.*

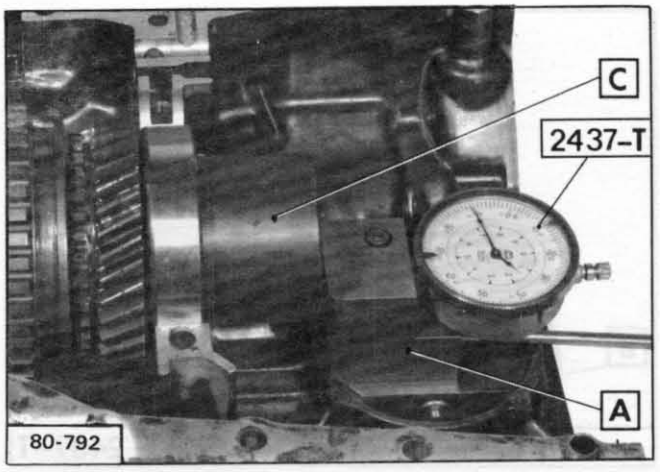
f) **Calculate the difference between the distance engraved on the pinion and the crownwheel and pinion distance measured** and reduce or increase as appropriate, thickness **(E').**
Remove the adjustment equipment, the rear cover and the bevel-pinion-and-pinions unit.

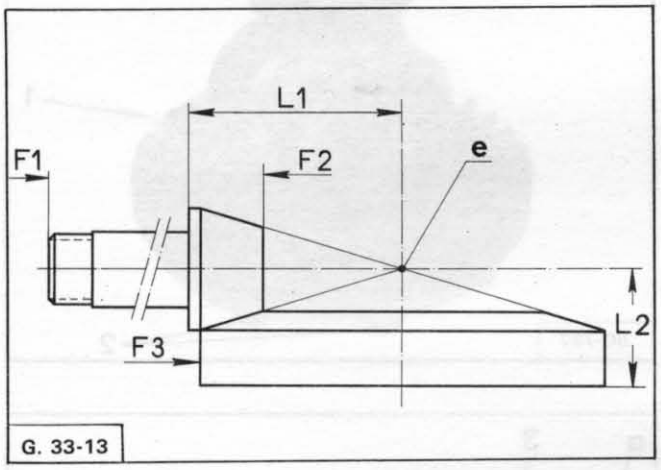
g) Replace the existing washer by that calculated above
Tighten bevel pinion nut from **10 to 12 m.daN,** and lock it by peening of metal.

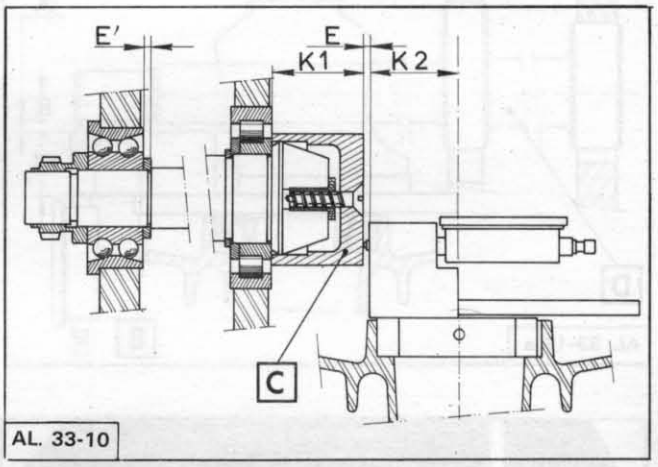
3. Adjusting the crownwheel position :

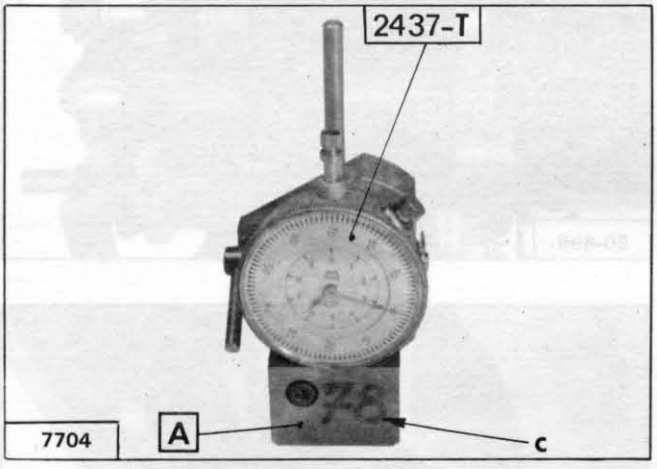
a) Put left bearing ring (5) in its housing, **with no adjustment shim.**
Fit the differential housing using mandrel **D** (with its end « d » engaged in the housing).
Fit the right half-casing and the rear cover.
Make sure that the housing is in position **and that ring (4) is in contact with the bearing rollers.**


b
1
2
a
3
80-826


C
2437-T
A
80-792


L1
F1
F2
e
L2
F3
G. 33-13


E'
E
K1
K2
C
AL. 33-10


2437-T
A
c
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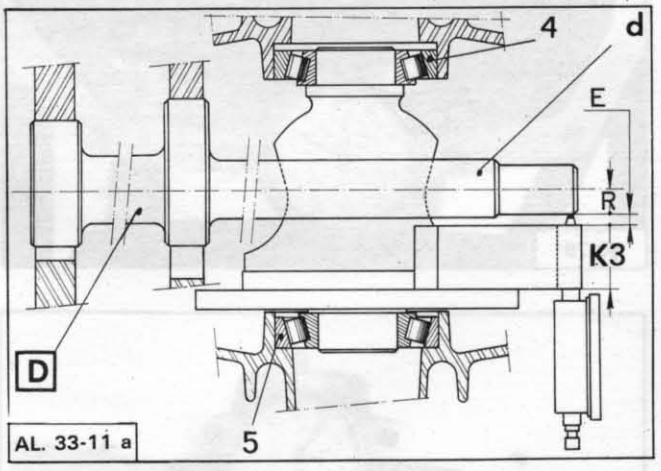
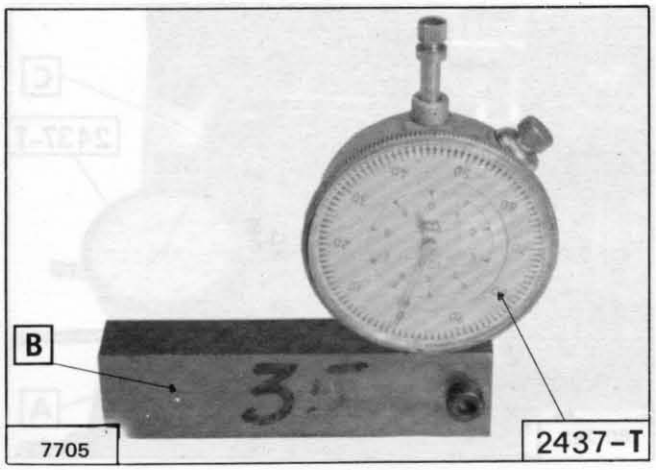
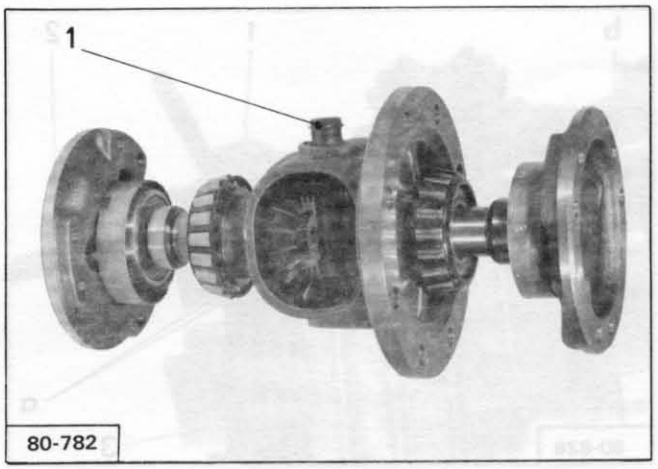

4
d
E
R
K3
D
5
AL. 33-11 a


B
3
7705
2437-T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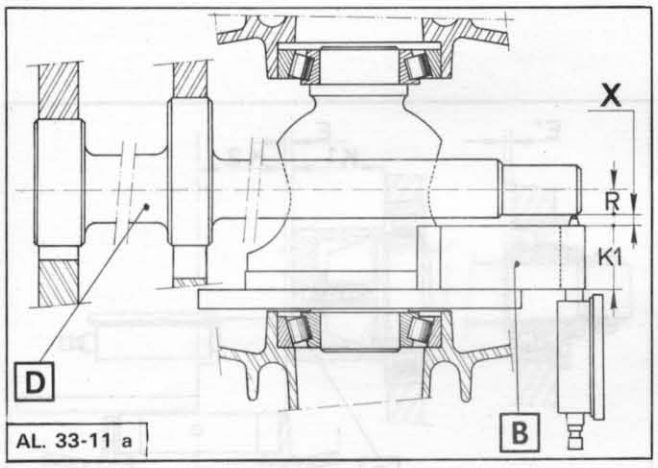
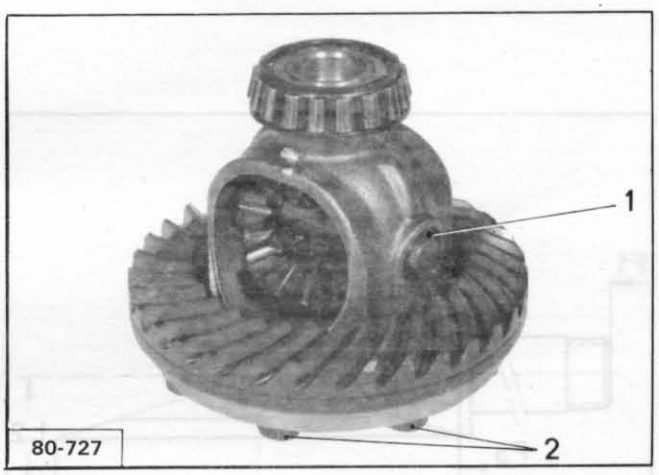

X
R
K1
D
B
AL. 33-11 a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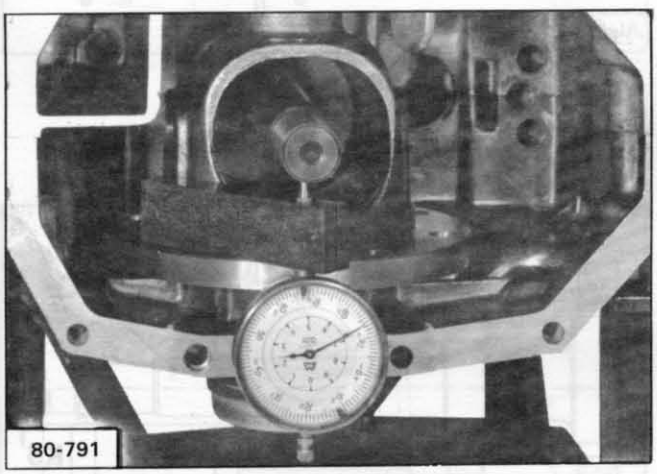
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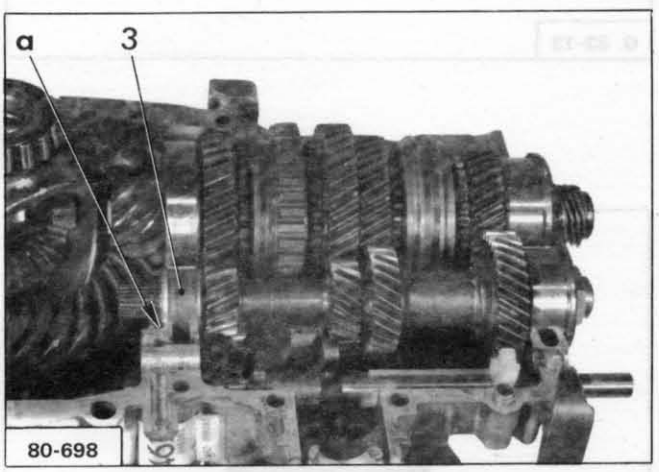
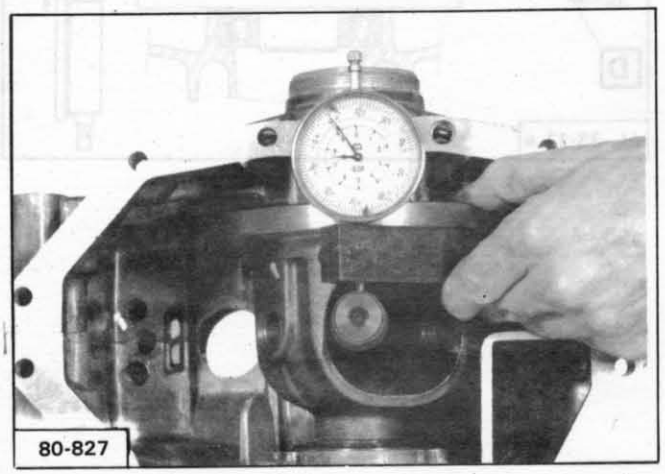

a
3
80-698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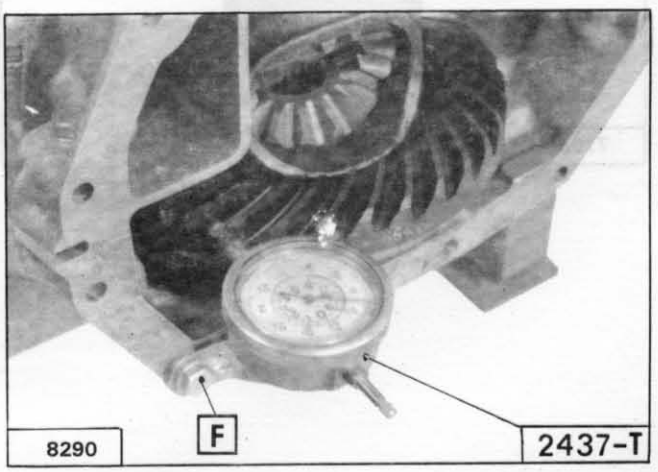

F
8290
2437-T

b) Fit dial gauge **2437-T** on ruler **B** of tool kit **3184-T bis** and calibrate the assembly setting it between 8 and 9 mm.

The mandrel **D** and calibrated ruler **B** unit corresponds to a distance of **K3 + R = 35 mm, engraved on ruler B**

c) Place the ruler against the housing, pivot the unit and block it as soon as the large needle changes its direction of rotation.
Bring the needles back to the calibration position and release slowly counting the number of turns and fractions of a turn.

Distance engraved on ruler + reading X = distance between contact face and shaft. The difference between the distance engraved on crownwheel and the distance measured gives the theoretical thickness of shims.

d) Proceed in the same way for the right side.
Make sure the differential is in position, the right bearing ring **fully home in the housing** and the left bearing ring **in contact with the bearing rollers.**

4. Add the bearing preload :

This load is of : **0.05 mm** for both bearings
That is of : **0.025 mm** for each bearing.
Thickness of left side shim :
Theoretical left shim thickness + theoretical right shim thickness + 0.05 mm = **total thickness of shims to be fitted.**
Calculate the difference between the total thickness of the shims already chosen.
Total thickness of shims to be fitted − thickness of left shim to be fitted = **thickness of right shim to be fitted.**

V- FITTING

1. Fit the differential :

a) Fit the crownwheel **tightening screws (2) (grease face and threads) to between 8 and 9 mdaN.**

b) Fit :
- the two planet gears, holding them by means of the two gearbox output shafts.
- the two satellite gears, making sure they are in line with the satellite shaft and then removing the shaft.

Make sure the satellite gears are correctly positioned by rotating the planet gears.
Engage the satellite shaft and fit circlip (1).

2. Fit the gear train unit :

Position the following in the left half-casing :
- the differential,
- the bevel pinion unit,
- the primary shaft unit, *turning needle bearing (3) so that the pin fits in the bearing stop slot.*
- needle bearing (3) is in position when slot « a » is in line with the half-casing joint face.

3. Checking the crownwheel and pinion tooth engagement play :

The tooth engagement play should be correct if the crownwheel and pinion have been carefully adjusted.

However, this value should be checked.
Fit the right half-casing and the rear cover.
Using support **F** from tool kit **3184-T bis** and dial gauge **2437-T**, measure the tooth engagement play which should be comprised **between 0.13 and 0.27 mm.**
Remove the dial gauge, the rear cover and the right half-casing.

4. Assemble the half-casings :

a) Check on the left half-casing, that sliding pinions (1) and (2) are correctly positioned on « neutral ».

b) Fit the 2nd-3rd gear selector fork on its shaft using pin (3).
Place a locking ball, smeared with grease, at « a ».
Fit the 2nd-3rd gear selector fork and shaft unit in the casing by sliding it under the reverse lamp switch-cam.

c) Position the reverse lamp switch-cam so as to allow cam end « b » to fit in the slot of the 1st-reverse gear selector fork shaft.
To carry out this operation, place the switch-cam end at about 12 mm from the casing edge.

d) Fit the spring retainer plate.

The plate springs are different.
The one with the biggest wire diameter goes on the reverse gear pinion side (in the left half-casing).

e) Fit interlock plunger (5).
Grease and fit ball pin (4) with guiding slot « c » towards right half-casing side.

f) Temporarily fit a gearbox output shaft in order to center the planet gears.

g) Secure with grease to the right half-casing, the ball pin guide and spring in their housing « d » as well as locking ball (6).
Make sure selector fork (7) is on « neutral » position : there should be a distance of approx. 12 mm between the shaft flat and the casing edge.

h) Smear the joint faces with LOCTITE FORMETANCH.
Assemble the half-casings.
Fit the screws (flat washer under each screw head, blind nuts **absolutely** fitted on right half-casing side).
Do up the screws without tightening them.

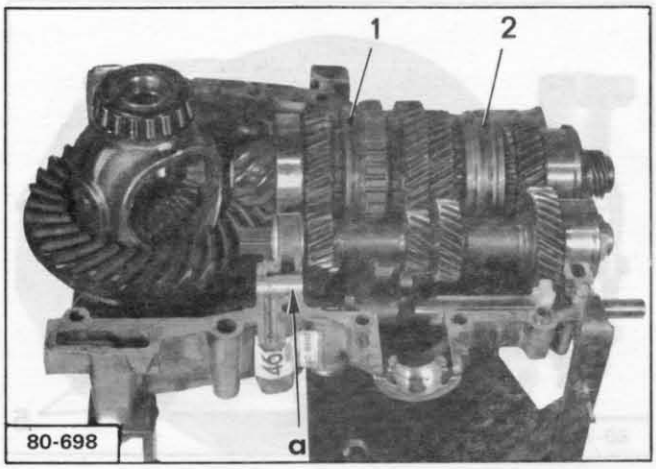
i) Fit the rear cover, coating the joint face with LOCTITE FORMETANCH.
Do up the screws finger tight *(flat washers under each screw head).*

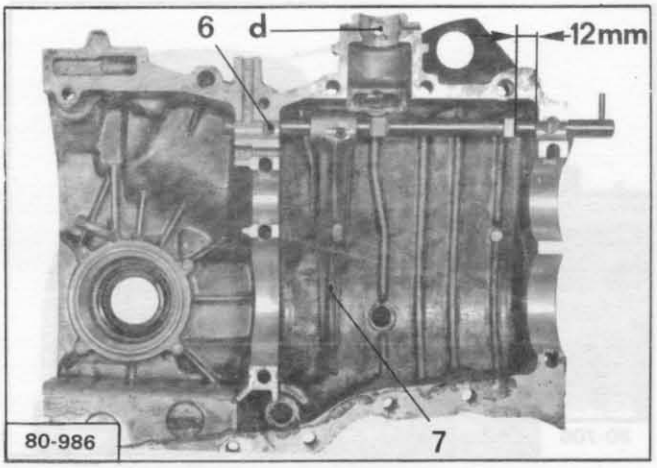
j) Tighten the half-casings assembly screws fully.

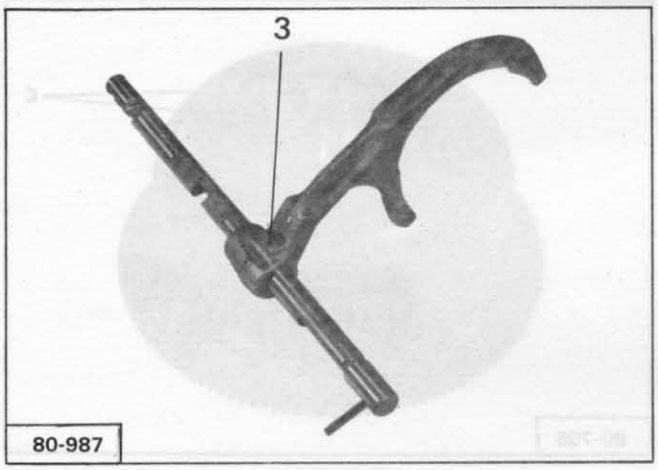
Follow the tightening order indicated in the photo.

