CITROËN

REPAIR MANUAL

DS21 & DS21M
DS19A & DS19MA

N 518

EDITION 1966

REPAIR MANUAL

DS 21

and

DS 21M

DS 19A

and

DS 19MA



PRINTED IN ENGLAND

No.518

USING THE MANUAL

OPERATION SEQUENCE

Dismantling and reassembly sequences have been defined to ensure the best quality of work in the shortest time.

NUMBERING

The Manual is divided into four sections, printed on paper of different colours, each section deals with one model.

At the beginning of each section there is a list of the operations included in the section.

Operations on the DS 21 are numbered DX and printed on white paper

Operations on the DS 21 M are numbered DJ and printed on yellow paper

Operations on the DS 19 A are numbered DY and printed on green paper

Operations on the DS 19 MA are numbered DL and printed on blue paper

When an operation is identical on several models it only appears once in the Manual.

In this case, the list of operations of the section covering the model in question shows the number of the operation to refer to, in the "Remarks" column, next to the operation number for the model itself.

KEEPING THE MANUAL UP-TO-DATE

We shall be sending to you from time to time the necessary additive and corrective sheets to keep the Manual up-to-date.

TOOLS

We recommend the use of sockets fitted on to various handles in preference to open-ended spanners and especially in preference to adjustable spanners.

Special tools are mentioned in the text, their part-numbers are followed by the suffix letter "T" (see footnote 1).

Supplementary tools which repairers are expected to make for themselves are also mentioned in the text; their part-numbers are prefixed by the letters "MR" (see footnote 2).

IMPORTANT NOTE

All enquiries concerning these vehicles should be addressed to:-

Service Department, Citroen Cars Limited, Slough, Bucks, England.
Telephone: Slough 23811

(1) "T" Tools are sold by Ste. Fenwick, 15 rue Fenelon, Paris 10e, France.

(2) "MR" Tool drawings are at the end of the volume. They are arranged in numerical order.

DS 21

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Corrective No. 1

Operation No.	DESCRIPTION	Paragraph No.
	CHARACTERISTICS	
DX.000	Characteristics and adjustments.	
DX.00	Work on the hydraulic systems. Precautions	
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	Stripping and assembling an engine-gearbox assembly (for replacement of the gearbox)	25
DX.100-3	Overhauling an engine	
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	Fitting the cylinder head	33
DX.111-1	Replacement of the sump	See Op. DX.100-1
DX.112-0	Adjusting the valve rocker clearances	
DX.112-1	Replacement of a cylinder head or a cylinder head gasket	
DX.112-3	Overhauling a cylinder head	
DX.112-4	Work on cylinder head	
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	Replacement of an exhaust rocker shaft assembly	
DX.120-1	Work on the timing gear	
	Replacement of a timing chain or pinions	1
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	Replacement of the pushrods	40
DX.133-0	Adjustment of the engine mountings	
DX.141-1	Replacement of an inlet manifold	
DX.142-0	Adjustment of the slow running	
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	Replacing an accelerated idling device	
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	Replacement of the exhaust outlet pipes	
DX.211-0	Adjustment of the distributor and sparking plugs	
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DX.211-1	Work on distributor	
	Replacement of a distributor	1
DX.211-3	Overhauling a distributor	
DX.211-6	Overhauling a distributor drive	
DX.212-0	Checking and adjusting a coil	
DX.220-0	Checking the oil pressure (on the car)	
DX.220-1	Work on oil circulation system	
	Replacement of a filter element	1
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DX.220-3	Overhauling an oil pump	
DX.231-0	Adjustment of pulleys and belts	
	Alignment of the pulleys	1
	Adjustment of the belt tensions	12
DX.231-1	Replacement of a water pump	
DX.231-4	Work on the pulleys and belts	
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DX.314-1	Work on the clutch controls	
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	GEARBOX	
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	Replacement of a suspension sphere	
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DX.440-00	Characteristics of the steering	
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DX.442-1	Work on the steering (replacement)	
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DX.451-3	Work on the front brakes (Overhauls)	
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DX.451-4	Work on the rear brakes	
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DX.851-1	Replacement of the front wings	

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Oil Circulation :

- Oil SAE 10 W 30 or SAE 20
- Oil capacity (engine) : after dismantling, or changing the filter element:-
  : $8\frac{3}{4}$ pints (5 litres).
  : after draining: 8 pints (4.5 litres)
- Between "mini" and "max" 1.3/4 pints (1 litre).

Cooling system :

Capacity of cooling system = 19 pints (10.8 litres). (21 pints with rear blower heater).

IV - CLUTCH (see Op. DX. 312-1 and 312-3).

- Tightening torque of the fixing screws (3 screws must face the toggles) = $18 \begin{smallmatrix}+2\\-3\end{smallmatrix}$ lbs ft ($2.5 \begin{smallmatrix}+0.3\\-0.4\end{smallmatrix}$ m.kg).
- Toggle adjustment:

  H = dimension between toggles and pressure plate = $39.8 \begin{smallmatrix}+1.5\\-0\end{smallmatrix}$ mm.

  h = the distance between toggle carrier plate and pressure plate = 21.3 mm.

- Springs :

  6 springs marked mauve - Length = 27.3 mm under a load of $60.75 \begin{smallmatrix}+2.5\\0\end{smallmatrix}$ kg.

  3 springs marked normandy green - Length = 27.3 mm under a load of $49 \begin{smallmatrix}+2\\-0\end{smallmatrix}$ kg.

V - GEARBOX (see Op. DX.330-1 and 330-3).

Oil capacity : 3.5 pints (2 litres) (SAE 90 EP).

Differential shaft, brake discs.

Maximum run-out of disc = 0.17 mm.

Thickness variation = 0.02 mm.

Tightening torque of bearing nut = 110 lbs ft (15 m.kg).

Tightening torque of the differential shaft nut = 72 lbs ft (10 m.kg).

Bevel Pinion Shaft :

Clearance of the second speed synchro sleeve = 0.1 mm.

Bevel pinion :

Tightening torque of the nut - (speedometer take-off) : 145 - 160 lbs ft. (20 - 22 m.kg).

Main shaft :

Tightening torque for starting handle dog: 110 - 125 lbs ft (15 - 17 m.kg).

Differential.

End float of planet wheels = 0.1 mm max.

End float of satellite pinions = 0.3 mm max.

Tightening torque of the crown wheel securing screws = 85 - 95 lbs ft (11.7 - 13 m.kg).

Crown wheel and pinion :

Clearance between teeth = 0.16 - 0.24 mm.

Gear ratio : 8 x 35.

Forks:

Tightening torque for the securing screws on the spindles : 29 lbs ft (4 m.kg).

Gear ratios:

1st	:	0.0703 (14.21 : 1),	5.5 m.p.h. (8.7 km/h) per 1,000 r.p.m. engine speed
2nd	:	0.1177 (8.49 : 1),	9 m.p.h. (14.6 km/h) per 1,000 r.p.m. engine speed
3rd	:	0.1795 (5.58 : 1),	14 m.p.h. (22.3 km/h) per 1,000 r.p.m. engine speed
4th	:	0.2683 (3.73 : 1),	21 m.p.h. (33.3 km/h) per 1,000 r.p.m. engine speed
Reverse	:	0.0724 (13.80 : 1),	5.5 m.p.h. (9 km/h) per 1,000 r.p.m. engine speed

VI - TRANSMISSION :

Tightening torque for the wheel fixing nuts .... 43 to 58 ft lbs (6.8 m.kg)

VII - SOURCE AND RESERVE OF PRESSURE

High-Pressure pump :

Belt tension : 88 lbs (40 kg.)

Main accumulator :

: $925 \begin{smallmatrix} + 70 \\ - 210 \end{smallmatrix}$ p.s.i.

($65 \begin{smallmatrix} + 5 \\ - 15 \end{smallmatrix}$ kg/cm^2)

Pressure distributor :

Valve checking pressure : 2,500 p.s.i. (175 kg/cm^2).

Adjustment of front suspension non-return valve:

- no-flow for a pressure less than 57 p.s.i. (4 kg/cm^2).
- flow with a pressure greater than 98 p.s.i. (7 kg/cm^2).

Adjustment of rear suspension non-return valve:

- no-flow under a pressure less than 360 p.s.i. (25 kg/cm^2).
- flow under a pressure greater than 580 p.s.i. (42 kg/cm^2).

Pressure regulator :

Cutting-out : 2130 - 2420 p.s.i. (150 - 170 kg/cm^2).

Cutting-in: 1850 - 1990 p.s.i. (130 - 140 kg/cm^2).

Tightening torque of the cylinder nut : 22 lbs ft (3 m.kg).

Clearance between ball and plate: 0.3 - 0.4 mm.

Tightening torque of cap: 122 - 144 lbs ft (17 - 20 m.kg), (threads lubricated with castor oil).

Brake accumulator :

Initial pressure: 570 $\pm$ 30 p.s.i. (40 $\pm$ 2 kg/cm^2).

VIII - FRONT AXLE :

Camber	Equal on both sides to within 1 mm precisely.
Caster angle	1° 30' (adjustable)
Alignment	Toe-in at the front: 1-3 mm.
Tightening torque of wheel screws	43 - 58 lbs ft (6 - 8 m.kg)

Tightening torque for trackrod lever on pivot	36 lbs ft (5 m.kg).
Tightening torque for pivot bearing nut	580 ft lbs (80 m.kg).
Clearance for the lower pivot ball pin	0.03 - 0.05 mm.
Clearance for the upper pivot ball pin	0.01 - 0.03 mm.
Tightening torque for the lower pivot ball pin nut	290 lbs ft (40 m.kg).
Tightening torque for the upper pivot ball pin nut	110 lbs ft (15 m.kg).
Tightening torque for the lower wheel arm nut	65 lbs ft (9 m.kg) followed by loosening the nut by between 1/24th and 1/12th of a turn.
Tightening torque for the upper wheel arm nut	

IX - REAR AXLE :

Camber	Equal on both sides to within 1 mm.
Alignment	Toe-in at the front: 0 - 2 mm.
Tightening torque for the wheel nuts	58 - 72 lbs ft (8 to 10 m.kg).
Tightening torque for the stub axle bearing nut	72 lbs ft (10 m. kg).
Tightening torque of the wheel arm housing nut	65 lbs ft (9 m.kg).

X - SUSPENSION

Front axle:

- Pre-adjustment of the heights: 175 mm from the centre line of the hub to the centre line of the steering relay fixing bolt.
- Adjustment of the heights: 225 $\pm$ 3 mm from under the anti-roll bar to the ground.
- Initial pressure of the suspension spheres :

$840 \,^{+\ 30}_{-\ 220}$ p.s.i. ($59 \,^{+\ 2}_{-\ 15}$ kg/cm^2).

Anti-roll bar :

Tightening torque for the bearing clamps	9 lbs ft (1.2 m.kg).
Rotating load of the anti-roll bar	9 - 13 lbs (4 - 6 kg).
Tightening torque of the ball joint	28 lbs ft (4 m.kg), then unscrew 1/8th of a turn
End float of the anti-roll bar	0.5 - 1 mm.

Dampers (see Technical Note No. 52D).

Tightening torque of the nuts	16 lbs ft (2.2 m.kg).
Tightening torque on the sphere	13 lbs ft (1.9 m.kg).

Rear axle:

- Pre-adjustment of the heights: 35 mm from the steel stop on the body, to the upper part of the front cup on the arm.
- Adjustment of the heights: 335 $\pm \,^{10}_{0}$ from under under the anti-roll bar to the ground (155 x 380 X AS tyres),

  or:-

  from under the anti-roll bar to the ground (180 x 380 X AS tyres): $355 \,^{+\ 10}_{-\ 0}$ mm.
- Initial pressure of the suspension spheres :

$370 \,^{+\ 30}_{-\ 150}$ p.s.i. ($26 \,^{+\ 2}_{-\ 10}$ kg/cm^2).

Anti-roll bar :

Tightening torque for the clamp screws	36 lb ft (5 m.kg)

Dampers (see Technical Note No. 52D).

Tightening torque for the nuts	16 lb ft (2.2 m.kg).
Tightening torque of damper on spheres	13 lb ft (1.9 m.kg).

Identification: Shoulder on nut, suspension cylinder side.

XI - STEERING:

Angle of steering lock	$42 \,^{0}_{-\ 1}$ degrees.
Alignment (toe-in at the front)	1 - 3 mm.

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Positioning the steering :

122.5 ± 2.5 mm between the centre line of the relay and the centre line of the rack plunger.

Positioning the centre yoke :

275 mm from the outside of the outer sleeve of the silentbloc, to the centre of the rack plunger.

Pre-adjustment of the right-hand track-rod :

402 mm from the centre line of the silentbloc to the centre line of the ball pin.

Crossover pressure	995 ± 150 p.s.i. (70 ± 10 kg/cm²)
Effort required to free the roller from the hollow of the centralising cam	14 - 15 lbs (6.5 - 7 kg)
Tightening torque of the pinion nut	36 lbs ft (5 m.kg)
Tightening torque of the casing end-piece	43 lbs ft (6 m.kg)
Tightening torque of the casing end-piece locknut	72 lbs ft (10 m.kg)
Tightening torque of the centre yoke nuts	25 lbs ft (3.5 m.kg)
Tightening torque of the centre ball pin nut	28 lbs ft (4 m.kg)
Tightening torque of the rack control rod	50 lbs ft (7 m.kg)
Tightening torque of the ball pin nuts on the track-rods	28 lbs ft (4 m.kg)
Tightening torque of the steering lever nuts on the relay	18 lbs ft (2.5 m.kg)

Steering relay:

Tightening torque of the fixing bolt nut	18 lbs ft (2.5 m.kg)
Tightening torque of the bearing nuts	18 lbs ft (2.5 m.kg)

XII - BRAKES:

Front:

Maximum run-out of the disc	0.17 mm max.
Thickness variation	0.02 mm max.
Tightening torque of the screw securing the brake unit to the gearbox drive outlet housing	95-100 lbs ft (13-14 m.kg).
Tightening torque for the securing screw of brake unit on crossmember	28-31 lbs ft (3.9 - 4.3 m.kg).
Tightening torque for screws securing parking brake calipers on bell housing	72-80 lbs ft (10 - 11 m.kg).

Rear:

Eccentricity tolerance on the drum	0.04 mm max.
Drum diameter after machining	257 mm max.

Hydraulic brake pedal gear :-

Brake pressure distribution	see Op. DX.453-0
Adjustment of the pressure-switch for the pressure warning light (extinction of light)	860 - 995 p.s.i. (60 - 70 kg/cm²)
Clearance of stop lamp switch operating screw	0. 4 - 0.6 mm
Pedal clearance	2 mm max.

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C1/

I - GENERAL CHARACTERISTICS :

- Vehicle type ..... DS 21
- Commercial name ..... DS 21
- Works symbol ..... DX
- Date of production ..... September 1965 - Chassis No. 4.350.000
- Number of seats 6
- Tyres, front ..... 180 x 380 X AS 27.p.s.i. (1.9 kg/cm^2)
- Tyres, rear ..... 155 x 380 X AS 27.p.s.i. (1.9 kg/cm^2)
  or 180 x 380 X AS 24.p.s.i. (1.7 kg/cm^2)
- Spare wheel ..... 155 x 380 X AS 27.p.s.i. (1.9 kg/cm^2)
  or 180 x 380 X AS 27.p.s.i. (1.9 kg/cm^2)

II - GENERAL DIMENSIONS :

- Wheel base ..... 10 ft. 3 ins. (3.125 m)
- Track, front ..... 4 ft. 11 ins. (1.50 m)
- Track, rear ..... 4 ft. 3.3/16 ins. (1.30 m)
- Length overall ..... 15 ft. 10.1/2 ins. (4.838 m)
- Width overall ..... 5 ft. 10.1/2 ins. (1.79 m)
- Height, normal running position ..... 4 ft. 9.7/8 ins. (1.47 m)
- Width of seats: at the front - 4 ft. 4.3/8 ins. (1.33 m)
  : at the rear - 3 ft. 10.7/8 ins. (1.19 m)

Ground Clearance :

- "low" position ..... 2.9/16 ins. (0.065 m)
- "normal" position ..... 5.7/8 ins. (0.150 m)
- 1st intermediate height position ..... 6.11/16 ins. (0.170 m)
- 2nd intermediate height position ..... 9 ins. (0.225 m)
- "high" position ..... 9.7/8 ins. (0.250 m)

- Turning radius ..... 18 ft. 1/2 ins. (5.50 m)
- Unladen weight ..... 25.1/4 cwt (1280 kg)
- Pay-load ..... 9.1/2 cwt (480 kg)
- Total laden weight ..... 35 cwt (1760 kg)

III - ENGINE :

- Fiscal rating (French) .... 12 CV
- Fiscal rating (RAC, British) 20.08 HP
- Number of cylinders 4
- Bore ..... 90 mm
- Stroke ..... 85.5 mm

- Cubic capacity ..... 2,175 cc
- Compression ratio ..... 8.75 : 1
- Brake horsepower ..... 109 at 5,500 r.p.m.
- Maximum torque ..... 127.5 lbs/ft at 3000 r.p.m. (17.7 m.kg @ 3000 r.p.m.)

Valve rocker clearance: (engine hot)

For method (see Op. DX.112-0).

- Inlet ..... 0.008 in. (0.20 mm)
- Exhaust ..... 0.010 in. (0.25 mm)

Cylinder head : (see Op. DX.112-1) tighten cold.

1st tightening: 21.5 lbs ft (3 m.kg)

2nd tightening: 43.5 $^{+3.5}_{-0}$ lbs ft (6 $^{+0.5}_{-0}$ m.kg)

Valves :

	Angle	Dia. of Head	Dia. of Stem	Length
Inlet	90°	47	7.95 $^{+0.015}_{0}$	113.47 $^{+0.6}_{-0.25}$
Exhaust	60°	39 ± 0.1	8.95 $^{0}_{-0.015}$	104.05 $^{+0.45}_{-0.25}$

Valve springs :

	Length	Load in Kg.	Length	Load in Kg.
Inner spring	30.7	7.4 ± 0.5	22	12 ± 1
Outer spring	39	28.9 ± 1.6	30.5	60 ± 3.2

Carburettor settings :

Carburettor WEBER 28/36 DDE

	Primary bore	Secondary bore		Primary bore	Secondary bore
Venturi diameter	23	27	Progression holes	80 dia.	90 dia.
Main jet	130	175		90 dia.	120 dia.
Air correction jet	155	155		120 dia.	170 dia.
Emulsion tube	F16	F16	Brass float	11 grammes	
Diffuser	3.5	3.5	Needle valve	175	
Idling jet	50	70	Accelerator pump injector	60	
Idling air jet	185	85	Pump bypass valve	55	

With the strangler flap in the "closed" position there must be a clearance of 0.90 mm between the edge of the primary butterfly and its bore.

Idling speed : from 550 to 600 r.p.m.

Accelerated idling speed : 875 to 925 r.p.m.

Ignition:

Distributors: S.E.V. MARCHAL A 147 or DUCELLIER 4155 B.

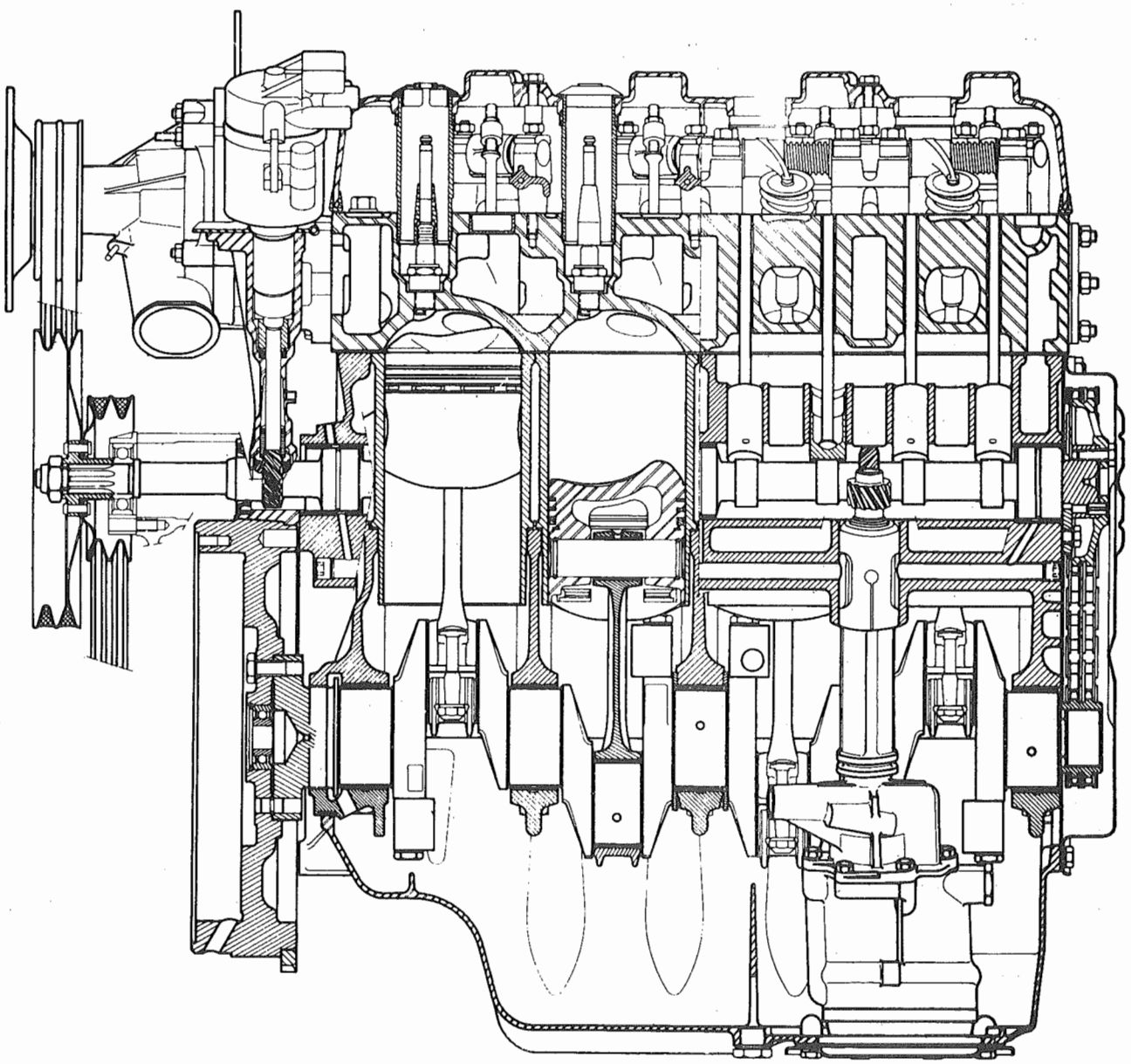
Contact breaker gap	0.4 mm
Initial ignition setting	12° B.T.D.C.
Automatic advance	max. 10° 25' - min. 8° 40' at 2500 r.p.m. of distributor
Sparking plugs	Marchal 35B
Sparking plug gaps	0.60 mm

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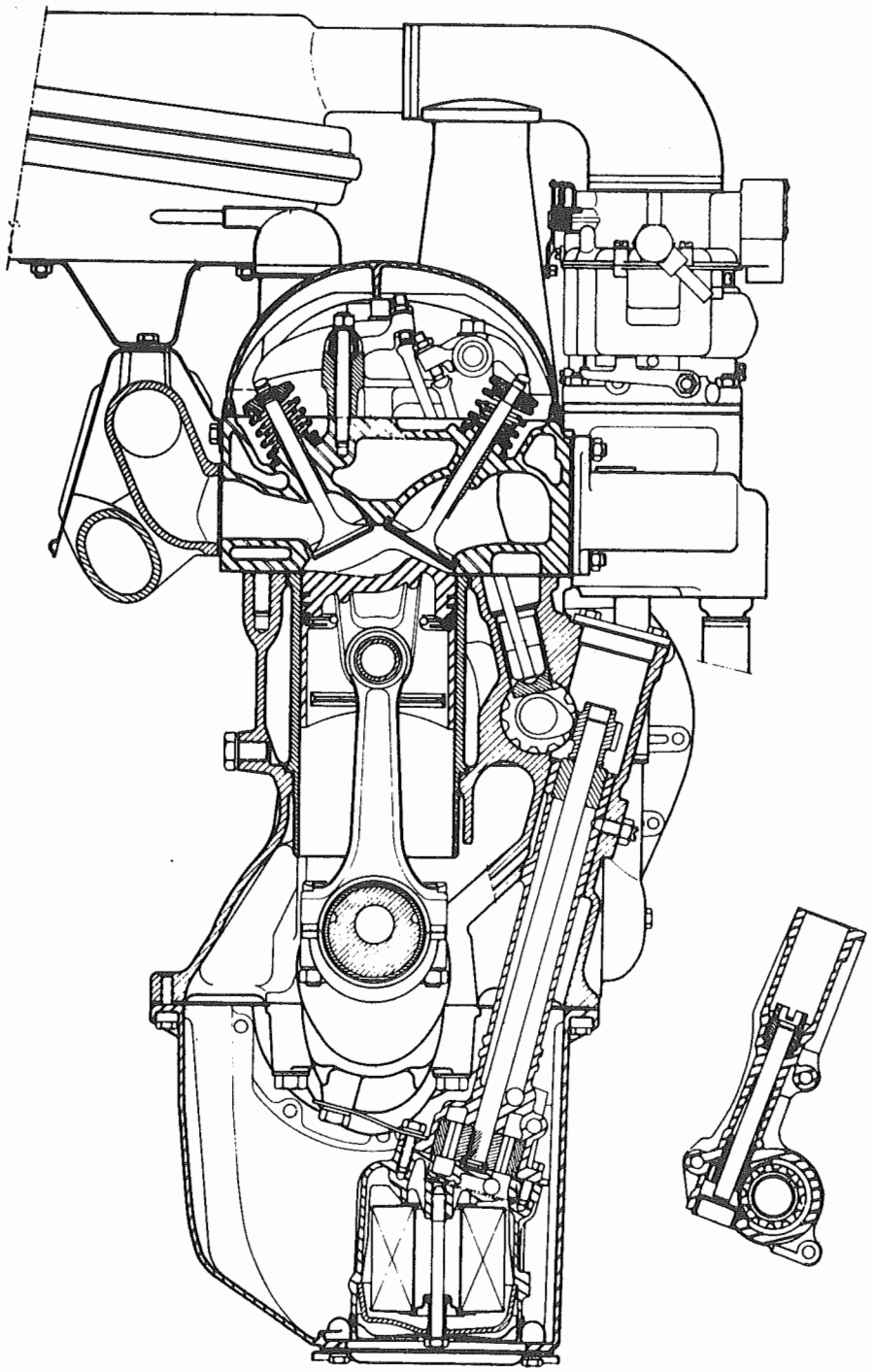
ENGINE

LONGITUDINAL SECTION



ENGINE

CROSS SECTION



Connecting rods.

Special equipment is required to replace the small end bushes.

After fitting, the number marked on the connecting rod and its cap must be towards the camshaft.

Tighten the connecting rod nuts to 50 ft lbs $^{+\ 3.5}_{-\ 2}$ ($7\ ^{+\ 0.5}_{-\ 0.25}$ m.kg).

Distributor.

End-float on distributor-drive spindle = 0.15 - 0.30 mm.

Contact breaker gap = 0.4 mm.

Sparks must occur at 90° to each other within 1° 30' max.

Centrifugal advance (at distributor rpm.) : starts at between 800 and 1,100 rpm.

@ 1000 rpm. = 0° to 1° 15 mins

@ 1500 rpm. = 2° 30 mins to 4° 15 mins

@ 2000 rpm. = 5° 30 mins to 7° 20 mins

max @ 2500 rpm. = 8° 45 mins to 10° 20 mins

Pressure of contact breaker points = 440 ± 40 gr. (16 oz. ± 1.5 oz.).
Condenser capacity = 0.21 to 0.23 µF.
Initial ignition advance setting: 12° BTDC.
Sparking plug electrode gap: 0.6 mm (0.024").

Carburettor : Weber type 28 x 36 DDE (DS 21)

28 x 36 DDE A1 (DS 21M)

	Primary Choke	Secondary Choke
Venturi bore	23	27
Main jet	130	175
Correction jet	155	155
Emulsion tube	F16	F16
Diffuser	3.5	3.5
Idling jet	50	70
Idling air jet	185	85
Progression holes	80 dia.	90 dia.
	90 dia.	120 dia.
	120 dia.	170 dia.
Brass float	11 g	
Needle	175	
Pump injector	60	
Pump bypass valve	55	

Adjustment for the strangler flap: with the strangler flap closed, the clearance between the edge of the primary butterfly and its bore must be 0.90 mm.

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XIII - ELECTRICAL

Dynamo: *Cars produced until January 1966.*

DUCELLIER Dynamo - 12 v - 7327 A -

Minimum diameter of commutator after machining = 35 mm.

PARIS-RHONE Dynamo - 12 v - G.10 C 39 -

Minimum diameter of commutator after machining = 34.5 mm.

Bench test :

Dynamo without regulator - Yellow field lead (EXC) connected to red output lead (DYN) and black lead to earth.

Minimum speed, cold, for 13 volts = 1200 r.p.m.

Output, cold, at 13 volts : 3.5 A at 1500 r.p.m.
22 A at 2500 r.p.m.

PALLAS vehicles and all types since January 1966.

June 1966.

DUCELLIER Dynamo - 12 v - 7336 A -

Minimum diameter of commutator after machining = 36 mm.

PARIS-RHONE Dynamo - 12 v - G.10 C 44 -

Minimum diameter of commutator after machining = 34.5 mm.

Bench test :

Dynamo without regulator - Yellow field lead (EXC) connected to red output lead (DYN) and black lead to earth.

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Minimum speed, cold, for 13 volts = 1950 r.p.m.

Output, cold at 13 volts : 11 A at 2200 r.p.m.
29 A at 3000 r.p.m.

Minimum speed, cold for 13 volts = 1700 r.p.m.

Output, cold, at 13 volts : 19.5 A at 2200 r.p.m.
33A at 3000 r.p.m.

Starter motor:

DUCELLIER Starter motor - 12 v - 6164A -

Minimum diameter of commutator after machining = 39.5 mm.

PARIS-RHONE Starter motor - 12 v - D.11 B 116

Minimum diameter of commutator after machining = 43 mm.

Bench test :

Starting current 190 to 230 A
no load 50 to 85 A.

REGULATOR : *Vehicles produced until January 1966.*

DUCELLIER Regulator - 12 volts - 8243 F - PARIS-RHONE - 12 volts - YT 2113

Cutting-in voltage = 12 - 13.5v (cold and hot).

Cutting-out voltage = lower at least by 1 volt than the cutting-in voltage.

Reverse current = 5 A max. (cold).

REGULATION:

Dynamo running at 3500 r.p.m.

Adjust the voltage to 12.5 volts, when the current must be 18 - 22A.

Adjust the voltage to 14 volts, when the current must be 18 - 22A.

Adjust the voltage to 15.5 volts, when the current must be 0 - 5A.

PALLAS and Vehicles all types since January 1966.

DUCELLIER Regulator - 12 volts - 8346A - PARIS-RHONE - 12 volts - YT 2116

Cutting-in voltage = 12 - 13.6v (cold and hot).

Cutting-out voltage = at least 1 volt lower than the cutting-in voltage.

Reverse current = 5A max. for a voltage of 13 volts.

REGULATION:

Dynamo running at 3.500 r.p.m.

Adjust the voltage to 12.5 volts, when the current must be 30 - 33A.

Adjust the voltage to 13 volts, when the current must be 30 - 33A.

Adjust the voltage to 13.5 volts, when the current must be 18 - 33A.

Adjust the voltage to 14 volts, when the current must be 5 - 28A.

Adjust the voltage to 14.5 volts, when the current must be 0 - 15A.

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TOOLS

To ensure the correct functioning of all hydraulic systems it is essential that the hydraulic fluid and all the component parts shall be perfectly clean. The most stringent precautions must be taken when working on the car and for the storage of fluid and parts.

1 STORAGE

All pipes, units and spare parts must be protected from dust and possible knocks.
Seals and rubber pipes must not be exposed to dust, air light or heat.
Hydraulic fluid must be kept in its original containers, securely sealed. We recommend the use of one quart (one litre) containers for topping up, or one gallon (five litres) when draining and refilling, in order to avoid keeping several open containers.

2 PRECAUTIONS DURING WORK :

Before starting work wash the car carefully or at least the area in which work is to be carried out. Example :
When replacing a rear suspension cylinder, carefully wash the corresponding wheel arch.
Before disconnecting a union, wash it carefully, and the surrounding area, with *alcohol.*

Release the pressure.
Then proceed as follows:

a) Work on all units except brakes and brake control :
   1) Unscrew the bleed screw on the pressure regulator.
   2) Place the manual height control lever in the "LOW" position.

b) Work on the brake circuits:
   1) Carry out all the operations mentioned in the preceding paragraph.
   2) Connect a flexible pipe (plastic or rubber) to the front brake bleed screw or to the rear bleed screw of the centrifugal regulator and to the bleed screw of the hydraulic control for accelerated idling. Also connect a pipe to the bleed screw of one of the rear brake cylinders and press on the hydraulic brake pedal until the flow of fluid ceases.
   3) If the union is situated below the level of fluid in the reservoir drain the latter to avoid loss of fluid, or close the pipe immediately with an appropriate plug.

c) Unions :
   The unions or union flange sealing plates must be fitted "freely" and without strain.

3 PRECAUTIONS AFTER DISCONNECTING THE UNIONS :

Close the open ends of all pipes with caps.

1) Metal pipes with screwed unions :

3.5 mm diameter	... ...	plug D 435-91
4.5 mm diameter	... ...	cap D 453-131
6.35 mm diameter	... ...	cap D 435-132
8 mm diameter	... ...	cap D 391-60

2) In the case of pipe assemblies, protect the union flanges with sellotape.

   Protect plastic pipes in the same way.

TOOLS

3) For rubber pipes use cylindrical plugs :

8 mm diameter	50 mm long
12 mm diameter	50 mm long

4 PROTECTION OF HYDRAULIC UNITS AFTER REMOVAL :

Seal all openings in the units as dismantling proceeds.

a) On the high pressure pump :

1 cap	... D 391-58	for the inlet pipe.
or 1 rubber cap		..for the high pressure pump outlet (connecting pipe diameter 6.35 mm).

b) On the pressure regulator :

1 cap	... D 391-60	for the return pipe.
1 plug	... D 391-63	for the hole for the pipe connecting the pressure regulator to the brake accumulator.
1 plug	... D 391-88	for the inlet from the high-pressure pump.
1 cap	... D 391-111	for the thread on the pressure regulator into which the main accumulator screws, (accumulator removed).
1 cap	... D 433-82	for the main accumulator (pressure regulator disconnected).

c) On the centrifugal regulator :

1 plug	... D 391-63	for the hole for the feed from the front brake unit.
3 rubber caps	...	for the bleed screws and overflow pipe.
1 blank flange	...	for the openings for the pipes connecting to the hydraulic gear selector.

d) On the brake accumulators :

1 plug	... D 391-88	for the outlet hole.
2 plugs	... D 391-63	for the inlet holes and the holes for the pipe connecting to the other brake accumulator.

e) On the pressure distributor unit :

3 plugs	... D 391-63	

f) On the height corrector :

3 plugs	... D 391-63	
1 plug	... D 435-91	

g) On the suspension cylinder:

1 plug	... D 391-63	for the hole for the inlet pipe.
1 plug	... D 434-70	for the thread in the cylinder, for the suspension sphere.
1 cap	... D 433-82	for the suspension sphere.

h) On the front brake cylinders:

2 plugs... ...	... D 391-63	for the inlet holes and the hole for the pipe connecting to the centrifugal regulator.

i) On the rear brake cylinders:

1 plug	... D 391-63	

j) On the clutch cylinder:

1 plug	... D 391-63	

k) On the gear control cylinders :

5 plugs... ...	... D 391-63	

TOOLS

1) On the clutch lock:
2 plugs .. .. D 391-63

IMPORTANT NOTE: All plugs and caps *must be carefully and thoroughly cleaned before using.*

5 PRECAUTIONS BEFORE ASSEMBLY :

All steel pipes must be blown through with compressed air. Rubber pipes and ring seals must be carefully washed in alcohol, then blown dry with compressed air. All hydraulic units must be cleaned with alcohol only. Nothing else must be used for this purpose. After cleaning, blow dry thoroughly with compressed air.

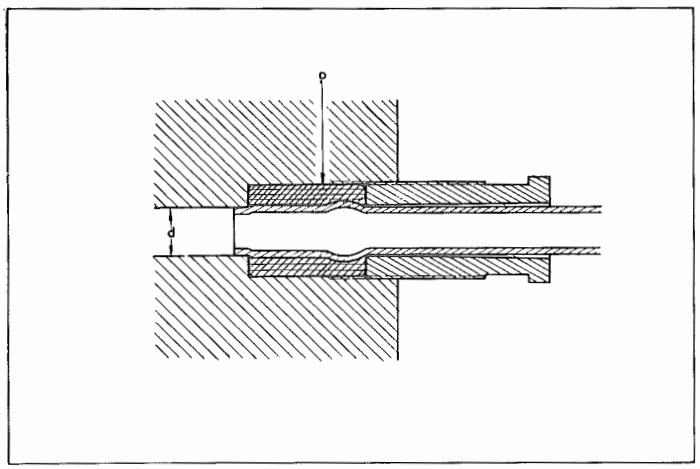
6 FITTING THE JOINT SEALS :

a) Sealing plates :

Before fitting a sealing plate, make sure that the ring seals are correctly positioned and in good condition (not deformed or split). The ring seals should be examined very carefully, if need be with a magnifying glass; *it is preferable to renew the ring seals.*

When assembling in position, make quite sure that the fluid holes in the seal plates coincide with those in the flanges.

b) Sealing sleeves (see illustrations) :



NOTE: All sealing sleeves must be renewed after each dismantling operation :

1) Place a sealing sleeve (a) on the pipe. This sleeve should be set back 2 mm from the end of the pipe.

2) Centralise the pipe in the bore by aligning it with the axis of the bore.

MOST IMPORTANT : Make quite sure that the end of the pipe enters the small bore (at "b").

3) Screw up the union nut by hand. On certain units the axis of the bore is oblique relative to the face of the boss for the nut.

4) Lightly tighten the nut (4.3 - 5.7 ft. /lbs) (0.6 - 0.8 m.kg).

This light tightening of the nut is sufficient to ensure a good seal. Excessive tightening will cause leakage.

c) Ring seals :

NOTE: These ring seals are so designed that their efficiency increases proportionately with the pressure in the pipes.

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C1/

TOOLS

Tightening the union does not increase sealing efficiency.

7 TACHOMETERS (REVOLUTION INDICATORS)

Certain checks and adjustments cannot be effectively carried out without the use of a tachometer.

To ensure accuracy when making these checks a precision instrument must be used. At 600 rpm particularly, it must be accurate to within ±20 rpm.

Electric tachometers

The following instruments have been tested by us with satisfactory results :

"RABOTTI" sold by Societe FENWICK, 15, rue Fenelon, Paris 10, under the number 2436-T.
"SOURIAU, type 1094" sold by Societe SOURIAU, 9, rue du General Gallieni, Billancourt (Seine).
"L. T. I. type CT1" sold by Societe De SARELLO, 7 bis, villa Berthier, Paris 17.
"GUYOT ELECTRONIC" sold by Societe R. E. M., 44, rue Brunel, Paris 17.
"SPEED-O-METER JUNIOR" sold by Societe C. I. D., 71, rue Chauveau, Neuilly-sur-Seine (Seine).

Electric tachometers should be checked periodically (about once a month). This check can be made by means of a stroboscopic disc MR-4142-20.

Mechanical Tachometers

Mechanical tachometers are sold by Societe FENWICK, under the number 2343-T, with drive adaptor 2423-T.

It is preferable to check this tachometer on a test bench, with appropriate coupling (contact breaker, dynamo, injection pump, speedometer, etc.).

This instrument can also be checked on a car by comparison with an electric tachometer of established accuracy.

To carry out this operation, the pulleys and belts must be in good condition, the pulleys correctly aligned and the belts correctly tensioned (see Op. DX. 231-0).

These conditions are also essential when using the instrument to carry out adjustments on the car.

Stroboscopic disc

This simple instrument is to be made by you; for constructional dimensions ask for Note MR-4142-20 from Service "Methodes Reparations", 163, avenue G. - Clemenceau, Nanterre (Seine).

The pulleys and belts must be in good condition, the pulleys correctly aligned and the belt tension correct (see Op. DX. 231-0).

a) Checking the tachometer

The stroboscopic disc is used for checking the electric tachometer. It enables the following engine speeds to be checked: 600 engine rpm, i.e. 300 HP pump rpm; 1200 engine rpm., i.e. 600 pump rpm, and all the multiples of 300 rpm on the high pressure pump, but at engine speeds over 1200 rpm reading becomes very difficult.

NOTE: the disc cannot replace a tachometer, it will only check the speeds given above.

TOOLS

8 PRESSURE GAUGES

When carrying out checks or adjustments on hydraulic units of the car, the use of pressure gauges is essential. In just the same way as precision tachometers are necessary for accurate checking and adjustment, so it is necessary to use sufficently accurate pressure gauges.

The pressure gauges of test bench 2290-T are of the required accuracy. To preserve this accuracy it is necessary to protect the gauges by using dashpots (dampers). These are sold by Societe FENWICK.

We strongly advise periodic checking of these pressure gauges, by comparison with a new pressure gauge reserved for the purpose.

9 CHECKS BEFORE COMMENCING OVERHAUL

If any irregularity of operation occurs, make quite sure that the H.P. hydraulic circuit is under pressure before doing anything else :

To do this, proceed as follows :
With the engine running at idling speed:-

- Unscrew the pressure regulator bleed screw 1-1$\frac{1}{2}$ turns (one should be able to hear the pressure release) ..... — 8 mm spanner

- Tighten the bleed screw, and the valve must cut-out in less than 20 seconds (the moment of cut-out is indicated by a reduction in the noise of operation) ..... — 8 mm spanner

If this check is negative, check the following points in the order given :

- That there is sufficient hydraulic fluid in the reservoir.
- That the reservoir filter is perfectly clean, and in good condition.
- That air is not entering the suction pipe of the pump.
- That the belts of the high pressure pump are not slipping.
- That the bleed screw is securely closed.

10 CHECKS AFTER WORK HAS BEEN CARRIED OUT

After all work, check the following :

1) All unions for possible leaks.

2) The clearance between pipes: the pipes must not touch each other nor must they touch any part of the vehicle, fixed or movable. Pay particular attention when assembling a steering rack or steering wheel.

TOOLS

11. CARS WITH HYDRAULIC SYSTEMS CONTAINING SYNTHETIC HYDRAULIC FLUID

L.H.S.2

Cars of the "D" type (DS 19 - DS 21 - DS 19A - ID) produced up to September 1966, had their hydraulic circuits filled with *synthetic hydraulic fluid (LHS. 2 fluid).*

On these cars the main Hydraulic Reservoir and the hydraulic units are *painted black.*

The general instructions given earlier in this chapter apply to these cars, provided that the following instructions are scrupulously observed:-

Cleaning: Use alcohol only.

Assembly: Follow the detailed operations in the Manual.
If seals or components need lubricating before fitting, use only *synthetic fluid LHS. 2.*

Rubber parts: Use only those seals, tubes and diaphragms made for use with *synthetic fluid LHS. 2.* Never fit parts of the same dimensions but intended for use with other fluids. We have sent you a "Table of Seals" giving you the part numbers of the only items suitable for use with synthetic fluid.

Units: Use only units intended for use in systems containing synthetic fluid. Certain units are painted black, but in no case must units with *green markings* be used.

Testing: Use only the Test Bench 2290-T with its accessories.
This test-bench is *painted grey* and the accessories bear no markings.
These accessories, and also the gauges, must only be used for testing units functioning with *synthetic fluid LHS. 2.* Never use them with any other fluid, or for testing units intended to function with any other fluid.

Hydraulic fluid: Use only factory approved fluids bearing the symbol LHS. 2.

BLACK RESERVOIR - Use SYNTHETIC FLUID LHS. 2.

TOOLS

12. CARS WITH HYDRAULIC SYSTEMS CONTAINING MINERAL HYDRAULIC FLUID

L.H.M

Cars of the "D" type (DS 19 - DS 21 - DS 19A - ID) produced since September 1966, with the exception of models for certain export markets, have their hydraulic circuits filled with *mineral hydraulic fluid (LHM fluid)*.

On these cars the main Hydraulic Reservoir and the hydraulic units are *painted green* or have *green identification marks* on them.

The general instructions given earlier in this chapter apply to these cars, provided that the following instructions are scrupulously observed:-

Cleaning: Use petrol only.

Assembly: Follow the detailed operations in the Manual.
If seals or components need lubricating before fitting, use only *mineral fluid LHM*.

Rubber parts: Use only those seals, tubes and diaphragms made for use with *mineral fluid LHM*. Never fit parts of the same dimensions but intended for use with other fluids. We have sent you a "Table of Seals" giving you the part numbers of the only items suitable for use with mineral fluid.

Units: Use only units with the green identification colour intended for use in systems containing mineral fluid.

Testing: Use only the Test Bench 3654-T with its accessory set 3655-T. This test-bench is *painted green* and the accessories bear *green markings*. These accessories, and also the gauges, must only be used for testing units functioning with *mineral oil LHM*. Never use them with any other fluid, or for testing units intended to function with any other fluid.

Hydraulic fluid: Use only factory approved fluids bearing the symbol LHM.

GREEN RESERVOIR - Use MINERAL FLUID LHM.

HOW TO USE THE MORE USUAL ADHESIVES

METHOD OF USE

The drying time before joining two parts together depends on the ambient temperature. Generally any times given are based on a temperature of between 18 and 20°C (65-68°F).

Generally speaking, an adhesive MUST BE LEFT DRYING until, although still "tacky", it will not stick to the fingers if touched very lightly.

For MINNESOTA "SPRAY ADHESIVE 77" in an aerosol pack, allow about 5 minutes for drying.

When large areas are to be joined it is better to bring the parts into contact immediately after applying the adhesive.

BOSTIK "1400" adhesive should be replaced by "1600" if it is to be applied to cellulose paintwork.

If MINNESOTA adhesive "EC 1099" employed for, or spread over, FRESH synthetic paint there is a risk of making the paint shrivel.

SUPPLIERS:

SCHULTZ ..... 43, rue de la Mertzau - 68 MULHOUSE - Tel. : 45-45-63

BOSTIK ..... 5, rue de Saint-Leu - 95 MONTMAGNY - Tel. : 964-64-12 (B.B. Chemical Co.)

MINNESOTA de FRANCE .... 135, boulevard Sérurier - 75 PARIS 19ème - Tel. : 208-42-80 (3-M Company)
205-71-19.

Material to be adhered	Backing Material	Procedure to follow	Supplier	Adhesive	Alternative
Bitumen treated felt strips. Packing strips between body and platform.	Painted panels	Spread on backing. Allow it to dry. Place together.	SCHULTZ	Colfix 170	
			BOSTIK	1600	1400
			MINNESOTA	E C 1099	
Coarse felt. Head-rest. Latex foam. Grey wadding. Rhovyline material. Woven fabric.	Rear window frame card-board. Felt cardboard. Head-rest cardboard.	Spread on backing surface. Allow to dry. Place together.	SCHULTZ	Colfix 170	
			BOSTIK	1600	1400
			MINNESOTA	E C 1099	
Spongy latex armrest. Leathercloth. Leathercloth for hood curtains.	Armrest card-board. Leathercloth.	Spread on backing surface. Allow to dry. Place together.	SCHULTZ	Colfix 550	
			BOSTIK	1500	1600 or 1400
			MINNESOTA	E C 1099	
Pebble weave cotton trim cloth.	Painted panels.	Spread on backing surface. Allow to dry. Place together.	SCHULTZ	Colfix 170	
			BOSTIK	1400	
			MINNESOTA	E C 1099	
Felt coated with vinyl chloride and perforated.	Painted panels.	Spread on backing surface. Allow to dry. Place together.	SCHULTZ	Colfix 170	
			BOSTIK	1600	1400
			MINNESOTA	Spray adhesive 77 (in aerosol)	
Rubber. Spongy polyurethane.	Aluminium.	Coat the aluminium with adhesive, using a roller. Place together.	SCHULTZ	Colfix 180	
			MINNESOTA	Spray adhesive 77 (in aerosol)	

Material to be adhered	Backing Material	Procedure to follow	Supplier	Adhesive	Alternative
Door opening (vinyl). Glove box embellisher. Facia sponge polyurethane. Padded protective strips. Roof cantrail.	Painted panels Cardboard. Painted tubes.	Spread on backing surface. Allow to dry. Spread on material to be "stuck". Allow to dry. Place together.	SCHULTZ	Colfix 430	
			BOSTIK	1400	
			MINNESOTA	E C 1236	
Klégécel strips.	Safety glass.	Spread, allow to dry and place together.	SCHULTZ	Colfix 550	
			BOSTIK	1400	
			MINNESOTA	E C 711	
Leathercloth for rear squab. Aluminium on sidemember.	Plywood. Painted panels	Spread on backing. Allow to dry. Place in contact.	SCHULTZ	Colfix 550	
			BOSTIK	1400	
			MINNESOTA	E C 1236	
Felt coated PVC. Polyurethane and sound deadening felt for facia. Dimpled ruberoid on ventilation ducts.	Painted panels	Spread on backing. Allow to dry. Place in contact.	SCHULTZ	Colfix 170	
			BOSTIK	1600	
			MINNESOTA	Spray adhesive 77 (in aerosol)	
Sponge rubber round tank filler. "U" section for sealing. Sponge rubber strips for window glass.	Painted panels Treated metal panels.	Spread on backing and on material. Allow them to dry. Place in contact.	SCHULTZ	Colfix 550	
			BOSTIK	1410	
			MINNESOTA	E C 1236	E C 1099
Calico. Rilsan slide. Boot door sealing section.	Aluminium. Wadding. Glass.	Spread on backing. Allow to dry. Place in contact.	SCHULTZ	Colfix 550	
			BOSTIK	1410	
			MINNESOTA	E C 711	

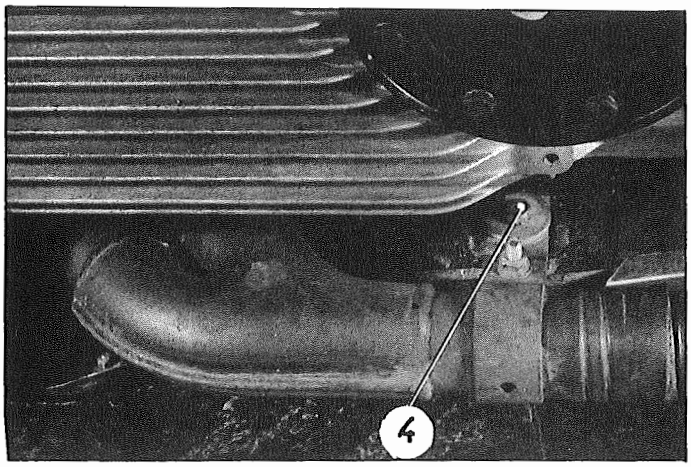
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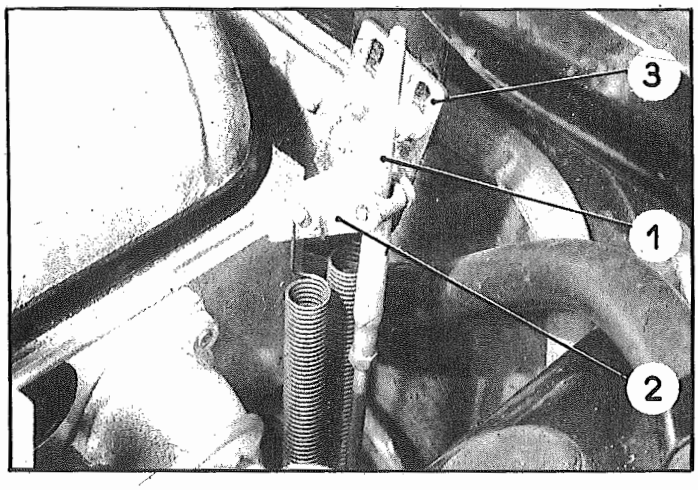
Material to be adhered	Backing Material	Procedure to follow	Supplier	Adhesive	Alternative
Imitation reptile for front squab. Rubber section for air duct and door. Pedal rubber pad. Polyurethane for air inlet and ventilation duct.	Painted panels Phosphated metal panels.	Spread on backing and material. Allow to dry and place in contact.	SCHULTZ	Colfix 550	
			BOSTIK	1410	
			MINNESOTA	E C 1099	
Sponge polyurethane and combed cotton on aluminium roof.	Aluminium.	Spread with roller on backing (or spray). Dry and place in contact.	SCHULTZ	Colfix 180	
			MINNESOTA	Spray adhesive 77 (in aerosol)	
Sponge polyurethane and combed cotton on polyester roof.	Polyester.	Spread with roller on backing (or spray). Allow to dry. Place in contact.	SCHULTZ	Colfix 180	
			MINNESOTA	Spray adhesive 77 (in aerosol)	
Leathercloth.	Painted panels	Spread on both faces. Allow to dry. Place in contact.	SCHULTZ	Colfix 550	
			BOSTIK	1400	
			MINNESOTA	E C 1099	
Padded protective sections on tube of seat squab.	Painted panels	Spread on both surfaces. Allow to dry. Place in contact.	SCHULTZ	Colfix 550	
			MINNESOTA	Spray adhesive 77 (in aerosol)	

REMOVAL

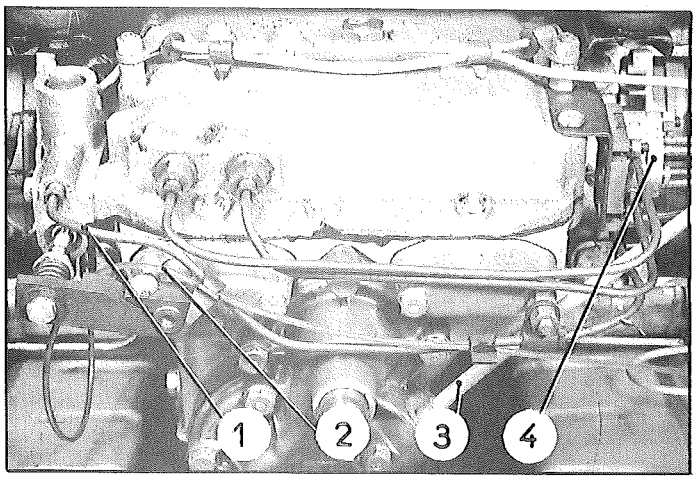
1. Remove :
   - the front wings,
   - the air filter and its support.
2. Drain the radiator and cylinder block (save the water as it contains anti-freeze).
3. Release the pressure in all the hydraulic circuits (see Op. DX.00).
4. Remove the radiator inlet duct assembly with the crossmember supporting the spare wheel.
5. Drain the hydraulic fluid reservoir.
6. Remove the battery and its tray, placing the battery top frame on the heater unit.
7. Disconnect the hydraulic reservoir and leave it lying on the left-hand sidemember.
8. Remove the steering rack (see Op. DJ.442-1). Remove the two front suspension spheres.
9. Disconnect the exhaust downpipe from the flexible exhaust pipe only. Remove the screws (4) securing the fixing clamp of the flexible exhaust pipe and unscrew the screw securing this pipe on the exhaust silencer. Withdraw the pipe towards the silencer.



10. Disconnect the dynamo leads, the distributor leads (LT and HT) and the lead to the thermometer transmitter.

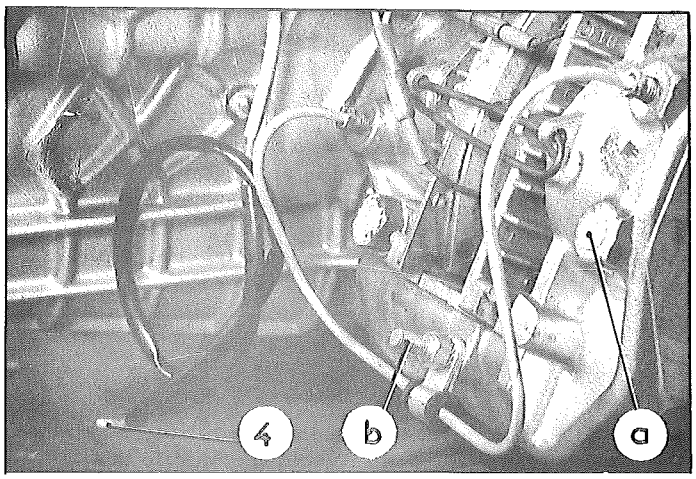


11. Disconnect the choke cable from the carburettor. Remove the two return springs and the rear support bracket (3) for the vertical accelerator control rod.



12. Disconnect :
    - the speedometer cable (3),
    - the gearchange pipe assembly (4),
    - the feedpipe (1) from the clutch-lock, and its return pipe (2).

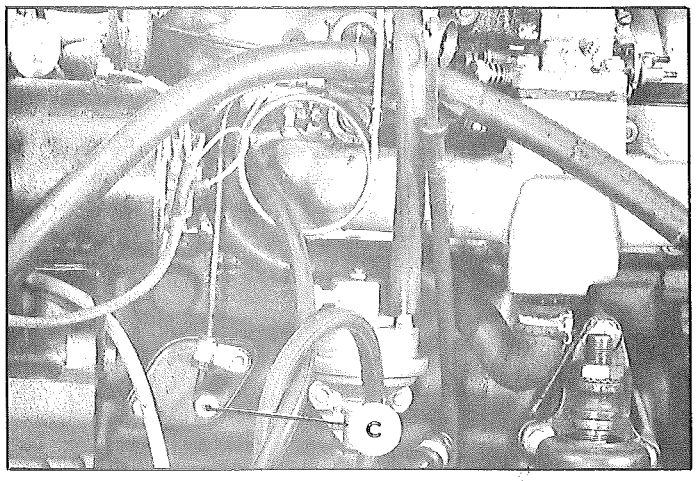
13. Disconnect the heater hose, from the water pump inlet tube.



14. Disconnect at "a" the supply pipe for the front left-hand brake unit.

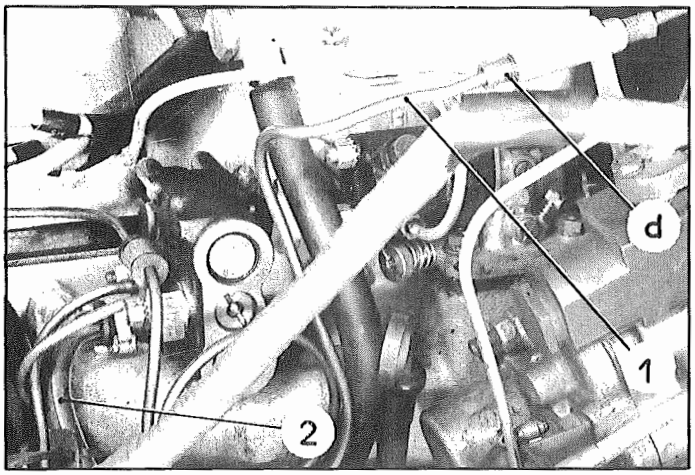
Remove the clip holding the supply pipe fixed at "b".

Disconnect the lead (4) for the brake pad wear warning light.



15. Disconnect :
    - the outlet pipe from the pressure regulator, from the three-way union,
    - the connecting pipe between the clutch re-engagement control and the hydraulic gear selector at "c",
    - the petrol pump inlet elbow, from the pump,
    - the reservoir return pipe, from the pressure regulator.

Close this pipe with a 9 mm screw or a plug to avoid the escape of the fluid remaining at the bottom of the reservoir.



16. Disconnect the heater tap inlet hose from the hot water pipe on the cylinder head.

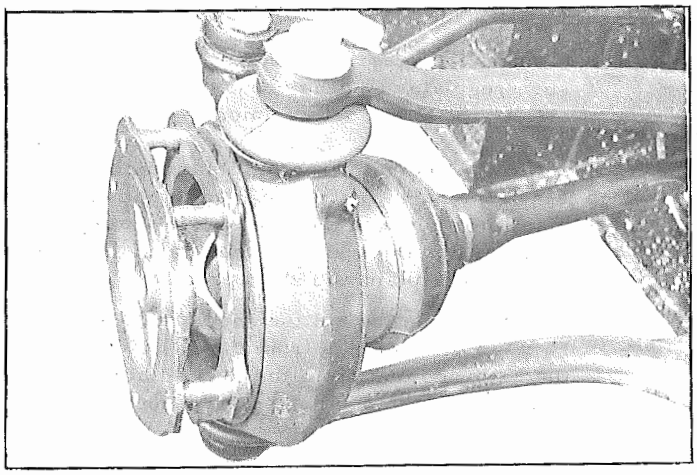
Disconnect :

- the rubber return pipe (2), to reservoir, from the clutch re-engagement control.
- the connecting pipe (1) between the hydraulic gear selector and the centrifugal regulator at "d".

17. Raise the front of the vehicle on stands.

18. Remove :

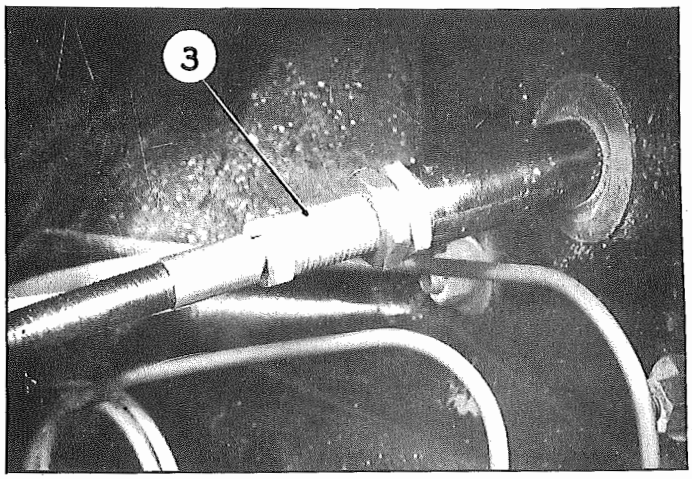
- the front wheels,
- the nuts securing the drive shafts to the flanges on the gearbox outlet shafts (17 mm socket and extension).



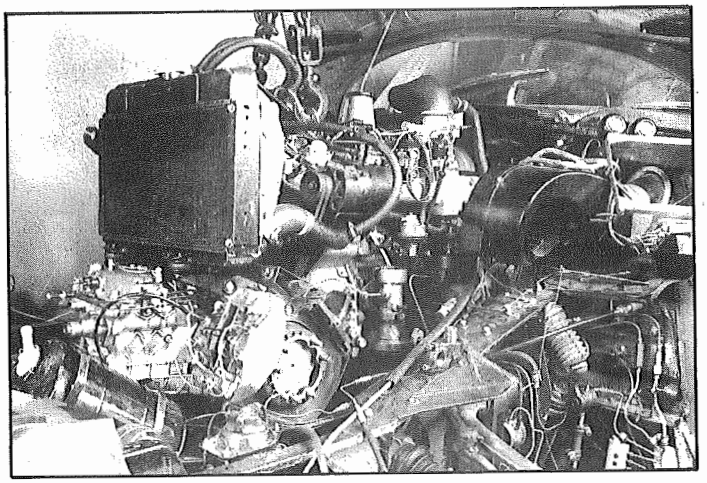
19. Disconnect the drive shafts from the pivot bearings (outwards)

To do this, remove the 2 countersunk screws.

Remove the tri-axe housings from the studs on the flanges of the gearbox outlet shafts.



20. Disconnect the handbrake cable from the mechanical brake caliper levers, after having completely unscrewed the locknut and the adjusting nut of the threaded sleeve (3).



21. Remove :
    - the screws securing the front engine cross-member to the body sidemembers (take care not to lose the adjustment packing pieces which may be found between the cross-member and the sidemembers).
    - the securing screws holding the rear engine mountings.

22. Suspend the engine-gearbox assembly on its sling bracket and withdraw it.

ASSEMBLY

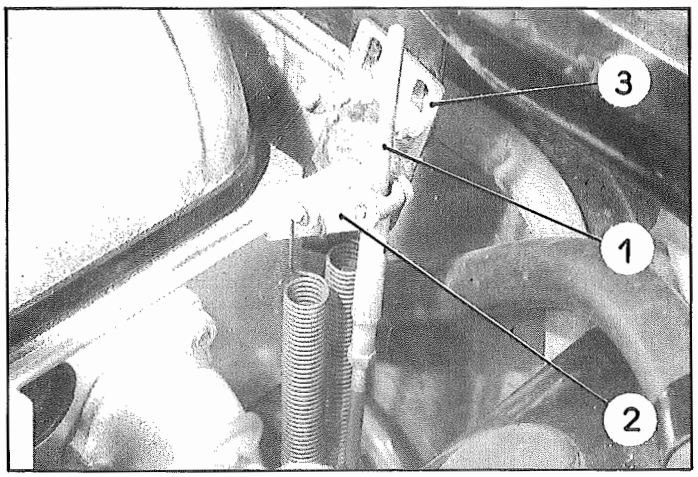
23. Lift the engine-gearbox assembly by its sling bracket and place it in position.

24. Connect the reservoir return pipe to the pressure regulator and the pressure regulator outlet pipe to the 3-way union.

25. Allow the engine to rest on its mountings. Place the packing pieces, found when dismantling, between the front engine cross-member and the body sidemembers. Tighten the screws (plain and shakeproof washers).

NOTE: There must be a difference of 80 ± 2 mm between the distance from the L.H. disc to the body and that from the R.H. disc to the body. Alter the packing shims if necessary.

Fix the rear engine mountings onto the rear supports. (Shakeproof washer and thrust plate under the screw heads).



26. Fit the flexible bearing onto the carburettor control relay and place it on its bracket (3) on the scuttle front.

Align the bearing. Tighten the securing nuts (flat and shakeproof washers).

Pass the vertical accelerator control rod (1) through the trunnion in the lever(2) and hook on the springs, adjust the control (see Op. DX. 142-4).

27. Replace the handbrake cable (see Op. DX.454-1) and adjust it (see Op. DX.454-0).

28. Place the driveshafts in position.

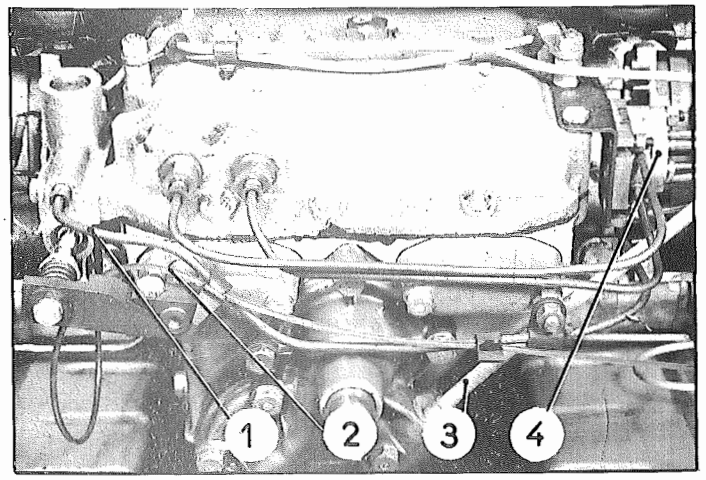
Replace the tri-axe housings on the studs in the flanges of the gearbox outlet shafts.

Replace the nuts and tighten them from 60 to 80 ft lbs (8.5-11 m.kg) (17 mm socket and extension).

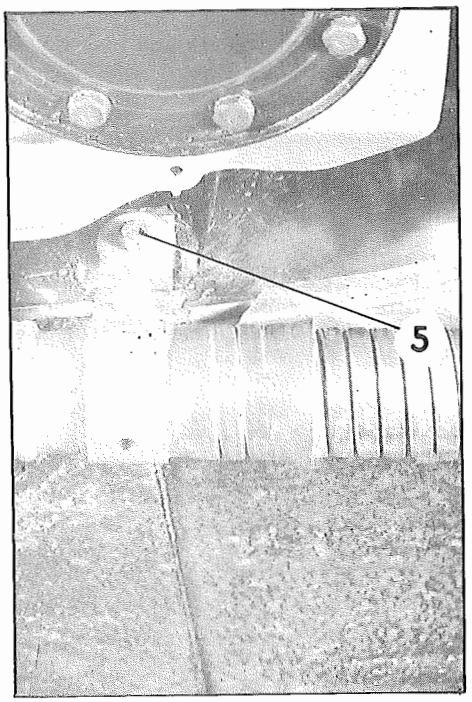
29. Fit the driveshaft flanges on to the wheel hubs (2 countersunk head screws on each side).

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30. Connect :
    - the speedometer cable (3).
    - the gearchange pipe assembly (4).
    - the feedpipe (1) for the clutch lock and its reservoir return pipe (2).



31. Connect the exhaust downpipe to the flexible exhaust pipe.

    Fit the downpipe in its support under the engine. Tighten the nut (5) (plain and shakeproof washers).

    Tighten the fixing clamp of the downpipe connection to the flexible exhaust pipe.

32. Connect the heater hose to the hot water supply pipe on the cylinder head.

33. Fit the steering rack (see Op. DX.442-1).

34. Connect the supply pipe to the front left-hand brake unit, also the holding clip for this pipe.

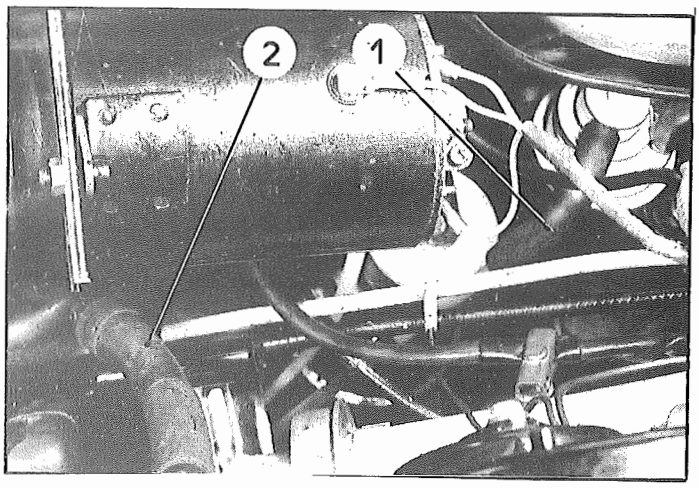
Connect the lead for the brake pad wear warning light.

35. Fit :
    - the battery tray, the battery, and the battery top frame,
    - the hydraulic reservoir.

Connect the cables to the battery terminals.

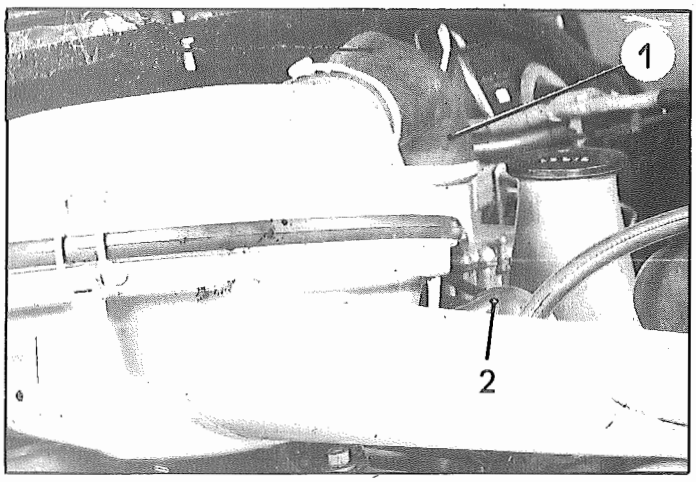
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Corrective No.1



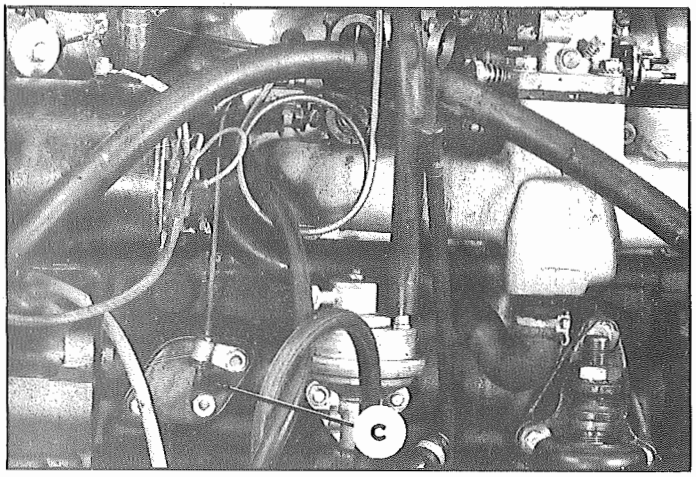
36. Fit :
    - the petrol pump feed hose (1),
    - the heating hose (2) to the heater unit.

37. Connect the dynamo leads, the distributor leads (LT and HT) and the lead for the thermometer transmitter.

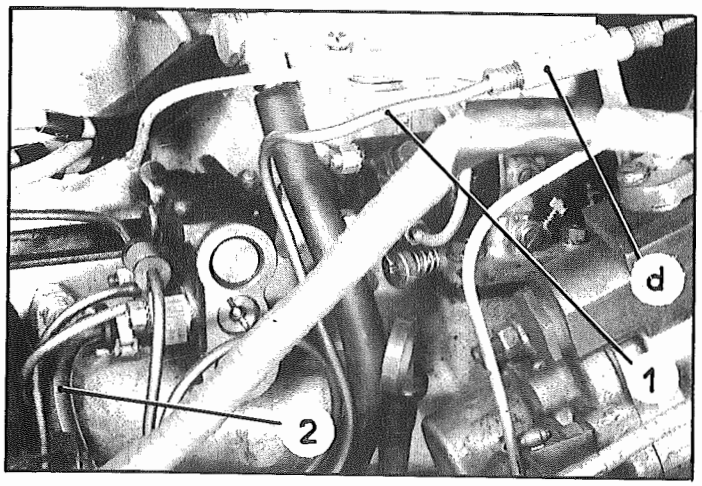


38. Fit the front wheels and lower the car to the ground.

39. Fit the air filter, the rubber union (2) between filter and rocker-cover and connect the rubber elbow (1) between carburettor and air filter.

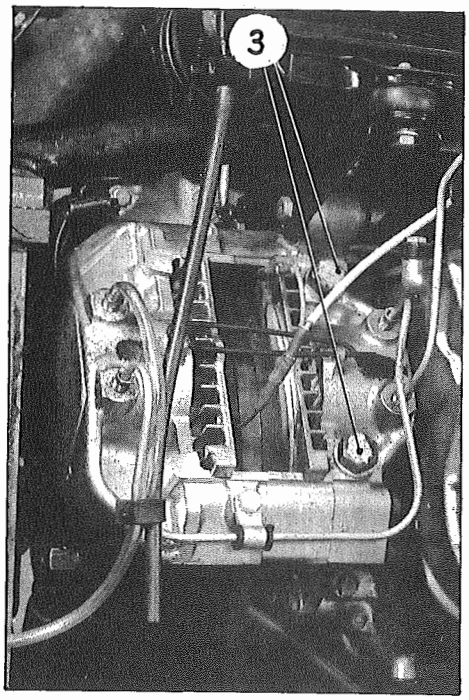


40. Couple up the connecting pipe between the clutch re-engagement control and the hydraulic gear selector, at "c".



41. Couple up the connecting pipe (1) between the hydraulic gear selector and the centrifugal regulator, at "d".

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42. Adjust, if necessary, the initial ignition advance setting (see Op. DX.211-0).

43. Connect the carburettor choke control and adjust it.

44. Fill the reservoir with hydraulic fluid.

45. Fit the two front suspension spheres.

46. Fill the radiator and the engine cylinder block. Open heater tap, start up the engine and check the level after a few minutes running, and top up if necessary.

47. Have pressure applied by an assistant to the hydraulic brake pedal, to centralise the brake. Tighten the screws (3) securing the brake units on the gearbox outlet housings to between 94 and 100 ft lbs (13 to 14 m.kg).

48. Bleed the brakes.

49. Raise the engine and secure the exhaust down-pipe to the manifolds.

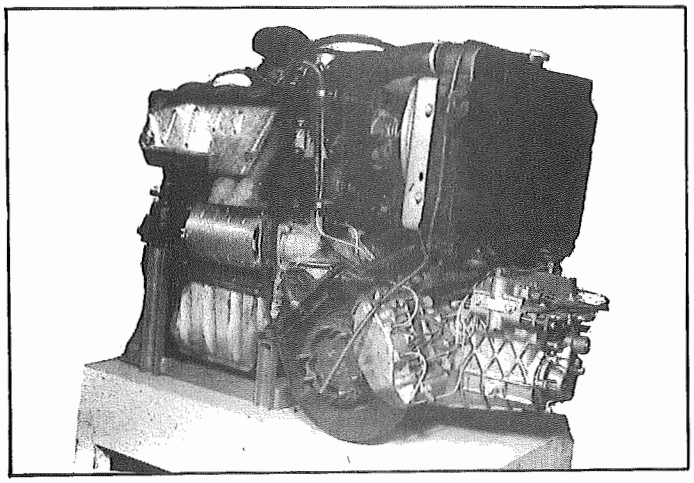
50. Adjust the idling (see Op. DX.142-0).

51. Fit the wings, connect the wiring harnesses. Fit the embellishers to the wheels.

52. Fit the radiator air intake duct with the spare wheel crossmember
Fit the spare wheel.

Corrective No. 1

STRIPPING AND ASSEMBLING FOR REPLACEMENT OF THE ENGINE.

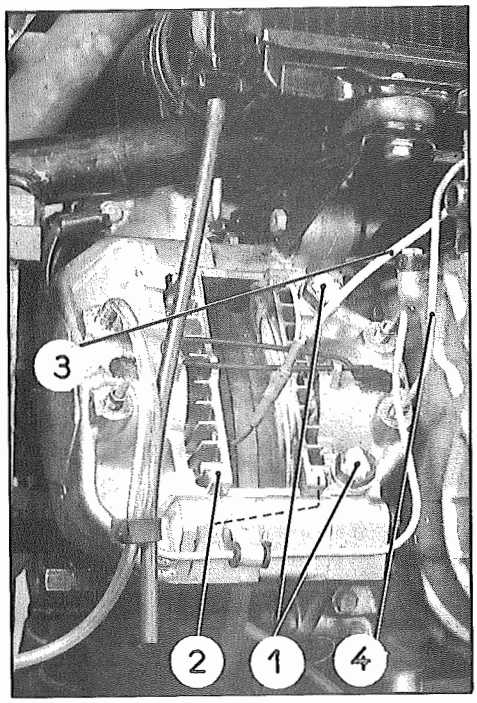


STRIPPING.

1. Remove the exhaust downpipe. Place the engine-gearbox assembly on the stand 3083-T.

2. Disconnect :
   - the radiator tie-rod from the radiator,
   - the upper and lower radiator hoses from the radiator.

Remove the radiator.



3. Disconnect the connecting pipe (4) between the hydraulic brake units and the lead (3) for the brake pad wear warning light.

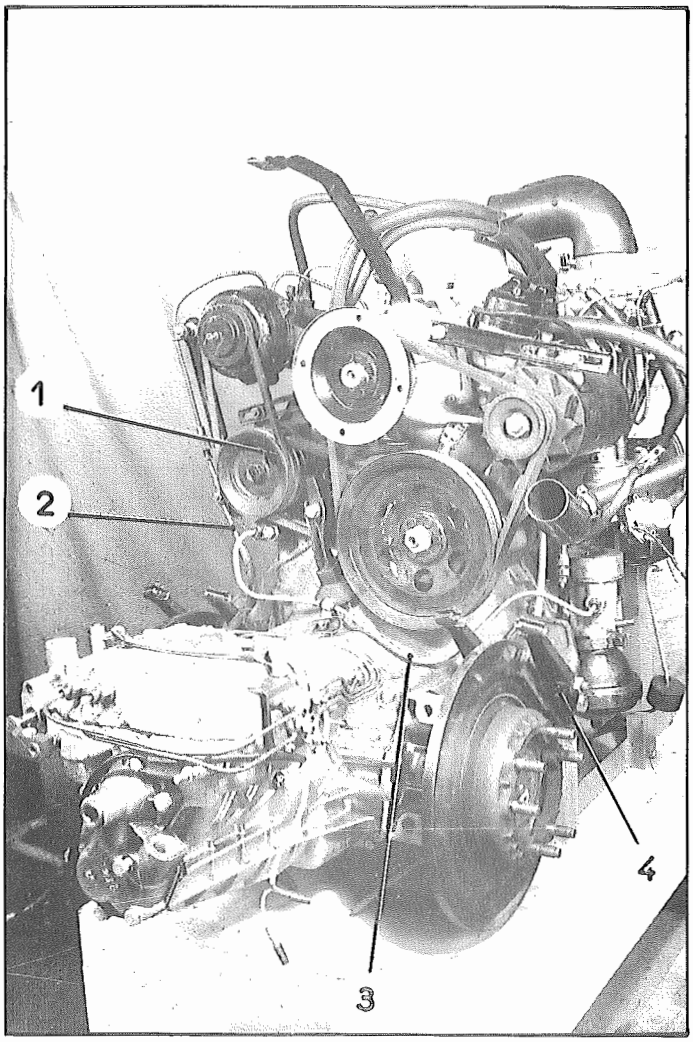
4. Remove :
   - the pads (2) from the hydraulic brake units,
   - the pipe connecting the right-hand hydraulic brake unit to the centrifugal regulator,
   - screws (1) securing the brake units on the gearbox outlet housings.

5. Disconnect the right-hand brake unit from the engine crossmember and remove it.

6. Remove the crossmember together with the left-hand unit.

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Corrective No. 1

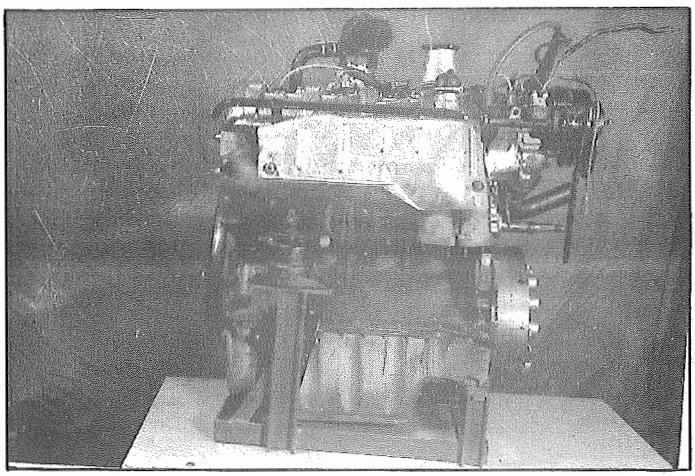


7. Remove :
   - the engine fan,
   - the pipe (3) between high pressure pump and pressure regulator,
   - the dynamo,
   - the pipe (2) between the centrifugal regulator and the clutch lock,
   - the high pressure pump (1),
   - the belts,
   - the mechanical brake caliper (4), left-hand,
   - the drive pulley (use a chisel to remove the metal of the nut turned down into the shaft for locking purposes),
   - the washers for adjusting the pulley alignment,
   - the starter motor, without removing its heat-shield,
   - the bearing support for the end of the camshaft,
   - the securing screws for the gearbox, using spanner 2431-T.

Disconnect the pressure feedpipe from the clutch cylinder.

8. Disconnect the gearbox from the engine.

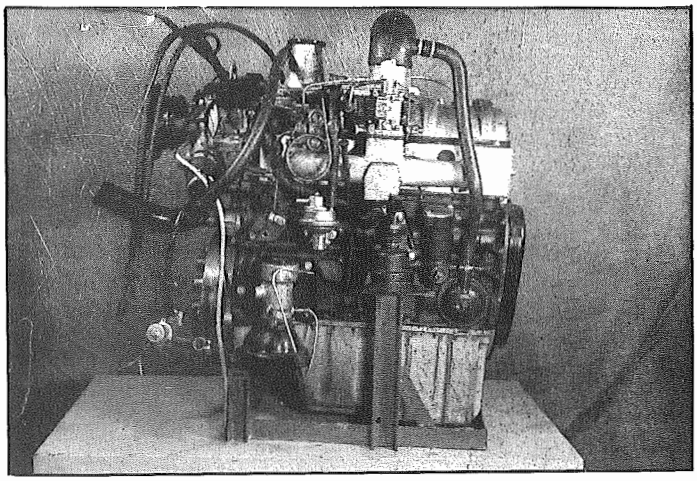
NOTE:- The gearbox must not on any account be moved about by rolling it with the brake discs on the ground. Fit old worn discs or dummy discs machined to 350 mm diameter. If these are not available, place a rubber mat or a sheet of plywood between the ground and the gearbox.

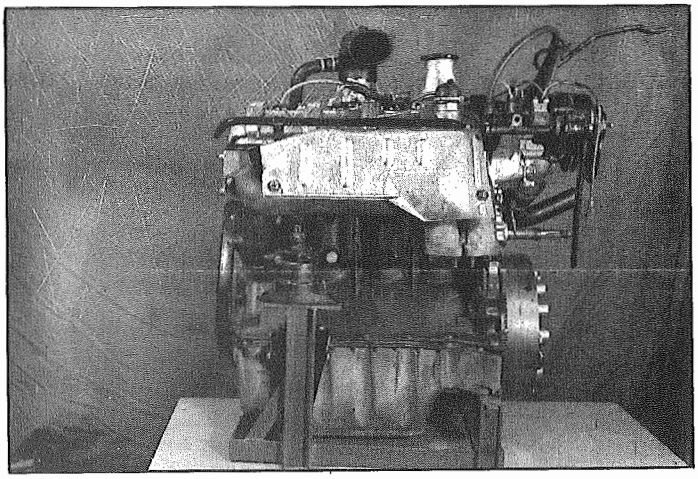


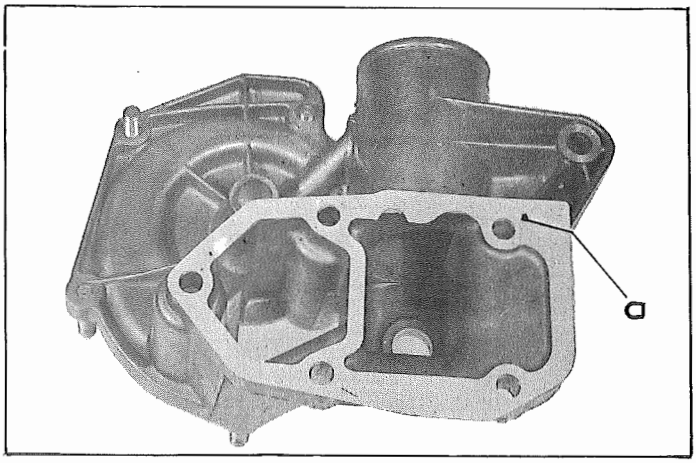
9. Remove :
   - the heat-shield from the exhaust manifold,
   - the exhaust manifolds,
   - the heater pipe with the metal bracket for the manifold shield.

10. Disconnect the hydraulic piping on the centrifugal regulator.

11. Remove :
   - the centrifugal regulator,
   - the water pump with the tie-rod, and its gasket,
   - the bracket under the engine holding the exhaust downpipe.







12. Remove :
    - the petrol pump, the insulation distance piece, the push-rod guide, the paper joint and the push-rod,
    - the rubber sleeves connecting carburettor, air filter and breather,
    - the carburettor and its packing piece,
    - the pressure regulator assembly with its support bracket.

13. Disconnect the piping on the clutch re-engagement control.

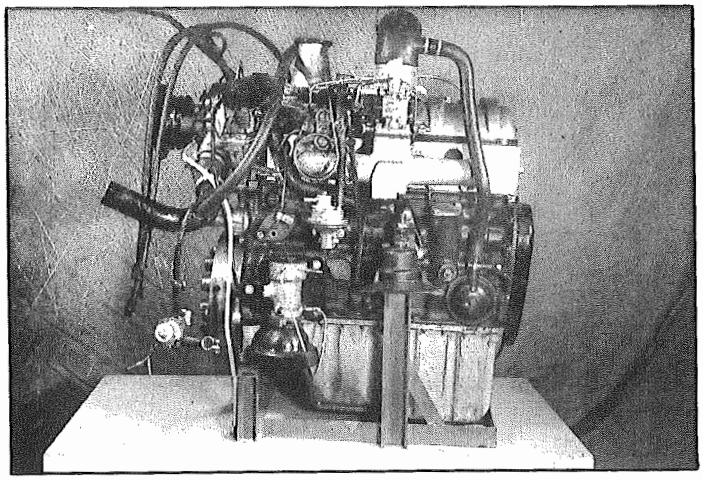
14. Remove :
    - the inlet manifold together with the clutch re-engagement control and the gaskets,
    - the distributor and its drive tower,
    - the sparking plugs,
    - the oil dipstick,
    - the positive cable going to the starter motor,
    - the hydraulic pipe assembly of the clutch re-engagement control,
    - the engine mounting arms together with the rubber mountings.

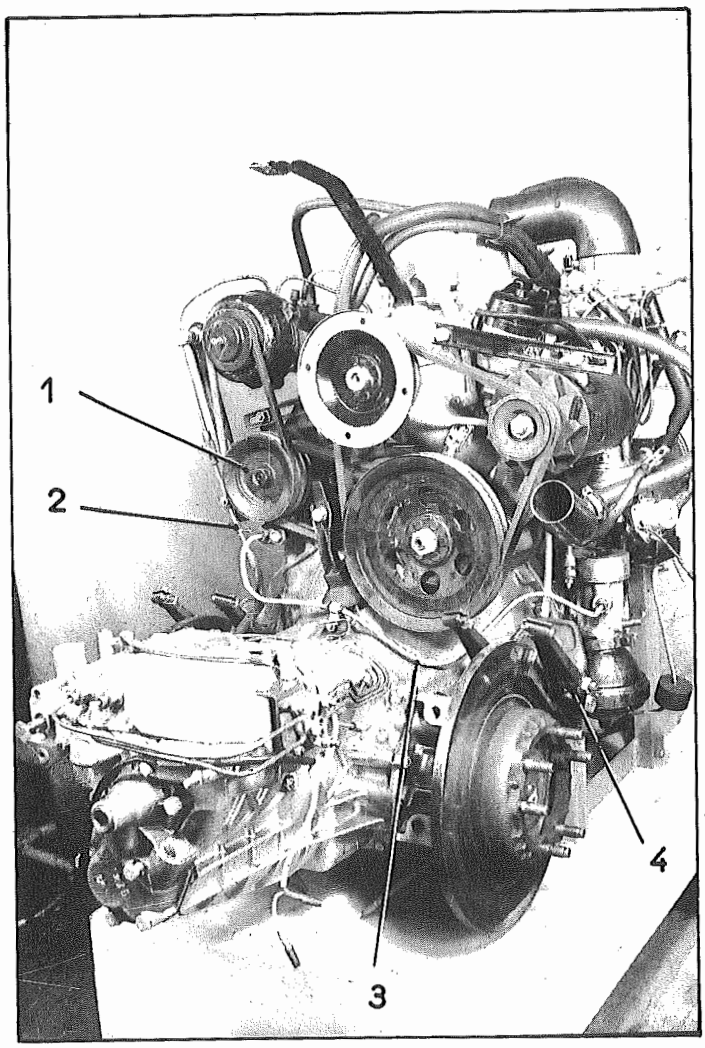
ASSEMBLY.

15. Fit the engine mounting arms together with the rubber mountings.
    Adjust the rubber mountings (see Op. DX.133-0).

16. Fit :
    - the securing bracket under the engine for the exhaust downpipe,
    - the water pump with the radiator tie-rod, inserting a paper gasket smeared with sealing compound, between the pump and its backplate, position the gasket as illustrated (corner "a").
    - the centrifugal regulator,
    - the heater pipe with the metal bracket for the manifold shield,
    - the exhaust gaskets (the joint turnover towards the manifolds),
    - the two exhaust manifolds together; (leave the securing nuts finger-tight, final tightening will be carried out when the engine is installed.

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Corrective No.1





17. Fit :
- the inlet manifold with the clutch re-engagement control,
- the distributor and its drive tower (adjust the initial advance setting, (see Op. DX. 211-0),
- the sparking plugs,
- the pressure regulator with its bracket: refit this assembly as high as possible within the limits allowed by the clearance between the holes and the securing screws for the bracket,
- the pipe between water pump and inlet manifold,
- the petrol pump (see Op. DX.173-1),
- the distributor earth lead, between dynamo tie-rod and water pump,
- the high pressure pump tie-rod,
- the guide tube for the oil dipstick. Insert oil dipstick.

NOTE : Position the guide tube for the gauge; (it is curved) so that the concave part is perpendicular to the engine and towards the outside. Then turn it 15 to 20° approximately towards the front of the engine. This allows a clearance between the guide tube and the hydraulic gear selector after fitting the engine in the car.

- the delivery pipe between radiator top and water pump (fit the thermostat).

18. Fit the gearbox to the engine :

a) Make quite sure that the dowels for centring the gearbox are correctly entered in the holes in the cylinder block.

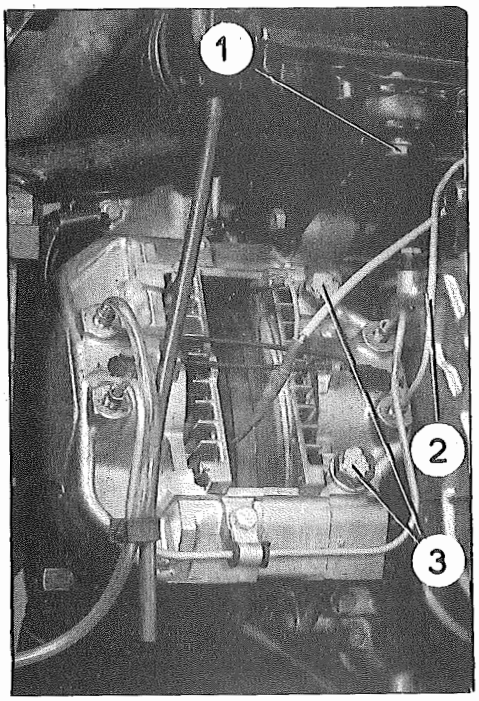
b) Offer up the gearbox, sliding it along the guides. Turn the main shaft using the starting handle dog, pushing the gearbox meanwhile to facilitate entry into the splines.

c) Insert the fixing screws for the gearbox using spanners 2431-T and 1677-T.

19. Fit:
- the front bearing for the camshaft,
- the drive pulley, inserting the adjusting washers,
- the dynamo.

20. Fit the starter motor with its heat shield.

21. Fit :
- high pressure pump (1),
- the fan (tighten the screws from 7 to 10 ft lbs (from 1 to 1.4 m.kg)),
- the connecting pipe (3) between high pressure pump and pressure regulator,
- the connecting pipe (2) between centrifugal regulator and clutch lock.



21 A. Fit the brake discs.

It is *essential* that the maximum run-out measured on the larger diameter does not exceed 0.15 mm. Proceed as indicated in Para. 42A of this Operation.

21 B. Fit :

- the mechanical brake caliper (4), left-hand,
- the control piping assembly for the clutch.

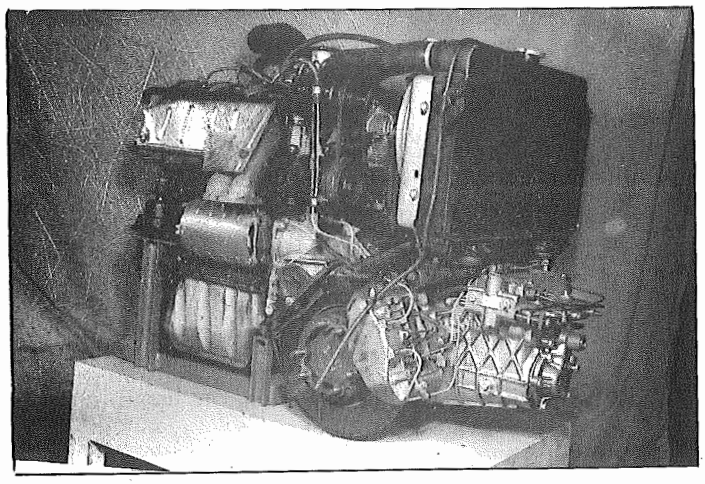
Align the pulleys. Fit and tension the belts. (See Op. DX. 231-0).

22. Fit :

- the engine crossmember together with the left-hand brake unit,
- the right-hand brake unit onto the cross-member,
- the screws (3) securing the brake units on the gearbox outlet housings. Tighten the screws to from 93 - 100 ft'lbs. (13 to 14 m.kg),
- the brake pads to the hydraulic brake units. Fit the pad-retaining spring wire clips.

23. Connect up :

- the connecting pipe (2) for the hydraulic brake units and the lead for the brake pad wear warning light.



24. Fit the radiator.

Couple up :

- the suction and delivery hoses,
- the radiator tie-rod to the radiator.

24 A. Raise the engine and secure the exhaust downpipe to the manifolds.

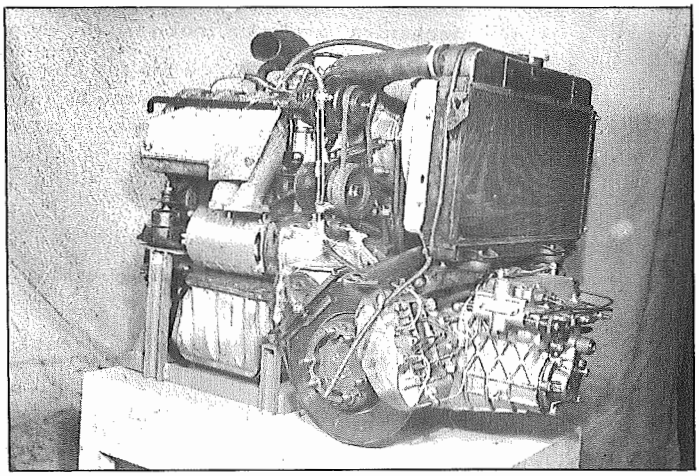
Tighten the nuts securing the manifolds on cylinder head.

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Corrective No.1

STRIPPING AND ASSEMBLING (for replacement of the gearbox).

STRIPPING.



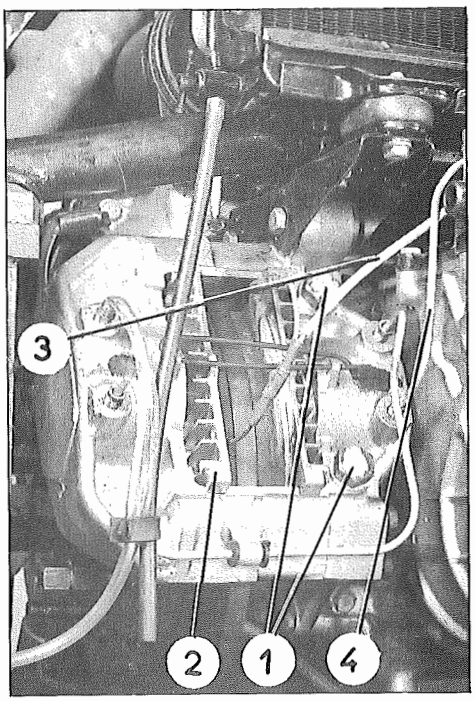
25. Remove the exhaust downpipe.

    Place the engine-gearbox assembly on stand 3083-T.

26. Disconnect :

    - the radiator tie-rod from the radiator,
    - the upper and lower hoses from the radiator.

Remove the radiator.



27. Disconnect :

    - the connecting pipe (4) between the hydraulic brake units and the lead (3) for the brake pad wear warning light.

28. Remove :

    - the pads (2) from the hydraulic brake units.

29. Remove :

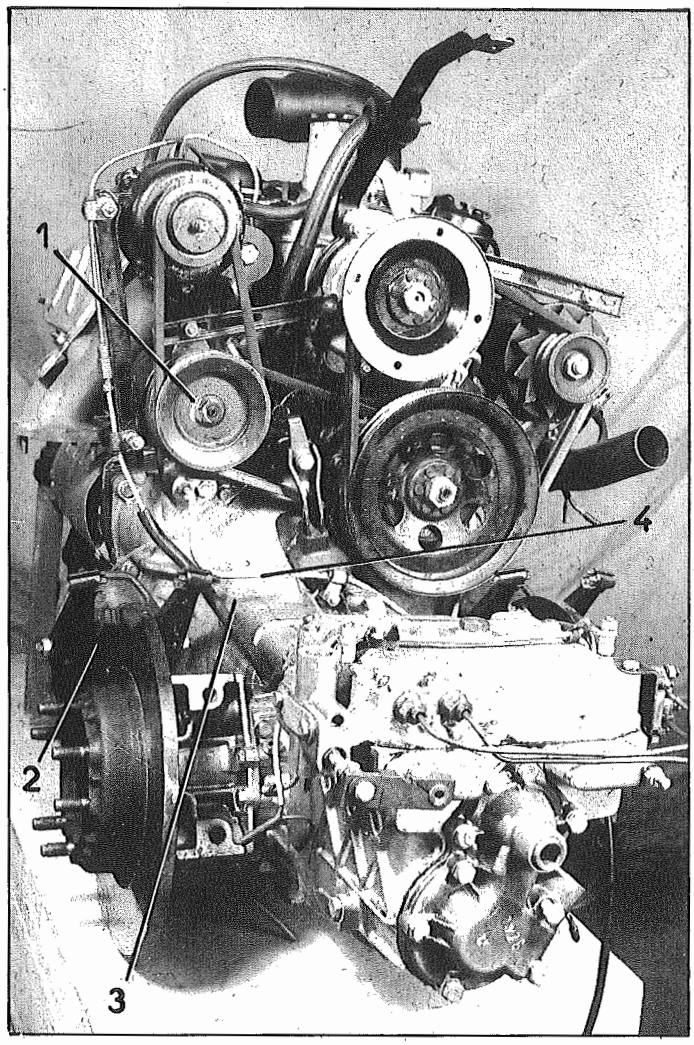
    - the connecting pipe between the right-hand hydraulic brake unit and the centrifugal regulator,
    - the screws (1) securing the units on the gearbox outlet housings.

30. Disconnect the right-hand brake unit from the crossmember and remove it.

31. Remove the crossmember together with the left-hand unit.

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32. Remove :
    - the fan,
    - the connecting pipe (4) between high pressure pump and pressure regulator,
    - the dynamo,
    - the connecting pipe (3) between centrifugal regulator and clutch lock,
    - the high pressure pump (1) (allow it to lie on the engine),
    - the belts,
    - the mechanical brake calipers (2),
    - the brake discs,
    - the drive pulley: using a chisel, remove the metal of the nut turned down into the slot in the shaft for locking purposes,
    - the washers for adjusting the pulley alignment,
    - the return spring for the clutch fork.

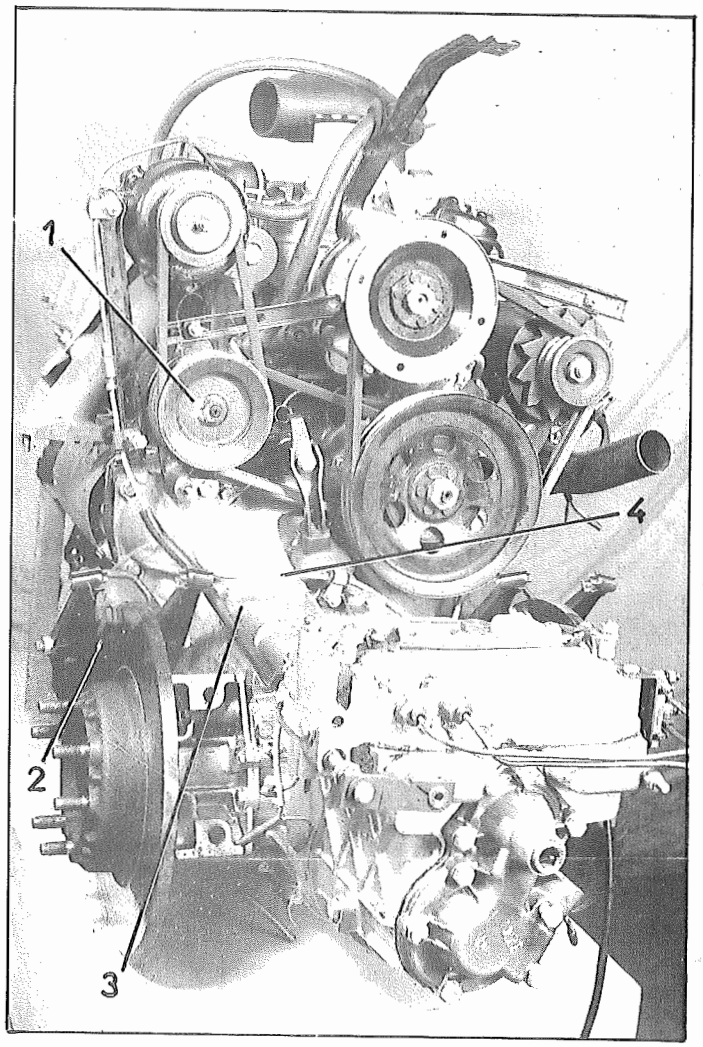
33. Disconnect the pressure delivery piping from the clutch cylinder.

34. Remove :
    - the starter motor together with its shield,
    - the bearing housing for the camshaft on the clutch housing,
    - the clutch cylinder.

35. Disconnect the gearbox from the engine: do not move the gearbox about by rolling it with its discs on the ground; place a rubber mat or a sheet of plywood in between.

    It is preferable to fit two worn discs or dummy discs 350 mm diameter: use packing washers under the nuts to ensure the discs are held tightly in position.

36. Remove :
    - the seal between clutch bellhousing and distributor drive tower,
    - the clutch lock with its control plate,
    - the piping connecting the brake units and the lead for the brake pad wear warning light.



ASSEMBLY

37. Fit :

- the seal between clutch bellhousing and distributor drive housing. Stick gasket with non-setting sealing compound,
- the clutch cylinder,
- the clutch lock with its control plate,
- the piping connecting the brake units and the lead for the brake pad wear warning light, on the gearbox.

38. Connect the gearbox to the engine :

a) Make quite sure that the dowels for centring the gearbox are correctly in place on the cylinder block.

b) Offer up the gearbox. Turn the mainshaft by the starting handle dog, pushing the gearbox meanwhile to facilitate entry into the splines.

c) Insert the securing screws for the gearbox using spanners 2431-T and 1677-T.

39. Connect the pressure feed piping to the clutch cylinder.

40. Fit :

- the bearing housing for the camshaft in the clutch bellhousing, (it is essential that the gearbox securing screws be correctly tightened),
- the starter motor with its shield,
- the return spring for the clutch fork.

41. Offer up :

- the drive pulley (do not overlook the adjusting washers). Fit the nut and tighten to 55 ft lbs. (7.5 m.kg). Lock it (knock down metal from the nut into the groove in the shaft),
- the high pressure pump (1) (fit the adjusting washer). If the gearbox casing has been replaced, check and adjust if necessary the alignment of the pulley (see Op. DX.231-0),
- the connecting pipe (4) between high pressure pump and pressure regulator.

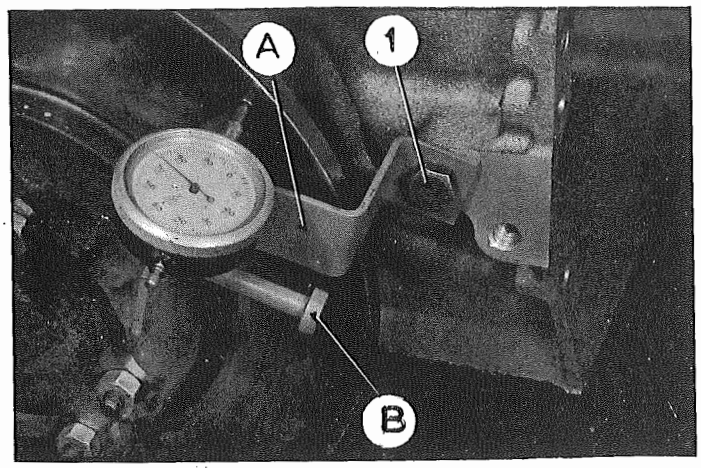
42. Fit and tension the belts (see Op. DX.231-0).

42 A. Fit the brake discs.

It is *essential* that the maximum run-out measured on the larger diameter does not exceed 0.15 mm.

a) Insert the washers and distance pieces between the nuts and the disc to ensure a good tightening of the latter on the differential shaft plate.

IMPORTANT: If there is a yellow mark on the gearbox outlet face and on the disc, they must be assembled as close to each other as possible.



b) Fit the dial gauge (2437-T) on a bracket (A) (MR. 3365-250) using the screw (B). (This screw forms part of tool set 2041-T).

Hold the bracket (A) on the clutch bell-housing by the upper securing screw of the mechanical brake caliper.

c) Position the pointer of the dial gauge on the largest diameter of the disc face. Tighten the screw (1) of the bracket (A).

d) Turn the disc. The maximum run-out shown on the dial gauge must not exceed 0.15 mm.

e) If it does, remove the disc, turn it through 1/3 of a turn in a clockwise direction, and replace it.

f) Again measure the run-out.
If it is greater than 0.15 mm remove and turn the disc another 1/3 turn still in a clockwise direction, and replace.

g) If after another reading the run-out is still greater than 0.15 mm the disc must be changed.

h) Check the run-out with the new disc, operating as indicated in paragraphs d) to f) above.

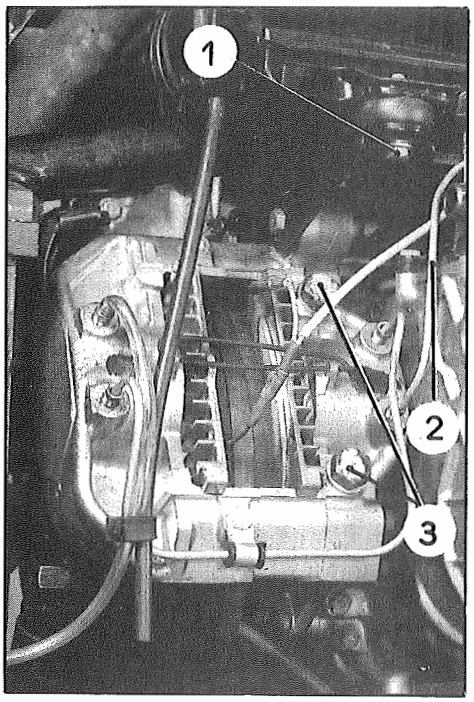
i) If, in the 3 possible positions, the run-out on the new disc is still greater than 0.15 mm it will be necessary to change the differential shaft (see Op. DX.330-4 para. 7 onwards).

43. Fit the mechanical brake units (2) (the adjustment will be carried out after fitting the assembly in the car).

44. Fit the connecting pipe (3) between centrifugal regulator and the clutch lock.

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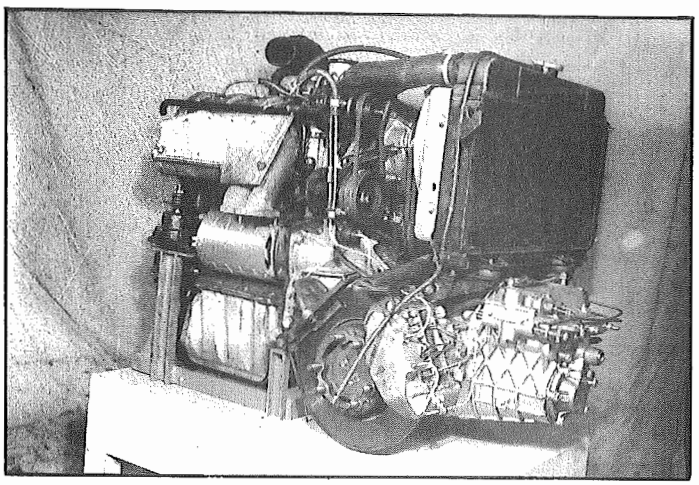


45. Fit :

- the fan. Tighten the nuts to 7-10 ft lbs. (1-1.4 m.kg),
- the engine crossmember together with the left-hand brake unit,
- the right-hand brake unit on the crossmember,
- the securing screws (3) for the brake units on the gearbox outlet housings. Screw in the screws, which will be finally tightened when the engine is fitted (Op. DX.100-1, para. 46A),
- the connecting pipe from the right-hand brake unit to the centrifugal regulator,
- the pads (4) to the hydraulic brake unit. Fit the spring wire clips.

46. Couple up:

- the connecting pipe (2) between the hydraulic brake units, and the lead for the brake pad wear warning light.



47. Fit the radiator.

Connect up :

- the upper and lower hoses,
- the radiator tie-rod to the radiator.

48. Raise the engine. Fix the exhaust downpipe to the manifolds.

DISMANTLING.

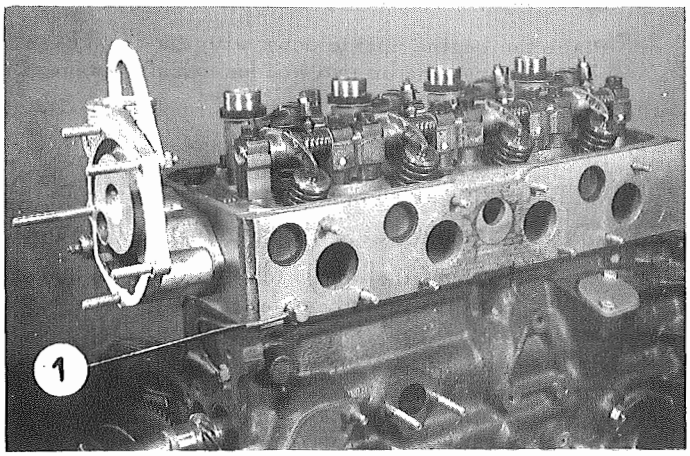
1. Drain the engine.

Mark the position of the clutch mechanism on the engine flywheel.

Remove:

- the clutch mechanism.
- the engine flywheel.

2. Remove the water pump backplate (see Op. DX. 231-1) the breather and its gasket.

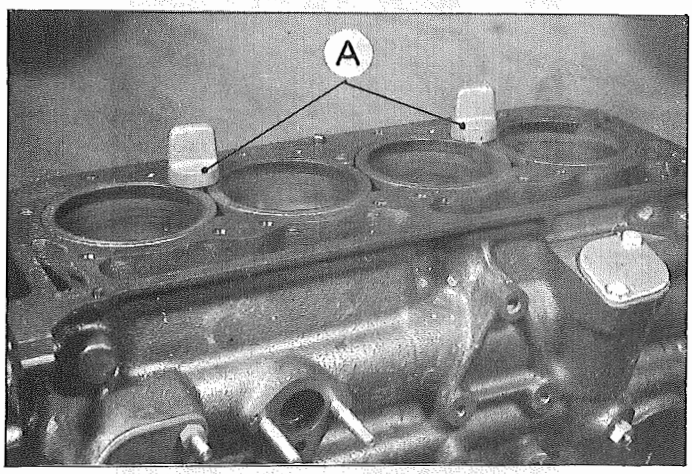


3. Remove the cylinder head.

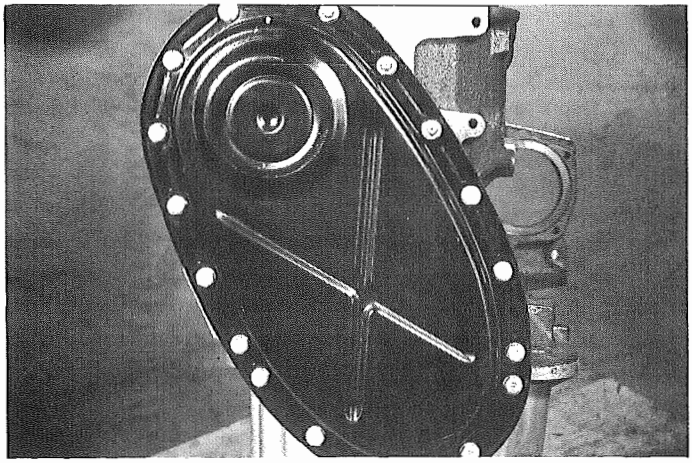
Remove :

- the lubrication pipe (1) for the valve rocker units,
- the valve rocker cover and its gasket,
- the sealing rings for the sparking plug wells and the washers,
- the exhaust rocker assemblies,
- the inlet rocker line and brackets (leave the screws in position to avoid separating the pieces),
- the cylinder head screws,
- the rocker push-rods (mark their positions),
- the cylinder head and its gasket.

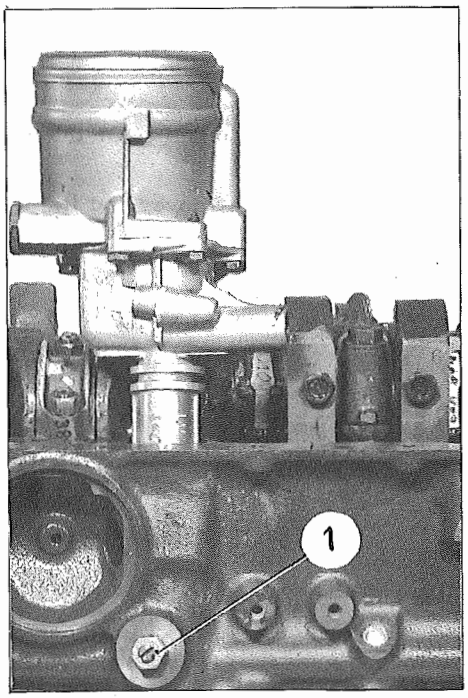
NOTE:- As the cylinder head is aluminium do not remove the studs unless they are damaged or worn.



Clamp down the cylinder barrels with securing screws (A) 3074-T.



4. Remove the timing case.



5. Remove the engine sump and oil pump.

Place the engine upside down with the crankcase top face resting on two wooden-packing pieces (about 50 mm thick).

Remove :

- the lower sump,
- the pointed screw (1) holding the oil pump,
- the securing screw for the oil pump body on No. 3 main bearing.

Free the oil pump from its housing.

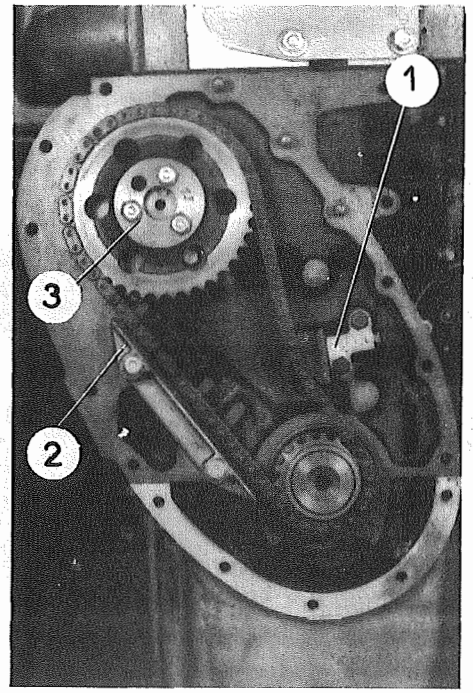
6. Remove the camshaft.

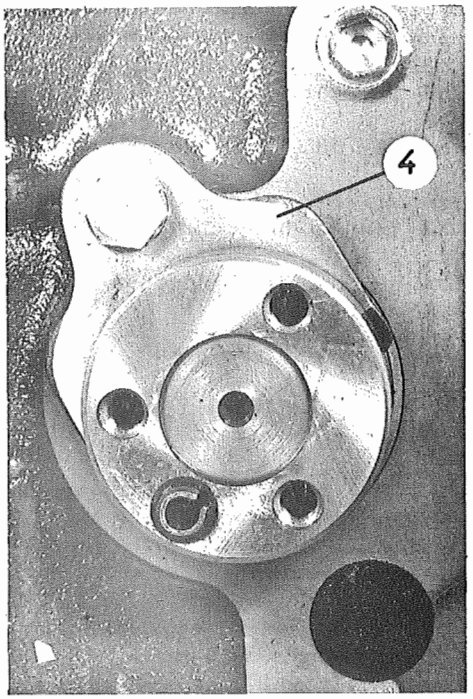
Withdraw the tappets from their housings (mark their positions).

Remove :

- the chain guide (2),
- the chain tensioner (1) (take care not to let the components fly apart).

Withdraw the camshaft pinion (3) and chain.



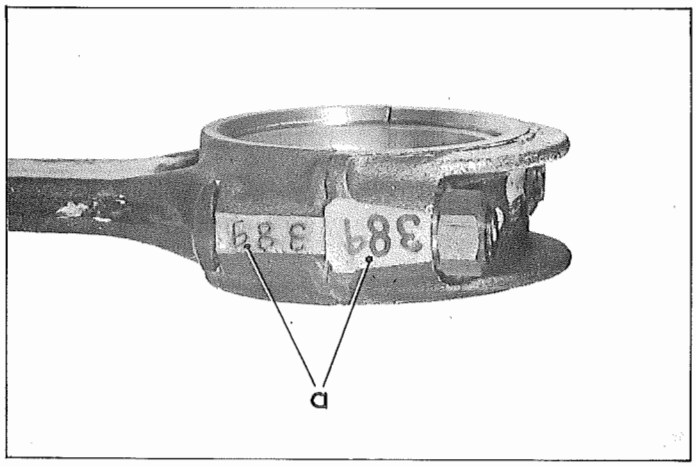


Remove :

- the securing fork (4) for the camshaft.

Withdraw the camshaft from the rear of the engine (timing-gear end).

Turn the engine over to lie on its side (camshaft uppermost).



7. Remove the assemblies of connecting rods - pistons - barrels.

NOTE:- The connecting rod and connecting rod cap are numbered at "a" (the same number on both parts). When the connecting rods are fitted to the engine this number is to be facing towards the camshaft side.

Before dismantling mark the connecting rods with a centre punch or figures, showing the order of assembly in the engine. Commence the marking with No. 1 connecting rod at the clutch end.

If the bearings or pistons and barrels are to be used again it is absolutely essential to fit them in the same place they occupied before dismantling. The barrels must be fitted so that they are in the same relative positions to the pistons as they were before dismantling.

a) Remove:-

- the connecting rod caps,
- the screws 3074-T holding the barrels in place.

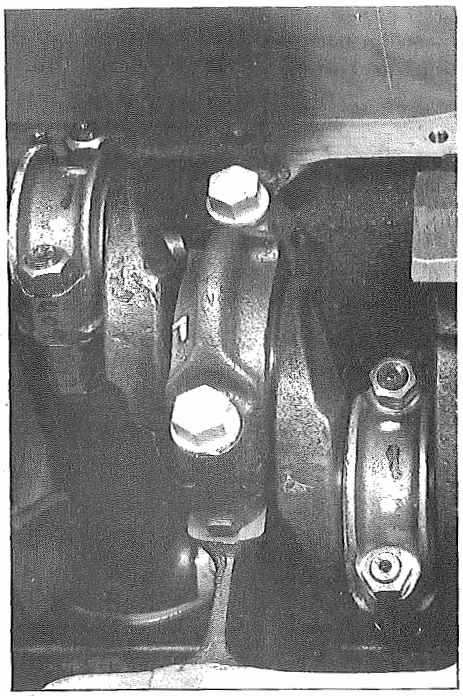
Withdraw the assemblies of connecting rods - pistons - barrels and gaskets.

Remove the bearings.

b) Remove the pistons from the connecting rods.

Extract one of the circlips holding the gudgeon pins and remove this pin by hand.

c) Remove the piston rings (using a piston ring remover).

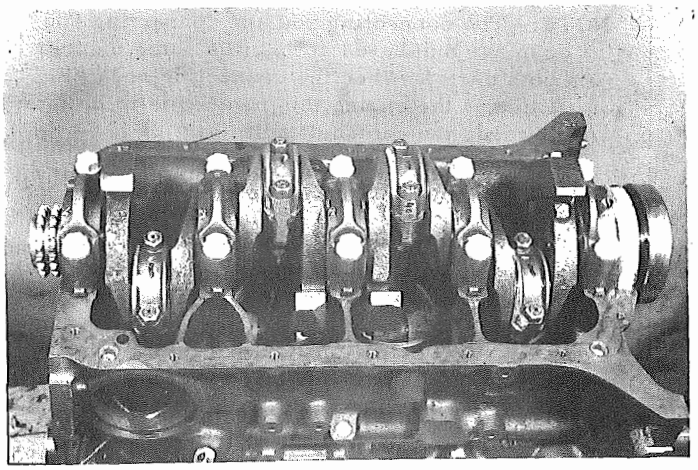


8. Remove the crankshaft.

NOTE:- The crankshaft bearing caps are marked with a figure except the bearing at the flywheel end which is not marked. A No. 4 bearing is fitted at the timing-gear end.

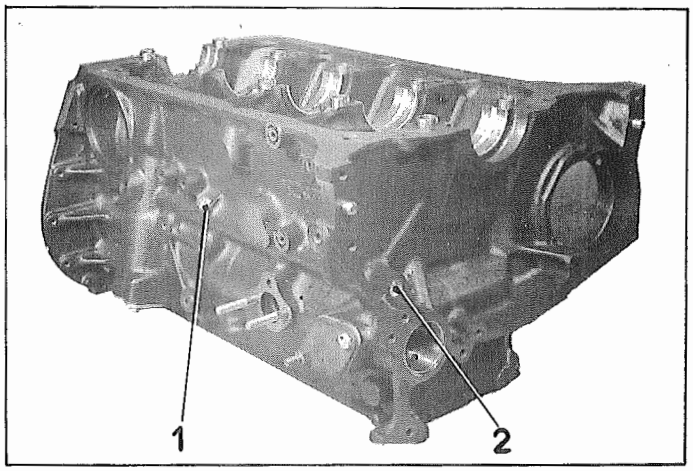
After fitting the bearing caps the figures must be facing towards the camshaft.

If the crankshaft shell-bearings are to be used again, mark them so that they can be returned to the same position they occupied before dismantling.



Remove:-

- the bearing caps,
- the bearings, and the half-thrust-rings on the central bearing No. 2,
- the crankshaft,
- the upper bearings and the other 2 half-thrust rings.



PREPARATION OF THE COMPONENTS.

9. Prepare the cylinder head.

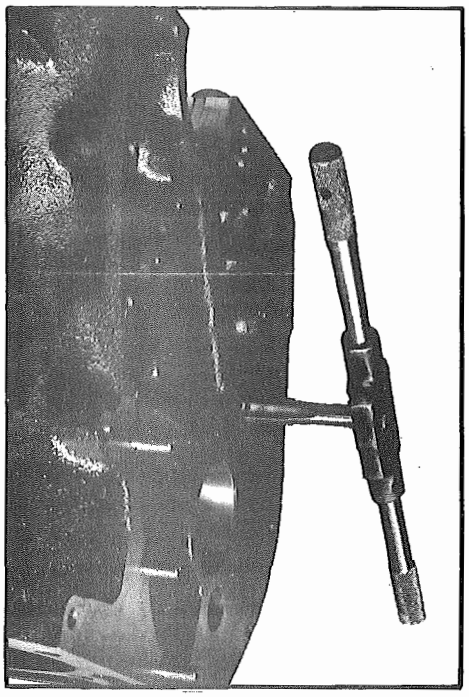
(See Op. DX.112-3).

10. Prepare the cylinder block.

a) Remove the closing plates and the drain plug.

b) Remove the 3 oil-way plugs.

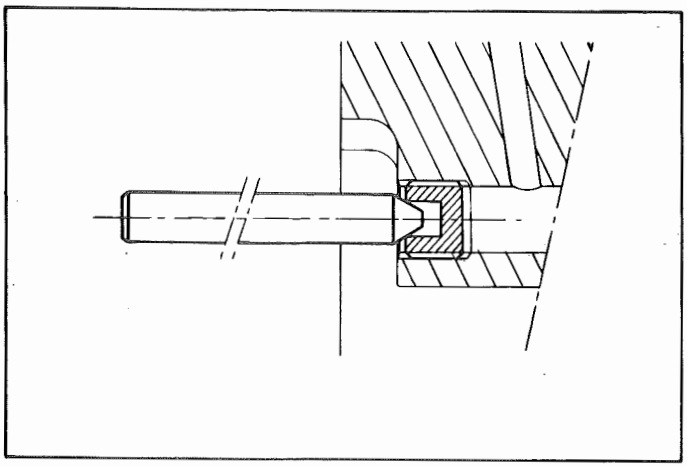
NOTE: Since December 1965 the aluminium plug (1) has been replaced by a hex. head steel plug, sealed on the face of the crankcase by a copper washer. The crankcase must be spot-faced round the plug-hole, otherwise an aluminium plug only can be fitted.



Remove the aluminium plugs (2) by drilling through them, first with a 6 mm drill, then 12 mm.

Remove the metal from the first few threads of the plugs using a scriber. Tap out 14 mm x 150, which will remove the remains of the plugs.

Carefully eliminate the swarf which may have fallen into the oil passages.



c) Clean: the cylinder block and oil passages.

d) Check the seating surfaces for the gaskets (barrels, cylinder head, sump and timing case).

e) Fit the 2 new aluminium plugs (2). (Screw them in until they are about 1 mm below the joint face).

Expand the plugs using a conical punch MR.3436-200.

Do this progressively to avoid splitting the cylinder block.

Fit the steel plug (2) with its washer, and tighten it.

f) Fit the closing plates. Fit new gaskets each time the plates are removed.

Tighten the drain plug in the cylinder block to 25 ft lbs ± 3.5 lbs (3.5 ± 0.5 m.kg).

Make sure that the dowels are in position in the cylinder block top face.

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g) Stand the cylinder block on the cylinder head joint face.

Fit the crankshaft bearings in the cylinder block and in the bearing caps, but do not fit the latter yet. Pay attention to the markings made when dismantling.

11. Prepare the crankshaft.

Clean the crankshaft and in particular the oil passages.

NOTE:-

1) If absolutely necessary, a better surface finish of the bearings may be obtained by lapping.

The maximum clearances are :-

on the crankshaft bearings: 0.06 mm.

on the connecting rod bearings: 0.06 mm.

2) We strongly advise standard exchange assemblies. These are sold by our Spare Parts Service, ready for fitting, without re-touching.

3) The crankshaft pinion cannot be replaced.

4) The crankshaft bearings may be machined to following dimensions:-

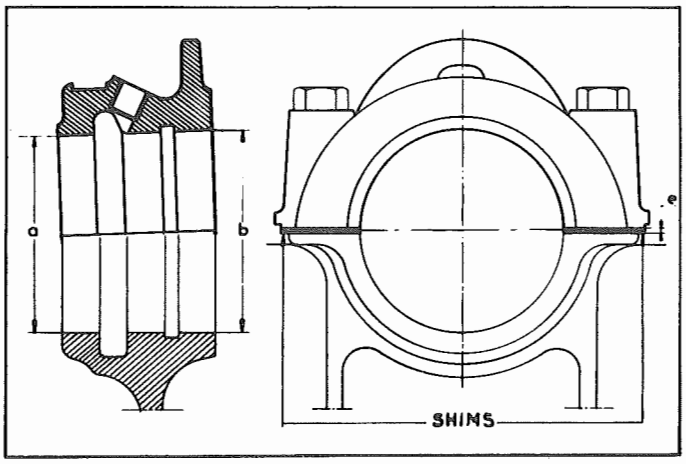
the crankshaft main bearings	:	64.04 mm dia. or 63.54 mm.
the big-end crank pins	:	54 mm dia. or 53.5 mm.

5) It is possible to replace the connecting rod and crankshaft bearings separately.

IMPORTANT:- If the bearing caps have been filed by unskilled repairers, the bores in the crankcase must be checked.

Fit the bearing caps (without the bearings) to the crankcase and tighten the screws to 72 ft lbs (10 m.kg).

Compare the diameters "a" (dial gauge) and "b". Make sure that these are identical. If not the bearing face of the cap must be filed or machined.



The difference between "a" and "b" must not be greater than 0.01 mm.

Again measure the diameter "a" and note the difference from the original size (68.7 ± 0.005 mm).

This difference represents the thickness "c" of the shims to be placed between the cap and the crankcase,

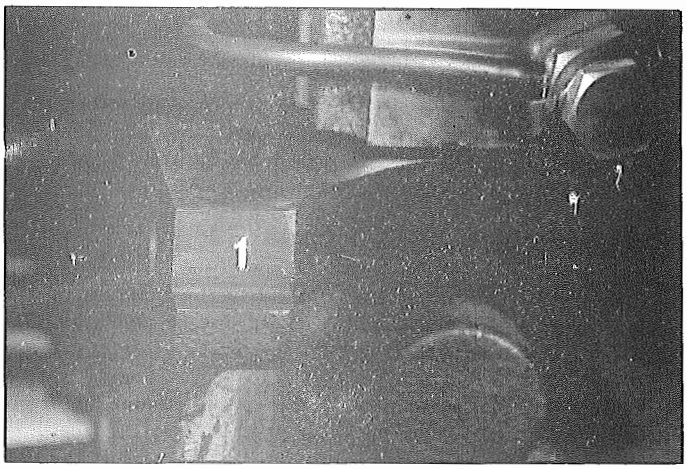
e = 68.7 ± 0.005 mm minus "a".

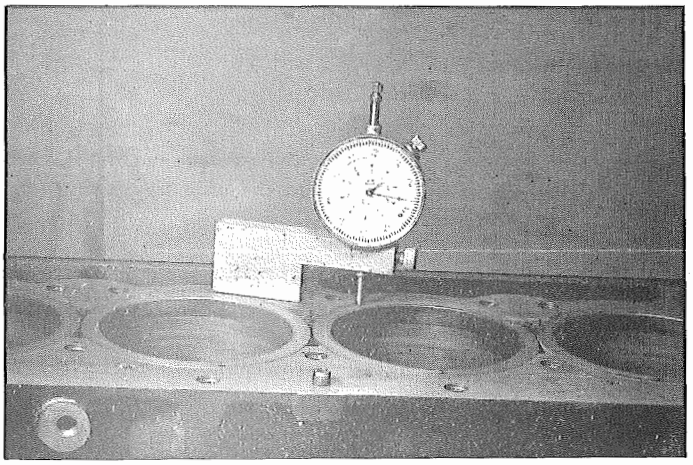
Fit the caps with the shims.

Tighten to 72 ft/lbs (10 m.kg) and measure the dimension "a". It must be equal to the original dimension, if not adjust the shims.

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12. Prepare the assemblies of connecting rods - pistons - barrels.

a) The assemblies of barrels and pistons are sold matched, as are the pistons and gudgeon pins.

- the position of the barrel in relation to the piston is not important with brand-new components,

- there are two types of barrel corresponding to two classes of cylinder blocks.

The groups are marked with a figure.

The barrels are marked:-

Class 1 : one ring,

Class 2 : two rings on the upper portion of the flange.

To avoid errors we advise checking the relationship of the barrel top face to the face of the cylinder block.

Place the barrels in position in the cylinder block (without gaskets) and measure the difference in level between the barrel top face and the face of the cylinder block using gauge 1754-T, with comparator 2437-T. The barrel top face must be from flush to 0.04 mm below the top face of the cylinder block. With the gasket in position the barrel top face must stand proud of the block face by 0.12 to 0.16 mm.

Remove the barrels from the cylinder block.

b) Prepare the connecting rods.

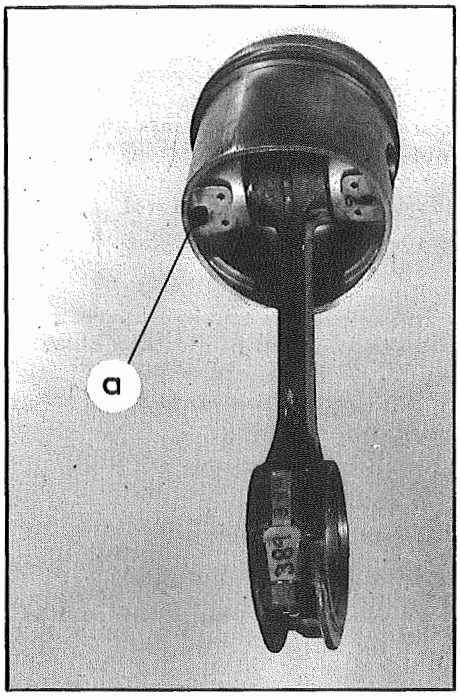
1) Small end bush.

It is not possible to replace the small end bushes. The bushes are fitted after being nitrogen-cooled and special tooling is required for reaming the bore.

2) Connecting rod bolts.

We recommend renewing these at each engine overhaul.

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c) Assemble the pistons and connecting rods.

Oil the gudgeon pin, the small end bush and the gudgeon pin bores in the piston.

Place a circlip in one of the grooves.

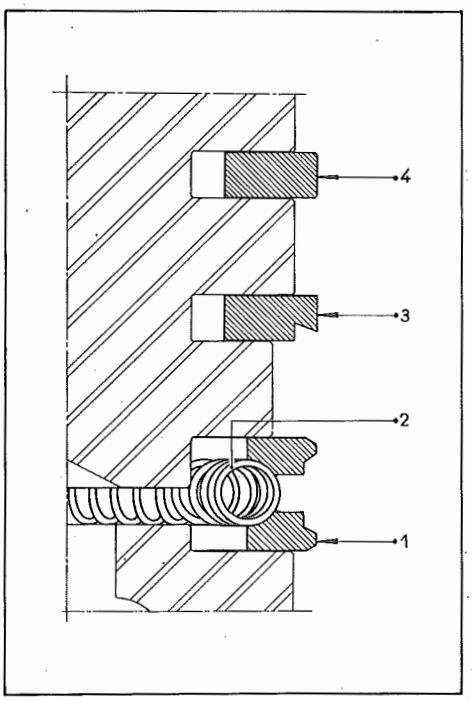
Although the pins are a push fit in the connecting rod and piston, heat the pistons to about 60°C (in an oil bath for preference).

Position the piston in relation to the connecting rod.

Arrange the projection marked "a" on one of the gudgeon-pin bosses, in relation to the matching number on the connecting rod, as illustrated.

Fit the gudgeon pin so that the two etched marks on the end of the pin are on the side opposite the boss marked "a".

Fit the second gudgeon pin circlip.



13. Fit the piston-rings.

a) Fit the rings using piston-ring pliers.

Fit them in the following order:

1) The oil ring with groove (1).

Place in position :-

- the expander (2) by hand.
- the oil ring with the aid of piston ring pliers (the gaps in these two parts must be at 180° to each other).

2) The scraper ring (3)

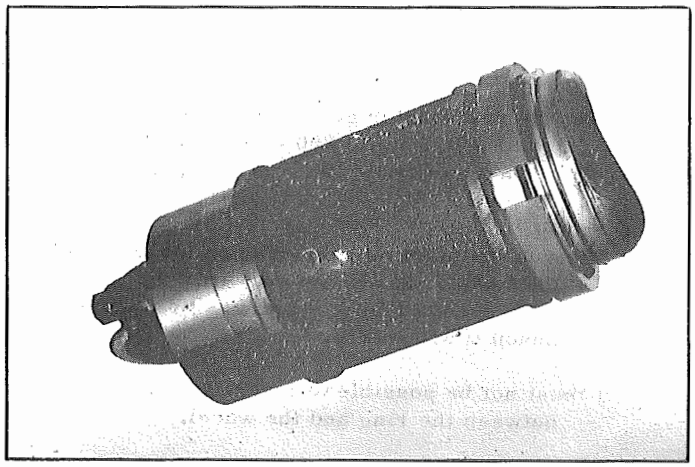
This is tapered and carries an oil scraper groove which must always face towards the piston skirt when the ring is fitted.

3) The compression ring (4).
This is chromed and has two small outer chamfers.
Fit the ring so that the mark "TOP" and the inner chamfer are towards the top.

4) Arrange the gaps in the piston rings.

a) Compression ring.
The gap towards the number on the big end of the connecting rod.

b) Scraper and oil rings:
Gaps at 120° from the gap in the first ring.



14. Fit the pistons in the barrels.

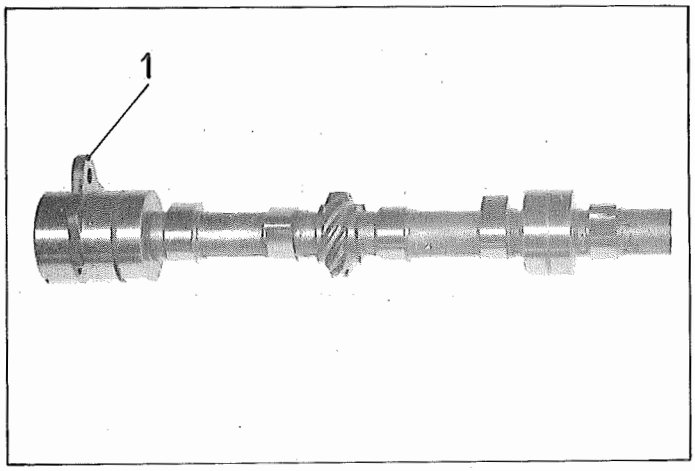
Oil the pistons and the barrels.

Fit the bush 3072-T over the rings (bringing it up from the skirt of the piston, the interior chamfer in the bush towards the top of the piston).

Place the pistons in the liners.

NOTE:- If necessary, assemble the pistons and liners in accordance with the marks made when dismantling.

VERY IMPORTANT:- The entry of the oil ring in the bush requires considerable force which must be reduced when the ring begins to slide into the bush, so as to avoid breaking the scraper ring by striking it with the edge of the bush.



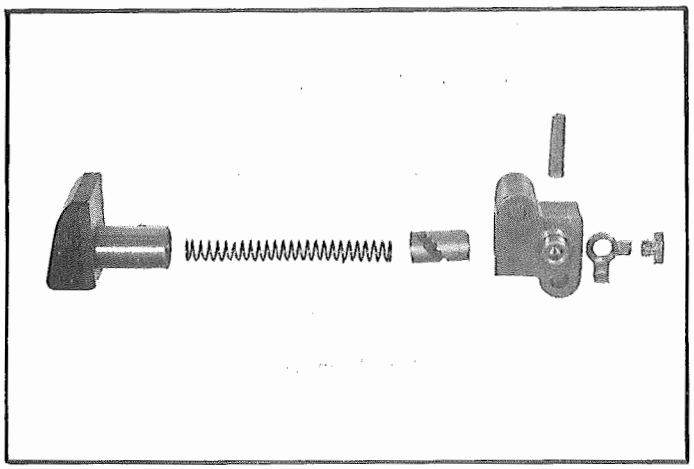
15. Prepare the camshaft.

a) The end-float on the camshaft must lie between 0.05 and 0.07 mm.

Engage the clamp fork (1) in the groove in the camshaft.

Measure, with feeler gauges, the existing clearance. If it is greater than 0.09 mm, select among the other clamp forks sold by our Spare Parts Department, the part which will give the required clearance.

b) Make sure that the camshaft pinion dowel is in position.



16. Prepare the timing gear.

a) Check the condition of the chain guide and tensioner.

b) We advise systematic replacement of the timing chain.

c) Check the joint face of the timing case and if need be dress it with a hide mallet.

17. Prepare the distributor drive tower.

(See Op. DX.211-6).

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18. Prepare the sump.

Remove the inspection plate and clean the sump and the plate.

19. Prepare the flywheel.

a) Replacing a starter gear-ring.

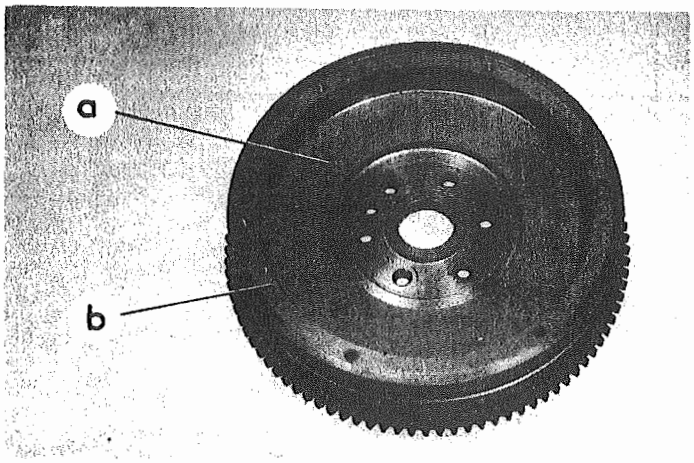
Drive off the starter ring with a hammer punch.

Heat the new starter gear-ring with a blow torch fitted with a jet of 800 - 1000 l., to a temperature of from 200 - 250°C (pale straw colour).

Offer up the starting gear-ring on the flywheel, the tooth-chamfer side towards the rear of the flywheel, and fit it rapidly using a hammer and punch if necessary.

It must not be possible to insert a feeler of 0.05 mm between the ring and the wheel.

b) Grind the seating face of the clutch disc on the flywheel.



1) Remove the circlip and the bearing which centres the gearbox main-shaft.

2) Regrind if necessary, removing the same amount from the seating face "a" of the disc and the seating face "b" of the clutch mechanism.

The distance between the 2 ground faces must be

$$29 \begin{smallmatrix} +0.2 \\ 0 \end{smallmatrix}$$

The amount of metal removed by grinding must not exceed 0.3 to 0.5 mm.

20. Prepare the clutch mechanism.

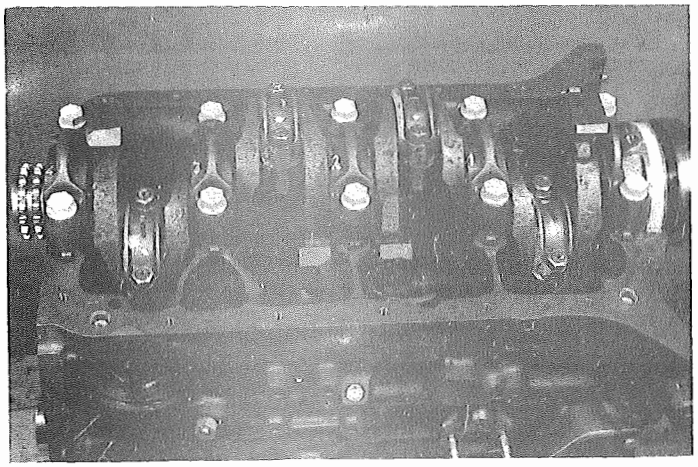
(see Op. DX.312-3).

21. Prepare the water pump.

(see Op. DX.231-3).

22. Check the oil pump.

(see Op. DX.220-0).



ASSEMBLY.

REMARKS :

1) The bearing caps are marked with a figure except the bearing at the flywheel end which is not marked. No. 4 bearing is fitted at the timing end. After fitting the bearings, the figures must be towards the camshaft.

2) If the crankshaft main bearings are to be used again, they must be fitted according to the markings made when dismantling.

23. Adjusting the end-float of the crankshaft.

REMARKS:

1) The end-float is adjusted by means of half-rings (1 and 2) placed on each side of the central main bearing.

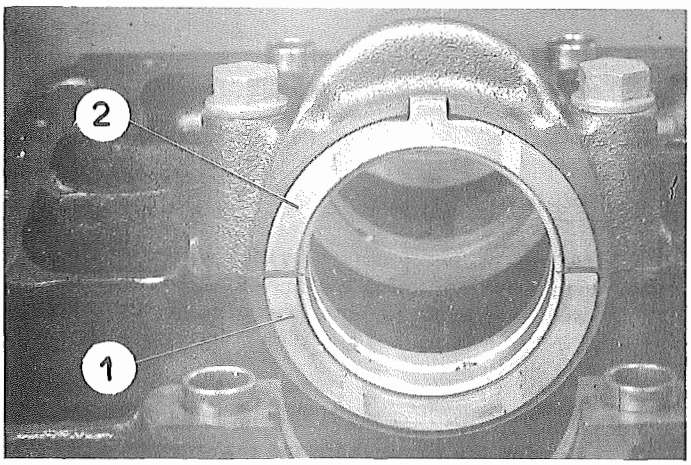
2) The half-rings fitted in the bearing caps have a locating lug.

3) There are two classes of rings (marked I and II on the steel face).

Rings class I	thickness 3.10 to 3.14 mm.
Rings class II	thickness 3.14 to 3.18 mm.

The two half-rings placed on the same side of the bearing must both be of the same thickness.

The half-rings placed on one side of the bearing may be of a different thickness from those placed on the other side.



4) Place the half-rings so that the faces covered with anti-friction metal are in contact with the crankshaft.

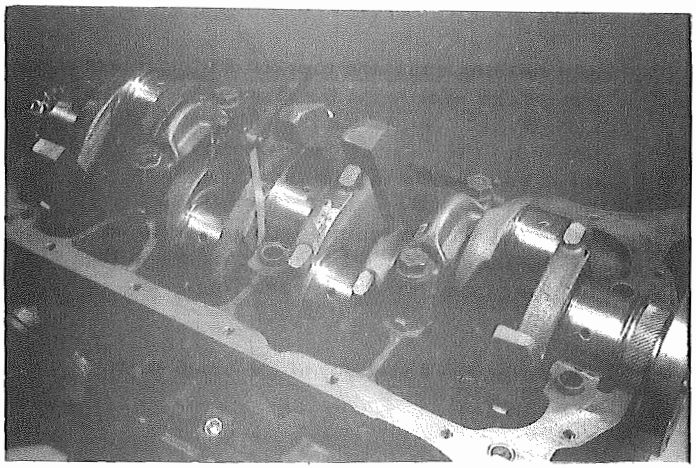
a) Oil the bearings. Place a half-ring class I on each side of the bearing.

b) Put the crankshaft in position.

Fit the two intermediate bearing caps (No. 1 and No. 3).

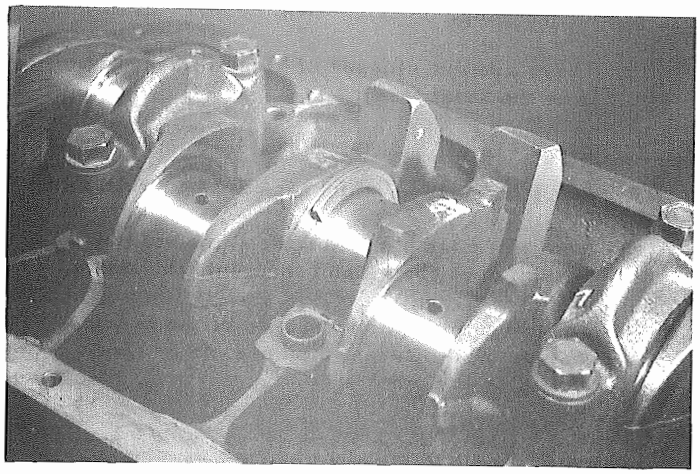
Tighten the screws to 36 ft/lbs (5 m.kg).

c) Push the crankshaft as far as possible towards the timing gear, turning it meanwhile (hold the two half-rings in position).



d) Using a feeler gauge, measure the clearance (j). It must lie between 0.045 mm and 0.16 mm.

If it is greater replace one of the rings or both the rings by rings of class II.



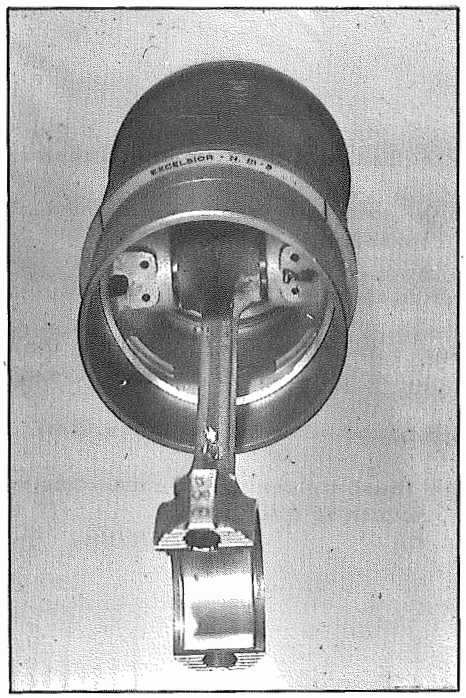
NOTE:- To replace them, push them round the crankshaft journal without removing the crankshaft.

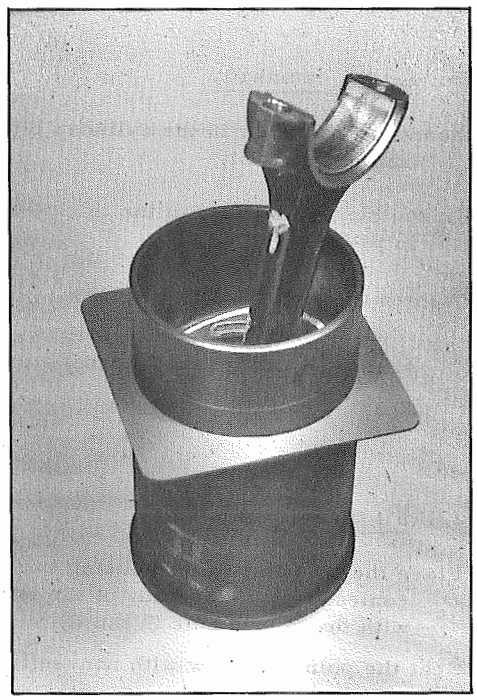
24. Fit the crankshaft.

Fit the cap of the central bearing, with its half-rings for adjusting the end-float and the two end bearings. Tighten the fixing screws to 36 ft/lbs (5 m.kg) and then finally to 72 ft/lbs (10 m.kg).

Make quite sure that there are no hard spots when turning the crankshaft and that the end float remains unchanged.

Place the engine on its side with the camshaft uppermost.





REMARK:- If the assemblies of connecting rods - pistons - barrels and connecting rod bearings are to be used again, they must be assembled in accordance with the markings made when dismantling.

c) From the top of the cylinder block introduce a connecting rod - piston - barrel assembly, with the piston at T.D.C. in the barrel.

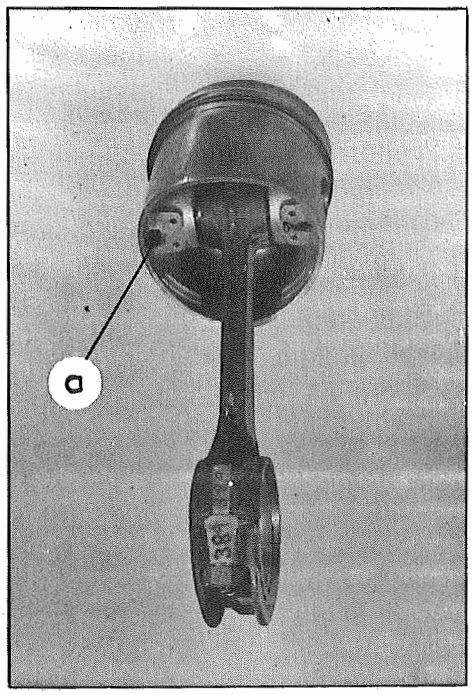
NOTE:- The projection "a" cast on one of the gudgeon pin bosses, must be towards the engine flywheel, with the connecting rod number facing towards the camshaft.

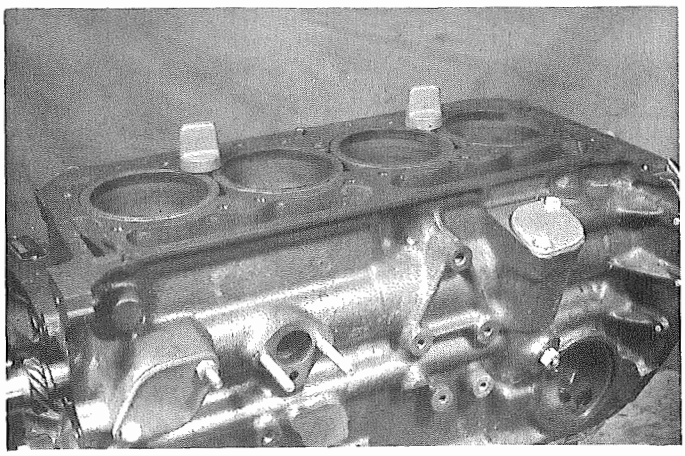
25. Fit the assemblies of connecting rods - pistons - barrels.

a) Offer up the paper gasket on the cylinder barrel, the black lines which outline the positions of the extra thickness, parallel to the end faces of the big end and the extra thicknesses (the part with brown paper) in contact with the shoulder of the barrel.

b) By hand work the joint onto the cylinder barrel as far as the first shoulder.

Then complete the fitting by using punch plate MR.4134.





Fit the bearings in place and oil them.

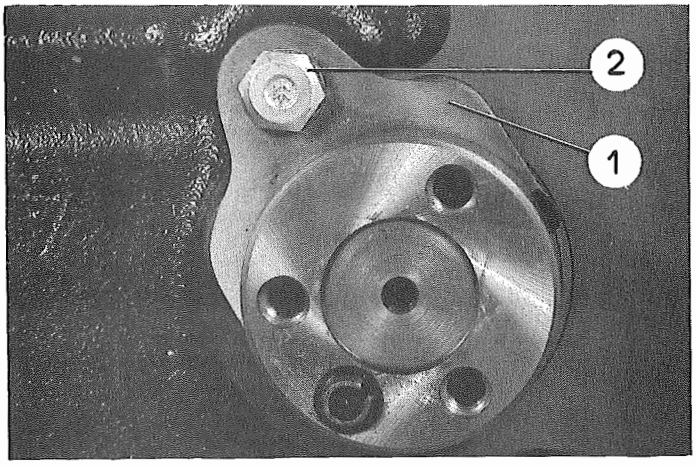
Fit the connecting rod to the crankshaft and fit the connecting rod cap.

Tighten the nuts lightly.

Insert a second assembly, holding the 2 barrels in place by means of a screw 3074-T.

Then fit the other 2 assemblies.

Then finish tightening the connecting rod big end nuts to 50 ft/lbs $^{+\ 3.5}_{-1.75}$ ft/lbs, ($7\ ^{+\ 0.50}_{-\ 0.25}$ m.kg)



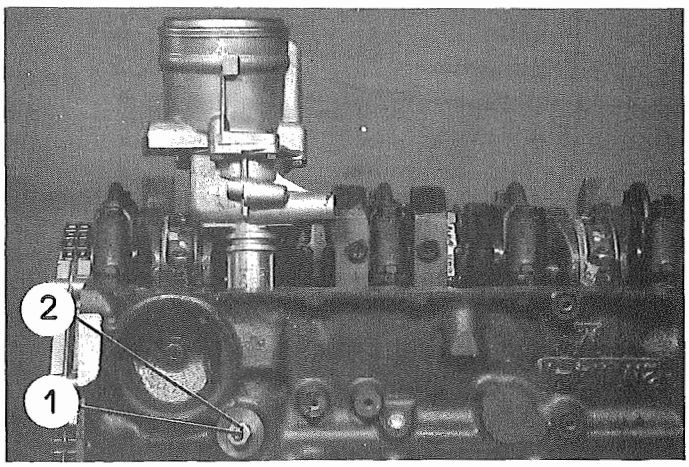
26. Fit the camshaft.

Insert the camshaft in the cylinder block from the timing case end.

Fit the clamp fork (1), of the thickness determined in paragraph 15.

Tighten the screw (2) to 12 ft lbs $^{+\ 1.4}_{-\ 2.1}$ ft lbs

($1.7\ ^{+\ 0.2}_{-\ 0.3}$ m.kg) (shakeproof washer under the head.



27. Fit the oil pump.

Place the oil pump in its housing taking care that the conical hole in the body of the pump is in line with the tapped hole in the cylinder block.

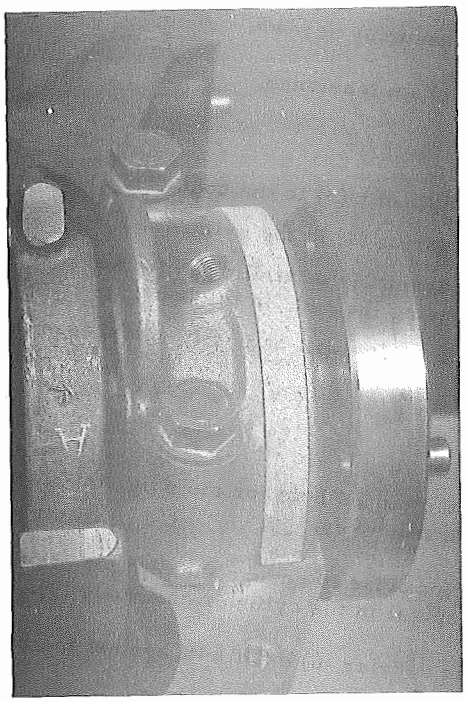
Coat the pointed screw with non-setting sealing compound and fit it.

Tighten the pointed screw (1) to 4 ft lbs $\pm$ .75 lbs (0.6 ± 0.1 m.kg).

Apply non-setting sealing compound to the bearing face of the locknut.

Tighten the locknut (2).

Tighten to 25 ft lbs $\pm$ 3.5 ft lbs (3.5 ± 0.5 m.kg) the screw securing the pump lug on No.3 bearing.



28. Fit the sump.

Place the cork gasket in the groove of the bearing cap at the flywheel end (the ends smeared with hermetic compound between gasket and bearing cap).

Smear with hermetic compound the two faces of the sump which meet the cylinder block.

Offer up the sump.

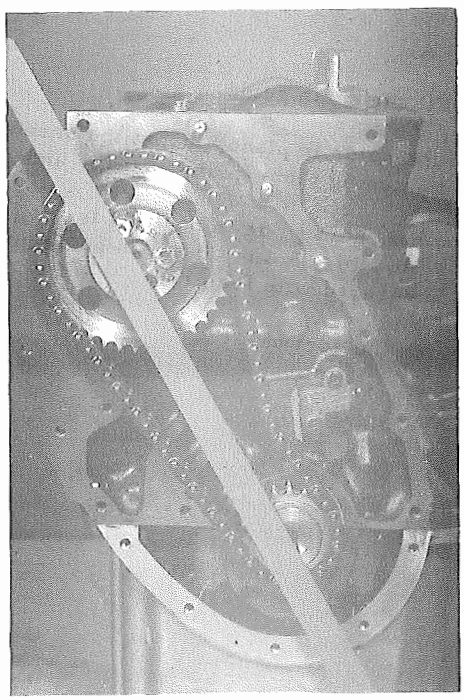
Place in position a long screw to the left-hand side of the bearing (timing gear end), and 2 long screws on the right-hand side of the engine (2nd and 3rd screws counting from the timing-end bearing.

Tighten all the screws to 12 ft lbs $^{+\ 1\frac{1}{2}}_{-\ 2}$ ($1.7\ ^{+\ 0.2}_{-\ 0.3}$ m.kg).

Grease the face of the paper joint for the inspection cover which comes in contact with the sump, and smear hermetic compound on the other face.

Fit the inspection cover and tighten the screws to 7 ft/lbs $^{+\ 1.5}_{-\ 0.75}$ ft/lbs ($1\ ^{+\ 0.2}_{-\ 0.1}$ m.kg)

Tighten the drain plug (new gasket) to 21 ft/lbs $\pm$ 3.5 ft/lbs (3 $\pm$ 0.5 m.kg).



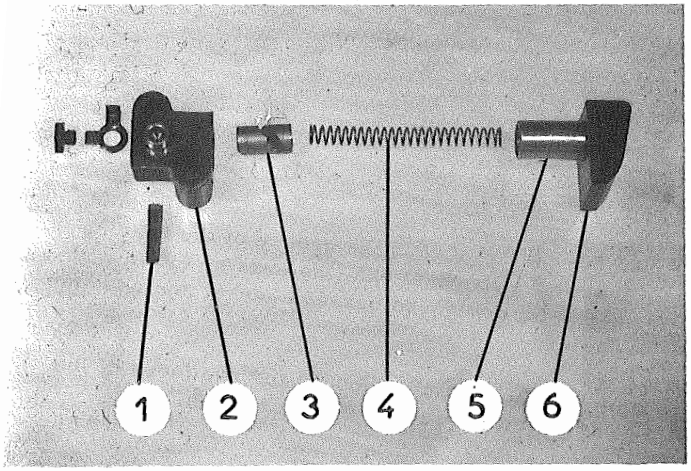
29. Turn the engine over, allowing it to rest on the sump.

30. Fit the timing gear.

Bring the pistons of cylinders Nos. 1 and 4 to about T.D.C.

a) Place the timing chain on the crankshaft pinion, then the camshaft pinion in the chain.

Position the pinions so that the taut side of the chain is on the side farther from the tensioner, and so that a straight edge passing through the centres of the two pinions passes also through the mark (centre punch on one tooth) on the camshaft pinion and through the mark (etched electrically between two teeth) of the crank-shaft pinion. The marks should face each other.



Turn the camshaft until the centring dowel and the tapped holes are in line with the holes drilled in the pinion.

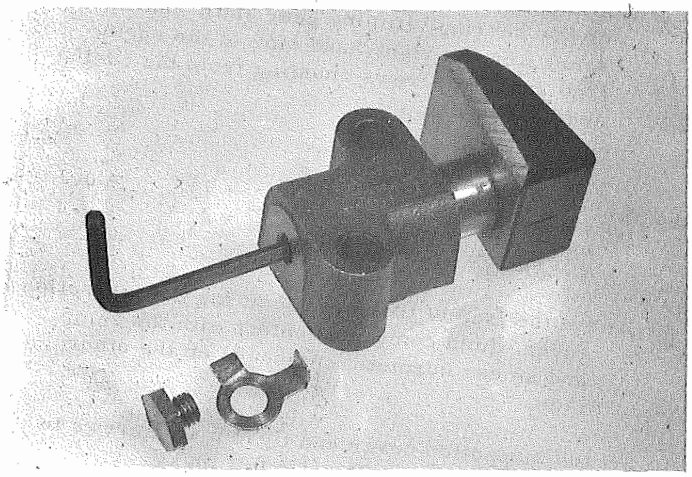
Tighten the securing screws.

b) Fit the chain tensioner.

Insert:

- the cylinder (3) in the body (2),
- the spring (4) in the cylinder,
- the assembly of slider pad (6) and plunger (5) carrying the pad, in the body.

(The spring will be partly compressed).



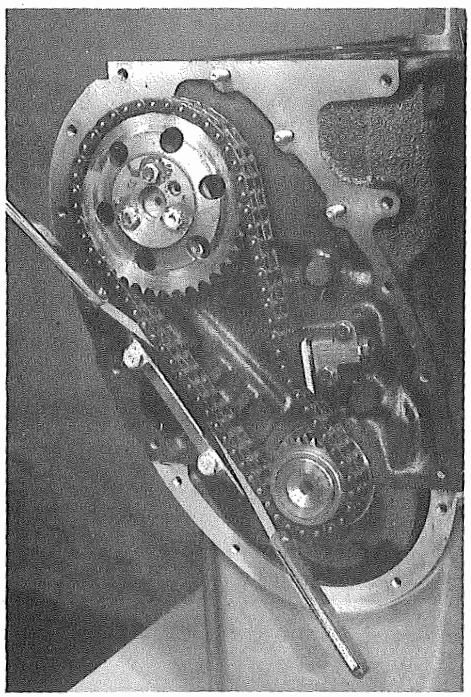
Through the tapped hole for the plug, insert a 3 mm Allen key.

Turn it clockwise to engage the plunger pin (5) in the spiral in the cylinder assembly (3).

The slide carrier (6) must butt against the body (2).

Without moving any parts insert the filter (1) in the crankcase. Fix the tensioner on the crankcase and tighten the screw to 12 ft/lbs (1.7 m.kg).

Tighten the screwed plug inserting a lockwasher. Turn over the lockwasher tabs.

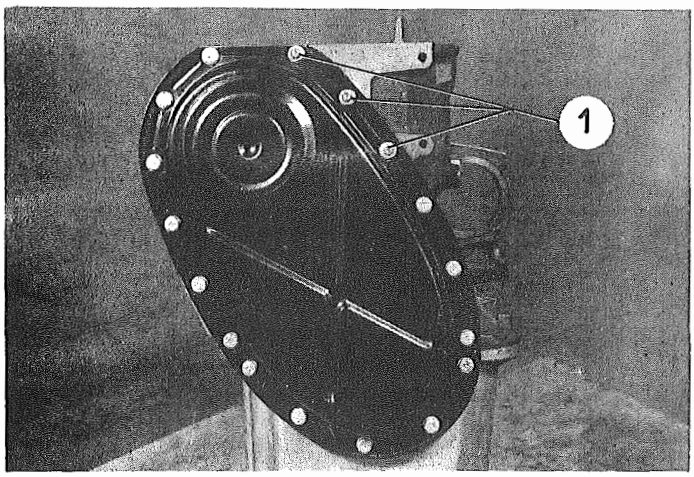


c) Fit the chain guide.

With the guide in place, insert the screws without tightening them (plain washers under the heads).

Move the chain guide in position leaving a clearance of 0.1 to 0.5 mm, between guide and chain, measured with feelers.

Tighten the screws.



31. Fit the timing cover.

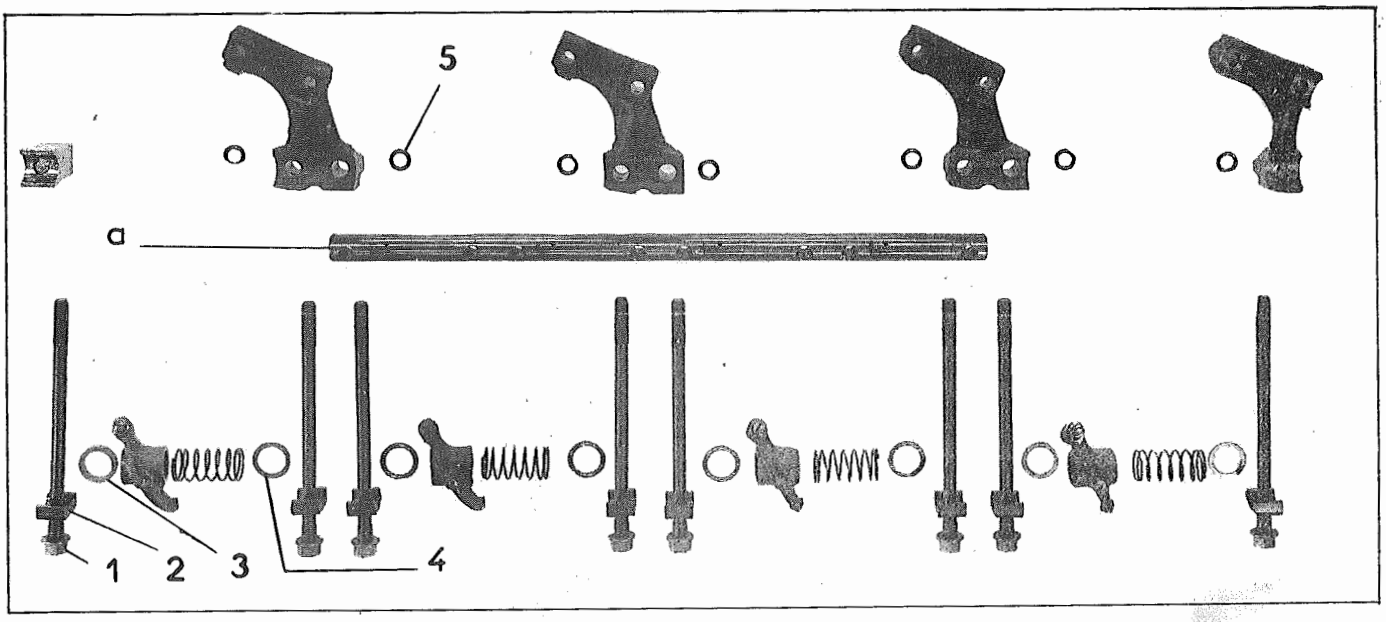
Smear hermetic compound on the face of the cover and stick the gasket to the cover. Smear the other face of the gasket with grease.

Fasten the cover with the three nuts (1) (distance pieces under the nuts) and the screws (plain washers under the heads).

Tighten to 12 ft/lbs $^{+\ 0.75\ \text{lbs}}_{-\ 2\ \text{lbs}}$ (1.7 $^{+\ 0.1}_{-\ 0.3}$ m.kg).

32. Oil the tappets.

Replace them according to the marks made when dismantling.



33. Fit the cylinder head.

a) Make sure that the dowel pins are in position in the cylinder block top face.

Put the cylinder head gasket in position.

Offer up the cylinder head on the block.

Insert the push-rods (according to the markings made when dismantling). The exhaust valve push-rods are the longer.

b) Prepare the inlet rocker valve line.

The oil hole (a) nearest to the end of the line indicates the front end.

Commence the assembly from this end.

On the spindle place the following parts (previously lubricated and with the oil holes facing downwards and towards the valve).

1 long screw (1) with its cap (2).

The thick washer (3).

1 rocker (see photo for position).

1 spring.

1 thin washer (4).

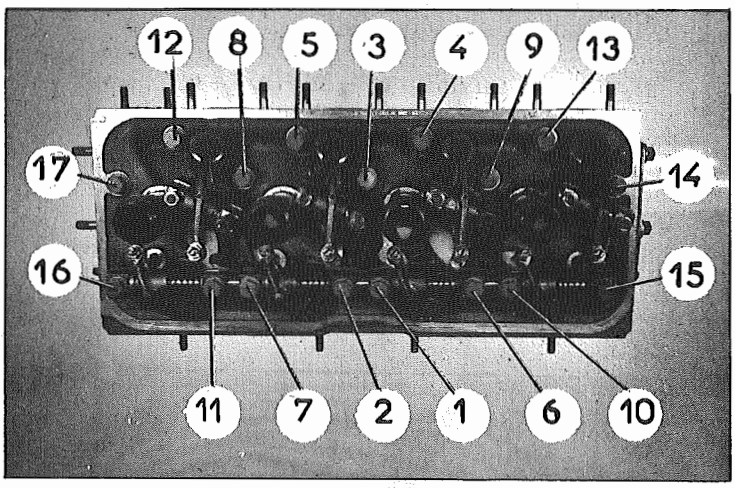
1 long screw with cap.

Continue assembly in the same order. The thick washer (3) is replaced by a thin washer (4) for the other rockers.

Place the rocker unit brackets on the long screws. Position the brackets as shown on the photograph.

The front support has a chamfer which must face towards the push-rod to allow it to be fitted.

Place a ring seal (5) over each screw except No. 1, in the grooves in the brackets. (The oil feed to the rocker shaft is through the hole round No. 1 screw).



Place the rocker assembly on the cylinder head.

Tighten the fixing screws of the cylinder head and the rocker assembly to 29 ft/lbs (4 m.kg) in the order indicated.

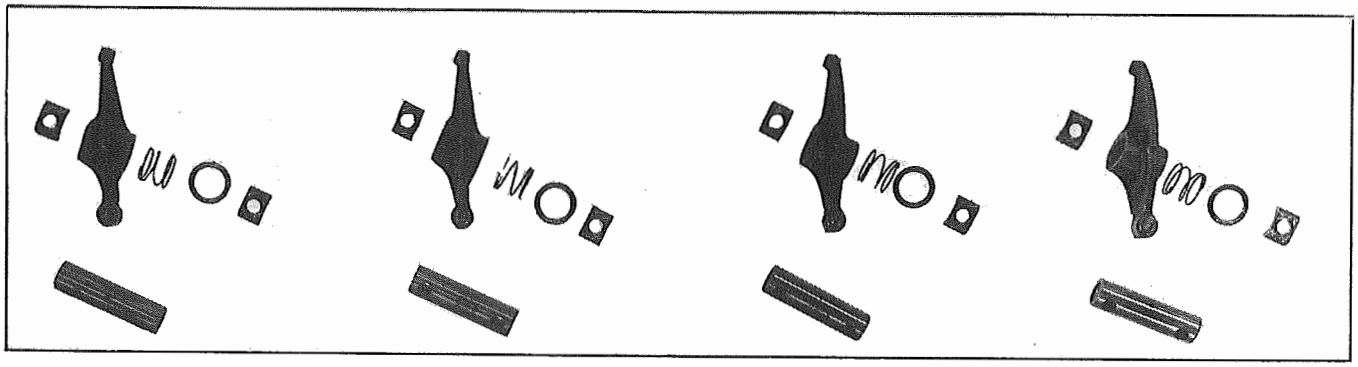
c) Fit the exhaust rockers.

Commencing at the front, place the following parts on each spindle (the oil holes towards the bottom):

One rocker

One spring

One washer.



Place each assembly on its support.

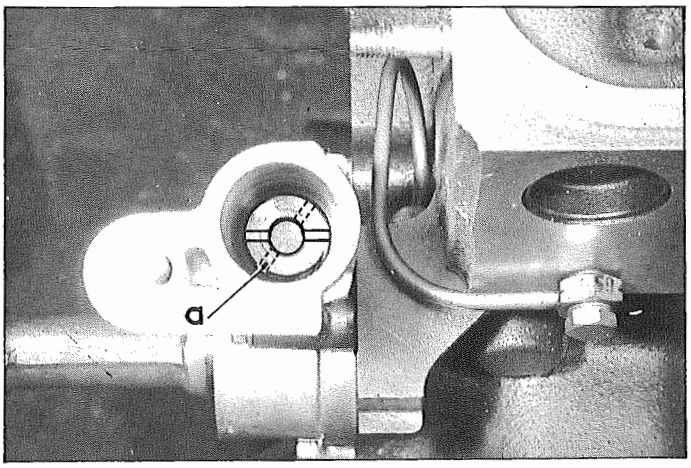
Fit the caps holding the spindle and the screws.

NOTE:- The rear securing screws for the exhaust rockers of cylinders Nos. 1 and 3 are replaced by screws with long heads, recessed and tapped to receive the screws fixing the rocker cover.

d) Give a final tightening to the cylinder head screws in the order indicated, to 43 ft/lbs $+3\frac{1}{2}$ -0 ($6\ ^{+0.5}_{-0}$ m.kg) and the screws holding the rocker assemblies to 18 ft/lbs $\pm$ 2 (2.5 ± 0.3 m.kg).

34. Adjusting the rocker clearances.

The clearance must be .008 in. (.20 mm) for the inlet and 0.010 in. (0.25 mm) for the exhaust. Adjust the valves for each cylinder, with the piston at T.D.C. at the end of the compression stroke.



35. Fit the distributor drive tower.

Bring No. 1 piston to T.D.C., end of compression.

Place a gasket, smeared with grease, on the distributor drive.

Grease the lips of the seal (1).

Offer up the distributor drive.

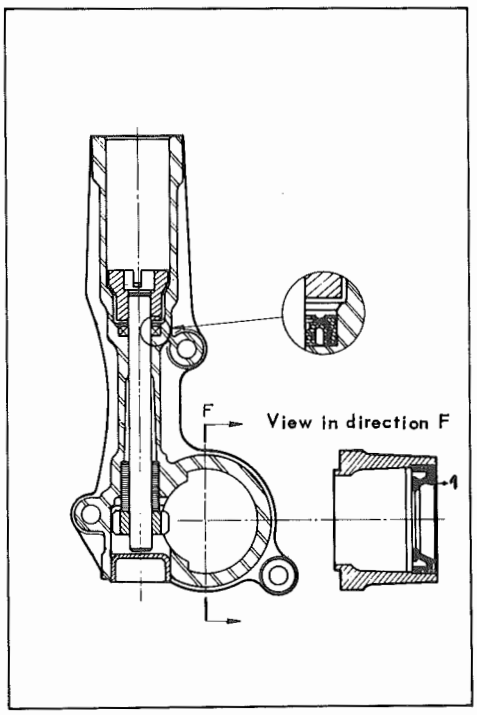
Before engaging the pinion, the offset driving slot "a" must be facing forwards at 45° to the camshaft, with the offset towards the engine.

After engaging the pinion and securing the drive on the crankcase (2 long screws in the upper part, 1 short in the lower part, plain washers under screw heads), the drive slot should be parallel to the centreline of the camshaft and the small side of the sleeve must still always be towards the engine.

36. Fit the engine flywheel.

Offer up the flywheel on the crankshaft. Tighten the screws to between 42 and 47 ft lbs (5.9 to 6.5 m.kg).

Fit a new bearing in the flywheel. Insert the circlip.



37. Fit the clutch mechanism.

Ensure that the seating faces of the disc on the flywheel and on the pressure plate are thoroughly clean.

Offer up the disc and engage in the centre a gearbox mainshaft or a mandrel MR.3676-350 to ensure concentricity with the flywheel bearing.

NOTE: There are 12 drilled holes in the clutch casing. For assembly only 6 holes are used. The clutch mechanism must be fitted so that 3 of its screws are in line with the toggles.

Fit the clutch mechanism according to the marks made when dismantling. Tighten the screws to 18 ft lbs $^{+2}_{-3}$ (2.5 $^{+0.3}_{-0.4}$ m.kg) (shakeproof washers under the heads).

During tightening make sure that the shaft slides freely.

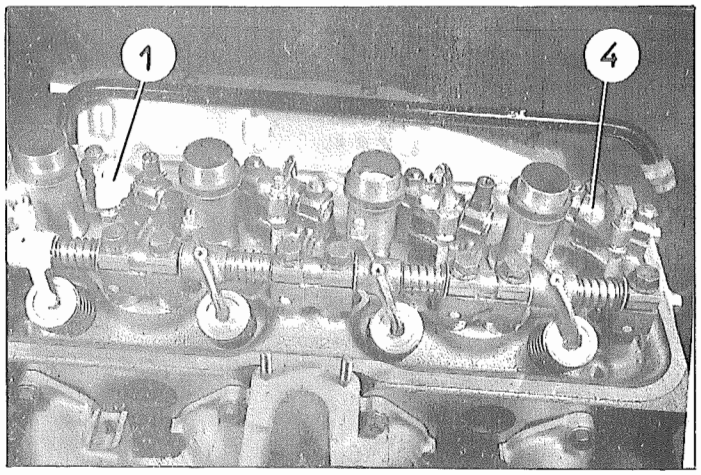
38. Fit the rocker unit cover.

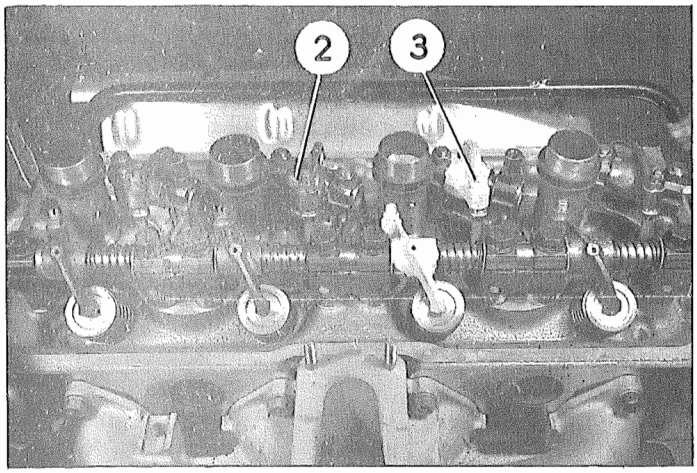
Insert the rubber gasket under the rocker cover.

Fit the rocker cover and tighten the screws (brass washers under the heads) to about $5\frac{1}{2}$ ft lbs (0.75 m.kg).

June 1966.

Corrective No.1





ADJUSTMENT.

1. Remove the air filter (see Op. DX.171-1, paragraph 1 to 3).

2. Remove the cylinder head cover :
   - disconnect the leads from the sparking plugs,
   - remove the cylinder head cover with its gasket (do not lose the seals for the sparking plug wells).

3. Adjust the clearances of the valve rockers (hot) to:

   0.008 ins. (0.20 mm) for the inlet valves
   0.010 ins. (0.25 mm) for the exhaust valves.

NOTE: This adjustment is made with the engine hot. The piston should be at T.D.C., end of compression, that is to say, with the valves of the opposite cylinder rocking.

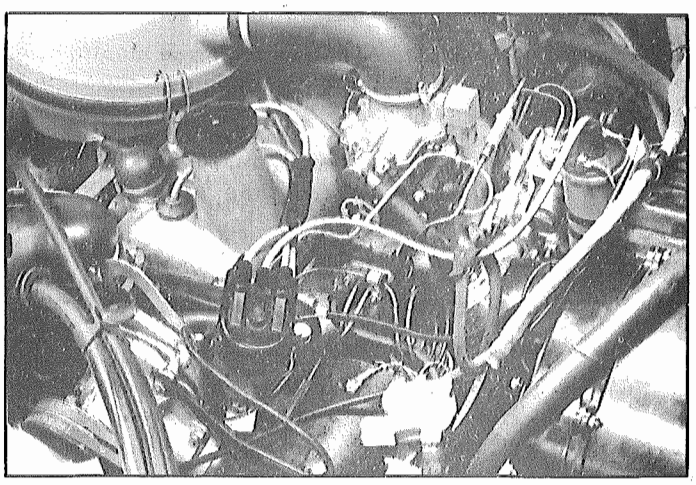
With No. 1 cylinder valves rocking, adjust No. 4.
With No. 3 cylinder valves rocking, adjust No. 2.
With No. 4 cylinder valves rocking, adjust No. 1.
With No. 2 cylinder valves rocking, adjust No. 3.

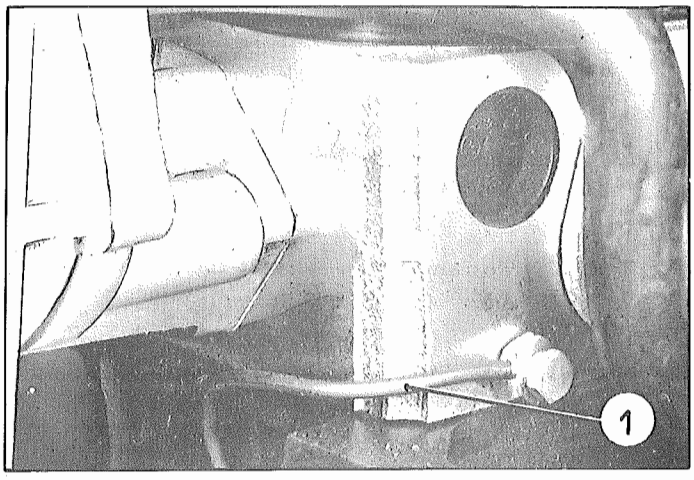
Turn the engine with the starting handle, after having operated the auxiliary clutch control.

4. Fit the cylinder head cover with its gasket, making quite certain that the gasket is correctly positioned (copper washers under the heads of the fixing screws).

5. Fit the air filter (see Op. DX.171-1, paragraphs 4 and 5).

June 1966. Corrective No. 1





REMOVAL

1. Drain the radiator and cylinder block. Retain the water as it contains anti-freeze.

2. Disconnect the cables from the battery terminals.

3. Release the pressure (see Op. DX.00).

4. Remove :

   - the air filter and its flexible pipe,
   - the sparking plug leads and the distributor head,
   - the pipe connecting the accelerating idling device with the centrifugal regulator,
   - the radiator tie-rod, the engine lifting clip, the battery earth wire,
   - the fan.

5. Disconnect :

   - the accelerator control, the choke cable, the petrol delivery pipe from the carburettor,
   - the feedpipe assembly from the centrifugal regulator.
   - the pipe assembly and return pipe from the clutch re-engagement control,
   - the upper water hose,
   - the dynamo tie-rod from the water pump.

   Remove the dynamo belts.

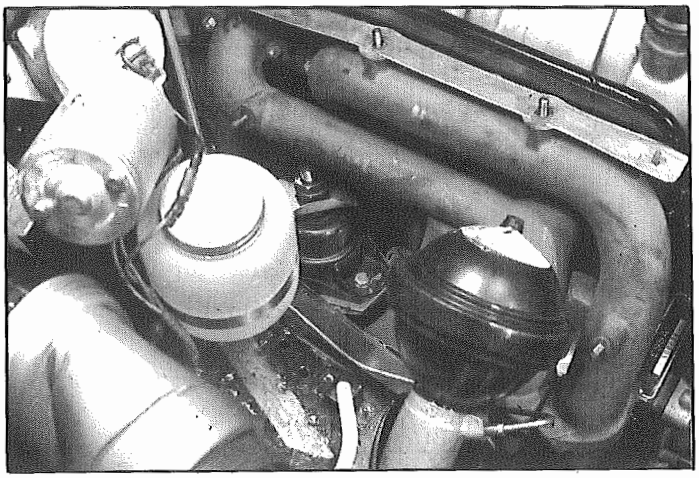
6. Remove :

   - the fulcrum pin of the centrifugal regulator. (Do not lose the adjusting packing pieces). Withdraw the regulator towards the right-hand side.
   - the clip securing the starter motor cable, from the water pump cover.

7. Disconnect the wire from the thermometer transmitter on the water pump cover.

8. Disconnect :

   - the lower water suction hose from the pump,
   - the rocker lubrication pipe (1), from the cylinder head,
   - the high pressure pump tie-rod from the water pump.



9. Remove :

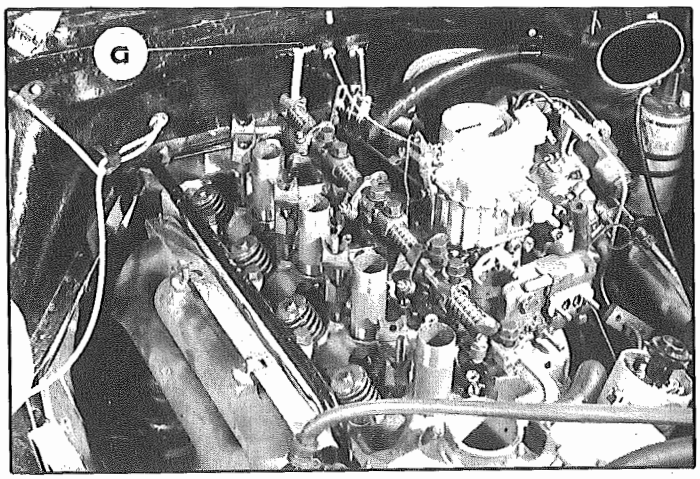
   - the front right-hand suspension sphere,
   - the exhaust shield.

10. Disconnect :

   - the exhaust downpipes from the manifolds,
   - the screw fixing the downpipe clamp from its bracket,
   - the exhaust manifolds from the cylinder head, withdrawing the manifolds,
   - the heater hose from the pipe on the cylinder head.

11. Remove :

   - the cylinder head cover and its gasket,
   - the sparking plugs,
   - the sealing cups from the sparking plug wells, and their rubber joints.



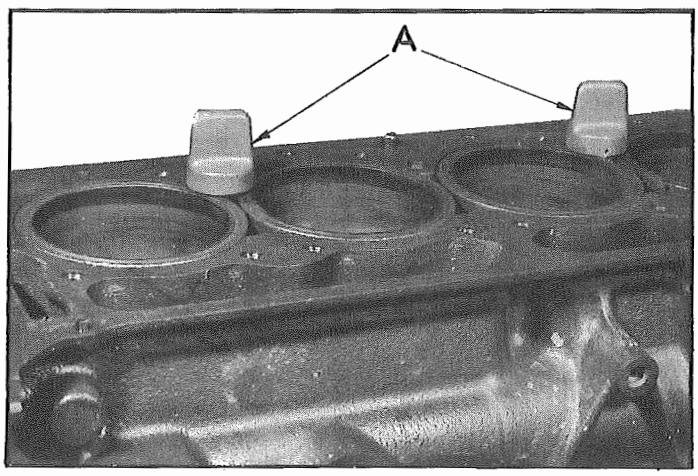
12. Unscrew completely the screws securing the cylinder head.

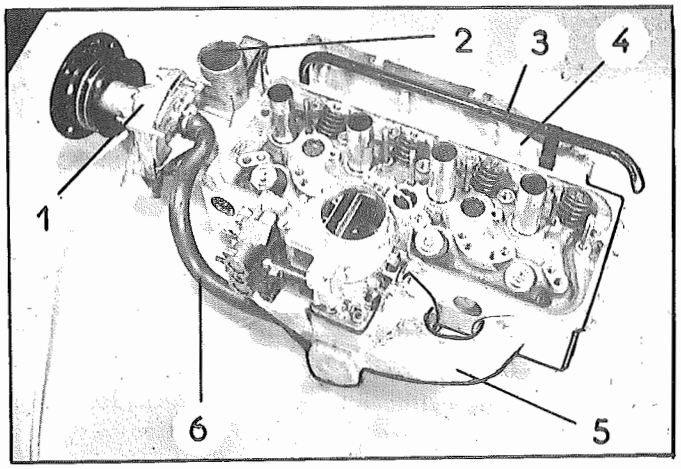
   - Remove the exhaust rocker units.
   - Remove the inlet rocker line.

NOTE: To remove the rear screw from the inlet rocker line, remove the rubber plug from the engine recess in the scuttle, cut the felt and remove the screw through this hole (a). Disengage the rocker push rods.

NOTE: To remove the exhaust rocker push rod from No. 4 cylinder raise the cylinder head slightly.

13. Free the cylinder head and gasket (do not damage the dowels). Hold the cylinder barrels in place using two screws (securing screw 3074-T).



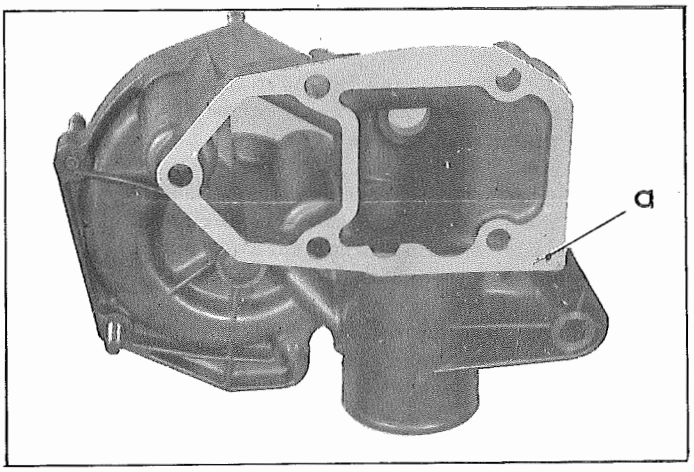


14. Stripping down the cylinder head.

a) Disconnect the hot-spot hose (6) from the inlet manifold.

b) Remove the water pump (1) and the water pump cover (2).

- the inlet manifold (5),
- the heater pipe (3) and exhaust shield (4),
- the studs for the inlet manifold, the exhaust manifold and the water pump cover, if necessary.



ASSEMBLY

15. Assembling the cylinder head.

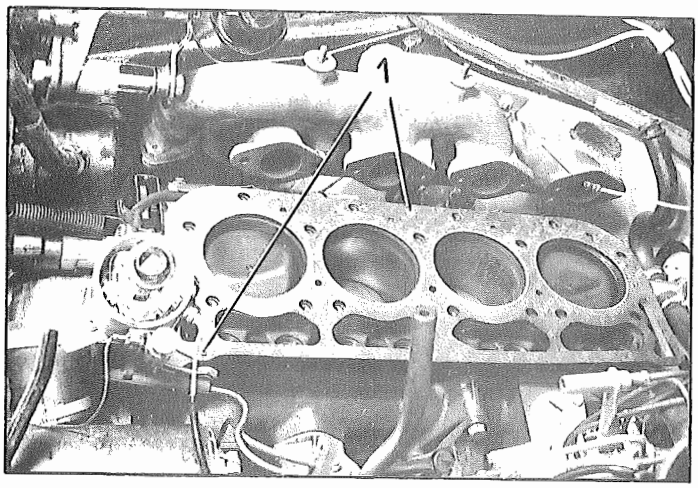
Fit :

- the studs for the inlet manifold, exhaust manifold and water pump cover if necessary,
- the cover (2) for the water pump, inserting the gasket (NOTE: Position gasket as illustrated corner "a").
- the water pump (1) inserting the gasket (special nuts 8 dia. x 12 across flats),
- the heater pipe (3), inserting the gasket,
- the exhaust shield (4),
- the inlet manifold, (5) inserting the gaskets.

Connect the hot-spot hose (6) to the inlet manifold and to the water pump cover, tightening the hose clips.

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ASSEMBLY



16. Remove the screws holding the cylinder barrels (screw 3074-T).

17. Offer up the cylinder head.

Fit the cylinder head gasket and centralise it on the 2 dowels (1).

Offer up the cylinder head with the exhaust rocker push-rod of No. 4 cylinder in position.

NOTE: Once the cylinder head is in position this push-rod cannot be fitted.

18. Fit the rocker push-rods (the exhaust push-rods are the longer).

19. Replace the inlet rocker line assembly with its supports and securing screws.

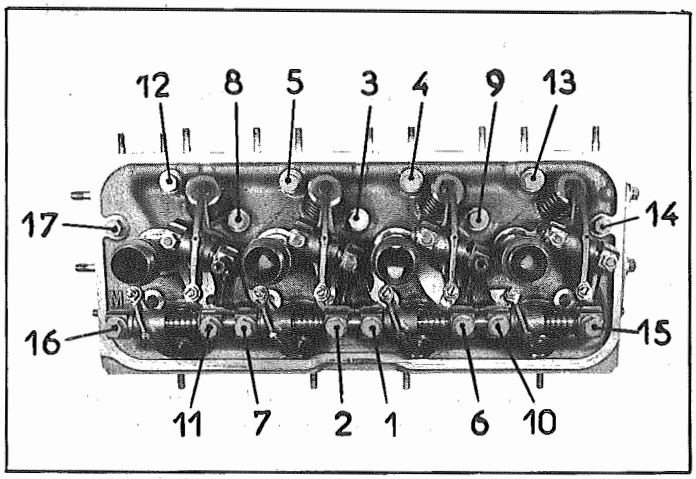
NOTE: When fitting the inlet rocker line assembly pass the head of the rear screw through the hole in the engine recess at "a".



Place the rubber ring seals between the supports of the rockers, and the cylinder head, on the cylinder head securing screws, except on the front screw (oil feed).

20. Replace the exhaust rocker assemblies, the oil holes towards the bottom and towards the valve. Fit the caps. Tighten the nuts on the exhaust rocker securing studs.

The screws holding the rocker assemblies for No. 1 and No. 3 cylinders also receive the cylinder head cover screws.



21. Fit the cylinder head screws and tighten them (torque spanner 2471-T).

    1st tightening to 21 lb/sq.in. (3 m.kg)
    2nd tightening to 43 lb/sq.in. (6 m.kg).

Observe the order of tightening shown.

During tightening make quite sure that the spherical ends of the tappet adjusting screws are correctly seated in the sockets on the rocker push rods.

NOTE: It is absolutely essential to tighten the cylinder head screws after the car has run 300 miles (500 km), with the engine cold.

It is imperative to proceed in the following manner:

1) Work on the screws one by one.

2) Loosen each screw and then tighten to 43 lb sq.in. (6 m.kg) (torque spanner 2471-T).

22. Couple up :

- the exhaust manifolds to the cylinder head, inserting the gaskets (plain washers and special nuts 8 diameter x 12 across flats). Leave the nuts finger-tight,
- the downpipes to the exhaust manifolds. Fit the gaskets. The nuts are accessible from below the car (spanner 2431-T),
- tighten the nuts fixing the manifolds to the cylinder head,
- tighten the screw fixing the downpipe clamp to its bracket,
- the heater hose to the heater feedpipe, tightening the hose clip.

23. Fit :

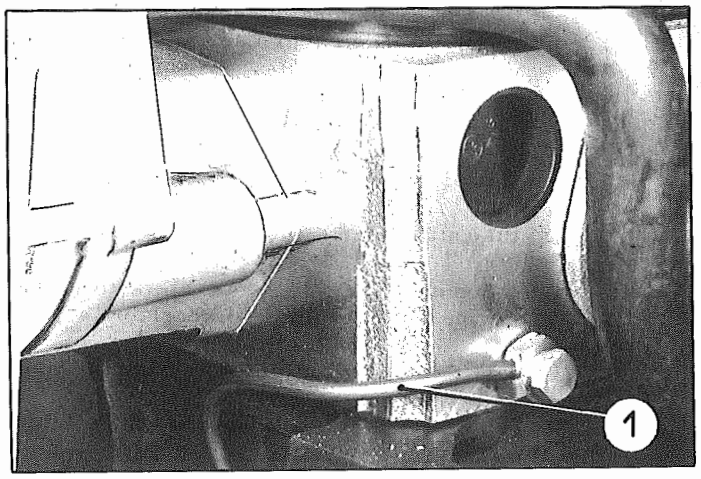
- the exhaust shield (plain washers),
- the front right-hand suspension sphere.

24. Couple up:

- lubrication pipe (1) to the cylinder head, inserting the double gasket,
- the lower water suction hose to the water pump.

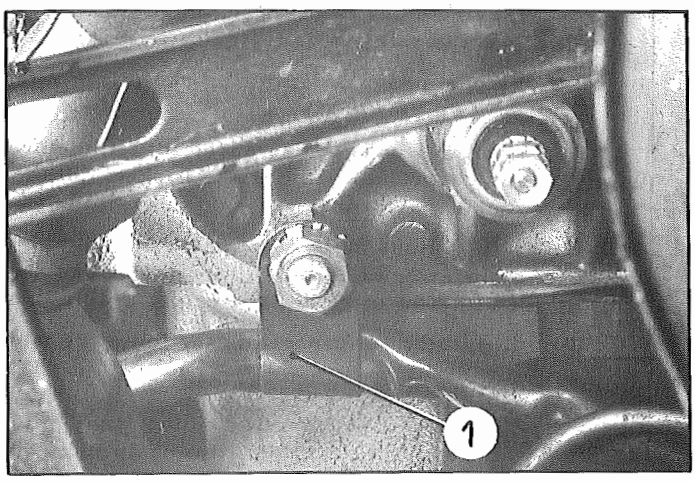
Connect the lead to the thermometer transmitter.

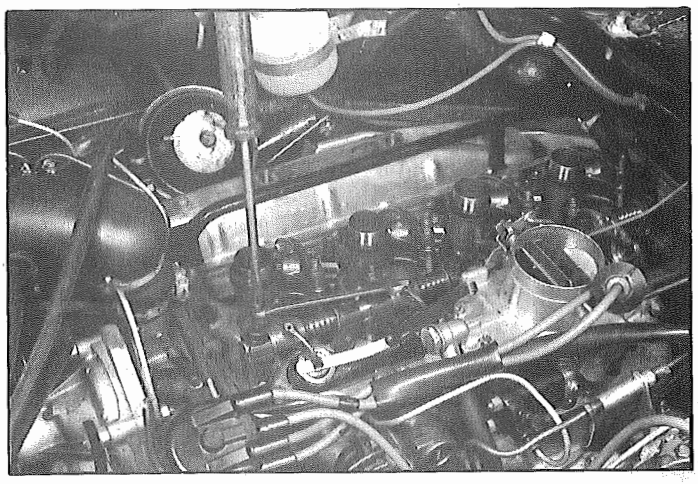
Connect the high pressure pump tie-rods to the water pump (inserting the square plate and the shakeproof washer).



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25. Fit :

- the securing clip (1) for the starter motor cable on the water pump cover,
- the fulcrum pin for the centrifugal regulator.

26. If the cylinder head, the water pump cover, or the water pump have been renewed, check the pulley alignment (see Op. DX.231-0).

27. Fit the dynamo belts.

28. Couple up :

- the dynamo tie-rod to the water pump, inserting the distributor earth wire,
- the pipe assembly to the centrifugal regulator,
- the pipe assembly and the return pipe to the reservoir, to the clutch re-engagement control,
- the upper radiator hose to the water pump,
- the accelerator control, the choke cable and the petrol delivery pipe to the carburettor.

29. Fit :

- the fan, tightening the screws to between 6 and 7 ft./lbs. maximum (0.9 to 1 m.kg maximum),
- the radiator tie-rod,
- the clip for raising the engine,
- the battery earth cable,
- the connecting pipe for accelerated idling device to the centrifugal regulator.

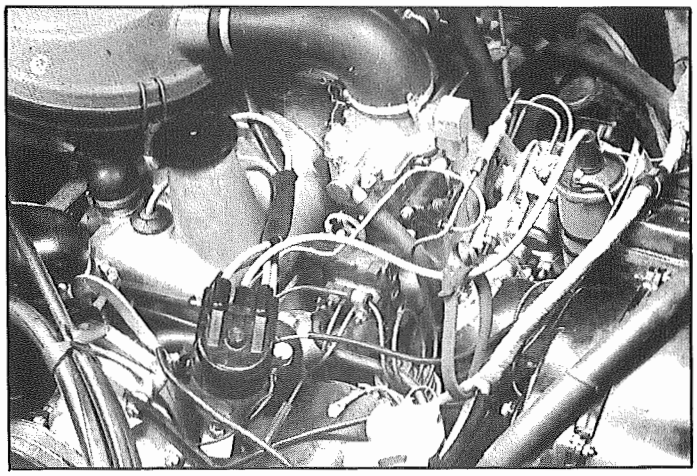
30. Adjust the rockers. (See Op. DX.112-0).

31. Fit the steel cups and rubber washers onto the sparking plug wells.

Fit the cylinder head cover, inserting the gasket.

Tighten the screws, (copper washers).

32. Fit the sparking plugs.



33. Fit the distributor head and connect the leads to the plugs.

34. Fit the air filter and tighten the clips.

35. Fit the rubber plug in the engine recess in the scuttle.

36. Fill the radiator with water and open the heater control valve.

37. Connect the cables to the battery terminals.

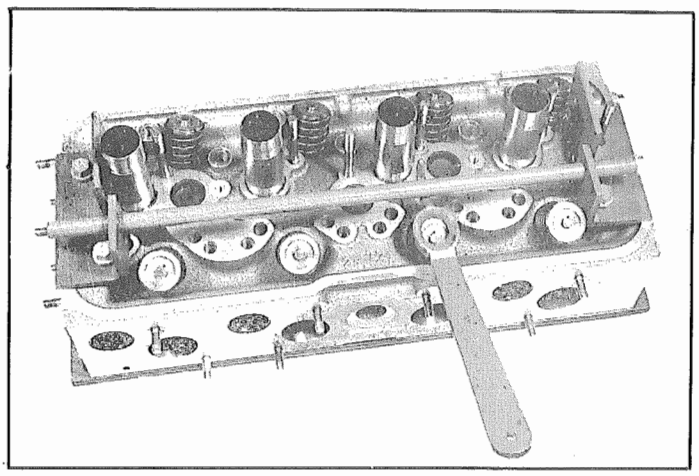
38. Start up the engine.

39. With pressure in the hydraulic circuits check all unions for leaks.

40. Bleed the centrifugal regulator and the brakes.

41. Adjust the slow running (see Op. DX.142-0).

DISMANTLING.

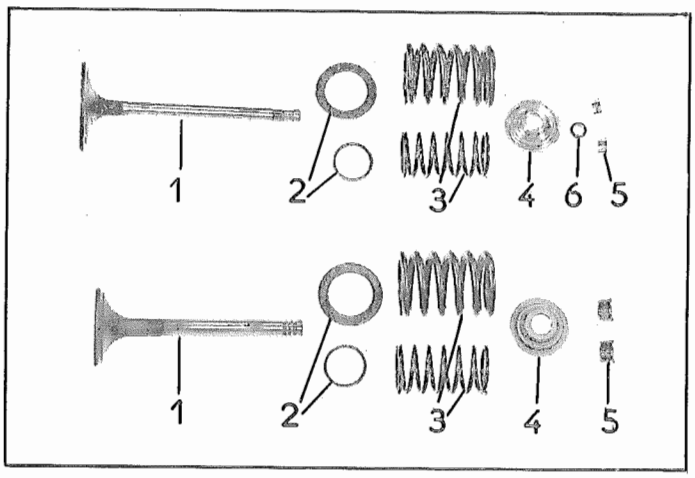


1. Strip down the cylinder head.

a) Remove :

- the exhaust manifold and its gaskets,
- the protective screen between exhaust manifold and cylinder head,
- the heating piping on the cylinder head,
- the inlet manifold and its gaskets,
- the sparking plugs,
- the water pump and its backplate,
- the exhaust rocker assemblies,
- the inlet rocker line assembly and its brackets.

b) Strip the inlet rocker line assembly.



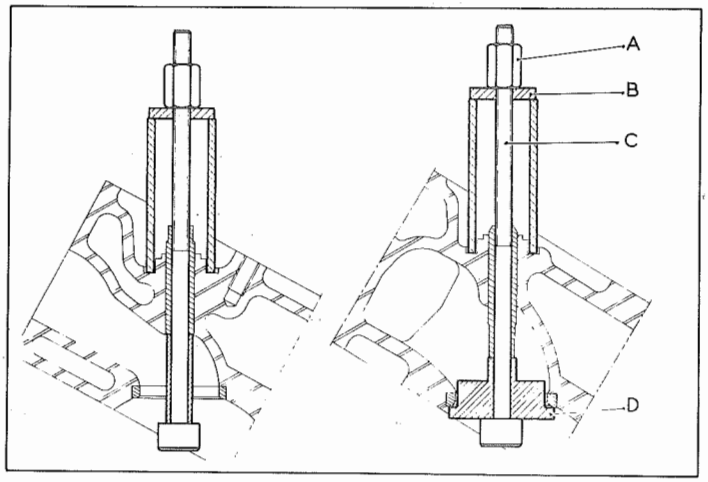
2. Remove the valves.

Use the spring compressor 3084-T and tool 3077-T. Hold the valves with support MR 4156-40.

Withdraw :

- the cotters (5),
- the upper cups (4),
- the springs (3),
- the thrust washers (2) for the springs,
- the sealing ring (6) on the inlet valve,
- the valve (1).

NOTE : As the cylinder head is aluminium it is impossible to replace the valve seats without special tooling.
Do not remove the studs.
To replace the sparking plug wells, ask for MR 4458-40.



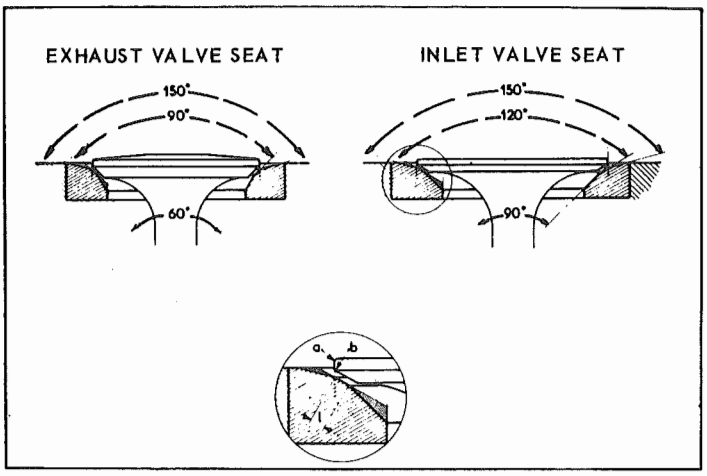
3. To replace the valve guides.

Withdraw the defective guide, or guides, using tool 3079-T.
Fit the guide by using the shouldered bush (D).
Smear with tallow the screw (C) and the thrust faces of the washer (B).
Tighten the nut (A) until the shouldered part of the bush sits on the face of the valve seat.

Ream the exhaust valve guides (reamer 1642-T) to $9\ ^{+015}_{-010}$ mm.

Ream the inlet valve guides (reamer 3080-T) to $8\ ^{+015}_{-010}$ mm.

Check the reamed diameters with go no-go gauges, or if not available, with the stems of new valves.



4. Grinding the valves and seats.

Use a valve grinder.

Valve seating angles : inlet : 120°
exhaust : 90°

Radius the corners of the valve heads to approximately 0.5 mm at "a" and "b".

The width "l" of the seat must be between 0.8 and 1.2 mm.

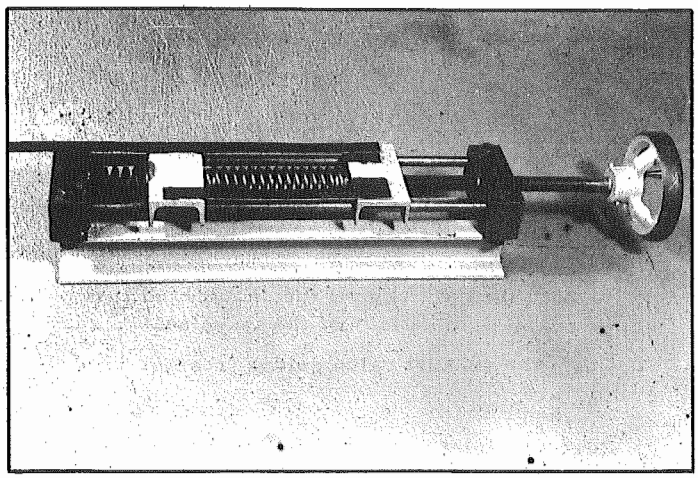
Use the following grinding wheels :

Exhaust valve seats		Inlet valve seats	
For the seating :		For the seating :	
90° biconical wheel	1627-T	120° biconical wheel	3046-T
For the top clearance :		For the top clearance :	
120° monoconical wheel	1660-T	150° biconical wheel	3047-T
For the bottom clearance :		For the bottom clearance :	
60° monoconical wheel	1633-T	90° biconical wheel	3047-T

The large diameter of the seating must be equal to the large diameter of the valve.

Grind the valves using valve grinder 1615-T.

Clean the cylinder head very carefully in order to eliminate all traces of emery in the valve chambers or gas passages.



ASSEMBLY.

5. Check the spring-rates.

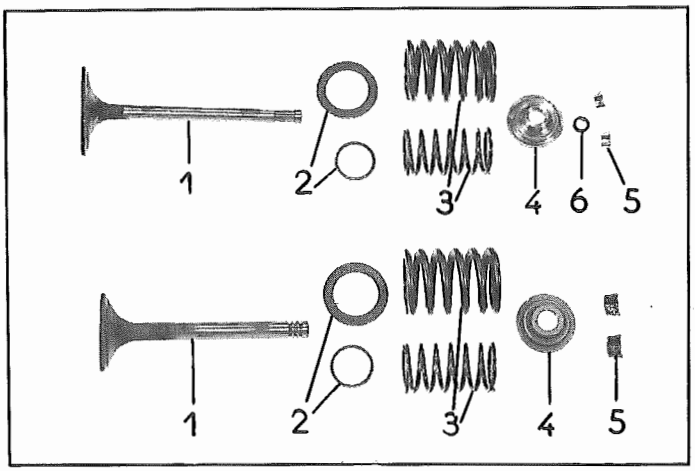
Use fixture 2420-T.

Outer springs

Length	Load in kg.
39 mm	28.9 ± 1.60 kg.
30.5 mm	60 ± 3.20 kg.

Inner springs

Length	Load in kg.
30.7 mm	7.4 ± 0.5 kg.
22 mm	12 ± 1 kg.



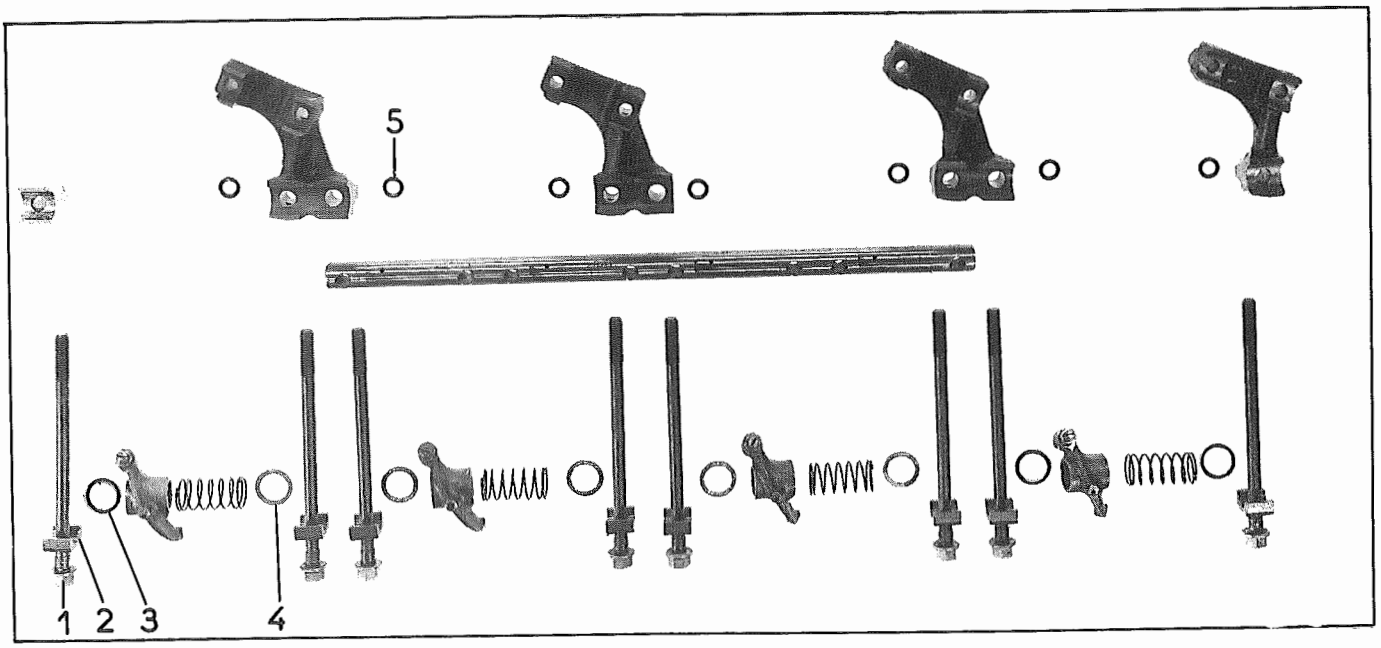
6. Fit the valves.

Insert in position :

- the valve (1),
- the thrust washers for the springs (2),
- the springs (3),
- the upper cup (4),
- the seal (6) (on the inlet valves only),
- the cotters (5).

Use the spring compressor 3084-T and the tool 3077-T. Hold the valves with the aid of support MR 4156-40.

7. Assemble the rocker inlet shaft.



The oil hole (a) nearest one end of the rocker shaft indicates the front end.

Commence assembly at this end.

Place on the shaft, previously oiled, with the oil holes downwards and towards the valves,

- 1 long screw (1) with its cap (2),
- the thick washer (3),
- 1 rocker (see photograph for position),
- 1 spring,
- 1 thin washer (4),
- 1 long screw.

Continue assembly in the same order (the thick washer (3) being replaced by a thin washer (4) for the other cylinders).

Fit the assembly brackets on the long screws.

Position the brackets as indicated in the illustration.

The front support has a chamfer which must be towards the push-rod to allow adequate clearance.

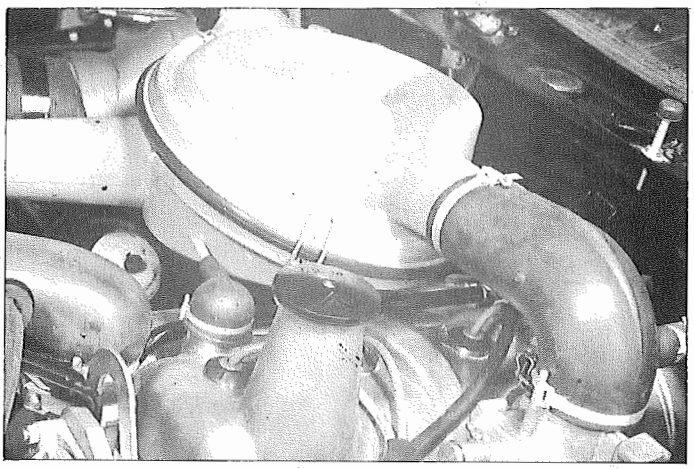
Place a ring seal (5) on the long screws between the rocker supports and the cylinder head (except on the first screw).

8. Assemble the cylinder head.

Fit:

- the water pump backplate and the water pump (gaskets smeared with hermetic),
- the inlet manifold (gaskets smeared with hermetic),
- the heater pipe on the cylinder head,
- the protective screen between exhaust manifold and cylinder head,
- the exhaust manifolds (copper asbestos gaskets),
- the sparking plugs.

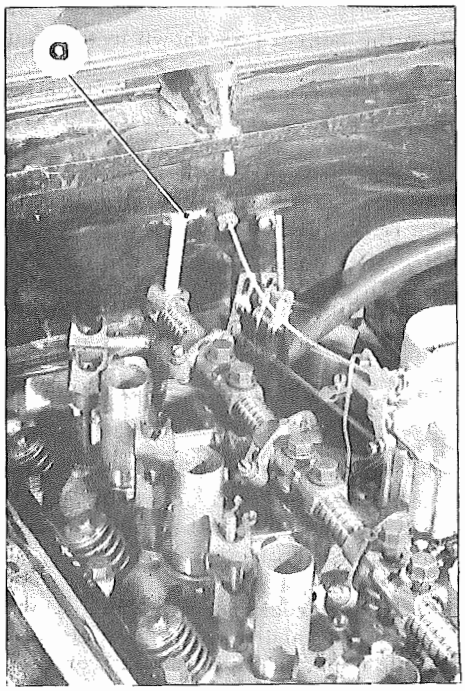
NOTE: The inlet and exhaust rocker assemblies will be fitted after fitting the cylinder head and after positioning the pushrods.



REPLACEMENT OF AN INLET ROCKERSHAFT ASSEMBLY.

Removal.

1. Drain the radiator and the cylinder block (retain the water as it contains anti-freeze).
2. Disconnect the cables from the battery terminals.
3. Disconnect the leads from the sparking plugs.
4. Remove:
   - the air filter and its flexible union.
   - the cylinder head and its gasket.



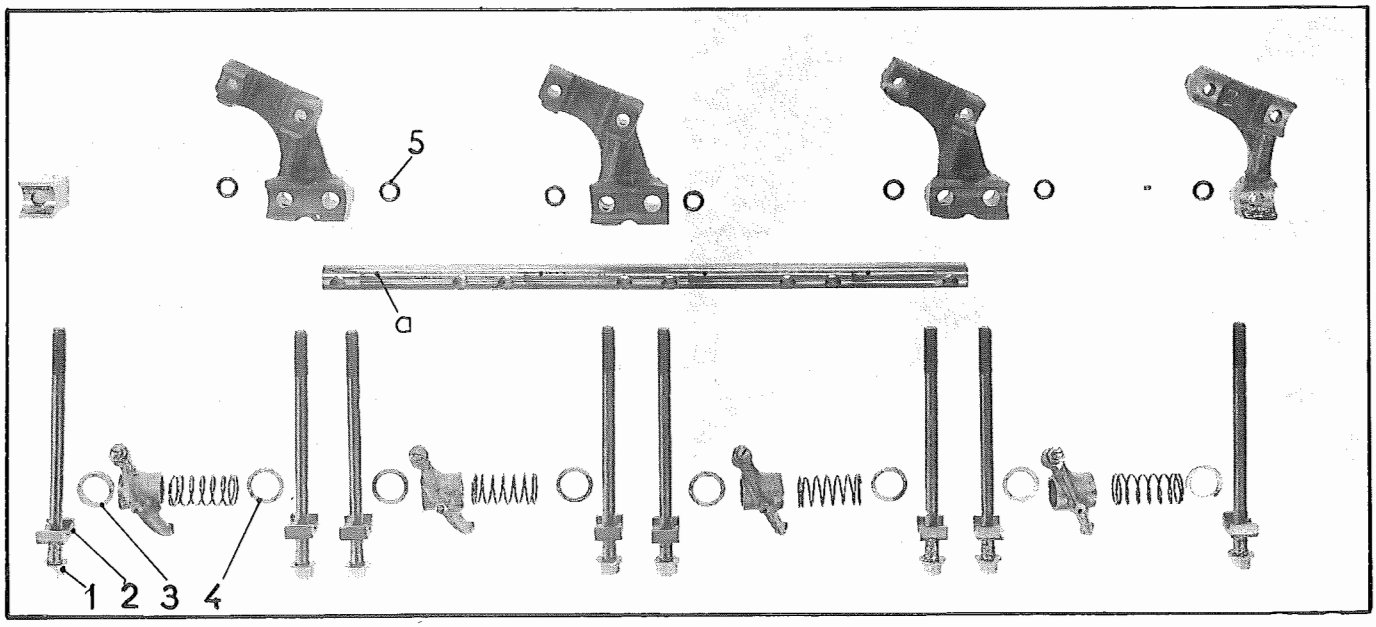
5. Loosen the screws holding the inlet rocker-shaft assembly and the screws holding the cylinder head on the right-hand side.
6. Remove:
   - the exhaust rocker valve assembly,
   - the inlet rockershaft assembly.

NOTE:- To free the rear screw on the inlet rockershaft assembly, remove the rubber plug from the engine recess, cut the felt and free the screw via the hole (a).

7. Strip the inlet rockershaft assembly.
8. Clean inside the shaft and make quite sure that the lubrication holes are not obstructed.

Assembly.

9. Assemble the inlet rockershaft assembly.



The end of the shaft with the lubrication hole (a) nearest the end, is the front end. Commence the assembly from this end. Oil the inlet rockershaft and with the lubrication holes facing downwards and towards the valves, commence fitting in the following order :

- one long screw (1) with its fixing cap (2),
- the thick washer (3),
- one rocker (see photograph for position),
- one spring,
- one thin washer (4),
- one long screw.

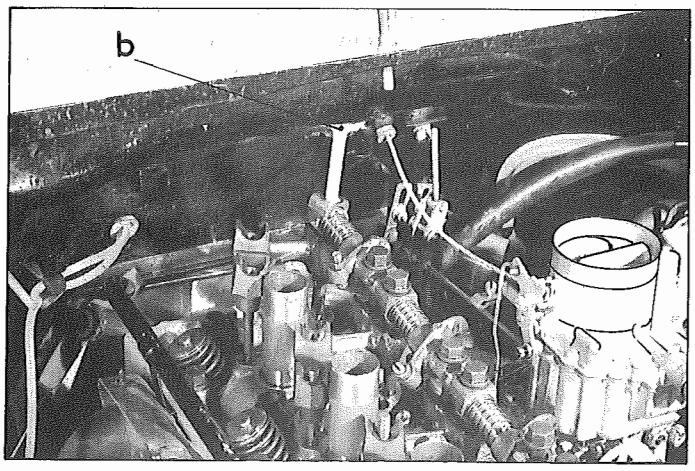
Continue the assembly in the same order (the thick washer (3) being replaced by a thin washer (4) for the other cylinders).

Fit the bearers on the long screws.

Position the bearers as shown in the figure.

The front bearer has a chamfer which must face the rocker push-rod to allow its entry.

Place a ring seal (5) on the long screws, between the brackets and the cylinder head (except on the front screw).



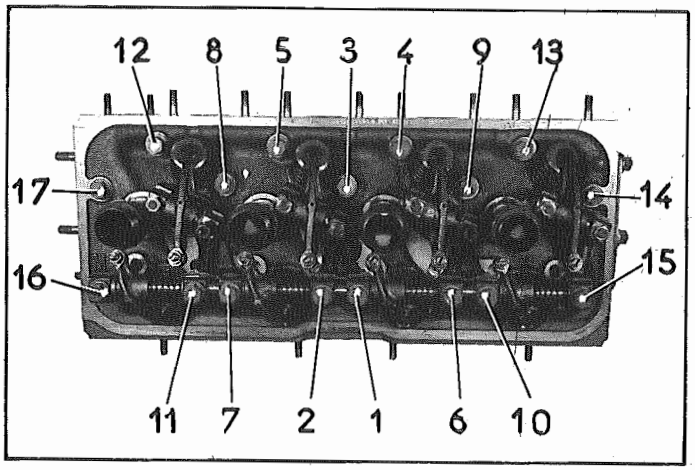
10. Make quite sure that the cylinder head is correctly seated on its dowels.

Place the assembled inlet rockershaft assembly in position.

NOTE:- To position the rockershaft assembly, pass the head of the rear screw through the hole (b) previously made in the engine recess felt (see this operation, paragraph 6).

Fit the exhaust rockers, the lubrication hole facing downwards and towards the valves. Fit the fixing caps. Tighten the nuts on the studs securing the exhaust rockers to 18 ft. lbs $\pm$ 2 (2.5 $\pm$ 0.3 m. kg).

The nuts holding the rockershaft assembly on No. 1 and No. 3 cylinders also hold the cylinder head.



11. Fit the securing screws for the cylinder head and then tighten them (torque spanner 2471-T).
1st tightening to 21.75 ft.lbs (3 m.kg).
2nd tightening to 43.5 ft.lbs (6 m.kg).

Observe the correct order of tightening.

During the tightening operation, make quite sure that the tappet adjusting screws are correctly located in the sockets of the push-rods.

NOTE:- It is compulsory to re-tighten the cylinder head screws when a distance of 300 miles (500 km) has been covered.

12. Adjusting the valve rocker clearance (see Op. DX. 112-0).

13. Fit the cylinder head cover, inserting the gasket. Tighten the screws (copper washer).

14. Connect the sparking plug leads to the plugs.

15. Fit the air filter. Tighten the clips.

16. Fit the rubber plug in the engine recess.

17. Fill up the radiator with water and open the heater control valve.

18. Connect the cables to the battery terminals.

REPLACEMENT OF AN EXHAUST ROCKER ASSEMBLY.

Removal.

19. Remove the air filter and tube assembly.

20. Disconnect the leads from the sparking plugs.

21. Remove the cylinder head cover and its gasket.

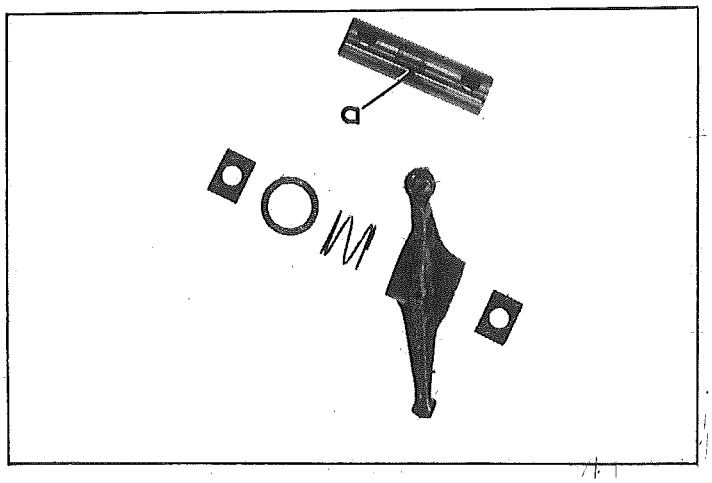
22. Remove the nuts holding the rocker assembly.

23. Free the rockershaft and the clamp nuts.

24. Stripping the rockershaft assembly.

Carefully clean inside the shaft and make quite sure that the lubrication holes are not blocked.

NOTE:- To replace a bearer, it is necessary to remove the inlet rockershaft (see this operation, paragraphs 5 to 7).



Assembly.

25. Assemble the rockershaft assembly.

Commencing at the front end, and with the lubrication holes (a) pointing downwards, place the following parts on the shaft

- one rocker,
- one spring,
- one washer.

26. Fit this assembly in its bearer.

Fit the securing caps for the shaft and the nuts. Tighten them to 18 ft.lbs ± 2 (2.5 ± 0.3 m.kg).

NOTE:- The rear nuts securing the exhaust rockershaft for No.1 and No.3 cylinders have been replaced by screws with the head recessed and tapped for securing the rocker-shaft cover.

27. Adjust the valve rocker clearance (see Op. DX.112-0).

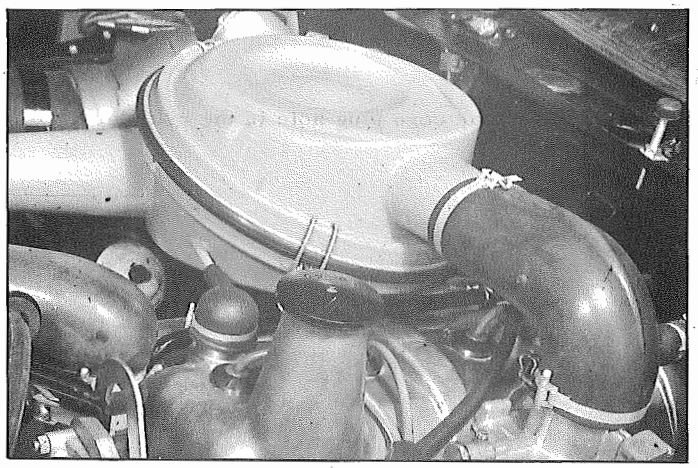
28. Fit the cylinder head cover with its gasket. Tighten the nuts.

29. Connect the sparking plug leads.

30. Fit the air filter and tube assembly. Tighten the nuts and the collar holding the carburettor manifold.

REPLACING A CORE PLUG.

NOTE: To replace a core plug (on the exhaust manifold side), remove the cylinder head (see Op. DX.112-1).



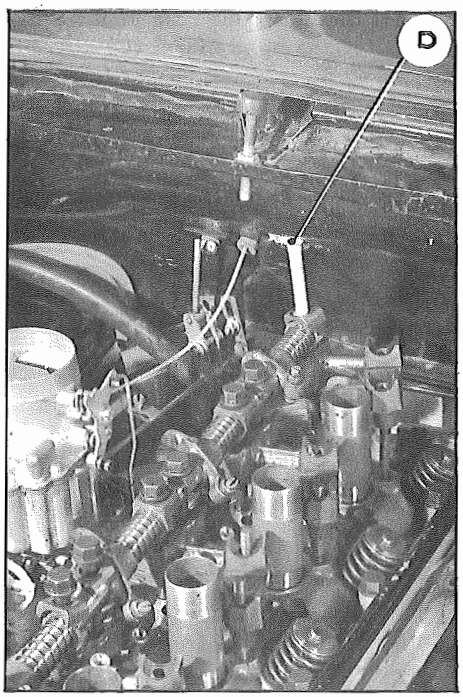
Removal.

31. Drain the radiator and cylinder block (save the liquid which contains anti-freeze.

32. Disconnect the cables from the battery terminals.

33. Remove the leads from the sparking plugs.

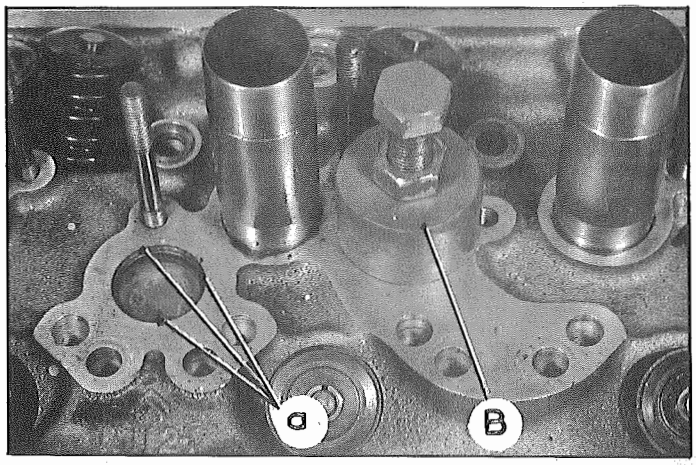
34. Remove:
    - the air filter and its flexible elbow
    - the cylinder head cover and its gasket.



35. Loosen the screws securing the inlet rocker line and the screws holding the cylinder head.

36. Remove:
    - the exhaust rocker assemblies,
    - the inlet rocker line.

NOTE: To remove the rear screw from the inlet rocker line, remove the rubber plug from the engine recess in the scuttle, cut the felt away and pass the head of the screw through this hole (a).



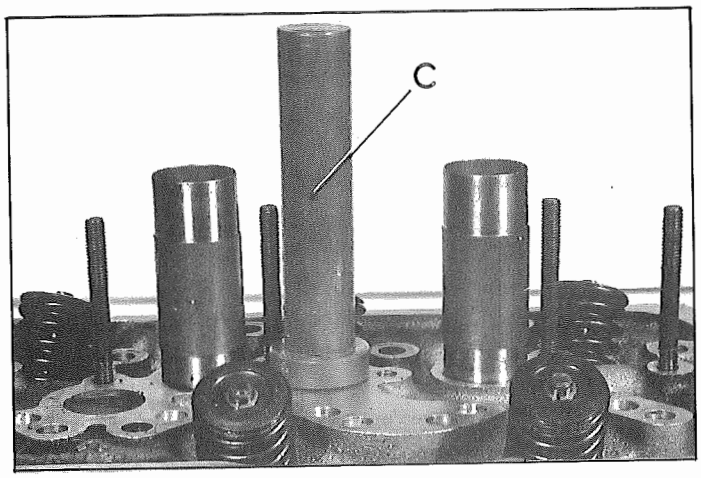
37. Drill a hole 11.5 mm diameter in the centre of the core plug and tap it 14 by 200.

38. With a bronze drift, tap the plug into the hole a few mm to free it from the three punch marks (a). With a scraper remove the metal turned down by these 3 punch marks (a) to lock the core plug.

39. Withdraw the core plug with extractor (B) MR.1540-170.

40. Clean the core plug hole in the cylinder head.

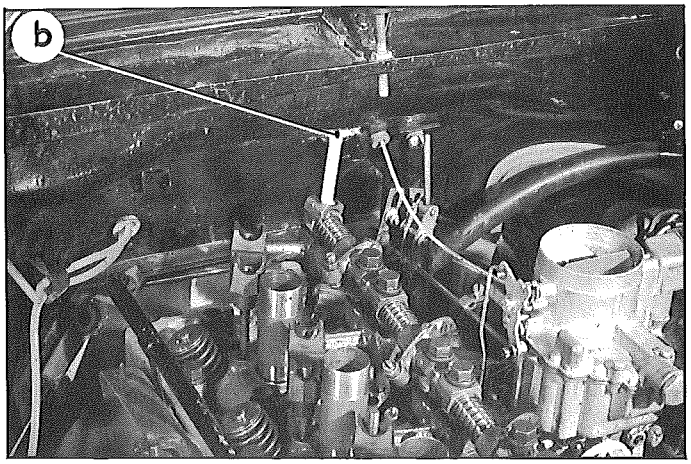
Assembly.



41. Smear the new core plug hole with hermetic compound.

42. Insert the new core plug under a press or with a mallet, using mandrel (C) MR.3436-220.

43. Punch over the metal at three points (a) to lock the core plug into the cylinder head.



44. Fit the inlet rocker line, fully assembled.

NOTE: When fitting the inlet rocker line assembly, pass the head of the rear screw up through the hole in the engine recess at (b) (see note this Op. para. 36).

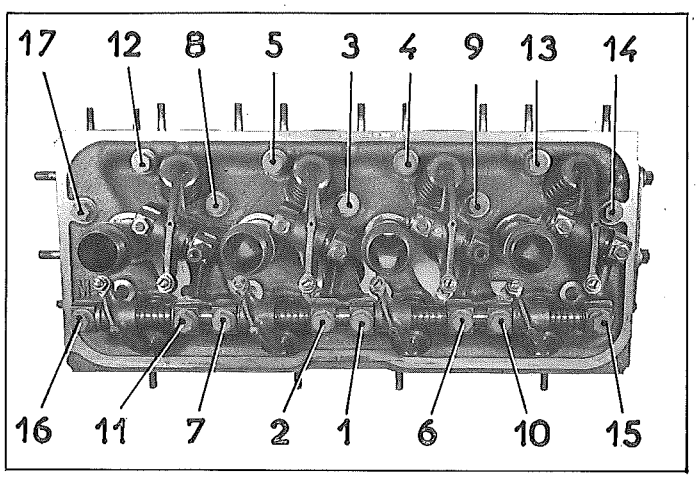
Replace the exhaust rocker assemblies, the oil holes towards the bottom and towards the valves. Fit the caps. Tighten the nuts on the exhaust rocker securing studs to 18 ft.lbs. ± 2 ft.lbs. (2.5 ± 0.3 m.kg).

The rear screws holding the rocker assemblies for nos. 1 and 3 cylinders also serve for the cylinder head cover screws.

45. Fit the cylinder head screws and then tighten them (torque spanner 2471-T).

1st tightening - 21 ft.lbs. (3 m.kg)
2nd tightening - 43 ft.lbs. (6 m.kg).

Observe the order of tightening shown.



While tightening make quite sure that the spherical ends of the tappet adjusting screws are correctly seated in the sockets on the rocker pushrods.

46. Adjust the valve rocker clearances (see Op. DX.112-0).

47. Fit the cylinder head cover, inserting the gasket. Tighten the screws (copper washers).

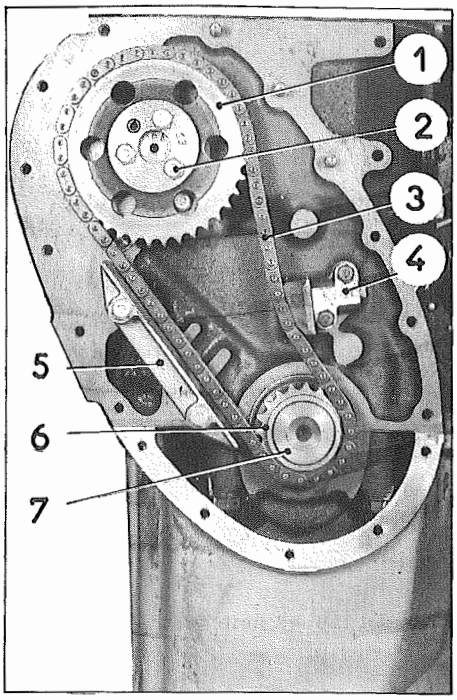
48. Connect the sparking plug leads to the plugs.

49. Fit the air filter. Tighten the clips.

50. Fit the rubber plug in the hole in the engine recess.

51. Fill up the radiator with water and open the heater control valve.

52. Connect the cables to the battery terminals.



REPLACEMENT OF A TIMING CHAIN OR TIMING PINION.

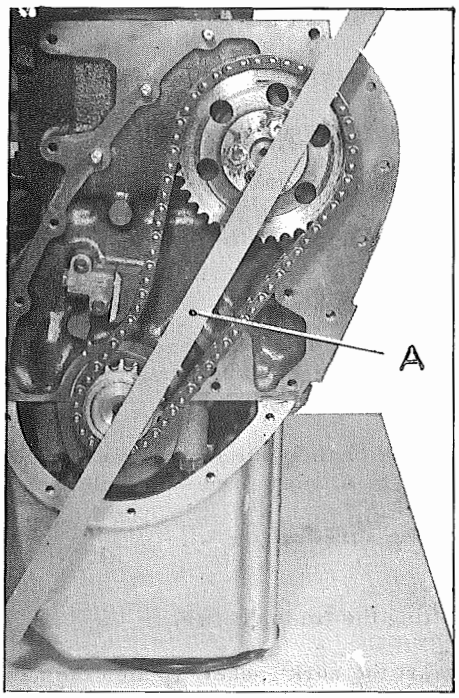
Removal.

1. Remove the engine-gearbox assembly (see Op. DX.100-1).

2. Remove:
   - the timing case,
   - the chain guide (5),
   - the chain tensioner (4) (take care not to let the components fly apart),
   - the screws (2) holding the pinion on the camshaft.

Remove the timing pinion (1) and chain (3).

NOTE:- As the pinion (6) is a force fit on the crankshaft (7) its replacement can only be carried out in a workshop with specialised equipment.



Assembly.

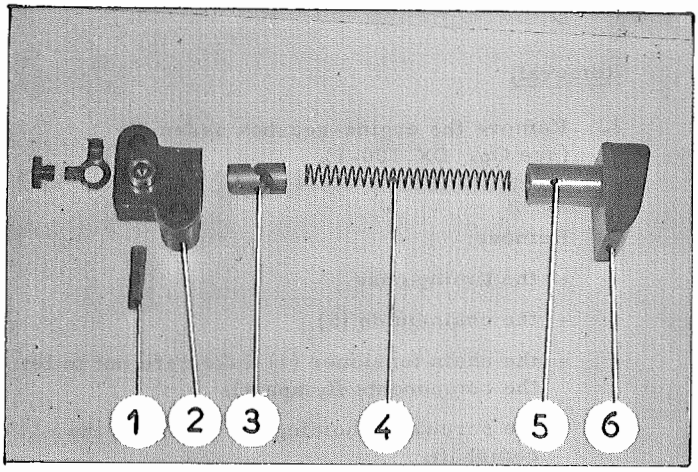
3. Bring the pistons of cylinders Nos. 1 and 4 to about T.D.C.

a) Place the timing chain on the crankshaft pinion, then the camshaft pinion in the chain.

Position the pinions so that the taut side of the chain is on the side farther from the tensioner, and so that a straight edge passing through the centres of the two pinions passes also through the mark (centre punch on one tooth) on the camshaft pinion and through the mark (etched electrically between two teeth) on the crankshaft pinions. The marks should face each other.

Turn the camshaft until the centring dowel and the tapped holes are in line with the holes drilled in the pinion.

Tighten the securing screws.

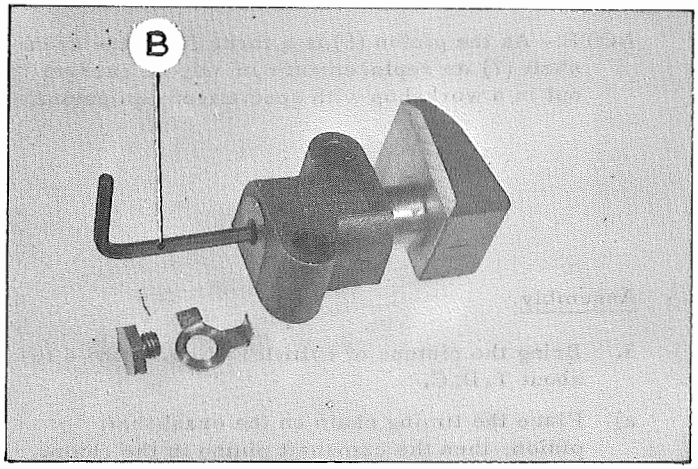


b) Fit the chain tensioner.

Insert:

- the cylinder (3) in the body (2),
- the spring (4) in the cylinder,
- the assembly of the slider pad (6) and plunger carrying the pad, (5) in the body.

(The spring will be partly compressed).



Through the tapped hole for the plug, insert a 3 mm Allen key.

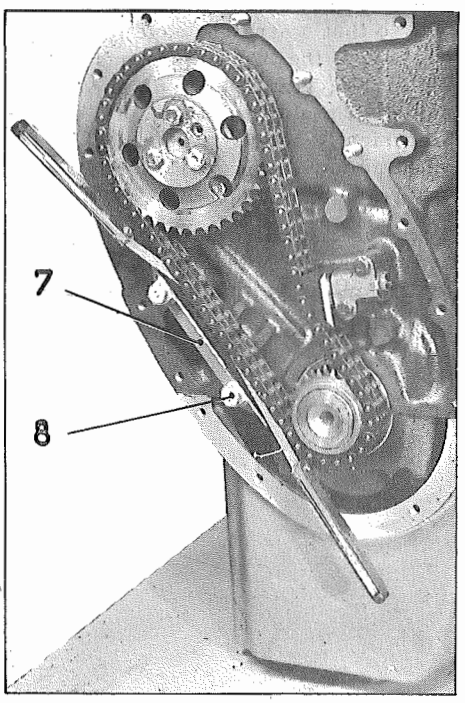
Turn it clockwise to engage the plunger pin (5) in the spiral in the cylinder assembly (3). The slide pad carrier (6) must butt against the body (2).

Without moving any parts insert the filter (1) in the housing and fit the tensioner on the crankcase.

Tighten the screw to 12 ft.lbs (1.7 m.kg).

Tighten the screwed plug, inserting a lock tab.

Turn over the lock tabs.



c) Fit the chain guide.

With the guide (7) in place, insert the screws (8) without tightening them, (plain washer under the heads).

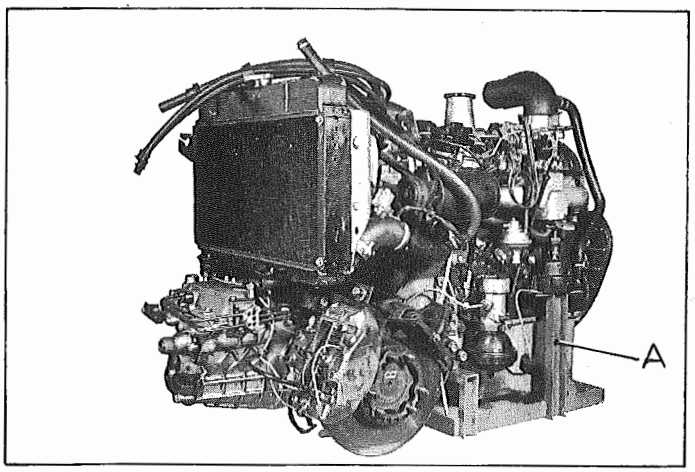
Position the chain guide leaving a clearance of 0.1 to 0.5 mm, measured with feeler gauges.

Tighten the screws.

4. Fitting the timing cover.

Insert the cork gasket, tighten the nuts (spacer under the nuts) and the screws (plain washer) to 12 ft.lbs (1.7 m.kg).

5. Fit the engine-gearbox assembly on the vehicle (see Op. DX.100-1).



REPLACEMENT OF A CAMSHAFT.

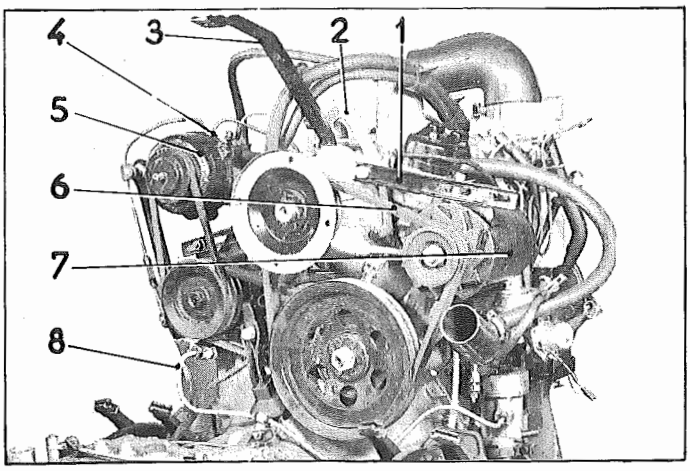
Removal.

6. Remove the engine-gearbox assembly (see Op. DX.100-1).

7. Drain the oil from the engine.

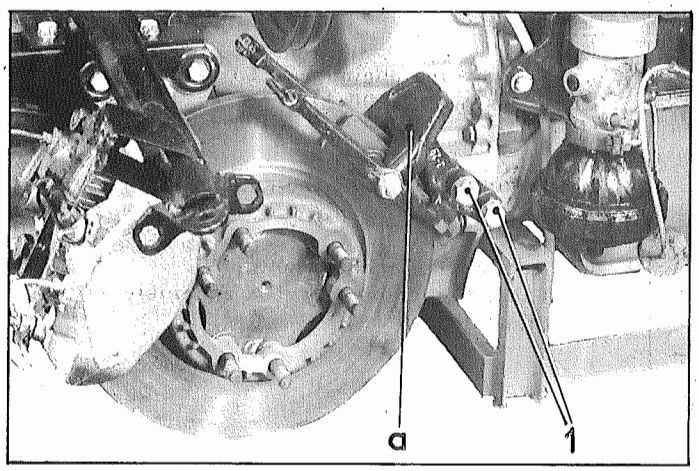
8. Remove the exhaust downpipe.
Place the engine-gearbox assembly on Stand 3083-T (A).

9. Disconnect:
   - the radiator tie-rod from the radiator,
   - the suction and delivery hoses from the water pump,
   - the radiator.



10. Remove:
   - the tie-rod (3) from the radiator,
   - the sling hook (2),
   - the earth cable,
   - the dynamo stay (1),
   - the dynamo belts (6),
   - the dynamo (7),
   - the pipe assembly (4) from the centrifugal regulator and the rubber return pipe,
   - the pipe between the right-hand brake unit and the clutch engagement corrector,
   - the regulator tie-rod,
   - the regulator (5). (Do not lose the alignment adjusting shims).
   - the pipe (8) connecting the high pressure pump to the pressure regulator.

11. Disconnect the lead from the thermometer unit.



12. Disconnect the high pressure pipe from the clutch cylinder and the tie-rod of the high pressure pump from the water pump.

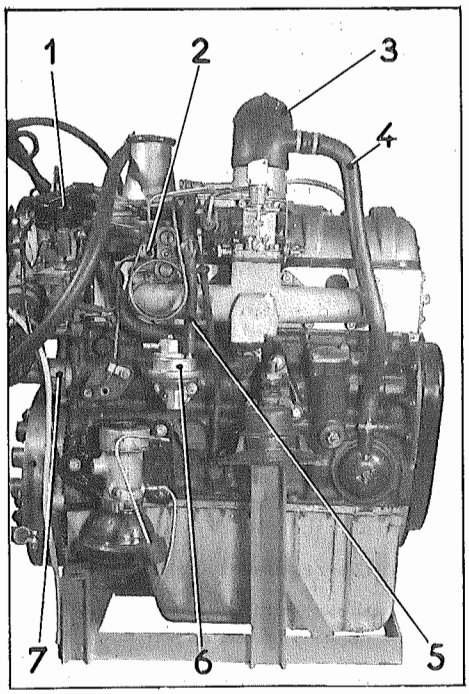
13. Remove the driving pulley (use a chisel to remove the metal from the nut slot).

Free the pulley and do not lose the adjusting washers.

14. Remove:

- the mechanical brake units (a), by taking out the two screws (1).
- the housing for the control shaft bearing.
- the screws holding the gearbox to the engine (spanners 2431-T and 1677-T).

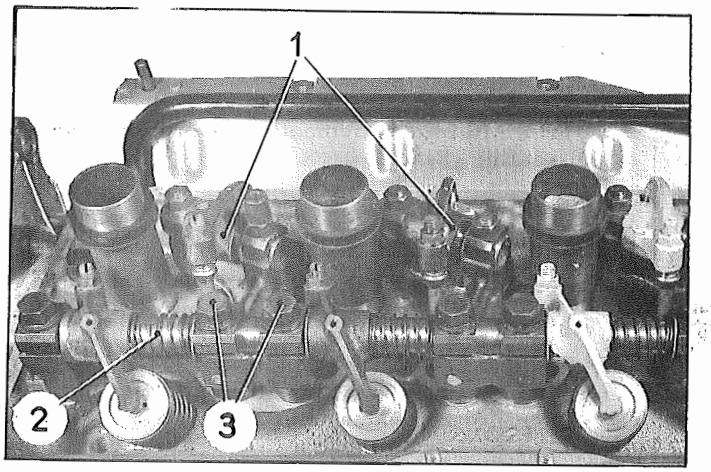
Remove the gearbox from the engine.



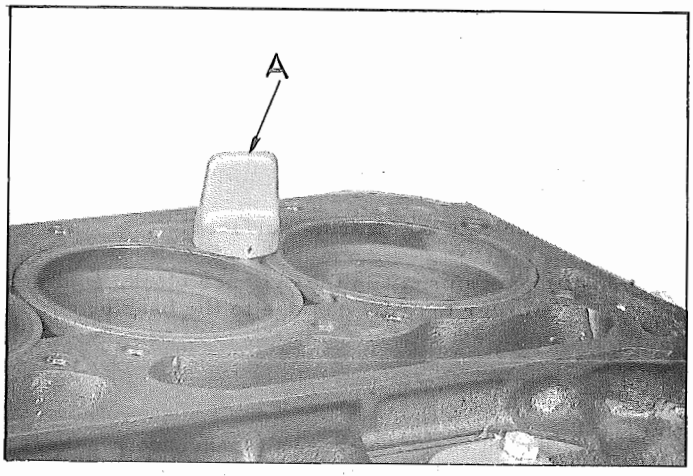
15. Remove:

- the rubber union (3) from the air filter and the flexible pipe (4) between the air filter and breather,
- the feedpipe (5) from the petrol pump of the carburettor,
- the petrol pump (6),
- the insulating pad,
- the push-rod,
- the distributor control (7) and the distributor (1),
- the pipe assembly (2) from the clutch re-engagement control.

Disconnect the lubrication pipe feeding the valve rocker assembly.



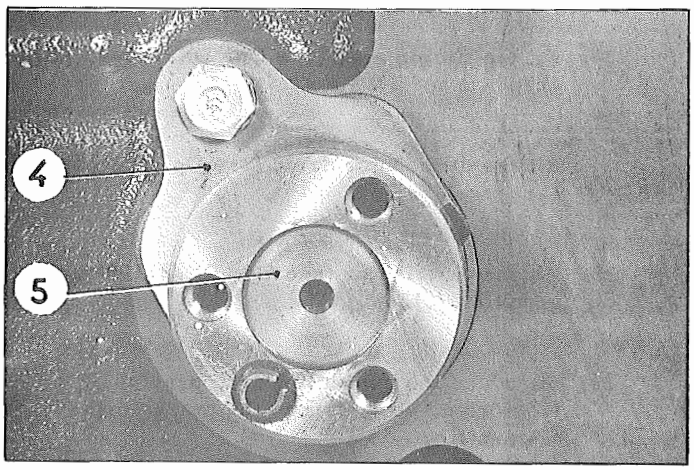
16. Remove the cylinder head.
    a) Remove the cylinder head cover and its gasket.
    b) Remove the exhaust rocker assemblies (1).
    c) Unscrew completely the screws (2) holding the cylinder head.
    d) Remove the inlet rocker assemblies (3).
    e) Free the rocker push-rod. (Mark their positions).
    f) Free the cylinder head and the cylinder-head gasket.
    (Attention to the dowels).



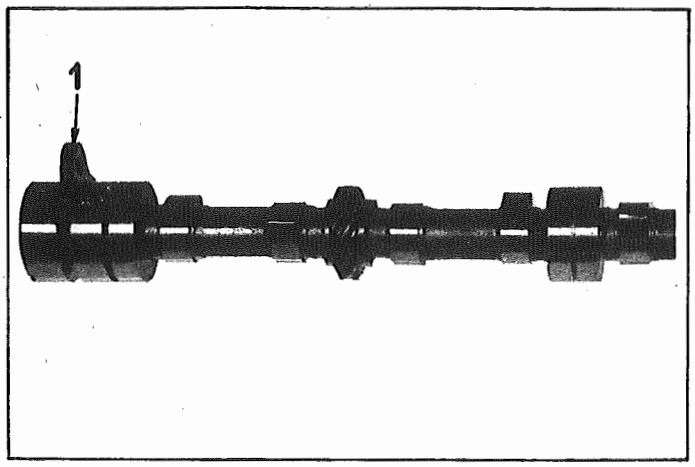
17. Hold the barrels by 2 screws (A) (screw 3074-T).

18. Remove the cam-followers from their housings, marking their positions.
    (If necessary, use extractor 1608-T).

19. Remove:
    - the timing cover,
    - the bracket for the exhaust downpipe,
    - the sump,
    - the oil pump,
    - the timing gear chain and pinion assembly (see Op. DX.120-1, paragraphs 1 to 5).



20. Remove the camshaft.
    Remove the clamp fork (4) from the camshaft.
    Remove the camshaft (5) from the rear of the engine (timing gear end).



ASSEMBLY.

NOTE:- After each dismantling operation, use new sealing gaskets.

21. Preparing the camshaft.

a) The end float of the camshaft should be between 0.05 and 0.07 mm.

Fit the clamp fork (1) in the camshaft groove.

Using gauges, measure the existing end float and if it exceeds 0.07 mm, select a clamp fork from those available from our Spare Parts Department, which will give the required clearance.

b) Make sure that the positioning dowel for the camshaft pinion is in position.

22. Fitting the camshaft.

Lubricate the bearing surfaces.

Insert the camshaft in the cylinder block, guiding it in order to avoid damage to the bearing surfaces.

Fit the clamp fork.

Tighten the securing screws (shakeproof washers under the heads) to 12 ft.lbs $\pm \frac{1.5}{2}$ ($1.7 \pm \frac{0.2}{0.3}$ m.kg).

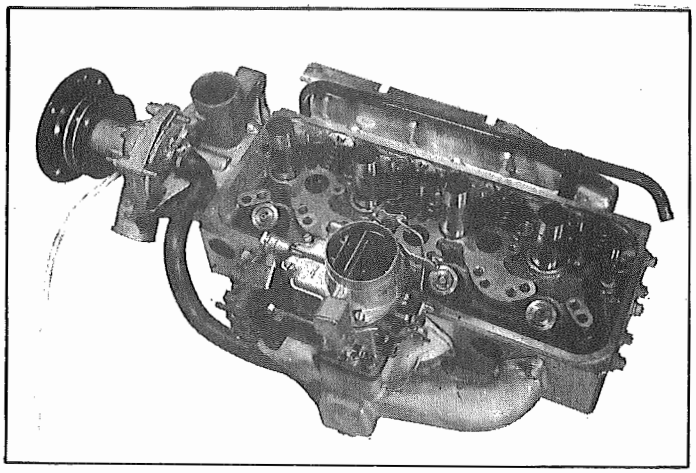
23. Fit the oil pump and the sump (see Op. DX. 100-3, paragraphs 27 and 28).

24. Fit the timing gear (see Op. DX.120-1, paragraphs 3 and 4).

Fit the distributor drive (see Op. DX.100-3, paragraph 35).

25. Fit the distributor (see Op. DX.211-0, paragraph 2 b/c).

26. Introduce the cam followers, previously lubricated, according to the marks made when dismantling.



27. Remove the screws holding the cylinder barrels (screw 3074-T).

28. Offer up the cylinder head.

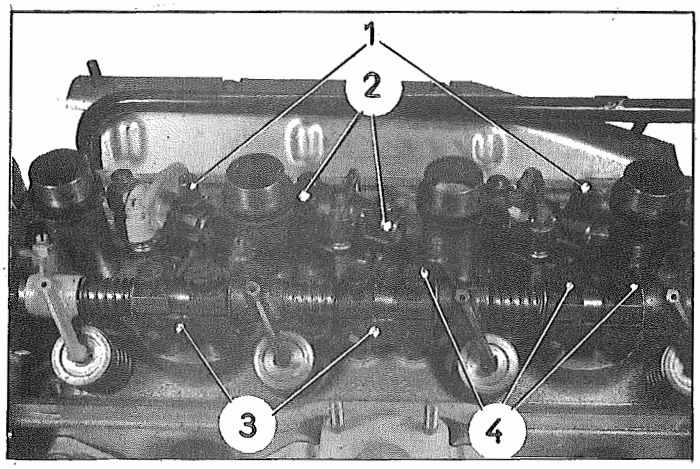
Make sure that the positioning dowels are in place in the cylinder block.

Fit the cylinder head gasket and the cylinder on the cylinder block.

29. Fit the rocker push-rods according to the marks made when dismantling.

The exhaust push-rods are the longer.

30. Fit the inlet rocker assembly with rocker supports (3) and the screws (4) securing the cylinder head.



Fit the ring seals between the inlet rocker supports and the cylinder head on the long screws (except on the front screw).

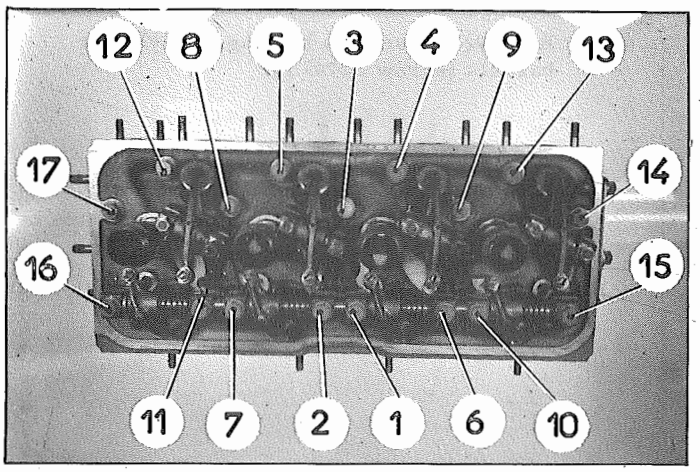
Position the cylinder head securing screws on the exhaust side.

Tighten the cylinder head screws to 29 ft.lbs (4 m.kg).

Fit the exhaust rocker assemblies, the oil hole towards the bottom and towards the valve. Fit the caps (2).

Tighten the nuts on the exhaust rocker securing studs to 18 ft.lbs ± 2 (2.5 ± 0.3 m.kg).

NOTE:- The rear nuts (1) securing the rocker assembly of No.1 and No.3 cylinders are replaced by screws with recessed head, tapped, which serve also for securing the cylinder head.

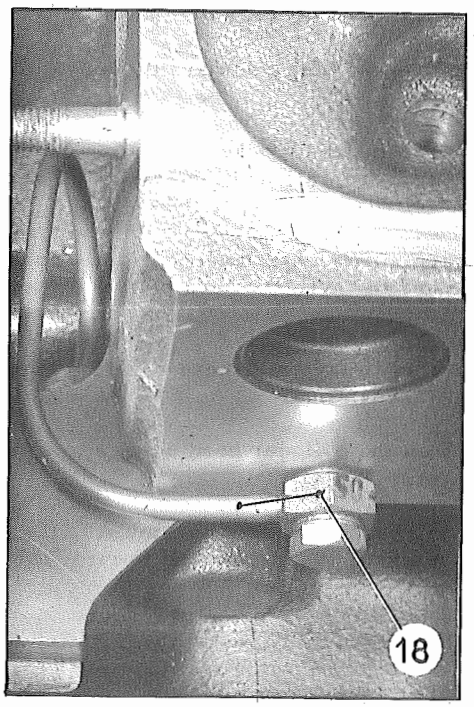


31. Tighten the screws holding the cylinder head.

    Observe the order of tightening shown.

    1st tightening 29 ft. lbs (4 m. kg).
    2nd tightening 43 ft. lbs (6 m. kg).

During tightening, make quite sure that the spherical ends of the tappet adjusting screws are correctly seated in the sockets of the rocker push-rods.



32. Connect up the lubrication pipe (18) for the valve rocker gear.

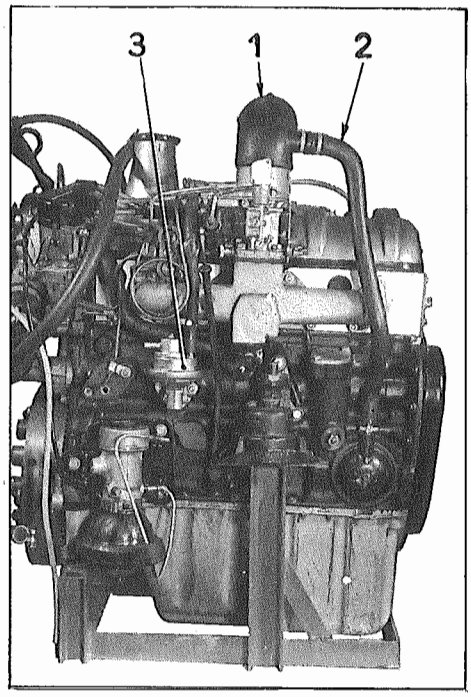
    Insert the double gasket.

33. Adjust the valve rocker clearance (see Op. DX. 112-0).

34. Fit the cylinder head cover.

    a) Fit the gasket on the cylinder head cover.

    b) Fit the cylinder head and tighten the screws (brass washer under the heads) to 5.5 ft. lbs (0.75 m. kg).



35. Fit the rubber union (1) to the air filter and the flexible pipe (2) between the air filter and breather.

36. Fit the petrol pump (3) (see Op. DX.173-1).

37. Fit:
    - the feedpipe between petrol pump and carburettor,
    - the pipe assembly for the clutch re-engagement control, inserting the seal plate.

38. Couple the gearbox to the engine. (See Op. DX.100-2).

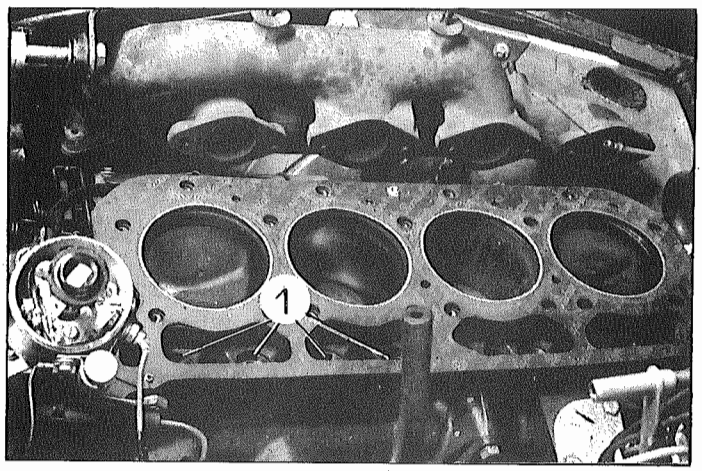
39. Fit the engine-gearbox assembly in the vehicle, (see Op. DX.100-1).

REPLACING THE CAM-FOLLOWERS

Removal.

40. Drain the cooling system (radiator and cylinder block). Save the liquid which contains anti-freeze.

41. Remove the cylinder head, (see Op. DX.112-1).



42. Free the cam-followers (1) from their housing. If necessary, use extractor 1608-T.

Assembly.

43. Fit the cam-followers (1), previously lubricated, in place.

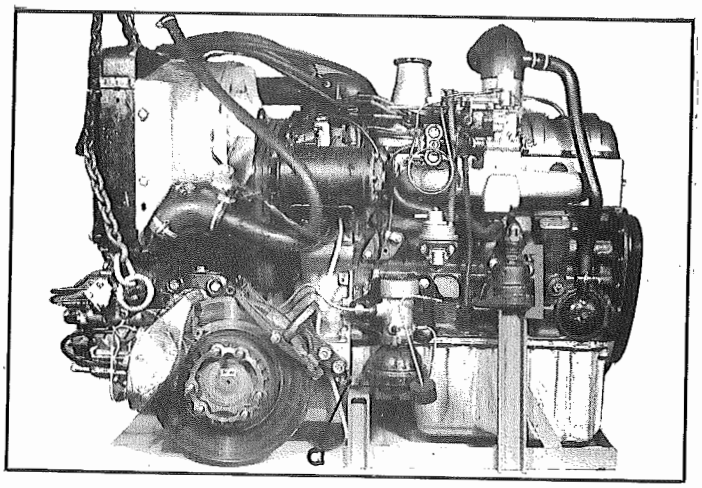
44. Offer up the cylinder head. (See Op. DX.112-1).

45. Fill up the radiator, with the heater valve open.

Check the unions for leaks (oil, water).

46. Adjust the idling. (See Op. DY.142-0).

ADJUSTMENT.

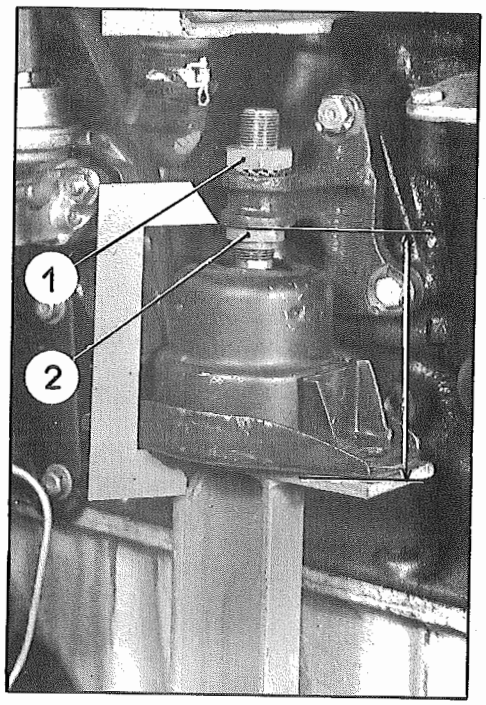


NOTE: The adjustment of the rear flexible mountings must be made under load: the engine complete in running order and resting on its four support points.

1. Place the engine-gearbox assembly on stand 3083-T.

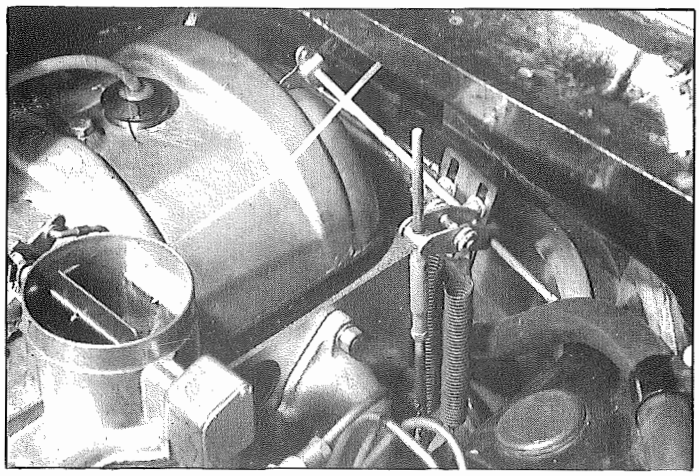
Raise the engine-gearbox assembly by the ends of the front crossmember in order to free the front end of the crankcase from the engine stand at "a".

The engine-gearbox assembly will then rest only on its four support points.



2. Adjust the nuts (2) so as to obtain a dimension of $L = 91 \, {}^{+2}_{0}$ mm on each flexible mounting (this measurement will be made using template MR 3725-110).

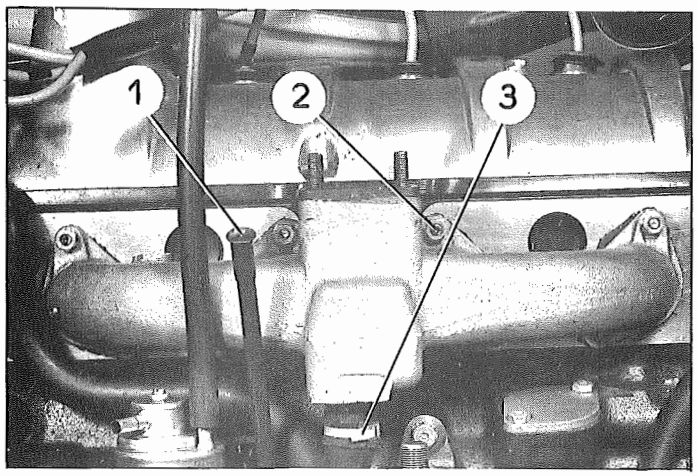
Tighten the nuts (1) to 72 ft/lbs (10 m.kg).



REMOVAL.

1. Drain the water from the radiator and cylinder block (save this water as it contains anti-freeze).
2. Disconnect the negative terminal of the battery.
3. Remove the clutch re-engagement control (see Op. DX. 314-1, para. 44 onwards).
4. Remove the carburettor (see Op. DX. 142-1, paragraphs 2 to 5).
5. Remove the accelerator control relay from its mounting on the scuttle, turn it round sideways, and allow it to rest there.
6. Remove the oil dipstick and its guide (1).
7. Remove the 8 nuts securing the manifold.
   Separate the manifold from the head as far as possible.
   Remove the 2 studs (2).
   Remove the manifold.
8. Disconnect the hot-spot hose (3) from the manifold.
9. Remove the gaskets.

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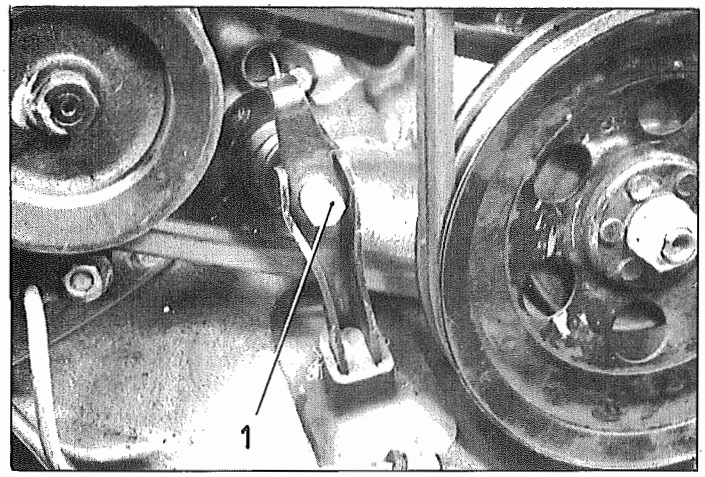
ASSEMBLY.

10. Offer up the gaskets.
11. Connect the hot-spot hose (3).
12. Offer up the manifold.
    Offer up the studs (2) smeared with hermetic (red).
    Place the manifold in position.
    Tighten the securing screws.
13. Fit the carburettor (see Op. DX. 142-1, paragraphs 6 to 7).
14. Fit the clutch re-engagement control (see Op. DX. 314-1, para. 47 onwards).
15. Fit the oil dipstick guide (1) and the dipstick.
16. Connect the accelerator control linkage.

NOTE: If there is any stiffness in the accelerator control, check the alignment of the carburettor with the clutch re-engagement control (see Op. DX. 142-1).

17. Fill up the radiator.
    During this operation, open the heater tap and bleed the water circuit.
18. Connect the negative terminal of the battery.
19. Adjust the idling (see Op. DX. 142-0).

Corrective No. 1



NOTE: It is essential to proceed in the following order :

Adjustment of the clutch clearance.

1. Pre-adjustment :

NOTE: The engine must be hot. Any adjustment made with the engine cold may be incorrect when the engine is hot.
Run the engine at idling speed.
Put the starting handle extension in position.
Unscrew the adjusting screw (1) of the clutch fork by fractions of a turn at a time until the starter handle extension just begins to turn but may be stopped by hand.

2. Adjustment.

Tighten the screw (1) two turns.

Adjustment of the slow running.

NOTE : This adjustment must be carried out with the engine hot.

3. Screw in fully, without forcing, the accelerated idling adjusting screw (4).

4. Turn the secondary butterfly stop screw (2) until a speed of approximately 550 r.p.m. is obtained.

5. Turn the mixture screw (1) in one direction or the other, until the point of maximum speed is reached for the butterfly opening as above.

6. Slowly unscrew the stop screw (2) until a speed of 550 - 600 r.p.m. is obtained.

7. If the running is erratic, re-adjust the mixture screw (1) (do this very slowly).

NOTE: After each adjustment on the secondary butterfly adjusting screw (2), flip the throttle open slightly, manual clutch control in engaged position to ensure that the butterfly returns fully to the stop screw.

NOTE : The use of a tachometer is essential (mechanical tachometer 2434-T with drive 2423-T driven by the pulley of the high pressure pump), or an electric tachometer 2436-T connected to the outlet terminal (red terminal) of the coil.

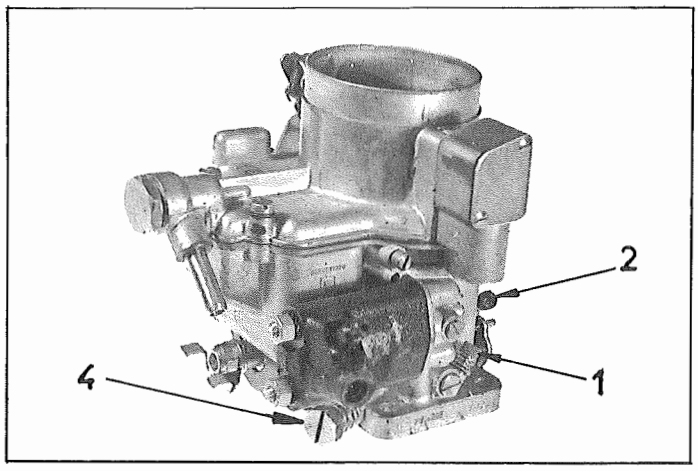
1) Mechanical Tachometer.

To compensate any error due to belt slip or to irregular running during the check, slacken the bleed screw of the pressure regulator, or place the manual height control lever in the low position.

2) Electric Tachometer.

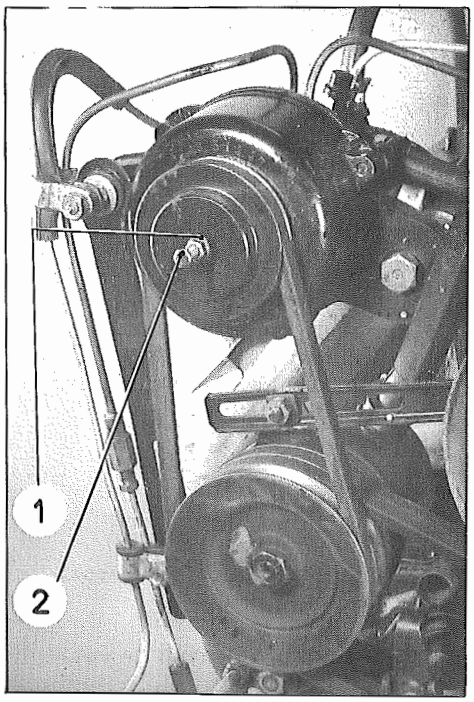
Electric tachometers should be checked periodically. They should conform to the following standards :

- dial of large diameter graduated from 0 - 1500 r.p.m. maximum,
- needle steady when in use.



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Corrective No.1



Adjusting the speed of clutch drag.

NOTE: This adjustment must be made with the engine hot and vehicle standing on flat horizontal surface.

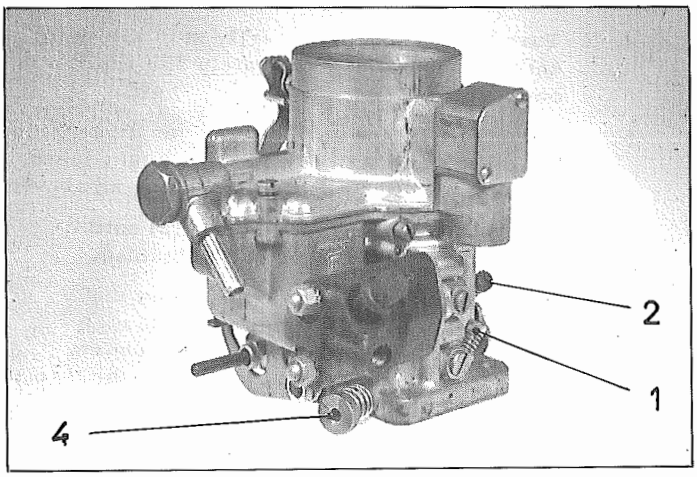
8. Start up the engine, engage first gear and accelerate very slowly. Clutch drag should commence between 700 and 750 r.p.m.

9. If it does not, proceed as follows :

   Stop the engine. Loosen the locknut (1) of the adjusting screw (2) on the centrifugal regulator. If the clutch "drags" at a speed less than 700 r.p.m., tighten the screw.

   Unscrew this adjusting screw if clutch drag begins at a speed greater than 750 r.p.m.

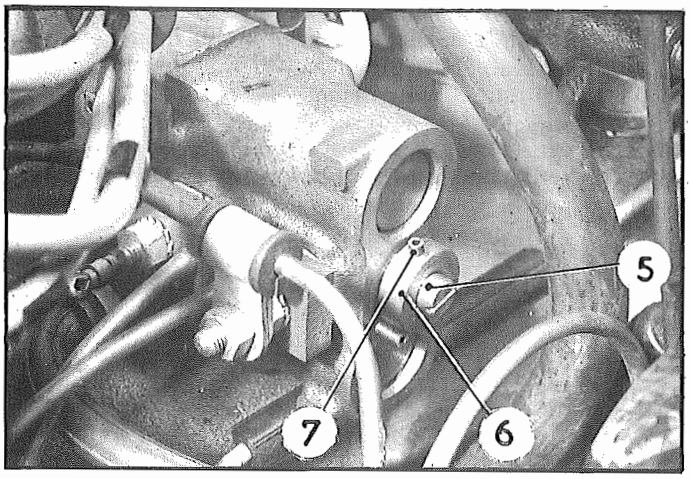
   Tighten the locknut (1).



Adjustment of accelerated idling.

NOTE: This adjustment must be made with the engine hot.

10. With the engine idling, unscrew the adjusting screw (4) of the accelerated idling until a speed of between 875 and 925 r.p.m. is obtained.

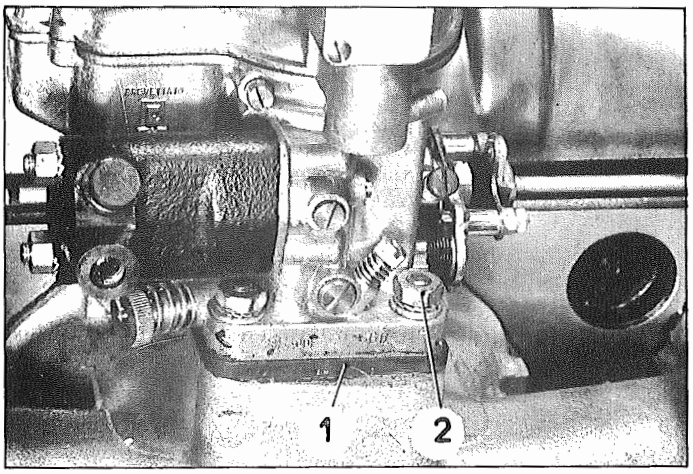


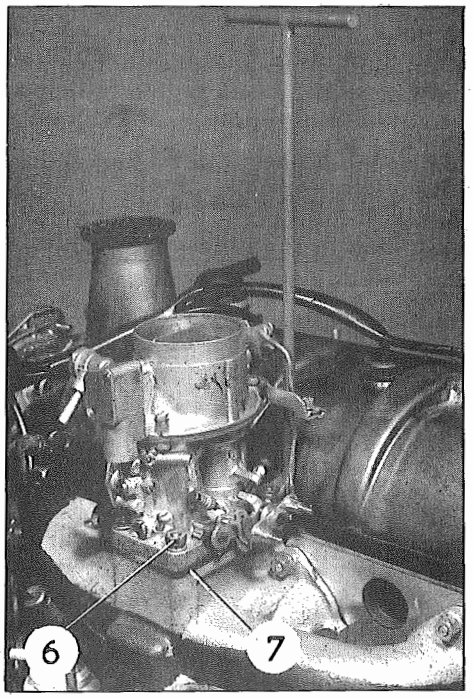
Adjustment of the clutch re-engagement control.

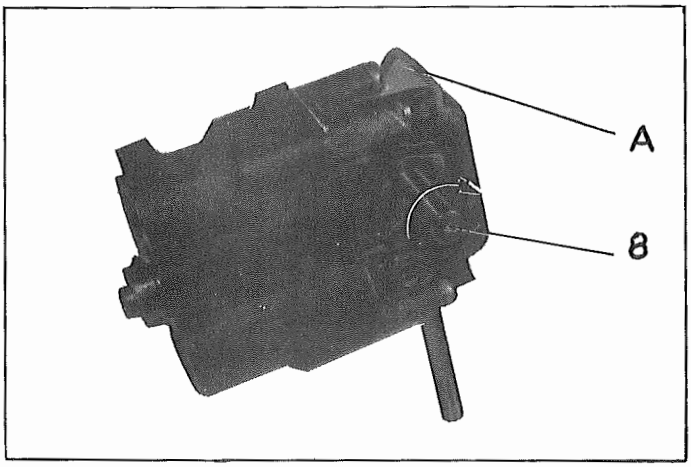
NOTE : This adjustment should be made on the road with the engine hot.

11. If the time for re-engagement is too short, unscrew the screw (5) (anti-clockwise direction). If the time is too long, tighten the screw (5).

    If the pin (7) contacts its stop before correct adjustment is obtained:-
    - slacken the screw locking the ring (6),
    - turn the ring and reposition it so as to afford the maximum adjustment in both directions,
    - tighten the screw.







REMOVAL.

1. Release the pressure in the brake circuit (see Op. DX.00).

NOTE: To avoid having to "set" the clutch re-engagement control:
- remove the plug from the setting hole, and insert the pin (A) in this hole.

2. Disconnect :
   - the petrol feed pipe (4) from the carburettor,
   - the air intake elbow (1) from the carburettor,
   - the choke control (2),
   - the feed pipe union (3) from the accelerated idling device,
   - the drive-flange (5) for the clutch re-engagement control on the carburettor spindle.

3. Disconnect the throttle relay from the carburettor.

4. Remove the 4 nuts (6) securing the carburettor on the manifold. Use spanner 3081-T for nuts on engine side.

5. Remove :
   - the carburettor,
   - the cruciform control trunnion for the clutch re-engagement control,
   - the distance piece (7),
   - the flector.

ASSEMBLY.

6. Setting the clutch re-engagement control.

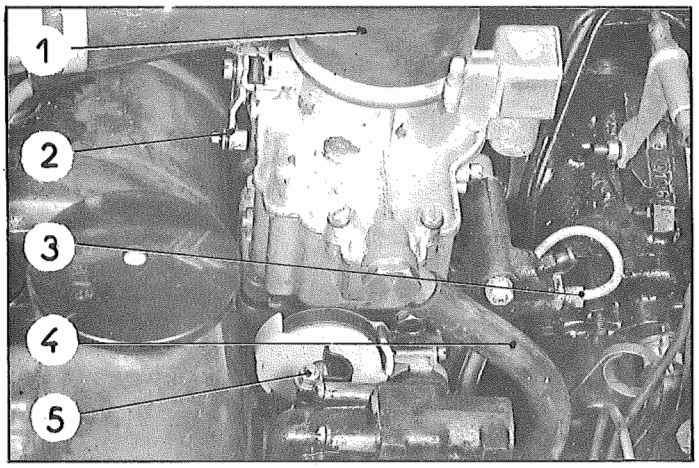
NOTE: This operation is not necessary unless the re-engagement control has been renewed or if the instructions given above, under para. 1 were not carried out.

a) Remove the plug from the "setting" hole.

Insert the pin (A) in this hole. Turn the spindle (8) of the re-engagement control in the direction of the arrow until a slight spring resistance is felt; overcome this resistance until the stop is reached.

Then turn back through approximately 30° until the pin (A) enters fully.

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7. Fit the carburettor with the cruciform control trunnion for the clutch re-engagement control. Insert the spacer (1).

8. Fit and tighten the nuts (2) securing the carburettor. (Use spanner 3081-T).

9. Align the clutch re-engagement control. (See Op. DX.314-1, para. 48).

10. Fit the Flector.

Remove the carburettor.

Pull back fully the control lever of the clutch re-engagement control and fit the flector on the control lever.

Fit the carburettor, inserting the spacer (1) smeared with jointing compound (or hermetic).
Fit and tighten the 4 nuts (2) (plain and shakeproof washers) using spanner 3081-T).

Connect up the throttle control relay.

Set the throttle in the "idling" position.

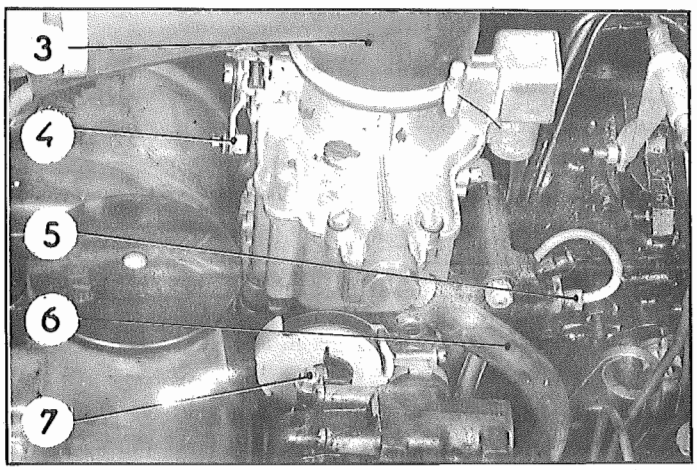
Fit the flector on the carburettor control lever.

Allow the flector an end float of 0.5 mm, then tighten the clip (7) on the control lever.

Withdraw the pin (from clutch re-engagement control) and insert the plug.

NOTE: Move the throttle control to "Maximum permitted opening" so as to engage the clutch re-engagement control spindle.

Hold the clutch re-engagement control spindle in this position. Releasing the throttle control, the carburettor butterfly valve should return to the idling position. If it does not return, check the alignment (vertical and horizontal planes) of the spindles of the carburettor and clutch re-engagement control.



