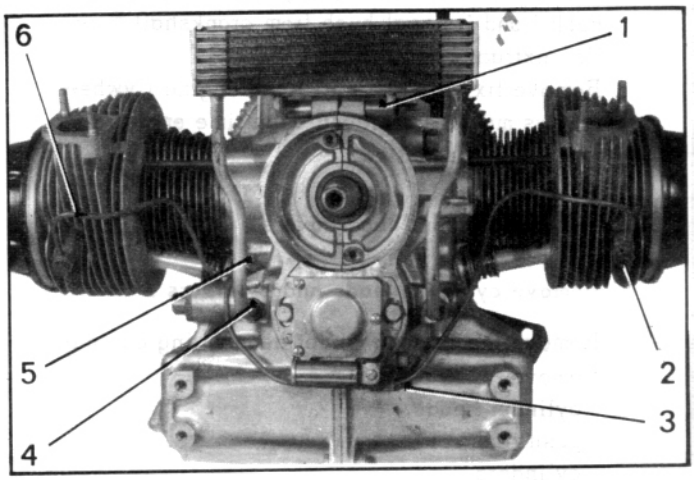
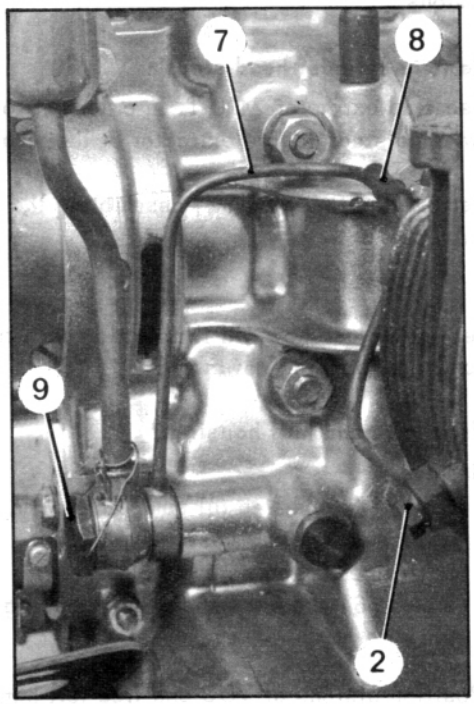
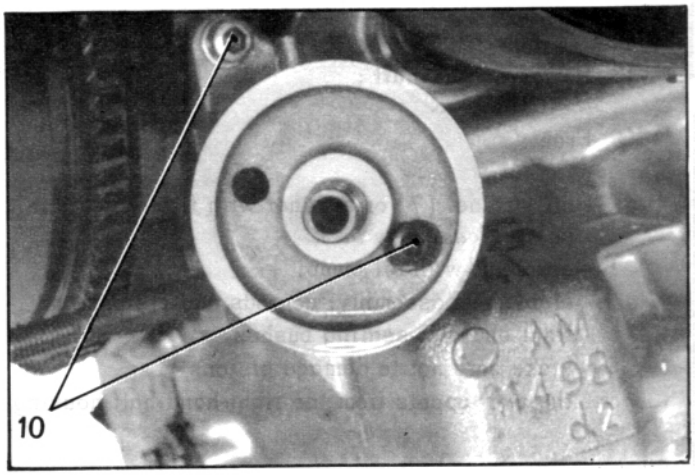
OVERHAULING AN ENGINE







DISMANTLING

1. Strip engine :
(See relevant operation).
Place the engine on support MR. 630-43/4.
Remove :
- alternator *(as applicable)*,
- fan,
- carburettor and its distance piece,
- inlet and exhaust manifold,
- the assembly fan cowl and cylinder cooling panels,
- crankcase breather,
- petrol pump,
- dynamo and its armature *(as applicable)*,
- clutch mechanism and clutch disc, or coupling ring with lined segments (centrifugal clutch).

2. Remove oil cooler :

Remove :
- fixing screw on crankcase,
- the two union screws (4) or the two union screws (9),
- the oil cooler and its two distance pieces (1).

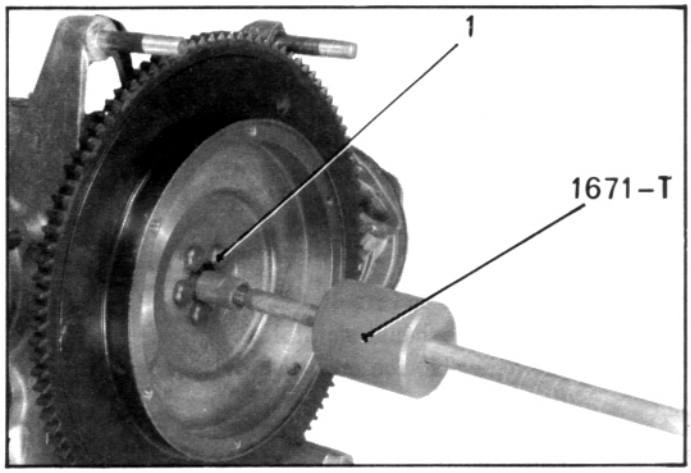
3. Remove, if necessary, the filter cartridge (spanner 1683-T).
Remove :
- the two cartridge bracket fixing screws (10),
- the cartridge bracket equipped with its O-ring seal.

4. Remove tube (6) or lubricating tubes (7) *(as the case may be) :*

Remove :
- union screw (5) on crankcase *(as applicable)*.
- union screws (2) on cylinder heads,
- clip (3) or clips (8) *(as the case may be)*.

5. Remove distributor :

Remove the two fixing screws.
Free the distributor housing with its cover and protection panel.