Tightening torque : 1.3 to 1.5 mdaN.
Tighten :
- the six rear cover securing screws (8) **to between 2.5 and 3 mdaN,**
- the two screws (9) **to between 0.3 and 0.5 mdaN**

k) Fit the interlocking for the 2nd-3rd gear selector fork shaft.
Position :
- the locking ball and the spring,
- pin (10),
- the plug.


1
2
a
80-698


6
d
12mm
7
80-986


3
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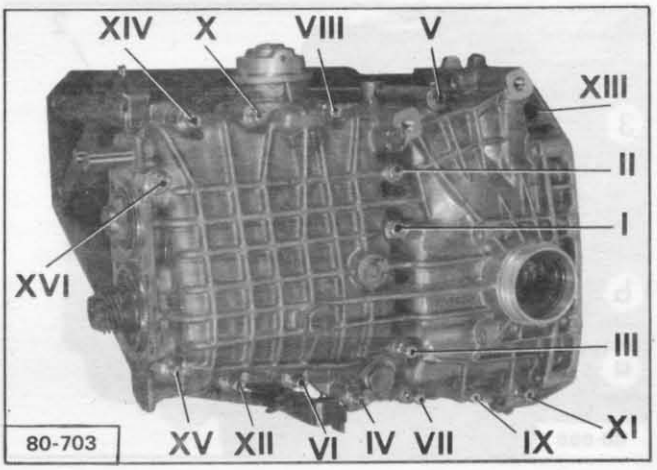
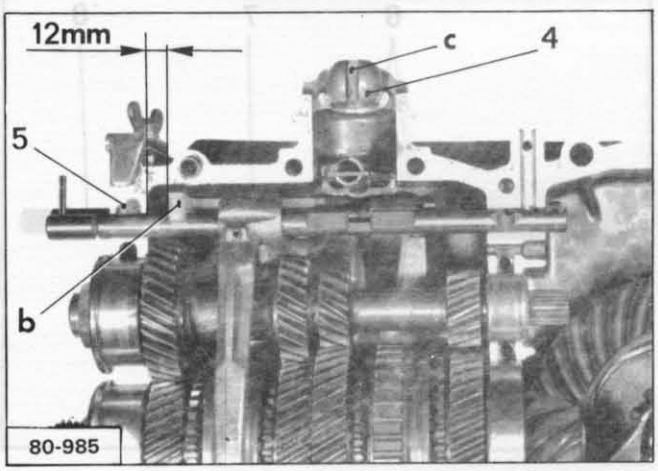
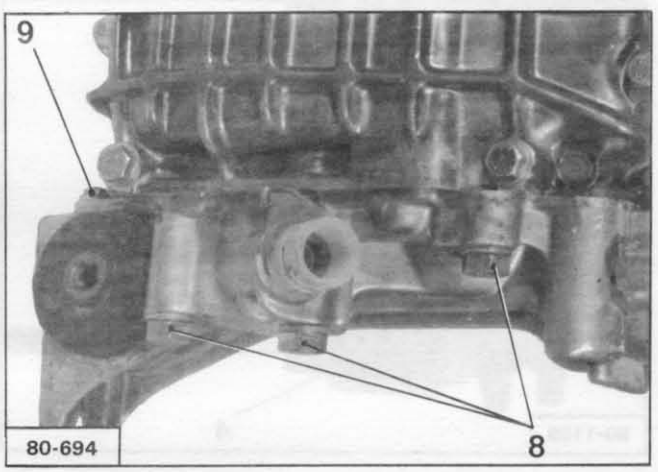

XIV
X
VIII
V
XIII
II
I
XVI
III
XV
XII
VI
IV
VII
IX
XI
80-703


12mm
c
4
5
b
80-985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8
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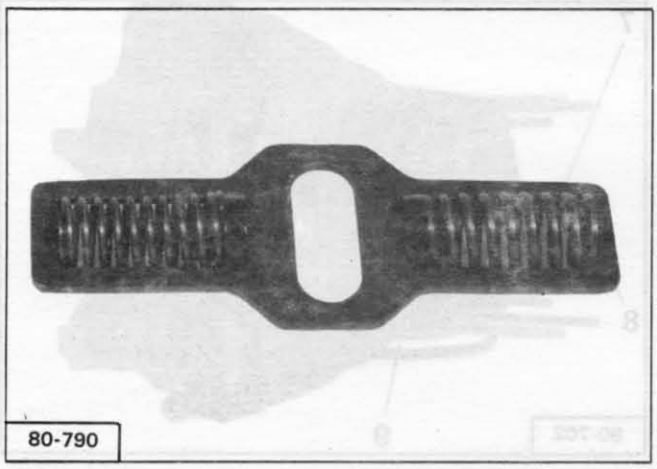
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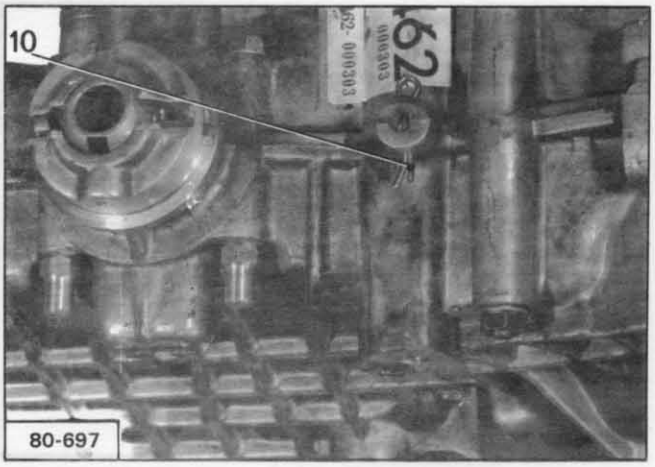
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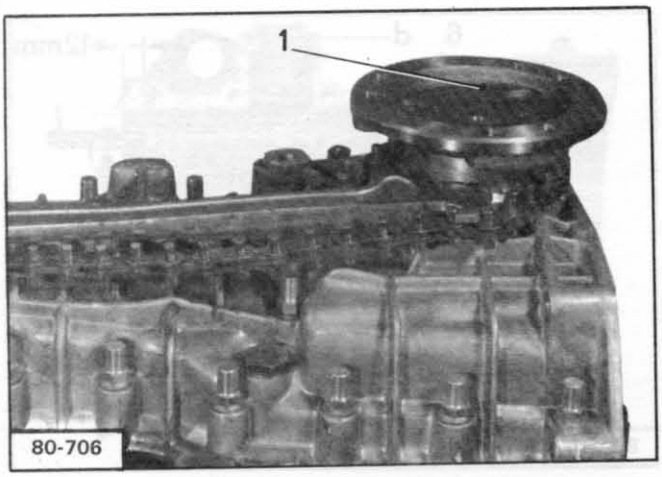
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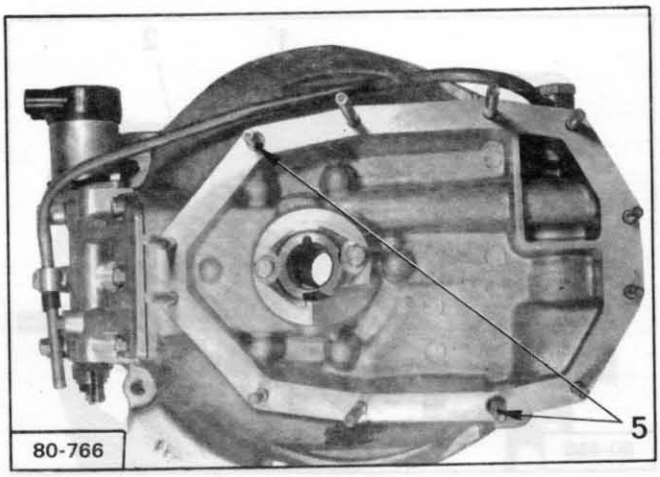
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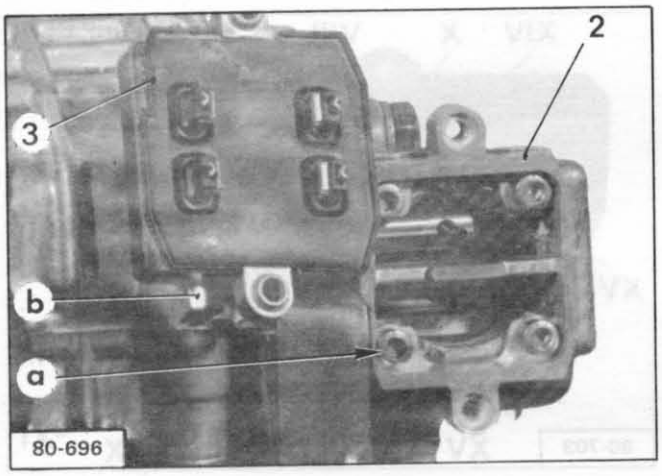
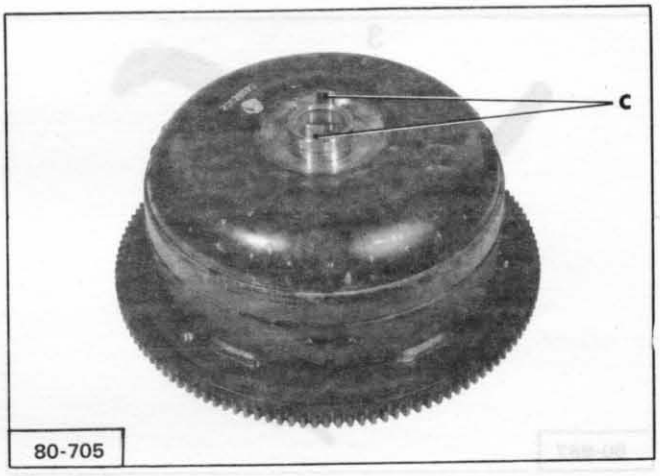

2
3
b
a
80-696


c
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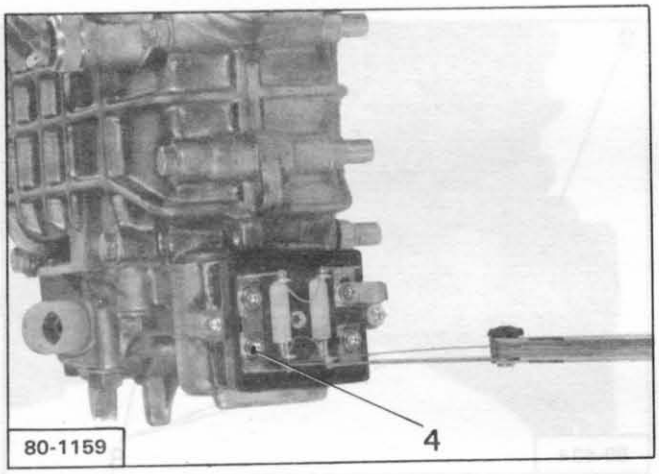
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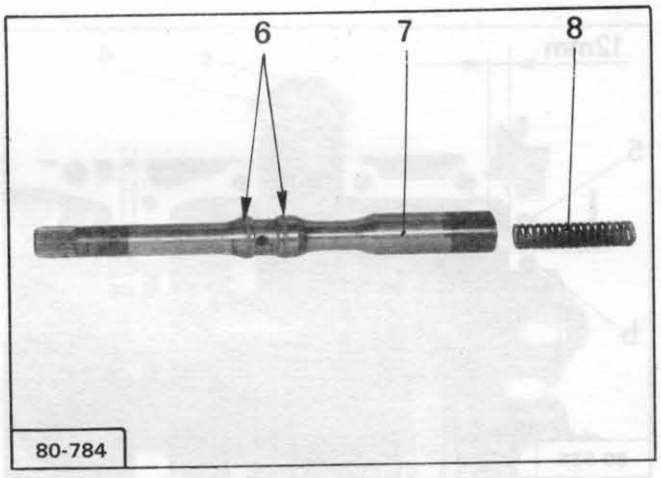
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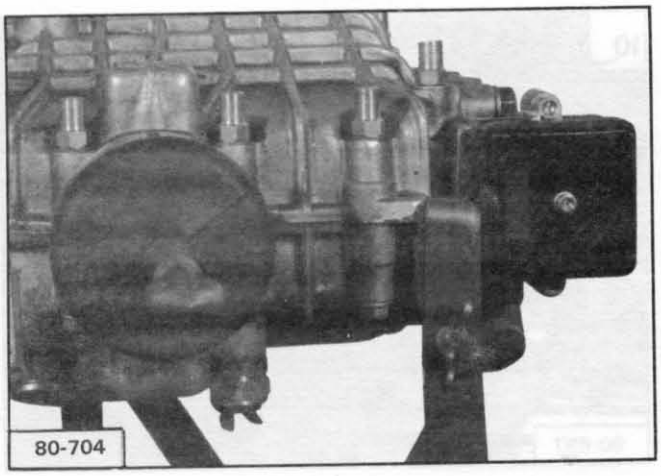
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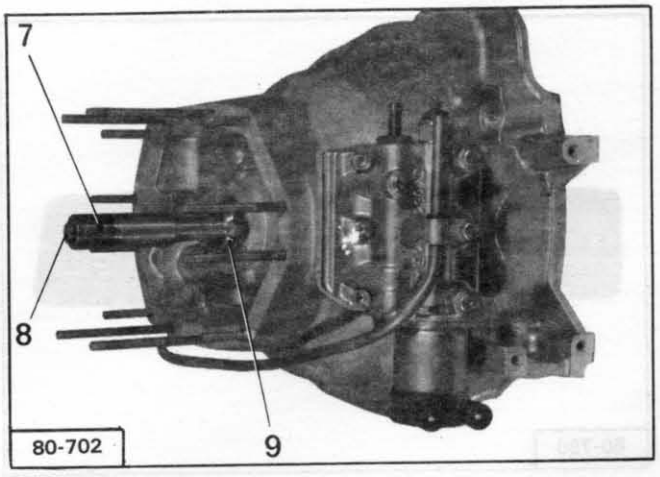
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5. Fit the gearbox output shafts :

Make sure the planet gears are correctly positioned and that, on assembly, the shaft teeth engage correctly in the corresponding planet gear teeth *(when turning the two output shafts by hand, in the same direction, the differential crownwheel should be driven along).*

a) Position shafts (1). (Tap lightly with a mallet to help positioning of the bearing).

b) **Tighten the bush-nuts to between 6 and 7.5 mdaN,** using a tube wrench.

c) Lock the rings by metal peening in the corresponding millings in the casings.

6. Fit the draining and level plugs.
Tighten them to between 3.5 and 4.5 mdaN (copper joint).
Fit the reverse lamp switch.
Tighten it to between 1.2 and 1.5 mdaN.
Fit clutch control switch.
Smear the joint face of switch baseplate (2) with CURTYLON.
Fit the switch baseplate on the rear cover (with recess « a » towards the front of the gearbox).
Engage on the contact pins, rubber joint (3) with the edging towards cover side.
Fit the switch on the baseplate (with flat plug « b » towards the right half-casing side).

7. Adjust the contact gap of the clutch control switch.
To carry out this operation, temporarily fit the gear change lever, each contact gap being adjusted with the corresponding gear engaged.
On « neutral » all the contacts must be closed.

Adjustment method :
Engage a gear, using a lever.
Adjust contact gap, using a set of shims and acting upon the mooving contact by means of screw (4).
- 1st and REV, to **1.45 ± 0.2 mm**
-2nd and 3rd, to **1.60 ± 0.2 mm**
Tighten the screw but not too closely.
Carry out the same operation for the other gears.
Fit the switch cover and position the plastic clip.

8. Fit the converter housing on the converter.
Make sure the two centering studs (5) are in place.
Place the converter flat on the work bench.
Engage the casing on the converter so that drive blocks « c » engage correctly in the corresponding notches of the pump pinion.

9. Fit the mainshaft :

Make sure seals (6) are in place.
Engage mainshaft (7) in stator sleeve (9).
Put spring (8) in its housing.

Fit the converter securing lug.

Slide the converter and converter casing unit towards the edge of the work bench.

Fit converter securing lug **3186-T** by means of two screws .

It is imperative to use lug 3186-T : it will keep the converter from coming out which would prevent the gearbox and engine to assemble and thus cause a damage to the drive blocks.

Connect the gearbox to the converter housing-converter unit.

Fit the joint on the converter casing. Offer up and engage the gearbox vertically on the studs of the converter housing.

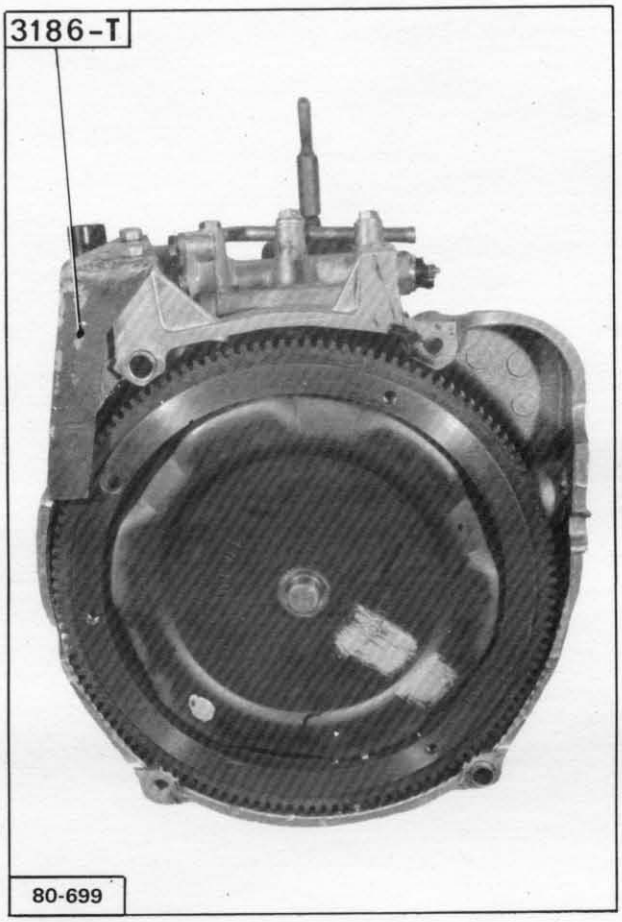
If necessary, engage a gear, using the gear change lever fitted momentarily, and turn the gearbox output shafts so as to allow the primary shaft splines to engage in the corresponding mainshaft splines.

Fit the lugged contact washers and the assembling nuts.

Tighten them to between 1.3 to 1.5 mdaN.

Fit the gearbox vertically.

Plug holes « a » and « b » of the oil inlet and outlet pipings with rubber caps.


