

# WORKSHOP MANUAL

## 404



PEUGEOT



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## 404



1st edition

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*The various units are listed and described in the same order as in all our technical documentation.*



# MILLIMETERS INTO INCHES CONVERSION TABLE

1 millimetre (mm) = 0.039 370 inch (")

Millim.	Inches	Millim.	Inches	Millim.	Inches	Millim.	Inches	Millim.	Inches
1/100	.000394	51/100	.020079	1	.039370	51	2.007870	105	4.133848
2	.000787	52	.020472	2	.078740	52	2.047240	110	1.330700
3	.001181	53	.020866	3	.118110	53	2.086610	115	4.527550
4	.001575	54	.021260	4	.157480	54	2.125980	120	4.724400
5	.001969	55	.021654	5	.196850	55	2.165350	125	4.921250
6	.002362	56	.022047	6	.236220	56	2.204720	130	5.118100
7	.002756	57	.022441	7	.275590	57	2.244090	135	5.314950
8	.003150	58	.022835	8	.314960	58	2.283460	140	5.511800
9	.003543	59	.023228	9	.354330	59	2.322830	145	5.708650
10	.003937	60	.023622	10	.393700	60	2.362200	150	5.905500
11/100	.004331	61/100	.024016	11	.433070	61	2.401570	155	6.102350
12	.004724	62	.024409	12	.472440	62	2.440940	160	6.299200
13	.005118	63	.024803	13	.511810	63	2.480310	165	6.496050
14	.005512	64	.025197	14	.551180	64	2.519680	170	6.692900
15	.005906	65	.025591	15	.590550	65	2.559050	175	6.889750
16	.006299	66	.025984	16	.629920	66	2.598420	180	7.086600
17	.006693	67	.026378	17	.669290	67	2.637790	185	7.283450
18	.007087	68	.026772	18	.708660	68	2.677160	190	7.480300
19	.007480	69	.027165	19	.748030	69	2.716530	195	7.677150
20	.007874	70	.027559	20	.787400	70	2.755900	200	7.874000
21/100	.008268	71/100	.027953	21	.826770	71	2.795270	210	8.267700
22	.008661	72	.028346	22	.866140	72	2.834640	220	8.661400
23	.009055	73	.028740	23	.905510	73	2.874010	230	9.055100
24	.009449	74	.029134	24	.944880	74	2.913380	240	9.448800
25	.009843	75	.029528	25	.984250	75	2.952750	250	9.842500
26	.010236	76	.029921	26	1.023620	76	2.992120	260	10.236200
27	.010630	77	.030315	27	1.062990	77	3.031490	270	10.629900
28	.011024	78	.030709	28	1.102360	78	3.070860	280	11.023600
29	.011417	79	.031102	29	1.141730	79	3.110230	290	11.417300
30	.011811	80	.031496	30	1.181100	80	3.149600	300	11.811000
31/100	.012205	81/100	.031890	31	1.220470	81	3.188970	310	12.204700
32	.012598	82	.032283	32	1.259840	82	3.228340	320	12.598400
33	.012992	83	.032677	33	1.299210	83	3.267710	330	12.992100
34	.013386	84	.033071	34	1.338580	84	3.307080	340	13.385800
35	.013780	85	.033465	35	1.377949	85	3.346450	350	13.779500
36	.014173	86	.033858	36	1.417319	86	3.385820	360	14.173200
37	.014567	87	.034252	37	1.456689	87	3.425190	370	14.566900
38	.014961	88	.034646	38	1.496050	88	3.464560	380	14.960600
39	.015354	89	.035039	39	1.535430	89	3.503930	390	15.354300
40	.015748	90	.035433	40	1.574800	90	3.543300	400	15.748000
41/100	.016142	91/100	.035827	41	1.614170	91	3.582670	500	19.685000
42	.016535	92	.036220	42	1.653540	92	3.622040	600	23.622000
43	.016929	93	.036614	43	1.692910	93	3.661410	700	27.559000
44	.017323	94	.037008	44	1.732280	94	3.700780	800	31.496000
45	.017717	95	.037402	45	1.771650	95	3.740150	900	35.433000
46	.018110	96	.037795	46	1.811020	96	3.779520	1000	39.370000
47	.018504	97	.038189	47	1.850390	97	3.818890	2000	78.740000
48	.018898	98	.038583	48	1.889760	98	3.858260	3000	118.110000
49	.019291	99	.038976	49	1.929130	99	3.897630	4000	157.480000
50	.019685	1mm	.039370	50	1.968500	100	3.937000	5000	196.850000

According to the French norms, the symbol Ø in the drawings means «Diameter».



# I - ENGINE

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# ENGINE

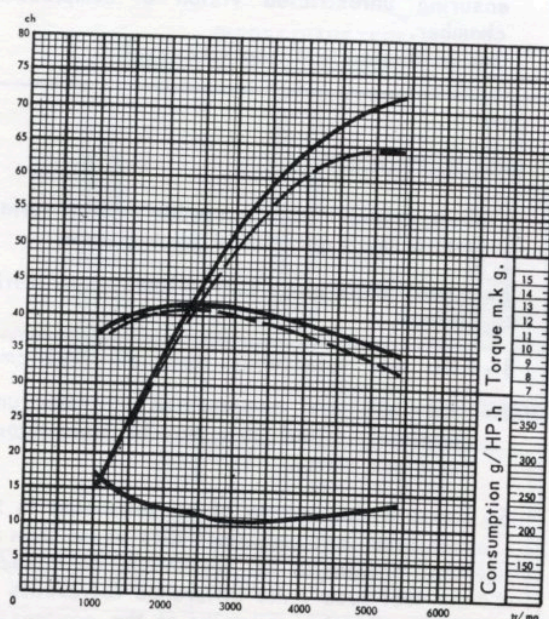
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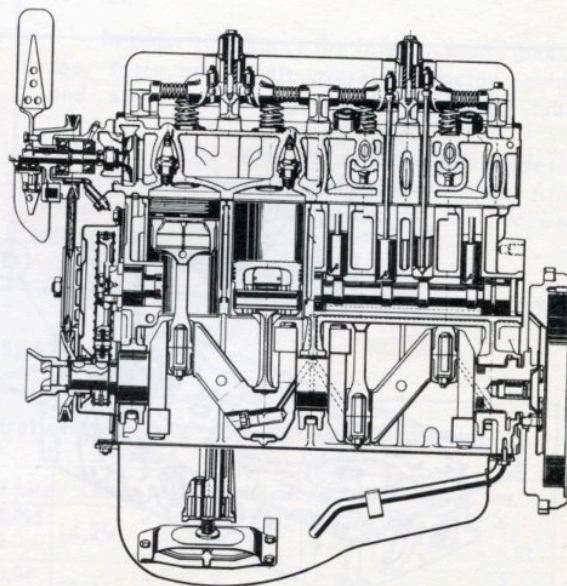
## GENERAL CHARACTERISTICS

Type	XC
Taxeable horsepower (France)	9 HP
Number of cylinders	4
Lay-out	in line
Cycle	4 stroke
Bore	84 mm
Stroke	73 mm
Cylinder capacity	1618 cc.
Compression ratio	7,2 to 7,4
Maximum horsepower (SAE)	72 HP
Maximum horsepower (DIN)	65 HP
Specific BHP/liter	44.5 HP
Corresponding r.p.m.	5.400 r.p.m.
Maximum r.p.m.	5.400 r.p.m.
Maximum torque	93.99 ft.lbs at 2.250 r.p.m.
Cylinder liners	removable, wet type
Cylinderhead	Alpax, offset spherical chambers
Crankshaft	3 main bearings with detachable counterweights
Timing	Double link chain with hydraulically controlled tensioner

Norms : SAE \_\_\_\_\_ DIN - - - -

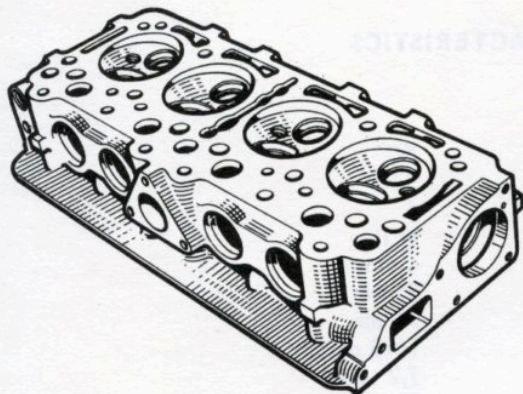


XC type engine - taxeable Horsepower : 9 HP. This curve corresponds to the standard adjustment of the carburetter and to the use of normal petrol, good quality, with lead point at 11° on flywheel.



Longitudinal view of the XC engine.

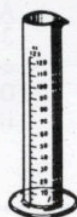
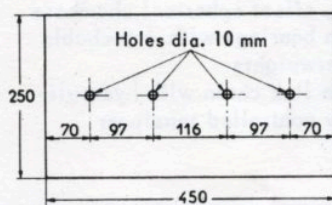




## TECHNICAL DESCRIPTION

### CYLINDER HEAD

The cylinderhead is made of *ALPAX* light alloy with *offset* spherical cap shaped compression chambers.



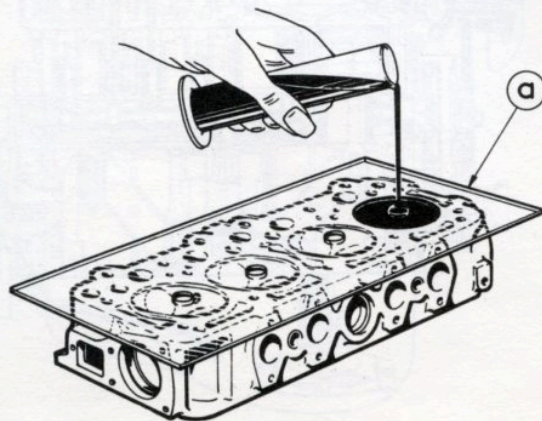
### CHECKING THE COMPRESSION CHAMBERS CAPACITY

Capacity of one chamber :  $61,28 \text{ cm}^3 \pm 1 \text{ cm}^3$   
c.in.  $3,7395 \pm 0,061$

To perform this check, the cylinder head assembly should be fitted with standard valves and sparking plugs.

### NECESSARY TOOLS

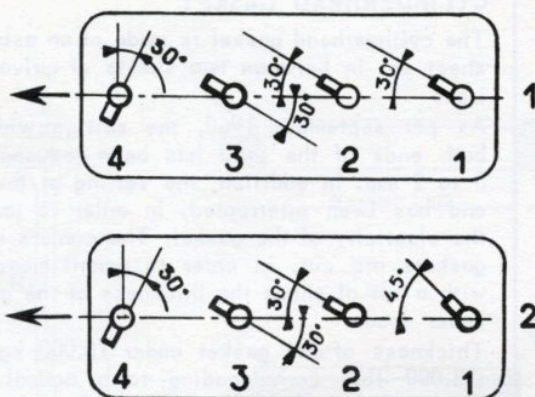
- One glass plate with 4 holes as per drawing, ensuring unrestricted vision of compression chamber.
- One calibrated test tube -  $125 \text{ cm}^3$ .



### CHECK PROCEDURE

- 1 - Coat cylinder head assembly mating surface with a small quantity of thick grease.
- 2 - Install glass plate over cylinder head mating surface.
- 3 - Fill test tube with fluid oil ( $125 \text{ cm}^3$ ).
- 4 - Pour oil into compression chamber until completely filled (this may be seen through the glass plate).
- 5 - Measure the volume of oil remaining in the test tube, and subtract this value from the total amount of oil previously contained in the test tube ; the difference represents the exact effective capacity of the compression chamber.
- 6 - Use the same procedure for all other chambers.



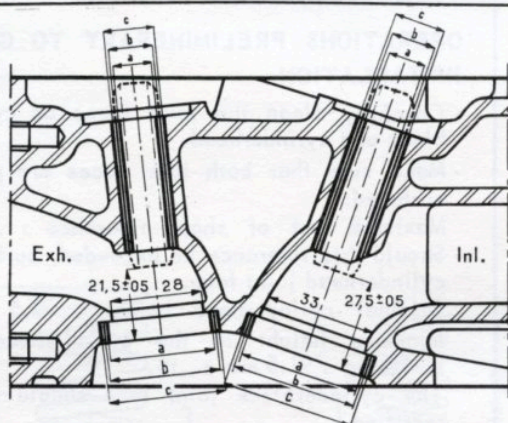


### SPARK PLUG PROTECTOR TUBES

If one or more spark plugs protector tubes have had to be removed, it is necessary, when refitting them, to check the socket pins for proper orientation.

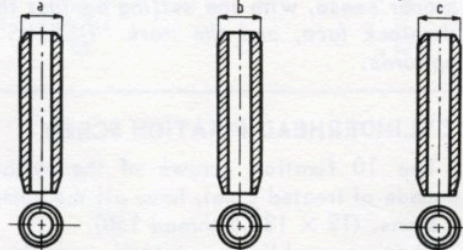
The orientation of the tube No 1 has been modified on 404 as per serial No 4.042.701.

On 404's prior to this No, it is recommended to orient tube No 1 at 45° (2).



GUIDES DIAMETERS

Corresponding to the bores oversizes in the cylinderhead



### VALVES SEATS AND GUIDES

The seats and guides are built type, made of special cast iron.

When repairing, the valve seats and guides will be installed after immersing the cylinderhead into boiling water.

It is strongly advised, before positioning them, to slightly chamfer the cylinderhead, in order to avoid chipping the material when installing.

Oversize when fitting the valve guides : .04 mm.

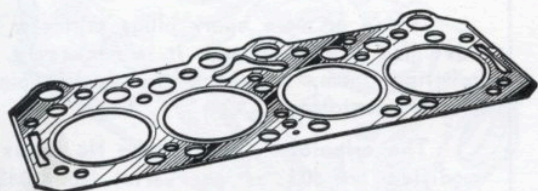
In order to respect the tolerance and guarantee, there are repair oversized factory guides and seats available, as per following table.

**Note :** The inner dia. of the repair guides is .2 mm. less than the original diameter. After installation, bore the guides to the desired dimension.

### VALVES GUIDES AND SEATS SIZES

item.	(a) original size		(b) first oversize		(c) second oversize	
	Cylinderhead bore	Corres. dia.	Cylinderhead bore	Corres. dia.	Cylinderhead bore	Corres. dia.
Guides I & E	13,97 $+0,025$ $+0$	14,02 $+0,04$ $+0,03$	14,2 $+0,025$ $+0$	14,29 $-0$ $-0,01$	14,5 $+0,025$ $+0$	14,59 $-0$ $-0,01$
Seats, I	40 $+0,025$ $+0$	40,16 $+0,14$ $+0,11$	40,2 $+0,04$ $+0$	40,36 $-0$ $-0,025$	40,5 $+0,04$ $+0$	40,66 $-0$ $-0,025$
Seats, E	35 $+0,025$ $+0$	35,13 $+0,14$ $+0,11$	35,2 $+0,04$ $+0$	35,33 $-0$ $-0,025$	35,5 $+0,04$ $+0$	35,63 $-0$ $-0,025$



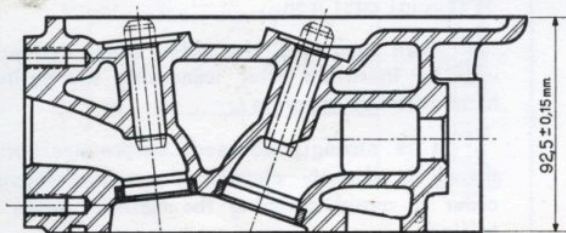


### CYLINDERHEAD GASKET

The cylinderhead gasket is made of an asbestos sheet set in between two sheets of galvanized iron.

As per september 1960, the setting width at both ends of the joint has been reduced from 3 to 2 mm. In addition, the setting at the rear end has been interrupted, in order to improve the elasticity of the gasket. The corners of the gaskets are cut, in order to permit measuring with a set of shims the thickness of the gasket under load.

Thickness of the gasket under 15.000 kg load (33.000 lbs) corresponding to a normal tightening of the cylinderhead : mm.  $1,5 \pm .1$

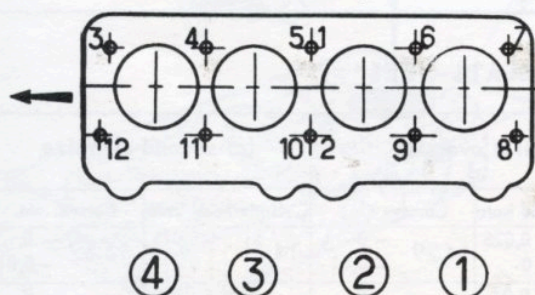


### OPERATIONS PRELIMINARY TO GASKET INSTALLATION

- Carefully clean the joint faces on cylinder-block and cylinderhead.
  - Make sure that both joint faces are properly surfaced.  
Maximum out of shape tolerance : .05 mm.
  - Should this tolerance be exceeded, surface the cylinderhead joint face.  
Original cylinderhead height :  $92,5 \pm .15$ .  
Minimum height of the cylinderhead, after surfacing :  $91,5 \text{ mm} \pm .15$ .
- The cylinderblock joint face should never be rectified.

**CAUTION :** Take care to install the gasket in the proper sense, with the setting against the cylinderblock face, and the mark "DESSUS" facing upwards.

### TIGHTENING SEQUENCE



### CYLINDERHEAD FIXATION SCREW

- The 10 fixation screws of the cylinderhead, made of treated steel, have all the same dimensions. ( $12 \times 135,5$  thread 150).
- When assembling, install a flat washer ( $12,5 \times 22 \times 2,5$ ) under each screw head and smear with tallow.