6. Remove engine flywheel :

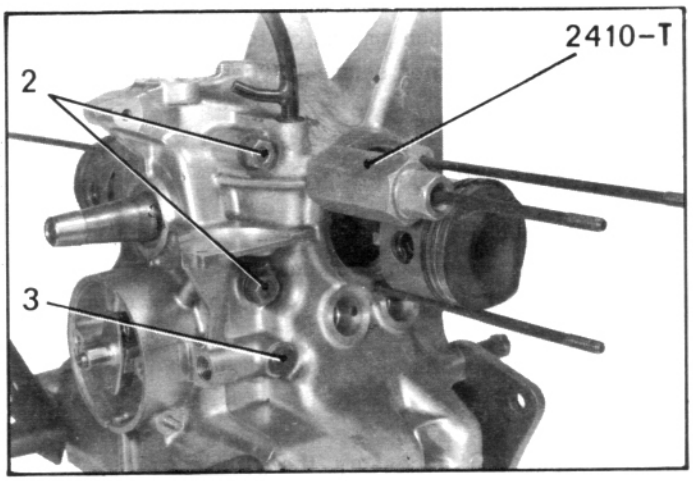
Remove needle bearing cage (or self-lubricating bush) and its seal bush from crankshaft bore.
Use extractor 1671-T.
Remove fixing screws (1) and engine flywheel.
Screws must be replaced each time engine flywheel is dismantled.

7. Remove cylinder head covers.

8. Remove cylinder heads and cylinders :

Remove the three cylinder head fixing cap nuts.
Remove :
- cylinder heads,
- push-rods,
- cylinders.

IMPORTANT : If cylinders are to be used again they must be marked as such with their respective pistons.

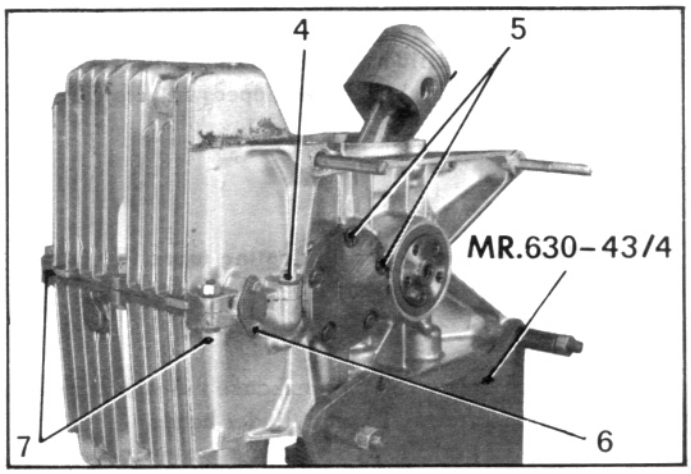


9. Remove cylinder head studs :

Use stud extractor 2410-T. In order not to risk twisting studs locate extractor at their base.

10. Remove the four nuts (2) assembling the crankcase halves.

11. Set engine as shown in illustration with right-hand half housing downwards.



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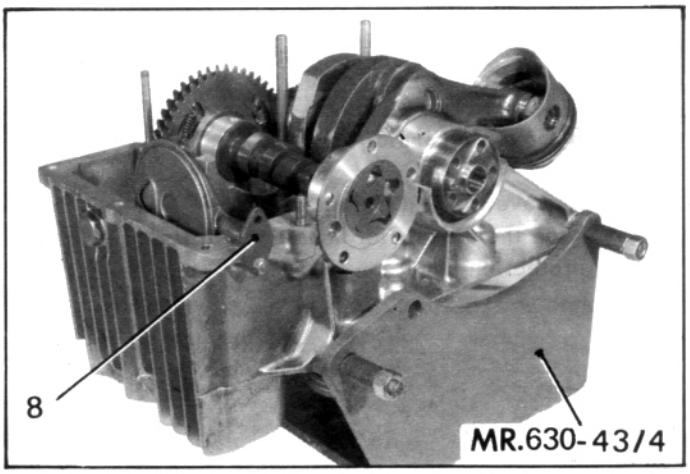
12. Free left-hand half-housing :

Remove :
- screws (4) and free oil pump cover and its O-ring seal *(as the case may be)*.
- oil strainer fixing screws (5),
- screws (6) and nut (3) for half-housing centring screw.

Position pistons at TDC and free left-hand half-housing.

Remove the two tappets.



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13. Remove crankshaft :

Free :

- oil strainer (7) or strainer with filter cartridge *(as the case may be)*.
- camshaft with oil pump,
- crankshaft assembly, conrods and pistons and front and rear sealing bushes, (take care not to damage pistons),
- the two tappets from the right-hand half-housing.

14. Remove right-hand half-housing from bracket MR. 630-43/4.

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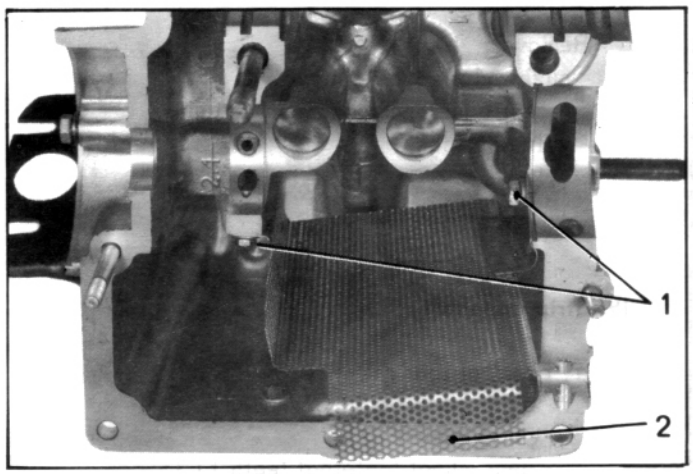

15. Strip the half-housings :

a) Remove :
- oil pressure switch or plug from left-hand half-housing,
- drain plug and plug for the pressure release valve (copper joint) from right-hand half-housing,
- spring adjusting washers (spring calibration) and valve ball or valve spring and piston *(as the case may be).*

b) Remove, if necessary, the two fixing screws (1) from anti emulsion shield (2) and free shield.

16. Remove pistons from connecting rods :

Remove :
- circlips from gudgeon pins,
- gudgeon pins (pairing each pin with its corresponding piston), by using extractor MR.630-23/8 (for engines of 425 and 435 cc), MR. 630-23/16 (for 602 cc engine).