3186-T
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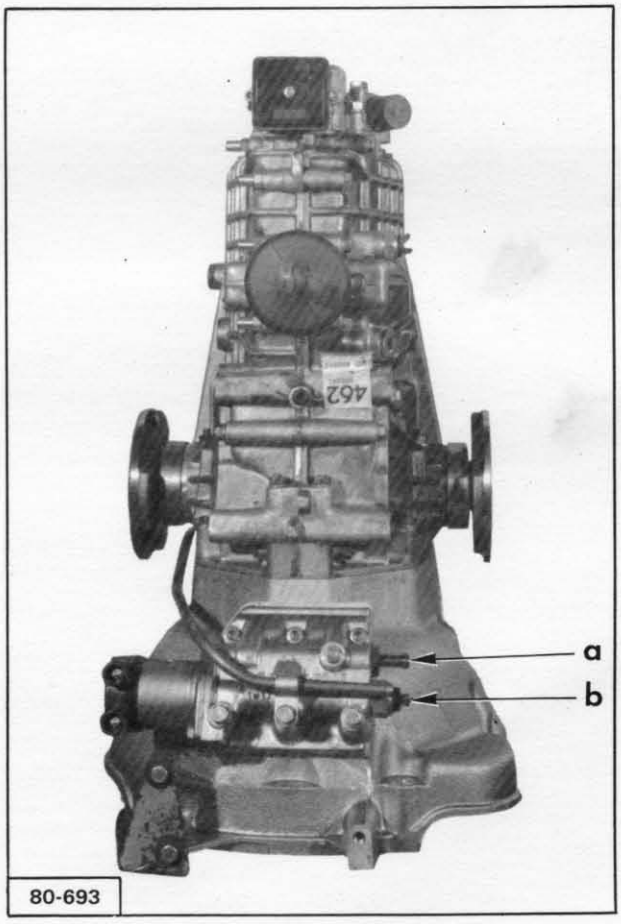

462
a
b
80-693

OPERATION
GX. 372-3

RECONDITIONING A DRIVE SHAFT

RECOMMENDED SPECIAL TOOLS

TOOLS SOLD

1671-T : Inertial extractor

TOOLS NOT SOLD

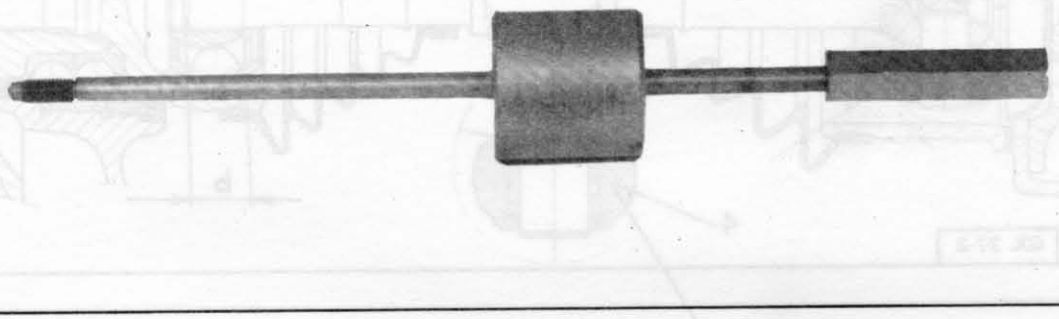
MR. 630-25/23 : Ball joint extractor sleeve

MR. 630-31/133 : Half-shells and ring for compression of the drive shaft snap-ring
(Ball joint assembly)

MR. 630-64/55 : Tool for fitting transmission shaft sleeves

13 551

1671-T



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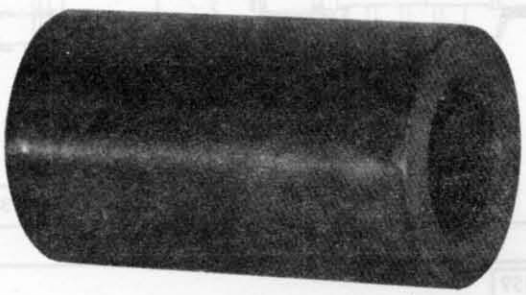
MR.630-25/23



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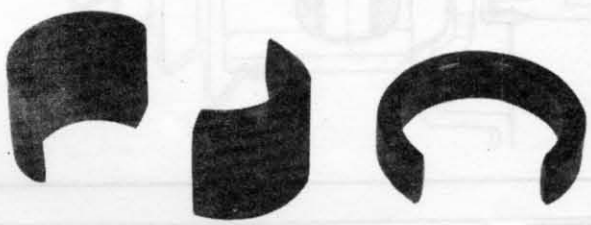
MR.630 31/133



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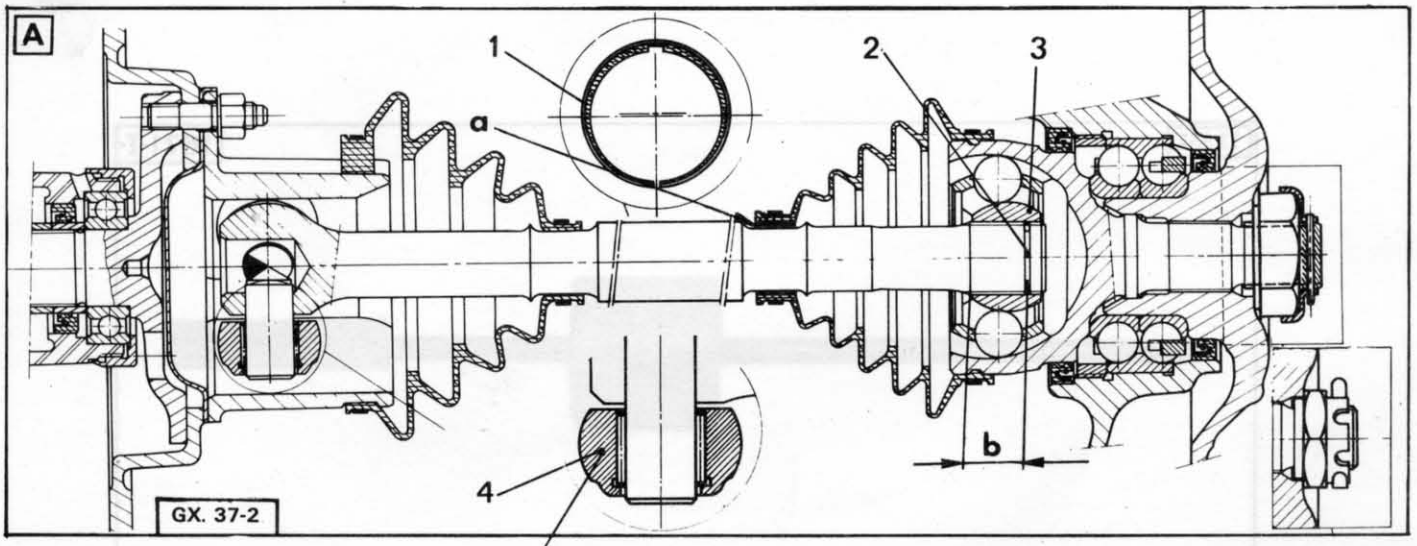
MR.630-64/55


A
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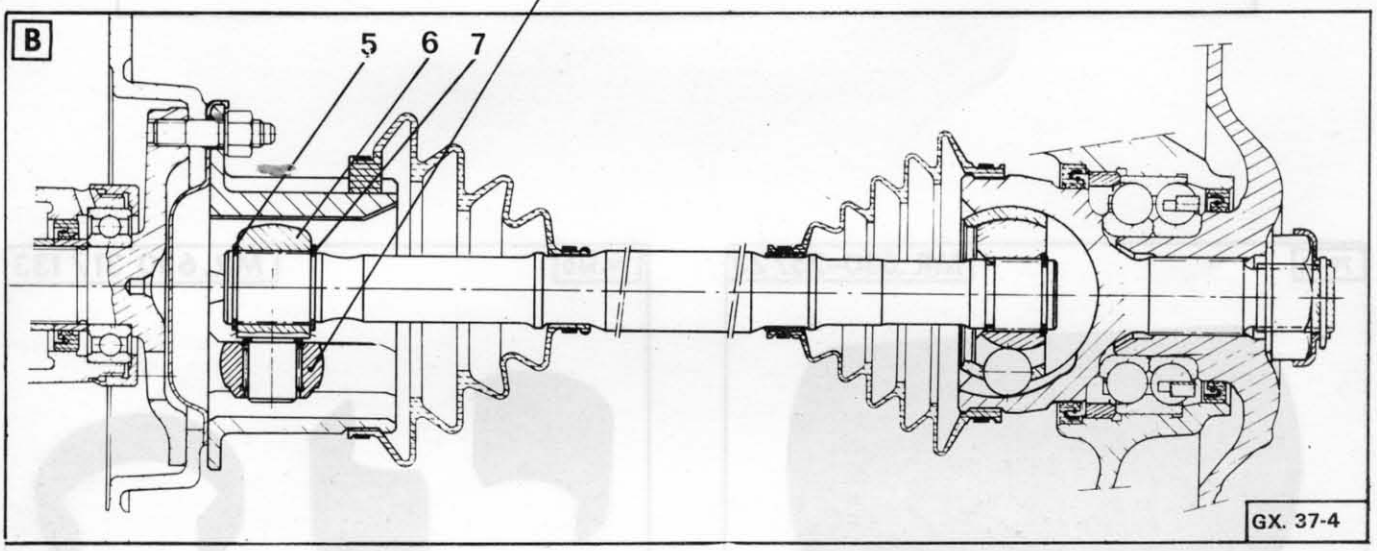
GX. 37-2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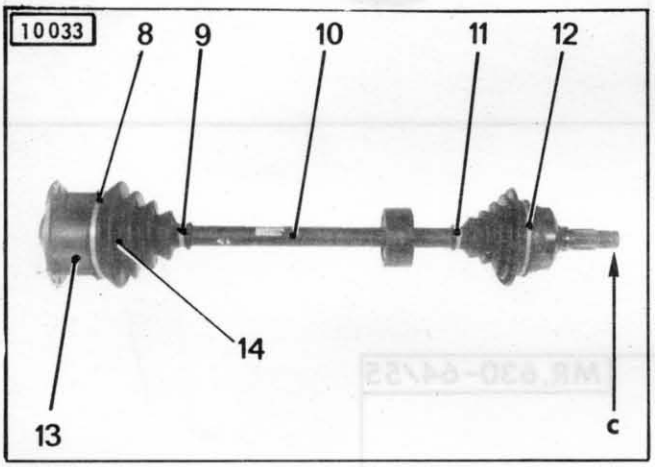
GX. 37-4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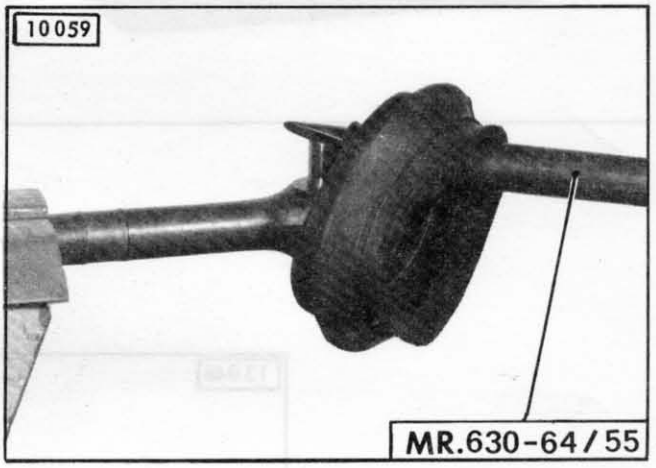
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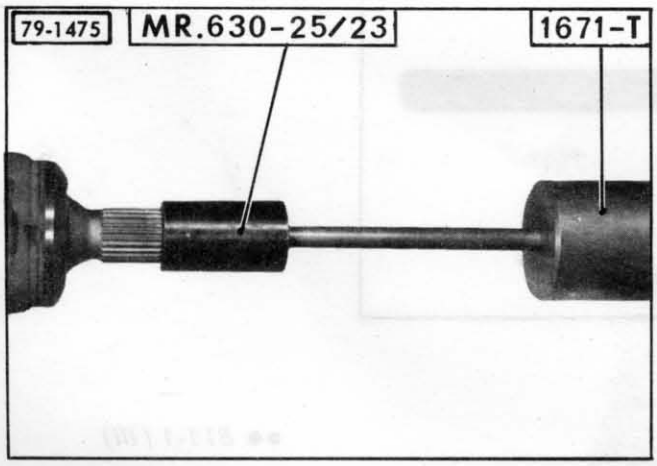
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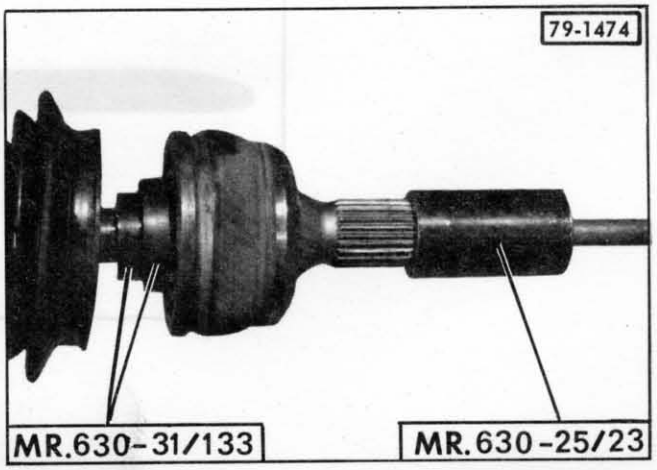
MR.630-25/23
1671-T


79-1474
MR.630-31/133
MR.630-25/23

RECONDITIONING A DRIVE SHAFT

DISMANTLING

If the parts are to be re-used, their respective positions must be indexed.

1. Fix drive shaft in a vice *(fitted with soft jaws).*

2. *Ball joint end :*

a) Remove collars (11) and (12), and disengage the sleeve.

b) Fit extractor sleeve MR. 630-25/23 on end « c » of the drive shaft, and remove the ball joint using inertial extractor 1671-T
Remove the tools.

c) Extract snap-ring (2).
Disengage the sleeve from shaft (10).

Do not attempt to disassemble the joint

3. *Tri-axe joint end :* (1st possibility) **(Fig. A) :**
Remove collars (8) and (9), and disengage driver (13) and ball joints (4) *(take care to catch the needles* **(28 per ball joint)** *as they fall).*

(2nd possibility) (Fig. B) :
- Lock ring (5),
- Tri-axe (6),
- Lock ring (7),
- Remove the sleeve.

4. Clean the parts, **but do not use solvent.**

ASSEMBLY

5. Fit the protective sleeves :

a) *Drive shaft without damper :*
Engage the two protective sleeves on shaft (10). Grease the shaft slightly, to facilitate assembly of the tri-axe sleeve.
Insert venting ring (1) between sleeve and shaft at « a ».

b) **Drive shaft with damper :**
Fit the tri-axe joint sleeve using tool MR. 630-64/55 .

The tool and sleeve must be greased, to facilitate passage over the tri-axe.

Engage the ball joint and sleeve **and fit vent ring (1) at « a ».**

6. *Fit the ball joint :*
Fit a **new** snap-ring (2).
Insert the snap-ring in its groove, using tool MR. 630-31/133

Snap ring (2) can only be inserted in its groove in yoke (3) if engagement length « b » is correct (16.5 mm)

Engage central yoke (3) on the end of shaft (10), and complete assembly using inertial extractor tool 1671-T and striking extractor sleeve MR. 630-25/23 .
Load ball joint and sleeve with 100 grams of type GL 245 MO grease *(supplied with sleeves).*
Fit the sleeve over the ball joint.
Fit the collars **using LIGAREX type collars only.**

7. *Fit the tri-axe joint :*

If the parts are re-used, follow the identification marks made on disassembly.

a) Coat the ball joints and needles with type GL 245 MO grease.
Position on the tri-axe. Load the driver and sleeve with 200 grams of grease *(supplied with the sleeves).*

b) Fit the driver and position the sleeve.

c) Fit the collars, **using LIGAREX collars only.**

OPERATION
GX. 391-3

RECONDITIONING A HIGH PRESSURE PUMP

RECOMMENDED SPECIAL TOOLS

TOOL SOLD

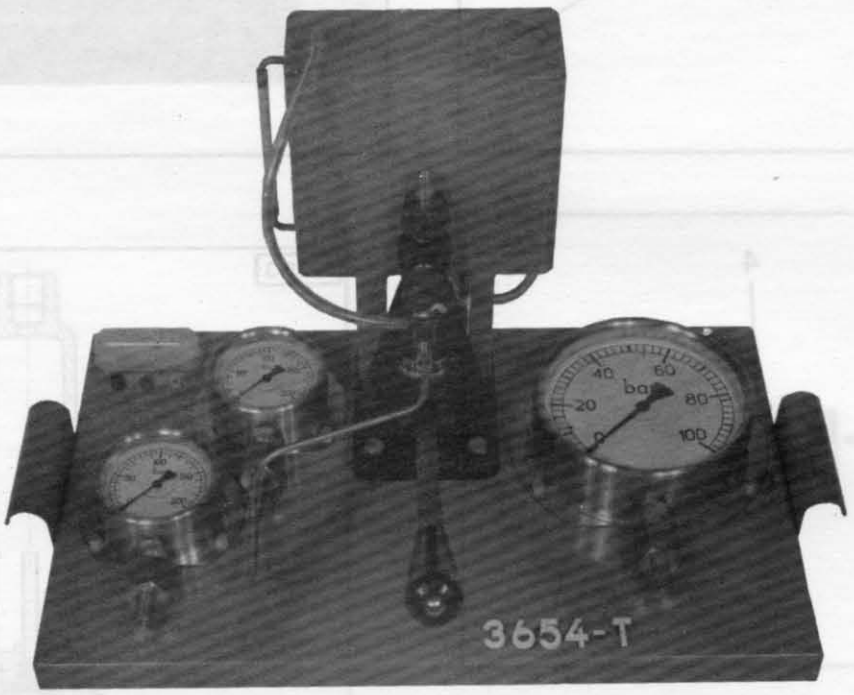
3654-T : Hydraulic test rig

♦ TIGHTENING TORQUE

Recommended tightening torque (in m.daN) :

Capacity chamber tightening : ..... **4.5 to 5**

4744



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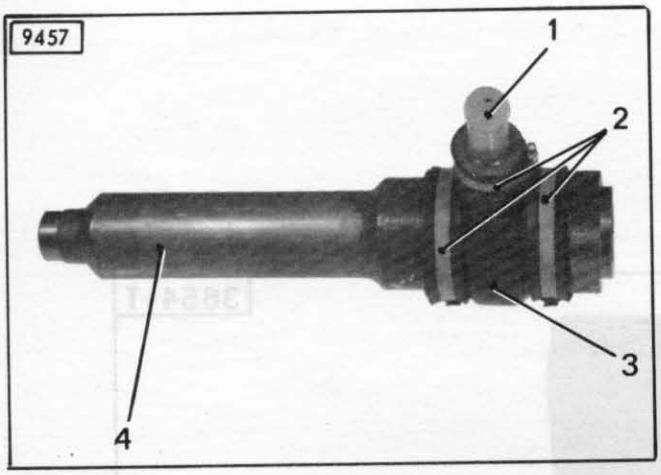
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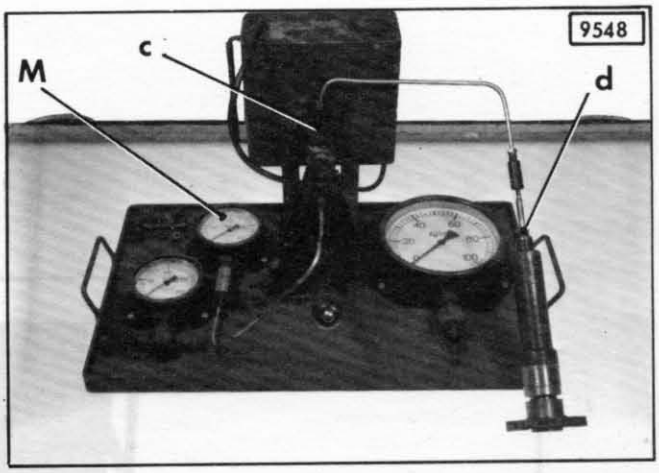
9548
c
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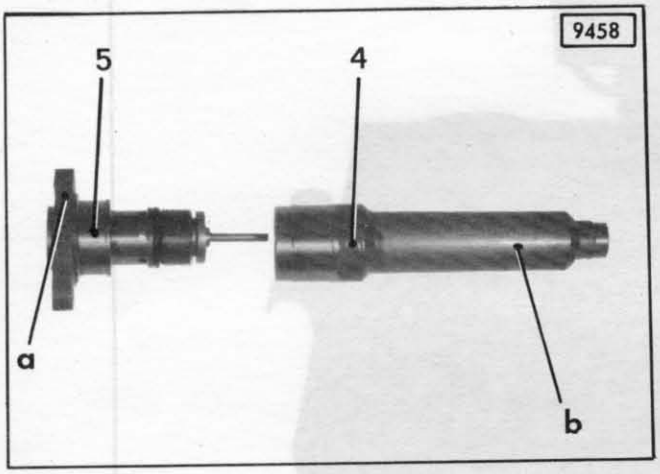
d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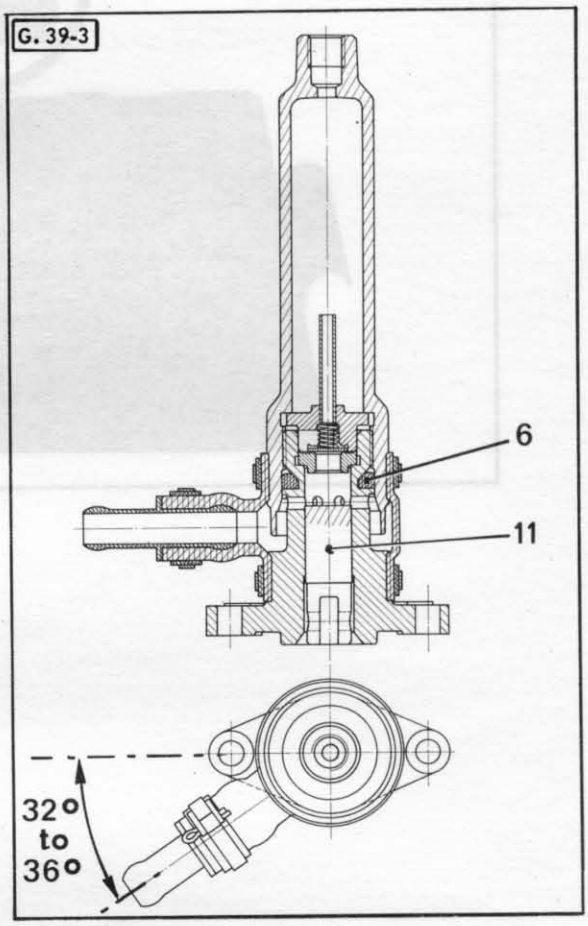
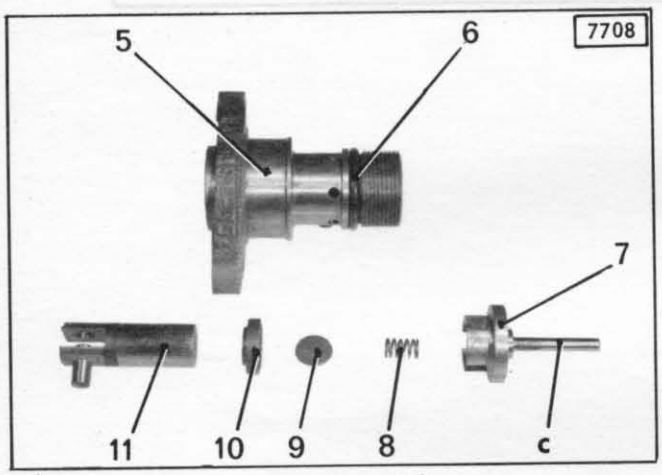
5
4
a
b


G. 39-3
6
11
32°
to
36°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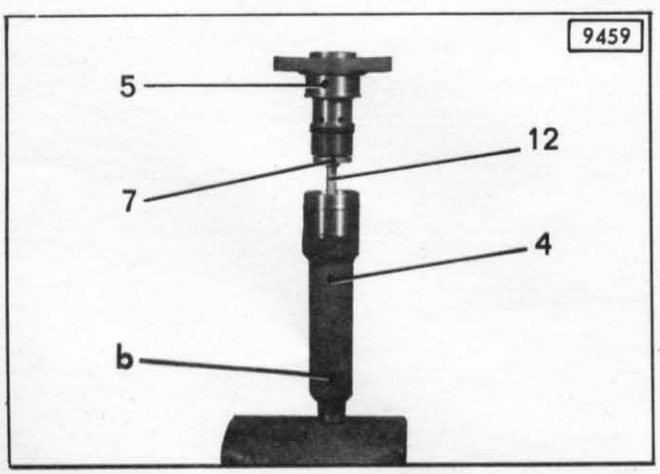
9459
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12
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b

RECONDITIONING A HIGH PRESSURE PUMP

DISMANTLING

1. Remove the suction sleeve :
Remove collars (2).
Disengage sleeve (3) after oiling the body of chamber (4) lightly.
Remove plastic pipe (1).