### CYLINDERHEAD SCREWS TIGHTENING

The screws should be tightened in two successive operations using a torque wrench, and in the given sequence.

Preliminary tightening : 28.9 to 36.1 ft.lbs.  
Definite tightening : 50.6 to 57.8 ft.lbs.

After some 600 miles driven, torque again, with engine cold, after at least six hours not running.

Re-tightening torque : 50.6 to 57.8 ft.lbs.

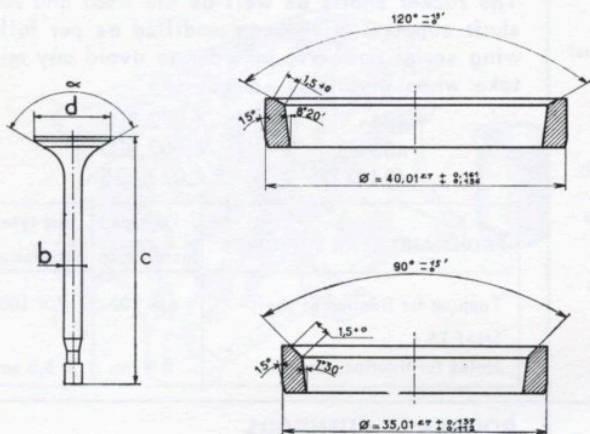
Adjust rockers clearances.



# ENGINE

1

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## VALVES

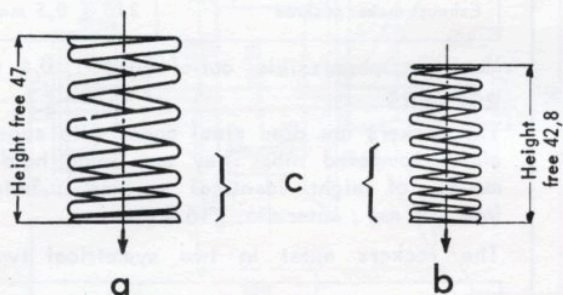
The valves are made of chromium nickel steel. The valve stem is hard chrome plated on its bearing length.

The inlet and exhaust valves on one cylinder form a 25° angle between them.

## VALVES CHARACTERISTICS

Description	Angle	Dia. Head (mm) d	Dia. stem (mm) b	Total length (mm) c
Inlet	120° +15' +0	39 -0 -0,2	8,52	119,36
Exhaust	90° +15' +0	33,5 ± 0,2	8,5	112,03

**NOTE :** In no case should the bearing of the valve on its seat exceed 1.5 mm in width.



## VALVE SPRINGS

Each valve is held by means of two springs, an outer one (a) and an inner one (b).

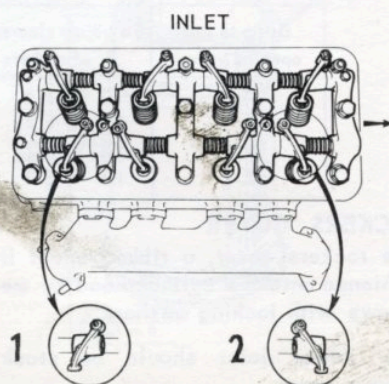
The springs of the Exhaust and Inlet valves are identical.

Springs characteristics :

Characteristics	Outer spring (R.H. thread) same as per 403	Inner spring (L.H. thread)
Free height	47 mm	42,8 mm
Inner Dia.	21,4 mm	14,1 mm
Number of useful coils	4 3/4	7
Dia. of wire	3,8 mm	2,8 mm
Height u. load	u. 36,7 kgs (81 lbs) : 33,7 mm	u. 22,3 kgs (49 lbs) : 29,7 mm

The coils with shorter thread (portion c) should be placed on the cylinderhead side.

**CAUTION :** The springs are being protected against corrosion by a synthetical varnish. Use only petrol or gas-oil to clean them.



## ROCKER GEARS

The rocker gear is made of two shafts resting on five supports common to both shafts.

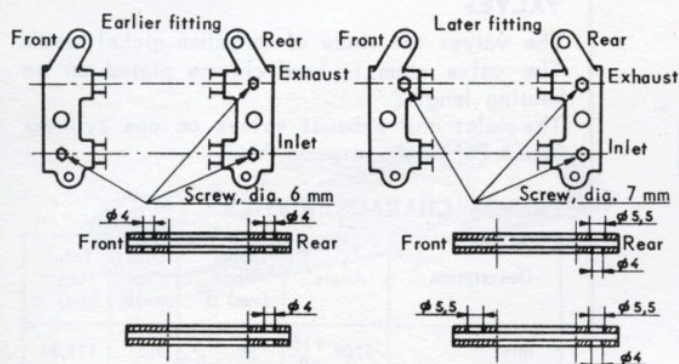
Length of the shafts : 442 ± 0.5 mm.

The supports n° 2 and 4 are interchangeable.

Each support is tightened by means of two cylinderhead screws, which provide a proper distribution of the efforts on the cylinderhead.

**CAUTION :** When assembling the rocker shafts, the rockers lubrication orifices should be turned inwards.

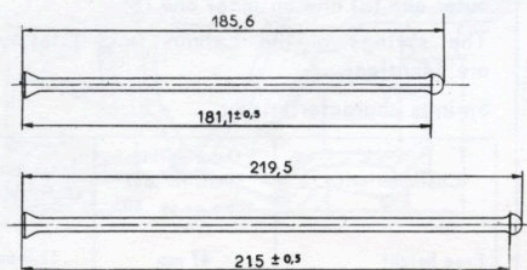


**MODIFICATION**

The rocker shafts as well as the front and rear shaft supports have been modified as per following serial numbers, in order to avoid any mistake when installing same.:

404	-	4.072.800
403 J	-	4.502.800
404 D.D.	-	4.071.625

FRONT AND REAR SUPPORTS	1st type	2nd type
	Installation	Installation
Tapping for fixation of shaft	6 × 100	7 × 100
SHAFTS :		
Holes for fixation screws	φ 4 mm	φ 5,5 mm

**ROCKERS PUSHRODS**

The rockers pushrods are made of a special steel, with cyanide treated ends.

They are of two types, with different lengths ;

Description	Lenght
Inlet rocker pushrod	181,1 ± 0,5 mm
Exhaust rocker pushrod	215 ± 0,5 mm

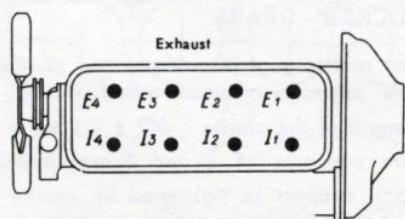
Maximum permissible out-of-round : 0,4 mm.

**ROCKERS**

The rockers are died steel ones, with superficially tempered nib. They are being held by means of eight identical springs : height, free : 46 mm ; outer dia. ; 16,5 mm.

The rockers exist in two symetrical types.

	Inlet	Exhaust
1 :	2 & 4	1 & 3
2 :	1 & 3	2 & 4

**METHOD FOR ROCKER CLEARANCES ADJUSTMENT**

Normal clearances : Inlet .10 mm. Exhaust .20 mm

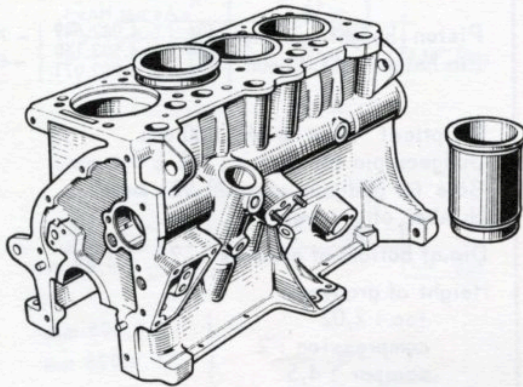
Bring to full opening valve	To adjust clearance of rockers	
E 1	13	E 4
E 3	14	E 2
E 4	12	E 1
E 2	11	E 3

**ROCKERS COVER**

The rockers cover, a ribbed sheet iron one, is tightened onto the cylinderhead by means of two screws with locking washers.

The rubber joint should be stuck onto the rockers cover.



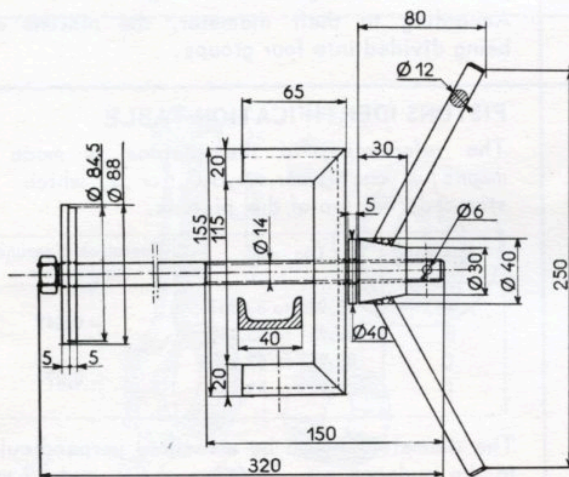
**CYLINDERBLOCK**

The cast iron cylinderblock of a detachable cylinder liners type, is one piece casted.

The lower joint face, which is 76 mm. lower than the crankshaft axis, provides it with high stiffness.

**Overall dimensions of the cylinderblock**

Length	470 mm
Width	335 mm
Height	286 + 0.15 mm

**CYLINDER LINERS**

The cylinder liners are detachable wet type ones. They are made of centrifugal cast iron

They are positioned :

- at the lower part, by a bore in the cylinder-block.
- at the upper part, by a shoulder in the cylinder-head gasket joint face.

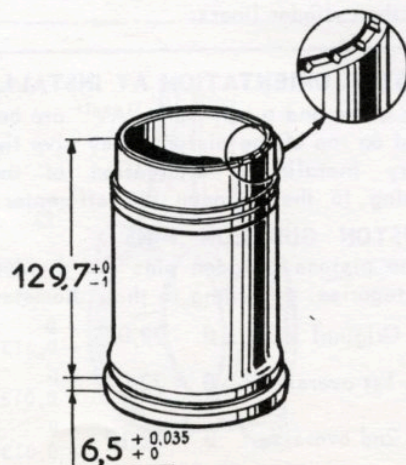
Cylinderliners out-of-level : between .015 and .075 mm. A rubber joint, 6 mm. in height, free, provides tightness between the liner and the block. The liners, removable by hand, can eventually be removed with help of the puller which will be manufactured following sketch herenext.

According to their average diameter, the liners are being divided into four groups.

**CYLINDER LINERS IDENTIFICATION TABLE**

The reference marks are 1, 2, 3 or 4 dashes, ground on the lower part of the liner.

Liner ref. mark	Liner bore
I	84.000 to 84.011
II	84.012 to 84.022
III	84.023 to 84.033
IIII	84.034 to 84.044

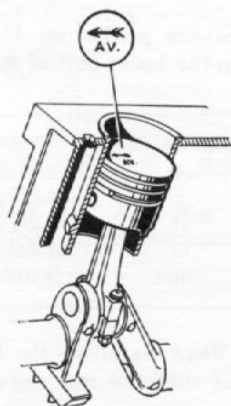
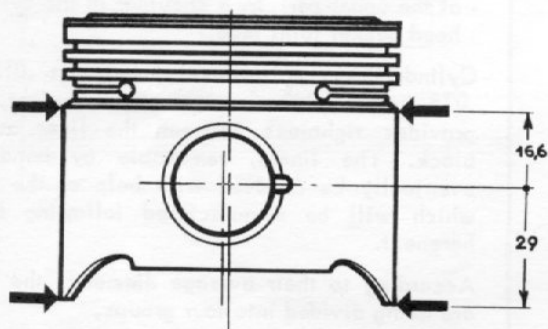
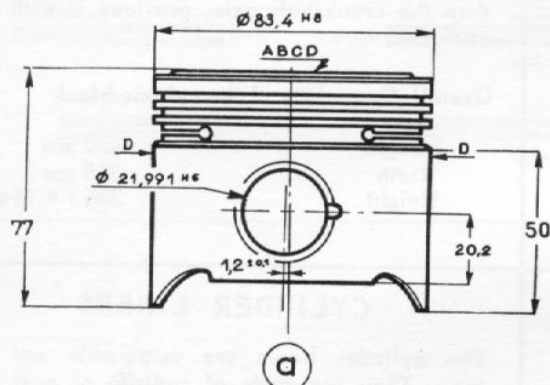


**NOTE :** When installing the liners these should be turned with the ref. marks on the camshaft-side.



## PISTONS

The low expansion aluminium alloy pistons have an elliptical skirt with wide carving at the bottom.  
The pistons skirts are not split.



## Pistons characteristics

Piston height : 77 mm  
Pin height : 43,05 mm

As per Nos :	
404	4.082.649
404 J	4.503.160
404 DD	4.082.071

77,65 mm  
43,70 mm

Elliptical skirt height : 50 mm  
Gudgeon pin off centre :  $1,2 \pm 0,1$  mm  
Bore for gudgeon pin : 21.991 mm  
Number of grooves : 3

Dia. at bottom of grooves :  $75 - 0 \text{ mm}$   
 $- 0,03 \text{ mm}$

Height of grooves

top : 2,02	} + 0,005 mm
compression : 2	
scraper : 4,5	

Weight of piston, bare : 380 g.

Weight of piston, complete : 539 g.

Maximum weight difference between the four pistons of one engine : 8 to 10 gr.

According to their diameter, the pistons are being divided into four groups.

## PISTONS IDENTIFICATION TABLE

The referencing of the pistons is made by means of one letter, A, B, C, or D, which is stamped on top of the pistons.

Ref. Mark	Dia. mm	Operation clearance between :
A	83,940 to 83,951	- 0,049
B	83,951 to 83,962	
C	83,963 to 83,973	
D	83,973 to 83,984	- 0,071

The diameter should be measured perpendicular to the gudgeon pin, 16.6 mm above and 29 mm. underneath the axis of this pin.

The ref. marks : A.B.C.D. on the pistons, correspond respectively to the ref. marks 1, 2, 3, 4, on the cylinder liners.

## PISTON ORIENTATION AT INSTALLATION

An arrow and a ref. mark "AV" are being stamped on top of the piston. They give the compulsory installation orientation of the piston, owing to the gudgeon pin off-center position.

## PISTON GUDGEON PINS

The pistons gudgeon pins are divided in three categories, according to their diameter :

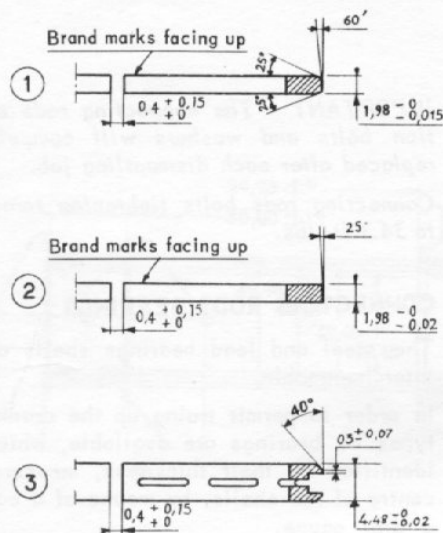
1. Original size :  $\varnothing = 22,005 - 0 \text{ mm}$   
 $- 0,013 \text{ mm}$

2. 1st oversize :  $\varnothing = 22,05 - 0 \text{ mm}$   
 $- 0,013 \text{ mm}$

3. 2nd oversize :  $\varnothing = 22,10 - 0 \text{ mm}$   
 $- 0,013 \text{ mm}$

Length : 70  $- 0 \text{ mm}$   
 $- 0,15 \text{ mm}$



**PISTON RINGS**

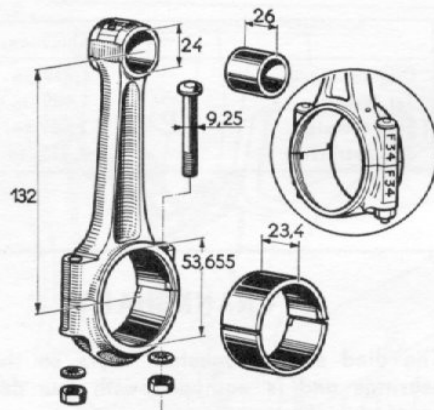
Each piston is fitted with three rings :

- 1 - Top compression ring, made of a special treated cast iron, chromium plated.
- 2 - Special treated cast iron compression ring.
- 3 - Special treated cast iron oil-scraper ring.

**Piston rings characteristics**

Description	Tap. in	Height in mm	Gap between ends (mm)	weight gr.
1 - Top compression ring, tapered	60	1,98 - 0 - 0,015	0,4 + 0,15 + 0	to 1 440 1 820
2 - Compression, tapered	25	1,98 - 0 - 0,02	0,4 + 0,15 + 0	to 1 440 1 820
3 - Oil scraper	0	4,98 - 0 - 0,02	0,4 + 0,15 + 0	to 1 680 2 100

When installing the compression rings, take care to have the mark near the gap facing upwards.

**CONNECTING RODS**

The treated forged steel connecting rods are fitted :

- at the small end : with a smooth bushing, providing bearing for the piston gudgeon pin.
- at the big end : with a pair of thin removable bearing shells.