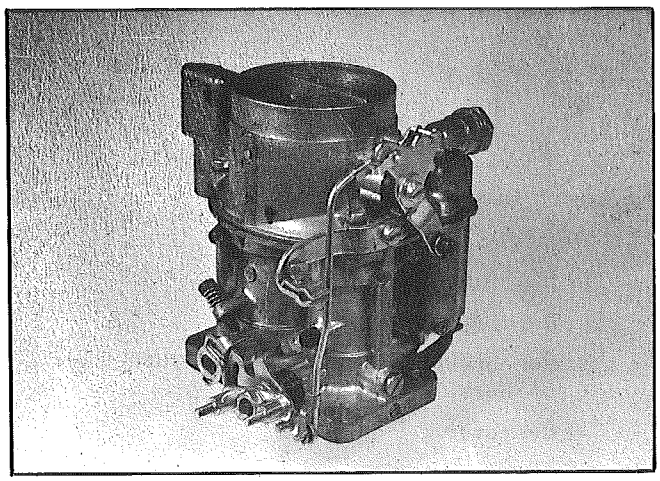
11. Connect up :

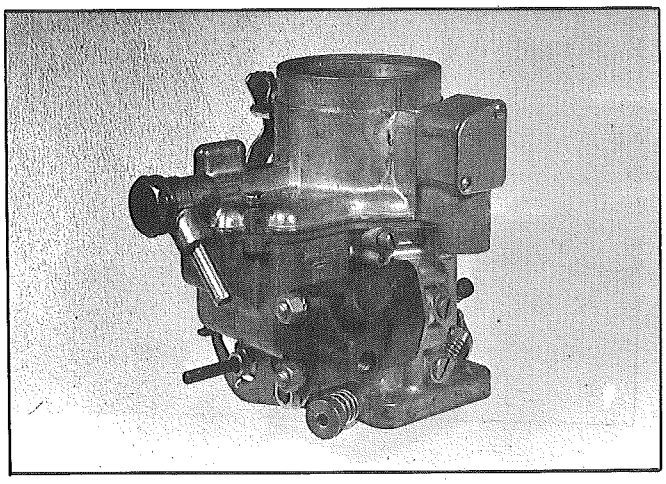
- the choke control (4),
- the feedpipe for the accelerated idling device (5),
- the petrol feed hose (6),
- the air intake hose (3).

12. Adjust the idling. (See Op. DX.142-0).

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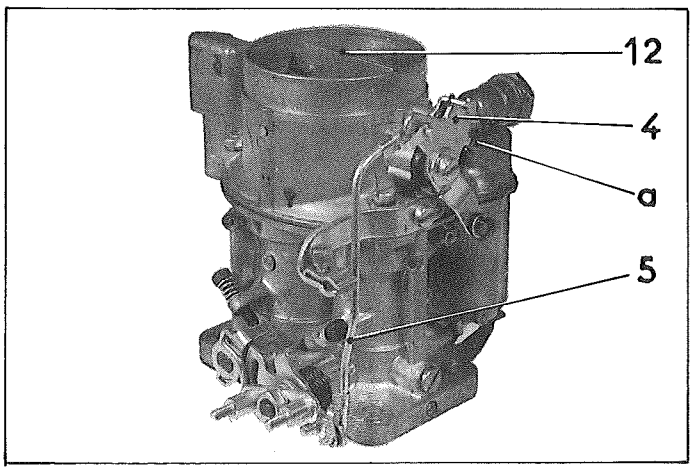
SETTINGS

Carburettor WEBER 28/36 DDE and 28/36 DDE A1

	Primary Bore	Secondary Bore
Venturi diameter	23	27
Main jet	130	175
Air correction jet	155	155
Emulsion tube	F16	F16
Diffuser	3.5	3.5
Idling jet	50	70
Air idling jet	185	85

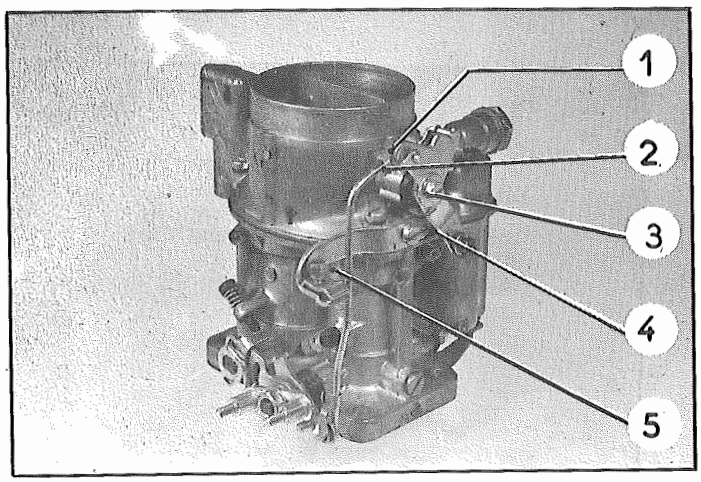
	Primary Bore	Secondary Bore
Progression holes	80 dia.	90 dia.
	90 dia.	120 dia.
	120 dia.	170 dia.
Brass float	11 grammes	
Needle valve	175	
Accelerator pump injector	60	
Pump overflow valve	55	

With the strangler flap in the "closed" position: there must be a clearance of 0.90 mm between the edge of the primary butterfly and the bore.



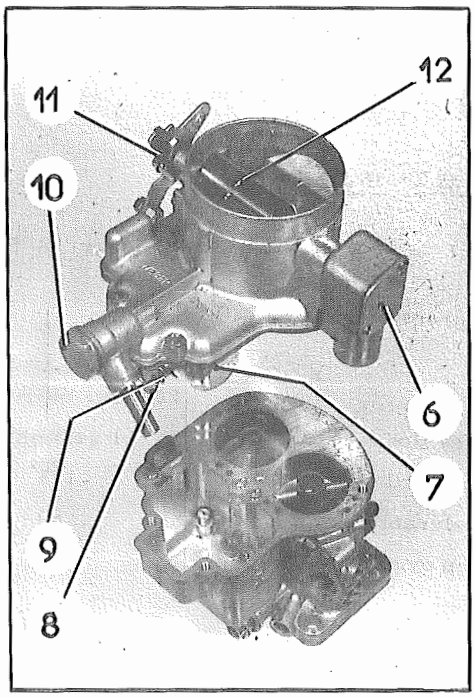
If this clearance is not obtained, check that:

- the connecting rod (5) is not twisted,
- the lug (a) which carries the end of the return spring of lever (4) controlling the strangler flap (12) is not deformed.



DISMANTLING.

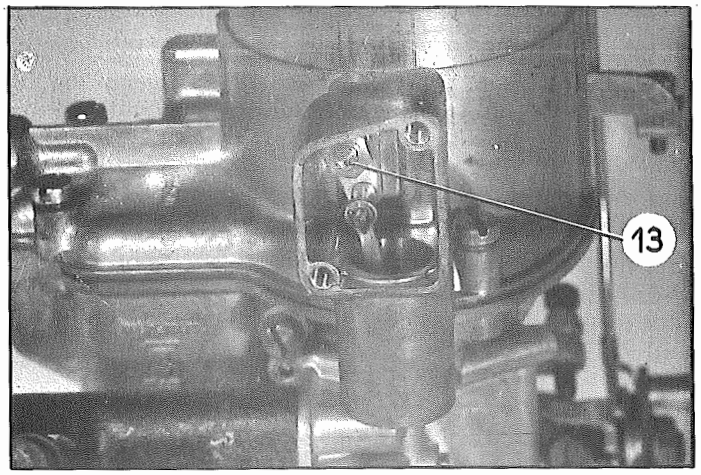
1. Remove :
   - the clips (2),
   - the ring seals (1),
   - the connecting link (5) with its shouldered washers,
   - the cover.

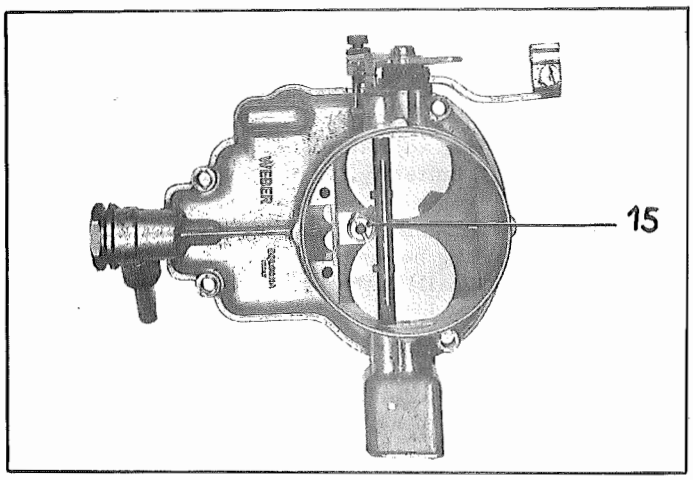


2. Stripping the cover.

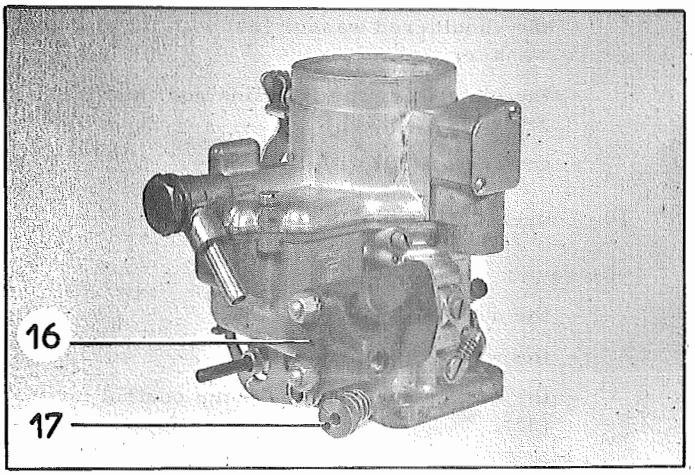
a) Remove :
   - the spring clip (9) holding the float,
   - the spindle (8) of the float,
   - the float (7),
   - the paper joint,
   - the needle with its joint,
   - the plug (10) and the filter,
   - the plate (6) covering the strangler control piston, and its paper joint,
   - the locknut (13), the nut and the flat washer securing the link arm of the strangler control piston,
   - the screw (3),
   - the return spring (11) of the strangler (12),
   - the control lever (4) of the strangler, with its return spring.

b) Disconnect :
   - the strangler (12),
   - the strangler spindle with its expanding washer,
   - the strangler control piston.

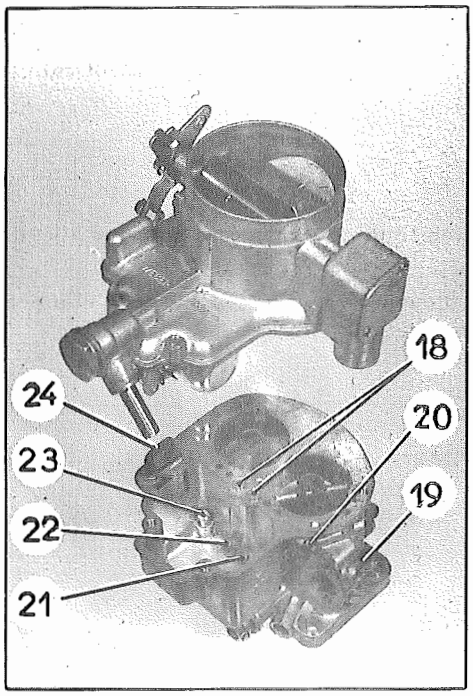




3. Remove :
   - the atomizer (15) for the accelerator pump.



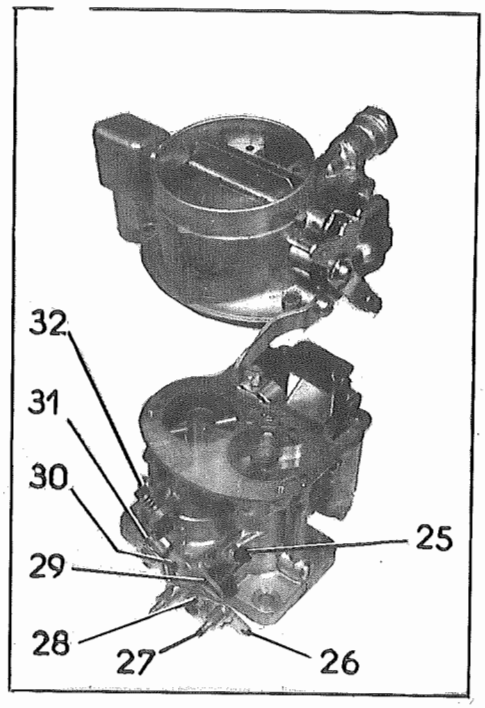
4. Remove (on carburettor 28/36 DDE only) :
   - the accelerated idling control (16) with its valve mechanism, complete,
   - the adjusting screw (17) for accelerated idling speed with its spring.



5. Remove :
   - the main jets (22) and (21),
   - the non-return valve (23) for the accelerator pump,
   - the correction jets (18).

6. Free :
   - the emulsion tubes under the correction jets (18),
   - the accelerator pump piston (24) by pulling its elbowed lever.

7. Remove :
   - the mixture control screw (19) for idling, with its spring,
   - the slow running jets (20).



8. Remove :

   - the idling adjusting screw (32) for the second (large) butterfly, with its spring.

IMPORTANT NOTE : Under no circumstances must anything be done to the stop screw (25) for the first (small) butterfly, individual adjustment of this screw having been carried out by Messrs. WEBER on each carburettor.

9. Unlock the nut (28).

Remove :

   - the control lever (27) of the butterflies,
   - the control lever (26) of the connecting link,
   - the shouldered washer (29) with its expanding washer,
   - the pin holding the interlink rod, and the interlink rod (31),
   - the sector (30) with its spring.

10. Loosen the nut (34).

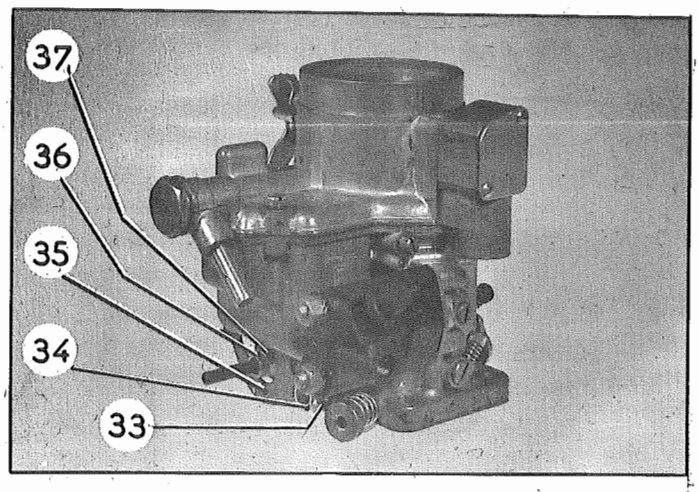
Remove :

   - the nut (34),
   - the washer (33),
   - the circlip securing the pump control lever (35),
   - the pump control lever (35).

11. Loosen the nut (36).

Remove:

   - the accelerator pump control cam (37).



NOTE : 1. - Any dismantling of the carburettor must be limited to the operations described above, otherwise it may be rendered unusable.

2. - Remove the plugs, clean the parts in petrol and blow out very thoroughly with compressed air the passages in the carburettor and the various jets.

3. - Before assembling the carburettor, check :

   - the state of the needle of the idling mixture screw,
   - the accelerator pump non-return valves for leaks,
   - the needle valve for leaks,
   - the float.

Never use metal wire for freeing the jet orifices.

ASSEMBLY.

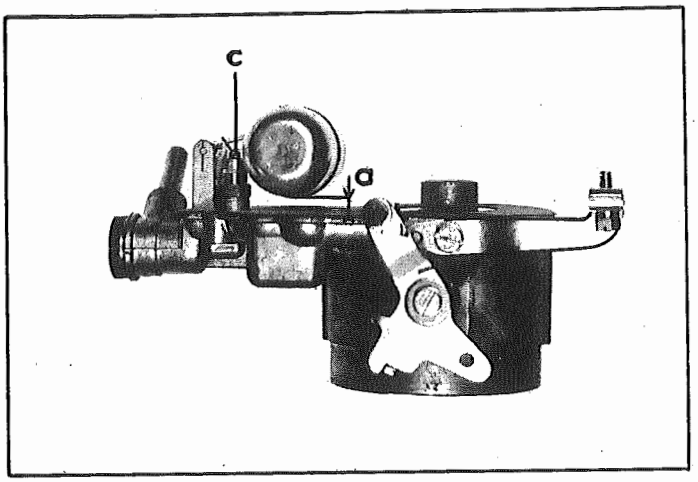
Proceed in the inverse order of dismantling.

NOTE :

Fit the corresponding jets to each chamber :

Primary chamber : main jet = 130

Secondary chamber : main jet = 175.

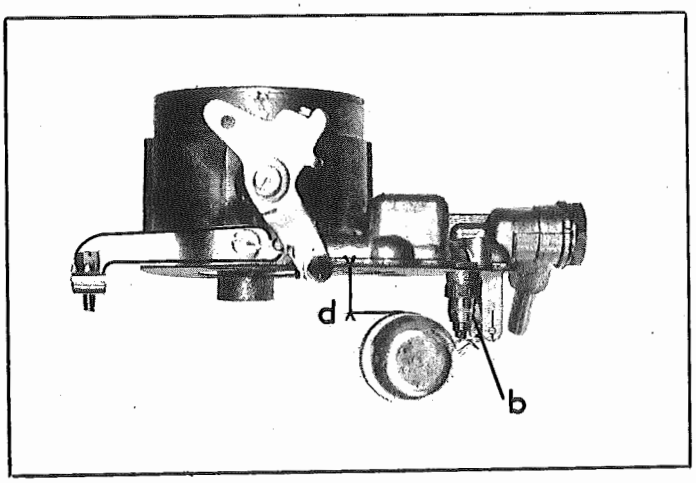


12. Adjusting the float level.

a) In the needle closed position.

Turn the cover over, the distance (a) between the float and the cover gasket must be 4.75 ± 0.1 mm.

If it is not, adjust the tongue "c" which should be, in this position, parallel to the cover joint face and at a distance of 19.75 mm from the paper joint.



b) With needle valve in fully-open position.

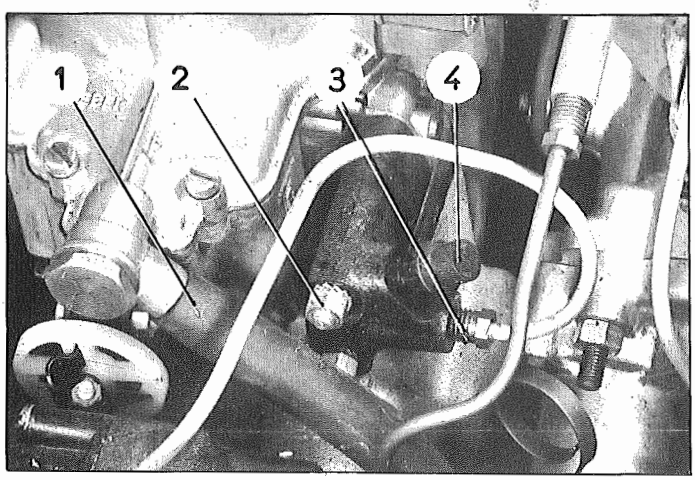
Place the cover in its normal position, and the distance "d" between the float and the cover joint should be 11.5 ± 0.1 mm.

If not, adjust the tongue "b".

NOTE : The overhaul of a carburettor 28/36 DDE-A1 is identical with that of carburettor 28/36 DDE; however, carburettor 28/36 DDE-A1 is not fitted with an accelerated idling device:- mechanism (16) and screw (17).

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REPLACEMENT OF AN ACCELERATED IDLING DEVICE.

REMOVAL.

1. Release the pressure in the circuit (see Op. DX.00).

2. Disconnect:
   - the petrol pipe (1) from the carburettor,
   - the pressure feedpipe (3).

3. Loosen the nuts and the studs (2).

   Withdraw the accelerated idling device towards the front.

ASSEMBLY.

4. Offer up the accelerated idling device on the carburettor.

   Insert the studs and tighten the nuts (2).

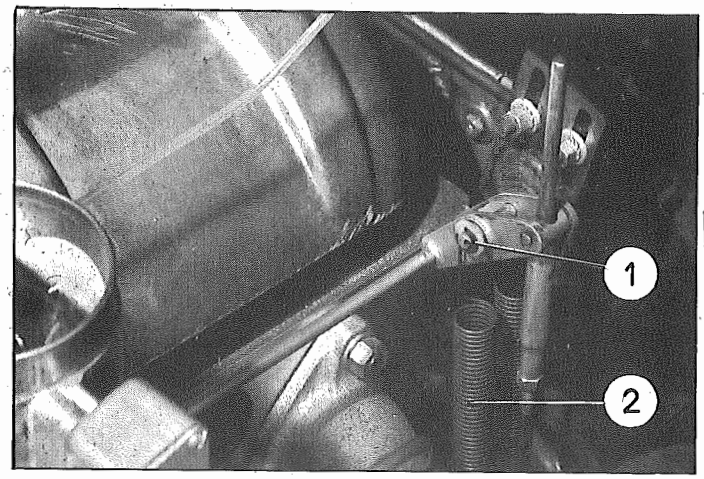
5. Connect up:
   - the pressure feedpipe (3) to the device,
   - the petrol delivery pipe (1) to the carburettor.

6. Bleed the corrector by the bleed screw (4) (see Op. DX.453-0).

NOTE: Check for leaks by depressing the brake pedal for a few moments.

7. Check the idling adjustments and the clutch drag (see Op. DX.142-0).

REPLACEMENT OF A CONTROL RELAY.



REMOVAL.

8. Disconnect the two springs (2) of the accelerator control.
9. Disconnect the carburettor control crosshead.
10. Free the relay (1).

ASSEMBLY.

11. Fit the relay (1), first smearing the spindle with graphite grease.

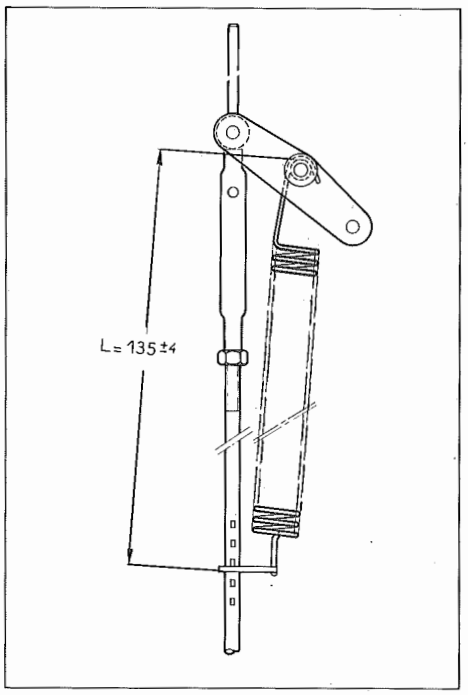
    Connect the crosshead to the carburettor.

NOTE: Check the alignment.

12. Connect up the two control return springs (2).

    Adjust the tension of the springs (see Fig. herewith) to obtain dimensions L = 135 $\pm$ 4 mm.

13. Adjust the idling (see Op. DX.142-0).



REPLACING A CARBURETTOR PEDAL.

Removal.

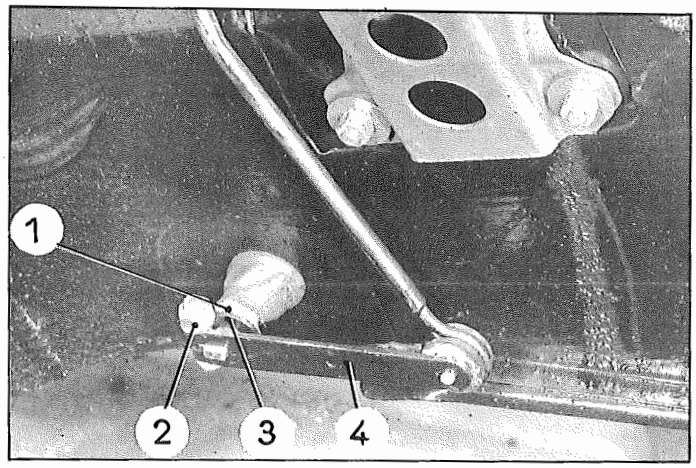
14. Place the vehicle on a lift or over a pit.

15. Loosen the nut (2) on the screw securing the lever (4) on the pedal spindle.

Free:

- the operating lever (4),
- the thrust washer (3) on the pedal spindle,
- the anti-rattle felt washer (1) on the pedal spindle.

16. Free the accelerator pedal from the bearing by pushing on the end of the spindle; if necessary, use a small brass drift.



Assembly.

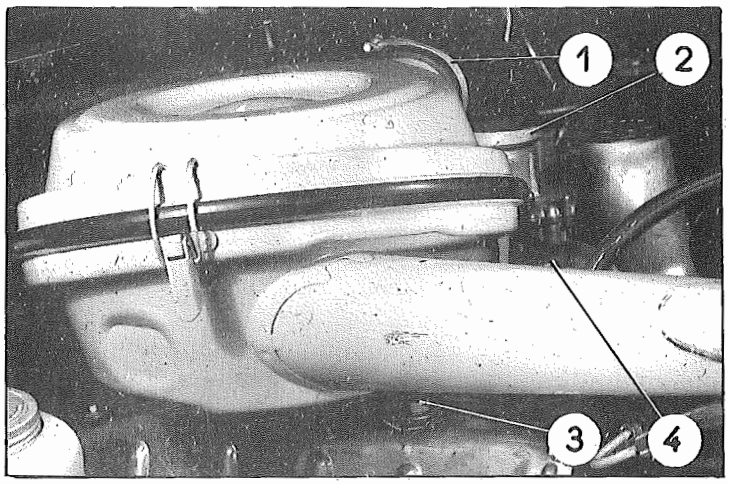
17. Fit the spindle for the accelerator pedal, previously lubricated, in the bearing. Hold the pedal in the high position.

18. On the pedal spindle place the following:

- the felt washer (1),
- the plain washer (3),
- the operating lever (4).

19. Fit the securing screw on the lever and tighten the nut (2) (plain washer).

20. Disconnect the air delivery hose and ensure that the butterfly valves open and close correctly.



REMOVAL.

1. Remove the hose clips (1) and (2) from the air hose.

   Disconnect the air hose.

2. Remove the 2 nuts (3) securing the air filter on the exhaust manifold.

3. Remove the air filter.

ASSEMBLY.

4. Offer up the air filter.

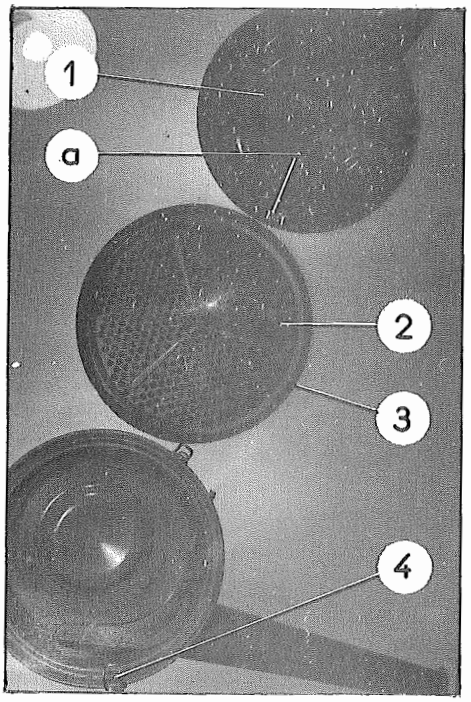
   Connect the oil vapour intake (4) to the cylinder head cover.

   Tighten the nuts (3).

5. Connect the air hose on the filter, and then on the carburettor.

   Tighten the clips (1) and (2).

OVERHAULING AN AIR FILTER, "MIOFILTER" TYPE.



DISMANTLING.

IMPORTANT: Clean the filter element every 6000 miles approximately (10,000 km.).

1. Release the 3 catches.

   Raise the upper cover (1).

   Remove the filter element (2).

2. Clean the parts in petrol.

   Blow the filter element out with compressed air, then immerse it in engine oil and allow it to drain.

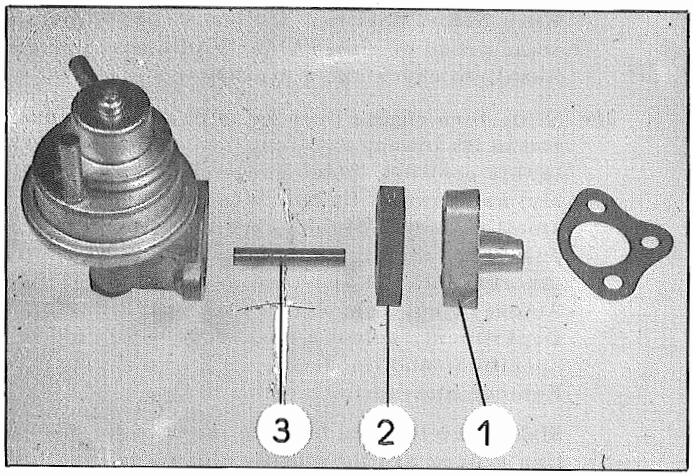
ASSEMBLY.

3. Make quire sure that the gasket (3) is correctly located on the filter element.

4. Fit the filter element in the lower part of the filter.

5. Fit the cover (1) placing the notch (a) in line with the clip (4).

NOTE: Make quite sure that the gasket (3) is properly embedded all round the circumference of the filter body.



REMOVAL.

1. Set height manual control in LOW position. Remove front left suspension sphere.

2. Disconnect pump to carburettor and petrol tank to pump rubber connections, at petrol pump.

Remove nuts fixing the pump.

Withdraw in order indicated :

- the fuel pump,
- insulating spacer (2),
- push rod (3),
- push rod guide (1),
- paper gasket.

FITTING.

NOTE:

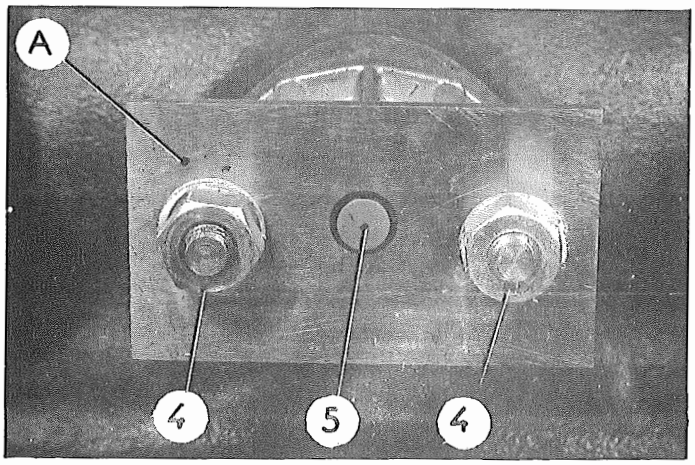
a) Petrol rubber connections are fitted without clips.

b) Push rods are supplied in three different lengths:

1) One reference groove on push-rod, length 48.06 mm (1.893 inch).
2) Two reference grooves on push-rod, length 48.57 mm (1.913 inch).
3) Three reference grooves on push-rod, length 49.08 mm (1.933 inch).

When replacing a pump by a new unit, there is no need of determining the length of the push-rod to be fitted.

This operation should be done only if it is noted that the petrol feed is not correct, or after having replaced the spacer, guide, cylinder block or engine.



3. Place in the order indicated :

- new paper gasket,
- push-rod guide (1),
- insulating spacer (2) (recess facing guide),
- push-rod (3).

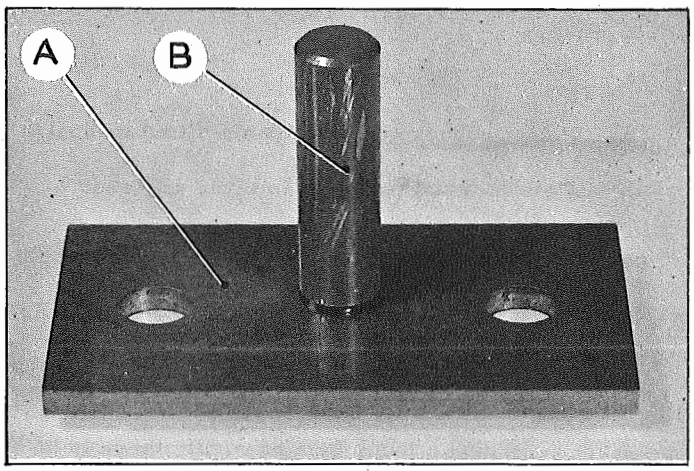
Fit plate (A) (3087-T) over pump mounting studs.

Place flat washers and then the nuts (4) over ends of studs and tighten between 21 to 28 mΛN (16 to 20 ft lbs).

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Two cases may occur :

1st. Turn engine over in order to bring the push-rod (5) to its outermost position.
When in this position the push-rod (5) must not stand proud of plate (A) (at maximum it may be flush), to check use a straight-edge.

2nd. Next, turn engine over so as to bring the push-rod in its lowest position.
In this position, place gauge (B) (3087-T assembly) as shown in figure. When the end of the small diameter of the guage bears upon the push-rod, the big diameter should not be inserted into the aperture in plate (A).
Amongst those supplied by the Spare Parts Department, select a push-rod, within above specified conditions.
Remove plate (A).

Make sure that the bearing faces of the insulating spacer are thoroughly clean.

Cars produced before April 1966.

Apply grease (special bearing grease) to the pump operating lever.

Cars produced since April 1966.

The pump end of the push-rod is oiled from the engine oil-circuit.
Do not put grease in the pump.

Apply non-setting sealing compound to the pump flange face and to the face of the push-rod guide in contact with the spacer.

4. Bring up and position the petrol pump, screw in the two fixing nuts simultaneously finger-tight, and then tighten down from 21 to 28 mΛN (16 to 20 ft lbs).

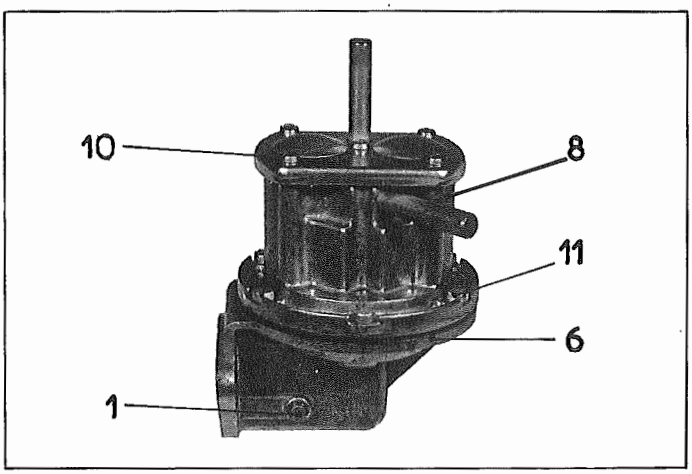
Connect rubber connections at pump fuel inlet and fuel outlet.

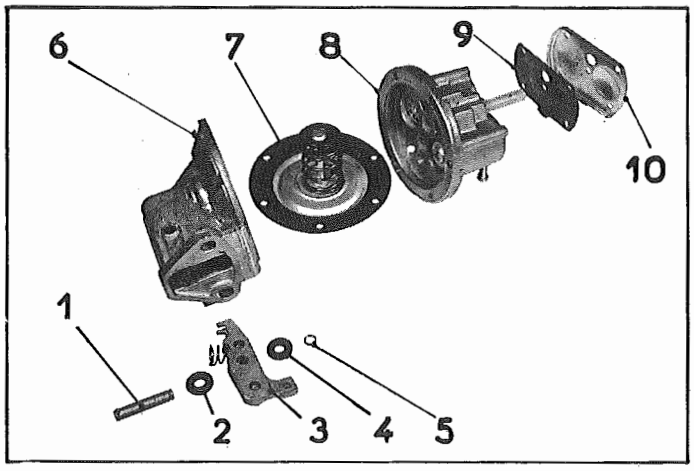
5. Fit the front left suspension sphere.

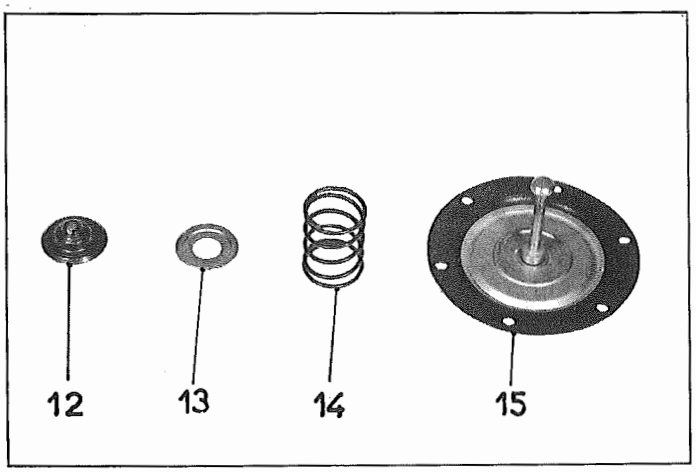
Set height manual control in NORMAL position.

Corrective No.

June 1966.







518.Add.1.

OVERHAULING A SEV. MARCHAL PETROL PUMP.

Removal.

1. Remove:
   - the cover (10) from the upper body (8),
   - the gasket (9) from the cover.

2. Loosen the screws (11).
Disconnect the upper body (8) from the lower body (6).

3. Remove the circlip (5).
Tap out the spindle (1) from the control lever.
Free:
   - the control lever (3) and its spring,
   - the washers (2) and (4),
   - the diaphragm-pushrod assembly (7).

4. Remove from the pushrod-diaphragm assembly (15):
   - the rubber cup (12),
   - the metal cup (13),
   - the spring (14).

5. Clean all the parts.
NOTE: The valves are clinched in the upper pump body. In case of faulty operation, it is necessary to replace the upper pump body.

Assembly.

6. On the pushrod-diaphragm assembly (15), place the following:
   - the spring (14),
   - the metal cup (13),
   - the rubber cup (12).

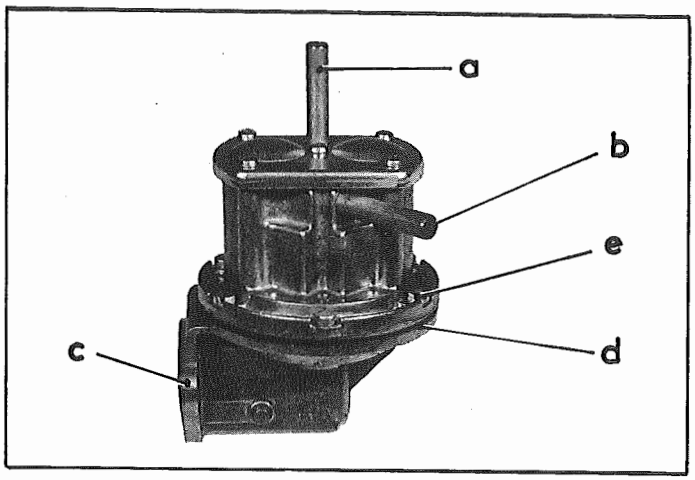
7. Place this assembly (7) inside the lower pump body.

8. Engage the control lever (3) on the pushrod.
Fit the two washers (2) and (4).
Fit the spindle (1) in the control lever.
Fit the circlip (5).

9. Connect the lower body (6) to the upper body (8).
Tighten the screws (11).

10. Place in position the gasket (9) for the cover.
Fit the cover (10).

11. Check for leaks (paras. 12 and following, this operation).



CHECKING FOR LEAKS.

12. Close the carburettor feed hole "a" with a plug.

Fit a rubber tube to the suction hole "b".

13. Submerge the pump completely in a vessel containing clean petrol.

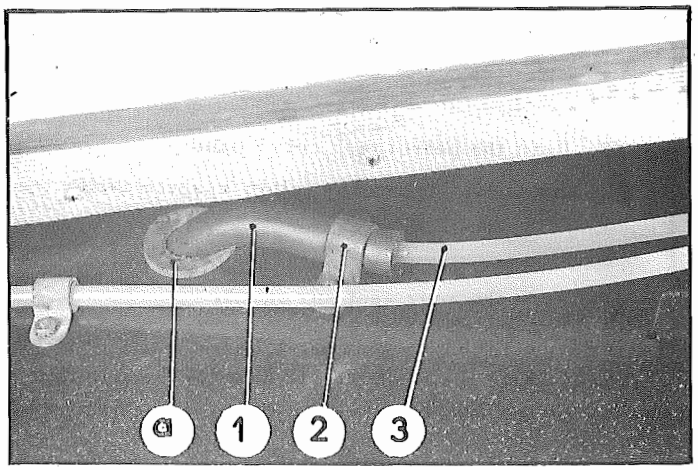
14. Through the tube connected to the hole "b" blow compressed air at a pressure of 1.5 to 4.5 p.s.i. (100 - 300 g/cm^2).

15. To begin with, some bubbling may occur, due to the action of the diaphragm.

Maintain the pressure for a few seconds.

If bubbles of air escape via the hole for the control lever at "c" it means that the diaphragm is leaking, and it must be renewed.

If air bubbles escape between the contact faces of the upper body and the lower body at "d" or round the securing screws at "e" it means that the joint faces are defective or that the screws are not sufficiently tight.



REMOVAL.

1. Put the front of the car on stands (jacking bracket 2505-T).

   Remove:
   - the right-hand front wing and the side protection panel.
   - the finishing panels and the sidemember.

2. Loosen the fixing screws and remove the rubber protectors from the clips (2) holding the petrol feedpipe (3) on the sidemember, the front unit panel and the front crossmember under the engine.
   Free the tube and supporting clips.

3. Remove:
   - the squab and rear seat,
   - the petrol tank cover panel.

4. Free the petrol feedpipe (3) with its rubber tube (1), from the tank and from the opening in the rear part of the sidemember.

5. Free the rubber pipe (1) connecting the pipe to the tank from the petrol feedpipe.

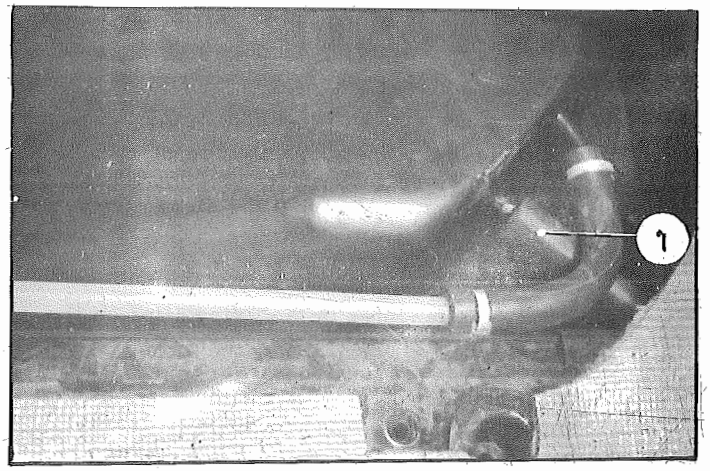
Disconnect the front union from the petrol pump and remove this union from the feedpipe.

6. Free the front part of the feedpipe from the front crossmember under the engine, the right-hand sidemember and the side panel.

7. Free the pipe from the sidemember by pulling towards the front.

8. Plug the front and rear ends of the feedpipe.

Drain the tank via the drain plug on the right-hand side.

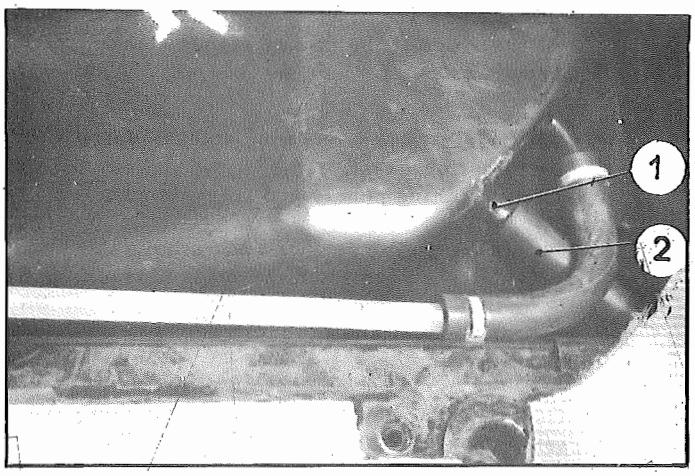


ASSEMBLY.

9. Insert the rear part of the tube through the hole in the closing panel and pass the pipe through the supporting clips (2) on the side-rail.

10. With the reduced diameter of the feedpipe (3) towards the rear, slide the rubber connecting pipe (1) towards the front of the narrow part of the feedpipe so that the end of the connecting pipe (1) is 370 mm from the end of the feed-pipe (3).

Use only talcum powder to make the tubes slide freely.



11. Insert the end of the feedpipe in the petrol tank and engage fully the rubber pipe (2) on the petrol tank union tube (1).

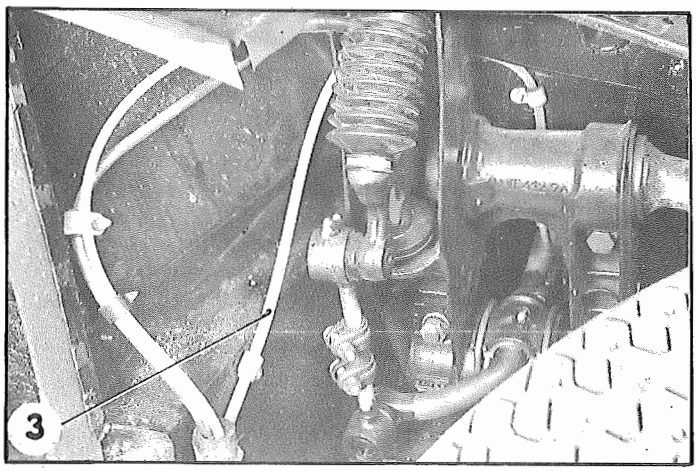
12. Cut the rear end of the feedpipe obliquely, close to the bottom of the tank and fit the drain plug (insert the gasket).

13. Refit the petrol tank cover panel.

Tighten the fixing screws (plain washers under the heads).

14. Refit the rear seat and squab.

15. Engage the front part of pipe (3) through the opening in the closing panel.



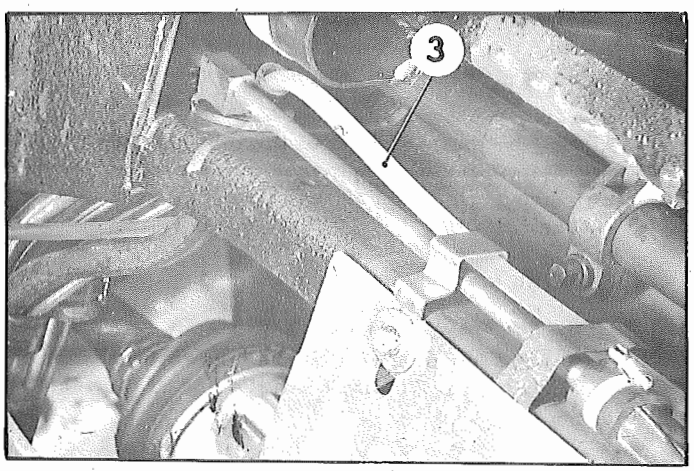
16. Fit the feedpipe under the clips on the right-hand sidemember (insert the rubber protectors), tighten the screws holding the supporting clips.

17. Fit the finishing under the sidemember.

Tighten the screws (plain washers under the heads).

18. Place the front part of the feedpipe against the closing panel, then behind the front axle arm bracket, against the sidemember and in the front crossmember under the engine.

Then insert the pipe through the opening on the left-hand side of the lower part of the cross-member.



19. Fit the rubber coupling sleeve to the petrol pump on the front end of the feedpipe. Fit the pipe in the rubber sleeve using talcum to facilitate entry. Connect the sleeve to the petrol pump.

20. Place the feedpipe in the fixing clips on the front closing panel of the sidemember, the front crossmember under the engine (insert the rubber protectors). Fit the drain plug and insert the filter in the feedpipe (Rilsan).

21. Fit the side protection panel and the right-hand front wing.

Lower the car to the ground.

Fill up the petrol and prime the petrol pump.

NOTE :-

a) This repair can be effected by fitting a sleeve on the piping.

b) If a pipe requires two sleeves, they must be at least 800 mm apart in order to maintain flexibility.

c) Obtain a bottle. of Rilsan adhesive (60 cm3) sold by Société Boyriven, 37 bis rue de Villiers, Neuilly sur Seine 75 Tel. MAIllot 36.11.

(Rilsan adhesive attacks the skin. Do not touch it with the fingers but use a wooden spatula).

1. Cut the piping to be repaired and roughen the two ends, for a length of about 90 mm, using abrasive paper No. 600.

2. Using trichlorethylene carefully degrease the roughened ends, as well as the sleeve.

3. Using a hot-water bath, heat the Rilsan adhesive to about 60°C.

   Do not exceed this temperature.

NOTE:- This operation is indispensable in order to reduce the drying time.

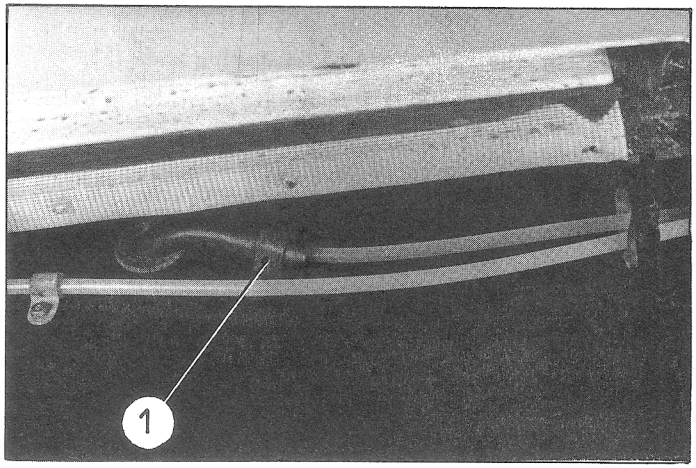
4. Smear the adhesive on the two roughened ends of the tube and also inside the sleeve.

Allow the parts to dry for a few minutes.

Insert the ends of the tubes in the sleeve.

Allow this assembly to dry for 3 or 4 hours before using it.

REPLACING A PETROL TANK



Removal.

1. Drain the tank.

Remove the plugs from the right and left ends.

2. Free and remove the rear squab and cushion.

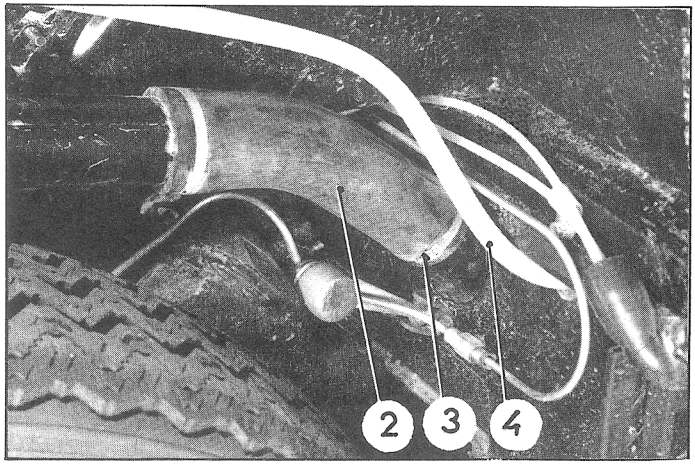
Remove the petrol tank cover panel.

3. Remove the rear closing panel under the right-hand cant rail.

Remove the clip (1) securing the feed hose.

4. Disconnect:
   - the air vent hose from the tank,
   - the feed hose from the tank and free the feedpipe from the tank.

Plug the holes in the tubes and in the tank.



5. Remove the rear right-hand wing and mudshield.

Clean the area to be worked on, around the tank filler holes.

Remove the front clip (3) and disconnect the hose (2) from the reservoir (4).

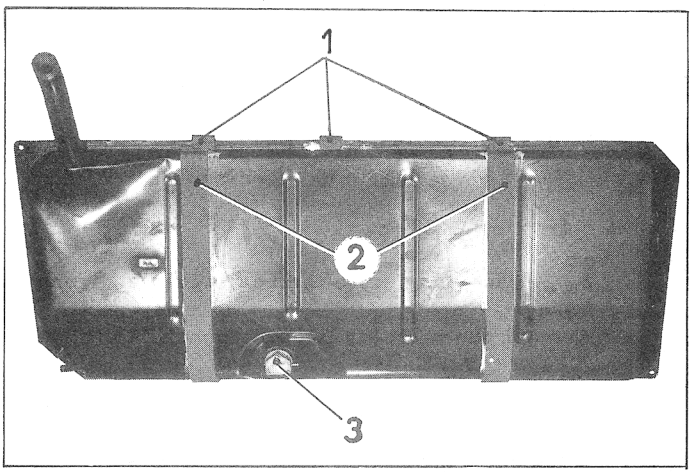
Plug the holes in the tank and in the hose.

6. Disconnect the negative cable from the battery.

Disconnect the leads from the terminals of the petrol gauge tank unit.

7. Turn down the clips holding the packing for the petrol tank and remove the packing.

Remove the securing straps from the tank and the packing. Free the tank.



8. Stripping the tank.

Remove:

- the petrol gauge tank unit (3),
- the rubber sound deadening pads (1),
- the protection strips (2) from the tank.

Fitting.

9. Assembling the tank.

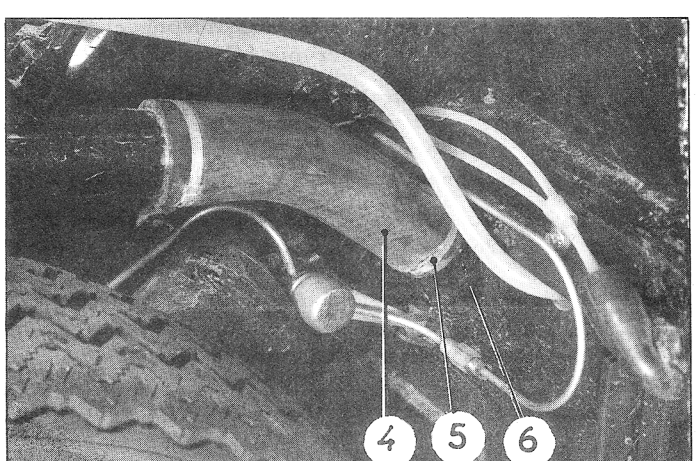
a) Fit the petrol gauge tank unit (3), inserting the rubber gasket.

Tighten the securing screws to .75 ft.lbs (0.1 m. kg) inserting fibre washers under the screw heads.

b) Fit and tighten the drain plug on the left-hand end, inserting a fibre washer.

c) Using Bostik, stick the two protective strips on the tank at a distance L = 340 mm (position for the straps securing the tank).

Fit the rubber anti-rattle stops (1), (using Bostik) at the front and rear of the tank (two for the protecting strips and one approximately in the centre).

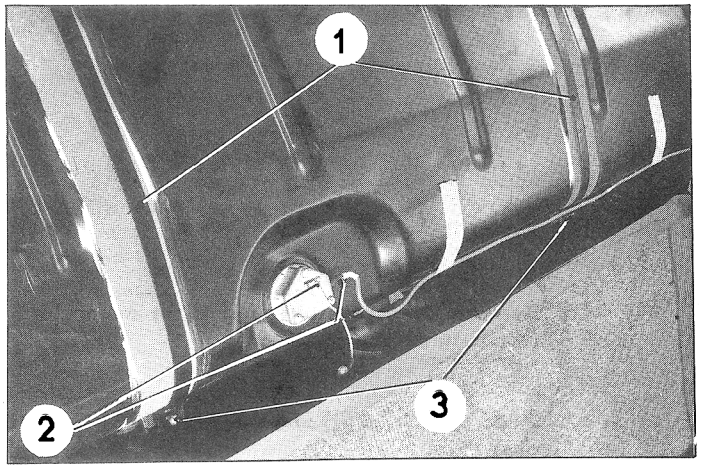


10. Fit the tank.

a) Offer up the tank, passing the tube (6) through the hole in the body and in the hose (4).

Fit the ligarex clip (5) (pliers 2483-T).

Fit the mudshield and the wing.

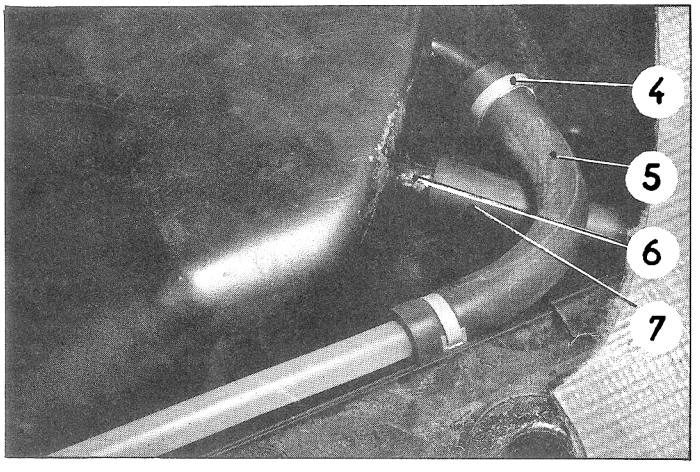


b) Fit the straps (1) securing the tank (insert the rubber packing pieces at the rear of the straps).

Tighten the screws (3).

c) Place the end packings at the ends of the tank and turn up the clips holding the packings.

d) Connect the leads (2) to the petrol gauge tank unit terminals.

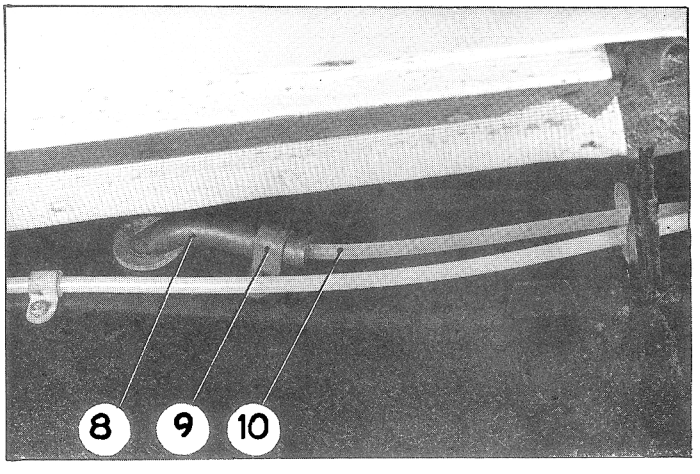


e) Into the tank outlet (6) fit about 370 mm of pipe feeding the petrol pump, so that the rear end of the Rilsan tube reaches the level of the drain plug hole, right-hand side; fit the rubber hose (7) on the tank outlet (6).

Fit the right-hand plug. Fit the Rilsan feedpipe into the filter. Tighten the drain plug (insert a fibre washer).

Couple the air vent pipe (5) to the tank.

Fit the ligarex collar (4) (pliers 2483-T).



f) Fit the clip (9) holding the hose (8) for the feedpipe (10) to the petrol pump.

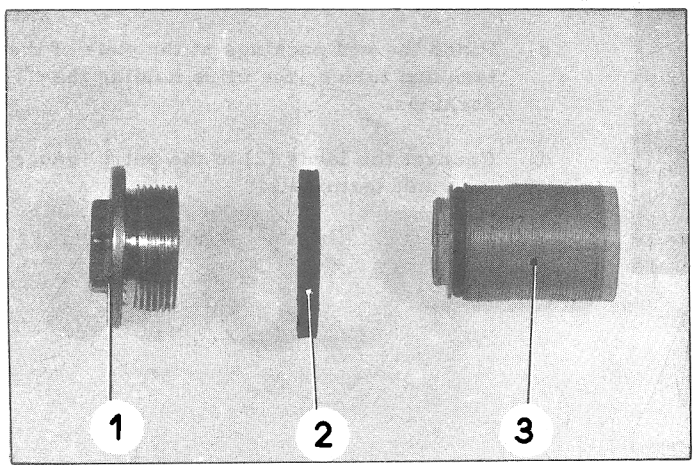
Tighten the securing screw.

11. Fit the finishing panel to the sidemember. Tighten the securing screws (shakeproof and plain washers under the heads).

12. Fit the petrol tank cover panel. Tighten securing screws.

13. Fit the rear squab and seat cushion.

14. Connect the negative cable to the battery.



REPLACING A FILTER

Removal.

15. Drain the petrol tank.

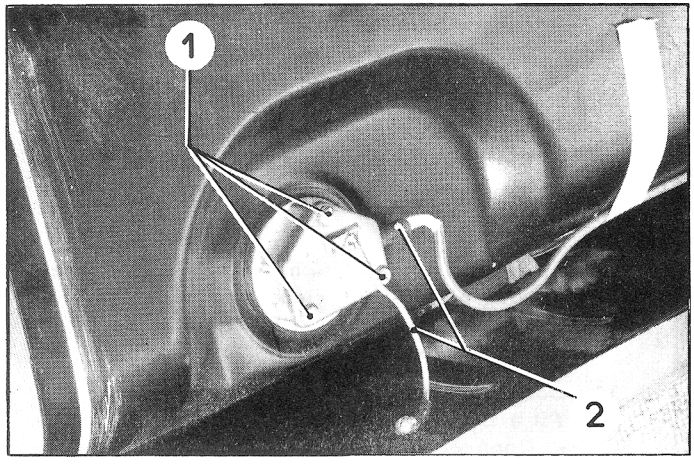
16. Remove the drain plug and filter assembly (right-hand end of tank).

17. Free the filter (3) and the gasket (2) from the plug (1).

Assembly.

18. Insert the filter (3) in the plug (1).

19. Insert the filter over the Rilsan feedpipe and tighten the plug, inserting a fibre washer (2).



REPLACEMENT OF A PETROL GAUGE TANK UNIT.

Removal.

20. Lift and remove the rear squab and the rear seat.

Remove the petrol tank cover panel.

21. Disconnect the negative cable from the battery terminal.

Disconnect also the leads (2) from the tank gauge unit terminals.

22. Remove the securing screws (1) from the tank gauge unit.

Remove:

- the tank gauge unit complete with its float,
- the gasket between the gauge unit and the petrol tank.

Assembly.

23. Place the gasket for the gauge unit on the petrol tank.

24. Insert the gauge unit float in the tank and place the gauge unit in position.

Tighten the securing screws (fibre washer under the heads).

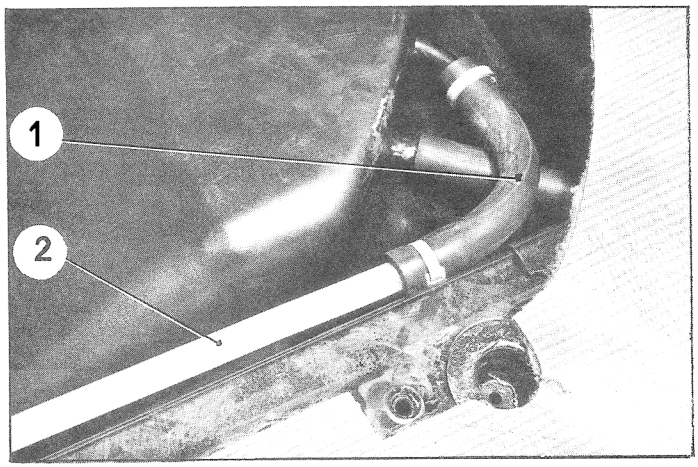
25. Connect up:

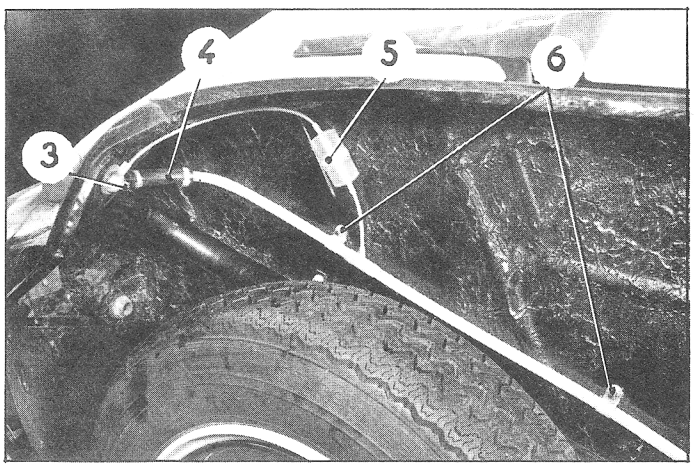
- the leads (2) to the gauge unit terminals,
- the negative cable to the battery terminals.

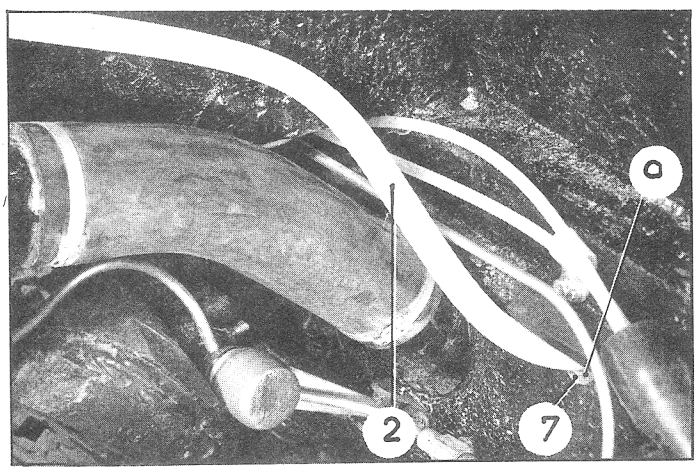
26. Switch on. Ensure that the tank gauge unit functions correctly.

27. Fit the petrol tank cover panel and tighten the securing screws.

28. Replace the rear seat and squab.







REPLACEMENT OF AN AIR OUTLET PIPE AND AN AIR VENT PIPE.

Removal.

29. Lift and remove the rear seat squab.
    - Remove the rear seat cushion.
    - Remove the petrol tank cover panel.
30. Disconnect the hose (1) connecting the air outlet pipe to the tank.
31. Remove the rear right-hand wing and the mud-shield.
    Clean very carefully the working area.
32. Remove the two screws (6) from the clips holding the pipe on the wheel-arch.
    - Remove the clip securing the air vent surge chamber (5).
    - Disconnect the hose (4) between the air pipe and the petrol filler pipe.
    - Remove the securing screw and nut (3) from the rear cups on the air vent pipe.
    - Remove the cups and their gasket.

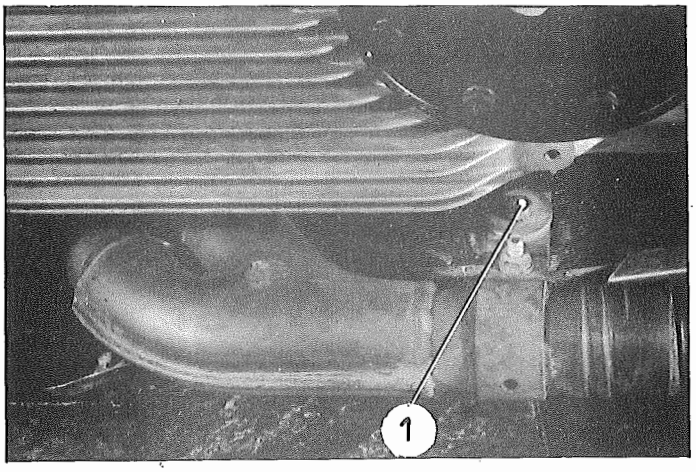
Assembly.

33. Insert the pipe (2) in the hole (a) in the rear closing plate of the right-hand sidemember.
    - Make sure that the rubber guide eyelets (7) are in position.
34. Connect the air pipe (2) to the tank hose (1).
    Fit a Ligarex collar (pliers 2483-T).
    - Connect the rear end of the air pipe to the connecting hose (4) of the tank filling pipe.
      Fit a Ligarex collar (pliers 2483-T).
    - Fit the two clips (6) securing the air pipe to the wheel-arch.
    - Tighten the nuts (plain washers).
    - Fit the cups to the air vent pipe; insert the rubber joints.
    - Moderately tighten the nut (3) (plain washer).
    - Tighten the clip securing the air vent surge chamber (5) (plain washer).
35. Fit the mudshield and tighten the securing screws and nuts (plain and spring washers).
36. Fit the wing.
37. Fit the petrol tank cover panel. Tighten the securing screws (plain washer under the head).

Glue the siderail trimming on the cover panel. (See list of adhesives).

38. Replace the rear seat and squab.

REPLACEMENT OF EXHAUST MANIFOLDS.



REMOVAL.

1. Remove :
   - the air filter assembly and its bracket,
   - the shield for the exhaust manifolds,
   - the nuts holding the downpipes (they are accessible from the underside of the vehicle using spanner 2431-T),
   - the screw holding the clamp onto the bracket (1) under the engine.
2. Free the flanges from the studs on the manifolds.
3. Remove :
   - the two manifolds and the copper asbestos gaskets.

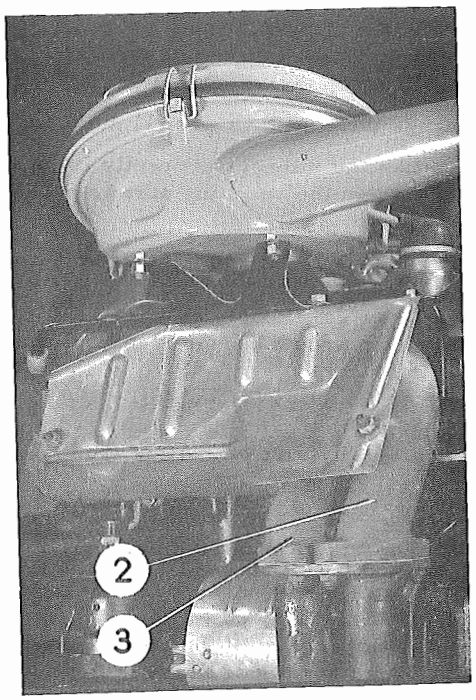
ASSEMBLY.

NOTE: 1. If the manifolds have been replaced, fit the downpipe mounting studs before setting the manifolds.

2. Never reface the flanges fixing the manifolds on the cylinder head.

4. Fit the copper asbestos gaskets and the manifolds (2) then (3),

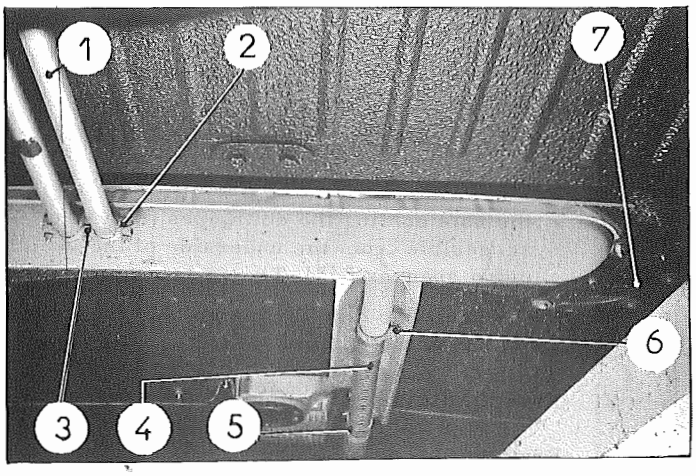
   Fit the nuts but do not tighten them (flat washers).
5. Connect the manifold downpipes.
   Insert the copper asbestos gaskets and the downpipes. Tighten the nuts (spanner 2431-T). The nuts are accessible from the underside of the vehicle.
6. Tighten the nuts securing the manifolds.
7. Fit :
   - the shield for the exhaust manifolds,
   - the air filter and its bracket.
8. The collar securing the pipe to the bracket under the engine (flat and shakeproof washers).



June 1966.

Corrective No.1

C1



REPLACEMENT OF AN EXHAUST SILENCER.

Remove.

9. Place the vehicle on a lift or over a pit.

10. Loosen the clips (5) and (6) and move the flexible exhaust pipe as far as possible towards the front.

11. To remove the exhaust silencer.

a) Loosen the nuts (3) of the flange (2) and remove the flange.

b) Remove the screws holding the flexible supports (7) to the body.

c) Remove the silencer withdrawing it towards the front of the vehicle.

12. Strip the exhaust silencer :
- free the clip (6),
- remove the flexible supports (7).

Fitting.

13. Assemble the exhaust silencer.

Fit :
- the flexible supports (7),
- the clip (6).

14. Offer up the silencer:

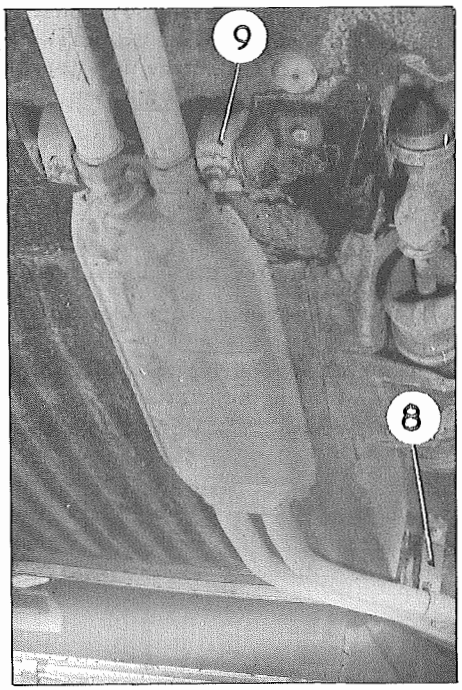
Engage the exhaust pipes (1) in the silencer.

Position the silencer correctly in its recess and tighten the securing screws of the flexible supports (7).

Fit the flanges (2) and tighten the nuts (3).

15. Draw the flexible exhaust pipe (4) towards the rear and engage it in the exhaust silencer.

Tighten the clips (5) and (6).



REPLACING THE EXHAUST OUTLET PIPES.

Removal.

16. Loosen the screws (3) and remove the flanges (2).

17. Remove :
- the screws of the intermediate support (9),
- the screws of the rear flexible supports (8).

Remove the exhaust outlet pipes.

18. Strip the outlet pipes :
- free the clips (8) and (9).

Fitting.

19. Assemble the exhaust outlet pipes.
- Fit the clips (8) and (9).

Fitting the pipes.

20. Offer up the exhaust outlet pipes (1) on the silencer. Fit and tighten the flanges (2).

21. Fit :
- the intermediate support (9),
- the rear supports (8).

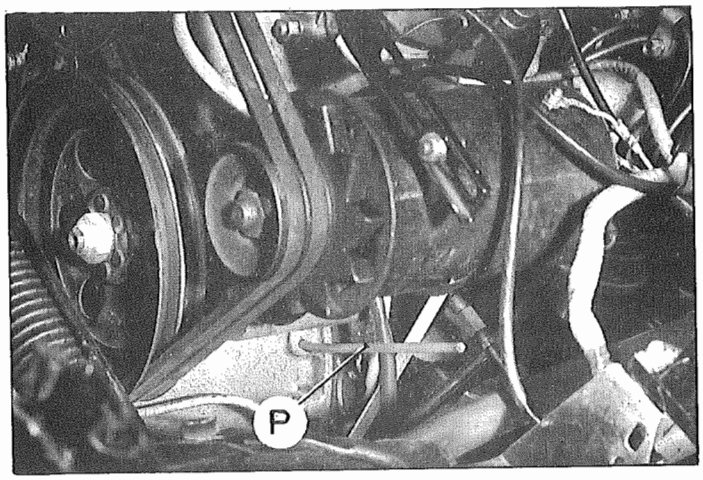
Tighten the screws.

June 1966.
Corrective No.1

ADJUSTING THE INITIAL IGNITION ADVANCE SETTING.

1. Remove the distributor head and check that the gap at the contact breaker points is 0.4 mm, (0.016"). If not, adjust it to this.

2. To find the position of initial advance on the engine.



a) Release the pressure in the suspension circuit. To do this move the manual height control lever to the "LOW" position. Make sure that the suspension sphere is free.

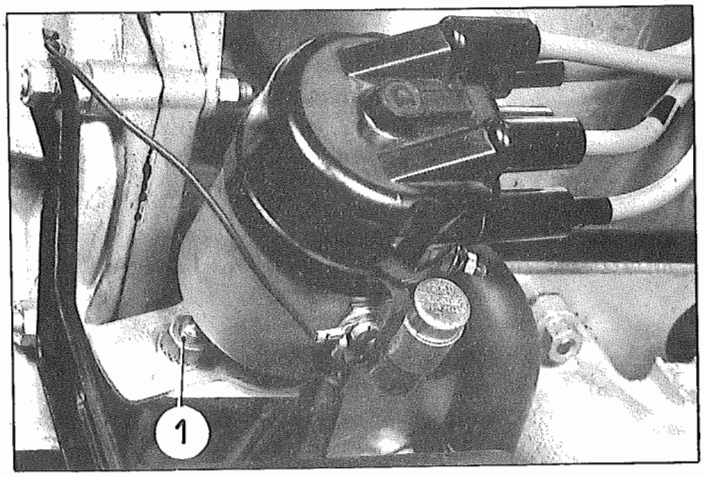
Remove the front left-hand suspension sphere and screw a plug into the suspension cylinder.

b) Bring No. 1 cylinder to the end of the compression stroke. Insert a 6 mm diameter locating pin "P" into the hole provided in the clutch bell housing (under the dynamo).

Slowly turn the engine until the locating pin falls into the slot in the flywheel. In this position the engine is at the firing point (No. 1 cylinder) i.e. 12° before T.D.C.

c) WITHDRAW THE LOCATING PIN.

3. Adjust the ignition.



Fit the leads from a test lamp to the condenser terminal and to earth. Switch ignition "on".

Loosen the securing nut (1) of the distributor clamp plate.

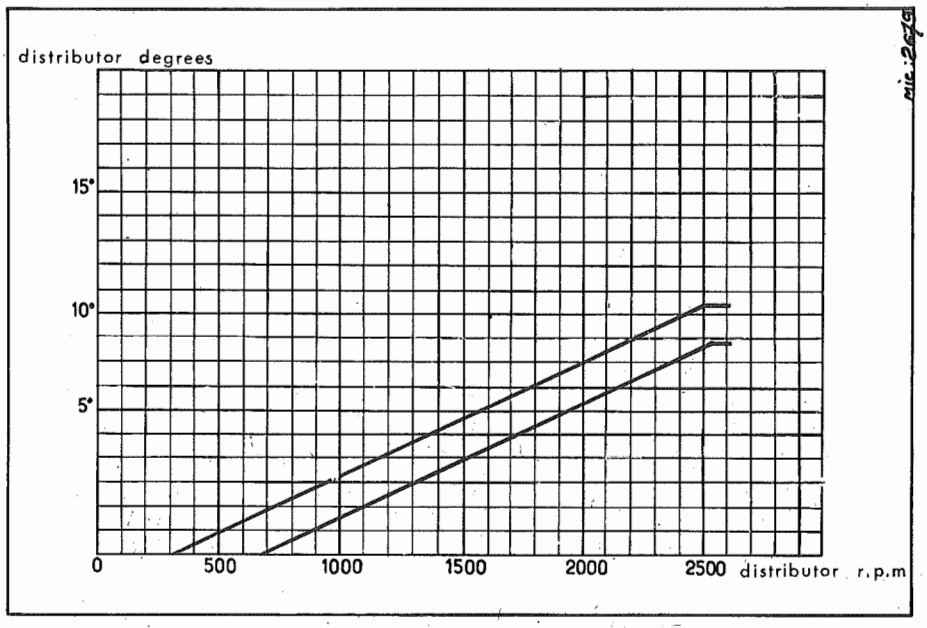
Place the clamp plate at the position marked "SUP" and tighten the securing nut.

Slacken the nut of the fixing screw at the split end of the clamp plate behind the distributor. Slowly turn the body of the distributor in an anti-clockwise direction. Stop the moment the lamp lights, which is the point at which the contacts just open.

Tighten the screw (1) behind the distributor.

Switch ignition "off".

Centrifugal advance curve for DUCELLIER 4155B and SEV MARCHAL A.147 distributors.



4. Check and adjust the contact breaker points.

5. Place the distributor in position on the test bench and connect the test bench coil negative to the distributor primary terminal.

6. Check the secondary winding insulation.
Adjust the spark gaps to 15 mm. Connect the coil HT terminal to the distributor central terminal and connect up the sparking plug leads to the contact breaker.
Run the distributor at 1000 r.p.m. for 15 minutes.

7. Check the spark grouping.
The angular difference must not exceed 1^{o} 30' max. at all speeds. (Max. speed of distributor 2000 r.p.m.).
At each opening point, the maximum variation of the sparking positions must not exceed 1^{o} 30'.

8. Check the closing angles of the breaker

DUCELLIER Distributor = 57 ± 2^{o}.
SEV MARCHAL Distributor = 59 ± 2^{o}.

9. Check the adjustment of the automatic ignition advance curve.
The actual curve must be between the minimum and maximum curves on the graph.

NOTE:
a) it is possible to modify the tension of the fly-weight springs by bending the spring anchor clips.

b) if there are sparks at other than the four normal positions, the cam follower contact is bouncing. Check the force necessary to separate the points:
DUCELLIER Distributor = 700 to 850 gr.
SEV MARCHAL Distributor = 850 to 1000 gr.

10. Check the primary circuit insulation.
With the condenser removed bring the temperature of the contact breaker to 60^{o}C. The contact points being open, apply 110 volts alternating current between the positive terminal and earth, inserting a lamp in series. Maintain this for a minute. The lamp must not light. If it does the insulation is defective.

11. Check the condenser.
a) Check the insulation.
Apply 110 volts between the condenser and its casing, for one minute, inserting a lamp in series in the circuit. If the lamp lights the insulation is defective.

b) Check the capacities.
Use a capacitance-meter. The capacitance must be between 0.21 and 0.23 µF.

CLEANING AND ADJUSTING THE SPARKING PLUGS.

IMPORTANT NOTE: Incomplete cleaning of the plugs after sand blasting can cause rapid engine wear. It is essential to eliminate all traces of sand after this operation.

12. Eliminate all lead and oil deposits on the insulators and electrodes by using a hardwood spatula, to the exclusion of all metallic objects.

13. Clean the plugs in petrol and blow out with compressed air.

14. Clean the plugs on a sand blasting machine supplied with compressed air at 85 p.s.i. (6 kg/cm^2 maximum).

    Blow out with an air jet at a maximum pressure of 56 p.s.i. (4 kg/cm^2) to remove all traces of sand, and to avoid forcing any sand between the insulator and the body of the plug.

15. Remove all sand from the base of the insulator by scraping with a very hardwood spatula.

NOTE: This operation is also necessary after prolonged town driving at slow speed, as the plugs become fouled.

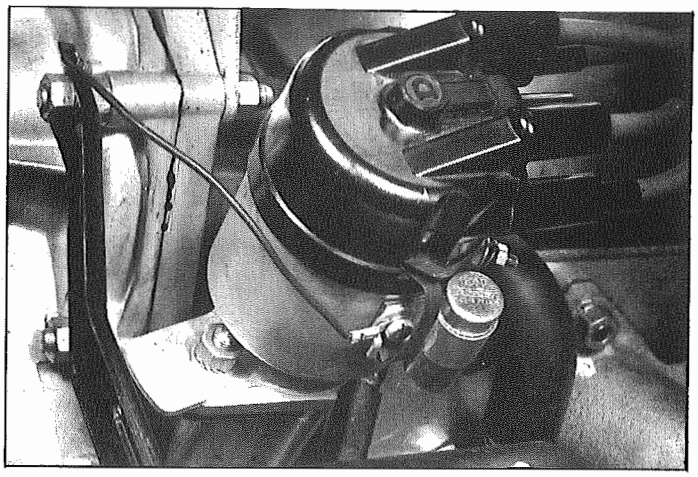
16. Maintaining the sand blasting machine.

a) Use only the sand supplied by the manufacturer of the machine.

b) Store the sand in a very dry place.

c) Renew the sand in the machine after cleaning about 100 plugs.

17. Adjust the gaps to 0.60 mm (0.024").



REMOVAL.

1. Disconnect the leads to the plugs, the coil and to earth.
2. Disconnect the screw fixing the distributor. Withdraw distributor from its housing.

ASSEMBLY

3. Put the distributor in position.
4. Adjust the initial ignition setting (see Op. DX. 211-0).
5. Tighten the distributor fixing screw.

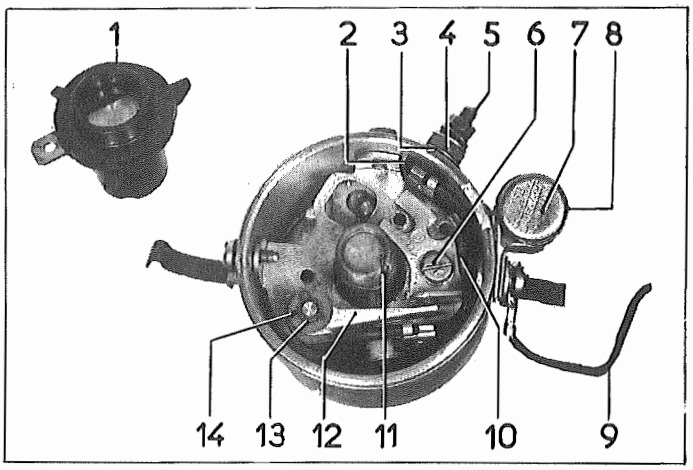
   Connect the leads to the plugs, the coil and to earth.

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Corrective No.1

OVERHAULING OF A DUCELLIER DISTRIBUTOR.

DISMANTLING.



1. Remove the distributor head with the leads.

Free the rotor arm (1).

Free the condenser connection (7), unscrew the nut (4) and withdraw the steel washers and the insulating washer (3).

Remove the securing clip (8) of the distributor head and the condenser (7).

2. Remove the circlip (13) and the insulating washer (14) from the moving contact pivot.

3. Withdraw the moving contact (12) and the primary terminal (5) with its insulating pad (2).

4. Withdraw the contact carrying plate (10) holding the cam follower (11) away from the cam.

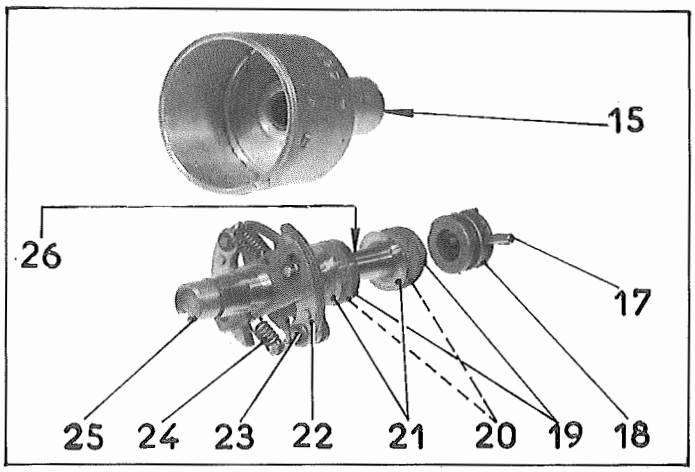
5. Tap out the pin (17) from the driving head (18).

Remove the driving head (18), the steel washer (19), the celeron washer (20) and the steel washer (21).

6. Withdraw the drive spindle (26) from the body of the distributor (15).

Withdraw the steel washer (19), the celeron washer (20), the steel washer (21), the drive spindle (26). Remove the circlips (23) unhook the springs (24) and free the advance weights (22).

Remove the felt, the screw limiting cam end-float and remove the cam (25).



7. Clean all the parts.

ASSEMBLY.

8. Prepare the drive spindle.

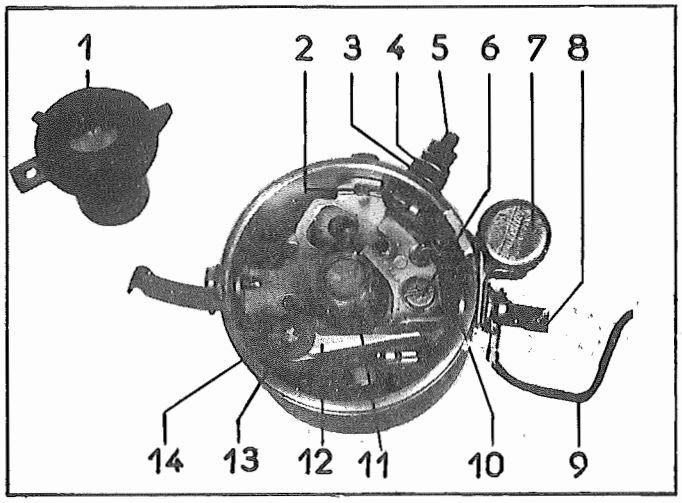
If the weights show abnormal clearance on their pivots, renew them.

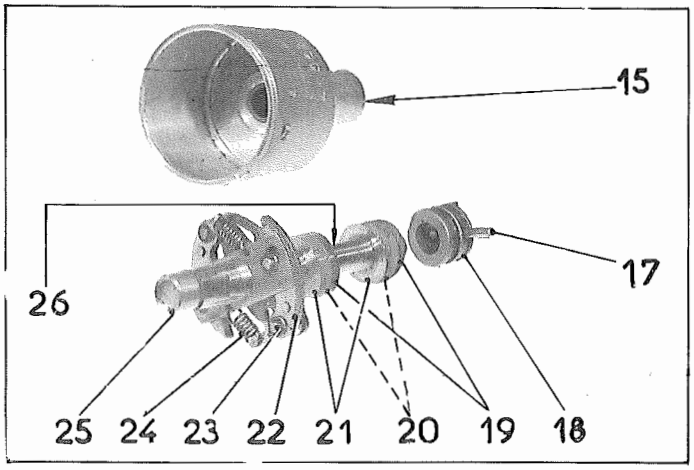
Place the weights (22) in position after lightly oiling their pivots.

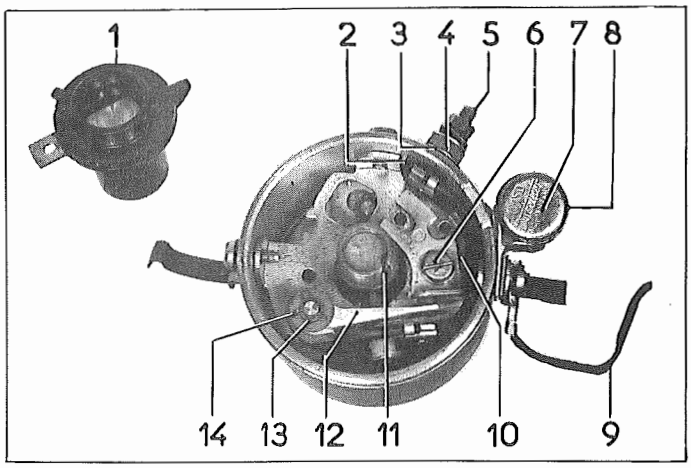
Engage the cam (25) on the spindle (26). Hook up the springs (24) and fit the circlips (23). Fit the screw limiting cam end-float (flat and shakeproof washers).

Fit the felt, soaked in oil.

C1







9. Fit the steel washer (21), the celeron washer (20), the steel washer (19) on the control spindle (25).

Oil this spindle and insert it in the distributor body (15).

On the end of the control spindle (26), place the steel washer (21), the celeron washer (20), and the steel washer (19).

Provisionally fit the drive sleeve (18) and the pin (17) and check that the spindle turns freely without end-float. If not change the number of adjusting washers (21).

Engage the drive sleeve (18) on the drive spindle with the offset portion towards the slot into which the rotor (1) engages on the cam (25).

Pin and spread the ends of the pin (17).

10. Fit the plate (10), guiding the cam follower (11). Make sure that the cam follower is correctly positioned in relation to the plate after fitting.

11. Fit the insulating sleeve (2) on the primary terminal (5).

Fit the moving contact (12), compressing its spring.

Insert the primary terminal thus prepared in the body of the distributor.

Fit the insulating washer (3), a steel washer, and tighten the nut (4).

Fit the insulating washer (14) and then the circlip (13).

12. Fit the securing clips (8), as well as the condenser (7) and the earth lead (9). Connect up the condenser and the condenser lead (7) to the primary terminal (5).

Adjust the contact gap to 0.45 $\pm$ 0.05 mm by means of the adjusting screw (6).

Fit the rotor (1).

Fit the distributor head with its leads.

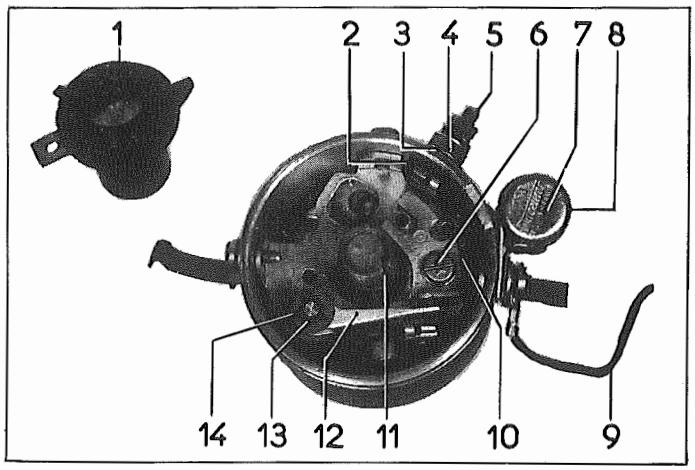
NOTE:

1st. When overhauling a distributor we recommend rubbing with fine emery the end of the rotor and the inside of the contacts in the distributor head, to remove any oxides which may hinder the passage of the HT current.

2nd. The contacts must be changed if the points are defective.

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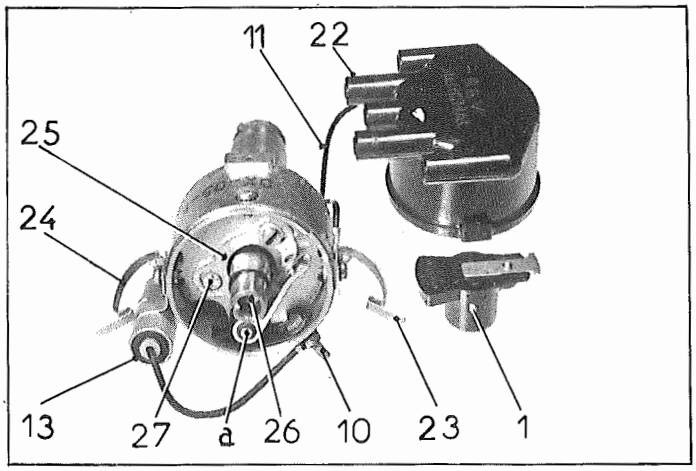
14. Adjust the contact gap to 0.4 mm by means of the adjusting screw (6).

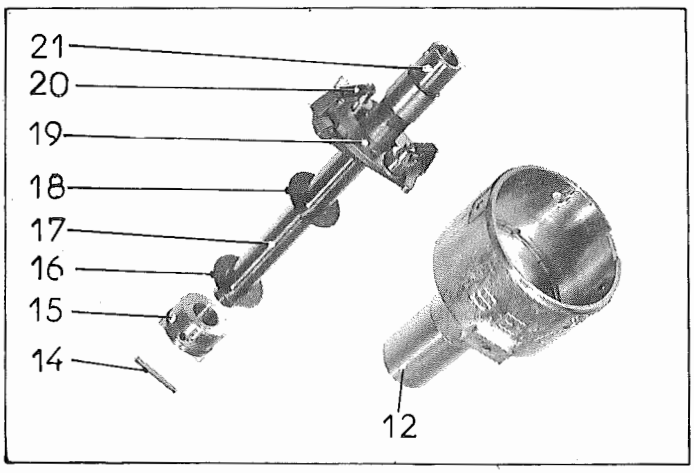
    Fit the rotor (1).

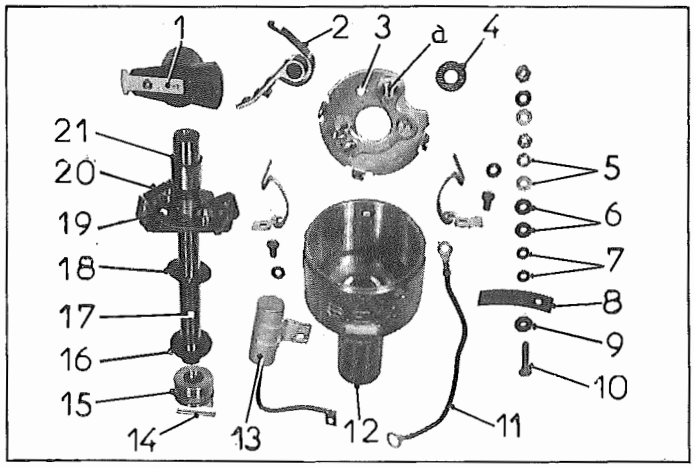
    Fit the distributor head with its leads.

NOTE: When overhauling the distributor, we recommend rubbing with fine emery the end of the rotor and the inside of the contacts in the distributor head to clear any oxides which hinder the passage of the HT current.

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Corrective No.1







OVERHAULING A S.E.V. DISTRIBUTOR.

Dismantling :

15. Remove the distributor head (22).
Free the rotor arm (1).
Free the condenser connection (13).
Remove the plain steel washers (5) and the insulating washers (6).
Free the primary terminal (10), the insulating washer (9), the insulating strip (8) and the two insulating washers (7).

16. Withdraw the moving contact (2) and the insulating washer (4).

17. Remove the clip (23) holding the distributor head with its earth lead (11).

Remove the clip (24) holding the distributor head with the condenser (13).

18. Free the plate (3) with the fixed contact (25).

19. Tap out the pin (14) and free the driving head (15) and steel washer (16).

20. Withdraw the driving spindle (17) from the body (12) of the distributor.

Free the steel washer (18).

Remove the two springs (20) and the two circlips holding the fly-weights (19).

Remove the fly-weights (19) and the cam (21).

21. Clean all the parts.

Assembly.

22. Prepare the driving spindle.

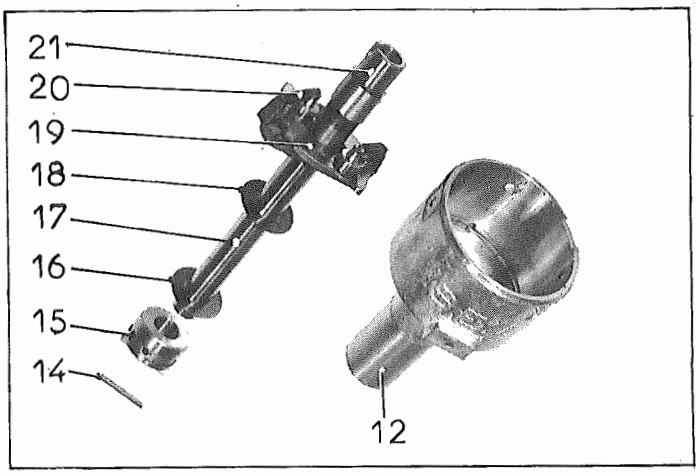
If the flyweights and cam have abnormal clearance (wear) in their bores, renew them.

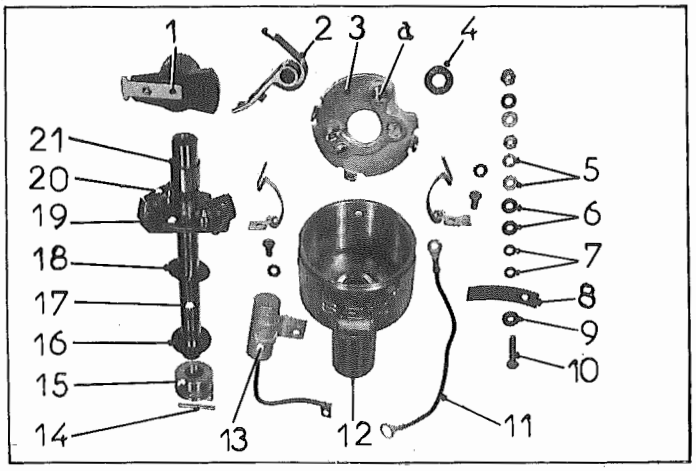
Fit the cam (21) on the driving spindle (17) lubricating it very lightly.

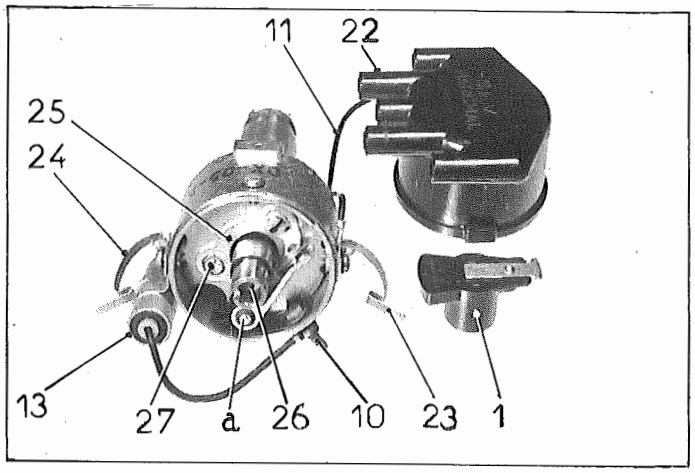
Fit the flyweights (19) lubricating their bearing surface lightly.

Fit the circlips and attach the springs (20).

Fit the felt (26) soaked in oil.







23. Place the steel washer (18) on the driving spindle (17).

Oil the spindle and insert it in the distributor body (12).

On the end of the driving spindle fit the steel washer (16).

Offer up the driving head (15) and insert the pin (14) and check that the spindle turns freely without end play. If it does not an adjustment must be made to the number of washers (18).

Fit the driving head (15) on the driving spindle with the offset portion towards the slot into which the rotor (1) engages on the cam (21).

Pin and spread the ends of the pin (14).

24. Fit the plate (3) with its fixed contact (25).

25. Fit the insulating washer (9) and the insulating strip (8) on the primary terminal (10) in the distributor body (12).

Fit the insulating washer (4) on the small spindle (a).

Fit the moving contact (2), compressing its spring and inserting it between the insulating washer (9) and the insulating strip (8).

On the primary terminal (10) fit the 2 insulating washers (7), then the 2 insulating washers (6), one flat washer (5), the connection to the condenser (13) a plain washer (5) and tighten the nut.

26. Fit the earth lead (11) and the clip (23) holding the distributor head.

Fit the condenser (13) and the clip (24) holding the distributor head.

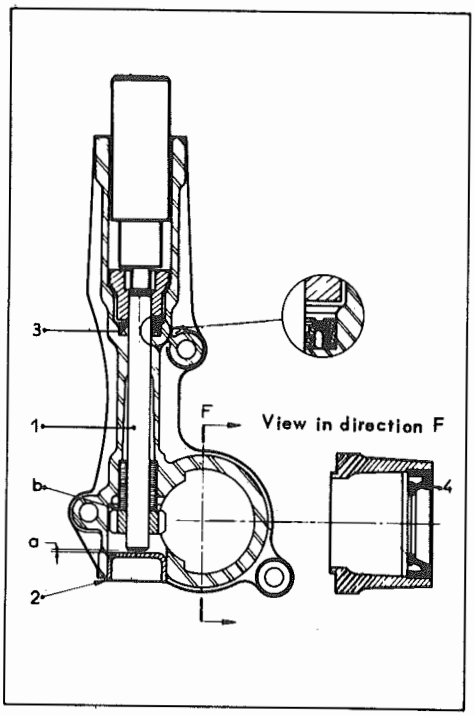
27. Adjust the contact gap to 0.45 $\pm$ 0.05 mm by means of the adjusting screw (27).

Fit the rotor (1).

Fit the distributor head (22).

NOTE: 1st. When overhauling a distributor we recommend rubbing with fine emery the end of the rotor and the inside of the contacts in the distributor head, to remove any oxides which may hinder the passage of the HT current.

2nd. The contact points must be changed if they show any signs of defect (pitting or burning etc.).



DISMANTLING.

1. Press out the spindle (1) from the distributor drive housing, and the cup (2) using a piece of 9 mm diameter steel about 100 mm long, under a press.

2. Remove : the oil seal (3),
the oil seal (4).

ASSEMBLY

NOTE: At each dismantling renew the oil seals (3) and (4).

3. Offer up the oil seal (3) previously oiled, in the position shown in the sketch, making it seat at the bottom of its recess.

4. Oil the distributor drive spindle (1) with engine oil and fit it in position.

5. Press the distributor drive socket on the spindle, using a press and a shouldered mandrel MR 3436-210.

6. Press in the pad (2).
Leave a clearance "a" between 0.15 and 0.30 mm, by inserting a feeler at "b", between the pinion and the distributor drive spindle bearing, before bringing the cup (2) into contact with the spindle (1).

7. Fit the oil seal (4), previously oiled, in the way shown on the sketch, and see that it seats at the bottom of its recess.

1. Check the coil for resistance to heating.

The coil must be capable of carrying 12 volts for 10 hours.

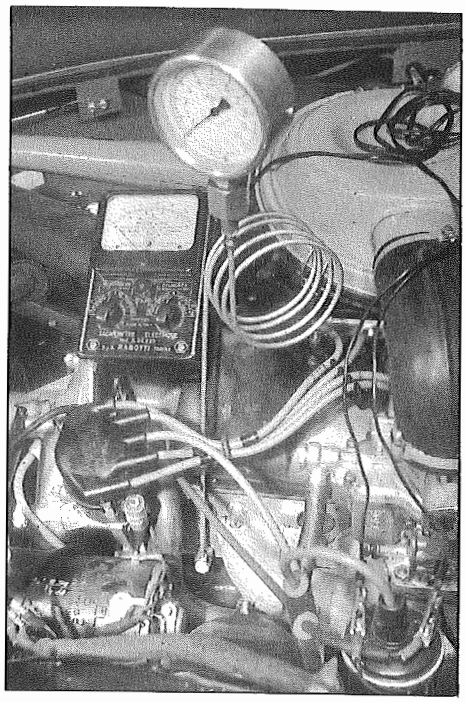
2. Check the primary circuit.
Bring the temperature of the coil to 60°C.
Apply alternating current, 110 volts 50 cycles, across the primary terminal (+ or BAT) and the housing for one minute. Switch off the alternating current and check the insulation of the primary circuit, using an ohmmeter connected between the primary terminal marked (+ or BAT) and the housing.
The resistance must be infinite.

3. Check the insulation of the secondary circuit. Use a test bench. (Coil and distributor of the same make).

   a) Adjust the spark gap, not shunted, to 15 mm.

   b) Run the distributor at 1, 000 rpm continuously.

The coil must supply a series of correct sparks for the duration of the test.



CHECKING.

1. Start up the engine and allow it to run until the oil temperature is around 60°C.

Stop the engine.

2. Remove the lubrication screw from the cylinder head.

Connect the pressure gauge feedpipe using the union MR. 3705.

3. Connect up a rev-counter, then start up the engine and let it run at 2, 000 rpm.

(Electric rev-counter 2436-T).

Read the pressure on the gauge. It should be 54 p. s. i. (3. 8 kg/cm^2).

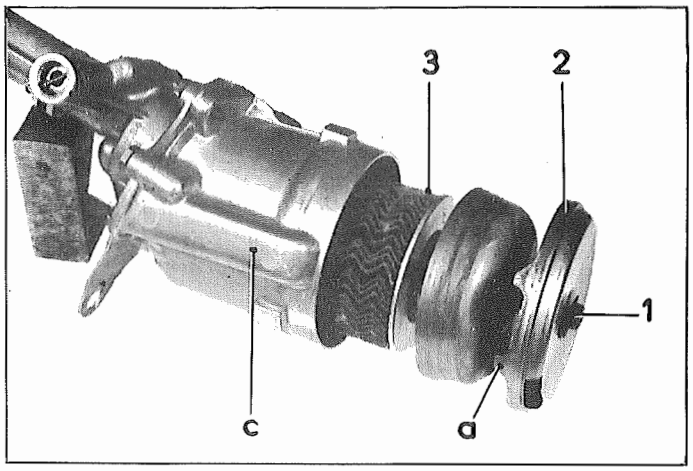
4. Switch off the engine and replace the cylinder head lubrication screw, inserting a copper gasket.

NOTE:- If the pressure is incorrect, the oil pump must be removed (see Op. DX. 220-1).

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Corrective No.1

REPLACEMENT OF A FILTER ELEMENT.



REMOVAL.

1. Raise the vehicle on stands (jacking bracket 2505-T) or on a lift.
   Drain the oil from the engine.
2. Remove the oil filter access plate under the sump.

NOTE : Draining of the sump is never complete, oil continues to drip from it.

3. Remove the screw (1), the strainer assembly (2) and the filter element (3).
4. Clean the strainer assembly with petrol. Dry it under a compressed air jet.

NOTE: Never reinstall a used filter element.

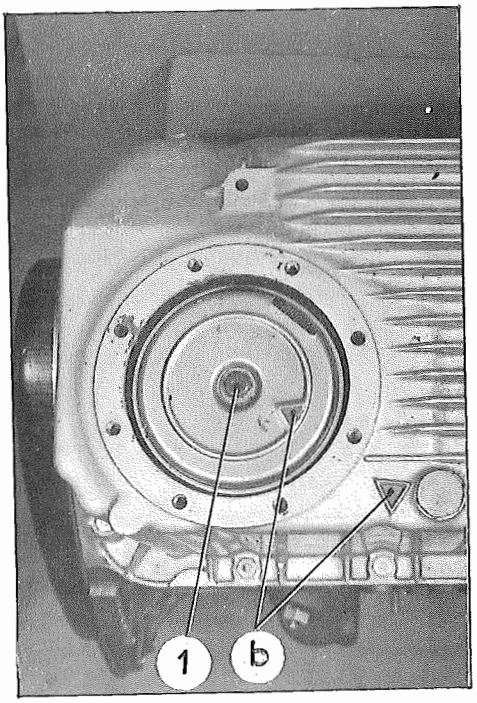
ASSEMBLY.

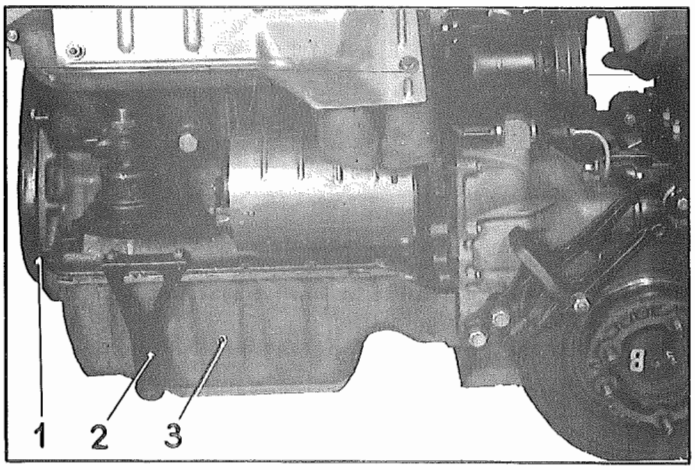
5. Fit the element on the strainer assembly in the following order:
   - the screw (1),
   - the plain washer,
   - the pre-filter (strainer),
   - the bowl,
   - the spring,
   - the plain washer,
   - the ring seal,
   - the filter thrust cup,
   - the filter element.
6. Fit this assembly into the filter housing, so that the red triangles, one on the strainer, the other on the sump are facing each other.

   Hold the assembly up against the filter body, screw the screw (1) in by hand.
   Screw the screw up without tightening it.

NOTE: Ensure that the screw (1) is not slanting, if it is, it means that it is not correctly engaged in the tapped hole of the pump body, but between the boss and the filter element. In this case lubrication of the engine is not ensured.

7. Before tightening the screw (1) ensure that the pre-filter cover cannot turn. If it does, the pre-filter is not correctly positioned. Tighten the screw to between 6 to 7 ft lbs (0.8 to 1 m.kg).
8. Fit the oil filter access plate on the sump, renewing the gasket if necessary.
9. Fill up with oil and lower the vehicle to the ground.





REPLACEMENT OF AN OIL PUMP.

Removal.

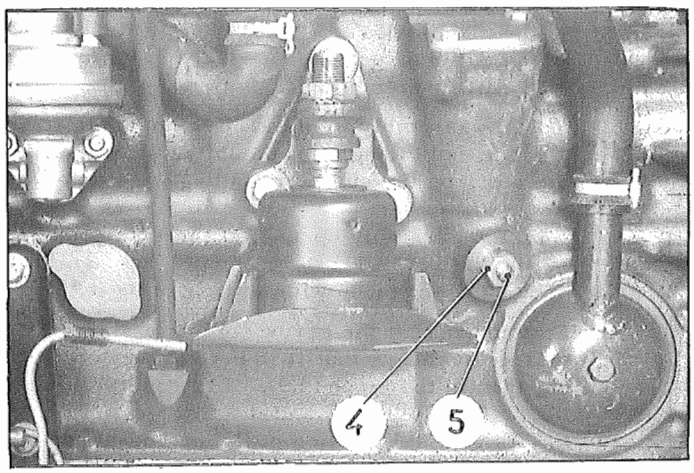
10. Remove the engine-gearbox assembly (see Op. DX.100-1).

Leave the engine-gearbox assembly suspended from a pulley block.

Drain the oil from the engine.

11. Remove :

- the timing case cover (1),
- the bracket (2) securing the exhaust down-pipes,
- the sump (3).

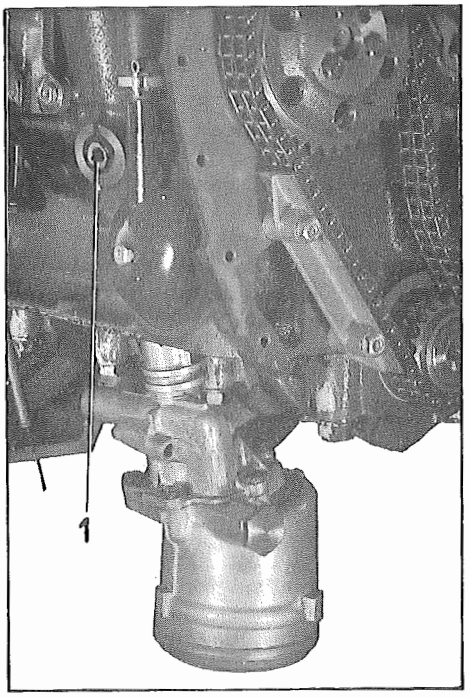


12. Remove the oil pump.

- loosen the locknut (4) and remove screw (5) holding the oil pump,
- loosen the screw holding the securing clip for the oil pump on No. 3 bearing.
- free the pump.

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Assembly.

13. Offer up the oil pump.

Fit the oil pump in position in its housing.

Bring the tapered hole in the pump body in line with the pointed screw (1) securing the oil pump.

Tighten the pointed securing screw of the oil pump to 4 ± 0.75 ft. lbs (0.6 ± 0.1 m.kg), after smearing the screw with masti-joint HD 37.

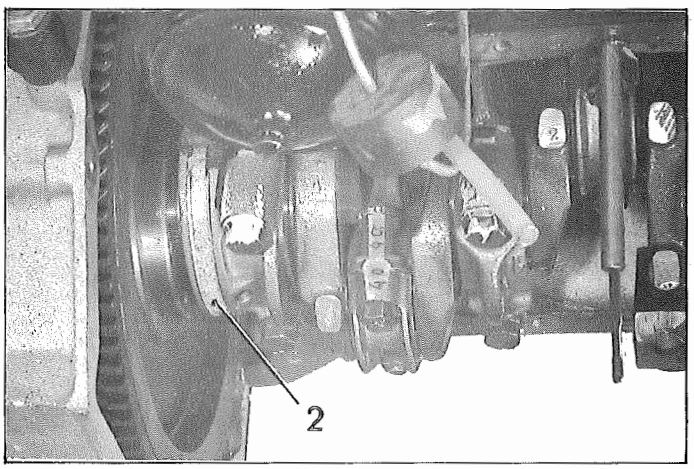
Tighten the locknut (smearing its seating surface also with masti-joint HD 37).

Tighten the securing screw for the oil pump clip on No. 3 bearing to 25 ± 3 ft.lbs (3.5 ± 0.5 m.kg).

14. Fit the sump.

a) Fit the cork joint (2) in the bearing groove, flywheel end.

Smear with masti-joint HD 37 the two contact faces of the sump and cylinder block.



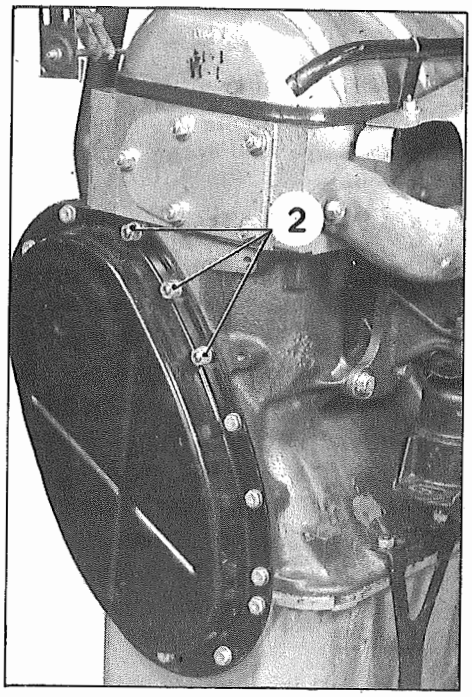
b) Offer up the sump.

c) Fit the bracket holding the exhaust downpipe on the right-hand side of the engine.

Fitting the long screws.

- 1 screw on the left-hand side of No. 5 bearing (timing side),
- 2 screws (shakeproof washers under the heads), on the right-hand side (the second and third from bearing No. 5, timing side),
- tighten the sump securing screws and the nuts holding the exhaust downpipe bracket to 21.75 $\pm \frac{3}{0}$ ft.lbs (3 $\pm \frac{0.5}{0}$ m.kg).

W 17



15. Fit the timing gear cover.

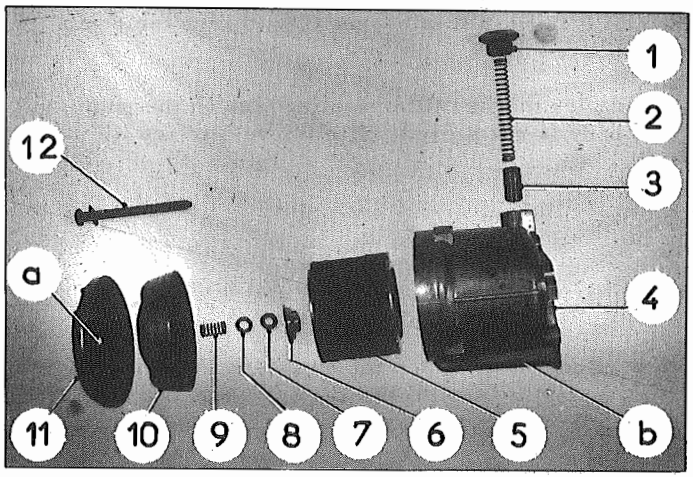
Insert the cork gasket.

Fit the cover by the three nuts (2) (spacer under the nuts) and the screws (plain washers under the heads).

Tighten the screws and nuts to 12 ± 0.75 ft. lbs ($1.7 \begin{smallmatrix} + 0.1 \\ - 0.3 \end{smallmatrix}$ m. kg).

16. Fill the engine with oil (9 pints of SAE 10 W 30 oil).

17. Fit the engine-gearbox assembly on the car. (See Op. DX. 100-1).



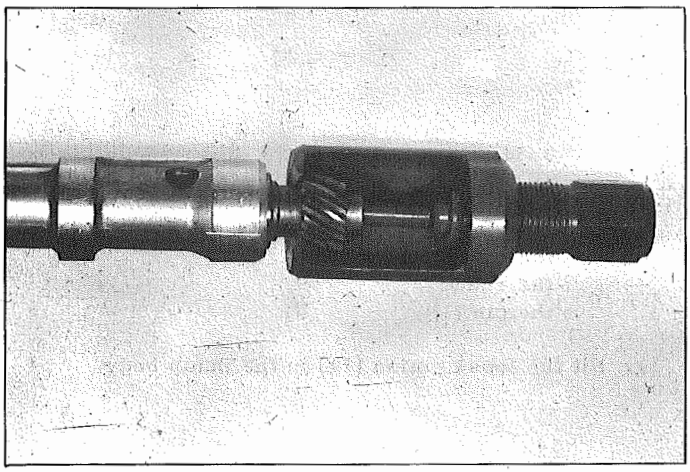
DISMANTLING

1. Remove : the screw (12) with its flat washer,
the cup (6) holding the filter,
the ring seal (7),
the flat washer (8),
the spring (9),
the bowl (10),
the pre-filter (11),
the filter element (5).

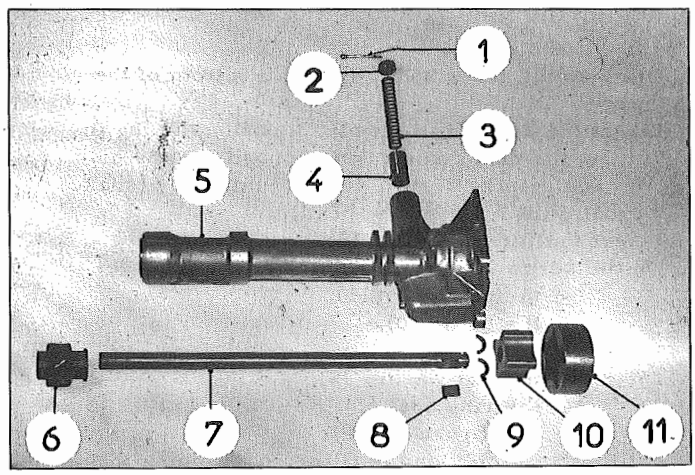
2. Dismantle the by-pass.
Remove the plug (1),
the spring (2),
the piston (3).

3. Remove the filter body (4) from the pump.

4. Withdraw the loose pinion from the pump.



5. Remove the drive pinion using extractor 1964-T and a spacer (10 mm diameter x 40 mm long).



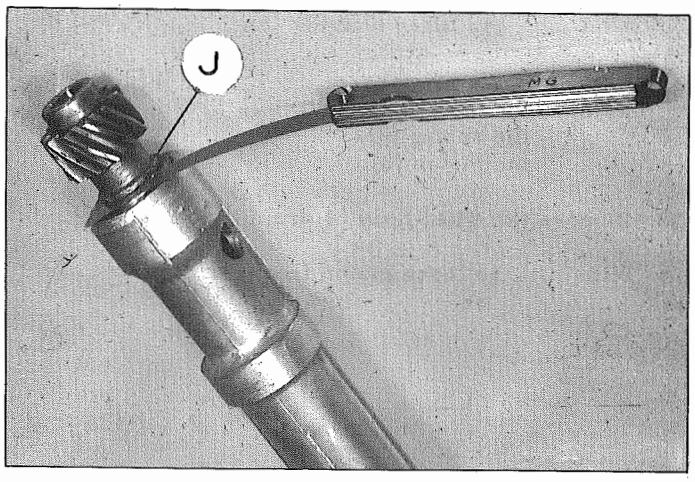
6. Remove: the spindle (7),
the half-cotters (9),
the key (8),
the pump pinion (10).

7. Remove the oil pressure control valve.
Take out: the pin (1),
the thrust cup (2) of the spring,
the spring (3),
the piston (4).

NOTE:

1) The bush of the support tube cannot be dismantled. If it is worn it is essential to change the pump body.

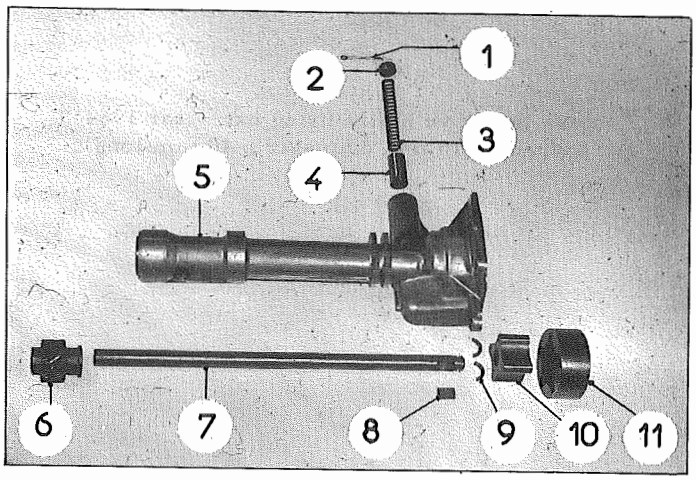
2) Check that the filter sealing face on the pump body is not scored. If it is, re-surface it.



ASSEMBLY

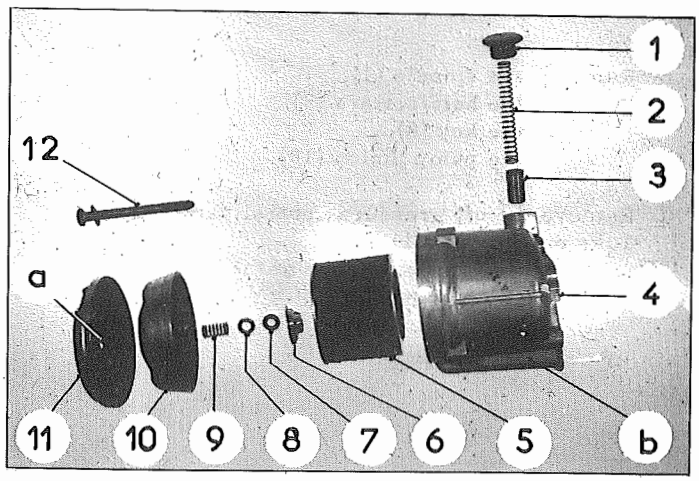
8. Connect the pump pinion (10) to the spindle, using the key (8) and the split stop cotters (9). Place this assembly in the pump body.

9. Fit the drive pinion (6) on the spindle using a press, and maintaining a clearance "J" of 0.4 to 0.5 mm between the pump body and the pinion.



10. Fit the oil-pressure control valve.
Fit: the piston (4),
the spring (3),
the cup (2),
the pin (1).

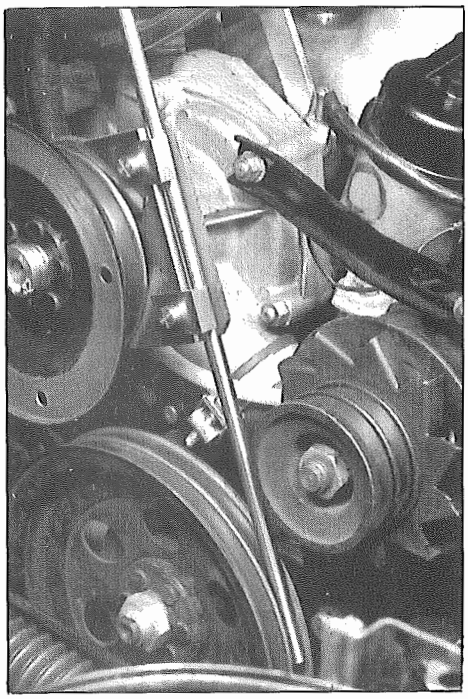
11. Fit the loose pinion (11) in the pump body.



12. Fit the filter.
Offer up the filter body (4) on the bottom of the pump.
Insert the securing screws. Position the lug for fixing the pump on the side opposite to the hole for the pointed screw, on the pump body (shake-proof washer under the head).
Insert the filter element (5).
On the screw (12), with its flat washer, place:
- the prefilter (11),
- the bowl (10),
- the spring (9),
- the flat washer (8),
- the ring seal (7),
- the thrust cup (6).

Fit this assembly on the filter, positioning the guides "a" on each side of the suction boss "b".

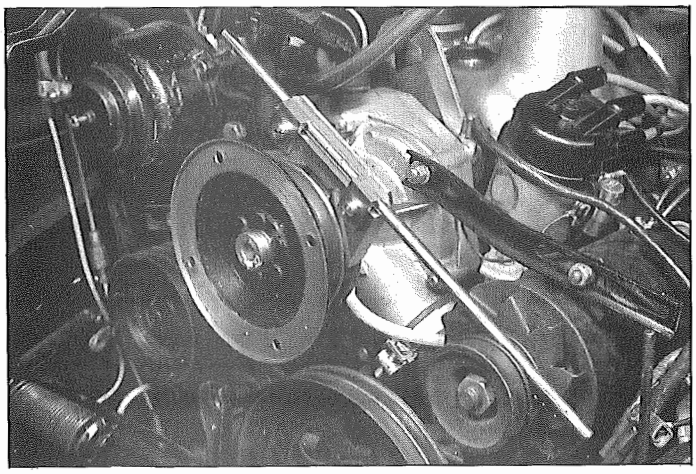
Tighten the screw (12) to between 6 and $7\frac{1}{4}$ ft lbs (0.8 to 1 m.kg).



NOTE: The adjustments are made starting from the water pump pulley which is fixed on its spindle.

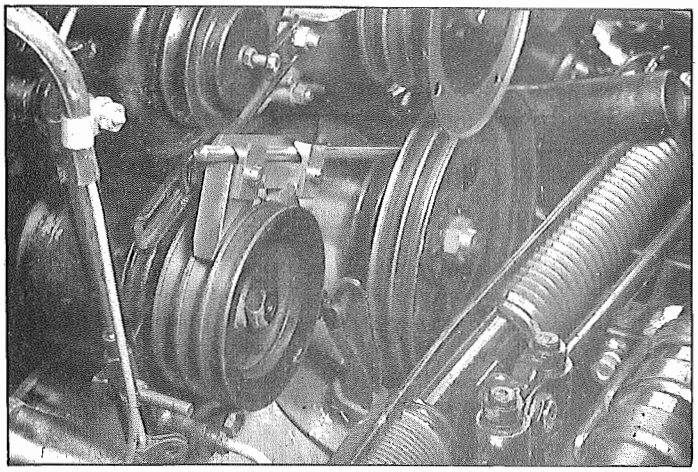
Adjustment of the drive pulley.

1. Place tool 3082-T in one of the grooves of the water pump pulley. The rod must centralise in the corresponding groove of the drive pulley.
2. Remove the drive pulley (see Op. DX.231-4).
3. Decrease or increase the thickness of the adjusting washers placed behind the pulley in order to obtain correct alignment.
4. Fit the drive pulley (see Op. DX.231-4).



Adjustment of the dynamo pulley.

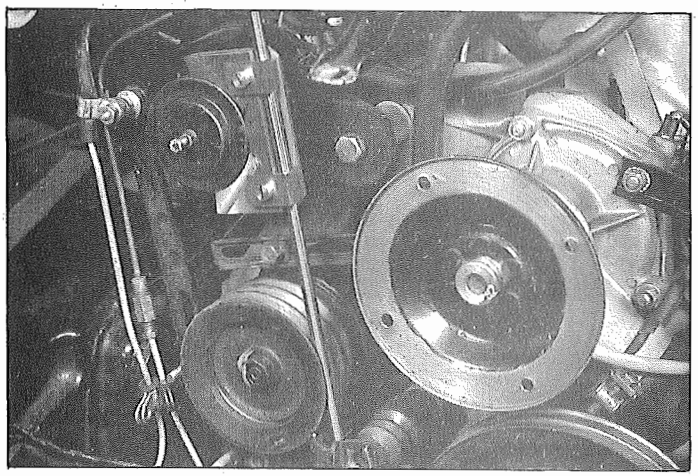
5. Place tool 3082-T in one of the grooves of the water pump pulley. The rod must centralise in the corresponding groove of the dynamo pulley.
   If not, decrease or increase the thickness of the adjusting washers placed behind the dynamo pulley.



Adjustment of the high pressure pump pulley.

6. Place tool 3082-T in the second or the third groove of the high pressure pump pulley. The rod must centralise in the corresponding groove of the drive pulley.

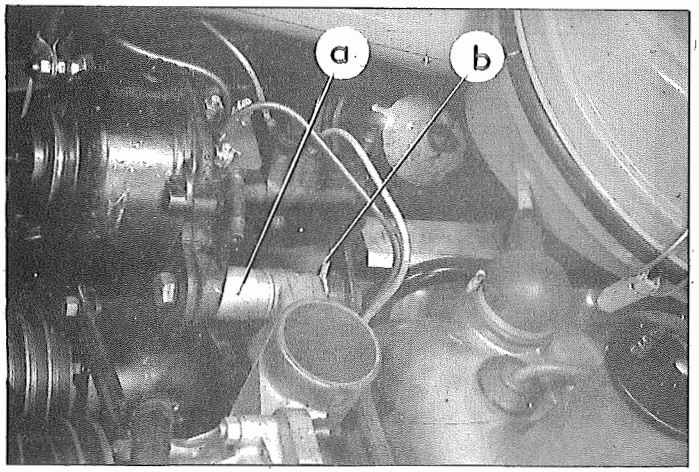
7. Decrease or increase the thickness of the packing pieces between the high pressure pump and the fixing boss of the pump on the clutch housing.



Adjustment of the centrifugal regulator pulley.

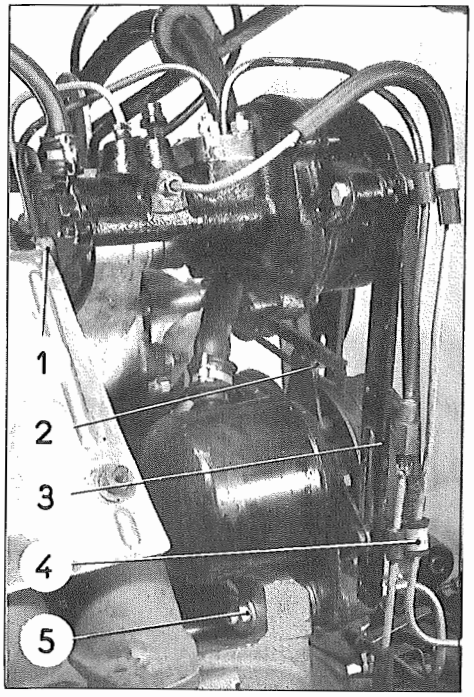
8. Place tool 3082-T in the groove of the regulator pulley. The rod must centralise in the first groove of the high pressure pump pulley.

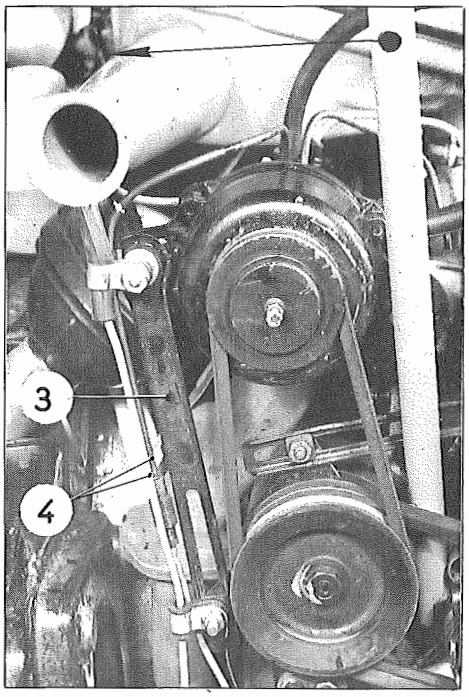
9. Decrease or increase the thickness of the packing pieces at (a) to obtain correct alignment.



10. Then modify the packing pieces at (b) so that before tightening there is a maximum clearance of 1 mm between the support clip and the housing.

11. Tighten the securing nut, which will take up this clearance.





Keeping the belt in tension, tighten the nut on the regulator mounting spindle (1).
Tighten the nut securing the tie-rod.
Fix the clips holding the pipes (4).

ADJUSTMENT OF BELT TENSIONS.
TENSION OF HIGH PRESSURE PUMP BELTS.

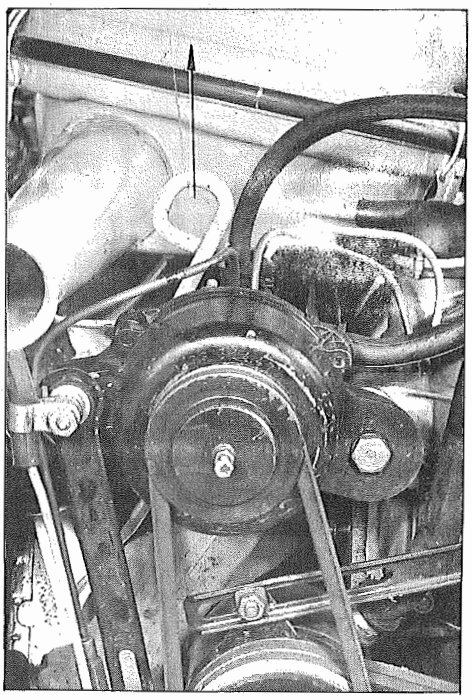
12. Unscrew:
- the nut (2) of the pump tie-rod,
- the tie-rod (3) of the centrifugal regulator on the pump (DX only),
- the securing nut for the screw (5) fixing the HP pump to the bell-housing (spanner 2280-T).

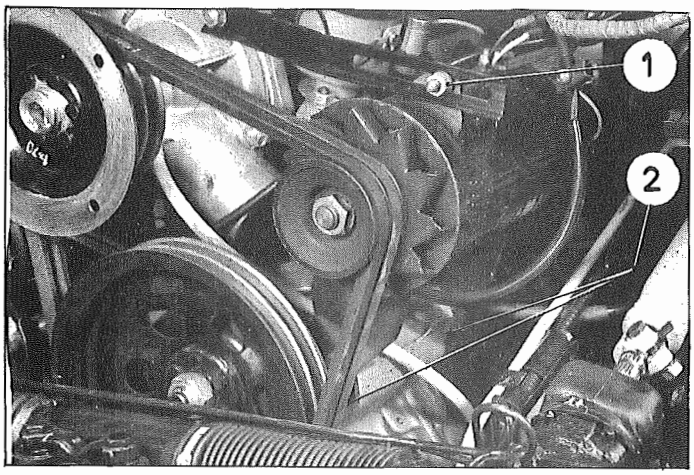
13. Tension the belts using a lever (lever MR 4208). Lever on the clutch cylinder and on the pump body.
Exert an effort of 5 kg.(11 lbs.) at the end of the lever (use a spring balance) which will correspond to a tension of 40 kg. on the belt.
Keeping the belts in tension, tighten the securing nut on the screw (5) (spanner 2280-T).
Tighten nut (2) of the pump tie-rod.
Tighten the tie-rod (3) of the centrifugal regulator (DX only).

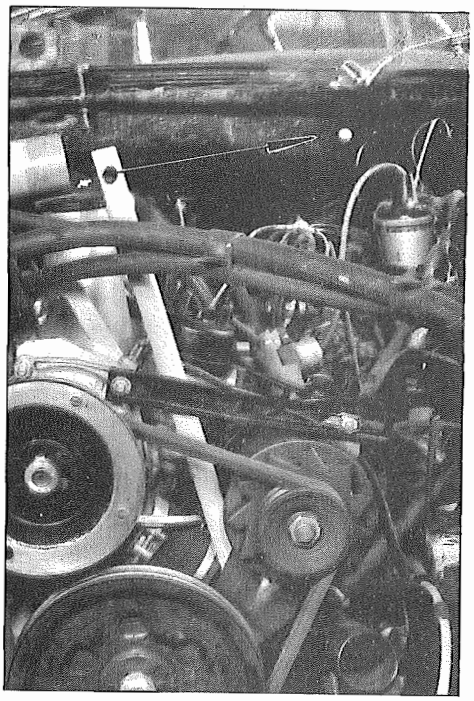
TENSION OF THE CENTRIFUGAL REGULATOR BELT (DX ONLY).

14. Remove the clips holding the pipes (4).
Unscrew the securing nut for the tie-rod (3) on the pump.
Unscrew the nut on the mounting spindle (1) of the regulator.

15. Tension the belt with the aid of hooked tool MR 4208-20. This hook passes round the regulator body behind the mechanical part.
Exert an effort of 25-30 kg. upwards (use a spring balance).







TENSION OF THE DYNAMO BELTS.

16. Unscrew the nut (1) of the dynamo tie-rod.

Slightly loosen the securing screws (2) holding the dynamo on the clutch housing.

17. Tension the belts using a lever (lever MR 4208) pressing on the boss between the two securing clips of the dynamo and on the dynamo body.

Exert an effort of 5 kg. on the end of the lever (spring balance) which corresponds to a tension of 28 kg. on the belt.

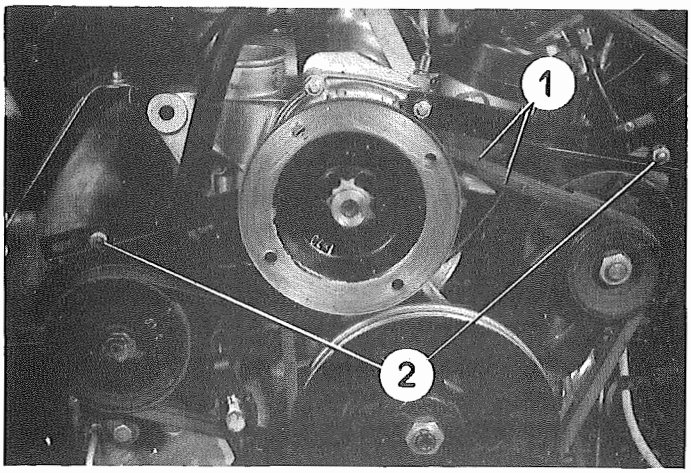
Maintaining the belt tension tighten the securing screws (2) of the dynamo and tighten the nut of the dynamo stay tie-rod (1).

REMOVAL.

1. Remove the water pump.

Drain the radiator and cylinder block (save any liquid which contains anti-freeze).

Remove the fan, but without removing it from inside the fan cowl.



Disconnect the tie-rods of the dynamo and high pressure pump from the water pump.

Disconnect the distributor earth lead.

Loosen the screws securing the dynamo and the high pressure pump on the clutch bellhousing, and the nuts (2) securing the tie-rods.

Free the dynamo belts (1).

Disconnect the lower hose from the water pump.

Remove the securing screws for the water pump on the cover and cylinder head.

Remove the water pump and its gasket.

2. Remove the water pump cover.

Remove :

- the engine sling bracket and disconnect the battery earth lead.

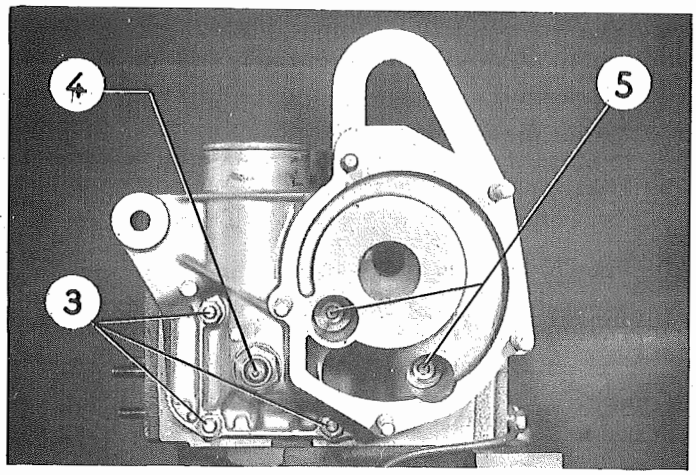
Remove :

- the radiator tie-rod, and the clip securing the distributor feed lead.

Disconnect :

- the hose from the carburettor hot spot,
- the upper radiator hose.

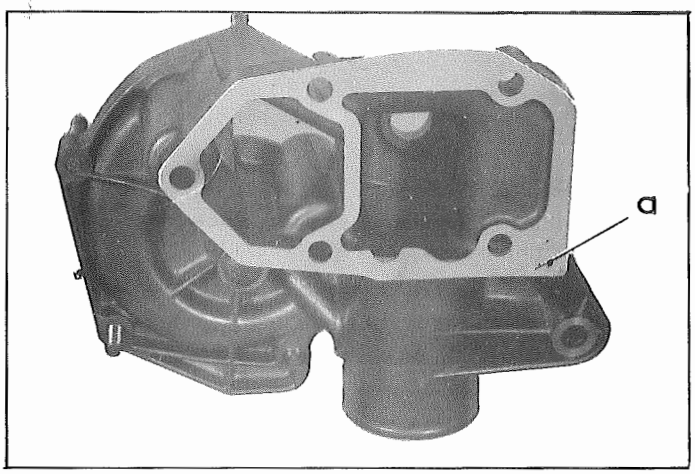
Disconnect the feed lead from the thermometer transmitter (4).

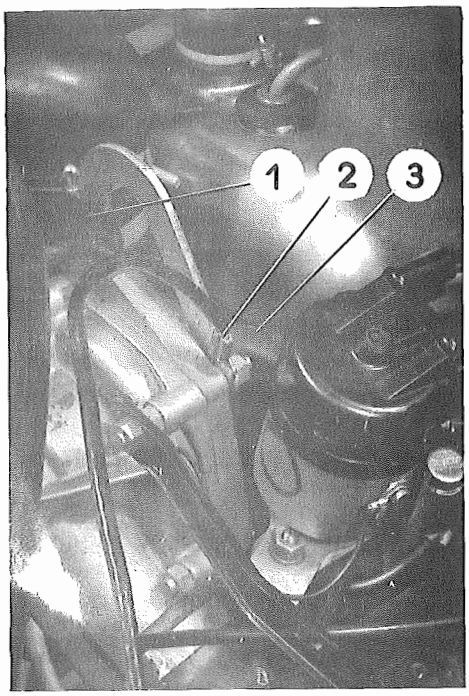


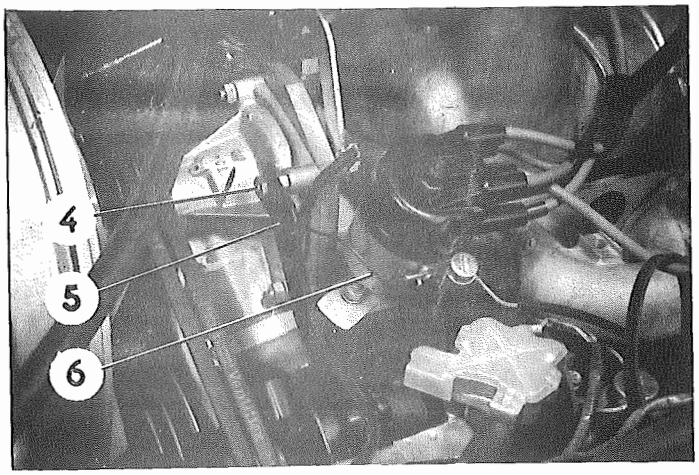
3. Remove the centrifugal regulator - on DS 21 vehicles only - (see Op. DX.314-1, paragraphs 53 and following).

4. Remove :

- the nuts (3) and (5) securing the pump backplate on the cylinder head and free the cover and its gasket.







ASSEMBLY.

5. Offer up the pump backplate.

Smear with festinol or hermetic compound the gasket between the pump backplate and the cylinder head.

Fit :
- the gasket, (position gasket as illustrated corner "A").
- the water pump backplate,
- the clip securing the distributor feed lead.

Tighten the screws and nuts securing the pump backplate on the cylinder head.

Fit :
- the radiator tie-rod (1),
- the battery earth lead (2),
- the engine sling bracket.

Tighten the nuts.

Couple up :
- the carburettor hot spot hose,
- the upper radiator hose.

Connect the lead to the thermometer.

6. Offer up the water pump.

Smear the gasket with festinol or hermetic compound.
Fit the gasket and the water pump and tighten the nuts.
Fit the distributor earth lead (6) and the dynamo tie-rod (5) on the stud (4).
Place the high pressure pump tie-rod on the diametrically opposite stud.

7. Couple up the lower radiator hose to the water pump.

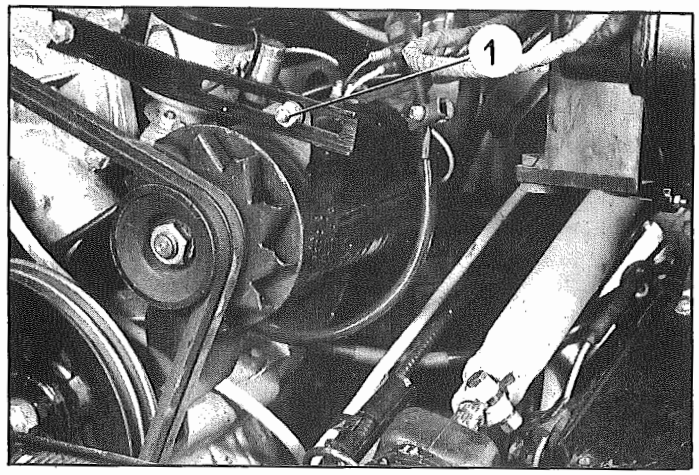
Fit the dynamo drive belts.
Tension the belts (see Op. DX.231-0), tighten the nuts on the tie-rods and the fixing screws on the dynamo and high pressure pump.

8. <u>On DS 21 vehicles only.</u>

Fit the centrifugal regulator (see Op. DX.314-1); if the water pump backplate has been renewed, check the pulley alignment (see Op. DX.231-0).

9. Fit the fan. Tighten the screws to 7 ft/lbs. maximum (1 m.kg maximum).

10. Fill up the radiator. Start up the engine and open the heater tap, topping up the level if necessary.



NOTE: In cases where equipment is driven by two belts, our Spare Parts Department supply the belts only in matched pairs. They are paired, their dimensions are identical, and it is for this reason that the two belts must be replaced even if one of the old ones seems to be good condition.

REPLACEMENT OF THE WATER PUMP BELTS.

REMOVAL.

1. Loosen the dynamo fixing screws and those of the tie-rod (1).
2. Pivot the dynamo towards the engine to its maximum.
3. Remove the belts, passing them between the fan blades.

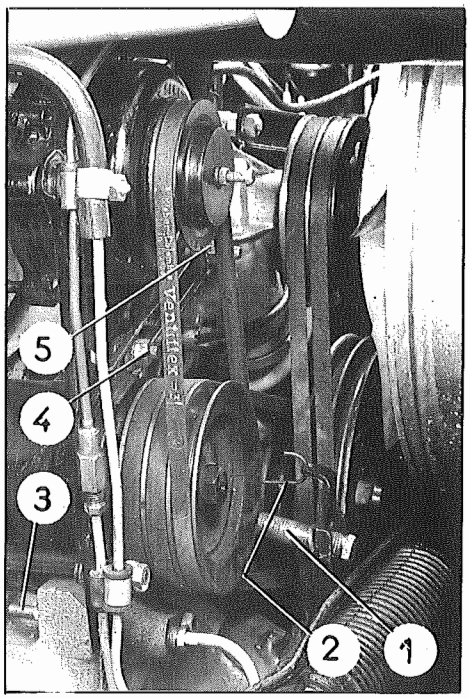
Note: In very cold weather the fan is fragile.

ASSEMBLY.

4. Fit the belts passing them between the fan blades.

   Adjust the belt tensions (see Op. DX.231-0).

5. Tighten the dynamo tie-rod nuts.
   Tighten the screws securing the dynamo.



REPLACEMENT OF THE HIGH PRESSURE PUMP BELTS.

REMOVAL.

6. Remove the dynamo and water pump belts (see paragraph 1 of this operation).

7. Place the auxiliary clutch control lever under the dash in the forward and upward position.

8. Unhook the return spring (2) from the clutch fork.
Unscrew to the maximum the screw (1) for adjusting the clutch clearance.
Free the rubber seal of the clutch cylinder from the screw (1).

9. Remove the tie-rod between high pressure pump and centrifugal regulator.

10. Remove the belt from the centrifugal regulator.

11. Loosen the nut on the fixing screw (3) of the high pressure pump (16 mm ring spanner or 2280-T).
Loosen the tie-rod securing nuts on the high pressure pump and on the water pump.
Free the belts.

ASSEMBLY.

12. Place the belts on the drive pulley, then on the high pressure pump pulley.

13. Tension the belts (see Op. DX.231-0).

14. Fit the centrifugal regulator belt.

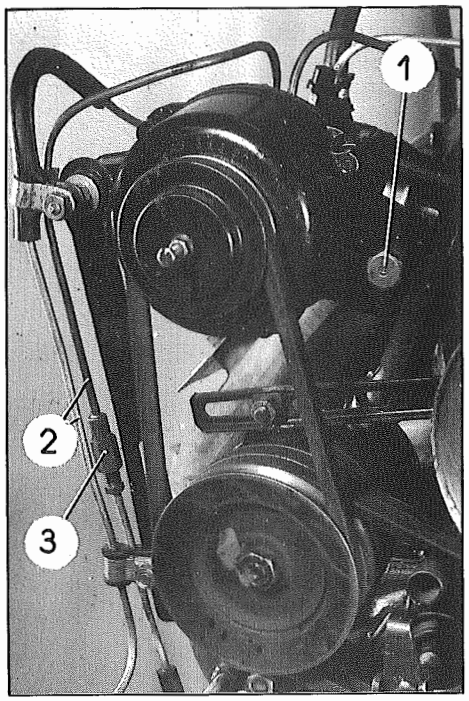
15. Tension the centrifugal regulator belt (see Op. DX.231-0).

16. Fit the belts on the dynamo and water pump (see Op. DX.231-0).

17. Screw in the adjusting screw (1) for the clutch clearance, ensuring that the push-rod is correctly placed in the screw (1), the shouldered part towards the adjusting screw. Fit the rubber dust-shield over the screw (1). Hook in place the return spring (2).

18. Put the auxilliary clutch control lever in the driving position (downwards and back).

19. Adjust the clutch clearance (see Op. DX.314-0 or Op. DJ.314-0).



REPLACEMENT OF A CENTRIFUGAL REGULATOR BELT.

REMOVAL.

20. Remove the clips holding the pipes (2).

21. Loosen the nut securing the tie-rod (3) on the HP pump.
Loosen the nut on the fulcrum pin (1) of the regulator.
Pivot the regulator downwards, freeing the belt.

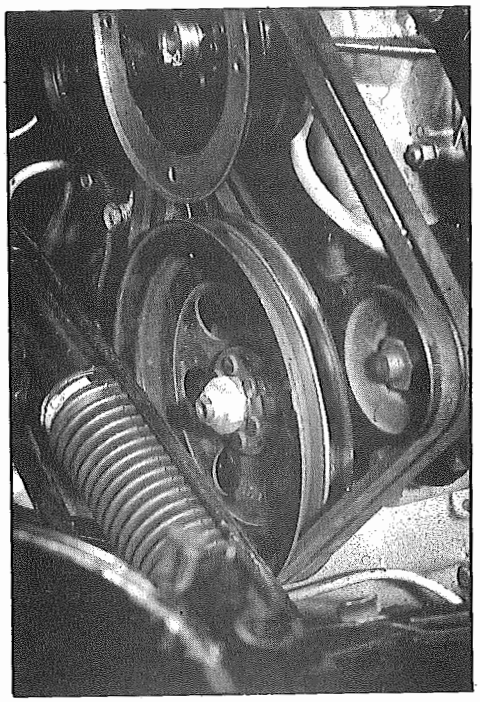
ASSEMBLY.

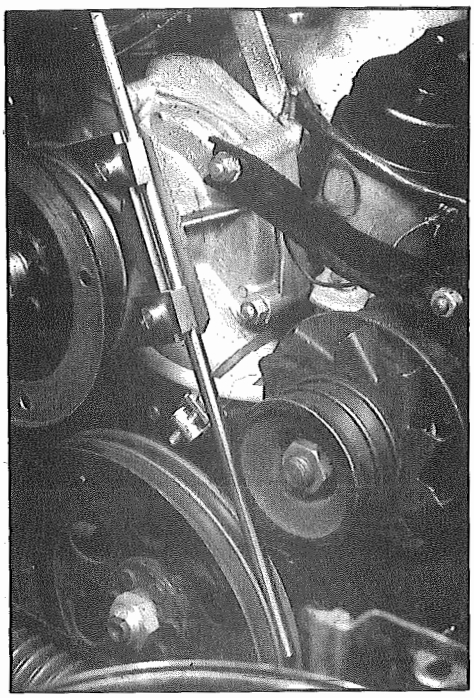
22. Fit the belt in place.

23. Tension the belt (see Op. DX.231-0).

24. Tighten the securing nut for the tie-rod (3) on the HP pump.
Tighten the nut on the fulcrum pin (1).

25. Fit the clips holding the tubes (2).





REPLACEMENT OF A DRIVE PULLEY FOR THE WATER PUMP, DYNAMO AND HIGH PRESSURE PUMP.

REMOVAL.

26. Remove :
    - the battery,
    - the radiator (see Op. DX.232-1),
    - the fan,
    - the steering rack (see Op. DX.442-1),
    - the dynamo and high pressure pump belts (see this Op., paragraph 6 and following).

27. Loosen the screws securing the left-hand handbrake mechanism.

28. Unlock the nut holding the pulley and remove it.

Remove the drive pulley, taking care not to lose the adjusting washers.

ASSEMBLY.

29. Place the pulley in position.
    Tighten the nut.

30. Place tool 3082-T in one of the grooves in the water pump pulley. The pin must be centralised in the corresponding groove of the drive pulley. If not, remove the pulley.

Decrease or increase the thickness of the adjusting washers behind the pulley to obtain correct alignment.

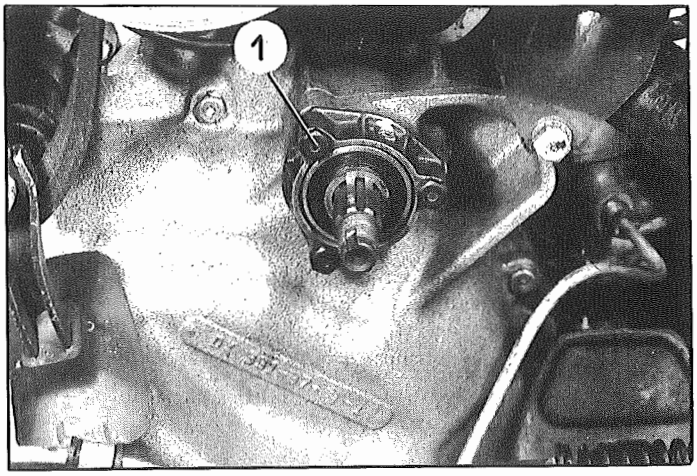
31. Offer up the pulley. Lock the nut. Knock over the metal into the groove in the shaft.

32. Tighten the screws securing the handbrake mechanism.

Check that there are 4 mm clearance between the disc and the mechanism.

33. Fit :
    - the dynamo and high pressure pump belts (see this Op., paragraphs 12 and following),
    - the steering rack (see Op. DX.442-1),
    - the fan,
    - the radiator (see Op. DX.232-1),
    - the battery.

REPLACING A BEARING ON THE DRIVESHAFT.



REMOVAL.

34. Remove the drive pulley (see this Op., paragraphs 26 - 28).

Free the adjusting washers.

35. Remove the screws (1) securing the bearing housing.

Remove the housing and the bearing from the shaft.

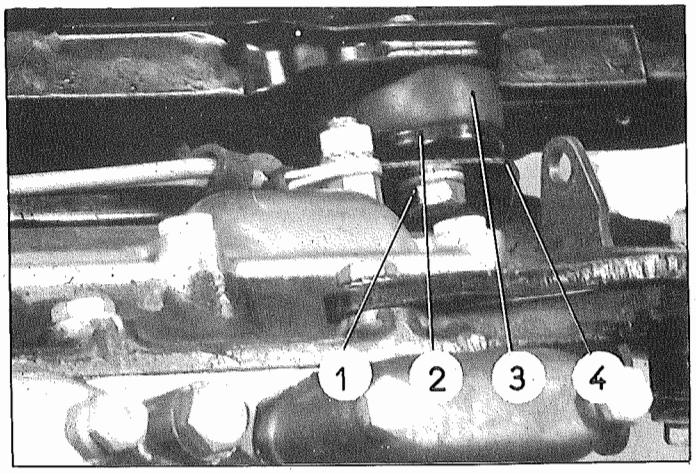
Remove the bearing from the housing.

ASSEMBLY.

36. Fit the bearing in the housing, fit over the shaft.

Tighten the securing screws.

37. Fit the drive pulley (see this Op. paragraphs 29 - 33).



REPLACING A RADIATOR.

REMOVAL.

1. Drain the radiator and the cylinder block (save the coolant which contains anti-freeze).

2. Remove :
   - the spare wheel,
   - the assembly of spare wheel support and radiator air duct.

3. Disconnect :
   - the upper and lower radiator hoses,
   - the upper tie-rod holding the radiator.

4. Remove the securing screws (1) from the radiator.

Free the radiator, the metal cups (2) and the rubber blocks (3).

ASSEMBLY.

5. Fit in place :
   - the metal cups (2) on their supports (4),
   - the rubber blocks (3) in the metal cups,
   - the radiator,
   - the securing screws (1) (plain washers under the heads).

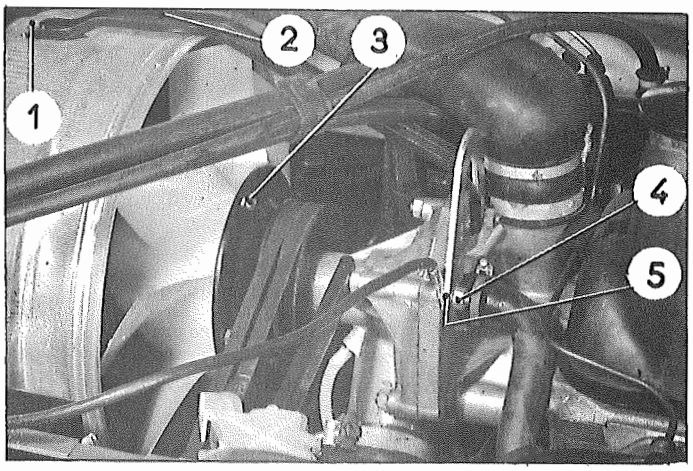
6. Centre the fan cowl (the fan blades must not touch the cowl). Fit the radiator tie-rod.

7. Couple up the upper and lower radiator hoses.

8. Fit :
   - the assembly of spare wheel support and radiator air duct,
   - the spare wheel.

9. Fill up the radiator, start up the engine, open the heater tap. Top up if necessary. Stop the engine.

REPLACEMENT OF A FAN.



Removal.

10. Remove the screw (1) securing the radiator tie-rod, from the radiator, and the nuts (4).

11. Free :
    - the lifting hook (5),
    - the radiator tie-rod (2) from the water pump stud and slide it towards the high pressure pump.

12. Remove the screws (3) holding the fan and withdraw it in an upward direction.

Fitting.

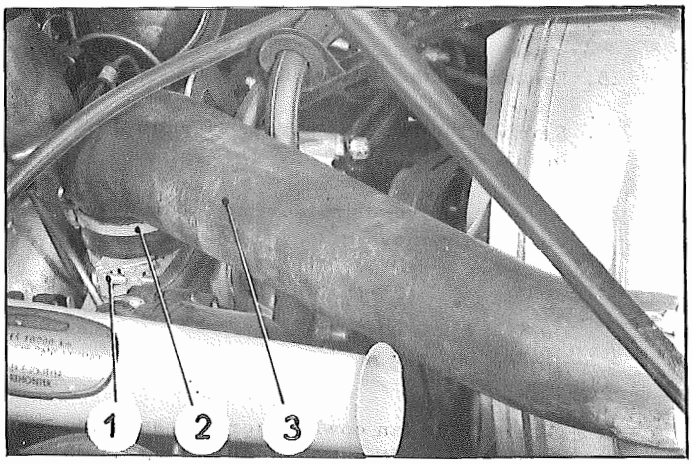
13. Insert the fan in the cowl in the radiator, from above.

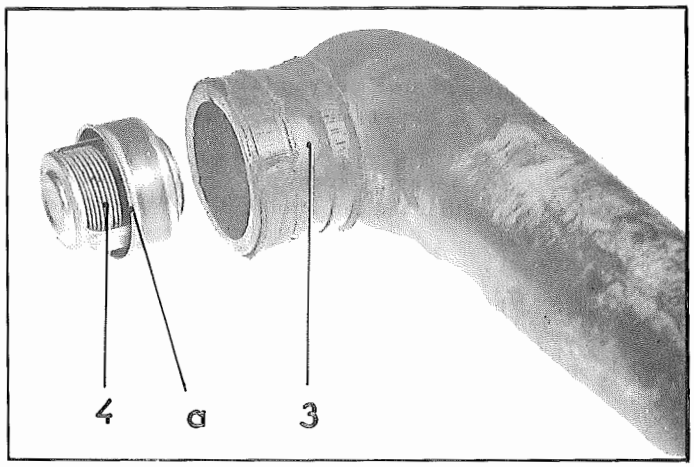
14. Fit the fan on the water pump pulley and tighten the nuts (3) to between 7 and 10 ft lbs (1 to 1.4 m.kg) (9.81 to 13.73 mAN).

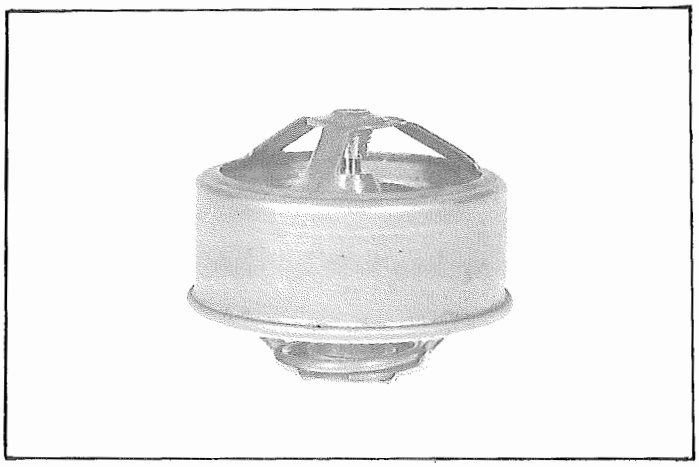
15. Fit :
    - the tie-rod (2) on the water pump and on the radiator,
    - the lifting hook (5).

16. Fit :
    - the nuts (4) (shakeproof washers),
    - the screw (1) (shakeproof and plain washers under the head).

Tighten the screw (1) and the nuts (4).







REPLACING A THERMOSTAT.

Removal.

17. Drain the radiator, (save the water which contains anti-freeze).

18. Loosen the clip (1) and free the flexible hose (3) from the water pump cover.

19. Remove the clip (2) securing the thermostat. Remove the thermostat.

Assembly.

20. Place the thermostat (4) in the flexible hose (3). Insert the thermostat in the hose until the flanged edge (a) of the thermostat body is in contact with the shoulder in the hose.

Tighten the securing clip (2).

21. Connect the flexible hose (3) to the water pump cover. Tighten securing clip (1).

22. Fill up the radiator. Open the heater valve, start up the engine and top up the water level if necessary, after a few minutes running.

Check for leaks.

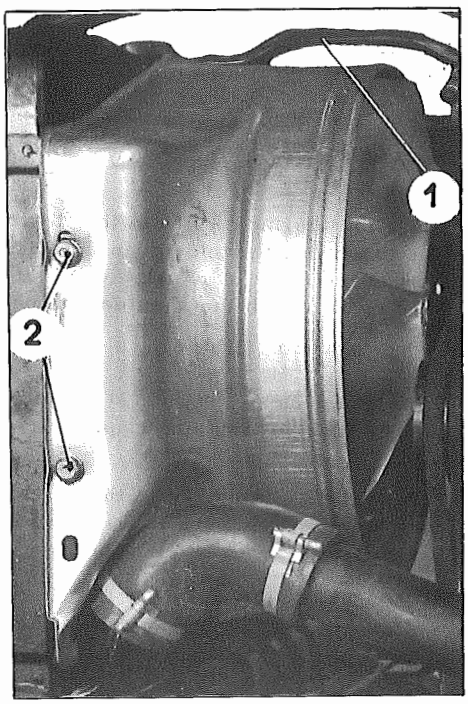
CHECKING A THERMOSTAT Calorstat 78° - Ref. V 1743.

23. Plunge the thermostat in water. Then heat progressively to a temperature of $78^{\circ}\ {}^{0}_{-3}{}^{\circ}$ C. The valve must commence to open.

24. Plunge the thermostat in water at 90°C and move it about. The valve must open completely within 20 to 50 seconds.

NOTE: No adjustment is possible on this thermostat.

If it does not fulfil the above conditions it must be renewed.



REPLACING A FAN COWL.

Removal.

25. Disconnect the battery terminals.

26. Remove the fan (see paras. 10 and following in this operation).

27. Remove the securing screws (2) from the fan cowl and remove it.

Assembly.

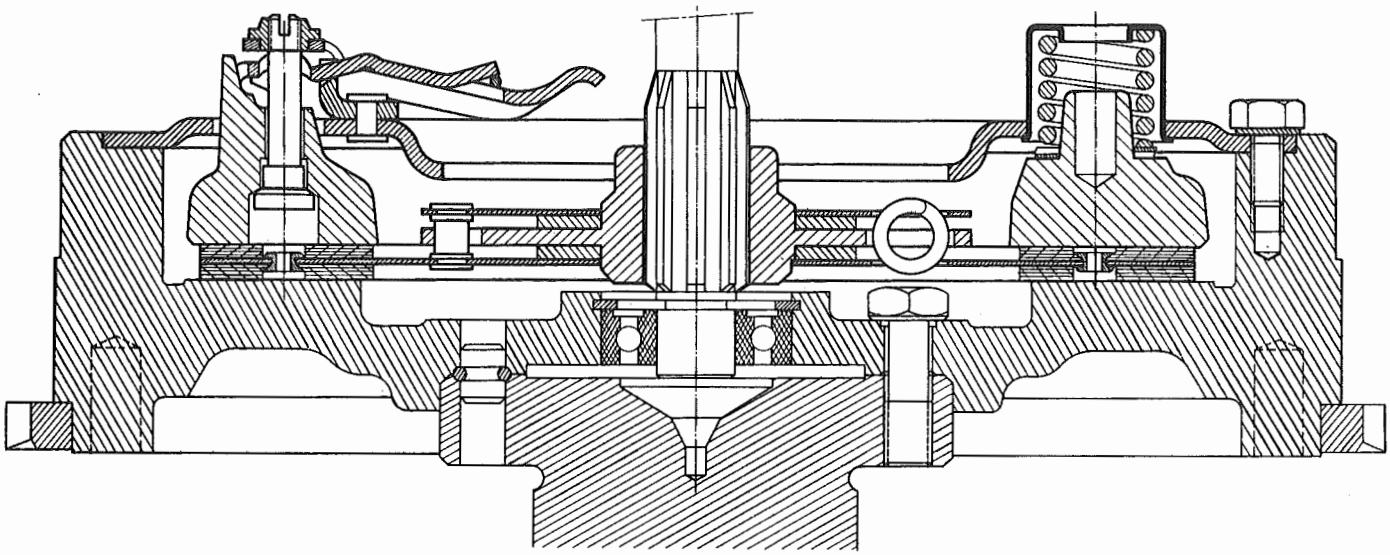
28. Offer up the fan cowl, insert the securing screws (2), without tightening them (plain and spring washers under the head).

29. Fit the fan (see paras. 13 and following this operation).

30. Fit the radiator tie-rod (1) and the sling hook for lifting the engine.

31. Tighten securing screws (2) on the fan cowl (ensure that the fan blades do not touch the cowl).

32. Fit the battery and connect the terminals.



June 1966.

Corrective No. 1

SPECIAL POINTS

Adjustment of the speed at which the clutch begins to engage 700 to 750 r.p.m.

Tightening torque for the screws securing the clutch mechanism to the flywheel = $18\ ^{+2}_{-3}$ ft lbs ($2.5\ ^{+0.3}_{-0.4}$ m.kg).

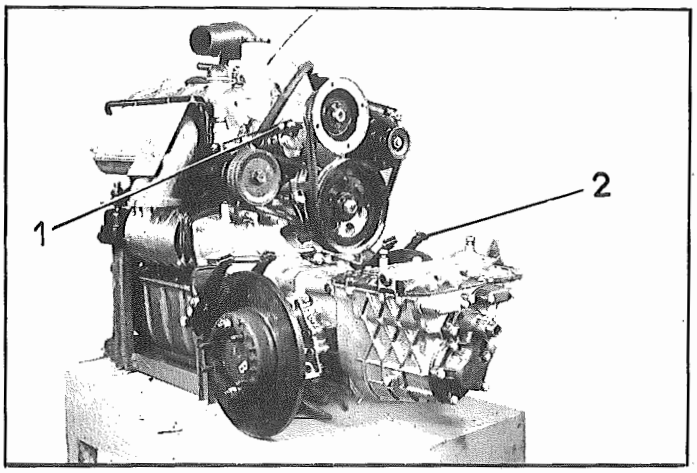
After resurfacing : the distance between the face of the clutch disc and the clutch driving plate on the engine flywheel = $29\ ^{+0.2}_{0}$ mm.

Springs :

Marking	Length	Under a load of
mauve	27.3 mm	$60.75\ ^{+2.5}_{0}$ kg.
green	27.3 mm	$40\ ^{+2}_{0}$ kg.

Adjustment of the toggles can only be carried out when assembling.

REMOVAL.



1. Remove the engine-gearbox assembly (see Op. DX.100.1).

2. Disconnect the gearbox from the engine.

Remove:

- the radiator,
- the belts and drive pulley (do not lose the adjusting washers),
- the starter motor.

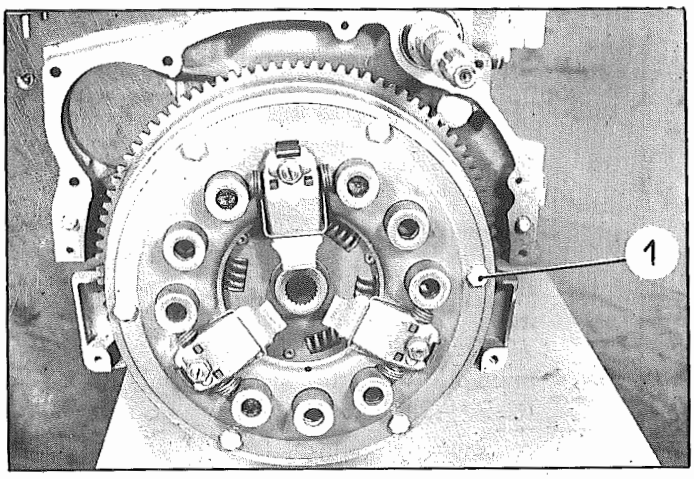
Disconnect:

- the pipe (2) connecting pump and pressure regulator, from the pressure regulator,
- the high pressure pump stay (1).

Remove the assembly screws from the gearbox.

NOTE: The gearbox must not on any account be moved about by rolling it with the brake discs on the ground. Fit old worn discs or dummy discs machined to 350 mm diameter. If these are not available place a rubber mat or sheet of plywood between the ground and the gearbox. Insert washers between the nut and the disc to ensure tightening.

Free the gearbox.



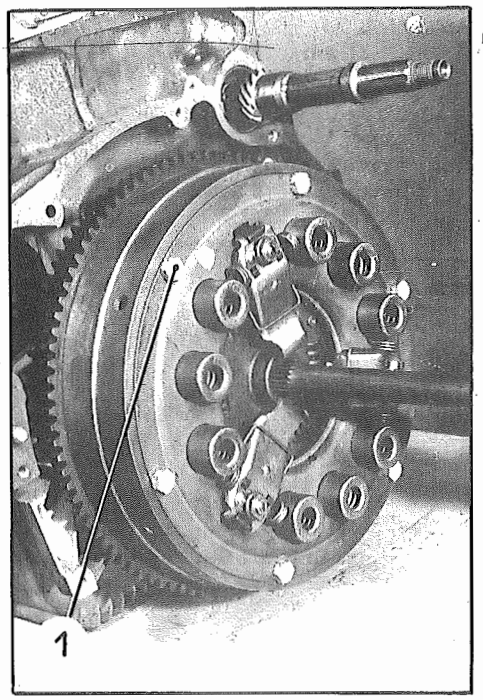
3. Removing the clutch.

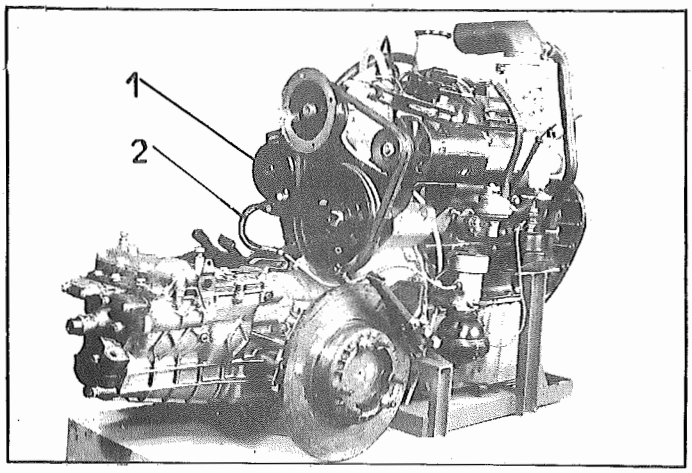
Mark with a centre punch the position of the clutch housing on the engine flywheel.

Remove the screws (1) holding the clutch mechanism.

Free:

- the clutch mechanism,
- the disc.





ASSEMBLY.

4. Make quite sure that the thrust faces of the clutch pressure-plate and engine flywheel are perfectly clean and free from scratches.

5. Offer up the disc, using a mandrel to centralise it (mandrel 3016-T). Otherwise use an old drive shaft.

6. Fit the clutch according to the marks made when dismantling. Tighten the screws (1) (spring washer under heads) to $18\ ^{+\ 2}_{-\ 3}$ ft.lbs.

($2.5\ ^{+\ 0.3}_{-\ 0.4}$ m.kg).

During the tightening operation ensure that the mandrel slides easily.

NOTE: If the clutch housing has 12 holes and the flywheel 6 tapped holes, the clutch must be arranged so that 3 of the screws (1) are in line with the toggles.

7. Couple the gearbox to the engine.

Fit the starter motor.

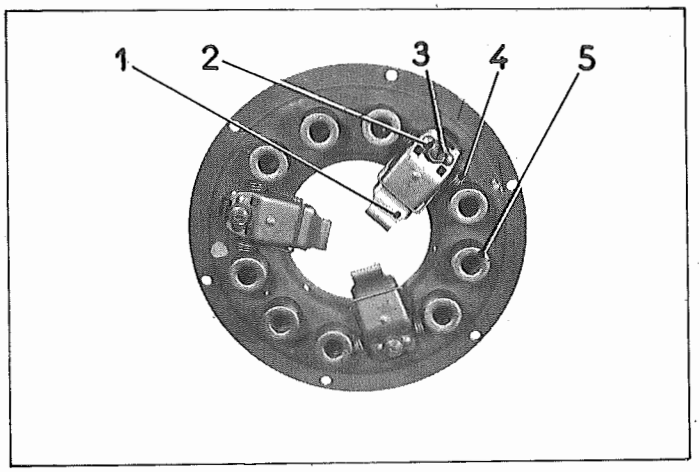
Remove the old brake discs, if used, and fit the current discs for the car.

8. Fit:

- the stay to the high pressure pump,
- the pipe (2) between high pressure pump and the pressure regulator,
- the drive pulley, insert the adjusting washers found when dismantling,
- tighten the nuts to $54\ ^{+\ 3.5}_{-\ 2}$ ft.lbs.

  ($7.5\ ^{+\ 0.5}_{-\ 0.3}$ m.kg), and lock them by knocking over the metal into the nut (support the nut).
- the belts, adjusting their tension (see Op. DX.231.0),
- the radiator (see Op. DX.232.1).

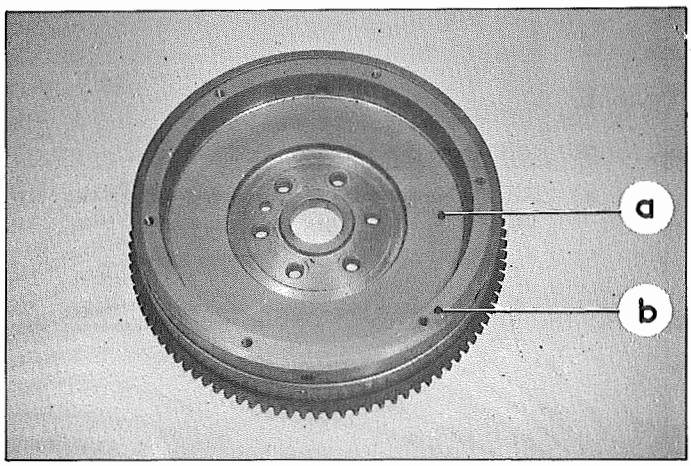
9. Fit the engine-gearbox assembly to the car (see Op. DX.100.1).



DISMANTLING.

1. Mark with a centre punch the position of the clutch pressure plate on the toggle carrier plate.
2. With a saw-cut clear the metal locking the nuts (2) from the slots of the screws (3).
3. Remove the toggles (1), the clutch pressure plate, the wavy washers, the springs, the cups (5), the toggle springs (4).
4. Clean all the parts.

ASSEMBLY.



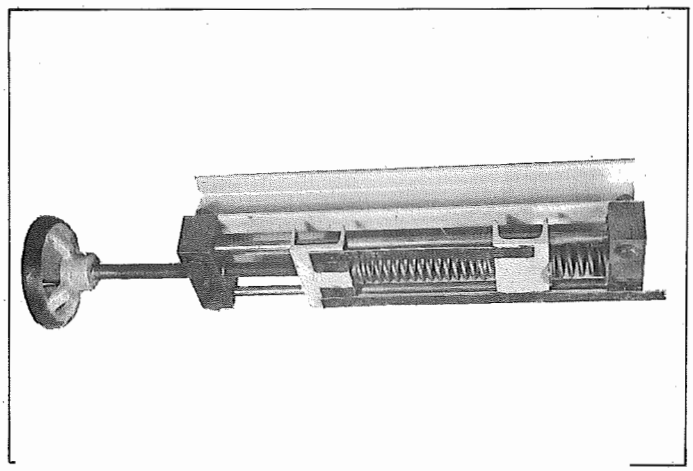
5. Grinding the clutch pressure plate:
on a lathe using a grinding wheel (if not possible, use a facing tool).

Cut some washers, of a thickness equal to the amount of metal removed by grinding, to pack the springs so as to compensate for the difference in spring pressure due to the grinding.

6. Grinding the engine flywheel.

Each time the clutch disc bearing face "a" on the flywheel is ground, remove the same amount from the clutch housing bearing face "b".

The distance between the two ground faces must be $29\ ^{+\ 0.2}_{-\ 0}$ mm. The amount of metal removed by grinding must not exceed 0.3 - 0.5 mm.



7. Checking the springs.

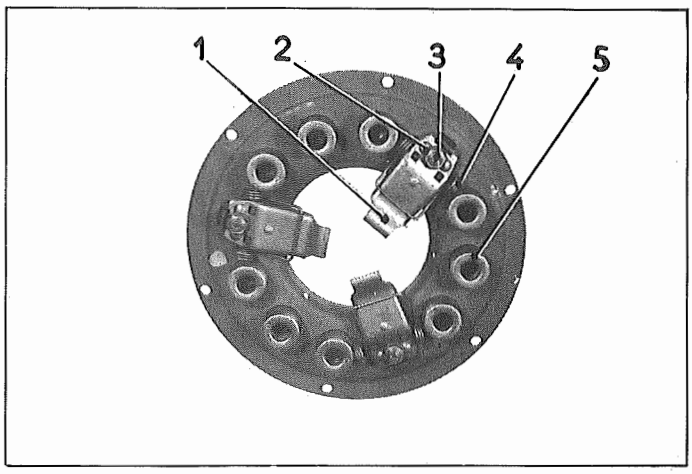
Use the fixture 2420-T.

Springs marked mauve:

Length under a load of $60.75\ ^{+\ 2.5}_{-\ 0}$ kg = 27.3 mm.

Springs marked normandy green:

Length under a load of $40\ ^{+\ 2}_{-\ 0}$ kg = 27.3 mm.



8. Assembling the mechanism.

Hook the springs (4) on the toggle carrier plate.

Place the wavy washers and the clutch springs on the bosses of the pressure plate. Place one spring marked green between two mauve springs and each group of three between two toggles.

On each spring place a cup (5), and, if necessary, the appropriate packing washers.

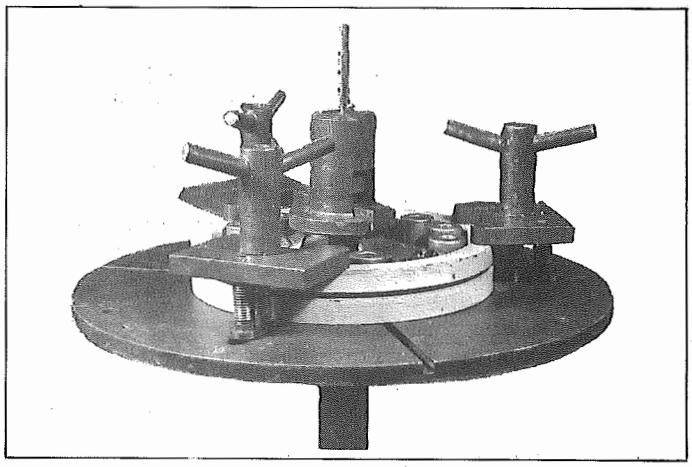
Offer up the toggle carrier plate over the cups in accordance with the marks made when dismantling.

Fit:

- the toggles (1) under the springs (4),
- the toggle screws (3).

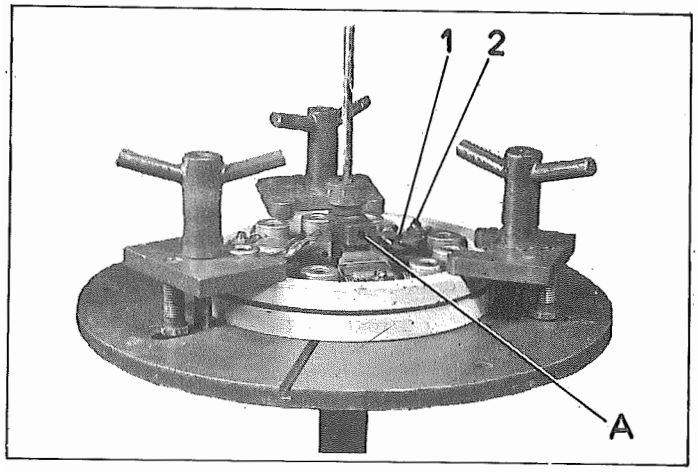
Place on each toggle screw the special articulating washers.

Tighten the nuts (2).



9. Adjusting the mechanism.

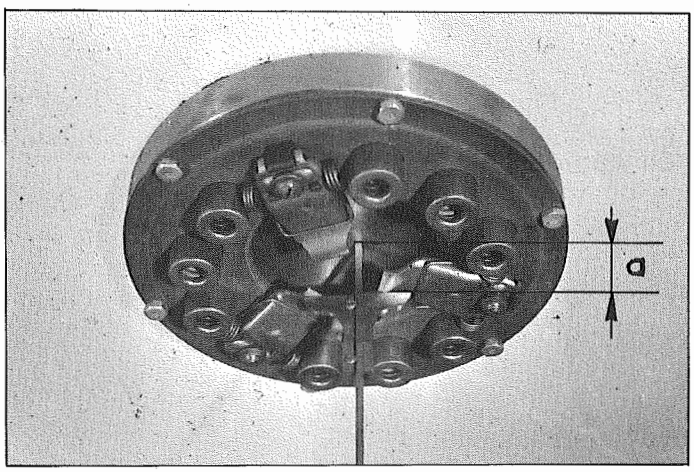
a) Fit the assembly on the adjusting fixture 1701-T.



b) Tighten the nuts (2) in order to bring the toggles (1) in contact under the rotating central arm (A).

c) Operate the clutch and verify that the toggles (1) are still in contact with the central arm (A) and that this latter rotates freely. Otherwise adjust the nuts (2).

d) Lock the nuts (2) by turning over metal into the screw slots.



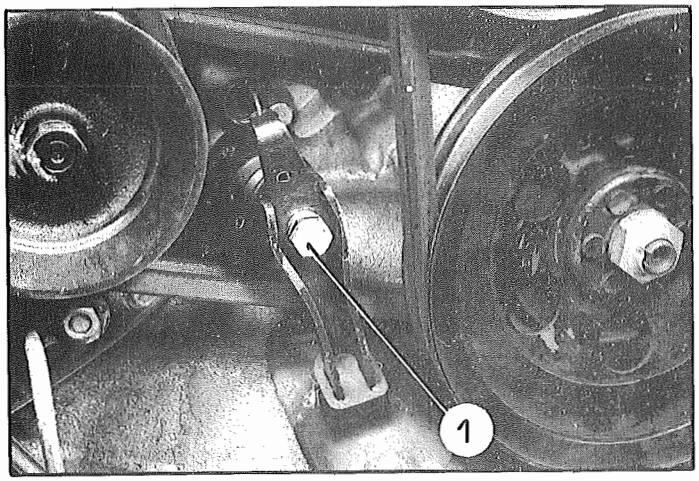
NOTE : If the fixture 1701-T is not available, use a simplified fixture.

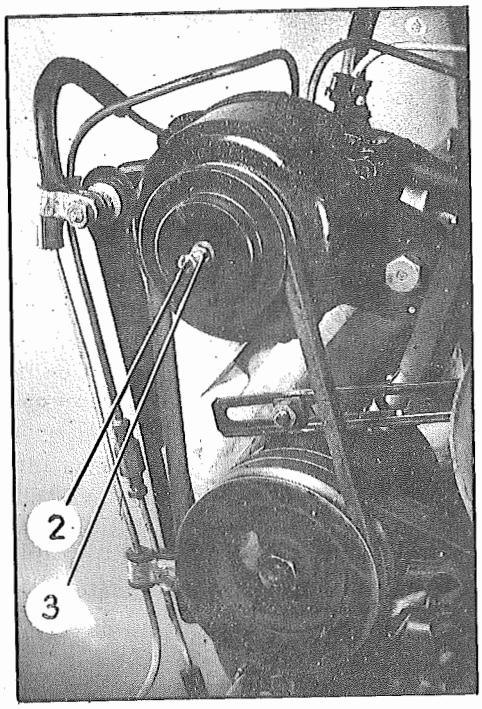
Measure the distance "a" between the upper part of the toggles and the bottom of the assembly 3108-T.

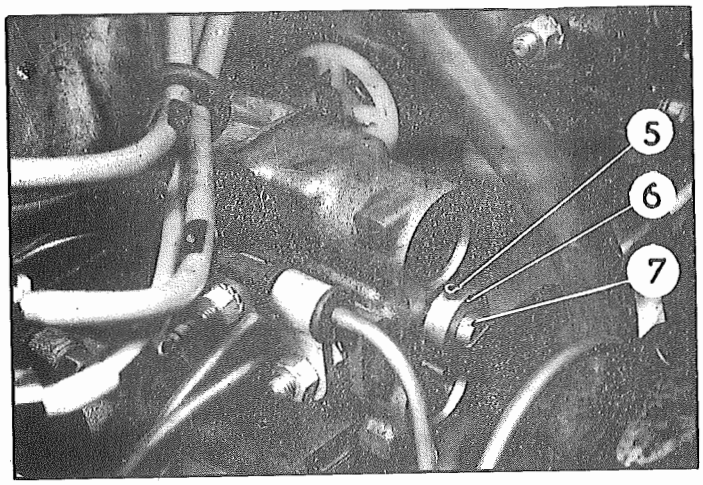
This dimension "a" = $39.8\ ^{+1.5}_{0}$ mm.

Operate the clutch up and down several times by means of a rack press and measure the dimension "a" again.

The dimension "a" can only be measured on this fixture.







NOTE : It is essential to proceed in the following order :

ADJUSTMENT OF THE CLUTCH CLEARANCE.

1. Pre-adjustment:
   NOTE: The engine must be hot. Any adjustment carried out with the engine cold may be incorrect with the engine hot.
   Run the engine at idling speed.
   Put the starting handle extension in position.
   Unscrew the adjusting screw (1) of the clutch fork by a fraction of a turn at a time, until the starting handle extension just begins to turn but may be stopped by hand.

2. Adjustment.
   Tighten the screw (1) two turns.

CHECKING THE CLUTCH CLEARANCE.

3. Release the pressure in the clutch system by operating the auxiliary clutch control.

Check that the clutch fork is free.

If it is not free, carry out the adjustment operation for clutch clearance again, which is probably excessive.

ADJUSTMENT OF THE CLUTCH DRAG.

NOTE: This adjustment must be made with the engine hot and vehicle standing on a flat horizontal surface.

4. Start up the engine, engage first gear and accelerate very slowly. Clutch drag should commence between 700 and 750 r.p.m.

5. If it does not, proceed as follows :-
   Stop the engine. Loosen the locknut (3) of the adjusting screw (2) on the centrifugal regulator. If the clutch "drags" at a speed less than 700 r.p.m. tighten the screw.

   Unscrew this adjusting screw if clutch drag begins at a speed greater than 750 r.p.m.

   Tighten the locknut (3).

ADJUSTMENT OF THE CLUTCH RE-ENGAGEMENT CONTROL.

NOTE: This adjustment should be made on the road with the engine hot.

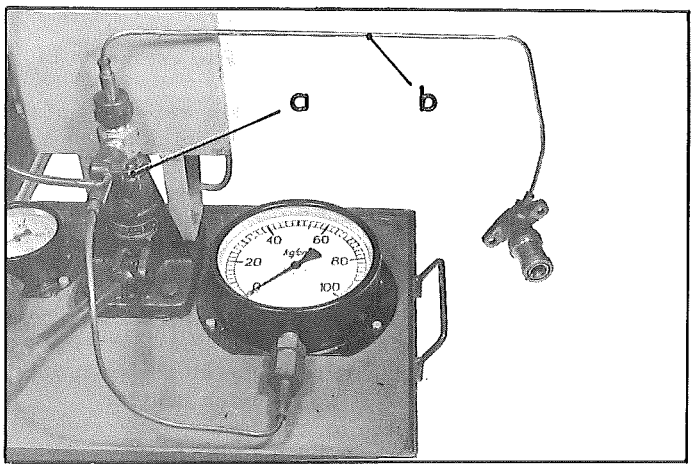
6. If the time for re-engagement is too short, unscrew the screw (7) (anti-clockwise direction). If the time is too long, tighten the screw (7).

If the pin (5) of bush (6) prevents further movement before the adjustment of the clutch re-engagement control is effected, it is necessary to :
- loosen the locking screw of bush (6),
- turn the bush (6), moving it to a position which will allow maximum adjustment in each direction.
- tighten the locking screw.

NOTE: To obtain full satisfaction from the vehicle, it is necessary to adjust also:
- the engine idling,
- the accelerated idling (see Op. DX.142-0).

June 1966.

Corrective No.1



CHECK THE CLUTCH CYLINDER FOR LEAKS.

7. Use test bench 2290-T. Connect the pump to the pressure gauge reading 0-100 kg/cm^2 (0-1500 p.s.i.).

8. Using a pipe (b) connect the tapping in the clutch cylinder to the pump.

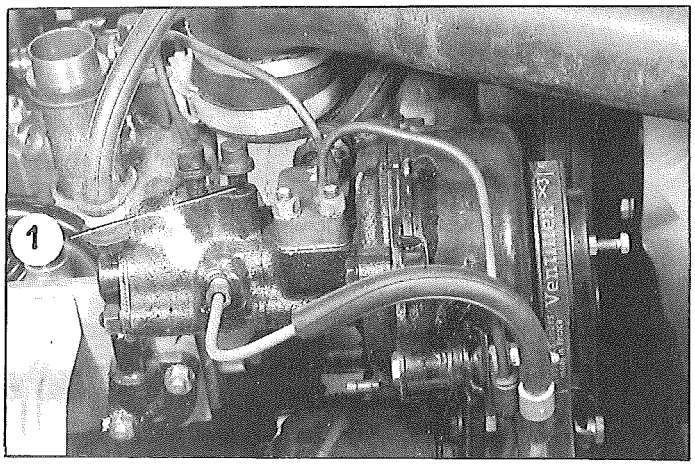
9. Close the pump bleed screw (a) and pump up to 75 kg/cm^2 (1070 p.s.i.).

The pressure gauge must not show any pressure drop. If it does, the ring seal or the piston and cylinder are defective.

10. Release the pressure by slackening the bleed screw (a) on the pump. Disconnect the pipe (b).

BLEEDING A CENTRIFUGAL REGULATOR.

11. Fit a flexible pipe (preferably transparent), on to the forward bleed screw (1) of the regulator. Insert the other end of the pipe into the filler hole of the hydraulic reservoir.



12. Make sure that the bleed screw on the pressure regulator, and both bleed screws on the centrifugal regulator, are tight.

Start the engine and run it at between 1500 and 2000 r.p.m. by unscrewing the accelerated idling adjusting screw on the carburettor.

13. Slacken the centrifugal regulator bleed screw (1).

14. Very slowly, adjust the accelerated idling adjusting screw to bring the engine speed down to 500-600 r.p.m.

15. Let the engine idle for about two minutes, then tighten the bleed screw.

16. Remove the flexible pipe, fit the rubber cap on to the bleed screw (1).

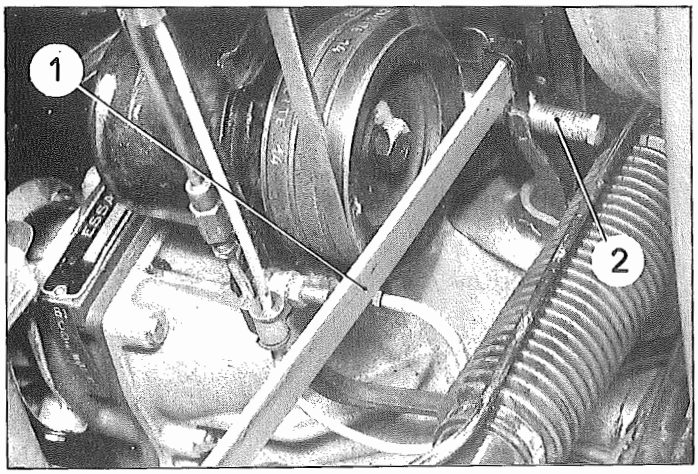
17. Adjust the accelerated idling (see Op. DX.142-0, paragraph 11).

A.P.

C1/10

REPLACEMENT OF A CLUTCH CYLINDER.

REMOVAL.



1. Release the pressure by means of the auxiliary clutch control lever under the dash.

2. Disconnect the pressure feedpipe from the clutch cylinder.

   Remove the two screws securing the clutch cylinder (12 mm socket - 125 mm extension and ratchet spanner).

   Unscrew fully the screw (2) which adjusts the clutch clearance.

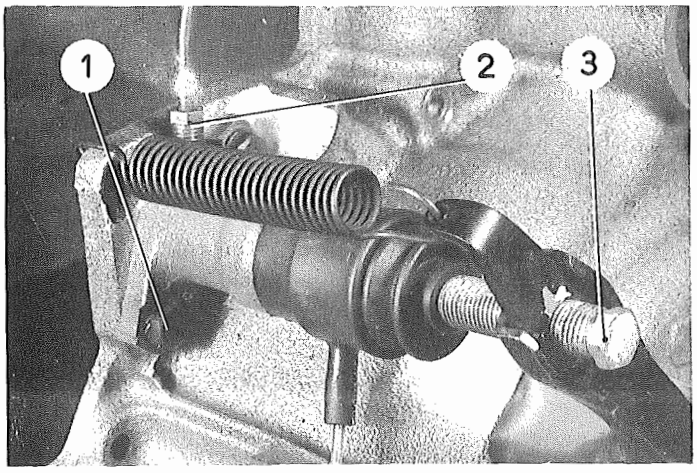
   Wedge the clutch fork (using a bar (1) levering on the pulley).

3. Free the cylinder and clutch fork control rod assembly.

June 1966.

Corrective No. 1

ASSEMBLY.



4. Place the clutch fork push-rod in position with the shouldered part towards the adjusting screw, and the dust cover on the cylinder, with the nylon overflow tube pointing downwards and to the right.

5. Offer up the cylinder. Tighten the screws (1). Place the control rod in the bore of the adjusting screw (3). Place the dust cover in position on the adjusting screw (3).

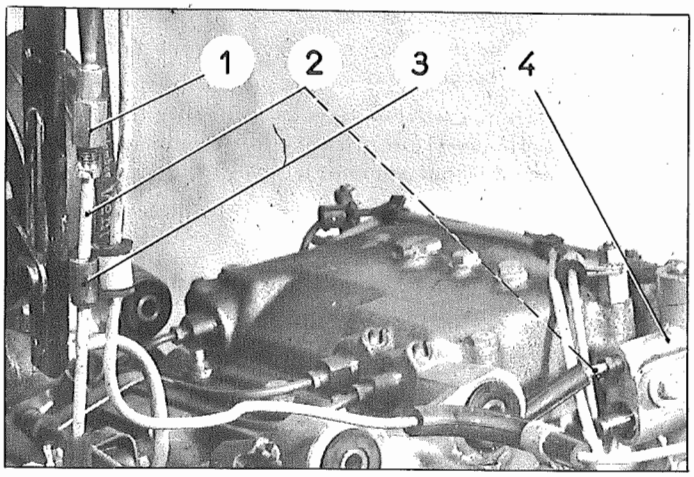
   Couple up the pressure feedpipe (2), <u>This tube must be free and not strained.</u>

   Place the nylon overflow tube against the clutch housing.

6. Put the circuit under pressure. Bleed the hydraulic gear selector (see Operation DX. 00).

7. Adjust the clutch clearance (see Operation DX. 314-0).

REPLACEMENT OF THE TUBE BETWEEN THE CENTRIFUGAL REGULATOR AND CLUTCH LOCK.



REMOVAL.

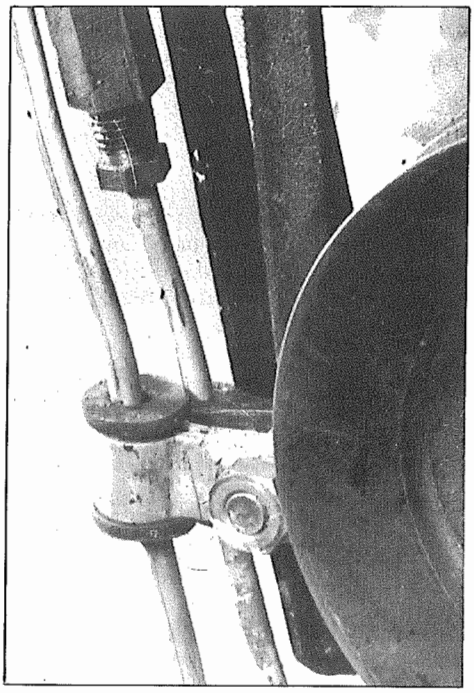
8. Remove the spare wheel, the spare wheel crossmember together with the radiator air inlet duct.

   - Release the pressure (see Op. DX. 00).

9. Disconnect: the tube (2) from the lock (4),
   the union (1).

   Remove the clip (3).

   Draw out the tube from the rear of the gearbox.



ASSEMBLY.

10. Insert the tube, passing it under the cross-member between the right-hand brake unit and the gearbox.

11. Connect :

    the union (1),

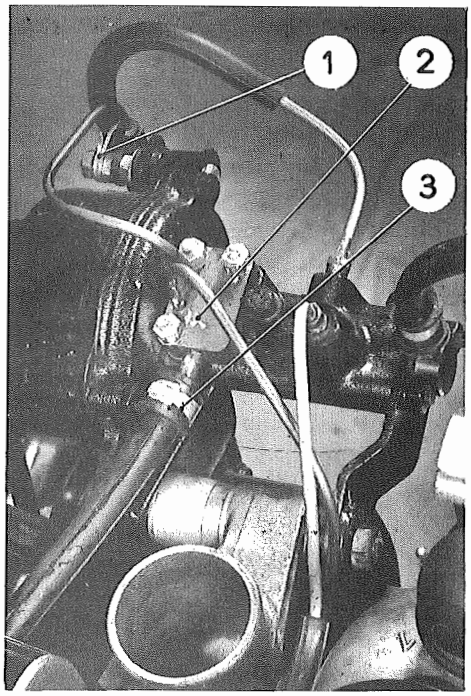
    the tube (2) to the clutch lock (4).

    Offer up the clip (3) securing the tube. Tighten the nuts.

12. Fit the spare wheel support and the radiator air inlet duct. Replace the spare wheel.

13. Put the circuit under pressure.

    Bleed the centrifugal regulator (see Op. DX. 314-0).



REPLACEMENT OF A PIPE ASSEMBLY BETWEEN HYDRAULIC GEAR SELECTOR AND CENTRIFUGAL REGULATOR.

REMOVAL.

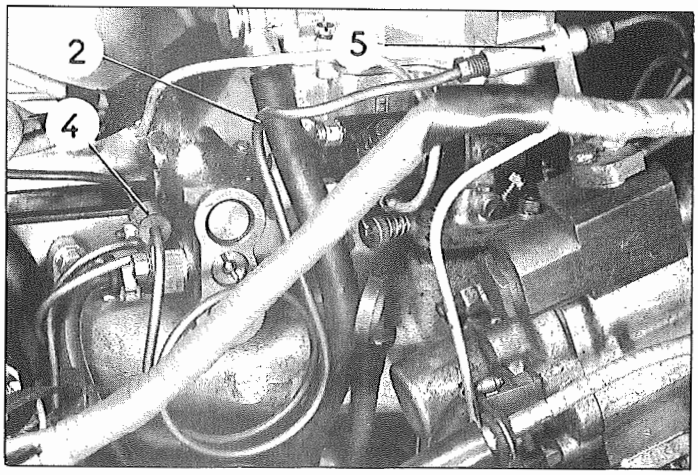
14. Release the pressure (see Operation DX.00).

15. Disconnect :-
- the pipe assembly (2) from the regulator,
- the union which lies parallel to the regulator tie-rod,
- the return pipe (3),
- the pipe assembly (2) from the union (5).

16. Remove :-
- the clip (1) securing the regulator pipe assembly,
- the clip (4) securing the pipe assembly of the clutch re-engagement control.

Remove the pipe assembly.

ASSEMBLY.



17. Place the pipe assembly in position.

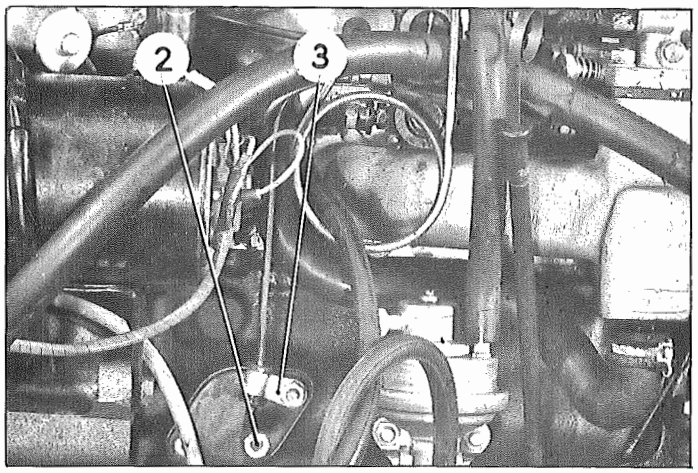
18. Connect :-
- the pipe assembly (2) to the regulator, inserting the sealing plate with new ring seals,
- the return pipe (3). Tighten the hose clip,
- the union which lies parallel to the regulator tie-rod,
- the pipe assembly (2) to the union (5).

19. Assemble:-
- the clip (1) securing the pipe assembly on the regulator,
- the clip (4) holding the pipe assembly on the clutch re-engagement control.

20. Put the circuit under pressure. Check unions for leaks.

Bleed the regulator (see Op. DX. 314-0).

REPLACEMENT OF A PIPE ASSEMBLY BETWEEN HYDRAULIC GEAR SELECTOR, CLUTCH RE-ENGAGEMENT CONTROL AND CLUTCH CYLINDER.



REMOVAL.

NOTE: The pipe assembly is in two parts, the union is above the pressure-regulator.

21. Release the pressure (see Op. DX.00).

    Remove the front left-hand sphere.

22. Disconnect :-

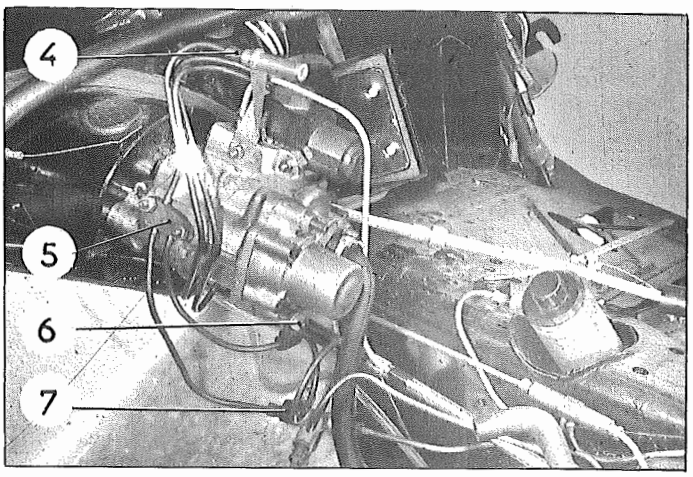
    - the pipe assembly from the clutch re-engagement control,
    - the union (2) situated above the pressure regulator,
    - the pipe from the clutch cylinder.

23. Remove the clip (3) securing the pipe assembly to the front left-hand engine closing plate.

    Withdraw the first part of the pipe assembly.

24. Disconnect :-

    - the union (4) held by a clip on the hydraulic gear selector,
    - the pipe assembly (5) from the hydraulic gear selector,
    - the pipe assembly from 3-way union (7).



25. Remove :-

    - the clip (6) securing the hydraulic gear selector pipe assembly.

    Withdraw the second part of the pipe assembly.

ASSEMBLY.

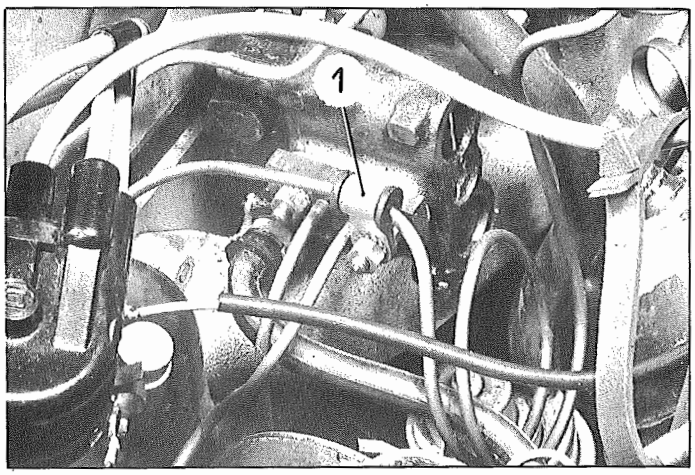
26. Place in position the second part of the pipe assembly.

    Connect :-

    - the pipe assembly (5) to the hydraulic gear selector, inserting the sealing plate with new ring seals,
    - the pipe assembly to the 3-way union (7) and to union (4) held by a clip on the hydraulic gear selector.

    Assemble :-

    - the clip (6) securing the pipe assembly on the hydraulic gear selector.

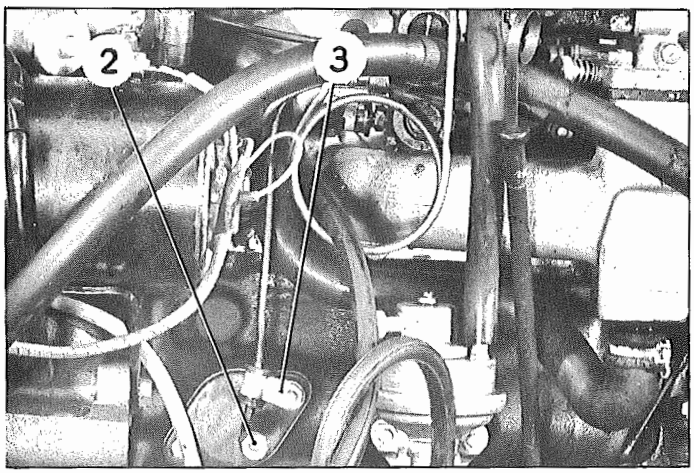


27. Place in position the first part of the pipe assembly (it must pass between the distributor drive tower and the water pump suction hose).

    Connect :-

    - the pipe assembly to the clutch re-engagement control, inserting the sealing plate with new ring seals. Fasten the clip (1) holding the pipe between the centrifugal regulator and the accelerated idling device,
    - the pipe assembly to the clutch cylinder,
    - the union (2) situated above the pressure-regulator.

    Fit the clip (3) securing the pipe assembly on the engine closing plate.

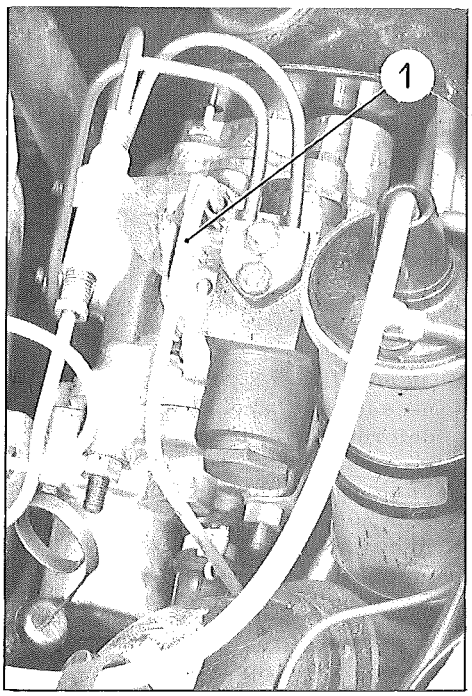


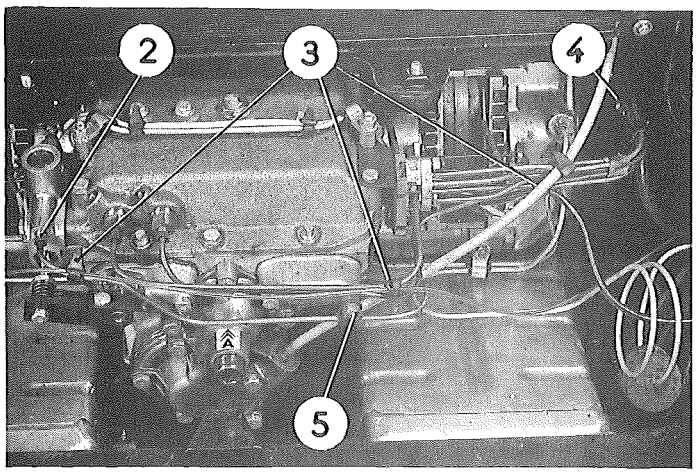
IMPORTANT NOTE : During this operation it is necessary to avoid as far as possible any deformation of the pipes.

In no case must the radius of curvature be less than 30 mm. Make sure that the pipes are not in contact with any part of the car.

28. Refit the front left-hand sphere.
    - Put the circuits under pressure and check all unions for leaks.

29. Bleed the hydraulic gear selector.





REPLACEMENT OF A PIPE BETWEEN HYDRAULIC GEAR SELECTOR AND CLUTCH LOCK.

REMOVAL.

NOTE: This pipe is in two parts.

30. Remove the spare wheel, the spare wheel crossmember together with the radiator air inlet duct.

    Release the pressure (see Op. DX. 00).

31. Disconnect :-

    - the pipe (1) from the hydraulic gear selector,
    - the union (4) situated under the crossmember supporting the gearbox.

    Separate the pipe from the gear change control pipe assembly (5 pipes).

    Disengage the first part of the pipe.

32. Disconnect :

    - the pipe (2) from the clutch lock.

    Remove :

    - the clip (5) securing the pipe,
    - the 3 rubber "arrow" clips (3).

    Disengage the second part of the pipe.

ASSEMBLY.

33. Engage the first part of the pipe from the front of the vehicle, along the length of the 5-pipe assembly.

    Couple the pipe to the hydraulic gear selector.

    Attach the pipe to the 5-pipe assembly using adhesive tape evens 8" (20 cm) along its length.

34. Replace the second part of the pipe.

    Connect up:

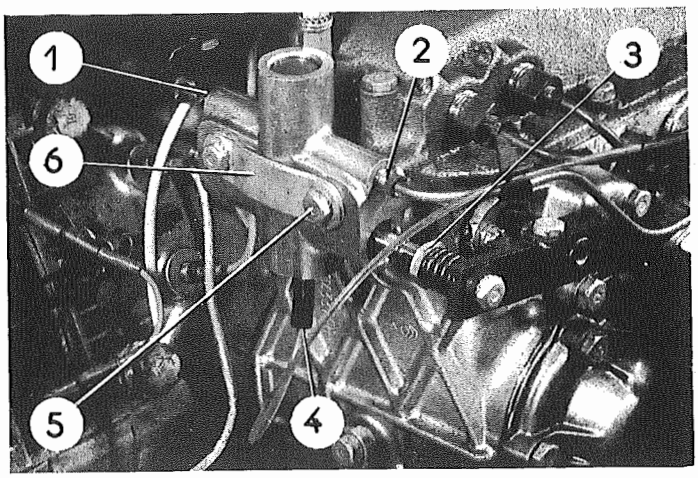
    - the pipe (2) to the clutch lock,
    - the union (4) situated under the cross-member supporting the gearbox.

    Fit the clip (5) on the gearbox.

    Fit the 3 rubber "arrow" clips (3).

35. Put the circuit under pressure and check all unions for leaks.

36. Fit the spare wheel support crossmember with the radiator air intake duct and reposition the spare wheel.



REPLACEMENT OF A CLUTCH LOCK.

REMOVAL.

37. Remove the spare wheel, the spare wheel support crossmember with the radiator air intake duct.
Release the pressure (see Op. DX.00).

38. Disconnect:

- the pipes (1 and 2) from the lock,
- the overflow return pipe (4).

39. Remove:

- the end piece (3) securing the clutch lock spindle to its operating plate (hold the spindle still with an 8 mm o/e spanner),
- the screws (5) securing the lock on the gearbox.

Disengage the lock.

ASSEMBLY.

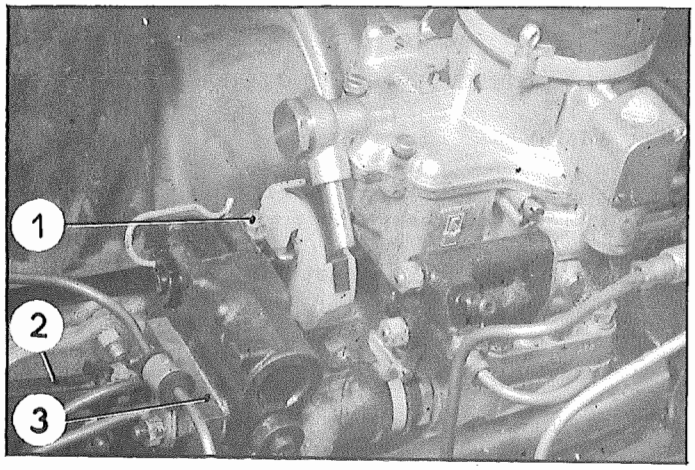
40. Place the lock in position.
Fit the screws (5) without tightening them, passing through the plates (6).
Connect the lock control spindle to its operating plate.
The lock spindle has 3 grooves, a spring-loaded ball engages in one or other of these grooves.
Move the lock in its slots so that the spring-loaded ball engages in the central groove.
Tighten the screws (5).

41. Connect up:

- the pipes (1 and 2) to the lock,
- the overflow return pipe (4).

42. Put the circuit under pressure. Check all unions for leaks, check that the gear change functions correctly.

43. Fit the radiator air inlet duct with the spare wheel support.
Fit the spare wheel.



REPLACEMENT OF A CLUTCH RE-ENGAGEMENT CONTROL.

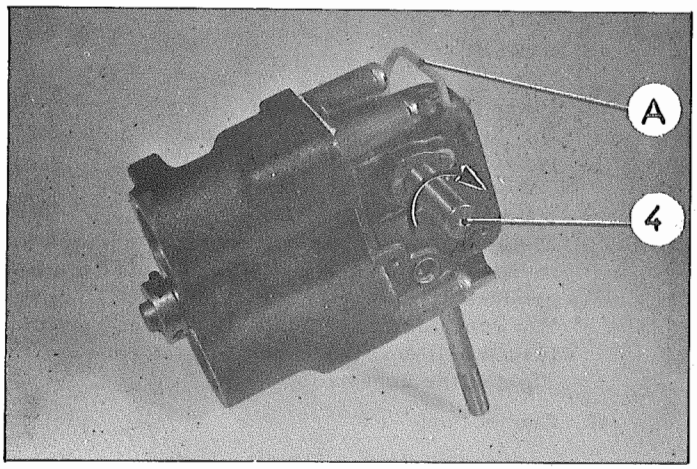
REMOVAL.

44. Release the pressure (see Op. DX.00). Remove the front left-hand sphere.

45. Disconnect :
- the union flange (3), and remove the sealing plate,
- the return pipe (2) to the reservoir,
- the nut (1) from the control lever. Withdraw the lever towards the re-engagement control,
- the petrol feedpipe from the carburettor.

46. Remove the fixing nut under the inlet manifold. Use spanner 3107-T. Remove the clutch re-engagement control. Do not lose the packing washer(s) between the control and manifold, if fitted.

ASSEMBLY.



47. Set the angular adjustment of the clutch re-engagement control.
Remove the closing plug from the setting hole. Insert the pin "A" in this hole. Turn the clutch engagement spindle (4) in the direction of the arrow until a spring resistance is felt; overcome this resistance to reach a stop. Turn back now about 30° until the pin "A" enters and bottoms.

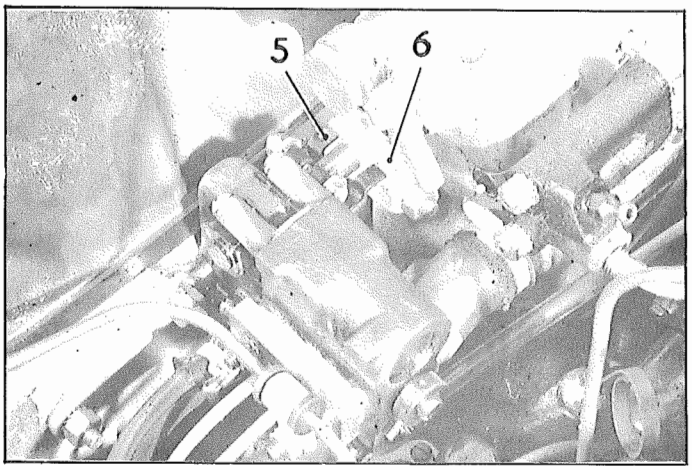
NOTE: When the spindle is in contact with the stop the pin "A" can still be introduced but correct adjustment is not achieved.

48. Aligning the clutch re-engagement control.

Fit the re-engagment control with its control lever. Do not tighten.

The spindles of the re-engagement control and the carburettor must be in line. There are two adjustments for effecting this.

a) Height adjustment.
Turn the carburettor spindle to bring the control lever lugs (6) together, in the horizontal plane. Do the same with the re-engagement control, turning the lever on the spindle. Introduce packing washers between the clutch re-engagement control and the inlet manifold so that the lugs on the levers are in the same plane.

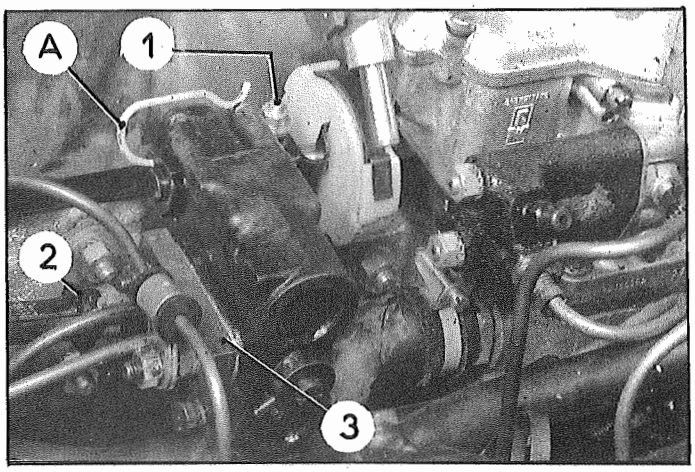


b) Transverse adjustment.
Turn the carburettor spindle and the clutch re-engagement control lever (5) so that the lugs are vertical. Move the re-engagement unit towards or away from the engine in the slot in the manifold so that the lever lugs are in one plane.

Fit and tighten the nut (spanner 3107-T).

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49. Fitting the flector.

Remove the carburettor (see Op. DX.142-1).

Pull back fully the control lever of the clutch re-engagement control and fit the flector on the control lever.

Fit the carburettor (see Op. DX.142-1) and engage the flector on the carburettor control lever.

50. Connect up :

- the union flange (3) inserting the seal plate,
- the return pipe (2) to the reservoir.

51. Place the accelerator control in the "idling" position.

Engage the control lever of the clutch re-engagement control in the flector so that the flector has an end float of 0,5 mm. Tighten the clip (1) on the control lever. Withdraw the pin "A" and replace it with the sealing plug.

NOTE: Move the throttle control to "Maximum permitted opening" so as to engage the spindle of the clutch re-engagement control.

Hold the spindle of the clutch re-engagement control in this position. Releasing the throttle control, the carburettor butterfly valve should return to the idling position. If it does not return, check the alignment (vertical and horizontal planes) of the spindles of the carburettor and clutch re-engagement controls.

52. Fit the front left-hand suspension sphere. Start up the engine and check for leaks. Check the adjustment of the clutch re-engagement control. (See Op. DX.314-0).

REPLACEMENT OF A CENTRIFUGAL REGULATOR.

Removal.

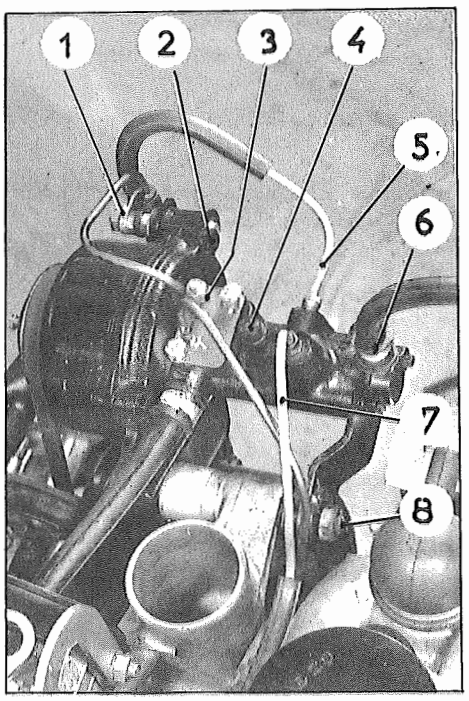
53. Loosen the bleed screw on the pressure regulator and the bleed screw (4) on the centrifugal regulator.

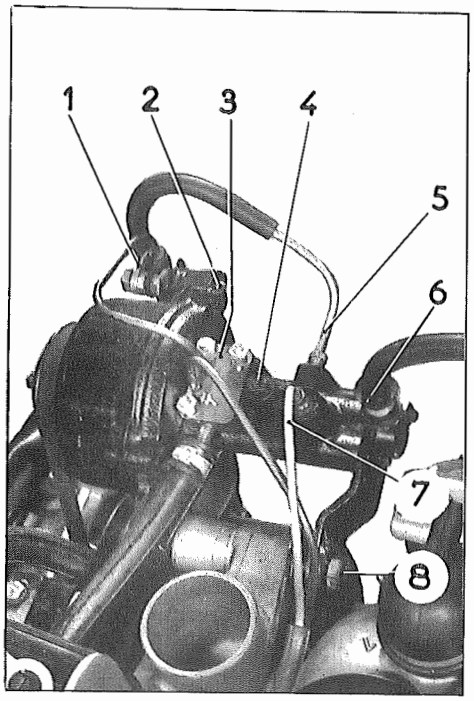
54. Disconnect :

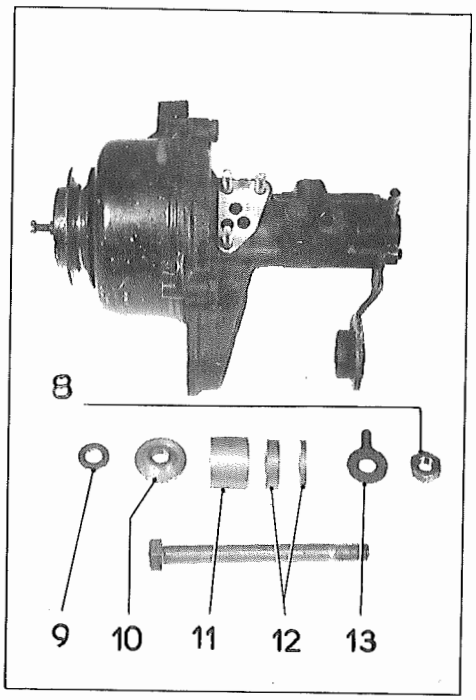
- the pipe (5) between the regulator and the right-hand brake unit, from the regulator,
- the pipe (7) between the regulator and the accelerated idling device, from the regulator,
- the return pipe (6) to the reservoir,
- the pipe assembly flange (3).

55. Remove :

- the two pipe retaining clips (1),
- the screw (2) securing the tie-rod on the regulator,
- the mounting spindle (8) of the regulator on the water pump backplate.







56. Remove the belt, remove the regulator, do not lose the packing adjusting pieces for aligning the regulator.

ASSEMBLY.

57. Fit the regulator.

a) Place the parts on the spindle in the following order :

- the flat washer (9),
- the front lug of the regulator,
- the shouldered washer (10),
- the distance piece (11),
- the alignment adjusting washers (12).

b) Offer up this assembly on the water pump back-plate, engage the spindle, then fit the washer (13) for adjusting the end-float and tighten the nut (8) moderately.

58. Check the pulley alignment (see Op. DX.231-0).

59. Connect :
- the union flange of the pipe assembly (3) to the centrifugal regulator, inserting the sealing plate with new ring seals,
- the pipe (5),
- the pipe (7)
- the pipe (6) for return to reservoir.

60. Fit the screw (2) securing the tie-rod on the centrifugal regulator.

61. Fit the two clips (1) holding the pipes.

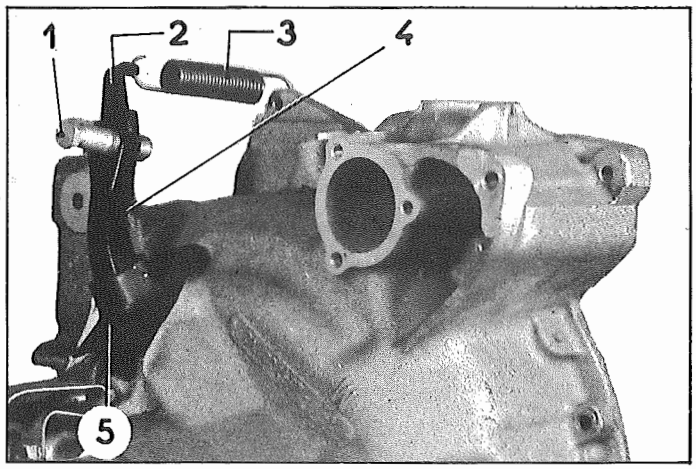
62. Fit and tension the belt (see Op. DX. 231-0).

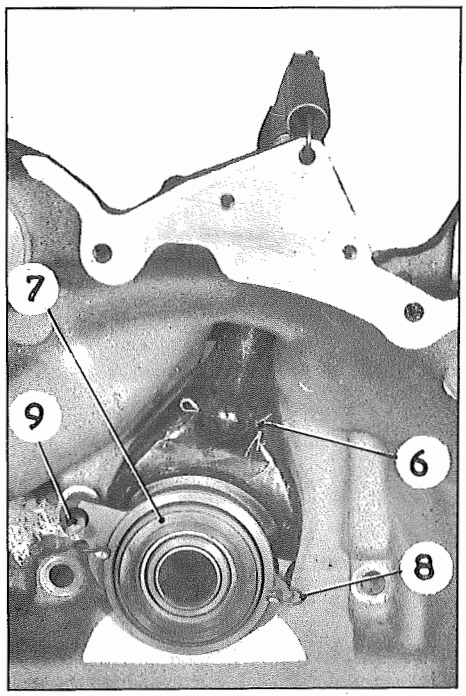
63. Put the circuits under pressure and check all the unions for leaks.

64. Bleed the centrifugal regulator (see Op. DX. 314-0).

65. Adjust the clutch drag (see Op. DX.314-0).

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REPLACEMENT OF A CLUTCH FORK.

Removal.

66. Remove the engine-gearbox assembly (see Op. DX.100-1).

67. Disconnect the gearbox from the engine (see Op. DX.100-2 paras. 25 - 35).

68. Remove:
- the return spring (3) from the clutch fork (4),
- the adjusting screw (1) from the fork,
- the anchor clip (2),
- the rubber dust cover (5) from the fork aperture,
- remove the clutch thrust roll retaining springs (8).

69. Free:
- the thrust race and its sleeve (7),
- the pin (6),
- the fork (4).

Assembly.

70. Fit:
- the clutch fork (4),
- the pin (6),
- the thrust race and its sleeve (7).

71. Fit:
- the thrust race retaining springs (8),
- the rubber dust cover (5),
- the adjusting screw (1). Insert the anchor clip (2),
- the fork return spring (3).

72. Connect the gearbox to the engine (see Op. DX.100-2 paras. 38 - 48).

73. Fit the assembly engine-gearbox (see Op. DX. 100-1).

REPLACEMENT OF A CLUTCH THRUST RACE AND ITS SLEEVE.

Removal.

74. Remove the engine-gearbox assembly (see Op. DX.100-1).

75. Disconnect the gearbox from the engine (see Op. DX.100-2 paras. 25 to 35).

76. Remove:
- the return spring (3) from the clutch fork (4),
- the clutch thrust roll retaining springs (8),
- the return spring (3) (for the fork (4)).

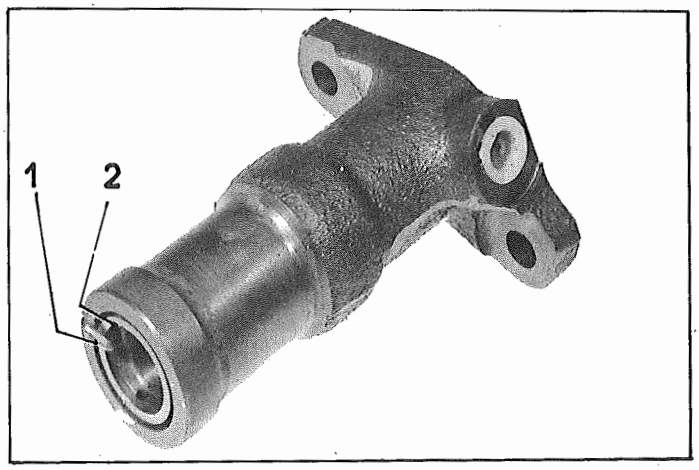
Assembly.

77. Slide the thrust race and sleeve (7) over its guide-peg (9).

78. Fit:
- the clutch thrust race retaining springs (8),
- the return spring (3) for the clutch fork (4).

79. Connect the gearbox to the engine (see Op. DX. 100-2 paras. 25 to 35).

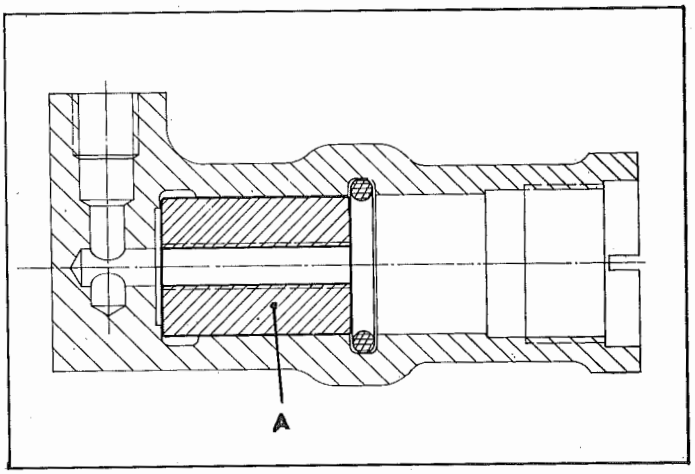
80. Fit the engine-gearbox assembly (see Op. DX. 100-1).



OVERHAULING A CLUTCH CYLINDER.

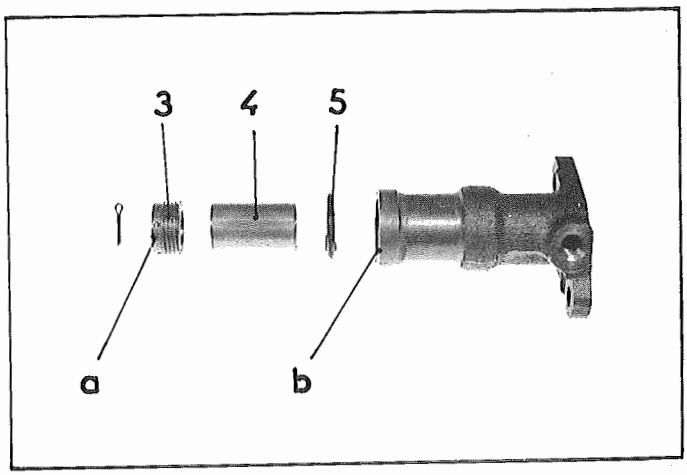
Dismantling.

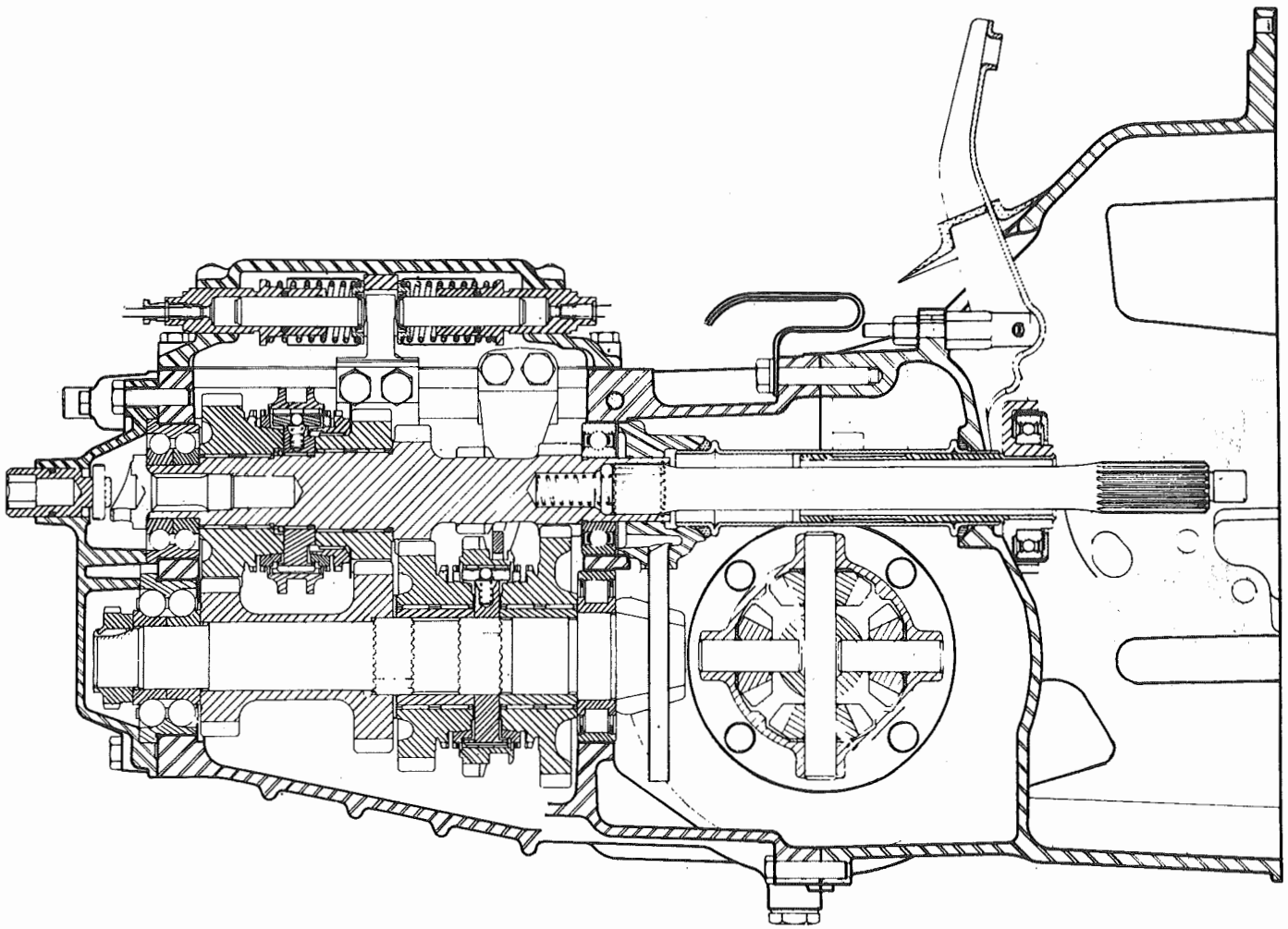
1. Remove the dust cover and control rod assembly from the cylinder.
2. Remove the pin (1) and the nut (2) from the cylinder.
3. Force the piston from the cylinder using fluid under pressure (test rig 2290-T), or compressed air.
4. Remove the ring seal using a small brass wire hook.
5. Clean all parts thoroughly with alcohol and blow with compressed air.



Assembly.

6. Insert the mandrel MR. 3045-60 (A) in the cylinder.
7. Moisten the ring seal (5) with special hydraulic fluid.
   Offer up the ring seal in the bore of the cylinder.
   Obtain the correct position of the ring seal in its groove by pushing it with the piston.
8. Withdraw:-
   - the piston,
   - the mandrel (A) using a screw 6 mm diameter x 100.
9. Lubricate the cylinder bore and the piston with special hydraulic fluid.
   Insert the piston (4) in the cylinder.
   Insert and screw in the nut (3) until its face (a) is flush with, or 0.5 mm maximum under the cylinder face (b). Fit the split pin.
10. Fit the dust cover control rod assembly on the cylinder.
11. Check the cylinder for leaks (see Op. DX. 314-0, paras. 6 and following).





SPECIAL POINTS

Clutch housing.

Distance between thrust race guide screw and housing joint face = 94 - 95 mm.

Main shaft.

Synchro clearance j = 0.10 maximum.

Tightening torque for nut : 108 - 122 lbs ft (15 - 17 m.kg). (i.e. 147 - 166.6 m N).

Bevel pinion shaft.

Tightening torque for end nut : 144 - 158 lbs ft (20 - 22 m.kg). (i.e. 196 - 215.6 m N).

Forks and operating dogs.

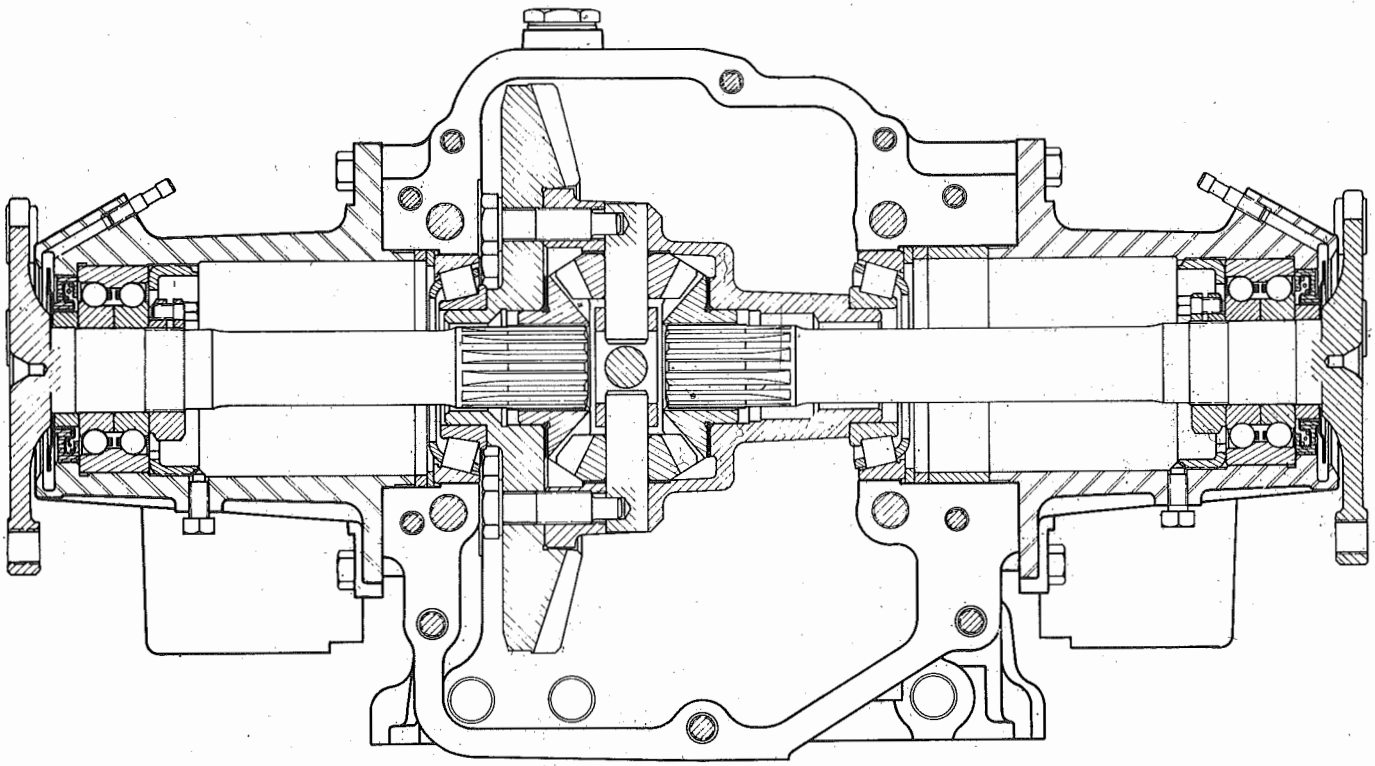
Tightening torque for screws : 29 lbs ft (4 m.kg). (i.e. 39.24 m N).

Adjusting the gear travel (except reverse gear).

Clearance between slider and loose pinion, j = 0.4 - 0.6 mm.

Clutch lock.

Clearance between clamp and head of securing screw for cover = 1.7 mm minimum, with 1st gear engaged.



SPECIAL POINTS

Differential.

Planet gear end float j = 0.1 mm mini.

Tightening torque for crown wheel screws 84 - 94 lbs ft. (11.7 to 13 m.kg). (i.e. 114.77 - 127.53 m N).

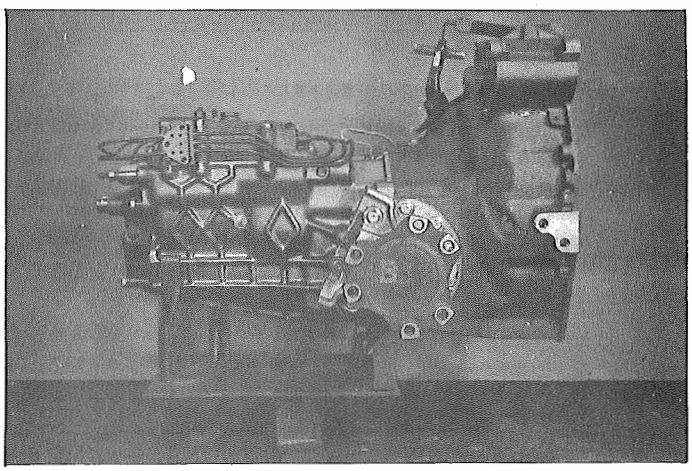
Differential shaft.

Tightening torque for nut 72 lbs ft. (10 m.kg). (i.e. 98 m N).

Tightening torque for bearing nut 108 lbs ft. (15 m.kg). (i.e. 147 m N).

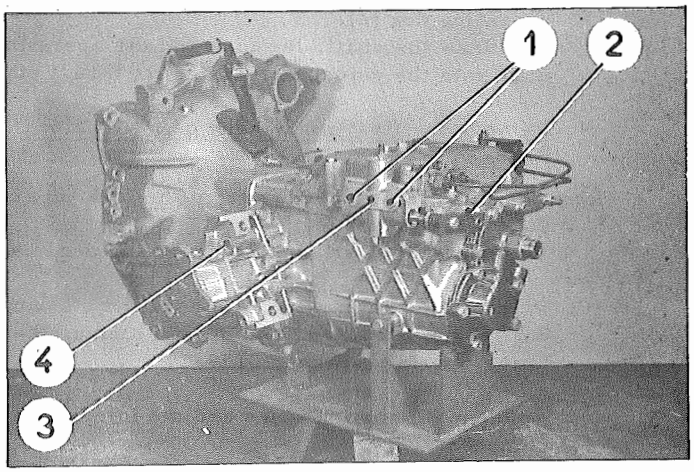
Crown wheel and Pinion.

Check the conic distance etched on the bevel pinion. Clearance between teeth on crown wheel and pinion j = 0.16 to 0.24 mm.



DISMANTLING.

1. Place the gearbox unit on a stand (stand 3169-T).



2. Remove the clutch lock.

a) Loosen the screw (2) securing the clamp.

b) Remove the screws (1) securing the lock and the two plates (3). Free the lock.

3. Remove the cover (spanner 1677-T for screw with flats on head).

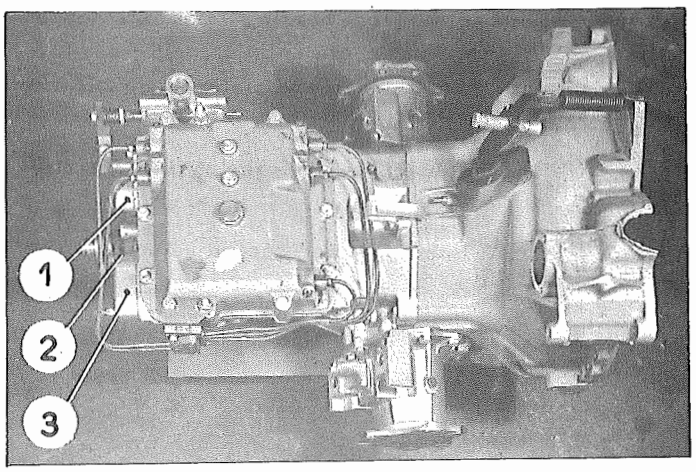
4. Remove the drive outlet shafts and housings.

Remove the securing screws (4) and the drive outlet shafts and housings, with their adjusting washers and distance pieces.

5. Disconnect the clutch housing.

Remove the nuts and the screws; hold the differential in position against the clutch housing and free the assembly.

Remove the tubular support for the clutch thrust bearing and the oil return flange.

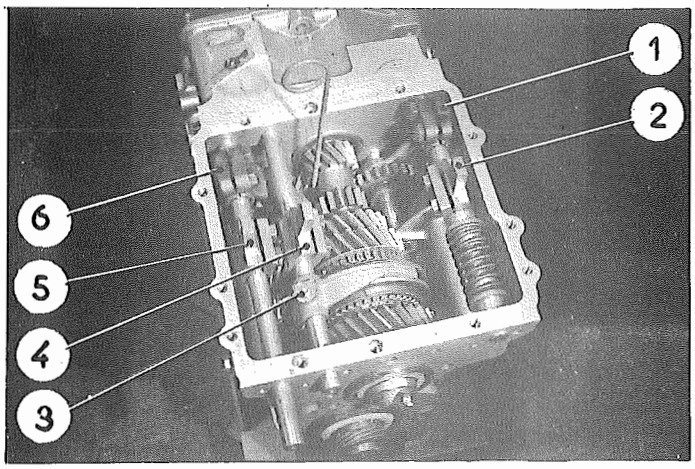


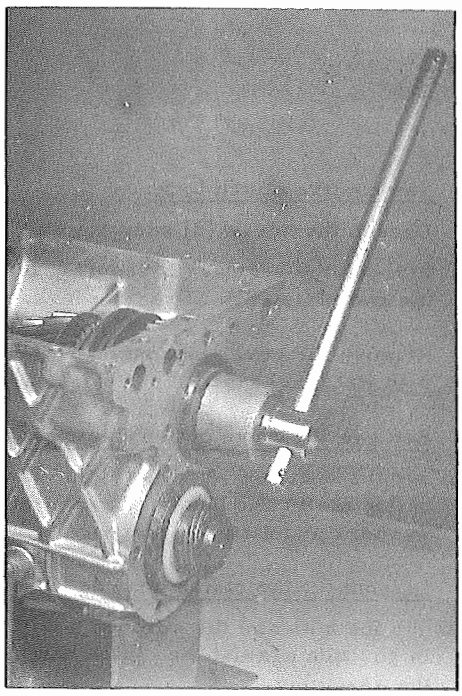
6. Remove the front caps.

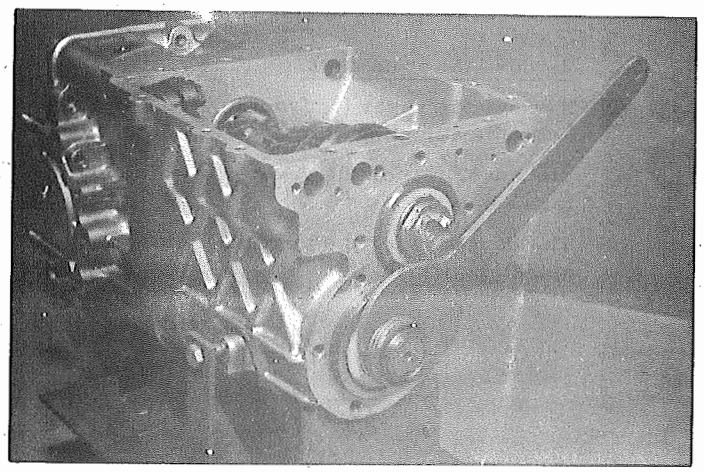
a) Remove the cover (2) from the front bearings (with the adjusting shims).

b) The cover (3) for the reverse gear selector fork shaft.

c) The cover (1) for the third and fourth gear selector fork shaft.







7. Remove the third and fourth gear selector fork shaft.

a) Loosen the pointed screw (3) securing the fork.

b) Take care, since the gearbox is not in neutral, (do not knock it).
Place the reverse gear shaft in the neutral position; push the shaft towards the front and place gauge 3183-T between the first gear idler pinion and the reverse gear intermediate pinion.

c) Withdraw the third and fourth gear fork shaft towards the front, pushing it by the operating dog (4).

d) Loosen the securing screws on the operating dog and withdraw the shaft, the operating dog and the fork.

e) Remove the gauge 3183-T.

8. Remove the reverse gear selector fork shaft.

Loosen the securing screws of the fork (1) and the operating dog (2).
Withdraw the shaft, the fork and the operating dog, with the return spring and its thrust cups.

9. Remove the first and second gear selector fork shaft.

Remove the securing screws from the fork (6) and the operating dog (5).
Withdraw the shaft and the operating dog.

10. Place 2 speeds in mesh. Remove the starting dog (spanner 1734-T) and the nut locking the lower bearing (spanner 3179-T).

11. Remove the sealing plugs and the interlock plungers.

12. Remove the main shaft.

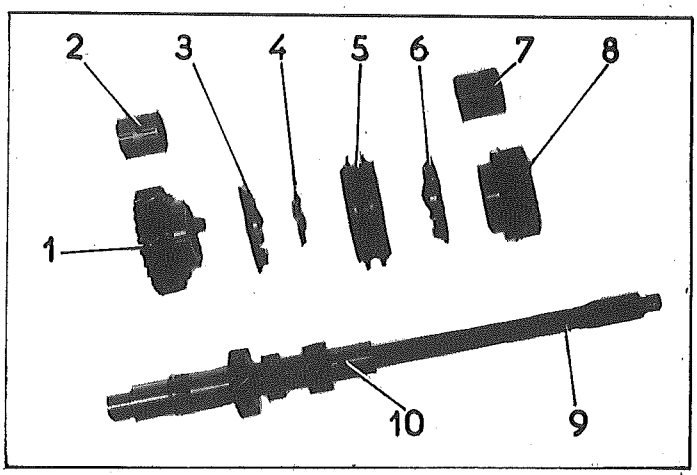
a) Remove the rear bearing using a bronze drift.

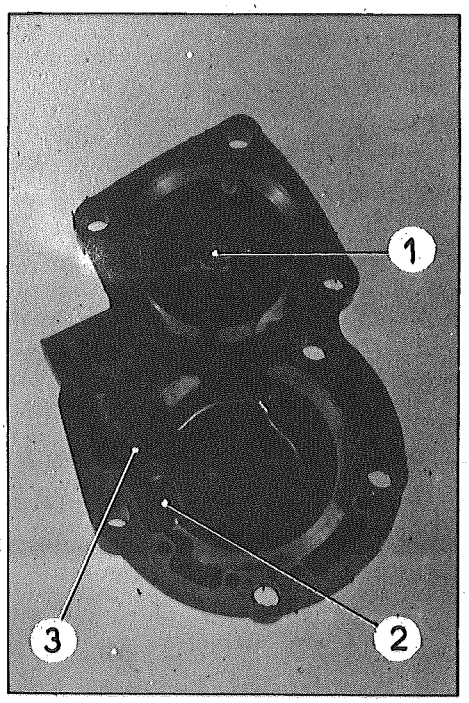
b) Remove the front bearing (take care not to lose the balls).

c) Withdraw the shaft and pinion assembly from the top of the gearbox.

NOTE : The inner bearing cage is in two parts; do not mix them.

13. Remove the first and second selector fork.





14. Remove the reverse gear intermediate pinion.

Unscrew the locknut and the shaft securing screw.

Remove the shaft and the pinion.

15. Remove the bevel pinion.

a) Remove the front bearing by tapping the end of the shaft with a mallet, finishing by hand or using small levers.

NOTE : The inner bearing cage is in two parts; do not mix them up.

b) Withdraw the bevel pinion towards the rear.

c) Withdraw the pinions and the adjusting washer.

16. Stripping the main shaft.

Remove :

- the loose 4th gear pinion (1),
- the needle bearing cage (2),
- the synchro ring (3),
- the circlip (4) from the synchro hub (use circlip pliers),
- the synchro (5),
- the synchro ring (6),
- the loose 3rd gear pinion (8),
- the needle bearing cage (7).

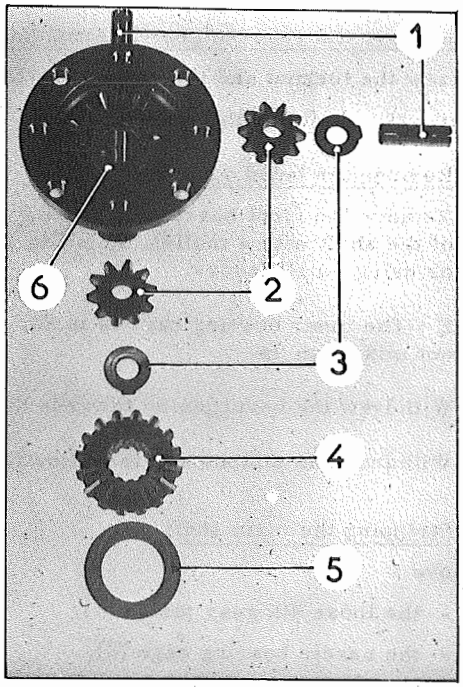
17. Remove the mainshaft.

Remove the circlip and withdraw the driving shaft (9) and the spring (10) from the main shaft.

18. Stripping the front cover.

Remove the speedometer drive pinion assembly (2) and the cup (3).

Withdraw the starting relay shaft (1).

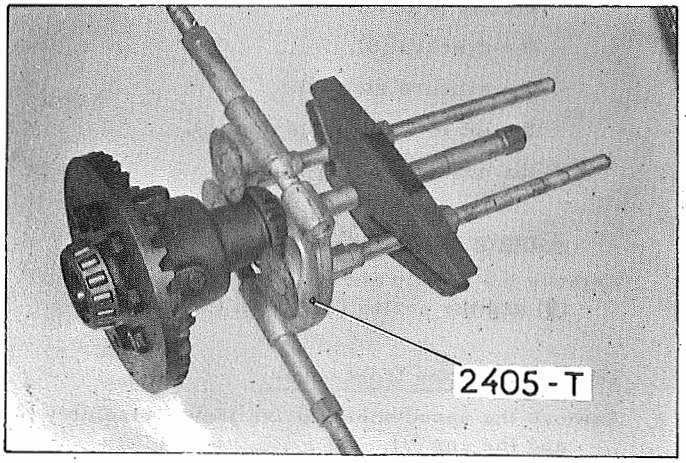


19. Dismantling the differential.

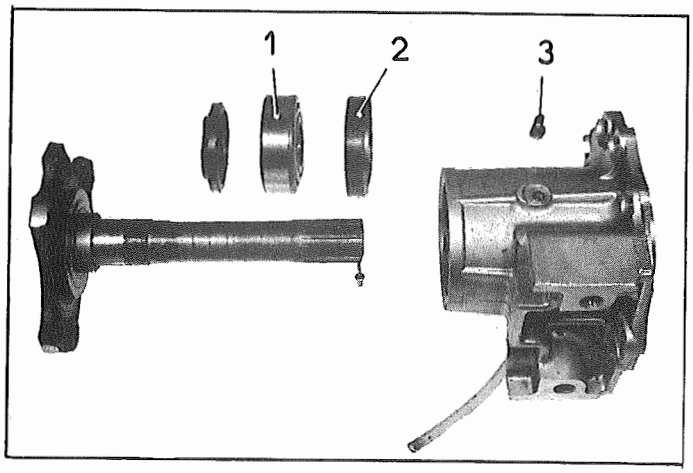
Remove the large crown wheel.

Remove :

- the planet wheel (4) and its thrust washer (5),
- the spindles (1) from the satellites,
- the satellite gears (2),
- the satellite stop washers (3),
- the crosshead (6),
- the other planet gear and its thrust washer.



Remove the conical roller bearings (extractor 2405-T and pad 1742-T).



20. Stripping the differential shafts.

Unscrew the stop screw from the locknut of the bearing on the shaft.

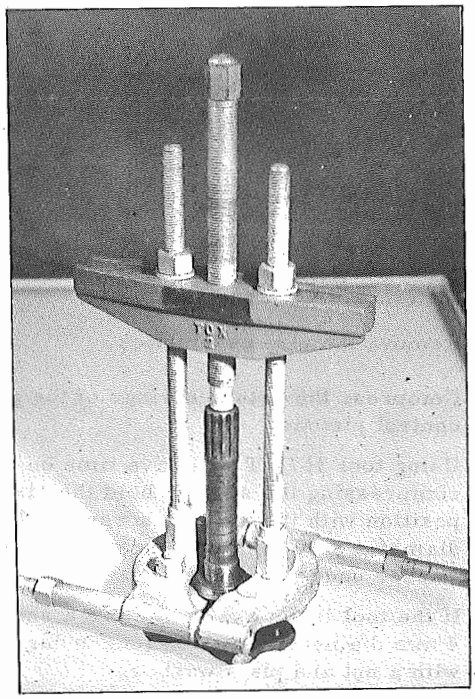
Remove the nut (spanner 1770A-T).

Tap out the shaft.

Remove the screw (3) locking the nut (2) securing the bearing in the housing.

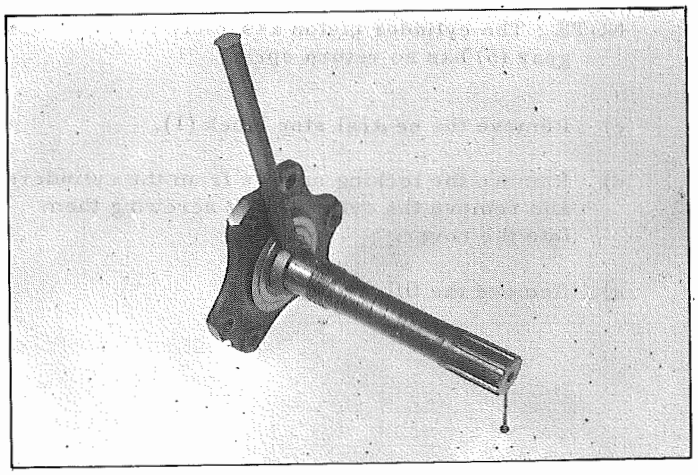
Remove the nut (2) (spanner 1771A-T).

Tap the bearing outer cage (1) out with a tube of 65 mm external diameter.



Withdraw the inner cage, from the shaft (extractor 2045-T).

Remove the oil seal.



Remove the oil retaining washer and bearing stop ring assembly.

Place the stop ring on a support.

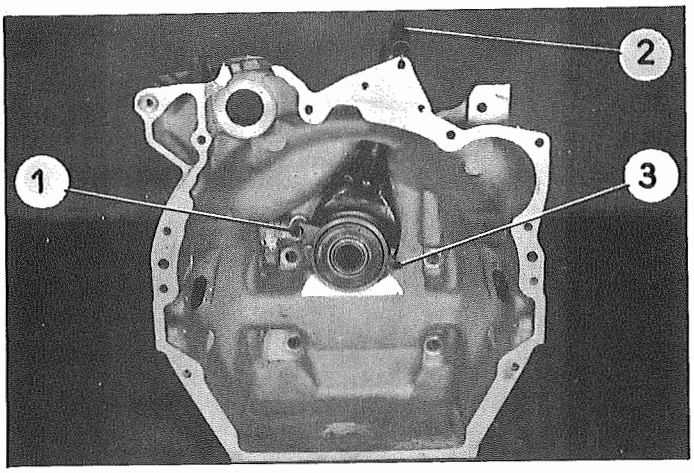
With a chisel expand the stop ring.

Remove the bearing stop ring and the oil retaining washer.

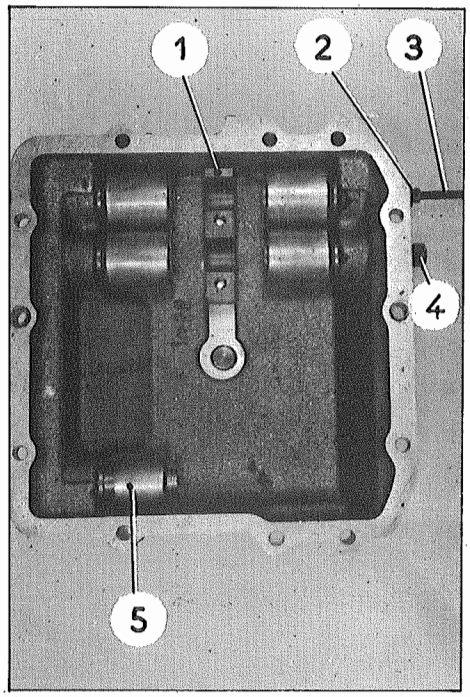
21. <u>Stripping the clutch housing.</u>

Remove :

- the return spring (2) from the fork,
- the springs (3) holding the thrust race, remove the thrust race,
- the thrust race guide screw (1),
- the fork adjusting screw and the spring anchorage plate,
- the dust cover from the fork,
- the securing screw from the fork ball joint (the ball is prevented from turning by a mecanindus dowel).



Remove the ball from the fork.



22. Stripping the cover.

a) Remove the pipe assemblies.

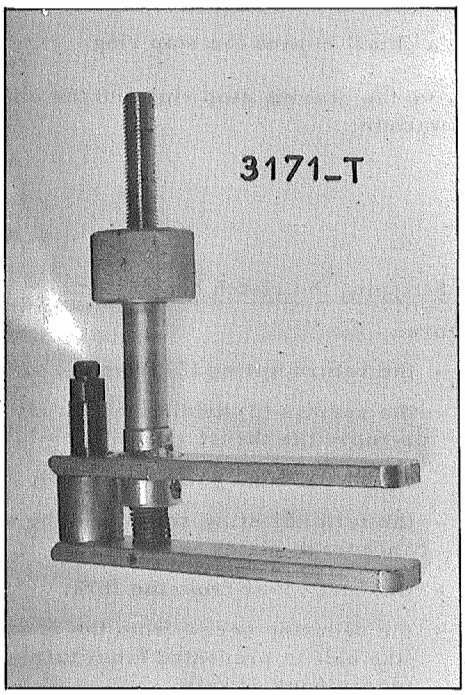
b) Compress the return springs of the gear change control pistons:

Using tool 3171-T will save time on this. After compressing the spring, hold the piston in this position with the aid of a screw (4) 4 mm diameter x 40 mm long under the head (plain washer under the head).

If the tool is not available, use a screw (3) 4 mm diameter x 80 mm long under the head, with a nut and plain washer.

Screw the screw (3) into the piston and compress the spring by tightening the nut (2).

NOTE : The cylinder piston assembly for reverse gear (5) has no return spring.

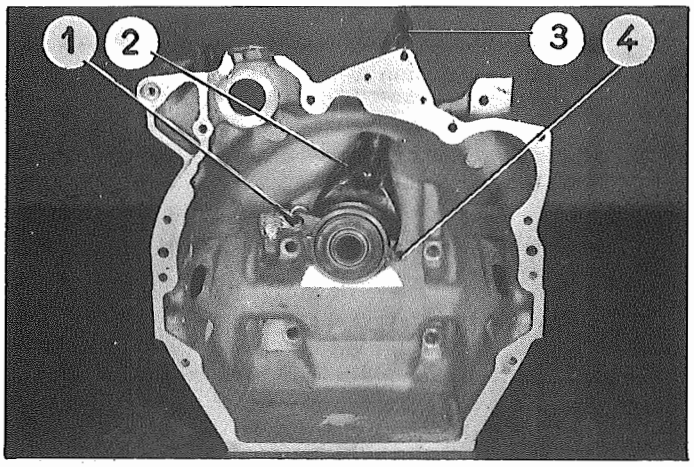


c) Remove the neutral stop block (1).

d) Remove the locking screws from the cylinders and remove the cylinders by screwing them into the cover.

e) Remove the filler plug.

ASSEMBLY.



23. Assembling the clutch housing.

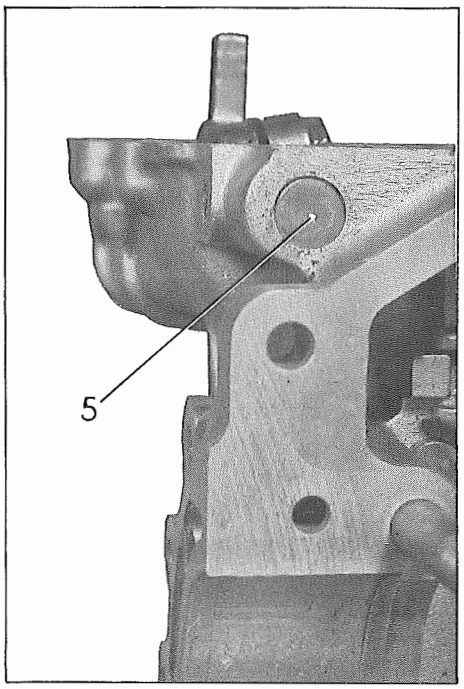
a) Fit the clutch fork ball joint (the position is given by a mecanindus dowel which engages in the hole in the housing). Tighten the securing screw.

b) Fit the thrust race guide screw (1), with its locknut, and adjust it so that the end is at a distance of between 94 and 95 mm from the gasket face on the engine side. Tighten the locknut.

c) Lubricate the ball joint and the guide screw, fit the clutch fork and insert the pin (2).

d) Fit the thrust race (with its guide lubricated), and secure it with the retaining springs (4).

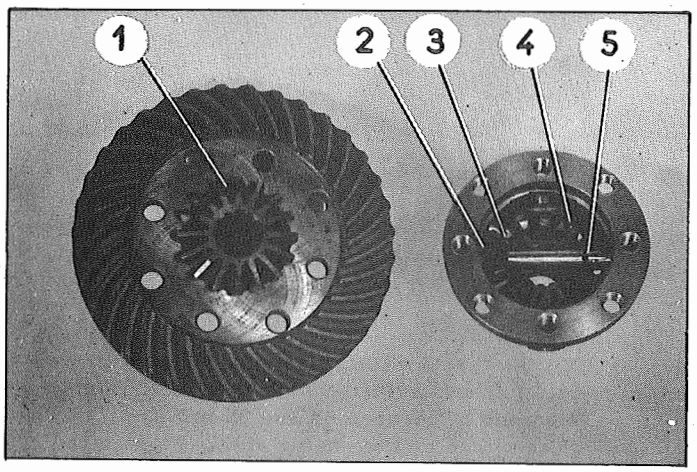
e) Fit the spring anchor clip, the adjusting screw and the return spring (3) for the fork.



NOTE : When changing a gearbox and clutch housing, fit the sealing washer (5) with "masti-joint HD 37, in the bore for the reverse gear selector fork shaft (clutch housing end).

June 1966.

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24. Prepare the differential.

a) Fit in the housing, one thrust washer, one planet gear (4), one fixed thrust washer (2), one satellite (3) and one spindle (5).

Turn the planet gear and check that at the point of least clearance, there remains a clearance of 0.1 mm. If not, replace the thrust washers to attain this clearance.

Remove the satellite and its thrust washer and mark the position of this assembly in the housing.

b) Carry out the same operation for each of the satellites.

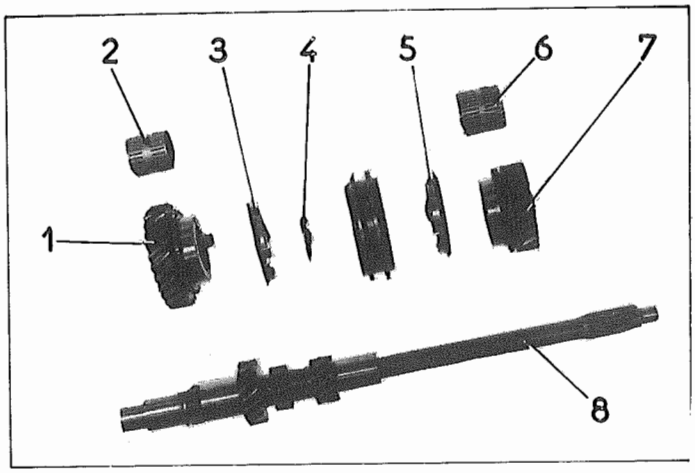
c) Fit all the satellites.

d) In the crown wheel fit the second planet gear (1) and its thrust washer.

e) Fit the crown wheel in position on the housing, progressively tighten the securing screws, ensuring meanwhile that the pinions turn freely. Tighten the screws to between 84 and 93 lbs ft. (11.8 to 13 m.kg) (i.e. 114.77 to 127.53 m N). At the point of least clearance, there must be a clearance of 0.1 mm on this planet gear. If not replace the thrust washer.

f) Remove all these parts, marking their position and, after oiling, refit them.

g) Fit the bearings (mandrel 1768-T).

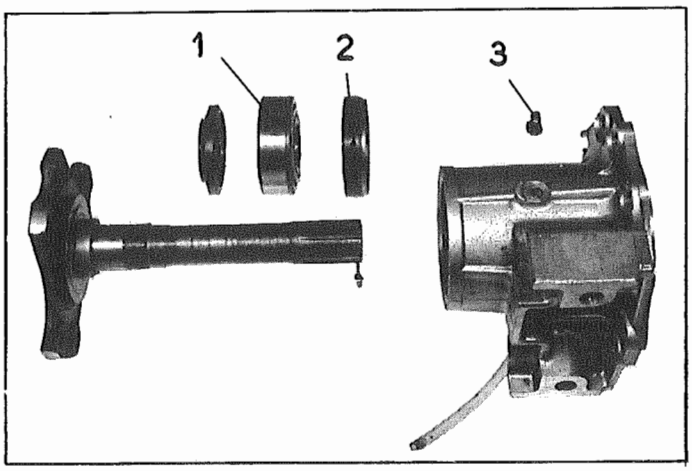


25. Prepare the main shaft.

a) Fit in place the spring, the driveshaft (8) and the circlip.

b) Place on the shaft:

- the third speed loose pinion (7) with its needle bearing cage (6),
- the synchro ring (5),
- the synchro fitted with its drive blocks, the face with the boss being towards the third speed pinion. Choose a suitable circlip (4) to obtain clearance of 0.10 mm maximum,
- the synchro ring (3),
- the fourth speed loose pinion (1) together with its needle bearing cage (2).



26. Prepare the bevel pinion.

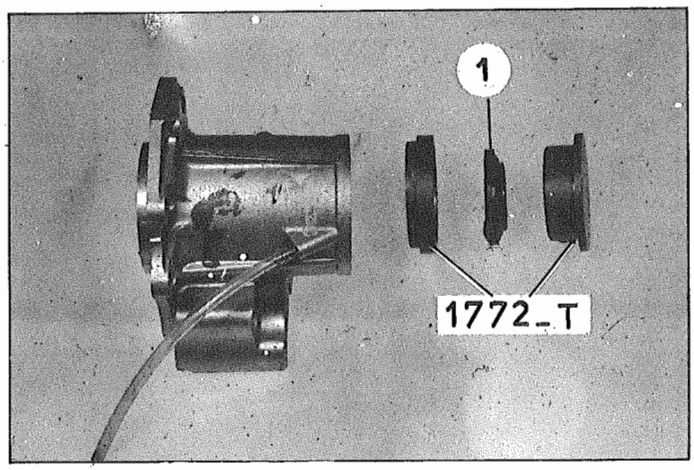
Fit the bearing if necessary (tube 44 mm internal diameter x 240 mm long).

27. Prepare the assembly of differential shaft and housing, right-hand side.

NOTE : The right-hand side differential shaft is the shorter.

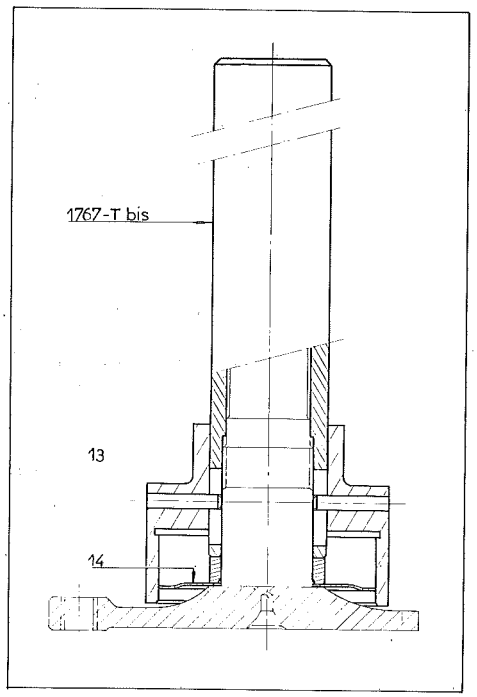
a) Fit the bearing (1) in the housing. Tighten the nut (2) to 72 lbs ft. (10 m.kg) (i.e. 98 m N) (spanner 1770A-T).

Lock the nut with the pointed screw (3).



b) Fit the oil seal (1) with the aid of tool 1772-T.

S2.

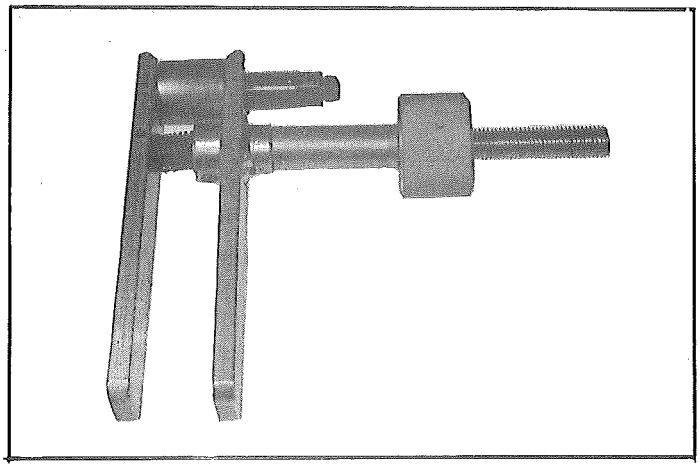


c) Fit the oil retaining washer (14) on the shaft.

Offer up the distance piece (13), put in position the mandrel 1767-T A. Centralise the oil retaining washer inside the mandrel centring bush and fit the distance piece using a press.

d) Fit the differential shaft thus prepared into the housing, using a press (use a tube of 30 mm internal diameter).

Tighten the bearing locknut to 108 lbs ft. (15 m.kg) (i.e. 147 m N). Tighten the screw locking the nut.



28. Assemble the cover.

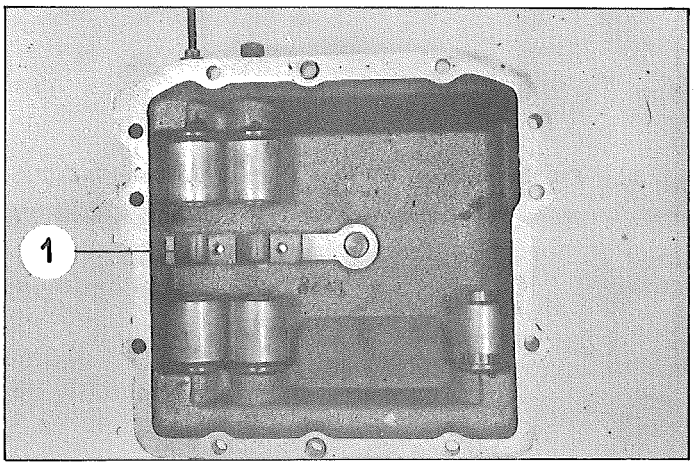
a) Fit the cylinder and piston assemblies:

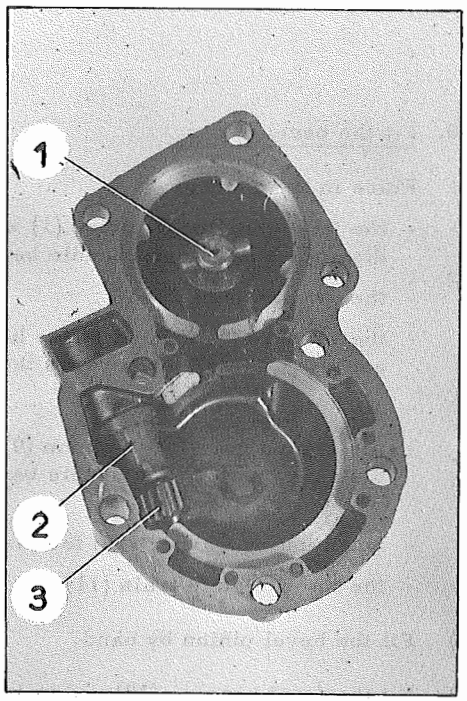
Compress the spring with the aid of tool 3171-T and retain the piston in the cylinder by means of a screw 4 mm diameter x 40 mm long - see paragraph 22.

If unavailable, use a screw (see paragraph 22).

Fit each cylinder screwing it into the cover to the full depth of thread.

b) Place the neutral stop block (1) on its locating dowels. Tighten the screws (plain washer).





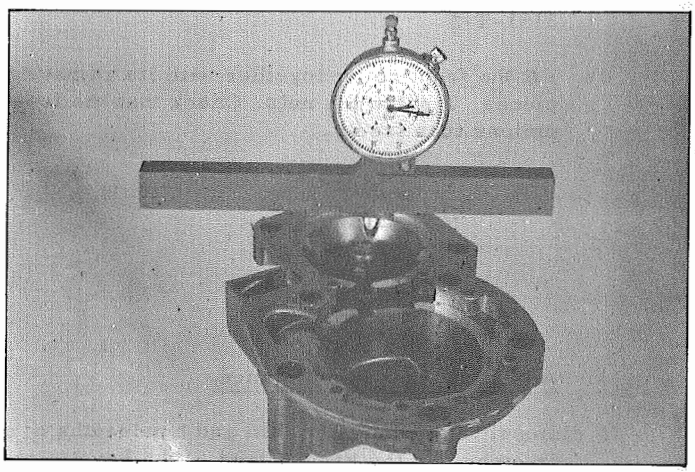
29. Prepare the front bearing cover.

a) Fit :

- the speedometer drive pinion (3),
- the pinion housing (2) smeared with "hyperix" sealing compound under the collar (positioned so that the notch lines up with the hole for the cap screw),
- the shaft (1) for the starting handle, fitted with its seal.

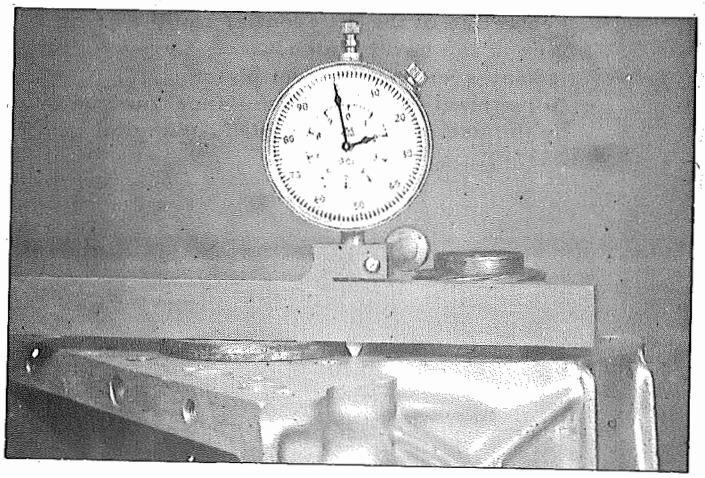
b) Determine the thickness of the shims to be fitted behind the bearing for the main shaft:

- Place a straight edge (straight edge 1651-T) fitted with dial gauge 2437-T on the cap, with the tip of the dial gauge stem in contact with the bearing thrust face. Turn the dial so that the large needle is at zero. Mark the position of the totalising needle.



- Place the bearing in the bore of the gearcase, with its collar hard against the joint face.
- Place the straight edge on the outer collar of the bearing case.
- The displacement of the large needle from its original set position gives the thickness of the shims to be used with the cover. A maximum clearance of 0,05 mm is permitted. Choose an appropriate shim from amongst those sold by our Spare Parts Service Dept. and place it in the recess in the cover.

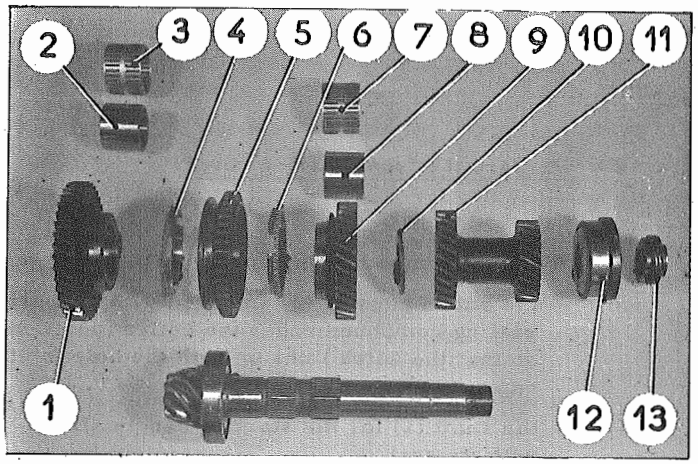
  If several shims are necessary, place the thickest on the side of the gearbox.



c) Determine the thickness of the packing shims behind the bevel pinion shaft bearing.

Carry out the same operations as above.

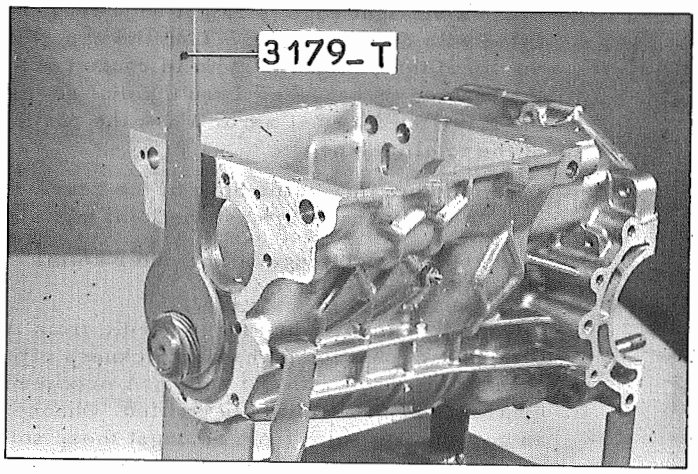
June 1966.
Corrective No.1



30. Fit the bevel pinion.

a) Place in the gearbox:

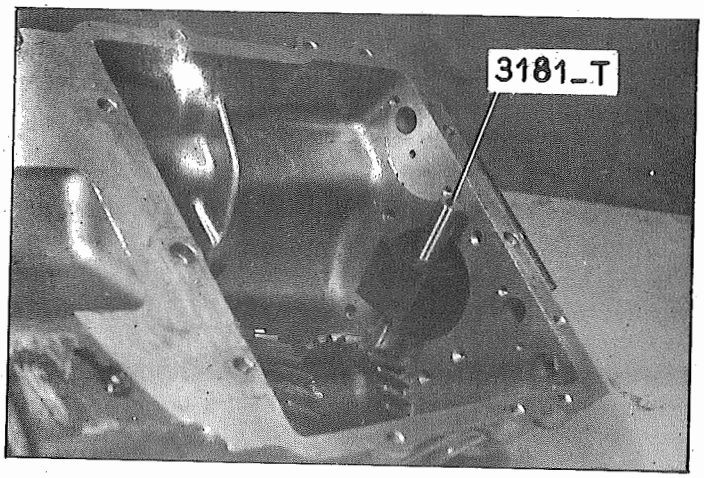
- the first gear loose pinion (1) with its distance bush (2) and needle bearing cage (3),
- the synchro ring (4),
- the synchro (5) with its drive blocks, the groove of the slider towards the bevel pinion,
- the synchro ring (6),
- the second gear loose pinion (9) with its distance bush (8) and needle bearing cage (7),
- an adjusting washer (10) for the conic distance,
- the intermediate train (11).



b) Fit the bevel pinion by hand.

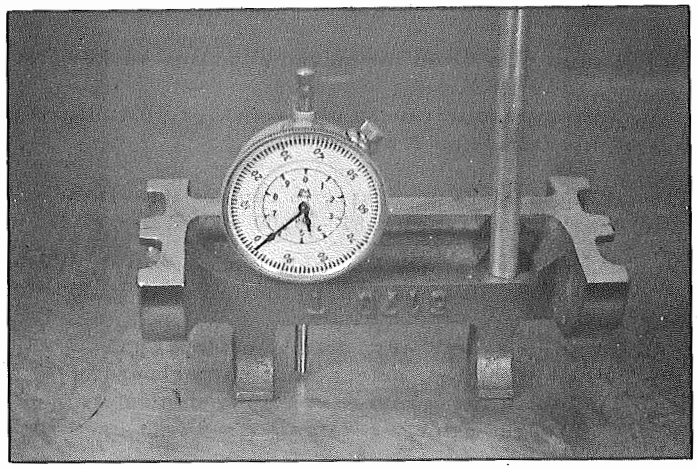
c) Fit the front bearing (12) and tighten the nut (13) to between 144 and 158 lbs ft. (20 - 22 m.kg) (i.e. 196 - 215 m N) (spanner 3179-T and tool 3181-T).

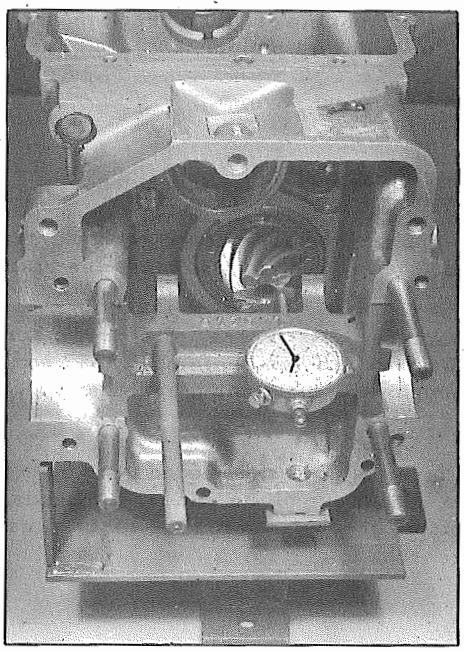
d) Fit the front cover together with its adjusting pieces. Tighten the nuts. Check that the loose pinions turn freely.



