



REPAIR MANUAL No. 581

VOLUME 1

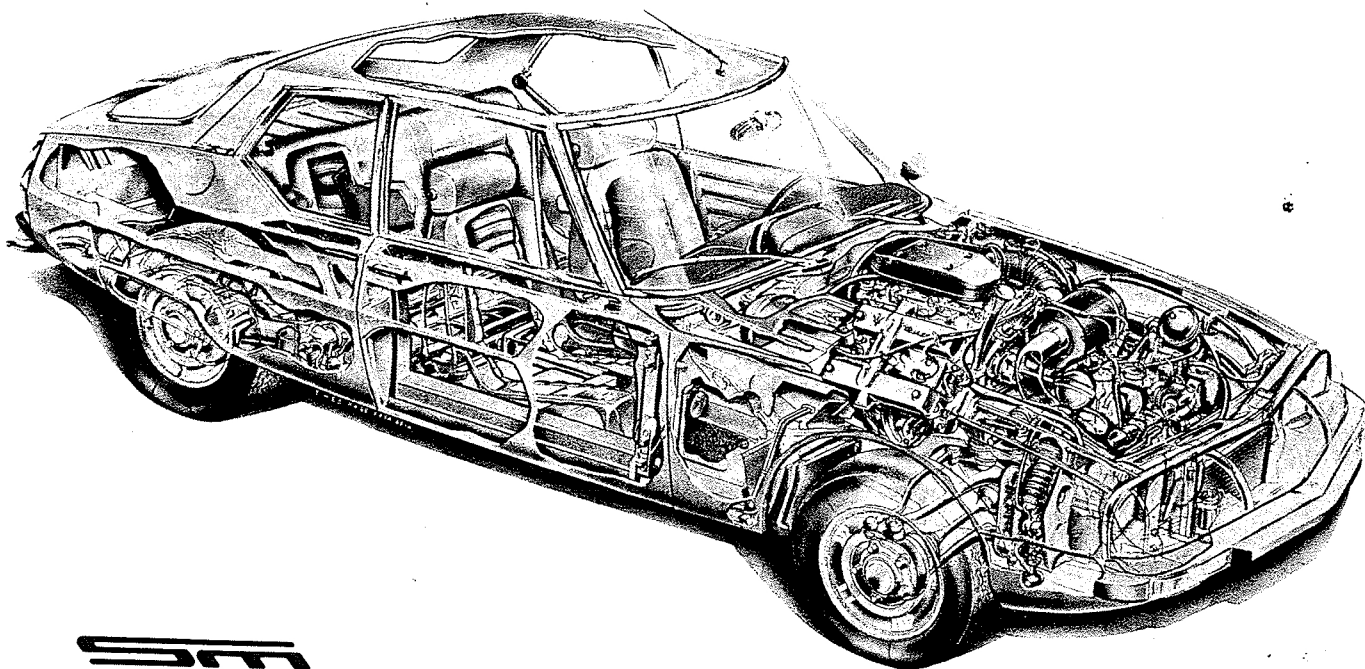
# SM MODEL

(SB Series SB)

• CHARACTERISTICS

• ADJUSTMENTS

• INSPECTIONS, CHECKS  
and TESTING



**SM**

CITROËN CARS CORPORATION

Direct Factory Branches of S.A. Automobiles Citroën, Paris, France  
40 VAN NOSTRAND AVE., ENGLEWOOD, N.J. 07631 TEL. (201) 871-3100

## OPERATIONS

The order of operations has been researched to obtain the best quality of workmanship within the shortest time.

The numbers of the operations are coded and consist:

- a) of the indication of the model: "S"
  - b) of a three digit figure designating the unit or element of a unit
  - c) of a figure indicating the nature of the repair.
- the figures 0 0 0 indicating the characteristics of the model.
  - the figures 0 0 indicating the characteristics of the unit.
  - the figure 0 indicates the inspections and adjustments.
  - the figures 1, 4, 7 indicating the removals and replacements.
  - the figures 2, 5, 8 indicating stripping and assembling.
  - the figures 3, 6, 9 indicating the reconditioning.

Triangles corresponding to the operations list reference marks permit rapid location of the operation sought.

## TOOLING

The special tooling is indicated in the text by a number followed by the letter T.

These tools are sold by the PARTS DEPARTMENT, CITROEN CARS CORPORATION.

The complementary tooling is indicated in the text by a number preceded by the indication MR.

The plans of execution for these tools, classified by numerical order, appear at the end of each volume.

## TIGHTENING TORQUES

These torque specifications are expressed:

- in Newton meters (mAN), the legal unit of measurement for torque (except in the U.S.)
  - in meter kilograms (m.kg.) followed by its conversion to the U.S. equivalent in foot pounds (ft.lbs.)
- The torque wrenches in general use in the U.S. are graduated in foot pounds.

$$\begin{aligned}1 \text{ m.kg.} &= 9,81 \text{ mAN} \\1 \text{ m.kg.} &= 7.233 \text{ ft.lbs. (U.S.)}\end{aligned}$$

The values corresponding to the torques expressed in m.kg. are "rounded", i.e., they are brought to the nearest applicable figure. For example:

$$\begin{aligned}2 \text{ mAN} &= 0,2 \text{ m.kg.} \\60 \text{ mAN} &= 6 \text{ m.kg.}\end{aligned}$$

Because of the calibration of torque wrenches used in the United States, the values expressed in m.kg. will be converted to the nearest "round" figure in ft.lbs. For example:

$$\begin{aligned}1 \text{ m.kg.} &= 7 \text{ ft.lbs.} \\10 \text{ m.kg.} &= 72 \text{ ft. lbs.}\end{aligned}$$

The values expressed in Newton meters (mAN), in most cases will be ignored.

◆NOTE: When the indication "torque wrench" is mentioned following the torque specification, the operation must IMPERATIVELY be executed with a torque wrench.

## IMPORTANT REMARK

For all technical information concerning these models, address inquiries to the:






TECHNICAL DEPARTMENT, CITROEN CARS CORPORATION

East: 40 Van Nostrand Ave., Englewood, New Jersey 07631 (201) 871-3100

West: 12615 Beatrice Street, Los Angeles, California 90066 (213) 390-3505

**LIST OF OPERATIONS APPEARING IN VOLUME I OF THE MANUAL No. 581**  
*"SM" Model (SB Series SB)*

1

Operation No.	DESIGNATION
	<p><b>CHARACTERISTICS (SPECIFICATIONS)</b>  ①</p> <p>S. 000 General characteristics and specifications (basic dimensions, various capacities)</p> <p>S. 00 Points for jacking and towing</p> <p>S. 01 Protection of the electrical units</p> <p>S. 02 Hydraulic work (precautions of assembly)</p> <p>S. 03 Recommended supplies</p> <p><b>MOTOR - CARBURETION - IGNITION</b>  ②</p> <p>S. 100-00 Characteristics of the motor</p> <p>S. 112-0 Inspection and adjustment of the valve clearances</p> <p>S. 120-0 Inspection and adjustment of the valve timing</p> <p>S. 142-00 Characteristics and specifications of the carburetors</p> <p>S. 142-0 Adjustments on the carburetors and linkage:</p> <ul style="list-style-type: none"> <li>- Inspections and adjustment of the linkage</li> <li>- Inspections and adjustment of the carburetors</li> </ul> <p>S. 173-0 Characteristics and inspection of the fuel delivery</p> <ul style="list-style-type: none"> <li>- Characteristics of the fuel pump</li> <li>- Particulars</li> <li>- Checking the regulated pressure</li> <li>- Replacement of a fuel filter</li> </ul> <p>S. 210-00 Characteristics and particulars of the ignition (Distributor, spark plugs, coils)</p> <p>S. 210-0 Inspections and adjustments of the ignition</p> <ul style="list-style-type: none"> <li>- Inspection of the ignition</li> <li>- Adjustment of the ignition</li> <li>- Adjustment of the ignition on a test bench</li> <li>- Checking an air ignition coil</li> </ul> <p>S. 220-0 Inspection and adjustment of the oil pressure on the car</p> <p>S. 234-0 Inspections on the cooling circuit (and system of ventilation)</p> <p>S. 236-0 Adjustments on the pulleys and belts</p> <ul style="list-style-type: none"> <li>- Tension of the belts</li> <li>- Alignment of the pulleys</li> </ul> <p><b>CLUTCHING</b>  ③</p> <p>S. 312-00 Characteristics and particulars of the clutching</p> <p>S. 314-0 Inspections and adjustments of the clutching control</p> <p><b>GEAR BOX</b>  ④</p> <p>S. 340-00 Characteristics and particulars of the 5 speed gear box.</p> <p>S. 344-0 Inspection and adjustment of the shift controls</p> <p><b>DRIVE SHAFTS</b>  ⑤</p> <p>S. 372-00 Characteristics and particulars of the drive shafts</p> <p>S. 372-0 Adjustment of the side play of the drive shaft universal crosses</p>







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Operation No.	DESIGNATION
	<b>SOURCE AND RESERVE OF PRESSURE</b>  <b>⑥</b>
S. 390-00	Characteristics and particulars of the source of pressure and the hydraulic circuits
S. 390-0	Inspection of the hydraulic units on the car
	<b>FRONT AXLE</b>  <b>⑦</b>
S. 410-00	Characteristics and particulars of the front axle
S. 410-0	Inspections and adjustments on the front axle <ul style="list-style-type: none"> <li>- Inspection and adjustment of the camber</li> <li>- Inspection of the caster</li> <li>- Adjustment of the parallelism (toe): see Op. S. 440-0</li> </ul>
	<b>REAR AXLE</b>  <b>⑧</b>
S. 420-00	Characteristics and particulars of the rear axle
	<b>SUSPENSION</b>  <b>⑨</b>
S. 430-00	Characteristics and particulars of the suspension
S. 430-0	Inspections and adjustments of the suspension and its controls <ul style="list-style-type: none"> <li>- Pre-adjustment of the heights</li> <li>- Adjustment of the heights</li> <li>- Adjustments on the front anti-roll bar</li> <li>- Adjustment of the manual height control</li> </ul>
	<b>STEERING</b>  <b>⑩</b>
S. 440-00	Characteristics and particulars of the steering
S. 440-0	Inspections and adjustments on the steering <ul style="list-style-type: none"> <li>- Adjustment of the lateral position of the steering unit</li> <li>- Adjustment of the angular position</li> <li>- Bleeding the steering unit</li> <li>- Adjustment of the "straight ahead" position of the steering unit</li> <li>- Adjustment of the parallelism (toe)</li> <li>- Adjustment of the "point zero"</li> </ul>
S. 441-0	Adjustment of the control for unlocking the steering wheel
S. 444-0	Inspections and adjustments on the hydraulic control of the steering
	<b>BRAKING</b>  <b>⑪</b>
S. 450-00	Characteristics and particulars of the braking system
S. 453-0	Inspections and adjustments of the braking control <ul style="list-style-type: none"> <li>- Bleeding the circuits</li> <li>- Adjustment of the braking distribution</li> <li>- Checking the mano-contact</li> <li>- Adjustment of the stop light switch</li> </ul>
S. 454-0	Inspections and adjustments of the emergency-parking brake <ul style="list-style-type: none"> <li>- Adjustment of the mechanical brake stirrups</li> <li>- Adjustment for the locking of the hand brake lever</li> <li>- Adjustment of the brake cable</li> <li>- Adjustment of the hand brake contact switch</li> </ul>

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LIST OF OPERATIONS APPEARING IN VOLUME I OF THE MANUAL No. 581  
*"SM" Model (SB Series SB)*

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Operation No.	DESIGNATION
	<p><b>ELECTRICITY</b>  12</p> <p>S. 510-00 Wiring diagram (1st possibility)</p> <p>S. 530-00 Characteristics and Inspections of the electrical units  (alternator, voltage regulator, starter)  - Inspection of an alternator (on the car)  - Inspection of a regulator (on the car)  - Inspection of a starter</p> <p>S. 540-0 Adjustment of the headlights</p> <p>S. 560-0 Inspection and adjustment of the windshield wipers (intermittence timer)</p> <p>S. 640-00 Characteristics and particulars of the climatisation system</p> <p>S. 640-0 Inspections and adjustments of the climatisation system</p> <p><b>BODY</b>  13</p> <p>S. 00-663 Assembly and mounting of a trailer hitch</p> <p>S. 00-800 Dimensions of the interior and exterior</p> <p>S. 840-0 Adjustments of the body elements</p> <p>S. 841-0 Adjustments of the doors</p> <p>S. 844-0 Adjustment of the trunk door</p> <p>S. 852-0 Adjustment of the hood</p> <p><b>TOOLING</b>  14</p> <p>List of special tools appearing in the volume</p> <p>Designs for execution of the special tools which are not sold</p>

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# CHARACTERISTICS

OPERATION No. S.000: *General Characteristics*

Op. S.000

1

## I - GENERAL CHARACTERISTICS

- Fiscal designation: .....	SB Series SB
- Commercial Name: .....	SM
- Factory Symbol: .....	S
- Production starting date: .....	July 1970
	Serial No. 00SB000 3
- Number of seats: .....	4
- Tires: Front and rear	
-Type: .....	195-380 X
	(195/70 VR 15 X tubeless)
- Pressure: } front wheels .....	32 p.s.i.
} rear wheels .....	29 p.s.i.
- Rim: .....	6"

## II - GENERAL DIMENSIONS

- Wheel base: .....	116 1/8"	- Clearance from the ground:	
- Track: front: .....	60 1/16"	- <i>low</i> position: .....	2 3/8"
rear: .....	52 3/16"	- <i>normal drive</i> position: .....	6 1/8"
- Length overall: .....	192 5/8"	- 1st <i>intermediate</i> position: .....	6 7/8"
- Width overall: .....	72 1/4"	- 2nd <i>intermediate</i> position: .....	9 1/16"
- Height - normal drive position: ...	52 1/8"	- <i>high</i> position: .....	10"
- Width - at the front seats: .....	56 11/16"	- Steering circle - between walls: (approx.) ...	45 ft. 3 in.
- at the rear seats: .....	56 11/16"	- between curbs: (approx.) ...	41 ft. 4 in.
- Volume of the rear trunk: .....	17 1/4 cu. ft.	- Curb weight: .....	3200 lbs.
		- Practical load: .....	860 lbs.
		- Total weight under load: .....	3970 lbs.

## III - VARIOUS CAPACITIES

- Fuel tank: .....	24 gal.
- Cooling system: .....	14 qts.
- Motor oil:	
- after draining: .....	6 3/8 qts.
- after changing oil filter (approx.) .....	7 3/8 qts.
- Gear Box Oil: .....	2 3/8 qts.
- Hydraulic system reservoir (LHM): .....	5 3/4 qts.
- Towing:	
- Maximum incline allowed with a trailer: .....	11%
- Towing Capacities:	
- without auxiliary braking: .....	1100 lbs.
- with inertia braking system: .....	2750 lbs.
- with continuous braking system: .....	3970 lbs.

## PROTECTION OF THE ELECTRICAL UNITS: PRECAUTIONS DURING REPAIRS ON A CAR

*It is absolutely necessary to avoid erroneous tactics which risk destruction of certain electrical units or provoke a short-circuit (incendiary risk).*

### 1. Battery:

- a) Firstly, disconnect the cable clamp from the negative post of the battery, then the positive cable clamp from the positive post.
- b) Be sure that the battery is correctly connected. The negative post should be attached to the ground.
- c) With care, connect the two cable clamps to the battery posts. The clamp of the ground cable should be connected last. Before tightening the negative terminal, be sure there is no passage of current. To check this, intermittently touch the clamp to the negative post. There should be no sparks. If so, there is a short-circuit in the electrical installation, and it must be remedied.
- d) Before activating the starter, be sure that the two clamps are correctly tightened on their respective posts.

### 2. Alternator—Regulator:

- a) Do not run the alternator without its being connected to the battery.
- b) Before connecting the alternator, be sure the battery is correctly connected. (Negative post to ground).
- c) Do not check the functioning of the alternator by placing the positive (+) and ground posts or the "EXC" (field) post and ground in short-circuit.
- d) Do not invert the wires which are connected to the regulator.
- e) Do not try to "re-polarize" an alternator: it is never necessary and will result in damage to the alternator and regulator.
- f) Do not connect an anti-static radio condenser to the "EXC" (field) terminal of the regulator, or of the alternator.
- g) Do not connect the battery posts to a charger and never use an electric welder (or place the electric welding ground clamp) on the chassis without having disconnected both the positive and negative cables from the battery.

### 3. Cooling system fans:

Do not operate the air conditioner unless both cooling system fans are connected. A rapid deterioration of the condenser will result due to the rise in temperature of the refrigerant recirculated under pressure.

### 4. Ignition coil:

- a) Connect the feed wire of the ignition coil onto the terminal of the external resistor and not onto the ignition coil itself.
- b) Connect the radio anti-static condenser by tapping the feed post of the ignition coil. Especially, mount the condenser recommended by the factory.

## I. PRECAUTIONS TO TAKE FOR THE DIFFERENT REPAIRS ON THE HYDRAULIC UNITS AND CIRCUITS OF THE CAR

*The correct functioning of the entire hydraulic installation demands perfect cleanliness of the hydraulic liquid and units. It is, therefore, necessary to take meticulous precautions during repairs as well as for storage of the liquid and replacement parts.*

### 1. HYDRAULIC LIQUID

*The mineral hydraulic liquid (LHM) is the only liquid which is suitable and must **imperatively** be used for the hydraulic circuits of this car.*

The LHM liquid, *colored green*, is of a nature similar to motor oil.

The use of *any other liquid* will cause the *complete deterioration* of the rubber parts and seals.

### 2. RUBBER PARTS AND UNITS

The appropriate units are painted or marked *in green* and should only be replaced by *original units* also painted or marked green.

All the rubber parts (seals, hoses, diaphragms, etc.) are of *a special quality for the LHM liquid* and are marked in green (or in white).

### 3. STORAGE

The units should be stocked filled with fluid and plugged. Like the tubing, they should be kept protected from shocks and dust.

The rubber hoses and seals should be preserved under cover against dust, air, light and heat.

The hydraulic liquid LHM should be stored in the original containers and carefully capped. We advise the use of containers having a capacity of 1 liter (1 + quarts) for complementary purposes.

### 4. VERIFICATION BEFORE REPAIRS

If a functioning difficulty appears, it is necessary before undertaking any repair work to be sure:

a) *There exists no binding in the controls or mechanical linkages of the hydraulic unit or group of units involved.*

b) *That the high pressure circuit (H.P.) is pressurized:*

To do this:

The motor idling:

- Loosen the bleed screw of the pressure regulator 1 to 1½ turns: A slight thud, emanating from the pressure regulator, will become evident, indicating the escape of liquid under pressure.
- Retighten the bleed screw: listen for the cut-out, which becomes evident by a lessening of the operating noise emitted by the high pressure pump.

In case of the contrary, check in the following order:

- that there is a sufficient quantity of liquid in the reservoir.
- that the filter of the reservoir is perfectly clean and in good condition.
- that the high pressure pump is primed and there is no entrance of air from the suction circuit of the pump.
- that the bleed screw of the pressure regulator is correctly tightened.

## 5. PRECAUTIONS TO TAKE BEFORE ANY OPENING OF THE HYDRAULIC CIRCUITS

a) *Carefully clean* the area of the repair, the connections and the unit to be removed.

- Disconnect the cable from the negative post of the battery.
- To clean the area use gasoline only; do not use any other product.

b) *Exhaust the pressure* in the hydraulic circuits.

- If necessary, place the car in *high* position and support it on jack stands.
- Loosen the bleed screw of the pressure regulator.
- Place the manual height control lever in *low* position.

## 6. PRECAUTIONS TO TAKE DURING THE COURSE OF DISASSEMBLY

a) *Plug the metal lines* with caps and the rubber hoses with round pins of the appropriate diameter.

b) *Block the orifices of the units* with the appropriate plugs.

REMARK: All the plugs and pins should be carefully cleaned before use.

## 7. INSPECTIONS OR TESTS OF THE HYDRAULIC ORGANS

- Use the *test bench 3651-T* which is equipped and provided for the LHM liquid.  
This test bench is *painted in green* and its accessories carry a green reference mark.
- Never use it with any liquid other than the original or for checking units functioning with another liquid (for example: "D" models functioning with LHS 2).

## 8. PRECAUTIONS TO TAKE DURING THE COURSE OF ASSEMBLY

a) *Cleaning:*

- the steel tubes should be blown with compressed air,
- the rubber hoses and rubber seals should be washed with gasoline and dried with compressed air,
- the hydraulic units should be cleaned with gasoline and dried with compressed air.

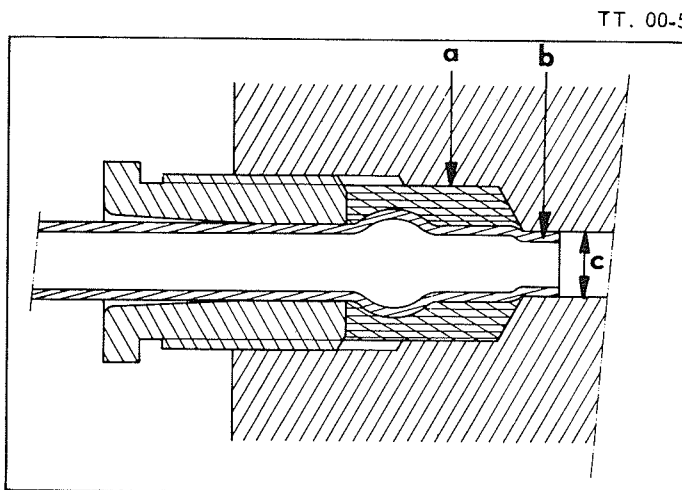
NOTE: At each repair it is necessary to change the seals.

b) *Lubrication:*

- Follow the schedule outlined in the Repair Manual.
- The seals and internal parts should be soaked before assembly (use LHM liquid only).
- If the parts in contact with the hydraulic organs must be lubricated, use a mineral grease exclusively (universal joint or bearing grease).

c) *Assembly:*

- Use only those seals, the quality of which corresponds to the LHM liquid.
- To couple a union, proceed as follows:



- Place the sleeve "a" soaked with LHM fluid onto the tube "b"
- Center the tube into the hole "c" by presenting it in line with the axis of the hole and avoiding any "cocking" (be sure that the end "b" of the tube penetrates the small bore "c").
- Take the union nut by the hand.
- Tighten the nut moderately; an excess tightening will occasion a leak because of the deformation of the tube

NOTE: Tightening torques:

Tube dia. = 3,5 mm	} (6-7 ft. lbs.)
Tube dia. = 4,5 mm	
Tube dia. = 6 mm	(7-8 ft. lbs.)