2. Remove the chamber :
Anchor pump body (5), holding baseplate « a » in a vice fitted with clamps.
Unscrew chamber (4) using a pipe wrench, fitted on part « b » of the body.

3. Strip down the pump body :
Remove :
- valve support (7),
- spring (8),
- valve (9),
- valve seat (10),
- O-ring seal (6),
- piston (11) and its shaft.

4. Clean and inspect the parts.

ASSEMBLY

5. Oil all parts lightly with LHM fluid.
NOTE : The valve and valve seat can be ground, by rubbing on a sheet of No. 600 emery paper, moistened with petroleum spirit and laid on a calibration table.

6. Assemble the pump body :
a) Fit O-ring seal (6) *(coated with LHM fluid).*
b) Insert in pump body (5) :
- valve seat (10) *(positioned as shown in figure opposite),*
- valve (9),
- valve support (7) with spring (8).

7. Fit the chamber :
a) Fix pipe (12) vertically in a vice *(hydraulic circuit pipe, diameter 6.35 mm, length 200 mm).*
Engage chamber (4) on pipe (12) *(end « b » towards the vice)*
Position pump body assembly (5) (see paragraph 6), engaging pipe « c » of support (7) in the end of pipe (12). Bear on the pump body to compress spring (8), positioning valve (9) and seat (10) correctly in the pump body. Maintaining the assembly in the compressed position, do up chamber (4) on the pump body by hand.

b) Take down the pump, and hold in the vice *(fitted with soft jaws)* by baseplate « a ». **Tighten down chamber** using a pipe wrench *(located on part « b »)* **to 4.5 to 5 m.daN**

8. Check pump seal-tightness :

Use test rig 3654-T *(painted green)*
Connect pump orifice « c » on the rig to HP pump delivery orifice « d ».
Increase pressure to 150 bar *(pressure gauge M).*

a) If seal tightness is good, the pressure gauge needle should not move or only drop slowly.

b) If a leak is observed between pump body and chamber, O-ring seal (6) must be replaced.

c) If the pressure gauge reading drops, the valve and valve seat must be replaced.

9. Fit suction sleeve (3) :

a) Coat the chamber body and inside of sleeve (3) lightly with LHM fluid.
Engage the suction sleeve on the chamber, and position so that the suction pipe, when assembled, forms an angle of **32 to 36°** with a line passing through the pump body attachment hole *(see sketch)*. Fit and tighten the two collars moderately, after inserting the protective rubber rings.

b) Fit plastic suction pipe (1).
Fit and tighten the attachment collar *(rubber ring).*

c) Coat piston (11) lightly with LHM fluid. Insert the piston, equipped with its shaft, in the pump body.

10. Blank off the pump orifices with protective plugs.

OPERATION
GX. 412-3

WORK ON FRONT AXLE ARM

SPECIAL TOOLS

TOOLS SOLD

1671-T : Inertial extractor

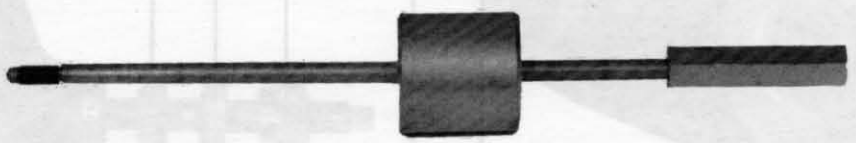
3319-T : Expandable mandrel for anchoring the lower arm "fluid-bloc (rubber bush)

6308-T : 35 mm expandable mandrel (used with extractor 1671-T)

6322-T : Adjustment tool for arm articulation bearings.

1671-T

13 551

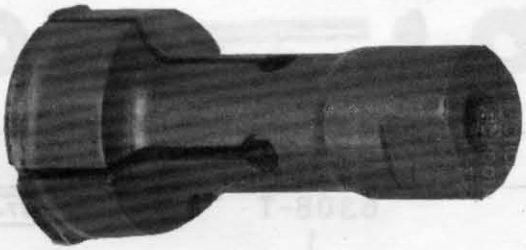


3319-T

79-749

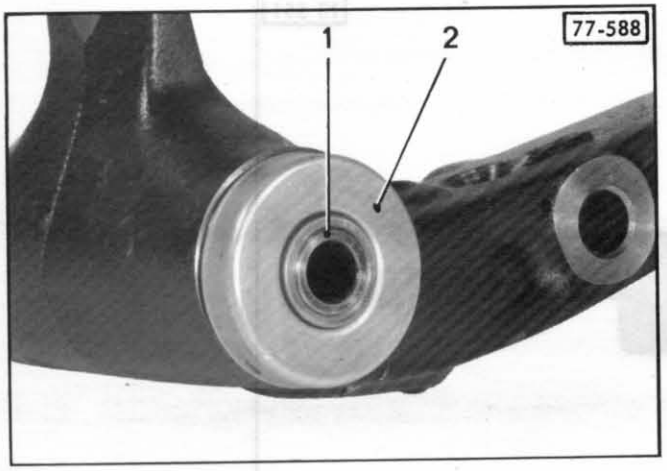
6308-T

14 142



6322-T

14 159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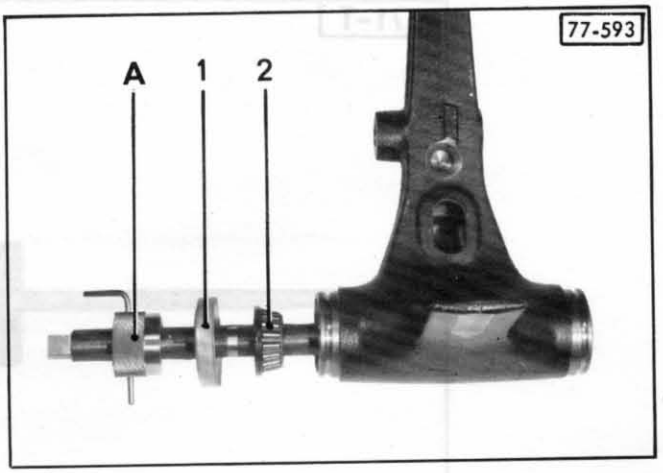
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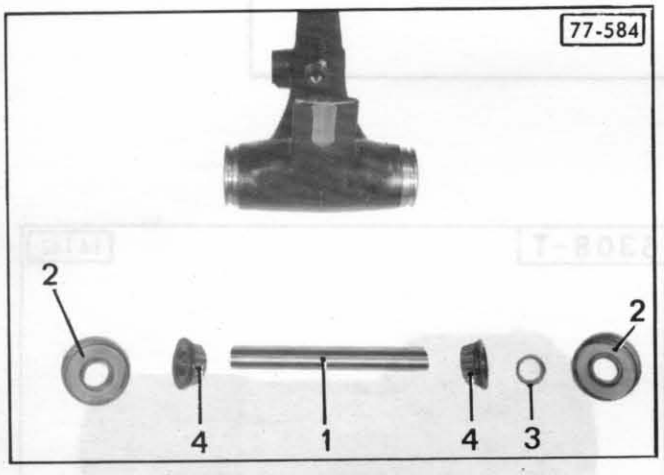
A
1
2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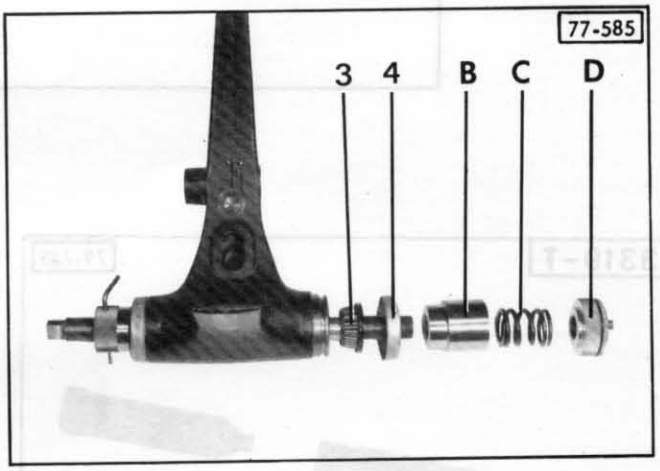
77-585
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B
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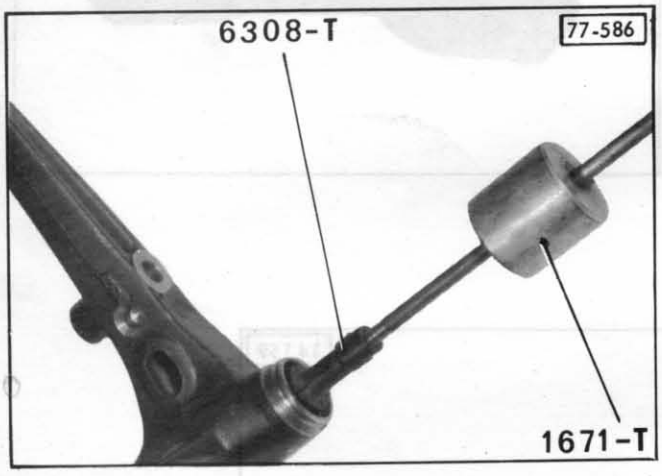
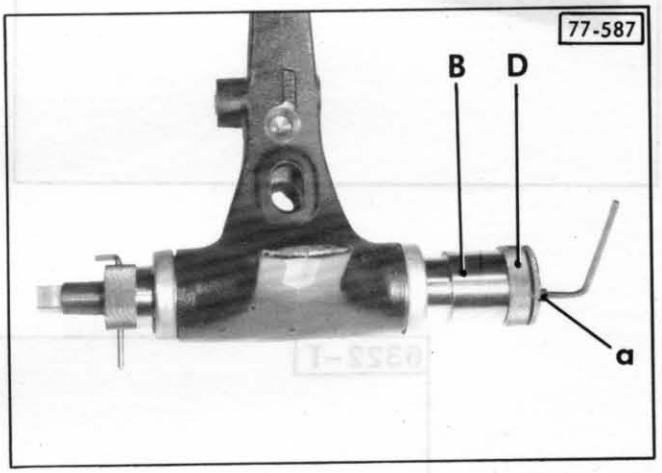

6308-T
77-586
1671-T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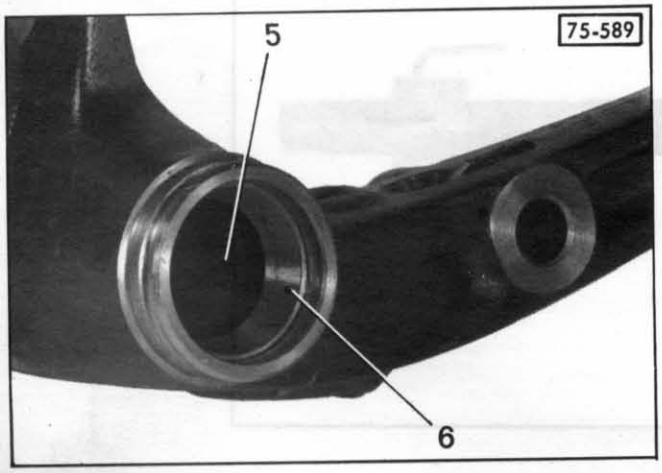
B
D
a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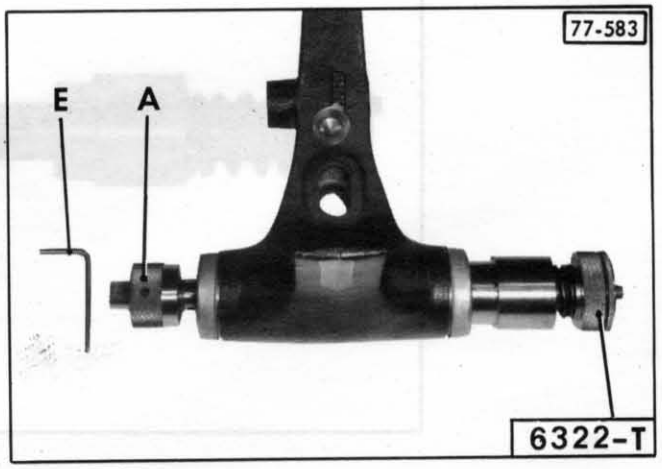

77-583
E
A
6322-T

I - REPLACEMENT OF UPPER ARM ARTICULATION BEARINGS

DISMANTLING

1. Disengage spacer (1) :

Remove :
- spacer rings (2),
- adjustment shim (3),
- race/bearing cage assemblies (4).

2. Extract outer bearing rings (6), using expandable mandrel 6308-T fitted with inertial extractor 1671-T .
Remove bearing protector tube (5).

3. Clean the parts.

ASSEMBLY

4. Fit :

a) Bearing race (6) *(use 42 mm OD pipe).*

b) Bearing protector tube (5).

c) Second outer bearing race (6).

5. Determine bearing setting

A - PREPARE THE BEARINGS

NOTE : Bearing measurements must be taken under a 500 N (50 kg) load.

Adjustment tool 6322-T is used to generate this load.

a) Insert tool 6322-T in the arm, equipped with nut A pinned to the first hole, with spacer ring (1), and corresponding race bearing cage assembly (2).

b) Fit :
- race bearing cage assembly (3),
- spacer ring (4),
- tube **B**,
- spring **C**,
- nut **D**.

c) Tighten nut **D** until tube **B** is in contact with the nut. Lock nut **D** by tightening screw « a » *(Allen key).*

B - DETERMINE ADJUSTMENT SHIM THICKNESS

a) Take down tool 6322-T from the arm. Disenage pin **E** and undo nut **A.**

b) Remove the spring from tool 6322-T , and fit :
- tube **C**,
- nut **B**,
- pin **A** *(first hole)*.

c) Measure dimension **L**.

d) Measure the length of spacer **L1**.
Calculate the difference : **L1 - L = E.**

When fitted in the vehicle, the bearings must have a preload between 0.03 and 0.23 mm. To obtain the thickness of the adjustment shim, add 0.03 to 0.23 mm to the difference between the dimensions.

The thickness of the adjustment shim is :
E + 0.13 ± 0.10 mm

Adjustment shims are supplied by the Replacement Parts Department, with thicknesses as follows :
1.71 mm, 1.88 mm, 2.05 mm, 2.22 mm, 2.39 mm

6. Fit the bearings :
Fit :
- spacer (1) *(coated with grease)*
- bearings (2) *(TOTAL MULTIS grease)*,
- **adjustment shim (3) on the side opposite boss « a »** *(towards rear of vehicle ➡)*.
- spacer rings (4).

II - REPLACEMENT OF LOWER ARM « FLUID-BLOCS » (anti-vibration bushes)

REMOVAL

1. Remove the plastic part (6) of the « fluid-bloc » :

a) Hold the arm in a vice (fitted with soft jaws).

Use tool 3319-T to facilitate extraction of the « fluid-bloc ».

2. Remove rubber part (5) of the « fluid bloc »
Heat metal part « b » of the « fluid bloc ».
Disengage the « fluid bloc ».

3. Remove the second « fluid bloc »

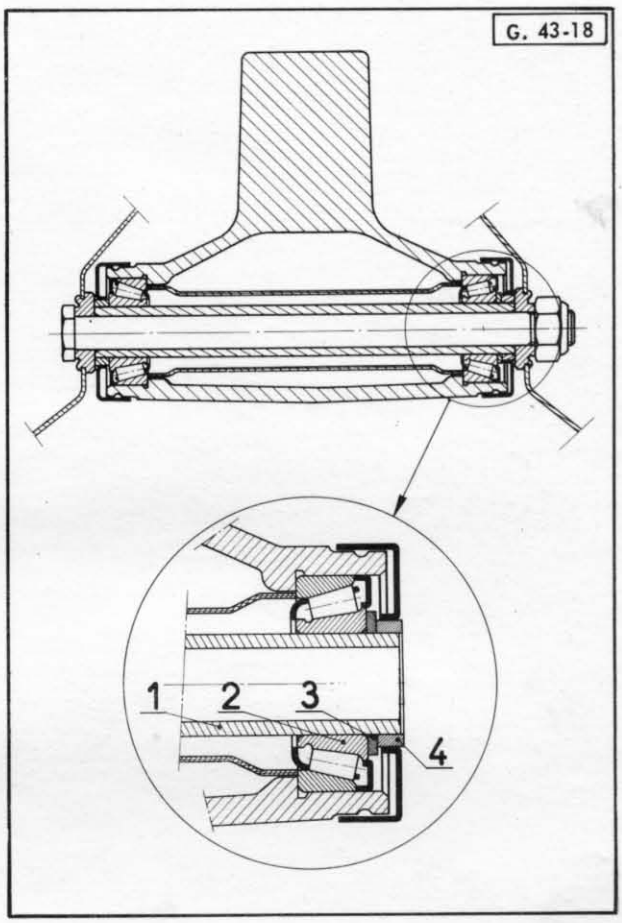
4. Clean the arm.

FITTING

5. Fit rubber part (5) of the « fluid bloc » :
A press is used for this operation
a) Coat the part of the « fluid bloc » engaging in the arm with rubber solution.
b) Position the « fluid bloc », taking purchase on metal part « a ».
c) Fit the rubber part of the second « fluid bloc ».

6. Fit plastic part (6) of the « fluid bloc » :
a) Coat with silicone grease.
b) Engage the « fluid bloc », and complete insertion by tapping face « c » with a mallet.

