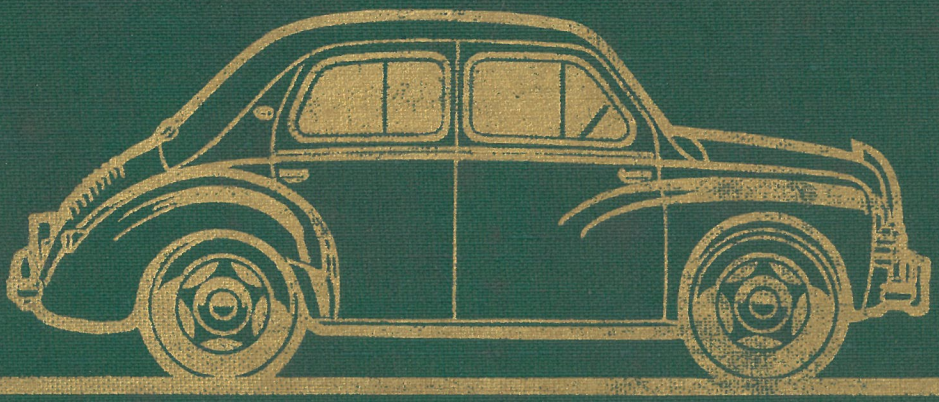
SPECIFICATIONS, ADJUSTMENTS AND SHOP REPAIRS RECOMMENDATIONS

M.R. 33 EA



4 CV

RENAULT

REGIE NATIONALE

R. 1062

RÉGIE NATIONALE DES USINES
RENAULT
REG. DU COM. : SEINE 55-B-8.620 — NUMÉRO D'ENT. : 261 75012 9001
BILLANCOURT (SEINE)
TÉLÉPHONE : MOL. 52-00 — INTER : MOL. 26-00
ADRESSE TÉLÉGRAPHIQUE : RENOFER-PARIS
TÉLEX-PARIS : 20 094 - 20 095



TYPE R 1062

SPECIFICATIONS, ADJUSTMENTS AND SHOP REPAIRS RECOMMENDATIONS



M. R. 33 EA
MARCH 1957

ERRATA

PAGE	CHAPTER	ASSEMBLY OR OPERATION	DELETE	READ
4	ENGINE	Engine specifications : Right hand column, 6th line.	Connecting rods **with babbitted big ends.**	Connecting rods **with elastic bearings shells.**
18	ENGINE	Text referring to the figure at bottom of page : 1st line.	From cylinder block, remove the **2** aluminium lubricating oil system plugs.	From cylinder block, remove the **3** aluminium lubricating oil system plugs.
39	CLUTCH	Removing the clutch mechanism and disk. After the NOTE.	Before removing the mechanism, mark the following : — Position of mechanism versus the flywheel. — Location of balancing washers.	Before removing the mechanism, mark the following : — Position of mechanism versus the flywheel. — Location of balancing washers and **attaching bolts.**
139	SPECIAL TOOLS - ENGINE	SAPRAR reference column : 7th line.	8 8**89.**	8 8**99.**

BRINGING THE WORKSHOP MANUAL UP TO DATE

Renault-Service notes will deal with the improvements that have been realized after the publication of the present manual.

These R. S. notes will bear a special mention.

You only have to write hereunder the number, date and subject of each of the above mentioned notes when receiving them. In the last column, please also mention the chapter of the summary to which the note refers.

R. S. Note Number	Date	SUBJECT	Chapter

R. S. Note Number	Date	SUBJECT	Chapter

SPECIFICATIONS, ADJUSTMENTS AND SHOP REPAIRS RECOMMENDATIONS

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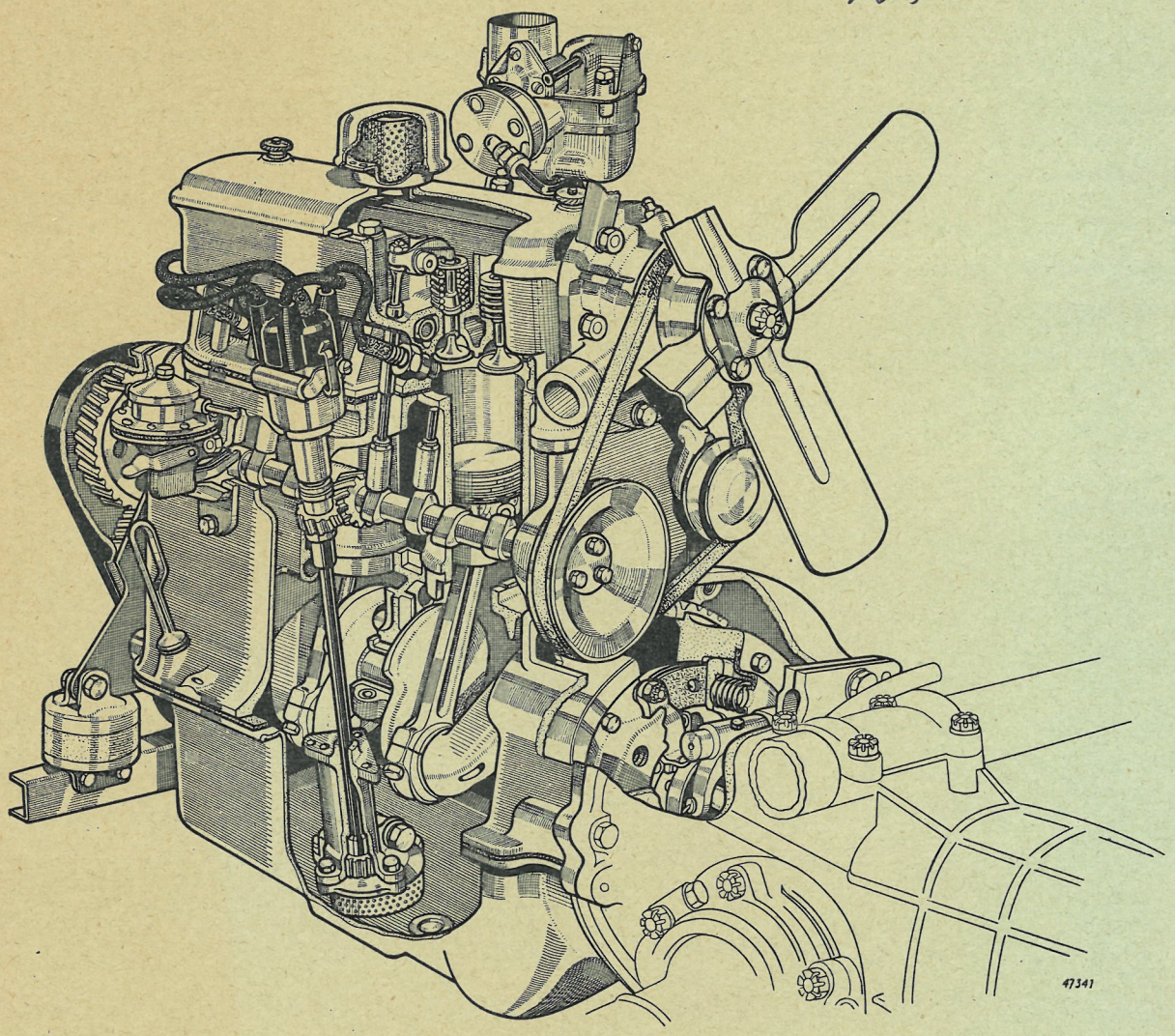
1. GENERAL SPECIFICATIONS OF VEHICLE

	Metres	Inches
Overall length	3.64	143.3
Overall width	1.43	56.3
Height (unladen)	1.47	57.87
Wheelbase	2.10	82.6
Front track	1.22	48.031
Rear track	1.22	48.031
Minimum turning radius	4.20	165.3
Ground clearance	.18	7.08
Curb weight (unladen in running order)	600 kg	1,322 lbs
Maximum total weight	920 kg	2,208 lbs

2. ENGINE

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ENGINE SPECIFICATIONS

4 vertical, in line type cylinders (4 stroke cycle)	Type 662-2
Normal operating temperature	80 to 85° C (176 to 185° F)
French taxable horsepower rating	4 HP
Brake horsepower	21 HP at 4,100 RPM
Maximum RPM	4 500
Slow running	600 RPM
Dry weight	82 kg (180.73 lbs)
Weight in running order	86.5 kg (190.64 lbs)
Bore	54.5 mm (2.144 in.)
Stroke	80 mm (3.15 in.)

Piston displacement	747 cc (45.58 cu.in)
Compression ratio	7.25 to 1
3 main bearings type cylinder block	
Removable, wet type, cylinder liners	
Pistons and cylinder head are of aluminium alloy.	
Connecting rods have babbitted big ends and bushed small ends.	
Firing order	1 - 3 - 4 - 2
Sparking plugs	14 mm
Water type cooling system, capacity	4.6 l (1 Imp. gal.)
Pressure lubrication, capacity	2.1 l (.44 Imp. gal.)

REMOVING ENGINE WITH SPECIAL LIFT

The engine is not to be removed as a distinct assembly. The " engine - clutch - gearbox " assembly is to be removed as a whole, whereafter the engine is to be separated from the assembly.

Vehicle on ground.

Drain water of cooling system by the 2 drain cocks on radiator (at lower LH side) and on cylinder block (close to generator).

Remove the water filling cap.

Disconnect battery.

Disconnect wires from :

— ignition coil (in-current wires) ;

— oil pressure switch ;

— temperature sender on radiator ;

— starter (4 wires) ;

— generator (2 wires).

Disconnect throttle control.

Remove air filter with flexible connection.

Remove the heating shells and the rear compartment floor panels.

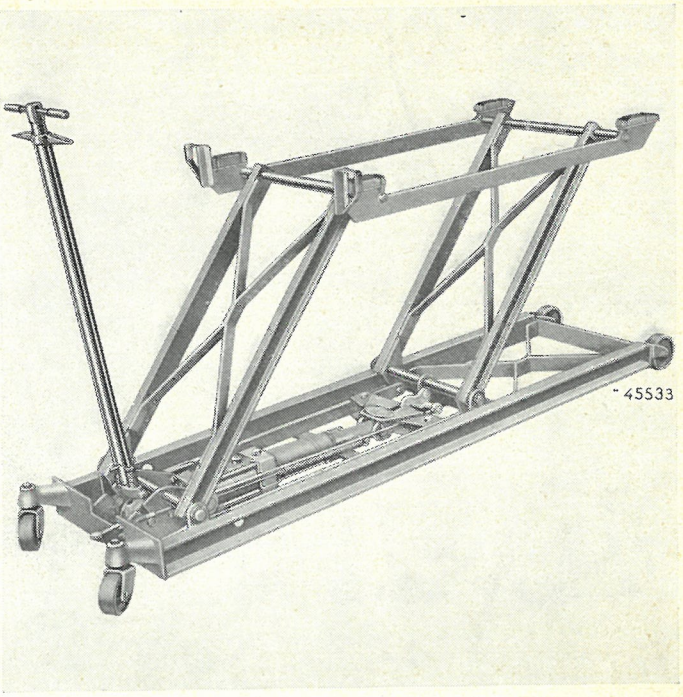
Loosen the radiator cardboards.

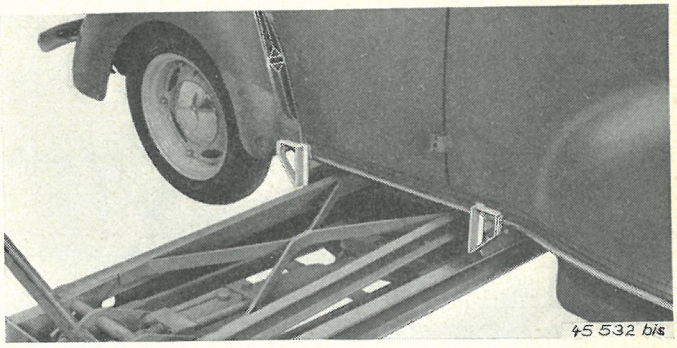
Disconnect the radiator filling flexible hose and disassemble the blind control cables.

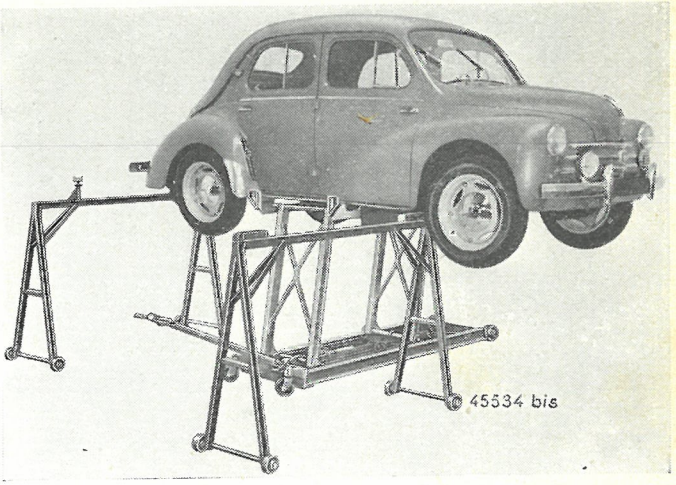
Remove the " exhaust pipe and silencer " assembly.

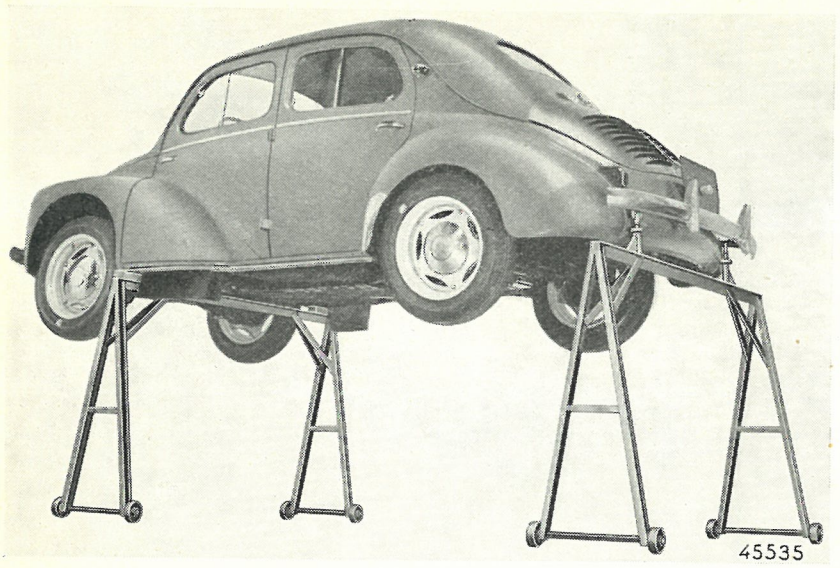
Insert the FOG special lift (Cha. 09) crosswise and against the rear wing protector.

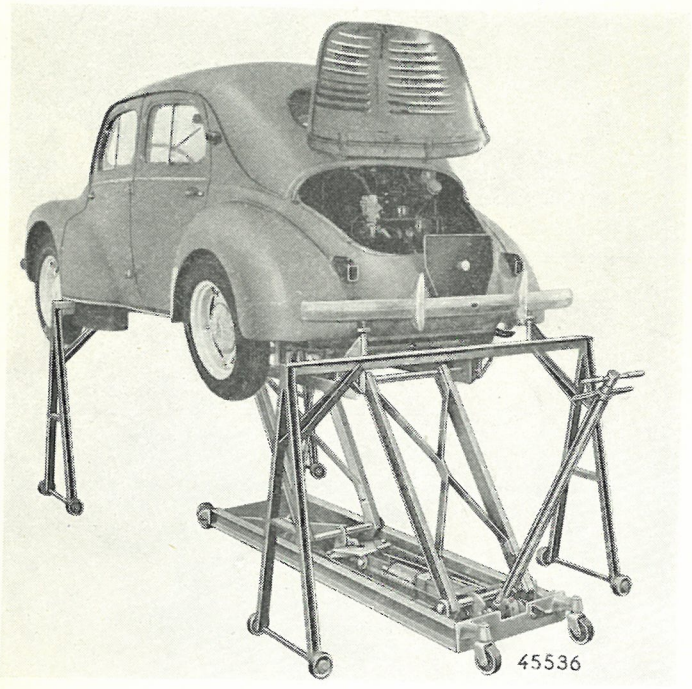
Raise until the safety system is hooked up.











REMOVING ENGINE WITH SPECIAL LIFT

(Continued)

Install the 2 special "FOG" rolling stands (Cha. 10) :

— In front, at the end of the side panel.

— At rear, under the bumper brackets. **Correctly adjust the height of the threaded arms to contact the brackets.**

Lower and remove lift.

Underneath vehicle.

Disconnect the throttle control at clevis.

Remove air baffle.

Disconnect :

— speedometer take off ;

— clutch control cable ;

— parking brake control rod.

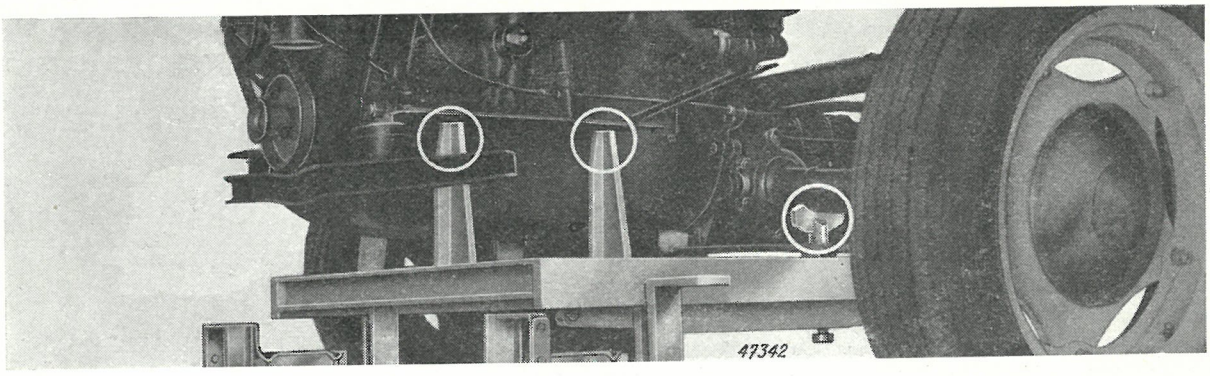
Clear clutch release and throttle control cable sheathings from their brackets on the cross-member.

Disconnect shock absorbers from their lower mounting.

Disconnect fuel pipe at fuel tank outlet.

Disconnect brake flexible lines at wheel cylinders.

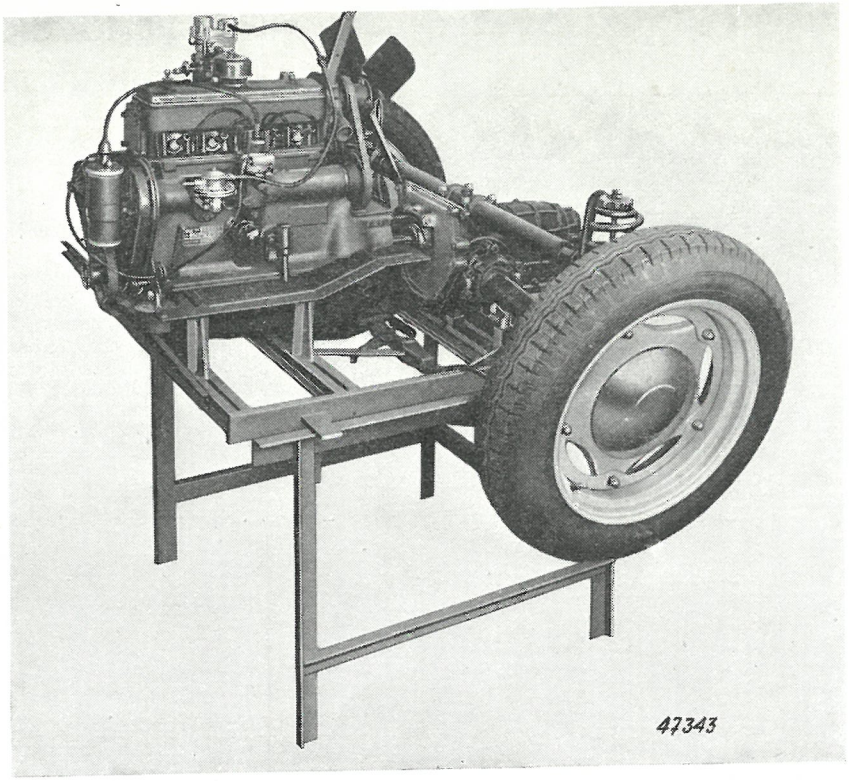
Insert special FOG lift with disassembling cradle (Cha. 07) from rear of vehicle.

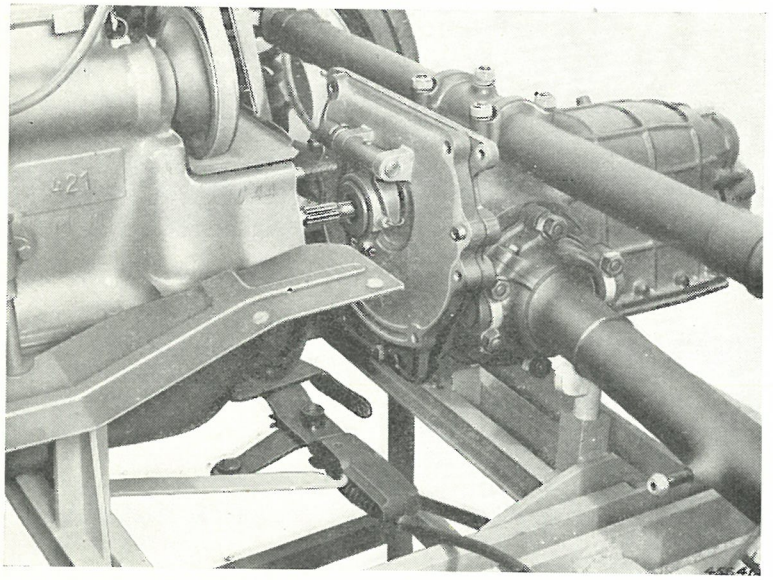


REMOVING ENGINE WITH SPECIAL LIFT

(Continued)

Raise lift, directing the rest points of the cradle under rear axle tubes on one hand and at both ends of the oil sump on the other hand.
Remove the cross member bearing caps attaching nuts.
Clear caps and rubber pads.
Loosen and remove bolts from the engine support rear cross-member.
Make sure no assembly or control is still connected to the mechanical unit.
Slowly lower the lift, and clear the whole through the rear.
Move lift with the unit into the special FOG disassembly support (Cha. 08).
Lower the lift when the cradle with the unit will rest on the disassembly support.





REMOVING ENGINE WITH SPECIAL LIFT

(Continued)

Separate engine from gearbox - rear axle mechanism :

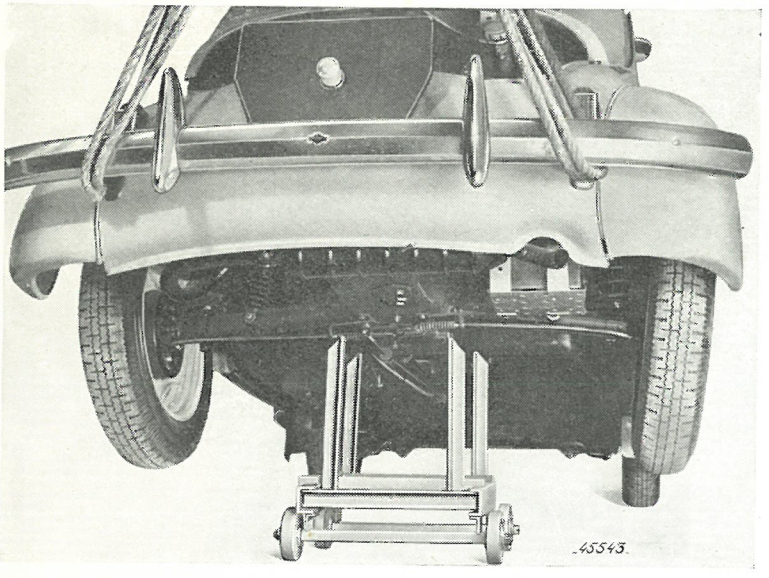
— Remove radiator.

— Unhook clutch lever retracting spring.

— Remove parking brake idle linkage to oil sump attaching bolts.

— Remove gearbox - rear axle housing to engine upper nuts and lower attaching bolts.

— Loosen the hook from the cradle and allow front end to slide off in order to clear engine from gearbox - rear axle housing.



REMOVING ENGINE WITHOUT SPECIAL LIFT

Disconnect, on floor and on pit, all of the items listed under the heading : " Removing engine with special lift ", except for the " exhaust pipe and silencer " assembly, the bearing caps and the rear cross-member mounting which should still be maintained after loosening their mountings.

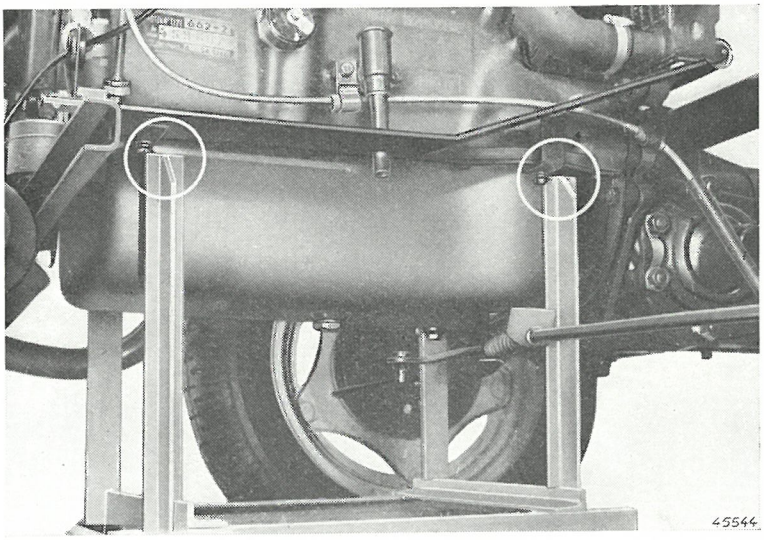
Clear vehicle from pit and lift rear end with a suitable sling.

Underneath the engine oil sump, insert special carrier (Mot. 80).

REMOVING ENGINE VITHOUT SPECIAL LIFT

(Continued)

Lower the vehicle, taking care to carefully allow the oil sump to rest on the 4 rest points of the carrier.

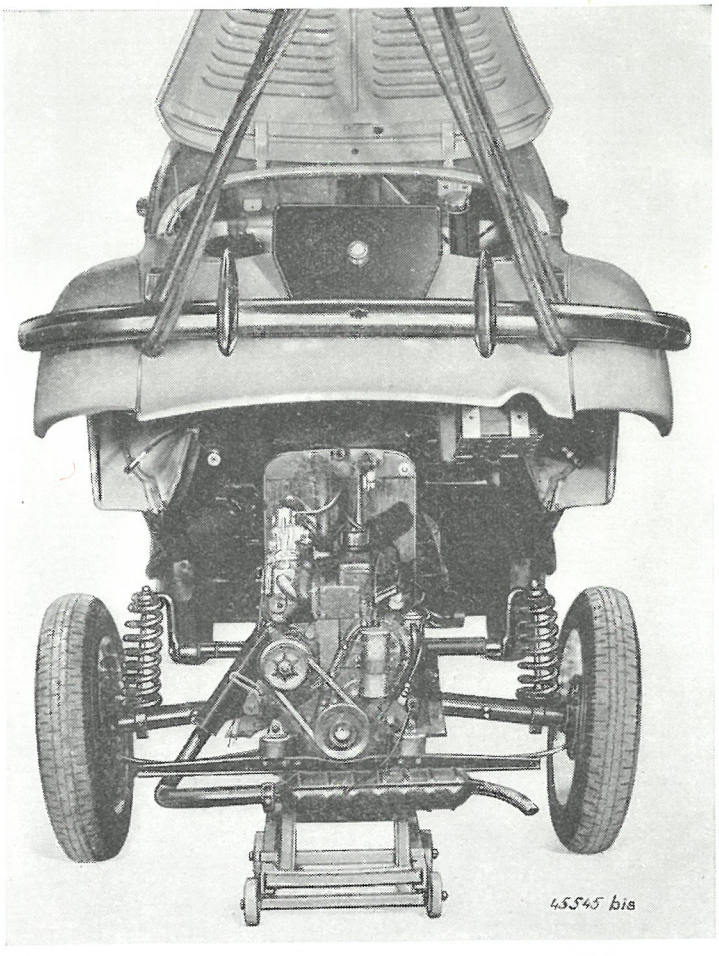


Remove caps, mechanical unit supporting cross-member holder bearings and remove the rear cross-member mounting bolts.

Raise vehicle to clear it from the mechanical unit.

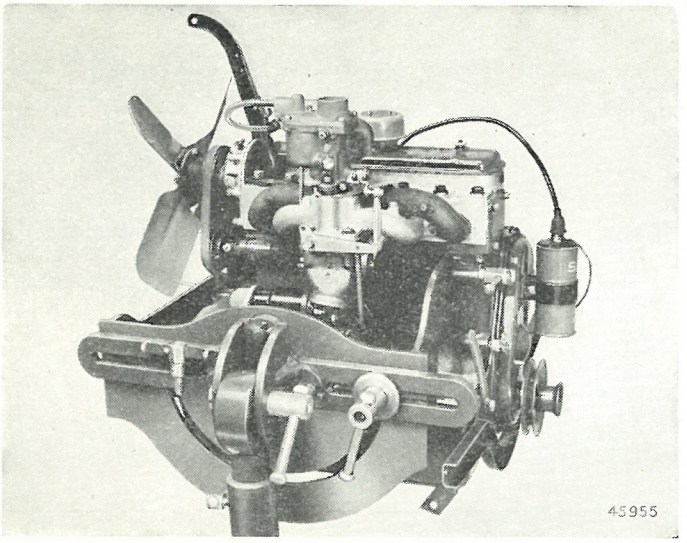
Pull the carrier and mechanical unit as a whole towards the rear of the vehicle.

NOTE. — The carrier will permit a proper rolling balance of the mechanical unit with tyres, and will also facilitate the partial dismantling of the engine and the separating operation of the engine from the gearbox - rear axle assembly.



REFITTING THE ENGINE

Perform in reverse sequence all of the operations performed during the removing.



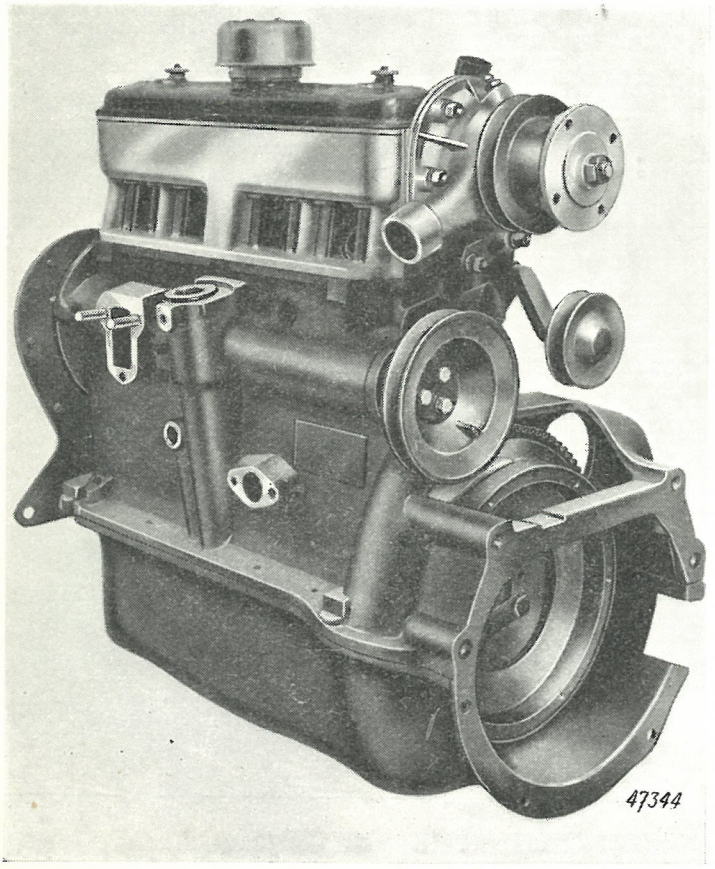
STRIPPING THE ENGINE

(Standard Exchange Plan)

With engine removed :

— Remove generator, generator belt, tensioning guide and wiring bracket.

— Secure the engine on the " DESVIL " engine support (Mot. 25 B) at the generator mounting boss on one hand and on the clutch housing at two locations on the other hand.



— Drain engine oil.

— Remove engine rear support cross-member.

— Remove the fuel pipe and clear the throttle control ball joint.

— Disconnect the automatic choke tube and remove carburetter.

— Remove manifolds and gaskets,

— ignition coil, distributor and sparking plugs.

— Remove oil gauge, the fuel pump with plate and gaskets and remove oil pressure switch (spanner Mot. 26).

— Remove breather, fan and belt,

— radiator mounting bolt (remove cylinder head cover to allow for clearing the bolt),

the water drain cock, the starter and the clutch mechanism.

" Engine Exchange Plan " : **At this stage,** the stripped engine corresponds to an " Exchange Plan " type engine.

CYLINDER HEAD

SPECIFICATIONS.

Cylinder heads are of aluminium alloy.

Height (between assembly faces) :
- — Standard size .. 95.3 mm (3.752 in.)
- — Maximum repair size ..... 94.8 mm (3.732 in.)

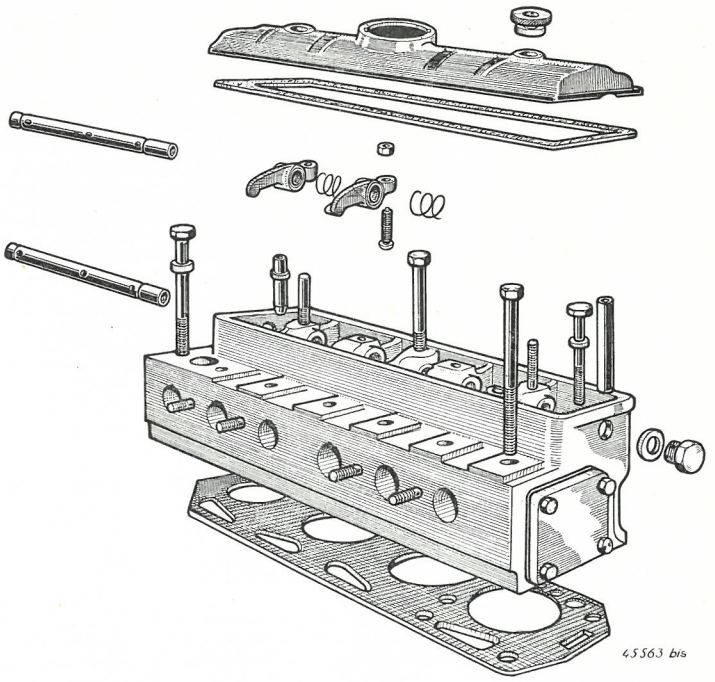
Thickness of gasket .. 1.2 mm (.047 in.)

Distortion of assembly face :
- — Maximum depression or protrusion ..... .05 mm (.0019 in.) (Beyond this value, mill down to minimum size ; over this value, replace cylinder head).

This inspection is to be performed on a surface plate, with a dial indicator.

Depth of chambers from seat to assembly face :
- — Standard size ... 14.3 mm (.563 in.)
- — Repair size ..... 13.8 mm (.543 in.)

From 14.3 to 14.1 mm (.563 to .555") mill face without reworking chambers.
From 14.1 to 13.8 mm (.555 to .543") rework chambers.
Under 13.8 mm (.543") replace cylinder head.



VOLUME OF COMBUSTION CHAMBERS :

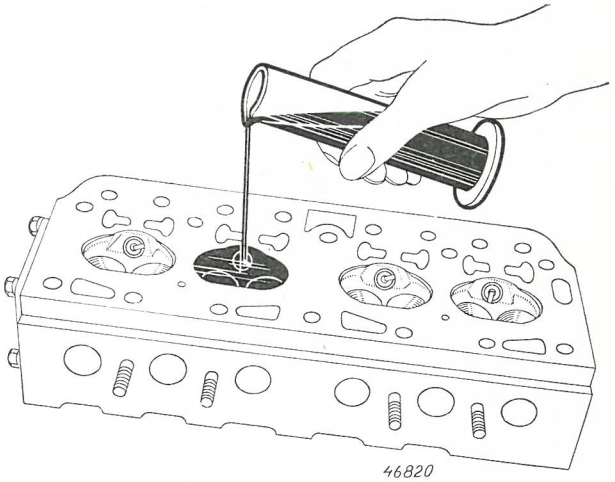
27.3 cm^3 ± .6 (1.66 cu.in. ± .036 cu.in.) (with sparking plugs and valves assembled).

Checking chambers volume.

The cylinder head should be fitted with sparking plugs (or with obturating cocks instead) and valves (the latter being coated with tallow or vaseline to ensure proper sealing).

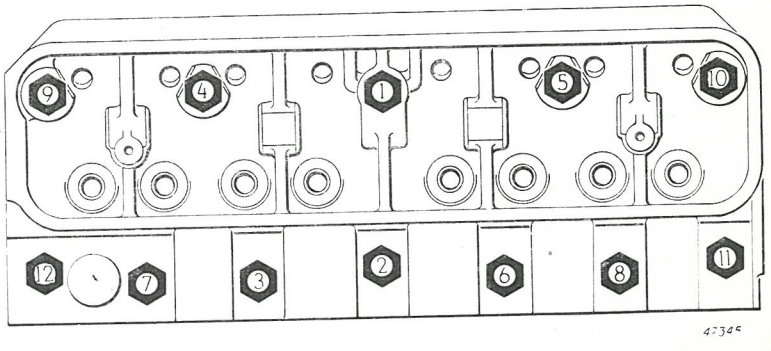
Position cylinder head horizontally (check with water level). Using a test tube (graduated to 100 cm^3 or 6.1 cu.in.) filled with fluid oil or diesel fuel, pour into the chamber to be checked the oil or fuel until the chamber is flush filled.

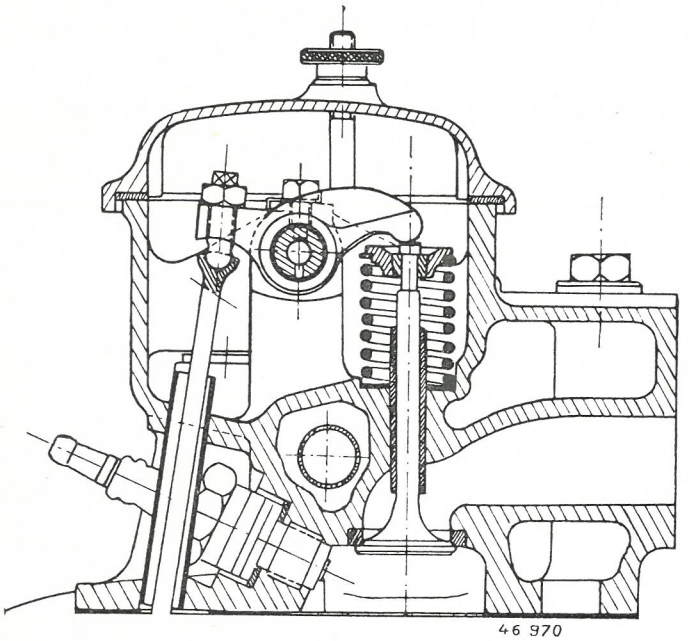
Record the difference, i.e. the chamber volume, from the liquid remaining in the test tube.



TIGHTENING.

To be performed on engine when cold only.
Use bushing Mot. 10.
Follow tightening sequence as illustrated.
Torque requirement : 5 to 6 m.kg (36.15 to 43.38 ft/lbs).
If cylinder head gasket has been replaced, retighten on engine when cold, after a road test of 30 to 50 km (20 to 30 miles).
Any cylinder head retightening operation should mandatorily be followed by the adjustment of the rocker arms.
Use either special spanner Mot. 23 or bushing, Mot. 10, to be fitted to standard torque wrench Mot. 50.



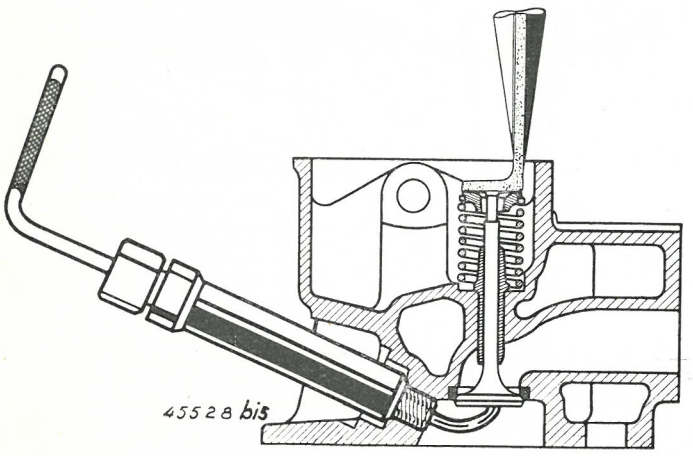


CYLINDER HEAD

(Continued)

VALVES.

Diameter of valve heads :	
— Inlet	27 mm (1.063 in.)
— Exhaust	25 mm (.984 in.)
Valve stem diameter, inlet and exhaust	6 mm (.236 in.)
Valve stem to guide clearance :	
— Inlet	.02 to .07 mm (.00078 to .0027 in.)
— Exhaust	.08 to .096 mm (.0031 to .0038 in.)
Valve lift :	
— Inlet	5.75 mm (.2263 in.)
— Exhaust	6 mm (.236 in.)
Seating angle	120°
Maximum seating width :	
— Inlet (Std dimension)	1 mm (.039 in.)
(repair dimension)	1.5 mm (.059 in.)
— Exhaust (Std dimension)	1.3 mm (.051 in.)
(repair dimension)	1.8 mm (.0708 in.)
Valve springs :	
— Free length	38 mm (1.496 in.)
— Number of active coils	5.5
— Length under 14 kg (30 lbs) load	24 mm (.944 in.)
— Length under 7 kg (15 lbs) load	31 mm (1.22 in.)
— Diameter of wire	2.5 mm (.098 in.)
Valve guides :	
Outside diameter :	
— Standard dimension	9 mm (.354 in.)
— Repair dimension	9.25 mm (.364 in.)
— Pressing in clearance	.065 to .100 mm (.0025 to .0039 in.)



Replacing a valve spring on a car.

For the springs located at ends and at center of cylinder head, remove the spring seat locking staples.

Run off as far as possible the nut and screw of the rocker arm concerned, compress spring **(single type compressor Mot. 02),** slide rocker arm along its shaft, remove rod and tilt rocker arm.

In lieu of the spark plug, assemble the **valve holder Mot. 61,** direct holder finger to contact the valve head and tighten check nut on tool stem.

Compress spring and remove the 2-piece split cones and spring with cap.

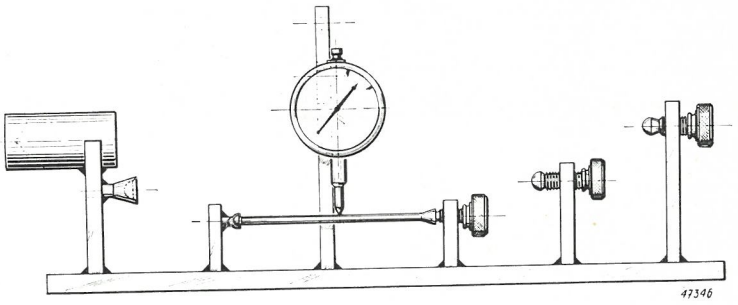
For refitting a new spring, perform the same operations in reverse sequence and, after reassembly, adjust the rocker arms.

CYLINDER HEAD

(Continued)

ROCKER ARMS.

Maximum out of round of push rods	.4 to .5 mm (.015 to .019 in.)
The out of round is to be checked with a dial indicator by rotating the push rod on the checking fixture Mot. 55.	
Clearance when cold between rocker arms and valve stems :	
Inlet	.10 to .15 mm (.0039 to .0059 in.)
Exhaust	.20 mm (.0078 in.)
Diametral clearance on shaft	.02 to .05 mm (.0008 to .0019 in.)
Adjusting of rocker arms is to be performed on engine when cold.	



Replacing a push rod guide tube.

If oil creeping is found at tubes or if tubes jeopardize normal stroke of rods, replace tubes as follows :

— Cut off the damaged tube right at cylinder head and **at both ends of its exterior location** and clear with broach the 2 end sections remaining in the cylinder head.

— Insert a new tube, allow to protrude by approx. 2 mm (.078 in.) from the cylinder head joint surface.

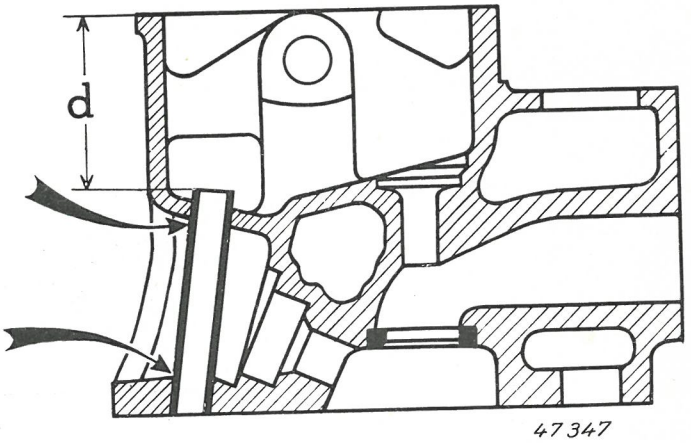
— Expand the oiled tube, while tilting the cylinder head by an angle of 8° with a 9 mm (.354 in.) ball inserted from the cylinder head joint surface with a concave end type broach.

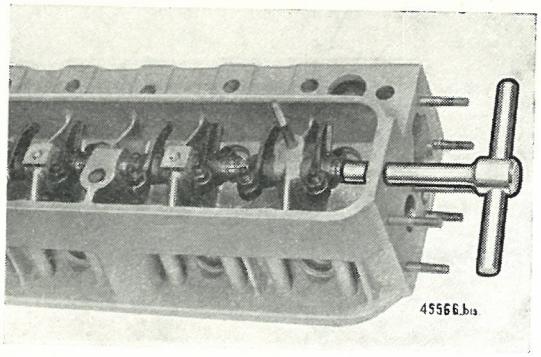
— After the expanding operation, work the end of the tube protruding from the cylinder head joint surface flush.

— **The protruding dimension** (d = 43 mm $^{+\ .3}_{-\ .0}$ i.e. 1.692 in. $^{+\ .0118}_{-\ .0}$ is to be complied with on the 8 tubes for oil leak off. To this end :

Flare the tube by hitting same, the cylinder head resting flat until the end of the tool (flaring tool Mot. 8) contacts the face whereon the cylinder head rests.

NOTE. — If tube is merely bossed without being punctured, expand the tube without replacing same.



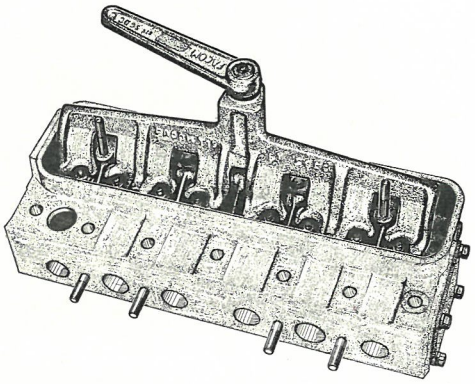


CYLINDER HEAD

(Continued)

DISMANTLING CYLINDER HEAD.

Remove water pump with support plate.
Remove rocker arm shaft rubber plug and cover plate.
Remove the 2 rocker arm shaft plugs, the 4 rocker arm locking staples and the 2 end (tapered) springs.
Remove the 2 rocker arm shaft lock screws.
Pull out rocker arm shafts (Mot. 31 tool).



Remove valves and springs :

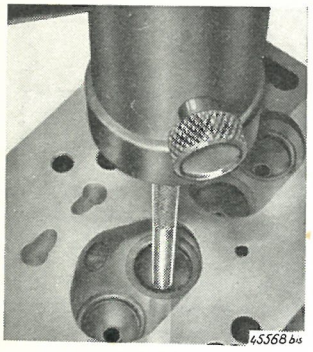
To this end :

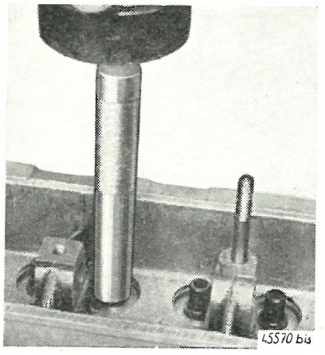
— Clear valve stems by compressing the caps and springs ; with nail, extract the 2-piece split cones.

— Remove compressor, remove caps, springs and rubber washers on valve stems (Mot. 01 multiple compressor and Mot. 08 cylinder head support).

— Remove valves, position on board with 8 drilled holes, in order to ensure reassembly in the same sequence.

— Tilt cylinder head in order to take out the 2-piece split cones and the springs lower thrust washers.





Replace valve guides, if required ; to this end :

— Drive out guide on press with puller Mot. 03 A.

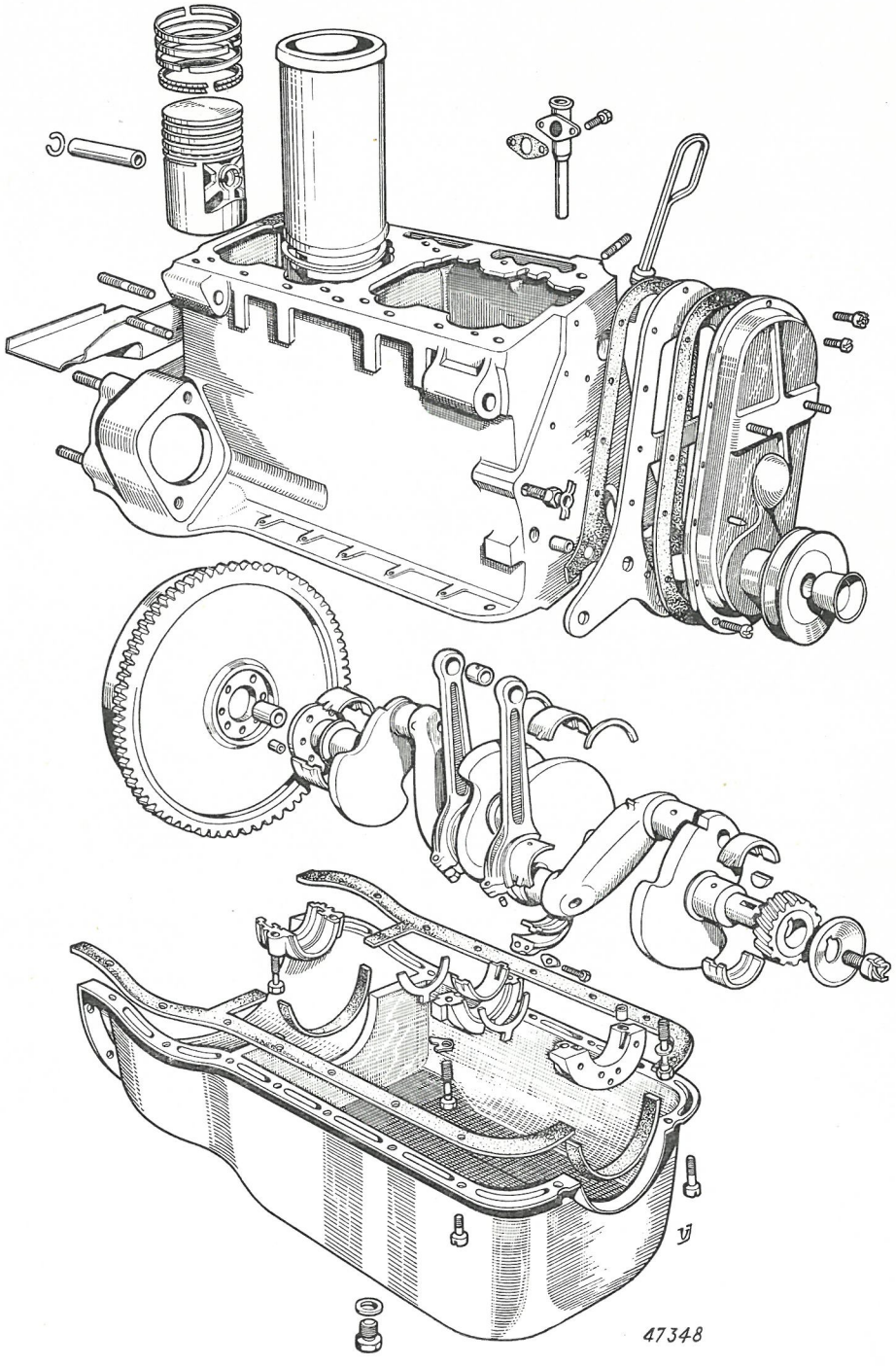
— Check guide location in cylinder head for cleanness ; from the top of cylinder head, press in the new guide (previously coated with tallow) with spacer Mot. 03 A.

— Ream the new guide and always grind the corresponding seat after replacing a valve guide.

REASSEMBLING CYLINDER HEAD.

Grind valves and seats.
Check joint surface and rocker arms.
Check springs for proper tension.
Apply oil on valve stems and install valves at their respective locations.
Turn over cylinder head.
Perform the dismantling operations in reverse sequence.

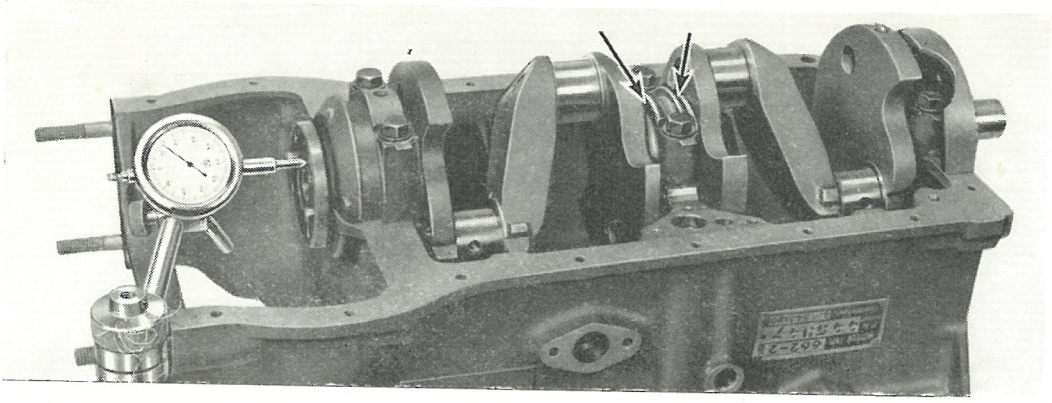
MOVING PARTS AND CYLINDER BLOCK



The crankshaft and flywheel are dynamically balanced as an assembly when the latter is of the standard type.

When replacing the clutch, remove the balancing weights (flat washers installed under bolt heads).

The crankshaft is balanced separately when the clutch is of the FERLEC type.



45595 bis

MOVING PARTS AND CYLINDER BLOCK (Continued)

CRANKSHAFT (three main bearing type) :

— Lengthwise clearance ..... .05 to .25 mm (.0020 to .0098 in.)
(Clearance controlled by 2 babbitted steel flanges located at either side of center main bearing).
Standard dimension ..... 2 mm (.078 in.)
Repair dimensions ..... 2.05 - 2.20 and 2.30 mm (.0806 - .0866 - .0905 in.)

— Trunnions and bearing shells :
normal diameter ..... 40 mm (1.57 in.)
grinding to diameters { 39.75 mm (1.565 in.) (for bearing shells) / 39.5 mm (1.555 in.) (for repair sizes) / 39 mm (1.535 in.)
Grinding tolerances ..... { — .009 mm (.00035 in.) / — .025 mm (.0010 in.)

— Torque requirements for main bearing bolts ..... 5.5 to 7 m.kg (39.7 to 50.6 ft/lbs)

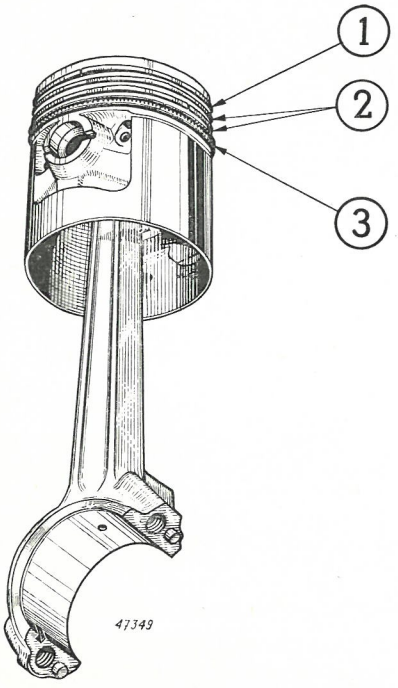
— Crankpins and bearing shells :
normal diameter ..... 38 mm (1.496 in.)
grinding to diameters { 37.75 mm (1.486 in.) (for bearing shells) / 37.5 mm (1.476 in.) (for repair sizes) / 37 mm (1.456 in.)
Grinding tolerances ..... { — .025 mm (.001") / — .041 mm (.0016 in.)

— Flywheel bolts torque requirement ..... 4.5 to 5 m.kg (32.5 to 36.15 ft/lbs)

— Maximum warp of flywheel as measured on diameter of 155 mm (6.102 in.) of clutch face ..... .08 mm (.0031 in.)

CONNECTING RODS :

— Big ends with elastic bearing shells. Clevite bushes, at small ends.
— Big end diameter ..... 26 mm (1.023 in.)



— Inside diameter of big end (with bearing shell fitted) ..... 38 mm (1.496 in.)
— Diameter of small end bush ... 14 mm (.551 in.)
The piston pin, when cold, should have a sliding fit into the bush).
— Torque requirement for cap bolts 3 to 3.5 m.kg (21.6 to 25.3 ft/lbs)
— Side clearance ..... .06 to .17 mm (.0023 to .0066 in.)
— Difference in weight of heaviest and lightest connecting rod used on the same engine 3 gr (.105 oz)

PISTONS (matched with cylinder liners) :

— Flat bottom type. Made from aluminium alloy and compensation plates.
— Diameter of skirt measured perpendicularily to piston pin ... 54.5 mm (2.144 in.)
— Difference in weight of heaviest and lightest piston as used on the same engine . 2 gr (.070 oz)
— Piston pin diameter ..... 14 mm (.551 in.)
(The pin, when cold, should be clamped in piston).

PISTON RINGS :

1 top ring (**1**) : chromium plated (set gap).
Thickness ..... 2 mm (.078 in.)
2 compression rings (**2**) phosphate coated : (gap to be set) (markings towards top of piston) ..... .1 to .15 mm (.0039 to .0059 in.)
Thickness ..... 2 mm (.078 in.)
1 oil control U-Flex type ring (**3**) : set length (do not rework).
Thickness ..... 3.5 mm (.137 in.)

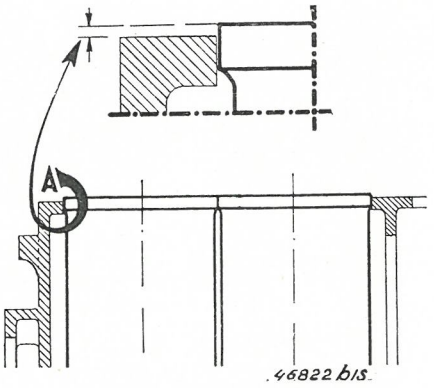
MOVING PARTS AND CYLINDER BLOCK (Continued)

CYLINDER LINERS (wet type, removable) :

— Bore ..... 54.5 mm (2.145 in.)

— **Protrusion of cylinder liner** from assembly face prior to tightening of cylinder head Dimension A ..... .08 to .15 mm (.0031 to .0059 in.)

— Thickness of bottom seal .... .9 mm (.035 in.) / .95 mm (.037 in.) / 1 mm (.039 in.) / 1.05 mm (.041 in.)



DISMANTLING THE ASSEMBLY.

The stripped engine being secured on support Mot. 25 :

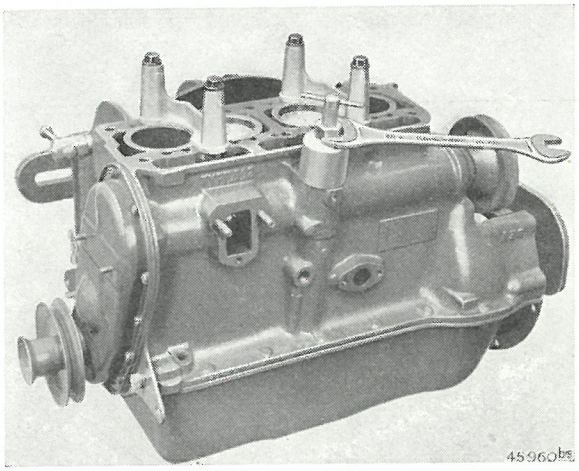
— Remove cylinder head and gasket.

— Remove tappets and **arrange in dismantling sequence for ultimate reassembly.**

— Position the cylinder liners clamps (Mot. 12 clamps).

— Remove the distributor socket and the oil pump drive pinion (Mot. 04 puller).

— Remove belt tensioner and water pump drive pulley.

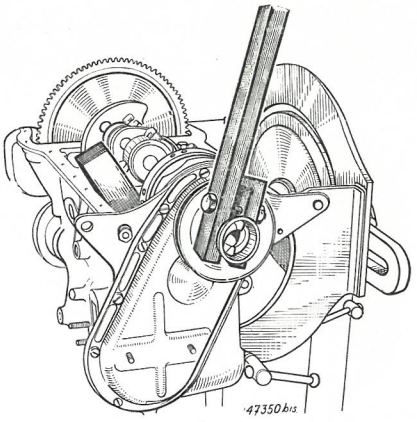


Pivot support by half a turn to bring oil sump upwards.

— Remove oil sump and gaskets.

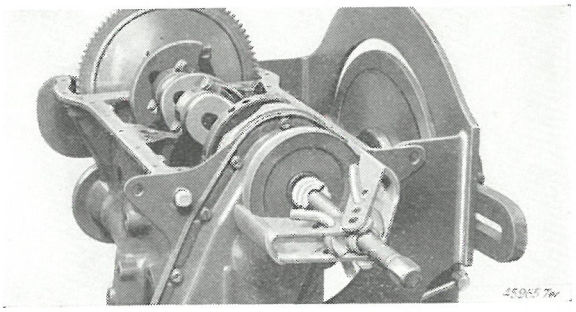
— Remove oil pump and driving shaft.

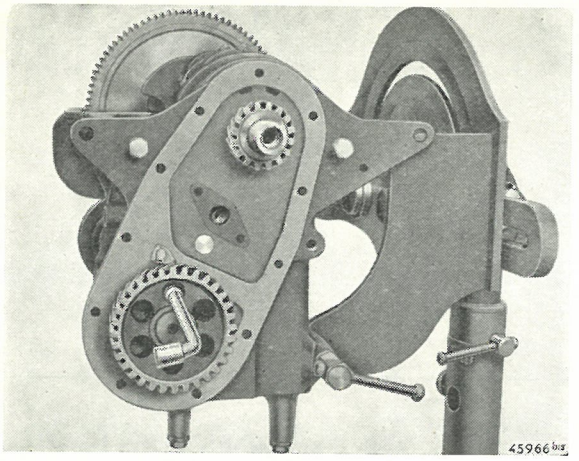
— Loosen and partially run off the crankshaft starting dog while holding the moving parts (spanner Mot. 53).



— Loosen pulley from crankshaft with the starting dog being used as a thrust for the gear puller screw (Mot. 49 tool).

— Remove starting dog and pull out crankhandle guide and pulley.

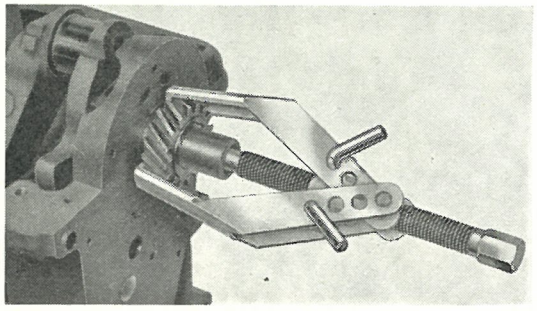




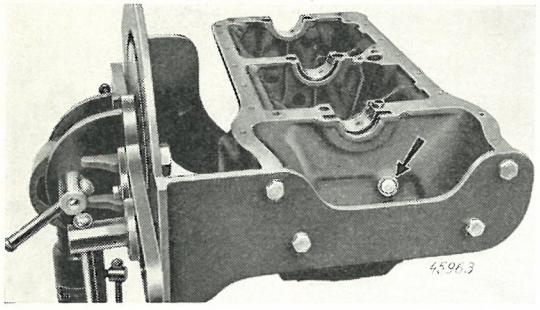
MOVING PARTS AND CYLINDER BLOCK

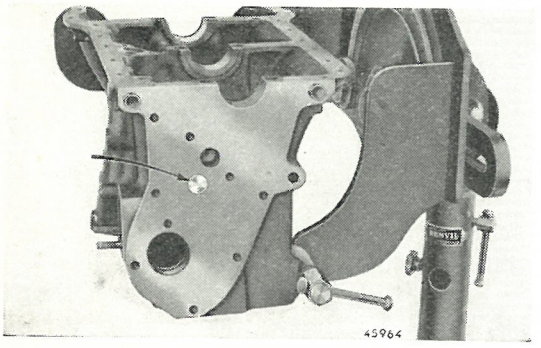
(Continued)

— Remove timing gear cover and gasket.
— Remove crankshaft gear oil baffle.
— Remove cotter pin and loosen (LH thread) the nut on the timing idle gear shaft and remove gear.
— Remove idle gear shaft.
— Remove the 2 camshaft thrust flange attaching bolts by inserting a socket wrench through the holes provided in the timing control gear and remove camshaft.



— Again run up the starting dog to pull off the crankshaft gear. Remove key.
— Remove timing gear plate.
— Remove connecting rod caps and bearing caps ; also, the elastic half bearing shells. **Do not mix up bearing shells.**
— Remove " crankshaft and clutch flywheel " as an assembly.
— Turn over support to lay engine flat, with tappet chambers upwards.
— Remove cylinder liner retaining flanges.
— Pull out the 4 assemblies : "-cylinder liners - pistons - connecting rods " through the upper face. Remove the elastic half bearing shells. **Do not mix up bearing shells.**





— From cylinder block, remove the 2 aluminium lubricating oil system plugs.

To this end :

— Drill hole in center of plug.
— Press in a square rod, lightly tapered.
— Unscrew plugs.
— Unscrew rocker arms lubricator.

Cleaning dismantled parts.

Insert a wire into all lubrication passages of engine unit. Scrape assembly faces.

Clean oil holes in connecting rods and oil passages in crankshaft.

Next, clean all parts with petrol and blow dry with compressed air.

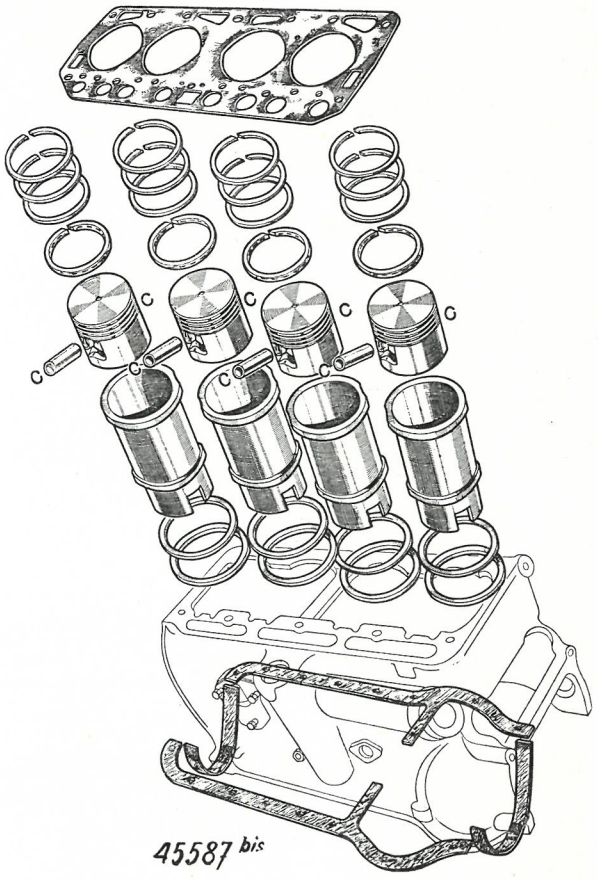
MOVING PARTS AND CYLINDER BLOCK

(Continued)

GENERAL REVISION OF ENGINE.

Carefully examine and inspect each part to decide whether it is to be reused or overhauled :

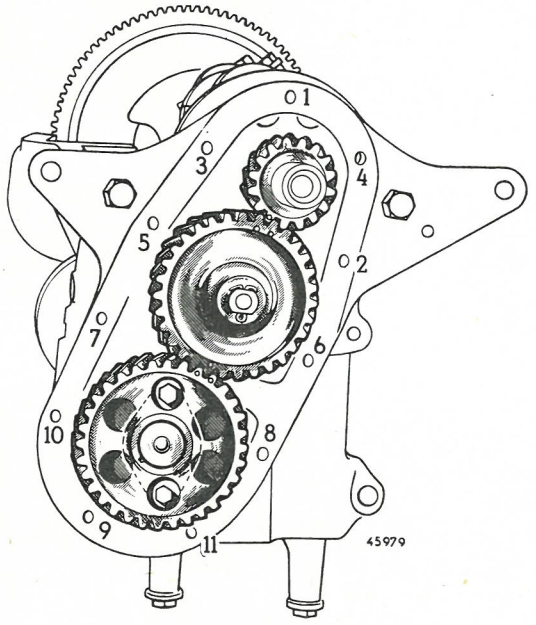
— Crankshaft : check wear of journals and of crankpins (eventually regrind). When the crankshaft is to be ground, separate the flywheel **after marking its position with reference to the crankshaft.**
— Tappets : diametral clearance ; eventually, reream the tappets location for reassembling repair size tappets.
— Clutch shaft guide bushing in crankshaft (clearance with clutch shaft) ; replace bushing if necessary.
— Camshaft : lengthwise clearance of thrust flange or replace gear.
— Cylinder head : joint surface. :
— Cylinder liner - pistons - piston rings : these parts should be replaced during this revision. **The Spare Parts Department makes available for the purpose, kits of new parts including :**
— 4 cylinder liners matched with 4 pistons.
— 4 piston ring sets.
— 4 piston pins with retainers.
— Cylinder liner bottom seals (2 thicknesses available).
— 1 cylinder head gasket.
— The cork gaskets for the oil sump.



REASSEMBLING.