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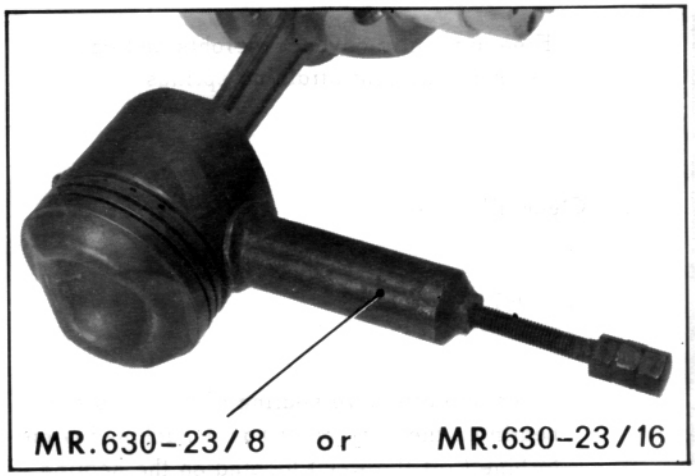

NOTES :

a) *Engines produced before October 1966 :*
If pistons are to be used again, heat them to a temperature of 60° centigrade before removing or refitting the gudgeon pins by immersion in an oil bath or heating them in an oven.

b) *Engines produced from October 1966 :*
The gudgeon pin is fitted loose in piston and connecting rod and it is not necessary to heat the piston before removing or re-fitting the pin.

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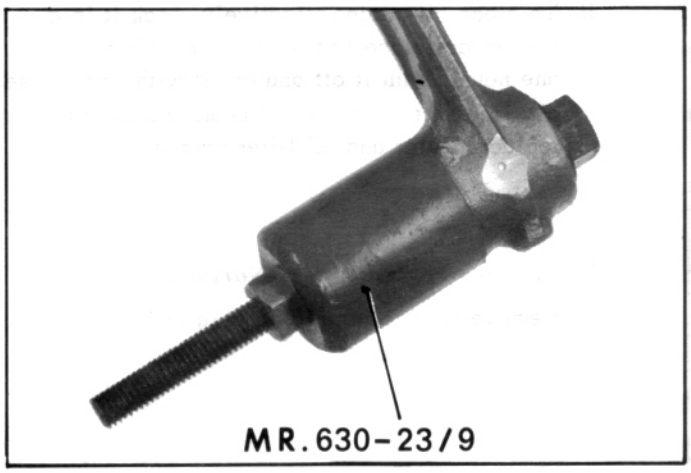

17. Remove connecting rod small end bushes (if necessary) :

NOTE : This delicate operation is not advised and can only be carried out in a specially equipped workshop.

Use extractor MR. 630-23/9.

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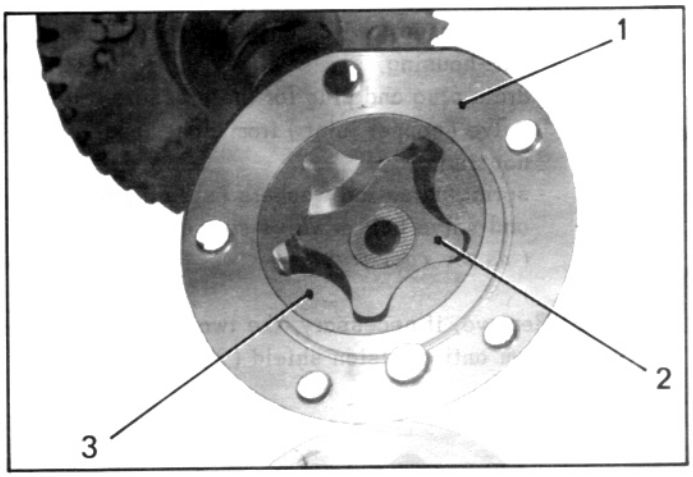

18. Strip the cylinder heads :
(See relevant operation)

Remove :
- push-rod sleeve joints,
- rocker arms and rocker arm spindles,
- valve springs,
- valves.

19. Strip camshaft :

a) Free, at rear :
- oil pump body (1),
- pump pinion (2),
- gear wheel (internal teeth) (3).

b) Remove, at front :
- circlip (5),
- thrust washer (4),

Free automatic advance weights and cam assembly without straining springs.

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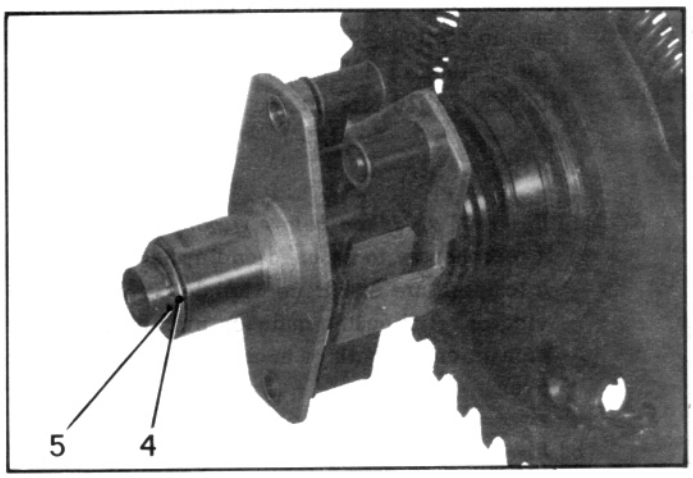

20. Clean all parts :

IMPORTANT NOTES :

I To ensure effective sealing of front and rear bearings, the crankshaft has a machined micro-turbine (oil thrower) located on the sealing faces for the oil seal. Any abrasive action on this micro-turbine will destroy its effectiveness and result in an oil leak.