**Connecting rods characteristics**

Centre to centre distance (mm)	Big end width (mm)	Big end bore (mm)	Small end width (mm)	Small end bore (mm)
132 ± 0,07	29,93 - 0,05 - 0	53,655 + 0,019 + 0	26 ± 0,2	24 + 0,033 + 0

For repair, the connecting rods are divided into six weight categories ref. 1 to 6, by means of a cipher marked with an acid stamp on the big end side. The big end and cap are referenced for proper match.

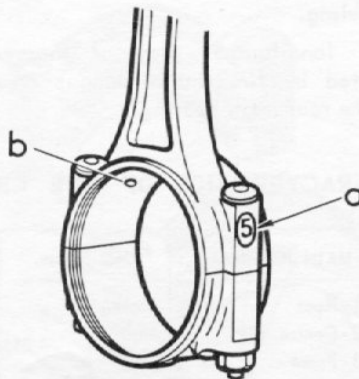
**CONNECTING RODS IDENTIFICATION TABLE**

ref. ciphers	Weight in gr.
1	591 to 610
2	611 to 630
3	631 to 650
4	651 to 670
5	671 to 690
6	691 to 710

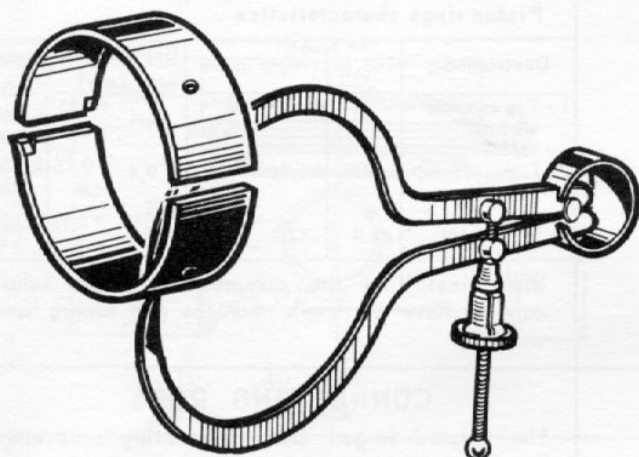
**NOTE** - These weights apply to connecting rods, complete, without bearing shells or washers.

**CONNECTING RODS INSTALLATION DIRECTION**

When installing the connecting rods, the oiling orifice (b) should be at the side opposite to the camshaft.







**IMPORTANT** - The connecting rods caps fixation bolts and washers will compulsorily be replaced after each dismantling job.

Connecting rods bolts tightening torque : 30,7 to 34.3 ft/lbs.

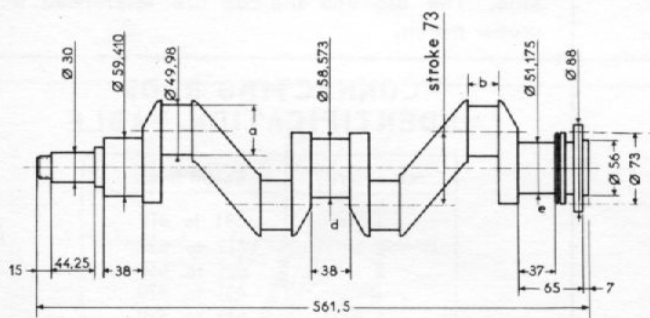
### CONNECTING RODS BEARINGS

The steel and lead bearings shells are easily interchangeable.

In order to permit truing up the crankpins four types of bearings are available, which can be identified by their thickness, measured at the centre of the shells, by means of a compass or a dial gauge.

### CONNECTING ROD BEARINGS IDENTIFICATION TABLE

	Thickness (mm)
Original thickness	1,819 to 1,825
1st. oversize	1,969 to 1,975
2nd. oversize	2,069 to 2,075
3rd. oversize	2,219 to 2,225



### CRANKSHAFT

The die steel crankshaft rests on three main bearings and is equipped with four detachable counterweights.

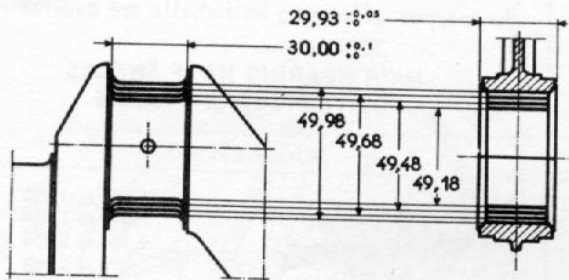
It is statically and dynamically balanced. When carrying out a job where it is necessary to remove the counterweights, carefully mark them so as to respect the original balance when reassembling.

The longitudinal play of the crankshaft is limited by two thrust flanges on either sides of the rear main bearing.

### CHARACTERISTICS OF THE CRANKSHAFT

MAIN JOURNAL	Dia. in mm.	Length in mm.
1 - Rear	51,175	37
2 - Centre	58,573	38
3 - Front	59,410	38
CRANKPINS	50 - 0,009 - 0,025	30 + 0,1 + 0



**JOURNALS TRUING UP**

The journals of the crankshaft can be trued up to the following oversizes :

**MAIN JOURNALS :**

Dia. in mm.

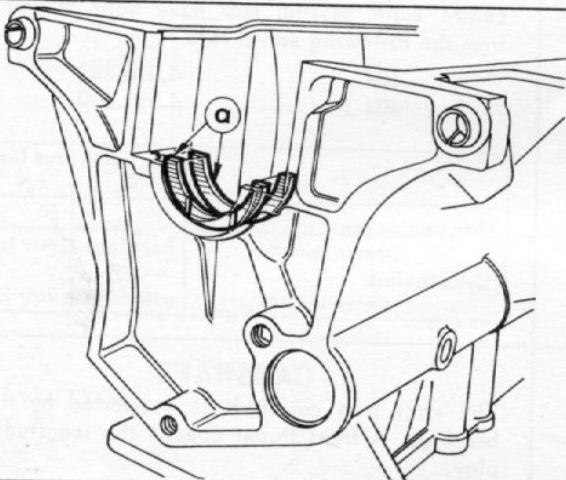
	Rear	Centre	Front
1st o. size	50,870	58,260	59,100
2nd "	50,670	58,060	58,900
3rd "	50,370	57,760	58,600

**CRANKPINS :**

dia. in mm.

1st oversize	49,680	+ 0,011
2nd oversize	49,480	- 0,005
3rd oversize	49,180	- 0,005

**NOTE :** It is imperative to respect these oversizes, in order to keep up with the normal operation plays with the corresponding bearing shells, within the factory tolerances.

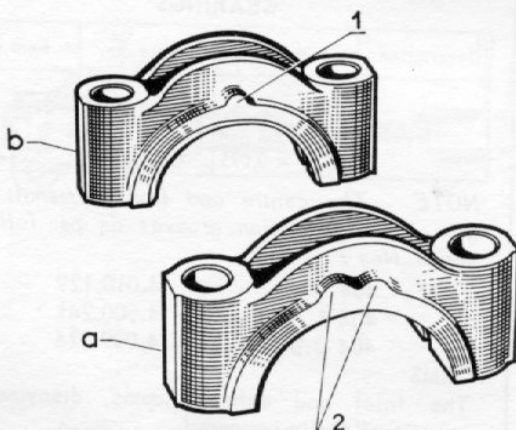
**THRUST FLANGES**

The thrust flanges (a) keep the longitudinal play of the crankshaft within the permissible tolerances : .08 to .2 mm.

In order to respect these tolerances, use the following flanges :

Original size :	2.30	
1st oversize :	2.40	+ 0
2nd oversize :	2.45	+ 0,03
3rd oversize :	2.50	

**NOTE :** When installing, have the "bronze" faces turned towards the crankshaft.

**MAIN BEARING CAPS**

The main bearing caps are positioned onto the cylinderblock by means of :

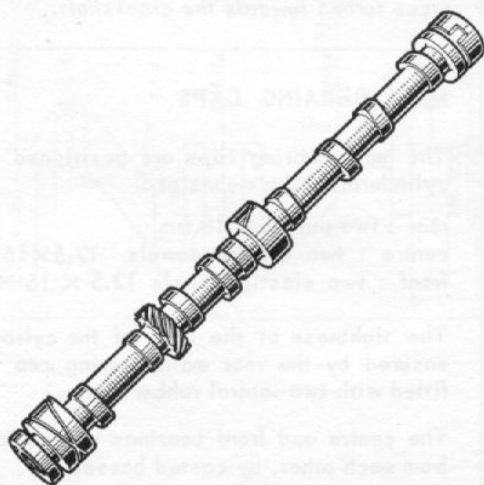
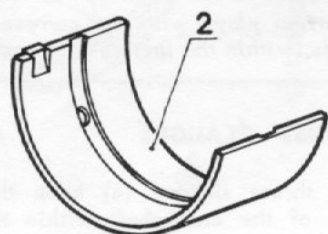
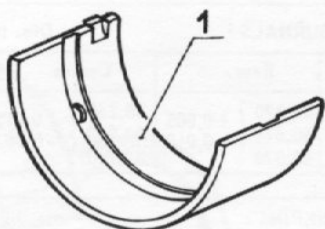
rear : two pins 5 × 18 mm  
 centre : two elastic dowels 12.5 × 16 × 14 mm.  
 front : two elastic dowels 12.5 × 16 × 14 mm.

The tightness at the rear of the cylinderblock ensured by the rear main bearing cap which is fitted with two lateral rubber seals.

The centre and front bearings can be identified from each other, by casted bosses :

- a) centre : 2 bosses
- b) front : 1 boss





### MAIN BEARING HALF-SHELLS

The main bearing half shells are lined steel ones, held in their housings by means of lugs.

To match with the main journals oversizes, three types of bearing half shells are available :

### MAIN BEARING HALF SHELLS IDENTIFICATION TABLE

Thickness in mm.		
Rear	Original size	1,894 to 1,900
	1st oversize	2,044 to 2,050
Centre	2nd oversize	2,144 to 2,150
	3rd oversize	2,294 to 2,300

### CENTRE MAIN BEARING

In order to avoid installing a front bearing half shell on the centre bearing or the other way round, the half shells locating lugs as well as the grooves on the cylinder-block and on centre main bearing cap have been moved as from the following serial Nos :

404	4.036.261
404 J	4.501.690

	1st. Instal. 1	2nd Instal. 2
Main bearing cap groove towards	front face	rear face
Cylinderblock groove towards	rear face	front face

### CAMSHAFT

The cast iron camshaft is supported by three bearings, A front thrust checks the longitudinal play.

### CHARACTERISTICS OF THE CAMSHAFT BEARINGS

Description	rear mm.	centre mm.	front mm.
Length	31,5 $\pm$ 0,25	20 $\pm$ 0,25	24,5 $\pm$ 0,25
Dia.	44 $-$ 0,050 $-$ 0,075	46 $-$ 0,050 $-$ 0,075	48 $-$ 0,050 $-$ 0,075

**NOTE** - The centre and front camshaft bearings bear lubrication grooves as per following serial Nos :

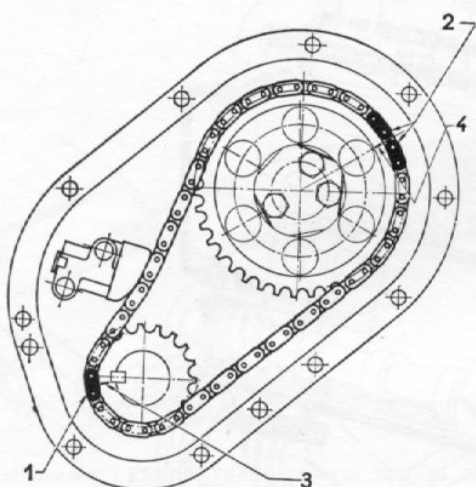
404	-	4.010.129
404 J	-	4.500.241
404 D.D.	-	4.009.324

### CAMS

The inlet and exhaust cams, dissymetrical, are superficially tempered.

Cams upstroke : 6.5 mm.





## ROCKER TAPPETS

The cast iron rocker tappets are common to both engine types TN3 and XC.

### Tappets characteristics

dia. (mm)	Height (mm)
24	68

Oversize tappets are available :  
dia. in mm : 24.20

## TIMING

The timing is provided through :

- 1 timing chain : two rolls of 58 links (9.525 thread) with coppered links (1 and 2)
- 1 steel crankshaft pinion, 19 teeth, with ref. mark (3).
- 1 cast iron camshaft pinion, 38 teeth, with ref. mark (4).
- 1 chain tensioner, automatic, RENOLD type

## TIMING THEORICAL ADJUSTMENT

With a 0,7 mm clearance at both rockers of the given cylinder.

	Angle on flywheel	Piston stroke (mm)
Lead I. op.	0° TDC	0. TDC
Lag I. cl.	30° 30'	69. 10
Lead E. op.	35°	68. 3
Lag E. cl.	4° 30'	0. 175

## CHAIN TENSIONER DESCRIPTION

The RENOLD chain tensioner is made of a cast iron body (1), a piston with play take-up slope (2), a spring (3), and a rubber sole-piece. The sole piece is constantly resting against the chain, under the combined actions of :

### a) The spring :

Length, free  $74 \pm 1$  mm

Number of coils : 27

Length under load :

50 mm under 3,6 lbs  $\pm$  .36 lbs

### b) The oil pressure, which varies with the engine r.p.m.

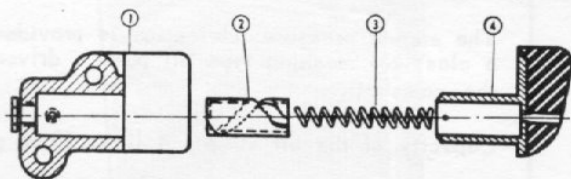
dia. of the inlet orifice on tensioner body : 0.8 mm.

dia. the chain lubrication hole on sole piece : 1.02 mm.

**NOTE :** In order to avoid clogging of the gauged oil intake orifice, a cylinder shaped filter has been installed as from the following serial numbers :

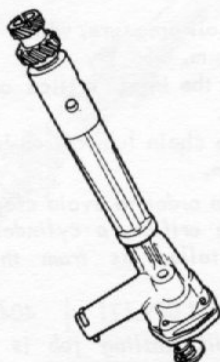
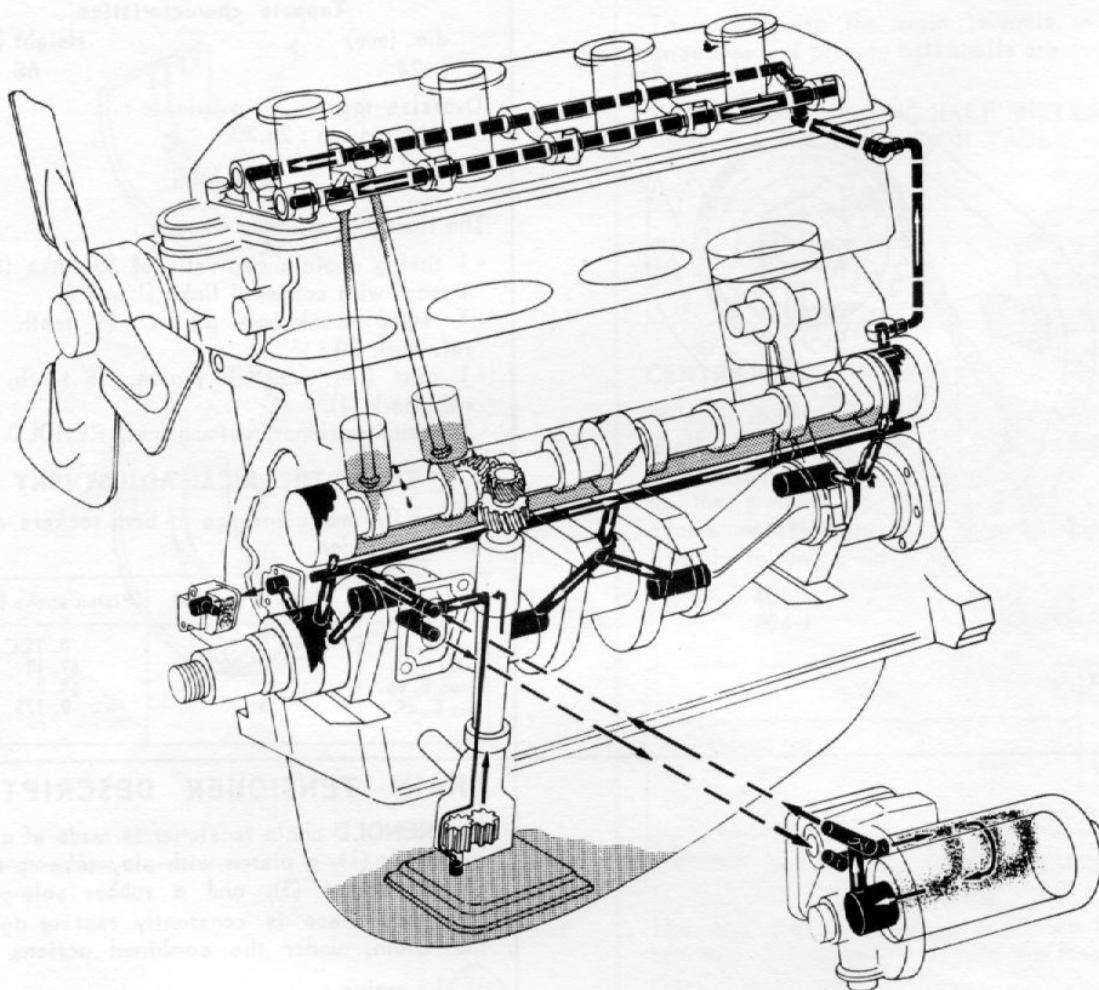
404 - 4.009.171 | 404 J - 4.500.218

When a dismantling job is being carried out, it is strongly advised to install the filter (P/N 0825.01) or to clean it if already fitted.