By design, the different seals become tighter as the pressure is raised higher. You cannot increase the sealing efficiency by making the unions tighter.

- In order to connect a rubber hose it is necessary to interpose between this hose and the clamp, a rubber ring of the appropriate diameter

## 9. INSPECTIONS AFTER REPAIRS

After any repairs on the units or the hydraulic circuits, verify:

- the sealing of the unions*
- the clearance existing between the tubes:* the tubes should not touch each other and should not touch or bind against another fixed or mobile organ.

## II. REPAIR OF A PLASTIC TUBE

### REMARKS:

- a) This operation can be done by making a sleeve on the tubing.
- b) If two sleeves are to be made on the same tube, they should be spaced approximately 32 inches so as to retain the flexibility of the tubing assembly.
- c) Obtain some plastic cement.

(Plastic cement tends to attack the skin; do not touch it with the fingers; use a wooden spatula)

1. Cut the tube at the section to be repaired. Using No. 600 abrasive paper, deglaze the ends along a length of approximately 3½ inches.
2. With trichlorethylene, carefully degrease the deglazed ends as well as those of the sleeve.
3. Heat the plastic cement in a water bath warmed to a temperature of 140° F.

*Do not exceed this temperature.*

NOTE: This operation is indispensable to reduce drying time.

4. Coat with cement, the deglazed ends of the tube and the inside of the sleeve.

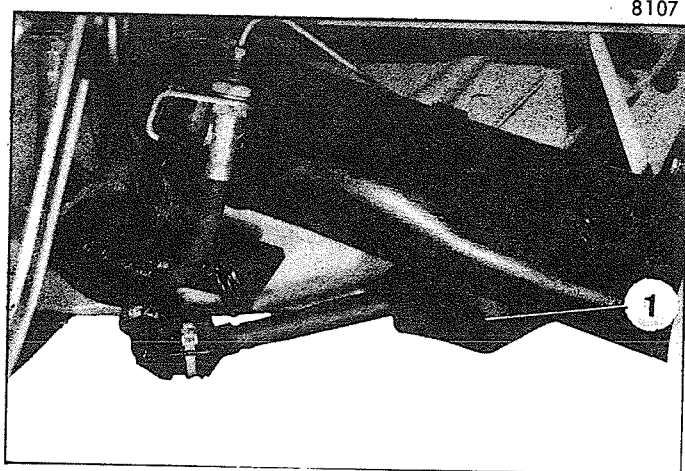
Allow the pieces to dry a few minutes.

Introduce the ends of the tube into the sleeve.

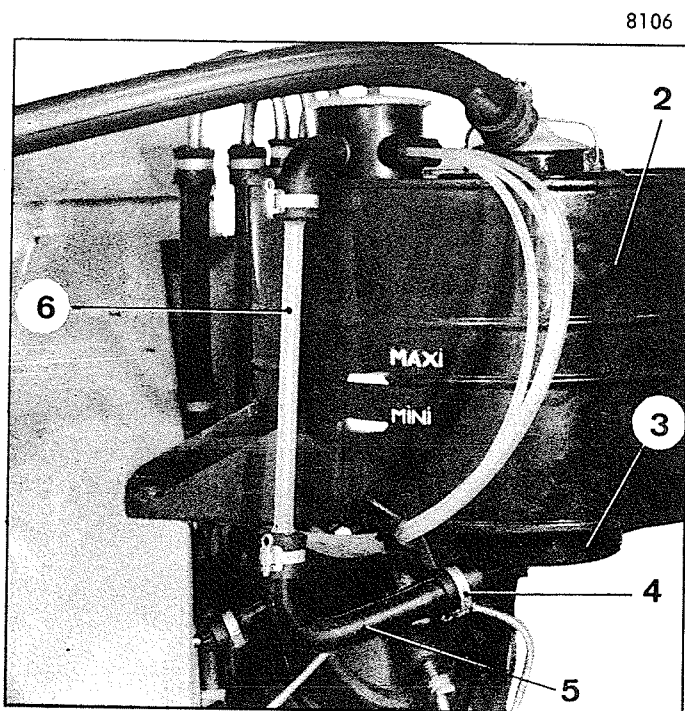
Allow the assembly to dry 3 to 4 hours before re-using the repaired line.

### III. DRAINING THE HYDRAULIC CIRCUIT

#### DRAINING



1. Place the car on a lift or over a pit.
2. Place the car in *low position*.
3. Open the bleed screw of the pressure regulator.
4. Turn the steering to the left then to the right several times.
5. *Exhaust all the pressure in the brake circuits.*  
Open a bleed screw or operate the brake control unit by applying the brakes a number of times in order to drop the pressure in the brake accumulator.
6. *Empty the rubber boots (1) of the rear suspension cylinders.*  
Press the boots (1) by hand, in such a manner as to make the liquid contained in these boots return to the reservoir to the maximum.
7. *Drain the reservoir (2).*  
Loosen the collar (4).  
Disengage the hose (5) from the cap (3).  
Drain the reservoir.



#### REFILLING

8. Connect the hose (5) to the cap (3) and tighten the collar (4).
9. Clean the filter of the reservoir with gasoline. Dry it with compressed air.
10. Refill the reservoir with *hydraulic LHM liquid (colored green)*.
11. *Prime the high pressure pump.*  
Refill the pump with hydraulic liquid through the filter housing of the reservoir.  
Start the motor and let it run a few moments.
12. Tighten the bleed screw of the pressure regulator.
13. *Complete the level of hydraulic liquid in the reservoir.*  
Place the car in *high position*. The height of the hydraulic liquid in the reservoir should stabilize between the "mini" and "maxi" of the transparent gauge (6).



### RECOMMENDED INGREDIENTS MENTIONED IN THE REPAIR MANUAL

#### LOCTITE

LOCTITE is a sealant available in two strengths according to the application. It is sold in automotive supply stores or hardware stores catering to the machine tool industry.

LOCQUIC-T is a quickener used in conjunction with LOCTITE.

#### USE:

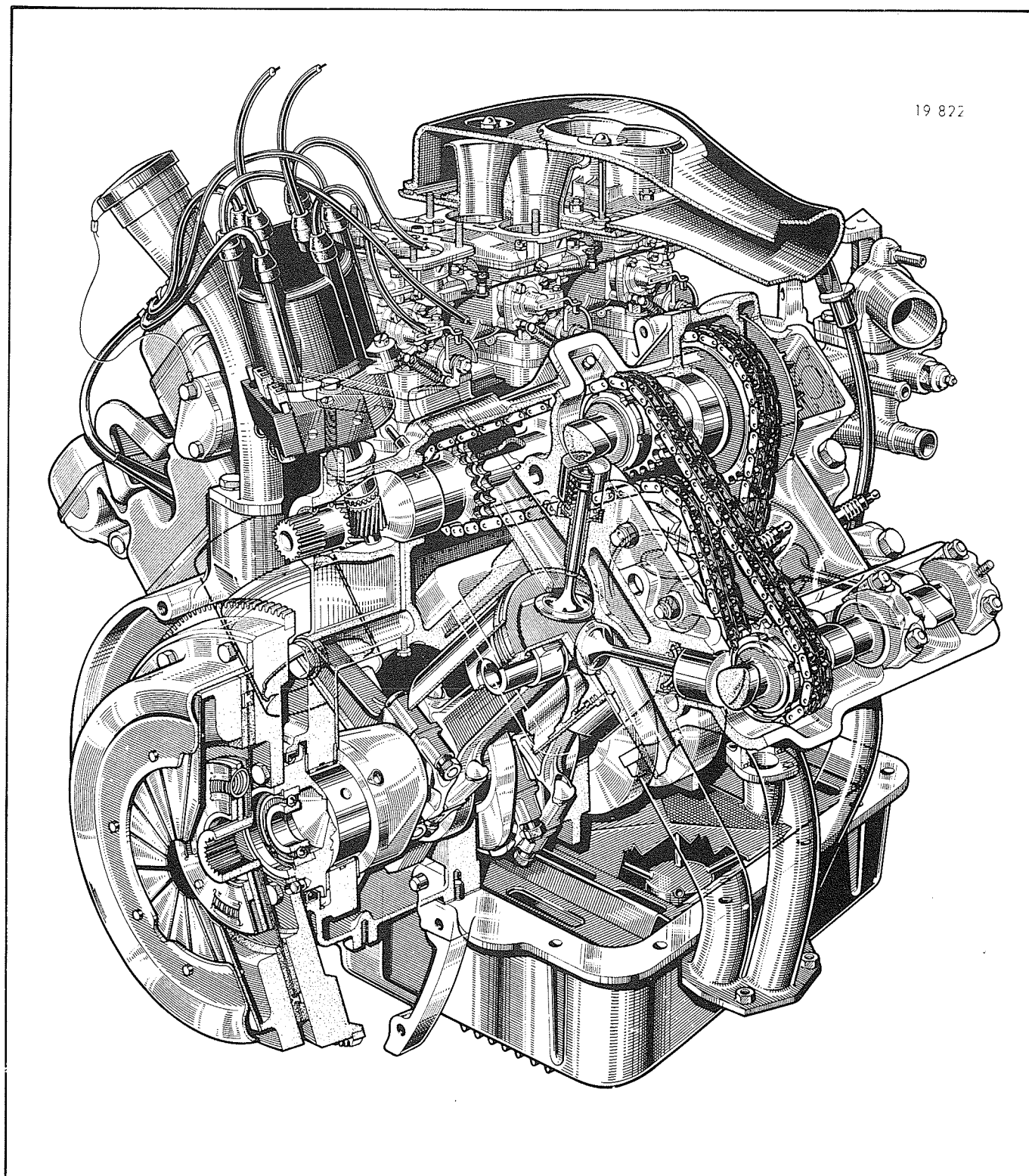
The quickener LOCQUIC-T is an activating wash designed for those parts to which one intends to apply the sealant LOCTITE. Non-metallic parts require a pre-treatment with the quickener LOCQUIC-T.

Most of the parts in zinc, cadmium, aluminum or stainless steel also require this treatment in order that the LOCTITE sealant will grip hard and rapidly. The quickener LOCQUIC-T can serve to degrease the parts. It can also be used to prepare dull surfaces.

Spray the quickener onto the surface to which the LOCTITE sealant is to be applied. Brush or wipe to remove the grease. Spray again to clean perfectly. Repeat, if necessary. Apply the LOCTITE only after the quickener is *perfectly dry*.

ATTENTION: **Precautions:** Proceed only with adequate ventilation. Avoid prolonged or repeated contact with the skin. Do not swallow. Avoid spraying painted areas. Preserve the container of LOCQUIC-T at a temperature below 110° F.

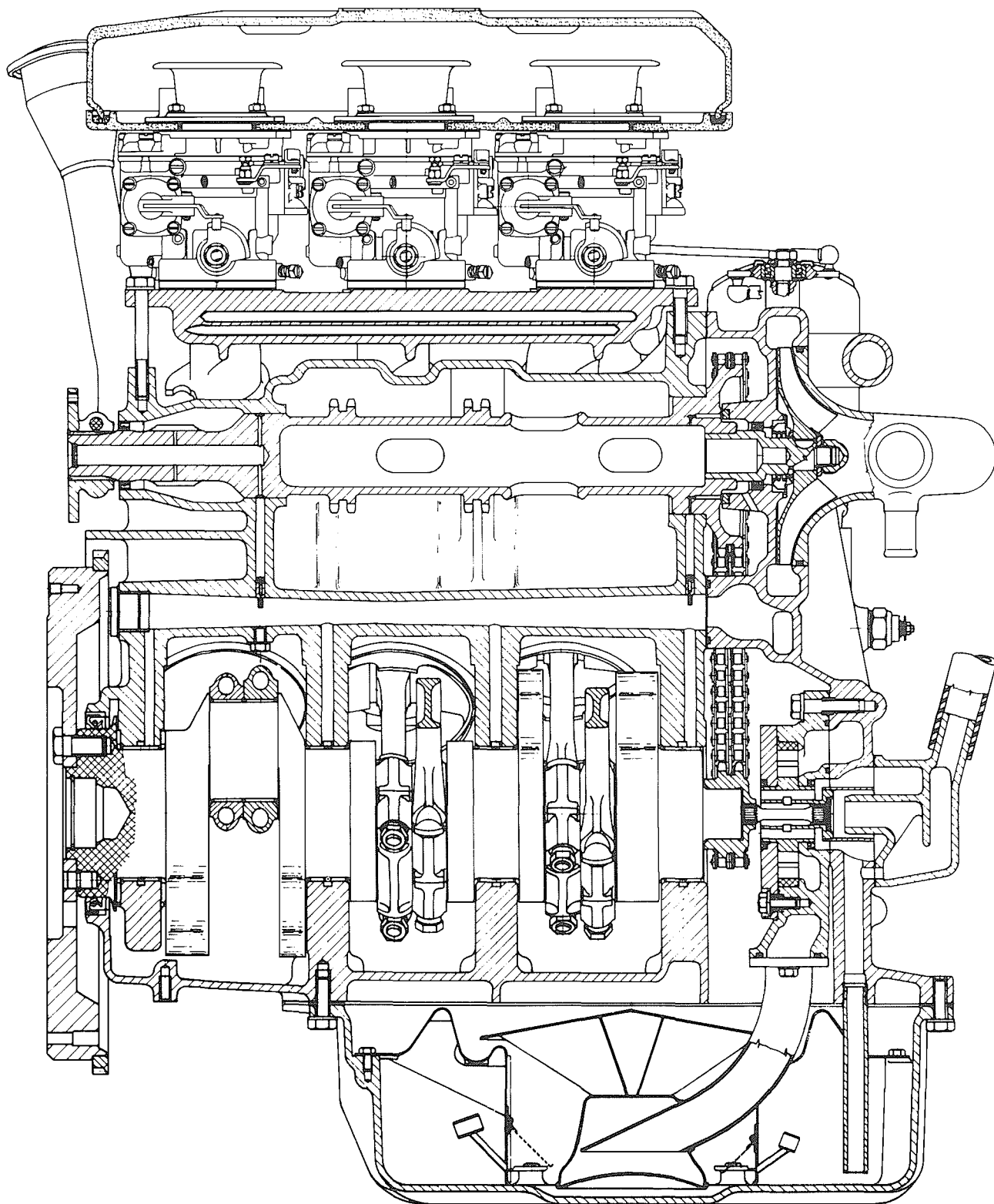
## I. CHARACTERISTICS



Type.....	MASERATI C. 114/1	Compression .....	9/1
Fiscal horsepower.....	15 CV	Max. H.P. (DIN) .....	170 @ 5500 R.P.M.
Number of cylinders.....	6	Max. H.P. (SAE) .....	180 @ 6250 R.P.M.
Arrangement.....	V at 90°	Max. torque (DIN) .....	170 ft. lbs. @ 4000 R.P.M.
Bore.....	87 mm (3.425")	Max. torque (SAE) .....	172 ft. lbs. @ 4000 R.P.M.
Stroke.....	75 mm (2.953")	Max. R.P.M. in 5th .....	6100
Displacement .....	2670 cm <sup>3</sup> (162.931 cu. in.)		

## LONGITUDINAL SECTION

S. 10.1



## II. PARTICULARS

### Motor Suspension:

- Height of the elastic motor mounts under load
    - at the left: .....  $19,5 \pm 1 \text{ mm } (.768'' \pm .040'')$
    - at the right: .....  $18,5 \pm 1 \text{ mm } (.728'' \pm .040'')$
- (Distance between the motor-support and the upper face of the elastic motor mount)

### Cylinder Heads:

- The position of each cylinder head is referenced in relation to the cylinder-block by the letters AA and BB stamped at the center of the upper faces of the cylinder head and the block.
- Tightening of the cylinder head bolts: *Cold*
  - 1st tightening ..... 36 ft. lbs.
  - 2nd tightening ..... 80 ft. lbs.
  - Tightening sequence:
 

●	●	●	●
6	2	3	7
5	1	4	8
●	●	●	●
- Valve clearances: *Cold*
  - ◆ Intake: .....  $.012'' \text{ to } .014''$
  - Exhaust: .....  $.020'' \text{ to } .022''$
- Bore of the valve guides:
  - Intake: .....  $7,85 \begin{matrix} + 0,022 \\ - 0 \end{matrix} \text{ mm } \left[ \begin{matrix} .309'' + .0009'' \\ - 0 \end{matrix} \right]$
  - Exhaust: .....  $8,85 \begin{matrix} + 0,022 \\ - 0 \end{matrix} \text{ mm } \left[ \begin{matrix} .348'' + .0009'' \\ - 0 \end{matrix} \right]$

Valve stem seals are mounted on the intake guides only.
- Valve seats:
  - Width:
    - Exhaust ..... 2,2 mm (.087'') max.
    - Intake ..... 2,5 mm (.098'') max.
  - Angles:
    - Intake and exhaust .....  $90^{\circ}$
- Calibration of the valve springs (intake and exhaust):
  - Length under a load of 40-50 lbs. .... 33 mm (1.3'')
  - Length under a load of 150-160 lbs. .... 24 mm (.945'')

### Cam Shafts:

- The bearing caps of the cam shafts are machined with the cylinder heads and referenced for matching.
- Markings of the cam shafts:
  - Marks:
    - Intake ..... V
    - Exhaust ..... I<sub>I</sub>

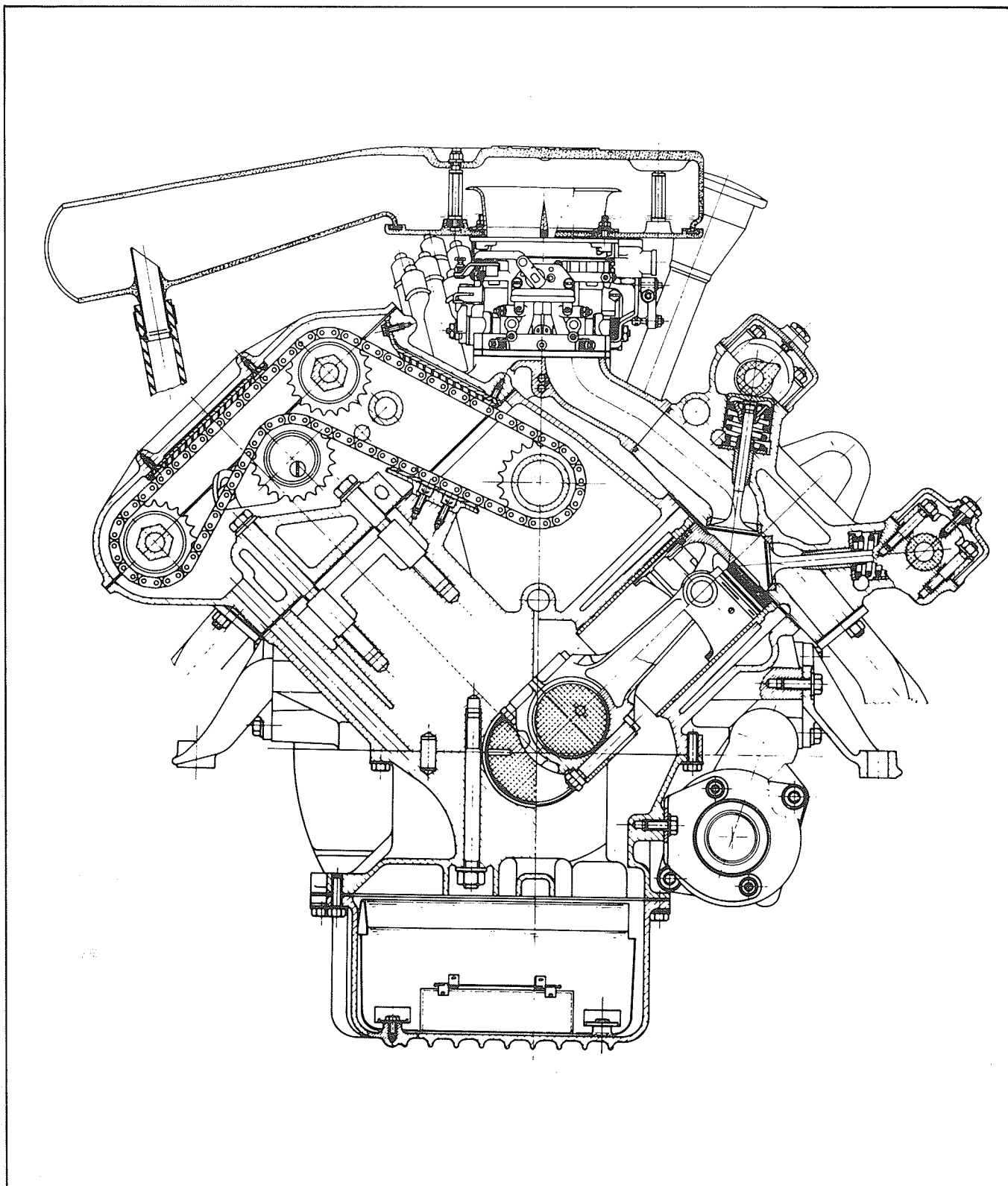
Located on one of the six faces of the integral hexagonal section of the cam shaft forging.