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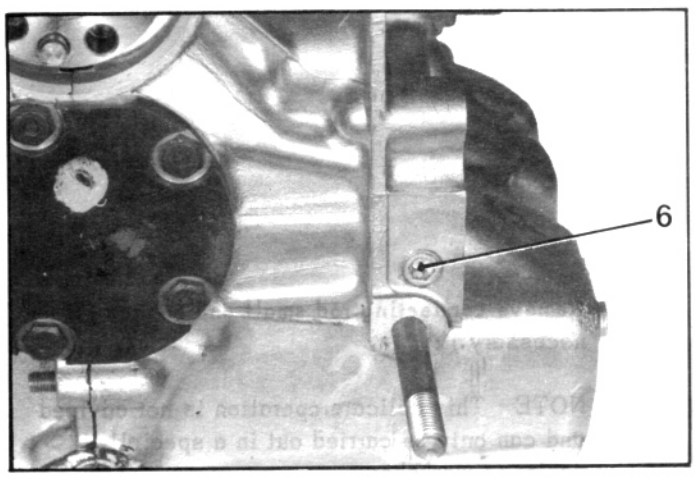
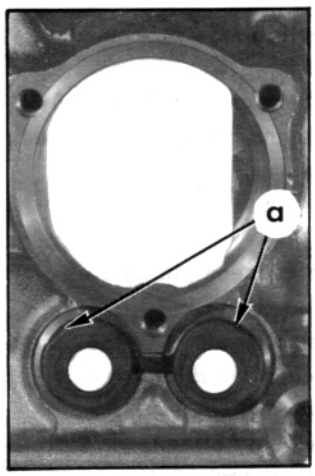
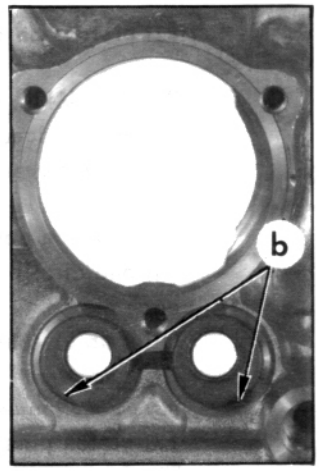


II To clean oil cooler effectively, soak it in a bath of cellulose thinner for approximately one hour. Drain it off and dry it with compressed air. However, if a big end bearing has « run », replace cooler and oil filter screen.

III *Vehicles produced since November 1970.*

Remove lubrication piping plug (6).





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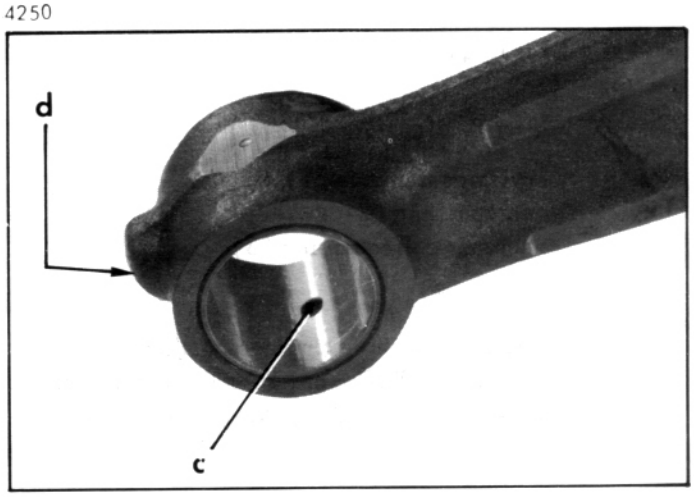

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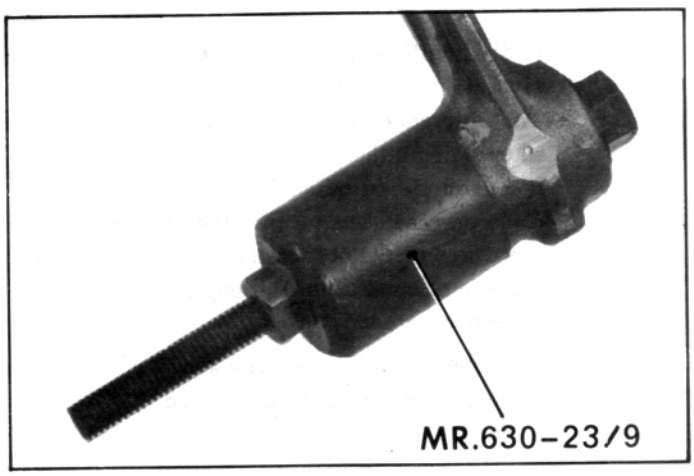


PREPARATION

21. Prepare cylinder heads :
(See relevant operation).

a) Grind valves and their seats, if necessary.
b) Lap the valves.
c) Fit valves and their springs.
d) Fit rocker arms and rocker arm spindles.
e) Fit joints on push-rod sleeves.

IMPORTANT :
Since December 1972, push-rod sleeve joints have no centring tab in crankcase and are positioned differently according to engine type (see illustrations). *This type of joint cannot be fitted to engines produced before this date.*

On engines M 28 and M 28/1 (602 cc), position flats « a » upwards.

On engines A 79/1 (435 cc), position flats « a » downwards.

22. Prepare connecting rod small ends :

If they have been removed, fit small end bushes.

NOTE : *This delicate operation can only be carried out in a specialized workshop.*

Bushes sold by the Replacement Parts Department have been bored to within approximately 0.05 mm under size of diameter of bore required.

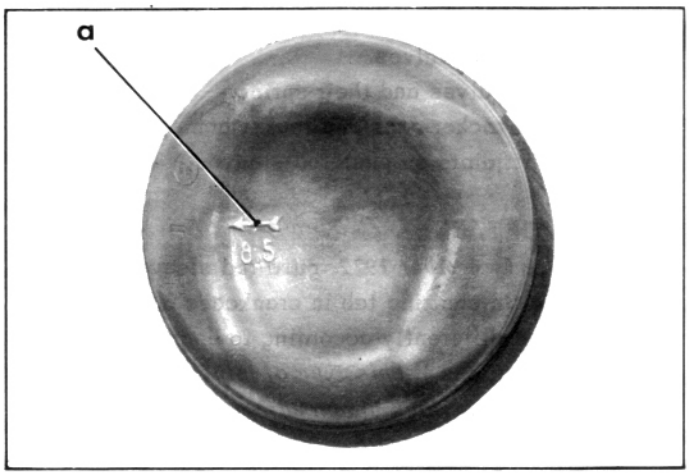
Plug holes « c » in bush with grease, or tallow.
Fit bush thus prepared so that centreline of lubrication holes « c » of the bush is perpendicular to centreline of connecting rod (Use extractor MR. 630-23/9.).
Ream the bush.
If a go-no-go gauge is not available, use the new gudgeon pin to check bore.
This delicate operation must be carried out with the greatest care as the bore measurement must be :

$$20.005 \begin{matrix} + 0.011 \\ + 0.006 \end{matrix} \text{ mm}$$

Blow compressed air through hole « d » to remove any grease and swarf.
Clean bore of bush.