### SKETCH OF THE LUBRICATING CIRCUIT



The engine pressure lubrication is provided by a classical meshing type oil pump, driven by the camshaft.

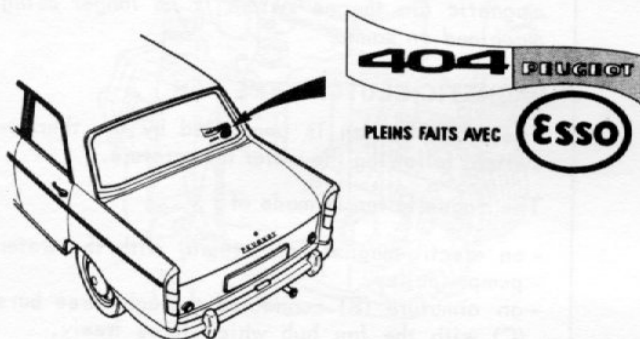
Capacity of the oil sump : 4 litres (0.88 gal).

### OIL PUMP

Component parts of the oil pump :

- Light alloy body.
- Control stud.
- Pinion (11 teeth)
- Cover with suction pipe and relief valve (operating u. 99 lbs/sq.in pressure).





In all season : ESSO EXTRA MOTOR OIL 20W/30-40  
or

Normal use : ESSO MOTOR OIL SAE 40

Deep frost periods : ESSO MOTOR OIL SAE 20

Starting from Nos :

404 L.H. drive	4.033.445
404 R.H. drive	4.033.861
404 J	4.501.584

the oil pump body has been modified, on the valve side, in order to reach the release pressure without the interference of the adjustment washers.

The cover and suction pipe have been modified, as per Nos :

404 L.H. drive	4.058.841
404 R.H. drive	4.058.434
404 J	4.502.081

#### OIL FILTER

A perfect lubrication is provided by the oil filter, which is fitted in an horizontal position between the pump and the lubrication circuit. It is made of a light alloy body, a cup and a cartridge (useful surface 34,875 sq.in) capacity of the filter : approximately 1 pint.

Oil fed by the pump flows through the cartridge from the outside to the inside. The cartridge should be cleaned with each draining job. However, should the cartridge be clogged, a valve allows the oil to pass.

#### PRESSURE GAUGE

The pressure gauge which is fitted onto the filter body, switches off the red tell-tale light on the facia panel as soon as the oil pressure reaches higher than :

$750 \pm 50 \text{ g/cm}^2$  (10,00 lbs/sq. in.)

#### COOLING

The cooling system includes :

- A radiator
- A centrifugal pump which quickens the water flow.
- A thermostwitch and a magnetic clutch type fan keeping the engine at its most favorable operation temperature.

Capacity of the cooling system : 14 pints (7,8 litres).

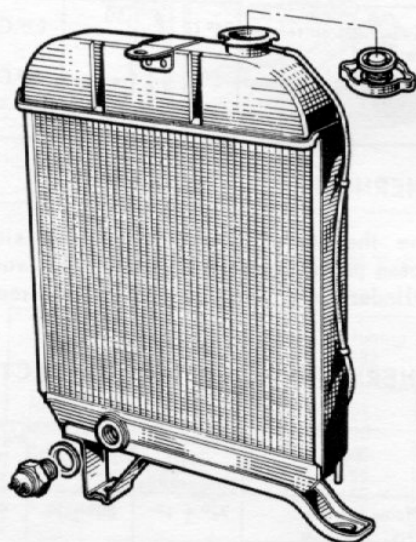
#### RADIATOR

Radiator capacity : (2,3 litres) 4 pints.

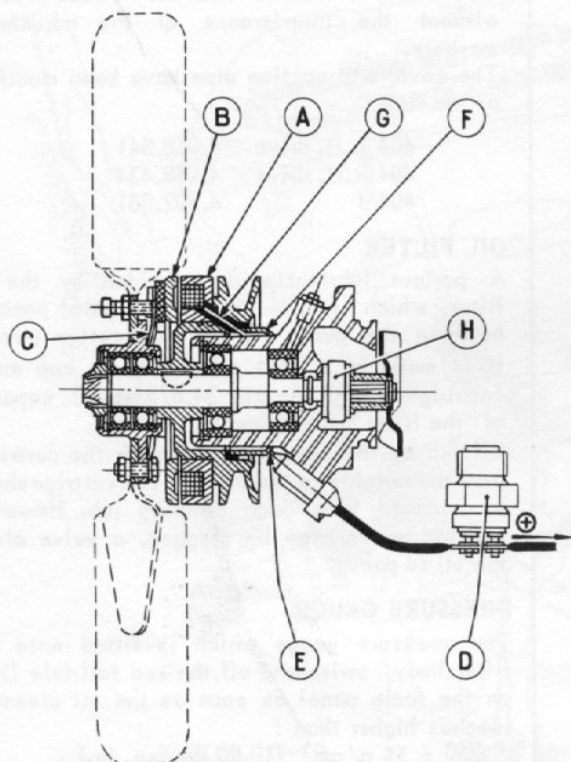
Useful cooling surface : 0,1148 sq.m.

A new type of radiator has been installed, which is fitted with :

- a pressure/vacuum type cap, rated at 280/cm<sup>2</sup> (4 lbs/sq.in.) allowing a water temperature up to 107° C (225° F) before boiling.







- a tapped section on the lower water case, which is meant to house the magnetic fan thermo switch (D).

as per following serial Nos :

404 - 4.079.240

404 J - 4.503.037

**NOTE** - This installation caused the water pump housing to be modified, since the location for magnetic fan thermo switch is no longer being machined on same.

### MAGNETIC CLUTCH TYPE FAN

The magnetic fan is controlled by the thermo-switch, following the water temperature.

The magnetic fan is made of :

- an electro-magnet (A) integral with the water pump pulley.
- an armature (B) connected through three bars (C) with the fan hub which turns freely.
- a fan, with three gap adjustment screws.

### MAGNETIC FAN THERMO-SWITCH

The thermo-switch (D) is attached to the water pump body, up to following numbers :

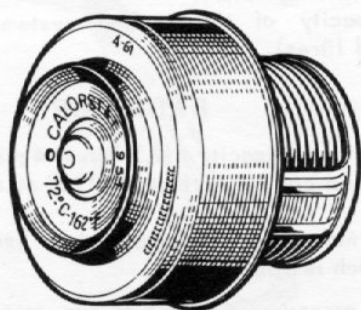
404 - 4.079.239

404 J - 4.503.036

Past these numbers, the switch, differently rated, is attached onto the lower water case of the radiator.

### THERMOSWITCH CHARACTERISTICS

	Earlier Model	Later Model
Switching on temperature	84° C $\pm 1,50$ - 1	82° C $\pm 1,50$ - 1
Switching off temperature	75° C $\pm 2$ - 1,5	68° C $\pm 2$ - 1,5



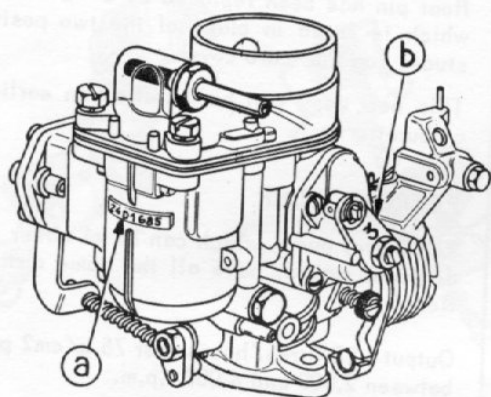
### THERMOSTAT

The thermostat plug, on the exit side of the water pump, opens as soon as the water in the cylinderblock reaches the proper temperature.

### THERMOSTATIC PLUGS CHARACTERISTICS

Type	Opening start temperature	Opening end	Manufactured ref.	Colour
Home market	72° $\pm 1^{\circ}$	80° $\pm 1^{\circ}$	951	Red
"Deep frost" countries	88° $\pm 1^{\circ}$	97° $\pm 1^{\circ}$	944	Black





## CARBURATION

The SOLEX 32 PBICA carburettor was several times modified.

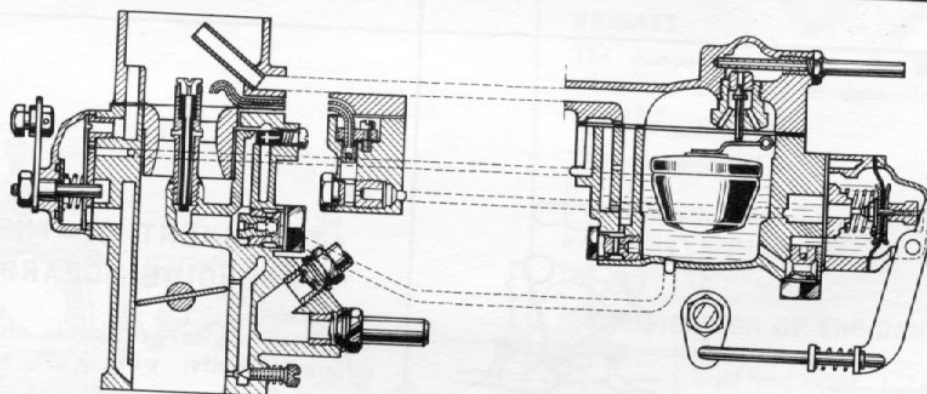
## IDENTIFICATION OF THE CARBURETTORS

a) The number stamped on the barrel ends in a number which goes up following the modifications.

Ref. mark	As from Nos	Adjustment	Needle val.	Heating li.
--- 682	---	1st	1.70	Screwed
--- 683	404 : 4.010.128 404 J : 4.500.241	2nd	1.70	Screwed
--- 684	---	2nd	1.70	Integral
--- 685	404 : 4.068.228 404 J : 4.502.545	2nd	1.70 with hook	Integral

b) The hand throttle control lever is marked with a cipher :

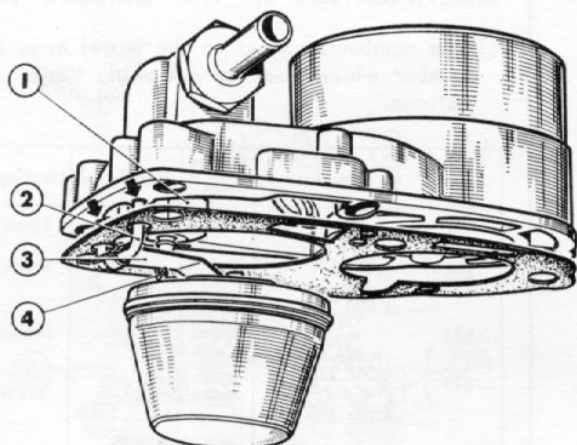
- 3 : 404 with L.H. steering  
4 : 404 with R.H. steering



## CARBURETTERS ADJUSTMENT TABLE

Description	1st tuning 682	2nd tuning 683-684-85	Description	1st tuning 682	2nd tuning 683-684-85
Nozzle	25	25	Starter Air	6,5	6,5
Main jet	130	130	Starter Gas	110	110
Automaticity	160	170	Emulsion pipe	19	19
Slow-running-Gas	55	50	Slow-running-Air (on Joint Face)	180	0
Slow-running-Air (Under nozzle)	150	220	Pump injector	50	50
Pump jet	45	45	Float	5,7 g	5,7 g





### HOOKED NEEDLE-VALVE

The carburettors with a ref. Mark ending in 685 have the needle valve (1) hooked onto the float flange (3) by a staple (4). The straight float pin has been replaced by a "U" bent axis which is fitted in place of the two positioning studs on the carb cover.

This new assy can be installed on earlier type carburettors.

### PETROL PUMP

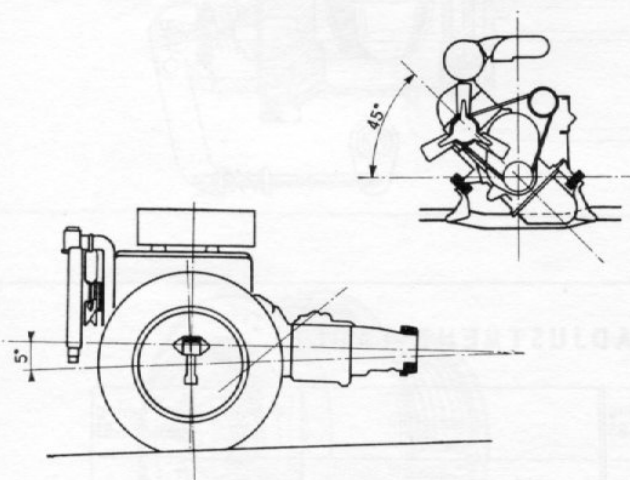
The petrol pump, which can be of either of three different makes, have all the same characteristics :

Output : 25 litres/hour under 75 g/cm<sup>2</sup> pressure, between 2,000 and 4,000 r.p.m.

Max. statical pressure (output null) 220 g/cm<sup>2</sup>.

### Pump identification

AC	:	YK 6070
GUIOT	:	ULP 520
S.E.V.	:	46 CQ



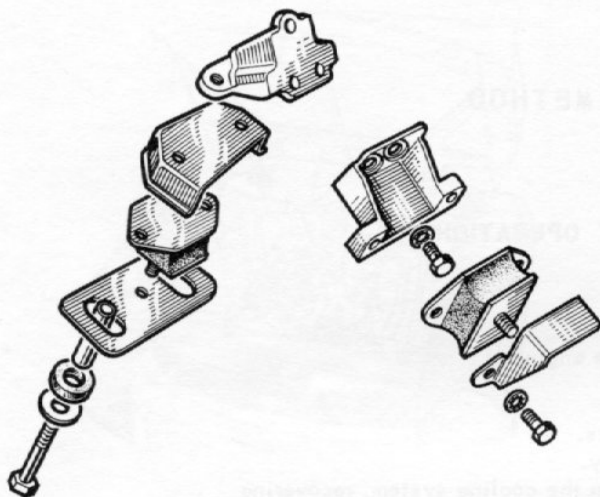
### ATTACHMENT OF THE ASSY : ENGINE - GEARBOX

The assy engine/gearbox is attached at three different points, with a 5° slope rearwards.

*At the front part :* The engine rests on two identical rubber support parts in mid-plane, 45° aslant to the right.

*At the rear :* A cured rubber ring support, fitted in a rigid armature which is integral with the body, holds the gearbox and reduces the torque effects.



**FRONT BRACKETS PECULIARITIES**

The peculiar position of the engine made it necessary to provide a safety system which would check its play on the front brackets.

a) *on the right hand side* : The maximum permissible stretch of the support pad is shown by a play checking device :

- a sheet iron arrester.
- two spacers  $8,5 \times 12 \times 44$  mm.
- two rubber thrusts  $11 \times 36 \times 6$  mm.

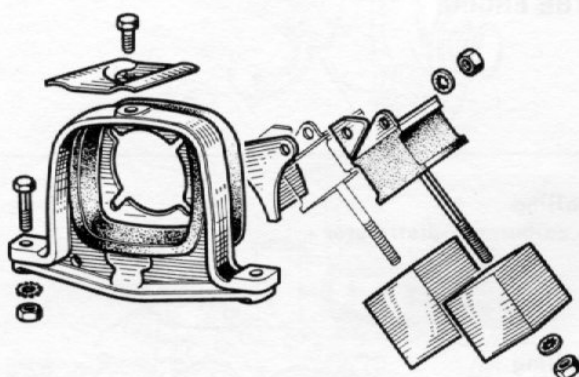
Screws tightening torque : 14,46 ft/lbs.

In addition, a heat protective sheet iron piece protects the rubber pad from excessive heat.

b) *on the left hand side* : Should the pad be excessively crushed, a safety checker keeps sufficient clearance between the oil sump and the cross-member.

**NOTE** - The light alloy intermediary supports have been assembled as from the following serial numbers :

404	-	4.044.653
404 J	-	4.501.893

**REAR SUPPORT**

The gearbox rear support is equipped with two dampering weights, the axes of which are parallel to these of the cylinders.

**WEIGHTS**

The dampering weights take up the interfering vibrations occurring at determined echoing frequencies.

They are made of :

- Two elastic identical supports.
- A R.H. weight (longer)
- A L.H. weight.

**IDENTIFICATION OF THE DAMPER WEIGHTS**

Starting from	Right Hand Weight		Left Hand Weight	
	Dimensions mm.	Echo freq.	Dimensions mm.	Echo freq.
404	$45 \times 45 \times 53$	107	$45 \times 45 \times 42$	120
4.019.440	$45 \times 45 \times 65$	120	$45 \times 45 \times 53$	135
404 J				
4.500.787				

**NOTE** - Oils, greases or paint will damage the rubber rear mount support.

It is therefore recommended, when installing same to smear it with seal paste.

**IMPORTANT** - Never clean the rear support with trichlorethylene.

- Never paint the torque sphere half shells.



## REPAIR METHOD

### PRELIMINARY OPERATIONS

- Before undertaking any job on the engine :
  - Steady the car.
  - Install wing covers.
  - Disconnect battery.
  - If necessary, drain the cooling system, recovering the anti-freeze mixture, if any.