7. Fit the plastic part of the second « fluid bloc ».


G. 43-18
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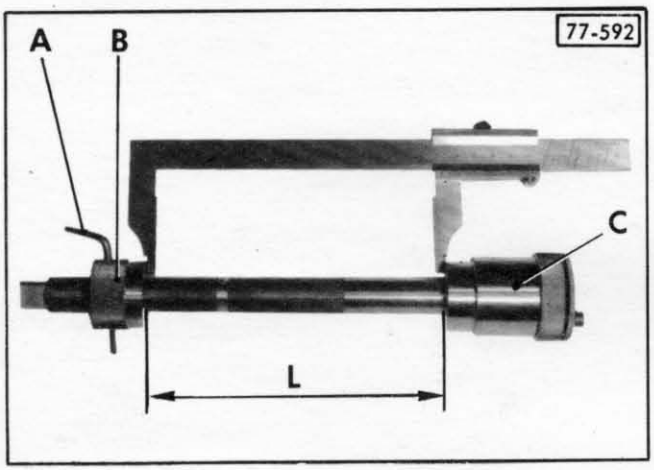
77-592
A
B
C
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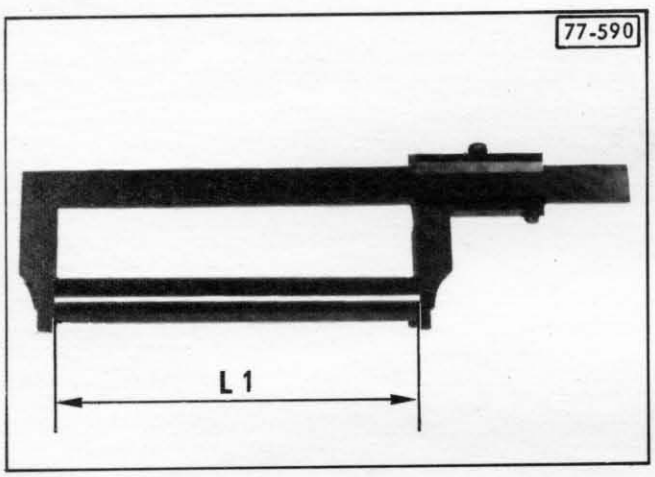
77-590
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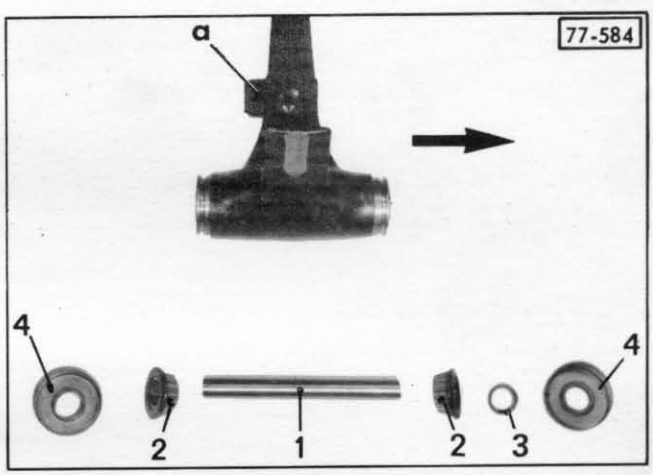
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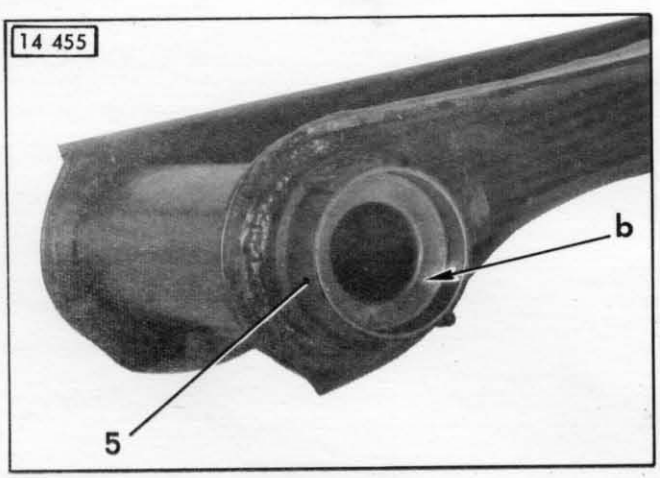
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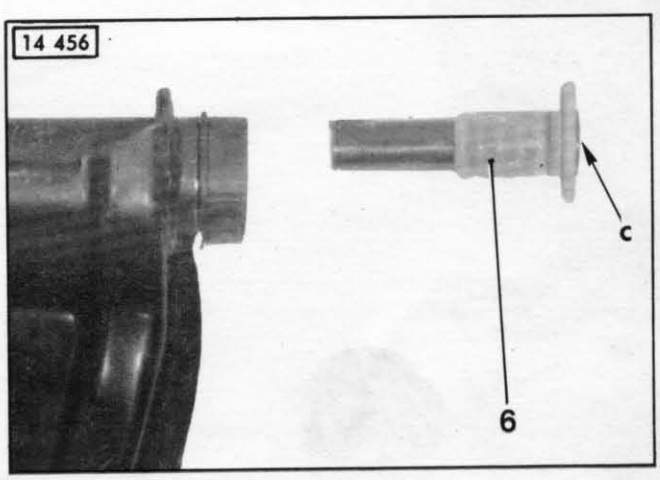
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OPERATION
GX. 413-3

RECONDITIONING A SWIVEL HUB

SPECIAL TOOLS

TOOLS SOLD

1893-T : Front hub extractor

3320-T : Front hub nut spanner

3321-T : Hub nut disassembly tool

TOOLS NOT SOLD

MR. 630-31/96 : Mandrel for fitting hub bearings

MR. 630-31/97: Mandrel for fitting swivel seal ring.

TIGHTENING TORQUE VALUES

Imperative values:

Tightening point	Torque (m.daN)
Front hub nut *(locked by pin-bitting two diametrically opposed points) :*	40 to 50

79-928

1893-T

79-750

3320-T

12607

3321-T

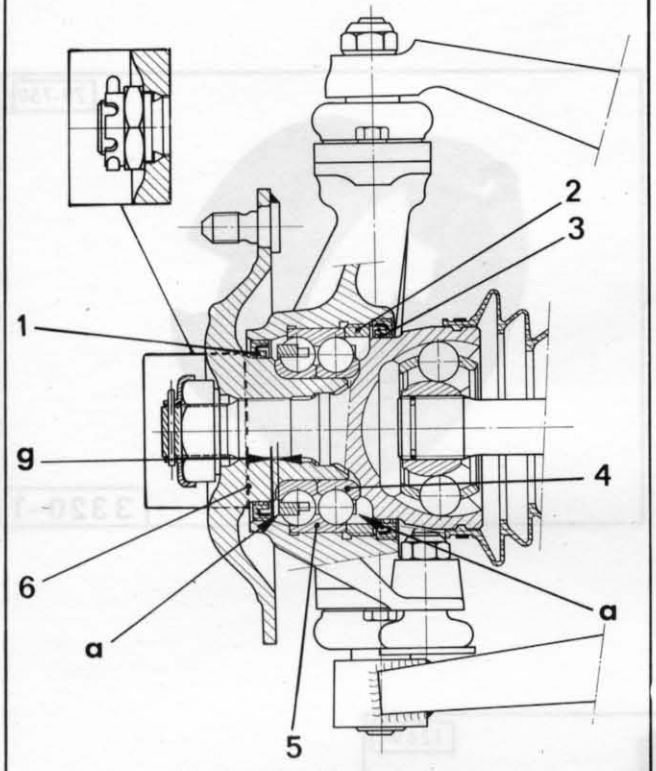
79-927

MR.630-31/96

79-927

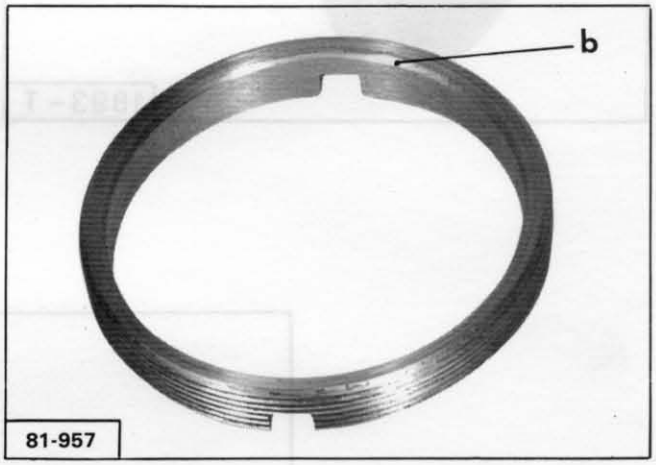
MR.630-31/97

GX. 41-1



9847

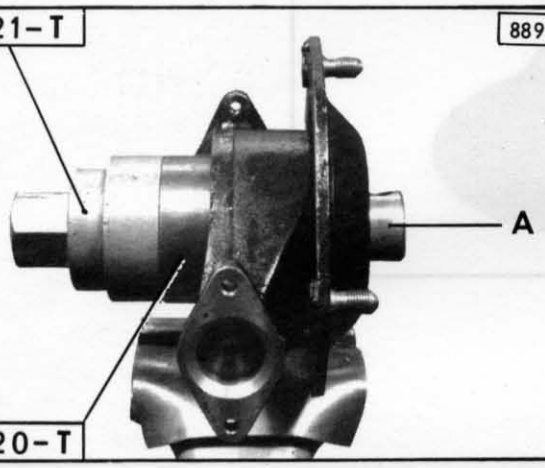
1893-T



81-957

3321-T

8897

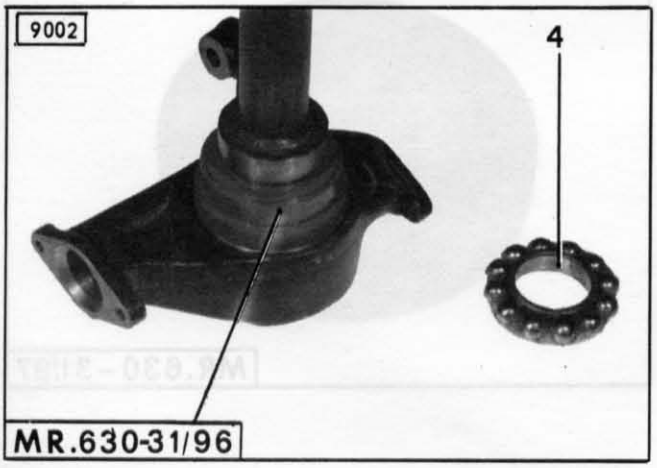


3320-T

9003

MR.630-31/97

9002



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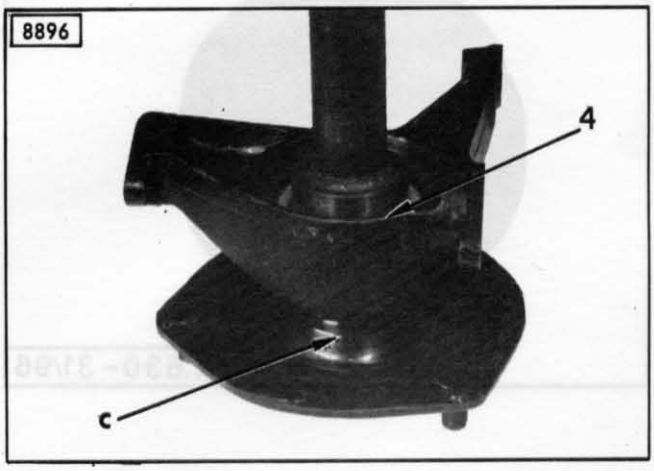


RECONDITIONING A SWIVEL HUB

REMOVAL

1. Remove seal ring (3) :

2. Remove ring nut (2) :
Drill out the pin-bitting locks on the ring nut, using a 4 mm drill-bit.
Fit the central part of tool [3321-T] equipped with spanner [3320-T] .
Insert screw **A.**

3. Remove hub (6) :
Screw extractor [1893-T] in place of the ring nut.

4. Remove seal ring (1).

5. Remove the hub bearing.

FITTING

6. Fit the hub bearing :
Coat the bearing with grease.
Remove inner race (4), and insert the bearing in the swivel, using a press and mandrel [MR. 630-31/96] . *The mandrel should bear on outer race (5).* Fit inner race (4).

CAUTION : Protruding parts « a » of the ball races should be positioned towards the ouside of the bearing (see sketch).

6/81 ⟶ R.P. No. 1667 : new bearing outside dia. = 82 mm.

7. Fit ring nut (2) :
Use the central part of tool [3321-T] , equipped with spanner [3320-T] .
Insert screw A.
Tighten the ring nut to 40 to 50 m.daN *(torque wrench),* and lock by pin-bitting at two diametrically opposed points.
With a dia. 82 bearing, make sure that there is a bevelled edge at « b » on ring nut (2).

8. Fit seal ring (1) :
Use mandrel [MR. 630-31/97] to ensure clearance « g » between ring and bearing race.

9. Fit the hub :

Grease the inner lip of ring (1), and contact surface « c » with the hub.
Position the hub, using a press, and *taking purchase on inner race (4)* of the bearing.

10. Fit seal ring (3) :

Push fully home in its recess.

OPERATION
GX. 422-3

RECONDITIONING A REAR AXLE ARM

SPECIAL TOOLS

TOOLS SOLD

3321-T : Tool for removal and fitting of the rear hub

3304 : Spanner for removal and fitting of the rear hub ring nut.

6310-T : Tool for anchoring the wheel hub

1671-T : Inertial extractor.
2070-T : Expandable tool for extraction of the bearings

2071-T : Mandrel for fitting rear wheel hub bearing

TOOL NOT SOLD

MR. 630-31/96 : Mandrel for fitting rear wheel hub bearing

TIGHTENING TORQUE VALUES

Mandatory values *(torque wrench) :*

Hub nut :	**35 to 40 m.daN**
Hub ring nut :	**35 to 40 m.daN**
Brake unit attachment :	**3.6 to 4 m.daN**

Recommended value :

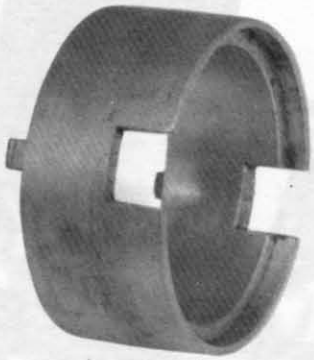
Brake disc attachment :	**4.5 to 5 m.daN**

79-1171

3321-T

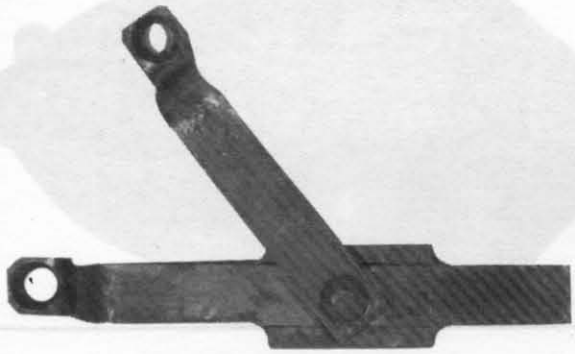
79-1178

3304-T



13 723

6310-T



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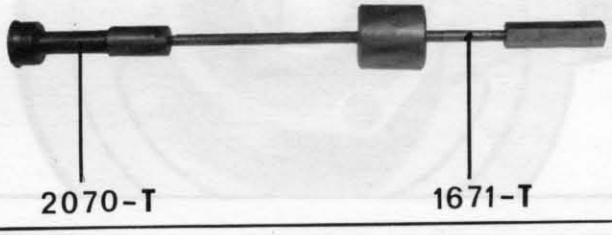

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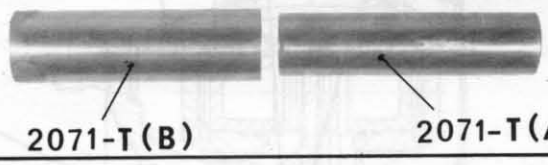

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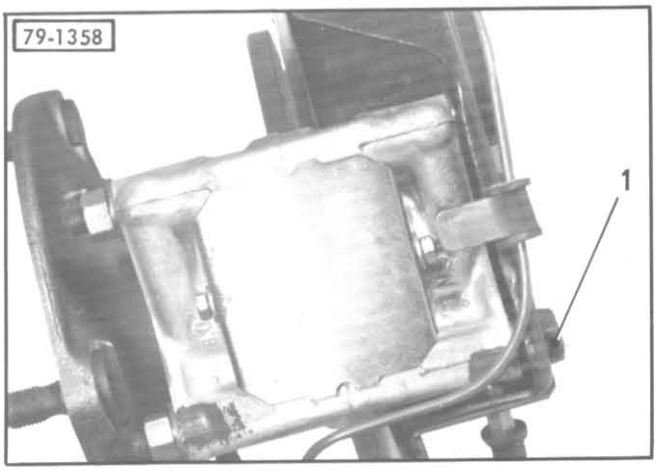
MR.630-31/96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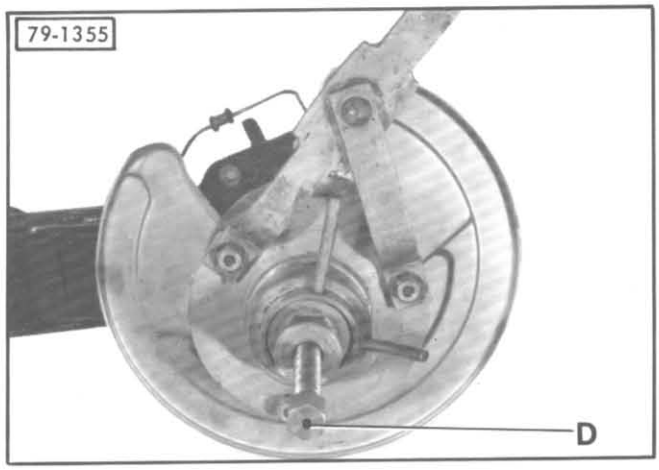
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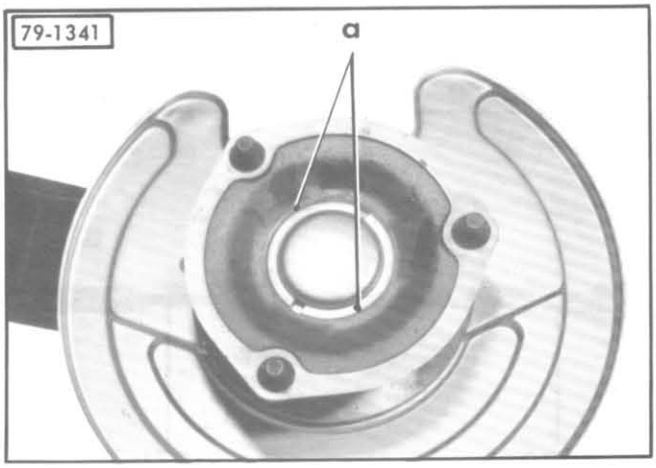
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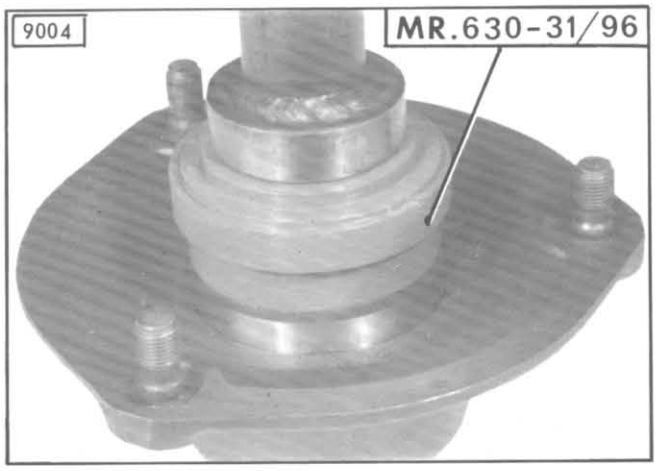
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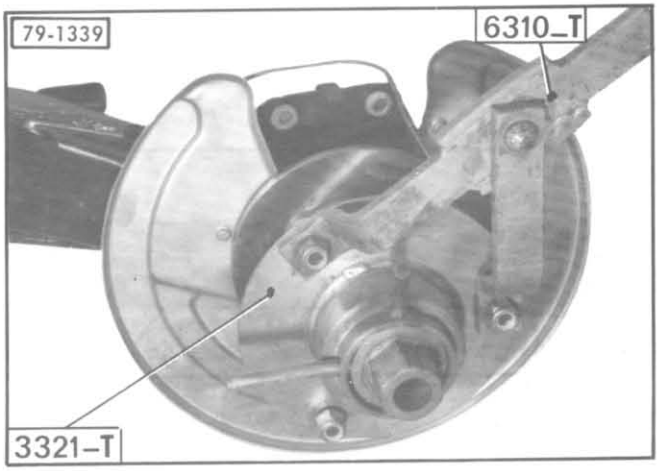
MR.630-31/96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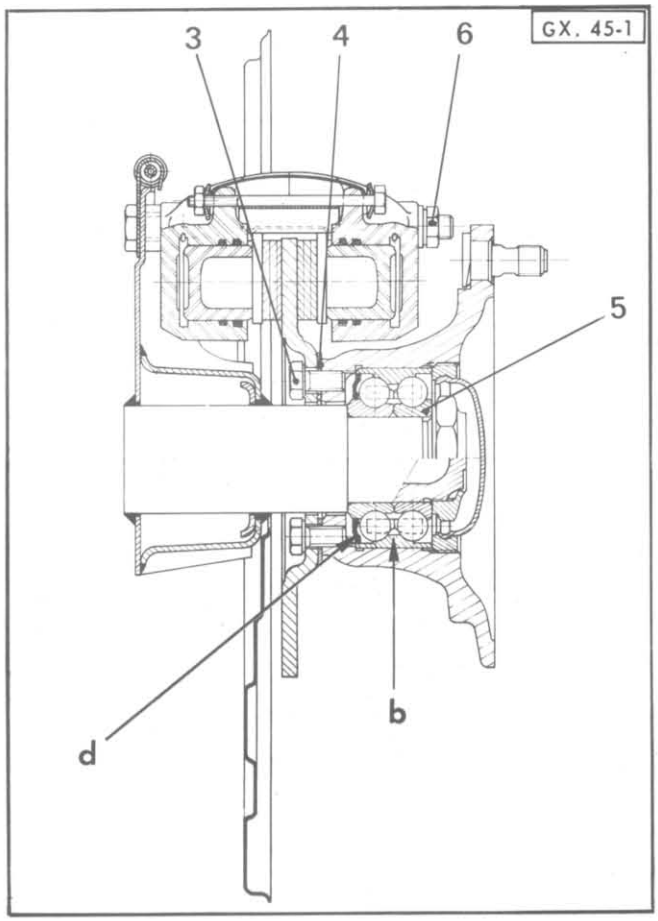
6310_T
3321–T


GX. 45-1
3
4
6
5
b
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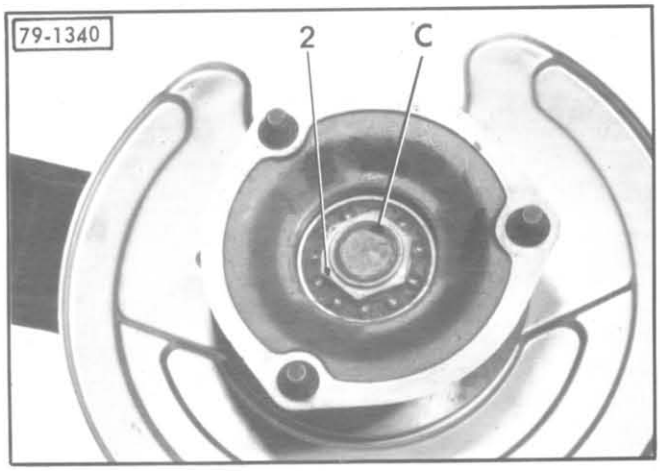

79-1340
2
C

I - REPLACEMENT OF A WHEEL HUB BEARING OR BRAKE DISC

REMOVAL

1. Remove spiral pipe (if necessary).

2. Remove the brake unit.
Proceed as follows, to avoid separating the two half-units :
- Slacken off the unit attachment screw.
- Undo screw (1) bleeder screw side).
- Extract the bleeder screw.
- Tip the unit, replace screw (1) and tighten the nut.
- Undo the other screw.
- Remove the brake unit.