23. **Engines fitted with conventional scraper-collector rings :**

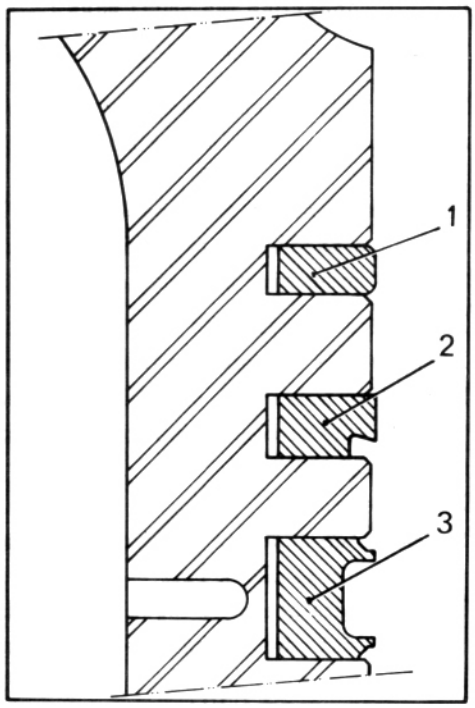
a) **Fit pistons on connecting rods :**



IMPORTANT : Cylinders are supplied with pistons, gudgeon pins and piston rings paired. *They must never be mixed.*

Oil gudgeon pins.
Fit one circlip in the gudgeon pin bore of each piston.
Offer up pistons on small ends of connecting rod : *an arrow « a » indicates direction of assembly (towards front of engine).*
Fit piston pins (previously oiled).
Fit the second circlip on each piston.

b) **Fit rings :**



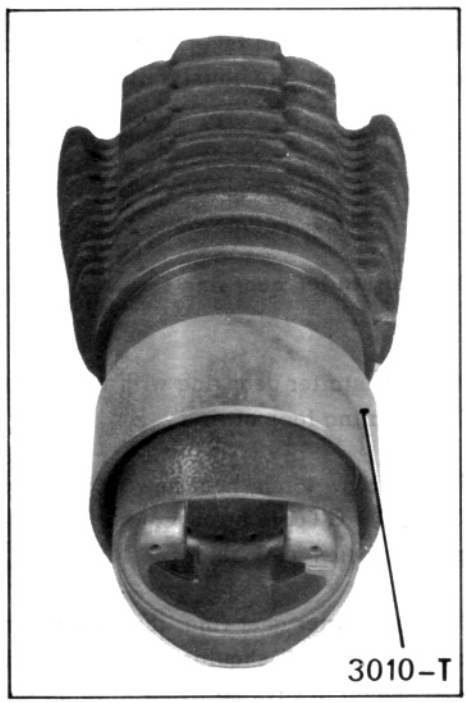
Fit in order :
- compression ring (1),
- scraper ring (2),
- scraper-collector ring (3).

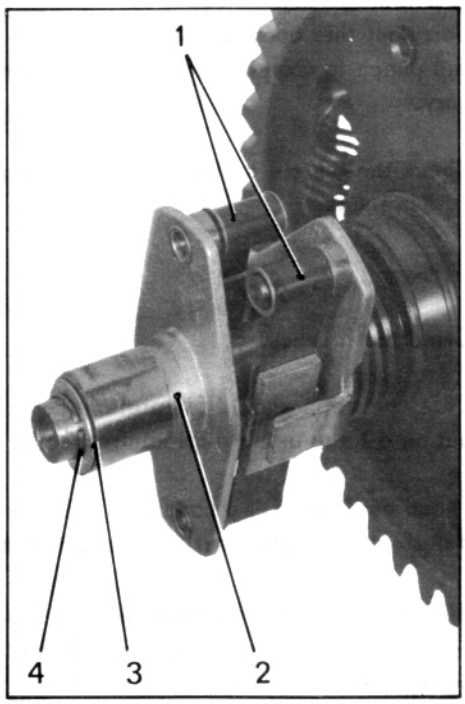
CARE : The three rings are marked near gap « H », « TOP », or « HAUT » or supplier's name (e.g. « NOVA »). *Rings must be positioned with this mark facing upwards.*

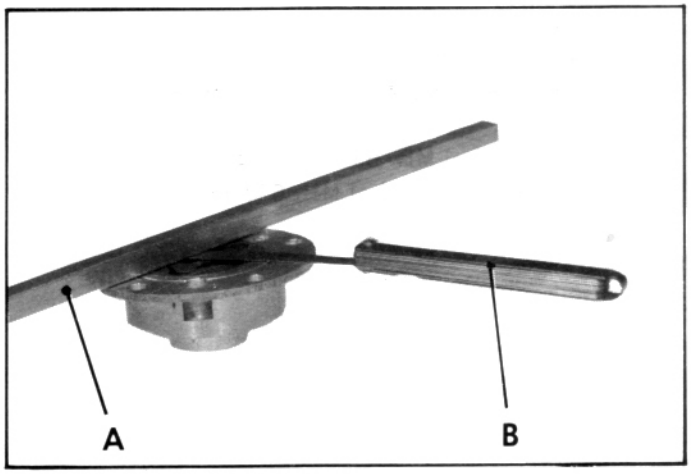
Arrange piston ring gaps at 120°.

NOTE :

Badly positioned rings will result in an excessive oil comsumption.
The clearance at the piston ring gap is checked when pairing them.
If a used piston being fitted and new piston rings are used ensure that they turn freely in their groove : if not, re-touch the latter with a piece of used ring, the gap of which will have been ground.
If on the contrary there is excessive clearance, the old piston must be discarded.







24. Engines fitted with U-FLEX scraper-collector rings :

NOTE :
Since June 1972, a number of 602 cc (3 CV) engines have been fitted with U-FLEX scraper-collector rings. When decompressed, the diameter of the U-FLEX ring is greater than the piston diameter.