### OPERATIONS WHICH CAN BE CARRIED OUT WITHOUT REMOVING THE ENGINE

#### 1 - Cylinderhead

- Removing - reinstalling
- Subsequent jobs - carburettor-distributor -

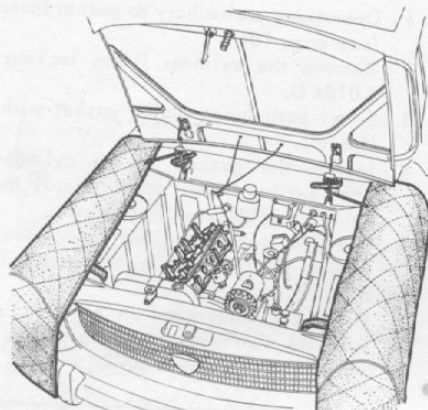
#### 2 - Timing

- Removing - reinstalling
- Adjustment and check.

#### 3 - Water pump

- Removing and reinstalling
- Repairs.

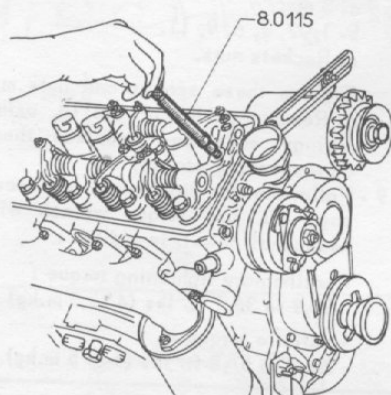


**1 - CYLINDERHEAD****REMOVAL -**

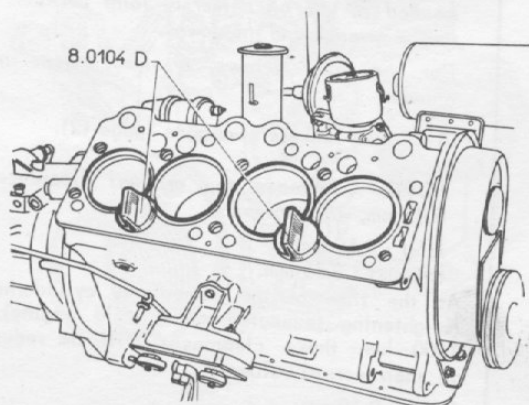
In order to avoid misshaping the cylinderhead, it should be removed from a cold engine.

- 1 - Preliminary operations (see page 26).
- 2 - Remove :
  - The spark plugs with their wire and the distributor cap.
  - The water inlet hose to radiator.
  - The fan belt.
  - The rockers lubrication line.
- 3 - Disconnect : on cylinderhead :
  - The lower radiator hose and the heater connection.
  - on carburettor :
    - The petrol feeding lines and the vacuum line.
    - The heater pipe.
    - The accelerator and choke controls.

Remove : the rocker cover and the air filter.

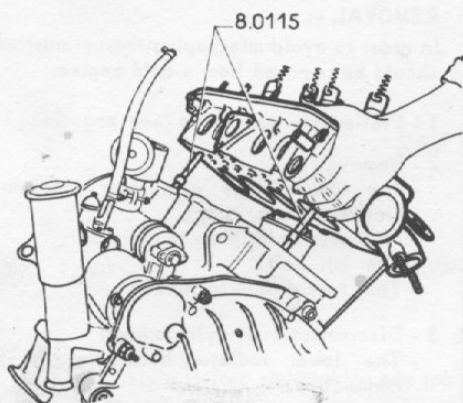


- 4 - Remove :
  - The assy : carburettor - inlet hose, recover the diffuser.
- 5 - Unfasten :
  - The exhaust flange.
  - The front muffler attachment collar.
  - The sliding lug of the dynamo to the cylinderhead.
- 6 - Disconnect :
  - The wire n° 47 of the thermometer connector.
  - The wire n° 57 of the magnetic fan on the carbon holder, according to the type of water pump installed.



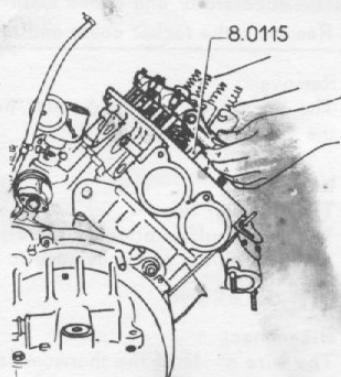
- 7 - Remove cylinderhead fixation screws 8 and 12 (table, page 10).
- 8 - Fit the cylinderhead guides 8.0115 into the holes thus made free, and screw the guides in completely.
 

These guides have a knurled fitting end, with L.H. thread, which should unscrew as soon as the guide comes level with the top of the rocker gear bearing.
- 9 - Remove alternately the cylinderhead screws and the rocker gear fastening nuts.
- 10 - Lift off the rocker gear and the pushrods (after marking those for position).
- 11 - Remove cylinderhead, guides and gasket.
- 12 - Lock the cylinderliners by means of the locking screws 8.0104 D.



### INSTALLATION

- 1 - Operations preliminary to gasket installation. (see page 10).
- 2 - Remove the cylinder liners locking screws 8.0104 D.
- 3 - Swaer both faces of the gasket with cooked line oil.
- 4 - Install the gasket on the cylinderblock :
  - the setting marks down towards the block.
  - the mark "dessus" facing up.
- 5 - Position it by means of the guides 8.0115, without the fitting ends, screwed in the holes 8 & 12.
- 6 - Fit the cylinderhead in position, equipped with its spark plugs, engaging the draining valve guide into into guide.



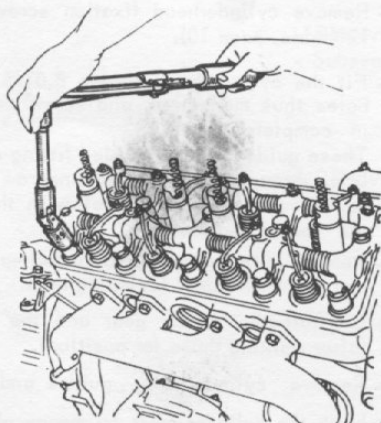
- 7 - Install the rockers pushrods in their respective place, and install the rocker gear.
- 8 - Install the cylinderhead, with the screws in the following order :
  - a- 3 et 7
  - b- 1, 2, 4, 6, 9, 11.
  - c- Rockets nuts.

Tighten these screws and nuts moderately.  
 a- Remove guides n° 8.0115, using knurled fittings ends and replace them by the corresponding screws.

- 9 - Following the tightening sequence given on page 10, use torque wrench with 19 mm hexagonal dowel, to tighten :

- preliminary tightening torque :  
 28,9 to 36,1 ft/lbs (4 to 5 m.kg)

- definite torque :  
 50,6 to 57,8 ft/lbs (4 to 5 m.kg).



**NOTE :** To torque screws 11 and 12, it is recommended to use an universal joint between the torque wrench and the dowel.

For the other screws, a short extension is enough.

- 10 - Adjust rockers clearance (page 12).

**NOTE :** Increase the original clearance by 0,05 mm, which gives :

inlet : 0,15 mm

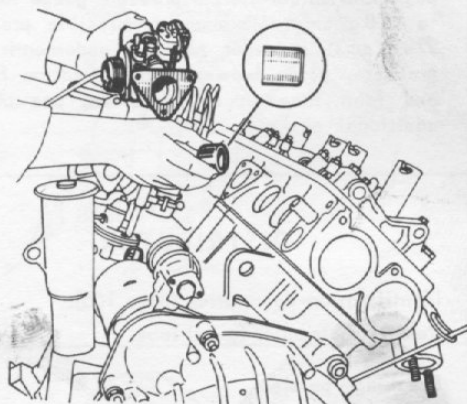
exhaust : 0,25 mm.

At the time of the compulsory cylinderhead retightening (executed on a cold engine) at 1000 km, these clearances will be reduced to their normal values :

inlet : 0.10 mm

exhaust : 0.20 mm.





- 11 - Install all accessories, adjust the controls connect the lines, electrical connexions and battery in the reverse sequence of the dismantling operations.

Set the time-clock.

### CARBURETTER

Identification-Description-Adjustment (page 23).

For all jobs, remove the assy, carburetter inlet hose.

When dismantling and reassembling, handle parts with care, avoiding any shock.

Blow the carb. barrel and lines when cleaning is required.

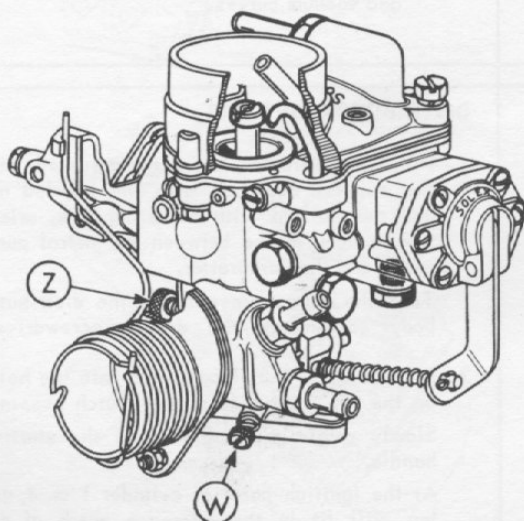
Systematically replace the barrel, flange and hose gasket.

Check the carburetter and hose joint faces for level, and surface them if necessary.

*NOTE - When refitting, take care not to mistake the anti-return valve holder of the accelerating pump with the choke jet.*

### INSTALLING THE CARBURETTER AND HOSE ASSY

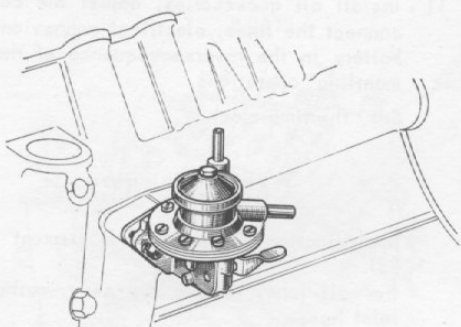
Install the inlet choke tube, with the smallest inner dia. inside the cylinderhead. Install the assy, fit the feeding and vacuum lines and adjust the gas and throttle controls with a 2 mm operation safety.



### IDLING SPEED ADJUSTMENT (to adjust on warm engine)

Before checking the idling speed, it is essential to check the sparking plugs condition, and to carefully adjust the clearance between poles and between the breaking points.

- Slightly tighten the throttle thrust screw **Z** in order to increase the engine r.p.m.
- Unscrew the mixture control screw **W** until the engine starts racing, then tighten it again, until the engine turns smoothly.
- Very slowly unscrew screw **Z** to bring the engine to run at about 650 r.p.m.
- Should the engine tend to race, slightly tighten the mixture screw again. In no case should this screw be fully tightened.



### PETROL PUMP

Identification - Adjustment (page 24).

In case of an abnormal petrol consumption, check the static pressure with nil output. Install in by-pass, on the petrol line, between pump and carburettor, a pressure gauge rated 0 to 500 g/cm<sup>2</sup>. Maximum permissible pressure: 220 g/cm<sup>2</sup>. In order to keep underneath said pressure, place between pump fixation flange and joint face on cylinderblock, one or two additional gaskets.



### DISTRIBUTOR

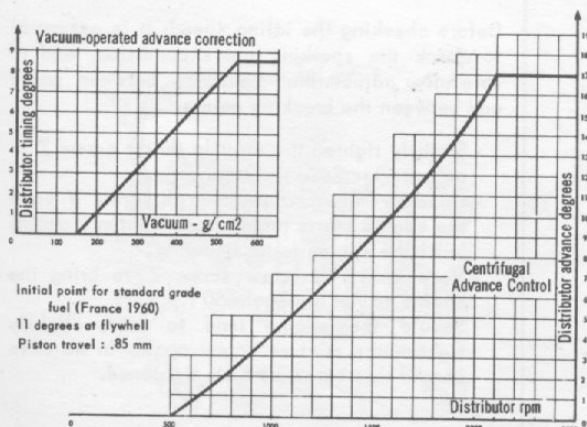
Identification-description (page 165).

Remove distributor for all jobs.

#### Breaking points.

Before proceeding with a precise distributor inspection, check the breaking points for proper bearing. Replace them if necessary.

- 1 - Proceed with a provisionnal adjustment with a 0.50 mm gap.
- 2 - Install the distributor on the testing bench. check :
  - a - Static check ; cam angle, for each cam boss  $57^\circ \pm 1$ .
  - b - Dynamical test : automatic, centrifugal and vacuum curves.



### DISTRIBUTOR SETTING

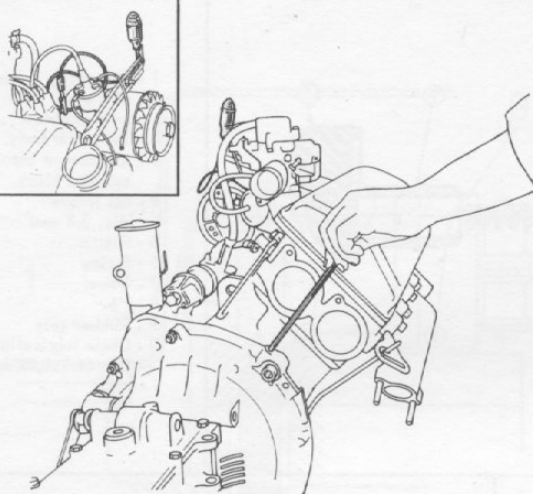
- 1 - Fit the distributor, correctly adjusted, into the support equipped with the knurled nut and the collar with adjusting fork, orient the vacuum intake between the petrol pump outlet and the carburettor.

Turn the rotor, pressing on the distributor body to engage the driving screwdriver.

- 2 - Drive a 8 mm dia. (spark plug into the hole, on the top right side of the clutch housing)
- Slowly rotate the engine with the starting handle.

At the ignition point of cylinder 1 or 4, the bar will fit in the reference notch of the flywheel.



**3 - Connect :**

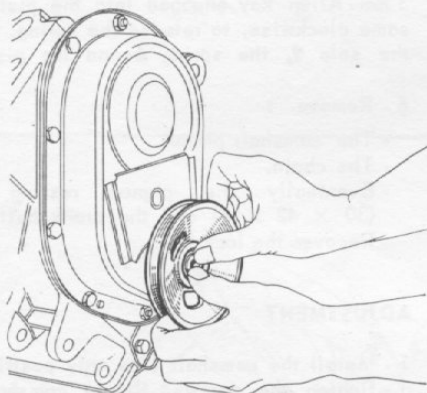
- wire 3 on distributor terminal,
  - a tell-tale lamp between this terminal and the earth.
  - the battery.
- Switch on.

**4 -** Rotate distributor to the left, to its maximum displacement (the lamp is off). Come back slowly to the right, until the lamp switches on.

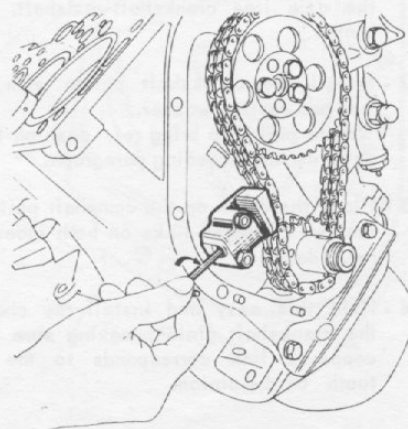
Tighten the adjustment collar.

**5 -** Remove the bar from the clutch housing and start again with operation n° 2 for control. At the very moment when the bar goes in, the lamp should go on. Eventually, correct the adjustment, acting on the knurled nut.**6 -** Lock the support collar nut.**7 -** Install the distributor head with the wires.

**NOTE -** The wire n° 1 is always nearest the vacuum plug.

**2 - TIMING GEAR****REMOVAL****1 -** Preliminary operations (page 27).**2 - a -** With cylinderhead on : Remove the sparking plugs.

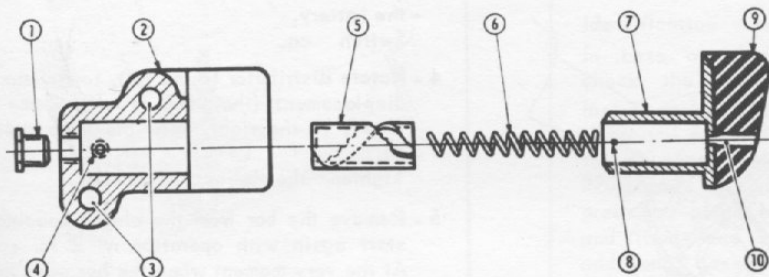
**b -** With cylinderhead off : Set the cylinderliners with the setting screws 8.0104 D.

**3 -** Remove the crankshaft pulley and its locking key, the timing gear housing and the oil rejecting ring.**4 -** Release the chain tensioner :

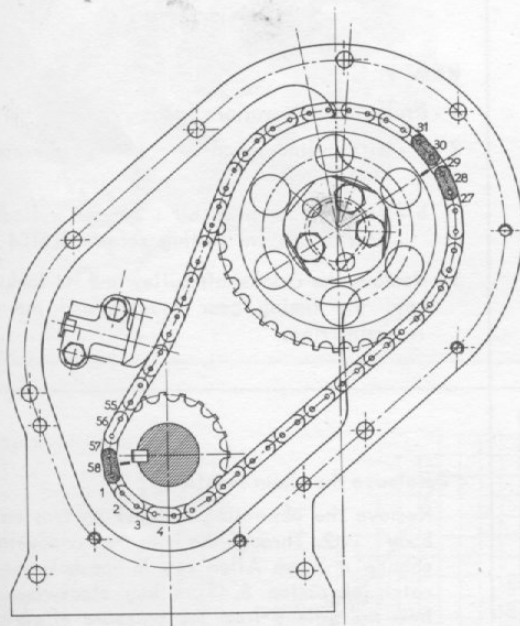
Remove the obturating screw 1 on tensioner body 2. Through the hole thus uncovered, engage a 3 mm Allen key in the hexagonal catch of piston 5. Turn key clockwise to free the sole 9 from the pressure of spring 6.