31. Adjusting the conic distance.

A dimension expressed in mm and hundredths of a mm is etched on the ground face of the bevel pinion. This dimension represents a distance which must remain after adjusting, between the centreline of the differential and the ground face of the bevel pinion.
It varies with each bevel pinion.
Adjustment of the conic distance must be made by the use of Fixture 3170-T, with dial gauge 2437-T.





This fixture is so made that the distance between the centre line of the ground contact surfaces and the contact points is 60 mm. This figure is etched between the pins.

a) Clean very carefully the bearing housings and the ground contact faces on the fixture.

b) Calibrate the fixture.

Place the fixture on a surface plate.

Turn the dial gauge dial so that its zero is in line with the large pointer.

Note the position of the dial gauge pointers.

Example : totalising pointer between 4 and 5.
large pointer on zero.

c) Measure the distance of the bevel pinion.

Put the fixture in the differential bearing housings. Rotate the fixture until the large pointer of the dial gauge changes its direction of rotation.

Note the pointer readings:

Example : totalising pointer between 0 and 1.
large pointer on 86.

Return the pointers to the position they occupied at b) above.

Allow the dial gauge stem to return slowly, counting the number of turns and fractions of a turn of the large pointer until the stem again contacts the ground face of the bevel pinion.

In the example chosen this would be:

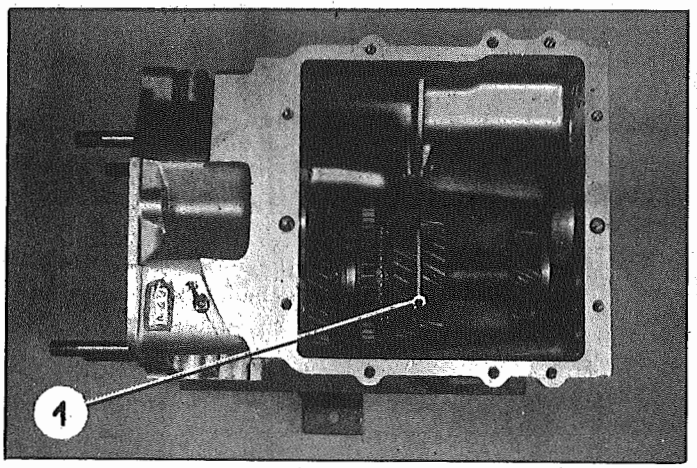
3.86 mm.

Therefore the conic distance is:

60 + 3.86 = 63.86 mm.

The dimension etched on the pinion is, for example, 63.95.

It is therefore necessary to move the bevel pinion away from the differential centre line by 63.95 - 63.86 = 0.09 mm.



d) Adjust the bevel pinion.

Remove the front cover.

Remove the nut locking the bearing.

Remove the bevel pinion and adjusting washer (1).

Measure the thickness of the washer which may for example be 2.81 mm.

It is therefore necessary to replace this washer with a washer 2.81 - 0.09 = 2.72 mm thick.

These washers are available from 1.65 - 3.13 mm thick, in steps of 0.04 mm.

From these washers, sold by our Spare Parts Department, select one, the thickness of which is nearest to the dimension determined above, namely 2.73 mm.

Fit:

- the washer,
- the bevel pinion, tighten the nut,
- the front cover, then check the adjustment of the bevel pinion.

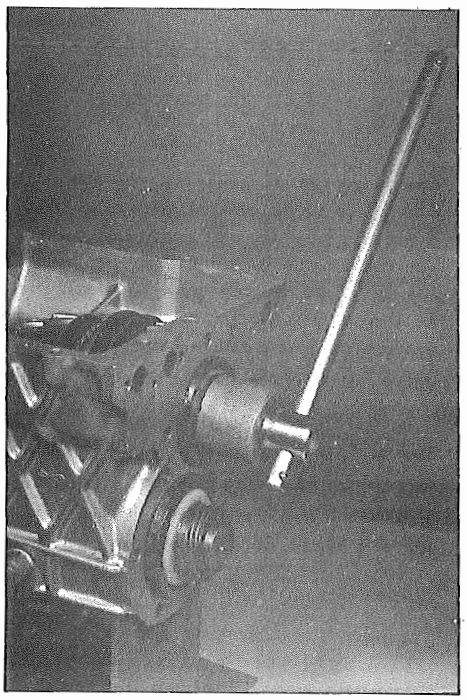
Remove the front cover.

32. Fit the reverse gear layshaft.

Place the reverse gear in the gearbox, the groove for the selector fork towards the rear.

Fit the shaft, so that the pointed stop screw engages in its recess. Smear the screw threads with "masti-joint HD 37" sealing compound. Tighten the screw and its locknut.

33. Place the first and second gear selector fork in the groove of the slider, the heads of the clamp screws towards the centre line of the gearbox.



34. Fit the main shaft.

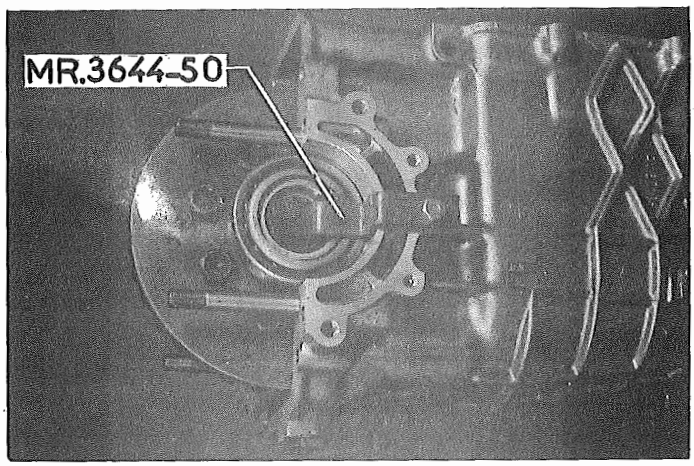
a) Place the shaft with the pinions, prepared as in paragraph 25, in the gearbox.

b) Fit the front bearing, then the rear bearing, using a tube, 30 mm interior diameter x 300 mm long.

c) Engage two gears and tighten the dog to between 108 and 122 lbs ft. (15 - 17 m.kg) (i.e. 147 - 166.6 m N) (spanner 1734-T).

d) Fit:

- the oil return flange, with its recess engaged on the stop boss,
- the thrust race support tube with its sealing gaskets.



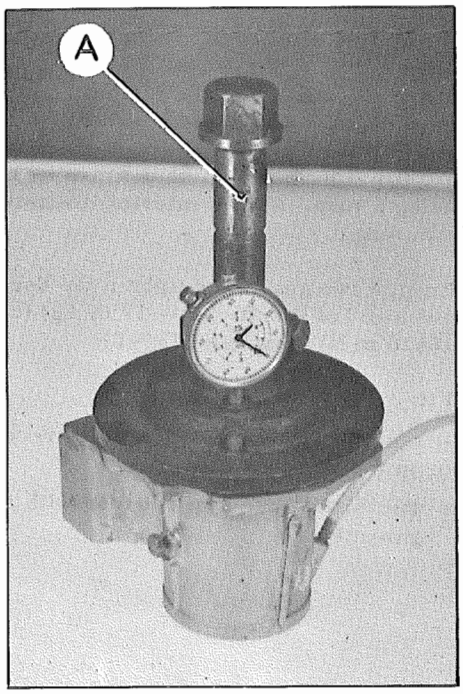
35. Fit the differential.

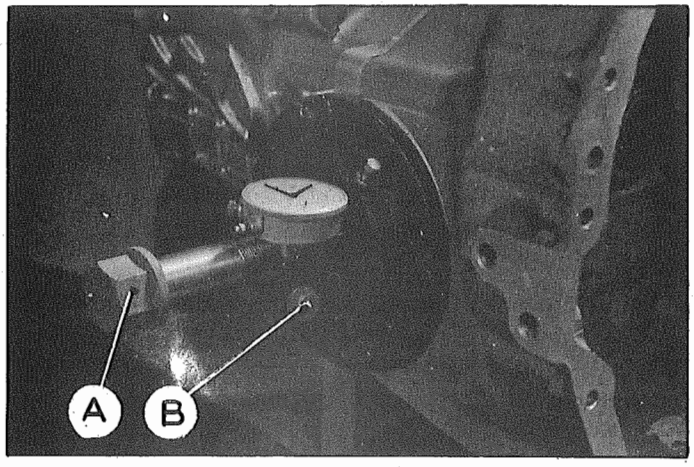
a) Place the differential with its bearings, in the gearbox. Hold it in position by means of clamps MR 3644-50.

b) Connect the clutch housing to the gearbox, the joint faces smeared with sealing compound, "masti-joint HD 37". Lightly tighten the nuts. Remove the clamps.

c) Place an adjusting washer and a distance piece whose total thickness is 7 mm, against the differential right-hand bearing.

Fit the shaft bearing housing assembly, right-hand, (inserting a paper gasket). Lightly tighten the screws. Tighten the nuts and screws connecting the gearcase and clutch housings, then the screws of the bearing housing.





36. Adjust the bearing clearance.

a) Place the distance piece on the left-hand bearing housing.

b) Place gauge 3177-T fitted with dial gauge 2437-T and extension piece 3178-T on the distance piece. Unscrew the centre screw of the fixture to bring the inner member below the level of the flange, position the dial gauge so that it reads between 9 and 10 mm when the extension is in contact with the bearing face. Turn the dial so that the large pointer coincides with zero. Note the positions of the pointers.

c) Fit the gauge on the gearbox, inserting a paper gasket. Tighten the securing screws. Tighten the adjusting screw (A) so as to move the pressure plate forward, find the position in which the pins engage in the splines of the planet gear.

Tighten the adjusting screw to 72 lbs ft. (10 m.kg) (i.e. 98 m N) and then unscrew one third of a turn. Tighten the locking screw (B).

d) Bring the dial gauge pointers back to the original position, as in paragraph b), by pulling the dial gauge stem.

Allow the dial gauge stem to return slowly into contact with the bearing cage, counting the turns and fractions of turns, which for example may be 8.40 mm.

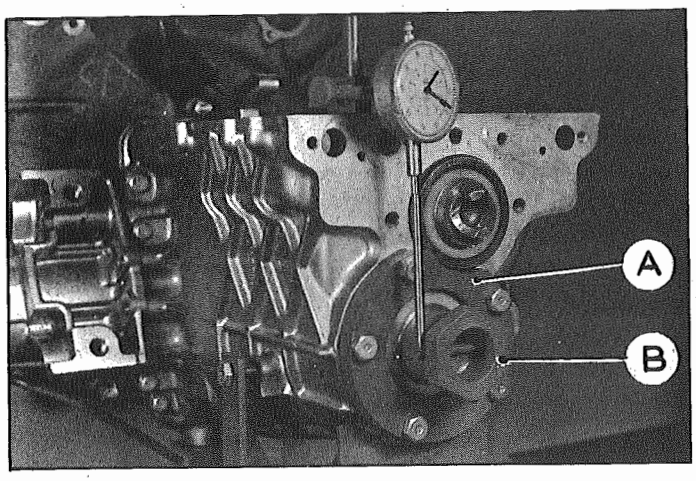
37. Measure the crown wheel to pinion backlash.

a) Fit the fixture 3175-T to the front of the gearbox:

- fit the flange (A) over the shoulder of the bevel pinion bearing. Fit the screws and tighten them to about 7 lbs ft. (1 m.kg).
- Replace the nut by the index (B).
- Bring the index finger (B) into a horizontal position.
- Fix the dial gauge 2437-T equipped with extension 3176-T on its support.

b) Using a screwdriver, prevent the large crown wheel from turning. Note the clearance between the teeth, rocking the index (B) by hand. Check this measurement five times, turning the bevel pinion by the index (B) one turn each time. The minimum clearance found during these measurements is, for example, 0.64 mm.

The backlash must be between 0.16 and 0.24 mm at the point of minimum clearance on the large diameter of the crown wheel, which corresponds to a reading of 0.26 to 0.34 on the fixture, i.e. an average of 0.30 mm.



38. Adjusting the backlash.

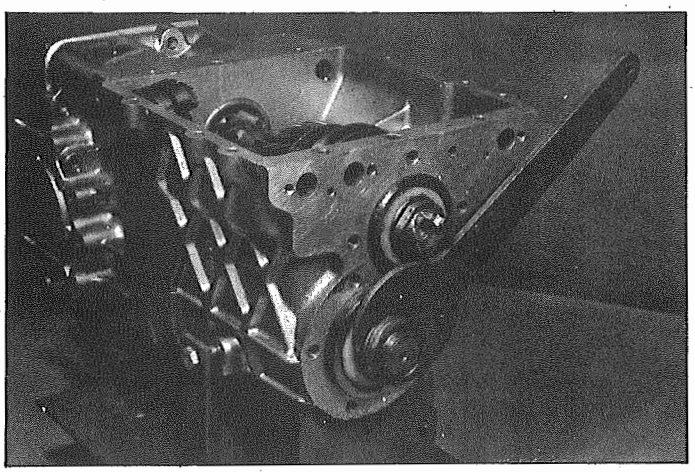
In the example chosen, it is necessary to reduce the backlash by 0.64 - 0.30 = 0.34 mm.

To obtain this correct clearance between teeth, without modifying the clearance in the bearings determined in paragraph 36, it is not necessary to change the total overall thickness of washers, but to increase the total thickness of the left-hand washers by 0.34 mm and reduce those at the right-hand side by the same amount, i.e.:

7 + 0.34 = 7.34 mm on the left-hand side.

8.40 - 0.34 = 8.06 mm on the right-hand side.

Select distance pieces and washers from amongst those sold by our Spare Parts Department to obtain this setting.



39. Prepare the left-hand bearing housing (see paragraph 27).

40. Fit the bearing housings and assemblies, distance pieces and adjusting washers in their respective places, and check the adjustment and the backlash.

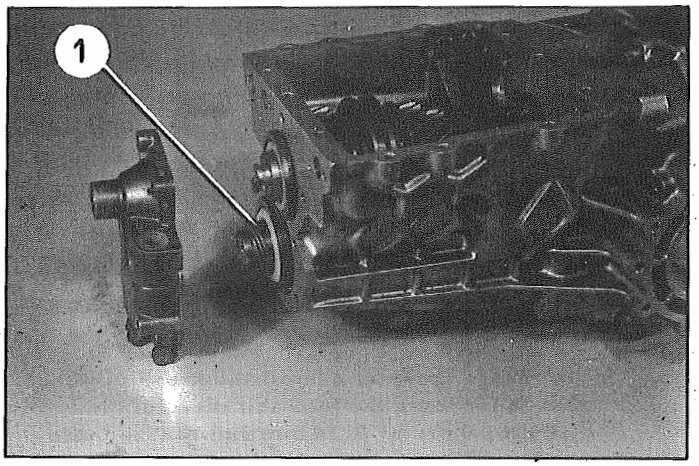
    Modify them if necessary.

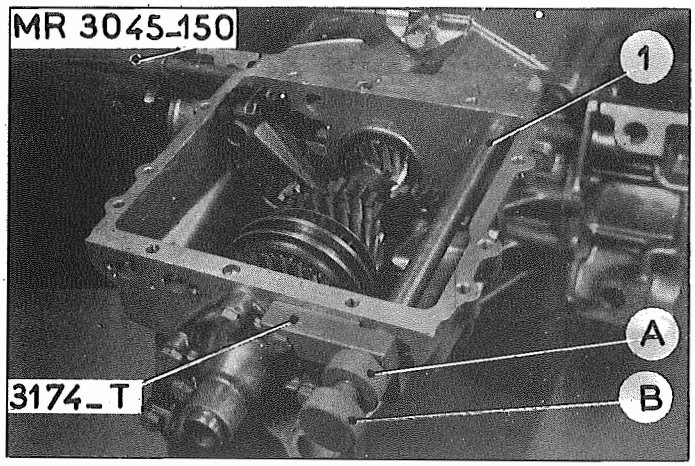
41. <u>Fit the front cover.</u>

Fit the nut (1) on the bevel pinion, tighten to between 144 and 157 lbs ft. (20 - 22 m.kg) (i.e. 196 - 215.6 m N) (spanner 3179-T).

Lock the nut by knocking over the metal into the groove in the spindle.

Fit the front cover, with its adjusting shims, the joint seating smeared with sealing compound "masti-joint HD 37". Also put some sealing compound "masti-joint HD 37" under the heads of the three lower securing screws. Tighten the screws.





42. Determine the neutral position of the reverse speed selector fork shaft.

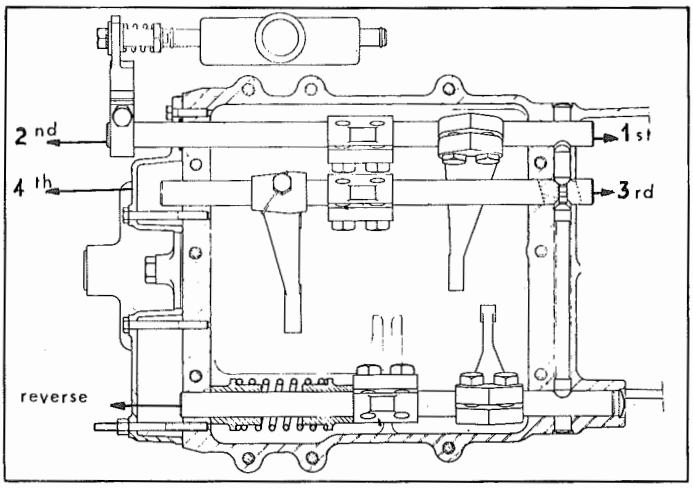
a) Engage the reverse selector fork shaft (1) in the bore in the gearbox.

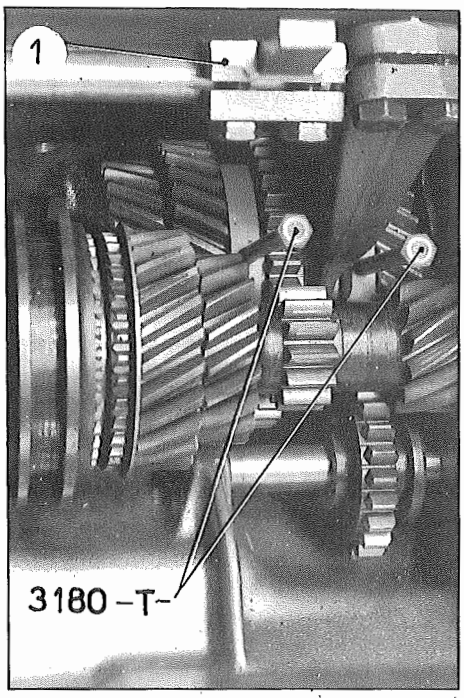
b) Fit Fixture 3174-T, with the screw (B) aligned on the centre line of the shaft.

c) Engage the Rod MR 3045-150 in the interlock plunger holes until the end of the bar enters the notch in the spindle.
Keep the bar in this position to lock the spindle at the neutral position. On the end of the shaft mark this position in its angular relation to the gearcase.

d) Bring the screw (B) into contact with the end of the shaft. Tighten the locknut (A).

e) Loosen the screw holding the fixture. Withdraw the rod and the shaft.





43. Fit the first and second gear selector fork shaft.

a) Fit the shaft in the bore in the gearbox, placing the operating dog (1) and the fork on the shaft.

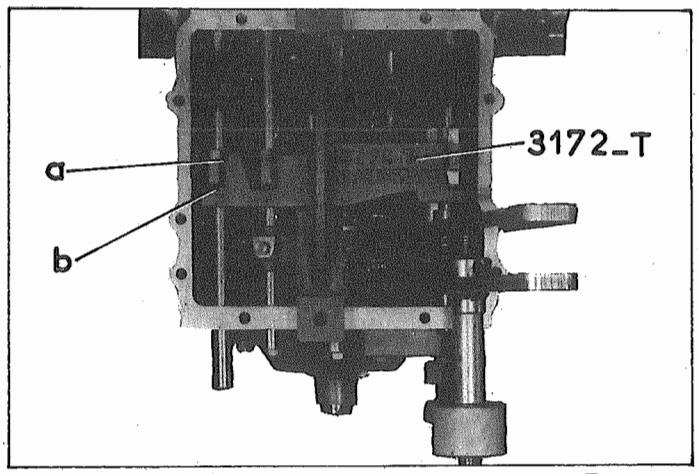
b) Hold the slider in the neutral position, using one pair of the set of gauges 3180-T (choose a pair of gauges which will give the least play on the sliding member).

c) Engage the rod MR 3045-150 in the interlock plunger holes and hold the shaft in the neutral position.

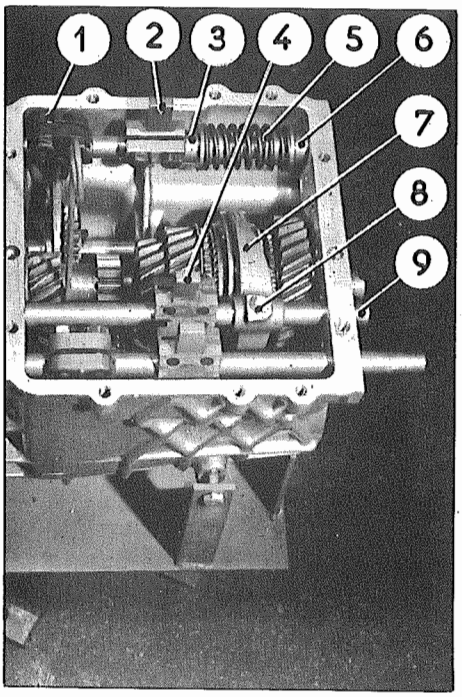
Tighten the fork securing screws to 29 lbs ft. (4 m.kg) (i.e. 39.24 m N).

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d) Place Fixture 3172-T with its centring dowels engaged in the locating holes in the gearcase. Keeping the fork shaft in neutral and using rod MR 3045-150 to hold it there, bring the operating dog into contact with the fixture locators at "a" and "b".
Tighten the screws to 29 lbs ft. (4 m.kg) (i.e. 39.24 m N).
Remove the fixtures and the rod.

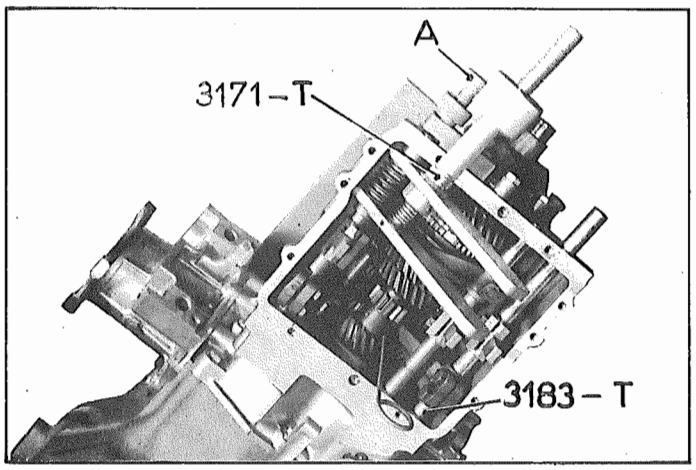


44. Fitting the third and fourth speed selector fork shaft.

a) Fit the interlock plunger (the shortest) in its bore.

b) Fit the shaft (9) and pass it through the fork (7) and the operating dog (4). Tighten the pointed locking screw (8) on the fork. Lock the screw with a piece of iron wire.

c) Adjust the position of the operating dog (see paragraph 43, sections c and d).



45. Fit the reverse speed selector fork shaft.

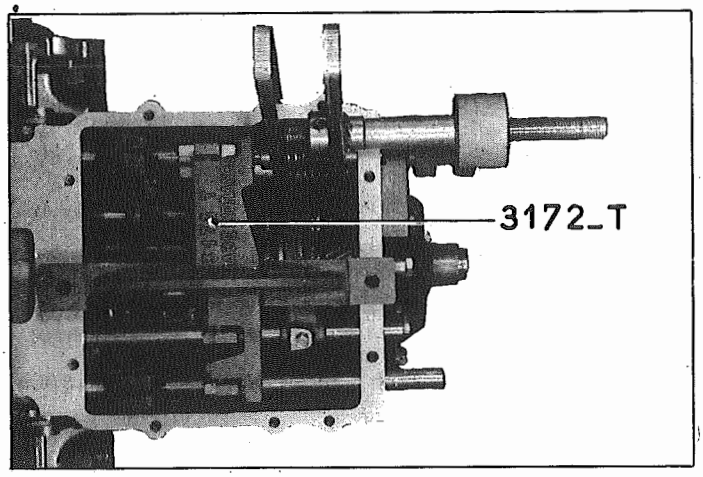
a) Engage the interlock plunger (the longest) in its bore.

b) Offer up the fork shaft and as its end enters the gearbox, place over it the following parts in this order:

- one thrust cup for return spring (6),
- the return spring (5),
- one thrust cup for return spring (3),
- the operating dog (2),
- the fork (1).

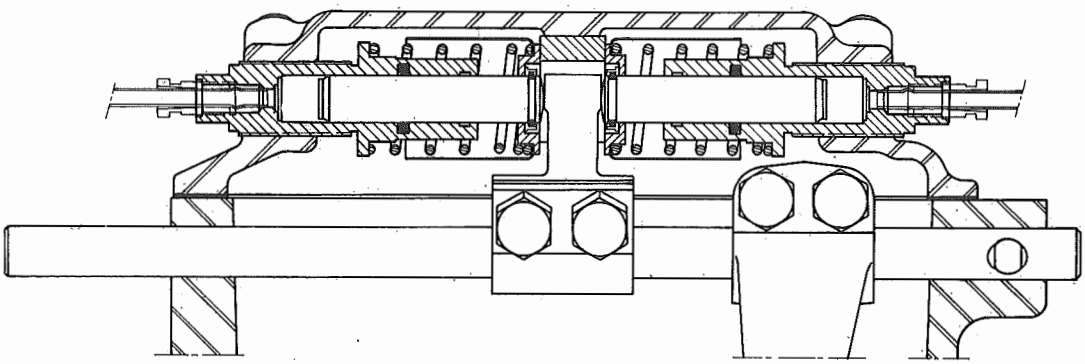
c) Fit the Fixture 3174-T, adjust it as in paragraph 42, the screw (A) in line with the centre line of the fork shaft.

d) Compress the spring with the aid of compressor 3171-T.
Bring the shaft up against the end of the screw (A).
Rotate the shaft to align the marks made at paragraph 42, line c.
Bring the reverse pinion to the neutral position using guage 3183-T placed between the loose 1st speed pinion and the reverse intermediate gear. Tighten the fork screws to 29 lbs ft. (4 m.kg) (i.e. 39.24 m N).



e) Adjust the position of the operating dog (see paragraph 43, sections c and d).

Remove the gauges and the pliers.



46. Adjust the stroke of first gear engagement.

a) Using a screwdriver as a lever, bring the reverse gear to neutral and engage first gear, with the first and second synchro slider in contact with the first gear pinion.

b) Ensure that the operating piston for second gear is fully withdrawn into the bottom of its cylinder, if not tighten the screw (A) (see paragraph 48).

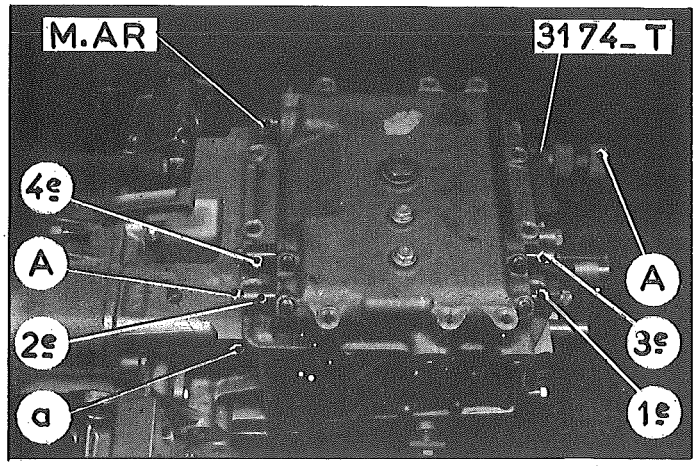
c) Place the cover on the gearbox.
Put some sealing compound "hyperix" in the hole for the cylinder locking screw.
Screw in the operating cylinder for second gear to bring it into contact with the operating dog and then screw in by a further one third of a turn to obtain the clearance of 0.4 - 0.6 mm between the synchro slider and the loose pinion.
Smear the stop screw with sealing compound "masti-joint HD 37", then tighten the screw.
Remove the screw (A).

d) Remove the cover.

47. Adjust the stroke of second gear engagement.

a) Engage second gear, the first and second synchro slider being in contact with the second gear loose pinion.

b) Ensure that the first gear operating piston is fully withdrawn into the bottom of its cylinder and adjust as in c and d of paragraph 46.



48. Adjust the stroke of third gear engagement.

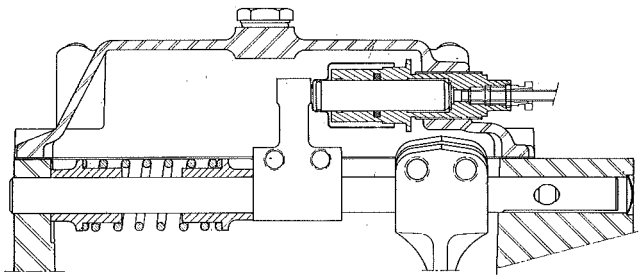
a) Engage third gear, the third and fourth synchro slider being in contact with the third gear loose pinion.

b) Ensure that the operating piston for fourth gear is fully withdrawn into the bottom of its cylinder and proceed as per c and d of paragraph 46.

49. Adjust the stroke of fourth gear engagement.

a) Engage fourth gear, the synchro slider of third and fourth being in contact with the fourth gear loose pinion.

b) Ensure that the operating piston for third gear is fully withdrawn into the bottom of its cylinder and proceed as per c and d of paragraph 46.



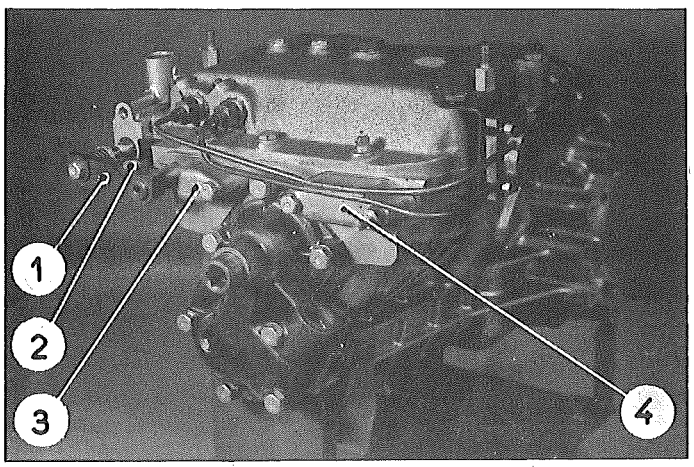
50. Adjust the stroke of reverse gear engagement.

a) Fit Fixture 3174-T adjusted as per paragraph 42, the screw (A) aligned with the fork shaft centre line.

b) Put some sealing compound "hyperix" in the hole for the cylinder locking screw. Screw in the cylinder until the shaft is in contact with the screw (A) of the Fixture 3174-T.

c) Smear the cylinder locking screw with sealing compound "masti-joint HD 37". Tighten the screw.

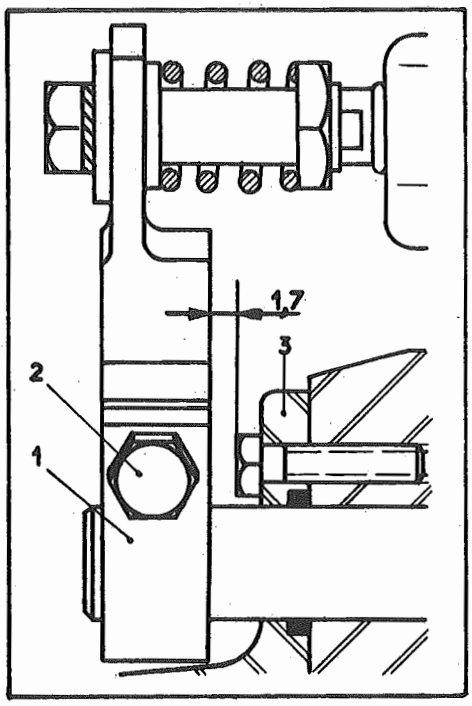
d) Remove the fixture.



51. Fit the closing plugs, previously smeared with sealing compound "masti-joint HD 37" in the bores for the interlock plungers at "a" (on each side of the gearbox).

52. Fit :

- the cover (4) for the reverse gear selector fork shaft ("masti-joint HD 37"),
- the covers (3) with ring seal, for the 1st, 2nd, 3rd and 4th gear selector shafts ("masti-joint HD 37),
- the pipe assemblies.



53. Fit the clutch lock.

Offer up the lock, with the lock spindle located in its central position, the clamp (1) engaged on the fork shaft, tighten the screws securing the lock (inserting the two thrust plates).

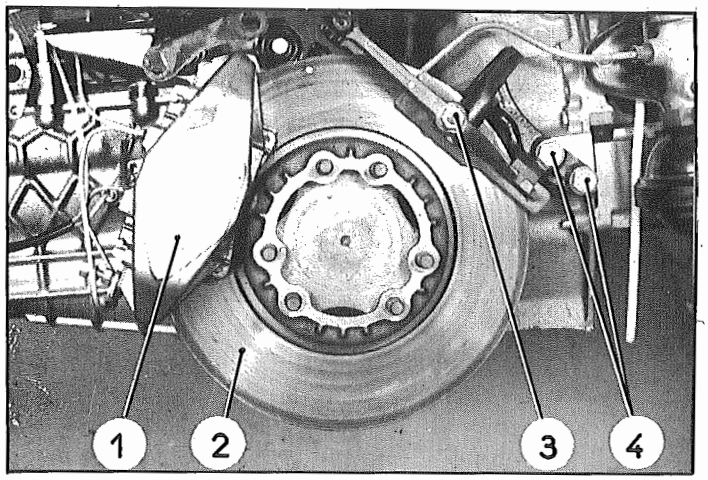
Tighten the screws (2) securing the clamp.

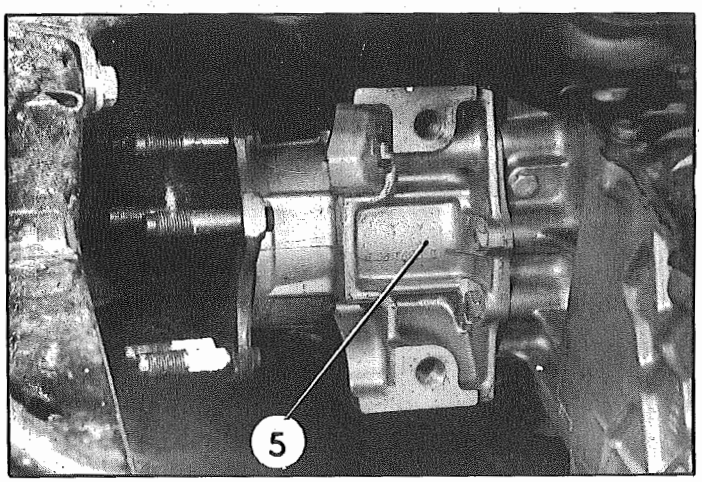
Engage first gear by pushing the fork shaft in, and check for a clearance of 1.7 mm minimum between the clamp and the head of the screw (3) securing the cover (3). Alter the clutch lock position if necessary.

Tighten the screw (2) of the clamp to 14 lbs ft. (2 m.kg) (i.e. 19.6 m N).

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REMOVAL.

1. Remove:
   - the spare wheel,
   - the headlamp control cross-bar,
   - the spare wheel crossmember,
   - the front wings and the radiator air intake duct,
   - the metal panel under the gearbox and the cooling ducts for the brakes.

2. Raise the front of the car on stands.

Release the pressure in the suspension circuit (see Op. DX. 00).

Drain the gearbox.

Remove the front wheels.

3. Remove the drive-shaft and pivot assembly (see Op. DX. 372-1).

4. Remove the hydraulic brake units (1) (see Op. DX. 451-1).

5. Remove the two screws (4) securing the mechanical brake caliper (3).

NOTE:- The right-hand side is accessible from above whereas the left-hand side can only be reached from the underside of the vehicle.

6. Free the disc (2).

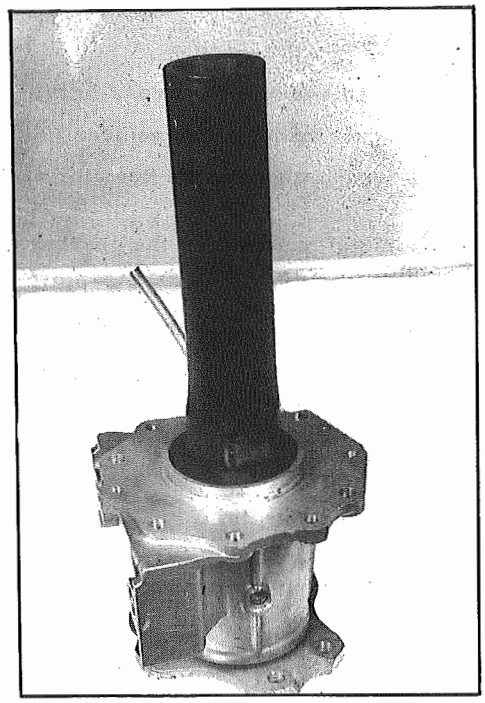
7. Remove the gearbox outlets (5).

Remove the screws securing the bearings. Free the bearing and shaft assemblies.

NOTE:- A distance piece and several packing pieces determine the position of the differential. The thickness is determined when assembling the gearbox.

These packing pieces must not be mixed.

When a gearbox outlet unit is to be replaced, it is necessary to adjust it again (see paragraph 9b, this operation).

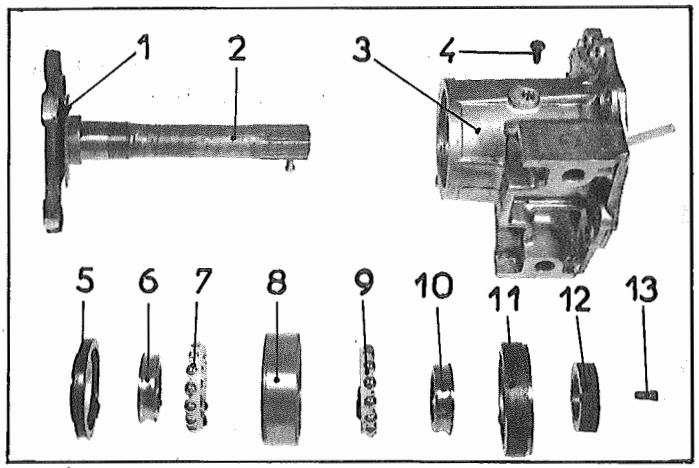


8. Stripping the gearbox outlets.

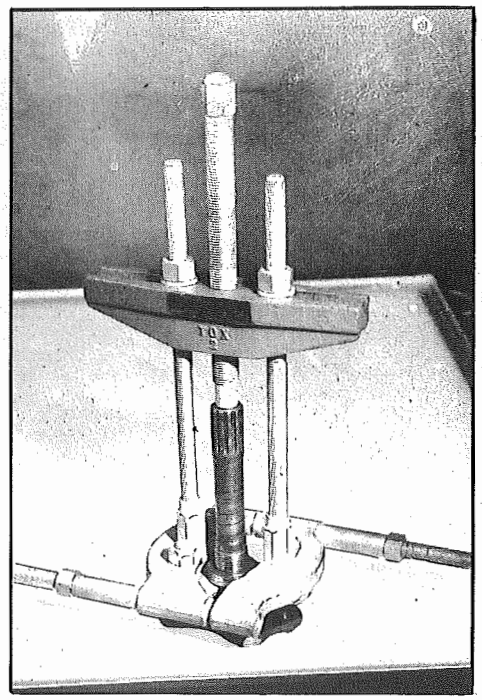
a) Remove:

- the locking screw (13),
- the nut (12) (spanner 1770-T -(A)).

b) Tap out the shaft (2) using a copper drift.

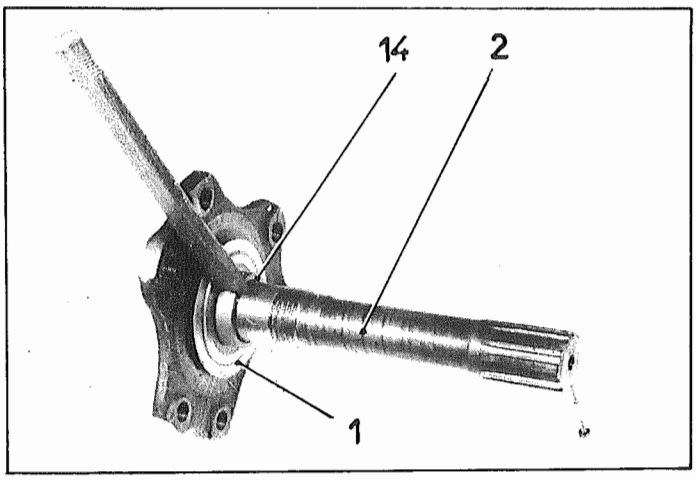


NOTE: The cage (6) remains on the shaft (2) but the nylon cage (7) comes away and the balls may fall out. Take care not to lose them.



c) Withdraw the cage (6) (extractor 2405-T).

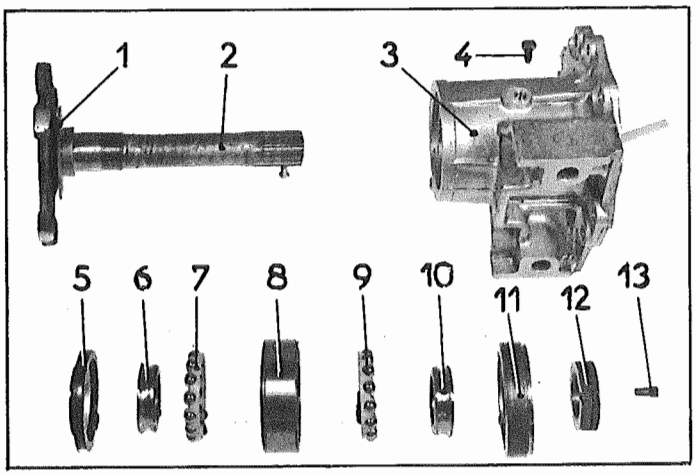
- Remove the seal (5).



d) Free the stop ring (14) from the shaft (2). To do this, use a chisel to make a small groove across the ring, proceed as shown in the illustration. This will enlarge the stop ring and allow its removal.

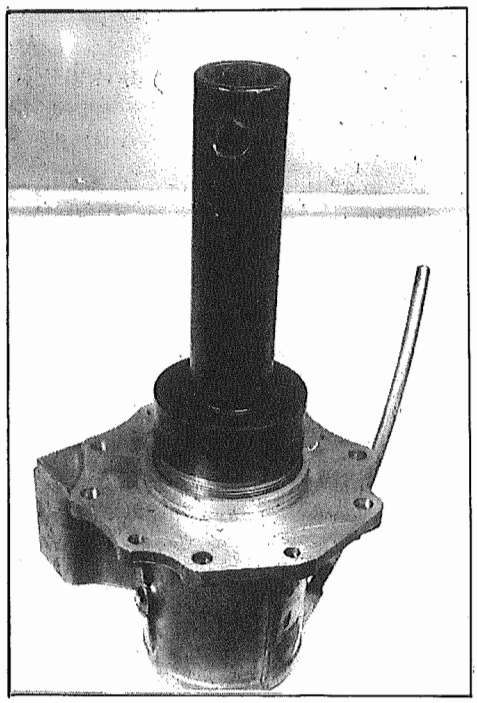
NOTE:- The stop ring must be renewed at each dismantling.

Remove the oil retaining washer (1).



e) Remove:

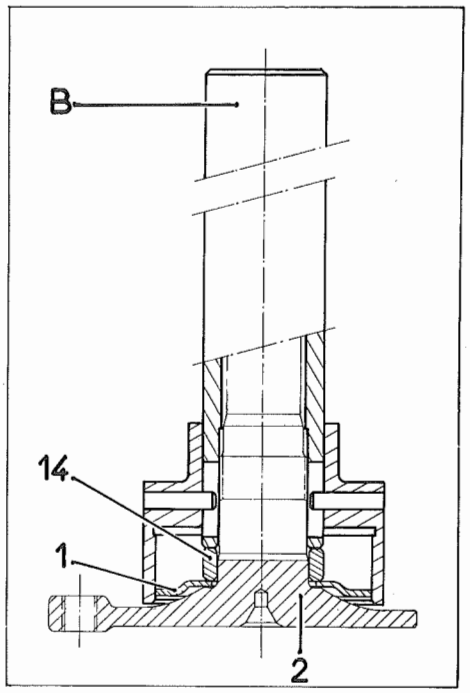
- the locking screw (13)
- the nut (11) (spanner 1771-T),
- the cage (10) as well as the ball housing (9).



f) Gently heat the body (3) with a blow-lamp in order to withdraw the outer cage (8).

NOTE:- If the bearing is to be used again, mark the positions of the various parts so that they can be reassembled in the same position.

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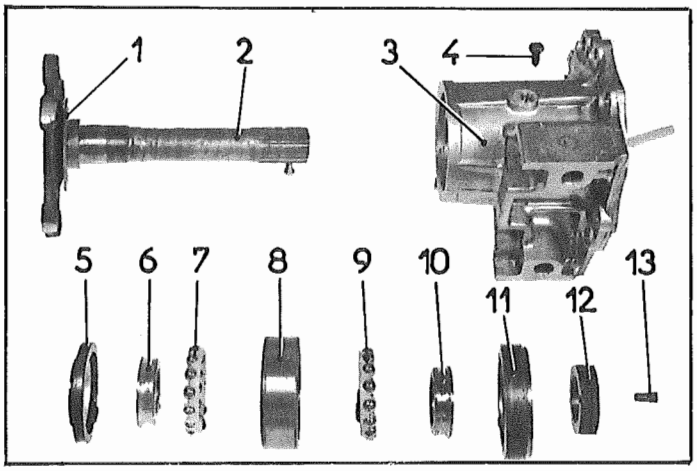


ASSEMBLY.

9. Assembling the gearbox outlets.

a) Prepare the shaft.

- Place on the shaft (2) the oil retaining washer (1) as well as the stop ring (14).
- Using fixture 1767-T (A) centre the washer (1) and fit the stop ring (14) by tapping part B.



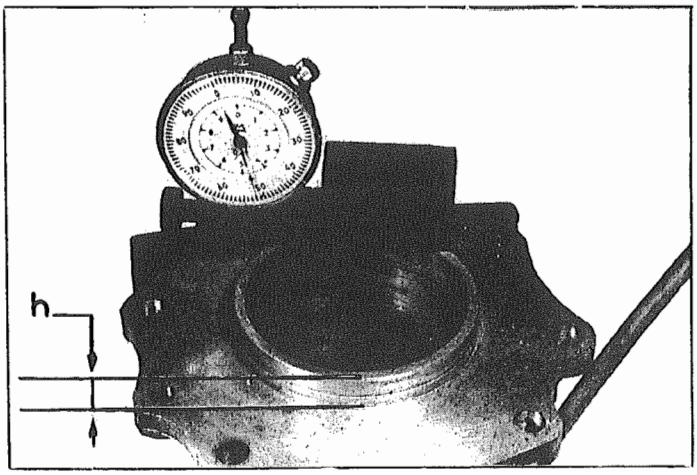
b) Preparing the body (3).

- If the gearbox outlet is to be renewed, it is necessary to determine the thickness of the packing pieces for the differential.
- To do this compare the height (h) of the collar on the new parts and the old.

Use a dial gauge on support 1754-T.

Fasten it on the gearbox outlet as shown in the photograph opposite.

Set the dial gauge at zero and mark the position of the totalising needle, for example, between 9 and 0.

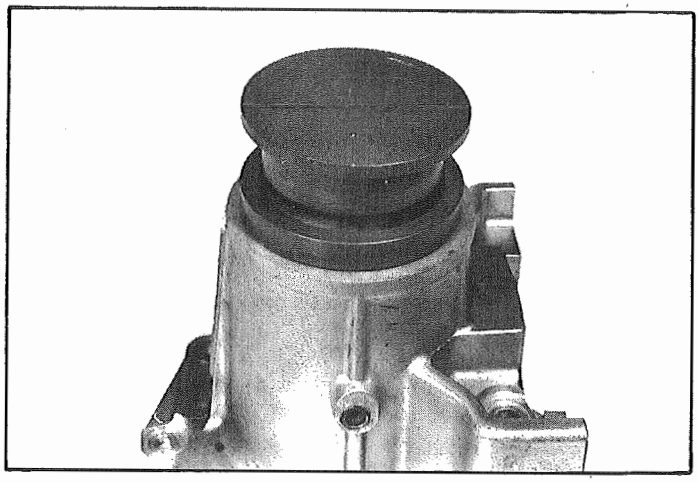


Place the apparatus on the new gearbox outlet and mark the position of the needles, for example:

- totalising needle between 9 and 0.
- large needle on 52.

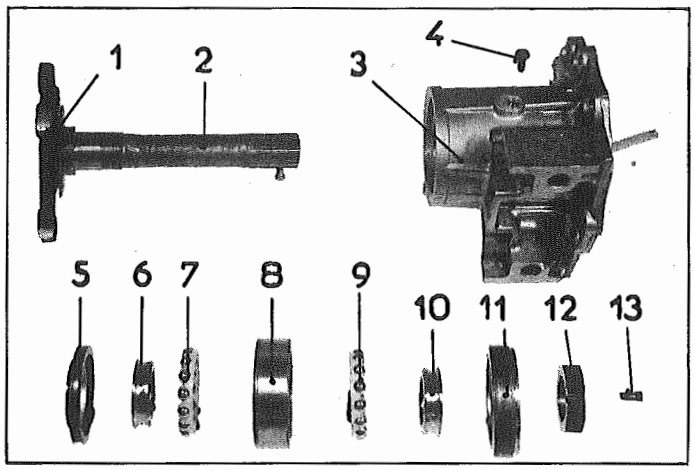
The new collar is higher than the old one by 0.52 mm. It will therefore be necessary to reduce the thickness of the packing pieces by this dimension of 0.52 mm.

If the collar is lower than the old one, it would be necessary to increase the thickness of the packing pieces by the distance between the two height dimensions.



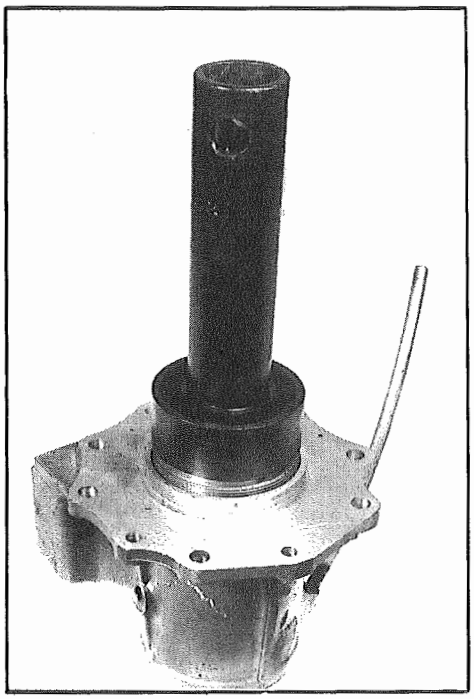
c) Fit the cage (8) using a piece of tube.

- Fit the cages (9) and (10).
- Fit the seal SPI (fixture 1772-T).
- Fit the cages (6) and (7).



NOTE:- The nylon cages (7) and (9) can only be fitted one way round.

The shouldered portion of the nylon cage must be towards the inside of the bearing.

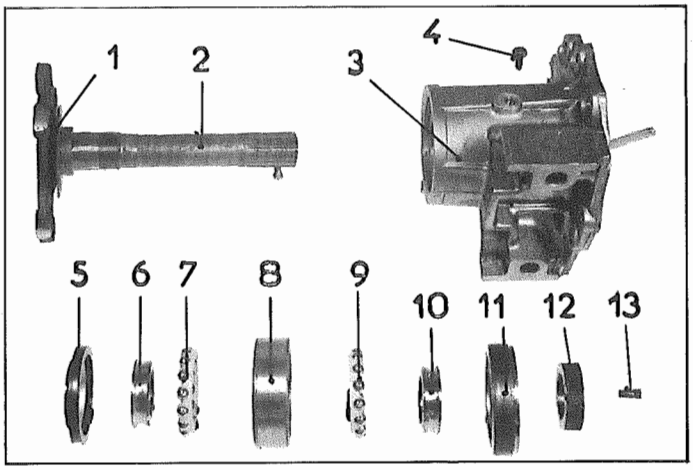


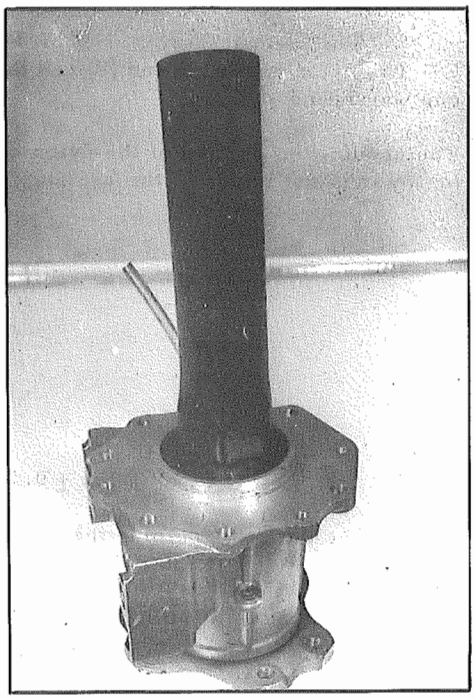
d) Tighten the nut (11) to 72 ft lbs ± 0.75 (10 m.kg).

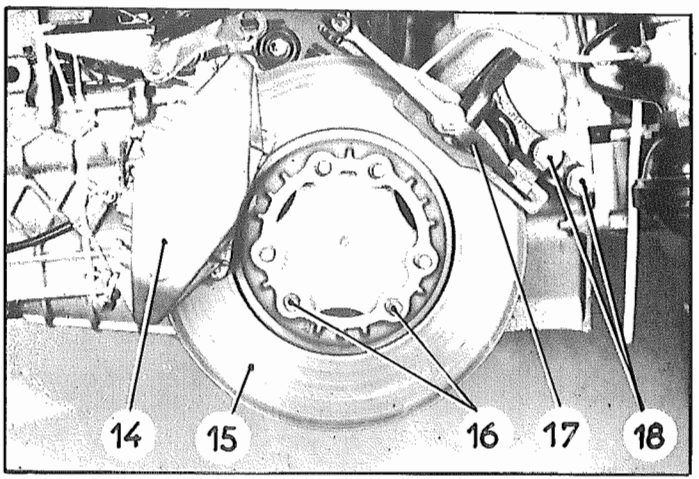
- Lock the nut by tightening the pointed screw (4).

e) Fit the shaft in the housing, using a piece of 30 mm inside diameter tube under a press.

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Corrective No.1







f) Tighten the locknut (12) to 109 ft lbs (14.5 m.kg) and lock the screw (13) to 5.5 - 8 ft lbs (0.8 - 1.1 m.kg).

NOTE:- The left-hand differential shaft is longer than the right-hand shaft.

10. Fit the gearbox outlets with the existing packing pieces or those determined in paragraph 9b.

11. Fit the brake discs (15) in the brake mechanism (17) and over the studs (16).

It is essential *that the maximum run-out, measured on the largest diameter of the disc, does not exceed 0.15 mm.*

Proceed as instructed in paragraph 23 of this operation.

Tighten the securing screws (18) of the mechanical units to 79 to 86 ft lbs (11 to 12 m.kg) (101 to 111 mAN).

12. Fit the hydraulic brake units (14) (see Op. DX.451-1).

13. Fit the drive shaft and pivot assembly (see Op. DX.372-1).

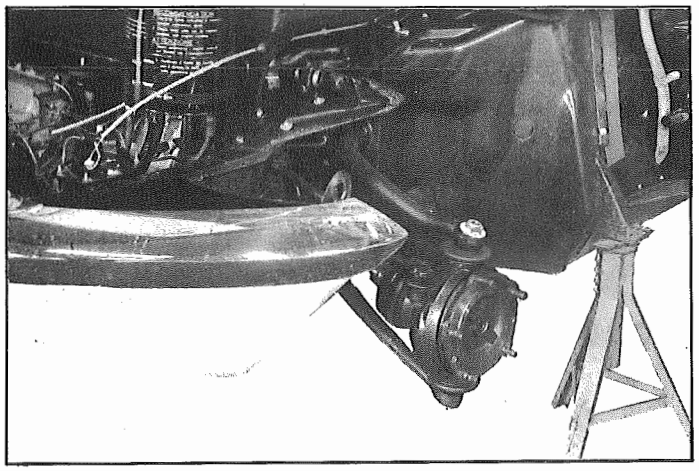
14. Fit the hydraulic pipe connecting the two units (14).

Fit the brake pads as well as the clips holding the pads in place.

15. Fit:-

- the brake cooling ducts,
- the panel under the gearbox,
- the front wings,
- the spare wheel support with the radiator air duct,
- the headlamp control cross-bar,
- the spare wheel.

16. Lower the car to the ground.



REPLACING A BRAKE DISC.

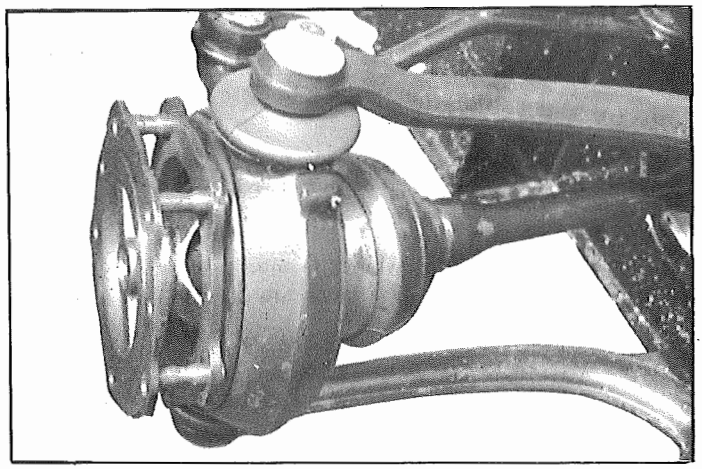
Removing.

17. Remove:
    - the spare wheel,
    - the support crossmember for the spare wheel,
    - the front wings (see Op. DX.851-1),
    - the cooling duct from the radiator.

18. Place the front of the vehicle on supports.

Release the pressure in the circuits.
Place the manual control in LOW position and open the bleed screw of the pressure regulator.

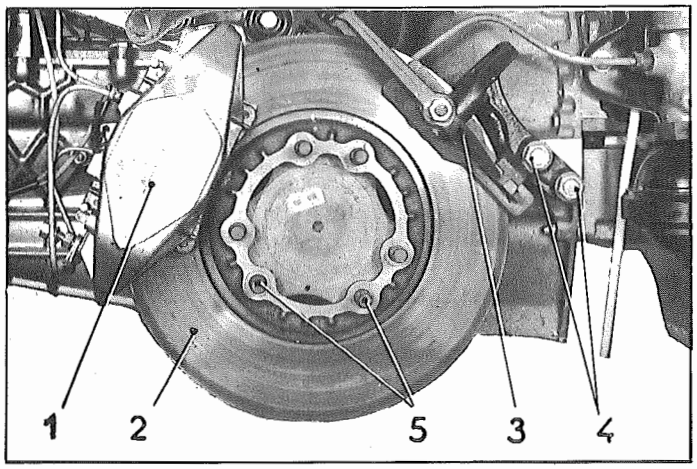
Remove:
- the front wheels,
- the nuts securing the driveshafts onto the flanges of the gearbox drive outlets.



19. Free the driveshafts from the pivot bearings (outwards).

To do this remove the two countersunk screws.

Free the tri-axe housings from the studs on the gearbox drive flange.



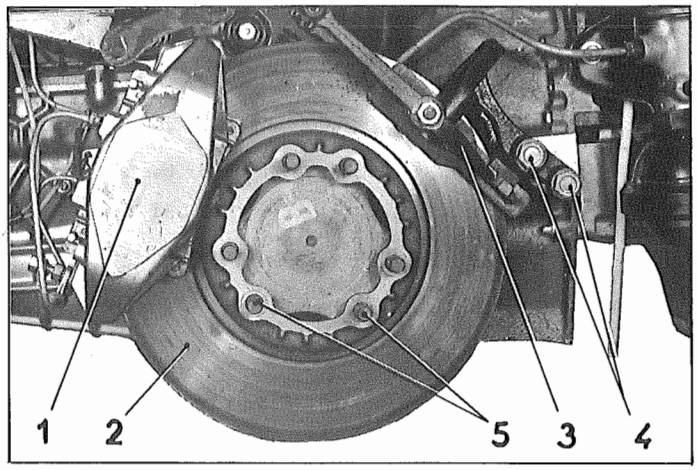
20. Remove the hydraulic brake units (1) (see Op. DX.451-1).

21. Remove the two screws (4) securing the mechanical brake unit (3).

Note: The right-hand side is accessible from above whereas the left-hand side can only be reached from underneath the car.

22. Free the disc (2) together with the mechanical brake caliper (3).

NOTE: It is forbidden to grind the brake discs.



Assembly.

23. Fitting the brake discs.

Fit the brake discs (2) into the brake calipers (3) then fit the assembly on the studs (5).

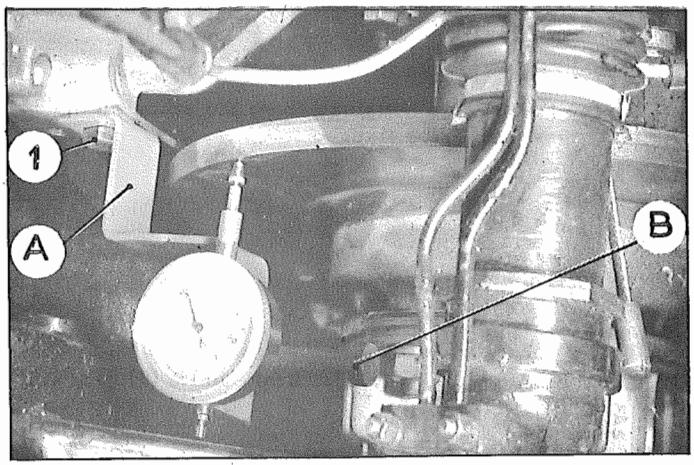
VERY IMPORTANT: *It is essential that the maximum run-out of the disc measured at the largest diameter shall not exceed 0.15 mm.*

a) Insert washers or spacers between the nuts and the discs to ensure thorough tightening of the latter on the differential shaft drive flange.

If there is a yellow mark on the gearbox drive-plate and on the disc, these two marks must be as close to each other as possible when assembled.

b) Fit the dial gauge (2437-T) on a support (A) (MR.3365-250) using the screw (B) (this screw forms part of gauge 2041-T).

Support bracket (A) on the clutch bell-housing by the upper screw securing the mechanical brake caliper.



c) Arrange the front of the dial gauge on the largest diameter of the face of the disc. Tighten the screw (1) of support (A).

d) Turn the disc, when the maximum run-out read on the comparator must not exceed 0.15 mm.

e) If it does exceed this amount, remove the disc, turn it through 1/3 of a turn in a clockwise direction and replace it.

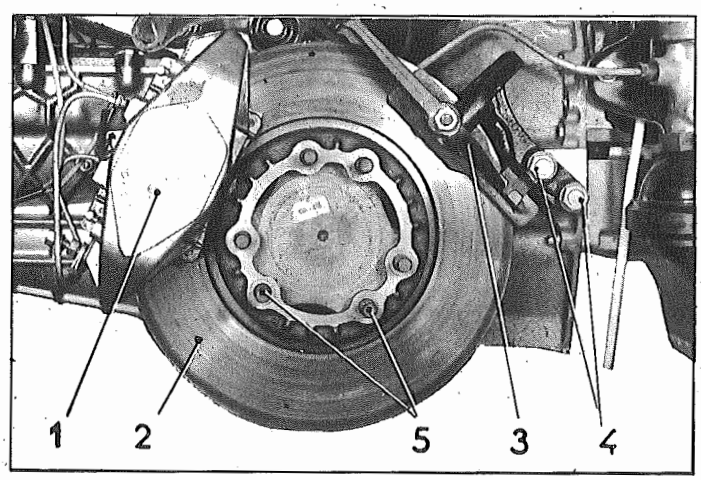
f) Measure the run-out again.
If it is greater than 0.15 mm turn it another 1/3 of a turn, still in a clockwise direction and check again.

g) If the run-out is still greater than 0.15 mm it will be necessary to change the disc.

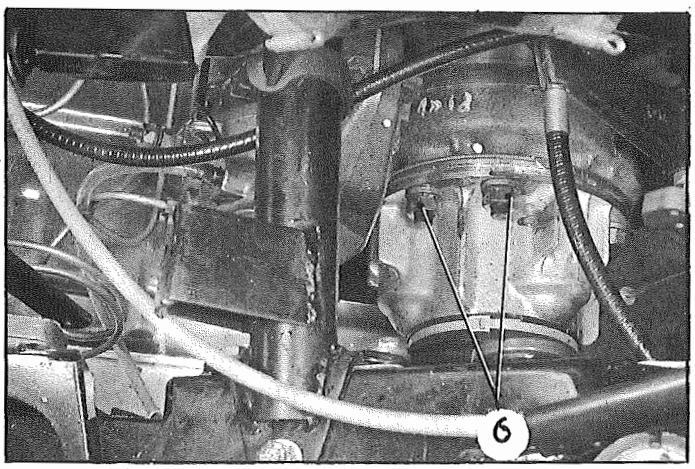
h) Check the run-out on the new disc as indicated in lines d) to f) above.

i) If in the three possible positions the run-out of the new disc is still greater than 0.15 mm then it will be necessary to change the differential shaft (see this Op. para. 7 onwards).

j) Tighten the securing screws (4) of the mechanical brake calipers to between 80 and 86 ft.lbs. (11 to 12 m.kg).



24. Fit the hydraulic brake units (1) (see Op. DX. 451-1).



25. Fit the driveshafts.

Fit the tri-axe housings on the studs of the gearbox drive outlet flange.

Fit the nuts (6) and tighten them to between 61 and 79 ft.lbs. (8.5 to 11 m.kg) (17 mm socket spanner with extension).

26. Fit the drive plates on the wheel hubs (two countersunk machine screws each side). Fit the front wheels.

27. Fit the pipe between the two hydraulic brake units (1).

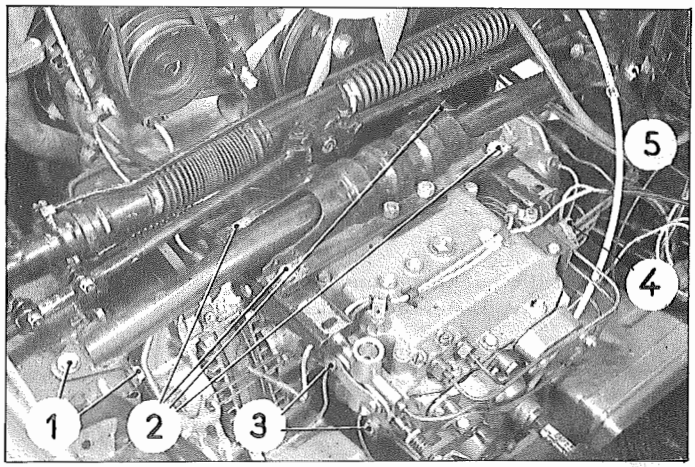
Fit the brake pads and the pins holding the pads.

28. Fit:

- the front wings (see Op. DX.851-1),
- the support member for the spare wheel with the air duct for the radiator,
- the spare wheel.

29. Start up the engine, put the circuits under pressure (tighten the screw on the pressure regulator and place the manual height control lever in position "normal").

30. Bleed the brakes (see Op. DX.453-0).



REMOVAL.

1. Hold the bonnet open (catch MR.4158).

2. Remove:
   - spare wheel, the front wings and the radiator cowl,
   - the battery and battery tray.

3. Release the pressure in the circuits (see Op. DX.00).

4. Drain the radiator (save the liquid which contains anti-freeze).
   Remove the radiator (see Op. DX.232-1).

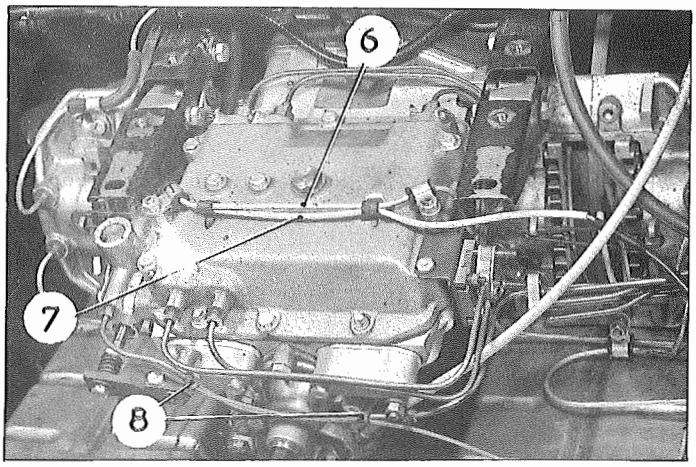
5. Support the engine-gearbox assembly by means of a sling and a workshop crane, (as the wings have been removed, stand 1797-T provided for the DS 19, may be used).

6. Removing the crossmember support for the gearbox.

Remove the screws (1, 2 and 5) securing the crossmember.

Free the crossmember.

NOTE: Do not lose the packing found between the crossmember and sidemembers.



7. Remove the screws (3) securing the lock and its two plates.

8. Remove the nuts (4) and disconnect the five-tube pipe assembly.

9. Disconnect the leads (7) for the brake pad wear tell-tale light.

10. Remove:
    - the pipe (6) connecting the brake units,
    - the rubber clips (8).

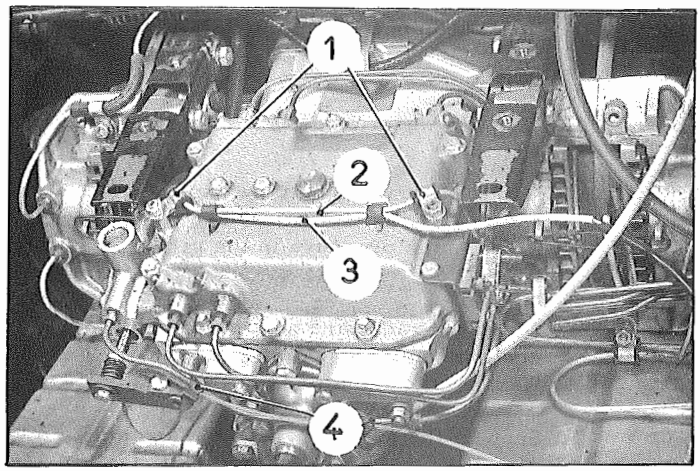
11. Remove the cover (spanner 1677-T for the flat head screws).

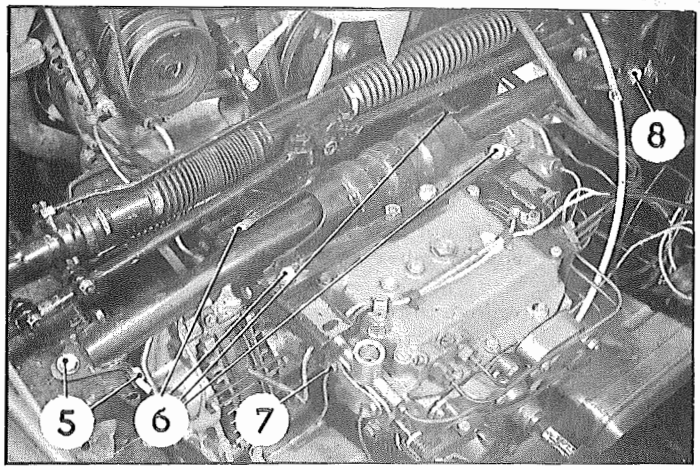
12. Strip the gearbox cover.
    (See Op. DX.330-3 para. 22).

ASSEMBLY.

13. Assembling the gearbox cover.
    (See Op. DX.330-3 para. 28).

14 Fit the gearbox cover and adjust the control cylinders (see Op. DX.334-7 paras. 40 to 44).





15. Fit the connecting pipe (2) between the two brake units. Tighten the nuts securing the clips (1) holding the tube.

16. Connect the lead (3) for the brake pad wear tell-tale light.

Fit the clips (4).

17. Fit the front crossmember supporting the gearbox.

Fit the packing found when dismantling, between crossmember and sidemembers.

Tighten the screws (5, 6 and 8).

18. Connect up the five-pipe assembly, insert the seal plate fitted with new ring seals.

19. Place the two plates on the clutch-lock and tighten the screws (11). With first gear engaged, check that there is a clearance of 1.7 mm minimum between the clamp and the head of the securing screw of the fork-shaft cap.

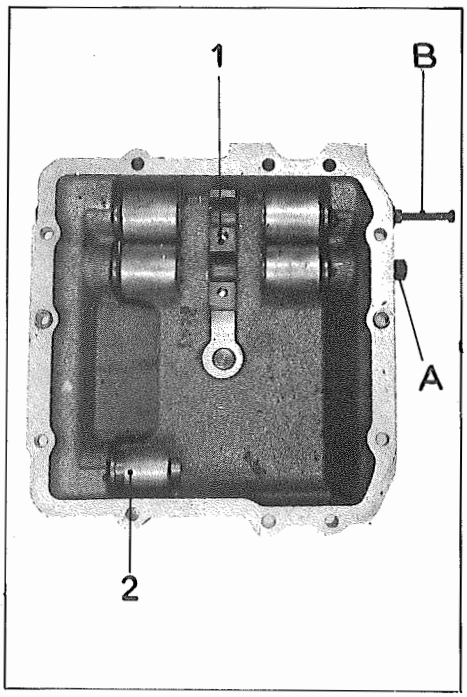
20. Fit:

- the radiator (see Op. DX.232-1),
- the battery and battery tray,
- the air cowl,
- the front wings,
- the spare wheel.

21. Fill up the radiator, with the heater control valve open.

22. Bleed the gearchange control circuit.

23. Bleed the brakes.



DISMANTLING.

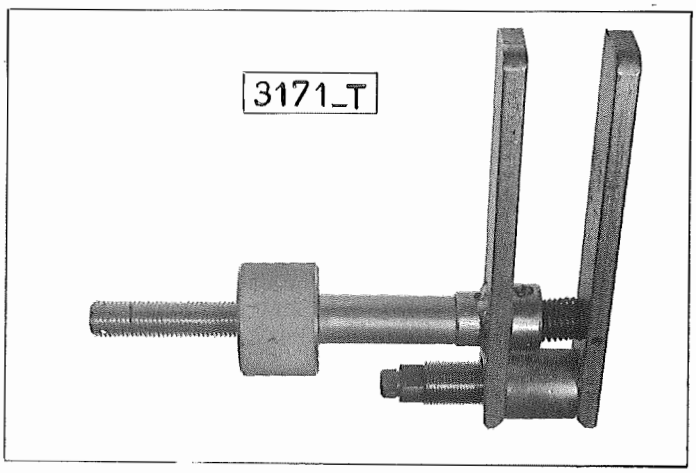
1. Remove the pipe assemblies.

2. Compress the piston return springs of the gear-change control, (the use of pliers 3171-T will save time).

After compressing the spring, hold the piston in this position by means of a screw (A) 4 mm diameter x 0.75 mm, length under head 40 mm (plain washer under head).

If this tool is not available, use a screw (B) 4 mm diameter x 0.75 mm, length under head 80 mm, with a nut and a plain washer.

Screw the screw (B) into the piston and compress the spring by tightening the nut.

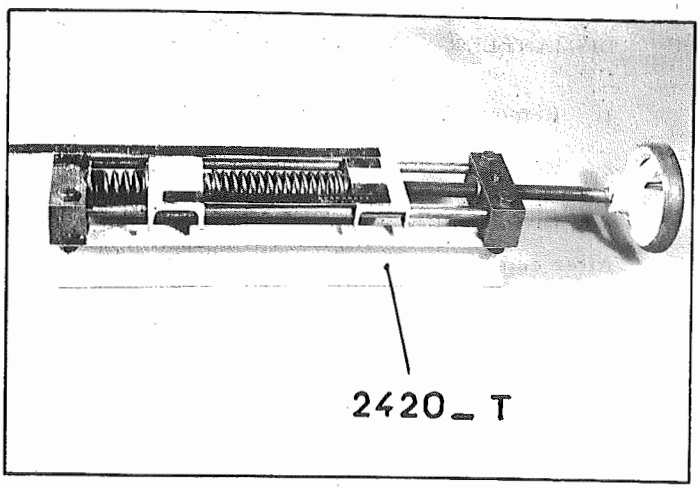


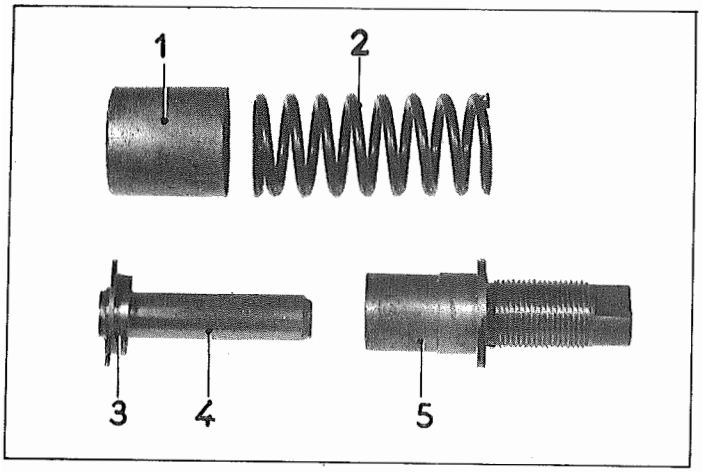
NOTE: The cylinder piston assembly for reverse gear (2) has no return spring.

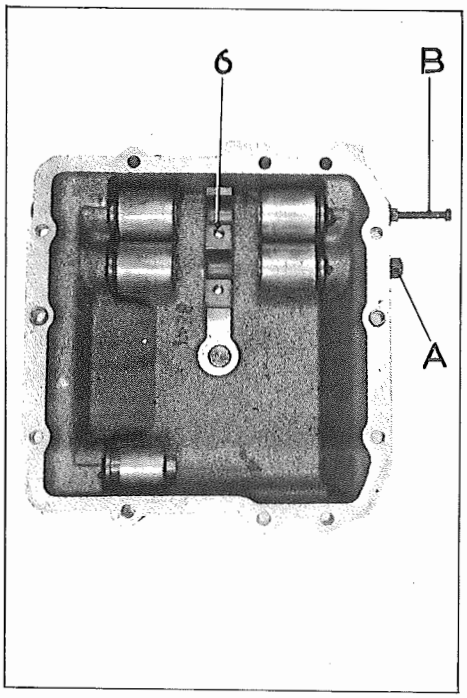
2. Remove the neutral stop-block (1).

3. Remove the cylinder stop screws and free the cylinders, screwing them into the cover.

4. Remove the filler plug.







5. Replacing the seals for the control pistons.

a) Mark each piston and corresponding cylinder, free the cylinder by hand.

b) Remove the seals from the cylinders using a small brass wire hook (do not scratch the cylinder bore).

c) Clean the cylinders and pistons by immersing them in clean alcohol. Then blow with compressed air.

d) Smear a new seal with special hydraulic fluid and fit it in position in the groove of the cylinder.

6. Checking the return springs.

Use fixture 2420-T.

Length	Load in kilogrammes
48.8 mm	(24.5 ± 1.5 kilogrammes
31.5 mm	(spirals closed.

7. On the piston (4) place the following:

- the thrust cup (3) for the spring,
- the protecting sleeve (1),
- the return spring (2).

Engage the cylinder (5) on the piston (4).

Compress the spring using tool 3171-T and hold the piston in the cylinder with a screw (A) (4 mm diameter x 0.75 mm x 40 mm long).

If this tool is not available, use a screw (B) (4 mm diameter x 0.75 mm x 80 mm long with a plain washer and a locknut).

8. Assembling the cover.

Fit the cylinder piston assemblies.

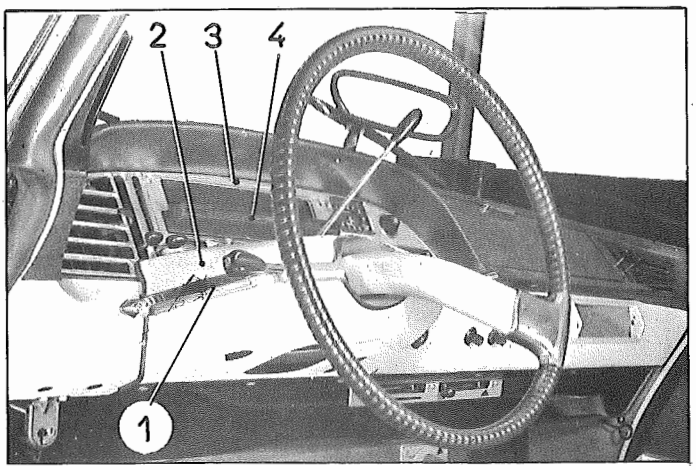
Fit each cylinder by screwing it fully into the cover.

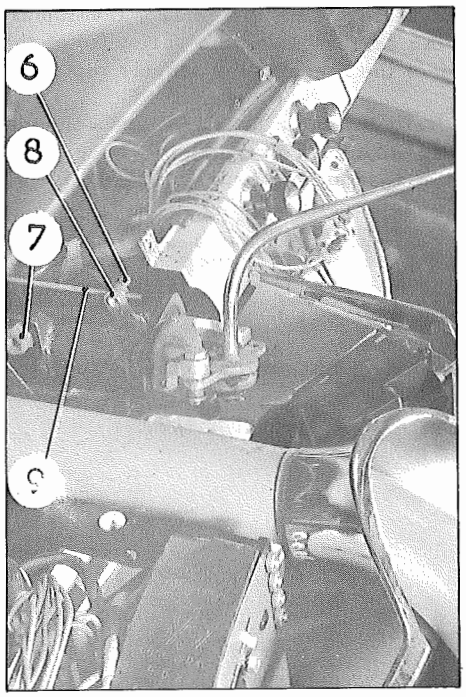
Place the neutral stop block (6) on the dowels. Tighten the screws (plain washers).

Fit the filler plug.

9. Adjust the pipe assemblies of the gearchange control.

(See Op. 330-3 para. 46 to 50).





REPLACEMENT OF A MECHANICAL GEAR SELECTOR.

Removal.

1. Disconnect the cables from the battery terminals.

2. Remove:
   - the finisher (1) from the facia board,
   - the cover (2) from above the steering column.

3. Free:
   - the speedometer surround (3) towards the right,
   - the speedometer (4) towards the left.

NOTE: To free the speedometer, unscrew the speedometer drive cable and place the gear selector lever in 4th speed position.

4. Put the gear selector lever (5) in the first speed position.

Remove the rubber plug from the alignment hole for the hydraulic gear selector and insert in this hole a rod 3.94 mm diameter (2429-T).

Remove the rubber cover from the hydraulic gear selector bracket.

Loosen the rear screw on the connecting sleeve between the change speed lever rod and the selector slide-valve of the hydraulic gear selector.

Loosen the screw (6) securing the manual clutch control rod.

Remove the screw (7) securing the mechanical gear selector.

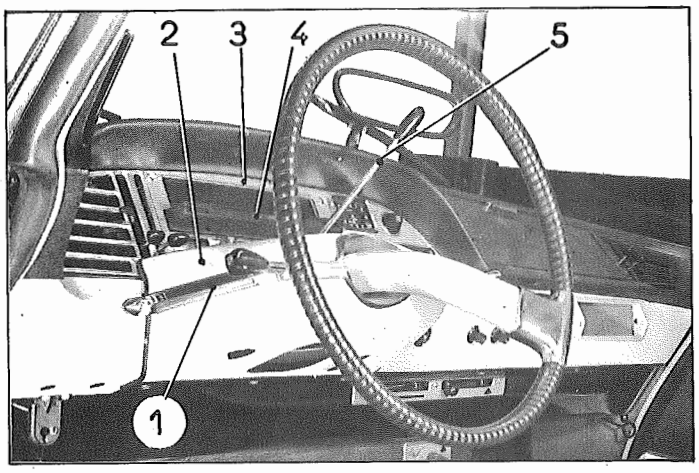
Disconnect the leads from the starter motor switch.

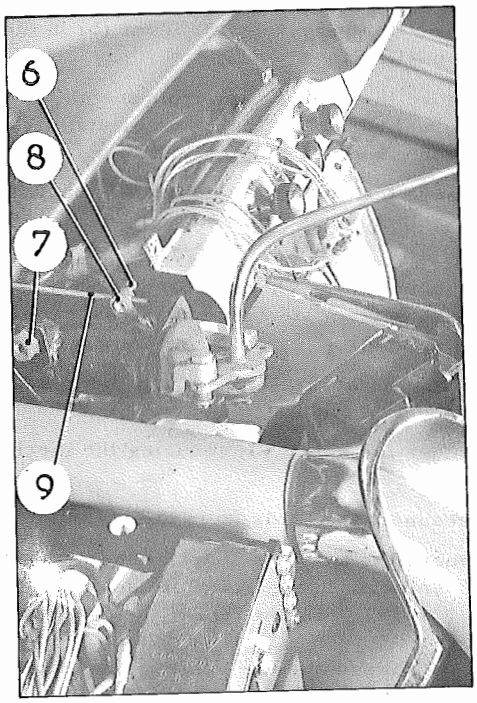
Remove the two nuts coupling the mechanical gear selector to the hydraulic selector (spanner 2431-T - 12 mm A/F).

5. Withdraw the mechanical gear selector.

Assembly.

6. With the change speed lever (5) in the first speed position, fit the selector in position. When fitting take care to pass the auxiliary clutch control rod (9) through the hole in the selector flange, then in the trunnion (8).





Engage the change speed lever rod in the clamp connecting the gear selector to the hydraulic gear control.
Fit and tighten the nuts securing the selector rod to the hydraulic gear control (spanner 2431-T - 12 mm A/F).
Fit and tighten the screw (7) securing the selector to the steering tube bracket, (plain and spring washers under the heads).

7. Check that the change speed lever is in the first speed position.

Insert the locating pin (2429-T) in the locating hole in the selector unit.
Tighten the clamp connecting the gear selector lever to the hydraulic gear control.
Remove the locating pin.
Refit the rubber plugs in the adjusting hole of the hydraulic gear selector and in the hole on the steering column bracket.

8. Push the rod (9) of the auxiliary clutch control as far as possible towards the hydraulic gear selector, with the control lever pulled towards the driver. Lock the screw (6) of the trunnion.

Connect the leads to the starter motor switch.

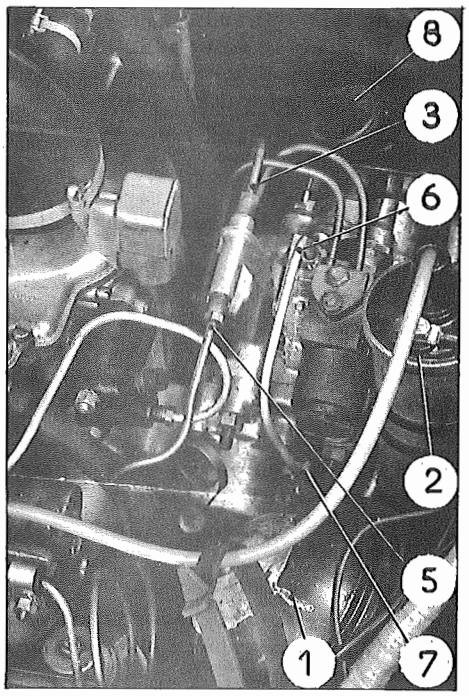
9. Refit the facia board (4) and connect up the speedometer drive cable.

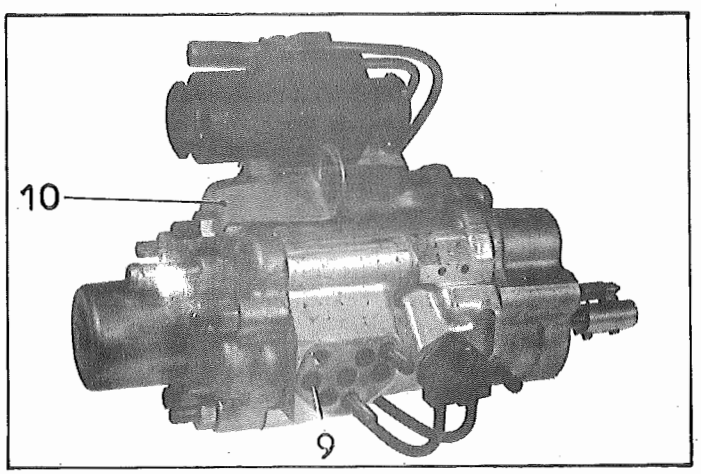
Fit the speedometer surround (3) (five Phillips-head screws).

10. Fit the cover (2) over the steering column.

Fit the finisher (1) to the facia board (2 Phillips-head screws).

11. Connect the cables to the battery terminals.





REPLACEMENT OF A HYDRAULIC GEAR SELECTOR.

Removal.

12. Remove the cover from the change speed control on the facia board and free the surround from the speedometer (see paras. 2 and 3 this Op.).

13. Release the pressure in all the circuits (see Op. DX.00).

14. Remove the left-hand front suspension sphere (1).
Remove the coil (2), disconnect the lead from the switch and loosen the two securing screws.

15. Disconnect from the hydraulic gear selector the following:
- the pressure feedpipe,
- the screwed union (3),
- the flange - remove the seal-plate,
- the securing clip,
- the connecting pipe (5) between centrifugal regulator and hydraulic gear selector,
- the connecting pipe (6) between hydraulic gear selector and clutch lock,
- the rubber pipe (7) from the hydraulic gear selector to the 4-way union,
- the pipe assembly from the selector to the gearbox, remove the seal-plate,
- the Rilsan overflow pipe.

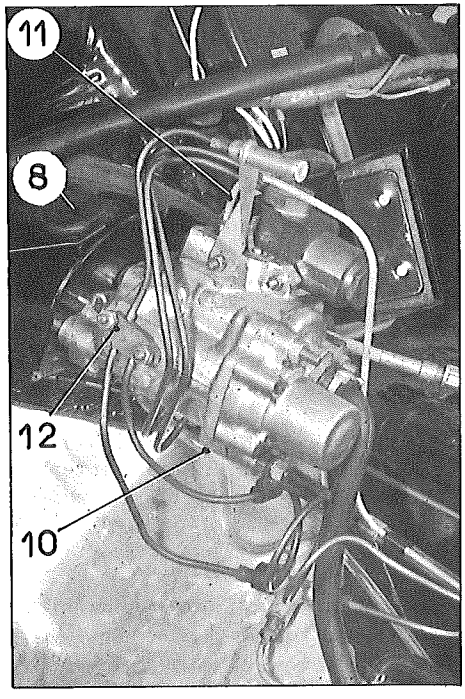
16. Free the speedometer cable from the clip (10) on the hydraulic gear selector after having disconnected the two parts of the cable.

17. Remove the rubber plug (8) from the steering tunnel and loosen the front screw connecting the change speed lever to the slide valve of the hydraulic gear selector (hydraulic gear selector side).

18. Loosen the clamp screw securing the manual clutch control rod.

19. Remove the two nuts from the studs securing the hydraulic gear selector to the mechanical selector assembly (spanner 2431-T).

20. Free the hydraulic gear selector.



Assembly.

21. Put the slide valve in the first speed position. To do this pull and turn the sliding valve until the hole in the valve is in line with that in the rear cap on the hydraulic gear selector. Insert the control rod (2429-T). It must penetrate approximately 30 mm. If it does not, turn the slide valve half a turn.

22. Put the gear selector lever in the first speed position.

23. Offer up the hydraulic gear selector taking care to pass the auxiliary clutch control rod through the hole in the selector flange, then in the trunnion of the auxiliary clutch control lever.

24. Fit the nuts on the studs securing the hydraulic gear selector to the selector lever assembly (spanner 2428-T).
Tighten the nuts.

25. Make sure that the lever is still in the first speed position, then tighten the screws on the coupling clamp.

26. Withdraw the alignment rod (2429-T) from the hydraulic gear selector.
Refit the rubber plug in the locating hole (8) and also the plug in the steering tunnel.

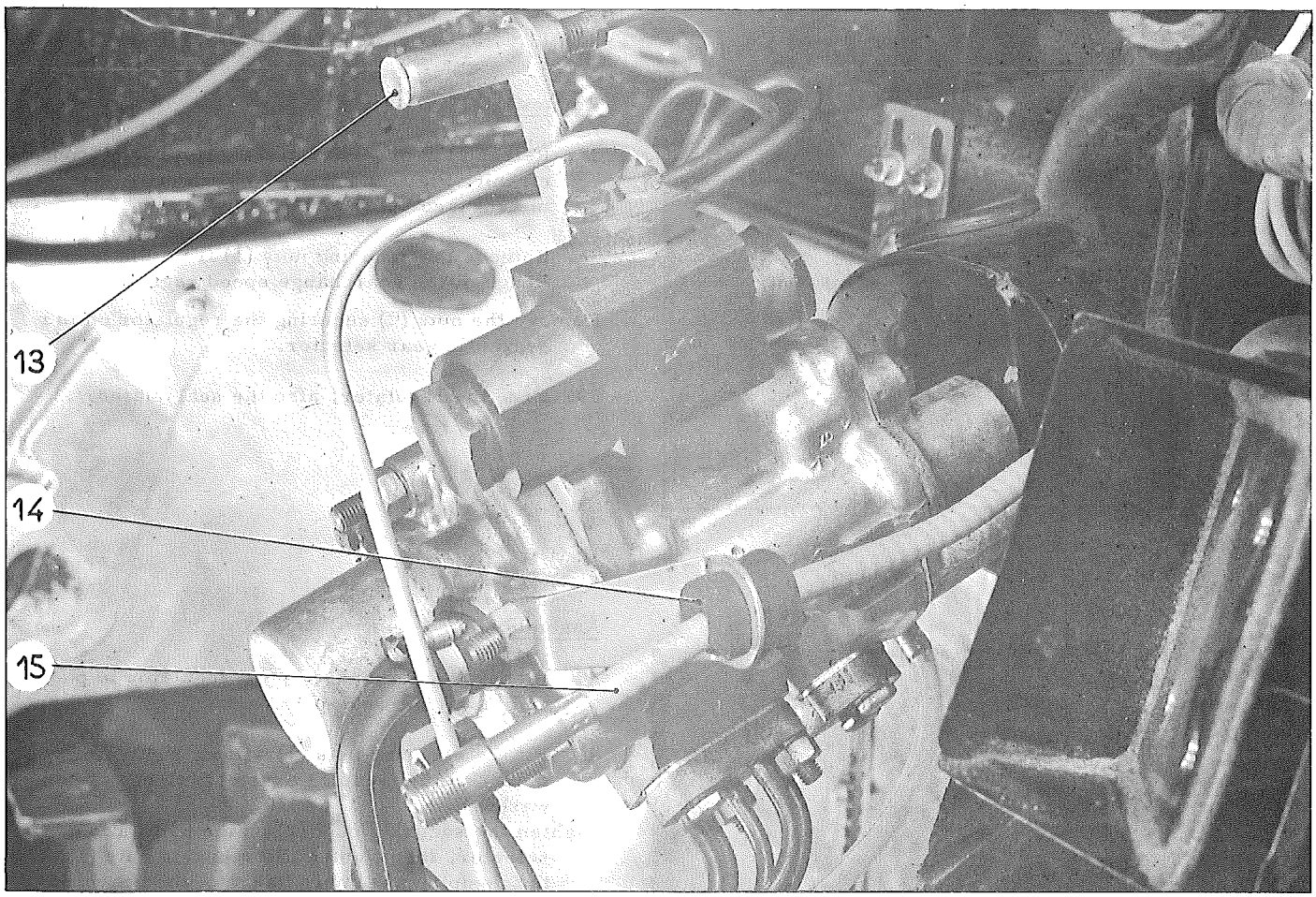
27. Push the auxiliary clutch control rod as far as possible towards the hydraulic gear selector and pull the lever towards the driver.
Then lock the screw of the trunnion.

28. Connect to the selector, the flange on the gear-box pipe assembly. Insert the seal-plate, making certain that the seals are in place (renew them after each removal).

29. Connect up the Rilsan overflow pipe (10).

30. Couple up the connecting pipe (11) between the gear selector and the clutch lock.

31. Couple up the feedpipe assembly (12) to the hydraulic gear selector.



Connect up the flange. Insert the seal-plate. Connect up:
- the screwed union
- the securing clip.

32. Couple up the connecting pipe between the centrifugal regulator (13) and the hydraulic gear selector.

33. Fit the rubber grommet (14) and the speedometer cable (15) on the hydraulic gear selector.

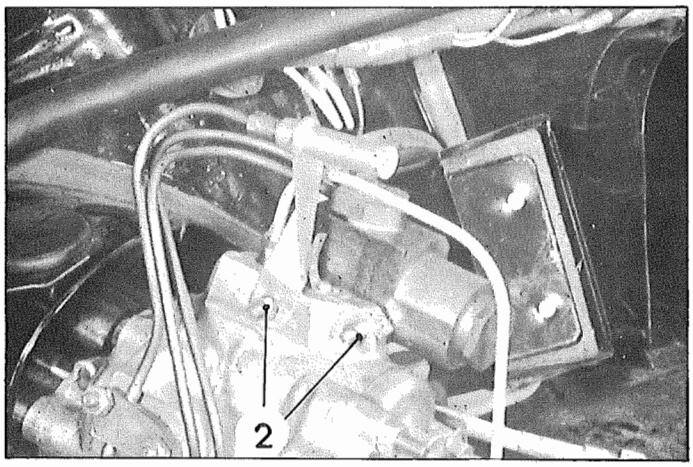
Assemble the two parts of the speedometer cable.

34. Fit the speedometer, the speedometer surround and the cover for the change speed control on the facia board (see paras. 9 and 10 this Op.).

35. Start up the engine. Let it idle for a few minutes, then tighten the bleed screw on the pressure regulator. Put the manual height control lever in "normal" position. Check all unions for leaks. Change into each gear in succession in order to check the sealing of the flanges.

36. Bleed the hydraulic gear selector. (See Op. DX.334-0).

REPLACING A GEAR CHANGE SPEED REGULATOR.



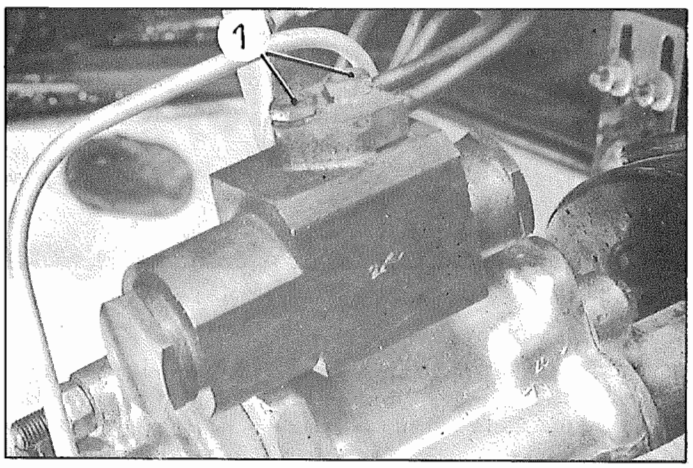
Removal.

37. Release the pressure in the gear change controls circuit. Place the manual clutch control lever in "engaged" position.

38. Remove the securing nuts (1) from the feed flange of the gearchange speed regulator.

Remove the nuts (2) securing the regulator on the hydraulic gear selector.

39. Free the regulator, also the seal-plates.



Assembly.

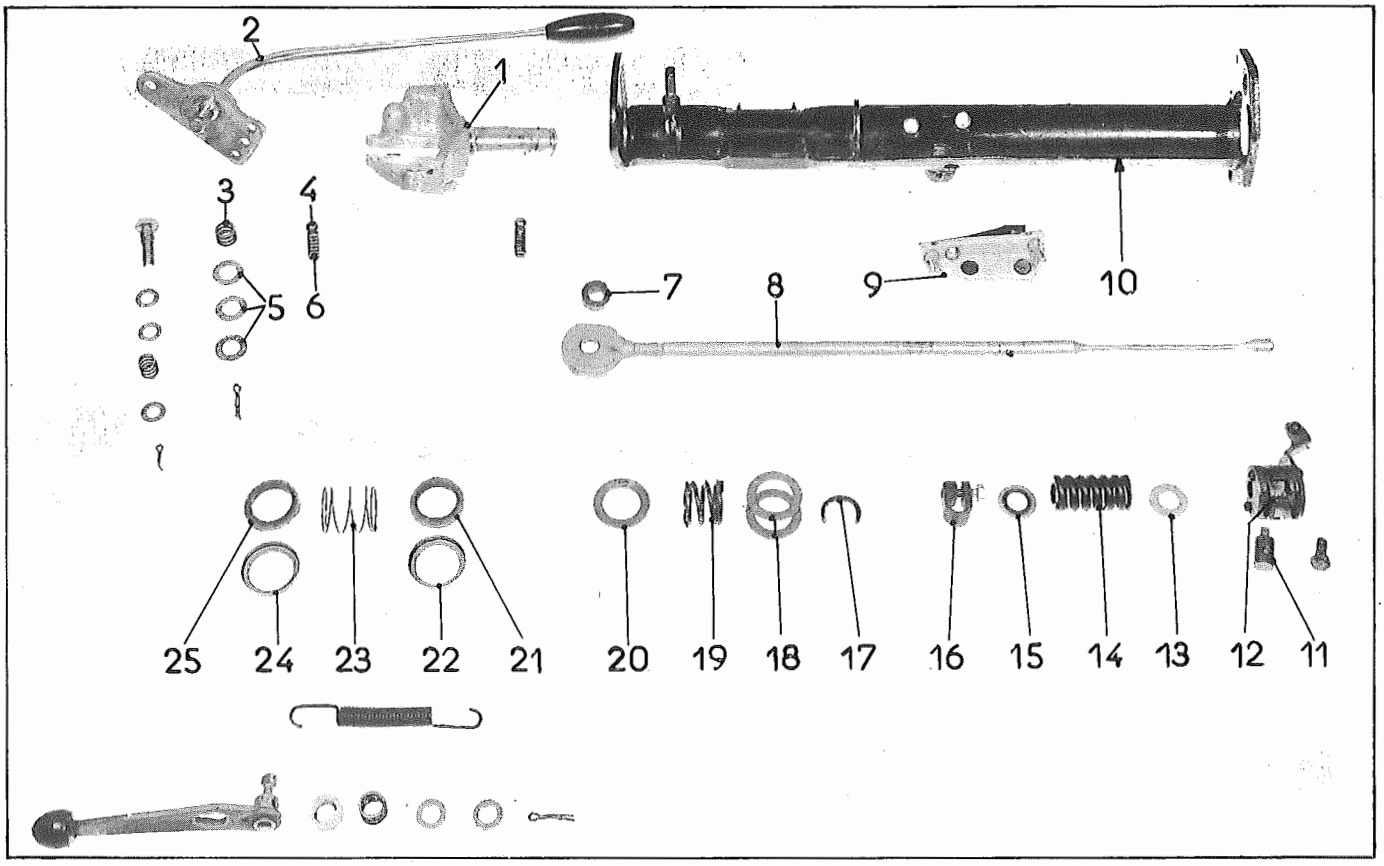
40. Place the gearchange speed regulator in position and insert the seal-plate.

41. Fit the securing nuts (1) without tightening them, on the feedpipe assembly flange (spring washer).

Tighten the securing nuts (2) on the hydraulic gear selector, then tighten the securing nuts (1) on the feedpipe assembly flange of the gearchange speed regulator.

42. Bleed the gearchange control circuit (see Op. DX.334-0).

OVERHAULING A MECHANICAL GEAR SELECTOR ASSEMBLY



518.Add.1.

Dismantling.

1. Remove the auxiliary manual clutch control lever (37):
   - unhook the return spring (41),
   - remove the pin, the thrust washer (40), the spring (39), the thrust washer (38). Free the lever (37) and remove the washer.

2. Remove the pin (17) holding the selector gate in position.
   Loosen the screw (21) holding the selector gate.
   Unscrew the screw of the operating rod stop clamp (27).

3. Remove the fulcrum pin (4) from the positioning sector:
   - Remove the pin, the thrust washers (7), the spring (6), and the thrust washer (5).

   Unscrew the fulcrum pin (4). This pin is screwed into the housing (1).

.8/W/27

4. Free the assembly of lever (2) locking sector (3) and control rod (15). Free the selector gate (23), the thrust washer (24), the spring (25), the thrust washer (26) and the stop clamp (27) from the operating rod.

NOTE: Do not lose the first and second speed locating ball (11) and its spring (10).

5. Disconnect the housing (1) from the steel support (20).
   Disengage the locking circlip (28), the washers (29), the spring (30), the thrust washer (31) and free the housing from the support. Do not lose the ball (12) and the spring (13).

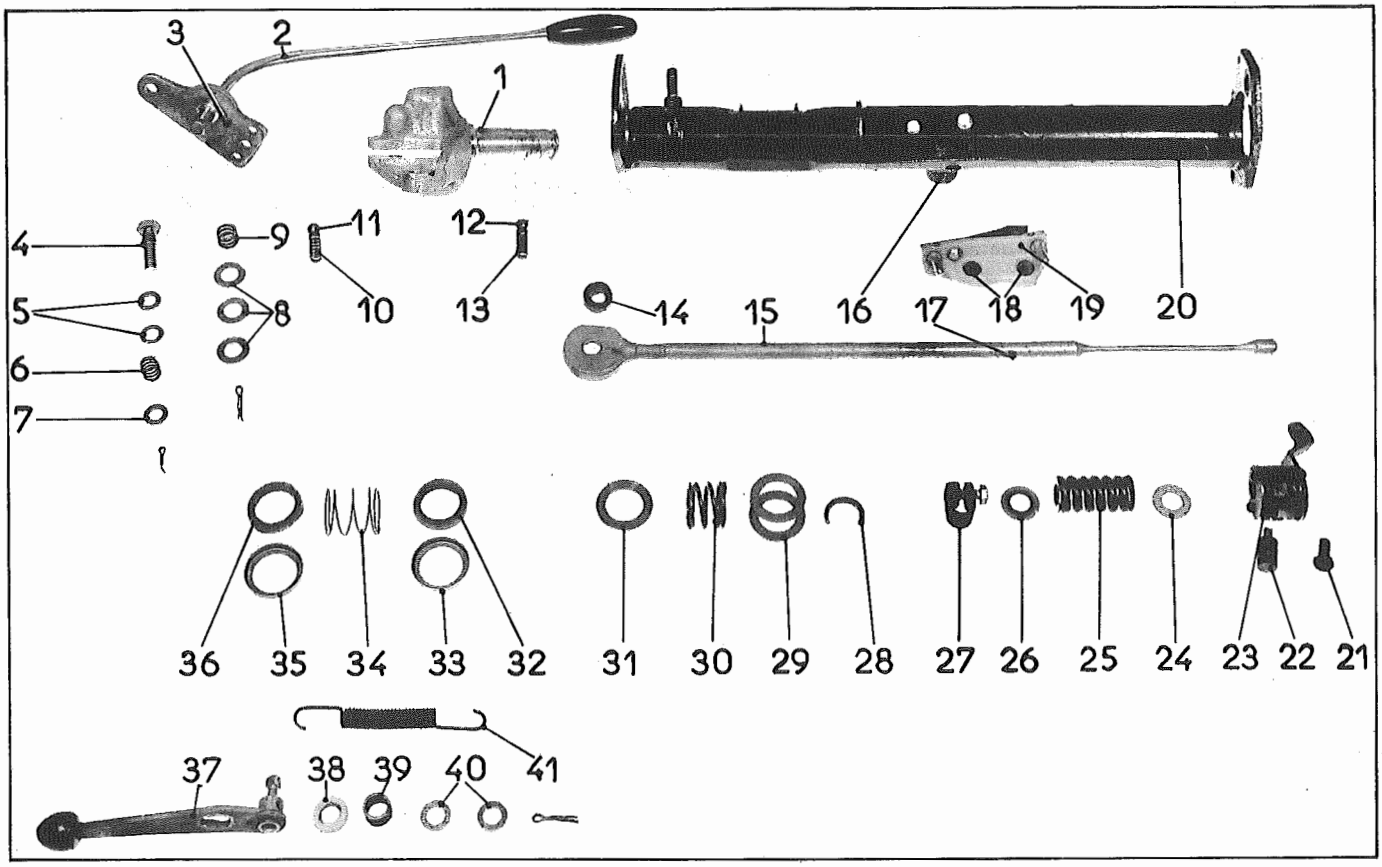
6. Free the housing (1), the felt washer (32) and the cup (33), the spring (34) the felt washer (36) and the cup (35).

7. Drive out the rivet (16) and free the selector gate guide peg (22).

8. Using a 7.5 mm diameter drill, remove the peening from the rivets (18) holding the starter switch (19) and remove the switch.

9. Remove the pin, the washer (8), the spring (9). Remove the operating rod (15) from the lever (2) and remove the felt washer (14) from the yoke of the operating rod.

10. Clean all the parts.



Assembly.

NOTE: When refitting, all joints and moving parts must be greased.
(ANTAR Cardex EP grease only).

11. Connect the operating rod (8) to the lever (2).
   a) Put the felt joint (7), previously soaked in engine oil, in the recess in the yoke of the operating rod.
   b) Put the lever in position in the operating rod eye, fit the spring (3), a washer (5) and then pin. When assembled, the coils of the spring should be touching and should have an end-float of between 0 and 0.2 mm. If not, modify the thickness of the washers in order to obtain this clearance.

12. Fit the starter switch (9) and rivet it to the steel support, (10).

13. Put the selector guide tongue (11) in position in the gate, the flat positioned away from the switch.

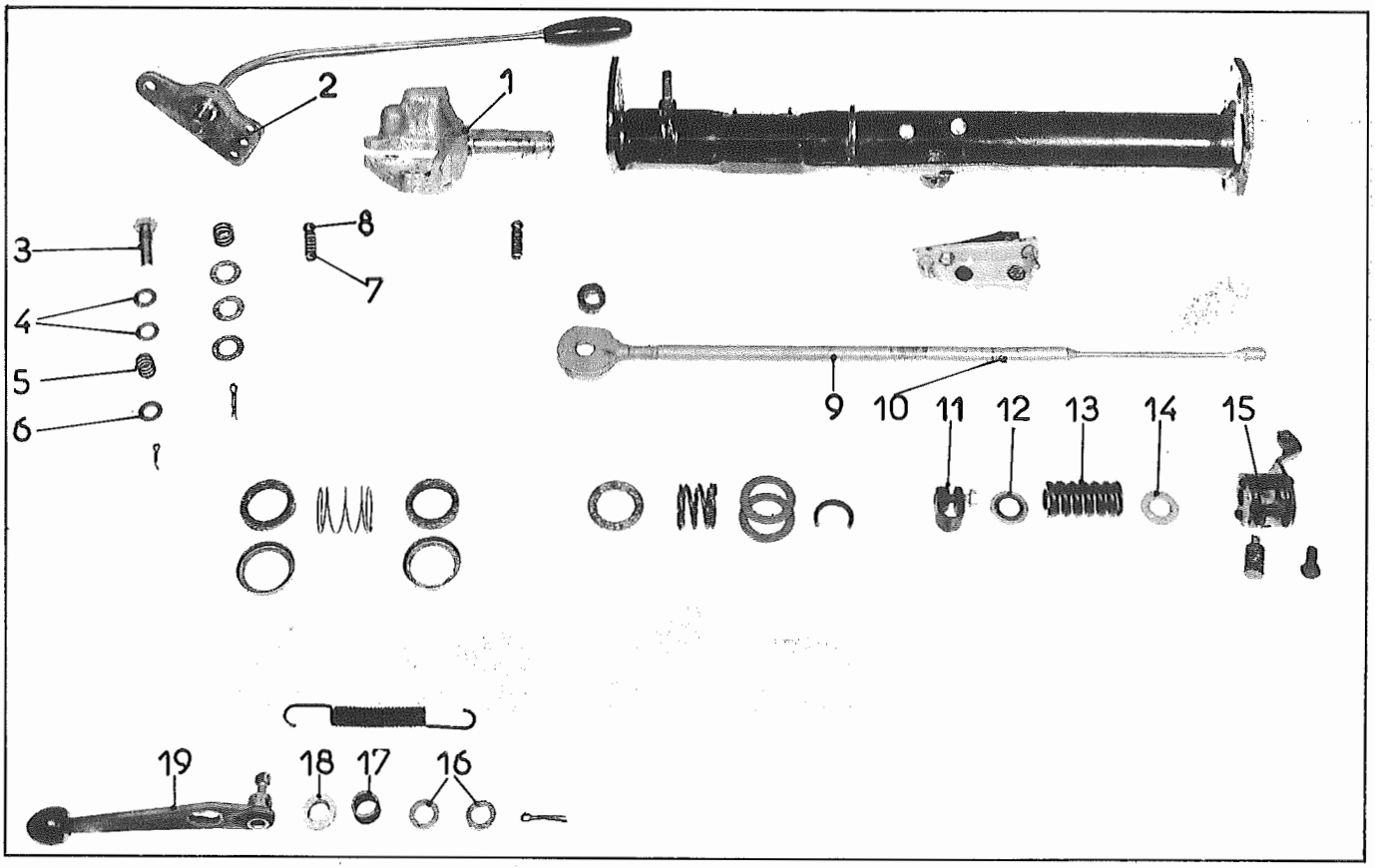
14. Engage the aluminium housing (1) in the steel support (10). Put the felt washer (25) in position, (previously soaked in engine oil), the cup (24), the spring (23), the cup (22) and the felt washer (21) also previously soaked in engine oil.

15. Fit the thrust washer (20), the spring (19), the washers (18) and the circlip (17). When assembled, the joint of the spring should be touching with a maximum end-float of between 0 and 0.2 mm. If not, add a second washer of suitable thickness to obtain this clearance.

16. Pass the operating rod (8) through the housing (1).
Fit the clamp (16), the thrust washer (15), the spring (14) and the thrust washer (13).

17. Fit the selector gate (12), with the guide finger (11) engaged in the gate.

18. Fit the spring (6) and the locking ball (4) for first and second speed in the housing (1).



19. Engage the locking sector (2) in the housing (1) and screw in the fulcrum pin (3). Fit the thrust washer (4), the spring (5), the washer or washers (6) and then pin. With the parts assembled, the coils of the spring should be touching with an end-float of between 0 and 0.2 mm. If not, modify the thickness of the washers to obtain this clearance.

20. Fit in place the spring (7) and the locking ball (8) in the housing.

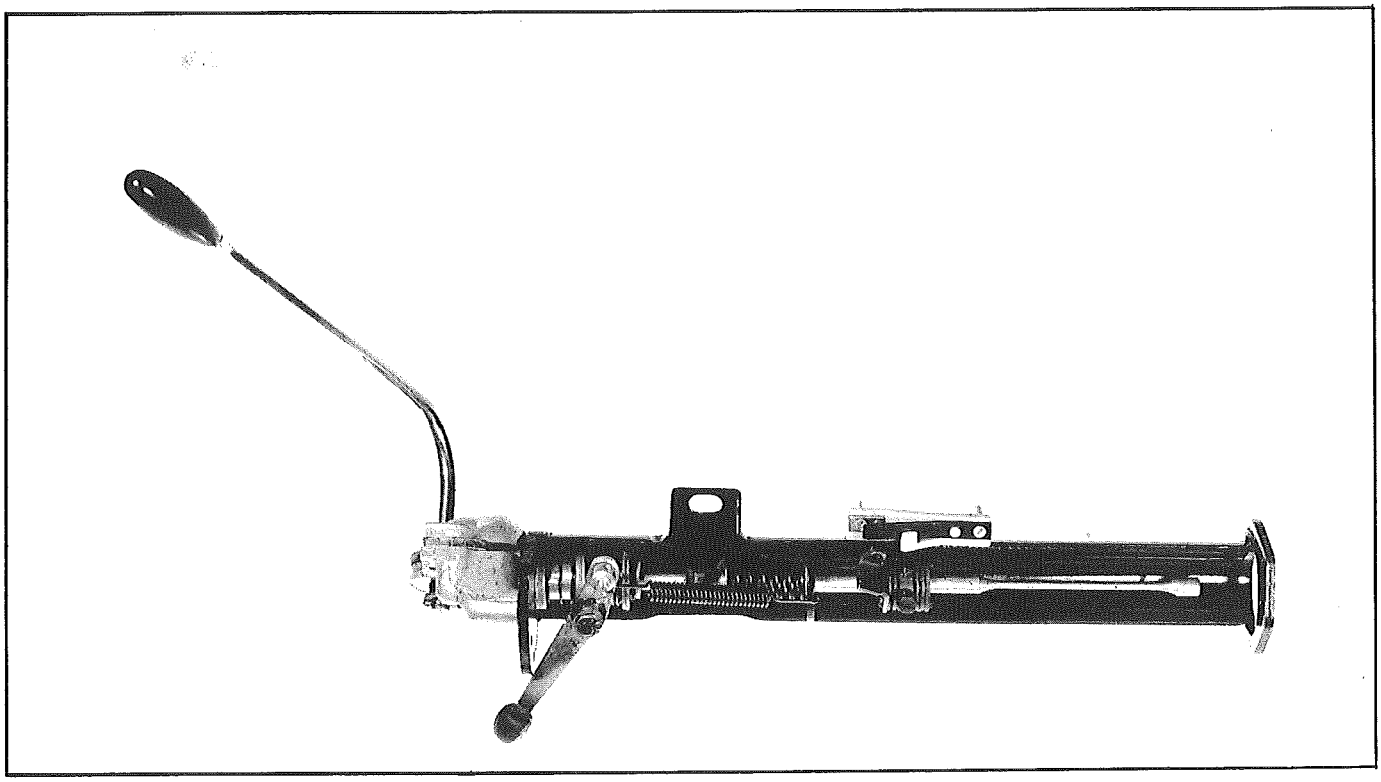
21. Adjust the selector gate.
    a) Place the lever and the gate (15) in the 4th speed position.
    Tighten the securing screw.
    b) Make sure that the gate slides the full distance ón the guide tongue, without any hard spots.
    c) Put the lever in the 1st speed position.
    Using a 2 mm diameter drill, drill through the gate (15) and the operating rod (9).

22. Fit the pin (10) and rivet the ends.

NOTE: Replacement of the gate (15) necessitates the replacement of the rod (9).

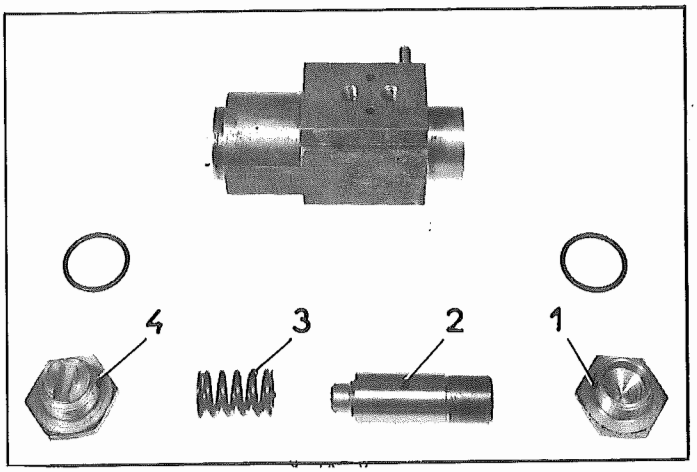
23. Adjust the resistance of the reverse speed spring.
    a) Put the lever in the 1st speed position (the locking ball pin being in position in the corresponding hole in the sector).
    b) Bring the clamp (11) in contact with the assembly of washer (12), spring (13), thrust washer (14), with the spring having practically no end-float or compression. Tighten the securing screw on the clamp.
    c) Make sure that the lever can locate correctly in the reverse speed position.

24. Fit the auxiliary manual clutch control lever.
    a) Place in the order given the following parts on the spindle: the stop washer, the lever (19), the thrust washer (18), the spring (17), the thrust washer (16) and the pin.
    b) After assembly, the lever must have a clearance of between 0 and 0.2 mm. If not, modify the thickness of the washers (16) to obtain this clearance.



c) Fit the lever return spring in position.

d) Fit the double clamp on the end of the operating rod.



OVERHAULING A GEAR-CHANGE SPEED REGULATOR.

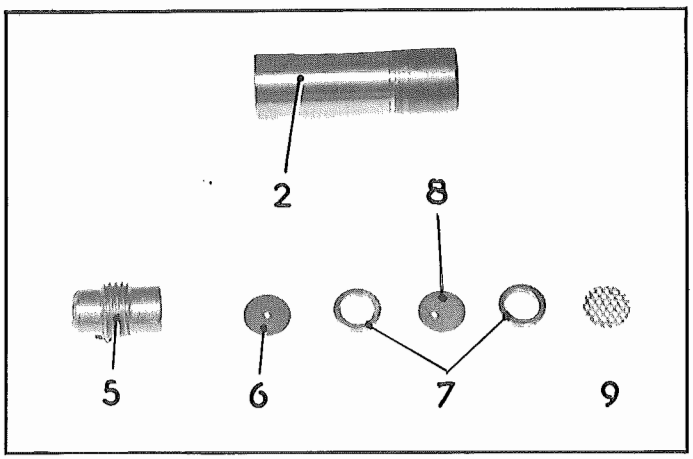
Dismantling.

25. Remove the plugs (1) and (4).
Free the piston (2) and the spring (3).

NOTE: It is essential not to alter the spring adjusting screw, otherwise the flow through the change speed regulator will be altered.

26. Remove the plug (5) from the piston (2).
Disengage the disc restrictors (6 and 8), the distance pieces (7) and the filter (9).

27. Clean the parts with alcohol to the exclusion of all other products.



Assembly.

28. Preparing the piston.

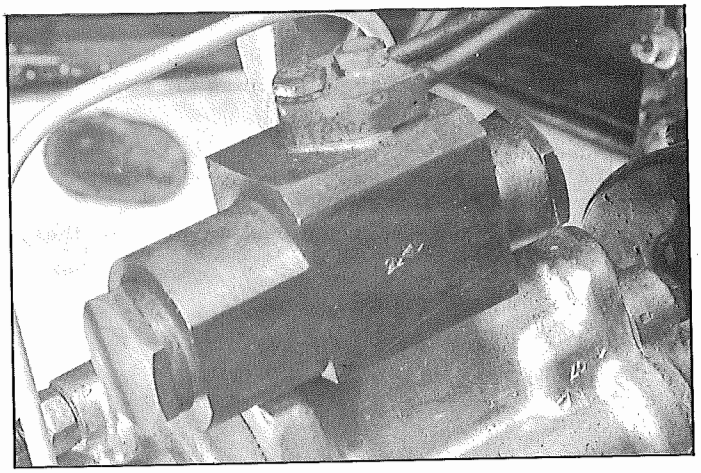
Fit the parts in the following order:
- 1 filter (9),
- 1 distance piece (7),
- 1 disc with central hole (6),
- 1 distance piece (7),
- 1 disc with offset hole (8), and so on alternately.

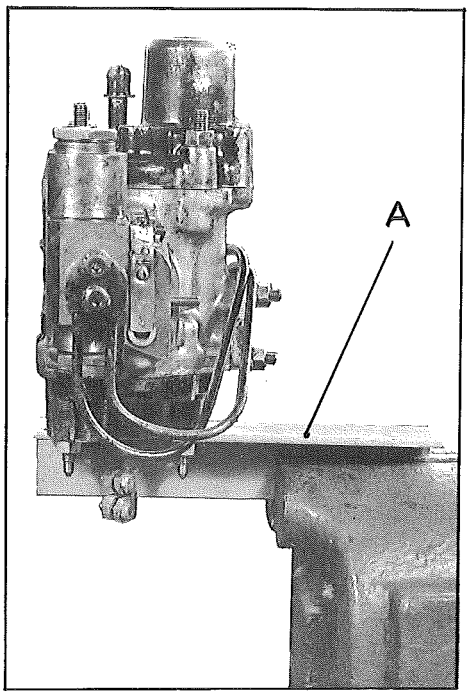
There are in the piston the following:
- 15 distance pieces (7),
- 7 discs with central holes (6),
- 7 discs with offset holes (8).

Tighten the screw (5).

29. Put the spring (3) in the body of the change speed control.
Fit the piston (2) in position, smear with hydraulic fluid, engaging the plug in the spring.

30. Place a ring seal on each plug.
Fit the plugs in the same positions as they occupied before dismantling.
(The plug (1) must enter by hand. If it does not the spring is out of place).





OVERHAULING A HYDRAULIC GEAR SELECTOR.

NOTE: In case of difficult gear engagement, before removing the hydraulic gear selector, carry out the following checks:

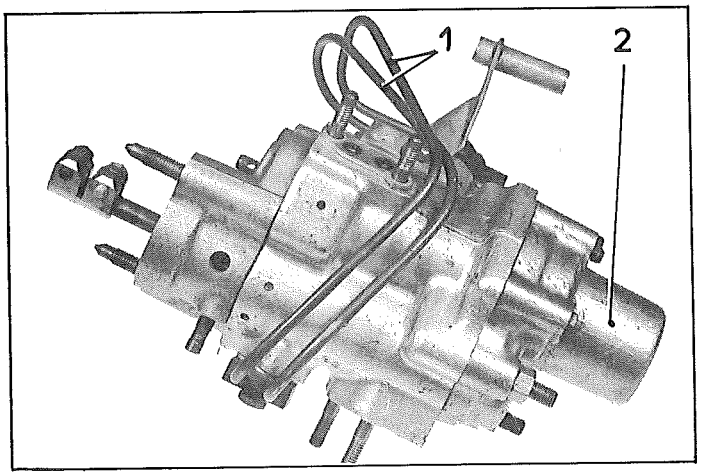
a) Make sure that the engine adjustments are correct:
- Adjust the slow running (Op. DX.142-0).
- Adjust the clutch clearance (Op. DX.314-0).
- Adjust the clutch drag (Op. DX.314-0).
- Adjust the clutch re-engagement control (Op. DX.314-0).

b) Make sure that the hydraulic gear selector and the gear change speed lever assembly are correctly aligned (Op. DX.334-1).

c) If second gear will not engage (by moving from 1st and 2nd gear), and if 2nd gear engages by lightly pressing on the lever towards the 1st gear position, it is necessary to check the gear selector.

d) Make sure that the pressure distribution is correct for each gear.
Raise the front of the car. With the engine running at about 925 rpm, engage each gear. The clutch fork should move after each change. If it does not it is necessary to repair the hydraulic gear selector.

518.Add.1.



Dismantling.

31. Secure the hydraulic gear selector in a vice, gripping the rear cover. (Stand MR.3053-200) (A).

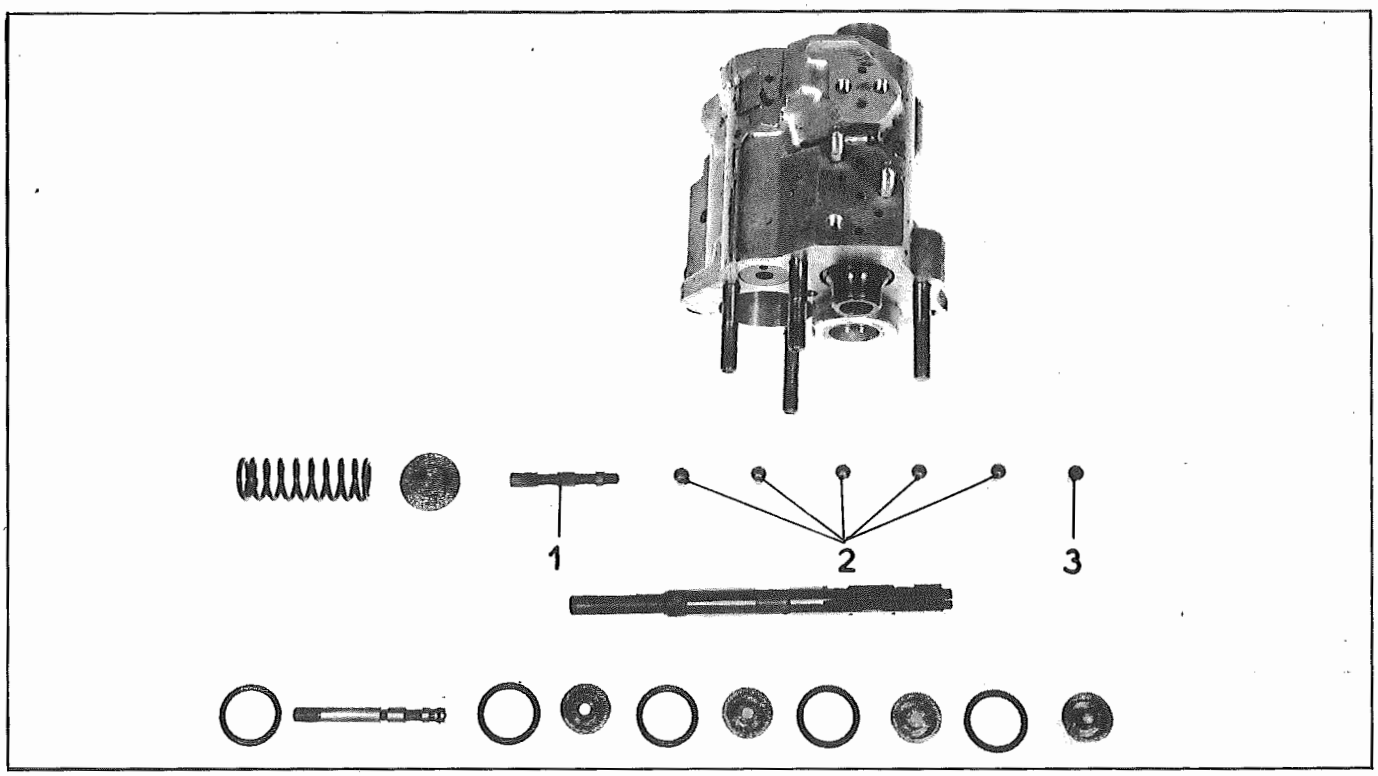
32. Remove the gearchange speed-regulator with its pipe assembly (1) and seal-plates.

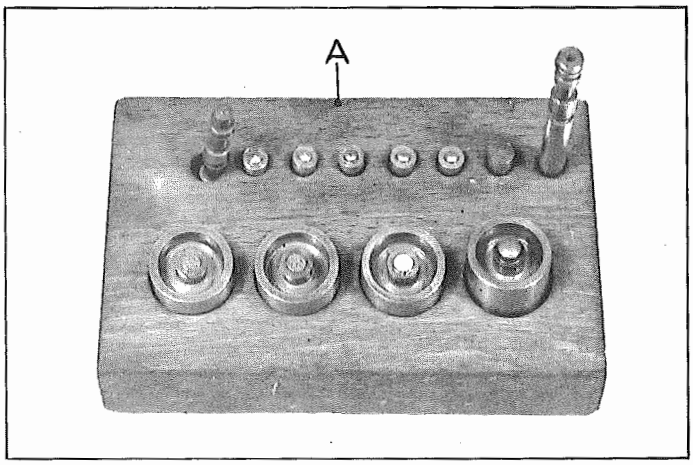
33. Remove the front cover (2).

Unscrew the nut and screws in turn by 1 flat each at a time to avoid jamming the cover sideways.

Remove the cover:
- the return springs for the synchro delay pistons,
- the upper and lower thrust washers for the springs.

Remove the gasket from the cover.



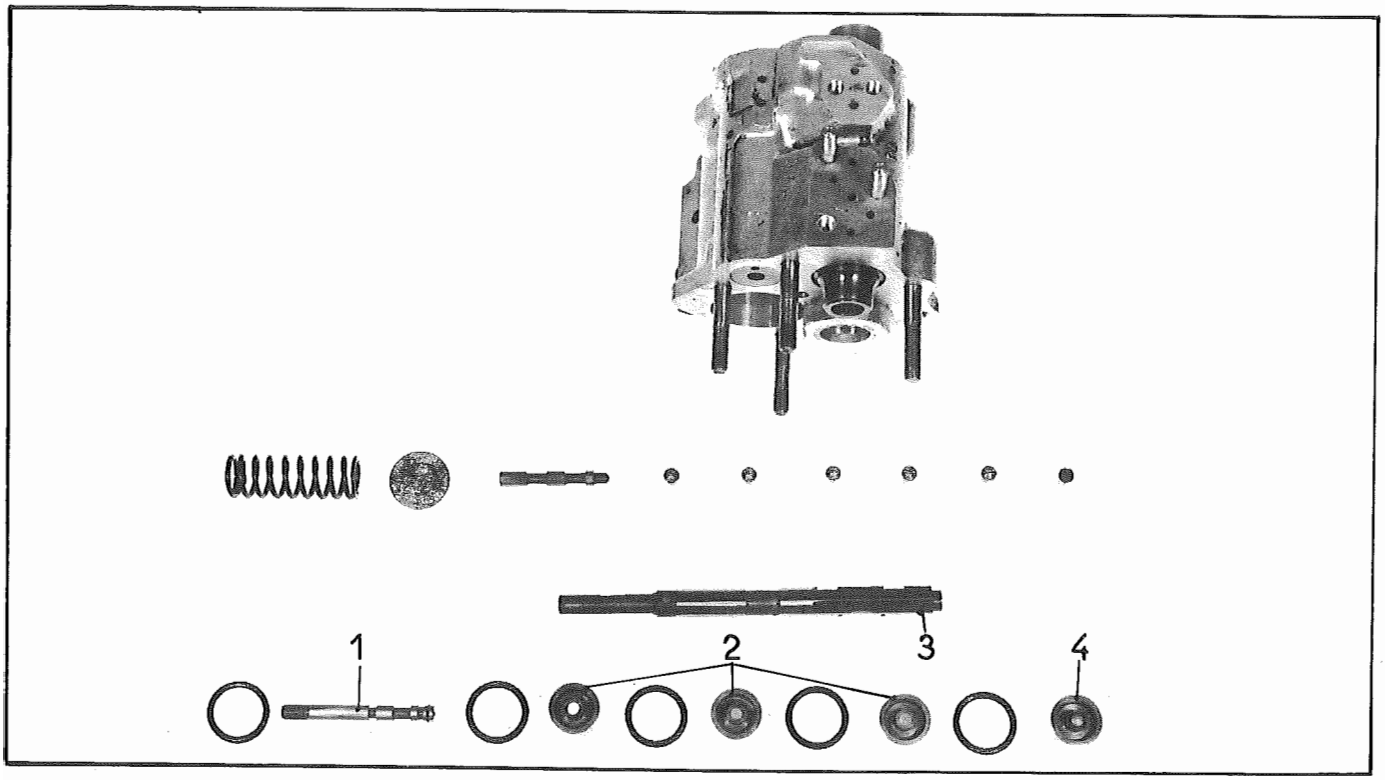


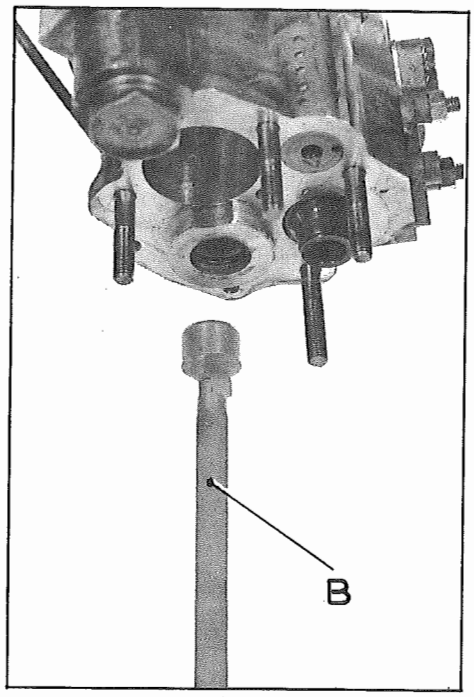
34. Remove the selector slide valve (3).

35. Free the synchro delay piston (4) for 3rd speed, and its seal.
Withdraw the other synchronising pistons (2) by pushing them with the auxiliary clutch control slide valve, then with a brass drift.
Place the pistons in order in a rack (A) (MR. 3053-210) immediately after dismantling.

36. Remove the auxiliary manual clutch control slide valve (1).

37. Clean the bores of the hydraulic gear selector with alcohol and blow out with compressed air.





38. Check the diameter of the bore, between the end of the selector and the 1st groove (plug gauge (B) 2277-T).
Check the diameter in several positions.
If the "no go" end can be inserted or if there are deep scratches in the bore, the selector is unusable.

39. Remove the ring seals from the grooves round the synchro delay pistons. Use a brass wire hook.

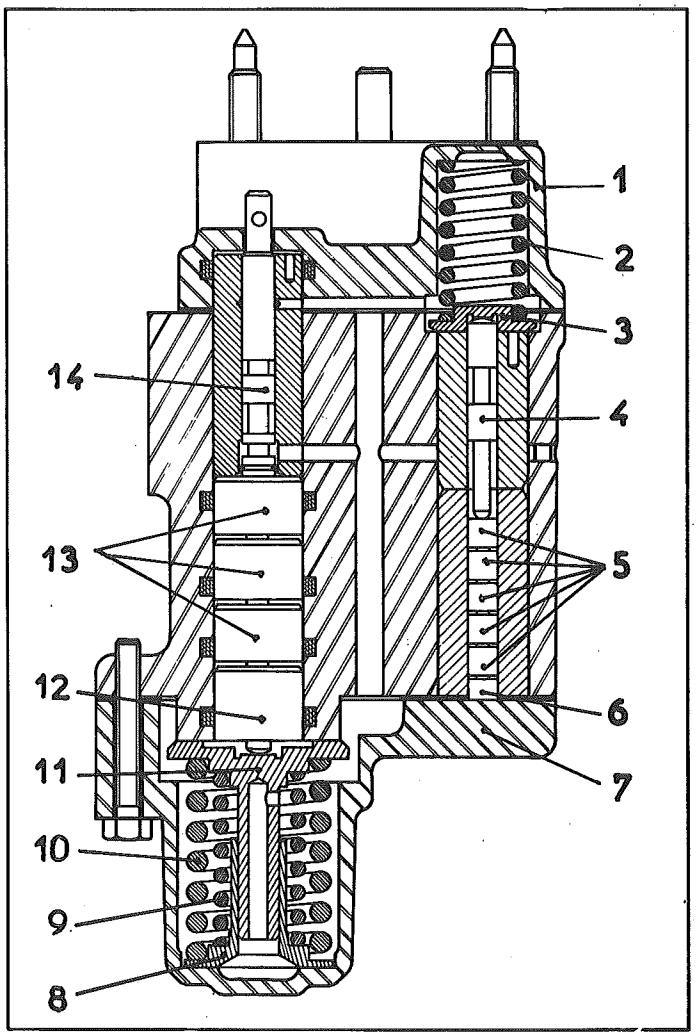
NOTE: Be careful not to scratch the bore or damage the groove, the corners of which must be sharp.

40. Remove the unit from the stand.

41. Remove the rear cover: remove the screws and studs then remove the cover.

42. Remove the automatic gear control pistons (1) by tapping on the automatic gearchange slide valve with a brass drift, until the plug (3) is freed.
Continue to free the pistons (2), one by one and place them in the rack in their order of disassembly.
Remove the automatic gear change slide valve (1).

43. Clean all parts with alcohol and blow with compressed air.



Assembly.

NOTE: All the parts should be dipped in special hydraulic fluid before assembly.

44. Hold the unit in a vice, (using bracket MR.3053-200), fixed to the front end face.

45. Fit the auxiliary manual clutch control slide-valve (14) via the front face of the unit.

46. Fit the automatic clutch control slide-valve (4) the ground portion towards the rear.
Fit the thrust washer (3) and the spring (2) over the valve.

47. Fit the gasket, smeared with hydraulic fluid, to the rear cover. Then fit the cover (1).
Fit the studs and screws by hand and tighten them.

48. Turn the unit over and fix to the support by the studs.

49. Fit the automatic gear control pistons (5) in the same order as before dismantling; the pip of each piston should be positioned towards the front.
Fit the plug (6).

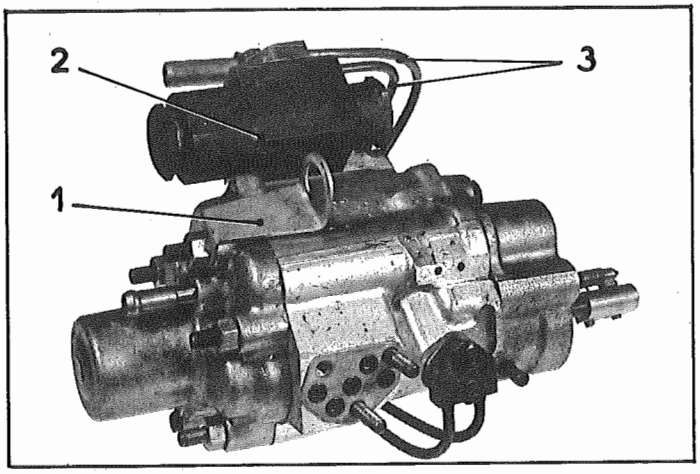
50. Fit the ring seal for the first synchro delay piston (13) then fit the piston in position. Carry out the same operation for the three other pistons (12 and 13) reversing the order of dismantling.
Assemble the cups (11) and (8) and the springs (9) and (10) for the synchro delay pistons.

Check that the guide cups of the synchro delay pistons slide freely; if there are any "hard" spots, lightly rub the stem of the upper cup (11) with no. 600 abrasive paper, after which clean very thoroughly with alcohol and blow with compressed air.

On the piston (12) place the assembly of the upper cup (11), springs (9 and 10), lower cup (8), with the hole located so it will be towards the bottom when assembled on the car.

51. Engage the gear selector slide-valve.
Fit the gasket, previously smeared with hydraulic fluid.

52. Fit the front cover (7).

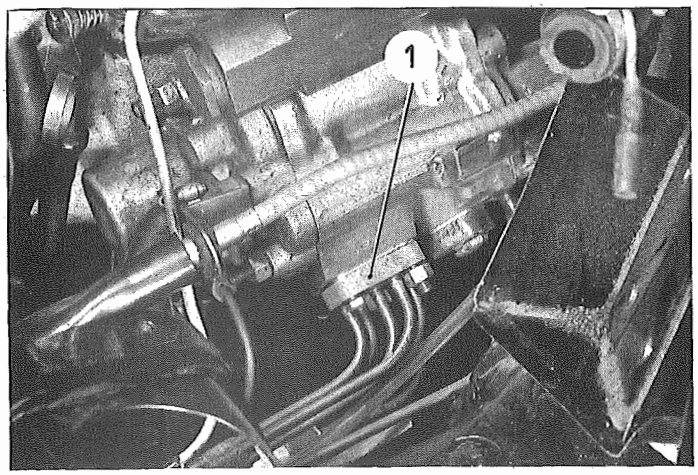


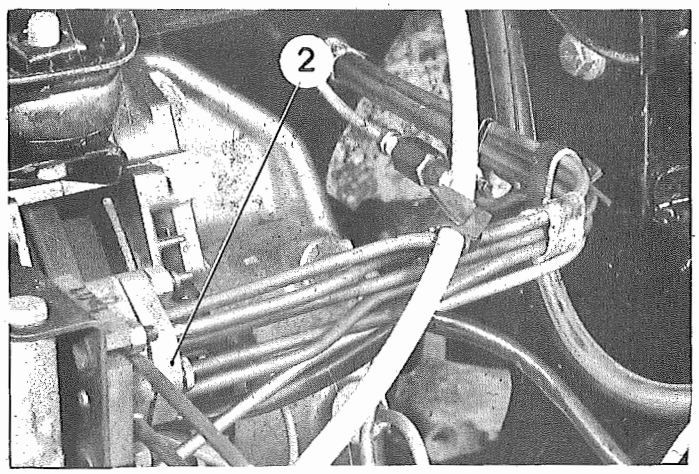
Tighten the screws and nuts progressively.

53. Fit the gearchange speed regulator (2) and pipe assembly (3). Insert a seal-plate with new ring seals (plate thickness 1.6 mm). Tighten the nuts.

54. Fit the securing clip (1) for the speedometer cable.

53. Remove the unit from the bracket.





REPLACEMENT OF A GEARCHANGE PIPE ASSEMBLY (5 pipes).

REMOVAL.

1. Remove the spare wheel, the spare wheel crossmember with the radiator air duct.
   Remove the front left-hand suspension sphere (LHD cars).
   Release the pressure (see Op. DX.00).

2. Remove :
   - the ignition coil, (for LHD cars),
   - the steering wheel and column (see Op. DX.441-1).

3. Disconnect :
   - the pipe assembly (1) from the hydraulic gear selector,
   - the pipe assembly (2) from the gearbox, remove the seal plates.

4. Separate the pipe assembly from the clutch lock control.
   Withdraw the pipe assembly from the front of the car.

ASSEMBLY.

5. Insert the pipe assembly from the front of the car, passing it under the handbrake cable.

6. Connect up :
   - the pipe assembly (1) to the hydraulic gear control,
   - the pipe assembly (2) to the gearbox.

   Insert the seal plates fitted with new ring seals.

7. Strap the pipe assembly to the clutch lock control tube, using adhesive tape every 20 cm. (8").

8. Fit the steering wheel and column (see Op. DX.441-1).

9. Fit the ignition coil (LHD cars).

10. Fit the front left-hand suspension sphere (LHD cars).

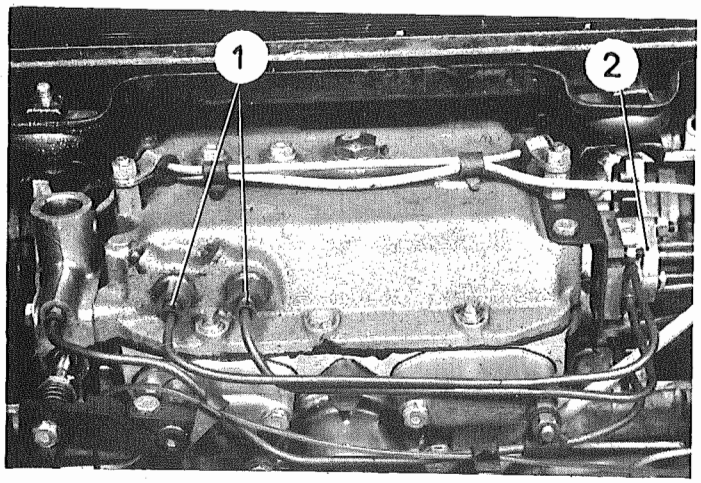
    Put the system under pressure.

    Check all unions for leaks and check the gear change mechanism.

11. Fit the radiator air duct with the spare wheel support.

    Fit the spare wheel.

REPLACING A FRONT PIPE ASSEMBLY ON THE GEARBOX COVER.



REMOVAL.

12. Remove the spare wheel, the spare wheel crossmember with the radiator air duct. Release the pressure (see Op. DX.00).

13. Disconnect :

    - the control pipe assembly (5 tubes) (2).

    Remove the seal plates.

    - the pipes (1) from the gearbox control cylinders.

    Free the pipe assembly, also the seal plate.

ASSEMBLY.

14. Place the pipe assembly in position, engage it on the two studs, insert the seal plates with new ring seals.

15. Connect up :

    - the pipes (1) to the gear control cylinders,
    - the control pipe assembly (5 pipes) (2), inserting the seal plates with new ring seals.

16. Put the circuits under pressure.

    Check that the gear change operates correctly.

17. Fit the radiator air duct with the spare wheel crossmember.

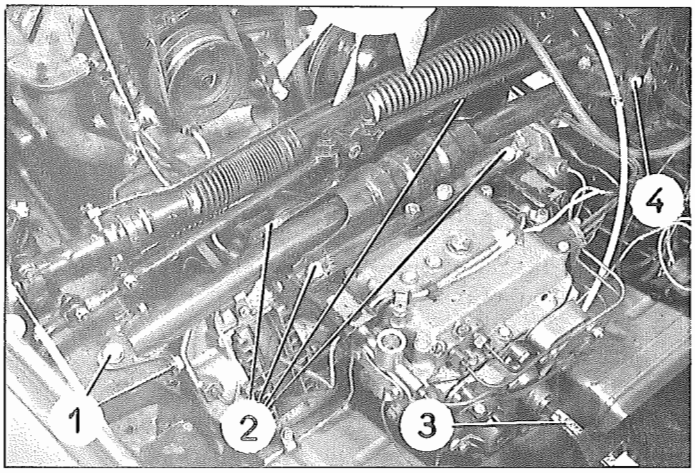
    Fit the spare wheel.

REPLACEMENT OF A REAR PIPE ASSEMBLY ON THE GEARBOX COVER.

REMOVAL.

18. Remove the spare wheel, the spare wheel crossmember and the radiator air duct.

    - the battery and the battery tray.



19. Drain and remove the radiator (save any water containing anti-freeze).

    Support the engine-gearbox assembly by the sling hook bracket, using a workshop crane.

    If the wings have been removed, it is possible to use engine support 1797-T provided for the DS 19.

    Release the pressure (see Op. DX.00).

20. Remove the front crossmember supporting the gearbox.

    Remove :

    - the screws (1) - 2 and 4)) securing the cross-member.

    Release the crossmember.

NOTE: Do not lose the packing pieces found between the crossmember and body sidemembers.

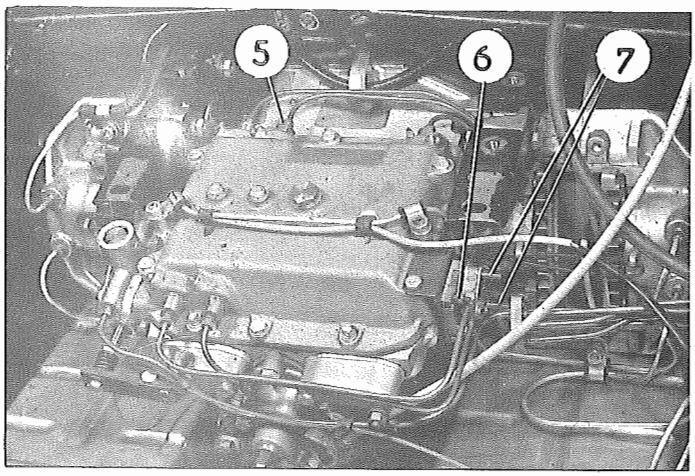
21. Disconnect the control pipe assembly (5 pipes).

    Remove the two studs (7) holding the pipe assemblies.

    Loosen the nuts securing the rear pipe assembly flange (6).

    Disconnect the pipe assembly from the gearbox rear cylinders (5).

    Free the pipe assembly.



ASSEMBLY.

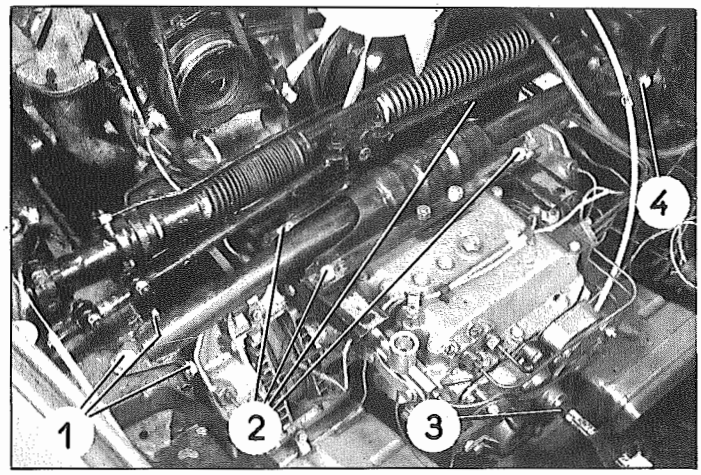
22. Offer up the pipe assembly.

    Couple up the pipe assembly to the gearbox rear cylinders (5).

    Tighten the nuts (6) securing the rear pipe assembly flange.

    Fit the studs (7).

    Couple up the pipe assembly, inserting seal plates fitted with new ring seals.



23. Fit the front engine suspension crossmember.

    Place between the body sidemembers and the crossmember the packing pieces found there when dismantling.

    The distance between the brake disc and the sidemember, left-hand, must be greater by 80 ± 2 mm than this same distance measured on the right-hand side.

24. Fit the securing screws (1-2 and 4).

    Fit the radiator (see Op. DX.232-1).

    Fit the battery.

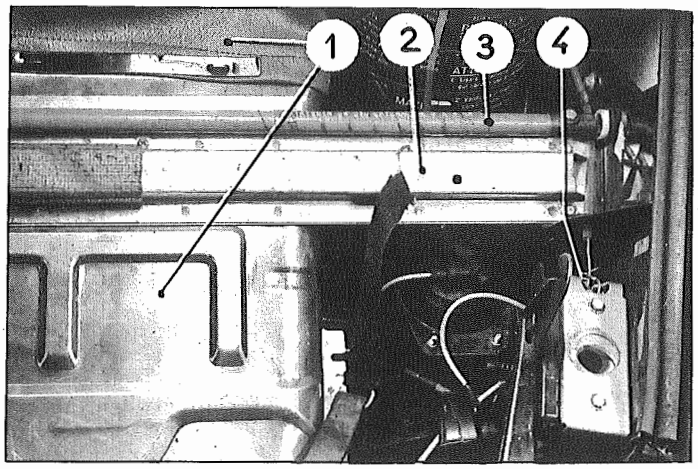
25. Put the circuits under pressure.

    Check all circuits for leaks.

    Check the gear change operation.

26. Fit the spare wheel crossmember and the radiator air duct.

    Fit the spare wheel.



REPLACING A CYLINDER PISTON ASSEMBLY FOR GEAR CHANGE CONTROL.

Dismantling.

27. Hold the bonnet open by means of catch MR.4158.

Remove:

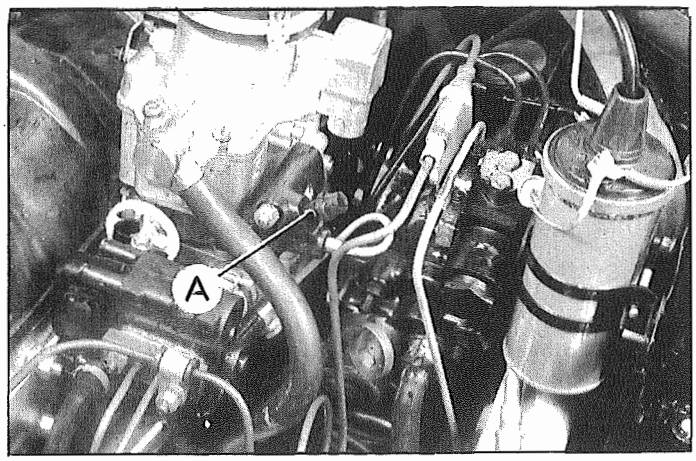
- the sparewheel,
- the headlamp beam level control (3),
- the crossmember assembly (2) for the spare-wheel support and the air cowl (1).

Disconnect the electrical cable assemblies.

Free the cables (4) for bonnet lock control.

Remove the wings. (This is not essential but makes the work easier).

28. Remove the battery and battery tray.



29. Release the pressure in the circuits.

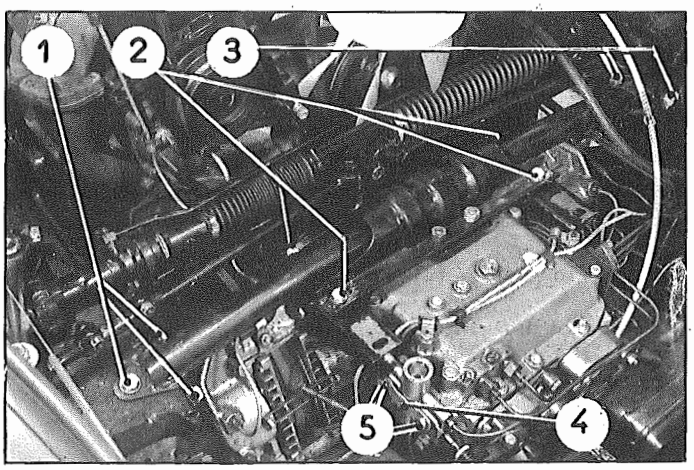
a) Unscrew the bleedscrew of the pressure regulator about 1 turn.

b) Move the manual height control to position "LOW".

c) Connect a flexible pipe on screw (A) to bleed the accelerated idling device, placing the other end of the pipe in the reservoir of the liquid. Press on the brake pedal and loosen the bleed screw (A).

30. Remove the radiator.

Save the water which contains anti-freeze.



31. Support the engine-gearbox assembly by means of a sling and a workshop crane.

Stand 1797-T, provided for the DS 19, may be used.

32. Remove the front crossmember support for the gearbox.

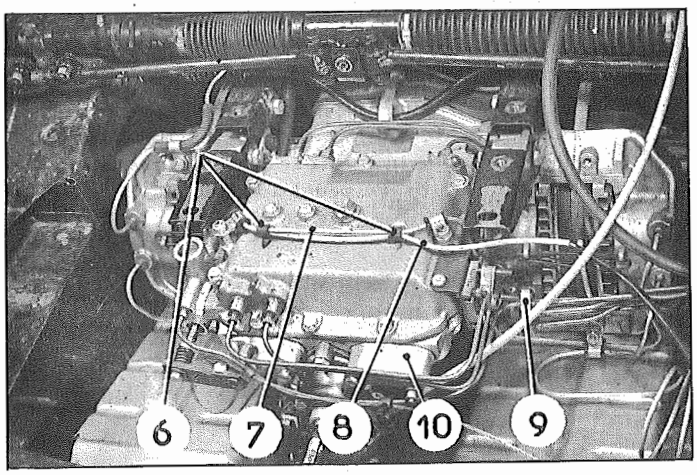
Remove the screws (1, 2, 3) securing the crossmember.

Free the crossmember.

NOTE: Do not lose the packing placed between the crossmember and the sidemember.

33. Disconnect the pipes from the clutch lock.

Loosen the screw securing the clutch lock control clamp and free this clamp from the first and second speed selector fork shaft.



34. Disconnect the five-tube pipe assembly (9).

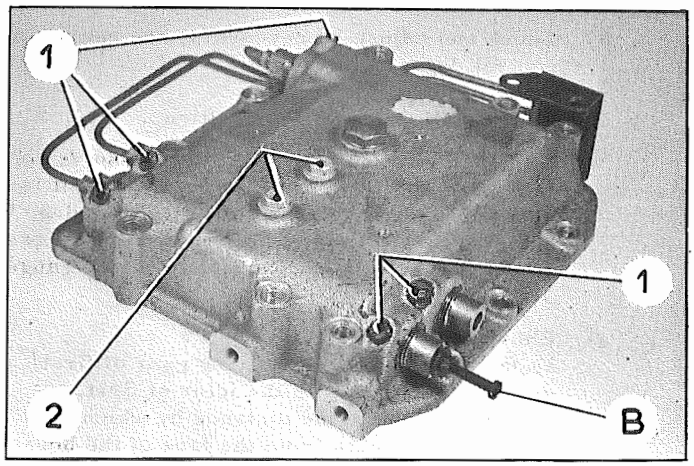
Disconnect the leads (8) for the brake pad wear tell-tale light.

Remove:

- the pipe (7) connecting the brake units,
- the rubber clips (6).

35. Remove the gearbox cover (spanner 1677-T for the screws with flat heads).

36. Remove the cover (10) over the end of reverse gear fork spindle and the cover over the end of 3rd and 4th gear selector fork shaft.



37. Stripping the cover.

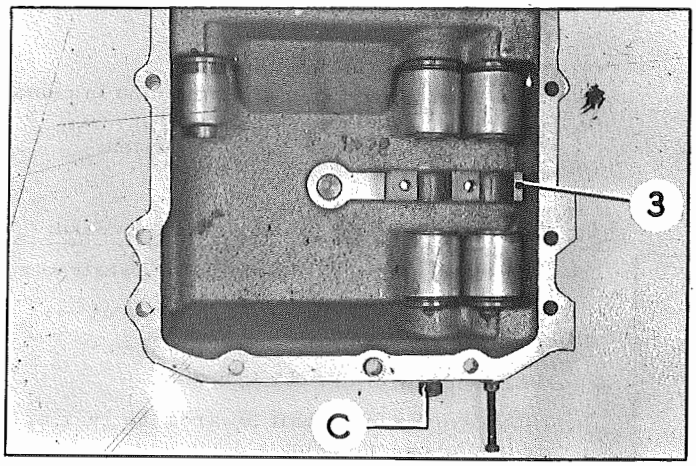
a) Remove the cylinder feedpipe assemblies.

b) Compress the piston springs using tool 3171-T, or if not available use a screw (B) (length 80 mm, x 4 mm diameter with plain washer and locknut, 5.75 mm).

c) Remove the screw (2) securing the neutral position stop block (3). Remove the stop block.

Remove the stop screws (1) from the cylinders.

Free the cylinder piston assemblies via the inside of the cover.



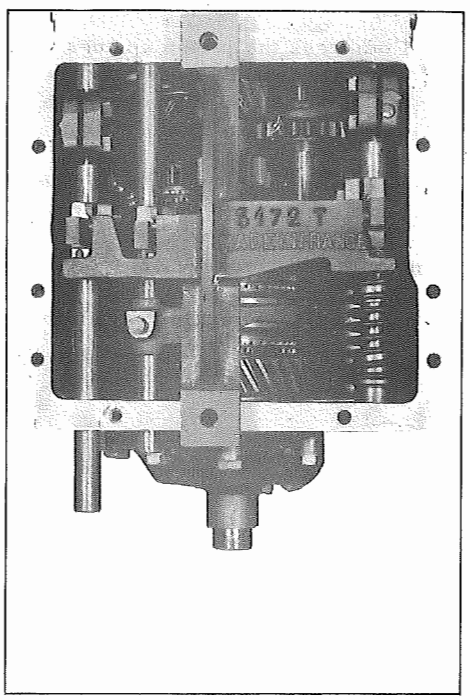
Assembly.

38. Assembling the cover.

a) Make sure that the pistons are at the bottom of their cylinders, by means of securing screws (C).

b) Fit the cylinder piston assemblies into the gearbox cover, screwing in fully.

c) Place the neutral position stop block (3) on the dowels in the cover. Tighten the screws (2) securing the stop block.



39. Check and adjust, if necessary, the gearchange control dogs, using gauge 3172-T.

40. Check the various speed positions.

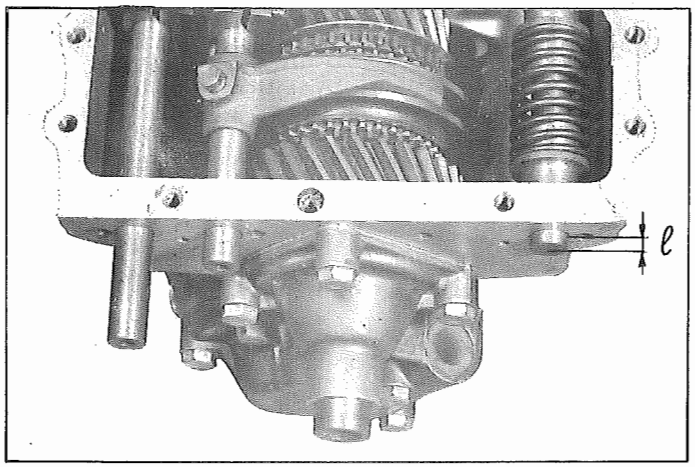
NOTE: With the cover removed the gearbox *is not in neutral position,* the reverse fork shaft is brought beyond neutral by its return spring. To select a gear it is necessary to bring reverse gear to neutral using a screw driver or gauge 3183-T.

a) Check the position of first gear.
Engage first gear, the sliding gear of first/second in contact with the idler of first.
Measure and note the distance by which the fork shaft projects from the face of the housing.
Say, for example, 34.3 mm.

b) Check the position of 2nd gear.
Engage 2nd gear, the sliding pinion in contact with the idler of 2nd.
Check and note the fork shaft projection again.
For example 55.3 mm.

c) Check the position of 3rd gear.
Engage 3rd gear, the sliding pinion in contact with the idler of 3rd.
Again check the fork shaft projection.
For example 1.3 mm.

d) Check the position of 4th gear.
Engage 4th gear, the sliding pinion in contact with the idler of 4th.
Again check the fork shaft projection.
For example 23.9 mm.



41. Check the position of neutral for reverse.

Check the end play of the reverse fork shaft when in neutral.

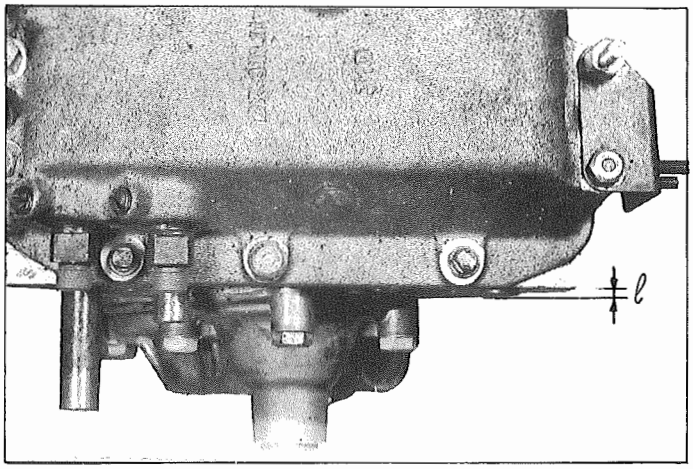
Engage 3rd or 4th speed.

Free the gauge 3183-T, if necessary.

Push the reverse fork shaft towards the rear of the gearbox, check, using a depth gauge, the distance "ℓ" between the end of the shaft and the front face of the gearbox, for example "1" = 1.6 mm.
Pull the shaft forwards and measure distance "ℓ1", for example "ℓ1" = 2.6 mm. Take the mean of these two measurements:

$$\frac{"\ell" + "\ell 1}{2} = \frac{1.6 + 2.6}{2} = 2.10 \text{ mm.}$$

In the example chosen, it will be therefore necessary to adjust the shaft to a distance "ℓ" = 2.10 mm.



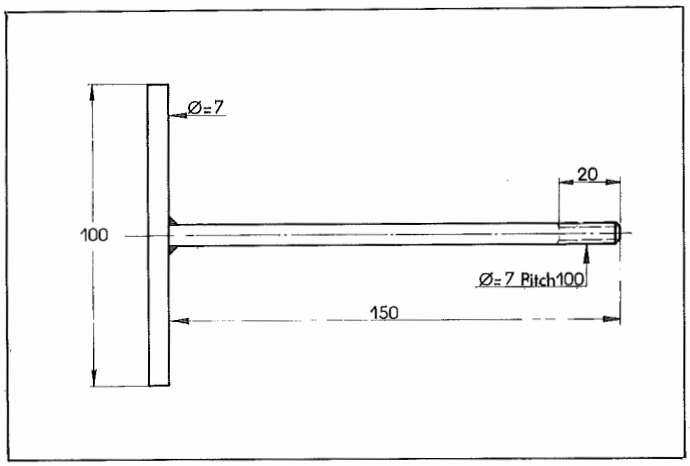
42. Fit the cover (smear the joint with masti-joint HD 37). Tighten the securing screws.

43. To adjust the cylinder of reverse gear.

Screw the cylinder piston assembly to bring it into contact with the selector control dog inserting some "hyperix" paste into the tapped hole for the cylinder stop screw. Then screw in the cylinder until the spindle protrudes beyond the front face of the gearbox, i.e. "ℓ" = 2.10 mm (the dimension previously determined).
Smear the cylinder stop screw with masti-joint HD 37.
Place a locking pad in the tapped hole, then fit and tighten the screw.

NOTE: It is necessary to renew the rubber pads of the change speed control cylinders each time they are removed.

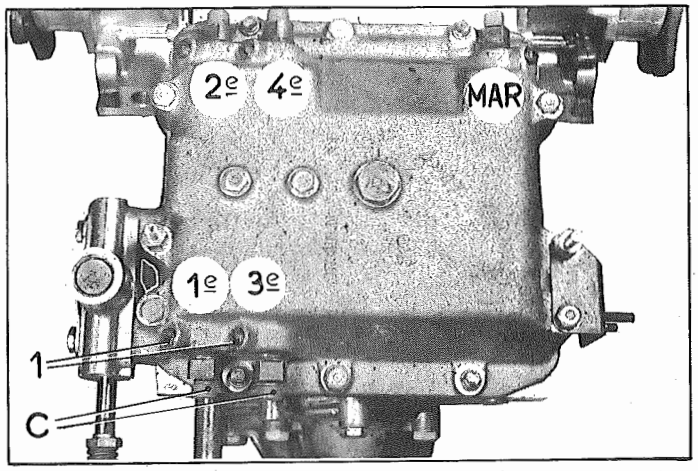
Remove the screw securing the piston.



44. Adjust the strokes of the selector fork shafts.

NOTE: To engage the different gears during this operation, fit a screw, 7 mm diameter or better still, a threaded "T" in the tapped holes in the ends of the shafts.

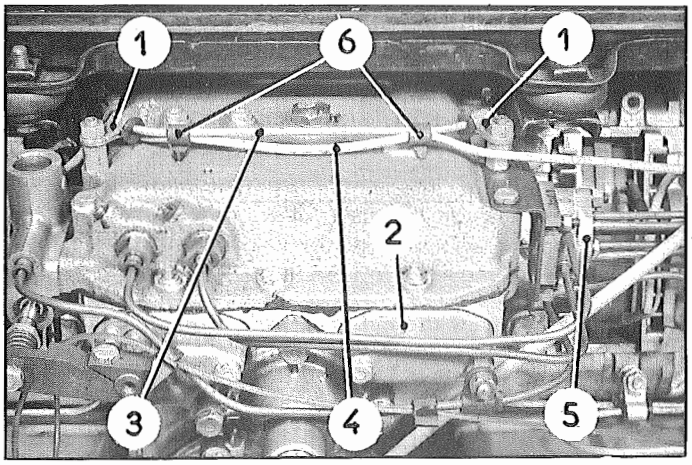
a) Adjust the stroke for first gear:
Engage 1st gear fully. Make sure that this speed is fully engaged by checking the shaft position (i.e. 34.3 mm as determined in para. 40, line a)).
Screw the cylinder piston for 2nd gear to bring it in contact with the selector dog, introducing "hyperix" paste in the tapped hole receiving the screw (1). Then screw the cylinder a further 1/3 of a turn to obtain a clearance of 0.4 to 0.6 mm between the sliding pinion and the idler.
Smear the cylinder stop screw (1) with masti-joint HD 37.
Place a rubber pad in the tapped hole, then tighten the screw.
Remove the screw (C) holding the piston in the cylinder.



b) Adjust the stroke of 2nd gear:
Pull on the spindle to engage 2nd fully. Make sure that the gear is fully engaged by checking the shaft position (i.e. 55.3 mm, the dimension determined in para. 40, line b).
Remove the screw or the "T" fitted on the end of the spindle.
Bring the cylinder piston assembly of first gear in contact with the control dog and operate as above.

c) Adjust the stroke of 3rd gear:
Engage 3rd pully. Make quite sure that the gear is fully engaged by checking the shaft position (1.3 mm, the dimension determined in para. 40, line c).
Bring the cylinder piston assembly for 4th gear in contact with the control dog and operate as indicated in line a).

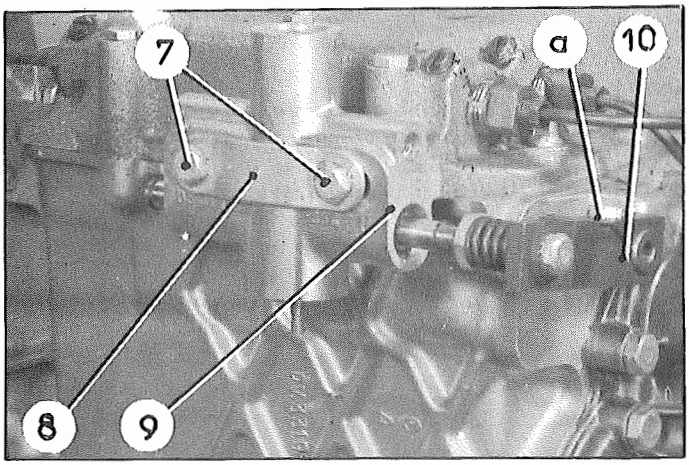
d) Adjust the stroke of 4th gear:
Engage 4th gear fully. Ensure that the speed is fully engaged by checking the position of the shaft (23.9 mm, the dimension determined in para. 40, line d).
Bring the cylinder piston assembly in contact with the control dog and operate as indicated above, in line a).



45. Fit the feedpipe assemblies to the cylinders (new rubber seals).

46. Fit the front cover (2) over the end of reverse gear fork shaft (masti-joint HD 37) and the cover over the end of 3rd/4th speed shaft. Make sure that the ring seal is in position.

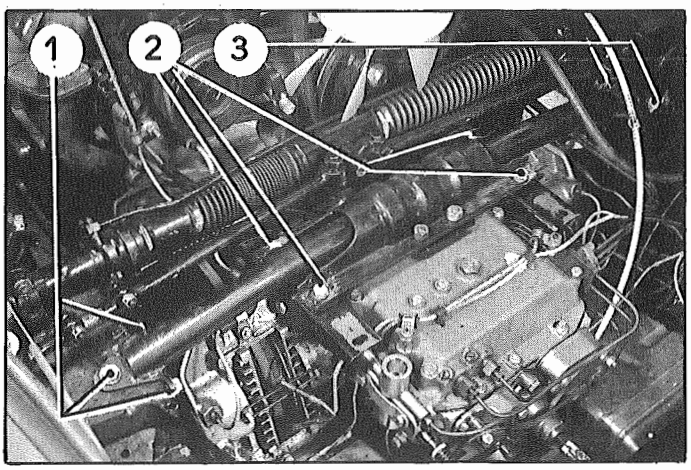
47. Fit the pipe (3) connecting the two brake units. Tighten the clips (1) securing the pipe. Connect the lead (4) for the brake pad wear tell-tale light.
Fit the rubber clips (6).
Connect the five-pipe assembly (5) to the gear-box pipe assembly. Insert the seal plates fitted with new ring seals.



48. Fit the clutch lock.

Connect the clamp (10) to the fork shaft of 1st and 2nd.

Connect the pipes to the clutch lock. With 1st speed engaged, check that there is a minimum clearance of 1.7 mm between the clamp (10) and the head of the screw (a) securing the shaft cover. If not, adjust the clutch lock (see Op. 330-3, para. 53).



49. Fit the front crossmember gearbox support.

Fit the packing pieces between the crossmember and sidemember, found on dismantling.

Tighten the securing screws (1, 2, 3).

50. Remove the sling or the stand 1797-T.

51. Fit the radiator (see Op. DX.232-1) and fill up the radiator with the heater control valve open.

52. Fit the battery and battery tray.

53. Place the manual height control lever in "normal".

Tighten the bleed screw on the pressure regulator and the screw on the accelerated idling control.

54. Bleed the front brake circuit (see Op. DX.453-0).

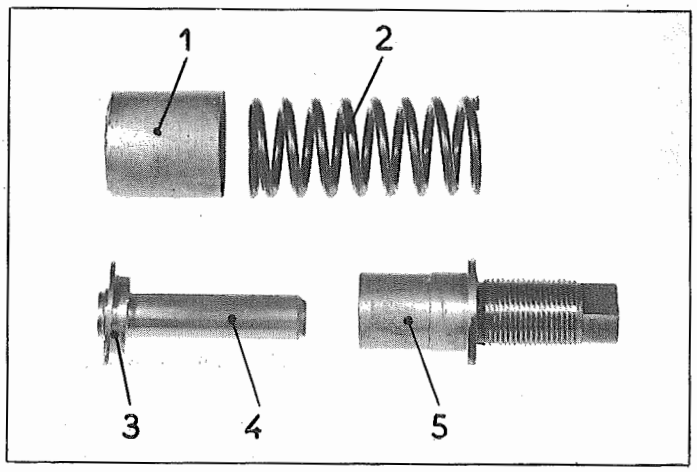
Bleed the gear change control circuits by operating the gear selector lever several times and the clutch control, by hand.

Check all unions for leaks.

55. Fit the front wings (see Op. DX.851-1).

Fit the crossmember support to the sparewheel and the radiator air cowl.

Fit the sparewheel.



REPLACING THE RING SEALS IN THE GEAR CHANGE CONTROL CYLINDERS.

56. Remove the cylinders (see this Op. paras. 27 to 37).

Dismantling.

NOTE:

1) The cylinder piston assembly for reverse gear has no return spring.

2) The piston cylinder assemblies are "paired". Do not mix them.

57. Free by hand the following:

- the piston assembly (4) and the spring thrust cup (3),
- the sleeve (1),
- the spring (2).

Free the cylinder ring seal, using a small brass wire hook (do not "score" the cylinder).

58. Clean the parts in alcohol and blow dry with compressed air.

Assembly.

59. Smear the cylinder, piston and seal with special hydraulic fluid.

60. Place the seal in the groove in the cylinder (5).

61. On the piston place the following:

- the spring thrust cup (3),
- the sleeve (1),
- the spring (2).

Fit the cylinder on the piston. Compress the spring with the aid of tool 3171-T and fit a securing screw. If the tool is not available, use a screw 4 mm diameter x 80 mm long fitted with a plain washer and locknut.

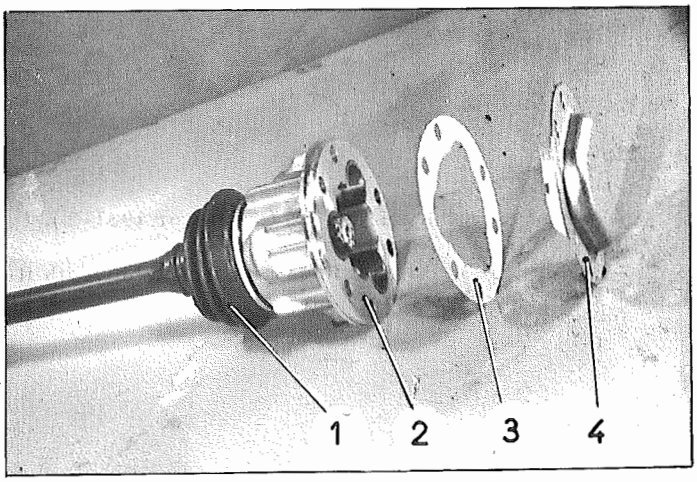
62. Fit the cylinders (see this Op. para. 38 and following).

Provision has not been made for the overhaul of the transmission as this generally necessitates the replacement of all the parts.

PARTICULAR POINTS

Apply 200 grammes of bearing grease to the liners, the ball joints and the tri-axe.

Tightening torque for the pivot ball-joint nuts	72 ft.lbs. (10 m.kg)
Tightening torque for the nut on the track-rod ball joint	50 ft.lbs. (7 m.kg)
Tightening torque for the nuts on the screws of the driveshaft coupling	61 to 79 ft.lbs. (8.5 to 11 m.kg)



REPLACEMENT OF A DRIVE SHAFT OR PIVOT.

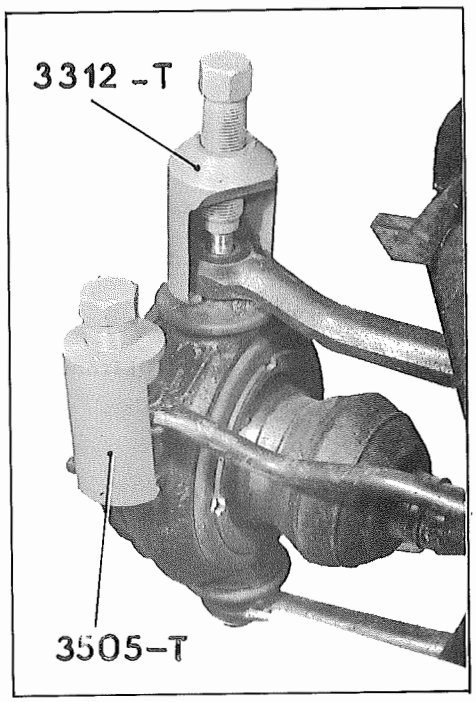
REMOVAL.

1. Raise the front of the car on stands.

Remove:

- the spare wheel,
- the spare wheel crossmember,
- the front wing,
- the front wheel.

Release the pressure (see Op. DX. 00).

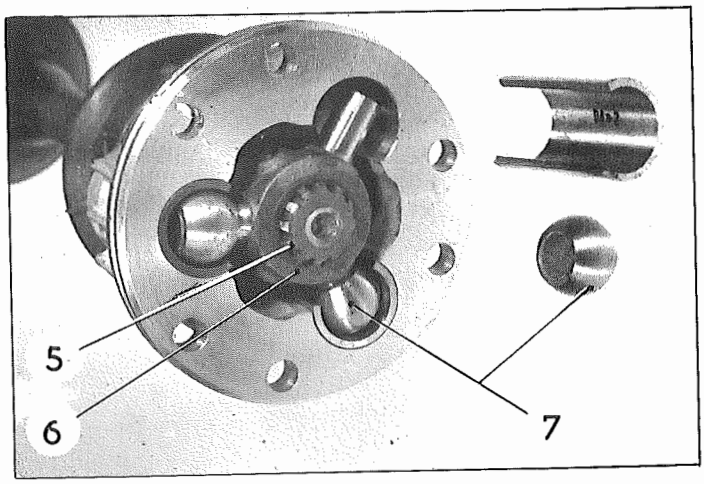


2. Removing a pivot and drive shaft assembly.

Disconnect:

- the driveshaft inner universal housings from the gearbox outlet flanges,
- the outer track rod, from the lever on the pivot (extractor 3505-T),
- the wheel arms from the pivot (extractor 3312-T).

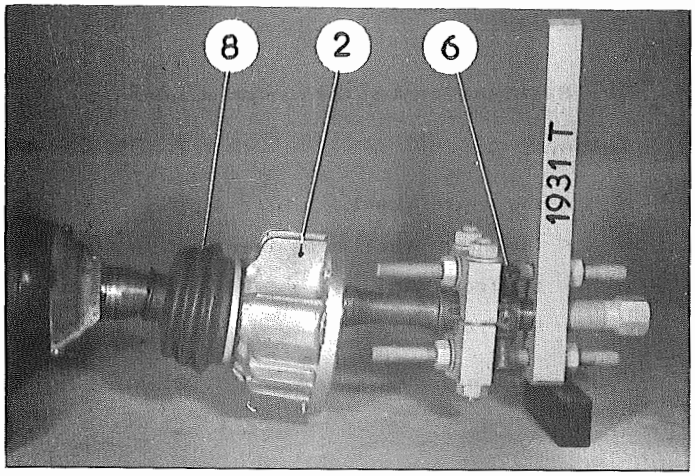
Remove the pivot and drive shaft assembly.



3. Removing the drive shaft inner universal housing.

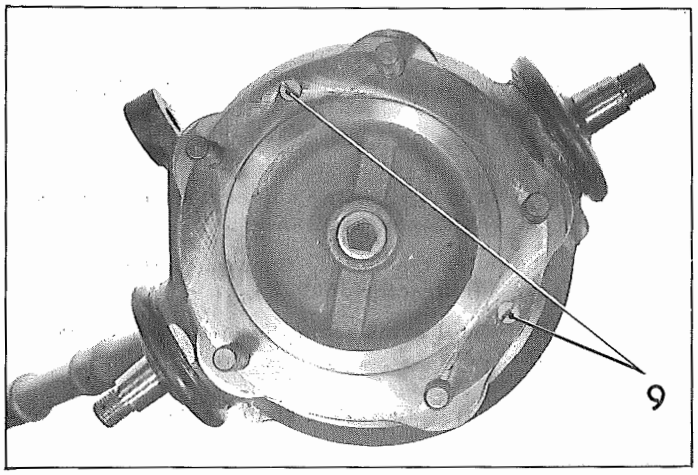
Remove:

- the metal end cover (4) as well as the gasket (3),
- the balls (7) from the tri-axe (6),
- the circlip (5).



4. Withdraw the tri-axe (6) (extractor 1931-T).

Free the drive unit housing (2) together with its dust cover (8).

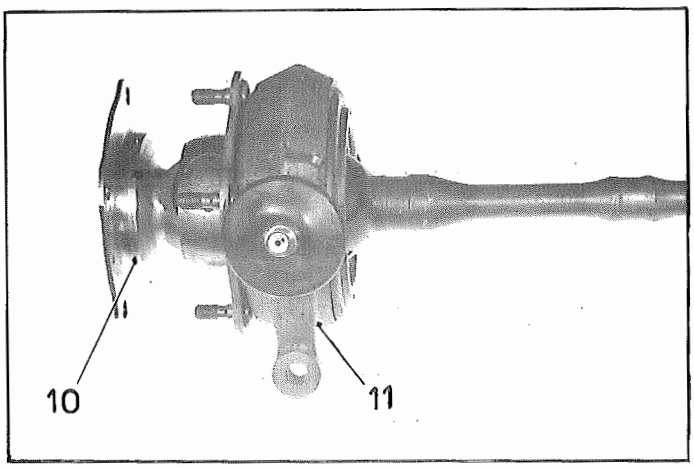


5. Disconnect the drive shaft from the pivot.

a) Remove the two screws (9).

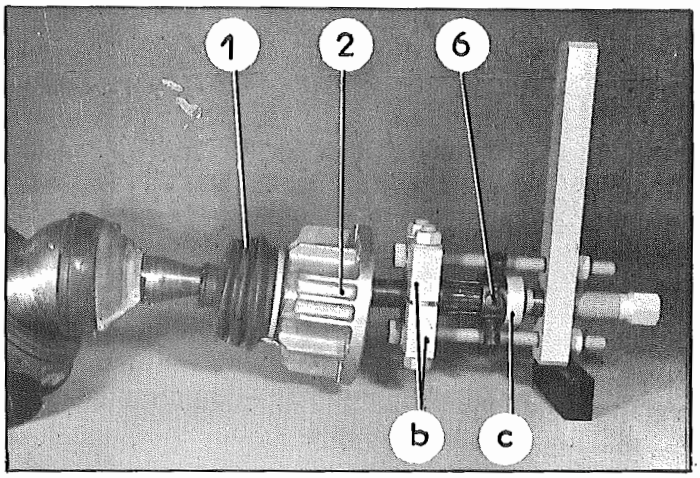
b) Withdraw the drive shaft (10) from the pivot (11).

ASSEMBLY.



6. Couple the drive shaft (10) to the pivot (11).

Tighten the two screws (9).



7. Offer up the housing (2) with its dust cover (1) on the drive shaft.

8. Fit the tri-axe (6) using extractor 1931-T with pad (c).

   Fit the circlip.

9. Fit:

   - the balls on the tri-axe,
   - the metal end cover with its gasket.

   Grease the tri-axe with about 7 oz. of RETINAX AM (distributed by Shell) including the balls and the liners.

NOTE:- Do not use any other type of grease otherwise the 'teflon' bearings for the balls may be damaged or destroyed.

10. Fit the pivot and drive shaft assembly.

NOTE:- The upper and lower balls of this pivot must be lubricated before use. To do this, two lubricators have been left in position.

When assembling, apply grease until it comes out of the ball housing, then fit in place the protective rubber cover (do not put too much grease in the rubber protector as this may displace it).

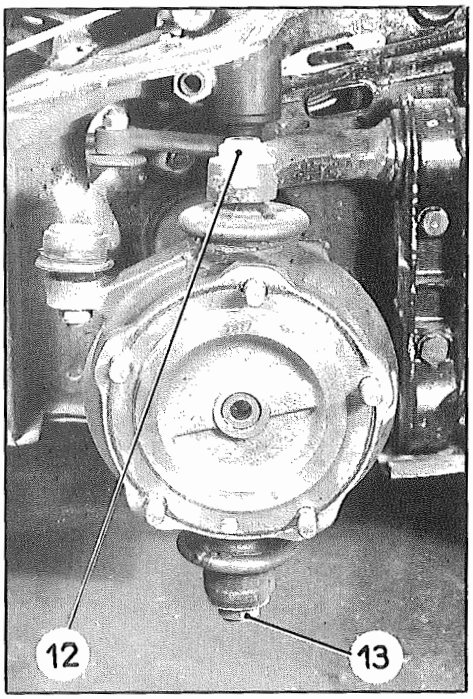
After lubricating, remove the lubricators and replace them with the screws taken from the old pivot.

Pivots sent for renewal or under guarantee must be supplied with lubricators.

Tighten the nuts (13) on the ball pins to 72 ft lbs (10.m.kg).

Tighten the nut (12) on the outer track rod ball pin to 50 ft lbs (7 m.kg).

Tighten the nuts securing the inner universal housing to between 58 and 80 ft lbs (8.5 to 11 m.kg).



11. Fit:

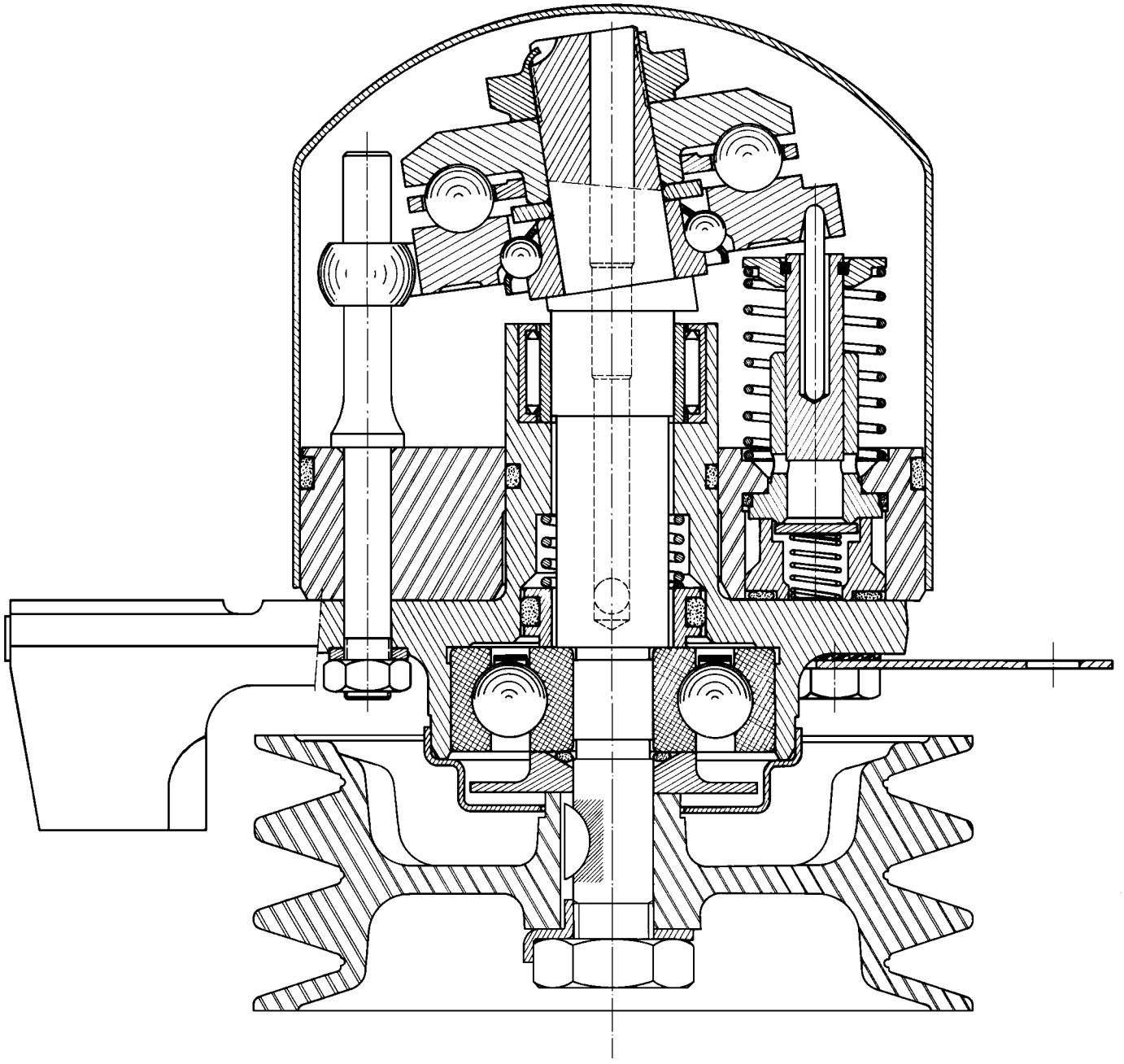
   - the front wheel and wing,
   - the spare wheel crossmember and the spare wheel.

12. Lower the car to the ground.

June 1966.

Corrective No.1

HIGH PRESSURE PUMP



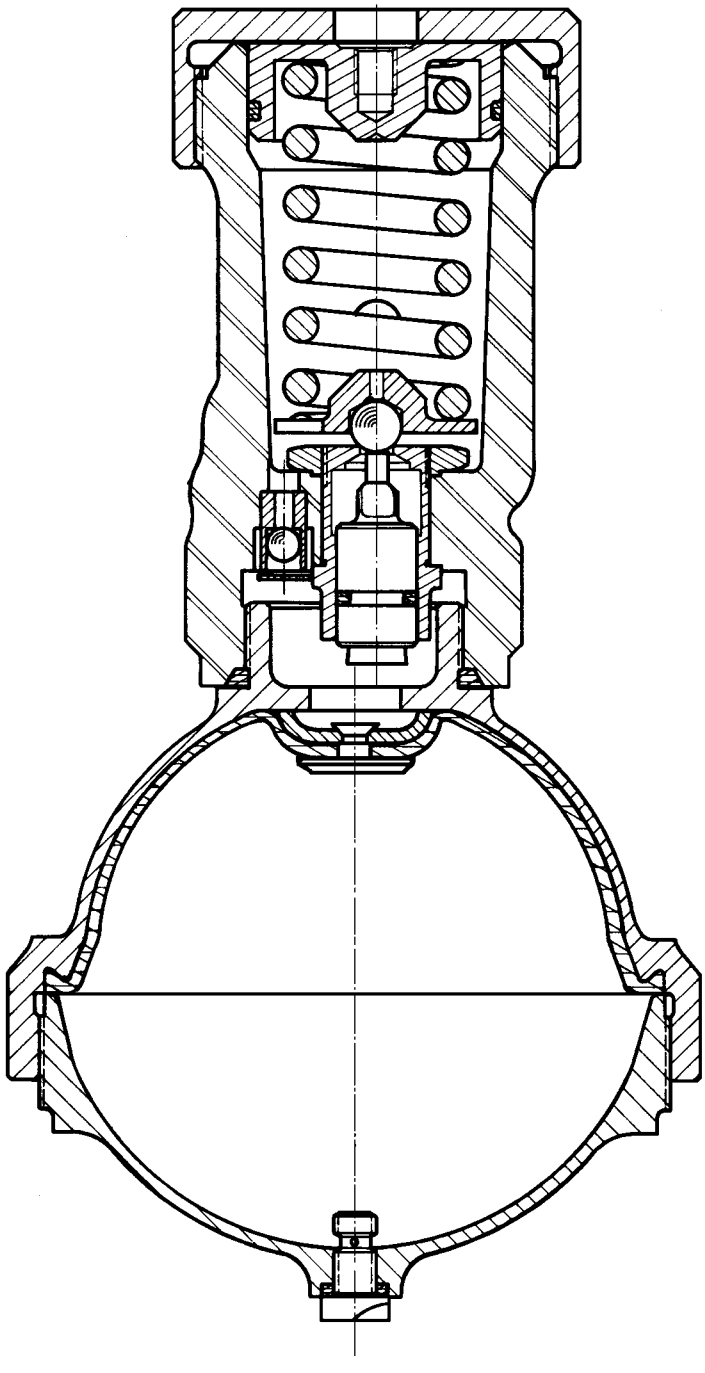
PARTICULAR POINTS

Renew all seals every time the pump is dismantled.

Tighten the nuts and screws securing the front end plate on the pump body to 25 ft.lbs. (3.5 m.kg).

Tighten the nut on the drive pulley 28 ft.lbs. (4 m.kg).

PRESSURE REGULATOR

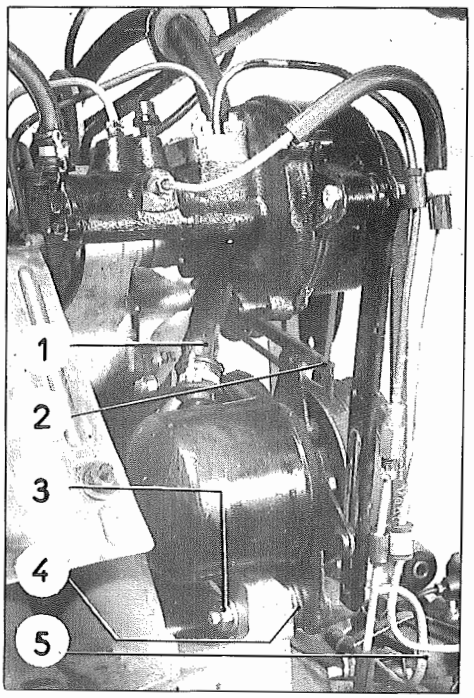


PARTICULAR POINTS

Clearance between the retaining plate and the ball valve = 0.3 to 0.4 mm.

Tightening torque for the securing nut of the control piston liner on the pressure regulator body = 21.5 ft.lbs. (3 m.kg).

Tightening torque for the nut securing the pressure regulator cap = 112 to 145 ft.lbs. (17 to 20 m.kg).



REPLACING A HIGH PRESSURE PUMP.

REMOVAL.

1. Release the pressure (see Op. DX. 00).

2. Remove:
   - the tie-rod between the high pressure pump and the centrifugal regulator,
   - the centrifugal regulator belt.

3. Disconnect:
   - the pipe (5) connecting the pressure-regulator to the pump,
   - the pump tie-rod (2) from the pump,
   - the suction pipe (1) from the pump.

4. Remove the nut (3) from the pump fulcrum pin (16 mm ring spanner or 2250-T).

Free the belts from the pump pulley.

Free the high pressure pump. Do not lose the adjusting shims (4).

ASSEMBLY.

5. Place the high pressure pump in position, insert the packing shims (4) and screw on the nut (3) (flat washer).

6. Check the alignment of the pump pulley (see Op. DX. 231-0).

7. Fit the belts on the pump pulley.

8. Couple up:
   - the suction pipe (1) to the pump,
   - the connecting pipe (5) between pressure-regulator and pump,
   - the tie-rod (2) to the pump.

9. Tension the belts (see Op. DX. 231-0).

10. Fit the belt on the centrifugal regulator.

Fit the tie-rod between the high pressure pump and centrifugal regulator (DX only).

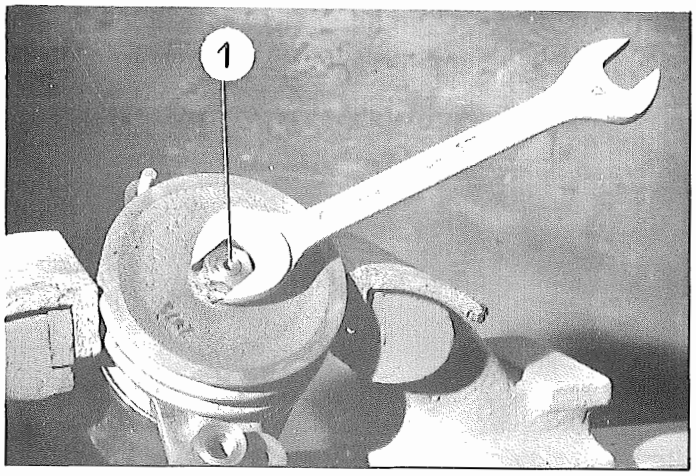
11. Tension the belt on the regulator (DX only) (see Op. DX. 231-0).

12. Fill the pump with fluid through the reservoir outlet filter housing.

Start up the engine with the regulator bleed screw loosened.

13. Put the circuits under pressure and check all unions for leaks.

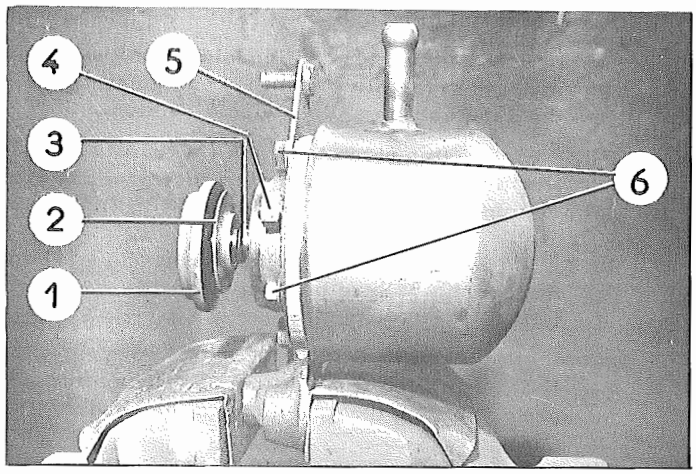
REMOVAL.



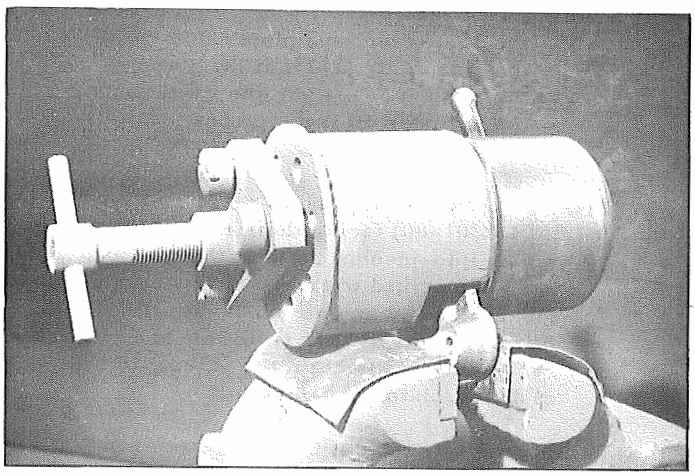
NOTE:

All gaskets and ring seals must be removed.

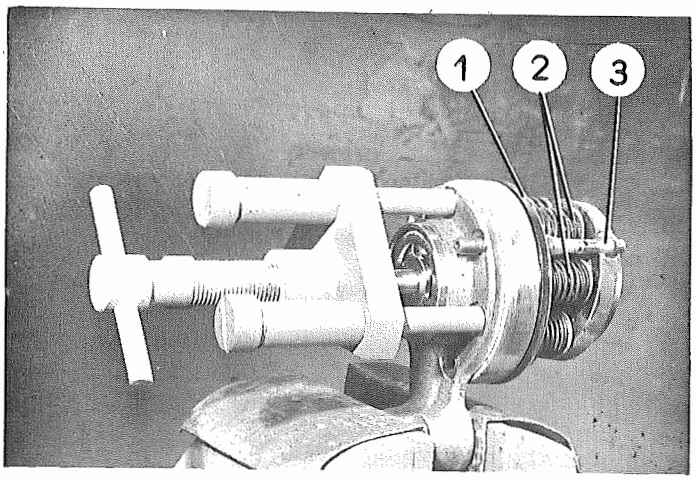
1. Drain all fluid from the pump.
2. Remove the pulley.
   a) Hold the pulley in a vice (lead jaws).
   b) Remove the nut (1) and its lockwasher.
   c) Remove the pulley and its key.



3. Hold the pump in the vice (copper or aluminium jaws), gripping the boss of the front end plate through which the pump fixing screw passes.
4. Free:
   - the closing cup (1),
   - the pump deflector (2),
   - the ring seal (3),
   - the nut (4) and the screws (6) securing the front end plate,
   - the plate (5) for the pump belt tie-rod.



5. Remove the pump cover using extractor 2282-T.

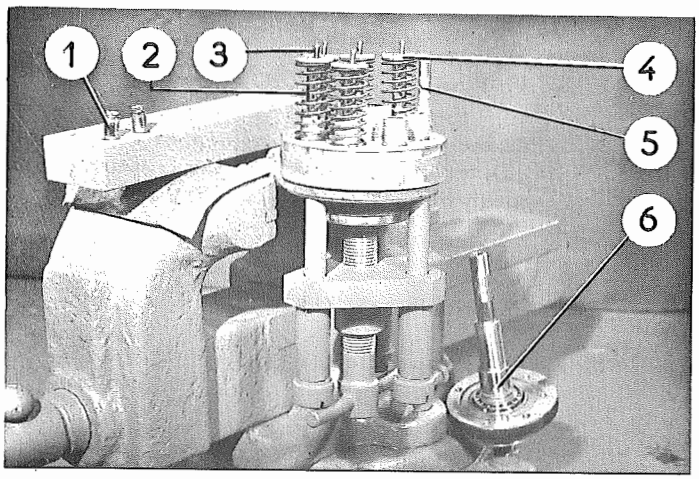


Remove the rubber sealing gasket (1) between the body and the cover.

6. Force out the bearing spindle (extractor 2282-T).

Take care not to let the assemblies (2) spring apart.

Remove the olive (3).



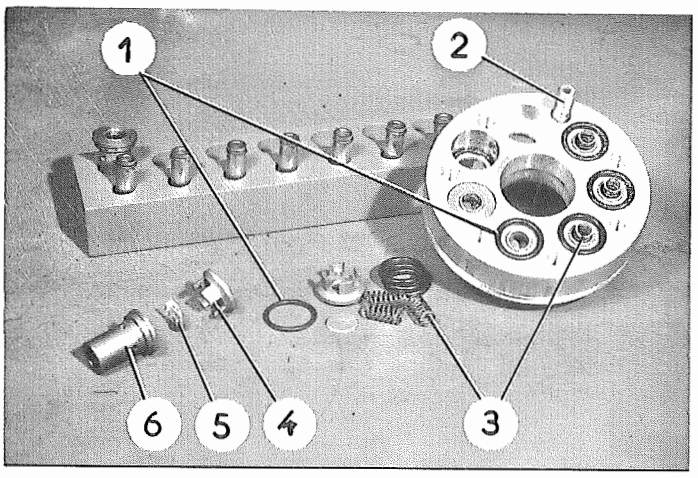
7. Holding the pump vertically, the swash-plate upwards, free the spindle (6). Take care not to separate the piston/cylinder assemblies which are matched.

Remove the piston push-rods (3).

Remove the pistons (1) commencing with the piston nearest to the olive stem (5) and going round the assembly in a clockwise direction.

Place each piston (1) in the rack (MR. 3301-80) (from left to right) the holes receiving the pistons towards the mechanic.

NOTE:- The push-rods (3), the spring-cups (4) and the springs (2) are not matched.



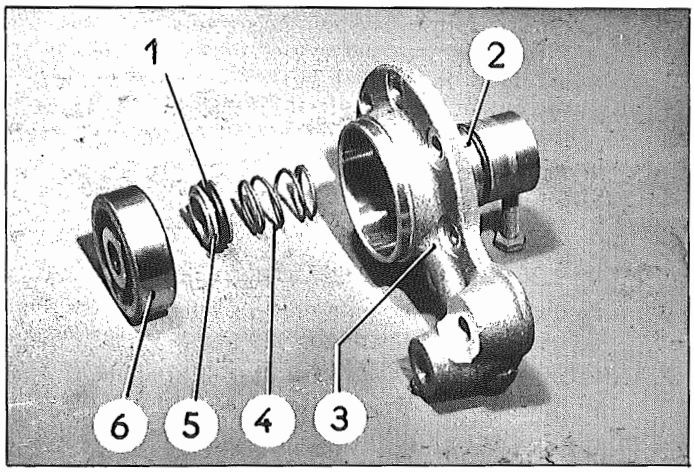
8. Using a mallet, tap out the pump front end plate, holding the assembly in the hand.

When the pump front end plate is free, turn the assembly over to avoid dispersing all the parts which will now be free also.

Remove:-
- the pump front end plate,
- the ring seals (1) from the pump,
- the springs (3), from the valve discs,
- the cylinder distance pieces (4),
- the valve discs (5).

Free the cylinders (6) and arrange them in the rack (MR. 3301-80) facing their respective pistons; taking into account the fact that the assembly has been turned over, start from the olive stem, work in an anti-clockwise direction. Arrange them always from left to right in the rack so as to maintain the pairing of the cylinder/piston assemblies.

Using a mallet, tap out the olive stem (2).

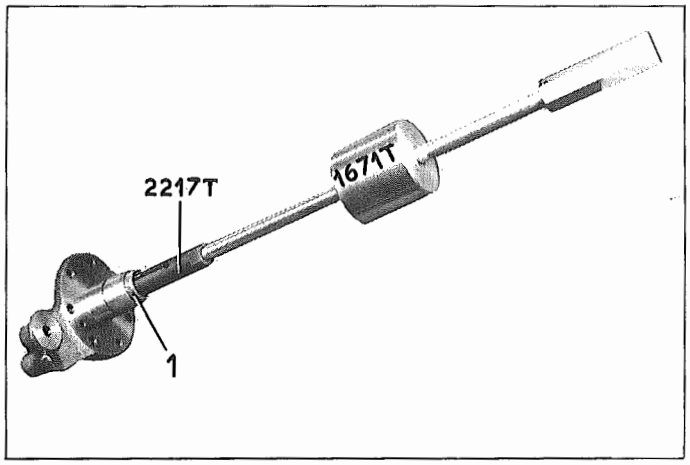


9. Stripping the front end plate.

a) Force out the ball bearing (6) from the housing (3) using a mandrel (17 mm diameter x 150 mm long). This bearing must be renewed at each dismantling.

Free the seal-carrier distance piece (5) and its spring (4).

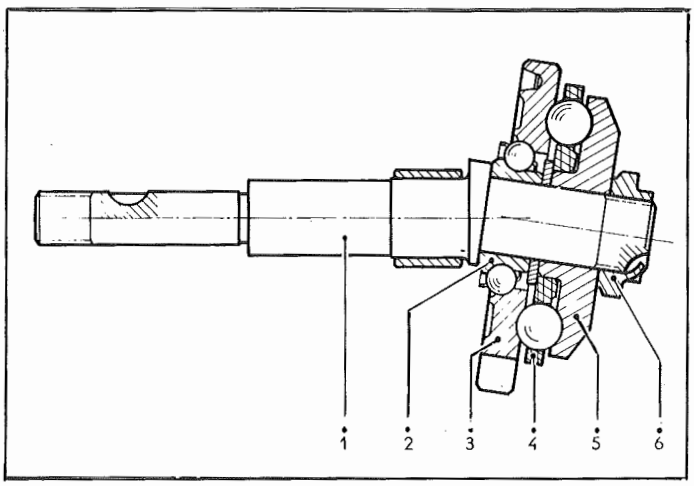
Remove the ring seals (1 and 2) from the distance piece and housing.



b) Remove the needle bearing (1). Use extractor 1671-T (used on 2CV and 3CV for extracting the crankshaft needle bearing), together with sleeve 2217-T.

10. Check the shaft bearing (1).

NOTE:- The component parts of this assembly are not sold separately by our Spare Parts Department.



a) Remove the metal of the nut (6) forced into the groove in the shaft (1).

b) Remove:

- the nut (6),
- the outer bearing race (5),
- the nylon bearing cage (4) and free the balls,
- the intermediate bearing race (3) and free the balls,
- the inner bearing race (2).

Use a magnifying glass to inspect the races, making certain there is no ball imprint, scaling, pitting, scoring or "build-up" on the races or the balls.

c) Assemble all the parts in the inverse order of dismantling.

11. Removing the inner bush of the needle roller bearing.

Arrange the shaft with the bush resting on a metal block. With a flat-pointed peening hammer, turn it and tap it at two or three equidistant points until the bush is free, or so that when the end of the spindle is brought down two or three times onto a piece of wood, the bearing falls by its own weight.

12. Clean all the parts in alcohol.

13. Prepare the cylinders and the seal-carrier.

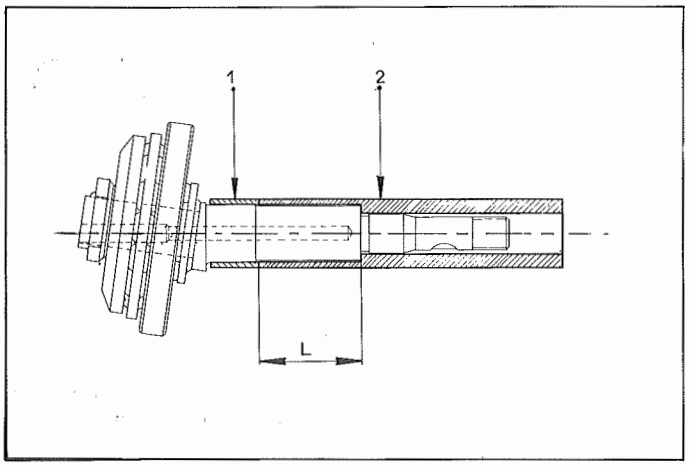
Lap the valve-disc seats on the cylinders, and the front face of the seal-carrier (bearing side).

Use No. 600 abrasive paper dipped in alcohol, and placed on a surface plate.

Clean all the parts in alcohol and then blow dry with compressed air.

Replace the cylinders in their proper places in the rack.

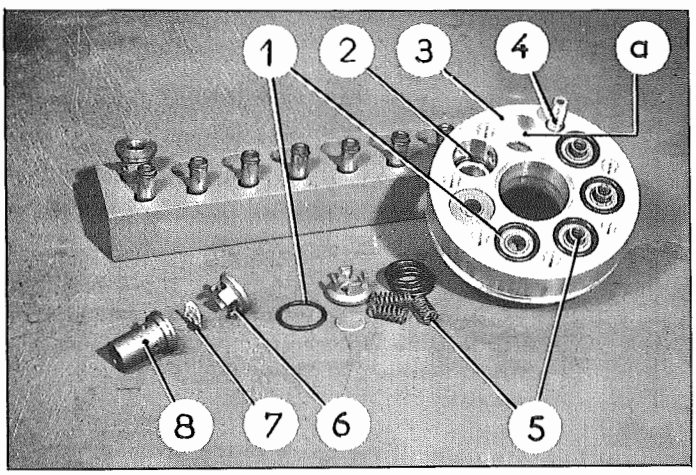
Renew the valve discs.



ASSEMBLY.

NOTE:- All the gaskets must be smeared with hydraulic fluid before assembly.

14. Fit the inner bush (1) of the needle bearing, using tool MR. 3045-140 (2), in a press, checking dimension L which must be 33 $^{+0.5}_{0}$ mm.



15. Prepare the pump body.

Fit the olive stem (4) in the pump body (3), using a press.

Fit the ring seals (2) for the cylinders, in the grooves (a) of the bores into which the cylinders (8) fit.

Prepare the assemblies: cylinders (8), valve (7), and distance piece (6) (smearing the collar of the cylinder (8) with hydraulic fluid).

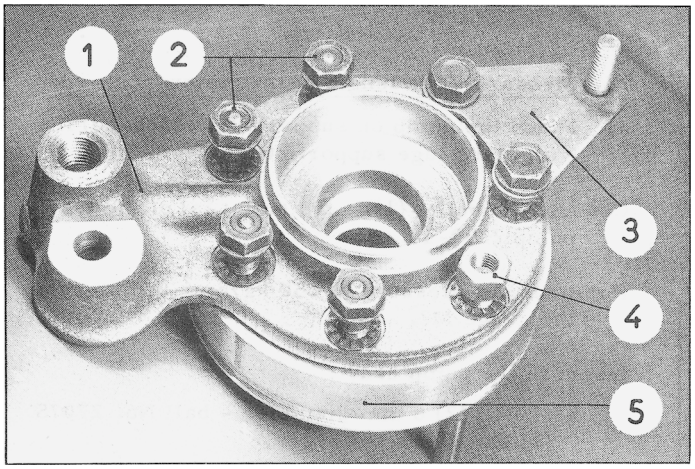
Fit these assemblies in the pump body (3) in the reverse order of dismantling, (taking the parts from the rack (MR. 3301-80) from the right towards the left, placing them in the body (3), turning it clockwise, starting from the olive stem (4).

Press hard on each assembly until it "locks" (the collar of the cylinder (8) passes through the ring seal (2).

Check that the cylinder distance pieces (6) are correctly located, they must be slightly below the face of the pump body (3).

Fit the ring seals (1) of the pump on the cylinder distance pieces (6).

Fit the springs (5) for the valve discs.



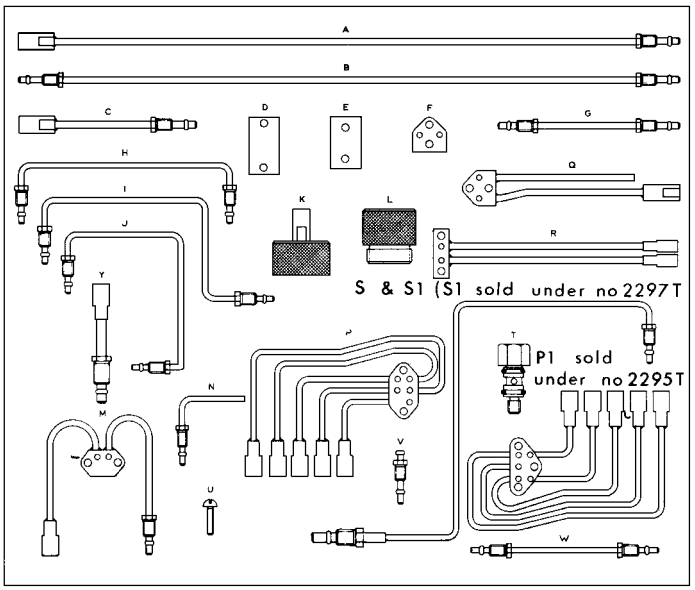
16. Fit the bearing to the pump body.

Fit the bearing ring seal in its groove on the nut of the front end plate (1) for the pump shaft.

Offer up the front end plate (1) into the pump body (5) arranged as shown in photograph herewith.

Fit the plate (3) for the pump belt tie-rod (insert shakeproof washers between the bracket (3) and the housing.

Tighten the nut (4) and the screws (2) to 25 ft/lbs (3.5 m.kg) (shakeproof washers).



17. Check the pump body for leaks.

Connect the pump outlet (1) to the outlet (a) of the test pump on the test bench 2290-T using pipe S1.

Ensure that the bleed screw (b) of the test pump is thoroughly tightened. Work the pump until a pressure of 150 kg/cm^2 registers on gauge M2.

The needle of the gauge should remain steady or fall very slowly.

If one observes:

a) A leakage between the front end plate (1) and body (2) of the pump, change the pump ring seals.

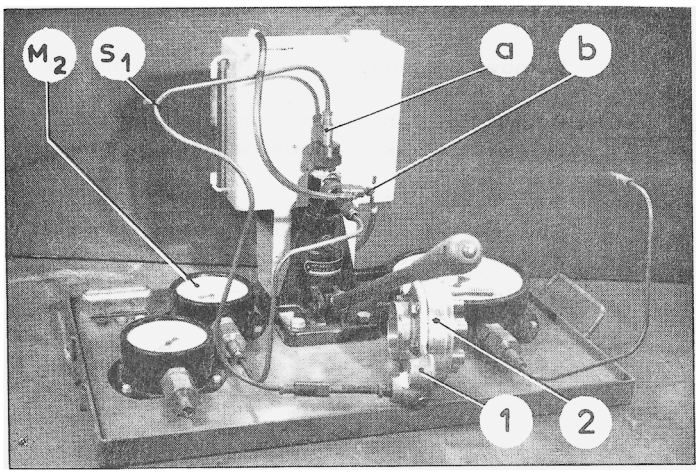
b) A leakage between the cylinders and pump body indicates incorrect assembly of the cylinders or their ring seals.

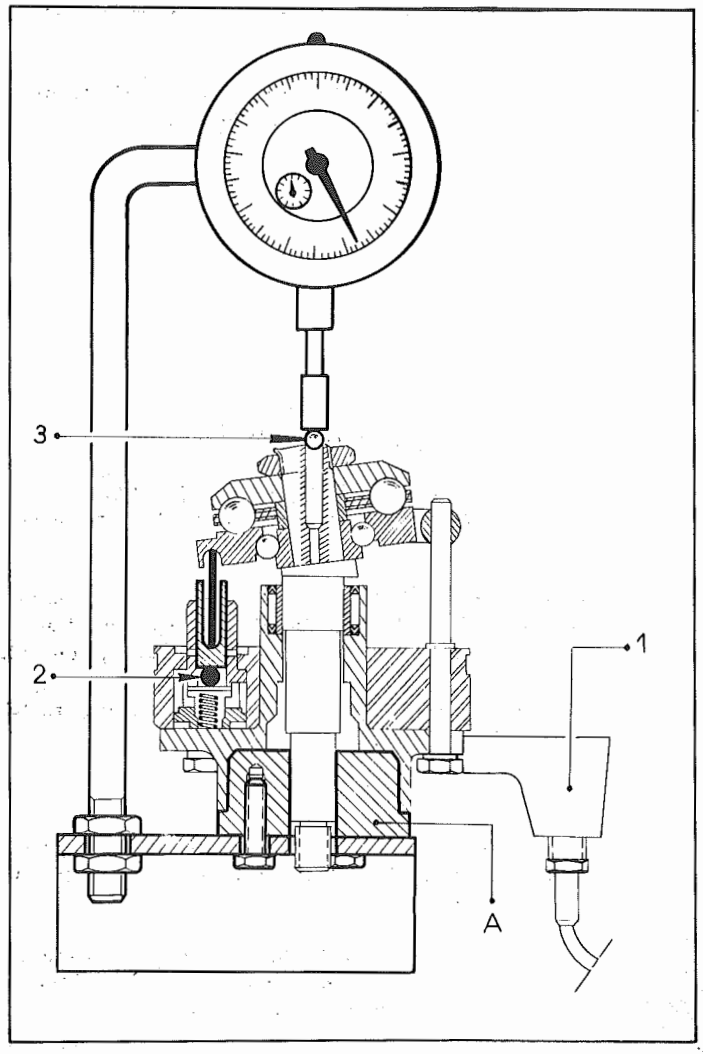
c) If the pressure does not rise: the seating of one or more valves may be defective.

Loosen bleed screw (b) then retighten and pump again.

Do this several times. Foreign matter under a valve may thus be eliminated.

If necessary, the disc valves and their seatings must be lapped to produce a thorough seal.





18. Measuring the length of the piston push-rods.

a) Place the pump on support (MR. 3365-60) fitted with dial gauge support 2039-T.

Connect the outlet (1) to the outlet (a) of the test pump 2290-T.

Pump until a pressure of 150 kg/cm^2 registers on the gauge M2.

Insert in the pump body :

- 1 ball (2) 6 mm diameter - ball No. 2707S, in one of the cylinders,
- the piston corresponding to this cylinder,
- a new piston push-rod - length = 29.5 mm, No. D 391-519.

Place the shaft in position in the pump body and centre it in spigot (A).

Place a ball (3) 6.35 mm diameter in the centre of the upper end of the shaft and position the dial gauge 2437-T, fitted with stem No. 2438-T so that the dial gauge anvil is concentric with the pump spindle.

b) Turn the shaft upper plate, to bring the shouldered part of the shaft into contact with spigot (A), and set the dial gauge to zero on the large needle.

Continue rotating the plate until the highest position of the shaft is reached, as shown by the dial gauge.

Count the turns and fractions of turns, calling this value "m".

The length "L1" of the piston must be :

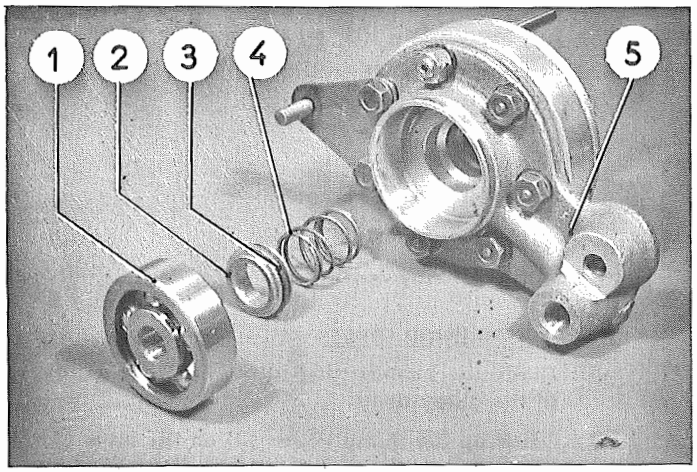
$$L1 = 35 - m$$

c) Remove the pump piston, the piston and the ball.

d) Repeat this same operation in two other cylinders so as to obtain two other values L2 and L3.

e) The length for all the pump piston push-rods will be the mean of the three values:

$$L1 = \frac{L1 + L2 + L3}{3}$$



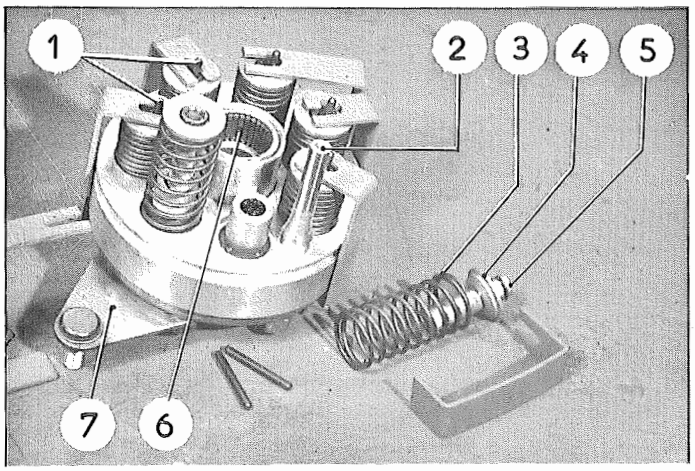
19. Prepare the front end plate (5).

NOTE: Check the condition of the surface on the side of the inner bearing cage (1) (on the nylon cage side).
This face must not show any trace of scoring, cutting, blows, or any marking whatsoever.
Smear it with hydraulic fluid.

Fit :

- the spring (4),
- the seal carrier (2) with its ring seal (3),
- the bearing (1) using a press.

Arrange the nylon bush towards the interior of the pump, centring the seal carrier (2) by using mandrel MR 3436-110.



20. Fitting the pistons.

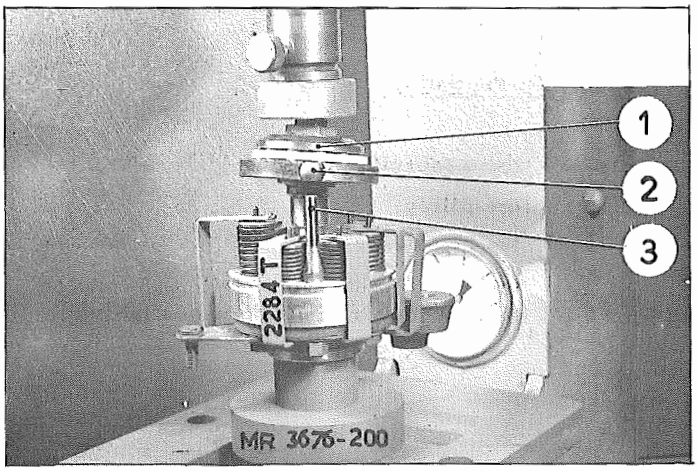
Take the first piston (5) on the right in the rack MR 3301-80, a cup (4) for the piston spring and a piston spring (3).

Fit these pieces in the first cylinder starting from the olive stem (2) (anti-clockwise). Press on the piston to insert it in the cylinder. Keep it there with a clamp 2284-T.

Repeat this same operation for the other cylinders. The longest clamp is used for the piston facing the pump fixing boss and the plate (7) for the pump belt tie-rod.

Fit the pump piston push-rods (1).

Offer up the needle bearing cage (6), engraved face towards the outside of the pump.



21. Fit the shaft.

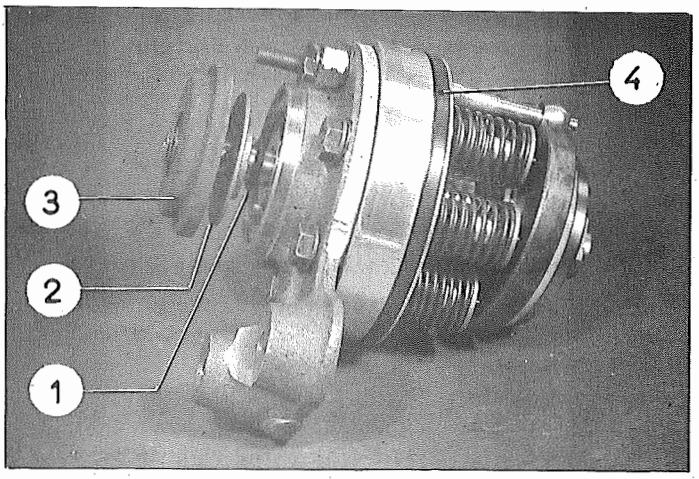
Offer up the shaft (1) so that the olive (2) enters the cut-out in the swash plate and slides onto the olive stem (3).

Fit the shaft in a press (1) using pad MR 3676-200.

Remove the clamps 2284-T.

Make sure that the piston rods are correctly seated in the sockets in the swash plate and that the olive does not bind on the olive stem.

Turn the spindle to ensure that there are no hard spots.



22. Sealing the front end.

Grease the bearing.

Fit :

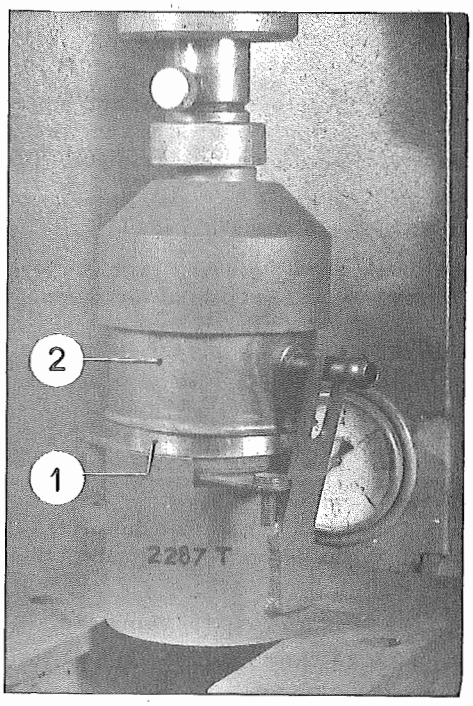
- the ring seal (1),
- the pump deflector (2),
- the closing cup (3).

23. Fit the pump cover.

a) Place the rubber ring joint (4) in the groove in the pump body.

b) Offer up the pump cover (2) on the body (1) (the correct angular position is obtained by using fixture 2287-T).

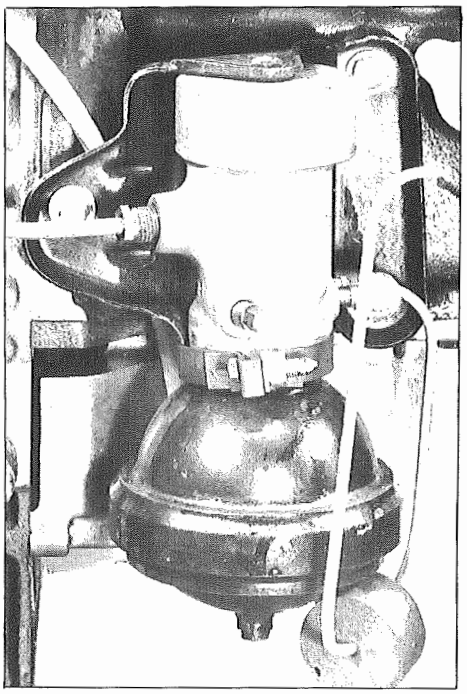
Finish assembly in a press.



24. Fit the pulley.

Fit :

- the woodruff key,
- the pulley,
- the lockwasher,
- the nut. Tighten to 28 ft/lbs. (4 m.kg) then turn over the lockwasher tabs.



REMOVAL.

1. Release the pressure in all the circuits (see Op. DX.00). Put the manual height control in the LOW position.

2. Remove the left-hand front suspension sphere and the petrol pump.

Disconnect the pipe between the hydraulic gear selector and the clutch re-engagement control (DX only).

3. Disconnect :

   - the inlet pipe, the outlet pipe, and the reservoir return pipe, from the pressure regulator.

Seal the return pipe to avoid loss of fluid.

4. Remove the upper fixing screw holding the pressure regulator on its bracket.

Loosen the screw on the retaining collar of the pressure regulator.

Withdraw, from the underside, the pressure-regulator-accumulator with the support collar.

5. Remove the main accumulator from the pressure regulator and the retaining collar if necessary.

ASSEMBLY.

6. Place the retaining collar on the pressure-regulator.

Fit the main accumulator on the pressure-regulator and tighten it by hand.

7. Offer up the pressure-regulator-accumulator assembly on its support. Fit the securing collar.

8. Fit and tighten the upper fixing screw of the pressure regulator (shakeproof washer). Tighten the nut on the collar.

9. Couple up :

   - the inlet pipe, the outlet pipe and the reservoir return pipe, to the pressure regulator.

Couple up the pipe connecting the hydraulic gear selector to the clutch re-engagement control (DX only).

10. Fit the petrol pump and the suspension sphere.

11. Loosen the bleed screw on the pressure-regulator.

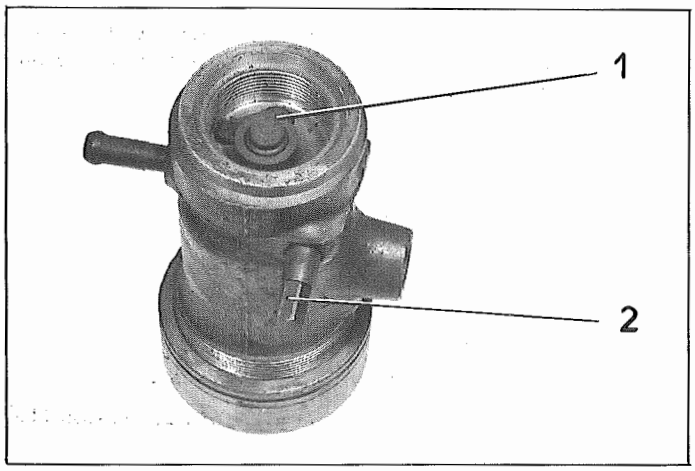
Start up the engine and let it run for a few minutes.

Tighten the bleed screw on the pressure regulator. Put the height control lever in the NORMAL position.

12. Check all unions for leaks.

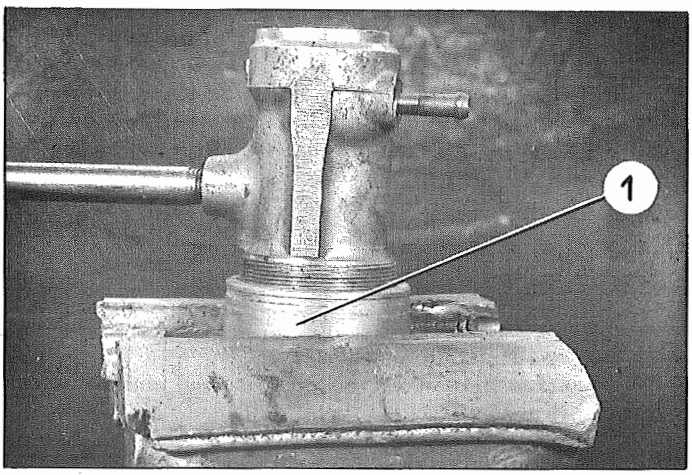
If necessary top up the hydraulic fluid in the reservoir.

DISMANTLING.



1. Disconnect the accumulator from the pressure regulator.

2. Remove :
   - the plate (1) retaining the non-return valve ball,
   - the adjusting shim or shims found under the plate. Remove the ball,
   - the bleed screw (2) and remove the ball.

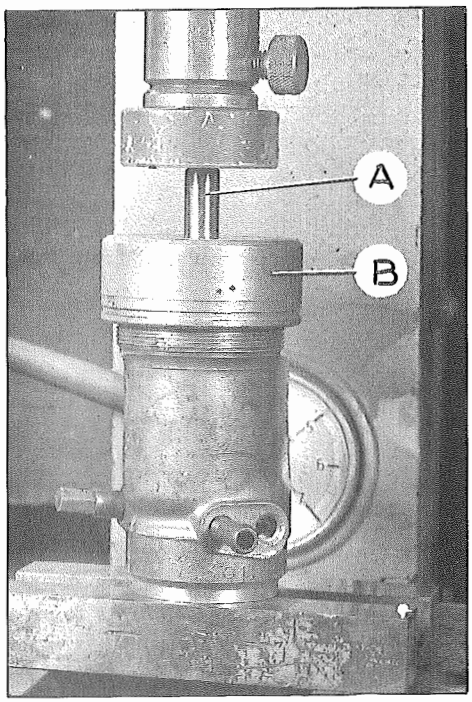


3. Remove the plug.

   a) Hold the plug securing nut (1) in a vice with lead jaws.

In the hole tapped to receive the connecting pipe between the high pressure pump and the pressure regulator, screw in the spindle 2224-T.

Unlock the nut (1) by turning the plug body by means of the spindle 2224-T with an extension piece.



b) In the central hole in the nut (B) insert a spindle (A), 14 mm diameter x 30 mm long, making contact with the plug.

Place the pressure regulator under a press with the spindle 2224-T resting against the body of the press, so that the pressure regulator cannot move.

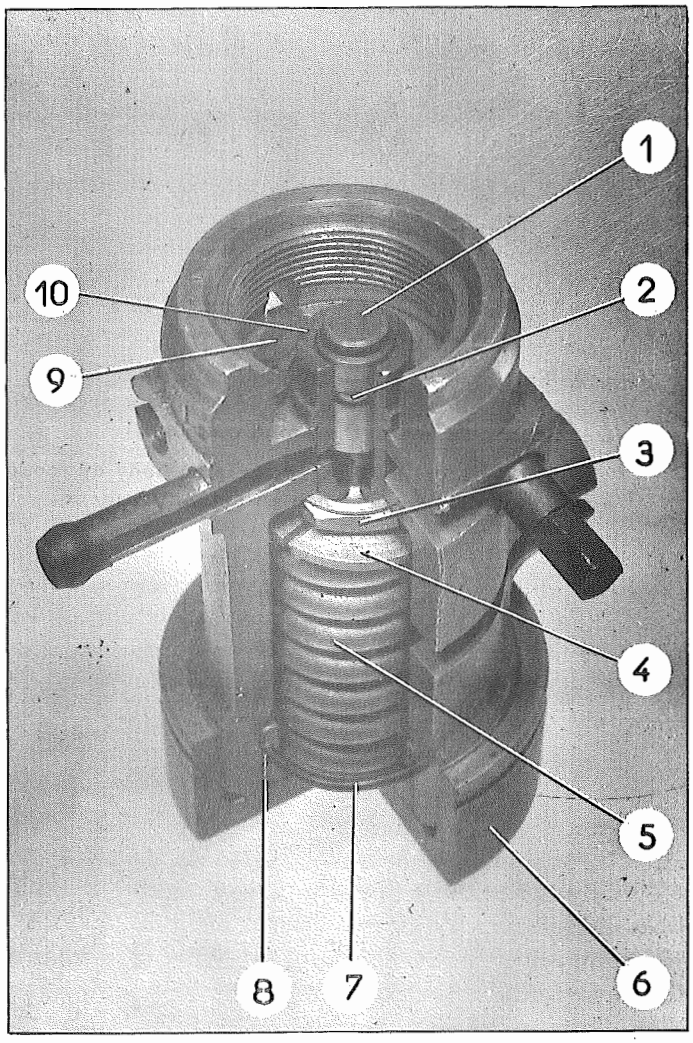
Using the press, apply light pressure on the plug to diminish the pressure of the regulator spring on the threads of nut (B).

Remove :

- the nut (6),
- the plug (8) with its ring seal,
- the adjusting washers,
- the spring (5),
- the cup (4) with its ball,
- the piston (1) with its ring seal.

Free the ring seals (2) and (7) from the piston (1) and the plug (8).

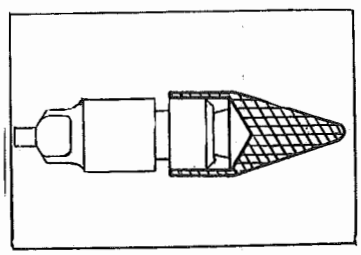
4. Clean all the parts in alcohol.
Blow dry with compressed air.



ASSEMBLY.

5. Prepare the body of the pressure-regulator.
Rectify the seatings of the balls of the non-return valve and the bleed screw.
Take a new ball, and placing it on the seat to be rectified, tap it lightly using a steel rod and a hammer. Remove the ball which must not be used.

6. Fit a ring seal (2) on the piston, using the cone 2226-T.
Dip the piston (1) in hydraulic fluid and replace it in position.
Check that it slides in the cylinder with a slight resistance.

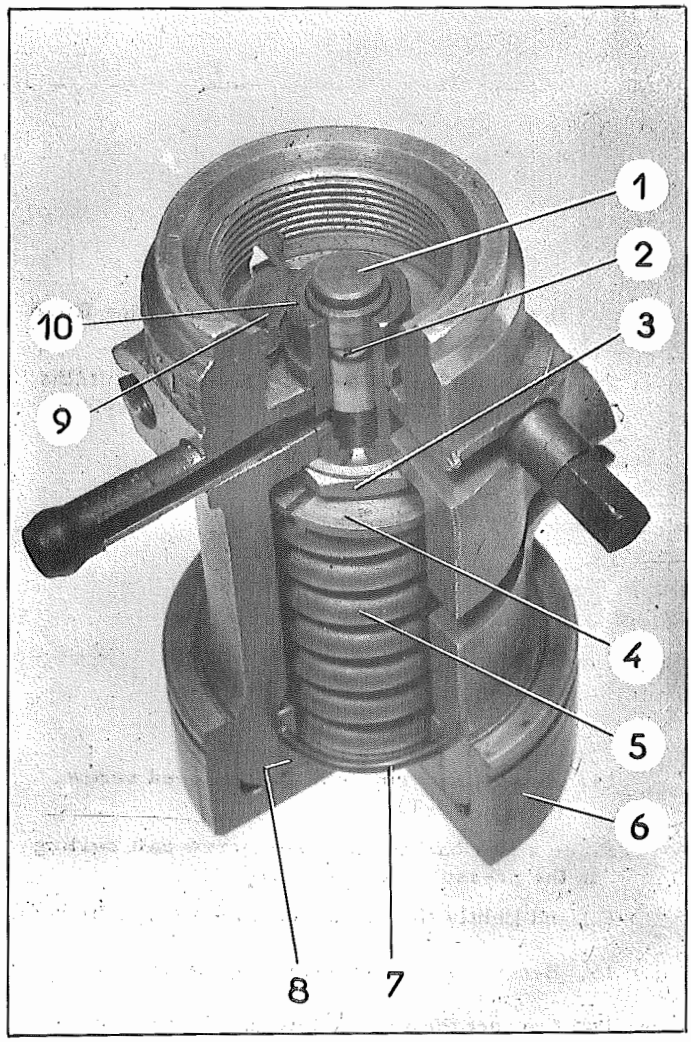


7. Place :

- one new ball on the retaining valve seat,
- two adjusting shims,
- the plate (9).

Hold the plate in position whilst tightening its securing screw.
Check with feelers, with the tip bent at right angles, the clearance between the plate (9) and the ball. This clearance must lie between 0.3 and 0.4 mm.
The required clearance must be obtained by varying the number of adjusting shims.

8. Check that the nut (3) of the cylinder (10) is correctly tightened to 21 ft/lbs. (3 m.kg).



9. Check that the ball in the cup (4) is not marked in any way. If it is, the cup (4) and its ball must be renewed.

Place the cup (4) in the body of the pressure-regulator.

Check that the piston (1) is sufficiently withdrawn to allow the ball in the cup (4) to be correctly positioned on its seat.

10. Fit the spring (5) in the body of the pressure-regulator.

11. Fit the ring seal (7) onto the plug (8).

12. Place the plug (8) with its washers in the body of the pressure-regulator.

13. Fit the nut (6).

IMPORTANT NOTE : The threads of the nut (6) must be thoroughly clean and free from all traces of aluminium dust and freely greased with castor grease to the exclusion of all other products. If adjustment necessitates removal of the nut (6), it is essential to take the same precautions outlined above for cleaning and greasing each time.

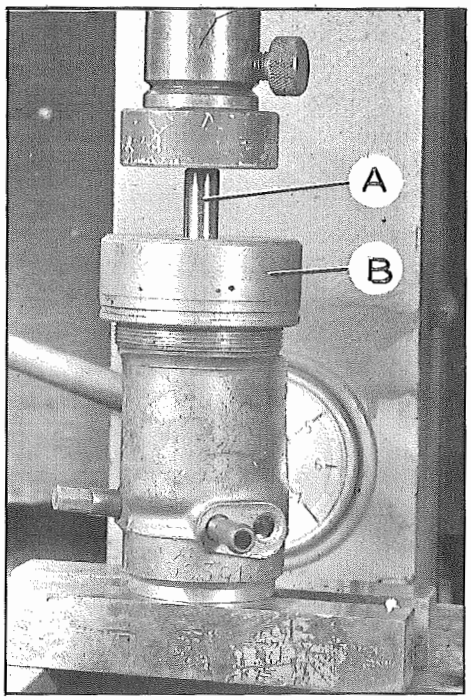
a) Fit and hand tighten the nut (6).

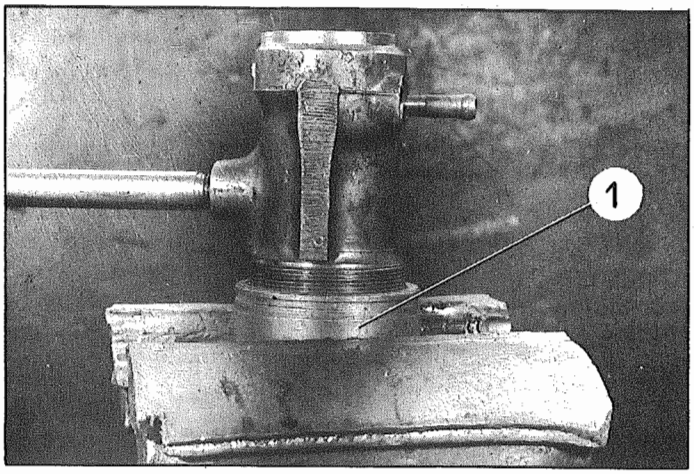
b) In the central hole of the nut (B) insert spindle (A), 14 mm diameter x 30 mm long, resting on the plug.

c) Place the pressure-regulator under a press and, using the spindle 2224-T, (screwed in the hole tapped to receive the union for the pipe connecting the high pressure pump to the pressure-regulator), prevent it from turning by letting spindle 2224-T rest against the press frame.

d) Using the press, exert light pressure on the plug to diminish the regulator spring pressure on the threads in the nut.

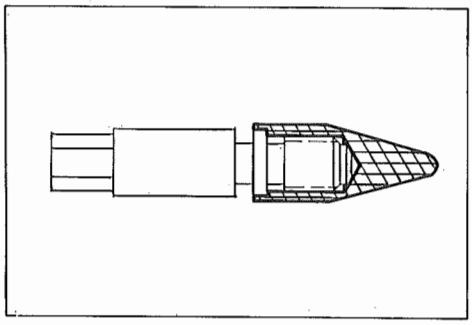
e) Tighten the nut fully by hand.





f) Hold the plug locking nut in a vice fitted with lead jaws.

Tighten the nut (1) to between 122 and 144 ft/lbs. (17-20 m.kg) turning the body with the spindle 2224-T.



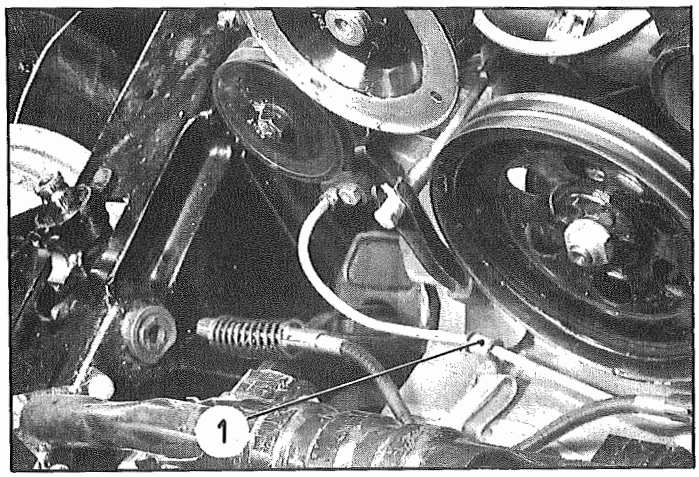
14. Place a new ring seal on the bleed screw (cone 2225-T).

Place a new ball on the bleed screw ball seating in the pressure regulator body.

Fit and lightly tighten the bleed screw in the body.

15. Bench test the pressure regulator.

16. Connect the accumulator to the pressure-regulator, and tighten by hand.



REMOVAL.

1. Remove the battery.
2. Remove the fan.
3. Release the pressure (see Op. DX.00).
4. Disconnect the pipe between the pump front endplate and the pressure-regulator.
5. Remove the clip (1) securing the connecting pipe on the gearbox housing.
6. Free the pipe, withdrawing it between the steering rack and the driving pulley on the camshaft.

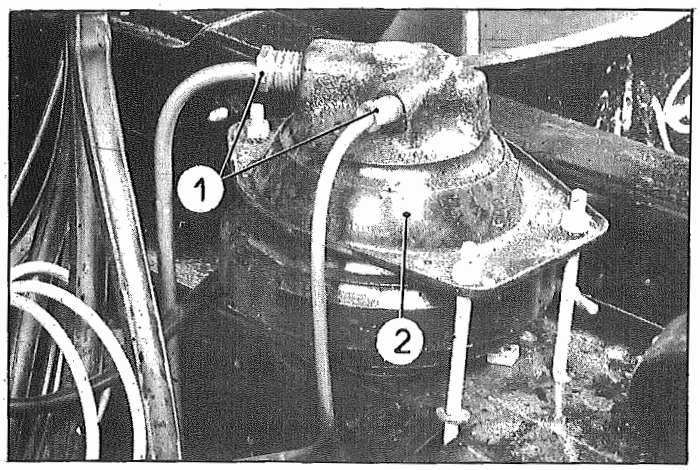
ASSEMBLY.

7. Put the connecting pipe in position.
8. Connect the pipe to the pump front endplate and to the pressure regulator.
9. Fit:-
   - the clip (1) holding the pipe on the gearbox housing,
   - the fan,
   - the battery.
10. Put the circuits under pressure and check all unions for leaks.

    Check that there is sufficient clearance between the connecting pipe and the drive pulley on the camshaft.

REMOVAL.

1. Remove the sparewheel.
2. Release the pressure in the main accumulator and in the brake accumulator (see Op. DX.00, para. 2).
3. Disconnect the pipes (1) from the accumulator.
4. Remove the securing plate (2) from the accumulator.
5. Free the accumulator.



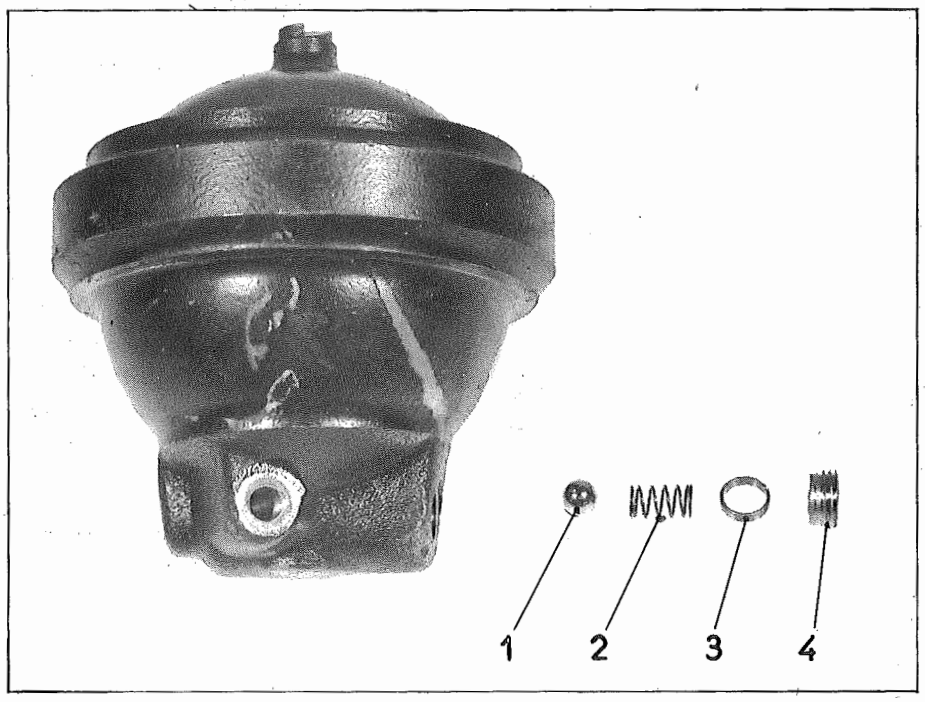
ASSEMBLY.

6. Offer up the accumulator in its support on the sidemember.
7. Fit the securing plate (2) fit the screws, without tightening them (shakeproof washer under the nuts).
8. Connect up the pipes (1).
9. Position the accumulator so that the pipes are not strained nor are they in contact with each other.
10. Tighten the nuts securing the plate (2).
11. Start up the engine. Loosen the bleed screw on the pressure regulator.

Allow the engine to run for a few minutes and then tighten the bleed screw.

Check all unions for leaks.

12. Bleed the brake circuits (see Op. DX.453-0).
13. Fit the sparewheel.



DISMANTLING.

1. Remove the screw (4) using Allen key, 6 mm.

2. Free:
   - the spacer (3),
   - the spring (2),
   - the ball (1).

3. Clean the parts in alcohol and then blow dry with compressed air.

ASSEMBLY.

4. Place a new ball on the ball seat.
   Remake the ball seating by striking the ball with a hammer and 7 mm rod.

NOTE: The ball cannot be used again.

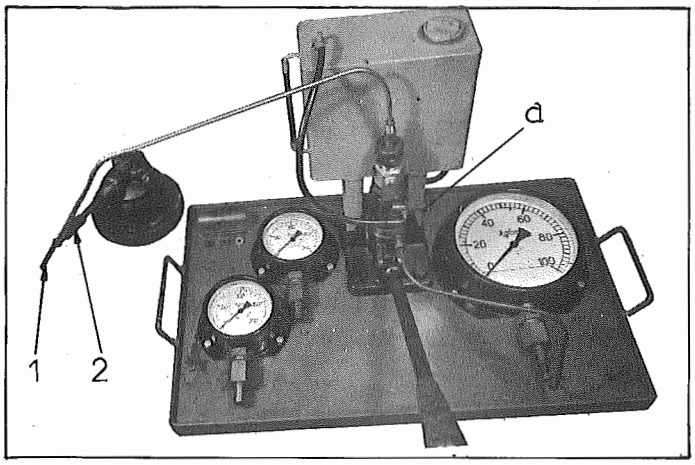
5. Clean with alcohol and blow dry with compressed air.

6. Place in position:
   - a new ball (1),
   - the spacer (3),
   - the spring (2),

   Tighten the screw (4).

7. Check the accumulator (see this Op. paras. 8 and following).

BENCH TESTING A BRAKE ACCUMULATOR.



Use the test bench 2290-T as shown in the photograph.

8. Check the seating of the valves.

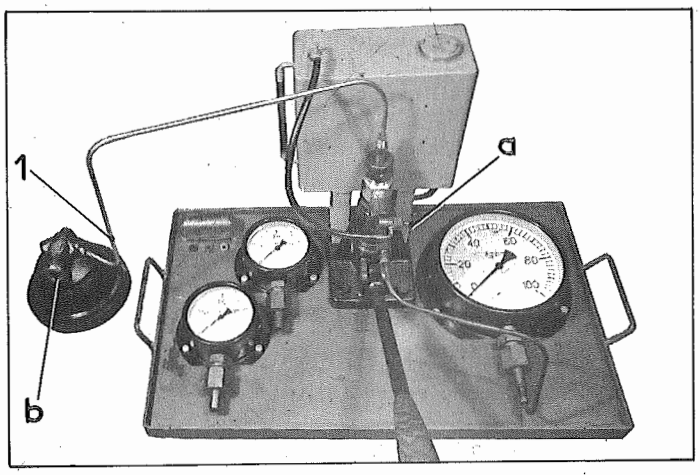
a) Connect the orifice (delivery) of the accumulator to the test bench, using a pipe (1).

b) Tighten the bleed screw (a) and operate the pump to build up pressure. The valve must satisfy the following conditions.

For a pressure lower than 21 p.s.i. (1.5 bar) there must be no flow through the orifice (b).

For a pressure greater than 49 p.s.i. (3.5 bars) there must be a flow through the orifice (b).

c) Release the pressure by unscrewing the bleed screw (a). Disconnect the test pipe (1) from the accumulator.

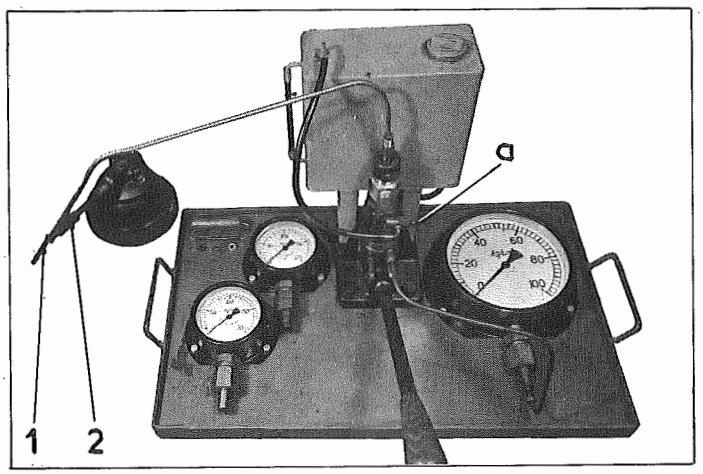


9. Checking the initial pressure and the valve for leakage.

a) Connect orifice (outlet) of the accumulator to the test pipe (1) using a union (2).

b) Tighten the bleed screw (1) operate the pump to build up pressure. The pressure will not rise appreciably at first but will then rise rapidly and remain steady at a figure which should be 570 $\pm$ 30 p.s.i. (40 $\pm$ 2 bars) at 20°C.

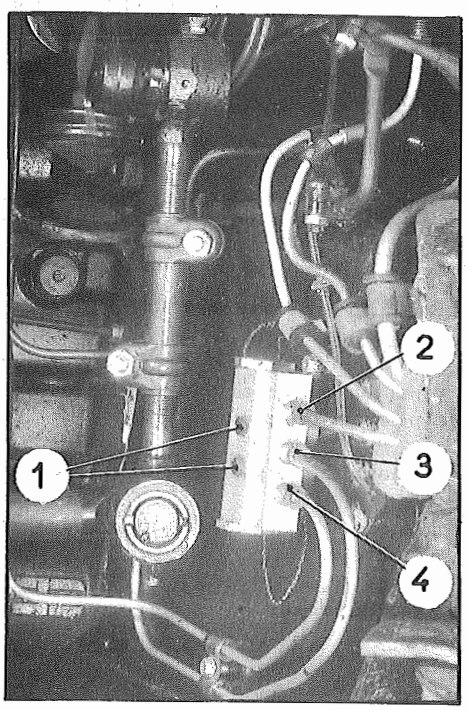
NOTE: This figure 40 is stamped on the accumulator plug.



c) Continue pumping to bring the pressure to 700 p.s.i. (50 bars).

Check the needle of the pressure gauge which should not register any drop in pressure. If it does the valve is leaking and the ball should be reseated (see this Op. para. 4).

d) Release the pressure, unscrewing the bleed screw (1). Remove the test pipe and the union.



REPLACEMENT OF A PRESSURE DISTRIBUTOR.

Removal.

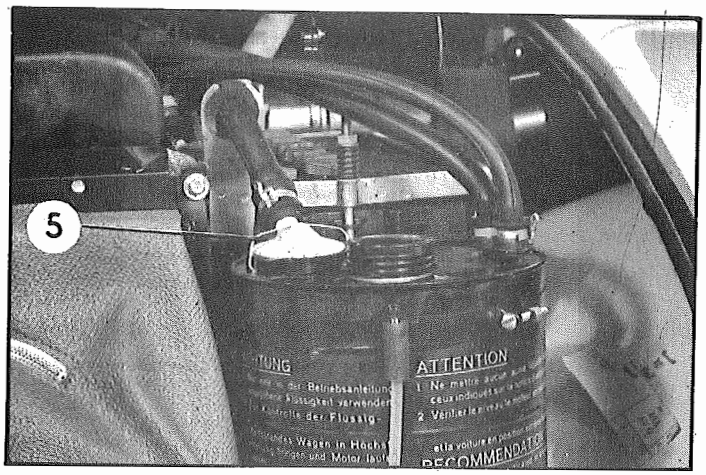
1. Remove the sparewheel, the front left-hand wing and the left-hand mudshield.
2. Release the pressure.
   Place the manual height control in "low" position.
3. Disconnect from the pressure distributor the following:
   - the union (2) from the rear suspension feedpipe,
   - the union (3) from the pressure feedpipe,
   - the union (4) from the front suspension feedpipe.
4. Remove the screw (1) from the distributor.
5. Remove the unit (take care not to lose the two spacers).

Assembly.

6. Offer up the pressure distributor (the convex plug uppermost) and tighten the securing screws (1) (inserting two spacers).
7. Connect the following to the distribution unit:
   - the union (2) for the rear suspension feedpipe,
   - the union (3) for the pressure feedpipe,
   - the union (4) for the front suspension feedpipe.
8. Start up the engine.

Put the circuits under pressure and check all unions for leaks.

9. Fit: - the mudshield,
   - the front left-hand wing and the sparewheel.



REPLACING OR CLEANING A FILTER FOR THE HYDRAULIC RESERVOIR.

Removal.

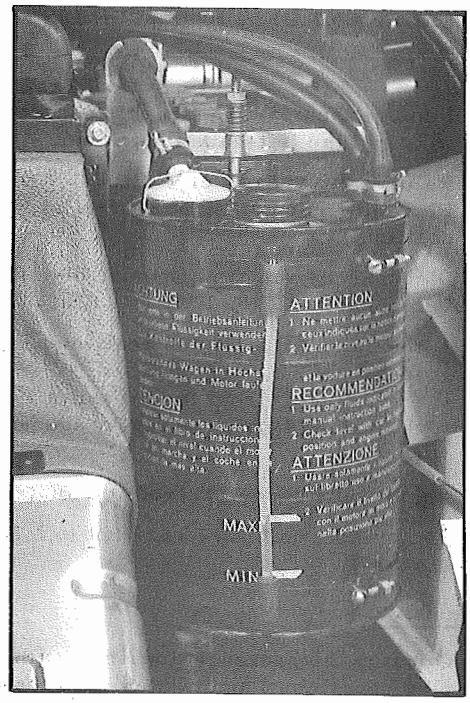
10. Free the spring (5) holding the plunger tube.
11. Withdraw the plunger tube from the reservoir by pulling it upwards.
12. Free the filter.
13. Clean the filter by immersing in clean alcohol, then blow compressed air over the outside.

Fitting.

14. Check the condition of the ring seal in the upper part of the plunger pipe.

Replace the plunger pipe and the securing spring (5).

Prime the high pressure pump (see Op. DX.391-1, paras. 12 to 13).



REPLACEMENT OF A HYDRAULIC RESERVOIR.

Removal.

15. Release the pressure.

16. Remove the sparewheel, the sparewheel support member and the mechanical headlamp control.

17. Drain the reservoir.

18. Disconnect the rubber pipes from the steel pipes on the reservoir and the pump suction pipe from the plunger pipe.

19. Remove the clips securing the reservoir.

20. Disconnect the rubber pipes underneath the reservoir.

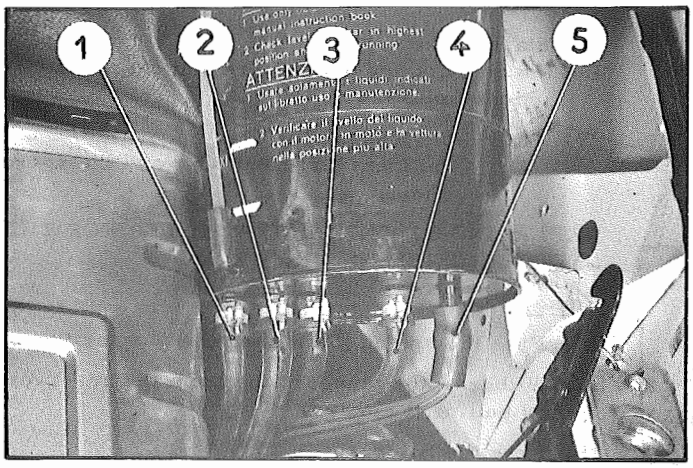
21. Free the reservoir.

Assembly.

22. Connect the following rubber pipes to the reservoir:

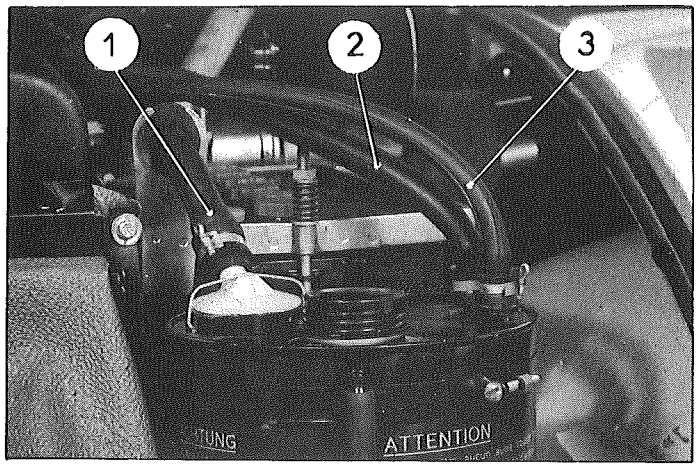
- the overflow return pipe (1) from the suspension cylinders,
- the return pipe (2) from the pressure regulator and the 3-way union (steering, height corrector and hydraulic gear selector),
- the return pipe (3) of the clutch re-engagement control,
- the return pipe (4) of the brake control,
- the overflow return pipes (5) (height correctors and clutch lock).

Tighten the clips. Insert under each clip a rubber bush to prevent pipe damage.



23. Fit the clips securing the reservoir, insert the screws but do not tighten them.

24. Position the reservoir and tighten the clips.



25. Connect up:
    - the pipe (1) (pump suction pipe) to the plunger tube,
    - the return pipe (3) from the centrifugal regulator return,
    - the return pipe (2) from the clutch re-engagement control.

Tighten the clips. Under each clip insert a rubber bush.

26. Fill up the reservoir and prime the high pressure pump (see Op. DX.391-1, para. 12).

27. Loosen the bleed screw. Start up the engine.

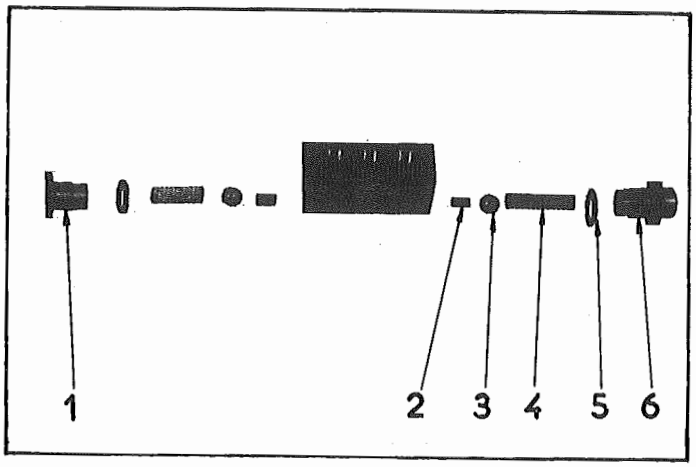
Put the circuits under pressure and check all unions for leaks.

Check the fluid level in the reservoir, with the engine running, car "high".

28. Bleed the brakes (see Op. DX.453-0).

29. Fit the crossmember support for the spare-wheel, the mechanical control for the head-lamps (see Op. DX.851-1).

Fit the sparewheel.



DISMANTLING.

1. Remove the plug (6).

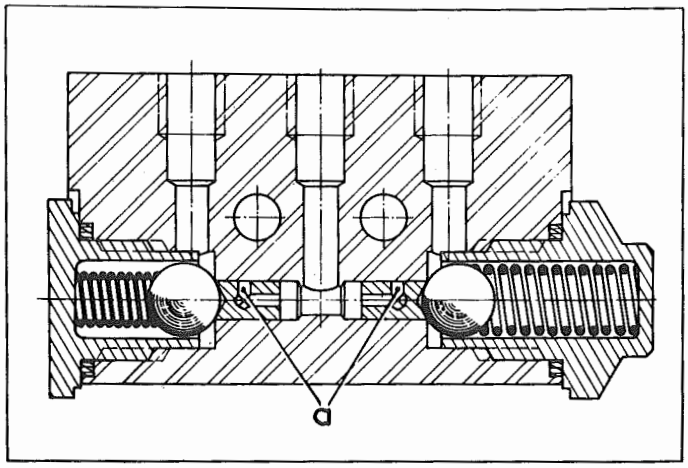
Remove:

- the spring (4),
- the ball (3),
- the piston (2) (to do this inject compressed air through the centre hole in the unit.

2. Remove the plug (1) and carry out the same operation as above.

3. Free the sealing washers (5) from the plugs (1 and 6).

4. Clean the parts in alcohol.



ASSEMBLY.

5. Place a new ball on the seating.
Remake the ball-seat by striking gently with a hammer and a 10 mm diameter rod.

NOTE: This ball cannot be used again.

6. Clean the unit in alcohol, blowing dry with compressed air.

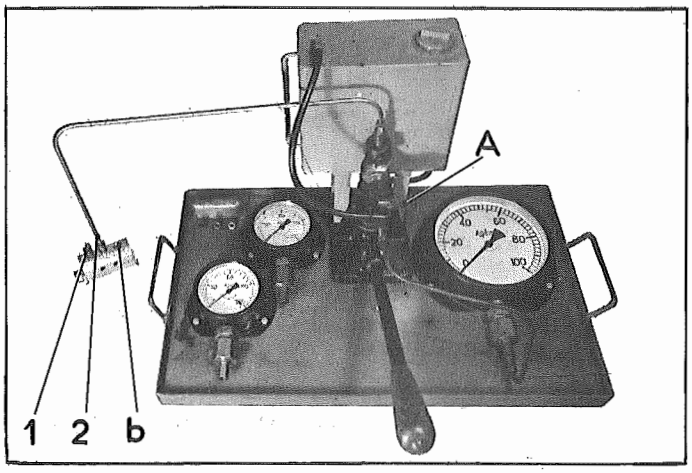
7. Place the following parts inside the distributor unit commencing at the rear suspension side:

- the piston (2) (the concave part and hole (a) on the ball side),
- a new ball (3),
- a spring (4) (the longest).

Fit and tighten the plug (6) (the longest) with a new sealing washer (5).

8. Carry out the same operation on the other side.

9. Check the distributor (see this Operation paras. 10 and following).



10. Use test bench 2290-T.
(Use the gauge graduated 0 to 100 kg/cm^2, 0-1500 p.s.i.).

11. Check the adjustment of the spring on the front valve.

a) Plug the rear outlet hole of the unit with a sealing plug (1).

b) Connect the central hole in the unit to the test bench pump by means of pipe (2).

c) Tighten the bleed screw (A) on the pump.

Operate the pump to increase the pressure progressively.

The valve should respond to the following conditions:

- for a pressure lower than 56 p.s.i. (4 kg/cm^2) there must be no flow through the hole (b),
- for a pressure greater than 98 p.s.i. (7 kg/cm^2) there must be a flow through the orifice (b).

NOTE: If the pressure remains steady outside these limits, replace the spring. If the pressure drops to zero reseat the ball (see front feed para. 5 this Operation).

d) Release the pressure by loosening the pump bleed screw (A).

Remove the sealing plug (1).

12. Checking the adjustment of the spring for the rear valve.

Use a guage graduated 0 to 1500 p.s.i. (0 to 100 kg/cm^2).

a) Plug the front outlet hole of the unit with a sealing plug (3).

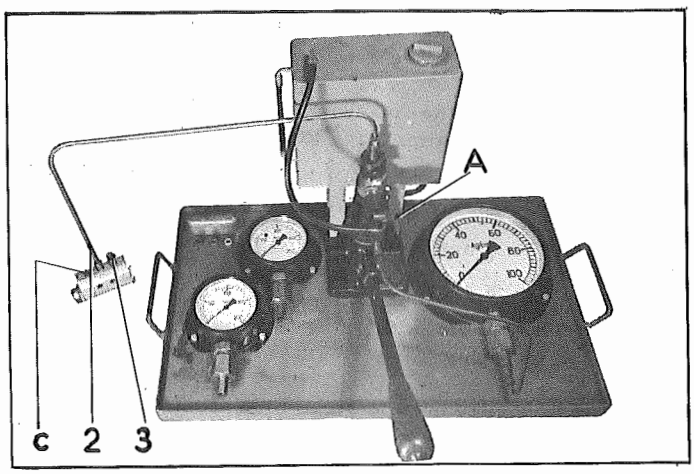
b) Connect the central hole in the unit to the test bench pump, using pipe (2).

c) Tighten the bleed screw (A) of the pump. Operate the pump in order to increase the pressure progressively.

The valve should respond to the following conditions:

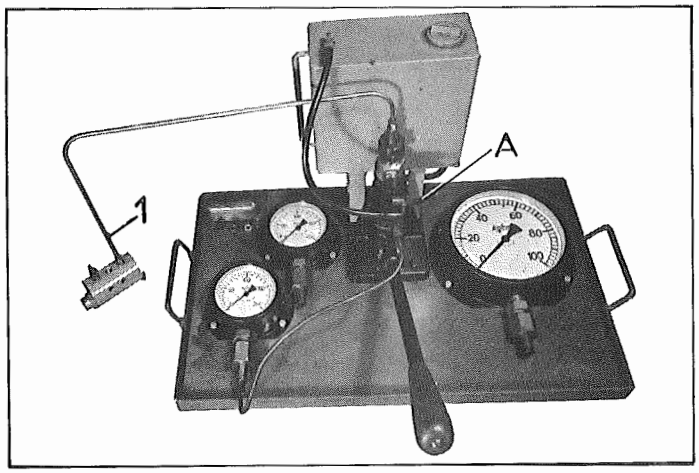
- for a pressure less than 355 p.s.i. (25 kg/cm^2) there must be no flow through the hole (c),
- for a pressure greater than 480 p.s.i. (42 kg/cm^2) there must be a flow through the orifice (c).

If these conditions are not fulfilled, carry out the operations indicated above (paragraph 11 NOTE).



13. Release the pressure by loosening the screw (A).

Disconnect the tube (2) from the distribution unit and remove the sealing plug (3).



14. Checking the front valve for leakage.

(Use a gauge graduated 0 to 3000 p.s.i. (0 to 200 kg/cm^2).

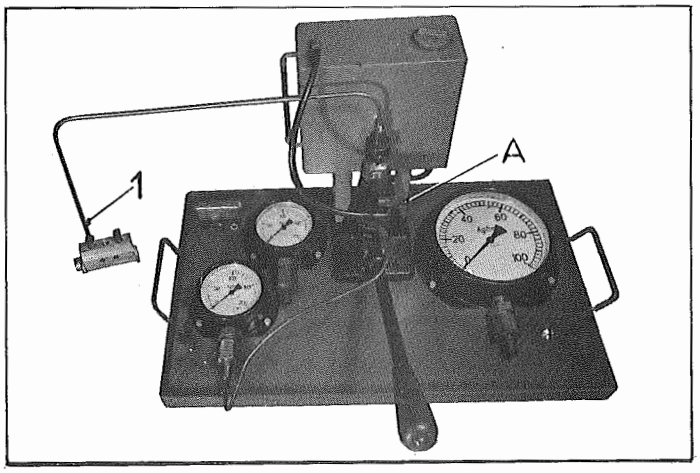
a) Connect the hole (front outlet) of the distributor to the test bench using tube (1).

b) Tighten the bleed screw (A) on the test bench pump.

c) Operate the pump to bring the pressure to 2489 p.s.i. (175 kg/cm^2).

The pressure gauge must not show any drop in pressure. If it does, the valve is defective. It is necessary to replace the ball and remake the ball seat (see paragraph 11 NOTE, this Operation).

d) Release the pressure by loosening the bleed screw (A) of the pump.

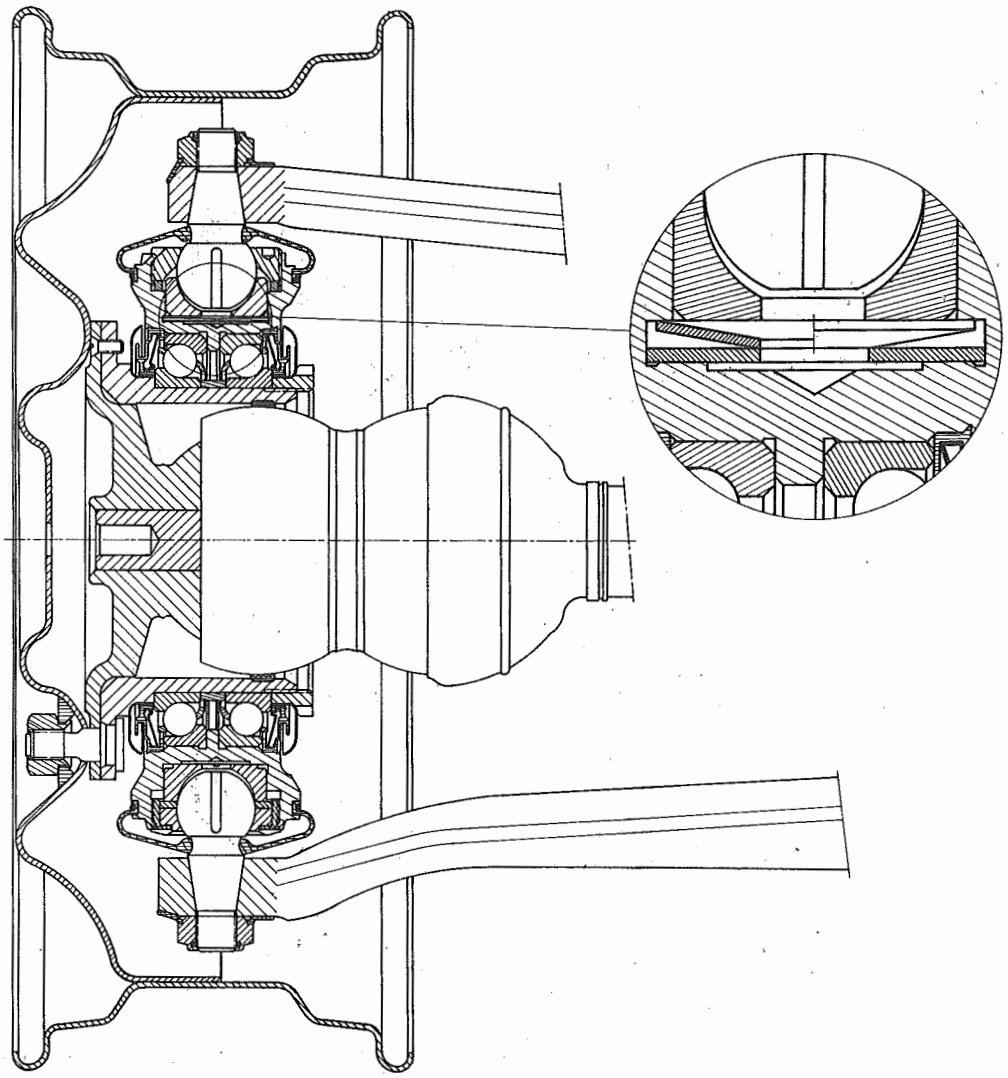


15. Checking the rear valve for leakage.

Use a gauge graduated 0 to 3000 p.s.i. (0 to 200 kg/cm^2).

Connect the hole (rear outlet) of the distributor to the test bench using tube (1).

Then proceed as indicated as in paragraph 14 above.



SPECIAL POINTS

PIVOT

Do not clean the pivot assembly by immersion.

The pivot bearings can only be replaced by using a special tool.

Tightening torque for the nut of the upper pivot ball on arm, from 61 to 79 ft lbs (8.5 to 11 m.kg).

Tightening torque for nut of lower pivot ball on arm, 72 ft lbs (10 m.kg).

Tightening torque of nut locking pivot bearings $720\ ^{+29}_{0}$ ft lbs ($100\ ^{+40}_{0}$ m.kg).

Tightening torque for upper ball pin nut on pivot 290 ft lbs (40 m.kg).

Because of the high torque it is impossible to replace a ball joint on the vehicle without destroying the pivot and linkage.

Select the thickness of the adjusting shim for the lower pivot ball with precision (see Op. DX. 413-1).

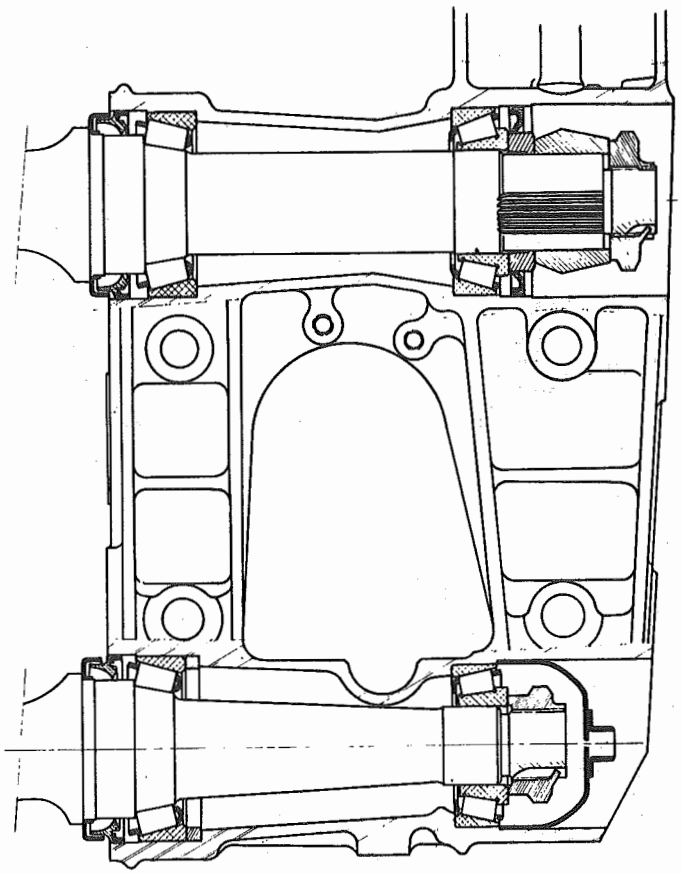
The adjusting shim for the upper pivot is sold paired with the bearing assembly and races.

Tighten the nut of the upper ball on pivot to 100 ft lbs (14 m.kg) and do not fit the upper ball cup under a press or by blows, to avoid damaging the pivot.

June 1966.

Corrective No.1

C1 5



SPECIAL POINTS

REMOVAL.

The suspension piston rod can only be freed when the pin holes in the rod and the lever are in line. To bring them in line it is necessary to press on the arm.

ASSEMBLY.

Tighten the screws holding the half-axle to between 50 and 65 ft lbs (7 to 9 m.kg).

Anti-roll bar: lateral position : obtained moving the right-hand stop to 110 $\pm$ 0.5 mm between the outer face of this stop and the inside face of the boss holding the anti-roll bar knuckle on the right-hand side (see Op. DX.433-0).

Tighten the anti-roll bar bearings to $8\frac{1}{2}$ ft lbs (1.2 m.kg).

The bar should turn without an effort greater than 4 to 6 kg. (9 to 13 lbs).

End-play of the bar 0.5 to 1 mm.

To connect the anti-roll bar to the suspension levers proceed as indicated in Op. DX.410-1, paragraph 22 to obtain a centre distance between the lever ball and the anti-roll bar ball of 198 mm on the right-hand side and 199 mm on the left-hand side.

FITTING.

The outer face of the rear joint of the upper arm should be at $6.25 \begin{smallmatrix} 0 \\ -0.5 \end{smallmatrix}$ from the outer face of the bearing inner cup.

The outer face of the front joint of the upper arm should be at 2.5 ± 0.25 mm from the outer face of the support bracket.

Tighten the nuts securing the upper and lower arms to 65 ft lbs (9 m.kg). Then loosen 1/12th of a turn.

Adjust the caster angle using gauge 2321-T. The reading on this gauge should be between 24.75 and 25.25 mm.

ADJUSTMENTS.

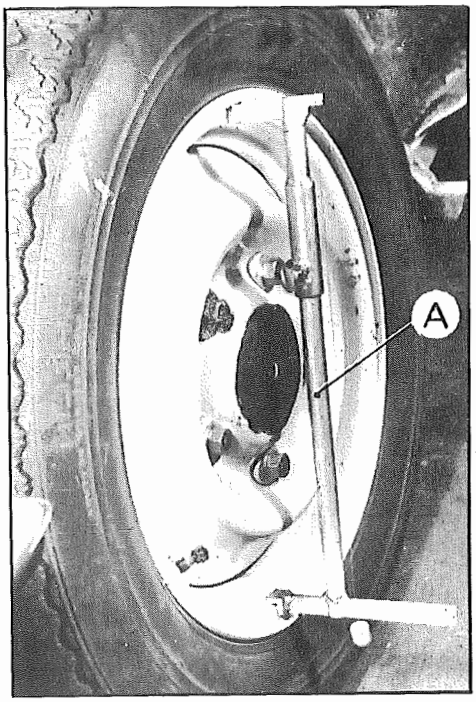
Camber. Not adjustable. The difference in the readings obtained with gauge 2315-T should not exceed 1 mm between the right and left-hand sides.

Alignment. Toe-in towards the front = 1 to 3 mm.

Steering lock: $42 \begin{smallmatrix} 0 \\ -1^{o} \end{smallmatrix}$

At maximum steering lock there should be a clearance of 10 mm between the tyre and the relay housing.

Zero position determine this on the road, see Op. DX. 410-0.

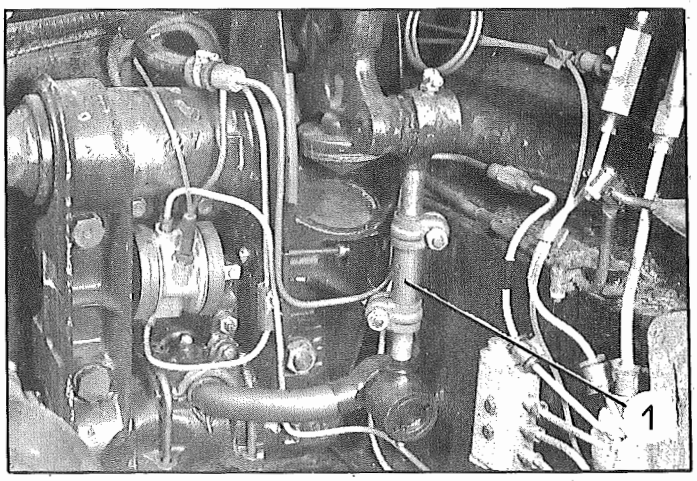


Adjustments of the camber.

1. Check the heights (see Op. DX.433-0).
2. Offer up the fixture 2315-T (A).

   Note the position given by the plumb-line on the fixture scale.
3. Carry out the same operation on the opposite wheel.

   The difference must not be greater than 1 mm.



4. If it is, proceed as follows:-

a) Remove:

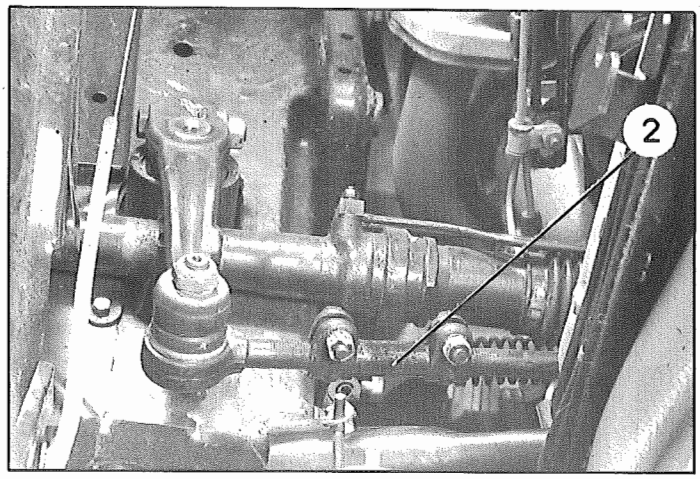
- the front left-hand wing,
- the height corrector mudshield.

b) Adjust the sleeve (1) to equalise the camber between the two wheels.

NOTE:- The plumb-line must fall in the zone between the two marks on the scale nearest to the wheel rim.

June 1966.

Corrective No.1



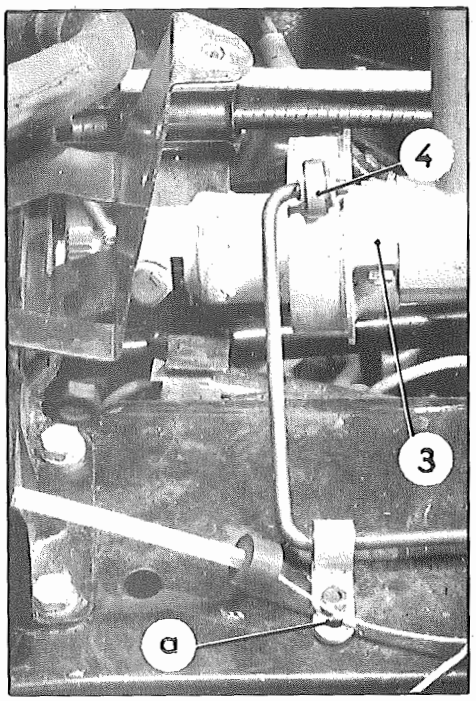
Adjusting the alignment.

NOTE: The car must be at normal height, with the engine running.

5. Use an ordinary commercial track-gauge.

Measure at wheel centre height the distance between the wheel rims, at the rear. Mark the points with chalk. Move the car so as to turn the wheels half a turn and measure at the front on the points previously marked.

6. There must be a toe-in of between 1 and 3 mm. If not, adjust the track-rod sleeve (2), first raising the front of the vehicle. Loosen the screws in the clamps of the sleeve. Work by fractions of turns (a quarter of a turn corresponds to a variation in the alignment of approximately 1 mm). Check the alignment again. Tighten the screws on the clamps to 7 ft lbs (1 m.kg). Turn the steering to full right-lock and left-lock to ensure that sufficient clearance exists between the clamp screws, the front crossmember and the radiator fan cowl.



Adjustment of the steering centre-point.

NOTE : This adjustment can only be carried out on the road.