Fit pistons in cylinders :
Fit a circlip in the gudgeon pin bore of the piston (arrow side).
Fit rings to piston *(take same precautions as at paragraph 23 b)*.
Oil piston-cylinder assembly.
Fit piston into lower part of cylinder.
Use piston ring fitting fixture 3010-T.

25. Prepare camshaft :

a) Check camshaft between centres. Ensure that the end of camshaft (distributor side) runs perfectly true. If not, camshaft must be changed because points gap will not be equal on both cams.

b) Position :

- automatic advance weights (1),
- cam (2),
- thrust washer (3),
- circlip (4).

26. Prepare oil pump :

a) Check end float of oil pump pinions, using straight edge A and a set of feelers B.
End float should not exceed *0.10 mm*

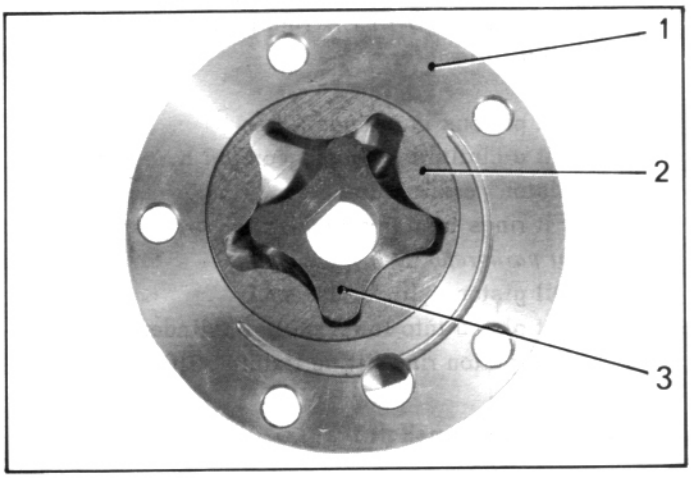
b) Check that pump body thrust faces have neither dents, not scratches (crankcase side and cover side).

c) Position *(according to engine type)* paper gasket on thrust face (engine crankcase side).
Stick in position with a few spots of grease.

IMPORTANT : The paper gasket should be fitted « dry ».

27. Offer up oil pump body (1) on camshaft.

Fit pinion (2) with inner teeth and pinion with outer teeth (3), previously oiled.



28. Replace starter gear ring :

Drive off starter gear ring with a hammer punch. Clean mating face of ring.

Using a blow-torch, heat new ring to approximately 200 - 250° C (pale straw color) turning constantly to ensure even expansion.

Offer up starter gear ring, the face not machined towards flywheel shoulder (machined and treated face should always be fitted towards the starter).

Carry out this operation quickly : use a hammer and punch to complete location of ring if necessary.

Check the run-out on the starter gear ring (0.3 mm max.).

29. Grind the flywheel :

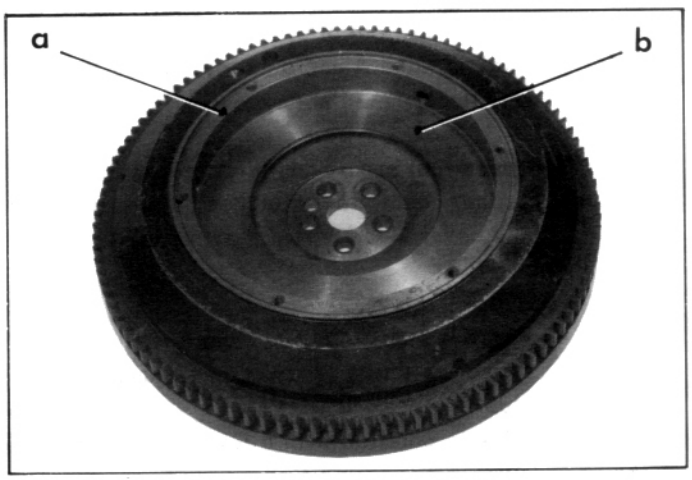
This operation should for preference be carried out on a lathe using a grinding wheel.

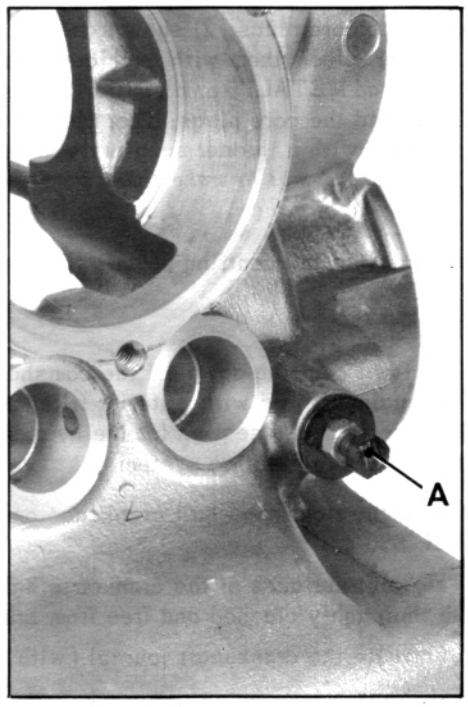
It can be done with a hand tool, provided that a perfectly polished surface can be obtained.

NOTE : After each grinding of disc thrust face « b », on flywheel, an equivalent amount should be removed on clutch mechanism thrust face « a ».

Both operations should be carried out without removing flywheel from lathe, so that the two machined surfaces are truly parallel.

Use mandrel MR. 630-35/9 (425 cc and 435 cc engines) or mandrel MR. 630-35/19 (602 cc engines).





30. Prepare distributor :
(See relevant operation).

Check condition of the contact breaker points. Replace them if necessary.