### Cylinder-block:

- The sleeves are rectified after assembly in the cylinder-block and cannot be replaced.
- Bore of crankshaft main bearing seats:
  - (nominal dimension): .....  $79,83 \begin{matrix} + 0,01 \\ - 0 \end{matrix} \text{ mm } \left[ \begin{matrix} 3.1429'' + .0004'' \\ - 0 \end{matrix} \right]$

## ◆ CROSS SECTION

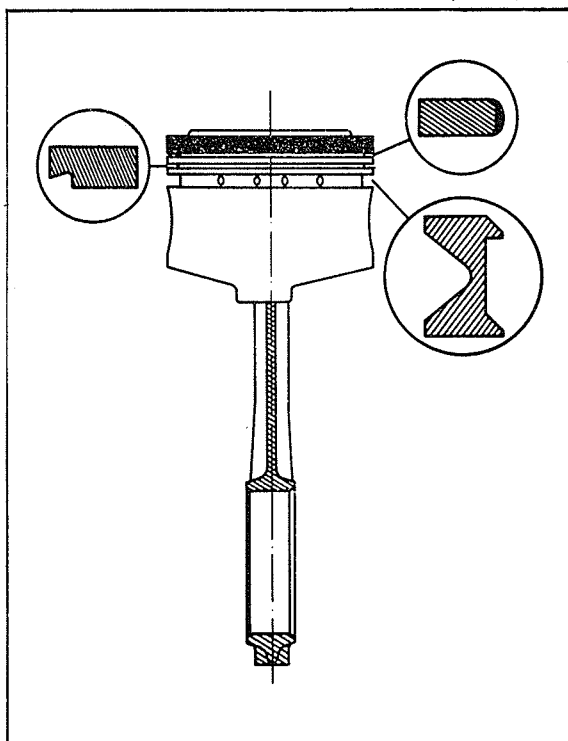
S. 10-2



- **Pistons and Rings:**

- The wrist pins are mounted "tight" in the connecting rod and "free" in the pistons.
- There exists three classes of pistons corresponding to three classes of the bore of the sleeves (2 production classes and 1 repair class).
- Each class is divided into two groups corresponding to the two classes of the bores of the piston for receiving the wrist pin.
- Orientation of the pistons on assembly: the slope of the piston skirt and the head of the connecting rod are machined off center. The longer slope of the skirt and the heavier side of the connecting rod head must be assembled on the same side.

♦ S. 12-1 a

- **Connecting Rods:**

- Orientation of the connecting rods on assembly:  
The chamfers on the connecting rods should be placed:
  - toward the front for cylinders: 1 - 2 - 3
  - toward the rear for cylinders: 4 - 5 - 6

- **Crankshaft** (nominal dimensions):

- Diameter of the main bearing journals:  
 $3.00'' \pm .0002''$
- Diameter of the crankpins:  
 $2.260'' \begin{bmatrix} -.0012'' \\ -.0016'' \end{bmatrix}$
- Sealing of the bearing caps:  
Use a paste type sealant.
- Torque of the bearing caps:  
 $65 \text{ to } 72 \text{ ft. lbs.}$
- Front bearing seal  
The oil return slinger should be turned in the direction opposite that of the rotation of the motor.

- **Flywheel:**

- Distance between the support surface of the clutch housing and the support surface of the clutch disc:  
 $0,35 - \overset{0}{0,15} \text{ mm} \begin{bmatrix} .014'' + 0 \\ -.006'' \end{bmatrix}$
- Rectification of the flywheel should not exceed  $0,50 \text{ mm } (.020'')$
- Tightening torque of the flywheel mounting bolts  $12 \text{ m.kg. (87 ft. lbs.)}$
- Tightening torque of the pressure plate mounting screws  $2,75 \text{ m.kg. (20 ft. lbs.)}$

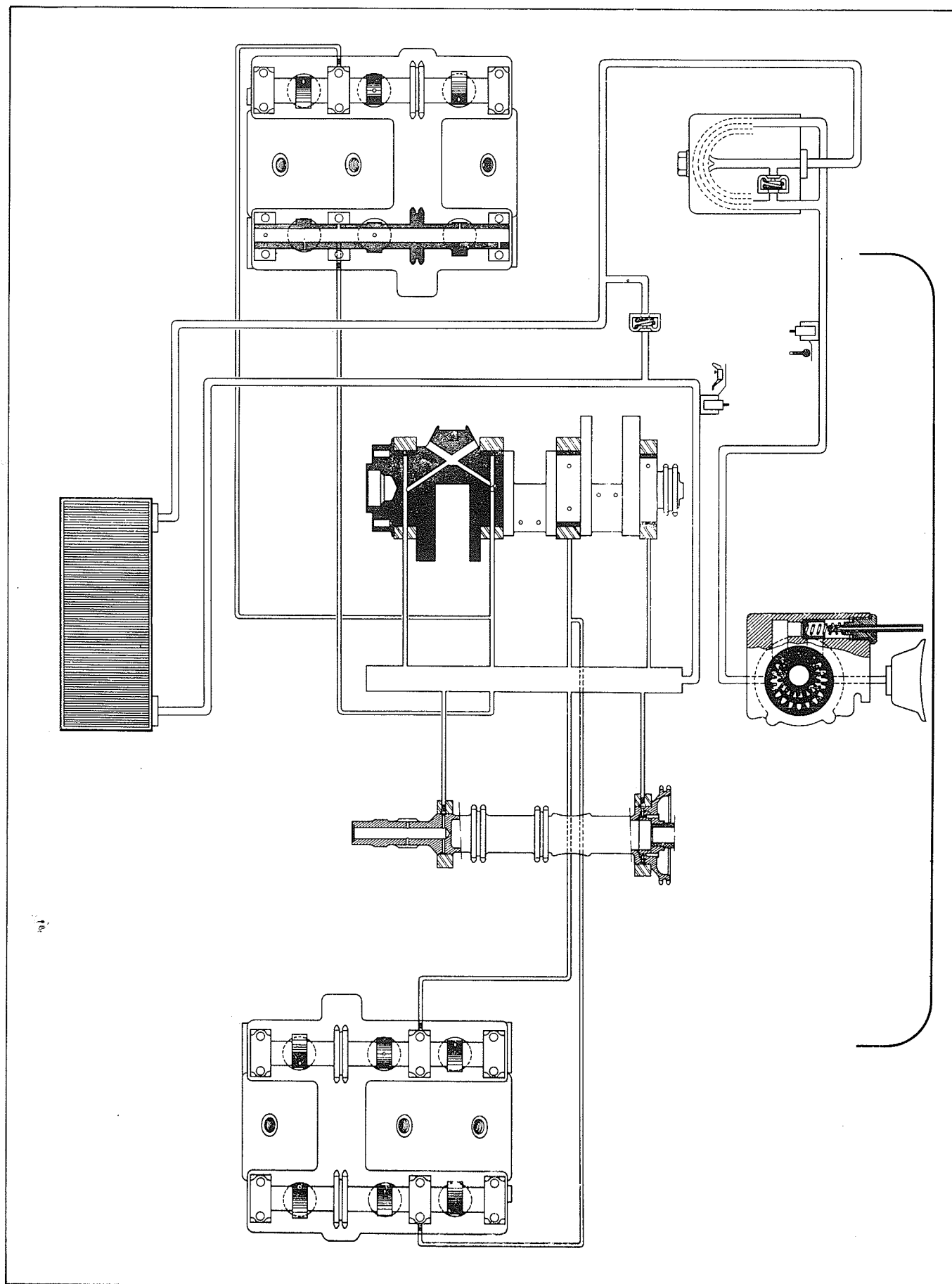
- **Valve Timing:**

- Calibration of the timing:
  - a) Clearance between the tensioners and the chains  $0,2 \text{ mm } (.008'')$
  - b) Valve adjustments for the practical clearance
  - c) Turn the crankshaft so as to place the piston No. 1 at T.D.C. with the valves in "balance" (use a dial indicator).
  - d) Turn the camshafts to obtain:
    - lifting of the intake valve  $1 \text{ mm } (.040'')$
    - lifting of the exhaust valve  $1,3 \text{ mm } (.050'')$
- ♦ e) Repeat the above operation for cylinder No. 6 (piston No. 6 being at T.D.C. with the valves in "balance").

- **Oil Circuit:**

- Quality  $20 \text{ W } 50 \text{ (10 W } 30 \text{ in cold countries)}$
- Capacity (after draining)  $6 \text{ liters (6-3/8 qts.)}$   
(after changing the oil filter (approx.) )  $7 \text{ liters (7-3/8 qts.)}$
- Pressure (at a temperature between  $212^{\circ}$  and  $230^{\circ} \text{ F.}$ ) the pressure should be:
  - @  $1000 \text{ r.p.m.}$   $1,5 \text{ bar (22 p.s.i.) min.}$
  - @  $6000 \text{ r.p.m.}$   $5,5 \text{ bars (80 p.s.i.)}$

S. 22-1



## REMOVAL AND FITTING OF AN ENGINE/GEARBOX ASSEMBLY

## REMOVAL.

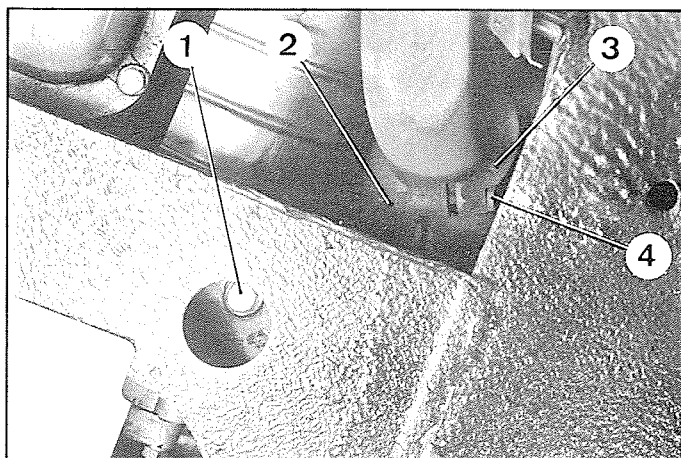
1. Place the vehicle on a lift or over a pit.

Remove :

- the securing bolts (1) of the engine mountings,
- the nuts (2),
- the exhaust manifold bolts (4) and clamps (3).

Return the vehicle to the ground.

Disconnect the negative battery lead.



2. Remove the bonnet :

(Mark the position of the hinges using a scribe)

3. Place the front of the vehicle on stands.

Drain the radiator.

4. Remove the front wheels and the drive shafts.

5. Release the pressure in all the circuits.

Remove the front suspension units (block the apertures in the suspension cylinders and spheres ).

6. Remove air filter assembly, coils and bracket :

a) Disconnect :

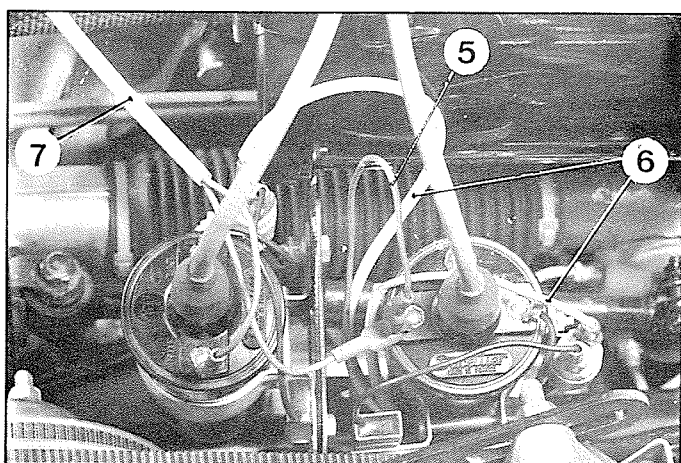
- the feed leads (6) and tachometer lead (5) from the coils,
- the high tension leads from the distributor,
- the connecting leads (7) from the condensers.

b) Remove :

- the connecting tube between air filter and air box, after uncoupling the gas recycling tube from the connecting tube,
- the rubber straps for intake tube and air filter,
- the bolt securing air filter assembly and coil bracket on the front crossmember.

Remove the lug supporting the connecting tube between gearbox and heat exchanger.

Remove the air filter assembly and coils from the coil bracket.

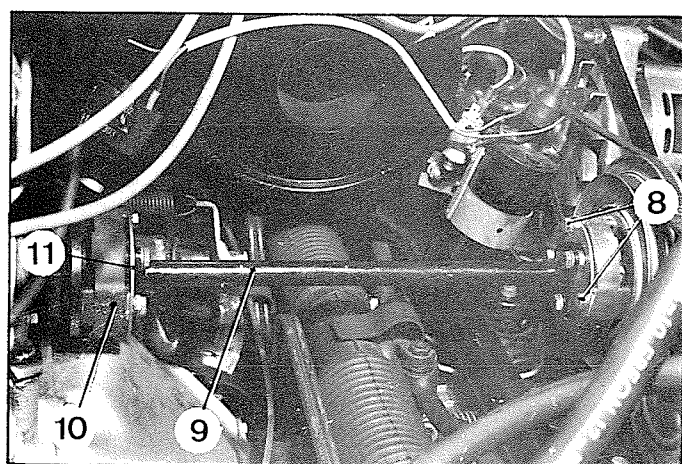


7. Remove the HP pump control shaft :

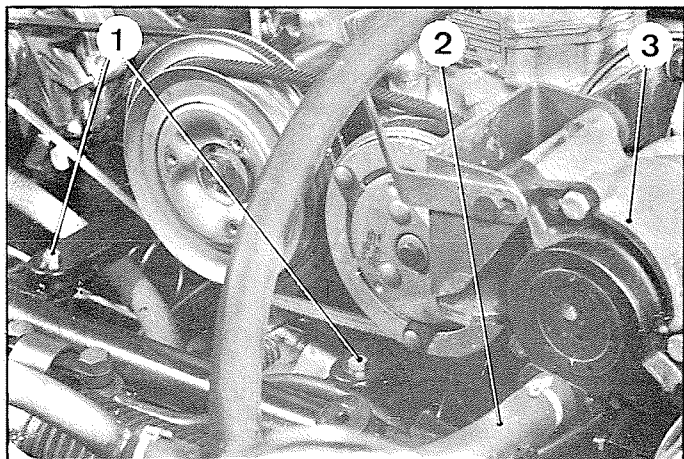
a) Remove the bolts (8) securing the flexible couplings (10) from the control shaft (9).

b) Remove the shaft (9) metal washers (11) and flexible couplings (10) assembly.

8. Uncouple the speedometer cable from the gearbox leaving the socket ( cast iron ) in its housing.

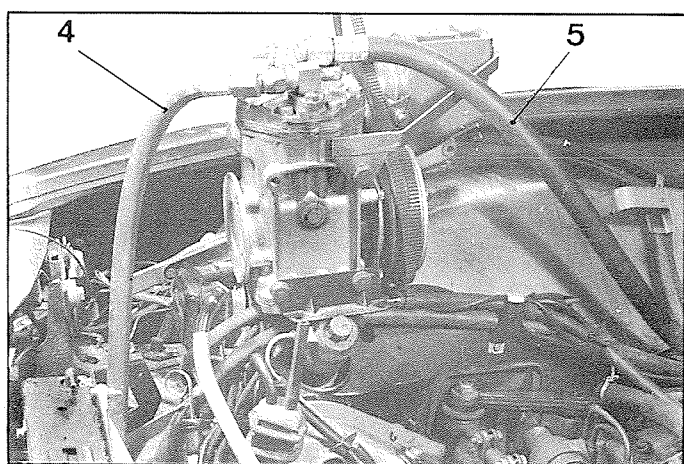






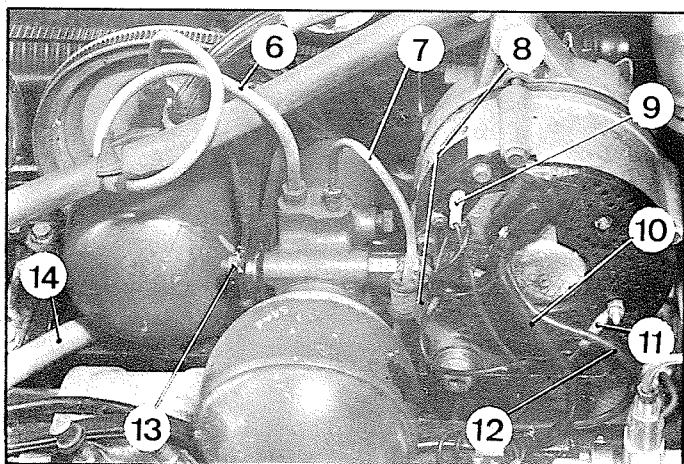
**9. Remove the compressor ( Vehicles with air-conditioner option ) :**

- a) Uncouple the outlet tube ( 2 ) from the air pump ( 3 ).
- b) Remove the nuts and bolts securing the gusset supports for the compressor on the crossmember.
- c) Disengage the compressor control belt from the H.P pump. Disconnect the cut-in feed lead from compressor.
- d) Disengage compressor and air pump assembly towards the R.H side, *without uncoupling flexible tubes ( 4 ) and ( 5 ) from the refrigeration circuit.*



**10. Remove the pressure regulator :**

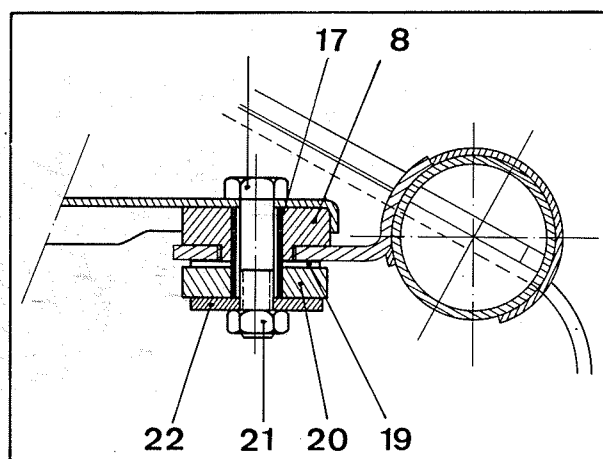
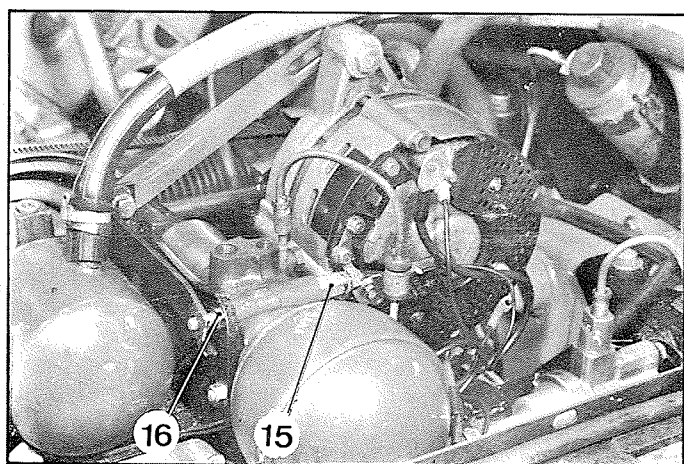
- a) Uncouple the HP outlet tube ( 7 ) and its retaining lug ( 8 ) from the pressure regulator.
- b) Remove the HP pump - regulator connecting tube ( 6 ).
- c) Remove the two regulator securing bolts, the nuts ( 13 ) and ( 16 ) and the shouldered screw ( 15 ).
- d) Remove the regulator and uncouple the return tube ( 14 ).

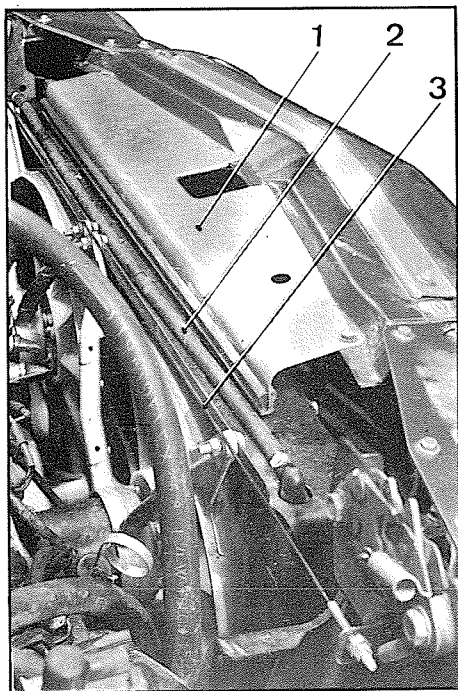


**11. Remove the plate supporting the components**

- a) Disconnect the leads ( 9 ), ( 10 ), ( 11 ) and ( 12 ) from the alternator.
- b) Remove the two bolts ( 1 ) securing the plate to the reinforcement crossmember.  
Remove nuts ( 21 ) washers ( 22 ) rubber bushes ( 20 ), shim ( 19 ) shouldered rubber bushes with spacers ( 17 ).

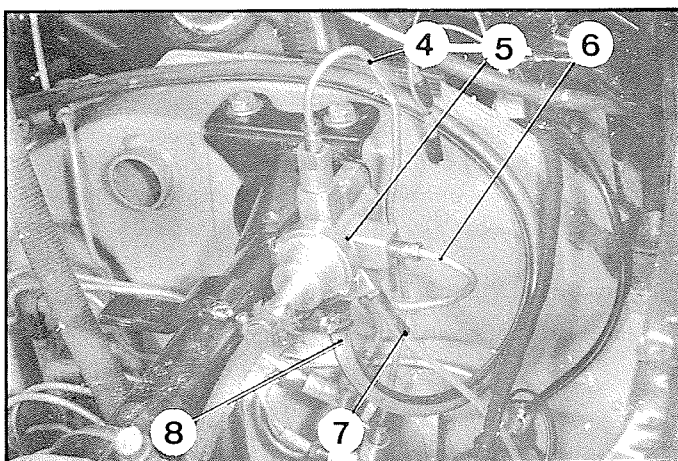
- 12. Disconnect the brake wear warning lamp leads from the brake pads. Remove the electrical harness and the speedometer cable, from the L.H front wheel arch.**



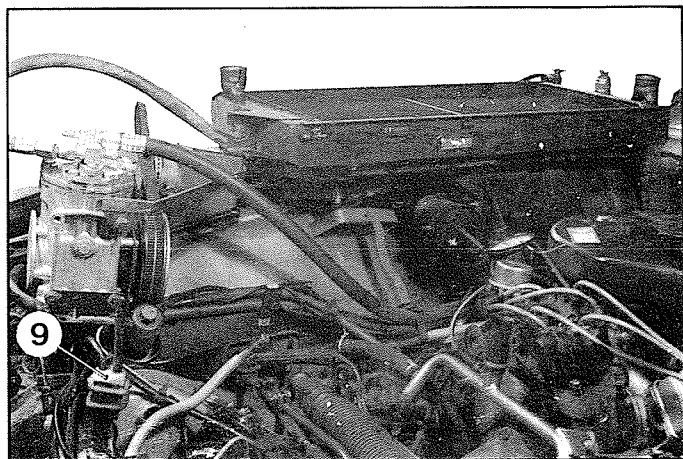
**13. Remove the radiator and fans assembly**

(and condenser, on vehicles with air-conditioner option) :

- a) Remove closing plate (1).
- b) Disconnect the feed wires from the fan motors and from the radiator thermal switch.
- c) Uncouple the vapour tube (2) from the radiator.
- d) Uncouple the bonnet lock connecting cable from L.H lock and remove it.
- e) Remove the feed tube (4) from the steering governor (5).
- f) Remove the radiator water pipes.
- g) Remove the two radiator securing nuts. Raise the radiator/fan motor assembly, to gain access to the lower securing bolts of the fan brackets.
- h) Remove the securing bolts of the fan brackets. Disengage the fans and brackets assemblies towards the rear, to permit the removal of the radiator, condenser and refrigerating fluid tank (vehicle with air-conditioner option).
- i) Remove the radiator, condenser and tank assembly, without removing the flexible tubes of the refrigeration circuit and rest it on the R.H side of the vehicle.