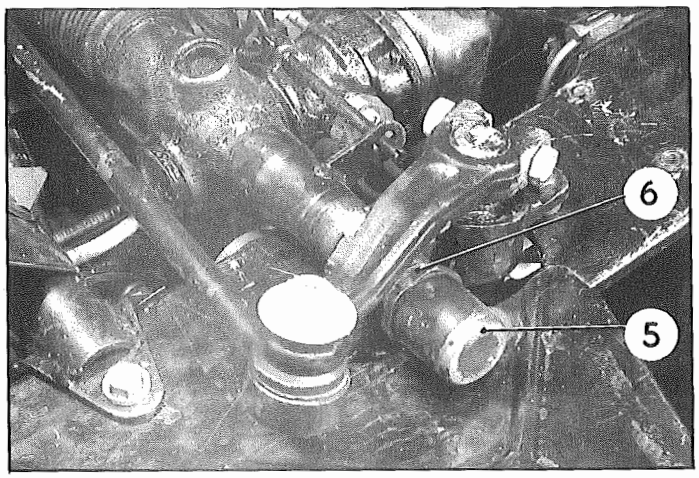
7. Determine the position of the steering wheel for running in a straight line.
   - Travel on a straight level road.
   - Hold the steering wheel in order to maintain a straight line.
   - Then make marks with chalk on the dash-board and on the arm of the steering wheel.

8. Stop the car.

9. Adjust the position of the cam:
   - Turn the steering wheel to align the marks made previously under paragraph 8.
   - Loosen the clamp (3) securing the cam and turn it until the roller (4) seats in the hollow of the cam.
   - Tighten the clamp 3 ft/lbs. (4 m N or 0.4 m.kg).

10. Check by driving along the road that the car runs on a straight line.

NOTE : The roller must be parallel to the cam and in the centre of it to within 2 mm approximately. The slot (a) allows for adjusting the roller position.



Adjusting the steering lock.

NOTE : To avoid undue strain on the driveshafts the steering lock must be adjusted to 42°.

11. Raise the front of the vehicle on stands.

    Remove the front wings.

12. Place the steering wheel as for running in a straight line (see paragraph 8, this operation).

13. Turn the steering wheel $1\frac{1}{2}$ turns exactly towards the left.

Screw up the stop cap (5) until it contacts the rack, and tighten the locknut (6).

14. Turn the wheel 3 turns towards the right.

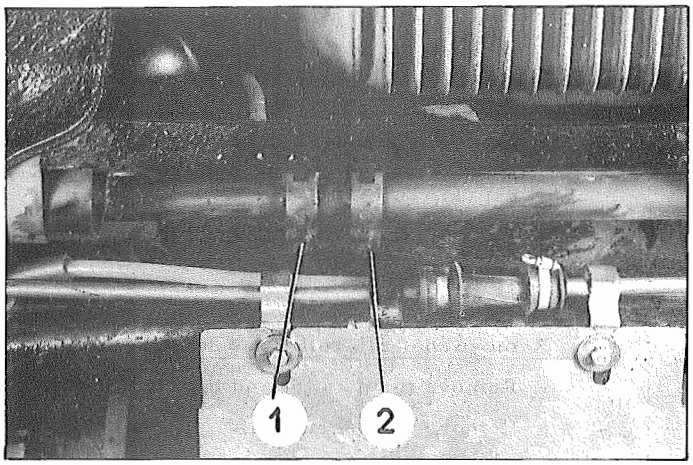
Screw up the stop cup and tighten the locknut.

15. Replace the wings and lower the car to the ground.

NOTE: With the wheels at full lock, there must be a clearance of 10 mm between the tyre and the relay mudshield. If necessary reduce the lock.

June 1966.

Corrective No.1



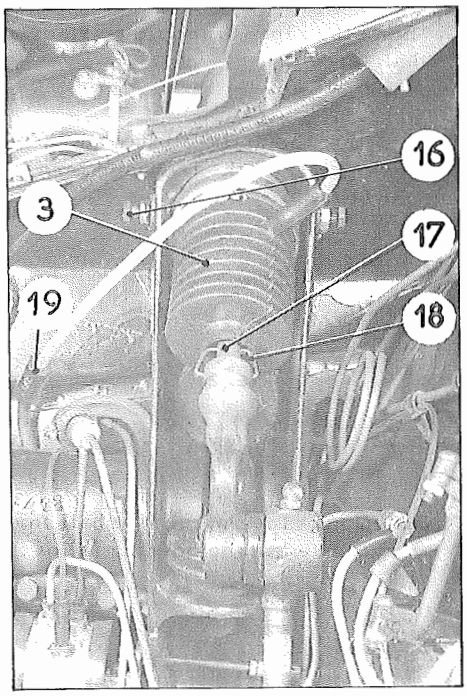
5. Remove:

   the suspension mechanism mudshield, and the lower protection shield on the side of the half-axle to be removed.

6. Loosen the two screws (1) and (2) of the clips on the height control corrector and the headlamp beam control rod, on the anti-roll bar.

7. With a touch of paint mark the position of the sleeve (9) loosen the screws of the clips, then remove the two sleeves.

NOTE: The left-hand sleeve has a left-hand thread at one end and a right-hand thread at the other. The right-hand sleeve has a right-hand thread at both ends.



REMOVAL.

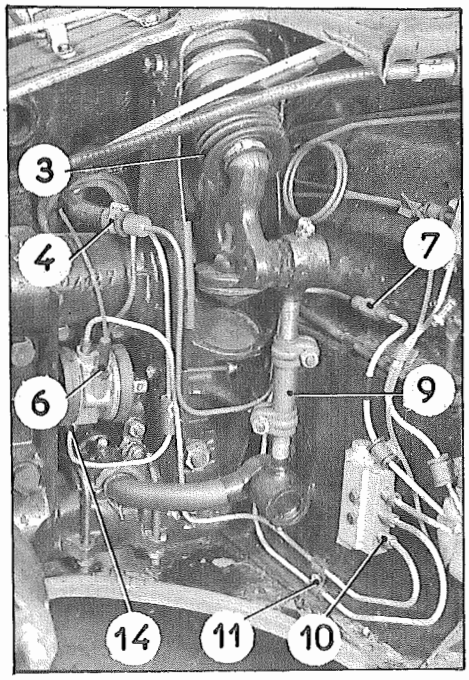
1. Loosen the nuts on the front wheels. Put the car on stands (jacking bracket 2505-T).

Remove the front wheels.

2. Remove the sparewheel, the sparewheel crossmember support, the headlamp control rod, the front wings.

3. Release the pressure (see Op. DX.372-1).

4. Remove the transmission on the side where the half-axle is to be removed (see Op. DX.372-1).



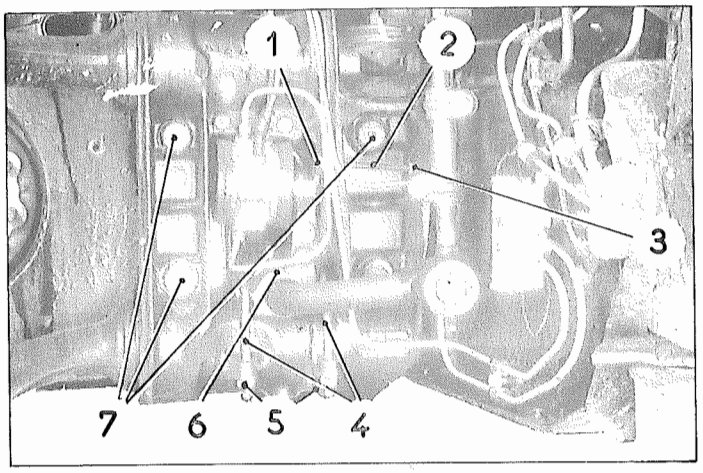
8. Disconnect the unions (14) (10) and (7), the overflow return (6) as well as the return pipe (4).

9. Loosen the screws (11) and remove the height corrector.

10. Remove the suspension cylinder:

- Remove the suspension sphere and its spacer.
- Disconnect the union between feedpipe and cylinder.
- Disconnect the dust cover (3) from the control lever.
- Remove the spring clip (18).
- Lower the arms to the maximum to free the rod (17).

NOTE: The pin holes in the rod and lever must be in line in order to free the rod from the lever. Loosen the locknuts on the screws (16). Remove the suspension cylinder after having disconnected the rubber union (19) from the overflow return.

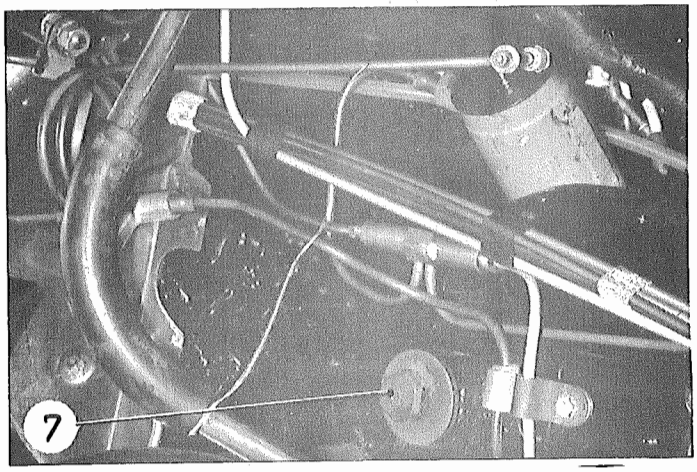


11. Remove the height control rod (2).

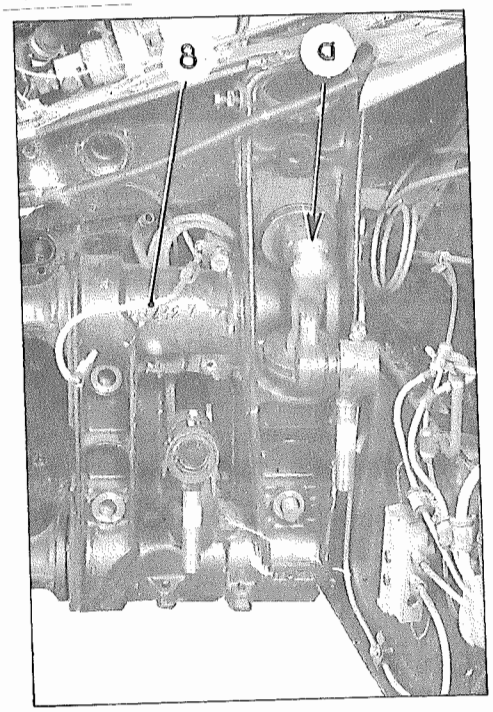
- Place the manual height control in position "high", loosen the locknut and remove the nut (1).
- Loosen the locknut (3) and remove the rod (2).

12. Remove the anti-roll bar bearing.

- Remove the nuts (5) and the clamps (4).
- Remove the bearing (6).



13. Remove the five screws (7).

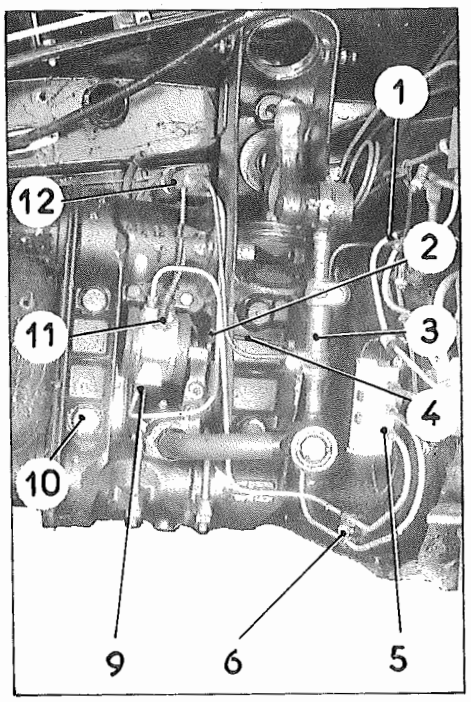


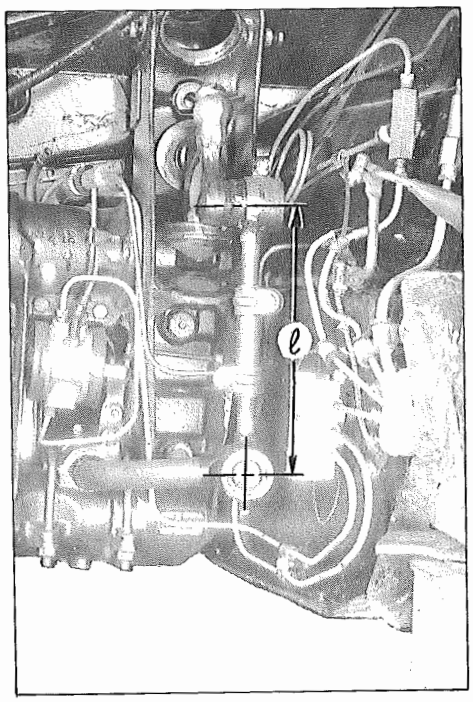
14. Bend the pipe (8) to allow withdrawal of the half-axle.

15. Position the anti-roll bar as shown in the photograph on the left, and turn it $\frac{1}{4}$ of a turn upwards.

16. Remove the half-axle.

NOTE: Do not lose the thrust ball for the piston rod located in the housing (a) of the lever.





ASSEMBLY.

17. Fit the half-axle, ensuring that the centring dowels are correctly located in the bores in the front unit.

18. Tighten the screws (10) to 50/65 ft.lbs. (7 to 9 m.kg).

19. Adjust the anti-roll bar (see Op. DX.433-0).

20. Fit the control rod (4) for the height control as well as the nut and locknut (2).

21. Fit the height corrector and then connect the unions (5) (1) and (9) as well as the overflow return (11) and the pipe (12) to the reservoir return.

Retighten the screw (6) on the securing clip.

22. Connect the anti-roll bar to the suspension levers:

a) Screw the left-hand sleeve (3) a few threads on the end of the suspension lever ball connection and then on the anti-roll bar connection.

b) Screw the right-hand sleeve on the fitted end of the bar connection until about 5 mm from the end of its thread.

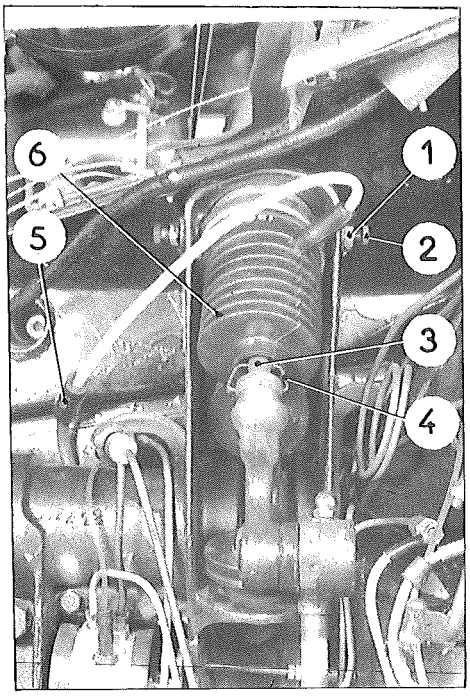
c) Screw the left-hand sleeve as far as the marks made when dismantling, or if a new part is being used, until a dimension "ℓ" = 198 mm is obtained (between the centre of the bar and the centre of the lever), right-hand side.

Connect up the right-hand sleeve screwing it so that it occupies the same number of threads on the lever connection as on the bar connection.

d) Adjust the left-hand sleeve to obtain a dimension "ℓ" = 199 mm on this side.

e) Tighten the screws of the securing clamps on the right and left-hand sleeves.

23. Carry out the pre-adjustment operation of the height control mechanism (see Op. DX.433-0).



24. Fit the suspension cylinder:
    - Engage the cylinder in its housing and then tighten the screws (2) moderately.
    - Tighten the locknuts (1).
    - Engage the piston rod (3) in its housing.

NOTE: Check that the suspension mechanism ball is in place in the lever.

    - Fit the pin (4).
    - Fit the dust cover (6).
    - Place the rubber bush on the dust cover.
    - Fit a Ligarex collar (tool 2483-T).
    - Connect the rubber union (5) for the overflow return.

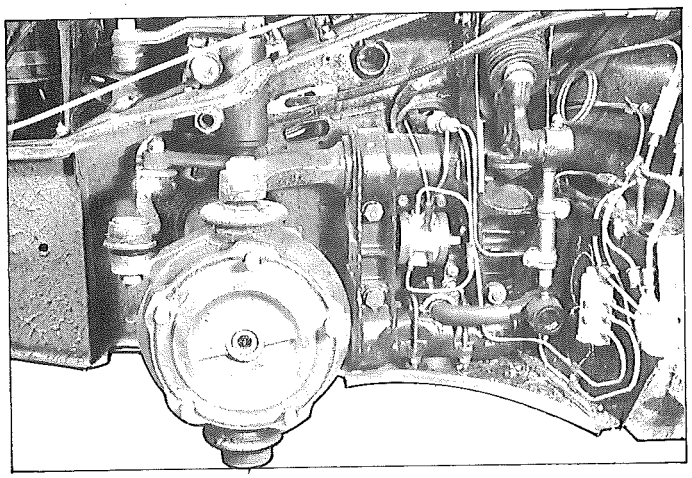
25. Connect up the feedpipe to the cylinder.

26. Fit the suspension sphere and its spacer (left-hand).

27. Fit the transmission (see Op. DX.372-1).

28. Fit the front wheels, then lower the car to the ground.

29. Adjust the heights (see Op. DX.433-0).
    - Check all unions for leaks and check the liquid level in the reservoir.



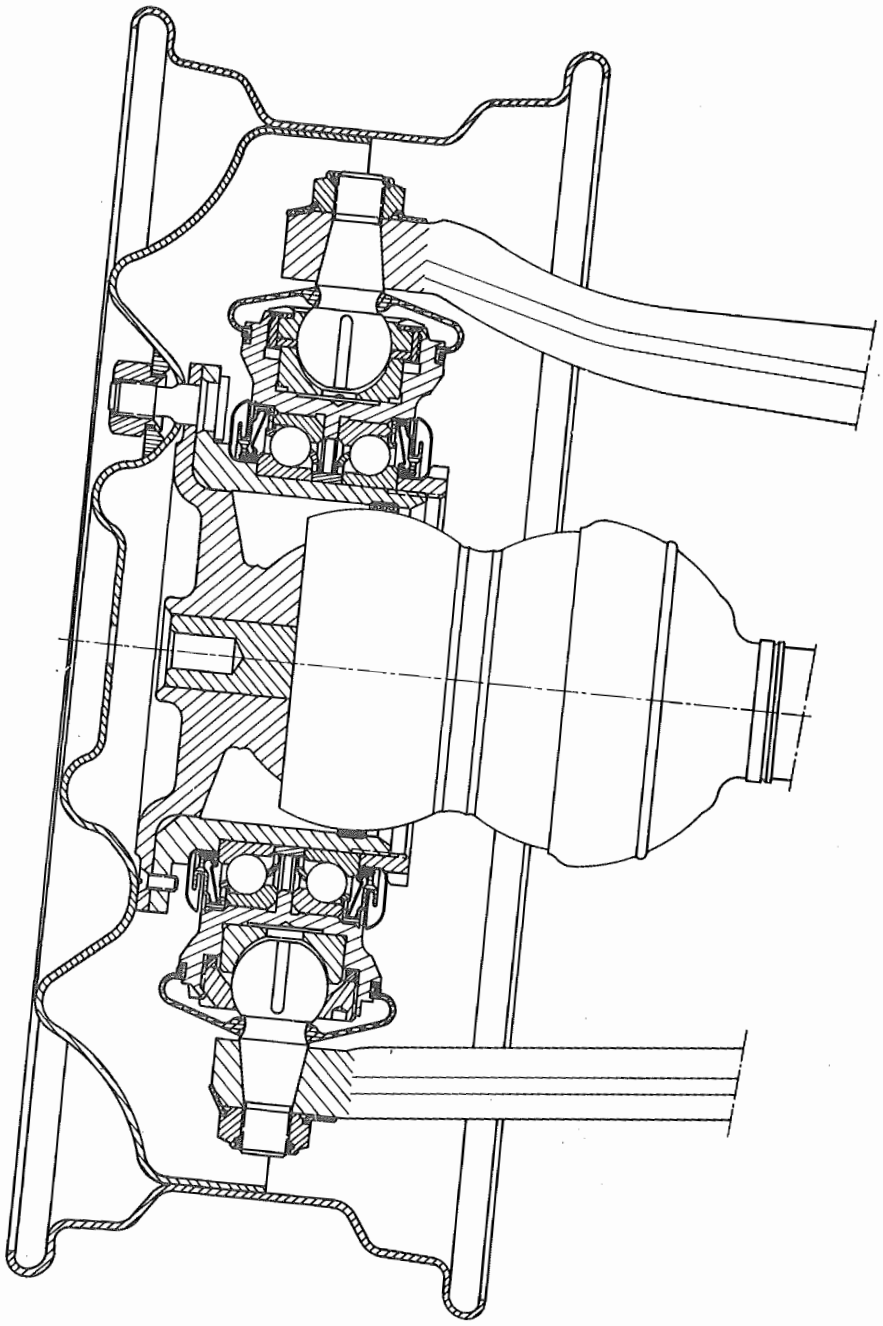
30. Adjust the manual height control (see Op. DX.437-0).

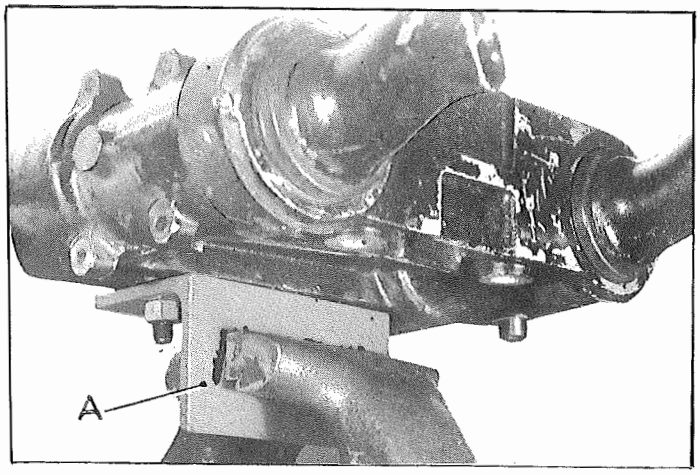
31. Adjust the toe-in and the steering lock (see Op. DX.410-0).

32. Fit the lower protection panel and mudshield for the suspension mechanism.

33. Fit the front wings.
    - the crossmember support for the spare-wheel,
    - the control rod for the headlamps (Op. DX. 540-0),
    - the sparewheel.

34. Adjust the straight-line cam for centre position (see Op. DX.410-0).



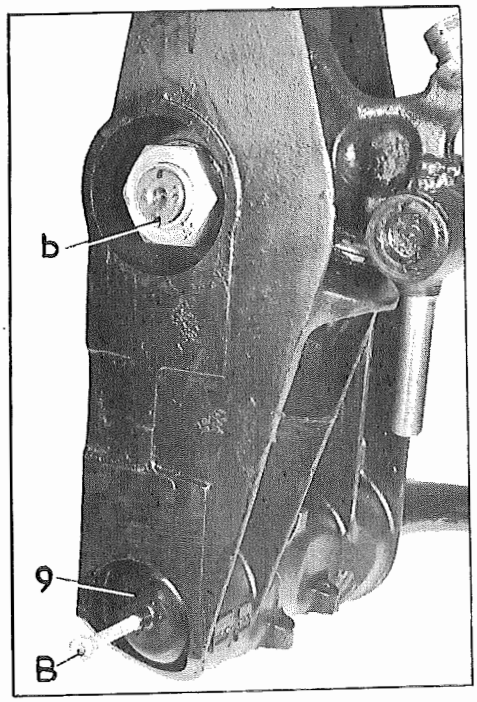


DISMANTLING.

1. Place the half-axle assembly in a vice (bracket MR.3053-120). (A).

2. Remove the lower arm:

Remove the cylindrical plug (9) using a screw (B) 7 mm diameter.
With a chisel remove the metal knocked down into the nut (10) securing the arm.



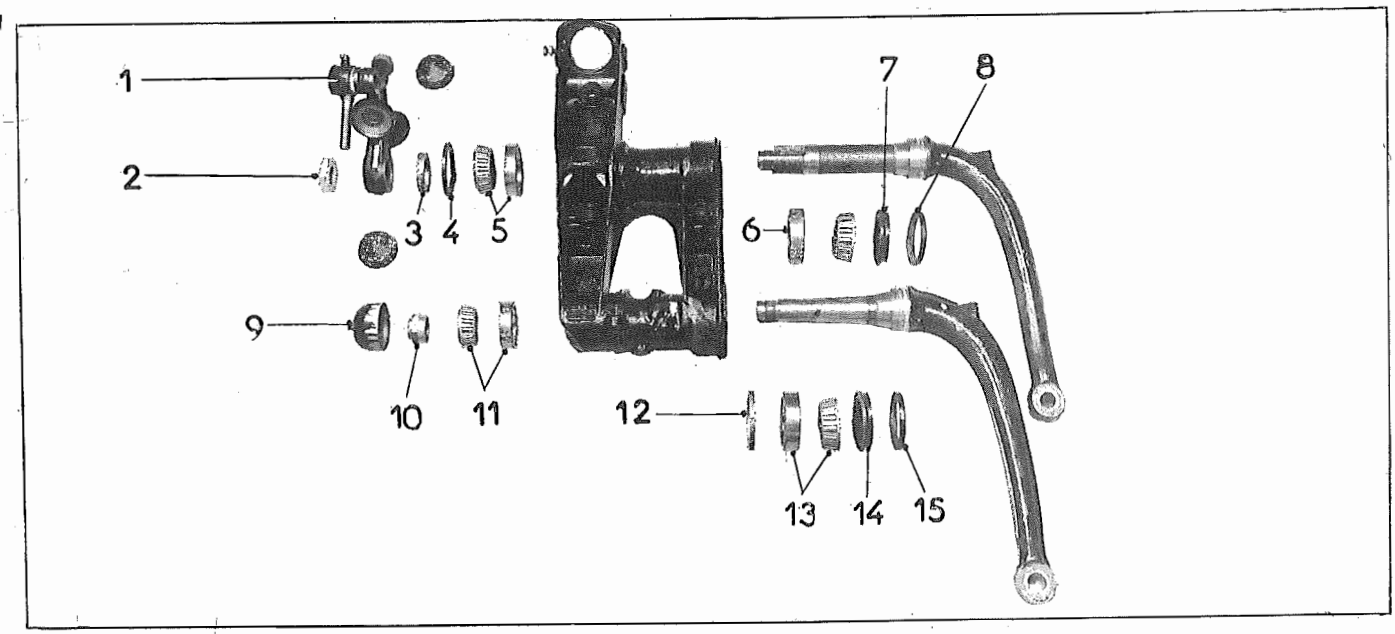
Remove the nut.
Tap out the arm with a bronze rod.
Remove the seal (14) and deflector (15).
Remove the roller cages (11 and 13).

3. Remove the upper arm.

With a chisel remove the metal knocked down into the nut securing the arm, and remove the nut (2).
Tap out the arm with a bronze rod.
Free the suspension lever (1) and its thrust bush (3) the sealing rings (4) and (7), the roller bearing cages (5) and (6) and the metal deflector (8).

4. Strip the arm body.

If necessary, heat with a blow pipe the arm body round the cage housings and free the bearing cages (5) (6) (11) and (13) and the adjusting shim for the caster angle (12).



ASSEMBLY.

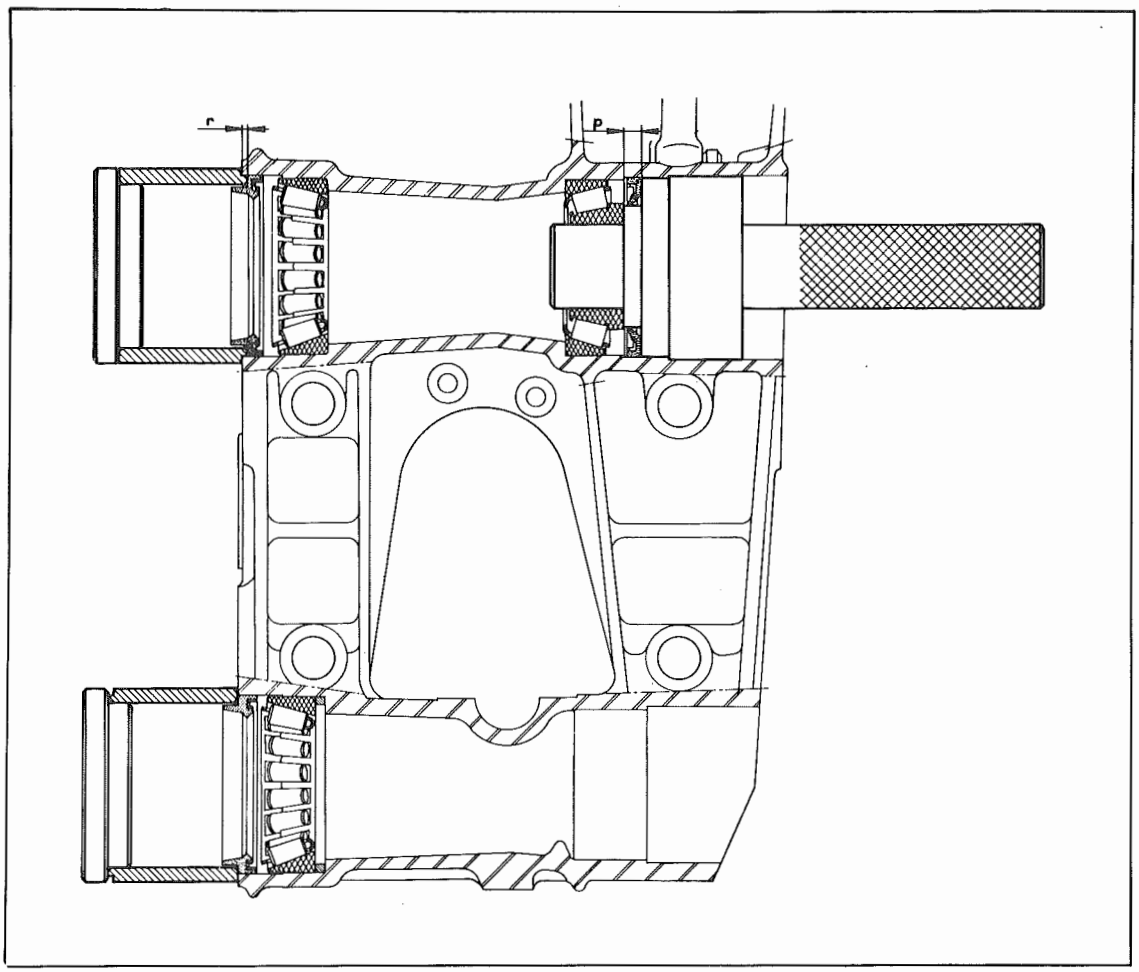
5. Prepare the arm body (see fig. on previous page).

a) Check the thrust face of the four bosses for the securing screws; use a face plate 200 x 250 mm; a maximum play of 0.2 mm is permissible between the bosses and the face plate.

b) Fit the bearings:
- With a blow pipe heat the bearing housings.
- Place the inner bearing cages (6) (5) (11) in their housings.
- Smear the roller cages for (6) and (5), with special bearing grease, then fit them in place in the body (use a piece of pipe 71.5 mm outside diameter x 150 mm long.

c) Fit the sealing joints (1) and (2) as shown:
$r = 2.5 \pm 0.25$ mm for the upper front seal $p = 6.5 \, {}^{0}_{-0.25}$ mm for the rear upper seal.

Use mandrels MR.3674-140 and MR.3676-150 to do this correctly.



6. Prepare the suspension lever (see fig. on previous page).

a) Remove the nut (1), the spring, and ball thrust cup, clean them thoroughly in petrol and blow off with compressed air.

b) Smear this assembly with adhesive grease and fit the ball thrust cup, the spring and the nut (1).

c) Tighten the nut to 7 ft.lbs. (1 m.kg) then unscrew 1/8 of a turn.

d) Pin the nut. If necessary drill a hole for the pin.

e) Replace the rubber stops. To facilitate their assembly, moisten them with hydraulic fluid.

7. Insert 50 grammes of special roller bearing grease between the two rollers, in the arm bracket.

8. Using a tube, engage the metal deflector (8) on the upper arm. Do not deform the deflector when fitting.

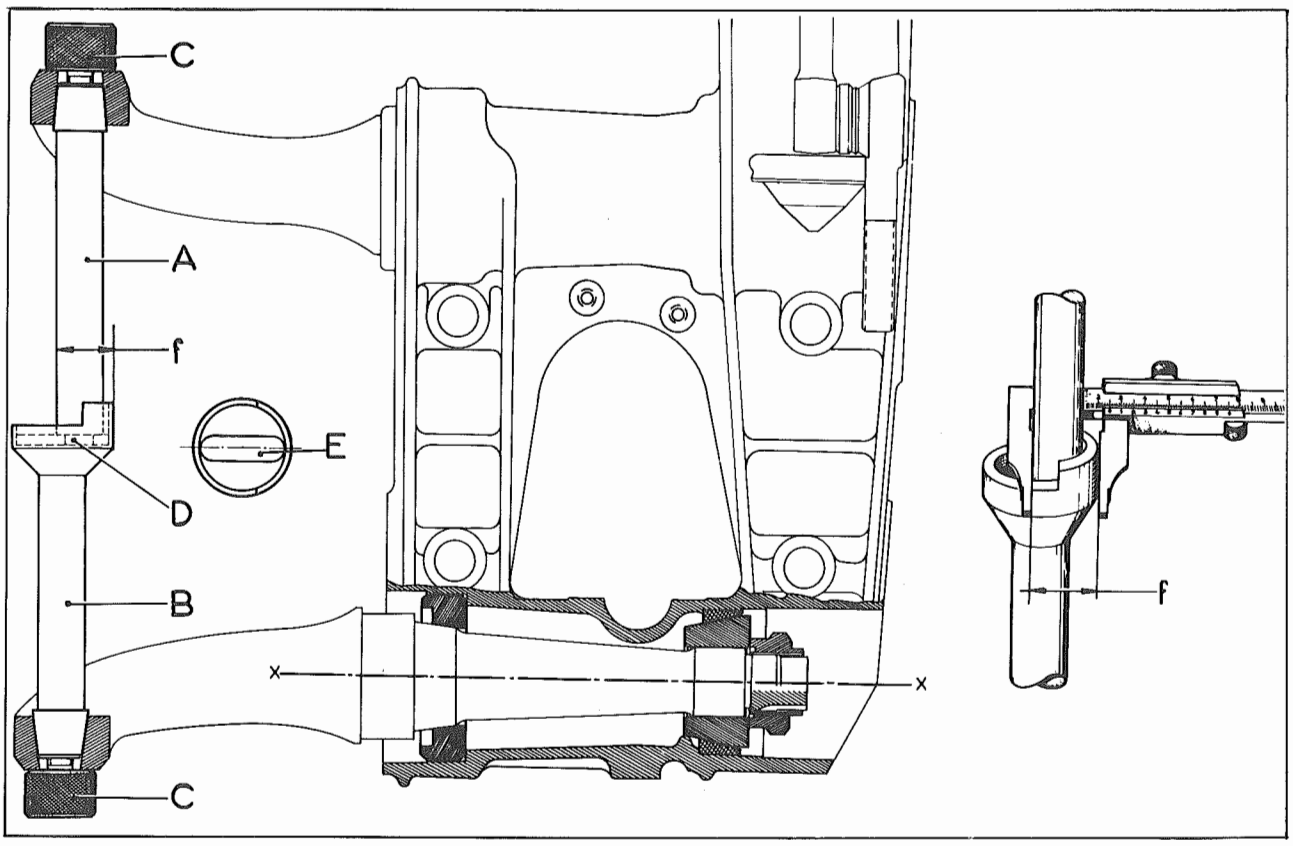
9. Engage the arm in the roller bearings, then the thrust bush (3) for the suspension lever (the flat face against the roller bearing).
   - Offer up the suspension lever on the arm splines.
   - Tap the lever, using a tube and supporting the opposite end meanwhile.
   - During this operation, take care not to displace the seal (4).

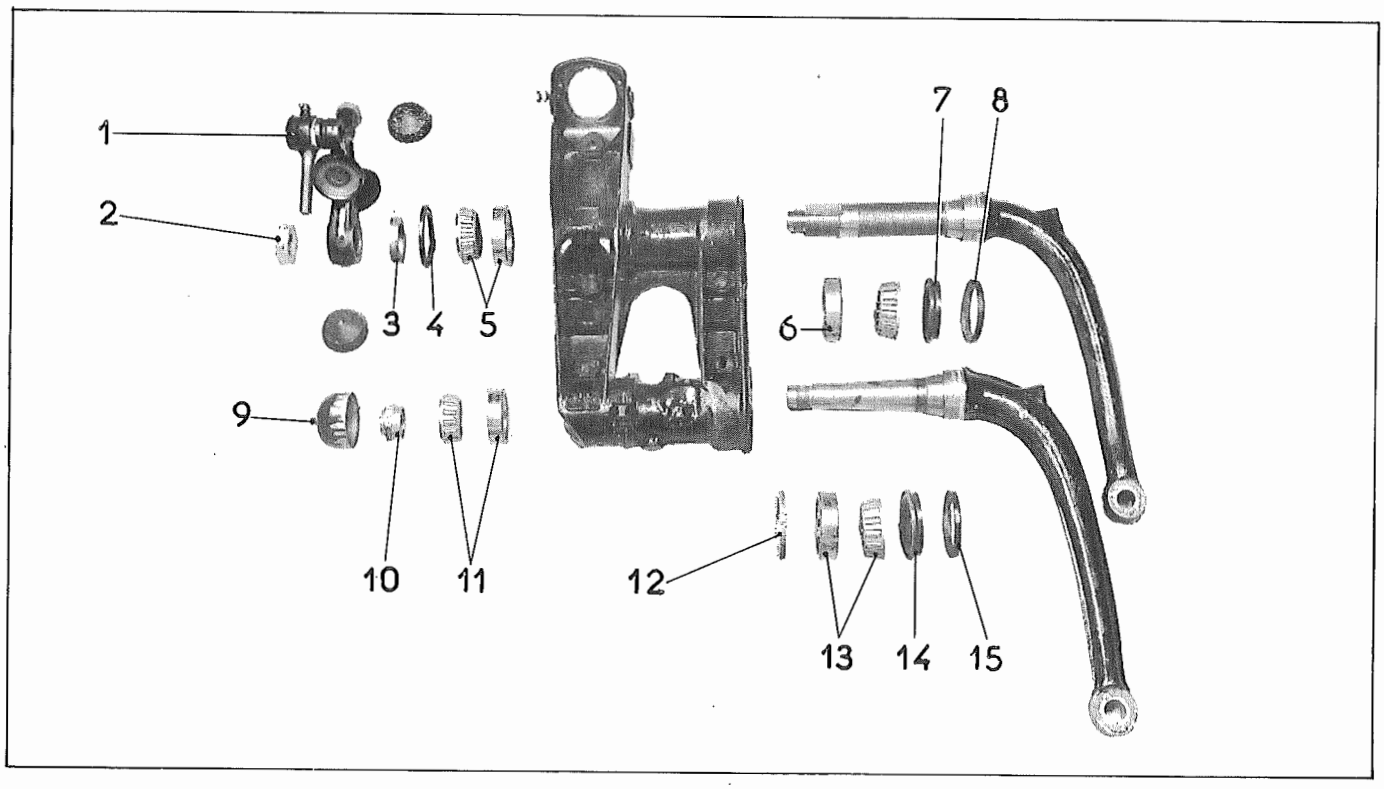
As soon as a few threads are visible, tighten the nut (2) to complete the fitting of the arm and lever.
Tighten the nut to 65 ft.lbs. (9 m.kg) then unscrew slightly (1/24th to 1/12th of a turn only). Lock the nut by beating the metal of the nut collar into the groove in the arm.

10. Determine the thickness of the caster angle adjusting shim.
   - Fit the lower arm with two setting bushes 1865-T and 1866-T and tighten the nut.
   - Put the castor angle fixture in position (2321-T).

On the arms fit the two rods (A) and (B) by means of the screws (C). The centre line of the slot (E) must be parallel with the centre lines of the arms xx'.
Bring pin (A) into contact with the cupped portion of pin (B), the spigot (D) on pin (A) engaged in the slot (E).

Measure the dimension "f" parallel to the centre line of the arms. To ensure this, pivot the vernier, the dimension "f" being the smallest registering on the vernier. The setting is correct when the dimension "f" lies between 24.74 and 25.25 mm. Choose a suitable shim to obtain this dimension from those sold by our Spare Parts Department.

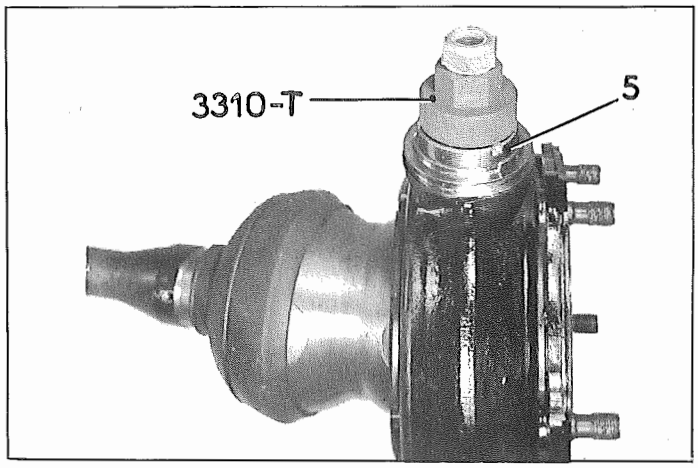




11. Remove the caster angle fixture as well as the arm.
12. Fit the caster angle shim (12) as well as the outer bearing cage (11).
13. Smear the roller cage (13) with special bearing grease and insert it in the arm body.
    - Fit the sealing ring (14) (mandrel MR.3676-140).
14. Using a tube, fit the deflector (15) on the arm and then insert the arm in the body.
15. Insert 50 grammes of special roller bearing grease between the two roller bearings (11) and (13).
16. Fit the roller cage (11).
17. Tighten the nut (10) to 65 ft.lbs. (9 m.kg) turning the arm meanwhile to ensure correct positioning of the bearings, then loosen the nut slightly (1/24th to 1/12th of a turn).
18. Lock the nut by beating the metal of the nut collar into the groove in the arm.
19. Fit the cap (9).

NOTE: For the renewal or adjustment of the upper and lower bearings, (see Op. DX.413-1).

REPLACEMENT OF AN UPPER PIVOT BALL PIN.



Removal.

1. Raise the car on stand (jacking bracket 2505-T).

Release the pressure in the suspension circuits (see Op. DX.00).

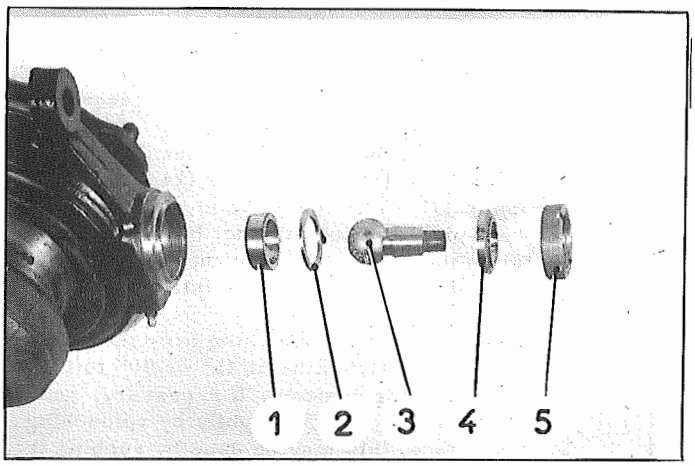
Remove the wheel on the relevant side.

2. Disconnect the upper arm (extractor 3312-T).

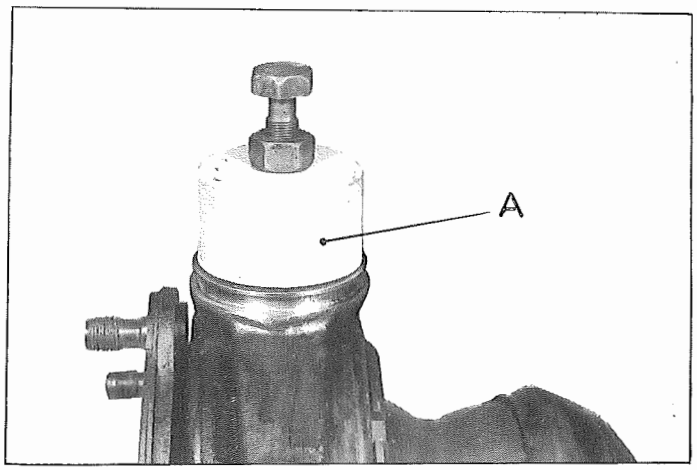
3. Remove the dust cover.

With a chisel remove the metal which was turned over into the nut slots for locking purposes.

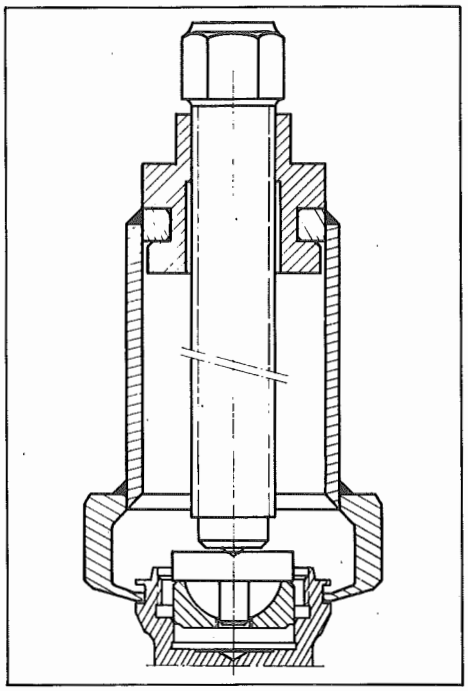
Remove the nut (5) (spanner 3310-T).



4. Free the upper ball cup (4) the ball pin (3) and the spacing washer (2).

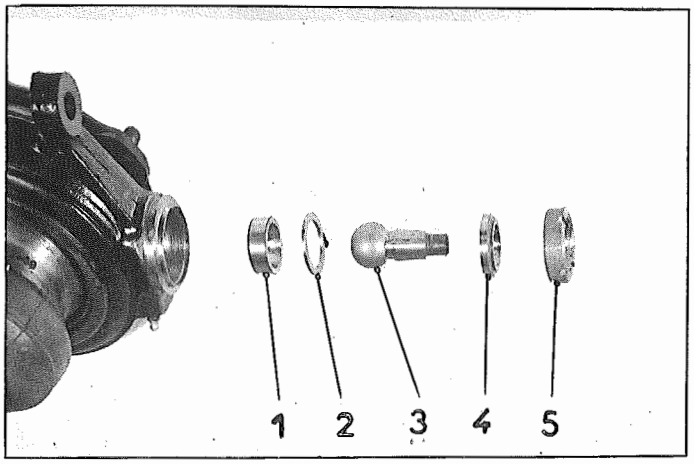


5. Withdraw the lower seating (1) (extractor 3311-T) (A).



Assembly.

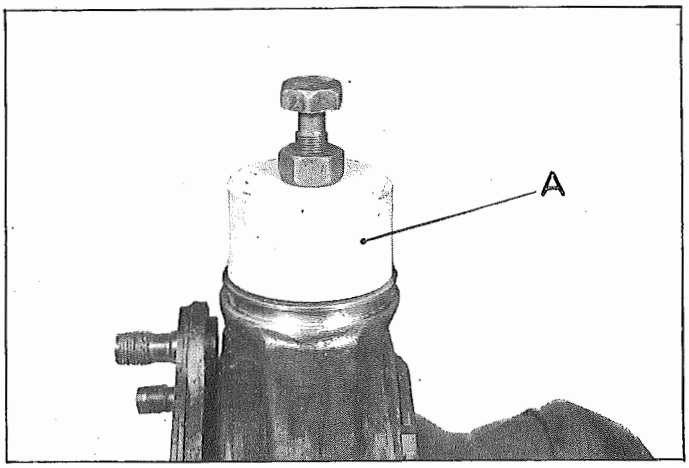
6. Insert the ball pin lower seating (tool 1753-T with extractor body 1750-T and thrust-pad MR 3408-270). Avoid any blows when inserting the seating, as this will damage the pivot bearings.



7. Fit the distance washer (2). Smear the lower ball-pin cup with Shell Retinax AM grease, also the ball-pin and the upper cup. Place the ball-pin in the upper cup, then fit and tighten the nut (5) to 100 ft.lbs (14 m.kg) (spanner 3310-T). Check the movement of the ball-pin, then lock the nut by knocking over metal on the end of the pivot into the nut slots at 2 diametrically opposite points.

NOTE:- The position for knocking over the metal to lock the nut should be at 45^{o} or 90^{o} to the previous locking position. If necessary, reduce the height of the nut (5) slightly by retouching its inner face; this may be done by rubbing it on emery paper placed on a surface plate.

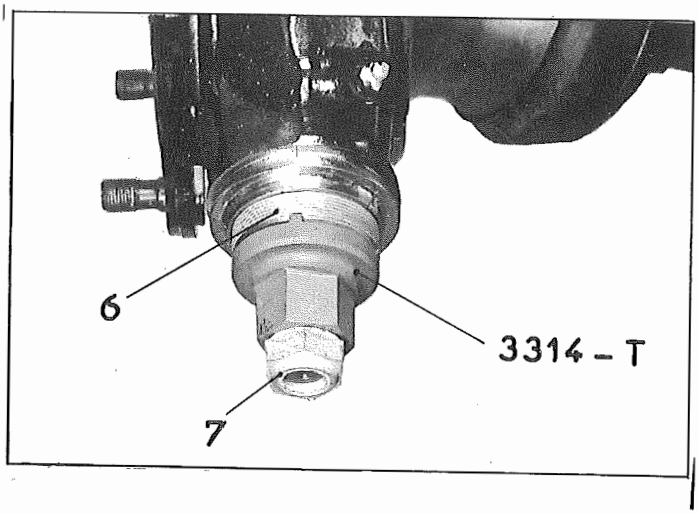
8. Refill the ball-pin dust cover with Shell Retinax AM grease and refit it.



9. Clean the end of the ball-pin with trichlorethylene and connect it to the arm. Tighten the nut to 72 ft.lbs (10 m.kg).

10. Fit the wheel and lower the car to the ground (bracket 2505-T).

11. Put the suspension circuit under pressure.



REPLACEMENT OF A LOWER PIVOT BALL PIN.

Removal.

12. Raise the vehicle on stands (bracket 2505-T).

    Release the pressure in the suspension circuits (see Op. DX.00).

    Remove the wheel.

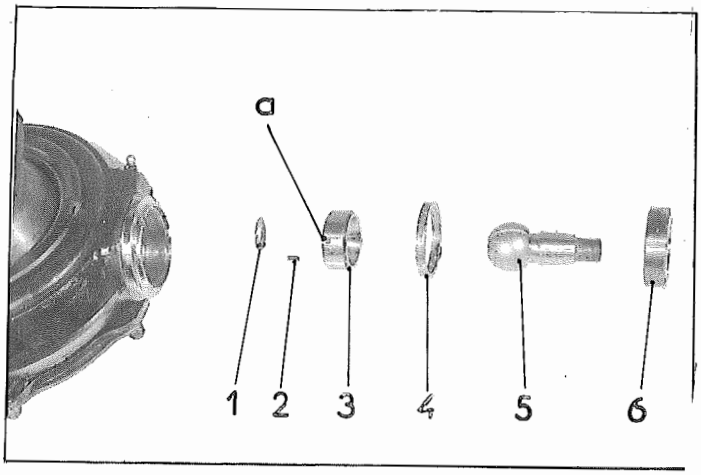
13. Disconnect the lower arm, (extractor 3312-T, see Op. DX.372-1, paragraph 2).

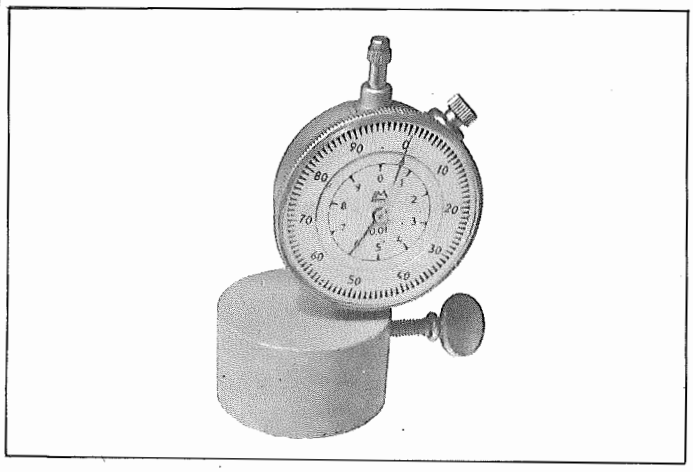
14. Remove the dust cover and with a chisel, remove the metal knocked over into the nut.

15. Remove the nut (6) (spanner 3314-T). This nut is in the form of a cup.

NOTE:- This nut is locked at 290 ft.lbs (40 m.kg) and therefore requires a special tool (spanner 3314-T) for the nut (7).

16. Remove the ball-pin (5), the spacer (4), the lower seating (3), the spring (1) and the mecanindus pin (2).





Assembly.

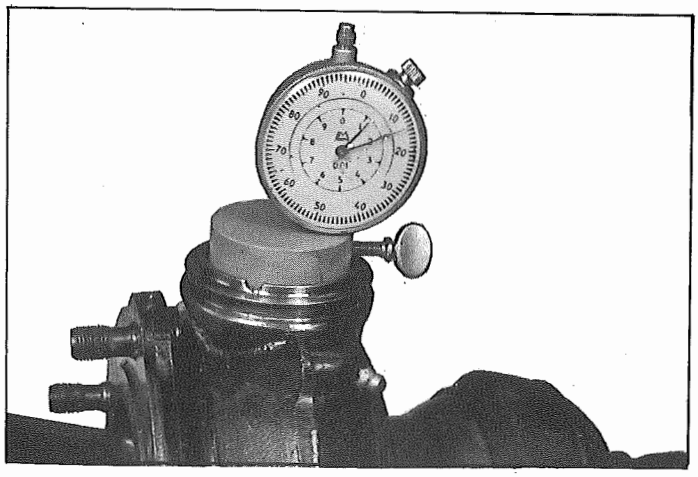
Check that the threads in the pivot are in good condition, if not, correct them.

17. Determine the thickness of the spacing washer (4).

Use dial gauge support (3306-T) with a dial gauge (2437-T).

a) Set the dial gauge on a face plate.

NOTE:- Position the dial gauge so that it reads at least 8 mm.

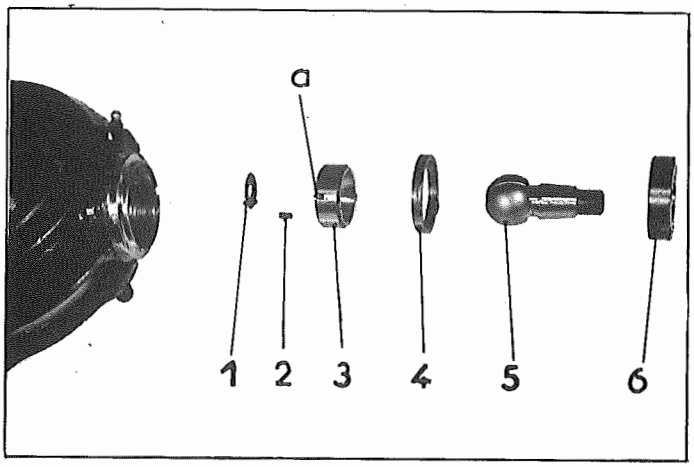


b) Now place the assembly on the pivot.

Read the dimension on the dial gauge, determine the difference between this dimension and the dimension noted when setting the dial gauge on the face plate.

18. Read the dimension given on the metal label following the part number of the ball-pin and cup assembly.

The difference between this figure and that obtained in paragraph 17 (b) represents the thickness of the spacer (4) to be used.

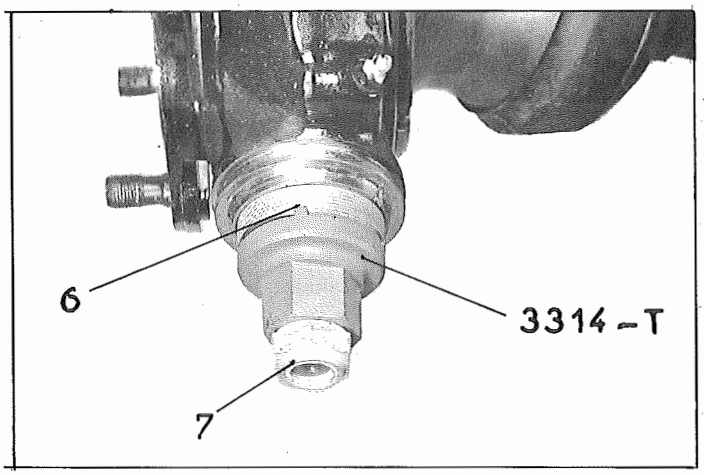


19. Fit the mecanindus pin (2), the spring washer (1) (the concave face towards the cup), the cup (3) (correctly position the groove (a) on the pin), the spacer (4) of the calculated thickness, the ball-pin (5) and the cupped nut (6) after having smeared these parts with Shell Retinax A.M. grease.

20. Tighten the nut (6) to 290 ft.lbs (40 m.kg) (spanner 3314-T).

21. Lock the nut (6) by knocking over metal into the slots.

22. Fit the dust cover filled with RETINAX A.M. grease.

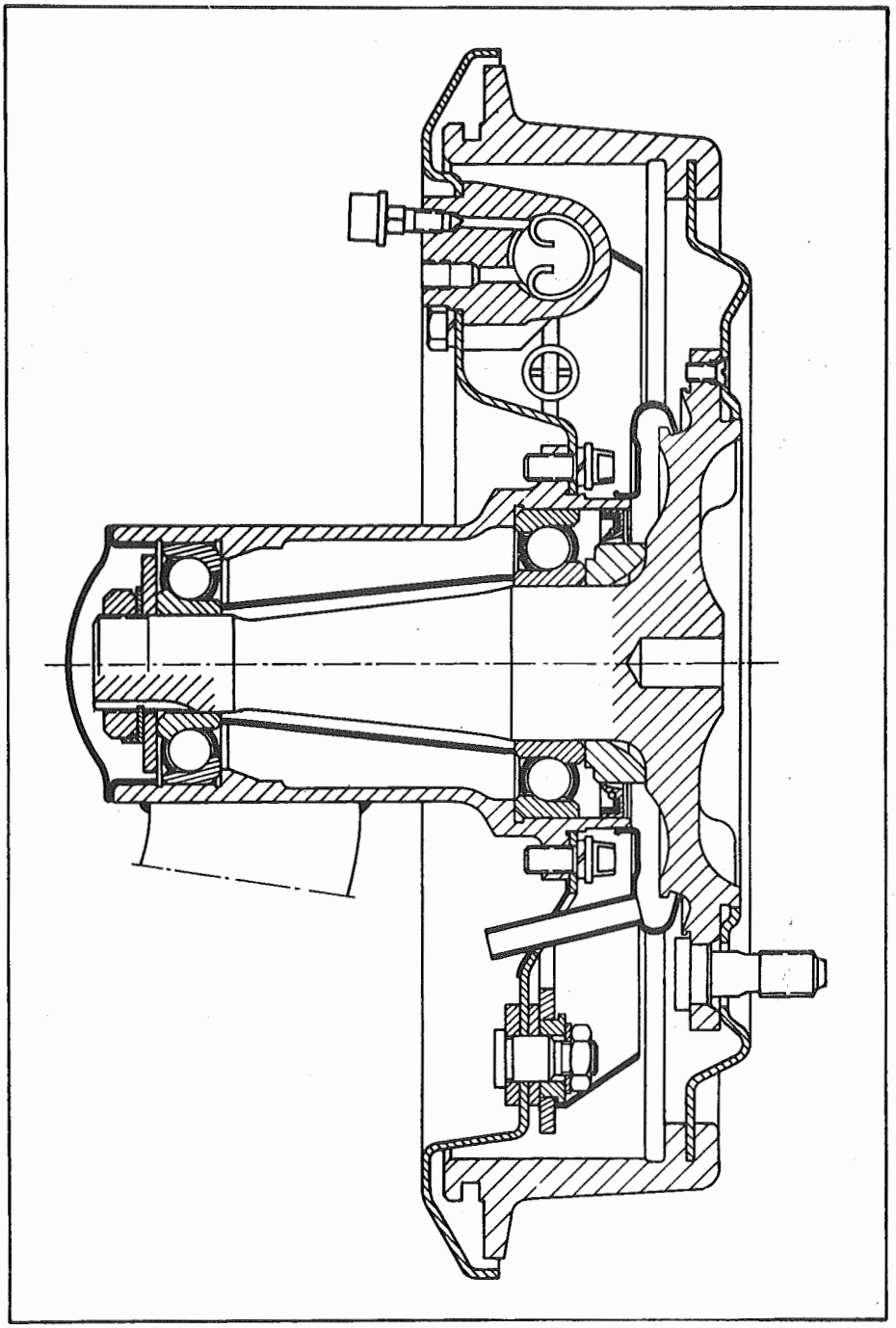


23. Connect the lower arm.

Tighten the nut to 72 ft.lbs (10 m.kg).

24. Fit the wheel and place the circuits under pressure (see Op. DX.00).

25. Lower the car to the ground.



SPECIAL POINTS

Resurfacing of the drums.

Original diameter = 225 mm.

Maximum diameter after rectification = 227 mm.

Out-of-round tolerance = 0.04 mm.

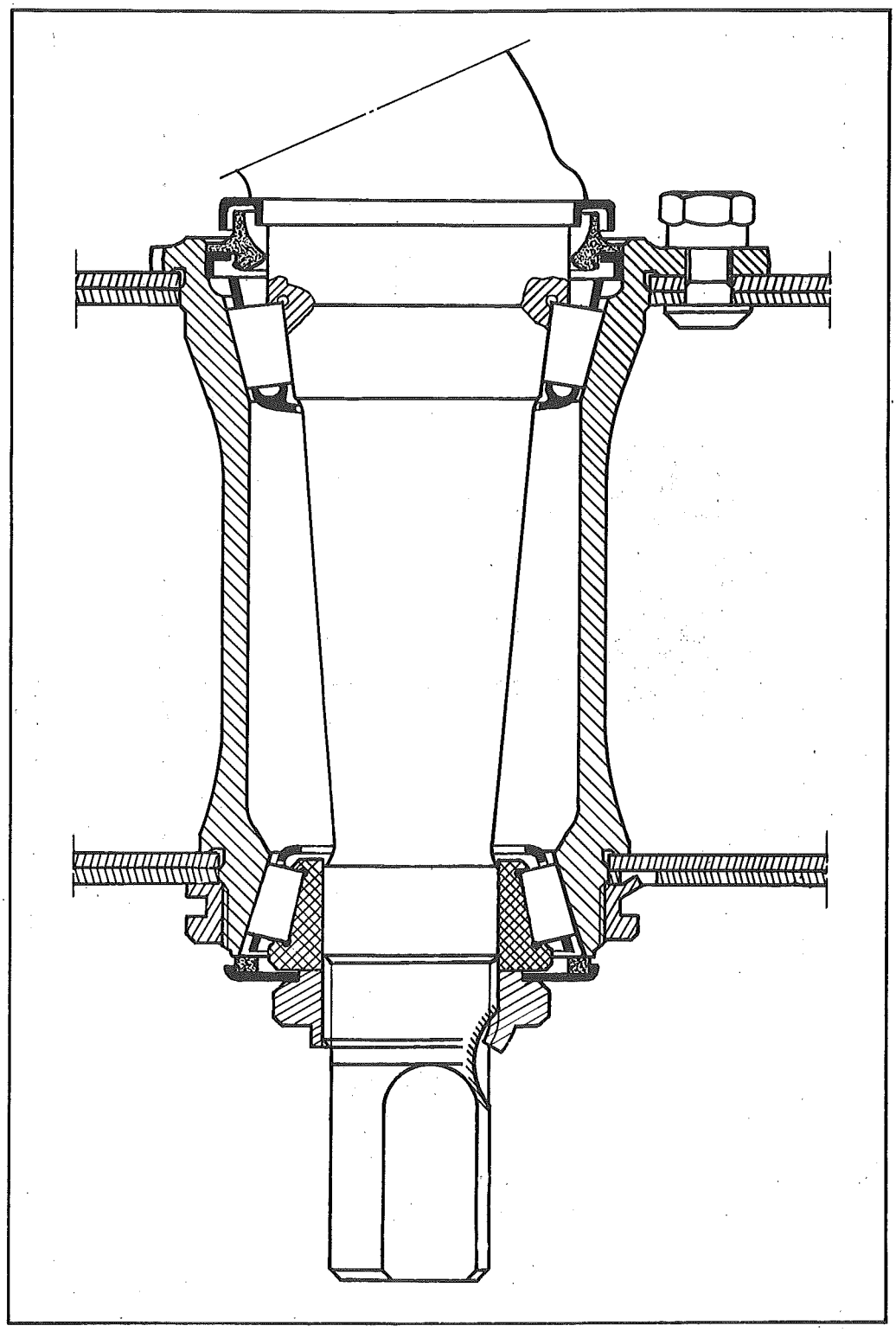
The outer face of the gasket must lie below the top of the bore 4.5 mm (see paragraph 12).

Tighten the nut of the hub bearing to 72 ft lbs (10 m.kg).

Tighten the screws holding the brake plate to 18 ft lbs (2.5 m.kg).

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Corrective No.1



SPECIAL POINTS

There must be a minimum clearance "j" = 0.5 mm between the arm and the stop on the chassis (see Op. DX. 420-1, paragraph 13).

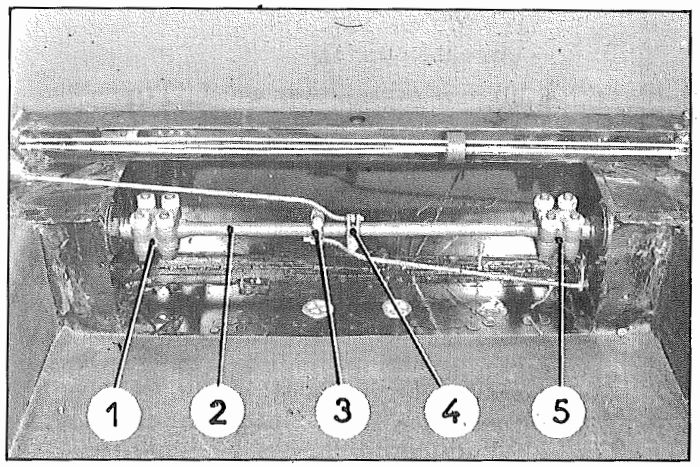
Tighten the nut of the axle arm bearing to 58 to 65 ft lbs (8 to 9 m.kg), then slacken off 1/6th of a turn (one sixth turn).

REMOVAL.

1. Put the car on stands.

Release the pressure.

Place the manual height control lever in position "low".

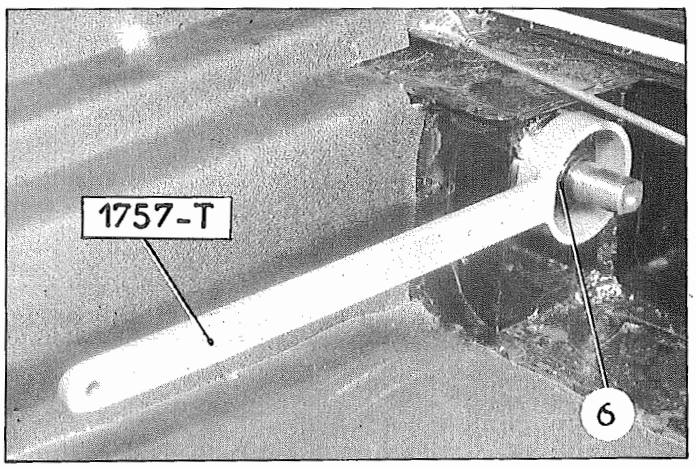


2. Remove:-
   - the rear wing on the relevant side,
   - the upper protection panel for the swivel union,
   - the lower protection panel for the swivel union,
   - the closing panel for the rear crossmember (in the boot).

3. Disconnect:-
   - the control clamp (4) for the height corrector,
   - the control clamp (3), for the headlamps.

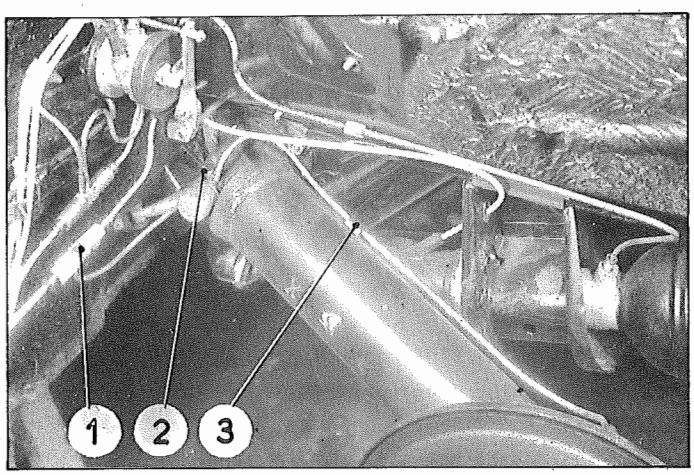
NOTE:- Mark the angular position of the clamps on the anti-roll bar (2).
   - the coupling clamps (1 and 5) from the anti-roll bar.

4. Free the anti-roll bar (2).



5. With a chisel remove the metal from the castellated nut (6) in the sidemember.

Remove the nut (6). Use spanner 1757-T.



6. Remove the brake pipe assembly:

   - remove the bleed screw from the wheel cylinder,
   - disconnect the feedpipe from the wheel cylinder,
   - raise the clip (3),
   - disconnect the 3-way union (1) from the feedpipe and from the right-hand brake pipe for the left-hand side. Loosen the locknut and remove the screw (2). Free the swivel union.

NOTE:- To remove the right-hand half axle, it is necessary to remove the rear left-hand wing, the wheel and the upper protection panel, and to free the tubes from the bushes in the rear crossmember, in order to free the pipe assembly for the right-hand swivel union.

7. Disconnect the piston rod.

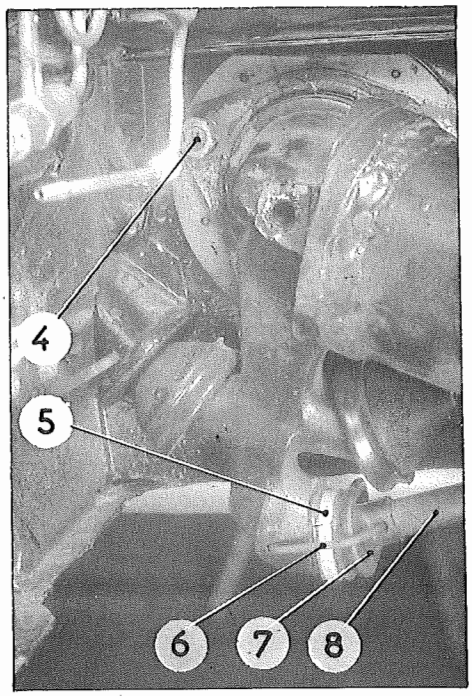
Remove:-

- the pin (6),
- the hoseclip (5).

Remove the dust cover (7) towards the rear.

Press the wheel-arm down to free the rod (8) towards the rear.

NOTE:- The rod (8) can only be freed when the pin holes in the rod and in the bracket are in parallel.



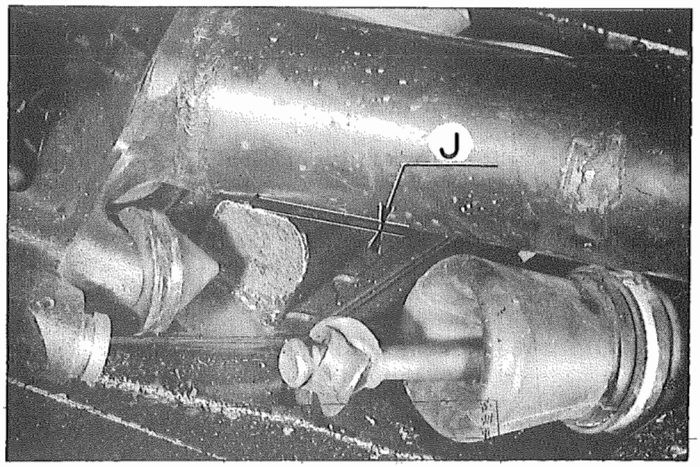
8. Remove the 3 securing nuts (4) from the bearing housing on the sidemember.

Free the arm; if necessary, tap it with a mallet on the end of the spindle.

9. Drive out the housing fixing screws (only if they are damaged or worn, do not lose them inside the sidemember).

10. Clean the ball-housing with petrol in order to remove the thrust ball from the bump-stop support.

NOTE:- Make sure that it is not scaled, if it is, change it and check the thrust-end of the rod.



ASSEMBLY.

11. Hammer in position the screws securing the bearing housing in the sidemember.

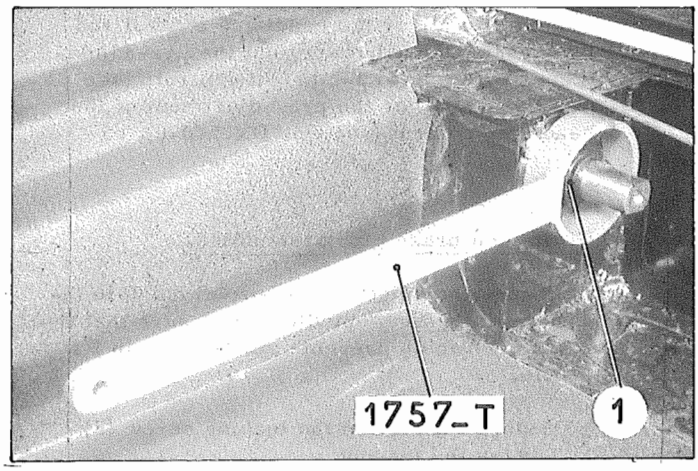
12. Fit the wheel-arm into the sidemember.

Screw on the slotted ring nut *with the thin collar in contact with the sidemember.*

Fit and tighten the three shouldered nuts securing the bearing housing. (Do not fit a washer).

13. Check that there is not less than 0.5 mm clearance between the arm and the edge of the bump stop on the chassis at "j".

If necessary, remove the front buffer and file the stop.



14. Finally tighten the ring nut (1) with spanner 1757-T.

At one point, knock the metal of the nut into one of the grooves in the sidemember.

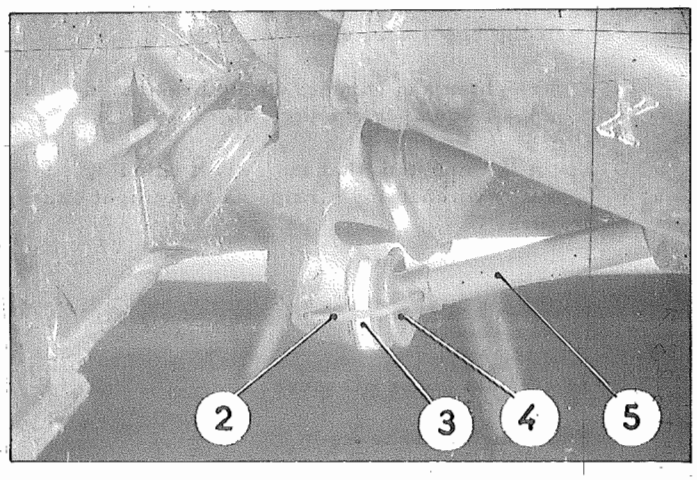
15. Fitting the piston rod.

Place the ball, previously greased, in its housing.

Engage the rod in the ball thrust cup, the wheel-arm being in the lowest position (the pin holes in the rod and thrust cup must be parallel).

Fit:-

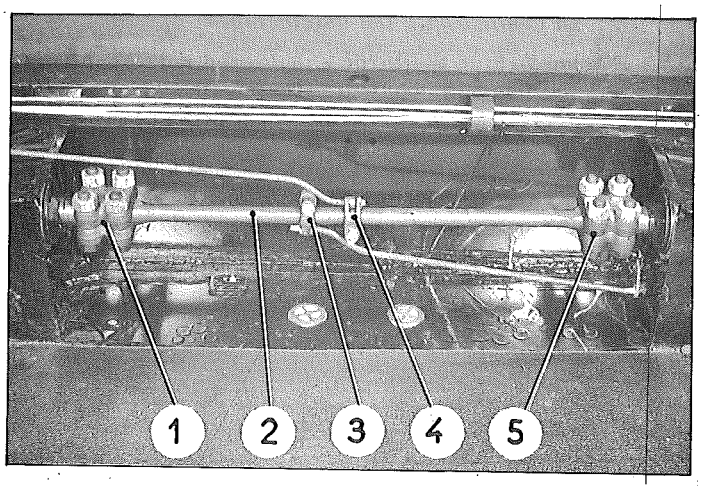
- the dust cover (4) over the thrust cup,
- the rubber sleeve on the dust cover.



Fit the pin (2), the longer end through the ball thrust cup and turn down this end.

Fit a ligarex collar (3) (tool 2483-T).

NOTE:- Before fitting the pin, make sure that the rod is correctly seated, raise the wheel-arm. The rod must not be able to slip out of the ball thrust cup.



16. Fit the anti-roll bar (2) equalising the clearance on each side.

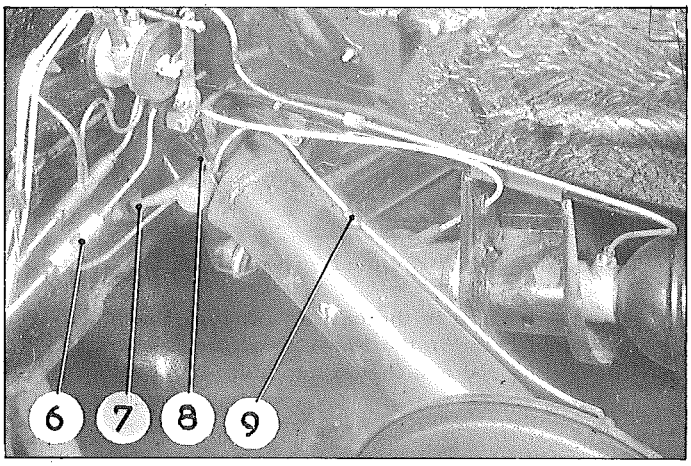
NOTE:- Fit the bar in its original position, according to the marks made when dismantling.

Tighten the clamp screws (1) and (5) to 36 ft.lbs (5 m.kg).

17. Fit the clamp (3) for the headlamp control rod, according to the marks made when dismantling.

Fit the clamp (4) for the height control rod, also according to the marks made when dismantling.

NOTE:- If the anti-roll bar or the height control corrector rod, or the headlamp control rod have been changed, carry out the pre-adjustment operation for the height control, (see Op. DX.433-0) or the pre-adjustment of the headlamp control (see Op. DX.540-0).



18. Fitting the brake pipe assemblies.

- Engage the spigot of the swivel union in the bore of the arm spindle. Make sure that the arm (7) which prevents rotation, is in its clip.
- Moderately tighten the locking screw (8). Tighten the locknut.
- Insert the pipe under the clip, and turn the end of the clip over.
- Connect the pipe to the wheel cylinder and fit the bleed screw.
- Straighten and connect up the brake feed-pipes to the 3-way union (6).

NOTE:- It is important that the swivel union operates without any strain, as this might cause seizure.

19. Fit the wheels.

Put the circuits under pressure.

Check thoroughly for leaks.

Lower the car to the ground.

20. Bleed the brakes.

    (See Op. DX.453-0).

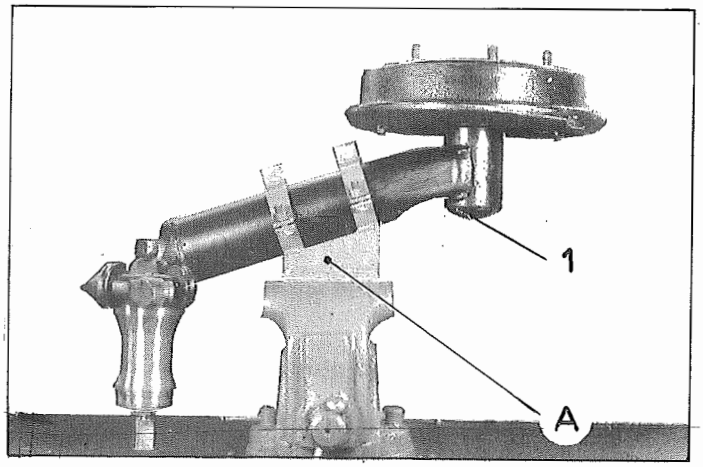
21. Adjust the heights.

    (See Op. DX.433-0).

22. Fit:-

    - the closing panel for the rear cross-member (for the right-hand side, fit the bushes supporting the pipes),
    - the protection panels for the height corrector,
    - the wing.

23. Adjust the headlamp control (see Op. DX. 540-00).



DISMANTLING.

1. Place the axle arm in a vice, on a vice adaptor MR 3053-90 (A).

2. Remove the stub axle.

a) Remove the hub sealing cap (1).

b) Lock the drum by tightening the brake shoe adjusting cams.

Remove:-

- the stub axle nut,
- the nut lock plate,
- the bearing thrust washer.

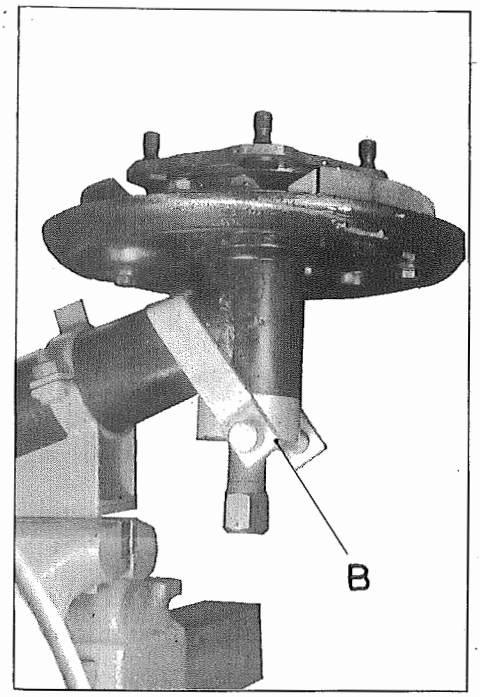
Free the drum by loosening the brake shoe adjuster cams.

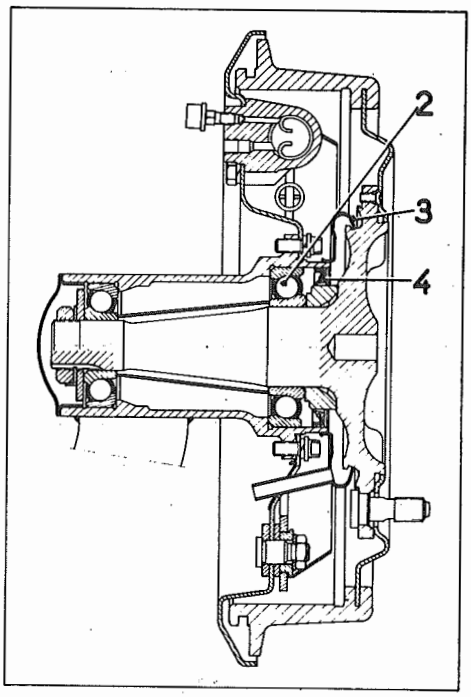
Remove the screws securing the drum.

Remove the drum (mark its position in relation to the hub).

c) Remove the stub axle. Use extractor 2018-T (B).

Free the bearing and spacer.





3. Stripping the arm.

a) Remove:-

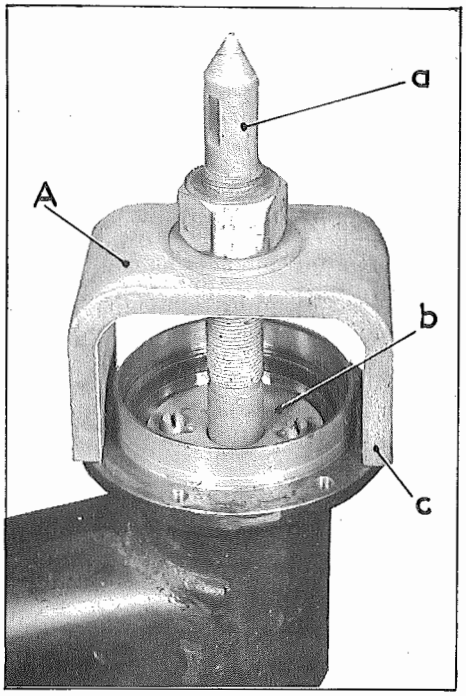
- the oil retainer (3),
- the brake backplate (use spanner 1677-T).

NOTE:- Mark the position of the backplate with relation to the arm.

b) Remove:-

- the seal (4),
- the ball cage (2) of the outer bearing.

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c) Remove the outer bearing outer cage.
Use extractor 2019-T (A).

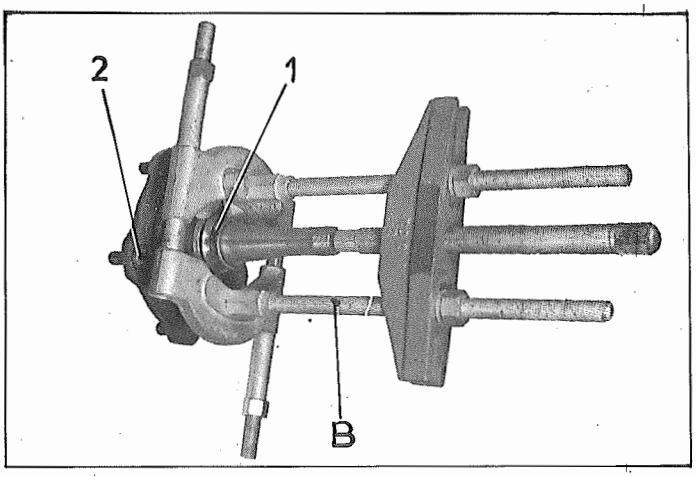
Place the split ring under the spindle (a) behind the ring (b).

Engage the spindle (a) in the split ring from inside the hub, to spread and locate it.

Fit the U clamp (c) and screw the nut on the spindle (a).

d) Remove the outer race of the inner bearing, using a piece of pipe.

Outside diameter = 53.3 mm.
Length = 200 mm.

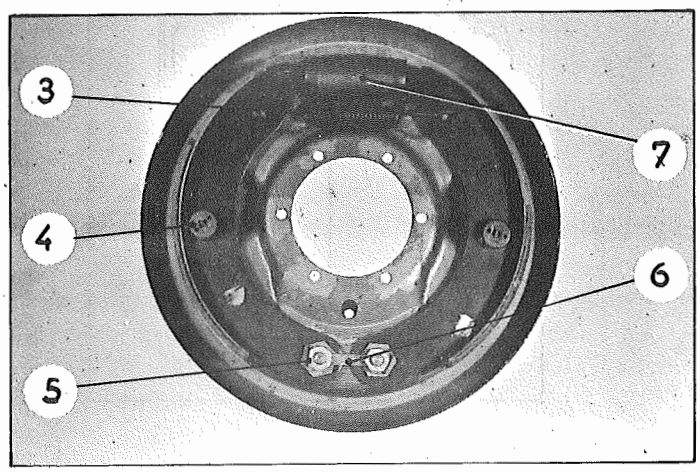


4. Strip the stub axle.

a) Remove the inner cage (1) of the outer bearing.

Use a universal extractor Wilmonda (B).

b) If necessary, remove the wheel studs (2).



5. Strip the brake backplate.

a) Remove the brake shoe return spring (3).
Use pliers 2110-T.

Remove the cups (4) by turning them 1/4 of a turn with tool 3556-T, removing the springs and the rods.

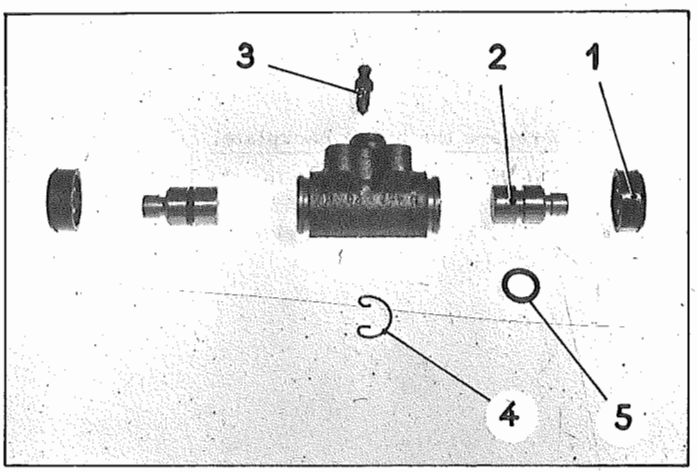
Remove the nuts (5) from the anchor pins, the lockplate (6) and the eccentric bushes.

Remove the brake shoes.

b) Remove the wheel cylinder (7).

c) If necessary, unrivet and remove the brake shoe adjusting cams.

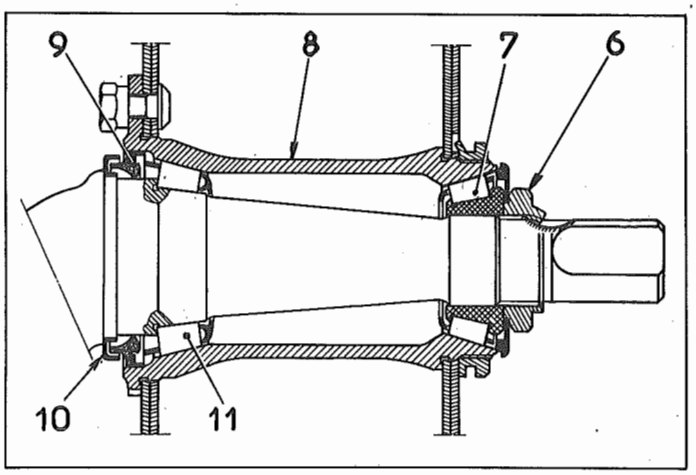
d) If necessary, remove the brake shoe fulcrum pins.



6. Strip the wheel cylinder.

Remove:-

- the rubber cups (1),
- the pistons (2),
- the circlips (4),
- the bleed screw (3),
- the ring seals (5) from the pistons.

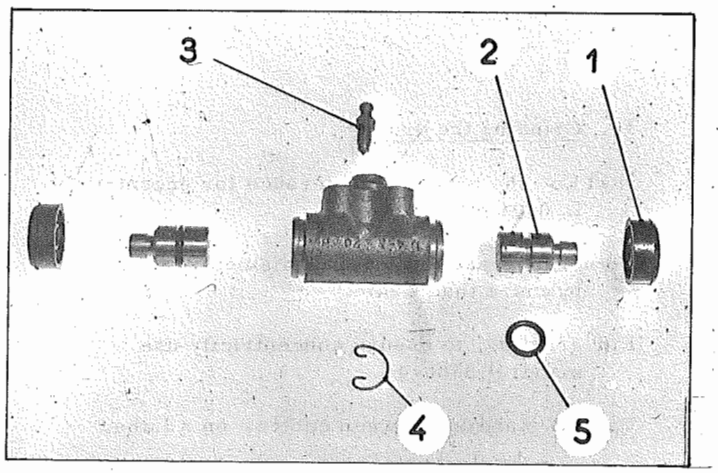


7. Remove the wheel-arm bearing housing.

Remove:-

- the nut (6),
- the inner bearing (7),
- the housing (8),
- the seal (9),
- the bearing cage (11),
- the oil deflector (10).

ASSEMBLY.



8. Prepare the wheel cylinders.

NOTE:- for cleaning the parts use only alcohol or hydraulic fluid. Any other product will cause rapid deterioration of the rubber seals.

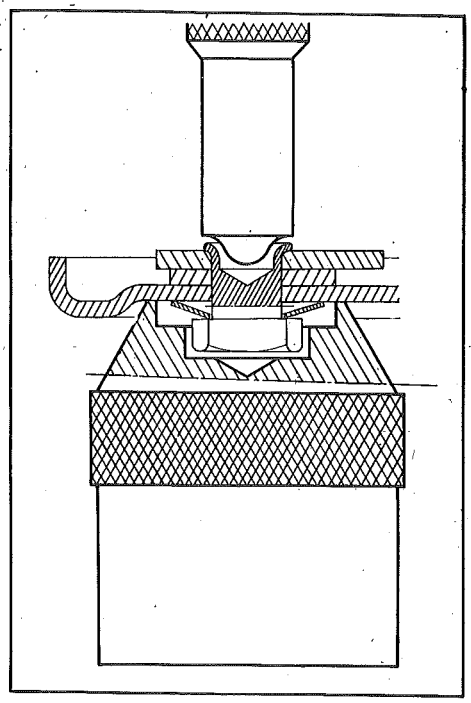
a) Fit the circlips (4) in the groove in the cylinder body.

Moisten the pistons (2) and the ring seals (5) with hydraulic fluid.

Fit the seals on the pistons.

Insert the pistons in the cylinder body.

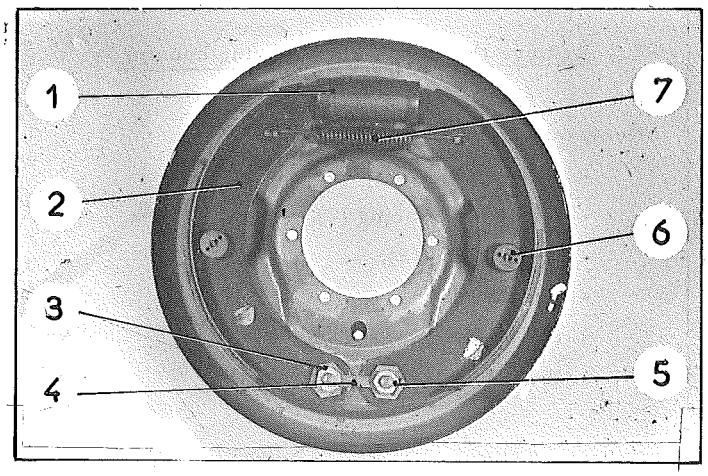
Fit the rubber cups (1).
Fit the bleed screw (3).



9. Prepare the brake backplate.

a) Fit the adjusting cams for the brake shoes.

Use fitting MR 3354-40 to rivet the pins.



b) If necessary, fit the brake shoe fulcrum pins, using a bronze drift.

c) Fit the wheel cylinder (1).

d) Fit the brake shoes (2) (the one with the longest lining towards the front).

- fit the brake shoe eccentric bushes (3) lightly oiled.
- the lockplate (4).

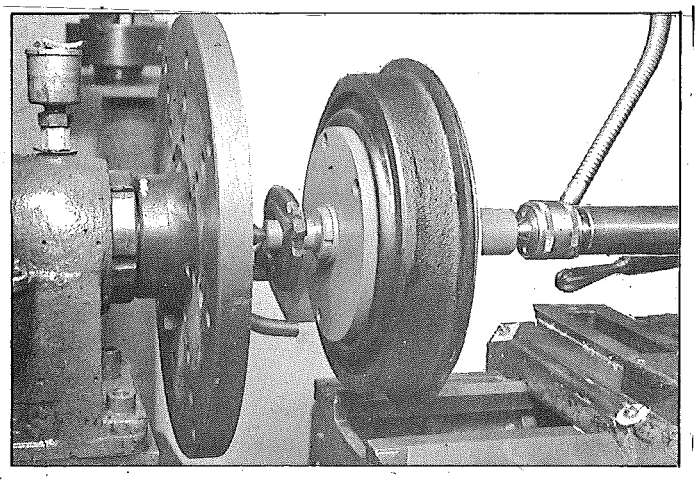
Screw on the nuts (5).

Fit:-

- the rods,
- the springs,
- the cups (6).

Use tool 3556-T.

Fit the brake shoe return spring (7).
Use pliers 2110-T.



10. Grinding the drum.

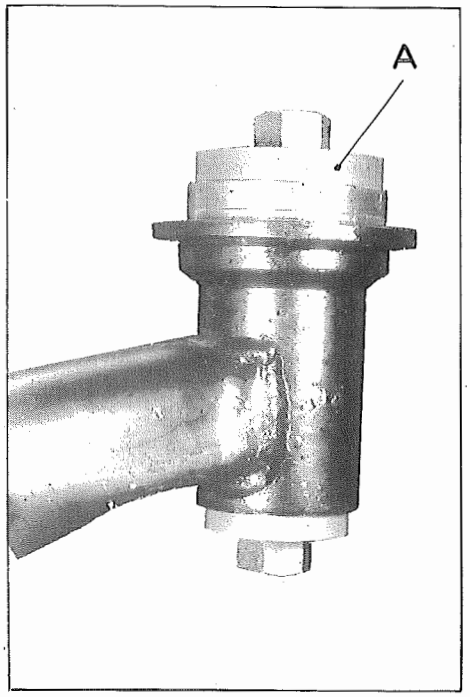
518/W

NOTE:- the maximum tolerance for eccentricity is 0.04 mm.

Do not increase the original diameter (255 mm) by more than 2 mm.

For grinding, to ensure concentricity use mandrel 3566-T.

Use the mandrel between centres on a lathe.



11. Preparing the stub axle bearings.

Fit the bearing outer races. (Lightly grease before assembling).

a) Using a press, and 2 tubes:-

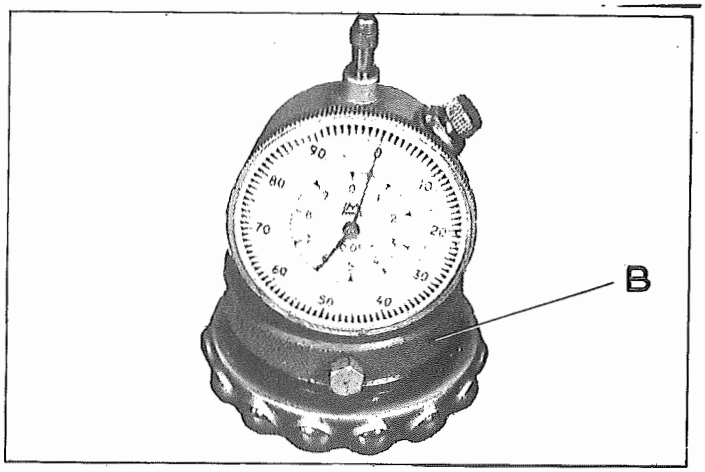
outside diameter = 79.5 mm.
length = 150 mm.

for the outer race and

outside diameter = 61.5 mm.
length = 150 mm.

for the inner race.

b) Or, use fixture MR 4114 (A).



IMPORTANT NOTE:- If the arm, the spacer, one or both bearings are to be renewed, it is necessary to fit a spacer which will give the correct adjustment.

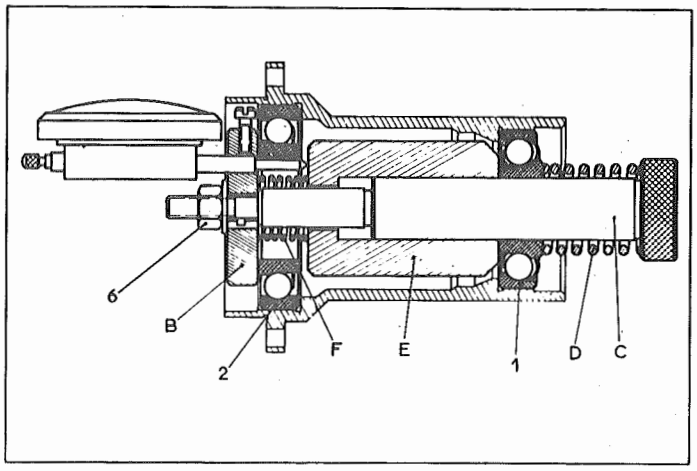
Operate as follows using fixture 2021-T.

c) Set the dial gauge.

Place the outer bearing (inner race and ball cage assembly) on a surface plate.

Fit the support plate (B) with dial gauge 2437-T.

Set the dial at zero and note the position of the totalising needle (the reading should be around 4 to 5 mm).

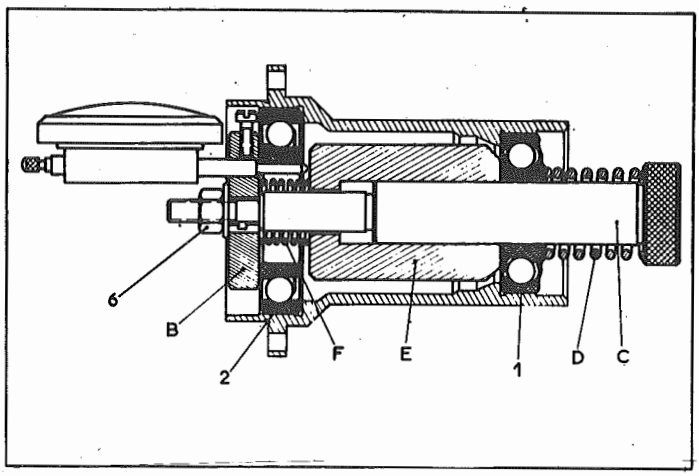


d) Put the fixture in position in the arm hub.

Fit the inner bearing (1) on the shaft (C) with the inner race in contact with spring (D).

Place this assembly in the hub of the arm, then place in position on shaft (C), the bush (E), the bush retaining spring (F), the outer bearing complete (2), the support plate (B) with dial gauge (take care not to alter the setting of the dial gauge). Tighten the nut (6).

Turn the assembly several times to make sure that the bearings are in position.



e) Bring the index needles of the dial gauge to their original position as noted in c) above.

Let the dial gauge spindle return slowly until it is in contact with the bush (E) counting the turns and fractions of turns, for example 0.97 mm.

To obtain a bearing setting with clearance = 0, the length of the spacer to be fitted would be 0.97 mm plus the length of the bush (E). This length is marked on the bush, e.g. 74.7 mm. The length of the spacer to be used would therefore be

74.71 + 0.97 = 75.68 mm.

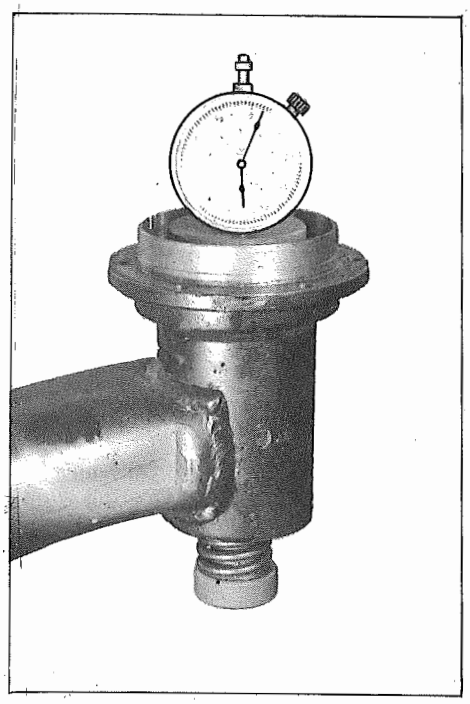
NOTE:- In order to facilitate the stocking of parts, only one distance piece will be sold by our Spare Parts Department, length 72.78 $\pm$ 0.02 mm. Only the hundreds number is marked on the distance piece. For example, "80" will mean the distance piece will measure 72.80 mm. (The length is measured under load and therefore cannot be obtained with a vernier gauge).

A series of washers enables the desired adjustment to be obtained.

In the example chosen, the measurement to be obtained is 75. 68 mm, the spacer measures 72.8 mm, therefore the necessary washer will be

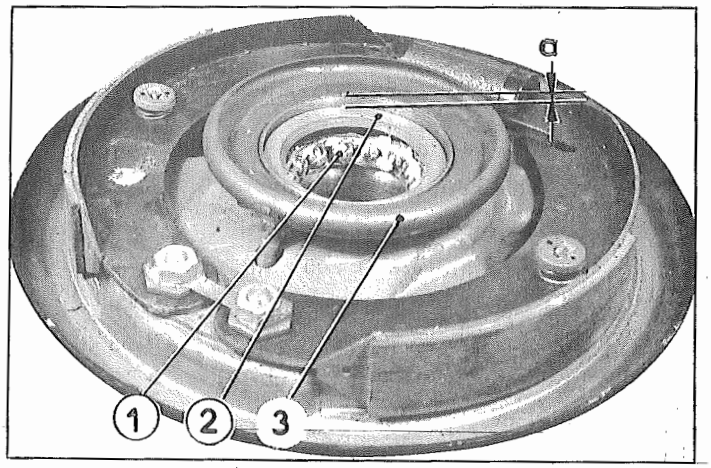
75.68 minus 72.80 = 2.88 mm.

Select the appropriate washer from those sold by our Spare Parts Department.



NOTE:- In a case where the washer thickness is equal to the washer limit dimension (for example 2.86) choose the next washer lower in thickness (e.g. D 421-321 from 2.82 to 2.86 mm).

f) Remove the fixture.



12. Prepare the arm.

a) Grease the outer bearing (1) and place it in position.

b) Fit the seal (2). Using mandrel MR 3676-170 push the ring seal to a position 4.5 mm from the face of the hub (a = 4.5 mm).

c) Fit the brake backplate. Tighten the screws to 18 ft.lbs (2.4 m.kg). Use spanner 1677-T. Position the backplate according to the mark made when dismantling.

d) Fit the oil.deflector (3).

13. Fit the stub axle and drum assembly on the arm.

a) Hold the stub axle in a vertical position.

Fit:-

- the outer bearing stop (8),
- the inner cage (9) of the outer bearing.

Use a tube inside diameter = 40 mm
length = 250 mm

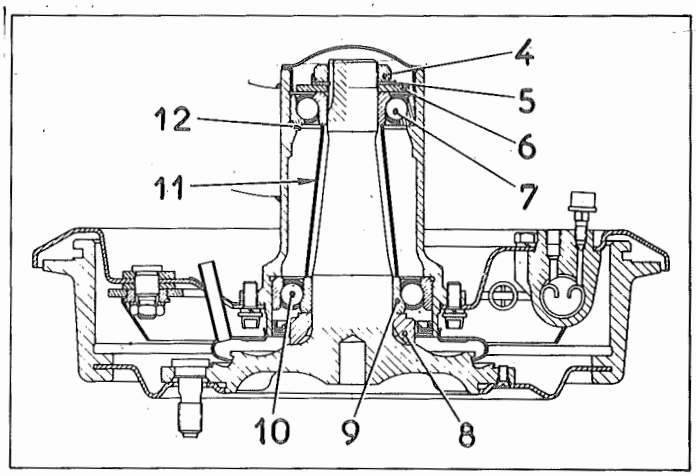
- fit the ball cage (10) previously greased (special bearing grease).

b) Fit:-

- the arm on the stub axle.

Insert 50 g . of special bearing grease in the housing.

Fit the spacer (11) and the washer (12) of the thickness determined in paragraph 11.



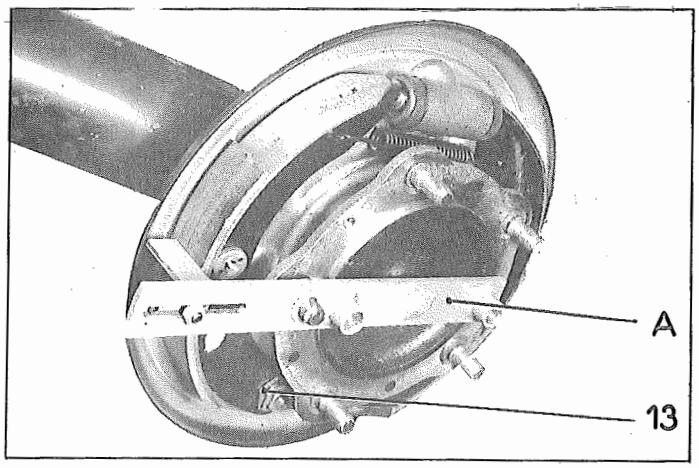
c) Fit the balls and cage (7) previously greased.

Fit:-

- the inner cage of the outer bearing using a tube of inside diameter = 25 mm
  length = 150 mm
- the thrust washer (6),
- the lockwasher (5),
- the nut (4), tighten to 72 ft.lbs (10 m.kg) and turn over the locking plate for the nut,
- the steel hub sealing cap filled with special bearing grease.

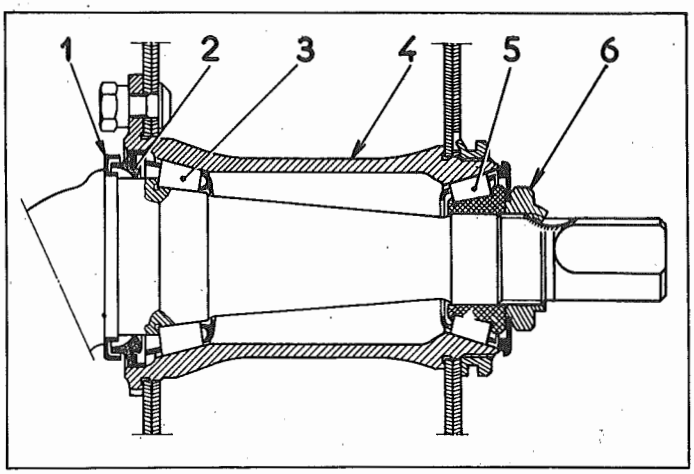
d) Centre the brake shoes by adjusting the eccentric bushes (13) and the cams. Use fixture 3565-T (A).

Lock the nuts on the adjusting bushes and turn over the locking plate.



e) Fit the drum according to the mark made when dismantling. Fit and tighten the two securing screws.

/W/91



14. Fit the wheel-arm bearing housing.

a) Fit the sealing cup (1) using a tube

outside diameter = 60 mm

inside diameter = 56 mm

length = 200 mm

b) Place the bearing (3) in housing (4) and fit the gasket (2) with a tube:

outside diameter = 79 mm

inside diameter = 67 mm

length = 100 mm

c) Fit the housing (4) on the arm.

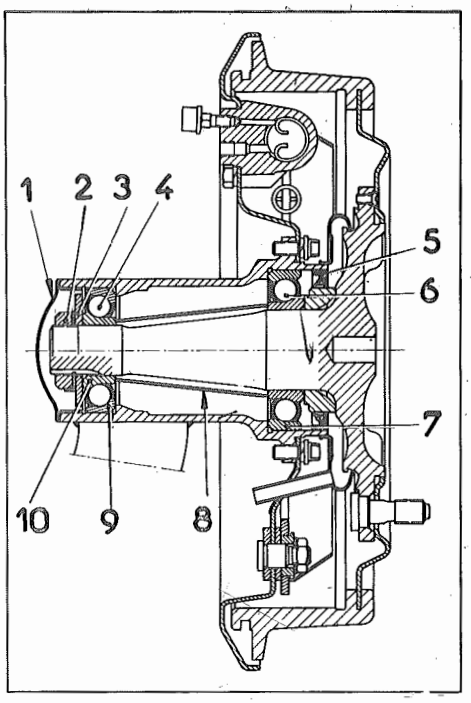
Insert 50 g . of special bearing grease in the housing.

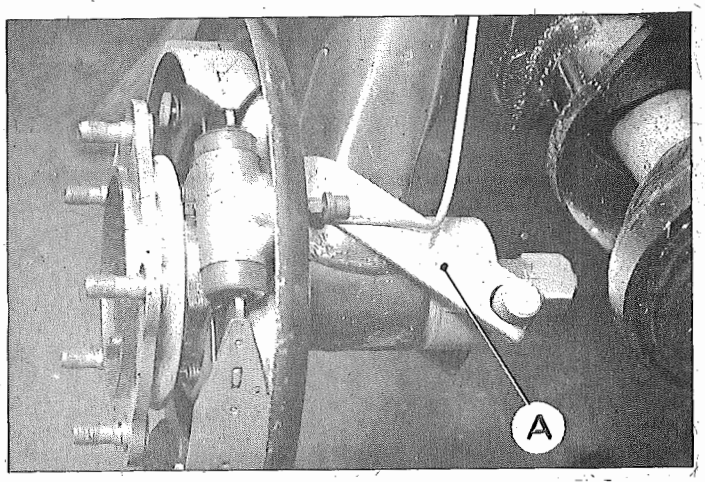
Fit the bearing (5) then the nut (6) with its metal cup and rubber joint. Tighten the nut to between 58 and 65 ft.lbs (8 to 9 m.kg), then loosen 1/6th of a turn and knock the metal of the nut into the slot in the shaft.

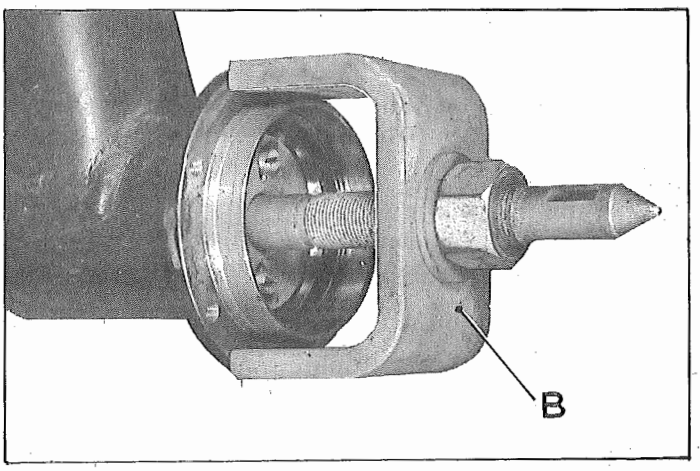
NOTE:- If the part of the nut to be used for locking on the shaft has been used before, it will be necessary to renew the nut in order to avoid altering the adjustment conditions.

15. Remove the arm from the stand.

16. Paint the part.







REPLACING A WHEEL STUB AXLE OR WHEEL STUB AXLE BEARINGS.

Removal.

1. Place the rear of the vehicle on stands.

Remove the wing and the wheel.

2. Removing the stub axle.

a) Remove the hub sealing cap (1).

b) Lock the drum by tightening the brake shoe adjusting cams.

c) Remove:-

- the nut (2),
- the lockwasher,
- the thrust washer (3).

d) Loosen the brake adjusting cams to free the drum.

Remove the screws securing the drum.

Mark the position of the drum and the hub and then remove the drum.

e) Remove the stub axle. Use extractor (A) 2018-T.

f) Remove:-

- the balls and cage (4) from the inner bearing,
- the outer cage (10) of the inner bearing,
- the spacer (8),
- the seal (5),
- the balls and cage (6) of the outer bearing.

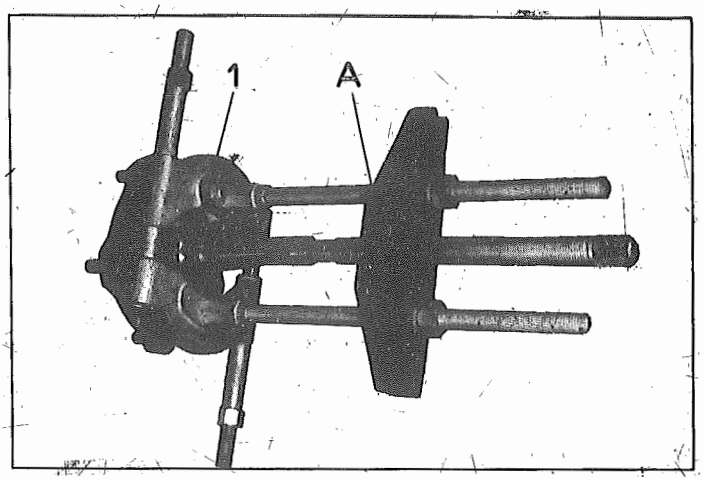
g) Remove:-

- the outer race (7) of the outer bearing.

Use extractor (B) 2019-T.

Remove the outer race (9) of the inner bearing.

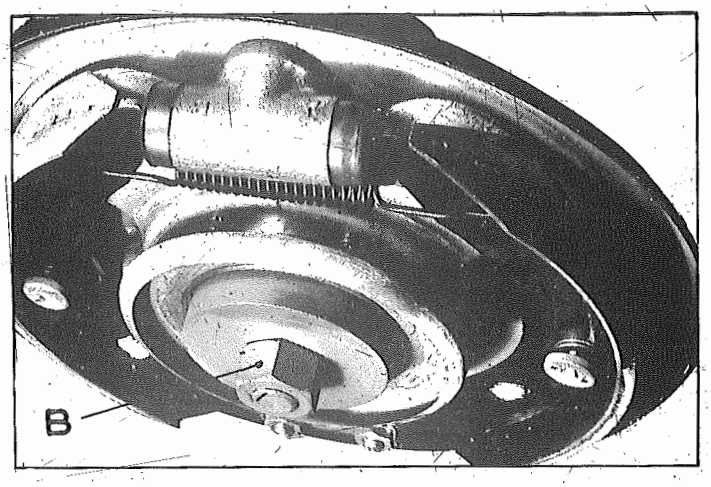
Use a tube outside diameter = 53.5 mm.
length = 200 mm.



3. Strip the stub axle.

- Remove the inner cup (1) of the outer bearing.

  Use universal extractor WILMONDA (A).



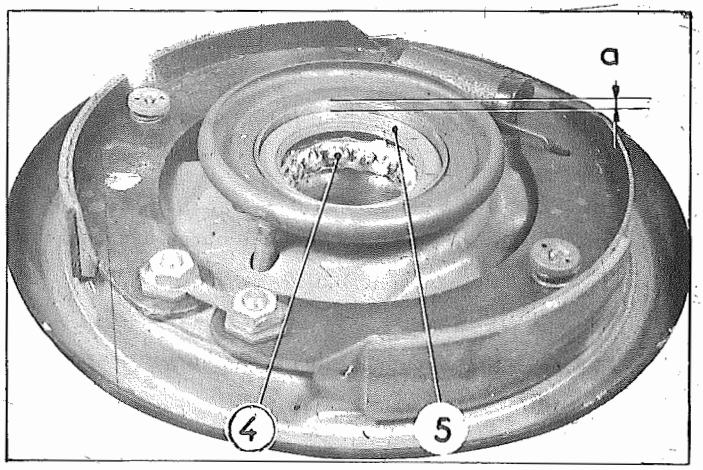
Assembly.

4. Prepare the stub axle bearings.

a) Fit the outer race of the inner bearing and the outer race of the outer bearing. Use the screw (B) MR 4114.

b) Determine the correct length of the adjusting spacer for the bearings.

(See Op. DX.420-3, paragraph 11).



c) Grease the balls and cage (4) of the outer bearing and fit it in position.

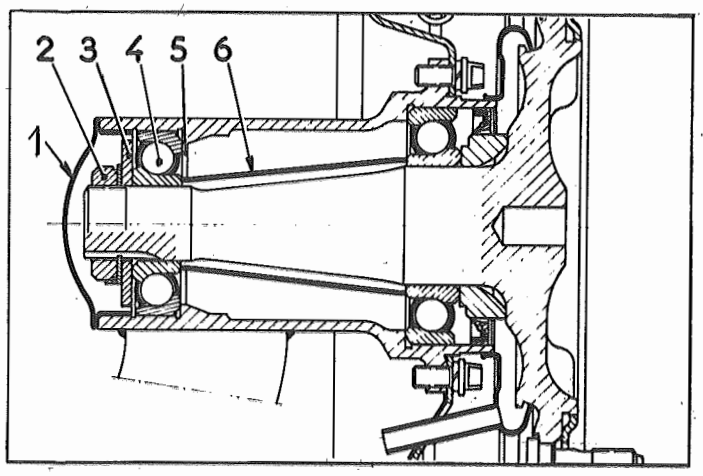
Fit the sealing joint (5) at a distance "a" = 4.5 mm from the outer face of the axle arm.

Use mandrel MR 3676-170.

5. Assemble the stub axle.

Fit the inner race of the outer bearing in a press, using a piece of tube

inside diameter = 40 mm
length = 250 mm



6. Fit the stub axle.

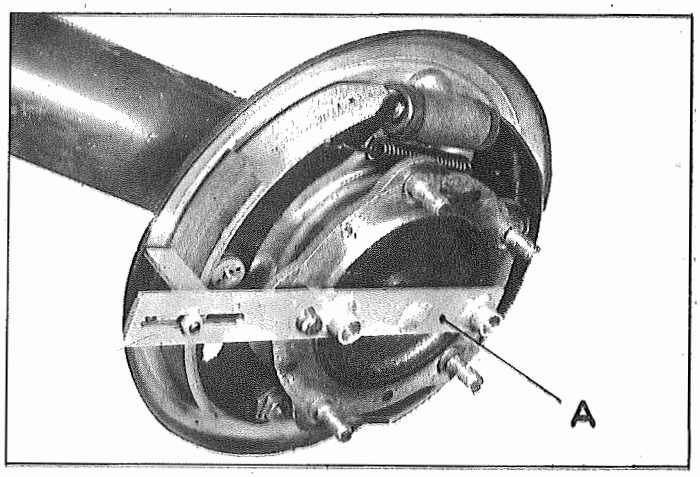
Offer up the stub axle on the axle arm.

Insert 50 g . of special bearing grease in the housing.

Place the spacer (6) and the washer (5) (as per paragraph 4 b)).

Fit:-

- the cage and balls (4) previously greased,
- the inner race,
- the thrust washer (3) (the recessed portion against the bearing,
- the lockwasher,
- the nut (2). Tighten this to 72 ft.lbs (10 m.kg).

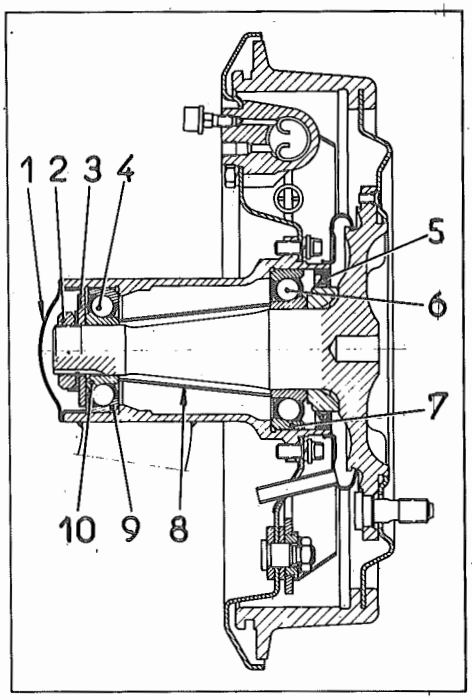


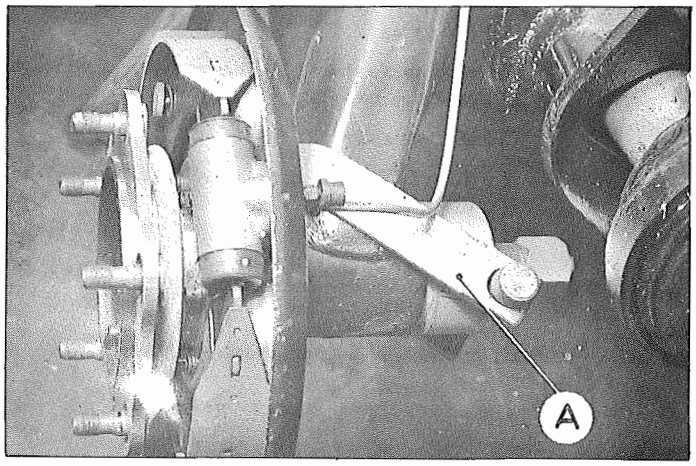
Turn over the lockwasher tabs.

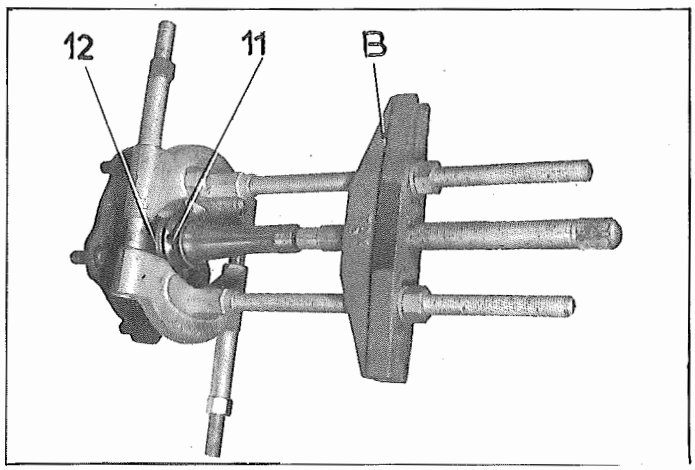
- fit the plugs (1) for grease filling.

7. Centre the brake shoes (use centring fixture (A) 3565-T.

8. Fit the wheel and the wing, lower the car to the ground.







REPLACING A BEARING SEAL OR A BEARING THRUST COLLAR.

Removal.

9. Raise the rear of the car on stands.

Remove the wheel and the wing.

10. Remove the stub axle.

a) Remove the hub sealing cap (1).

b) Lock the drum by tightening the brake shoe adjusting cams.

c) Remove:-

- the nut (2),
- the lockwasher,
- the thrustwasher (3).

d) Loosen the brake shoe adjusting cams to free the brake drum.

Remove the screws securing the brake drum.

Mark the position of the drum with regard to the hub and then remove the drum.

e) Remove the stub axle. Use extractor (A) 2018-T.

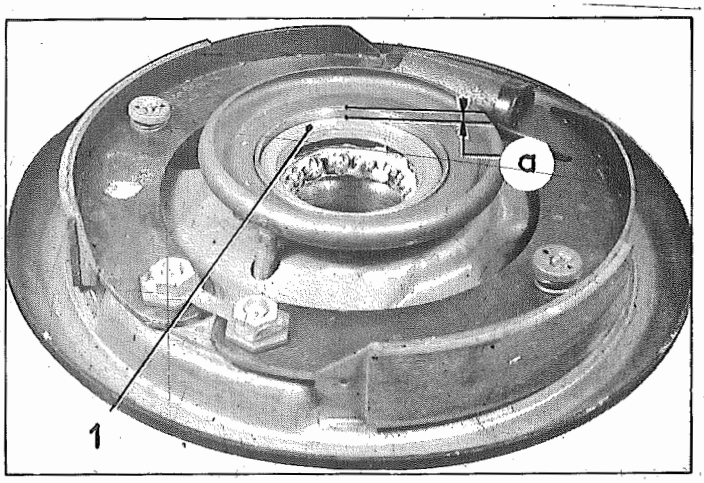
f) Remove the balls and cage (4) from the inner bearings.

- the inner race (10) of the inner bearing,
- the spacer (8),
- the gasket (5).

11. Strip the stub axle.

Remove the inner cup (11) of the outer bearing and the stop (12).

Use universal extractor WILMONDA (B).



Assembly.

12. Fit the seal (1) at a distance "a" = 4.5 mm from the outer face of the arm. Use mandrel MR 3676-170.

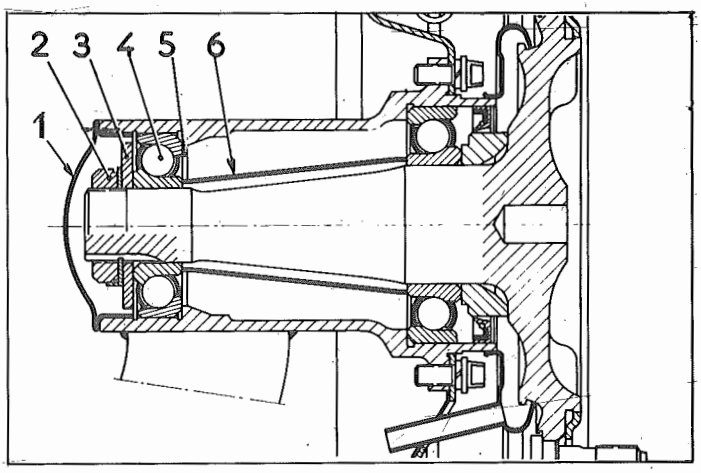
13. Assemble the half axle.

Fit the bearing stop and the inner race of the outer bearing in a press using a tube

inside diameter = 40 mm

length = 250 mm

NOTE:- Make sure that the face of the bush on the spacer is free from scratches or dents. If not renew it.



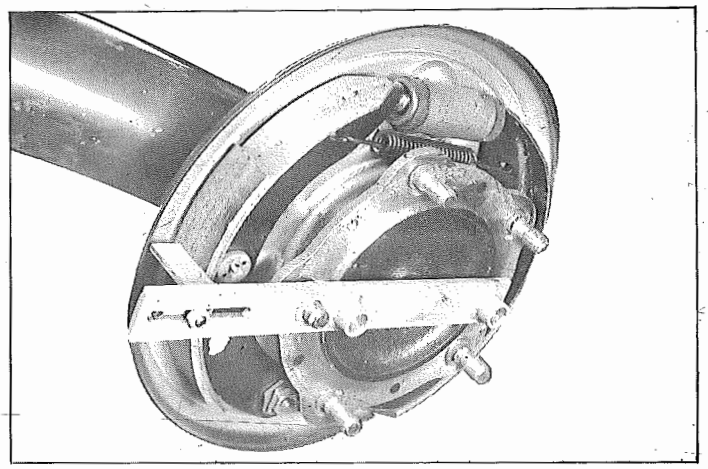
14. Fitting the stub axle.

Offer up the stub axle on the arm.

Insert 50 g . of special bearing grease in the housing.

Fit:-

- the spacer (6) and the washer (5),
- the inner bearing (4),
- the thrust washer (3) (recessed part against the bearing),
- the lockwasher,
- the nut (2), tighten the 72 ft.lbs (10 m.kg). Knock up the tab against the nut to lock it.
- fit the hub sealing cap (1) (grease-filled).



15. Centre the brake segments. Use centring fixture (A) 3565-T.

16. Fit the wing and the wheel.

Lower the car to the ground.

PRE-ADJUSTMENT OF THE HEIGHTS :

At the front, use gauges MR 1401-30.

At the rear, position the two arms so that there is a distance of 35 mm between the upper face of the cup and the rubber stop (see Op. DX. 433-0, paragraph 4).

ADJUSTMENT OF THE HEIGHTS :

The front tyres (180 x 380 XAS) and the rear (155 x 380 XAS) should be inflated to 27 psi (1.9 kg/cm^2)

The rear tyres (180 x 380 XAS) should be inflated to 24 psi ... ...(1.7 kg/cm^2)

At the front, the height from under the anti-roll bar to the surface upon which the wheels are resting = 222 to 228 mm.

At the rear, the height measured as above ... . tyres 155 x 380 XAS = 335 to 345 mm.
tyres 180 x 380 XAS = 355 to 365 mm.

After adjustment, the difference in camber of the front wheels, measured with fixture 2314-T, must not exceed 1 mm.

ADJUSTING THE MANUAL HEIGHT CONTROL RODS :

(See Op. DX. 433-0, paragraph 12).

ADJUSTING THE ANTI-ROLL BAR :

The distance between the stop clamp and the inner face of the pivot boss on the right-hand end = 110 $\pm$ 0.5 mm.

The clearance between the left-hand stop clamp and the lower bearing when the right-hand stop clamp is in contact with the right-hand bearing = 0.5 to 1 mm.

The diametral clearance of the bearings (see Op. DX. 433-0, paragraph 15).

Tightening torques for the U-bolt nuts: 9 ft.lbs (1.2 m.kg).

Force required (leverage) to turn the anti-roll bar, applied on the ball joint = 9 to 13 lbs (4 to 6 kg).

SUSPENSION SPHERES :

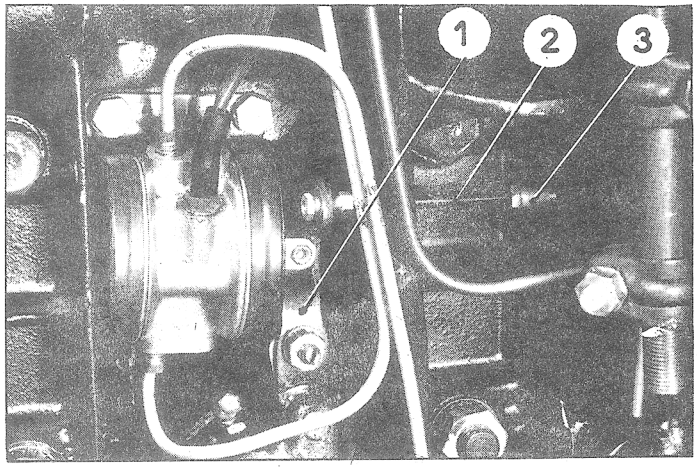
Inflation pressures:	Saloons	Front 840 $^{+\ 40}_{-\ 220}$ p.s.i. (50 $^{+\ 2}_{-\ 15}$ kg/cm^2)	
		Rear 370 $^{+\ 30}_{-\ 150}$ p.s.i. (26 $^{+\ 2}_{-\ 10}$ kg/cm^2)	
	Familiale and Breaks (Safari)	Front 840 $^{+\ 40}_{-\ 220}$ p.s.i. (59 $^{+\ 2}_{-\ 15}$ kg/cm^2)	
		Rear 520 $^{+\ 40}_{-\ 150}$ p.s.i. (37 $^{+\ 2}_{-\ 10}$ kg/cm^2)	

Tightening torque for front left-hand spacer 36 ft.lbs (5 m.kg).

Tightening torque for the screws securing suspension cylinder = hand tight.

Tightening torque for the corresponding locknuts 14 ft.lbs (1.9 m.kg).

Tightening torque for the dampers (torque spanner) 11 to 12 ft.lbs (1.5 to 1.7 m.kg).

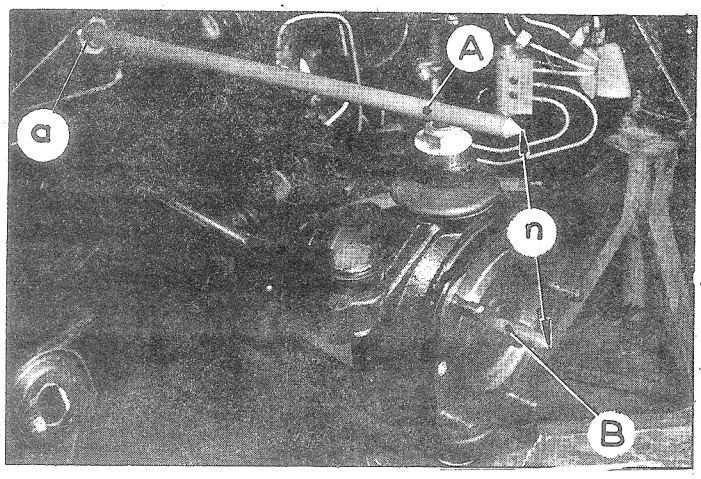


PRE-ADJUSTMENT OF THE FRONT HEIGHTS

1. Connect the height control rod (2) to the lever (1) and to the fork end (3) on the corrector control bar (the manual height control lever being in the "low" position).

2. Place the manual height control lever in the "high" position. Make sure that the corrector valve is in the fully open position (check this by trying to push it forwards with a screw-driver pressing on the wheel-arm support rib).

NOTE:- Never lever against the corrector as this would cut the rubber cup.



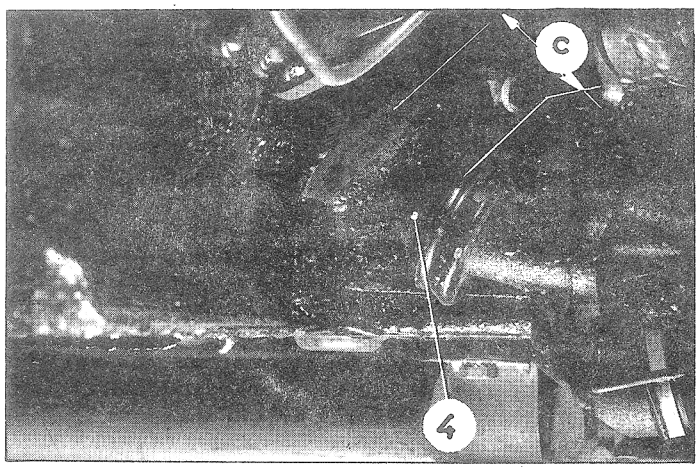
3. Put the gauges MR 1401-30 in position. The shorter gauge (B) in the wheel hub, the longer gauge (A) in the bore (a) of the steering relay.

Using two jacks (1 under each lower arm) raise the arm assembly so as to bring the shorter gauge to a dimension "n" = 175 mm from the steering relay gauge.

Ensure that there is a clearance of about 1 mm between the fork on the control lever and the corrector ball-pin, if not, move the control rod.

Tighten the clamp for the control rod on the anti-roll bar (spanner 1677-T).

Remove the gauges MR 1401-30.



PRE-ADJUSTMENT OF THE REAR HEIGHTS

4. Position the two arms so as to obtain a dimension "c" = 35 mm between the upper edge of the cup for the rubber stop (4) and the thrust face of the steel stop.

5. Using the control rod put the height corrector valve in the fully open position. Tighten the clamp (spanner 1677-T for the screws with flats).

ADJUSTMENT OF THE HEIGHTS

To carry out this operation, the car must be unladen and ready for the road (with spare wheel, tool kit and 5 litres ($1\frac{1}{2}$ gallons) of petrol in the tank).

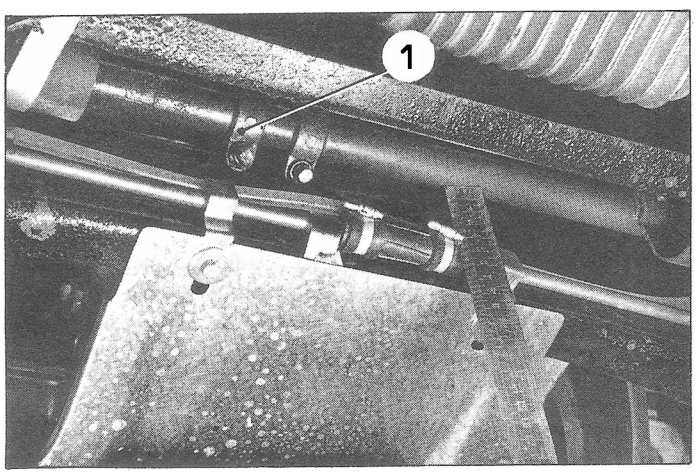
Place the height control lever in the "normal" position.

6. Check the tyre pressures :

at the front 180 x 380 XAS = 27 psi (1.9 kg/cm^2)

at the rear 155 x 380 XAS = 27 psi (1.9 kg/cm^2)

or 180 x 380 XAS = 24 psi (1.7 kg/cm^2)



7. Put the car on a lift or over a pit.

Leave the engine idling. Release the parking brake. Do not chock the wheels.

8. Adjusting the front heights:

Slightly loosen the screw in the clamp (1) securing the height corrector control rod. Turn the clamp (1) in the required direction to obtain an average height of 225 $\pm$ 3 mm from the underside of the anti-roll bar to the surface on which the wheels are resting. Do this by fractions of a turn. By turning the clamp (1) towards the front, the height of the car is increased, by turning the clamp towards the rear, the height is decreased.

Retighten the screw in the clamp (1) (spanner 1677-T).

9. Checking the front heights :

a) Place a straight edge, resting on the sides of the lift or pit immediately below and parallel to the anti-roll bar. The lower edge of the straight edge must be exactly level with the surface on which the wheels are resting.

b) Slowly raise the car by the front bumper, stopping when resistance is felt, hold it in this position until a hissing noise indicates commencement of the exhaust position.

NOTE:- The time taken must be not less than 20 seconds. At this moment, with the aid of an assistant, measure the distance between the underside of the anti-roll bar, at each end, and the surface on which the wheels stand. These two measurements must not vary by more than 3 mm. Take the average of these two dimensions, e.g. 245 mm.

c) Allow the vehicle to stabilise itself.

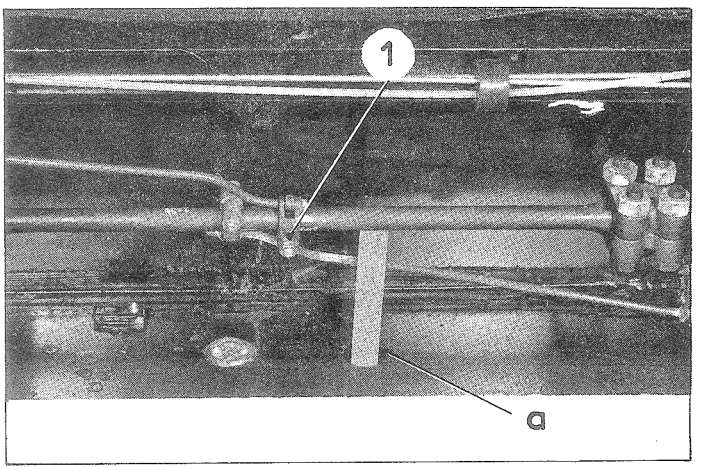
d) Lower the car slowly by pressing on the front bumpers, stopping when resistance is felt. Maintain this position until a hissing noise indicates commencement of the inlet position. With the aid of an assistant, measure the dimension between the underside of the anti-roll bar, at each end, and the surface on which the wheels stand. Take the average of these two dimensions, e.g. 210 mm.

Take the average of the figures determined under b and d above. In the example chosen :

$$\frac{245 + 210}{2} = 227.5 \text{ mm.}$$

This average must fall between 222 and 228 mm. If it does not, repeat the operations in paragraph 3.

10. Adjusting the rear heights:



Proceed in the same way for the adjustment of the front heights (see paragraph 8) after having removed the protection shield from the corrector control (inside the boot).

Operate on the clamp (1).

The height to obtain is $335 \, ^{+10}_{0}$ mm from the underside of the anti-roll bar to the ground.

If the car is fitted with rear tyres, 180 x 380 XAS the rear height should be $355 \, ^{+10}_{0}$ mm.

11. Checking the rear heights :

a) Place a straight edge, resting on the side of the pit or lift, immediately below and parallel to the anti-roll bar.

b) Remove the rubber plug from the floor.

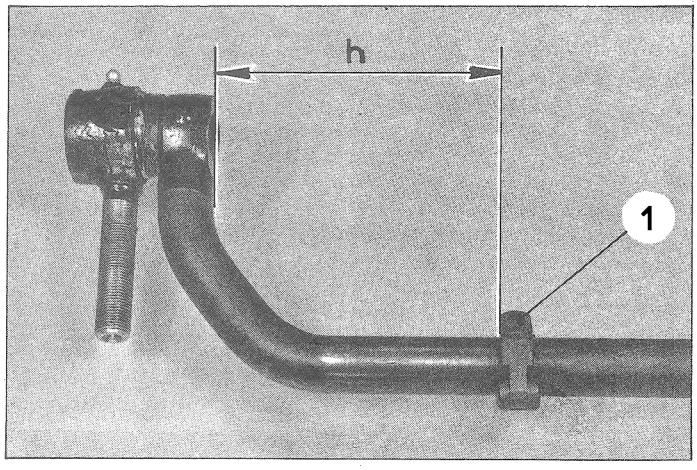
c) Raise the car slowly by means of the rear bumpers, stopping when resistance is felt, and maintaining this position until hissing indicates the commencement of the exhaust position.

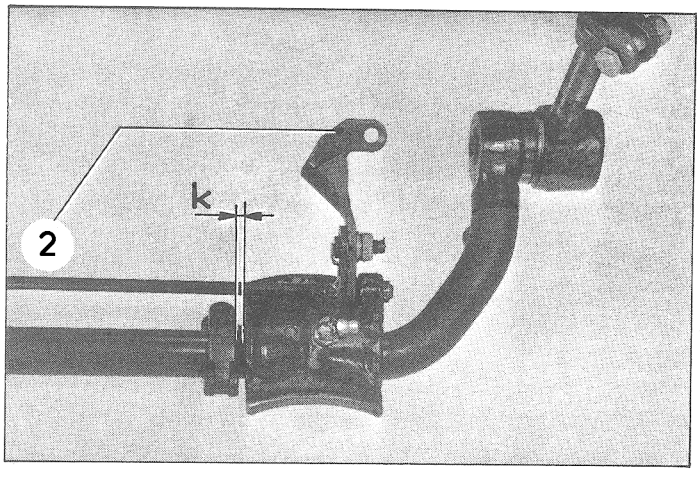
NOTE:- The time taken must be not less than 20 seconds.

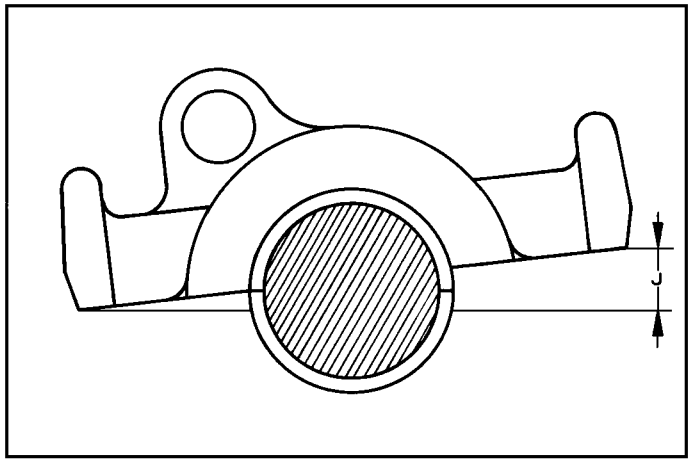
At this precise moment, with the help of an assistant, read the dimension between the underside of the anti-roll bar and the surface on which the wheels stand (insert the straight edge through the hole in the floor, the end resting on the anti-roll bar); let this dimension be e.g. 347 mm.

d) Allow the car to stabilise itself.

e) Lower the car slowly by pressing on the rear bumpers, stopping when resistance is felt. Maintain this position until a hissing indicates commencement of the inlet position.







518/W/105

ADJUSTMENTS ON THE FRONT ANTI-ROLL BAR.

13. Adjusting the lateral position of the anti-roll bar.

a) Remove the front mudshields.

b) Measure the distance (h) between the stop clamp (1) and the inside face of the right-hand fixing boss.

This dimension can be measured by placing a straight edge on the boss, holding it in the hand and measuring the dimension (h) with the aid of a rule (between the stop and the outer face of the straight edge).

If necessary, move the stop as required to obtain a distance (h) equal to 110 $\pm$ 0.5 mm. Tighten the stop fixing screw.

14. Adjusting the end-float of the anti-roll bar.

Push the bar to bring the right-hand stop in contact with the right-hand bearing.

Move the left-hand stop in the required direction to obtain a clearance (k = 0.5 to 1 mm) between the stop and the lower left-hand bearing.

15. Adjusting the bearings of the anti-roll bar.

a) Place the bearing cap on the bar as indicated in the illustration. Holding it in this position measure the clearance (j) using feeler gauges; let (j) = 1.80 mm.

NOTE:- These bearings are assembled so that they grip the bar lightly. Choose amongst the shims sold by our Spare Parts Department, those which will give a thickness equal to :-

$$\frac{j - 0.2}{2}$$ or in the above example

$$\frac{1.80 - 0.2}{2} = 0.8 \text{ mm.}$$

b) Smear the bearings with graphite grease and fit the bearing caps.

Insert two appropriate shims above between bearing and cap.

Tighten the nuts on the clamps to 9 ft.lbs (1.2 m.kg).

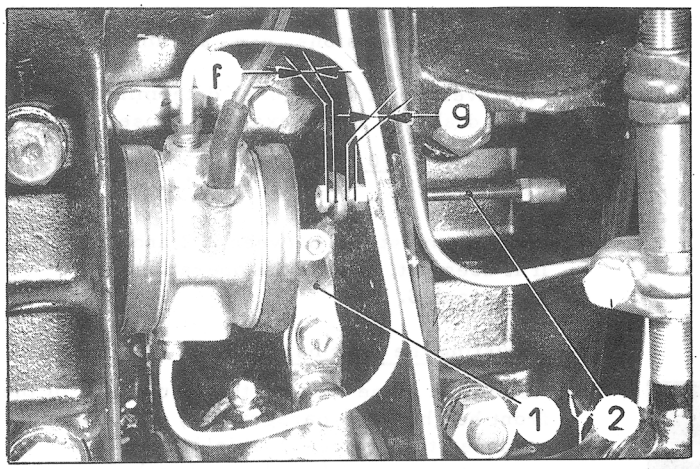
c) Check the leverage required to turn the anti-roll bar. This should turn under a force of 4 to 6 kg. applied on the ball joint. If it does not, modify the thickness of the shim.

d) Ensure that there is a clearance of 1 mm approximately between the bottom of the corrector control rod fork and the corrector ball pin.

e) Fit the mudshields.

With the help of an assistant, read the dimension from the underside of the anti-roll bar and the surface on which the wheels stand, for example 329 mm. Take the average of these dimensions, for example:

$$\frac{347 + 329}{2} = 338 \text{ mm.}$$



This dimension must lie between 335 and 345 mm. If not, repeat the operations in paragraph 10.

If the car is fitted with rear tyres 180 x 380 XAS, the rear height should be between 355 and 365 mm.

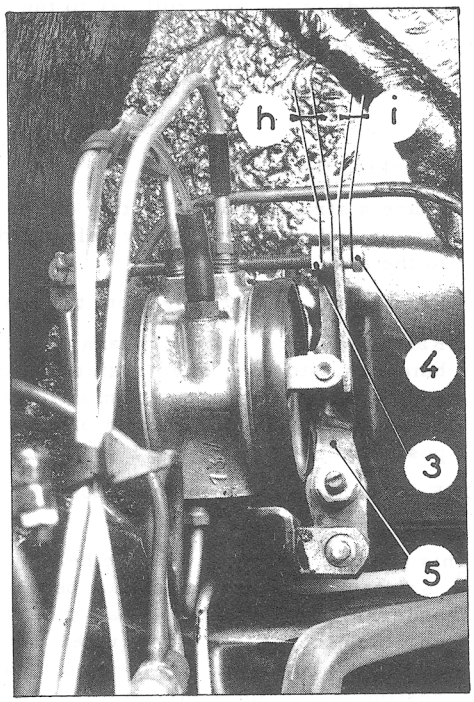
f) Refit the rubber plug and the corrector control protection panel.

Check again the front heights and adjust them if necessary.

Check the camber of the front wheels. The difference between the two wheels must not be greater than 1 mm (see Op. DX.410-0, paragraph 1).

12. <u>Adjusting the manual height control rods.</u>

Place the manual control inposition "normal".



a) At the front, check that there is clearance (f) with the corrector slide valve in the fully open inlet position (lever (1) pushed towards the front) and clearance (g) with the corrector slide valve fully open in the exhaust position (lever (1) pushed towards the rear). (Clearance measured between the lever (1) and the nut).

If necessary, adjust the control rod (2).

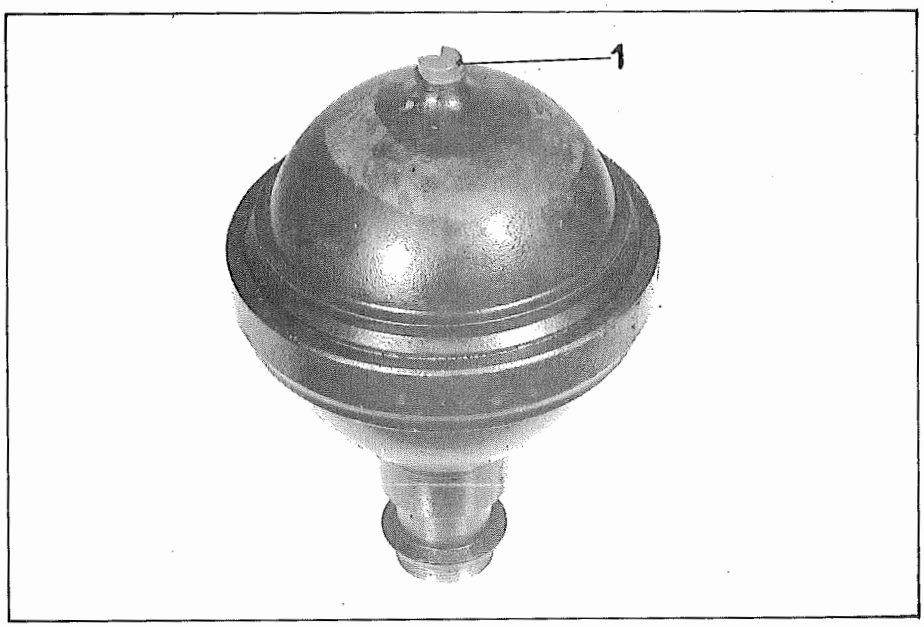
b) At the rear, check that there is clearance (h) with the corrector slide valve fully open in the inlet position (the lever (5) pushed towards the front) and clearance (i) with the corrector slide valve fully open in the exhaust position (lever (5) pushed towards the rear). (Clearance measured between the lever (5) and the nut).

If necessary, adjust the nuts (3) and (4).

c) Check the functioning of the manual height control. Make quite sure that the height control levers do not touch the body. If they do, adjust the position of the control bearings.

NOTE:- If it is impossible to adjust the heights by working on the control rods, carry out the pre-adjustment of the heights (see paragraphs 1 to 3, this operation, for the front and paragraphs 4 and 5, this operation, for the rear).

IDENTIFICATION OF SUSPENSION SPHERES



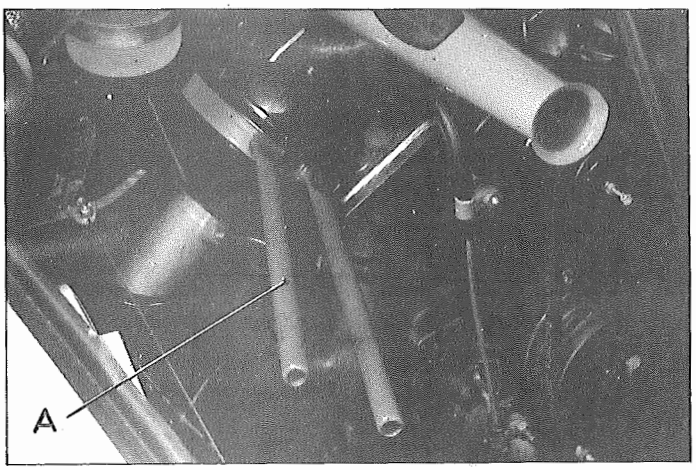
Pressure engraved on the sealing screw (1)

8/W/107

VEHICLE	INFLATION PRESSURES	
	Front in kg/cm^2	Rear in kg/cm^2
DX	59 (855.5 p.s.i.)	26 (377 p.s.i.)
DVF	59 (855.5 p.s.i.)	37 (536.5 p.s.i.)

DS 21

REPLACEMENT OF SUSPENSION SPHERE OR A DAMPER VALVE



Removal.

1. Thoroughly clean the area in which work is to be carried out.

Release the pressure in the suspension circuit, and place the manual height control in "low" position.

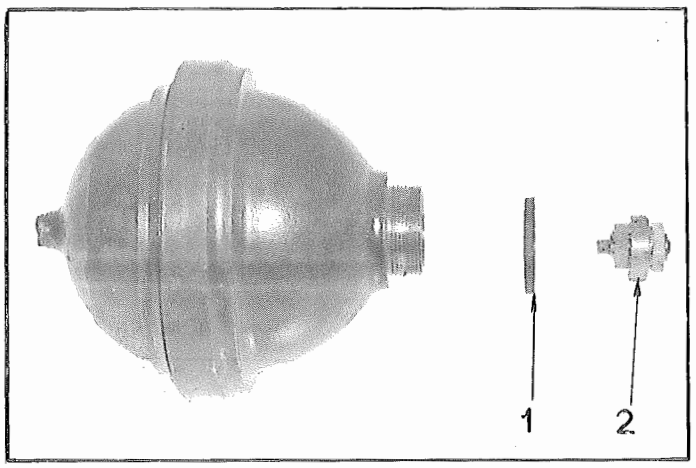
Place a cloth under the suspension cylinder to prevent the leakage of fluid onto the sidemember and the steering.

2. Remove the suspension sphere from the suspension cylinder using strap wrench 2223-T bis (A).

NOTE:- On the front left-hand side there is a spacer between the suspension cylinder and the suspension sphere.

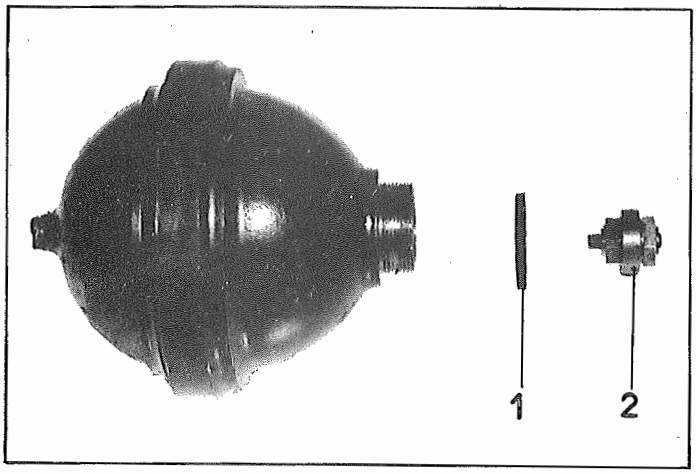
3. Unscrew and remove the spacer from the suspension sphere.

4. Close the hole in the suspension cylinder using a plug.



5. Remove the damper valve (2), the sealing ring (1) and clean the damper valve housing with alcohol.

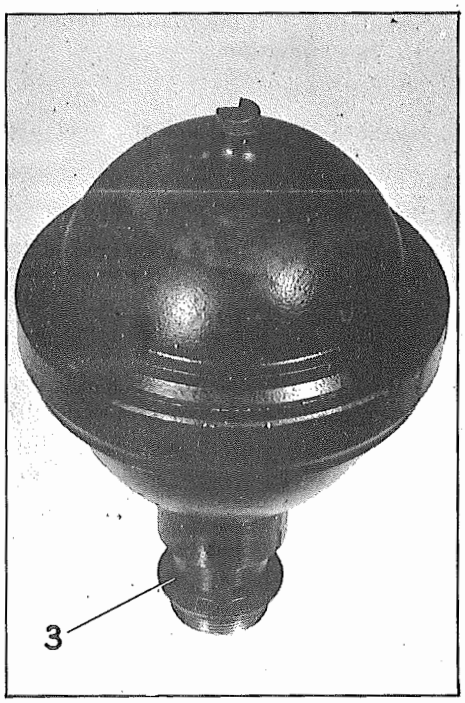
Close the opening in the sphere with a plug.



ASSEMBLY.

6. Screw the damper valve (2) into the suspension sphere and tighten to between 11 and 122 ft.lbs (1.5 to 1.7 m.kg), (torque spanner 2473-T).

NOTE:- Do not exceed this tightening torque, otherwise the damper valves may be deformed.



7. Fit and tighten the distance piece (3) between the suspension sphere and the suspension cylinder, left-hand front side, to 36 ft.lbs (5 m.kg).

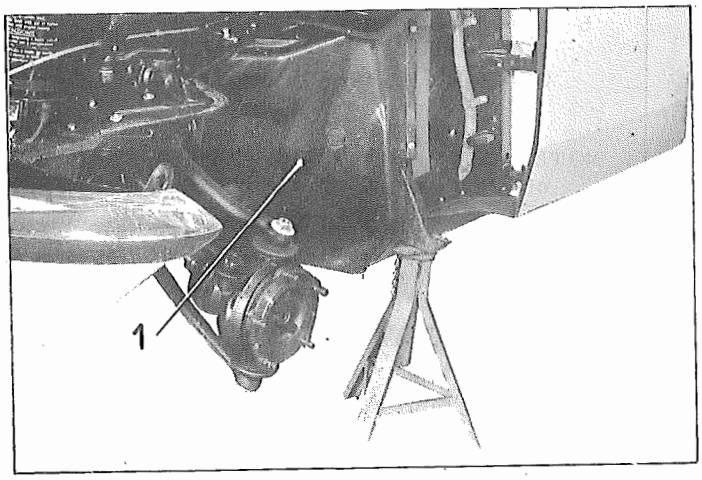
8. Fit and tighten by hand the suspension sphere on the suspension cylinder, inserting the seal (1) moistened with special hydraulic fluid.

9. Put the circuit under pressure, run the engine and place the manual height control in position "normal".

10. Check all unions for leaks.

REPLACEMENT OF A SUSPENSION CYLINDER.

Removal.



11. Remove:-

- the spare wheel,
- the headlamp levelling control,
- the wing (see Op. DX.851-1).

12. Loosen the wheel nuts.

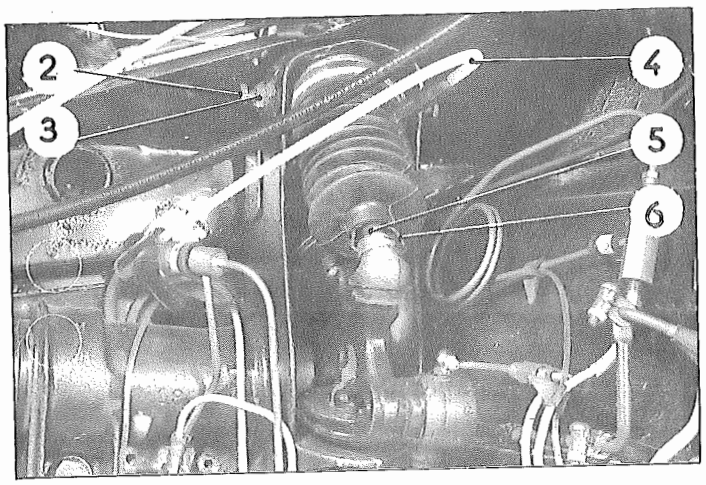
Place the car on stands.

13. Release the pressure in the suspension circuit by loosening the bleed screw on the pressure regulator. Put the manual height control lever in "low" position.

14. Remove the wheel and the mudshield (1).

15. Remove the suspension sphere.

(See this operation, paragraphs 1 to 4).



16. Remove the suspension cylinder.

a) Disconnect the union on the cylinder feedpipe. Plug the holes in the pipe and in the suspension cylinder.

b) Free the overflow return pipe (4) from the dust cover.

c) Remove the securing clip from the dust cover on the ball thrust cup. Free the dust cover.

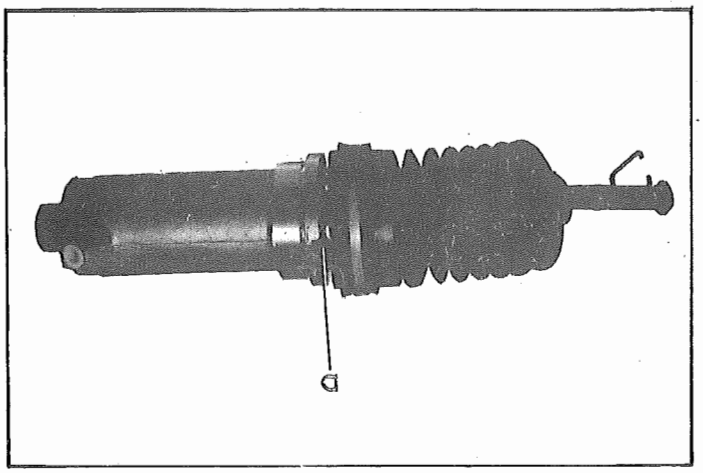
d) Remove the connecting pin (6).

e) Remove the rod (5) from the piston by pressing down the axle arm to the maximum.

NOTE:- The rod can only be disengaged when the holes in the rod and the lever are parallel.

f) Loosen the nuts (3) and the pointed screws (2) securing the cylinder.

g) Free the suspension cylinder.

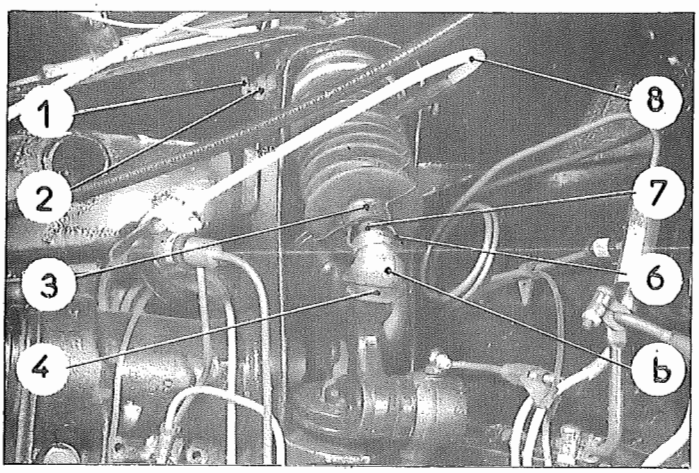


Assembly.

17. Place the cylinder in its housing. See that the countersinks (a) in the cylinder are in line with the pointed securing screws.

18. Tighten the pointed securing screws (1) by hand so that the cylinder is fitted without play or strain.

Tighten the nuts (2) to 13.1/2 ft.lbs (1.9 m.kg).

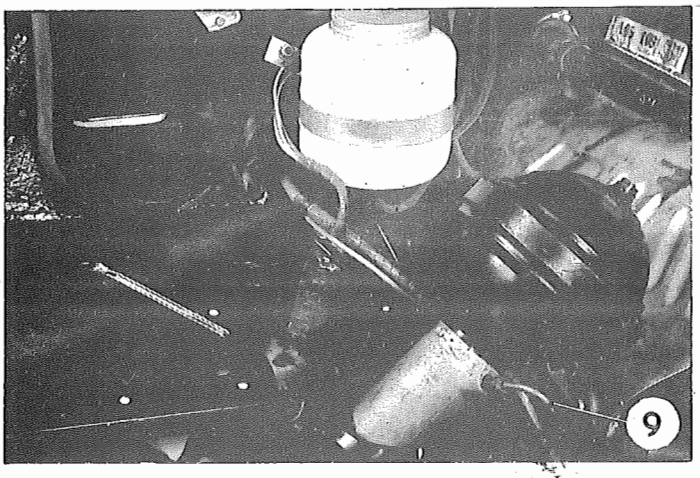


19. Engage the piston rod (7) in the ball thrust cup (b), by lowering the axle arms to the maximum. Make sure that the ball is in position.

20. Engage the ends of the pin (6) in the holes of the ball thrust cup.

21. Fit onto the ball thrust cup (b), the dust cover (3), the rubber sleeve (4) over the dust cover, then the ligarex hoseclip (pliers 2483-T).

22. Fit the overflow return pipe (8) into the dust cover.



23. Connect the feedpipe to the suspension cylinder.

Tighten the union.

24. Fit the suspension sphere.

(See this operation, paragraphs 8 to 10).

25. Put the suspension circuit under pressure.

Tighten the bleed screw on the pressure regulator and put the manual height control in "high" position. Start up the engine.

Check all unions for leaks.

26. Fit:-

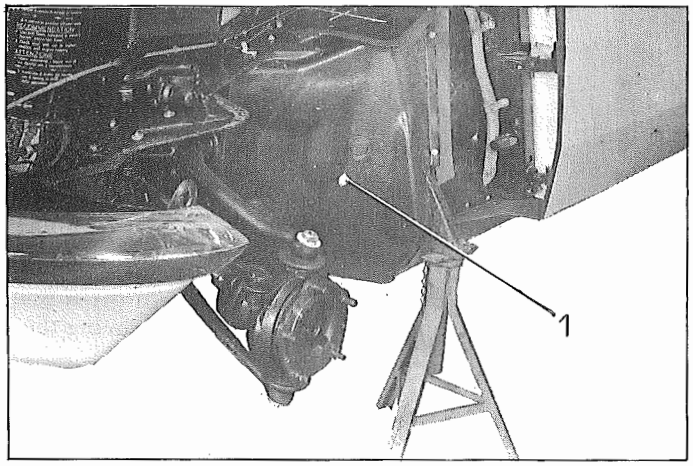
- the front mudshield.
- the wheel.

27. Fit the wing (see Op. DX.851-1), the spare wheel and headlamp control.

28. Lower the car to the ground.

Tighten the wheel nuts.

REPLACEMENT OF A FRONT HEIGHT CORRECTOR.



Removal.

NOTE:- Renew the pipe sleeve-seals at each dismantling.

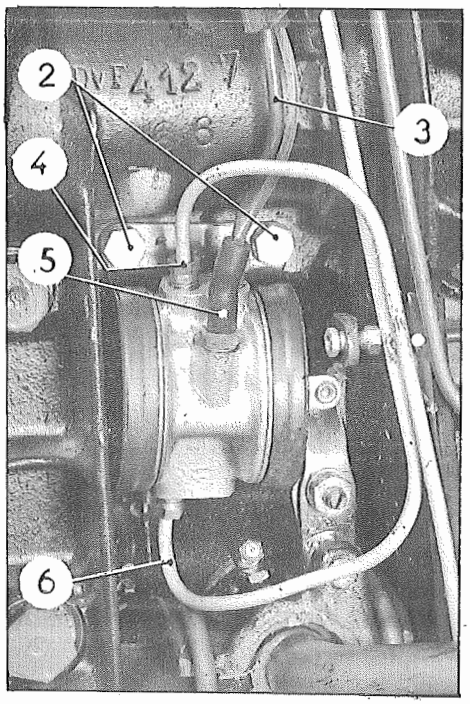
28. Place the front of the vehicle on stands.

Remove:

- the spare wheel,
- the front left-hand wheel,
- the front left-hand wing,
- the left-hand mudshield (1).

29. Release the pressure in the suspension circuit by loosening the bleed screw on the pressure-regulator.

Place the manual height control lever in the "low" position.



30. Disconnect the unions on the height corrector in the following order:-

a) the overflow return pipe (5),

b) the suspension cylinder feedpipe (6),

c) the return pipe (3) from the corrector,

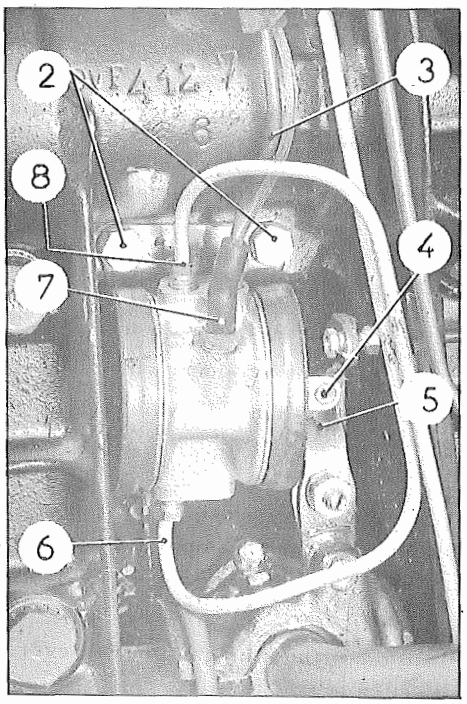
d) the feedpipe (4) from the corrector.

Plug the openings on the corrector and the pipes as the work proceeds.

31. Remove the screws (2) securing the height corrector bracket on the half axle.

Free the corrector with its bracket.

32. Remove the corrector bracket from the height corrector.



Refitting.

33. Fit the corrector bracket to the corrector.

34. Place the manual height control lever in "normal" position.

35. Connect the suspension cylinder feedpipe (6) without tightening the union.

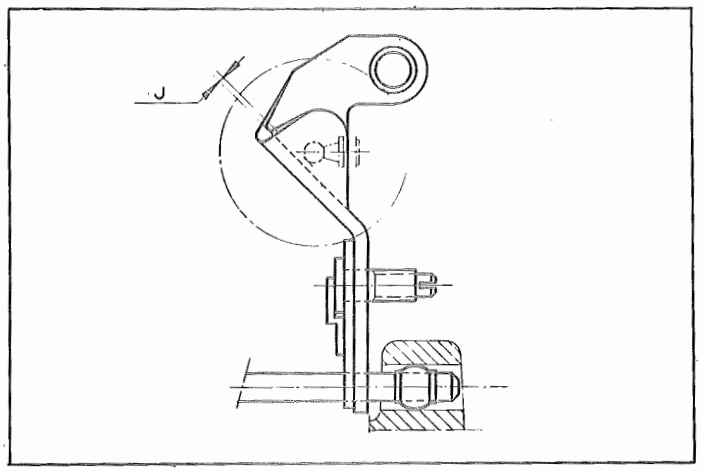
Offer up the corrector to locate the ball (4) in the fork (5). Tighten the screws (2) securing the corrector bracket.

Tighten the union of the suspension cylinder feedpipe (6).

36. Connect:

- the corrector feedpipe (8). Tighten the union.
- the corrector return pipe (3). Tighten the union.
- the overflow return pipe (7).

37. Make sure that there is a clearance "j" of 1 mm between the corrector ball pin and the bottom of the control lever arm fork.
If not, loosen the control rod of the suspension mechanism on the anti-roll bar and move the arm. Tighten again.



37. Start up the engine. Tighten the bleed screw on the pressure-regulator.

Check all unions for leaks, and the liquid level in the reservoir.

Fit the wheel, lower the car to the ground and tighten the wheel nuts.

38. Check and adjust the heights.

(See Op. DX.433-0).

39. Fit the mudshield.

Fit the front left-hand wing and the spare wheel.

OVERHAULING A DAMPER VALVE.

Removal.

1. Remove the damper valve and hold it in a vice by the nut at the suspension sphere end. Undo the other nut.

2. Clean the parts with alcohol and blow with compressed air.

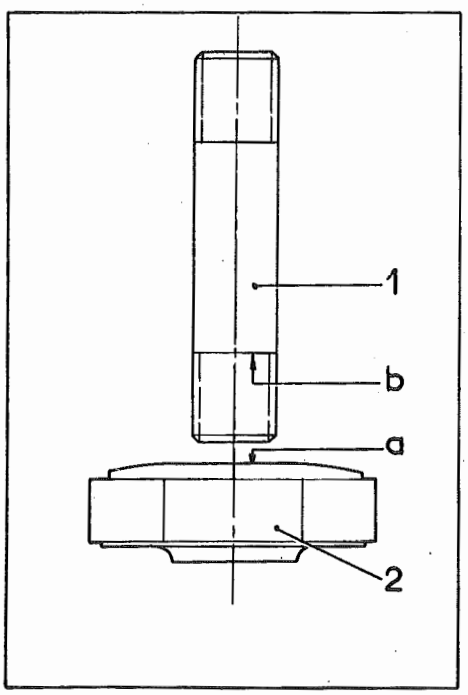
Preparation.

3. a) The damper body.

It is possible to remove any "scratches" by rubbing the parts on abrasive paper on a surface plate.

Use No.400 abrasive paper moistened with alcohol to commence the operation and finish by polishing with No.600 abrasive paper.

Clean the holes with a small brush.



b) Valve discs.

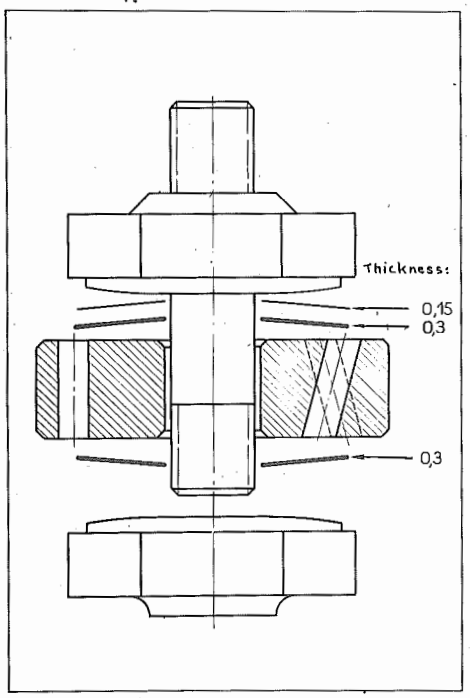
The valve discs should be changed each time the damper is dismantled. Pre-packed sets of discs may be obtained from our Spare Parts Department containing the necessary parts for overhauling a damper valve.

The valve discs are slightly curved. To mark the convex side, rub the valve lightly on No.600 abrasive paper on a surface-plate. The convex face of the disc will show a mark near its centre.

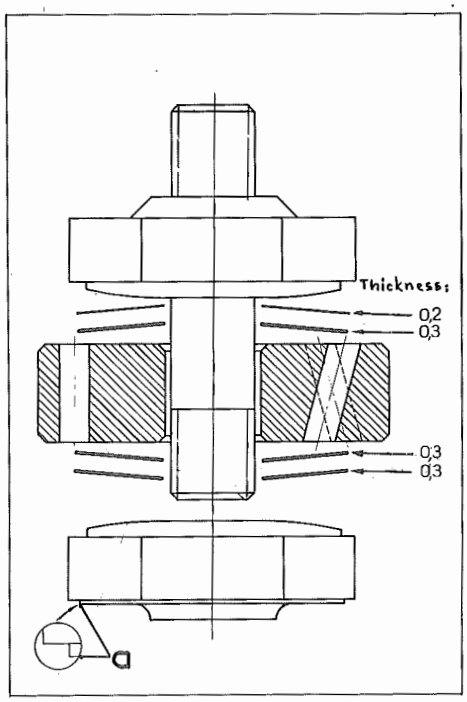
Assembly.

4. Screw the stud (1) into the nut (2) (short-thread end) until the upper face of the nut (at a) reaches the end of the thread on the stud (at b). This prevents the valve discs from being pinched in the threaded part of the stud.

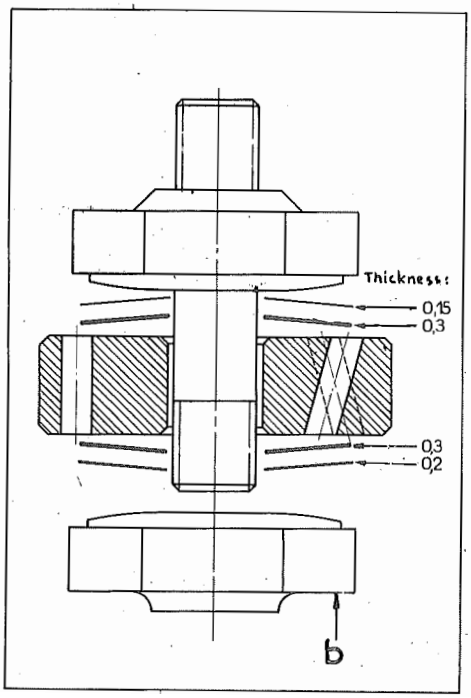
Front damper valve saloons and Break
No. DS 436-06 i
(without identification)



Rear damper, saloons
No. DS 436-06 j
(identified by a shoulder at (a))



Rear damper, Break
No. DVF 436-06
(marked AR3 at (b))

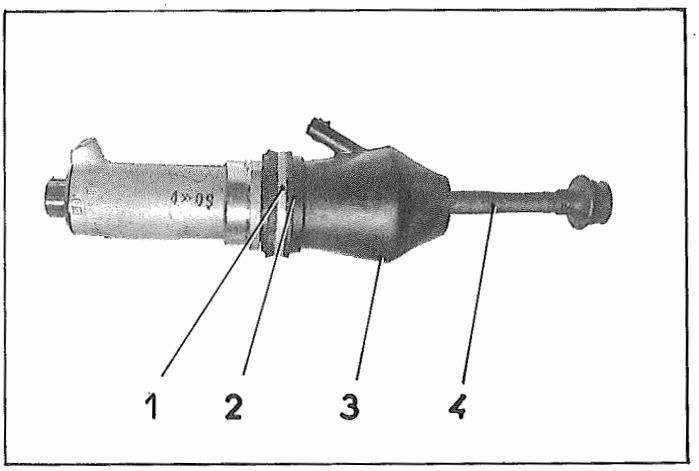


5. Fit the valve discs (cylinder side) in the order indicated. Fit the concave part of the valve towards the damper body.

6. Fit the damper valve body (either way up).

7. Fit the valve discs (sphere side) in the correct order.

8. Screw on the upper nut taking care not to turn the stud. Tighten the nut to 14.1/2 ft.lbs (2 m.kg) exactly.



OVERHAULING A SUSPENSION CYLINDER.

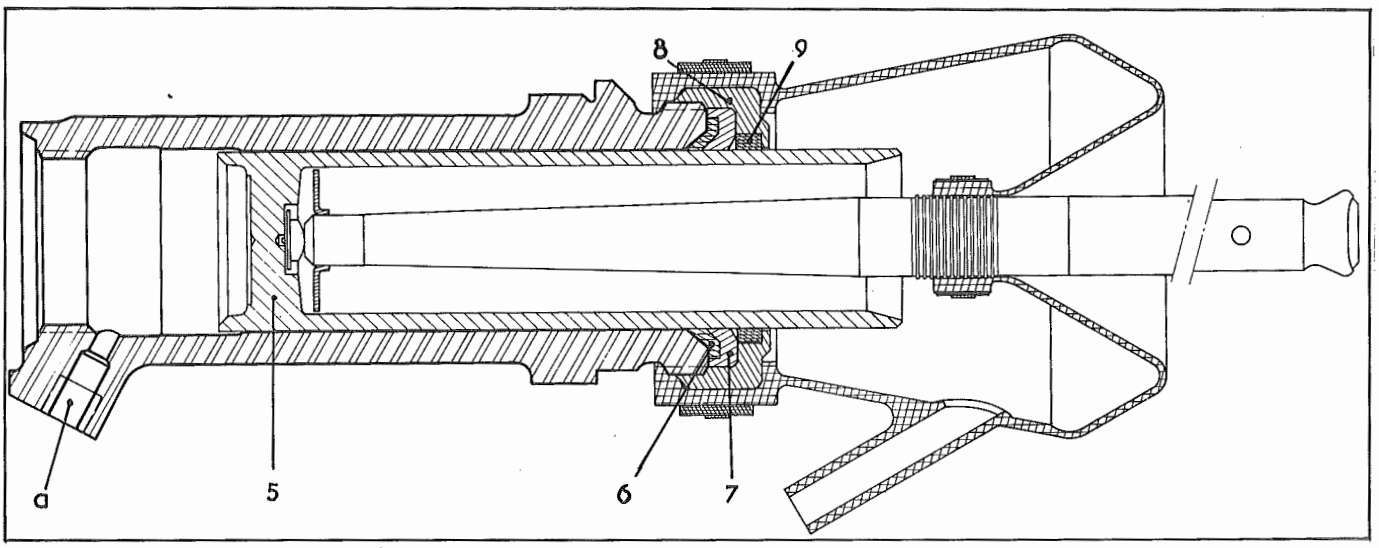
Dismantling.

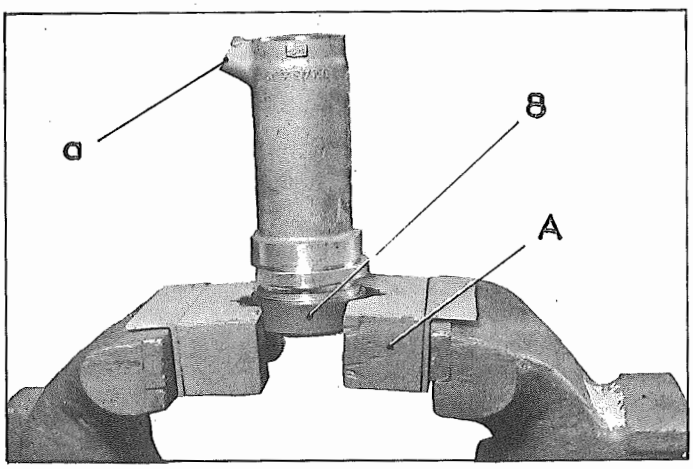
9. Release the clip (1) securing the dust cover.

Remove:

- the rubber protection sleeve (2),
- the dust cover (3), the suspension piston rod (4).

Remove the piston (5) from the cylinder.





10. Hold the cylinder in a vice by the nut (8), using wooden jaws (A) (MR.3407-30).

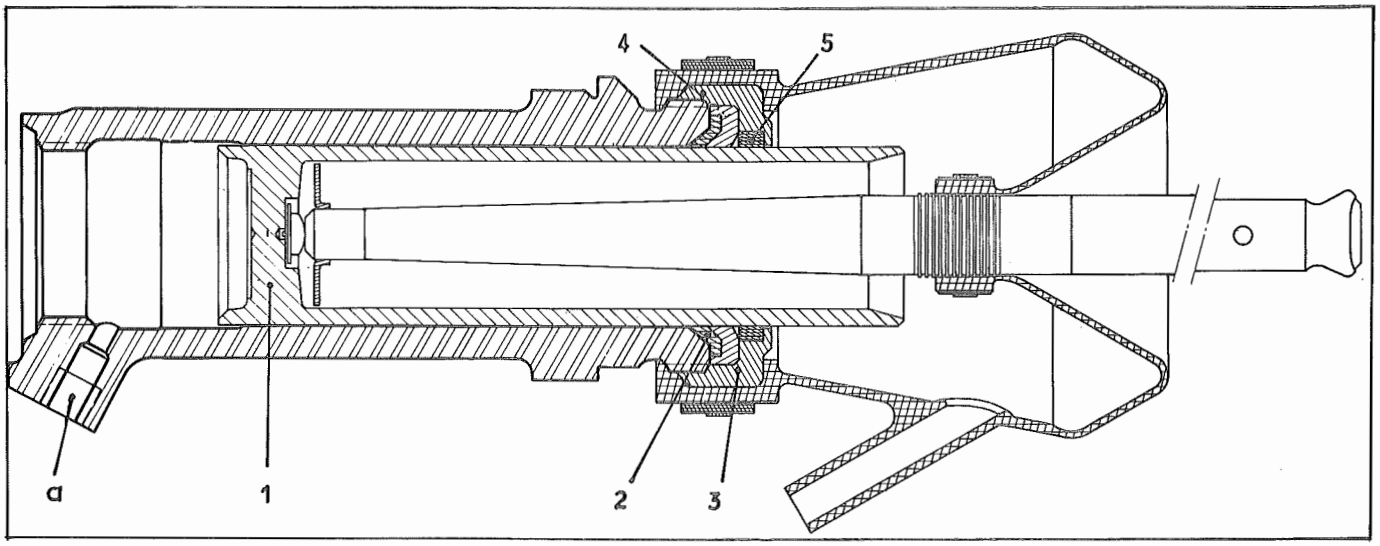
Tighten the vice moderately taking care not to damage the nut (8).

Unscrew the cylinder (use a pipe wrench, bearing on the boss of the feedpipe union (a).

Remove the felt washer (9).

11. Free:

- the seal thrust washer (7),
- the seal (6).

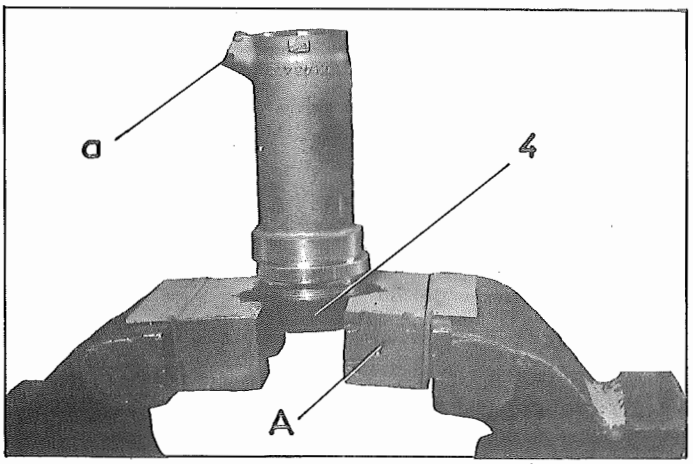


Assembly.

12. Fit the rubber seal (2) previously smeared with special hydraulic fluid, in the seal-retaining washer (3).

IMPORTANT NOTE: The seal retaining washer (3) is paired with the piston (1). If one of these parts is replaced it is necessary to fit a part of the same classification: a number is engraved on the edge of the retaining washer and is stamped on the head of the piston.
Example: a washer engraved with the figure '3' must be assembled with a piston stamped '3'.

13. Place the felt washer (5), impregnated with special hydraulic fluid, in the nut (4).



NOTE: The felt washers must be immersed in special hydraulic fluid for a few hours before being fitted.

14. Fit the joint (2) with retaining washer (3) on the cylinder.
Fit the nut (4) without tightening.

15. Fit the piston.

NOTE:
In the case of slight scratches, a light cleaning with abrasive paper No. 600, smeared with alcohol, is permitted.

a) Carefully clean the parts with alcohol and blow with compressed air.

b) Lubricate the piston (1) with special hydraulic fluid.

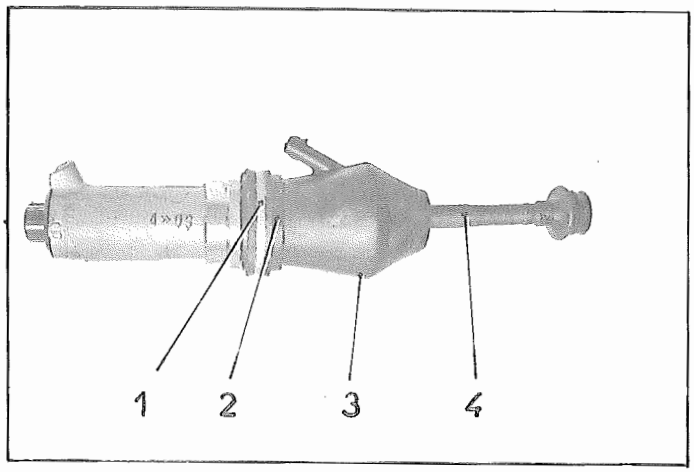
c) Insert the piston (1) in the cylinder.

16. Hold the cylinder in a vice by the nut (4) using wooden jaws (A) (MR.3407-30).

NOTE: Take care not to drop the piston during this operation.

17. Tighten the vice moderately so as not to deform the nut. Tighten the cylinder in the nut to 14 ft.lbs. (2 m.kg). Use a pipe wrench resting on the feedpipe union boss 'a' and torque indicator (torque indicator 2472-T).

This tightening torque is of the greatest importance.



This must be observed to ensure that the joint retaining washer is a good fit and to avoid the piston chattering in the cylinder or a severe leak.

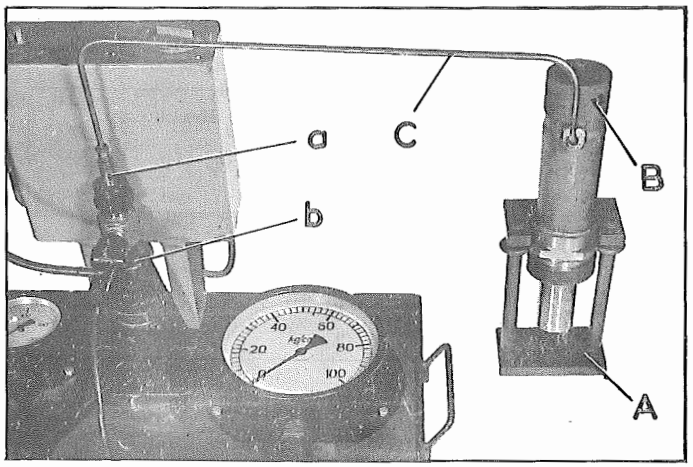
18. Check the sliding movement of the piston.

19. Check the sealing of the piston cylinder assembly (see paragraphs 21 and following, this operation).

20. Fit:

- the assembly of dust cover (3) and suspension piston rod (4),
- the rubber protection sleeve (2).

Tighten the clip (1) of the dust cover.



BENCH-TESTING A SUSPENSION CYLINDER.

For this operation, use test bench No. 2290-T.

Connect the pump to the pressure gauge of 0 - 1500 lbs/sq.in. (0-100 kg/cm^2).

21. a) Put the cylinder together with the piston rod on the stand (A) (2293-T).
Fit the cap (B) fitted with a seal.

b) Insert the end of the rod in the socket on the support.

22. a) Connect the feedpipe orifice in the cylinder to the orifice "a" on the pump, using a tube (C).
Tighten the bleed screw "b" on the test bench.

b) Operate the pump to build up the pressure to 570 p.s.i. (40 kg/cm^2).

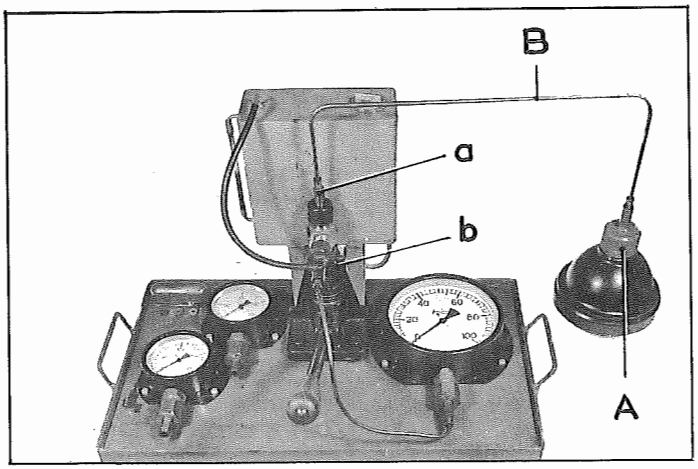
c) Check the pressure gauge. There must be no drop in pressure.

d) Release the pressure by unscrewing the bleed screw "b".

23. Remove:

- the pipe (C),
- the plug (B).

Remove the cylinder from the stand.



CHECKING THE INFLATION PRESSURE OF A SUSPENSION SPHERE.

Use test bench 2290-T.

Connect the pump to a pressure gauge of 0 - 1500 lbs/sq.in. (0 - 100 kg/cm^2).

24. Screw on the union (A). Insert a seal.

25. Read the number engraved on the filler screw. This number indicates the pressure.

26. a) Connect the union (A) to the orifice "a" on the pump, using the pipe (B).

    b) Tighten the bleed screw "b".

    c) Operate the pump in order to build up pressure.

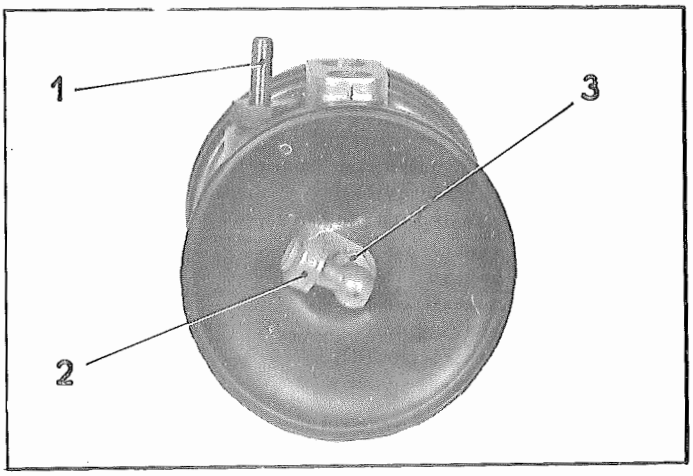
    d) Watch the pressure gauge. At first the pressure will not rise, then it rises rapidly and then ceases to rise; at this point the gauge shows the pressure of the sphere.

At 20°C (68°F) this pressure should equal the number engraved on the filler screw.

DX Saloon (front)	840p.s.i. $^{+30}_{-210}$ lbs/sq.in. ($59\ ^{+2}_{-15}$ kg/cm^2)
(rear)	370p.s.i. $^{+30}_{-140}$ lbs/sq.in. ($26\ ^{+2}_{-10}$ kg/cm^2)
DVF Estate car (Safari) (front)	840p.s.i. $^{+30}_{-210}$ lbs/sq.in. ($59\ ^{+2}_{-15}$ kg/cm^2)
(rear)	525p.s.i. $^{+30}_{-140}$ lbs/sq.in. ($37\ ^{+2}_{-10}$ kg/cm^2)

    e) Release the pressure by unscrewing the bleed screw "b".

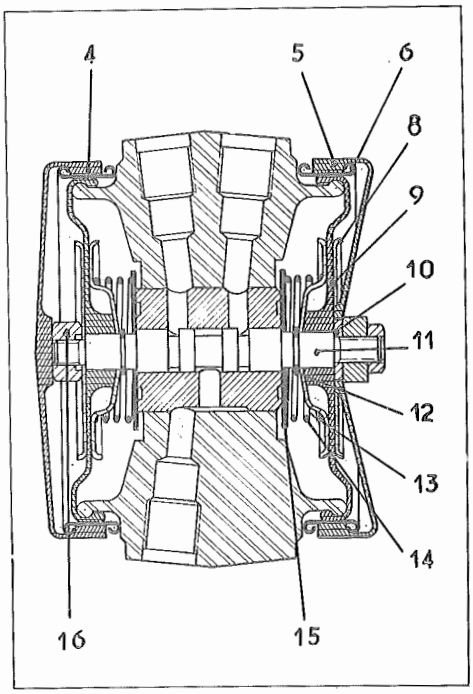
27. Remove the pipe (B) and the union (A).



OVERHAULING A HEIGHT CORRECTOR.

Dismantling.

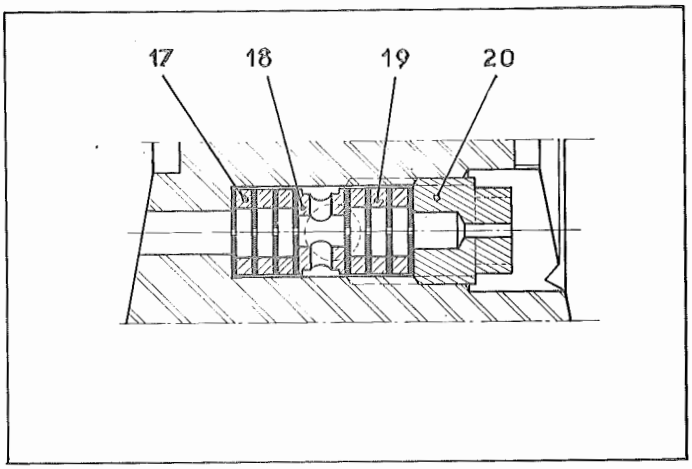
28. Remove:
- the overflow pipe union (1),
- the locknut (3),
- the control (2),
- the washer (10).



29. Remove the sealing cups (4) and (5).

30. Remove:
- the nut (16),
- the outer metal rings (6) holding the diaphragms,
- the outer metal cups (8),
- the diaphragms (9),
- the inner metal cups (13),
- the springs (14),
- the circlips (12),
- the disc-valves (15).

31. Remove the slide-valve (11) from the corrector body.

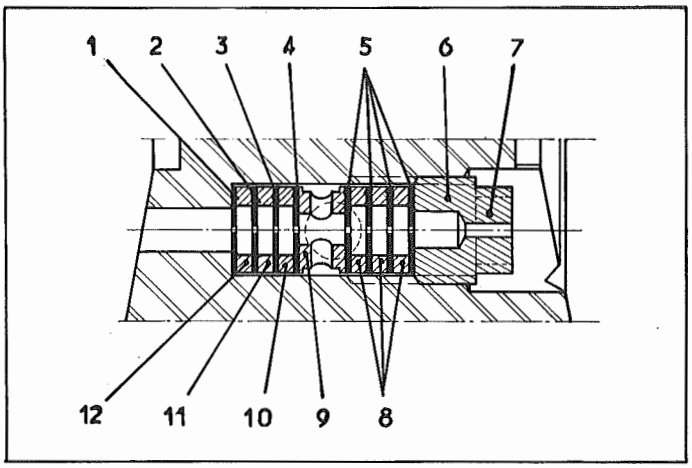


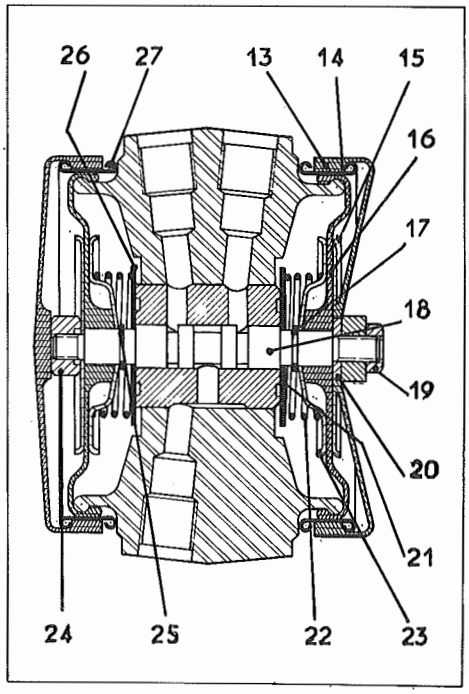
32. Dismantling the dash-pot.

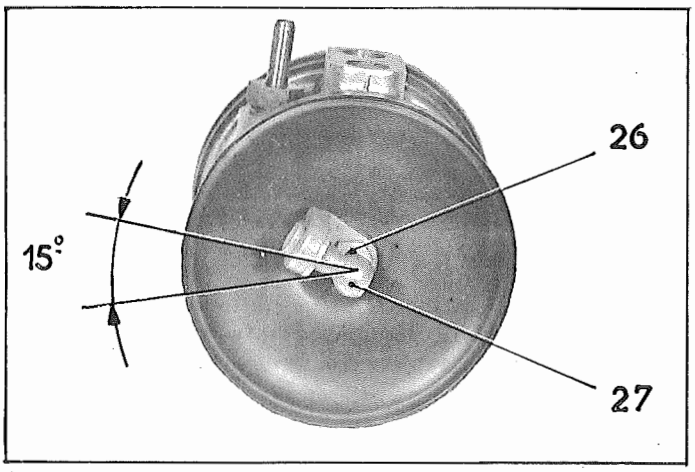
Loosen the screw (20) securing the restrictors (spanner MR.1376-50).

Free:
- the 8 restrictors (19),
- the 6 spacing washers (17),
- the central spacer (18).

33. Carefully clean all parts in alcohol.
Blow with compressed air (except the small pieces forming the dash-pot).







Assembly.

34. Assembling the dash-pot.

Fit in the following order:
- 1 restrictor (1),
- 1 spacing washer (12),
- 1 restrictor (2),
- 1 spacing washer (11),
- 1 restrictor (3),
- 1 spacing washer (10),
- 1 restrictor (4),
- 1 central spacer (9).

In the same order assemble the remaining four restrictors (5) and three spacing washers (8).

NOTE:
Make sure that the restrictors are correctly assembled; e.g. the restrictors on the side of the securing screw may engage in the thread for the screw, and if tightened in this position they would be "askew" and damaged.

Tighten the locknut (7) (1.7 - 2 ft.lbs. (0.25 - 0.30 m.kg)) (spanner MR.1376-50).

35. On the slide-valve (18) place the following:
- 1 disc-valve (26),
- circlip (25).

Insert this assembly in the corrector body, with the longer threaded part of the valve towards the rear.

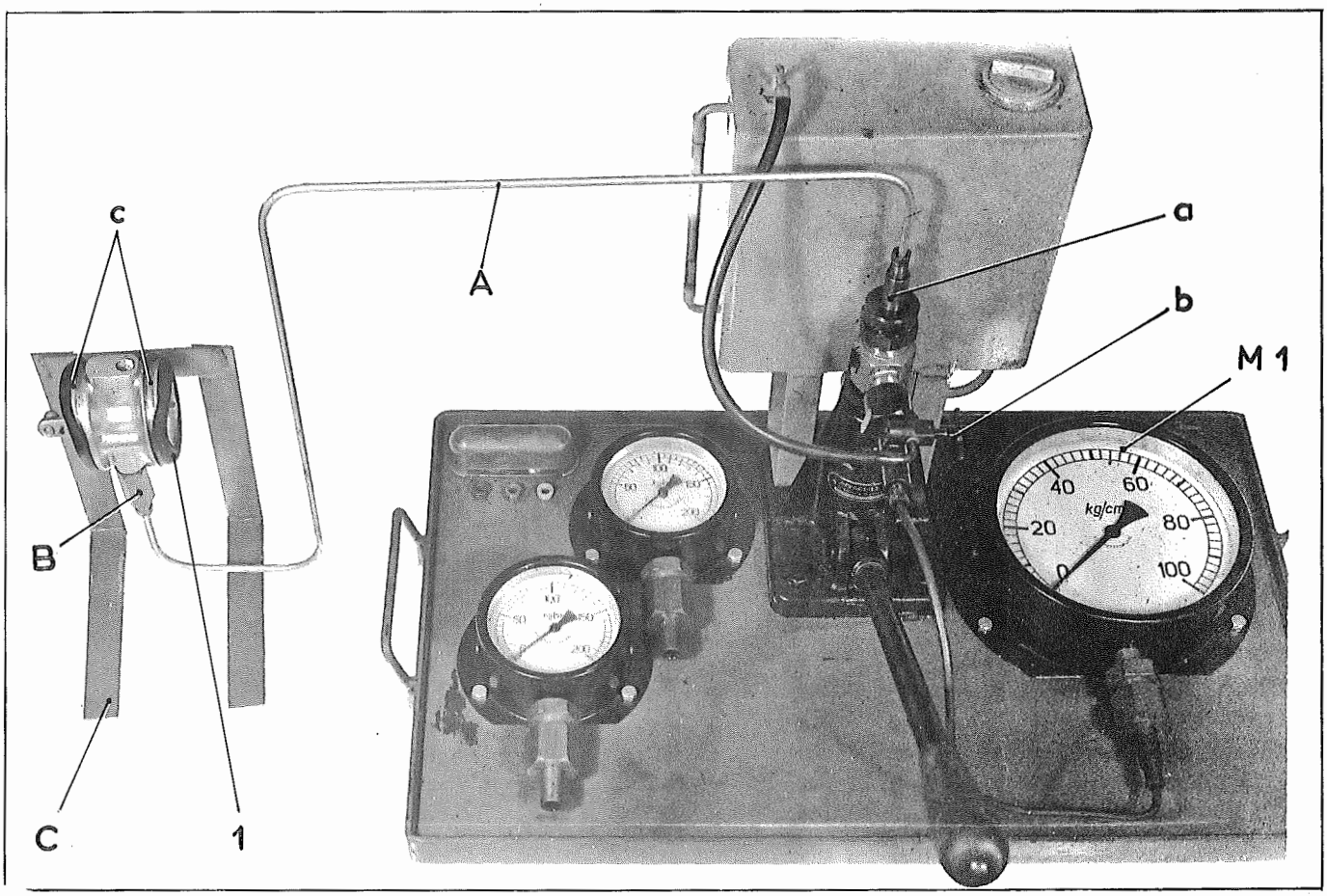
36. Fit:
- the disc-valve (21),
- circlip (17),
- the springs (22) (positioned as shown in the diagram),
- the inner metal cups (23),
- the diaphragms (16),
- the outer metal cups (15).

37. Tighten the nut (24) (the thicker nut) to 1.45 ± .15 ft.lbs. (0.2 ± 0.02 m.kg).

38. Fit:
- the washer (20),
- the control (27) (tighten to 1.45 ± .15 ft.lbs. (0.2 ± 0.02 m.kg).

Fit the control at 15° from the horizontal (see photograph).
Tighten the locknut (19).

NOTE:
Do not fit
- the metal retainers (14),
- the sealing cups (13) and (27) as these will be fitted after filling the corrector.



FILLING A HEIGHT CORRECTOR.

39. Fill the corrector.
Connect the test bench pump (test bench 2290-T) to pressure gauge M1 (0 - 1500 lbs/sq.in., 0 - 100 kg/cm^2).

Connect the orifice "a" of the test bench pump to the overflow return orifice on the corrector, using a tube (A) and a union (B) (2218-T).

The corrector will be fitted on a bracket (C) (MR. 3053-260) (with the overflow return orifice downwards).

If necessary, draw the upper part of the diaphragms (1) away from the grooves in the corrector (at c).

Tighten the bleed screw (b) on the test bench pump and pump to send liquid into the corrector.

Do not exceed a pressure of 70 lbs/sq.in. (5 kg/cm^2).

Cease pumping when liquid flows from the opening between the diaphragms and the corrector body at "c".

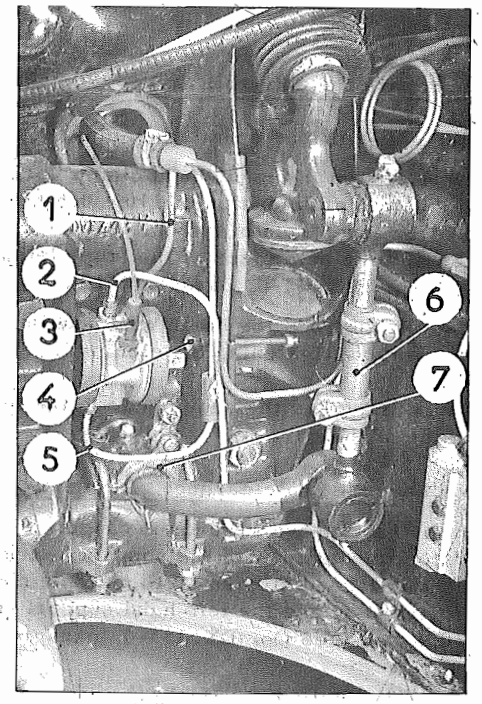
Replace the diaphragms (1).

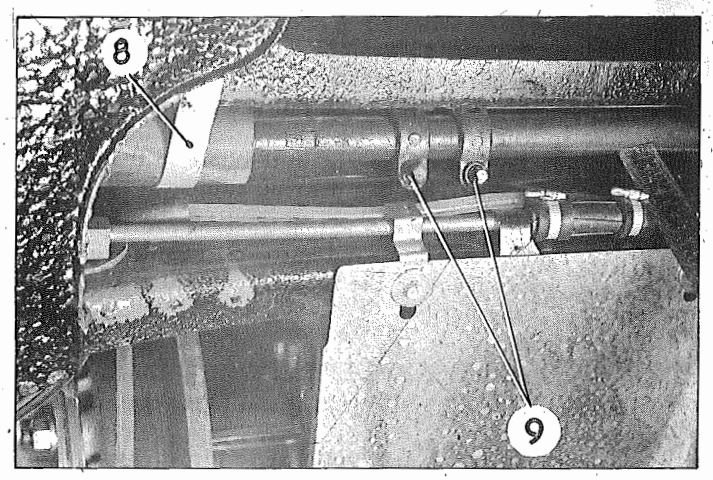
40. Fit:
- the securing rings (14),
- the sealing cups (see NOTE, paragraph 38, this operation).

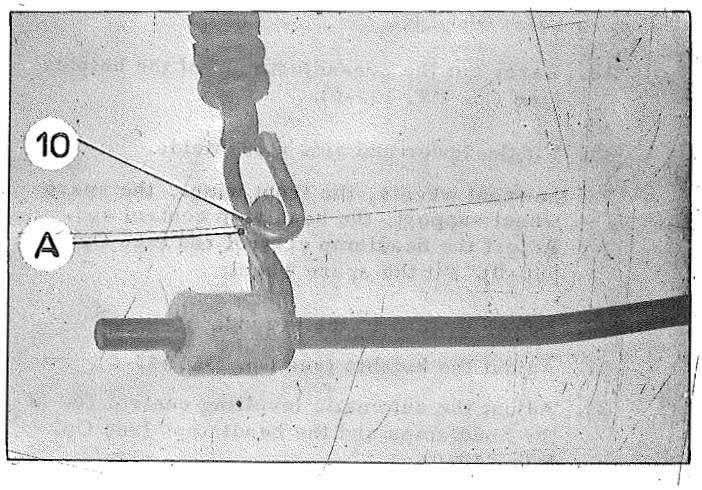
41. Loosen the bleed screw (b) on the test bench. Disconnect the union (B) (2218-T) from the overflow return orifice on the corrector.

42. Fit the overflow return pipe union. (Close this with a rubber cap).

43. Thoroughly clean the outside of the corrector with alcohol.







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REPLACING AN ANTI-ROLL BAR.

Removal.

1. Place the front of the vehicle on stands (jacking bracket 2505-T). Remove the front wheels, the spare wheel, the headlamp control rod, the spare wheel support member, the front wings, the side and lower suspension mudshields.

2. Release the pressure in the pressure regulator and the suspension circuits.

3. Remove the height corrector.

   - disconnect the pipes:
   - (2) corrector feed
   - (1) corrector return
   - (3) overflow return
   - (5) front cylinder feed pipe
   - remove the corrector.

Connect the corrector return pipe to the overflow return to prevent the overflow of liquid via the return pipe.

4. Remove the sleeves (6):

   - on the right, screw the sleeve up onto the ball pin on the suspension lever,
   - on the left, (left and right-hand thread), remove it.

5. Remove the anti-rattle springs (8) then loosen the screws (9) holding the clamps of the height control rod and the headlamp levelling control rod (spanner 1677-T).

6. Remove the anti-roll bar bearing clamps.

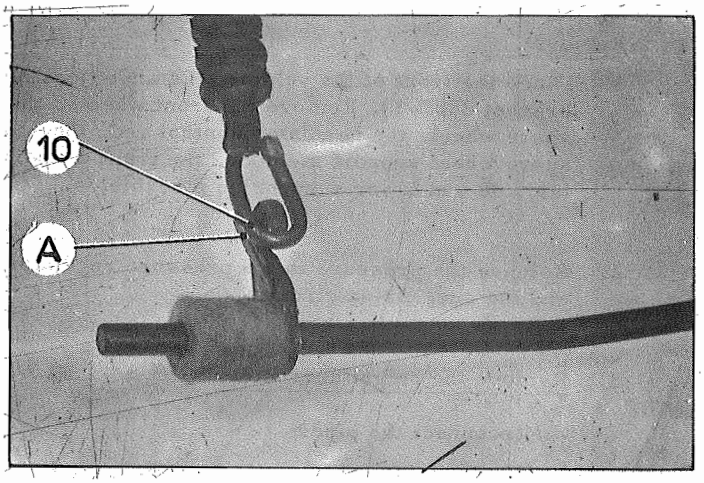
7. Disconnect:

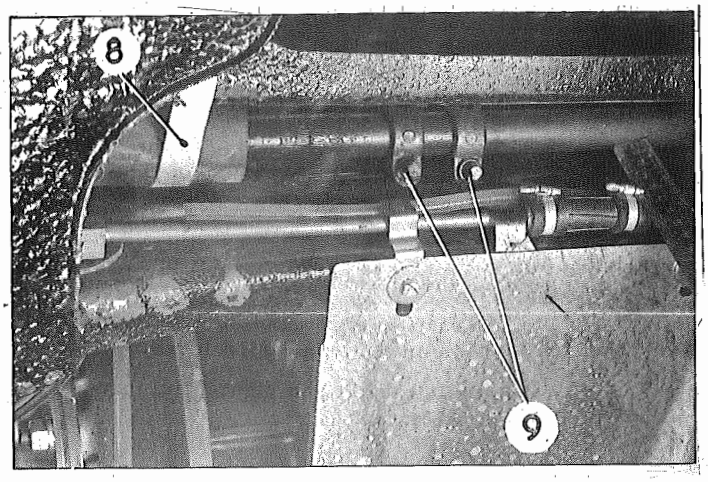
   - the height control,
   - remove the cap nut (4),
   - the headlamp control,
   - pull back the tongue (A) as shown in the photograph then unhook the cable attachment (10).

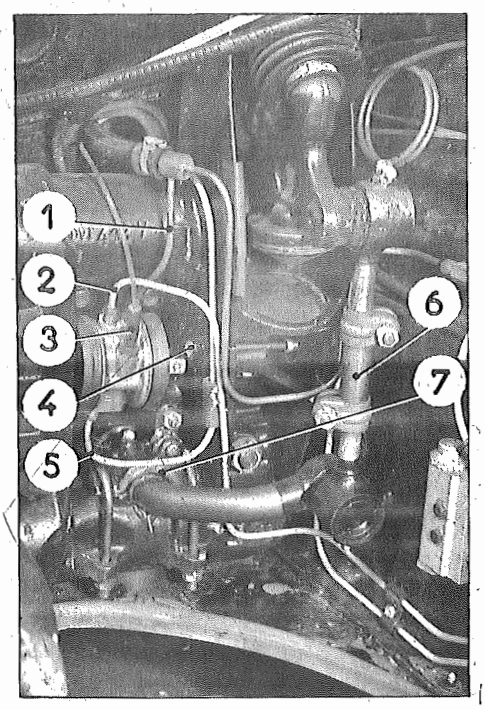
8. Remove the anti-roll bar via the left-hand side of the car.

9. Strip the anti-roll bar:

   - remove the headlamp and height corrector controls,
   - remove the anti-roll bar end stop clamps.







Assembly.

10. Prepare the anti-roll bar.

Fit the anti-roll bar end stop clamps.

- Position the right-hand clamp so as to obtain a dimension of 110 ± 0.5 mm between the inner face of the ball-pin securing boss and the outer face of the stop clamp (see Op. DX.433-0, paragraph 13).
- Fit the rods for height and headlamp control, without tightening the clamps.

11. Insert the bar thus equipped via the left-hand side of the car.

12. Adjust the end clearance of the bar:

With the bar pushed towards the right, the right-hand stop in contact with the support bearing, place the left-hand stop so as to obtain a clearance between it and the left-hand support bearing of 0.5 mm (see Op. DX.433-0, paragraph 14).

13. Adjust and fit the bearings:

(see Op. DX.433-0, paragraph 15).

14. Connect the controls:

a) Engage the hook (10) of the headlamp control cable on the lever on the rod and flatten the tongue (A).

Engage the end of the rod in the hole in the right-hand anti-roll bar bearing cap.

b) Fit the end of the height control rod into the hole in the left-hand anti-roll bar bearing cap and connect up the manual control to the lever. Fit the nut (4).

15. Fit the height corrector.

Connect the pipes (5) (1) (2) and (3) to the corrector.

16. Connect the anti-roll bar to the suspension lever (see Op. DX.410-1, paragraph 22).

17. Fit the anti-rattle springs (8) previously greased.

18. Carry out the pre-adjustment of the heights (see Op. DX. 433-0).

19. Fit the lower and side mudshields.

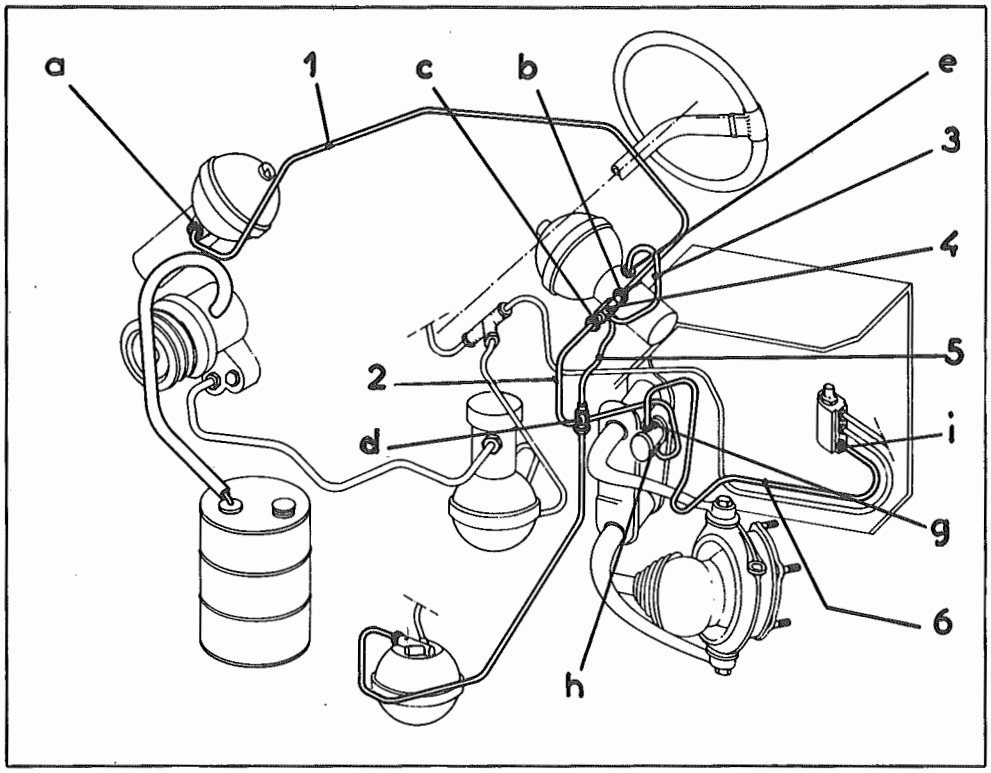
Fit the front wheels, the front wings, the spare wheel support, the headlamp control rod. Adjust the headlamp control rod (see Op. DX. 540-0). Fit the spare wheel.

20. Lower the car to the ground.

21. Adjust the heights (see Op. DX.433-0).

22. Adjust the automatic levelling control rod of the headlamps and the headlamps (see Op. DX. 540-0).

REPLACING A FEEDPIPE ASSEMBLY ON THE FRONT SUSPENSION.



Removal.

1. Place the vehicle in "high" position.
Remove the left-hand front wing (see Op. DX.851-1).
Remove the protection plate.
Disconnect and remove the battery.
Remove the battery tray.
Release the pressure in the circuits including the brakes (see Op. DX.00, paragraph 2).
Remove the right and left-hand front suspension spheres.

2. Remove the feedpipe assembly (6) between the pressure distribution unit and the front height corrector.

   Disconnect the pipe from the corrector at (g) and from the distribution unit at (i).
   Remove the securing clip on the large assembly.
   Free the pipe.

3. Remove the feedpipe assembly (2) between the front height corrector and the 4-way union.

   Disconnect the tube from the height corrector at (h) and from the 4-way union at (c).
   Remove the securing clip on the unit.
   Free the pipe.

4. Remove the feedpipe assembly (3) between the front left-hand cylinder and the 4-way union.

   Disconnect the pipe from the front left-hand cylinder at (e).

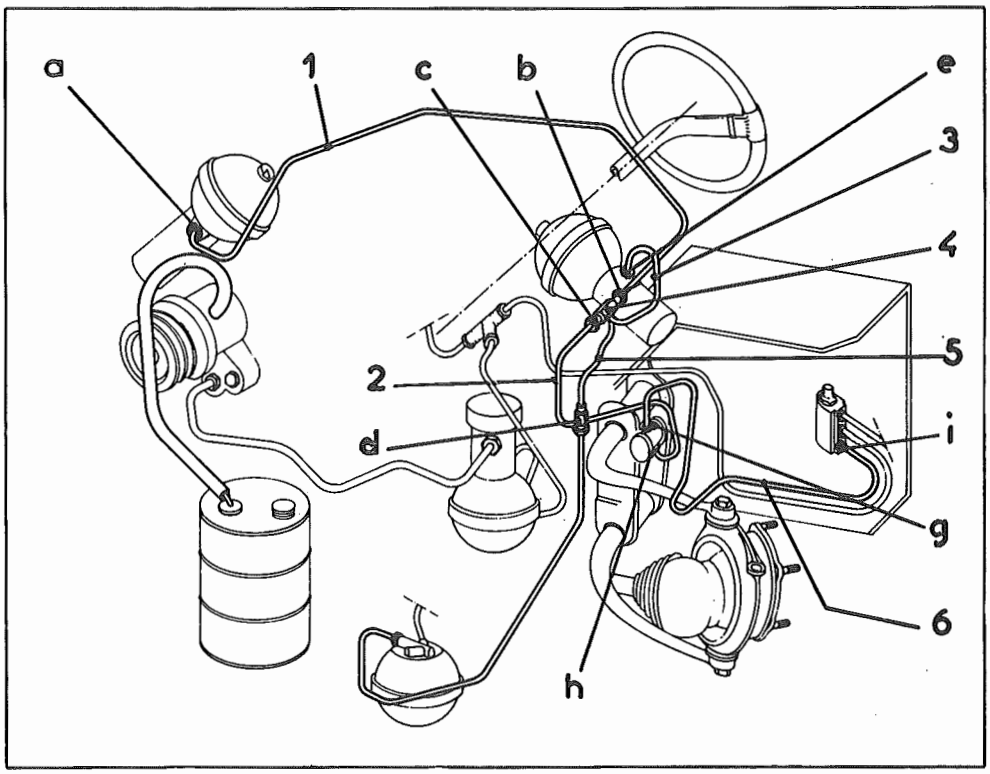
5. Remove the feedpipe assembly (1) between the front right-hand cylinder and the 4-way union.

   Disconnect the pipe from the 4-way union at (b) and from the front right-hand cylinder at (a).
   Open the right-hand and left-hand securing clips fitted in the engine recess.
   Remove the collar and the securing clips from the 3 heater hoses on the recess.
   Disconnect the accelerator control bearing on the engine recess.
   Free the pipe towards the right-hand of the vehicle.

6. Remove the feedpipe assembly (5) from the 4-way union to the brake accumulator.

   Open the securing clip on the unit.
   Disconnect the pipe from the two-way union at (d).
   Free the 4-way union (4) with its 2 pipes (3) and (5).

/W/45



Assembly.

7. Assemble the feedpipe assembly (5) between the 4-way union and the brake accumulator.

   Insert the 4-way union (4) with its 4 pipes (3) and (5).
   Connect the tube to the union at (d).
   Close the securing clip on the unit.

8. Fit the feedpipe assembly (1) between the front right-hand cylinder and the 4-way union.

   Insert the pipe via the right-hand side of the vehicle.
   Connect the pipe to the 4-way union at (b) and to the front right-hand cylinder at (a).
   Close the clips, right and left-hand, fitted in the engine recess.
   Fit the collar and clips on the three heater hoses on the recess.
   Connect the accelerator control into its bearing.

9. Fit the feedpipe assembly (3) between the L.H. cylinder and the 4-way union.

   Connect the pipe to the front left-hand cylinder at (e).

10. Fit the feedpipe assembly (2) between the 4-way union and the height corrector.

    Insert the pipe.
    Connect the pipe to the corrector at (h) and to the 4-way union at (c).
    Fit the clip on the unit.

11. Fit the feedpipe assembly (6) between the pressure distribution unit and the front height corrector.

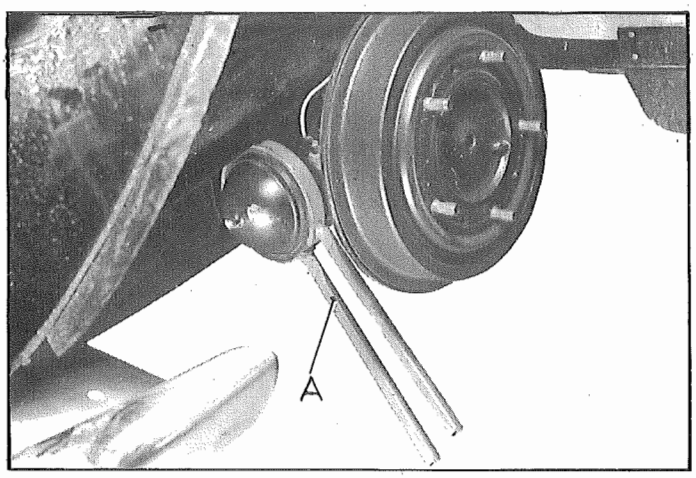
    Insert the pipe.
    Connect the pipe to the corrector at (g) and to the distribution unit at (i).
    Fit the clip on the large unit.
    Fit the front right-hand and left-hand suspension spheres.
    Fit the battery tray.
    Fit and connect up the battery.
    Fit the front left-hand wing (see Op. DX.851-1).
    Start up the engine.
    Put the circuits under pressure.
    Bleed the brakes (see Op. DX.453-0).
    Check all unions for leaks.

REPLACEMENT OF A SUSPENSION SPHERE OR A DAMPER VALVE

Removal.

1. Remove the rear wing.

Loosen the wheel nuts.



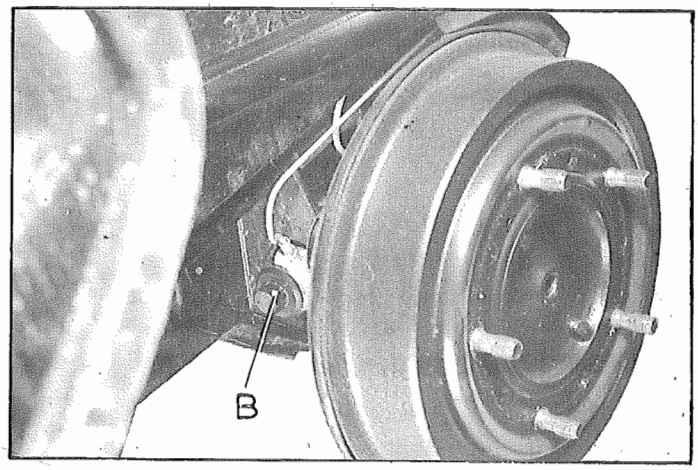
Place the rear of the vehicle on stands.

2. Release the pressure in the suspension circuit.

Place the manual control in "low" position.

3. Remove the wheel.

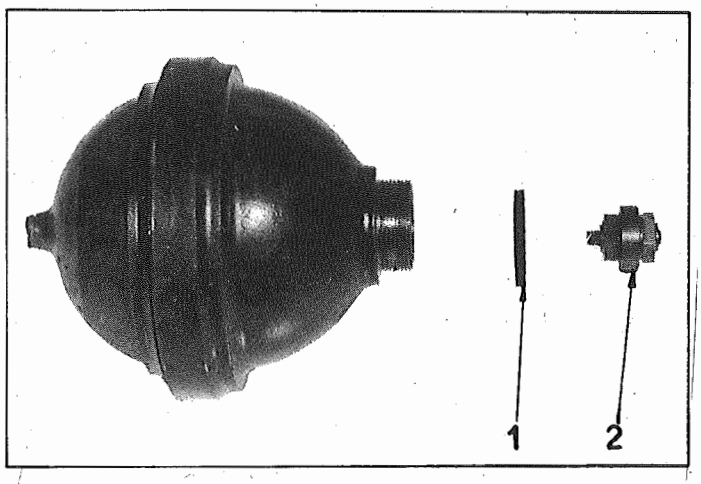
Clean around the area to be worked upon.



4. Remove the suspension sphere from the suspension cylinder using pliers 2223-T bis (A).

Close the hole in the suspension cylinder with a plug (B).

5. Remove the damper valve (2), the sealing ring (1) between the cylinder and the sphere. Clean the damper valve housing with alcohol.



Assembly.

6. Screw the damper valve (2) into the suspension sphere and tighten to between 11 and 12½ ft. lbs (1.5 to 1.7 m.kg) (torque spanner 2473-T).

NOTE:- Do not exceed this tightening torque, to avoid deformation of the damper valves.

7. Remove the closing plug from the cylinder.

Fit and tighten by hand the suspension sphere on the suspension cylinder, inserting the seal (1) moistened with special hydraulic fluid.

8. Fit the wheel.

9. Put the circuit under pressure. Put the manual control in "high" position.

10. Lower the car to the ground.

Check all unions for leaks.

11. Tighten the wheel securing nuts.

Fit the wing.

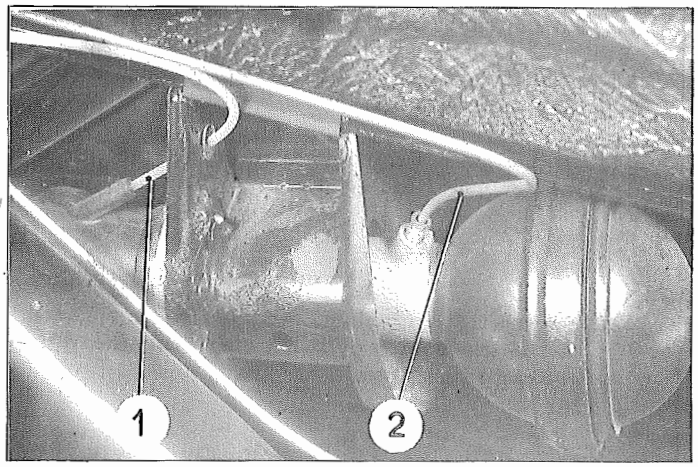
REPLACEMENT OF A REAR SUSPENSION CYLINDER.

Removal.

12. Remove the rear wing.

Loosen the wheel nuts.

Place the car on stands.



Release the pressure in the suspension circuit, and place the manual height control in "low" position.

Remove the wheel.

13. Disconnect the suspension cylinder feedpipe (2).

Free the overflow return pipe (1).

Close the holes in the pipes and the suspension cylinder with plugs.

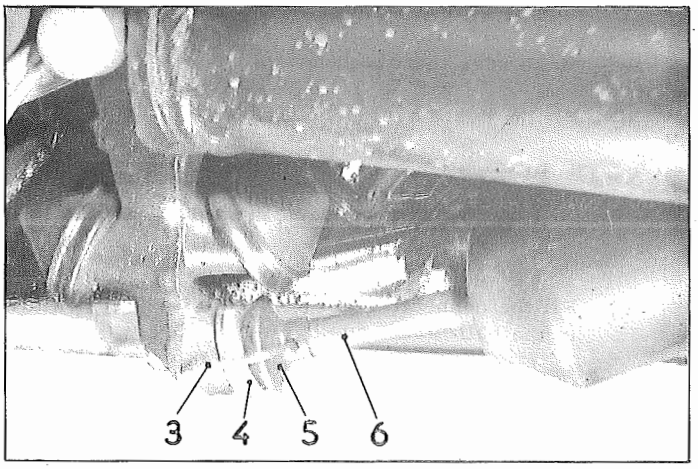
14. Disconnect the piston rod from the ball thrust cup.

a) Remove the connecting pin (3).

b) Remove the hoseclip (4) securing the dust cover.

Free the dust cover (5) towards the rear.

c) Disconnect the piston rod (6), lowering the axle arm to the maximum.

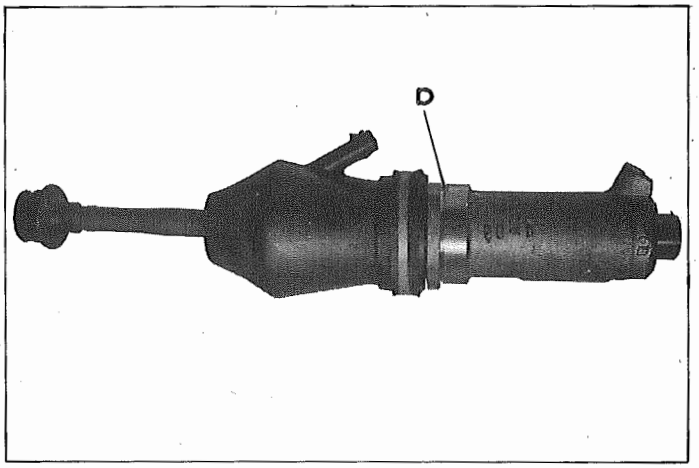


NOTE:- The piston rod can only be freed when the pin holes in the rod and the lever are parallel.

15. Remove the suspension sphere (see Op. 434-1, paragraphs 1 and following).

16. Remove the screw and suspension-cylinder stop-plate and withdraw the suspension cylinder towards the front.

Assembly.

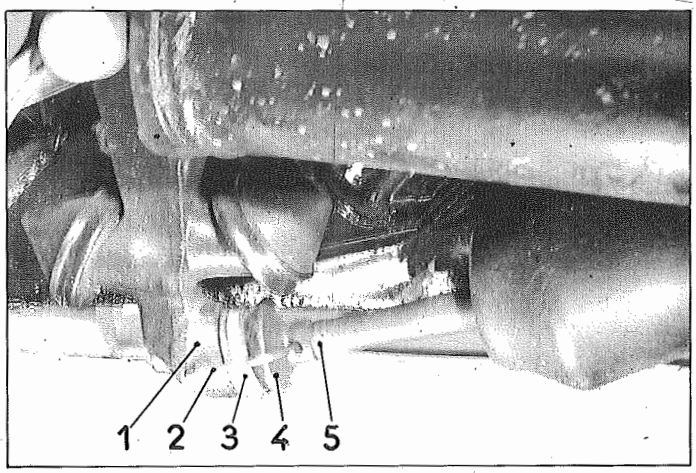


17. Fit the suspension cylinder in its housing.

Make the flat (a) on the cylinder correspond with the securing plate.

Tighten the plate securing screw (spring and plain washer under the head).

18. Fit and tighten by hand the suspension sphere on the suspension cylinder, inserting the sealing ring.



19. Fit the piston rod.

a) Engage the piston rod (5) in the ball thrust cup, lowering the axle arms to the maximum.

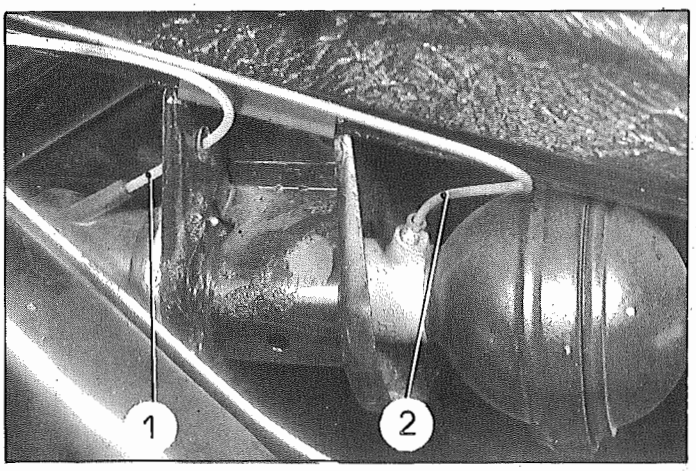
Make sure that the ball isin position.

b) Fit the dust cover (4) over the ball thrust cup.

- fit the rubber sleeve on the dust cover.
- fit the ligarex hoseclip (3) (pliers 2483-T).

c) Fit the connecting pin (2) with the longer leg in the ball thrust cup.

d) Knock over the end of the pin.



20. Fit the overflow return pipe (1).

Connect the cylinder feedpipe (2) with a new sleeve-seal.

Tighten the union.

21. Fit the wheel.

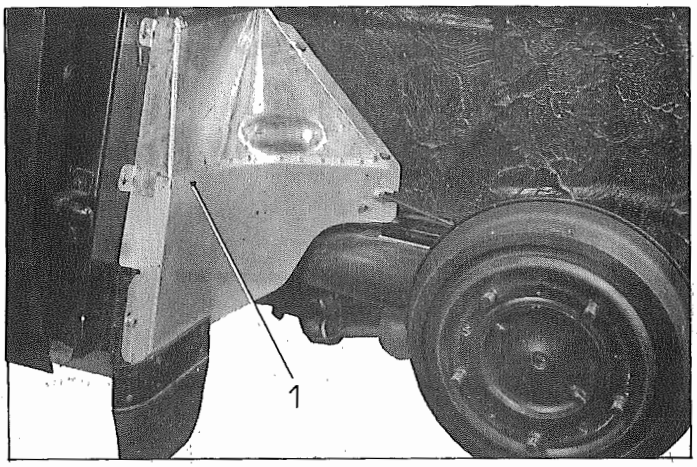
Lower the car to the ground and tighten the wheel nuts.

22. Put the suspension circuit under pressure.

Check all unions for leaks.

23. Fit the wing.

REPLACEMENT OF A REAR HEIGHT CORRECTOR.



Removal.

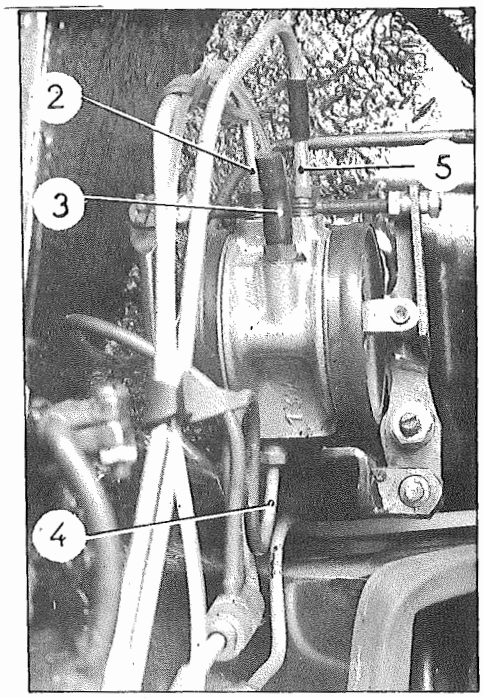
NOTE:- At each dismantling renew the sleeve-seals.

24. Loosen the nuts on the left-hand rear wheel.

Place the car on stands.

Remove the wing and the left-hand rear wheel.

25. Remove the rear mudshield (1).

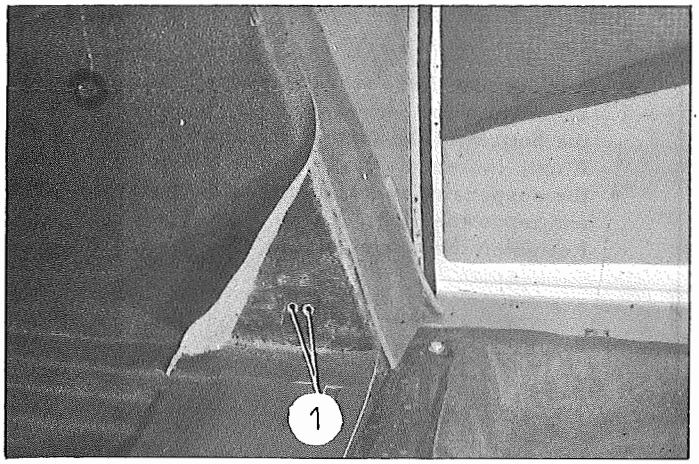


26. Release the pressure in the suspension circuit. Loosen the bleed screw on the pressure regulator, place the manual height control in "low" position.

27. Disconnect the pipes from the height corrector in the following order:-

- the overflow return pipe (3),
- the corrector return pipe (5),
- the corrector feed pipe (2),
- the suspension cylinder feed pipe (4).

Plug the holes in the corrector and in the pipes as dismantling proceeds.



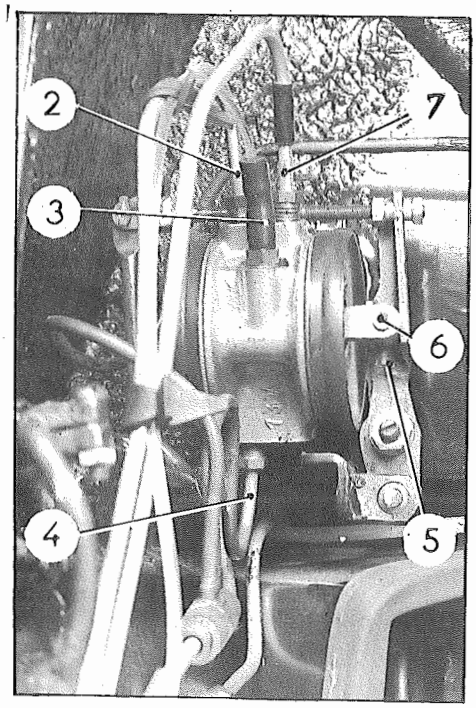
28. Remove the rear seat and the rear squab.

29. Remove the screws (1) securing the height corrector. As these screws are inside the body it is necessary to lift the trimming.

Remove the corrector.

Assembly.

30. Place the manual height control lever in "normal" position.



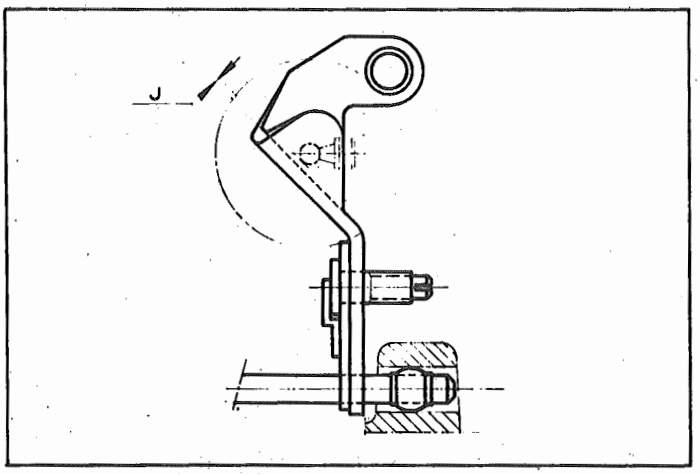
31. Connect the suspension cylinder feedpipe (4) to the corrector, without tightening the union.

Offer up the height corrector to position the ball (6) in the fork (5). Tighten the screws (1) securing the corrector.

Tighten the union of the suspension cylinder feedpipe (4).

32. Connect up the corrector as follows:

- the feedpipe (2). Tighten the union,
- the return pipe (7). Tighten the union,
- the overflow return pipe (3).



33. Ensure that there is a clearance "j" of 1 mm approximately between the corrector ball and the bottom of the fork on the control lever.
If not, loosen the clamp of the control rod for the suspension mechanism on the anti-roll bar and move the clamp along.
Retighten the clamp screw.

34. Start up the engine. Tighten the bleed screw on the pressure regulator.

35. Check all unions for leaks and the level of the fluid in the reservoir.

36. Fit the wheel.

Lower the car to the ground and tighten the wheel nuts.

37. Check and adjust the heights.

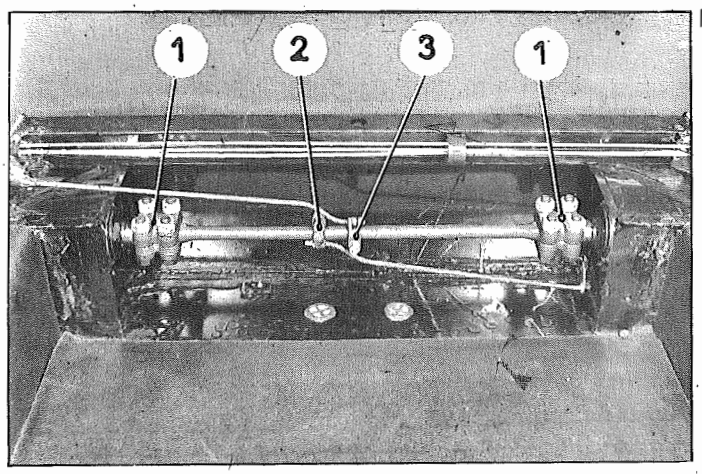
(See Op. DX.433-0).

38. Fit the rear mudshield.

39. Fit the left-hand rear wing.

Stick back the trimming.

Replace the rear seat and rear squab.



REMOVAL.

1. Place the vehicle on stands and release the pressure (see Op. DX.00).

2. Remove the wing and mudshield, upper, rear left-hand.

3. Remove the protection shield from the corrector control (inside the boot).

4. Unhook the return spring for the automatic headlamp control (at the front).

5. Disconnect:
   - the clamp (3) of the corrector control rod from the anti-roll bar.
   - the clamp (2) of the headlamp control rod.

6. Disconnect the clamps (1) connecting the anti-roll bar to the wheel-arm spindles.

Remove the bar.

ASSEMBLY.

7. Fit the anti-roll bar.

Fit the clamps connecting the anti-roll bar to the wheel-arm spindles.

Distribute the clearance on the anti-roll bar equally on each side. Centre the clamps (1) connecting the anti-roll bar to the wheel-arm spindles.

Tighten the nuts diagonally to 72 ft.lbs (10.5 m.kg).

8. Connect up:
   - the clamp (3) for the corrector control rod,
   - the clamp (2) for the headlamp control rod.

9. Carry out the pre-adjustment of the heights.
   (See Op. DX.433-0).

10. Adjust the heights.
    (See Op. DX. 433-0).

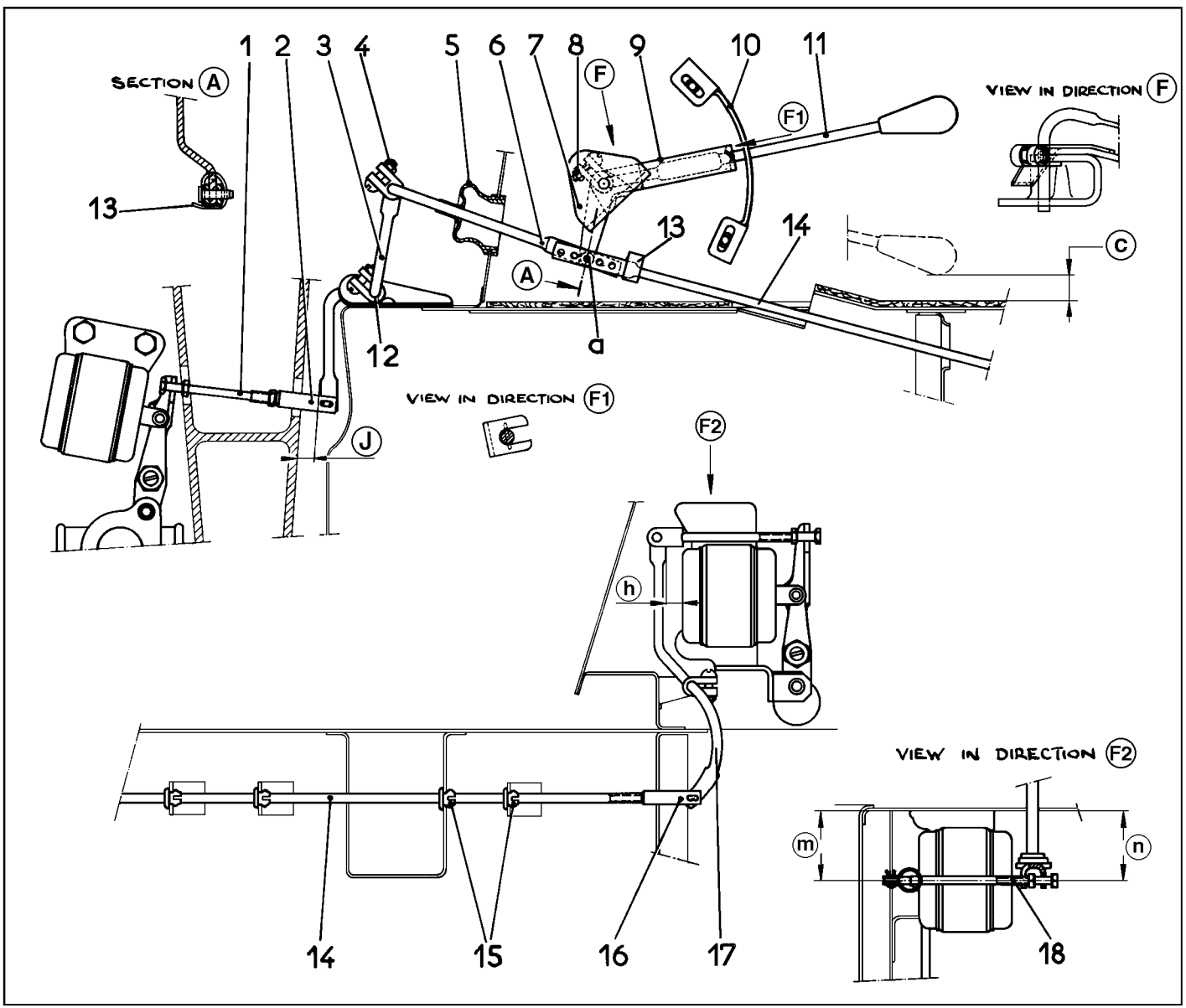
11. Fit the return spring for the automatic headlamp control.

12. Adjust the automatic headlamp control.
    (See Op. DX.510-0).

13. Fit the rear mudshield, upper, left-hand. Tighten the screws and the nuts.

Fit the rear left-hand wing.

14. Fit the protection shield for the corrector control (inside the boot).


SECTION A
VIEW IN DIRECTION F
VIEW IN DIRECTION F1
VIEW IN DIRECTION F2
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18
a
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h
m
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ADJUSTMENT.

1. Position the front connecting rod (6) correctly in relation to the bell crank lever (9).

Determine which hole (a) on the rod will give dimension "J" = $7.5 \begin{smallmatrix}+1\\0\end{smallmatrix}.5$ mm with the control lever in the "normal" slot.

If this dimension cannot be obtained by using the holes in the rod (6), move the quadrant (10) in its slots.

2. Position the rear connecting rod (14) correctly in relation to the bell crank lever (9).

Find the hole (a) in the rod which will give a dimension "h" = $8 \begin{smallmatrix}+1\\0\end{smallmatrix}.5$ mm.

If this dimension cannot be obtained with the holes in the rod (14), screw up or unscrew the fork (16).

3. Fit the peg connecting the rods (6) and (14) to the lever (9). Turn over the lock tab on the peg as shown in diagram A.

4. Lubricate the moving parts and bearings (14) (universal-joint grease).

5. Adjust the lateral position of the front torsion rod.

The end piece (1) of the rod must be within 1 mm approximately of the centre of the hole in the front axle arm body.

If necessary move the rod after loosening the clamp (12).

6. Adjust the lateral position of the rear torsion rod.

The end piece (18) must be parallel to the body within the limits m = n $\pm$ 1 mm.

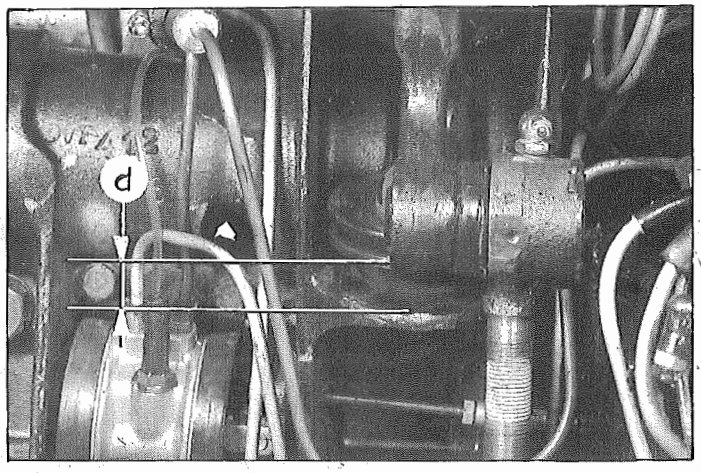
If necessary move the torsion rod (3) after loosening the clamp (4).

7. Adjust the control lever.

With the control lever (11) in the "low" position there should be a distance e = $10 \begin{smallmatrix}+5\\0\end{smallmatrix}$ mm between the ball of the control lever and the trim of the sidemember.

If not, "set" the lever (11) to obtain this dimension.

8. Check that nothing prevents the torsion rods, front and rear, being placed in "low" and "high" position.

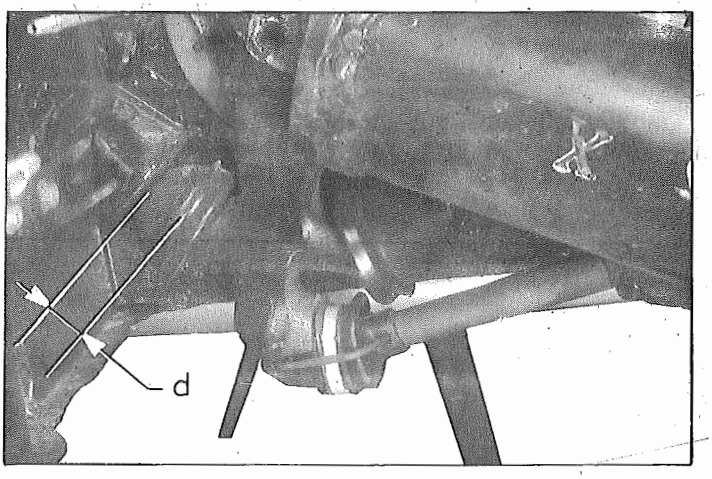


NOTE:- In the low position the suspension spheres must be free.

In the high position the rubber stops are compressed. The distance between the cup and the stop, measured on the centre line of the cup, should be:-

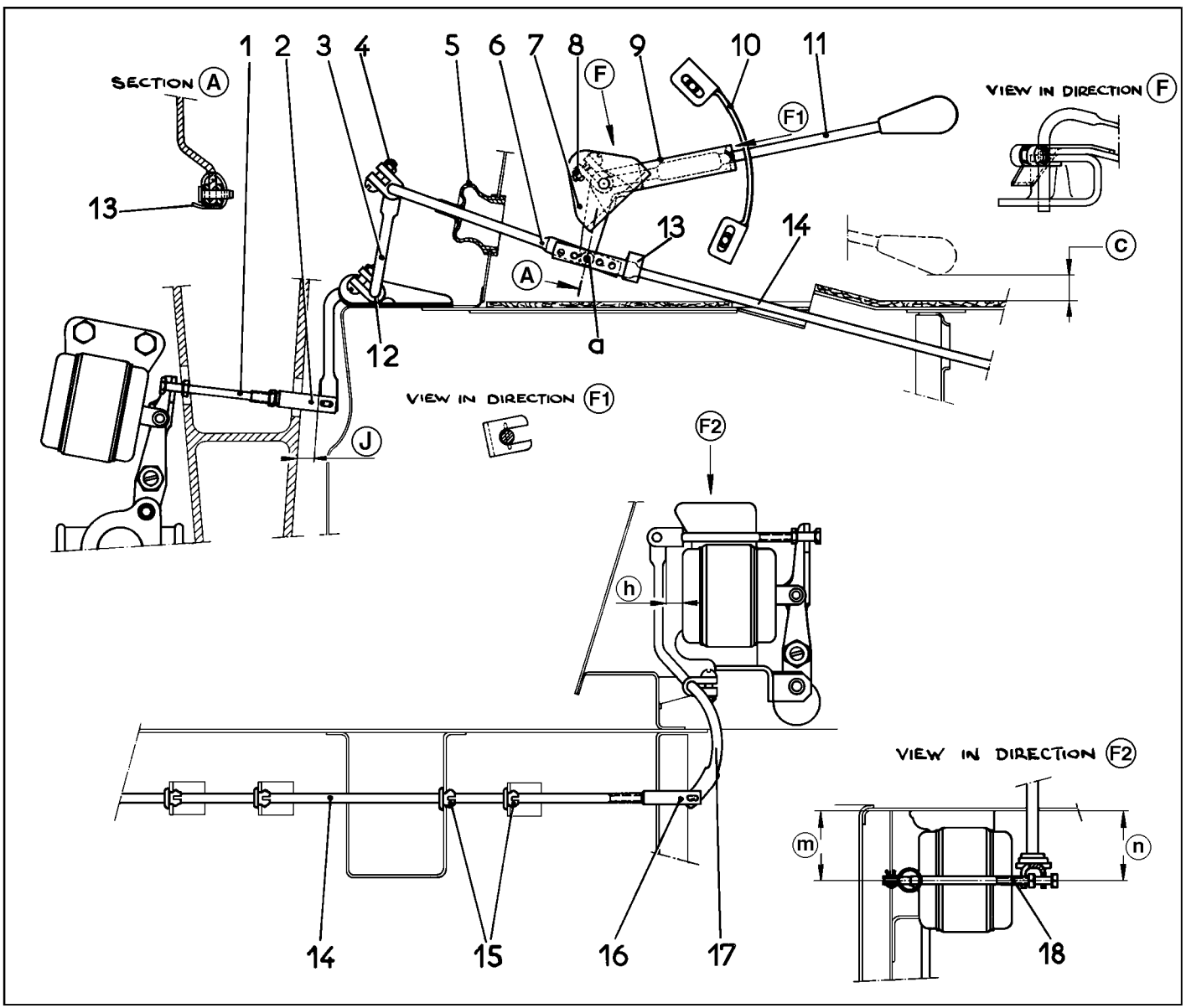
d = 6 mm maximum at the front

8 mm maximum at the rear



9. Check the adjustment of the corrector control levers (1 & 17) (see Op. DX.433-0).

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SECTION A
VIEW IN DIRECTION F
VIEW IN DIRECTION F1
VIEW IN DIRECTION F2
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REMOVAL.

1. Remove the wings, front and rear left-hand.

   (See Op. DX.851-1).

Loosen the nuts on the wheels, front and rear left-hand.

2. Put the left side of the car on stands.

Remove the wheels, front and rear left-hand.

3. Remove the side mudshields, front and rear left-hand.

4. Straighten the lock tab (13) (see section A) and remove it, withdrawing the peg connecting the rods (6) and (14) to the lever (9). The peg is welded to the lock tab (13).

5. Remove the screw securing the quadrant (10) on the scuttle side panel.

Loosen the nut (8) on the securing screw of the lever (9).

Free the lever assembly (11) and quadrant (10).

Free the lever (11) from the quadrant (10) and the lever (9) from the metal support welded on the body.

6. Loosen the nut on the screw of clamp (4) and separate the connecting rod (6) from the front torsion rod (3).

Remove the connecting rod (6) and the sealing sleeve (5).

7. Remove the rivet securing the front fork-end (2) on the connecting rod.

8. Remove the rivet securing the fork-end (16) of the rear connecting rod on the torsion rod (17).

Loosen and remove the fork-end (16).

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9. Free the rear connecting rod (14) via the hole for the front connecting rod.

10. Remove the lower closing panels from the left-hand sidemember.

ASSEMBLY.

11. Fit the rear connecting rod (14). Insert it through the hole in the scuttle front for the front connecting rod, then through the hole in the upper part of the sidemember, then through the nylon bearings (15), and through the hole existing in the rear closing panel of the sidemember.

12. Screw the fork-end (16) on the end of the connecting rod (14), engaging about half the threaded portion.

13. Couple the fork-end (16) to the torsion rod (17).

Insert the rivet.

14. Fit the sealing sleeve (5) and couple the front connecting rod (6) to the front torsion rod (3). Tighten the nut on clamp (4).

15. Place the lever (9) on the metal support and engage the control lever (11) fitted with quadrant (10) in the fork of lever (9) and in the hole in the metal support (7).

16. Bring the front end of the lever (11) in contact with the side scuttle panel. Tighten the nut (8) on the clamp.

17. Fit the quadrant (10), with the securing screws in the middle of the slots. Tighten the screws (plain and springs washers under the heads).

18. Place the control lever (11) in normal position. Couple the front and rear connecting rods (6) and (14) to the lever (9). Insert the peg in the third hole at (a) on each of the connecting rods (6) and (14) and through the hole in the lever. Turn over the lock tab as shown in section (A).

19. Adjust the height control (see Op. DX.437-0).

20. Check the adjustment of the corrector control lever (1) and (18).

    (See Op. DX.433-0).

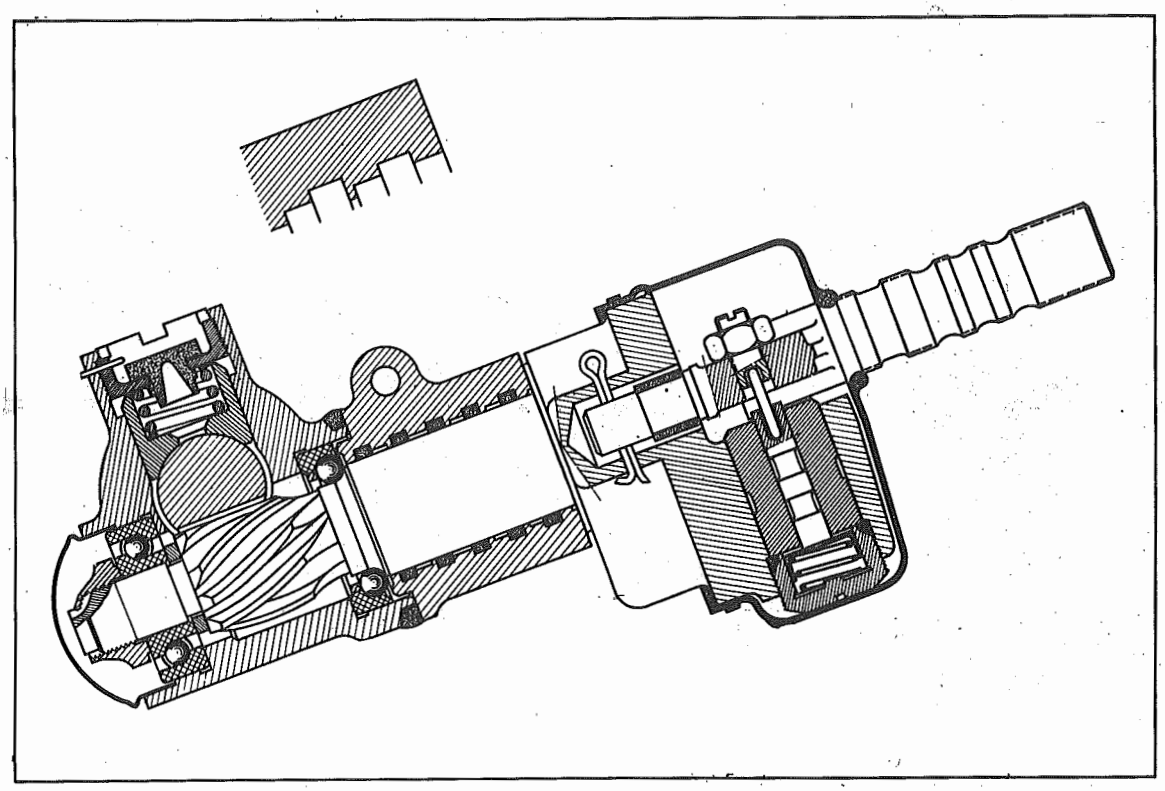
21. Fit:-

    - the mudshields, front and rear, left-hand, the wheels, the rear wing, the front wing.

      (See Op. DX. 851-1).

Lower the car to the ground.

Tighten the nuts securing the wheels.



SPECIAL POINTS

Adjustments on the vehicle.

The lateral position: the distance between the centre line of the left-hand lower relay lever and the centre line of the rack pressure pad "g" = ... 122.5 ± 2.5 mm

The angular position: use fixture 1955-T.

Adjusting the alignment: toe-in at the front : = 1 to 3 mm.

Adjusting the centraliser cam: this is carried out on the road.

Adjusting the lock: 42°.

The distance between the centre line of the right-hand track rod outer ball joint and the centre line of the inner flexible bearing = ... 402 mm

Tightening torque for nut securing ball joint on steering lever = 29 ft.lbs (4 m.kg).

Tightening torque for the nut of the steering pinion bearing = 36 ft.lbs (5 m.kg).

Tightening torque for the control rod on the rack = 51 ft.lbs (7 m.kg).

Distance between the anti-rattle bush and the centre line of the pin = 140 ± 5 mm.

Tightening torque for the nut securing the yoke = 29 ft.lbs (4 m.kg).

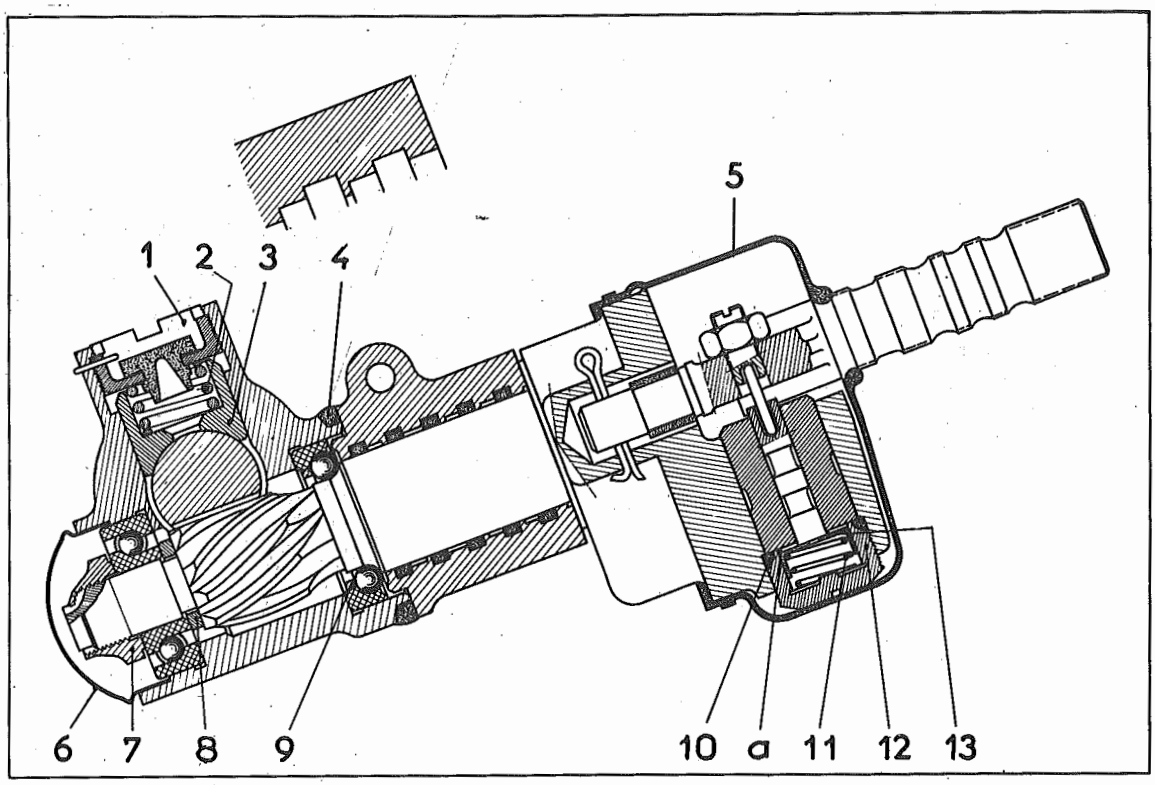
Tightening torque for the nuts securing track rods to yoke = 25 ft.lbs (3.5 m.kg).

Tightening torque for the locknut on the housing end piece = 72 ft.lbs (10 m.kg).

Distance of sealing sleeves with regard to the centre line of the pressure pad :-

left-hand side : 56 ± 2.5 mm.

right-hand side : 574 ± 2.5 mm.



IMPORTANT POINTS

A - Before doing any work on the hydraulic control of the steering make quite sure that the ball joints of the steering track-rods are in good condition.

To do this:

Disconnect the steering outer track-rod ball pins from the pivot levers (use ball pin extractor 3505-T). The ball pins (on the pivot lever and on the relay spindle) must move freely without any binding or tight spots, even at the limit of their movement.
If a ball pin binds, it is necessary to replace the outer track-rod.

B - <u>If the steering shows any sign of "leakage".</u>

for example:

1) a leakage causing a noise resembling an escape of gas.

In this case proceed as follows:-

Disconnect the pipe assembly feeding the steering cylinder, from the steering end-housing. Close the openings of the flange with a steel plate, inserting a seal plate.

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a) If the leak persists, it comes from the rotating union, which must be renewed (see Op. DX.442-1) or repaired (see Op. DX.442-3, paragraphs 48 and following).

b) If the leak disappears, it came from the steering piston and cylinder assembly, which must be renewed (see Op. DX. 442-1) or repaired (see Op. DX.442-3, paragraphs 36 and following).

2) A leak causing inflation of the rubber dust covers leading to external leakage of fluid, necessitates overhaul of the steering.

C - If the steering is "harsh" in operation or when starting to move to one lock or the other, proceed as follows:-

1) Check the steering for correct alignment (see Op. DX.440-0).

Lateral position : paragraphs 1 to 4

Angular position : paragraphs 5 to 8

2) Adjust the crossover pressure (see Op. DX.440-0, paragraphs 21 and following).

D - If the steering "knocks" it is necessary to adjust the crossover pressures (see Op. DX.440-0, paragraphs 21 and following).

The knocking may also be caused by any of the following:

- excessive play between piston shackle pin and rack control rod,
- excessive clearance on the rack support plunger (3),
- a hard spot in the slide valves or dash-pots.

In these cases it is necessary to overhaul the steering.

E - If the steering "flickers" in the central position:

1) Check the crossover pressures (see Op. DX.440-0, paragraphs 21 and following).

2) Check the assembly of plugs (12) and cups (13).

Remove the battery and its tray.

Disengage the dust cover (5) from the rotating union in order to reach the plugs (12).

Release the pressure.

Remove the plugs (12) and take care not to mix the parts: each cup (13) is paired with its plug (12).

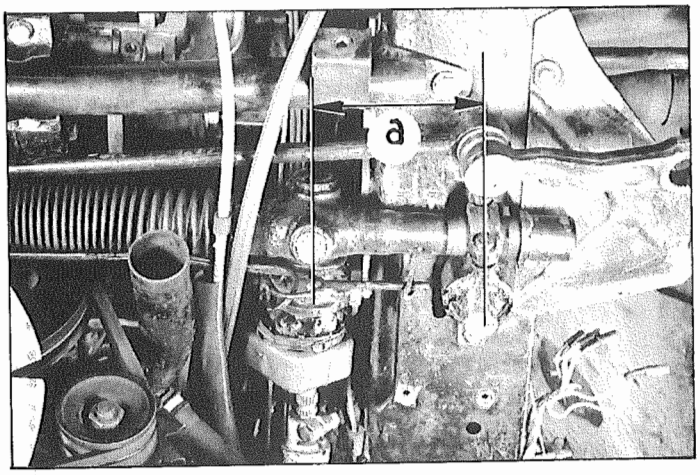
Disengage the cup and its spring (11). Check that it does not bind in the bore of the plug. If necessary, using a small scraper, remove any burr which may exist at (a) in the plug.

In the case of light scratches on the cup a very light cleaning with No. 600 abrasive paper is permitted.

Then thoroughly clean the parts.

In case the cup (13) is unusable, renew the plug and cup assembly.

Fit the plug and cup assemblies with springs, inserting a seal (10). Tighten the plugs moderately (7 ft.lbs, 1 m.kg) and adjust the crossover pressures (see Op. DX.440-0, paragraphs 21 and following).



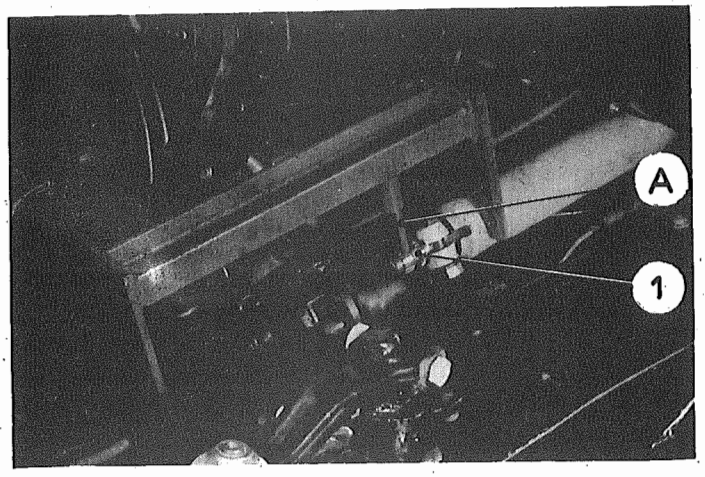
ADJUST THE LATERAL POSITION OF THE STEERING.

1. Raise the front of the car on stands (support 2.505-T).

2. Remove:
   - the spare wheel,
   - the front left-hand wing,
   - the battery.

3. With the clamp screws unscrewed, move the steering in its bearers to obtain a dimension "g" of 122.5 ± 2.5 mm between the centreline of the lower relay lever and the centreline of the rack pressure pad.

4. Screw in the clamp fixing screws and adjust the angular position of the steering (see following paragraphs, this operation).



TO ADJUST THE ANGULAR POSITION OF THE STEERING.

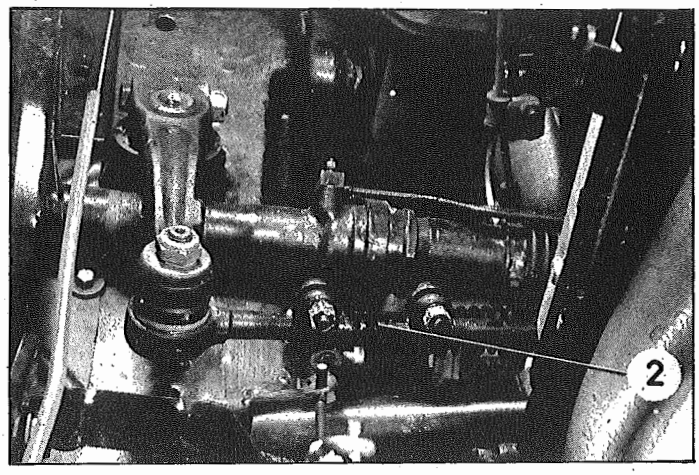
5. Remove:
   - the spare wheel,
   - the front left-hand wing,
   - the battery,
   - the battery tray,
   - the battery bracket.

6. With the front of the car on stands and the clamp fixing screws loose, place the fixture 1955-T in position.

7. Rotate the steering rack assembly in its bearers to bring the steering pinion (1) into contact with the central pin A of the fixture.

8. Tighten the screws in the clamps.

   Remove the fixture.



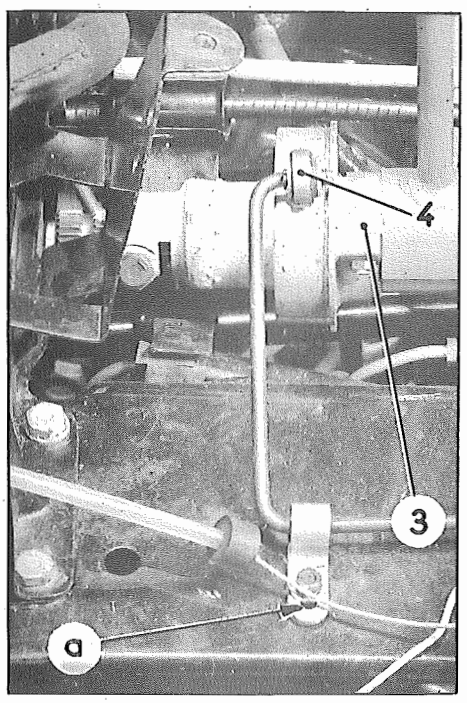
TO ADJUST THE ROAD WHEEL ALIGNMENT.

9. To carry out this adjustment the car must be at 'normal' height, and the engine running.

10. Use an ordinary commercial track gauge.

Measure at the exact height of the wheel centre, the distance between the wheel rims at the rear. With chalk mark the points of the rim where the measurements have been made. Turn the wheels half-a-turn and measure at the front on the points previously marked.

11. There must be a toe-in at the front of between 1 and 3 mm. If not, adjust the sleeve (2) with the vehicle raised at the front. Loosen the screws in the clamps of the sleeve. Turn the sleeve only a fraction of a turn at a time (a quarter of a turn corresponds to a variation of alignment of 1 mm). Check the alignment again. Tighten the clamp screws to 7 ft lbs (1 m.kg). Turn the steering fully to the right and left locks to ensure that there is sufficient clearance between the clamp screws and the front crossmember and radiator fan cowl.

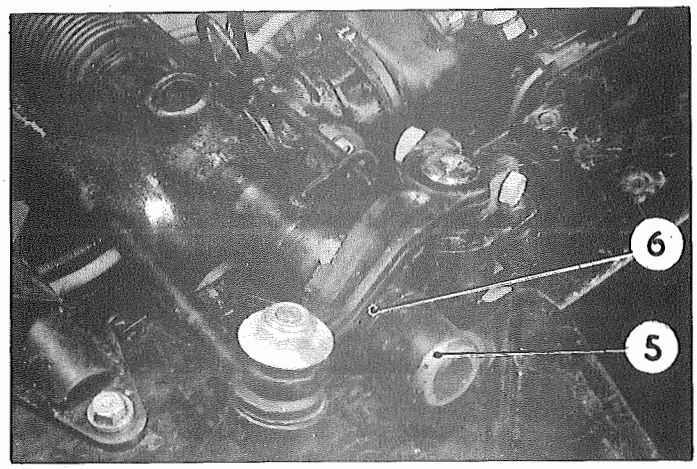


To adjust the straight line steering position.

NOTE : This adjustment can only be carried out on the road.

12. Determine the position of the steering wheel for running in a straight line.
    - Travel on a straight flat road.
    - Hold the steering wheel in order to follow a straight line.
    - Then make a mark with chalk on the dashboard and on the rim of the steering wheel.
13. Stop the vehicle.
14. Turn the steering wheel so that the marks made previously (paragraph 12), correspond.
    - Loosen the securing clamp (3) of the cam and turn this until the roller (4) is in the hollow of the cam.
    - Tighten the clamp to 3 lbs ft. (0.4 m.kg) (i.e. 4 m N).
15. Check by a road test that the vehicle runs in a straight line.

NOTE : The roller must be parallel to the cam and central to within 2 mm. The slot (a) allows for moving the cam.



Adjust the steering lock.

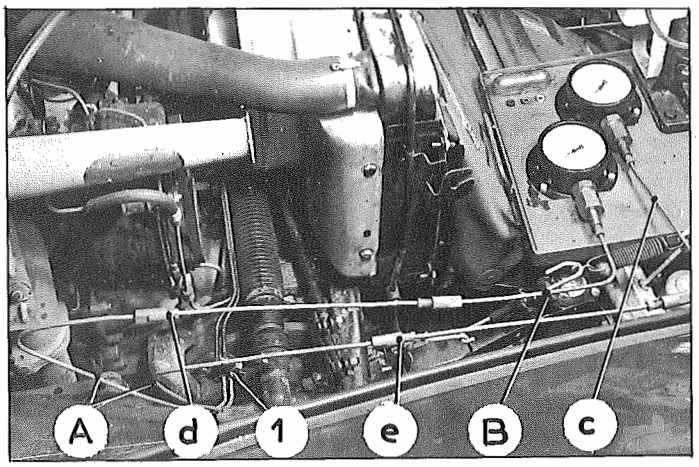
NOTE : To avoid undue strain on the drive, the lock should be set at $42\ ^{+\ 0}_{-\ 1}{}^{o}$.

16. Raise the front of the vehicle on stands. Remove the front wings.
17. Place the steering wheel as for running in a straight line (see paragraph 12, this operation).
18. Turn the wheel one and a half turns exactly to the left.

    Bring the stop cap (5) in contact with the rack and tighten the locknut (6).
19. Turn the steering wheel one and a half turns exactly to the right, from centre.

    Bring the stop cap into contact and tighten the locknut.
20. Fit the wing and lower the vehicle to the ground.

REMARK : When the wheels are at maximum lock there must remain a clearance of 10 mm between the tyre and the relay shields. If necessary reduce the lock angle.



ADJUSTMENT OF THE CROSSOVER PRESSURE.

NOTE: Use test bench 2290-T.
Pressure gauges between 0 and 3000 lbs/sq.in. 0 - 200 kg/cm^2) will be used.

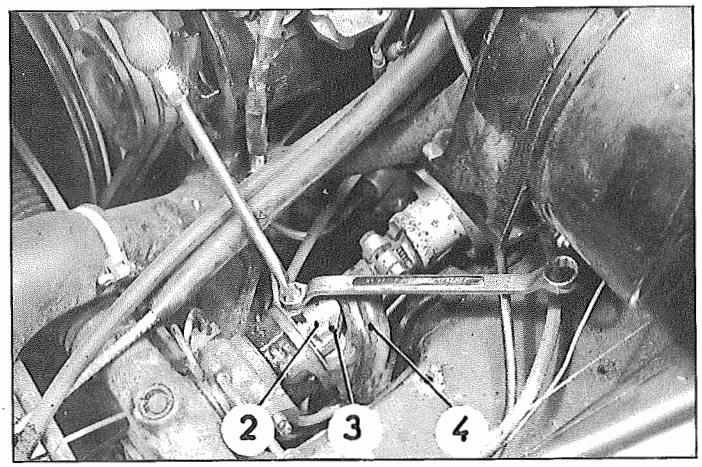
21. Release the pressure by loosening the bleed screw in the pressure regulator.

22. Place a cloth under the steering pipe assembly flange (1), right-hand side, in order to avoid spilling fluid on the brake unit.
Remove the connecting pipe assembly from the end piece side of the casing.

23. Fit the pipe assembly (A) on the connecting pipe assembly flange (1) (inserting a seal plate).
Connect the ends (d) and (e) of the pipe assembly (A) by means of the tubes (B) and (C) to the pressure gauges on the test bench.

24. Start up the engine and tighten the bleed screw on the pressure regulator.
Turn the steering from left to right in order to bleed the pipes on the pressure gauges.
Position the wheels as for running in a straight line (roller in the hollow of the cam).

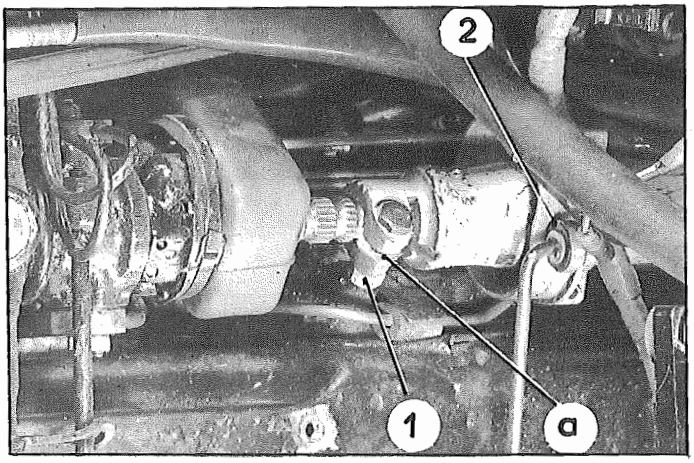
25. Turn the steering wheel slowly to the right and left in order to obtain a difference of pressure of about 850 p.s.i. (60 kg/cm^2) between the two pressure gauges (example : 290 p.s.i. (20 kg/cm^2) and 1137 p.s.i. (80 kg/cm^2).
Turn the steering wheel slowly in the reverse direction and note the pressure when the two pressure gauges show the same reading. This pressure should be 710 $\pm$ 70 p.s.i. (50 $\pm$ 5 kg/cm^2).



26. If the pressure does not read 710 $\pm$ 70 p.s.i. (50 $\pm$ 5 kg/cm^2), it is necessary to adjust the pressure distributor slide-valves.
Stop the engine. Remove the battery and its bracket.
Disengage the rubber protector (4) from the valve body in order to obtain access to the adjusting screws (2) for the valves.
Loosen the locknut (3) of one of the screws (2).

NOTE: Do not turn the adjusting screw during the unscrewing of the locknut.
If the cross-over pressure is too high, unscrew one of the adjusting screws (2) or tighten it if the pressure is too low. (Adjust the screw a very small fraction at a time, about one twelfth of a turn).

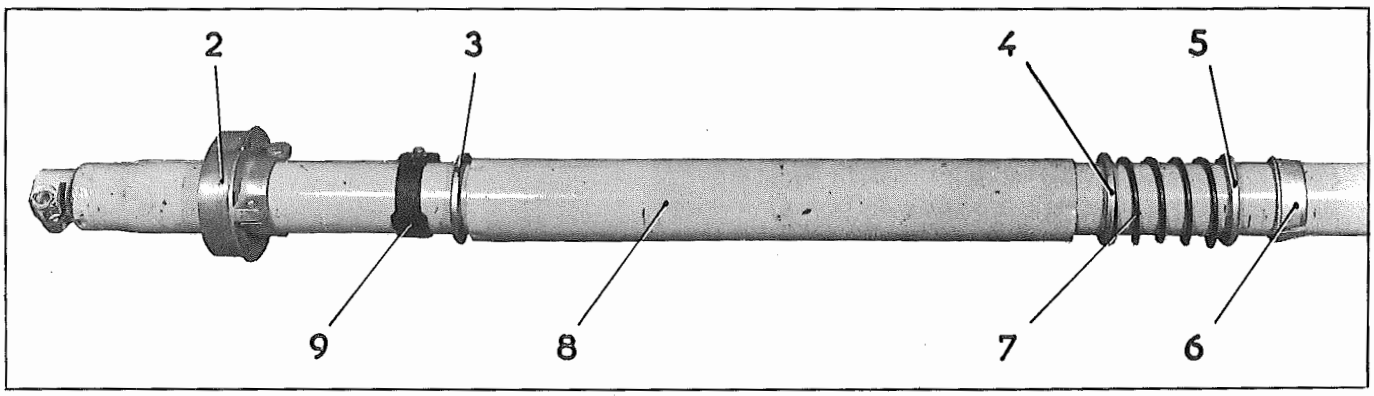
NOTE: Do not release the steering wheel until the pressures are stabilised, otherwise an oscillation may be set up at the steering wheel, which could ruin the pressure gauges.

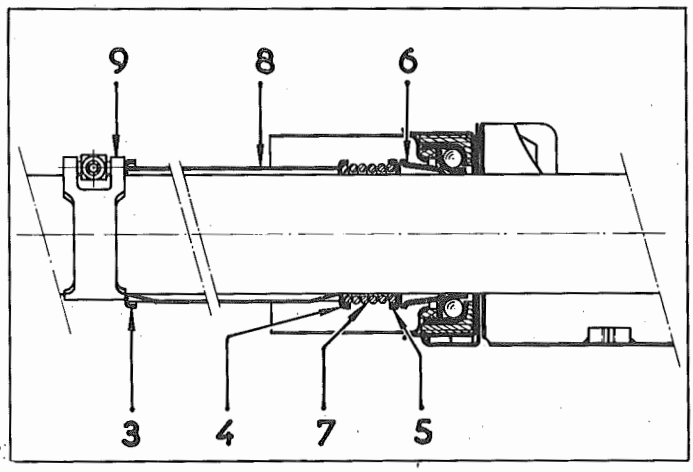


REPLACING A STEERING WHEEL.

Removal.

1. Release the pressure in the suspension units.
2. Remove the left-hand front suspension sphere. Fit a plug on the cylinder.
3. Disconnect the negative cable from the battery.
4. If the same steering wheel is to be refitted, mark (with a scriber), the position of the steering centralising cam (2) in relation to the steering column. Mark also with a spot of paint the position of the slot (a) on the splines of the steering pinion.
5. Loosen the securing screw on the cam (2) and remove the cam towards the front.
6. Loosen the screw in the clamp (9) (spanner 1994-T).
   Allow the spring (7) to extend.
7. Remove the clamp screw (1) securing the column to the steering pinion.

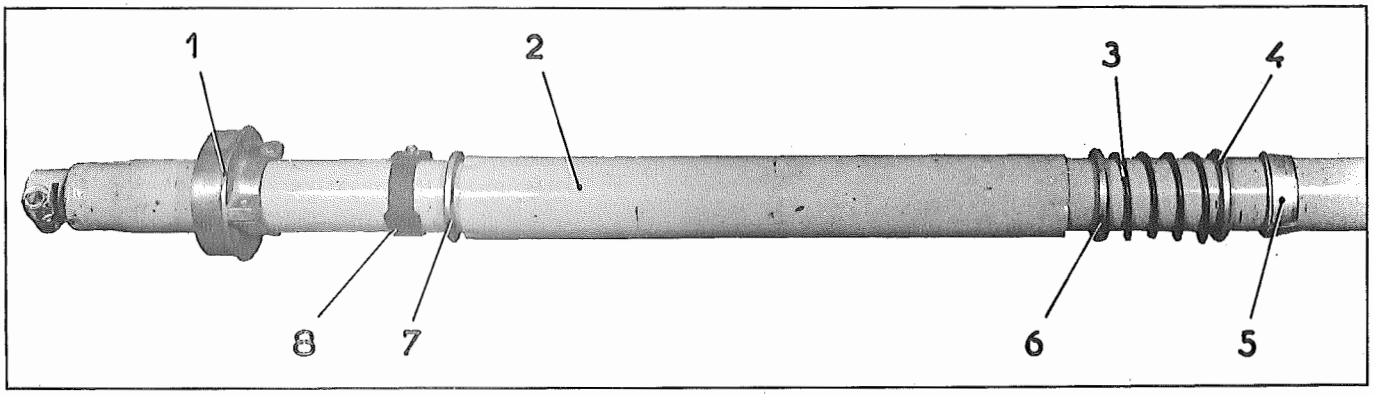


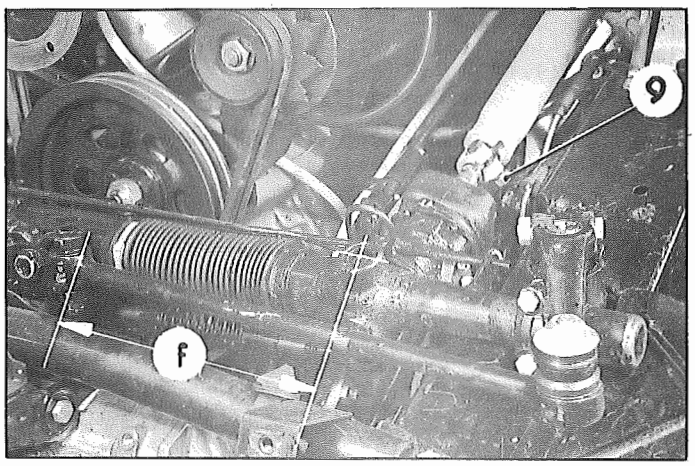


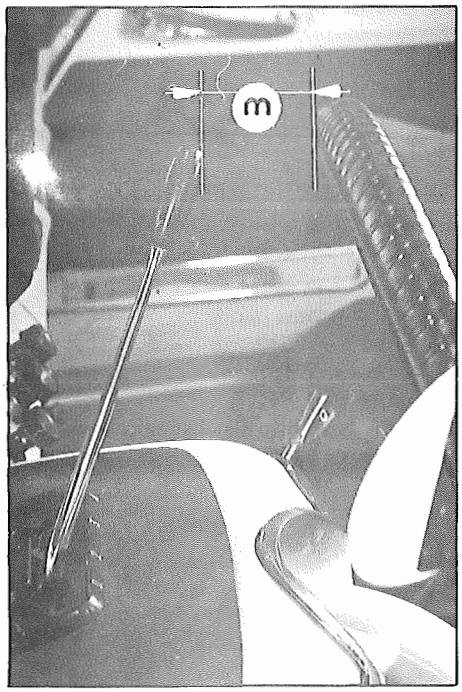
8. By pulling on the column from inside the vehicle free the following:
   - the cam (2),
   - the clamp (9),
   - the cup (3),
   - the tube (8),
   - the cup (4),
   - the spring (7),
   - the cup (5),
   - the cone (6).