31. Prepare half-housings :

a) *Engines fitted with « ball type » pressure release valve :*

Replace if necessary, pressure release valve seating :

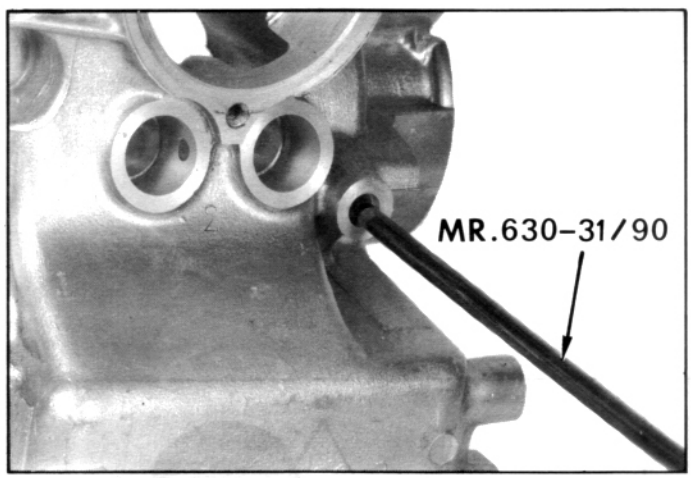
1°) Extract seating :
Tap thread dia. 6 mm, pitch 1.00 into bore of seat.
(turn a few threads with tap N° 2)

Extract seat, using screw A dia. 6 mm, length 50 mm, fitted with 6 × 20 washer and a nut.

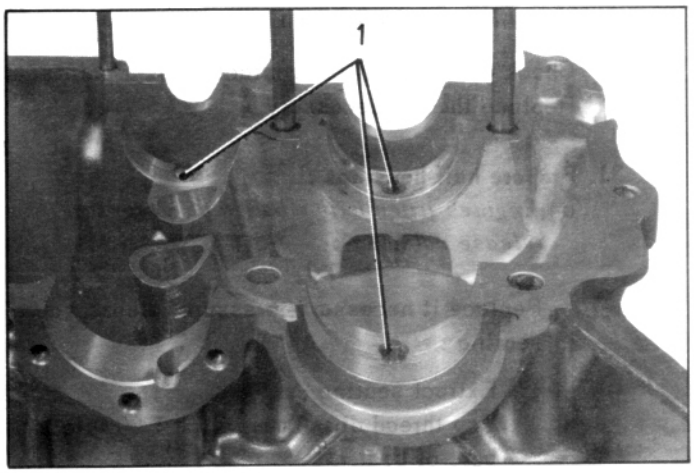
2°) Position new seat, using mandrel MR. 630-31/90.
Crimp seat, using crimping tool MR. 630-31/91.

b) Check condition of all the tapped holes in the half-housings. If a thread is damaged the half-housings can be used again by fitting a « HELICOIL » thread insert into some of these tapped holes. *(See relevant operation).* This process enables original fixing screws and studs to be used again. Fitting « thread inserts » is permitted in the following cases :

Fixing the petrol pump, breather, distributor, side plugs for draining and oil pressure gauge; front engine mountings, oil pump and oil pump strainer assembling studs for the half-housings and the connecting studs for the engine-gearbox assembly.



NOTE : If connecting studs for engine-gearbox assembly must be dismantled, note their positions as they are of varying length.



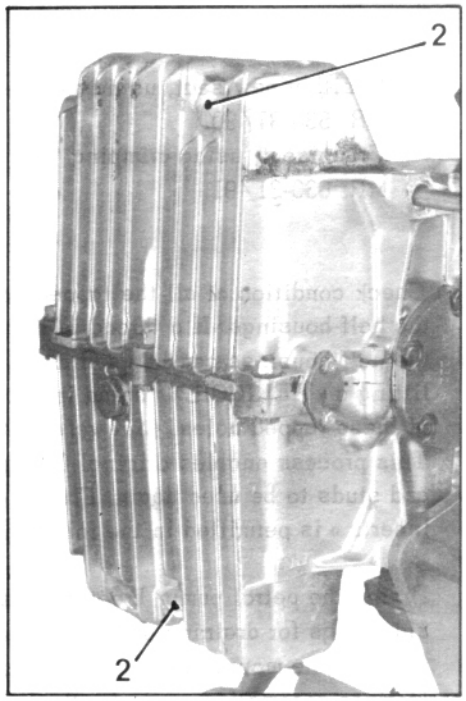
c) Fit the engine-gearbox connecting studs, if necessary One end of each stud has a thread 15 mm in length which is screwed into crankcase.

d) If the core plugs (2) show traces of oil seepage, clean them with trichlorethylene. Spread METALIT or a similar type of product around the core plugs, after cleaning them again with a thinner supplied with the product. *Never attempt to make these plugs oil-tight by dismantling them.*

32. Ensure that the centring dowels (1) are correctly in place.

NOTE :

The front centring dowel of the camshaft bearing for engines fitted with exterior filter cartridges also serves as a seating for the by-pass valve ball in the lubricating system.



Place the right-hand half crankcase on stand MR. 630-43/4.

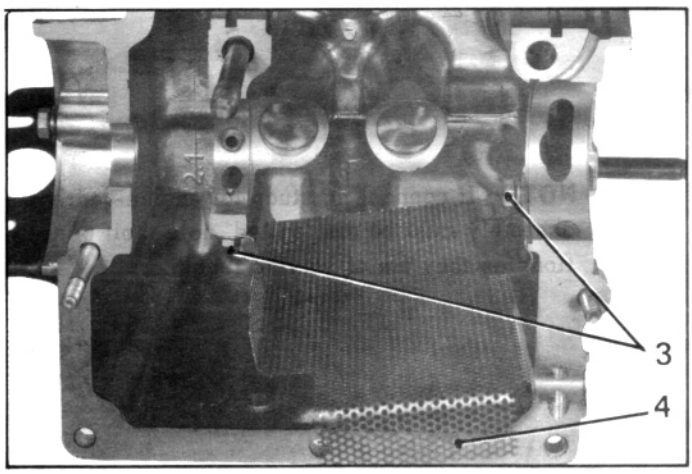
The joint surfaces of the crankcase halves should be thoroughly cleaned and free from bruise marks.