3. Remove the ring nut :
Drill out the pin-bit locks « at » a on the ring nut, using a 4 mm drill-bit.
Use tool 3321-T and spanner 3304-T anchoring the hub with tool 6310-T.

4. Undo nut (2) :
Use a cold chisel to release the nut at « c ».

5. Remove the wheel hub :
Repeat the same operation as for taking down the ring nut, using tool 3321-T, but without wrench 3304-T extracting the hub with screw **D.**

6. Remove the brake disc :
Undo screws (3).
Collect thrust washer (4) inserted between disc and hub.

7. Remove the wheel hub bearing :

8. If necessary, remove the brake disc protector panel.

FITTING

9. Fit the brake disc protector panel (if necessary).

10. Fit the wheel hub bearing :
Prepare the new bearing :
Remove, interior race (5) (not seal-tight), complete with its balls, to allow insertion of mandrel MR. 630-31/96.
Position the bearing on the hub (sealed face « d » on disc side).
Insert the bearing in a press.

11. Fit the brake disc on the hub :
Insert thrust washer (4) between disc and hub.
Fit and tighten screws (3) to 4.5 to 5 m.daN *(torque wrench).*

12. Fit the hub :
Position the hub assembly on the stub.
Engage the bearing (without inner race (5) and commence assembly by doing up nut (2).
Remove nut (2) and fit a spacer with ID 37 mm, thickness 7 mm.
Replace screw (2) and terminate engagement of the bearing.
Fit inner race (5) (side « b » of the nylon races must be assembled face to face : see sketch).
Fit a new screw *(grease threads and face).*
Tighten to 35 to 40 m.daN (torque wrench).
Pin-bit the nut collar in the stub chamfer at « c ».

13. Fit the ring nut :
Use tool 3321-T and spanner 3304-T anchoring the hub with tool 6310-T.

Tighten the ring nut *(grease threads and face)* **to 35 to 40 m.daN**
Lock by pin-bit at two diametrically opposed points « a ».

14. Fit the brake caliper.
Tighten nuts (6) *(grease threads and face)* **to 3.6 to 4 m.daN.**

15. Fit the spiral pipe (if necessary)

II - REPLACING THE ARM HUB BEARINGS

REMOVAL

1. If necessary, remove arm hub deflector (1).

2. Remove seal (2)

3. Remove the arm hub bearings :
Use extractor 1671-T fitted with expandable tool 2070-T.

4. Remove friction washer (3).

5. Clean the parts.

FITTING

6. Fit the friction washer :
Coat with bearing grease (TOTAL MULTIS) on both faces, and insert in the arm hub.

The friction washer is flat when new. Fit a new friction washer following any removal operation.

7. Fit the bearings in the arm hub :

The needle bearings are equipped with seals « a ». Follow the assembly arrangement shown in the sketch opposite :
The side with seal « a » must be positioned in the direction of arrow F2 for inner bearing (4) and arrow F1 for outer bearing (5).

a) Insert guide mandrel **A** (tool 2071-T) in the arm hub.
Engage outer bearing (5) on mandrel **A**, *checking correct assembly position,* and push with tube **B,** until the tube comes into contact with end « b » of mandrel **A**.

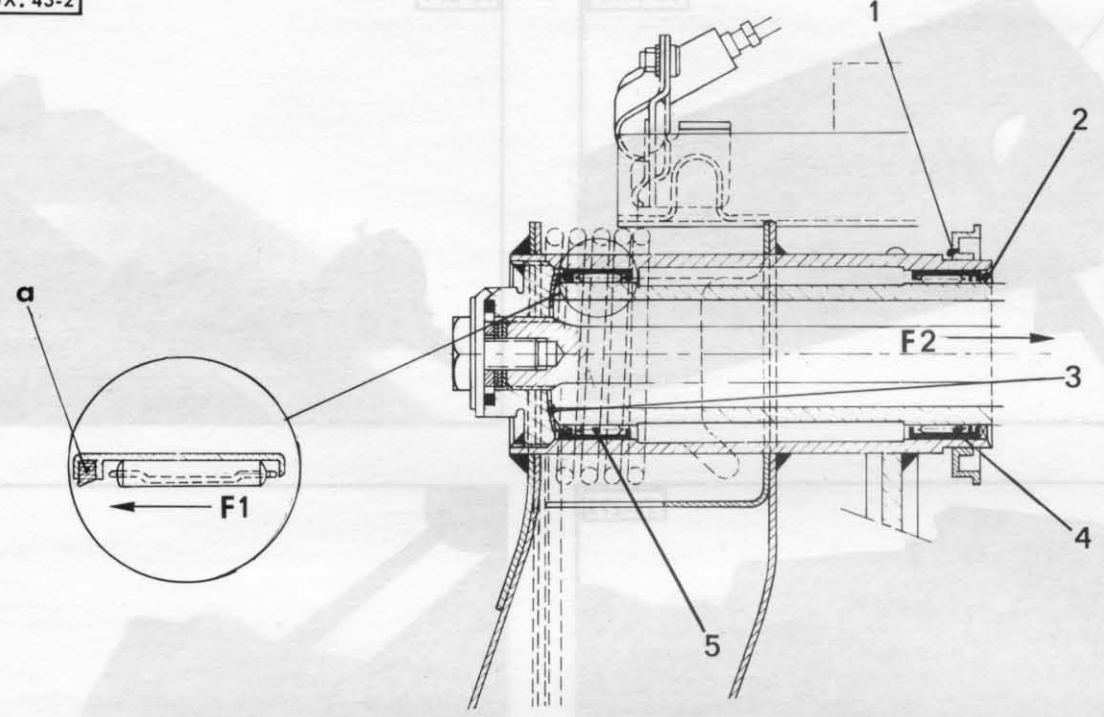
b) Proceed as above for inner bearing (4), using tube **C,** *and checking correct assembly position.*
The correct position of the bearings is determined by the length of tubes **B** and **C.**

c) Take down tool 2071-T.
Coat the bearing needles with grease (TOTAL MULTIS).

8. Fit seal (2) :
Position the marked face toward the outside of the hub, and push the seal home until it is in contact with bearing (4).

9. If necessary, fit deflector (1).
The deflector should stand 2 to 3 mm back from the edge of the hub.

GX. 43-2



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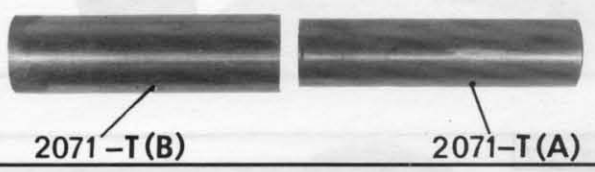

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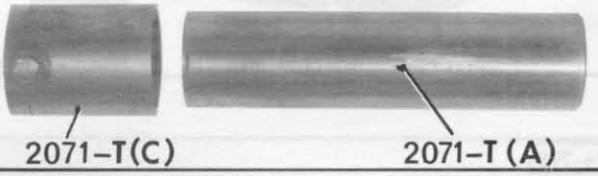

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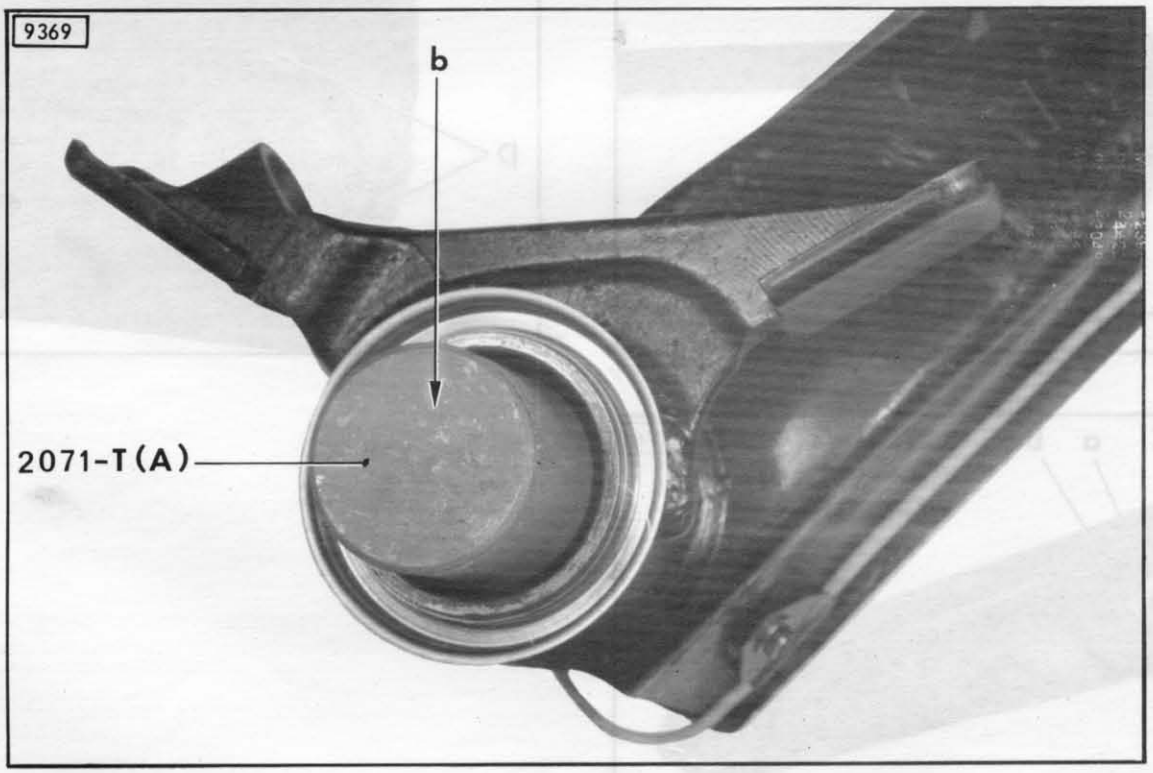

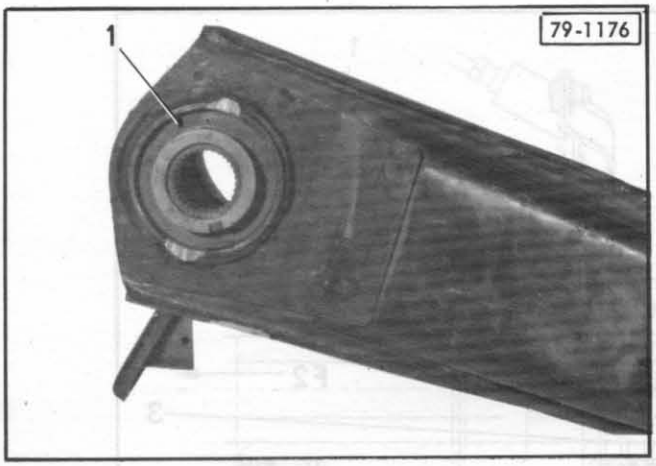
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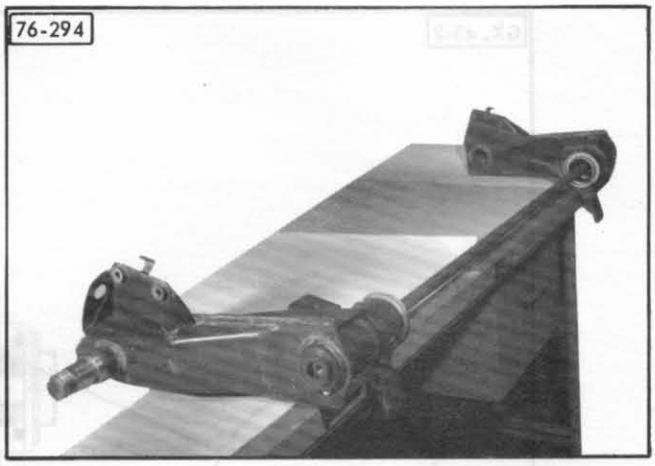
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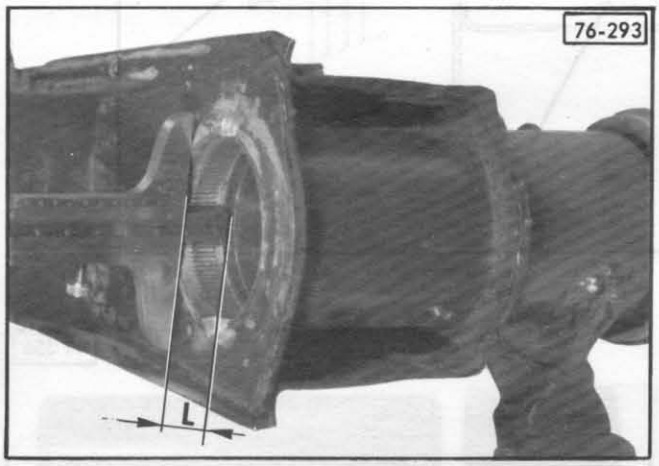
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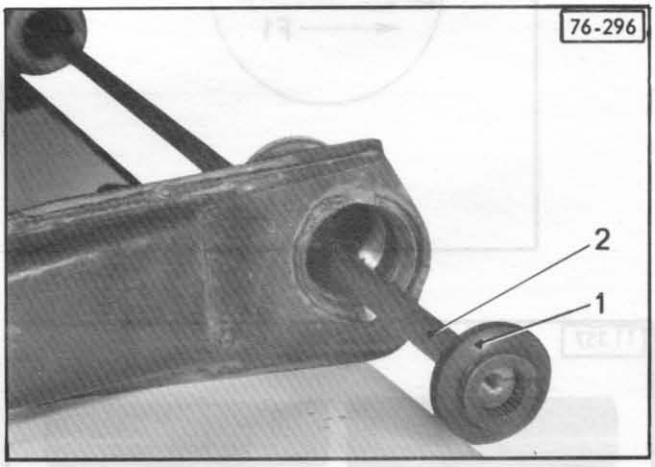
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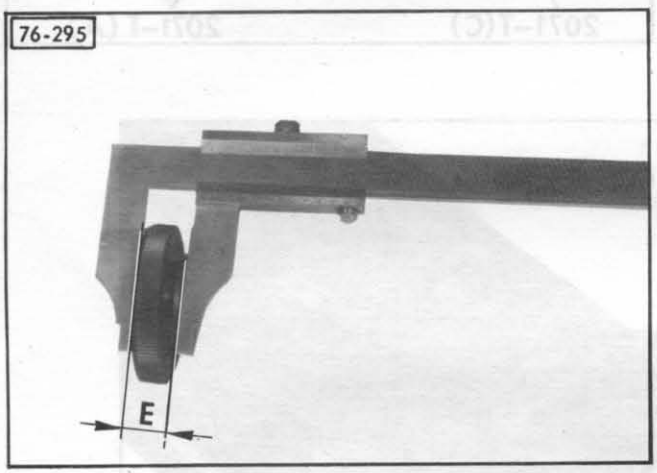
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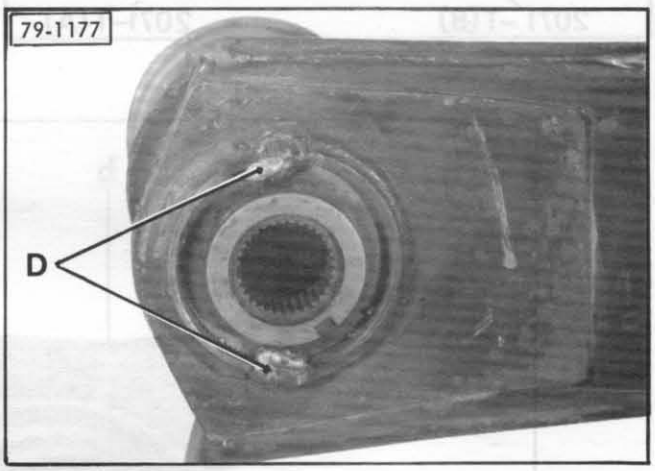
79-1177
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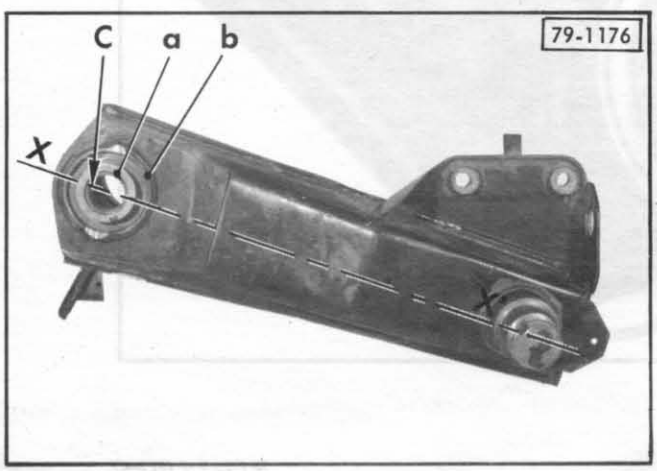

79-1176
C
a
b
X

III - REPLACING AN ANTI-ROLL BAR ANCHOR CUP

1. Disengage cup (1) by grinding, or if necessary, by drilling out the welding tacks, taking care not to damage the welded joint between hub and arm shell.

2. Remove the cup :
Drive out the cup in a press, using mandrel 2071-A from tool set 2071-T .

The old anti-roll bar should not be re-used after disassembly.

3. Fit the new cup :
For correct execution of this operation, the new anti-roll bar to be fitted on the vehicle must be to hand.
To facilitate subsequent fitting of the cup in the arm, measure depth (L) of the cup recess in the arm.
Measure thickness (E) of the old cup and calculate the difference : **E - L** = dimension to be obtained between cup face « a » and arm collar « b » (see photo).

4. Position the cup for a left arm :
(large diameter hole, 32 teeth).
Position missing tooth **C** approximately on arm axis XX' and engage firmly in the arm teeth.

a) Engage the anti-roll bar in the left cup, with the index marked (engraved line) on the position of the missing tooth.

b) Place this assembly (arm and bar) on a bench, as shown in the photo.
To facilitate completion of the operation, clamp the arm to the bench.

c) With right arm cup (1) positioned on anti-roll bar (2) as for the left arm (missing tooth opposite engraved line of bar), rotate the arm gently to engage the cup teeth with those of the arm.

The position of the cup on the anti-roll bar can be changed by one tooth, while maintaining the engraved line on the bar opposite the missing tooth on the cup.

Incorrect arm alignment affects the attitude of the vehicle.

d) Identify the position of the cup on the arm.

e) Disengage the arm from the anti-roll bar.

5. Insert the cups in the arms, using a press.
Take account of the measurements made (see paragraph 3) when inserting the cups).