Remove the steering wheel via the inside of the vehicle.

Assembly.







9. Insert the steering wheel via the inside of the vehicle.

Over the column place the following:

- the cone (5),
- the cup (4),
- the spring (3),
- the cup (6),
- the tube (2),
- the cup (7),
- the clamp (8),
- the cam (1).

Engage the steering wheel on the rack pinion according to the marks made when dismantling.

10. *If the steering wheel has been renewed:*

a) Turn the pinion in order to bring the outer bush of the silentbloc bearing in the left-hand track-rod, to a distance "f" = 275 mm from the centre line of the pinion pressure plunger nut.

b) Turn the steering wheel to bring the arm at 30° approximately below the horizontal, to the left.

c) Engage the steering pinion in the splines in the steering column.

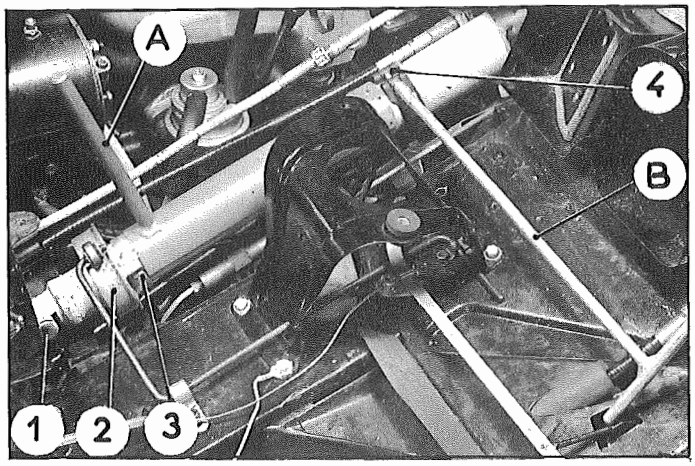
11. Fit the screw (9).

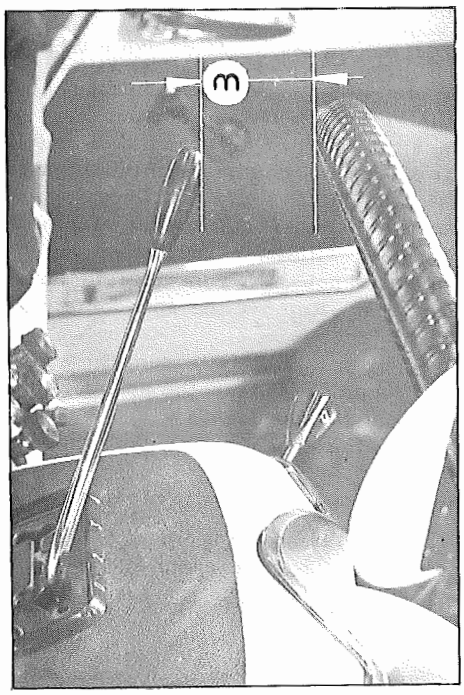
NOTE: Fit only screws (9) DM 441-100 with smooth shanks.

a) Move the gear lever to 2nd gear position, then push slightly on the steering wheel, when the distance "m" should lie between 40 and 60 mm.

b) Choose a slot in the steering pinion which will give these conditions.

c) Tighten the nut on the clamping screw (9).





12. Get an assistant to compress the spring using spring compressor (A) (1991-T).

When the spring coils are touching tighten the retaining clamp using spanner (B) (1994-T). (Make sure that there is no axial play in the steering wheel).

13. Fit the cam (3) for straight-line steering position.

Adjust the cam position approximately (see this operation, paragraph 26).
Tighten the screw (3) securing the cam.

14. Fit the front left-hand suspension sphere.

15. Connect the negative lead to the battery.
Start up the engine and close the bleed screw.

16. Adjust the steering cam (see Op. DX.440, paragraphs 12 - 15).

REPLACING A STEERING CENTRALISING CAM.

Removal.

17. Release the pressure in the suspension units.

18. Remove the left-hand front suspension sphere and plug the hole in the cylinder.

19. Disconnect the negative cable from the battery.

20. Mark the longitudinal position of the cam (2) on the steering wheel with a scriber mark.
Also mark with a spot of paint the position of the slot on the steering pinion splines.
Loosen the screw (3) securing the cam.
Free the cam towards the front.

21. Loosen the screw in the clamp (4) (spanner 1994-T) (B), releasing the spring.

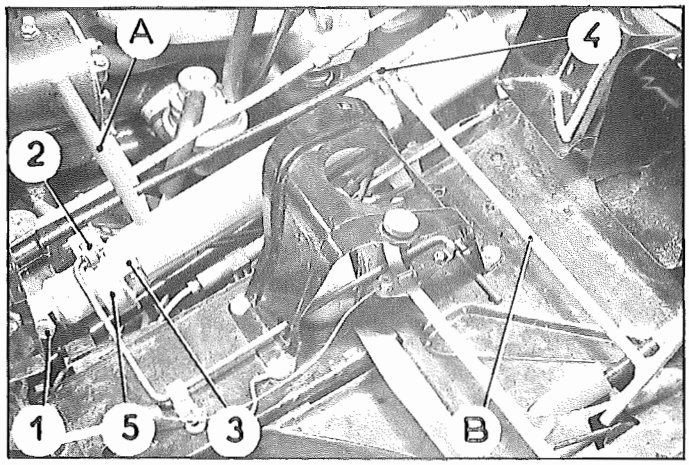
22. Remove the coupling screw (1) from the control pinion.
Slightly move the steering wheel towards the rear in order to remove the centralising cam (2).

Assembly.

23. Engage the centralising cam (2) on the steering column (note the assembly position), and make sure that the marks made when dismantling correspond.
Engage the steering column on the steering pinion according to the marks made when dismantling.

24. Fit the clamping screw (1).

NOTE: Use only screws (1) DM 441-100 with smooth shanks.
Place the gear selector lever in the 2nd speed position then press lightly on the steering wheel, when the distance "m" should lie between 40 and 60 mm. Choose a groove in the steering pinion to fulfil this condition.



Tighten the nut on the clamping screw (1).

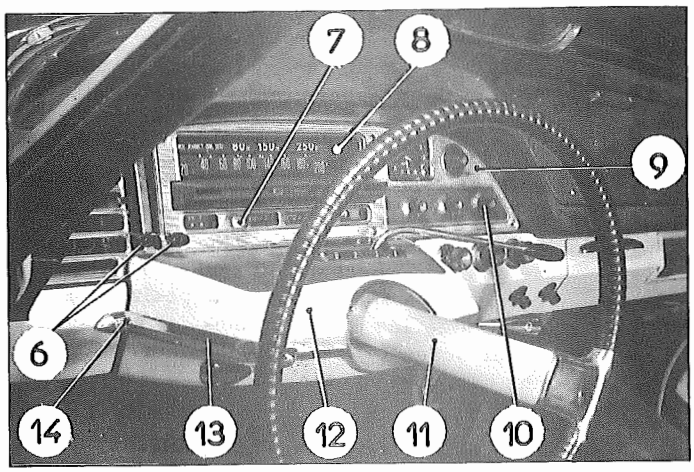
25. Obtain the help of an assistant to compress the spring, using a spring compressor (A) (1991-T).

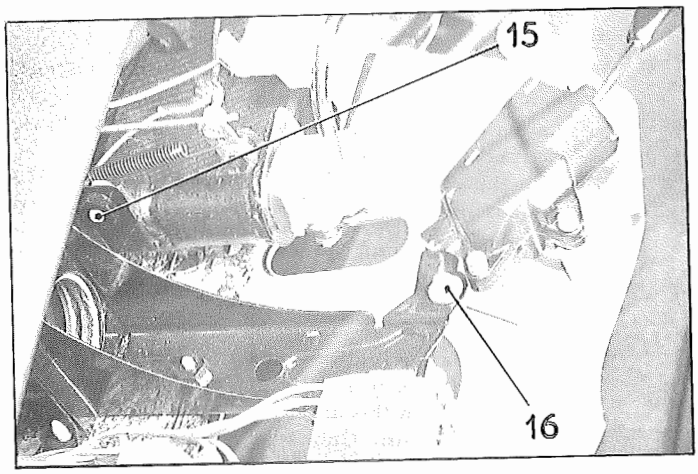
When the coils of the spring are touching tighten the retaining clamp (4), using spanner (B) (1994-T). (Check that there is no axial play in the steering-wheel).

26. With the wheels of the car in an approximate position for running in a straight line, turn the cam (5) so that the roller is resting in the hollow of the cam.

Tighten the securing screw (3) of the cam.

27. Fit the left-hand front suspension sphere.
28. Connect the negative cable to the battery.
29. Start up the engine and close the bleed screw.
30. Adjust the centralising cam (see Op. DX.440-0, paragraphs 12 - 15).





518.Add.1.

REPLACING A STEERING COLUMN BRACKET.

Removal.

31. Disconnect the negative cable from the battery.
32. Remove the screws (14) holding the finisher for the steering column aperture.

Remove the finisher (13) from this aperture (leave it on the steering column tube) and its rubber stops.

Remove the cover (12) from the electrical controls together with its rubber trim.

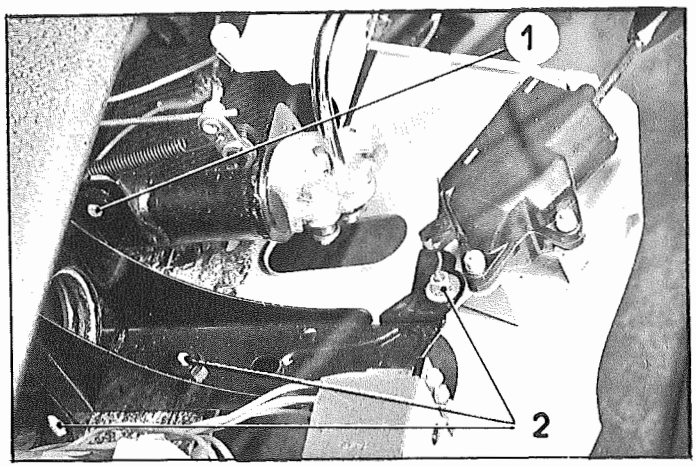
Remove the knobs (6) from the left-hand ventilation controls. Remove the speedometer reset button (7).

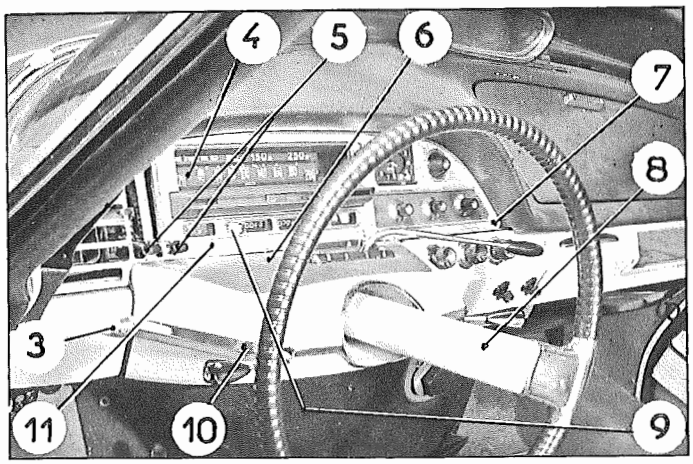
Remove the 5 screws (10) from the speedometer surround. Withdraw the speedometer surround (9) towards the right.

Disconnect the speedometer cable (unscrew it by hand).

Remove the speedometer (8) towards the left.

33. Remove the steering wheel (11) (see this operation, paragraphs 1 and following).
34. Remove the finishing panel from under the facia panel.
35. Remove the 5 screws (16) securing the steering column bracket and the screw (15) holding the selector.
36. Remove the steering column bracket and its sealing sleeve.





Refitting.

37. Position the steering column support and its sealing sleeve and engage it on the stop bush.

Insert the 5 screws (2) securing the steering column bracket and the screw (1) holding the selector.

38. Fit the finishing panel under the scuttle shelf.

39. Fit the steering wheel (8) (see this operation, paragraphs 9 and following).

40. Fit the speedometer (4).

Connect the speedometer cable.

Fit the speedometer surround (11).

Insert the 5 screws (7) in the speedometer surround.

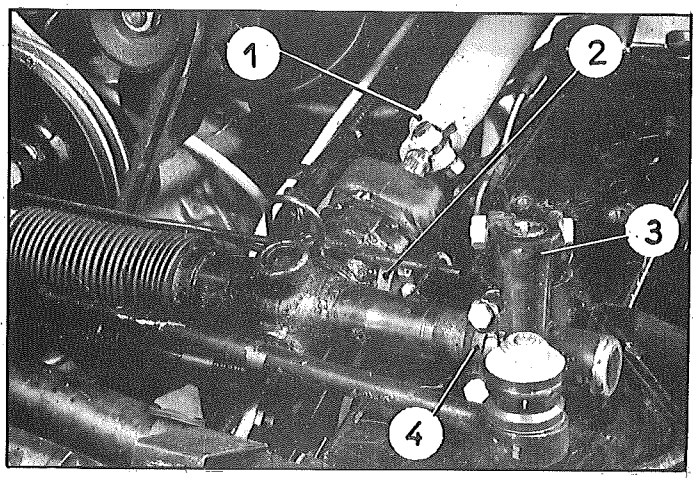
Fit the speedometer reset button (9).

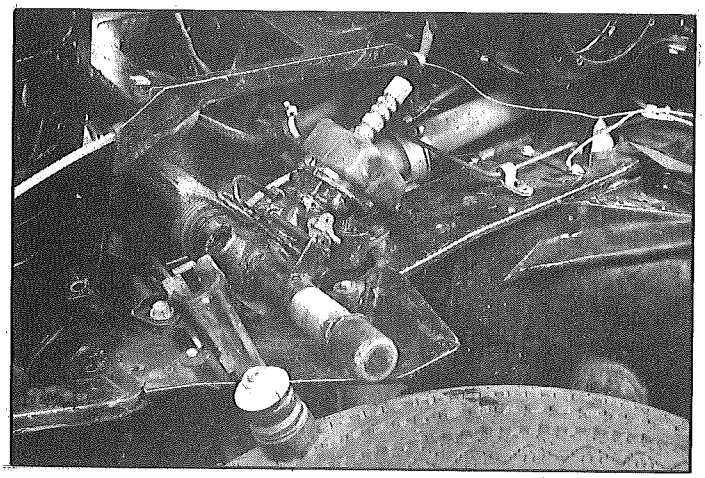
41. Fit the knobs (5) for the left-hand ventilation control.

Fit the cover (6) over the electrical controls with its rubber trim.

42. Tighten the screws (3) for the finisher (10) around the steering column aperture (do not forget the rubber stops).

43. Connect the negative terminal to the battery.





REPLACEMENT OF A STEERING RACK ASSEMBLY.

REMOVAL.

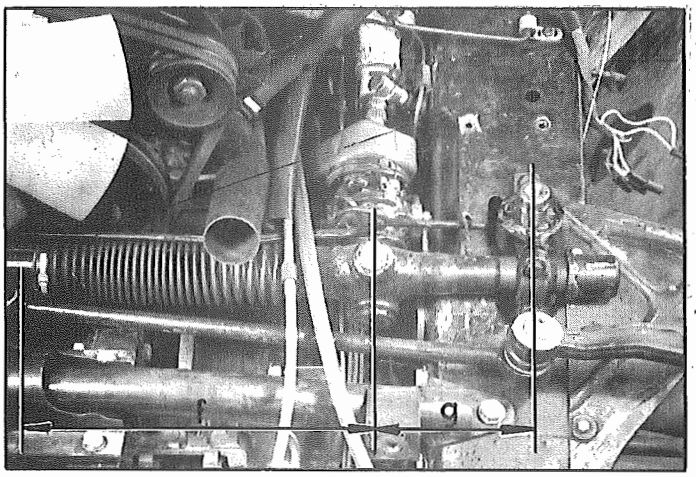
1. Remove:
   - the spare wheel,
   - the front left-hand wing,
   - the battery, free the battery tray.
2. Release the pressure (see Op. DX.00).
3. Remove the screws fixing the assembly comprising battery cradle and reservoir bracket, freeing the assembly as much as possible.
4. Disconnect :
   - the steering column tube (1) from the steering pinion,
   - the pipe assembly from the steering pinion housing (2). Free the sealing plate. Fit a closing plate on the pipe assembly flange to prevent draining the reservoir.
   - the steering levers (3), from the steering relay spindles.
5. Remove the steering clamp caps (4).

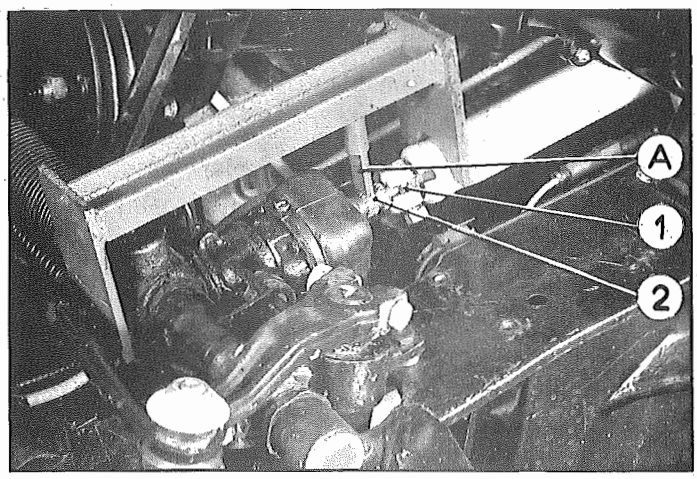
   Remove the steering rack assembly from the steering column.

   Withdraw the steering rack from the left-hand side of the car.

ASSEMBLY.

6. Insert the steering rack from the left-hand side of the car.





7. Turn the steering pinion to bring the outer bush of the left-hand steering track-rod silentbloc to a distance "f" = 275 mm from the centre of the rack pinion pressure pad nut.

   Turn the steering wheel to bring the arm to 30° below the horizontal, on the left-hand side for L.H. drive and to the right for R.H. drive.

   Engage the control pinion in the splines of the steering column.

8. Fit the steering into its clamps.

   Adjust the lateral position in order to obtain a distance "g" of 122.5 ± 2.5 mm, between the centre-line of the spindle of the steering relay and the centreline of the rack pinion pressure pad nut.

9. Fit the clamp caps without tightening the securing screws.

   Fit the screw (1) coupling the steering column and tighten the nut.

10. Adjust the angular position of the steering.

    Fit the fixture 1955-T.

    Rotate the steering assembly in its clamps to bring the control pinion (2) into contact with the central gauge pin (A) of the fixture.

    Tighten the securing screws on the clamp caps.

11. Connect up:

    - the steering track-rod levers to the relay spindles (the nuts facing outwards) tightening torque 18 ft/lbs (2.5 m.kg),
    - the feed pipe assembly to the steering pinion housing. Insert the seal plates with new ring seals.

12. Fit the battery and reservoir support assembly.

13. Fit the battery and battery tray and connect the cables.

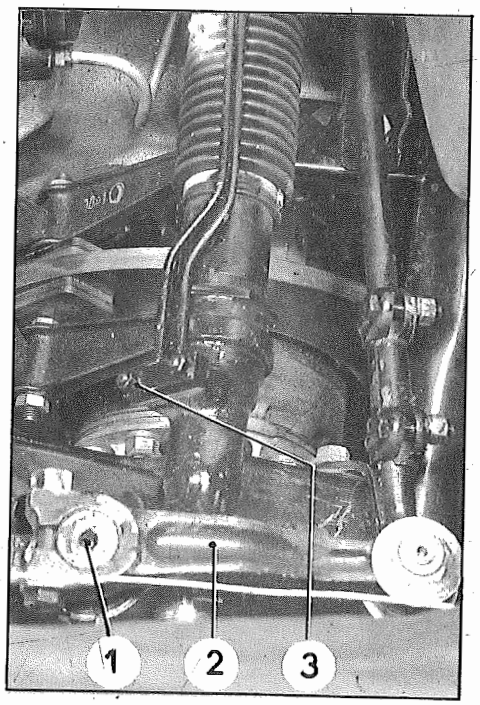
14. Put the circuits under pressure. Check all unions for leaks.

15. Adjust the wheel alignment (see Op. DX.440-0).

16. Check the steering lock (see Op. DX.440-0).

17. Fit the front left-hand wing and the spare wheel.

18. Adjust the steering centre-point (see Op. DX.440-0).



REPLACEMENT OF A RACK HYDRAULIC CONTROL (without removing the steering).

Removal.

19. Loosen the wheel nuts on the front right-hand wheel and put the front of the car on stands.

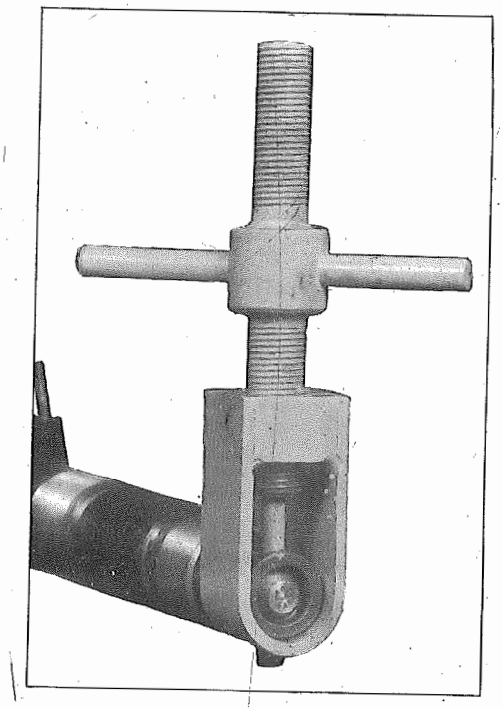
Remove the wheel and the front right-hand wing.

20. Release the pressure, loosening by about one third of a turn the bleed screw of the pressure regulator.

21. Drain the steering circuit by turning the steering wheel to full lock to both right and left.

22. Place a cloth under the flange (3) to prevent the leakage of fluid onto the brake unit.

Disconnect the flange (3) of the pipe assembly on the end of the steering housing.



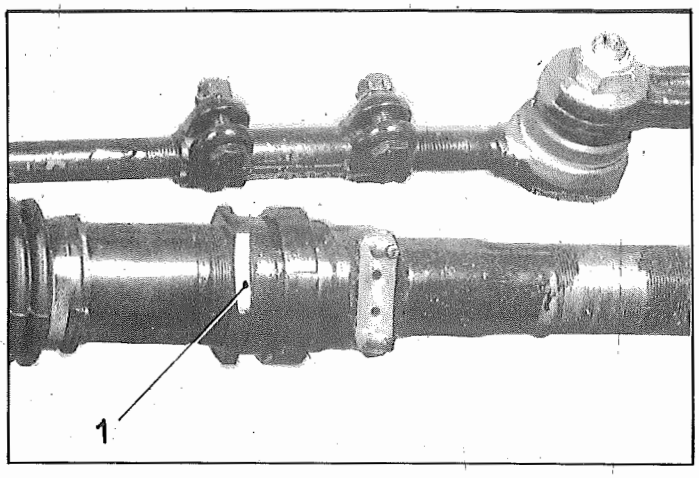
23. Disconnect the steering lever (2) from the relay spindle (1).

24. Loosen the locknut on the steering lock stop, right-hand, and remove the stop.

25. Put the steering on full left-hand lock.

Remove the circlip from the end of the piston.

Remove the connecting pin from the rack control rod using extractor 1969-T.

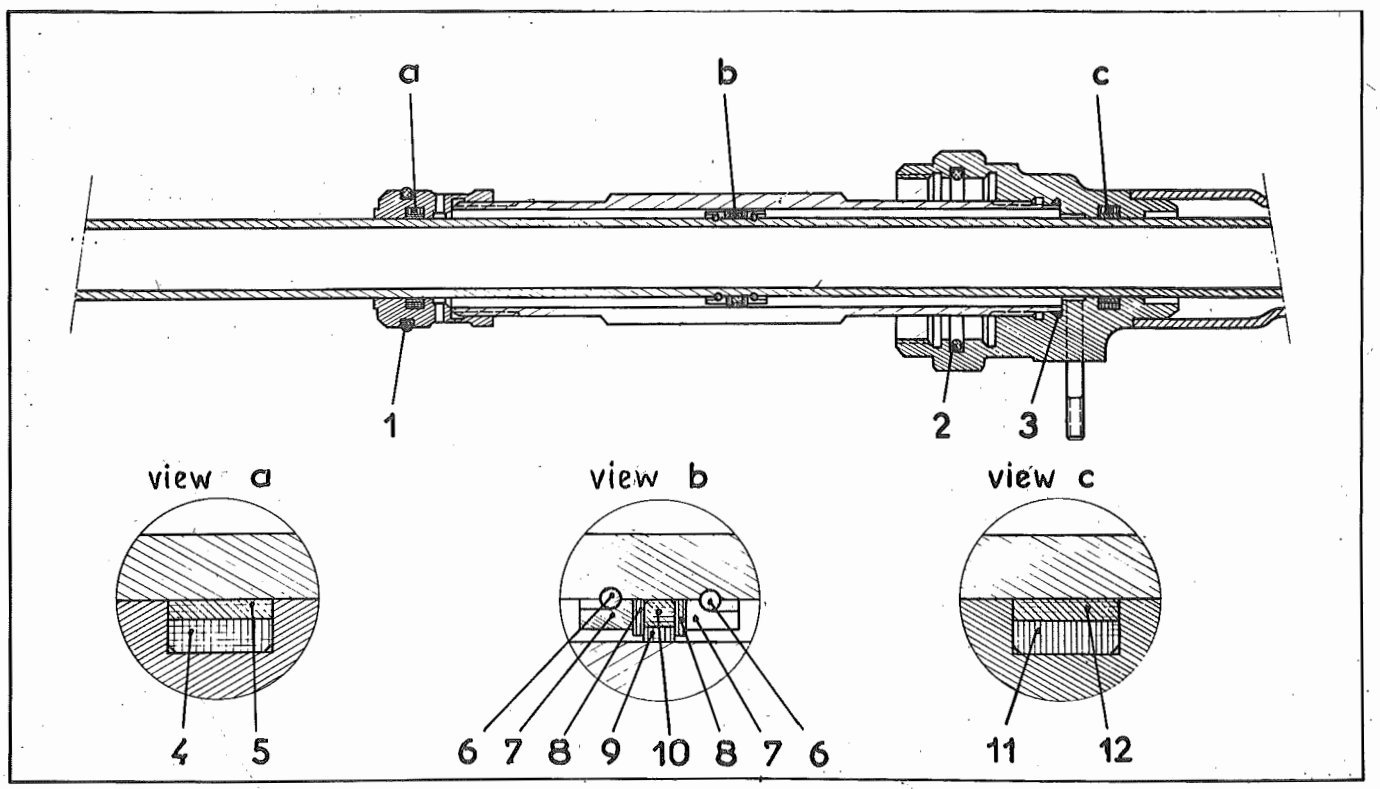


26. Release the locknut (1) on the end of the steering relay housing.

27. Remove the clamp securing the steering assembly to the right-hand steering relay housing.

28. Unscrew and remove the rack control cylinder-piston assembly, pulling the steering assembly as far as it will go towards the front of the car.

Assembly.

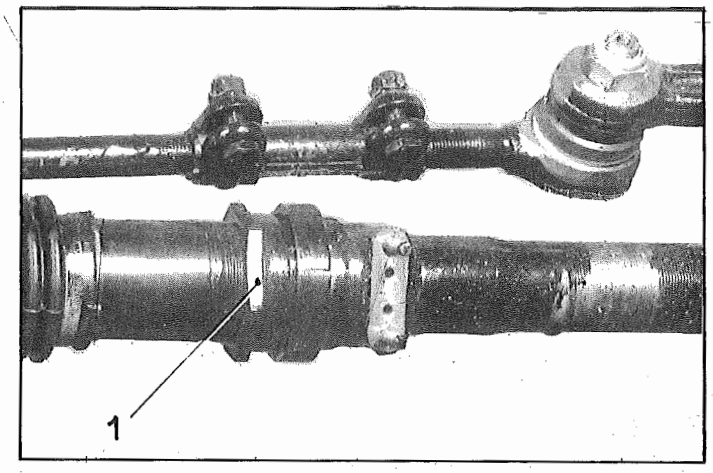


NOTES:

a) Make sure that the parts are thoroughly clean.
b) Make sure that the seals (1) (2) (3) are in position in the casing end piece, and the cylinder end piece.
c) Moisten all parts with special hydraulic fluid.

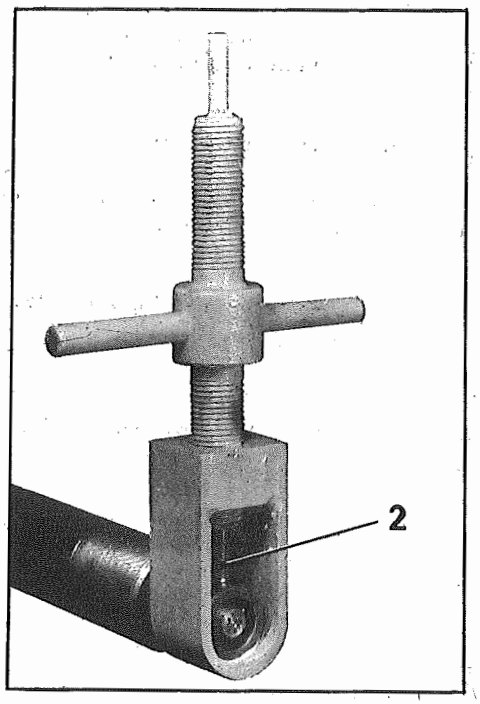
29. Engage the rack control cylinder-piston assembly in the steering housing. This operation is made easier by pulling the steering towards the front of the car as far as it will go.

Screw in the assembly until the pipe assembly flange is correctly positioned, without using force.



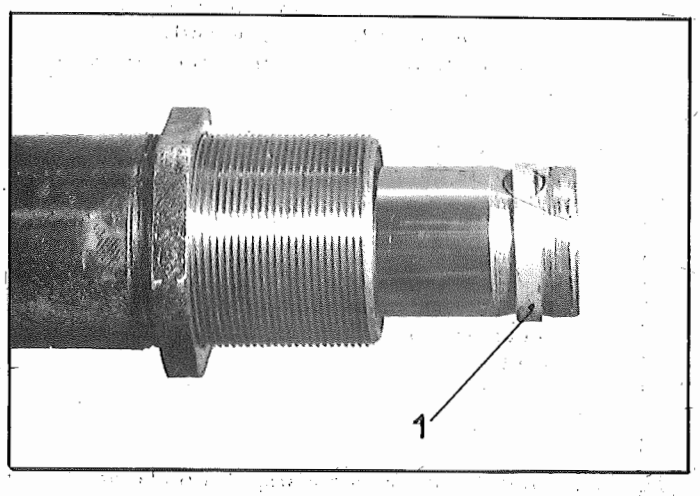
30. Fit the right-hand clamp cap. Tighten the securing screws (spring washers under the heads).

31. Hold the steering housing end piece and tighten the locknut (1) to 72 ft. lbs (10 m.kg).

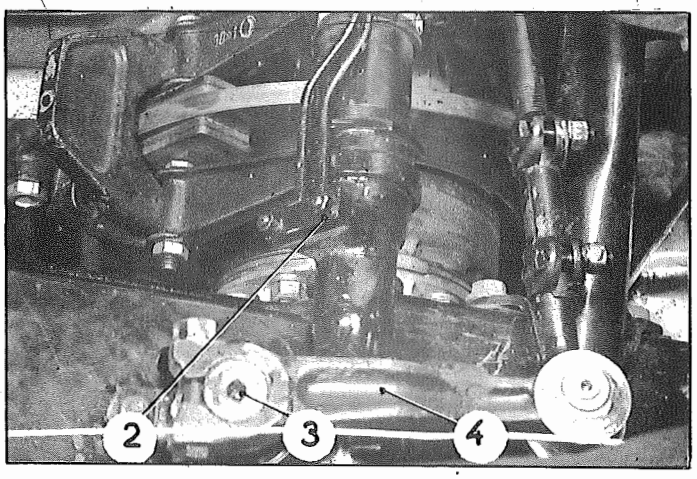


32. Turn the steering to left lock, so that the hole in the rack control rod is in line with the holes in the piston. Align these two parts with a drift.

Fit the pin (2) using extractor 1969-T.



Fit the circlip (1).



33. Couple the steering relay lever (4) to the relay lever spindle (3).

34. Connect up the pipe assembly flange (2), inserting the seal plate. Tighten the nuts (spring washers).

35. Fit the wheel and lower the car to the ground. Tighten the wheel nuts.

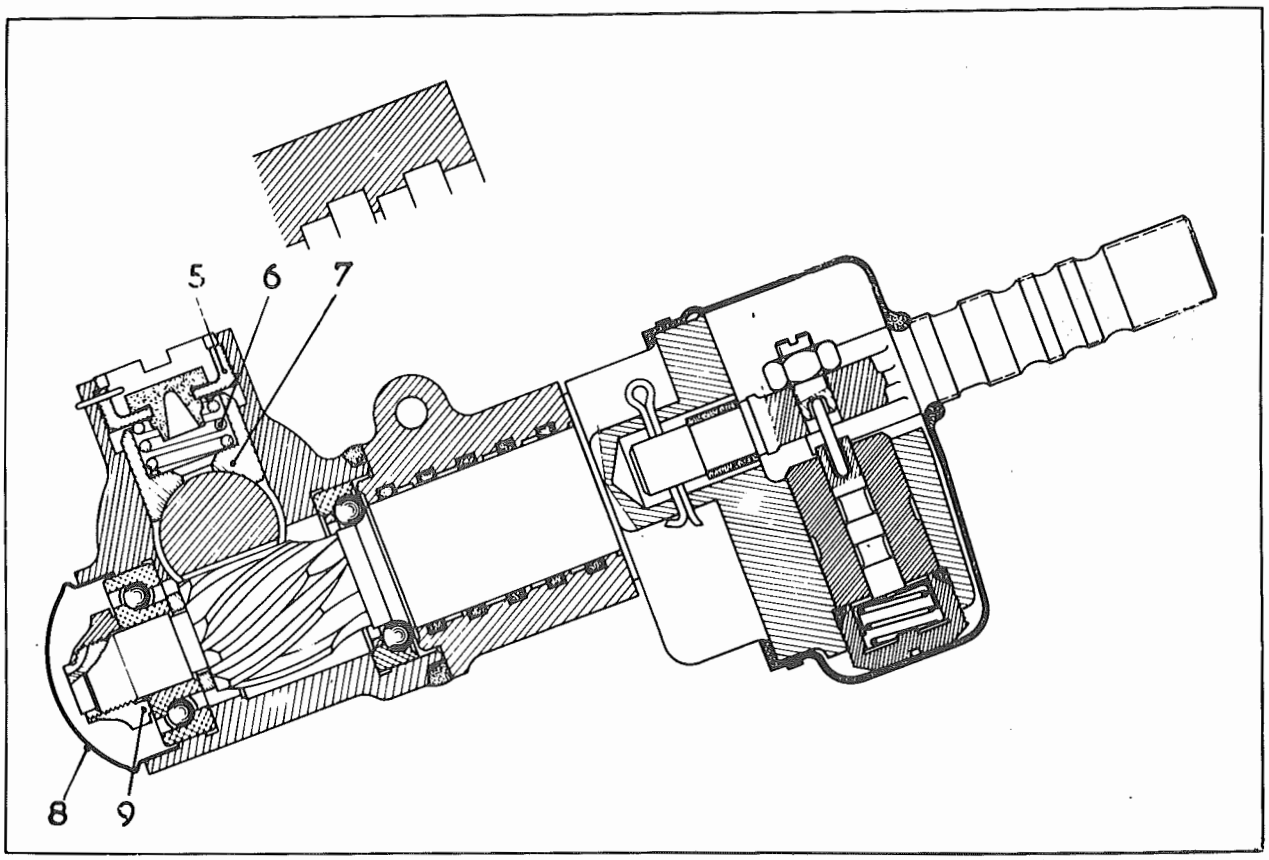
36. Start up the engine.

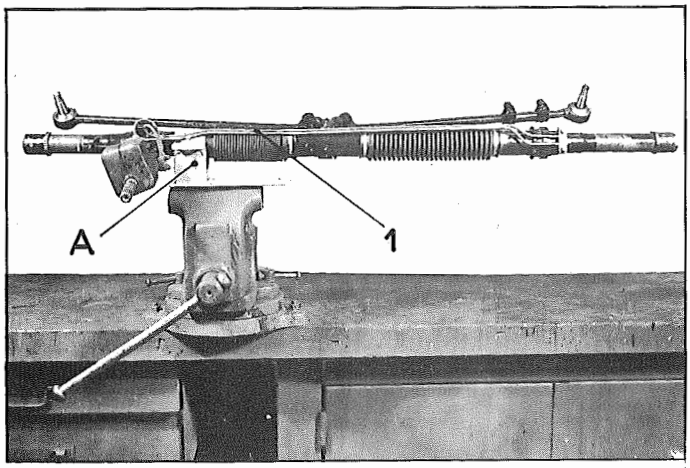
Put the circuits under pressure and check all unions for leaks.

37. Adjust the steering lock. (See Op. DX.440-0, paragraphs 17 - 18 - 19).

38. Fit the wing (see Op. DX.851-1).

REPLACING A PINION AND ROTATING UNION ASSEMBLY.





41. Remove the nut (4) and remove the stop rod (2) from the rotating union.

42. Remove the metal cap (8). Remove the metal locking the nut (9) from the groove in the pinion and remove the nut.

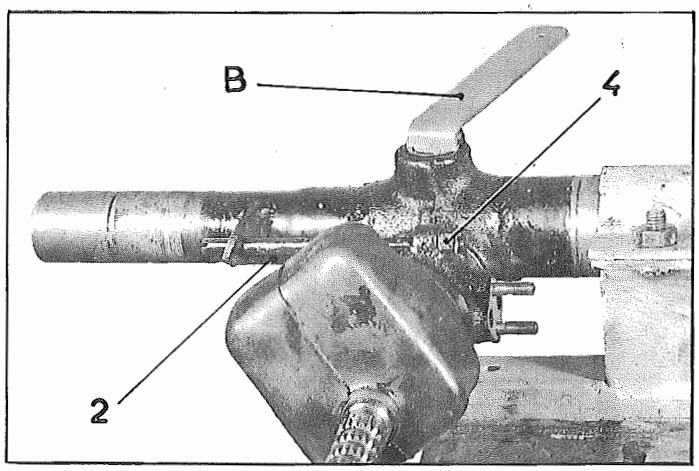
43. Remove the split pin and the nut (5) from the rack pressure pad using spanner (B) MR 3691-70.

Remove the spring (6) and the pressure pad (7).

Removal.

39. Remove the steering (see this operation, paragraphs 1 and following).

40. Hold the steering in a vice using bracket (A) 1999-T. Remove the pipe assembly (1).

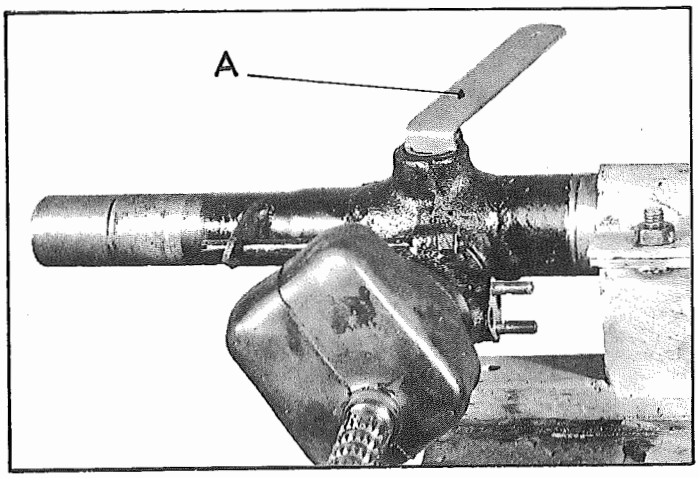


44. Free the pinion and rotating union assembly, tapping the end of the pinion, if necessary, with a brass rod.

NOTE: Do not lose the balls from the upper bearing.

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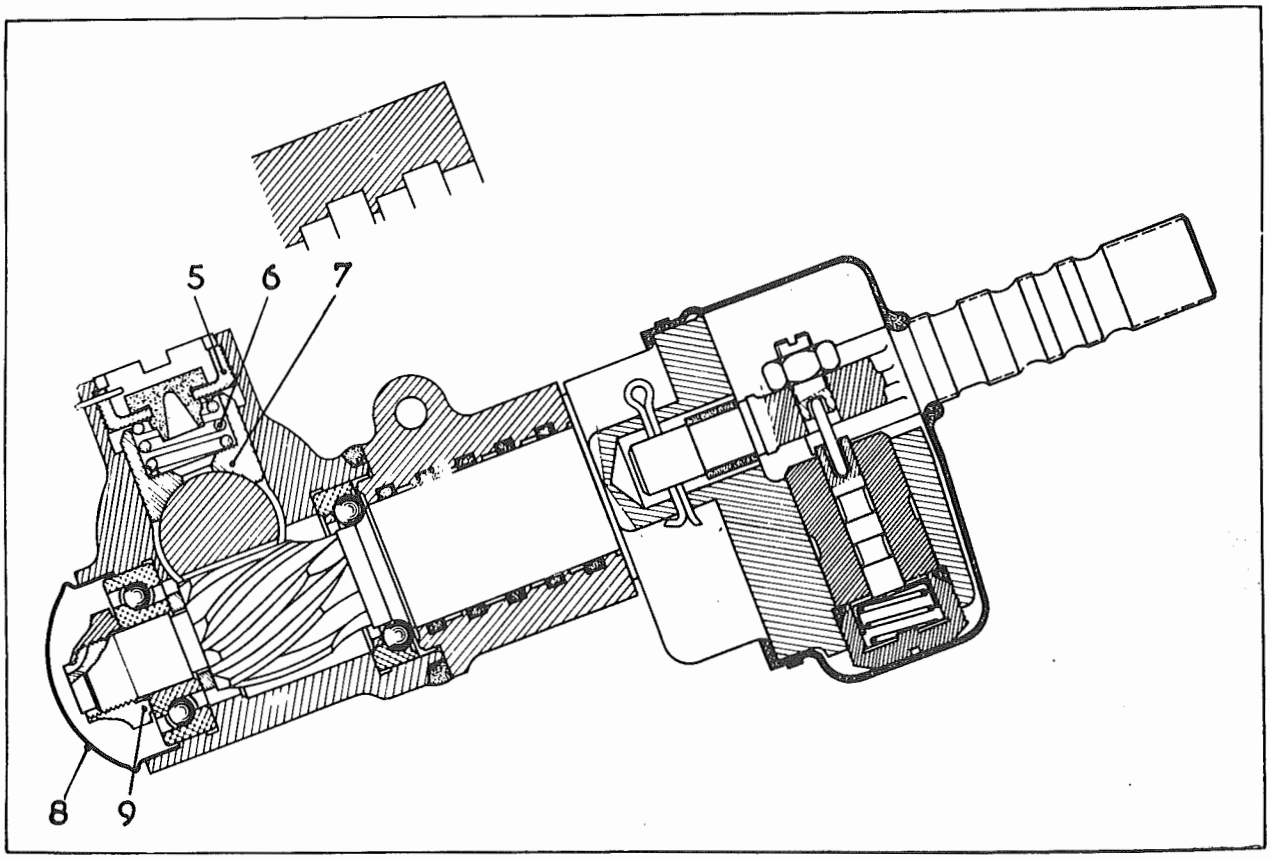
Refitting.

45. Fit and adjust the pinion and rotating union assembly (see Op. DX. 442-3, paragraphs 19 - 20).

46. Fit the rack pressure pad (7).
Fit the spring (6).
Tighten the nut (5) and unscrew 1/6th of a turn using spanner (A) MR 3691-70.
Split-pin the nut.

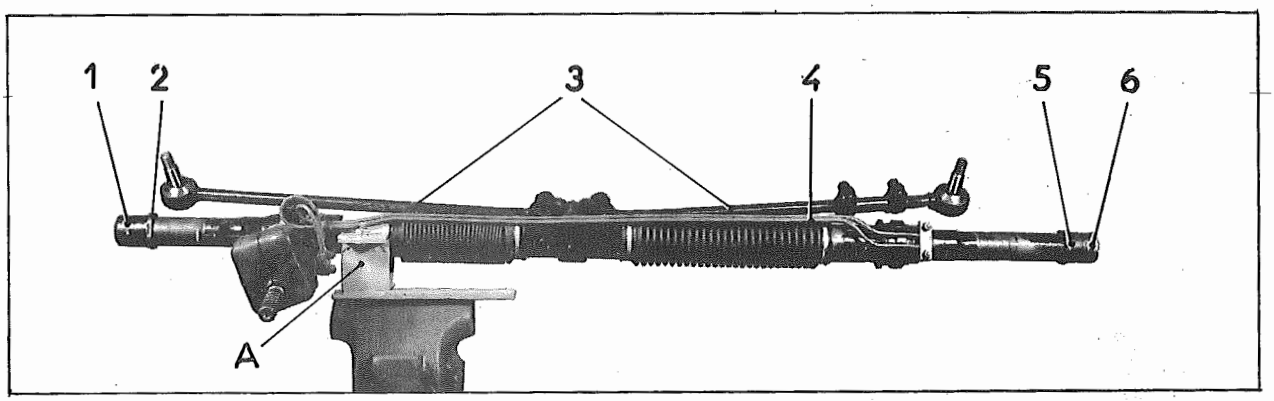
47. Remove the steering unit from the support bracket.

48. Fit the steering unit in the car.
(see this operation, paragraphs 6 and following).



OVERHAULING A STEERING UNIT.

Dismantling.



1. Hold the steering unit in a vice using a vice adaptor (A) 1999-T.

Remove the clip from the left-hand dust cover: push the dust cover back so that the vice support can be fixed onto the steering unit.

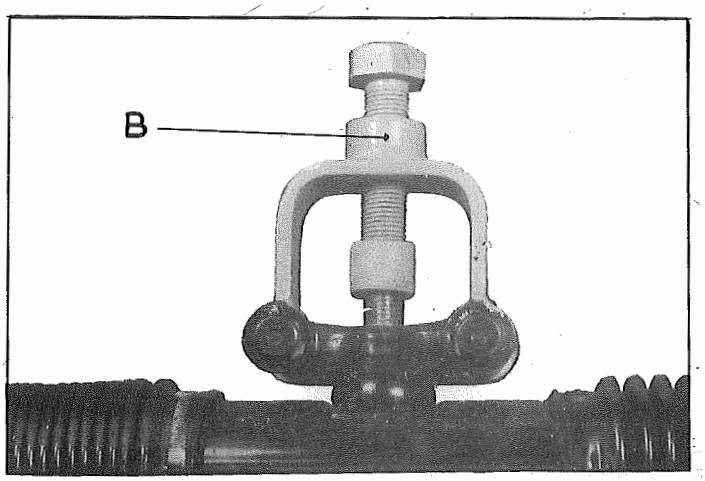
Remove the piping (4) for the rack control.

Remove the seal plates.

Disconnect the track-rods (3) from the central yoke.

Drain any liquid from the steering unit by moving the rotating union to full lock position (right-hand side then left-hand side).

Loosen the locknuts (2) and (5) and remove the end caps, right and left-hand (1) and (6) using a pipe wrench.

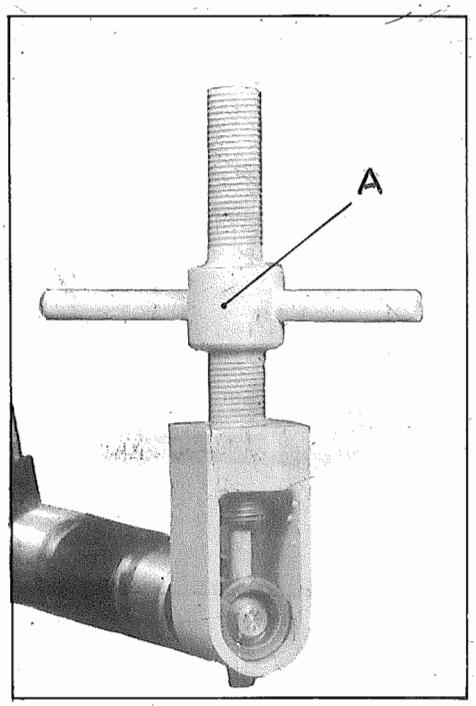


2. Remove the nut securing the yoke on the ball pin.

Remove the spring.

Disconnect the yoke from the ball pin using extractor (B) 1967-T.

Remove the rubber sealing washer (7).

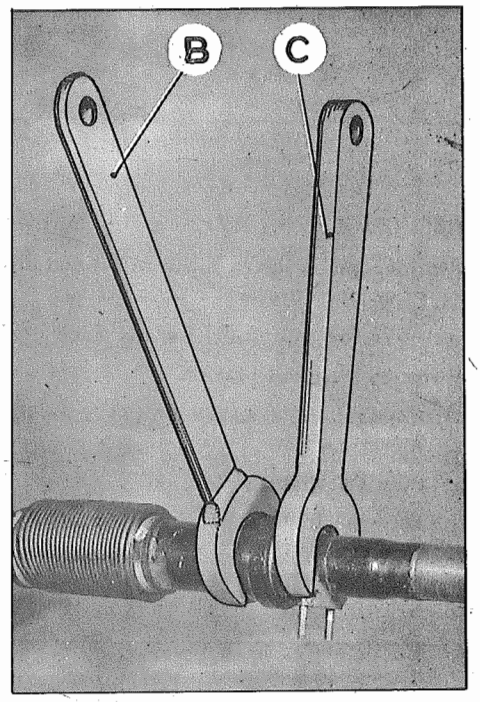


3. Disconnect the cylinder-piston assembly.

Put the steering in full right-hand lock position.

Remove the circlip from the piston.

Remove the pin from the rack control piston rod using extractor (A) 1969-T.

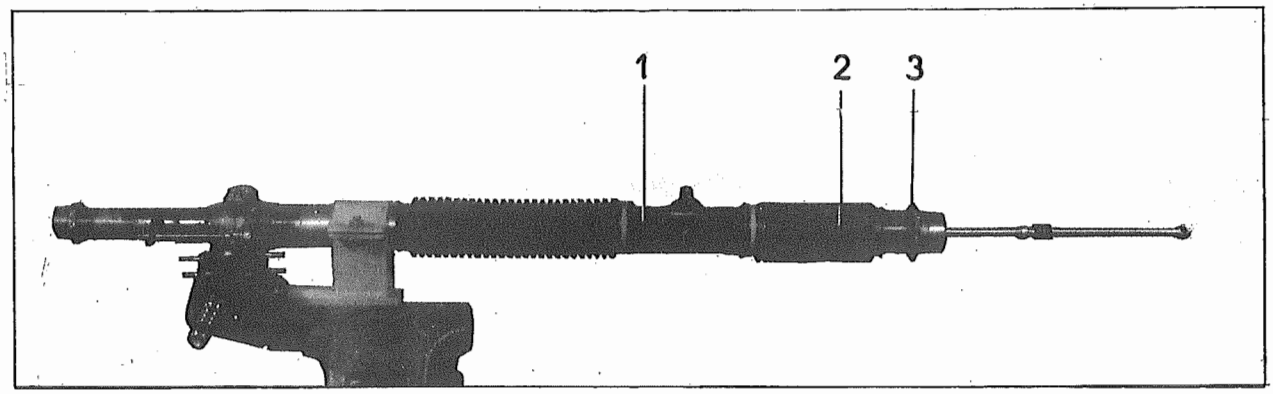


4. Release the locknut on the end of the steering housing using spanner (B) 2186-T and an open-ended spanner (C) or an adjustable spanner, taking care that the jaws do not project over the joint face for the pipe assembly, to avoid making a burr on the joint face which would result in a leak.

Disconnect the steering piston-cylinder assembly with end piece.

Remove the locknut (3).

Free the right-hand dust cover (2) the sliding closing plate (1) and the rack guide block.



5. Disconnect the rack control rod.

Turn the steering on stand 1999-T to bring the steering pinion underneath.

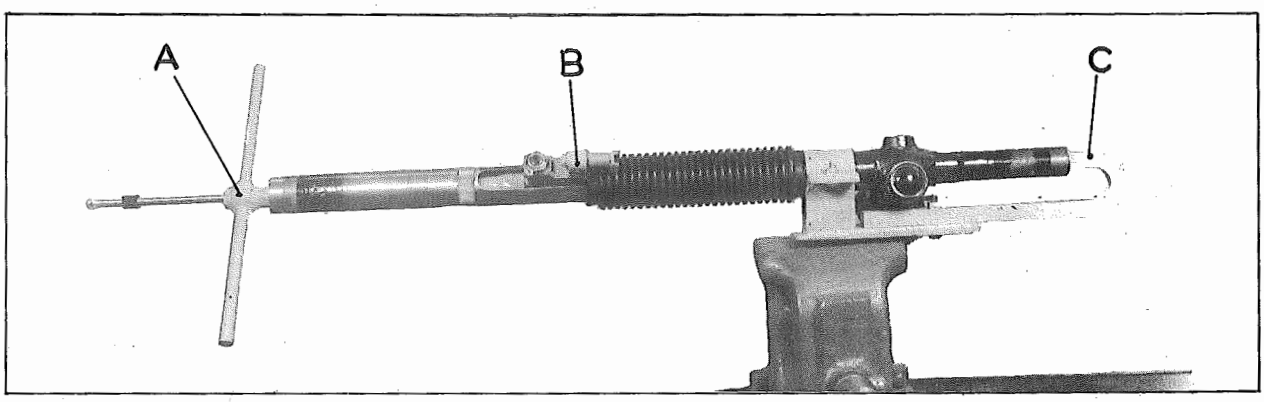
Insert screwdriver portion (C) of the fixture 1999-T into the slot in the rack.

Adjust the position of the rack and the steering so that the screwdriver may be fixed onto the attachment 1999-T.

Turn down the tongue of the locking tab on the central ball pin.

Lock the ball pin using extractor (B) 1966-T.

Disconnect the control rod by unscrewing it with spanner (A) 1982-T.



6. Removing the central ball pin.

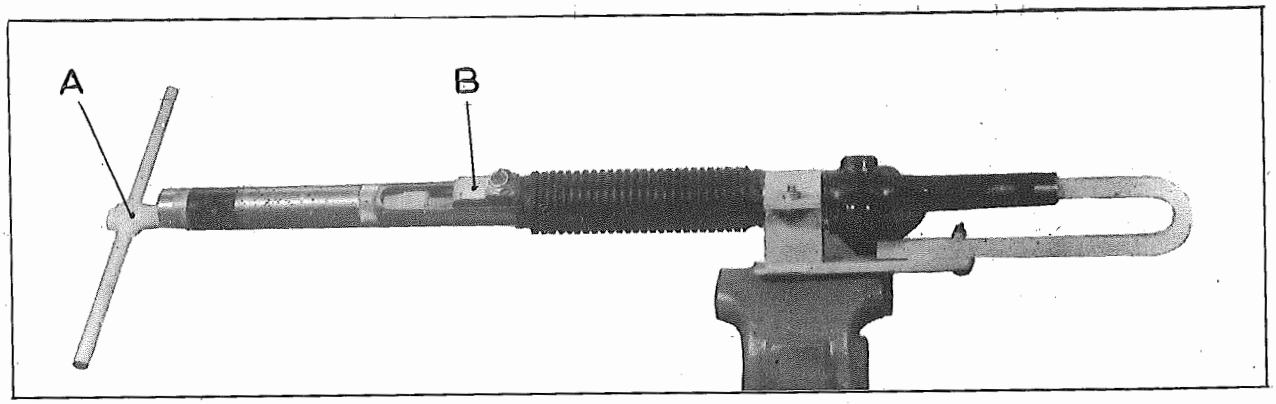
Screw the pad (of assembly 1966-T) on the rack and fit extractor (B) 1966-T.

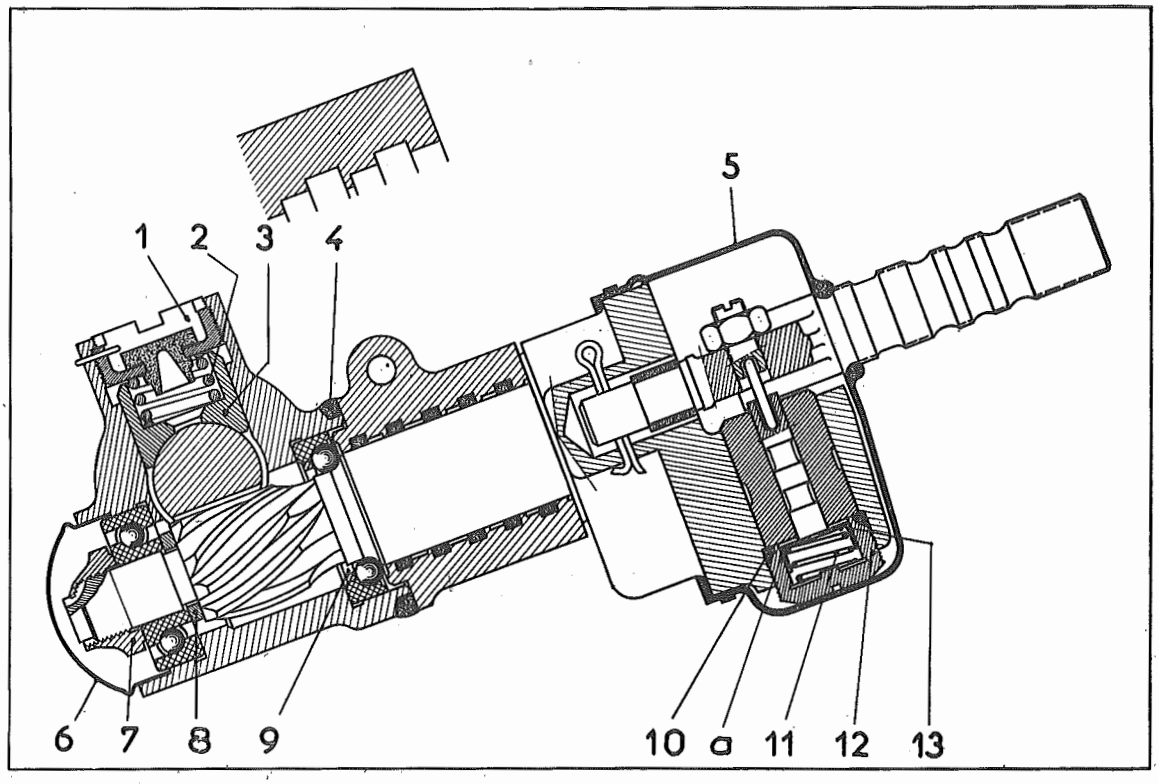
Place the guide block on the stem of the ball pin (as a distance piece) and lightly tighten the nut on the ball pin.

Extract the ball by turning the screw of extractor (B) 1966-T using spanner (A) 1982-T.

NOTE: After freeing the ball pin it comes at once into contact with the extractor. It is therefore impossible to completely remove the ball with the extractor.

Remove the extractor and the screwdriver.





7. Remove the split pin, and the nut (1) using spanner (MR 3691-70).

Remove the spring (2) and the thrust pad guide (3).

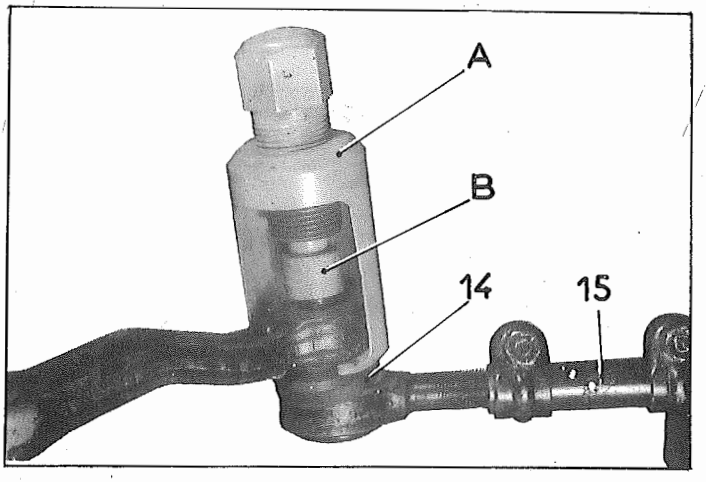
Remove the rack.

8. Disconnect the assembly of steering pinion and rotating union.

Remove the metal cap (6).

Remove the locating rod from the rotating union.

Remove from the slot in the pinion, the metal edge of nut (7) and remove the nut.



Remove the pinion and rotating union assembly, tapping the end of the pinion with a piece of brass rod if necessary.

Take care not to lose the balls from the upper bearing.

Tap out the lower bearing and the upper bearing outer race.

9. Remove the locknut for the stop for the left-hand lock position.

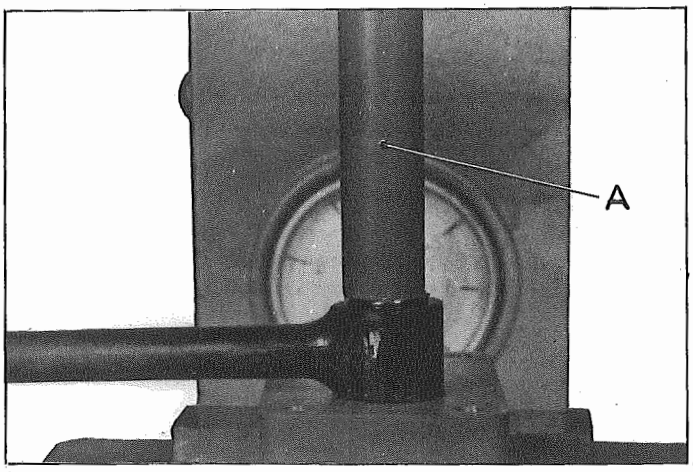
10. Remove the steering from its bracket.

11. Strip the steering track rods.

Disconnect the steering levers from the rods using extractor (A) 1964-T and pad (B) 1968-T.

Free the rubber cup (14) and the nylon sealing cup for the ball joint.

Disconnect the adjustable sleeve (15) from the right-hand rod.



Remove the flexible bushes from the rod in a press (using mandrel MR 3676-110).

NOTE:- The steering rod balls cannot be dismantled. Change the whole left-hand rod, or the end piece of the right-hand rod.

If the rod ball joints are in good condition it is essential not to clean the rods by immersion, thereby avoiding degreasing the ball joints.

Clean the mechanical parts.

12. Strip the steering pinion and rotating union assembly (see paragraphs 48 and following of this operation).

13. Dismantle the rack control (see paragraphs 37 and following, of this operation).

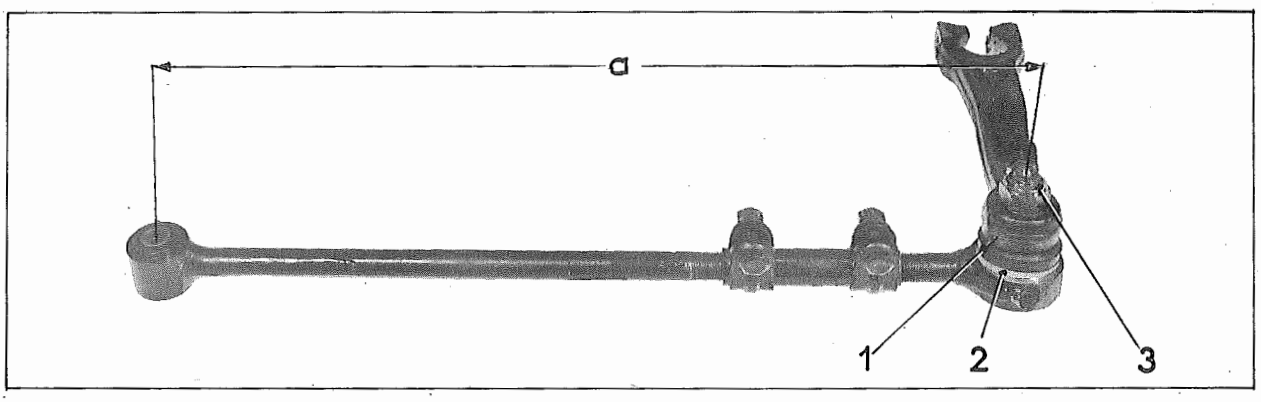
ASSEMBLY.

14. Prepare the rack control (see paragraphs 41 and following of this operation).

15. Prepare the steering pinion and rotating union assembly (see paragraphs 52 and following, of this operation).

16. Assemble the track-rods.

Fit the flexible bushes in the sockets of the steering track-rods using mandrel (A) MR 3676-110.



Fit the adjusting sleeve with its clamps on the right-hand track-rod: screw it on the track rod and on the end of the ball joint so that dimension "a", 402 mm, is obtained between the ball joint centre line and the centre line of the flexible bush.

Fit the nuts on the clamps without tightening them.

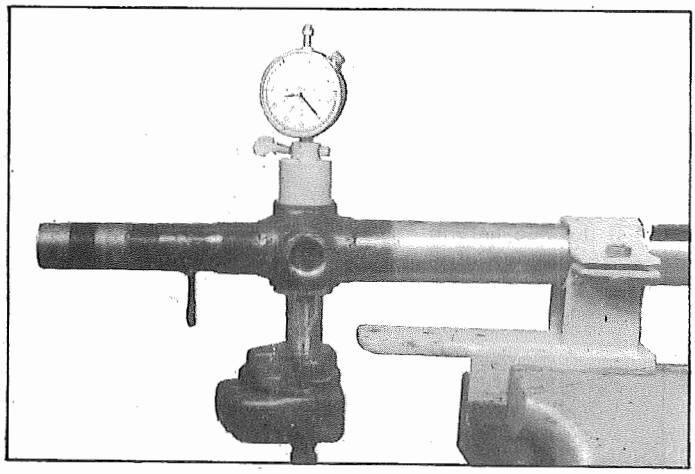
17. Connect the levers to the steering track-rods.

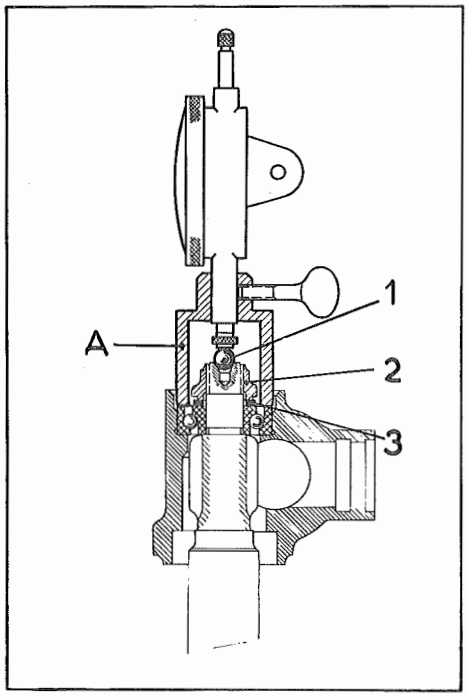
Put a little grease in the annular space between the tail of the ball pin and housing.

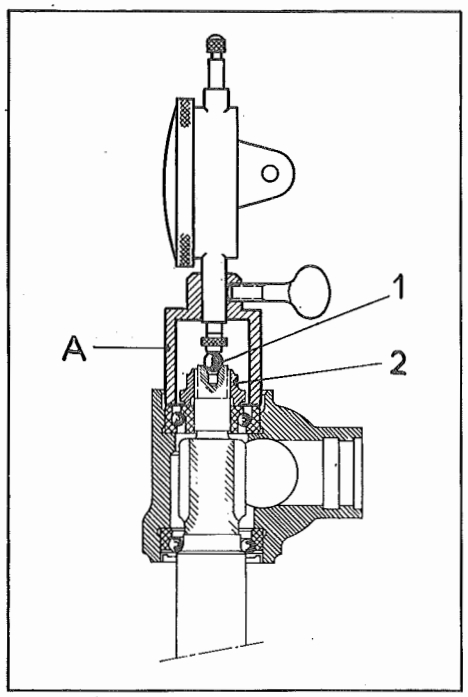
Fit the lever, inserting the nylon cup (2) and the rubber cup (1).

The cone of the ball joint must then be very carefully degreased.

Tighten the nut (3) to 29 ft.lbs (4 m.kg).







18. Fit the steering housing on bracket 1999-T.

Make sure that the inside of the housing is quite clean.

Fit the outer cage of the upper bearing and the lower bearing.

19. <u>Fit and adjust the steering pinion and rotating union assembly.</u>

a) Fit the steering pinion without the rear balls and without the rotating union.

Tighten the nut (2) to 36 ft. lbs (5 m. kg) inserting an adjusting washer (3) of 3 mm thickness.

Fit support (A) 1997-T with dial gauge 2437-T (fitted with a flat plunger) on the steering unit. Insert a 6 mm diameter ball (a ball from the upper bearing). The dial gauge should be positioned so that it reads about 6 mm.

With the dial gauge plunger resting on the ball (1) turn the zero mark on the dial in line with the large needle and note the position of the totaliser needle; for example 7 and 8.

b) Remove:-
- the dial gauge bracket (without removing the dial gauge),
- the nut (2) and the steering pinion.

c) Place the upper bearing on the steering pinion (see that the nylon cage is correctly positioned).

Insert the pinion in the steering unit.

Tighten the nut (2) to obtain free movement of the control pinion without any free play.

d) Place the bracket (A) 1997-T with the dial gauge on the steering unit.

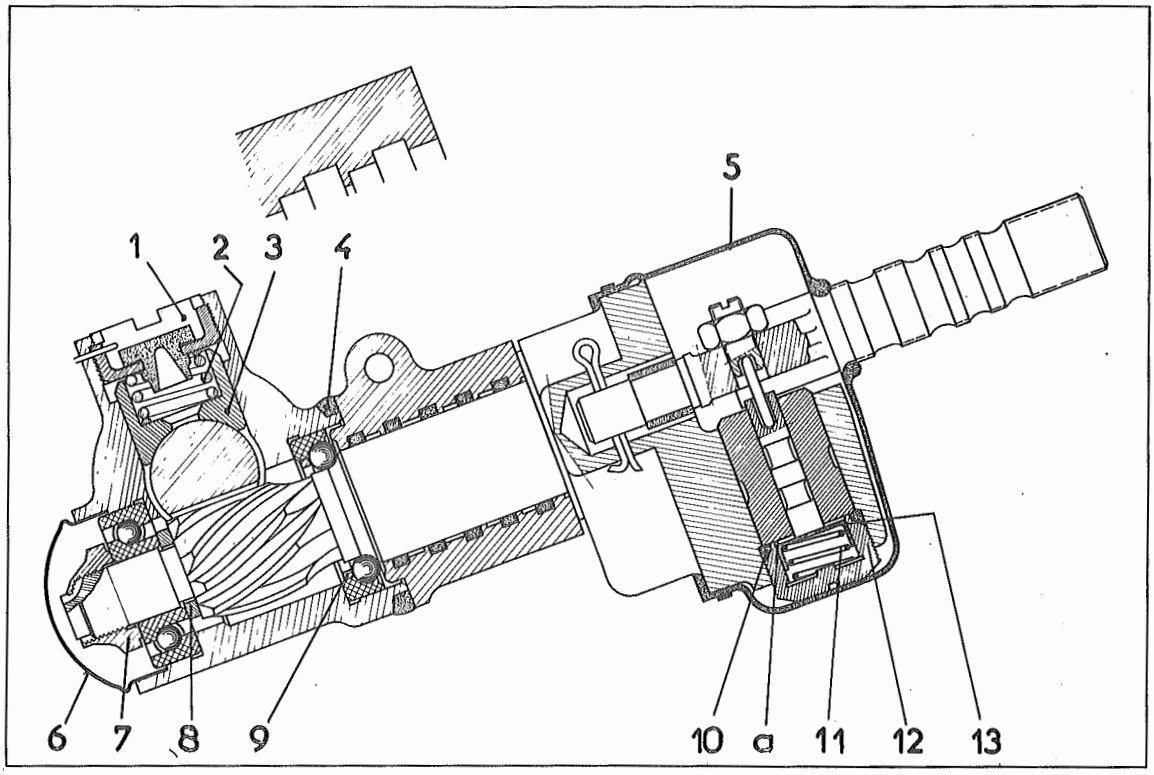
Bring the hands of the dial gauge to the position they occupied originally, then bring the dial gauge plunger into contact with the ball (1) counting the turns and fractions of a turn; for example 4. 28 mm.

e) Choose an adjusting washer from amongst those supplied by our Spare Parts Department correspondin g to the above thickness.

In the example chosen it would be necessary to use washer no. DS 442-346.

f) Remove:-

- the dial gauge bracket (A),
- the nut (2),
- the steering pinion and the bearing from the steering.



g) Fit the rotating union on the steering pinion (see paragraph 53, this operation).

Fit the rubber sealing joint (4) on the collar against which the rotating union seats.

Fit the upper bearing previously lubricated (special castor oil grease Type Antar R.C.).

See that the nylon cage (9) is correctly positioned.

Place the adjusting washer (8) on the pinion.

The recessed side is fitted towards the pinion.

Lubricate the pinion (special castor oil grease Type Antar R.C.) and insert it in the steering housing.

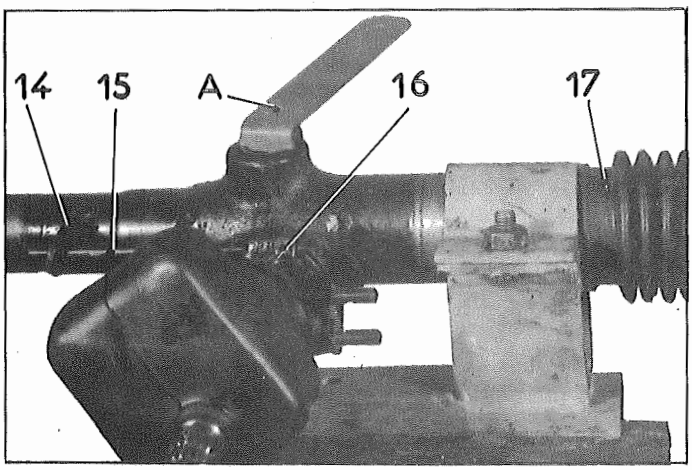
h) Fit and tighten the nut (7) to 36 ft.lbs (5 m.kg) using torque spanner 2471-T.

Make sure that the pinion functions freely, without play in the steering housing.

Turn over the metal of the nut (7) into the slot of the pinion, supporting the pinion meanwhile from the opposite side.

Fit the metal cap (6) filled with grease (special castor oil grease type Antar R.C.).

20. Fit the rotating union locating rod (15). Screw the rod in to the bottom of the thread and tighten the locknut (16). Take up any play between the rod (15) and the slotted clip (14) by twisting the clip slightly with the aid of pliers.



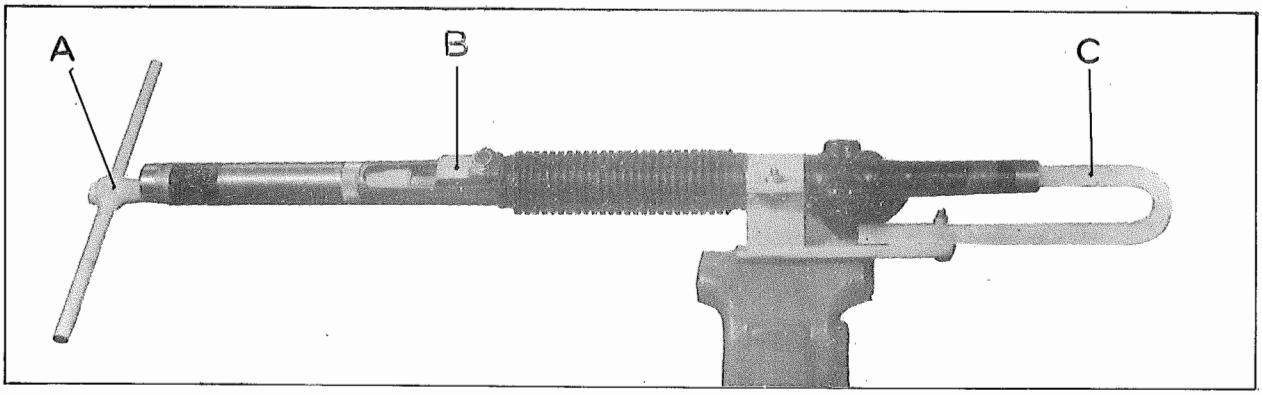
21. Fit the rack and engage it with the pinion.

Fit the rack pressure pad guide (3).

Fit the spring (2) tighten the nut (1) and then release it 1/6th of a turn using spanner (A) MR3691-70. The nut (1) will not be locked until after adjusting the crossover pressure.

22. Fit the left-hand sealing sleeve (17) (the smaller diameter-end first).

23. Fit the rack ball pin.



a) Position the steering on support 1999-T to bring the steering pinion underneath.

Engage the screwdriver portion (C) in the slot in the rack.

Adjust the position of the rack and steering unit to allow for fixing the screwdriver portion onto support 1999-T.

b) Put the ball pin through the opening in the housing, the taper previously degreased.

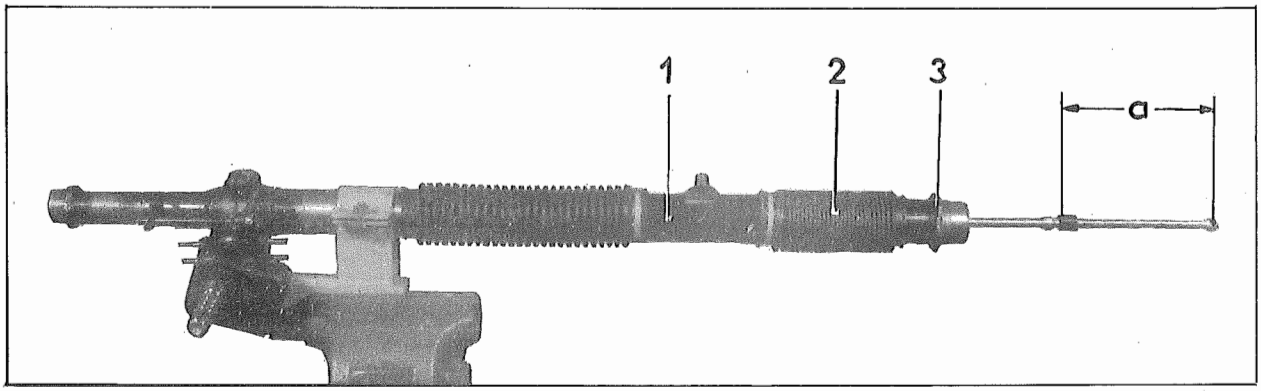
Secure the ball pin using extractor (B) 1966-T.

c) Secure the taper by striking on the eye of the ball pin with a piece of tube.

Fit the lockwasher. Screw in the rack control rod and tighten to 50 ft.lbs (7 m.kg) using spanner (A) 1982-T.

Turn over the lockwasher. Remove the screwdriver portion and extractor 1966-T.

Through the opening for the ball pin in the housing insert 80 g . of grease (special castor-oil-based grease Type Antar R.C.) towards the end containing the steering pinion.



24. Fit the right-hand dust cover (2) commencing at the end with the larger diameter.

Place the ball guide, previously greased, on the stem of the ball pin.

Fit the sliding dust shields (1).

Place the dust covers over the ends of the sliding dust shields. Fit the clips.

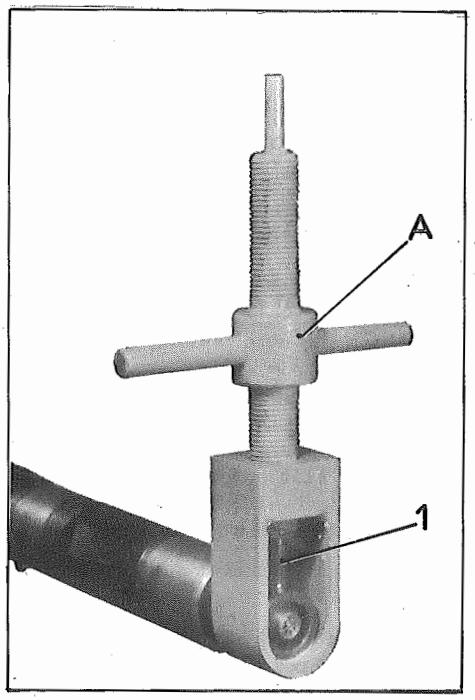
25. Fit the steering end-housing locknut (3).

Fit the anti-rattle bush on the rack control rod so that the distance "a" = 140 $\pm$ 5 mm from the pin.

Engage the cylinder - piston assembly, previously smeared with special hydraulic fluid, in the steering housing.

Screw the housing right home and then unscrew lightly (maximum one turn).

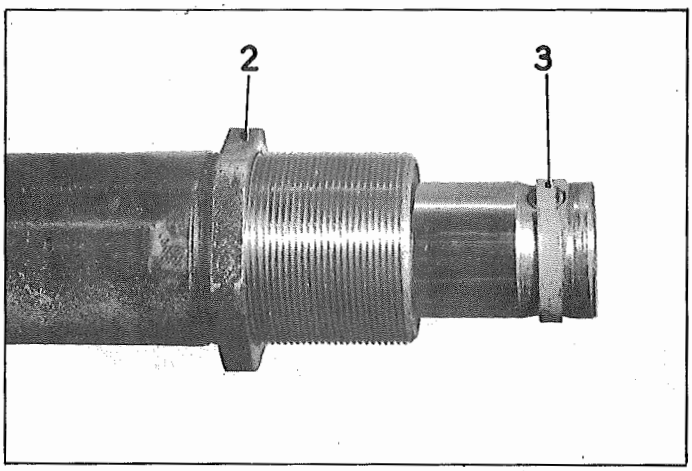
Tighten the locknut (3).



26. Bring the holes in the piston and those in the control rod in line by turning the piston with the aid of a tommy bar.

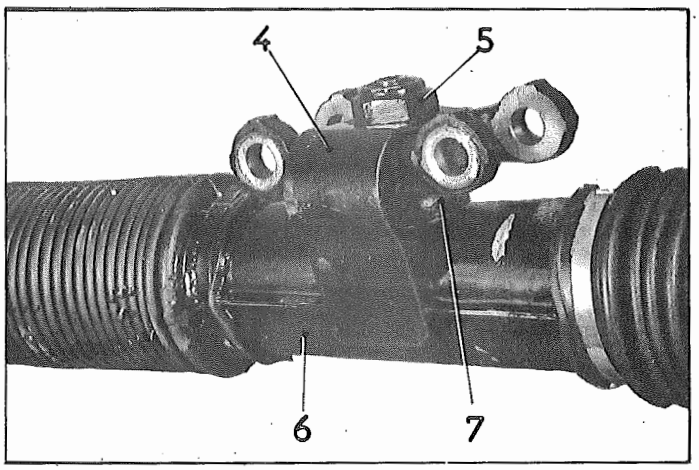
Fit the connecting pin (1) using extractor (A) 1969-T.

This pin must be renewed after each dismantling.



Fit the circlip (3).

27. Fit the locknut (2) and the right-hand lock cap.



28. <u>Fit the yoke and steering track-rods.</u>

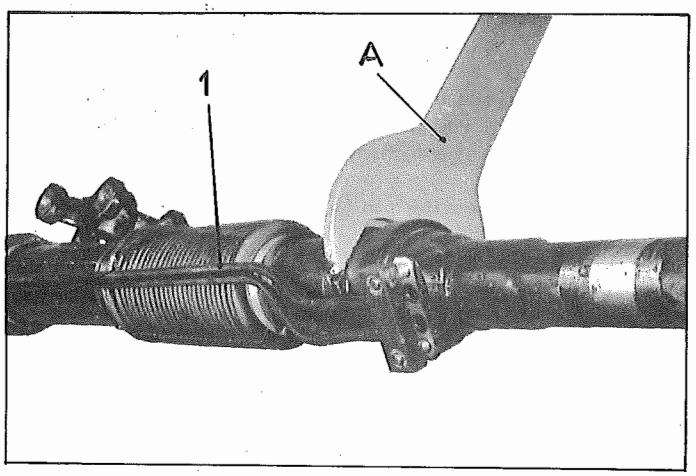
a) Fit the rubber sealing washer (7) and the yoke.

Fit the spring (4).

Tighten the nut (5) to 29 ft.lbs (4 m.kg).

During this operation see that the spring does not foul the flanged edges of the movable dust shields (6). Fit a piece of sheet steel between the springs and the dust shields to facilitate the spring movement and to ensure that the yoke remains parallel to the centre line of the steering.

After tightening the nut remove the piece of sheet steel from the spring.



b) Fit the steering track-rods on the yoke, (screw head uppermost). Tighten the nuts to 25 ft.lbs (3.5 m.kg).

29. Fitting the rack pipe assembly (1).

Connect the pipe assembly to the rotating union and to the steering end-housing, so that the flanges coincide perfectly with the seating face of the end-housing.

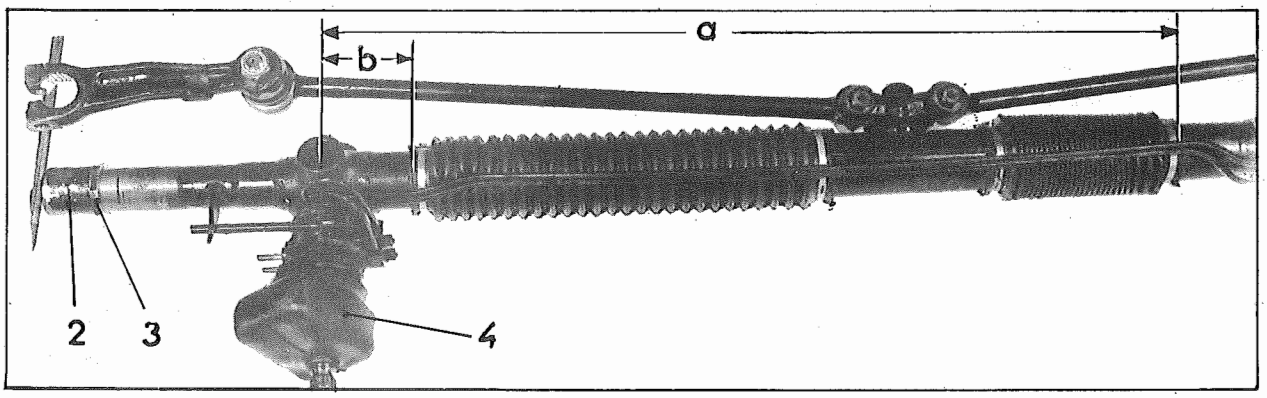
(Insert a seal plate with new ring seals).

Tighten the nuts (spring washers).

30. Tighten the locknut on the end-housing to 72 ft.lbs (10 m.kg) using spanner (A) 2186-T and plain spanner or adjustable spanner with the jaws clear of the joint face of the feedpipe assembly flange, to avoid making a burr on the joint face, which would result in a leak.

Fit the locknut (3) and the left-hand steering lock cap (2).

Fit the dust cap (4) protecting the steering pinion (do not fit the clip).



31. Remove the steering from the vice support.

Fit the left-hand dust cover at a distance "b" 56 ± 2.5 mm and the right-hand dust cover with dimension "c" 574 ± 2.5 mm. Tighten the clips.

32. Check the cylinder-piston assembly for leaks.

(See this operation).

33. Adjusting the crossover pressure.

(See Op. DX.440-0, paragraphs 21 and following).

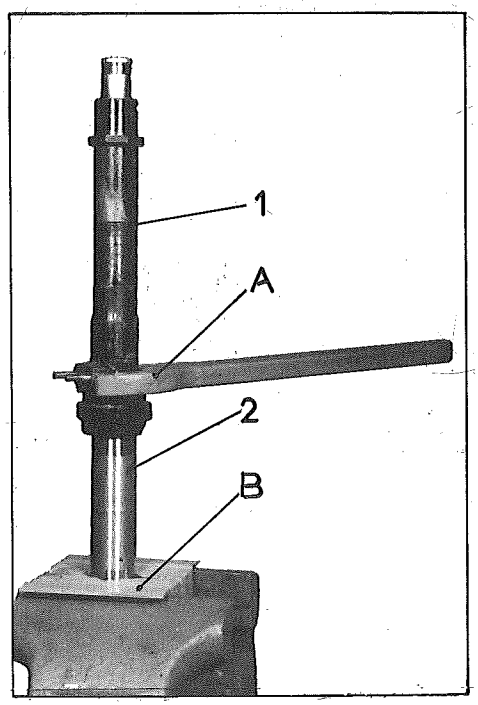
34. Protect the rotating union pipe flange face with masking or a seal plate.

35. Paint the assembly, except the threads, the pinion splines and the feedpipe joint face.

OVERHAULING A RACK CONTROL.

Dismantling.

36. Disengage the steering housing end-piece from the piston - cylinder assembly (see this operation, paragraphs 3 and 4).

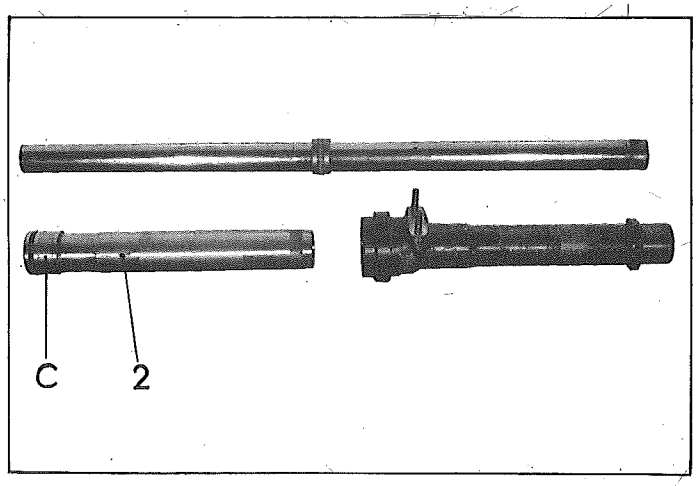


37. Strip the housing end-piece, cylinder and piston assembly.

a) Hold the rack control cylinder in a vice (using soft jaws (B) MR 3407-20).

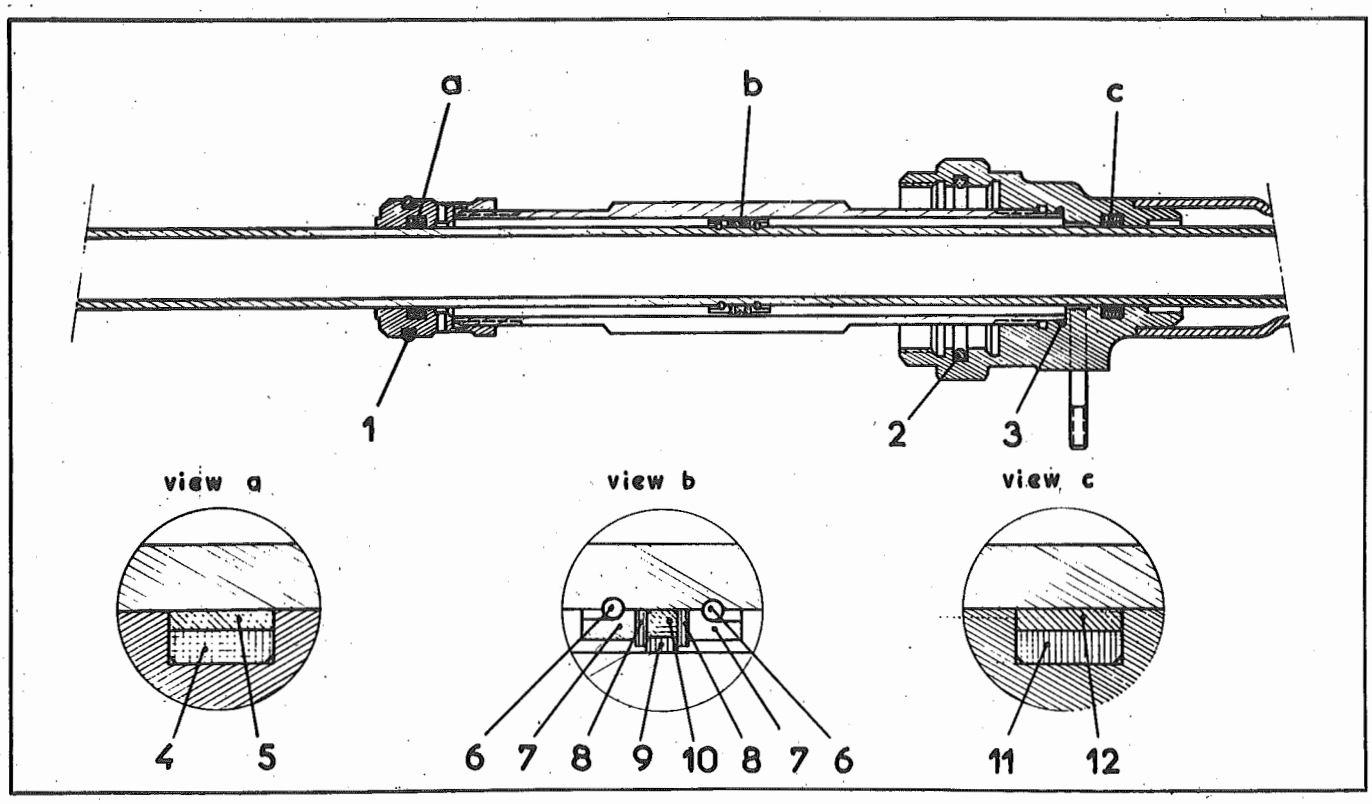
b) Loosen and disconnect the cylinder (2) from the steering housing end-piece (1) using a plain or adjustable spanner, making sure that the jaws are clear of the feedpipe flange joint face, to avoid burring this face which would cause a leak.

c) Free the piston from the cylinder, through the end which was screwed into the end housing.



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NOTE:- The inner end-piece (c) must not be disconnected from the cylinder (2).



38. Strip the housing end-piece.

Remove:-

- the ring seals (2) and (3),
- the teflon joint (12),
- the rubber joint (11).

39. Strip the cylinder.

Remove:-

- the ring seal (1),
- the teflon joint (5),
- the rubber joint (4).

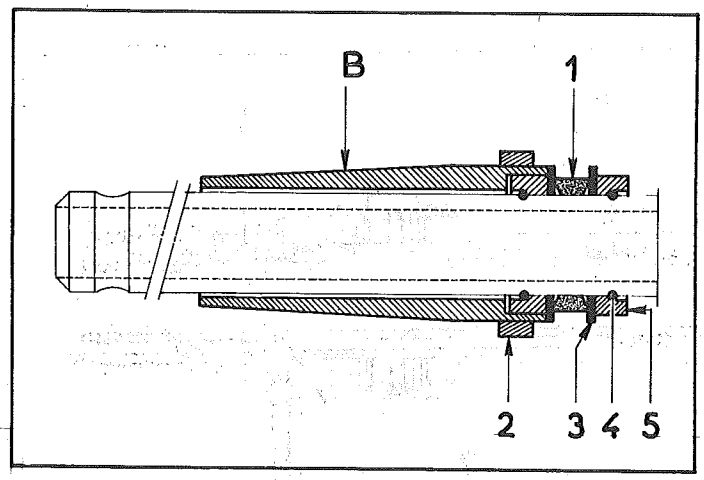
40. Strip the piston.

a) Remove:-

- the teflon joint (9),
- the rubber joint (10),
- the circlips (6),
- the washers (7) securing the piston joint,
- the piston washers (8) (rilsan).

b) Clean all parts in alcohol and blow off with compressed air.

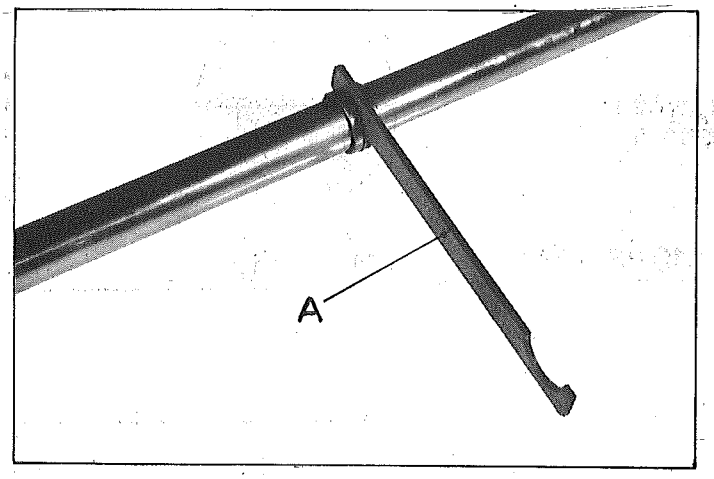
(Pay particular attention to the fluid ducts).



Assembly.

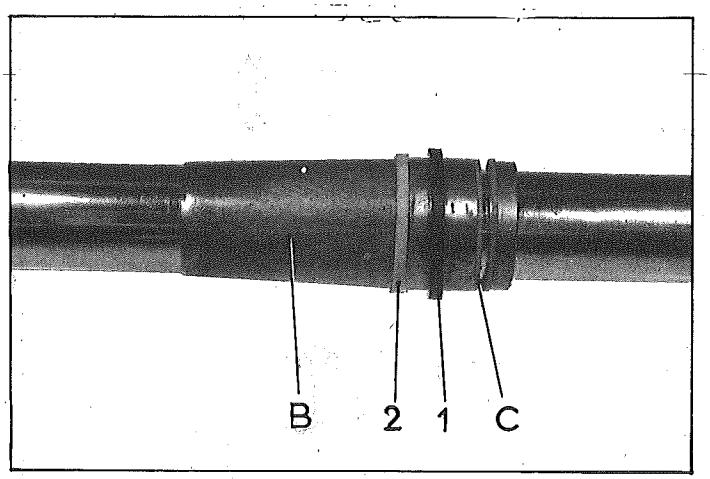
41. Prepare the piston.

a) On the piston fit a circlip (4) a retaining washer (5) a piston joint, 2 washers (3), (rilsan), a retaining washer (5) for the lock joint, the second circlip.



b) Measure the width of the joint recess using gauge (A) 1983-T (the smaller size must enter the groove, and the maximum size must not enter).

From amongst the retaining washers for the piston joints sold by our Spare Parts Department choose those which will give a width of $2.4\ ^{+0.15}_{0}$.

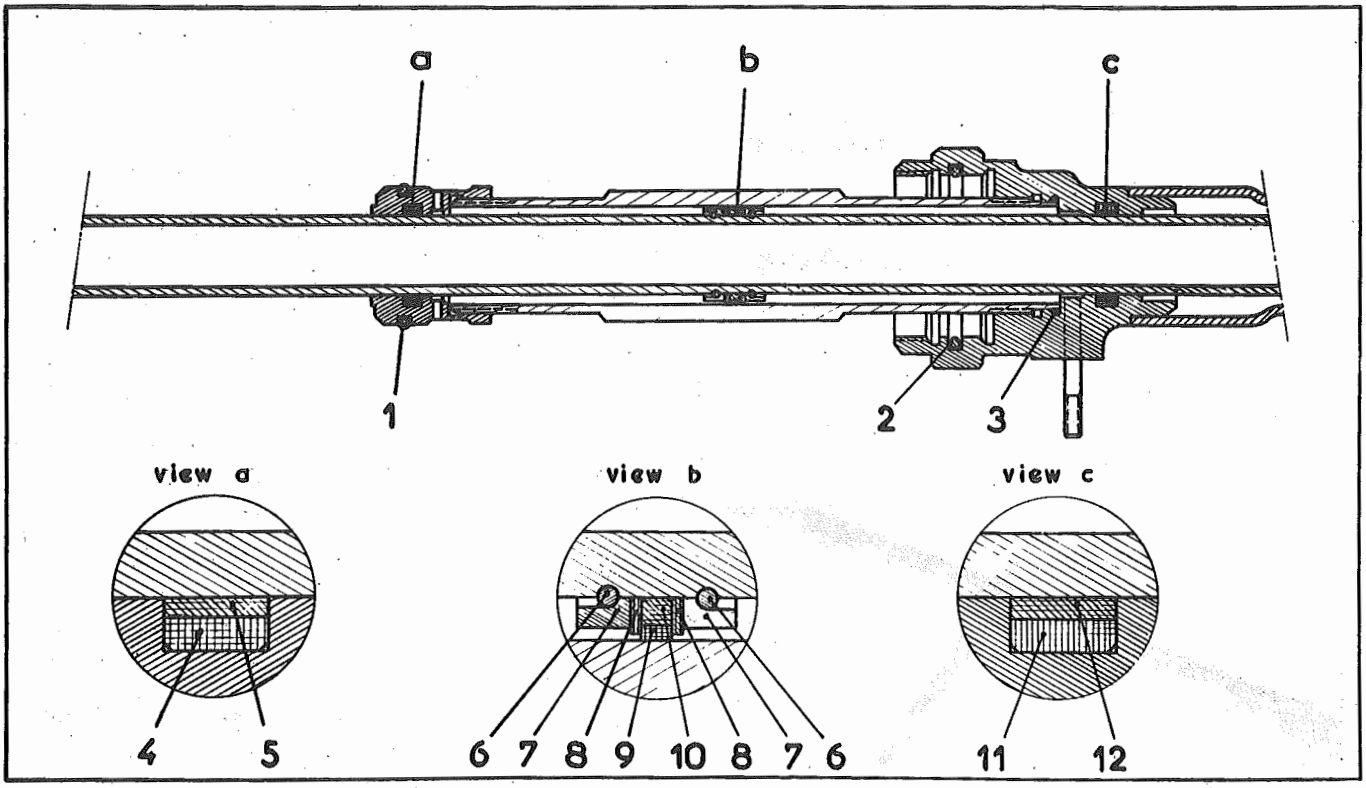


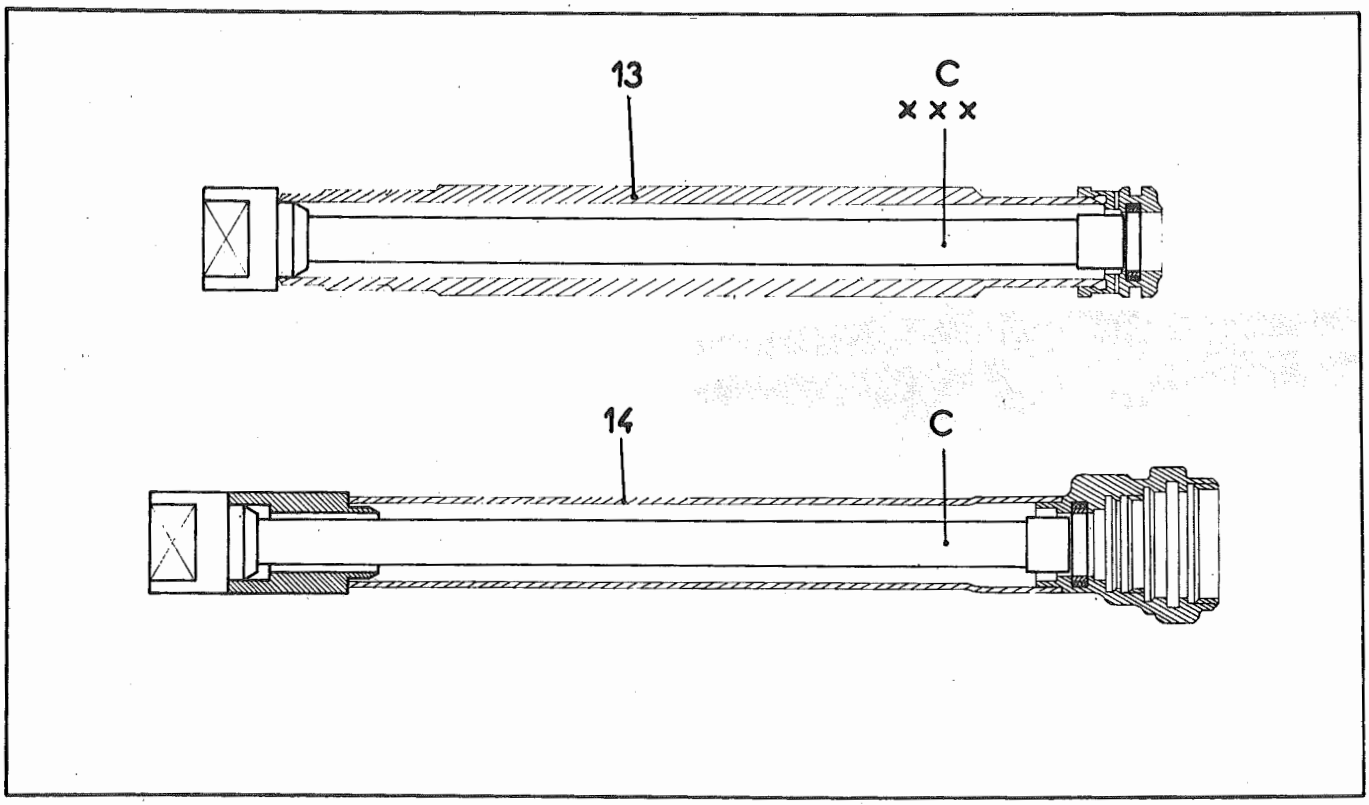
42. Fit the joints.

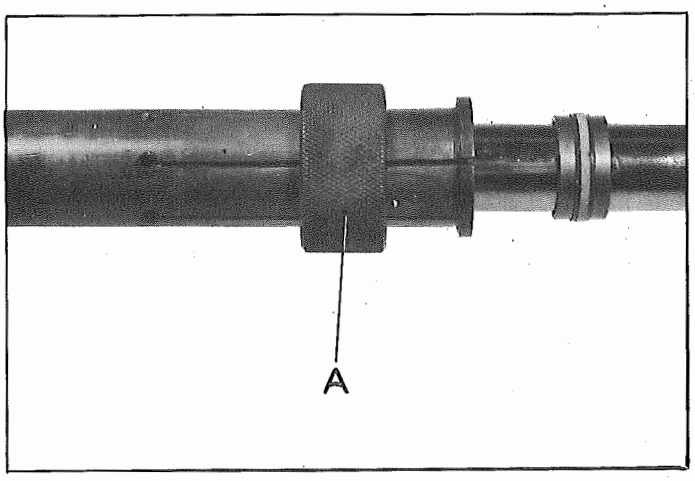
a) On the cone (B) 3975-T fit the rubber joint (1) and the teflon joint (2) smeared with castor oil or if not available with special hydraulic fluid.

b) Engage the cone (B) on the cylinder, and slide into the groove (c):

- the rubber joint (1) (the chamfers towards the bottom of the groove),
- the teflon joint (2) on the rubber joint.


a
b
c
1
2
3
view a
view b
view c
4
5
6
7
8
9
10
8
7
6
11
12


13
C
x x x
14
C



c) Squeeze in the teflon joints using mandrel 1985-T.

To do this place the mandrel over the joint and move the bush (A) along several times.

NOTE:- Do not slide the mandrel over the joint without having first withdrawn the bush from the split end.

43. Prepare the cylinder.

a) Place the cylinder (13) on a support (c) (support 1971-T).

b) Fit the rubber joint (4) in the groove (the chamfers towards the bottom of the groove), and then the teflon joint (5) inside the rubber joint, after having smeared them with castor oil or, if not available, with special hydraulic fluid.

c) Remove the support (c).

d) Complete the fitting of the joints using cone (B) 1970-T.

NOTE:- Never withdraw the cone backwards.

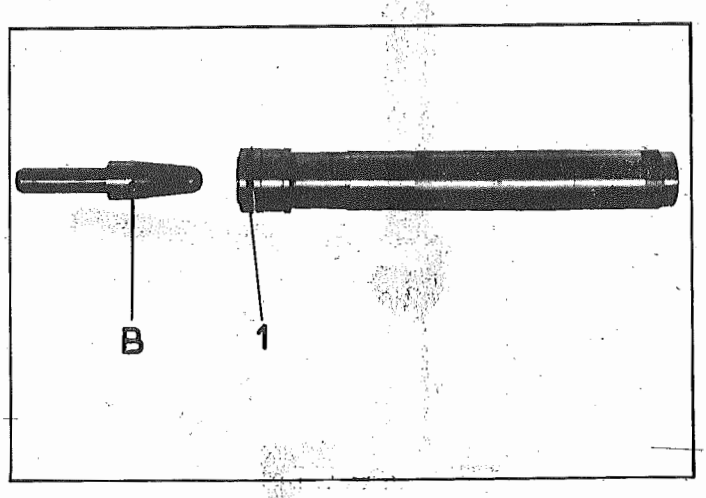
e) Place the ring seal (1) in the outer groove of the cylinder end-piece.

44. Prepare the steering housing end-piece.

a) Place the housing end-piece (14) on a support 1971-T.

b) Fit the rubber joint (11) in its groove (the chamfers towards the bottom of the groove and then the teflon joint (12) inside the rubber joint, after having smeared them with castor oil or, if not available, with special hydraulic circuit fluid.

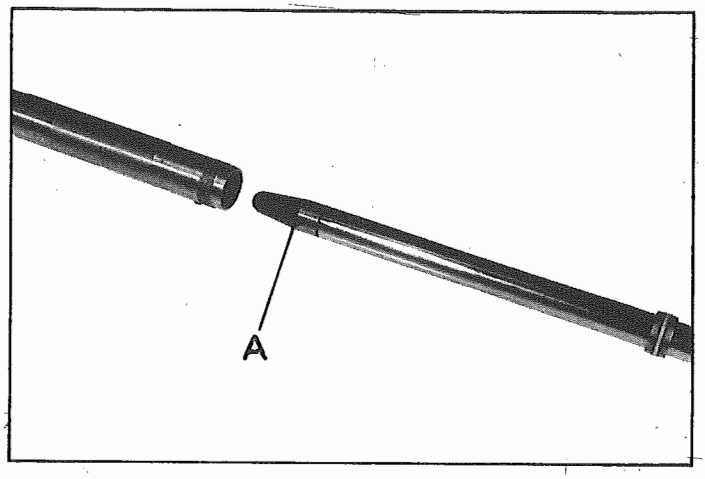
c) Remove the support (C).



d) Complete the fitting of the joints using cone (B) 1970-T.

NOTE:- Never withdraw the cone backwards.

e) Fit the ring seals (2) and (3) in their grooves.



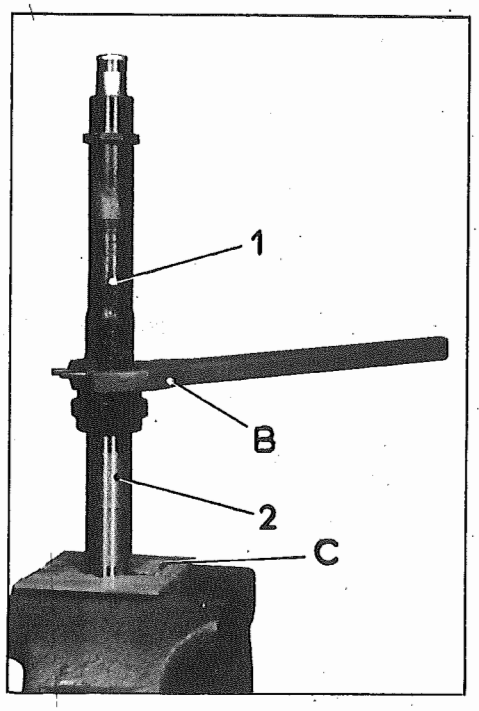
45. Fit the piston.

a) Smear the piston over its entire length with castor oil, or if unavailable with special hydraulic fluid.

b) Engage the piston in the cylinder using cone (A) 1970-T.

NOTE:- Position the piston so that the hole for the pin is at the end of the cylinder which screws into the rack-housing end-piece.

c) Engage the piston in the housing end-piece, using cone (A) 1970-T.



46. Fit the housing end-piece on the cylinder.

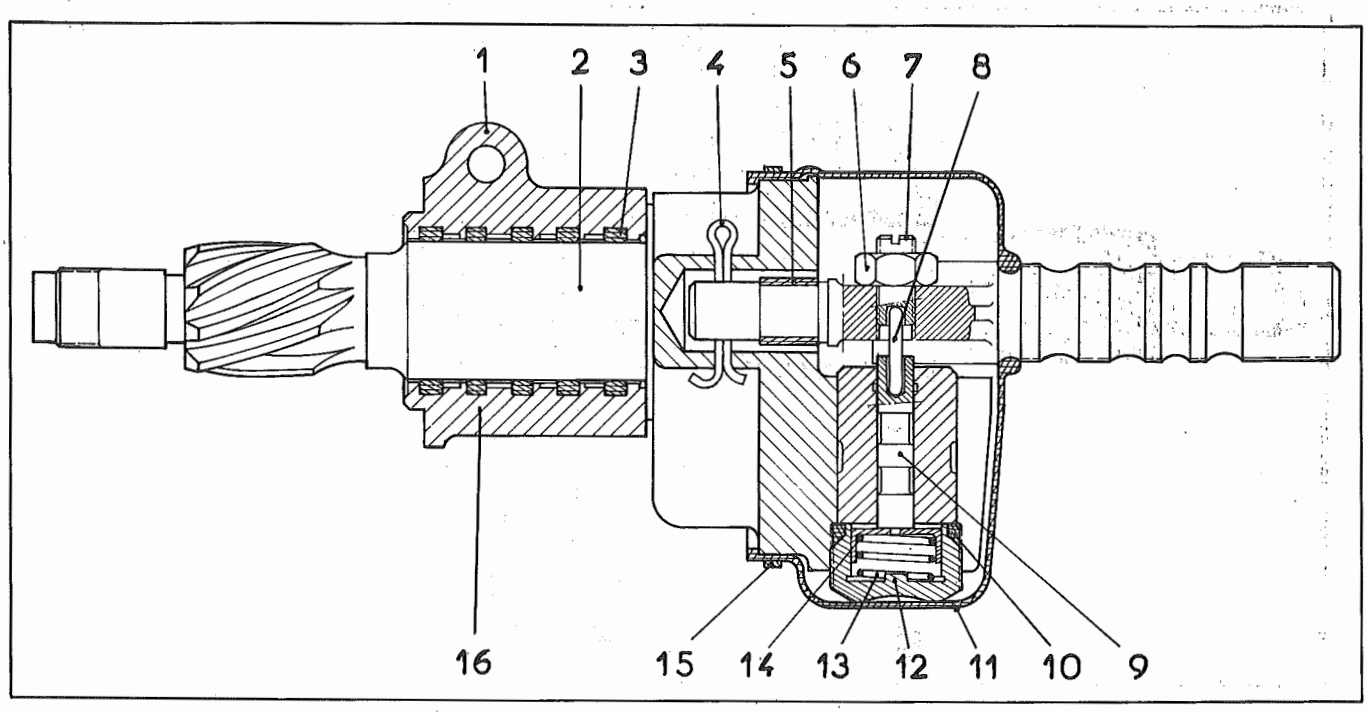
a) Hold the cylinder (2) in a vice (using vice jaws (C) MR 3407-20).

b) Tighten the housing end-piece (1) on the cylinder (2) to 21.5 ft.lbs (3 m.kg), using a plain or adjustable spanner (see precautions re use in paragraph 37 of this same operation).

47. Fit the assembly on the steering housing.

(See this operation, paragraph 25).

OVERHAULING A STEERING PINION AND ROTATING UNION ASSEMBLY



Dismantling.

NOTE:- To avoid scratching the bore of the rotating union (16) when disengaging the pinion (2) stick adhesive tape over the teeth of the pinion.

48. Remove the clip (15) and the dust cover (11).

Withdraw the pinion from the rotating union.

Extract the ring seals (3) from the rotating union using a small brass wire hook (do not scratch the ground bore of the union).

49. Strip the control pinion.

a) Loosen the locknuts (6) and remove the adjusting screws (7).

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Free the valve push-rods (8).

b) Remove the split pins (4) from the fork.

Free the fork and remove the flexible bushes (5) from the fork.

Remove the valves (9).

NOTE:- the valves are matched to their bores and must not be mixed. Use rack MR 3053-210.

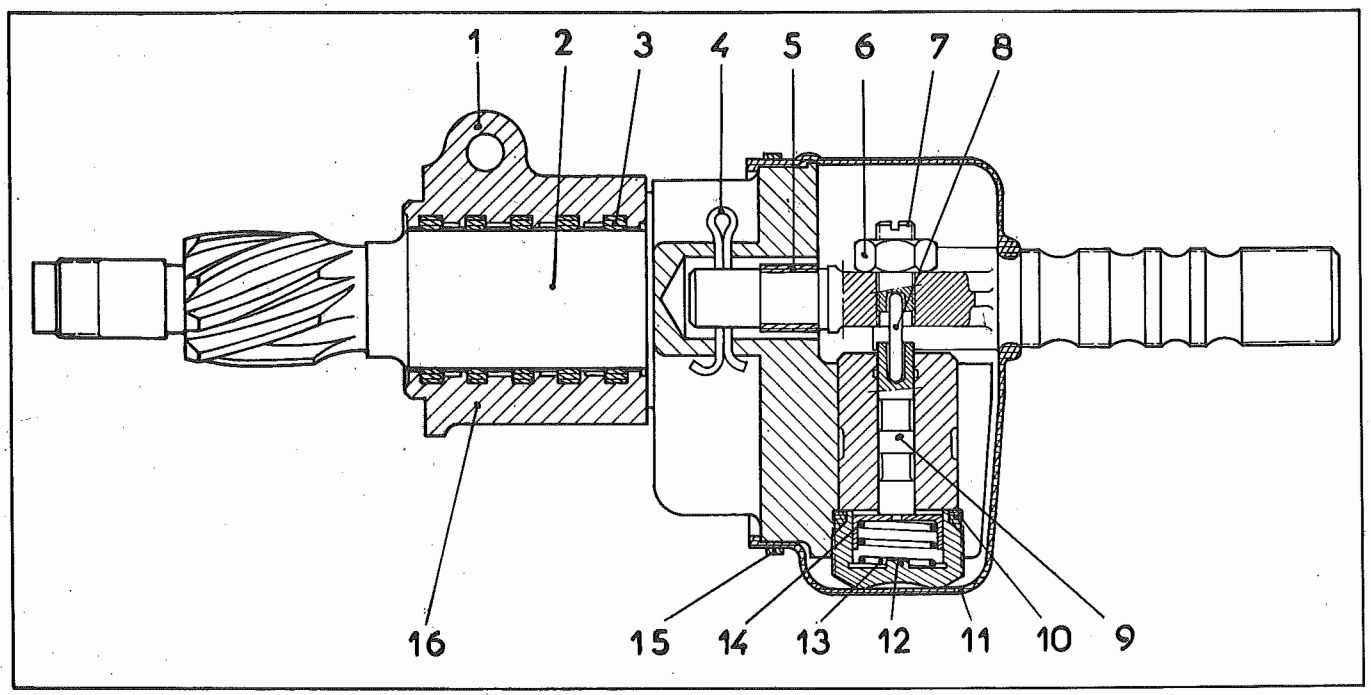
c) Remove the dashpot plugs (12).

NOTE:- Each cup (14) is paired with its plug (12) and must not be mixed.

d) Free the cup (14) and its spring (13).

50. Clean all parts in alcohol and blow off with compressed air.

51. Examine very carefully all parts. They must show no signs of rust, scratching, or abnormal wear.



Assembly.

52. Prepare the steering pinion.

a) Fit the plug assemblies (12) the cups (14) and springs (13) previously smeared with special hydraulic fluid. Insert new seals (10).

Tighten the dashpot plug (12) to 14.5 ft.lbs ± 1.5 (2 ± 0.2 m.kg).

b) Insert the valves (9) smeared with hydraulic liquid in their bores (in the same order as when dismantled).

c) Fit the flexible bushes (5) on the fork spigots.

Engage the fork on the pinion (the machined faces of the fork are those on which the locknuts (6) seat).

Fit the pins (4) and lock them by spreading their ends.

Fit the valve push-rods. Insert 0.5 g of grease in each end of the push-rod (RC ANTAR).

Fit the adjusting screws (7) and the locknuts (6).

53. Fit the rotating union.

a) Fit the ring seals (3) previously smeared with special hydraulic fluid, into the grooves of the rotating union.

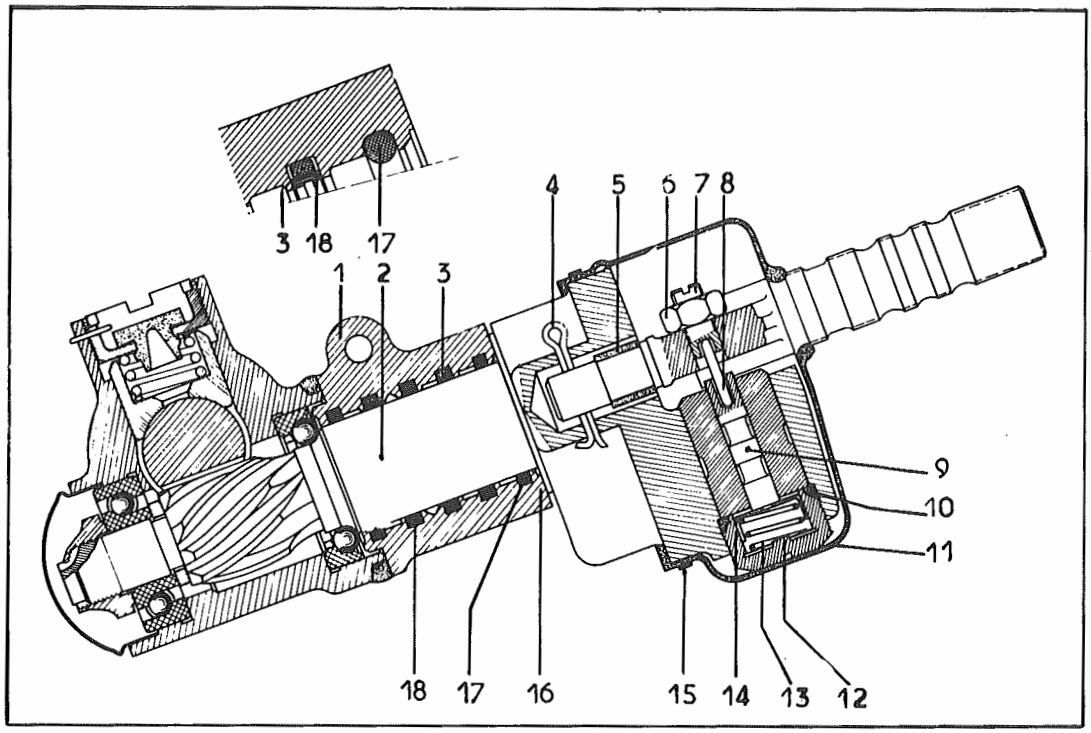
b) Wrap adhesive tape round the pinion teeth (2) to prevent scratching the bore of the rotating union.

Insert the pinion in the rotating union after having smeared it with hydraulic fluid (the boss for the locating rod towards the pinion).

Remove the adhesive tape.

c) Put the dust cover (11) in position without fitting the hoseclip which will not be tightened until after the adjustment of crossover pressures.

OVERHAULING A PINION AND ROTATING UNION ASSEMBLY
(with Teflon joints)



Assembly.

54. Prepare the steering pinion:

a) Fit the assembly of plugs (12) cups (14) and spring (13) previously smeared with special hydraulic fluid.
Insert a new seal (10).
Tighten the dash-pot plug (12) to between 14 $^{+1.5}_{-1.5}$ ft.lbs. (2 ± 0.2 m.kg).

b) Insert the valves (9) smeared with hydraulic fluid, in the sleeves (in the same order as found on dismantling).

c) Place the flexible bushes (5) on the fork spigots.
Engage the fork in the pinion (the ground face of the fork receives the locknuts (6).
Fit the split pins (4) and turn over the ends.
Fit the valve push-rods (8). Insert 0.5 g of Castor-grease at each end of each needle (RC ANTAR).
Fit the adjusting screws (7) and the locknuts (6).

55. Fit the rotating union.

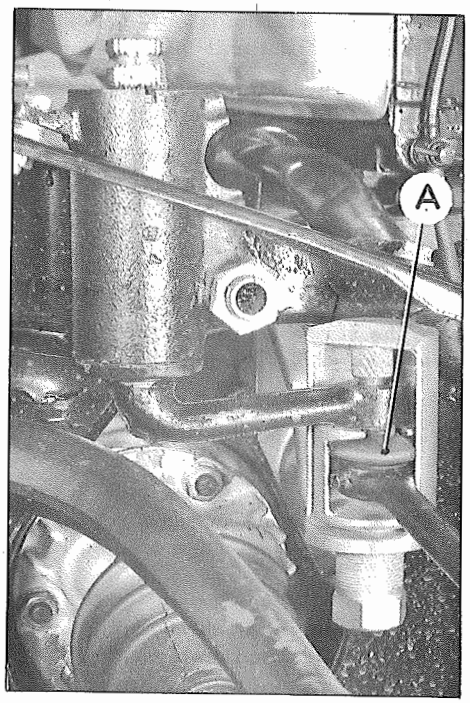
a) Place the rubber seals (3) and (17) previously smeared with special hydraulic fluid in the grooves of the rotating union.

b) Also fit the Teflon seals (18).

NOTE: The seals (3) (17) and (18) are fitted by hand.

c) Wrap adhesive tape around the pinion teeth to prevent scratching the faces of the rotating union and insert the steering pinion (coated with hydraulic fluid) in the union, with the boss (1) towards the pinion.

d) Fit the dust-cover (11) without fitting the hose-clip (15) which will be fitted after adjusting the cross-over pressures (on the vehicle).



REMOVAL.

1. Put the front of the car on stands (stand 2505-T).

2. Release the pressure.

3. Remove:-

   - the front wing - the battery and battery tray,

   - the securing screws for the battery cradle, and withdraw the cradle with the hydraulic reservoir as far as possible.

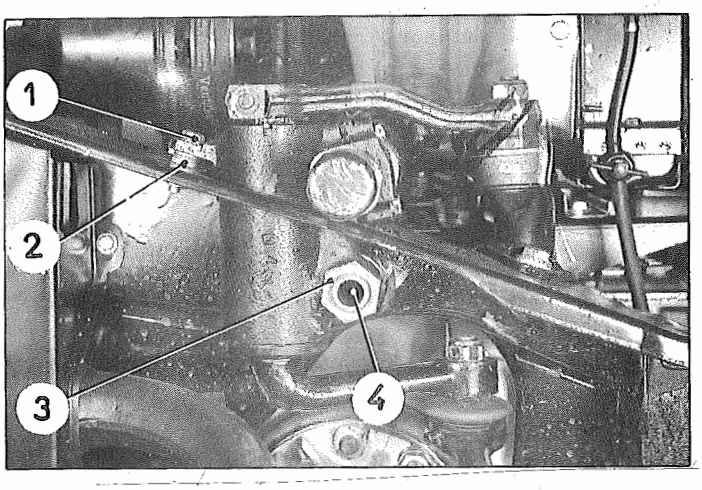
4. Disconnect:-

   - the lower relay lever from the outer steering track-rod (extractor 3505-T (A)).

   - the upper steering lever from the relay spindle.

5. Mark the position of the steering in the relay bearings.

Remove the bearing cups and lower the steering assembly and column assembly slowly.



6. Remove the screw (1). Do not lose the adjusting washers (2).

Remove the nut (3) holding the relay spindle (4).

Free the spindle towards the inner right-hand side.

It may be necessary to free the parking brake caliper.

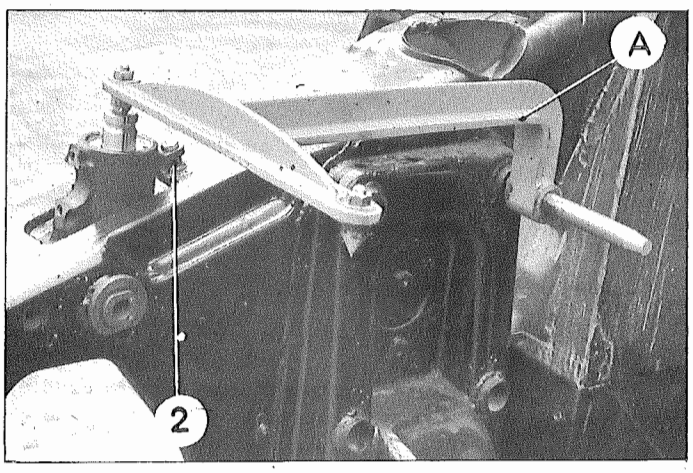
Remove the relay.

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ASSEMBLY.

7. Offer up the relay. Fit the spindle (4) with its thrust washer then the nut (3) without tightening it.

NOTE:- Check the position of the thrust washer : the concave part towards the head of the spindle and the flat downwards.



8. Adjust the angular position of the relay.

NOTE:- This operation is only necessary when the caisson or front unit have been renewed.

- This adjustment must be carried out before fitting the front half-axles, and engine.

Determine the thickness of the washers (2) (the tolerance for the position of the relay being 0 ± 30').

Use fixture 1995-T (A).

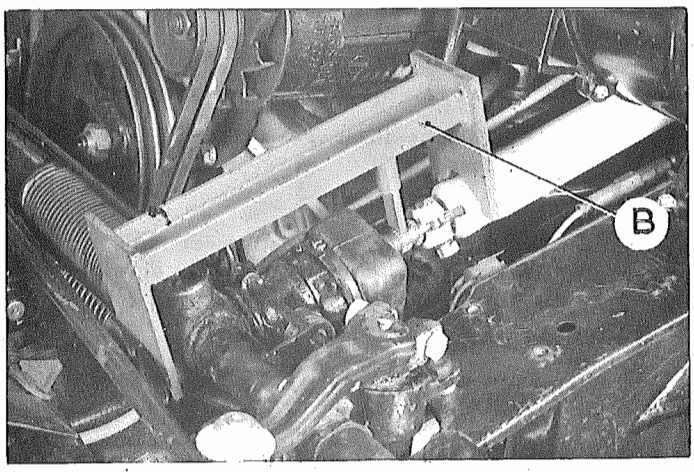
Fit washers as required.

Tighten the screw (1) (plain and shakeproof washers).

Tighten the nut (3) of the spindle (4) to 86 ft.lbs (12 m.kg).

Check the adjustment.

If only the relay itself is renewed, fit the adjusting washers (2) found when dismantling the old relay.



9. Fit the steering in the bearing according to the marks made when dismantling.

Fit the screws (5) securing the bearing caps.

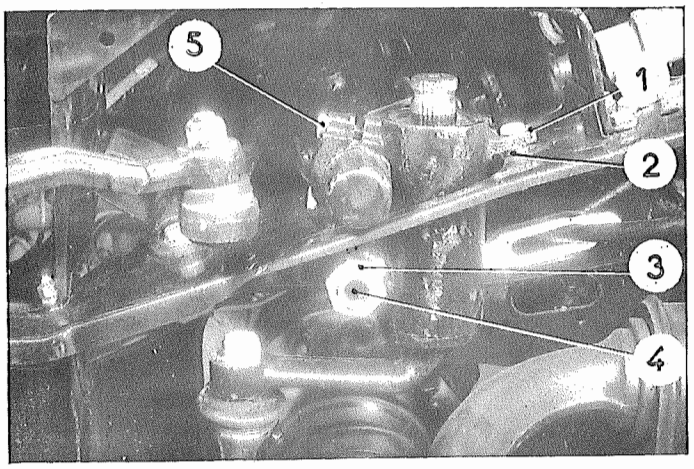
Adjust the angular position of the steering (fixture 1955-T (B)).

Tighten the screws of the bearing caps.

10. Connect up:

- the steering lever to the top of the relay spindle (nut towards engine). Tighten the nut to 50 ft.lbs (7 m.. kg).

- the outer steering track-rod to the lower relay lever, tightening the nut to 50 ft.lbs (7 m.kg).



11. Fit:

- the battery cradle,
- the battery tray and the battery,
- the front wings.

12. Lower the car to the ground.

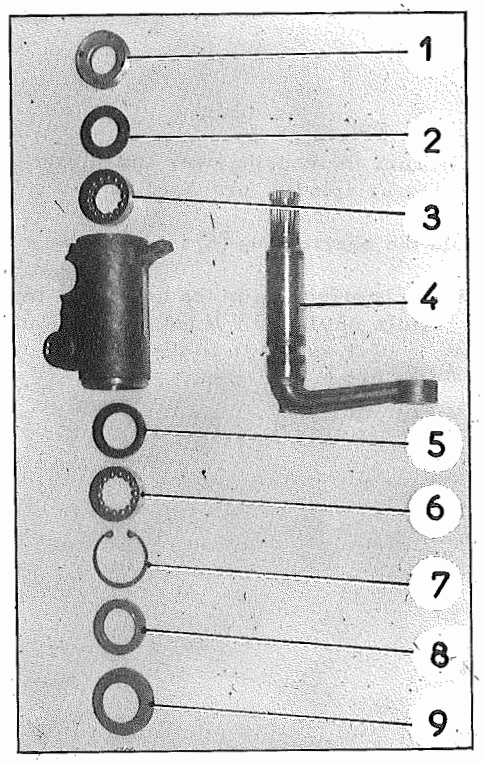
518/W

13. Put the circuits under pressure.

14. Adjust the alignment (see Op. DX.440-0).

15. Adjust the lock (see Op. DX.440-0).

16. Adjust the centraliser cam (see Op. DX.440-0).



DISMANTLING.

1. Force out the metal locking the upper nut (1) and remove the nut (spanner 3506-T).

Remove:-

- the metal cup (9),
- the sealing joint (8).

2. Remove the circlip (7).

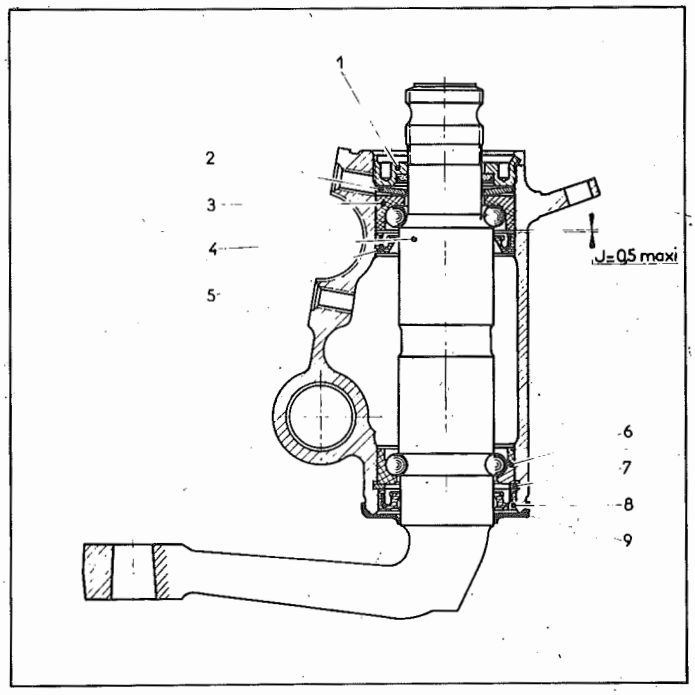
Tap out the relay spindle (4). (Do not lose the balls).

3. Remove: the lower bearing cup (6), the joint (8) and the metal cup (9) from the relay spindle.

4. From the bearing housing free the following:

- the flexible washer (2),
- the upper bearing cup (3),
- the sealing joint (5).

Clean all the parts.



ASSEMBLY.

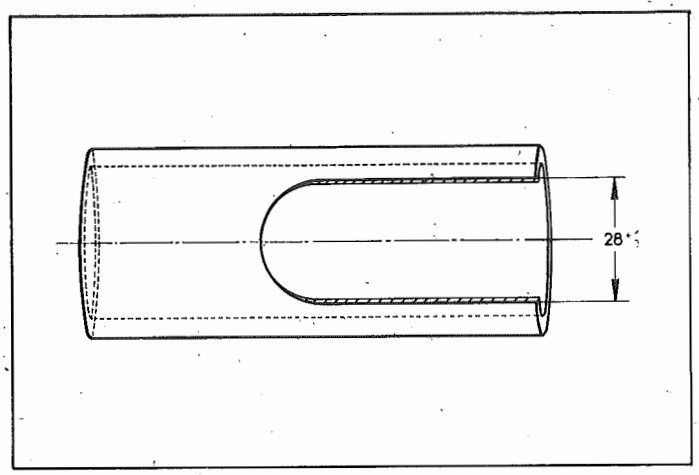
5. In the relay housing fit the following:

- the sealing joint (5) with the lip on the joint towards the upper bearing (do not force the joint too far into the housing),
- the upper bearing cup (3) with its 14 balls held in place with grease (10 g of propshaft grease),
- the flexible washer (2) positioned as shown in the illustration,
- the nut (1), without tightening it. Screw it in just below the upper face of the housing.

6. Over the relay spindle fit the following:

- the metal cup (9),
- the sealing joint (8) with the lip of the joint towards the bearing,
- the lower bearing cup (6).

Place the 14 balls in the groove of the spindle and in the cup (10 g of propshaft grease).

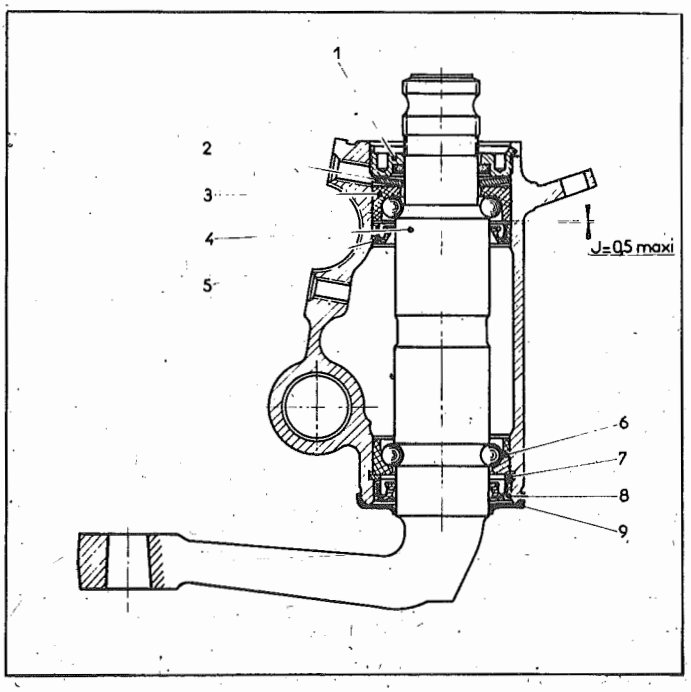


7. Turn the housing over and engage the relay lever spindle, prepared as above, vertically.

Hold the bearing cup (6) in position.

Fit the bearing cup in the housing using a tube (tube 3507-T) or if not available modify a tube 1990-T as shown in the illustration, removing the notched portion.

Fit the circlip (7).



8. Fit the sealing joint (8) and the metal cup (9).

Tighten the upper nut (1) to 43 ft.lbs (6 m.kg) turning the relay spindle meanwhile to correctly locate the assembly.

Loosen the nut and then tighten it until it is in contact with the flexible washer, tightening again one third of a turn corresponding to a torque of 14.5 ft.lbs (2 m.kg).

NOTE:- The nut (1) and the flexible washer (2) must be renewed after each dismantling.

Tightening torque for screws securing hydraulic brake units on crossmember ..... 29 - 31 ft.lbs (3.9 - 4.3 m.kg)

Tightening torque for screws securing hydraulic brake units on gearbox drive outlets ..... 94 - 100 ft.lbs (13 - 14 m.kg)

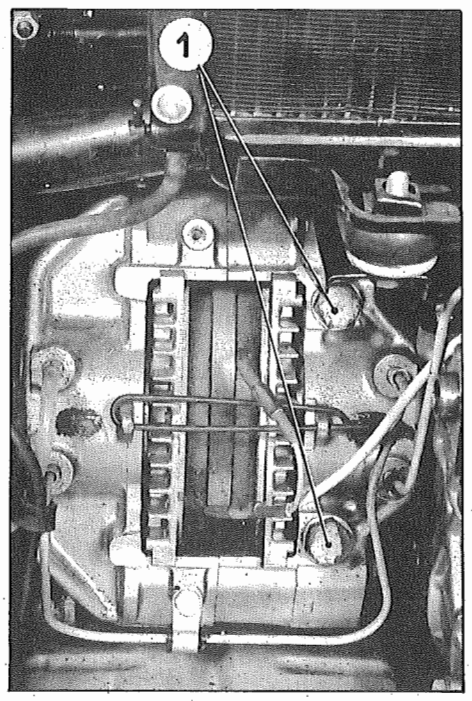
Tightening torque for screws securing parking brake calipers on gearcase ..... 72 - 80 ft.lbs (10 - 11 m.kg)

Adjustment of the parking-brake shoes: clearance of 0.1 mm at the point of maximum run-out on the disc (see Op. DX.451-0, paragraph 14):

Maximum run-out on disc	= 0.15 mm
Maximum ovality on rear drum	= 0.04 mm
Maximum diameter of drum after machining	= 257 mm
Setting of pressure switch	= 60 - 70 kg/cm^2
Clearance for brake stop light switch	= 0.4 to 0.6 mm
Free movement of pedal	= 2 mm maximum

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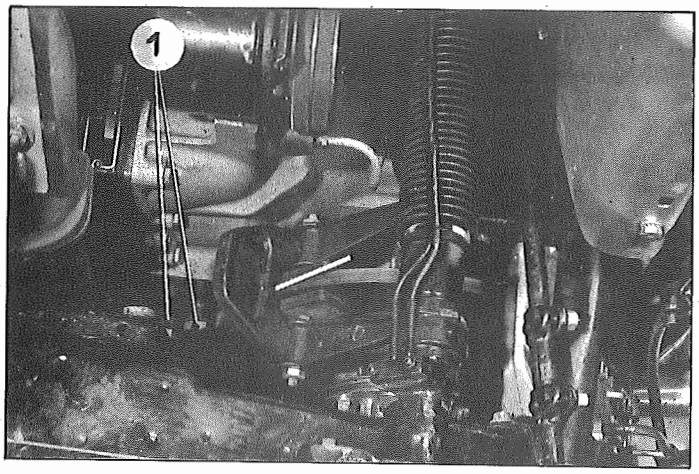
Corrective No.1



ADJUSTMENT OF HYDRAULIC BRAKES.

Adjust the hydraulic brake unit.

1. Remove:
   - the spare wheel,
   - the headlamp control cross-bar,
   - the spare wheel crossmember,
   - the radiator air intake duct.
2. Loosen the screws (1).
3. If the brake pads are to be replaced, fit new ones (see Op. DX.451-1).
4. Have the hydraulic brake control pedal depressed by an assistant.
5. Tighten the screws (1) to between 94 and 100 ft lbs (13 - 14 m.kg) (i.e. 127-5 to 137-3 mΛN).
6. Release the brake pedal.
7. Refit:
   - the radiator air intake duct,
   - the spare wheel crossmember,
   - the headlamp control cross-bar (see Op. DX. 540-0).
   - the spare wheel.



ADJUSTMENT OF THE MECHANICAL BRAKE CONTROL.

Adjust the clearance between the brake unit fork and the disc.

8. Remove the left-hand front wing and the metal mudshield for the suspension mechanism.

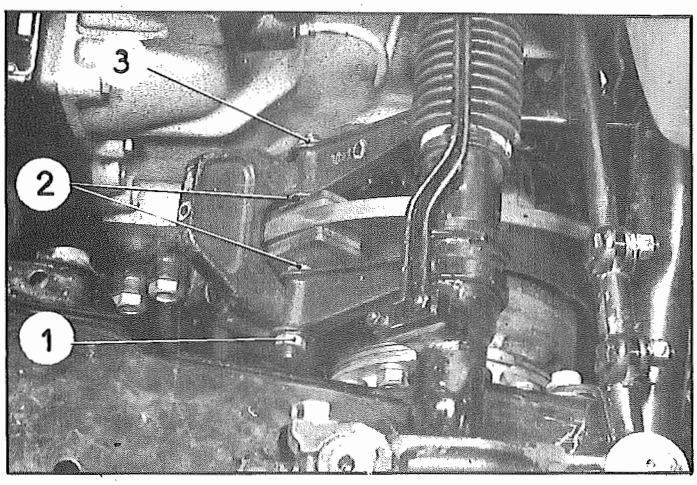
9. Loosen the screws (1) and place a spacer 4 mm thick between the brake unit and the disc.

10. Tighten the screws (1) to between 72 and 79 ft lbs (10 - 11 m.kg) (i.e. 98 - 107.8 mAN).

NOTE:- To gain access to the screws (1) on the left-hand side, it is necessary to remove the metal mudshield under the engine and work from the underside of the vehicle.

11. Fit the front left-hand wing and the metal mudshield for the suspension mechanism.

Adjust the clearance between brake pad and disc.



12. Raise the front of the vehicle.

13. With the brake released, raise the pedal to the maximum and hold it in this position with a wedge (a piece of wood about 210 mm high).

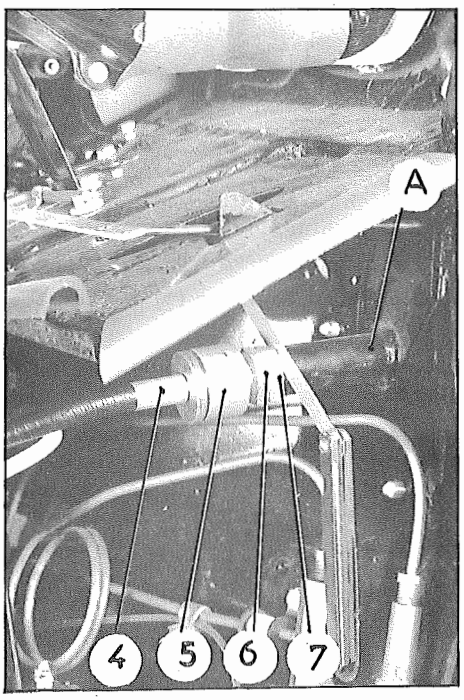
14. Place between the brake pads and the disc, on each side, a shim 0.1 mm thick, having a surface equivalent to that of the pad to prevent them rocking.

    Loosen the nuts (1) and (3) (16 mm 12 sided ring spanner reduced to 3 mm thickness). Adjust the screws (2) (thin 14 mm open ended spanner), so that the pads just contact the highest spots on the disc (turn the wheel).

    Tighten the nuts (1) and (3) (16 mm thin ring spanner).

15. Carry out the same adjustment on the other brake unit.

16. Lower the vehicle to the ground.



Adjust the tension of the cable sheath.

17. Remove the front left-hand wing and the metal mud shield for the suspension mechanism.

18. Raise the pedal the maximum amount and hold it in this position with a wedge (a piece of wood about 210 mm high).

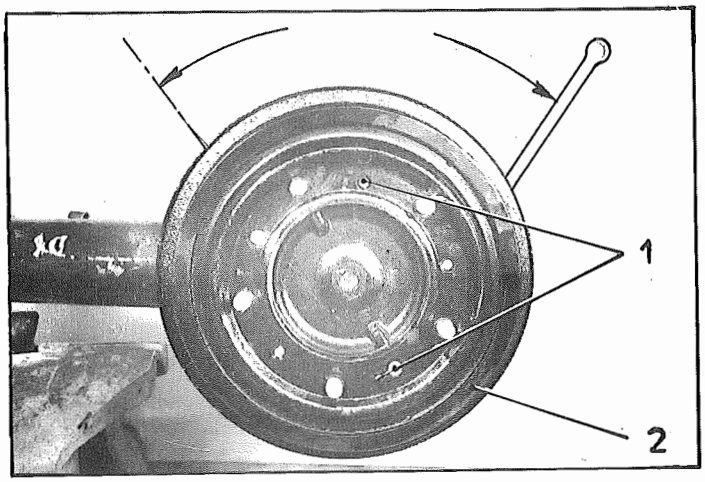
19. Loosen the locknut (6) and the nut (7).
Bring the screwed sleeve (5) into contact with the cable sheath, and tighten the nut (7) until it is at a distance of 0.3 mm to 0.5 mm from the end of the tube (A).
Tighten the locknut (6).

20. Remove the wedge placed under the pedal and check that the wheels turn freely.

21. Lower the vehicle to the ground.

22. Fit the metal mud shield for the suspension mechanism and fit the front left-hand wing.

ADJUSTMENT OF THE REAR BRAKES.



Centring the brake shoes.

REMOVAL.

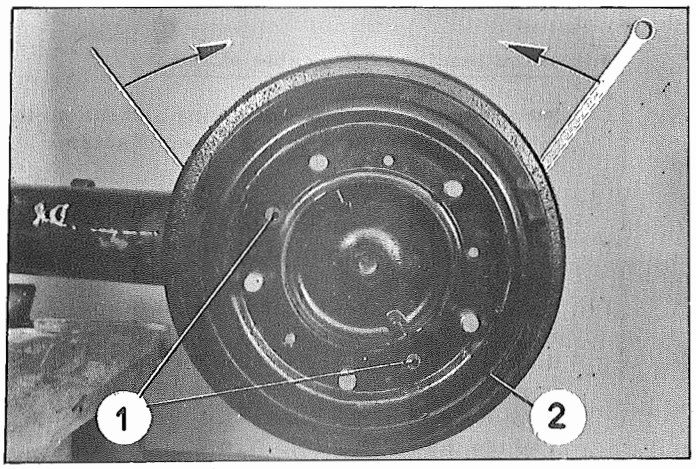
23. Raise the rear of the vehicle on stands (stand 2505-T).
Remove the wing and the wheel on the side to be adjusted.

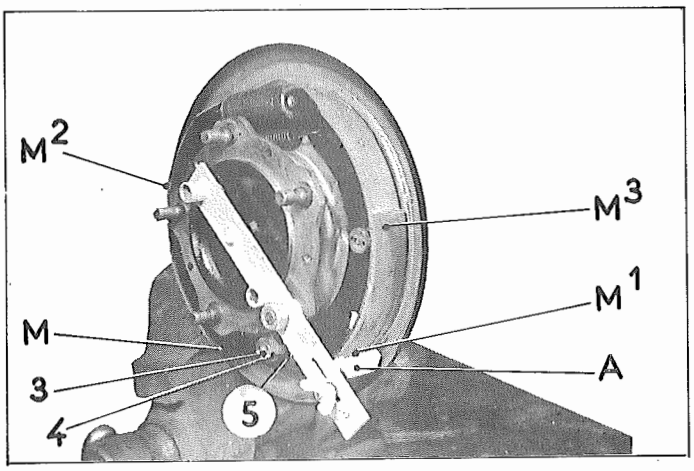
24. Bring the shoes into contact with the drum by turning the adjusting cams in the direction shown by the arrows.
It must still be possible to turn the drum by hand.

25. Remove the two screws (1) and remove the drum (2).

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FITTING.

26. Fit the gauge 3565-T (see photograph).

    Turn the apparatus and find the highest point on the linings by means of the arm A.
    Fix it with a wing nut.

27. Loosen the locknuts (3) on the eccentric brushes (4).

    Position the eccentric so that the smaller "throw" is downwards.

28. Adjust the shoes by means of the cams and eccentrics (4) so as to obtain a clearance between the straight edge (A) and the shoes:

    - of 0.15 mm at points M and M1,
    - of 0.25 mm at points M2 and M3.

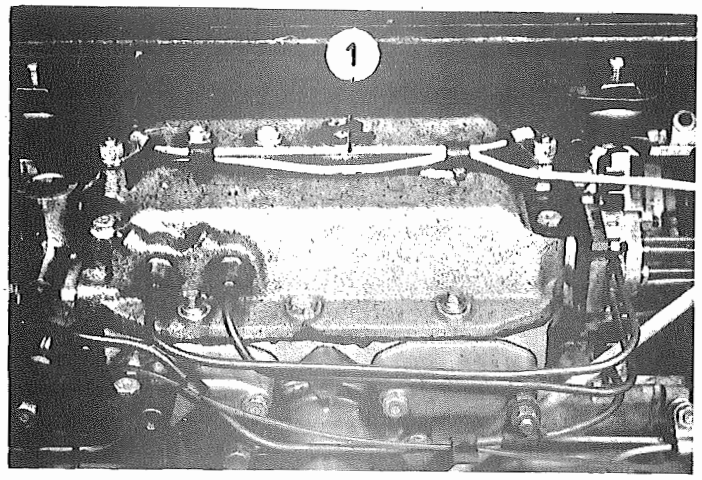
    Measure this clearance with feelers.

29. Tighten the nut (3) and knock over the lock washer (5).

    Fit the drum (2) and tighten the screws (1).

30. Fit the spare wheel.

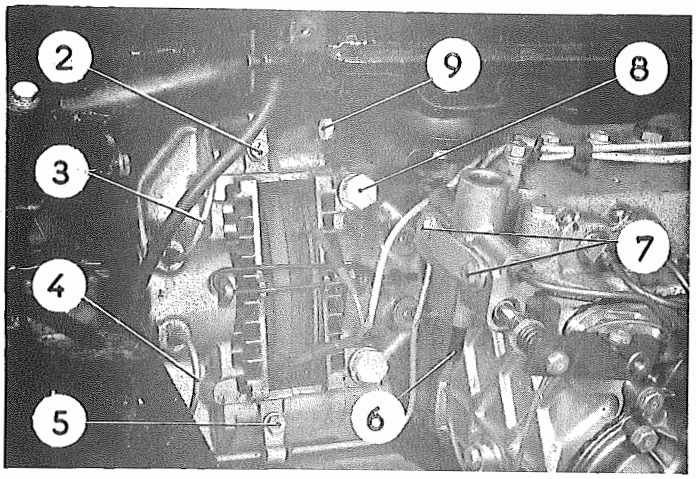
31. Lower the vehicle to the ground.



REPLACEMENT OF THE HYDRAULIC BRAKE UNITS.

REMOVAL.

1. Release the pressure (see Op. DX.00).
Remove from the brake units:- the brake pads (see this operation, paragraphs 10 and 14), and the tube (1) connecting the brake units.
Support the engine-gearbox assembly by the sling hook, using a workshop crane.
If the wings have been removed, it is possible to use support 1797-T as previously used for the DS19.

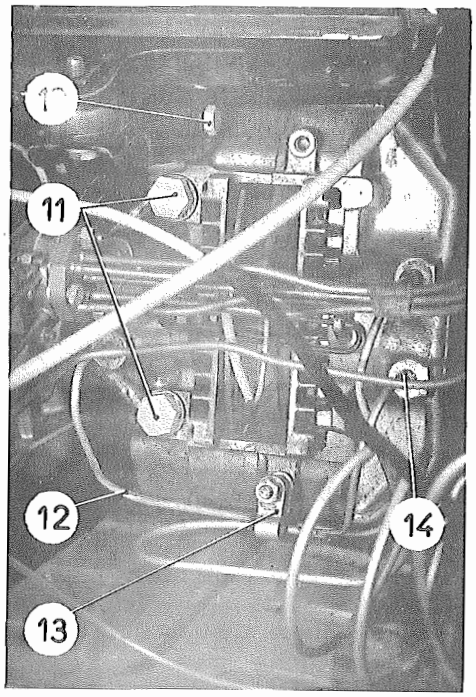


2. Remove the right-hand brake unit.

Disconnect the union (3) and the clip (2) from the feedpipe of the clutch re-engagement control.
Remove the connecting pipe (4) and the clip (5).
Disconnect the overflow return pipe (6) from the clutch lock.
Remove the screws (7) securing the clutch lock,
the 2 screws (8) securing the brake-unit on the gearbox,
the 2 screws (9) securing the brake unit on the crossmember.

NOTE : Use a ratchet spanner with a 150 mm (6") extension, with a universal joint. Pass it between the steering and the track rod.

Remove the brake unit, withdrawing it downwards and forwards, at the same time raising the clutch lock and bringing it forward, without forcing it.

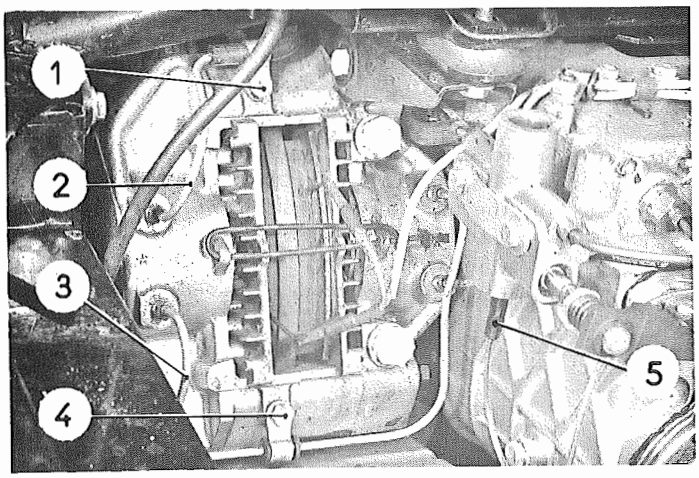


3. Remove the left-hand brake unit.

Disconnect the feed union (14) and the clip (13).
Remove the connecting pipe (12) and the clip (13).
Remove:- the two screws (11) securing the brake unit on the gearbox,
- the two screws (10) securing the brake unit on the front crossmember.

NOTE : Use a ratchet spanner with an extension, with a universal joint. Pass the spanner along parallel to the driveshaft through the wheel arch.

Remove the brake unit withdrawing it downwards and forwards passing under the pipe assembly (5 pipes) of the gearbox control.



Assembly.

4. Fit the right-hand brake unit.

Place the brake unit in position. Tighten the two securing screws on the crossmember to between 28 and 31 ft/lbs. (3.9 - 4.3 m.kg) (use a ratchet spanner with 150 mm (6") extension, jointed, for the rear screw).

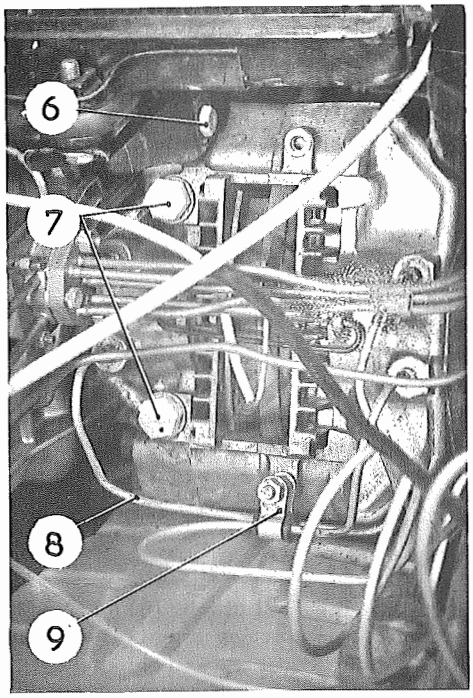
Screw in the 2 screws (7) fixing the unit on the gearbox. These screws will be tightened later (see para. 8a).

Adjust the clutch lock (see Op. DX.314-1, paragraph 39).

Connect up the clutch re-engagement control feedpipe (2) and the clip (1).

Fit the connecting pipe (3) and the clip (4).

Connect up the overflow return pipe to the clutch lock (5).



5. Fit the left-hand brake unit.

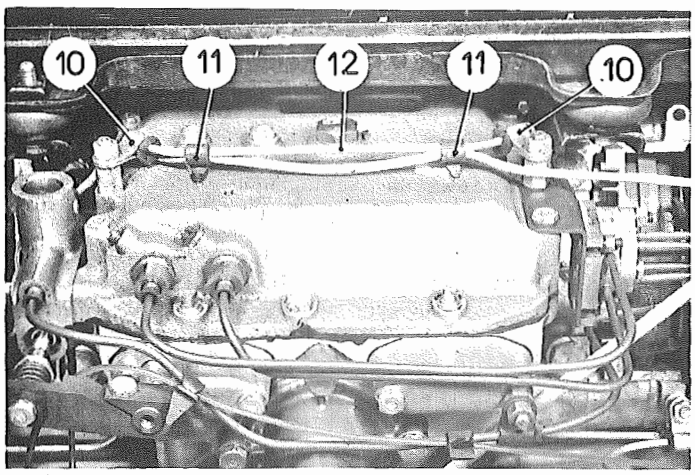
Place the brake unit in position. Tighten the two securing screws (6) on the crossmember to between 28 and 31 ft/lbs. (3.9 - 4.3 m.kg) (use a 300 mm (12") extension, jointed, and a ratchet spanner. Insert it through the wheel arch and parallel to the driveshaft).

Screw in the 2 screws (7) fixing the unit on the gearbox. These screws will be tightened later (see para. 8a).

Fit the connecting pipe (8) and the clip (9).

Connect up the feedpipe.

6. Fit the connecting pipe (12) between the two units, the two clips (10) and the rubber clips (11).

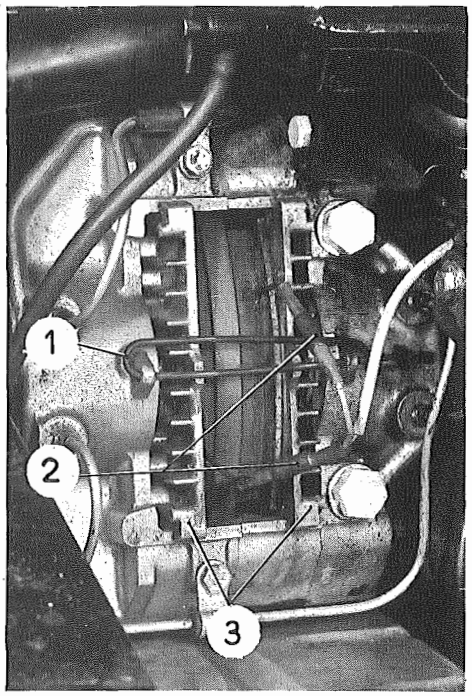


7. Fit the brake pads (see this operation, paragraphs 15 to 17).

8. Bleed the brakes (see Op. DX.453-0), make quite certain that there are no leaks.

8a. Have pressure applied by an assistant to the hydraulic brake pedal, to centralise the brake units. Tighten the screw (7) securing the units to the gearbox outlet housings to between 94 and 100 ft lbs (13 to 14 m.kg).

9. Fit the radiator air inlet duct and the spare wheel.



REPLACEMENT OF THE HYDRAULIC BRAKE PADS.

REMOVAL.

10. Remove the spare wheel.
    - the radiator air inlet duct with the spare wheel support crossmember,
    - the head lamp control cross-bar.
11. Remove the spring clips (1).
12. Disconnect the leads (2) for the brake pad wear warning light.
13. Remove the pads (3), withdrawing them towards the front.
14. Clean very carefully the parts of the pistons exposed to dust.

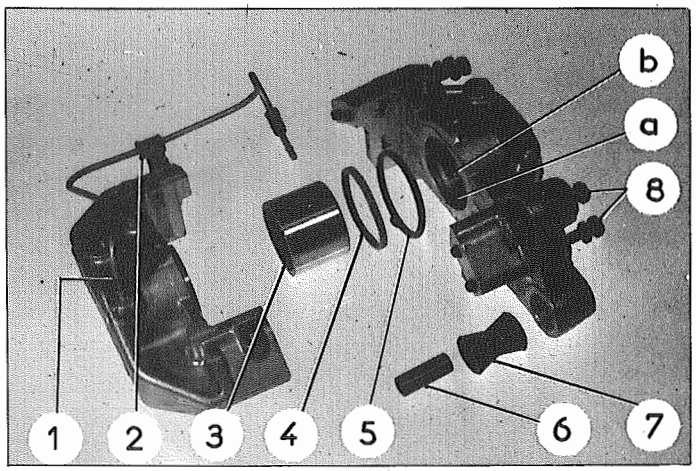
ASSEMBLY.

15. Using the disc as a fulcrum, push the pistons back in their cylinder using a piece of wood.

    Fit the pads (3).
16. Connect the cables (2).
17. Fit the clip (1).

17a. Loosen the screws holding the hydraulic brake units on the gearbox outlet housings. Have pressure applied by an assistant to the hydraulic brake pedal. Tighten the securing screws to between 94 and 110 ft lbs (13 to 14 m.kg).

18. Fit the air duct, crossmember, and spare wheel support assembly.
    - the head lamp control cross-bar (see Op. DX.540-0),
    - also the spare wheel.



OVERHAULING A HYDRAULIC BRAKE UNIT.

DISMANTLING.

1. Remove: the piping (1) with its securing clip (2).
2. Remove: the 4 screws (8) securing the two halves of the unit together.
3. From each of these two halves, free:
   - the piston (3),
   - the felt ring (4),
   - the ring seal (5).
4. Remove the distance piece (6) from the silentblocs (7) using a hammer and a small punch.

   Free the silentblocs after dipping them in water.
5. Clean all parts very carefully in alcohol, then blow dry with compressed air.

ASSEMBLY.

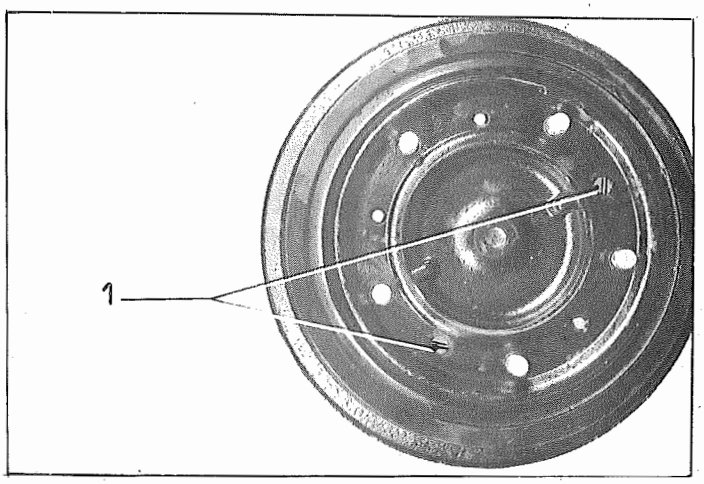
6. Dip the silentblocs (7) in water and replace them in position by hand.

   Fit the distance pieces (6) into the silentblocs using a mallet.

NOTE:-
(1) The pistons and cylinders must show no signs of knocks or scores. If they do, they must be renewed.
(2) After each dismantling new seals must be used.

7. Smear the ring seals (5) with special hydraulic fluid, also the felts (4), the pistons (3) and their cylinders.
8. In each of the two halves of the unit fit the following:-
   - 1 ring seal (5) in groove "b",
   - 1 felt ring (4) in the groove "a".

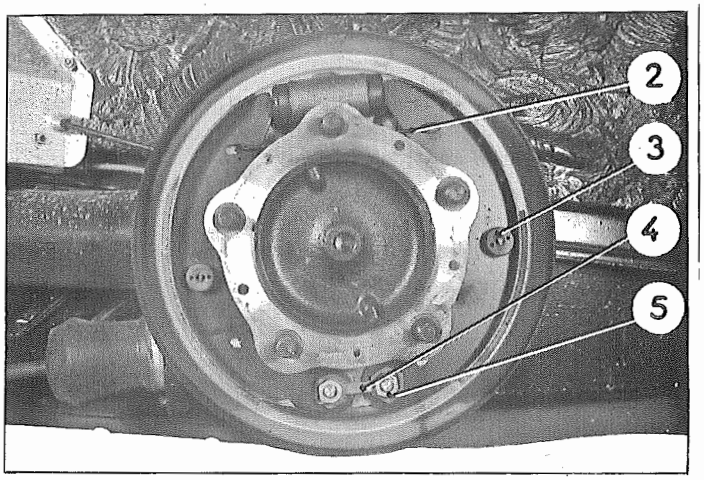
   Fit the piston by hand.
9. Assemble the two halves of the brake unit using the four screws (8) with a plain washer under the head of each. Tighten to 36 ft/lbs (5 m.kg).
10. Fit the piping and its securing clip (2).
11. Close all holes with plugs.



REPLACING A BRAKE DRUM.

Removal.

1. Put the rear of the vehicle on stands (stand 2505-T).
2. Remove the wing and the wheel.
3. Remove the screws securing the drum, then remove the drum.

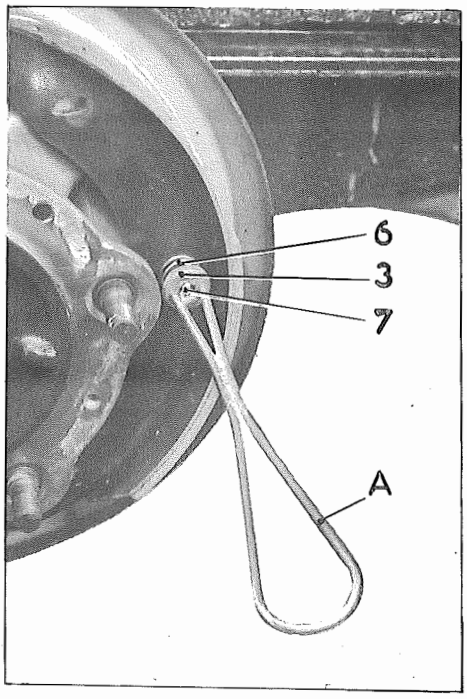


Assembly.

4. Centre the brake segments (see Op. DX. 451-0).
5. Fit the drum. Tighten the screws (1).
6. Fit the wheel and the wing. Lower the car to the ground.

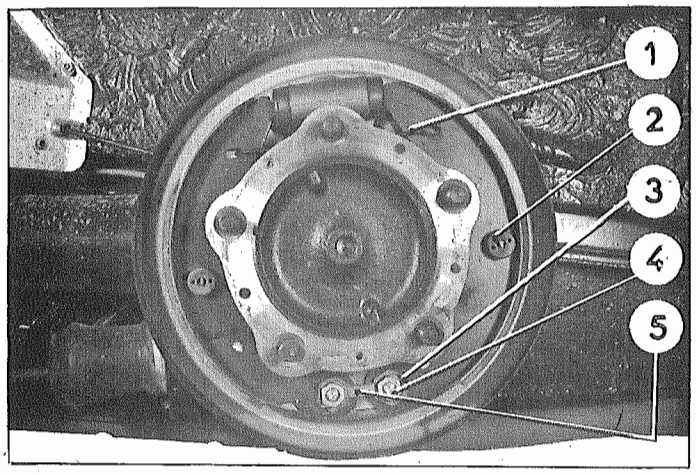
REPLACEMENT OF THE BRAKE SHOES

Removal.



7. Place the rear of the vehicle on stands.
   - remove the wing and the wheel.
8. Remove the screws securing the drum. Remove the drum.
9. Unhook the springs (3) (spring pliers 2110-T).
10. Remove the cup (3) (tool 3556-T) (A) then the springs (6) and the pins (7).
11. Turn down the tabs of the metal lockplate (4) then remove the nuts and eccentric bushes (5).
12. Remove the shoes. Free the shoe adjusting bushes.

NOTE:- To ensure even braking, it is essential to renew the brake shoes on both rear wheels at the same time.



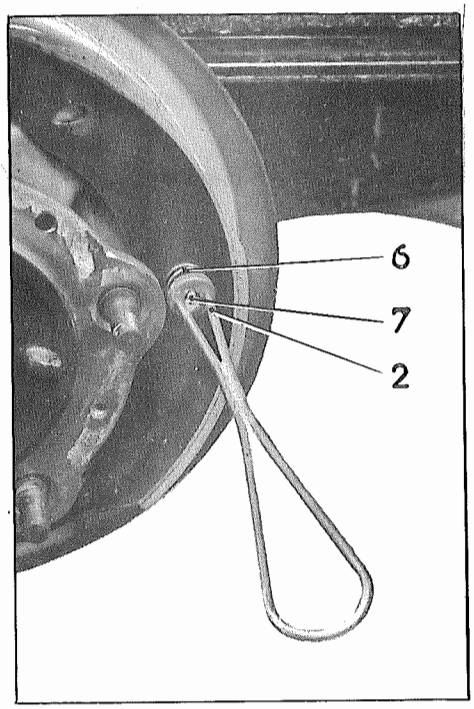
Assembly.

13. Fit the adjusting bushes (3) to the shoes.

    - Fit the brake shoes on the backplate, the shoe with the longer lining towards the front of the vehicle.

    - Fit the lockplate (5) then the nuts (4) without tightening them.

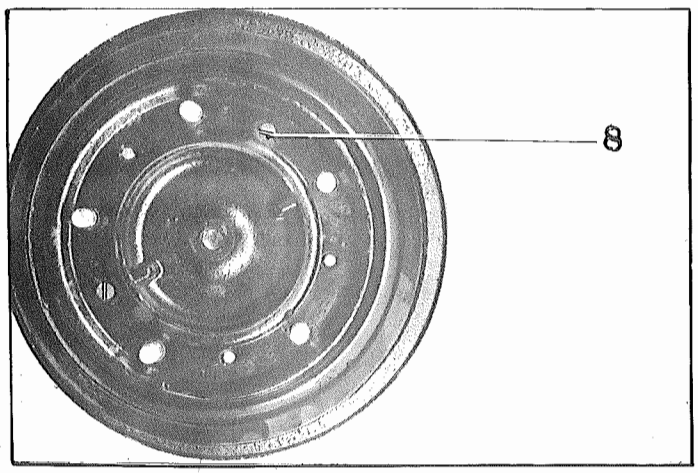
14. Fit the pins (7) the springs (6) and the cups (2). Lock the cups by turning them a quarter of a turn on the rods (7) (tool 3556-T).



15. Hook on the brake shoe spring (1) (spring pliers 2110-T).

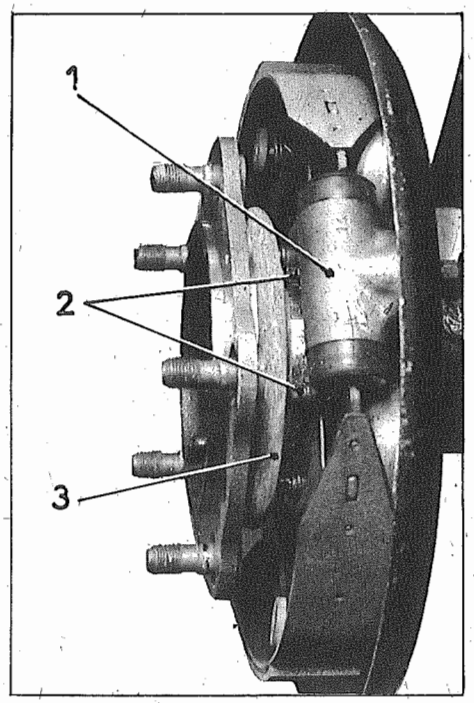
16. Centralise the brake shoes (see Op. DX. 451-0).

    Tighten and lock the nuts (4).



17. Fit the drums and tighten the screws (8).

18. Fit the wheel and wing then lower the car to the ground.



REPLACING A BRAKE BACKPLATE

Removal.

19. Place the rear of the vehicle on stands. Remove the wing, the wheel and the brake drum.

20. Remove the stub-axle (see Op. DX. 420-4, paragraph 2).

21. Remove:-
    - the brake shoes (see this operation, paragraphs 9 to 12).
    - the deflector (3).

22. Remove the cylinder (1) (see this operation, paragraphs 32 and following).

23. Remove the screws (2) (spanner 1677-T) and free the backplate.

Assembly.

24. Fit the backplate and tighten the securing screws (2) (spanner 1677-T).

25. Fit the metal deflector (3) the flat part level with the end of the hub.

26. Fit the stub-axle (see Op. DX. 420-4, paragraph 6).

27. Fit:-
    - the wheel cylinder (see this operation, paragraph 36).
    - the brake shoes (see this operation, paragraph 13 to 15).

28. Centralise the brake shoes (see Operation No. DX. 451-0).

29. Fit the brake drum.

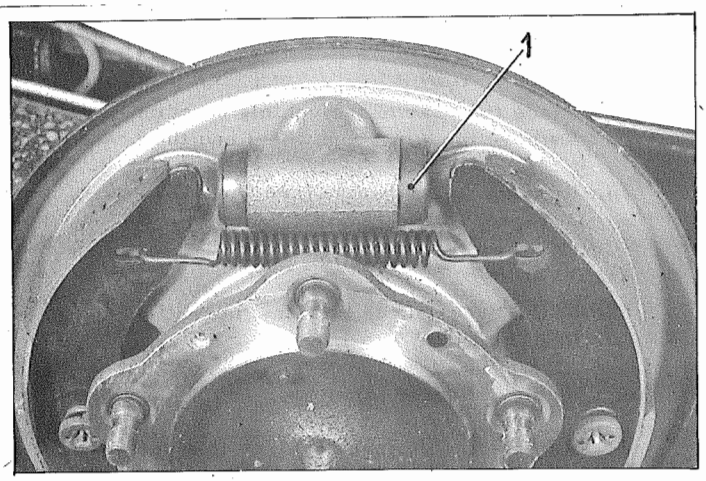
30. Fit the wheel and wing then lower the car to the ground.

REPLACEMENT OF A WHEEL CYLINDER.

Removal.

31. Place the car on stands.

Remove:-
- the wing and the wheel,
- the drum. Release the pressure in the brake circuit (see Op. DX. 00).



32. Using the cams, spread the brake shoes apart as shown in the photograph to facilitate removal of the cylinder without damaging the cups (1).

33. Remove the wheel cylinder.

- disconnect the tube (2) and plug the holes,
- remove the two screws (3),
- remove the cylinder.

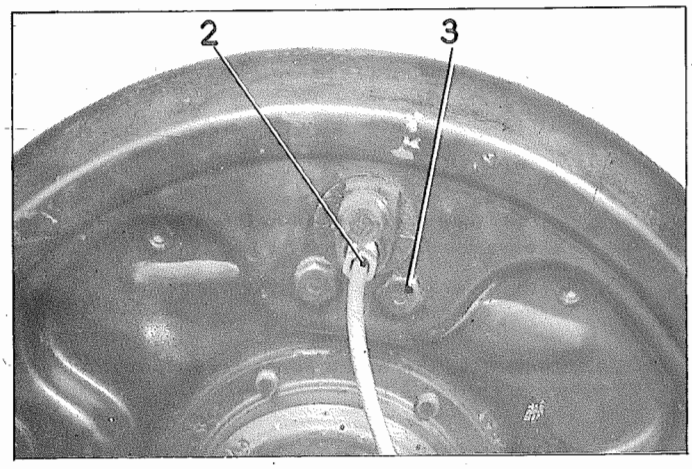
34. Strip the cylinder (see Op. DX. 420-3, paragraph 6).

Assembly.

35. Assemble the wheel cylinder (see Op. DX. 420-3, paragraph 8).

36. Fit the wheel cylinder on the brake backplate.

- fit the two screws (3) without tightening them,
- connect up the pipe (2) (spanner 2219-T) and tighten the union moderately.



37. Centralise the brake shoes (see Op. DX. 451-0).

38. Lightly oil the bearing face between drum and stub axle flange, then fit the drum.

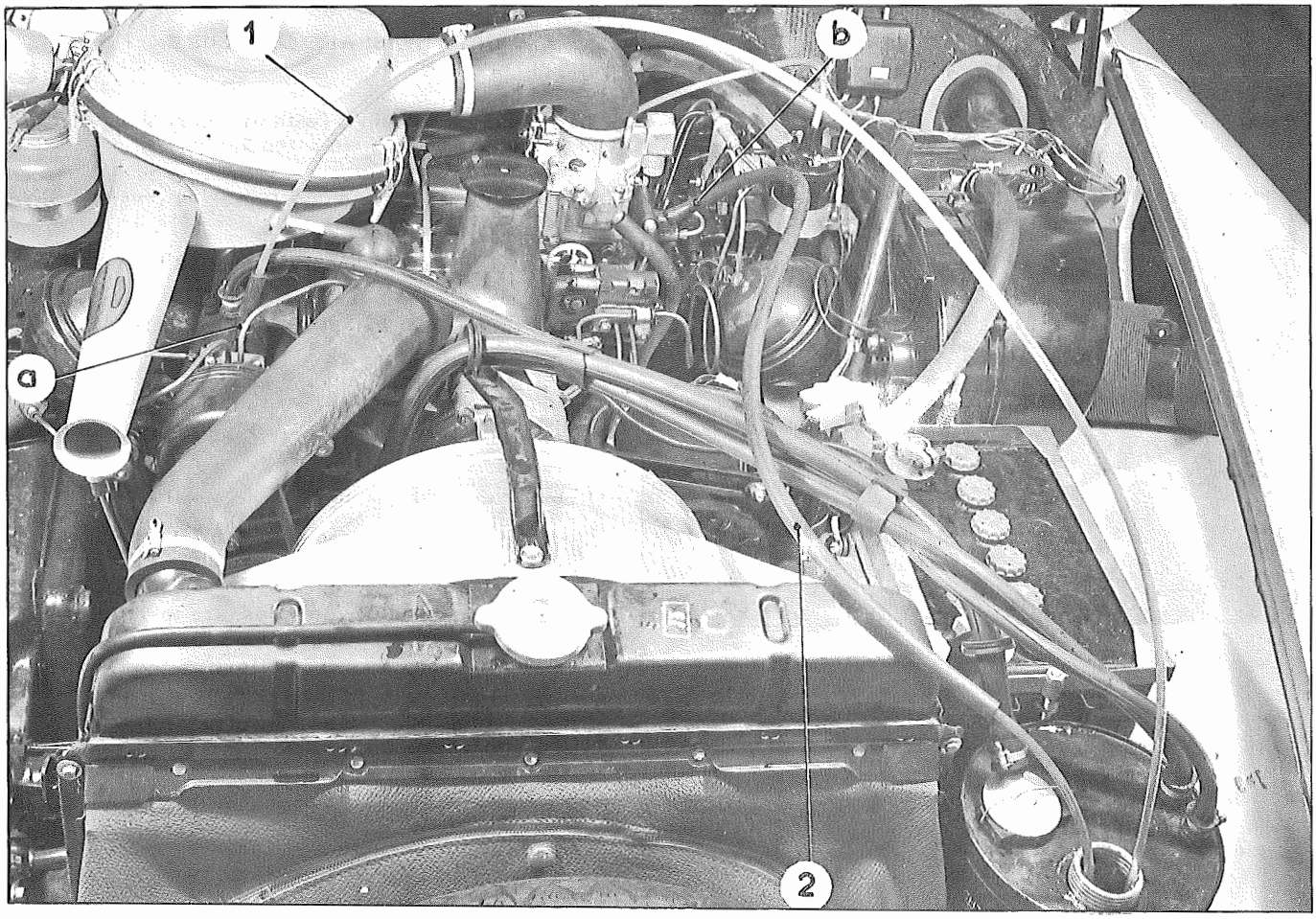
39. Bleed the brake circuit.

40. Obtain the aid of an assistant to press on the brake pedal to allow the wheel cylinder to centralise itself between the shoes. Tighten the two screws (3).

41. Fit the wheel and the wing.

- Lower the car to the ground.

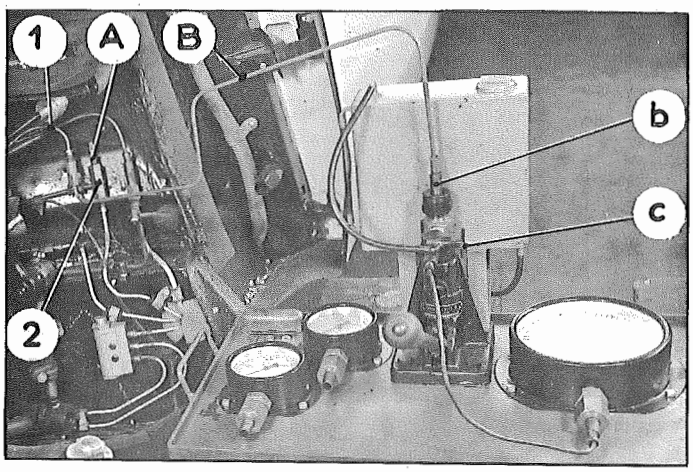
BLEEDING THE BRAKE SYSTEM



NOTE: Do not bleed the brake system under pressure, thereby preventing the formation of small air bubbles in the fluid and the eventual formation of air pockets in the system.

1. Place the rear of the car on stands or over a pit.
2. Release the pressure in all the circuits including the brake accumulator, (see Op. DX.00) *and place the manual height control lever in "HIGH" position.*
3. Fit a flexible tube on
   - the rear bleed screw of the centrifugal regulator at "a" (to bleed the front right-hand brake),
   - the accelerated idling control at "b" (to bleed the front left-hand brake).

   Insert the ends of the tubes (1) and (2) in the hydraulic reservoir.
4. Remove the rubber caps protecting the rear cylinder bleed screws. Fit a flexible tube on each rear cylinder bleed screw and dip the end of these tubes in a container already holding a small quantity of special hydraulic fluid.
5. Loosen the front and rear bleed screws.
6. Tighten the bleed screw on the pressure regulator. Depress the brake pedal holding it in this position with a weight of about 22 lbs. (10 kg). Start up the engine. Allow the fluid to flow through the tubes until it is free from air bubbles. Then tighten the bleed screws.
7. Remove the bleed tubes. Leave the engine idling in order to put the circuits under pressure.
8. Check the bleed screws for leakage by depressing fully the brake pedal for about one minute.
9. Stop the engine.
10. Replace the rubber protecting caps on the 4 bleed screws.
11. Lower the car to the ground.
12. Start up the engine. Top up the level of fluid in the hydraulic fluid reservoir. (The manual height control lever being in the "HIGH" position.



ADJUSTING THE BRAKE PRESSURE DISTRIBUTION.

Use test bench 2290-T (with pressure gauge from 0 - 1500 p.s.i. (0 - 100 kg/cm^2)).

13. Remove the left-hand front wing (see Op. DX. 851-1).

Remove the side mudshield covering the suspension mechanism.

Place the manual height control in "LOW".

14. Disconnect the upper pipe (1) from the 3-way union (2) and connect it to the orifice "b" on the pump, using a pipe (B). Plug the hole in the union (2) with plug (A).

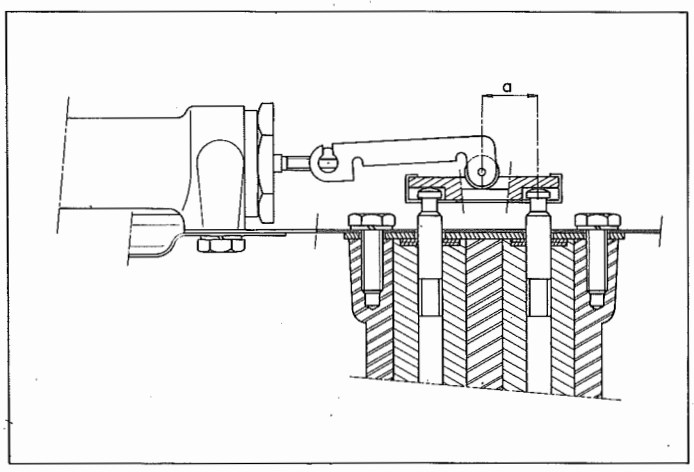
Remove the pedal panel and the pedal itself.

Operate the pump in order to build up the pressure to approximately 1420 p.s.i. (100 kg/cm^2). Gently loosen the bleed screw (c) on the pump in order to lower the pressure to 710 p.s.i. (50 kg/cm^2). Measure the distance "a" between the centre line of the rollers on the trolley and the centre line of the rear brake slide-valve.

15. Release the pressure.

16. Operate the pump again to bring the pressure to 712 p.s.i. (50 kg/cm^2). Measure the distance "a" again.

This distance "a" must be 14 $\pm$ 0.25 mm as the average of these two readings.



17. Release the pressure by loosening the test bench bleed screw (c).

18. Refit the pedal panel, the pedal and the trimming.

19. Disconnect the pipe (B) from the distribution cylinder feedpipe (1).

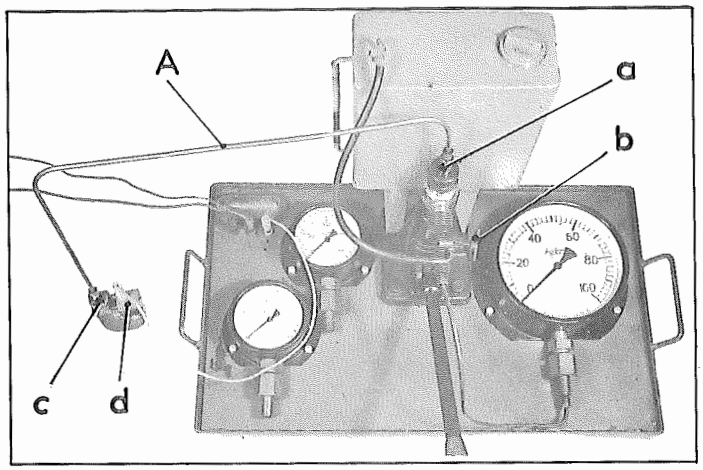
Remove the sealing plug (A) from the 3-way union (2) and connect the tube (1) back into the union (2).

Fit the side protection panel for the suspension mechanism.

Fit the front left-hand wing (see Op. DX.851-1).

21. Start up the engine and place the manual height control lever in "HIGH" position.

22. Bleed the brakes (see this operation, paragraphs 1 and following).



CHECKING THE PRESSURE SWITCH.

Use test bench 2290-T (with pressure gauge from 0 - 1500 p.s.i. (0 - 100 kg/cm^2)).

23. Connect the orifice (c) on the pressure switch to the orifice (a) on the pump using tube (A).

Connect the green and blue plugs on the test bench to the corresponding coloured terminals of the wiring harness supplied with the test bench.

Connect the crocodile clips on the wiring harness to the terminals on a 12-volt battery. Using the yellow wire, connect the terminal (d) on the pressure switch to the vacant terminal on the test bench.

The tell-tale lamp must light; if it does not, then the pressure switch is defective.

24. Tighten the bleed screw (b) and operate the pump in order to build up pressure progressively.

At 860 p.s.i. (60 kg/cm^2) the light should be extinguished. Then increase the pressure to approximately 1150 p.s.i. (80 kg/cm^2). Release the pressure very slowly by opening bleed screw "b".

At 1000 p.s.i. (70 kg/cm^2) the lamp should light.

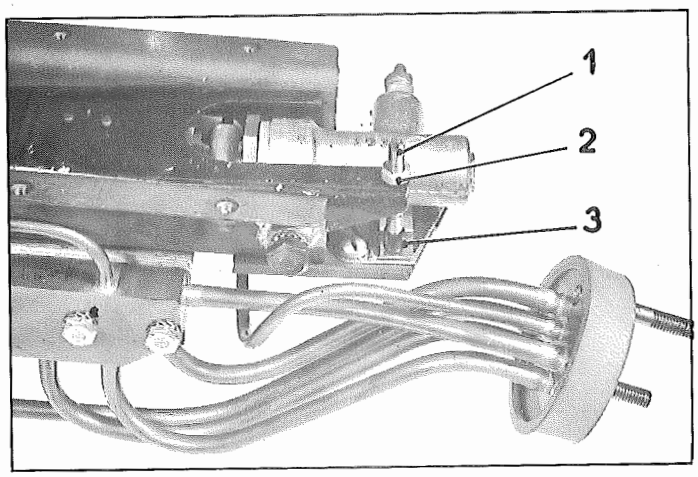
Therefore the light should go out between 850 and 1000 p.s.i. (60 and 70 kg/cm^2). If these conditions are not fulfilled the pressure switch must be renewed.

25. Release the pressure by loosening the bleed screw (b).

Disconnect the battery terminals.

Disconnect the wiring harness and the tube (A).

NOTE: This operation can be carried out on the car.



ADJUSTING A STOP LAMP SWITCH.

26. Remove the pedal panel (see Op. DX.453-1, paragraphs, 2 and 3).

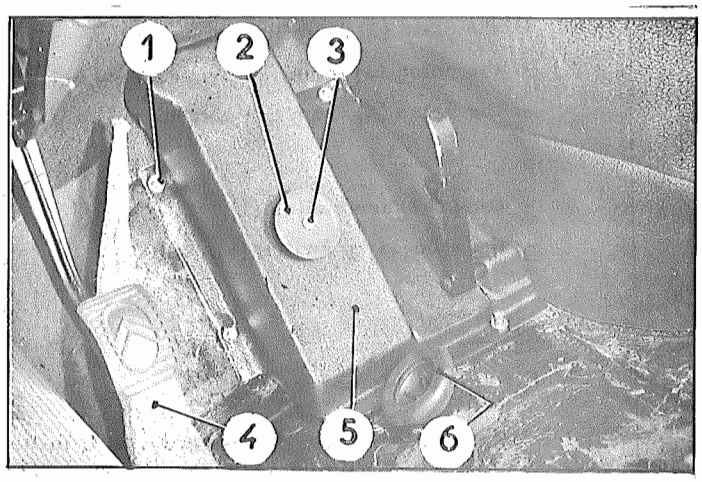
27. Connect a test lamp to the switch.

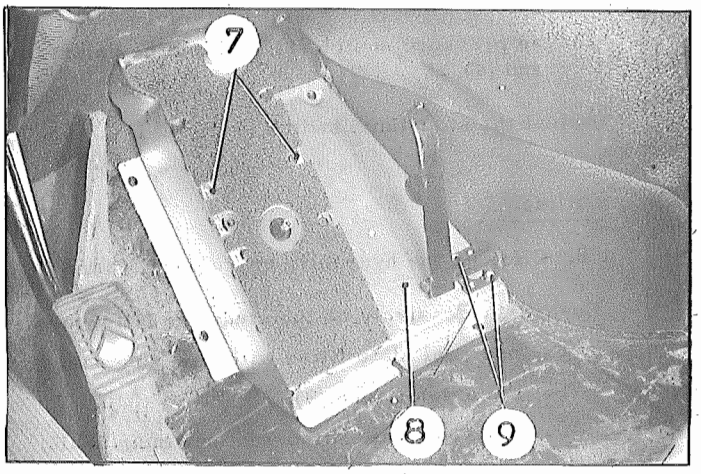
Turn the adjusting screw (1) until the test lamp is extinguished.

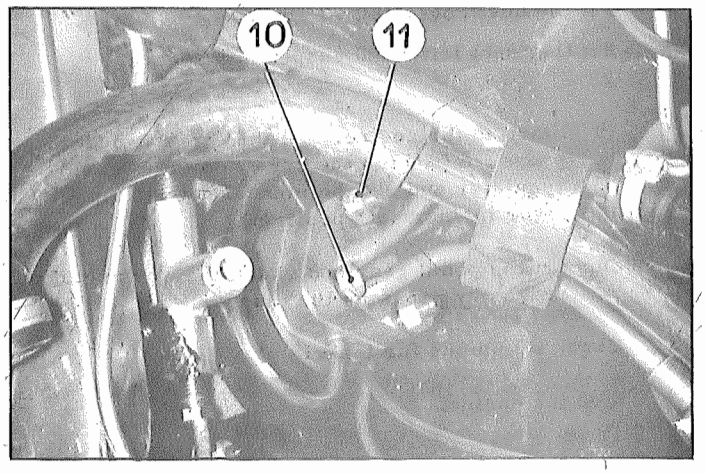
Then tighten the adjusting screw (1) by exactly one turn and lock the locknut (2).

NOTE: The screw (1) must be perpendicular and in the centre of the blade (3): if necessary bend the end of the blade.

28. Fit the pedal panel (see Op. DX.453-1, paragraphs 11 - 14).







REPLACEMENT OF A HYDRAULIC BRAKE PEDAL GEAR.

Removal.

1. Put the vehicle in the low position and release the pressure in the circuits.

Remove the left-hand front wing (see Op. DX. 851-1).

Remove the front left-hand suspension sphere.

2. Take out the rubber carpet from the pedal board.

Unstick the felt trimming (4).

Remove:-

- the rubber pedal pad (6),
- the screw (3),
- the pedal disc (2).

Unscrew the 4 screws (1) securing the floorboard.

Remove the plastic trimming (5).

3. Remove the screws (7) fixing the toeboard to the pedal gear.

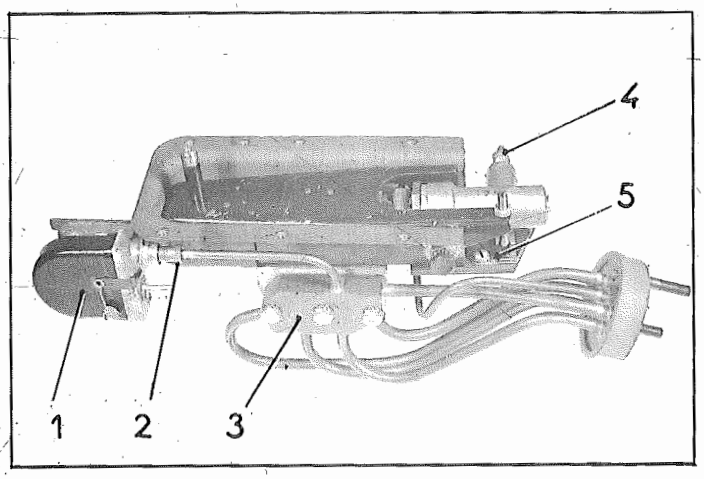
Remove the screws (9) holding the accelerator support to the floor.

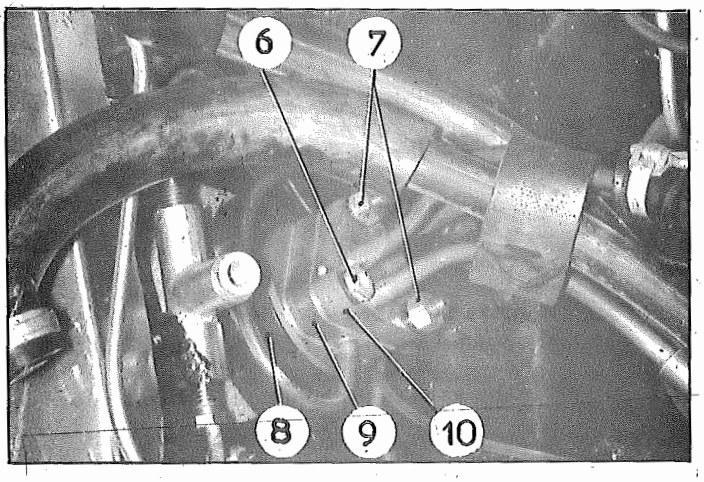
Remove the toeboard (8).

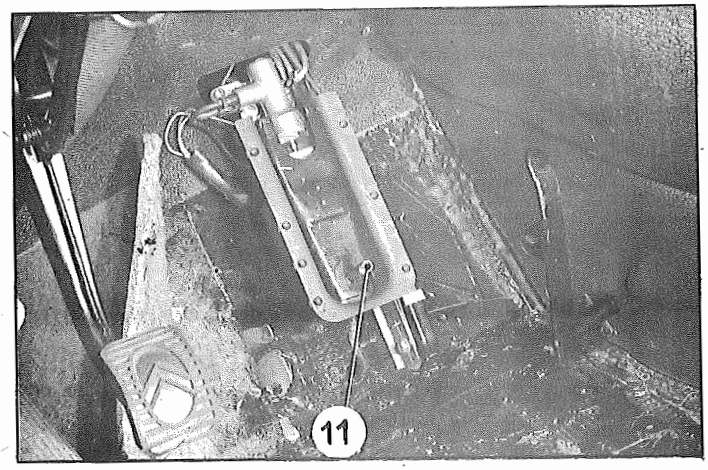
4. Disconnect the leads from the pressure switch and stop lamp switch.

5. Remove the nuts (11) from the studs securing the union flanges as well as the screws (10).

Withdraw the hydraulic brake pedal gear towards the interior of the car.







Stripping.

6. Disconnect:-
   - the plate (3) from the brake unit,
   - the union (2) from the pressure switch,
   - the union (4) from the distributor.

Remove:-
   - the pressure switch (1),
   - the stop-lamp switch (5).

Assembly.

7. Fit the stop-lamp switch (5).

Couple the pipe assembly to the brake unit; insert the seal plate with new ring-seals and tighten the seal plate screws (3).

Connect the pipe (2) to the pressure switch, and to the distributor at (4).

Fit the pressure switch (1), tighten the unions (2) and (4).

Adjust the stop-lamp switch (see Op. DX. 453-0).

Fitting.

8. Offer up the hydraulic brake pedal gear.

Engage successively on the studs the following:-
   - one seal plate fitted with new ring seals,
   - the union flange (9),
   - one seal plate fitted with new ring seals,
   - the union flange (10).

Tighten the nuts (7) and the screw (6)

Fit the dust cover (8).

Fit the front left-hand suspension sphere.

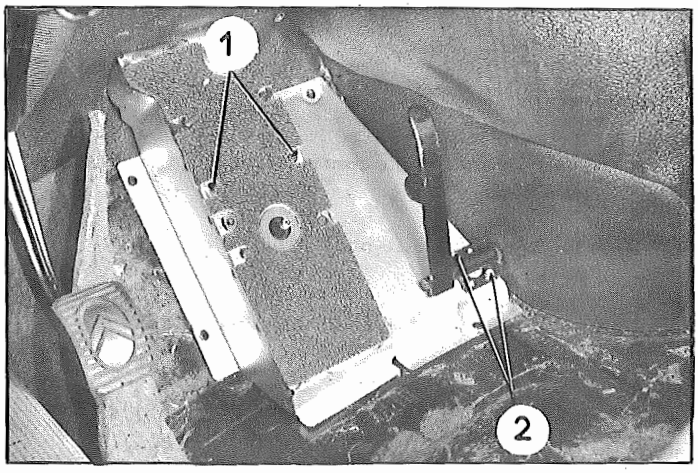
9. Start up the engine. Put the circuits under pressure (tighten the screw on the pressure regulator and put the manual height control lever in "normal" position).

Support the pedal gear and check the working of the brakes by pressing the plunger (11).

Check all unions for leaks.

Stop the engine.

10. Connect the leads to the stop-light and the pressure switch.



11. Fit the floorboard.

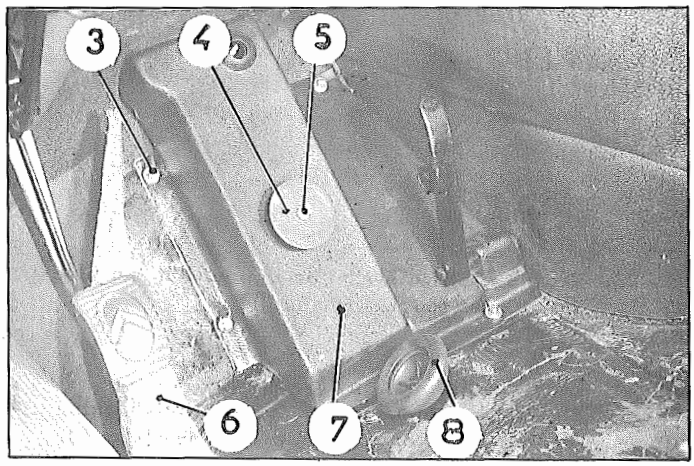
Fit the screws (1) securing the floorboard to the hydraulic control.

Fit the accelerator support (2) to the floor.

12. Refit the plastic trimming (7) on the floorboard.

Fit the securing screws (3) in the floor (plain and shakeproof washers).

Fit and stick the felt trimming (6).



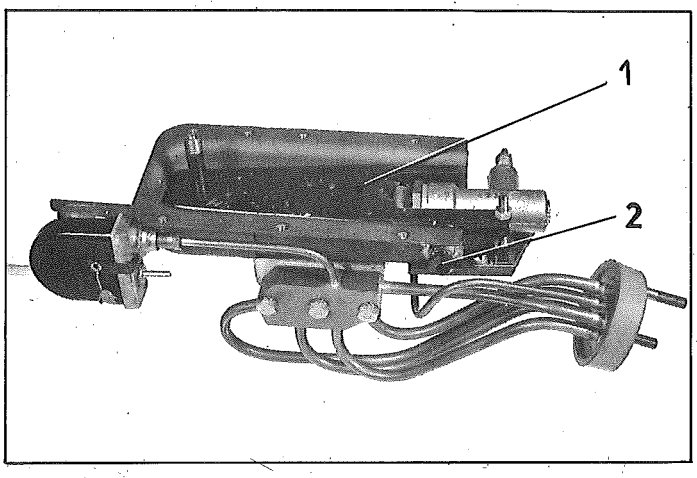
13. Fit:-

- the pedal disc (4),
- the countersunk-head screw (5),
- the rubber pedal pad (8).

14. Refit the rubber carpet to the floor.

15. Fit the left-hand front wing (see Op. DX. 851-1).

16. Bleed the brakes (see Op. DX. 453-0).



REPLACING A BRAKE PRESSURE DISTRIBUTOR.

Removal.

17. Release the pressure in the circuits and place the manual height control lever in the "low" position.

Remove the front left-hand wing (see Op. DX. 851-1).

Remove the front left-hand suspension sphere.

18. Remove the hydraulic brake pedal gear (see paragraphs 2 to 5 in this Operation).

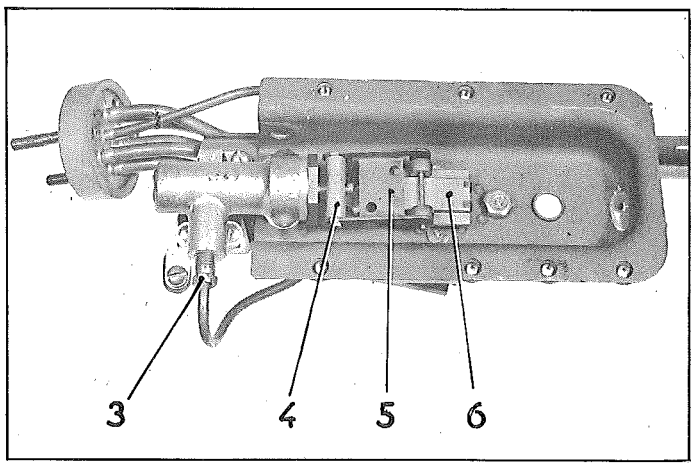
19. Remove the two brake pedal pivot screws (2) and remove the pedal (1).

20. Lift the roller-carrying trolley (5) up by a quarter of a turn and free it from its spindle (4).

21. Disconnect the suspension feedpipe union (3) from the distributor.

22. Remove the two securing screws from the brake distributor.

Free the distributor.



Assembly.

23. Fit the brake distributor in position and insert the screws (spring washer).

24. Fit the roller trolley (5) and line-up the distributor to ensure the correct positioning of the rollers on the compensating plate (6).

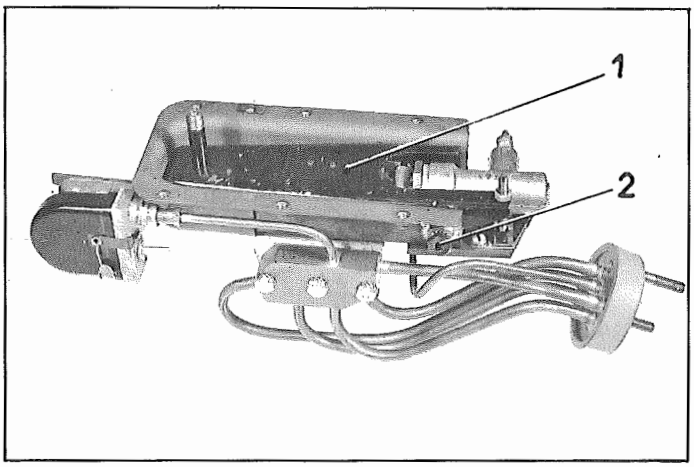
Tighten the screws securing the distributor.

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Connect the suspension feedpipe (3) to the distributor.

25. Adjust the brake distributor.

(See Op. DX. 453-0).



26. Fit the pedal (1) and tighten the pivoting screws (2). Check that the pedal operates normally.

27. Fit the hydraulic brake pedal gear.

(See paragraphs 8 to 13 of this operation).

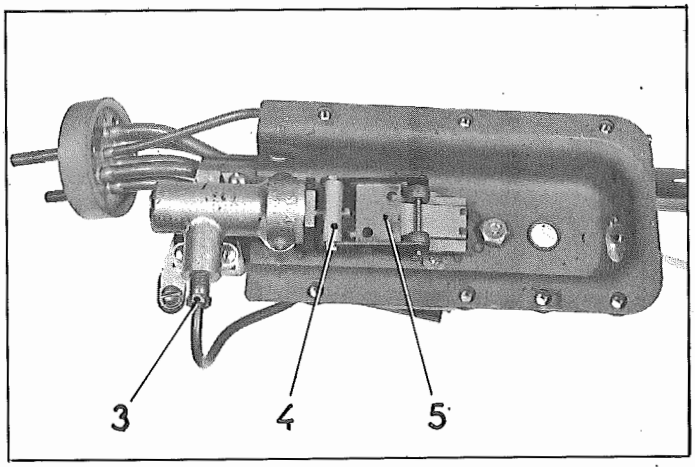
28. Fit the front left-hand suspension sphere. Start up the engine. Put the circuits under pressure (tighten the screws on the pressure regulator and put the manual height control lever in "normal" position).

Check all unions for leaks.

Fit the front left-hand wing (see Op. DX. 851-1).

Bleed the brakes (see Op. DX. 453-0).

CHECKING THE BRAKE DISTRIBUTOR FOR LEAKAGE.



Removal.

29. Remove the hydraulic brake control (see paragraph 2 to 5, this operation).

30. Remove the two pivoting screws from the brake pedal and remove the pedal.

31. Lift the roller trolley (5) up by one quarter of a turn and free it from its spindle (4).

32. Disconnect the suspension feedpipe union from the distributor.

33. Remove the two screws securing the distributor.

Free the brake distributor and remove the spindle (4).

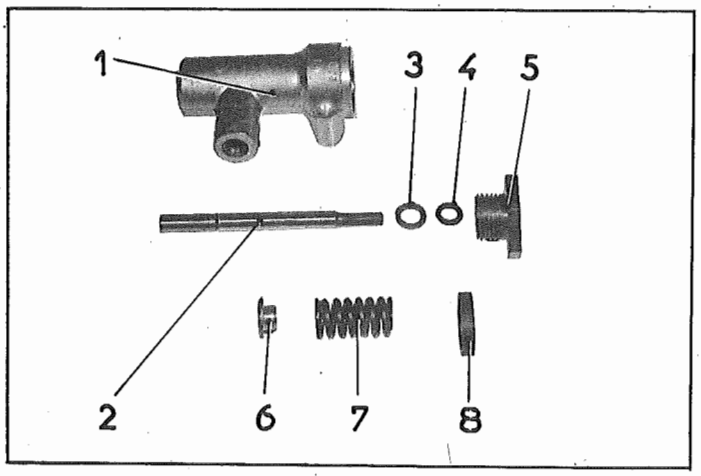
34. Hold the distributor in a vice (use lead jaws).

Remove the guide cap (5) and remove the control piston assembly (2) the spring (7) and the cup (6).

Remove:-

- the seal (8) between the cup and the distributor body,
- the washer (3),
- the ring seal (4).

35. Clean all parts in alcohol. If the parts moving on the rod show scratches of slight depth, a light polishing with No. 600 abrasive paper moistened with fluid is permissible.



Assembly.

36. In the cap place the following:

- the ring seal (4) previously moistened with special hydraulic liquid,
- the washer (3) holding the ring seal (4).

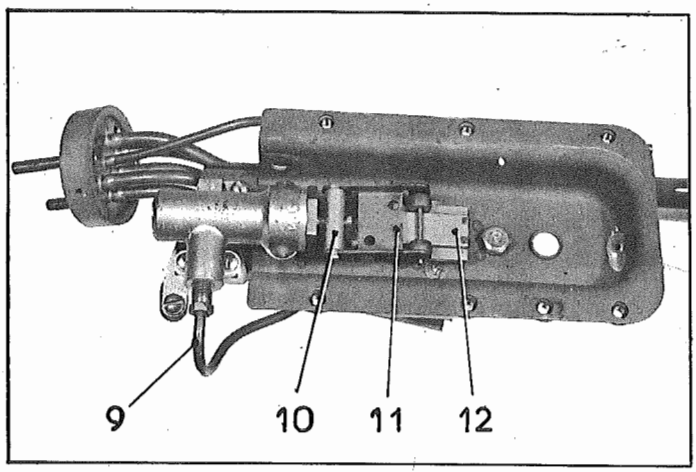
Fit onto the plug the seal (8) between the body and the plug.

Place onto the rod (2), previously moistened with special hydraulic fluid,

- the thrust cup (6),
- the spring (7) (fit a new spring).

Engage the end of the rod (2) in the plug guide (5) and fit this assembly in the distributor. Tighten the guide plug to between 14.5 and 18 ft.lbs (2 to 2.5 m.kg).

Fit the spindle (10) on the rod (2).



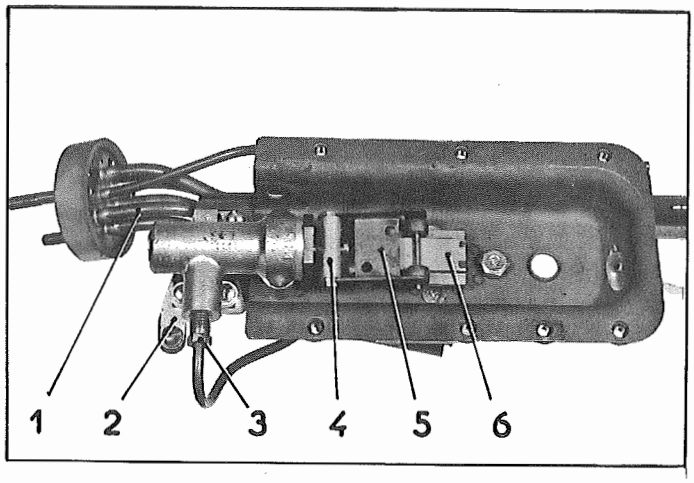
37. Fit the distributor on the support and insert the two securing screws.

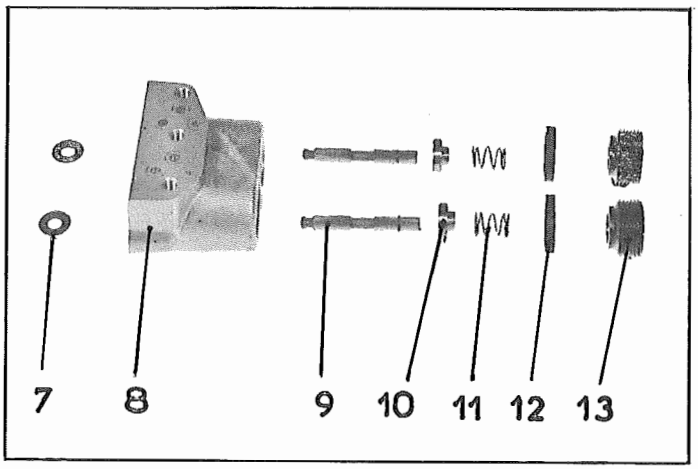
Fit the roller trolley (11) and line-up the distributor to ensure correct positioning of the rollers on the compensating plate (12). Tighten the screws securing the distributor and connect the pipe (9) to the distributor.

518/W

38. Fit the brake pedal gear on the car (see paragraphs 8 to 13 of this operation).

39. Adjust the braking distributor (see Op. DX. 453-0).





DISMANTLING.

1. Remove the pedal.

Lift up the roller trolley (5) about one quarter of a turn and free it from its control shaft (4). Remove the thrust plate and leaf spring from the slide-valves.

2. Remove the two screws securing the brake pressure distributor.

Disconnect the union (3) from the pipe leading from the rear suspension.

Remove the brake pressure distributor.

3. Disconnect the pipe assembly from the pressure switch and valve housing. Remove the seal-plate.

4. Remove the pressure switch. Remove the stop lamp switch (2) (only if it is faulty).

5. Remove the valve housing (8) from the casing.

6. Hold the valve housing in a vice (use lead jaws).

Remove the plugs (13) using spanner MR.3691-50.

Remove:
- the felt washers, (7),
- the springs (11),
- the spring cups (10),
- the slide-valves (9) and place them in a rack (rack MR.3053-210),
- the ring seals (12).

Do not mix any of these parts, as they are paired.

7. Clean all the parts and blow with compressed air, especially in the fluid holes.

ASSEMBLY.

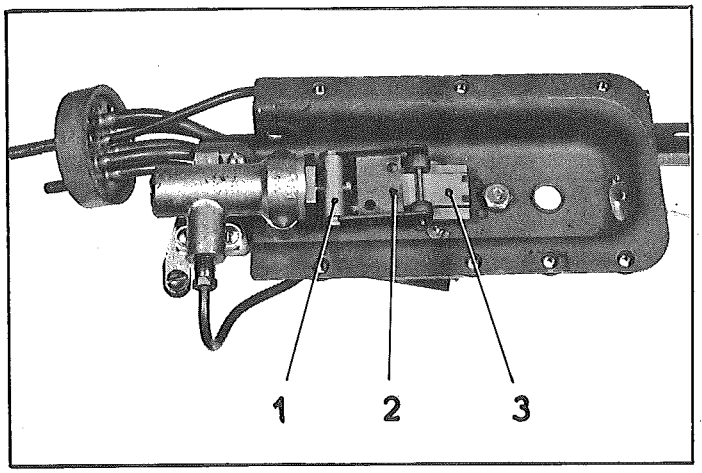
8. Place each valve, previously lubricated with special hydraulic fluid, in its corresponding cylinder.

NOTE: 1) If the valves show very slight scratches a light polishing with No. 600 abrasive paper, moistened with special hydraulic fluid, is allowed.
2) It is often preferable to renew the control unit, because of possible internal leakage.

9. Fit the following:
- the cups (10) for the springs,
- the springs (11),
- the plugs (13) with their seals (12).

Tighten the plugs (13) to between 28.5 and 35 ft.lbs. (2 - 2.5 m.kg) (spanner MR.3691-50).

Fit the felt washers (7).



10. Prepare the brake pressure distributor (see Op. DX.453-1, paragraphs 34 - 36).

11. Fit the valve housing to the bracket, making quite sure that the contact faces on the valve housing and the bracket are perfectly clean.

Tighten the two countersunk head screws, then fit and tighten the other two screws.

12. Fit the distributor on the housing and insert the two securing screws.

Fit the slide-valve thrust plate (3) and its retaining leaf-spring.

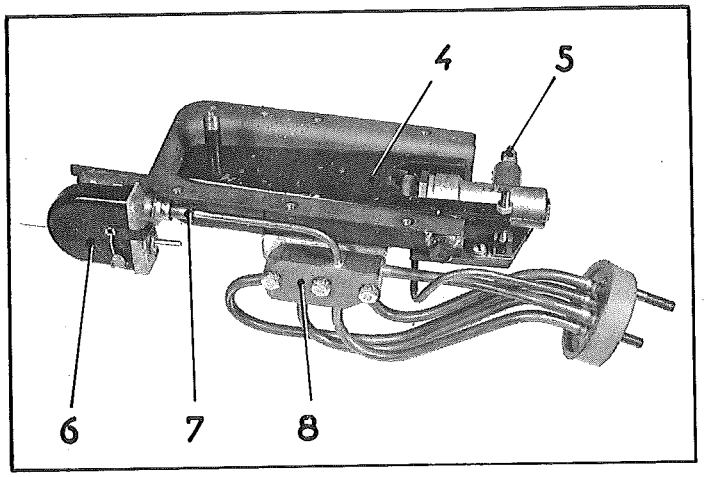
Fit the roller trolley (2) and position the distributor to ensure correct seating of the rollers on the thrust plate (3).

Tighten the screws securing the distributor.

13. Fit the pedal (4) and tighten the fulcrum screws. Ensure that the pedal operates normally.

14. Fit the stop lamp switch.

15. Adjust the stop lamp switch (see Op. DX. 453-0, paragraph 27).



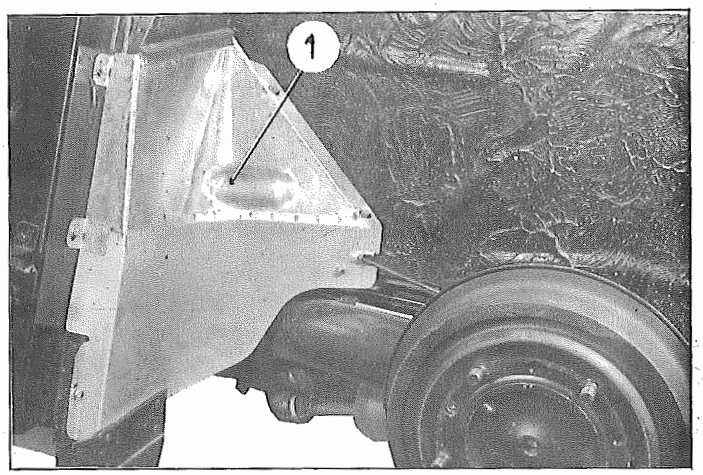
16. Check the pressure switch (see Op. DX.453-0, paragraphs 23 and following).

17. Connect the pipe assembly to the unit. Insert the seal-plate, fitted with new seals, and tighten the screws fixing the union flange (8).

Connect the pipe assembly to the pressure switch (7) and to the distribution unit at (5).

18. Fit the pressure switch (6). Tighten the unions (7) and (5) to between 3 and 4.25 ft.lbs. (0.4 - 0.6 m.kg).

REPLACING A REAR BRAKE PIVOTING PIPE ASSEMBLY.



Removal.

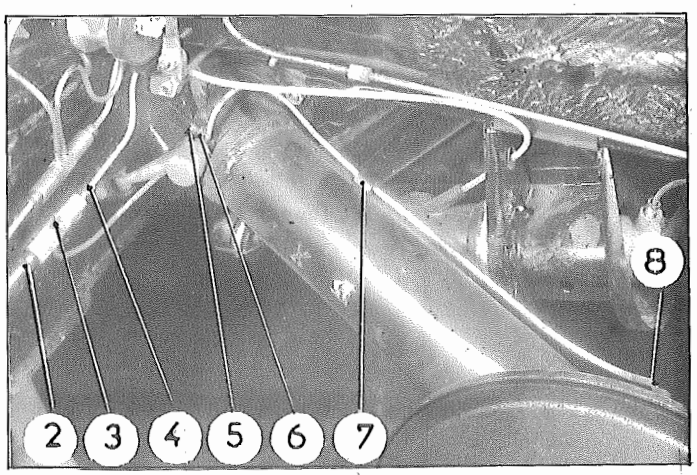
1. Place the rear of the vehicle on stands.
   Remove the wheel.

2. Release the pressure.

   a) Loosen the pressure regulating screw about one third of a turn.

   b) Place the manual height control lever in "low" position.

3. Remove the rear wing (on the side to be worked on).
   Remove the corrector mudshield (1) and the lower mudshield panel.



4. Remove the brake pivoting pipe.

   Disconnect: (left-hand)

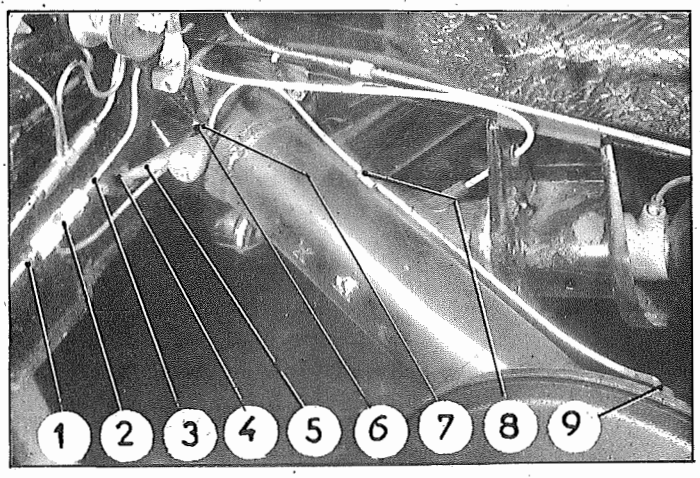
   - the three-way union (3) from the feedpipe (2) and from the pipe (4) feeding the right-hand brake,

   - the feedpipe (8) from the wheel cylinder.

   Raise the retaining clip (7).

5. Loosen the locknut (6) and remove the screw (5).

6. Disengage the pivoting pipe from the rear wheel-arm.



Assembly.

7. Insert the articulating spindle in the bore in the arm.

   See that the conical hole in the articulating spindle lines up with the pointed screw (6).

   Tighten the pointed screw (6).

   Tighten the locknut (7).

8. Ensure that the locating lever (5) is central in its housing (4).

9. Pass the pipe under the securing clip (8) and turn down the clip.

10. Fit a new seal and connect the tube (9) to the wheel cylinder.

11. Connect up:-

   - the three-way union (2) to the feedpipe (1) and to the pipe (3) connecting the right-hand brake (new seals).

12. Bleed the brakes (see Op. DX. 453-0).

   - Check all unions for leaks.

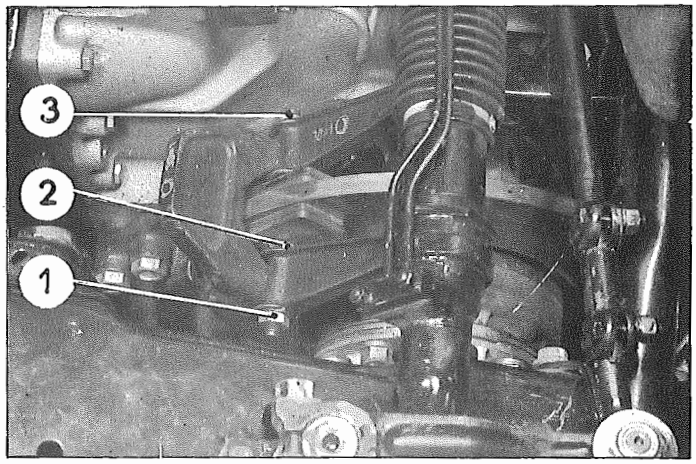
13. Fit the wheel.

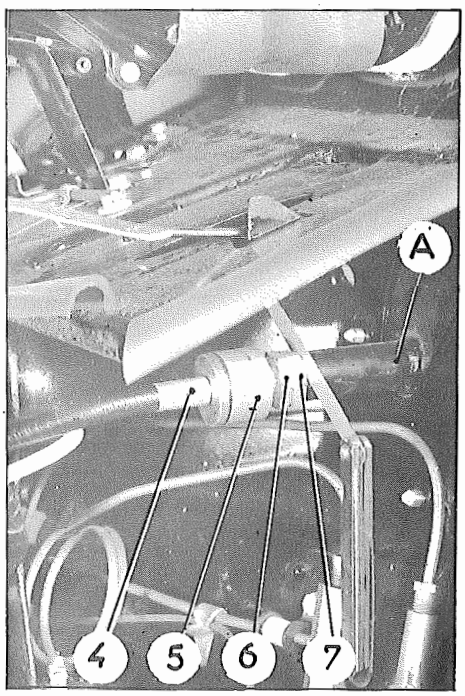
   Lower the car to the ground and tighten the wheel nuts.

14. Fit:-

   - the mudshields (upper and lower),

   - the rear wing.





ADJUSTMENT.

1. Remove the front left-hand wing and the metal shield protecting the suspension mechanism.

Adjust the clearance between the brake pads and brake disc.

2. Raise the front of the vehicle.

3. With the brake off, raise the pedal to the maximum and wedge it there with a piece of wood about 210 mm high.

Place between the brake pads and the disc, on each side, a shim 0.1 mm thick, having a surface equivalent to that of the pad to prevent them rocking.

Loosen the nuts (1) and (3) (ring spanner, 16 mm, with 12 sides, reduced to 3 mm thick).

Adjust the screws (2) (thin-jawed 14 mm O/E spanner) to bring the brake shoes just in contact with the shim.

Tighten nuts (1) and (3) (thin ring spanner, 12 sided 16 mm).

Remove the shims.

4. Carry out the same adjustment on the other brake unit.

To adjust the cable sheath tension.

5. With the pedal held in position as explained in paragraph 3 above, free the locknut (3) and the nut (4).

Bring the threaded sleeve (2) in contact with the sheath, then screw the nut (4) until it makes contact with the tube (A) or at 0.1 mm maximum from the end of this tube. Tighten the locknut (3). Remove the wooden wedge from underneath the pedal and check that the wheels turn freely.

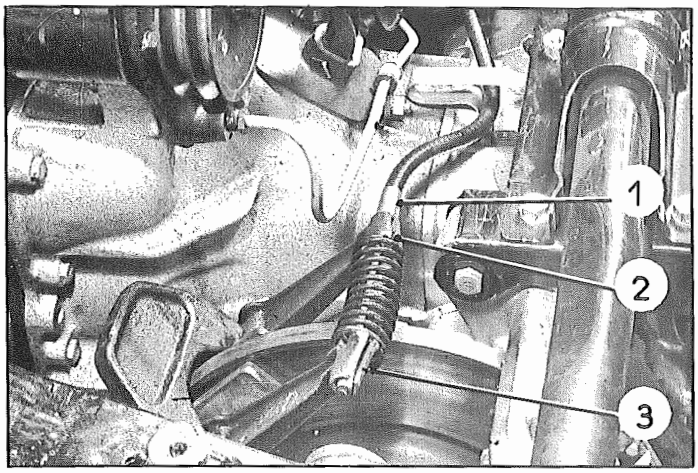
6. Lower the car to the ground.

7. Fit the metal shield protecting the suspension mechanism and fit the front left-hand wing.

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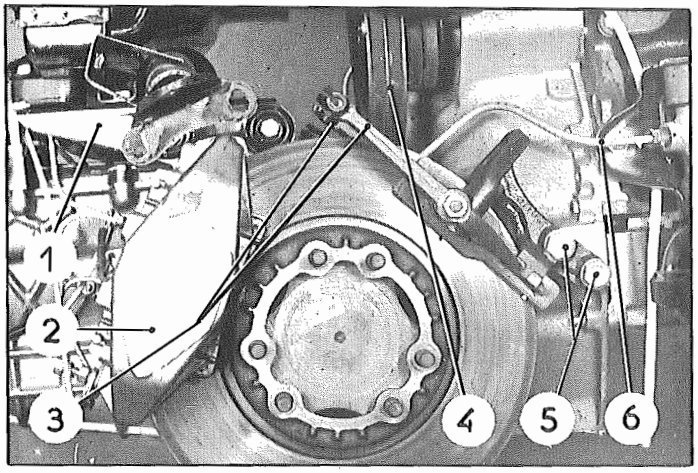
REPLACEMENT OF THE MECHANICAL BRAKE CALIPERS.



Removal.

1. Remove the right-hand brake unit.

- Disconnect the cable (1) from the levers (3) and (2) (see this Operation, paragraphs 13 - 17).
- Remove the two securing screws (5) holding the mechanical brake caliper on the clutch housing.
- Withdraw the brake unit upwards.



2. Remove the left-hand brake unit.

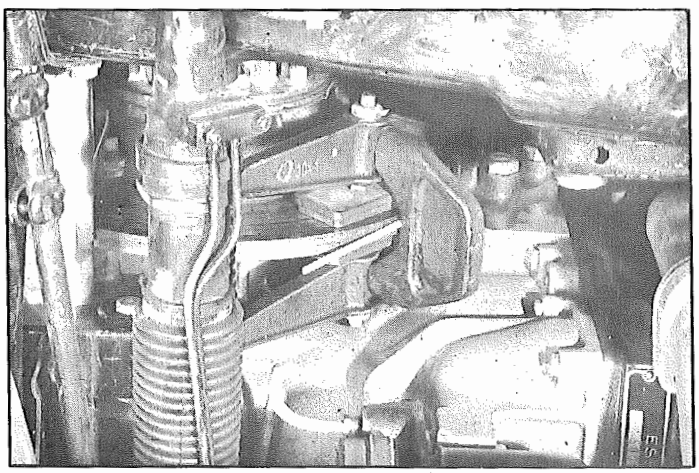
Remove :

- the radiator (see Op. DX.232-1),
- the left-hand bracket (1) on the crossmember,
- the left-hand hydraulic brake unit (2) (see Op. DJ.451-1).

Disconnect the brake control cable from the levers (3) (see this Operation, paragraphs 13 - 17).

Remove the two securing screws (5) (access underneath the vehicle).

Withdraw the brake caliper towards the front of the vehicle (take care not to damage the drive pulley and the pipe (6) between the pump and the pressure regulator).



Assembly.

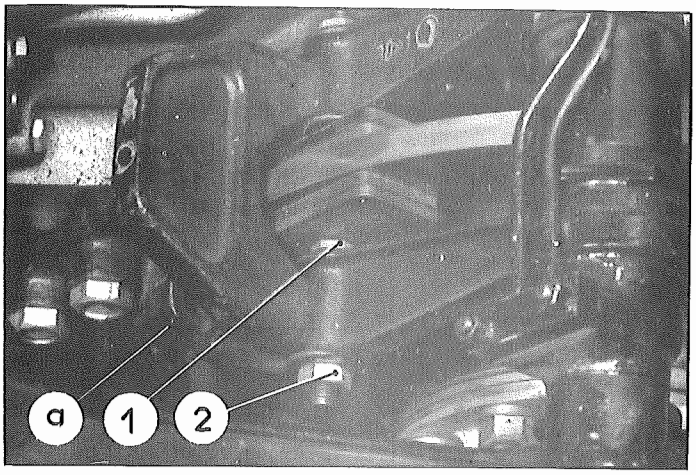
3. Place the brake calipers in position from the front of the vehicle.

Fit the two screws (5) holding the brake calipers (for the left-hand side access is obtained from the underside of the vehicle).

Connect up the brake control cable (see this Operation, paragraphs 22 - 24).

Adjust the clearance between the fork of the brake caliper and the disc. This must be 4 mm.

Tighten the screws (5) securing the calipers on the clutch housing to between 72 and 79 ft/lbs. (10 - 11 m.kg).



4. Adjust the clearance between the brake pads and the brake disc.

Place between the brake pads and the disc, on each side, a shim 0.1 mm thick, having a surface equivalent to that of the pad, to prevent them rocking.

With the levers against the stop at (a), adjust the screws (1) until the pads begin to just touch the disc (16 mm O/E spanner with thin jaws).

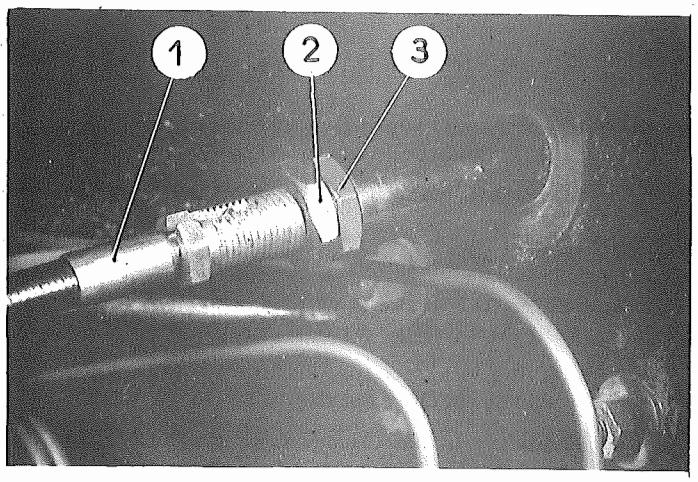
Tighten the locknuts (2).

Adjust the tension of the cable sheath (see Op. DX.454-0, para. 5).

Fit the left-hand hydraulic brake unit (see Op. DJ.451-1),

- the radiator left-hand support,
- the radiator (see Op. DX.232-1).

NOTE : Check the clearance between the connecting pipe, pump-pressure regulator and the drive pulley.



REPLACEMENT OF A BRAKE PEDAL GEAR.

Removal.

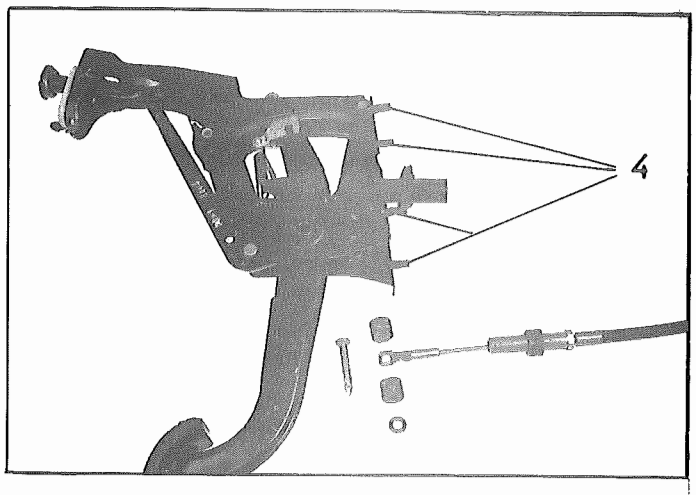
5. Remove the front left-hand wing and the protection panel for the suspension mechanism.

6. Slacken the sheath (1) by loosening the locknut (2) and the nut (3).

7. Close the split portion of the spindle connecting the control cable to the pedal.

Remove the plain washer and the right-hand rubber stop. Disengage the connecting spindle from the pedal.

Disengage the cable from the pedal gear.



8. Remove the 4 front fixing nuts from the studs (4), and the 2 upper fixing screws from the brake control.

Remove the brake pedal gear.

Refitting.

9. Offer up the brake pedal gear, making sure that the rubber bush is in position in the side scuttle panel.

Fit the fixing nuts and screws.

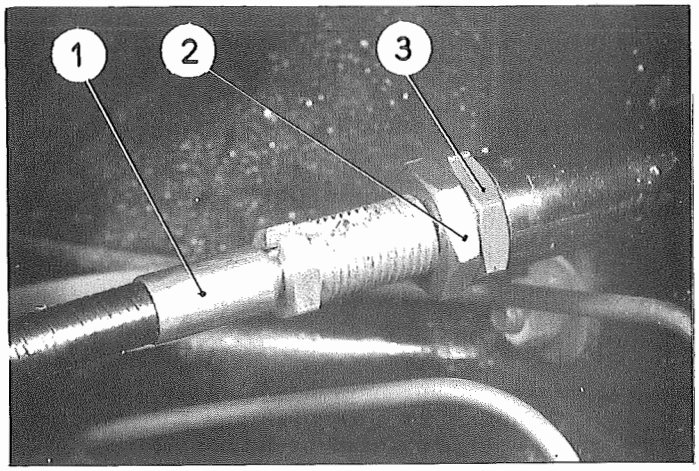
10. Connect the control cable to the pedal.

Fit a new connecting spindle, a left-hand rubber stop, fit the right-hand rubber stop, the washer and then open out the split end of the connecting spindle.

11. Adjust the tension of the sheath (see Op. DX. 454-0).

12. Fit the protection panel for the suspension

Corrective 1 June 1966.



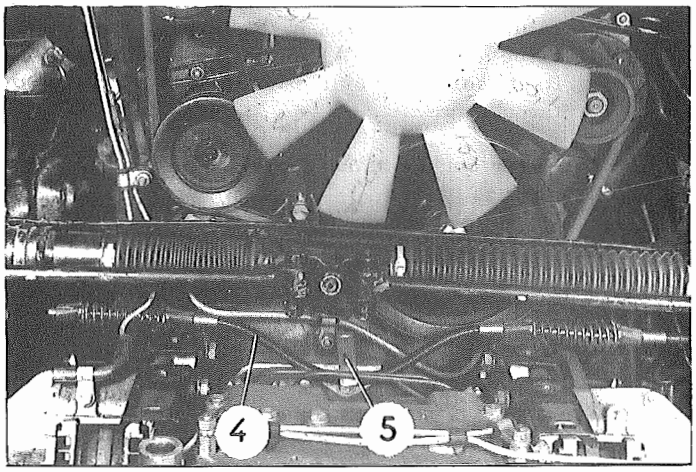
REPLACEMENT OF A PARKING BRAKE CABLE.

REMOVAL.

13. Remove the left-hand front wing and the metal protection shield for the suspension mechanism.

14. Remove the radiator (see Op. DX.232-1).

15. Loosen completely the sheath (1) unscrewing to the maximum the locknut (2) and the nut (3).



16. Free the two springs, the cable and the sheath from the brake caliper levers.

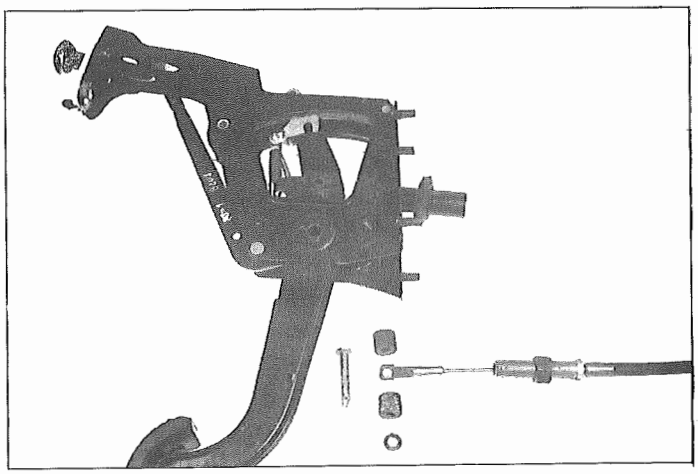
    Free the sheath (4) from the securing clip (5).

17. Free the cable and its sheath from the left-hand body sidemember, taking care not to lose the springs.

18. Disconnect the cable from the brake pedal.

    Remove the retaining clevis pin from the brake pedal and cable, taking care not to lose the rubber stops and the plain washers.

    Remove the cable from the car.



ASSEMBLY.

19. Connect the control cable to the pedal.

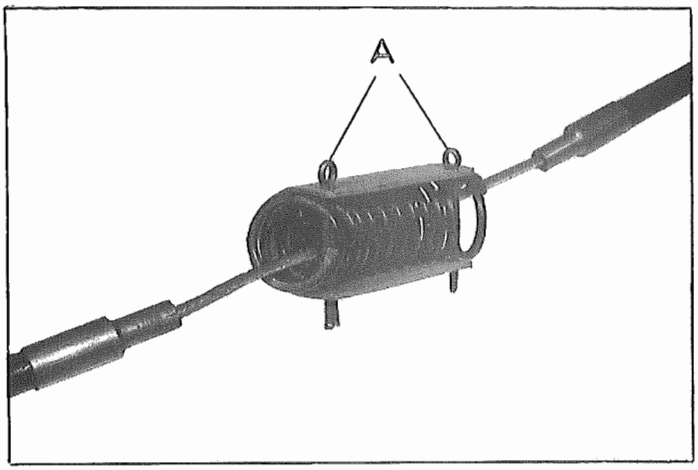
    Fit a new retaining clevis pin fitted with a left-hand rubber stop, and then fit the right-hand rubber stop and the plain washer.

    Spread the metal at the end of the retaining clevis pin.

20. Insert the cable and its sheath through the left-hand body sidemember.

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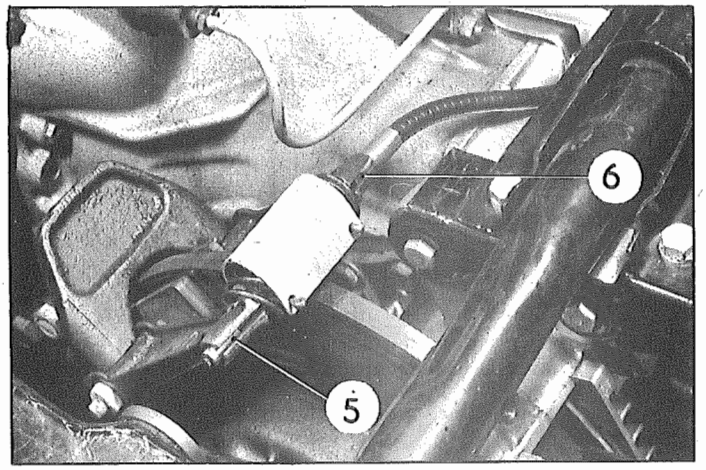
Corrective No.1



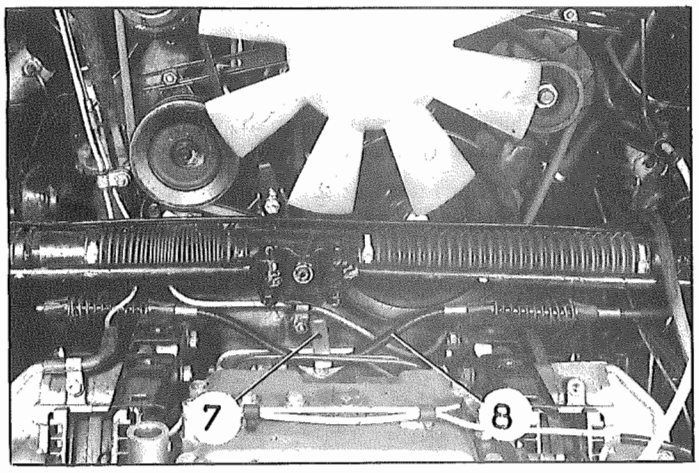
21. Fit the springs on the brake levers.

a) Place the spring in the clamp MR 4158-50. Compress the spring in a vice and place the pins (A) in position to hold the outer spirals of the spring.

b) Fit this assembly, spring and clamp, over the cable and the sheath, and place it between the left-hand levers (5) and (6), engaging the cable in the grooves in the levers, then remove the pins (A) so that the spring positions itself correctly on the lever bosses. Remove the clamp.



22. Carry out the same operation on the second spring.

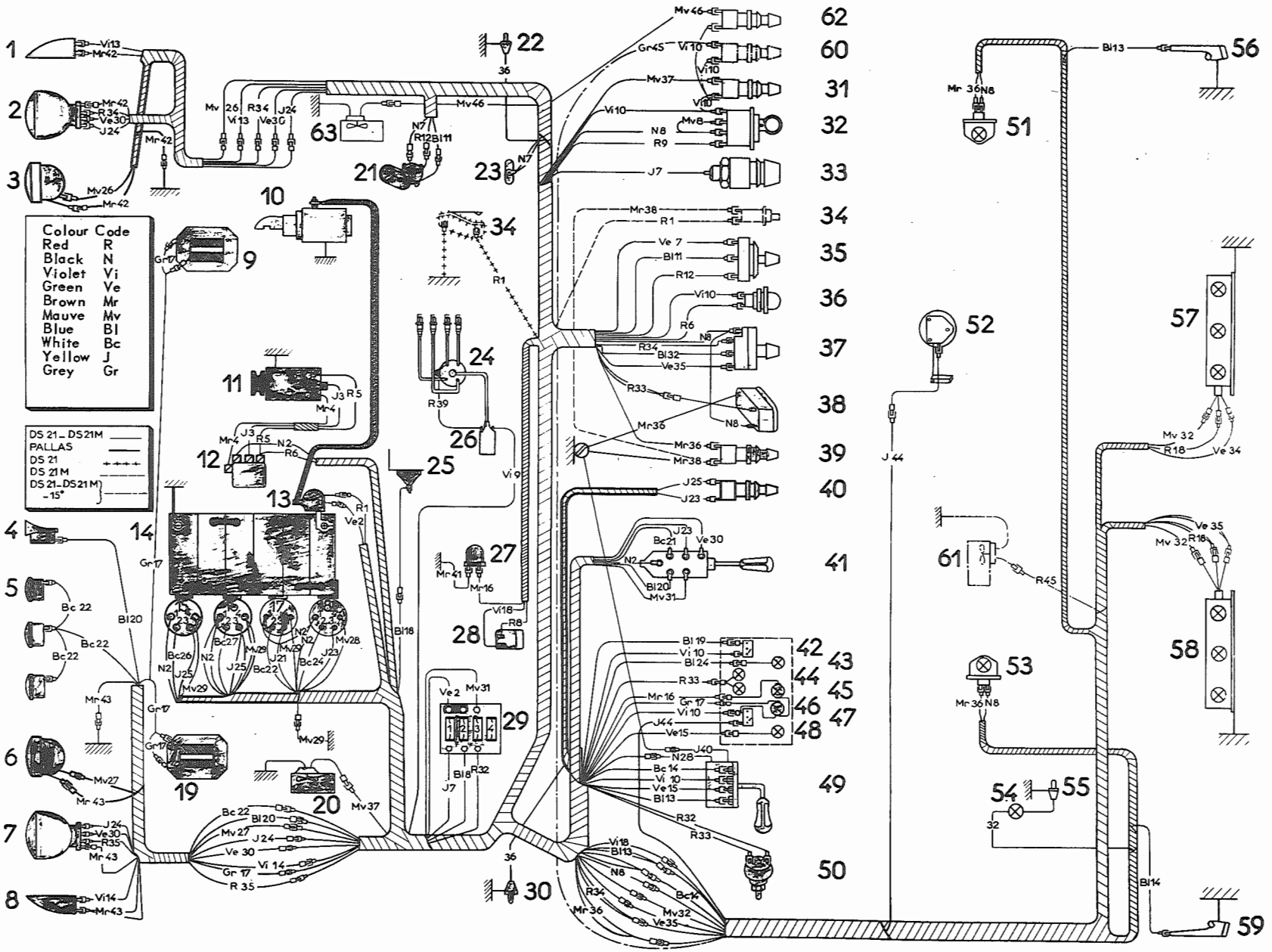


23. Insert the sheath (8) in the securing clip (7).

24. Adjust the tension of the sheath (see Op. DX.454-0).

25. Fit the radiator (see Op. DX.232-1), the metal protection shield for the suspension mechanism and the front left-hand wing.

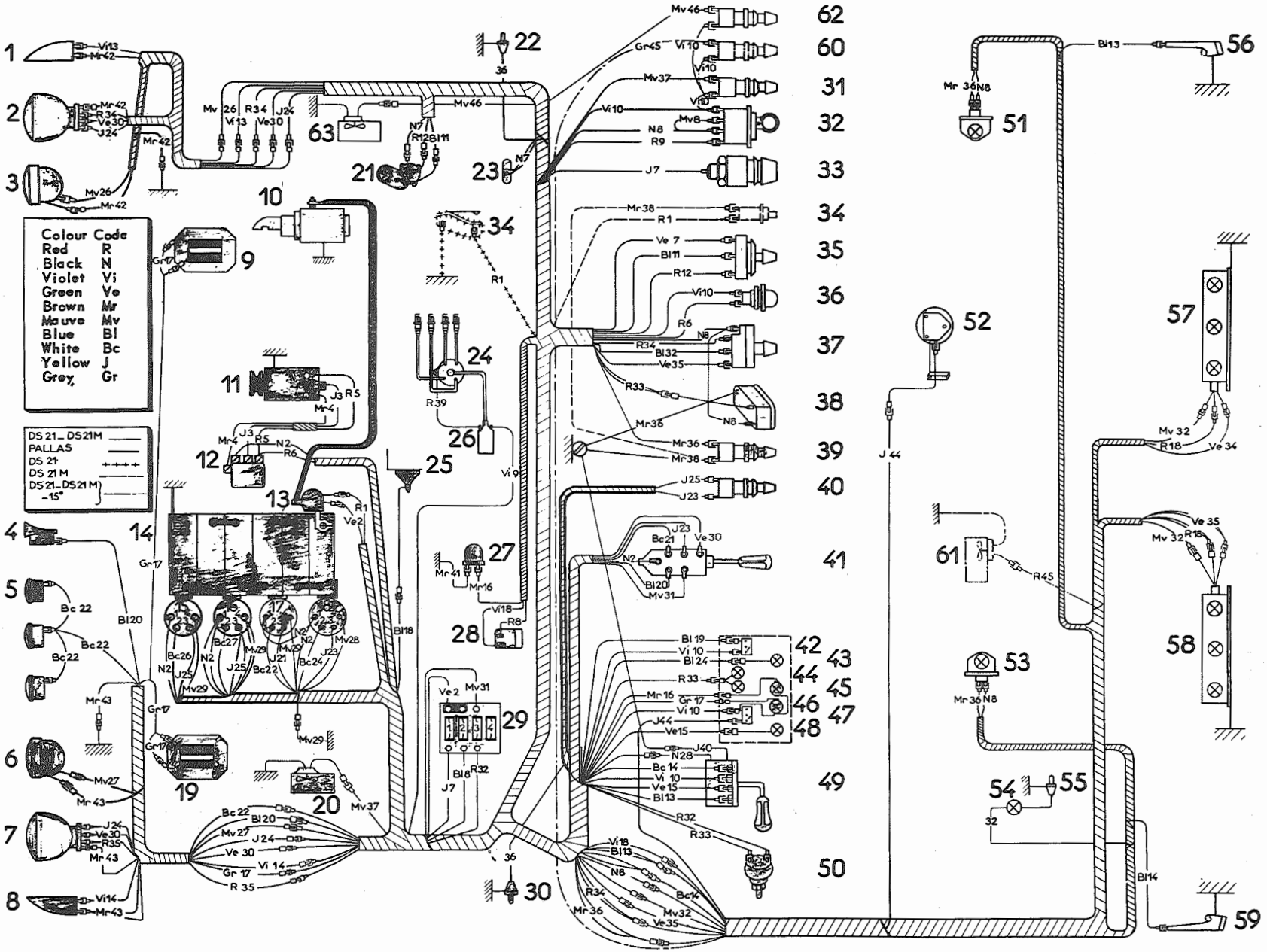
WIRING DIAGRAM



SCHEDULE OF PARTS

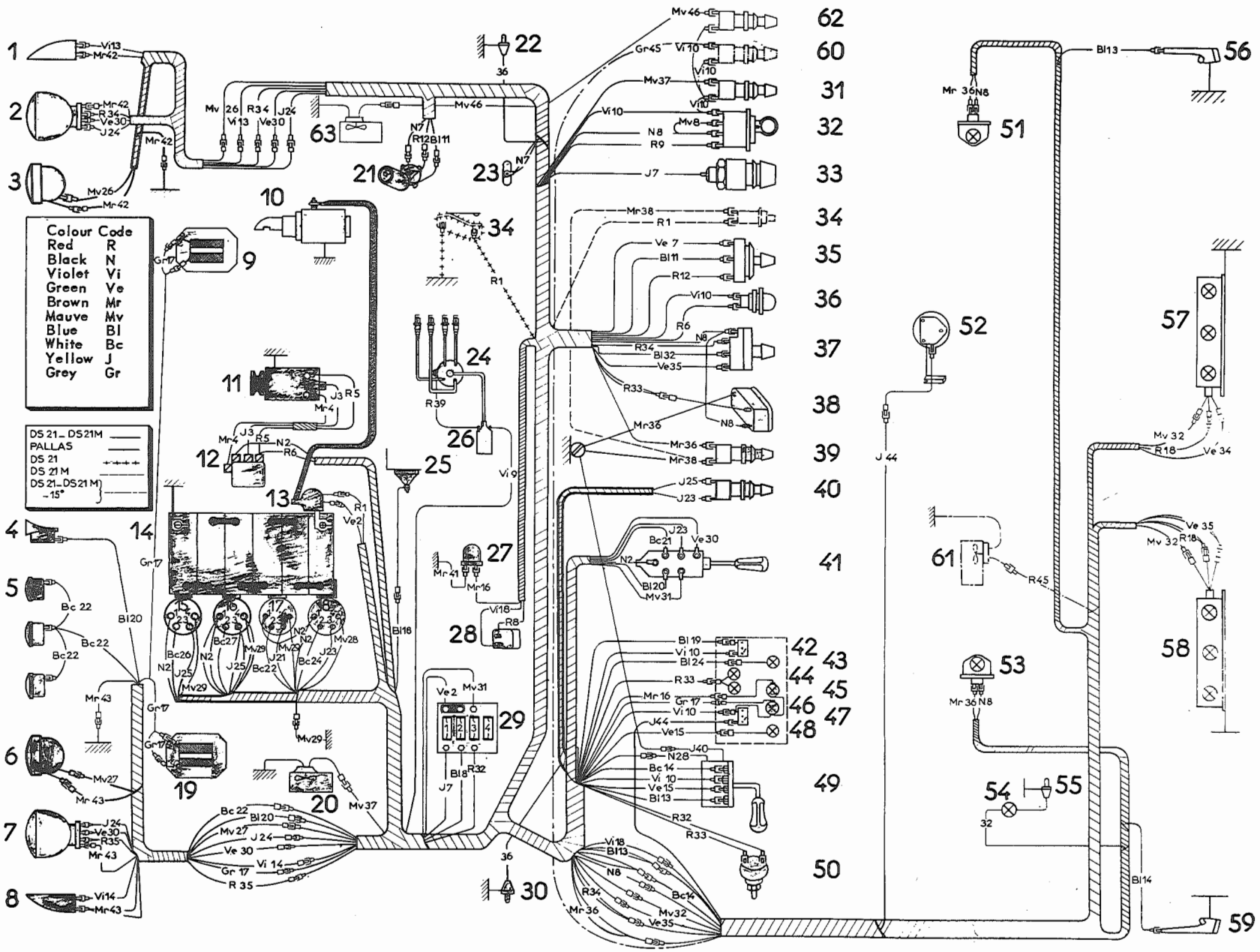
1. Direction indicator lamp, front right.
2. Headlamp, front right.
3. Headlamp, quartz-iodine, front right.
4. Horn, town use (low note).
5. Horns, country (high note).
6. Headlamp, quartz-iodine, front left-hand.
7. Headlamp, front left-hand.
8. Direction indicator lamp, front left.
9. Brake unit, front, right.
10. Starter motor.
11. Dynamo.
12. Regulator.
13. Starter motor solenoid.
14. Battery.
15. Solenoid, SANOR, for quartz-iodine headlamp, front right.
16. Solenoid, SANOR, for quartz-iodine headlamp, front left.
17. Solenoid, SANOR, for horns, country (high note).
18. Solenoid, SANOR, for headlamp flasher.
19. Brake unit, front left.
20. Blower motor, heating, front.
21. Motor for windscreen wiper.
22. Switch for interior lamps operated by front right-hand door.
23. Terminal for accessories.
24. Distributor.
25. Thermometer transmitter.
26. Ignition coil.
27. Pressure switch for brake.
28. Stop light switch.
29. Fuse box.
30. Switch for interior lamps operated by door, front left.
31. Switch for heating, front.
32. Ignition switch.
33. Cigar lighter.
34. Switch for starter solenoid.
35. Switch for windscreen wiper.
36. Ignition and charge-lights.
37. Switch for parking lights.
38. Electric clock.
39. Switch for interior lights.
40. Switch for quartz-iodine headlamps.
41. Switch for lighting and horns.
42. Thermometer.
43. Warning lamp for headlamp main beam.
44. Instrument lighting bulbs.
45. Warning lamp for brake pressure switch.
46. Warning lamp for brake pad wear, front.
47. Feul gauge.
48. Warning lamp for direction indicators.
49. Switch for direction indicators with switch for headlamp flasher.
50. Rheostat for instrument and clock lighting.
51. Interior light, front right.
52. Rheostat for fuel gauge unit.
53. Interior light, front, left-hand.
54. Boot light.
55. Switch for boot light.
56. Right-hand rear direction indicator light.
57. Lights for number plate - rear light and stop lights, right-hand.
58. Lights for number plate - rear light and stop lights, left-hand.
59. Direction indicator light - rear, left.
60. Switch for rear heater (-15 heating).
61. Blower motor for rear heating (-15 heating).
62. Switch for fresh air blower motor.) optional.
63. Fresh air blower.)

WIRING DIAGRAM



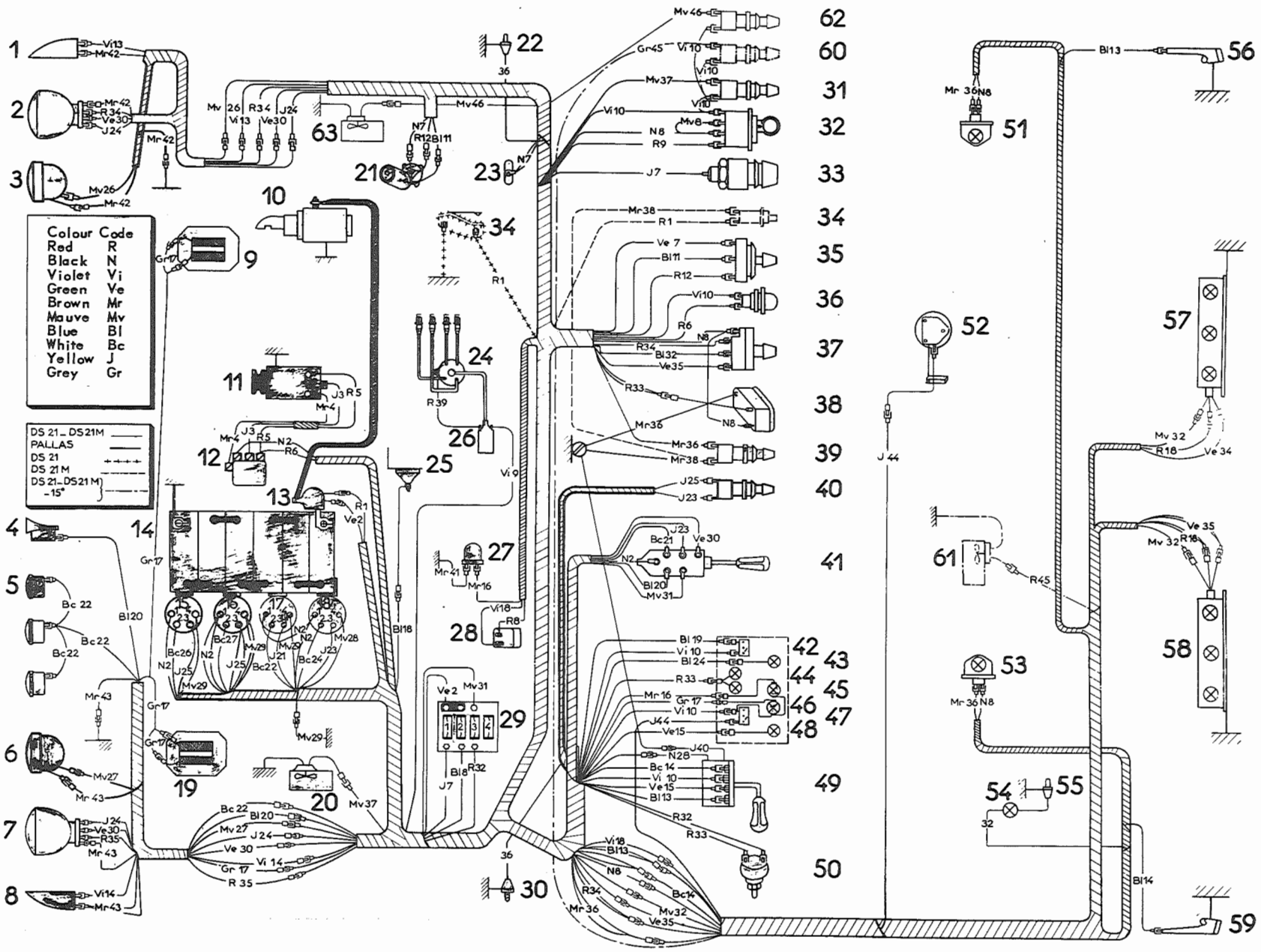
Harness	Lead No.	Colour of End Sleeve	Schedule of Wiring
Front	1	Red	Starter solenoid (13)
		Red	to switch for starter solenoid (34)
Front	2	Green	Starter solenoid (13)
		Black	to terminal "BAT" of regulator (11)
		Green	to fuse box (29) (fuses No. 1 & 2)
		Black	to switch for lighting and horns (41)
		Black	to solenoid for quartz-iodine headlamp, front right (15)
		Black	to solenoid for quartz-iodine headlamp, front left (16)
		Black	to solenoid for country (high note) horns (17)
		Black	to solenoid for headlamp fla (18)
Dynamo	3	Yellow	Dynamo (11)
		Yellow	to terminal "EXC" of regulator (12)
Dynamo	4	Brown	Dynamo (11)
		Brown	to regulator earth (12)
Dynamo	5	Red	Dynamo (11)
		Red	to terminal "DYN" of regulator (12)
Front	6	Red	Terminal "DYN" of regulator (12)
		Red	to ignition and charge light (36)
Front	7	Yellow	Fuse box (29) (fuse No. 1)
		Green	to windscreen wiper switch (35)
		Black	to terminal for accessories (23)
		Black	to windscreen wiper motor (21) (automatic parking)
		Yellow	to cigar lighter (33)
Front	8	Blue	Fuse box (29) (fuse No. 2)
		Black	to rear harness junction
		Red	to stop light switch (28)
		Black	to switch for parking lights (37)
		Black	to clock (38)
		Black and Mauve	to ignition switch (32)
Front	9	Red	Ignition switch (32)
		Violet	to ignition coil (26)
Front	10	Violet	Ignition switch (32)
		Violet	to heater switch (31)
		Violet	to fuel gauge (47)
			to warning light for brake pressure (45)
			to warning lamp for brake pad wear, front (46)
		Violet	to ignition and charge light (36)
		Violet	to switch for direction indicators (49)
		Violet	to thermometer (42)
		Violet	to switch (60) for rear heater (-15 heating)
Front	11	Blue	Switch for windscreen wiper (35)
		Blue	to windscreen wiper motor (21)
Front	12	Red	Switch for windscreen wiper (35)
		Red	to windscreen wiper motor (21)
Front	13	Blue	Switch for direction indicators (49)
		Violet	to front right-hand harness junction
		Blue	to rear harness junction
Front	14	White	Switch for direction indicators (49)
		Violet	to front left-hand harness junction
		White	to rear harness junction

WIRING DIAGRAM



Harness	Lead No.	Colour of End Sleeve	Schedule of Wiring
Front	15	Green	Direction indicator switch (49)
		Green	to warning light (48) for direction indicators
Front	16	Brown	Warning light (45) for brake pressure, front
		Brown	to pressure switch (27) on hydraulic brake pedal gear
Front	17	Grey	Warning light (46) for front brake pad wear,
		Grey	to front harness, left
Front	18	Violet	Stop light switch (28)
		Violet	to rear harness junction
Front	19	Blue	Thermometer (42)
		Blue	to feed wire (18) for thermometer transmitter (25)
Front	20	Blue	Switch for lighting and horns (41)
		Blue	to front harness junction left-hand
Front	21	White	Switch for lighting and horns (41)
		Yellow	to solenoid for horns (country (high note) (17)
Front	22	White	Solenoid for horns (country) (17)
		White	to front harness junction left-hand
Front	23	Yellow	Switch for lighting and horns (41)) on PA
		Yellow	to switch for quartz-iodine headlamps (40))
		Yellow	to solenoid for headlamp flasher (18)
Front	24	White	Solenoid for headlamp flasher (18)
		Yellow	to front harness junction left-hand
		Yellow	to front harness junction right-hand
		Blue	to warning light for headlamp main beam (43)
Front	25	Yellow	Switch (40) for quartz-iodine headlamps
		Yellow	to solenoid (15) for quartz-iodine headlamp, front right (3)
		Yellow	to solenoid (16) for quartz-iodine headlamp, front left (6)
Front	26	White	Solenoid (15) for quartz-iodine headlamp, front right
		Mauve	to harness junction, front right
Front	27	White	Solenoid (16) for quartz-iodine headlamp, front left
		Mauve	to harness junction,front left
Front	28	Mauve	Solenoid (18) for headlamp flasher
		Black	to switch for direction indicators (49)
Front	29		Earth
		Mauve	to solenoid (15) for quartz-iodine headlamp, front right
		Mauve	to solenoid (16) for quartz-iodine headlamp, front left
		Mauve	to solenoid (17) for country horns (high note)
Front	30	Green	Switch for lighting and horns (41)
		Green	to harness junction, front right
		Green	to harness junction, front left
Front	31	Mauve	Switch for lighting and horns (41)
		Mauve	to fuse box (29) (fuse No. 3)
Front	32	Red	Fuse box (29) (fuse No. 3)
		Mauve	to rear harness junction
		Red	to rheostat (50) for instrument lighting
		Blue	to switch for parking lights (37)
Front	33	Red	Lighting rheostat for instruments (50)
		Red	to lamps on instruments (44)
		Red	to clock light (38)

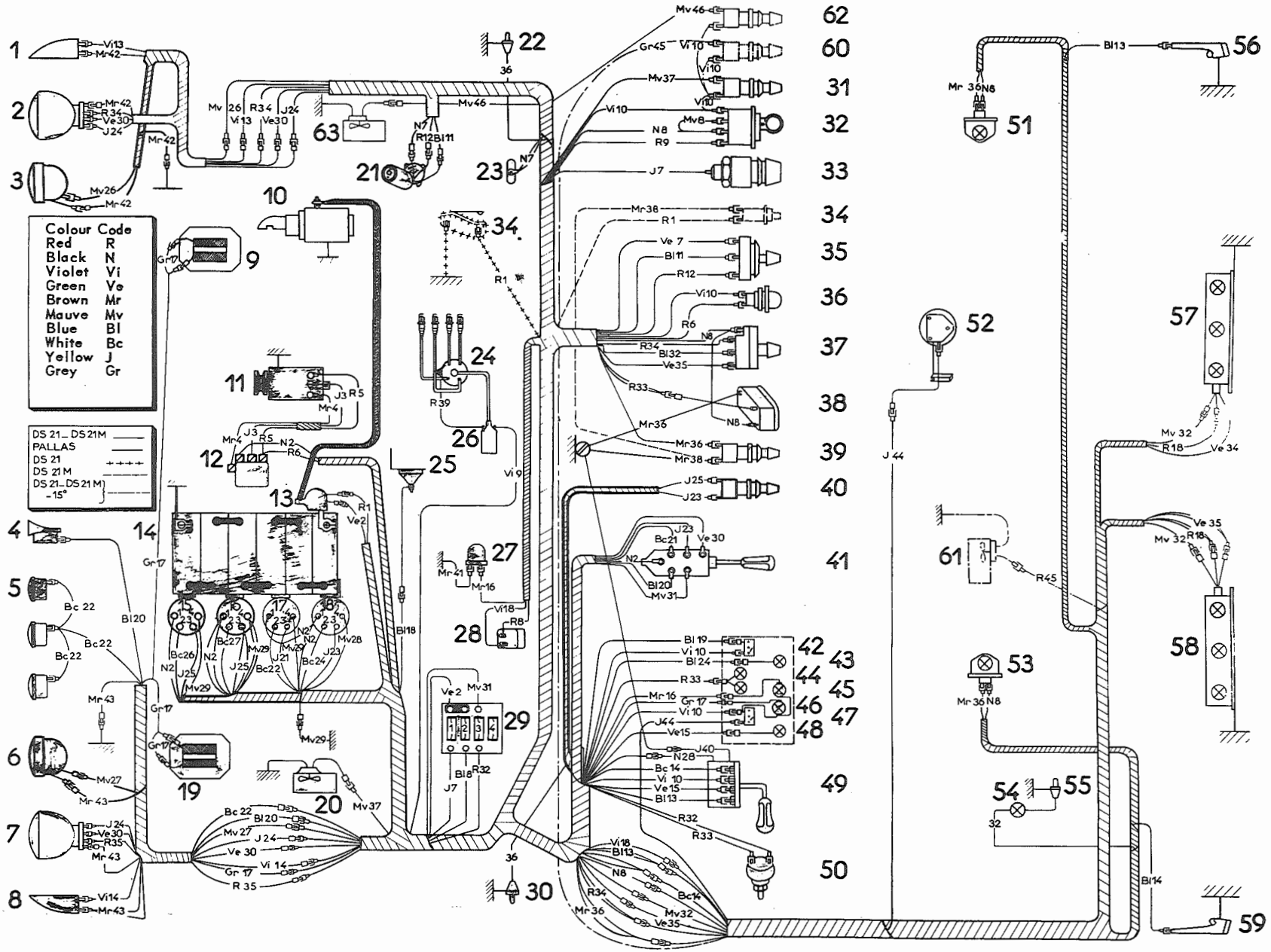
WIRING DIAGRAM



Harness	Lead No.	Colour of End Sleeves	Schedule of Wiring
Front	34	Red	Switch for parking lights (37)
		Red	to harness junction, front right
		Red	to harness junction, rear
Front	35	Green	Switch for parking lights (37)
		Red	to harness junction, front left
		Green	to harness junction, rear
Front	36	Brown	Switch for interior light (39)
		Brown	to harness junction, rear
			to switch (22) for int. lamps operated by front door, right
			to switch (30) for int. lamps operated by front door, left
Front	37	Mauve	Switch for heater, front (31)
		Mauve	to blower motor (20)
Independent lead	38	Brown	Earth
		Brown	to switch (34) for starter solenoid
		Brown	to switch (39) for interior lighting
			to clock (38)
Independent lead	39	Red	Ignition coil (26)
			to distributor (25)
Independent lead	40	Yellow	Earth
		Yellow	to direction indicator switch (49)
Independent lead	42		Earth
		Brown	to brake pressure switch (27)
Front right	13	Violet	Harness junction, front right
		Violet	to direction indicator lamp, right (1)
Front right	24	Yellow	Harness junction, front right
		Yellow	to headlamp front right (2) (main beam)
Front right	26	Mauve	Harness junction, front right
		Mauve	to quartz-iodine headlamp, right (3)
Front right	30	Green	Harness junction, front right
		Green	to headlamp, front right (2) (dipped beam)
Front right	34	Red	Harness junction, front right
		Red	to headlamp front right (2) (sidelamp parking light)
Front right	42		Earth
		Brown	to direction indicator lamp, front right (1)
		Brown	to headlamp, front right (2)
		Brown	to headlamp, quartz-iodine right (3)
Front left	14	Violet	Harness junction, front left
		Violet	to direction indicator lamp front left (8)
Front left	17	Grey	Harness junction, front left
		Grey	to harness for front brake pads (9) and (19)
Front left	20	Blue	Harness junction, front left
		Blue	to town horn (4)
Front left	22	White	Harness junction, front left
		White	to country horns (5)
Front left	24	Yellow	Harness junction, front left
		Yellow	to headlamp, front left (7) (main beam)
Front left	27	Mauve	Harness junction, front left
		Mauve	to quartz-iodine headlamp, left (6)

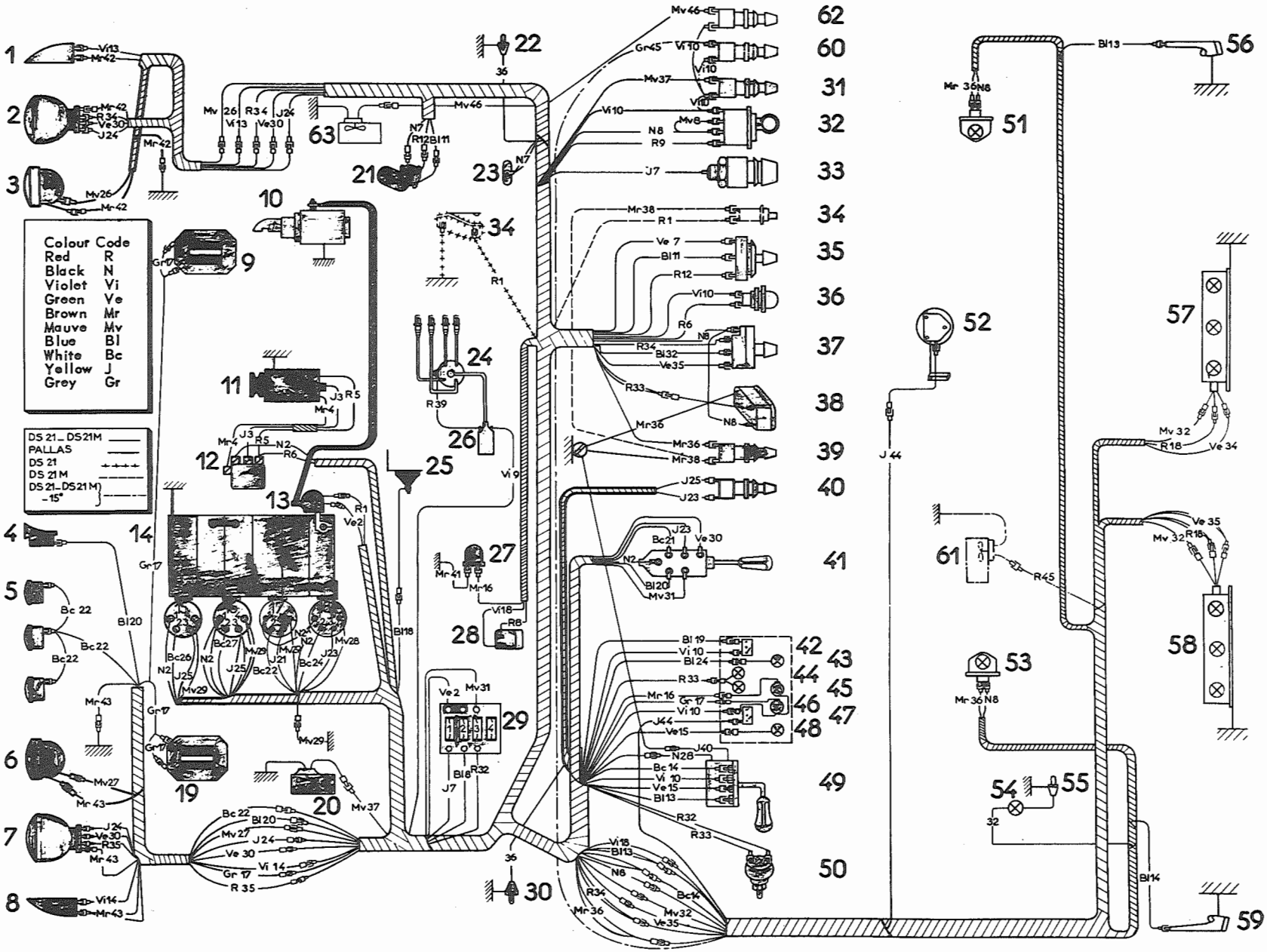
ELECTRICAL

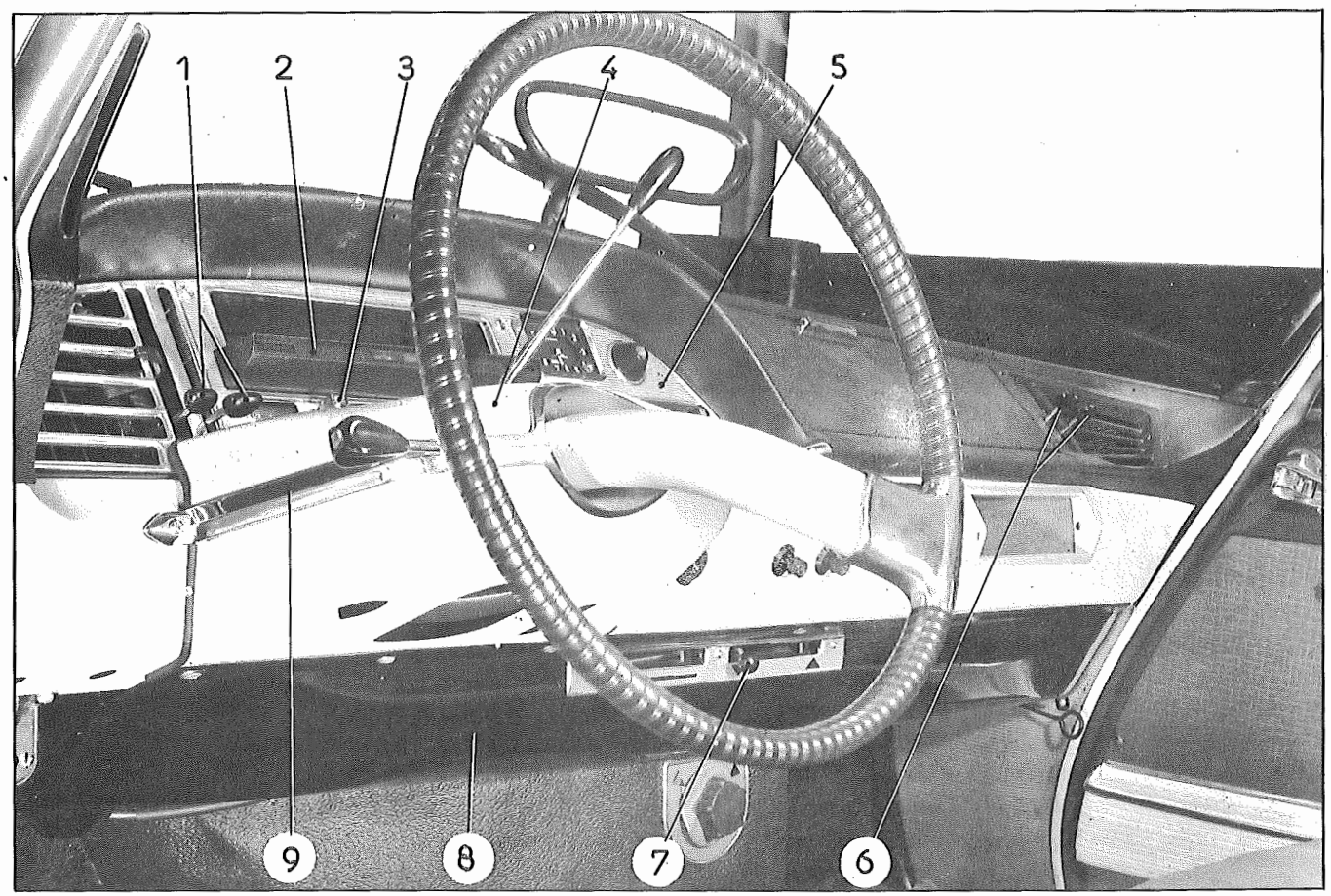
WIRING DIAGRAM



Harness	Lead No.	Colour of End Sleeve	Schedule of Wiring
Front left	30	Green Green	Harness junction, front left to headlamp, front left (7) (dipped beam)
Front left	35	Red Red	Harness junction, front left to headlamp, front left (7) (sidelamp - parking lamp)
Independent lead	43		Earth
		Brown	to direction indicator lamp, front left (8)
		Brown	to headlamp, front left (7)
		Brown	to quartz-iodine headlamp, left (6)
Rear	8	Black Black	Harness junction, rear to interior lamps, front right (51) and front left (53)
Rear	13	Blue Blue	Harness junction, rear to direction indicator lamp, rear right (56)
Rear	14	White Blue	Harness junction, rear to direction indicator lamp, rear left (59)
Rear	18	Violet Red Red	Harness junction, rear to rear stop lamp, right (57) to rear stop lamp, left (58)
Rear	32	Mauve Mauve Mauve	Harness junction, rear to right lamp (57) for number plate to left lamp (58) for number plate to boot lamp (54)
Rear	34	Red Green	Harness junction, rear to parking light (rear light), rear right (57)
Rear	35	Green Green	Harness junction, rear to parking light (rear light), rear left (58)
Rear	36	Brown Brown	Harness junction, rear to interior lights, front right (51) and front left (53)
Rear	44	Yellow Yellow	Petrol gauge (47) to rheostat for petrol gauge unit (52)
Rear	45	Grey Red	Switch (60) for rear heating (-15°C) to blower motor (61) for rear heating (-15°C)
			OPTION:
			On demand, a fresh air blower is fitted (63).
		Violet	A jumper lead Vi 10 feeds switch (62)
		Mauve	One independent lead Mv 46 feeds the fresh air blower motor (63).

WIRING DIAGRAM





REPLACING A FACIA PANEL

Removal.

1. Disconnect the negative lead from the battery.

2. Remove the screws holding the finisher over the steering aperture.

Move the finisher (9) back.

3. Remove the cover (4) from the electrical control bracket.

Remove:

- the screws securing the speedometer surround,
- the reset knob (3) from the speedometer,
- the buttons (1) right and left-hand, for the ventilation shutter controls.

Remove the speedometer surround (5).

4. Disconnect the wiring harness from behind the switches next to the speedometer.

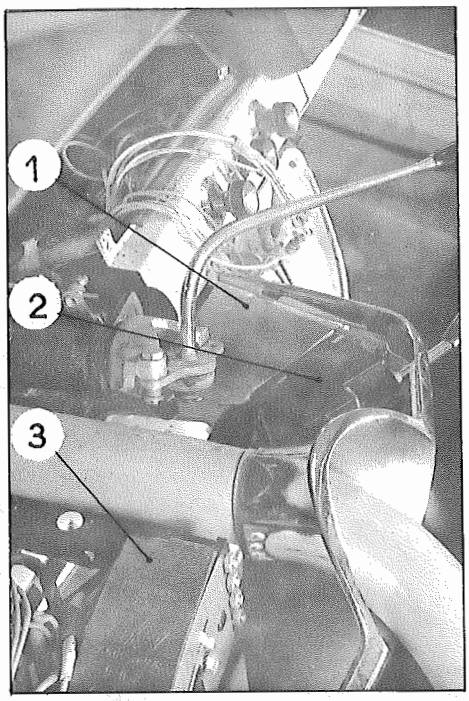
5. Remove the speedometer (2).

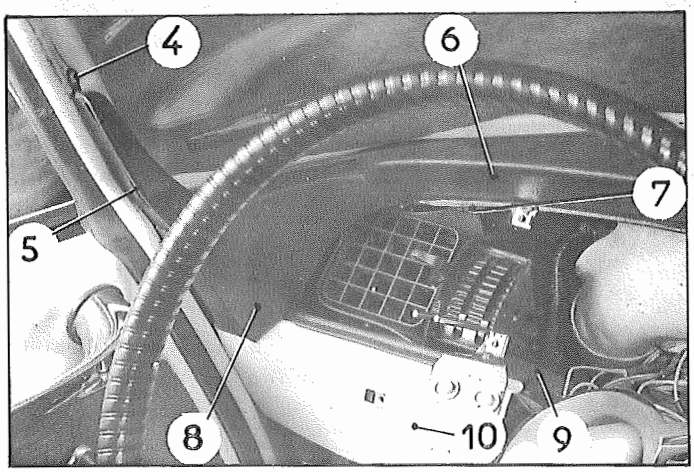
Disconnect the speedometer flexible cable and disconnect the wiring harness from behind the speedometer.

6. Remove the knobs (6) from the control levers of the heater shutters.

7. Remove the screws holding the finishing panel under the facia.
Remove the finishing panel (8).

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8. Remove the nuts securing the switch (2) for lighting and horns.
Remove the switch with its wiring.

9. Remove the screw holding the "AXO" switch (3) for the direction indicators with headlamp flasher and disconnect the wiring harness.

10. Remove the electrical control bracket (1) with the switch (3) for the direction indicators.

11. Remove the upper screw (4) securing the demisting nozzle (5) for the left-hand front door window, and the screw securing the lower left-hand facia panel.

12. Free the assembly of upper (8) and lower (10) facia panel, left-hand and disconnect the nozzle from its flexible tube (9).

13. Remove the ashtray.

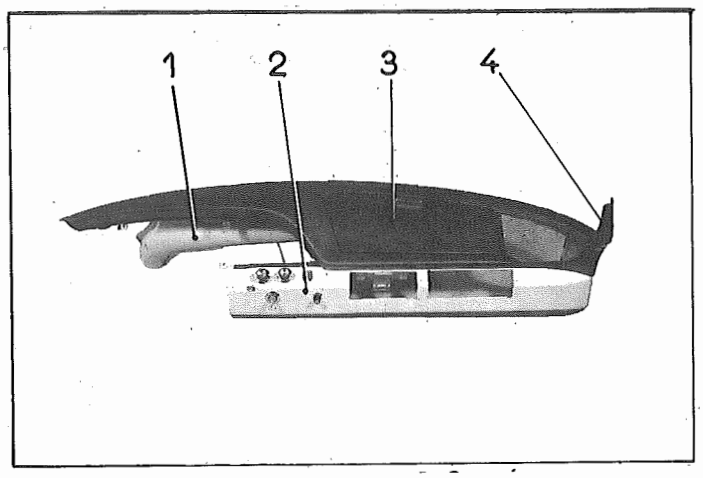
14. Remove the screw securing the map pocket.
Remove the map pocket towards the rear.

15. Remove the rubber stop from the rear view mirror support.
Remove the rear view mirror.

16. Remove the right-hand ventilation grille.

17. Remove the nuts, right-hand (7) and left-hand securing the upper part of the facia panel (6), right-hand.

18. Remove the upper securing screw from the demisting nozzle for the front right-hand door window.

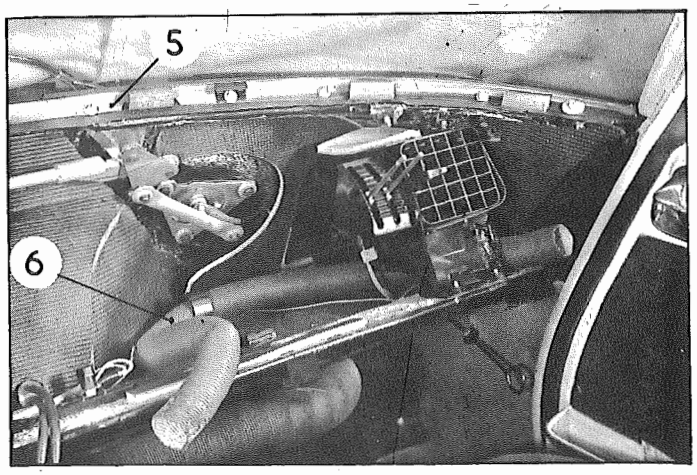


19. Disconnect the choke cable from the carburettor.
Disconnect the harnesses.
Disconnect the rubber tubes from the windscreen washer pump.

20. Free the assembly of facia panel upper (3) and lower (2), right-hand, and the nozzle (4) for demisting the right-hand front window glass.
Disconnect the union pipe (6) between the right-hand side nozzle and the windscreen demisting duct.

21. Remove the right-hand facia panel assembly.

22. Remove the finishing strip (5) between the windscreen and the facia panel.



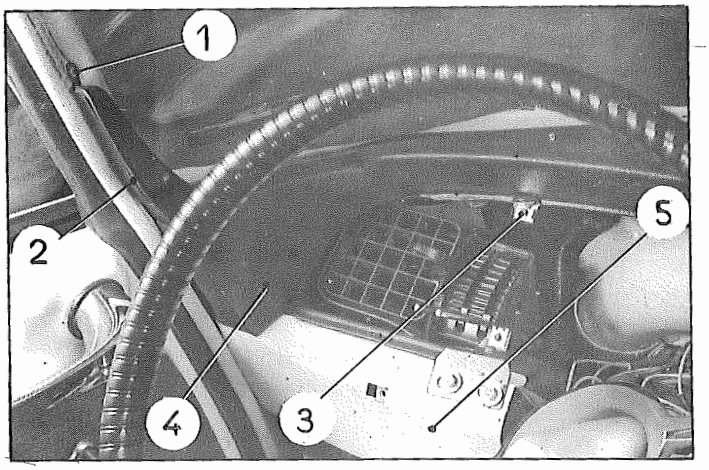
Assembly.

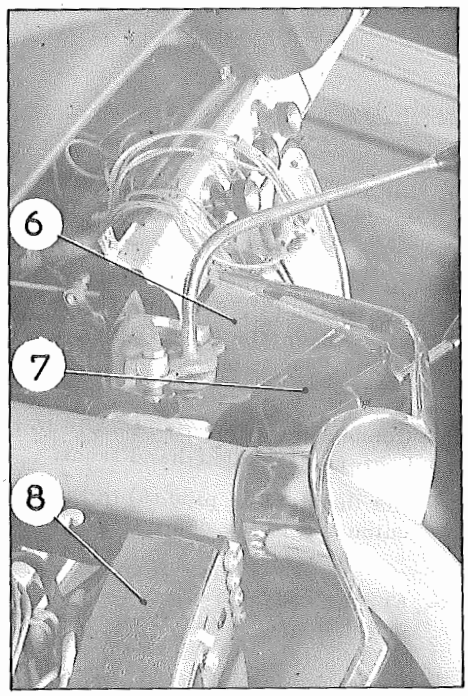
23. Fit and secure the finishing strip (5) between windscreen and facia panel.