Install bearing shell halves in cylinder block (make sure the oil holes are aligned).
Position crankshaft previously lubricated and fitted with the flywheel.
At either side of center main bearing, install the upper thrust half-flanges with **babbitted side having the lubricating grooves turned to crankshaft.**
Install bearing caps with the bearing shell halves and the lower center main bearing thrust flange halves. **The locking stud on the bearing shell half of this cap should be located at the same side as the one of the cylinder block.**
It is expressly prohibited to rework even lightly the bearing cap assembly face, also the connecting rod big ends and the bearing shell halves assembly faces.
Moderately tighten the bearing cap nuts.
Make sure the crankshaft rotates freely, check lengthwise play with indicator gauge and, also, check the flywheel warpage (page 16).
If lengthwise play is excessive, assemble repair size flanges.
Permanently tighten up the bearing caps to 5.5 to 7 m.kg (39.7 to 50.6 ft/lbs).
Have support plate pivot by 1/2 turn.
Pistons and cylinder liners are delivered in matched sets. Do not mix up same.
Determine thickness of cylinder liners bottom seals. To this end :
— Install into cylinder block the cylinder liners only fitted with their thinnest bottom seals (flat on collars should be opposite one another).
— Apply pressure by hand on cylinder liners, to achieve a correct seating on the bottom seals and **check protrusion** (page 17).

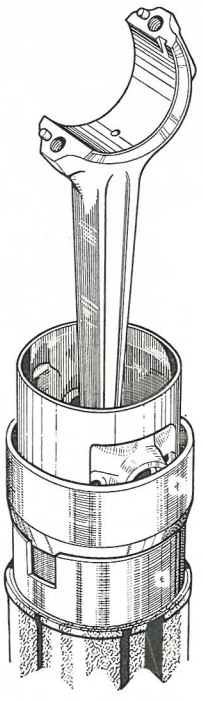
If protrusion is too small, use the heavier bottom seal.
Install the bearing shell halves on the connecting rods and on the connecting rod caps.
Install the " connecting rod - piston - cylinder liner " assembly with the bottom seal into the cylinder block (connecting rod big end slant edge towards camshaft).
Position the cylinder liners retaining flanges (Mot. 12) and pivot support to bring crankshaft up.
Insert the connecting rods on the lubricated crankpins of the crankshaft and assemble the caps. Tighten and lock the bolts.
Make sure the crankshaft rotates freely (tightening torque : **3 to 3.5 m.kg (21.69 to 25.30 ft/lbs).**
Reassemble the oil pump with a new gasket.
Reassemble the engine rear support timing plate with a new paper gasket cemented with sealing compound after positioning the alignment dowels.



MOVING PARTS AND CYLINDER BLOCK

(Continued)

Lock the screws which are covered by the timing gear cover.
Install the idle gear shaft with slot turned towards crankshaft. Lock screws.
Assemble camshaft previously generously coated with lubricating oil and fitted with its pinion. Through the timing drive gear, lock the 2 bolts attaching the thrust flange with their lockwasher. Check for free rotation of camshaft.
Assemble crankshaft gear and key **(with mark on pinion turned outside).**
Assemble the idle gear **by aligning the markings on the three gears.** Run up nut and insert cotter pin **(LH thread).**
Fit the crankshaft gear oil baffle.
Assemble timing gear cover with a new cork gasket. Align with Mot. 52 aligning tool. Moderately tighten the bolts in the **specified sequence.**
Assemble pulley on crankshaft, fit crankhandle guide and crankshaft starting dog.
Hold crankshaft and run up and tighten the crankshaft starting dog.
Assemble oil sump with new cork gaskets.
Remove cylinder liners retaining flanges.
Install oiled tappets as per removal sequence.
Refit cylinder head.
Install and position the oil pump drive gear and shaft.
Assemble distributor socket complete with rubber gasket.
Reassemble the water pump drive pulley and fan belt tensioner.



Assembling " connecting rod - piston and rings " as an assembly into cylinder liners.

The assembling operation of the piston is performed through the lower end of the cylinder liner. This end allows namely for the top and compression rings to pass, but a heavy compression is required for the U-Flex oil control ring to be at the diameter of the liner.

To this end, use a special tapered ring (Mot. 82).

Space piston ring gaps 120 degrees apart and generously lubricated.

Insert " piston with piston rings " into the special tapered ring.

Place this assembly onto the lower end of the cylinder liner, direct the connecting rod with reference to the cylinder liner (with slant edge of connecting rod towards camshaft and with flat on upper collar of cylinder liner facing the flat on the next located cylinder liner).

Push in the assembly.

MOVING PARTS AND CYLINDER BLOCK

(Continued)

PISTON AND CONNECTING ROD ASSEMBLY.

Dismantling.

Remove the " piston and connecting rod " assembly through the lower end of the cylinder liner.

Remove piston pin circlips and drive out pin.

With a new piston pin, check clearance at connecting rod small end bushing.
Replace bushing if required.

To this end :

— Press in a new clevite bush, previously coated with tallow (pressing-in chamfer) with slit of pin directed upwards of connecting rod small end and slightly offset with reference to the lubricating hole.

— Drill the lubricating hole into the bush.

— Carefully rework the connecting rod small end bush bore in order to obtain a sliding fit of the new piston pin.

Use a reamer with a slightly rounded off cutting edge in order to obtain a mirror finish (13.5 and 14 mm .531 and .551 in.) dia. expansion reamer).

Check connecting rod for distortion and squareness with SAPRAR Reglo-Bielle 11.597.
Straighten out if required.

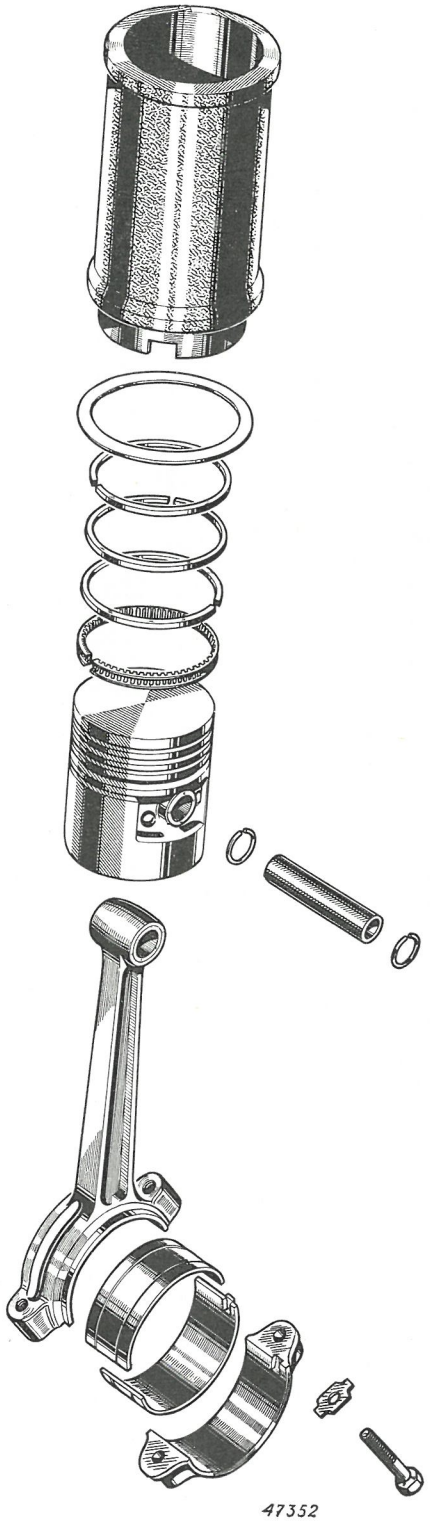
Reassembling.

Assemble a piston pin circlip on piston.

Dip piston in boiling water to expand the piston.

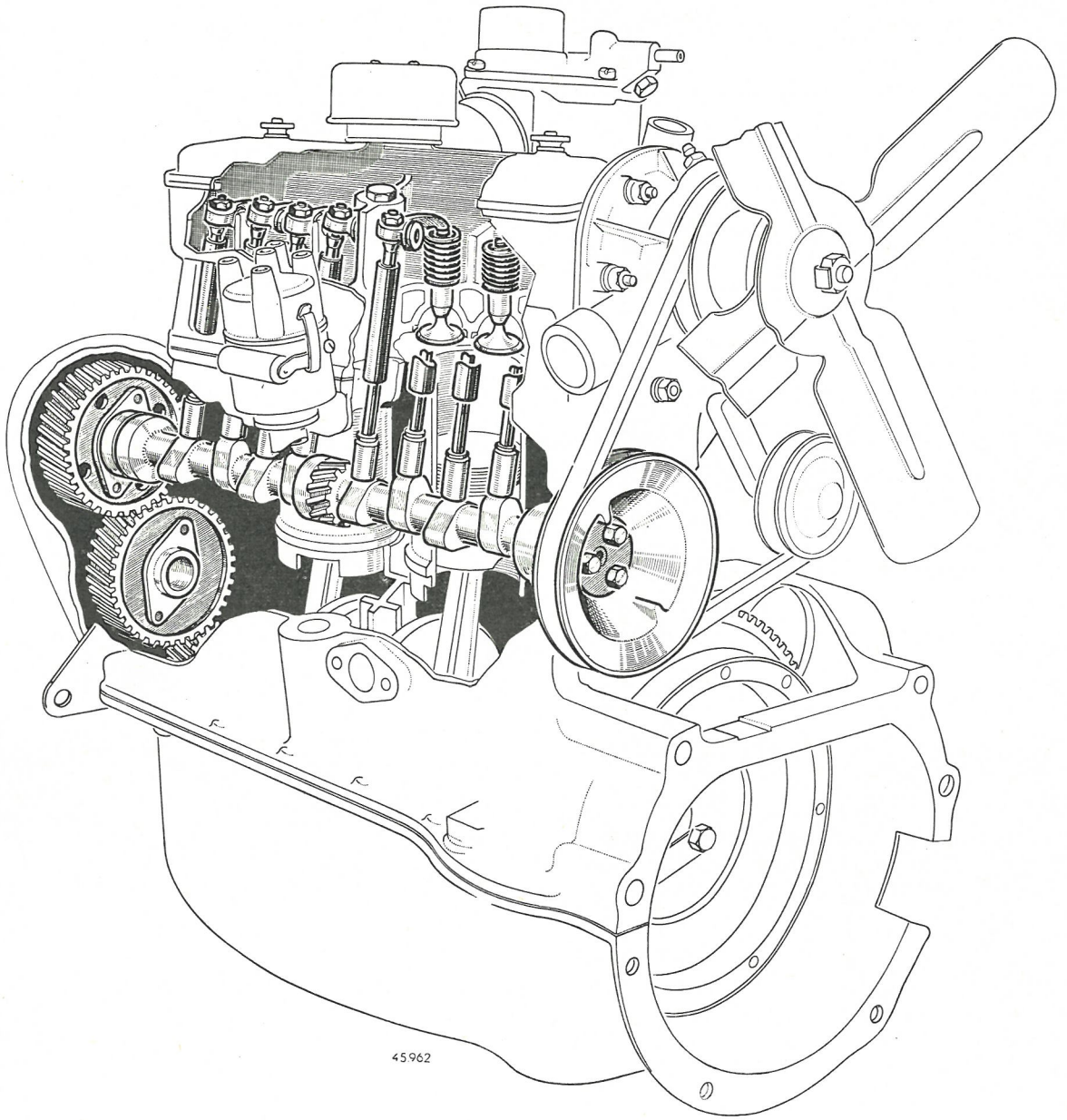
Insert the lubricated connecting rod small end into piston and slide piston pin into these 2 parts until it abuts against the previously fitted circlip. **Never hit a piston pin for assembling same.**

Fit the second piston pin circlip.



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TIMING GEAR



For valves, valve guides, rocker arms and push rods, see : Cylinder head, page 12.

Tappets :

— Outside diameter (standard dimension)	19 mm (.748 in.)
(repair dimensions)	19.2 mm (.775 in.) 19.5 mm (.767 in.)
— Tappet location reboring diameter limits	+ .013 mm (.0005 in.) + 0

Camshaft :

— Clearances	Diametral	.025 to .075 mm (.00098 to .0029 in.)
	Lengthwise	.06 to .145 mm (.0023 to .0057 in.)

TIMING GEAR

(Continued)

Timing diagram.

With theoretical valve lash of ..... Inlet = .2 mm (.0078 in.) — Exhaust = .3 mm (.0118 in.)

	Crankshaft degrees	Piston stroke	
		mm	in.
Inlet valve opens (before T.D.C.)	6	.3	.0118
Inlet valve closes (after B.D.C.)	30	4	.157
Exhaust valve opens (before B.D.C.)	45	9	.354
Exhaust valve closes (after T.D.C.)	7	.4	.0157

REPLACING A CAMSHAFT PINION

Dismantling.

This replacing operation may be performed only after the " camshaft - timing drive pinion " assembly has been removed.

Pull out the pinion to be replaced (drive out shaft on press by using the thrust flange as a rest point).

Check thrust flange faces for wear and distortion, if any.

Replace according to wear condition.

Reassembling.

Install the rear face of the first bearing of the camshaft on shims (**A**).

Never use the other end of the camshaft as a rest.

Assemble the thrust flange (direction of assembly : inner chamfer towards camshaft) and, next, the key.

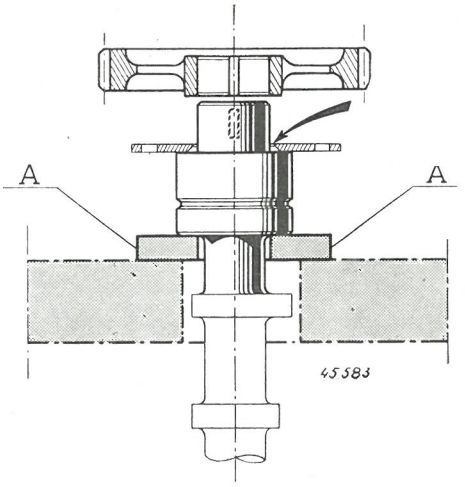
Position drive pinion with keyway and key aligned (direction of assembly : hub offset towards camshaft).

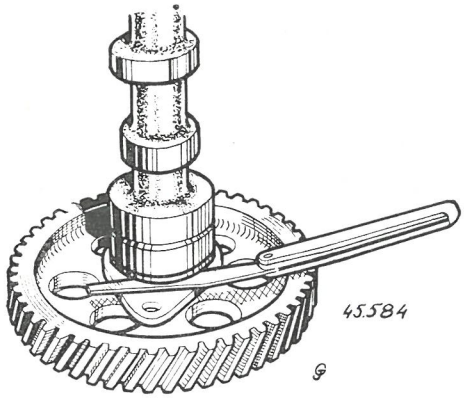
Apply tallow on bore.

On press, press in pinion until a correct lengthwise clearance is obtained at flange.

Check clearance with feeler gauge (.06 to .14 mm, i.e. .0023 to .005 in.)

If lengthwise clearance is too small, back off pinion by hitting end of shaft with mallet, while holding pinion in hand.

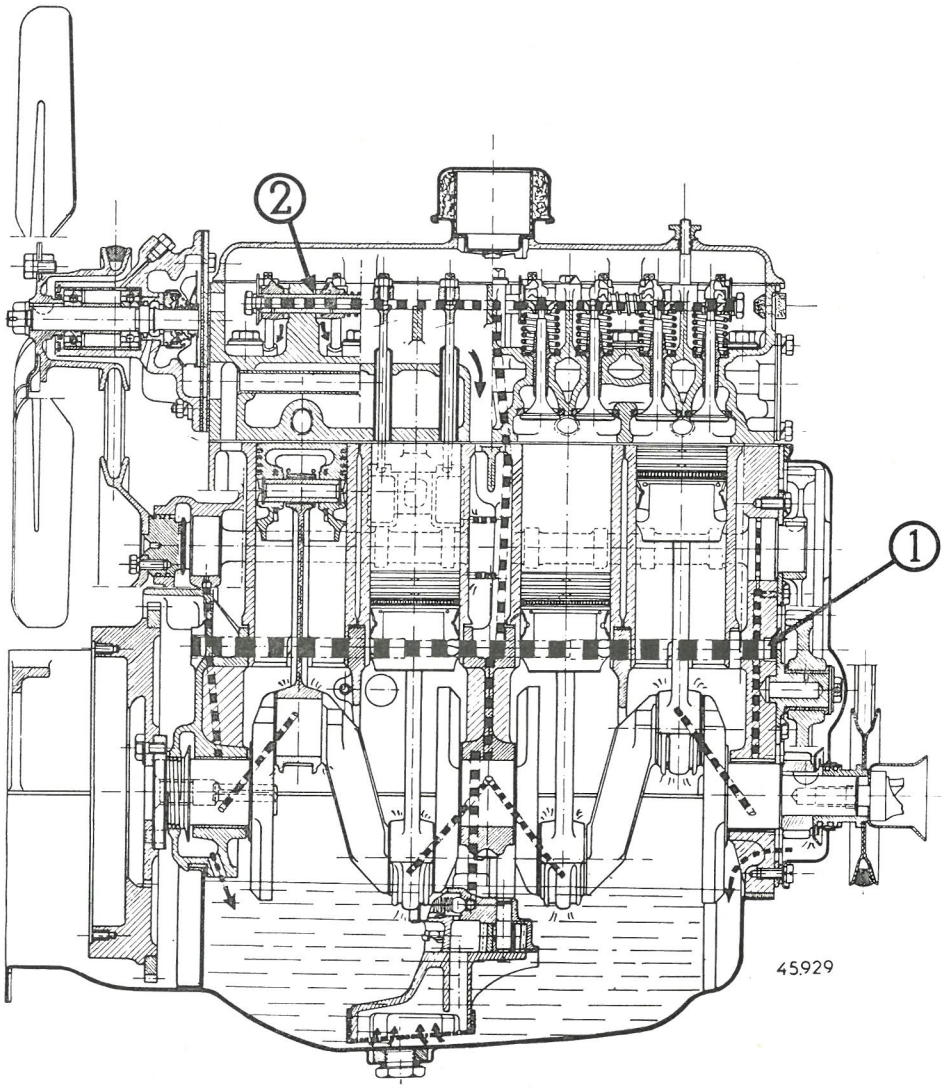




LUBRICATION

(1) **Lubrication gallery for the lubrication of the moving parts.**

(2) **Lubrication gallery (hollow rocker arm shafts for the lubrication of the rocker arms).**



LUBRICATION

(Continued)

OIL PUMP.

Specifications.

Pump to engine ratio	.5
Pressure ..... (Normal operating temperature : 80 to 85° C (176 to 185° F).	2 kg/cm² (28.4 psi) at 600 engine RPM. 3 kg/cm² (42.6 psi) at nominal RPM.

Oil viscosity (see Maintenance and Lubrication Manual).

Spring of oil pressure limiting or relief valve :

Free length	41 mm (1.614 in.)
Number of active coils	10
Diameter of wire	.8 mm (.0314 in.)

INSPECTION OF OIL PUMP.

(After checking oil for correct viscosity).

Remove engine oil sump.

Remove oil pump and save the gasket.

Unlock and remove relief valve plug with aluminium gasket used as a retainer.

Remove spring and ball and clean with petrol.

Check spring pressure and make sure the ball is not jammed in its location.

Reassemble the oiled ball and spring, with plug fitted with new aluminium gasket.

Tighten plug, hammer down the aluminium gasket acting as retainer on the pump body and on one of the plug flats.

NOTE. — With plug locked on its aluminium gasket, a spring compression is obtained such as to ensure a correct oil pressure at delivery end without adjustment.

REPLACING THE OIL PUMP GEARS.

If pressure is still low after inspection and reconditioning of relief valve, this condition can be traced to wear of gears.

The latter should then be replaced.

Unlock and remove the screen body or cover mounting bolts.

Remove the 2 gears, the drive rod and clean with petrol.

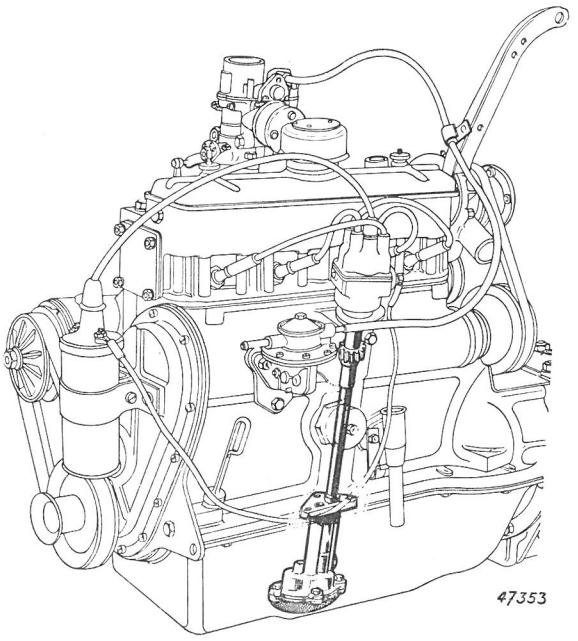
Check surface condition of cover at gears end (wear due to gears and to movement).

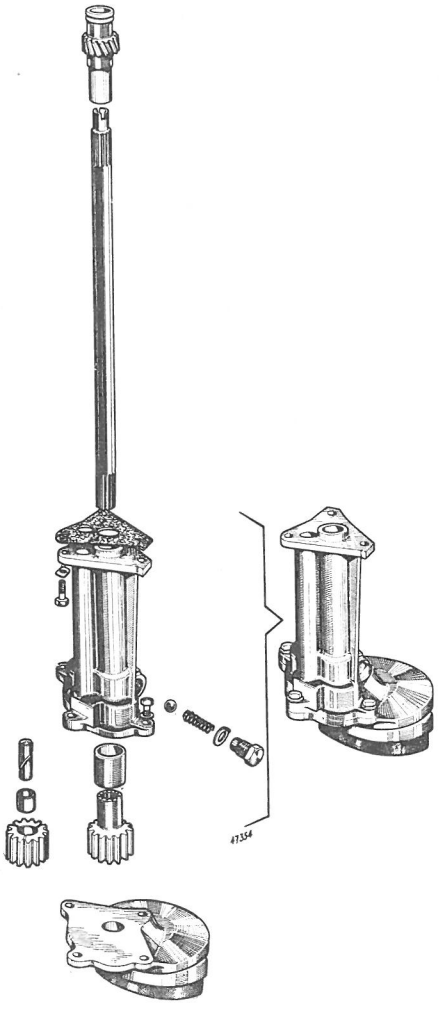
Remove traces of wear on cover face with fine emery cloth stretched on a surface plate (if wear is excessive, replace the cover).

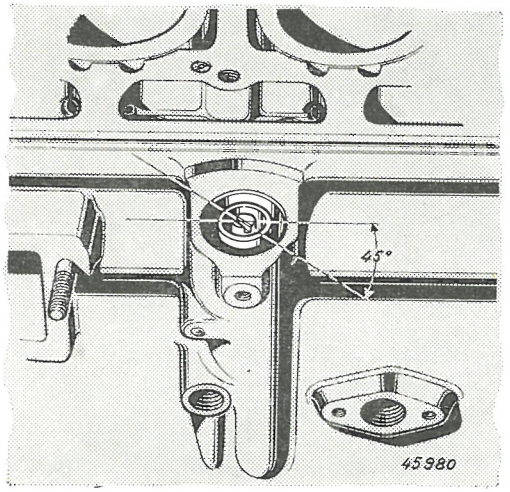
Assemble 2 new gears.

Assemble the screen body and combination cover.

Hammer down bolt retainers, and mesh drive rod teeth with drive gear teeth.







LUBRICATION

(Continued)

REFITTING.

Assemble oil pump on cylinder block, taking care to **properly direct the drive shaft.**

To this end :

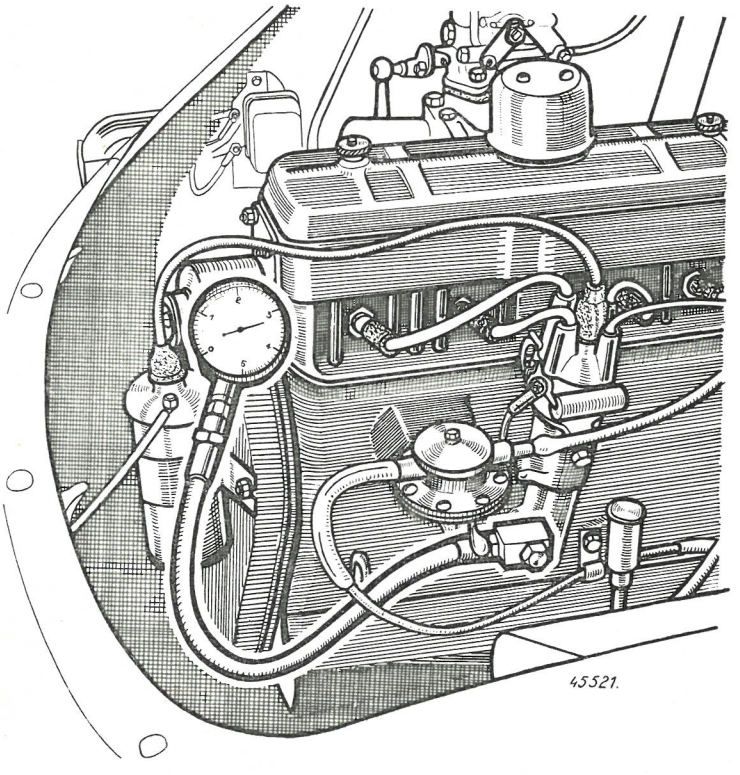
— Remove distributor.

— Bring n° 1 piston (at clutch end) to top dead center, at "compression" (the valves of cylinder n° 4 are in equilibrium and the marking on the pulley is opposite to pointer on timing gear cover).

— Position the oil pump provided with a new paper gasket and direct the slot of the drive shaft at 45° with the lengthwise centerline of the engine (largest offset towards engine side and towards clutch).

— Attach the pump by progressively tightening the bolts and lock same.

— Reassemble the oil sump and the distributor.



CHECKING THE OIL PRESSURE.

In lieu of the oil pressure switch, fit a pressure gauge graduated up to 5 kg (71 lbs/sq.in.). Ref. Mot 73.

Run engine :

1° At idling speed (600 RPM).

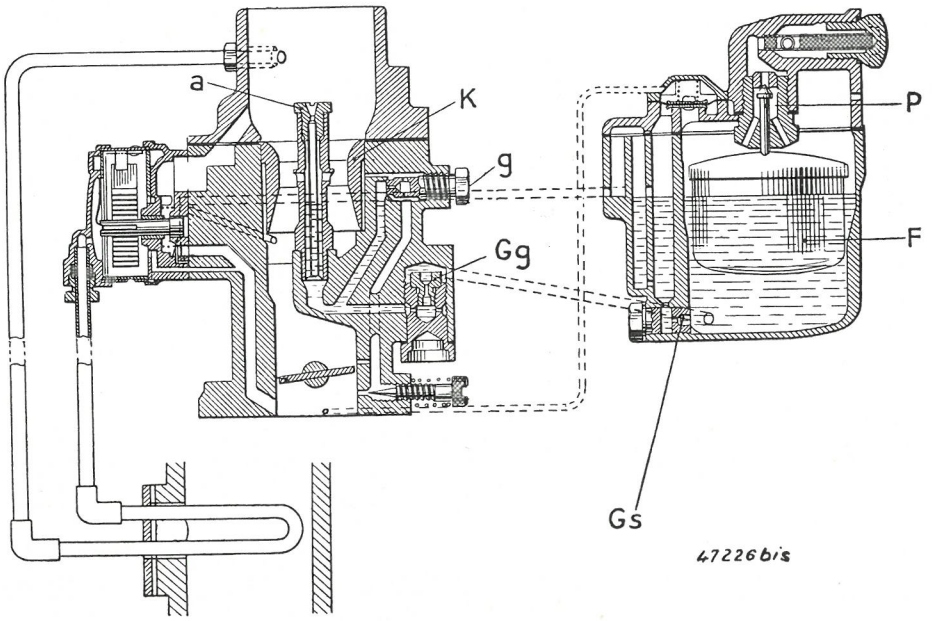
2° At 4,500 RPM.

Check nominal pressures :

1° 2 kg/cm² (28.4 psi).

2° 3 kg/cm² (42.6 psi).

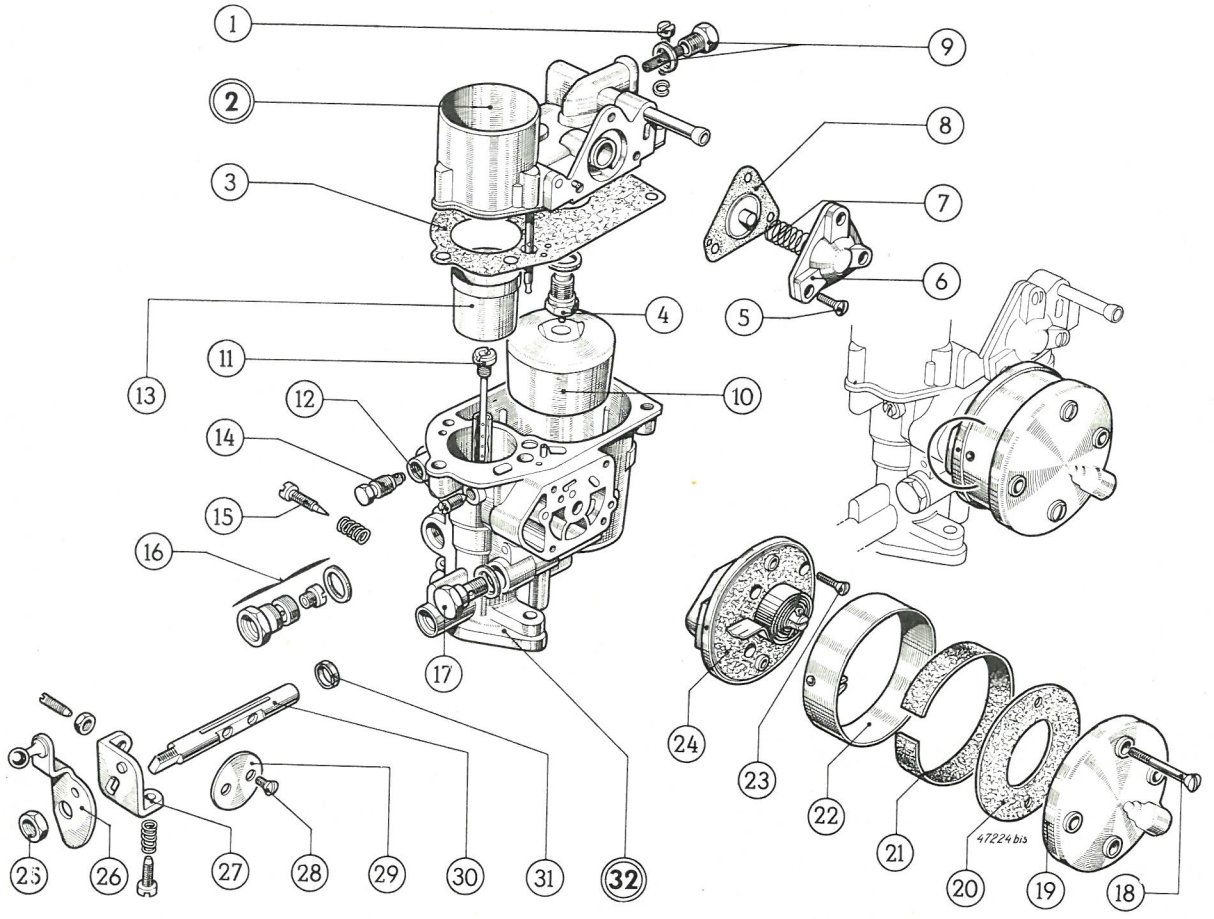
FUEL SYSTEM



REFERENCE of plate	DESCRIPTION (Solex 182 equipment)	SOLEX 22 ICBT CARBURETTER SPECIFICATIONS			
		Reference 245	Reference 245/1	Reference 245/2	Reference 245/3
	Type of vehicle	R. 1 062 and R. 1 062 U.S.A.	R. 1 062 Tropiques	R. 1 062 High altitude	R. 1 062 Tropiques High altitudes
	Normal operation :				
Gg	Main jet	100	95	100	95
	Air correction jet	165 K	160 K	165 K	160 K
	Slow running :				
g	Slow running jet	40	40	40	40
	Choke :				
Gs	Choke fuel jet	95	95	95	95
K	Spray chamber	18	18	18	18
P	Needle valve	1.5	1.5	1.5	1.5
F	Float	12.5 gr (.43 oz)	12.5 gr (.43 oz)	12.5 gr (.43 oz)	12.5 gr (.43 oz)
	Altitude corrector	none	none	with	with

FUEL SYSTEM

(Continued)



DISMANTLING AND REASSEMBLING THE SOLEX 22 ICBT CARBURETTER.

Dismantling.

The numerical order of the reference numbers shown on the illustration corresponds to the dismantling sequence of the parts. Follow this order.

NOTE. — The components of assembly **(24)** should under no circumstances be separated.

Reassembling.

Reassemble the parts in reverse sequence of numbers on the illustration, noting the characteristics concerning the following parts :

(29) Check throttle plate for correct assembly, making sure the lips fit on the inside contours of the body when at the fully closed position.

(22) Insert end of thermostatic spring into slot of casing **(22)**.

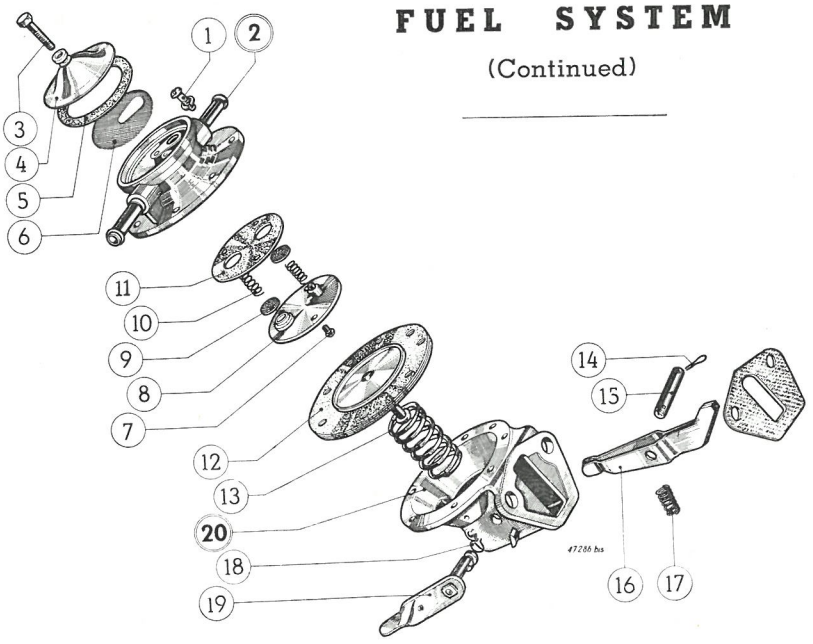
(18) Before tightening screws **(18)**, align the marking on the casing **(22)** with the punchmark on the assembly body **(24)**. This position is determined by the manufacturer and corresponds to proper operation of automatic choke ; therefore, strictly adhere to this specification.

(15) Fully tighten the assembly **(15)** and next back off by 3 turns (approximate position of adjustment of idle mixture screw).

(13) Assemble spray chamber with markings and figures upwards.

FUEL SYSTEM

(Continued)



DISMANTLING THE FUEL PUMP.

Before attempting to dismantle, mark position of part (2) with reference to part (20).

The numerical order of reference numbers on illustration corresponds to dismantling sequence. Follow this order.

NOTE. — Lift end of rocker arm **(16)**, push in assembly **(12)** and clear by a rocking motion in the axis of arm **(16)**.

REASSEMBLING THE FUEL PUMP.

Reassemble the parts in a sequence reverse to numerical sequence, while noting the following characteristics of the specific parts :

(12) Insert control rod in the fork end of rocker arm **(16)** by rocking the assembly **(12)**.

(9) Smooth face towards seat.

(7) Lock with punch.

(2) Align marking with the one on the body **(20)**.

(1) Tighten progressively, lightly and in criss-cross sequence.

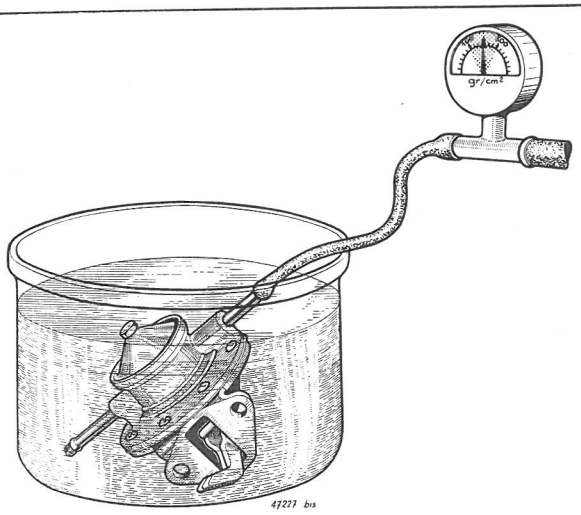
CHECKING THE FUEL PUMP.

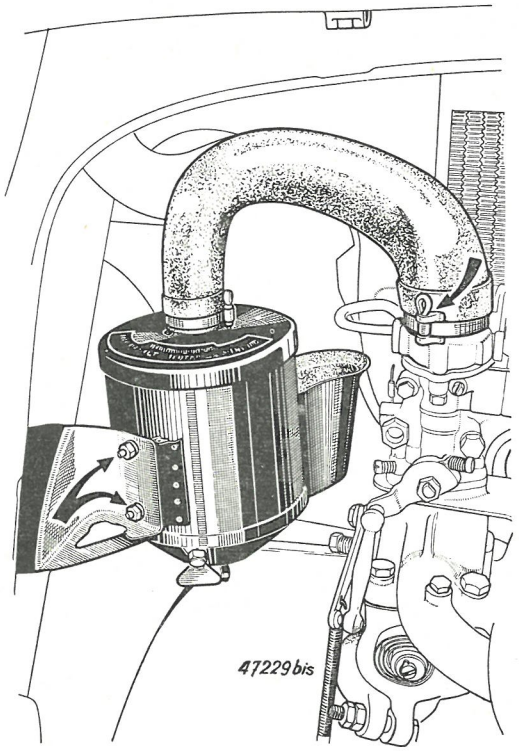
Refer to accompanying illustration for set up.
Use clean petrol.

Plug up delivery end and allow air to enter at a pressure from 100 to 300 gr/cm² (1.42 to 4.26 psi) at inlet end.

If air bubbles appear at rocker arm location, this will indicate that the diaphragm does not make a perfect seal. Replace.

If bubbles appear at cover assembly face, the gaskets are defective or diaphragm laminations are not sufficiently tight. Correct this condition.





FUEL SYSTEM

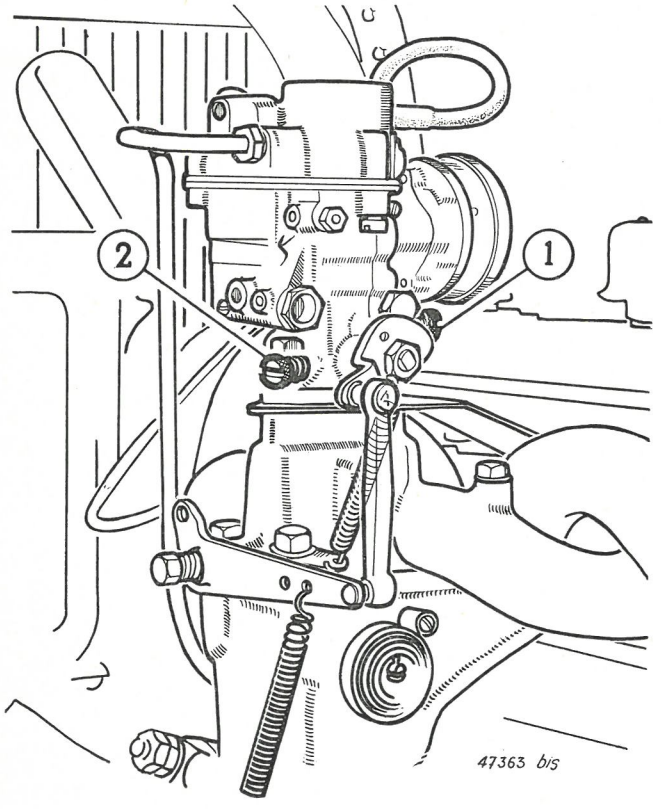
(Continued)

OIL BATH AIR FILTER.

Every 10,000 km (6,000 miles), remove filter element and carefully clean in petrol.

Every 20,000 km (12,000 miles), remove filter, drain the oil, carefully clean filter and element and fill with fresh oil.

For removing the filter, disconnect at locations marked with arrows.



ADJUSTING SLOW RUNNING SPEED.

NOTE. — Before adjusting the slow running speed, it is essential to check the condition of the spark plugs and to adjust carefully the electrode gap.

Operate on a hot engine.

Tighten the slow running air screw (**2**) fully up and, next, run off by 3 turns.

Run engine.

Lightly tighten the slow running stop screw (**1**) to make engine run faster.

Lightly run off the slow running air screw (**2**) until engine " races " and next tighten progressively until it runs smoothly.

Very slowly run up the stop screw (**1**) to bring engine speed to approx. 600 RPM.

If engine " races " again, lightly tighten the air screw (**2**).

Make sure :

— **that, without accelerating, the engine starts,**
— **that, after sudden acceleration, the engine does not stall.**

If not, again lightly tighten the stop screw (**1**).

FUEL SYSTEM

(Continued)

INLET AND EXHAUST MANIFOLDS :

Torque requirements of attaching nuts :

— At center ..... 2 m.kg (14.46 ft/lbs)
— At ends ..... 1.5 m.kg (10.8 ft/lbs)

Reassembling a new heating flap :

Install a new flap (the plate with the two holes for the mounting at side opposite to tubes) and insert a new pin (with slotted end towards spring locking stud).

Check for free operation.

Position flap plane perpendicularily to pin slot.

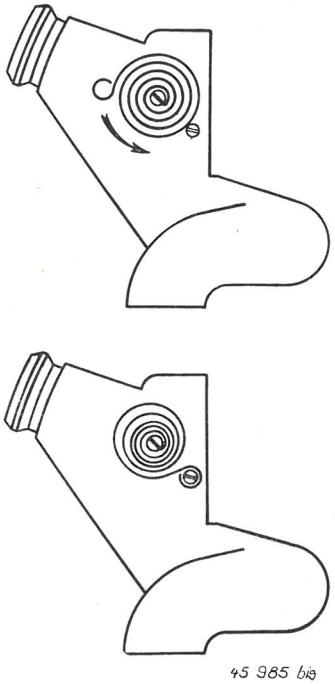
At this position, lock the flap on its pin by two arc welding spots in the holes provided for this end in the flap.

Insert thermostatic spring in the flap pin slot and insert cotter pin.

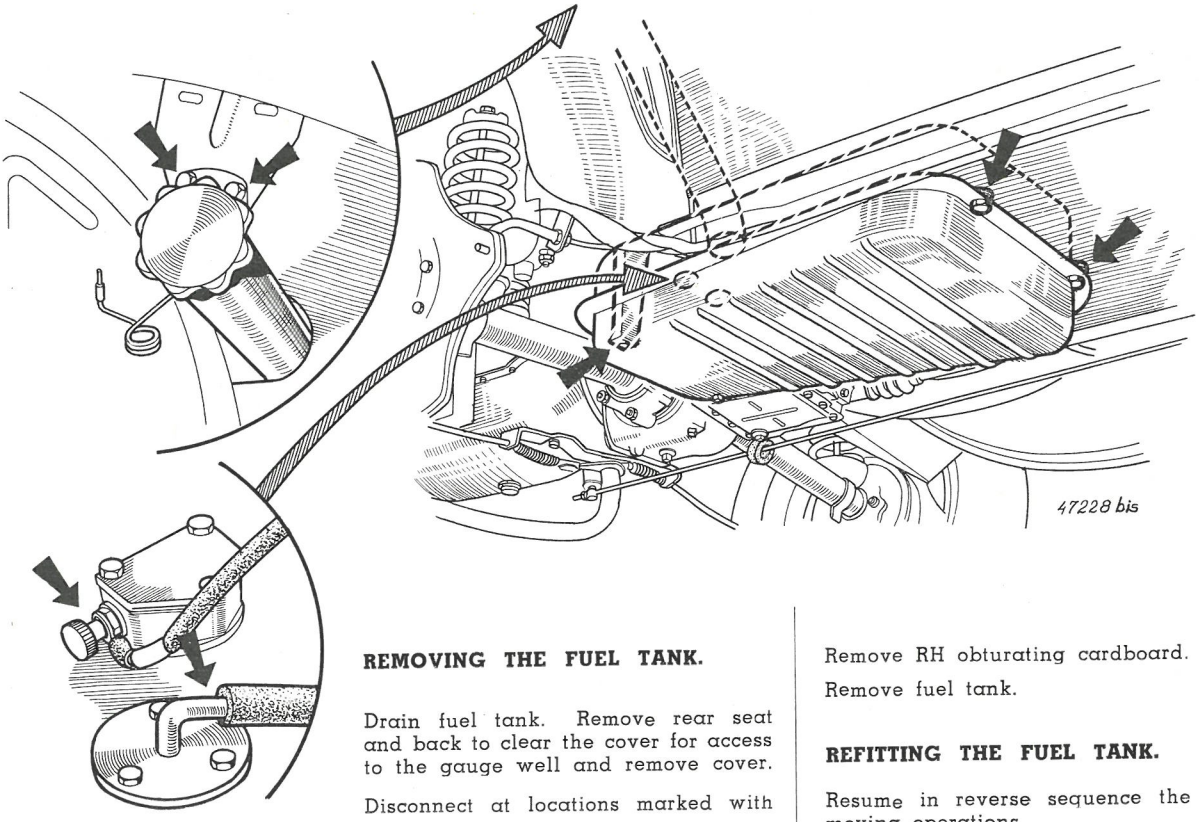
Hook on the eye of the spring into the locking stud.

Through the action of the thermostatic spring, the flap should remain open.

Reassemble the manifolds.



45 985 bis



47228 bis

REMOVING THE FUEL TANK.

Drain fuel tank. Remove rear seat and back to clear the cover for access to the gauge well and remove cover.

Disconnect at locations marked with arrows.

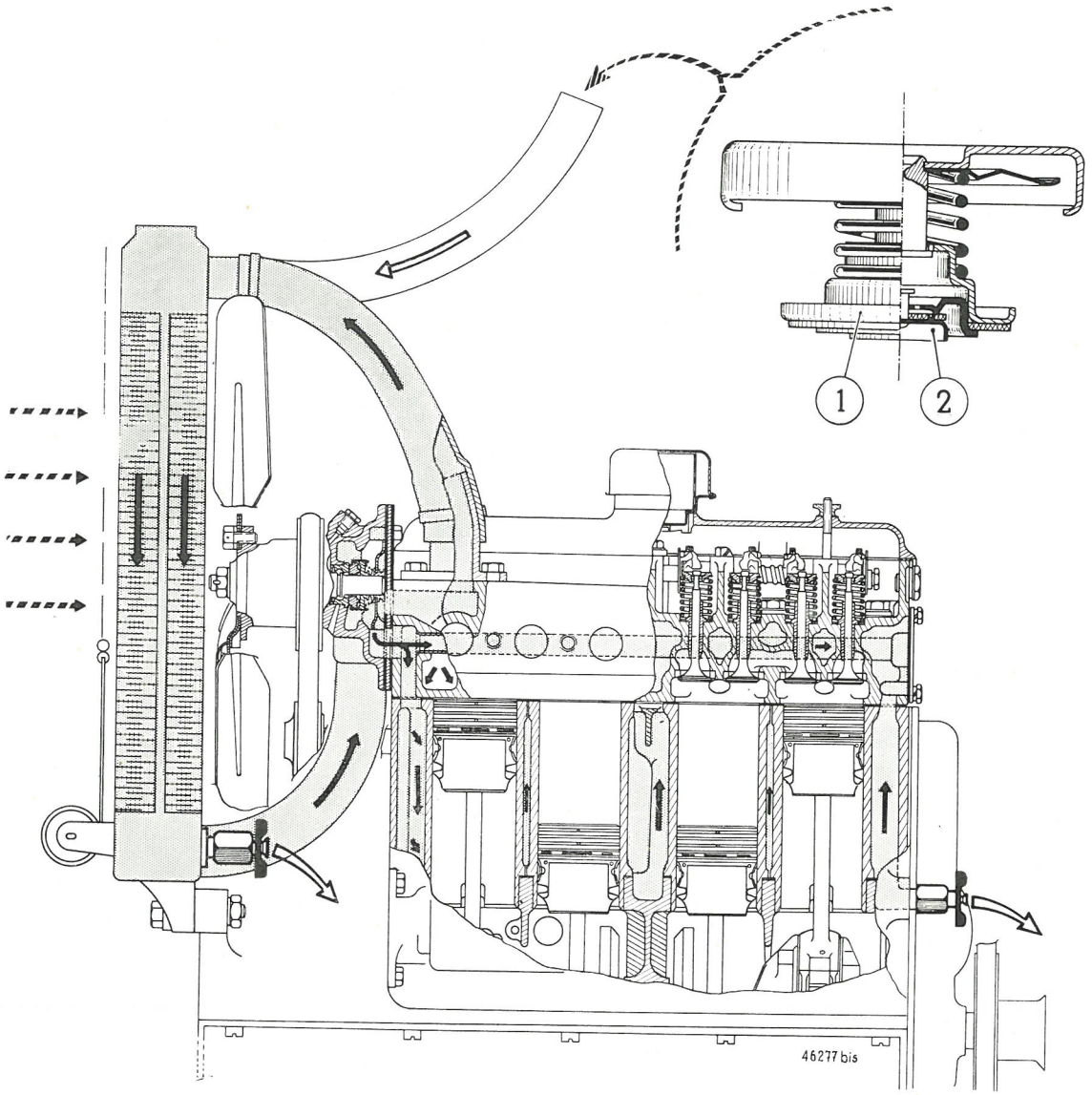
Remove RH obturating cardboard.

Remove fuel tank.

REFITTING THE FUEL TANK.

Resume in reverse sequence the removing operations.

COOLING SYSTEM



SPECIFICATIONS.

The cooling is through radiator and recirculated water acceleration pump.

The system is under a maximum pressure of 280 g/cm² (4 lbs per sq. inch).

Cooling system capacity : 4.6 litres (1.012 imp. gal.).

Normal operating temperature : 80 to 85°C (176 to 185° F) controlled by a blind in front of the radiator.

The purpose of the filler cap (of the 2 valve type) is to bring the water boiling point to 103° C (217.4° F) for a normal atmospheric pressure as measured at sea level. This avoids loss of water caused by evaporation while maintaining the engine at its optimum operating temperature.

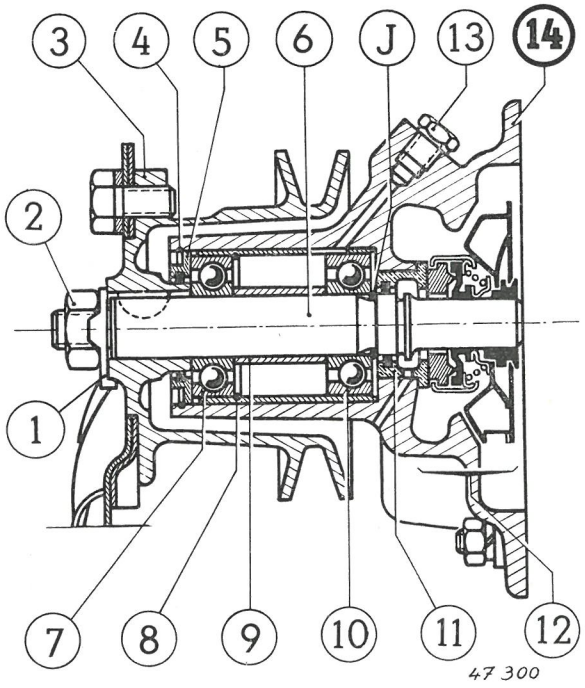
The valve (1) opens when pressure reaches 280 gr/cm² $\begin{matrix}+\ 20\\ -\ 50\end{matrix}$ (4 lbs/sq. in. $\begin{matrix}+\ .28\\ -\ .7\end{matrix}$) **allowing excess water to flow out** through the overflow pipe.

The second valve (2) opens under a minimum vacuum of 70 g/cm² (1 lb per sq. in.) (created by the water contraction during the cooling). **The valve thus allows outside air to enter.**

NOTE. — When engine is hot, it is recommended to loosen the filler cap slowly to allow for the steam inside the cooling system to escape evenly, thereby preventing any risks from burns due to steam projections.

COOLING SYSTEM

(Continued)



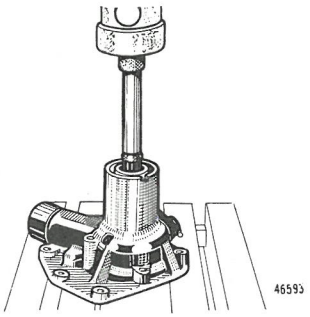
DISMANTLING AND REASSEMBLING THE WATER PUMP.

Dismantling.

The numerical sequence of the references on the above illustration corresponds to the disassembly sequence for the parts. This order should be followed while noting the characteristics for the following parts :

(**6**) Never separate part 6 from assembly 12 which includes friction washer, rubber washer, seal retainer, thrust spring and impeller.

Use the water pump shaft puller Ref. 01.



Reassembling.

Reassembling the parts by reversing numerical sequence of parts on illustration while noting the characteristics for the following parts :

(**11**) **Align the 2 oil loss holes.** Upon each disassembling of this part, perform a dressing operation with tool ref. 03.

(**6**) Do not push in the shaft completely ; its permanent position is obtained with nut (**2**).

(**2**) Torque requirement to be under 2 m.kg (14.46 ft/lbs) in order to avoid snap ring **J** from getting off its groove.

Fill pump body with grease through plug (**13**) temporarily fitted with a grease lubricator.

COOLING SYSTEM

(Continued)

OVERHAULING THE WATER PUMP.

Leaks at the water pump may stem from two reasons : poor condition of the friction washer or of the bronze bush assembled into the pump body.

REPLACING THE FRICTION WASHER.

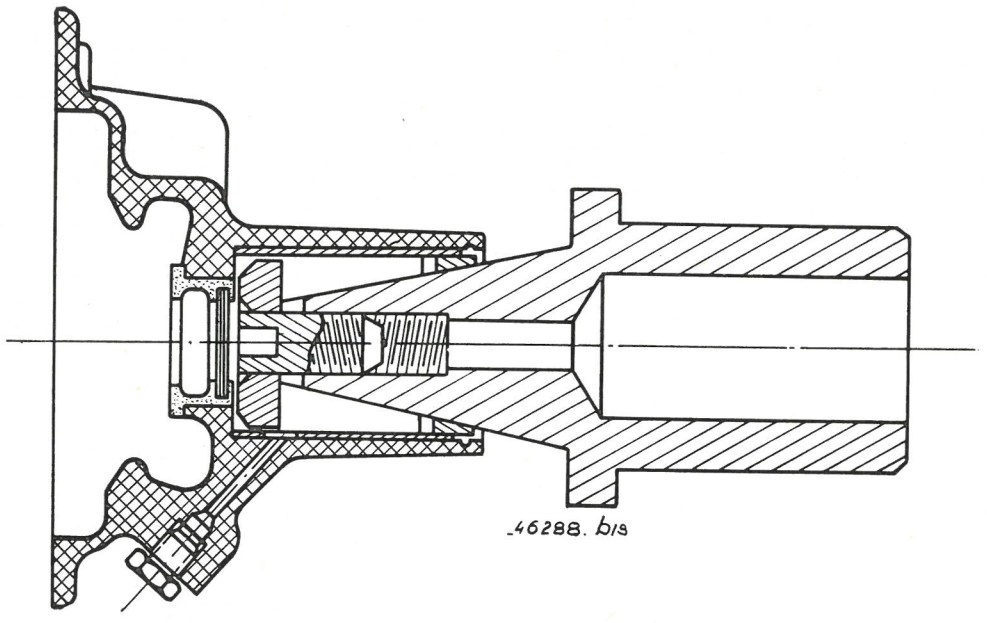
Replace the assembly including " shaft - friction washer - rubber gasket - seal retainer - thrust spring - impeller ".

NOTE. — This assembly is not to be separated.

REPLACING THE BRONZE BUSH.

Drive out the bronze bush.
Fit a new bush and align the drain hole of the bush with the one on the pump body.
On a lathe equipped with a soft jaw chuck, install the tool ref. 03 and next fit the pump body on the tool.
Light cut the assembly face of the bronze bush and round off sharp edges.

NOTE. — It is essential that the expansion tool ref. 03 be fabricated very carefully.



COOLING SYSTEM

(Continued)

REMOVING AND REFITTING THE RADIATOR BLIND.

Removing.

Remove radiator.

Disconnect blind cable (at blind end).

Remove blind by pushing in the telescopic rod.

Refitting.

Insert blind telescopic rod into its location.

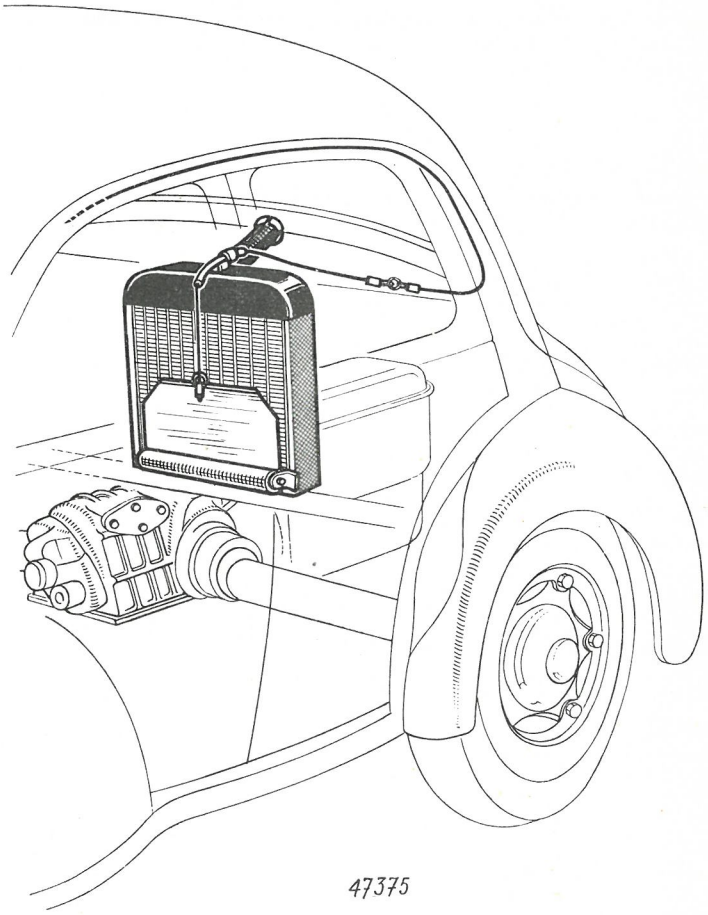
Rotate the blind by 6 turns in the unwinding direction in order to load the retracting spring.

Insert the second rod of the blind and maintain the blind.

Hook the blind cable (at blind side).

Free the blind.

Reinstall the radiator.

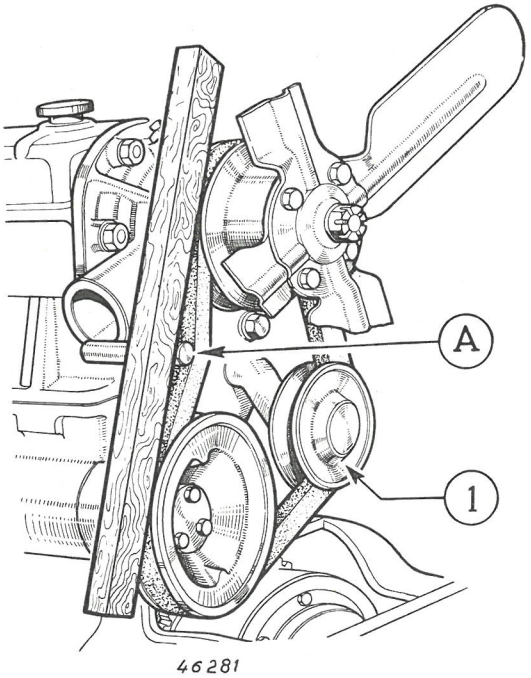


47375

ADJUSTING TENSION OF FAN BELT.

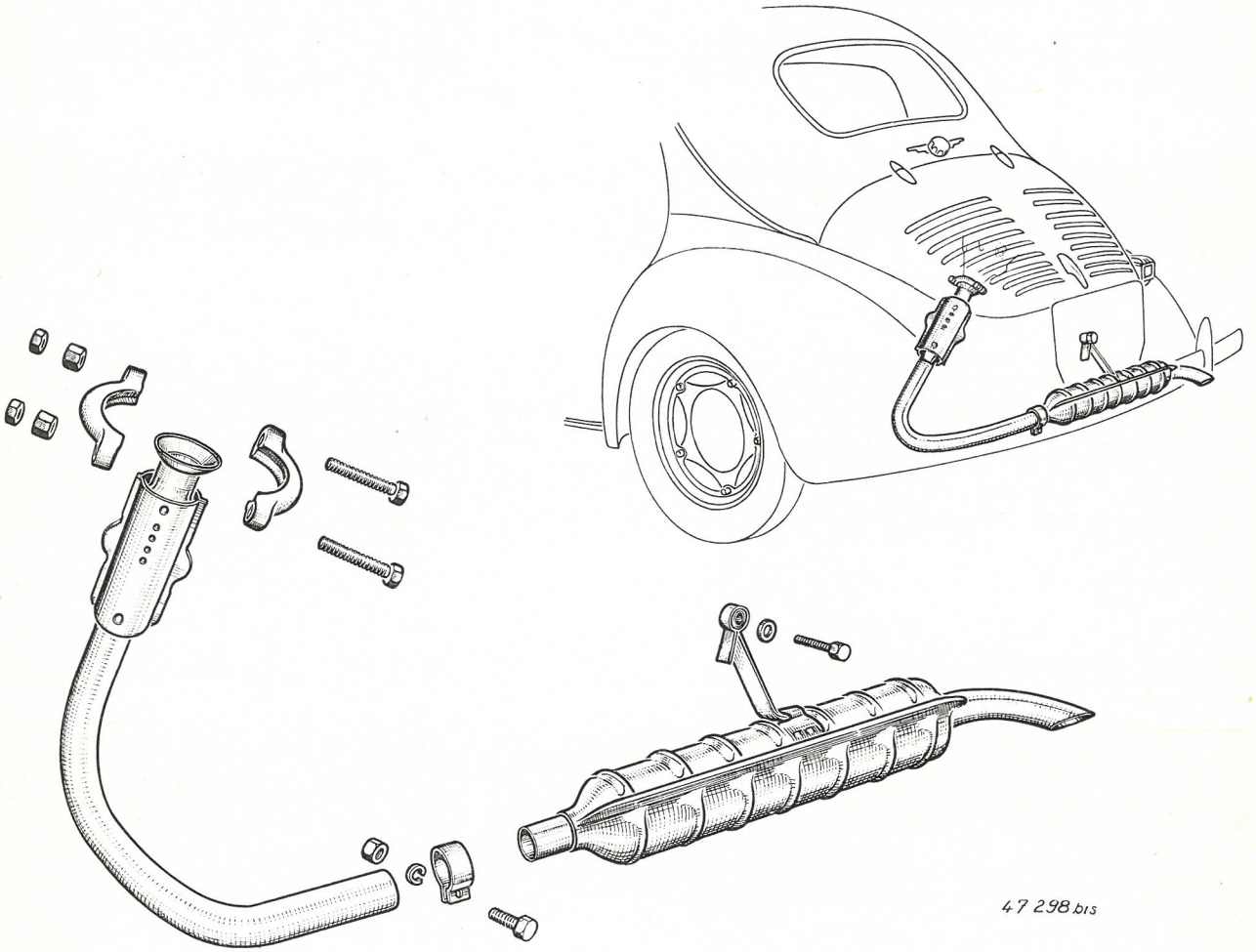
Deflection to be : **A** = 10 mm (.39 in.).

Tightening torque for fan pulley **(1)** : 2 m.kg (14.46 ft/lbs).



46281

EXHAUST SYSTEM



3. CLUTCH

	PAGES
Specifications	38
Special tools	140-1
Operation	38
Identification	39
Removing clutch mechanism and disc	39
Refitting clutch mechanism and disc	39
Checking clutch adjustment	40
Overhauling the flywheel	40
Replacing the clutch thrust bearing	41
Replacing the control	41
Adjusting the pedal free play	41
Replacing the cable	41
Removing and refitting the pedal	42-1
Ferlec clutch	42-1

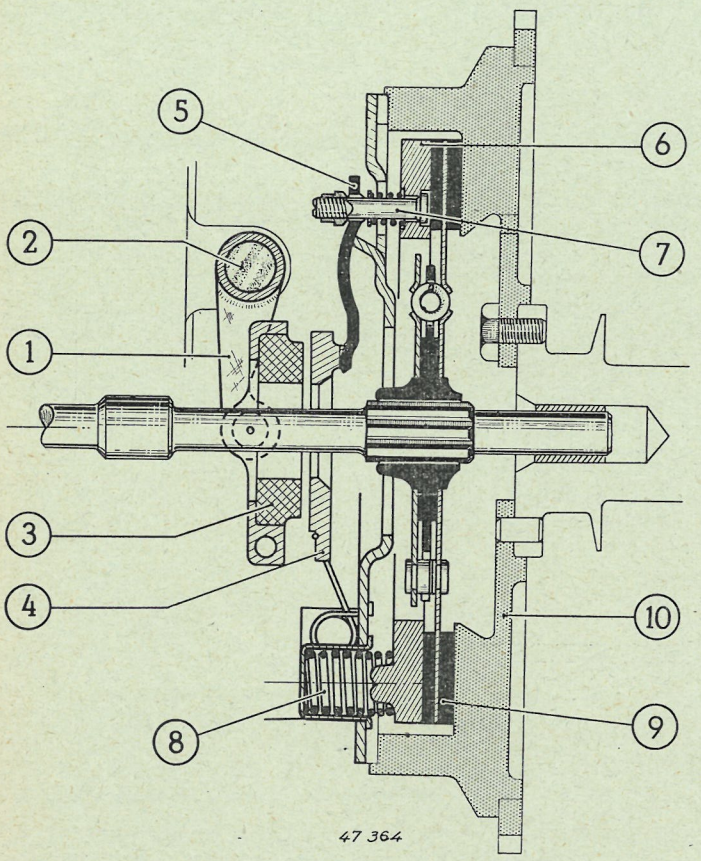
SPECIFICATIONS

Single disc, dry type clutch. Type PKH 4 (or 4.5). " FERODO " clutch disc with elastic hub.

Disc lining thickness : 7.4 mm $^{+\ .4}_{+\ .1}$ (.2914 $^{+\ .0157}_{+\ .0039}$ inches).

Clutch plate features 6 calibrated springs (3 black and 3 pink ones for PKH 4 type).
(6 black springs for PKH 4.5 type).

Pedal free play : 20 mm (.78 in.) (at pedal).



CLUTCH OPERATION

The pedal motion is transmitted through a cable to the clutch release lever connected to the fork (**1**) by means of pin (**2**).

The clutch release fork (**1**) pivots and moves the clutch thrust bearing (**3**) forward. The latter contacts the clutch release bush (**4**) (making up for the pedal free play) and, next, applies pressure on the bush. The bush (**4**), in turn, moves forward and tilts the 3 clutch release fingers (**5**). The latter being built integral with plate (**6**) through bolts (**7**) moves back the plate as the pressure springs (**8**) are compressed.

At this stage, the clutch disc (**9**) is no longer locked in-between flywheel (**10**) and plate (**6**) ; thereby, the gearbox and the engine are no longer connected.

IDENTIFICATION

The PKH 4 marking is punched on the front face of the clutch cover.

REMOVING THE CLUTCH MECHANISM AND DISC

Remove engine and separate from gearbox (see under " Engine ").

NOTE. — The clutch mechanism is dynamically balanced, as an assembly, with the flywheel and the crankshaft. Balancing is achieved by inserting flat washers (washers of different thickness are available) under the lockwashers of some bolts attaching clutch mechanism to flywheel.

Before removing the mechanism, mark the following :

— Position of mechanism versus the flywheel.

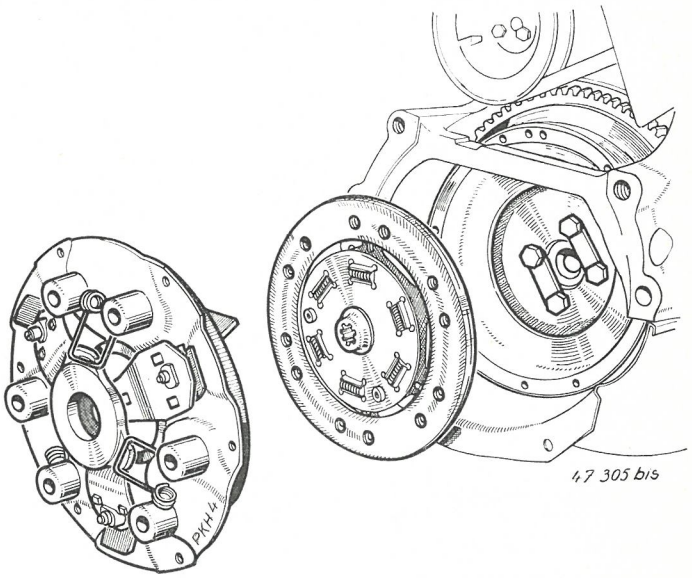
— Location of balancing washers.

Remove bolts attaching clutch mechanism to flywheel.

Remove mechanism and disc.

Check flywheel and recondition if required (see page 40).

NOTE. — Should one of the sections " mechanism " or " disc " be defective, replace same, either through the standard exchange plan or for a new part.



REFITTING THE CLUTCH MECHANISM AND DISC

Check the lining face towards the clutch flywheel, for perfect cleanliness (the face should under no circumstances be smeared with grease).

Position the clutch disc in the flywheel, with hub offset end towards the gearbox.

Position the mechanism, paying attention to the markings made during the disassembly ; hold in place by 2 screws.

Center the clutch disc, using the centering tool (Emb. 02).

Install bolts (bolts of identical length), lockwashers and flat balancing washers at their respective location.