**5 -** Remove :

- Both tensioner to cylinder - bloc fixation screws 3.
- The tensioner.
- The filter.



- 1 - Obturating screw with sheet iron lock washer
- 2 - Tensioner body
- 3 - Attachment onto cylinder block
- 4 - Oil intake (dia. 0,8 mm)
- 5 - Piston
- 6 - Spring
- 7 - Dowel
- 8 - Pin
- 9 - Rubber sole
- 10 - Chain lubrication line (dia. 1,02 mm)



Hold the sole in the tensioner body. Using the 3 mm Allen key engaged into the piston, turn same clockwise, to release the spring. Recover the sole 9, the spring 6 and the piston 5.

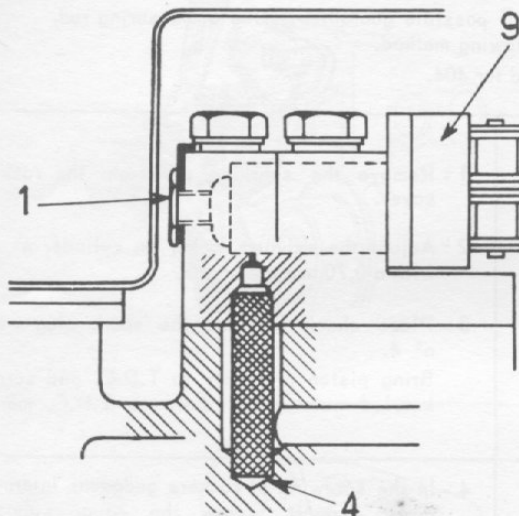
#### 6 - Remove :

- The camshaft pinion
- The chain.
- Eventually the pignon resting washer (30 x 42 x 4) and the crankshaft pinion. Recover the lock-key.

#### ADJUSTMENT

- 1 - Install the camshaft (one only position) and tighten the screws. Rotate camshaft until the ref. saw-dash comes, on the outside, in the axis line crankshaft-camshaft. Remove pinion.
- 2 - Install the crankshaft pinion with locking key and resting washer. Rotate pinion to bring ref. dash on the same axis as in preceeding paragraph.
- 3 - Place the chain on the camshaft pinion, with the two coppered links on both sides of the ref. dash.
- 4 - Hold this assy and install the chain over the crankshaft pinion, making sure that the coppered link corresponds to the marked tooth on the pinion.





5 - Install and tighten the camshaft sprocket using a new sheet-iron lock-washer. Screw tightening torque : 1,75 to 2,5 m.kg (12,6 to 18 ft/lbs).  
Peen screws.

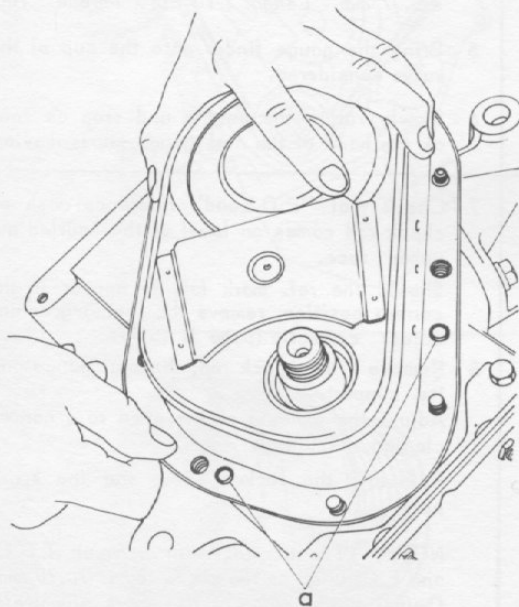
6 - Install the tensioner.  
Make sure that :

- a - The piston moves freely inside the sole dowel.
- b - The filter, the oil intake orifices on the chain tensioner and the chain lubricating orifices on the sole are clean.

Fit the spring and piston into the dowel.

Compress the piston in "loose" position, using the 3 mm Allen key and turning clockwise, install this assy into the tensioner body.

Place the tensioner in position against the cylinderblock, introducing the filter 4 into its location in the oil line.



**IMPORTANT** - The tensioner should perfectly bear on its joint face.

Install the tensioner.

Screws tightening torque : 3,6 to 5,42 ft/lbs

Using the ALLEN key, rotate slowly clockwise and stop as soon as the piston operates under the pressure of the spring. Install and safety the obturating screw 1.

**NOTE** - Never assist the chain tensioner. This would compromise :

- The resistance of the shoe.
- The operation silence.

7 - Reinstall the oil rejecting cup, the timing gear cover located by two studs a and a new gasket, the pulley and the locking key.

Lock and peen the starting grip.

Tightening torque : 10 to 12 m.kg (72.3 to 86.76 ft/lbs).

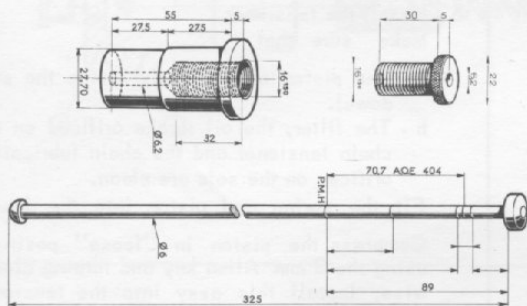
8 - Check and rectify the distributor setting. (page 30).

## TIMING GEAR ADJUSTMENT CHECK

The timing adjustment reference links on the chain only correspond with the sprockets reference marks every 58 revolution of the engine.

In order to carry out a quick check, with all possible guarantee, make a measuring rod, according to drawing below, and proceed as per following method.

The existing rod for 203/403 can be modified for 404.

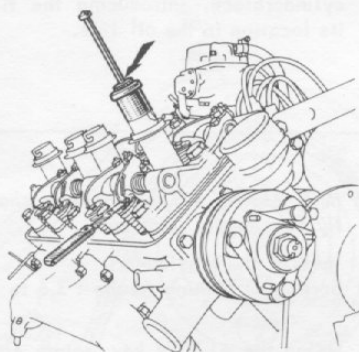


1 - Remove the sparking plug and the rocker cover.

2 - Adjust the exhaust rocker on cylinder n° 4, with a 0,70 mm clearance.

3 - Place check rod into the spark plug well n° 4.

Bring piston precisely to T.D.C. and screw knurled nut on rod down to T.D.C. mark.



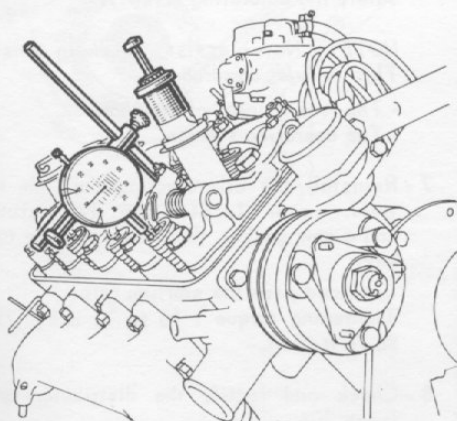
4 - In the screwing of rockers gudgeons intermediary support, screw the gauge support n° 8.0110 GZ equipped with the dial gauge n° 8.0504.

NOTE - The supports bearing ref. G, of the earliest type, have no cutting off facing the knurled portion. This cutting off will be realized in the workshop. :

dia. 7 mm - Length : 10 mm - Thread : 100.

5 - Bring the gauge finder onto the cup of the valve considered.

6 - Slowly rotate the engine and stop as soon as the hand of the dial gauge starts moving.



7 - Check that "E.O. Lead" reference dash on check rod comes on level of the knurled nut upper face.

Should the ref. mark fail to appear in the correct position, remove the timing gear and adjust correctly (page 31 to 33).

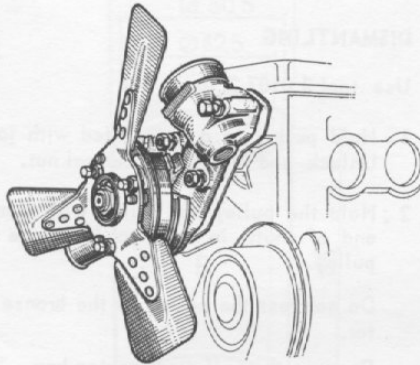
8 - Remove : the check rod, the dial gauge and its support.

Adjust the exhaust rocker n° 4 to a normal clearance (20 mm).

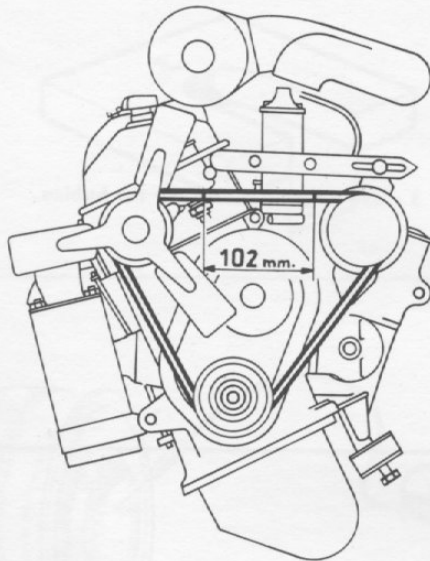
Reinstall the rocker cover and the spark plugs.

NOTE - The displacement between T.D.C. and E.O. Lead on the check rod is 70,70 mm. Owing to the slant of the spark plug well, this corresponds to an actual displacement of 68,30 mm for the piston.



**3 - WATER PUMP****REMOVAL**

- 1 - Preliminary operations (page 26).
- 2 - Remove :
  - Water intake radiator hose.
  - Fan belt.
- 3 - Disconnect :
  - The lower water hose and the heater line.
  - The magnetic fan switch wire n° 57, or the carbon holder, according to the type of water pump considered.
- 4 - Remove the five fixation screws and remove the pump.

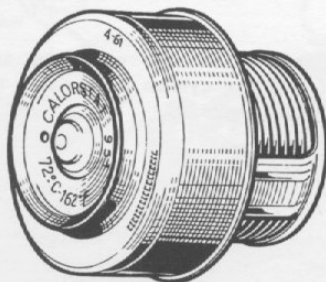
**INSTALLATION**

Carefully clean the mating faces on water pump and cylinderhead.  
Smear both faces of gasket with seal paste.  
Proceed in the reverse order as per removal.

**FAN BELT TENSION**

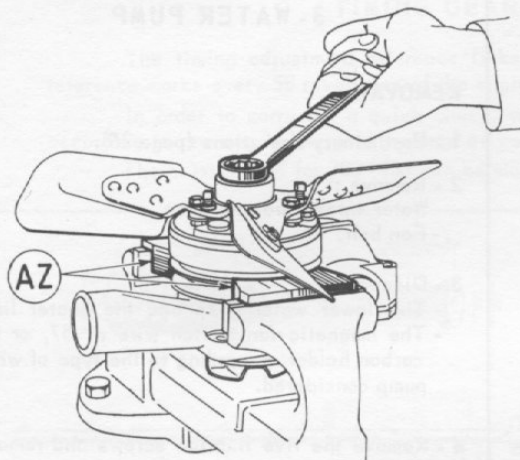
Before installing the fan belt, draw two reference marks, 100 mm apart, on back of belt.  
After tensioning, this distance should not exceed 102 mm.

*NOTE - These belts might seem to be loose and to whip. This is due to their particular elasticity. They nevertheless keep driving the generator and water pump correctly.*

**THERMOSTAT**

Should the cooling water reach abnormal temperatures, check thermostat for proper operation, according to the characteristics on page 22.

*IMPORTANT - Never take away the thermostat plug. This contributes to keep the engine at its best operation temperature.*

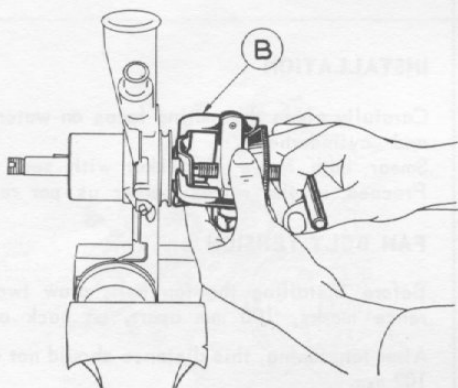
**DISMANTLING**

Use tool 8.0107 Z (page 39)

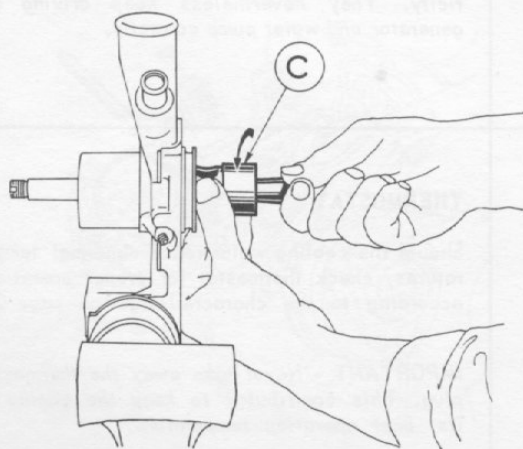
- 1 - Hold pulley in a vice fitted with jaws **AZ**.  
Unlock and remove the central nut.
- 2 - Hold the pulley and strike with a mallet at end of shaft, in order to disengage fan and pulley.

Do not rest the pulley on the bronze collector.

Recover the half-disc locking key.

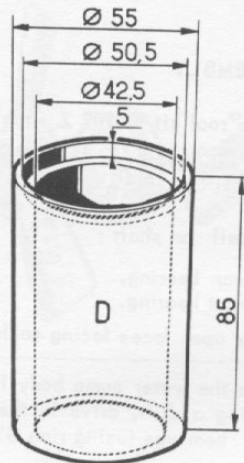


- 3 - Use puller **B** to remove the turbine.



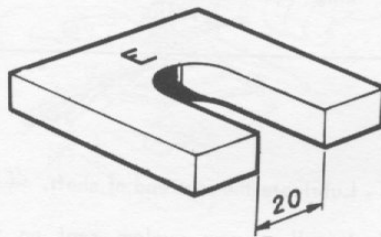
- 4 - Drop a little thin oil under seal rubber.  
Remove the cyclam seal, using tool **C**, and rotating same.





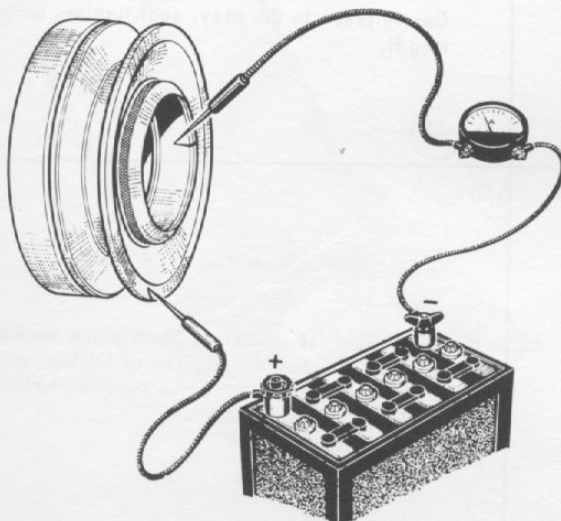
5 - Remove the front bearing circlet.

6 - Dip the pump body into boiling water. Using a press and a drift, remove the shaft with both its bearings, resting on spacer D.



7 - If necessary, remove :  
 - the front bearing  $15 \times 42 \times 13$   
 - the rear bearing  $12 \times 37 \times 12$   
 resting on plate E.

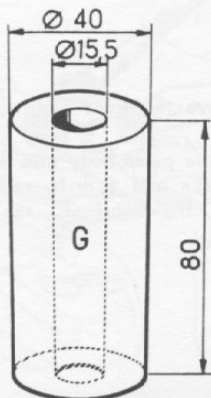
NOTE : The tools D and E will be manufactured in the workshop.



#### CHECK

- Check the cyclam seal and bearings for condition.
- There should be on the outer bearing face of the driving cheek traces of seizing. These are normal and useful.
- Check the electro-magnet, placing one terminal of ammeter inside the collector and the other terminal on the pulley body.

Ammeter reading	Interpretation
0	Winding cut
0,6	Normal
Over 0,6	Winding earthed

**REASSEMBLY**

Use the tool kit 8.0107 Z page 39.

Smear the bearings with "Esso Multipurpose Grease H".

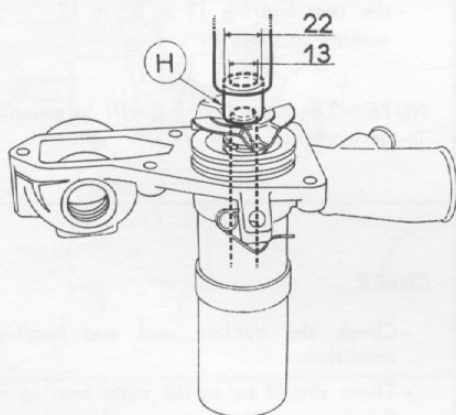
**1 - Install on shaft :**

- Rear bearing.
- Front bearing.

The open faces facing each other.