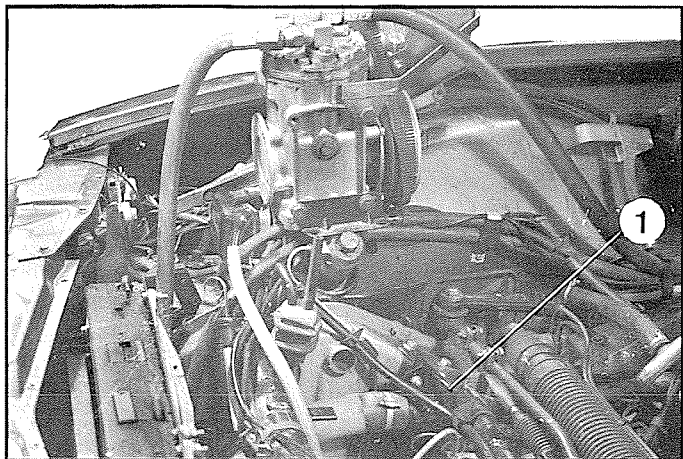


14. Remove the feed pipe (6) of the flow output regulator. Uncouple the return tube (8) and the overflow return tube (7), from the governor (5).



15. Remove the two retaining clips of the electrical harness on the front crossmember support for the gearbox. Remove the crossmember securing bolts.

16. Remove the gearbox breather (9), without removing the flexible tubes.



17. Remove the shouldered securing screws of the air filter bracket and remove this bracket.

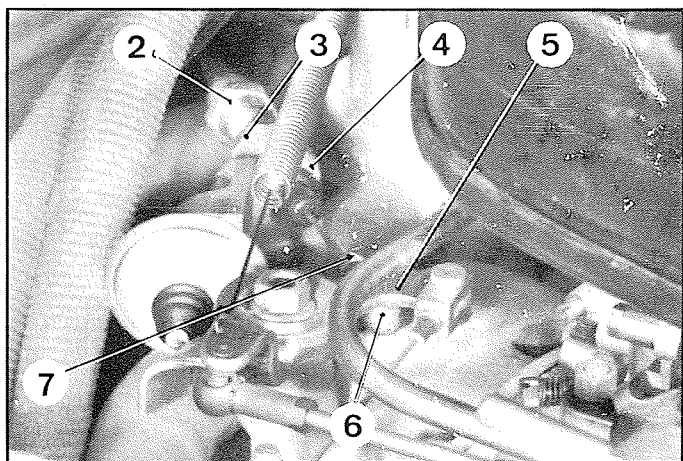
18. Remove the reinforcement crossmember (1).

19. Remove the steering rack.

20. Remove the mechanical brake units :

- a) Remove the brake cable retaining spring on gearbox.
- b) Remove the securing bolts of the brake units on the converter housing.
- c) Remove the brake unit and cable assembly on the R.H side of the vehicle.

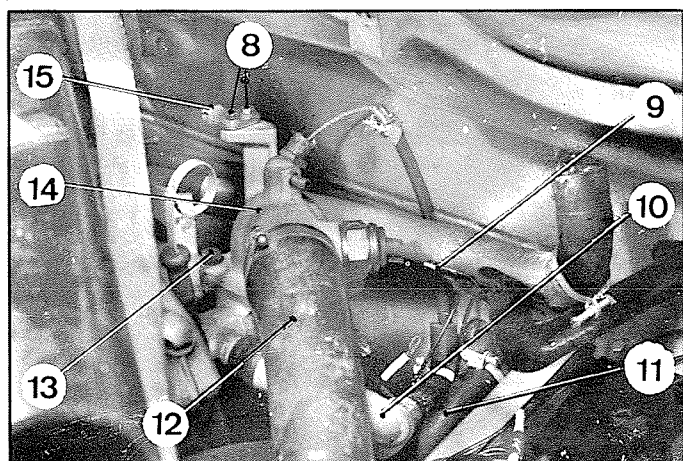
21. Remove the HP outlet tube from the pressure regulator. Uncouple the feed tubes to the brake units, from the unions on the left side-member.



22. Uncouple the accelerator control :

- a) Remove the retaining clip and uncouple the accelerator cable end piece (6), from the return lever (5).
- b) Slacken the lock-nut (3) and unscrew the end-piece (2) to uncouple it from the boss (4).
- c) Slacken the lock-nut (7) and remove the accelerator cable end piece (6).
- d) Remove the accelerator control from the boss(4).

23. Uncouple the choke control cable from the carburettor control cable clamp.  
Loosen the two screws (8) and remove the sheath endpiece from the lug (15).



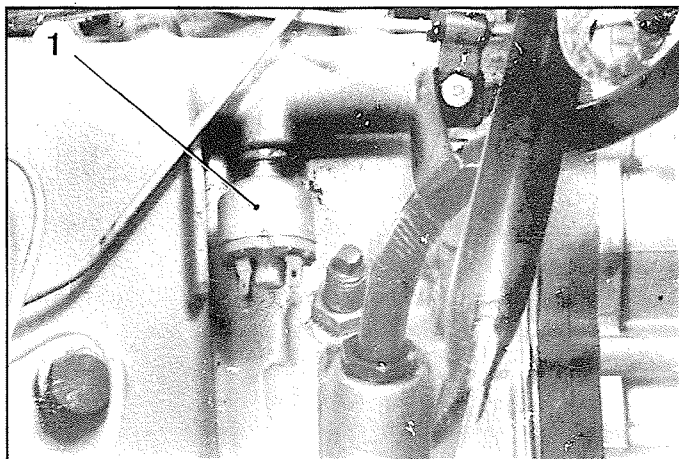
24. Uncouple the breather tube from the thermostat housing.  
Remove the two securing screws (13) of the housing (14) and remove the water pipe (12) and housing (14) assembly.  
Remove the thermostat.

25. Remove the water header tank and disconnect the leads (9) of the faulty components detector from the main electrical harness.

Uncouple :

- the heating feed duct (17) from the steel tube on the bulkhead,
- the return duct (10) from the engine coolant piping,
- the petrol feed pipe from the pipe on carburettors.





26. Disconnect the starter-motor feed cable from the positive battery terminal.  
Remove the cable terminal securing screw to uncouple the front harness.

27. Disconnect the wires for the reversing lamp switch and the starter-motor control (1).

28. Uncouple the speed selector cable from the gearbox :

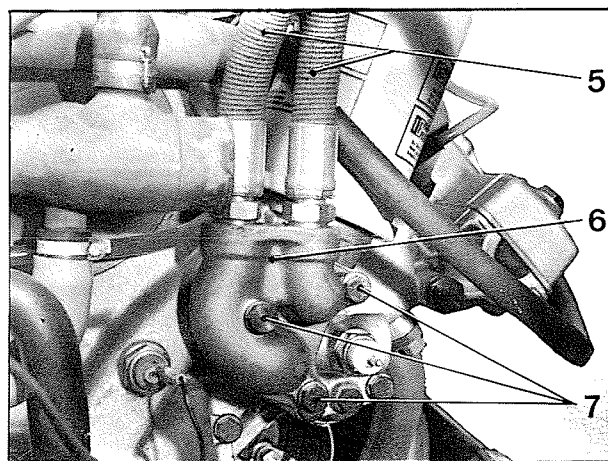
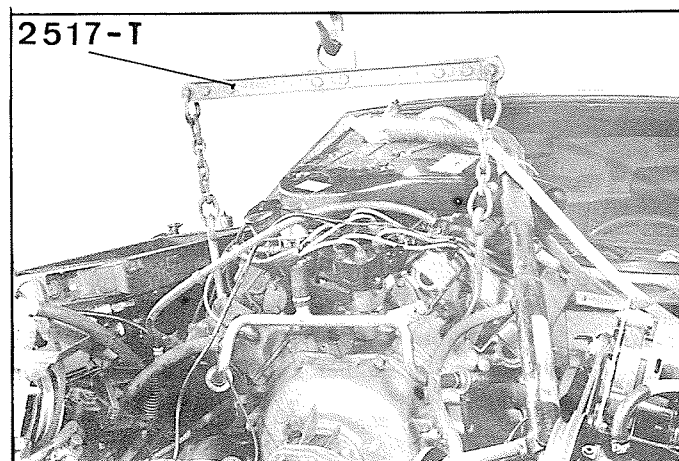
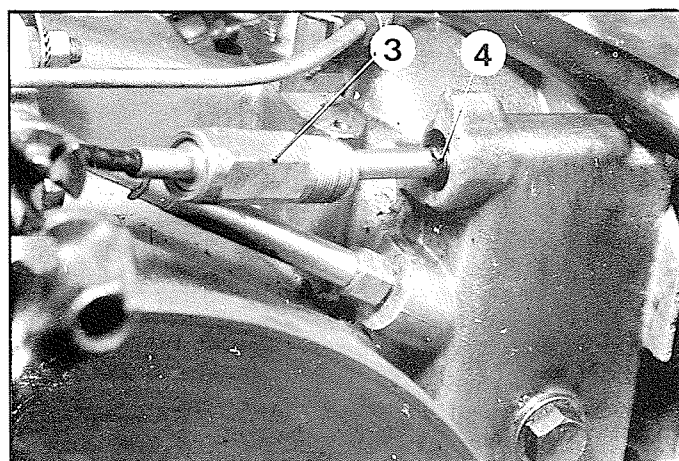
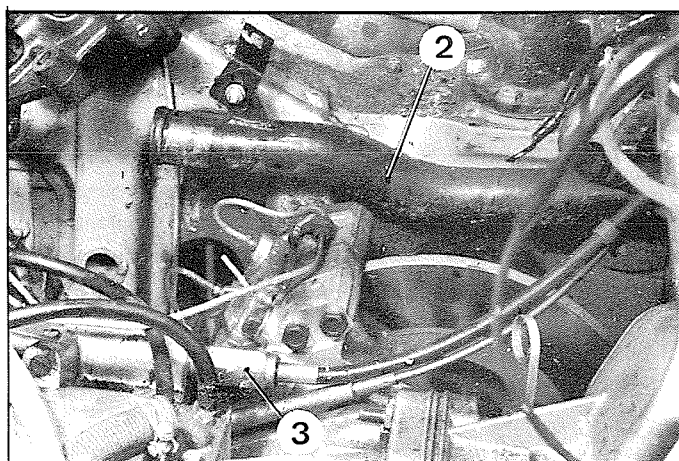
Unscrew the end-piece (3), free the spring (4) from the groove of the cable end-piece and remove the cable.

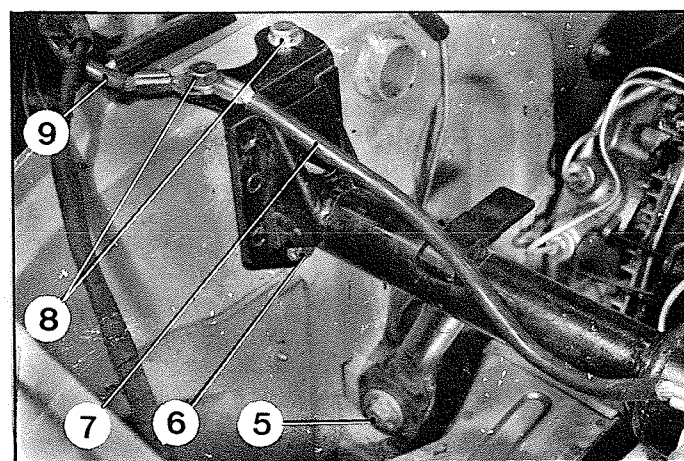
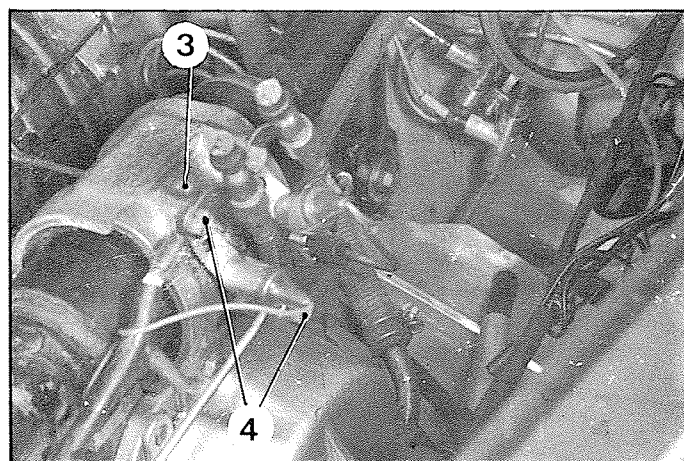
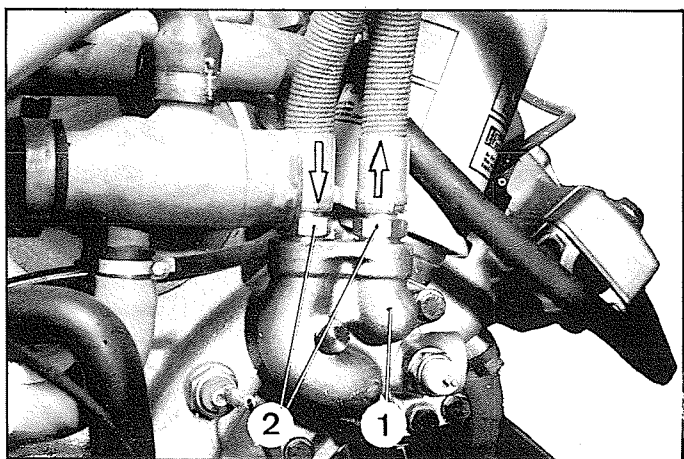
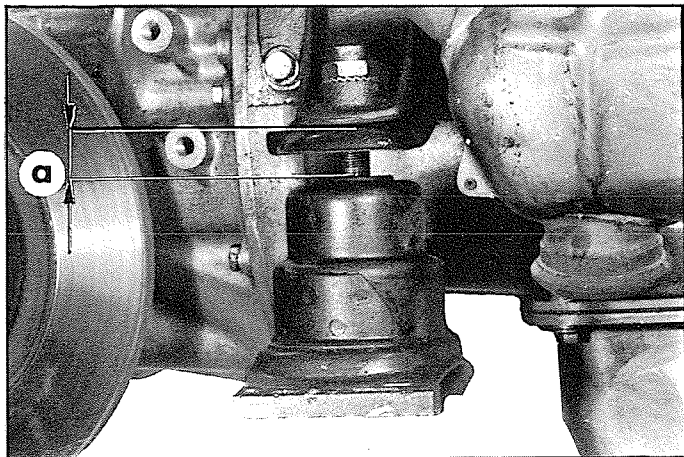
29. Remove the water pipe (2) on the R.H side and the securing bolts of the rear engine mountings on the chassis.

30. Start to raise the engine/gearbox assembly ( sling 2517-T) and turn the rear engine mountings a quarter of a turn. Remove the engine/gearbox assembly, to the limit allowed by the connecting tubes (5) between the engine and the oil cooler.

31. Remove the screws (7) and free the housing (6) and connecting tubes (5) assembly.  
( Beware of engine oil ).

32. Complete the removal of the engine/gearbox assembly.





## FITTING.

**33. Adjust the rear engine mountings :**

Operate on the nuts to obtain a distance :

$a = 26 \pm 0.5 \text{ mm}$ , left side

$a = 23.5 \pm 0.5 \text{ mm}$ , right side

This preadjustment is valid for new flexible mountings not under load.

Under load, when the assembly is in place in the vehicle, the following distances should be obtained :

$a = 19.5 \pm 1 \text{ mm}$ , left side

$a = 18.5 \pm 1 \text{ mm}$ , right side

**34. Put the engine/gearbox assembly in place.**  
(sling 2517-T)

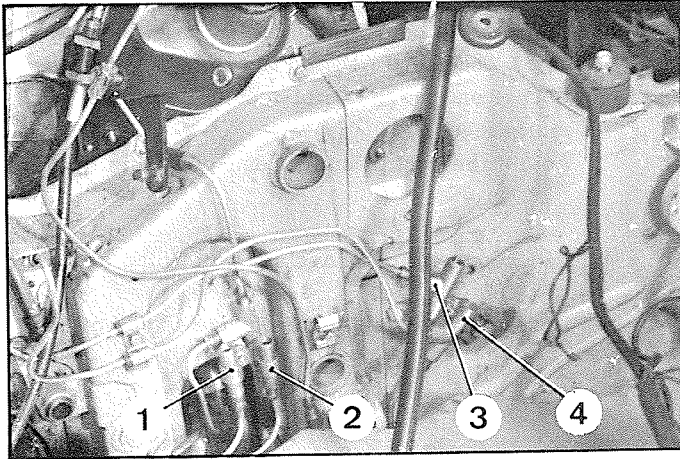
NOTE : If the engine has been replaced, remove the thermostat and its housing.

- 35.** If the connecting tubes to the oil cooler have been uncoupled, recouple them to the housing (1) (take note of the marks made when dismantling). Tighten the unions (2) to between 30 and 35 mAN (3 and 3,5 m.kg or 22 and 25,3 ft.lbs). If the tubes have not been uncoupled, position the housing (1) and tighten the securing bolts to 20 mAN (2 m.kg or 14.44 ft.lbs).

- 36.** Ensure that the thrust plates of the engine mountings are parallel to the engine and lower the engine/gearbox assembly to about 10 mm from the thrust face for the mountings. Position the front crossmember, then the engine mountings using the two bolts and complete the positioning of the engine/gearbox assembly. Check the adjustment of the mountings (see § 33 distances under load). Tighten the securing bolts of the engine mountings (contact washer).

**37. Fit the front crossmember supporting the gearbox :**

- a) Unscrew the four securing bolts (4) of the half-collar (3) holding the gearbox on the front crossmember.
- b) Position without tightening, the lower securing bolts of the crossmember (thick flat washer and contact washer).
- c) Tighten the four securing bolts (4) of the half-collar (3).
- d) Adjust the lateral position of the front crossmember, to obtain on each side the same distance between the brake disc and sidemember within about 2 mm using the shims placed between the crossmember and sidemember, under the bolts (6).
- e) Tighten the upper securing bolts (8) (contact washer). Fit the cables to earth (7) and (9) under the front R.H bolt. Fit the lug for the gearbox oil breather under the rear R.H bolt. Tighten the bolts (8).

**38. Connect the brake pipes :**

Connect the feed pipe of the R.H brake unit to the two-way union (2) and the feed pipe of the L.H brake unit to the union (1). Tighten the securing screw of the support plate for the two pipes on the L.H sidemember.

**39. Fit the feed pipe (5) of the governor and the connecting tube (6) to the flow output regulator.**

Connect tube (5) to union (4) and tube (6) to union (3).

Connect return pipe (8) and overflow return pipes (7) to governor.

**40. Fit the drive shafts.****41. Fit the R.H engine coolant tube.****42. Fit the mechanical brake calipers :**

Position the calipers.

Hand tighten the securing screws.

*Ensure that there is a clearance of 5 mm between the lever return springs and the brake disc.*

Tighten the caliper securing screws to between 100 and 110 mAN (10 and 11 m.kg - 72 and 79 ft.lbs).

Fit cable retaining spring on gearbox cover.

Check clearance between brake pads and discs.

Adjust if necessary.

**43. Adjust the brake bands of the gearbox :**

(If the operation has not already been done).