24. Offer up the assembly of demisting nozzle, right-hand (4), demisting duct (1) for the windscreen, facia panel upper (3) and lower (2).

25. Connect the demisting nozzle to the flexible heater duct, right-hand front.
Connect the flexible pipe (6) to the side nozzle union and to the demisting nozzle union.

26. Engage fully the upper part of the facia panel under the finishing strip.





27. Fit and tighten the 2 nuts, right and left-hand (3) securing the upper right-hand facia panel.

28. Fit the rear view mirror and adjust it correctly.

29. Fit the upper securing screw for the demisting nozzle for the front right-hand door window.

30. Fit the map pocket. Fit the screw securing the map pocket.

31. Connect the rubber tubes to the windscreen washer pump.

Connect the harness to the lower right-hand facia panel.

Connect the choke cable to the carburettor, allowing a small clearance.

32. Fit the right-hand ventilation grille.

33. Fit the assembly of the facia panel, upper (5) and lower (4) and demisting nozzle (2) left-hand.

Fit the securing screw (1) for the demisting nozzle, left-hand and the securing screw for the lower left-hand facia panel.

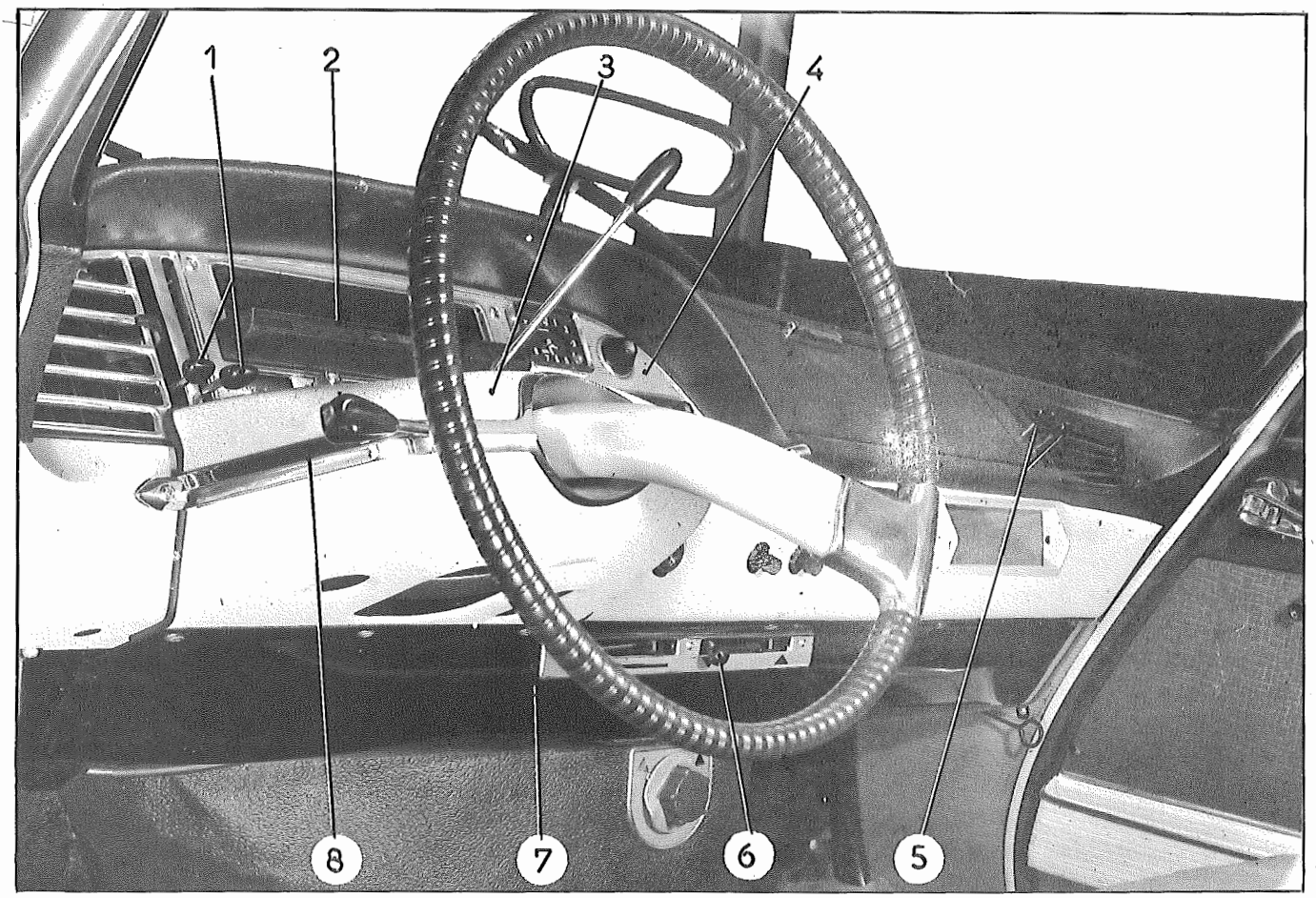
34. Fit the support (6) for the electrical control unit.

Pass the wiring harness for the lighting and horn switch under the support clip in the steering tunnel.

Fit the switch (7).

Fit the screw securing the "AXO" switch (8) for the direction indicators, with headlamp flasher.

Connect the leads to the switches.



35. Fit the finishing panel (7) under the scuttle shelf.

Push on the knobs (6) for the heater control levers.

36. Offer up the speedometer (2).

Connect up:

- the leads,
- the flexible drive to the speedometer.

Offer up the speedometer surround (4).

Connect up the leads.

Fit the speedometer surround.

37. Fit the cover (3) over the electrical support bracket.

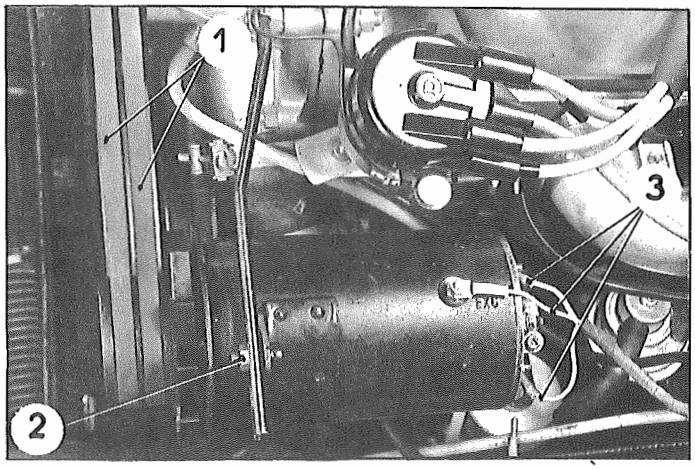
38. Fit and secure the finisher (8) for the steering aperture.

39. Fit the right-hand knobs (5) and left-hand knobs (1) for the ventilation ducts.

40. Fit the ash-tray.

NOTE: For connecting up the leads, reference should be made to the electrical wiring diagram (see Op. DX.510-1).

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REMOVAL.

1. Disconnect the negative lead from the battery terminal.

Place the manual height control lever in "low" position.

Remove the front left-hand suspension sphere.

2. Disconnect the leads (3) from the dynamo.

3. Disconnect the nut (2) from the dynamo tie-rod. Swing the tie-rod over towards the engine.

4. Unscrew by a few turns the 2 screws (4) securing the dynamo.

Swing the dynamo towards the engine.

5. Remove the belts (1) from the pulley.

6. Remove the securing screws (4).

Remove the dynamo.

ASSEMBLY.

7. Offer up the dynamo.

Fit the securing screws (4).

Insert a spring washer and a plain washer under the heads.

Screw the securing screws up.

8. Adjust the dynamo pulley (see Op. DX.231-0, paragraph 5).

9. Swing the dynamo towards the engine.

Fit the belts (1) on the pulley.

10. Connect the dynamo tie-rod.

Tension the belts. (See Op. DX.231-0, paragraphs 16 and 17).

Lock the nut (2) on the tie-rod.

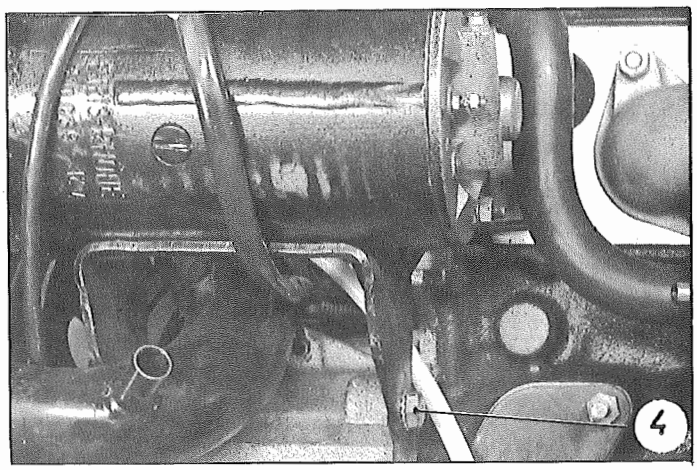
11. Tighten the securing screws (4).

12. Connect the leads (3) to the dynamo.

13. Fit the front left-hand suspension sphere.

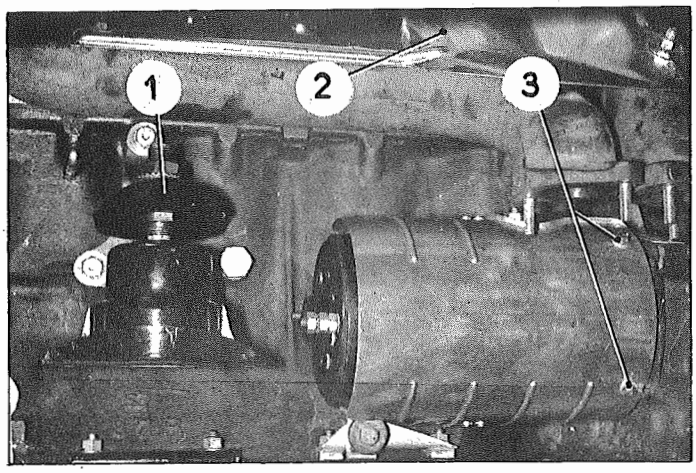
Connect the lead to the negative terminal of the battery.

Start up the engine and place the manual height control lever in "normal" position.



June 1966.

Corrective No.1

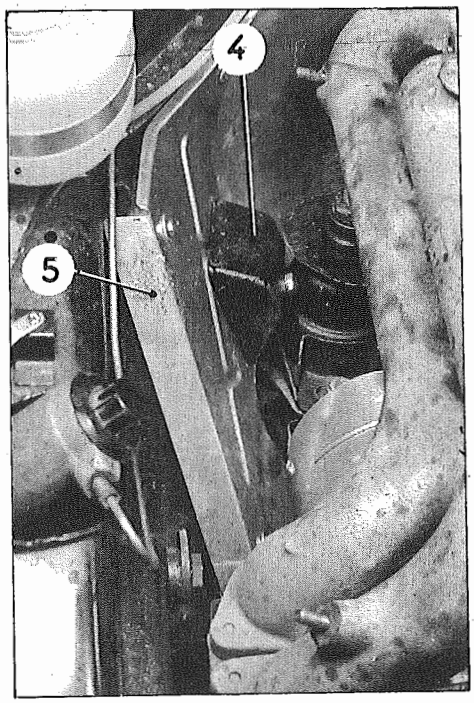


REMOVAL.

1. Disconnect the negative cable from the battery, and the starter cable from the starter motor.

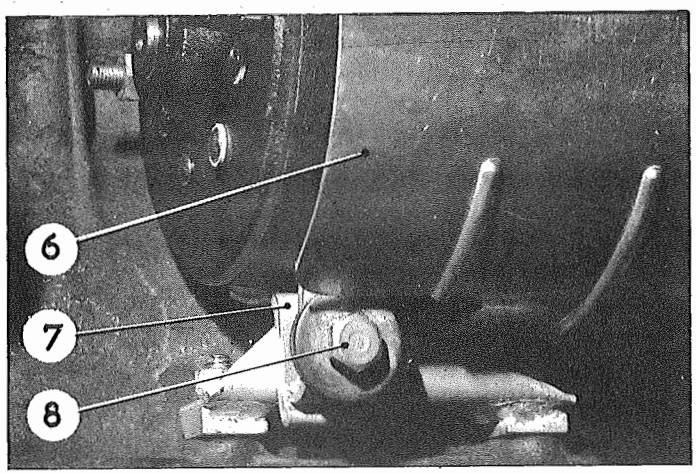
2. Bend upwards the protective shield (1) of the engine mounting.

3. Remove :
   - the air filter and its bracket,
   - the protection shield for the exhaust manifold,
   - the two screws (3) securing the starter motor shield.



4. Place the manual height control in the low position and remove the right-hand front suspension sphere. Fit a sealing plug on the cylinder.

5. Remove :
   - the damping weight (4),
   - the anti-drumming plate (5).



6. Slide the starter shield (6) as far as possible to the front of the engine so as to gain access to the collar (7).

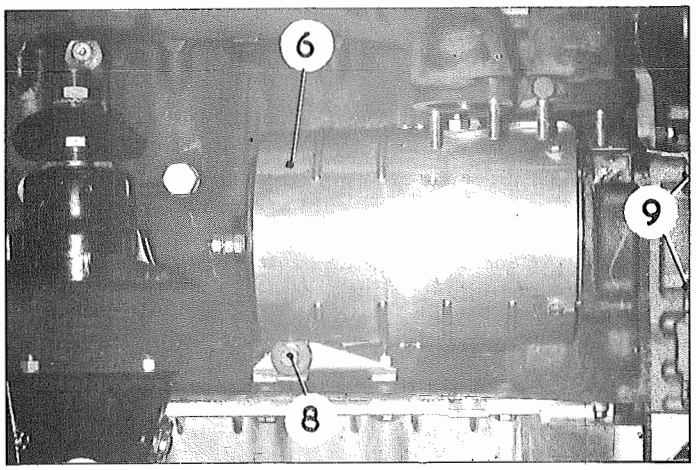
Remove the screw (8) from above using a 12 mm box spanner.

Remove the collar (7), sliding it towards the rear of the starter motor.

Remove the starter motor shield.

7. Remove the three securing screws from the starter motor.

Withdraw the starter motor towards the rear and upwards. To facilitate its removal a cable may be fixed on the rear stud of the starter motor.



ASSEMBLY.

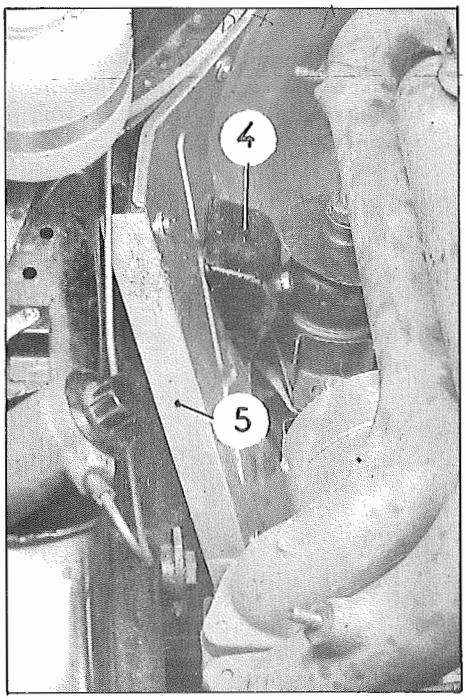
8. Fit the starter motor shield (6) sliding it as far as possible under the engine support.

9. Put the starter motor in position and tighten the three securing screws (9).

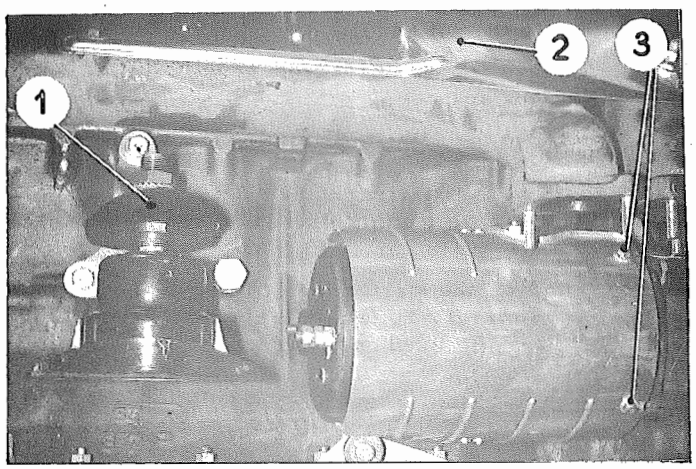
10. Bring the starter motor shield (6) above the starter and slide it towards the front.

11. Fit the collar and tighten the screw (8).

12. Put the shield (6) in place. Tighten the two securing screws.



13. Fit :
- the anti-drumming plate (5),
- the damping weight (4).



14. Bend down again the protective shield for the engine mounting (1).

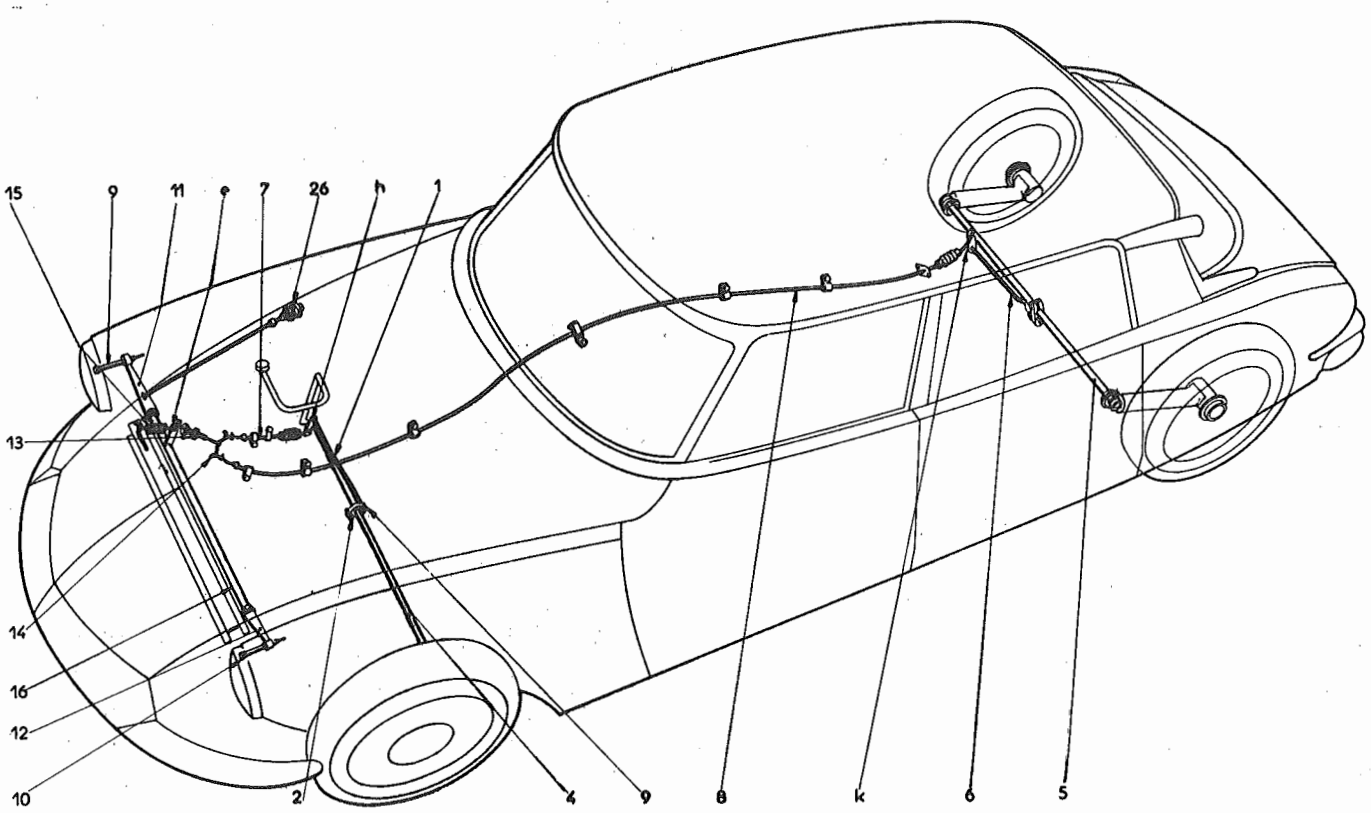
15. Fit the exhaust manifold shield (2), the air filter and its bracket.

16. Connect the negative cable to the battery and the feed lead to the starter motor.

17. Fit the front right-hand suspension sphere and put the circuits under pressure.

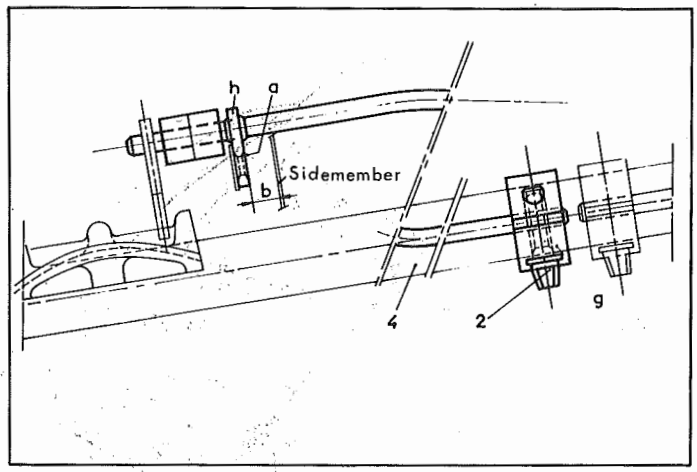
Corrective No.

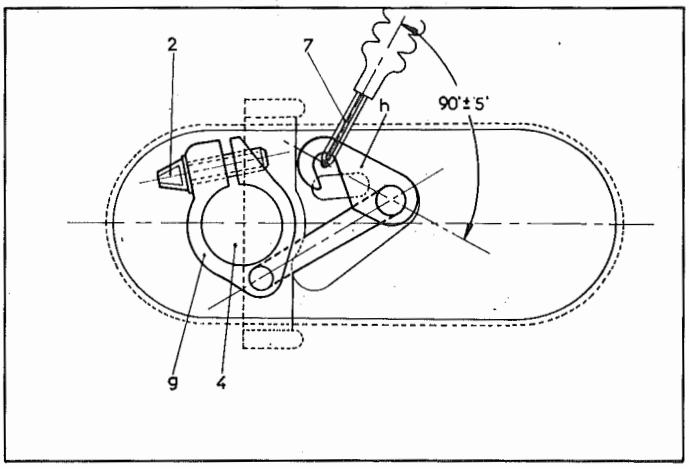
June 1966.

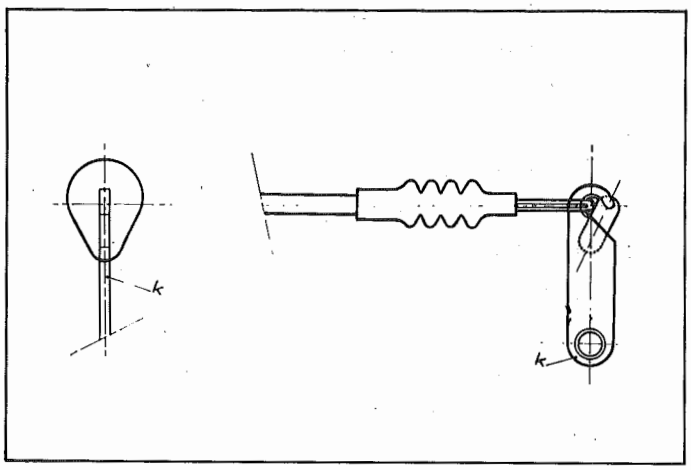


1. Headlamp control torsion rod - front.
g. Clamp for control torsion rod - front (1).
h. Lever with cable hook for control torsion rod (1).
4. Anti-roll bar, front.
5. Anti-roll bar, rear.
6. Headlamp control torsion rod, rear.
7. Cable for front control.
8. Cable for rear control.
9. Control rod, right-hand.
10. Control rod, left-hand.
11. Control lever, right-hand.
12. Control lever, left-hand.
13. Adjuster.
14. Integrator.
15. Return spring.
e. Lever for control rod.
16. Headlamp control cross-bar, front.
26 Delay device.

June 1966. Corrective No.1







PRE-ADJUSTMENT OF THE HEADLAMP CONTROL.

IMPORTANT NOTE : Ensure that the car is in running order, with the heights correctly adjusted, the tyres inflated to the correct pressures and engine idling.

The manual height control lever should be in the "normal" position.

1. Position the headlamp control torsion rod, front, on the front anti-roll bar (4).

a) Lateral position. Measure the distance "b" (between the face (a) of the lever with cable hook (h) and the outer side of the right-hand sidemember).
This must be (b) = 8.5 to 10.5 mm. If necessary move the clamp (g) on the anti-roll bar (4), after loosening the screw (2) in clamp (g).

b) Angular position. Make an angle of $90^{\circ} \pm 5^{\circ}$ between the centre line of the lever with cable hook (h) and the cable (7) by moving, if necessary, the clamp (g) on the anti-roll bar.

c) Tighten the screw (2) holding the clamp on the anti-roll bar (4).

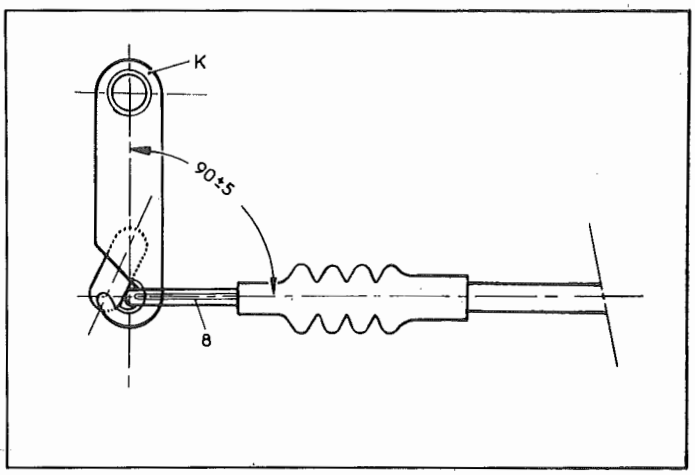
2. Position the headlamp control torsion rod, rear (6) on the rear anti-roll bar (5).

a) Remove the metal panel protecting the rear corrector control.

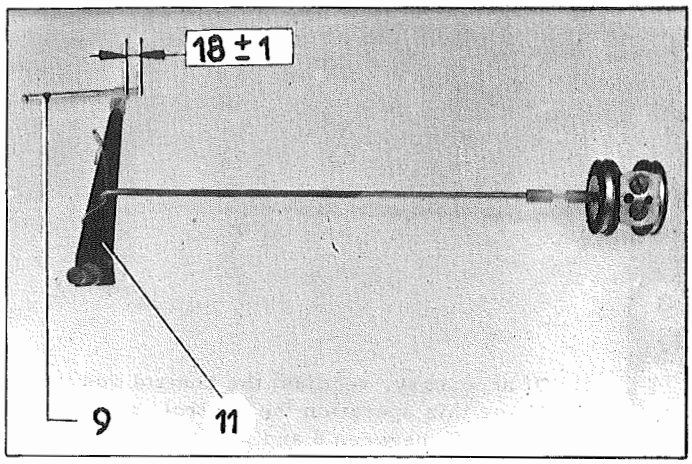
b) Lateral position. Place the lever (k) with cable hook, in the centre of the hole for the passage of the cable, in the rear unit.

Without affecting in any way the functioning, the lever (k) may be offset by a maximum of 2 mm to the right or left of the centre of the hole.

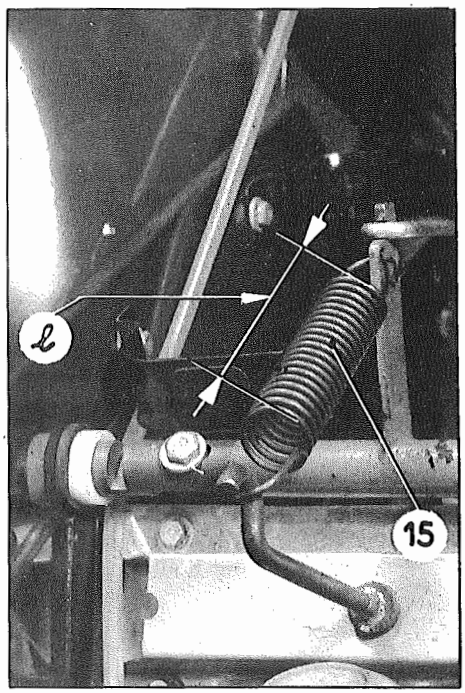
Corrective 1 June 1966.



c) Angular position. Make an angle of $90^{\circ} \pm 5^{\circ}$ between the centre line of lever (k) and the cable (8).

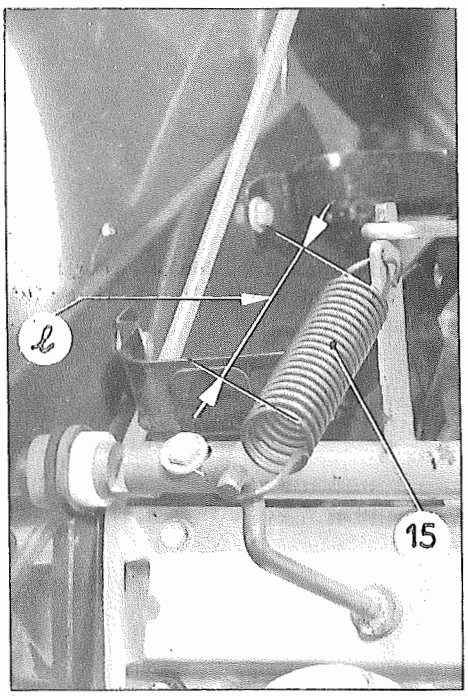


3. Adjust the control rods (9) and (10), screwed into the right-hand lever (11) and left-hand lever (12) so that they protrude by 18 ± 1 mm. For the items (10) and (12) see diagram on page 1 of this operation.



4. Adjust the length of the return spring (15). This should be "l" = 75 ± 5 mm measured as shown in the photograph.

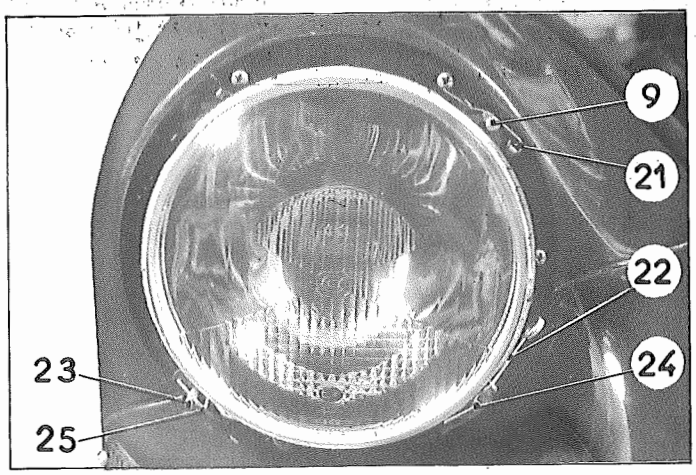
To obtain this measurement proceed as follows :



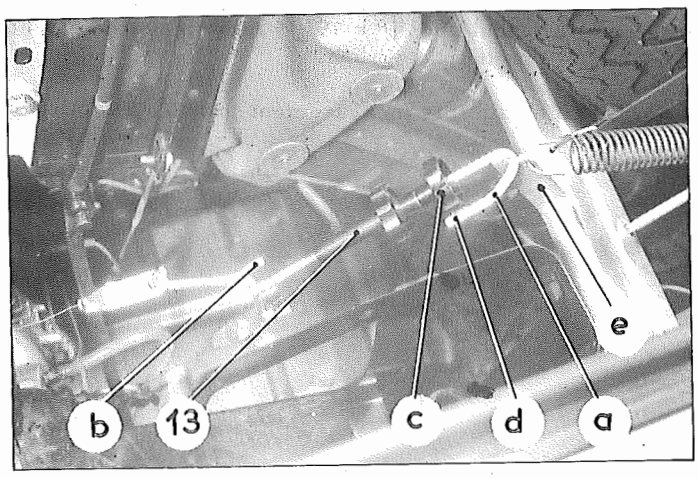
a) Disconnect the adjuster (13) from the lever on the cross-bar (16).

b) Position the lever (e) of the headlamp control cross-bar so as to bring the headlamps light units approximately parallel to the edges of the headlamp bodies on the front wings.

Hook the return spring (15) on the lever, choosing a hole in the lever to give dimension "l" of 75.5 ± 5 mm.

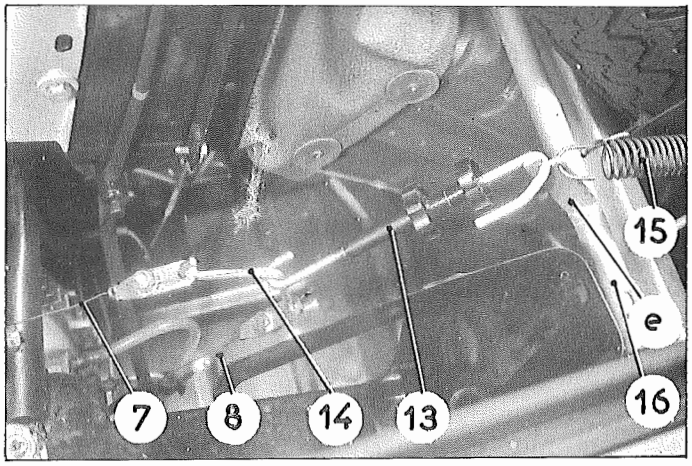


c) If necessary, readjust the control rod (9). After this operation the control rods should protrude between 8 and 28 mm.

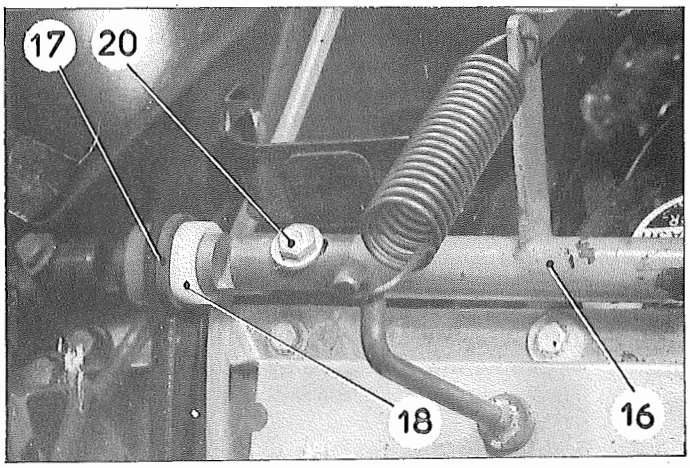


d) Positioning the adjuster (13)

- turn the hook "a" of the front rod of the assembly (13) towards the front right-hand wing,
- turn the hook "b" of the rear rod of the assembly (13) towards the engine,
- screw the adjusting knob until the front edge of knob "c" is in line with the central mark "d" on the front hook.



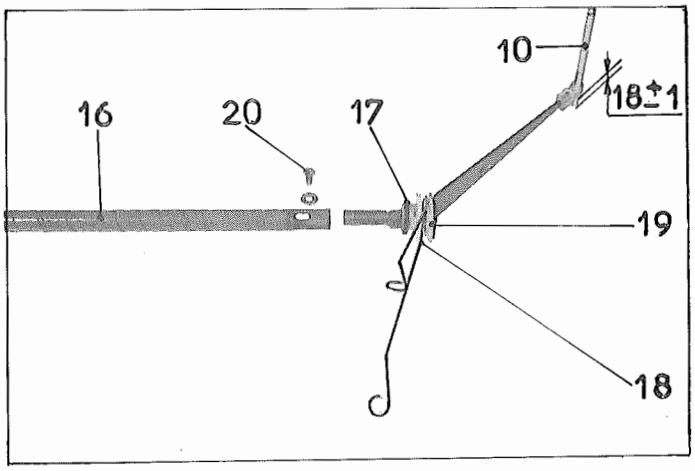
e) Adjust the length of the two cables (7) and (8) using cable clamps, so that the adjuster (13) is at right angles to a line passing through the holes in the cable clamps on the integrator (14) and so that the headlamp light units are approximately parallel to the edges of the headlamp bodies on the front wings.



5. To check the operation of the control cross-bar (16).

NOTE : For this cross-bar to operate without any strain, it is necessary :

- that the bearings (18) butt correctly against the wing valance,
- that the rubber rings (17) are fitted correctly on the bearings (18) on the engine side and also snugly against the wing valance,
- that the end-float of the cross-bar is correctly adjusted,
- that if the cross-bar is moved towards the right, it returns freely towards the left of the vehicle and that the lever seats correctly against the right-hand bearing.

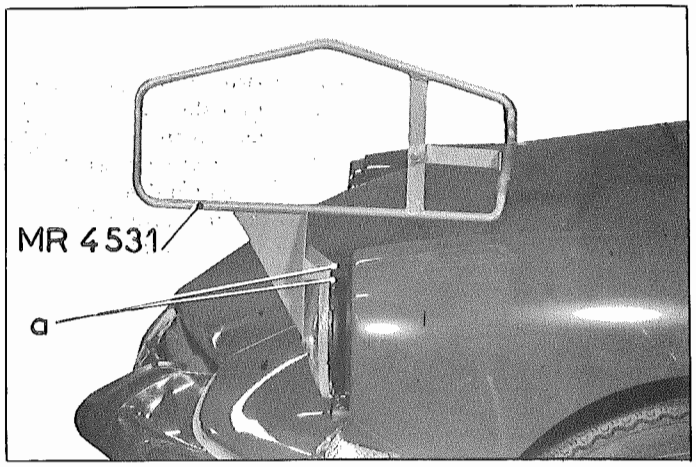


Adjust the end-float of the cross-bar, which must be between 2 and 4 mm.

a) Push the bar towards the right, in contact with the spring, the bearing (18) and the washer (19).

b) Measure, on the right-hand side, the existing end-float between the lever and the bearing, which should be between 2 and 4 mm.

If it is not, loosen the screws (20) holding the control cross-bar (16). Move the rod laterally (slots are provided to allow this movement). Tighten the screws (20) and again check the end-float.



6. Check the automatic headlamp control.

Before adjusting the headlamps themselves it is advisable to check the working of the automatic headlamp control.
To do this, proceed as follows :

a) Place the height control at maximum height position.

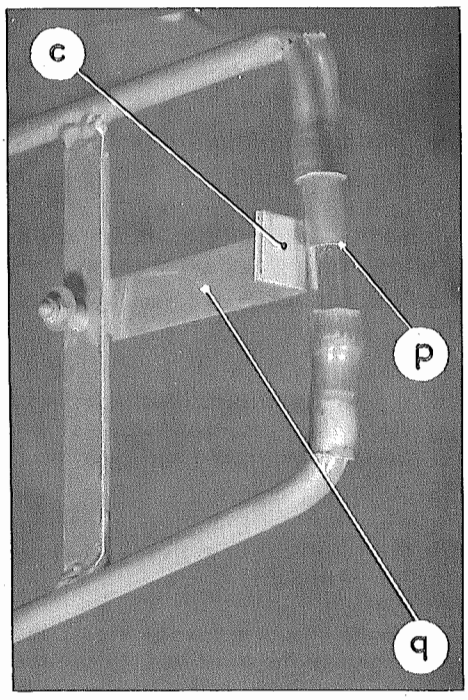
b) Remove the rim from the headlamp on the driver's side.

c) Fit the gauge MR.4531 on the headlamp light unit (see photograph). This gauge must be level and vertical. Check that the two clips "a" fit securely behind the flange on the light unit.

Adjust the index (d) so that the mark (c) is in line with the level of the liquid in the plastic tube.

d) Now proceed as follows. During these operations the level of the liquid should not change appreciably (7 mm maximum).

Press hard on the main brake pedal, and using the lever of the manual height control, lower the car as slowly as possible. The front alone descends at first until the height control lever reaches the "normal" position. Then, the front and the rear will lower very slowly but almost simultaneously, so long as the control lever is lowered until the "maximum low" position is reached.

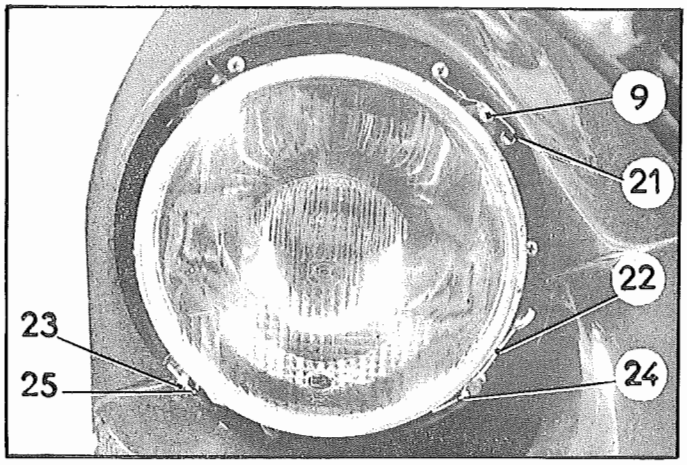


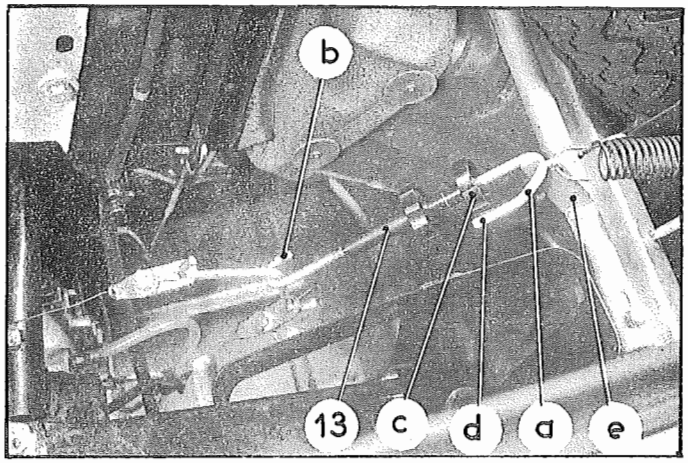
NOTE : If this operation is too rapid, the delay device fitted on the front right-hand wing will come into action and delay appreciably the movement of the headlamp.

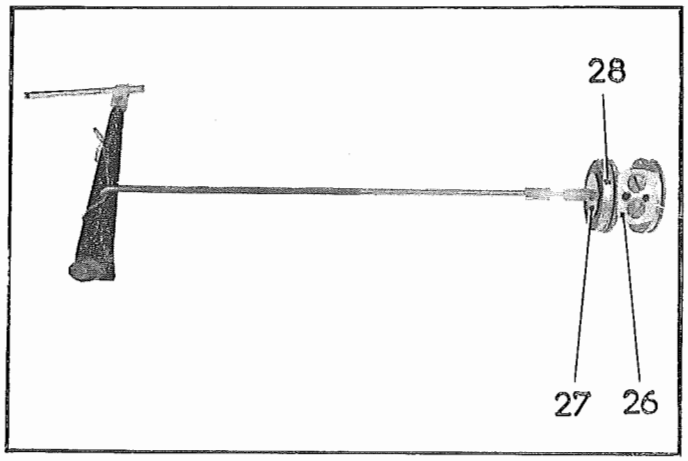
In this way it is possible to check if the front control or the rear control of the headlamps does not work. If it does not function the liquid level will not remain in line with the mark on the index during one or other phase of lowering the car.

If there are "hard spots" in the control the liquid level will change in "jerks".

e) If the liquid level moves more than 7 mm it is necessary to check for hard spots which impede the operation of the automatic control of the headlamps, and also the position of the delay device (see paragraph 10, this operation).







ADJUSTING THE HEADLAMPS.

7. Ensure:
   - that the upper spring pin (21) is in tension in the groove of the control rod (9),
   - that the spring (22) embeds itself in the screw locating spring to prevent slip,
   - that the light unit, when disconnected from the control rod, pivots freely (if not, check the position of the leads and wiring connectors, which may foul the housing),
   - that the points of the lower springs (22) and (25) press on the headlamp light unit flange,
   - that the lower pivot pins are correctly positioned in the bearing holes,
   - that the leads pass through the hole at the bottom of the headlamp body,
   - that the hole at the top of the headlamp body is fitted with a rubber plug (if not the air pressure, when travelling fast, may raise the headlamp),
   - that the plated headlamp rim is of the type designed for headlamps with automatic control.

8. Put the circuits under pressure and leave the engine idling during the adjustment.

9. Adjustment of the headlamps.

Use a device such as "Reglolux" or "Regloscope". Ensure that the vehicle and the adjusting device are on the same plane.

a) Loosen, without removing, the 2 screws securing the delay device (26) on the front right-hand wing and make sure that during the adjustment the delay device (26) does not restrict the movements of the controls.

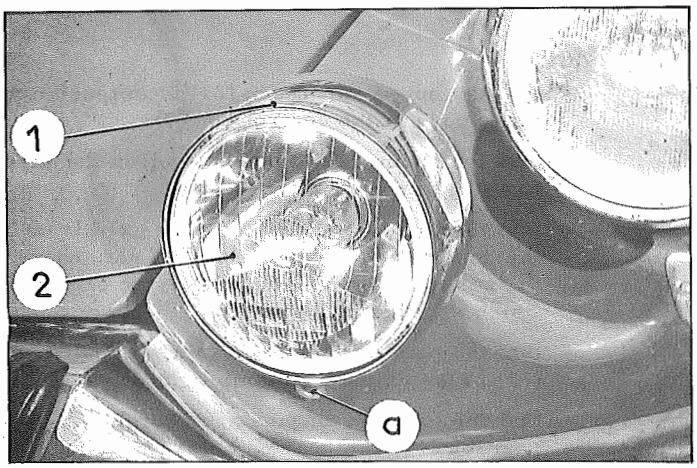
b) To adjust the light unit laterally, turn the lower outer screw (23).

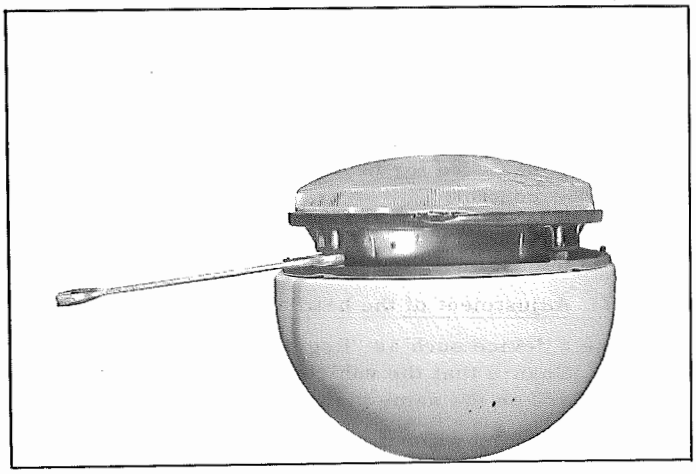
c) To adjust the light unit vertically, use the control rod (9).

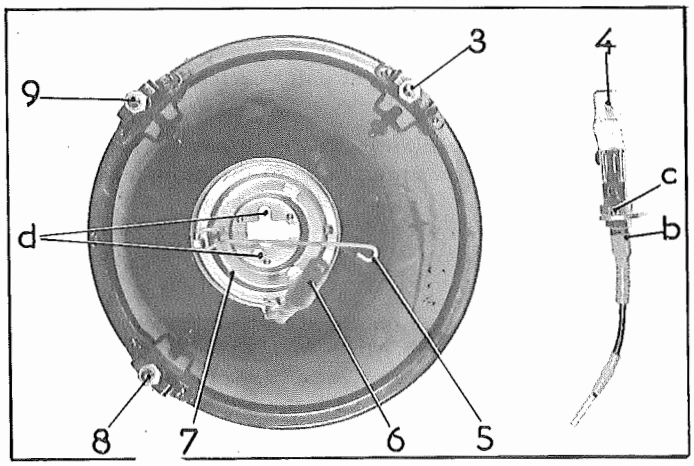
d) If both headlamps are each set too low or too high, adjust the length of the adjuster (13), by means of its sleeve. This should not be moved morethan 2 graduations from the central graduation.

NOTE:
- Do not press on the adjusting screw with a screwdriver. After each adjustment tap the headlamp glass to stabilise its position.
- Do not interfere with the adjustment of the screw (24) locked with a hexagon nut.

10. Adjust the position of the delay device.
With the thumb and finger hold the two cups (27) level with their retaining rings (28). The body of the delay device will position itself so that the slide-valve is in the middle of its stroke.







REPLACING A QUARTZ-IODINE HEADLAMP BULB.

PRECAUTIONS.

This operation must only be carried out with the headlamp extinguished.

After switching off it is advisable to allow about 5 minutes for cooling before proceeding to handle them.

Do not touch the bulb with the fingers. If this is done inadvertently, clean the bulb very carefully with a little soapy water and dry with a clean cloth free from fluff.

Removal.

11. Remove:
    - the rim (1) by pulling the clip (a),
    - the light unit (2) by pulling until the 3 adjusting screws, (3), (8) and (9) for the headlamp, are completely free from their plastic sockets.
12. Disconnect the feed wire from the quartz-iodine bulb, and the earth wire (6).
13. Unhook the spring (5) supporting the bulb. Remove the bulb.

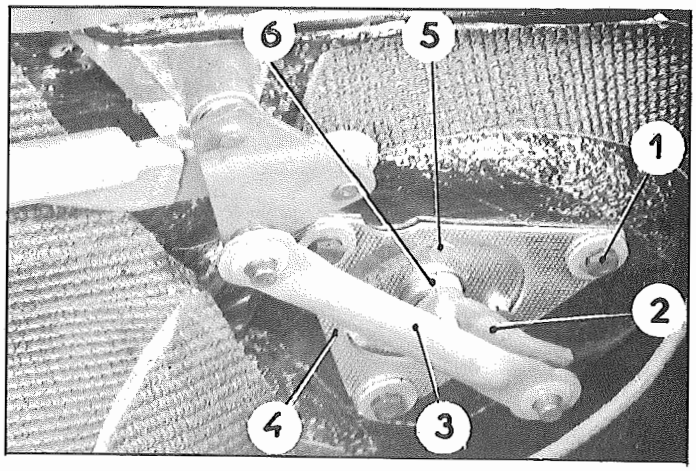
Assembly.

14. Take hold of the quartz-iodine bulb (4) at (b) and position it in the projector with the locating dowels (c) in their housings (d).
15. Hook on the spring (3).
16. Fit the feed wire.
17. Place the light unit (2) in position, engaging the 3 adjusting screws (3), (8) and (9) fully in their plastic sockets.
18. Engage the centre clip of the rim (1) in the slot, and push the rim on.

ADJUSTING THE HEADLAMP.

The quartz-iodine headlamps must be adjusted so that the centre lines of the two beams are parallel to each other, horizontal, and parallel to the longitudinal centre line of the car (use a beam-setting device such as "Regloscope" or "Reglolux").

19. To adjust the light unit horizontally turn screw (3).
20. To adjust the light unit vertically turn screw (8).
21. Screw (9) permits simultaneous adjustment laterally and vertically.



REMOVAL.

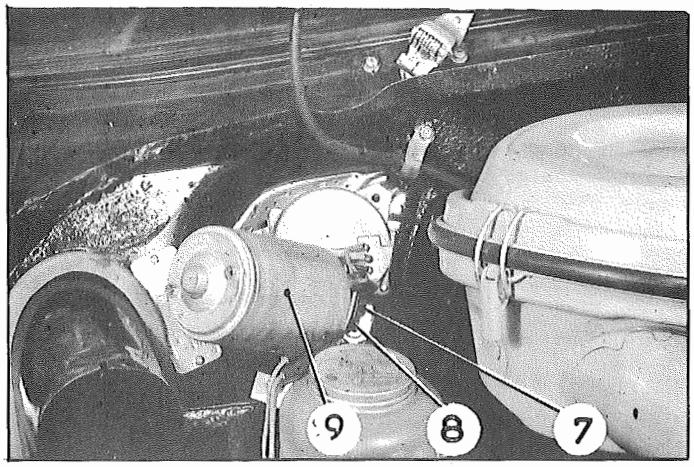
1. Remove the windscreen wiper motor.

a) Remove the facia panel (see Op. DX.520-1).

b) Disconnect the control arm (3) from the motor connecting rod (2). To do this remove with a screwdriver the nylon bush securing the control rod (3) to the ball pin on the motor connecting rod (2).

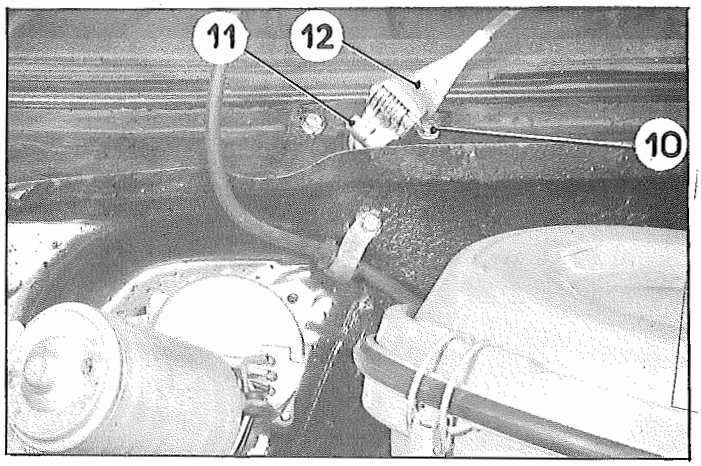
c) Remove:

- the 3 screws (1) securing the backplate (4) and the plate (7) holding the motor (9),
- the backplate (4).



d) Disconnect the supply leads from the motor and remove the motor (9) with its plate (7) and the 3 locators (8).

e) Remove the 3 screws (5) securing plate (7) to the motor (9).



2. Remove the linkage.

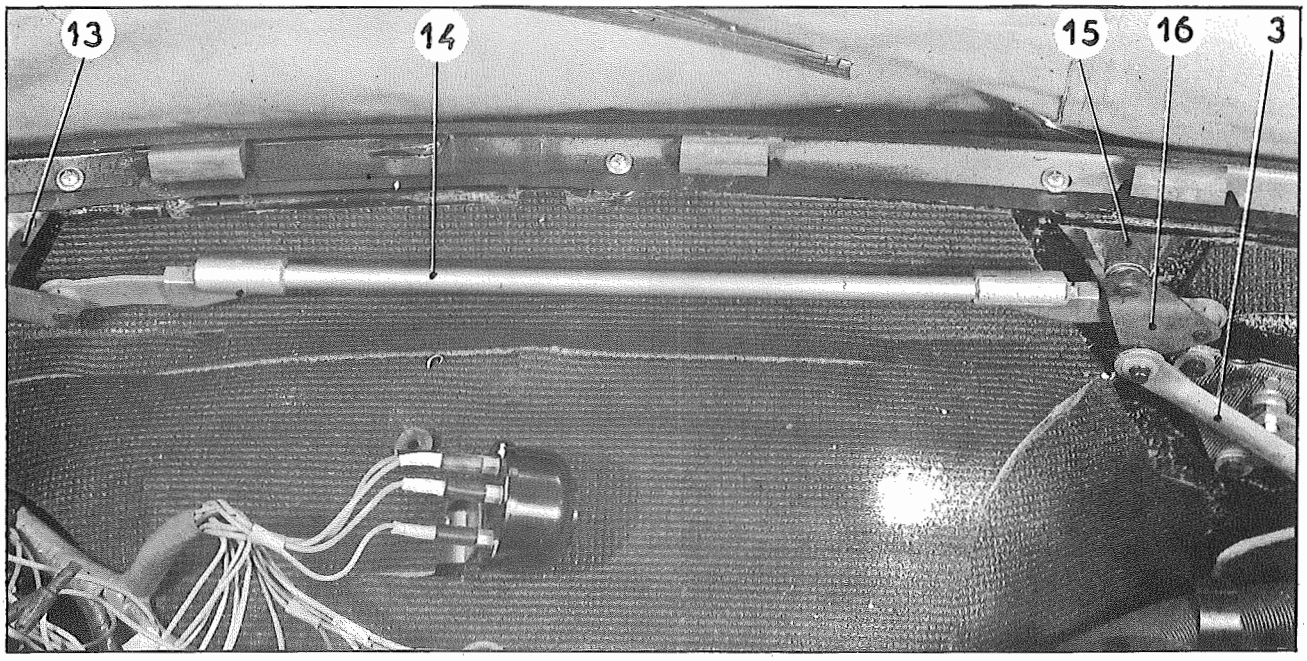
a) Loosen the screw (11) and free the wiper arms (12).

b) Remove the angled packing piece and the rubber sealing gasket.

c) With a screwdriver remove the sealing compound from the windscreen round the heads of the screws (10).

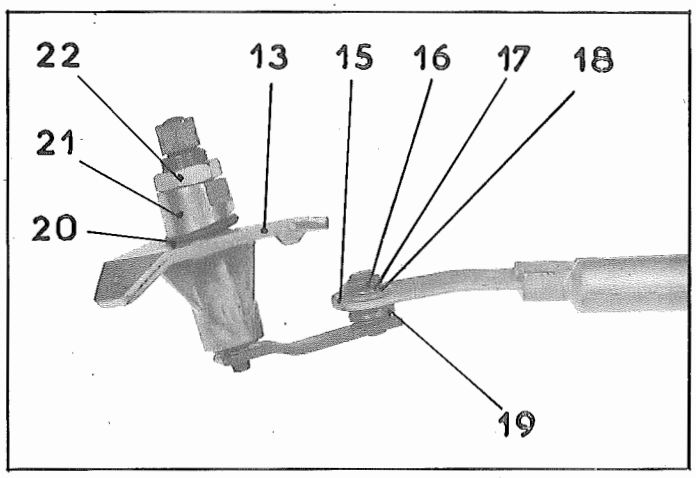
Remove the 3 screws (10) securing the bracket for the wiper arm spindle.

Do this on both the right-hand and left-hand sides.



d) Remove the supports (13) and (15) for the wiper arm spindles on the left-hand and right-hand side, with the connecting rod (14) and the control arm (3).

3. Remove the connecting rod (14).



a) Remove:

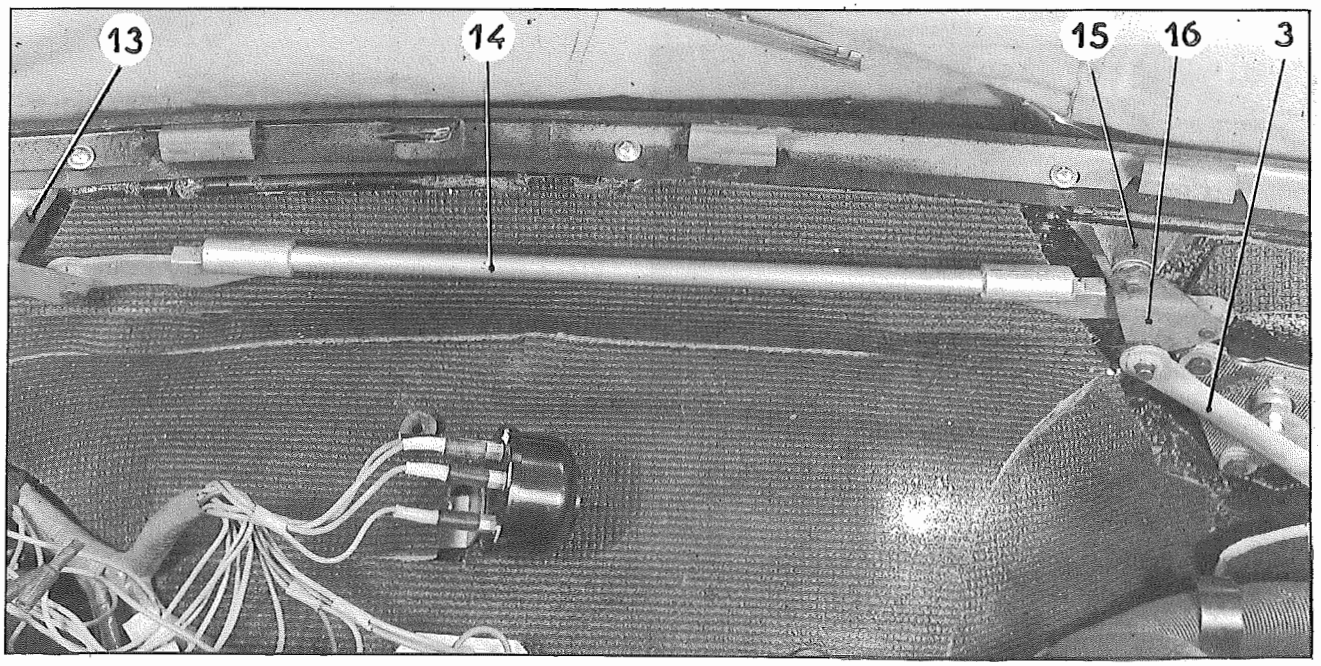
- the circlip (16),
- the plain washer (17),
- the nylon washer (18).

Free the nylon bush, hold the connecting rod (14) in place on the ball joint, using a screwdriver.

Remove:

- the nylon washer (19),
- the support for the left-hand wiper arm spindle (13).

b) Remove the support for the right-hand wiper arm spindle (15) in the same way.

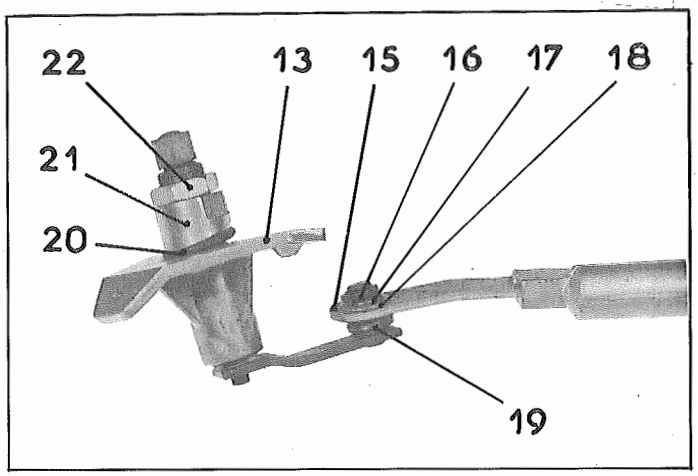


ASSEMBLY.

4. Assemble the linkage.

a) Fit the nylon washer (19). Smear with "special cardan" grease the ball joint on the lever of the left-hand wiper arm spindle support (13) and the nylon bush for the connecting rod (14).

Fit the connecting rod (14) on the fulcrum pin using Gordon pliers (for position see photo.).



Fit:

- the nylon washer (18),
- the plain washer (17),
- the circlip (16).

b) Carry out the same operation on the right-hand wiper arm spindle (15) and the connecting rod (14).

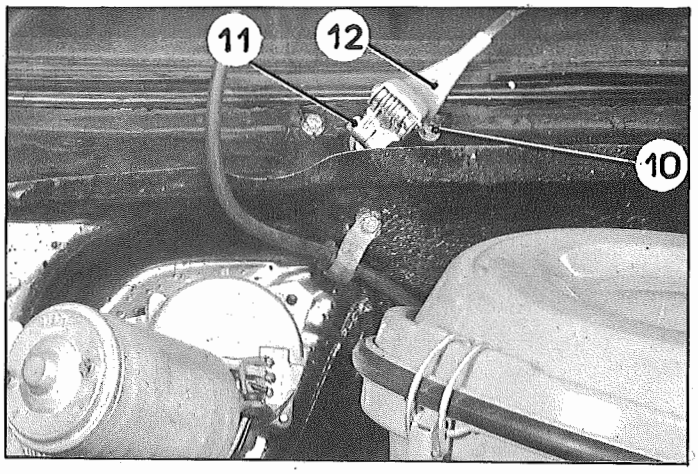
c) Fit the control arm (3).

Smear with "special cardan" grease the ball joint and nylon bush.

Connect the control rod (3) to the crank portion (16) on the connecting rod (14) using Gordon pliers.

5. Fit the linkage.

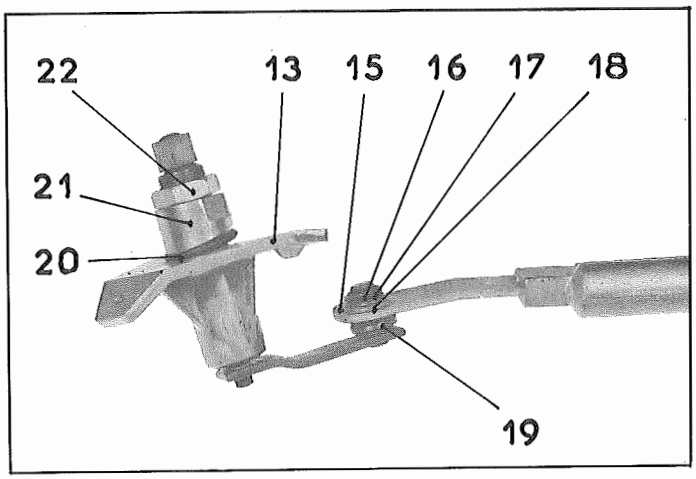
a) Offer up the supports for the right and left-hand arm spindles (13) and (14), on the scuttle.



b) Fit the arm spindle supports, right and left-hand, using the screws (10) (plain and shake-proof washers under the head).

Tighten the screws (10) to 3.5 ft.lbs. (0.5 m.kg).

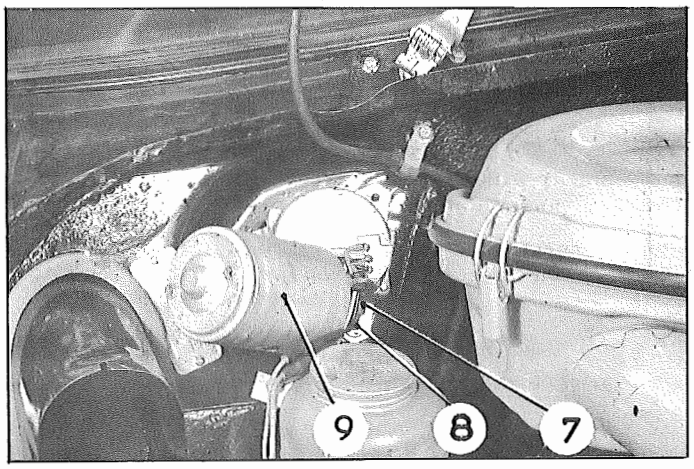
Place some sealing compound round the heads of the screws (10) to seal the windscreen.



c) Fit:

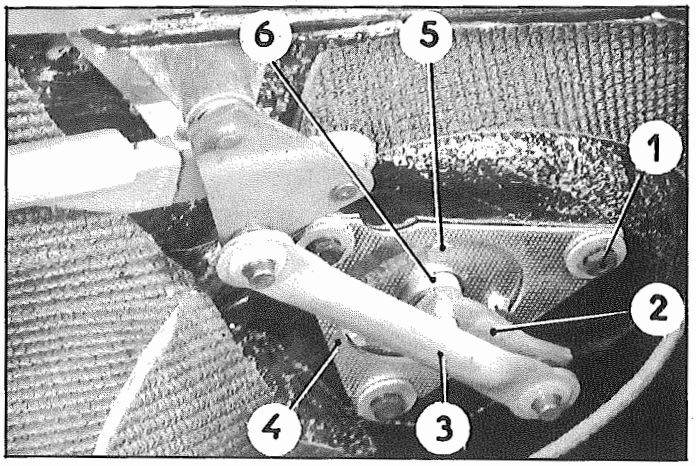
- the rubber sealing gaskets (20),
- the angled packing pieces (21), positioning these so that they correctly contact the scuttle.

Tighten the nuts (22) to 3.5 ft.lbs. (0.5 m.kg).



6. Fitting the motor.

a) Offer up the motor (9) (in the "automatic parking" position). Fit it with its plate (7) and its connecting rod on the scuttle. Hold it in this position.



b) Offer up the backplate (4) (positioned as shown in the accompanying figure).

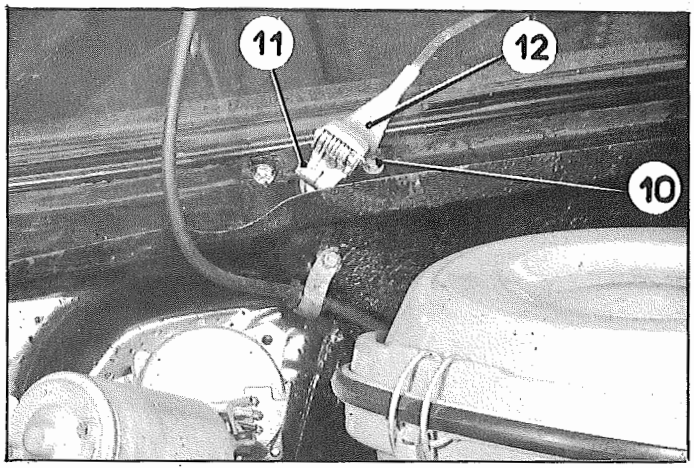
IMPORTANT NOTE: Centre the backplate (4) on the 3 locators (8) and tighten the 3 screws (1) (plain and spring washers under the head) to 6 ft.lbs. (0.8 m.kg).

7. Couple the control rod (3) to the motor connecting rod (2).

Smear "special cardan" grease on the ball joint and the nylon bush and secure them using Gordon pliers.

Operate the control arm (3) to bring it parallel to and over the motor connecting rod (2).

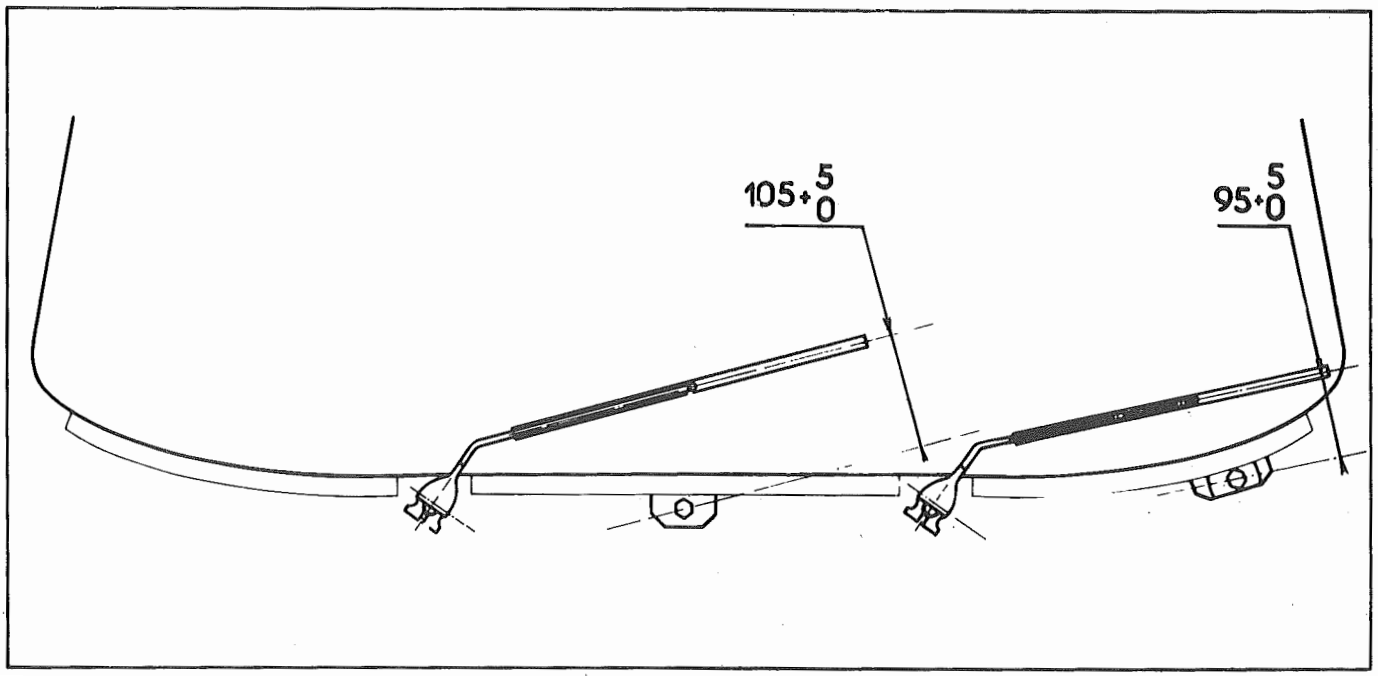
Connect the feed wires to the motor in correct colour order.

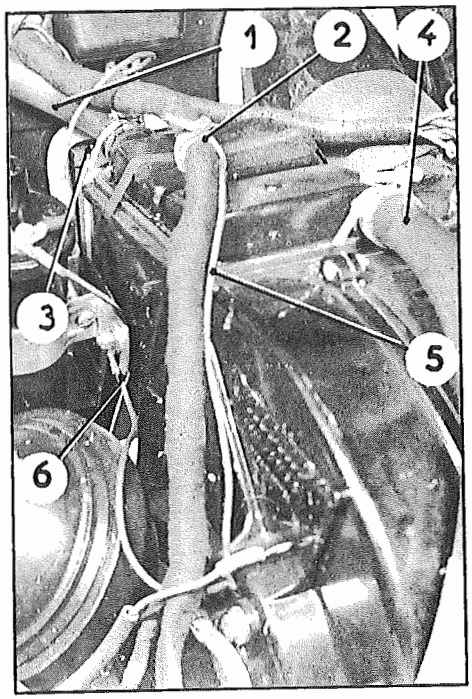


8. Position the wiper arms.

Position the windscreen wiper arms on their spindles as shown in the accompanying figure.

Tighten the screws (11) to 3 ft.lbs. (0.4 m.kg).





REPLACING A HEATING AND VENTILATION ASSEMBLY.

Removal.

1. Disconnect the negative lead from the battery. Remove the left-hand front wing (see Op. DX. 851-1).

2. Disconnect the flexible water return pipes (4) and water feedpipes (1). (Plug them with conical wood plugs).

3. Remove the 3 screws securing the heater unit on its bracket (do not lose the rubber bushes and plain washers).

4. Disconnect the earth wire (6) and the feed wire (5).

5. Remove the rubber clip (2).
Free the heater unit.

Assembly.

6. Offer up the heater unit on its bracket. Insert the 3 securing screws (plain washers and rubber bushes).

7. Fit the flexible hose (3) between the radiator and heater group and the distribution duct.
Connect the flexible hoses (1) and (4) and fit and tighten the clips.
Fit the rubber collar (2).

8. Connect the earth wire (6) and the feed wire (5).

9. Fit the front left-hand wing (see Op. DX.851-1). Connect the negative lead to the battery.

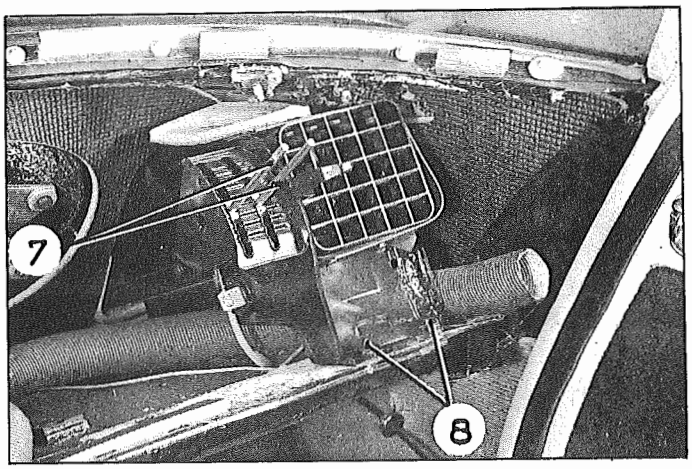
REPLACING THE VENTILATION DUCTS.

Removal.

10. Remove the facia board (see Op. DX.520-1).

11. Remove:
- the 2 securing screws (8),
- the flexible ducts between the heater group and the ventilation duct.

Free the ventilation ducts, right and left-hand.



Assembly.

12. Offer up the ventilation ducts, right and left-hand and insert the polyester sponge gasket smeared with "Bostik" adhesive between the trimming panel and the duct.
Insert the screws (8) without tightening them.

13. Fit the facia board (see Op. DX.520-1). Adjust the ventilation ducts to obtain the correct positioning of the control rods (7) in the grilles.

Tighten the screws (8).

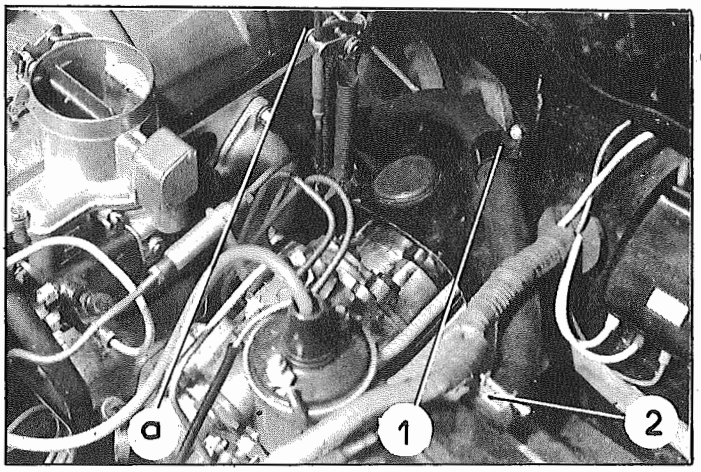
REPLACEMENT OF A HEATER CONTROL VALVE.

Removal.

1. Drain the radiator.
   (Save the liquid which contains anti-freeze).

2. Remove:-
   - the air filter and its bracket,
   - the exhaust shield.

3. Disconnect the heater valve inlet hose from the water delivery pipe on the cylinder head.



4. Disconnect the delivery hose (2) from the heater radiator.

Remove the supporting clip (1) from the hose on the scuttle panel.

Loosen the clip supporting the hose at (a) in the engine recess and remove the hose.

5. Removing the heater valve.

a) Free the rubber cover from the valve knob.

Remove the nut holding the operating knob (hold still with Gordon pliers).

Remove from the valve:-
   - the valve-operating knob,
   - the indicating disc for opening,
   - the stop for the valve.

Remove from the body:-
   - the heater valve indicator plate,
   - the three screws securing the valve in the engine recess.

b) Free the valve and hose assembly. Pass this assembly under the exhaust manifold.

c) Remove the hoses from the valve.

Assembly.

6. Fit the hoses on the valve (the longest on the left-hand side).

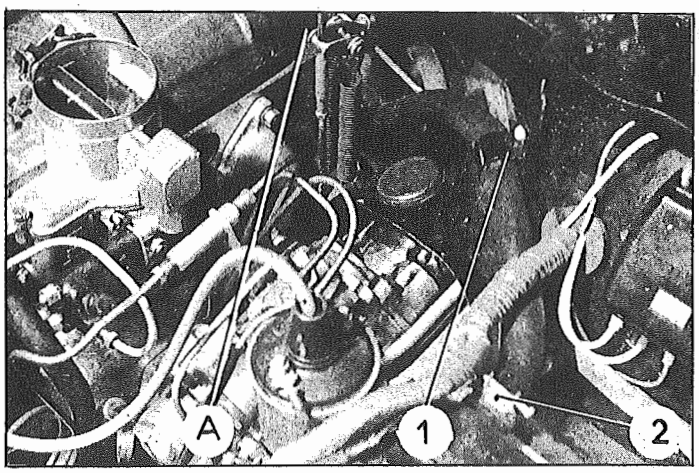
Tighten the clips securing the hoses on the valve.

7. Insert the valve in the engine housing recess, passing the assembly of hoses and valve under the exhaust manifold.

Insert the rubber insulating washer between the engine recess and the anti-rattle plate.

Tighten the 3 screws securing the valve to the body.

8. Fit and tighten the indicator plate to the engine opening inside the car.



On the valve fit the following:-

- the valve stop (with the pointer towards the right-hand stop),
- the indicator plate,
- the valve operating knob,
- the shakeproof washer.

Fit and tighten the securing nut for the operating button on the valve (hold the button still with Gordon pliers to avoid damaging the valve stop). On the operating knob fit the rubber cap.

9. Fit the delivery pipe on the heater radiator. Tighten the clip (2).

10. Pass the hose under the securing clip at (A) and tighten the securing screw.

Fit and tighten the securing clip (1) for the hose on the dash.

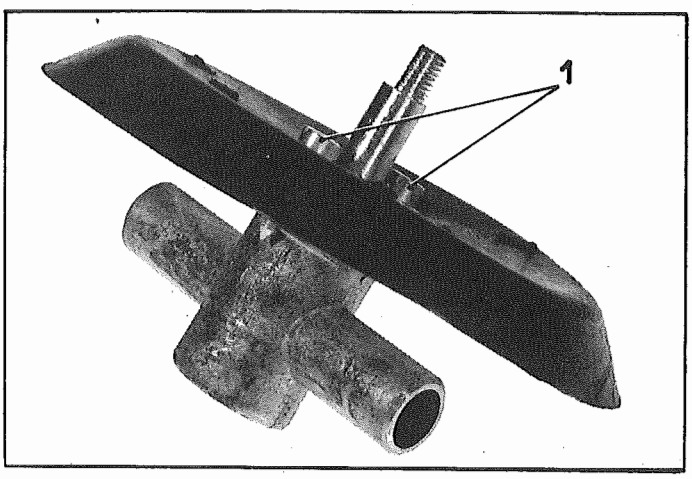
11. Fit the delivery hose to the heater valve on the water intake pipe on the cylinder head. Tighten the clip.

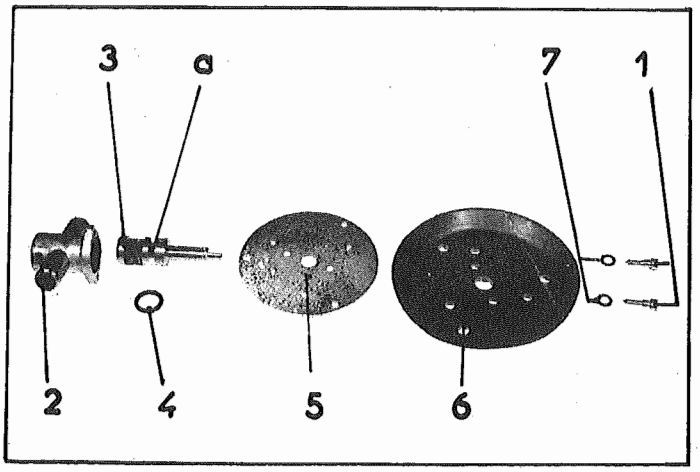
12. Fit:-

- the exhaust shield,
- the air filter and its support.

13. Turn the heater control valve to the "on" position and fill up the radiator.

14. Check all unions for leaks.





518.Add.1.

DISMANTLING.

1. Remove the heater valve from the engine recess (see Op. DX.642-1).

2. Remove the stop and securing screw (1).

Free:

- the insulation washer (6) (rubber),
- the plate (5) securing the valve.

3. Free the valve stem (3) from the valve body (2).
   - the ring seal (4) from the valve stem (3).

ASSEMBLY.

4. Fit a new ring seal in the groove (a) of the valve stem (3).

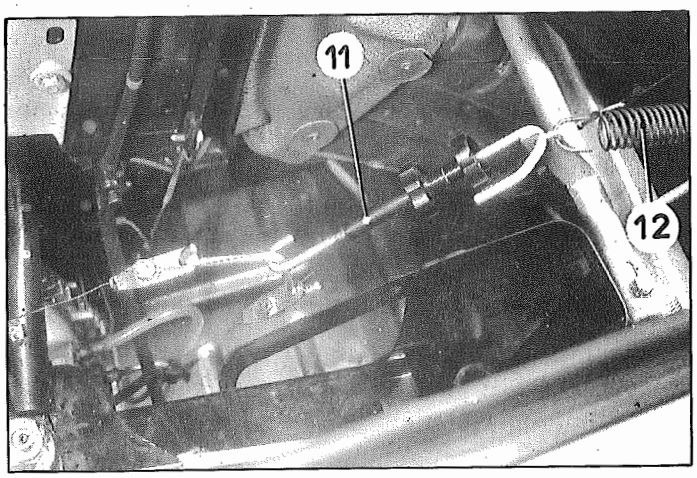
Insert the valve stem (3) in the body of the valve (2).

5. On the valve stem engage the following:
   - the securing plate (5),
   - the insulation washer (6) (rubber).

Tighten the screws (1) inserting the washers (7).

6. Fit the heater valve in the engine recess (see Op. DX.642-1).

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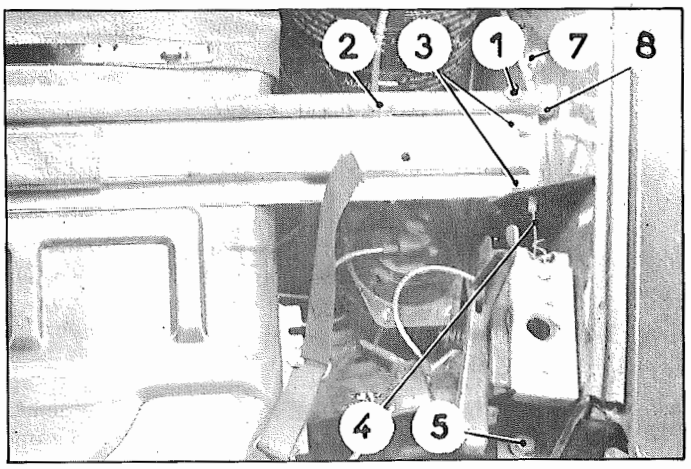
REMOVAL.

NOTE : Mark the position of the wing lengthwise and across, at the front fixing point, using a scriber.

Mark the lateral position, on the two wings, of the crossmember for the sparewheel support.

This allows for removal and refitting of the wings without having to adjust the bonnet, and it should also be unnecessary to readjust the headlamp height.

1. Remove the adjuster (11).
   - the return spring (12) marking the hole in which it hooks.



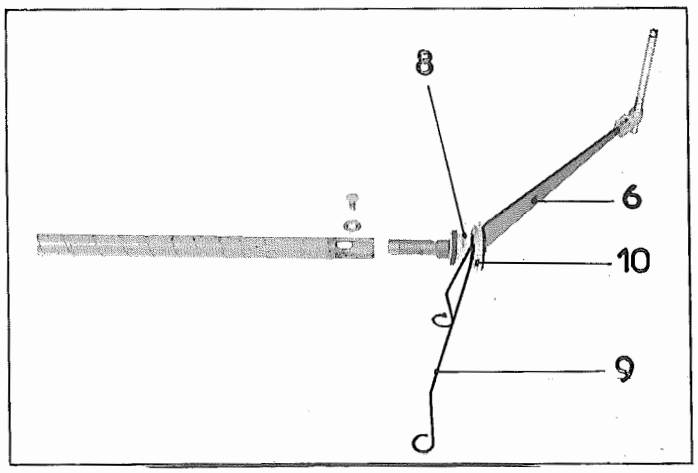
Remove the securing screw (1) from the headlamp control cross-bar (2).

- the securing screws (3) for the sparewheel crossmember support.

Free the cable (4) for releasing the bonnet opening catch.

Remove the inner and outer screws (5) holding the front wing.

Disconnect the wiring harness.



Free the lever (6) of the headlamp control, pushing it inside the wing, in order to free it.

Free the securing screw (7) of the clip holding the control cable for the bonnet opening catch.

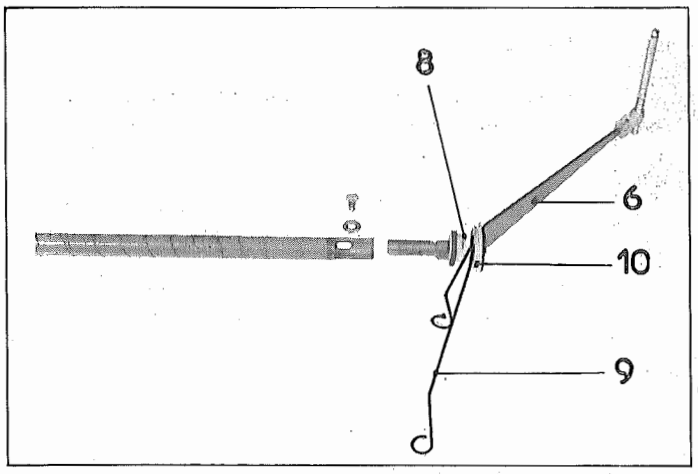
Free the unlocking control cable.

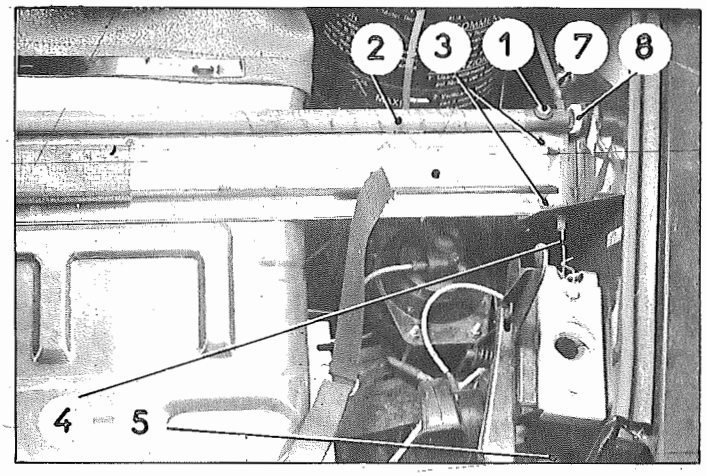
Remove the front wing.

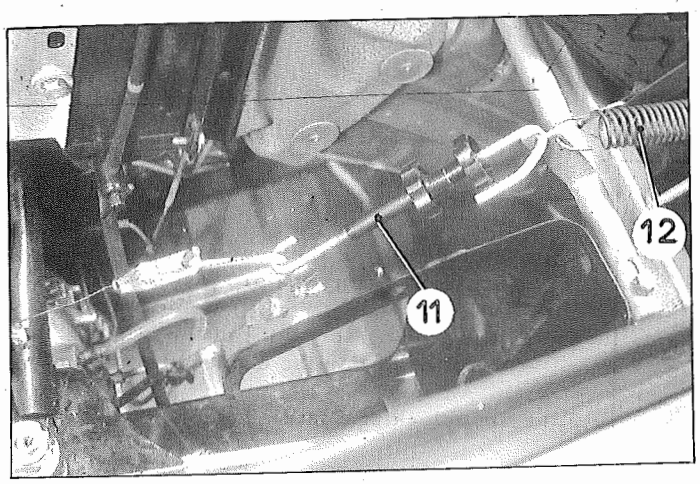
June 1966.

Corrective No.1

C1/'69







ASSEMBLY.

2. Offer up the front wing.

a) Pass the control lever (6) for the headlamp control through the nylon bush (8) and connect it with the control rod (2).

Insert, without tightening, the locking screw (1) in the control rod (2) (to be adjusted later).

Loosen slightly the securing screw (1) on the other wing of the car to enable adjustment to be made.

b) Insert and tighten the securing screws (5) in the front wing, the latter positioned according to the marks made before removing.

c) Fit the crossmember sparewheel support, according to the marks made before removing it.

d) Fit the securing clip (7) for the cable of the bonnet opening lock control.

Connect the cable to the lock.

e) Connect up the harnesses.

f) Adjust the end-float of the cross-bar (2). This should be between 2 and 4 mm. It should be measured with feeler gauges. Push the rod towards the right of the vehicle to bring it into contact with the spring (9), the bearing (8) and the thrust washer (10) for the spring. Then measure the end-float between the lever (6) and the bearing (8) on the *right-hand* side.

Move the rod (2) laterally (slots are provided in the rod (2) to enable an end-float of 2 to 4 mm to be obtained).
Tighten the securing screw (1).

NOTE : The control rod should return freely under the spring action towards the left of the vehicle and bring the lever into close contact with the right-hand bearing.

g) Connect the return spring (12).

h) Connect the adjuster (11)

DS 21M

LIST OF OPERATIONS SHOWN IN THE REPAIR MANUAL
Vehicle DS 21 M

Operation No.	Remarks	DESCRIPTION	Paragraph No.
		CHARACTERISTICS	
DJ.000		Characteristics and adjustments	
DJ.00	See Op. DX.00	Work on the hydraulic system. Precautions	
		ENGINE	
DJ.100-00		Engine characteristics	
DJ.100-1		Replacement of an engine-gearbox assembly	
DJ.100-2		Stripping and assembling engine-gearbox assembly (for replacement of an engine)	1
		Stripping and assembling engine-gearbox assembly (for replacement of the gearbox)	25
DJ.100-3	See Op. DX.100-3	Overhauling an engine	
		Removing the cylinder head	3
		Adjusting crankshaft end-float	23
		Fitting a camshaft	26
		Fitting the cylinder head	33
DJ.111-1	See Op. DX.111-1	Replacing a sump	See Op. DX.100-1
DJ.112-0	See Op. DX.112-0	Adjusting the valve rocker clearance	
DJ.112-1		Replacing a cylinder head or gasket	
DJ.112-3	See Op. DX.112-3	Overhauling a cylinder head	
DJ.112-4	See Op. DX.112-4	Work on the cylinder head	
		Replacing an inlet rockershaft assembly	1
		Replacing an exhaust rockershaft assembly	
DJ.120-1	See Op. DX.120-1	Work on the timing gear	
		Replacing a timing chain or pinion	1
		Replacing a camshaft	6
		Replacing the tappets	40
DJ.133-0	See Op. DX.133-0	Adjustment of the engine mountings	
DJ.141-1		Replacing an inlet manifold	
DJ.142-0		Adjusting the idling	
DJ.142-1		Replacing a carburettor	
DJ.142-3	See Op. DX.142-3	Overhauling a carburettor	
DJ.171-1	See Op. DX.171-1	Replacing an air filter	
DJ.171-3	See Op. DX.171-3	Overhauling an air filter	
DJ.173-1	See Op. DX.173-1	Replacing a petrol pump	
DJ.173-3	See Op. DX.173-3	Overhauling a petrol pump	
DJ.174-1	See Op. DX.174-1	Replacing a petrol feedpipe	
DJ.174-3	See Op. DX.174-3	Repairing a petrol feedpipe	
/Y/185 DJ.175-1	See Op. DX.175-1	Work on the petrol tank	
		Replacing a petrol tank	1

LIST OF OPERATIONS SHOWN IN THE REPAIR MANUAL
Vehicle DS 21 M

Operation No.	Remarks	DESCRIPTION	Paragraph No.
DJ.180-1	See Op. DX.180-1	Work on the exhaust system	
		Replacing an exhaust silencer	
		Replacing the exhaust pipes	
DJ.211-0	See Op. DX.211-0	Adjustment to the distributor and sparking plugs	
		Adjusting the ignition setting	1
		Adjustment on test bench	4
		Cleaning and adjusting the plugs	10
DJ.211-1	See Op. DX.211-1	Work on the distributor	
		Replacement of a distributor	1
DJ.211-3	See Op. DX.211-3	Overhauling a distributor	
DJ.211-6	See Op. DX.211-6	Overhauling the distributor drive	
DJ.212-0	See Op. DX.212-0	Checking a coil	
DJ.220-0	See Op. DX.220-0	Checking the oil pressure (on the car)	
DJ.220-1	See Op. DX.220-1	Work on the oil circulation system	
		Replacing a filter unit	1
		Replacing an oil pump	10
DJ.220-3	See Op. DX.220-3	Overhauling an oil pump	
DJ.231-0	See Op. DX.231-0	Adjusting the pulleys and belts	
		Aligning the pulleys	1
		Adjusting the tension of the belts	12
DJ.231-1	See Op. DX.231-1	Replacing a water pump	
DJ.231-4	See Op. DX.231-4	Work on the pulleys and belts	
		Replacing the water pump belts	1
		Replacing the high pressure pump belts	6
		Replacing a driving pulley	26
		Replacing a bearing for a driveshaft	34
DJ.232-1	See Op. DX.232-1	Work on the cooling system	
		Replacing a radiator	1
		CLUTCH	
DJ.312-00		Clutch characteristics	
DJ.312-1		Replacing a clutch	
DJ.312-3	See Op. DX.312-3	Overhauling a clutch	
DJ.314-0		Adjusting the clutch control	
		GEARBOX	
DJ.330-00		Characteristics of the gearbox	
DJ.330-1	See Op. DJ.100-1	Replacing a gearbox	

LIST OF OPERATIONS SHOWN IN THE REPAIR MANUAL
Vehicle DS 21 M

Operation No.	Remarks	DESCRIPTION	Paragraph No.
DJ.330-2	See Op. DJ.100-2	Stripping and assembling a gearbox	
DJ.330-3		Overhauling a gearbox	
DJ.330-4	See Op. DX.330-4	Work on the differential shaft, brake disc, or differential shaft bearing	
DJ.331-1		Replacement of a gearbox cover	
DJ.331-3	See Op. DJ.330-3 (Para. 19 to 25)	Overhauling a gearbox cover	
DJ.334-0		Adjustment and checking of the change-speed control	
DJ.334-1		Work on the gear controls	
		Replacing a gear selector lever	1
		Replacing a cable	8
		Replacing a control rod	28
		Replacing a control tube and its bearing	35
		Replacing a control spindle	48
DJ.334-3			
		TRANSMISSION	
DJ.372-1	See Op. DX.372-1	Replacement of a driveshaft or a pivot	
		SOURCE AND RESERVE OF PRESSURE	
DJ.391-1		Replacing a high pressure pump	
DJ.391-3	See Op. DX.391-3	Overhauling a high pressure pump	
DJ.391-4	See Op. DX.391-4	Replacing a pressure-regulator	
DJ.391-6	See Op. DX.391-6	Overhauling a pressure-regulator	
DJ.391-7	See Op. DX.391-7	Replacing a connecting pipe between high pressure pump and pressure-regulator	
DJ.392-1	See Op. DX.392-1	Replacing a brake accumulator	
DJ.392-3	See Op. DX.392-3	Overhauling a brake accumulator	
DJ.393-1	See Op. DX.393-1	Work on the hydraulic reservoir	
		Replacing a pressure distribution unit	
		Replacing a hydraulic reservoir	
		Replacing a filter	
DJ.393-3		Overhauling a pressure distribution unit	
		FRONT AXLE	
DJ.410-00		Characteristics of the front axle	

LIST OF OPERATIONS SHOWN IN THE REPAIR MANUAL
Vehicle DS 21 M

Operation No.	Remarks	DESCRIPTION	Paragraph No.
DJ.410-0	See Op. DX.410-0	Adjustments on the front axle	
		Adjusting the camber	
		Adjusting the alignment	
		Adjusting the straight-line position	
		Adjusting the lock	
DJ.410-1	See Op. DX.410-1	Replacement of a front half-axle	
DJ.410-3	See Op. DX.410-3	Overhauling a front half-axle	
DJ.413-1	See Op. DX.413-1	Work on the pivot and wheel	
		Replacing an upper ball pin	1
		Replacing a lower ball pin	12
		REAR AXLE	
DJ.420-00		Characteristics of the rear axle	
DJ.420-1	See Op. DX.420-1	Replacing a half-axle	
DJ.420-3	See Op. DX.420-3	Overhauling a half-axle	
DJ.420-4	See Op. DX.420-4	Work on the rear axle	
		Replacing a stub axle or stub axle bearings	1
		Replacing a bearing oil seal or a bearing thrust collar	9
		SUSPENSION	
DJ.433-0	See Op. DX.433-0	Adjustments on the suspension	
DJ.433-1	See Op. DX.433-1	Work on the front suspension	
		Replacing a suspension unit	
		Replacing a height corrector	
		Replacing a suspension cylinder	
DJ.433-3	See Op. DX.433-3	Work on the suspension units	
		Overhauling a damper valve	
DJ.433-4	See Op. DX.433-4	Replacing a front anti-roll bar	
DJ.434-1	See Op. DX.434-1	Work on the rear suspension	
		Replacing a height corrector	
		Replacing a suspension cylinder	
DJ.434-4	See Op. DX.434-4	Replacing a rear anti-roll bar	
DJ.437-0	See Op. DX.437-0	Adjustment of the manual height control	
DJ.437-1	See Op. DX.437-1	Replacement of a manual height control	

LIST OF OPERATIONS SHOWN IN THE REPAIR MANUAL
Vehicle DS 21 M

Operation No.	Remarks	DESCRIPTION	Paragraph No.
		STEERING	
DJ.440-00		Characteristics of the steering	
DJ.440-0	See Op. DX.440-0	Adjustment on the steering	
		Adjusting the lateral position of the steering	1
		Adjusting the angular position	5
		Adjusting the alignment	9
		Adjusting the straight-line position	12
		Adjusting the lock	16
DJ.442-1		Work on the steering (replacement)	
		Replacing a steering unit	1
DJ.442-3	See Op. DX.442-3	Work on the steering (overhaul)	
		Overhauling a steering unit	1
DJ.443-1	See Op. DX.443-1	Replacing a steering relay	
DJ.443-3	See Op. DX.443-3	Overhauling a steering relay	
		BRAKES	
DJ.451-0	See Op. DX.451-0	Adjusting the brakes	
		Adjusting the hydraulic brakes	
		Adjusting the hydraulic brake unit	1
		Adjustments on the mechanical brakes	
		Adjusting the clearance between brake units and disc.	8
		Adjusting the clearance between brake pads and disc.	12
		Adjusting the cable sheath tension	17
		Adjustments on the rear brakes	
		Centring the brake shoes	23
DJ.451-1		Work on the front brakes (replacements)	
		Replacing the brake units	1
		Replacing the hydraulic brake pads	10
	See Op. DX.330-4	Replacing a brake disc	
DJ.451-3		Work on the front brakes (overhauling)	
		Overhauling a hydraulic brake unit	1
DJ.451-4	See Op. DX.451-4	Work on the rear brakes	
		Replacing a brake drum	1
		Replacing the shoes	7
		Replacing a brake backplate	19
		Replacing a wheel cylinder	31
DJ.454-0		Adjusting the parking brake	

LIST OF OPERATIONS SHOWN IN THE REPAIR MANUAL
Vehicle DS 21 M

Operation No.	Remarks	DESCRIPTION	Paragraph No.
DJ.454-1	See Op. DX.454-1	Work on the mechanical brake control *For removing a hydraulic brake unit (see Op. DJ.451-1)*	
		ELECTRICAL	
DJ.510-1	See Op. DX.510-1	Arrangement of the electrical installation	
DJ.533-1	See Op. DX.533-1	Replacing a starter motor	
DJ.540-0	See Op. DX.540-0	Adjusting the headlamps (with automatic beam-level control)	
		BODYWORK	
DJ.851-1	See Op. DX.851-1	Replacing the front wings	

The characteristics of the vehicle DS 21 M (DJ) differ from those of the DS 21 (DX) dealt with in Operation DX.000, in the following points only.

I. GENERAL CHARACTERISTICS

Vehicle type .....DS 21 M series

Commercial name .....DS 21 M

Works symbol .....DJ

Date of production .....September 1965 - Chassis No. 4.460.000

II. ENGINE

Carburettor settings.

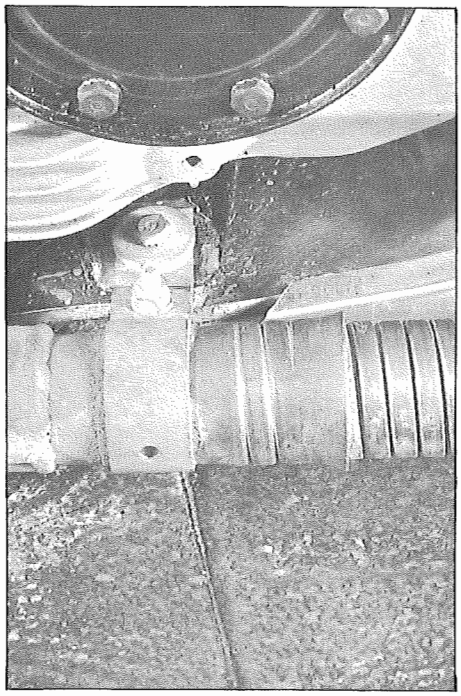
WEBER Carburettor 28/36 DDE A I

The settings are the same as on the DX type cars, but this carburettor has no accelerated idling device.

The characteristics are the same as those for the engine of the DS 21, (see Op. DX.100-00).

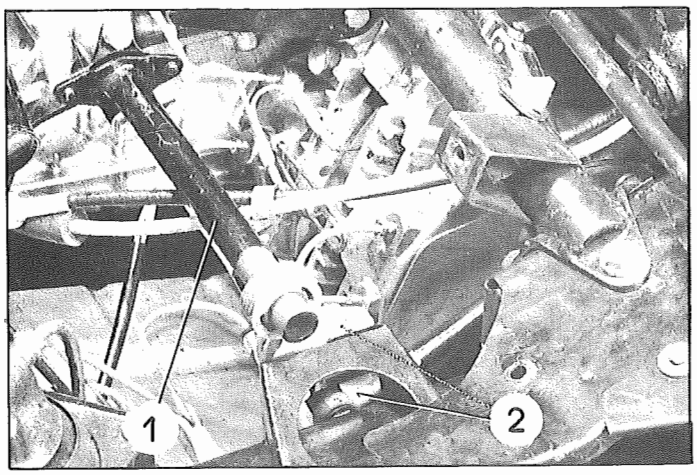
WEBER Carburettor 28 x 36 DDE A1

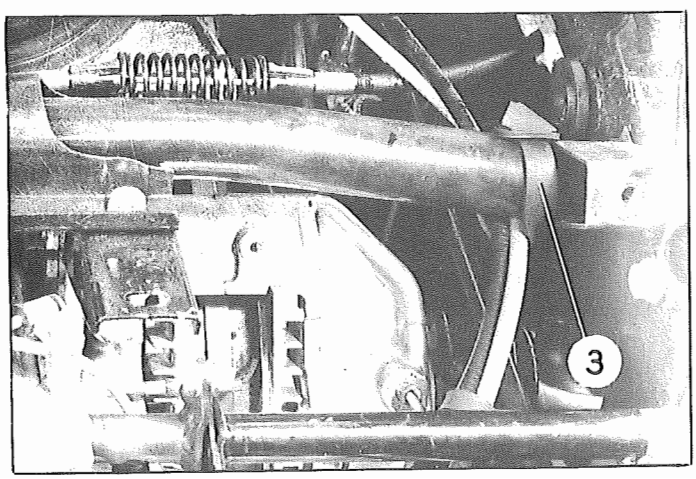
The settings are the same as on the DX type cars, but this carburettor has no accelerated idling device.



REMOVAL.

1. Remove :
   - the front wings,
   - the air filter and its support.
2. Drain the radiator and cylinder block (save the water as it contains anti-freeze).
3. Release the pressure in all the hydraulic circuits (see Op. DX.00).
4. Remove the radiator inlet duct assembly with the crossmember supporting the spare wheel.
5. Drain the hydraulic fluid reservoir.
6. Remove the battery and its tray, placing the battery top frame on the heater unit.
7. Disconnect the hydraulic reservoir and leave it lying on the left-hand sidemember.
8. Remove the steering rack (see Op. DJ.442-1).
9. Disconnect the exhaust downpipe from the flexible exhaust pipe only. Remove the screws (4) securing the fixing clamp of the flexible exhaust pipe and unscrew the screw securing this pipe on the exhaust silencer. Withdraw the pipe towards the silencer.
10. Disconnect the dynamo leads, the distributor leads (L.T. and H.T.) and the lead to the thermometer transmitter.
11. Disconnect the choke cable from the carburettor. Remove the 2 return springs and the rear support bracket for the vertical accelerator control rod.
12. Disconnect :
    - the speedometer cable,
    - the assembly of gear change control lever, the cable bracket, and the cable,
    - the gear change control rod (2) from the cross tube (1),
    - the gear change cross tube, from the shaft on the gearbox cover, and free the tube from its support bearing on the chassis.





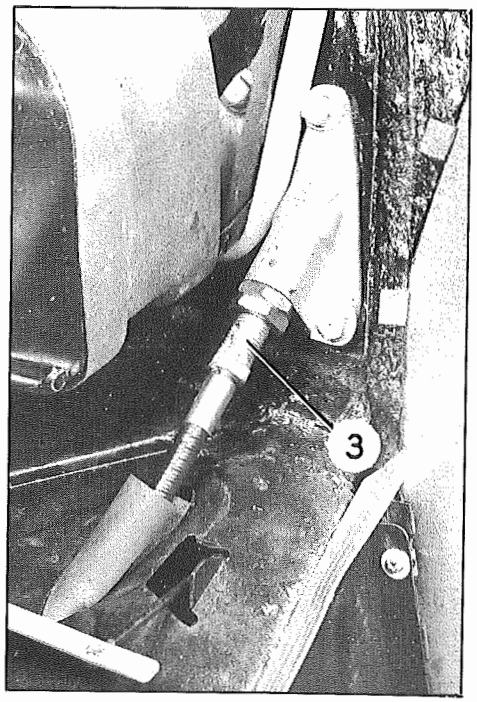
Remove the rubber strap (3) holding the speedometer cable and the gear change selection cable on the crossmember.

13. Disconnect the heater hose from the water pump inlet tube.

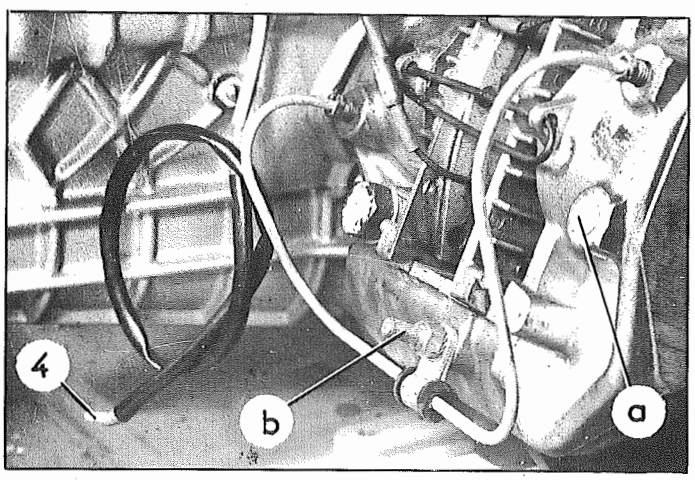
June 1966.

Corrective No.1

C1/



14. Disconnect the handbrake cable from the mechanical brake caliper levers, after having fully loosened the locknut and the adjusting nut on the threaded sleeve (3).



15. Disconnect at "a" the supply pipe for the front left-hand brake unit.

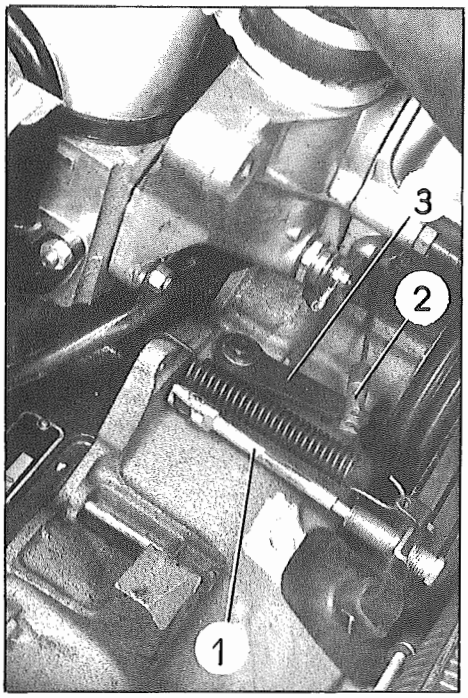
Remove the clip holding the supply pipe fixed at "b".

Disconnect the lead (4) for the brake pad wear warning light.

16. Disconnect :

- the outlet pipe from the pressure regulator, from the three-way union,
- the petrol pump inlet elbow, from the pump,
- the reservoir return pipe, from the pressure regulator.

Close this pipe with a 9 mm screw or a plug to avoid the escape of the fluid remaining at the bottom of the reservoir.



17. Disconnect the heater tap inlet hose from the hot water pipe on the cylinder head.

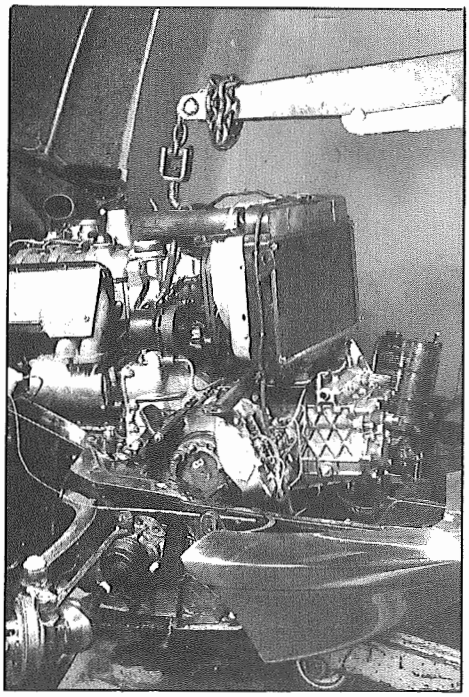
18. Disconnect the clutch cable :
    - Remove the return spring from the clutch fork.
    - Loosen the clutch clearance adjusting screw.
    - Remove the push-rod (1) and free the end of the cable (2) from the lever (3) on the bell-housing, and the sheath from the clutch housing.

19. Raise the front of the vehicle on stands.

20. Remove:
    - the front wheels,
    - the nuts securing the driveshafts to the flanges on the gearbox outlet shafts (17 mm socket and extension).

Disconnect the drive shafts from the pivot bearings. To do this, remove the 2 countersunk-head screws.

Remove the tri-axe housings from the studs on the flanges of the gearbox outlet shafts and withdraw the drive shafts outwards.

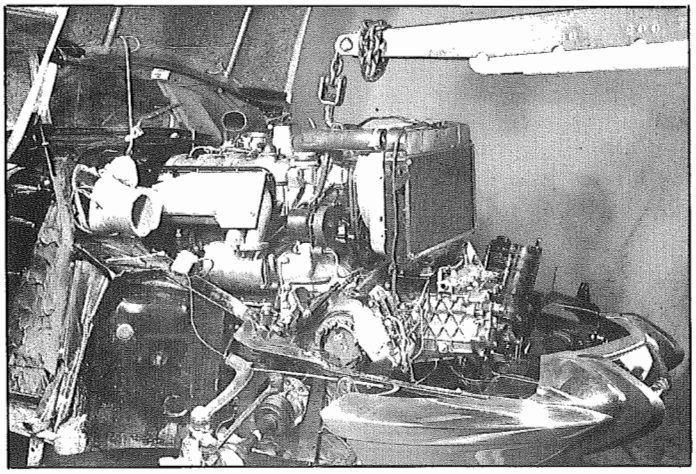


21. Remove the screws securing the front engine crossmember to the body sidemembers (take care not to lose the adjustment packing pieces which may be found between the crossmember and the sidemembers).

Remove the securing screws holding the rear engine mountings.

Suspend the engine-gearbox assembly on its sling bracket and withdraw it.

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ASSEMBLY.

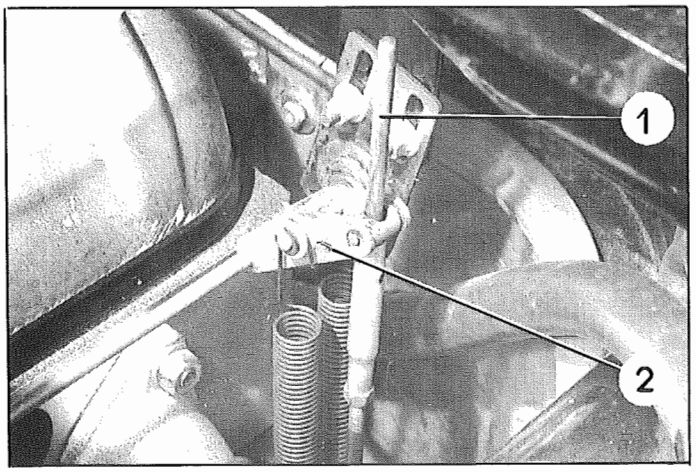
22. Guide the engine-gearbox assembly, held by its sling bracket, into place.

Allow the engine to rest on its mountings.

Place the packing pieces, found when dismantling, between the front engine crossmember and the body sidemembers. Tighten the screws (plain and shakeproof washers).

Fix the rear engine mountings onto the rear supports. (Shakeproof washer and thrust plate under screw heads).

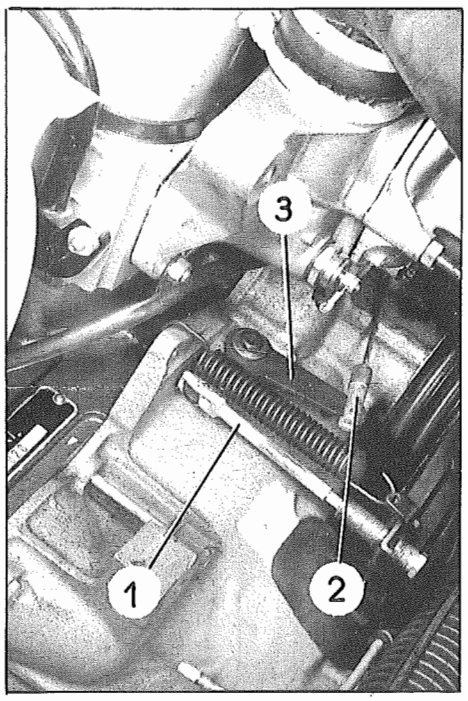
23. Connect the reservoir return pipe to the pressure regulator and the pressure regulator outlet pipe to the 3-way union.



24. Fit the flexible bearing onto the carburettor control relay and place it on its bracket on the scuttle front.

Align the bearing. Tighten the securing nuts (plain and shakeproof washers).

Pass the vertical accelerator control rod (1) (through the trunnion in the lever (2) and hook on the springs, adjust the control (see Op. DJ.142-4).



25. Connect up the clutch control cable.

Place the sheath in the recess on the clutch bell-housing and the cable (2) in the lever (3). Fit the push-rod (1).

Hook up the clutch fork return spring.

26. Adjust the clutch clearance (see Op. DJ.314-0).

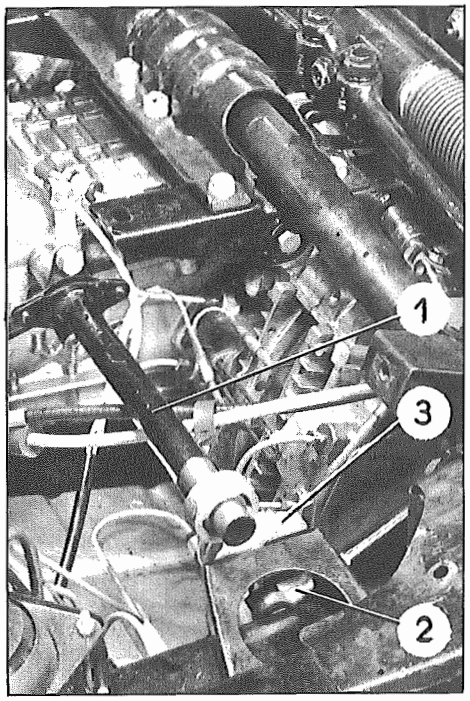
27. Place the drive shafts in position.

Replace the tri-axe housings on the studs in the flanges of the gearbox outlet shafts.

Replace the nuts and tighten them from 60 to 80 ft lbs (8.5 - 11 m.kg) (17 mm socket and extension).

28. Fit the driveshaft flanges on to the wheel hubs (2 countersunk head screws on each side).

Corrective 1 June 1966.



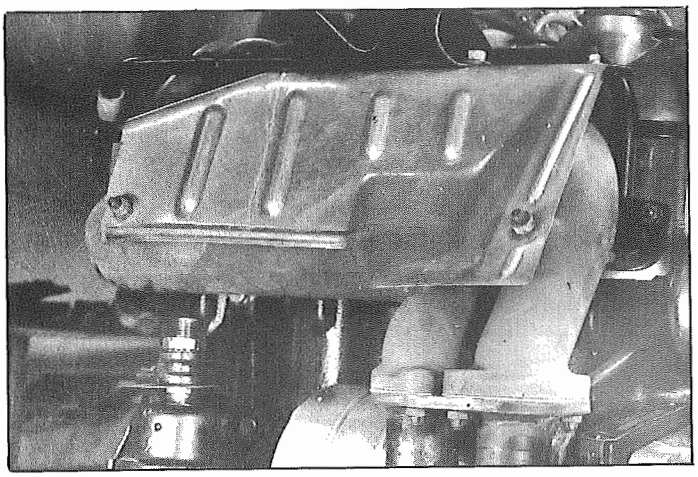
29. Replace the handbrake cable and adjust it (see Op. DJ.454-0).

30. Connect the change gear control to the gearbox.

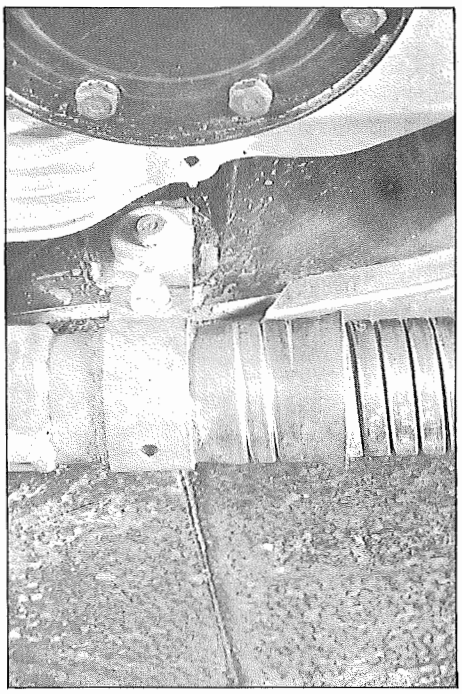
Fit the cross tube (1) in the ball housing on the chassis and couple up the gearbox control shaft. Adjust the shaft alignment if necessary, by moving the position of the bracket (3).

Connect up :

- the gearchange control rod (2) to the cross tube,
- the assembly of gearchange control lever, cable anchor bracket and cable,
- the speedometer cable.

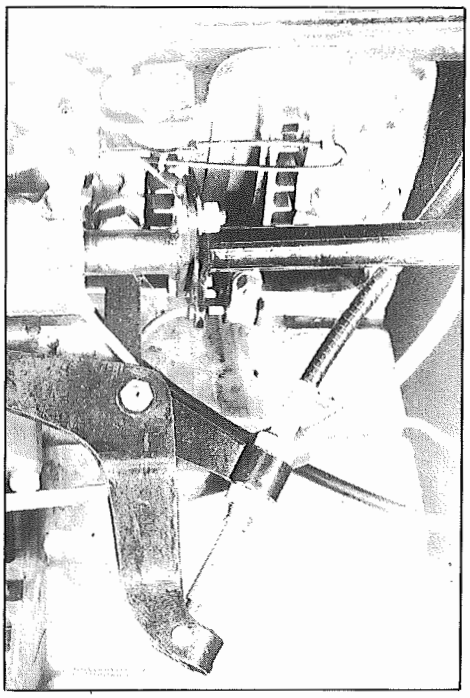


31. Connect the exhaust downpipe to the flexible exhaust pipe.



Secure the pipe to the bracket under the engine. Tighten the nuts (plain and shakeproof washers).

Tighten the screw in the collar holding the downpipe and exhaust flexible pipe.



32. Connect the heater tap hose to the hot water supply pipe on the cylinder head.

33. Fit the steering rack (see Op. DJ.442-1).

34. Connect the supply pipe to the front left-hand brake unit, also the holding clip for this pipe.

Connect the lead for the brake-pad wear warning light.

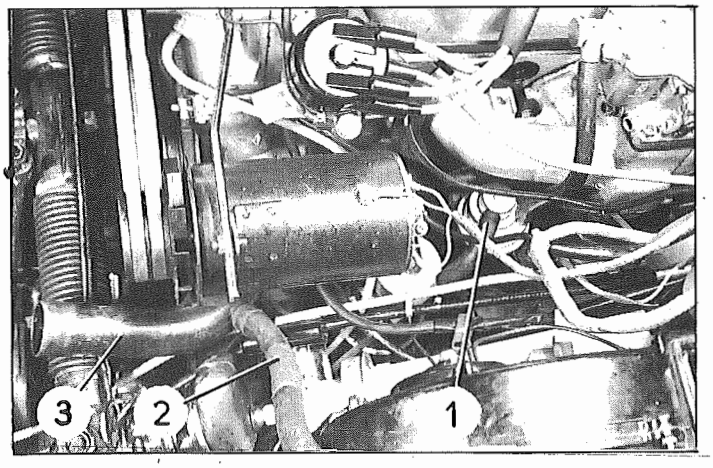
35. Connect up the battery to starter motor cable, to the starter motor.

Secure the cable holding clip to the lower nut fixing the water pump.

Fit :

- the battery tray, the battery, and the battery top frame,
- the hydraulic reservoir.

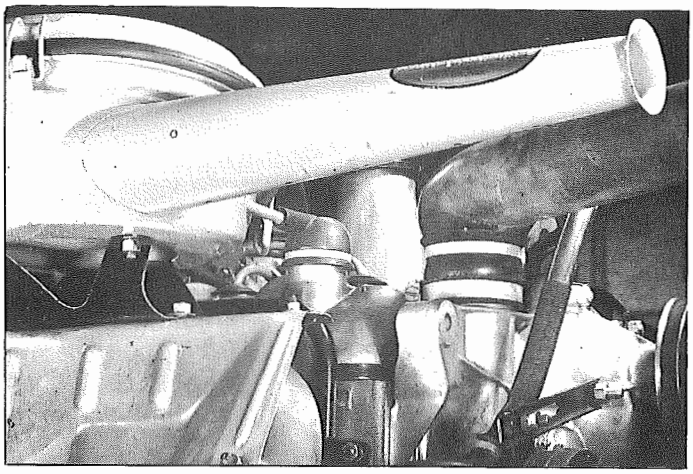
Connect the cables to the battery terminals.



36. Fit in position :

- the petrol pump inlet pipe (1),
- the heater hose (2) to the lower pipe, radiator to water pump (3).

37. Connect the dynamo leads, the distributor leads, (L.T. and H.T.) and the lead for the thermometer transmitter.



38. Fit the front wheels and lower the car to the ground.

39. Adjust, if necessary, the initial ignition advance setting (see Op. DX.211-0).

40. Connect the carburettor choke control and adjust it.

41. Fit the air filter, also the rubber union between the filter and the rocker cover and connect up the rubber elbow between the carburettor and the air filter.

42. Fill the reservoir with hydraulic fluid.

43. Fill the radiator and the engine cylinder block. Open the heater tap, start up the engine and check the level after a few minutes running, and top up if necessary.

44. Bleed the brakes (see Op. DX.453-0).

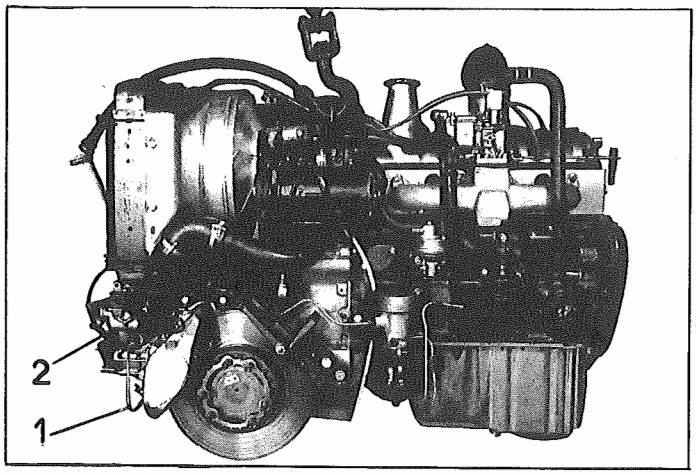
45. Have pressure applied by an assistant to the hydraulic brake pedal, to centralise the brake pads. Tighten the screws (2) securing the brake units on the gearbox outlet housings to between 94 and 100 ft lbs (13 to 14 m.kg).

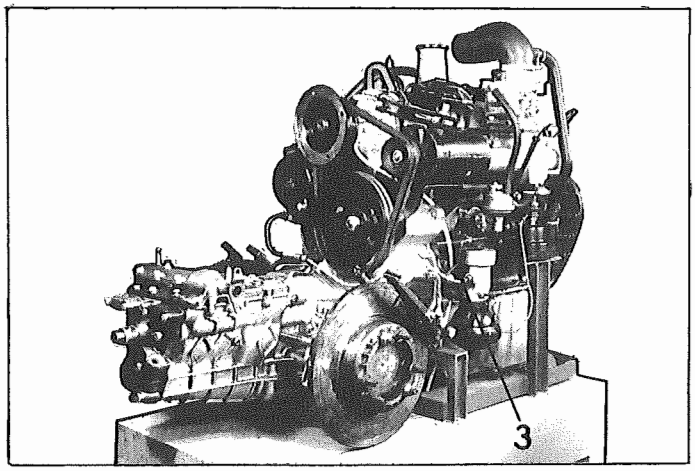
46. Adjust the idling.

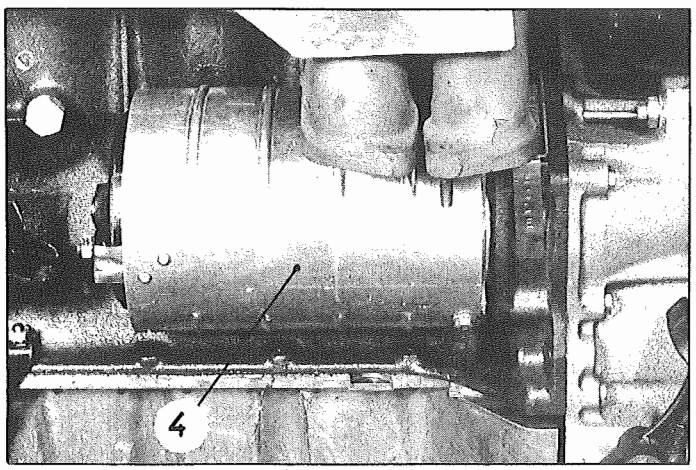
47. Fit the wings, connect the wiring harness. Fit the embellishers to the wheels.

48. Fit the radiator air intake duct, with the spare wheel crossmember. Fit the spare wheel.

STRIPPING AND ASSEMBLING FOR REPLACEMENT OF THE ENGINE.







STRIPPING.

1. Remove the exhaust downpipe. Place the engine-gearbox assembly on the stand 3083-T.
2. Remove :
   - the brake pads from the hydraulic brake units,
   - the tube (1) connecting the hydraulic brake units, and the lead (2) for the brake pad wear warning light,
   - the screws securing the brake units on the gearbox outlets.
3. Disconnect :
   - the tie-rod from the radiator,
   - the upper and lower hoses, from the radiator.

Remove the radiator assembly, the front engine suspension crossmember and brake units.

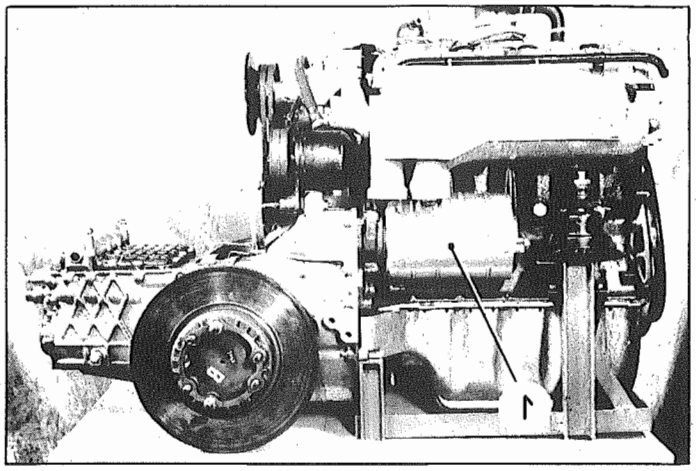
4. Disconnect :
   - the inlet tube (3) from the pressure-regulator,
   - the dynamo tie-rod from the water pump.

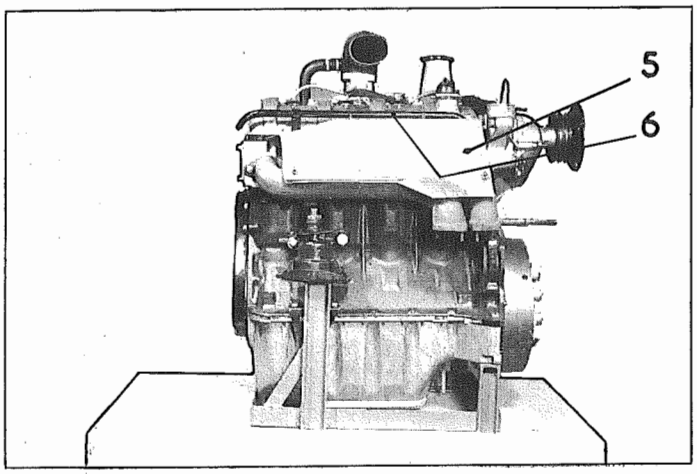
Remove :

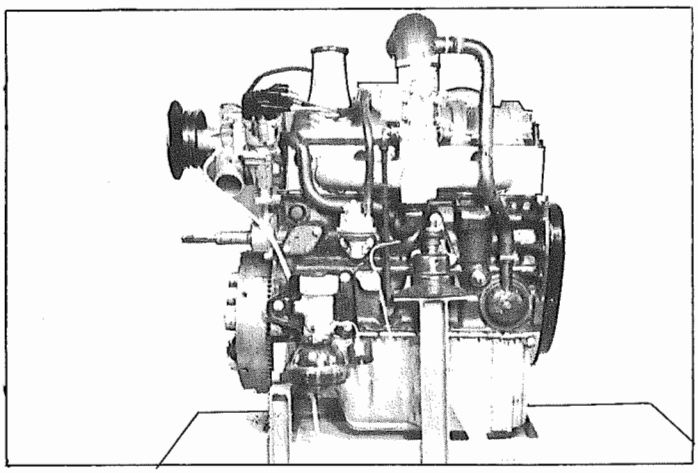
- the belts,
- the left-hand mechanical brake caliper,
- the fan,
- the drive pulley (remove with a file the metal of the nut turned down into the shaft for locking purposes),
- the adjusting washers for the pulley alignment,
- the return spring from the clutch lever,
- the starter motor, without removing its heat shield (4),
- the bearing housing carrying the end of the camshaft,
- the screws securing the gearbox, using spanner 2431-T.

Disconnect the gearbox from the engine.

NOTE : The gearbox must not on any account be moved about by rolling it with the brake discs on the ground. Fit old worn discs or dummy discs machined to 350 mm diameter. If these are not available place a rubber mat or a sheet of plywood between the ground and the gearbox.







5. Remove :

- the petrol pump, the insulation distance piece, the push-rod guide, the paper joint and the push-rod,
- the rubber sleeves connecting carburettor, air filter and breather,
- the carburettor and its packing piece,
- the pressure regulator assembly with its support bracket,
- the exhaust shield (5),
- the rear engine bearers with their side arm assemblies,
- the exhaust manifolds,
- the heater pipe (6) and its gasket,
- the securing clip, under the engine, for the exhaust downpipe,
- the inlet manifold and its gaskets,
- the water pump,
- the sparking plugs,
- the oil dipstick.

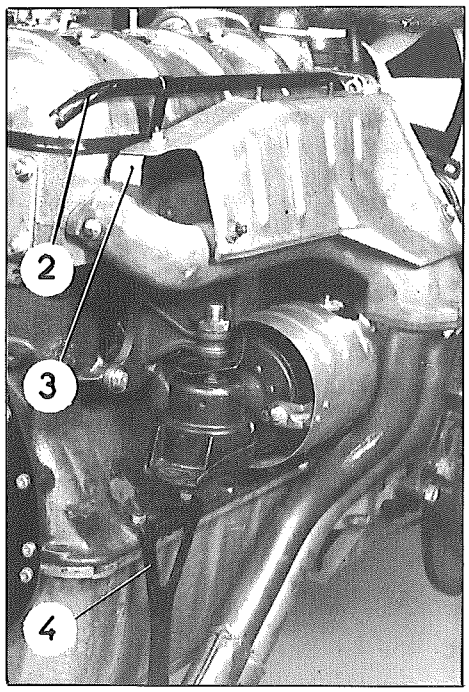
Assembly.

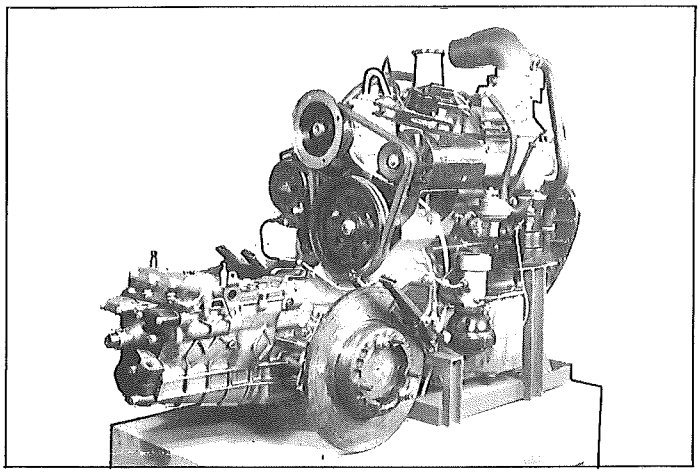
6. Connect the gearbox to the engine.
   a) Ensure that the centring dowels for the gearbox are in place in the cylinder block.
   b) Offer up the gearbox. Turn the mainshaft by the starting handle dog, pushing the gearbox meanwhile to facilitate entry of the splines.
   c) Tighten the securing screws of the gearbox using spanners 2431-T and 1677-T.

7. Fit the front camshaft bearing.

8. Fit the starter motor with its shield (1).

9. Fit :
   - the sparking plugs,
   - the starter motor supply lead (secured by a clip on the water pump).





10. Fit :
    - the water pump, inserting a paper gasket smeared with hermetic compound between the backplate and the pump,
    - the heater pipe (2) on the cylinder head (inserting fibre gasket),
    - the upper exhaust shield (3).

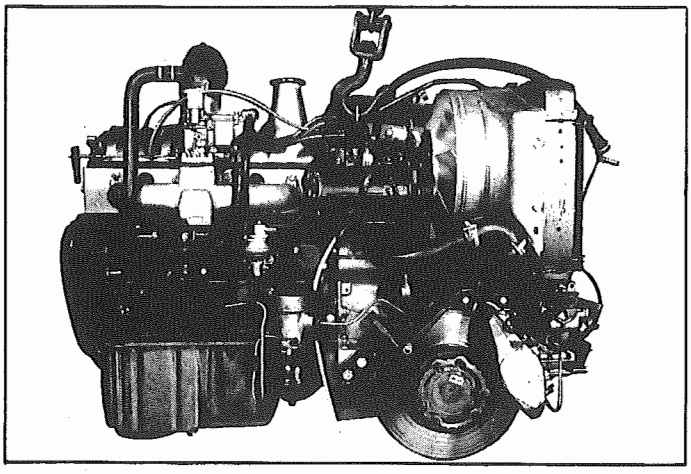
11. Fit the exhaust gaskets (the clinched edge towards the manifold.

12. Fit the 2 exhaust manifolds at the same time. Fit the securing nuts. (Final tightening when fitting downpipe).

13. Fit the supporting clip (3) for the exhaust downpipe.

14. Fit :
    - the inlet manifold (insert the gaskets),
    - the carburettor (insert a distance piece smeared with hermetic compound),
    - the breather with its rubber gasket (copper washer under the screw head),
    - the pressure regulator with its bracket, refit this assembly as high as possible within the limits allowed by the clearance between the holes and the securing screws for the brackets,
    - the pipe between water pump and inlet manifold,
    - the petrol pump (see Op. DX.173-1),
    - the distributor earth lead, between dynamo tie-rod and water pump,
    - the guide tube for the oil dipstick. Insert oil dipstick,
    - the drive pulley, inserting the adjusting washers. Tighten the nut to 56 ft lbs (7.8 m.kg).

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15. Line up the pulleys. Fit the belts and tension them (see Op. DX.231-0).

16. Replace the dummy brake discs by the real ones. It is essential *that the maximum run-out, measured on the larger diameter, does not exceed 0.15 mm.* Proceed as indicated in paragraph 36A of this operation.

17. Place the handbrake calipers over their respective discs and tighten the nuts to between 72 and 79 ft lbs (10 - 11 m.kg).

18. Offer up the assembly of radiator, crossmember and hydraulic brake units.

19. Fit the fan. Tighten the screws to between 7 and 11 ft lbs (1-1.4 m.kg).

20. Secure the hydraulic brake units on the gear-box drive outlets. Insert screws but do not tighten.

21. Tighten the radiator securing screws.

22. Fit the brake pads and insert the spring clips.

23. Fit the hoses :
    - the air filter elbow to the carburettor and crankcase breather,
    - the upper radiator hose to the water pump (fit the thermostat),
    - the lower radiator hose onto the radiator.

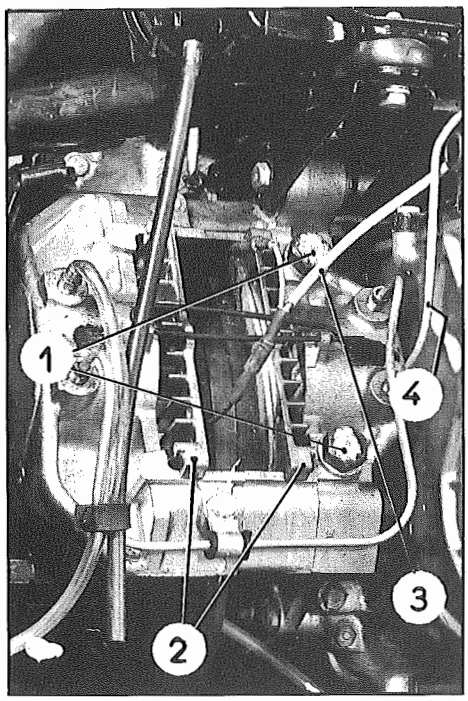
24. Fit :
    - the radiator tie-rod,
    - the pipe connecting the hydraulic brake units,
    - the leads for the warning light for brake pad wear.

25. Raise the engine and secure the exhaust down-pipe to the manifolds.
    Tighten the nuts securing the manifolds on cylinder head.

STRIPPING AND ASSEMBLING (for replacing a gearbox).

STRIPPING.

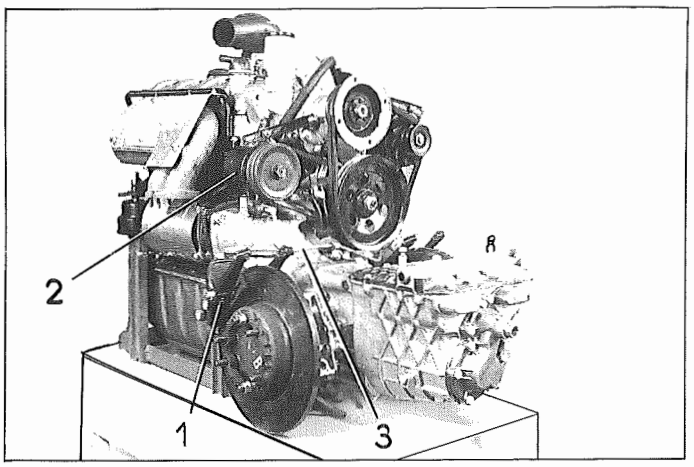
26. Remove the exhaust downpipe. Place the engine-gearbox assembly on stand 3083-T.



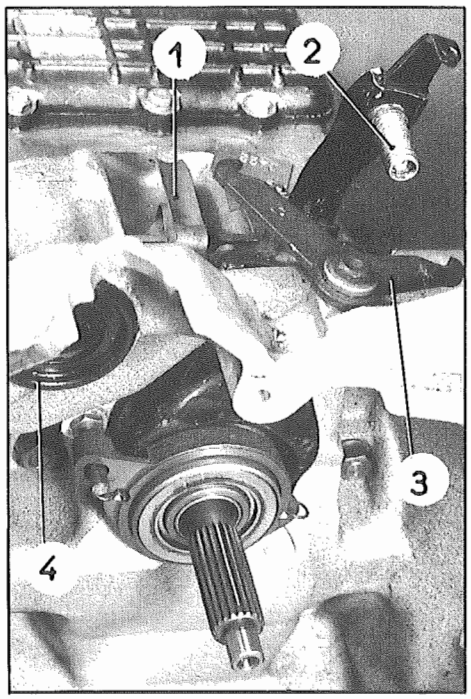
27. Remove :
    - the pads (2) of the hydraulic brake units,
    - the connecting tube (4) between the hydraulic brake units and the lead (3) for the brake pad wear warning light,
    - the screws (1) securing the brake units on the housings for the gearbox drive outlets.

28. Disconnect :
    - the radiator tie-rod from the radiator,
    - the upper and lower hoses.

29. Remove the assembly of radiator, cross-member and brake units.



30. Remove :
    - the connecting tube (3) between the high-pressure pump and pressure-regulator,
    - the dynamo,
    - the high pressure pump (2) (leave it lying on the engine),
    - the belts,
    - the mechanical brake calipers (1),
    - the brake discs,
    - the fan,
    - the drive pulley. With a file remove the metal of the nut turned down into the shaft for locking purposes,
    - the pulley alignment adjusting washers.



- the return spring from the clutch lever,
- the starter motor with its heat shield,
- the camshaft bearing housing on the clutch bell-housing.

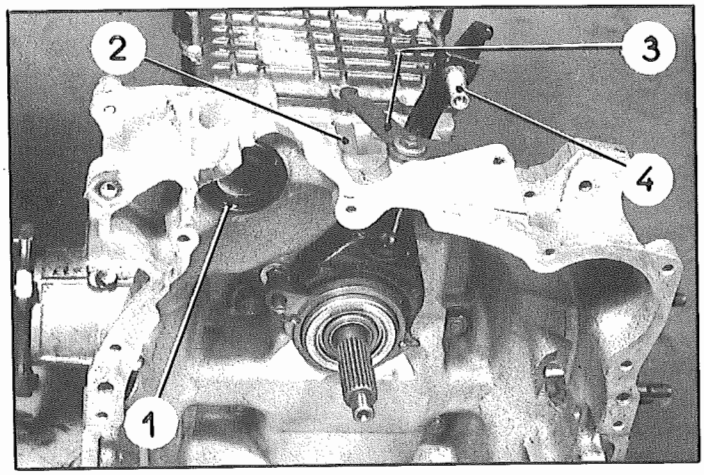
31. Disconnect the gearbox from the engine.

Do not move the gearbox about by rolling it with its discs on the ground; place a rubber mat or a sheet of plywood in between.

Fit dummy discs (350 mm diameter) or old brake discs; remove the securing screws from the gearbox (spanner 2431-T) and remove the gearbox.

32. Remove :

- the seal (4) between the clutch housing and the distributor drive housing,
- the clutch bell-crank lever (3),
- the adjusting screw (2) for the clutch clearance,
- the clip (1) securing the handbrake cable.



Assembly.

33. Fit :

- the seal (1),
- the bell-crank lever (3) for the clutch: place the thrust washer on the housing boss, then the lever with its bearing (the flange towards the top),
- the screw (4) for adjusting clutch clearance,
- the clip (2) securing the handbrake cable.

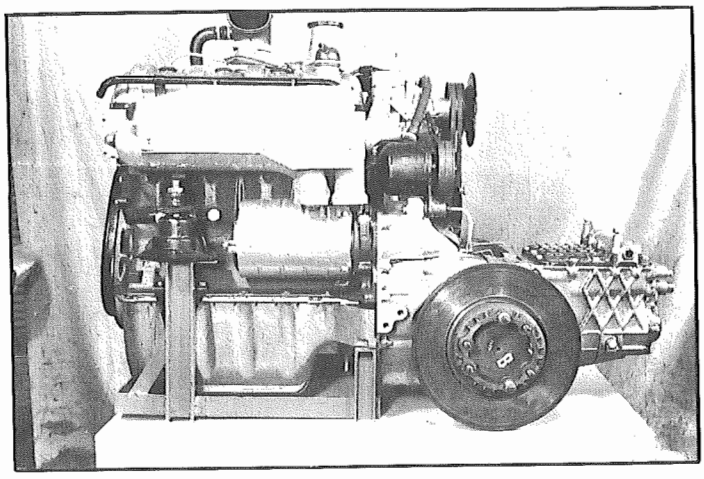
34. Coupling the gearbox to the engine:

NOTE : To protect the gearbox take the precautions described in paragraph 31 above.

a) Ensure that the centring dowels for the gearbox are in position in the cylinder block.

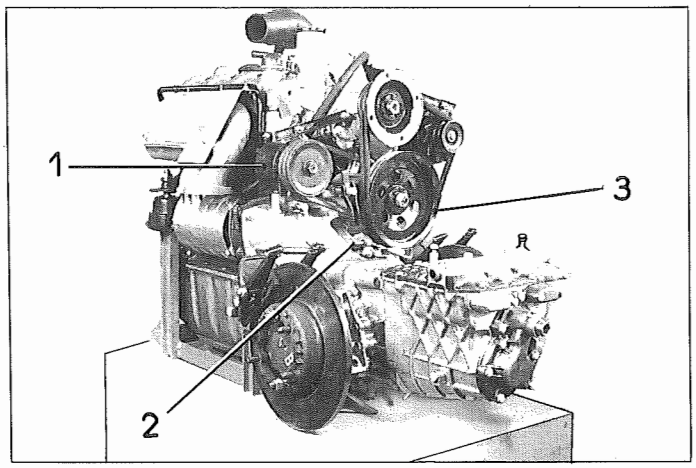
b) Offer up the gearbox. Turn the primary shaft using the starting handle dog, to facilitate entry of the splines.

c) Tighten the gearbox securing screws using spanners 2431-T and 1677-T.



35. Fit :

- the camshaft bearing housing on the clutch bell-housing,
- the starter motor with its heat shield,
- the return spring to the clutch lever.



36. Fit :

- the drive pulley (3) (do not forget the adjusting washers). Fit the nut and tighten it to 53 ft lbs (7.5 m.kg) then lock it (support the underside of the nut),
- the high pressure pump (1) (fit the adjusting washer). If the gearcase has been renewed, check and adjust if necessary the pulley alignment (see Op. DX.231-0).

36A. Fit the brake discs.

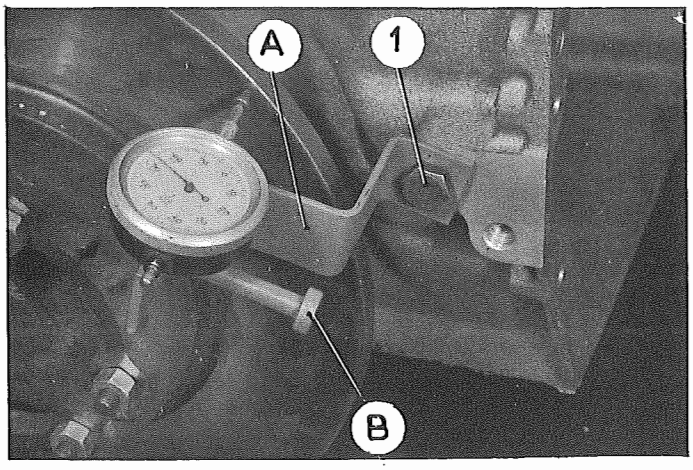
It is essential *that the maximum run-out of the discs, measured as near the outer edge as possible, does not exceed 0.15 mm.*

a) Fit washers or spacers between the nuts and the disc to ensure that the latter is tightened firmly on to the flange of the differential shaft.

IMPORTANT : If there is a yellow mark on the differential shaft flange and another on the disc these 2 marks must be as close together as possible when assembling.

b) Fix the dial gauge (2437-T) on a support (A) (MR.3365-250) by means of the screw (B). (This screw is part of Tool No. 2041-T). Fix the support (A) on to the bell-housing by the upper screw fixing the parking brake caliper.

c) Bring the stem of the dial gauge into contact with the face of the disc as near its outer edge as possible. Tighten the screw (1) of the support (A).



d) Rotate the disc, the maximum run-out read on the dial gauge must not exceed 0.15 mm.

e) If it does, remove the disc, turn it 1/3 of a turn clockwise and refit it.

f) Measure the run-out again. If it exceeds 0.15 mm, turn the disc clockwise by another 1/3 of a turn.

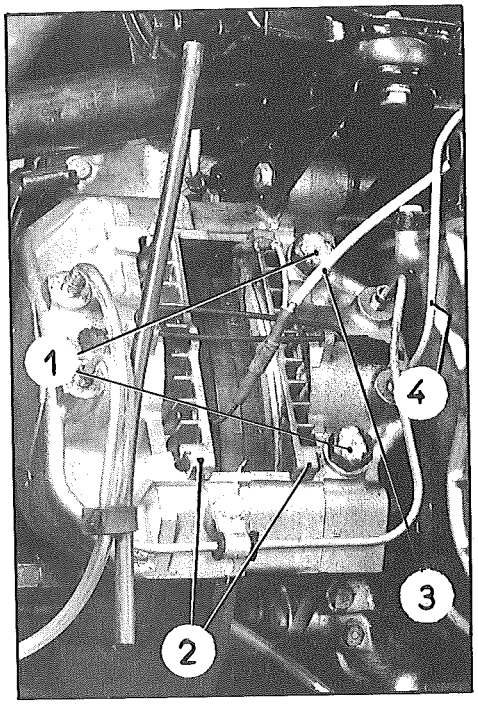
g) If after measuring again, the run-out is still greater than 0.15 mm, it is necessary to change the disc.

h) Check the run-out of the new disc and if necessary repeat the sequence shown in d) to f) above.

i) If in the 3 possible positions the run-out of the new disc is still greater than 0.15 mm it is necessary to replace the differential shaft (see Op. DX.330-4, paragraph f and following).

36B. Fit :

- the dynamo; if the gear-case has been replaced, check and adjust if necessary, the alignment of the drive pulley (see Op. DX.231-0).
- the pipe (2) connecting the high pressure pump to the pressure regulator.



37. Fit and tension the belts (see Op. DX.231-0).
    - the mechanical brake calipers (adjustment will be carried out after fitting the assembly on the car).

38. Fit the assembly of radiator, crossmember and hydraulic brake units.

39. Fit the fan and tighten the screws to between 7 and 10 ft lbs (1 - 1.4 m.kg).

40. Screw in the screws securing the hydraulic brake units to the gearbox outlet flanges. They will be finally tightened when the engine is fitted. (See Op. DJ.100-1, para. 46A).

41. Tighten the screws (1) securing the radiator.

42. Fit the brake pads, inserting the retaining spring clips.

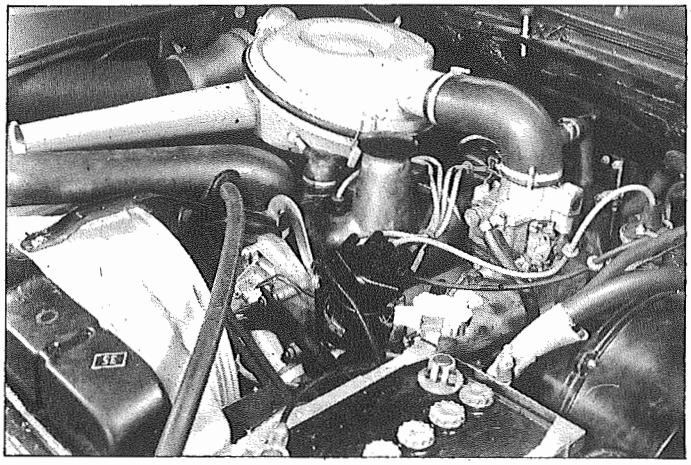
43. Fit :
    - the radiator upper and lower hoses,
    - the connecting pipe (2) between the hydraulic brake units, and the lead for the brake pad wear warning light.

44. Raise the engine and secure the exhaust downpipe to the manifolds.

Corrective N

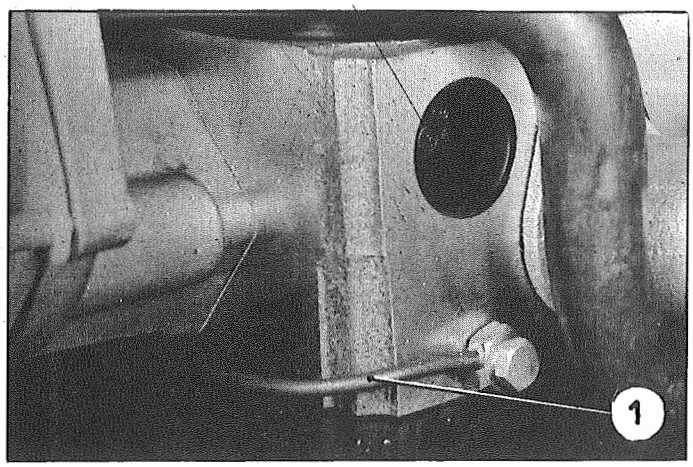
June 1966.

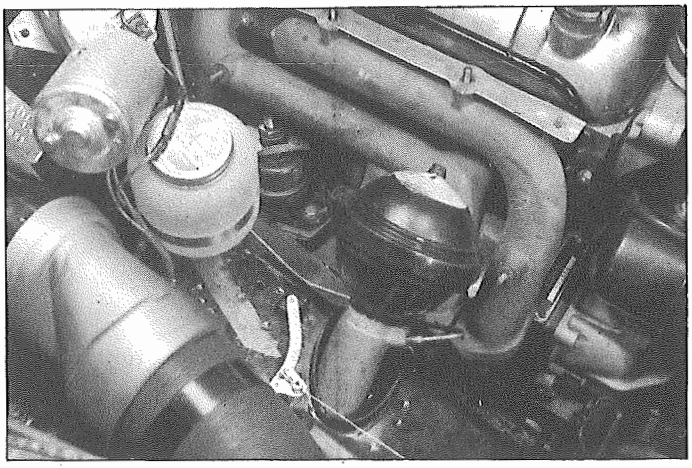
REMOVAL.

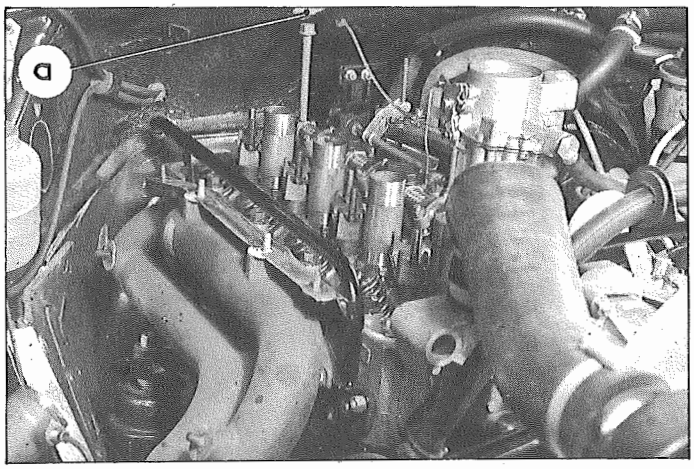


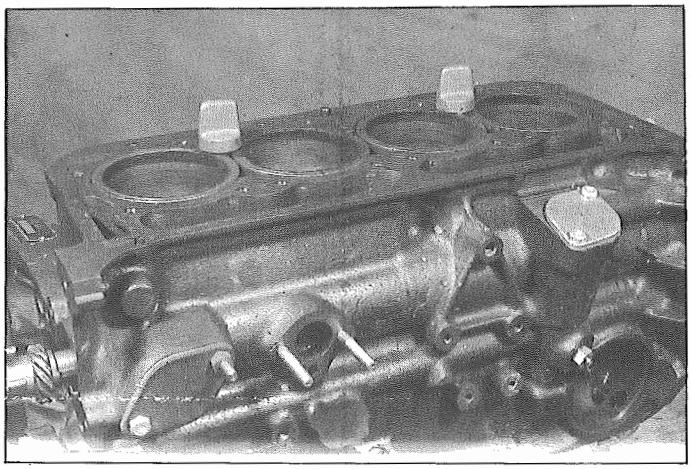
1. Drain the radiator and cylinder block. Save the water as it contains anti-freeze.
2. Disconnect the cables from the battery terminals.
3. Place the manual height control in "low" position.
4. Remove:
   - the air filter and its flexible pipe,
   - the sparking plug leads and the distributor head,
   - the radiator tie-rod, the engine lifting clip, the battery earth lead,
   - the fan.
5. Disconnect:
   - the accelerator control, the choke cable, the petrol delivery pipe from the carburettor,
   - the upper water hose,
   - the dynamo tie-rod from the water pump.

   Remove the dynamo belts.
6. Remove:
   - the clip securing the starter motor cable, from the water pump cover.
7. Disconnect the wire from the thermometer transmitter on the water pump cover.
8. Disconnect:
   - the lower water suction hose from the pump,
   - the lubrication pipe (1) for the rockers from the cylinder head,
   - the high pressure pump tie-rod from the water pump.









9. Remove:
   - the front right-hand suspension sphere,
   - the exhaust shield.

10. Disconnect·
   - the exhaust manifolds from the cylinder head, withdrawing the manifolds,
   - the heater hose from the pipe on the cylinder head.

11. Remove:
   - the cylinder head cover and its gasket,
   - the sparking plugs,
   - the sealing cups from the sparking plug wells, and their rubber joints.

12. Unscrew completely the screws securing the cylinder head.
   - Remove the exhaust rocker units.
   - Remove the inlet rocker line.

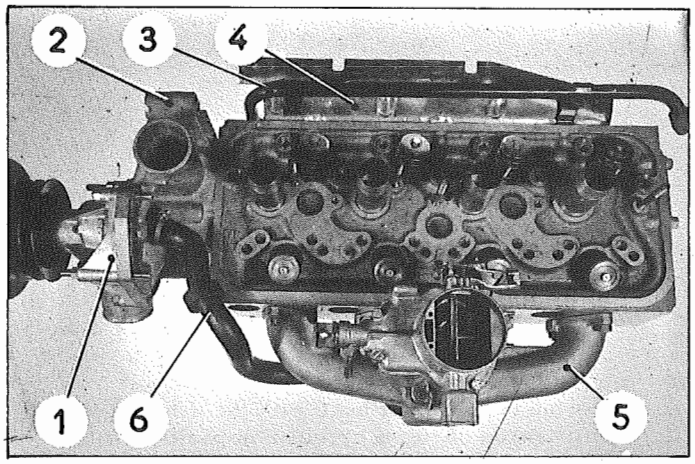
NOTE: To remove the rear screw from the inlet rocker line, remove the rubber plug from the engine recess in the scuttle, cut the felt behind it, and remove the screw by passing its head through this hole (a).

Withdraw the rocker pushrods.

NOTE: To remove the exhaust rocker pushrod from No. 4 cylinder, raise the cylinder head slightly.

13. Free the cylinder head and gasket (do not damage the dowels).

Hold the cylinder barrels in place using two screws (securing screw 3074-T).



14. Strip down the cylinder head.

a) Disconnect the hot-spot hose (6) from the inlet manifold.

b) Remove the water pump (1) and the water pump cover (2) from the water pump,

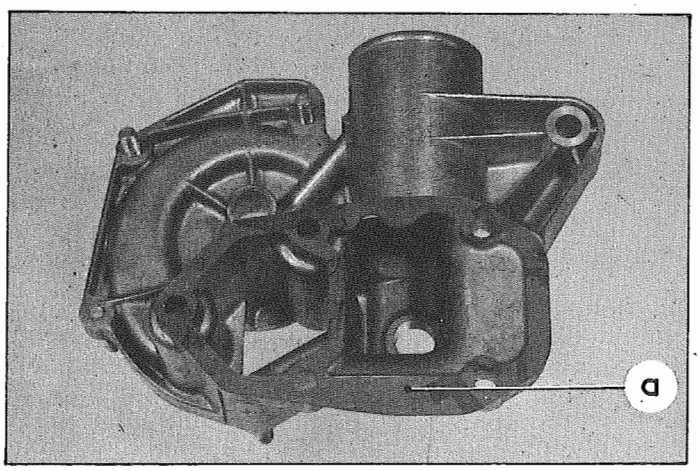
- the inlet manifold (5),
- the heater pipe (3) and the exhaust shield (4),
- the studs for the inlet manifold, the exhaust manifold and the water pump cover if necessary.

ASSEMBLY.

15. Assembling the cylinder head.

Fit:

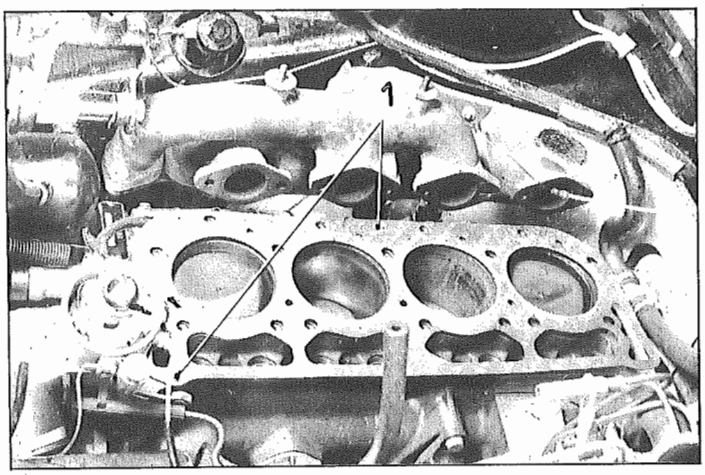
- the studs for the inlet manifold, exhaust manifold and water pump cover if necessary,
- the cover (2) for the water pump, inserting the gasket.

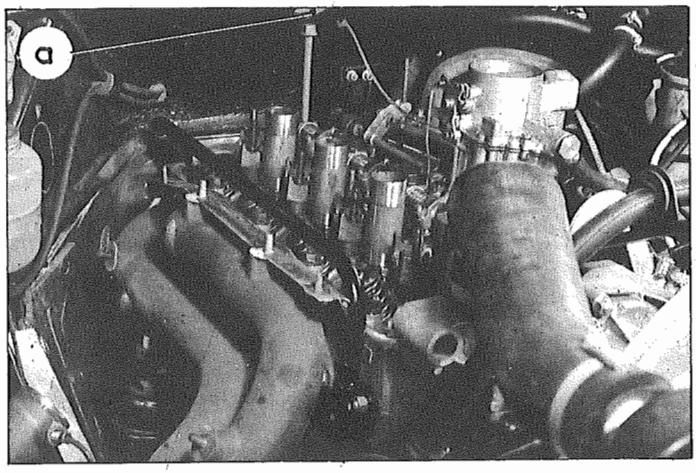


NOTE: See that the corner "a" of the gasket is as shown for correct fitting position,

- the water pump (1) inserting the gasket (special nuts 8 diameter x 12 across flats),
- the heater pipe (3) inserting the gasket,
- the exhaust shield (4),
- the inlet manifold (5) inserting the gasket.

Connect the hot-spot hose (6) to the inlet manifold and to the water pump cover, tightening the hose clips.





16. Remove the screws holding the cylinder barrels (screw 3074-T).

17. Offer up the cylinder head.

Fit the cylinder head gasket and centralise it on the dowels (1).

Offer up the cylinder head with the exhaust rocker pushrod of No. 4 cylinder in position.

NOTE: Once the cylinder head is in position this pushrod cannot be fitted.

18. Fit the rocker pushrods (the exhaust pushrods are the longer).

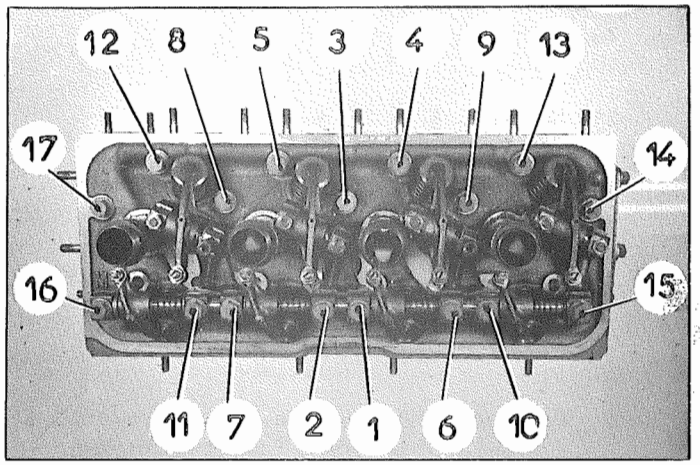
19. Replace the inlet rocker line assembly with its supports and securing screws.

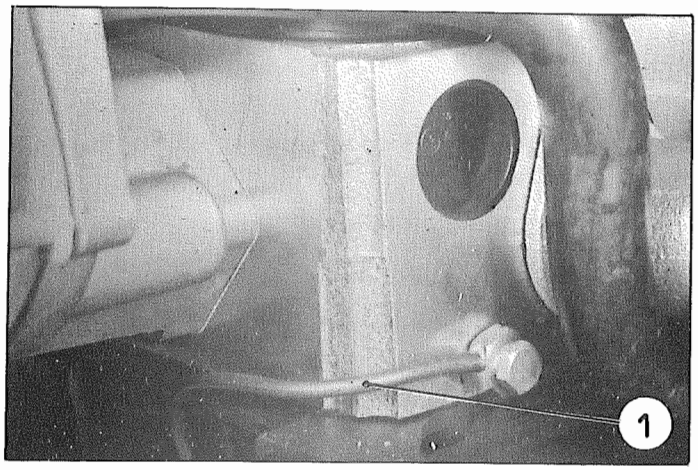
NOTE: When fitting the inlet rocker line assembly pass the head of the rear screw through the hole in the engine recess at "a".

Place the rubber ring seals between the supports of the rockers and the cylinder head, and the cylinder head securing screws, except on the front screw.

20. Replace the exhaust rocker assemblies, the oil holes towards the bottom and towards the valves. Fit the caps. Tighten the nuts on the exhaust rocker securing studs.

The screws holding the rocker assembly for No. 1 and No. 3 cylinder also receive the cylinder head cover screws.





21. Fit the cylinder head screws and tighten them (torque spanner 2471-T).

    1st tightening to 21 ft.lbs. (3 m.kg)
    2nd tightening to 43 ft.lbs. (6 m.kg)

Observe the order of tightening shown.

During tightening make quite sure that the spherical ends of the tappet adjusting screws are correctly seated in the sockets on the rocker pushrods.

NOTE: It is absolutely essential to tighten the cylinder head screws (with the engine cold), after the car has run 300 miles (500 km).

It is imperative to proceed in the following manner:

1st - work on the screws one by one.

2nd - loosen each screw and then tighten to 43 ft.lbs. (6 m.kg) (torque spanner 2471-T).

22. Couple up:

- the exhaust manifolds to the cylinder head, inserting the gaskets with their clinched edges towards the manifolds, (plain washers and special nuts 8 diameter x 12 across flats),
- the heater hose to the heater feedpipe, tightening the hose clip.

23. Fit:

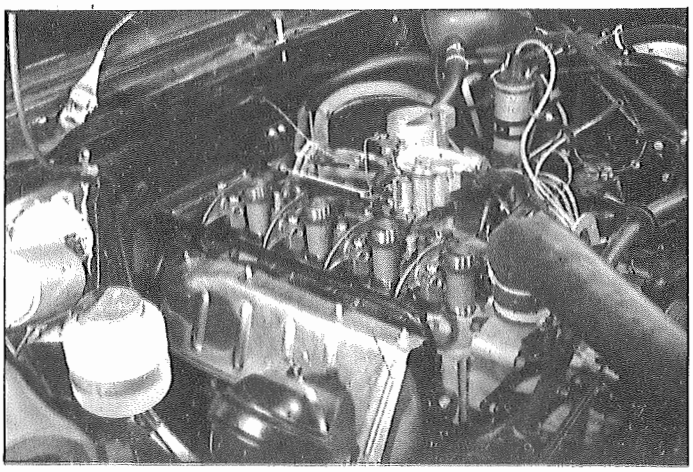
- the exhaust shield (plain washers),
- the front right-hand suspension sphere.

24. Couple up:

- the lubrication pipe (1) to the cylinder head, inserting the double gasket,
- the lower water suction hose to the water pump.

Connect the lead to the thermometer transmitter.

Connect the high pressure pump tie-rod to the water pump (inserting the square plate and the shakeproof washer).



25. If the cylinder head, the water pump cover, or the water pump have been renewed, check the pulley alignment, (see Op. DX.231-0).

26. Fit the dynamo belts.

27. Couple up:
    - the dynamo tie-rod to the water pump, inserting the distributor earth wire,
    - the water pump suction pipe,
    - the accelerator control, the choke wire and the petrol feedpipe to the carburettor.

28. Fit:
    - the fan, tightening the screws to between 6 and 7 ft.lbs. (0.9 to 1 m.kg maximum),
    - the radiator tie-rod,
    - the hook for raising the engine,
    - the battery earth cable.

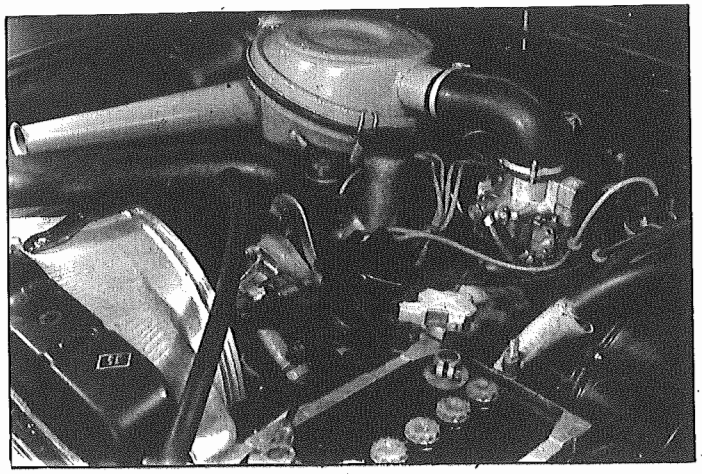
29. Adjust the rockers (see Op. DX. 112-0).

30. Fit the steel cups and rubber washers to the sparking plug wells.

Fit the cylinder head cover, inserting the gasket.

Tighten the screws (copper washers).

31. Fit the sparking plugs, (spanner 1603-T).



32. Fit the distributor head and connect the leads to the plugs.

33. Fit the air filter and tighten the clips.

34. Fit the rubber plug in the engine recess in the scuttle.

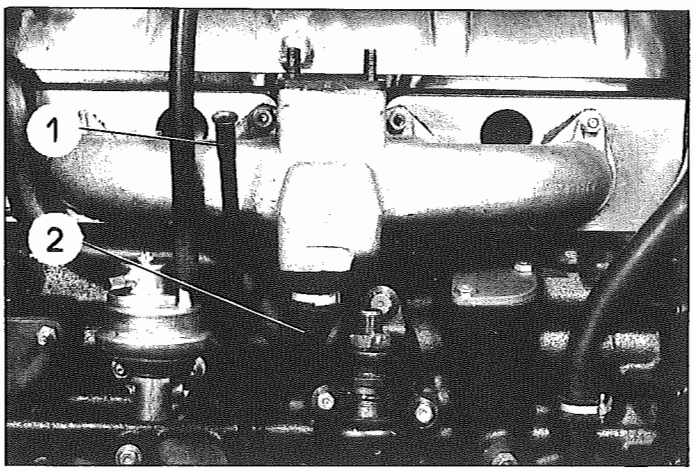
35. Fill the radiator with water and open the heater control valve.

36. Connect the cables to the battery terminals.

37. Start up the engine.

38. Place the manual height control in "normal" position.

39. Adjust the slow running (see Op. DJ.142-0).



REMOVAL.

1. Drain the radiator and cylinder block. Save the water which contains anti-freeze.
2. Disconnect the battery negative lead.
3. Remove the carburettor (see Op. DJ.142-1).

   Disconnect the accelerator control linkage from the flexible bearing on the scuttle.
4. Remove the oil dipstick and its housing (1).

   Remove the nuts securing the manifold.

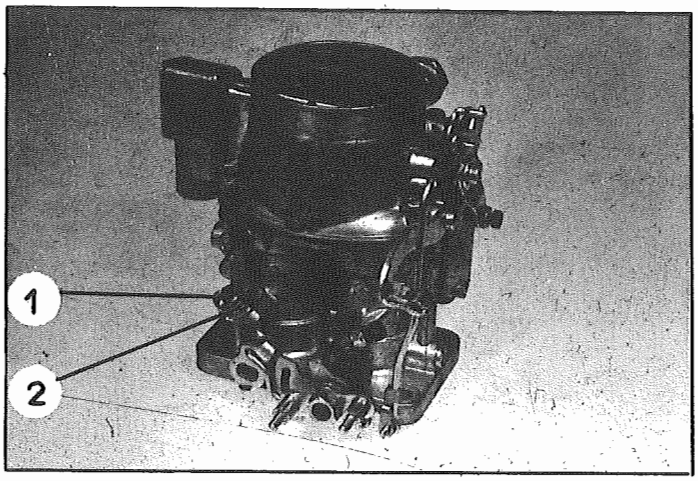
   Remove the manifold.

   Disconnect the pre-heater hose (2) from the manifold.
5. Remove the gaskets.

ASSEMBLY.

6. Insert the gaskets.
7. Connect the pre-heater hose (2).

   Fit the manifold.
8. Fit :
   - the carburettor (see Op. DJ.142-1),
   - the oil dipstick and its housing (1).
9. Fit the accelerator control linkage in the flexible bearing on the scuttle and couple it to the carburettor.
10. Fill the radiator. (Open the heater tap and bleed the water circuit).
11. Connect the negative lead to the battery.
12. Adjust the idling (see Op. DJ.142-0).



Adjustment of the idling.

NOTE : This adjustment must be made with the engine hot.

1. Turn the secondary butterfly stop screw (2) until a speed of approximately 550 r.p.m. is obtained.

2. Turn the mixture screw (1) in one direction or the other, until the point of maximum speed is reached for the butterfly opening as above.

3. Slowly unscrew the stop screw (2) until a speed of 550 - 600 r.p.m. is obtained. If running is erratic, re-adjust again the mixture screw (1) (do this very slowly).

NOTE : After each adjustment on the secondary butterfly adjusting screw (2), flip the throttle open slightly to ensure that the butterfly returns fully to the stop screw.

NOTE : The use of a tachometer is essential (mechanical tachometer 2434-T with drive 2423-T driven by the pulley of the high pressure pump), or an electric tachometer 2436-T connected to the outlet terminal (red terminal) of the coil.

1) Mechanical Revolution Counter.

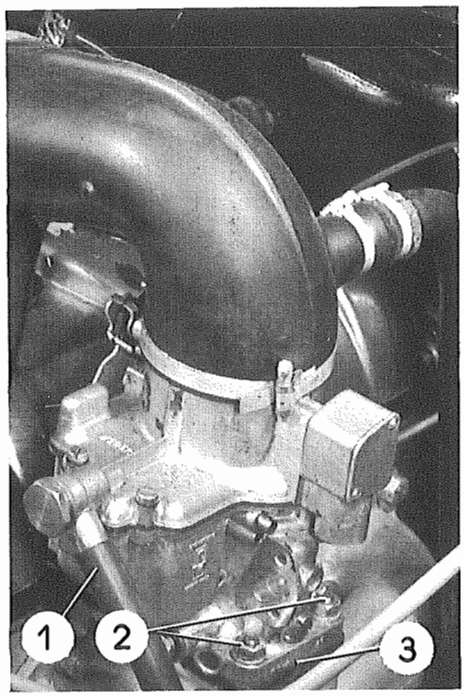
To compensate any error due to belt slip or to irregular running during the check, loosen the bleed screw of the pressure regulator, or place the manual height control lever in the low position.

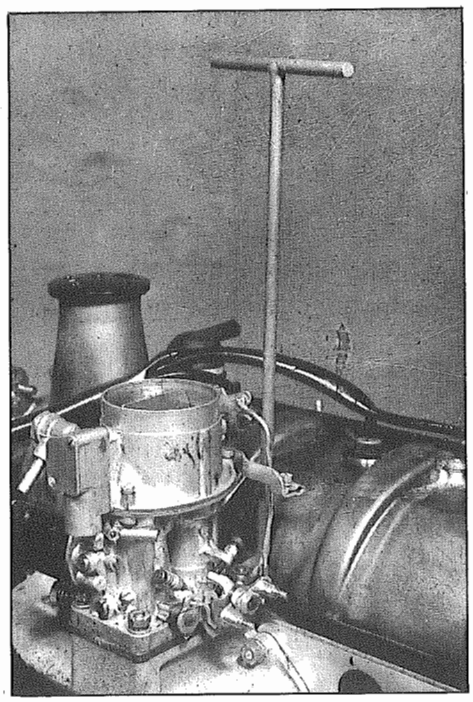
2) Electric Revolution Counter.

Electric revolution counters should be checked periodically.

They should conform to the following standards :

- dial of large diameter graduated from 0 - 1500 r.p.m. maximum
- needle steady when in use.





REMOVAL.

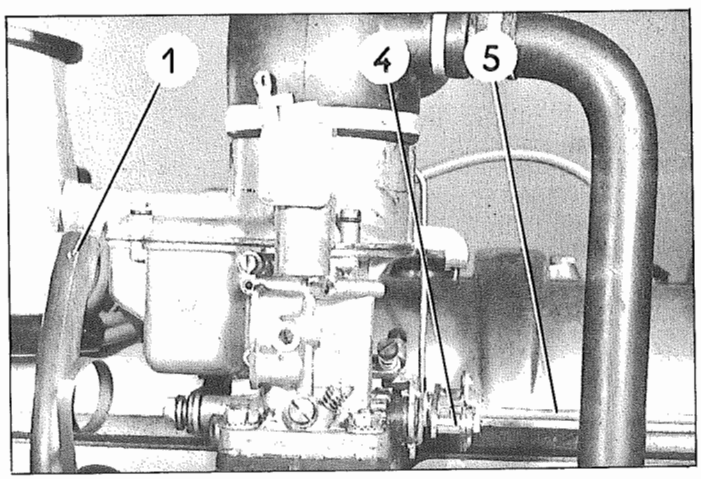
1. Remove:
   - the rubber elbow connecting the air filter to the carburettor,
   - the petrol delivery hose (1).
2. Disconnect:
   - the choke control cable,
   - the throttle relay (5) from the flange (4) on the butterfly spindle (nuts and locknuts).
3. Remove:
   - the 4 nuts (2) securing the carburettor (spanner 3081-T),
   - the carburettor and its spacer (3).

ASSEMBLY.

4. Smear the two faces of the spacer (3) with hermetic compound. Place them in position.

   Fit:
   - the carburettor.

   Tighten the securing nuts (spanner 3081-T).
5. Connect up:
   - the throttle relay (5) to the flange (4) on the butterfly spindle (nuts and locknuts),
   - the choke cable, and adjust it.



6. Fit:
   - the petrol delivery hose (1),
   - the rubber elbow connecting the air filter to the carburettor.

   Fit the hose clips.

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The clutch is identical with that on cars DS 21 (DX). The characteristics are as given in Operation DX.312-00 except the following :

Mechanism.

Mauve spring,

length 27.3 mm under a load of $60\ ^{+4}_{0}$ kg.

Mechanical clutch control.

height of pedal measured from the underside of pedal pad to floor ..... = $137\ ^{+5}_{0}$ mm for L.H. drive.

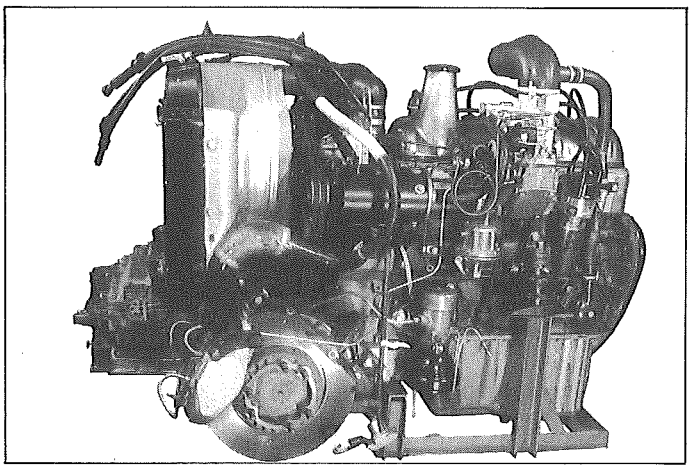
or $162\ ^{+5}_{0}$ mm for R.H. drive.

the clearance between the end of the connecting rod and the clutch bell-housing (see Op. DJ. 314-0, paragraph 2) ..... j = 3.5 to 4.5 mm for L.H. drive.

or j = 2.5 to 3.5 mm for R.H. drive.

clutch clearance (pedal lost motion) (see Op. DJ.314-0, paragraph 3) ..... j - j' = 1.6 to 2.4 mm.

518.Add.1.



REMOVAL.

1. Remove the engine gearbox assembly (see Op. DJ.100-1).

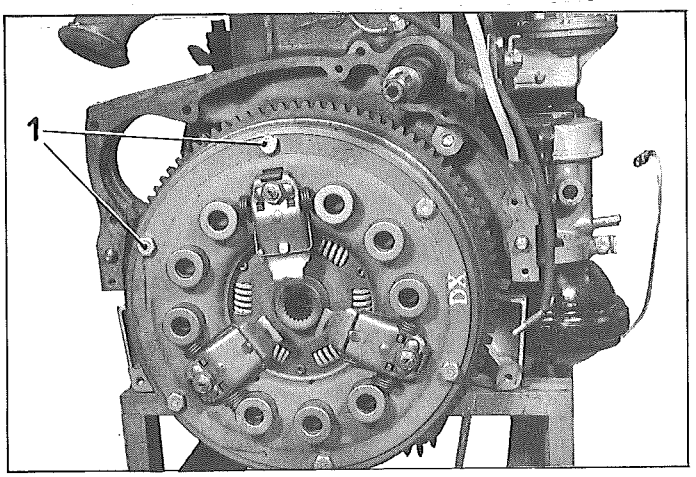
2. Disconnect the gearbox from the engine (see Op. DJ.100-2).

3. Remove the clutch unit.

With a centre-punch mark the position of the clutch plate on the engine flywheel. Remove the screws securing the mechanism.

Free :

- the clutch mechanism,
- the disc.



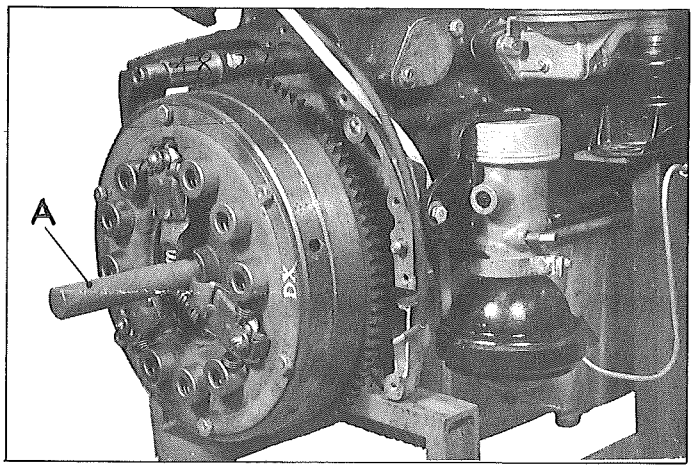
ASSEMBLY.

4. Make quite sure that the faces on the clutch mechanism and on the engine flywheel which the disc contacts are perfectly clean and free from scratches etc.

5. Offer up the clutch disc and centre it by using a mandrel 3016-T (A). If not available use an old main shaft.

6. Fit the clutch unit in accordance with the marks made when dismantling. Tighten the screws (1) (spring washer under the heads) to 18 ft lbs $^{+\ 2}_{-\ 3}$ ($2.5\ ^{+\ 0.3}_{-\ 0.4}$ m.kg).

During tightening, make sure that the mandrel slides freely in the splines.



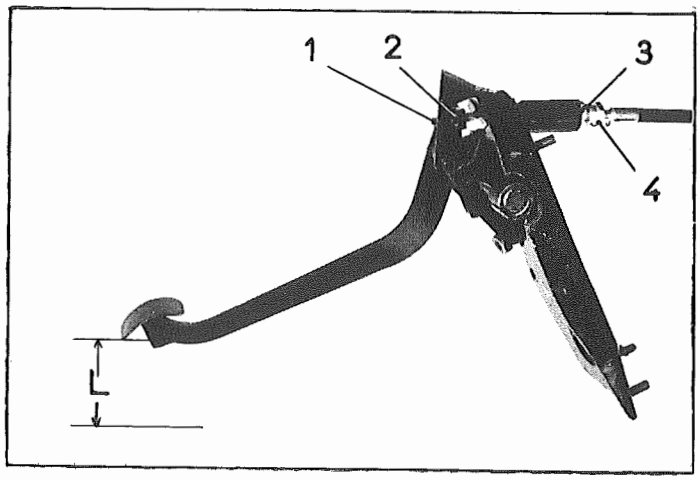
NOTE : If there are 12 drilled holes in the clutch casing for assembly, only 6 holes are used. The clutch mechanism must be fitted so that 3 of its screws are in line with the toggles.

7. Connect the gearbox to the engine.

8. Fit the engine-gearbox assembly (see Op. DJ.100-1).

June 1966.

Corrective No.1



1. Checking the height of the clutch pedal.

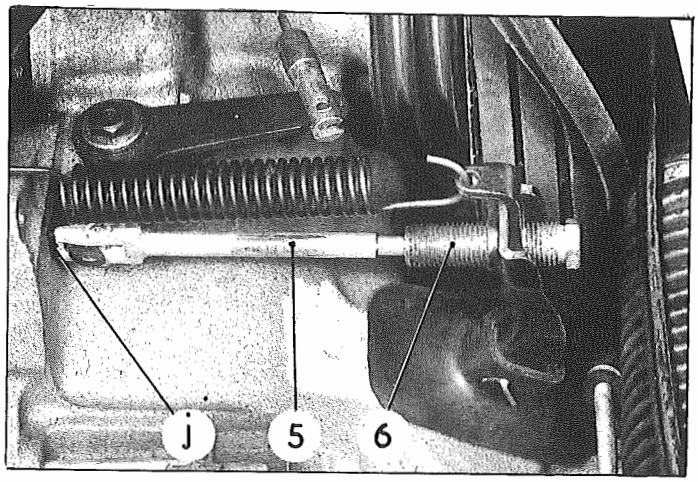
This should be L = 137 mm $^{+5}_{0}$ mm from the underside of the pedal pad, with cover removed, to the floor panel. (For R.H. drive: L = 162 $^{+5}_{0}$).

To obtain this dimension loosen the locknut (2) and adjust the stop screw (1).

2. Adjusting the length of the rod.

The clearance between the end of the connecting rod (5) and the clutch housing must be j = 3.5 to 4.5 mm. (For R.H. drive: j = 2.5 to 3.5 mm between pushrod and bracket on bellhousing).

To obtain this dimension adjust the threaded sleeve (3) by turning the nut (4).



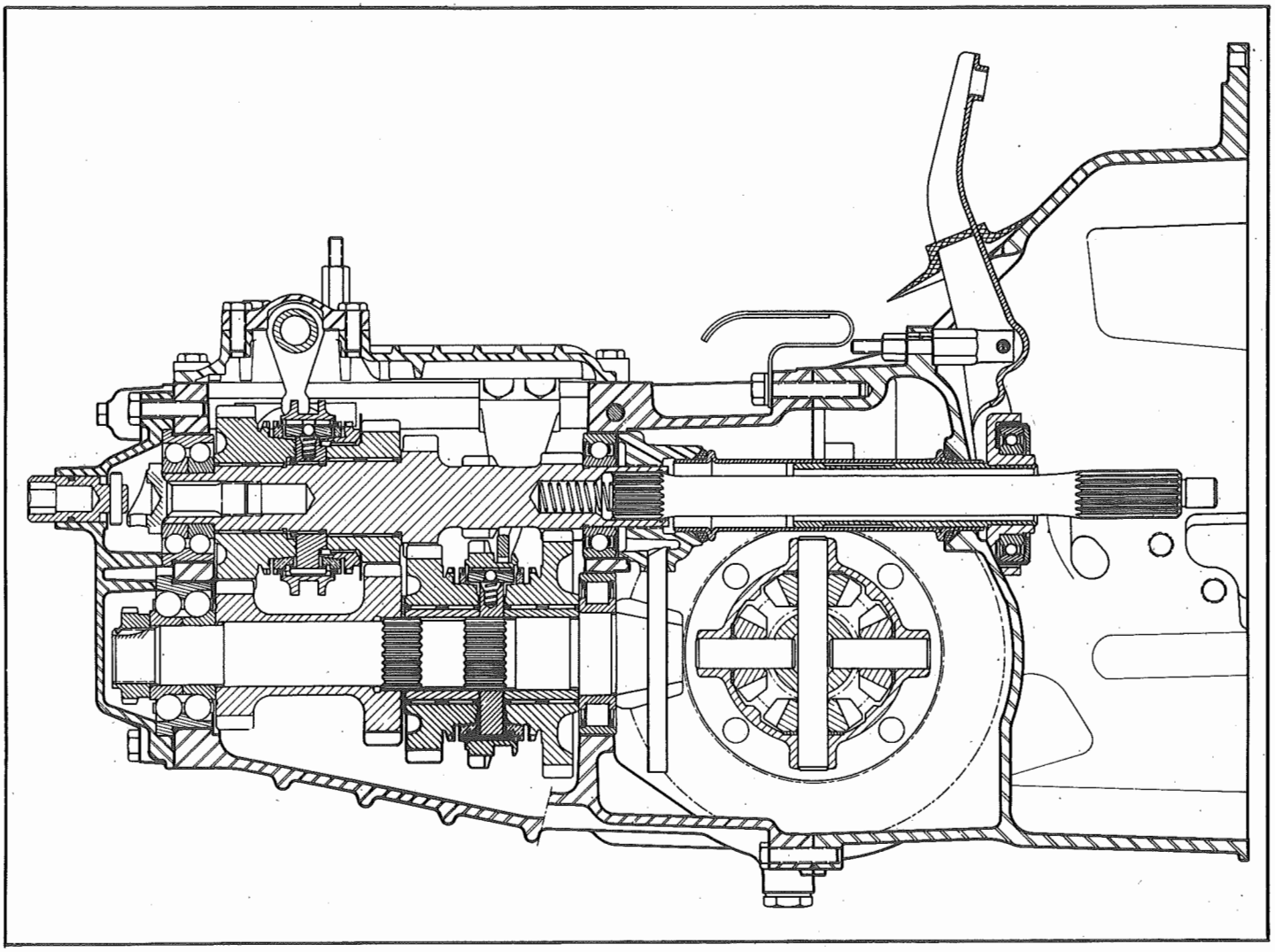
3. Adjusting the clutch clearance.

Using a rule measure the clearance "j" given above.

Obtain an assistant to depress the clutch pedal by hand just sufficiently to feel resistance on making contact with the thrust race, against the toggles.

Again measure the clearance "j". The difference (j - j') should lie between 1.6 and 2.4 mm.

If it does not, adjust the screw (6).



SPECIAL POINTS

Clutch housing.

Distance between the end of the thrust race guide screw and the housing joint face = 94 to 95 mm.

Mainshaft.

Synchro clearance, 3rd and 4th j = 0.10 mm maximum.

Tightening torque for nut : 108 - 122 ft.lbs. (15 - 17 m.kg).

Bevel pinion shaft.

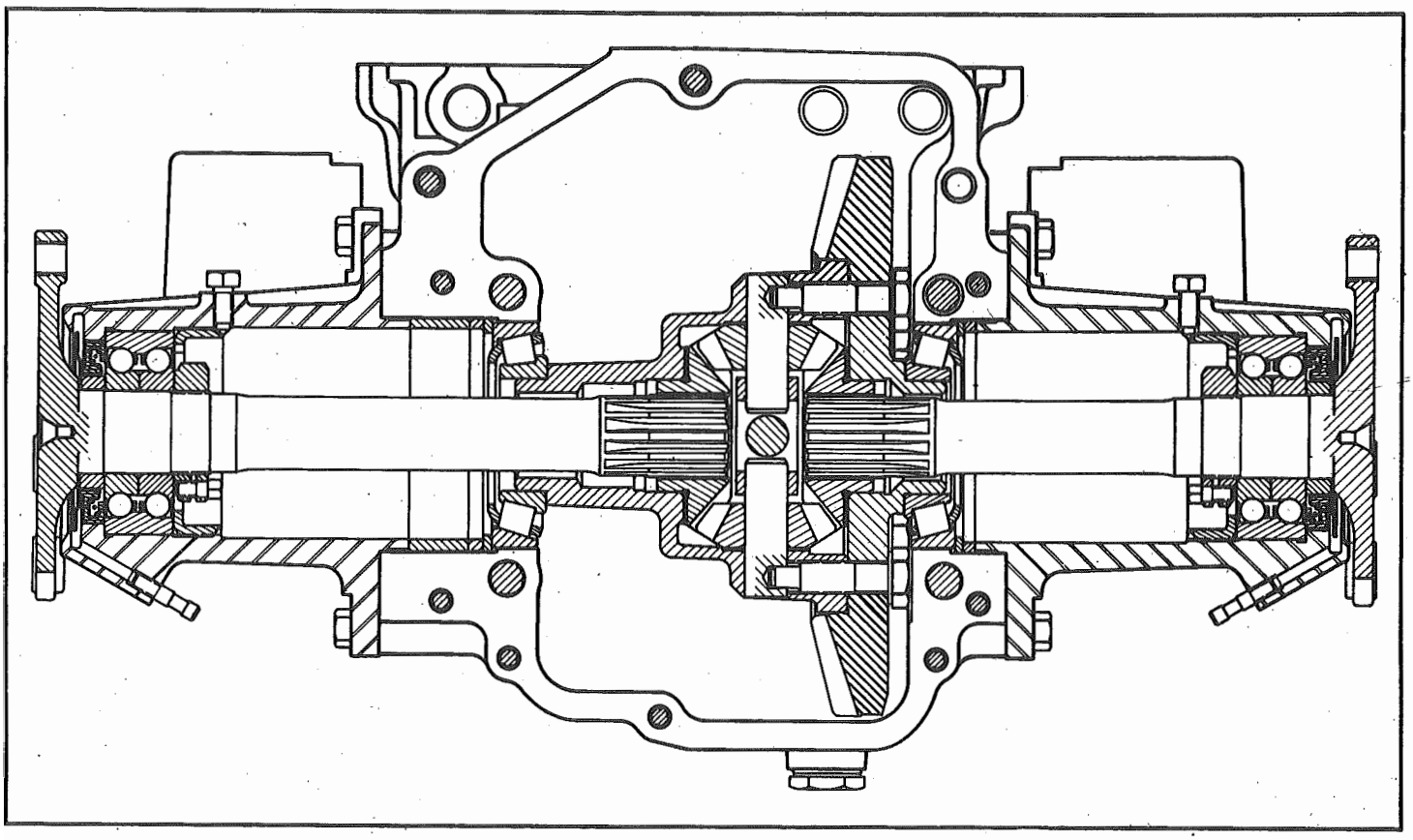
Tightening torque for end nut : 144 - 158 ft.lbs. (20 - 22 m.kg).

Forks.

Tightening torque for screws : 29 ft.lbs. (4 m.kg).

Adjusting the gear travel for 4th gear.

Clearance between slider and loose pinion j = 0.4 - 0.6 mm.



SPECIAL POINTS

Differential.

- Planet gear end-float j = 0.1 mm minimum.
- Clearance between planet gear and satellite = 0.1 mm.
- Tightening torque for crown wheel screws 84 - 94 ft.lbs. (11.7 - 13 m.kg).

Differential shaft.

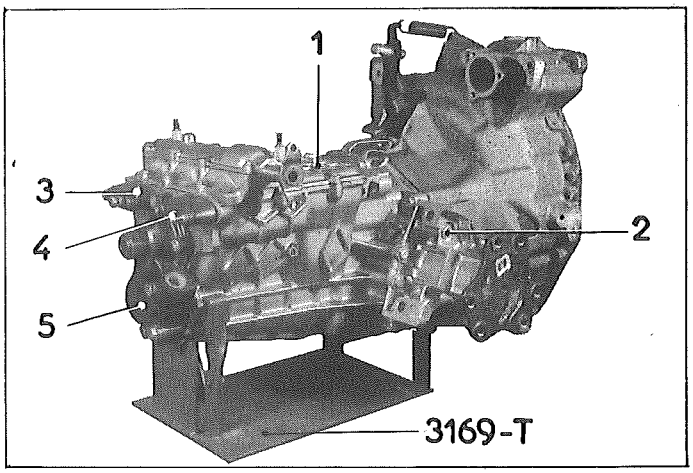
Tightening torque for bush-nut for ball cage : 72 ft.lbs. (10 m.kg).

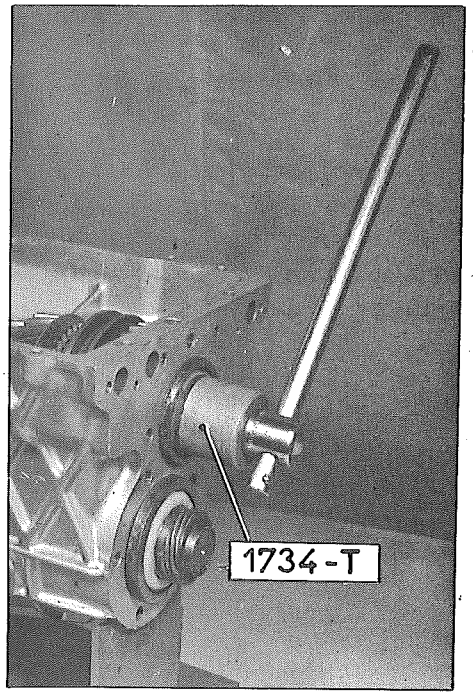
Tightening torque for bearing nut : 108 ft.lbs (15 m.kg).

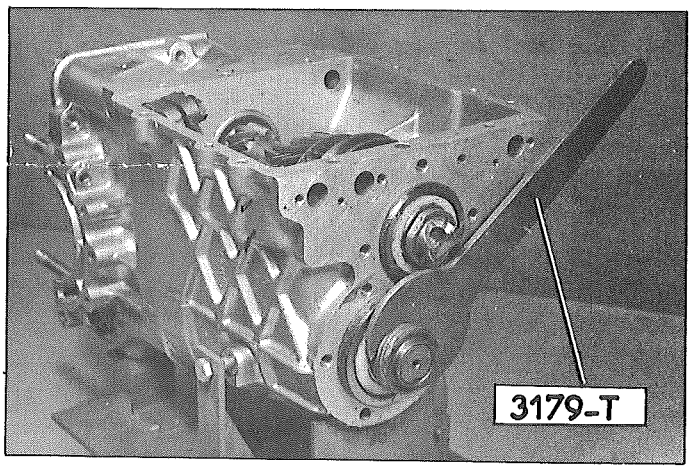
Crown wheel and pinion.

Check the conic distance etched on the bevel pinion.

Clearance between teeth on crown wheel and pinion j = 0.16 - 0.24 mm.







DISMANTLING.

1. Place the gearbox unit on a stand (stand 3169-T).

2. Remove the cover (1).

3. Remove the drive outlet shafts and housings.

Remove the securing screws (2) and free the drive outlet shaft housing assembly, the adjusting washers and distance pieces (if the differential is to remain undisturbed mark the positions of the washers).

4. Disconnect the clutch housing.

Remove the nuts and screws; hold the differential in position against the clutch housing and free the assembly.

Remove the tubular support for the clutch thrust bearing, and the oil return flange.

5. Remove the front caps.

   a) Remove the cover (5) from the front bearings (keep its adjusting shims).

   b) The cover (4) from the reverse gear selector fork shaft.

   c) The cover (3) from the 3rd and 4th gears selector fork shaft.

6. Remove the selector fork shafts.

   a) Loosen the screws securing the operating dog for reverse gear, and those for the forks.

   b) Free the shafts by turning them one quarter of a turn (take care not to lose the locking balls).

   c) Remove the locking balls and springs from their housings; the selector fork for 3rd and 4th and the reverse gear selector fork and the operating dog.

7. Place two speeds in mesh.

Remove the starting dog (spanner 1734-T) and the lower bearing locking nut (spanner 3179-T).

8. Remove the sealing plugs.

9. Remove the mainshaft.

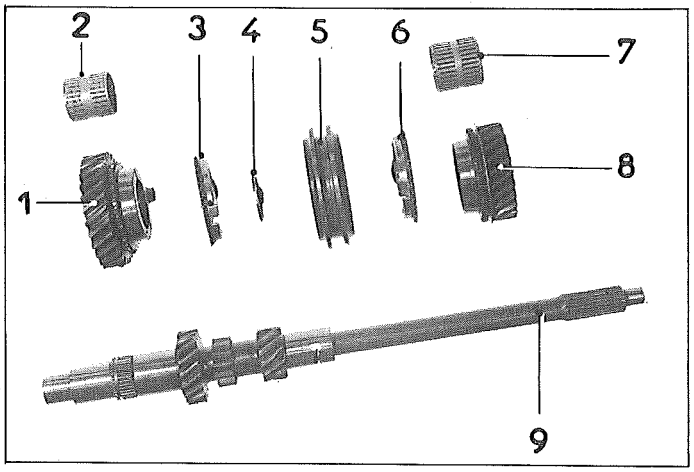
   a) Remove the rear bearing using a bronze drift.

   b) Remove the front bearing (take care not to lose the balls).

   c) Withdraw the shaft with pinions through the top of the gearbox.

NOTE: The inner bearing cage is in two parts. Do not separate them.

10. Remove the 1st/2nd selector fork.



11. Remove the reverse gear intermediate pinion.

Unscrew the locknut and shaft securing screw. Remove the shaft and pinion.

12. Remove the bevel pinion.

a) Remove the front bearing by tapping the end of the shaft with a mallet, finishing by hand or using small levers.

NOTE: The inner bearing cage is in two parts, do not separate them.

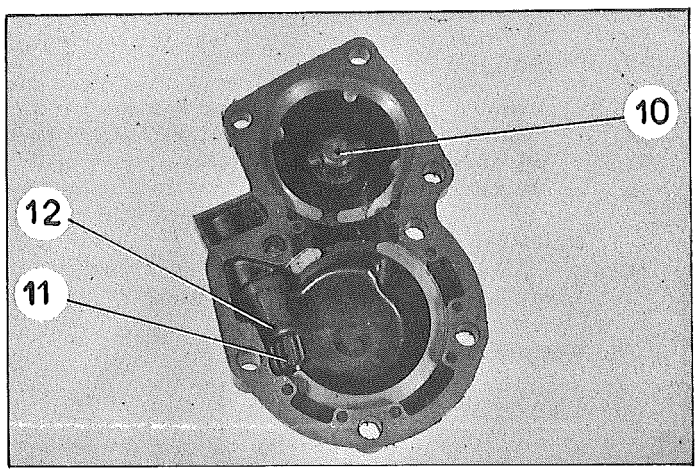
b) Withdraw the bevel pinion towards the rear.

c) Withdraw the pinions and the adjusting washer.

13. Strip the mainshaft.

Remove:

- the loose 4th gear pinion (1),
- the needle bearing cage (2),
- the synchro ring (3),
- the circlip (4) from the synchro hub (use circlip pliers),
- the synchro (5),
- the synchro ring (6),
- the loose 3rd gear pinion (8),
- the needle bearing cage (7).



14. Remove the mainshaft.

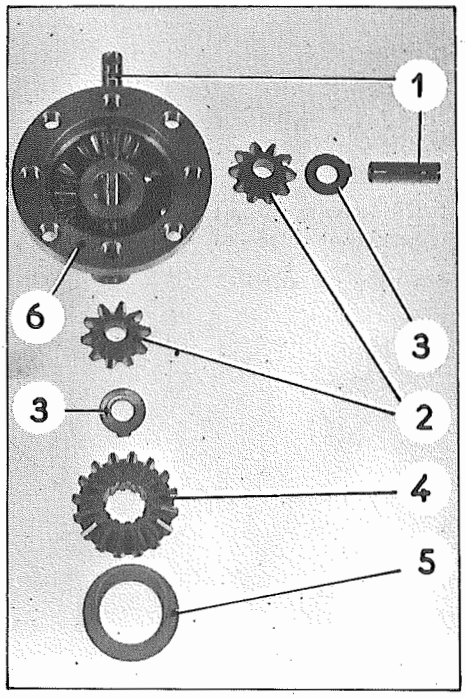
Remove the circlip.

Withdraw the driving shaft (9) and the spring, from the mainshaft.

15. Strip the front cover.

Remove:

- the speedometer drive pinion assembly (11),
- the cup (12),
- the starting relay shaft (10).

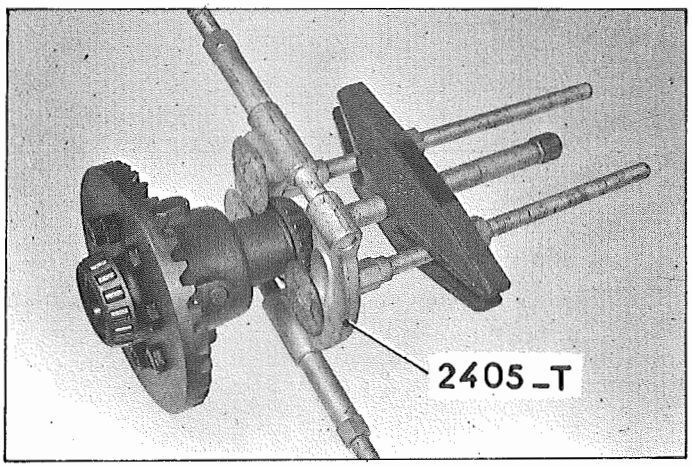


16. Dismantle the differential.

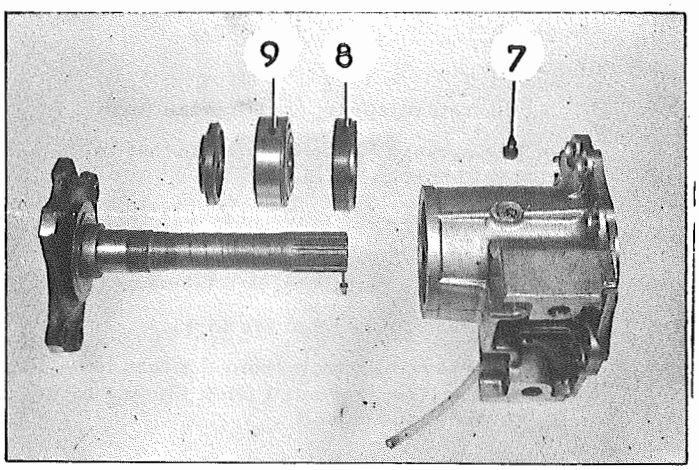
a) Remove the large crown wheel.

b) Free:

- one planet wheel (4) and its thrust washer (5),
- the satellite spindles (1),
- the satellite gears (2),
- the satellite thrust washers (3),
- the crosshead (6),
- the other planet gear and its thrust washer.



c) Remove the taper roller bearings (extractor 2405-T and pad 1742-T).



17. Strip the differential shafts.

a) Unscrew the stop screw for the locknut of the bearing on the shaft.

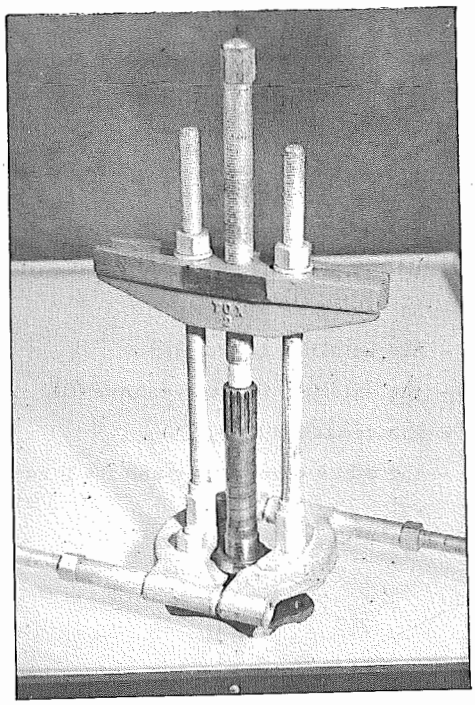
Remove the nut (spanner 1770-T bis).

Tap out the shaft.

Remove the screw (7) locking the nut (8) securing the bearing in the housing.

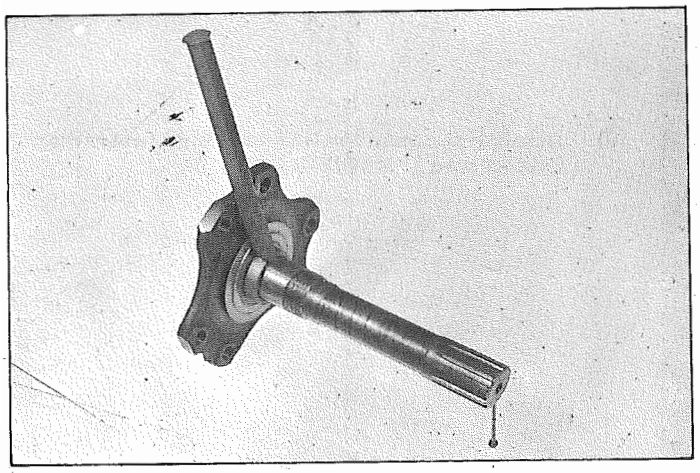
Remove the nut (8) (spanner 1771-T bis).

Tap out the bearing outer cage (9) with a tube of 65 mm external diameter.



b) Withdraw the inner cage from the shaft (extractor 2045-T).

Remove the oil seal.

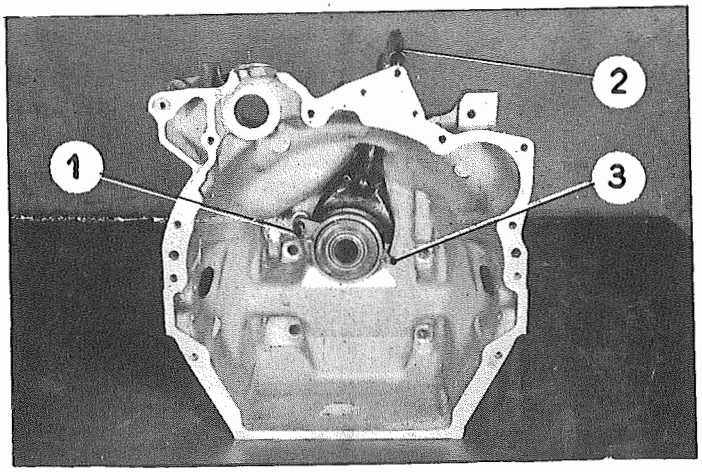


c) Remove the oil retaining washer and bearing stop ring assembly.

Place the stop ring on a support.

With a chisel expand the stop ring.

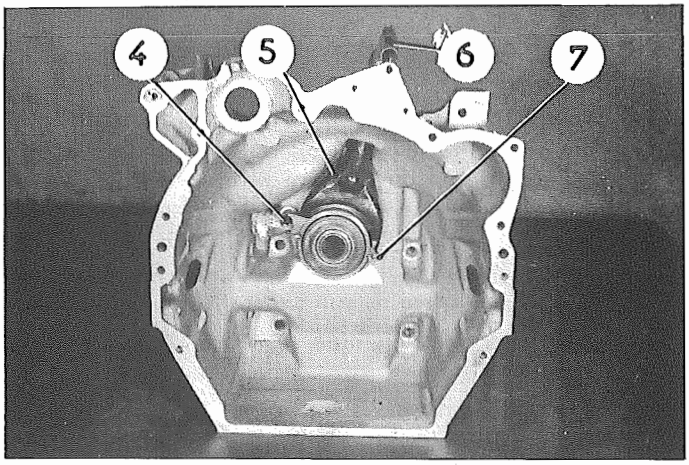
Remove the stop ring and the oil retaining washer.



18. Strip the clutch bell-housing.

Remove:

- the return spring (2) from the fork,
- the springs (3) holding the thrust race, and the thrust race itself,
- the thrust race guide screw (1),
- the fork adjusting screw and the spring anchorage plate,
- the dust cover from the fork,
- the securing screw from the fork ball joint (the ball is prevented from turning by a mecanindus dowel),
- disconnect the ball from the fork.

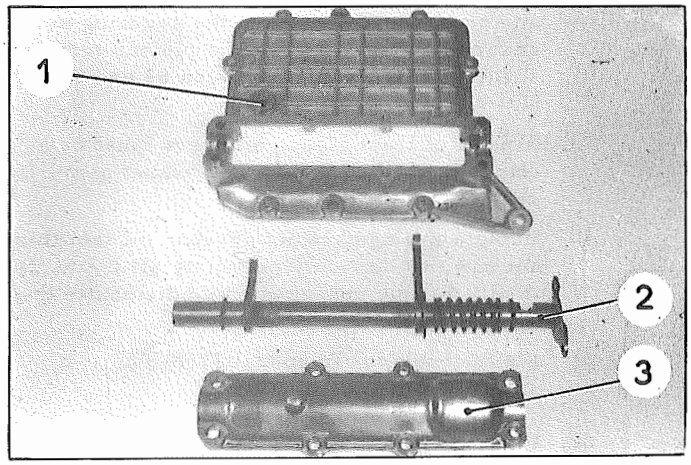


19. Strip the gearbox cover.

Loosen the screws securing the cross-shaft cover.

Remove the cover (3) and the gear change control cross-shaft (2).

Remove the filler plug (1).



ASSEMBLY.

20. Assemble the clutch bell-housing.

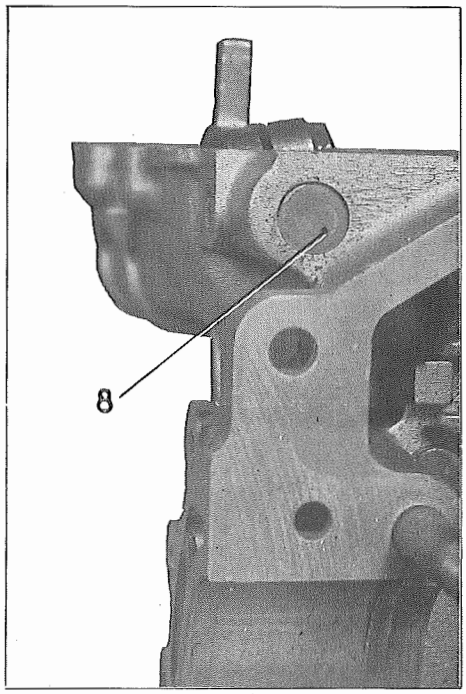
a) Fit the clutch fork ball joint (the position is given by a mecanindus dowel which engages in the hole in the housing). Tighten the securing screw.

b) Fit the thrust race guide screw (4) with its locknut and adjust it so that the end is at a distance of between 94 and 95 mm from the gasket face on the engine side. Tighten the locknut.

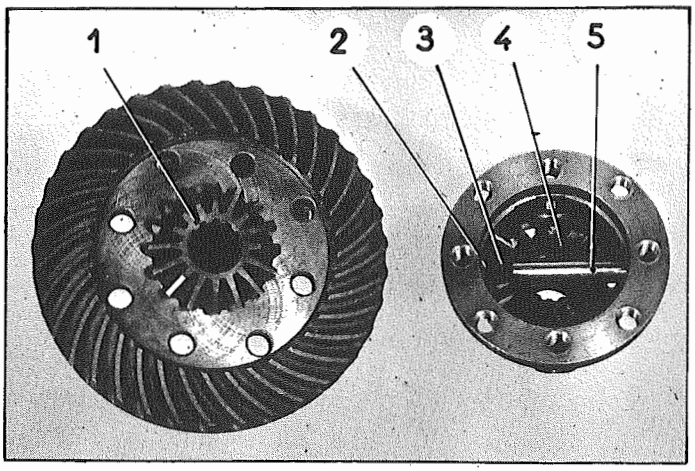
c) Lubricate the ball joint and the guide screw, fit the clutch fork and insert the pin (5).

d) Fit the thrust race (with its guide lubricated) and secure it with retaining springs (7).

e) Fit the spring anchor clip, the adjusting screw and the return spring (16) for the fork.



NOTE: If the gearbox housing is to be changed, fit the sealing plug (8) with masti-joint HD 37, (sealing compound), in the bore for the spindle of reverse gear control, (clutch housing end).



21. Prepare the differential.

a) Fit in the housing one thrust washer, one planet gear (4), one fixed thrust washer (2), one satellite (3) and one spindle (5).

Rotate the planet gear and check that at the point of least clearance there remains a clearance of 0.1 mm. If not replace the thrust washer (2) to obtain this clearance.

Remove the satellite and its thrust washer and mark the position of this assembly in the housing.

b) Carry out the same operation for each of the satellites.

c) Fit all the satellites.

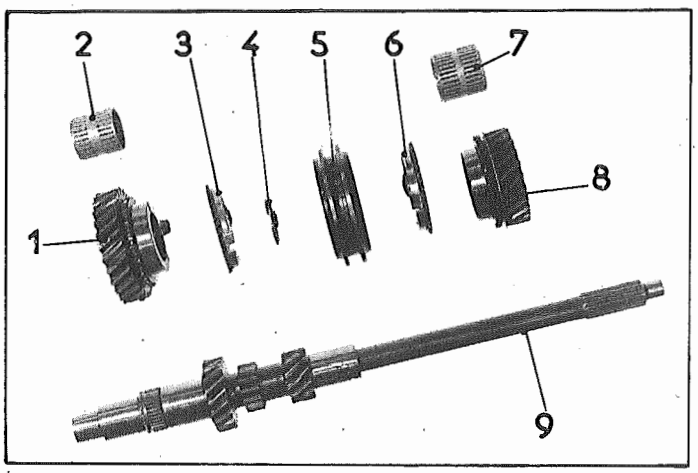
d) In the crown wheel fit the second planet gear (1) and its thrust washer.

e) Fit the crown wheel in position on the housing and progressively tighten the securing screws, ensuring meanwhile that the pinions turn freely. Tighten the screws to between 84 and 93 ft.lbs. (11.7 - 13 m.kg).

At the point of least clearance there must be a clearance of 0.1 mm on this planet gear. If not replace the thrust washer.

f) Using a syringe, inject gearbox oil into this housing, to lubricate correctly all the parts. It will then be unnecessary to dismantle the housing again.

g) Fit the bearings (mandrel 1768-T).

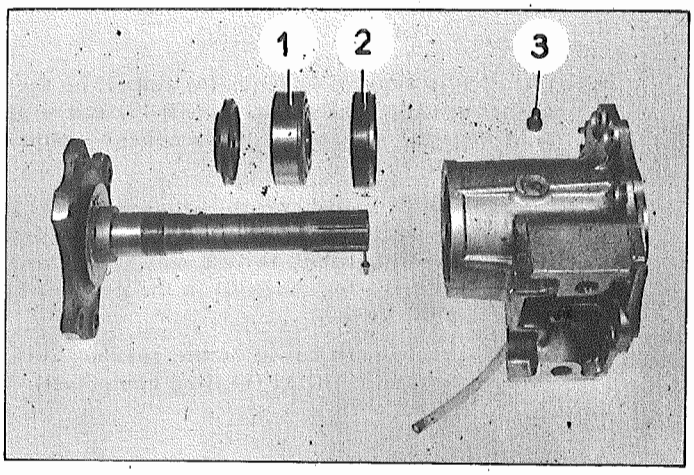


22. Prepare the mainshaft.

a) Fit in place the spring, the drive shaft (9) and the circlip.

b) Place on the shaft the following:

- the 3rd speed loose pinion (8) with its needle bearing cage (7) previously lubricated with special bearing grease,
- the synchro ring (6),
- the synchro (5) fitted with its drive dogs, the face with the boss being towards the 3rd speed pinion. Choose a suitable circlip (4) to obtain a clearance of 0.10 mm maximum,
- the synchro ring (3),
- the 4th speed loose pinion (1) together with its needle bearing cage (2) previously lubricated (with bearing grease).



23. Prepare the bevel pinion.

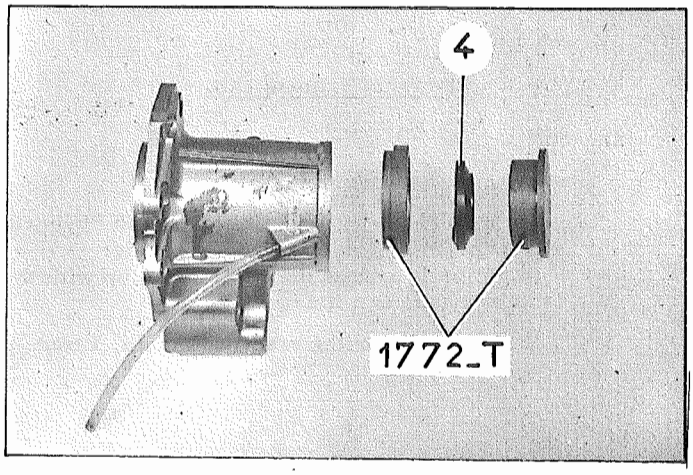
Fit the bearing, (if necessary use a tube 44 mm internal diameter by 240 mm long).

24. Prepare the assembly of differential shaft and housing, right-hand side.

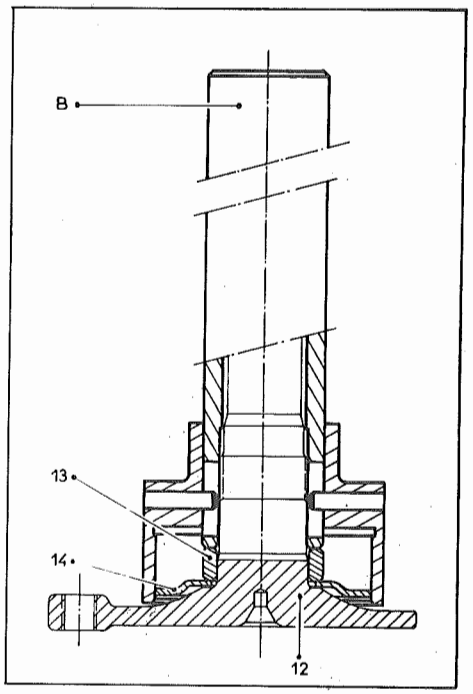
NOTE: The right-hand side differential shaft is the shorter.

a) Fit the bearing (1) in the housing. Tighten the nut (2) to 72 ft.lbs. (10 m.kg) (spanner 1770-T bis). Lock the nut with the pointed screw (3).

NOTE: The bearing (1) can be dismantled. When assembling, the shoulders on the nylon cages (carrying the balls) should face towards the centre of the bearing.

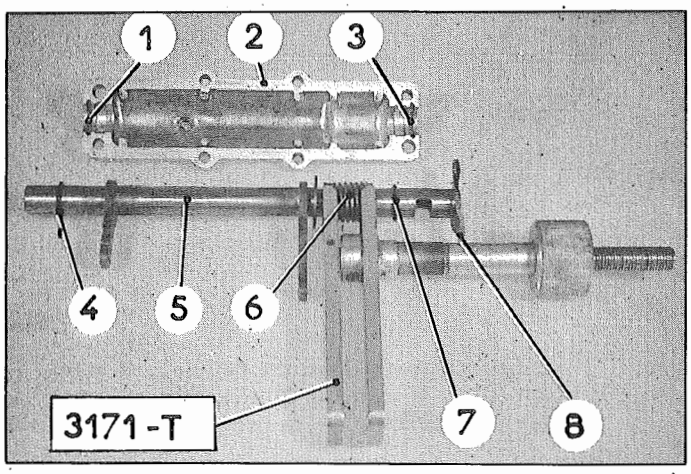


b) Fit the oil seal (4) with the aid of tool 1772-T.



c) Fit the oil retaining washer (14) on the shaft. Offer up the distance piece (13) and put the mandrel 1767-T bis in position. Centralise the oil retaining washer inside the mandrel centring bush and fit the distance piece using a press.

d) Fit the differential shaft thus prepared into the housing, using a press and a tube of 30 mm inside diameter. Tighten the bearing locknut to 108 ft.lbs. (15 m.kg). Tighten the screw locking the nut.

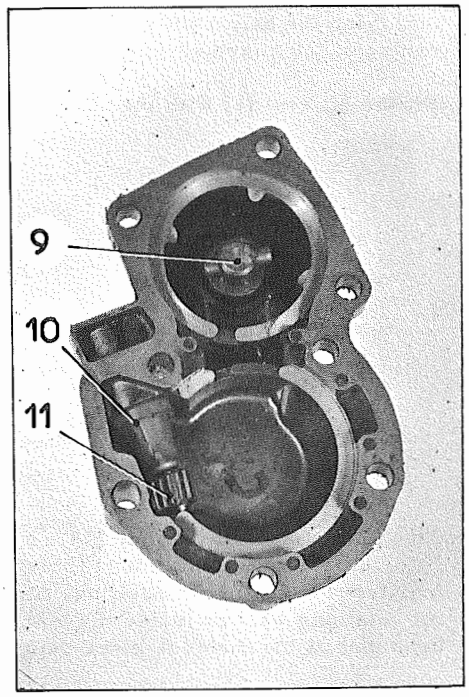


25. Assemble the gearbox cover.

a) Change the sealing washers (4) and (7) on the change speed control cross-shaft (5) and wrap the flange (8) with sellotape or adhesive paper, passing the seal over it.

b) Fit the change speed control cross-shaft (5) in the cross-shaft cover (2). Compress the spring (6) with the aid of tool 3171-T with its distance pieces. The sealing rings fit in the grooves (1) and (3) in the cover.

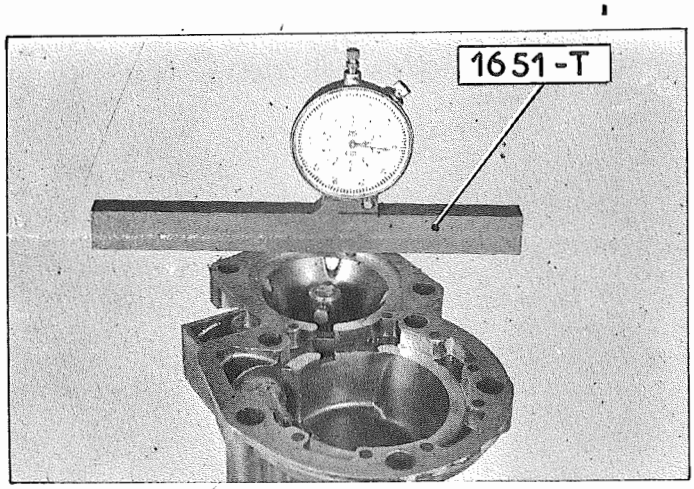
c) Fit the cross-shaft cover on the gearbox cover using masti-joint HD 37 (sealing compound).



26. Prepare the front bearing cap.

a) Fit:

- the speedometer drive pinion (11),
- the nylon housing (10) smeared with "hyperix" sealing compound under the shoulder (position it so that the notch lines up with the hole for the cap fixing screw),
- the shaft (9) for the starting handle, fitted with its seal.

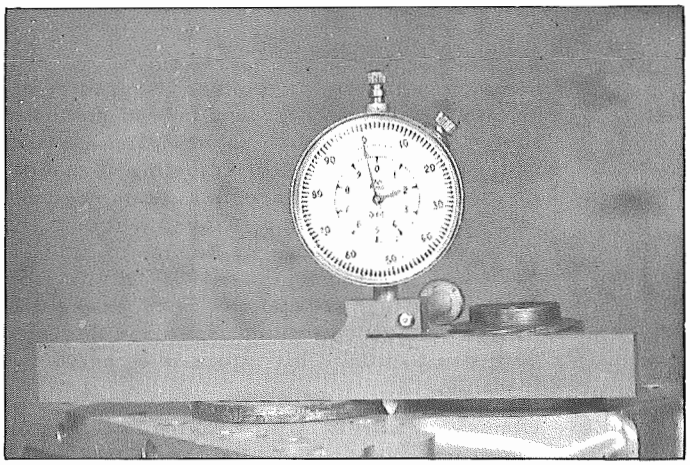


b) Determine the thickness of the shims to be fitted behind the bearing for the mainshaft.

Place a straight edge (straight edge 1651-T) fitted with dial gauge 2437-T on the cap, with the tip of the dial gauge stem in contact with the bearing thrust face.

Turn the dial so that the large needle it at zero.

Note the position of the totalising needle.



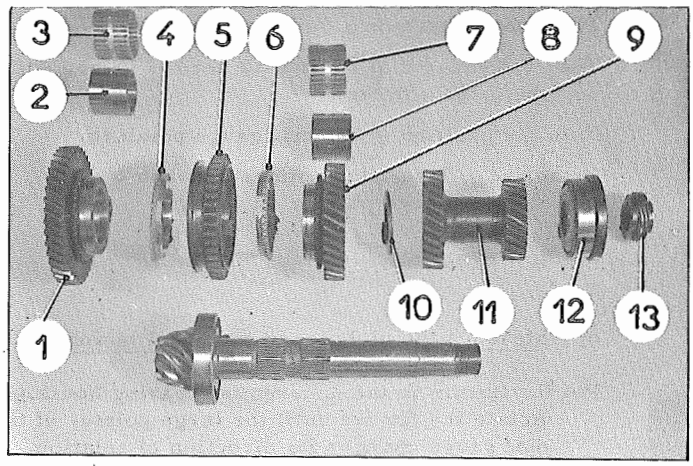
Place the bearing in the bore of the gearcase with its collar hard against the joint face.
Place the straight edge on the outer collar of the bearing cage.
The movement of the large needle on the dial gauge from its original position will give the thickness of the shims to be fitted.
A maximum clearance of 0.05 mm is permissible.
Choose suitable shims from amongst those sold by our Spare Parts Department. Place them in the recess in the cover. If several shims are necessary place the thickest on the gearbox side.

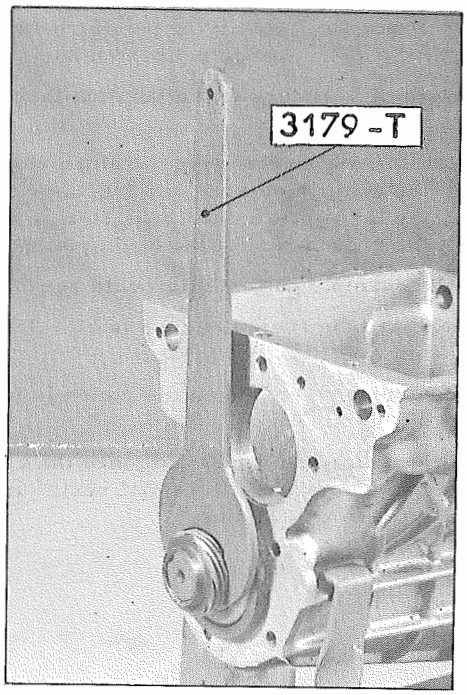
c) Determine the thickness of the packing shims behind the bevel pinion shaft bearing.
Carry out the same operation as in b) above.

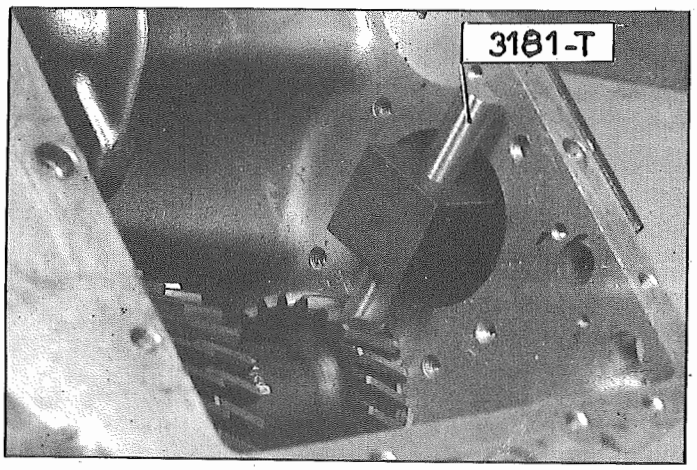
27. Fit the bevel pinion.

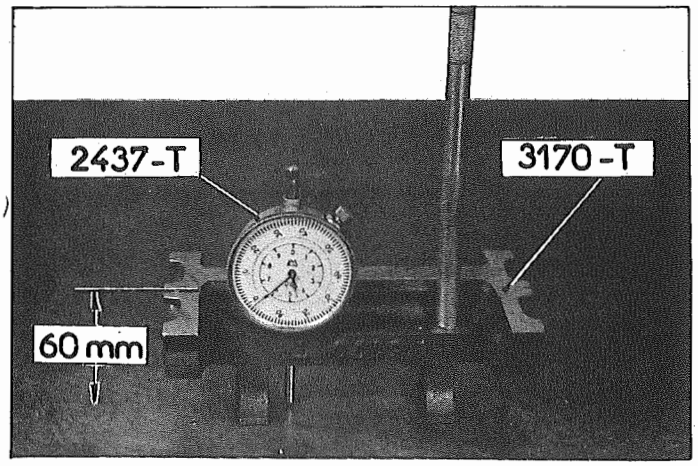
a) Place in the gearbox the following:
- the 1st gear loose pinion (1) with its distance bush (2) and needle bearing cage (3) previously lubricated with special bearing grease,
- the synchro ring (4),
- the synchro (5) with its drive dogs, the groove of the slider towards the bevel pinion,
- the synchro ring (6),
- the 2nd gear loose pinion (9) with its distance bush (8) and needle bearing cage (7) previously lubricated with special bearing grease,
- an adjusting washer (10) for the conic distance,
- the intermediate train (11).

b) Fit the bevel pinion by hand.
c) Fit the front bearing (12) and tighten the nut (13) to between 144 and 158 ft.lbs. (20 - 22 m.kg) (spanner 3179-T and tool 3181-T).
d) Fit the front cover together with its adjusting pieces as determined in paragraph 26 above. Tighten the screws. Check that the loose pinions turn freely.









28. Adjusting the conic distance.

A dimension expressed in mm and hundredths of a mm is etched on the ground face of the bevel pinion. This dimension represents a distance which must remain after adjusting, between the centre line of the differential and the ground face of the bevel pinion. Adjustment of the conic distance must be made by the use of fixture 3170-T with dial gauge 2437-T. This fixture is so made that the distance between the centre line of the ground contact faces and the contact points is 60 mm. This figure is etched between the pins.

a) Clean very carefully the bearing housings and the ground contact faces on the fixture.

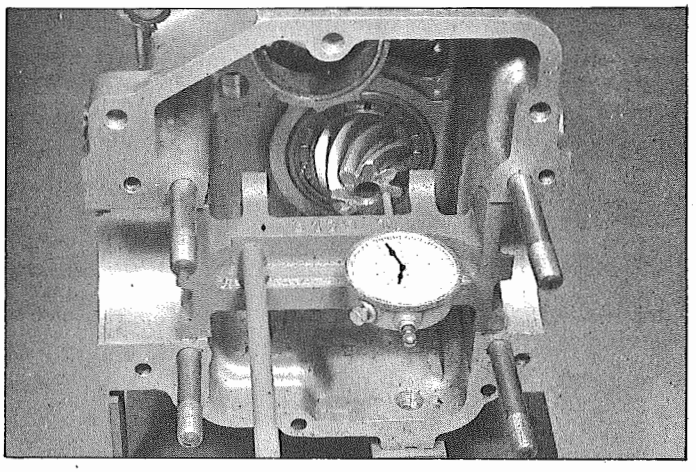
b) Calibrate the fixture.

Place the fixture on a surface plate.

Turn the gauge dial so that its zero is in line with the large pointer.

Note the position of the dial gauge pointers.

Example: Totalising pointer between 4 and 5.
Large pointer on zero.



c) Measure the distance of the bevel pinion.

Put the fixture in the differential bearing housings. Rotate the fixture until the large pointer of the dial gauge changes its direction of rotation.

Note the pointer readings.

Example: Totalising pointer between 0 and 1.
Large pointer on 86.

Return the pointers to the position they occupied at b) above.

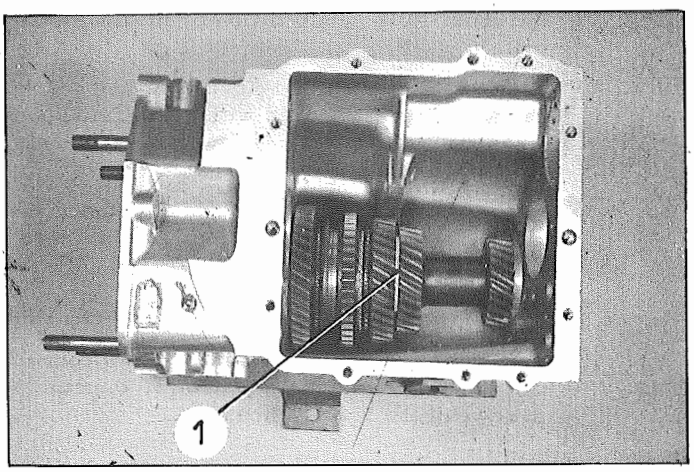
Allow the dial gauge stem to return slowly, counting the number of turns and fractions of a turn of the large pointer until the stem again contacts the ground face of the bevel pinion.

In the example chosen this would be : 3.86 mm.

Therefore the conic distance is 60 + 3.86 = 63.86 mm.

The dimension etched on the pinion is for example 63.95 mm.

It is therefore necessary to move the bevel pinion away from the differential centre line by 63.95 - 63.86 = 0.09 mm.



d) Adjust the bevel pinion.

Remove:

- the front cover,
- the nut locking the bearing.

Remove the bevel pinion and adjusting washer (1).

Measure the thickness of the washer which may be, for example, 2.81 mm.

It is therefore necessary to replace this washer with a washer 2.81 - 0.09 = 2.72 mm thick.

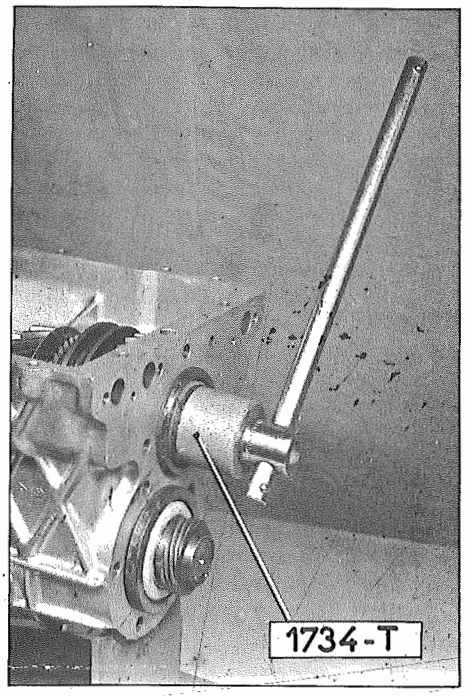
These washers are available from 1.65 to 3.13 mm, in steps of 0.04 mm.

From these washers sold by our Spare Parts Department select one, the thickness of which is nearest to the dimension determined above, namely, 2.73 mm.

Fit:

- the washer,
- the bevel pinion. Tighten the nut,
- the front cover, then check the adjustment of the bevel pinion.

Remove the front cover.



29. Fit the reverse gear layshaft.

Place the reverse gear in the gearbox, the groove for the selector fork towards the rear.

Fit the shaft so that the pointed stop screw engages in its recess. Smear the screw thread with masti-joint HD 37 sealing compound. Tighten the screw and its locknut.

Place the 1st and 2nd gear selector fork in the groove of the slider, the heads of the clamp screws towards the centre line of the gearbox.

30. Fit the mainshaft.

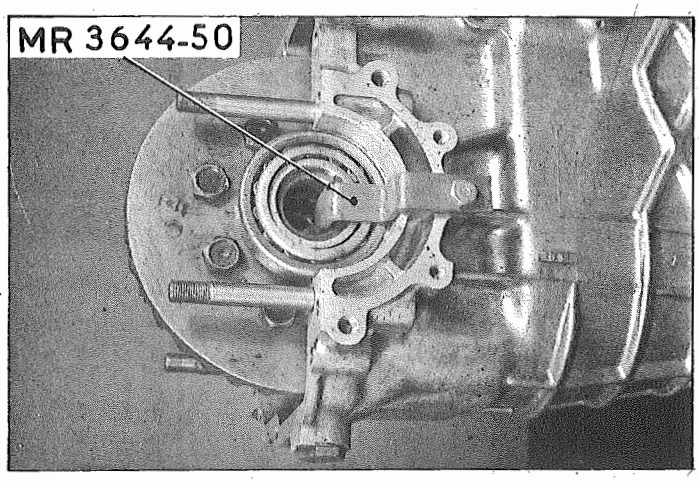
a) Place the shaft with the pinions, prepared as in paragraph 22, in the gearbox.

b) Fit the front bearing, then the rear bearing, using a tube 30 mm internal diameter x 300 mm long.

c) Engage two gears and tighten the starting dog to between 108 and 122 ft.lbs. (15 - 17 m.kg) (spanner 1734-T).

d) Fit:

- the oil return flange, with its slot engaged on the locating boss,
- the thrust race support tube with its sealing gaskets.



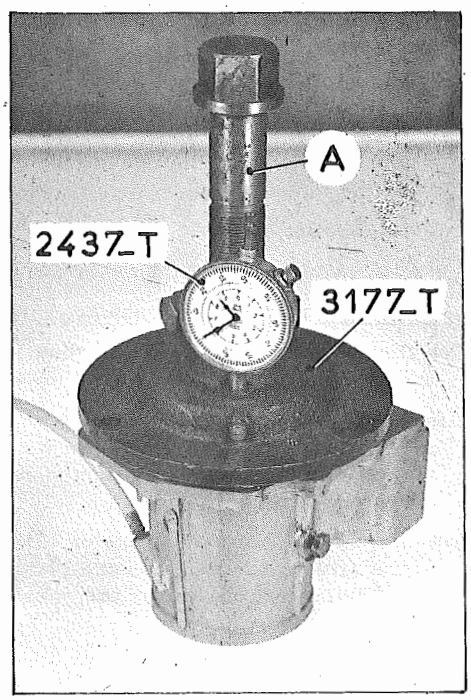
31. Fit the differential.

a) Place the differential, with its bearings, in the gearbox. Hold it in position by means of clamps MR.3644-50.

b) Connect the clutch bell-housing to the gearbox, the joint faces smeared with sealing compound (masti-joint HD 37). Lightly tighten the nuts. Remove the clamps.

c) Place an adjusting washer and a distance piece whose total thickness is 7 mm, against the differential right-hand bearing.

Fit the shaft bearing housing assembly, right-hand (inserting a paper gasket). Lightly tighten the screws. Tighten the nuts and screws connecting the gearcase and clutch housings, then the screws of the bearing housing.



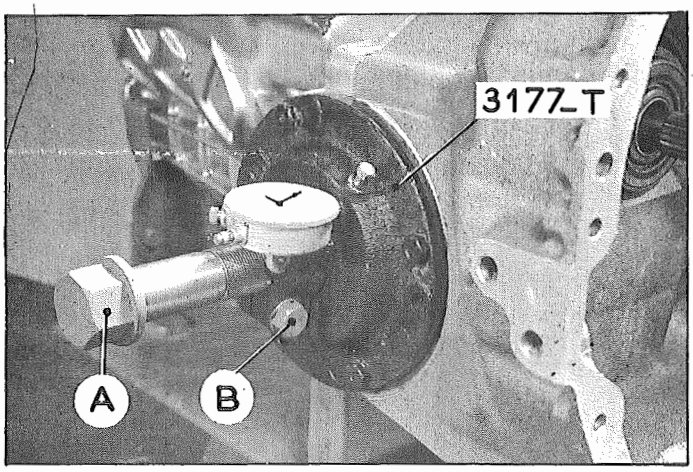
32. Adjust the bearing clearance.

a) Place the distance piece on the left-hand bearing housing.

b) Place gauge 3177-T fitted with dial gauge 2437-T and extension piece 3178-T on the distance piece. Unscrew the centre screw of the fixture, bring the inner member below the level of the flange, then position the dial gauge so that it reads between 9 and 10 mm when the extension is in contact with the bearing face of the spacer.

Turn the dial so that the large pointer coincides with zero. Note the position of the pointers.

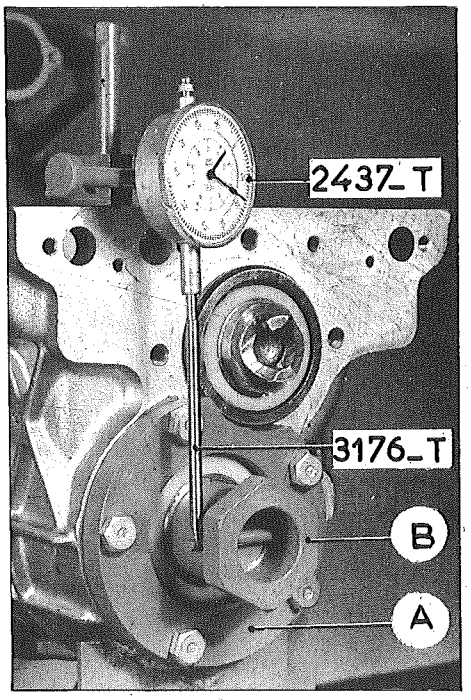
c) Fit the gauge 3177-T on the gearbox, inserting a paper gasket. Tighten the securing screws. Tighten the adjusting screw (A) so as to move the pressure plate forward, at the same time find the position at which the pins engage in the splines of the planet gear. Tighten the adjusting screw (A) to 72 ft.lbs. (10 m.kg) and then unscrew 1/3rd of a turn. Tighten the locking screw (B).



d) Bring the dial gauge pointers back to the original position, as in paragraph b), by pulling the dial gauge stem out.

Allow the dial gauge stem to return slowly into contact with the bearing cage, counting the turns and fractions of turns, which for example may be 8.40 mm.

This is the thickness of the washers for the L.H. side which, added to those fitted to the R.H. side in paragraph 31c, will give the necessary clearance for the correct functioning of the bearings.



33. Measure the crown wheel to pinion backlash.

a) Fit the fixture 3175-T.

Fit the flange (A) over the shoulder of the bevel pinion bearing. Fit the screws and tighten them to about 7 ft.lbs. (1 m.kg).

Replace the nut by the index "B".

Bring the index finger "B" into a horizontal position.

Fix the dial gauge 2437-T equipped with extension 3176-T on its support.

b) Using a screwdriver, prevent the large crown wheel from turning. Note the clearance between the teeth, rocking the index "B" by hand. Check this measurement five times, turning the bevel pinion by the index "B" one turn each time.

The minimum clearance found during these measurements is, for example, 0.64 mm.

NOTE: The backlash must be between 0.16 and 0.24 mm at the point of minimum clearance on the large diameter crown wheel, which corresponds to a reading of 0.26 - 0.34 on the dial gauge, i.e. an average of 0.30 mm.

34. Adjusting the backlash.

In the example chosen it is necessary to reduce the backlash by 0.64 - 0.30 = 0.34 mm.

To obtain this correct clearance between teeth, without modifying the clearance in the bearings determined in paragraph 32, it is not necessary to change the total overall thickness of the washers, but to increase the total thickness of the left-hand washers by 0.34 mm and reduce those at the right-hand side by the same amount, i.e. 7 + 0.34 = 7.34 mm on the right-hand side, 8.40 - 0.34 = 8.06 mm on the left-hand side.

Select distance pieces and washers from amongst those sold by our Spare Parts Department to obtain this setting.

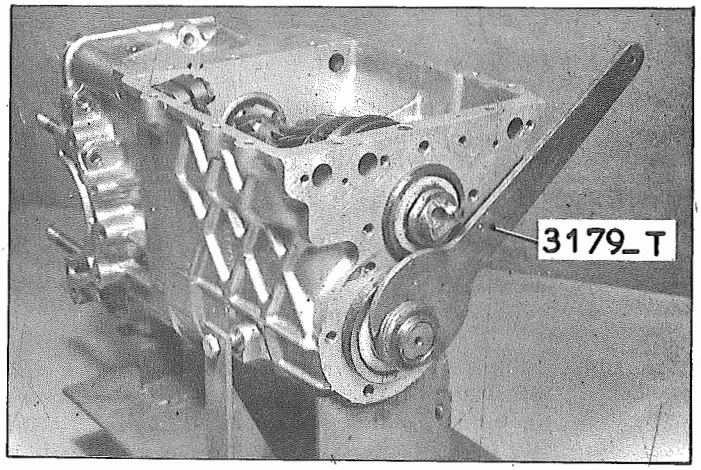
35. Prepare the left-hand bearing housing.

Carry out the instructions as in paragraph 24 for the right-hand side.

36. Fit the bearing housings and distance piece assemblies with adjusting washers in their respective places.

Check the tooth backlash adjustment.

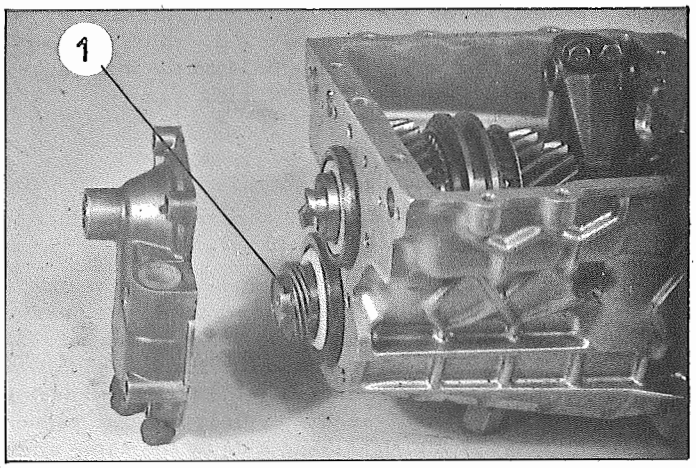
Modify it if necessary.



37. Fit the front cover.

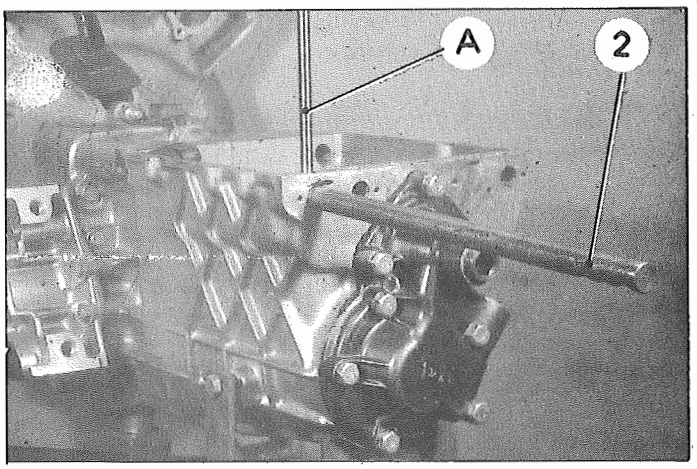
Fit the nut (1) on the bevel pinion, tighten to between 144 and 157 ft.lbs. (20 - 22 m.kg) (spanner 3179-T).

Lock the nut by knocking over the metal into the groove in the shaft.



Fit the front cover with its adjusting shims, the joint smeared with sealing compound (masti-joint HD 37).

Also put some sealing compound "masti-joint HD 37" under the heads of the three lower securing screws. Tighten the screws.

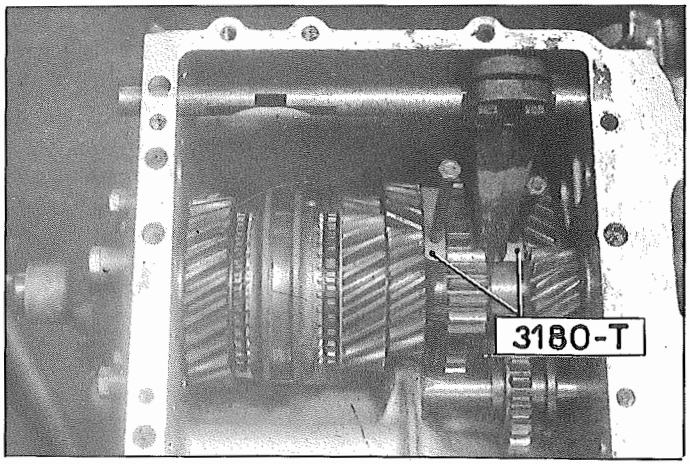


38. Fit the first and second gear selector fork shaft.

a) Fit the 1st and 2nd gear selector fork shaft (2) in the bore in the gearbox.

Fit the spring and locking ball in its housing.

Compress the spring and ball assembly with the aid of a steel rod (A) (6 mm diameter) and complete the engagement of the shaft in the fork and housing as far as the "neutral" position.



b) Hold the slider in the neutral position, using one pair of a set of gauges 3180-T (choose a pair of gauges which will give the least play on the sliding member).

Tighten the fork securing screws to 29 ft.lbs. (4 m.kg).

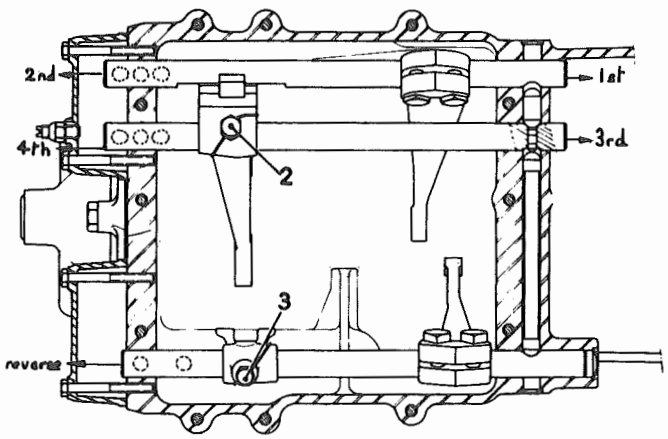
Remove the gauges.

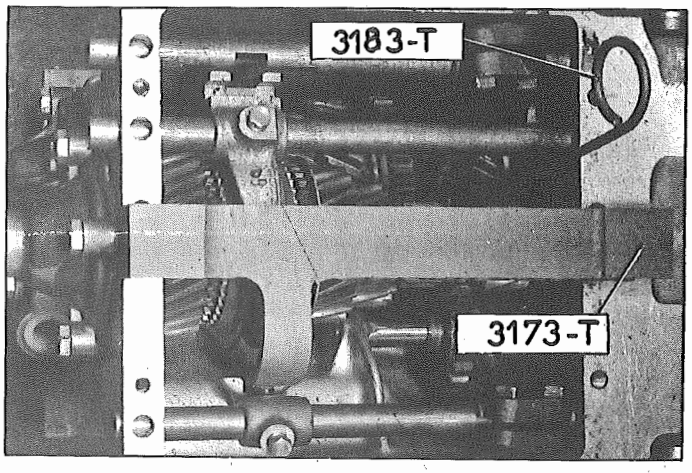
39. Fit the 3rd and 4th speed selector fork shaft.

a) Fit the interlock plunger (the shortest) in the bore.

To fit the 3rd and 4th speed selector fork shaft in the bore in the gearbox, proceed as indicated in paragraph 38 a).

b) Tighten the pointed locking screw (2) on the fork. Lock the screw with a piece of iron wire.





40. Fit the reverse speed selector fork shaft.

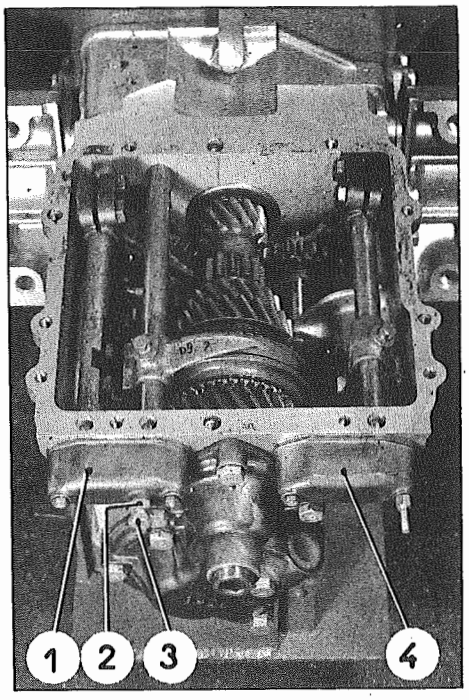
a) Engage the interlock plunger (the longest) in the bore.

Offer up the reverse speed selector fork shaft in the bore in the gearbox (operate as in paragraph 38 a) tighten the pointed locking screw (3) on the operating dog. Lock the screw with a piece of iron wire.

b) Bring the reverse pinion to the neutral position using gauge 3183-T, place between the loose 1st speed pinion and the reverse intermediate gear.

c) Fit the gauge 3173-T parallel to the shaft and move the operating dog so that it touches both contact points on the gauge.

Tighten the fork screws to 29 ft.lbs. (4 m.kg). Remove the gauges.

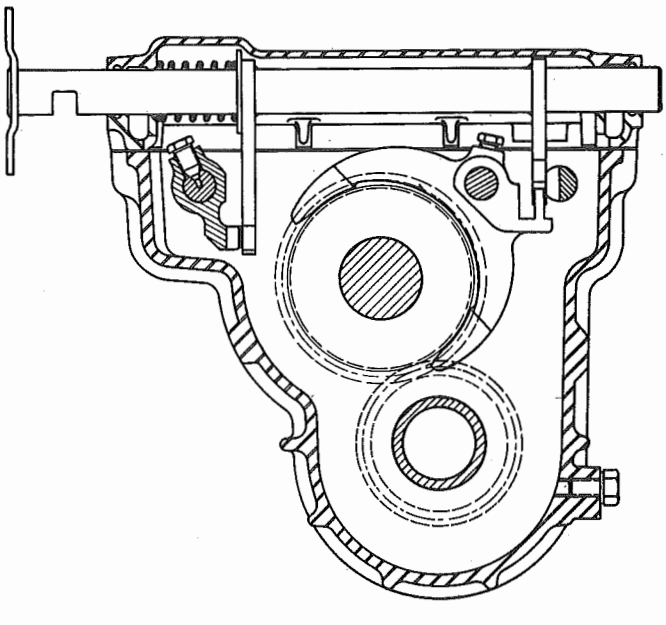


41. Fit the closing plugs, (previously smeared with sealing compound masti-joint HD 37) in the bores for the interlock plungers (on each side of the gearbox).

Fit the covers for the shafts (1) and (4) smeared with "masti-joint HD 37" sealing compound.

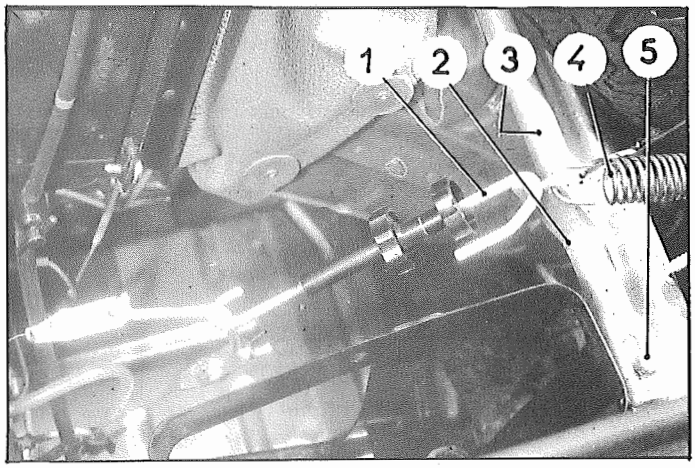
42. Adjust the stroke of 4th gear engagement.

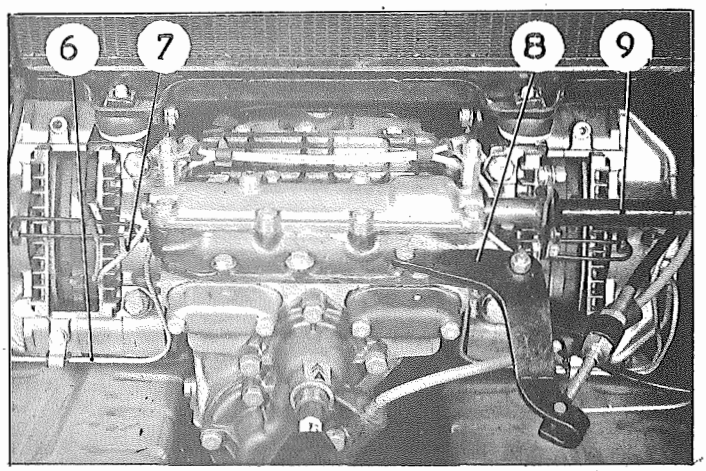
Engage 4th gear, the synchro slider of the 4th being in contact with the 4th gear loose pinion. Bring the screw (3) into contact with the fork shaft and screw it in half a turn, to obtain a clearance of 0.4 to 0.6 mm between the synchro slider and the 4th gear loose pinion.
Tighten the locknut (2).



43. Fit the cover on the gearbox.

Tighten the securing screws.





REMOVAL.

1. Hold the bonnet open using hook MR.4158.

Remove the sparewheel.

2. Release the pressure in the hydraulic circuit (see Op. DX.00).

3. Disconnect the headlamp control.

Disconnect:

- the adjuster (1) from the lever (2),
- the spring (4) from the lever (2).

Remove the two screws (5) and remove the cross-bar (3).

4. Remove the assembly of air duct and sparewheel support crossmember.

5. Disconnect the gear change control.

Disconnect:

- the tube (9) from the cover cross-shaft,
- the bracket (8) from the extension on the gearbox cover.

6. Disconnect and free the lead for the brake pad wear tell-tale light (7) from the right-hand brake unit.

Disconnect and free the feedpipe (6) from the right-hand brake unit.

7. Remove the securing screws and free the gearbox cover.

ASSEMBLY.

NOTE: Before fitting the gearbox cover:

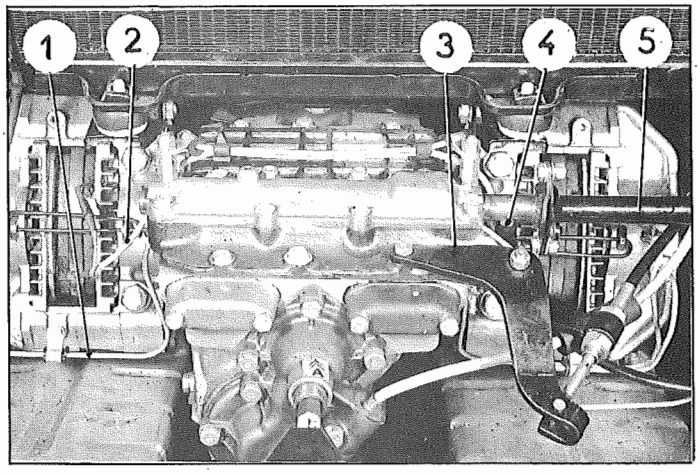
- smear the joint face lightly with "masti-joint HD 37" sealing compound,
- fit into its hole in the cover the centre screw of the rear row (length under head 35 mm).

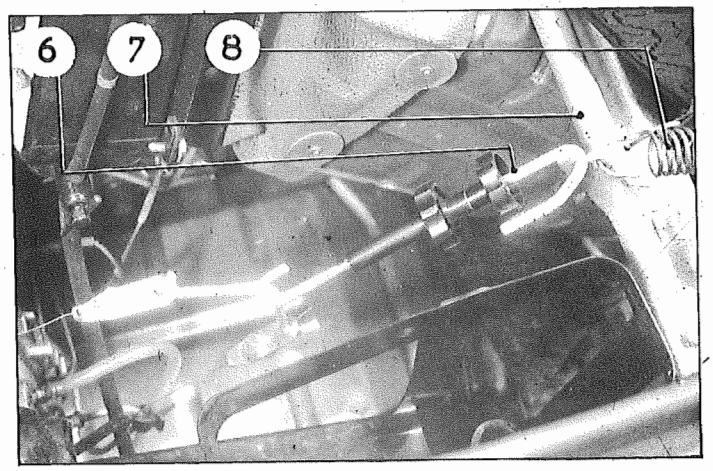
8. Fit the cover.

Position the rear centring dowels on the gearbox housing.

Lower the front of the cover holding the fork control dogs in a vertical position.

Engage the dowels.





NOTE: If the positioning of the fork control dogs is correct, the cover cross-shaft should have an end play of approximately 5 mm and no back-lash in rotation.

Fit and tighten the securing screws for the gearbox cover.

9. Connect the feedpipe (1) to the right-hand brake unit. Fit the clips on the cover. Connect the leads for the tell-tale light (2) for brake pad wear on the right-hand unit.

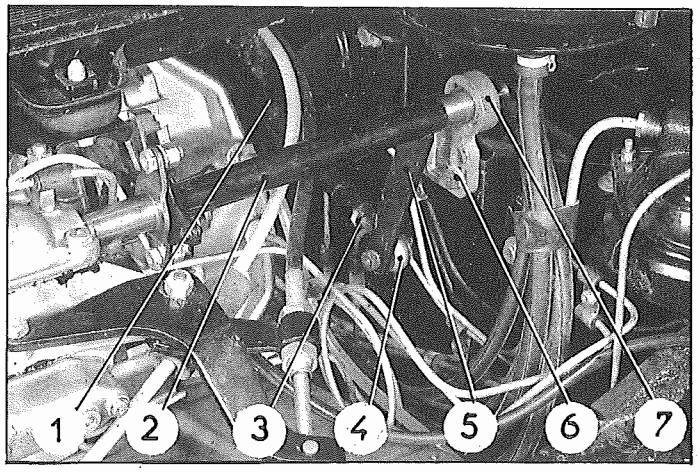
10. Connect the gear change control.
    - Connect the tube (5) to the cover cross-shaft.
    - Connect the bracket (3) to the projection on the cover and engage the dog (4) in the slot in the cover cross-shaft.

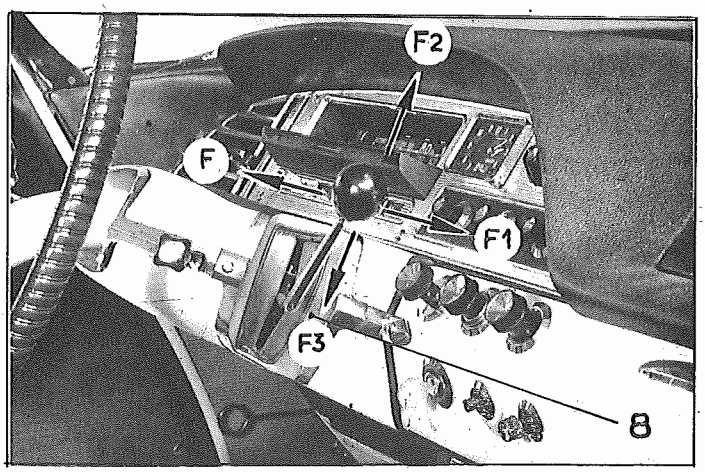
11. Start up the engine. Check that the gears engage normally.
    Re-establish pressure in the hydraulic circuits. (See Op. DX. 00). Bleed the brakes (see Op. DX.453-0).

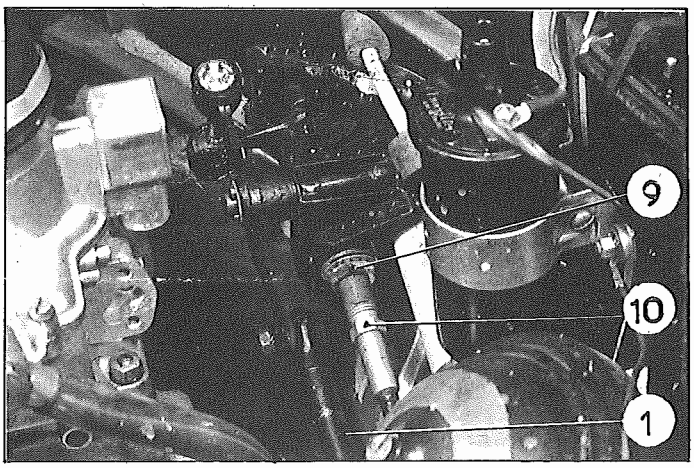
12. Fit the assembly of air duct and sparewheel crossmember support.

13. Connect up the headlamp control:
    - fit the cross-bar (7) (see Op. DX.851-1, paragraph f),
    - fit the return spring (8),
    - fit the adjuster (6).

14. Fit the sparewheel.
    Close the bonnet.







CHECKING:

1. Check the alignment of the control tube (2).

2. When changing gear, the lever must not touch the finisher (8) surrounding the aperture for the gear change lever.

ADJUSTMENTS:

3. Adjusting the control tube:

The tube (2) must lie on the centre line of the control cross-shaft of the gear selector forks in the gearbox cover.

To attain this, proceed as follows:

a) Disconnect the rod (1) from the lever (5).

b) Loosen the securing screws of the bearing housing (6) and move this housing in its slots to obtain vertical adjustment, and in the slots in the sidemember to move it forwards or backwards.

c) Tighten the securing screws of the bearing housing.

d) Connect the rod (1) to the lever (5).

4. Adjust the gear lever movement.

a) Movement for gear selection (movement along F and F^1).
Adjust the length of the cable so that the lever does not touch the finisher (8).

To do this:

a) Loosen the nut (9) and screw the adjuster (10) in or out to shorten or lengthen the cable sheath.

b) Tighten the nut (9).

b) Movement for gear change (movement along F^2 and F^3).
Adjust the length of the control rod (1) so that the gear lever movement is equalised without touching the finisher.

To do this:

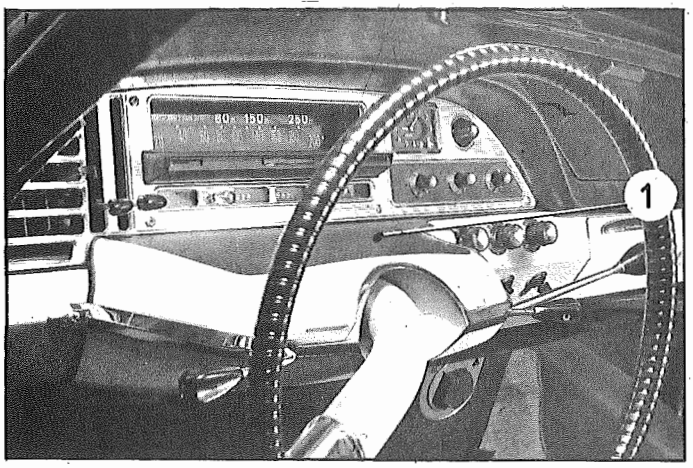
a) Loosen the nut (3).

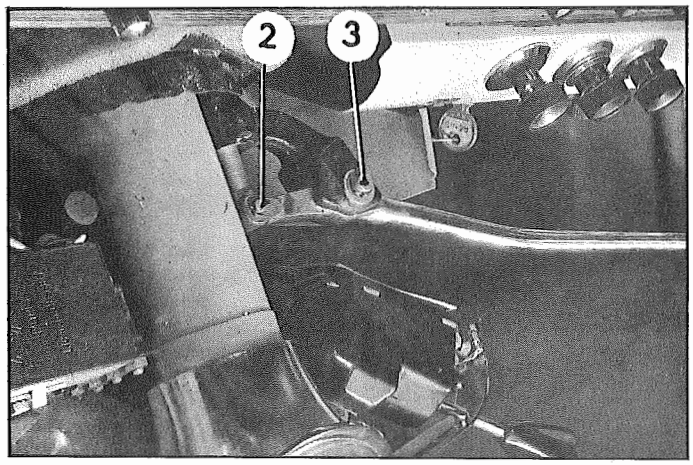
b) Disconnect the rod (1) from the arm (5).

c) Screw the union (4) in or out to shorten or lengthen the rod (1).

d) Connect the rod (4) to the arm (5).

e) Tighten the nut (3).





REPLACEMENT OF A GEAR SELECTOR LEVER.

Removal:

1. Remove the upper steering cover from above the electrical controls (1).
2. Take out the split pins and remove the fulcrum pins from the gear selector lever:
   - on the cable (2),
   - on the control shaft (3).
3. Free the lever.

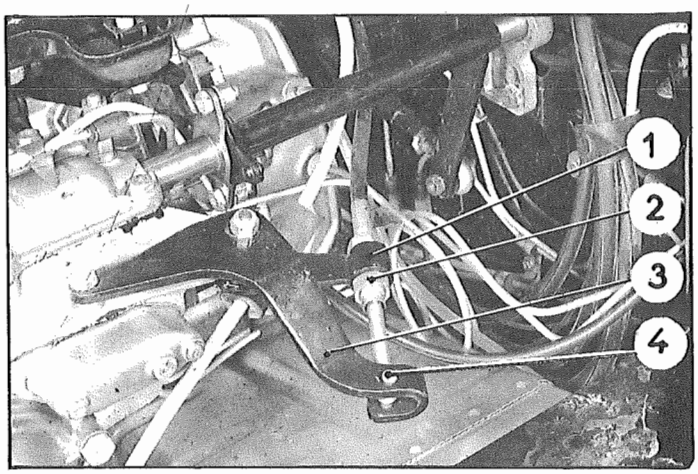
Assembly.

4. Offer up the lever.
5. Fit and pin the fulcrum pins of the selector lever:
   - on the control spindle (3),
   - on the cable (2).
6. Fit the cover over the electrical controls (1).
7. Operate the lever and ensure that all speeds engage without the lever touching the finisher on the facia board. If it does, adjust the lever, (see Op. DJ.334-0).

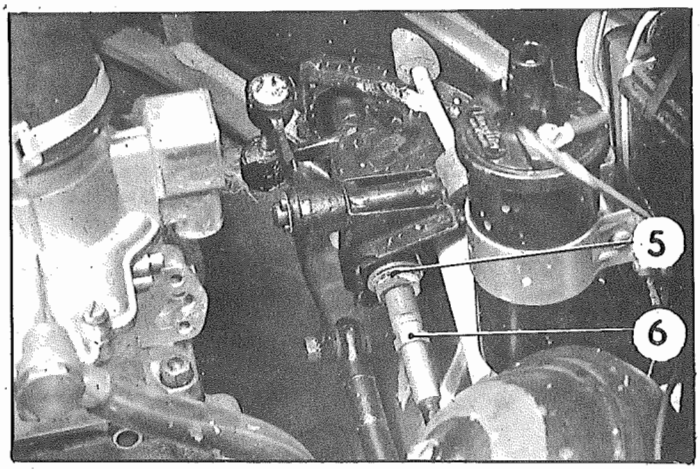
REPLACEMENT OF A CABLE.

Removal.

8. Remove the cover from above the electrical controls (1).
9. Take out the pin and remove the fulcrum pin (2) from the cable on the selector lever.
10. Open the bonnet and remove the sparewheel.
11. Disconnect the headlamp control (see Op. DJ. 331-1, para. 3).
12. Remove the assembly of air duct and sparewheel crossmember support.

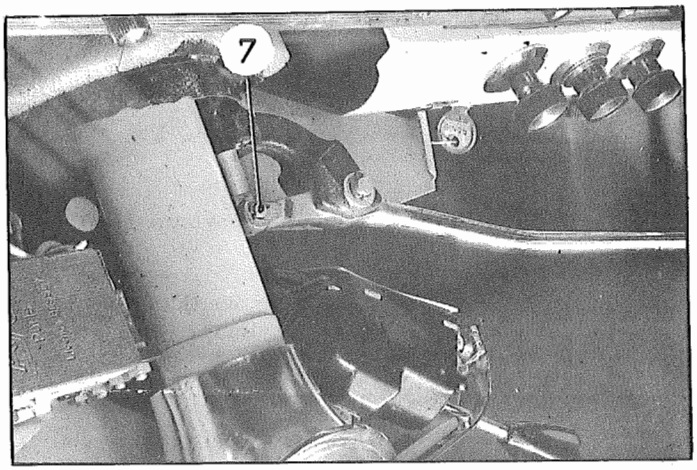


13. Remove the rubber clips holding the cable:
    - on the front crossmember gearbox support,
    - on the speedometer cable.
14. Take out the pin and remove the spindle (4) securing the cable to the bracket (3) on the gearbox cover.
15. Remove the nut (2) and free the cable (1).
16. Release the locknut (5) and unscrew the adjuster (6).
17. Withdraw the cable towards the front. Remove the locknut (5).



Assembly.

18. Insert the cable from the front.
    - Pass it along the length of the speedometer cable between the steering and the mechanical brake cable and in the sleeve on the support bracket on the side of the steering centraliser cam.
    - Fit the locknut (5) and tighten it.
    - Insert the cable in the control shaft.
    - Screw up the adjuster (6).
19. Insert the cable in the relay bracket (1).
    - Fit the nut (2) and ensure that the threaded sleeve protrudes for a minimum of 3 mm.
    - Lock the nut (2).
20. Fit and pin the spindle (4) securing the front end of the cable.

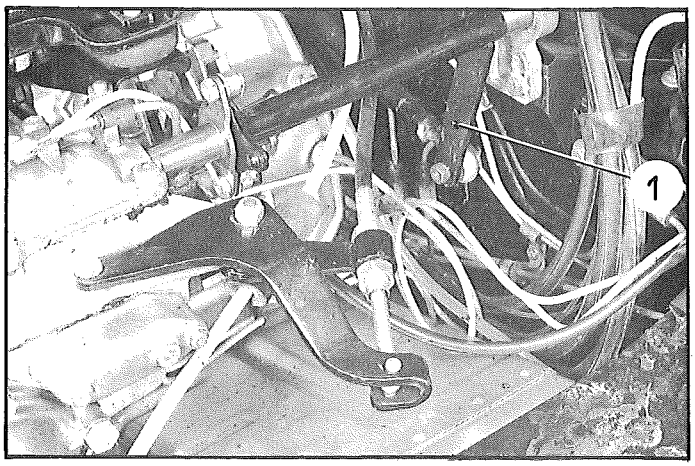


21. Fit and pin the fulcrum pin (7) for the cable on the lever.
22. Fit the cover over the electrical controls.
23. Adjust the length of the cable. (see Op. DJ.334-0, paragraph 4a).
24. Fit the rubber clips holding the cable,
    - on the front crossmember gearbox bracket,
    - on the speedometer cable.

25. Fit the assembly of air duct and sparewheel support.

26. Connect up the headlamp control (see Op. DX. 851-1).

27. Fit the sparewheel. Close the bonnet.



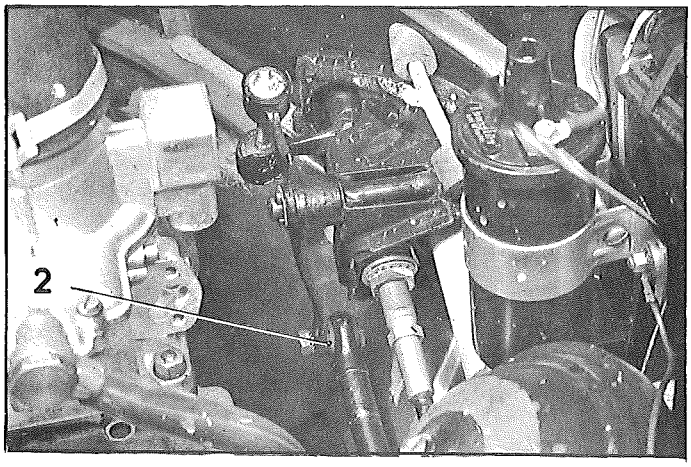
REPLACEMENT OF A CONTROL ROD.

Removal.

28. Hold the bonnet open using hook MR.4158. Remove the sparewheel.

29. Disconnect the control rod:
    - from the lever (1) of the control tube,
    - from the relay lever (2).

30. Withdraw the control rod via the rear of the bonnet.



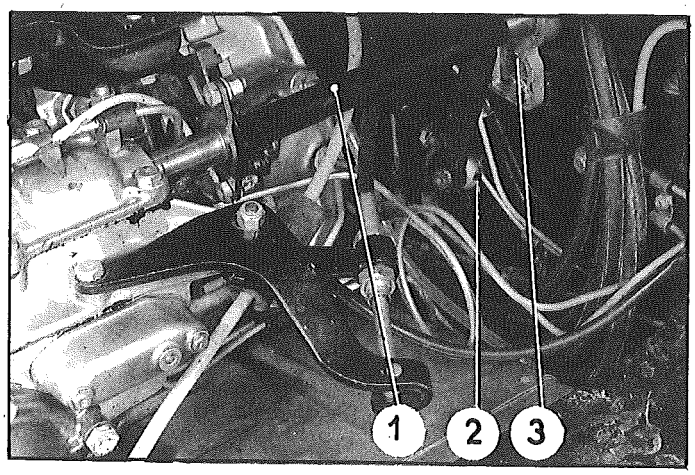
Assembly.

31. Engage the control rod via the rear of the bonnet.

32. Connect up the control spindle:
    - to the relay lever (2) on the side near the sidemember,
    - to the lever (1) on the side near the sidemember.

33. Adjust the length of the rod (see Op. DJ.334-0, paragraph 4b).

34. Fit the sparewheel.
    Close the bonnet.



REPLACEMENT OF A CONTROL TUBE AND ITS HOUSING.

Removal.

35. Hold the bonnet open with a hook MR.4158. Remove the sparewheel.

36. Disconnect the headlamp control. (see Op. DX.851-1).

37. Remove the assembly of air duct and sparewheel crossmember.

38. Disconnect the gearchange control rod (2).

39. Disconnect the tube (1) from the gearbox cover.
    - Disconnect the housing (3) from the sidemember.
    - Disconnect the control tube.

40. Disconnect the bearing housing (3) from the tube (1).
    Free the ball joint from the housing.

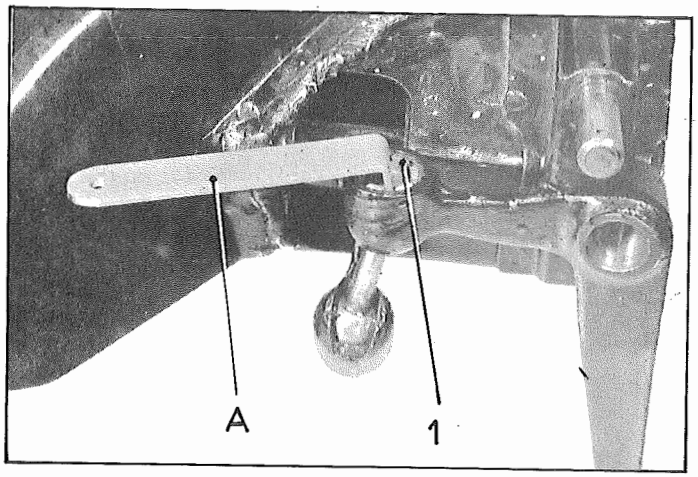
Assembly.

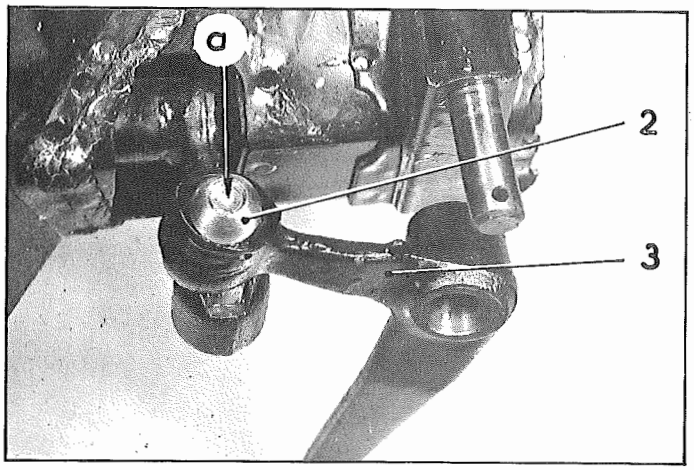
41. Insert the ball joint in the housing (3) previously lubricated.
    Engage the bearing housing on the tube (1).

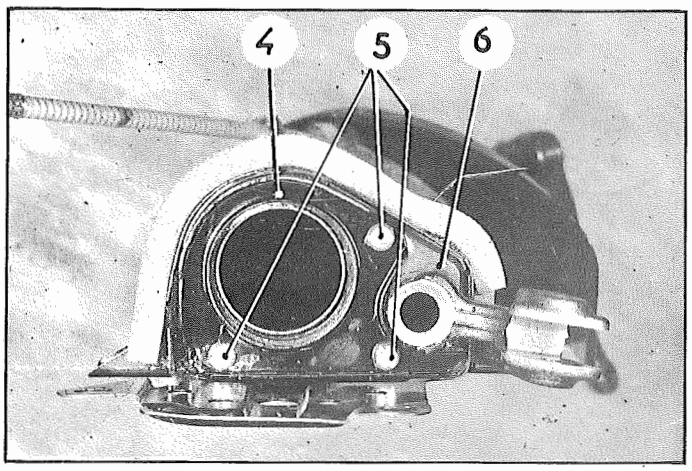
42. Fit the control tube on the vehicle:
    - Connect the bearing housing to the sidemember without tightening the securing screws.
    - Connect the control tube to the flange of the cross-shaft in the cover of the gearbox.

43. Align the control tube.
    (See Op. DJ.334-0, paragraph 3).

44. Connect the rod to the lever. Ensure that all gears engage correctly and that the lever is correctly adjusted: otherwise adjust it.
    (See Op. DJ.334-0, paragraphs 2 and 4).







45. Fit the assembly of air duct and sparewheel crossmember.

46. Connect up the headlamp control. (See Op. DX.851-1).

47. Fit the sparewheel. Close the bonnet.

REPLACING A CONTROL SHAFT.

Removal.

48. Remove the steering wheel bracket (see Op. DJ. 441-1, paragraphs 1 - 8).

49. Disconnect the ball joints on the bell crank lever:

- Take out the pins and remove the two plugs (1) from the ball joints (spanner MR.3691-60) (A).
- Place the ball joint of the bell crank lever in a vice and drill a hole 8 mm diameter x 3 mm deep at "a" to remove the metal peened over to lock the ball.
- Unscrew the ball (2).
- Remove the bell crank lever (3).
- Remove the ball pin from the control shaft.

50. Remove the control shaft and steering column bearing housing.

- Remove the 3 securing screws (5).
- Remove the plate (4).
- Remove the rubber bearing block (6).
- Recover the two half-bushes from the control shaft.

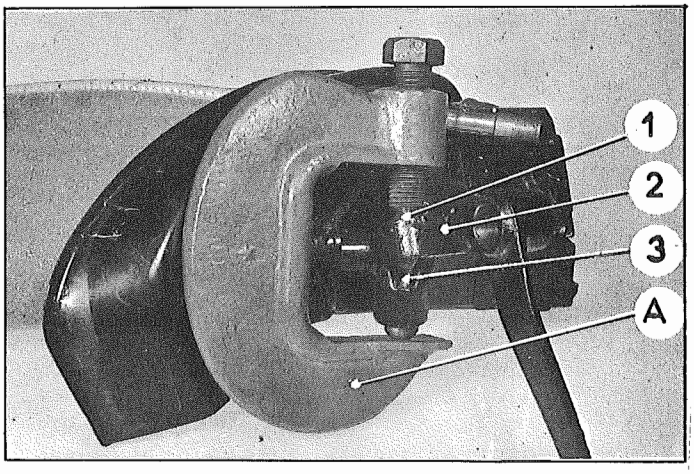
51. Free the control shaft.

Assembly.

52. Engage the control shaft in position.

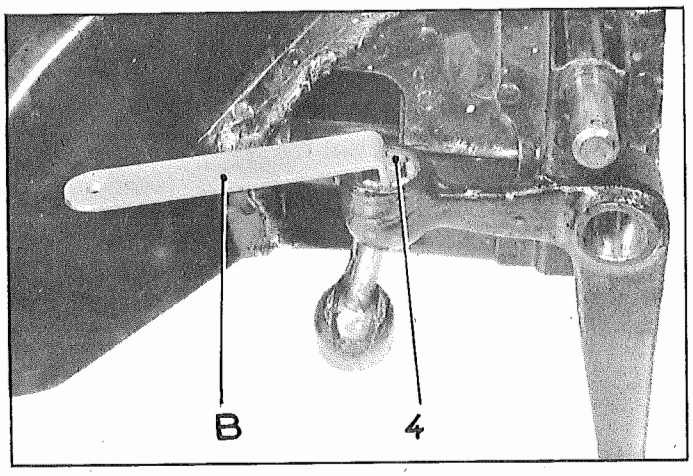
53. Fit the two half-bushes previously lubricated.