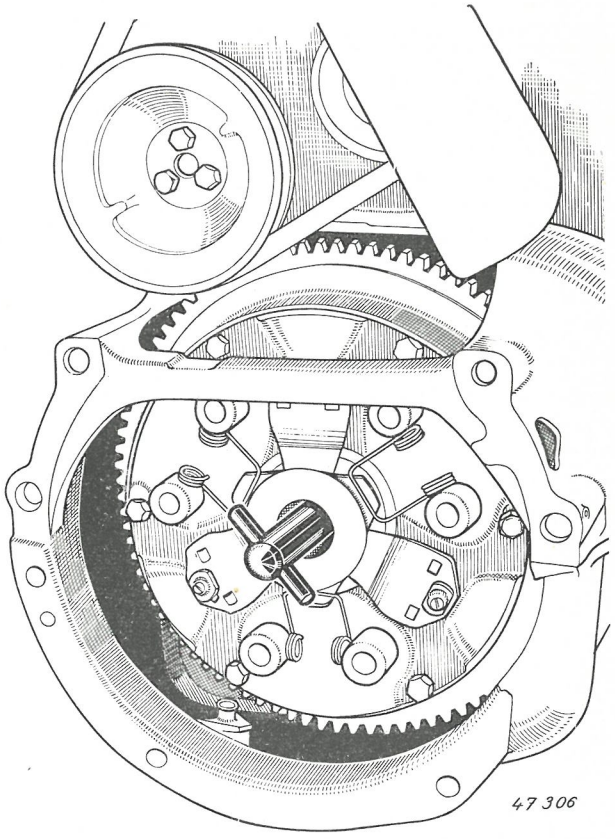
NOTE. — When replacing the mechanism, do not assemble the balancing washers.

Progressively run up and tighten.

NOTE. — When a new clutch mechanism is assembled, remove the shims under the fingers. These shims are merely used to facilitate the assembling procedure.

Check mechanism for proper adjustment (see page 40).

Connect gearbox to engine, and refit the assembly (see under " Engine ").



CHECKING THE CLUTCH ADJUSTMENT

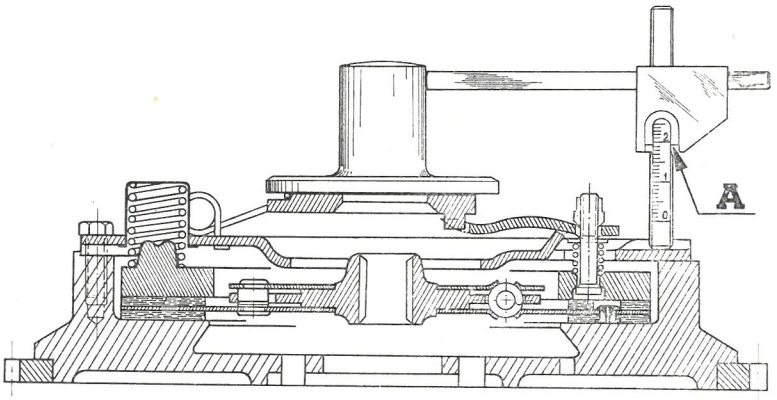
Checking the clutch for correct adjustment may be performed only when the mechanism is assembled on the flywheel with a **new lining being used.**

Position the checking rule (Emb. 12) on the clutch release bush and measure distance (**A**) from top of bush to top of cover.

This measurement should be made at 3 different points (located approx. 120° apart).

The recorded measurements should equal 17.5 mm ± .5 (.68 in. ± .019). If different, the adjustment is not correct and may stem from a distorted finger, from the plate or from a warped cover.

Replacement is in order either through standard exchange plan or for a new mechanism.



47307

OVERHAULING THE FLYWHEEL

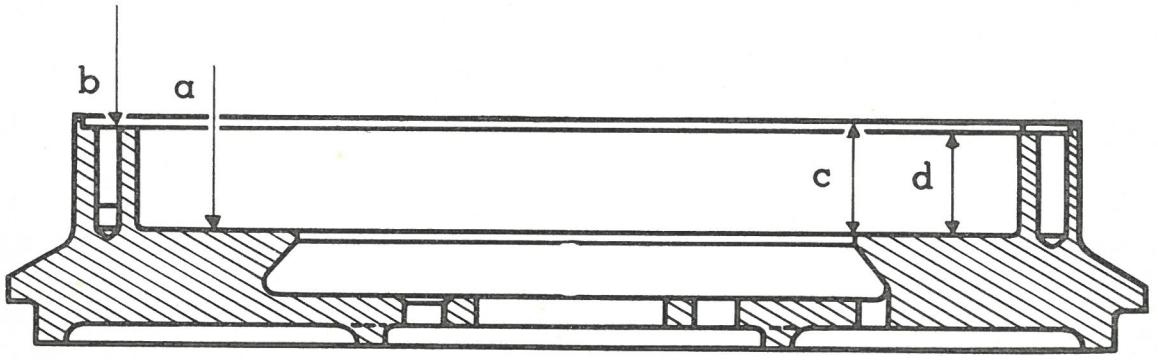
Should the friction face of the flywheel be damaged (scores, overheating marks, etc.), it should be turned on a lathe or, better, on a grinding machine.

Remove flywheel.

Identical amounts of stock should be removed by turning on faces (a) and (b) to maintain dimension (**d**) = 19.5 mm $^{+\ 0}_{-\ .2}$ (.76 in. $^{+\ 0\ }_{-\ .007}$).

To obtain a very good surface finish on face (**a**), it is essential that the flywheel be very accurately aligned on the fixture.

Under no circumstances should dimension (c) be over 22 mm $^{+\ 0}_{-\ .2}$ (.85 in. $^{+\ 0\ }_{-\ .007}$) or the flywheel should be replaced.

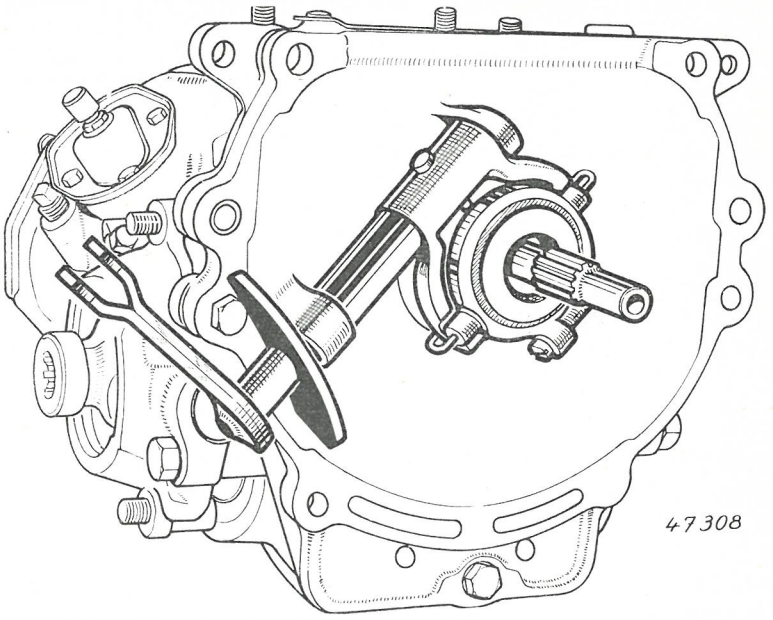


46340

REPLACING THE CLUTCH THRUST BEARING

Position the " cage and bearing " assembly on the clutch fork with clamping screw at end opposite to fork.

Hook on the 2 holding springs with the straight ends of springs being located in the center holes of the cage trunnions, and the springs hooked ends being inserted in the fork holes.



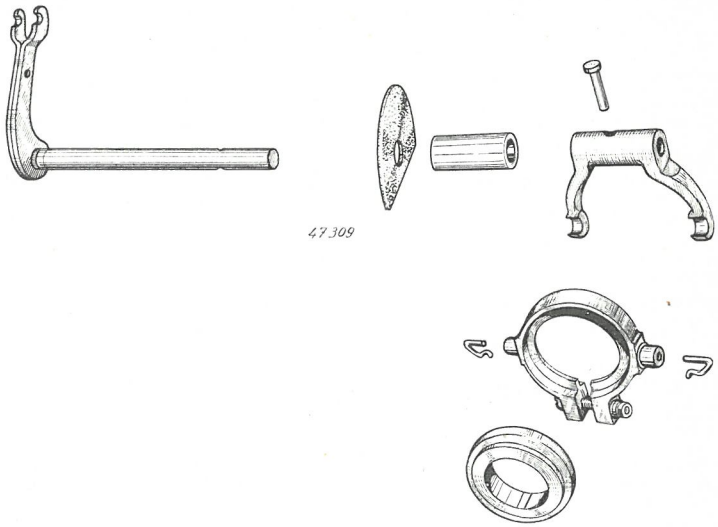
REPLACING THE CONTROL ON GEARBOX COVER

On shaft, assemble the rubber washer.

Insert shaft on first bearing, next position spacer and fork (with the groove where the thrust bearing is fitted being turned towards the end opposite to the gearbox).

Secure fork to shaft (cotter pin head turned upwards).

Reassemble the clutch thrust bearing.

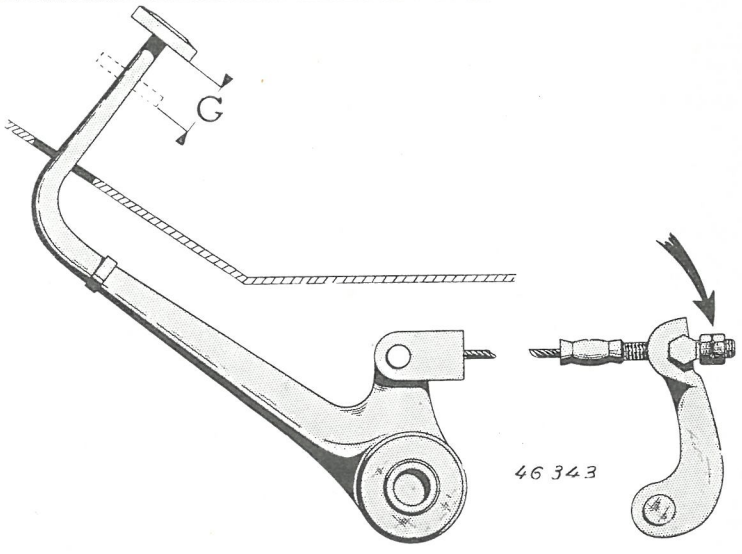


ADJUSTING THE PEDAL FREE PLAY

Loosen the check nut at end of cable (close to lever) and run up or off the nut until a pedal free play of (**G**) = 20 mm (.78 in.) is obtained.

REPLACING THE CABLE

Position the new " cable and sheath " assembly, insert the 2 ends of the sheath on the 2 stops and secure to bracket.
Attach cable to pedal.
Insert the staple on end of cable, connect it to the lever and hook on the retracting spring.
Adjust the pedal free play.
Reassemble the protecting housing underneath the car.



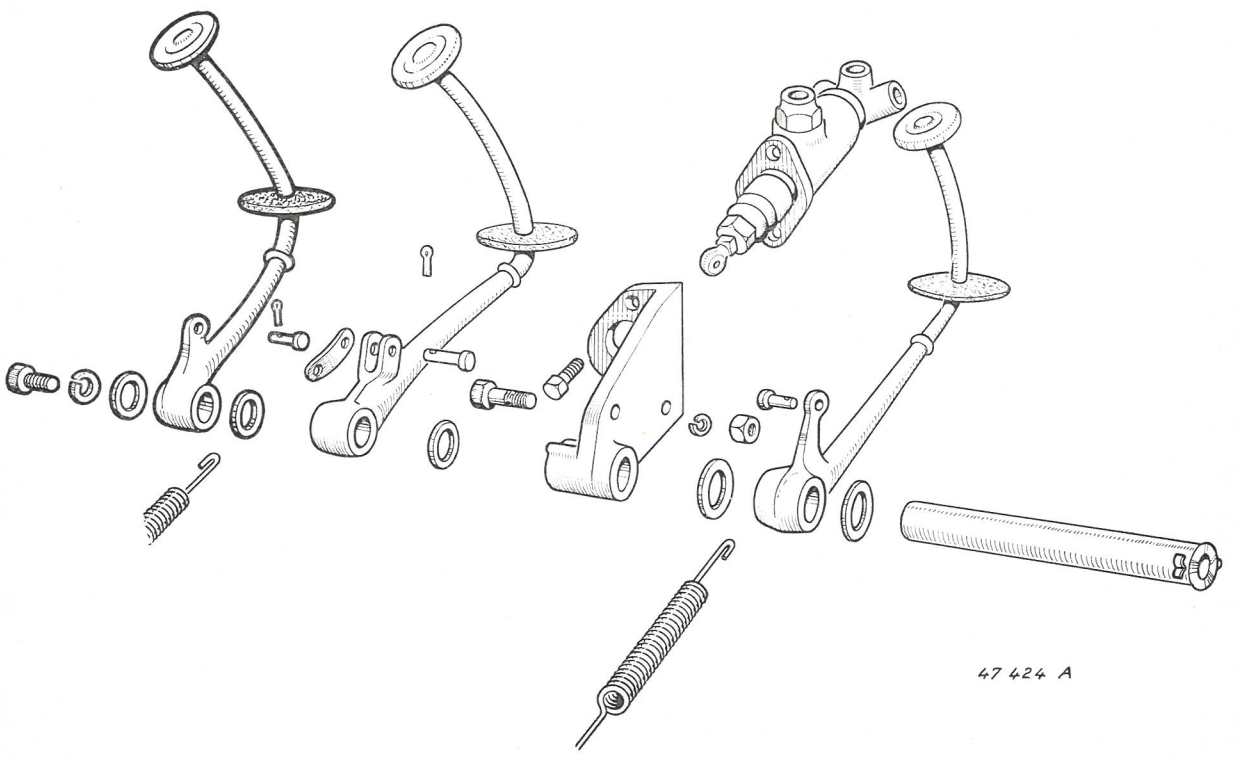
REMOVING AND REFITTING THE PEDAL

REMOVING.

To remove the clutch pedal, it is necessary to remove the pedal linkage.
Disconnect battery.
Plug up the brake fluid outlet to reservoir.
Clear the floor mat.
Unhook the clutch release and accelerator cables retracting springs and the brake pedal retracting spring.
Disconnect :
— Fluid inlet to master cylinder.
— Stop switch wires. Next, remove switch to clear the fluid outlet lines.
Remove bolt attaching pedal linkage shaft to the supporting side-member and back off shaft to clear.
Remove the 2 bolts attaching the pedal linkage support to the side-member.
Clear the sealing washers on floor and remove pedal linkage.
Remove shaft and separate the parts.

REFITTING.

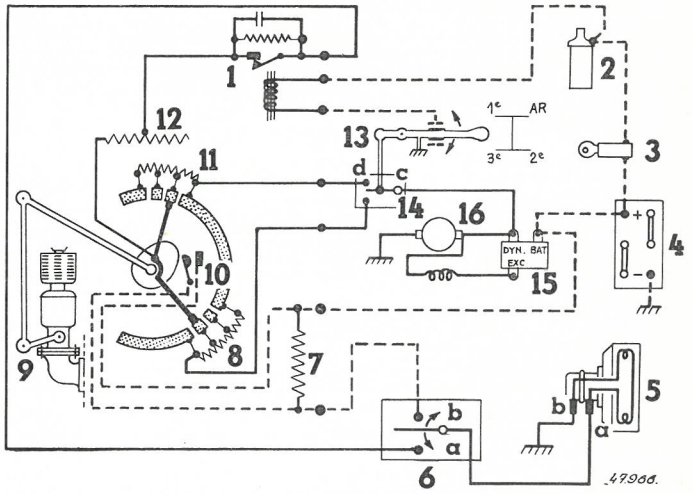
Position pedals and washers on shaft.
Position pedal linkage, install bolts attaching pedal linkage support and the shaft securing bolt.
Place sealing washers on floor.
Secure fluid outlet lines to master-cylinder with the stop switch and connect the 2 wires on the switch.
Connect inlet lines to master-cylinder.
Hook on :
— The brake pedal retracting spring.
— The clutch and accelerator cables and attach the retracting springs.
Remove plug from fluid outlet pipe to reservoir and bleed the brakes.
Adjust free play of clutch and brake pedals.
Install mat on floor.
Connect battery.



FERLEC CLUTCH

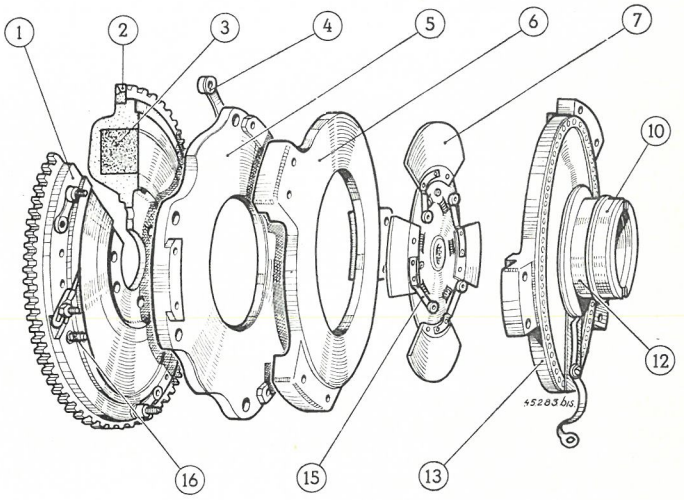
LIST OF COMPONENTS

1. Clutch release relay.
2. Ignition coil.
3. Ignition key.
4. Battery.
5. Clutch.
6. Polarity switch (generator-battery).
7. Parking resistance.
8. Low-reverse rheostat.
9. Linkage of " Ferlec " case.
10. Short circuit switch (**7**).
11. Intermediate-high resistance.
12. Adjusting resistance.
13. Gearshift lever.
14. Underload-reversing switch.
15. Voltage regulator.
16. Generator.



CLUTCH COMPONENTS

1. Magnet head and combination flywheel.
2. Starter ring gear.
3. Solenoid.
4. Driving lugs.
5. Armature.
6. Intermediate plate.
7. Driven plate.
10. Current outlet ring.
12. Current supply ring.
13. Pressure plate.
15. Friction lugs.
16. Armature retracting spring.

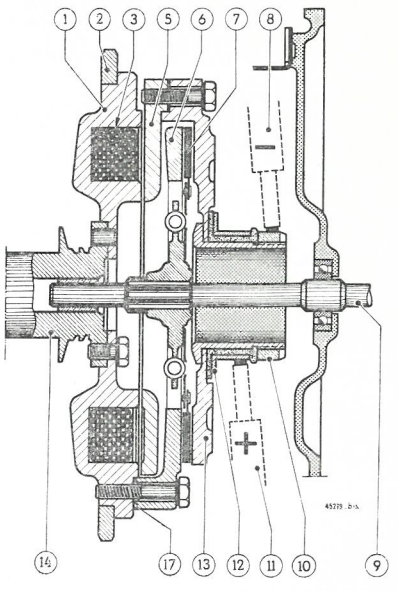


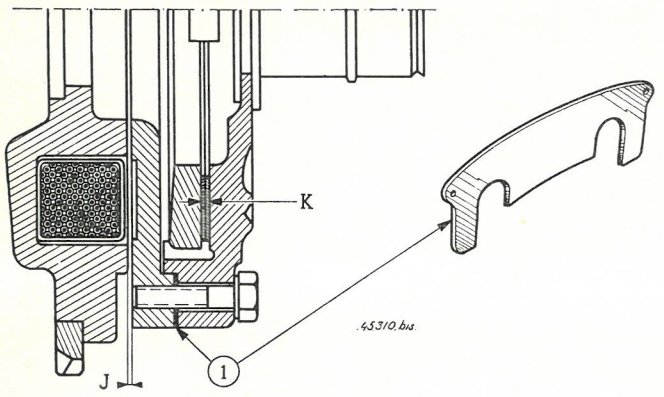
OPERATION

The " head (**1**) and intermediate plate " assembly and the " armature (**5**) and pressure plate (**13**) " assembly are mechanically connected by lugs (**4**). Due to this connection, the rotation of the former assembly results in that of the latter.

Clutch release is achieved by springs (**16**) with no current flow. When coil (**3**) is energized, the armature (**5**) is forced towards the head and the pressure plate (**13**) forces driven plate against intermediate plate (**6**). The clutch is applied.

The lugs (**15**) are for drive play compensation.





ADJUSTING THE CLUTCH AIR GAP

See diagram 1, page 42-1

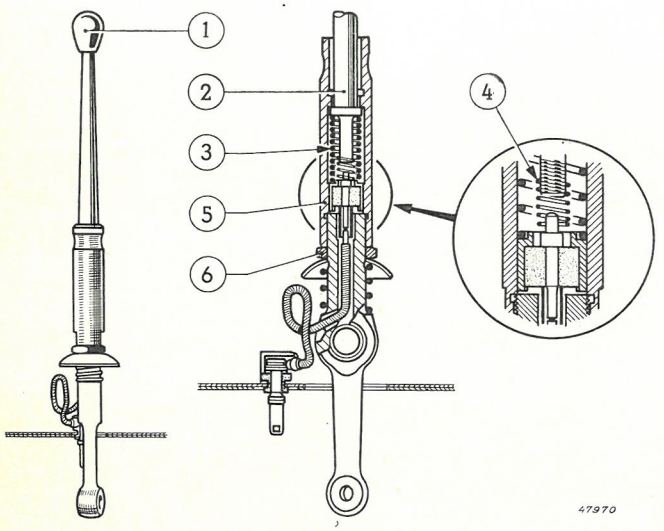
Connect a jumping wire between the wire clip coming form the rheostat brushes (" Ferlec " case) and the " Battery " terminal of voltage regulator (**15**).

Place the polarity switch (**6**) at the generator position (**a**). The clutch is energized.

See diagram opposite.

At three 120° apart locations, an identical clearance (**J**) should be found between head and armature ranging from .20 to .41 mm (.0079 to .0161 ").

If clearance is smaller, remove the 3 adjusting shims (**1**) between armature and pressure plate. Correct adjusting resistance by bringing it to its proper value.



FERLEC GEARSHIFT LEVER

Function and operation.

The lever is used for shifting gears and energizing the case relay, and thereby clutch release, when moved forward or rearward.

Adjustment.

The socket (**5**) is ovalised at its upper end.

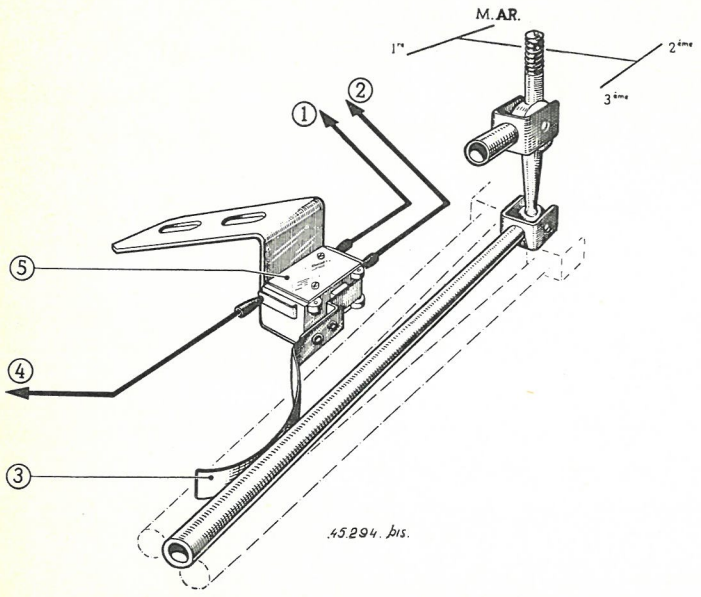
The largest displacement of lever (**2**) should be from front to aft and conversely.

After dismantling, run up socket home and screw it off until the above operation of lever is obtained.

Then tighten locknut (**6**).

Overhauling.

This involves merely the replacement of the silver coated contact spring (**4**).



" SERMEC " UNDERLOAD REVERSING SWITCH

Function and operation.

The underload-reversing switch is a 2 position switch for current supply from the generator to the clutch through the low-reverse or intermediate-high rheostat, according to the position of the operating gearshift control link.

Adjustment.

Position bracket in order that for each gear shifted into, the contact remains whatever the movements of the link.

No overhauling operation.

FUNCTION AND OPERATION OF THE "GEMA" POLARITY SWITCH

This switch is located underneath the instrument panel and is controlled manually ; the switch controls the current flow from either generator or battery to the clutch as well as the cutting off of this flow. This device cannot be repaired.

REMOVING THE CLUTCH MECHANISM

Remove the power unit as usually, with in addition, special current supply wires having to be disconnected.

Remove brushes and brush-holders, disconnect current supply shunt from head.

Remove pressure plate, noting position of shims if any, and the driven plate.

Mark and remove mechanism (4 mounting bolts).

DISMANTLING AND REASSEMBLING THE MECHANISM. — CLEANING

The parallelism of faces in the "head - armature and intermediate plate" assembly has been set up during the initial assembly by means of shims with eventually varying thicknesses. **The only permissible dismantling of this assembly is when a driving lug has been broken.** Replacement of one lug **involves mandatorily the replacement of the three lugs.**

This case excepted, the only permissible operations are :

Clean with alcohol the current supply rings and, with trichloroethylen, the friction faces and the driven plate (if the latter is too heavily smeared with grease, it has to be changed).

Clean air gap : dip the assembly : head - armature - intermediate plate, into trichloroethylen and blow dry (3 kg or 42.6 psi pressure).

REFITTING THE MECHANISM

Position mechanism with marks opposite each other.

Tighten and lock the 4 bolts.

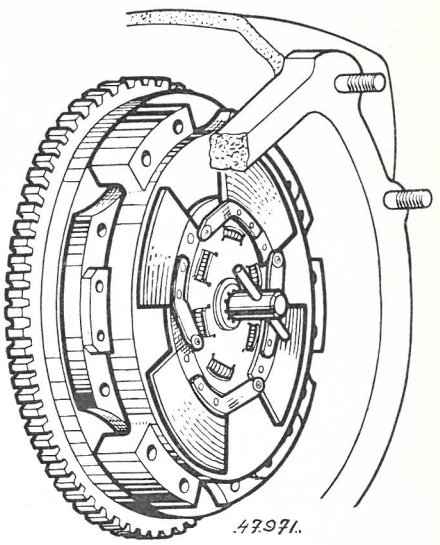
Place driven plate, with lugs turned outwards, and pressure plate.

Place adjusting shims if any ; connect shunt and coat with varnish.

Refit brush holders and brushes.

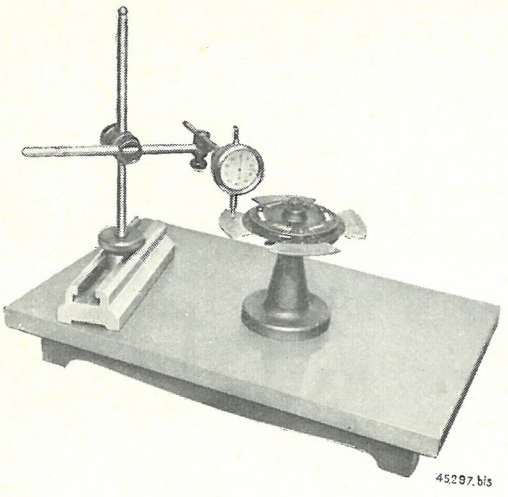
Position centering tool (Emb. 02).

Operate clutch, remove tool and connect engine and gearbox - rear axle assembly.



REMOVING AND REFITTING THE OTHER DEVICES

These operations should not cause any difficulty. Carefully mark wiring connections with figures and colour code.



CHECKING THE DRIVEN PLATE

Check :

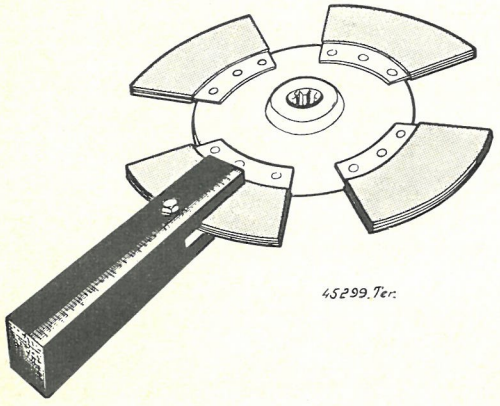
— Play compensating lugs for flexibility.

— Friction blades for uniform thickness.

— Limits ..... ± .04 mm (.0015").

— Warpage (tool Emb. 06 and dial indicator).
Maximum ..... ± 1 mm (.0039").

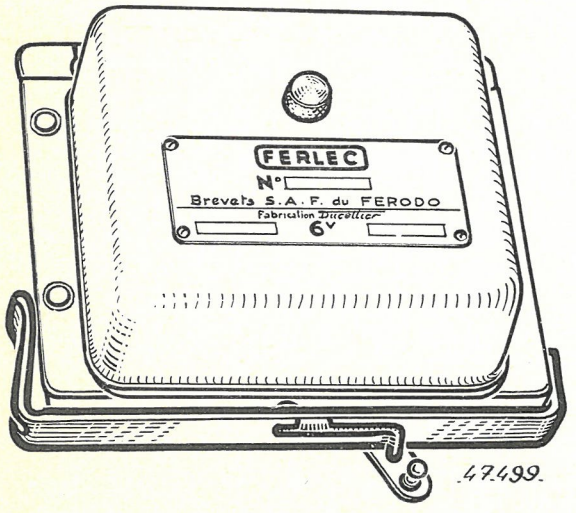
— Surface condition (see under : Cleaning mechanism).



CORRECTING WARPAGE OF DRIVEN PLATE

If warpage is close to ± .1 mm (.0039") limit, use fork Emb. 08 to reduce it below this maximum value.

If distortion is excessive, replace driven plate.



ADJUSTING CONTROL LINKAGE OF "FERLEC" CASE

Disconnect one of the 2 ball joint cages.

Install the rheostat lever positioning tool (Emb. 11) onto the case, with stem entering the lever hole.

Adjust link to proper length.

Reconnect the ball joint cage and remove tool.

Special adjustment (4 CV "Tropiques" model).

The control of the "Ferlec" case lever is through a flexible cable.

The positioning tool (Emb. 11) cannot be used.

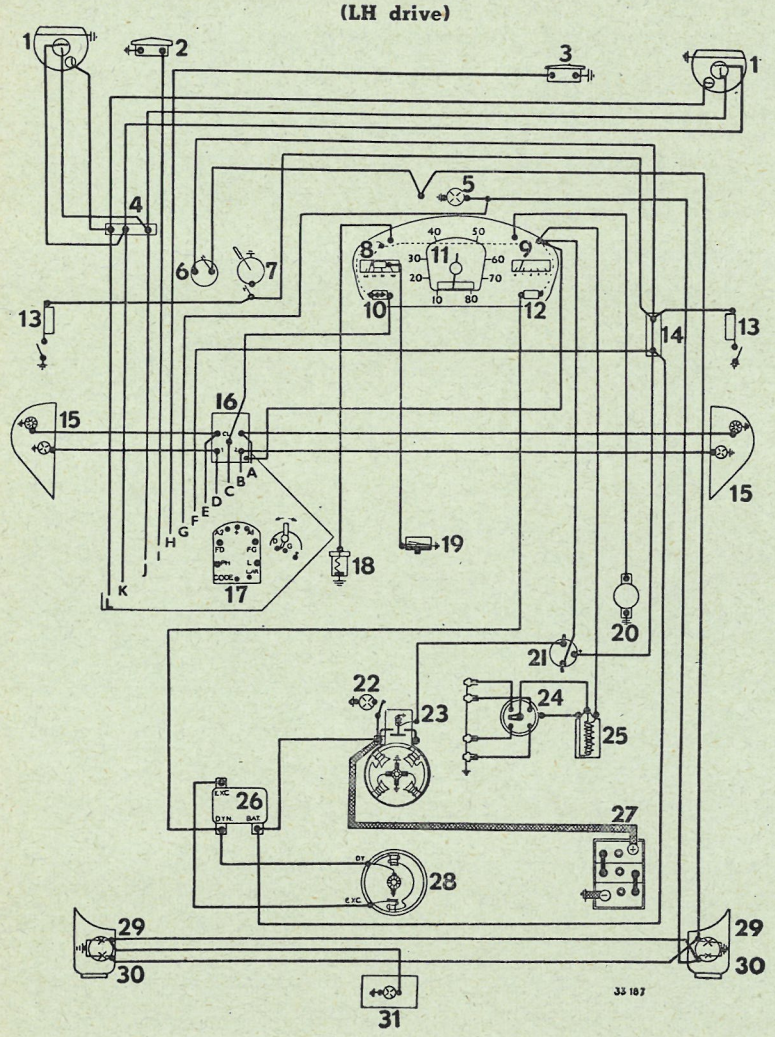
Using the adjustable sheath stop, install the rheostat brushes at 4 mm (.157") from the first studs (accelerator released).

4. ELECTRICAL SYSTEM AND IGNITION

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LUXE AND GRAND LUXE

(LH drive)



ELECTRICAL WIRING DIAGRAM

1. Front lights.
2. City traffic horn.
3. Road horn.
4. Front connection plate (*3 terminals*).
5. Instrument panel light.
6. Stop switch.
7. Windscreen wiper switch.
8. Oil pressure pilot lamp.
9. Fuel level indicator.
10. Trafficator pilot light.
11. Speedometer.
12. Battery charging pilot lamp.
13. Interior lamps (R and LH).
14. Instrument panel connection plate (*2 terminals*).
15. Parking lights and trafficator lights (R & LH).
16. Positive action bi-metal switch.
17. Avercod " Covir " combination switch.
18. Water temperature sender unit.
19. Oil pressure switch.
20. Fuel gauge.
21. Ignition - starting.
22. Engine compartment lamp.
23. Starter.
24. Ignition distributor.
25. Ignition coil.
26. Voltage regulator.
27. Battery.
28. Generator.
29. Rear (or tail) lights.
30. " Stop " lights.
31. Rear number plate light.

AVERCOD " COVIR "

(Combination switch)

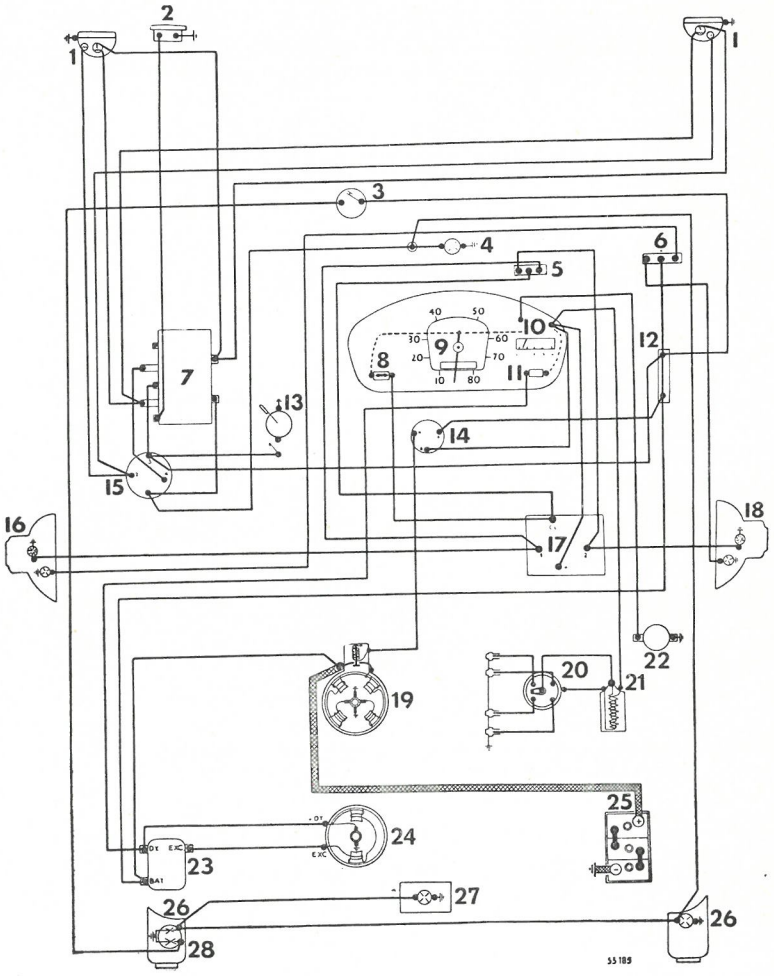
INDEX		DESCRIPTION
Sketch	Switch	
A	D	RH trafficator.
B	FD	RH parking lamp.
C	+	+ Covir reversing switch.
D	+	LH parking lamp.
E	FG	LH trafficator.
F	G	+ current supply.
G	L AR	Rear light.
H	A 2	Road horn.
I	A 1	City traffic horn.
J	PH	Road lights.
K	CODE	Dimmer lights.
L	L	Town lights.

ELECTRICAL WIRING DIAGRAM

(Continued)

" STANDARD "

(LH drive)



1. Front lights.
2. Horn.
3. Stoplight switch.
4. Instrument panel light.
5. Trafficator change over switch.
6. Parking lamp switch.
7. Day and night driving control switch.
8. Trafficator pilot lamp.
9. Speedometer.
10. Fuel level indicator.
11. Battery charging pilot lamp.
12. Two-terminal connection plate.
13. Windscreen wiper.
14. Ignition starting switch.
15. Head light - dimmer switch.
16. Parking light and trafficator light. *(LH side).*
17. Positive control bi-metal switch.
18. Parking light and trafficator *(RH side).*
19. Starter motor.
20. Ignition distributor.
21. Ignition coil.
22. Fuel gauge.
23. Voltage regulator.
24. Generator.
25. Battery.
26. Rear (tail) lights.
27. Rear number plate light.
28. Stop light.

NOTE. — In the service shop, the repairs to the electrical system involve generally the replacement of the defective parts merely. Repairing the devices and accessories should be performed in special shops.

SPECIFICATIONS

Electrical equipment : 6 volts.

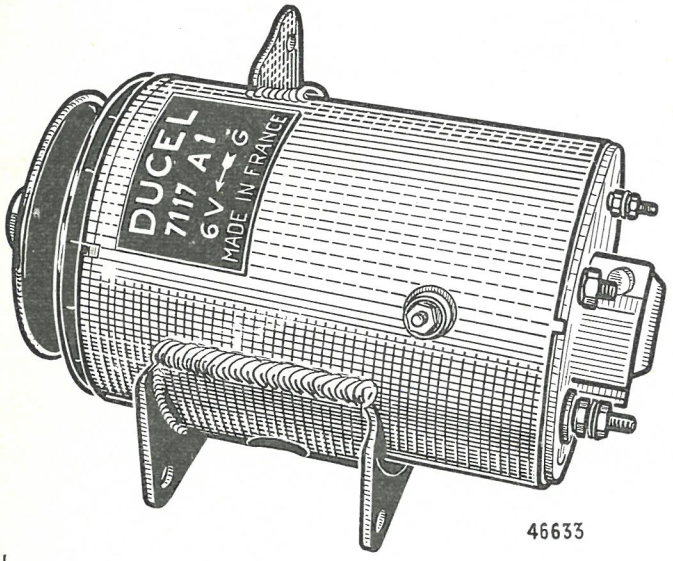
Spark plugs AC 45 L.
Marchal 37.
Eyquem 112 S.

Battery : 60/75 AH.

Ignition coil : S.E.V. 3 H or Ducellier.

SPECIFICATIONS

(Continued)



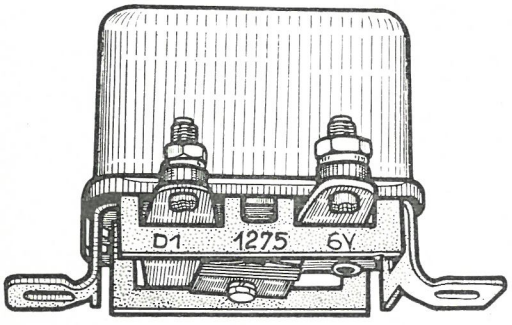
46633

Either :

Ducellier n° 7.117 A 1 generator.

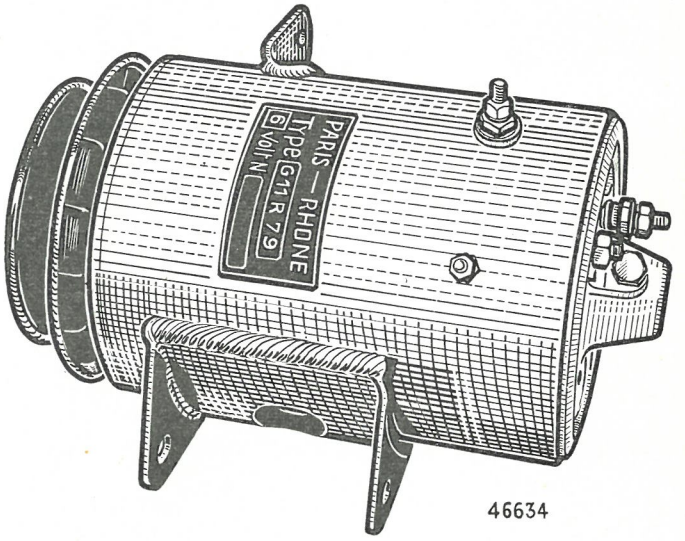
— Inlet of **negative field.**

— Intensity under a voltage ranging from 6.4 to 6.8 volts : 24 amperes.



46635

and **Ducellier n° 1275 regulator** with two regulation stages.



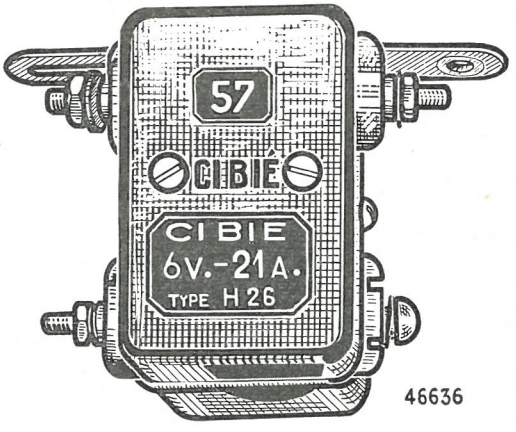
46634

Or :

Paris-Rhône n° G. 11 R. 79 generator.

— Inlet of **positive field.**

— Intensity under a voltage ranging from 6.4 to 6.8 volts : 24 amperes.



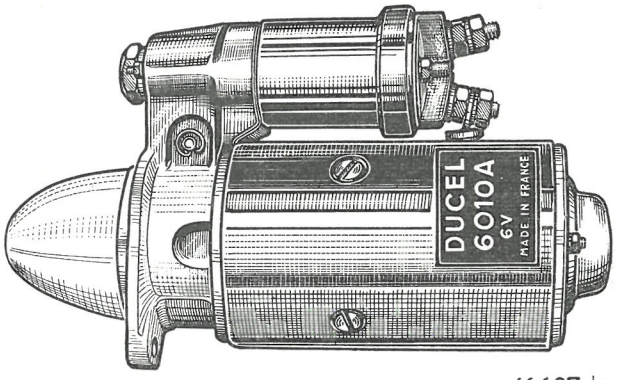
46636

and **Cibié regulator n° H 26** with two regulation stages.

NOTE. — **The Cibié regulator cannot be used with the Ducellier generator and the Ducellier regulator cannot be used with the Paris-Rhône generator.**
These devices are sealed and cannot be set or revised.

SPECIFICATIONS

(Continued)



46.637 bis

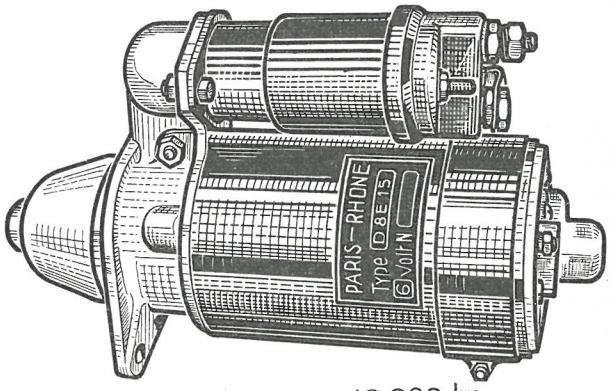
Either :

Ducellier n° 6010 A starter.

— With **" positive control " through solenoid.**

— Maximum torque : .75 m.kg (5.42 ft/lbs).

— Intensity : 400 amperes.
(Static torque with locked ring gear).



46 638 bis

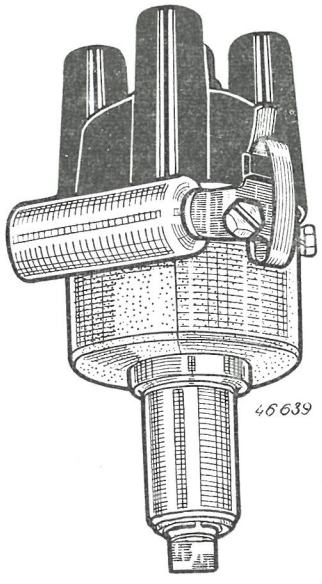
Or :

Paris-Rhône n° D 8 E 15 starter.

— With **" positive control " through solenoid.**

— Maximum torque : .8 m kg (5.78 ft/lbs).

— Intensity : 350 amperes.
(Static torque with locked ring gear).

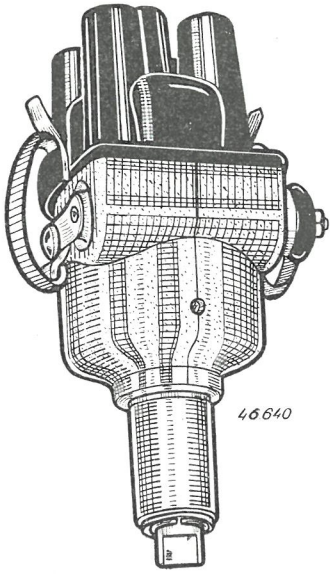


46639

Either :

S.E.V. 4 cylinder **distributor.**

MU marking with **automatic centrifugal advance.**

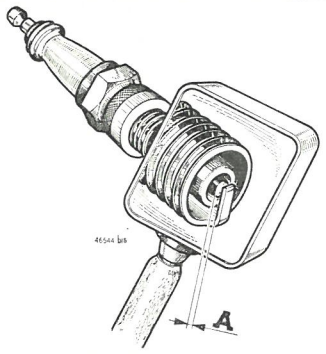


46640

Or :

R.B. 4 cylinder **distributor.**

LH marking with **centrifugal automatic advance.**



SPARK PLUGS

ADJUSTING.

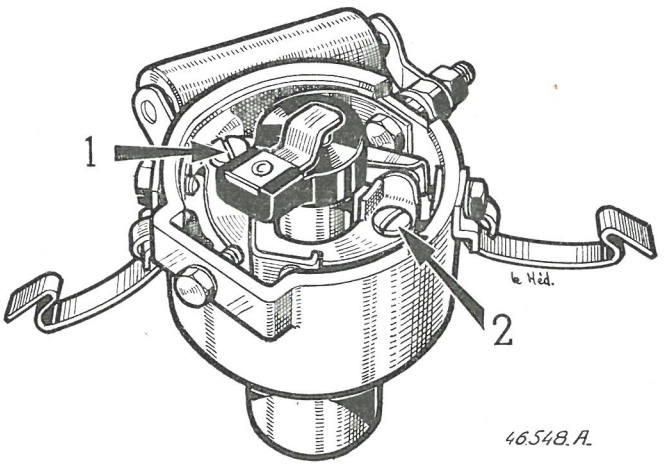
Every 5,000 km (3,000 miles) approximately, set electrode gap (setting is through the earth electrode).

Comply with **spacing A = .6 to .7 mm (.023 to .027 in.).**

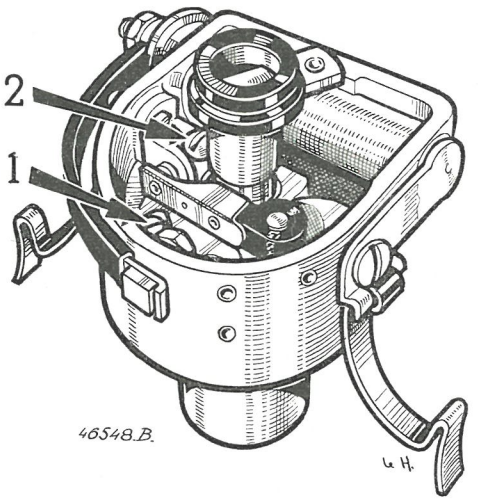
DISTRIBUTOR

SETTING CONTACT POINT GAP.

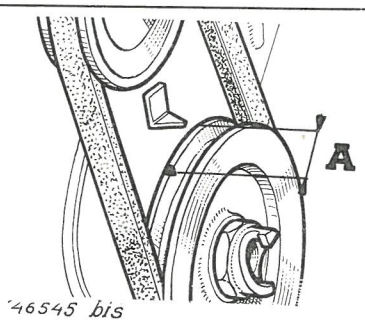
Position the breaker rubbing block on a cam nose.
Set gap to .5 - .6 mm (.019 to .023 in.) by operating the **adjusting screw (1)** after, prior, loosening the **lock screw (2)**.



Location of screws : S.E.V. distributor - MU marking.



Location of screws : R.B. distributor - LH marking.

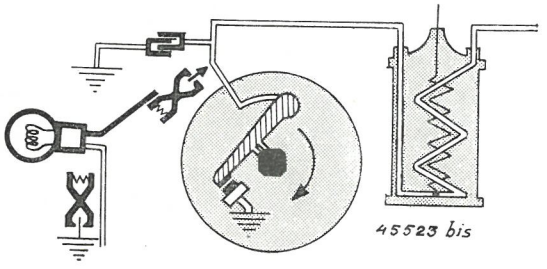


REFITTING AND SETTING.

Refit the distributor (make sure to insert shaft into the driving slot).

Connect primary terminal wire.

Remove the rocker arm cover, bring **rocker arms of cylinder n° 4 in equilibrium,** then position marking on pulley to **a distance A = 2 to 4 mm (.078 to .157 in.) from pointer.**



Connect a tell-tale lamp between primary terminal and earth.

Switch on ignition. Rotate distributor in counterclockwise direction. **As soon as the tell-tale lamp flashes on, secure in position.**

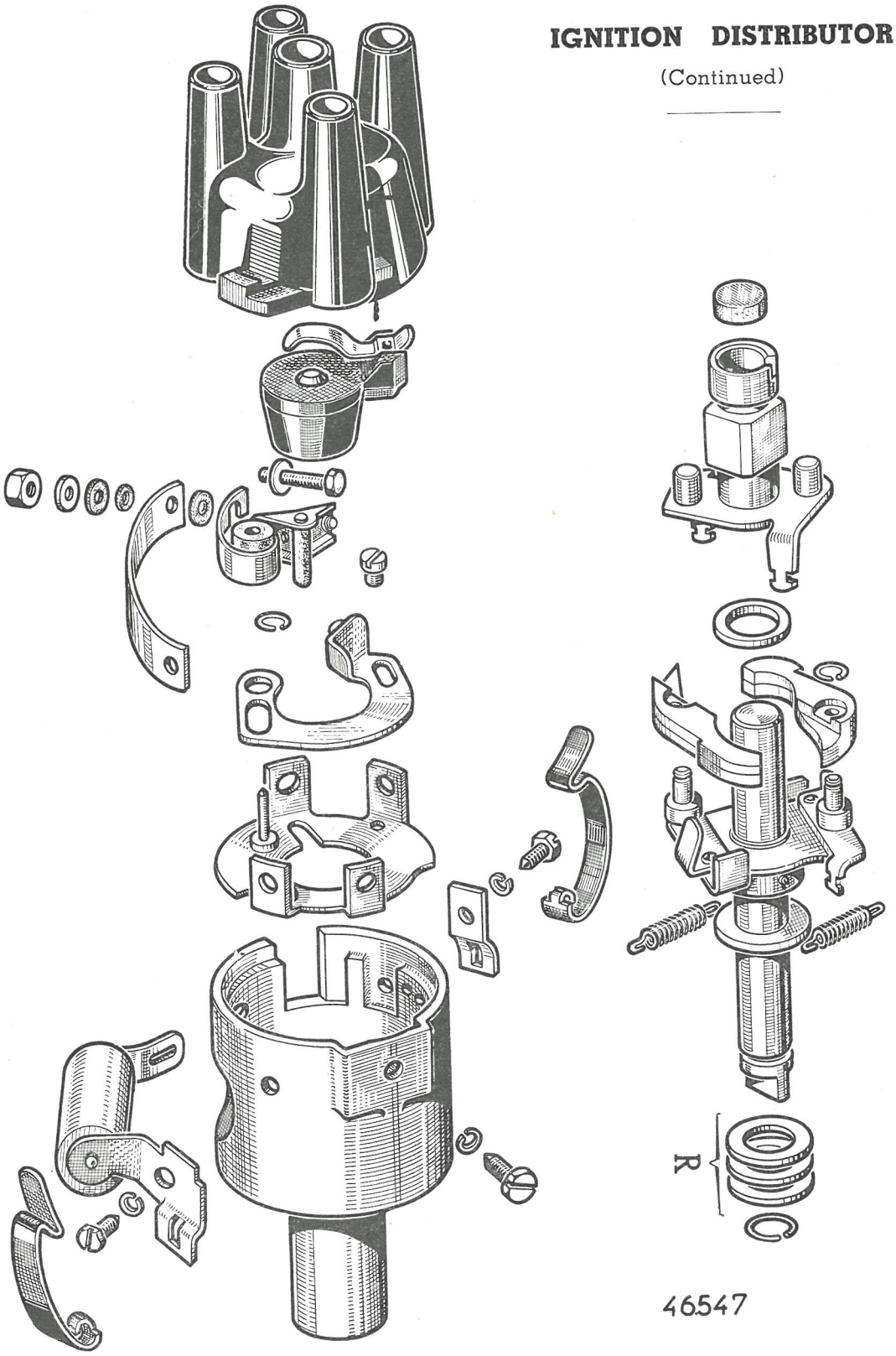
Connect the spark plug wire of cylinder n° 1 onto the terminal corresponding to the distributor rotor.

Connect up the other wires.

Wiring order : 1 - 3 - 4 - 2.

IGNITION DISTRIBUTOR

(Continued)



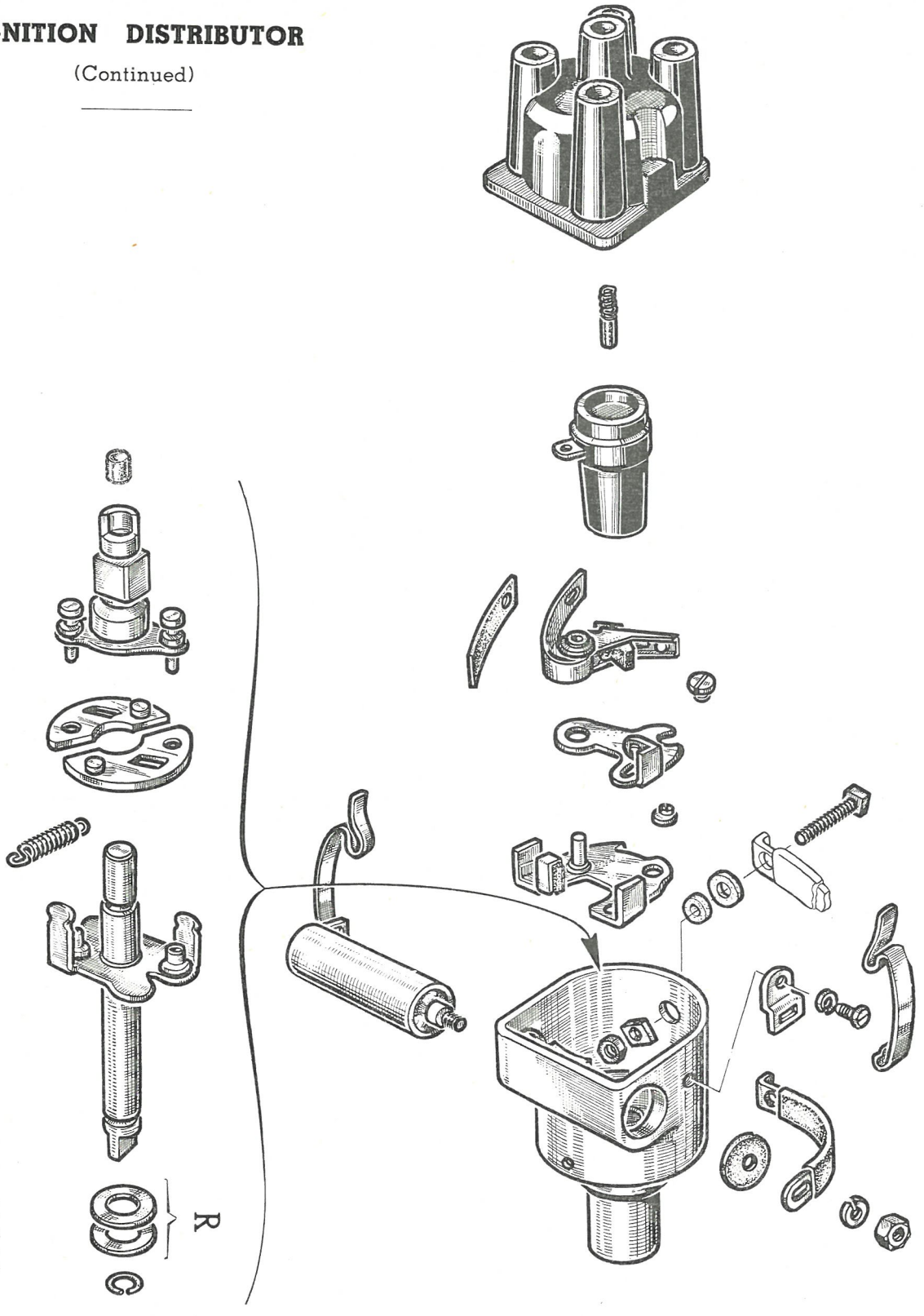
S.E.V. distributor. Marking MU.

— **Lengthwise clearance of shaft : .2 to .3 mm (.0078 to .0118 in.).**

— **Adjusting washers (R) with a thickness from .2 to .3 mm (.0078 to .0118 in.).**

IGNITION DISTRIBUTOR

(Continued)



R.B. distributor. Marking LH.

— Lengthwise clearance of shaft : .2 to .3 mm (.0078 to .0118 in.).

— Adjusting washers (R) with a thickness from .2 to .3 mm (.0078 to .0118 in.).

IGNITION DISTRIBUTOR

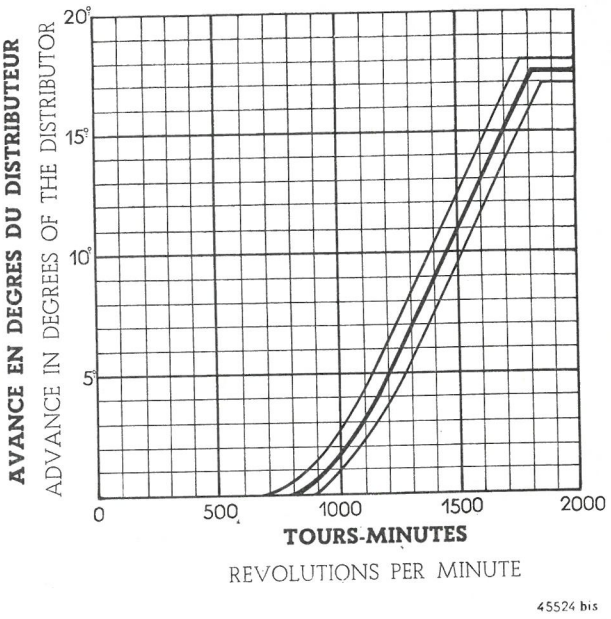
(Continued)

CHECKING ADVANCE CURVE ON TEST BENCH.

Clean distributor and set point gap.

Check advance curve pattern on test bench **by comparing to the curve as shown at right**

NOTE. — Take this opportunity to check the position of the 4 flashes.

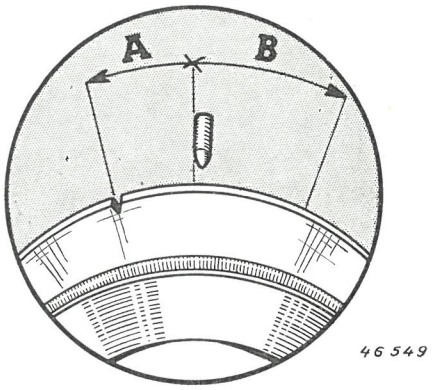


CHECKING ADVANCE ON CAR.

First check setting and correct if necessary.

Next, connect a **stroboscopic lamp** on secondary current, in-between coil and distributor.

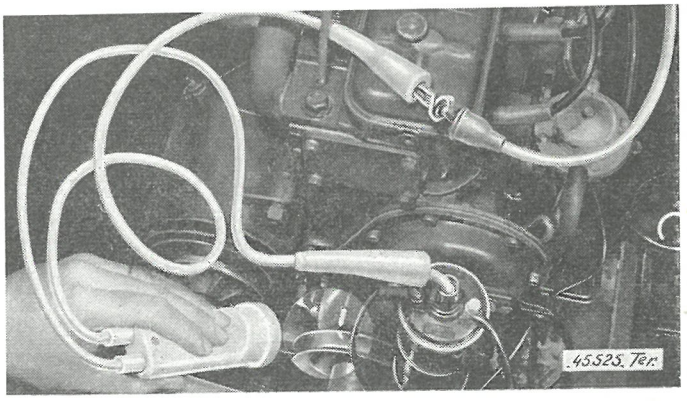
With engine at ignition point (A = 2 to 4 mm or .078 to .156 in.) draw a line with a piece of chalk on pulley at a **distance B = 33 mm (1.3 in.)** from pointer.



Next, rotate engine over, **position the stroboscopic lamp** at approximately 5 cm (1.95 in.) from pulley.

Progressively accelerate engine speed : in the beam of the lamp, the line marked with a piece of chalk should be seen **to move progressively towards the pointer until it is aligned with the latter (with engine speed now being 3 600 RPM).**

NOTE. — The start of the advance curve should be at 1,600 engine RPM.



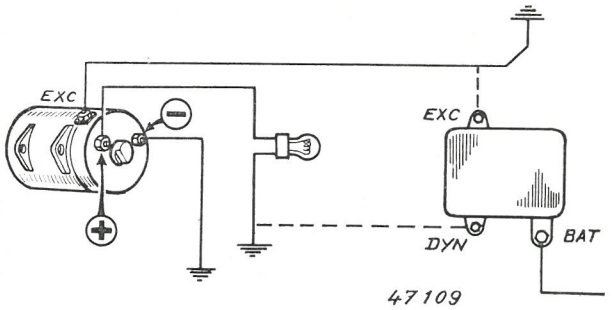
BATTERY

Tension of charged cell : 2.2 volts (recharge below 1.8 volt).
Electrolyte level : 10 to 12 mm (.39 to .46 in.) above the plates.
Electrolyte gravity (at end of charge) : 28 to 30° Baumé.

GENERATOR

CHECKING GENERATOR OPERATION ON CAR.

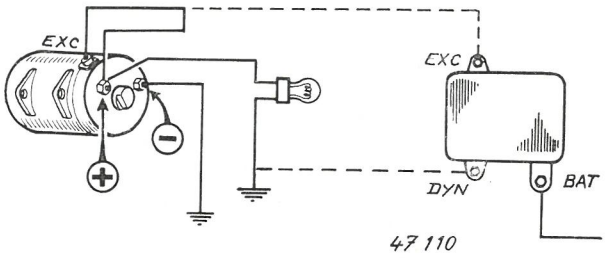
Connect a tell-tale lamp or a voltmeter between the " + " terminal of the generator and earth.



47109

For the Ducellier generator :

Disconnect the cable from the "exc" (field) terminal of the regulator and **earth** this cable.



47110

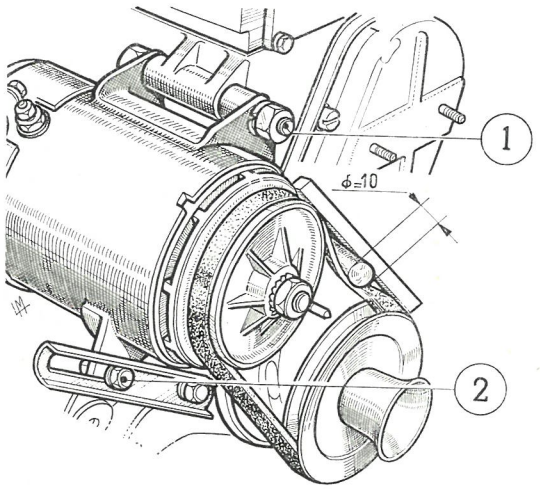
For the Paris-Rhône generator :

Disconnect the cable from the "exc" (field) terminal of the regulator and connect this cable **to the " + " terminal of the generator.**

Operate engine to approximately 1,000 RPM **(never exceed this RPM under any circumstances).**

— Should the lamp flash on or the voltmeter record : **the generator is O.K.**

— Should the lamp not flash or should the voltmeter not record : **the generator is defective (report to a specialist or have it changed).**

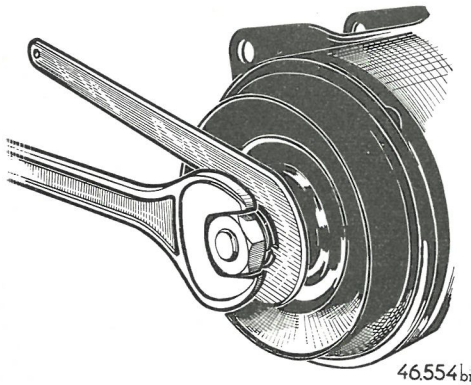


46543 bis

ADJUSTING THE BELT TENSION.

After loosening the clamping screw (**1**) and the tensioner screw (**2**), tilt generator to **obtain a tension deflection of 10 mm (.39 in.).**

Tighten up screw (**2**) and (**1**).

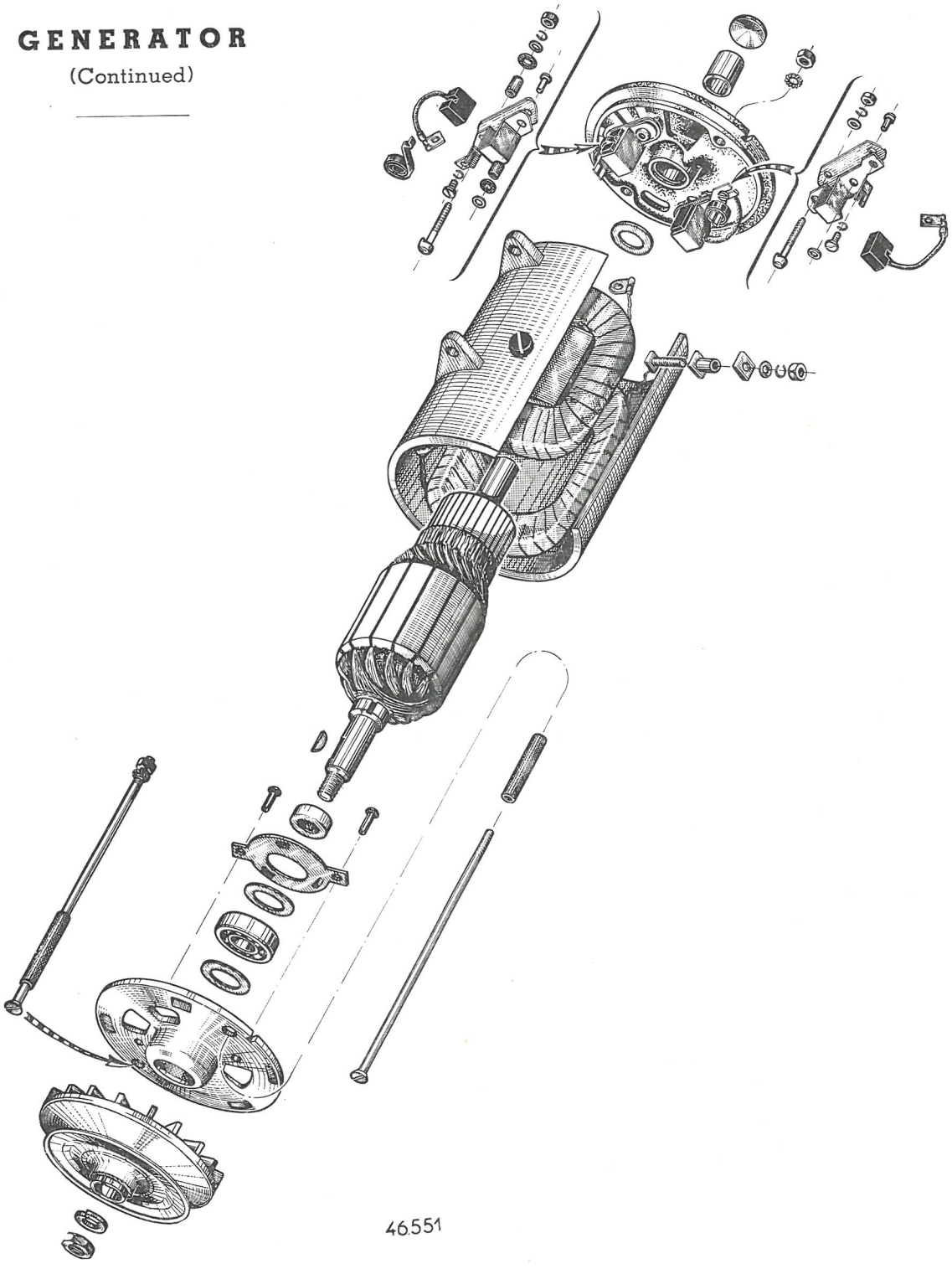

46554 bis

REMOVING OR REFITTING THE PULLEY.