**2 - Dip the water pump body into boiling water. Using a drift, drive in the shaft fitted with its bearings (using ring G).**

**3 - Position the arresting circlip and take up play between circlip and bearing, by striking rear of shaft.**



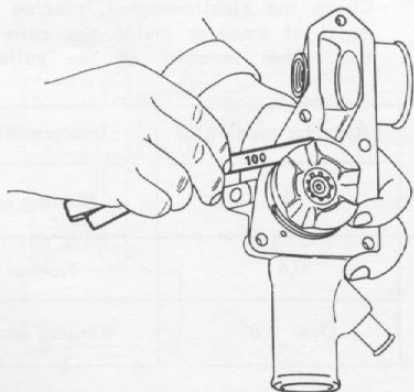
**4 - Lubricate the rear end of shaft.**

**5 - Install a new cyclam seal on the shaft.**

Engage the turbine :

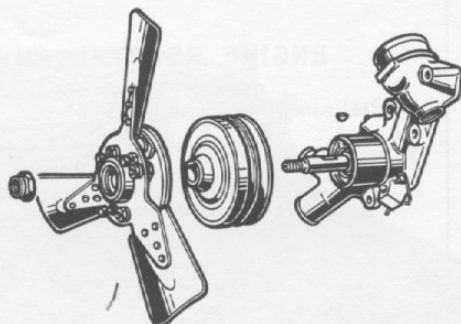
- a) into the seal driving pins.
- b) over the shaft channelings.

Gently press in the assy, seal turbine, using ring H.



**6 - Check and, if necessary rectify the turbine position. It should turn, free of buckle, with a 1 mm maximum clearance between turbine blades and pump collar.**

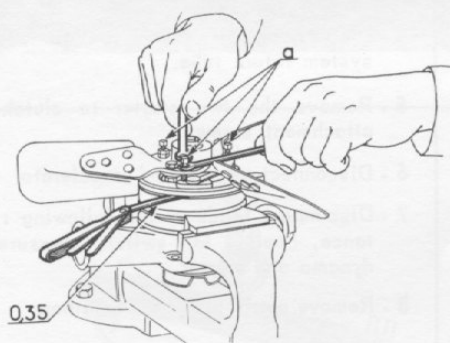




7 - Install half-disc key at other end of shaft. Position the electro-magnet pulley and the fan.

8 - Hold the pulley in a vice fitted with jaws AZ.

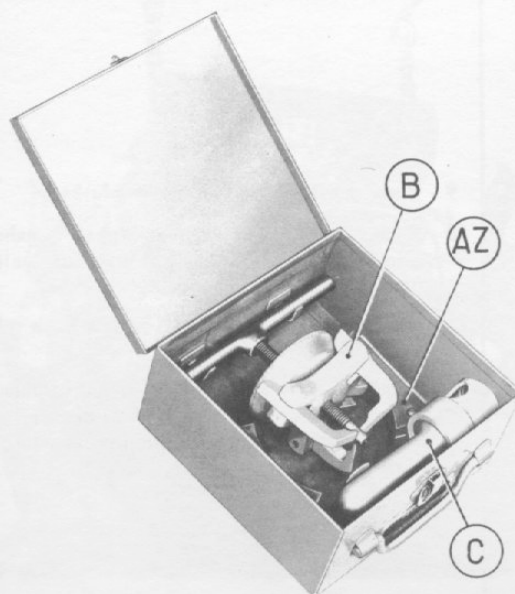
Torque nut to 21,6 to 28,9 ft/lbs and safety.



9 - Check the gap between fan and magnet. Normal gap : 0,35 to 0,40 mm.

If necessary, adjust it by means of the three square headed adjustment screws (a).

10 - On workbench, check magnetic fan for proper operation, by connecting the carbon holder-wire at (+) end, and the water pump with (-) end of a battery.



11 - After installation on car, start the engine to warm up the cooling water.

The fan should take the drive at 105°F (84° C) and switch off at 167°F (75° C)

In case of non operation :

After checking the fuse F3, short-circuit both terminals of the thermostatic switch ; if the fan then take the drive, so is the thermostatic switch defective.

If the operation is defective (out of the above temperature limits), replace the thermostatic switch.

Thermostatic switch tightening torque : 21,6 to 36,1 ft/lbs.

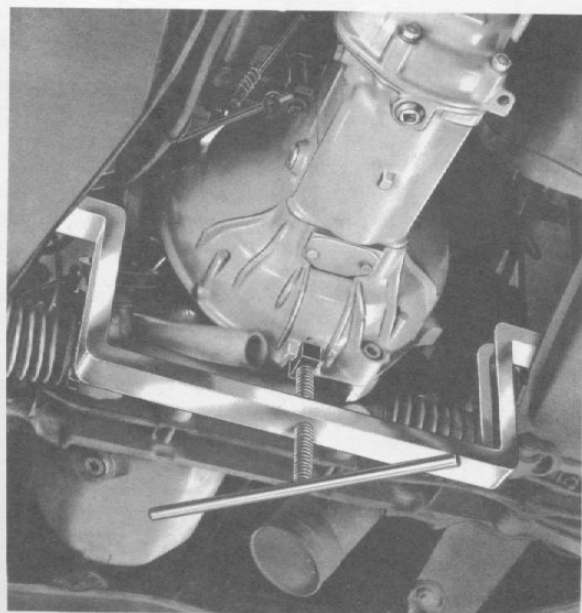
#### TOOL KIT N° 8.0107 Z DESCRIPTION

- AZ Jaws
- B Turbine puller
- C Cyclam seal puller.



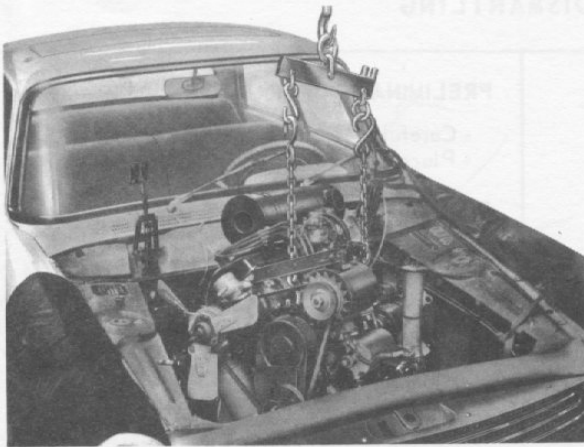
### ENGINE REMOVAL 404

- 1 - Preliminary operation (page 26)
- 2 - Remove - windshield washer nozzles
  - bonnet
  - starting handcrank
  - windshield washer reservoir
  - filter to carburettor coupling
  - ignition coil
  - battery
  - town horn.
- 3 - Disconnect radiator hoses as well as carburettor heating and conditioning lines.
- 4 - Disconnect and remove radiator and heating system return tube.
- 5 - Remove the two starter to clutch housing attachment screws.
- 6 - Disconnect choke and accelerator controls.
- 7 - Disconnect leads at the following : thermistance, cooling fan switch, pressure switch, dynamo and starter.
- 8 - Remove petrol pipe from breather.

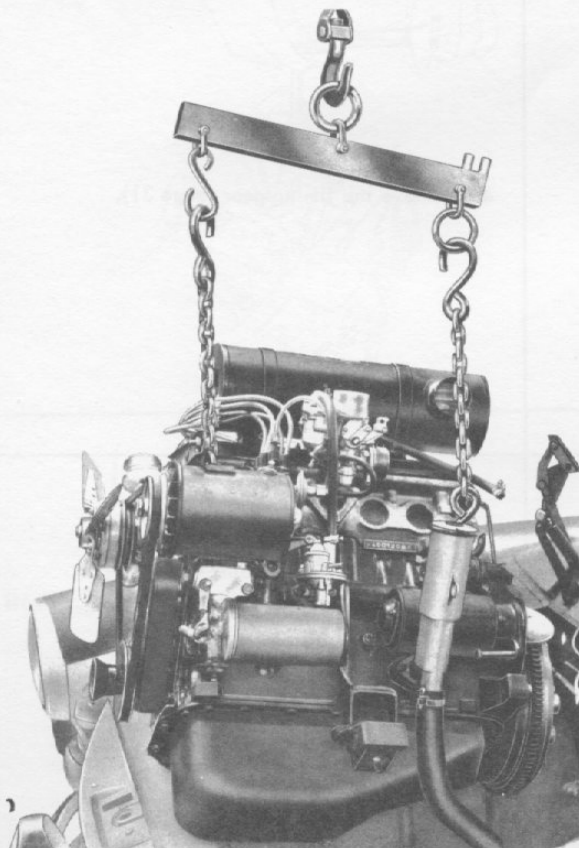


- 9 - Remove clutch housing cover plates.
- 10 - Remove the two exhaust pipes to exhaust manifold flange attachment nuts as well as attachment nut.
- 11 - Install support saddle n° 8.0103 Z in place (with fitting end n° 8.0103 C).
- 12 - Remove the 3 clutch housing attachment screws (wrench n° 8.0202).





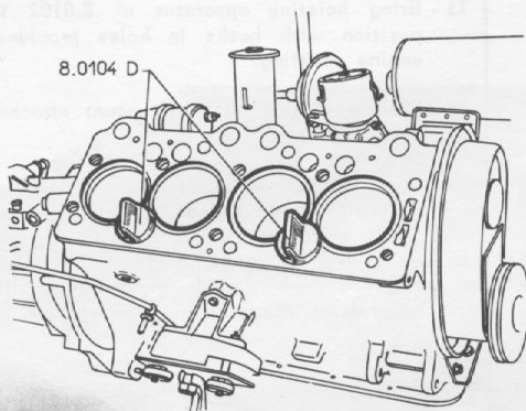
- 13 - Bring hoisting apparatus n° 8.0102 Y in position with hooks in holes provided in engine casting.
- 14 - Remove engine to front mount attachment nuts.
- 15 - Operate hoist, while working engine towards the front to have it clear the gearbox.
- 16 - As soon as propeller shaft has cleared clutch assembly, guide engine diagonally to help clearing body.



#### RE - INSTALLATION PROCEDURE

- 1 - Bring in engine diagonally as for removal.
- 2 - Engage 4th speed to help engine and gearbox engagement.
- 3 - Operate hoist and support saddle simultaneously to obtain correct alignment of engine and gearbox until clutch housing is properly rested on engine casting, with clutch protective plates in position.
- 4 - Reinstall engine on its front mounts.  
After all accessories are reinstalled, fill water system, reconnect battery and set clock.
- 5 - Check oil level.

## ENGINE DISMANTLING

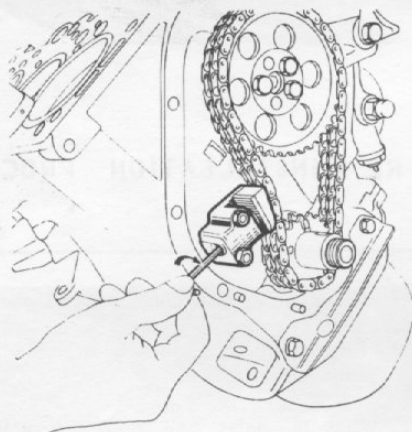


## PRELIMINARY OPERATIONS

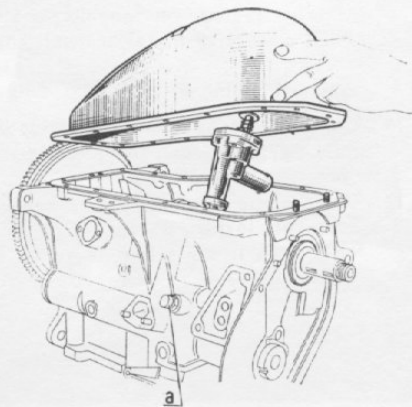
- Carefully clean the engine.
- Place it on an appropriate support.

## DISMANTLING

- 1 - Drain the oil sump.
- 2 - Remove the distributor, the generator with its belt, the petrol pump, the oil filter (mind the oil which is left in it), the starter and the breather.
- 3 - Remove the cylinderhead (page 27).
  - Set the cylinderliners by means of the two screws 8.0104 D.

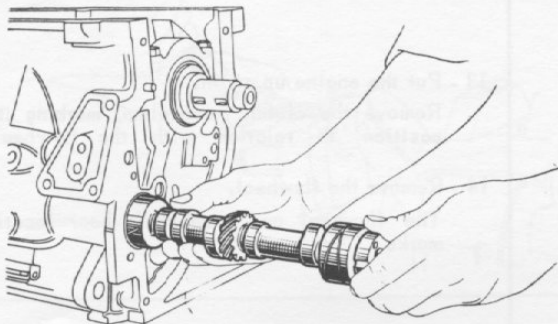


- 4 - Remove the timing gear (page 31).



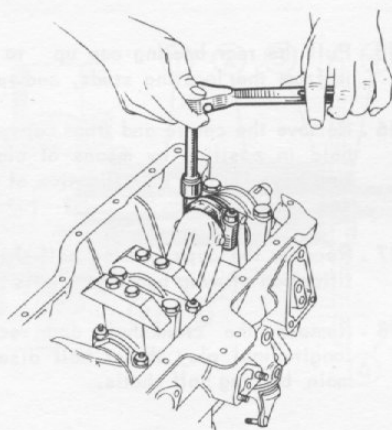
- 5 - Remove the filter support.
  - Hold the engine aslant and take off all tapets.
  - Turn the engine upside down.
- 6 - Remove the oil sump.
- 7 - Remove the oil pump.
  - a) unscrew the cap nut (a)
  - b) remove the fixation needle screw.





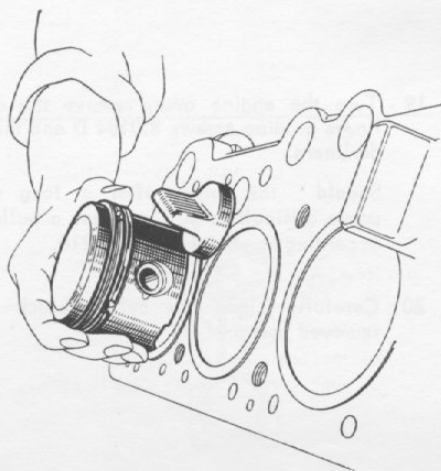
8 - Remove front thrust and take the camshaft out with care.

9 - Remove the timing gear housing support and gasket.



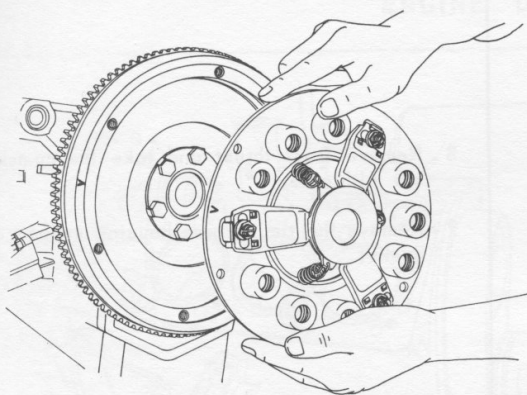
10 - Unscrew the connecting rods caps nuts.  
- Remove the connecting rods caps and bearing shells.

- Install these on a tray in the dismantling order.



11 - Lay the cylinderblock on its side and set it.  
Remove the assies :connecting-rod/ pistons.

12 - Recover the connecting-rods bearing shells.  
- Assemble the corresponding caps, paying attention to the reference marks (page 15).

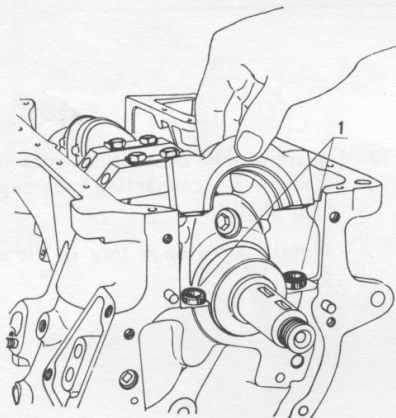


13 - Put the engine up again.

Remove the clutch mechanism, marking its position in relation with the flywheel.

14 - Remove the flywheel.

The flywheel and crankshaft bear location marks.

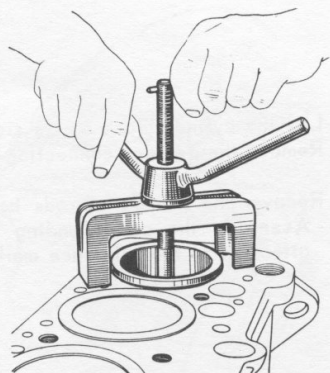


15 - Pull the rear bearing cap up to disengage it from the locating studs, and remove cap.

16 - Remove the centre and front caps, which are held in position by means of elastic locating keys (1) (for identification of said caps, see page 17).

17 - Recover the caps bearing half-shells. (Identification of main bearings shells : page 18).

18 - Remove the crankshaft and recover both longitudinal play thrust half discs and the main bearing half shells.

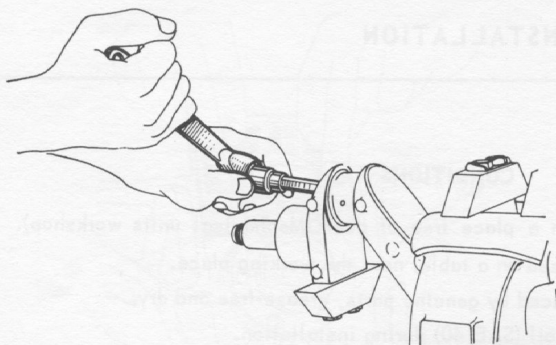


19 - Turn the engine over, remove the cylinder liners holding screws 8.0104 D and the cylinder liners.