7. Carefully degrease the cups on the arm contact teeth side.
Seal the teeth with SILICOMET paste.

OPERATION
GX. 433-3

RECONDITIONING A SUSPENSION CYLINDER

RECOMMENDED SPECIAL TOOLS

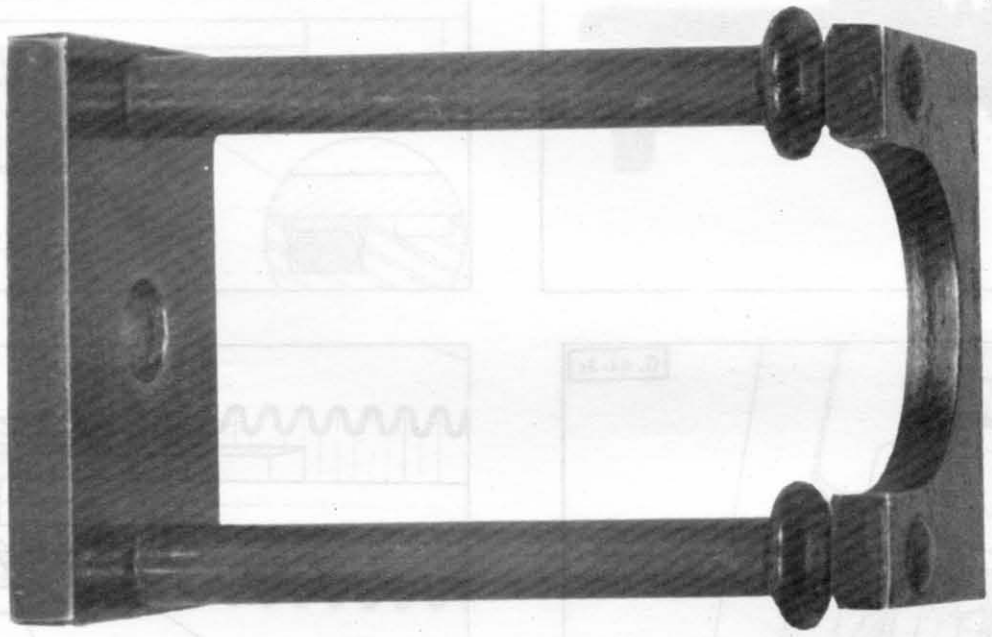
TOOLS SOLD

2293-T : Suspension cylinder support

3654-T : Hydraulic test rig

14420

2293-T



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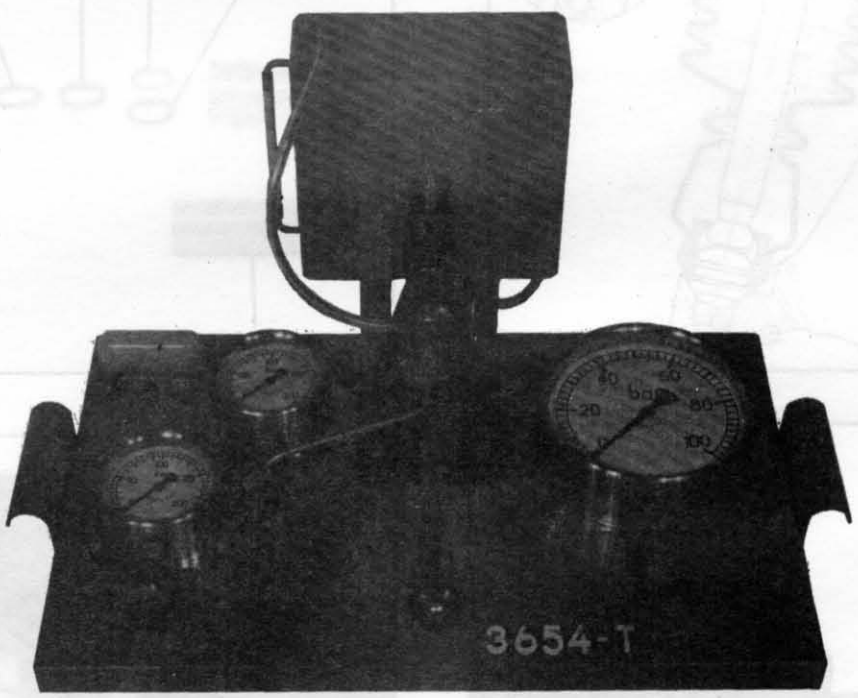
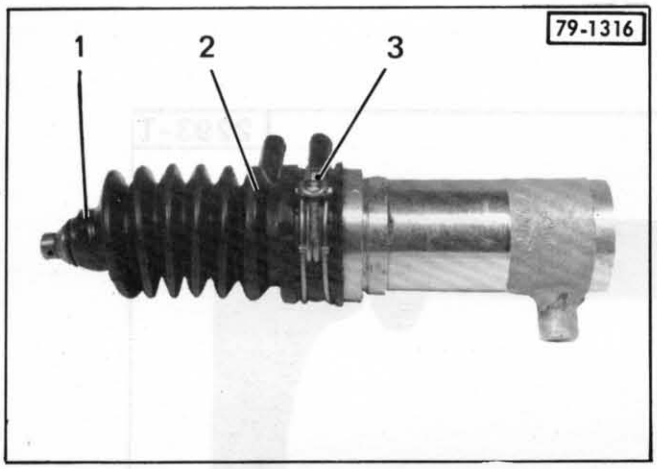
3654-T

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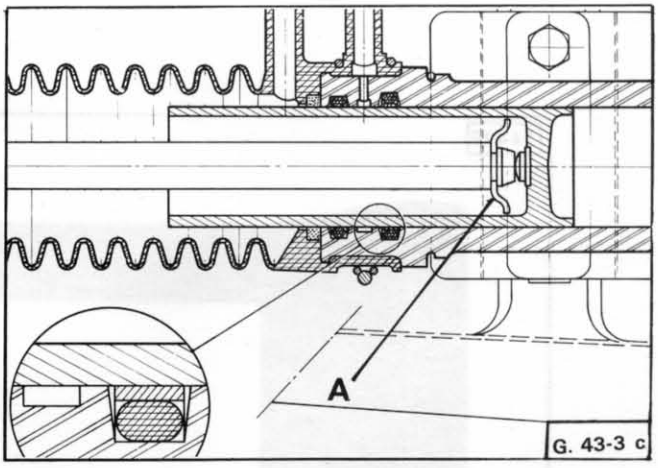
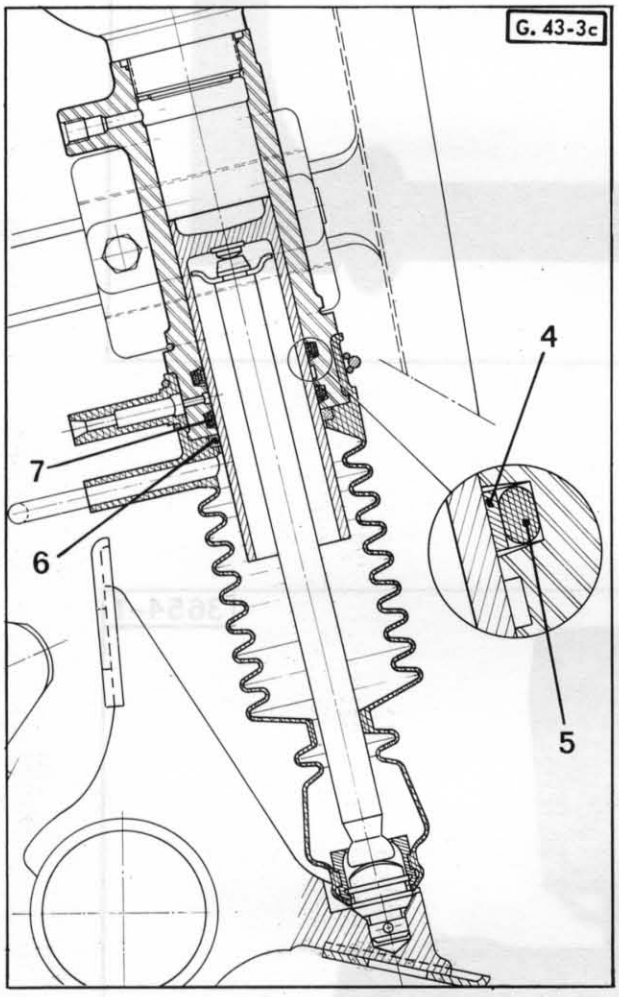

A
G. 43-3 c


G. 43-3c
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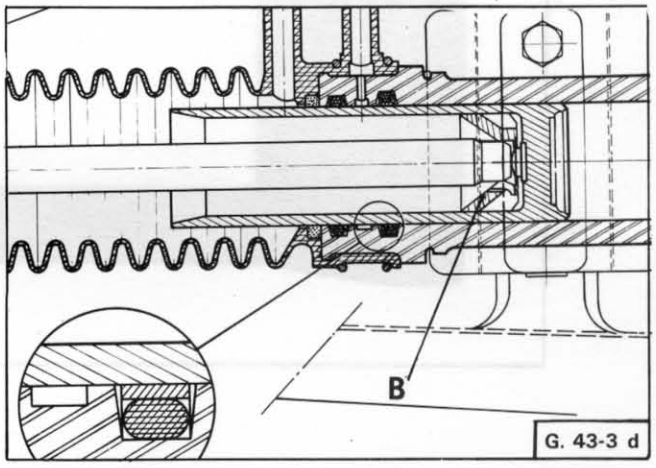
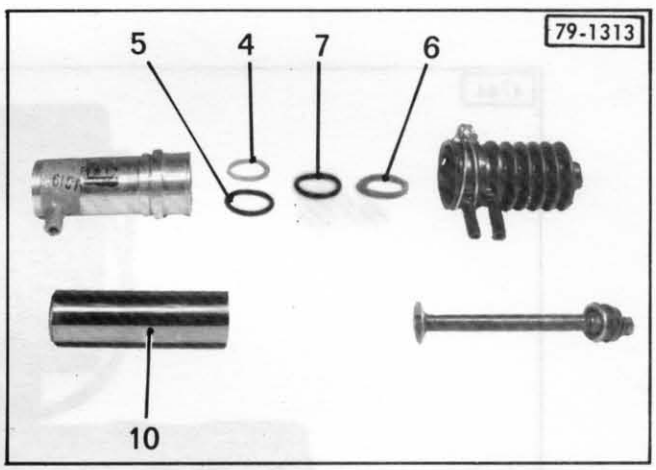

B
G. 43-3 d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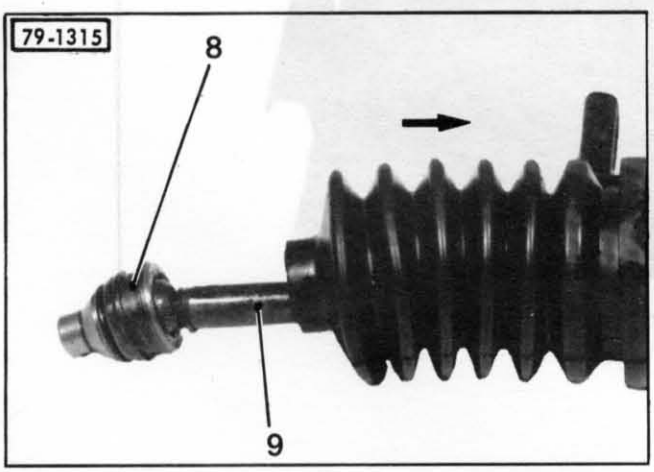
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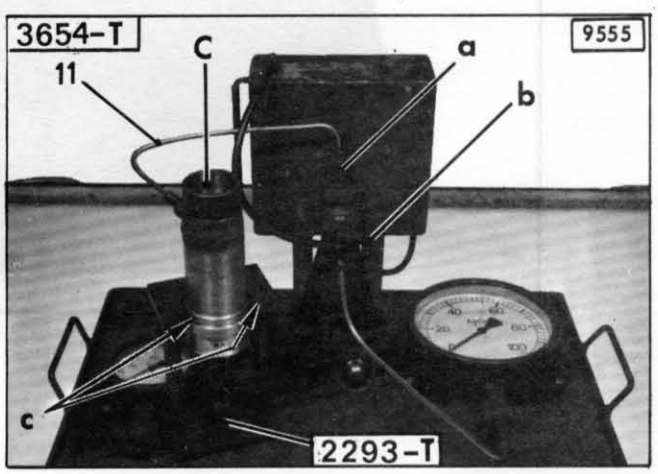

3654-T
9555
11
C
a
b
c
2293-T

RECONDITIONING A SUSPENSION CYLINDER

DISMANTLING

1. Remove :
- dust-guard attachment (3),
- assembly comprising dust-guard (2) and piston shaft (9).

2. Remove :
- felt seal (6),
- piston (10),
- O-ring seal (7),
- PTFE (teflon) seal (4),
- O-ring seal (5).

3. Remove the collar and elastic protective ring (1).

4. Disengage dust-guard (2) from recess (8) pushing the dust-guard towards the piston shaft (direction of arrow).

5. Disengage dust-guard (2) from piston shaft (9).

6. Clean and check the parts.
NOTE : If piston (10) shows traces of shallow scratching, light rubbing with No. 600 emery cloth, dipped in petroleum spirit, is admissible. Carefully clean with petroleum spirit and blow off with compressed air.

ASSEMBLY

7. Coat the inside of the cylinder with LHM fluid.

a) Fit :
- O-ring seal (5),
- PTFE (teflon) seal (4) on O-ring seal (5) (take care not to distort during fitting)

Fit the PTFE (teflon) seal on the O-ring, pressing with the thumb over its total surface area.

b) Fit O-ring seal (7).

8. Engage the piston in the cylinder, after coating with LHM fluid. Do not insert the piston fully.

9. Check the seal-tightness of the suspension cylinder :

Use test rig 3654-T *(painted green)* and accessories 3657-T .Connect the pump to the pressure gauge (graduated from 0 to 100 bar).

a) Place the cylinder, equipped with the piston shaft, on support 2293-T

NOTE : If necessary, adjust the support at « c » for correct mounting of the suspension cylinder.

b) Fit plug **C** equipped with a seal. Engage the end of the shaft in the recess in support 2293-T .

c) Connect the cylinder feed orifice « a » in the pump, by means of pipe(11). Tighten test rig bleed screw « b ».

d) Build up pressure to 40 bar. Check the pressure gauge, which should show no drop in pressure.

e) Undo bleed screw « b ». Remove plug **C.** Uncouple pipe (11) from the cylinder and pump.

f) Remove the cylinder from support 2293-T

10. Fit felt seal (6), soaked in LHM fluid, on the piston.

11. Fit dust-guard (2) on piston shaft (9).
7/81 ⟶ *:* cup **A** is replaced by cone **B.**

12. Fit dust-guard (2) in recess (1).
Fit the protective elastic ring.

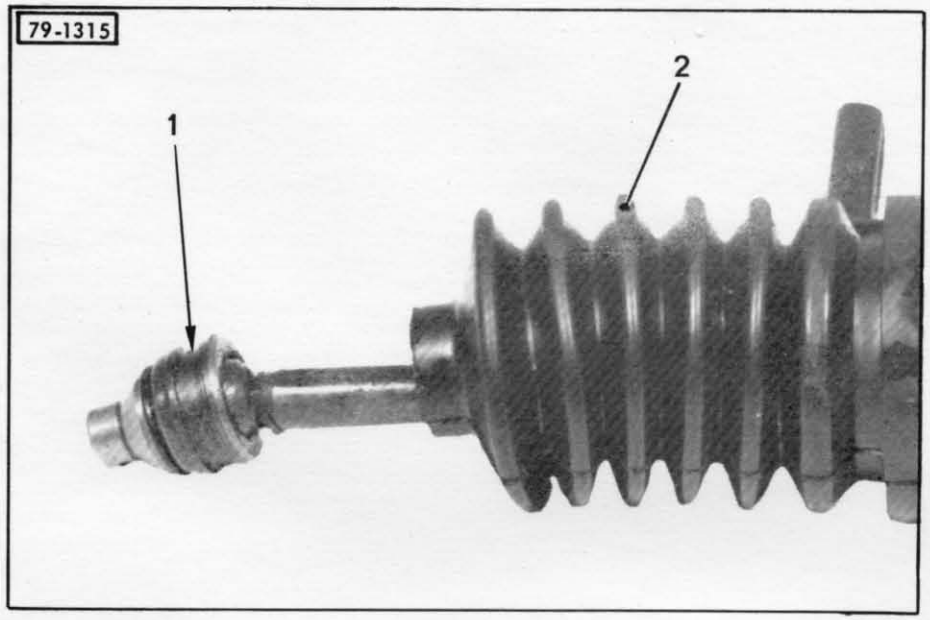
13. Fit the dust-guard/piston shaft assembly on the cylinder :

NOTE : The position of the dust guard with respect to the cylinder is different for the front and rear cylinders.
- Front : cylinder feed orifice « b » should form an angle of 140° with overflow return and vent orifices « a » *(see photo opposite)*.
- *Rear :* orifices « a » and « b » should be in the same plane.

14. Fit collar (3) and piston :
- *Front cylinder :* see figure opposite
- *Rear cylinder :* the screw of collar (3) should point towards the exterior of the vehicle.

15. Position recess (1) :
- *Front cylinder :* pinhole « c » should be in the same plane as orifices « a »; to within 5°.
- *Rear cylinder :* pinhole « c « should be perpendicular to the plane formed by orifices « a » and « b ».

NOTE : Before mounting in the vehicle, fill each dust guard with LHM fluid, as follows :
- front dust guard : 7 cc
- rear dust guard : 25 cc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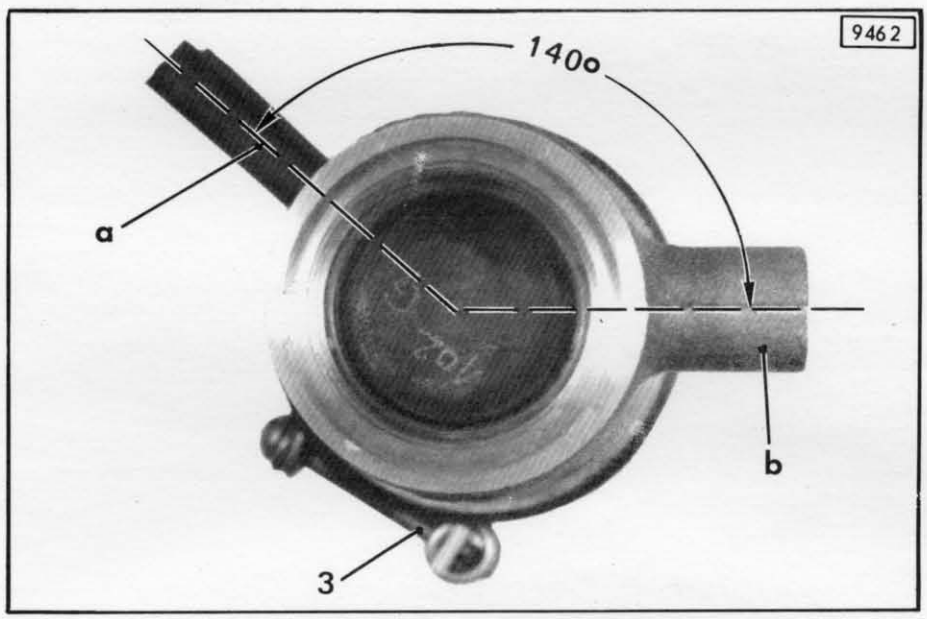
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a
b
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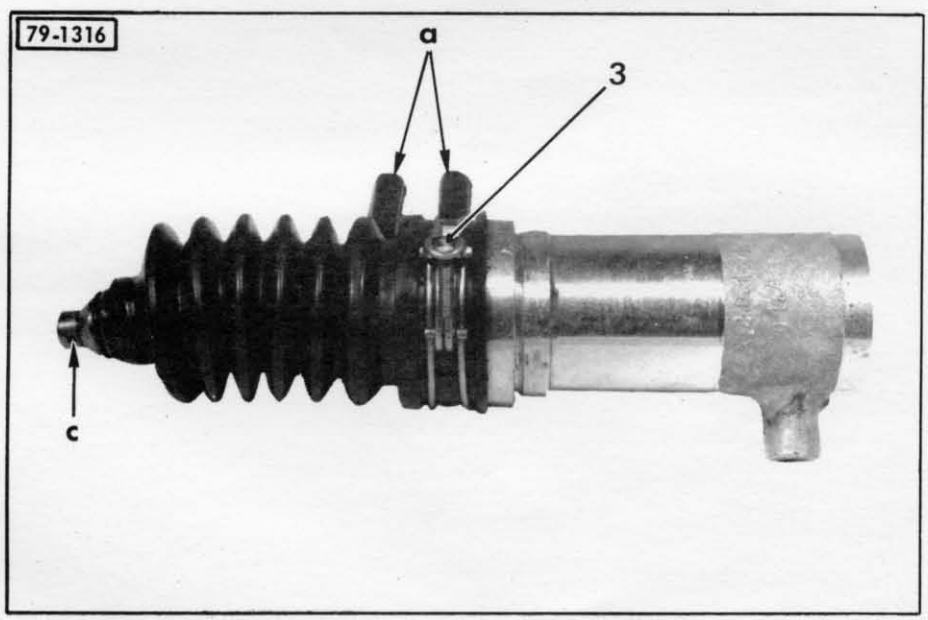

79-1316
a
3
c

OPERATION
GX. 442-3

RECONDITIONING A STEERING SYSTEM

RECONDITIONING A STEERING SYSTEM

DISMANTLING

1. Fix the steering gear box in a vice *(fitted with soft jaws).*

2. Remove :

- pin (4) and nut (5),
- spring (3),
- plunger (2),
- flange (7),
- pinion (8) and bearing,
- rack (1),
- rubber bush (10),
- needle bearing (9) *(drive into the interior of the housing, using a tube with OD 13 mm).*

3. If necessary, remove :

- retainer ring for bush (10) at « b »,
- seal (6).