To perform this operation, **hold the pulley from turning using the Ele. 04 spanner.**

GENERATOR

(Continued)

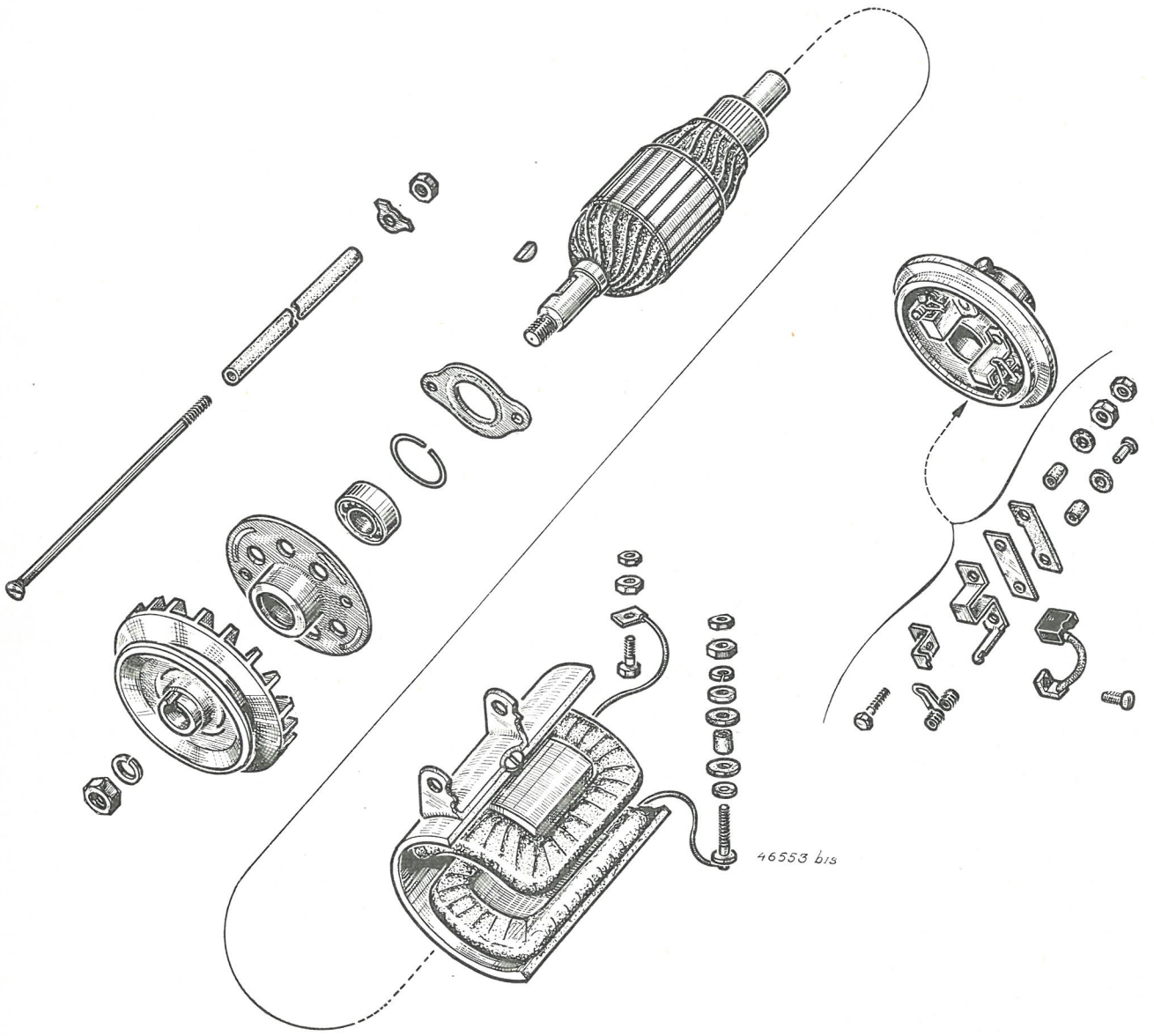


Ducellier n° 7117 A 1 generator.

— Minimum length of brushes	10 mm (.39 in.)
— Minimum diameter of commutator	44 mm (1.71 in.)
— Mica inserts, milling depth	.5 mm (.019 in.) deep on the entire width of the insert.

GENERATOR

(Continued)



Paris-Rhône n° G. 11 R. 79 generator :

— Minimum length of brushes	8 mm (.31 in.)
— Minimum diameter of commutator	38 mm (1.49 in.)
— Mica inserts, milling depth	.6 mm (.023 in.) deep on the entire width of the insert.

REGULATOR

INSPECTION.

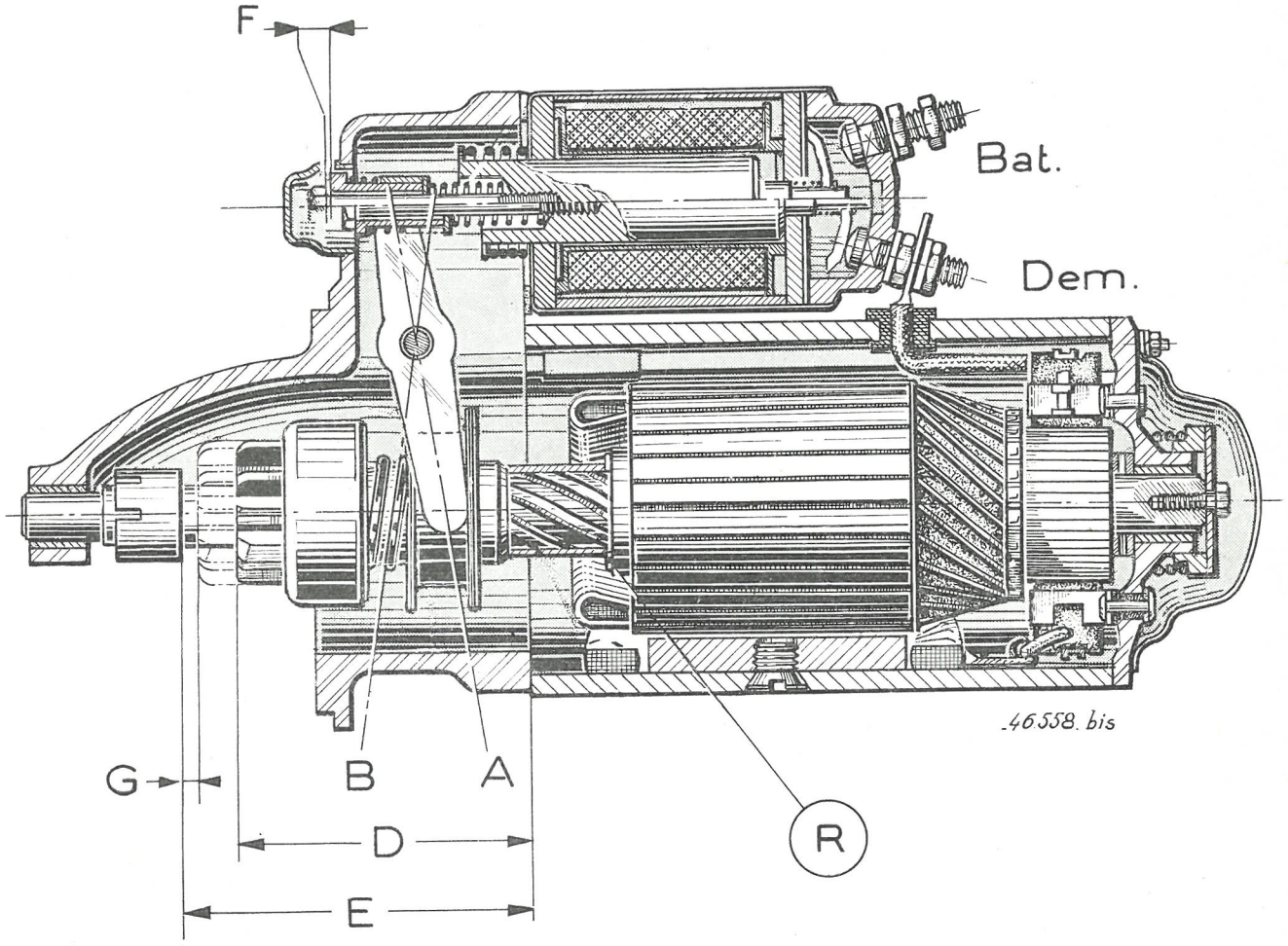
NOTE. — When endeavouring to locate a trouble on **Ducellier generator-regulator assembly, never connect one of the "exc" (field) terminals** of the generator or of the regulator **to earth.** The regulator contacts otherwise whould be immediately damaged and would thus be improper for use.

Should a charging trouble occur, **check generator before tracing trouble to regulator.**

If the generator is found to be O.K., the trouble stems from the regulator and the latter should be replaced.

NOTE. — The regulator is sealed at the works. Its setting is very accurate and requires a special equipment. **We prohibit the regulator repair (it should be replaced).**

STARTER



Ducellier n° 6 010 A starter.

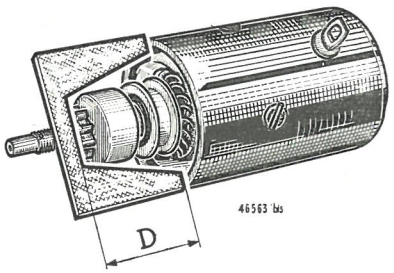
— Minimum length of brushes ..... 7.5 mm (.295 in.)
— Minimum diameter of commutator ..... 32 mm (1.25 in.)
— Mica inserts, milling depth ..... .5 mm (.019 in.) deep on the entire width of the insert.
— Position of pinion when released : **dimension D = 59 + .5 mm (2.32 ± .019 in.).**
— Position of pinion when in action : **dimension E = 70.5 mm $^{+.5}_{-0}$ (2.77 in. $^{+.019}_{-0}$).**
— Clearance between drive worm and socket : **dimension F = .1 to .5 mm (.0039 to .019 in.).**
— Clearance between front stop and pinion when in action : **dimension G = 1. to 1.5 mm (.0039 to .059 in.).**
— Thickness of adjusting washers (R) = **.5 and .2 mm (.019 and .0078 in.).**

STARTER

(Continued)

ADJUSTMENTS.

Should it occur that the Ducellier has to be dismantled, **the following adjustments should be performed when reassembling :**
After reassembling the armature in the frame and before reassembling the end plate at drive side :



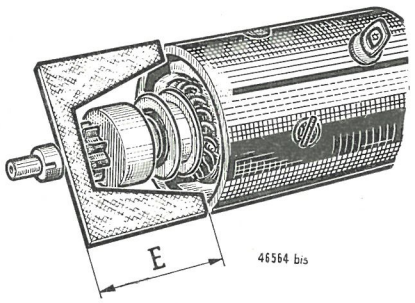
Adjust the pinion in its released position.

Make sure that the end plate contacts the frame and that the armature contacts the end plate.

Position Ele. 05 gauge, which corresponds to dimension **D**.

The gauge should bear both on the frame and on the front face of the pinion.

If position of pinion is not correct, **change washers (R)**.

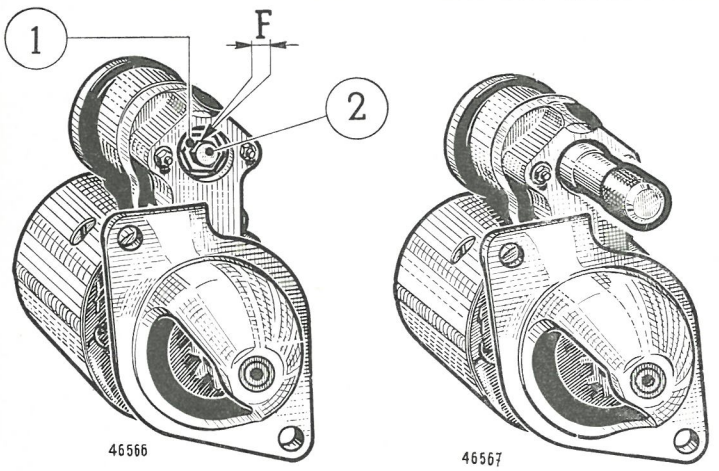


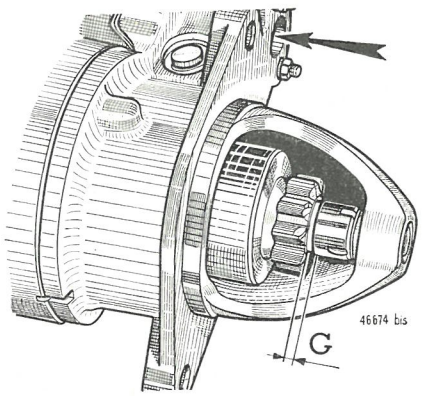
Adjusting the pinion in its foremost position.

Install **gauge Ele. 05** as for the above adjustment.

Run up the front stop and have it contact **the outside portion of gauge which represents the dimension E.**

Insert cotter pin on stop, fold down the ends of the pin **(maximum protrusion of pin to be .5 mm or .019 in.).**





After assembling the "switch and end plate" assembly on the frame, continue the operations as hereunder :

Adjusting connection between core and fork.

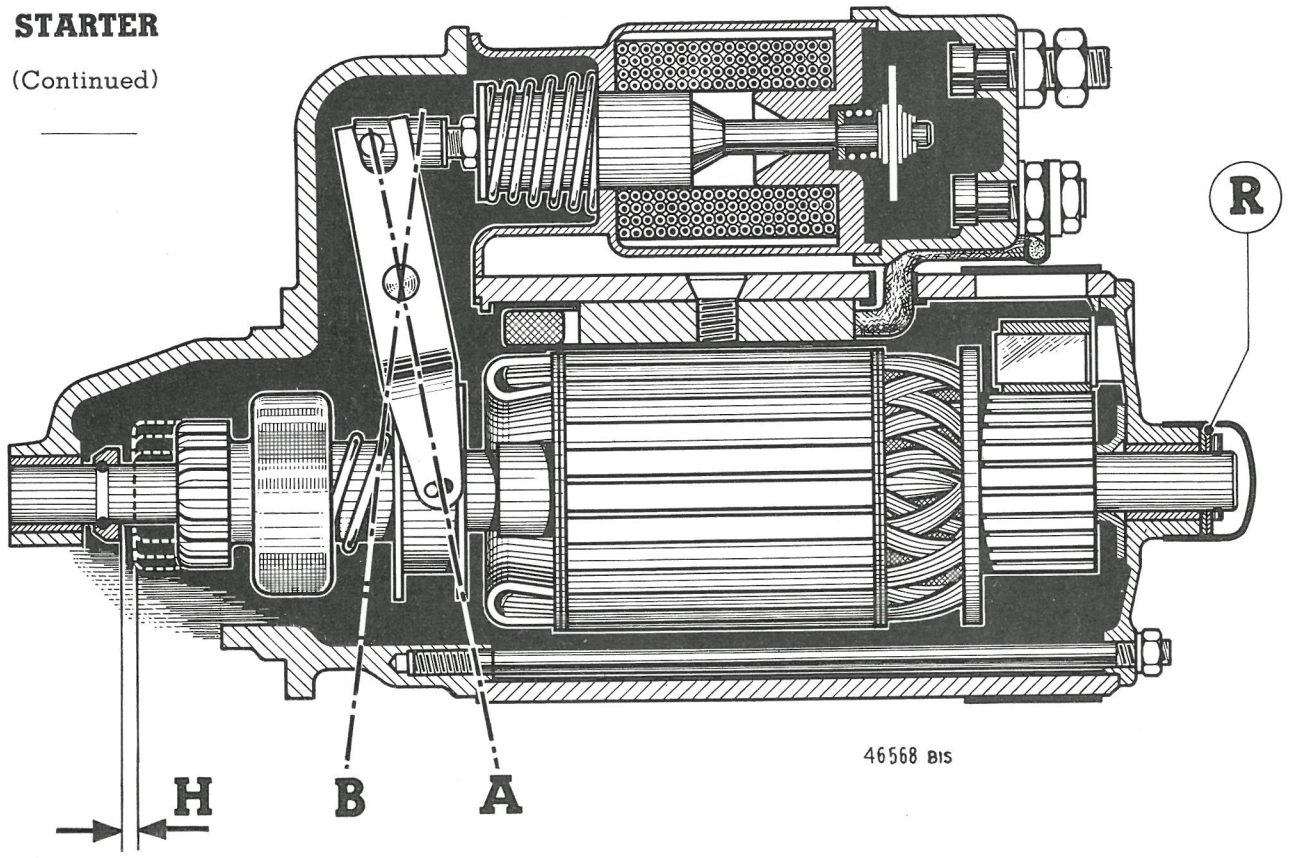
Fully push in the control rod (2) and **estimate the clearance G : .1 to 1.5 mm (.0039 to .059 in.)** between pinion and front stop.

Allow the assembly to resume its initial position and run up or off the socket (1) using the **Mot. 15 hand tool** in order to obtain a correct G clearance with a **dimension F as small as feasible.**

Finally check that, when released, the starter drive contacts the rear stop.

STARTER

(Continued)



Paris-Rhône n° D. 8 E. 15 starter.

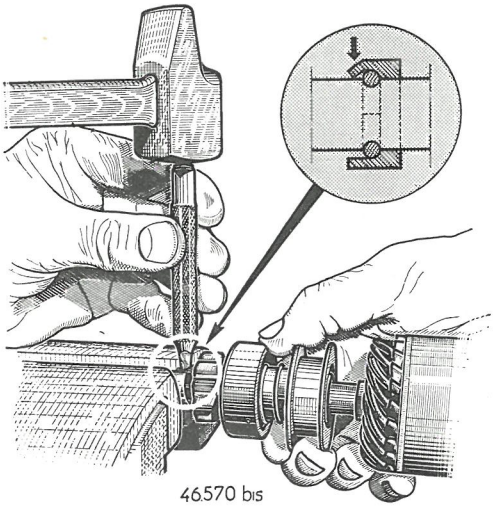
— Minimum length of brushes ..... 8 mm (.31 in.)
— Minimum diameter of commutator ..... 34 mm (1.338 in.)
— Mica inserts, milling depth ..... .6 mm (.0236 in.) deep on the entire width of the insert.
— Clearance between front stop and pinion when in action : **dimension H** = .5 to 2.5 mm (.019 to .098 in.).
— Lengthwise clearance of armature : .2 to .5 mm (.0078 to .0196 in.).
— Thickness of adjusting washers (**R**) for lengthwise clearance : .3 to .5 mm (.0118 to .0196 in.).

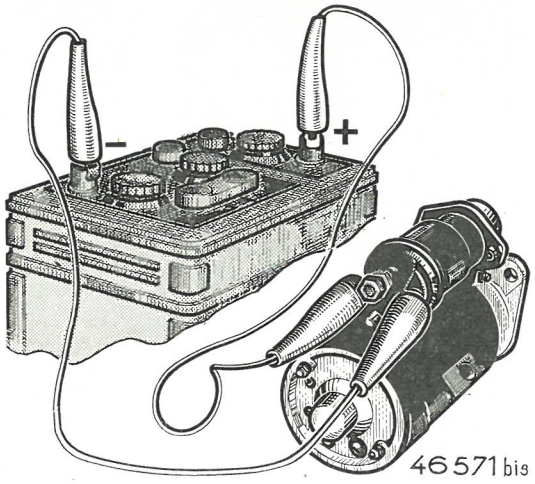
Where the Paris-Rhône starter is to be dismantled, **attention should be paid, when reassembling, to the following specific points :**

Always use a new front stop.

Straddle the snap rings with the stop.

Flatten the end of the stop at 4 points, **as per the illustration,** in order to lock the snap rings in position.





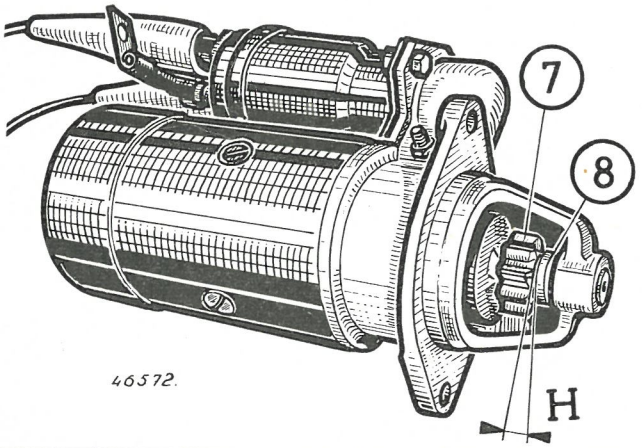
STARTER

(Continued)

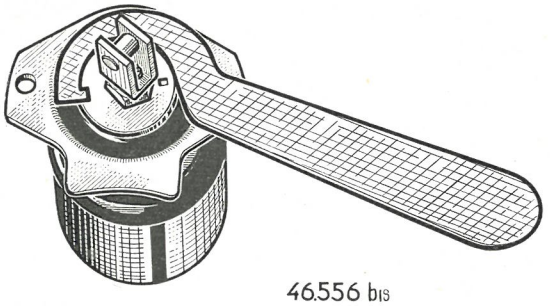
SETTING THE CONNECTION BETWEEN CORE AND FORK :

Supply solenoid with current as shown on the illustration.

NOTE. — **The field windings in the terminal clip should never be connected.**



The pinion (**7**) is thus at its foremost position, and a **clearance H of .5 to 2.5 mm (.019 to .098 in.)** should be found **between pinion (7) and stop (8).**



If clearance (**H**) is not correct, remove switch, hold switch washer, using **Ele. 06 spanner,** and run up or off the clevis.

STARTER SWITCH

CHECKING STARTER SWITCH FOR CORRECT CURRENT SUPPLY.

With starter correctly assembled on car, connect a **tell-tale lamp** between the current supply terminal of switch and earth. **Operate the Neiman combination switch. If the tell-tale lamp does not flash on, check** the switch current supply wire and the combination switch supply wire. If both wires are in good condition, replace the combination switch.

CHECKING THE SWITCH.

With starter removed, connect the terminal at starter end of the switch to the "+" terminal of battery. Connect the frame to the "—" terminal of same battery. **If starter turns over, the switch is at fault,** replace (Ducellier) or repair (Paris-Rhône). **If starter does not turn over, have it checked by a specialized shop.**

OIL PRESSURE SWITCH

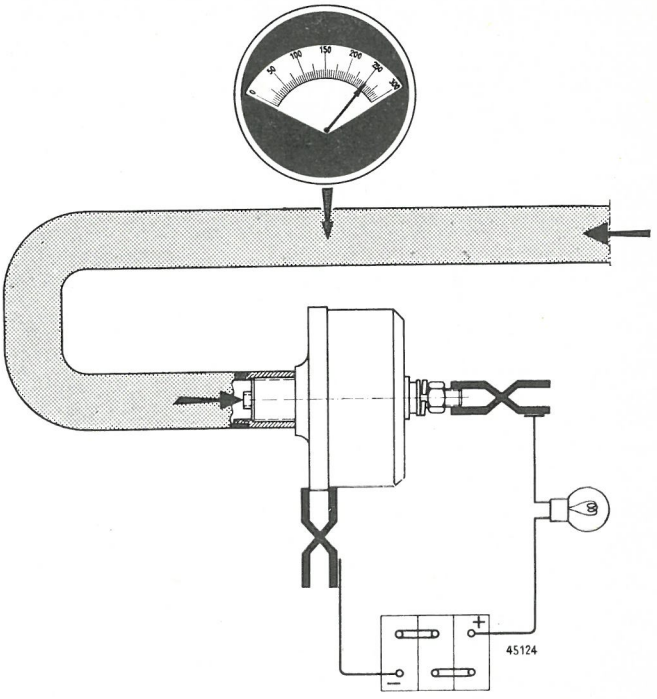
INSPECTION :

For the operation as hereunder, **compressed air** and a **pressure release gauge** with accurate **recordings should be available.**

Connect the pressure switch to air inlet, using a flexible hose. Connect a tell-tale lamp on the circuit.

With the air inlet being shut off, the **tell-tale lamp** flashes on. **It should flash off when the following pressure is recorded on the pressure gauge :** 250 gr/cm² ± 25 (3.55 psi ± .35).

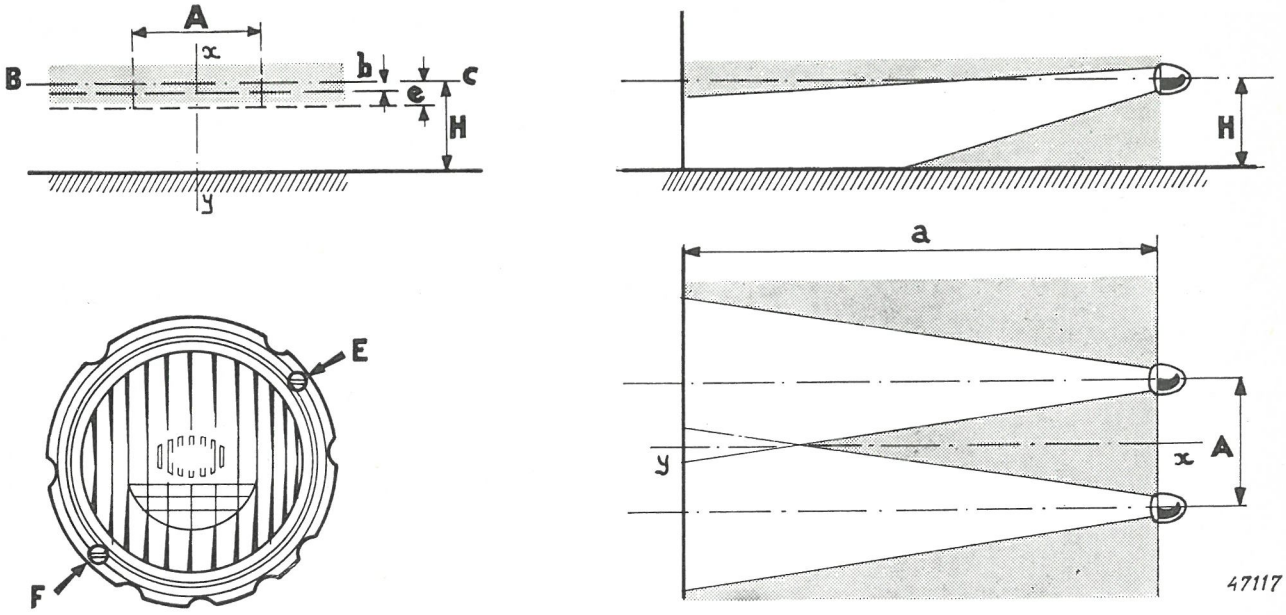
If the tell-tale lamp stays on, or if it flashes off too soon, replace the oil pressure switch.



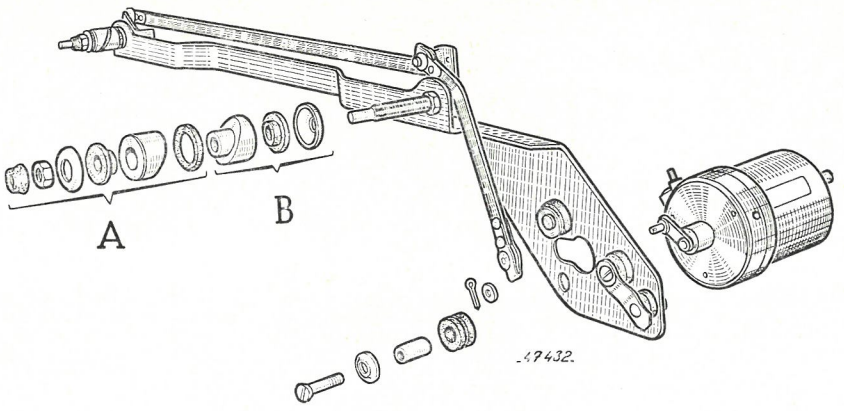
WATER TEMPERATURE SENDER AND INDICATOR UNIT

INSPECTION : Use the **Jaeger reference 04 temperature sender and indicator tester.** Comply with manufacturer's instructions for its use.

HEADLAMPS



ADJUSTMENT : Locate **vehicle loaded** on a flat and horizontal area, at a distance **a = 10 m (32.8 ft)** from a wall or from a smooth panel perpendicular to ground. — Mark **a horizontal line BC** on the wall **at a height H** (height of headlamps). — Mark a vertical centerline xy at the center of A. Mark two horizontal lines as **b = 10 cm (3.93 in.) e = 25 cm (9.84 in.). Switch headlamps to dimmer beams.** — Check **for verticality of glass striations** (if glasses are loosen replace the reflector unit). — **The intersection should be horizontal and located between lines b and e.** — **Adjust height of intersection through screw F.** — **The beams** should be **parallel to the centerline of the car. Adjust this parallelism through screw E.**



REMOVING AND REFITTING THE " WINDSCREEN WIPER MOTOR - BRACKET - CONTROL " ASSEMBLY

REMOVAL.

Disconnect the battery.
Remove blade holders and parts (**A**) from pin.
Disconnect the motor current supply wire.
Remove bolt attaching bracket and remove assembly by clearing the pins.

REFITTING.

Perform the removal operations in reverse sequence, after positioning parts (**B**) on pin.

DISMANTLING AND REASSEMBLING THE " WINDSCREEN WIPER MOTOR - BRACKET - CONTROL " ASSEMBLY

DISMANTLING.

Motor.

Disconnect drive link and remove the 3 attaching bolts.

Controls.

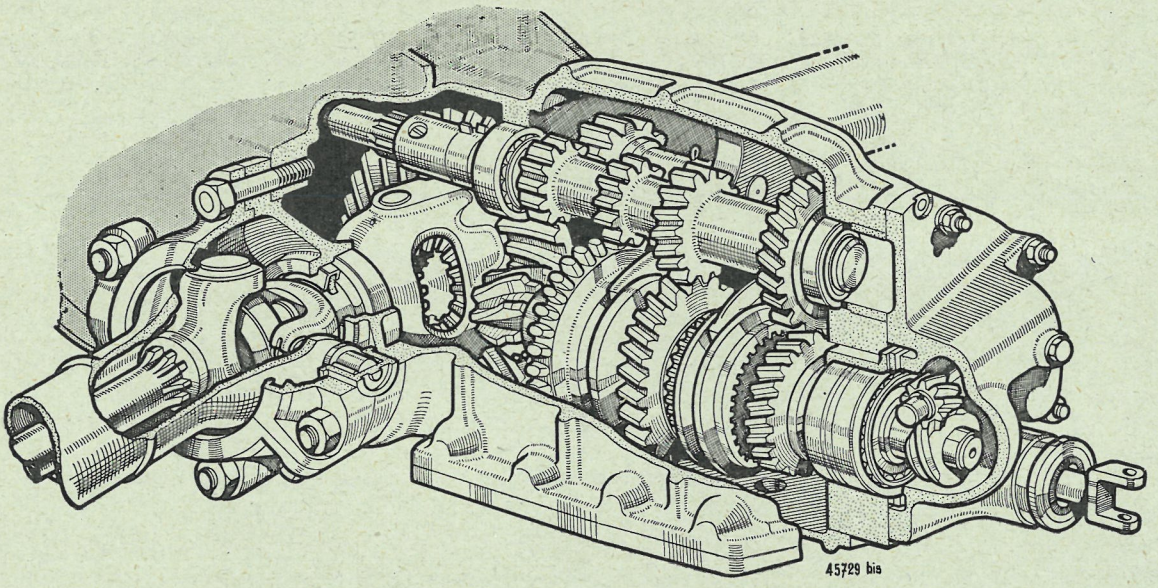
To remove the pins, clear the retainer.

REASSEMBLING.

Perform the dismantling operations in reverse sequence.
Lubricate the pins before assembling same in their guide.

5. GEARBOX AND REAR AXLE MECHANISM

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Lubrication		66
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Refitting of " Gearbox and rear axle " mechanism		68
Dismantling the mechanism	Dismantling rear axle	68
	Dismantling the gearbox	69
Reassembling the mechanism	Reassembling gearbox	74
	Reassembling rear axle	79
Operations on sub-assemblies	Differential inspection (dismantling - reassembling)	81
	Rear axle shaft tube - Rear axle shaft (removing - refitting)	82
	Universal joint (Inspection and overhauling)	82
	Gear shift lever (assembly)	82



SPECIFICATIONS (289-2 type Gearbox and Rear Axle)

Of gearbox.

Three forward speeds, one reverse.
Intermediate and high synchronized.

Gearbox ratios :

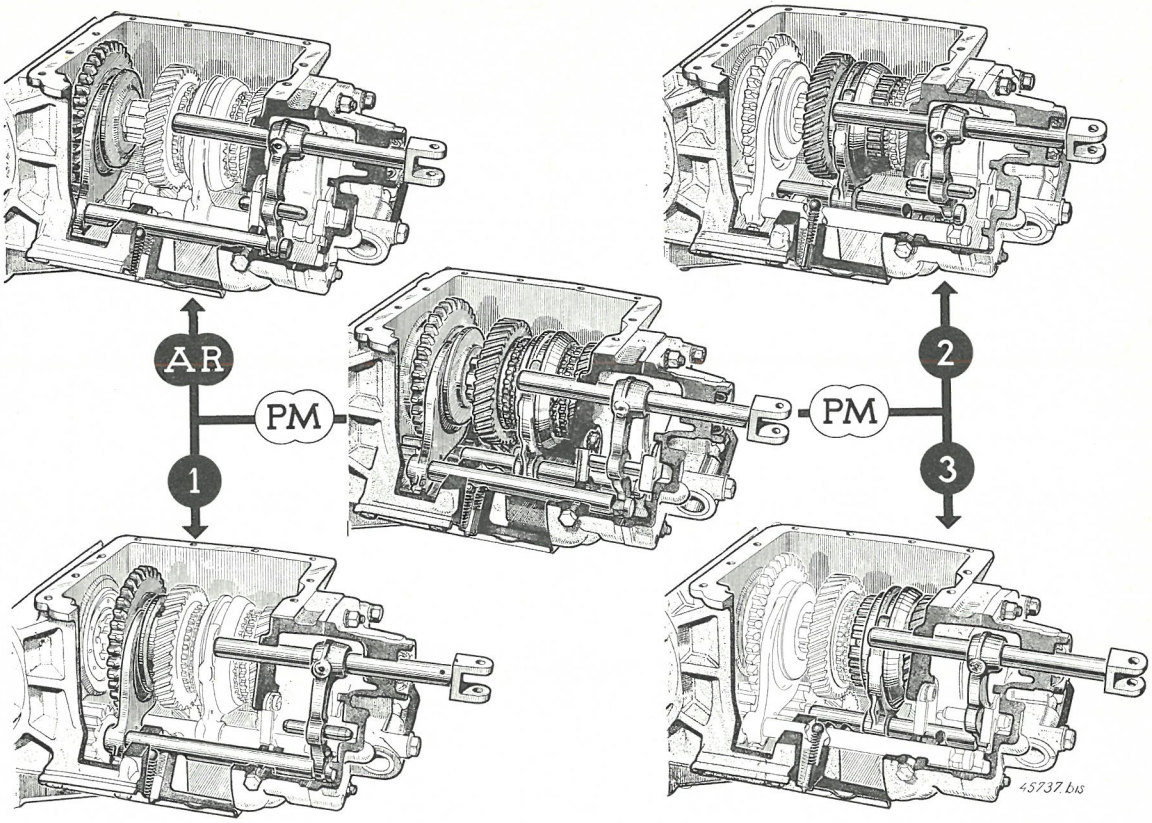
— Low 3.7
— Intermediate 1.8
— High 1.07
— Reverse 3.7

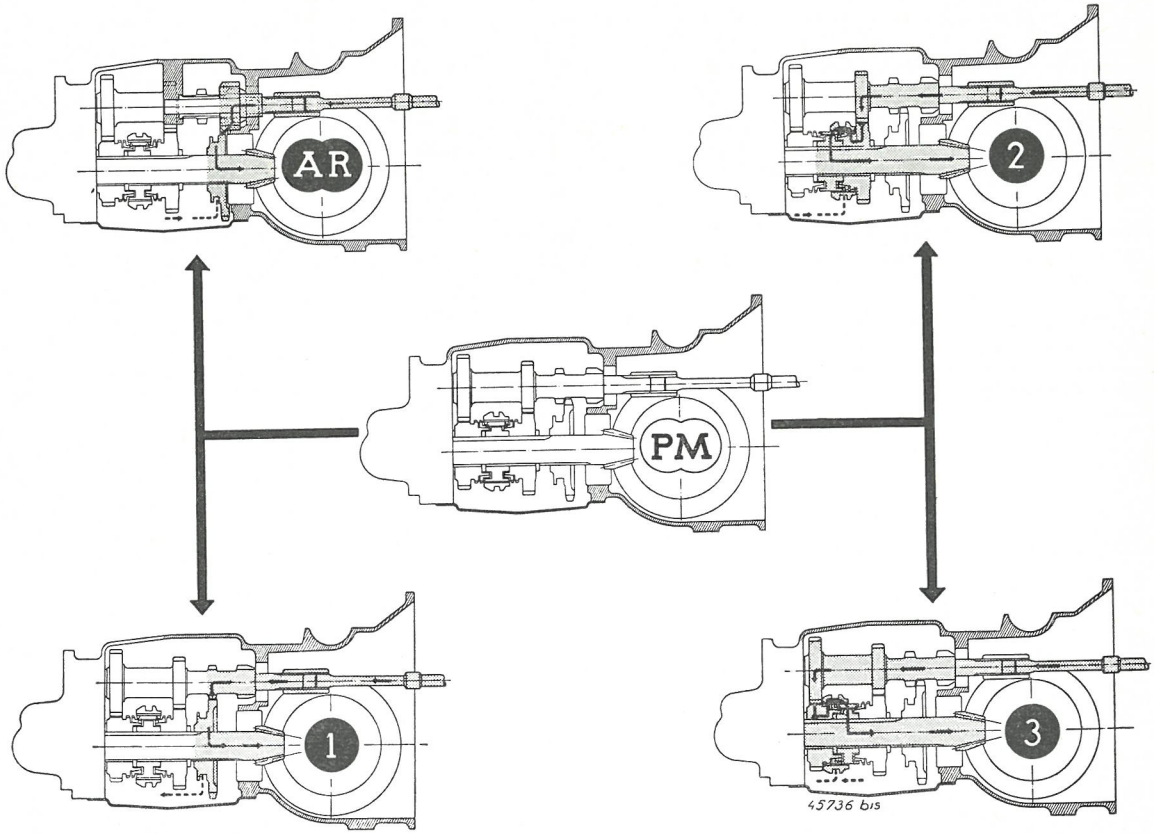
Oil capacity of gearbox and rear axle housing : 1 litre (1.76 english pint).
(Gearbox : .6 litres or 1.05 english pint. — Rear axle : .4 litres or .7 english pint).

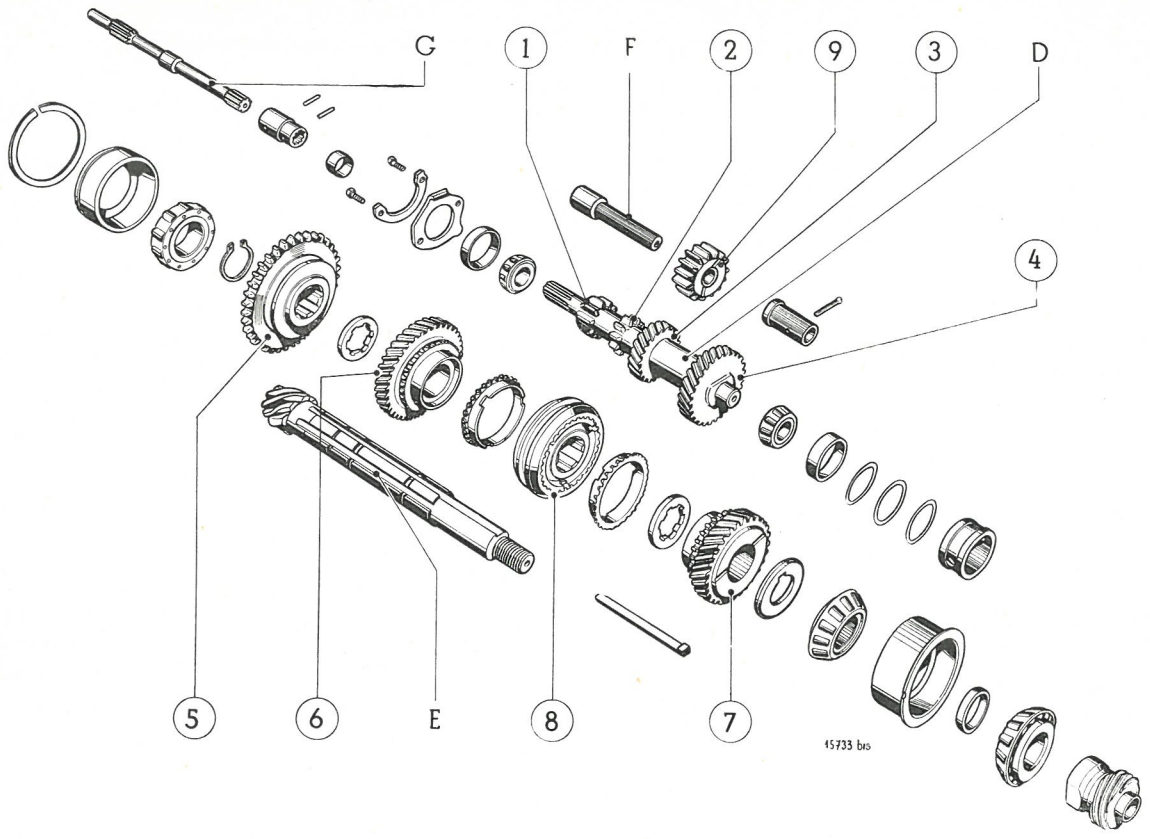
Of rear axle.

It includes :

— A rear axle housing integral with the gearbox.
— A differential including two differential wheels and 2 differential pinions.
— A crown wheel (33 teeth).
— A drive pinion (7 teeth) included in the gearbox assembly (secondary shaft).
— Two differential carriers.
— Two universal joints.
— Two " rear " axle shafts and shaft tube " assemblies connected to the carriers.
— A speedometer pinion.


AR
PM
1
PM
2
3
45737 bis


AR
PM
2
1
3
45736 bis



DESCRIPTION

The gearbox contains 4 different shafts :

— A primary shaft (**D**).
— A secondary shaft (**E**) and combination drive pinion.
— A reverse gear shaft (**F**).
— A clutch shaft (**G**) for clutch to primary shaft connection.

The rear axle located in the " gearbox - rear axle " unit housing is driven directly from the secondary shaft.

The primary shaft (**D**) has 4 gears integral with shaft :

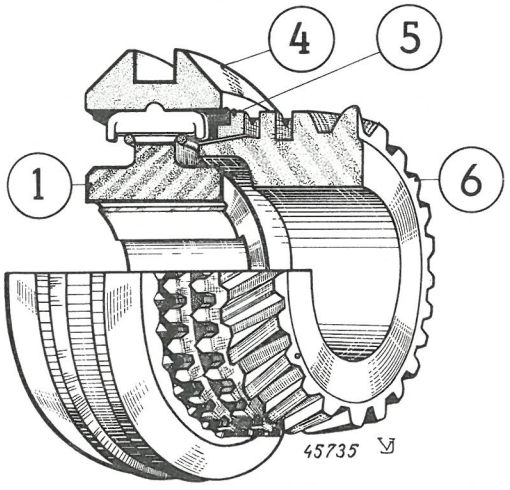
— A reverse gear (**1**) - 10 teeth.
— A low speed gear (**2**) - 10 teeth.
— An intermediate gear (**3**) - 21 teeth.
— A high speed gear (**4**) - 27 teeth.

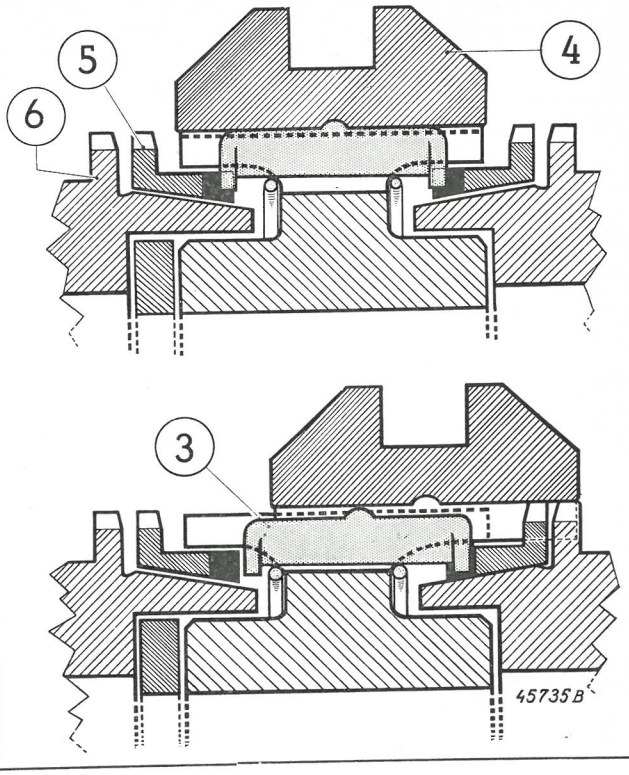
The secondary shaft (**E**) carries :

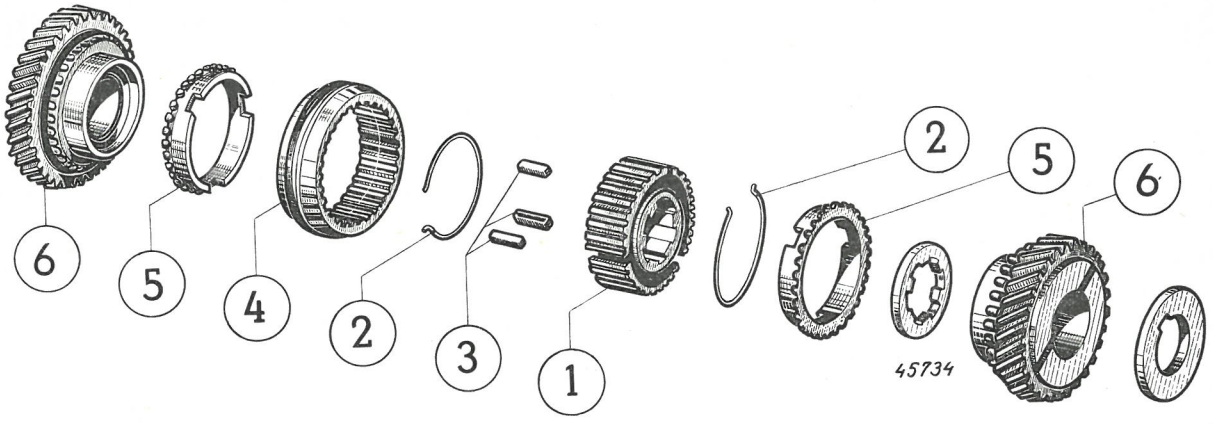
— A low and reverse sliding gear (**5**), 37 teeth, splined and sliding on the shaft.
— An intermediate idler gear (**6**), 38 teeth, with synchronizer cone.
— A high speed idler gear (**7**), 29 teeth, with synchronizer cone.
— A synchronizer assembly (**8**) of the " positive " type with hub integral with shaft.
— A speedometer worm (4 threads) driving a gear (10 teeth).

The reverse gear shaft (**F**) has a reverse idler gear (**9**), 15 teeth.

Gears (**3**) and (**6**), (**4**) and (**7**), (**9**) and (**1**) are in constant mesh.







SYNCHRONIZER ASSEMBLY

The synchronizer assembly, of the " positive " type, includes :

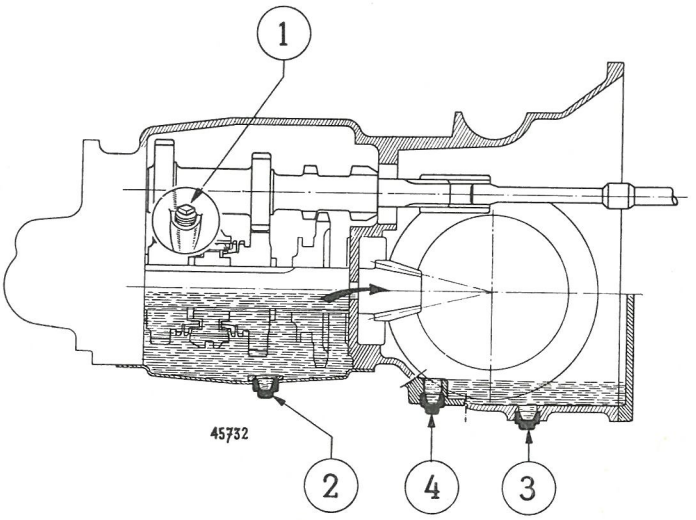
— Two bronze locking rings (**5**) with inner cone and outer meshing teeth. The rings also feature 3 equally spaced notches, opposite to the teeth.

— A sliding gear (**4**) with inner meshing teeth and a circular groove for locating the control fork.

— A sliding gear hub (**1**) splined to the shaft, with outer teeth to allow the gear to slide as well as 3 outside and equally spaced slots for the keys location.

— 3 keys (**3**) fitted in-between the sliding gear (**4**) and the hub (**1**) and maintained by 2 snap rings (**2**).

LUBRICATION



The lubrication is of the splash type.

The " gearbox " and " rear axle " housings communicate.

Filling both compartments (gearbox and rear axle) is through the same opening (**1**).

Draining is a distinct operation : one plug (**2**) is used for the gearbox and one (**3**) for the rear axle.

The level plug (**4**) is common to both.

Use cranked spanner B. Vi. 03.

Filling.

Filling is through the filler hole (**1**) (1 litre i.e. 1.76 english pint).

Checking the level.

— Remove the level plug (**4**) and allow for the excess oil accumulated in the rear axle compartment to flow out.

— Top up the " gearbox " compartment by pouring oil through the filler opening (**1**) until oil flows out again through the level opening (**4**).

— Allow oil flow to stop and retighten plug (**4**).

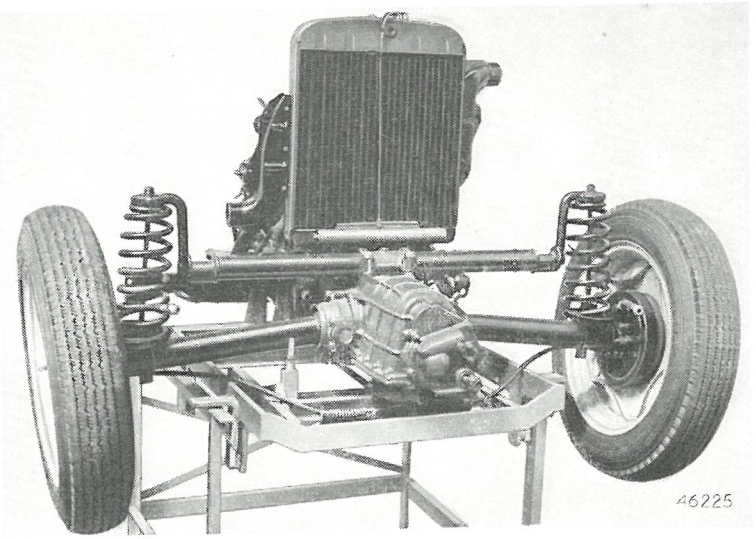
It is mandatory to follow above procedure as overfilling the " rear axle " compartment may lead to oil penetrating into the rear axle shaft tubes, while the underfilling of the " gearbox " compartment may result in seizure.

REMOVING THE " GEARBOX AND REAR AXLE " MECHANISM

Remove the power unit.

Do not separate the " gearbox and rear axle " from the engine.

Remove the wheels and drain the oil.

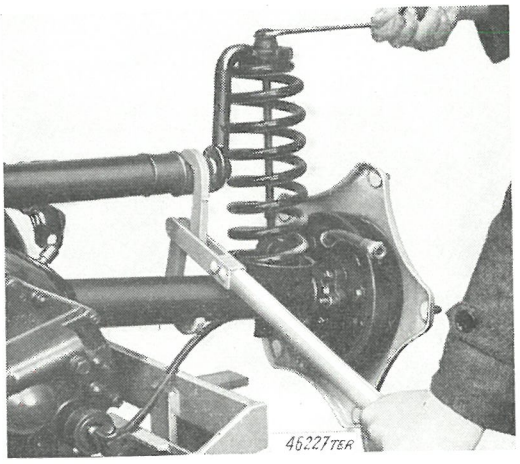


Compress suspension springs (compression clamp Sus. 10).

Remove the cross-member to mechanism mounting cap.

Clear cross-member and remove.

Remove suspension springs.



Remove the rear axle shaft tubes.

To this end :

— Clear the half-shells : each " rear axle shaft and tube " assembly is now cleared.

— Separate the two shells from the rear axle tubes.

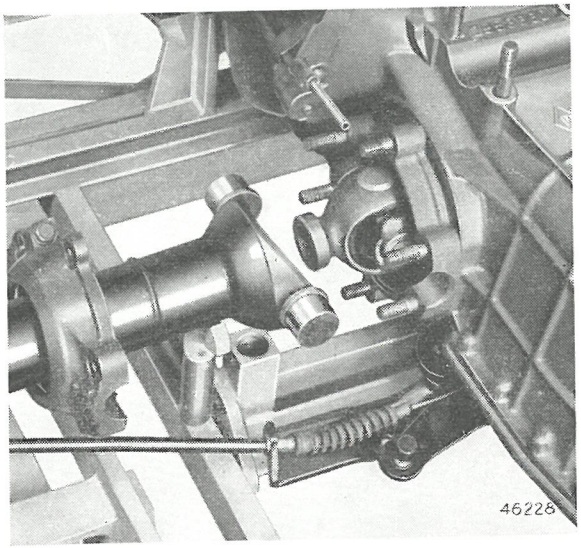
— Replace the shells on the gearbox in order to maintain the differential carriers.

— Remove the cover plate obturating the clutch flywheel location by moving plate to the right to clear the hook.

Separate the " gearbox and rear axle " mechanism from the engine. To this end :

— Remove mounting bolts and nuts.

— Clear housings from centering dowels.



REFITTING THE " GEARBOX AND REAR AXLE " MECHANISM

Reverse sequence of all operations performed when removing. **Do not omit :**

a) Locking the 4 upper bolts attaching the mechanism to the engine, with 2 retainers (the one on the RH side has a lug for attaching the fuel pipe).

b) Filling universal joints with grease.

c) Securing the half-shells, taking care to follow their correct mounting direction (inner paint markings on differential carrier and half-shells are located opposite each other) and locking the nuts.

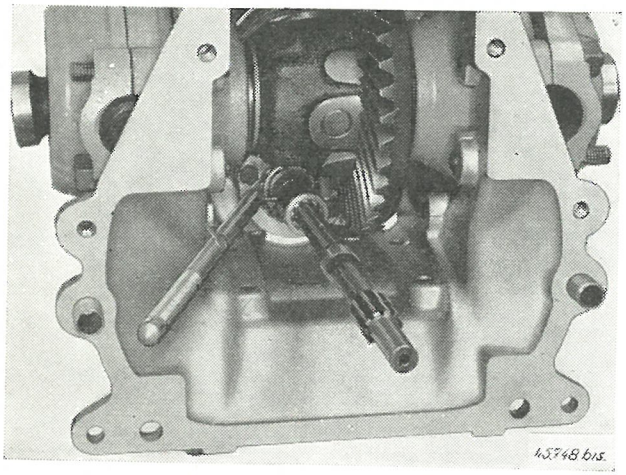
d) Installing and positioning the suspension springs in their cups, with largest diameter towards rear axle tubes.

e) Installing cross-member into its location on the mechanism housing (the sheath retaining lugs towards clutch control end).

f) Installing the centering dowel of the cross-member ; attaching cap.

g) Fitting rubber pads onto the limiting rods with largest diameter on cross-member. Tightening nuts and check nuts ; rod to be flush.

h) Filling with oil.



DISMANTLING THE " GEARBOX AND REAR AXLE " HOUSING

DISMANTLING THE REAR AXLE.

Secure the " gearbox and rear axle " housing on the dismantling support (B. Vi. 20).

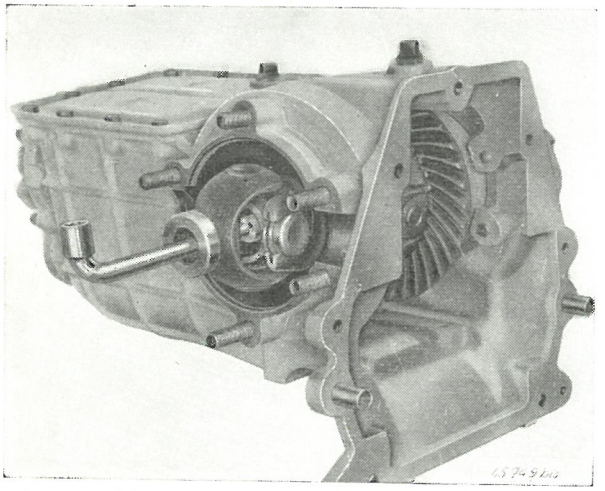
Remove the clutch control and the housing cover at engine side.

Remove the clutch shaft. To this end :

— Move together the two ends of the cotter pin retaining spring and push in order to reach the pin.

— Drive out pin (puller Emb. 03).

— Remove clutch shaft.



Remove the differential carriers. To this end :

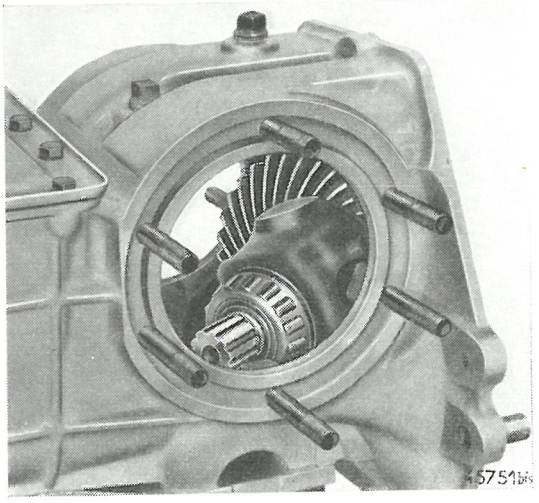
— Remove the half-shells.

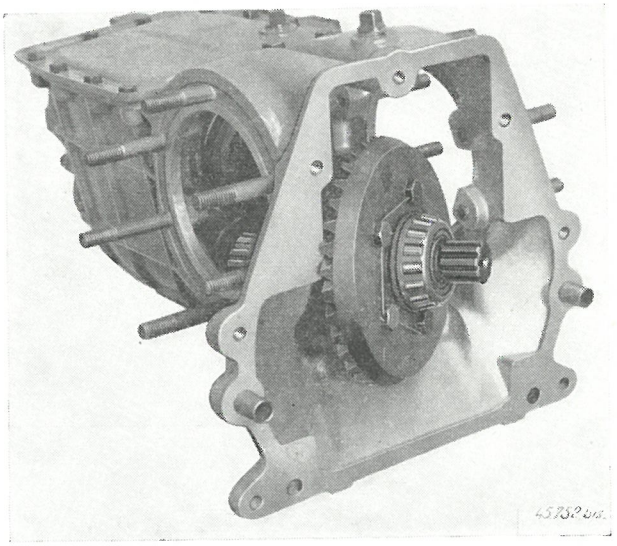
— Through the rear axle shaft hole, remove the universal joint attaching bolt and remove joint.

— Remove differential carriers.

— From carriers, press out as an assembly : the bearing cup, the adjusting washers and the sealing ring.

NOTE. — The differential carrier and the half-shells are matched. Paint markings are provided at the inside. Te replacing of one of these parts results in replacing the assembly.





DISMANTLING THE " GEARBOX AND REAR AXLE " MECHANISM

(Continued)

Position one of the differential case recesses opposite to the boss in the rear axle housing to cover the latter and allow for clearing the crown wheel and remove differential.

DISMANTLING THE GEARBOX.

Remove the fork cover and save the 2 springs and the 2 balls.

Remove the lower obturating plate.

Remove cover and combination speedometer housing.

To this end :

— Shift into first gear.

— Remove cover attaching bolts.

— Back off cover until it bears against the control shaft clevis.

— Rotate clevis clockwise to clear the fork shaft plunger.

— Remove cover and remove primary shaft bearings adjusting washers and spacer.

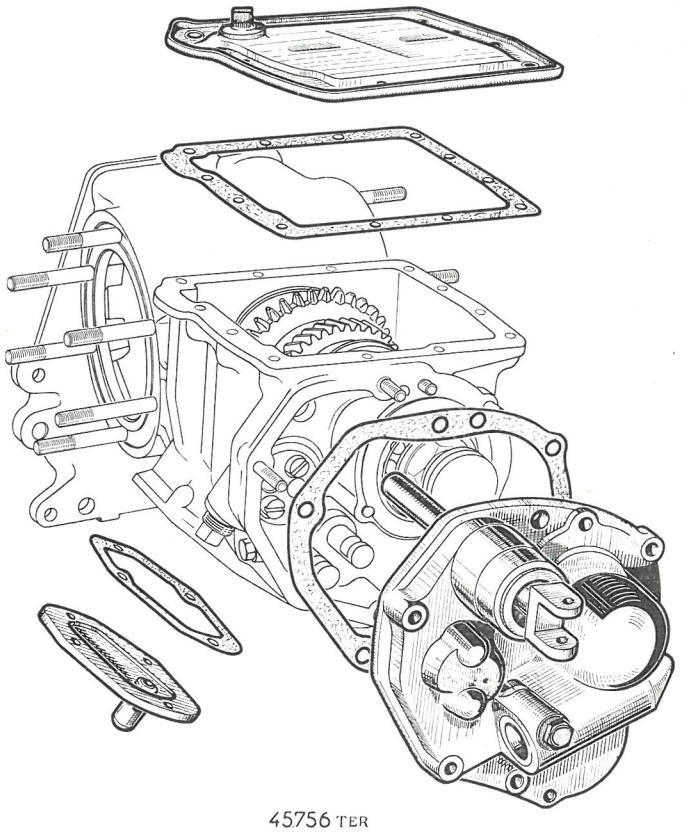
If necessary, separate from cover :

— The shifter shaft by driving out the lever attaching cotter pins.

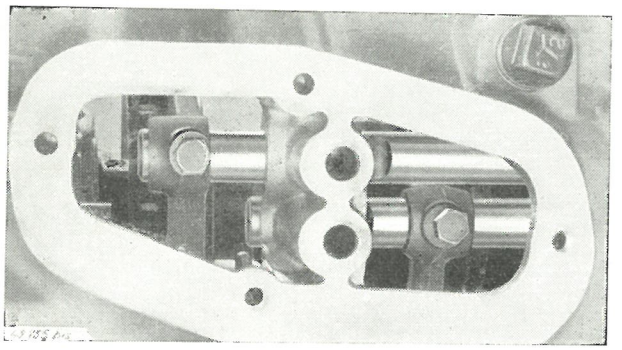
— The sealing ring.

— The fork control lever guide plate.

— The speedometer drive pinion and guide by removing the stop screw.



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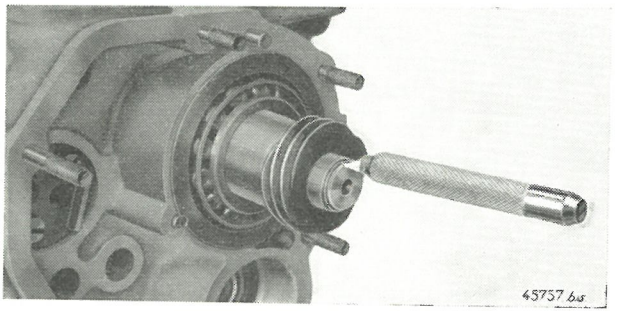
DISMANTLING THE "GEARBOX AND REAR AXLE" MECHANISM

(Continued)

Remove the fork control shafts. To this end :

— Unlock and remove the forks to shafts attaching screws and remove fork shafts from gearbox housing.

— Withdraw the locking plunger located in between the two shafts in the housing compartment at control side and remove the two forks.



Remove the secondary shaft.

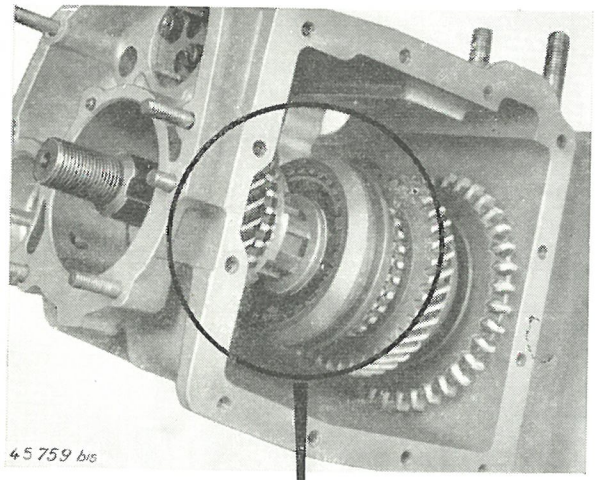
— Lock the secondary shaft by shifting two speeds.

— Loosen the speedometer worm and nut, using a chisel having the width and height of the slot.

— Remove the bearings at cover side.

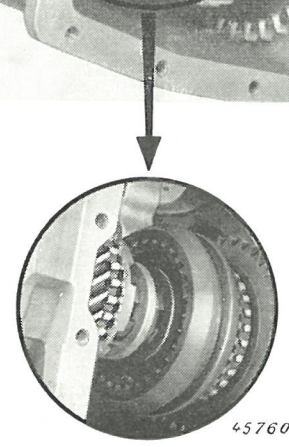
NOTE. — The inner bearing cone has a cross marking made with an electrical tracing point.

— **Drive out the secondary shaft towards the rear axle until the drive pinion bearing cup is loosened** (after removing retainer).



— Back off the high speed gear and withdraw the gear locking key.

— Bring the high speed gear and the locking ring to bear against the housing. **Access will thus be gained to the high gear lock washer.**

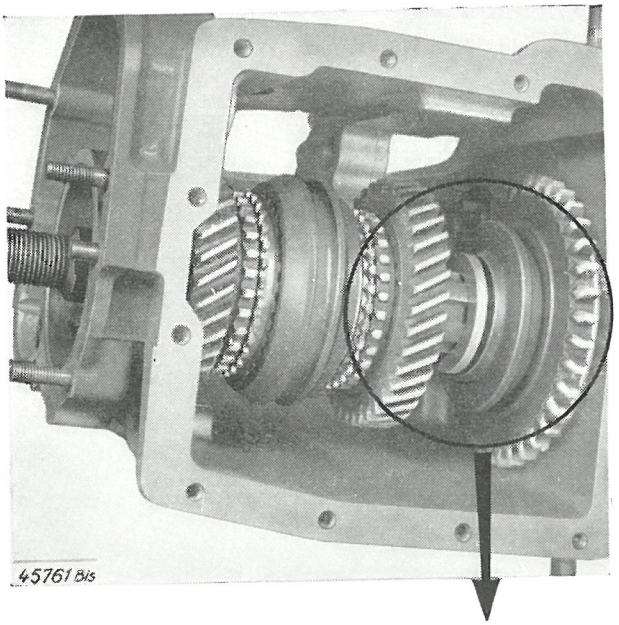


Rotate washer to align splines with those on the shaft and back off washer.

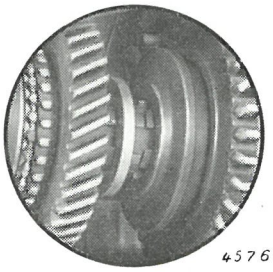
DISMANTLING THE "GEARBOX AND REAR AXLE" MECHANISM

(Continued)

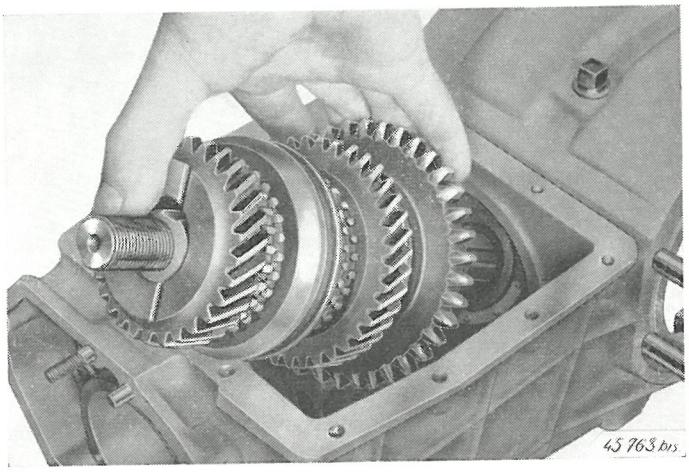
Back off synchronizer, the synchronizer locking ring and the intermediate gear. **Access wil thus be gained to the intermediate gear lock washer.**

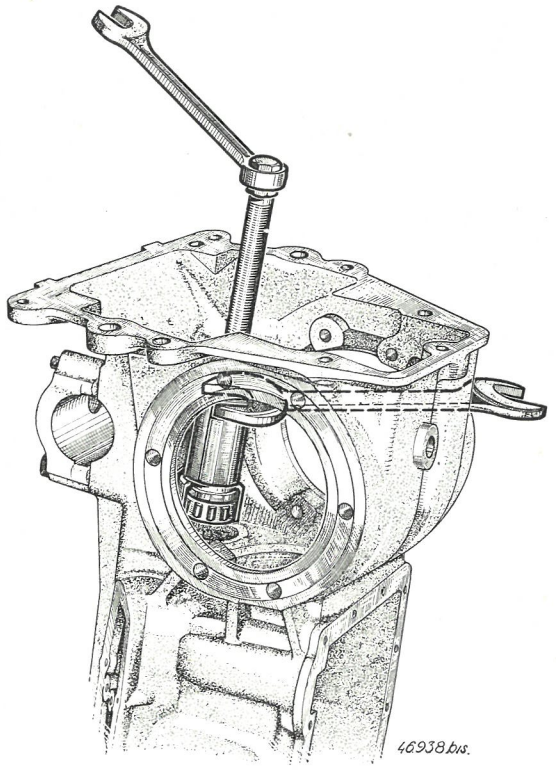


Rotate washer to align splines with those on the shaft and back off washer. **All gears can now slide on the shaft ;** back off gears towards the low and reverse gears.



Move shaft towards rear axle until its threaded end clears the housing bore ; hold all of the gears together and remove the gears and shaft as an assembly through the cover plate side.





DISMANTLING THE "GEARBOX AND REAR AXLE" MECHANISM

(Continued)

Remove the reverse shaft :

— Remove cotter pin.

— Drive out shaft (B. Vi. puller).

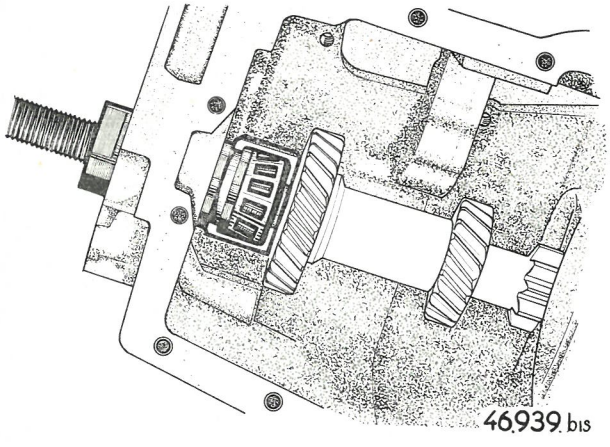
— Remove gear and spacer.

Remove the primary shaft :

— Move shaft towards the rear axle using the bearing cup at cover side as a thrust to clear the 2 cups. Mark cups for ultimate reassembly.

— The shaft is thus free in the housing but cannot be removed until after the 2 bearings have been removed (B. Vi. 22 puller).

— Remove the bearing at differential side.



— Remove the second bearing.

— Remove from the gearbox housing the fork control lever guide plate.

— Remove the plunger hole obturating screw.

Removivng the secondary shaft bearing (at drive pinion end). To this end :

— Remove the bearing snap ring.