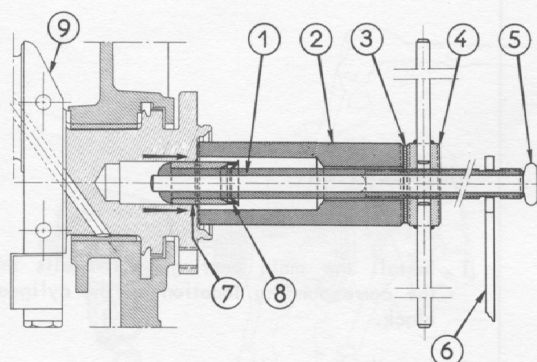
Should the liner, after a long service, prove difficult to pull out, use a puller made according to sketch on page 210.

20 - Carefully clean the cylinderblock and all removed parts.





- Remove the obturating screws (dia 20 - 150 thread) from the crank pin and clean out the lubricating lines.
- Inspect each unit removed from the engine, checking the dimensions and the condition of the journals.
- Systematically discard each part found to be out of tolerances.  
(Heading "Technical Description" pages 8 to 25).



### CRANKSHAFT - PECULIARITIES

#### 21 - a - Journals

The crankpins and main journals can be rectified up to definite oversizes (see page 16).

Mark the counterweights and remove them. (page 16).

Have the bearings corresponding to the crankshaft oversize.

#### b - Drive shaft locating ring

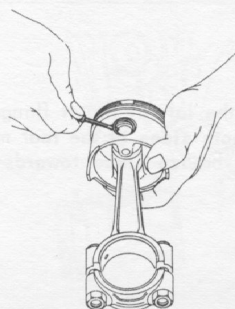
The guiding ring -  $16 \times 21,25 \times 25$  is self-lubricating. Should it be worn out, pull it out, using tool made as per sketch on page 217 (class 15).

**NOTE** - Never immerse this ring into petrol or trichlore, lest it would loose its self-lubrication properties.

Lubricate with engine oil.

#### Extract the drive shaft locating dowel :

- |                              |                              |
|------------------------------|------------------------------|
| 1 - Steel hook               | 6 - Flat spanner 12 a/c flat |
| 2 - Steel sleeve             | 7 - Locating dowel           |
| 3 - Steel ring               | 8 - Tightness seal           |
| 4 - Steel nut                | 9 - Crankshaft               |
| 5 - Rod, dia. 8, length 220. |                              |



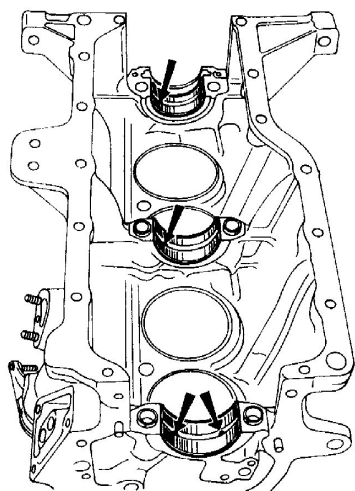
### CONNECTING RODS & PISTONS

- 22 - Remove the piston gudgeon pins arresting circlips, using a scriber.  
Remove the pistons pins by hand and remove the connecting rods.  
Check the connecting rod for condition : warping or corkscrewing.  
In order to exchange the cylinder-liners and pistons, it is necessary to remove the engine from the car.

## ENGINE INSTALLATION

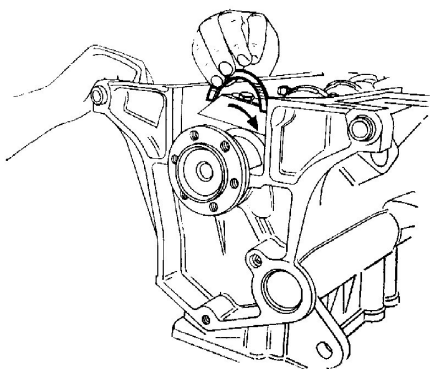
## PRELIMINARY CONDITIONS

- The engine installation should be carried out in a place free of dust (Mechanical units workshop).
- The constituent parts, clean and dry, will be exposed on a table, near the working place.
- The parts which show traces of wear will be replaced by **genuine parts**, grease-free and dry.
- The various units will be lubricated with engine oil (SAE 40) during installation.
- Have at hand :
  - the tool-kit n° 8.0110 Z
  - the cylinderhead guides n° 8.0115
  - SUNNEN torque wrench
  - the checking tool n° 8.0504 (page 208).



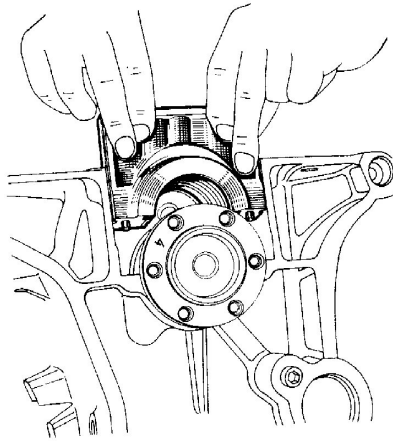
## INSTALLATION

- 1 - Install the main bearings half-shells into the corresponding location on the cylinder-block.
- 2 - Install the camshaft.  
Oil the main journals.



- 3 - Fit the lateral thrust flanges, original size, on both sides of the rear main bearing, with the bronze face towards the crankshaft.

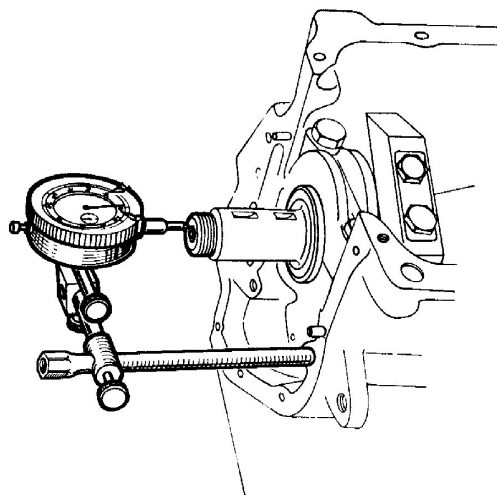


**4 - Install :**

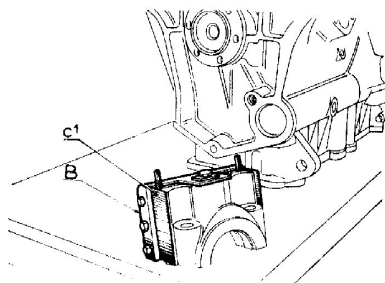
- the rear main bearing cap equipped with its half shell and without lateral seals.
- the centre cap (2 bosses) and front cap (1 boss) with their half shells.

Torque the main bearings caps nuts no 50,6/57,8 ft/lbs.

Rotate the crankshaft a few turns.

**5 - Check the crankshaft longitudinal play :**

- Install the support n° 8.0110 Z6, equipped with the dial gauge n° 8.0504, in a timing gear housing fixation hole.
- Bring the dial gauge finder to rest on the front end of the crankshaft.
- By displacing the crankshaft longitudinally, read on gauge dial the actual value of the play.
- It should range from 0.08 to 0.20 mm.
- Should the play exceed this tolerance, remove the rear main bearing main cap and replace the thrust flanges by two other flanges selected in the oversize series (page 17).
- Fit rear bearing cap and check play.

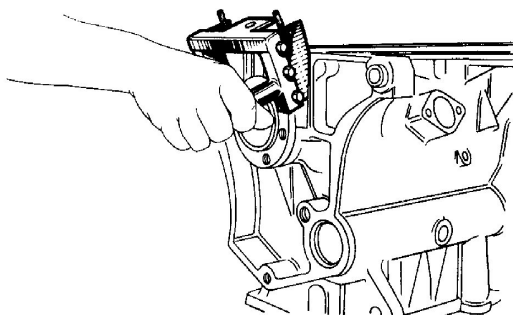
**6 - Remove the rear main bearing cap and proceed with the definite installation.****7 - Use the toolkit n° 8.0110 Z (page 207).**

The apparatus B being equipped with the foils C1 at minimum width.

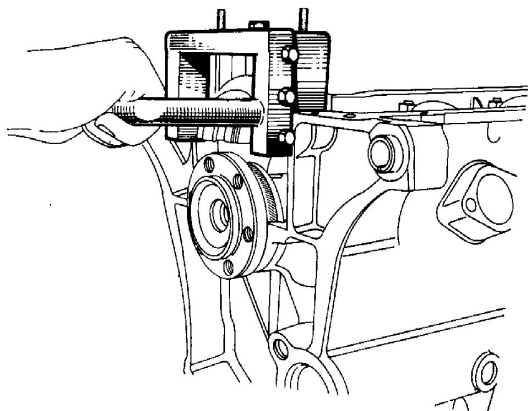
Install both rubber joints on main bearing cap.

Engage apparatus, opening the foils slightly.

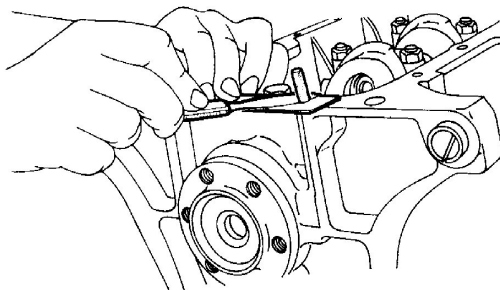
Hand-tighten the outer part of the foils.



- Fit apparatus over bearing cap with one of the screws from the lower oil sump, fitting under the screw the "Blocfor" washer and the plate (waiting under one of the foils fixations screws).
- Oil the foils.
- Tilt the assy and bring it into the opening in the cylinderblock.
- Bring it vertically and drive it down, striking slightly with the handle of a hammer.

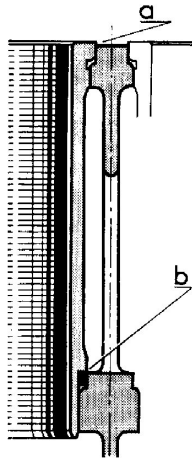


- Fit the bearing cap, remove the apparatus **B** and torque the screws to 50,6/57,8 ft/lbs.
- Using a .05 mm shim, make sure that the bearing cap is properly fitting onto the cylinderblock face.



- Cut off the lateral seals .05 mm above the joint face of the cylinderblock.
- Engage the shim n° 8.0110 ZD over both seals (minimum centre-to-centre distance).
- Cut off these seals with a sharp knife sliding along the shim.





8 - Place a new rubber seal (b) on each cylinderliner.

Lay the engine on its side and set it.

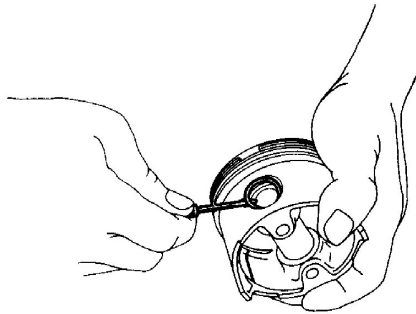
9 - Install the cylinderliners in their housing orienting the reference dashes on the came shaft side.

Set the cylinderliners by means of the screws 8.0104 D.

*NOTE - The cylinderliners out of level (a) above the cylinderblock joint face, should range between .015 and .075 mm.*

To check it :

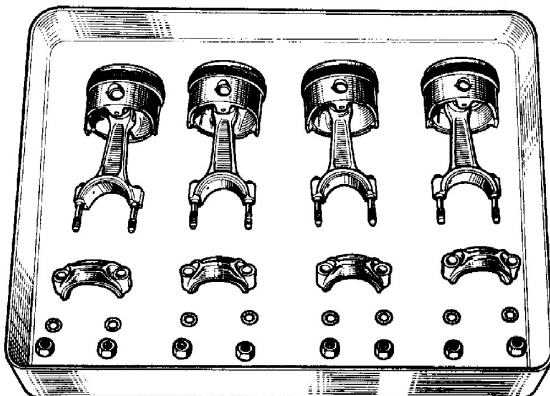
- install the liner without seal.
- use a dial gauge.



10 - In the case of a "liners and pistons" exchange, remove the gudgeon pins from the new pistons, paired with the cylinderliners lubricate them and drive them by hand into the pistons and connecting rods small ends.

Never modify the mating of the pistons & axles, which was realized when manufactured, by means of high precision equipments.

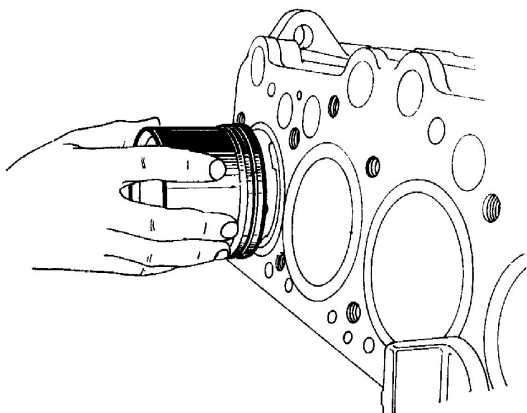
An overtightening might cause undue misshapenings which would affect the service life of the engine.



11 - When one looks at the connecting rod through its bore, with the oil rejecting orifice on the L.H. side, the ref-mark AV (front side) and the arrow on the piston should be turned towards one (see figure on paragraph "Piston", page 14).

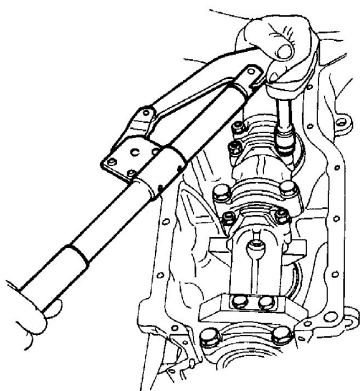
Carefully place the circlips.

Lay on a tray : connecting rods and pistons, in the connecting rods dismantling order (very important caution).



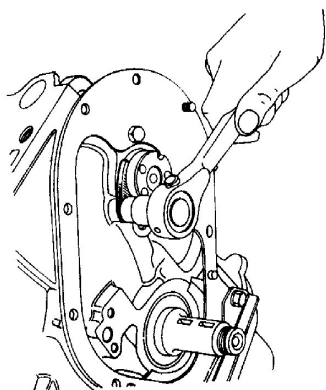
12. Space the rings gaps  $120^\circ$  apart and oil them, as well as the pistons, with engine oil.

13. Using a fitting ring (in a tapered machined liner), fit the assy : piston connecting rod, with the arrow on top of the piston showing to the front part of the engine, and in the same sequence (1-2-3-4) as observed when dismantling.



14. As soon as the pistons are in, fit each connecting rod with its bearing and cap, assembling them with the corresponding crankpin, taking care not to seize the crankpin. The machining references on the connecting rod and cap should appear on the same side.

The new bolts and "Blocfor" lockwashers will be torqued to 30,7 to 34,3 ft/lbs.



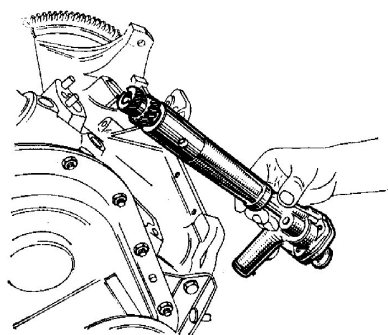
15. Put the engine up.

Install the timing gear housing support sheet iron with its paper gasket.

Install the camshaft with its front thrust, held in position by means of a screw.

Install and adjust timing gear (page 32).





Replace the plastic ring seal of the self-lubricating ring. Oil this ring.

16 - Install the flywheel, with a new lock paying attention to the location marks. Torque the screw to 43,3/47 ft/lbs. (6/6,5 mkg).

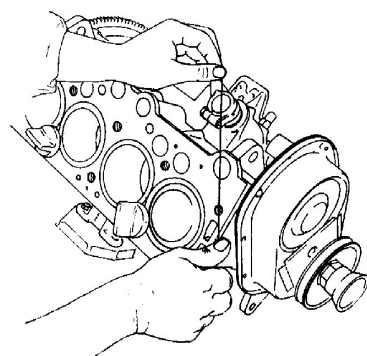
17 - Install the clutch plate and mechanism, looking after the location marks.  
Use a drive shaft to locate the plate.

18 - Install the oil pump.

For a proper orientation of the distributor :

- Rotate the crankshaft to bring the piston n° 4 at T.D.C.  
(N° 1 cylinder tappets : end exhaust/ beginning inlet).

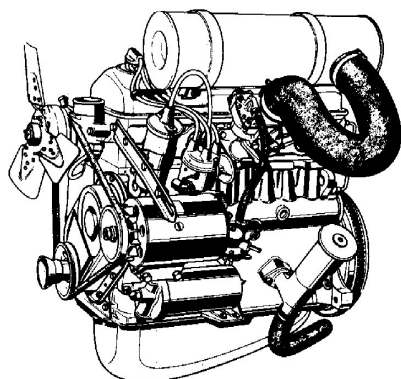
- Bring the oil pump in position ; with the small end of the distributor driving screwdriver facing away from the engine.



- Fit and lock the pump.

- Make sure that the screwdriver slot is oriented to the threaded cylinderhead screwhole n° 12.

19 - Install the oil sump and its cork gasket.  
Turn the engine up.



20 - Install : - the oil filter  
- the petrol pump  
- the breather

21 - Position the valve pushrods.

Install : the cylinderhead (page 28).  
the carburetter (page 29).  
the distributor (page 30).  
the generator and starter (pages 166,167).  
the fan belt, tension (page 35)  
and the accessories.

Fill up with oil (page 40)