**44. Connect speed selector cable to the gearbox :**

a) Fit cable end-piece (9) onto the extremity of the control valve (10) and position the spring (11). Ensure that the spring is fully engaged in the valve groove.

b) Screw in end-piece (12). tighten it to 30AN (3 m.kg - 22 ft.lbs)

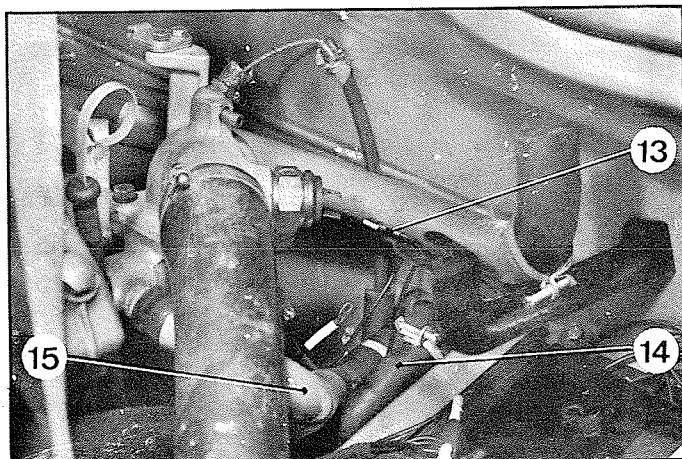
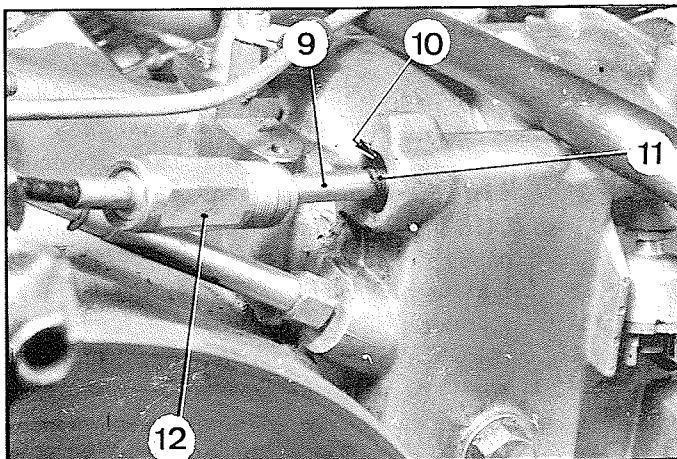
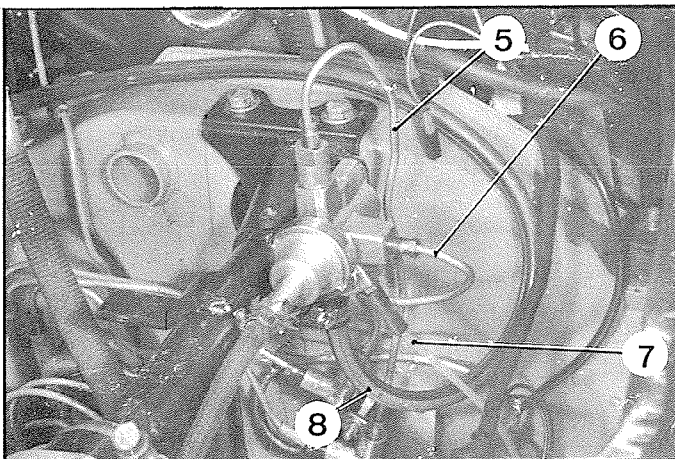
c) *Check adjustment of selector cable.*

**45. Connect the leads of the brake pad wear warning lamp to the brake pads. Connect the starter motor control harness and the reversing light harness to the switch on the gearbox.**

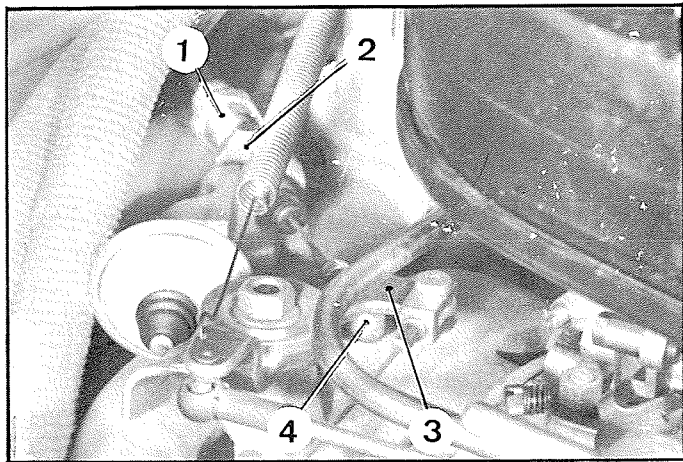
*Check adjustment of switch.*

**46. Connect**

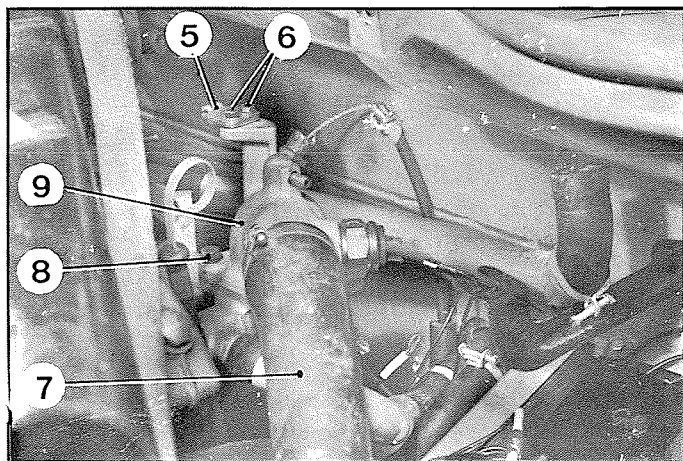
- the heating feed duct (14), to the steel tube on the bulkhead,
- the return duct (15) to the engine coolant piping.

**47. Connect the harness (13) of the faulty components detector to the main electrical harness.**





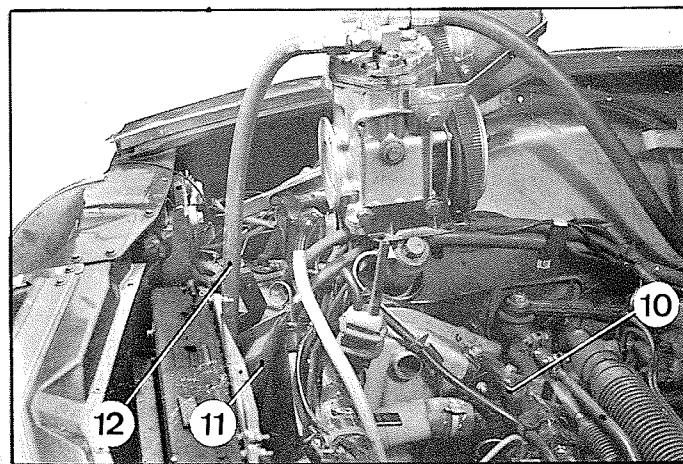
- 48. Connect the accelerator control to the engine :**  
Screw end-piece ( 1 ) into lug ( 2 ).  
Couple end-piece ( 4 ) of accelerator cable to return lever ( 3 ).  
Adjust the control and fit end-piece circlip ( 4 ).



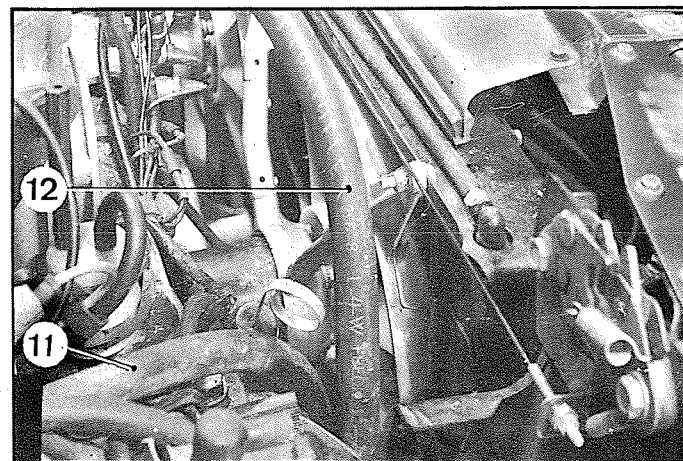
- 49. Fit thermostat and housing/ water-pipe assembly ( 9 ) ( 7 ).**  
Moderately tighten securing screws ( 8 ) of housing ( 9 ).
- 50. Connect choke control cable to the carburettor control cable clamp and position the sheath end-piece in the lug ( 5 ).**  
Moderately tighten the screw ( 6 ).  
Ensure that the control works correctly.

- 51. Fit the water header-tank.**

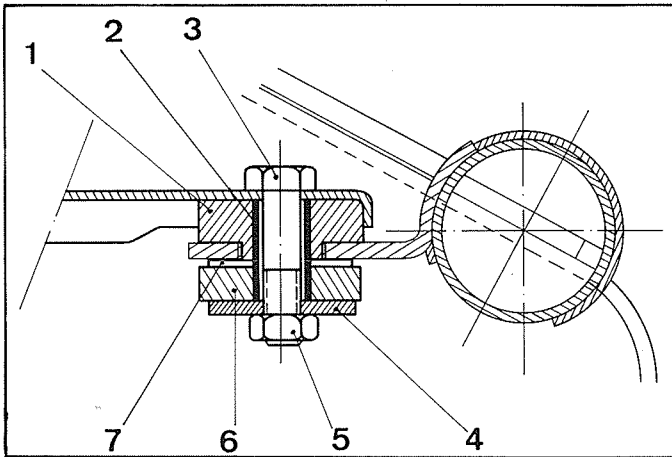
- 52. Fit and adjust the steering rack.**



- 53. Fit the reinforcement crossmember ( 10 ).**  
Tighten the securing bolts ( contact washer ).  
Fit air filter bracket screw, L.H side. Tighten the second shouldered securing screw of the air filter bracket.



- 54. Fit the radiator/ fans assembly : ( and condenser for a vehicle with air-conditioner option ) :**
- Place the fan motors on the brake cooling ducts, pushing them as far back as possible
  - Offer up the radiator/condensor/ fluid tank assembly, engaged R.H side first ( Ensure that the rubber blocks are in place on the radiator ).  
**IMPORTANT :** When fitting the radiator, push tubes ( 11 ) and ( 12 ) of the air-conditioning system between the radiator and the R.H side-member under the radiator securing bracket.
  - Position the fan motors on the radiator. Tighten the securing screws ( flat and star washers ).
  - Connect the two pipes and the vapour tube to the radiator. Tighten the clips.
  - Position the radiator and tighten the two Nylstop securing nuts ( wide flat washers ).
  - Connect the leads to the thermal-switch for fan control and to the motors.  
Keep the front harness on the crossmember with rubber clips.



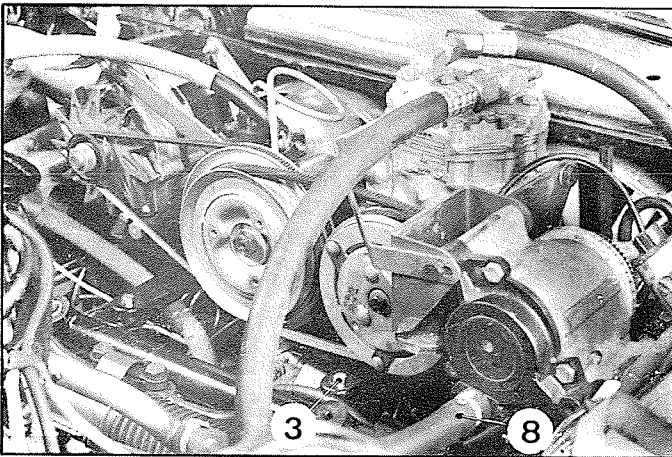
55. Connect the HP output tube of the pressure regulator to the two unions on the L.H sidemember.

56. Fit the plate supporting the components :

Position the plate and fit on the reinforcement crossmember.

Fit in this order :

- the shouldered rubber bush (1),
- the spacer tube (2),
- the shim (washer) (7),
- the rubber bush (6),
- the bolt (3),
- the washer (4),
- the nut (5) .



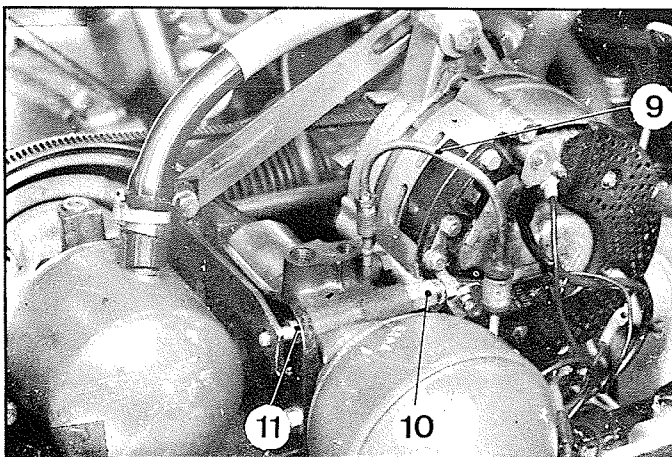
57. Fit the compressor / air pump assembly :

Hand tighten bolts and securing nuts of the compressor gussets (contact washer).

Connect tube (8) to the air pump. Tighten the clip.

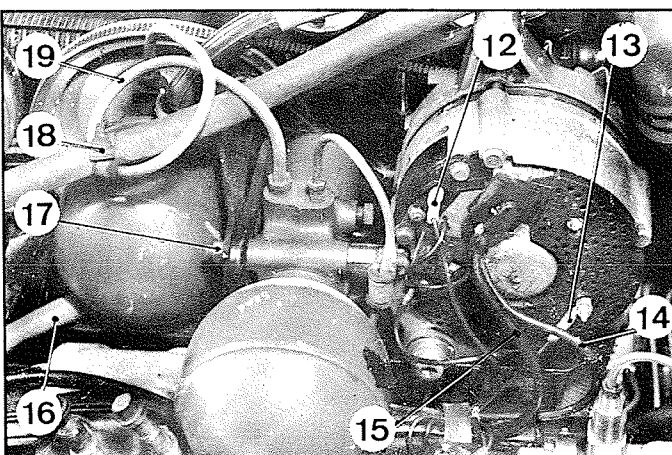
Tension the compressor belt and tighten the compressor gusset securing screws.

*Check tension of alternator and air pump belts.*



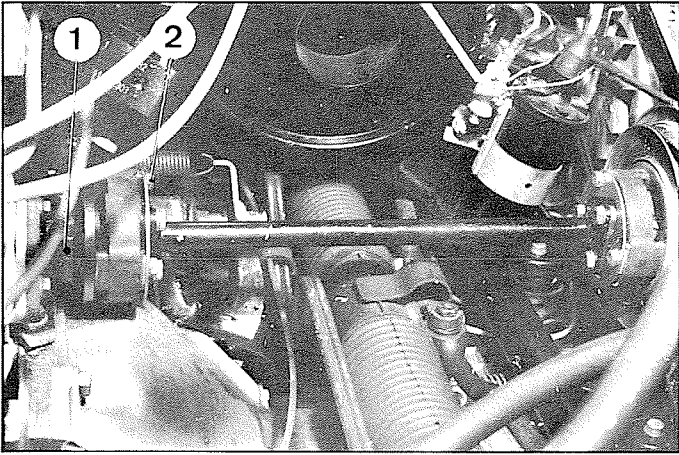
58. Fit the pressure regulator :

- a) Connect return tube (16) to regulator.
- b) Position the regulator. Fit shouldered screw (10) nuts (11) and (17) and the two securing screws (contact washer).
- c) Fit the tube joining the H.P pump to the regulator (19) while running the speedometer cable as indicated in the appropriate figure opposite. Fit the rubber clip (18).
- d) Connect HP output tube (9), to the regulator. Fix the support tube clamp (9) to the regulator (star washer under the nut).



59. Connect leads (12), (13), (14) and (15) to the alternator.





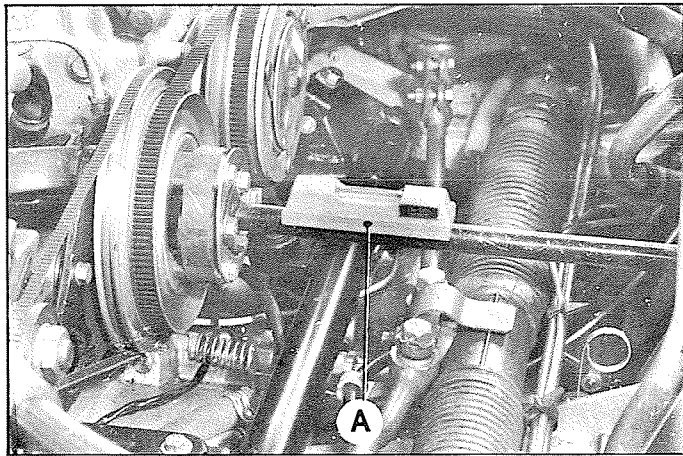
#### 60. Fit the HP pump control shaft :

- a) Ensure that the control shaft drive (1) *slides freely but without play* on the intermediate timing shaft (TOTAL MULTIS grease).
- b) Position the shaft. Tighten securing screws (2) to 10 mAN (1 m.kg - 7.22 ft.lbs) (contact washer).

#### c) Check the control shaft alignment :

- Place a spirit level on one of the cylinder head covers and bring the bubble to zero.
- Then place the spirit-level on the control shaft : *the bubble should lie between zero and 1° (slope of 17.5 mm per metre)*

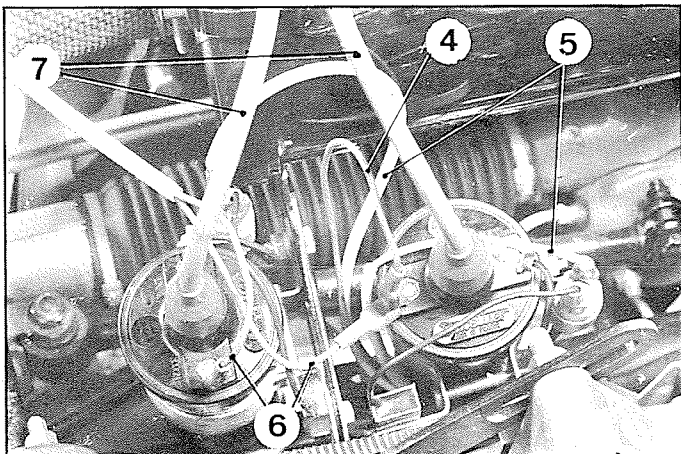
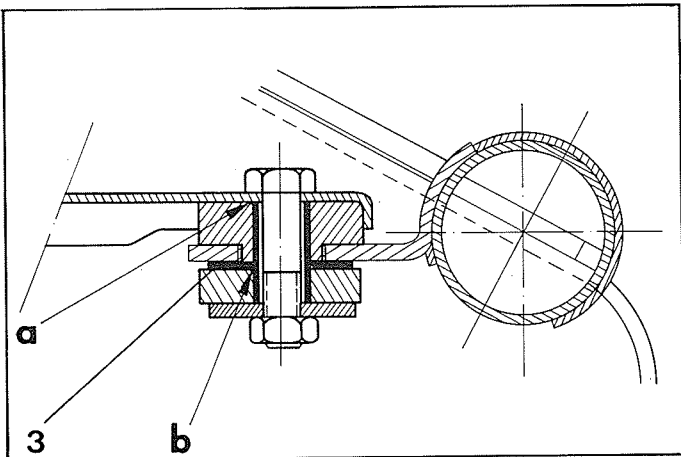
If this is not the case, add adjusting shims as necessary at « a » after removing the one at « b » ( attachment for the plate supporting the components on the reinforcement crossmember ).



#### 61. Connect the petrol feed pipe to the pipe of the carburettors.

#### 62. Fit the air filter/coils/bracket assembly :

- a) Position this assembly and tighten the securing screw on the crossmember ( contact washer ).
- b) Fit the clamps for the air filter and the inlet tube.
- c) Fit the tube linking the filter to the air box.
- d) Fit the support clamp of the rear connecting duct between the gearbox and the heat exchanger.
- e) Connect :
  - the feed (5) and tachometer (4) leads to the coils,
  - the high tension lead (7) to the distributor,
  - the outlet lead (6) to the condenser.

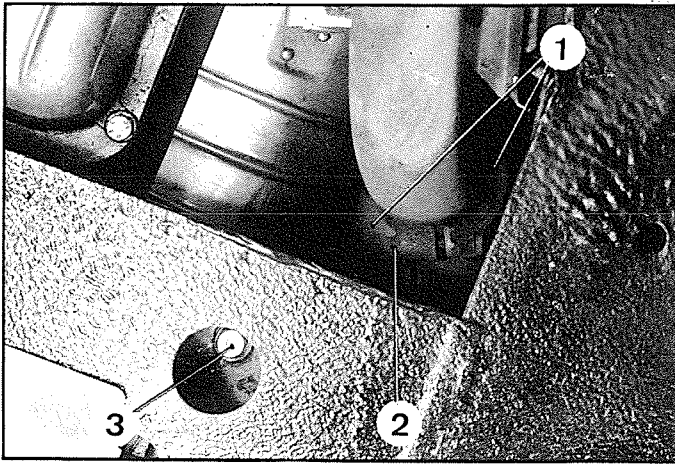


#### 63. Fit front suspension units. Turn until finger-tight.

#### 64. Connect the cables to the battery.

#### 65. Fill the engine with oil.

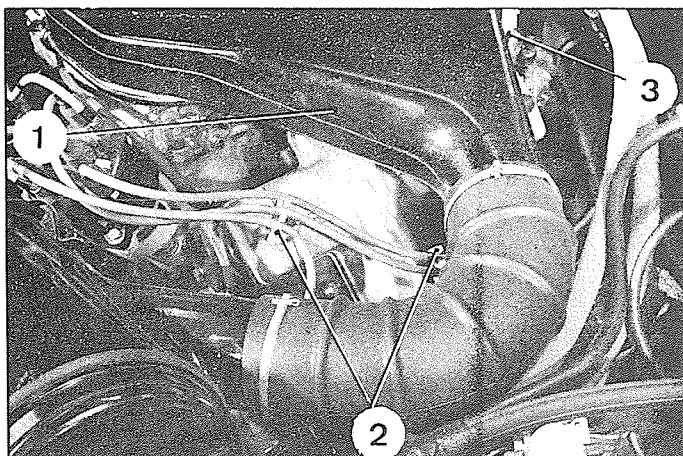
Check the oil-level of the differential housing (TOTAL HIGH PRESSURE SAE 80 oil).



66. Lower the vehicle to the ground.  
Re-pressurise the circuits.  
Re-fill the cooling circuit with heating control open and engine running.
67. Check the gearbox oil-level, engine running ( TOTAL ATF 33 oil ).
68. Position the vehicle on a lift or over a pit.  
Connect the exhaust down pipe to the cylinder head exhaust manifold.  
Tighten the securing nuts ( 2 ) of the clamps ( 1 ) ( contact washer ).  
Check the tightness of the engine mountings securing bolts ( 3 ) and position the rubber plugs.
69. Connect the bonnet fastener connecting cable to the L.H lock and check the operation of the control.
70. Fit the bonnet, taking note of the marks made when removing.
71. Bleed :
  - the steering,
  - the front brakes.
72. Check :
  - the operation of the heating system,
  - the steering straight-ahead position ( road -test ).