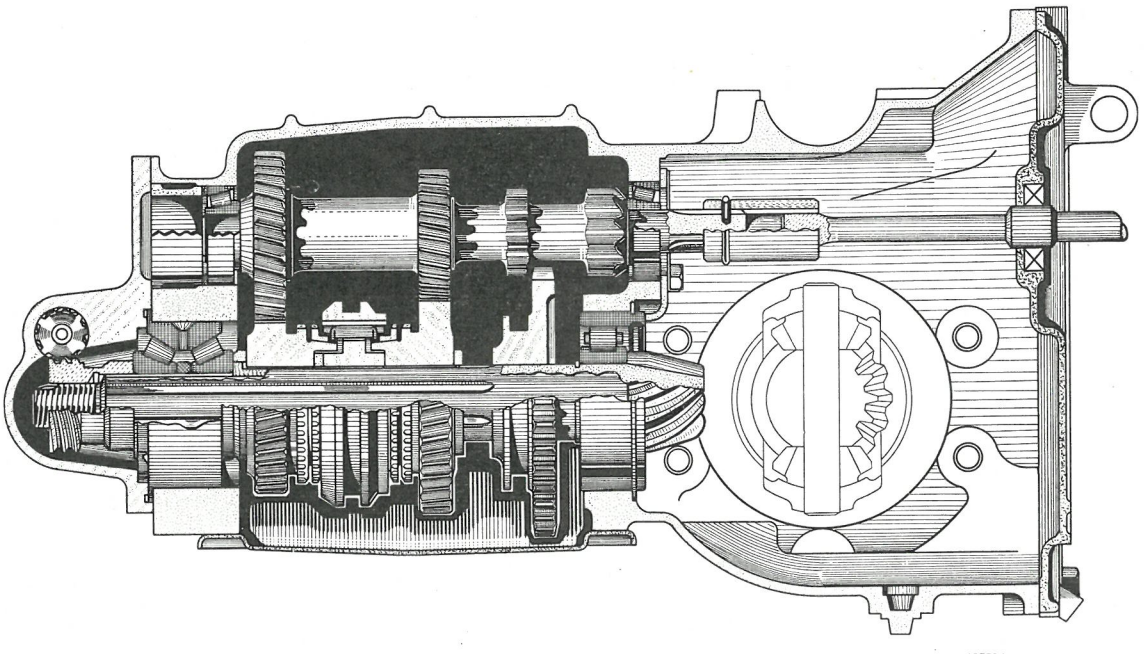
— Drive out the bearing on the press using a spacer for leverage action (31 mm I.D. — 60 mm long spacer).

Dismantle the synchronizer assembly.

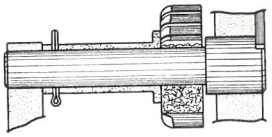
Remove sliding gear and separate spring and keys.

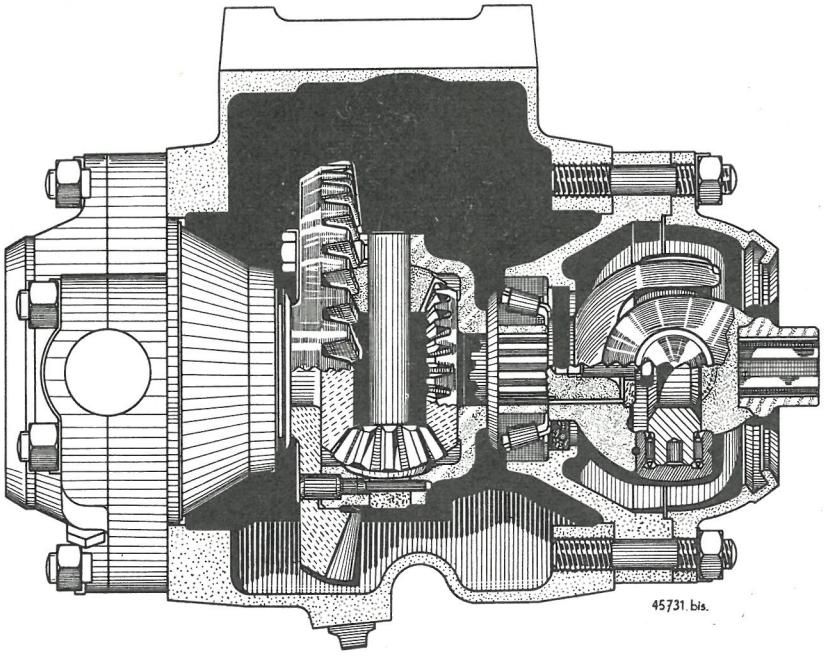
Clean all dismantled parts and check same.

REASSEMBLING THE " GEARBOX AND REAR AXLE " MECHANISM



45730 bis



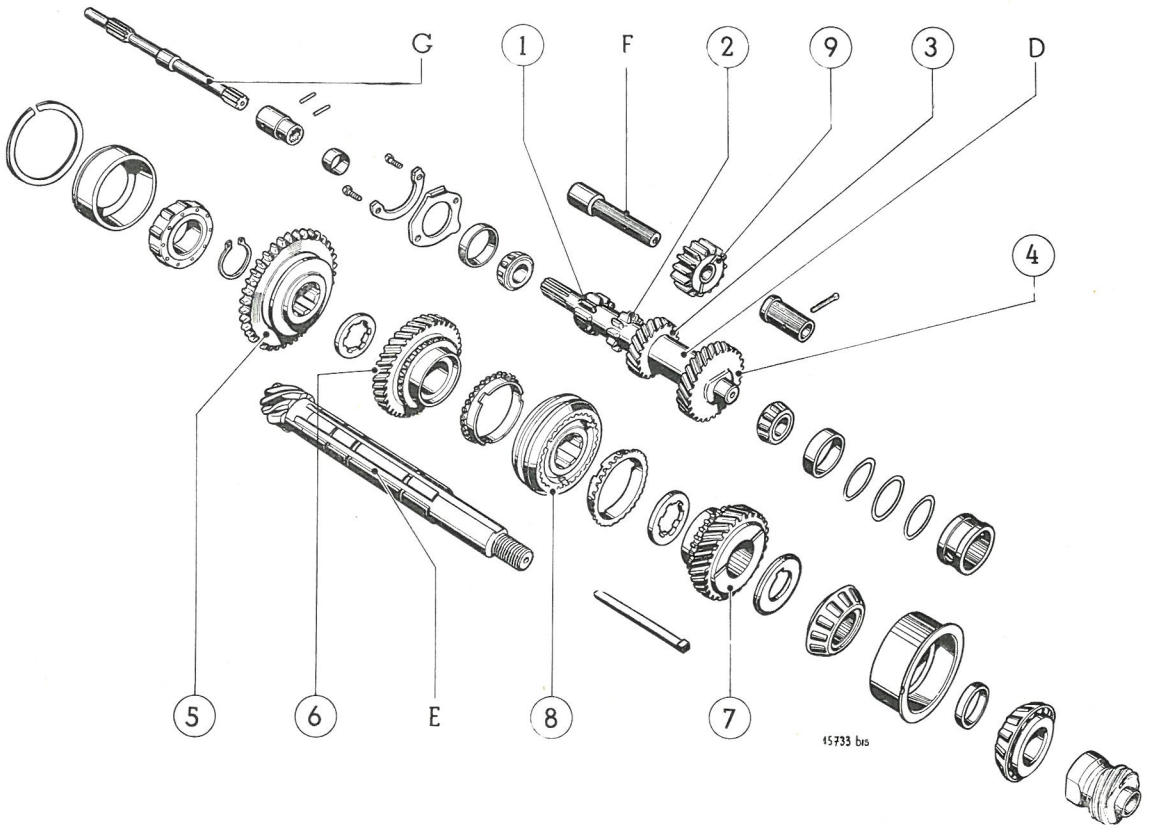


45731 bis.

REASSEMBLING THE " GEARBOX AND REAR AXLE " MECHANISM

(Continued)

REASSEMBLING THE GEARBOX



— On secondary shaft (**E**), position the bearing at the drive pinion side and its snap ring.

— Position **primary shaft only** (**D**) into housing. Assemble the 2 bearings.

Assemble the marked cups : At rear axle side, mount flush.
At rear end, **do not push in entirely.**

— Install in the housing : The reverse gear (**9**), **teeth chamfer towards spacer** and the spacer (shoulder towards gear).

Insert the shaft (**F**) through the rear axle end. **Position the flat on the shaft** with reference to the primary shaft bearing thrust plate.

Cotter pin spacer on shaft.

REASSEMBLING THE " GEARBOX AND REAR AXLE " MECHANISM

(Continued)

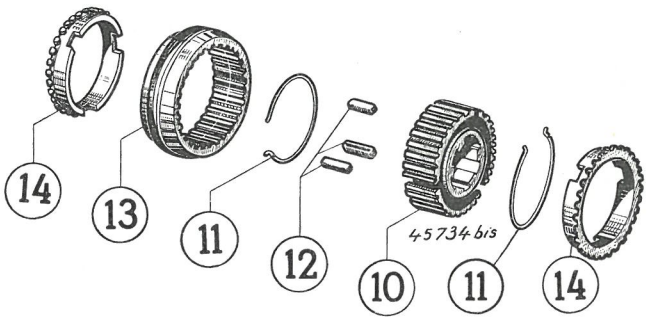
Prepare synchronizer assembly as follows :

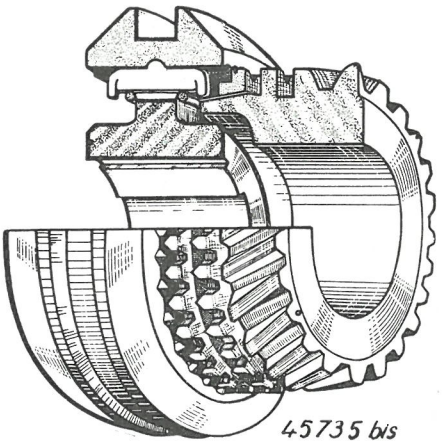
Install in sliding gear : (**13**) :

— The hub (**10**).

— The 3 keys (**12**) with hollow side towards hub.

— The 2 snap rings (**11**). **Insert one end of each snap ring in different keys.**





On secondary shaft, assemble :

— The sliding gear (**5**), with teeth towards rear axle. **The pinion should slide freely.**

— The **lockwasher** with the **largest diameter.**

— The gear (**6**).

— The locking ring (**14**).

— The synchronizer assembly (**8**). **Align the spline free section of the hub with the shaft keyway.**

— The second locking ring (**14**).

— The **lockwasher** with the **smallest diameter.**

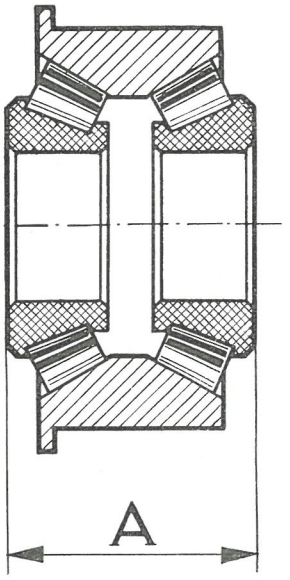
— The gear (**7**).

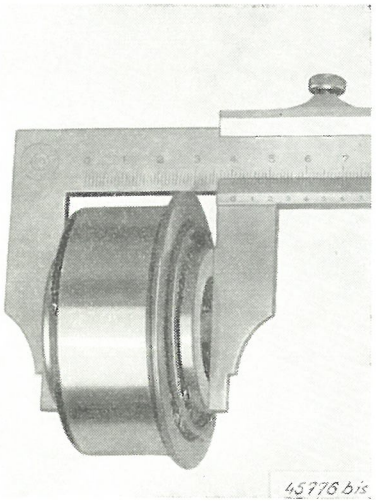
Install the assembly thus prepared into the housing. **Hold gears to avoid the shifting of the hub.**

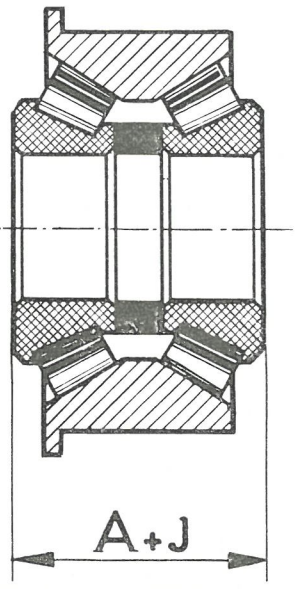
Place the lockwashers and lock by means of the key by reversing dismantling sequence.

Install the cone distance adjusting washer (large chamfer towards rear).

This is a tentative assembly (see cone distance adjustment).







REASSEMBLING THE " GEARBOX AND REAR AXLE " MECHANISM

(Continued)

The secondary shaft dual bearing includes :

— A dual cup.

— Two bearings with rollers.

— A spacer.

Two conditions may be encountered :

1° Assembling a dual bearing already used :

The bearing wear should first be compensated for by replacing the spacer for a thinner spacer.

Spacers are available in increments of .05 to .05 mm (.0019 to .0019 in.) from 6.15 to 6.45 mm (.242 to .2539 in.).

The thickness of the spacer is determined as follows :

— Locate the 2 bearings without spacer into the dual cup following their dismantling position (the bearing marked with an electrically engraved cross is to be fitted at end opposite to outer shoulder of cage).

— Place a sliding caliper on the 2 bearings cones. Rotate cup to properly position the rollers and record size A. This size corresponds to the position of the 2 bearings assembled without play. To obtain correct clearance J = .06 mm (.0023 in.), the 2 bearings should be moved apart by a distance **J**. Thus, the distance of the 2 bearings is now A + J.

To determine the thickness of the final spacer, install any spacer in-between the 2 bearings and record size. The latter should be closest to size A + J. Look for proper spacer.

2° Assembling a new spacer :

If one of the parts of the dual bearing is to be eliminated, it is mandatory to replace the dual bearing assembly. The Spare Parts Department will supply this assembly as a matched and pre-set whole, therefore it will not be necessary to determine the thickness of the spacer.

REASSEMBLING THE " GEARBOX AND REAR AXLE " MECHANISM

(Continued)

On shaft, assemble :

— The inner bearing **(marked with a cross),** the cup **(position locking lug),** the spacer, the other bearing.

— The combined speedometer nut and worm **(replace if collar is damaged).**

At rear axle side :

— Assemble bearing cup, snap ring, oil baffle.

— Secure the primary shaft bearing thrust plate and lock the screws.

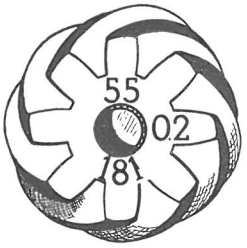
Tighten up the speedometer nut and worm. **Do not lock** (for ultimate cone distance adjustment).

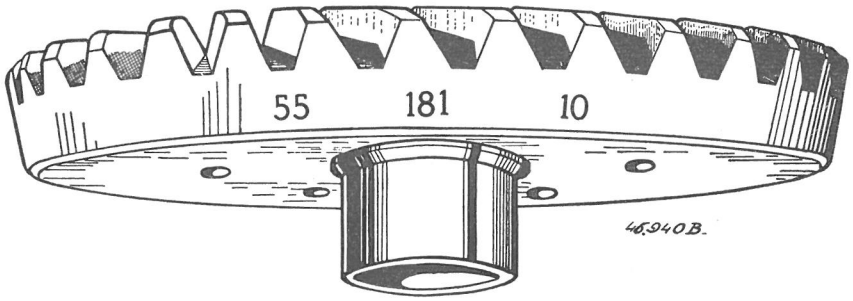
The shaft should revolve freely without play.

To set the **primary shaft** bearings clearance, push in fully the rear bearing cup.

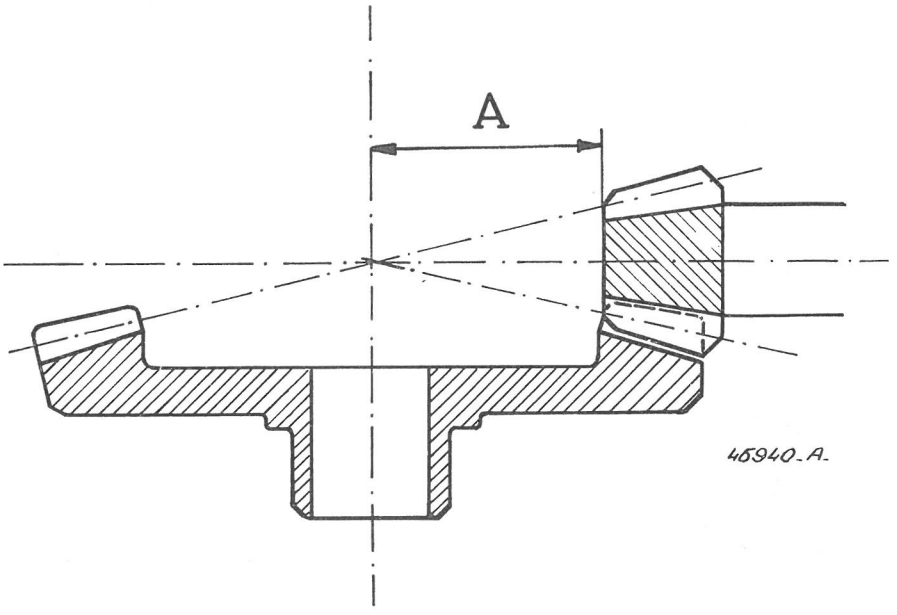
— **If shaft rotates freely,** insert adjusting shims and, next, the spacer until the latter is **flush.**

— **If shaft is hard to revolve,** insert thinner adjusting shims to move spacer back by .10 mm (.0039 in.) ; temporarily assemble the cover and gasket ; hit the end of the shaft at rear axle side to correctly position same.





Markings as 55 and 181, for example, are reference figures which, when shown on the ring gear, are proof that they are matched.

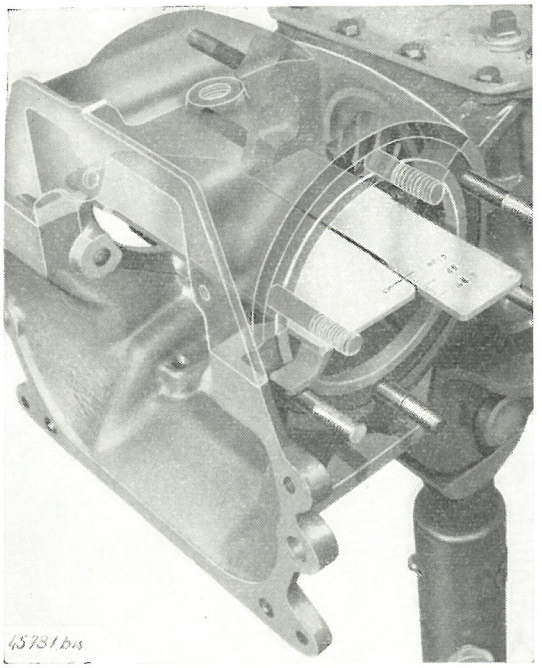


The theoretical cone distance " A " is 47.5 mm (1.87 in.).

The actual cone distance equals 47.5 mm (.1.87 in.) + the difference marking shown on pinion.

In above illustration, the cone distance is : 47.5 mm + .2 = 47.7 mm (1.877 in.).

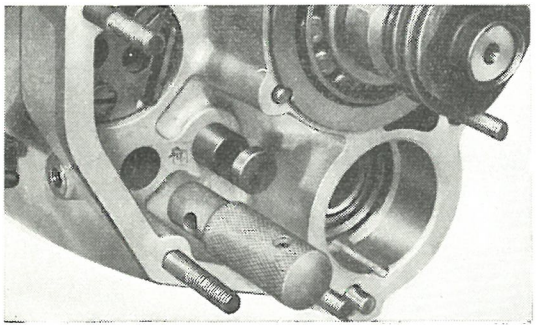
If no marking is shown on the pinion, the actual distance equals 47.5 mm (.1.87 in.).



REASSEMBLING THE " GEARBOX AND REAR AXLE " MECHANISM

(Continued)

Measuring the actual cone distance is made with the direct reading type device T. Ar. 27.
The reference plate marked " O " should be applied against the assembly centering.
The graduated rule should be applied against the front face of the drive pinion. One graduation on the rule corresponds to a move of the pinion of .1 mm (.0039 in.).
The dimension recorded in front of marking " O " should equal the actual cone distance previously computed.
If not, insert between high speed gear and dual bearing, an adjusting washer of correct thickness (adjusting washers are available by increments of .10 mm (.0039 in.) from 3.3 to 4.3 mm, i.e. .129 to .169 in.).
Remove the cone distance adjusting washer of the temporary assembly and replace by the determined washer.
Reinstall the dual bearing.
Run up and tighten the nut and combination speedometer worm and temporarily assemble the rear cover (and combination speedometer housing) with gasket and check cone distance obtained.
Remove cover and push down the speedometer worm and nut collar into the shaft groove.
On housing, attach the fork control lever guide plate.



Assembling forks and shafts.

Install the intermediate and high fork into the sliding gear groove.

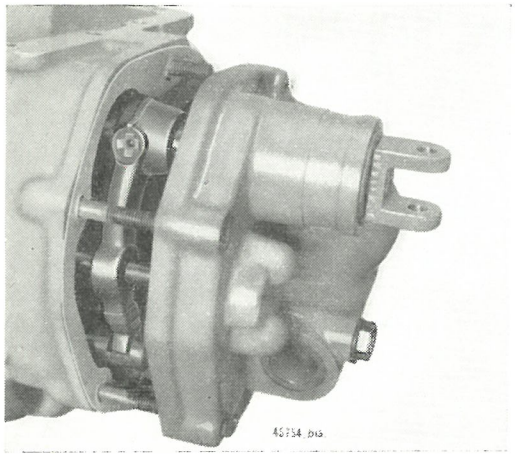
Insert the intermediate and high shaft **(the shortest)** and assemble to fork. Tighten up the lock screw and lock with wire.

Insert the locking plunger in its location **(using guide B. Vi. 04)** and install the plunger hole obturating screw.

Install the low and reverse fork into the sliding gear groove **(the fork boss offset towards the gear).**

Insert the low and reverse shaft and assemble to the fork.

Tighten the lock screw and lock with wire.



Shift to low gear, insert the fork control lever into the low and reverse shaft notch. Assemble the rear cover with its paper gasket coated with sealing compound.

Reinstall the lower cover plate along with the Vellumoid gasket.

Assemble the fork balls and springs **(the longest spring is to be located on the intermediate and high fork shaft).**

Reassemble the fork cover with its paper gasket coated with sealing compound.

REASSEMBLING THE " GEARBOX AND REAR AXLE " MECHANISM

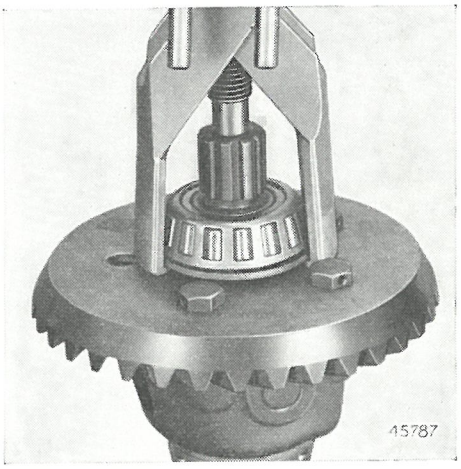
(Continued)

REASSEMBLING THE REAR AXLE.

Remove the differential bearings with **tool Mot. 49 gear puller.**

(At crown wheel side, it will be necessary to remove 2 mounting bolts to position tool).

The baffles will be distorted by the removal of the bearings ; it is mandatory to replace the baffles for new ones when reassembling).



Setting the backlash.

Install in housing the differential assembly.

Install one of the **setting tools T. Ar. 28** on the differential housing **(with setting screw fully backed off.**

On tool, install the differential carrier with its paper gasket and the matched half shells. Install the other tool in the same way.

Secure a dial indicator onto the housing by **T. Ar. 29 bracket.**

Make sure that the indicator point contacts one tooth of the rear axle crown wheel.

Tighten the tool screw at the wheel end in order to obtain the backlash of .1 to .2 mm (.0039 to .0078 in.).

Tighten the check nut.

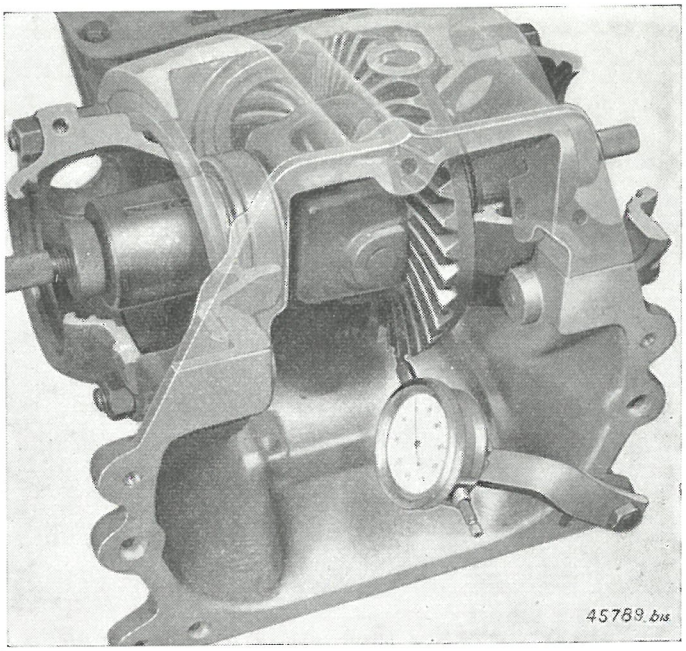
Tighten the screw at opposite end and tighten check nut.

Measure backlash at several teeth.

If backlash is not uniform : this will indicate a warped wheel and **the pinion and wheel should be replaced as an assembly.**

Remove the half-shells and the differential carriers.

Remove tools and baffles, taking care to **mark** same.

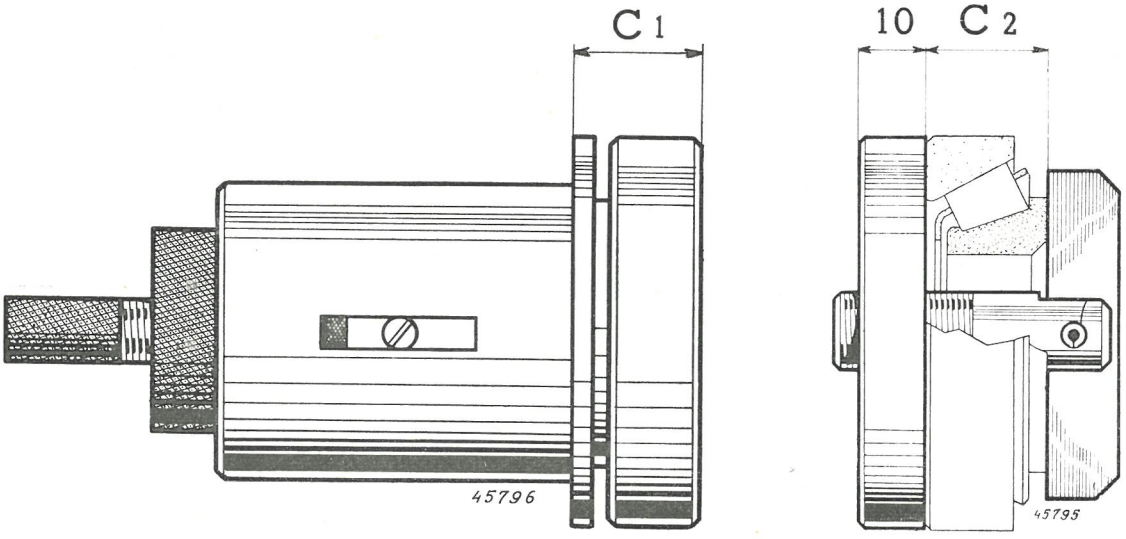


REASSEMBLING THE " GEARBOX AND REAR AXLE " MECHANISM

(Continued)

Setting the bearings clearance :

This setting is through shims inserted under cups in the differential carriers.
The shim thickness is obtained by the difference C1 - C2.

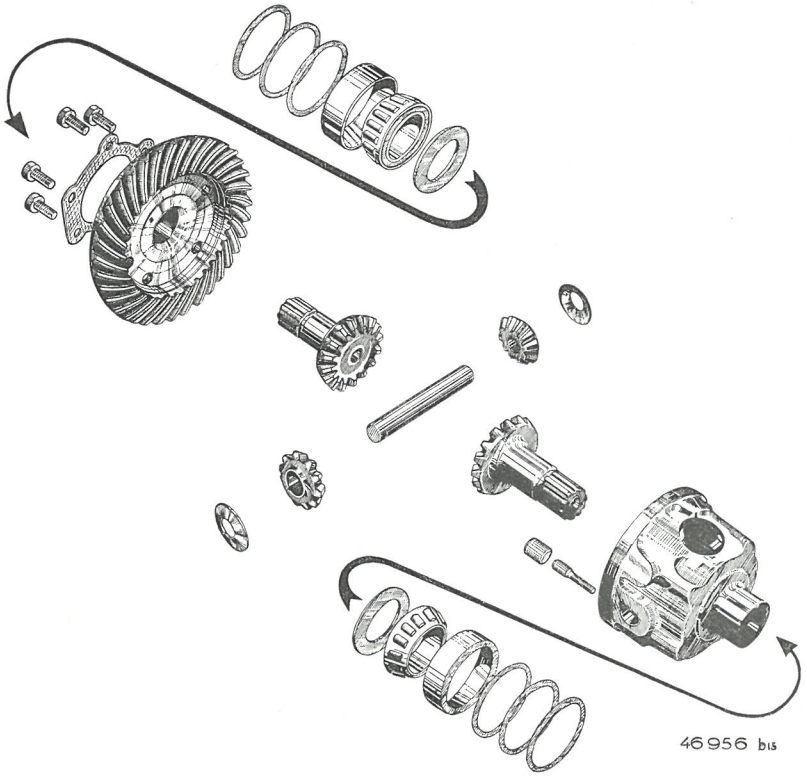


C 1 is measured with a micrometer gauge on adjusted tool.
On T. Ar. 28 fixture, clamp the bearing corresponding to the measured tool.
Stop tightening before the rollers are locked.
Measure C 2 with micrometer gauge on T. Ar. 28 fixture.
To obtain C 2 thickness, deduct thickness of plate (10 mm or .39 in.).

Make up a set of shims as close as possible to the size obtained (shims are available of the following dimensions : .10 - .20 - .50 - .95 mm, i.e. : .0039 - .0078 - .0196 - .0374 in.) and mark this clearance with reference to the bearing wherefore it is to be used.
Follow the same procedure for the second bearing.

Assemble, as per the markings :
— The bearings, on differential.
— The sealing washers, adjusting shims and cups in the differential carriers.

Install differential in housing.
Install differential carriers with their paper gasket coated with sealing compound.
Install universal joints and secure.
Install the half-shells with the felt gasket and temporarily secure.
Refit the clutch shaft with the cotter pin retaining spring on primary shaft.
Align the pin holes.
Fit pin and next its retaining spring.
Reposition the front cover with its paper gasket coated with sealing compound (make sure the centering dowels are properly positioned).
Reassemble the clutch control.



DISMANTLING AND REASSEMBLING DIFFERENTIAL

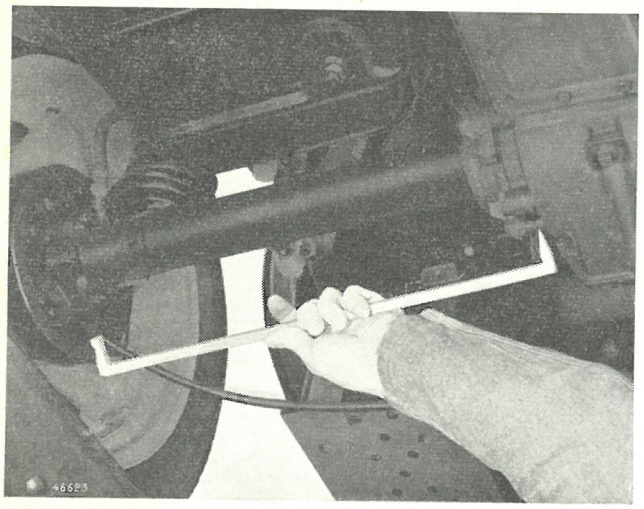
DISMANTLING.

Remove bearings as specified page 79.
Remove baffles.
Separate crown wheel from housing.
Remove shearing pin.
Drive out the differential pinion shaft lock pin.
Remove shaft.
From housing, remove the differential pinions and pinion bearings.

REASSEMBLING.

Into housing, install the differential wheel opposite to crown wheel and the differential pinions with their bearings.
Insert shaft by aligning the cotter pin hole.
Install cotter pin and shearing pin.
Install second differential wheel in crown wheel.
Install crown wheel on housing by aligning the shearing pin. Position retainer on crown wheel **(the notchless portion should be placed on the shearing pin).**
Secure crown wheel to housing and tighten with torque wrench.
Torque requirement : 3.5 m.kg (25.3 ft/lbs).
Hammer down retainer.

NOTE. — **The bearings are to be assembled after setting the backlash (page 79).**



REAR AXLE
TUBE AND SHAFT ASSEMBLY

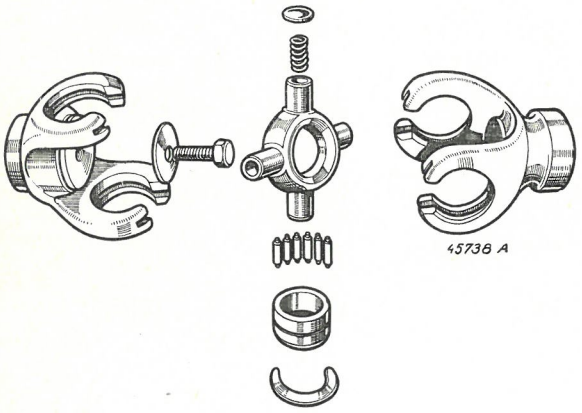
Inspection. — (With gauge T. Av. 04 - reference B).
The end portion recess of the tool comes to bear against the outer edge of the brake carrier plate.
The point of the other end aligns with the assembly plane of the 2 half-shells. A difference in measurement will indicate a distortion.

REMOVAL.

Remove wheel. Disconnect : parking brake control, flexible line, lower end of shock absorber. Run off the nuts on the limiting rod by lifting the rear axle tube with a jack.
Remove the half-shells and save the needle cages.
Refit the rear axle tube.

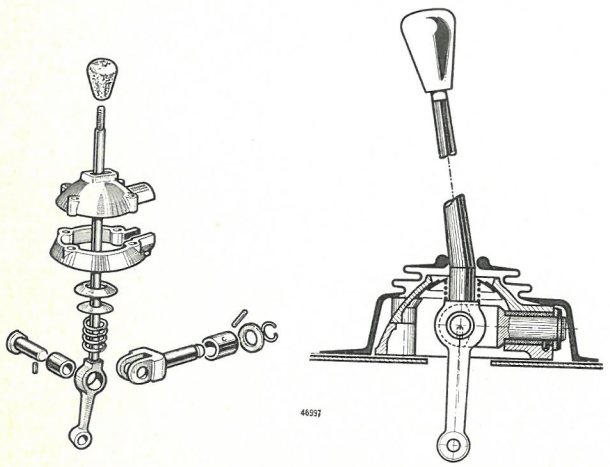
REFITTING.

Resume removing operations in reverse sequence.
Align paint markings opposite each other when reassembling the half-shells.
After refitting : bleed and adjust the brakes.



INSPECTING AND OVERHAULING UNIVERSAL JOINT

Remove retainers. Drive out cups.
Save needles **(16 needles per cup).**
The new cups should have no diametral play in the yokes.
The new snap rings should have no play in their groove.
If the universal joint exhibits either of those defects, the joint is to be replaced.
If the universal joint exibits some play, causing a light knocking, correct as follows :
— Either by inserting a special spring into the axial hole drilled into each spider arm (if spring protrudes by more than 4 mm (.157 in.), grind as required).
— Or by assembling into the bottom of the cups special adjusting washers, the thickness of which is to be determined upon assembly (available thicknesses : .1 - .2 - .3 mm, i.e. .0039 - .0078 - .0118 in.).
When reassembling, use new snap rings only.



ASSEMBLING
THE GEAR SHIFT LEVER

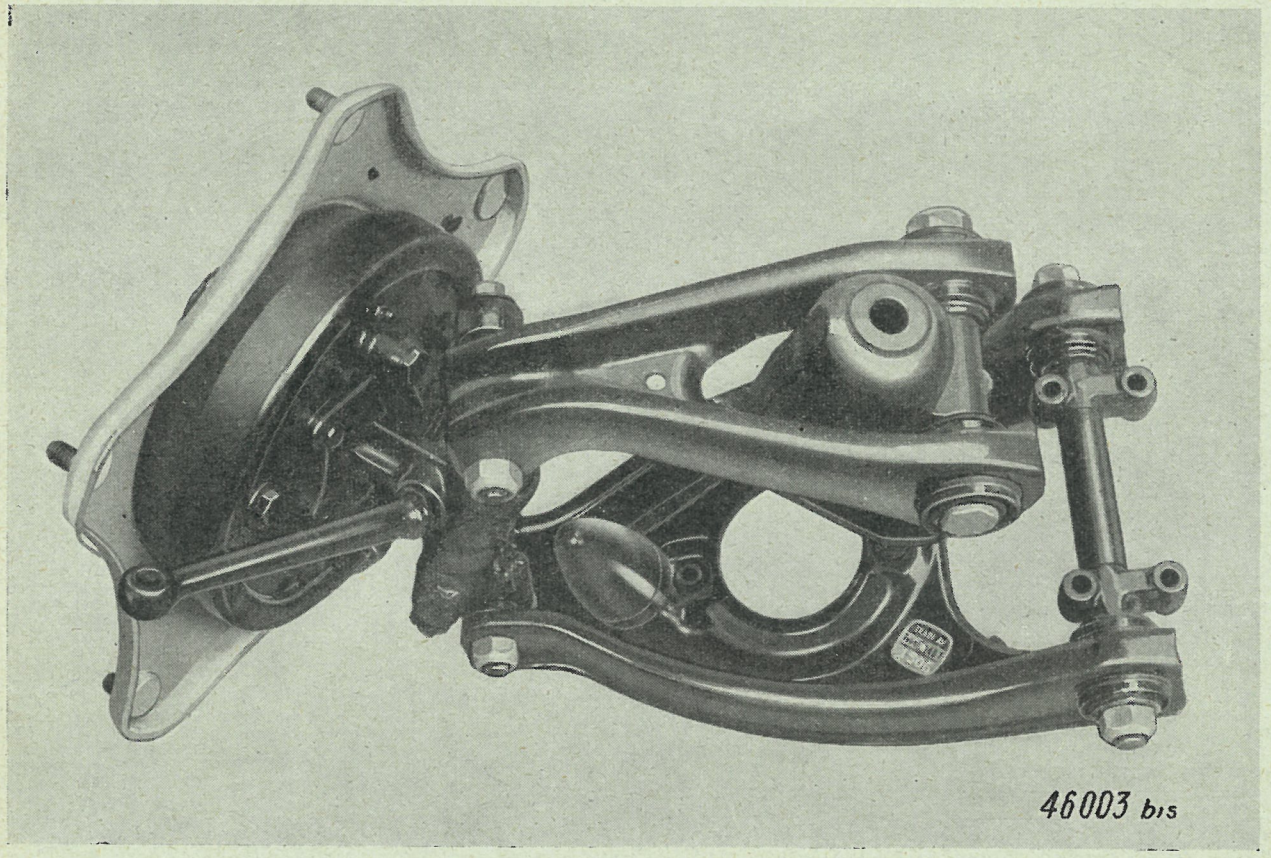
6. FRONT AXLE

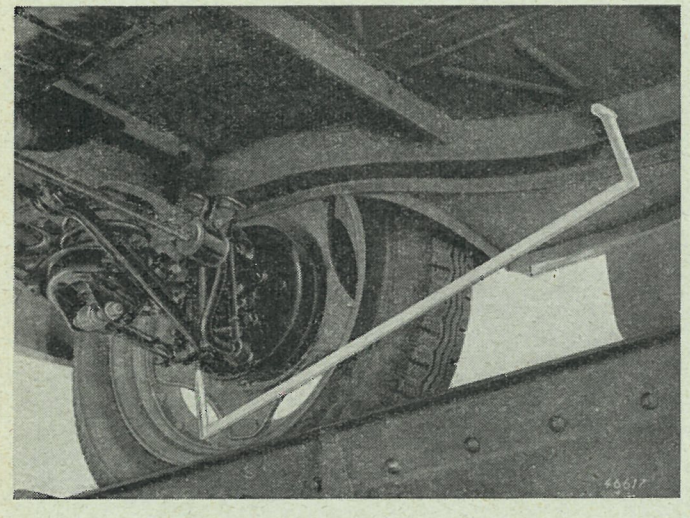
		PAGES
Specifications		84
Special tools		143
Checking for correct specifications	Preliminary inspections	85
	Measuring and adjusting toe-in	85
	Checking specifications	87
Front axle half assembly (R or LH)	Removing	88
	Refitting and locking the rubber bushes	88
	Dismantling and reassembling	89
" Drum, brake plate, king pin, stub axle " assembly	Removing and refitting	89
Checking and replacing the front axle components	Checking the suspension arms	90
	Replacing the rubber bushes	92
	Checking a stub axle king pin	93
	Replacing the stub axle bushes	93

SPECIFICATIONS

Track on ground	1.22 m (47.32 in.)
King pin inclination	10°
Camber angle	1.20°
Castor angle	10°
Toe-in (no load)	3 to 5 mm (.118 to .196 in.)
Turning radius	4.20 m (13.77 ft)
Suspension arm hinges	On rubber bushes
Rubber bush locknuts tightening torque	At wheel end : 5 m.kg (36.16 ft.lb) At body end : 7.5 m.kg (54.24 ft.lb)
Locked position of rubber bushes	Achieved by installing tool T. Av. 03 positioning shim

FRONT AXLE HALF





PRELIMINARY INSPECTION.

The positioning gauge of the front stub axle T. Av. reference A will permit checking, without prior dismantling, the position of the front axle.

The gauge should be centered in the side member pilot hole on one hand and in the stub axle king pin centering on the other hand

CHECKING FOR CORRECT SPECIFICATIONS

PRELIMINARY INSPECTIONS.

To check the front axle for correct specifications, **the points listed below should be inspected first :**

— King pins play.
— Steering connecting link ball joints play.
— Tyre inflation pressure.
— Rims and wheel flanges (star) for warpage.
— Hub bearing play.
— Tyre tread for uniform wear pattern.
— Condition of springs.
— Shock absorbers for proper operation.
— Rubber bushes for proper condition.
— Mounting of front axle half on cross-member.

If, when checking the above points, uncorrect conditions are found, the latter should be corrected prior to proceeding any further.

If, after this checking and after correction (if required) the trouble continues, then the front axle should be inspected for correct specifications.



MEASURING TOE-IN.

Preliminary operation.

a) Locate vehicle on a flat, horizontal surface. Stop vehicle in forward position.

b) Preliminary checkings :

Tyres to be inflated at normal pressure.
Various clearances to be normal.

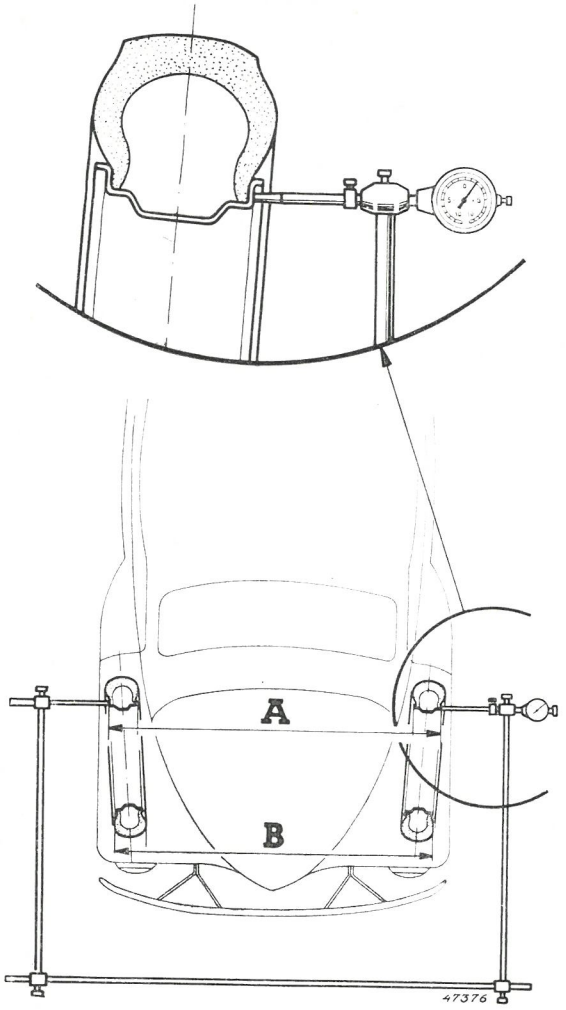
c) Steering rack :

Position steering wheel in the mean position by rotating (to the right and to the left) until the rack stops contact the retracting spring.

d) Achieve equal wheelbases :

Using a rule with 2 sliding pointers or with a suitable instrument (as a trammel gauge), record the RH wheels center distance (compare with theoretical center distance and correct if necessary by operating the connecting links). Compare the LH wheels center distance and correct if required to achieve identical value with RH wheels center distance.

The front wheels are now symmetrical as compared to the lengthwise centerline of car.



CHECKING FOR CORRECT SPECIFICATIONS

(Continued)

MEASURING TOE-IN (continued) :

— Adjust the height of the gauge contact points to the height of the wheel hubs.

— Move contact points so that they touch the rims at their rear end (position A).

— Mark the contact spots with chalk and set gauge dial to zero.

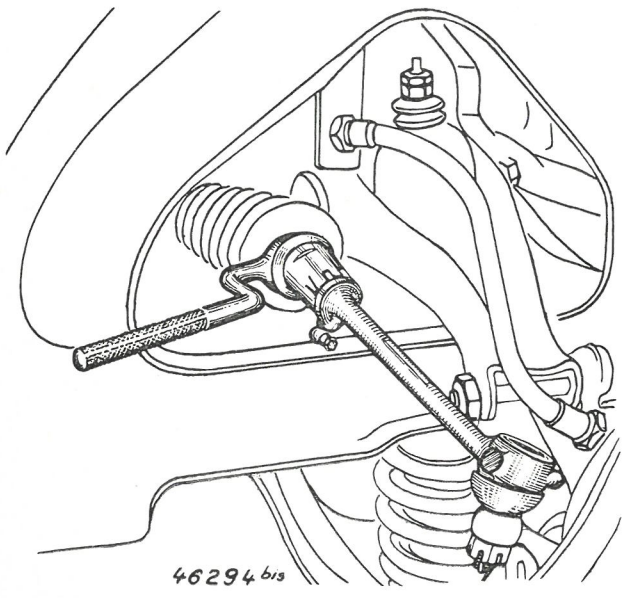
— Remove gauge.

— Move the car forward by half a wheel turn ending by a forward movement (markings on rim are aligned with gauge points). If necessary, push car back and start all over again.

— Record distance between rims at the front end of rims by positioning gauge points on the chalk marks (position B).

— The toe-in value will be recorded from the dial indicator of the gauge.

— If this value does not range from 3 to 5 mm (.118 to .195 in.), correct toe-in.



ADJUSTING TOE-IN.

The toe-in is set by equal halves through the R and LH connecting links.

The latter are provided with lock nuts and flats on the threaded portion of the ball joint to enable lengthening or shortening the links.

CHECKING FOR CORRECT SPECIFICATIONS

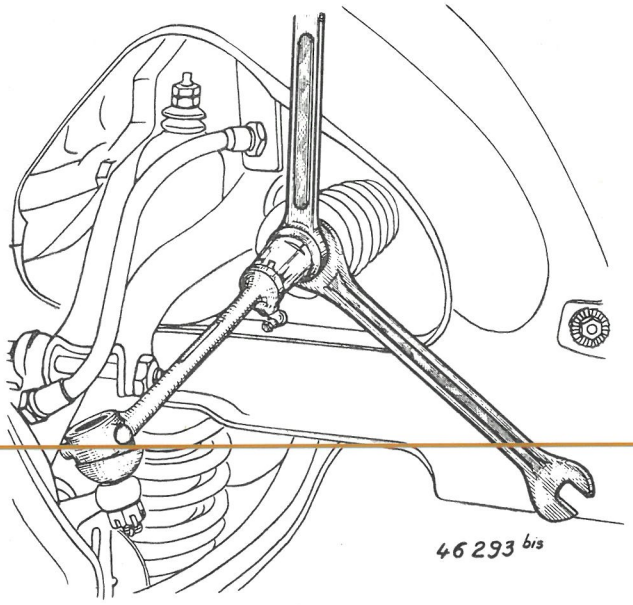
(Continued)

ADJUSTING TOE-IN (continued) :

When tightening or loosening the lock nut, it is mandatory to hold the attaching flange with a spanner to prevent the steering rack from turning (tools Dir. 02 - T. Av. 17).

We strongly advise against the inserting of intermediate washers at the link end. The grinding of the end at the notches end is also prohibited.

These modifications result in locking the ball joint in-between the cups and will cause automatically the failure of the ball joint tail.



CHECKING FOR CORRECT SPECIFICATIONS.

Check, whenever :

— The front of the vehicle has been subjected to a heavy impact or collision.

— Trouble is experienced with the steering gear.

— There is abnormal wear of the front tyres.

— By measuring the skidding with a floating type table, abnormal values are found.

Checking the front axle for specifications should be performed on a perfectly horizontal and flat area. The vehicle should be stopped :

1° After being driven in a forward direction.

2° With wheels in straight ahead position.

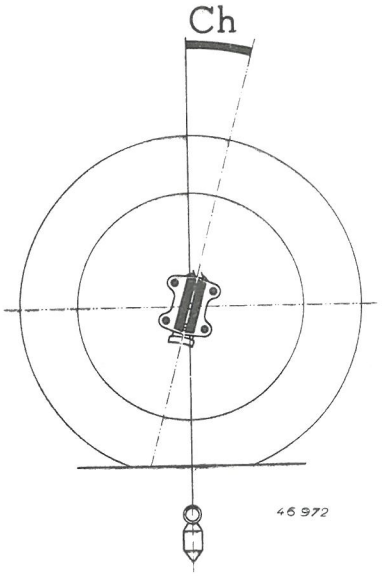
First check and adjust the toe-in, next check with special gauges (see Specifications from Manufacturer or how to use these gauges) :

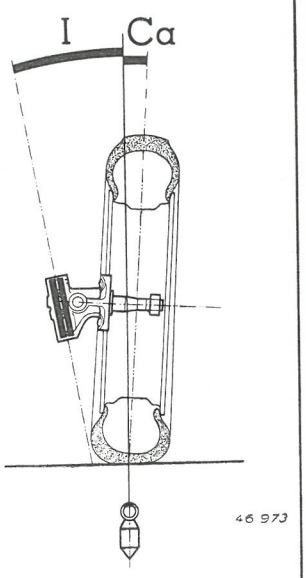
— Camber angle Ca = 1°20.

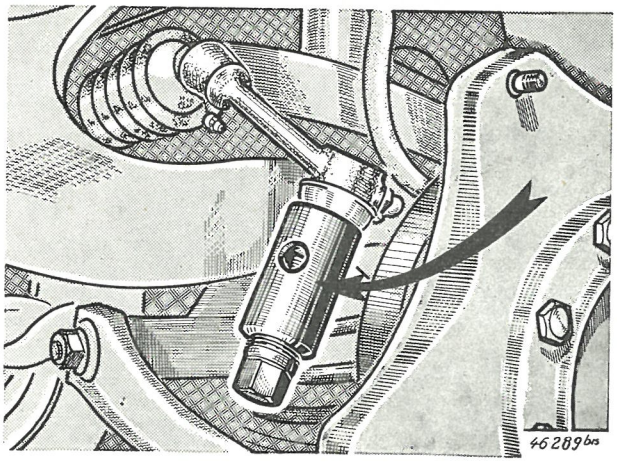
— Caster angle Ch = 10°.

— King pin angle or inclination I = 10°.

Should the dimensions found not correspond to the theoretical dimensions, dismantle and inspect the front axle components, using the gauges provided to this end.







FRONT AXLE HALF (R or LH)

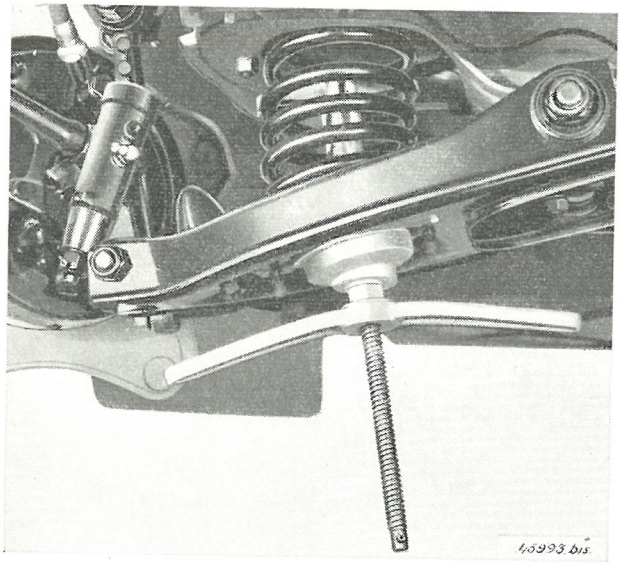
REMOVING A FRONT AXLE.

At the side concerned, loosen the wheel nuts, raise the vehicle on stands and remove the wheel.

Disconnect the steering connecting rod (remover T. Av. 05 reference A).

Remove the shock absorber (see suspension).

Disconnect the rigid brake line from flexible line and remove retainer securing line to lug.



Disconnect the torsion bar link to the stub axle upper hinge bolt.

Compress suspension spring (tool Sus. 09).

Unlock and remove the lower hinge bolt bearing nuts on cross-member.

Clear the mounting bolts.

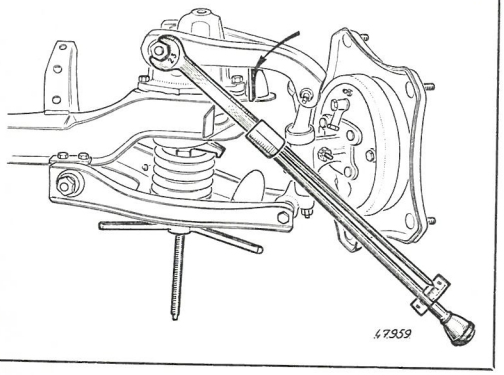
Release spring and remove.

Remove upper impact bumper.

Loosen and remove nuts from shock absorber support.

Remove mounting bolts.

Clear the front axle half.



REFITTING A FRONT AXLE HALF AND LOCKING THE RUBBER BUSHES.

Position the front axle half assembly and the shock absorber support onto the cross-member ; install and tighten the support mounting bolts.

Place the impact pad (with flat towards support) ; lubricate the spring bearing faces and fit spring into its location and position properly.

Compress spring (compressor sus. 09).

Fit bearing bolts, tighten and lock.

Install the positioning shim between the upper suspension arm and the end of the cross-member (shim T. Av. 03).

This shim positions the front axle in-between its topmost and down-most movements.

The arm bolt nuts will thus be locked in this medium position which will correspond for the rubber bushes to the torsion-less position.

At this position, tighten the bolt nuts to 7.5 m.kg (54.22 ft/lbs) at wheel end and to 10 m.kg (72.3 ft/lbs) at body end.

Compress spring to remove shim. Release spring and check for correct position at upper end.

Reconnect the torsion bar link and attach the brake flexible line with its retainer. Connect the brake line.

Refit the shock absorber and assemble the steering connecting link. Tighten and insert cotter pin.

Bleed brakes and refit the wheel.

FRONT AXLE HALF (R and LH)

(Continued)

DISMANTLING AND REASSEMBLING A FRONT AXLE HALF.

DISMANTLING.

Upper suspension arm.

— Run off the upper hinge mounting bolt nut and drive out the bolt.
— Tighten shock absorber support in vice at flange end.
— Run upper hinge bolt nut and drive out bolt.

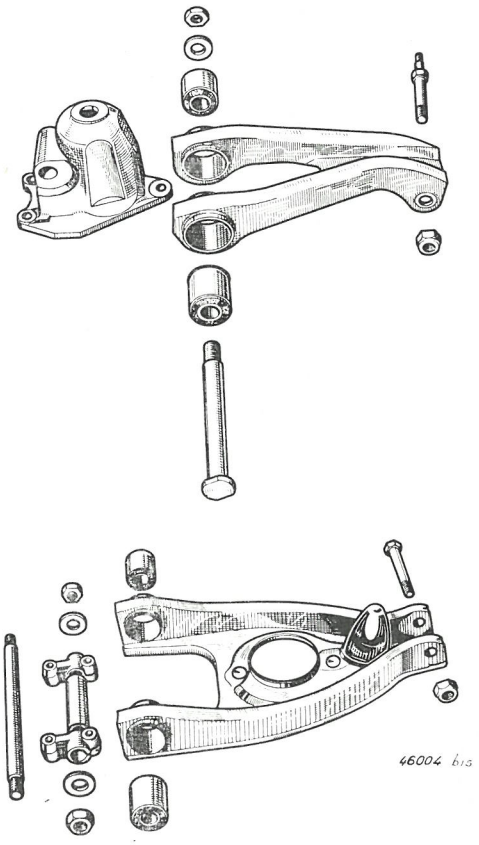
Lower suspension arm :

— Run off the lower hinge mounting bolt nut and drive out bolt.
— In a vice, clamp one of the nuts on the center mounting bolt. Run off the other nut and drive out the bolt.
— Remove spacer, the two mounting bearings and impact bumper.

REASSEMBLING.

Resume in the reverse sequence all of the operations performed during the dismantling.

Do not tighten the hinge bolt nuts.



" DRUM - BRAKE CARRIER PLATE - STUB AXLE - KING PIN " ASSEMBLY

REMOVING.

Remove the wheel and disconnect the brake rigid line from the flexible hose (remove retainer securing the flexible line on the lug). Remove the steering connecting link from the stub axle control lever (T. Av. 05 tool) and the torsion bar link at its upper end.

Remove the shock absorber and compress the suspension spring (Sus. 09 tool).

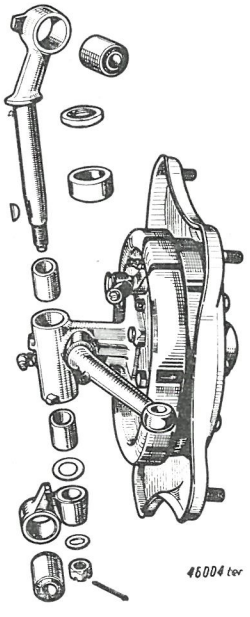
Remove the stub axle lower and upper hinge bolts and the " drum - brake plate - stub axle - king pin " assembly.

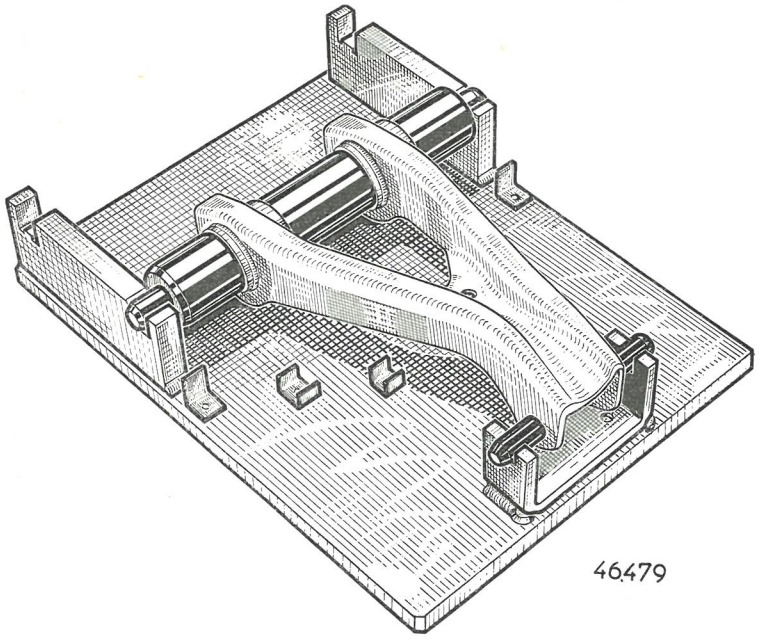
REFITTING.

Insert the " drum - brake plate - stub axle - king pin " assembly on the suspension arms.

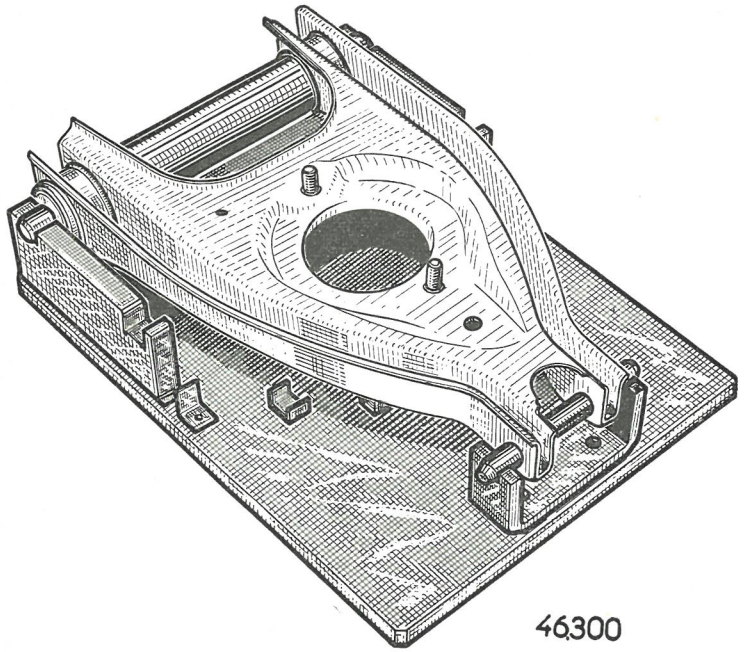
Assemble the hinge bolts from the rear and run up the nuts without tightening.

Next, follow the operation as for the refitting of a front axle half. Take advantage of this to check the hinge bolts for proper tightening and also the lower hinge bolt bearings to cross-member attaching nuts.





46479



46300

CHECKING AND REPLACING THE FRONT AXLE COMPONENTS

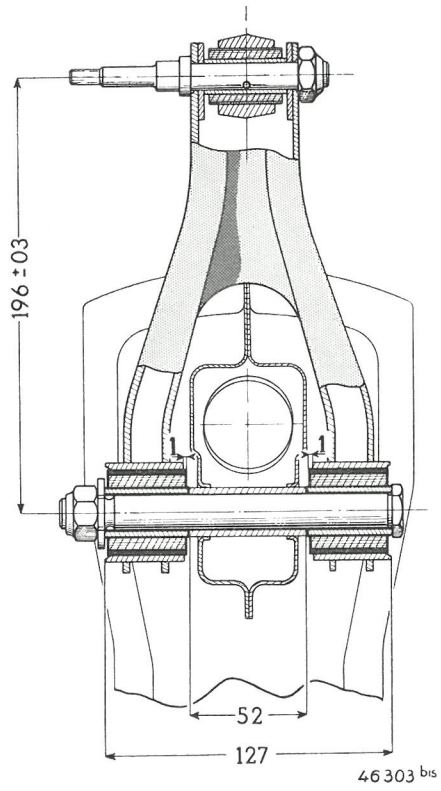
CHECKING THE SUSPENSION ARMS.

Two checking operations are possible :

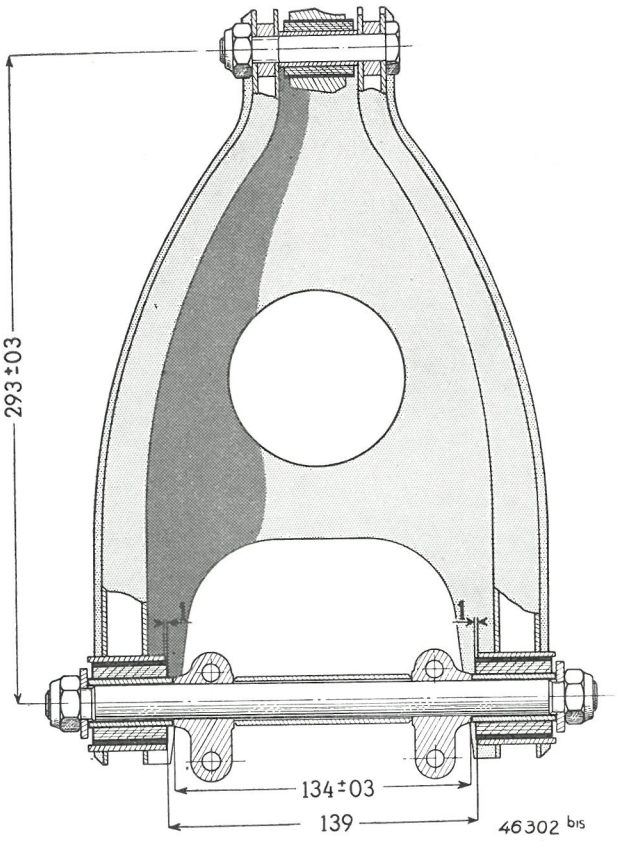
1° **Checking with rubber bushes fitted :**

Insert the corresponding mandrels into the bores and position this assembly on the checking fixture (T. Av. 22 fixture). The suspension arm should be able to move around the main shaft without applying pressure and the two mandrels on the fixture should be properly seated at all points.

If the inserting of the mandrels is not possible, or if the " suspension arms - mandrels " assembly does not properly seat in the fixture, remove the rubber bushes and perform the checking without the rubber bushes.



46303 bis



46302 bis

CHECKING AND REPLACING THE FRONT AXLE COMPONENTS

(Continued)

CHECKING THE SUSPENSION ARMS (continued) :

2° **Checking without the rubber bushes :**

Insert the corresponding mandrels into the bores and position the assembly on the checking fixture (fixture T. Av. 22).

The mandrels on this fixture are relatively free in the suspension arms bores ; this clearance is normal and corresponds to the permissible tolerances for the bores.

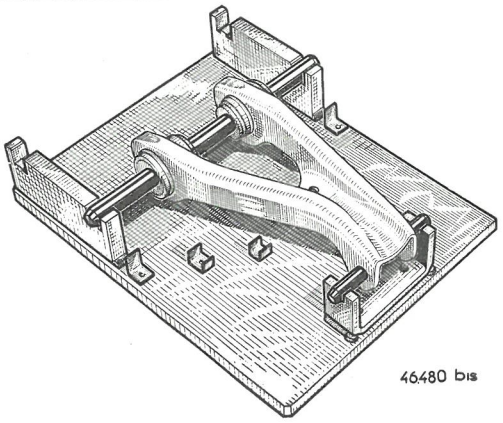
These tolerances are as follows :

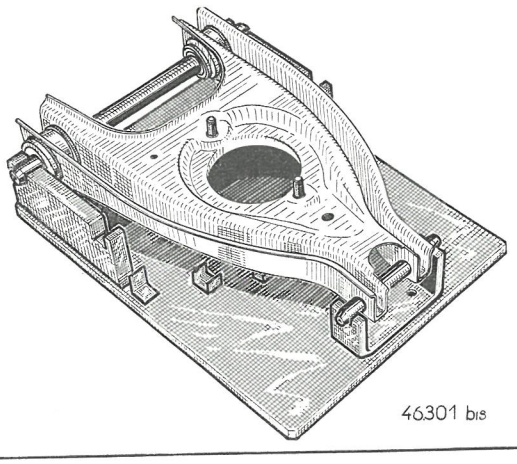
— Permissible misalignment of the rubber bushes bores on suspension arm (at chassis side) :
Upper arm ..... 1 mm (.039 in.)
Lower arm ..... 3 mm (.118 in.)

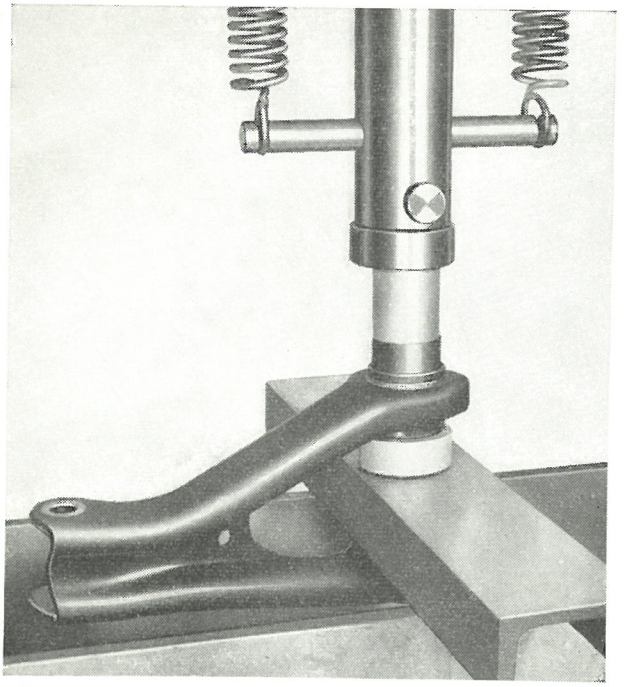
— Admissible distortion and non-parallelism of the 2 bolts of a suspension arm : 2 mm (.078 in.).

— Center distance :
Upper arm .. 196 ± .3 mm (7.64 ± .0118 in.)
Lower arm .. 293 ± .3 mm (11.42 ± .0118 in.)

If, after checking, the distortion exceeds the permissible tolerances, it is possible to straighten out the arms, cold, (unless the sheet metal is wrinkled) but, **under no circumstances,** should the parts be heated to this end.


46480 bis


46301 bis



46010 ter

CHECKING AND REPLACING THE FRONT AXLE COMPONENTS

(Continued)

REPLACING THE RUBBER BUSHES :

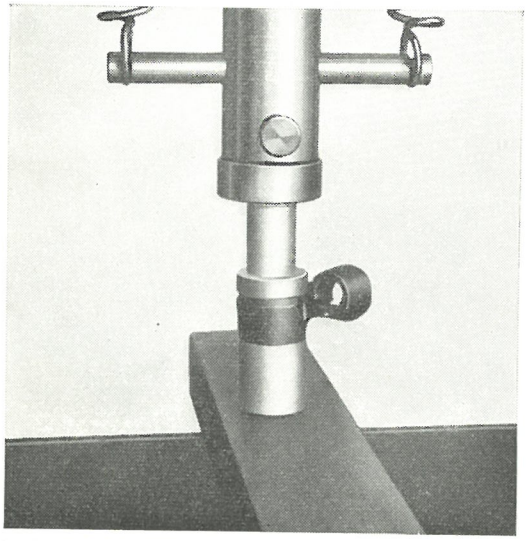
Remove the upper suspension arms, the lower suspension arms (see under Removing Front Axle Half), the king pin lower carriers and king pins.

On a press, drive out the rubber bushes from suspension arms, upper and lower (T. Av. 21 A puller and T. Av. 19 plate), from the king pin and from the lower carrier (T. Av. 21 D tool).

Coat rubber bushes bores with tallow.