4. Clean the parts.

ASSEMBLY

5. Fit needle bearing (9) *which should be inset 1 mm with respect to housing face « a »*. Lock the bearing, pin-bitting the metal of the casing at « a » at three equidistant points.

6. Fit rubber bush (10) in its retainer ring at « b ».

7. Coat bearing (9), rack (1) and drive pinion (8) with grease (TOTAL MULTIS MS).
Engage the rack in the steering gearbox, and fit pinion (8).

8. Fit seal (6) on flange (7). Fit the flange.

The face of seal (6) carrying the manufacturer's mark should be positioned towards the bearing of pinion (8) (seal lip towards the housing).

Tightening torque : 1.3 to 1.4 m.daN

9. Fit and adjust the rack plunger :

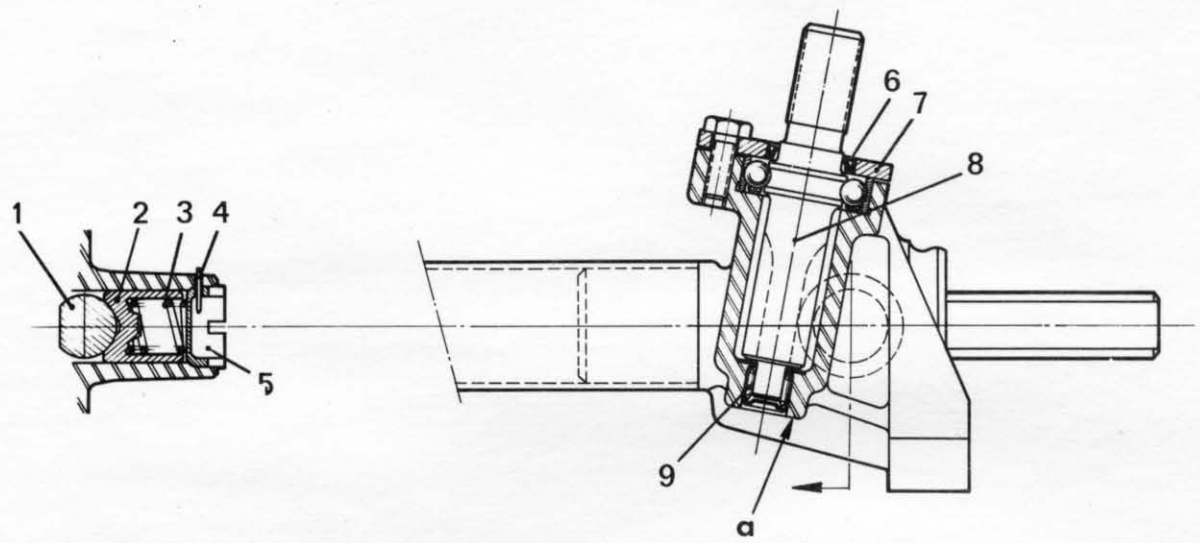
a) Fit plunger (2) and spring (3).

b) **Tighten nut (5) fully, then slacken off by 1/8th to 1/6th of a turn.**

c) Drive the rack over its full stroke, rotating the pinion to check that there is no hard point. In the contrary case, adjust plunger pressure at this point, by means of nut (5). The rack should be displaced with no sensation of tooth-to-tooth movement.

d) Fit stop pin (4) and nut (5).

G. 44-2 b



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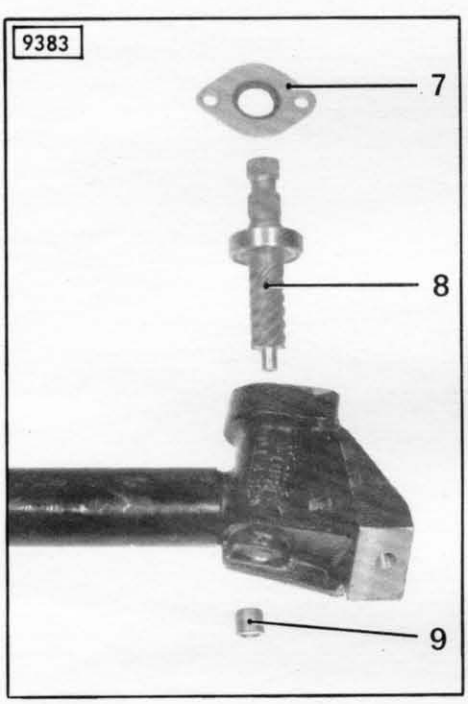

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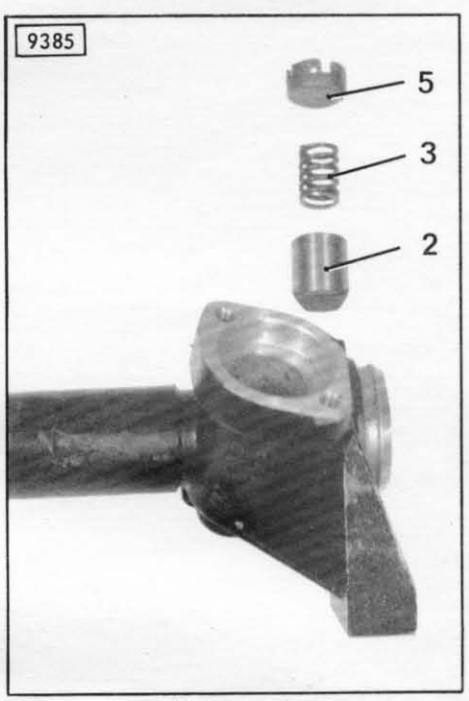

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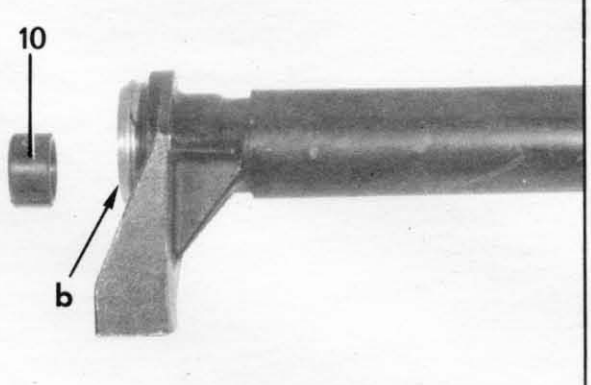


OPERATION
GX. 451-3

RECONDITIONING A BRAKE UNIT
(Front or rear)

RECONDITIONING A BRAKE UNIT *(Front or rear)*

DISMANTLING

1. Strip down the brake unit *(front brake unit).*

Disengage :
- handbrake pads (2),
- two screws (3),
- lever/cam assemblies (5),
- spring (1).

Remove :
- pad locking ring (4),
- nut **A,** fitted when the unit was removed.

Drive out screw (6) and uncouple the two half-units.

2. Strip down the half-units :

Extract piston (7), blowing compressed air through feed orifice (11).

Remove :
- O-ring seal (9),
- dust-guard (8),
- square profile seal (10).

3. Clean the parts with petroleum spirit. Blow off and dry with compressed air.

If the pistons show any trace of impact damage or scratching, they must be replaced.

ASSEMBLY

4. Prepare the half-units :

Replace all seals following any disassembly operations.

a) Coat piston (7) and its recess with LHM fluid.

b) Fit :
- square profile seal (10),
- dust-guard (8).

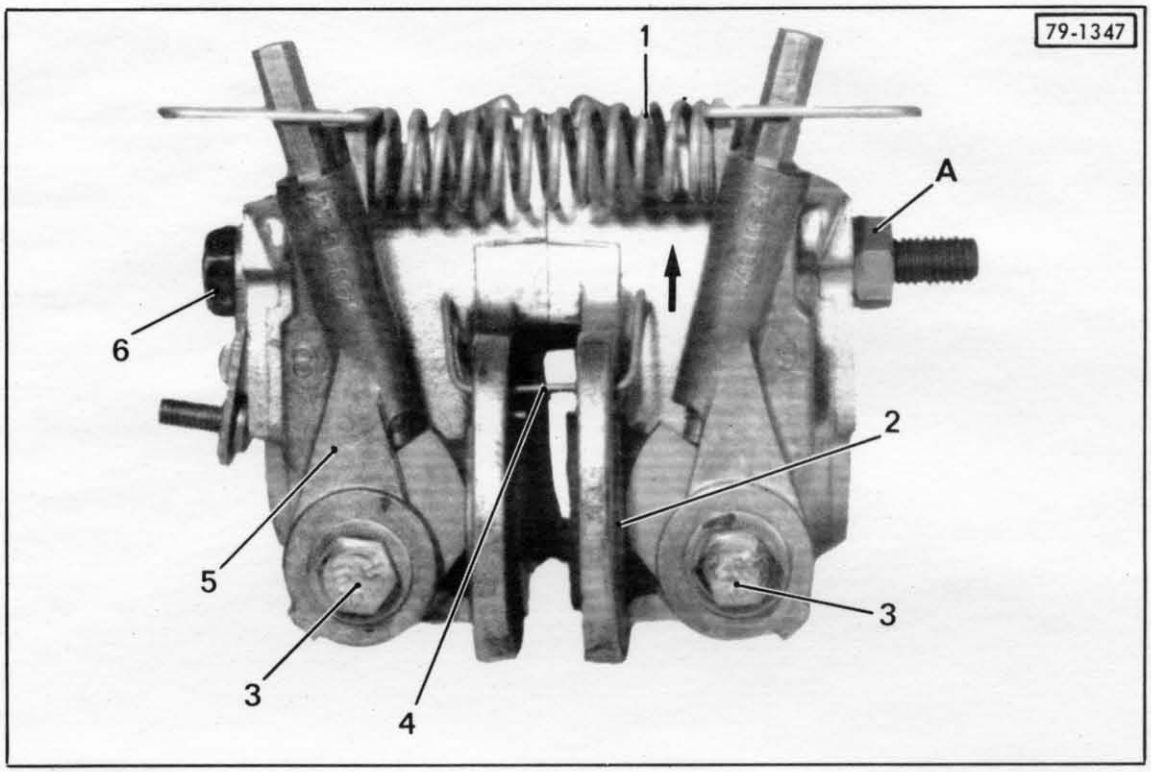
c) Engage piston (7) in its recess, with hollow part « b » towards the exterior of the half-unit.
Fit O-ring seal (9) at « a » *(check that pipe (11) is present).*

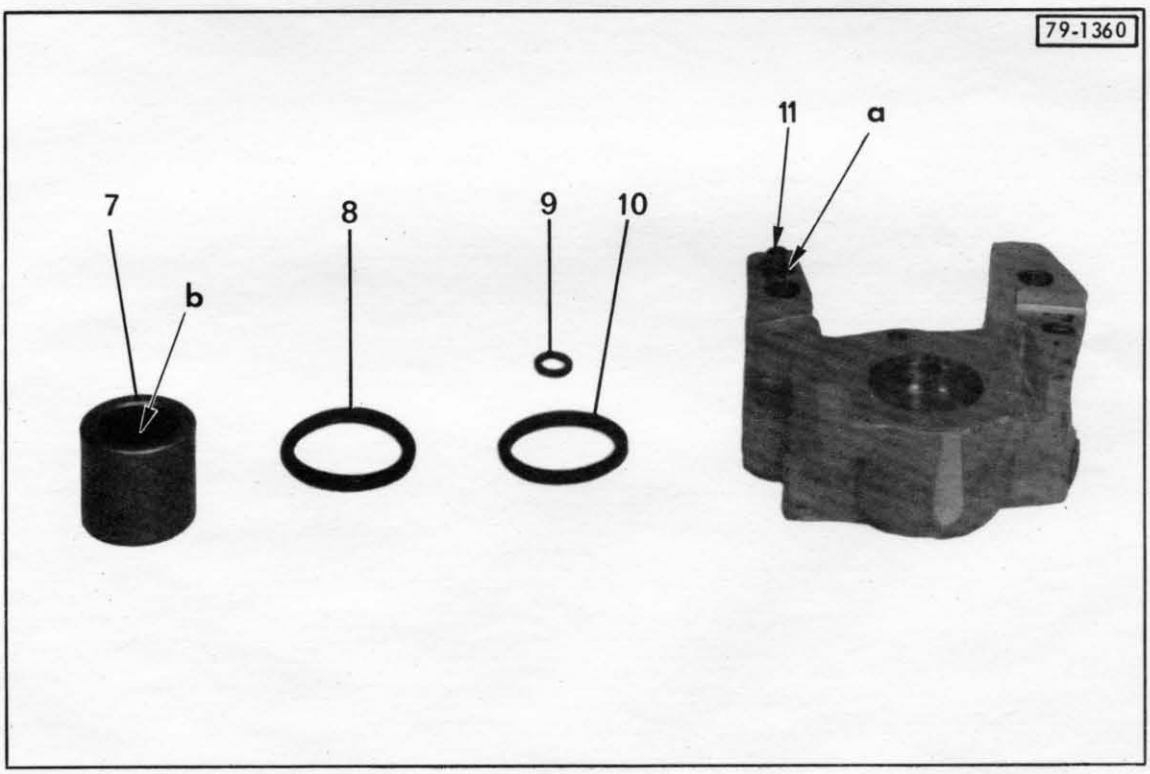
5. Assemble the two half-units by means of screw (6) and nut **A.**

6. Prepare the brake unit *(front brake unit)*

Fit :
- spring (4),
- handbrake pads (2),

(tip spring (4) forwards, following the direction of the arrow, to lock the pads),
- lever/cam assembly (5),
- screws (3) *(do not tighten fully),*
- spring (1).


79-1347
1
A
6
2
5
3
3
4


79-1360
11
a
7
b
8
9
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OPERATION
GX. 453-3

RECONDITIONING A HYDRAULIC BRAKE CONTROL

RECONDITIONING A HYDRAULIC BRAKE CONTROL
(brake control valve)

DISMANTLING

1. Hold the brake control in a vice.

2. Using a screwdriver as a lever, take off retainer ring (4) and rubber protector (5).

3. Remove :
- circlip (3),
- slide-valve/cup assembly (2) (disconnect if necessary),
- spring (1).

4. Turn the control over in the vice. Remove union (10) and its seal.

5. Push in plug (7) slightly, to allow extraction of snap-ring (6).

6. Using a 5 mm dia. bronze rod, drive out slide-valve (11), thrust washer (9), spring (8) and plug (7).

7. Disengage O-ring (12) from plug (7).

8. Clean the parts with petroleum spirit. Blow with compressed air.

NOTE : Slide-valves (2) and (11) are adjusted in the control unit and cannot be sold separately.
- ⟶ *7/81* : dia. = 8.5 mm
- *7/81* ⟶ : dia. = 7.5 mm.

ASSEMBLY

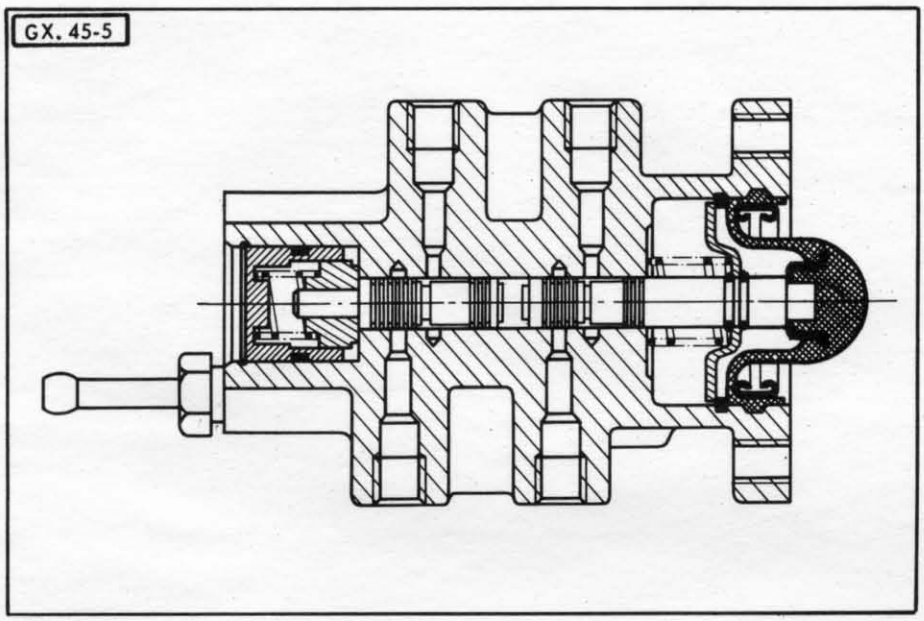
9. Coat all parts and the interior of the block with LHM fluid.

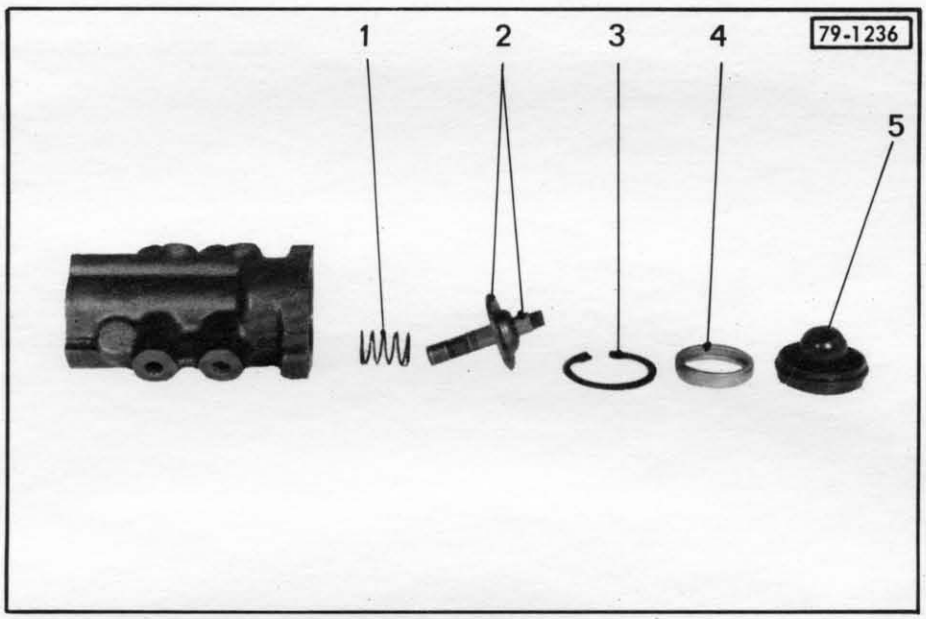
10. If necessary, assemble slide-valve (2) *(snap ring, cup and second snap ring).*

11. Hold the brake control in a vice. Fit :
- spring (1),
- slide-valve assembly (2),
- circlip (3),
- rubber protector (5),
- retainer ring (4).

12. Engage slide-valve (11) equipped with the thrust washer (9) in the control unit *(end « a » pointing outwards).*
Fit :
- spring (8),
- plug (7) with seal (12),
- snap-ring (6).

13. Fit union (10) *(copper seal)*


GX. 45-5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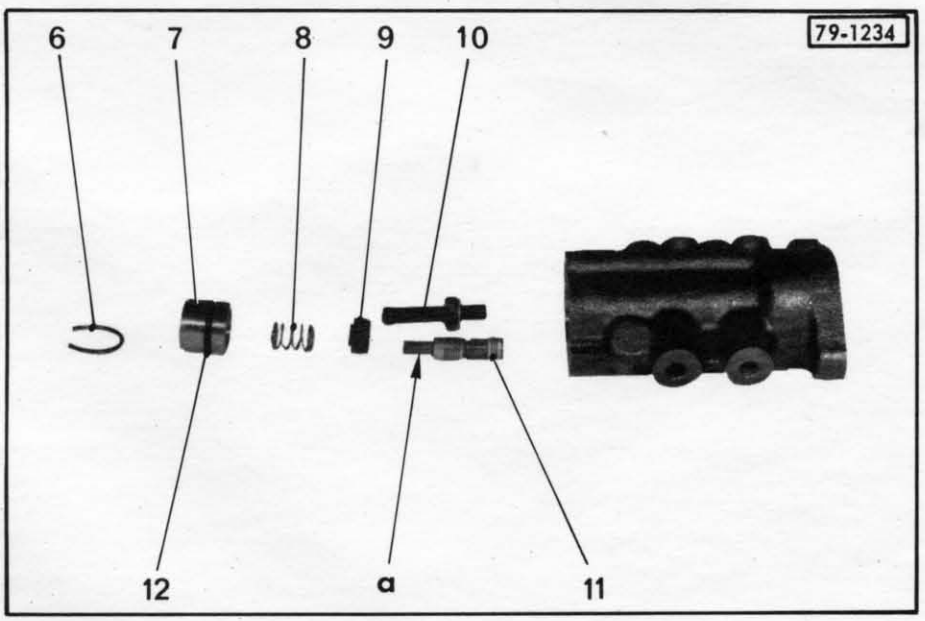
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