## ◆ CHECKING AND ADJUSTMENT OF THE VALVE CLEARANCES

8555



## CHECKING.

REMARK - *This operation should be done separately on each of the two cylinder heads.*

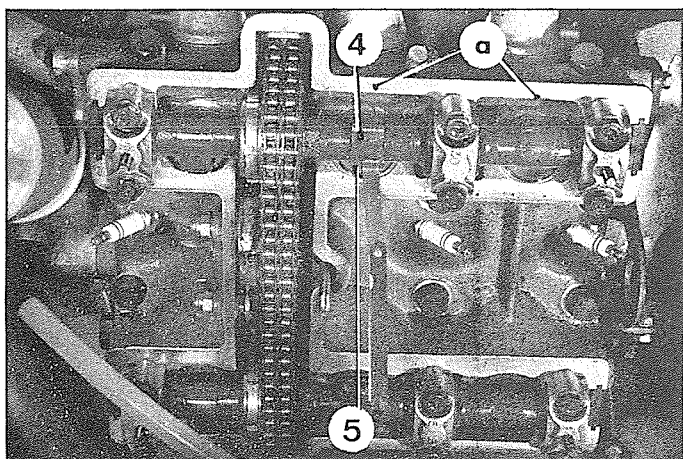
1. *Strip the right cylinder head (cylinders No. 1 - 2 - 3):*

Disengage the assembly of the wire holders and the wires of the spark plugs.  
Disconnect the tube from the vacuum tank.  
Loosen the nuts and remove the cylinder head cover. (nuts held by circlips).

2. *Strip the left cylinder head (cylinders No. 4 - 5 - 6):*

Uncouple the ducts of the air intake and gas recycling system from the cover (1) of the air intake assembly. Remove the cover (1).  
Disengage the assembly of the wire holders (2) and the wires of the spark plugs.  
Remove the oil dipstick (3).  
Loosen the nuts and remove the cylinder head cover (nuts held by circlips).

8541

3. *Measure the clearance of the valves:*

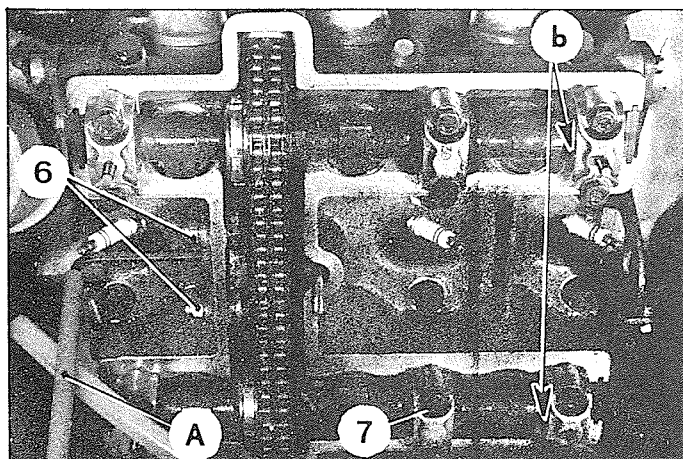
*This clearance should be:*

Intake = 0,30 to 0,35 mm (.012" to .014")

Exhaust = 0,50 to 0,55 mm (.020" to .022")

- Raise one front wheel, shift into 5th speed and rotate the front wheel in order to bring a cam (4) **to its position of maximum clearance** in relation to its corresponding lifter (5).
- Measure this clearance with feeler gauges and, with a suitable crayon or pencil, note it at "a" on the gasket surface of the cylinder head.  
To obtain greater precision, use if need be, brass or steel shim stock 0,03 mm (.001") thick.
- Proceed likewise for the other valves and note the clearances read at each valve.

8543



## ADJUSTMENT

4. *Remove the camshafts:*

Rotate the raised wheel (in the forward direction) in order to turn the motor, and bring the reference marks "b" of the camshafts in line with the reference marks stamped on the bearing caps.

ATTENTION: On the camshafts of the left cylinder head there are two types of reference marks. **Use the shorter ones. Do not uncouple the timing chains.**

Mark (with a touch of paint) the position of the timing pinions in relation to the chain.

Loosen the nuts (6) and slacken the chain (6 mm. Allen wrench and extension A).

Remove the nuts (7) and the bearing caps.

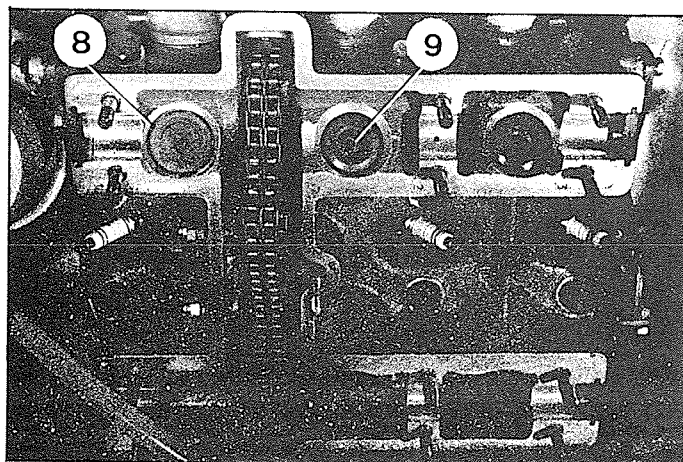
Remove the exhaust camshaft first, then remove the intake camshaft.

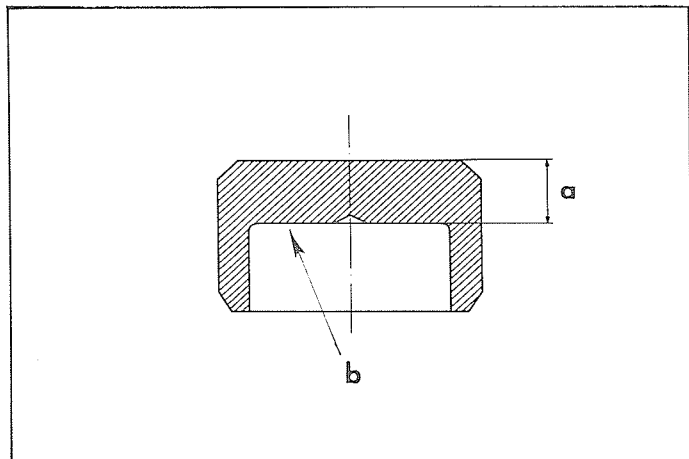
5. *Remove the lifters (8) by hand, with the help of a suction cup. Do not mix them.*

Disengage the adjusting spacers (9).

**Place them with their corresponding lifters.**

8547





6. Be sure that the inside support surface "b" of the adjustment spacer is in good condition and measure the thickness "a" of each spacer.

Choose, from among those sold by the Parts Department, the spacers which will permit obtaining the correct clearance of the valves.

**7. Install the camshafts:**

- Set in place, the spacers (2) and the lifters (1) previously oiled.
- Position the intake camshaft.
- Position the exhaust camshaft while respecting the reference mark (touch of paint) made on disassembly.
- Mount the bearing caps (respect the reference marks stamped on the bearing caps and the cylinder head). Tighten the nuts to 19-20 ft. lbs. (use flat washers).
- Tension the timing chain to 15 ft. lbs. or 22 lbs. if using a tensiometer (6 mm. Allen wrench, extension MR 630-13/5 and tensiometer). Tighten the nuts (3) to 15 ft. lbs.
- Check the position of the reference marks. (See paragraph 4).
- Check the valve clearances:  
Intake : .012" — .014"  
Exhaust: .020" — .022"

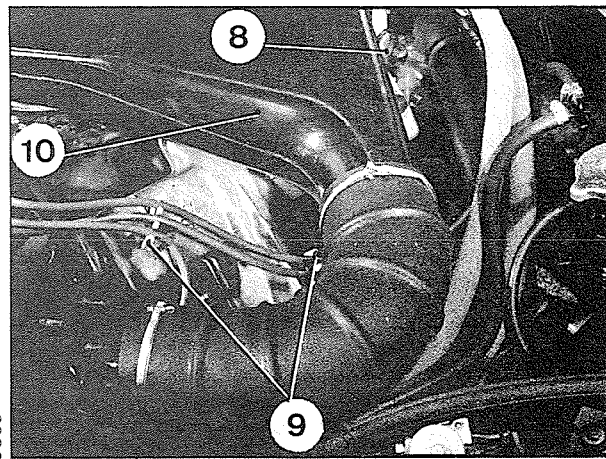
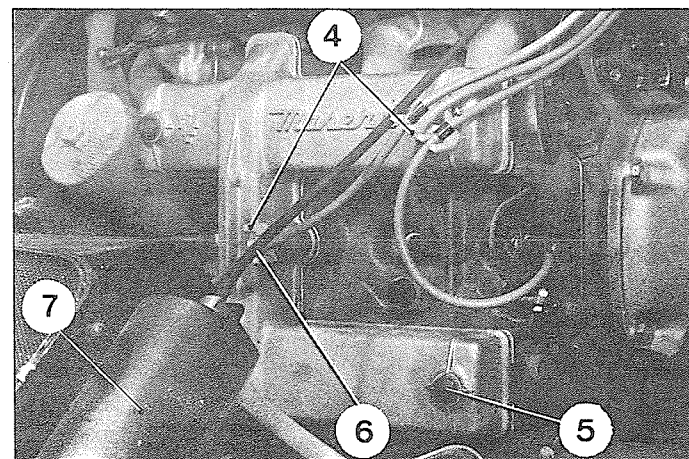
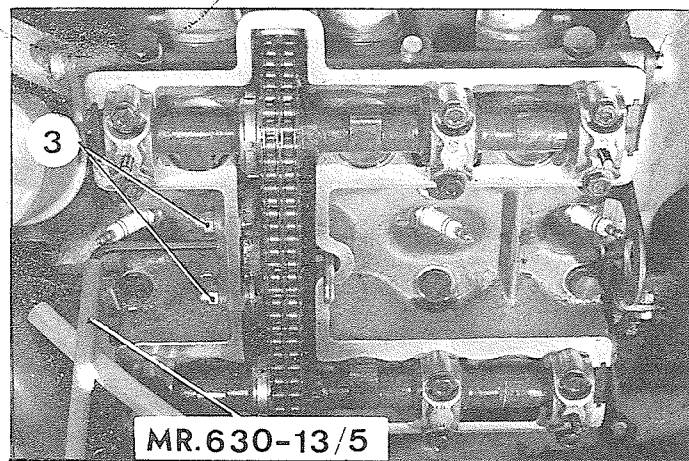
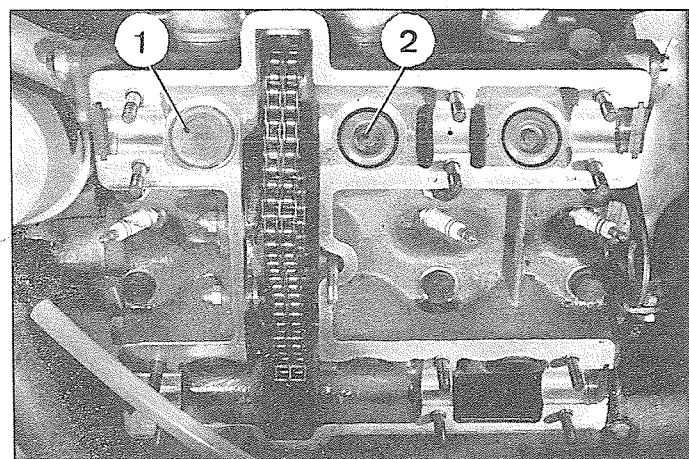
8. Proceed in the same manner for the other cylinder head. (See paragraphs 3 to 7).

**9. Redress the right cylinder head:**

Replace the cylinder head cover, insert the gasket. Tighten the nuts (5) to 7-8½ ft. lbs. Replace the assemblies of the spark plug wires and wire holders (4). Reconnect the tube (6) to the vacuum tank (7).

**10. Redress the left cylinder head:**

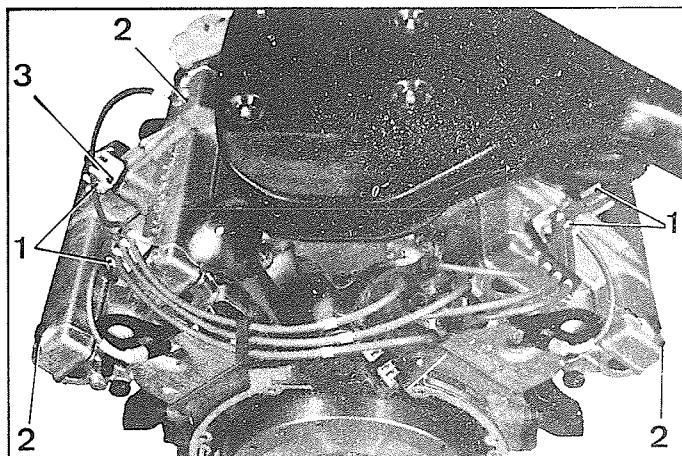
Replace the cylinder head cover; insert the gasket. Tighten the nuts to 7-8½ ft. lbs. Replace the oil dipstick (8) and the assembly (9) of the spark plug wires and the wire holder. Replace the cover (10) of the air intake assembly. **Be careful of the gasket**, and moderately tighten the nuts (flat washer). Connect the flexible ducts of the air intake and gas recycling system to the air intake assembly.





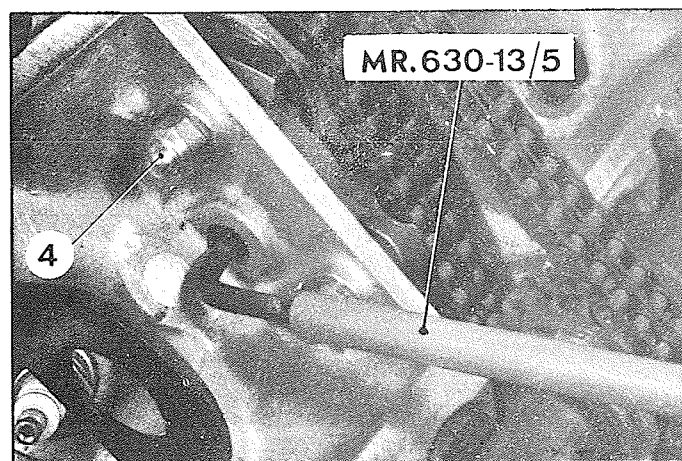
## CHECKS AND ADJUSTMENTS OF THE VALVE TIMING

(Adjustment of the pressure of the chains)



- ◆ 1. Raise and support one side of the car in such a manner as to have one front wheel suspended. Shift into 5th speed.
2. Remove:
  - the nuts (3) and the wire holders (1).
  - the nuts (2) fastening the cylinder head covers.
  - the cylinder head covers.
3. Check the clearance of the valves of cylinders No. 1 and No. 6 (motor cold)
 

Intake :	.012" to .014"
Exhaust:	.020" to .022"

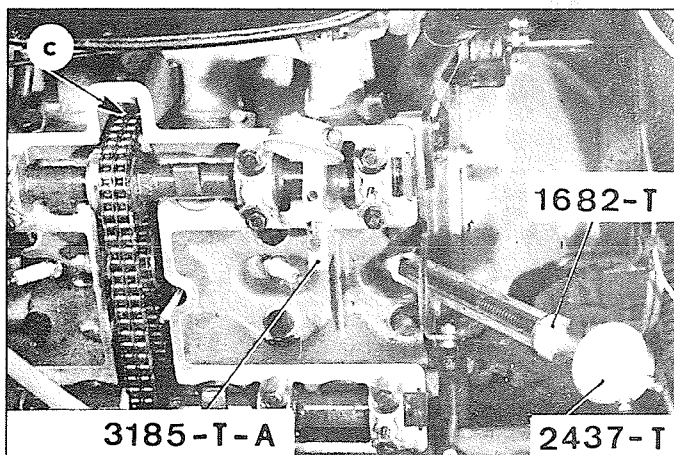
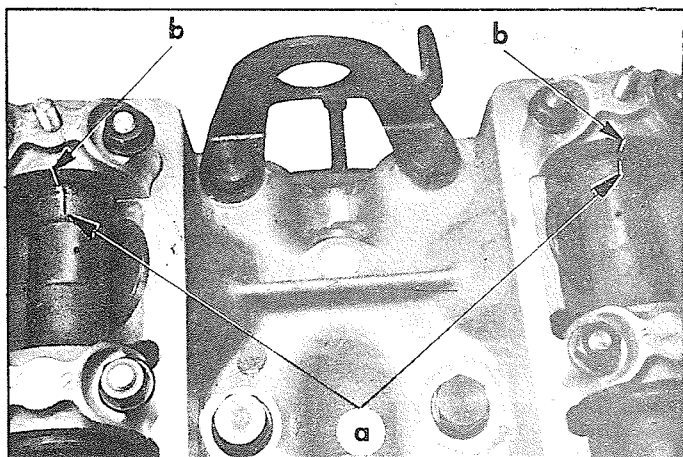


4. Adjust the tension of the timing chains:
  - Loosen the nuts (4).
  - With the help of the wrench MR 630-13/5, tension each chain to a torque of 15 ft. lbs. (or 22 lbs. if using a tensiometer attached to the end of the wrench).
  - Lock the nuts (4).

**VERY IMPORTANT:** *It is imperative that the clearance of the valves and the tension of the chains be correctly adjusted. If not, the operation will be faulty.*

- ◆ 5. Check the adjustment of the valve timing:
  - a) Remove the spark plug of cylinder No. 1 and mount in its place the support 1682-T fitted with the dial indicator 2437-T.
  - b) Turn the raised wheel (in the forward direction) in order to bring piston No. 1 to TDC, the valves being in "balance" (exhaust valve at the end of exhaust, intake valve at the beginning of intake). At this moment the reference marks "a" of the camshafts should be found in line with the stationary reference marks "b" of the bearing caps (for a new motor) and the reference mark "o" stamped on the intermediate timing shaft is visible through the hole "c" of each of the two cylinder heads.

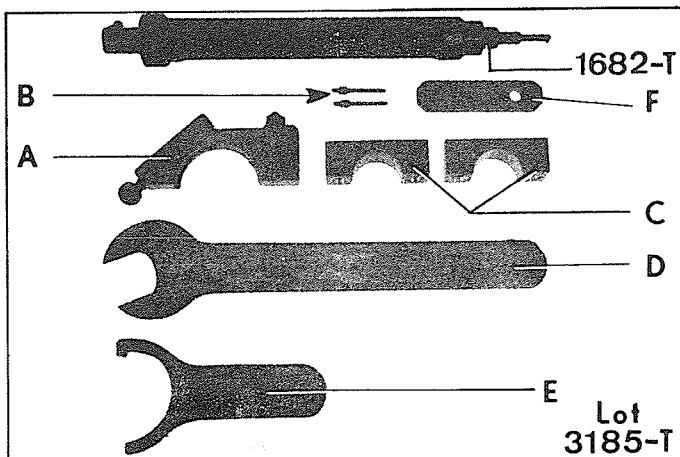
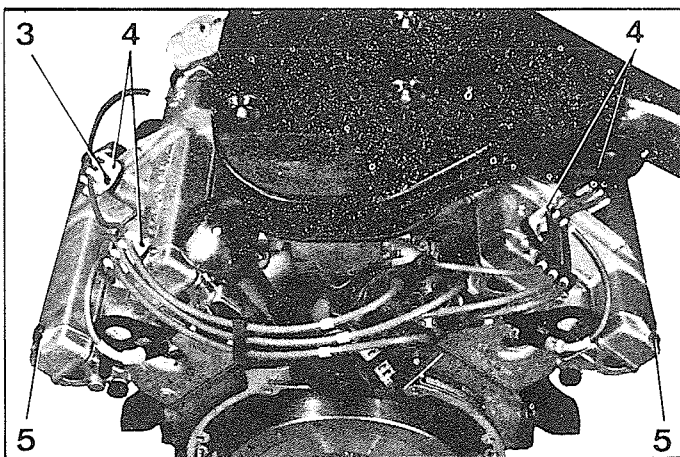
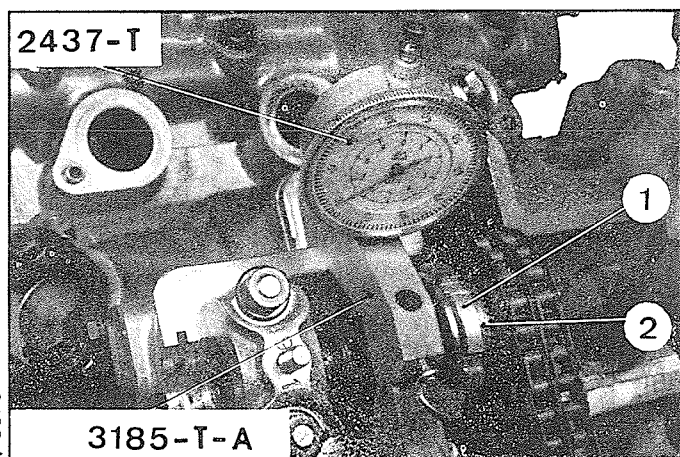
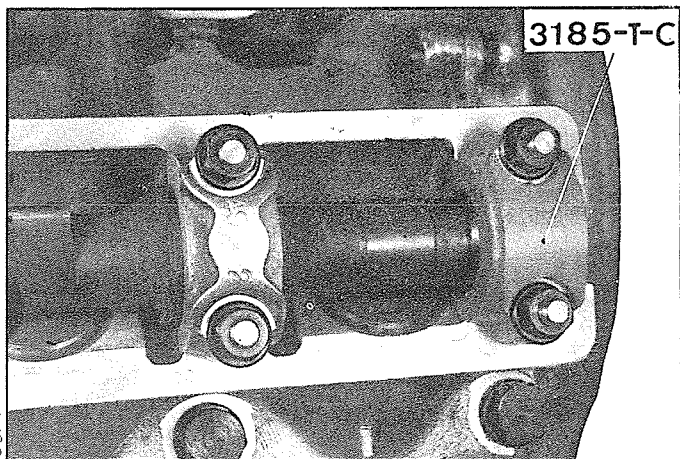
If not, it is necessary to proceed with the calibration of the, or those, camshafts which are not correctly adjusted.