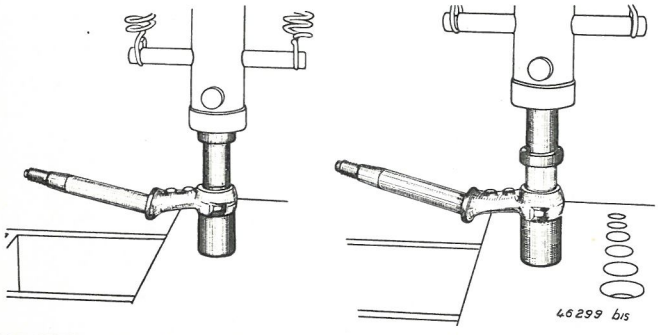
Press in the new bushes :

a) At the upper and lower suspension arms.



46012 bis

b) At the lower carrier (T. Av. 21 Mark A inserter).



46299 bis

c) At the king pin (T. Av. 21 Mark A inserter).

NOTE. — (Use the same tools as for dismantling).

The protrusion values for the rubber bushes are obtained automatically with the mandrels.

CHECKING AND REPLACING THE FRONT AXLE COMPONENTS

(Continued)

CHECKING A KING PIN.

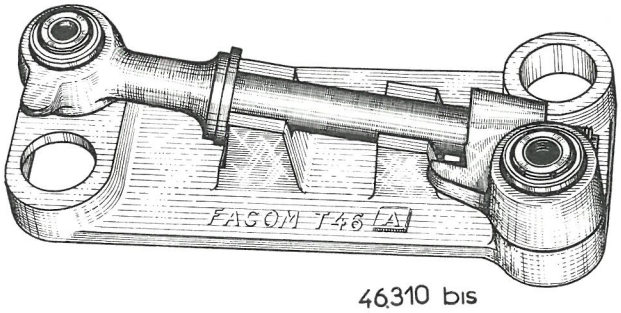
On the king pin : fit the thrust washer, the key and insert the lower carrier.

Position this assembly on the checking fixture, **with thrust washer correctly seated** (T. Av. 20 fixture).

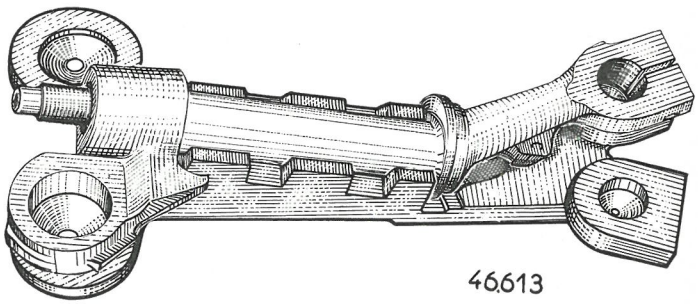
Check that the king pin and carrier bore faces are parallel and contact the fixture.

Check that both rubber bushes are in proper alignment with the fixture locators and that king pin is not twisted.

If any defect is found on the king pin, the latter must be replaced.



46.310 bis



46.613

REPLACING THE STUB AXLE BUSHES.

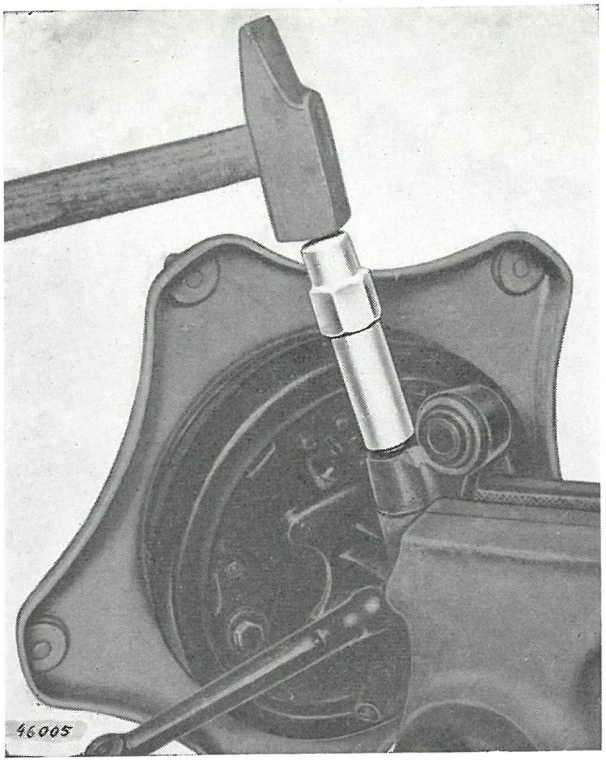
Dismantling.

Remove the " drum - brake plate - stub axle - king pin " as an assembly and remove the king pin nut.

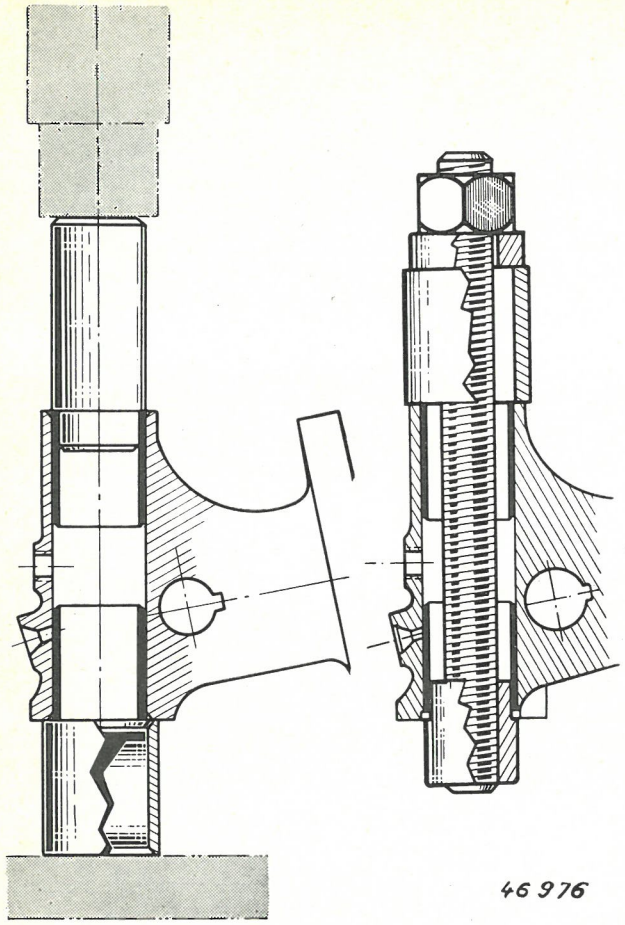
Loosen and remove carrier, key, and adjusting washers (T. Av. 18 tool).

Clear the upper dust seal and remove the king pin.

Run off the grease fitting and drive out the bushes (T. Av. 25 mark B and T. Av. 25 mark A).



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CHECKING AND REPLACING THE FRONT AXLE COMPONENTS

(Continued)

Reassembling :

Coat bore with tallow and press in the new bushes from the outside (pressing in chamfer) **until flush** (T. Av. 25 B, T. Av. 25 A) **with stub axle.**

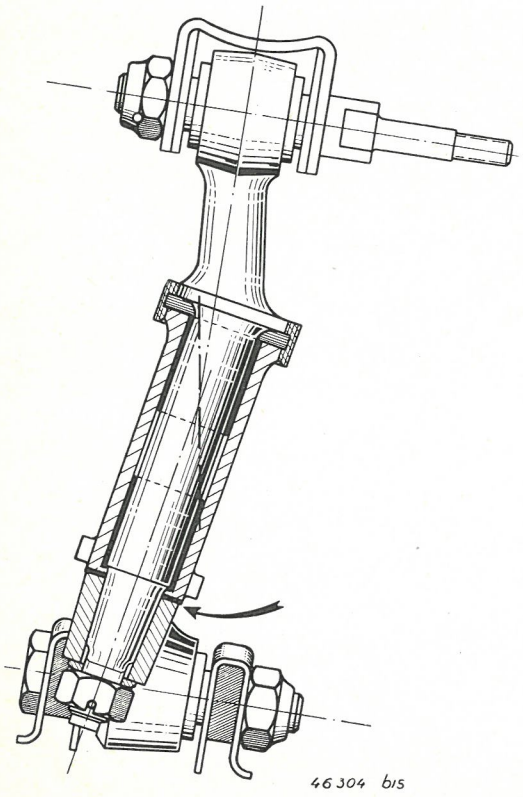
Pass reamer through the 2 bushes in order to achieve correctly aligned bores.

The king pin should move with a snug fit without clearance.

Clean bores and run up grease fitting.

On king pin, assemble dust seal, thrust washer **(with chamfer of washer towards upper end of stub axle)** and, next, press in the king pin on stub axle.

Assemble lower carrier **(with boss on carrier in-between the 2 stops on the stub axle being located opposite to wheel end).**



Adjusting the longitudinal play :

The longitudinal play is compensated for by inserting adjusting washers on king pin between the stub axle and the lower carrier.

Measure the thickness of the washers required, to limit the play.

Assemble washers to the determined thickness.

Install key and lower carrier, the washer, and tighten the nut.

Make sure the king pin is able to turn freely and without axial play.

Check lengthwise clearance : .1 mm (.0039 in.) approx.

If more, add adjusting washers (.2 or .5 mm, i.e. .0078 or .019 in.).

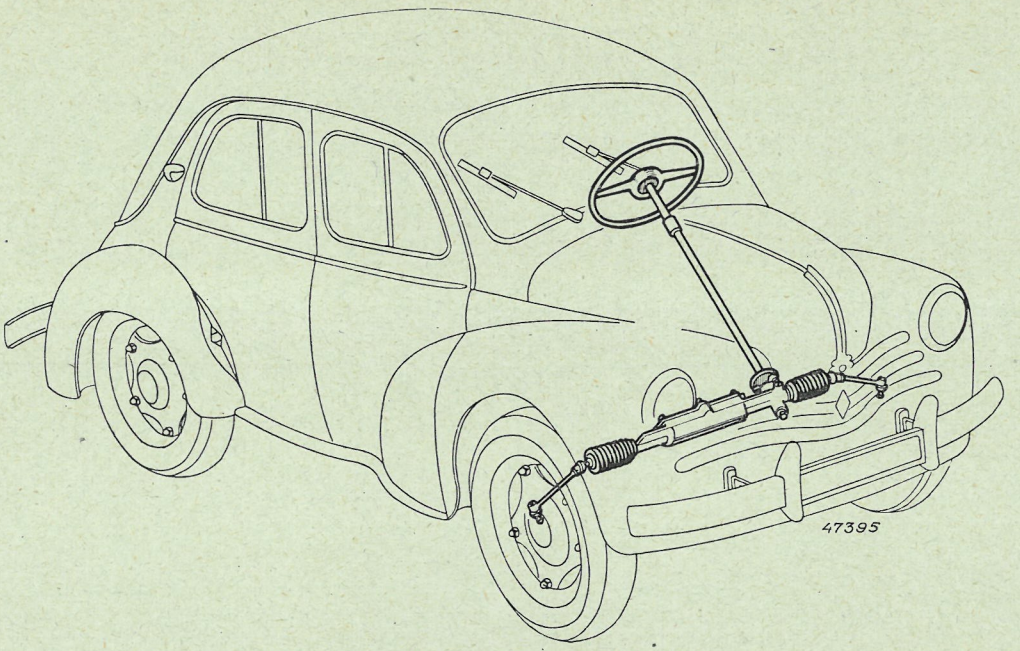
If movement is hard, remove one or several adjusting washers and again check the play.
Insert cotter pin on nut.

Refit the : drum - brake plate - stub axle - king pin as an assembly.

NOTE. — Make sure the lubricator does not contact the king pin. To prevent hardening, the length of lubricator would have to be reduced as required.

7. STEERING GEAR

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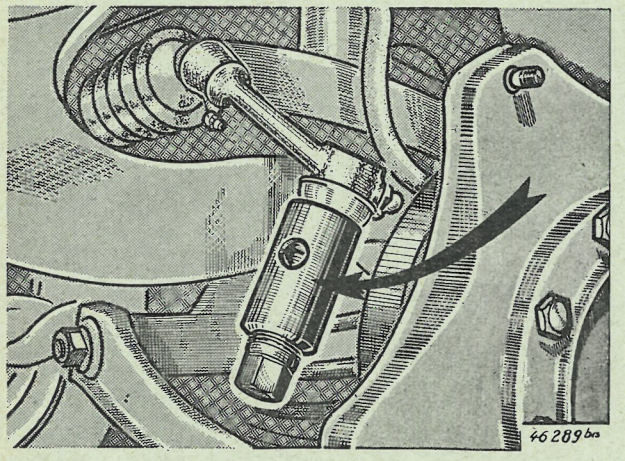


SPECIFICATIONS

Steering gear ratio : 24 to 1.
Rack type with inside retracting spring in water-and dust-proof housing.
One piece type housing.
Turning radius : 4.20 m. (165.35 in.).
Type 43, mark 4 : for LH drive.
Type 43, mark 6 : for RH drive (symmetrical).

DETERMINING THE MIDWAY POSITION AND ALIGNING STEERING WHEEL

The steering wheel spokes should be horizontal when the wheels are in a straight line.
At this position, with the wheels in a straight ahead position, and the spokes horizontal, **the steering wheel should be at the midway position,** i.e. at the center of the total distance by which the steering wheel can be turned to the right or to the left **without the spring being compressed.**
To this end, and before reconnecting the connecting links, position the steering wheel on its knurled shaft so that the wheel spokes may be moved to the right and to the left by 2 identical angles from the horizontal line and until a resistance is encountered when the spring is just being compressed.



STEERING GEAR ASSEMBLY

REMOVING.

Remove the front wheels.
Disconnect the 2 connecting links from the stub axle control levers (T. Av. 05 A puller).
Remove the two coupling joint to flange attaching bolts, at gear side.
Remove the 2 steering gear housing to front cross-member support attaching bolts.
Remove the steering gear assembly by pulling it out through one side of the vehicle.

REFITTING.

Perform in reverse sequence the same operations as for removing.
— **Insert cotter pin on the 2 bolts** attaching the steering gear housing to the front cross-member supports.
— **See to it that proper alignment with steering wheel is achieved.**
— **Perform front wheel alignment.**

CONNECTING LINKS

REMOVING.

Disconnect the connecting links from the stub axle control levers (T. Av. 05 puller).
Free nuts **(43)**, loosen the nuts and remove the links.

REFITTING.

Perform, in reverse sequence, the same operations as for removing.
Take care to assemble a **new retainer (44)**.
Set front wheel alignment.

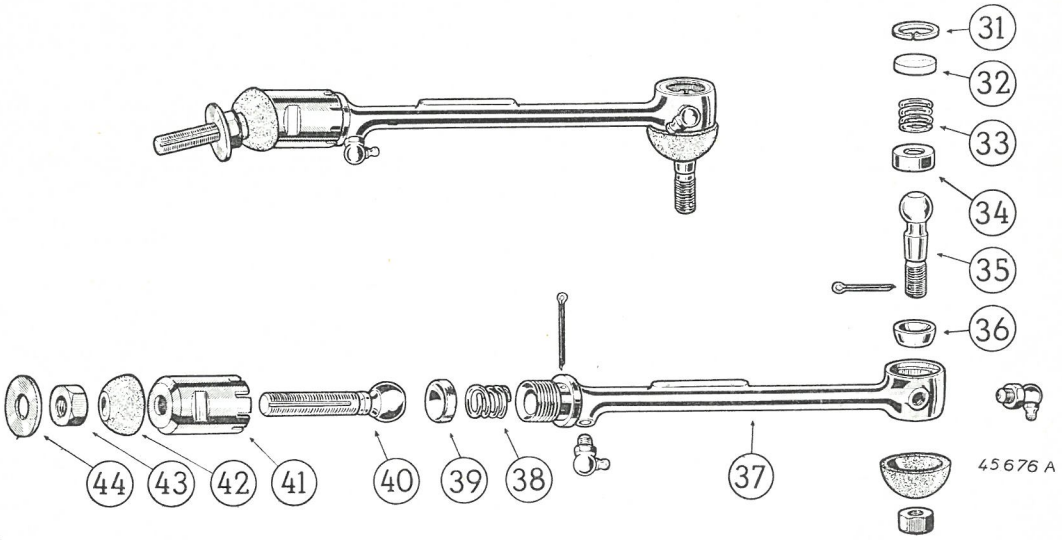
DISMANTLING.

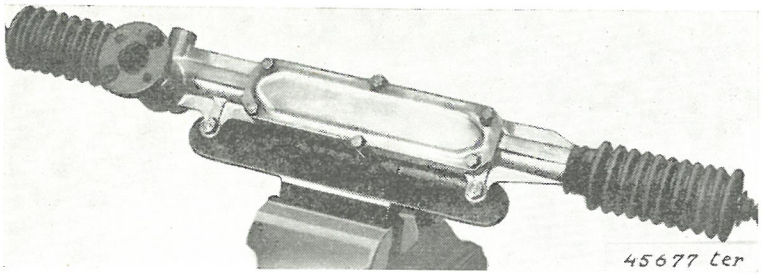
At rack end : remove cotter pin from link adjuster **(41)** and run off same.
Remove cup **(39)**, the nut retainer **(44)**, run off nut.
Separate ball joint **(40)** from end adjuster and save the dust seal **(42)**.
At stub axle end : Remove the retainer **(31)**, the spacer plug **(32)**, the spring **(33)**, the lower cup **(34)**, the ball stud **(35)** and the upper cup **(36)**. Save the dust seal.

NOTE. — **The use of washers or shims in the end adjuster is strictly forbidden as well as grinding the end adjuster at the notched end.**
The above changes will result in the seizure of the ball joint and cause the failure of the ball joint stem.

REASSEMBLING.

At stub axle end : Install the upper cup **(36)**, insert the ball **(35)** coated with **graphited grease,** the lower cup **(34)**, the spring **(33)** and the spacer plug **(32)**.
Compress this assembly, install a **new retainer (31)** and install the dust seal.
At rack end : Insert the ball stud **(40)** previously coated with **graphited grease** into the end adjuster **(41)**. Insert the dust seal, run up nut **(43)** and install a **new retainer (44)**.
In the end adjuster, fit the cup **(39)** and the spring **(38)**. Securely run up the end adjuster and insert cotter pin. Run up the lubricator fittings and directhem.
Reassemble the links.



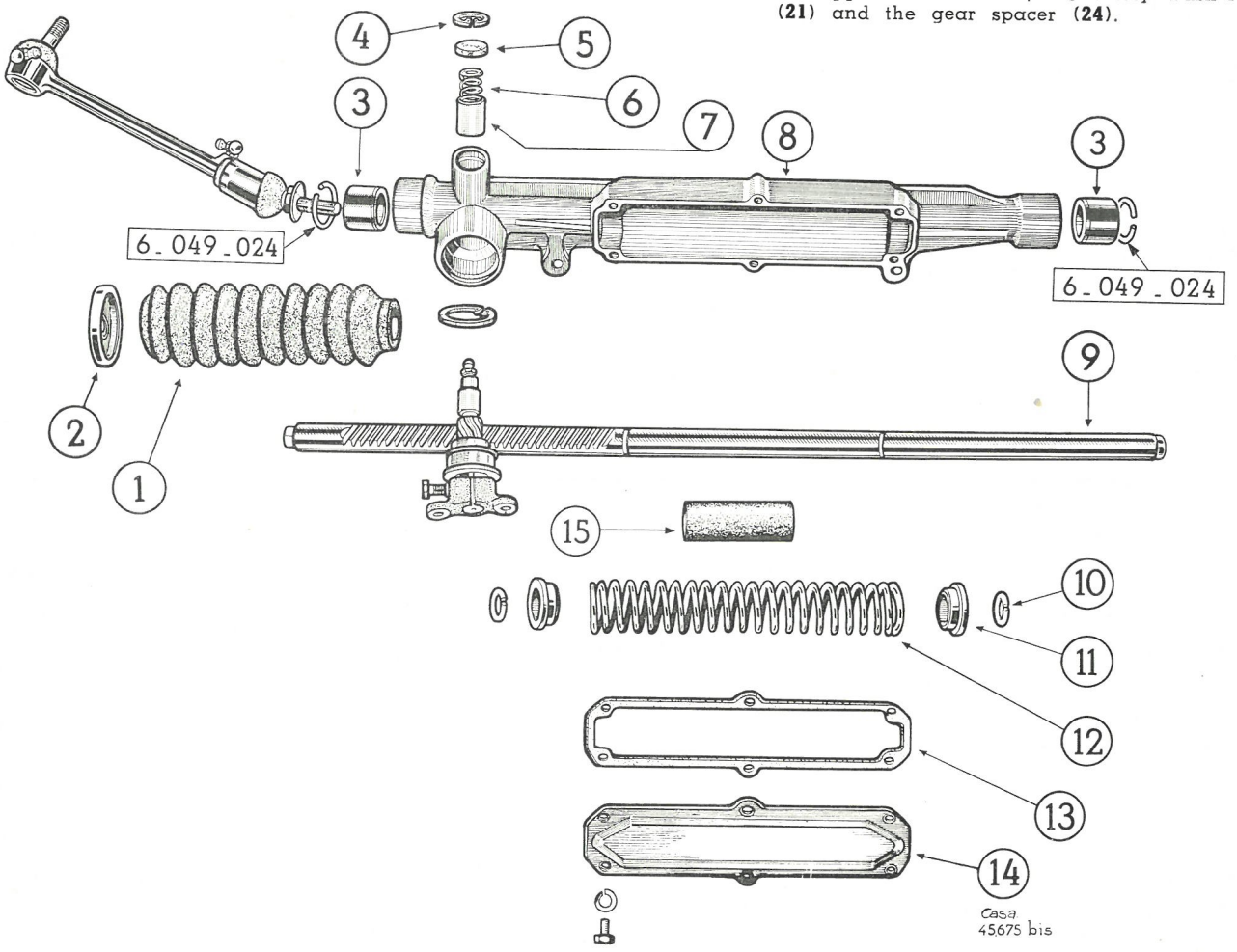


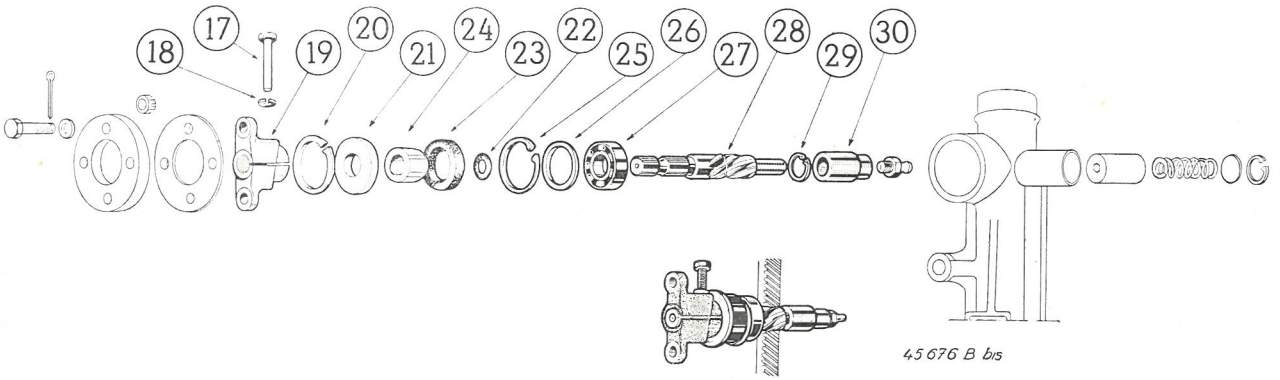
STEERING GEAR MECHANISM

DISMANTLING.

Secure the steering gear housing to the **special carrier Dir. 20,** the latter being clamped in a vice.

Remove the dust seals (**1**), the mounting cups (**2**), the plunger inside retainer (**4**), the thrust washer (**5**), the spring (**6**) and the plunger (**7**). Remove the driving flange (**19**) from the notched shaft. Remove the upper retainer (**20**), the safety washer (**21**) and the gear spacer (**24**).





STEERING GEAR MECHANISM

(Continued)

Remove the sealing ring (**23**) with **Dir. 16 remover.**

Remove the lower retainer (**25**), lubricator fitting and the bearing thrust washer (**26**) by properly aligning same.

Drive out gear (**28**) and the bearing (**27**) by hitting.

Remove the sealing washer (**22**) and the outer retainer (**29**).

Separate bearing (**27**) from gear. Remove housing cover (**14**).

Extract snap rings (**10**) of cups (**11**).

First : the snap ring, at the rack smooth end, outwards.

Second : the snap ring, at the rack toothed end, inwards.

Slide the rack (**9**) outwards through its toothed end.

The first snap ring falls off and it will be possible that the second snap ring falls into the groove of the first one., Remove the 2nd ring, as above.

NOTE. — **The snap rings, retainers and sealing ring cannot be reused.**

Clear the retracting spring (**12**), the cups (**11**) and the rubber bush (**15**).

Drive out, inwards, the gear lower combination bush and bearing (**30**).



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To reassemble the steering gear mechanism, the rack bush-and-bearing, at gear side, has to be removed.

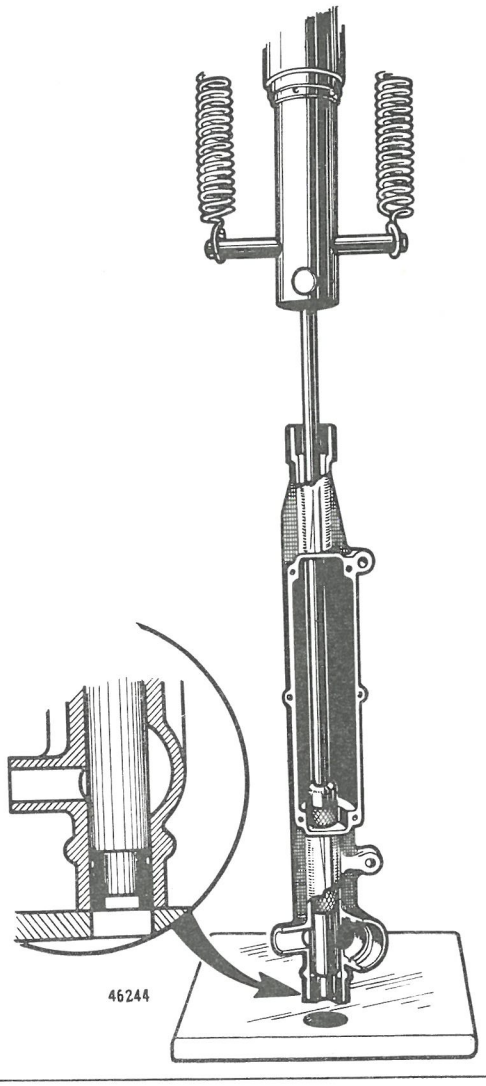
Two conditions may be found :

— The 2 grooves of the snap ring existing on the housing are cleared : either of the bushes may be removed.

— One groove only is cleared : remove the corresponding bush.

Any dismantling or replacement of a rack bush-and-bearing requires that a snap ring (n° 6.049.024 be fitted, as the tightening of the bushes may prove insufficient.

For removing the bushes, use tool Dir. 17.



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REASSEMBLING.

If required, press in the bush-and-bearing at gear side **(press-in chamfer turned inwards).**

Assemble a snap ring of the bush in its groove and make **sure the ring clamps properly.**

From the inside of the housing, assemble the gear combination bush-and-bearing (**30**).

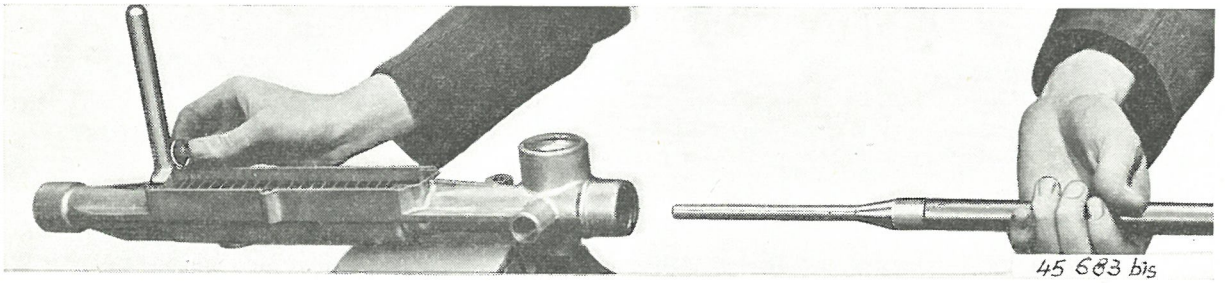
Next, lubricate the combination bush-and-bearing at the end opposite to the gear end and **pack some grease into that portion of the housing behind this bush.**

Install the bush (**15**) inside the spring. Compress retracting spring (**12**) complete with cups (**11**) and install it.

Install snap ring (**10**) in the groove at teeth side.

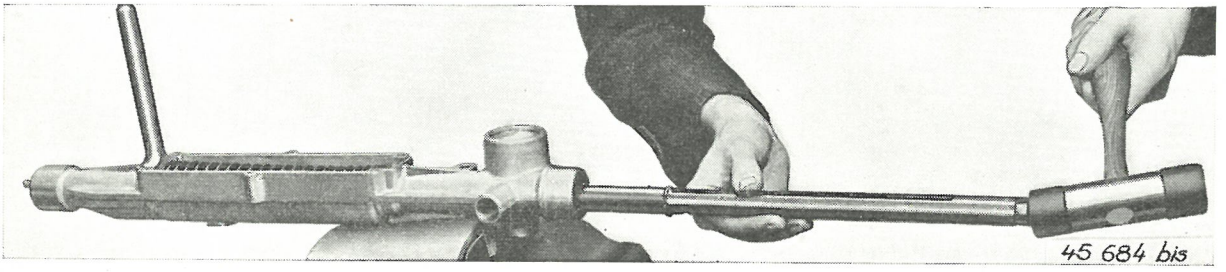
STEERING GEAR MECHANISM (Continued)

Insert rack (**9**) previously lubricated, fitted with its **assembly tool Dir. 18 B,** through the smooth end, until this smooth end reaches the center of the spring approximately. Insert rack inside the bush (**15**).
Insert the second snap ring (**10**) on the tool.
Have the **snap ring holding fork Dir. 18 A** abutting in the housing on the assembly tool.



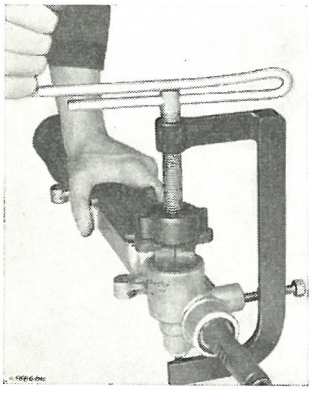
Move rack until the snap ring is seating in its groove.
Remove the assembly tool through the combination bush-and-bearing at end opposite to gear and remove fork.

NOTE. — **It is mandatory that the 2 snap rings are new and that they have a good clamping action in their groove.**



Reassemble the housing cover (**14**) with an oiled paper gasket (**13**).
Assemble the outer retainer (**29**) on gear. Press in the bearing (**27**) on the gear.
Align the rack and install the gear (**28**) fitted with its bearing into the case.

With smooth portion on notched end of gear facing the retracting spring :
Successively install : the new washer (**22**), on the gear, the thrust washer (**26**), the new retainer (**25**), the new and lubricated sealing ring (**23**), the gear spacer (**24**), the safety washer (**21**) and the new upper retainer (**20**).
Position the driving flange (**19**) **(with flange perpendicular with the rack centerline).**



Apply pressure on the flange (with special clamping press Dir. 19), until the flexible leg of the clamp contacts the bolt head (pressure : 50 kg or 110 lbs approx.). Tighten bolt (**17**).

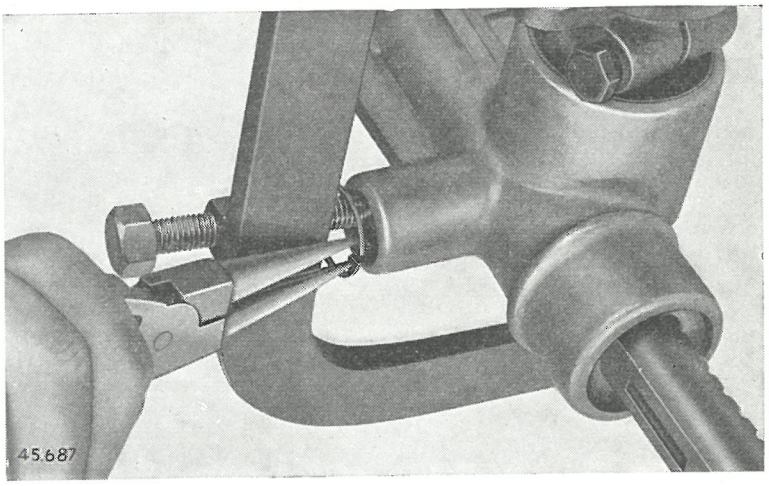
Assemble plunger (**7**), spring (**6**), thrust washer (**5**).

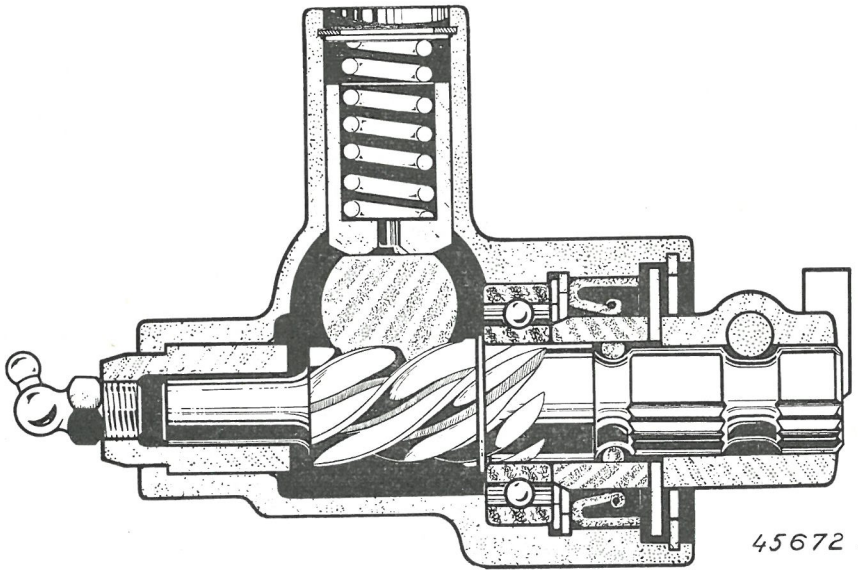
STEERING GEAR MECHANISM

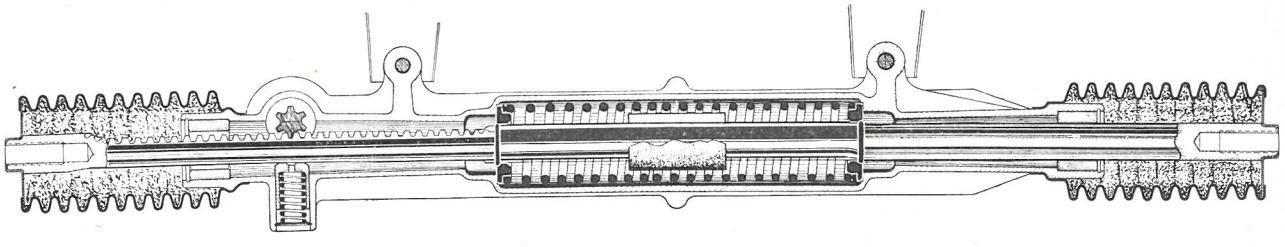
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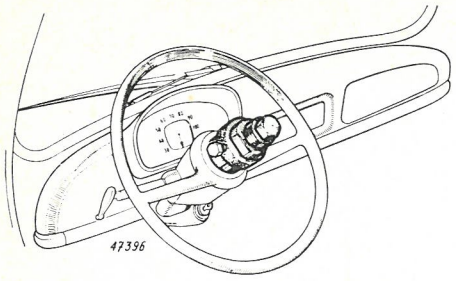
Apply pressure on the assembly, using the bolt fitted to the special clamp.

Assemble the new inside retainer (4).





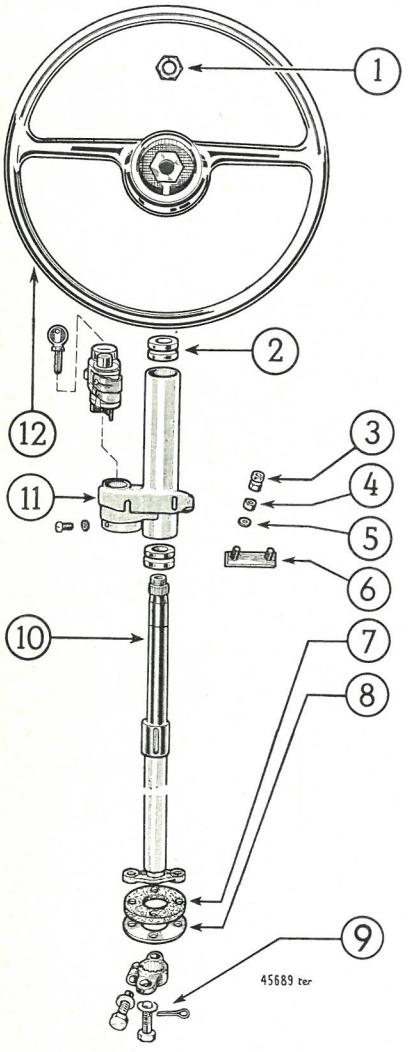




STEERING WHEEL

REPLACING.

Remove the steering wheel motif. Loosen and remove the steering wheel nut (**1**). Pull off the steering wheel (**12**) **(Dir. 21 steering wheel puller).**
When reassembling, replace the steering wheel with the spokes located horizontally.



STEERING GEAR CONTROL

DISMANTLING.

Remove front wheel at steering gear control side.
Put anti-theft device at " garage " position.
Remove cotter pin, run off bolts (**9**) and remove coupling joint (**7**) with washer (**8**).
Remove steering wheel. Remove safety check nuts (**3**) and nuts (**4**) attaching bracket (**11**).
Allow steering wheel shaft (**10**) to move downwards until it clears the bracket (**11**).
Loosen the combination switch control positioning bolt and remove from bracket. Allow the switch control **to hang by its connection wiring.**
Remove the 2 cross slot head type screws near the pedal.
Fold back the rubber mat and the felt carpet. Remove the toe-board insulating panel (2 screws are used for attaching the felt washer cage).
Remove the steering wheel shaft from the inside of the vehicle (pulling the driving flange through the opening made in the toe-board).

Replacing the bracket bushes (2).

NOTE. — It is not necessary to remove the steering wheel shaft. To remove bracket (**11**), disconnect all of the wires from the " Avercod " combination switch and from the anti-theft device (see under : Electrical Equipment).

Pull out the bushes.
When reassembling the bushes : **check that all inner centerings of the bracket tube align with the groove of the bushes.**

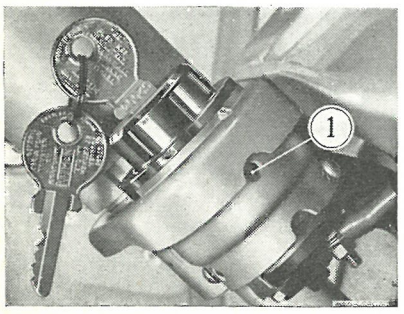
REASSEMBLING.

Reverse sequence of dismantling operations, paying attention to the following points :

— **The hexagonal nuts (4) should not be tightened when starting the positioning of parts but only at the end of the reassembling.**

NOTE. — **The safety check nuts (3) cannot be used again** after disassembly as these nuts are designed so that their hexagonal portion fractures under tightening pressure, leaving only the cylindrical portion.

— **Make sure that all electrical accessories connected to the Avercod combination switch operate normally** (check each position).



REPLACING THE ANTI-THEFT DEVICE

Disconnect battery and remove steering wheel.

Loosen combination switch case positioning screw and move case as far as length of wires will permit.

Switch anti-theft device to " garage " position.

Disconnect the 3 electrical wires - **mark wires.**

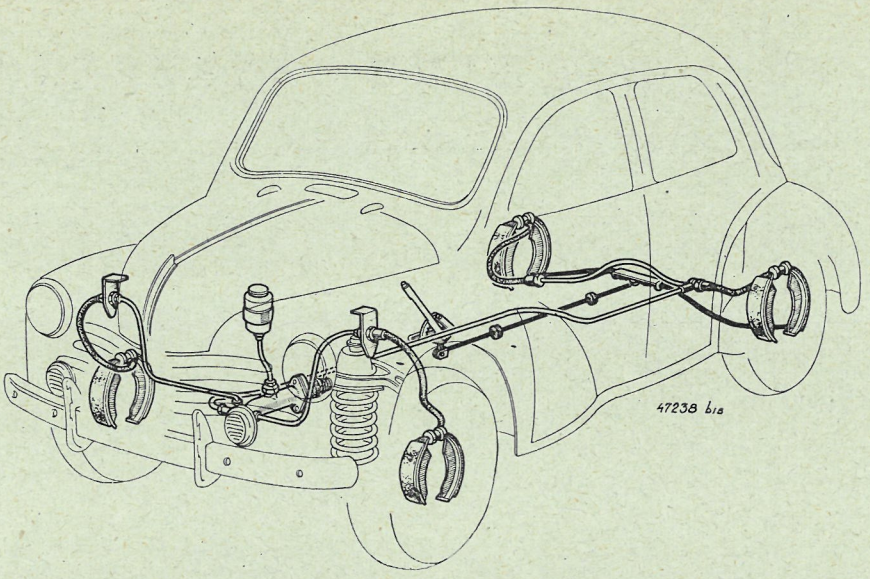
Remove the 2 screws attaching the anti-theft device to the bracket.

Apply pressure on the lug through hole (1) and on the ball diametrically opposite to hole (1) to pull off device.

Insert a new anti-theft device at the **" garage " position** and reassemble by reversing sequence of operations.

8. BRAKING SYSTEM

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SPECIFICATIONS

7 in. brakes, floating shoe type, controlled by hydraulic system. Mechanical parking brake on rear wheels.

The hydraulic control includes :

— 1 special fluid reservoir loaded with reference to master cylinder.
— 1 master cylinder actuated by pedal.
— Rigid and flexible lines.
— 1 wheel cylinder for each wheel.

The pressure exertion on the pedal is thereby transformed into an **absolutely uniform and simultaneous** pressure to each of the 4 wheels for **balanced braking.**

The braking itself is obtained by the friction between :

— A drum integral with the wheel.
— Two brake shoes with linings, mounted on the drum.

GENERAL RECOMMENDATIONS FOR REPAIRS

Exclusively use N° 5 Lockheed special fluid.

HYDRAULIC SYSTEM.

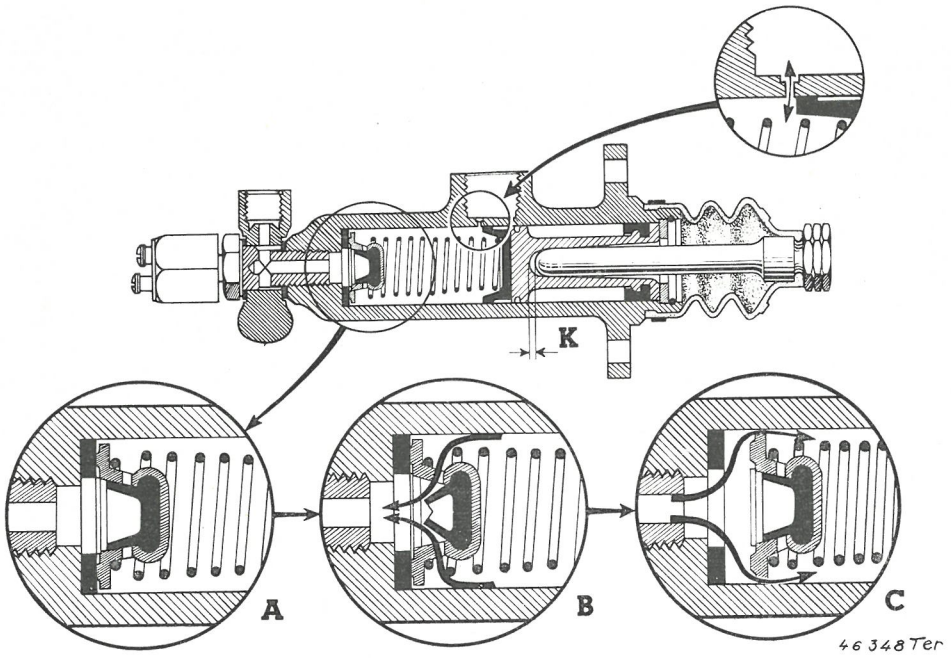
It is mandatory that the special fluid should contain **no dirt or the lightest traces of air ;** therefore, it is recommended :
— To clean with **a dry** brush the parts to be disassembled before disconnecting any brake line.
— To **plug up** the lines with a plug.
— The hydraulic system is to be cleaned with **alcohol** exclusively.
— **Bleed lines** after reconnecting.

MECHANICAL SYSTEM.

It is mandatory that the **linings** be free from any **lubricant, greasy or oily matter** (avoid handling with dirty hands).
New lining to be of same material and of same **sizes** (length : primary lining : 198 mm (7.795 in). Secondary lining : 162 mm (6.377 in.). Thickness : 5 mm $^{+\ .3}_{-\ 0}$ (1.96 in. $^{+\ .011}_{-\ 0}$). Width : 30 mm $^{-\ 0}_{-\ .5}$ (1.181 in. $^{-\ 0}_{-\ .019}$).
Back off chamfer : 6 mm (.236 in.).
Drum surface to be perfectly smooth, clean and dry.
The changing of the brake linings (as well as drum grinding) should be performed by "set".

FAULT FINDING

FAULT	CAUSES
Spongy pedal. Poor braking system.	Air in hydraulic circuit.
Pedal travel is excessive. When pedal is depressed several times, pedal travel is reduced.	Excessive lining to drum clearance. Expansion of flexible lines.
Level drops fast in reservoir.	Leaks at hydraulic lines, or from rear of master cylinder.
Brakes are locked, overheat and drag.	Pedal clearance is nil or too small. Parking brake poorly adjusted. Weak shoe retracting springs.
Brakes are out of balance.	Grease on linings or different material used for linings. Drums out of round. Swollen cups. Seized wheel cylinders. Lines have reduced section.
One or several wheels are locked as soon as linings contact drum.	Lining chamfer uncorrect.



MASTER CYLINDER

A. — **Released position :** The primary cup fully uncovers the fluid reservoir connection port. A clerance **(K)** should exist from the piston to the end of the push rod. The valve is closed by the spring.

B. — **Applied position.** — The primary cup is moved, closes the reservoir connection port and the master cylinder fluid is slightly forced back by the valve being opened.

C. — **Brakes being at released position :** The fluid is forced back into the master cylinder by the shoe retracting springs acting on the wheel cylinders. The fluid pressure compresses the spring and lifts the valve.

MASTER CYLINDER

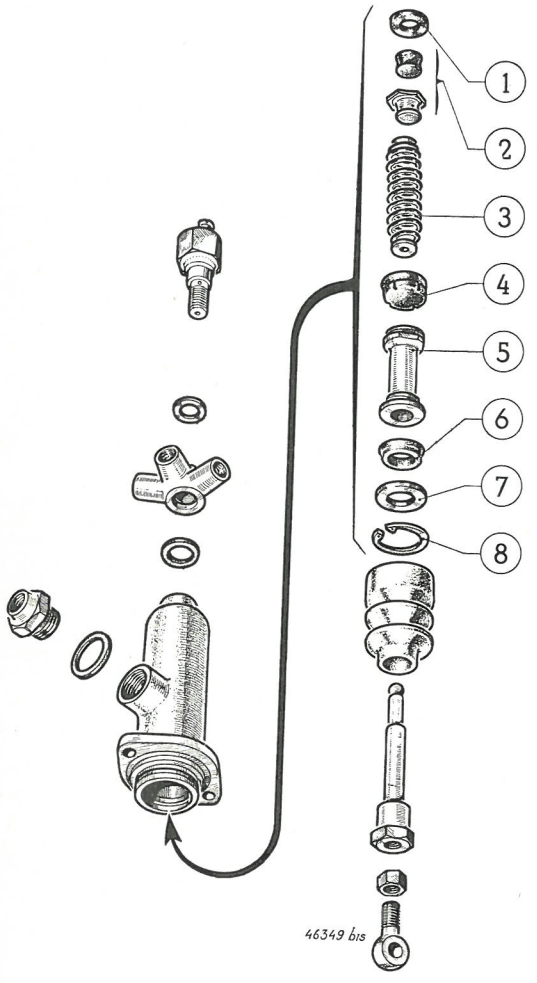
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REMOVING :

Disconnect battery. Remove tunnel.
Disconnect the 2 wires from the stoplight switch. Plug up the fluid reservoir outlet.
Disconnect the Lockheed fluid inlet connection. Remove the stoplight switch and the 3-way fitting (save gaskets).
Remove the 2 master cylinder attaching bolts and **clear towards the front.**

REFITTING.

Perform removing operations in reverse sequence and **adjust free play and bleed brakes.**



OVERHAULING.

Remove master cylinder.

Inspect parts : if cylinder is not smooth or if out-of-round, **do not rework it but replace.**

The rubber parts should be genuine and free from moulding marks.

Upon reassembling, successively install :

— The thrust washer (**1**).

— The valve (**2**) complete with spring (**3**).

— The primary cup (**4**) with **flat end towards piston.**

— The piston (**5**), **complete with secondary cup** (**6**).

— The washer (**7**).

Hold above assembly in place and reinstall the snap ring (**8**).

Check for free sliding action of parts.

WHEEL CYLINDERS

REMOVING.

Remove hub and drum assembly.
Remove the shoes and disconnect the hydraulic line connection **(plug end).**
Fit cylinder with **Fre. 05 A clip.** Remove the 2 cylinder attaching screws and remove cylinder.

REFITTING.

Reverse above sequence of operations then **adjust linings and bleed hydraulic circuit.**

WHEEL CYLINDERS
(Continued)

OVERHAULING.

Remove cylinder.

Inspect parts : if cylinder is not smooth or if out-of-round, **do not rework it but replace.**

The rubber parts should be genuine and free from moulding marks.

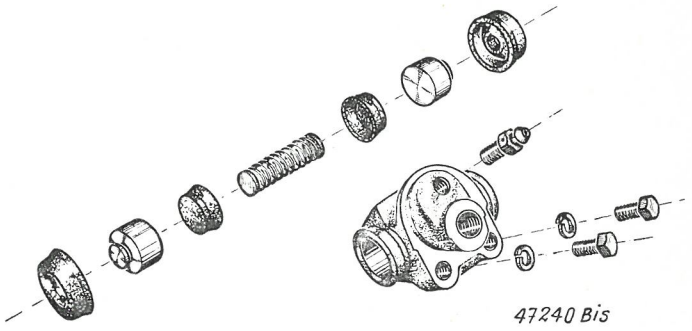
Upon reassembling, run up the bleeder screw and install cap.

Coat sliding parts with special Lockheed fluid.

Successively assemble : springs, cups, pistons, the protective rubber caps.

Make sure that parts slide freely.

Hold the above assembly **in place by inserting clip Fre. 05 A.**



FLEXIBLE LINES

REFITTING.

Refit the flexible line on the wheel cylinder and on the rigid line (or to the 3-way connection for the LH rear flexible line).

NOTE. — **After any operation on the circuit, bleed system.**

BLEEDING THE HYDRAULIC SYSTEM

The bleeding operation has to be performed at the wheel cylinder of each wheel.

Before bleeding, check for pedal **clearance and** special fluid **level** in reservoir.

Start the bleeding operations with the wheel cylinder located the remotest from the master cylinder. Finish with cylinder closest to master cylinder.

For each wheel cylinder :

Clean with a dry brush the bleeder screw, remove cap and install bleeding wrench and bleeding pipe.

Submerge the end of the pipe into a transparent container partially filled with the special Lockheed fluid.

Loosen the bleeder screw by 1/4 turn.

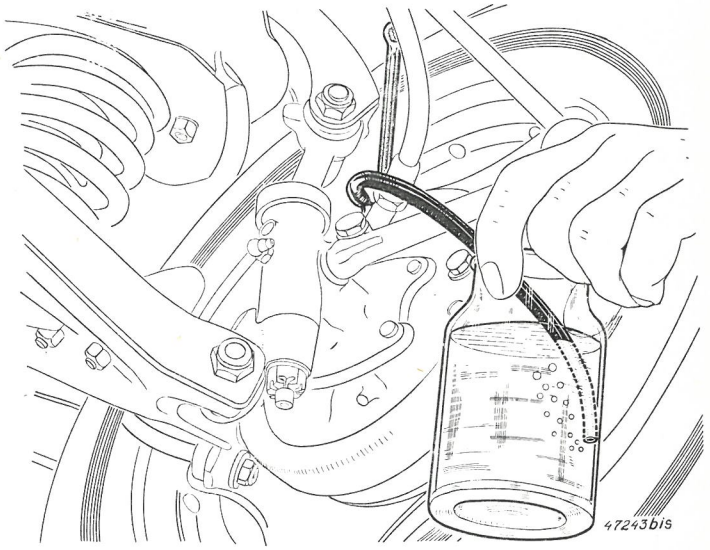
Fully and slowly depress the brake pedal until air bubbles cease to appear entirely. This operation should be performed by the operator assistant.

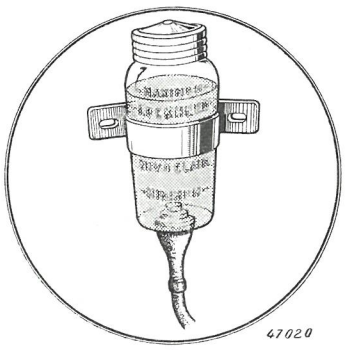
With pedal fully depressed, tighten bleeder screw.

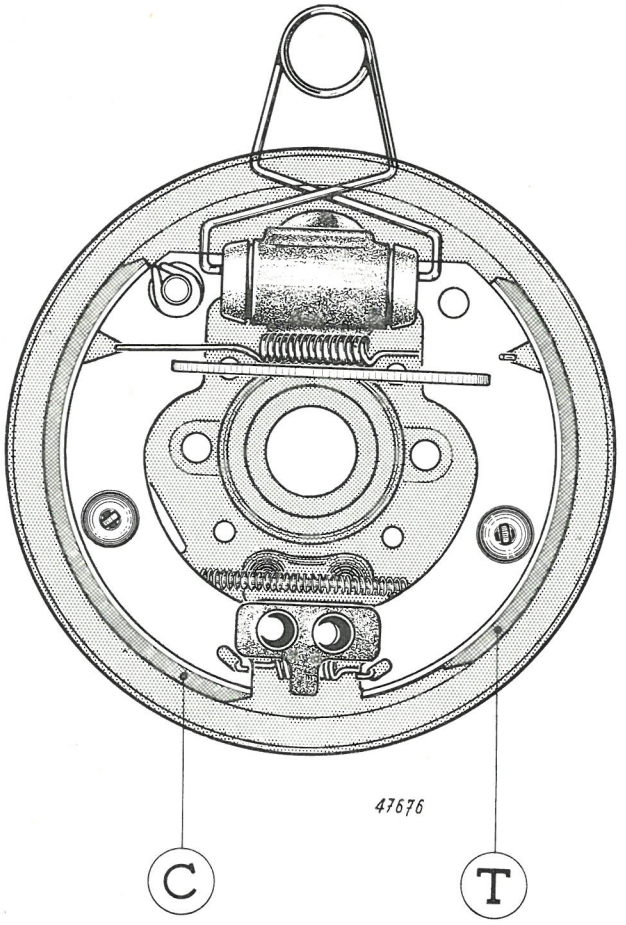
Remove bleeding wrench and pipe. Install bleeder screw rubber cap.

After bleeding each cylinder, top up with clean fluid.

NOTE. — **The fluid removed during bleeding operation can only be reused if it has been thoroughly filtered. An emulsified fluid, after handling, may be used only after having been allowed to settle for 15 minutes.**







BRAKE SHOES

REMOVING.

Remove wheel and hub. **Install the wheel cylinder clip (Fre. 05 A)** on wheel cylinder.

(At rear : disconnect parking brake cable).

Remove the upper retracting spring.

Remove cups and springs, move apart the brake shoes (at rear, save the parking brake link).

Remove the brake shoes and unhook from the lower retracting springs.

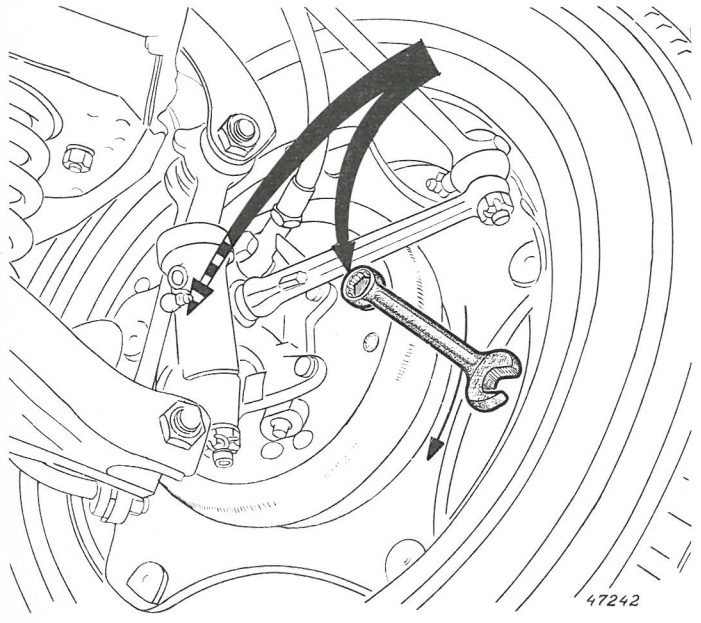
REFITTING.

NOTE. — **It is not recommended to fit new linings or to rework the linings brake shoes. Instead, replace through the exchange plan.**

Reverse the above sequence of operations.

The shoe with the **longest lining (C)** is to be located **in front.**

After refitting, **adjust brakes.**



ADJUSTING THE BRAKES

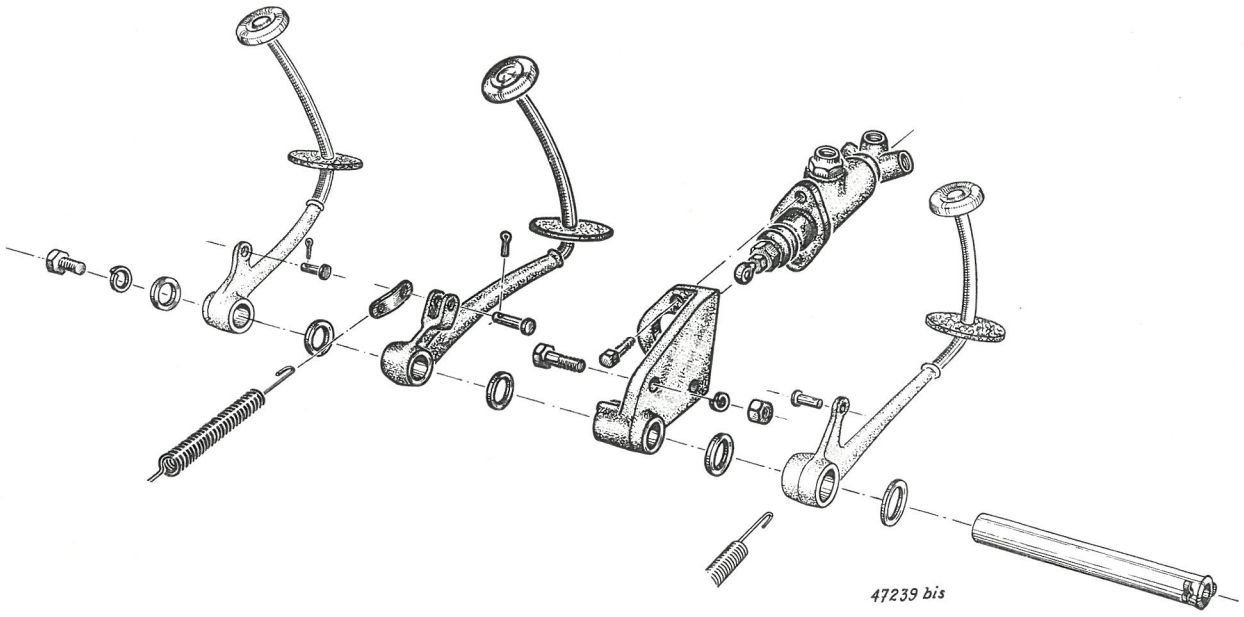
This adjustment is to be performed for each brake shoe (therefore, twice per wheel).

It consists in **bringing the shoes closer to the drum by operating the cams,** as follows :

Rotate wheel in the **forward direction.**

Tighten front cam until the wheel is **just locked** and, next, loosen the cam until wheel rotates **freely.**

Rotate wheel in the **reverse direction** and **similarly operate rear cam.**



BRAKE PEDAL

REMOVING.

Disconnect the battery.
Plug up the reservoir brake fluid outlet.
Unhook the brake and accelerator pedal retracting springs from body.
Remove the cables from the clutch and accelerator pedals.
Disconnect the inlet from the master cylinder.
Disconnect the stoplight switch and remove switch.
Remove the pedal linkage shaft attaching bolt, back off shaft to clear same from side-member.
Remove the bolts attaching the pedal linkage support to the side-member.
Remove pedal linkage by clearing the sealing washers on floor.
Clear pedal linkage shaft and save the spacing washers.

REFITTING.

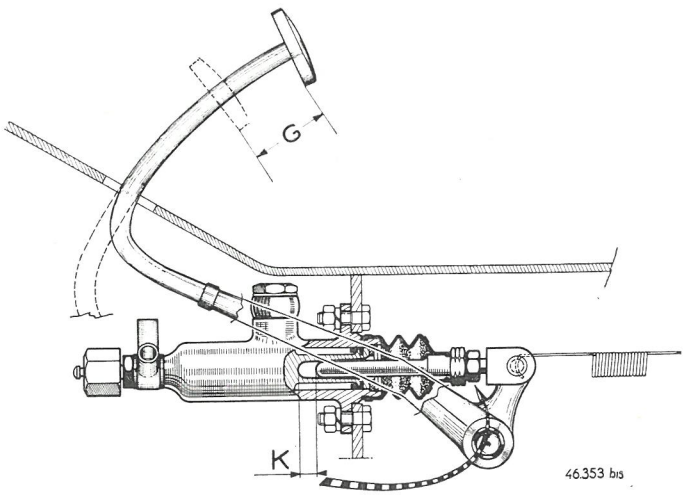
Reverse sequence of removing operations and, next :

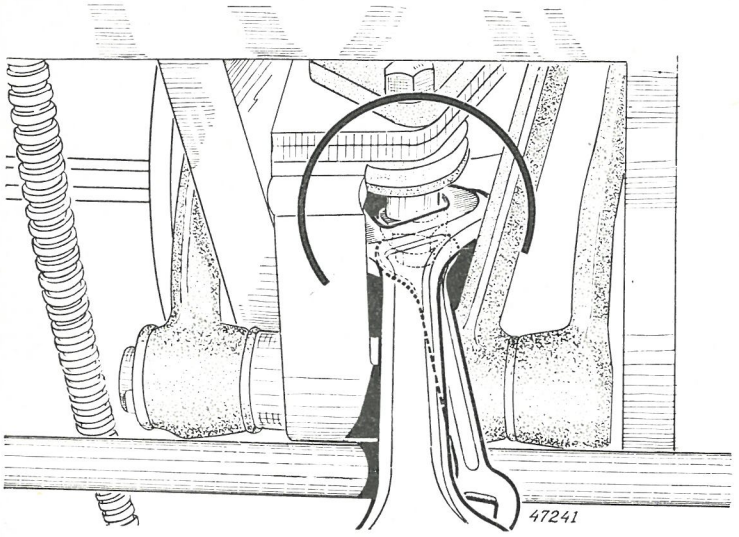
— Bleed brakes.
— Adjust clutch and accelerator pedals free play.

ADJUSTING FREE PLAY

This is by operating the master cylinder push rod.

Normal free play K is obtained for a movement G = 20 mm (.78 in.) of the brake pedal.

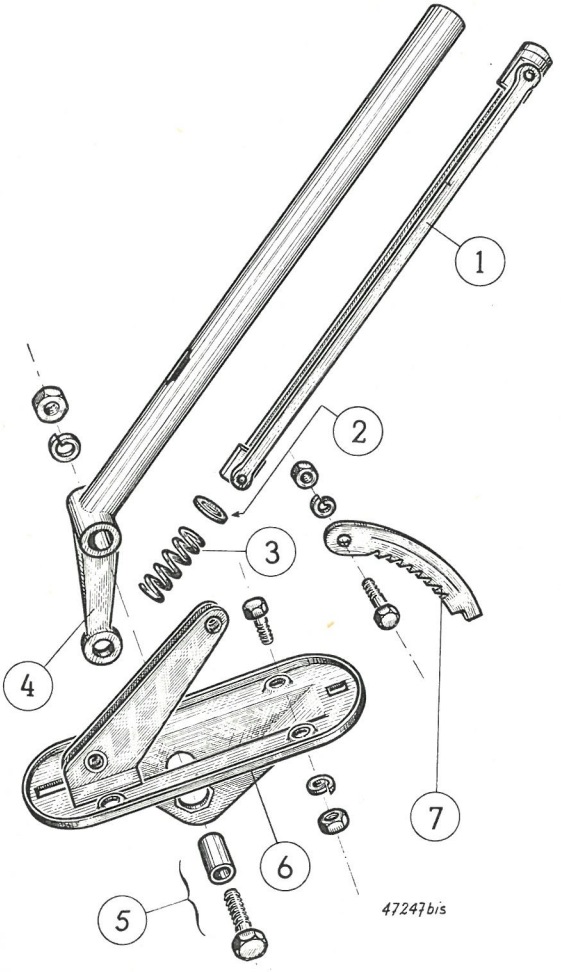




ADJUSTING FREE PLAY

(Continued)

Adjust play by rotating the push rod and **tighten check nut.**



PARKING BRAKE LEVER

REFITTING.

Install the retracting spring (**3**), the thrust washer (**2**) and the assembly (**1**) in lever (**4**).

Insert sector (**7**) at its location in the lever (**4**) by applying pressure on the push button.

Secure sector to bracket (**6**).

Reassemble lever hinge pin (**5**).

Reassemble the parking brake control rod to equalizer.

Reassemble lever and bracket.

Reconnect control rod to lever and insert pin.

Adjust parking brake.

PARKING BRAKE CABLE

REFITTING.

Install cable on equalizer and hook its ends to the brake links in the drums.

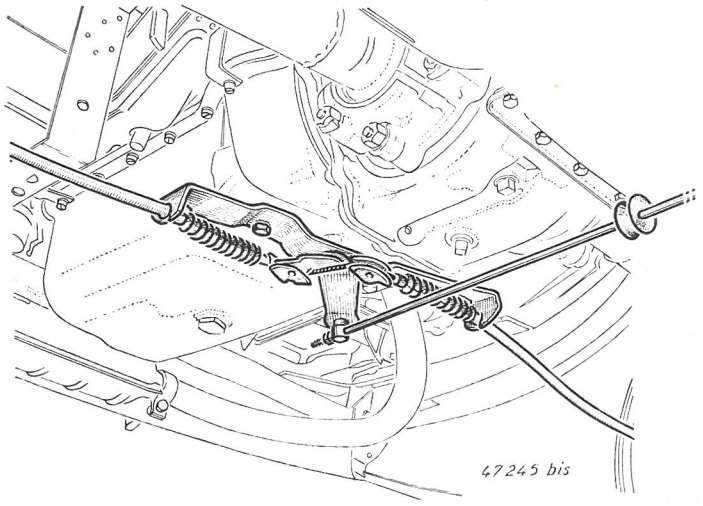
Install sheath stops on flanges.

Hook on the sheaths to equalizer.

Hook on the control rod to equalizer.

Refit hubs.

Adjust the parking brake.



PARKING BRAKE SECTOR AND RATCHET

REPLACING.

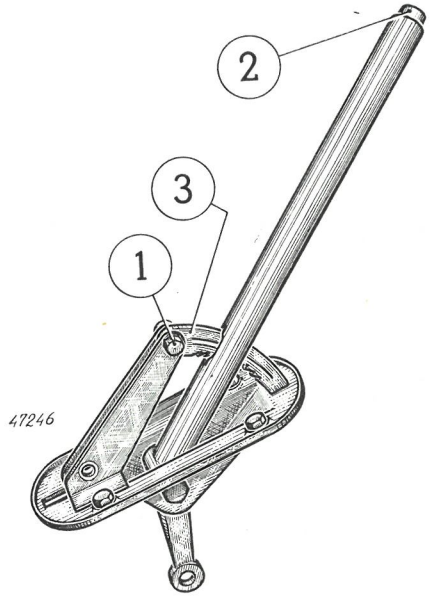
Remove the sector attaching screw **(1)**.

By applying pressure on the push button **(2)**, clear sector **(3)**.

Release pressure and save the push button and the ratchet.

Change the defective parts.

Refit by reversing above sequence of operations.



PARKING BRAKE

ADJUSTMENT.

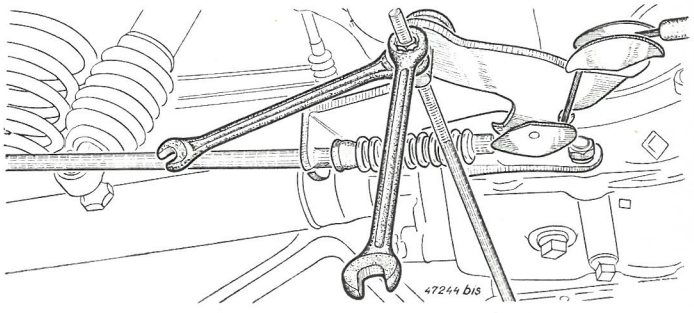
This adjustment may be correctly performed only after adjusting the brake pedal.

Raise the rear end of the vehicle, release the parking brake lever and shift gearbox to neutral. Loosen the check nut and operate the latter to adjust cable tension.

Check for free rotation of wheels.

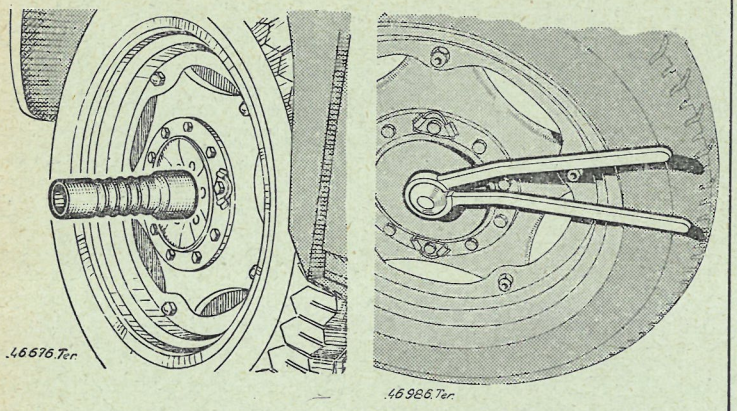
The parking brake lever should mesh three teeth on the sector before braking actually starts.

Retighten check nut.