- Fit the rubber bearing block (6).
- Fit the stop plate (4).
- Fit and tighten the 3 securing screws (5).



54. Connect up the ball joints of the bell crank lever.

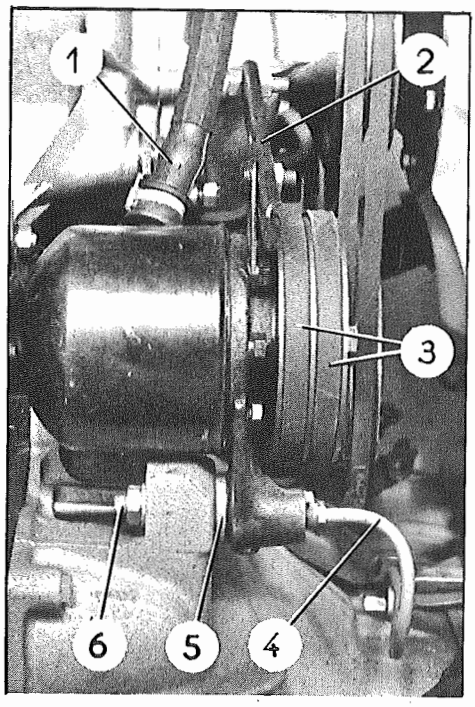
- Engage the ball pin (3) in the control shaft.
- Engage the bell crank lever (2) on the tail of the ball pin.
- Screw in and tighten the ball (1) on the ball pin (3).
- Peen over the metal in the end of the ball (1) using a hand press 2427-T (A).
- Lubricate the ball joints with graphite grease.
- Fit the cups (4) on the ball joints and tighten moderately using spanner MR.3691-60 (B).
- Check the working of the ball joints, and fit split pins to secure the cups (4).



Replacement and overhaul of transmission parts and assemblies is carried out as on the DS 21 vehicles. Follow the instructions in the corresponding DX sections.

The characteristics of the units used on this vehicle are the same as those described in Operation DX.391-00.

REPLACEMENT OF A HIGH PRESSURE PUMP.



REMOVAL.

Release the pressure and then tighten the pressure regulator bleed screw.

Disconnect :

- the inlet hose (1), from the pump,
- the outlet pipe union (4), from the pump,
- the tie-rod (2).

Free the belts (3).

Remove the screw (6) securing the pump, and the distance piece (5).

Remove the pump.

ASSEMBLY.

Offer up the pump, inserting between the pump and the gearbox housing, the distance piece (5).

Fit the fulcrum screw (6). Fit the nut, but without tightening it. Check the alignment of the pulleys (see Op. DX.231-0).

Fit the belts (3) on the pulley.

Connect up the tie-rod (2).

Tension the belts (see Op. DX.231-0).

Tighten the nuts on the tie-rod and on the fulcrum screw (6) of the pump.

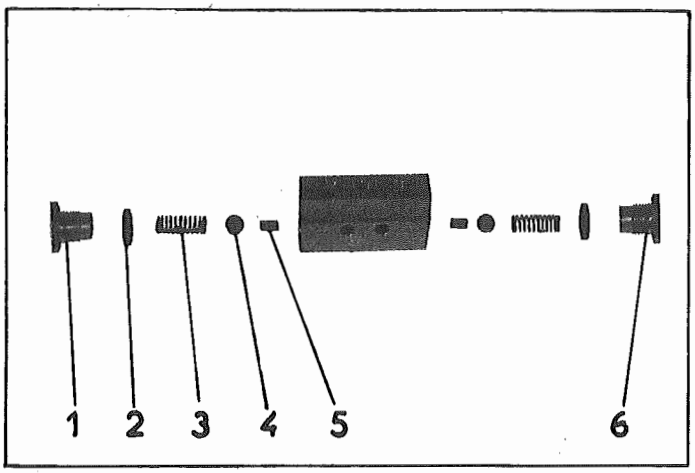
Connect up the outlet pipe union (4) to the pump.

Connect the inlet hose (1) to the pump.

Fill the pump with liquid via the inlet pipe.

Start up the engine.

Put the circuits under pressure and check all unions for leaks.



DISMANTLING.

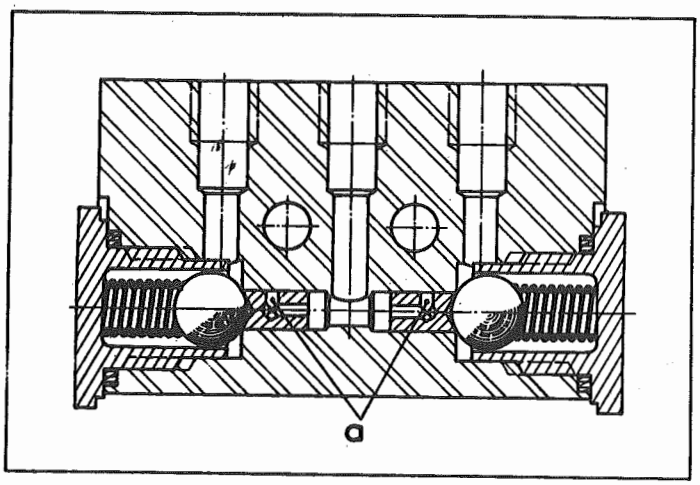
1. Remove the plug (1).

Withdraw:

- the spring (3),
- the ball (4),
- the piston (5) by injecting compressed air through the centre hole.

2. Remove the plug (6) and carry out the same operation as above.

3. Free the ring seals (2) from the plugs (1 and 6). Clean all parts in alcohol.



ASSEMBLY.

4. Place a new ball on the ball seat. Make an imprint on the seating by striking lightly on the ball with a hammer and a piece of 10 mm diameter rod.

NOTE: The ball must not be used again.

5. Clean the distribution unit with alcohol and blow with compressed air.

6. In one end of the unit place the following:

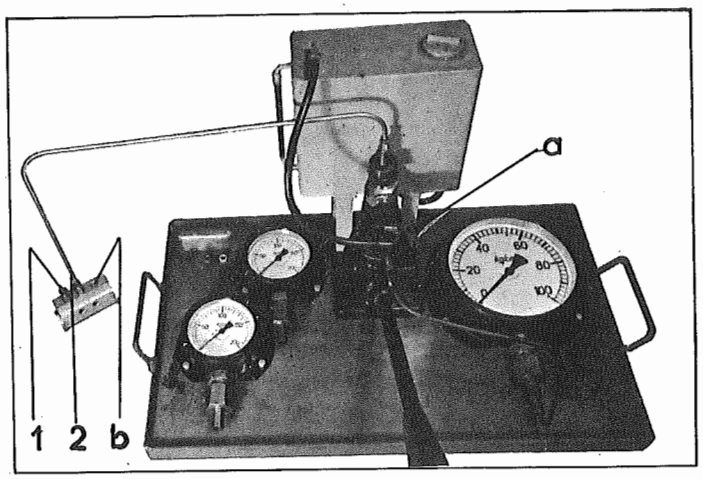
- the piston (5) with the concave and hole (a) towards the ball,
- a new ball (4),
- a spring (3).

Fit and tighten the plug (1) using a new seal (2).

7. Carry out the same procedure on the other side.

8. Check the distribution unit.

(See this Operation, paragraphs 9 - 12).



CHECKING.

Use test bench 2290-T (gauge 0 to 1500 p.s.i.) (0 to 100 kg/cm^2).

9. Checking the setting of the non-return valve for the front suspension.

a) Close the opening in the unit for the rear suspension feed with a plug (1).

b) Connect the central hole in the unit to the test bench, using a tube (2).

c) Tighten the pump bleed screw (a).

d) Operate the pump to build up the pressure progressively.

The valves must meet the following conditions:

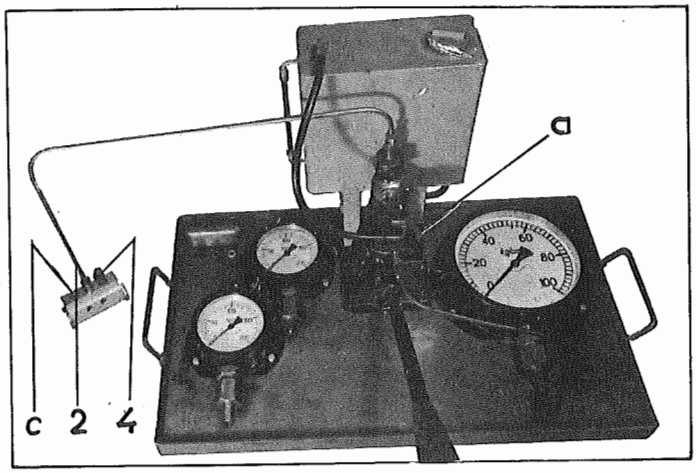
For a pressure less than 58 p.s.i. (4 kg/cm^2), there must be no flow from hole (b).

For a pressure greater than 100 p.s.i. (7 kg/cm^2), there must be a flow from hole (b).

- If the pressure remains steady outside these values replace the spring.
- If the pressure falls to zero remake the ball seat (see paragraph 4 of this operation).

e) Release the pressure by loosening the pump bleed screw (a).

Remove the plug (1).



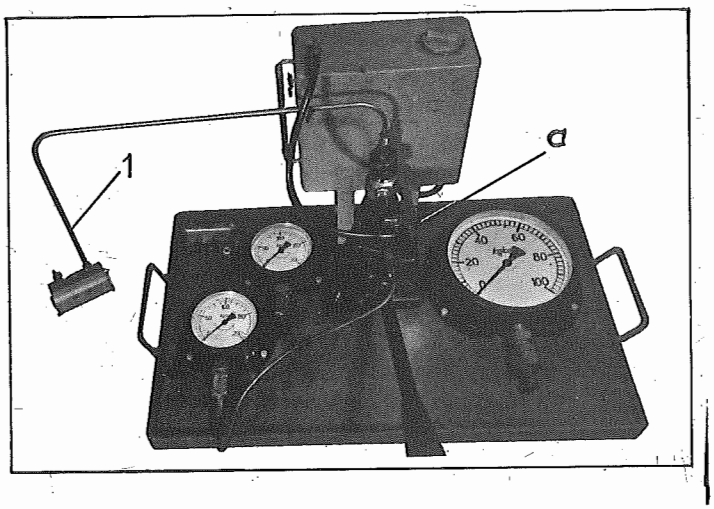
10. Checking the setting of the non-return valve spring for the rear suspension.
(gauge 0 to 1500 p.s.i.) (0 to 100 kg/cm^2).

a) Close the front suspension feed hole with a plug (4).

b) Proceed as indicated in paragraph 9 above.
For a pressure less than 58 p.s.i. (4 kg/cm^2) there must be no flow from hole (c).
For a pressure greater than 100 p.s.i. (7 kg/cm^2) there must be a flow from the hole (c).

c) Release the pressure by loosening the screw (a).

d) Disconnect the tube (2) from the distribution unit and remove the plug (4).



11. Check the front valve for leakage.

(gauge 0 to 3000 p.s.i.) (0 to 200 kg/cm^2).

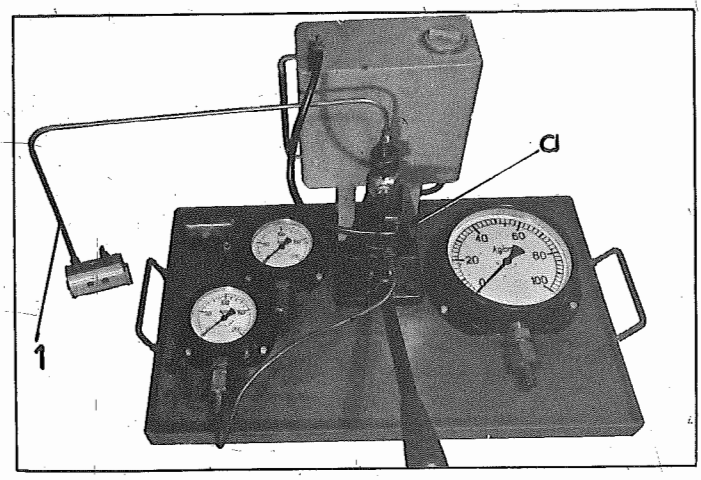
a) Connect the front feed hole on the unit to the test bench using a tube (1).

b) Tighten the bleed screw (a) on the test bench.

c) Operate the pump to build up pressure to 2500 p.s.i. (175 kg/cm^2).

The pressure gauge must not indicate any drop in pressure: if it does, the valve is defective. It is necessary to renew the ball and resurface the ball seat (see paragraph 4, this operation).

d) Release the pressure by loosening the pump bleed screw (a).



12. Checking the rear suspension valve for leakage.

(gauge 0 to 3000 p.s.i.) (0 to 200 kg/cm^2).

Connect the rear suspension hole in the unit to the test bench using a tube (1).

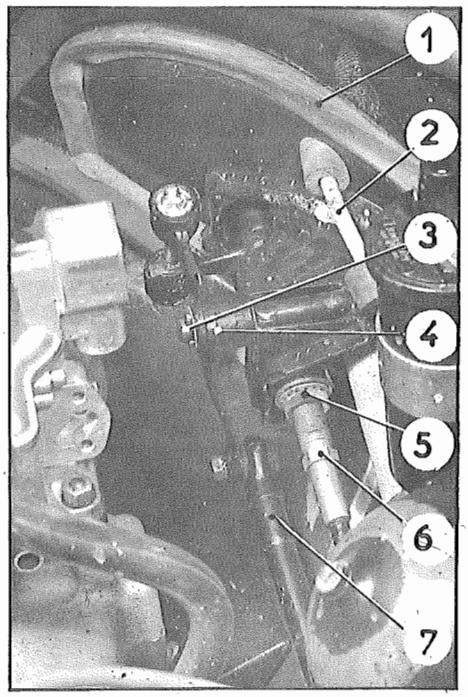
Then proceed as indicated in paragraph 11 above.

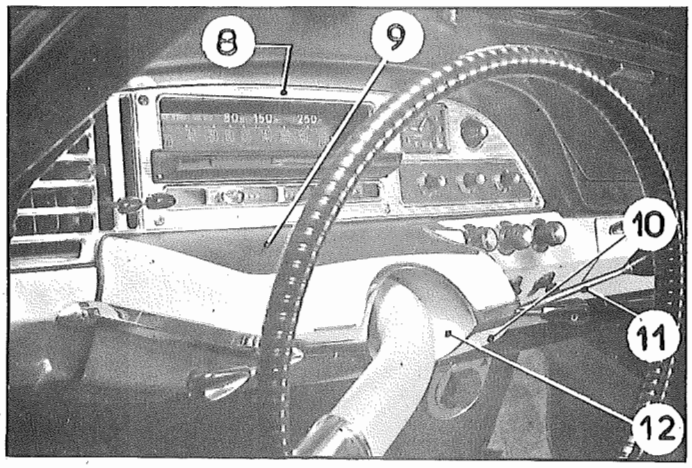
The characteristics of the component parts of the front axle on this vehicle are the same as those described in Operation DX.410-00.

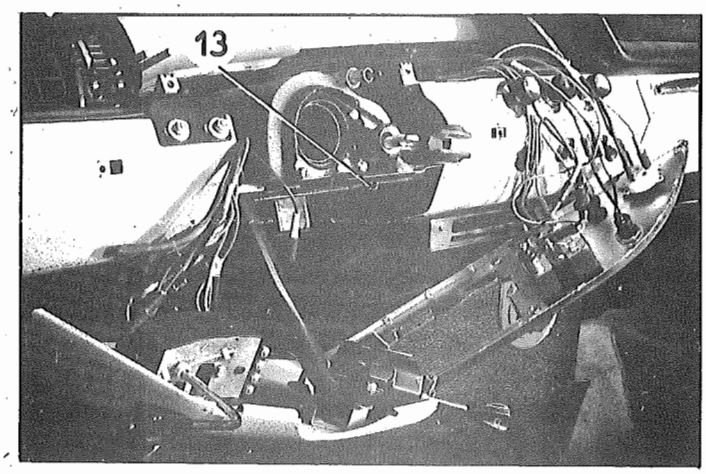
The characteristics of the component parts of the rear axle on this vehicle are the same as those described in Operation DX.420-00.

The adjustments, renewals and overhauls of the suspension units are carried out in the same way as those on the DS 21. Follow the instructions in the corresponding DX sections.

The characteristics and adjustments of the steering are the same as those for DS 21 (DX) vehicles. See Operation DX.440-00.







REPLACEMENT OF A STEERING COLUMN BEARING BLOCK.

Removal.

1. Hold the bonnet open by means of a hook MR.4158.
   - Disconnect the cables from the battery.
2. Remove the steering wheel. (See Op. DX.441-1).
3. Disconnect:
   - the connection on the speedometer cable (2),
   - the control rod (7),
   - the control cable (6), loosening the nut (5).
4. Remove the pin from the spindle (3) and remove the lever (4).

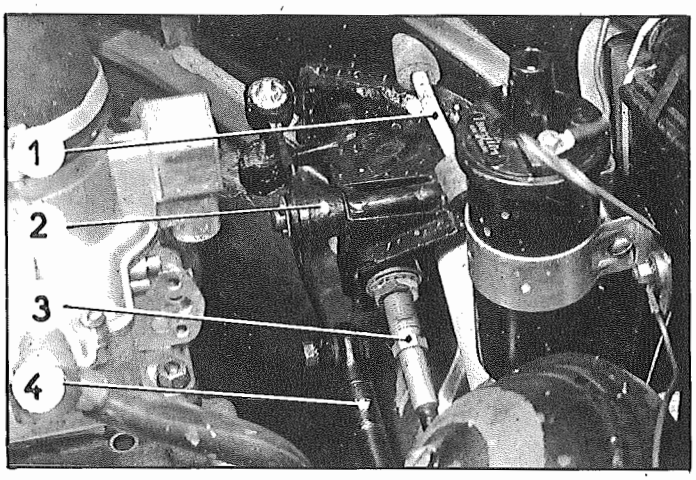
NOTE: Take care not to lose the rilsan bush for the lever (3).

5. Remove:
   - the upper steering cover (9),
   - the gear change lever (11).
6. Remove:-
   - the panel (10) carrying the electrical controls,
   - the speedometer surround (8).
7. Disconnect the speedometer cable and leads from the speedometer, and remove the speedometer.
8. Remove the 3 screws (13) securing the steering column bearing block.

Remove the steering column bearing block, taking care not to hook up any electrical wiring.

Refitting.

9. Fit the steering column bearing block.
   - Take care not to damage the electrical wiring.
   - See that the sealing strip (1) is correctly positioned.
   - Tighten the 3 securing screws (13).
10. Connect the speedometer leads.
    Fit the speedometer.
    Connect the speedometer cable.
11. Fit the speedometer surround (8).
12. Fit the change speed lever (11).
    (See Op. DJ.334-1, paragraphs 4 to 7).
13. Fit the steering wheel and column with its embellisher (12).
    (See Op. DX.441-1).



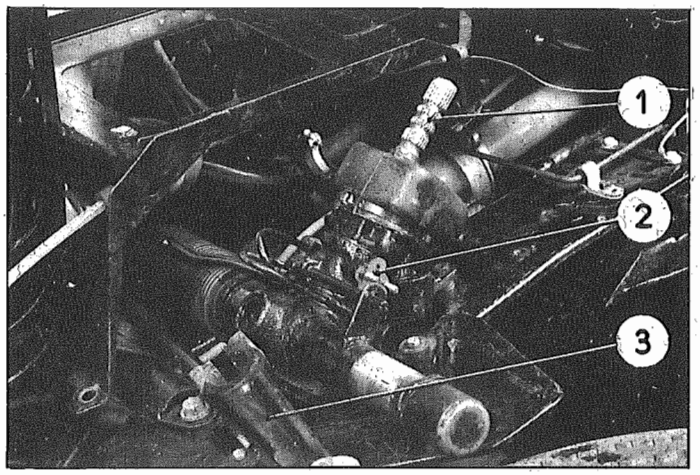
14. Fit the panel carrying the electrical controls and the steering cover panel.
Centralise these items so that the steering wheel does not touch the embellisher when turned.

15. Connect the gearchange control cable (3) into its tunnel, connect the speedometer cables (1).

16. Fit the rilsan bush.
Fit the lever (2) on its spindle and pin it.
Connect the control rod (4) to the relay lever (2).

17. Adjust the position of the gear change lever. (See Op. DJ.334-0, paragraphs 4a and b).

18. Connect the cables to the battery.
Close the bonnet.



REPLACEMENT OF A STEERING.

REMOVAL.

1. Remove : the spare wheel,
the front left-hand wing.

Release the pressure.

Remove : the battery and its tray,
the securing screws for the battery support.

2. Slacken the adjusting collar of the spring controlling end-float on the steering column.

3. Disconnect the steering column from the steering pinion (1).

Disconnect the pipe assembly from the steering pinion housing (2).

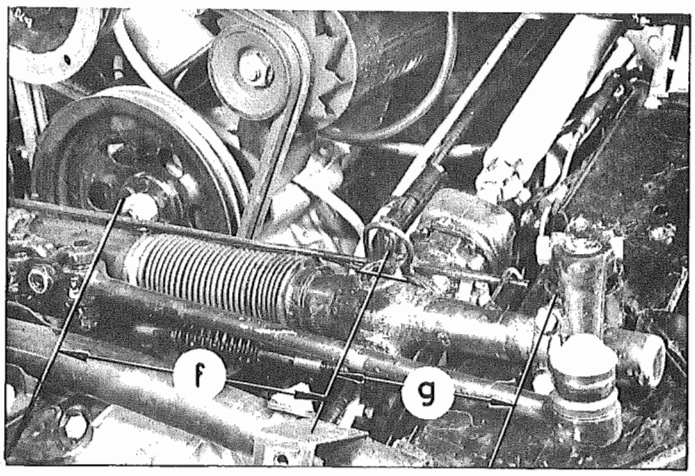
Remove the seal plate.

Fit a blank flange on the pipe assembly flange.

4. Disconnect the steering levers (3) from the steering relay spindles.

5. Remove the steering clamp caps.

Remove the steering.



ASSEMBLY.

6. Turn the steering pinion so as to bring the outer silentbloc bush of the left-hand track rod to a distance "f" = 275 mm from the pinion plunger nut centreline.

7. Fit the steering to the vehicle from the left-hand side.

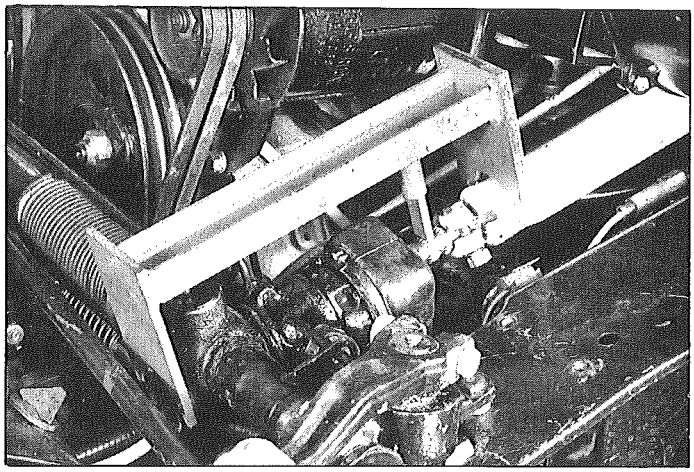
Fit the steering in its bearers.

8. Adjust the lateral position so as to obtain a distance "g" = 122.5 $\pm$ 2.5 mm between the centre of the spindle of the left-hand steering relay and the centre of the pinion plunger nut.

9. Fit the clamp caps without finally tightening the screws.

10. Turn the steering wheel to bring the spoke to approximately 30° below the horizontal to the left-hand side for LHD cars, and vice versa.

Engage the steering pinion in the splines of the steering column.



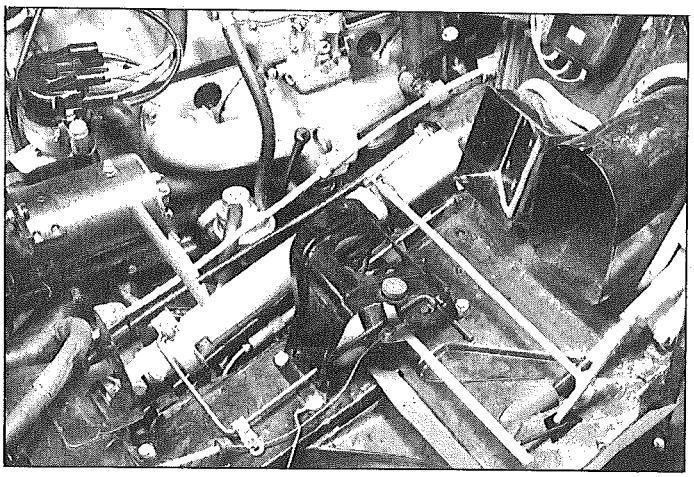
11. Adjust the angular position of the steering using fixture 1955-T.

Tighten the screws fixing the clamp caps.

12. Connect up :

- the steering levers to the steering relay spindles,
- the pipe assembly to the steering.

Insert a seal plate (tighten the nuts).



13. Tighten the steering cloumn end-float spring using spring compressor 1991-T.

When the spring is compressed with its turns touching, tighten the retaining collar using spanner 1994-T (check the steering wheel clearance).

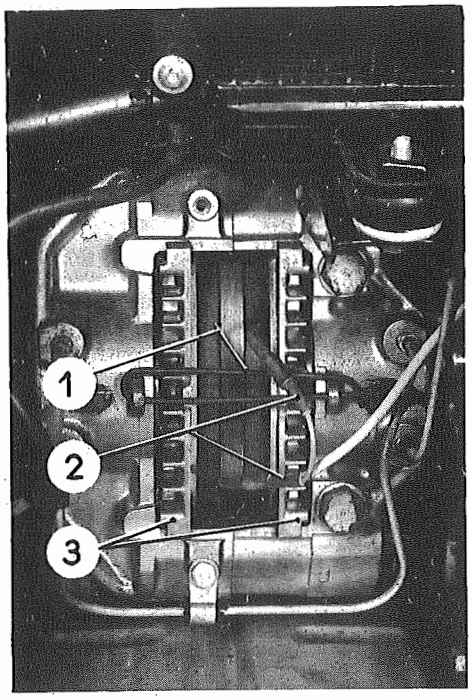
14. Fit :

- the screws securing the battery cradle,
- the battery tray,
- the battery.

Put the circuits under pressure.

15. With the car at its normal height, check the wheel alignment (see Op. DX.440-0).

The adjustments, renewals and overhauls of the brake units are carried out as for DS 21 vehicles. Follow the instructions given in the corresponding DX sections.



REPLACEMENT OF HYDRAULIC BRAKE PADS.

REMOVAL.

1. Remove :
   - the spare wheel,
   - the spare wheel support crossmember with the radiator air duct.

2. Withdraw the spring clip (1) holding the shoes.

Disconnect the leads (2) for the brake pad wear warning light.

3. Remove the pads (3) withdrawing them towards the front of the vehicle.

4. Clean very carefully the parts of the pistons exposed to dust.

ASSEMBLY.

5. Using the disc as a fulcrum, push the pistons back in their cylinders, using a hammer handle.

6. Fit the brake pads.

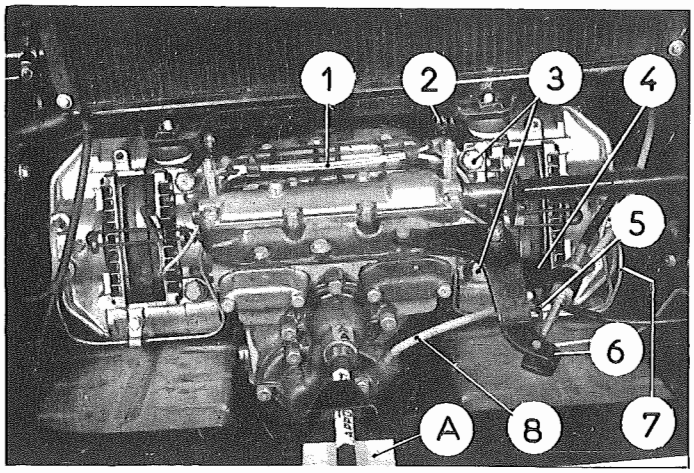
7. Connect the leads (2) for the brake pad wear warning light (the general feed lead must be placed at the bottom).

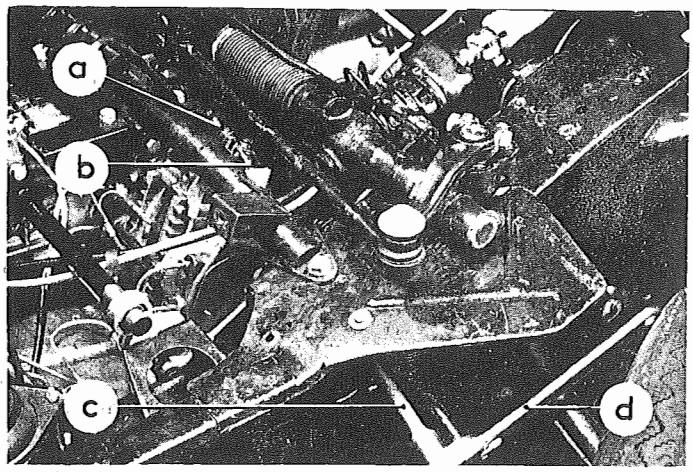
8. Fit the spring clips (1) holding the brake pads.

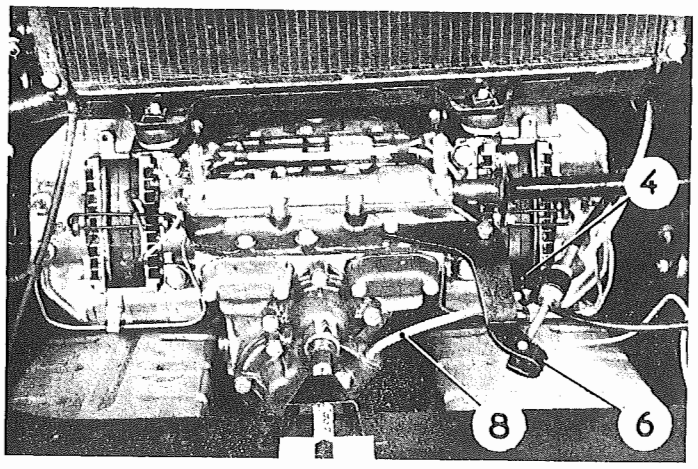
8A. Loosen the screws holding the hydraulic brake units on the gearbox outlet housings. Have pressure applied by an assistant to the hydraulic brake pedal. Tighten the securing screws to between 94 and 100 ft lbs (13 to 14 m.kg).

9. Fix the spare wheel support crossmember with the radiator air duct.

Fit the spare wheel.







REPLACEMENT OF THE HYDRAULIC BRAKE UNITS.

REMOVAL.

10. Release the pressure in the hydraulic circuits (see Op. DX.00).

11. Remove : - the pads (see this operation, paragraphs 1 and following),
- the pipe (1) between the two units.

12. Support the engine-gearbox assembly by the slinghook using a workshop crane. If the wings have been removed, it is possible to use support 1797-T previously provided for the DS19.

13. Remove the left-hand brake unit.

a) Disconnect the feedpipe (7).

b) Remove :

- the securing clip (5) for the feed tube,
- the 2 screws (3) securing the brake unit on the gearbox outlet,
- the 2 screws securing the brake unit on the fixed bracket on the front crossmember.

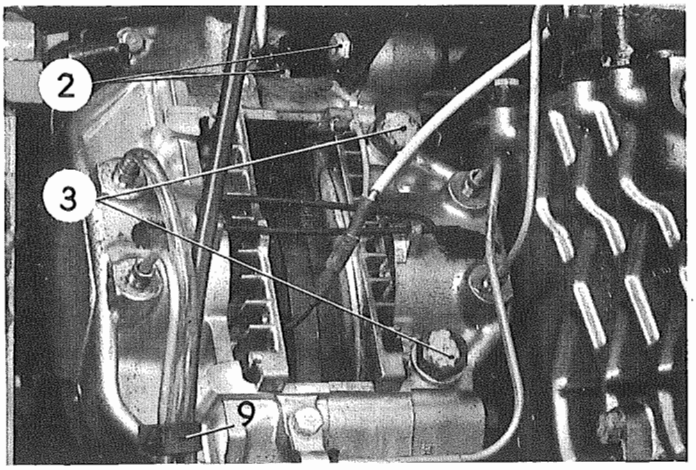
NOTE : To remove the rear securing screw, use a 14 mm socket (a), a universal joint (b), a 300 mm (12") extension piece (c) and a ratchet spanner (d).
Proceed as shown in the illustration.

c) Remove :

- the gear selection lever (4),
- the support (6) for the cable anchorage.

Disconnect the speedometer drive cable (8).

d) Withdraw the brake unit towards the front of the vehicle.



14. Remove the right-hand brake unit.

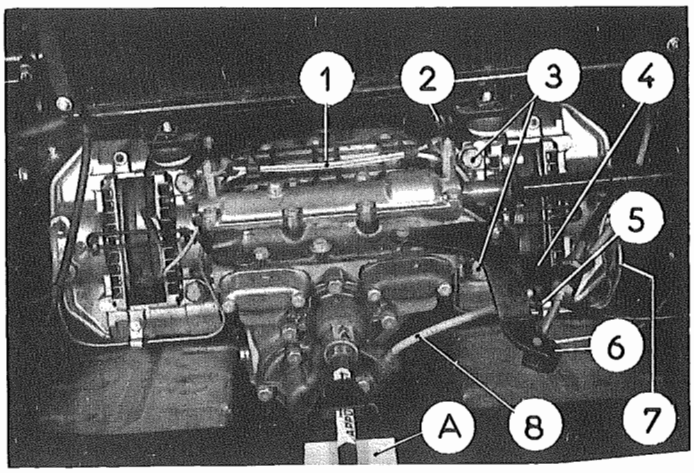
a) Remove :
- the rubber strap (9),
- the 2 screws (3) securing the unit to the gearbox drive outlet housing,
- the 2 screws (2) holding the unit on the fixed support on the front crossmember.

b) Withdraw the brake unit towards the front of the vehicle.

ASSEMBLY.

15. Fit in position :
- the brake units,
- the screws (2) securing the brake unit on the fixed support of the front crossmember,
- the screws (3) securing the unit on the gearbox outlet housing.

Insert the screws (3) without tightening them. Tighten the screws (2) to between 29 and 31 ft lbs (3.9 - 4.3 m.kg).



LEFT-HAND SIDE:-

Connect the piping (7) and the clip (5) holding the feedpipe (insert a rubber bush).

Fit :
- the bracket (6) for cable anchorage,
- the lever (4) for gear selection,
- the speedometer drive cable (8).

RIGHT-HAND SIDE:-

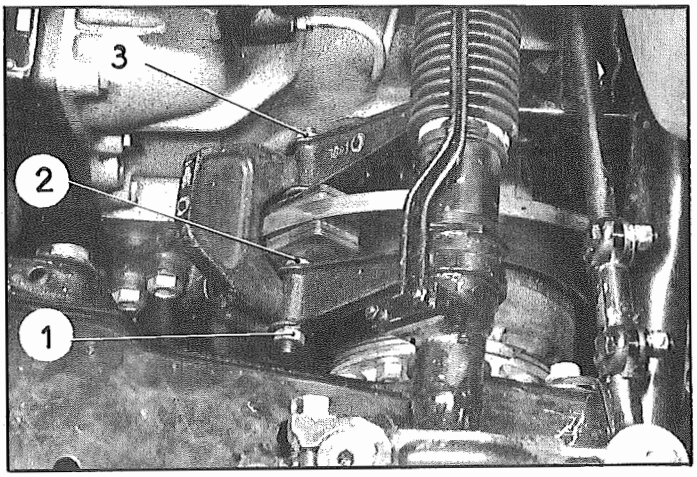
Fit the rubber strap (9),
- the pads (see same Operation, paragraphs 5 and following),
- the connecting pipe (1).

16. Bleed the brakes (see Op. DX.453-0).

16A. Have pressure applied by an assistant to the hydraulic brake pedal, to centralise the brake units. Tighten the screws (7) securing the units to the gearbox outlet housings to between 94 and 100 ft lbs (13 to 14 m.kg).

June 1966.

Corrective No.1



ADJUSTMENT.

1. Remove the front left-hand wing and the suspension mechanism protecting shield.

Adjust the clearance between pad and brake disc.

2. Raise the front of the vehicle.

3. With the brake off, raise the pedal to the maximum and wedge it there with a piece of wood about 210 mm high.

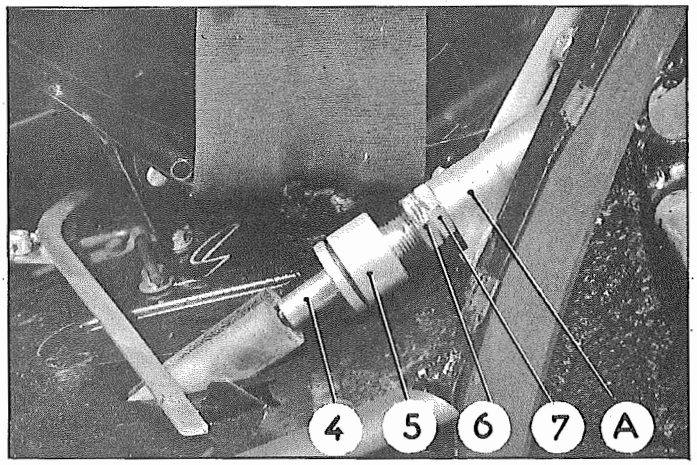
Place between the brake pads and the disc, on each side, a shim 0.1 mm thick, having a surface equivalent to that of the pad, to prevent them rocking.

Loosen the nuts (1) and (3) (ring spanner, 16 mm, with 12 sides, reduced to 3 mm thick).

Adjust the screws (2) using thin jawed 14 mm O/E spanner, to bring the brake shoes into contact with the shims.

Tighten nuts (1) and (3) (thin ring spanner, 12 grooves, 16 mm).

4. Carry out the same adjustment on the other brake unit.
Lower the car to the ground.



To adjust the tension of the cable sheath.

5. With the pedal held in position explained in paragraph 3 above, free the locknut (6) and the nut (7).

Bring the threaded sleeve (5) in contact with the sheath (4). Then screw up the nut (7) to bring it within 0.3 to 0.5 mm from the end of the support tube (A) (use feeler gauges).

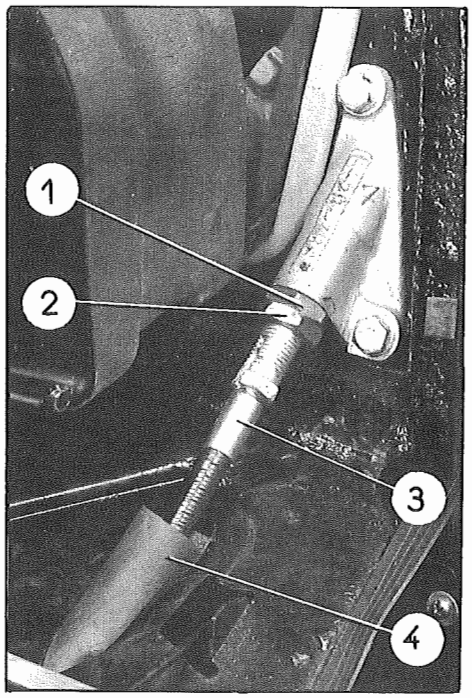
Tighten the locknut (6). Remove the wedge from under the pedal and check that the wheels turn freely.

6. Lower the car to the ground.

7. Fit the metal shield protecting the suspension mechanism and fit the front left-hand wing.

June 1966.

Corrective No. 1



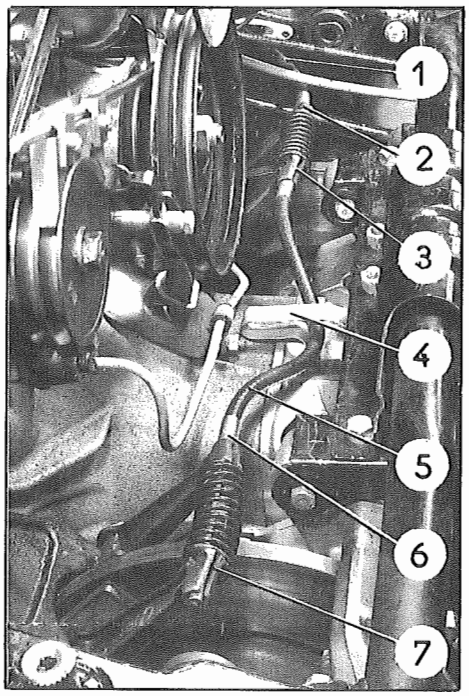
REPLACING A BRAKE CABLE.

REMOVAL.

1. Remove the front left-hand wing.

2. Remove the radiator (see Op. DX.232-1).

3. Free completely the cable sheath (3) by unscrewing to the maximum the locknut (2) and the nut (1).



4. On the right-hand free the cable from the lever (7), the spring, and the cable sheath (5), from the levers (6) and (3).

5. Free the cable and the sheath from the securing clip (4) on the gearbox housing.

Remove the left-hand spring.

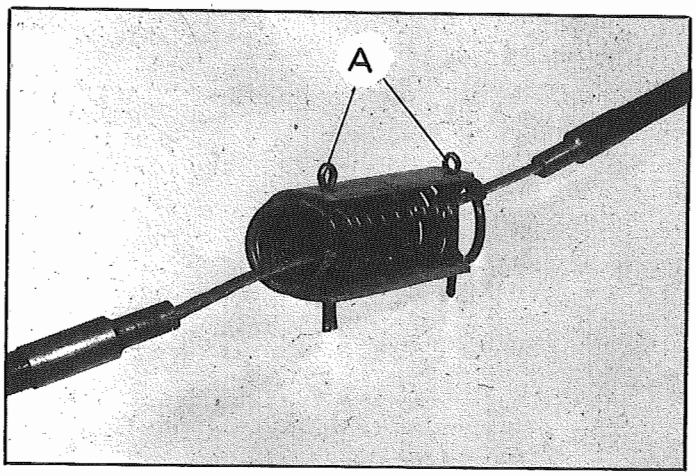
6. Free the cable and its sheath from the left-hand sidemember. Recover the rubber protector (4) (see first photograph).

Remove the pin from the clevis pin securing the cable to the handbrake handle and remove the cable.

ASSEMBLY.

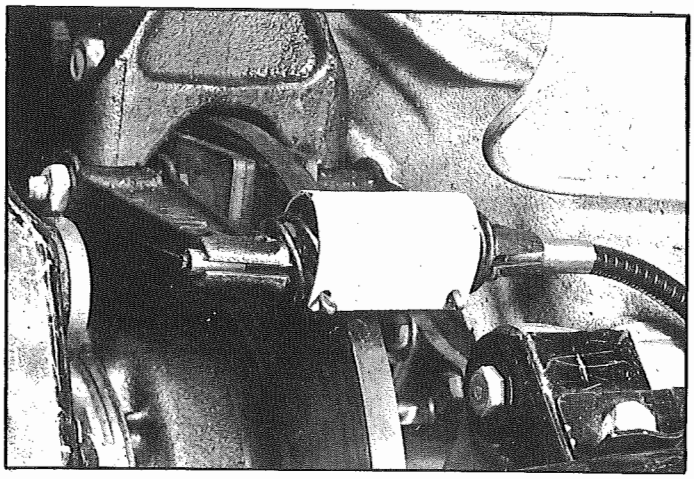
7. Connect the cable to the handbrake handle with its clevis pin; fit the split pin.

Pass the cable in its sheath through the body sidemember. Fit the rubber protector. Place the cable sheath end (1) in the lever (2).



8. Fit the spring in a clamp MR 4158-50, compressing the spring in a vice and fitting the pins (A) to secure the outer coils of the spring.

Fit this assembly, spring and clamp, on the cable and sheath. Fit it between the brake levers. Insert the cable in the lever slot. Remove the pins (A) and correctly engage this spring on the lever bosses. Remove the clamp.



Carry out the same operation on the second spring.

Fit the cable sheath in the securing clip on the gearbox.

Adjust the cable sheath tension (see Op. DJ.454-0).

Fit the radiator (see Op. DX.232-1) and the front left-hand wing.

The electrical installations are the same as on DS 21 (DX) vehicles.

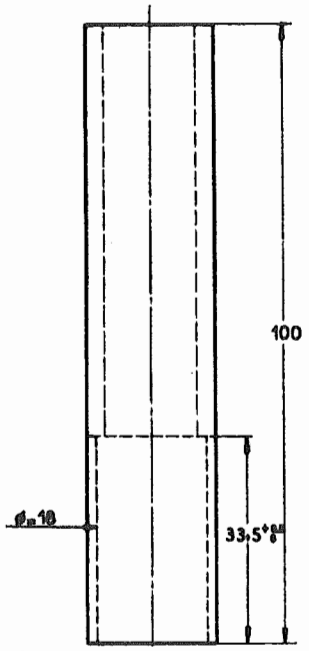
The wiring diagrams and operations sections for the DX vehicles may be used for this model.

As the body parts on this vehicle are the same as those on the DS 21, follow the instructions in the corresponding DX sections for their overhaul.

DRAWINGS FOR SETTING UP MR TOOLS

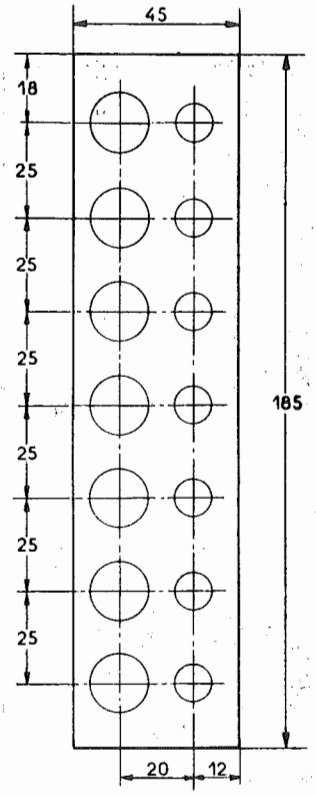
Suggested for Repairs

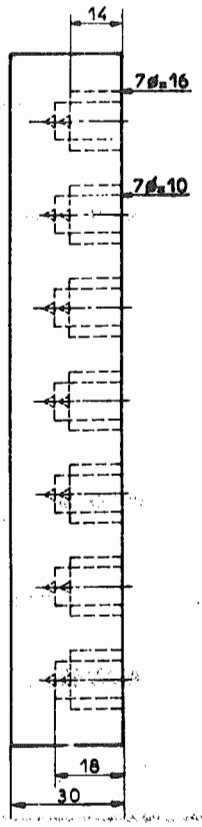
MR - 3045 - 140



Solid drawn mild steel tube Ø - 15 x 21

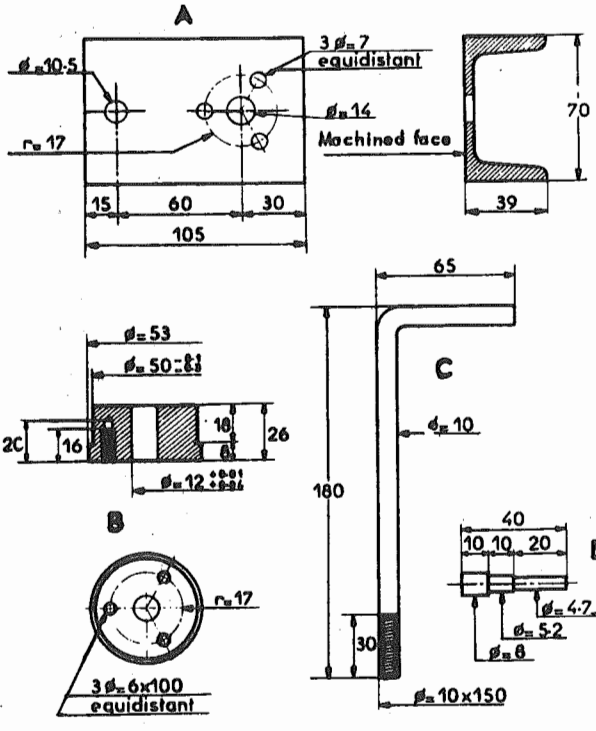
MR - 3301 - 80

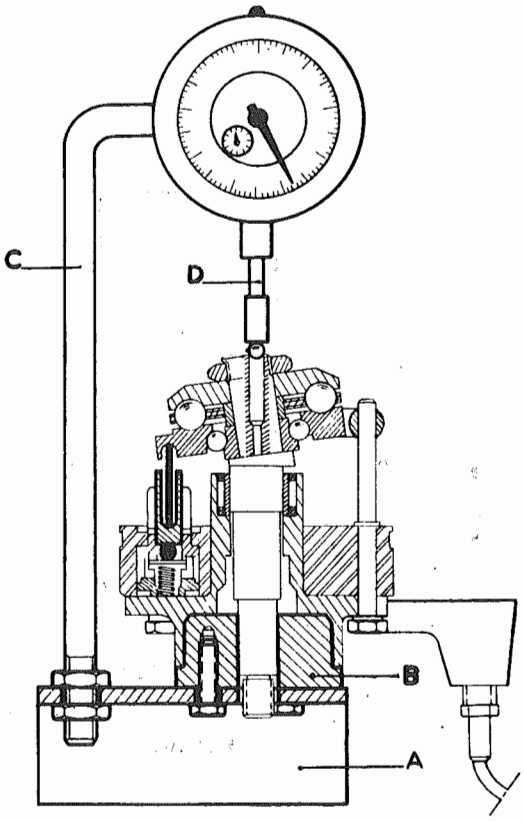




Aluminium

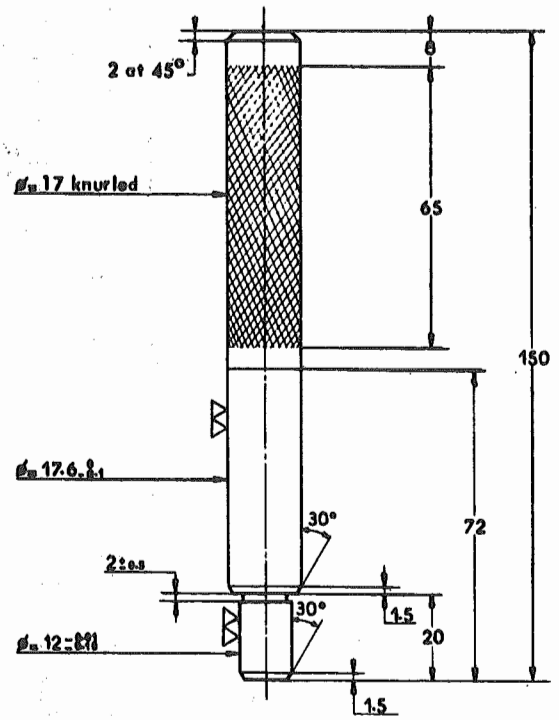
MR - 3365 - 60





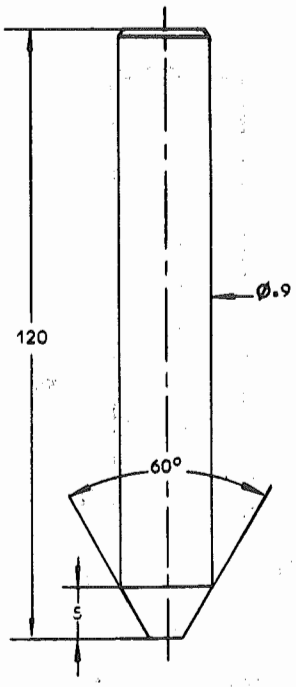
Mild Steel

MR - 3436 - 110



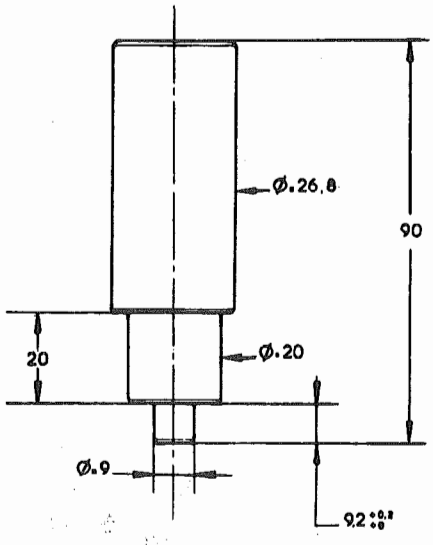
Mild Steel

MR - 3436 - 200



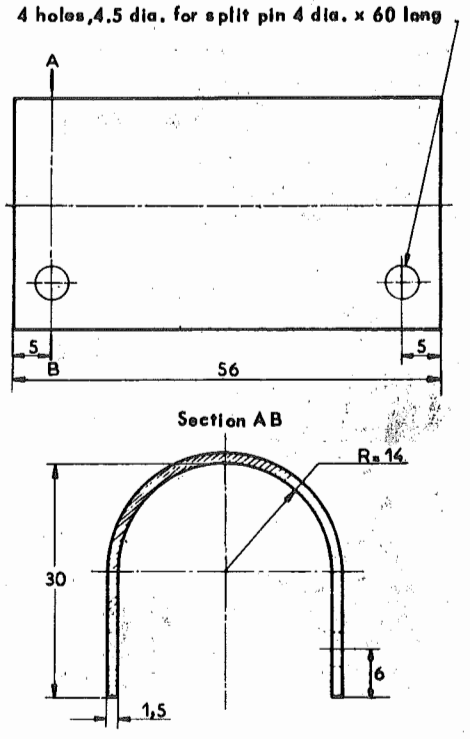
Mild Steel

MR - 3436 - 210

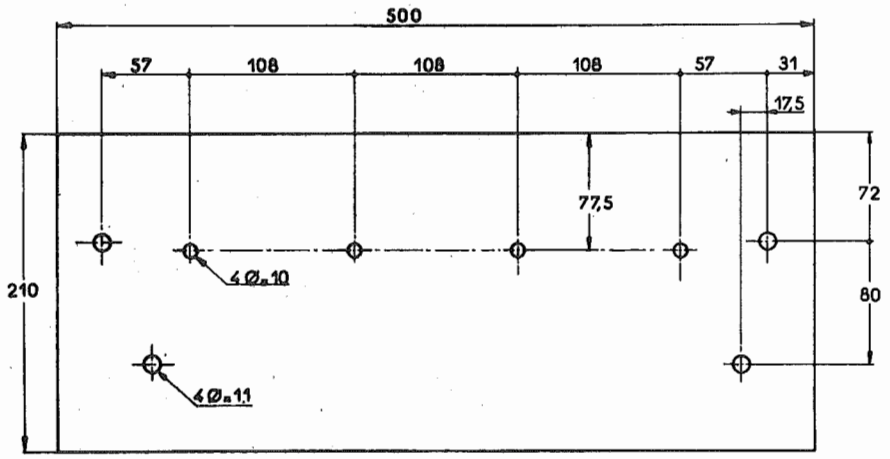


Mild Steel

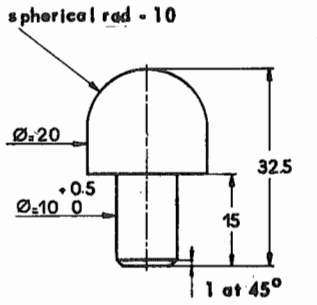
MR - 4158 - 50



MR - 4156 - 40

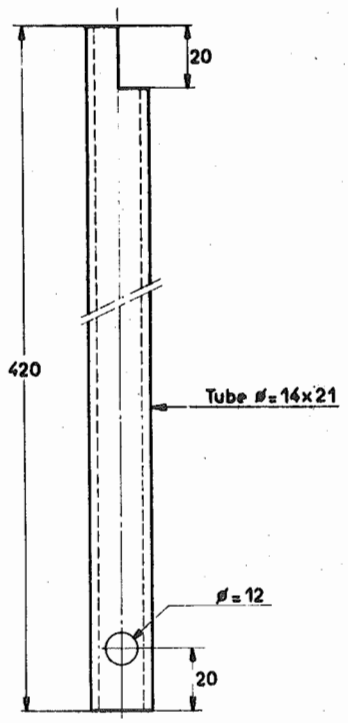


Counterplate in hard wood, thickness 20

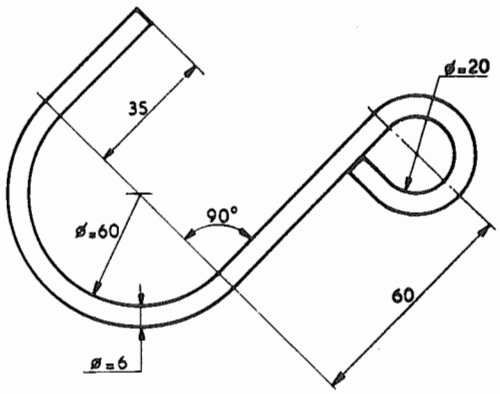


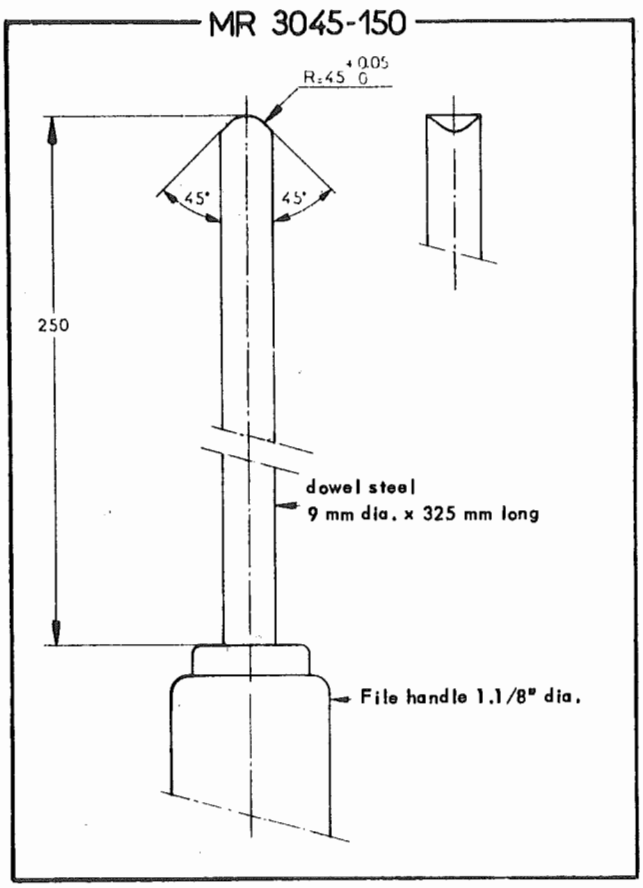
Machine all surfaces
4 parts
Mild Steel

MR - 4208



MR - 4208 - 20





Stick in place at the end of the manual.

DS 19A

LIST OF OPERATIONS SHOWN IN THE REPAIR MANUAL
Vehicle DS 19 A

Operation No.	Remarks	DESCRIPTION	Paragraph No.
		CHARACTERISTICS	
DY.000		Characteristics and adjustments	
DY.00	See Op. DX.00	Work on the hydraulic system. Precautions	
		ENGINE	
DY.100-00		Engine characteristics	
DY.100-1		Replacement of an engine-gearbox assembly	
DY.100-2		Stripping and assembling an engine-gearbox assembly (for replacement of the engine)	1
		Stripping and assembling an engine-gearbox assembly (for replacement of the gearbox)	25
DY.100-3		Overhauling an engine	
		Removing the cylinder head	3
		Adjusting the crankshaft end-float	23
		Fitting a camshaft	26
		Fitting a cylinder head	33
DY.111-1	See Op. DX.111-1	Replacing a sump	See Op. DX.100-1
DY.112-0	See Op. DX.112-0	Adjusting the valve rocker clearance	
DY.112-1		Replacing a cylinder head or gasket	
DY.112-3	See Op. DX.112-3	Overhauling a cylinder head	
DY.112-4	See Op. DX.112-4	Work on the cylinder head	
		Replacing an inlet rocker assembly	1
		Replacing an exhaust rocker assembly	
DY.120-1		Work on the timing gear	
		Replacing a timing chain or pinion	1
		Replacing a camshaft	6
		Replacing the tappets	42
DY.133-0	See Op. DX.133-0	Adjustment of the engine mountings	
DY.141-1		Replacing an inlet manifold	
DY.142-0	See Op. DX.142-0	Adjusting the idling	
DY.142-1	See Op. DX.142-1	Replacing a carburettor	
DY.142-3		Overhauling a carburettor	
DY.142-4	See Op. DX.142-4	Work on the carburettor control	
		Replacing an accelerated idling device	
		Replacing the control linkage	
DY.171-1		Replacing an air filter	
DY.171-3	See Op. DX.171-3	Overhauling an air filter	

LIST OF OPERATIONS SHOWN IN THE REPAIR MANUAL
Vehicle DS 19 A

Operation No.	Remarks	DESCRIPTION	Paragraph No.
DY.173-1	See Op. DX.173-1	Replacing a petrol pump	
DY.173-3	See Op. DX.173-3	Overhauling a petrol pump	
DY.174-1	See Op. DX.174-1	Replacing a petrol feedpipe	
DY.174-3	See Op. DX.174-3	Repairing a petrol feedpipe	
DY.175-1	See Op. DX.175-1	Work on the petrol tank	
		Replacing a petrol tank	1
DY.180-1		Work on the exhaust system	
		Replacing an exhaust manifold	
		Replacing an exhaust silencer	
		Replacing the exhaust tail-pipes	
DY.211-0		Adjustments to the distributor and sparking plugs	
		Adjusting the ignition initial setting	1
		Adjustment on a test bench	4
		Cleaning and adjusting the plugs	See Op. DX.211-0
DY.211-1		Work on the distributor	
		Replacing a distributor	1
DY.211-3		Overhauling a distributor	
DY.212-0	See Op. DX.212-0	Changing a coil	
DY.220-0		Checking the oil pressure (on the car)	
DY.220-1		Work on the oil circulation system	
		Replacing an oil filter element	1
		Replacing an oil pump	10
DY.220-3	See Op. DX.220-3	Overhauling an oil pump	
DY.231-0	See Op. DX.231-0	Adjusting the pulleys and belts	
		Aligning the pulleys	1
		Adjusting the tension of the belts	12
DY.231-1	See Op. DX.231-1	Replacing a water pump	
DY.231-4	See Op. DX.231-4	Work on the pulleys and belts	
		Replacing the water pump belts	1
		Replacing the high pressure pump belts	6
		Replacing the driving pulley	26
		Replacing a bearing for the driving pulley shaft	34
DY.232-1	See Op. DX.232-1	Work on the cooling system	
		Replacing a radiator	1
		Replacing a fan	10

LIST OF OPERATIONS SHOWN IN THE REPAIR MANUAL
Vehicle DS 19 A

Operation No.	Remarks	DESCRIPTION	Paragraph No.
		CLUTCH	
DY.312-00		Clutch characteristics	
DY.312-1		Replacing a clutch	
DY.312-3	See Op. DX.312-3	Overhauling a clutch	
DY.314-0	See Op. DX.314-0	Checking and adjusting the clutch control	
		Adjusting the clutch clearance	1
		Adjusting the clutch drag	3
		Adjusting the clutch re-engagement control	5
DY.314-1		Work on the clutch control	
		Replacing a clutch re-engagement control	1
		GEARBOX	
DY.330-00		Characteristics of the gearbox	
DY.330-1	See Op. DY.100-1	Replacing a gearbox	
DY.330-2	See Op. DY.100-2	Stripping and assembling a gearbox	
DY.330-3	See Op. DX.330-3	Overhauling a gearbox	
DY.330-4	See Op. DX.330-4	Work on the differential shaft, brake disc or differential shaft housing	
		Replacing a differential shaft or housing	1
		Replacing a brake disc	17
DY.331-1	See Op. DX.331-1	Replacing a gearbox cover	
DY.331-3	See Op. DX.330-3	Overhauling a gearbox cover	
DY.334-7	See Op. DX.334-7	Work on the gear change control	
		Replacing a gear change pipe assembly (5 pipes)	1
		Replacing a front pipe assembly on the gearbox cover .	12
		Replacing a rear pipe assembly on the gearbox cover .	18
		Replacing the gear change control cylinders	27
		Replacing the ring seals	56
		TRANSMISSION	
DY.372-0		Characteristics and adjustments	
DY.372-1	See Op. DX.372-1	Replacement of a driveshaft or pivot	

LIST OF OPERATIONS SHOWN IN THE REPAIR MANUAL

Vehicle DS 19 A

Operation No.	Remarks	DESCRIPTION	Paragraph No.
		SOURCE AND RESERVE OF PRESSURE	
DY.391-0		Characteristics and adjustments	
DY.391-1	See Op. DX.391-1	Replacing a high pressure pump	
DY.391-3	See Op. DX.391-3	Overhauling a high pressure pump	
DY.391-4	See Op. DX.391-4	Replacing a pressure-regulator	
DY.391-6	See Op. DX.391-6	Overhauling a pressure-regulator	
DY.391-7	See Op. DX.391-7	Replacing a connecting pipe between the high pressure pump and pressure regulator	
DY.392-1	See Op. DX.392-1	Replacing a brake accumulator	
DY.392-3	See Op. DX.392-3	Overhauling a brake accumulator	
DY.393-1	See Op. DX.393-1	Work on the hydraulic reservoir	
		Replacing a pressure distribution unit	
		Replacing a hydraulic reservoir	
		Replacing a filter	
DY.393-3	See Op. DX.393-3	Overhauling a pressure distribution unit	
		FRONT AXLE	
DY.410-00		Characteristics of the front axle	
DY.410-0	See Op. DX.410-0	Adjustments of the front axle	
		Adjustment of the camber	
		Adjustment of the wheel alignment	
		Adjustment of the steering centralising cam	
		Adjustment of the steering lock angle	
DY.410-1		Replacing a front half-axle	
DY.410-3	See Op. DX.410-3	Overhauling a front half-axle	
DY.413-1	See Op. DX.413-1	Work on the pivot and wheel	
		Replacement of an upper pivot ball pin	1
		Replacement of a lower pivot ball pin	12
		REAR AXLE	
DY.420-00		Characteristics of the rear axle	
DY.420-1		Replacing a rear half-axle	
DY.420-3	See Op. DX.420-3	Overhauling a rear half-axle	
DY.420-4	See Op. DX.420-4	Work on the rear axle	
		Replacing a stub axle or stub axle bearings	1
		Replacing a bearing oil seal or a bearing thrust collar .	9

LIST OF OPERATIONS SHOWN IN THE REPAIR MANUAL
Vehicle DS 19 A

Operation No.	Remarks	DESCRIPTION	Paragraph No.
		SUSPENSION	
DY.433-00		Characteristics and adjustments	
DY.433-0		Adjustments to the suspension	
DY.433-1	See Op. DX.433-1	Work on the front suspension	
		Replacing a suspension sphere	
		Replacing a height corrector	
		Replacing a suspension cylinder	
DY.433-3	See Op. DX.433-3	Work on the suspension units	
		Overhauling a damper	1
		Overhauling a suspension cylinder	9
		Checking a cylinder for leaks	20
		Checking a suspension sphere	24
		Overhauling a corrector	28
DY.433-4		Replacing a front anti-roll bar	
DY.434-1	See Op. DX.434-1	Work on the rear suspension	
		Replacing a height corrector	
		Replacing a suspension cylinder	
DY.434-4		Replacing a rear anti-roll bar	
DY.437-0	See Op. DX.437-0	Adjustment of the manual height control	
DY.437-1	See Op. DX.437-1	Replacing the manual height control	
		STEERING	
DY.440-00		Characteristics of the steering	
DY.440-0	See Op. DX.440-0	Adjustments on the steering	
		Adjusting the lateral position of the steering	1
		Adjusting the angular position	5
		Adjusting the alignment	9
		Adjusting the steering centraliser cam	12
		Adjusting the steering lock angle	16
DY.442-1		Work on the steering (replacements)	
		Replacing a steering unit	1
/G/283		Replacing a hydraylic control cylinder	19
DY.442-3	See Op. DX.442-3	Work on the steering (overhaul)	
		Overhauling a steering unit	1
		Overhauling a hydraulic control cylinder	36
		Overhauling a pinion and rack with valves	48

LIST OF OPERATIONS SHOWN IN THE REPAIR MANUAL
Vehicle DS 19 A

Operation No.	Remarks	DESCRIPTION	Paragraph No.
DY.443-1	See Op. DX.443-1	Replacing a steering relay	
DY.443-3	See Op. DX.443-3	Overhauling a steering relay	
		BRAKES	
DY.451-00		Characteristics and adjustments	
DY.451-0	See Op. DX.451-0	Adjustments on the brakes	
		Adjustments on the brakes with hydraulic control	
		Adjusting the brake unit, hydraulic control	1
		Adjusting the brakes, manual control	
		Adjusting clearance between brake caliper and disc .	8
		Adjusting the clearance between pads and disc	12
		Adjusting the tension of the cable sheath	17
		Adjustments on the rear brakes	
		Centring the brake shoes	23
DY.451-1		Work on the front brakes (replacements)	
		Replacing the hydraulic brake shoes	
		Replacing the hydraulic brake units	See Op. DX.451-1
		Replacing a brake disc	See Op. DX.330-4
DY.451-3	See Op. DX.451-3	Work on the front brakes (overhaul)	
		Overhauling a hydraulic brake unit	1
DY.451-4	See Op. DX.451-4	Work on the rear brakes	
		Replacing a brake drum	1
		Replacing the shoes	7
		Replacing the backplate	19
		Replacing a wheel cylinder	31
DY.453-0	See Op. DX.453-0	Adjustments on the hydraulic brake pedal gear	
		Bleeding the brakes	1
		Adjusting the brake distribution pressure	13
		Checking the pressure switches	23
		Adjusting the stop lamp switch	26

Operation No.	Remarks	DESCRIPTION	Paragraph No.
DY.453-1	See Op. DX.453-1	Work on the hydraulic brake pedal gear	
		Replacing a hydraulic brake pedal gear	1
		Replacing a brake pressure distributor	17
		Checking a brake pressure distributor for leaks	29
DY.453-3	See Op. DX.453-3	Overhauling a brake pedal gear	
DY.453-4	See Op. DX.453-4	Replacing a rear swivel pipe	
DY.454-0	See Op. DX.454-0	Adjusting the parking brake	
DY.454-1	See Op. DX.454-1	Work on the mechanical brake control	
		Replacing the mechanical brake calipers	1
		Replacing a brake control pedal gear	5
		Replacing a control cable	13
		ELECTRICAL	
DY.510-1		Electrical installation	
DY.533-1	See Op. DL.533-1	Replacing a starter motor	
		BODY	
DY.851-00		Characteristics	

I GENERAL CHARACTERISTICS:

- Vehicle type ..... DS 19 series A
- Commercial type ..... DS 19 A
- Works symbol ..... DY
- Date of production ..... September 1965 - Chassis No. 4.311.000
- Number of seats 6
- Tyres, front ..... 180 x 380 X AS 27 p.s.i. (1.9 kg/cm^2)
- Tyres, rear ..... 155 x 380 X AS 27 p.s.i. (1.9 kg/cm^2)
  or 180 x 380 X AS 24 p.s.i. (1.7 kg/cm^2)
- Sparewheel ..... 155 x 380 X AS 127 p.s.i. (1.9 kg/cm^2)
  or 180 x 380 X AS 30 p.s.i. (2.1 kg/cm^2)

II GENERAL DIMENSIONS:

- Wheel base ..... 10ft. 3in. (3.125 m)
- Track, front ..... 4ft. 11 in. (1.50 m)
- Track, rear ..... 4ft. 3.3/16 in. (1.30 m)
- Length overall ..... 15ft. 10½in. (4.838 m)
- Width overall ..... 5ft. 10½in. (1.79 m)
- Height, "normal" running position ..... 4ft. 9.7/8in. (1.47 m)
- Width of seats, at the front 4ft. 4.3/8in. (1.33 m)
- Width of seats, at the rear 3ft. 10.7/8in. (1.19 m)
- Ground clearance:
  - "low" position ..... 2.9/16in. (0.065 m)
  - "normal" position ..... 5.7/8in. (0.150 m)
  - 1st intermediate height position ..... 6.11/16in. (0.170 m)
  - 2nd intermediate height position ..... 9in. (0.225 m)
  - "high" position ..... 9.7/8in. (0.250 m)
- Turning radius ..... 18ft. ½in. (5.50 m)
- Unladen weight ..... 25¼ cwt. (1275 kg)
- Pay-load ..... 9½ cwt. (485 kg)
- Total laden weight ..... 35 cwt. (1760 kg)

III ENGINE

- Fiscal rating (French) ..... 12 cv
- Fiscal rating (RAC British) ..... 18.34 HP
- Number of cylinders 4
- Bore ..... 86 mm
- Stroke ..... 85.5 mm
- Cubic capacity ..... 1,985 cc
- Compression ratio 8.75:1
- Brake horsepower ..... 90(SAE), 84(DIN), at 5250 rpm
- Maximum torque, ft.lbs... 109.9(SAE), 105.5 (DIN), at 3500 rpm

Valve rocker clearance (engine hot)

For method (see Op. DX.112-0).

- Inlet working clearance .... 0.008in. (0.20 mm)
- Exhaust working clearance . 0.010in. (0.25 mm)

Cylinder head: (see Op. DY.112-1) (Tighten cold)

1st tightening 21.5 ft.lbs. (3 m.kg)

2nd tightening $43.5\ ^{+3.5}_{0}$ ft.lbs. ($6\ ^{+0.5}_{0}$ m.kg)

Valves:

	Angle	Diameter of Head	Diameter of Stem	Length
Inlet: 2N 124-7	90°	47	$7.95\ ^{+0.015}_{0}$	$115.47\ ^{+0.6}_{-0.25}$
Exhaust: 2N 124-8	60°	39 ± 0.1	$8.95\ ^{0}_{-0.015}$	$104.05\ ^{+0.45}_{-0.25}$

Valve Springs:

	Length	Load in Kg	Length	Load in Kg
Inner spring 2N 124-9	30.7	7.4 ± 0.5	22	12 ± 1
Outer spring N 124-25	39	28.9 ± 1.6	30.5	60 ± 3.2

Carburettor settings:

Carburettor: WEBER 28/36 DDE 2

	Primary Bore	Secondary Bore
Venturi diameter	23	27
Main jet	120	170
Air correction jet	140	140
Emulsion tube	F 16	F 16
Diffuser	3.5	3.5
Idling jet	45	55
Idling air jet	185	85

	Primary Bore	Secondary Bore
Progression holes	80 dia.	90 dia.
	90 dia.	120 dia.
	120 dia.	170 dia.
Brass float	11 g.	
Needle valve	175	
Accelerator pump injector ...	60	
Pump bypass valve	55	

With the strangler flap in the "closed" position there must be a clearance of 0.90 mm between the edge of the primary butterfly and its bore.

Idling speed : from 550 - 600 r.p.m.
Accelerated idling speed : 875 - 925 r.p.m.

Ignition:

Contact breaker gap ..... 0.45 mm

Initial ignition setting ..... 12° before T.D.C.

Automatic advance ..... Maximum 10° 25' - Minimum 8° 40' at 2500 r.p.m. of the distributor

Sparking plugs ..... Marchal 35 B

Sparking plug gaps ..... 0.60 mm

Oil circulation :

- Oil S A E 10 W 30
- Oil capacity (engine) : after dismantling or changing the filter element $8\frac{3}{4}$ pints (5 litres)
  : after draining, 8 pints (4.5 litres)
- Between "mini" and "max" : $1\frac{3}{4}$ pints (1 litre).

Cooling system :

Capacity of cooling system = 19 pints (10.6 litres)

OTHER UNITS.

For the other units on the vehicles see Op. DX.000.

SPECIAL POINTS

Engine mounting.

Height of flexible mountings under load = $91 \begin{smallmatrix}+2\\0\end{smallmatrix}$ mm (see Op. DX.133-0).

Cylinder Head.

To remove the valve rocker pushrod from No. 4 cylinder, the cylinder head must be lifted towards the front. Assemble the valve rocker push-rod at the same time as the cylinder head.

Valve rocker clearance (hot) :
inlet = 0.008 in. (0.20 mm)
exhaust = 0.010 in. (0.25 mm)

Tightening the cylinder head screws (cold) :
1st tightening = 21.75 ft.lbs. (3 m.kg).
final tightening = 43.5 ft.lbs. $\begin{smallmatrix}+3\\0\end{smallmatrix}$ ($6 \begin{smallmatrix}+0.5\\0\end{smallmatrix}$ m.kg).

Tighten the screws of the valve rocker cover to 5.5 ft.lbs. (0.75 m.kg).

The valve seats can only be replaced with the aid of special tooling.

Bores of the valve guides :
inlet = $8 \begin{smallmatrix}+0.015\\-0.010\end{smallmatrix}$ mm.
exhaust = $8.99 \begin{smallmatrix}+0.015\\-0.010\end{smallmatrix}$ mm.

Width of the valve seat = 0.8 - 1.5 mm.

Valve seat angle : inlet = 120°
exhaust = 90°.

Valve spring rates: outer:
39 mm under a load of 28.9 ± 1.6 kg.
30.5 mm under a load of 60 ± 3.2 kg.
inner:
30.7 mm under a load of 7.4 ± 0.5 kg.
22 mm under a load of 12 ± 1 kg.

Tighten the valve rocker assembly nuts to 18 ft.lbs. ± 2 (2.5 ± 0.3 m.kg).

Cylinder block.

Tighten the drain plug to 25 ft.lbs. ± 3.5 (3.5 ± 0.5 m.kg).

Bore diameter for main bearings = 68.7 ± 0.005 mm.

Barrels.

There are two types, of different heights, marked yellow or blue on the stock.

After fitting, without their gaskets, the upper faces must be flush with the upper face of the cylinder block, or from 0 - 0.4 mm below it.

After fitting, with their gaskets, the upper faces must be between 0.12 and 0.16 mm above the upper face of the cylinder block.

Pistons and Piston Rings.

The gudgeon pins are free in the connecting rods.

The 2 marks etched on one end of the gudgeon pin must be on the opposite side of the piston to the projecting portion on one of the gudgeon pin bosses.

When fitting the connecting rod, this projecting part must be on the same side as the matching number marked on the connecting rod.

Camshaft.

End float = 0.05 to 0.07 mm (it is adjusted by the thickness of the securing clamp).

Tighten the clamp securing screw to 12 ft.lbs. $\begin{smallmatrix}+1\frac{1}{2}\\-2\end{smallmatrix}$ ($1.7 \begin{smallmatrix}+0.2\\-0.3\end{smallmatrix}$ m.kg).

Timing Gear.

Tighten the screws securing the chain tensioner to 12 ft.lbs. (1.7 m.kg).

Clearance between chain guide and chain = 0.1 - 0.5 mm.

Tighten the nuts of the timing case to 12 ft.lbs. $\begin{smallmatrix}+0.75\\-2\end{smallmatrix}$ ($1.7 \begin{smallmatrix}+0.1\\-0.3\end{smallmatrix}$ m.kg).

Oil Pump.

Tighten the pointed locking screw to 4 ft.lbs. ± 0.75 (0.6 ± 0.1 m.kg).

Tighten the screw on the pump lug to 25 ft.lbs. ± 3.5 (3.5 ± 0.5 m.kg).

End float of the spindle = 0.4 to 0.5 mm.

Pressure (S A E oil 10 W 30 at 60°C).
8 p.s.i. (0.550 kg/cm^2) min. at 500 r.p.m. of the pump.
$57 \begin{smallmatrix}+7\\0\end{smallmatrix}$ p.s.i. ($4 \begin{smallmatrix}+0.5\\0\end{smallmatrix}$ kg/cm^2) at 2000 r.p.m. of the pump.

Special equipment is required for this test, which is carried out with the pump removed from the engine.

Crankshaft.

Maximum diametral clearance of the connecting rods = 0.06 mm.

Maximum diametral clearance of the main bearings = 0.06 mm.

Crankshaft main journal diameter = 64.04 or 63.54 mm.

Crank pin big-end diameter = 54 or 53.5 mm.

End float = 0.045 - 0.16 mm.

Tighten the main bearing nuts to 72 ft.lbs. (10 m.kg).

Tighten the connecting rod nuts to 50 ft.lbs. $\begin{smallmatrix}+3\frac{1}{2}\\-2\end{smallmatrix}$ ($7 \begin{smallmatrix}+0.50\\-0.25\end{smallmatrix}$ m.kg).

Flywheel.

The distance between the clutch casing face on the flywheel and the friction disc seating face = $29 \begin{smallmatrix}+0.2\\0\end{smallmatrix}$ mm.

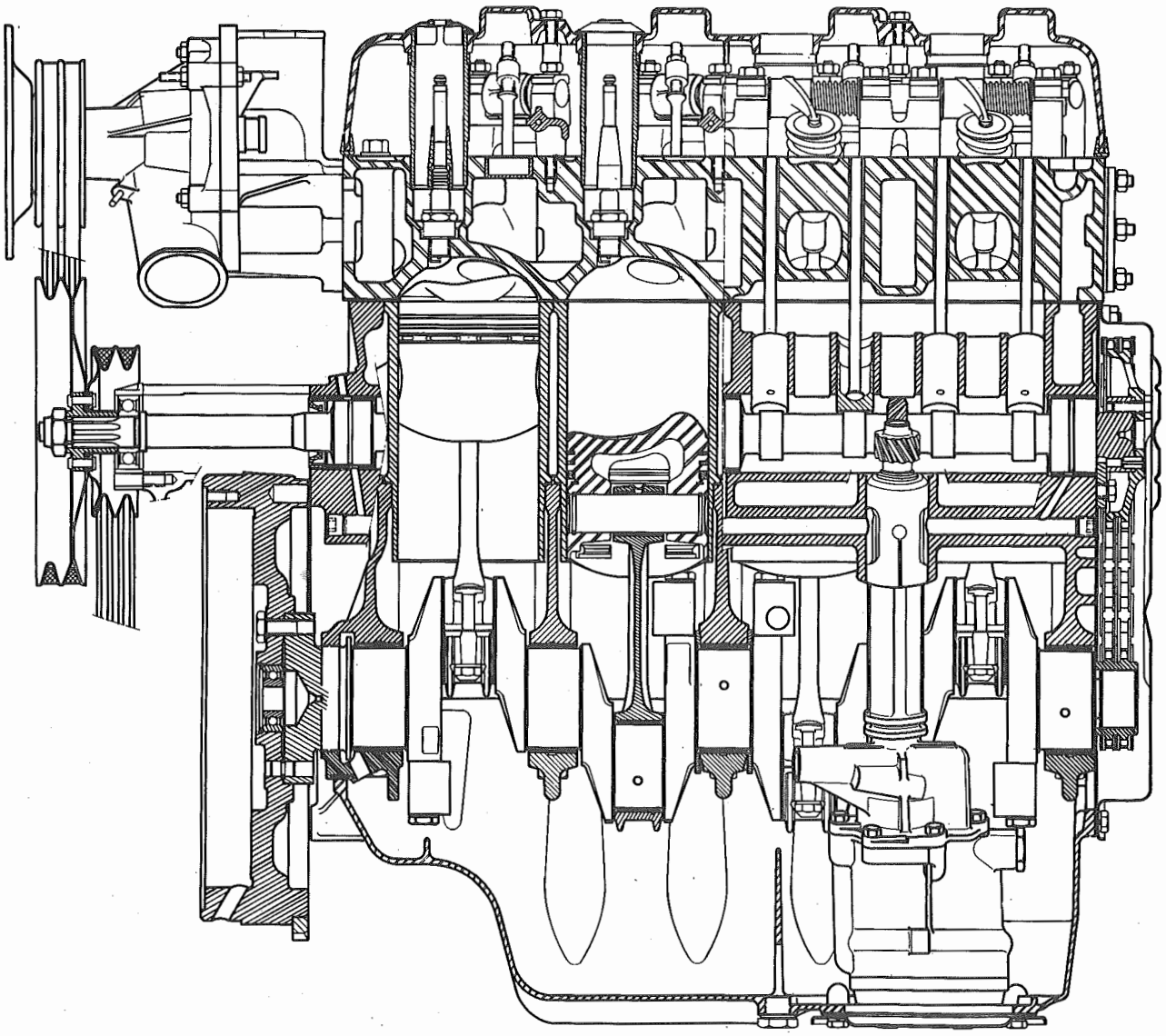
Thickness of metal removed by grinding must not exceed 0.3 - 0.5 mm.

Tighten the flywheel fixing screws to 47 - 50 ft.lbs. (6.5 - 7 m.kg).

Tighten the screws fixing the clutch to 18 $\begin{smallmatrix}+2\\-3\end{smallmatrix}$ ft.lbs. ($2.5 \begin{smallmatrix}+0.3\\-0.4\end{smallmatrix}$ m.kg).

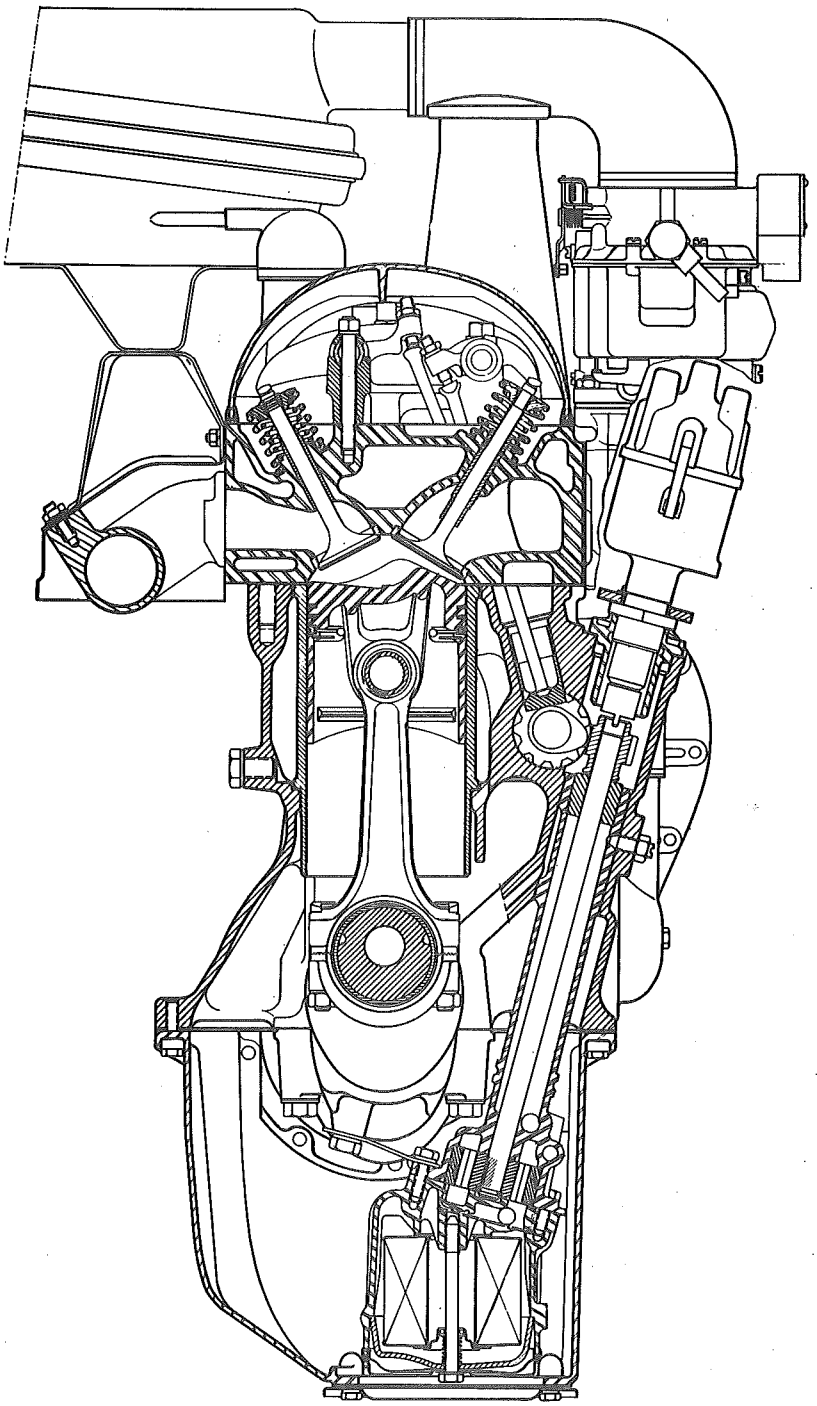
ENGINE

LONGITUDINAL SECTION



ENGINE

CROSS SECTION



Connecting Rods.

Special equipment is required to replace the small end bushes.
After fitting the connecting rod, the number marked on the connecting rod and its cap must be towards the camshaft.
Tighten the connecting rod nuts to 50 $^{+3.5}_{-2}$ ft.lbs. ($7\ ^{+0.5}_{-0.25}$ m.kg).

Distributor.

Contact breaker gap = 0.45 mm.
Sparks must occur at 90° to each other within 1° 30' maximum.
Centrifugal advance (at distributor r.p.m.)
Starts at between 800 and 1100 r.p.m.
at 1,000 r.p.m. = 0° to 2°
at 1,500 r.p.m. = 2° 30' to 4° 30'
at 2,000 r.p.m. = 5° 30' to 7° 30'
Maximum at 2,500 r.p.m. = 8° 45' to 10° 20'.

Breaker point contact pressure =

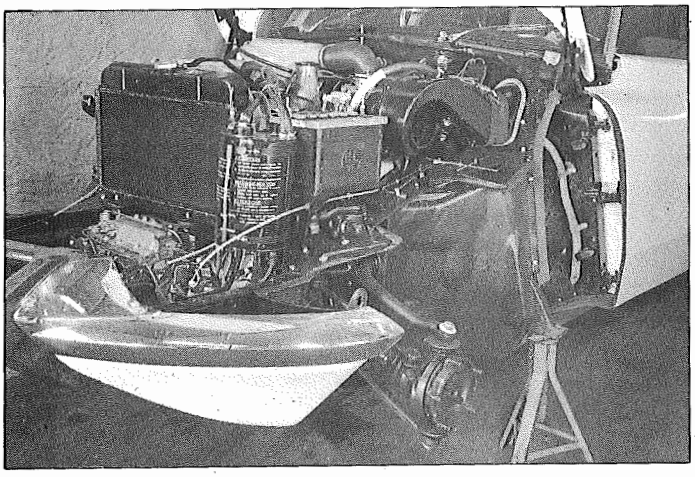
Ducellier = 700 to 850 g (24½ oz. to 30 oz.)
SEV = 850 to 1000 g (30 oz. to 35 oz.).

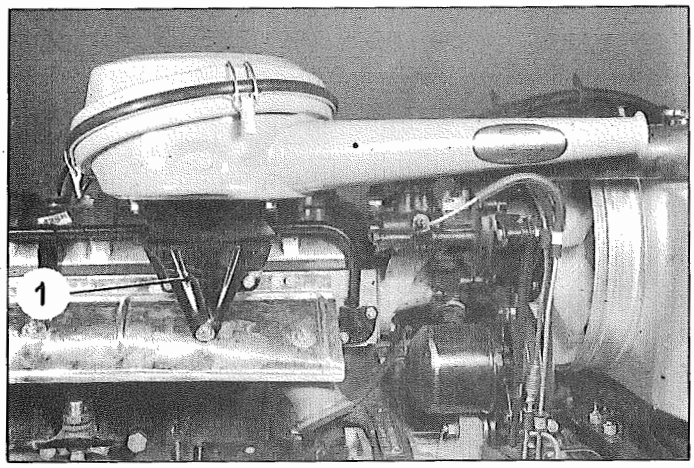
Condenser capacity = 0.21 to 0.23 µF.
Ignition : 12° before T.D.C. static timing.
Sparking plug gap = 0.6 mm.

Carburettor : WEBER type : 28 x 36 DDE 2 (DS 19 A)
28 x 36 DDE A2 (DS 19 MA)

	Primary Choke	Secondary Choke
Venturi bore	23	27
Main jet	120	170
Correction jet	140	140
Emulsion tube	F16	F16
Diffuser	3.5	3.5
Idling jet	45	55
Idling air jet	185	85
Progression holes	80 dia.	90 dia.
	90 dia.	120 dia.
	120 dia.	170 dia.
Brass float	11 g.	
Needle	175	
Pump injector	60	
Pump by-pass valve	55	

Adjustment of the strangler flap : with the strangler flap closed, the clearance between the edge of the primary butterfly and its bore must be 0.90 mm.





REMOVAL.

1. Place the front of the vehicle on stands (stand 2505-T).

Hold the bonnet open (stay MR 4158).

2. Remove:
   - the sparewheel,
   - the front wings, the assembly of the radiator air duct and crossmember supporting spare-wheel,
   - the two front wheels.

3. Drain the radiator and cylinder block (save the water which contains anti-freeze.

4. Release the pressure in all the hydraulic circuits (see Op. DX.00).

5. Remove the battery and its tray, placing the battery top-frame on the heater unit.

Remove the battery cradle.

6. Disconnect the return pipes fitted on the hydraulic reservoir, and the suction pipe feeding the high pressure pump from the filter outlet.

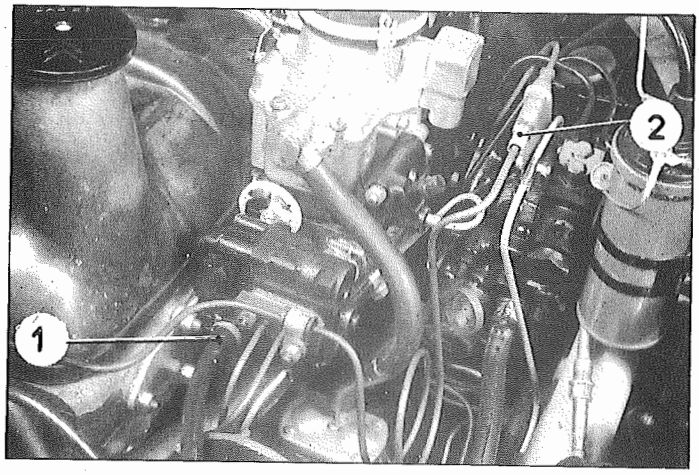
Free the reservoir and battery cradle assembly and leave it lying on the left-hand sidemember.

7. Disconnect the air filter from its bracket (1).

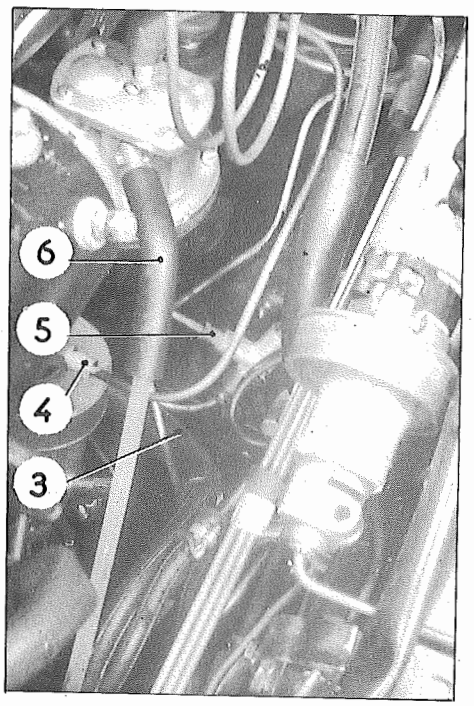
8. Remove the steering rack (see Op. DX.442-1).

Disconnect the dynamo leads, the distributor leads (LT and HT) and the lead to the thermometer transmitter.

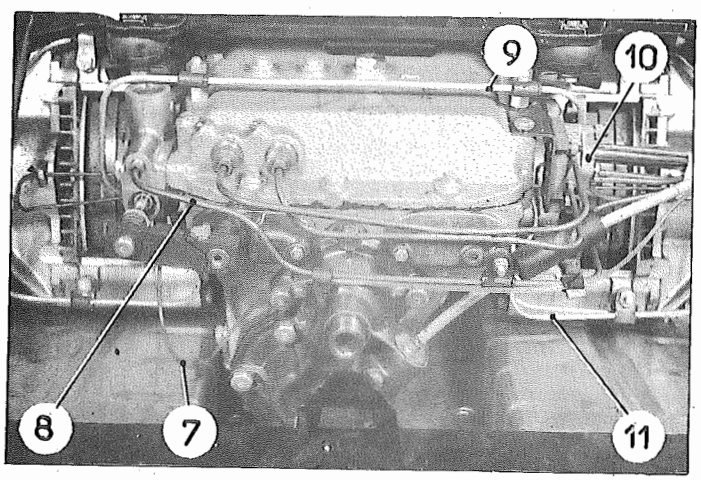
9. Remove the left-hand front suspension sphere.

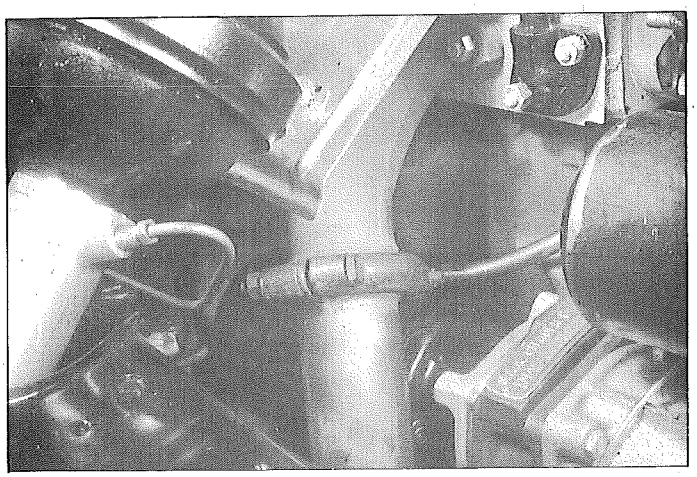


10. Disconnect:
    - the choke cable from the carburettor,
    - the accelerator control linkage from the carburettor and free it from its rear bearer,
    - the union (2) of the pipe assembly between the centrifugal regulator and the hydraulic selector, from the selector,
    - the union (4) from the pipe assembly of the clutch re-engagement control (above the pressure regulator),
    - the return pipe (1) from the clutch re-engagement control (3), from the pressure regulator,
    - the outlet pipe from the regulator, from the 3-way union (5) situated under the hydraulic selector,
    - the petrol delivery pipe (6) from the petrol pump,
    - the rubber heater pipe from the left-hand heater unit.

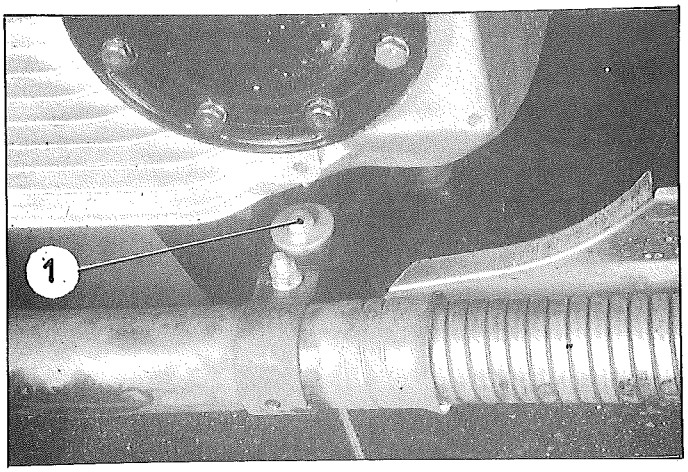


11. Disconnect:
    - the 5-pipe assembly (10) from the gearbox,
    - the feedpipe (9), from the front right-hand brake unit,
    - the feedpipe (11) from the front left-hand brake unit,
    - the nylon return pipe (7) from the clutch lock, removing the 2 rubber clips,
    - the connecting pipe (8) (clutch lock - hydraulic selector) from the lock,
    - the speedometer cable from the speedometer drive outlet on the gearbox.

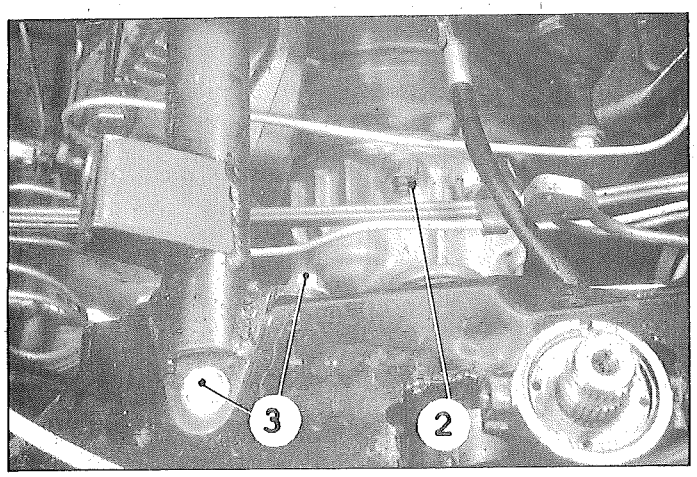




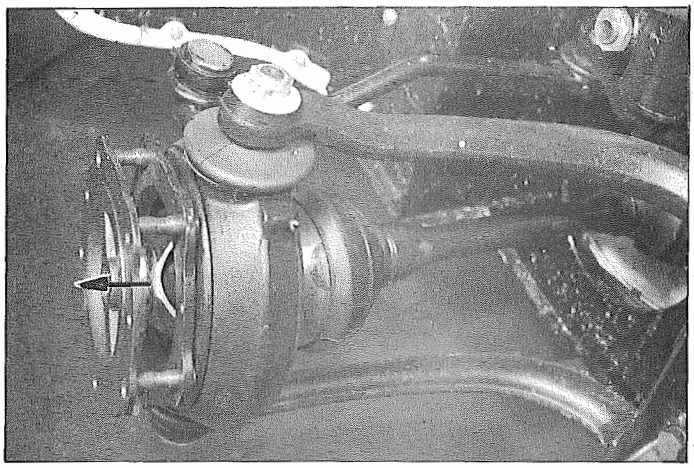
12. Disconnect:
    - the exhaust downpipe from the manifold,
    - the flexible heater delivery pipe from the water outlet pipe on the cylinder head.



13. Remove the screw (1) securing the clip holding the exhaust pipe, from the clip support.

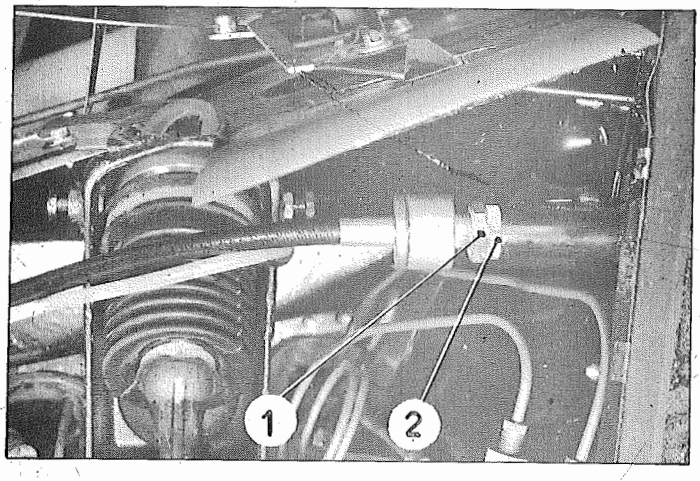


14. Remove:
    - the nuts (2) securing the driveshafts to the flanges on the gearbox outlet shafts,
    - the screws (3) securing the front engine crossmember to the body sidemembers. (Take care not to lose the adjustment packing pieces which may be found between the crossmember and the sidemember).



15. Disconnect the driveshafts (right and left-hand) from the pivots.

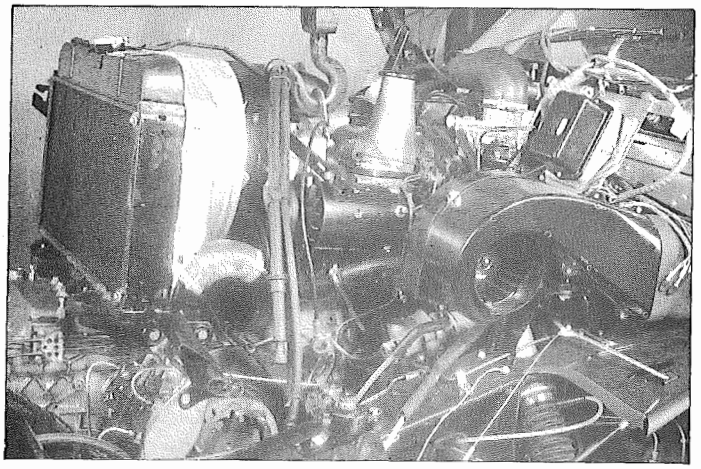
Remove the 2 countersunk head screws and withdraw the driveshafts as far as possible through the pivots and off the studs on the flanges of the gearbox outlet shafts.



16. Remove the parking brake cable :

Remove the front left-hand suspension mudshield.

Disconnect the parking brake cable from the parking brake caliper levers, after having completely unscrewed the locknut (1) and the adjusting nut (2) on the threaded sleeve.

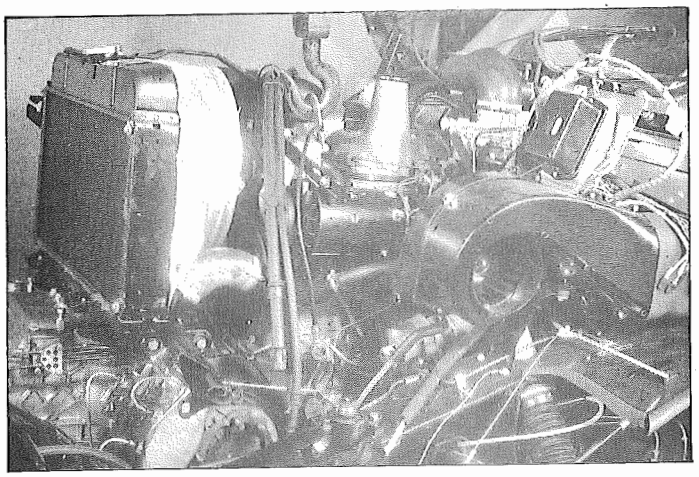


17. Remove the screws securing the rear engine mountings on the body brackets (14 mm tee-spanner with universal joint: 500 mm long).

18. Suspend the engine-gearbox assembly on its sling bracket and withdraw it.

19. Place the assembly on support 3083-T.

Place between the ground and the brake discs a rubber mat or a sheet of plywood to prevent damage to the discs.



ASSEMBLY.

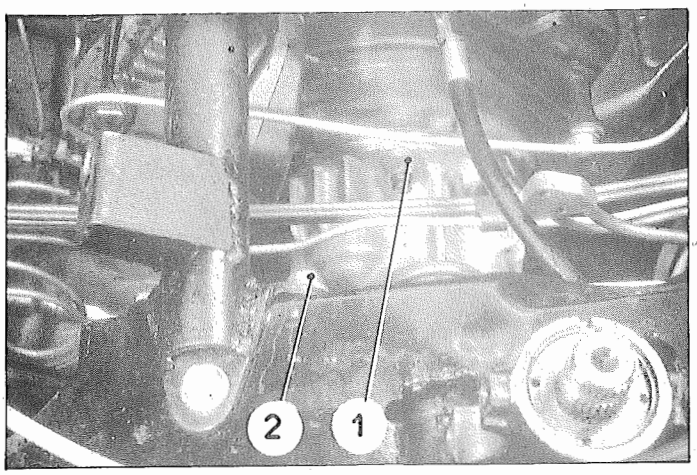
20. Adjust the engine rear suspension blocks (see Op. DX.133-0).

21. Hold the engine-gearbox assembly by its sling bracket and guide it into position on the vehicle.

Before lowering the engine down onto its mountings connect onto the pressure-regulator the return pipe to the reservoir.

Tighten the clip.

Fit the engine suspension blocks on the rear engine mountings (shakeproof washer, and thrust plates under the screw heads).



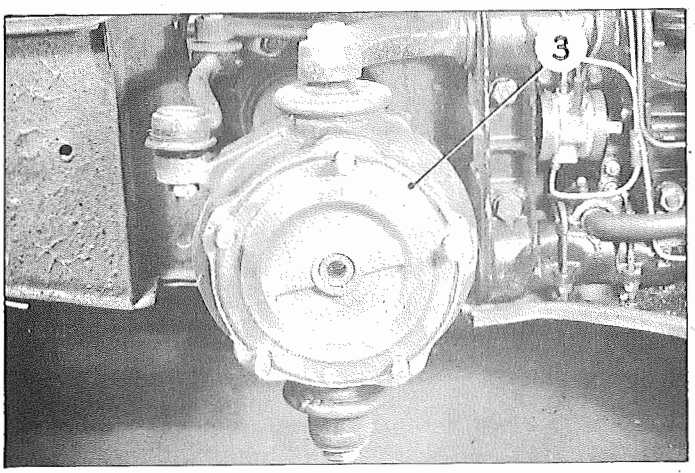
22. Couple up the front crossmember to the side-members.

Place the packing pieces found when dismantling between the front engine crossmember and the body sidemembers.

Tighten the nuts (2) (shakeproof and plain washers).

Connect the driveshafts to the driving flanges of the gearbox outlet shafts.

Replace the nuts and tighten them to 60 - 80 ft.lbs. (8.5 - 11 m.kg) (17 mm socket spanner and extension).

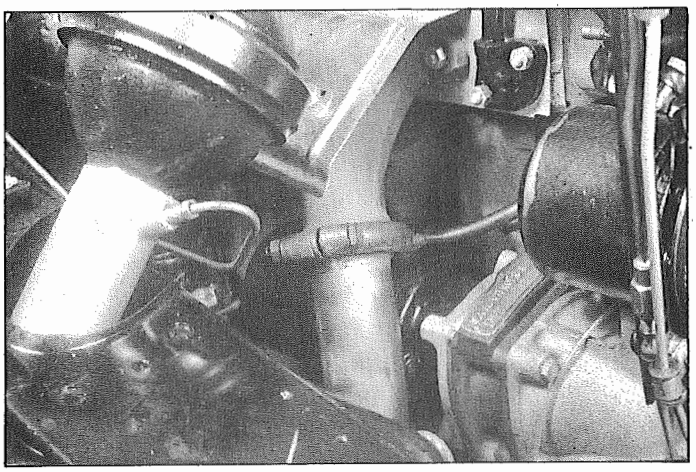


NOTE: The difference between the distances from the brake disc and sidemember, on each side, must be 80 ± 2 mm.

23. Connect the driveshafts to the pivots, right and left-hand (countersunk head screws (3)).

24. Fit the parking brake cable (see Op. DX.454-1) and adjust it (see Op. DX.454-0).

Fit the front left-hand suspension mechanism mud-shield.



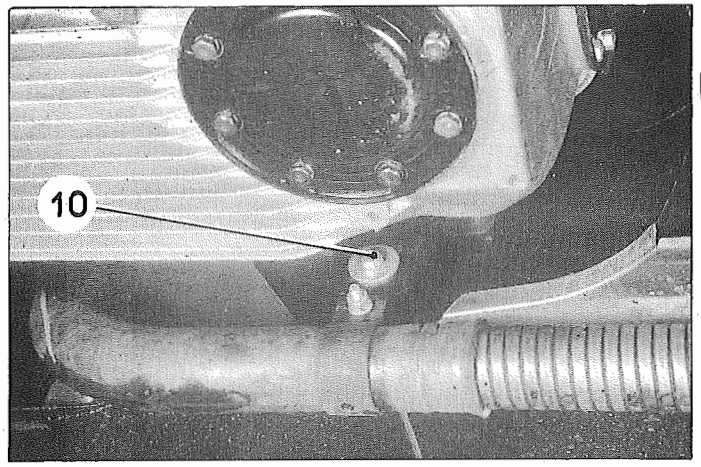
25. Connect:

The exhaust downpipe to the manifold.

Fit the securing clamps (spring washers).

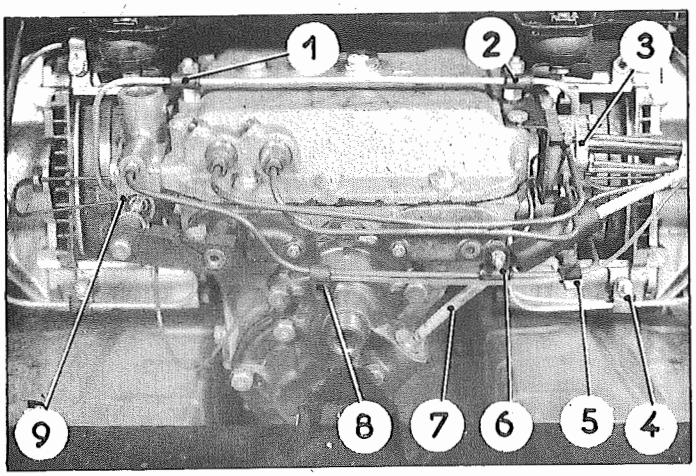
The flexible heater hose to the hot water supply pipe on the cylinder head.

Tighten the clip.



26. Fit the exhaust pipe to the clip under the engine. Tighten the screw (10) (plain and shakeproof washer).

Tighten the fixing clamp of the downpipe connection to the flexible exhaust pipe.



27. Connect:

The 5-pipe assembly (3) to the gearbox (seal plate fitted with new seals).

The feedpipe to the front right-hand brake unit, fitting the clips (1) and (2) holding the pipe.

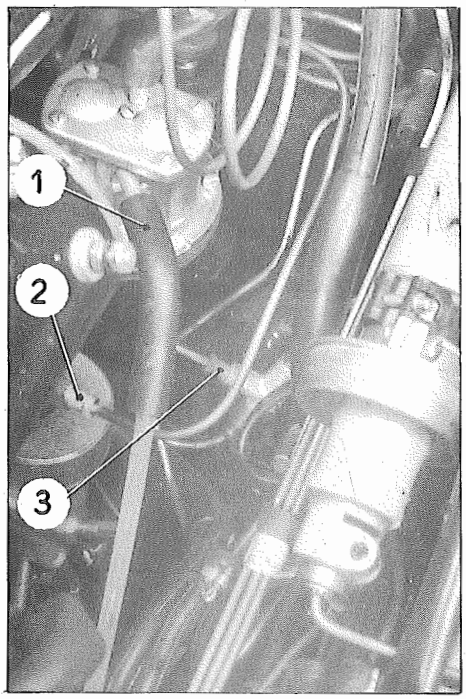
The feedpipe to the left-hand front brake unit, securing the clip (4) holding the pipe.

The connecting pipe between the clutch lock and hydraulic gear selector (9). Fit the clip (6) holding the pipe.

The overflow return pipe to the lock, fitting the rubber clips (8) and (5).

The speedometer cable (7).

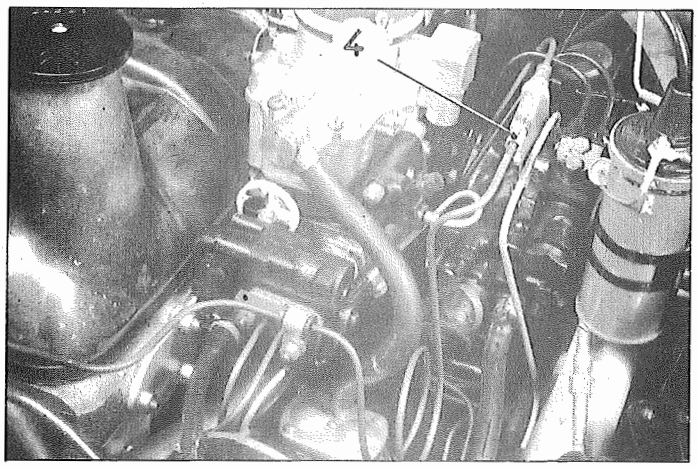
28. Hold the assembly: speedometer cable, 5-pipe assembly, brake-feed pipes, clutch-lock pipes and overflow return pipes all together with a rubber clip.



29. Connect:
    - the petrol delivery hose (1) to the petrol pump,
    - the union (2) in the pipe between the hydraulic gear selector and clutch re-engagement control,
    - the pipe (4) connecting the hydraulic gear selector to the centrifugal regulator,
    - the pressure regulator outlet pipe (3) to the 3-way union underneath the hydraulic gear selector,
    - the choke control to the carburettor.

30. Fit the accelerator control relay into its rear bearer.

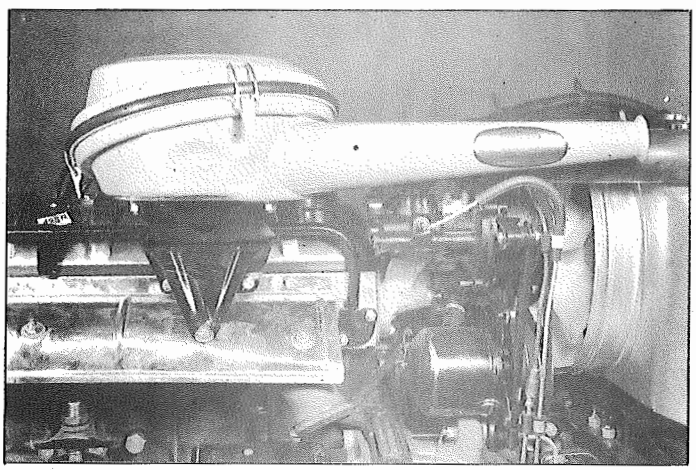
Connect the relay to the carburettor.



31. Connect the rubber heater pipe to the left-hand heater unit.

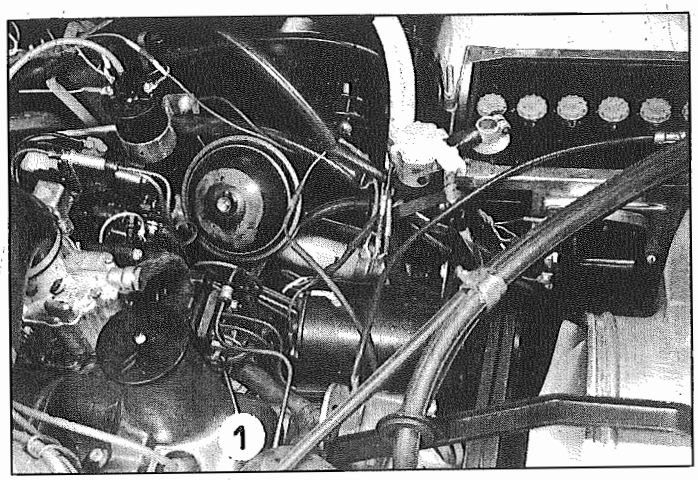
32. Fit the front left-hand suspension sphere.

33. Fit the steering unit (see Op. DX.442-1).



34. Fit the air filter.

Fit the rubber union between filter and rocker cover and connect the rubber elbow between the carburettor and air filter.



35. Fit the battery cradle and the hydraulic fluid reservoir.

Connect:

- the return pipes, and the feedpipe for the high pressure pump, to the reservoir and tighten the clips.

36. Connect the return pipe (1) to the clutch re-engagement control and tighten the clip.

37. Fit the battery and its tray,

- the battery top frame.

38. Connect the leads:

- to the dynamo,
- to the distributor (L.T. and H.T.),
- to the thermometer transmitter.

Connect the cables to the battery terminals.

39. Fit the front wheels and lower the car to the ground.

40. Adjust the ignition setting if necessary (see Op. DX.211-0).

41. Fill up the radiator and cylinder block.

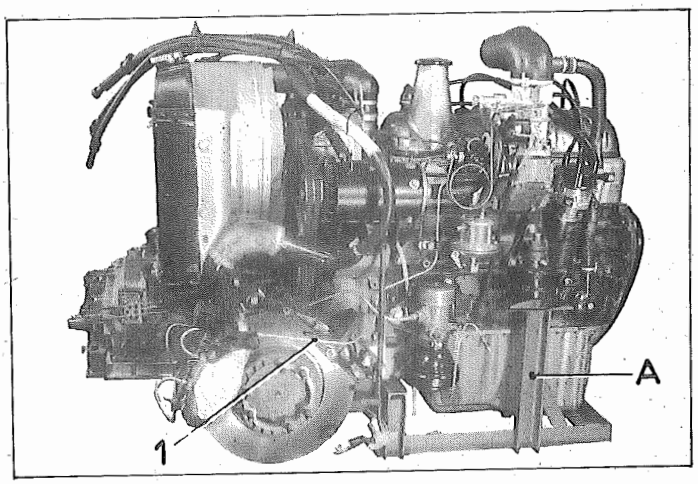
Open the heater valve, start up the engine and top up the water level if necessary after a few minutes running.

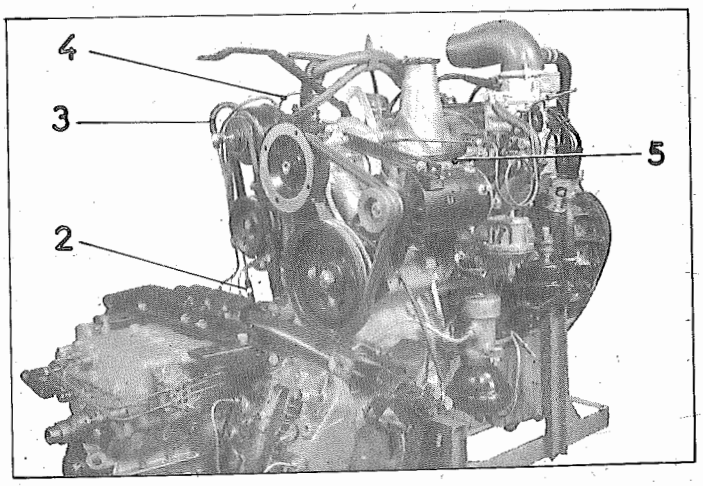
42. Bleed the brake and clutch circuits. (See Op. DX.453-0).

43. Adjust the idling (see Op. DX.142-0).

44. Fit the wings, connect up the wiring and fit the wheel embellishers.

45. Fit the inlet duct on the radiator, with the sparewheel crossmember. Fit the sparewheel.





STRIPPING AND ASSEMBLING FOR REPLACEMENT OF THE ENGINE.

Stripping.

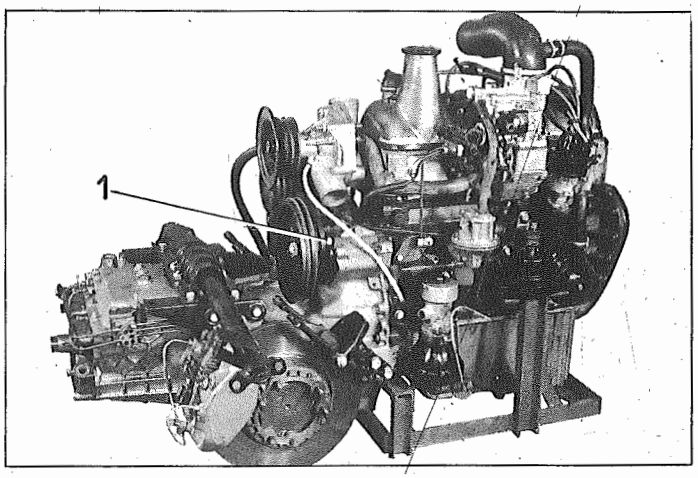
1. Place the engine-gearbox assembly on stand (A) 3083-T.

2. Disconnect:
   - the radiator tie-rod from the radiator,
   - the radiator hoses from the water pump.

3. Remove:
   - the radiator,
   - the fan,
   - the pipe (1) connecting the left-hand brake unit to the accelerated idling control,
   - the starter motor cable.

4. Remove:
   - the radiator tie-rod, the sling hook and the earth cable,
   - the belts from the dynamo,
   - the dynamo and the dynamo tie-rod,
   - the feedpipe assembly (4) from the centrifugal regulator, and the return pipe,
   - the connecting pipe (3) between the right-hand brake unit and the centrifugal regulator,
   - the connecting pipe (2) between the clutch lock and the centrifugal regulator,
   - the centrifugal regulator and the regulator tie-rod (do not lose the packing pieces for alignment adjustment),
   - the connecting pipe between the high pressure pump and high pressure regulator.

5. Disconnect:
   - the pipe (5) from the clutch cylinder,
   - the high pressure pump tie-rod from the water pump.



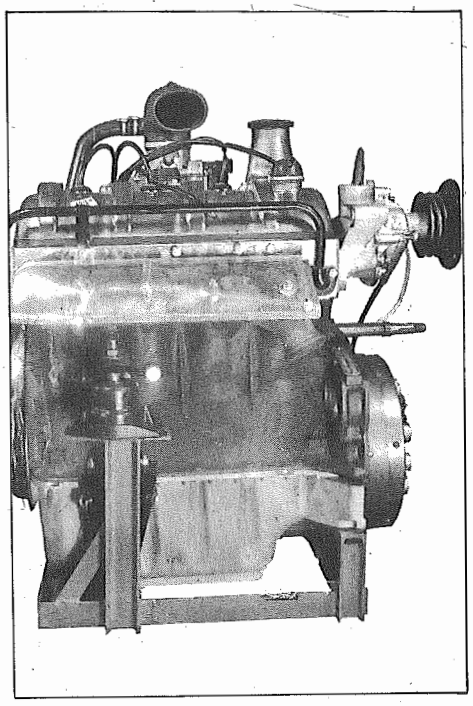
6. Removing the drive pulley:

With a chisel remove the metal of the nut turned down into the shaft for locking purposes.

Free the drive pulley. Do not lose the adjusting washers.

7. Remove:

- the mechanical brake calipers,
- the housing (1) for the camshaft front bearing (spanner 2431-T),
- the screws securing the gearbox to the engine (spanners 2431-T and 1677-T),
- the starter motor.



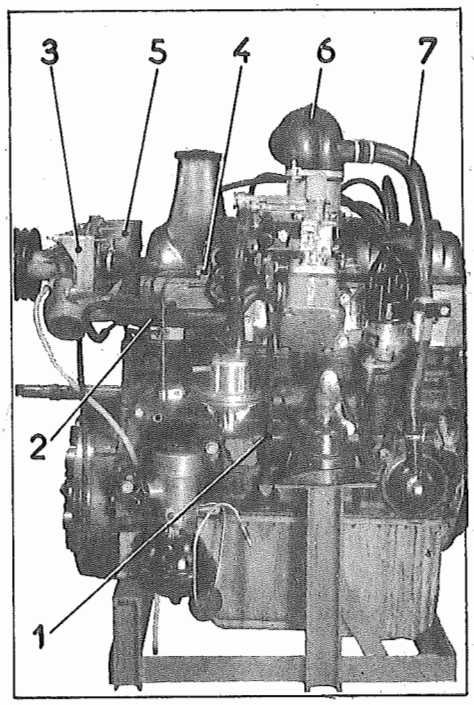
8. Disconnect the gearbox from the engine.

NOTE: The gearbox must not on any account be moved about by rolling it with the brake discs on the ground. Fit old worn discs or dummy discs machined to 350 mm diameter. If these are not available, place a rubber mat or a sheet of plywood between the ground and the gearbox.

Insert washers between the nuts and the disc to ensure tightening.

9. Remove:

- the heat shield from the exhaust manifold,
- the exhaust manifold,
- the heater tube,
- the bracket for the exhaust downpipe.

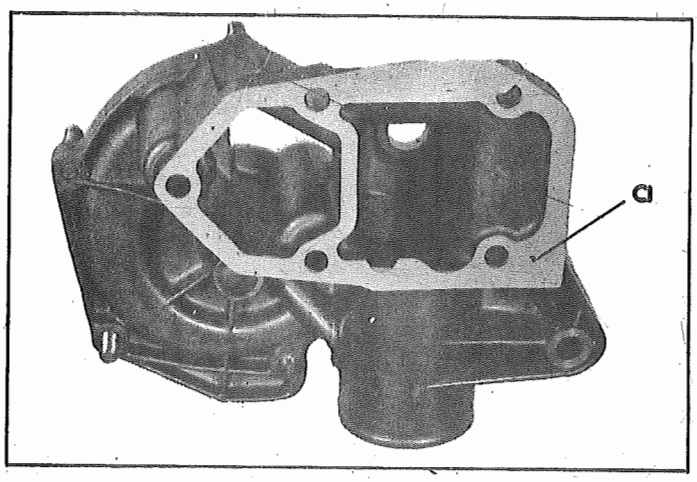


12. Drain the engine.

13. Free the gearbox locating dowels from the engine.

ASSEMBLY.

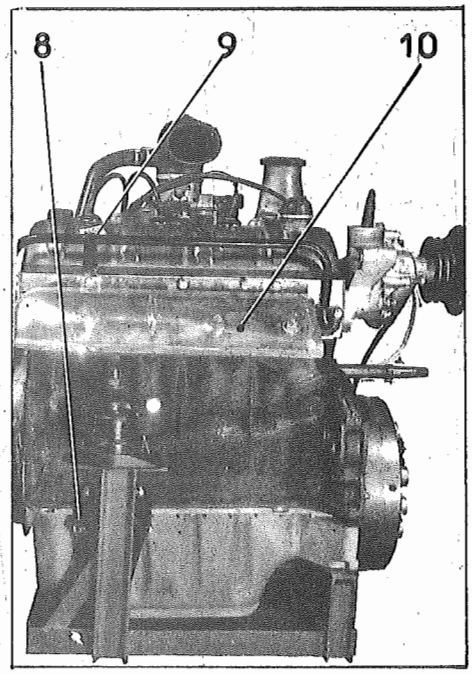
14. Fit the engine mounting arms together with the rubber mountings.



10. Disconnect the flexible heater pipe (2) from the carburettor mounting block.

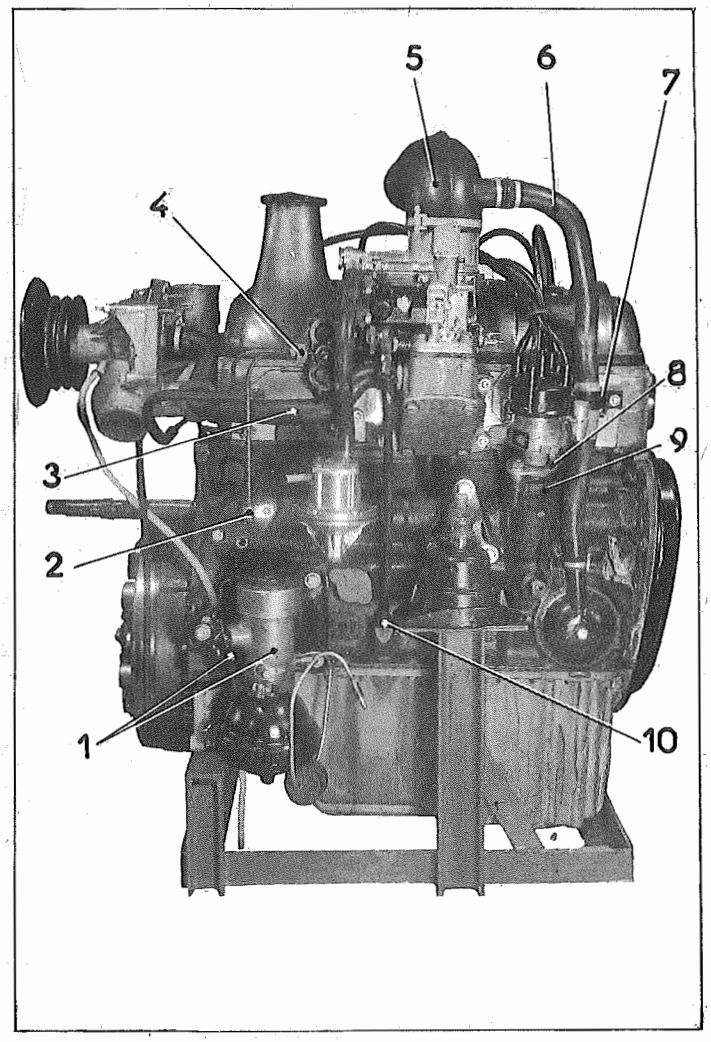
11. Remove:
- the water pump (3),
- the water pump cover (5),
- the assembly of rubber elbow (6) from the air filter with the flexible pipe (7) connecting the air filter elbow to the breather,
- disconnect the petrol delivery hose from the carburettor:
- the petrol pump (withdraw the insulation distance piece and the push-rod,
- the distributor and its housing,
- the hydraulic pipe assembly (4) for the clutch re-engagement control,
- the clutch re-engagement control together with its bracket,
- the assembly of carburettor and mounting block,
- the assembly of pressure-regulator and its bracket.

Place the engine on a wooden cradle and remove:
- the plugs (spanner 1603-T),
- the engine mounting arms together with the rubber mountings,
- the oil dipstick.



15. Fit:
- the securing bracket for the exhaust down-pipe (8).

Place the engine on support 3083-T and fit:
- the exhaust manifold, inserting the gaskets (swaged-over edges facing manifold),
- the heater tube (9) with a gasket,
- the exhaust shield (10),
- the water pump cover, inserting the gasket, (note the position for fitting, i.e. the corner "a" of the gasket),
- the water pump, inserting the gasket.



16. Fit the carburettor with its mounting block, inserting the gasket. Tighten the nuts progressively (plain washers).

17. Fit the assembly of clutch re-engagement control with its bracket, inserting the connecting nylon ring between the carburettor and the control.
Adjust the alignment of the re-engagement control. (See Op. DY.314-1).

18. Connect the flexible hot-spot pipe (3) to the carburettor mounting block, and tighten the clip.
Fit the rubber elbow (5), for the air filter, and connect the flexible pipe (6) from the air filter elbow onto the breather. Tighten the clips.

19. Fit the petrol pump (see Op. DX.173-1). Connect the petrol feedpipe to the carburettor.

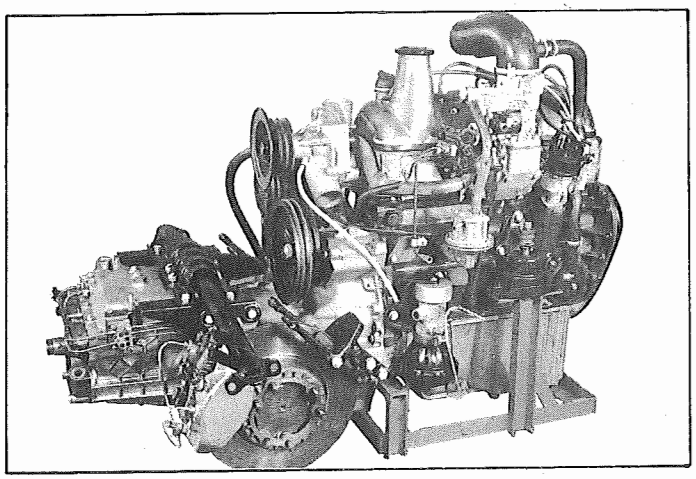
20. Fit the assembly of the pressure regulator (1) with its bracket (plain washers).

21. Fit the distributor:
- Position the housing (9) and the plate (8) holding the distributor. Fit the nuts without tightening them (plain and shakeproof washers).
- Fit the distributor (see Op. DY.211-1). Run the distributor earth lead behind the pipe (6) and fix the terminal on the securing stud of the clip (7). Fit the clip (7) and tighten the nut.

22. Fit:
- the sparking plugs (spanner 1603-T),
- the guide tube for the dipstick.

NOTE: Position the dipstick guide tube. It is curved, place it so that it curves outwards and at right-angles to the engine. Then turn it between 15° and 20° towards the front of the engine. This ensures clearance between the guide tube and the gear selector, after having fitted the engine on the vehicle.
Insert a rubber gasket under the union (10) and fit the dipstick.

23. Fit the pipe assembly (4) for the clutch re-engagement control (inserting a seal plate with new seals).
Fit the securing clip (2) for the pipe assembly on the engine.



24. Couple the gearbox to the engine.

Place the centring dowels with their circlips on the engine.
Engage the gearbox, turning the main shaft with the starting handle socket.
Fit the starter motor. Tighten the screws securing the gearbox on the engine (spanner 2431-T).
The gearbox is secured to the sump by 2 screws with flats (spanner 1677-T).

25. Fit the bearing housing for the camshaft (spanner 2431-T).
Fit the drive pulley together with the high pressure pump belts. (Insert adjusting washers found when dismantling).

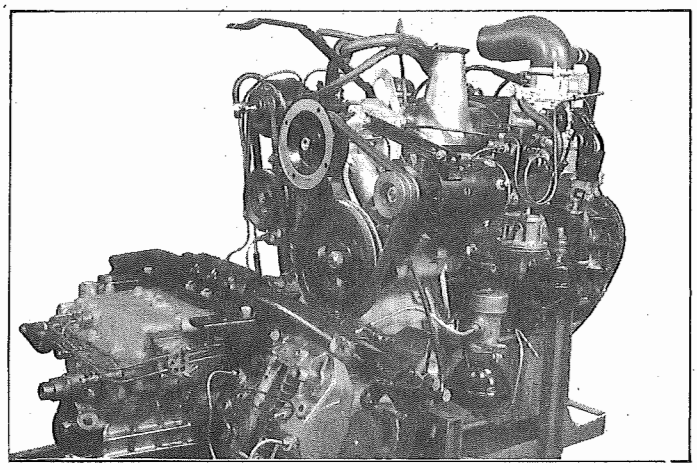
26. Check the alignment of the pulley (see Op. DX. 231-0). Tighten the nut to 54 ft.lbs. (7.5 m.kg) and knock over the metal of the nut into the groove of the shaft.

27. Connect the feedpipe to the clutch cylinder.

28. Fit the tube connecting the high pressure pump to the pressure regulator. Fit the clip securing the tube to the stem of the ball-peg for the clutch fork (shakeproof washer).

29. Connect the tie-rod between the high pressure pump and the water pump (shakeproof and plain washers).

30. Check the alignment of the high pressure pump (see Op. DX.231-0).



31. Tension the high pressure pump belts.

32. Fit the centrifugal regulator, inserting the adjusting shims found when dismantling.
Check the alignment of the regulator (see Op. DX.231-0).
Fit the regulator belt, the tie-rod (shakeproof and plate washer).
Tension the belt.

33. Fit the brake discs.

It is essential *that the maximum run-out of the disc, measured at the largest diameter, shall not exceed 0.15 mm.*

Proceed as per paragraph 63 of this operation.

34. Fit the parking brake calipers.
Adjust the clearance between calipers and brake discs (see Op. DX.454-1).
Tighten the screws to 72 - 80 ft.lbs. (10 - 11 m.kg).

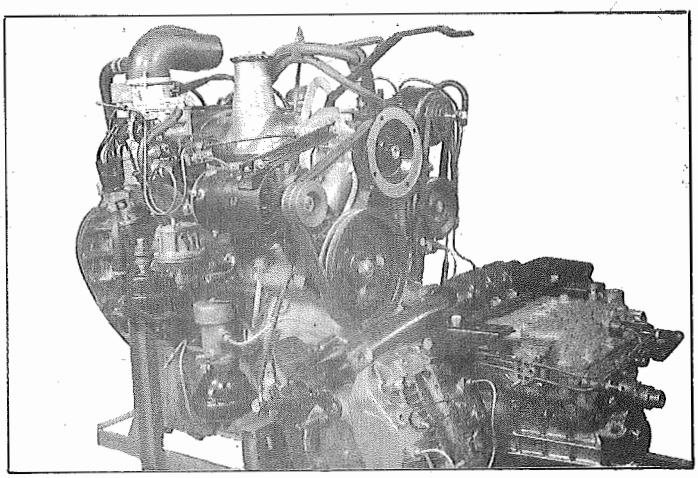
35. Fit the dynamo.

Connect the dynamo tie-rod to the water pump.

Check the alignment of the dynamo (see Op. DX.231 -0). Fit the dynamo belts.

Tension the belts.

36. Fit the starter motor cable.
Tighten the nut.



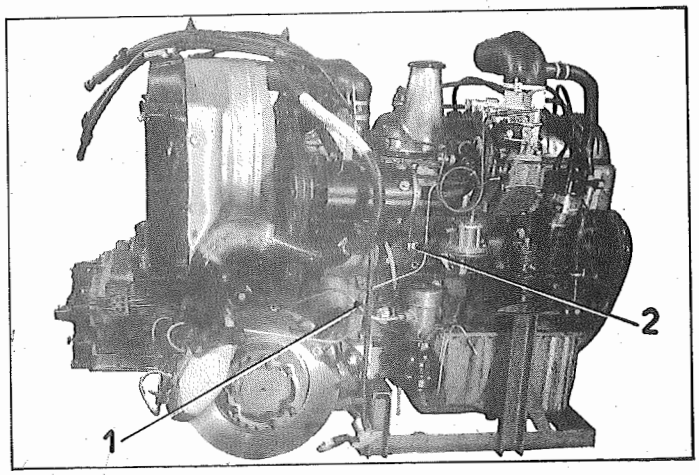
37. Fit the feedpipe assembly for the centrifugal regulator, inserting a seal plate fitted with new seals. Tighten the nuts (shakeproof washers).
Connect the pipe assembly to the clutch lock pipe.
Fit the clips holding the pipe assembly on the clutch re-engagement control and on the regulator tie-rod.

38. Fit the pipe connecting the right-hand brake unit to the centrifugal regulator.

Fit the clips securing the pipe on the right-hand brake unit and on the regulator tie-rod (shake-proof washers).

39. Fit the radiator tie-rod, the earth cable and the sling hook on the water pump.

40. Fit the pipe connecting the accelerated idling control to the left-hand brake unit.
Fit the clip securing the pipe at (1) and (2).



41. Fit the fan and tighten the screws progressively.

42. Fit the radiator and centre it.
Fit the radiator tie-rod to the radiator.
Fit the rubber radiator hoses, upper and lower, to the water pump.

43. Pass the suction pipe for the high pressure pump through the bracket on the radiator tie-rod.

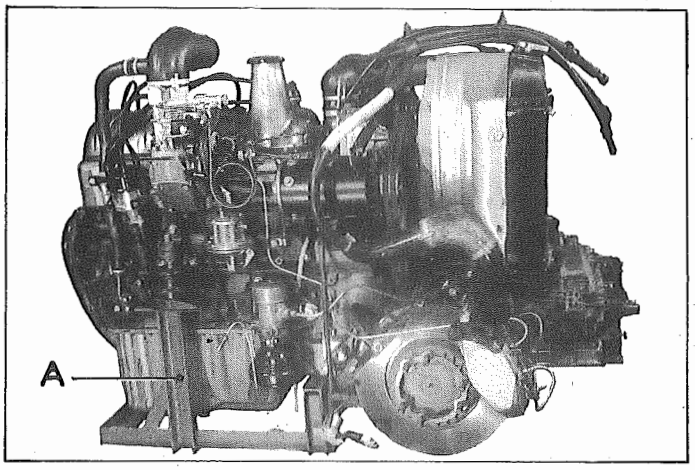
44. Secure the group of return pipes with rubber clips.

45. Fill up the engine with oil, 9 pints (5 litres) of SAE 10 W 30 oil.

46. Adjust the engine suspension blocks (see Op. DX.133-0).

STRIPPING AND ASSEMBLING (FOR REPLACEMENT OF THE GEARBOX).

Stripping.



47. Place the engine-gearbox assembly on a stand (A) 3803-T.

Disconnect:

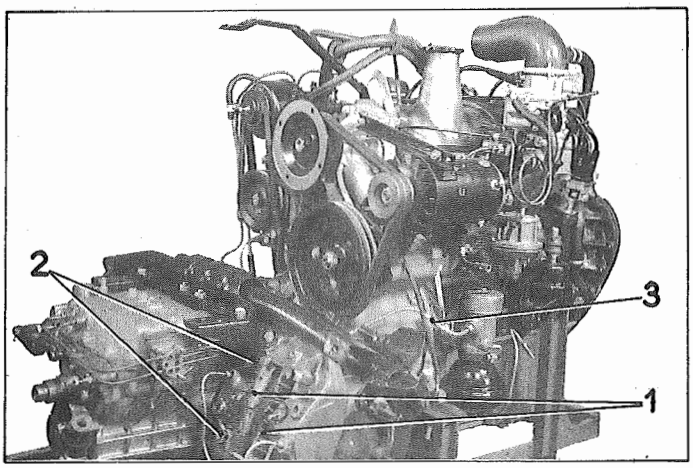
- the radiator tie-rod from the radiator,
- the suction and delivery hoses from the water pump.

48. Remove:

- the radiator,
- the fan,
- the pipe between the left-hand brake unit and the accelerated idling control,
- the starter motor cable.

49. Remove:

- the pipe between the right-hand brake unit and the centrifugal regulator,
- the pipe between the regulator and the clutch lock,
- the dynamo tie-rod and the dynamo,
- the brake pads (1),
- the screws (2) securing the hydraulic brake units to the gearbox outlet housings.



50. Disconnect the crossmember from the right-hand brake unit and remove the latter.

Remove the crossmember together with the left-hand unit.

51. Remove:

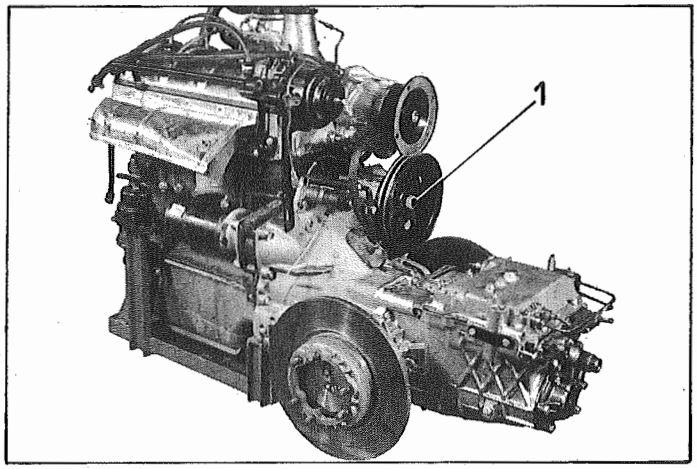
- the parking brake calipers,
- the connecting pipe (3) between the high pressure pump and the pressure-regulator.

52. Disconnect:

- the regulator tie-rod from the high pressure pump.

Remove:

- the high pressure pump (do not lose the alignment adjusting washers).



53. Remove the drive pulley.

Use a chisel to remove the metal of the nut turned down into the slot in the shaft for locking purposes (1).

Remove:

- the washers for adjusting the pulley alignment,
- the return spring for the clutch cylinder,
- the high pressure pump belts,
- the brake discs.

54. Disconnect the hydraulic pipe from the clutch cylinder.

55. Remove:

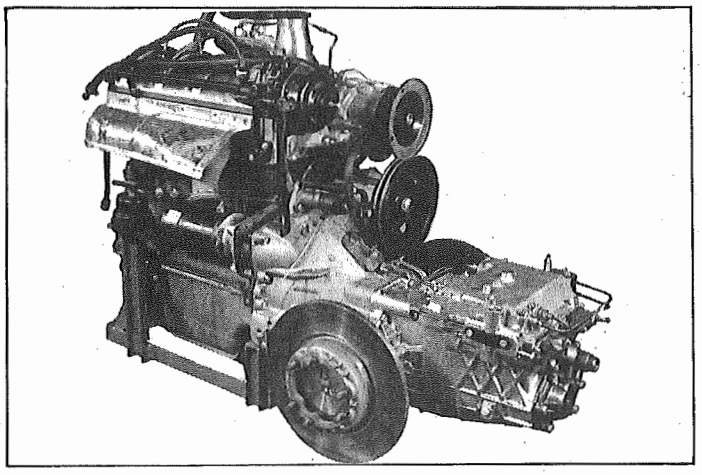
- the bearing housing for the camshaft forward end,
- the clutch cylinder, -
- the screws securing the gearbox on the engine,
- the starter motor (spanners 2431-T and 1677-T).

56. Disconnect the gearbox from the engine.

Remove the screws securing the gearbox (spanner 2431-T).

57. Free the gearbox.

NOTE: The gearbox must not on any account be moved about by rolling it with the brake discs on the ground. Fit old worn discs or dummy discs machined to 350 mm diameter. If these are not available place a rubber mat or a sheet of plywood between the ground and the gearbox. Insert washers between the nuts and the discs to ensure tightening.



ASSEMBLY.

58. Fit the clutch lock with its control lever (see Op. DX.314-1).

59. Connect the gearbox to the engine:

a) Make quite sure that the dowels for centring the gearbox are correctly entered in the holes in the cylinder block.

b) Offer up the gearbox. Turn the mainshaft using the starting handle dog, pushing the gearbox meanwhile, to facilitate entry into the splines.

c) Tighten the screws securing the gearbox to the engine, (spanner 2431-T).
The gearbox is secured to the sump by two screws with flats (spanner 1677-T).

d) Fit the starter motor.

60. Fit:

- the bearing housing for the camshaft,
- the clutch cylinder (spanner 2431-T).

61. Connect the feedpipe to the clutch cylinder.

Fit the belts to the high pressure pump.

Fit the clutch cylinder control rod in the bore of the adjusting screw and in the clutch cylinder.

Fit the return spring for the clutch fork.

62. Fit the drive pulley.

Insert the alignment adjusting washers found on dismantling.

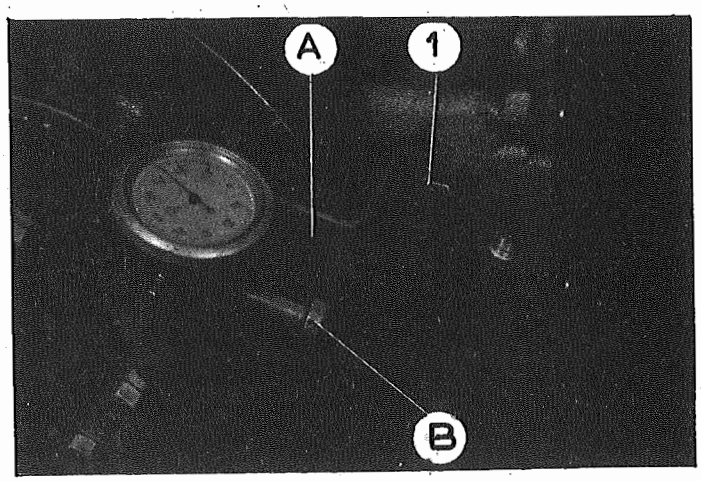
Tighten the nut to 54 ft.lbs. (7.5 m.kg).

Knock over the metal of the nut into the slot in the shaft for locking purposes.

63. Fit the brake discs.

It is essential *that the maximum run-out of the disc measured at the largest diameter shall not exceed 0.15 mm.*

a) Insert washers and distance pieces between the nuts and the discs to ensure thorough tightening of the latter on the differential shaft flanges.



IMPORTANT: If there is a yellow mark on the gearbox driveshaft flange and on the disc, these two marks must be as close to each other as possible when assembled.

b) Fit a dial gauge (2437-T) on a support (A) (MR.3365-250) using the screw (B). (This screw forms part of tool 2041-T).

Hold the bracket (A) on the clutch bell-housing by the upper screw securing the mechanical brake caliper.

c) Position the stem of the dial gauge on the largest diameter of the face of the disc. Tighten the screw (1) of the support (A).

d) Turn the disc, when the maximum run-out read on the dial gauge must not exceed 0.15 mm.

e) If it does exceed this amount, remove the disc, turn it through one third of a turn in a clockwise direction and replace it.

f) Measure again the run-out.

If it is greater than 0.15 mm, turn the disc another one third of a turn, still in a clockwise direction, and check again.

g) If the run-out is still greater than 0.15 mm, it will be necessary to change the disc.

h) Check the run-out on the new disc as indicated in lines d) to f) above.

i) If in the three possible positions the run-out of the new disc is still greater than 0.15 mm then it will be necessary to change the differential shaft (see Op. DX.330-4, paras. 7 and following).

64. Fit the high pressure pump.

Insert the adjusting washers found when dismantling.

Check the alignment of the pulley (see Op. DX. 231-0).

Connect the regulator tie-rod to the high pressure pump. (Shakeproof washer and plate).

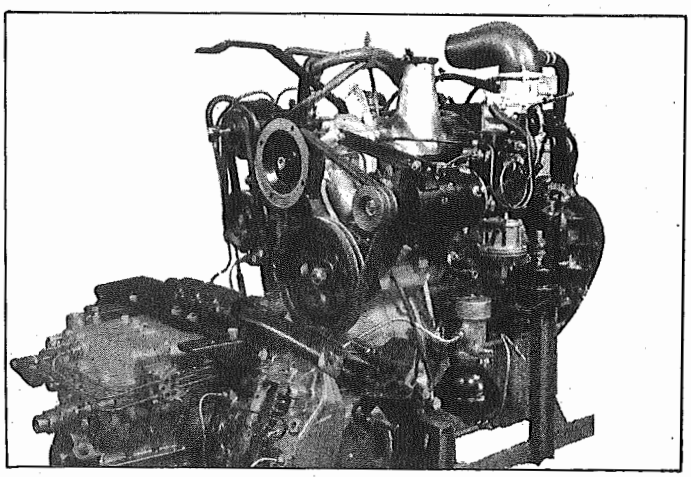
65. Fit the dynamo.

Check the alignment of the pulley (see Op. DX. 231-0).

66. Fit and tension the belts (see Op. DX.231-0).

67. Fit:

- the connecting pipe between the high pressure pump and the pressure regulator,
- the parking brake calipers,
- adjust the clearance between the calipers and the brake discs (see Op. DX.454-1),
- tighten the screws to 72 - 80 ft.lbs. (10 - 11 m.kg).



68. Fit the crossmember with the left-hand brake unit, and the right-hand brake unit.

Connect the crossmember to the right-hand brake unit (plain and shakeproof washers).

Fit the screws securing the brake units on the housings of the gearbox driveshaft. Insert the screws without tightening them.

69. Fit:

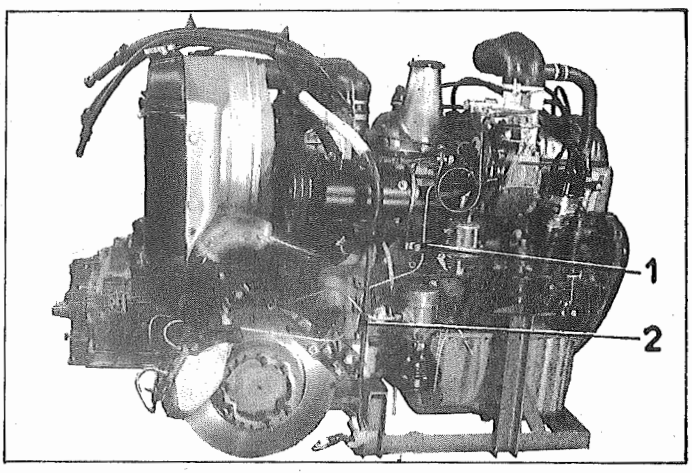
- the hydraulic brake pads.

Fit:

- the spring wire clips,
- the connecting tube between clutch lock and centrifugal regulator,
- the connecting tube between the right-hand brake unit and the centrifugal regulator,
- the clips supporting the tubes on the regulator tie-rod and on the right-hand brake unit (shakeproof washers).

70. Fit:

- the fan, tightening the screws progressively from 6.5 to 7.2 ft.lbs. (0.9 to 1 m.kg),
- the connecting pipe between the left-hand brake unit and the accelerated idling control,
- the clip securing the pipe (1) and (2),
- the starter motor cable.



71. Fit the radiator and centre it.

Connect:

- the suction and delivery hoses to the water pump,
- the tie-rod to the radiator.

72. Fill up the gearbox with oil, $3\frac{1}{2}$ pints (2 litres) of SAE 90 EP oil.

DISMANTLING.

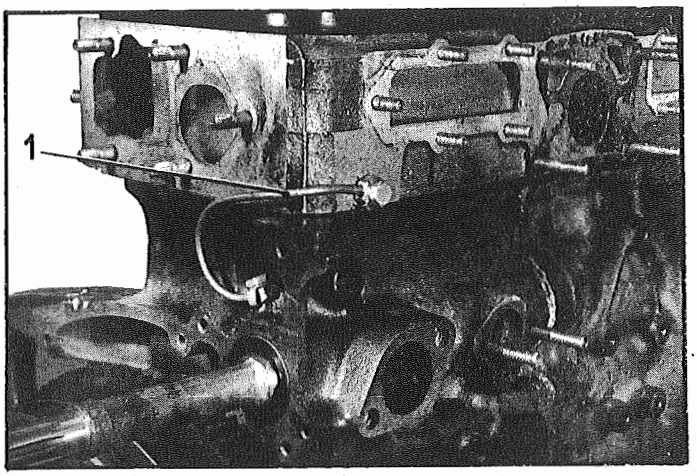
1. Drain the engine.

Mark the position of the clutch mechanism on the engine flywheel.

Remove:

- the clutch mechanism,
- the engine flywheel.

2. Remove the water pump and cover (see Op. DX.231-1), the breather and its gasket.

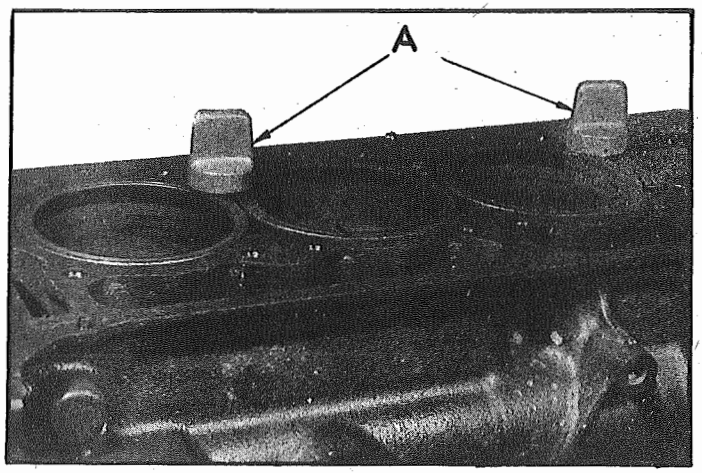


3. Remove the cylinder head.

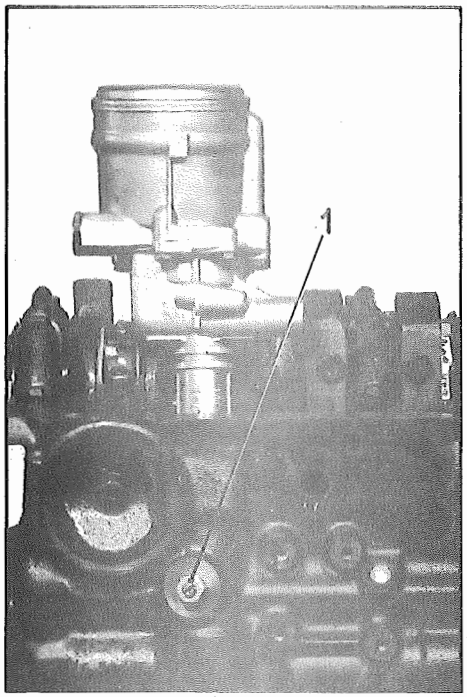
Remove:

- the lubrication pipe (1) for the valve rocker units,
- the valve rocker cover and its gasket,
- the sealing rings for the sparking plug wells, and the washers,
- the exhaust rocker assemblies,
- the inlet rocker line (leave the screws in position to avoid separating the pieces),
- the cylinder head screws,
- the rocker pushrods (mark their position),
- the cylinder head and its gasket.

NOTE: As the cylinder head is aluminium, do not remove the studs unless they are damaged or worn.



Clamp down the cylinder barrels with securing screws 3074-T.



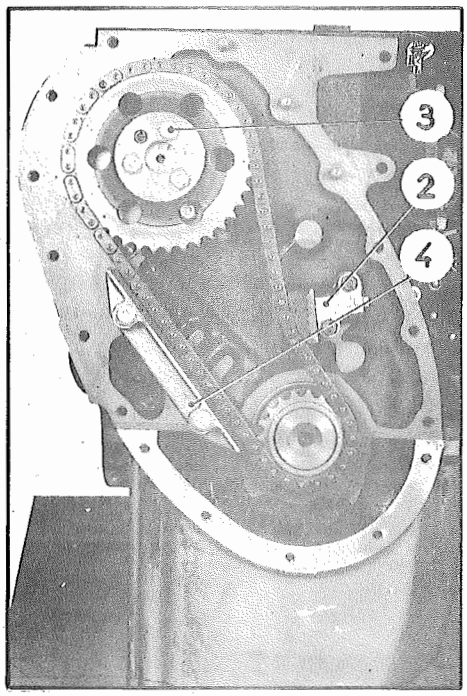
4. Remove the timing case.

5. Remove the engine sump and oil pump.

Remove:

- the sump,
- the pointed screw (1) holding the oil pump,
- the securing screw for the oil pump body on No. 3 main bearing.

Free the oil pump from its housing.



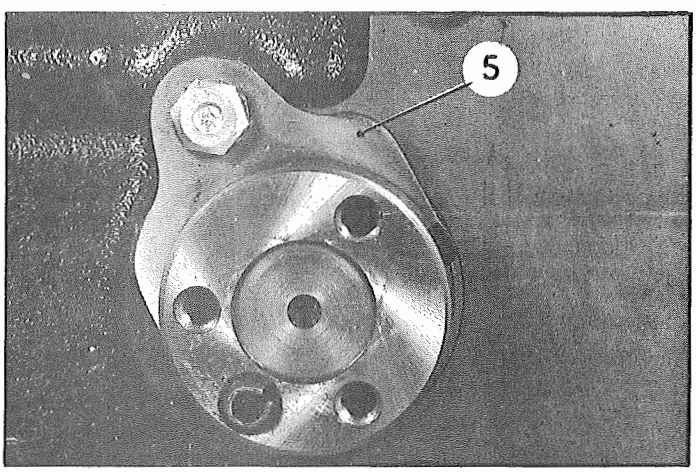
6. Remove the camshaft.

Withdraw the tappets from their housings (mark their positions).

Remove:

- the chain guide (4),
- the chain tensioner (2) (take care not to let the components fly apart).

Withdraw the camshaft pinion (3) and chain.

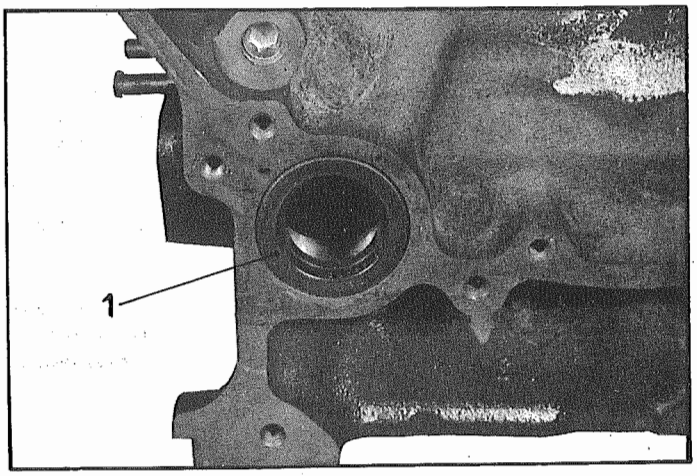


Remove:

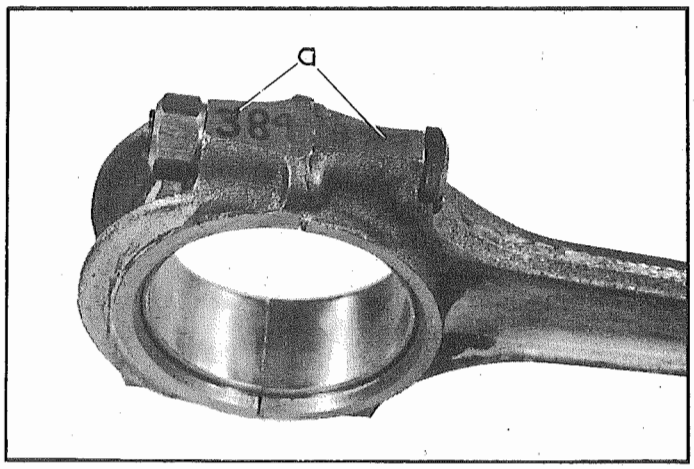
- the securing fork (5) for the camshaft.

Withdraw the camshaft from the rear of the engine (timing gear end).

Place the engine upside down with the crankcase top face resting on two wooden blocks (about 2" thick).



7. Remove the sealing ring (1).



8. <u>Remove the assemblies of connecting rods - pistons - barrels.</u>

NOTE: The connecting rod and connecting rod cap are numbered at "a" (the same number on both parts). When the connecting rods are fitted to the engine this number is to be facing towards the camshaft.

Before dismantling mark the connecting rods with a centre punch or figures, showing the order of assembly in the engine. Commence the marking with No. 1 connecting rod at the clutch end.

If the bearings or pistons and barrels are to be used again it is absolutely essential to fit them in the same place they occupied before dismantling. The barrels must be fitted so that they are in the same relative positions to the pistons as they were before dismantling.

a) Remove:

- the connecting rod caps,
- the screws 3074-T holding the barrels in place.

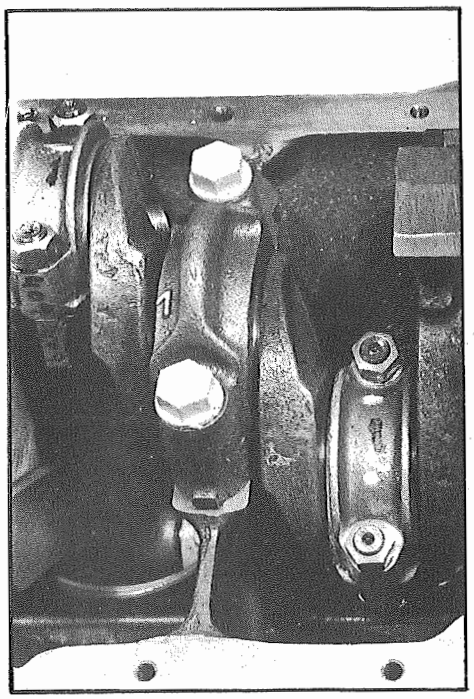
Withdraw the assemblies of connecting rods - pistons - barrels and gaskets.

Remove the bearings.

b) Remove the pistons from the connecting rods.

Extract one of the circlips holding the gudgeon pin and remove this by hand.

c) Remove the piston rings (using a pair of piston ring pliers).

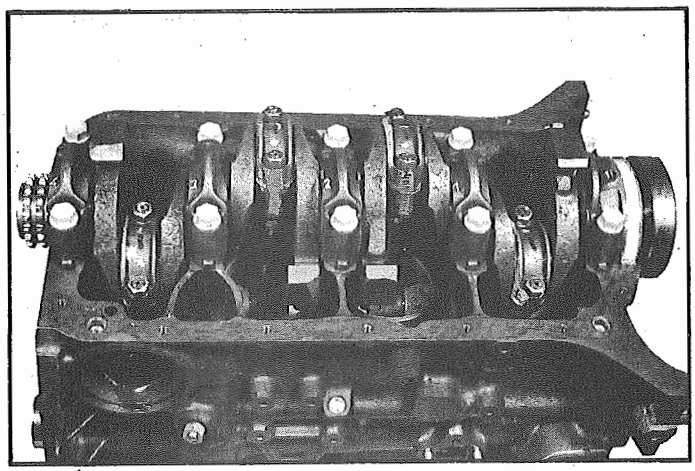


9. Remove the crankshaft.

NOTE: The crankshaft bearing caps are marked with a figure except the cap at the flywheel end which is not marked. Number 4 bearing cap is fitted at the timing gear end.

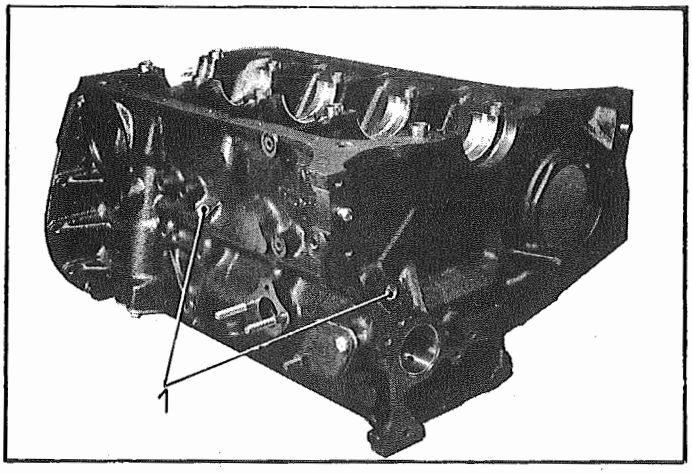
After fitting the bearing caps, the figures must be towards the camshaft.

If the crankshaft shell bearings are to be used again, mark them so that they can be returned to the same positions they occupied before dismantling.



Remove:

- the bearing caps,
- the bearings, and the half thrust rings on the central bearing (No. 2),
- the crankshaft,
- the upper bearings and the other two half thrust rings.



PREPARATION OF THE COMPONENTS.

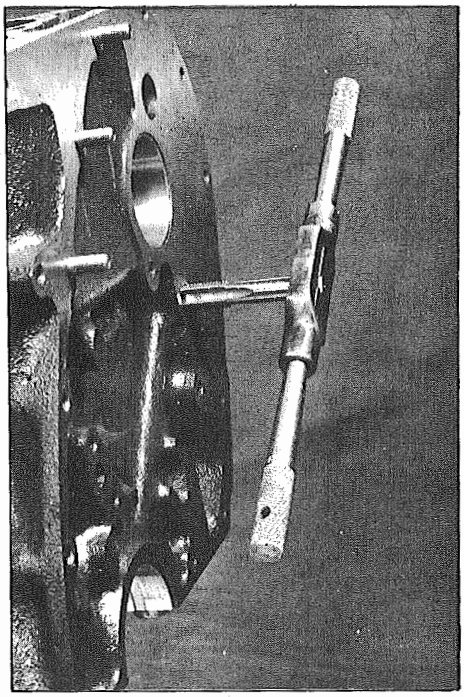
10. Preparing the cylinder head (see Op. DX.112-3).

11. Preparing the cylinder block.

a) Remove the closing plates and the drain plug.

b) Remove the three oil-way plugs.

NOTE: Since December 1965 the aluminium plug (1) has been replaced by a steel plug with hexagonal head, the seal on the housing being obtained with a copper washer. The cylinder block must be spot-faced round the tapped hole, otherwise only an aluminium plug may be fitted.



Remove the aluminium plugs (2) drilling first with a 6 mm drill and then with a 12 mm drill.

Remove the remaining metal from the first few threads of the plugs using a scriber. Tap out 14 mm x 150, which will remove the remains of the plugs.

Carefully eliminate the swarf which may have fallen into the oil passages.

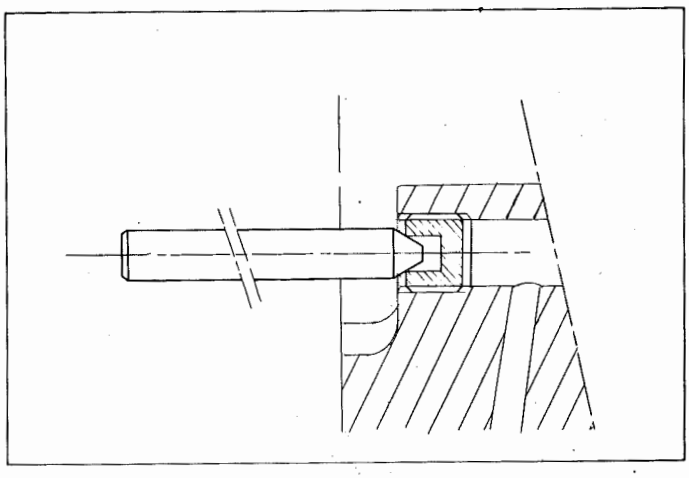
c) Clean the cylinder block and oil passages.

d) Check the seating surfaces for the gaskets (barrels, cylinder head, sump and timing case).

e) Fit two new aluminium plugs (2), screw them in until they are about 1 mm below the joint face.

Expand the plugs using a conical punch MR.3436-200.

Do this progressively to avoid splitting the cylinder block.



Tighten the steel plug (1) with its gasket.

f) Fit the closing plates. Fit new gaskets each time the plates are removed.

Tighten the drain plug in the cylinder block to 25 ± 3.5 ft.lbs. (3.5 ± 0.5 m.kg).

Make sure that the dowels are in position in the cylinder block top face.

g) Stand the cylinder block upside down, resting on the cylinder head joint face.

Fit the crankshaft bearings in the cylinder block and in the bearing caps, but do not fit the latter yet. Pay attention to the markings made when dismantling.

12. Prepare the crankshaft.

Clean the crankshaft and in particular the oil passages.

NOTE:

1) If absolutely necessary a better surface finish to the bearings may be obtained by using fine emery cloth.

The maximum clearances are:

on the crankshaft main bearings : 0.06 mm
on the connecting rod bearings : 0.06 mm.

2) We strongly advise standard exchange assemblies. They are sold by our Spare Parts Service ready for fitting, without retouching.

3) The crankshaft pinion cannot be replaced.

4) The crankshaft bearings may be of the following dimensions:
the crankshaft main bearings : 64.04 mm or 63.54 mm dia.
the big-end crank pins : 54 mm or 53.5 mm dia.

5) It is possible to replace the connecting rod and crankshaft bearings separately.

IMPORTANT: If the bearing cap faces have been filed by unscrupulous operators, the diameters of the bores in the crankcase must be checked.

Fit the bearing caps (without the bearings) to the crankcase and tighten the screws to 72 ft.lbs. (10 m.kg).

Compare the diameters "a" (dial gauge) and "b", on each side of each cap. Make sure that these are identical. If not, the bearing faces of the cap must be filed or machined.

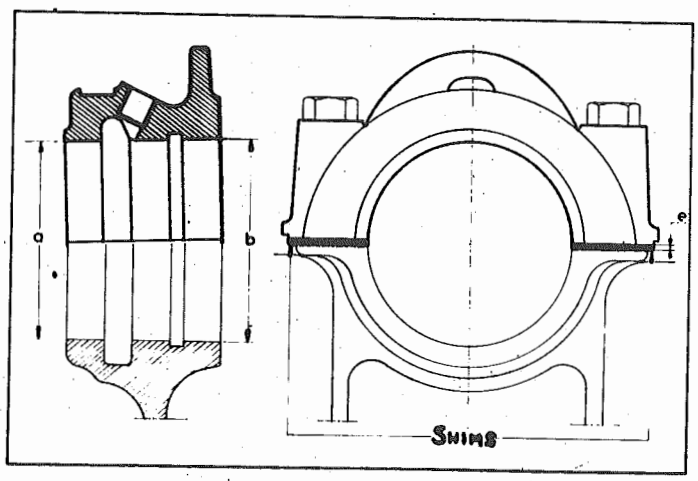
The difference between "a" and "b" must not be greater than 0.01 mm.

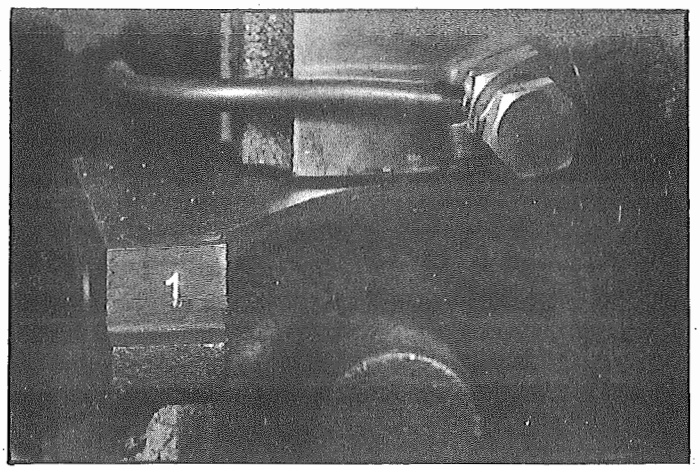
Again measure the diameter "a" and note by how much it differs from the original size (68.7 ± 0.005 mm).

This difference represents the thickness "c" of shims to be placed between the cap and the crankcase
e = 68.7 ± 0.005 mm minus the diameter "a".

Fit the caps with the shims.

Tighten to 72 ft.lbs. (10 m.kg) and measure the dimension "a". It must be equal to the original dimension. If not, adjust the shims.





13. Prepare the assemblies of connecting rods - pistons - barrels.

a) The assemblies of barrels and pistons are sold matched as are the pistons and gudgeon pins.

- the position of the barrel in relation to the piston is not important with brand-new components.
- there are two types of barrel corresponding to two classes of cylinder blocks.

The blocks are marked with a figure at the front left-hand upper corner.

The barrels are marked:

Class 1 : 1 circle.
Class 2 : 2 circles on the upper part of the barrel flange.

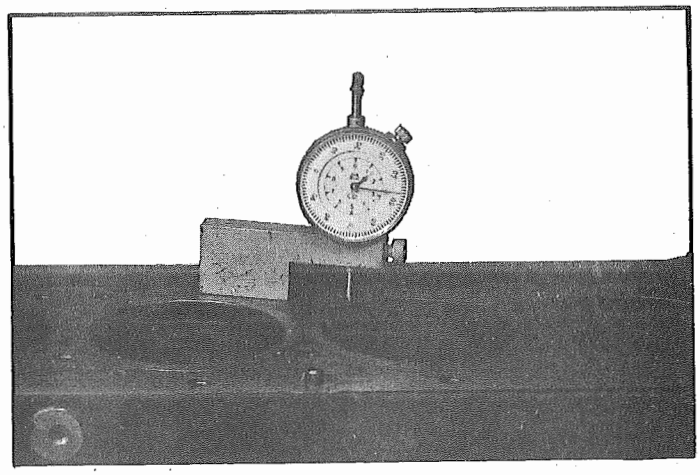
To avoid errors we advise checking the relationship of the barrel top face to the face of the cylinder block.

Place the barrels in position in the cylinder block (without gaskets) and measure the difference in level between the barrel top face and the face of the cylinder block, using a straight edge block 1754-T and dial gauge 2437-T.

The barrel top face *must be flush* with, or between 0 and 0.04 mm below the top face of the cylinder block.

If the barrels have been fitted *with gasket* their top faces must be between 0.12 and 0.16 mm above the top face of the cylinder block.

Remove the barrels from the cylinder block.



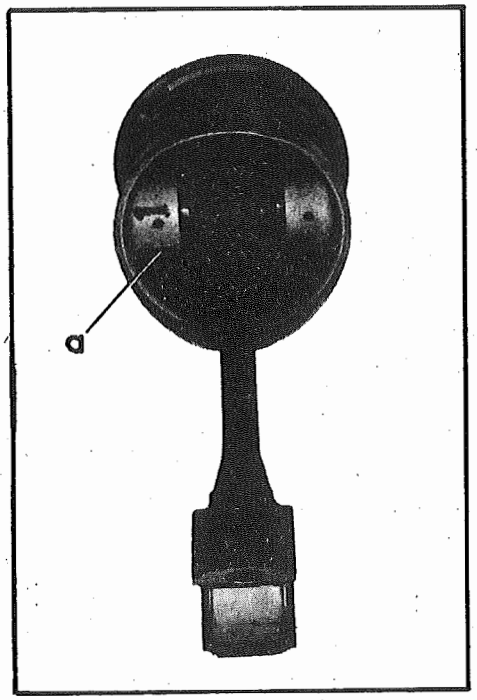
b) Prepare the connecting rods.

1) Small end bushes.

It is not possible to replace the small end bushes. The bushes are fitted after being nitrogen-cooled and special tooling is required for reaming the bore.

2) Connecting rod bolts.

We recommend renewing these at each engine overhaul.



c) Assemble the pistons and connecting rods.

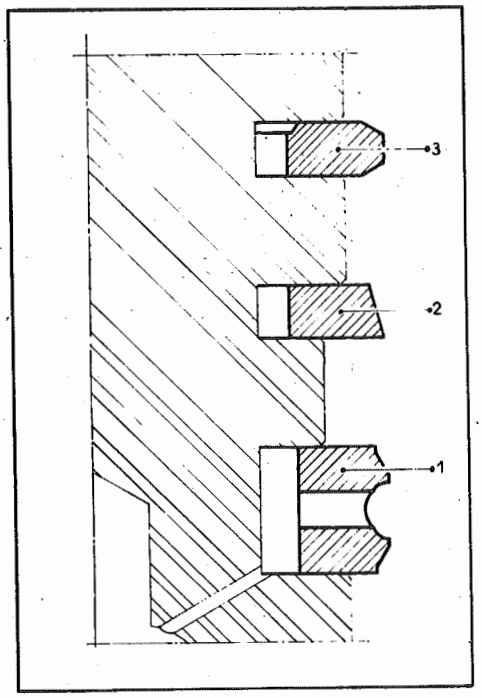
Oil the gudgeon pin, the small end bush and the gudgeon pin bores in the piston.

Place a circlip in one of the grooves.

Although the pins are a push fit in the connecting rod and piston, heat the pistons to about 60°C (in an oil bath for preference).

Position the pistons in relation to the connecting rods.

Arrange the projection marked "a" on one of the gudgeon pin bosses, in relation to the matched number on the connecting rod, as illustrated.



Fit the gudgeon pin so that the two etched marks on the end of the pin are on the side opposite the boss marked "a".

Fit the second gudgeon pin circlip.

14. Fit the piston rings.

a) Fit the rings using piston ring pliers. The word "top" uppermost.

Fit them in the following order:

1) - The grooved oil control ring (1).

2) - The scraper ring (2).

3) - The compression ring (3).

This is chromed and has two small outer chamfers.

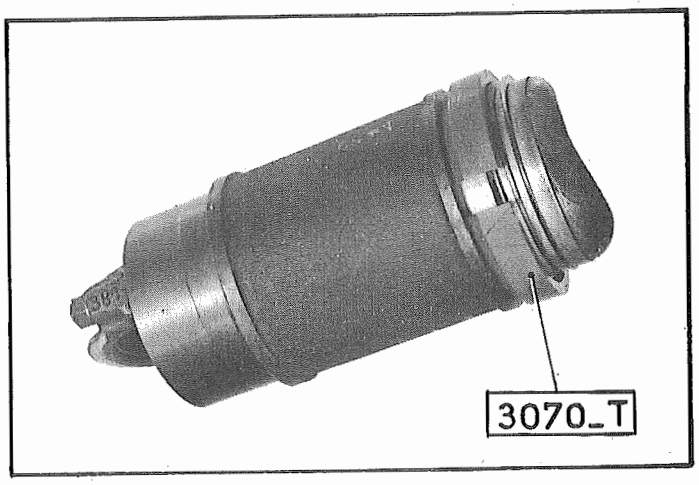
4) Arrange the gaps in the piston rings.

a) Compression ring:

the gap towards the number on the big-end of the connecting rod.

b) The oil ring and the scraper ring:

the gaps must be at 120° from the gap in the first ring, to one side and the other.



15. Fit the pistons in the barrels.

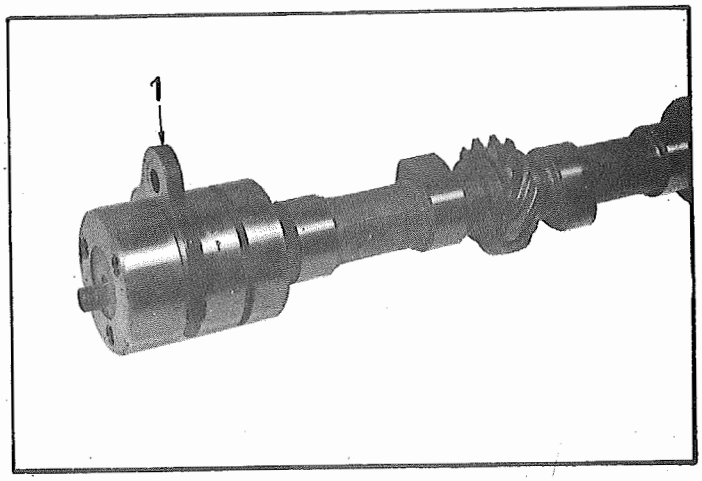
Oil the pistons and the barrels.

Fit the bush 3072-T over the rings (bringing it up from the skirt of the piston, the inner chamfer in the bush towards the top of the piston).

Place the pistons in the barrels.

NOTE: If necessary, assemble the pistons and barrels in accordance with the marks made when dismantling.

VERY IMPORTANT: The entry *of the oil control ring* into the bush requires considerable force which must be reduced when the ring begins to slide into the bush, so as to *avoid breaking the scraper ring* by striking it with the edge of the bush.



16. Prepare the camshaft.

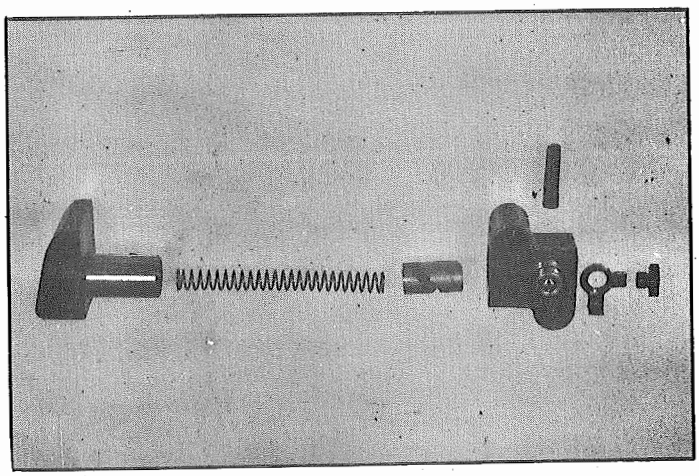
a) The end float on the camshaft must lie between 0.05 and 0.07 mm.

Engage the clamp fork (1) in the groove of the camshaft.

Measure, with feeler gauges, the existing clearance.

If it is greater than 0.07 mm, select among the other clamp forks sold by our Spare Parts Department, the part which will give the required clearance.

b) Make sure that the camshaft pinion dowel is in position.

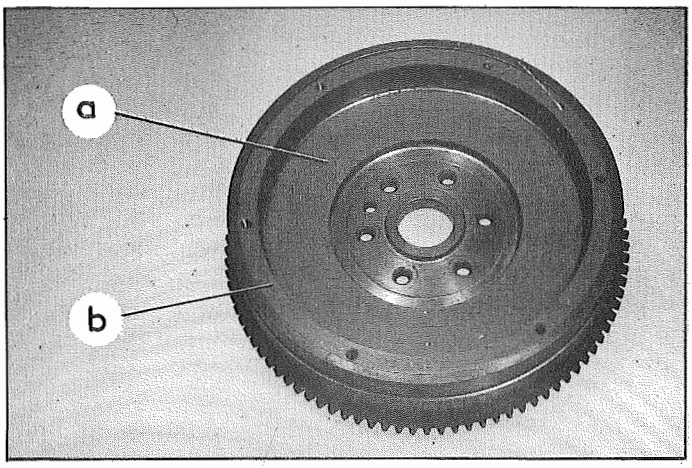


17. Prepare the timing gear.

a) Check the conditions of the chain guide and tensioner.

b) We advise systematic replacement of the timing chain.

c) Check the joint face of the timing case and if need be dress it with a hide mallet.



18. Prepare the sump.

Remove the inspection plate and clean the sump and the plate.

19. Prepare the flywheel.

a) Replacing a starter gear ring.

Drive off the starter ring with a hammer and drift.

Heat the new starter ring with a blow torch fitted with a jet of 800 to 1000 l, to a temperature of from 200 - 250°C (pale straw colour).

Offer up the starter gear ring on the flywheel, the tooth chamfer side towards the rear of the flywheel, and fit it rapidly using a hammer and drift if necessary.

It must not be possible to insert a feeler of 0.05 mm between the ring and the step on the flywheel.

b) Grinding the seating face of the clutch disc on the flywheel.

1) Remove the circlip and the bearing which centres the gearbox mainshaft.

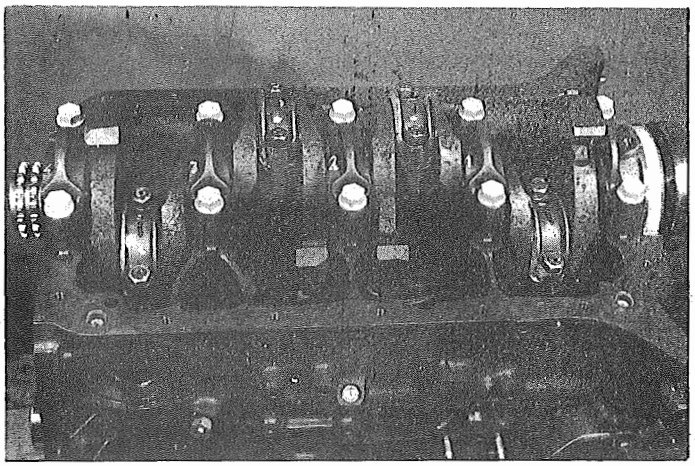
2) Re-grind if necessary, removing the same amount from the seating face "a" of the disc, and the seating face "b" of the clutch mechanism.

The distance between the two ground faces must be $29\ ^{+0.2}_{0}$. The amount of metal removed by grinding must not exceed 0.3 - 0.5 mm.

20. Prepare the clutch mechanism (See Op. DX.312-3).

21. Prepare the water pump (see Op. DX.231-3).

22. Check the oil pump (See Op. DX.220-0).



ASSEMBLY.

NOTES:

1) The bearing caps are marked with a figure except the bearing cap at the flywheel end which is not marked. No. 4 bearing is fitted at the timing end. After fitting the bearings, the figures must be towards the camshaft.

2) If the crankshaft main bearings are to be used again, they must be fitted according to the marks made when dismantling.

23. Adjusting the end-float of the crankshaft.

REMARKS:

1) The end-float is adjusted by means of half-rings (1) and (2) placed on each side of the central main bearing.

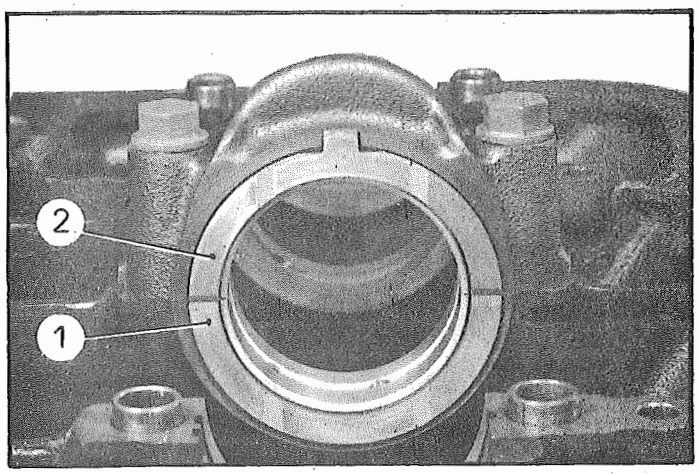
2) The half-rings fitted in the bearing caps have a locating lug.

3) There are two classes of rings (marked I and II on the steel face).

Rings class I thickness 3.10 to 3.14 mm.
Rings class II thickness 3.14 to 3.18 mm.

The two half-rings placed on the same side of the bearing must both be of the same thickness.

The half-rings placed on one side of the bearing may be of a different thickness from those placed on the other side.



4) Place the half- rings so that the faces covered with anti-friction metal are in contact with the crankshaft.

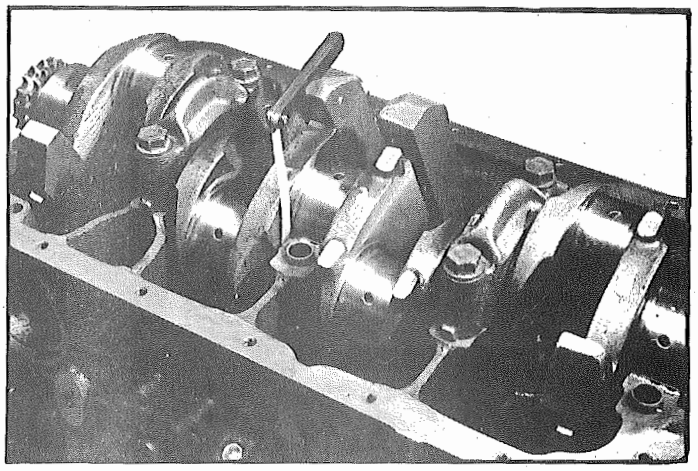
a) Oil the bearings. Place a half-ring class I on each side of the bearing.

b) Put the crankshaft in position.

Fit the two intermediate bearing caps (No. 1 and No. 3).

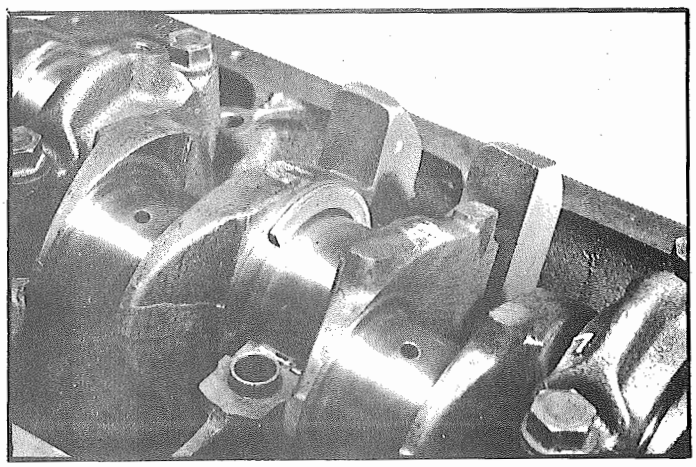
Tighten the screws to 36 ft.lbs. (5 m.kg).

c) Push the crankshaft as far as possible towards the timing gear, turning it meanwhile (hold the two half-rings in position).



d) Using a feeler gauge, measure the clearance "j". It must lie between 0.045 and 0.16 mm.

If it is greater than this, replace one of both of the half-rings by half-rings of class II.



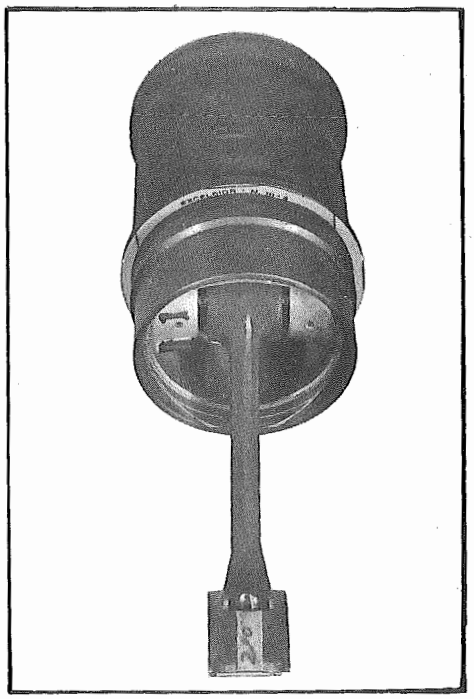
NOTE: To replace them push them round the crankshaft journal without removing the crankshaft.

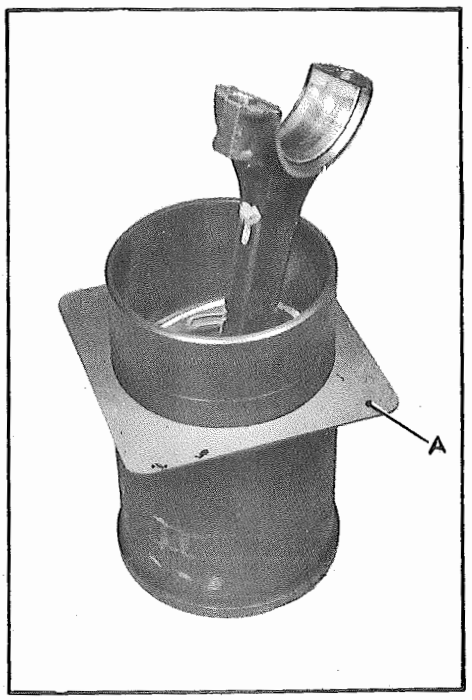
24. Fit the crankshaft.

Fit the cap of the central bearing, with its half-rings for adjusting the end-float, and the two end bearings. Tighten the fixing screws to 36 ft.lbs. (5 m.kg) and then finally to 72 ft.lbs. (10 m.kg).

Make quite sure that there are no hard spots when turning the crankshaft and that the end-float remains unchanged.

Place the engine on its side with the camshaft uppermost.





REMARK: If the assemblies of connecting rods - pistons - barrels and connecting rod bearings are being used again, they must be assembled in accordance with the marks made when dismantling.

8/G/327

c) From the top of the cylinder block introduce a connecting rod - piston barrel assembly, with the piston at T.D.C. in the barrel.

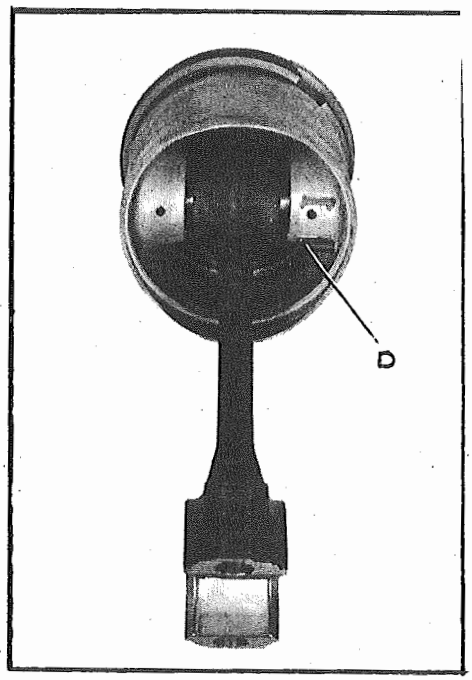
NOTE: The projection "a" cast on one side of the gudgeon pin bosses, must be towards the engine flywheel, with the connecting rod matching number facing towards the camshaft.

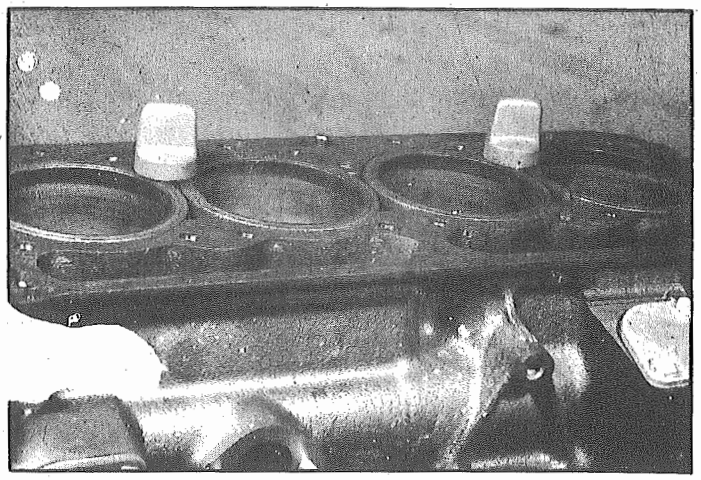
25. Fit the assemblies of connecting rods - pistons - barrels.

a) Offer up the paper gasket on the cylinder barrel, the black lines which outline the positions of the extra thickness, parallel to the end faces of the big-end and the extra thickness (the part with brown paper) in contact with the shoulder of the barrel.

b) By hand, work the joint onto the cylinder barrel as far as the first shoulder.

Then complete the fitting by using a plate MR.4134. (A).





Fit the bearings in place and oil them.

Fit the connecting rod to the crankshaft and fit the connecting rod cap.

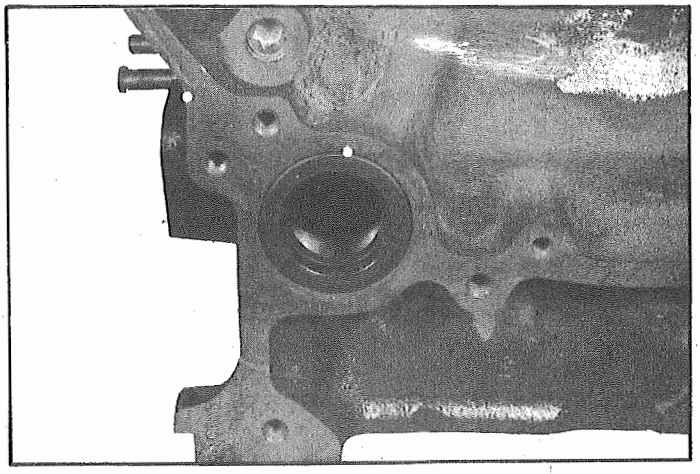
Tighten the nuts lightly.

Insert a second assembly, holding the two barrels in place by means of a screw 3074-T.

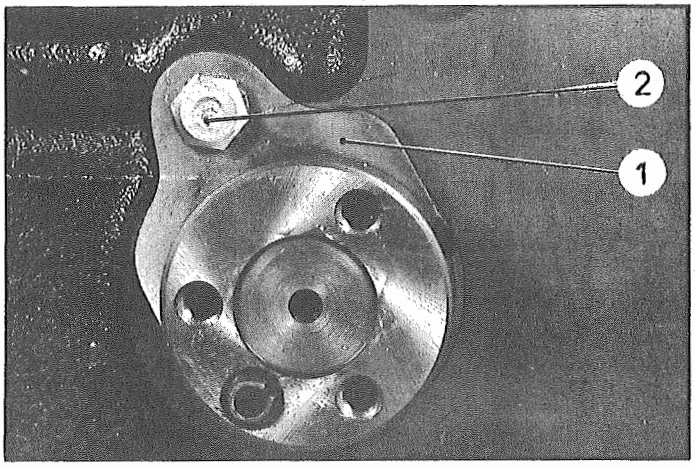
Then fit the other two assemblies.

Then finish tightening the connecting rod big-end nuts to :

$50\ ^{+\ 3}_{-\ 1.7}$ ft.lbs ($7\ ^{+\ 0.50}_{-\ 0.25}$ m.kg).



26. Fit the camshaft oil-seal previously oiled, so that it is flush with the engine-gearbox joint face, the lip innermost as shown in the adjoining illustration.



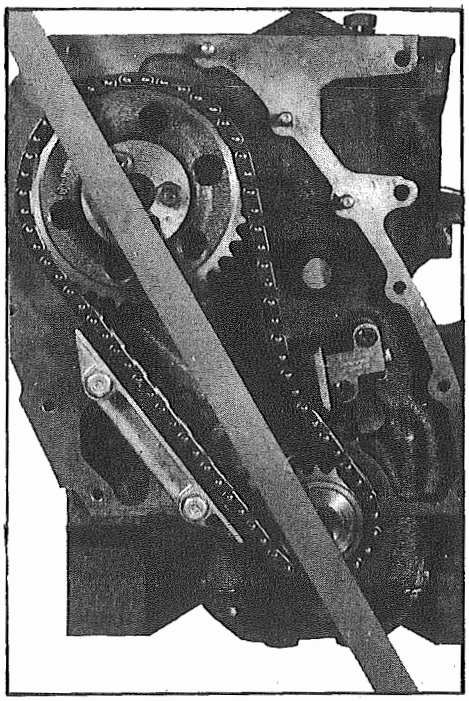
27. <u>Fit the camshaft.</u>

Insert the camshaft in the cylinder block from the timing case end.

Fit the clamp fork (1) selected in paragraph 16.

Tighten the screw (2) to $12\ ^{+\ 1.4}_{-\ 2.1}$ ft.lbs

($1.7\ ^{+\ 0.2}_{-\ 0.3}$ m.kg) (shakeproof washer under the head).

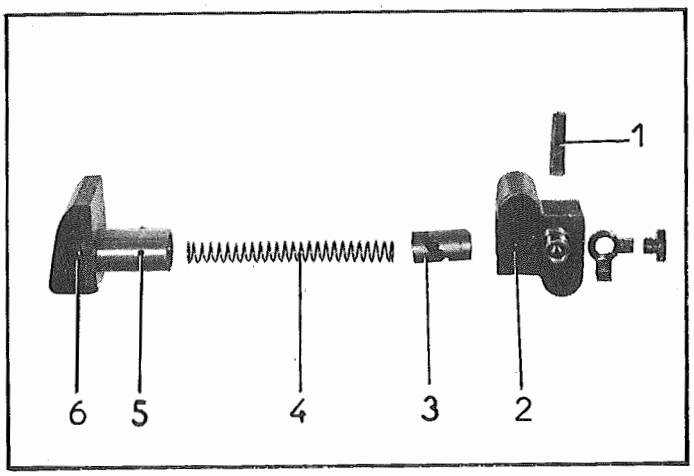


28. Fit the timing gear.

Bring the pistons of cylinders numbers 1 and 4 to about T.D.C.

a) Place the timing chain on the crankshaft pinion, then put the camshaft pinion into the chain.

Position the pinions so that the taut side of the chain is on the side farther from the tensioner, and so that a straight edge passing through the centres of the two pinions passes also through the mark (centre punch on one tooth) on the camshaft pinion and through the mark (etched electrically between two teeth) of the crankshaft pinion. The pinion marks must be towards each other.



Turn the camshaft until the centring dowel and the tapped holes are in line with the holes drilled in the pinion.

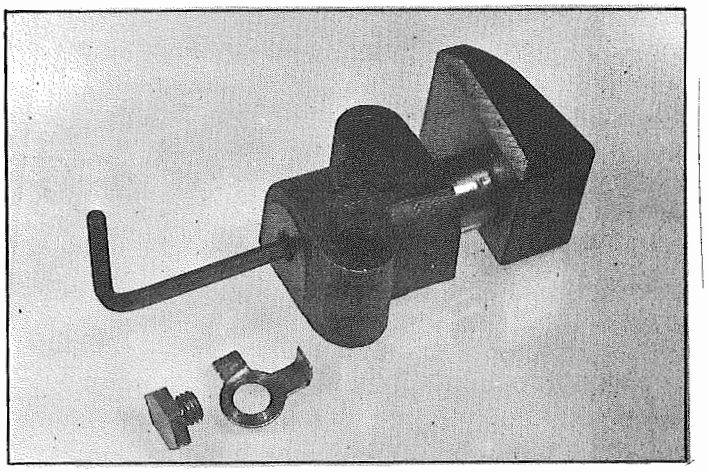
Tighten the securing screws.

b) Fit the chain tensioner:

Insert:

- the cylinder (3) in the body (2),
- the spring (4) in the cylinder,
- the assembly of slider pad (6) and plunger (5) carrying the pad in the body.

(The spring will be partly compressed).



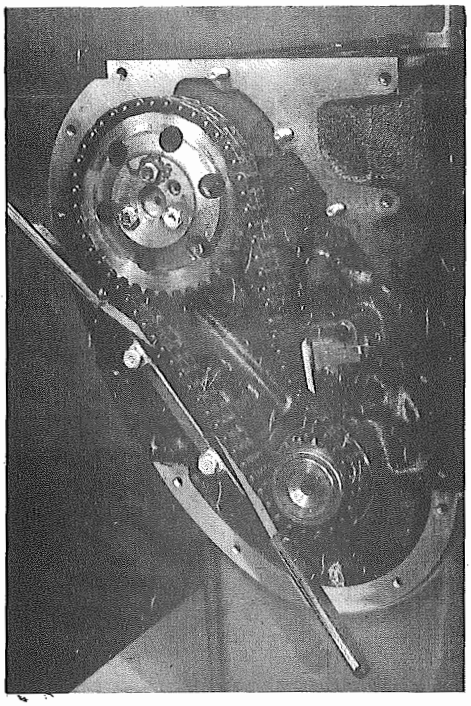
Through the tapped hole for the plug, insert a 3 mm Allen key.

Turn it clockwise to engage the peg inside the plunger (5) in the spiral in the cylinder assembly (3).

The slide carrier (6) must butt against the body (2).

Without moving any parts insert the filter (1) in the body. Fix the tensioner on the crankcase and tighten the screw to 12 ft.lbs (1.7 m.kg). Unscrew the Allen key to release the plunger, until it clicks.

Tighten the screwed plug inserting a lockwasher. Turn over the lockwasher tabs.

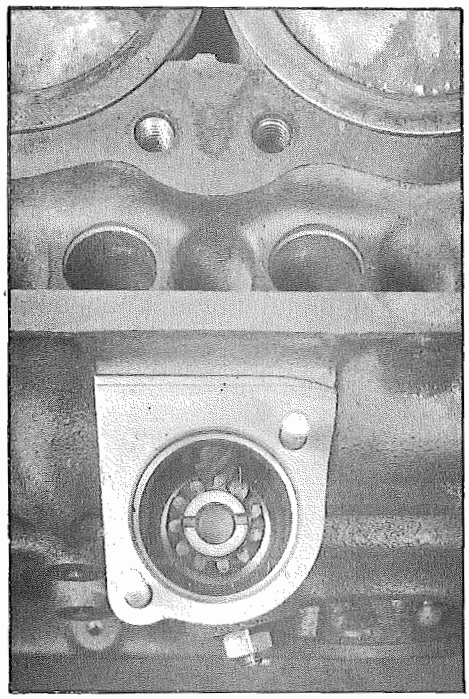


c) Fit the chain guide.

With the guide in place, insert the screws without tightening them (plain washers under the heads).

Move the chain guide in position leaving a clearance of 0.1 - 0.5 mm between guide and chain, measured with feelers.

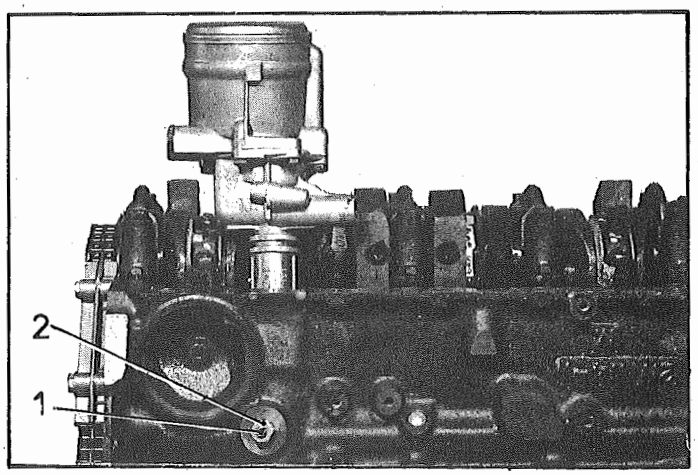
Tighten the screws.



29. Fit the oil pump.

Bring No. 1 piston to T.D.C. (compression). If the crankshaft has not been disturbed after fitting the timing gear, it will be sufficient to turn it 1 revolution in the direction of normal rotation.

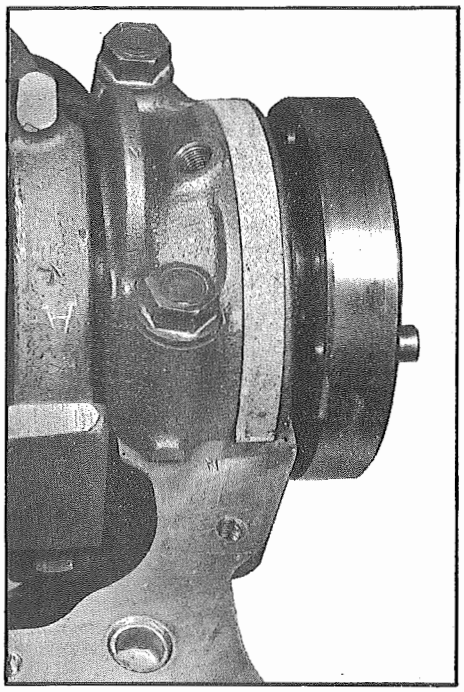
Place the oil pump in its housing so that after engagement of the pinions, the offset slot in the driving dog is parallel to the centre line of the camshaft, with the small (offset) side of the dog towards the engine.



Smear the threads of the pointed screw (1) with sealing compound. Tighten the screw to 4 ± .75 ft.lbs. (0.6 ± 0.1 m.kg).

Smear the face of the locknut, (2), which contacts the crankcase, with sealing compound. Tighten the locknut.

Tighten the screw securing the pump lug on No. 3 bearing to 25 ± 3.5 ft.lbs. (3.5 ± 0.5 m.kg).



30. Fit the sump.

Place the self-adhesive cork gasket in the groove of the crankshaft bearing cap at the flywheel end (ends of gasket smeared with hermetic compound for 3/8" inside and outside).

Smear with hermetic compound the two faces of the sump which meet the cylinder block.

Offer up the sump.

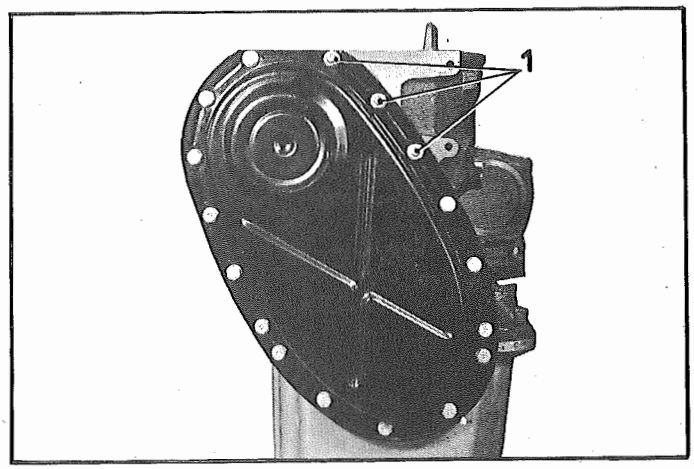
Place in position one long screw to the left of No. 5 bearing (timing gear end), and two long screws on the right-hand side of the engine (second and third screws counting from No. 5 bearing (timing gear end).

Tighten all the screws to $12 \begin{smallmatrix} +1.5 \\ -2 \end{smallmatrix}$ ft.lbs. ($1.7 \begin{smallmatrix} +0.2 \\ -0.3 \end{smallmatrix}$ m.kg).

Grease the face of the paper joint for the inspection cover which comes in contact with the sump, and smear hermetic compound on the other face.

Fit the inspection cover and tighten the screws to $7 \begin{smallmatrix} +1.5 \\ -0.75 \end{smallmatrix}$ ft.lbs. ($1 \begin{smallmatrix} +0.2 \\ -0.1 \end{smallmatrix}$ m.kg).

Tighten the drain plug (new gasket) to 21 $\pm$ 3.5 ft.lbs. (3 + 0.5 m.kg).



31. Fit the timing gear cover.

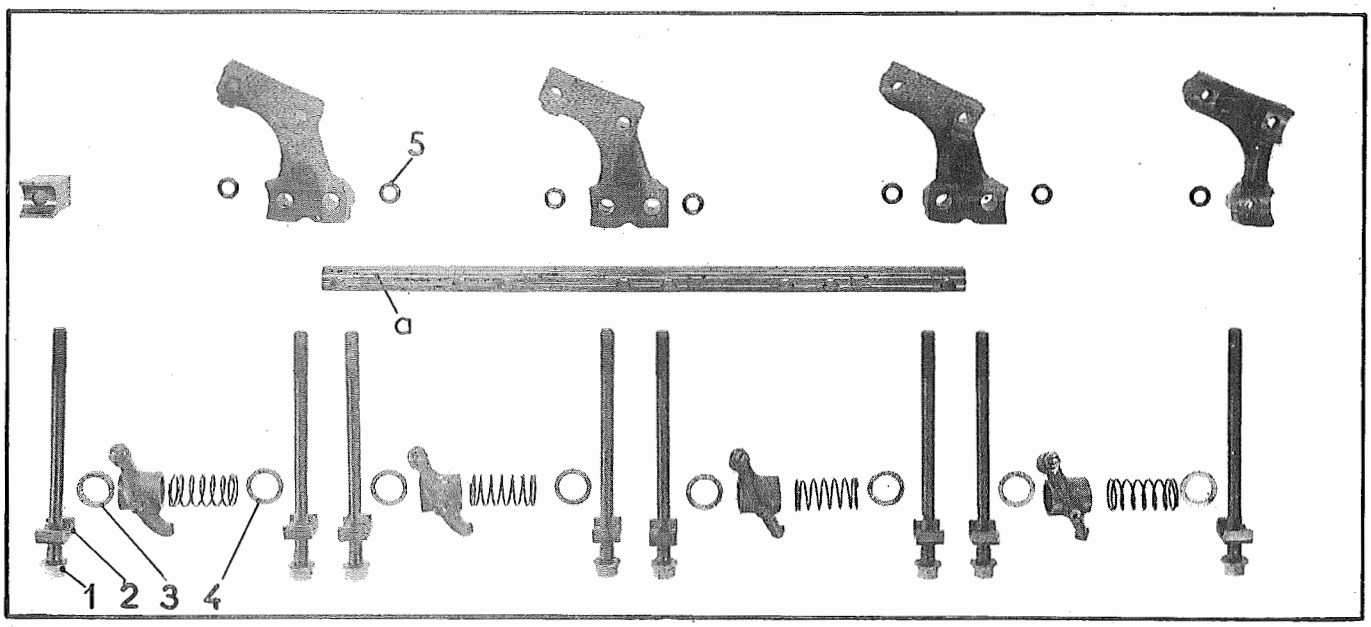
Hold the gasket with hermetic compound on the face of the cover, and smear the other face of the gasket with grease.

Fasten the cover with the three nuts (1) (distance pieces under the nuts) and the screws (plain washers under the heads).

Tighten to $12 \begin{smallmatrix} +0.75 \\ -2 \end{smallmatrix}$ ft.lbs. ($1.7 \begin{smallmatrix} +0.1 \\ -0.3 \end{smallmatrix}$ m.kg).

32. Oil the tappets.

Replace them according to the marks made when dismantling.



33. Fit the cylinder head.

a) Make sure that the dowel pins are in position on the cylinder block top face.

Put the cylinder head gasket in position.

Offer up the cylinder head on the block.

Insert the push-rods (according to the markings made when dismantling). The exhaust valve push-rods are the longer.

b) Prepare the inlet rocker line.

The oil outlet hole (a) nearest to one end of the shaft indicates the front end.

Commence the assembly from this end.

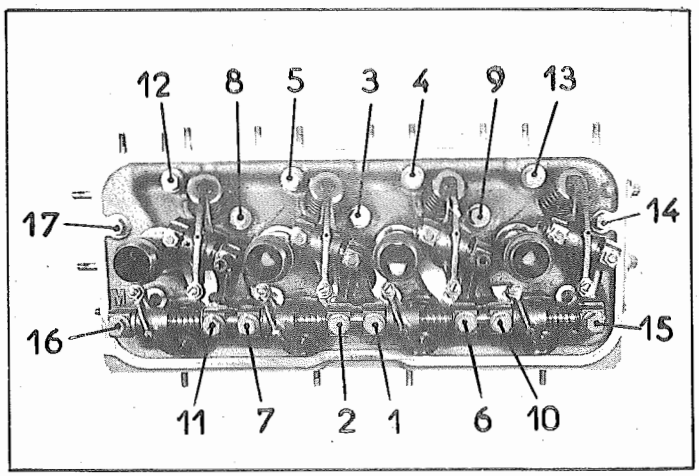
On the spindle (previously lubricated and with the oil holes facing downwards and towards the valve), place the following parts:

- 1 long screw (1) with its cap (2),
- the thick washer (3),
- 1 rocker (see photograph for position),
- 1 spring,
- 1 thin washer (4),
- 1 long screw and cap.

Continue assembly in the same order. The thick washer (3) is replaced by a thin washer (4) for the other rockers.

Place the rocker shaft bearers over the long screws.

Position the bearers as shown in the photograph.



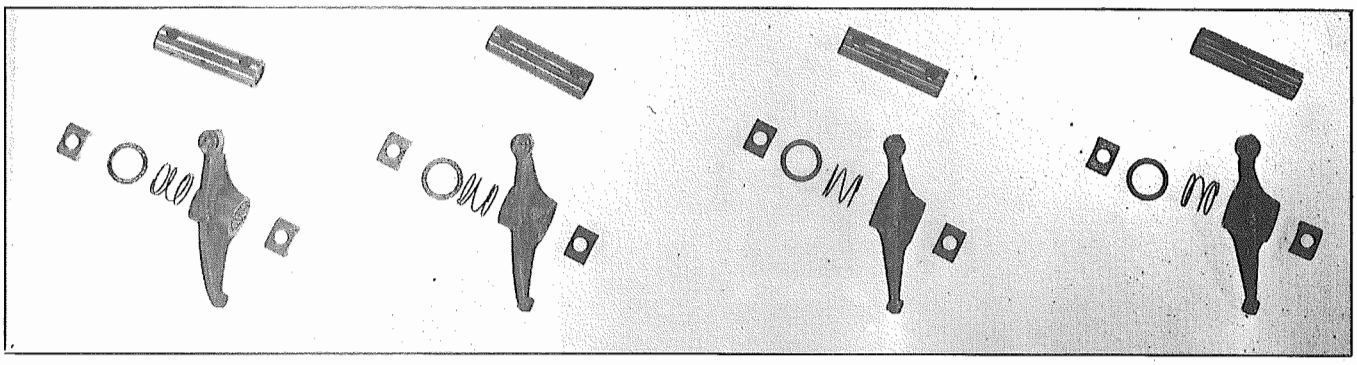
The front bearer has a chamfer which must face towards the push-rod to allow it to be fitted.

Place a ring seal (5) on the long screws, between the bearers and the cylinder head (except on the front screw).

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Place the rocker assembly on the cylinder head.

Tighten the screws securing the cylinder head and the rocker assembly to 29 ft.lbs. (4 m.kg) in the order indicated.



c) Fit the exhaust rockers.

Commencing at the front, place the following parts on each shaft (the oil hole towards the bottom),

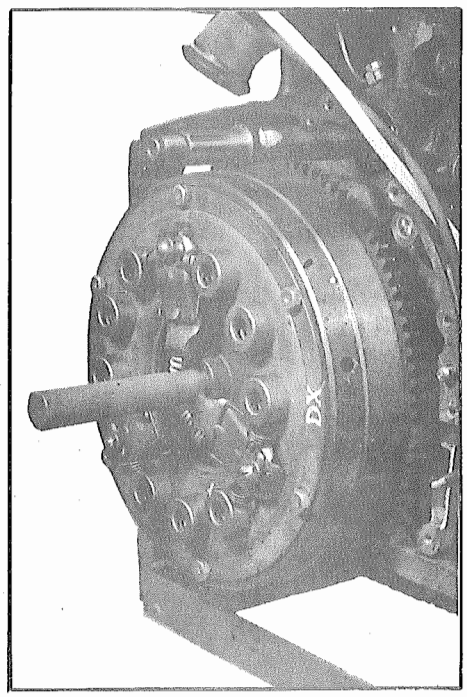
- one rocker,
- one spring,
- one washer.

Place each assembly on its support.

Fit the caps holding the shaft, and the nuts.

NOTE: The rear securing screws for the exhaust rockers of cylinders Nos. 1 and 3 are replaced by screws with long heads, recessed and tapped to receive the screws fixing the rocker cover.

d) Give a final tightening to the cylinder head screws in the order indicated in paragraph 33 b) to 43 $^{+3\frac{1}{2}}_{0}$ ft.lbs. (6 $^{+0.5}_{0}$ m.kg), and the screws holding the rocker assemblies to 18 $\pm$ 2 ft.lbs. (2.5 $\pm$ 0.3 m.kg).



34. Adjusting the rocker clearances.

The clearance must be 0.008 in (0.20 mm) for the inlet and 0.010 in (0.25 mm) for the exhaust. Adjust the valves for each cylinder, with the piston at T.D.C. at the end of the compression stroke.

35. Fit the valve cover.

Insert the rubber gasket under the rocker cover.

Fit the rocker cover and tighten the screws (brass washer under the heads) to about 5$\frac{1}{2}$ ft.lbs. (0.75 m.kg).

36. Fit the engine flywheel.

Offer up the flywheel on the crankshaft. Tighten the screws to between 47 and 50 ft.lbs. (6.5 to 7 m.kg).

Fit a new bearing in the flywheel. Insert the circlip.

37. Fit the clutch mechanism.

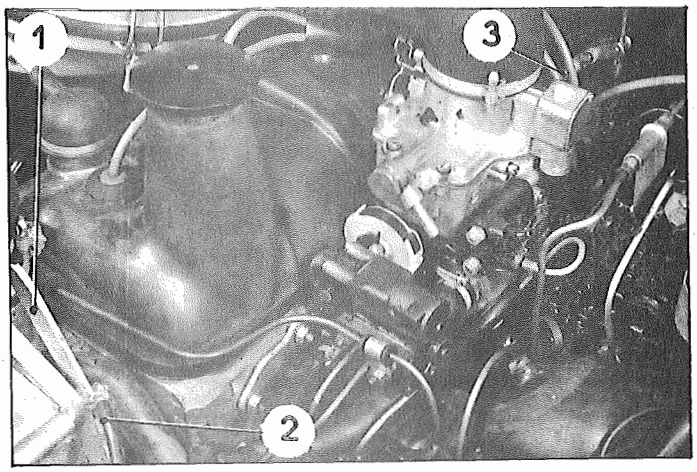
Ensure that the seating faces of the disc on the flywheel and the pressure plate are thoroughly clean.

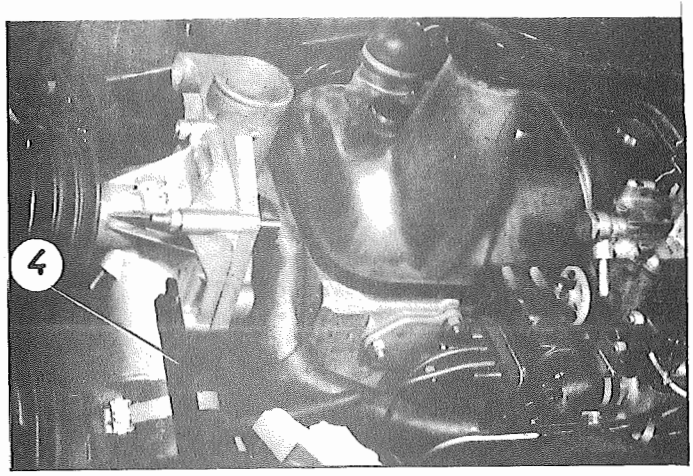
Offer up the disc and engage in the centre a gearbox mainshaft or a mandrel MR.3676-350, to ensure concentricity with the flywheel bearing.

Fit the clutch mechanism according to the marks made when dismantling. Tighten the screws to 18 $^{+2}_{-3}$ ft.lbs. (2.5 $^{+0.3}_{-0.4}$ m.kg) (shakeproof washers under the heads).

During tightening make sure that the shaft slides freely in the splines.

NOTE: If the housing has 12 holes and the flywheel has only 6 tapped holes, it is necessary to position the mechanism so that 3 of the screws are in line with the toggles.



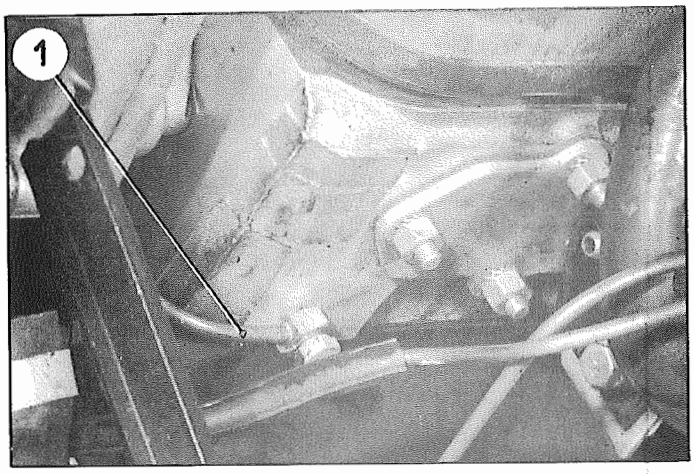


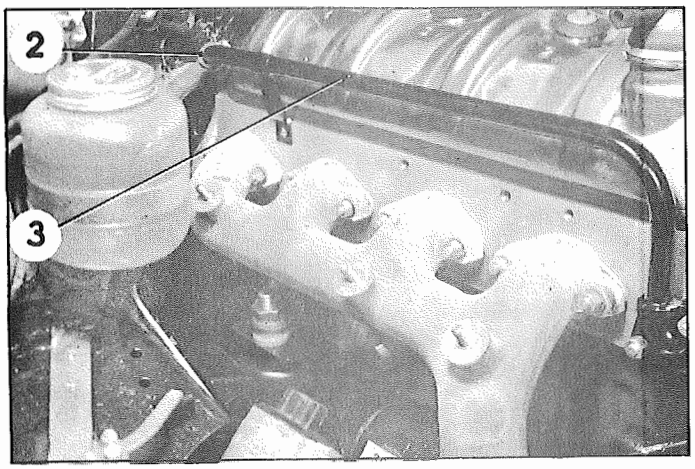
REMOVAL.

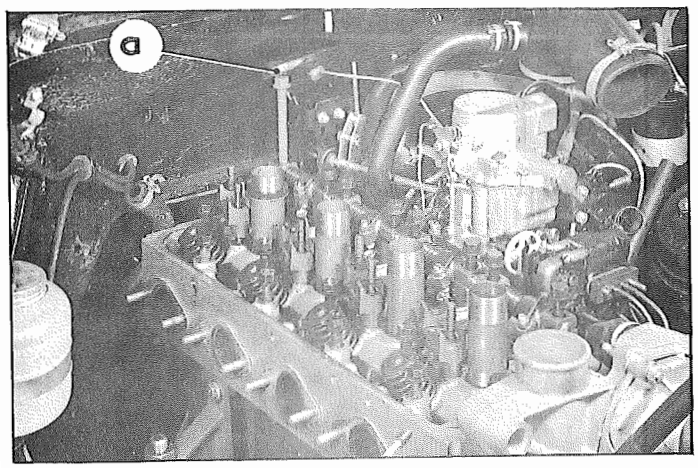
1. Remove the air filter (see Op. DY.171-1).
2. Drain the radiator and cylinder block. (Save the water as it contains anti-freeze).
3. Disconnect the cables from the battery terminals.
4. Release the pressure in all the circuits (see Op. DX.00).
5. Remove:
   - the sparking plug leads,
   - the radiator tie-rod, the engine sling hook (1), the earth cable (2),
   - the fan.
6. Disconnect:
   - the accelerator control (3), the choke cable, the petrol delivery pipe from the carburettor,
   - the feedpipe assembly from the centrifugal regulator,
   - the feedpipe from the de-clutching activator,
   - the upper water hose,
   - the dynamo tie-rod (4) from the water pump.

Remove the belts from the dynamo - water pump.

7. Remove:
   - the fulcrum pin from the centrifugal regulator, (do not lose the adjusting shims for aligning the pulleys when re-assembling),
   - withdraw the centrifugal regulator from the right-hand side.
8. Disconnect:
   - the lead from the thermometer unit under the water pump cover,
   - the distributor earth lead secured by the clip holding the breather tube on the stud securing the rear closing plate.
9. Disconnect:
   - the lower water suction hose from the pump,
   - the overflow pipe from the water pump.







- the lubrication pipe for the rocker assembly (1),
- the tie-rod for the high pressure pump from the water pump.

10. Remove:
- the front right-hand suspension sphere,
- the bracket for the air filter,
- the exhaust shield.

11. Disconnect:
- the exhaust manifold from the cylinder head and the downpipe,
- the heater hose (2) from the heating pipe (3).

12. Remove:
- the exhaust manifolds,
- the heater hose (2),
- the cylinder head cover with its gasket,
- the sparking plugs,
- the sealing cups from the sparking plug wells and their rubber joints.

13. Loosen the screws securing the exhaust rocker assembly.

Loosen the screws securing the cylinder head.

Remove the exhaust rockers.

Remove the inlet rocker line.

NOTE: To remove the rear screw from the inlet rocker line, remove the rubber plug from the engine recess in the scuttle, cut away the felt and remove the screw by lifting it so that its head enters this hole (at "a").

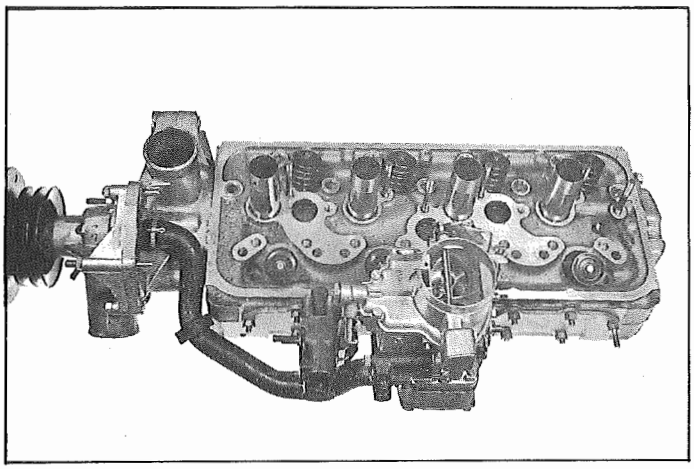
Remove the rocker push-rods.

NOTE: To remove the exhaust rocker push-rod from No. 4 cylinder, raise the cylinder head slightly.

14. Remove the cylinder head and its gasket.

(Do not damage the dowels).

Hold the cylinder barrels in place using 2 screws (securing screw 3074-T).



15. Stripping the cylinder head.

Remove the heater pipe and the hot spot hose.

Remove the water pump and the water pump cover.

Disconnect the clutch re-engagement control from the carburettor.

Remove the clutch re-engagement control (see Op. DY.314-1).

Remove the inlet manifold and carburettor assembly.

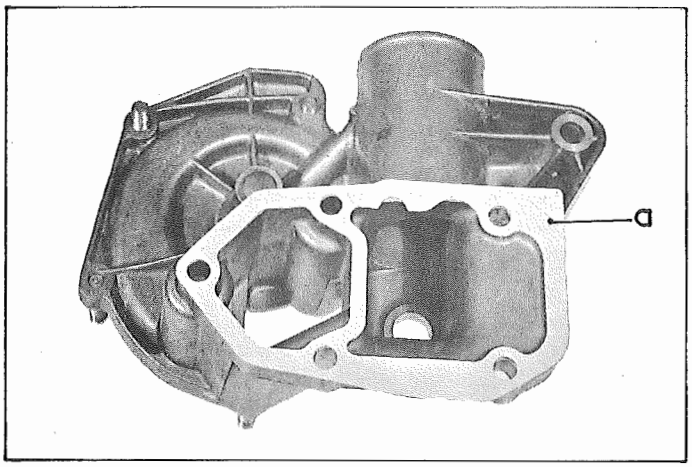
ASSEMBLY.

16. Assembling the cylinder head.

Fit:

- the water pump cover, inserting the gasket (the gasket must only be fitted in position with the corner "a" as shown),
- the water pump, inserting the gasket (special nuts 8 diameter x 12 across flats),
- the inlet manifold and carburettor, inserting the gasket,
- the clutch re-engagement control (see Op. DY.314-1).

Connect the hot spot hose to the water pump cover and tighten the hose clip.



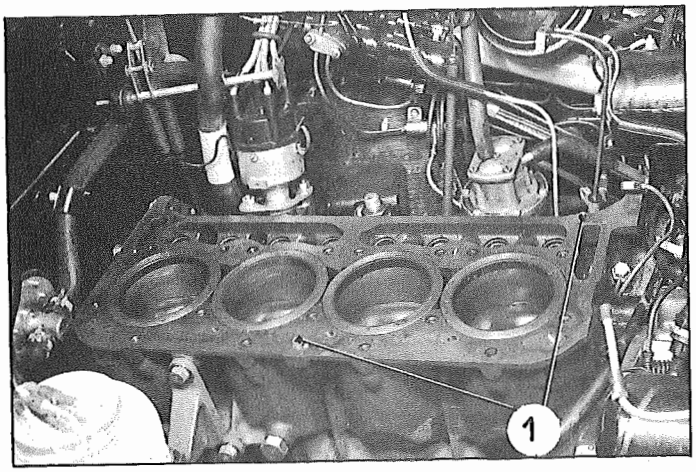
17. Remove the screws holding the cylinder barrels (screw 3074-T).

18. Fitting the cylinder head.

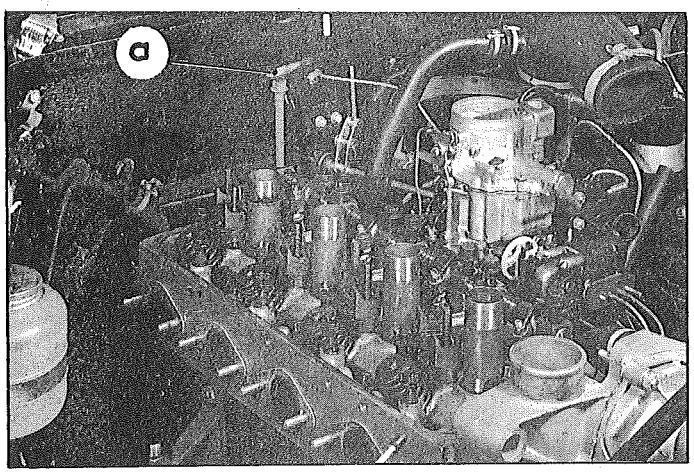
Fit the cylinder head gasket and centralise it on the two dowels (1).

Offer up the cylinder head with the exhaust rocker push-rod of No. 4 cylinder in position in the head.

NOTE: Once the cylinder head is in position this push-rod cannot be fitted.



19. Fit the rocker push-rods (the exhaust push-rods are the longer).



20. Replace the inlet rocker line assembly with its supports and securing screws.

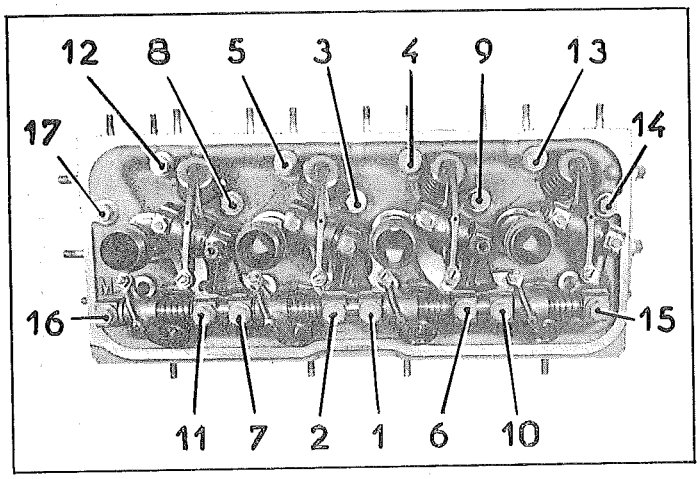
NOTE: When fitting the inlet rocker line assembly pass the head of the rear screw up through the hole in the engine recess at "a".

Place the rubber ring seals between the rocker supports and the cylinder head, on the cylinder head securing screws, except the front screw.

21. Replace the exhaust rocker assemblies, the oil hole towards the bottom and towards the valves. Fit the caps. Tighten the nuts on the exhaust rocker securing studs (the rear screws holding the rocker assembly for No.1 and No. 3 cylinders also receive the cylinder head cover nuts).

22. Fit the cylinder head screws and tighten them (torque spanner 2471-T).

1st tightening : to 21 ft.lbs. (3 m.kg).
2nd tightening : to 43 ft.lbs. (6 m.kg).



Observe the order of tightening shown.

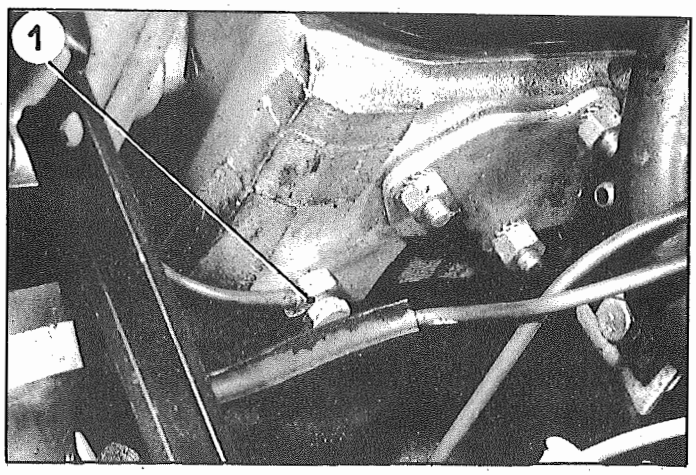
While tightening the screws make quite sure that the spherical ends of the tappet adjusting screws are correctly seated in the sockets on the rocker push-rods.

NOTE: It is absolutely essential to tighten the cylinder head screws with the engine cold after the car has run 300 miles (500 km).

It is imperative to proceed in the following manner:

1st. Operate on the screws one by one.

2nd. Loosen each screw and then tighten to 43 ft.lbs. (6 m.kg).



23. Fit:

- the lubrication pipe to the cylinder head (with double copper sealing washer (1)),
- the clip holding the breather pipe with the ignition earth cable,
- the thermometer unit,
- the outlet pipe to the water pump,
- the water suction hose to the water pump.

Tighten the clip.

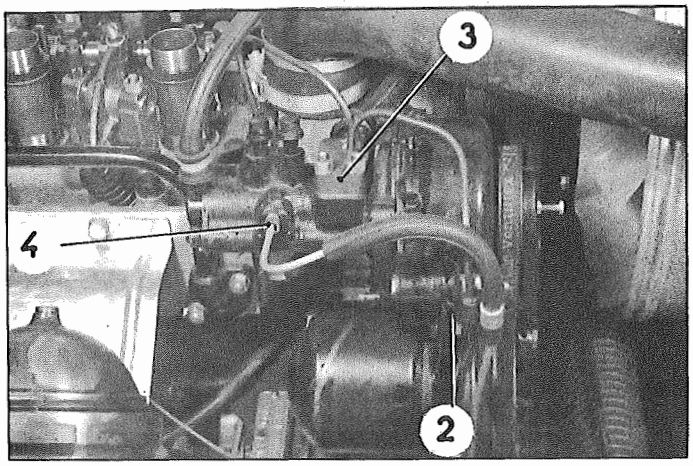
Fit the belts to the dynamo and water pump.

Connect the dynamo - water pump tie-rod.

Adjust the tension of the dynamo - water pump belts (see Op. DX.231-0).

Fit:

- the throttle control, the choke cable, the petrol delivery hose to the carburettor,
- the high pressure pump tie-rod to the water pump (insert shim and shakeproof washer).



24. Fit:

- the centrifugal regulator and its fulcrum pin. Fit the packing pieces found when dismantling.
- the drive belt to the centrifugal regulator.

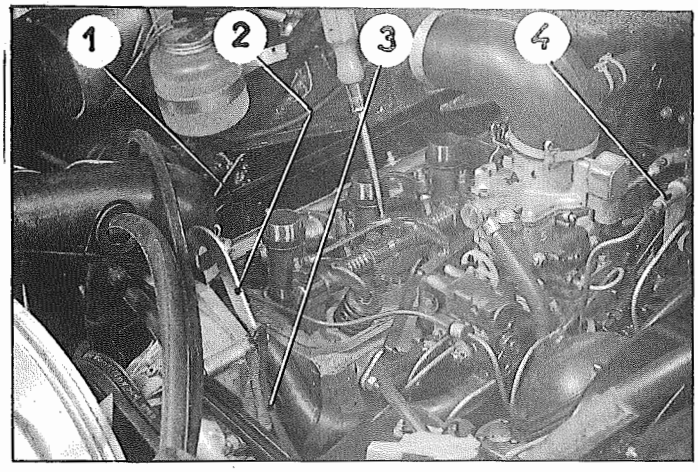
25. Secure the high pressure pump tie-rod (2) to the centrifugal regulator.

Adjust the tension of the belt on the centrifugal regulator (see Op. DX.231-0).

26. Fit the feedpipe assembly (3) to the centrifugal regulator.

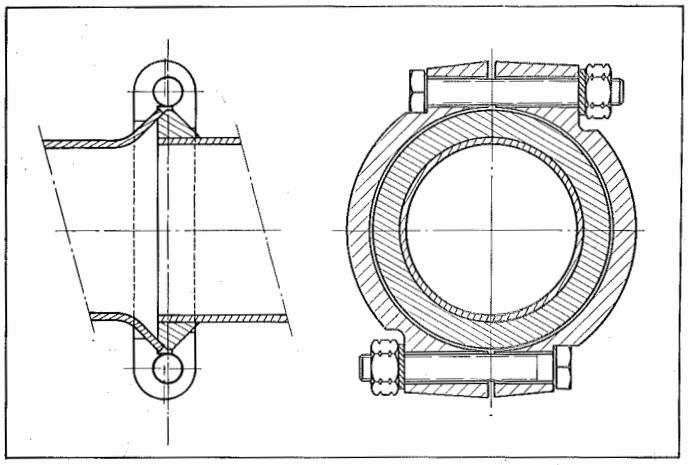
Fit the feedpipe (4) to the de-clutching activator.

NOTE: It is necessary to renew the rubber sealing sleeves D.453-82 after each dismantling.



27. Fit:
    - the exhaust manifolds on the cylinder head, inserting the gaskets (plain washers and special nuts 8 diameter x 12 across flats),
    - the hot spot hose (1),
    - the exhaust shield,
    - the fan (tighten the screws to 6.5 ft.lbs. (0.9 m.kg),
    - the radiator tie-rod,
    - the sling hook (2) for lifting the engine, and the battery earth lead (3).

28. Connect up:
    - the hot spot hose to the flexible pipe and tighten the clips,
    - the downpipe to the exhaust manifold (see that the clamps and bolts are fitted correctly),
    - the water delivery hose to the water pump,
    - the connecting pipe between centrifugal regulator and hydraulic gear selector to its union (4),
    - the connecting pipe between the front right-hand brake unit and the de-clutching activator,
    - the connecting pipe between front left-hand brake and accelerated idling control.



29. Adjust the valve rocker clearance (see Op. DY.112-0).

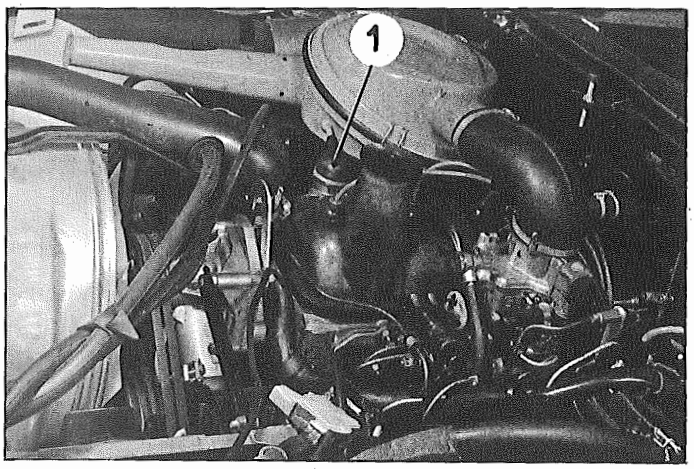
30. Fit:
    - the sealing cups and washers to the sparking plug wells
    - Fit the cylinder head cover, inserting the gasket.
    - Tighten the screws (copper washers).

31. Fit the sparking plugs.

Fit the distributor leads to the sparking plugs.

32. Fit the air filter bracket.

Fit the air filter (see Op. DY.171-1).



33. Connect the air filter to the anti-pollution device (1) on the cylinder head cover.

Connect the air hose to the air filter.

Tighten the clips.

34. Fill the radiator with water and open the heat control valve.

35. Connect the cable to the battery terminals.

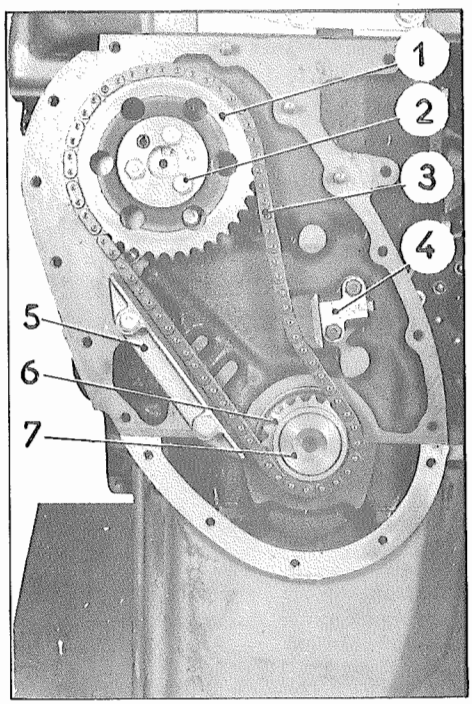
36. Start up the engine.

37. Put all circuits under pressure.

38. Check all unions for leaks.

39. Bleed the centrifugal regulator and the brakes.

40. Adjust the idling speeds (see Op. DY.142-0).



REPLACEMENT OF A TIMING CHAIN OR TIMING PINION.

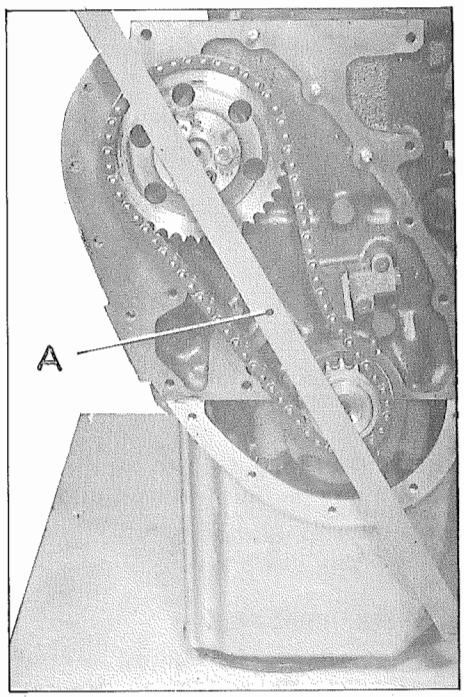
Removal.

1. Remove the engine-gearbox assembly (see Op. DY.100-1.

2. Remove:
   - the timing case,
   - the chain guide (5),
   - the chain tensioner (4) (take care not to let the components fly apart),
   - the screws (2) holding the pinion on the camshaft.

Remove the timing pinion (1) and the timing chain (3).

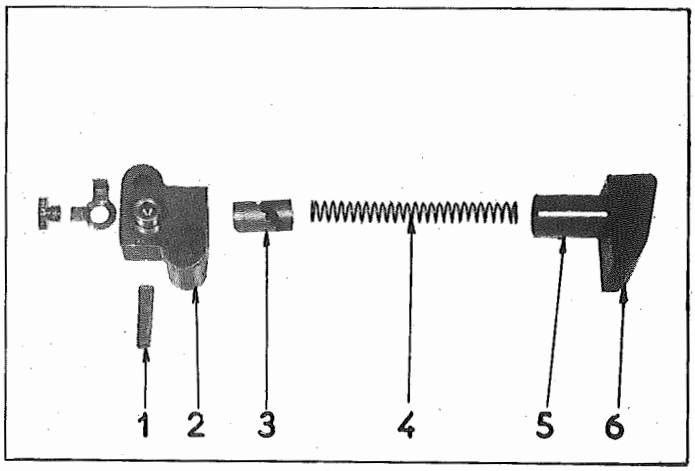
NOTE: As the pinion (6) is a force fit on the crankshaft (7) its replacement can only be carried out in a workshop with specialised equipment, (there is no positioning peg for this pinion).



Assembly.

3. Bring the pistons of cylinders Nos. 1 and 4 to about T.D.C.

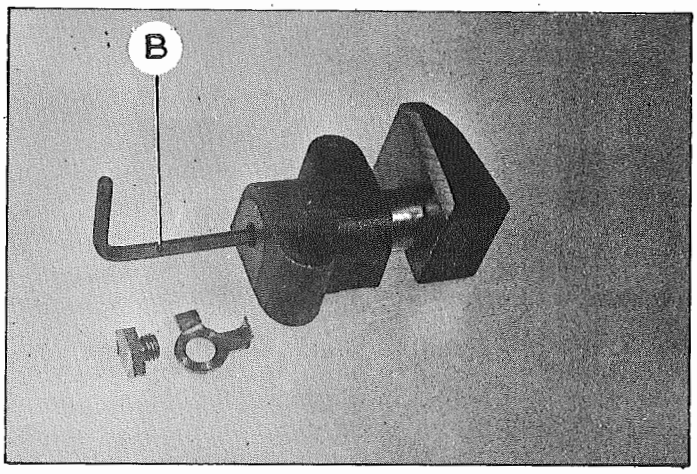
a) Place the timing chain on the crankshaft pinion, then the camshaft pinion in the chain. Position the pinions to tauten the chain on the side farther from the tensioner, and so that a straight edge passing through the centres of the two pinions passes also through the mark (centre punch on one tooth) on the camshaft pinion and through the mark (etched electrically between two teeth) on the crankshaft pinion. The marks must be towards each other. Turn the camshaft until the centring dowel and the tapped holes are in line with the holes drilled in the pinion. Tighten the securing screws.



b) Fit the chain tensioner.

Insert:

- the cylinder (3) in the body (2),
- the spring (4) in the cylinder,
- the assembly of the slider pad (6) and plunger carrying the pad (5) in the body (the spring will be partly compressed).



Through the tapped hole for the plug insert a 3 mm Allen key (B).

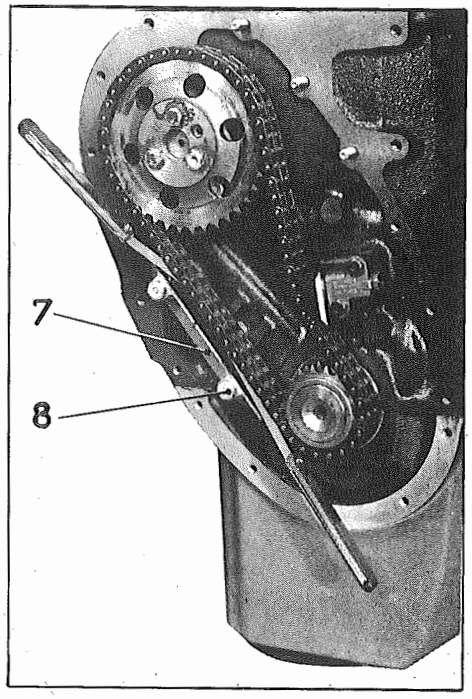
Turn it clockwise to engage the peg inside the plunger (5) in the spiral in the cylinder assembly (3).

The slide pad carrier (6) must butt against the body (2).

Without moving any parts insert the filter (1) in the body and fit the tensioner on the crankcase. Tighten the screw to 12 ft.lbs. (1.7 m.kg). Unscrew the Allen key to release the plunger, until it clicks.

Tighten the screwed plug inserting a lockwasher.

Turn over the lockwasher tabs.



c) Fit the chain guide.

With the guide (7) in place, insert the screws (8) without tightening them (plain washer under the heads).

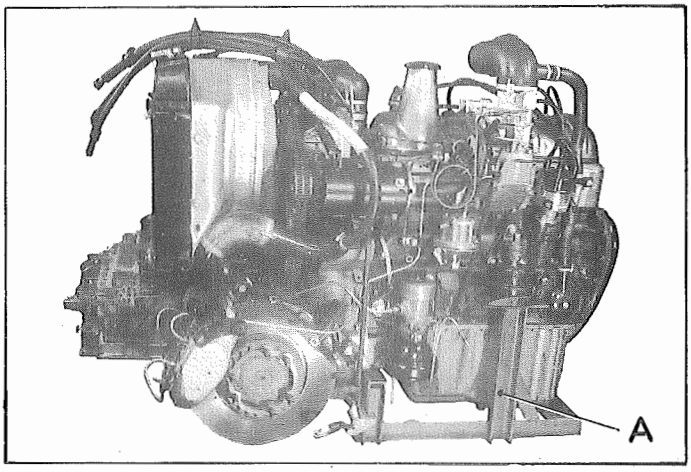
Position the chain guide leaving a clearance of 0.1 - 0.5 mm measured with feeler gauges.

Tighten the screws.

4. Fit the timing cover.

Insert the cork gasket, tighten the nuts (spacer under the nuts) and the screws (plain washers) to 12 ft.lbs. (1.7 m.kg).

5. Fit the engine-gearbox assembly on the vehicle (see Op. DY.100-1.



REPLACING A CAMSHAFT.

Removal.

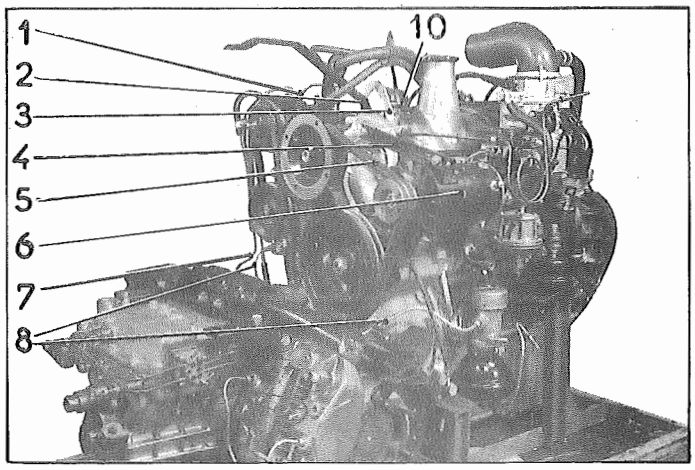
6. Remove the engine-gearbox assembly (see Op. DX.100-1).

7. Drain the oil from the engine.

8. Place the engine-gearbox assembly on a stand 3083-T (A).

9. Disconnect:

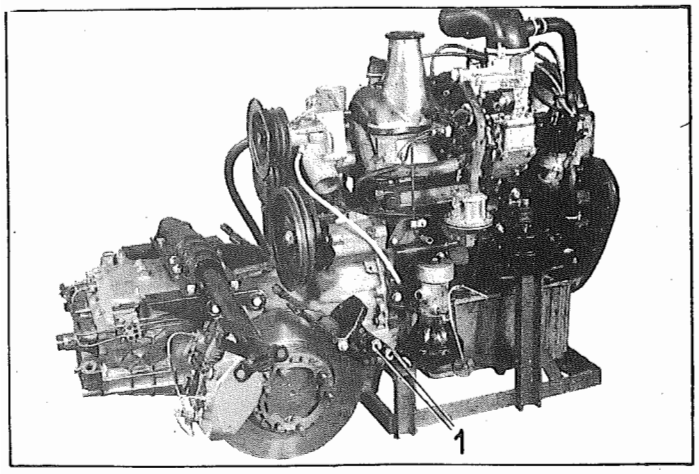
- the radiator tie-rod from the radiator,
- the suction and delivery hoses from the water pump,
- the radiator.



10. Remove:

- the tie-rod (2) from the radiator,
- the sling hook (3),
- the earth cable,
- the dynamo stay (4),
- the dynamo belts (5),
- the dynamo (6),
- the pipe assembly (1) from the centrifugal regulator - the rubber return pipe,
- the pipe (7) connecting the right-hand brake unit to the centrifugal regulator,
- the centrifugal regulator tie-rod,
- the centrifugal regulator (10) (do not lose the alignment adjusting shims),
- the pipe (8) connecting the high pressure pump to the pressure-regulator.

11. Disconnect the lead from the thermometer unit.



12. Disconnect:

- the high pressure pipe from the clutch cylinder, and the tie-rod for the high pressure pump from the water pump.

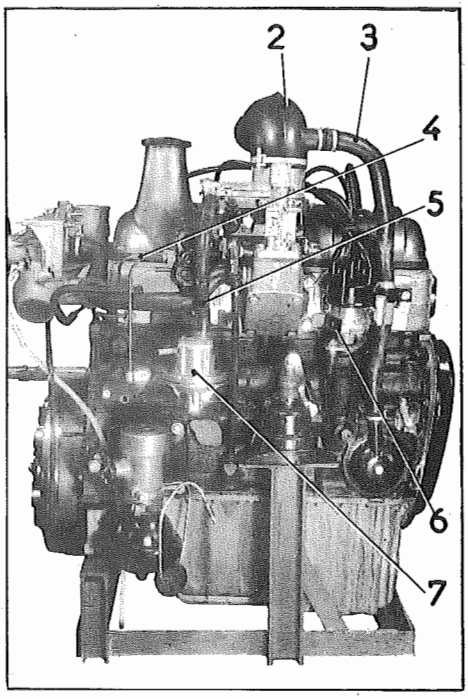
13. Remove the driving pulley (use a chisel to remove the metal from the slot).

Remove the pulley and take care not to lose the adjusting washers.

14. Remove:

- the mechanical brake calipers, taking out the two screws (1),
- the housing for the front camshaft bearing,
- the screws holding the gearbox to the engine (spanners 2431-T and 1677-T).

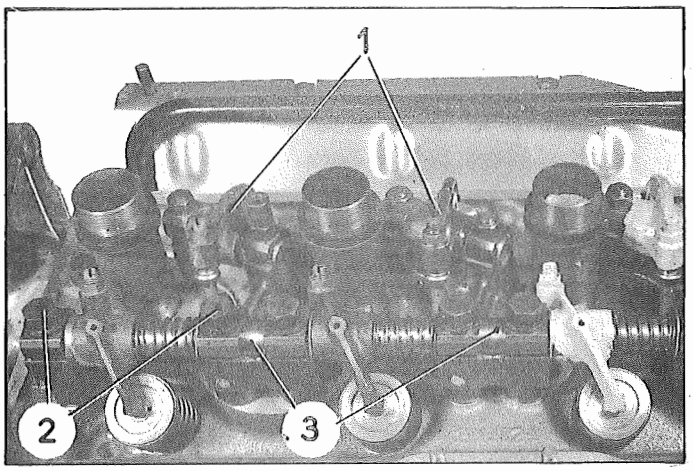
15. Remove the gearbox from the engine.



16. Remove:

- the rubber elbow (2) from the air filter, together with the flexible pipe (3) between the air filter elbow and the breather,
- the feedpipe (5) from the petrol pump to the carburettor,
- the petrol pump (7),
- the insulating pad,
- the push-rod,
- the distributor (6),
- the pipe assembly (4) from the clutch re-engagement control.

Disconnect the lubrication pipe from the valve rocker assembly.



17. Remove the cylinder head.

a) Remove the cylinder head cover and its gasket.

b) Remove the exhaust rocker assemblies (1).

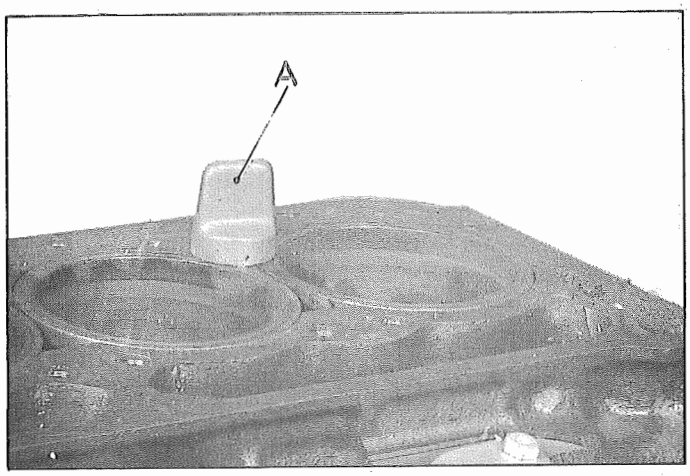
c) Loosen completely the screws (3) securing the cylinder head.

d) Remove the inlet rocker line assemblies (2).

e) Withdraw the rocker push-rods. (Mark their positions).

Free the cylinder head and the cylinder head gasket (attention to the dowels).

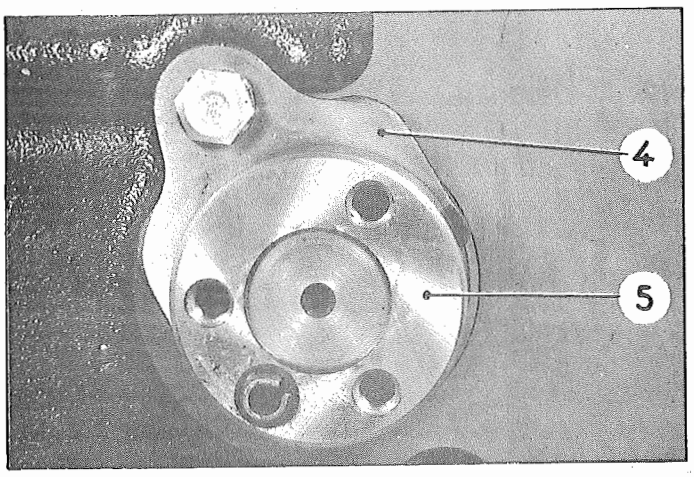
18. Hold the barrels in place with two screws (screw MR.3074-T) (A).



19. Remove the tappets from their housings, marking their positions (if necessary use extractor 1608-T).

20. Remove:

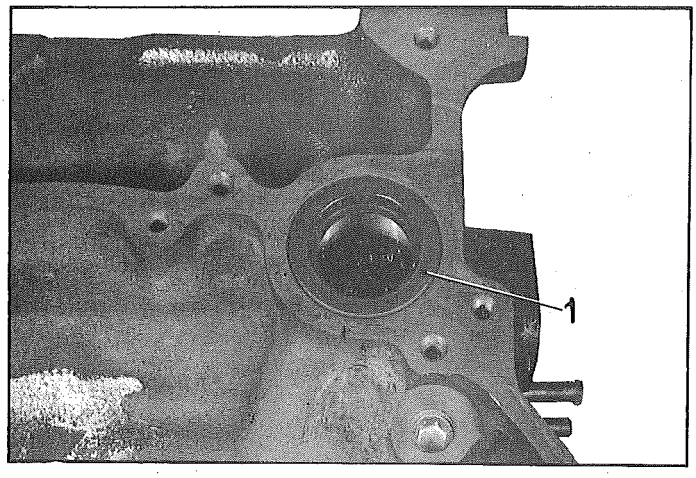
- the timing gear cover,
- the bracket for the exhaust downpipe,
- the sump,
- the oil pump,
- the timing gear chain and pinion assembly (this operation, paragraphs 1 - 5).



21. Remove the camshaft.

Remove the clamp fork (4) from the camshaft.

Remove the camshaft (5) from the rear end of the engine (timing gear end).



Assembly.

NOTE: After each dismantling operation use new sealing gaskets.

22. Offer up the camshaft oil seal (1) previously oiled, inserting it flush with the joint face of the engine-gearbox.

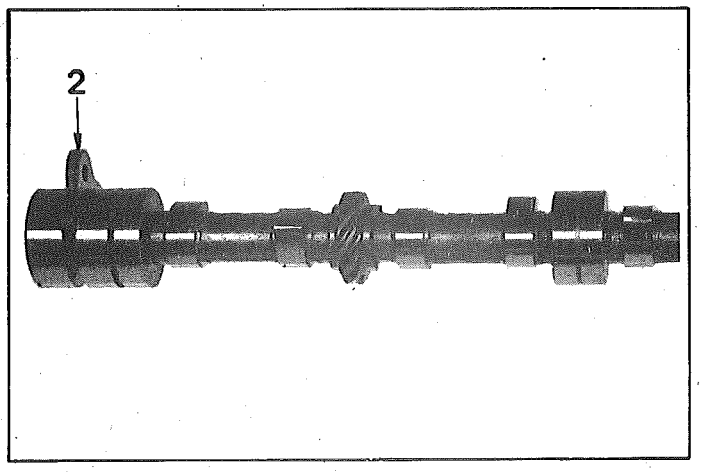
23. Preparing the camshaft.

a) The end float of the camshaft should be between 0.05 and 0.07 mm.

Engage the clamp fork (2) in the camshaft groove.

Using feeler gauges, measure the existing end float, and if it exceeds 0.07 mm, select a clamp fork from those available from our Spare Parts Department, which will give the required clearance.

b) Make sure that the positioning dowel for the camshaft pinion is in position.



24. Fitting the camshaft.

Lubricate the bearing surfaces.

Insert the camshaft in the cylinder block, guiding it in order to avoid damage to the bearing surface.

Fit the clamp fork.

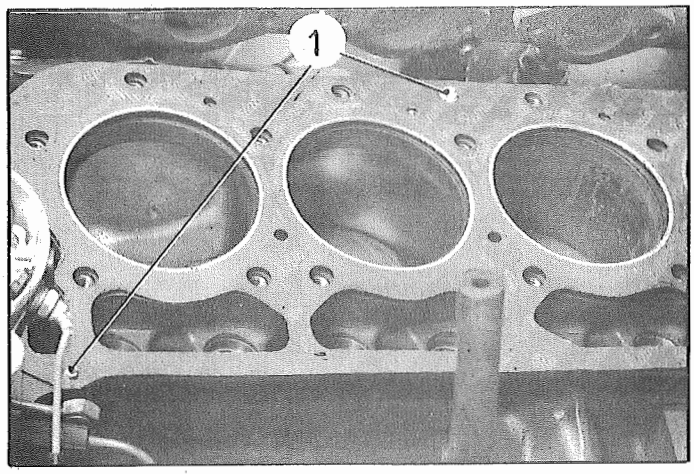
Tighten the securing screws (shakeproof washers under the head) to $12\ ^{+\ 1.5}_{-\ 2}$ ft.lbs. ($1.7\ ^{+\ 0.2}_{-\ 0.3}$ m.kg).

25. Fit the oil pump and sump (see Op. DY.100-3, paragraphs 27 - 28).

26. Fit the timing gear (see Op. DY.120-1, paragraphs 3 and 4).

27. Fit the distributor (see Op. DY.211-0, paragraphs b.c.).

28. Introduce the tappets (previously lubricated) according to the marks made when dismantling.



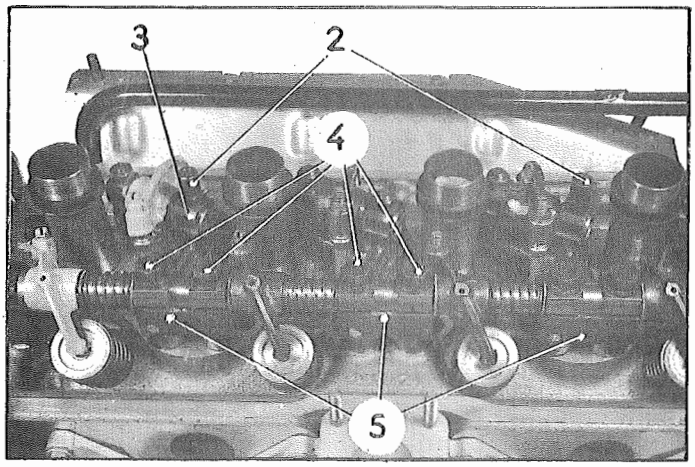
29. Remove the screws holding the cylinder barrels (screw 3074-T).

30. Offer up the cylinder head.

Make sure that the positioning dowels are in place in the cylinder block.

Fit the cylinder head gasket and the cylinder head on the cylinder block.

31. Fit the rocker pushrods according to the marks made when dismantling. The exhaust pushrods are the longer.



32. Fit the inlet rocker line assembly with rocker bearers (5) and the screws (4) securing the cylinder head.

Fit ring seals between the inlet rocker bearers and the cylinder head on the long screws (except on the front screw).

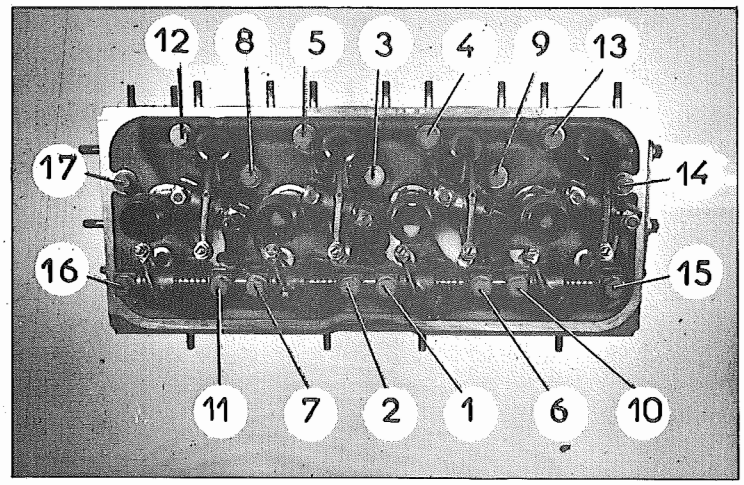
Insert the cylinder head securing screws on the exhaust side.

Tighten the cylinder head screws to 29 ft.lbs. (4 m.kg).

Fit the exhaust rocker assemblies, the oil hole towards the bottom and towards the valve. Fit the caps (3).

Tighten the nuts on the exhaust rocker securing studs to 18 $\pm$ 2 ft.lbs. (2.5 $\pm$ 0.3 m.kg).

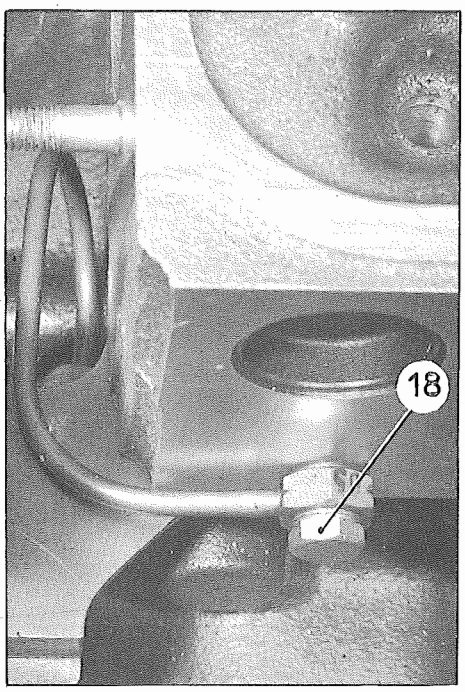
NOTE: The rear nuts (2) securing the exhaust rocker assemblies of No. 1 and No. 3 cylinders are replaced by screws with recessed head, tapped, which serve also for securing the valve cover.



33. Tighten the securing screws holding the cylinder head. Observe the order of tightening shown.

    1st tightening : 29 ft.lbs. (4 m.kg).
    2nd tightening : 43 ft.lbs. (6 m.kg).

During tightening make quite sure that the spherical ends of the tappet adjusting screws are correctly seated in the sockets of the rocker push-rods.



34. Connect up the lubrication pipe (18) for the valve rocker gear.

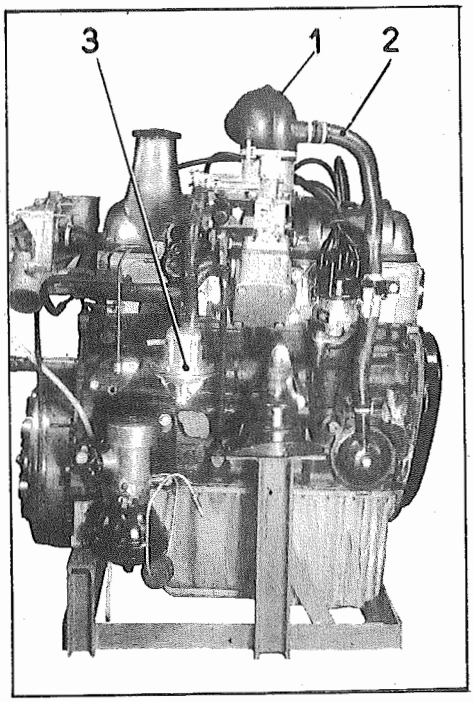
Insert the double gasket.

35. Adjust the valve rocker clearance (see Op. DX.112-0).

36. Fit the cylinder head cover.

a) Fit the gasket on the cylinder head cover.

b) Fit the cylinder head and tighten the screws (brass washers under the heads), to 5.5 ft.lbs. (0.75 m.kg).



37. Fit the rubber elbow (1) from the air filter together with the flexible pipe (2) between the air filter elbow and the breather.

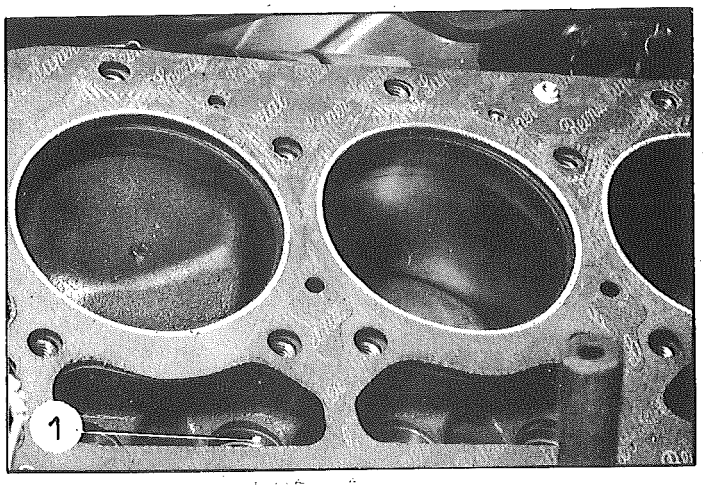
38. Fit the petrol pump (See Op. DY.173-1).

39. Fit:

- the feedpipe between petrol pump and carburettor,
- the pipe assembly for the clutch re-engagement control, inserting the seal plate.

40. Connect the gearbox to the engine (see Op. DY.100-2).

41. Fit the engine-gearbox assembly in the vehicle (see Op. DY.100-1).



REPLACING THE TAPPETS.

Removal.

42. Drain the cooling system (radiator and cylinder block). Save the liquid which contains anti-freeze.

43. Remove the cylinder head (see Op. DY.112-1).

44. Withdraw the tappets from their housings. If necessary use extractor 1608-T.

Assembly.

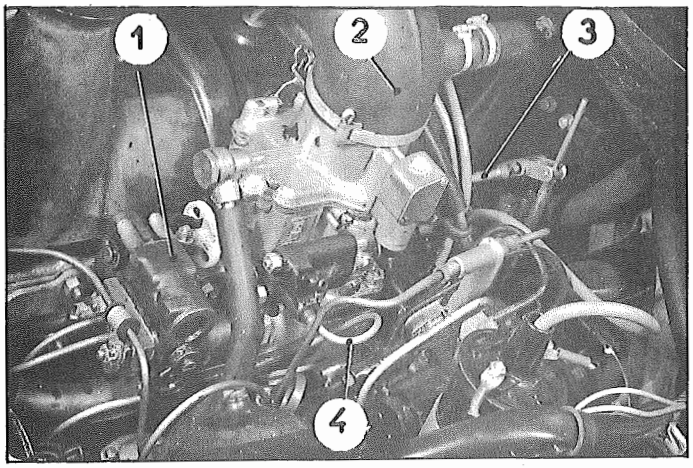
45. Fit the tappets (1) previously lubricated.

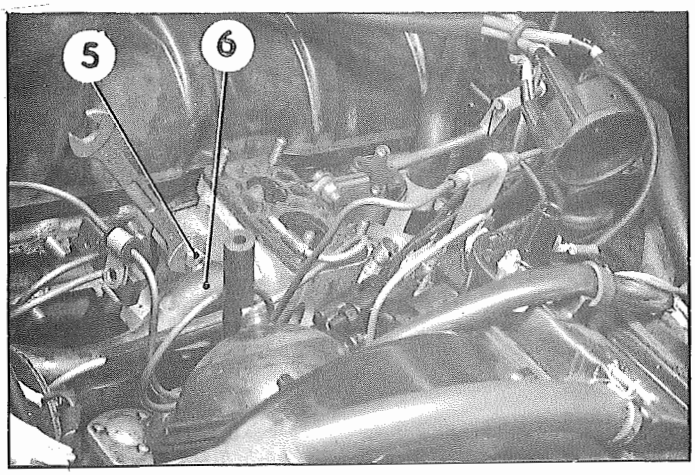
46. Fit the cylinder head (see Op. DY.112-1).

47. Fill up the radiator, with the heater valve open.

    Check the unions for leaks (oil - water).

48. Adjust the idling (see Op. DY.142-0).





REMOVAL.

1. Drain the water from the radiator and cylinder block (save the liquid which contains anti-freeze).
2. Place the height control in "low" position.
3. Disconnect the negative terminal from the battery.
4. Disconnect the carburettor from:
   - the clutch re-engagement control (1),
   - the rubber union (2),
   - the accelerator control (3) and the choke.

Disconnect the accelerated idling device from the pipe (4) coming from the front left-hand brake.

5. Remove the carburettor
   the distributor head
   the front left-hand suspension sphere.
6. Remove the 4 securing nuts and the 4 studs (5) for the manifold.
7. Disconnect the hot spot hose (6) from the inlet housing.
8. Remove the housing.
9. Remove the gasket.

ASSEMBLY.

10. Fit the gasket.
11. Fit the housing.
12. Fit the 4 securing studs (5). Tighten them. Tighten the 4 securing nuts.
13. Connect up the hot spot hose (6).
14. Fit:
    - the front left-hand suspension sphere,
    - the distributor head.

15. Fit the carburettor (see Op. DX.142-1).

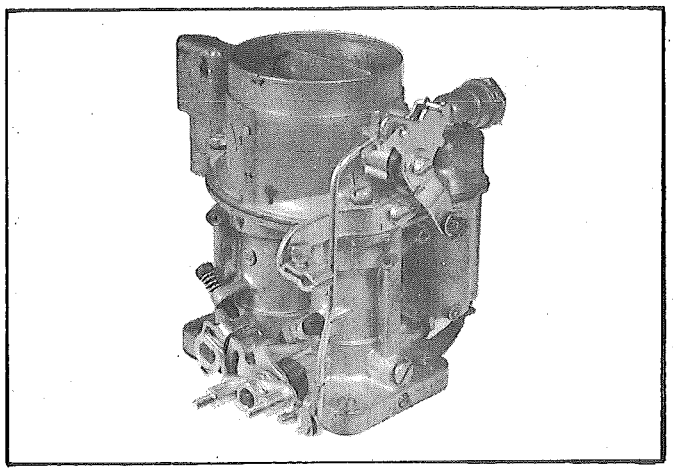
16. Fill up the radiator.

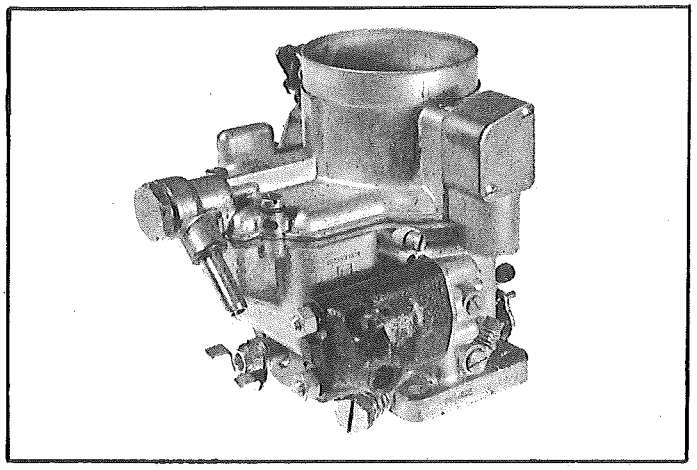
When doing this open the heater valve and bleed the water system.

17. Connect the negative lead to the battery terminal.

18. Adjust the slow running, (see Op. DX.142-0).

19. Bleed the brakes (see Op. DX.453-0).





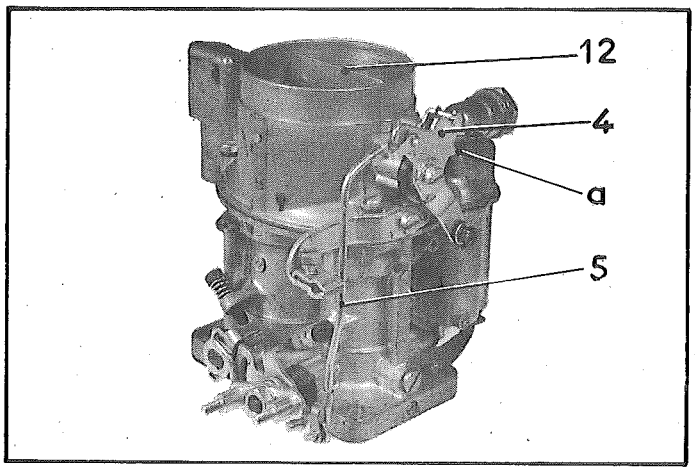
SETTINGS

Carburettor WEBER 28/36 DDE2 and 28/36 DDEA2

	Primary Bore	Secondary Bore
Venturi diameter	23	27
Main jet	120	170
Air correction jet	140	140
Emulsion tube	F16	F16
Diffuser	3.5	3.5
Idling jet	45	55
Air idling jet	185	85

	Primary Bore	Secondary Bore
Progression holes	80	90
	90	120
	120	170
Brass float	11g	
Needle valve	175	
Accelerator pump injector ..	60	
Pump bypass valve	55	

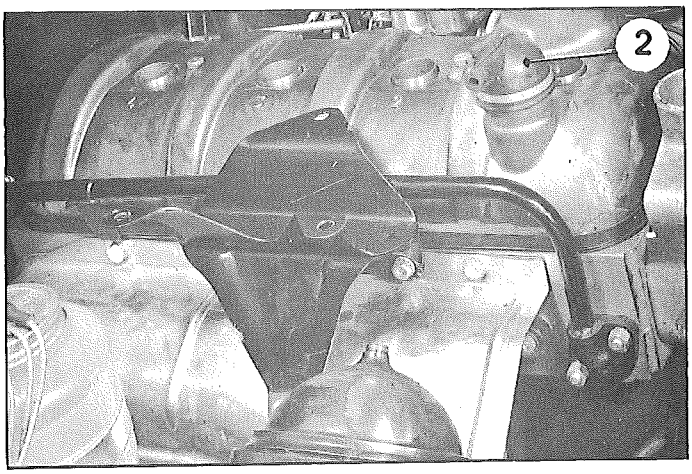
With the strangler flap in the "closed" position, there must be a clearance of 0.90 mm between the edge of the primary butterfly and its bore.



If not, check that:

- the connecting rod (5) is not twisted.
- the clip (a) anchoring the return spring of the control lever (4) of the strangler flap (12) is not deformed.

DISMANTLING and ASSEMBLING: see Op. DX.142-3, pages 2 and following.



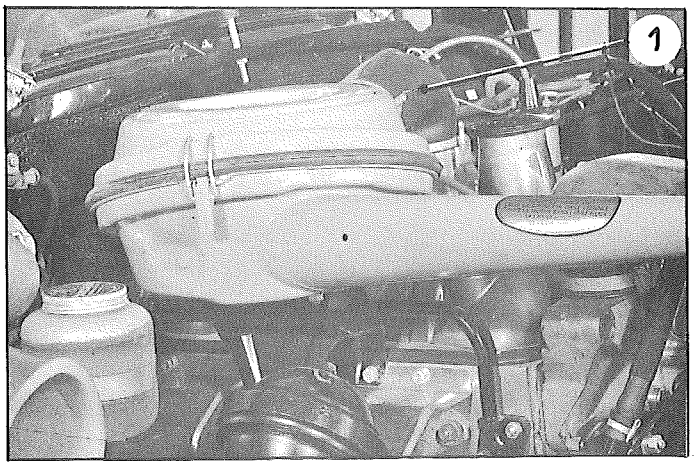
REMOVAL.

1. Remove the clip securing the flexible union (1).
2. Disconnect the flexible union (1) from the air filter.

Disconnect the flexible union (2) between the cylinder head cover and the filter, from the air filter.

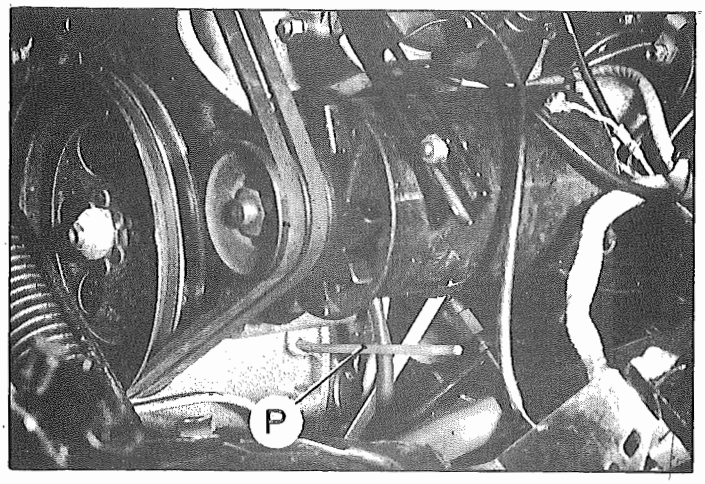
3. Remove the 3 nuts securing the air filter to its bracket.
4. Remove the air filter.

ASSEMBLY.



5. Fit the air filter on its bracket.
6. Connect the flexible union (2) to the filter.
7. Secure the filter on its bracket (3 nuts).
8. Connect up the flexible union (1) on the filter.
9. Tighten the clip.

518.Add.1.



ADJUSTING THE INITIAL IGNITION ADVANCE SETTING.

1. Remove the distributor head and check that the gap at the contact breaker points is 0.45 ± 0.05 mm. If not, adjust it.

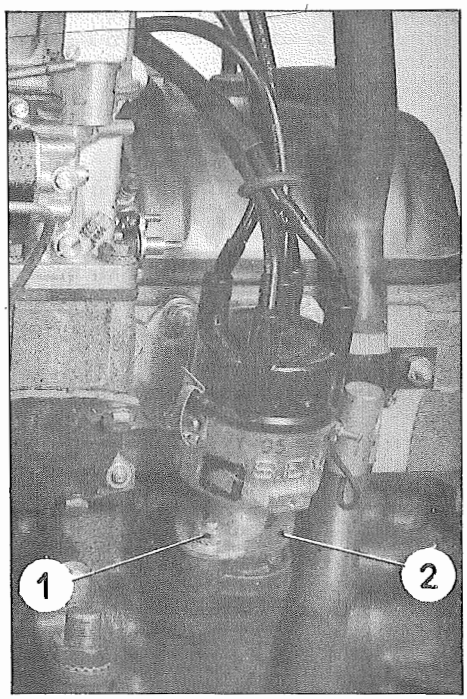
2. <u>To find the position of initial advance on the engine.</u>

a) Release the pressure in the suspension circuit. To do this move the manual height control lever to the "low" position. Make sure that the suspension sphere is free. Remove the front left-hand suspension sphere and screw a plug into the suspension cylinder.

b) Bring No. 1 piston almost to the end of the compression stroke. Insert a 6 mm diameter locating pin (P) into the hole provided in the clutch bell housing (under the dynamo).

Slowly turn the engine until the locating pin falls into the slot in the flywheel. In this position the engine is at the firing point (No. 1 cylinder) i.e. 12° before T.D.C.

c) *WITHDRAW THE LOCATING PIN.*



3. <u>Adjust the ignition.</u>

Fit the leads from a test lamp to the condenser terminal and to earth. Switch the ignition on.

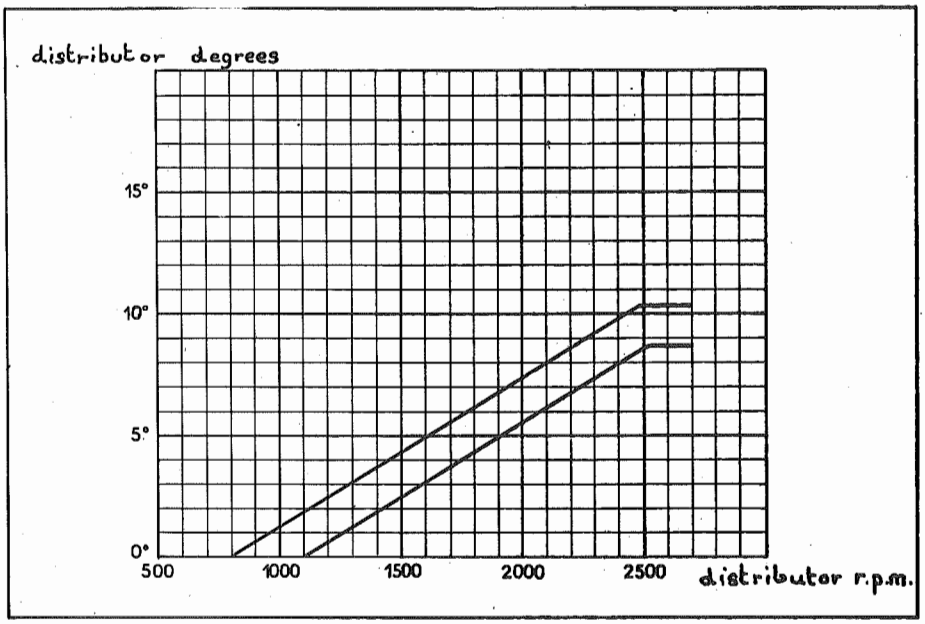
Loosen the 2 securing nuts (1) of the distributor clamp plate (2).