**ATTENTION:** On the camshafts of the left cylinder head there are two reference marks. The longer one corresponds to the TDC (balance) of piston No. 1. The shorter one corresponds to the TDC (balance) of piston No. 6.

To calibrate the camshafts of the left cylinder head, place piston No. 6 at TDC (balance) which should be 90° (flywheel) after TDC of the piston No. 1.

**REMARK:** For the TDC position of piston No. 6 there is no reference mark "o" on the intermediate timing shaft.



◆ 6. *Adjust the intake camshafts (if necessary):*

a) The motor being always in the position described in paragraph 5, lock the camshaft by replacing one of its bearing caps by a false cap, tool No. 3185-T-C.

b) Unlock the ring nut (1) and disengage the washer (2) from its notches.

c) Loosen the false cap 3185-T-C. Set in position (see figure) the support 3185-T-A together with the dial indicator 2437-T (equipped with the extension finger 3185-T.B.). Hold the support with the help of the plate 3185-T.F.

The extension finger of the dial indicator should rest on the lifter of the intake valve of cylinder No.1 (right cylinder head) or No.6 (left cylinder head).

The camshaft, no longer being solid with its drive train, the intake valve is returned to its seat. Bring the "zero" of the movable dial of the indicator in line with the large needle.

With the help of the wrench 3185-T.D., turn the camshaft by small fractions of a turn to obtain: *a forcing down of the lifter equal to 1 mm (.040")*.

d) Choose a position of the washer (2) so that its teeth engage all the way into those of the pinion. Tighten the ring nut (1).

e) Lift the extension finger of the dial indicator and turn the motor approximately ¼ turn opposite to its normal running direction.

Check the timing (see paragraph 5).

f) Remove:

- the plate 3185-T.F.
- the support 3185-T.A.
- the support 1682-T
- the false cap 3185-T.C.

Mount the camshaft bearing and the spark plug of cylinder No.1 (right cylinder head) or No.6 (left cylinder head).

7. *Adjust the exhaust camshaft (if necessary):*

Proceed in the same manner as for the intake camshaft, so as to obtain, on the exhaust valve of cylinder No.1 (right cylinder head), or No.6 (left cylinder head): *a forcing down of the lifter equal to 1,3 mm (.050")*.

8. Replace the cylinder head covers. Tighten the nuts (5) mounting the cylinder head covers. Replace the wire holders (4). Tighten the screws (3). Reposition and connect the spark plug wires.

9. Set the car on the ground. Place the shift lever in "neutral" position.

NOTE: The special tools, necessary for the checking and adjustment of the valve timing, are sold as a kit, under the number 3185-T. The kit comprises:

- the support for the dial indicator 1682-T
- the support for the dial indicator
- two extension fingers for the dial indicator
- two false bearing caps
- the wrench (for the camshafts)
- the wrench (for the camshaft nut)
- the holding plate

A  
B  
C  
D  
E  
F

# CARBURETION

OPERATION No. S. 142-00: *Characteristics and particulars of the carburetors*

Op. S. 142-00

1

## I. CHARACTERISTICS OF THE CARBURETORS

1. **REFERENCE:** 3 Carburetors..... WEBER 42 - DCNF 2

### 2. SPECIFICATIONS:

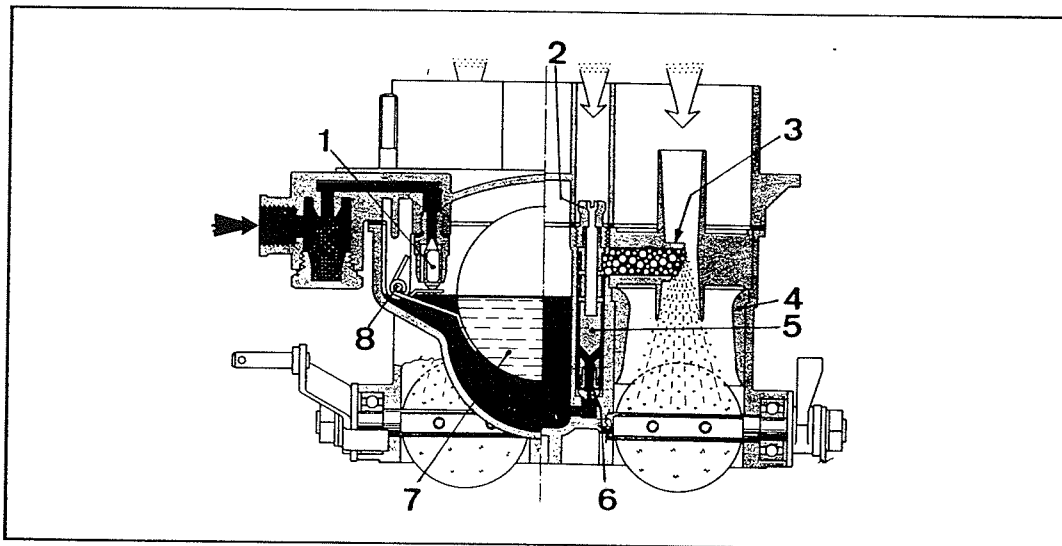
Designation	Size (mm)	Number Required
Venturi.....	32	2
Nozzle.....	3,5	2
Main Jet.....	1,30	2
Emulsion Tube.....	F .25	2
Air Correction Jet.....	1,80	2
Idling Jet.....	0,50	2
Accelerator Pump Jet.....	0,40	1
Choke Jet.....	F .7/80	2
Needle and Seat.....	1,75	1
Accelerator Pump Check Valve.....	1	1

Please turn

## II. FUNCTIONING SCHEMATICS

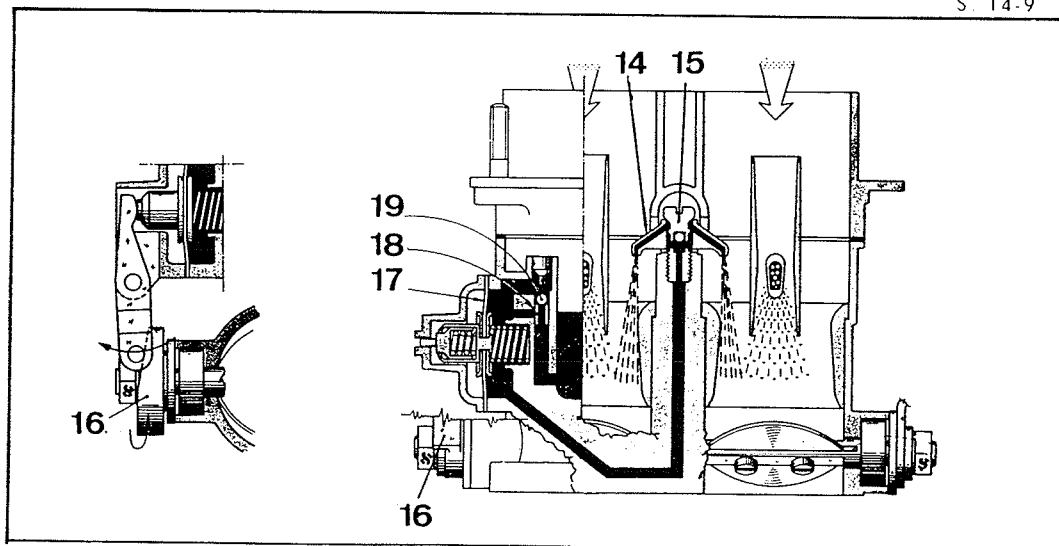
### 1 - Normal running circuit

S. 14-8



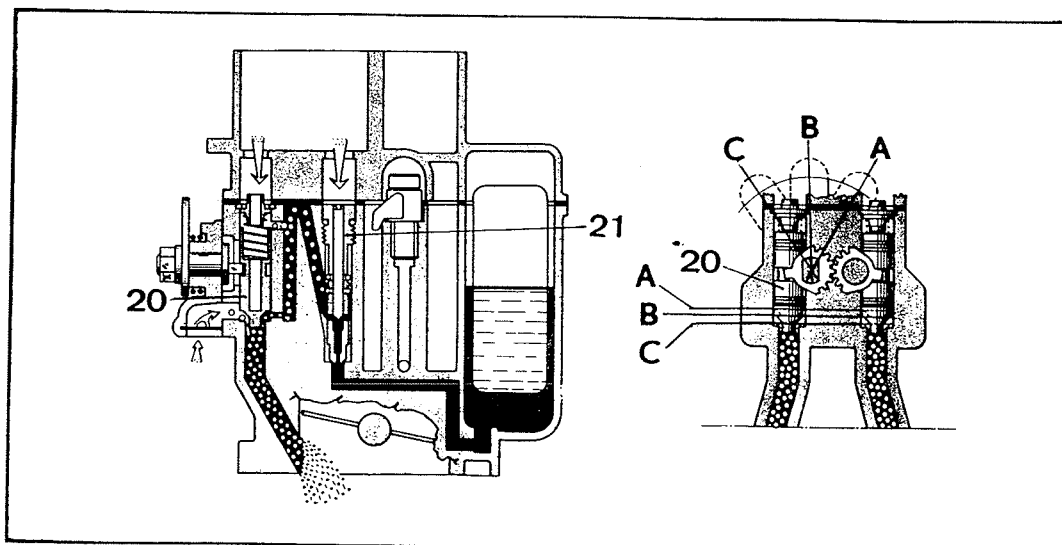
### 2 - Accelerator pump circuit

S. 14-9



### 3 - Choke circuit

S. 14-10

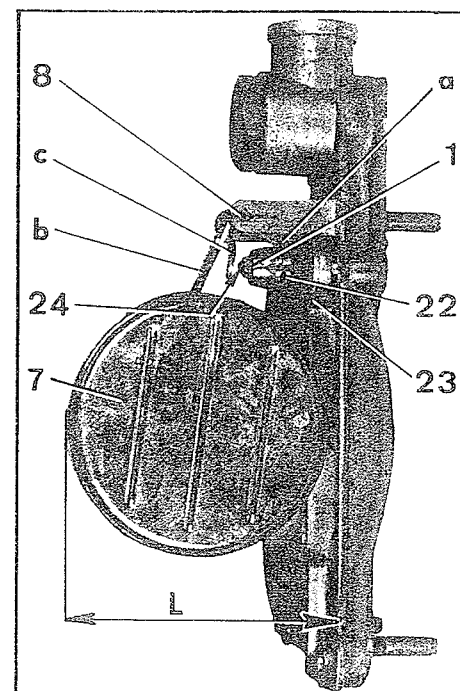
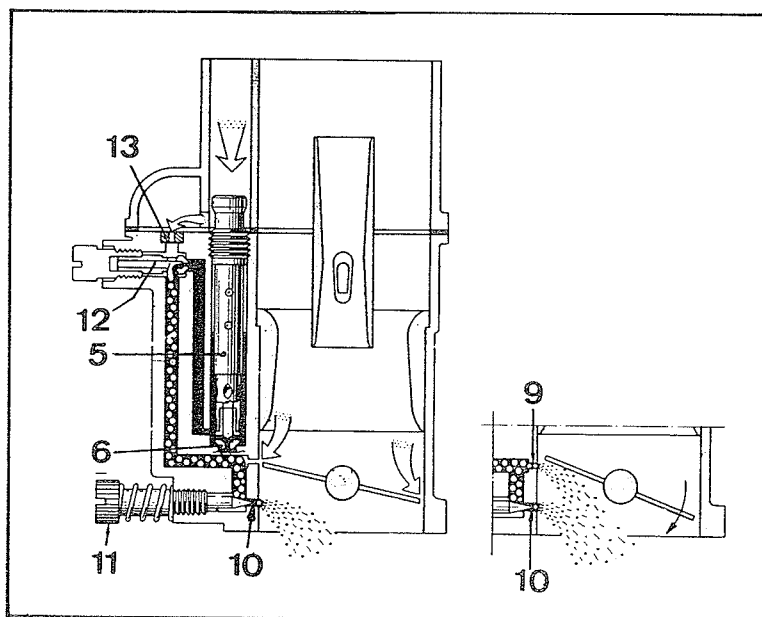




8385

## 4 - Idling circuit

S. 14-11



## 5 - Legend of the schematics of operation:

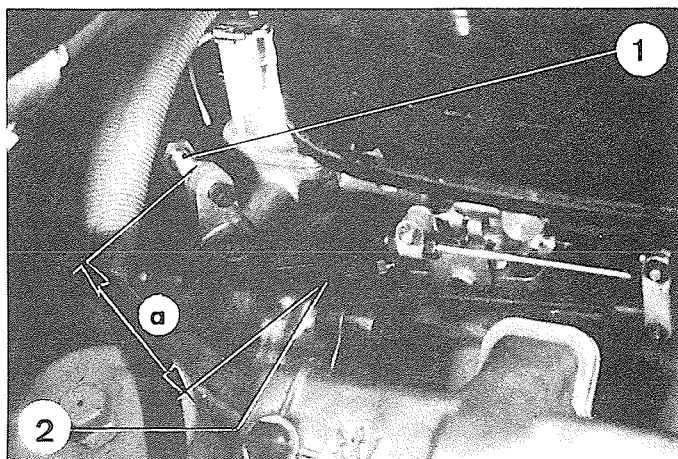
- 1: Needle and seat - 2: Air correction jet - 3: Nozzle - 4: Venturi - 5: Emulsion tube - 6: Main jet - 7: Float - 8: Float pin - 9: Idling progression port - 10: Idling port - 11: Mixture screw - 12: Idling jet - 13: Idling air jet - 14: Accelerator pump jet (injector) - 15: Accelerator pump check valve - 16: Cam of the accelerator control - 17: Accelerator pump diaphragm - 18: Passage for feeding and return of excess fuel from the accelerator pump - 19: Suction valve of the accelerator pump - 20: Choke piston chamber - 21: Choke jet.

- Position A of the choke: corresponds to the starting of a cold motor.
- Position B of the choke: corresponds to a luke warm motor.
- Position C of the choke: corresponds to a hot motor. The effect of the choke is nullified.

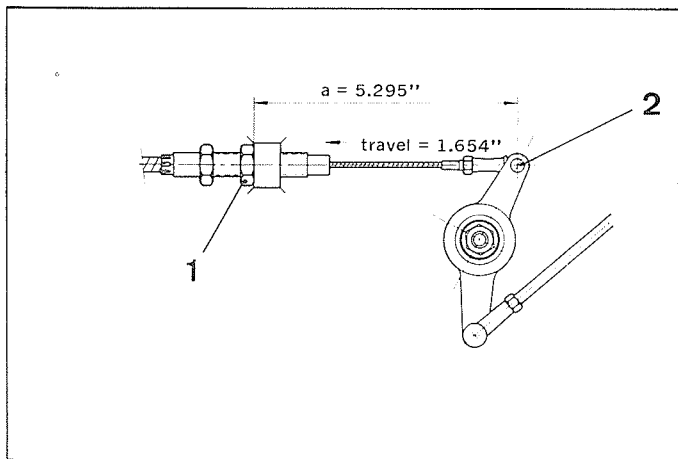
## 6 - Adjustment of the float level:

- a) Be sure that the seat (22) of the needle is correctly threaded into its recess with its gasket (23).
  - b) Hold the cover of the carburetor vertically, the weight of the float (7) should drop the ball (24) mounted on the spring inside the needle (1).
  - c) Verify that the float moves freely on its pin (8).
  - d) Adjust the level of the float (7).
- **At the closed position of the needle (1):** Incline the cover in such a manner that the tongue "c" of the float (7) comes in *slight contact* with the ball (24). Measure the distance "L".
- The dimension (L) is measured between the plane of the cover *without the gasket* and the lowest rim of the float (7). In this instance, (L) should be 48 mm  $\pm$  0,25 (1.88" to 1.99"). If not, slightly bend the arm "b" being sure that the tongue "c" remains perpendicular to the axis of the needle (1) and that its surface presents no roughness which can influence the movement of the needle.
- **At the fully opened position of the needle (1):** Incline the cover so that the tongue "a" comes to rest against the seat (22) of the needle. Measure the distance "L". In this instance "L" should be 56,5 mm (2.224"). If not, slightly bend the tongue "a".

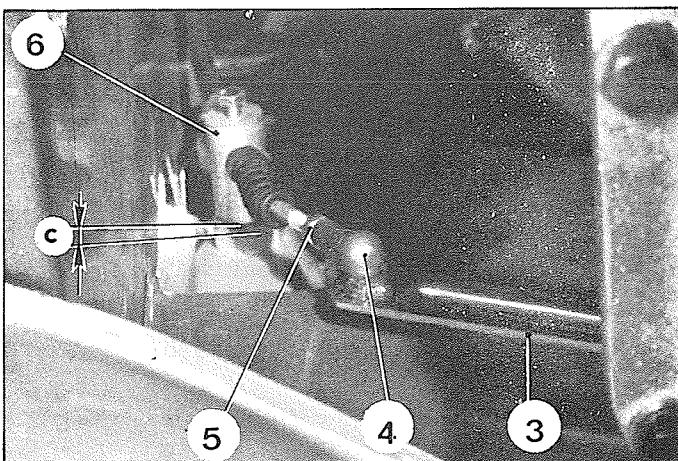
8619



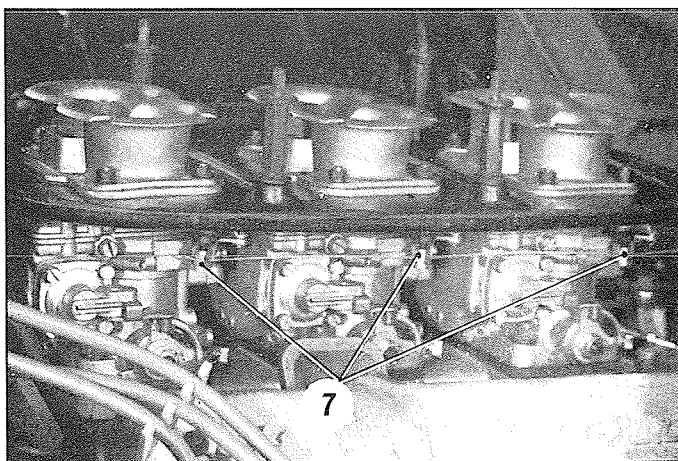
S. 14-7



8565



8560



## INSPECTION AND ADJUSTMENT OF THE LINKAGE

### 1. Adjustment of the control cable:

- Verify that:  $a = 134,5 \text{ mm (5.295")}$   
(distance between the axis of the ball joint (2) of the control rod, and the pressure face of the lock-nut (1), locking the cable housing).  
If not, work the lock-nut (1).
- Verify that:  $c = 1 \text{ to } 2 \text{ mm (.040" - .080")}$   
(distance between the stop of the cable housing (6) and the nut welded onto the chassis).  
If not, disengage the housing from the stop (6) and screw the stop in or out.

### 2. Adjustment of the accelerator pedal:

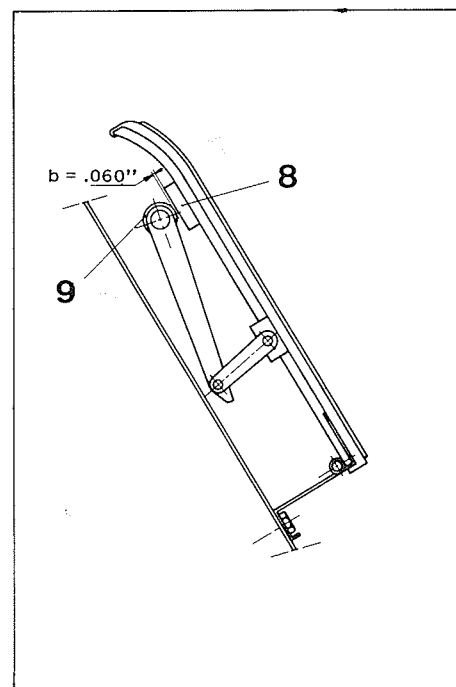
- Set the throttle valve butterflies to "full open" position.
- Verify that:  $b = 1,5 \text{ mm (.060")}$   
(distance between the thrust plate (8) on the accelerator pedal and the support (9) for the return lever shaft (3)).  
If not:
  - disengage the ferrule (4) of the ball and socket joint by removing the retaining circlip.
  - unlock the counter-nut (5) and screw the ferrule (4) in or out in order to obtain the dimension "b".
 Engage the ferrule (4) on its ball joint and replace the retaining circlip. Tighten the counter-nut (5).

### 3. Adjustment of the choke control:

The choke cable being pushed all the way in, be sure that:

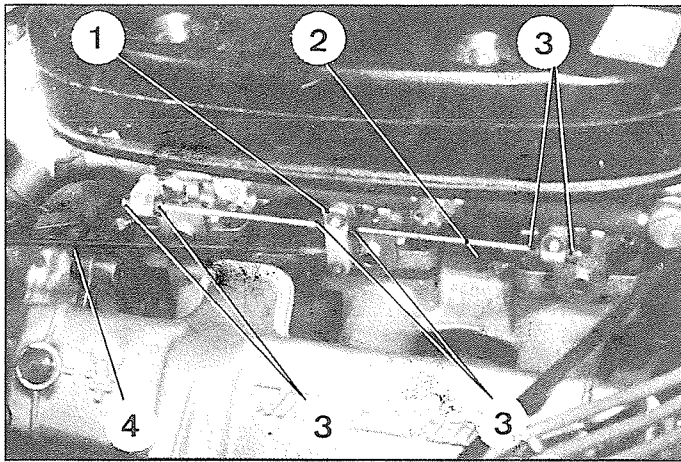
- The three choke control levers (7) are pushed all the way toward the front (levers "bottomed" against the carburetor bodies).
- The clearance between the knob of the choke cable and the dashboard is:  
 $1 \text{ to } 2 \text{ mm (.040" to .080")}$

S. 14-6



## INSPECTION AND ADJUSTMENT OF THE CARBURETORS

8619

4. *Adjustment of the connector rod (2):*

*The adjustment of this connector rod is of great importance. It determines the synchronization of the three carburetors.*

a) Adjust an equal opening of the throttle valve butterflies on each of the carburetors. To do this:

- Disconnect the control rod (4) from the center carburetor.
- Loosen the six nuts (3) (on both sides of the throttle lever (5)).
- Loosen the three stop screws (6).
- Moderately move the lever (5) in order to close the throttle valves.