9. WHEELS - HUBS - DRUMS

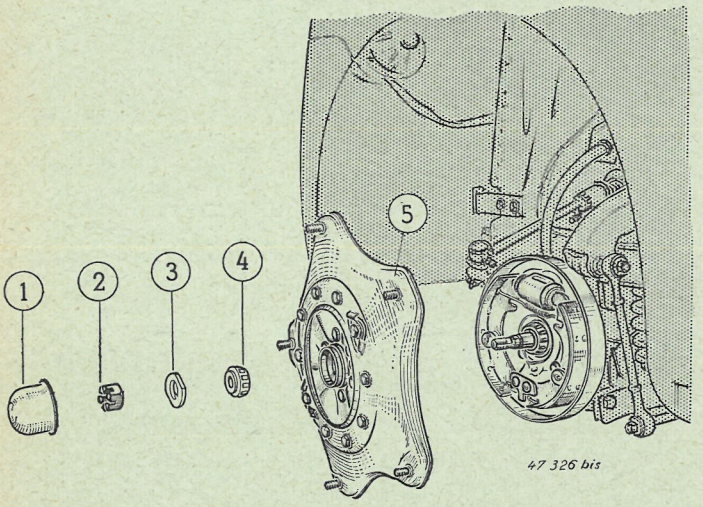
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Rear wheels - hubs - drums	Removing	115
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FRONT WHEELS - HUBS - DRUMS

REMOVING.

Remove wheel hub cover.
Remove hub cap with tool Rou. 01 or Rou. 08.
Put car on stands and remove the wheel.



The numerical order of the references on the accompanying illustration corresponds to the dismantling sequence of the parts. Follow this sequence for the dismantling.

NOTE. — The " flange - hub - drum " assembly **(5)** is removed as an assembly ; if required to separate these parts, remove the assembling screws.

REPLACING THE BEARINGS.

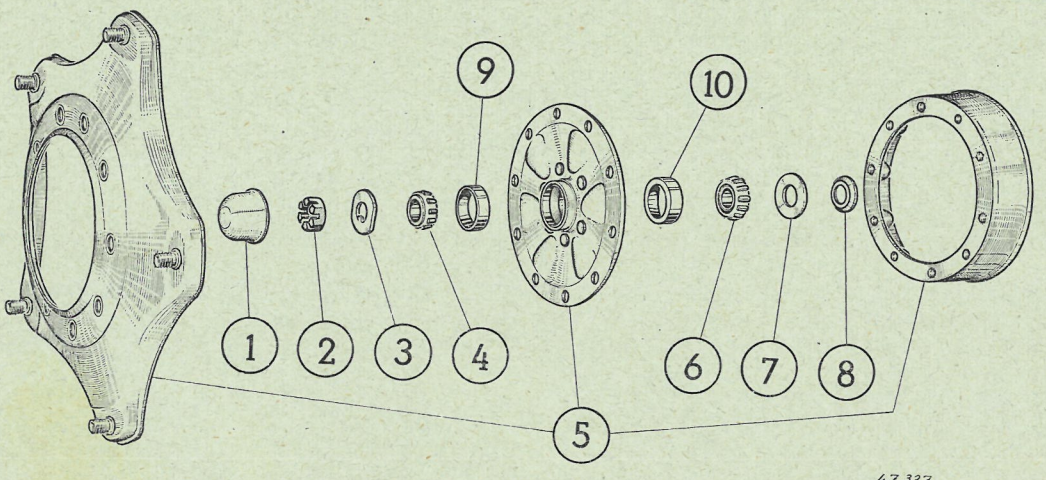
It is mandatory to also replace the cups.
Make sure that the cup locations are clean.

REFITTING.

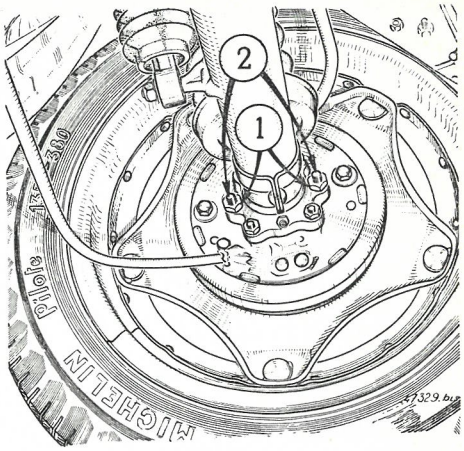
Assemble " hub - drum - flange ".
Without tightening the bolts : perform the centering on a lathe (see page 116).
Reassemble on stub axle.
— The inner chamfer of the inside bearing thrust against the brake plate.
— Fill with grease : the bearings and the location in-between the two faces (see under " lubrication ").

ADJUSTING CLEARANCE.

Tighten nut while rotating wheel until a slight binding effect is experienced. Loosen nut by 1/6 turn or slightly more and insert cotter pin on nut.
With a mallet, hit the end of the stub axle to seat the bearing.
Reassemble the hub cap filled up to 3/4 with grease.



REAR WHEELS - HUBS - DRUMS



REMOVING.

Raise car on stands, remove wheel and hub cover.

Remove bearing cover attaching nuts (**1**). If necessary, hit studs (**2**).

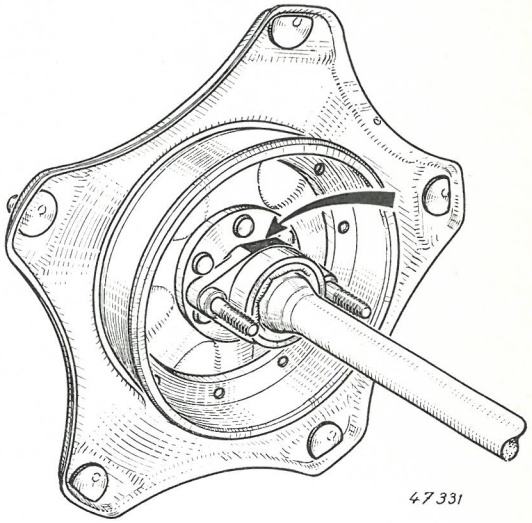
Remove the " drum - hub - flange - rear axle shaft " assembly.

NOTE. — In case of fracture of the wheel shaft and should it prove difficult to remove the splined portion, remove the rear axle tube.

DISMANTLING THE SHAFT.

Remove the nut at shaft end and the split bush.

Drive out the shaft on a press, the bearing and the seal.



REASSEMBLING.

Perform the centering of the " drum - hub - flange " assembly (see page 116). Assemble the lubricated bearing on the shaft. Assemble, on press, a new seal in the bearing cover by **complying with the direction of assembly (lip towards bearing).**

Assemble cover (fitted with its paper gasket), the studs and the spacers (with flat towards shaft) on the hub.

Insert the shaft in the hub.

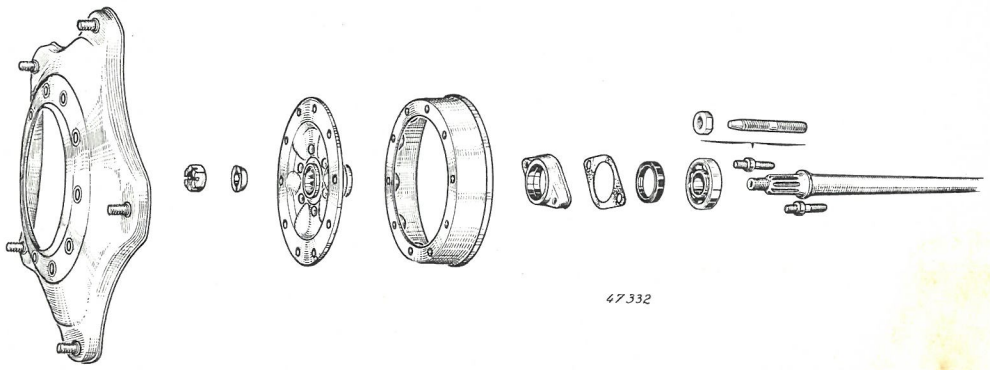
Install the split bush. Run up nut, tighten and insert cotter pin.

REFITTING.

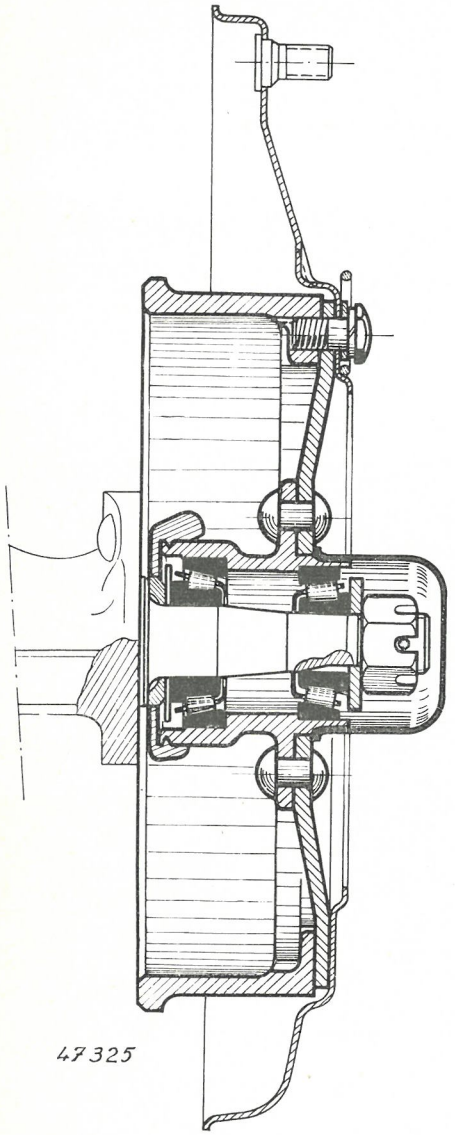
Insert shaft in the rear axle tube **with the flat on the bearing cover turned upwards** to enable assembling the parking brake link.

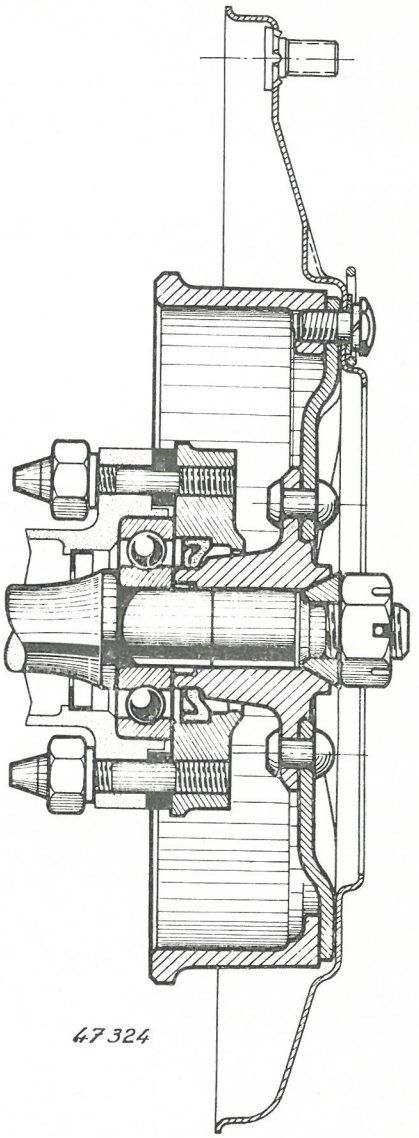
Install the studs in the brake carrier plate.

Fit the lockwashers. Run up and tighten the nuts.



CENTERING AND TOUCHING UP THE FRONT AND REAR DRUMS





CENTERING ON LATHE.

Loosen the " flange - hub - drum " assembly bolts. Install the assembly between points on a lathe (bearing cups should be installed at their location in the front hub).

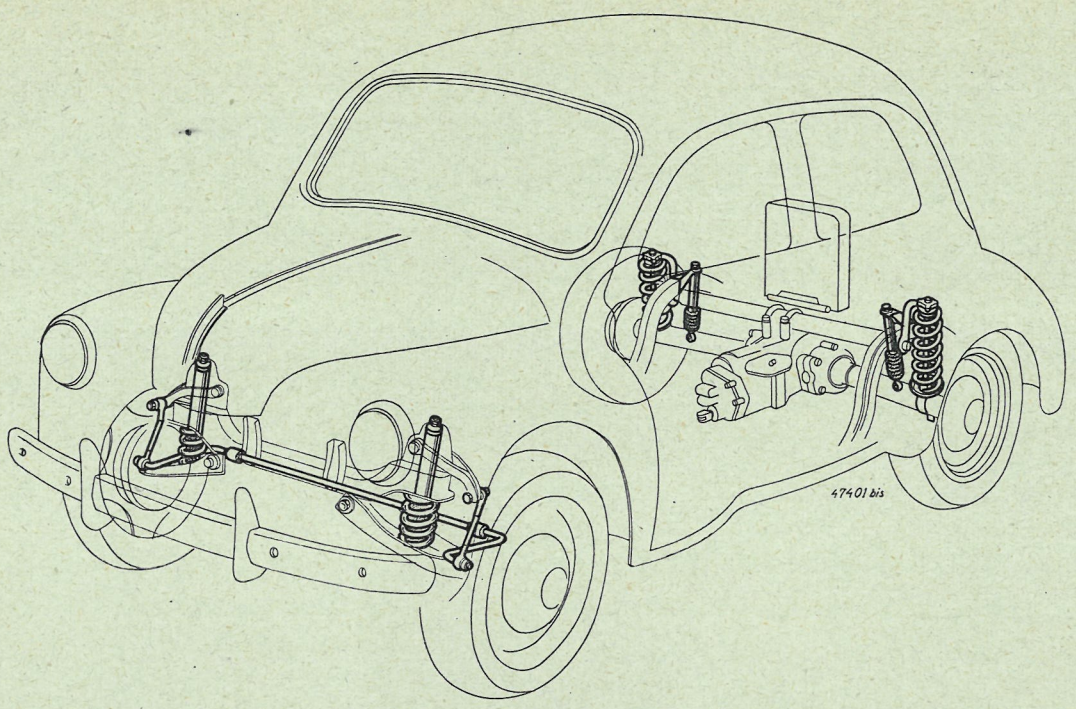
Center the scriber point, **using as reference points :**
— The wheel studs for the flange.
— The friction area of the linings for the drum.
After centering : **Tighten the bolts criss-cross.**

NOTE. — It is mandatory to perform the centering operation each time a flange or a hub and drum assembly is replaced.

Reconditioning the drums (standard diameter : 180.25 mm or 7.096 in.).
The friction area of a drum should be touched up every time it shows traces of scoring, out-of-roundness or warpage.
This touching up is performed by removing the least possible stock from the drum on a drum lathe.
After turning the drum, diameter should not exceed 180.75 mm (7.116 in.).
If, after the operation, this diameter is found to have been exceeded, the drum is to be replaced.

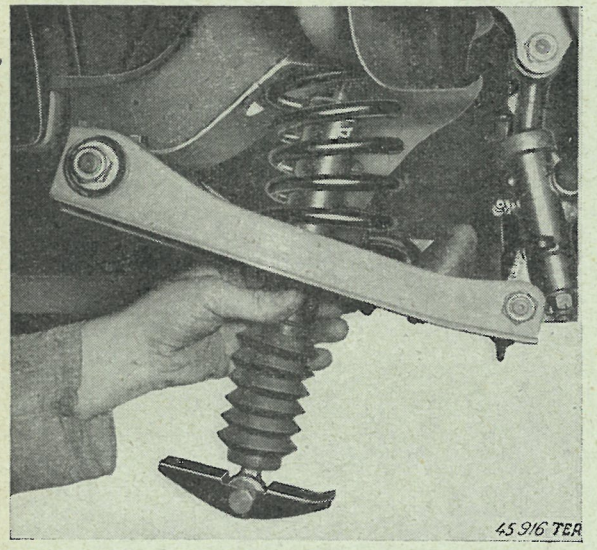
10. SUSPENSION - SHOCK ABSORBERS

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SPECIFICATIONS

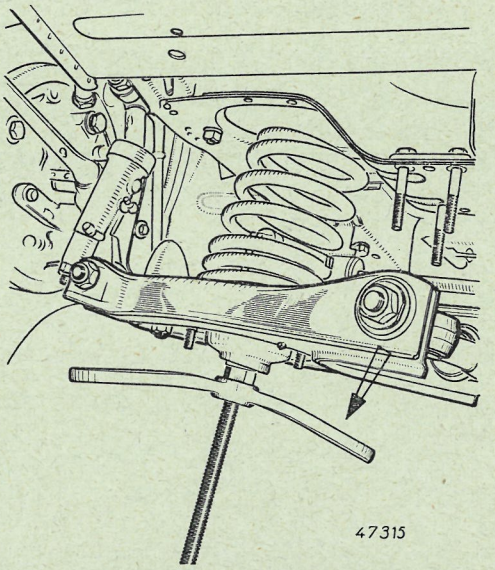
Independent wheel suspension by helical springs.
Telescopic hydraulic shock absorbers.
Torsion bar in front.



FRONT SHOCK ABSORBER

REMOVING.

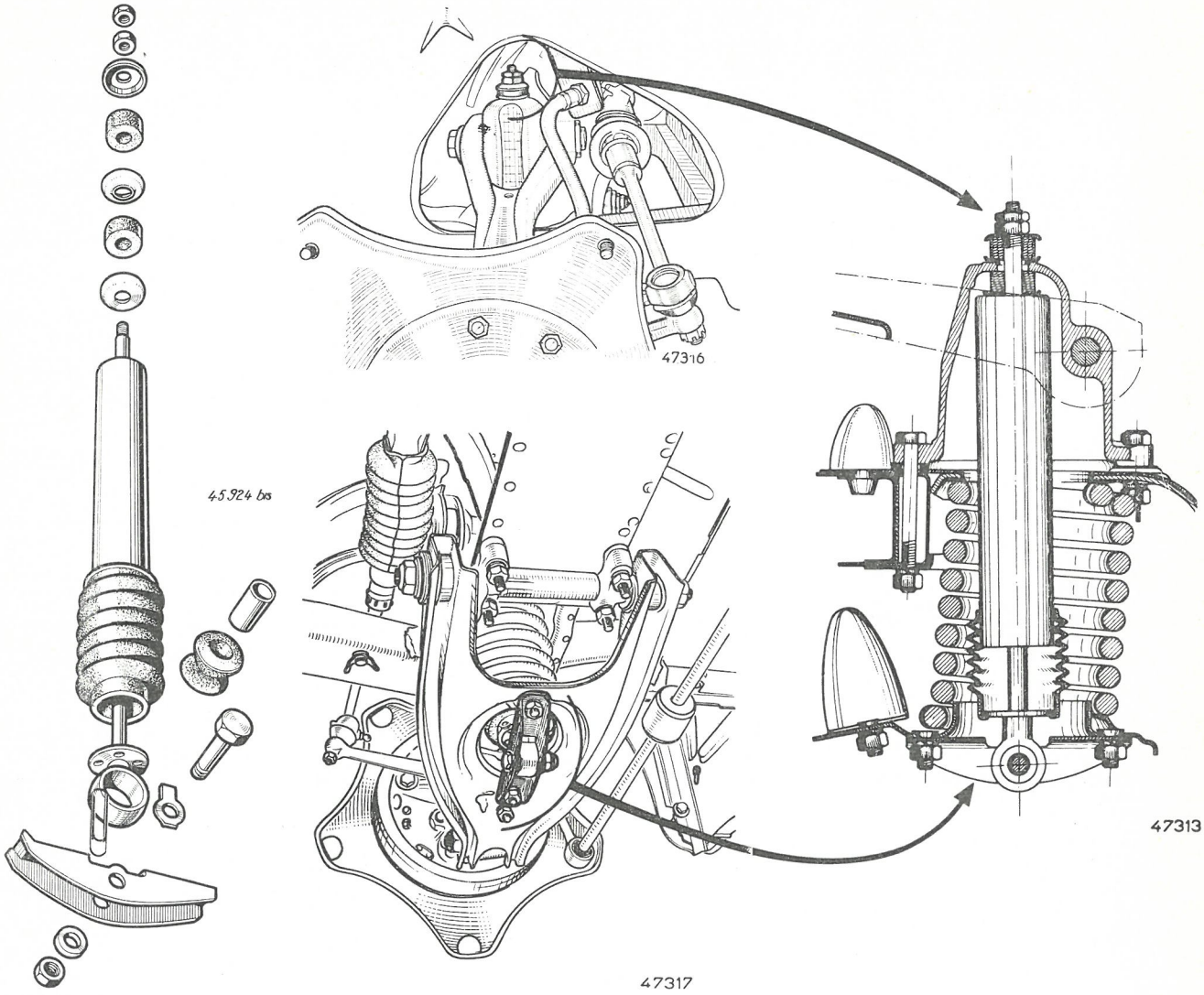
Put car on stands and remove the wheel.
Disconnect the shock absorber upper mounting.
Remove the nuts from the lower mounting bracket, and remove shock absorber.



FRONT SPRING

REMOVING.

Remove the shock absorber.
Compress spring with compressor Sus. 09.
Remove nuts attaching the lower hinge bolt on the cross-member.
Pivot assembly to clear the spring from its seat on the cross-member.
Remove the compressor and the spring.



FRONT SHOCK ABSORBER

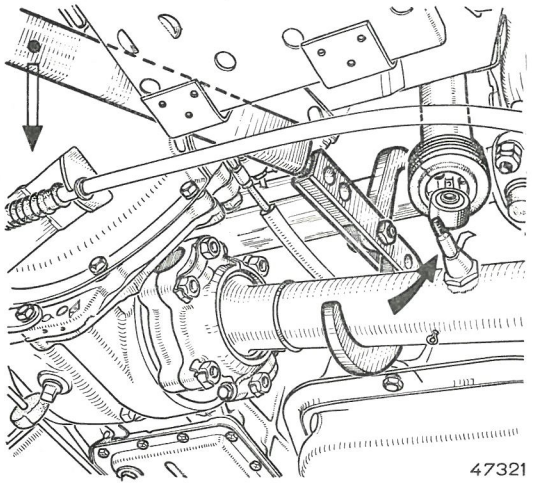
REFITTING.

Connect the shock absorber to its lower mounting with the bolt (fit a retainer under the head). Do not tighten the nut.
Release shock absorber to its maximum length.
On rod, install : the cup and the pad.
Insert shock absorber into spring.
On rod install : the guide cup (the centering protrusion being installed into the cross-member), a pad and a cup. Run up nut and tighten the check nut.
Secure the lower mounting bracket (with nose towards wheel).
Tighten the bolt nut.
Reassemble the wheel.

FRONT SPRING

REFITTING.

Perform the removing operations in reverse sequence.



47321

REMOVING AND REFITTING A REAR SPRING

REMOVING.

Put car on stands and remove the wheel.

Disconnect the lower end of the shock absorber.

Remove the check nut and loosen the limiting rod nut.

Position the spring compressor Sus. 10 and compress spring.

Remove nut, washer, rubber pad and remove spring.

REFITTING.

Insert spring onto the limiting rod and position into the lower cup.

Position spring compressor Sus. 10 and compress spring.

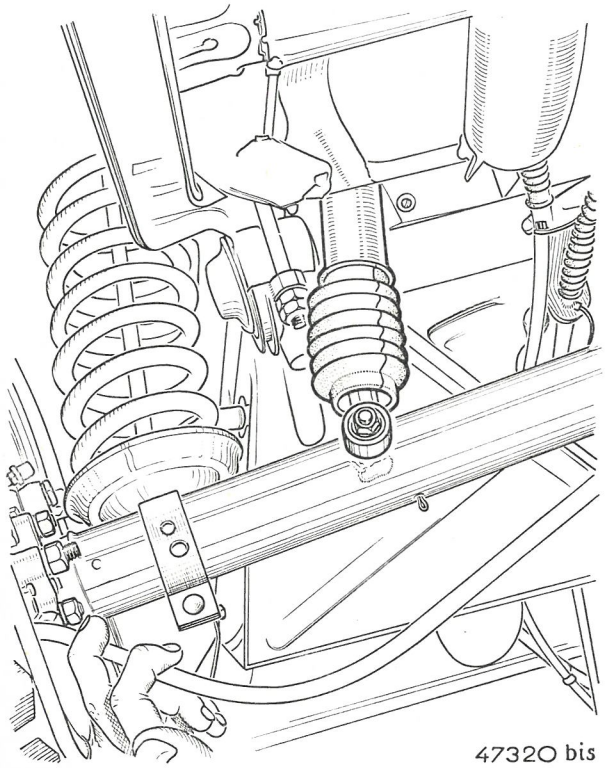
On limiting rod, assemble : the rubber pad, the washer.

Run up nut in order to allow the rod to protrude by somewhat more than the height of the check nut.

Tighten check nut.

Remove spring compressor.

Reconnect the lower end of the shock absorber.



47320 bis

REMOVING AND REFITTING A REAR SHOCK ABSORBER

REMOVING.

Put car on stands.

Remove the radiator obturating cardboard and, if required, the air filter.

Disconnect the upper end of the shock absorber.

Depress shock absorber to shortest length.

Disconnect the lower end of the shock absorber and remove same.

Check condition of mounting eye rubber bushes.

Replace if required **(do not omit fitting the spacer into the bush).**

REFITTING.

On rod assemble : cup and pad.

Insert the lower hinge mounting on the bolt and tighten the nut.

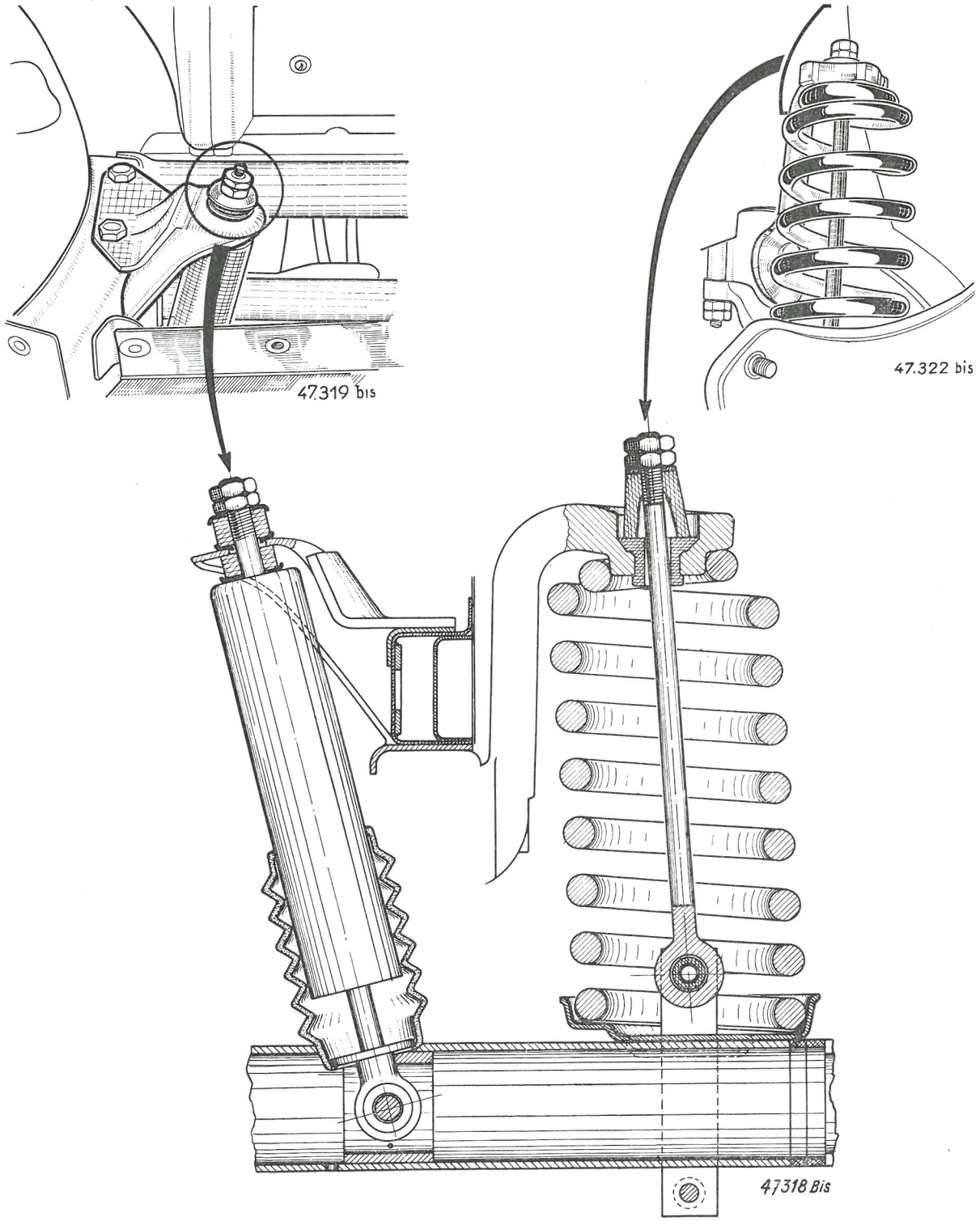
Insert the shock absorber rod into the upper bracket.

On rod and on top of bracket, assemble : the pad guide cup (the one with the centering protrusion to be located into the cross-member), the pad and the cup.

Run up nut fully and carefully tighten check nut.

Refit the radiator obturating cardboard and, if required, the air filter.

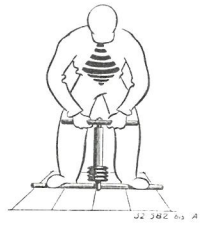
REAR SHOCK ABSORBER AND SPRING



SHOCK ABSORBER TEST

Scrape any shock absorber showing one of the following exterior defects :

— Piston rod warped.
— Loosened mounting.
— Leaks (at piston rod seal or at crimped-on section).
— Body damaged or dented.

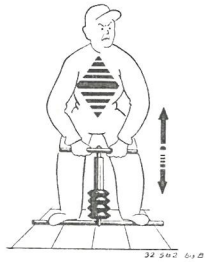


If none of above defects have been found, **perform the following manual test :**

Hold shock absorber vertically, after inserting a rod in the mounting eye rubber bush and a tube drilled with a 10 mm (.39 in.) dia. hole in the upper rod.

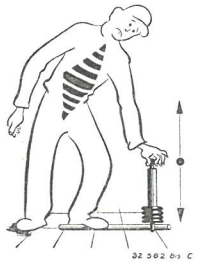
Operate shock 8 to 10 times along its whole stroke.

There should be a constant resistance.

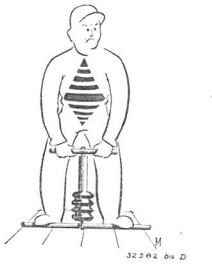


If the following conditions are found :

a) **A " hole " when reversing direction** (cavitation effect).



b) **No resistance during the operation,** even on a portion of the stroke.



c) **The shock absorber cannot be operated manually.**

Replace the shock absorber.

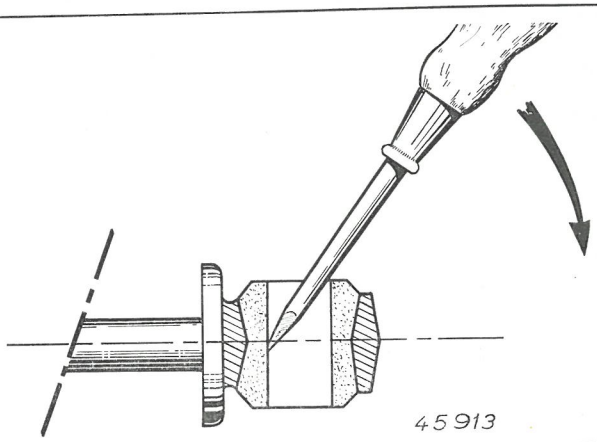
NOTE. — **Comparison with a new shock absorber would lead to a wrong conclusion,** as a shock absorber which has not been broken-in is inevitably harder to operate.

The manual test will only give a rough estimate. To obtain a definite conclusion, it will be necessary to use a special testing machine.

REPLACING A MOUNTING EYE RUBBER BUSH

From removed shock absorber, drive out the spacer, using **tool Sus. 12.**

Remove rubber bush by a leverage action, using a screwdriver.



TORSION BAR

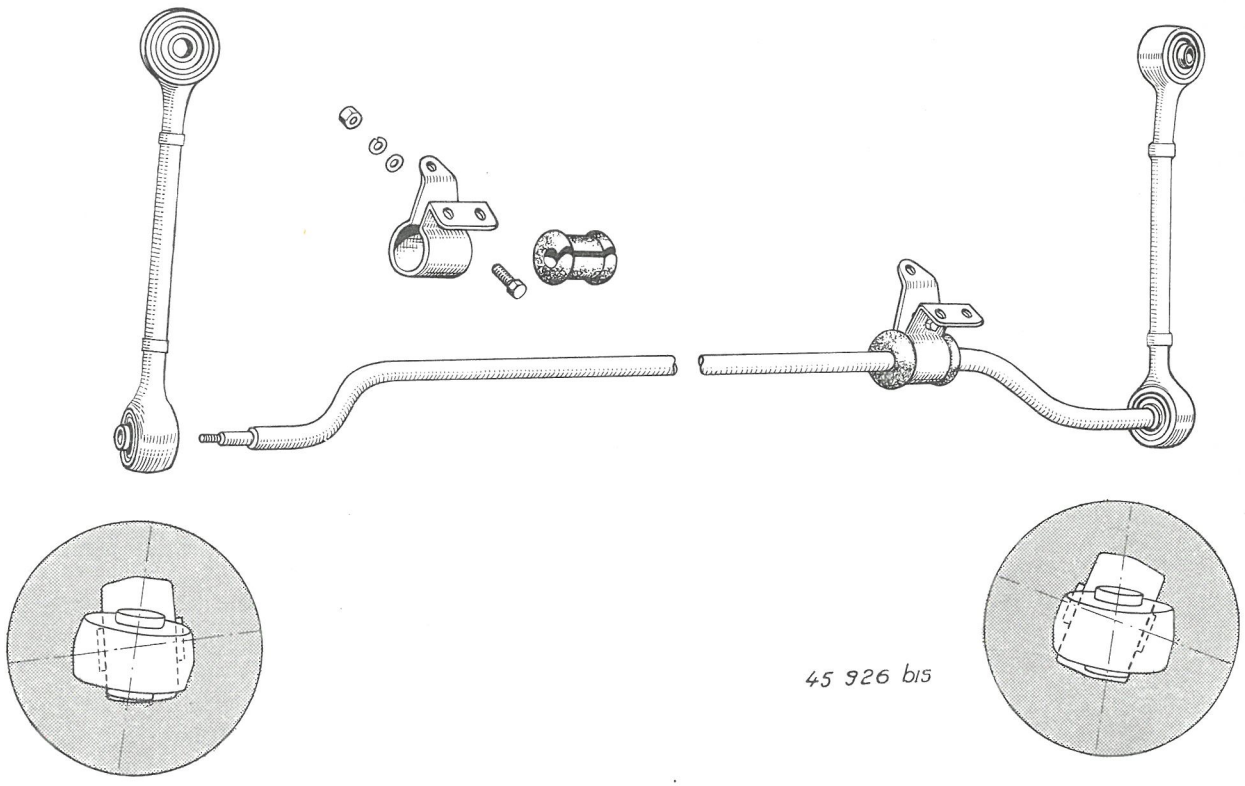
REMOVING.

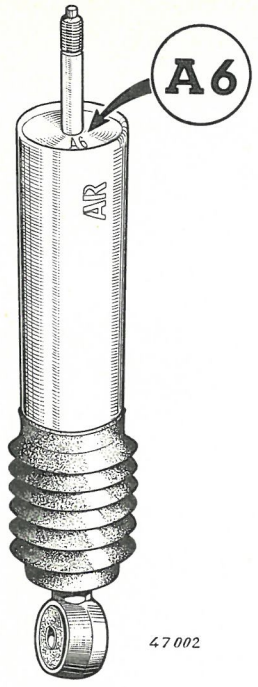
Raise front end of vehicle on stands and remove the wheels.
Disconnect links and mark them **(R and LH ones).**
Remove the bearings attaching bolts and remove bar.
Check the link rubber bushes. Replace if necessary.
Check bearing liners and replace if required. (Do not tighten the liner attaching bolt).

REFITTING.

Reverse above sequence of operations.

NOTE. — **Do not invert links when refitting.**
Adjust bearings attaching holes center distance using the liners clamping screw.
When assembling, apply a coating of TYPHUS Michelin compound on the rubber bushes to obtain an easy sliding action.





47002

SHOCK ABSORBERS IDENTIFICATION

The shock absorbers body is coated with paint :

— Green for the front.

— Grey for the rear.

Each shock absorber has a marking in white paint showing the vehicle for which it is designed.

In addition, a manufacturing date code is stamped on the upper shock absorber face :

— Month code is a letter (from A to L).

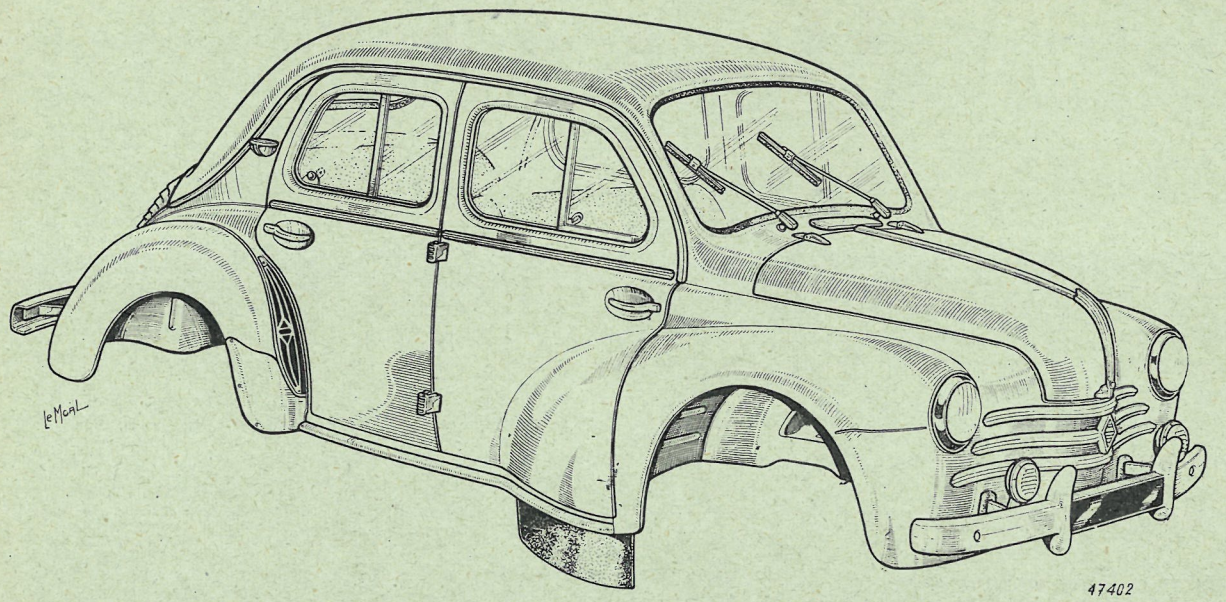
— Year shown by a figure corresponding to the last digit of the current year.

For example : the shock absorber shows : A 6.

This means : January 1956.

11. BODY

	PAGES
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Replacing a front door ventilating glass	130
Replacing a rear door sliding glass	131
Fitting a windscreen or back window glass	132
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Replacing a front cross-member	134



SPECIFICATIONS

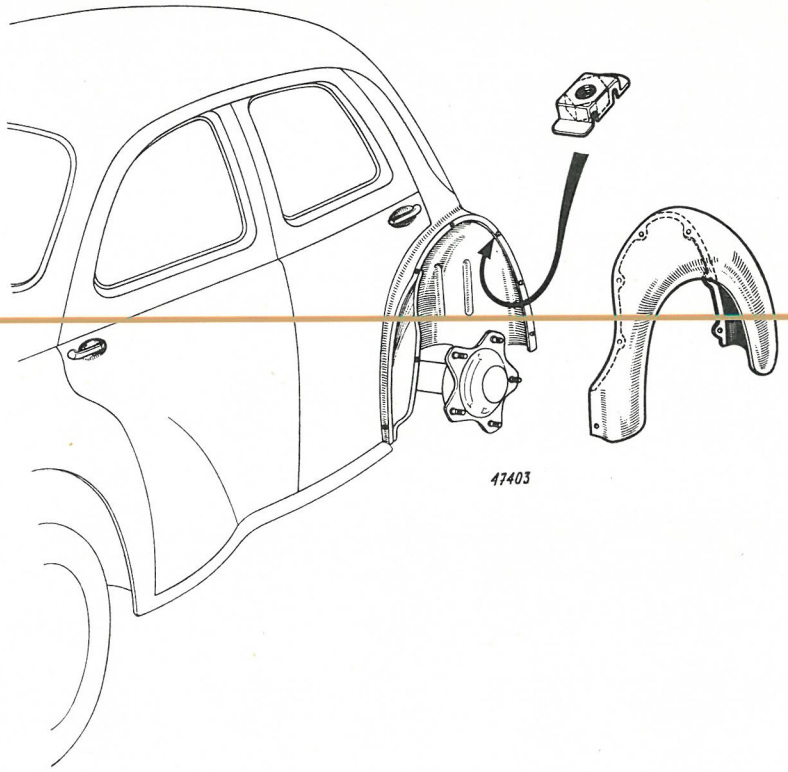
Weight of body only : 150 kg (330 lbs) — less front and rear bonnets.
Total weight of 4 doors : 25 kg (55 lbs).

Dimensions of body only :

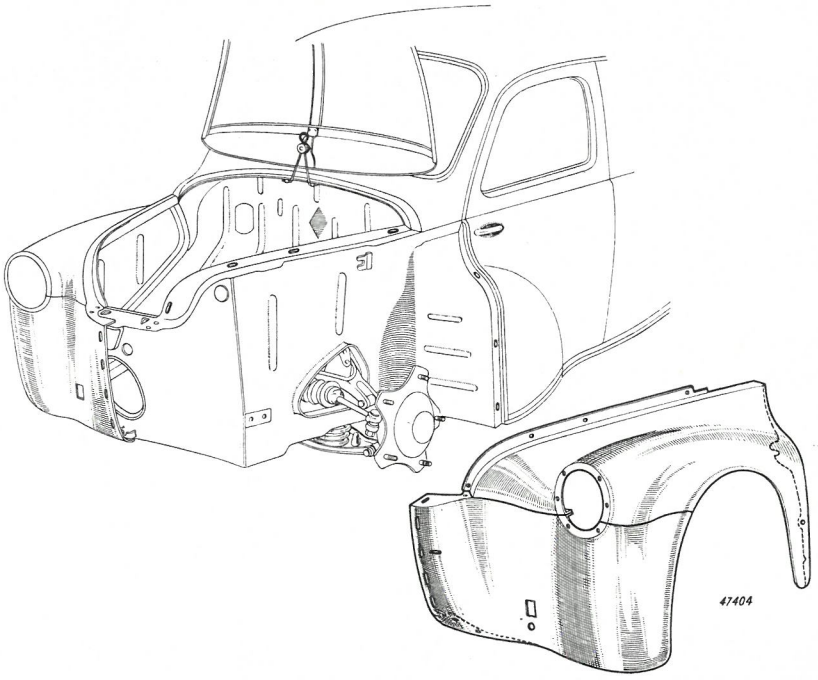
Overall length	3.480 metres (137 in.)
Overall width	1.430 metres (56.3 in.)
Total height	1.185 metres (46.65 in.)

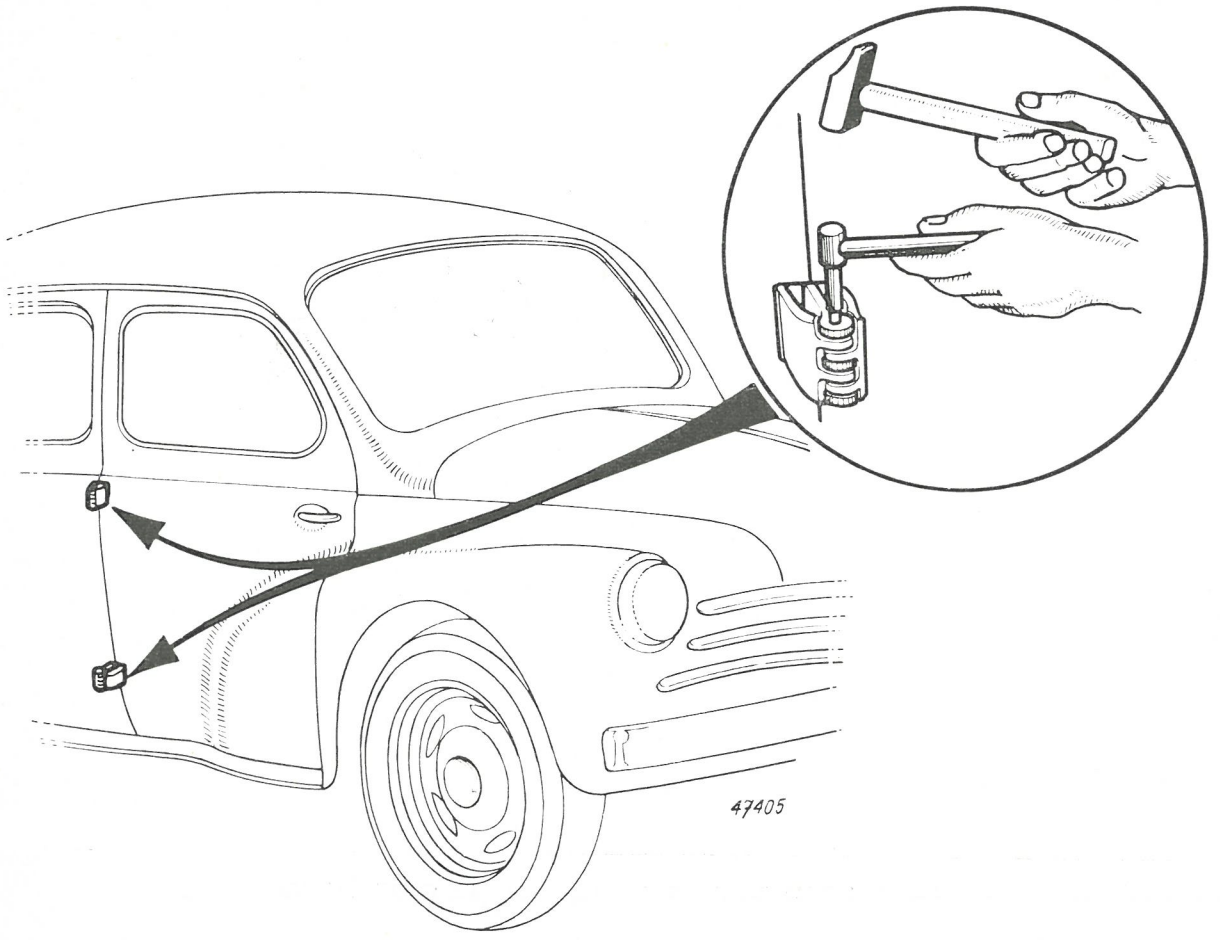
Inside dimensions of equipped body :	metres	inches
From center of windscreen to center of back window	1.66	65.35
From front seat back to rear seat back (according to position of front seat)	.64 to .74	25.19 to 29.13
From front seat back to rear seat cushion (according to position of front seat)	.19 to .29	7.48 to 11.41
Elbow room at front	1.25	49.21
Elbow room at rear	1.20	47.24
Inside height from floor to roof panel	1.14	44.8
Inside height from top of seats, in front	.92	36.22
Inside height from top of seats, at rear	.89	35.03

REPLACING A RH OR LH REAR WING



REPLACING A RH OR LH FRONT WING





REPLACING A FRONT OR REAR DOOR

To remove the door, remove the hinge pin using the puller tool Car. 07.
For the upper hinge, operate from the lower end.
For the lower hinge, operate from the upper end.

FITTING.

Insert pins (chamfer end) :

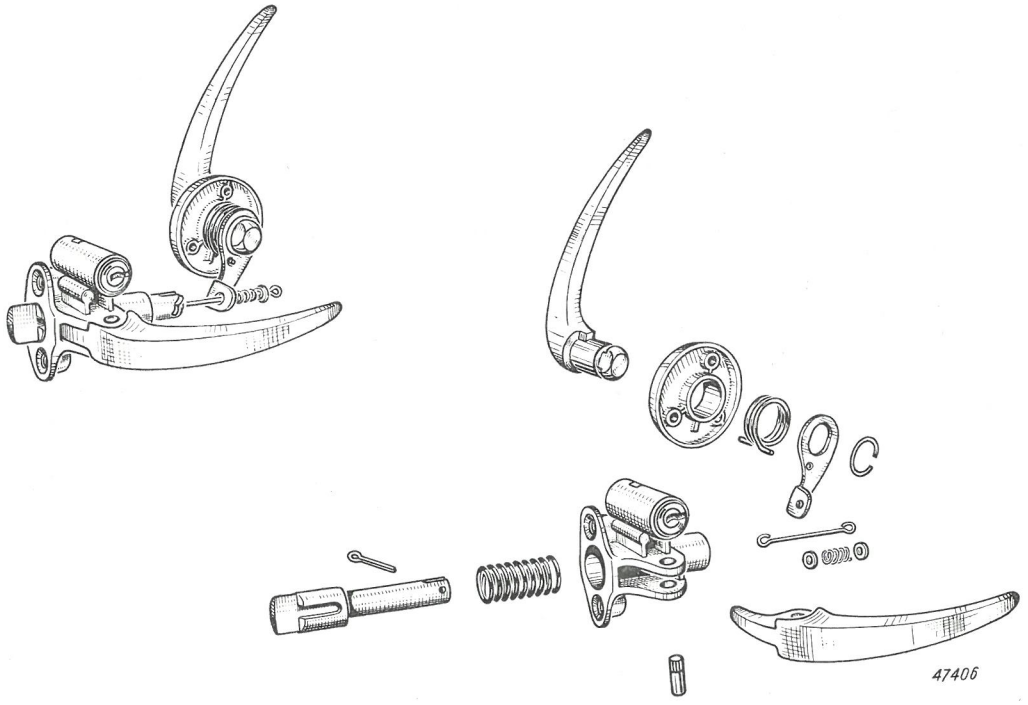
— For the upper hinge : insert pin through the lower end.
— For the lower hinge : insert pin through the upper end.

Complete the operation by hitting lightly with a hammer.

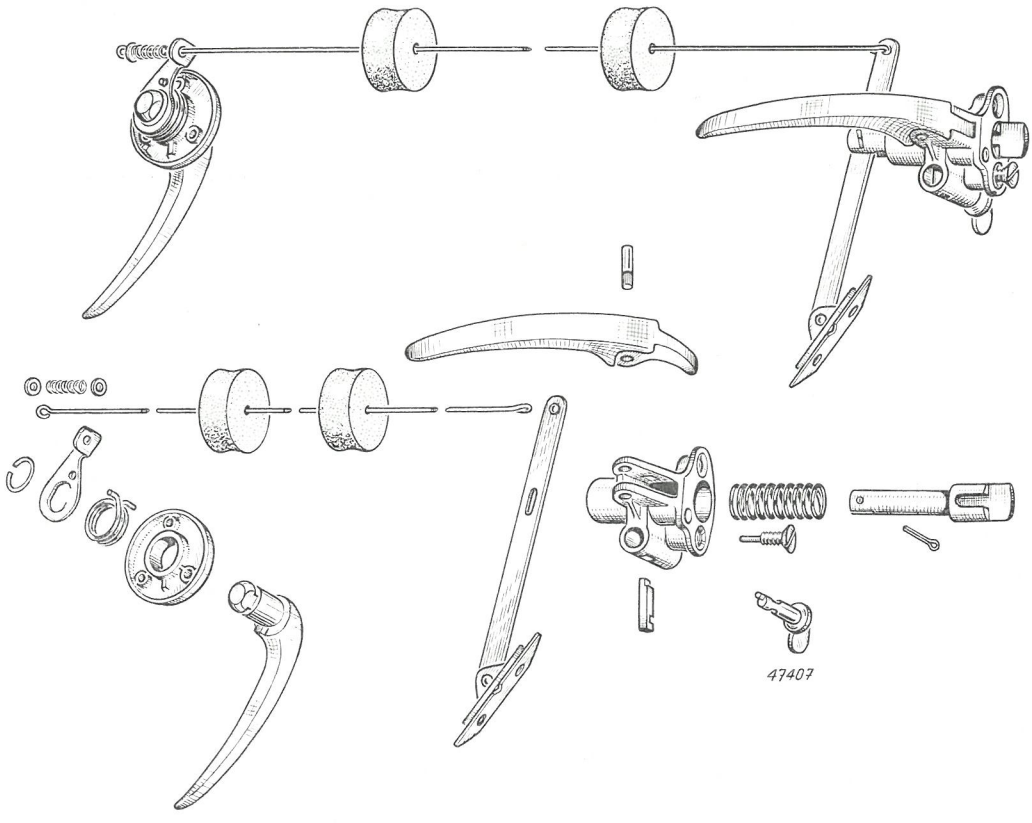
Make sure :

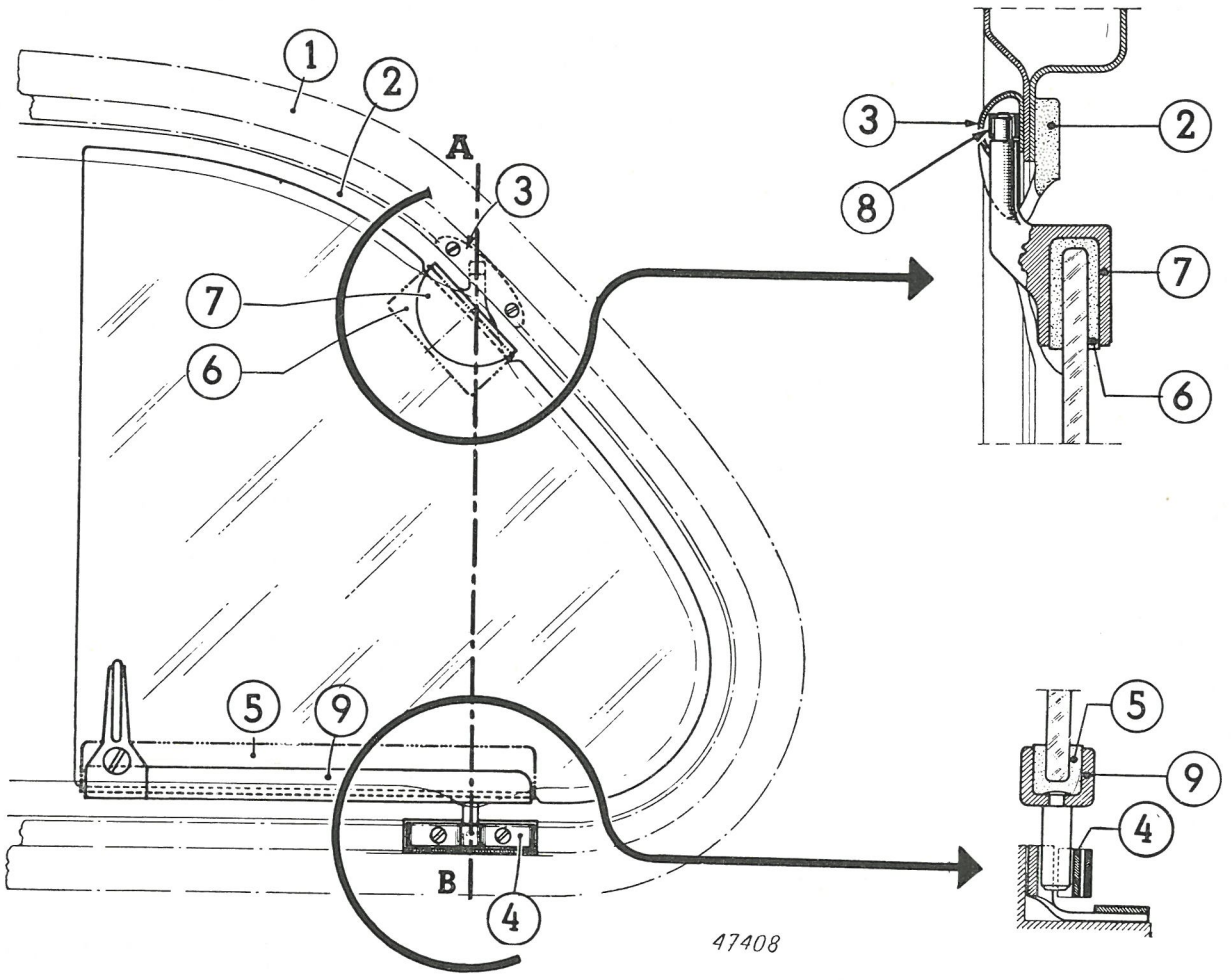
— The hinge pins have no play in their locations.
— The door striker plate is properly adjusted.
— The rubber weatherstrip is in good condition (not hard, not damaged, nor loosened).
— The door does not bind at any point around the opening.

FRONT LOCK



REAR LOCK





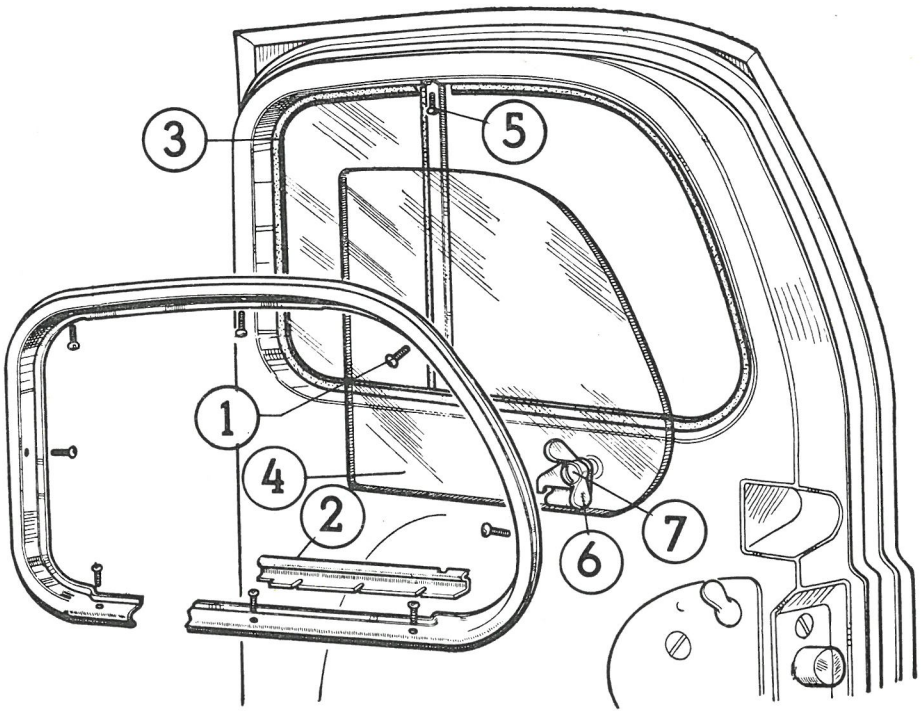
REPLACING A FRONT DOOR VENTILATING GLASS

REMOVING.

Remove the door inner frame (**1**) (use a Phillips screwdriver for the cross-recessed screws).
Remove the glass weatherstrip (**2**), except at the lower end.
Remove the upper pivot bracket (**3**), next the retainer (**4**) at lower pivot and remove the lower U channel (**9**) and pivot of the glass.

REFITTING THE GLASS.

Insert the inner holding strip (**5**) previously dampened with soap water, into the lower U channel.
Apply a heavy hand pressure on the glass to seat the latter into the lower U channel.
Insert the upper holding strip (**6**) previously dampened with soap water into the flanges of pivot (**7**). Put pivot (**7**) into the glass recess and securely push in the pivot.
Make sure the upper and lower pivot pins are aligned (A - B line).
Cut out the rubber strips (**5**) and (**6**) to the contours of the brackets, and place dampener bush (**8**) onto the upper pivot.
Insert lower pivot into its location (without lubricating same).
Position pivot upper bracket (**3**) on pivot (**7**) and attach it to the door.
Refit the glass rubber weatherstrip, the lower pivot retainer (**4**) and with the 2 attaching screws adjust pivoting clamping action.
Refit door frame.



47409

REPLACING A FRONT DOOR SLIDING GLASS

REMOVING.

— Remove the screws attaching the glass inside frame (**1**).

— Remove glass run (**2**) secured with the frame screws.

— Remove the sliding glass rubber stop (**3**).

— Slide the glass (**4**) fully rearwards in order to clear it out of the felt guide.

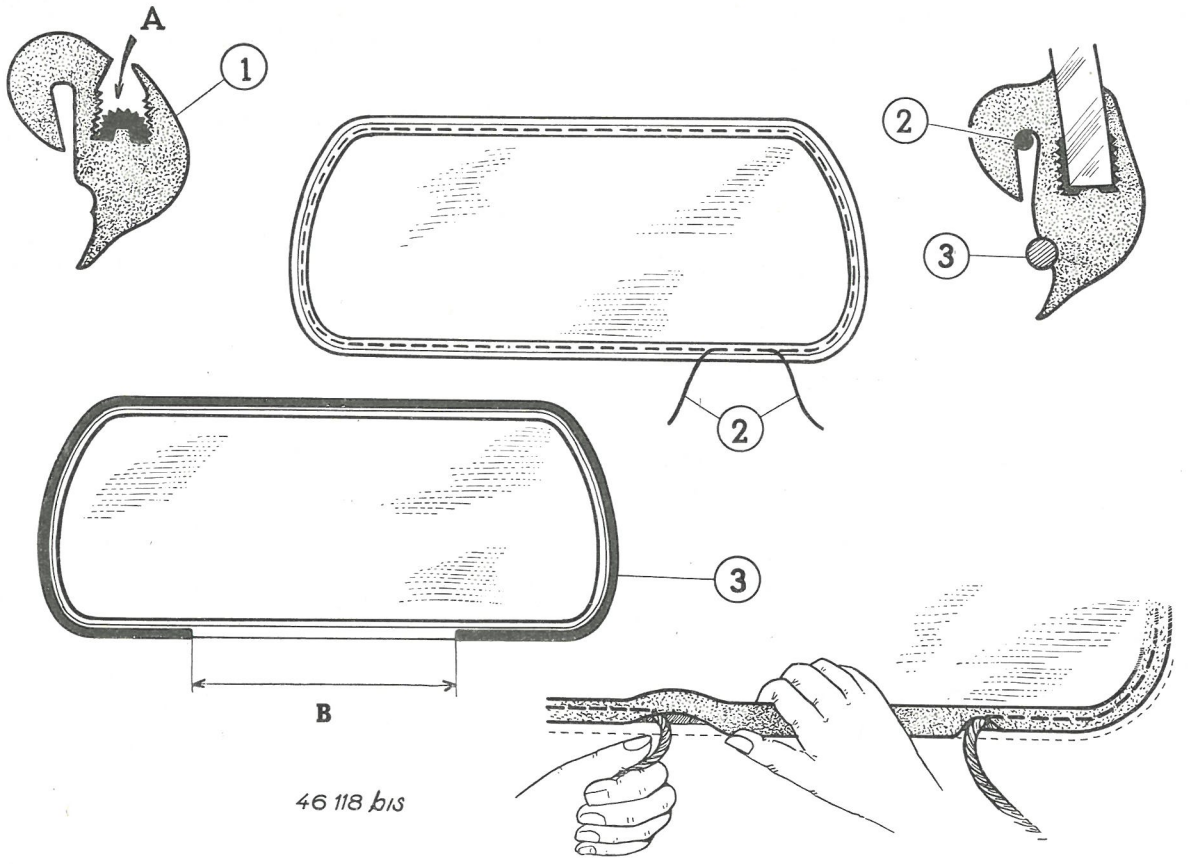
— If required, remove felt guide (it is attached with staples).

— At ends of stationary glass bright moulding, remove the 2 screws (**5**) maintaining the glass and remove the latter.

— Remove control handle on sliding glass (**6**). To this end, remove pin (**7**) when the various components of the control handle will be cleared.

REFITTING.

— Reverse sequence of removing operations.



FITTING A WINDSCREEN OR BACK WINDOW GLASS

PRELIMINARY OPERATIONS.

At (**A**), on the periphery of weatherstrip (**1**), apply a coat of colourless "Bostick" type cement.

Fit glass with rubber strip, with the **round portion of the strip being located opposite to the glass convex side.**

Install glass (with convex side down) on a properly padded table. In the free slot of the rubber strip, insert a cord (**2**) of 3 to 4 mm (.118 to .157 in.) dia. all around the strip, taking care to cross cord for about 10 cm (4 in.) at the lower end and **towards an angle.** Allow ends to hang by approximately 20 cm (8 in.).

On rubber strip, at location provided to this purpose, apply a "Prestick" (**3**) sealer bead. **Leave lower portion (B) free.**

NOTE. — If a "Prestick" sealer is not available, use the "Bostick" type cement applied with a brush.

INSTALLING.

Secure window glass, fitted with its strip, from the outside, **with ends of cord hanging inside.**

Position glass properly with reference to frame, hold and **apply pressure at the location where the cord crosses.**

From the inside of the car, successively pull on each end of the cord, **starting from the lower end of the glass ;** this will cause the lip of the strip to be lifted and to be pulled inwards, thereby straddling the frame.

(The operator assistant, from the outside, facilitates the fitting of the rubber strip by applying pressure on the glass).

Continue the assembling of the glass on the sides, in the same manner.

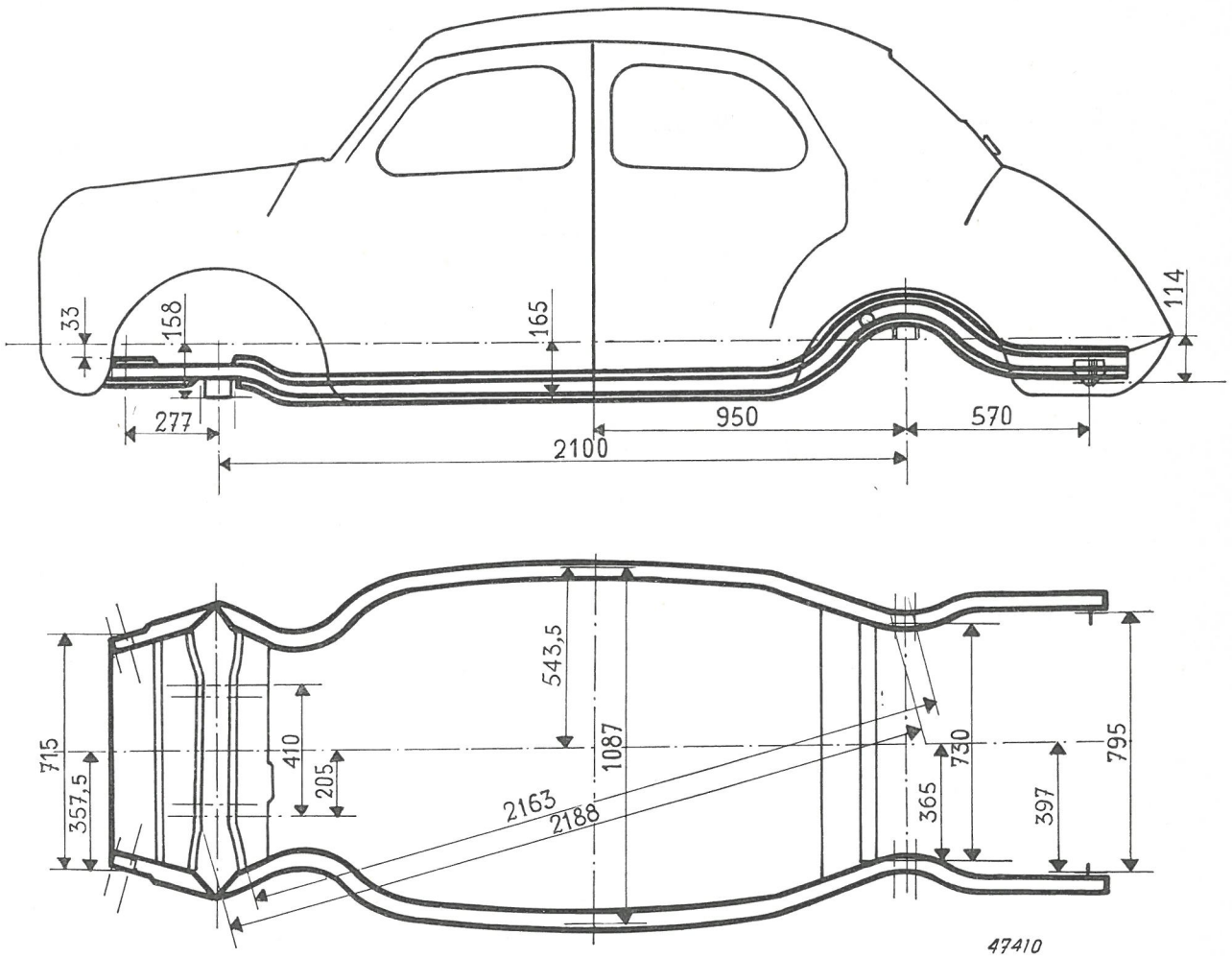
At half-height of the sides, the assistant will accompany the removal of the cord by hitting the glass with a rubber mallet.

Complete removal at the upper end.

Once the cord is removed, the assistant should make sure that the strip perfectly adheres to body on the whole periphery and should complete this adherence by a few blows of the mallet.

FRAME AND FLOOR

CHECKING



For the checking of the body, use combination bench Car. 08, fitted with the set of stands for the 4 CV - Car. 09.

REPLACING A FRONT CROSS-MEMBER

DISMANTLING FRONT CROSS-MEMBER.

— Dismantle the entire front axle, including the steering gear, the shock absorbers, the pedals and the master cylinder.

— After mounting a spacer with a C clamp, in-between the 2 pedal linkage brackets remove with a chisel the welding spots connecting the reinforcement to the front cross-member.

— With a sharp chisel, loosen the flanges of the cross-member on the side-members.

— Remove front cross-member from underneath, after raising the upper flanges.

ASSEMBLING THE REPLACEMENT CROSS-MEMBER.

Raise at one end of the cross-member, the upper flange by heating it to a dark red colour (avoid sharp edges).

— Position cross-member, from underneath, approximately at its correct location.

— Fold down the flange on the side-member by again heating to dark red (to facilitate this operation, put a wooden shim in the spring location, with the shim resting on a jack, in order to maintain the lower portion of the cross-member.

— The proper position is ensured by the use of the corresponding support (Car. 09) provided on the 4 CV bench and on the combination bench (Car. 08).