Slowly turn the body of the distributor in an anti-clockwise direction. Stop at the moment the lamp lights, which is the point at which the contacts just open.

Tighten the 2 nuts (1) securing the distributor clamp plate (2).

Switch off.

Centrifugal advance curve : DUCELLIER 4169-A
S.E.V.-MARCHAL A 158



BENCH TEST OF A DISTRIBUTOR

4. Check the condition of the contact breaker points and adjust their gap.

5. Place the distributor in position on the test bench and connect the test bench coil negative terminal to the distributor primary terminal.

6. Check the secondary winding insulation.

Adjust the test-bench spark gaps to 15 mm.

Connect the coil high tension terminal to the distributor central terminal and connect up the sparking plug leads to the spark gaps.

Run the distributor at 1000 r.p.m. for 15 minutes.

There must be no "misses" at the spark gaps.

7. Check the spark grouping.

The 4 sparks must occur at intervals of 90° to within 1° 30' maximum at all speeds (maximum speed of distributor 3000 r.p.m.).

At each point in the speed range the maximum variation of the spark position must not exceed 1° 30'.

8. Check the dwell angles of the contact breakers.

Ducellier Distributor :- 57 ± 2°.

S.E.V. - Marchal Distributor:- 59 ± 2°.

9. Check the adjustment of the automatic ignition advance curve: the actual curve must lie between the minimum and maximum curves on the graph.

NOTE:- a) It is possible to modify the tension of the flyweight springs by bending the spring-fixing clips.

b) If there are sparks at other than the four normal positions, the cam follower contact is bouncing. Check the force necessary to separate the points which must be as follows:

Ducellier Distributor : 700 - 850 g. (24½ to 30 oz).
S.E.V. - Marchal Distributor : 850 - 1000 g. (30 oz. to 35 oz.).

10. Check the primary circuit insulation.

With the condenser removed bring the temperature of the distributor to 60°C. With the contact points open, apply 110V alternating current between the positive terminal and earth, inserting a mains lamp in series. Maintain this for one minute. The lamp must not light. If it does the insulation is defective.

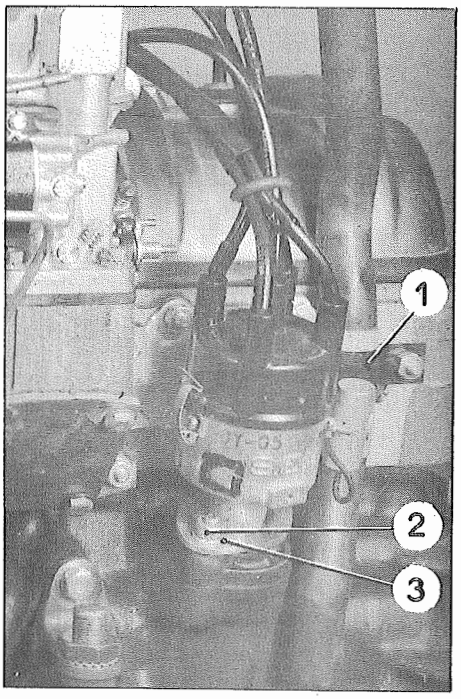
11. Check the condenser.

a) Check the insulation.

Apply 110V across the condenser lead and its casing, inserting a mains lamp in series in the circuit. If the lamp lights the insulation is defective.

b) Check the capacitance.

Use a capacitance meter. The capacitance must be between 0.21 and 0.23µF.



REMOVAL.

1. Hold the bonnet open (stay MR.4158).

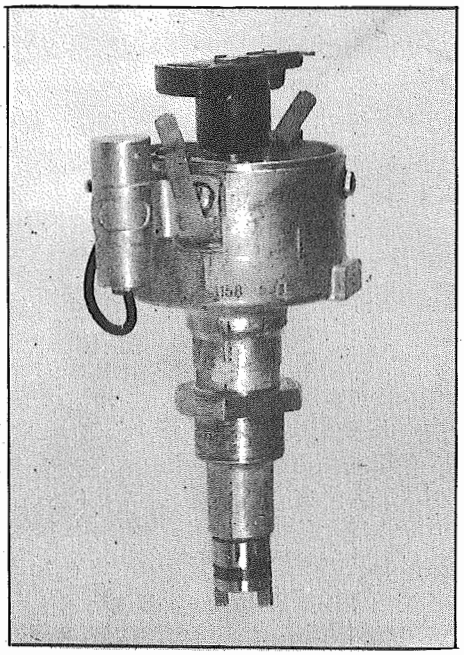
2. Disconnect,
   - the HT leads from the plugs and from the coil,
   - the primary lead to the distributor.

3. Remove the clip (1), free the distributor earth lead.

4. Unscrew a few turns the two nuts (2) holding the clamp plate (3) (use a extra short 12 mm ring spanner, or a carburettor spanner 3081-T).

5. Turn the distributor in a clockwise direction, about one third of a turn, to free it from the clamp plate (3).

   Remove the distributor.

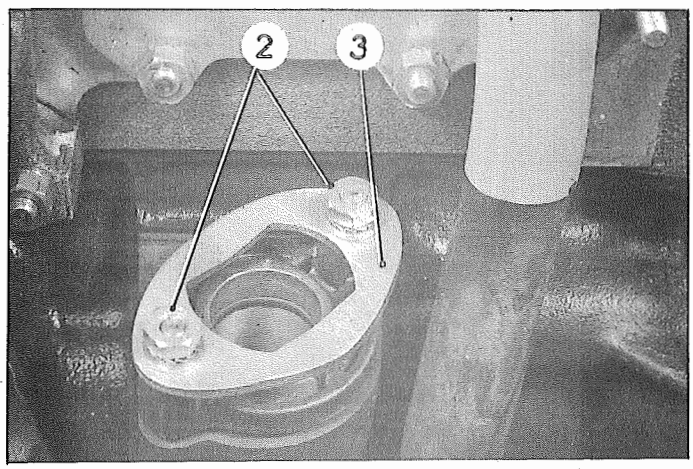


ASSEMBLY.

6. Remove the distributor head. Put the distributor in place in its housing. Make sure the flats on the distributor correspond with those in the clamp plate (3) and turn the rotor to ensure that the distributor drive dog is correctly engaged with its drive slot.

7. Secure the distributor under the clamp plate (3) by turning it anti-clockwise about one third of a turn. The condenser must be towards the rear of the engine.

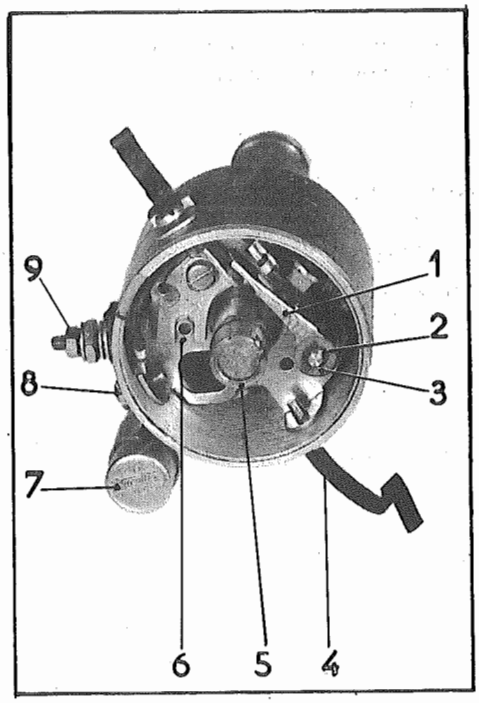
8. Connect the earth terminal under the clip (1), and tighten the nut (shakeproof washer).



9. Connect up:
   - the leads to the plugs and the coil,
   - the primary lead to the distributor.

10. Adjust the initial ignition setting (see Op. DY.211-0).

11. Tighten the 2 nuts (2) on the clamp plate under the distributor (extra short ring spanner, 12 mm, or spanner 3081-T).



DISMANTLING.

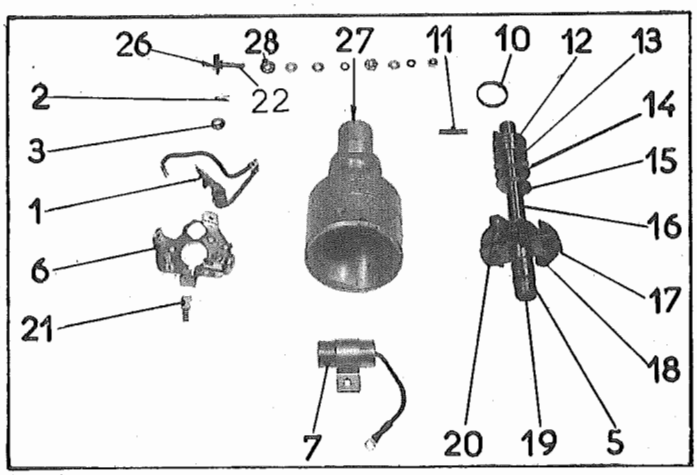
1. Remove the distributor head with the leads.

Free the rotor arm.

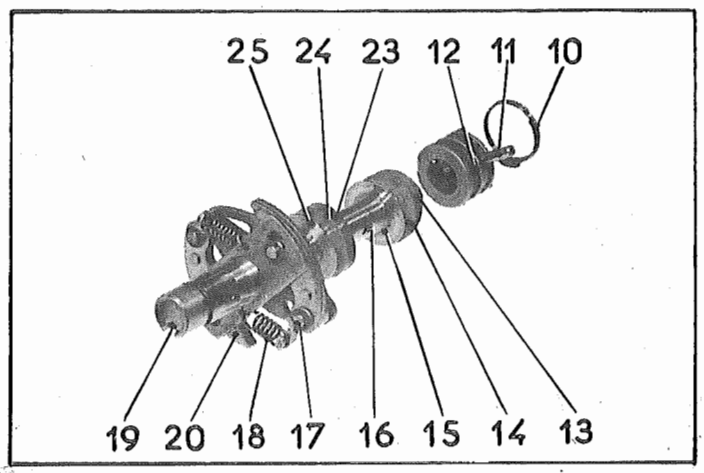
2. Free the condenser
   - loosen the nut (9) and withdraw the steel washers and spring washer,
   - remove the screw (8) securing the condenser and contact-carrier plate.

3. Free the spring clips (4) securing the distributor head,
   - remove the circlip (2) and the washer (3) from the moving contact,
   - free the primary terminal (22) with its insulating pad,
   - withdraw the contact carrier-plate (6), holding the cam follower (21) away from the cam,

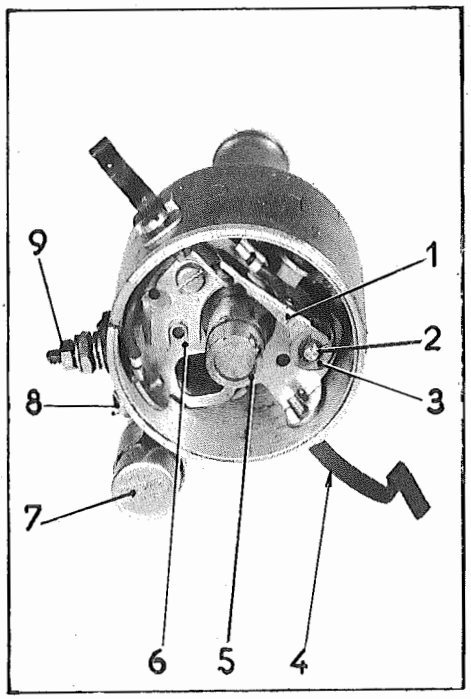
   remove the moving contact (1).



4. Remove the spring (10) which acts as an oil return,
   - tap out the pin (11) from the driving dog (12),
   - remove the driving dog (12), the steel washer (13), the celoron washer (14), and the washer (15).



5. Withdraw the drive spindle (16) from the body of the distributor
   - withdraw the steel washer (23), the celoron washer (24) and the steel washer (25),
   - remove the circlips (17) unhook the springs (18) and the lubrication felt (19),
   - remove the screw limiting cam end-float from under the felt (19).



- remove the cam (5) and the automatic advance fly-weights (20).

6. Clean all the parts.

ASSEMBLY.

7. Prepare the drive shaft.

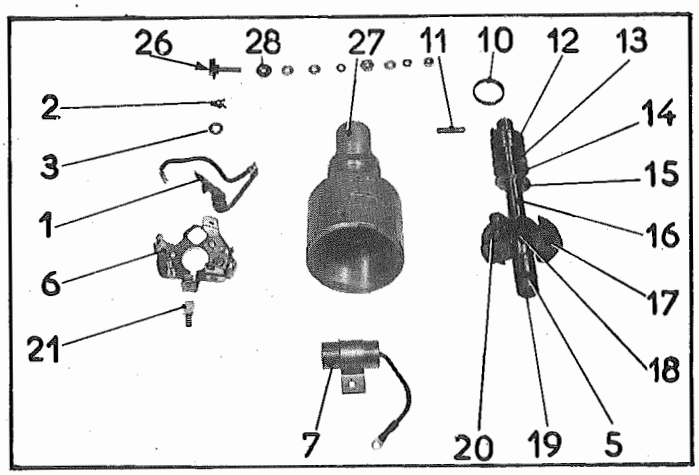
If the weights show abnormal clearance on their pivots, renew them.

Check the condition of the slots in the cam base-plate, and if necessary renew it.

Place the weights (20) in position after lightly oiling their pivots.

Engage the cam (5) on the shaft (16). Fit the screw limiting cam end-float (plain and shakeproof washer). Hook up the springs (18) and fit the circlips (17). Fit the felt (19) soaked in oil.

Fit the steel washer (25) the celoron washer (24) and the steel washer (23) on the driveshaft.

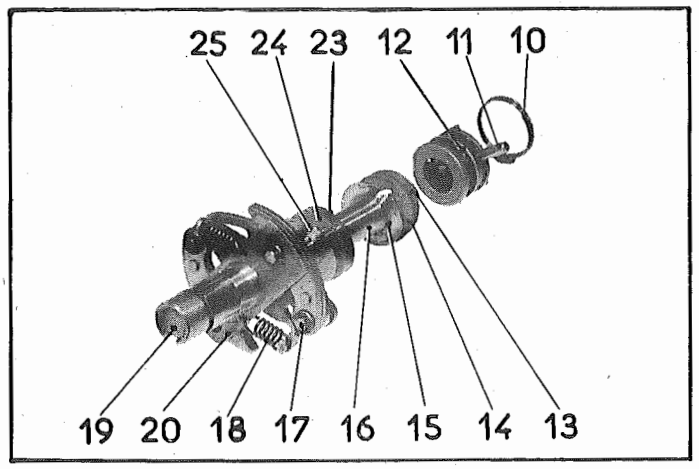


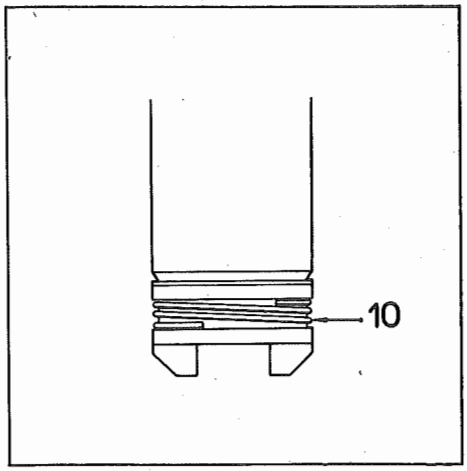
8. Oil the shaft (16) and insert it in the distributor body.

On the end of the shaft (16) place the steel washer (15) the celoron washer (14) and the steel washer (13).

Provisionally fit the drive dog (12) and the pin (11) and check that the spindle turns freely without end-float.
If not, change the number of adjusting washers (13).

Engage the drive dog on the driveshaft with the offset on the side away from the slot into which the rotor engages on the cam (5).





Fit the spring (10) which acts as an oil rejector, making certain that the spirals are left-handed.

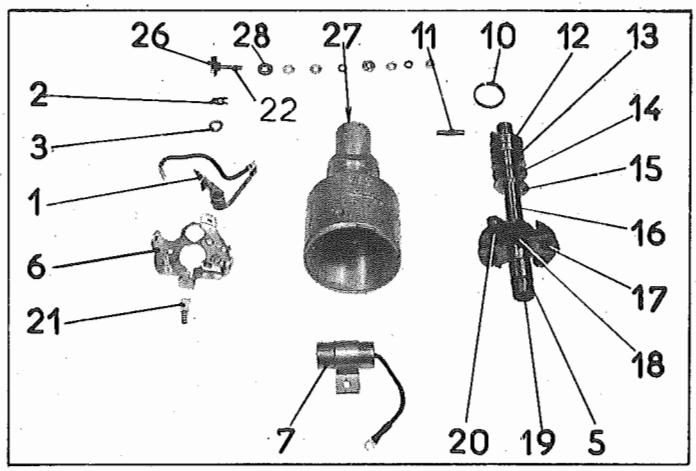
NOTE:

If the coils of the spring are reversed, they will allow oil to rise up into the distributor instead of rejecting it.

9. Fit the plate (6) guiding the cam follower (21) into position.

Make sure that the cam follower is correctly positioned in relation to the plate after fitting.

Fit the spring clips (4) securing the distributor head to the plate (6) and the condenser (7) (shakeproof washer, condenser clip, spring washer).



10. Fit the insulating sleeve (26) on the primary terminal (22).

Fit the moving contact (1) compressing its spring.

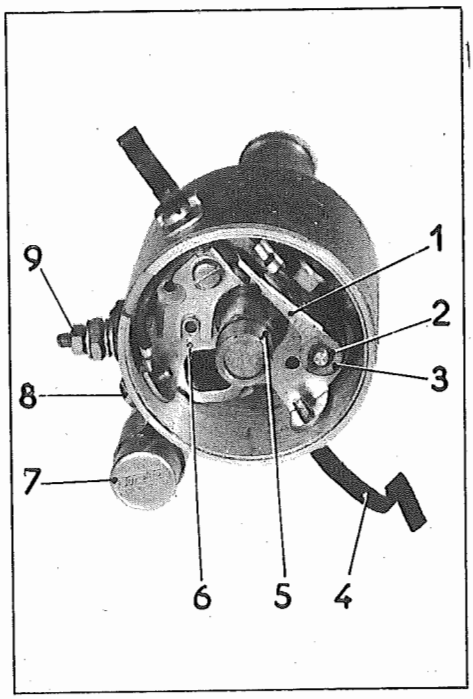
Insert the primary terminal thus prepared in the body of the distributor (27).

Fit the insulating washer (3) and the circlip (2).

Fit the insulating washer (28) and the steel washer.

Connect up the condenser (7).

Fit the steel washer and spring washer and tighten the nut.

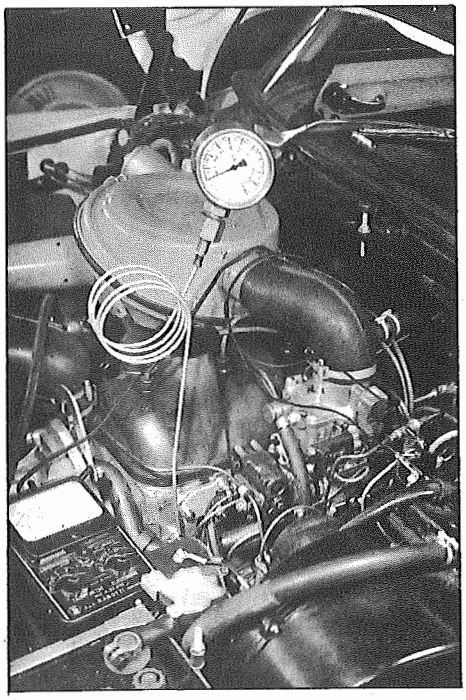


11. Adjust the contact gap to 0.45 $\pm$ 0.05 mm.

12. Fit the rotor arm.

13. Fit the distributor head with its leads.

NOTE: When overhauling a distributor, we recommend rubbing with fine emery the end of the rotor and the inside of the contacts in the distributor head to clear away any oxides which hinder the passage of the H.T. current. The contact points must be renewed if they show any signs of pitting or other defect.



CONTROL.

1. Start the engine and leave it running in order to bring the oil temperature to about 60°C.

   Stop the engine.

2. Remove the screw from the oil feedpipe to the cylinder head.

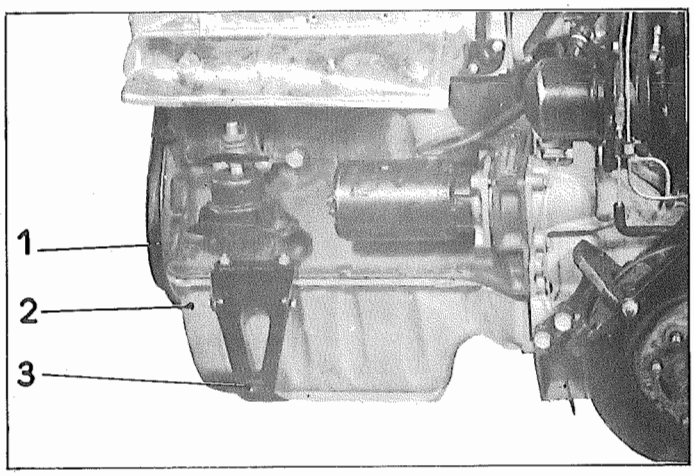
   Connect in its place a pressure gauge, using union MR.3705.

3. Connect an electric tachometer 2436-T to the coil, then start the engine and let it run at 2000 r.p.m.

   Read the pressure on the gauge. This should be 54 p.s.i. (3.8 kg/cm^2).

4. Stop the engine, remove the gauge and replace the cylinder head lubrication screw, inserting a double copper sealing washer.

NOTE: If the pressure is not correct the oil pump must be removed (see Op. DY.220-1) and overhauled (see Op. DX.220-3).



REMOVAL.

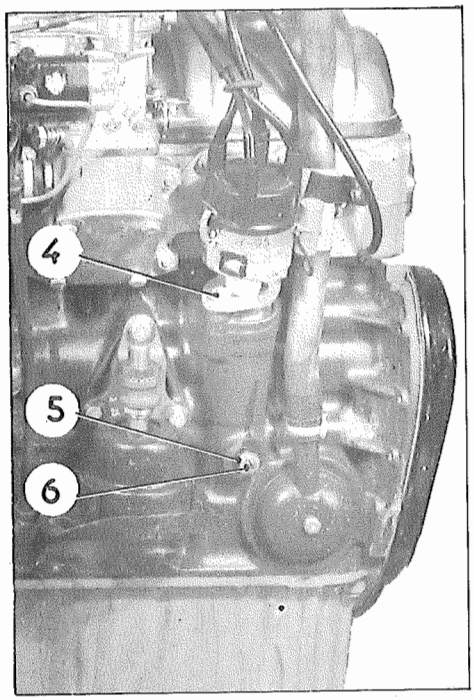
1. Remove the engine-gearbox assembly (see Op. DY.100-1).

Leave the engine-gearbox assembly suspended from a pulley block.

Drain the oil from the engine.

2. Remove:

- the timing case cover (1),
- the bracket (3) securing the exhaust down-pipe,
- the sump (2).



3. <u>Remove the distributor.</u>

a) Loosen the nuts (4) securing the clamp-plate.

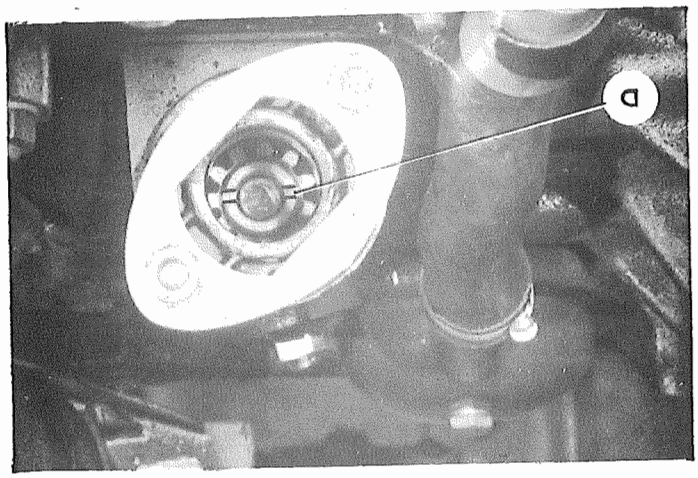
b) Turn the distributor about 90° and free it.

4. <u>Remove the oil pump.</u>

Loosen the locknut (5), remove the screw (6) securing the oil pump.

Loosen the screw holding the securing lug for the oil pump on No. 3 bearing.

Free the pump.



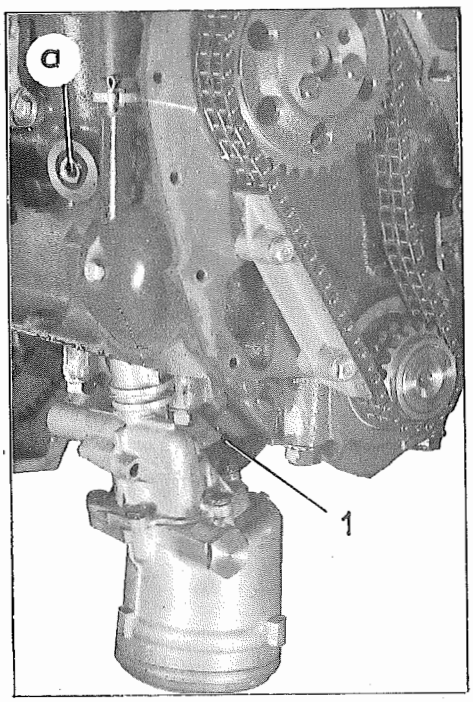
ASSEMBLY.

5. Fit the oil pump. u/c

Place No. 1 piston at T.D.C. at the end of the compression stroke.

Insert the oil pump.

NOTE: After meshing the pinions the driving slot for the distributor (a) must be parallel with the centre line of the camshaft, with the small offset side towards the engine.

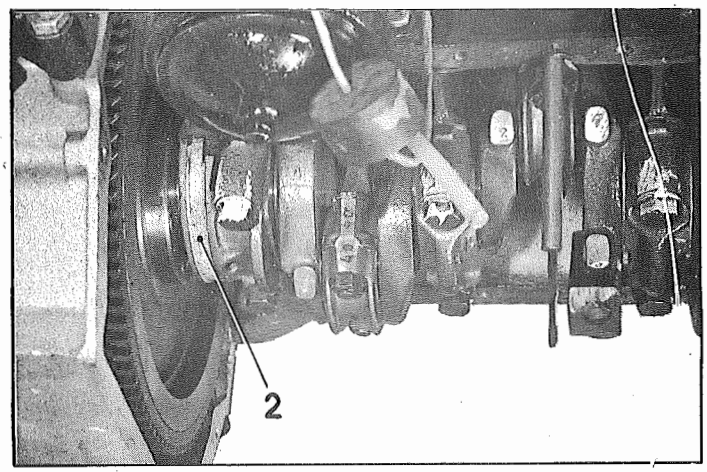


Bring the tapered hole in the pump body in line with the tapped hole (a) for the pointed screw securing the oil pump.

Tighten the pointed screw to 4 ± 0.75 ft.lbs. (0.6 ± 0.1 m.kg), after having smeared it with sealing compound).

Tighten the locknut (smear the surface contacting the crankcase with sealing compound).

Tighten the screw securing the lug (1) of the oil pump on No. 3 bearing to 25 ± 3.5 ft.lbs. (3.5 ± 0.5 m.kg).



6. Fit the sump.

a) Place the self-adhesive cork gasket (2) in the groove of the bearing cap at the flywheel end.

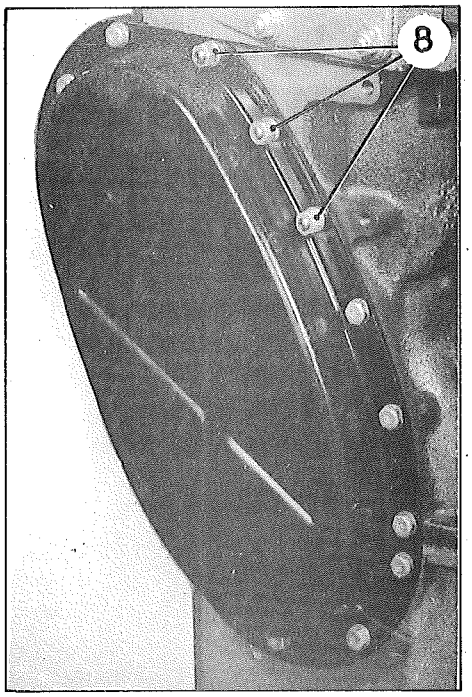
Smear with sealing compound the 2 contact faces of sump on cylinder block.

b) Offer up the sump.

Fit the bracket for the exhaust downpipe, right-hand side of engine.

Fit the screws securing the sump (2 long screws with shakeproof washers under the heads, for securing the exhaust downpipe, and one at the rear left-hand in the longest boss of the sump).

Tighten all the screws to 22 $^{+\ 3.5}_{0}$ ft.lbs. (3 $^{+\ 0.5}_{0}$ m.kg) and the nuts securing the exhaust down-pipe.



7. Fit the timing case.

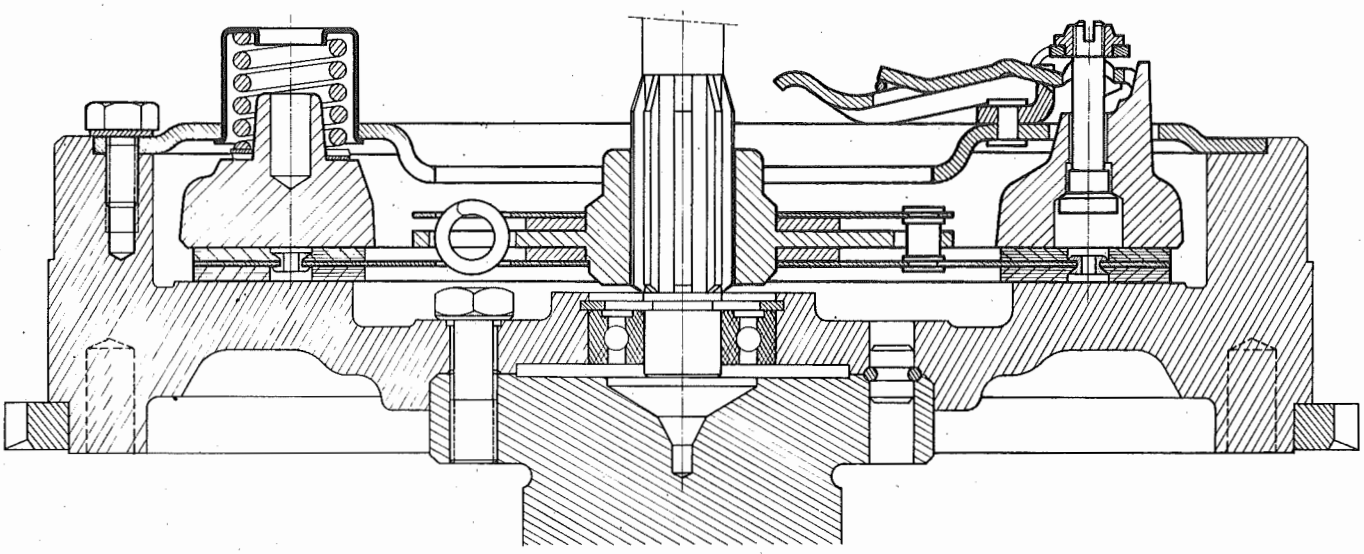
Insert the cork gasket.

Fit the cover with three nuts (8) (distance piece under the nut) and the screws (plain washers under the head). Tighten the screws and nuts to $12\ ^{+\ 0.75}_{-\ 2}$ ft.lbs. ($1.7\ ^{+\ 0.1}_{-\ 0.3}$ m.kg).

8. Fit the distributor.
(See Op. DY.211-1).

9. Fill up the engine with oil (9 pints (5 litres) of oil SAE 10 W 30).

10. Fit the engine-gearbox assembly in the car.
(See Op. DY.100-1).



SPECIAL POINTS

Adjustment of the speed at which the clutch begins to engage 700 to 750 r.p.m.

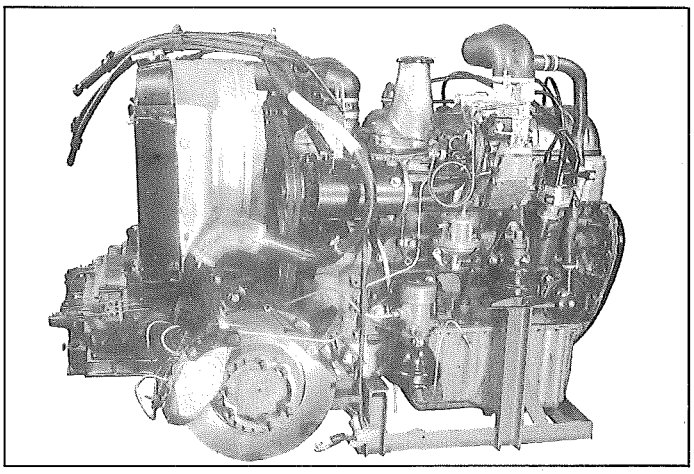
Tightening torque for the screws securing the clutch mechanism to the flywheel = $18\ ^{+2}_{-3}$ ft.lbs. ($2.5\ ^{+0.3}_{-0.4}$ m.kg).

After rectification : the distance between the face of the clutch disc and the clutch driving plate on the engine flywheel = $29\ ^{+0.2}_{0}$ mm.

Springs :

Marking	Length	Under a load of
Mauve	27.3 mm	$60.75\ ^{+2.5}_{0}$ kg.
Green normandy	27.3 mm	$40\ ^{+2}_{0}$ kg.

Adjustment of the toggles can only be carried out on a special fixture.



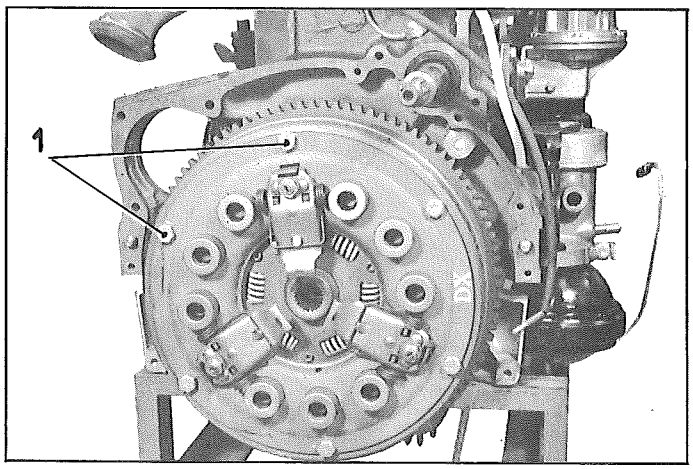
REMOVAL.

1. Remove the engine-gearbox assembly (see Op. DY.100-1).
2. Disconnect the gearbox from the engine (see Op. DY.100-2).
3. Remove the clutch unit. With a centre punch mark the position of the clutch plate on the engine flywheel.

Remove the screws securing the mechanism.

Free:

- the clutch mechanism,
- the disc.

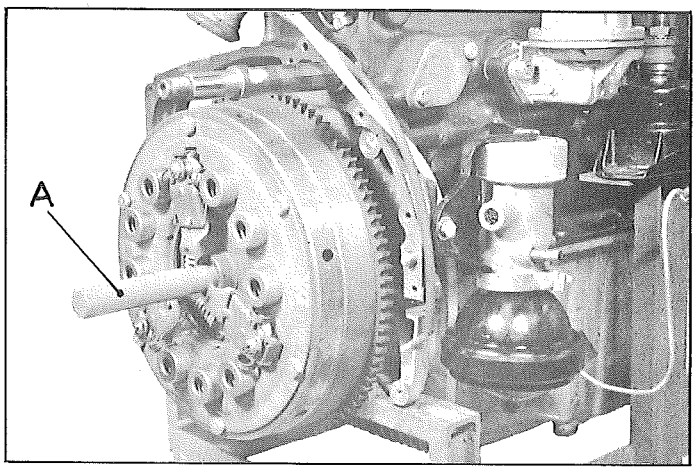


ASSEMBLY.

4. Make quite sure that the faces on the clutch mechanism which contact the flywheel are perfectly clean and free from scratches etc.
5. Offer up the clutch disc and centre it by using a mandrel (mandrel 3016-T) (A). If not available use an old mainshaft.
6. Fit the clutch unit in accordance with the marks made when dismantling.

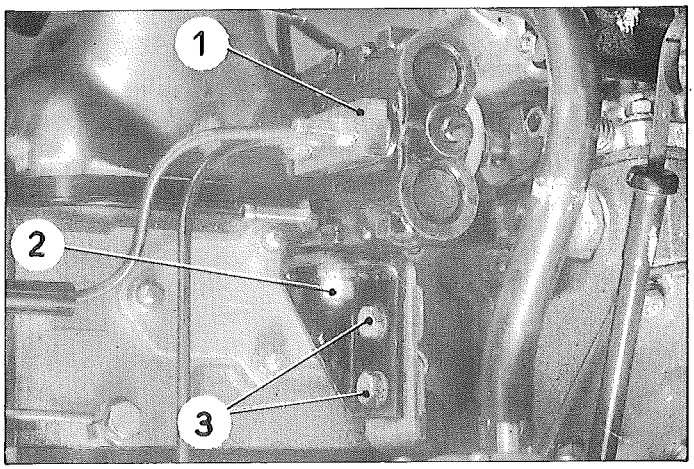
Tighten the screws (1) (spring washers under the heads) to 18 $^{+2}_{-3}$ ft.lbs. (2.5 $^{+0.3}_{-0.4}$ m.kg).

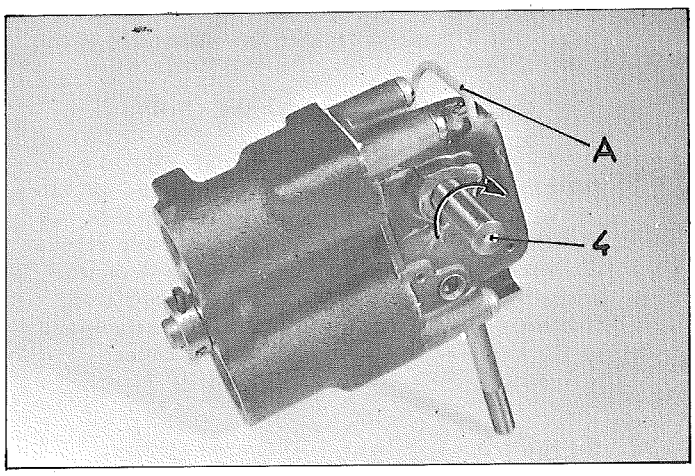
During tightening, make sure that the mandrel slides freely in the splines to ensure correct centring of the disc.

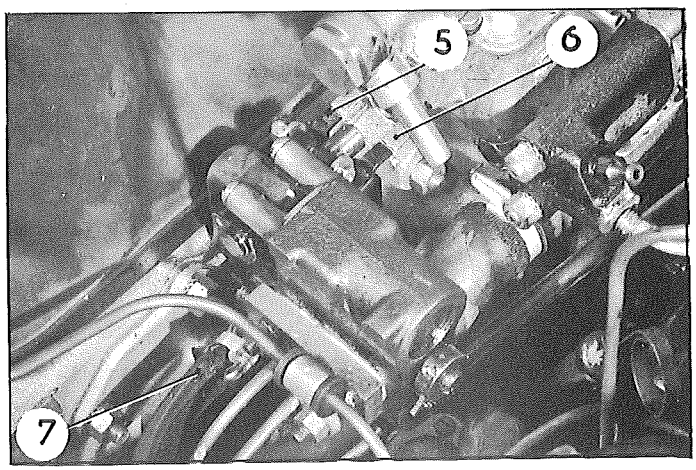


NOTE: If there are 12 holes in the clutch housing and 6 tapped holes in the flywheel the clutch mechanism should be fitted so that 3 screves (1) are in line with the toggles.

7. Connect the gearbox to the engine (see Op. DY.100-2).
8. Fit the engine-gearbox assembly (see Op. DY.100-1).







REPLACEMENT OF A CLUTCH RE-ENGAGEMENT CONTROL.

Removal.

1. Release the pressure (see Op. DX.00). Remove the front left-hand suspension sphere.
2. Disconnect:
   - the union flange (1) and remove the clip holding the pipe from the regulator and the seal plate,
   - the return pipe (7) to reservoir,
   - the petrol feedpipe from the carburettor,
   - undo the screw on the control lever (5) and move it towards the re-engagement control.
3. Remove the securing nut (2) from the control. Remove the clutch re-engagement control and do not lose the nylon ring.

Assembly.

NOTE: The clutch re-engagement control as sold by our Spare Parts Department has a pin "A" fitted in it which locates its position for functioning correctly. Avoid withdrawing this pin so as not to interfere with the setting. If this pin is not in position, proceed as follows:

4. Setting the angular adjustment of the clutch re-engagement control.

Remove the closing plug from the setting hole. Insert the pin "A" in this hole. Turn the clutch re-engagement spindle (4) in the direction of the arrow until the spring resistance is felt; overcome this resistance to reach a stop. Now turn back about 30° until the pin "A" enters and bottoms.

NOTE: When the spindle is in contact with the stop the pin "A" can still be introduced but correct adjustment is not achieved.

5. Aligning the clutch re-engagement control.

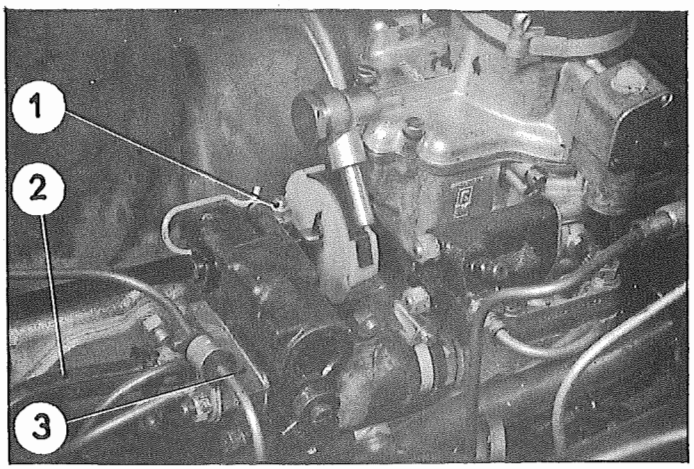
Fit the clutch re-engagement control with its control lever (5) not tightened.
The spindles of the engagement control and of the carburettor must be in line. There are two adjustments for effecting this.

a) Height adjustment.

Turn the carburettor spindle to bring the control lever lugs (6) in the horizontal plane. Do the same with the re-engagement control, turning the lever on the spindle.
Loosen the screws (3) and move the clutch re-engagement control with its support so that the lever lugs are in the same plane. Tighten the screws (3).

b) Transverse adjustment.

Turn the carburettor spindle and the clutch engagement control lever (5) so that the lugs are vertical. Loosen the nut (2) and move the re-engagement control unit towards or away from the engine in its slot so that the lever lugs are in one plane. Tighten the nut (2).



6. Fit the nylon flector.

Remove the carburettor (see Op. DX.142-1).

Withdraw the clutch re-engagement control lever to the maximum towards the control and fit the flector on the clutch re-engagement control lever.

Fit the carburettor (see Op. DX.142-1) and fit the nylon flector on the carburettor control lever.

7. Connect:

- the flanged union (3), inserting a seal plate,
- the return pipe to the reservoir,
- the petrol delivery hose to the carburettor.

8. Put the accelerator control in the "idling" position.

Engage the clutch re-engagement control lever in the flector so as to leave an end-float at the flector of 0.5 mm. Tighten the clamp (1) of the control lever.

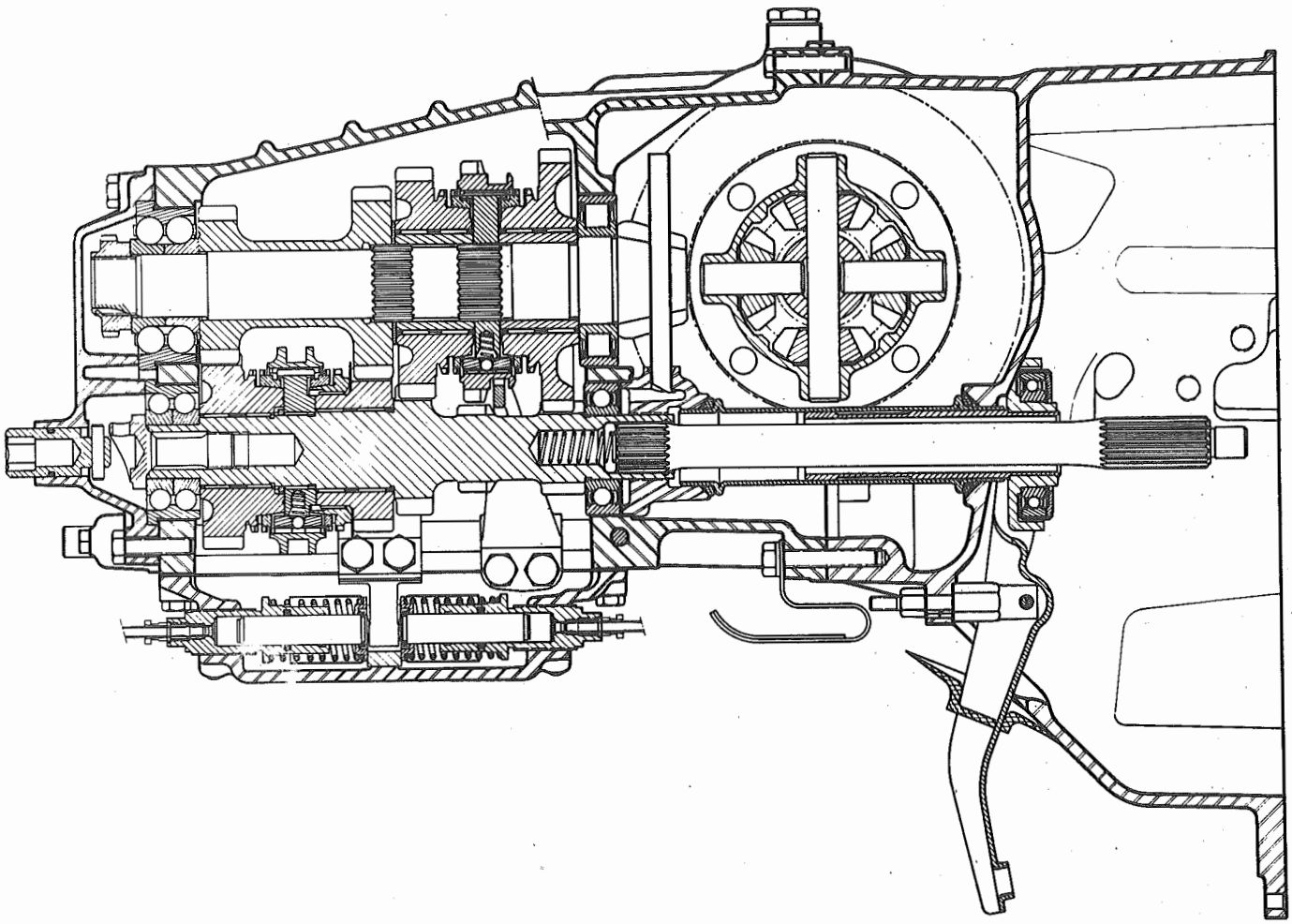
Withdraw the pin (A) and replace the closing plug.

NOTE: Depress the accelerator pedal fully to open the carburettor butterfly fully. Hold the spindle of the clutch re-engagement control in this position to prevent it from turning. Now release the accelerator control, when the carburettor butterfly must return to its "idling" position. If it does not, check and correct the alignment of the carburettor-clutch re-engagement assembly.

9. Fit the front left-hand suspension sphere.

Start up the engine.

Put the circuits under pressure and check all unions for leaks.



SPECIAL POINTS

IMPORTANT NOTE: Replacement of the gearbox can only be carried out by removing the engine-gearbox assembly (see Op. DY.100-1 and DY.100-2).

Clutch housing.

Distance between thrust race guide screw and housing joint face = 94 - 95 mm.

Main shaft.

Synchro clearance j = 0.10 max.
Tightening torque for nut : 108 - 112 ft.lbs. (15 - 17 m.kg).

Bevel pinion shaft.

Tightening torque for end nut = 144 - 158 ft.lbs. (20 - 22 m.kg).

Forks and operating dogs.

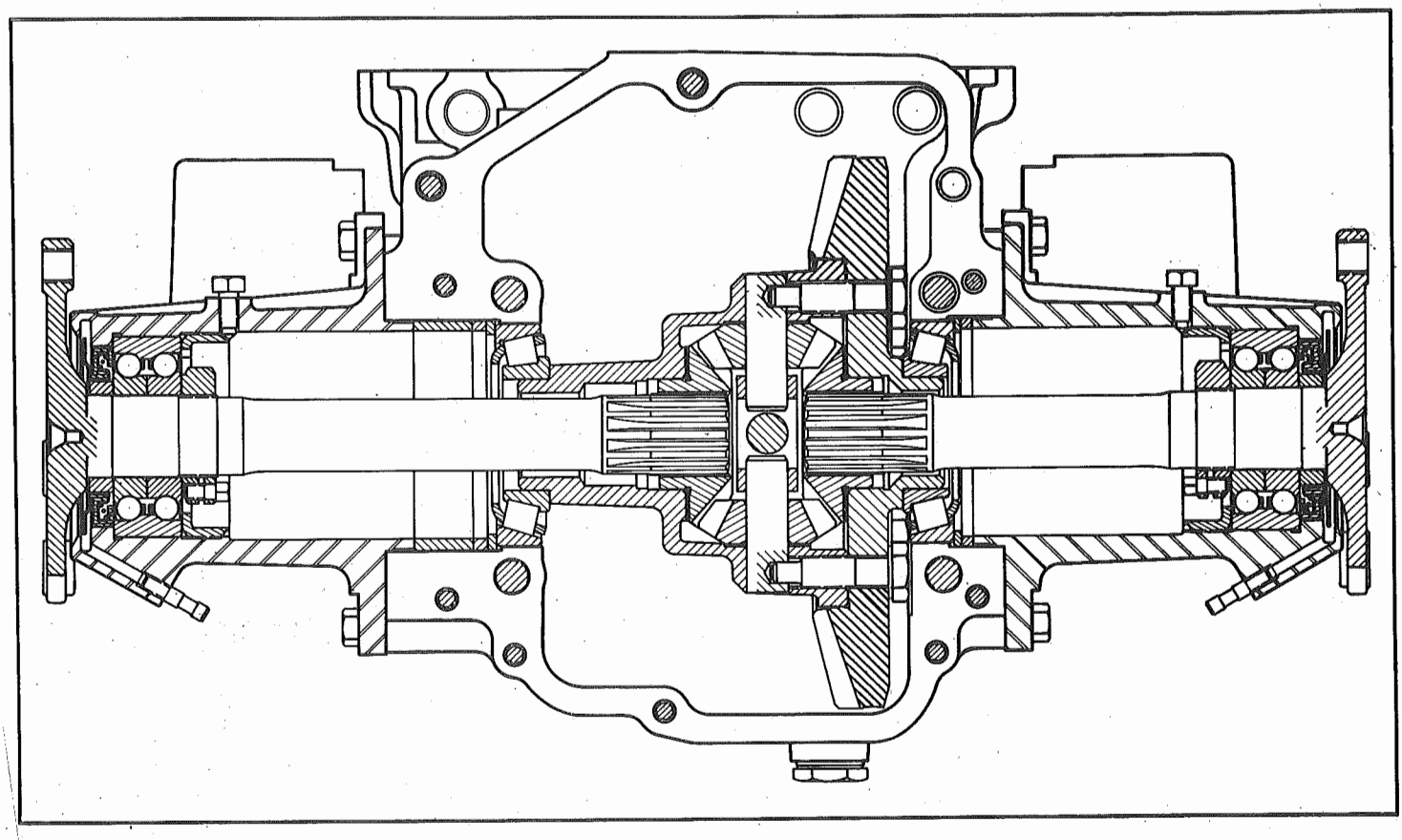
Tightening torque for screw = 29 ft.lbs. (4 m.kg).

Adjusting the gear travel (except reverse gear).

Clearance between slider and the loose pinion : j = 0.4 - 0.6 mm.

Clutch lock.

Clearance between clamp and head of securing screw for cover = 1.7 mm minimum, with first gear engaged.



SPECIAL POINTS

Differential.

Planet gear end-float j = 0.1 mm minimum.
Tightening torque for crown wheel screws 84 - 94 ft.lbs. (11.7 - 13 m.kg).

Differential shaft.

Tightening torque for nut (outer cage): 72 ft.lbs. (10 m.kg).
Tightening torque for bearing nut (inner cage): 108 ft.lbs. (15 m.kg).

Crown wheel and pinion.

Obtain the conic distance etched on the bevel pinion. Clearance between teeth on crown wheel and pinion j = 0.16 - 0.24 mm.

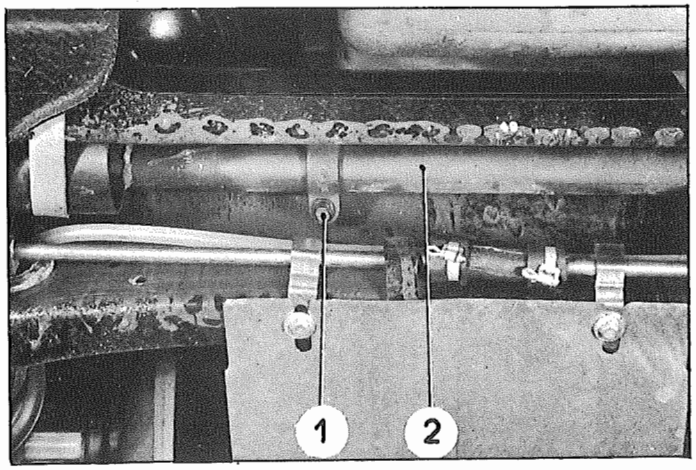
We have not considered the overhaul of this unit, as the operation usually requires replacement of all the parts.

SPECIAL POINTS

For removal and assembly instructions see Operation DX.372-00.

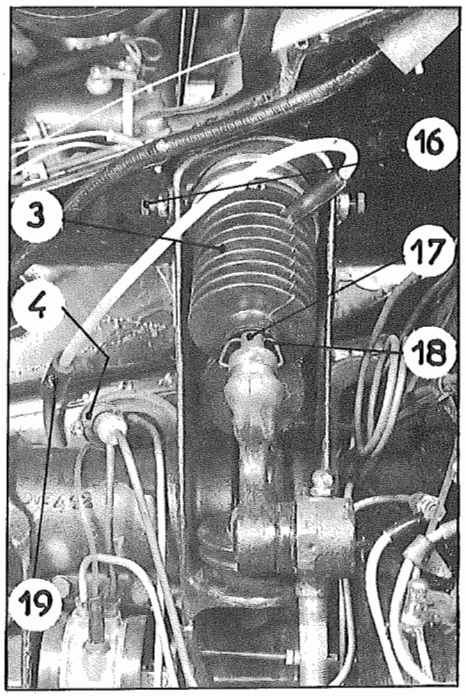
The characteristics of the equipment used on this vehicle are the same as those described in Operation DX.391-00.

The characteristics of the component parts of the front axle of this vehicle are the same as those described in Operation DX.410-00.



5. Remove:
   - the protection shields of the suspension mechanism,
   - the lower protection shield on the side on which the half-axle is to be removed.
6. Loosen the screw (1) on the clamp securing the height corrector control bar to the anti-roll bar (2).
7. With paint, mark the position of the sleeve (9), then loosen the clamp screws and remove the 2 sleeves.

NOTE: The left-hand sleeve has a left-hand thread at one end and a right-hand thread at the other end. The right-hand sleeve has a right-hand thread at both ends.

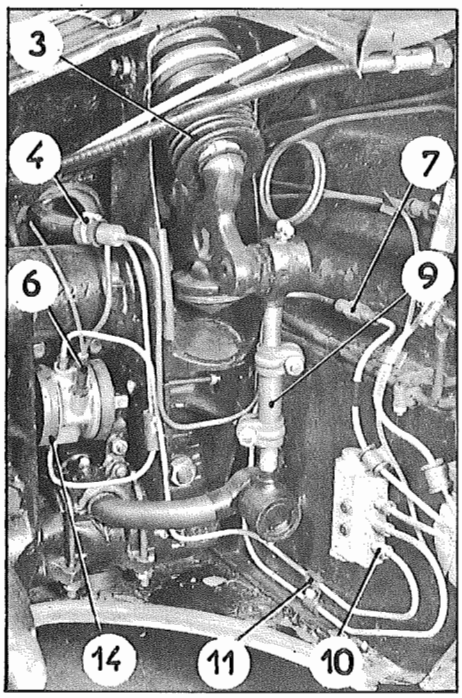


REMOVAL.

1. Loosen the nuts on the front wheels. Put the vehicle on stands (stand 2505-T).

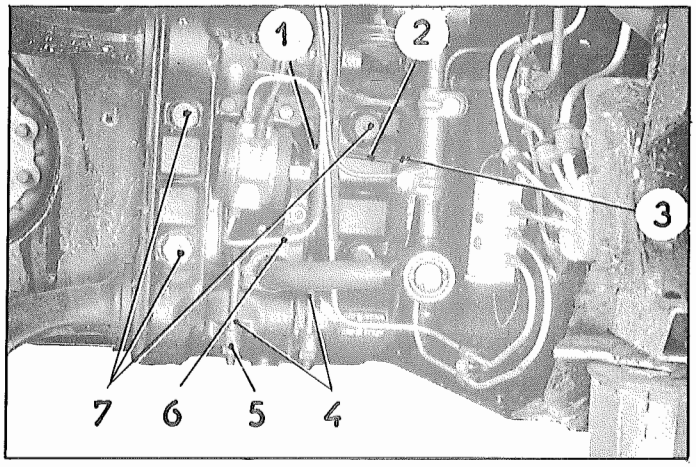
Remove the front wheels.

2. Remove the sparewheel, the sparewheel support and the front wings.
3. Release the pressure (see Op. DX.00).
4. Remove the driveshafts from the side on which the half-axle is to be removed (see Op. DX. 372-1).



8. Disconnect the unions (14), (10) and (7), the overflow return (6) as well as the return pipe (4).
9. Loosen the screw (11) and remove the height corrector.
10. <u>Removing the suspension cylinder:</u>
    - Remove the suspension sphere and its distance piece.
    - Disconnect the union from the cylinder feed-pipe.
    - Disconnect the dust cover (3) from the control lever.
    - Remove the pin (18).
    - Push the arm down as far as possible and disengage the rod (17).

NOTE: The holes for the pin in the rod and in the lever must be in line in order to free the rod from the lever.
- Loosen the locknuts and the screws (16).
- Disconnect the rubber union (19) from the overflow return pipe and remove the suspension cylinder.

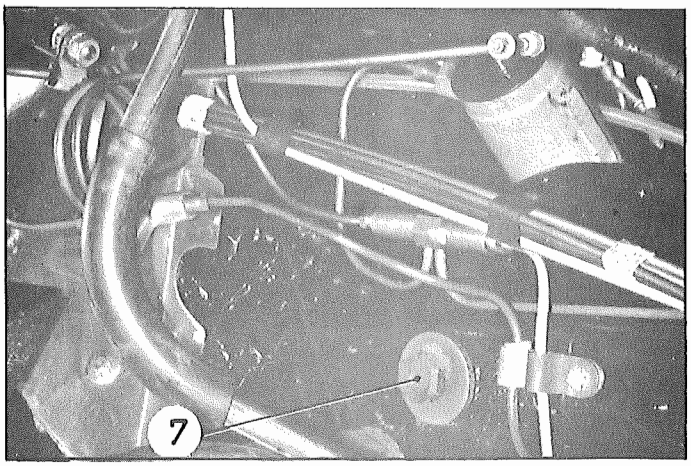


11. Removing the height control rod (2).

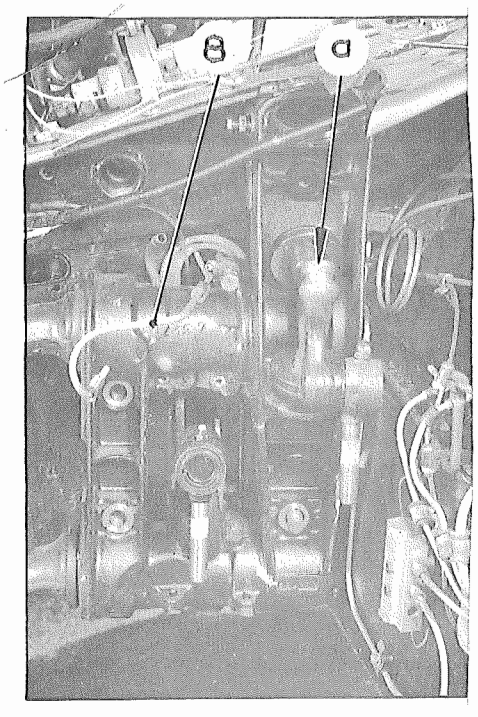
- Put the height control in "high" position, loosening the locknut and removing the nut (1).
- Loosen the locknut (3) and remove the rod (2).

12. Removing the anti-roll bar bearing clamp.

- Remove the nuts (5) and the clamps (4).
- Remove the clamp (6).



13. Remove the 5 screws (7).

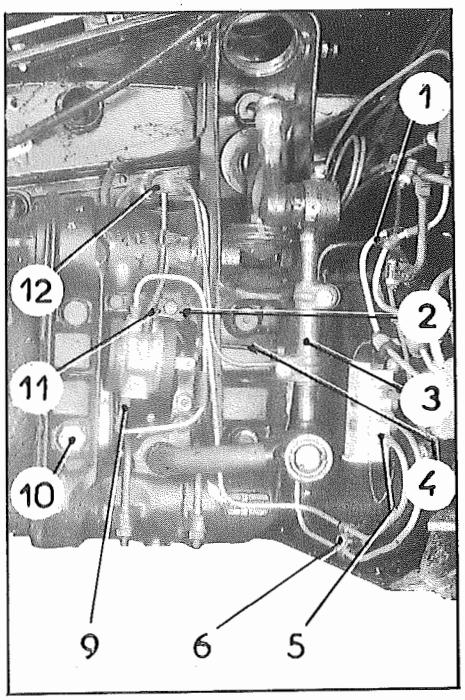


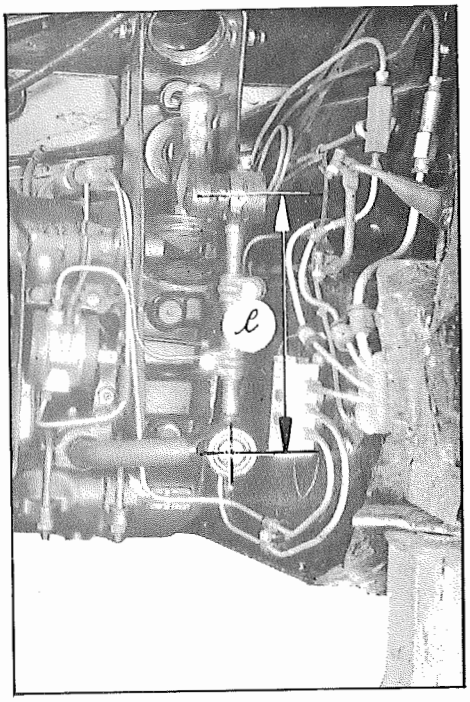
14. Bend the tube (8) to allow the passage of the half-axle.

15. Position the anti-roll bar as shown in the photograph. Turn it one quarter of a turn upwards.

16. Remove the half-axle.

NOTE: Do not lose the thrust ball for the piston rod from its housing (a) in the lever.





ASSEMBLY.

17. Offer up the half-axle, making sure that the dowels are correctly engaged in the holes in the front unit.

18. Tighten the screws (10) to between 50 and 65 ft.lbs. (7 - 9 m.kg).

19. Fit and adjust the anti-roll bar (see Op. DY. 433-0).

20. Fit the height control rod (4) also the nut and locknut (2).

21. Fit the height corrector, then connect the unions (5) and (1) and (9), also the overflow return pipe (11) and the return pipe (12) to the reservoir.

Tighten the screw (6) on the securing clip.

22. Connecting the anti-roll bar to the suspension levers:

a) Screw the left-hand sleeve (3) for a few threads onto the end piece of the suspension lever ball joint, then on the anti-roll bar ball joint.

b) Screw the right-hand sleeve on the threaded end of the anti-roll bar ball joint until about 5 mm from the end of the thread.

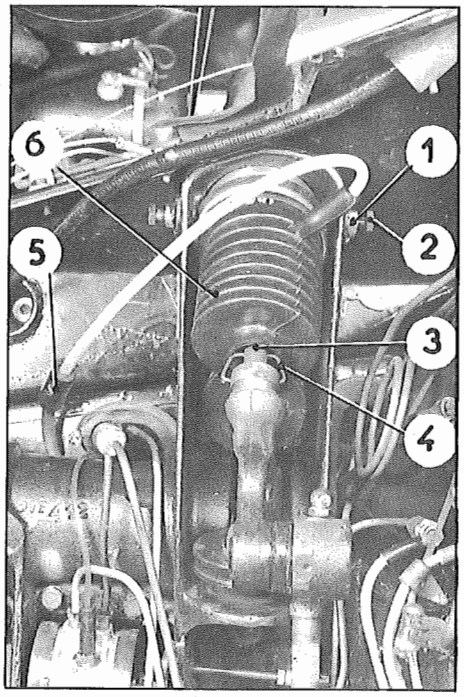
c) Screw the left-hand sleeve up to the marks made when dismantling, or if new parts have been fitted, sufficient to obtain on the right-hand side, a dimension ℓ = 198 mm (between the centre-lines of the ball joints on the anti-roll bar and on the lever).

Screw the right-hand sleeve so that the number of threads engaged on the end of the lever ball joint is the same as that on theanti-roll bar ball joint.

d) Adjust the left-hand sleeve to obtain dimension ℓ = 199 mm on this side.

e) Tighten the screws in the clamps securing the right and left-hand sleeves.

23. Carry out pre-adjustment of the heights (see Op. DY.433-0).



24. Fit the suspension cylinder:
    - Engage the cylinder in its housing, then tighten moderately the screws (2).
    - Tighten the locknut (1).
    - Engage the piston rod (3) in its housing.

NOTE: Check that the suspension ball is in its place in the lever.

    - Fit the pin (4).
    - Fit the dust cover (6).
    - Fit the rubber bush on the dust cover. Fit a ligarex clip (plier 2483-T).
    - Connect the rubber union (5) to the overflow return pipe.

25. Connect the feedpipe to the cylinder.

26. Fit the left-hand suspension sphere and its distance piece.

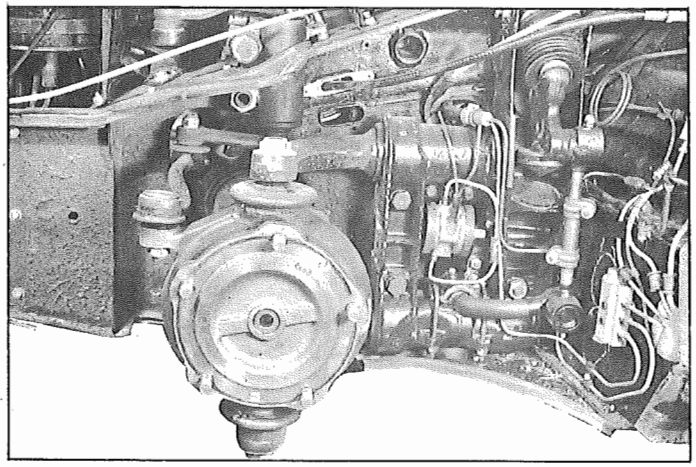
27. Fit the driveshaft (see Op. DX.372-1).

28. Fit the front wheels, then lower the car to the ground.

    Put the circuits under pressure and check for possible leaks.

29. Bleed the brakes (see Op. DX.453-0).

30. Adjust the heights (see Op. DX.433-0).
    - Check all unions for leaks and also the level of the fluid in the reservoir.



31. Adjust the manual height control (see Op. DX. 437-0).

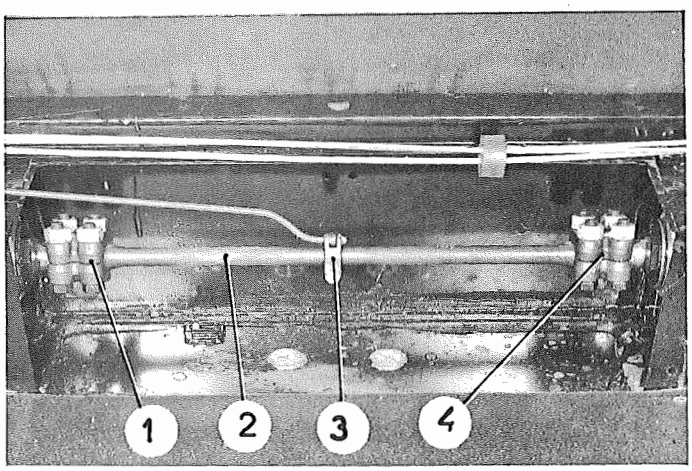
32. Check the toe-in and the steering lock (see Op. DX.410-0).

33. Fit the lower protection shield and the side protection shield of the suspension mechanism.

34. Fit the front wings.
    - the sparewheel support,
    - the sparewheel.

35. Adjust the cam for straight-line steering (see Op. DX.410-0).

The characteristics of the component parts of the rear axle of this vehicle are the same as those described in Operation DX.420-00.



REMOVAL.

1. Place the vehicle on stands.

Release the pressure.

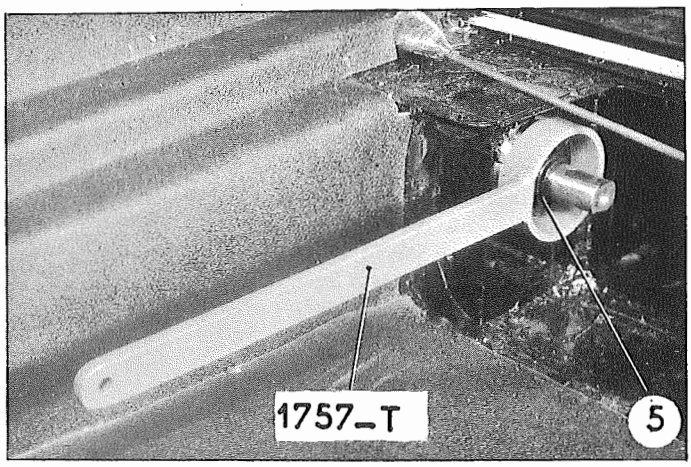
Place the manual height control in "low" position.

2. Remove:
   - the rear wing on the side to be worked on,
   - the wheel,
   - the upper protection shield for the swivel union,
   - the lower protection shield for the swivel union,
   - the closing plate for the rear crossmember (inside the boot).

3. Disconnect:
   - the clamp (3) from the height corrector control.

NOTE: Mark the angular position of the clamp on the anti-roll bar (2).

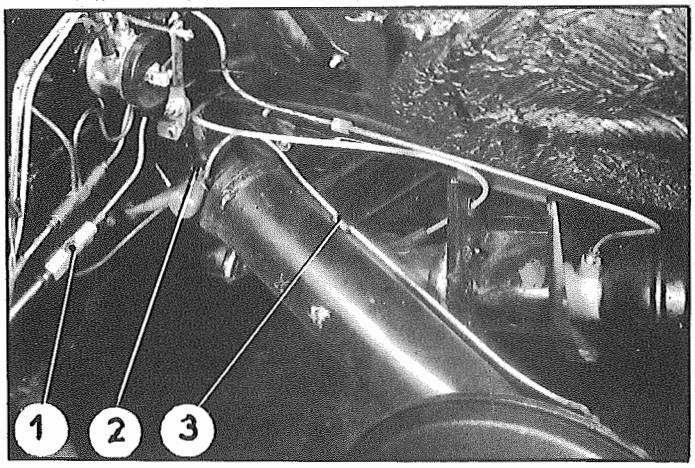
Remove the coupling flanges (1) and (4) from the anti-roll bar (2).

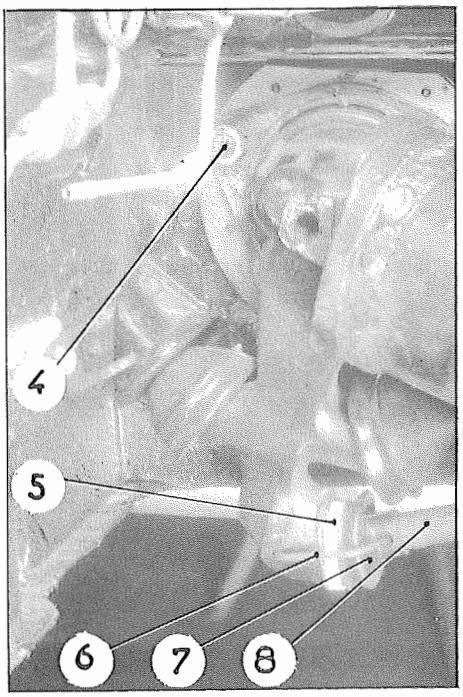


4. Free the anti-roll bar (2).

5. Clear the metal locking the ring nut (5) from the groove in the sidemember.

Remove the nut (5), use spanner 1757-T.





6. Removing the brake pipe assembly:

- remove the bleed screw from the wheel cylinder,
- disconnect the brake feedpipe from the wheel cylinder,
- turn back the clip (3),
- disconnect the 3-way union (1) from the feedpipe and the right-hand brake pipe on the left-hand side. Loosen the locknut and remove the screw (2). Free the swivel union.

NOTE: To remove the right-hand half-axle, it is necessary to remove the rear left-hand wing, the wheel and the upper protection panel. Also free the tubes from the bushes in the rear crossmember in order to free the right-hand swivel union pipe assembly.

7. Disconnect the piston rod:

Remove:

- the pin (6),
- the retaining clip (5).

Withdraw the dust shield (7) towards the rear.

Press the wheel arm down to free the piston rod (8) towards the rear.

NOTE: The piston rod (8) cannot be removed unless the pin holes in the rod and in the thrust cup are in line.

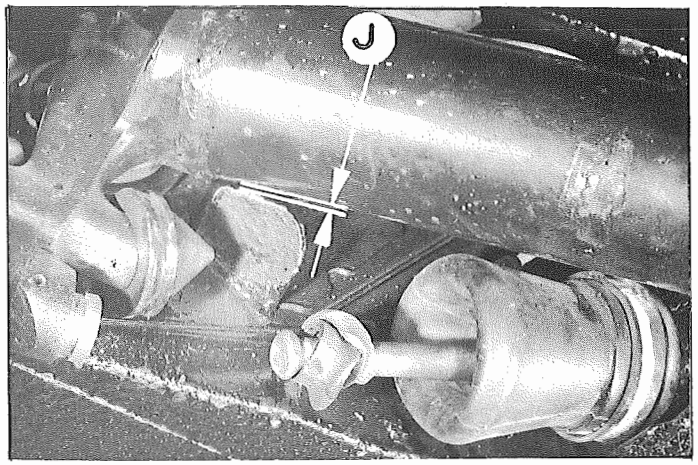
8. Remove the 3 nuts (4) securing the bearing housing on the sidemember.

Free the arm; if necessary using a wooden mallet, tap the end of the swivel pin.

9. Tap out the screws securing the housing (only if they are worn, taking care not to lose them inside the sidemember).

10. Clean the ball housing with petrol to free the piston rod thrust ball from the bump stop support.

NOTE: Make sure that it is not scaled or chipped. If it is, replace it and check the seating end of the pushrod.



ASSEMBLY.

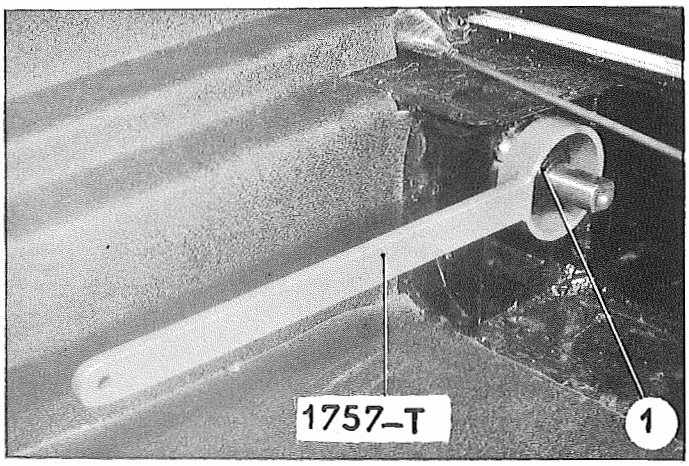
11. Using a hammer, tap into position the screws securing the bearing housing in the sidemember.

12. Fit the arm in its housing.

Provisionally screw on the ring nut, *the thinner collar in contact with the sidemember.*

Fit and tighten the 3 shouldered nuts securing the bearing housing (do not fit a washer).

13. Check that there is not less than 0.5 mm clearance between the arm and the metal bump-stop on the chassis at "J". To make this easier, remove the forward rubber rebound stop, and if necessary file the stop on the body.



14. Thoroughly tighten the ring nut (1) with spanner 1757-T.

At one point knock over the metal of the nut into one of the slots in the sidemember.

15. Fitting the piston rod.

Place the ball, previously lubricated, in its housing.

With the arm in its lowest position, engage the piston rod (5) in the ball thrust cup (the pin holes in the rod and in the thrust cup must be in line).

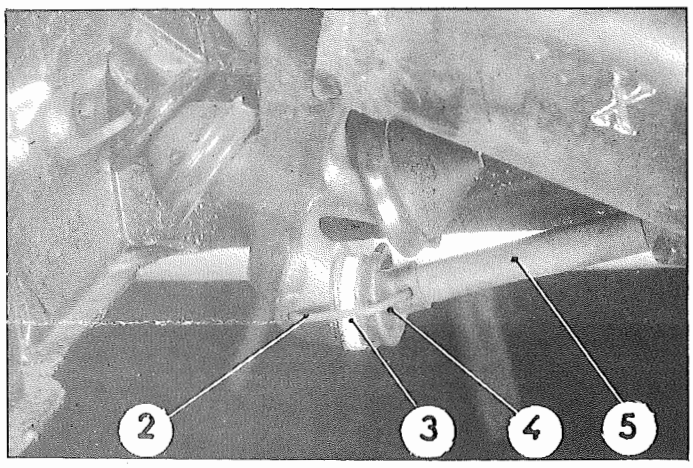
Insert:

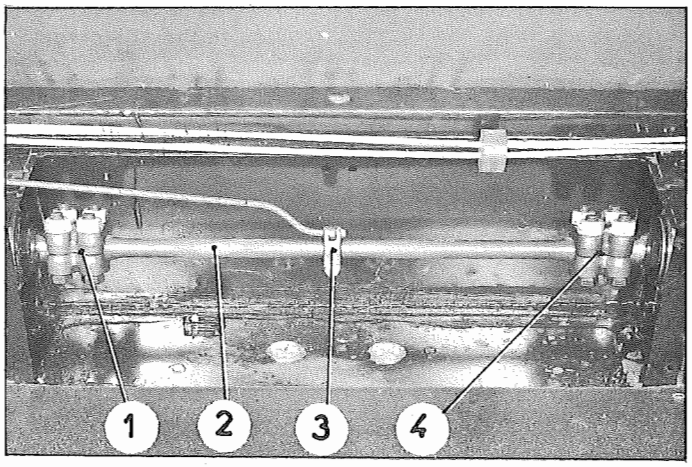
- the dust shield (4) on the thrust cup,
- the flexible bush on the dust shield.

Fit the pin (2) with the longest end in the ball thrust cup, and turn down this end.

Fit the clip (3) with Ligarex collar (pliers 2483-T).

NOTE: Before fitting the connecting pin, make sure that the rod is correctly positioned, and raise the arm. It must not be possible for the piston rod to slip out of the ball thrust cup.





16. Fit the anti-roll bar (2) giving equal clearance on both ends.

NOTE: Fit the anti-roll bar in the original position so as to be able to line up the marks made when dismantling.

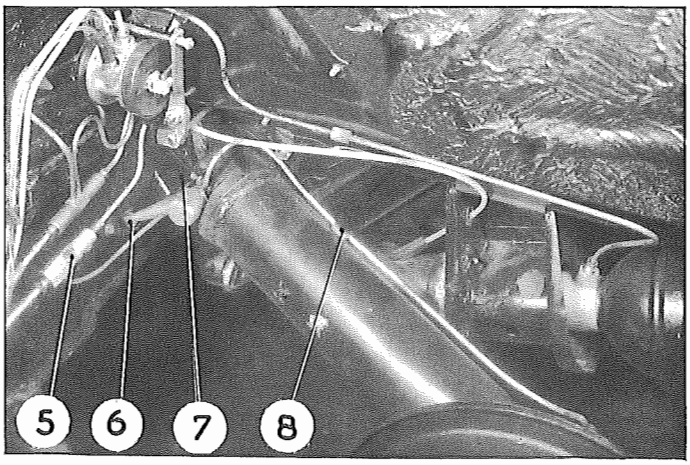
Tighten the screws in the flanges (1 and 4) to 36 ft.lbs. (5 m.kg).

17. Fit the corrector control rod clamp (3). Fit this to the marks made when dismantling.

NOTE: If the anti-roll bar or the corrector control rod have been changed, carry out the height pre-adjustment operation (see Op. DX.433-0).

18. Fit the brake piping:

- Engage the trunnion of the swivel union in the bore of the arm spindle. Make sure that the lever (6) preventing rotation is in its housing.
- Moderately tighten the stop screw (7). Tighten the locknut.
- Insert the tube under the clip (8) and turn over the clip.
- Connect the pipe to the wheel cylinder and fit the bleed screw.
- Align and connect the feedpipes for the brakes to the 3-way union (5).



NOTE: It is essential that the rotating union is not under strain, otherwise there would be a risk of seizure.

19. Fit the wheels.

Put the circuit under pressure.

Check all unions for leaks.

Lower the car to the ground.

20. Bleed the brakes (see Op. DX.453-0).

21. Adjust the heights (see Op. DY.433-0).

22. Fit:
    - the closing panel for the rear crossmember (for the right-hand side, fit the sleeves holding the pipes),
    - the protection shields for the height corrector,
    - the wing.

PRE-ADJUSTMENT OF THE HEIGHTS:

At the front, use gauges MR.1401-30.

At the rear, position the two arms so that there is a distance of 35 mm between the upper edge of the cup and the stop on the body (see Op. DX.433-0, paragraph 4).

ADJUSTING THE HEIGHTS:

The front tyres (180 x 380 X AS) and the rear (155 x 380 X AS) should be inflated to 27 p.s.i. (1.9 kg/cm^2). Rear tyres 180 x 380 X AS should be inflated to 24 p.s.i. (1.7 kg/cm^2).

At the front, the height from under the anti-roll bar to the surface upon which the wheels are resting = 222 - 228 mm.

At the rear, the height measured as above - tyres 155 x 380 X AS = 335 - 345 mm.

- tyres 180 x 380 X AS = 355 - 365 mm.

After adjustment, the camber of the front wheels, measured with fixture 2314-T, must be equal to within 1 mm.

ADJUSTING THE MANUAL HEIGHT CONTROL RODS:

(See Op. DX.433-0, paragraph 12).

ADJUSTING THE ANTI-ROLL BAR:

The distance between the stop and the inner face of the pivot boss on the right-hand side = 110 $\pm$ 0.5 mm.

The clearance between the left-hand stop and the lower bearing when the right-hand stop is in contact with the right-hand bearing = 0.5 - 1 mm.

The diametral clearance of the bearings (see Op. DX.433-0, paragraph 15).

Tightening torques for the U-bolt nuts = 9 ft.lbs. (1.2 m.kg).

Force required (leverage) to turn the anti-roll bar, applied on the ball joint = 9 - 13 lbs. (4 - 6 kg).

SUSPENSION SPHERES:

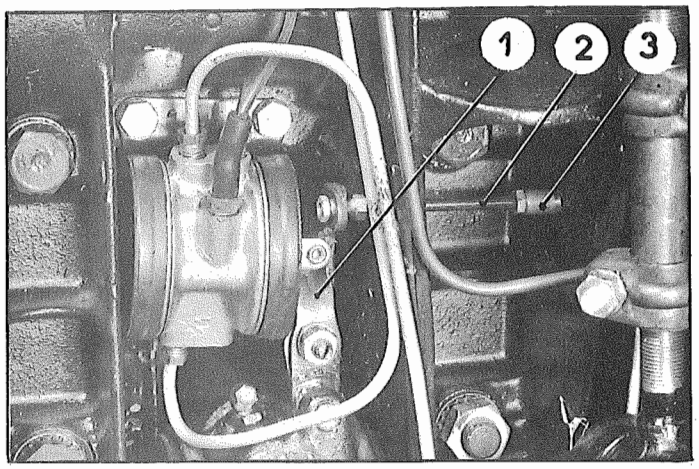
Inflation pressures :	Saloons:	Front 840 $^{+\ 40}_{-\ 220}$ p.s.i. (59 $^{+\ 2}_{-\ 15}$ kg/cm^2)
		Rear 370 $^{+\ 30}_{-\ 150}$ p.s.i. (26 $^{+\ 2}_{-\ 10}$ kg/cm^2)
	Family Type & Break: (Safari)	Front 840 $^{+\ 40}_{-\ 220}$ p.s.i. (59 $^{+\ 2}_{-\ 15}$ kg/cm^2)
		Rear 520 $^{+\ 40}_{-\ 150}$ p.s.i. (37 $^{+\ 2}_{-\ 10}$ kg/cm^2).

Tightening torque for front left-hand spacer ..... = 36 ft.lbs. (5 m.kg).

Tightening torque for the screw securing suspension cylinder ..... = hand tight.

Tightening torque for the corresponding nuts ..... = 14 ft.lbs. (1.9 m.kg).

Tightening torque for the dampers (torque spanner) ..... = 11 - 12 ft.lbs. (1.5 - 1.7 m.kg).

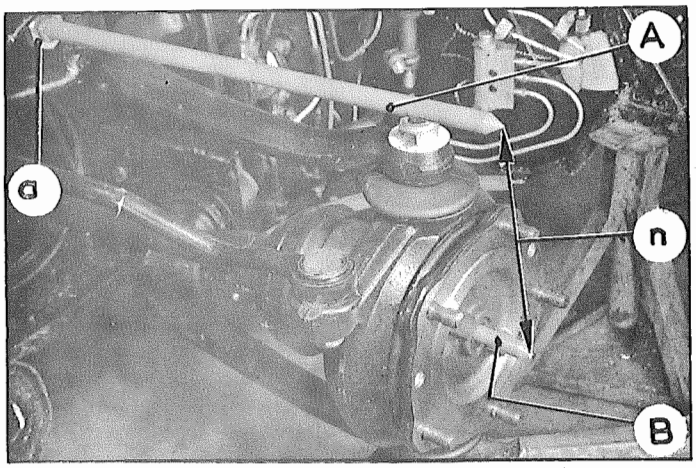


PRE-ADJUSTMENT OF THE FRONT HEIGHTS.

1. Connect the height control rod (2) to the rod (1) and to the trunnion (3) on the corrector control rod (the manual height control lever being in the "low" position).

2. Put the manual height control lever in the "high" position. Make sure that the valve of the corrector is in the fully open position. (The lever being pushed towards the front with a screwdriver levering on the web of the half-axle body.

NOTE: Never use the corrector as a levering point as this would damage the rubber cup.

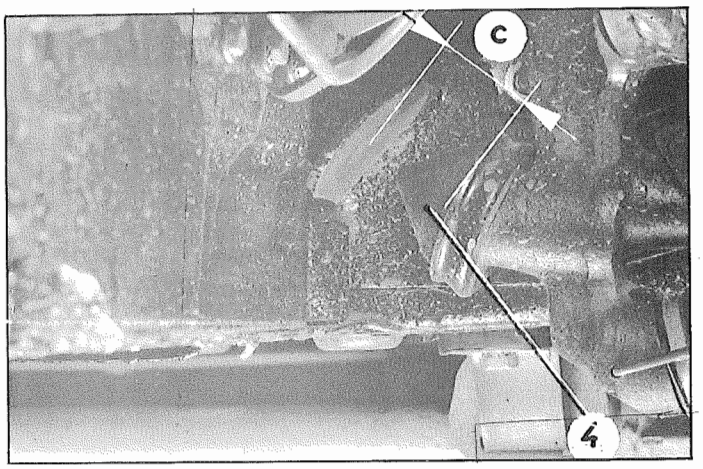


3. Fit the gauges MR.1401-30. The shorter gauge (B) in the wheel hub; the longer gauge (A) in the bore "a" of the steering relay.

Using 2 jacks (one under each lower arm) raise the arm assembly in order to bring the shorter gauge to dimension "n" = 175 mm from the gauge in the steering relay.

Make certain that a gap of approximately 1 mm exists between the base of the control lever fork and the corrector ball. If it does not, move the control rod. Tighten the control rod clamp on the anti-roll bar (spanner 1677-T).

Remove the gauges MR.1401-30.



PRE-ADJUSTMENT OF THE REAR HEIGHTS.

4. Position the 2 wheel-arms so as to obtain a dimension "c" = 35 mm between the upper edge of the cup of the rubber stop (4) and the thrust face on the steel stop.

5. Place the height corrector in the fully open position by means of the control rod. Tighten the clamp (spanner 1677-T for the screws with flats).

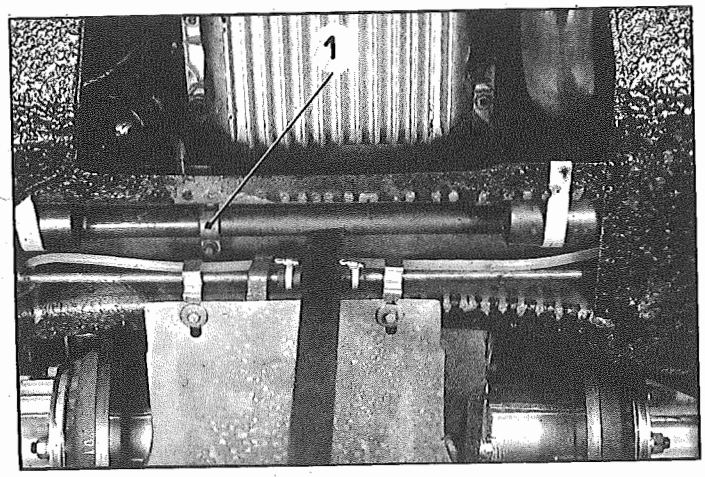
ADJUSTMENT OF THE HEIGHTS.

In order to carry out this operation, the car must be unladen and ready for the road (with spare-wheel, tool kit and $1\frac{1}{2}$ gallons (5 litres) of petrol in the tank).

Place the height control lever in the "normal" position.

6. Check the tyre pressures:

at the front	180 x 380 X A S =	27 p.s.i. (1.9 kg/cm^2)
at the rear	155 x 380 X A S =	27 p.s.i. (1.9 kg/cm^2)
or	180 x 380 X A S =	24 p.s.i. (1.7 kg/cm^2).



7. Place the car on a lift or over a pit.
Leave the engine idling. Release the parking brake. Do not chock the wheels.

8. Adjust the front heights:

Slightly loosen the clamp screw (1) securing the height corrector control rod. Turn the clamp in the direction required to obtain an average height of 228 $\pm$ 3 mm from the underside of the anti-roll bar to the surface on which the wheels are resting. Carry out this operation by fractions of a turn. By turning the clamp (1) towards the front, one increases the height of the car. Turning the clamp towards the rear decreases the height.

Retighten the screw in the clamp (1) (spanner 1677-T).

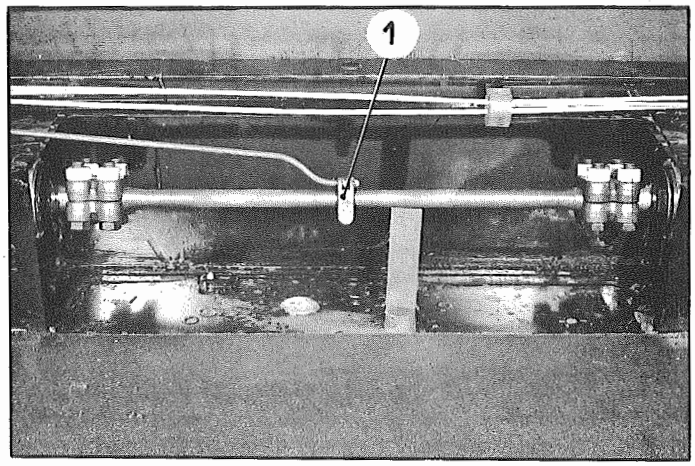
9. Check the front heights:

a) Place a straight edge, resting on the sides of the lift or pit, immediately below and parallel to the anti-roll bar. The lower edge of the straight edge must be exactly level with the surface on which the wheels are resting.

b) Slowly raise the car by lifting the front bumper. Stop raising when resistance is felt, and wait until a hissing sound indicates the commencement of the exhaust of the liquid via the corrector.

NOTE: The time for raising the car should be 20 seconds minimum.

At this precise moment, with the aid of an assistant, measure the distance between the underside of the anti-roll bar and the surface on which the wheels rest, on both sides of the car. The difference between these two measurements must not exceed 3 mm. Take the average of the two dimensions, which may be for example 245 mm.



c) Allow the vehicle to stabilise itself.

d) Lower the car slowly by pressing the front bumpers, stopping when resistance is felt. Wait until a hissing noise indicates the beginning of fluid inlet. Measure again, with the aid of an assistant, the dimensions from the underside of the anti-roll bar to the ground on each side of the car. Take the average of these two readings, for example, 210 mm.

Take the average of the two numbers determined in lines b and d, in the example chosen,

$$\frac{245 + 210}{2} = 227.5 \text{ mm.}$$

This average must lie between 222 and 228 mm. If it does not, again carry out the operation in paragraph 8.

10. Adjusting the rear heights:

Carry out the adjustment as for the front heights (see paragraph 8) after having removed the protection panel from the height corrector control (inside the boot).

Operate on the clamp (1).

The height obtained must be $335 \begin{smallmatrix}+10\\0\end{smallmatrix}$ mm from the underside of the anti-roll bar to the ground.

If the car is fitted with rear tyres 180 x 380 X A S the rear height should be $355 \begin{smallmatrix}+10\\0\end{smallmatrix}$ mm.

11. Checking the rear heights:

a) Place a straight edge, resting on the side of the pit or lift, immediately below and parallel to the anti-roll bar.

b) Remove the rubber plug from the car floor.

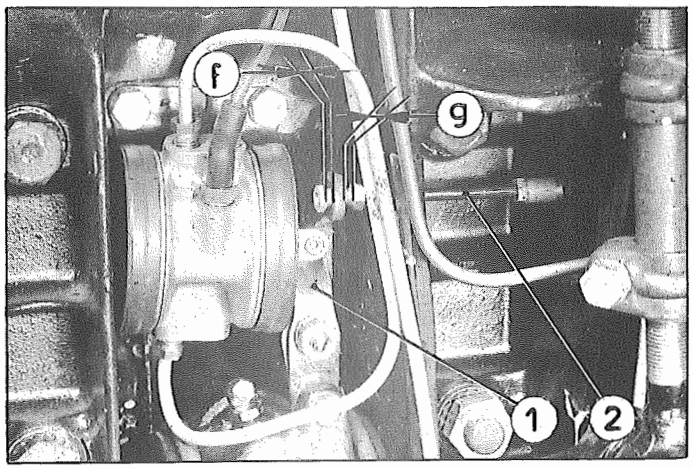
c) Raise the car very slowly by the rear bumpers. Let go when resistance is felt and wait until a hissing noise indicates the beginning of liquid exhaust.

NOTE: The time for raising the car should be 20 seconds minimum.

At this precise moment, with the aid of an assistant, measure the distance from the underside of the anti-roll bar to the surface on which the wheels rest (insert the rule through the hole in the floor, the end of the rule pressing against the anti-roll bar). This dimension could be, for example, 347 mm.

d) Allow the car to stabilise itself.

e) Lower the car slowly by pressing on the rear bumpers. Stop when resistance is felt. Wait until a hissing noise indicates the commencement of fluid inlet.



With the aid of an assistant measure the distance from the underside of the anti-roll bar to the surface on which the wheels rest, which may be for example 329 mm. Take the average of these dimensions, for example:

$$\frac{347 + 329}{2} = 338 \text{ mm.}$$

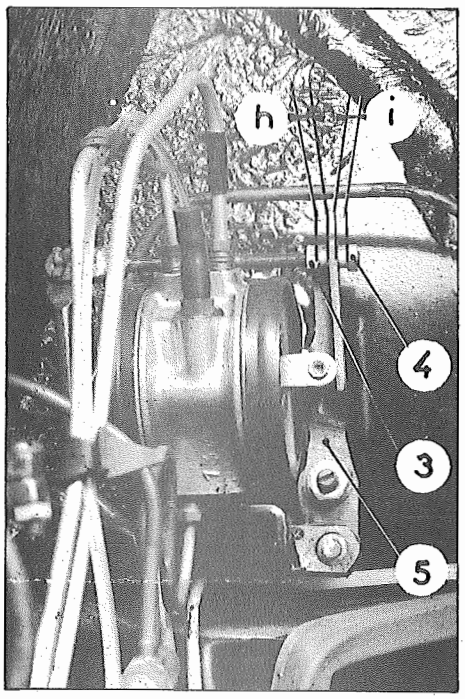
This dimension must lie between 335 and 345 mm. If not, again carry out the operations under paragraph 10.

If the car is fitted with rear tyres 180 x 380 X A S, the rear height must lie between 355 and 365 mm.

f) Replace the rubber plug and the corrector control rod protection panel.

Again check the front heights and adjust them if necessary.

Check the camber of the front wheels. The difference in camber between the two wheels must not be greater than 1 mm (see Op. DX. 410-0, paragraph 1).



12. Adjust the manual height control rods.

Place the height control in "normal" position.

a) At the front, make sure that there is a gap "f" the corrector being at the end of the inlet stroke (lever (1) pushed towards the front) and a gap "g", the corrector being at the end of the exhaust stroke (lever (1) pushed towards the rear). (Gap measured between the lever (1) and the nut).

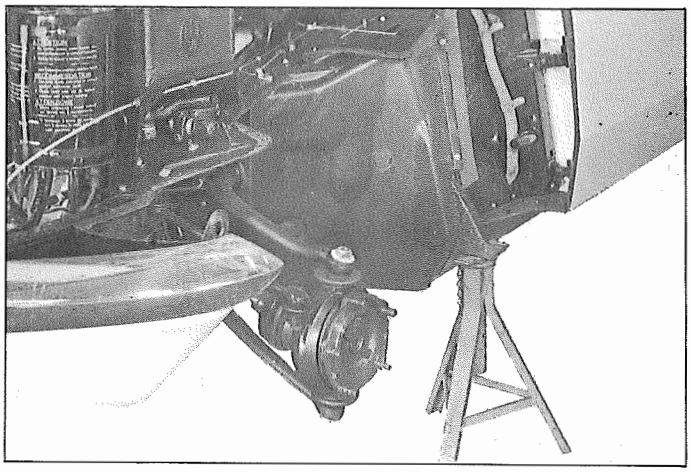
If necessary, adjust the rod (2).

b) At the rear, make sure that there is a gap "h", the corrector being at the end of the inlet stroke (the lever (5) pushed towards the front, and a gap "i" the corrector being at the end of the exhaust stroke (lever (5) pushed towards the rear. (Gap measured between the lever (5) and the nut).

If necessary, adjust the nuts (3) and (4).

c) Check the functioning of the manual height control. Make sure especially that the control levers do not touch the car body. If they do, adjust the position of the control bearings.

NOTE: If it is not possible to adjust the height by working on the control rods, carry out the pre-adjustment of the heights (see paras. 1 - 3 this operation) for the front and (paras. 4 and 5 of this operation) for the rear.

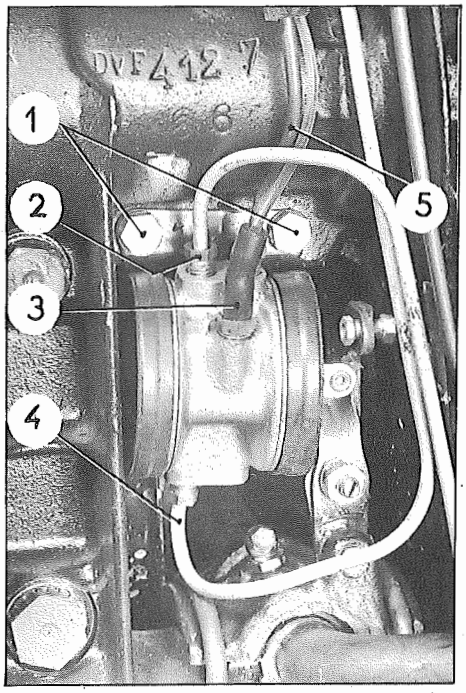


REMOVAL.

1. Loosen the nuts on the front wheels.
   Put the front of the car on stands and remove the wheels.

2. Release the pressure.
   Unscrew the pressure-regulator bleed screw about one third of a turn.
   Put the manual height control lever in the "low" position.

3. Remove:
   - the front wing (see Op. DY.851-1),
   - the mudshields, side and lower, for the suspension mechanism.



4. Remove the height corrector.

Disconnect the unions on the corrector.

Remove:

a) the overflow return pipe (3).

b) the pipe (4) feeding the suspension cylinders.

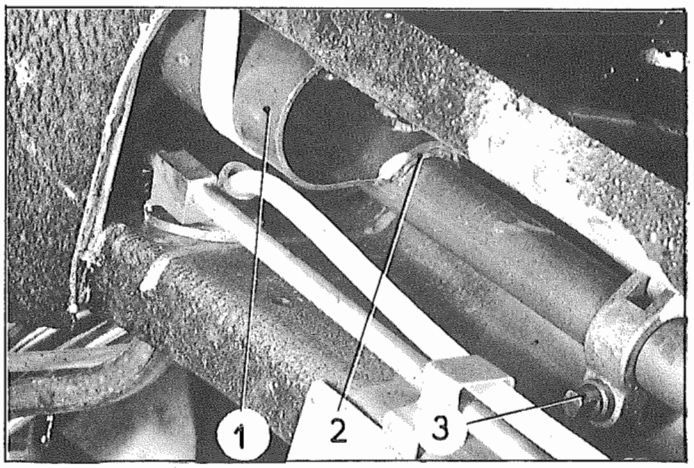
c) the return pipe (5).

d) the feedpipe (2).

Plug the holes in the height corrector and in the pipes as the work proceeds.

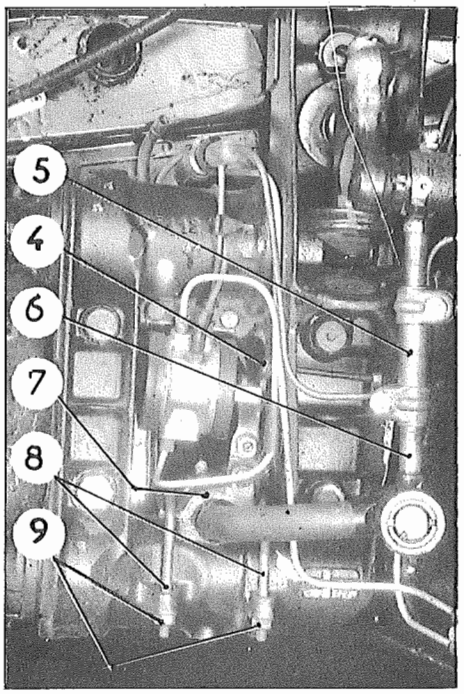
e) remove the screws (1) securing the height corrector bracket on the half-axle.

Free the assembly of height corrector and bracket.



5. Remove the anti-rattle springs (1) and their bearings (2).

6. Loosen the screw (3) in the clamp of the height corrector control rod (spanner 1677-T).



7. Remove the sleeve nut (4).

   Remove the adjusting sleeves (5).

   a) On the right:- screw the sleeve up onto the suspension lever (6).

   b) On the left:- remove the sleeve (right and left-hand threads).

8. <u>Removing the anti-roll bar bearings.</u>

   Remove the nuts (9).

   Free:

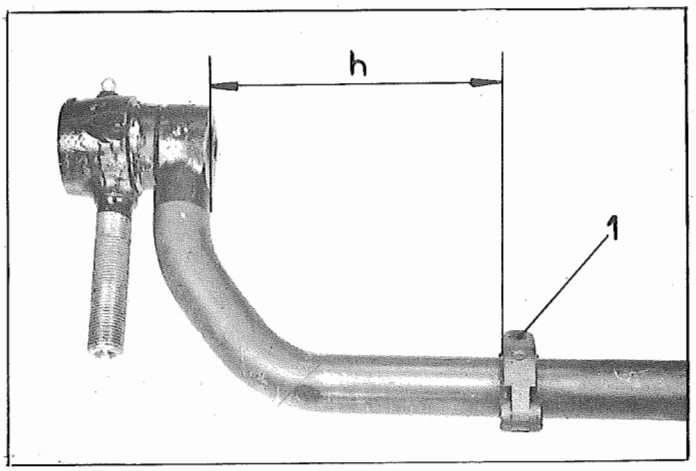
   - the U-bolts (8),
   - the clamps (7) from the anti-roll bar,
   - the adjusting shims,
   - the bearings.

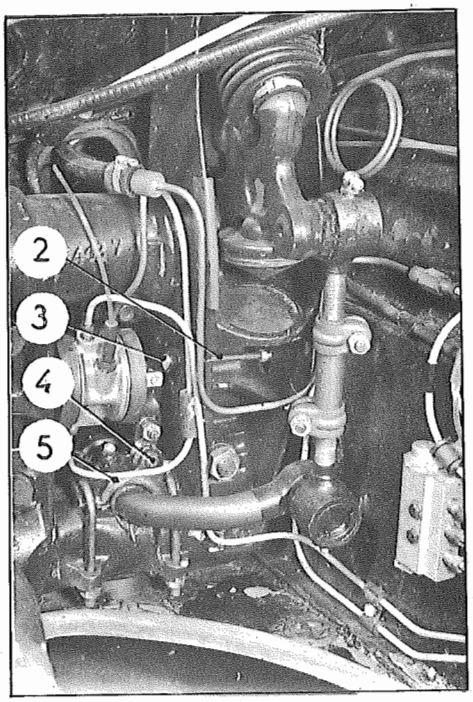
9. Remove the anti-roll bar via the left-hand side of the vehicle.

10. Strip the anti-roll bar.

    Remove:

    - the control rod for the height corrector,
    - the anti-roll bar stop clamps.





ASSEMBLY.

11. Prepare the anti-roll bar.

Fit the stop clamps (1) on the anti-roll bar.

Position the right-hand collar to obtain dimension h = 110 ± 0.5 mm between the inner face of the ball joint stem boss and the outer face of the stop clamp (see illustration).

Fit the height corrector control rod without tightening the clamp.

12. Fit the bar thus equipped, from the left-hand side of the vehicle.

13. Adjust the end-float of the bar.

With the anti-roll bar pushed towards the right, and the right-hand stop up against the bearing, move the left-hand stop in the direction required to obtain a gap of 0.5 mm between the stop and the lower bearing of the left-hand bearing block (see Op. DY.433-0), paragraph 14).

14. Fit and adjust the bearings

(see Op. DY.433-0, paragraph 15).

15. Insert the end of the height control rod (4) in the hole in the bearing cap (5).

Connect the rod (2) to the lever.

Fit the sleeve nut (3).

16. Fit the height corrector

(see Op. DY. 433-1, paragraphs 28 and following).

17. Connect the anti-roll bar to the suspension lever (see Op. DY.410-1, paragraph 22).

18. Fit the anti-rattle springs together with their bearings, previously lubricated.

19. Carry out the pre-adjustment of the height control. (See Op. DY.433-0).

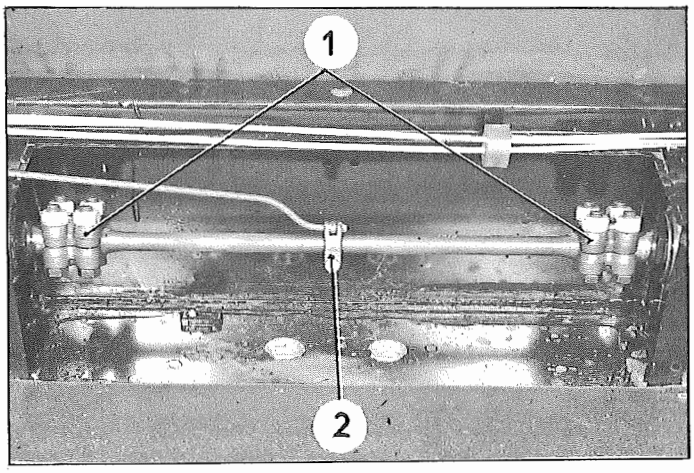
20. Fit the lower and side mudshields.

    Fit the front wheels and wings (see Op. DY.851-1).

21. Lower the car to the ground.

    Tighten the nuts securing the wheels.

22. Adjust the heights (see Op. DY.433-0).



REMOVAL.

1. Put the car on stands and release the pressure (see Op. DX.00).

2. Remove the wing and upper mudshield, rear left-hand.

3. Remove the protection shield from the height corrector control (inside the boot).

4. Disconnect the clamp (2) from the corrector control rod.

5. Disconnect the anti-roll bar coupling flanges (1) from the swivel arm spindles.

Free the bar.

ASSEMBLY.

6. Fit the anti-roll bar.

Fit the anti-roll bar and its coupling flanges (1) to the axle swivel arms.

Equalise the clearance between the anti-roll bar and the swivel spindle on each side. Centralise the coupling flanges (1).

Tighten the nuts diagonally to 76 ft.lbs. (10.5 m.kg).

7. Connect up the clamp (2) of the corrector control rod.

8. Carry out the pre-adjustment of the heights (see Op. DY.433-0).

9. Adjust the heights (see Op. DY.433-0).

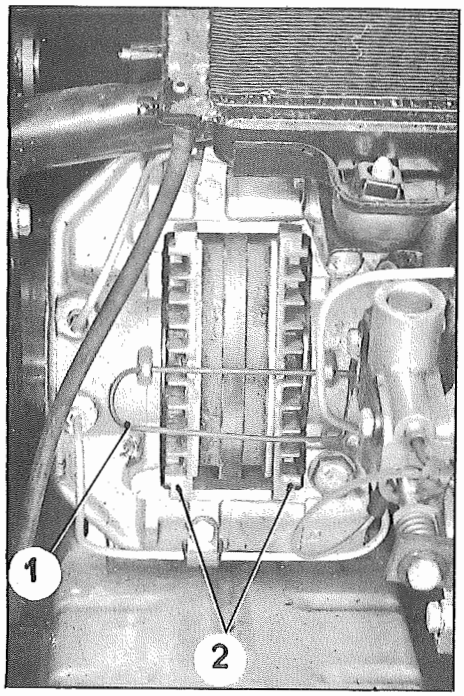
10. Fit the rear left-hand upper mudshield. Tighten the screws and the nuts.

Fit the rear left-hand wing.

11. Fit the protection panel for the corrector control (inside the boot).

The characteristics and adjustments of the steering are the same as those on the DS 21 vehicle. See Operation DX.440-00.

The operations for adjusting, replacing and overhauling the brake units are the same as those on DS 21 vehicles. Follow the instructions in the corresponding DX sections.



REPLACEMENT OF THE HYDRAULIC BRAKE PADS.

Removal.

10. Remove the sparewheel.
    - the radiator air inlet duct with the sparewheel support crossmember.

11. Remove the spring clip (1).

12. Remove the pads (2) withdrawing them towards the front.

13. Clean very carefully the part of the pistons exposed to dust.

Assembly.

14. Using the disc as a fulcrum, push the pistons back in their cylinders using a piece of wood.

Fit the pads (2).

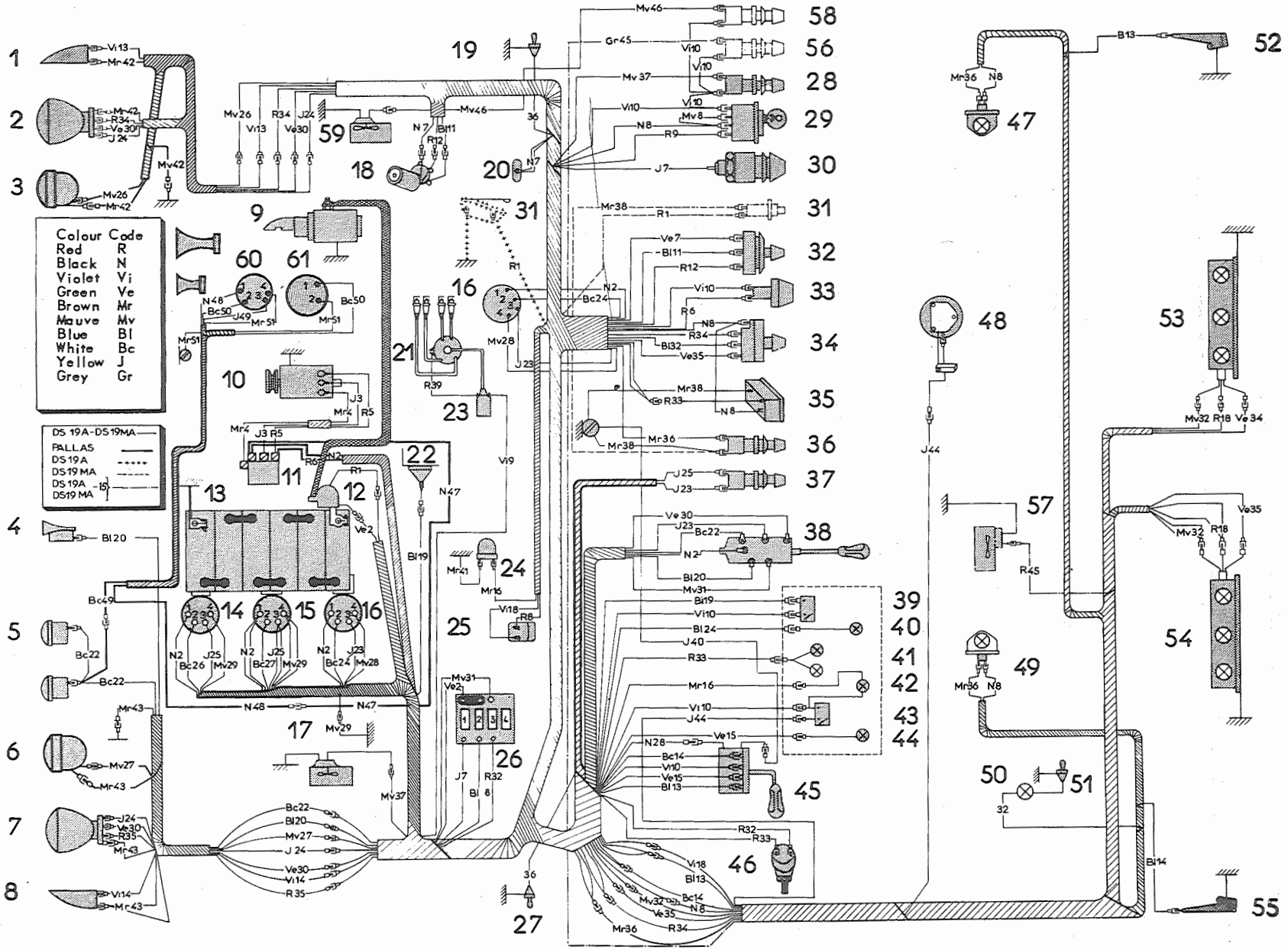
15. Fit the spring clip (1).

16. Fit the air duct, crossmember, and sparewheel support assembly,
    - the sparewheel.

LIST OF BULBS

Description	Quantity	Type of Bulb
Headlamp - dipping	2	European P 45 t 41 (yellow selective) 12v. 45/40w.
Front flashers Rear flashers Stop lamp	6	B.A. - 15 s - single contact - 12v. 15w. (large balloon)
Rear lamp Number plate Spare bulbs	6	B.A. - 15 s - 1 plot - 12v. 5w. Philips Hollande. Ref. 12.821
Front side lamp	2	B.A. - 9 s - 12v. - 4w. - tube 10 diameter.
Front interior light (on PALLAS)	2	B.A. - 15 s - 12v. - 15w. (large balloon)
Front interior light Rear interior light	4	Festoon - 12v. - 7w.
Panel light Brake light Brake pad wear light	4	B.A. - 9 s - 12v. - 2w. tube 8.8 dia. max. (NORMA 1529)
Ignition warning light Clock light	2	B.A. - 9 s - 12v. - 1.5w.
Flashing indicator warning light Headlamp main beam warning light	2	B.A. - 9 s - 24v. - 3w.
Boot light	1	Festoon - 12v. - 4w.
Iodine-quartz (option)	2	Iodine-vapour bulb - 12v. - 62w. (NORMA 112).

WIRING DIAGRAM



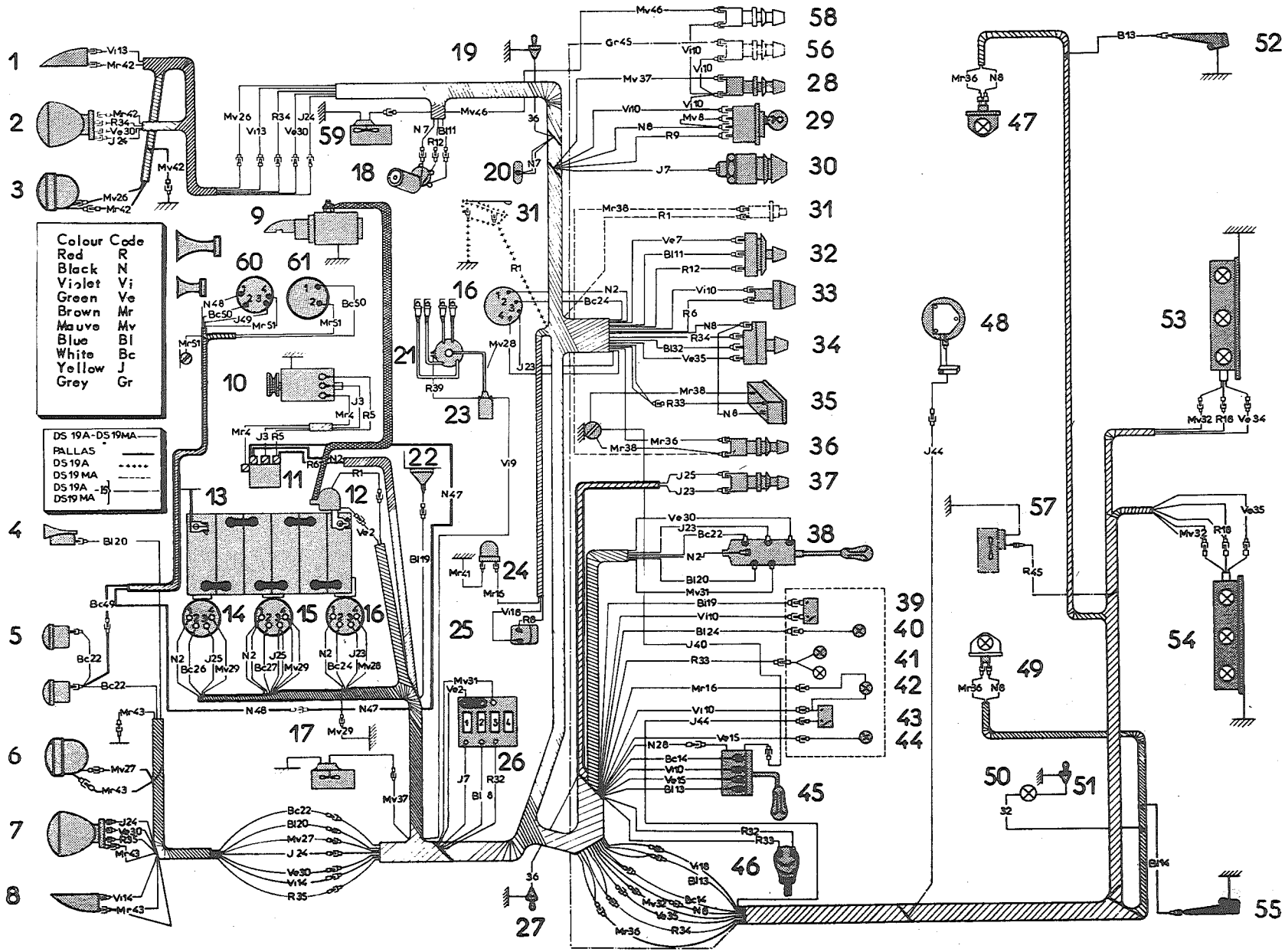
SCHEDULE OF PARTS

1. Direction indicator lamp, front right
2. Headlamp, front right
3. Headlamp, quartz iodine, front right
4. Horn, town use (low note)
5. Horns, country (high note)
6. Headlamp, quartz iodine, front left-hand
7. Headlamp, front left-hand
8. Direction indicator lamp, front left
9. Starter motor
10. Dynamo
11. Regulator
12. Starter motor solenoid
13. Battery
14. Solenoid, SANOR for quartz iodine, headlamp, front right
15. Solenoid, SANOR for quartz iodine, headlamp, front left
16. Solenoid, SANOR for headlamp flasher
17. Blower motor, heating, front
18. Motor for windscreen wiper
19. Switch for interior lamps operated by front right-hand door
20. Terminal for accessories
21. Distributor
22. Thermometer transmitter
23. Ignition coil
24. Pressure switch for brake pressure warning light
25. Stop light switch
26. Fusebox
27. Switch for interior lamps operated by door, front left-hand
28. Switch for heating, front
29. Ignition switch
30. Cigar lighter
31. Switch for starter solenoid
32. Switch for windscreen wiper
33. Ignition and charge light
34. Switch for parking lights
35. Electric clock
36. Switch for interior lights
37. Switch for quartz iodine, headlamps
38. Switch for lighting and horns
39. Thermometer
40. Warning lamp for headlamp main beam
41. Instrument lighting bulbs
42. Warning lamp for brake pressure switch
43. Fuel gauge
44. Warning lamp for direction indicators
45. Switch for direction indicators with switch for headlamp flasher
46. Rheostat for instrument and clock lighting
47. Interior light, front right-hand
48. Rheostat for fuel gauge unit
49. Interior light, front, left-hand
50. Boot light
51. Switch for boot light
52. Right-hand rear direction indicator light
53. Lights for number plate - rear light - and stop light - rear right-hand
54. Lights for number plate - rear light and stop light, rear left-hand
55. Direction indicator light - rear left
56. Switch for rear heater (heating - 15°)
57. Blower motor for rear heating (heating - 15°)
58. Switch for fresh air blower motor
59. Fresh air blower
60. Solenoid SANOR for horn
61. Compressor

OPTIONAL

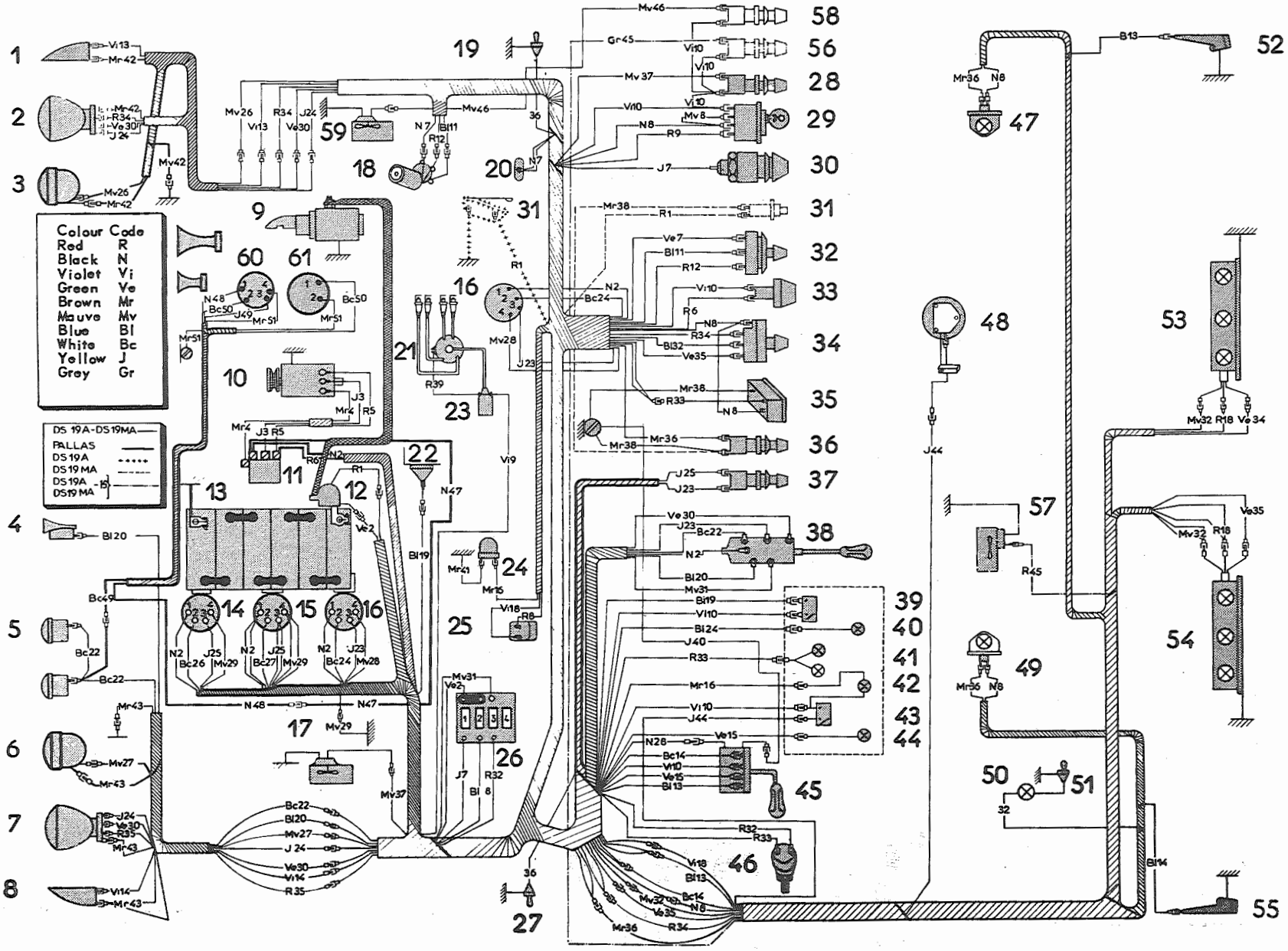
NOTE:- On the DS 19 PALLAS vehicles the solenoid for the headlamp flasher which is on the scuttle (in the case of the DS 19) is on the battery tray with the solenoid for the iodine-quartz headlamps. On the breaks, (Safari), there is no headlamp flasher.

WIRING DIAGRAM



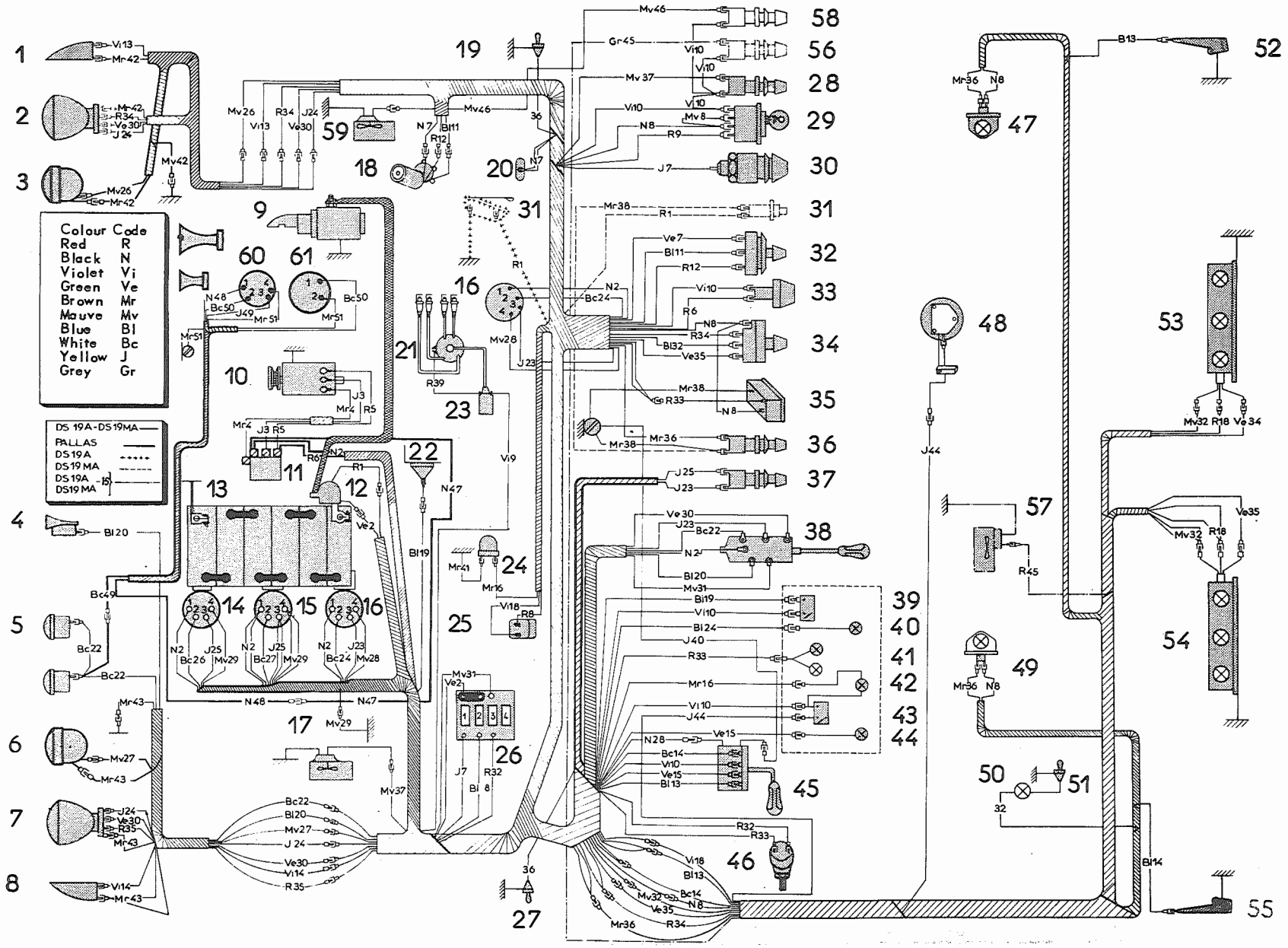
Harness	Wire No.	Colour of Ends	Schedule of Wiring
Front	1	Red	Starter motor solenoid (12)
		Red	to starter motor solenoid switch (31)
Front	2	Green	Starter motor solenoid (12)
		Black	to regulator terminal BAT (11)
		Green	to fusebox (26) (No. 1 and 2 fuses)
		Black	to switch for lighting and horns (38)
		Black	to solenoid for quartz iodine, headlamp, front right (14)
		Black	to solenoid for quartz iodine, headlamp, front left (15)
		Black	to solenoid for headlamp flasher (16)
Dynamo	3	Yellow	Dynamo (10)
		Yellow	to terminal "EXC" of regulator (11)
Dynamo	4	Brown	Dynamo (10)
		Brown	to regulator earth (11)
Dynamo	5	Red	Dynamo (10)
		Red	to terminal "DYN" of regulator (11)
Front	6	Red	Terminal "DYN" of regulator (11)
		Red	to ignition and battery charging tell-tale light (33)
Front	7	Yellow	Fusebox (26) (fuse No. 1)
		Green	to switch for windscreen wiper (32)
		Black	to terminal for accessories (20)
		Black	to windscreen wiper motor (18) (automatic stop)
		Yellow	to cigar lighter (30)
Front	8	Blue	Fusebox (26) (fuse No. 2)
		Black	to rear junction
		Red	to stop light switch (25)
		Black	to parking light switch (34)
		Black	to clock (35)
		Black & Mauve	to ignition switch (29)
Front	9	Red	Ignition switch (29)
		Violet	to ignition coil (23)
Front	10	Violet	Ignition switch (29)
		Violet	to heater switch (28)
		Violet	to petrol gauge (43)
			to pressure switch lamp (42)
		Violet	to battery charging tell-tale (33)
		Violet	to direction indicator switch (45)
		Violet	to thermometer (39)
		Violet	to switch (56) for rear heating (-15^{o})
Front	11	Blue	Windscreen wiper switch (32)
		Blue	to windscreen wiper motor (18)
Front	12	Red	Windscreen wiper switch (32)
		Red	to windscreen wiper motor (18)
Front	13	Blue	Direction indicator switch (45)
		Violet	to front right-hand junction
		Blue	to rear junction

WIRING DIAGRAM



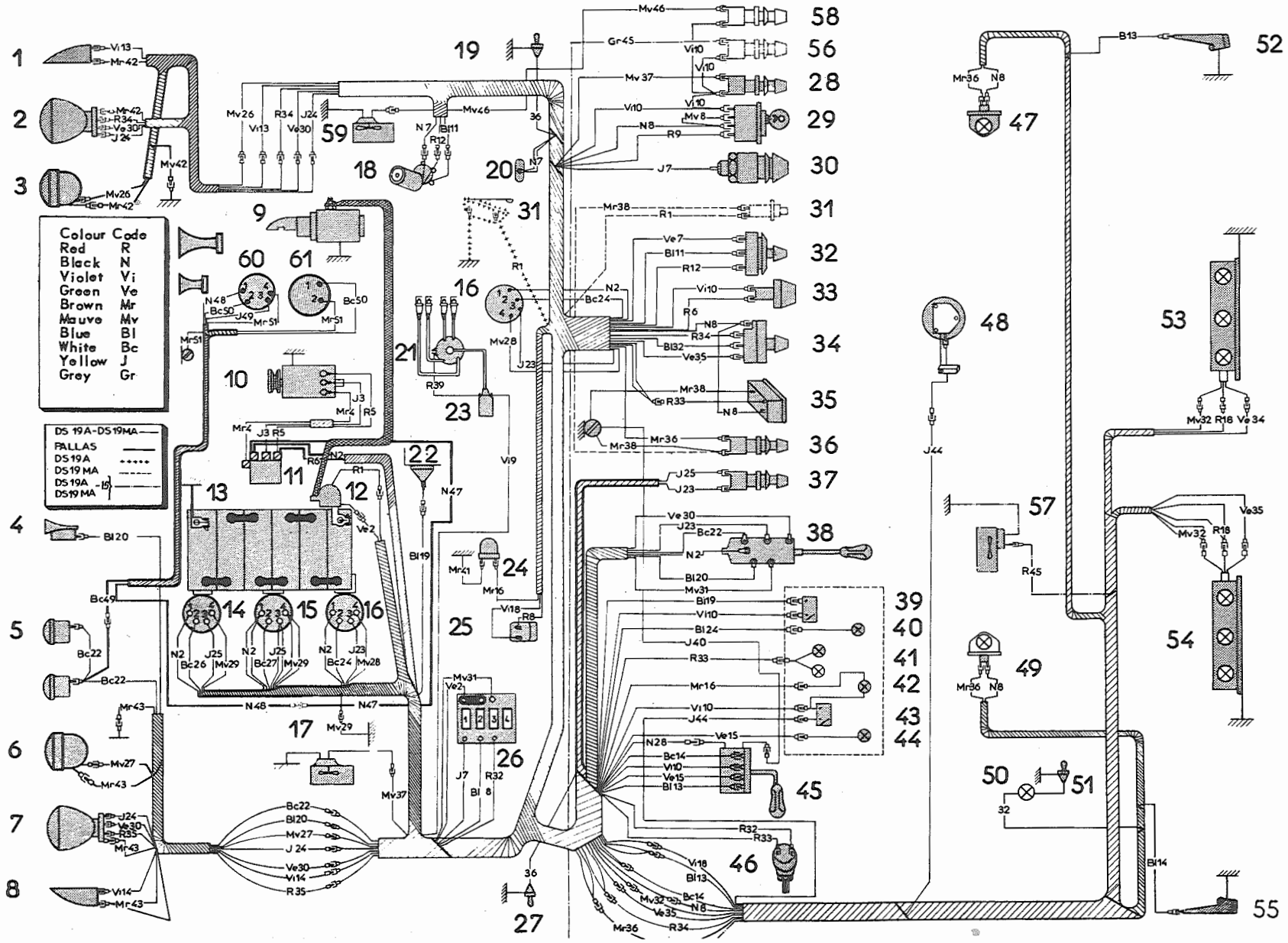
Harness	Wire No.	Colour of Ends	Schedule of Wiring
Front	14	White Violet White	Direction indicator switch (45) to front left-hand junction to rear junction
Front	15	Green Green	Direction indicator switch (45) to direction indicator tell-tale light (44)
Front	16	Brown Brown	Brake pressure warning light (42) to pressure switch (24) on hydraulic brake pedal gear
Front	18	Violet Violet	Stop switch (25) to rear junction
Front	19	Blue Blue	Thermometer (39) to supply lead for thermometer unit
Front	20	Blue Blue	Lighting and horn switch (38) to junction, front left-hand
Front	22	White White	Lighting and horn switch (38) to junction, front left-hand
Front	23	Yellow Yellow Yellow	Lighting and horn switch (38) to quartz iodine headlamp switch (37) (on PALLAS) to solenoid for headlamp flasher (16) (terminal 3)
Front	24	White Yellow Yellow Blue	Solenoid for headlamp flasher (16) (terminal 2) to junction, front left-hand to junction, front right-hand to headlamp, tell-tale light (40)
Front	25	Yellow Yellow Yellow	Quartz-iodine headlamp switch (37) to solenoid (14) for quartz-iodine, front right-hand (3) terminal 3 to solenoid (15) for quartz-iodine, front left-hand (6) terminal 3
Front	26	White Mauve	Solenoid (14) to quartz-iodine lamp, front right-hand (terminal 2) to junction, front right-hand
Front	27	White Mauve	Solenoid (15) to quartz-iodine lamp, front left-hand (terminal 2) to junction, front left-hand
Front	28	Mauve Black	Solenoid (17) for headlamp flasher (terminal 4) to switch for direction indicator lamps (45)
Front	29	Mauve Mauve Mauve	Earth to solenoid (14) for quartz-iodine, front right-hand (terminal 4) to solenoid (15) for quartz-iodine, front left-hand (terminal 4)
Front	30	Green Green Green	Lighting and horn switch (38) to junction, front right-hand to junction, front left-hand
Front	31	Mauve Mauve	Lighting and horn switch to fusebox (26) (fuse No. 3)
Front	32	Red Mauve Red Blue	Fusebox (26) (fuse No. 3) to rear junction to rheostat (46) for instrument lighting to switch (34) for parking lights

WIRING DIAGRAM



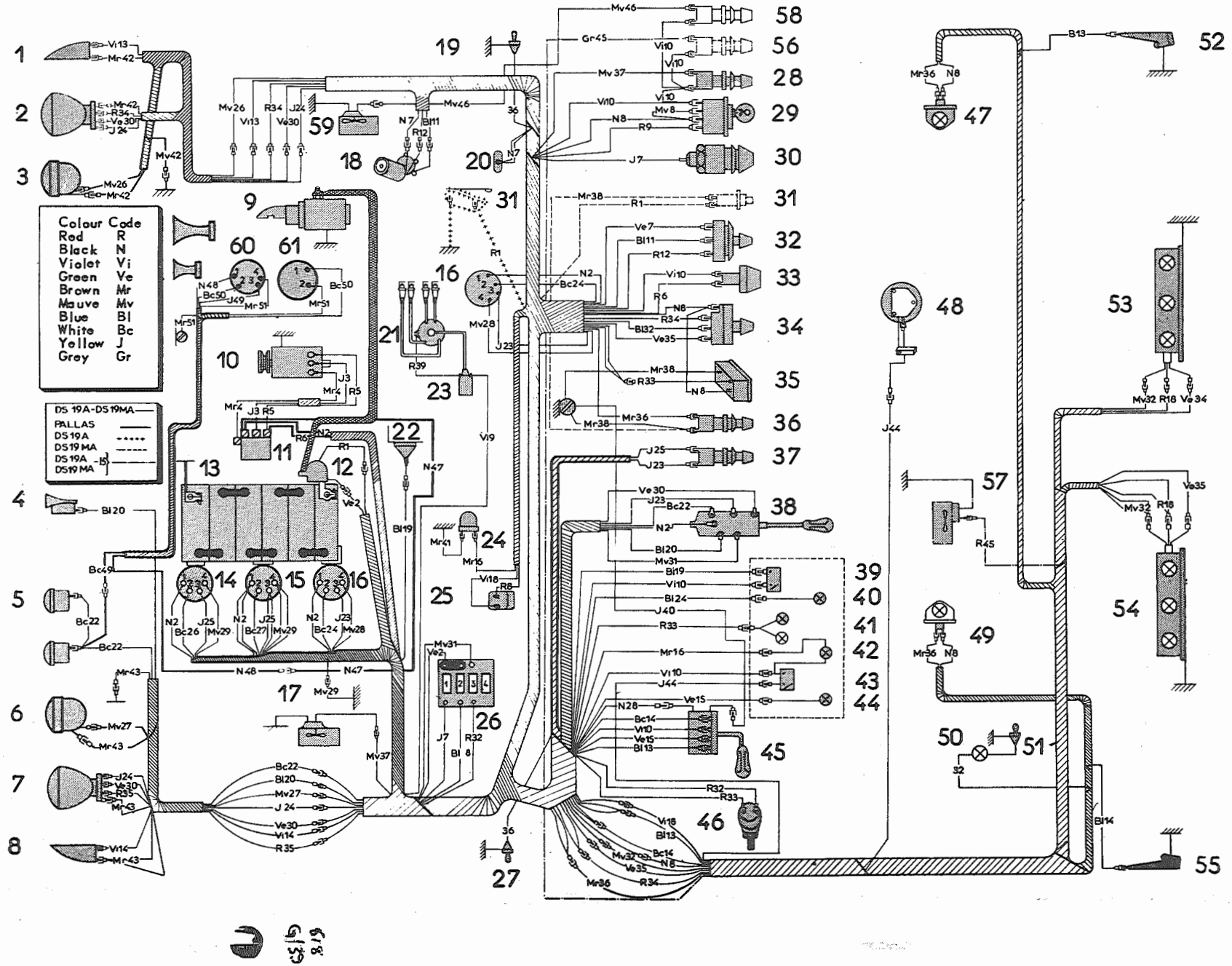
Harness	Wire No.	Colour of Ends	Schedule of Wiring
Front	33	Red	Rheostat (46), instrument lighting
		Red	to bulbs for instrument lighting (41)
		Red	to clock light (35)
Front	34	Red	Parking light switch (34)
		Red	to junction, front right-hand
		Red	to junction, rear
Front	35	Green	Parking light switch (34)
		Red	to junction, front left-hand
		Green	to junction, rear
Front	36	Brown	Interior light switch (36)
		Brown	to rear junction
			to switch (19) for right-hand door
			to switch (27) for left-hand door
Front	37	Mauve	Switch (28) for front heating
		Mauve	to heater blower motor (17)
Flying lead	38	Brown	Earth
		Brown	to switch (31) for starter solenoid
		Brown	to switch (36) for interior lighting
			to clock (35)
Flying lead	39	Red	Ignition coil (23)
		Red	to distributor (21)
Flying lead	40	Yellow	Earth
		Yellow	to switch (45) for direction indicator lights
Flying lead	41		Earth
		Brown	to brake pressure switch (24)
Front R.H.	13	Violet	Junction, front right-hand
		Violet	to right-hand direction indicator light (1)
Front R.H.	24	Yellow	Junction, front right-hand
		Yellow	to front right-hand headlamp (2) (main beam)
Front R.H.	26	Mauve	Junction, front right-hand
		Mauve	to quartz-iodine, right-hand (3)
Front R.H.	30	Green	Junction, front right-hand
		Green	to headlamp, front right-hand (2) (dipped)
Front R.H.	34	Red	Junction, front right-hand
		Red	to headlamp, front right-hand (2) (sidelight-parking light)
Front R.H.	42		Earth
		Brown	to front right-hand direction indicator (1)
		Brown	to headlamp, front right-hand (2)
		Brown	to headlamp, quartz-iodine right-hand (3)
Front L.H.	14	Violet	Junction, front left-hand
		Violet	to direction indicator lamp, front left-hand (8)

WIRING DIAGRAM

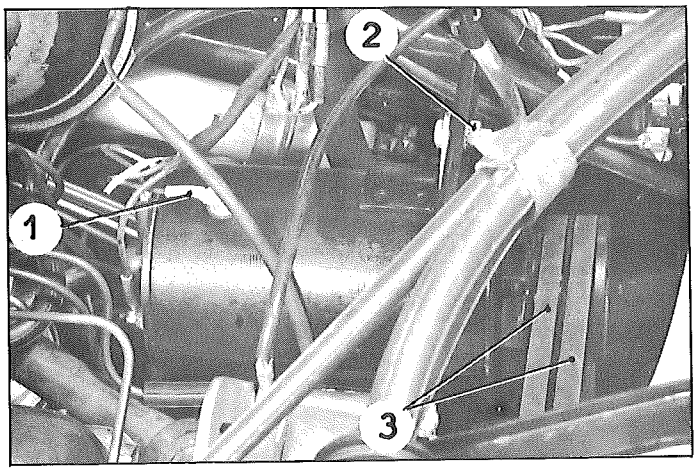


Harness	Wire No.	Colour of Ends	Schedule of Wiring
Front L.H.	20	Blue Blue	Junction, front left-hand to town horn (4)
Front L.H.	22	White White	Junction, front left-hand to horn, country (5)
Front L.H.	24	Yellow Yellow	Junction, front left-hand to headlamp, front left-hand (7) (main beam)
Front L.H.	27	Mauve Mauve	Junction, front, left-hand to quartz-iodine headlamp, front left-hand (6)
Front L.H.	30	Green Green	Junction, front, left-hand to headlamp, front left-hand (7) (dipped)
Front L.H.	35	Red Red	Junction, front left-hand to headlamp, front left-hand (7) (sidelamp - parking lamp)
Flying lead	43	 Brown Brown Brown	Earth to front left-hand direction indicator lamp (8) to headlamp, front left-hand (7) to headlamp, quartz-iodine, front left-hand (6)
Rear	8	Black Black	Junction, rear to interior lights, front right-hand (47) and front left-hand (49)
Rear	13	Blue Blue	Junction, rear to rear direction indicator lamp, right-hand (52)
Rear	14	White Blue	Junction, rear to rear direction indicator light, left-hand (55)
Rear	18	Violet Red Red	Junction, rear to rear stop light, right-hand (53) to rear stop light, left-hand (54)
Rear	32	Mauve Mauve Mauve	Junction, rear to right-hand light (53) for number plate to left-hand light (54) for number plate to boot light (50)
Rear	34	Red Green	Junction, rear to parking light (or rear light) rear right-hand (53)
Rear	35	Green Green	Junction, rear to parking light (or rear light) rear left-hand (54)
Rear	36	Brown Brown	Junction, rear to interior light, front right-hand (47) and front left-hand (49)
Rear	44	Yellow Yellow	Petrol gauge to rheostat for petrol gauge (48)
Rear	45	Grey Red	Switch (56) for rear heating (-15°C) to blower motor for rear heating (57) (-15°C)

WIRING DIAGRAM



Harness	Wire No.	Colour of Ends	Schedule of Wiring
			OPTIONAL FITTINGS
			1) To order, a fresh air blower (59) is fitted:-
		Violet Mauve	Jumper lead Vi 10 feeds the switch (58) Flying lead Mv 46 for fresh air blower (59) motor
			2) To order, two air horns are fitted:-
Flying lead	47	Black Black	Regulator (11) terminal BAT to junction on horn harness to compressor
Harness, horn to compressor	48	Black Black	Junction on the feed lead to terminal (1) for SANOR solenoid (60)
Harness, horn to compressor	49	Yellow White	Terminal (3) for SANOR solenoid (60) to country horn (5)
Harness, horn to compressor	50	White White	Terminal (2) to SANOR solenoid (60) to compressor (61)
Harness, horn to compressor	51	Mauve Brown Brown	Terminal (4) for SANOR solenoid (60) to compressor (61) to earth - chassis



REMOVAL.

1. Disconnect the leads from the battery.
2. Place the height control lever in "low" position.
3. Remove the left-hand front suspension sphere.
4. Disconnect the leads (1) from the dynamo.

Loosen the nut (2) for adjusting the dynamo belt. Swing the tensioner towards the engine.

5. Loosen a few turns the two screws (4) securing the dynamo.

Swing the dynamo towards the engine.

Free the belts (3) from the pulley.

Remove the securing screws (4).

Free the dynamo.

518.Add.1.

ASSEMBLY.

6. Place the dynamo in position.

Fit the securing screws (4).

Insert one plain and one spring washer under the head.

Screw in the securing screws.

Adjust the dynamo pulley (see Op. DX.231-0, paragraph 5).

Swing the dynamo towards the engine.

Fit the belts (3) on the pulley.

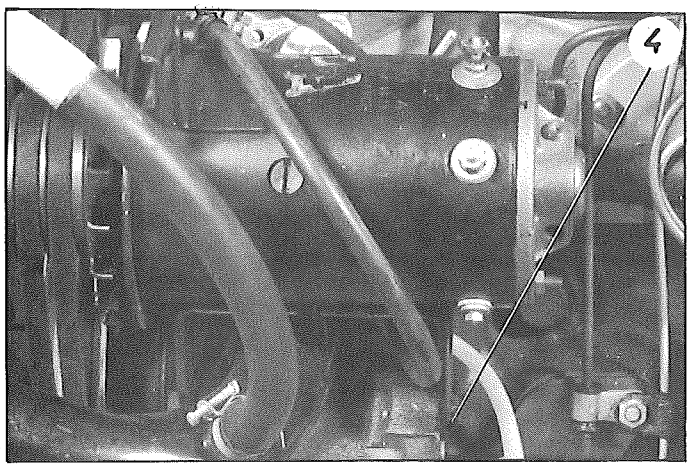
Connect the dynamo tensioner.

Tension the belts (see Op. DX.231-0, paragraphs 16 and 17).

Tighten the nut (2) on the tensioner.

Tighten the securing screws (4).

7. Connect up the leads (1) to the dynamo.
8. Fit the front left-hand suspension sphere.
9. Connect the leads to the battery terminals.
10. Start up the engine and place the height control lever in "normal" position.



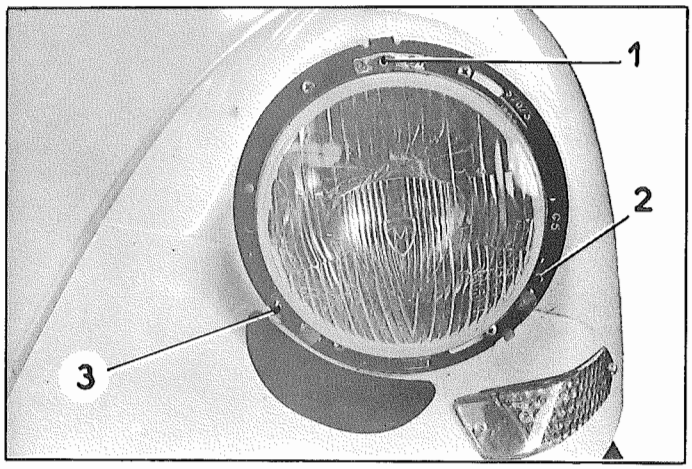
IMPORTANT NOTES:

1) Ensure that the car is in running order, with the heights correctly adjusted and the tyres inflated to the correct pressures.

2) Place the manual height control lever in "normal" position and leave the engine idling during the adjustment.

3) Use a beam-setting device such as "Reglolux" or "Regloscope".

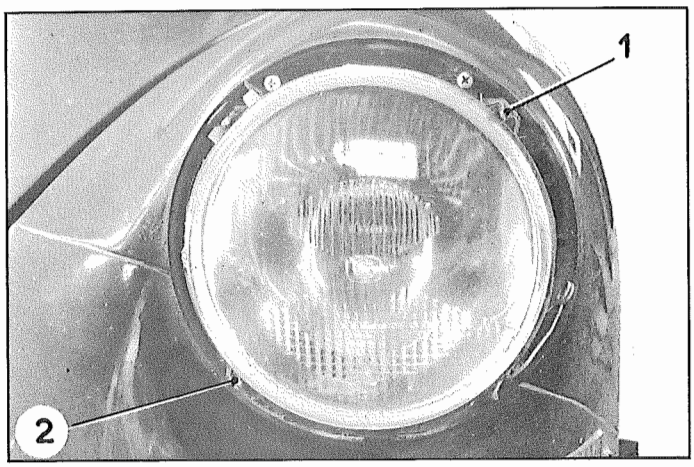
4) Ensure that the car and the adjusting apparatus are on one and the same plane.



ADJUSTING A SEV-MARCHAL HEADLAMP.

1. For horizontal adjustment, adjust the lower screws (2) and (3).

2. For vertical adjustment, adjust the upper screw (1).

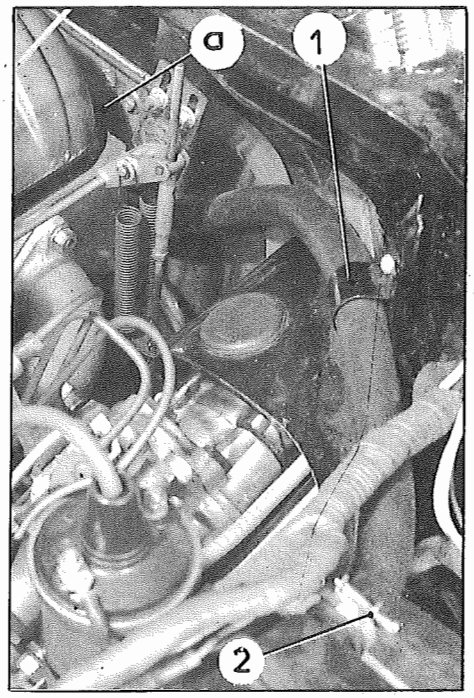


ADJUSTING A CIBIE HEADLAMP.

3. For horizontal adjustment, adjust the lower screw (2).

4. For vertical adjustment, adjust the upper screw (1).

NOTE: Adjust the beam-level as accurately as possible. Set the dipped beam cut-off at the upper limit of the range of the beam-setter.



REPLACEMENT OF A HEATER CONTROL VALVE.

Dismantling.

1. Drain the radiator, (save the liquid which contains anti-freeze).

2. Remove:
   - the air filter and its bracket,
   - the exhaust shield.

3. Disconnect the delivery hose to the heater valve from the hot water outlet pipe on the cylinder head.

4. Disconnect the delivery hose (2), from the heater radiator.

Remove the clip (1) holding the hose to the scuttle panel.

Unscrew the securing clip (a) for the hose in the engine recess and free the hose.

5. Remove the heater valve.

a) Remove the rubber cap from the valve operating knob.

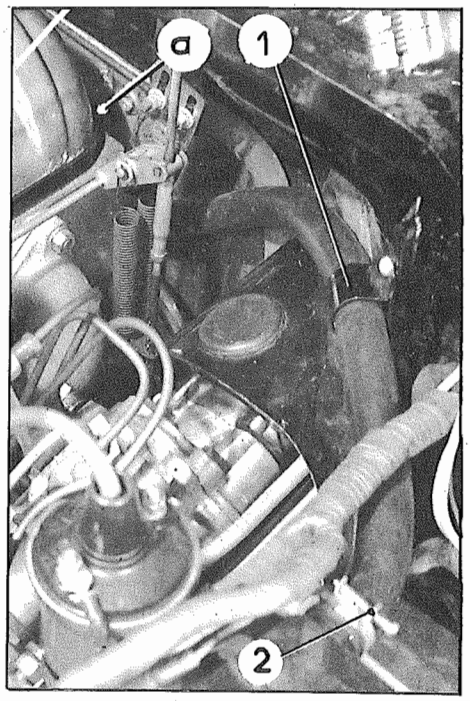
Remove the nut securing the knob (hold the button in Gordon pliers).

Remove:
- the valve operating knob,
- the indicator disc,
- the valve stop.

Remove:
- the indicator plate,
- the three screws securing the valve in the engine recess.

b) Remove the assembly of valve and hoses, passing them under the exhaust manifold.

c) Remove the hoses from the valve.



Assembly.

6. Fit the hoses on the valve (the longer on the left-hand side).

Tighten the hose clips securing the hoses on the valve.

7. Fit the valve in the engine recess, passing the assembly of hoses and valve under the exhaust manifold.

Tighten the three screws securing the valve on the body.

8. Fit and tighten the indicator plate on the carpet.

On the valve fit the following:

- the valve stop (the stop pointer towards the right-hand side,
- the indicator disc,
- the operating knob for the valve,
- the shakeproof washer.

Fit and tighten the securing nut for the operating knob of the valve.
(Hold the knob in Gordon pliers to avoid damaging the valve stop).

Over the knob fit the rubber cap.

9. Fit the delivery hose on the heater radiator. Tighten the hose clip (2).

10. Fit the hose under the securing clip (a) and tighten the securing screw. Fit and tighten the securing clip (1) for the hose on the scuttle panel.

11. Fit the delivery hose feeding the heater valve, on the water outlet pipe on the cylinder head. Tighten the hose clip.

12. Fit:

- the exhaust shield,
- the air filter and bracket assembly.

13. Open the heater valve and fill the radiator.

14. Check all unions for leaks.

As the body parts are the same as those on the DS 21 vehicles, follow the instructions in the corresponding DX sections for their overhaul.

DS 19 MA

Operation No.	Remarks	DESCRIPTION	Paragraph No.
		CHARACTERISTICS	
DL. 000		Characteristics and adjustments	
DL. 00	See Op. DX.00	Work on the hydraulic system. Precautions	
		ENGINE	
DL. 100-00		Engine characteristics	
DL. 100-1		Replacement of an engine-gearbox assembly	
DL. 100-2		Stripping and assembling an engine-gearbox assembly (for replacement of the engine)	1
		Stripping and assembling an engine-gearbox assembly (for replacement of the gearbox)	25
DL. 100-3	See Op. DY. 100-3	Overhauling an engine	
		Removing the cylinder head	3
		Adjusting the end-float of the crankshaft	23
		Fitting the camshaft	26
		Fitting the cylinder head	33
DL. 111-1	See Op. DX. 111-1	Replacing a sump	See Op. DX. 100-1
DL. 112-0	See Op. DX. 112-0	Adjusting the valve rocker clearances	
DL. 112-1		Replacement of a cylinder head or cylinder head gasket ..	
DL. 112-3	See Op. DX. 112-3	Overhauling a cylinder head	
DL. 112-4	See Op. DX. 112-4	Work on the cylinder head	
		Replacing an inlet rocker shaft assembly	1
		Replacing an exhaust rocker shaft assembly	
DL. 120-1	See Op. DY. 120-1	Work on the timing gear	
		Replacing a timing chain or pinions	1
		Replacing a camshaft	6
		Replacing the tappets	42
DL. 133-0	See Op. DX. 133-0	Adjustment of the engine mountings	
DL. 141-1		Replacing an inlet manifold	
DL. 142-0	See Op. DJ. 142-0	Adjusting the idling	
DL. 142-1	See Op. DJ. 142-1	Replacing a carburettor	
DL. 142-3	See Op. DY. 142-3	Overhauling a carburettor	
DL. 142-4	See Op. DX. 142-4	Work on the carburettor control	
		Replacing a control relay	
DL. 171-1	See Op. DY. 171-1	Replacing an air filter	
DL. 171-3	See Op. DX. 171-3	Overhauling an air filter	
DL. 173-1	See Op. DX. 173-1	Replacing a petrol pump	
DL. 173-3	See Op. DX. 173-3	Overhauling a petrol pump	

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Vehicle DS 19 MA

Operation No.	Remarks	DESCRIPTION	Paragraph No.
DL. 174-1	See Op. DX.174-1	Replacing a petrol feedpipe	
DL. 174-3	See Op. DX.174-3	Repairing a petrol feedpipe	
DL. 175-1	See Op. DX. 175-1	Work on the petrol tank	
		Replacing a petrol tank	1
DL. 180-1		Work on the exhaust system	
		Replacing a manifold	
		Replacing an exhaust silencer	
		Replacing the exhaust pipes	
DL. 211-0	See Op. DY.211-0	Adjustment of the distributor and sparking plugs	
		Adjusting the initial ignition setting	1
		Adjusting on a test bench	4
		Cleaning and adjusting the plugs	See Op. DX. 211-0
DL. 211-1	See Op. DY.211-1	Work on the distributor	
		Replacement of a distributor	1
DL. 211-3	See Op. DY.211-3	Overhauling a distributor	
DL. 212-0	See Op. DX.212-0	Checking a coil	
DL. 220-0	See Op. DY.220-0	Checking the oil pressure	
DL. 220-1	See Op. DY.220-1	Work on the oil circulation system	
		Replacing a filter unit	1
		Replacing an oil pump	10
DL. 220-3	See Op. DX.220-3	Overhauling an oil pump	
DL. 231-0	See Op. DX.231-0	Adjustments on the pulleys and belts	
		Aligning the pulleys	1
		Adjusting the tension of the belts	12
DL. 231-1	See Op. DX.231-1	Replacing a water pump	
DL. 231-4	See Op. DX.231-4	Work on the pulleys and belts	
		Replacing the water pump belts	1
		Replacing the high pressure pump belts	6
		Replacing a driving pulley	26
		Replacing a bearing for a driving shaft	34
DL. 232-1	See Op. DX.232-1	Work on the cooling system	
		Replacing a radiator	1
		Replacing a fan	10

Operation No.	Remarks	DESCRIPTION	Paragraph No.
		CLUTCH	
DL. 312-00		Clutch characteristics	
DL. 312-1		Replacing a clutch	
DL. 312-3	See Op. DX. 312-3	Overhauling a clutch	
DL. 314-0	See Op. DJ. 314-0	Adjusting the clutch control	
		Replacing a clutch fork	1
		Replacing a thrust race and its guide	9
		GEARBOX	
DL. 330-00		Characteristics of the gearbox	
DL. 330-1	See Op. DY. 100-1	Replacing a gearbox	
DL. 330-2	See Op. DY. 100-2	Stripping and assembling a gearbox	
DL. 330-3	See Op. DX. 330-3	Overhauling a gearbox	
DL. 330-4	See Op. DX. 330-4	Work on the differential shaft, brake disc or differential shaft bearing	
		Replacing a differential shaft or bearing	1
		Replacing a brake disc	17
DL. 331-1	See Op. DJ. 331-1	Replacing a gearbox cover	
DL. 331-3	See Op. DJ. 330-3	Overhauling a gearbox cover	
		TRANSMISSION	
DL. 372-00		Characteristics and adjustments	
DL. 372-1	See Op. DX. 372-1	Replacement of a drive shaft or pivot	
		SOURCE AND RESERVE OF PRESSURE	
DL. 391-00		Characteristics and adjustments	
DL. 391-1	See Op. DX. 391-1	Replacing a high pressure pump	
DL. 391-3	See Op. DX. 391-3	Overhauling a high pressure pump	
DL. 391-4	See Op. DX. 391-4	Replacing a pressure regulator	
DL. 391-6	See Op. DX. 391-6	Overhauling a pressure regulator	
DL. 391-7	See Op. DX. 391-7	Replacing the connecting pipe between high pressure pump and pressure regulator	
DL. 392-1	See Op. DX. 392-1	Replacing a brake accumulator	
DL. 392-3	See Op. DX. 392-3	Overhauling a brake accumulator	
DL. 393-1	See Op. DX. 393-1	Work on the hydraulic reservoir	
		Replacing a pressure distribution unit	
		Replacing a hydraulic reservoir	

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Operation No.	Remarks	DESCRIPTION	Paragraph No.
		Replacing a filter	
DL. 393-3	See Op. DX. 393-3	Overhauling a pressure distribution unit	
		FRONT AXLE	
DL. 410-00		Characteristics of the front axle	
DL. 410-0	See Op. DX. 410-0	Adjustment on the front axle	
		Adjusting the camber	
		Adjusting the wheel alignment	
		Adjusting the steering centraliser cam	
		Adjusting the steering lock angle	
DL. 410-1	See Op. DY. 410-1	Replacing a front half-axle	
DL. 410-3	See Op. DX. 410-3	Overhauling a front half-axle	
DL. 413-1	See Op. DX. 413-1	Work on the pivot and wheel	
		Replacing an upper ball pin	1
		Replacing a lower ball pin	12
		REAR AXLE	
DL. 420-00		Characteristics of the rear axle	
DL. 420-1	See Op. DY. 420-1	Replacing a rear half-axle	
DL. 420-3	See Op. DX. 420-3	Overhauling a half-axle	
DL. 420-4	See Op. DX. 420-4	Work on the rear axle	
		Replacing a stub axle or stub axle bearing	1
		Replacing a bearing oil seal or a bearing thrust collar	9
		SUSPENSION	
DL. 433-00		Characteristics and adjustments	
DL. 433-0	See Op. DY. 433-0	Adjustments to the suspension	
DL. 433-1	See Op. DX. 433-1	Work on the front suspension	
		Replacing a suspension sphere	
		Replacing a height corrector	
		Replacing a suspension cylinder	
DL. 433-3	See Op. DX. 433-3	Work on the suspension units	
		Overhauling a damper valve	1

Operation No.	Remarks	DESCRIPTION	Paragraph No.
		Overhauling a suspension cylinder	9
		Checking a cylinder for leaks	20
		Checking a suspension sphere	24
		Overhauling a corrector	28
DL.433-4	See Op. DY.433-4	Replacing a front anti-roll bar	
DL.434-1	See Op. DX.434-1	Work on the rear suspension	
		Replacing a height corrector	
		Replacing a suspension cylinder	
DL.434-4	See Op. DY.434-4	Replacing a rear anti-roll bar.....	
DL.437-0	See Op. DX.437-0	Adjusting the manual height control	
DL.437-1	See Op. DX.437-1	Replacing a manual height control unit	
		STEERING	
DL.440-00		Characteristics of the steering	
DL.440-0	See Op. DX.440-0	Adjustments on the steering	
		Adjusting the lateral position of the steering	1
		Adjusting the angular position	5
		Adjusting the alignment	9
		Adjusting the steering centraliser cam	12
		Adjusting the steering lock angle	16
DL.442-1		Work on the steering (replacement)	
		Replacing a steering unit	1
		Replacing a steering cylinder and piston.....	19
DL.442-3	See Op. DX.442-3	Work on the steering (overhauling)	
		Overhauling a steering unit	1
		Overhauling a steering cylinder and piston	36
		Overhauling a steering pinion with slide-valves	48
DL.443-1	See Op. DX.443-1	Replacing a steering relay	
DL.443-3	See Op. DX.443-3	Overhauling a steering relay	
		BRAKES	
DL.451-00		Characteristics and adjustments	
DL.451-0	See Op. DX.451-0	Adjustments on the brakes	
		Adjusting the brakes with hydraulic control	
		Adjusting the hydraulic brake unit	1

Operation No.	Remarks	DESCRIPTION	Paragraph No.
		Adjustment on brakes, mechanical control	
		Adjusting the clearance between brake caliper and disc	8
		Adjusting the clearance between pads and disc	12
		Adjusting the tension of the sheath	17
		Adjustments on rear brakes	
		Centring the brake shoes	23
DL. 451-1	See Op. DY. 451-1	Work on the front brakes (replacements)	
		Replacing the pads on hydraulic brakes	
		Replacing a hydraulic brake unit	See Op. DX. 451-1
		Replacing a brake disc	See Op. DX. 330-4
DL. 451-3	See Op. DX. 451-3	Work on the front brakes (overhaul)	
		Overhauling a hydraulic brake unit	1
DL. 451-4	See Op. DX. 451-4	Work on the rear brakes	
		Replacing a brake drum	1
		Replacing the shoes	7
		Replacing the brake backplate	19
		Replacing the wheel cylinder	31
DL. 453-0	See Op. DJ. 453-0	Adjustments on the hydraulic brake pedal gear	
		Bleeding the brakes	1
		Adjusting the brake distribution	13
		Checking the pressure switch	23
		Adjusting the stop switch	26
DL. 453-1	See Op. DX. 453-1	Work on the hydraulic brake pedal gear	
		Replacing a hydraulic brake pedal gear	1
		Replacing a brake distributor	17
		Checking the brake distributor for leaks	29
DL. 453-3	See Op. DX. 453-3	Overhauling a hydraulic brake pedal gear	
DL. 453-4	See Op. DX. 453-4	Replacing a swivel rear pipe assembly	
DL. 454-0	See Op. DJ. 454-0	Adjusting the handbrake	
DL. 454-1	See Op. DJ. 454-1	Work on the mechanical brake control	
		For removal of the hydraulic brake unit (see Op. DJ. 451-1)	

Operation No.	Remarks	DESCRIPTION	Paragraph No.
		ELECTRICAL	
DL.510-1	See Op. DY.510-1	Arrangement of electrical installation	
DL.533-1		Replacing a starter motor	
		BODYWORK	
DL.851-00		Characteristics	

The characteristics of vehicle DS 19 MA (DL.) only differ from those of DS 19 A (DY.) dealt with in Operation No. DY. 000, in the following points:-

GENERAL CHARACTERISTICS:

Vehicle type	DS 19 series MA
Commercial name	DS 19 MA
Works symbol	DL
Date of production	September 1965 - chassis 4.438.000.

ENGINE:

Carburettor settings:

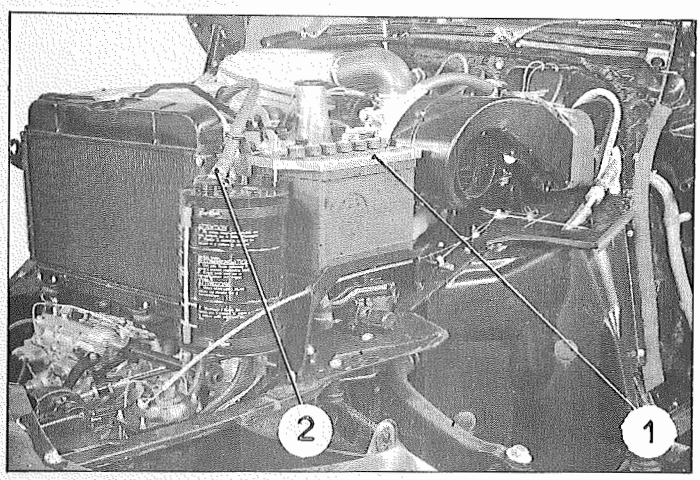
Carburettor Weber 28/36 DDE A 2.

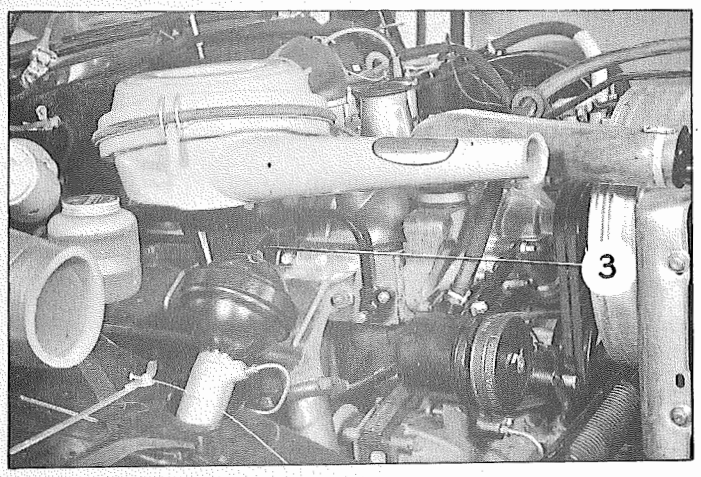
The settings are the same as those on the DY vehicle, but there is no accelerated idling device.

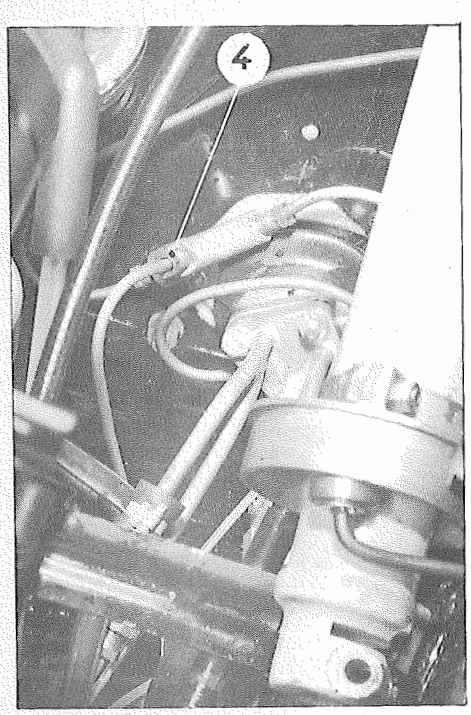
The characteristics are the same as those for the DS 19 A engine (see Op. DY.100-00).

CARBURETTOR WEBER 28/36 DDE A 2.

The settings are the same as those for the DY vehicle, but the carburettor has no accelerated idling device.







REMOVAL.

1. Place the front of the vehicle on stands (stand 2505-T).

Hold the bonnet open (stay MR 4158).

2. Remove:-

   - the spare wheel,
   - the front wings,
   - the radiator inlet duct assembly with the crossmember supporting the spare wheel,
   - the two front wheels.

3. Drain the radiator and cylinder block (save the water which contains anti-freeze).

4. Release the pressure in all the circuits (see Op. DX.00).

5. Remove the battery and its tray.

Leave the battery top frame (1) on the heater unit.

Remove the filter (2) from the reservoir.

Free the assembly of the battery cradle and reservoir.

Drain the hydraulic fluid reservoir and leave it lying on the left-hand front sidemember.

6. Remove the air filter and its bracket (3).

7. Remove the steering (see Op. DL.422-1).

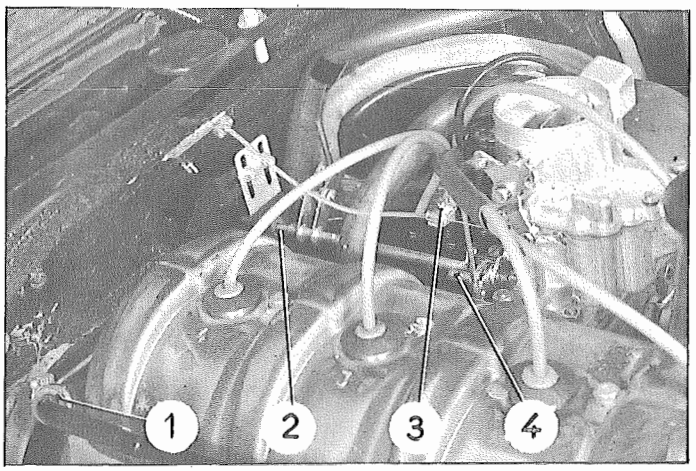
8. Disconnect:-

   - the dynamo leads,
   - the distributor leads to the coil,
   - the lead to the thermometer transmitter.

9. Remove the front left-hand suspension sphere.

10. Disconnect:-

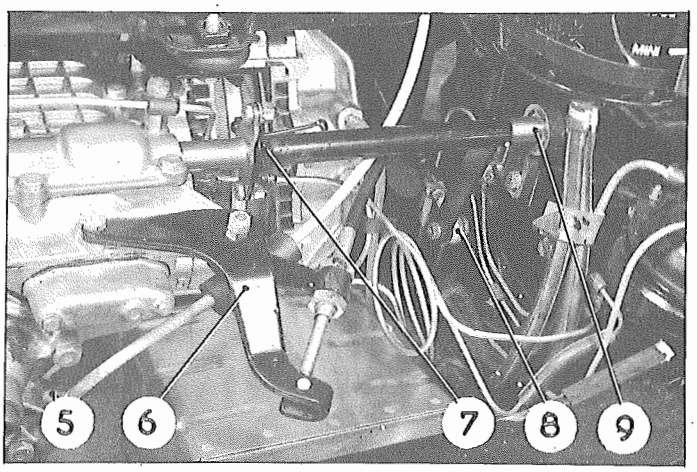
    - the heater pipe from the heater unit,
    - the pressure regulator outlet pipe (4) from the 3-way union.

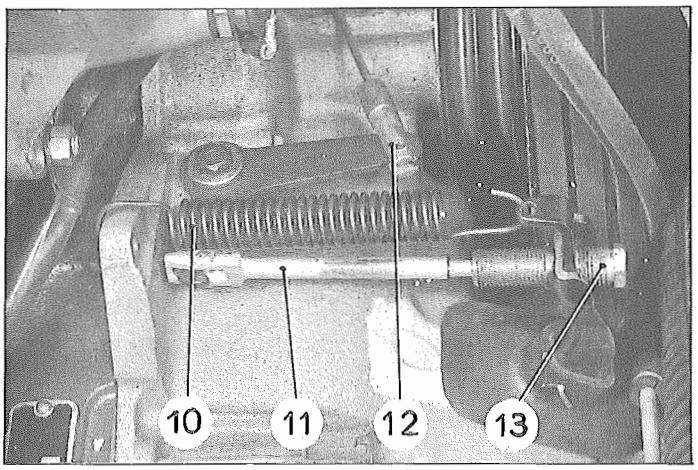


11. Disconnect:-

- the choke cable from the carburettor (3),
- the accelerator control relay (4) from the carburettor, freeing it from the rear support (2),
- the petrol inlet pipe from the petrol pump,
- the heater pipe from the water pipe on the cylinder head (1),
- the supply pipe from the front left-hand brake unit,
- the supply pipe from the front right-hand brake unit,
- the speedometer cable (5) from the speedometer drive on the gearbox,
- the gear change control unit:

  remove the bracket (6) from the gearbox cover, disconnect the control rod (9), disconnect the rod (7) from the gearbox cover and free it from the ball joint (8).





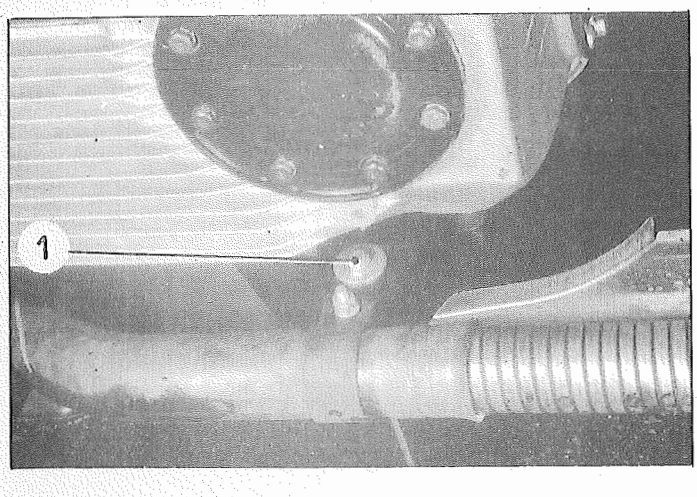
- the clutch cable:

  loosen the adjusting screw (13)

  remove the spring (10)

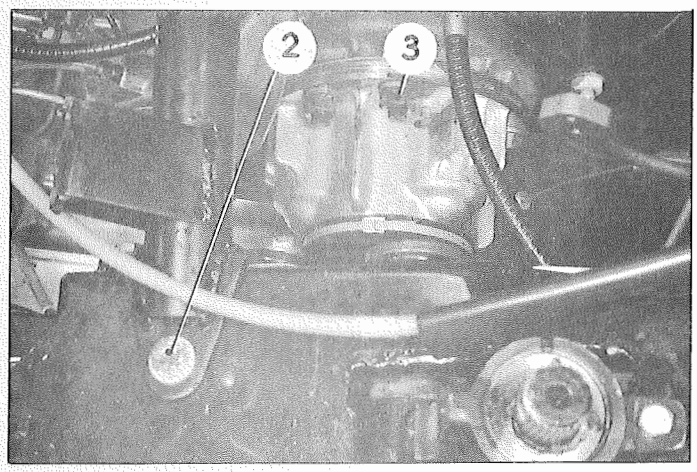
  remove the push-rod (11)

  free the cable from the lever (12).



12. Disconnect the exhaust downpipe from the exhaust manifold.

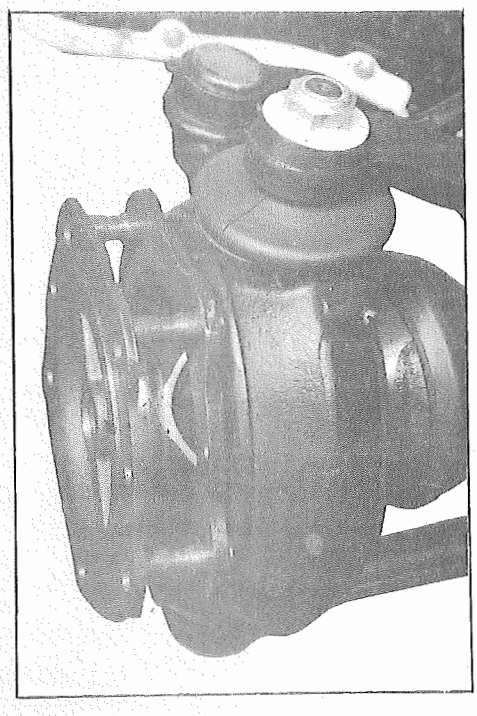
Remove the securing screw (1) from the clip holding the flexible exhaust pipe.



13. Remove:

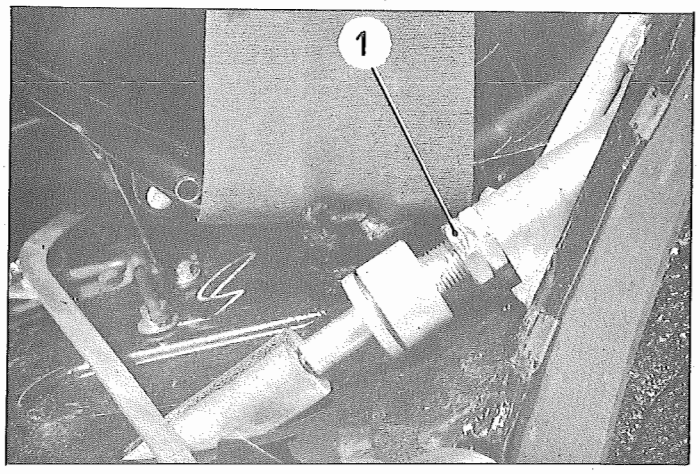
- the nuts (3) securing the drive shafts to the flanges on the gearbox outlet shafts
- the securing screws (2) from the front crossmember on the sidemember

NOTE:- Recover and mark the adjusting shims which may be found between the crossmember and the sidemember.



14. Disconnect the drive shaft, right-hand and left-hand from the pivots

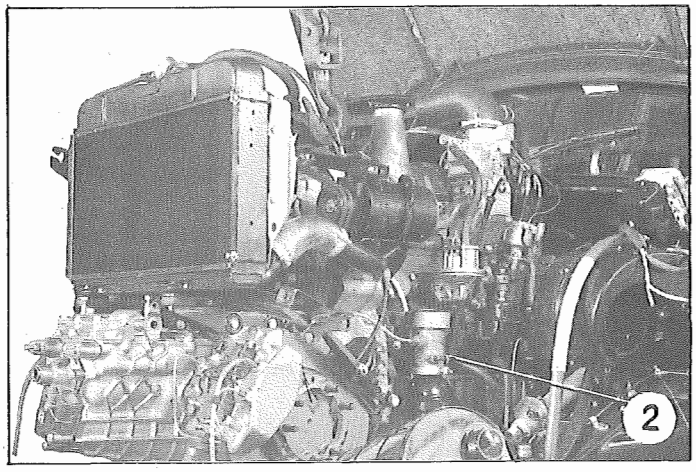
Remove the two countersunk head screws and withdraw as far as possible the drive shafts through the pivots and off the studs on the gearbox outlet shafts.



15. Remove the handbrake cable.

Unscrew completely the nut and locknut (1) on the threaded sleeve.

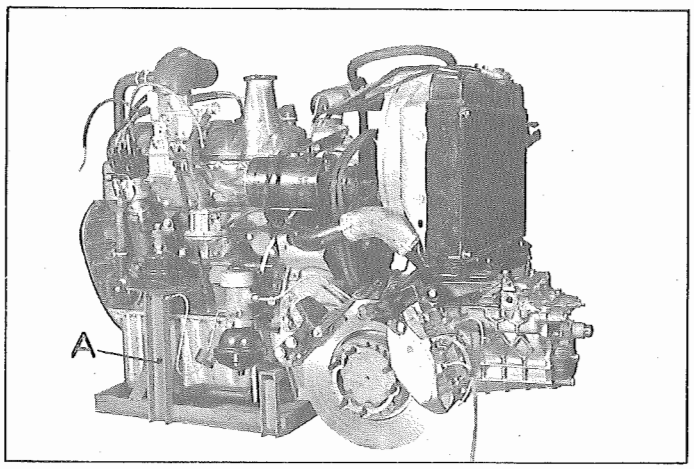
Free the cable from the levers on the handbrake calipers by compressing the springs.



16. Remove the screws securing the rear engine mountings (14 mm tee spanner, 20"(500 mm) long, with universal joint).

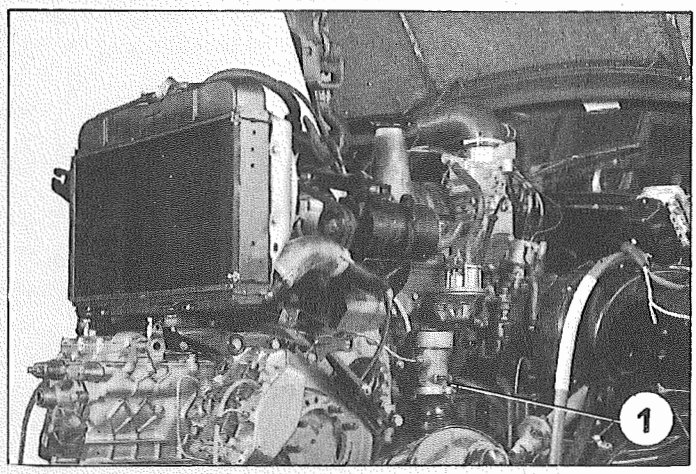
17. Suspend the engine-gearbox assembly on its sling bracket and withdraw it.

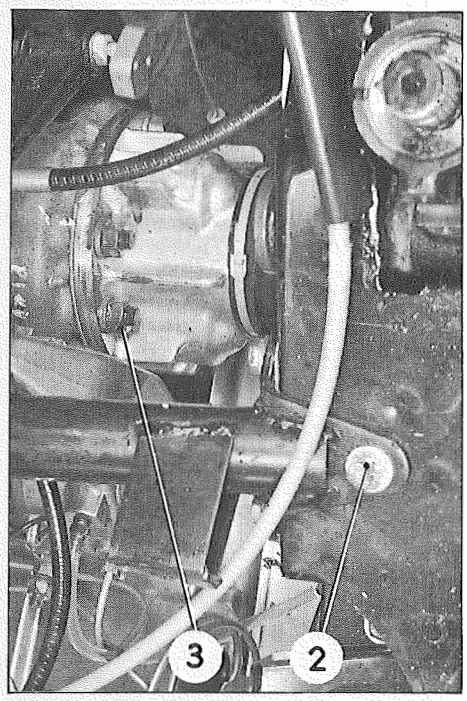
18. Disconnect the reservoir return pipe (2) from the pressure regulator.

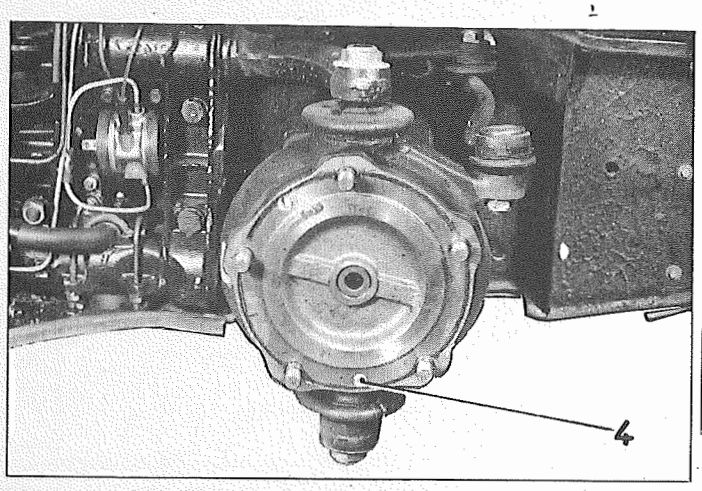


19. Place the assembly on a support 3083-T (A).

Place a mat or a piece of hardboard between the discs and the floor to prevent damage to the discs.







ASSEMBLY.

20. Adjust the rear engine-mountings, (see Op. DX.133-0).

21. Suspend the engine-gearbox assembly on its sling and guide it into the vehicle.

Before lowering it onto its mountings connect the reservoir return pipe (1) to the pressure regulator and tighten the clip.

Fit the rear engine mountings to the rear supports (shakeproof washer and thrust plate under screw heads).

22. Connect the front crossmember to the side-members:

Place the packing pieces found when dismantling, between the front engine crossmember and body sidemembers.

Tighten the screws (2).

NOTE:- The difference between the distances from the brake disc and sidemember, on each side, must be 80 ± 2 mm. If not, re-adjust by changing the packing pieces.

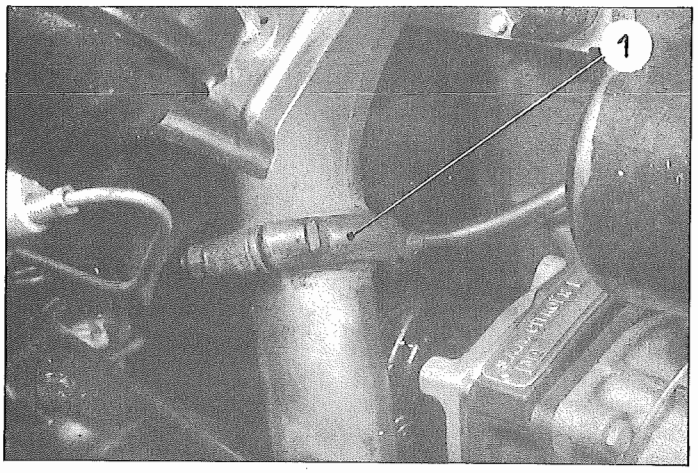
23. Connect the drive shafts to the driving flanges of the gearbox outlet shafts. Tighten the nuts (3) from 60 - 80 ft.lbs (8.5 - 11 m.kg).

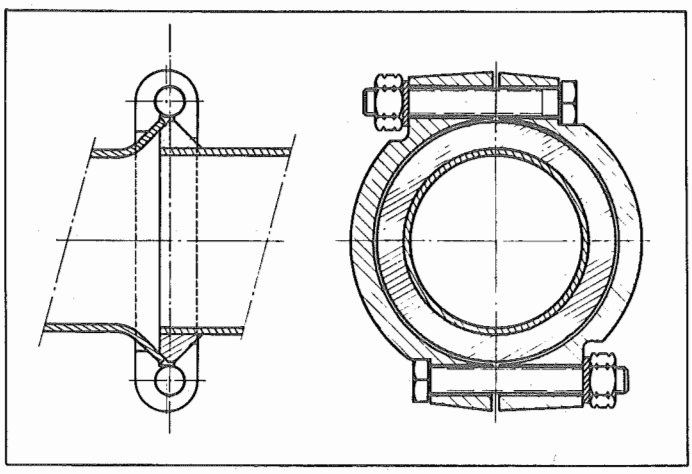
24. Connect the drive shafts to the pivots, right-hand and left-hand.

Fit and tighten the countersunk head screws (4).

25. Fit the handbrake cable (see Op. DL.454-1).

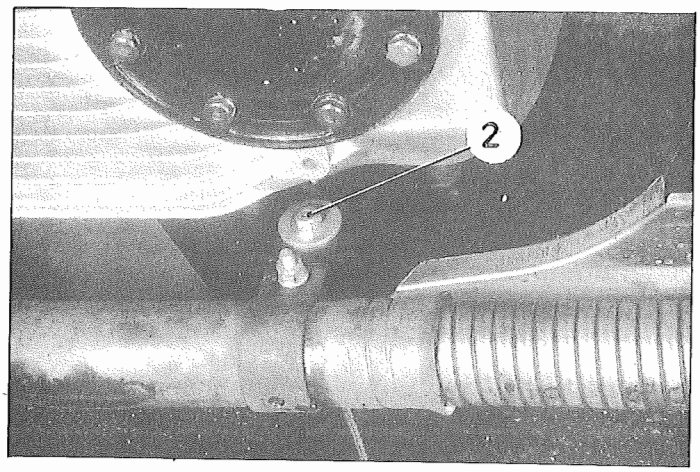
Adjust the handbrake cable (see Op. DL. 454-0).



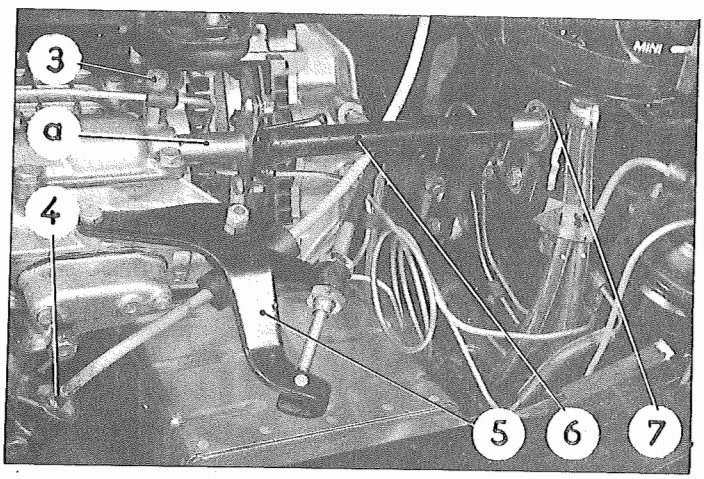


26. Connect the exhaust downpipe to the exhaust manifold.

Fit the clamps (1) as shown in the above photograph. Tighten the screws.



27. Fit the clip securing the exhaust flexible pipe under the engine. Tighten the screw (2).



28. Connect up:-

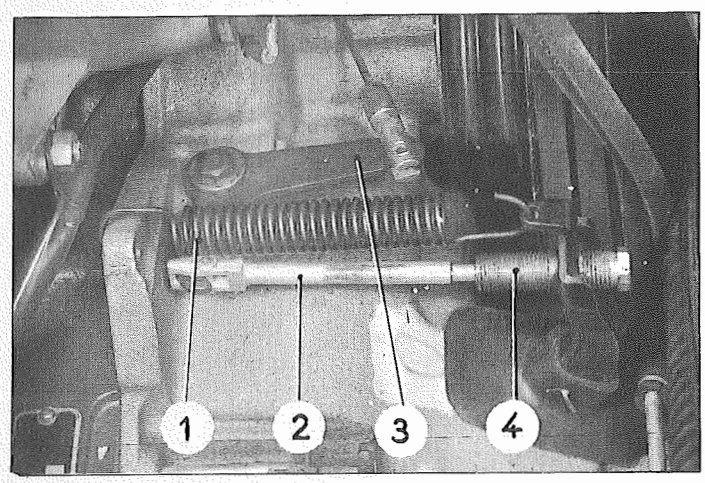
- the supply pipe to the front right-hand brake unit, fitting the securing clips (3) for the pipe on the gearbox cover,
- the supply pipe for the front left-hand brake unit. Fit the securing clip for the pipe,
- the speedometer cable (4).

29. Couple up the gear change control unit:

Fit the tube (6) in the ball joint (7) and connect up the control rod to the gearbox. Adjust the alignment of the control rod if necessary by moving the support (7).

Connect the rod on the clip of the control tube.

Fit the bracket (5) on the gearbox cover. Engage the control lever on the gearbox shaft "a".



31. Connect up the clutch control

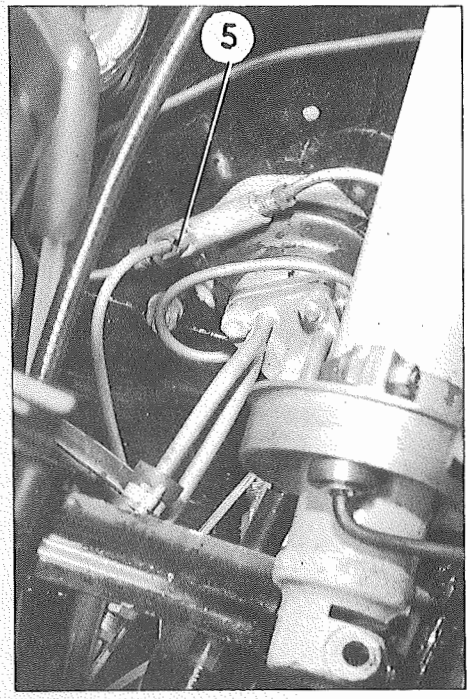
Insert the sheath in the boss on the clutch housing.

Connect the cable to the relay lever (3).

Fit the push rod (2).

Fit the return spring (1).

Adjust the clutch clearance by means of the screw (4) (see Op. DJ.314-0).

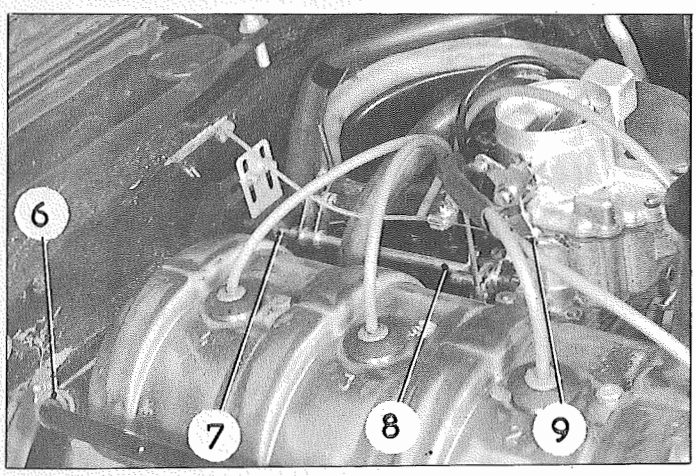


32. Connect up:-

- the petrol delivery hose to the petrol pump,
- the pressure regulator outlet pipe (5) to the 3-way union,
- the rubber pipe to the left-hand heater unit,
- the heater hose (6) to the hot water supply pipe on the cylinder head.

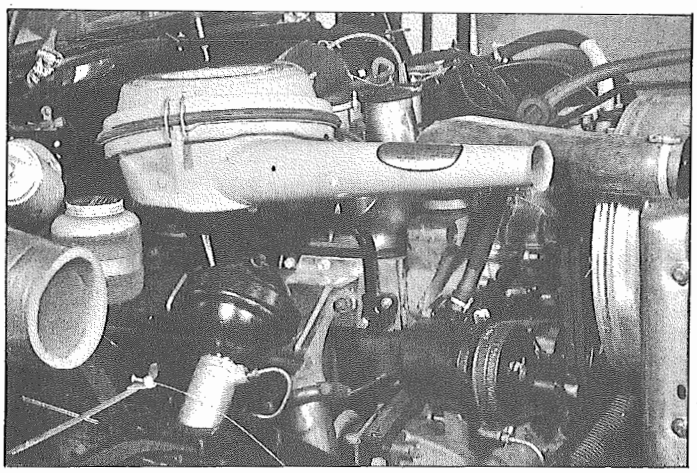
33. Fit the left-hand front suspension sphere.

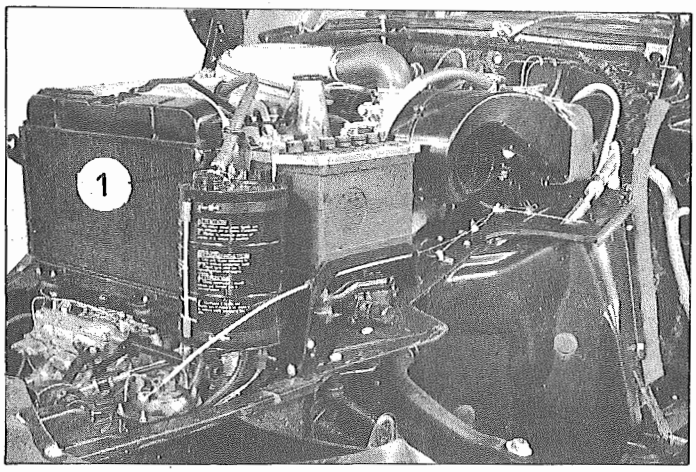
34. Fit the steering unit (see Op. DL.442-1).



35. Fit the accelerator control relay (8) in the rear housing (7) and connect up to the carburettor. Align it if necessary.

Connect up the choke control (9).





36. Fit the air filter:

Fit the rubber connector between filter and rocker cover and connect the rubber elbow between the carburettor and air filter.

37. Fit:-

- the battery cradle and the hydraulic reservoir,
- the battery and its tray,
- the battery top frame,
- the suction filter (1) on the reservoir.

38. Connect:

- the dynamo leads,
- the lead from distributor to coil,
- the lead to the thermometer transmitter,
- the cables to the battery terminals.

39. Fit the front wheels.

Lower the car to the ground.

40. Adjust the initial ignition setting if necessary (see Op. DY.211-0).

41. Fill up the radiator and cylinder block.

Open the heater valve.

Start up the engine and top up the level after several minutes running.

42. With an assistant depressing the hydraulic brake pedal, centralise the brake units. Tighten the securing screws on the gearbox outlets to between 94 and 100 ft.lbs (13 - 14 m.kg).

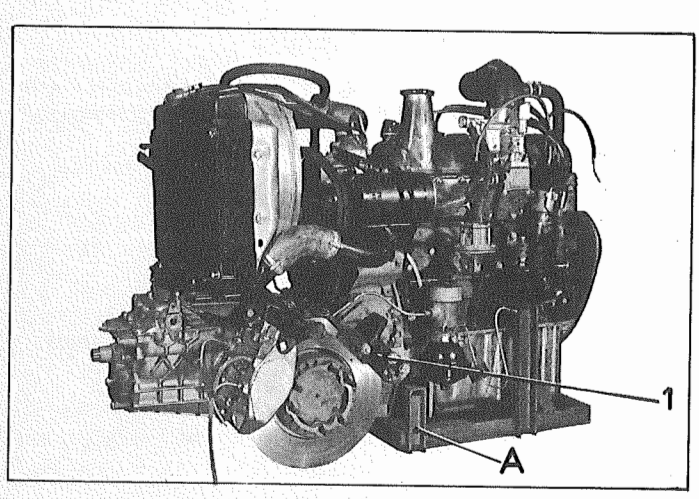
43. Bleed the brakes (see Op. DX.453-0).

44. Adjust the idling.

45. Fit:-

- the wings; connect the wiring harnesses,
- the embellishers to the wheels,
- the radiator air intake duct,
- the spare wheel.

STRIPPING AND ASSEMBLING FOR REPLACEMENT OF THE ENGINE



Stripping.

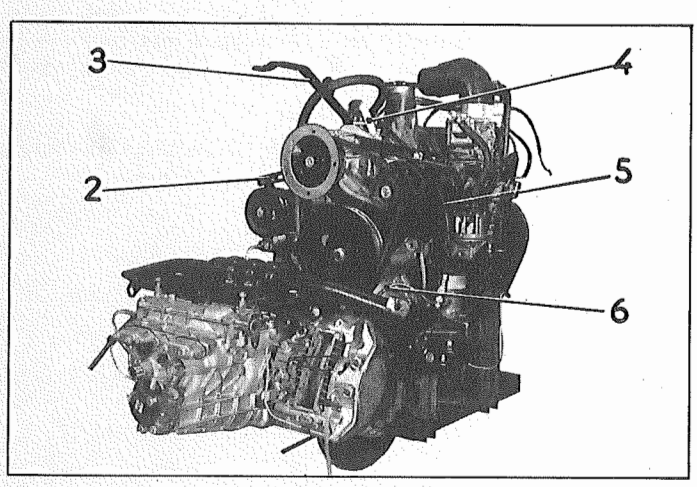
1. Place the engine-gearbox assembly on a stand (3083-T (A)).

2. Disconnect:-

   - the radiator tie-rod from the radiator,
   - the suction and delivery hoses. from the water pump.

3. Remove:-

   - the radiator,
   - the fan,
   - the starter motor cable.

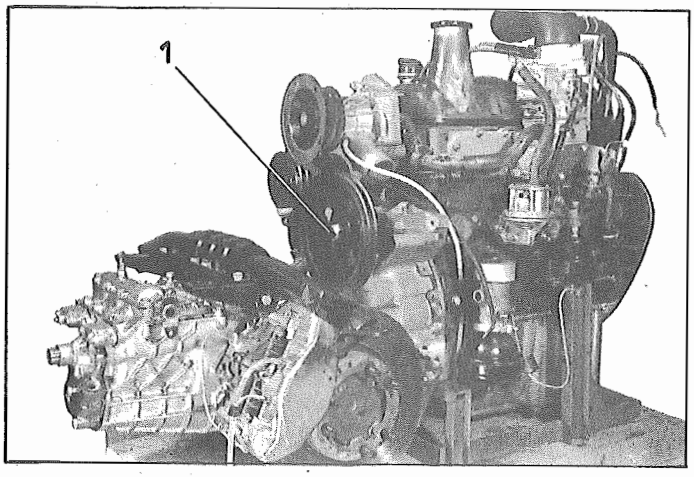


4. Remove:-

   - the radiator tie-rod (3), the sling hook (4) and the earth cable (5),
   - the belts from the dynamo,
   - the dynamo and the dynamo tie-rod,
   - the connecting pipe (6) between high pressure pump and pressure regulator,
   - the mechanical brake units (1).

5. Disconnect:-

   - the high pressure pump tie-rod (2) from the water pump.



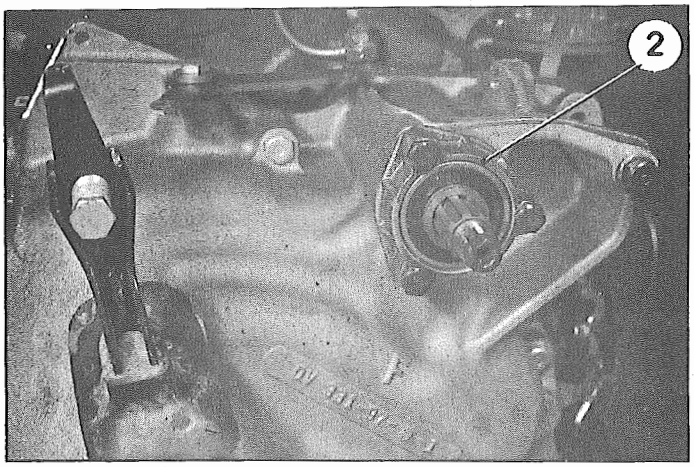
6. Remove the drive pulley:

Use a chisel to remove the metal of the nut turned down into the shaft for locking purposes (1).

Remove the pulley, taking care not to lose the adjusting washers.

7. Remove:

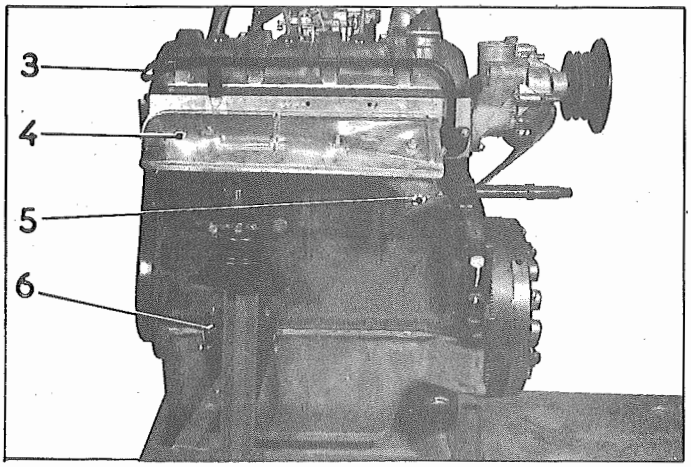
- the bearing support (2) for the camshaft (spanner 2431-T),
- the screws securing the gearbox to the engine (spanners 2431-T and 1677-T),
- the starter motor.



8. Disconnect the gearbox from the engine

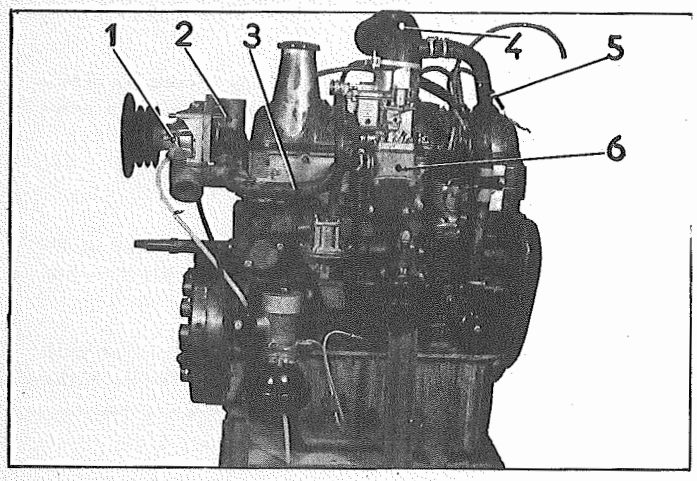
NOTE:- The gearbox must not on any account be moved about by rolling it with the brake discs on the ground. Insert a rubber mat or a sheet of plywood between the ground and the gearbox.

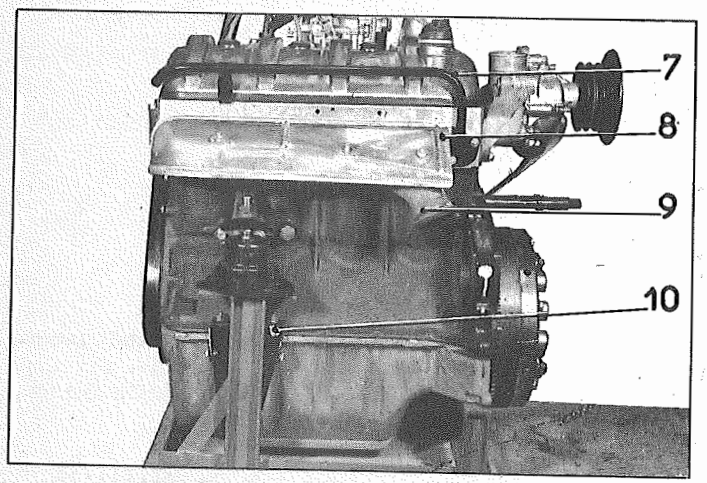
It is preferable to fit old worn discs or dummy discs machined to 350 mm diameter.

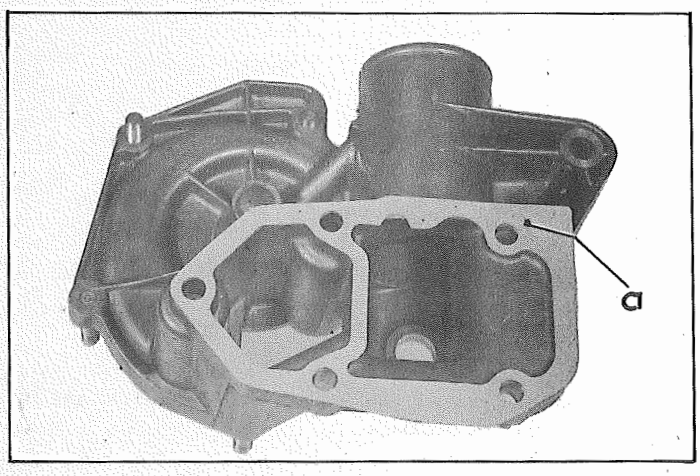


9. Remove:

- the heat shield (4) from the exhaust manifold,
- the exhaust manifold (5),
- the heater pipe (3),
- the bracket (6) for the exhaust downpipe.







10. Disconnect the flexible hot-spot pipe (3) from the carburettor mounting block (6).

11. Remove:

- the water pump (1),
- the water pump cover (2),
- the assembly of the flexible air filter elbow (4) and flexible connecting pipe (5) air filter to breather,
- disconnect the petrol delivery pipe from the carburettor and remove:-
- the petrol pump, freeing the insulating distance piece and pushrod,
- the distributor and its housing,
- the assembly of carburettor with mounting block,
- the assembly of pressure regulator and bracket,
- place the engine on a wooden cradle and remove:-
- the sparking plugs (spanner 1603-T),
- the engine mounting arms together with the rubber mountings,
- the dipstick.

12. Drain the engine.

13. Free the gearbox centring dowels from the engine.

Assembly.

14. Fit the engine mounting arms together with the rubber mountings.

15. Fit:-

- the securing bracket under the engine for the exhaust downpipe (10).

Place the engine on a support 3083-T.

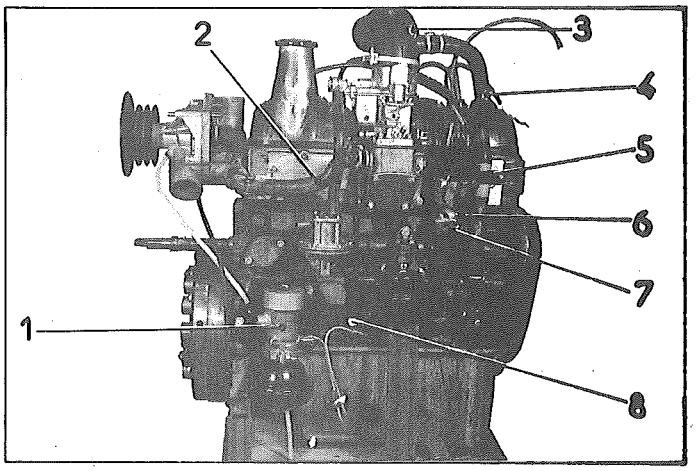
Fit:-

- the exhaust pipe (9) inserting the gasket (the joint turnover towards the manifold),
- the heater pipe (7) inserting the gasket,
- the exhaust shield (8),
- the water pump cover inserting the gasket (note method of fitting. See position of corner "a" on gasket in photo),
- the water pump, inserting the gasket.

16. Fit the carburettor with its mounting block, inserting the gasket. Tighten the nuts progressively (plain washers).

17. Connect the flexible hot-spot pipe (2) to the carburettor mounting block and tighten the clip.

Fit the rubber air filter elbow (3) together with the flexible connecting pipe (4) between the air filter and breather (tighten the clips).



18. Fit the petrol pump (see Op. DX.173-1).

Connect the petrol feed pipe to the carburettor.

19. Fit the pressure regulator and bracket assembly (1) (plain washer).

20. Fit the distributor:

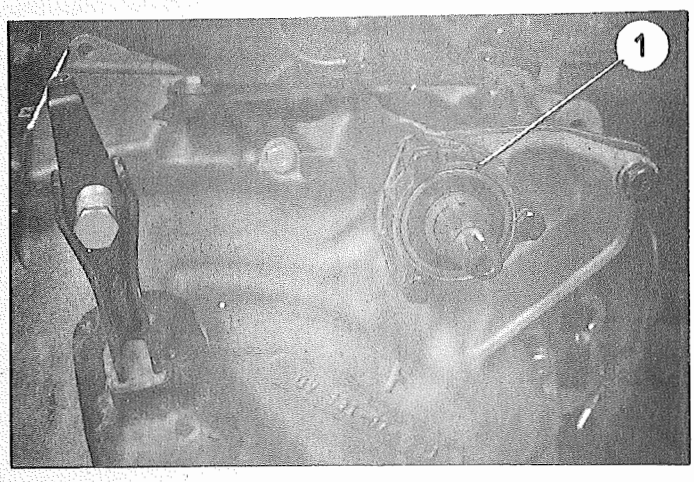
- Fit the distributor housing (7), the clamp-plate (6), holding the distributor. Fit the nuts without tightening them (plain and shake-proof washers).
- Fit the distributor (see Op. DY.211-1).

Fit the earth lead to the distributor behind the pipe (4), secure the terminal onto the stud fixing the clip (5). Fit the clip (5) and tighten the nut.

21. Fit:-

- the sparking plugs (spanner 1603-T),
- the oil dipstick guide tube.

Insert a rubber gasket under the union (8) and fit the oil dipstick.



22. Connect the gearbox to the engine.

Fit the centring dowels with their circlips on the engine.

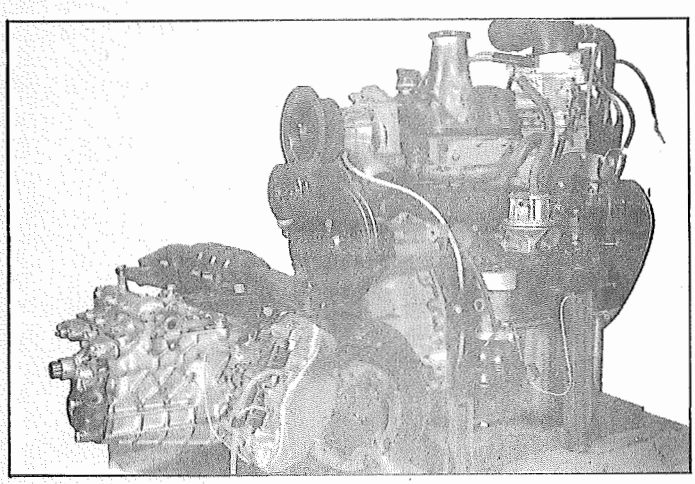
Offer up the gearbox, turning the mainshaft using the starting handle dog.

Fit the starter motor. Tighten the screws securing the gearbox to the engine (spanner 2431-T).

The gearbox is secured to the sump by means of two screws with flats (spanner 1677-T).

23. Fit the bearing housing (1) for the camshaft (spanner 2431-T).

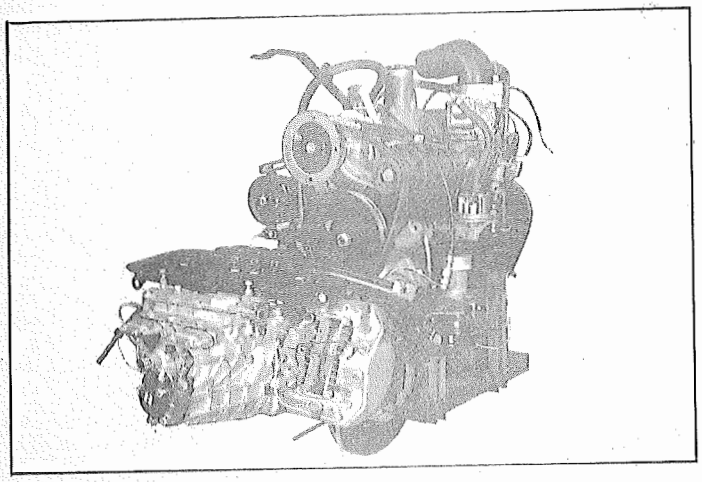
Fit the drive pulley together with the belts for the high pressure pump (insert adjusting washers found when dismantling.



24. Check the alignment of the pulley (see Op. DX. 231-0). Tighten the nut to 54 ft. lbs (7.5 m. kg) and turn over the metal of the nut into the groove in the shaft for locking purposes.

25. Fit the connecting pipe between high pressure pump and pressure regulator. Fit the pipe securing clip on the stem of the swivel ball of the clutch fork (shakeproof washer).

26. Connect the high pressure pump tie-rod to the water pump (shakeproof washer and plate).



27. Check the alignment of the high pressure pump (see Op. DX. 231-0).

28. Tension the belts of the high pressure pump.

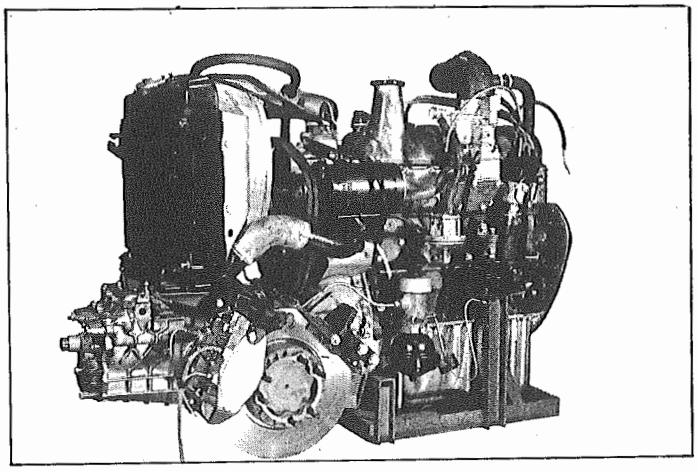
29. Fit the brake discs.

It is essential *that the maximum run-out of the disc, measured at the largest diameter does not exceed 0.15 mm.* Proceed as indicated in paragraph 52 of this operation.

30. Fit the mechanical brake calipers.

Adjust the clearance between brake caliper and brake disc (see Op. DX. 454-1).

Tighten the screws from 72-80 ft. lbs (10 - 11 m. kg).



31. Fit the dynamo.

Connect the dynamo tie-rod to the water pump.

Check the alignment of the dynamo (see Op. DX. 231-0).

- Fit the dynamo belts,
- Tension the belts.

32. Fit the starter motor cable and tighten the nuts.

33. Fit the radiator tie-rod, the earth cable and the sling hook on the water pump.

34. Fit the fan and tighten the screws progressively.

35. Fit the radiator and centralise it.

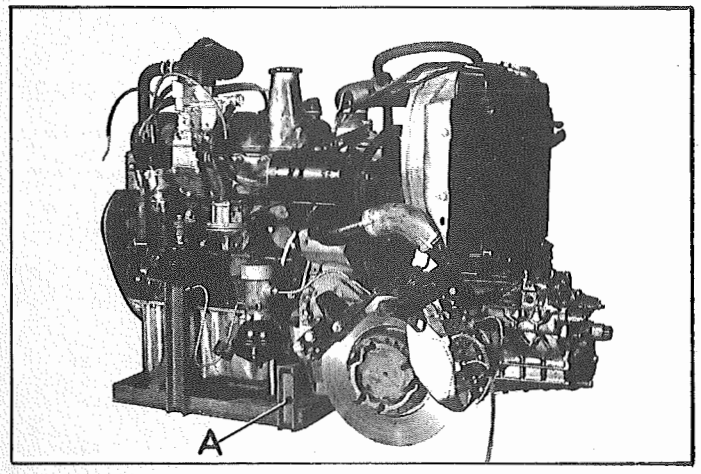
Fit the radiator tie-rod to the radiator.

Fit the suction and delivery hoses to the water pump.

36. Pass the high pressure pump suction hose through the bracket on the radiator tie-rod.

37. Fill up the engine with oil, 9 pints (5 litres) of SAE 10 W 30.

38. Adjust the flexible engine support mountings (see Op. DX. 133-0).



STRIPPING AND ASSEMBLING FOR REPLACING THE GEARBOX

Stripping

39. Place the engine-gearbox assembly on a stand 3083-T (A).

Disconnect:-

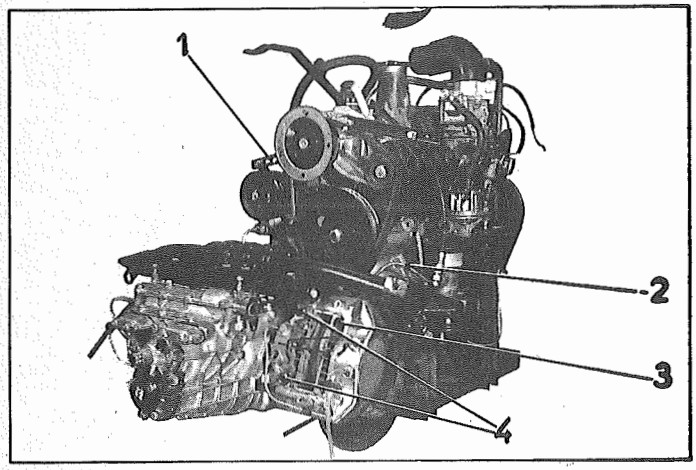
- the radiator tie-rod from the radiator,
- the suction and delivery hoses from the water pump.

40. Remove:-

- the radiator,
- the fan,
- the starter motor cable.

41. Remove:-

- the dynamo tie-rod,
- the dynamo,
- the brake pads (3),
- the securing screws (4) from the hydraulic brake unit on the gearbox outlet housing.



42. Disconnect the crossmember from the right-hand brake unit and free the unit.

Remove the crossmember with the left-hand brake unit.

43. Remove:-

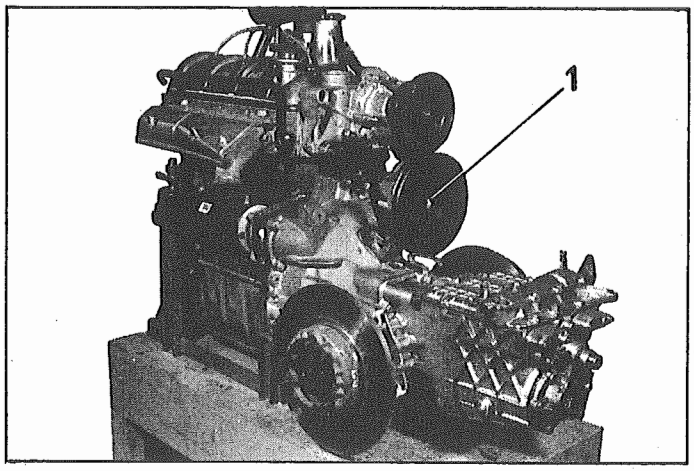
- the mechanical brake calipers,
- the connecting pipe (2) between high pressure pump and pressure regulator.

44. Disconnect:-

- the high pressure pump tie-rod (1) from the water pump.

Remove:-

- the high pressure pump (do not lose the alignment adjusting washers).



45. Remove the drive pulley

Using a chisel remove the metal of the nut turned down into the slot in the shaft for locking purposes (1).

Remove:-

- the pulley,
- the alignment adjusting washers from under the pulley,
- the belts from the high pressure pump.

46. Remove:-

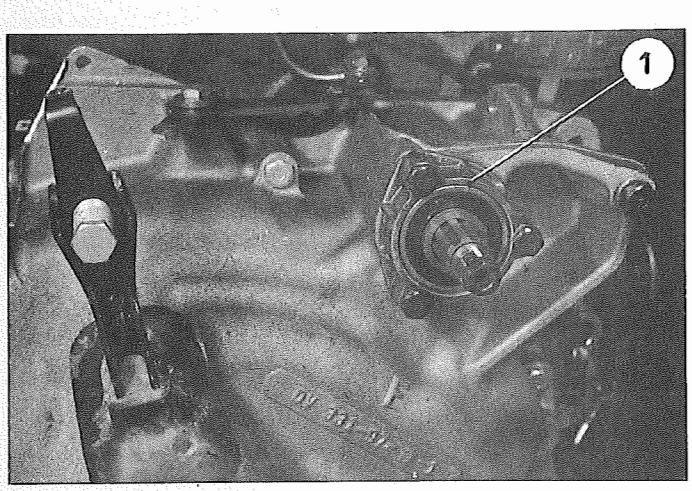
- the bell crank lever from the clutch control,
- the bearing housing for the camshaft,
- the starter motor (spanner 2431-T and 1677-T).

47. Disconnect the gearbox from the engine.

NOTE:- the gearbox must not on any account be moved about by rolling it with the brake discs on the ground. Insert a rubber mat or a sheet of plywood between the ground and the discs.

It is preferable to fit old worn discs or dummy discs machined to 350 mm diameter. Insert washers between the nuts and the disc to ensure thorough tightening. Remove the screws securing the gearbox (spanners 2431-T and 1677-T).

Free the gearbox.



ASSEMBLY.

48. Connect the gearbox to the engine.

a) Ensure that the centring dowels of the gearbox are in place on the cylinder block.

b) Offer up the gearbox, turning the mainshaft using the starting handle dog, pushing the gearbox meanwhile, to facilitate entry into the splines.

c) Tighten the screws securing the gearbox (spanner 2431-T).

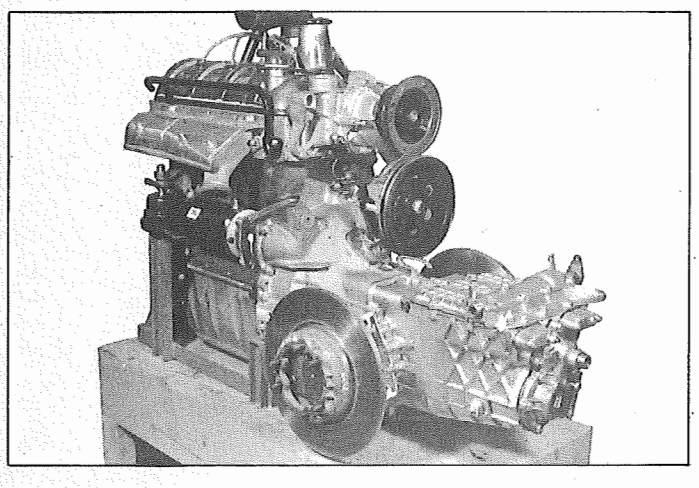
d) Fit the starter motor.

NOTE:- The gearbox is secured to the sump by means of two screws with flats (spanner 1677-T).

49. Fit:-

- the bearing housing (1) for the camshaft (spanner 2431-T),
- the bell crank lever for the clutch control.

50. Fit the belts for the high pressure pump.



51. Fit the drive pulley.

Insert the alignment adjusting washers found when dismantling.

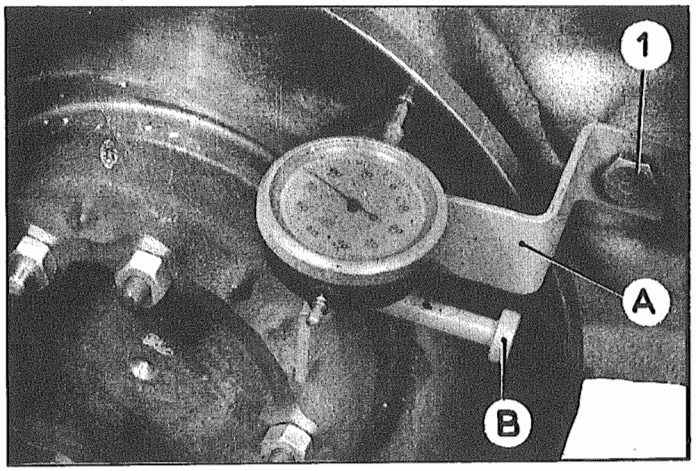
Tighten the nut to 54 ft.lbs (7.5 m.kg).

Knock over the metal of the nut into the slot in the shaft for locking purposes.

52. Fit the brake discs.

It is essential *that the maximum run-out of the disc measured at the largest diameter does not exceed 0.15 mm.*

a) Insert washers and spacers between the nuts and the discs to ensure thorough tightening of the latter on the differential shaft flanges.



IMPORTANT:- If there is a yellow mark on the gearbox drive flange and on the disc, these two marks must be placed as near as possible to each other on assembly.

b) Fit a dial gauge (2437-T) on a bracket (A) (MR 3365-250) using a screw (B) (this screw forms part of tool 2041-T).

Hold the bracket (A) on the clutch bell housing by the upper securing screw of the mechanical brake caliper.

c) Position the stem of the dial gauge on the largest diameter of the disc face. Tighten the screw (1) of the bracket (A).

d) Turn the disc. The maximum run-out shown on the dial gauge must not exceed 0.15 mm.

e) If it does, remove the disc, turn it through one third of a turn in a clockwise direction and replace it.

f) Again measure the run-out. If it is greater than 0.15 mm, remove and turn the disc another one third of a turn, still in a clockwise direction and replace it.

g) If after another reading the run-out is still greater than 0.15 mm the disc must be changed.

h) Check the run-out with the new disc, operating as indicated in paragraphs d) to f) above.

i) If, in the three possible positions, the run-out on the new disc is still greater than 0.15 mm it will be necessary to change the differential shaft (see Op. DX. 330-4, paragraphs 7 onwards).

53. Fit:- 518

- the high pressure pump, inserting the adjusting washers found when dismantling.

Check the alignment of the pulley (see Op. DX.231-0).

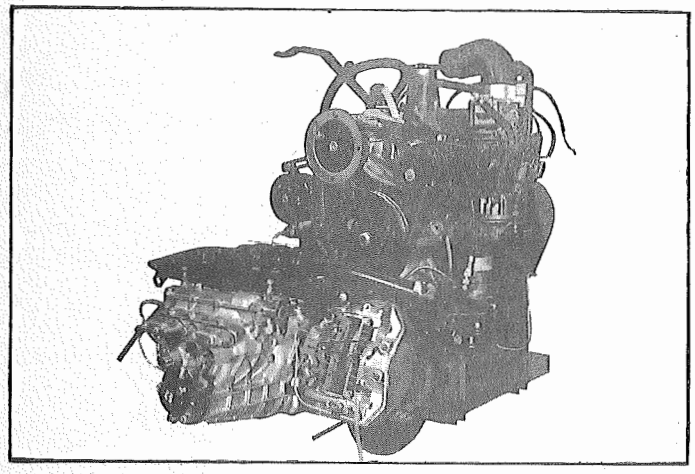
Connect the high pressure pump tie-rod to the water pump (shakeproof washer and plate).

Check the pulley alignment (see Op. DX.231-0).

54. Fit and tension the belts (see Op. DX.231-0).

55. Fit:-

- the connecting pipe between high pressure pump and pressure regulator,
- the mechanical brake calipers,
- adjust the clearance between brake calipers and discs (see Op. DX.454-1),
- tighten the screws from 72 - 80 ft.lbs (10 - 11 m.kg).



56. Fit the engine crossmember together with the left-hand brake unit.

Fit the right-hand brake unit onto the crossmember, (plain and shakeproof washers).

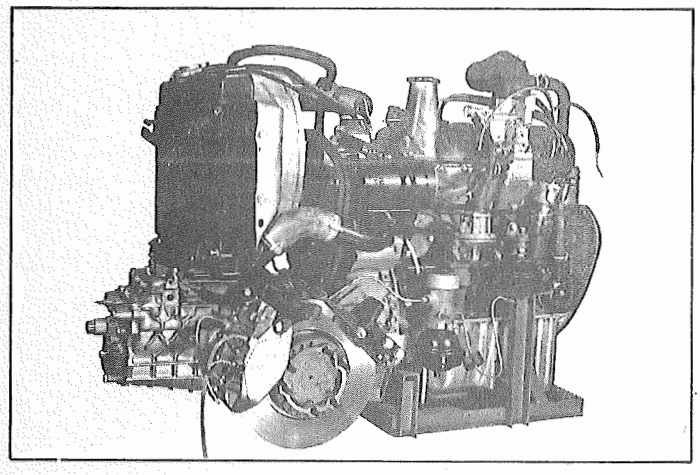
Fit the screws securing the brake units on the gearbox outlet housings. *Do not tighten the screws.*

57. Fit:-

- the brake pads to the hydraulic brake units.

Fit:-

- the pad-retaining spring wire clips.



58. Fit:-

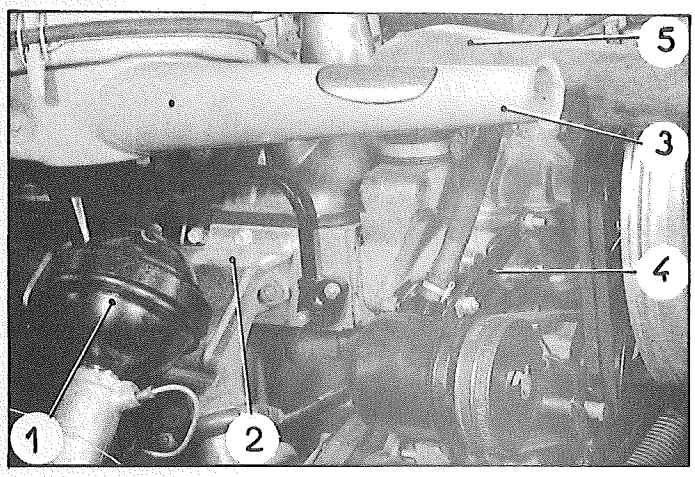
- the fan, tightening the screws progressively from 6.5 to 7 ft.lbs (0.9 - 1 m.kg),
- the starter motor cable.

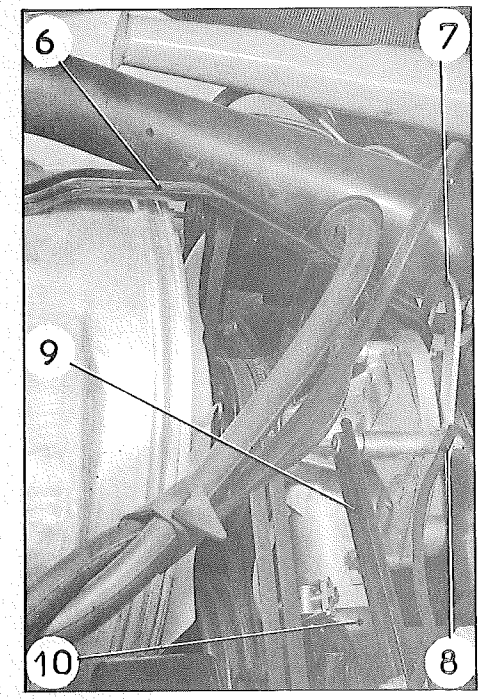
59. Fit the radiator and centralise it.

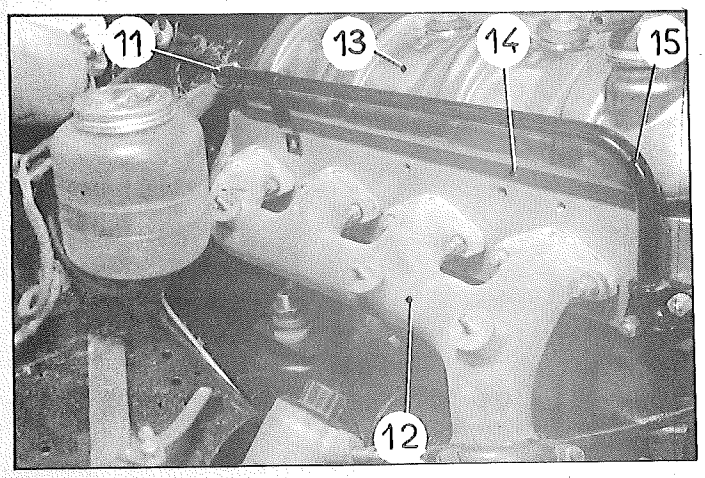
Connect up:-

- the suction and delivery hoses to the water pump,
- the tie-rod to the radiator.

60. Fill up the gearbox with oil ($3\frac{1}{2}$ pints) (2 litres) of SAE 90 EP.



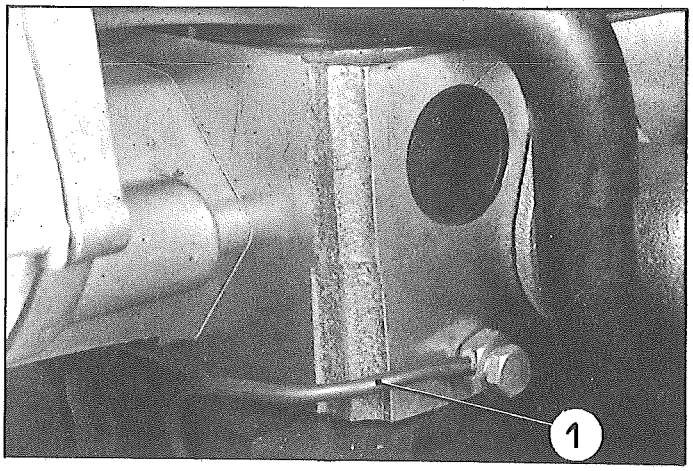




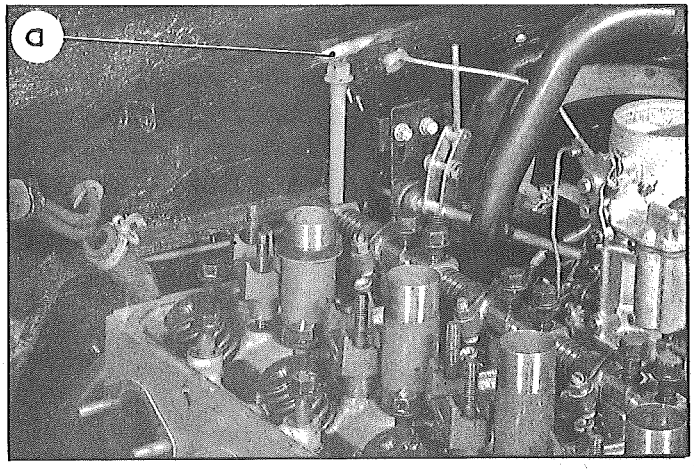
REMOVAL.

1. Drain the radiator and cylinder block. Save the water as it contains anti-freeze.
2. Disconnect the cables from the battery terminals.
3. Release the pressure (see Op. DX.00).
4. Remove:
   - the air filter (3) and its flexible pipe (see Op. DX.171-1),
   - the leads to the sparking plugs and distributor head,
   - the front right-hand suspension sphere (1).
   - the exhaust shield (2).
5. Disconnect:
   - the high pressure pump tie-rod (4) from the water pump,
   - the upper water delivery hose (5).
6. Remove:
   - the radiator tie-rod (6),
   - the sling hook (7) for lifting the engine,
   - the battery earth cable (8),
   - the fan (see Op. DX.232-1).
7. Disconnect:
   - the dynamo tie-rod (9) from the water pump,
   - the upper water suction hose (10) from the pump,
   - the accelerator control, the choke cable, the petrol delivery pipe from the carburettor.

   Free the dynamo belts.
8. Disconnect:
   - the thermometer unit lead on the water pump cover,
   - the distributor earth wire secured with the clip holding the breather on the stud securing the rear closing plate.
9. Disconnect:
   - the exhaust manifold (12) from the cylinder head and the exhaust pipe,
   - the heater hose (11) from the tube on the cylinder head.
10. Remove:
   - the heater hose (15),
   - the cylinder head cover (13) and its gasket (14),
   - the sparking plugs,
   - the sealing cups from the sparking plug wells, and their rubber seals.



11. Disconnect the oil pipe (1) for the rockers, from the cylinder head.



12. Unscrew fully the securing screws from the cylinder head.

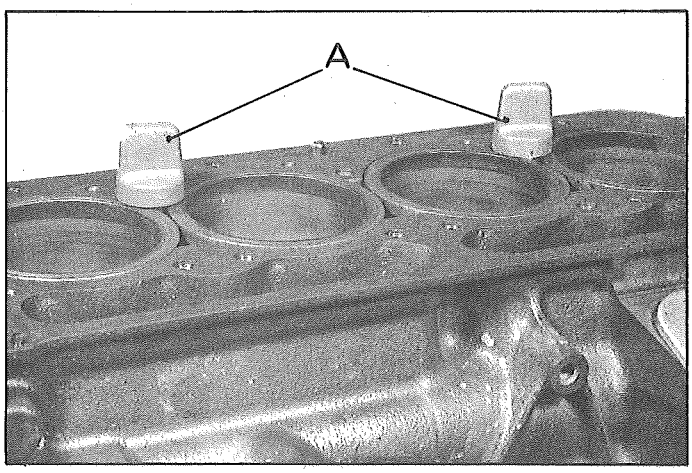
Remove:

- the exhaust rocker assembly,
- the inlet rocker assembly.

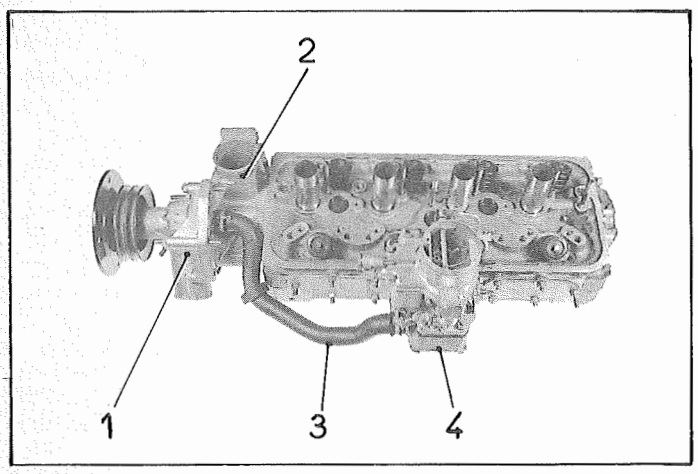
NOTE: To remove the rear screw from the inlet rocker line, remove the rubber plug from the engine recess in the scuttle, cut the felt away and remove the screw by passing its head up and through the hole (a).

13. Disengage the rocker pushrods.

NOTE: To remove the exhaust rocker push-rod from No. 4 cylinder raise the cylinder head slightly.



14. Free the cylinder head and gasket (do not damage the dowels). Hold the cylinder barrels in place using 2 screws (A) (securing screws 3074-T).



15. Stripping the cylinder head.

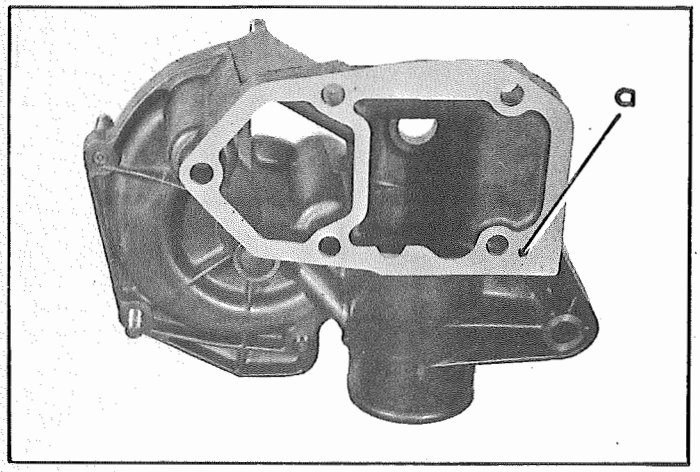
a) Disconnect the hot spot hose (3) from the inlet manifold.

b) Remove the water pump (1) and the water pump cover (2).

c) Remove the inlet manifold and carburettor assembly (4).

d) Remove the inlet manifold studs, the exhaust manifold studs and the water pump cover studs, *if necessary*.

ASSEMBLY.



16. Assembling the cylinder head.

Fit:

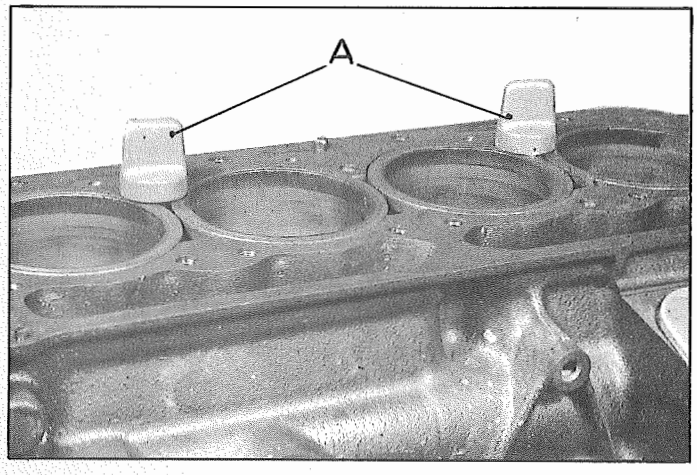
a) the studs for the inlet manifold, the exhaust manifold and the water pump cover *if necessary*.

b) the inlet manifold and carburettor assembly (4), inserting the gasket.

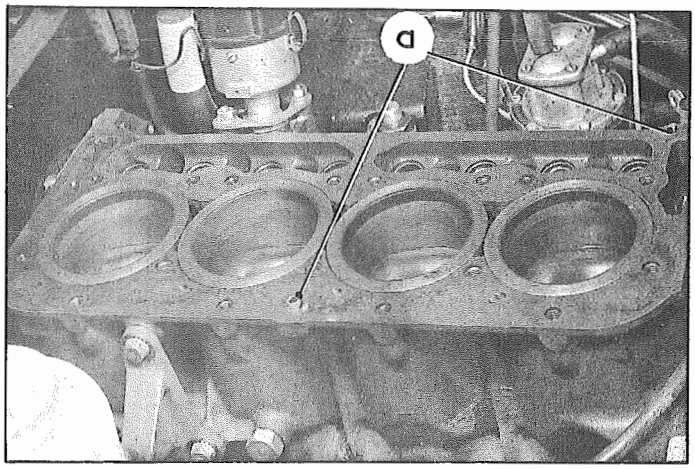
c) the water pump cover (2) insert the gasket. (See that the corner "a" of the gasket is in the correct location).

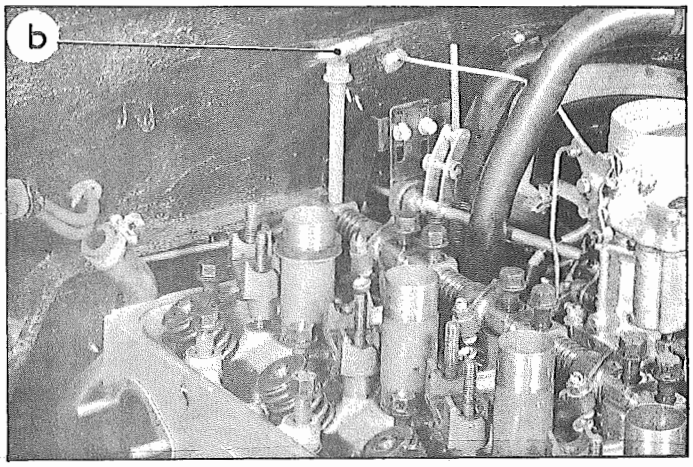
d) the water pump (1), insert the gasket (special nuts 8 diameter x 12 across flats).

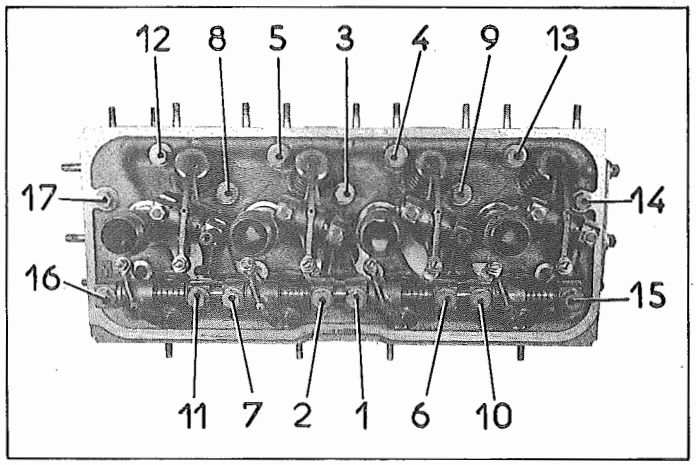
e) connect the hot spot hose (3) to the inlet manifold and to the water pump cover, tighten the clips.



17. Remove the screws holding the cylinder barrels (A) (screw 3074-T).







18. Fit the cylinder head.

a) Place the cylinder head gasket in position and centre it on the two dowels (at "a").

Offer up the cylinder head together with exhaust rocker push-rod for No. 4 cylinder in position.

NOTE: Once the cylinder head is in position this push-rod cannot be fitted.

b) Fit the rocker push-rods (the exhaust push-rods are the longer).

c) Fit the inlet rocker assembly with its supports and securing screws for the cylinder head.

NOTE: When fitting the inlet rocker line assembly pass the head of the rear screw up through the hole in the engine recess (at "b").

d) Place the rubber seals between the rocker supports and the cylinder head, on the screws securing the cylinder head.

e) Fit the exhaust rocker assemblies, the oil hole downwards and towards the valve. Fit the caps. Tighten the nuts on the exhaust rocker securing studs.

The nuts holding the rocker assembly for No. 1 and No. 3 cylinder also serve for securing the valve cover.

19. Fit the cylinder head screws and tighten them (torque spanner 2471-T),

1st tightening to 21 ft.lbs. (3 m.kg)
2nd tightening to 43 ft.lbs. (6 m.kg).

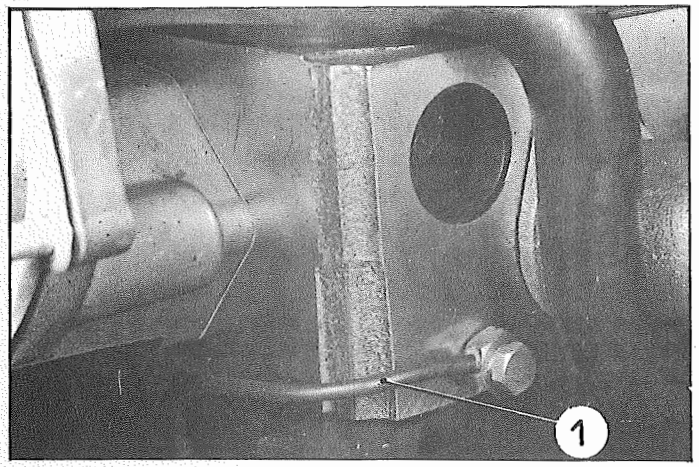
Observe the order of tightening shown.

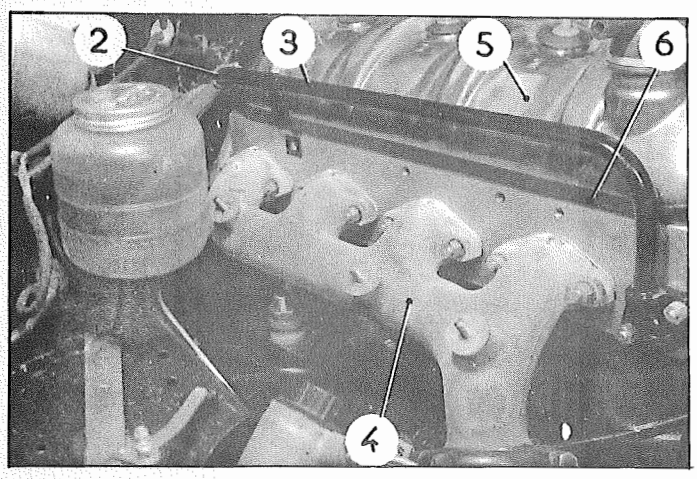
During tightening make quite sure that the spherical ends of the tappet adjusting screws are correctly seated in the sockets of the rocker push-rods.

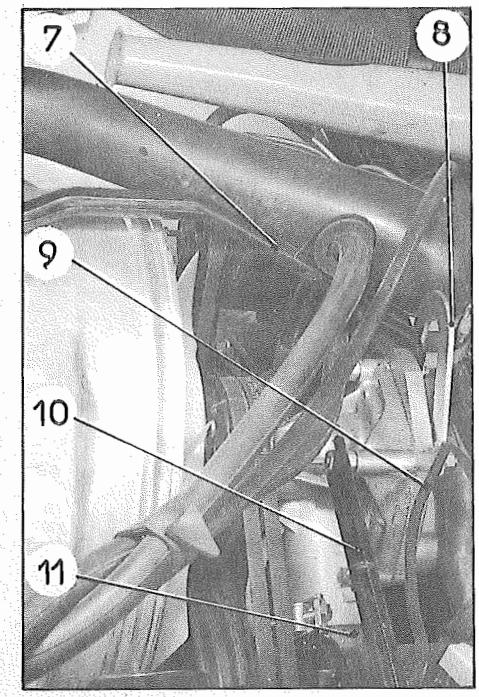
NOTE: It is absolutely essential to tighten the cylinder head screws after the car has run 300 miles (500 km), (engine cold).

It is also imperative to proceed in the following manner:

- work on the screws one by one,
- loosen each screw,
- then tighten to 43 ft.lbs. (6 m.kg).







20. Couple up the lubrication pipe (1) to the cylinder head inserting the double copper gasket.

21. Adjust the valve rocker clearances (see Op. DX.112-0).

22. Fit:
- the sealing cups on the sparking plug wells, and their rubber seals,
- the sparking plugs,
- the cylinder head cover (5) and its gasket (6),
- the heater pipe (3).

23. Connect up:
- the heater hose (2) to the tube on the cylinder head,
- the exhaust manifold (4) to the cylinder head and to the downpipe. Insert the gaskets (plain washers and special nuts 8 diameter x 12 across flats).

24. Connect up:
- the lead to the thermometer unit on the water pump cover,
- the earth lead to the distributor, secured with a clip holding the breather pipe on a stud securing the rear closing plate.

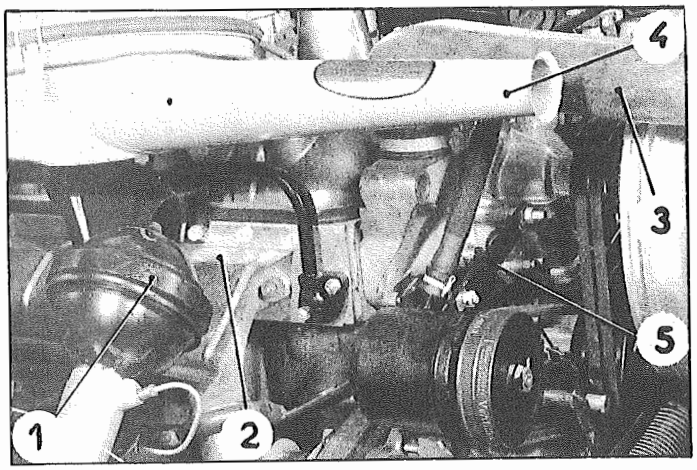
NOTE: If the cylinder head, the water pump cover or the water pump have been renewed, check the alignment of the pulleys (see Op. DX.231-0, paragraph 5).

25. Fit the dynamo belts (see Op. DX.231-0, paragraphs 16 and 17).

Connect the tie-rod (10) between the dynamo and water pump.

26. Fit:
- the lower water suction hose (11) to the pump,
- the accelerator control, the choke cable and the petrol delivery hose to the carburettor.

27. Fit:
- the fan. Tighten the screws to between 6.5 and 7 ft.lbs. maximum (0.9 - 1 m.kg),
- the earth cable (9) to the battery,
- the sling hook (8) for lifting the engine,
- the radiator tie-rod (7).



28. Connect:
    - the upper water delivery hose (3),
    - the tie-rod (5) between high pressure pump and water pump (insert the plate and shake-proof washer).

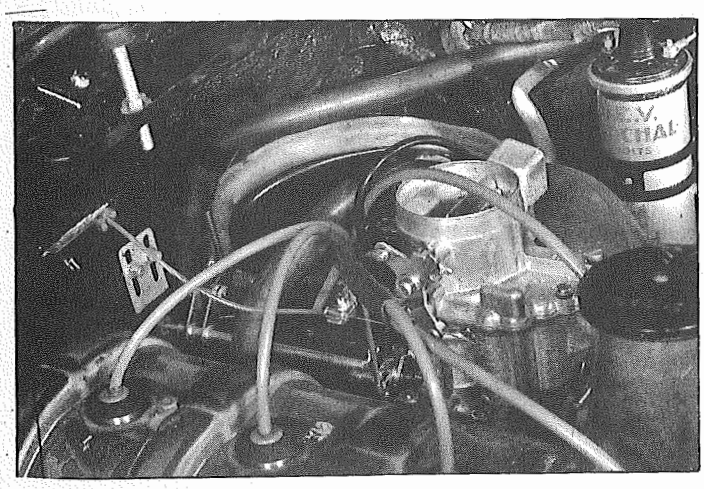
29. Fit:
    - the exhaust shield (2),
    - the front right-hand suspension sphere (1),
    - the air filter (4) and its flexible union. Tighten the clips,
    - the distributor head, and connect the plug leads to the plugs.

30. Fit the rubber plug to the hole in the engine recess.

31. Fill up the radiator with water and open the heater control valve.

32. Connect the cables to the battery terminals.

33. Start up the engine.
    Put the circuits under pressure.
    Check all unions for leaks.
    Adjust the slow running (see Op. DX.142-0).



REMOVAL.

1. Drain the water from the radiator and cylinder block (save the water which contains anti-freeze).

2. Disconnect the negative lead from the battery terminal.

3. Remove the carburettor (see Op. DJ.142-1).

Disconnect the accelerator control relay from the flexible housing on the scuttle.

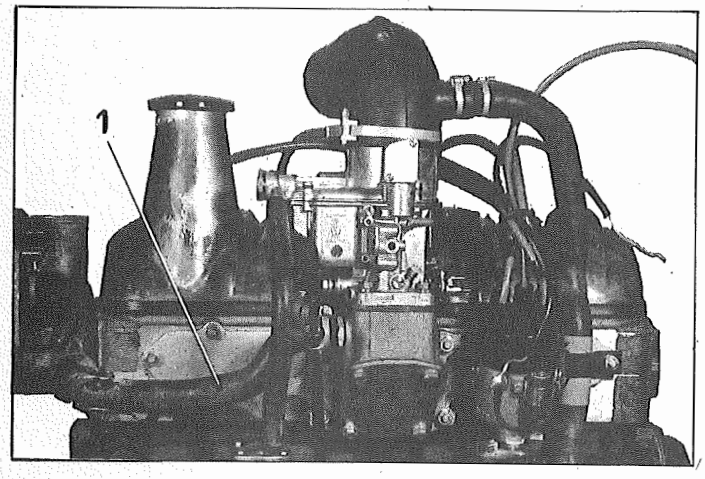
4. Disconnect the hot-spot hose (1) from the mounting block.

Remove the nuts securing the mounting block.

Remove the mounting block and its gasket.

ASSEMBLY.

5. Fit the gasket.



Fit the mounting block and tighten the nuts (plain washers.

Connect up the hot-spot hose (1).

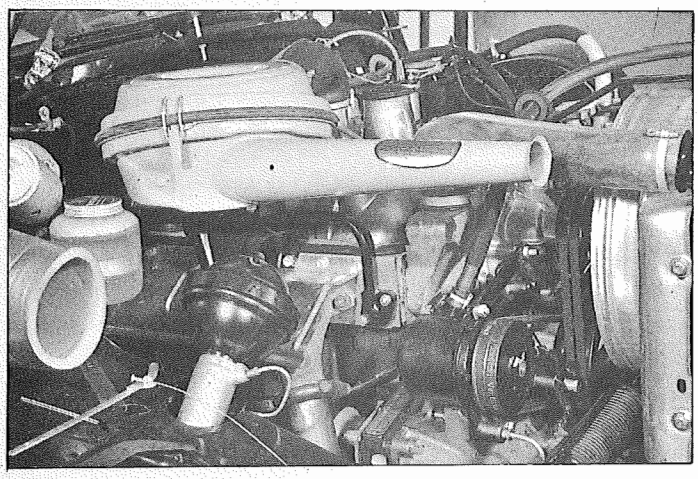
6. Fit the carburettor (see Op. DJ.142-1).

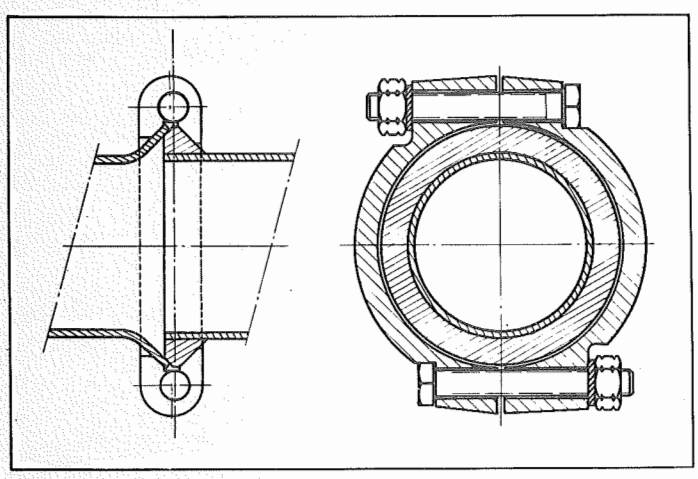
Connect the accelerator control relay in the flexible housing on the scuttle and couple up to the carburettor.

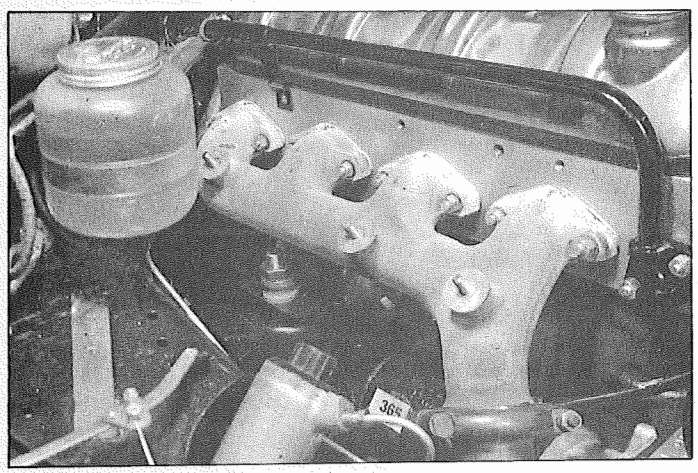
7. Fill up the radiator (open the heater valve).

8. Connect the negative lead to the battery terminal.

9. Adjust the idling (see Op. DJ.142-0).







REPLACING AN EXHAUST HEAT SHIELD OR MANIFOLD

Removal.

1. Place the height control in "low" position.

Remove the front right-hand suspension sphere.

2. Remove the air filter, leaving it lying on the cylinder head.

3. Remove the exhaust heat shield.

4. Remove the half-clamps connecting the exhaust downpipe to the manifold.

Remove the securing nuts for the manifold and free the manifold and its gaskets.

Assembly.

5. Offer up the manifold, inserting the gaskets (turndown side towards manifold). Tighten the nuts (plain washers).

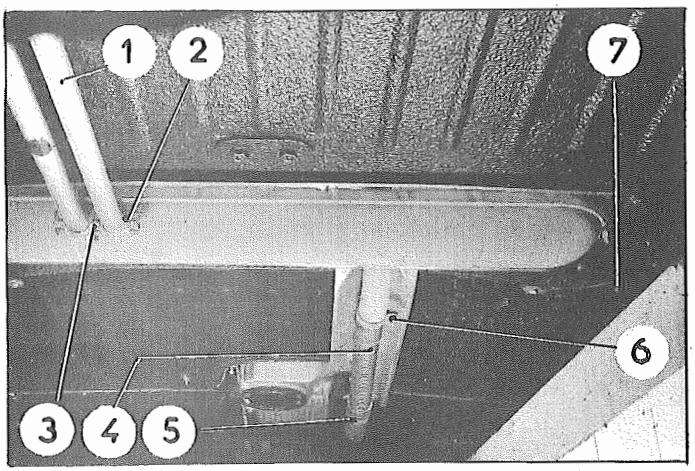
6. Fit the half-clamps connecting the exhaust downpipe to the manifold (see sketch for position of half-clamps).

7. Fit the heat shield (plain and shakeproof washers).

8. Fit the air filter.

9. Fit the front right-hand suspension sphere.

Place the height control in "normal" position.



REPLACING AN EXHAUST SILENCER

Removal.

10. Place the vehicle on a lift or over a pit.

11. Loosen the clips (5) and (6) and move the flexible exhaust pipe (4) as far as possible towards the front.

12. Remove the exhaust silencer.

a) Loosen the nuts (3) of the flange (2) and remove the flange.

b) Remove the screws holding the flexible supports (7) to the body.

c) Remove the silencer, withdrawing it towards the front of the vehicle.

13. Stripping the exhaust silencer:

- free the clip (6),
- remove the flexible supports (7).

Assembly.

14. Assemble the exhaust silencer:

Fit:-

- the flexible supports (7),
- the clip (6).

15. Offer up the silencer.

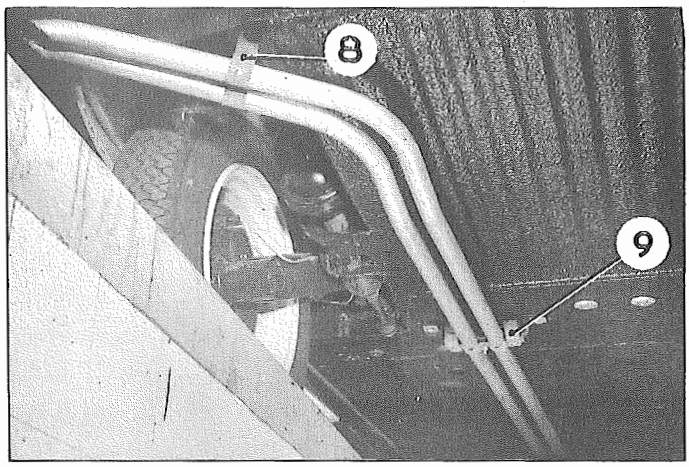
Engage the exhaust pipes (1) in the silencer.

Position the silencer correctly in its recess and tighten the securing screws for the flexible supports (7).

Fit the flanges (2) and tighten the nuts (3).

16. Draw the flexible exhaust pipe (4) towards the rear and engage it in the exhaust silencer.

Tighten the clips (5) and (6).



REPLACING THE EXHAUST TAIL PIPES.

Removal.

17. Loosen the screws (3) and remove the flanges (2).

18. Remove:-

- the screws of the intermediate support (9),
- the screws of the rear flexible supports (8).

Remove the exhaust tail pipes.

19. Strip the tail pipes:

- free the clips (8) and (9).

Assembly.

20. Assemble the exhaust tail pipes:

- fit the clips (8) and (9).

Fit the pipes:

21. Offer up the exhaust tail pipes (1) on the silencer. Fit and tighten the flanges (2).

22. Fit:-

- the intermediate support (9),
- the rear support (8).

Tighten the screws.

The clutch is identical to that on DS 21 (DX) vehicles and the characteristics are the same as those given in Operation DX. 312-00, except the following points concerning the mechanical clutch control.

The height of the clutch pedal measured from the underside of the metal pedal pad to the metal floor panel ... ... = $137\ ^{+5}_{0}$ mm (L.H. Drive)

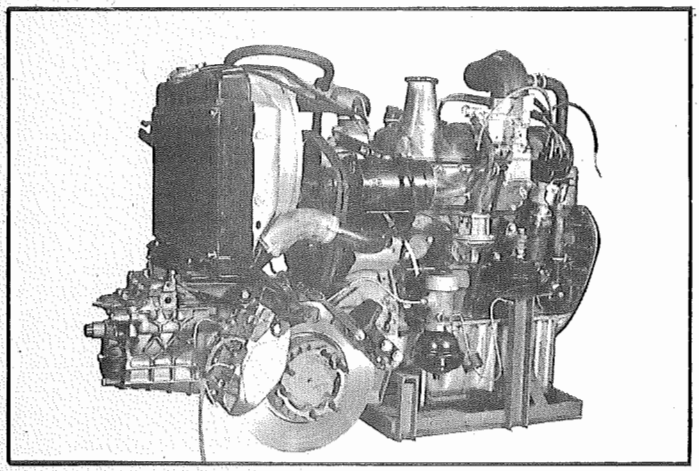
or

$162\ ^{+5}_{0}$ mm (R.H. Drive)

The clearance between the end of the push-rod and the clutch housing (see Op. DJ. 314-0, paragraph 2) ... ... j = 3.5 - 4.5 mm (L.H. Drive)

or between push-rod and bracket on bell-housing ... ... j = 2.5 - 3.5 mm (R.H. Drive)

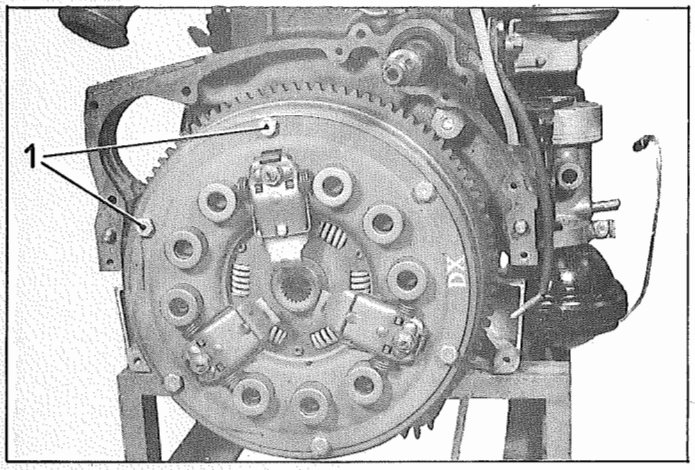
Clutch clearance (see Op. DJ. 314-0, paragraph 3) ... ... j-j = 1.6 to 2.4 mm



REMOVAL.

1. Remove the engine-gearbox assembly (see Op. DL. 100-1).

2. Disconnect the gearbox from the engine, (see Op. DL. 100-2, paragraphs 1 - 8).



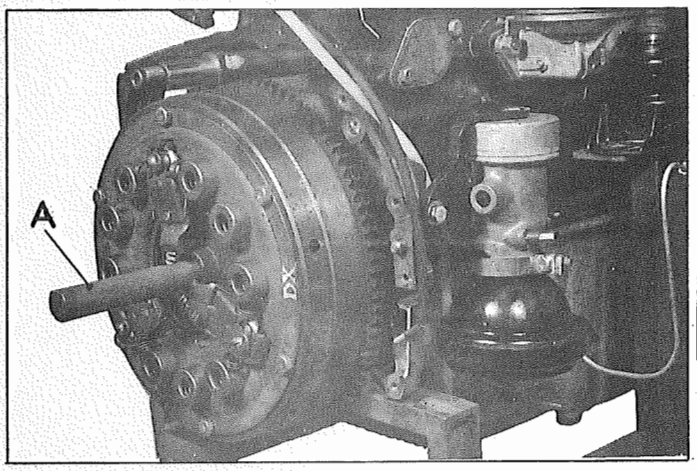
3. Remove the clutch unit.

With a centre punch mark the position of the clutch plate on the engine flywheel.

Remove the screws securing the mechanism.

Free:-

- the clutch mechanism,
- the disc.



ASSEMBLY.

4. Make quite sure that the faces on the clutch mechanism and on the engine flywheel which the disc contacts are perfectly clean and free from scratches etc.

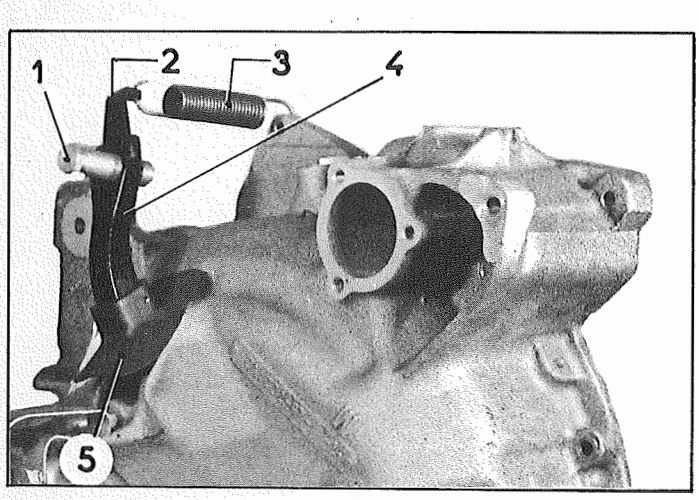
5. Offer up the clutch disc and centre it by using a mandrel (3016-T) (A). If not available, use an old mainshaft.

6. Fit the clutch unit in accordance with the marks made when dismantling. Tighten the screws (1) (spring washer under the heads) to $18\ ^{+2}_{-3}$ ft. lbs ($2.5\ ^{+0.3}_{-0.4}$ m. kg).

During tightening, make sure that the mandrel slides freely in the splines.

7. Connect the gearbox to the engine. (see Op. DL. 100-2, paragraphs 24 - 40).

8. Fit the engine-gearbox assembly (see Op. DL. 100-1).



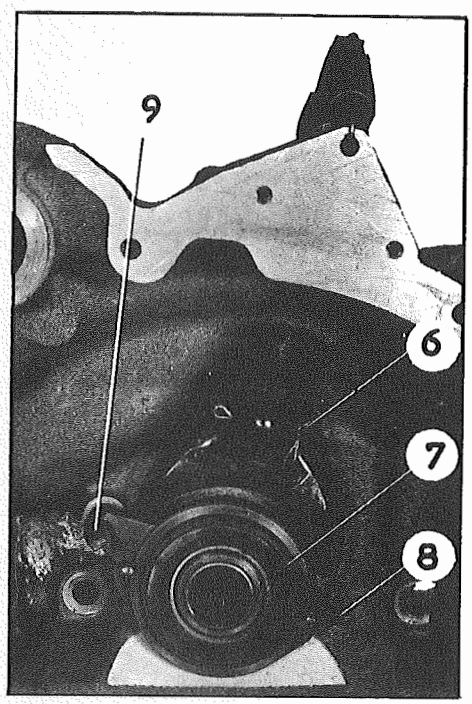
REPLACING A CLUTCH FORK.

Removal.

1. Remove:
   - the engine-gearbox assembly (see Op. DL. 100-1),
   - the gearbox from the engine (see Op. DL.100-2, paragraphs 39 to 47).
2. Remove:
   - the return spring (3) from the clutch fork (4),
   - the adjusting screw (1) from the fork,
   - the securing clip (2),
   - the rubber dust cover (5) from the fork aperture.
3. Remove the retaining springs (8) from the clutch thrust bearing housing.
4. Free:
   - the thrust bearing and its housing (7),
   - the pin (6),
   - the fork (4).

Assembly.

5. Place in position:
   - the clutch fork (4),
   - the pin (6),
   - the thrust bearing and its housing (7).
6. Fit:
   - the springs (8) holding the thrust bearing housing,
   - the rubber dust cover (5),
   - the adjusting screw (1). Insert the securing clip (2),
   - the fork return spring (3).
7. Connect the gearbox to the engine (see Op. DL. 100-2, paragraphs 48 to 53).
8. Fit the engine-gearbox assembly (see Op. DL. 100-1).



REPLACING A CLUTCH THRUST RACE AND ITS HOUSING.

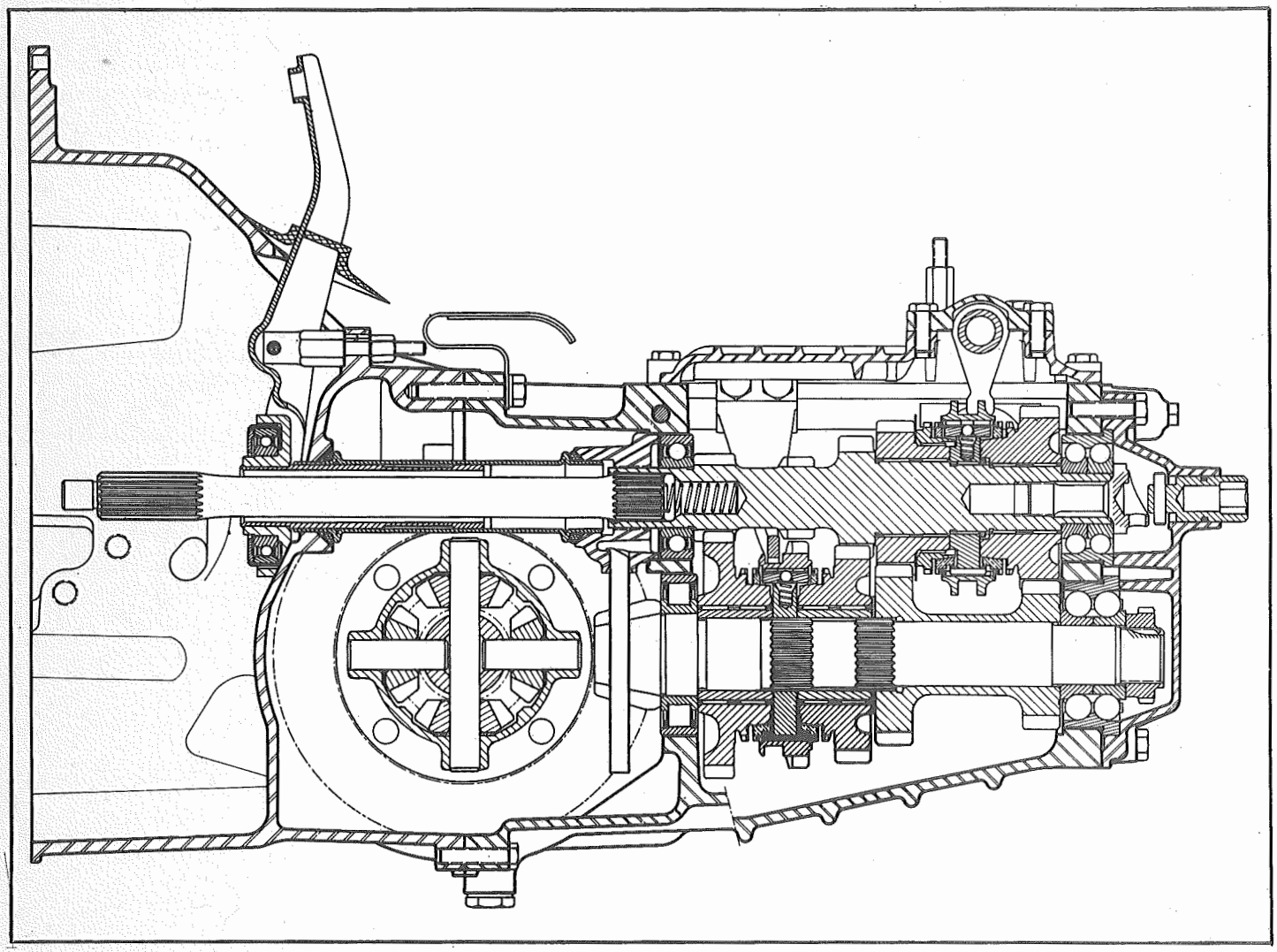
Removal.

9. Remove the engine-gearbox assembly (see Op. DL.100-1).
10. Disconnect the gearbox from the engine (see Op. DL.100-2, paragraphs 39 to 47).
11. Remove:
    - the return spring (3) from the clutch fork (4),
    - the securing springs (8) for the clutch thrust bearing housing (7).

Free the thrust bearing and its housing.

Assembly.

12. Engage the thrust bearing hub and its support (7) on the guide (9).
13. Fit:
    - the retaining springs (8) for the clutch thrust bearing housing,
    - the return springs (3) for the fork (4).
14. Connect the gearbox to the engine (see Op. DL.100-2, paragraphs 48 - 53).
15. Fit the engine-gearbox assembly (see Op. DL.100-1).



SPECIAL POINTS

IMPORTANT NOTE:- Replacement of the gearbox can only be carried out by removing the engine-gearbox assembly (see Op. DL. 100-1 and 100-2).

Clutch housing.

Distance between thrust race guide screw and housing joint face = 94 - 95 mm.

/445

Mainshaft

Synchro clearance (3rd and 4th)
j = 0.10 mm maximum

Tightening torque for the nut: 108 - 122 ft. lbs (15 - 17 m. kg)

Bevel pinion.

Tightening torque for end nut: 144 - 158 ft. lbs (20 - 22 m. kg)

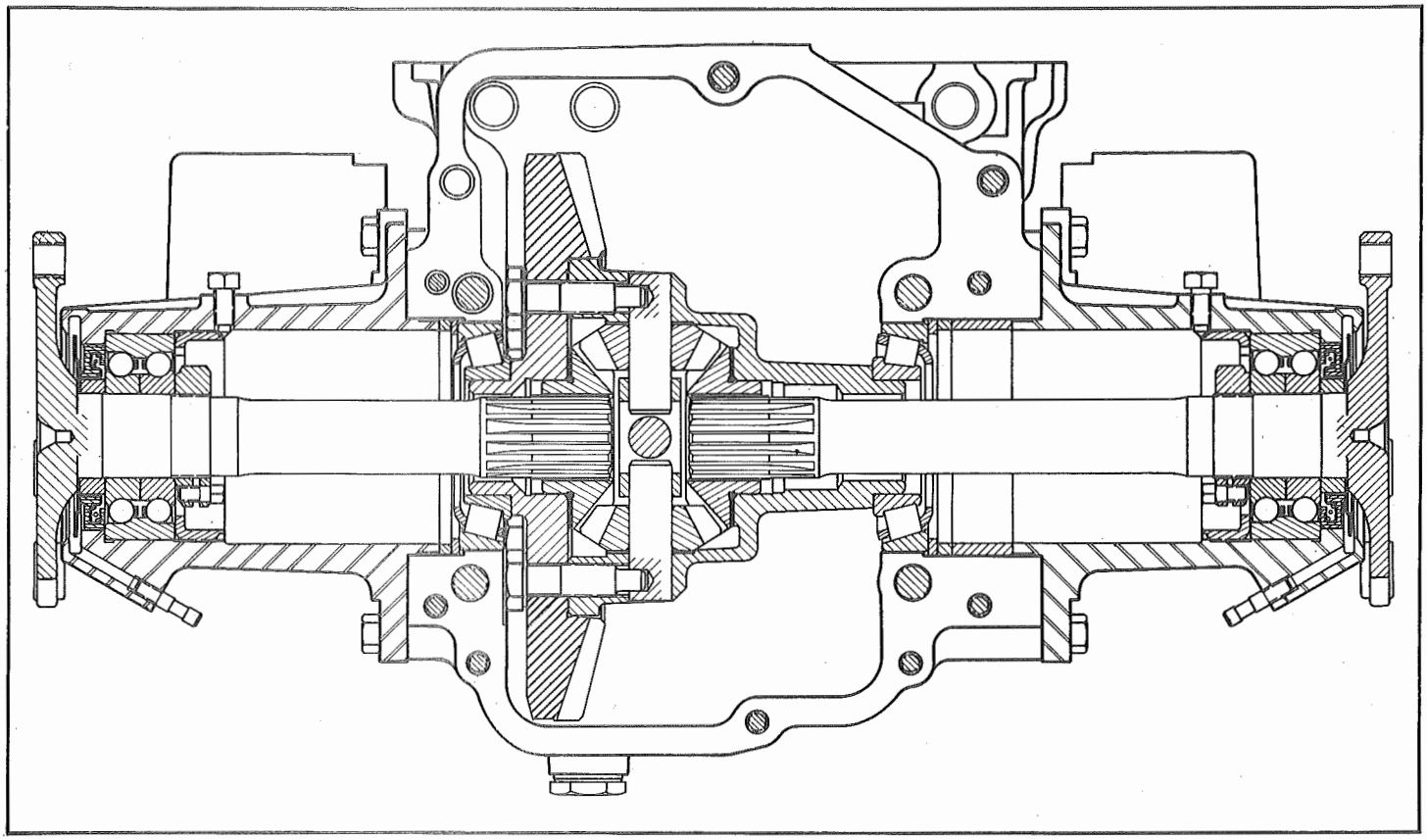
Forks

Tightening torque for screws:
29 ft. lbs (4 m. kg)

Adjustment of gear travel for 4th speed:

Clearance between slider and loose pinion :-

j = 0.4 - 0.6 mm.



SPECIAL POINTS

Differential

- planet gear end-float j = 0.1 mm minimum
- clearance between planet gear and satellites = 0.1 mm
- tightening torque for crown wheel screws : 84 - 94 ft.lbs (11.7 - 13 m.kg).

Differential shaft

Tightening torque for nut on bearing cage: 72 ft.lbs (10 m.kg)

Tightening torque for bearing nut: 108 ft.lbs (15 m.kg).

Crown wheel and pinion

Obtain the conic distance etched on the bevel pinion

Clearance between teeth on crown wheel and pinion j = 0.16 - 0.24 mm.

We have not considered the overhaul of this unit, as the operation generally requires renewal of all the parts.

SPECIAL POINTS

For removal and assembly instructions see Operation DX. 372-00.

The characteristics of the equipment used on this vehicle are the same as those described in Operation DX.391-00.

The characteristics of the constituent parts of the front axle of this vehicle are the same as those described in Operation DX.410-00.

The characteristics of the constituent parts of the rear axle on this vehicle are the same as those described in Operation DX. 420-00.

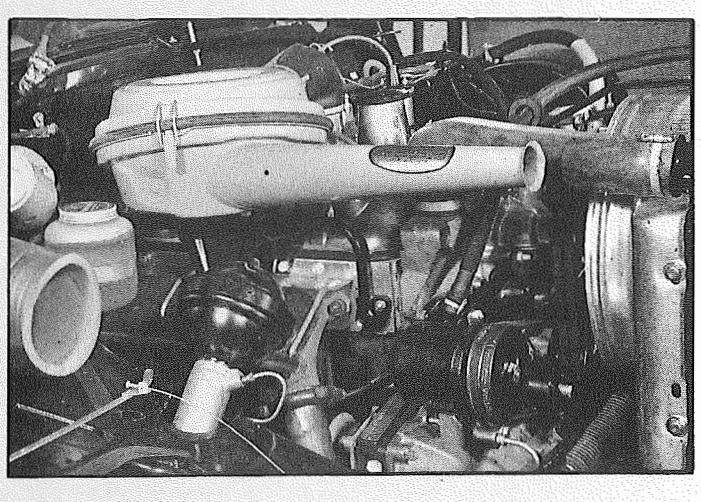
The adjustments, renewals and overhaul of the suspension units are carried out as for DS 19 A vehicle. Follow the indications given in the corresponding DY sections.

The characteristics and adjustments of the steering are the same as those for the DS 21 vehicle, see Operation DX. 440-00.

The adjustments, renewals and overhauls of the brake units are carried out as on DS 21 vehicles. Follow the instructions in the corresponding DX sections.

The electrical installation is the same as on the DS 19 A (DY) vehicles.

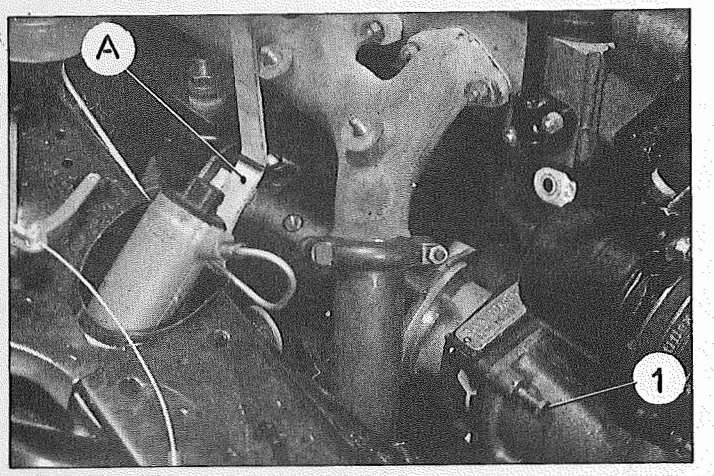
Wiring diagrams and instruction sections for the DY may be used for this vehicle.



REMOVAL.

1. Disconnect the negative lead from the battery terminal.
2. Place the vehicle in the "low" position.
3. Remove:
   - the front right-hand suspension sphere,
   - the air filter, leaving it lying on the cylinder head,
   - the exhaust shield,
   - the R.H. damping weight.
4. Disconnect the cable from the starter motor.
5. Remove the 3 securing screws for the starter motor on the clutch housing.

Hold the starter motor up, using a strap (A), and withdraw it towards the rear of the engine between the manifold and the body.



ASSEMBLY.

6. Fit the starter motor, using a strap (A).

Tighten the 3 securing screws (1) for the starter motor.

Connect the cable to the starter motor.

7. Fit:
   - the damping weight,
   - the exhaust shield (plain and shakeproof washers),
   - the air filter,
   - the right-hand front suspension sphere.
8. Place the vehicle in "normal" position.
9. Connect the negative cable to the battery terminal.