*Hold the lever (5) in this position and bring the stop screw (6) in contact with the lever (5). From this position turn the screw in one turn exactly.*

Proceed in the same manner on the other two carburetors.

b) Adjust the connector rod (2):

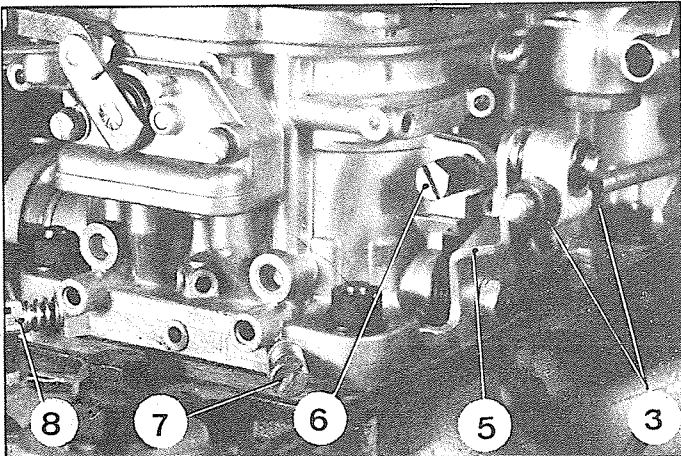
The connector rod (2) being fully free, with no binding, tighten the nuts (3) of the center carburetor.

- Slightly pull the rod (2) to the rear (closed position of the throttle valves).
- By hand, bring the nuts (3) up to both sides of the throttle lever (5) of the rear carburetor in such a manner that the **stop screw (6) rests in contact with the lever (5)**. Tighten the two nuts (3) by turning them at identical angular values and **without pulling or straining the throttle levers (5)**. Proceed in the same manner for the adjustment of the front carburetor.

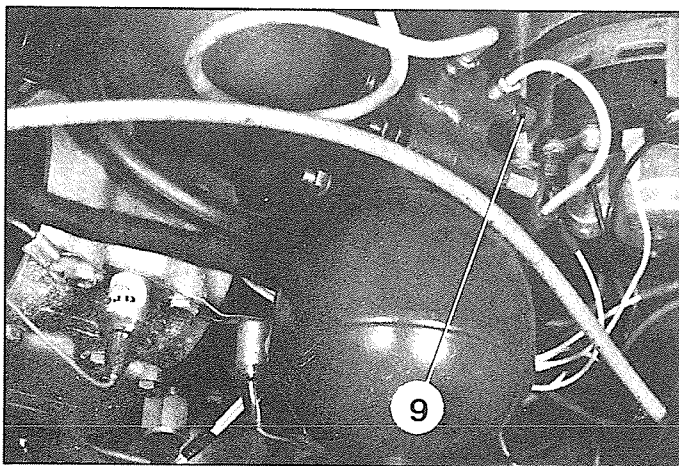
*With a feeler gauge (for example) check that the levers (5) are bearing against the stop screws (6).* If not, repeat the respective adjustment of the nuts (3).

Reconnect the control rod (2).

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8508

5. *Adjustment of the idling:*

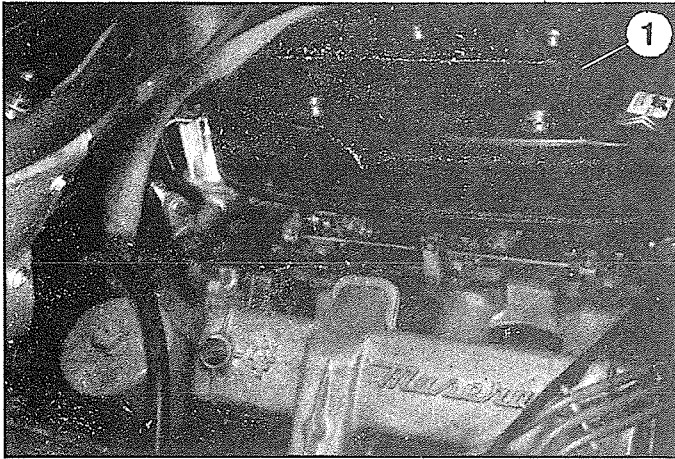
This adjustment can only be done on a hot motor in good running order.

a) **Pre-adjustment:** the connector rod (2) being correctly adjusted, loosen the stop screw (6) of the front and rear carburetors: adjust the stop screw of the center carburetor **separately**.

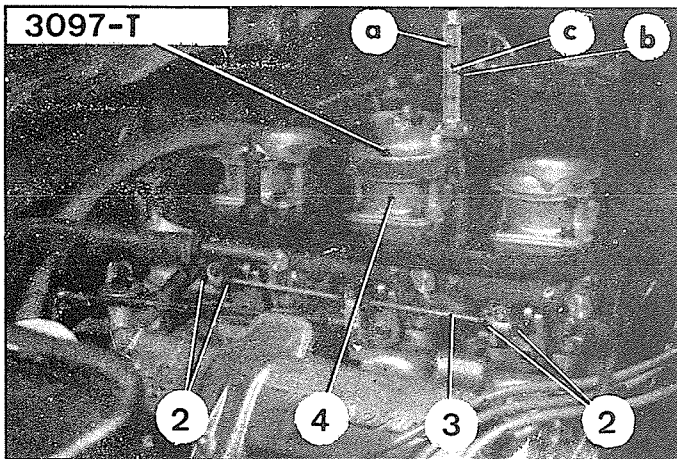
**ATTENTION:** On each carburetor, turn the idle mixture screws (7) and (8) all the way in **without force**, then turn them out **1½ turns**.

- Open the bleed screw (9) of the pressure regulator and be sure that the electrical units are not affected.

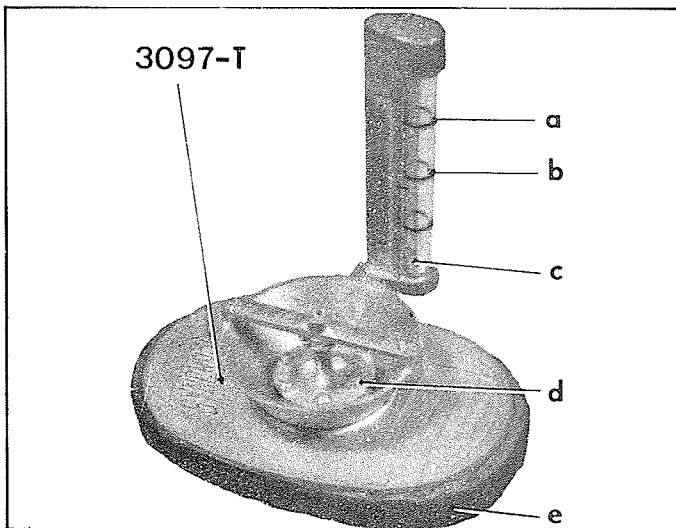
8618



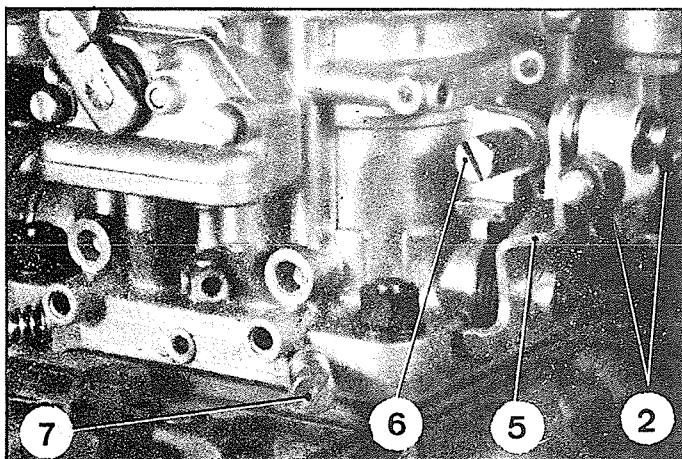
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9478



8479



b) **Adjustment:** Connect a tachometer to one of the coils.

- Remove the cover (1) of the air intake tank (on top of the carburetors).
- The motor turning at idle, work the stop screw of the *center carburetor* in order to bring the speed of the motor to 900/1000 R.P.M.

c) **Check and, if necessary, retouch the adjustment of the carburetors, using the tool Synchro-Test 3097-T.** Adjust the *Synchro-Test 3097-T* to the air flow of the *center carburetor*.

To do this:

Place the *Synchro-Test* on top of the *center carburetor* so that the shoe "E" correctly covers the rim of the carburetor air horns (4).

Exercise a slight pressure on the SYNCHRO-TEST in order to seal the shoe "E" on the air horns (4) and turn the center part "d" just until the ballast "c" rises inside the glass tube and stabilizes between the two upper reference marks "a" and "b". Make no further adjustments on the SYNCHRO-TEST.

Check the air flow of the front and rear carburetors. The ballast "c" should stabilize itself between the two upper reference marks "a" and "b". If not, eventually retouch the adjustment of the connector rod (3) by working on the nuts (2) of the carburetor requiring re-adjustment, just to the point where this condition must be obtained.

NOTE: During the use of the SYNCHRO-TEST, be sure the speed of the motor does not vary. Replace the cover (1) of the air intake tank.

d) **Adjustment of the mixture screw:**

IMPORTANT:

*This adjustment can only be done on a motor warm and "decarboned," equipped with spark plugs in perfect condition.*

Work on the mixture screw (7) of cylinder No.1 so as to obtain the maximum speed of the motor while observing the tachometer.

If necessary, work the stop-screw (6) of the *center carburetor* to bring the speed of the motor to 900/1000 R.P.M.

Proceed likewise for adjusting the mixture screw of cylinder No. 2, 3, 4, 5 and 6.

Finally, work the stop screw (6) of the *center carburetor* to adjust the idling speed of the motor between *900 and 1000 R.P.M.*

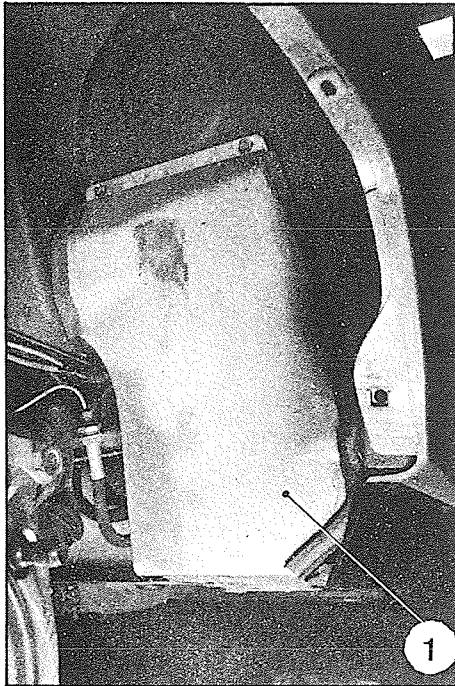
- Bring the stop screws (6) of the front and rear carburetors in contact with the levers (5) (without varying the idling speed).

Stop the motor. Close the bleed screw of the pressure regulator.

Remove the tachometer.



8469

**I - CHARACTERISTICS OF THE FUEL PUMP**

Electric fuel pump:

Reference: BENDIX 476 087 - 12 V.

Output: 21 gal/hr. mini for a current equal to or higher than 12 volts.

Regulated pressures at zero delivery to the carburetors:

- 2.1 p.s.i. max., under 12 volts
- 2.18 p.s.i. max., under 13 volts
- 2.25 p.s.i. max., under 14 volts
- 2.32 p.s.i. max., under 15 volts

Consumption. . . . . 3 amps. max.

Replacement of the fuel filter:

*- every 18,000 miles***II - PARTICULARS**

Tightening torque of the couplings (3) for the suction and delivery hoses . . . 4 ft. lbs. The delivery hose (5) of the pump should pass behind the flexible hose (6) of the right rear brake and must be clamped onto the feed hose of the right rear brake by means of the collar (2).

**III - INSPECTION OF THE REGULATED PRESSURE**

Connect a pressure gauge A, graduated in ounces to approximately 3 to 5 p.s.i. by tapping into the feed line of and before the three carburetors. Turn the ignition on but do not start the motor. Measure the pressure regulated by the fuel pump *with no fuel flow*. (The different values are indicated in "Characteristics of the fuel pump").

**IV - REPLACEMENT OF THE FUEL FILTER**

REMOVAL.

1. Remove:

- the right rear wheel.
- the protection pan (1).

2. With a wrench, turn the lower cover (4) of the pump so as to unlock it.

3. Remove the cover (4) with the filter (7).

REMARK: Clean the magnetized pastille (8) in order to remove all metallic particles.

REPLACEMENT.

4. Center the magnetized pastille (8) in the cover (4).

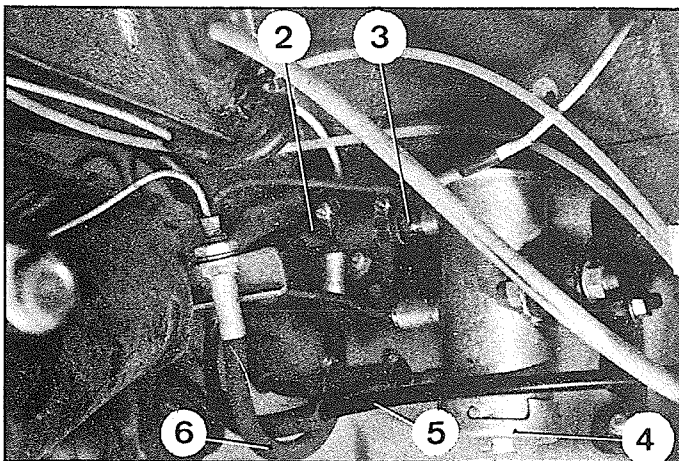
Center the filter (7) in the cover (4).

5. Lock the cover (4) on the pump with the help of a wrench.

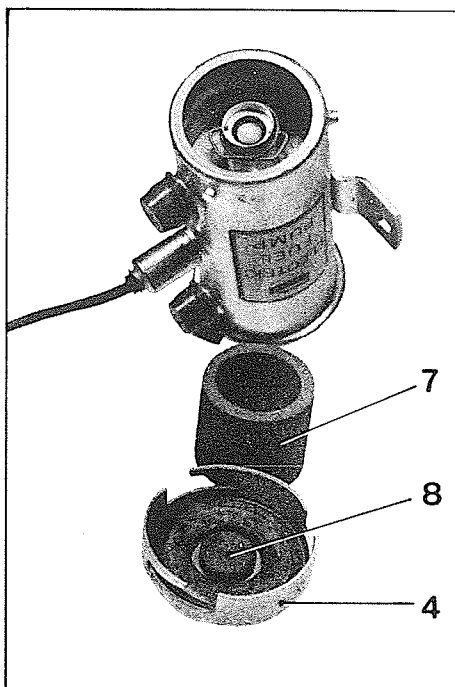
6. Set in place:

- the protection pan (1).
- the right rear wheel.

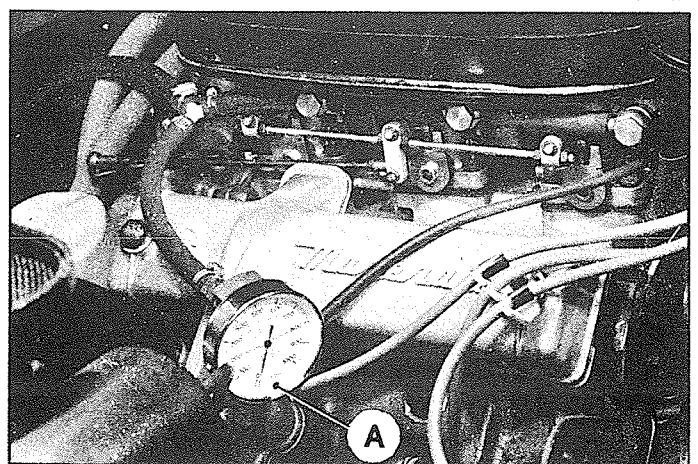
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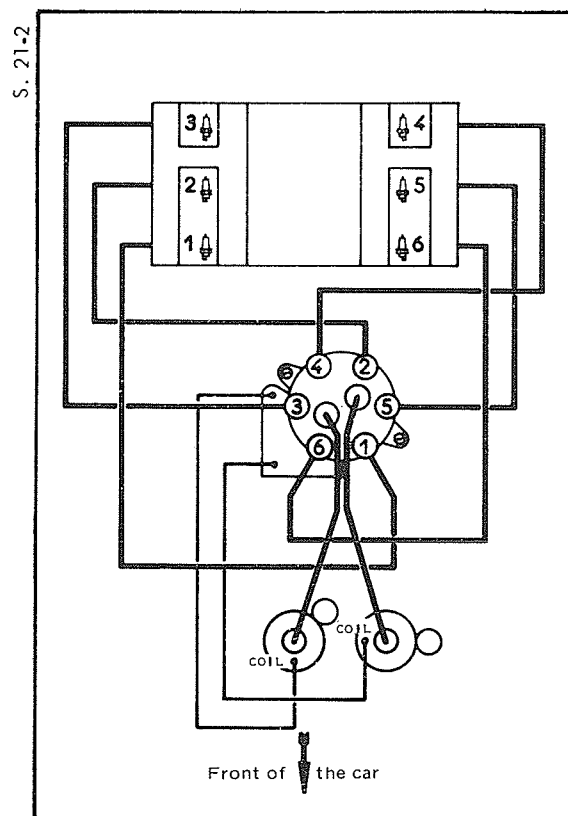


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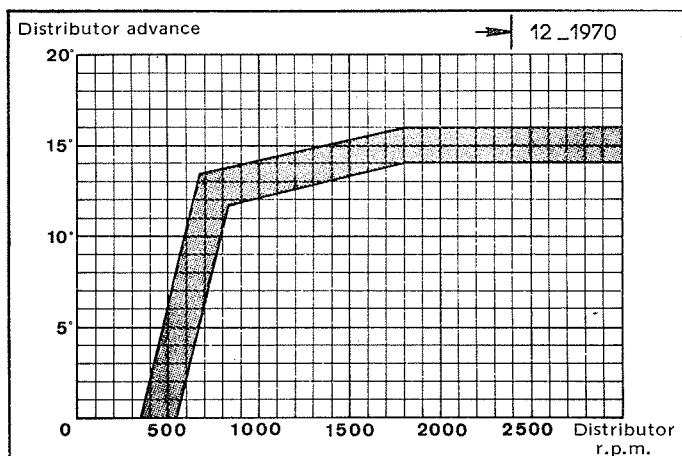


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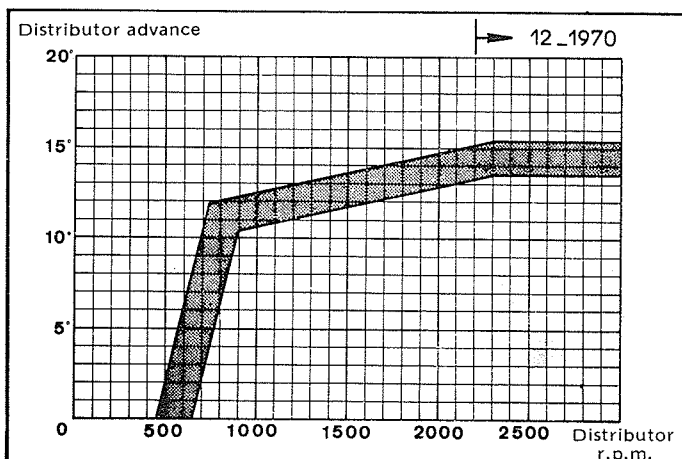




Cars produced until 12/1970



Cars produced until 12/1970



## I - CHARACTERISTICS

### 1. Distributor:

Type: Double cassette (1 set of breaker points in each cassette)

Brand: ..... SEV-MARCHAL

Reference: ..... 08-1, 09-1, 10-1, etc.

Firing order: ..... 1-6-2-5-3-4

Direction of rotation:

(viewed from the driver's seat) ... clockwise

Centrifugal advance:

Reference of the curve: ..... E 931 4127

Breaker point gap: ..... .014" to .018"

Angle of cam opening: .....  $32^\circ \pm 4^\circ$

Angle of cam closing: .....  $88^\circ \pm 4^\circ$

Dwell ratio: .....  $73\% \pm 3\%$

Dynamic timing: on the motor flywheel

@ 2000 motor R.P.M. ....  $27^\circ$  BTDC

Angular spacing between two consecutive openings of the contact points (within  $1^\circ$ ):

-  $45^\circ$  between ignition of cylinders 1 and 6

-  $75^\circ$  between ignition of cylinders 6 and 2

-  $45^\circ$  between ignition of cylinders 2 and 5

-  $75^\circ$  between ignition of cylinders 5 and 3

-  $45^\circ$  between ignition of cylinders 3 and 4

-  $75^\circ$  between ignition of cylinders 4 and 1

Resistance of the rotor blades:  $5000\Omega \pm 20\%$

### 2. Spark plugs:

BOSCH. .... W 200 T 30

CHAMPION. .... N 6Y

AC. .... 42 XLS

LODGE. .... GOLDEN H.L.

Gap of the electrodes: ..... .024" to .028"

Tightening torque (Cold) ... 14-18 ft. lbs.

### 3. Coils:

Two coils with external resistors of the "BALCO" type:

DUCELLIER. .... 2777B

"BALCO" resistance. ....  $0.9\Omega$  (@  $68^\circ$  F)

Primary resistance. ....  $1.3\Omega$  (@  $68^\circ$  F)

Secondary resistance. ....  $5900\Omega \pm 10\%$  ( $68^\circ$  F)

or SEV-MARCHAL. .... E 44 910 312

"BALCO" resistance. .... 1.1 to  $1.2\Omega$  ( $68^\circ$  F)

Primary resistance. ....  $1.5\Omega$  min ( $68^\circ$  F)

Secondary resistance. ....  $6050\Omega \pm 10\%$  ( $68^\circ$  F)