As soon as accurate location has been obtained :

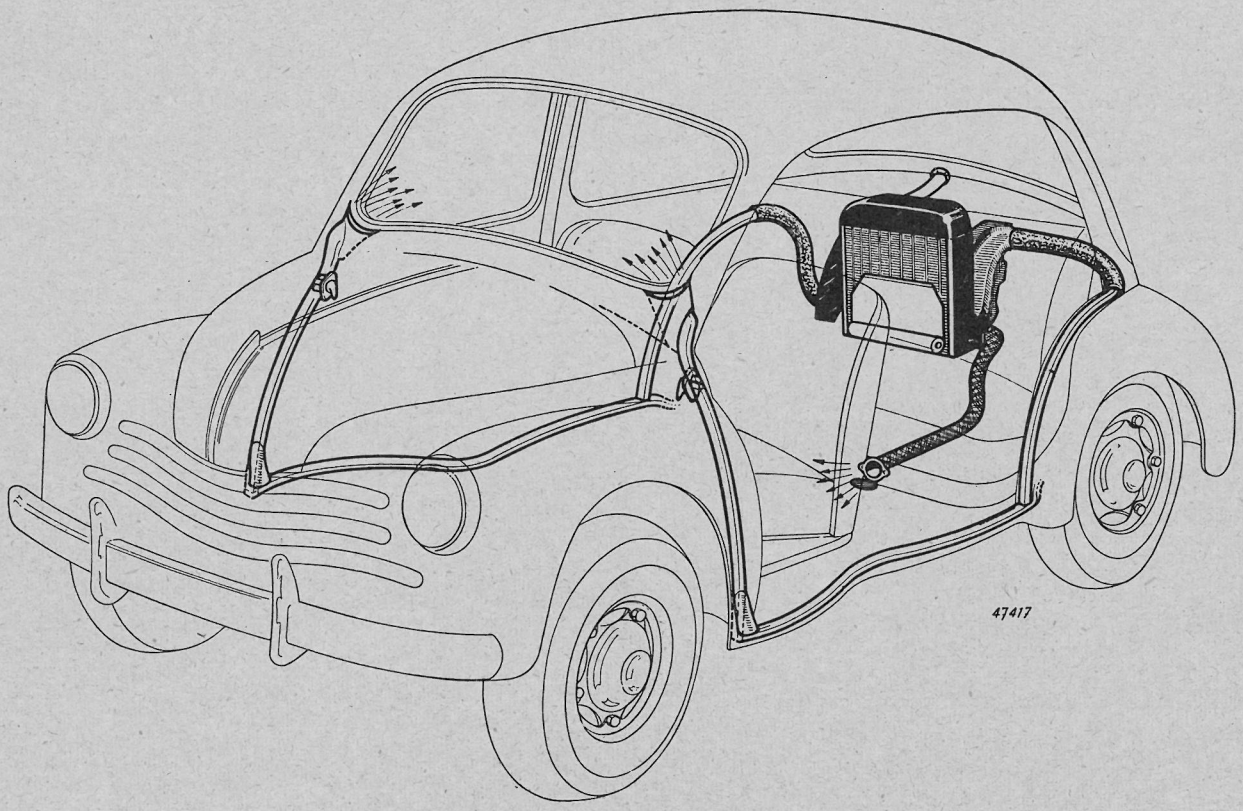
— Secure cross-member to body bench support with bolts.

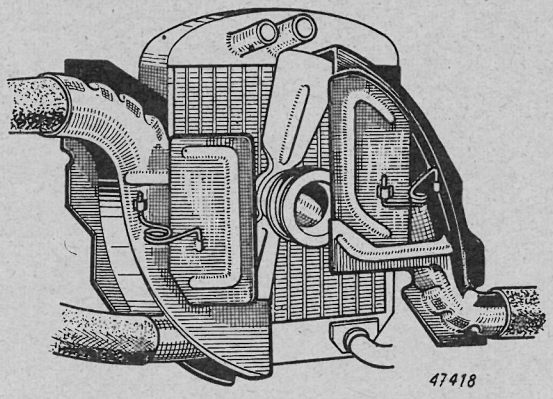
— Permanently weld the cross-member onto the side-members by welding spots, preferably arc welding.

— Next, reassemble the pedal linkage, the master cylinder, in order to straighten out the position of the 2 linkage brackets and weld brackets to the cross-member.

— Next, assemble the steering gear and the other parts of the front axle.

12. HEATING





Heating and demisting are achieved by the hot air flowing through the radiator.

This air is directed to the scoops around the fan and forced into the car.

An opening at the base of the rear seat ensures efficient heating.

Two nozzles at the bottom of the windscreen are for demisting purposes.

The efficiency of both systems is dependent on the water temperature inside the radiator (80° C, i.e. 176° F minimum) and, consequently, on the position of the radiator blind.

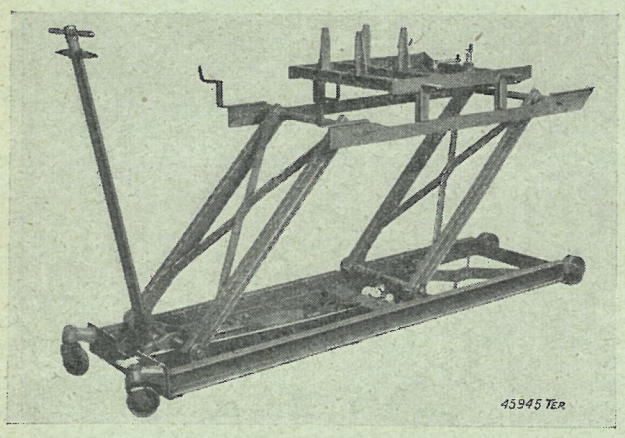
To cut off the heating, open the flaps by pivoting same by a quarter turn only and close the cover of the opening at the base of rear seat.

No difficulty should be experienced with the dismantling and reassembling of the various components of this assembly.

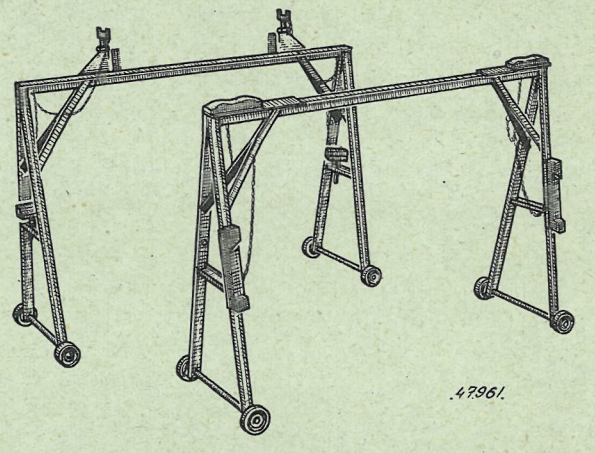
13. SPECIAL TOOLS

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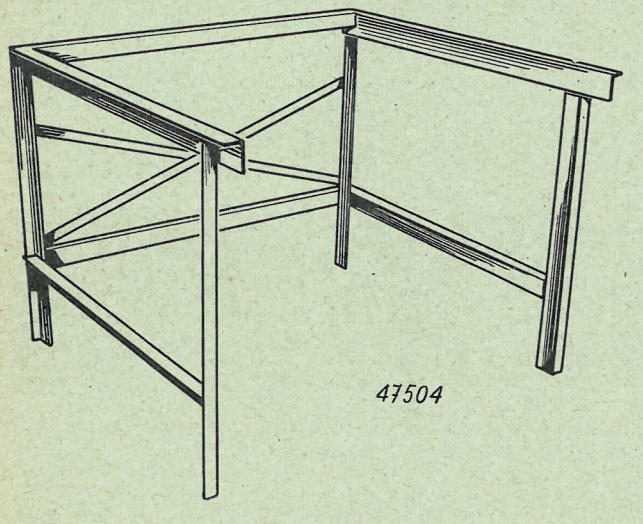
ENGINE (Removal)



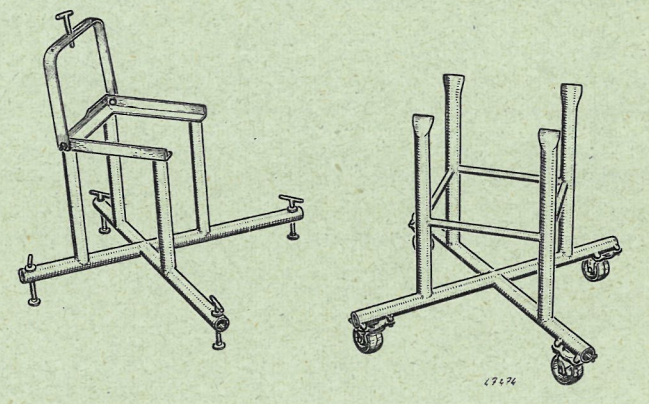
Cha. 09 et Cha. 07



Cha. 10



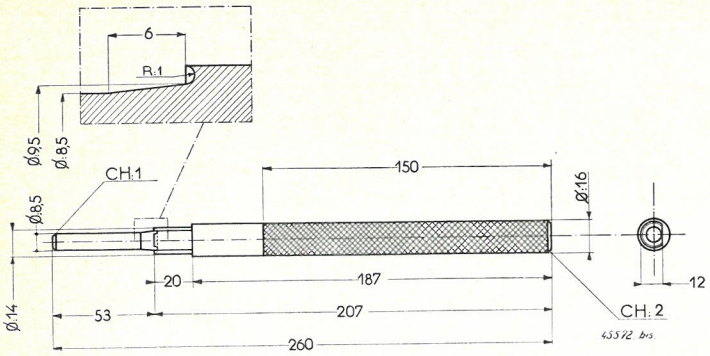
Cha. 08



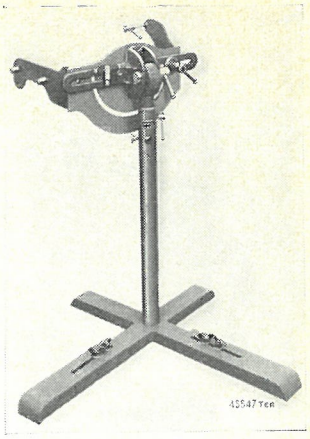
Mot. 80

RENAULT SERVICE REFERENCE	SAPRAR REFERENCE	DESCRIPTION
Cha. 09	12.200	Special FOG lift for 4 CV and DAUPHINE.
Cha. 07	10.326	Disassembly cradle FOG.
Cha. 10	12.201/2	Rolling stands FOG.
Cha. 08	10.374	Cradle support table FOG.
Mot. 80	12.254	Special removing carrier.

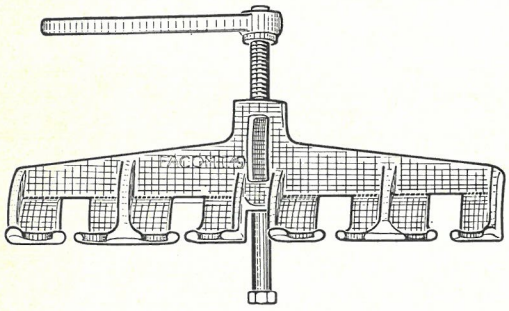
ENGINE



MOT. 81



MOT. 25 A et B



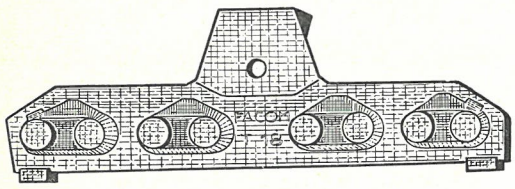
MOT. 01



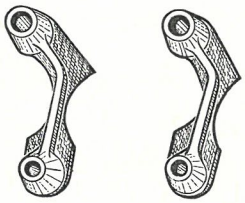
MOT. 03A



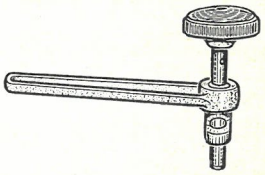
MOT. 04



MOT. 08



MOT. 12

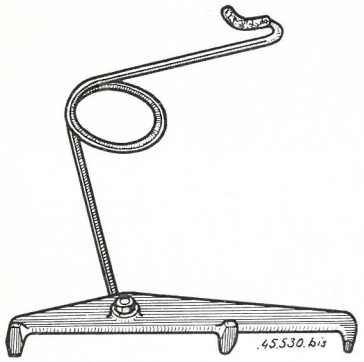


MOT. 13

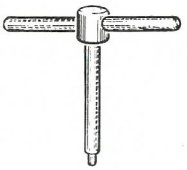
47111bis

RENAULT SERVICE REFERENCE	REFERENCE SAPRAR	DESCRIPTION
Mot. 81	Local manufacture	Flaring tool for rocker arm tubes.
Mot. 25 A et B	12.074	Engine support with adaptable extensions on swivelling stand.
Mot. 01	10.586	Compressor, valve springs - multiple type.
Mot. 03 A	12.175	Inserter and puller, valve guide.
Mot. 04	8.891	Puller, oil pump gear.
Mot. 08	8.880	Plate, cylinder head (use with Mot. 01).
Mot. 12	8.889	Flanges, cylinder liners retaining.
Mot. 13	10.578	Spanner, rocker arm combination adjusting.

ENGINE



MOT. 18



MOT. 31

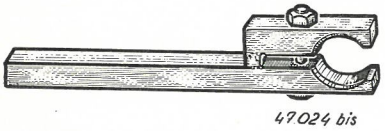


MOT. 49

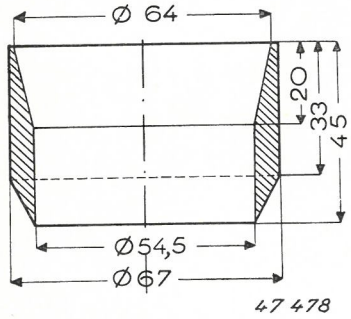


MOT. 52

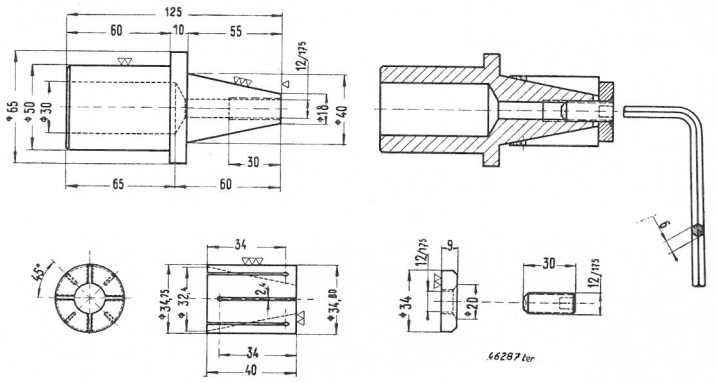
47 111 ter



MOT. 53



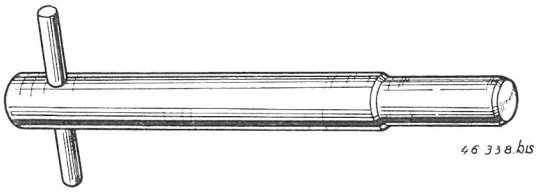
MOT. 82



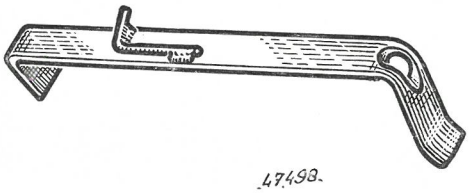
REF. 03

RENAULT SERVICE REFERENCE	REFERENCE SAPRAR	DESCRIPTION
Mot. 18	10.595	Cylinder liner retaining tool.
Mot. 53	12.150	Loosening clamp for starting dog.
Mot. 31	11.983	Puller, rocker arm mechanism.
Mot. 49	10.756	Gear puller.
Mot. 52	12.149	Aligner, timing gear cover.
Mot. 82	Local manufacture	Piston assembly ring.
Ref. 03	Local manufacture	Expansion reamer for water pump bush.

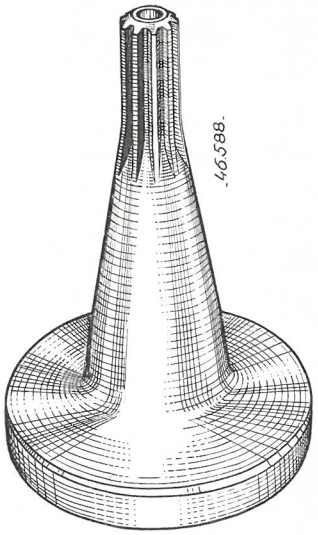
CLUTCH



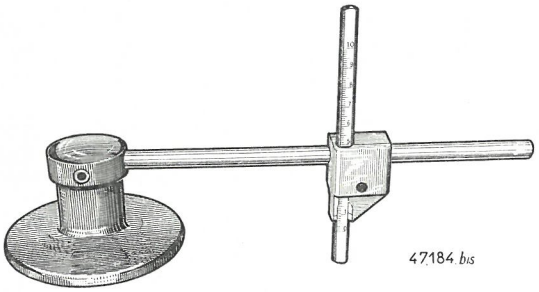
Emb. 02



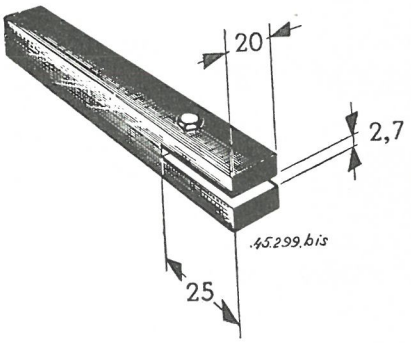
Emb. 11



Emb. 06



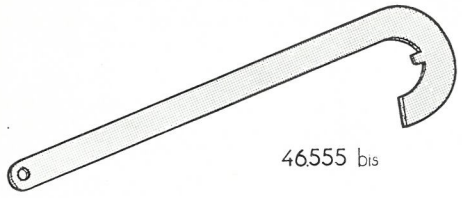
Emb. 12



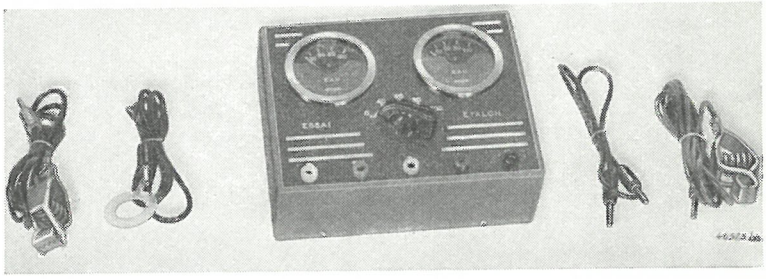
Emb. 08

RENAULT SERVICE REFERENCE	SAPRAR REFERENCE	DESCRIPTION
Emb. 02	8.900	Aligner for clutch disc.
Emb. 06	12.059	Holder, Ferlec driven plate.
Emb. 11	12.165	Positioner, Ferlec rheostat lever.
Emb. 12	12.191	Rule, clutch checking.
Emb. 08	Local manufacture	Fork for correcting Ferlec driven plate warpage.

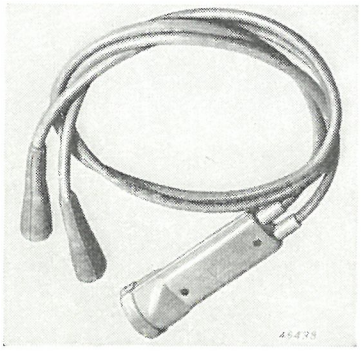
ELECTRICAL EQUIPMENT



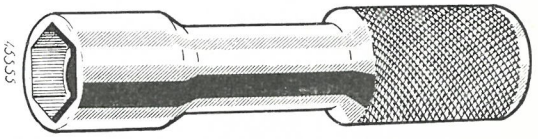
Elé. 04



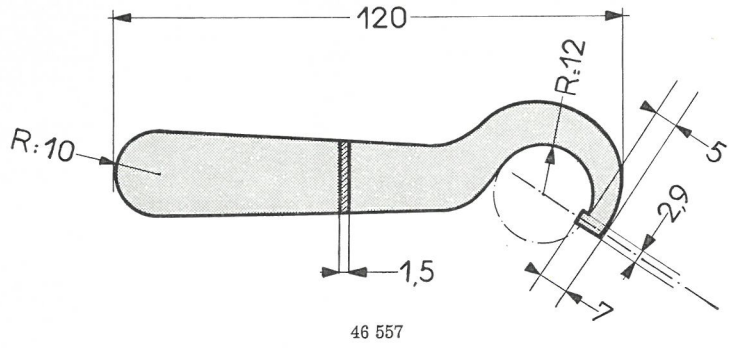
Ref. 04



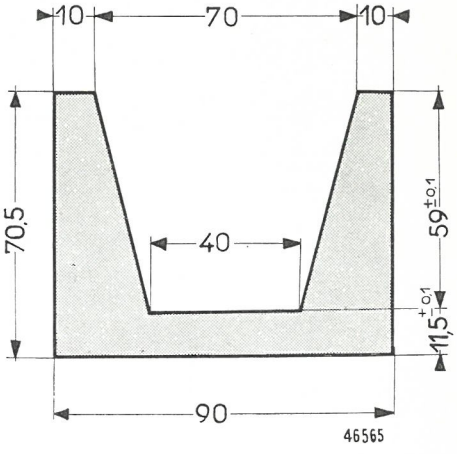
Mot. 24



Mot. 15



Elé. 06



Elé. 05

RENAULT SERVICE REFERENCE	SAPRAR REFERENCE	DESCRIPTION
Ele. 04	11.505	Spanner, generator pulley loosening.
Ele. 05	Local manufacture	Gauge, starter pinion position adjustment.
Ele. 06	Local manufacture	Spanner. switch washer locking.
Mot. 15	10.594	Hand tool for cylinder head nut and bolt.
Ref. 04	12.124	Tester, Jaeger temperature sender and indicator.
Mot. 24	9.477	Stroboscopic lamp.

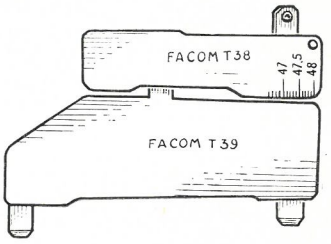
GEARBOX - REAR AXLE MECHANISM



B. Vi. 04



B. Vi. 22



T. Ar. 27



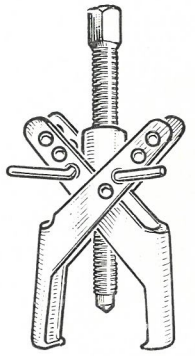
Emb. 03



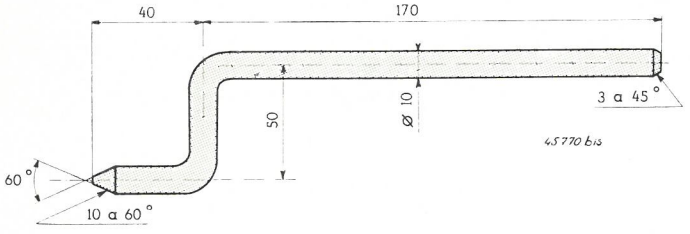
T. Av. 14 B



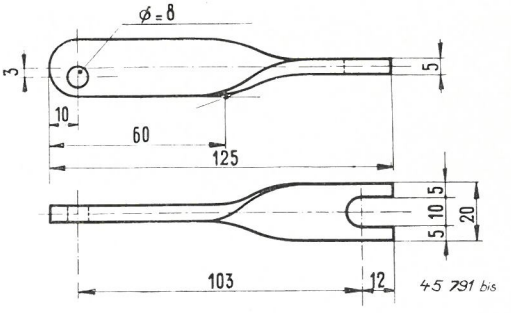
T. Ar. 28



Mot. 49



B. Vi. 11



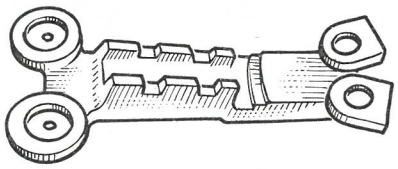
T. Ar. 29

RENAULT SERVICE REFERENCE	SAPRAR REFERENCE	DESCRIPTION
Emb. 03	10.554	Remover, clutch shaft sleeve cotter pin.
B. Vi. 04	8.889	Guide, fork locking plunger.
B. Vi. 22	12.164	Puller, primary shaft bearing.
T. Ar. 27	8.881	Device, direct reading type, for checking position of drive pinion.
T. Ar. 28	8.888	Setting tool, rear axle crown wheel and pinion.
Mot. 49	10.756	Puller, gear.
T. Av. 14 B	10.885	Gauge, rear axle shaft tube checking.
B. Vi. 11	Local manufacture	Puller, reverse gear shaft.
T. Ar. 29	Local manufacture	Bracket, dial indicator - for setting backlash.

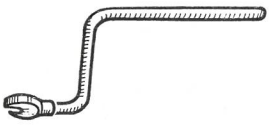
FRONT AXLE



T. Av. 05 A



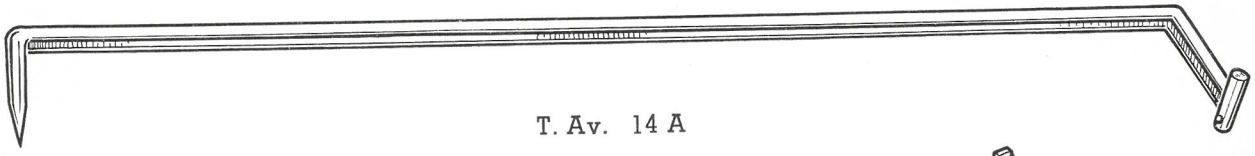
T. Av. 07



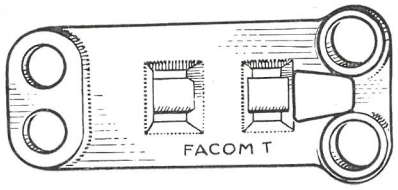
T. Av. 17



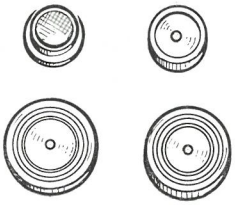
T. Av. 18



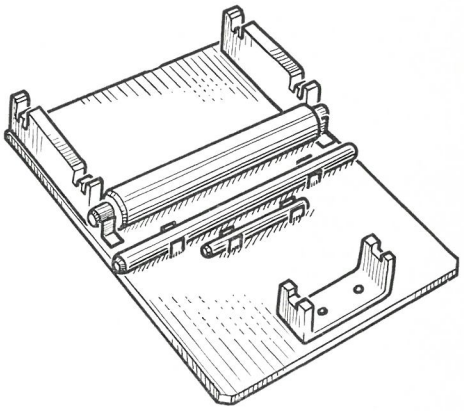
T. Av. 14 A



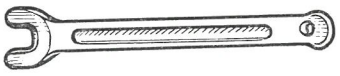
T. Av. 20



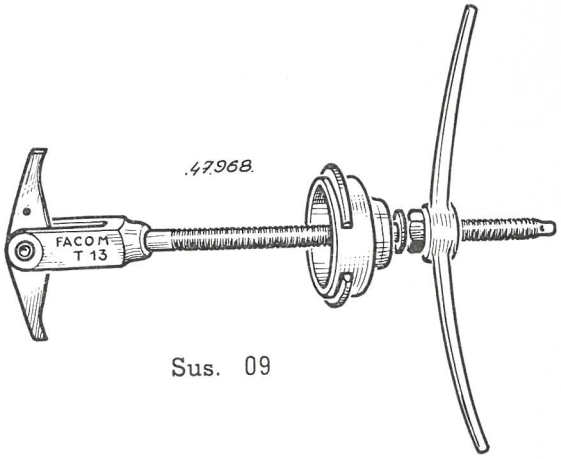
T. Av. 21



T. Av. 22



Dir. 02

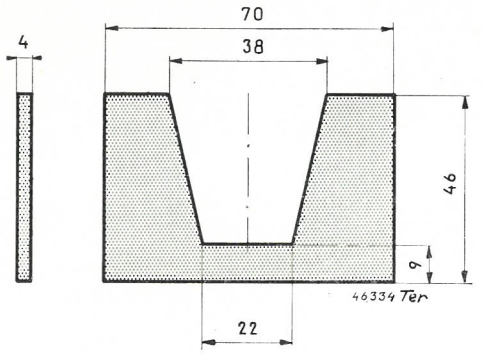


Sus. 09

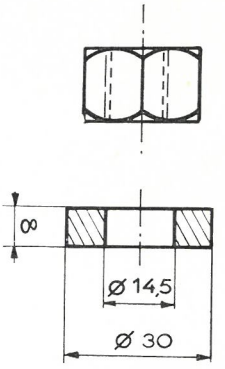
RENAULT SERVICE REFERENCE	SAPRAR REFERENCE	DESCRIPTION
T. Av. 07	12.146	Checking fixture for king pin.
T. Av. 05 A	12.160	Remover, steering connecting link ball joint.
T. Av. 14 A	10.885	Gauge for positioning the front stub axles.
T. Av. 17	10.592	Spanner, front wheel alignment - cranked.
T. Av. 18	10.593	Adapter, king pin removing, impact type.
T. Av. 20	12.161	Fixture, king pin checking.
T. Av. 21	12.147	Inserter and puller, rubber bushes.
T. Av. 22	12.148	Fixture, suspension arm checking.
Dir. 02	9.356	Spanner, steering link ball joint check nut.
Sus. 09	12.132	Compressor, suspension front spring.

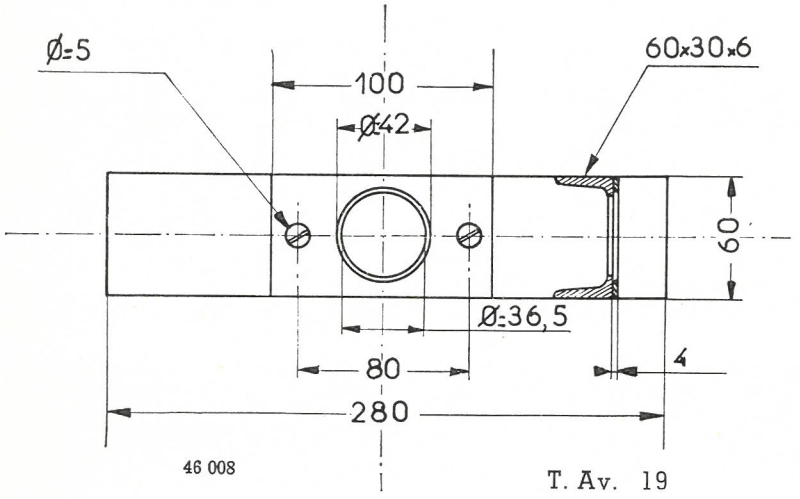
FRONT AXLE

(Continued)

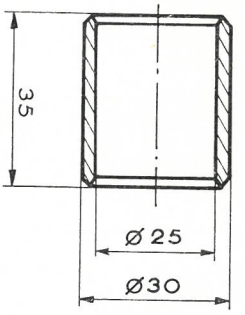


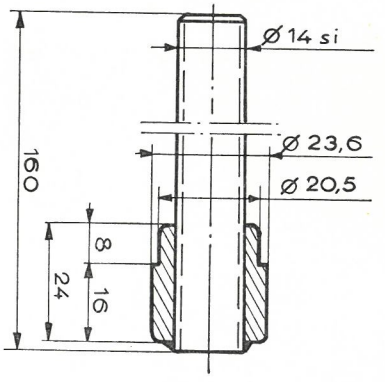
T. Av. 03



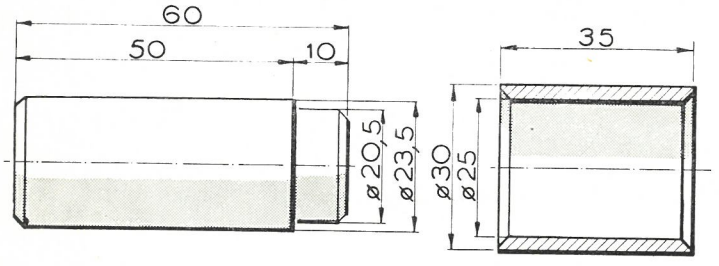


T. Av. 19





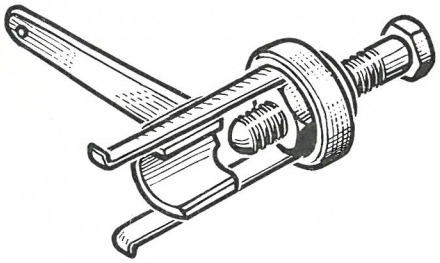
T. Av. 25 A



T. Av. 25 B

RENAULT SERVICE REFERENCE	SAPRAR REFERENCE	DESCRIPTION
T. Av. 03	Local manufacture	Shim, positioning for locking hinge bolts.
T. AV. 19	Local manufacture	Rest plate for rubber bushes.
T. Av. 25 A	Local manufacture	Hand puller, stub axle bushes.
T. Av. 25 B	Local manufacture	Puller and inserter, stub axle bushes - on press.

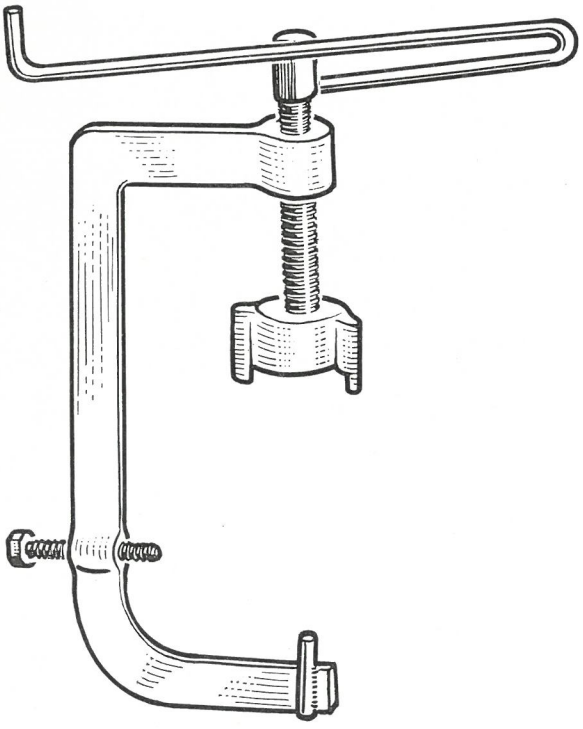
STEERING GEAR



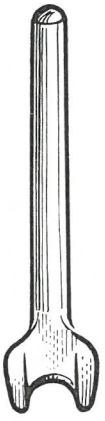
Dir. 16



Dir. 17



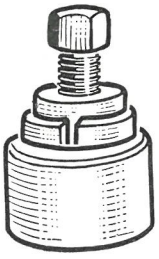
Dir. 19



Dir. 18 A



Dir. 18 B



Dir. 21

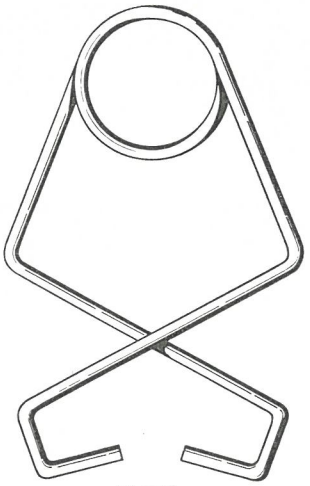


47969.

T. Av. 05 A

RENAULT SERVICE REFERENCE	SAPRAR REFERENCE	DESCRIPTION
Dir. 16	12.093	Remover, sealing ring.
Dir. 18 A & B	12.100	Fork, steering rack snap ring holding and combination inserter.
Dir. 19	12.096	Fixture, steering gear pre-stressing.
Dir. 21	12.153	Puller, steering wheel.
T. Av. 05 A	12.160	Puller, connecting link ball-joint.
Dir. 17	Local manufacture	Puller, rack bearing bushes.

BRAKING SYSTEM



46 622

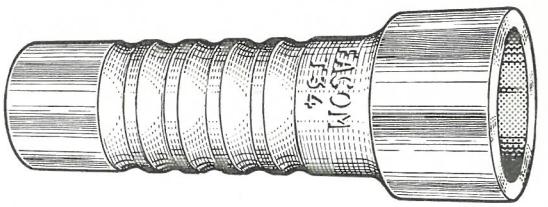
Fre. 05 A

WHEELS - HUBS - DRUMS



46 985 bis

Rou. 08



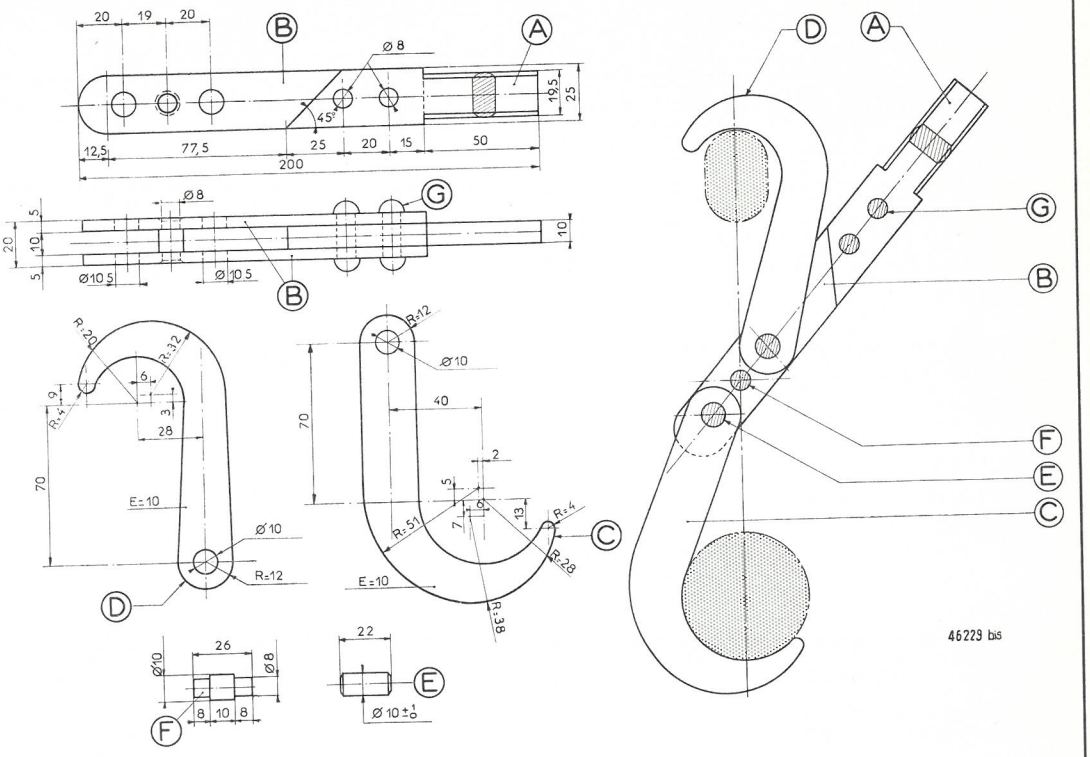
46.675

Rou. 01

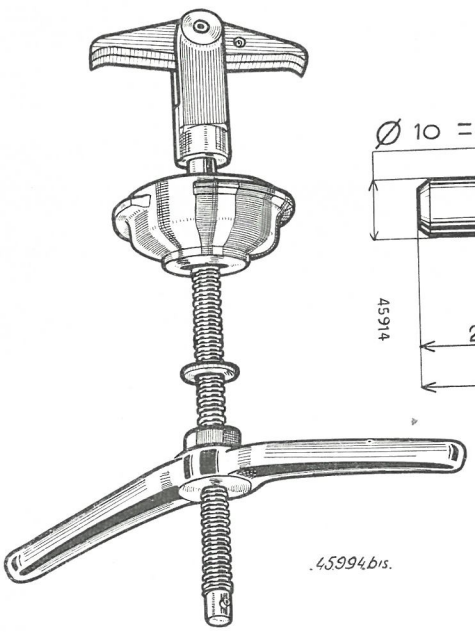
RENAULT SERVICE REFERENCE	SAPRAR REFERENCE	DESCRIPTION
Fre. 05 A	9.994	Clip, brake wheel cylinder.
Rou. 01	10.555	Sleeve for fitting and removing the front wheels caps.
Rou. 08	12.168	Pliers, front wheels cap removing and refitting.

SUSPENSION

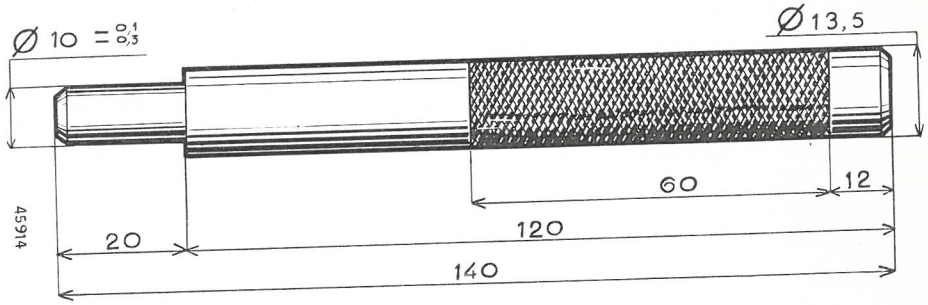
SHOCK-ABSORBERS



Sus. 10



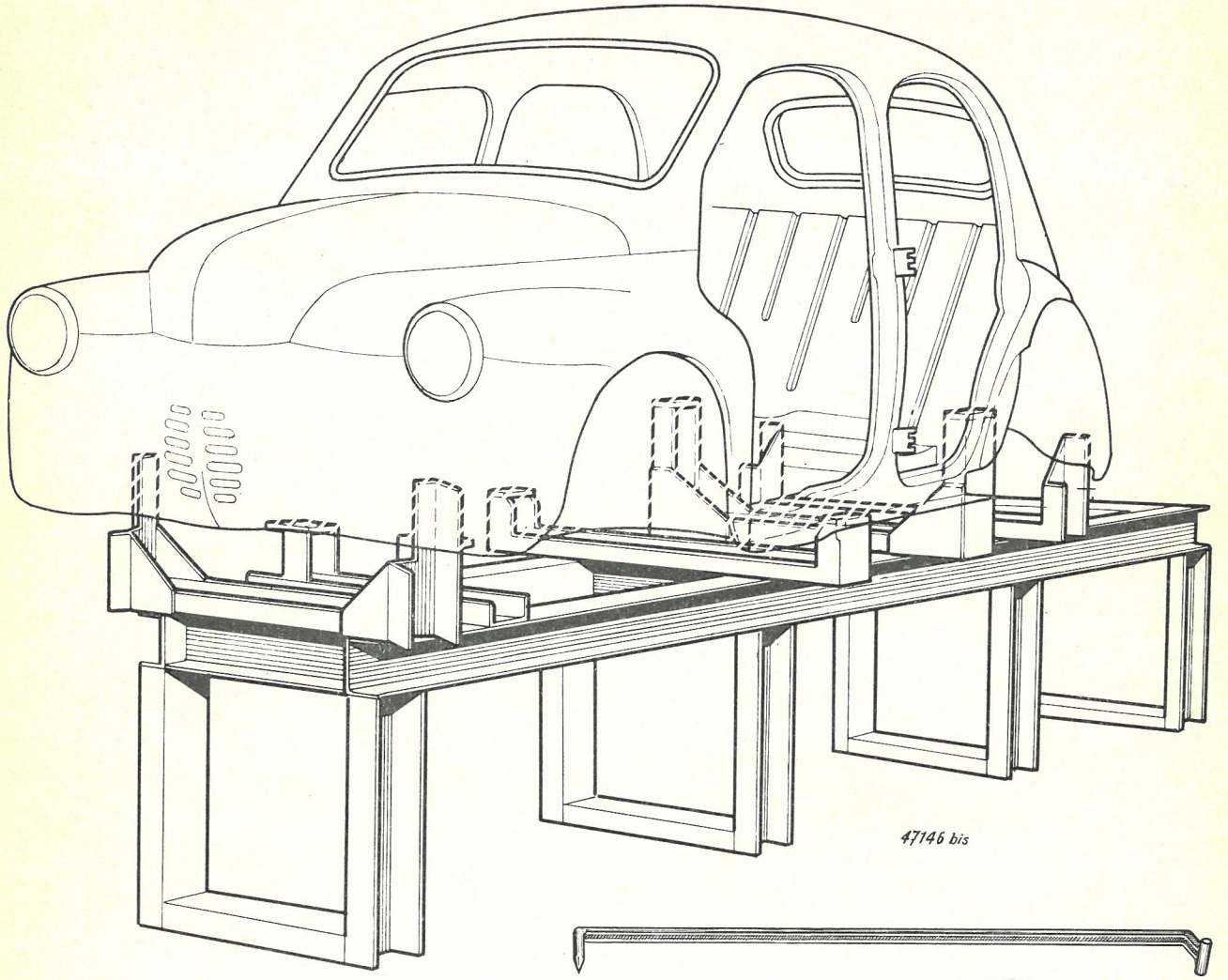
Sus. 09



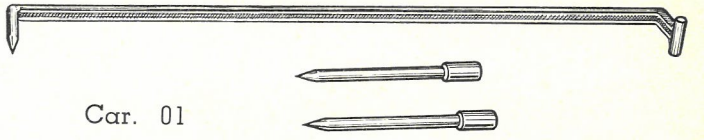
Sus. 12

RENAULT SERVICE REFERENCE	SAPRAR REFERENCE	DESCRIPTION
Sus. 10	Local manufacture	Clamp-compressor, rear suspension spring.
Sus. 09	12.132	Compressor, front suspension spring.
Sus. 12	Local manufacture	Puller, rubber bush spacer.

BODY



Car. 08 et Car. 09



Car. 01

46.507

RENAULT SERVICE REFERENCE	SAPRAR REFERENCE	DESCRIPTION
Car. 01	10.781	Gauge, 4 CV body checking.
Car. 08	12.182	Base, body checking combination bench.
Car. 09	12.183	Set of seven 4 CV stands.

14. LUBRICATION AND MAINTENANCE

Use lubricants of brands listed
Brands are listed with
no preferential order

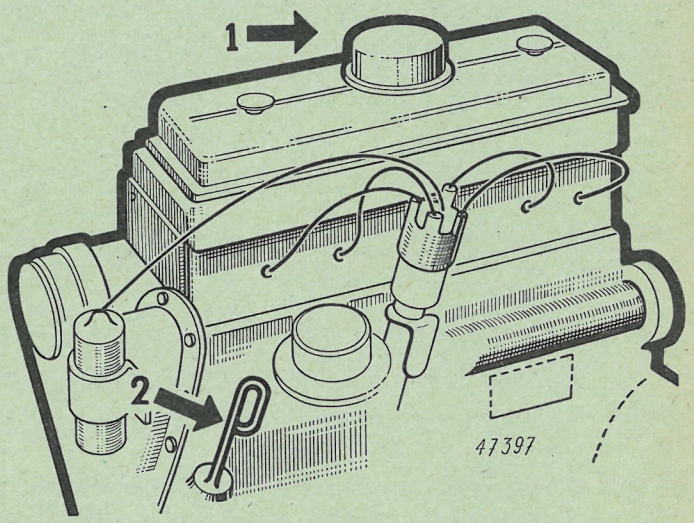
LUBRICATION

Every 500 km (300 miles)

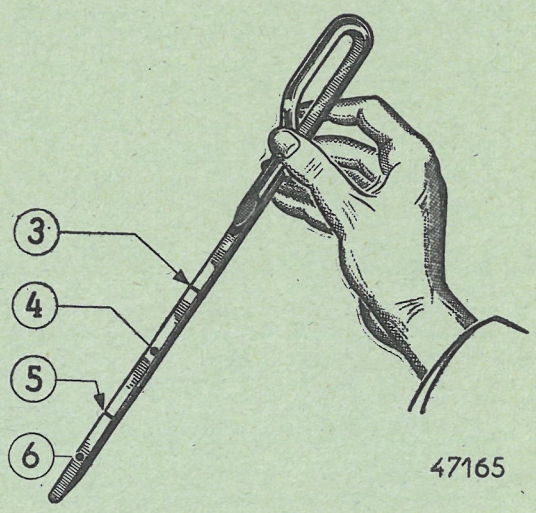
ENGINE - Top up

ENGINE OIL

	Extreme cold	Winter	Summer
ENERGOL	BP ENERGOL AUTO SAE 10 W	SAE 20 W	SAE 30
ESSO	ESSO EXTRA MOTOR OIL N° 1	N° 3	N° 3
Huiles RENAULT	HUILE RENAULT 10 W	20	30
MOBILOIL	MOBILOIL ARCTIC SPECIAL	ARCTIC	A
SHELL	SHELL X 100 10 W	20/ 20 W	30



1 : Filling.
2 : Dipstick.



3 : Maximum - do not exceed.
4 : Mean.
5 : Minimum.
6 : Danger.

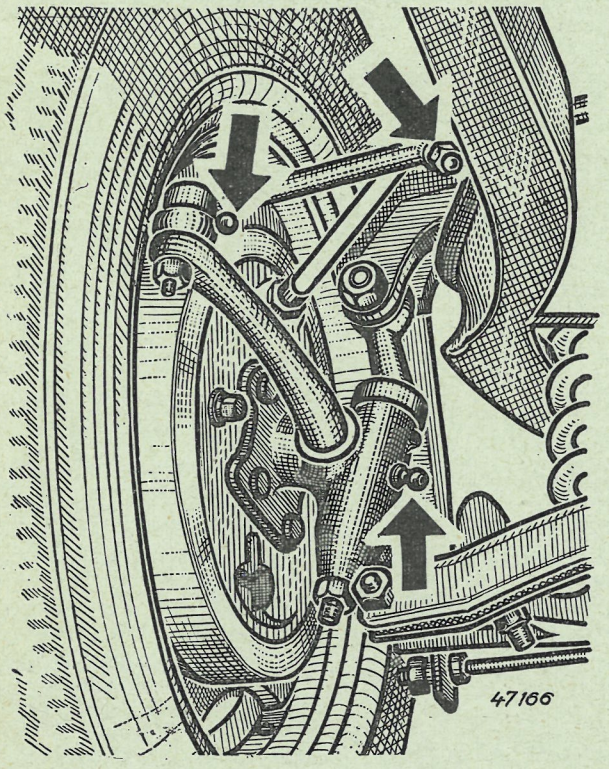
Every 2,500 km

ENGINE OIL

	Extreme cold	Winter	Summer
ENERGOL	BP ENERGOL AUTO SAE 10 W	SAE 20 W	SAE 30
ESSO	ESSO EXTRA MOTOR OIL N° 1	N° 3	N° 3
Huiles RENAULT	HUILE RENAULT 10 W	20	30
MOBILOIL	MOBILOIL ARCTIC SPECIAL	ARCTIC	A
SHELL	SHELL X 100 10 W	20/ 20 W	30

OIL SUMP CAPACITY : 2 LITERS (3.52 ENGLISH PINT).

STEERING LINKS



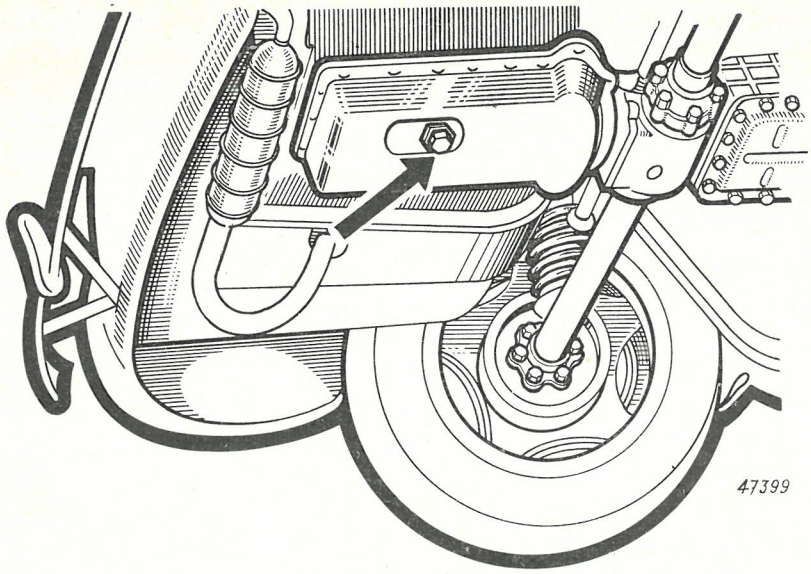
KING PINS

CHASSIS GREASE

ENERGOL	BP ENERGOL CHASSIS
ESSO	ESSO CHASSIS GREASE L
Huiles RENAULT	RENAULT CARTER F or GSP
MOBILOIL	MobilGrease N° 2 ex MobilCompound N° 2
SHELL	SHELL RETINAX A or RETINAX C

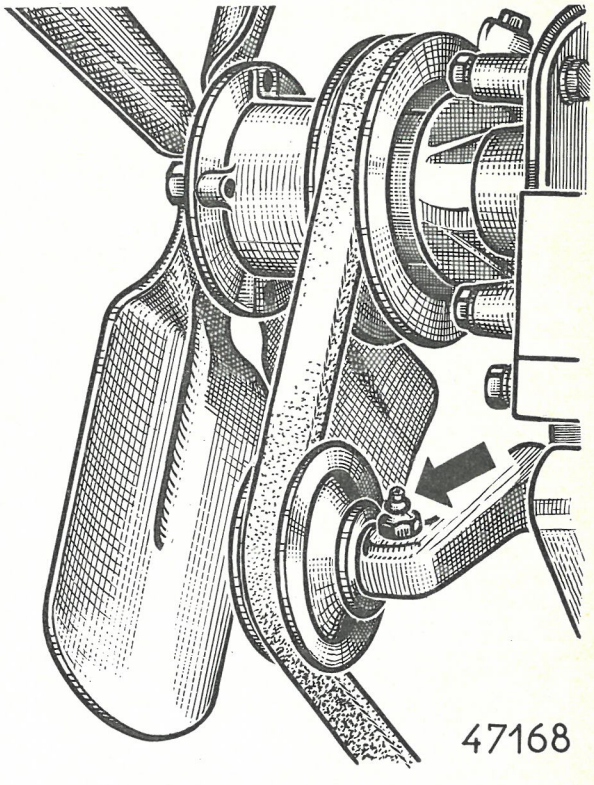
(1,500 miles)

ENGINE - Draining



BEARING GREASE

ENERGOL	BP ENERGOL LC 2 or ENERGREASE N° 2
ESSO	ESSO BEARING GREASE
Huiles RENAULT	RENAULT ROULEMENTS LC
MOBILOIL	MobilGrease N° 5 or MobilGrease MP
SHELL	SHELL RETINAX A

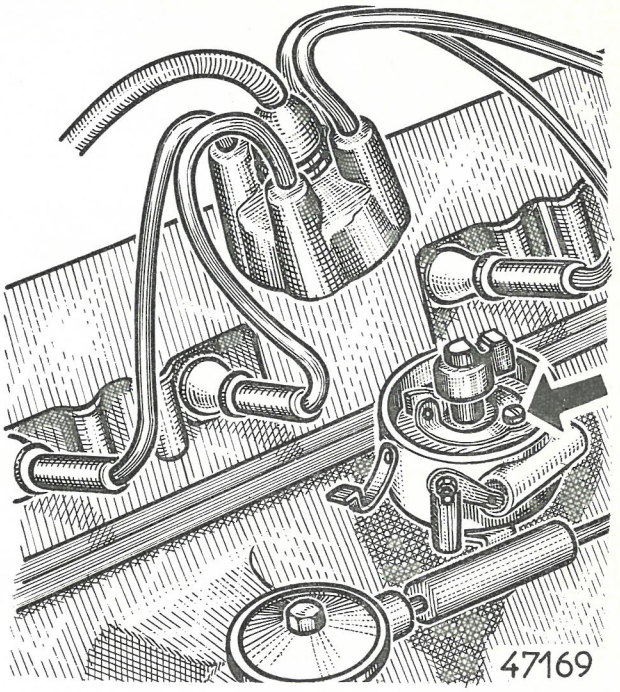


FAN BELT TENSIONER

Every 5,000 km

ENGINE OIL

ENERGOL	BP ENERGOL AUTO SAE 20 W
ESSO	ESSO EXTRA MOTOR OIL N° 3
Huiles RENAULT	HUILE RENAULT 20
MOBILOIL	MOBILOIL ARCTIC
SHELL	SHELL X 100 20/20 W



GEARBOX and REAR AXLE OIL

ENERGOL	BP ENERGOL CARTER SAE 80 EP
ESSO	ESSO XP COMPOUND SAE 80 EP
Huiles RENAULT	HUILE RENAULT CARTER EP 80
MOBILOIL	MOBILUBE GX 80
SHELL	SHELL SPIRAX 80 EP

GEARBOX - REAR AXLE DRAINING

Run off level plug 4 :

1° **If level is high, allow excess oil to flow out.**

2° **If level is not up to hole, top up by pouring oil through filler hole I until oil appears at hole 4.**

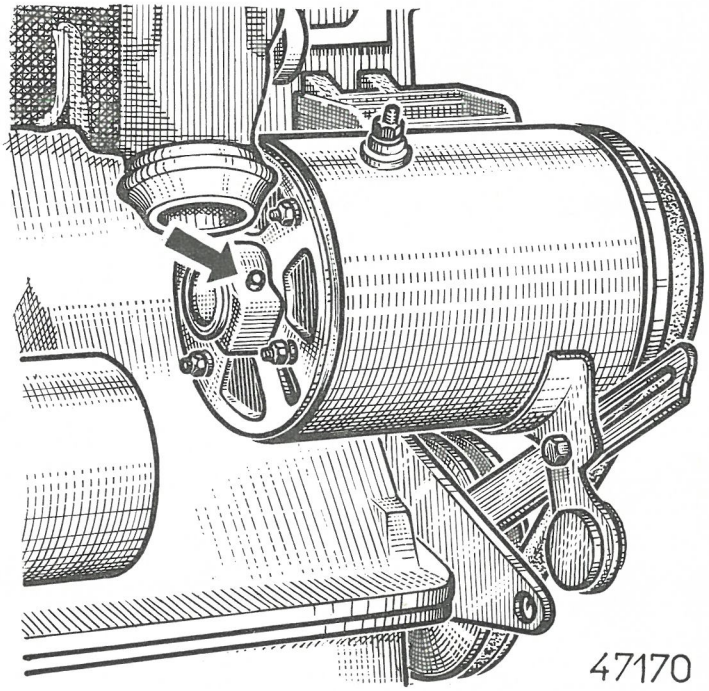
CAUTION : Allow excess oil to flow out entirely before tightening plug 4.

CAPACITY OF GEARBOX-REAR AXLE HOUSING : 1 LITRE (.1.76 ENGLISH PINT).

(3,000 miles)

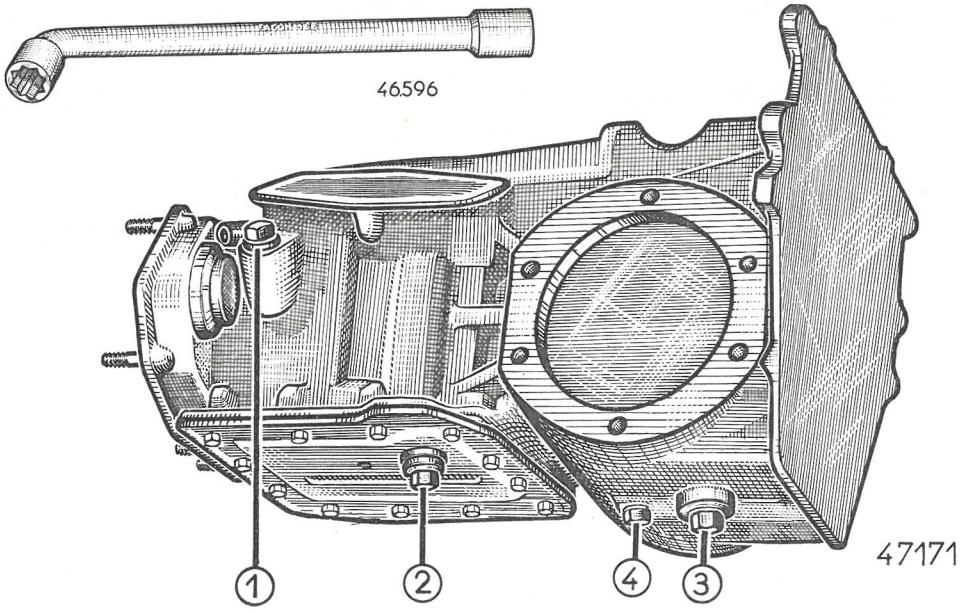
GENERATOR

Clear hole to insert can.



DISTRIBUTOR

With can, apply a few drops of oil in bottom of housing.



1 : Filling.
2 & 3 : Draining (1 litre, i.e. 1.76 english pint capacity).
4 : Level.

Every 10,000 km

GEARBOX and REAR AXLE OIL

ENERGOL	BP ENERGOL CARTER SAE 80 EP
ESSO	ESSO XP COMPOUND SAE 80 EP
Huiles RENAULT	HUILE RENAULT CARTER EP 80
MOBILOIL	MOBILUBE GX 80
SHELL	SHELL SPIRAX 80 EP

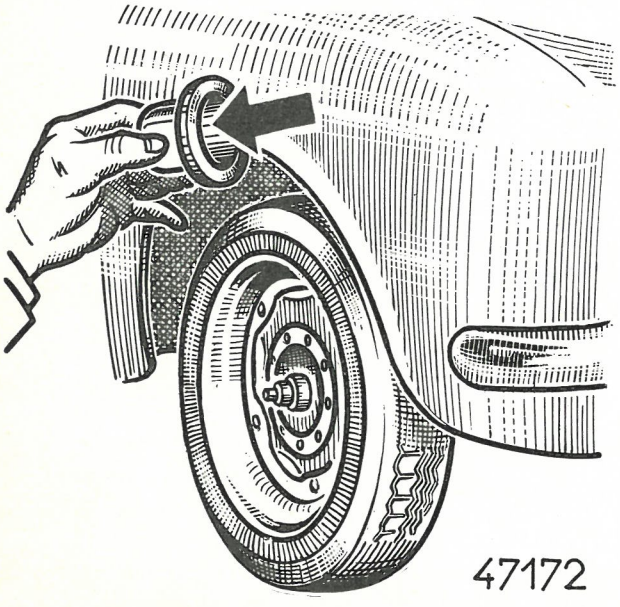
GEARBOX - REAR AXLE

Checking level

Drain, preferably after driving the car : the oil is hot and therefore fluid.

To top up level correctly, see prescriptions at foregoing page.

FRONT WHEELS



After removing hub cover, remove wheel caps (no threads) and fill up to 3/4.

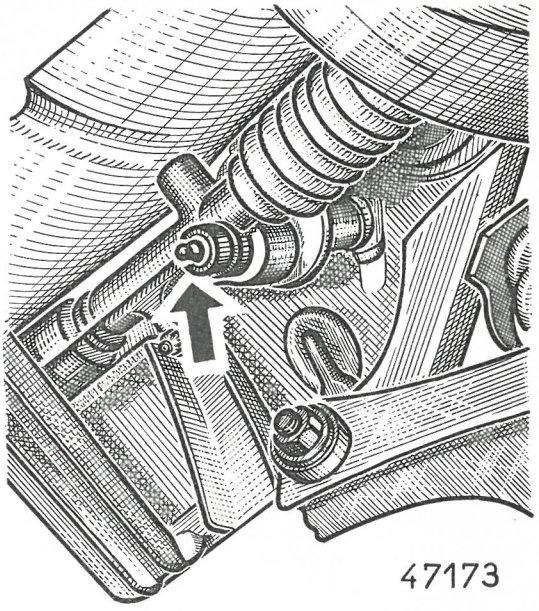
BEARING GREASE

ENERGOL	BP ENERGOL LC 2 or ENERGREASE N° 2
ESSO	ESSO GRAISSE FOR BEARINGS
Huiles RENAULT	RENAULT ROULEMENTS LC
MOBILOIL	MobilGrease N° 5 or MobilGrease MP
SHELL	SHELL RETINAX A

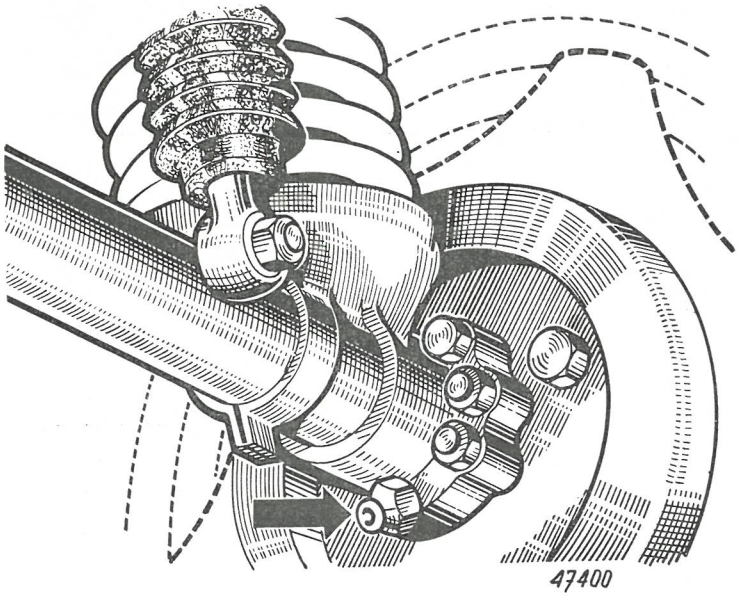
(6,000 miles)

STEERING GEAR GREASE

ENERGOL	BP ENERGOL CHASSIS
ESSO	ESSO CHASSIS GREASE L
Huiles RENAULT	RENAULT CARTER F
MOBILOIL	MobilGrease N° 2 ex MobilCompound N° 2
SHELL	SHELL RETINAX A or RETINAX C



STEERING GEAR

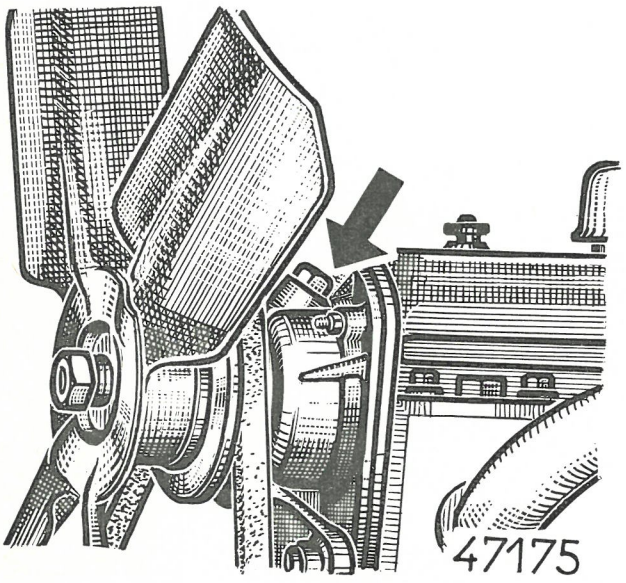


REAR WHEELS (lubricate moderately)

Every 50,000 km (30,000 miles)

FAN AND WATER PUMP

Run off plug and temporarily replace for a standard lubricator to perform the lubrication. Next, run up plug. (Lubricate moderately).



BEARING GREASE

ENERGOL	BP ENERGOL LC 2 or ENERGREASE N 2
ESSO	ESSO BEARING GREASE
Huiles RENAULT	RENAULT ROULEMENTS LC
MOBILOIL	MobilGrease N° 5 or MobilGrease MP
SHELL	SHELL RETINAX A

From time to time

ENERGOL	OIL FOR DOMESTIC USAGE
ESSO	ESSO HANDY-OIL
Huiles RENAULT	VASELINE OIL RENAULT
MOBILOIL	MOBILBURETTE
SHELL	SHELL DONAX A 1

Lubricate windscreen wiper bearings, bonnet and door hinges, locks, radiator blind control etc.

MAINTENANCE

THE OPERATIONS TO BE PERFORMED AT THE PRESCRIBED MILEAGES ARE INDICATED BY A CIRCLE ○ IN THE CORRESPONDING COLUMN

			Miles		
			600	3,000 9,000 15,500	6,000 12,500
INSPECTIONS, Adjustments, Tightenings	CHECKINGS	1 — TYRES : INFLATE TO CORRECT PRESSURES	○	○	○
		2 — BATTERY : TOP UP LEVELS	○	○	○
		3 — LOCKHEED RESERVOIR : TOP UP LEVELS	○	○	○
	ON PIT or LIFT	4 — ENGINE, CROSS MEMBERS FOR PROPER MOUTING	○	.....	○
		5 — ENGINE COMPARTMENT SHIELDS FOR PROPER MOUNTING	○	.....	○
		6 — SILENCER AND EXHAUST PIPE FOR PROPER MOUNTING	○	.....	○
		7 — SHOCK ABSORBERS FOR PROPER MOUNTING	.....	.....	○
		8 — ENGINE OIL SUMP BOLTS FOR PROPER TIGHTENING	○	.....	.....
		9 — HYDRAULIC BRAKES CONNECTIONS FOR TIGHTNESS	○	.....	○
	ENGINE	10 — GENERATOR AND FAN BELT FOR TENSION	○	.....	○
		11 — RADIATOR BLIND CONTROL FOR PROPER OPERATION	○	.....	○
		12 — WATER SYSTEM CLAMPS FOR TIGHTENING	○	.....	○
		13 — CLEAN INLET FILTER	.....	.....	○
		14 — CLEAN CARBURETTER AND FUEL PUMP	○	○	○
		15 — NUTS, INLET MANIFOLD AND CARBURETTER FOR TIGHTENING	○	○	○
		16 — SPARK PLUG ELECTRODES CONDITION AND GAP	.....	○	○
		17 — DISTRIBUTOR CONTACT POINT CONDITION AND SPACING	.....	○	○
		18 — IGNITION ADVANCE CURVE AND POINT	.....	○	○
		19 — CYLINDER HEAD TIGHTENING (Torque wrench)	○	.....	.....
		20 — ROCKER ARM CLEARANCE ADJUSTMENT (when cold)	○	.....	○
		21 — SLOW RUNNING ADJUSTMENT	○	○	○
	WHEELS FRONT AXLE LINKAGES	22 — TYRE CROSS SWITCHING	.....	○	○
		23 — TIGHTEN WHEEL NUTS	○	○	○
		24 — RETIGHTEN REAR HUBS	○	.....	.....
		25 — CHECK FRONT WHEEL BEARING PLAY	.....	.....	○
		26 — CHECK STEERING LINKAGE JOINTS	.....	.....	○
		27 — CHECK FRONT WHEEL TOE IN	.....	.....	○
		28 — CHECK CLUTCH PEDAL CLEARANCE	○	○	○
		29 — BRAKE ADJUSTMENT (foot and parking brake)	○	○	○
	MISCELLANOUS INSPECTIONS	30 — TIGHTEN BODY BOLTS	.....	.....	○
		31 — CHECK CLOSING OF REAR BONNET AND FRONT LUGGAGE COMPARTMENT	○	.....	○
		32 — CHECK CLOSING OF DOORS AND LOCKS	○	.....	○
		33 — CHECK OPERATION OF WINDOWS	○	.....	○
		34 — CHECK OPERATION OF WINDSCREEN WIPERS	○	○	○
		35 — CHECK ALL ELECTRICAL BULBS	○	○	○
		36 — ADJUST DIMMER LIGHTS	○	○	○
	ROAD TESTS	37 — CHECK : ACCELERATION — SUSPENSION — BRAKES	○	○	○

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