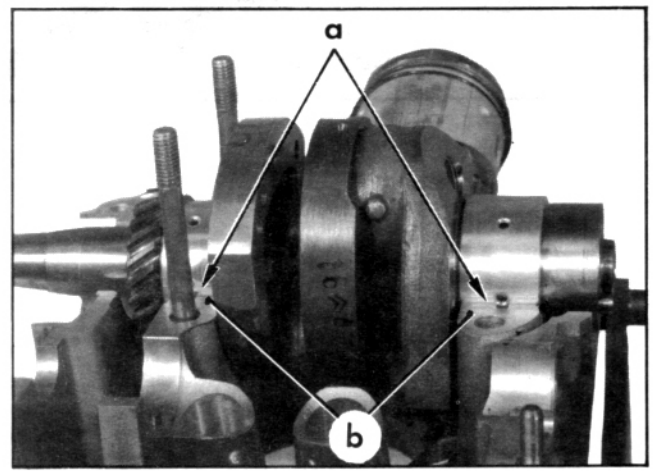
Lubricate the crankshaft journal (with an oiler)

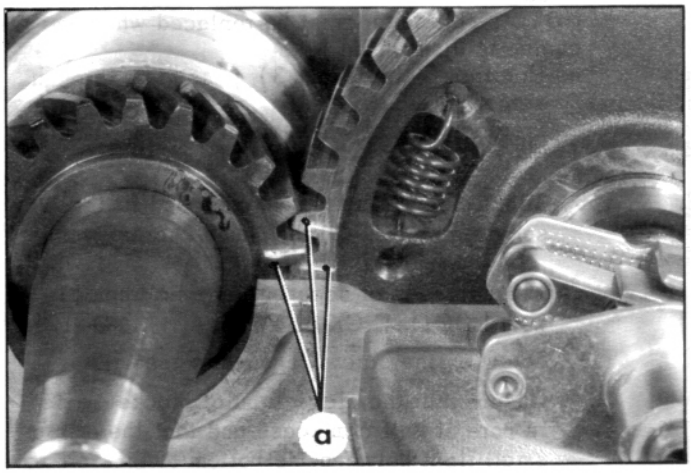
Fit the rear bearing on the crankshaft journal.

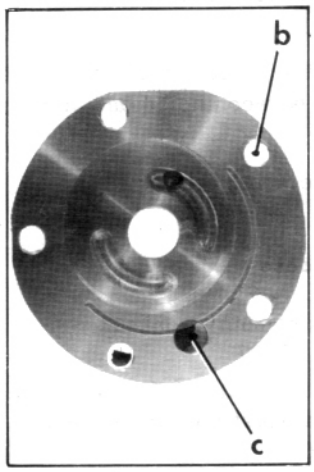
Fit the crankshaft in place, noting position of the groove « a » on the rings, which should be level with joint « b ».

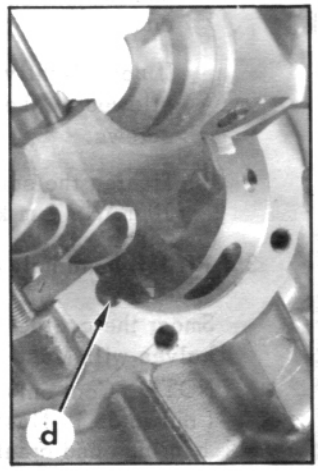
Ensure that the centring are properly fitted on the holes of front and rear bearings.

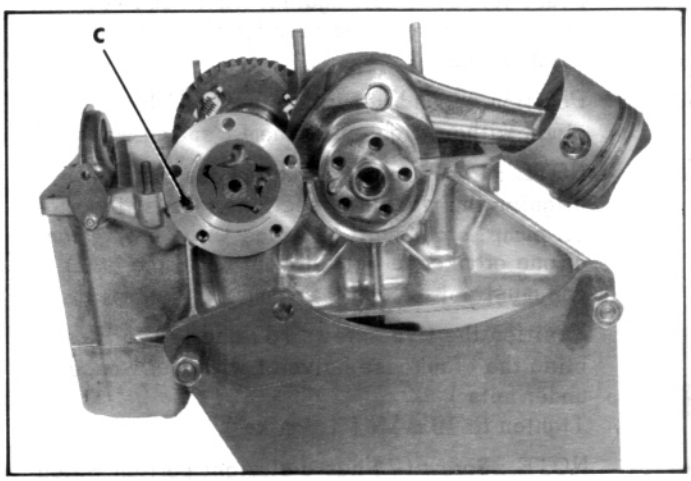


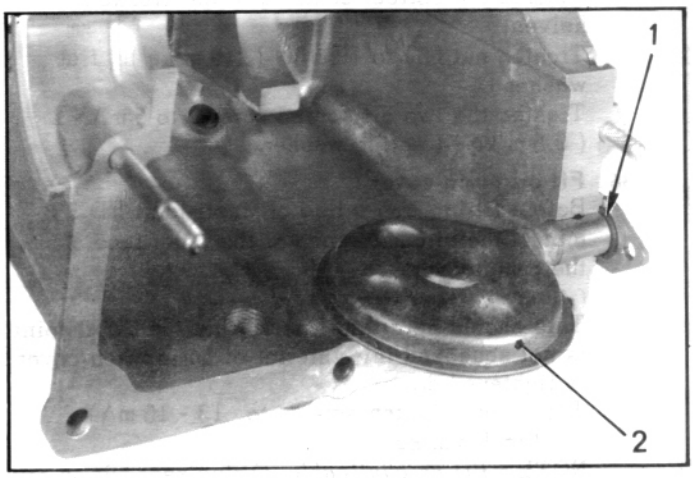












33. Fitting the camshaft :

Oil camshaft bearings (use an oiler)

a) Fit the assembly of camshaft and oil pump in right-hand half-crankcase so that markings « a » on pinions should be in accordance with each other.

Ensure that the front bearing is properly set on centring dowel.

b) Locate the oil pump body.

NOTES :

I. *If the oil pump body is equipped with a paper gasket,* check that the gasket is properly fitted between pump body and engine crankcase. This gasket should be fitted dry.

II. *If there is no paper gasket fitted to pump body,* coat thrust face of oil pump body on crankcase with Masti-joint HD 37.

Make holes « b » in pump body, face holes threaded in half crankcase, and align oil intake hole « c » in pump body, with corresponding hole « d » on engine crankcase.

34. Fit the oil filter screen (model without cartridge type filter) :

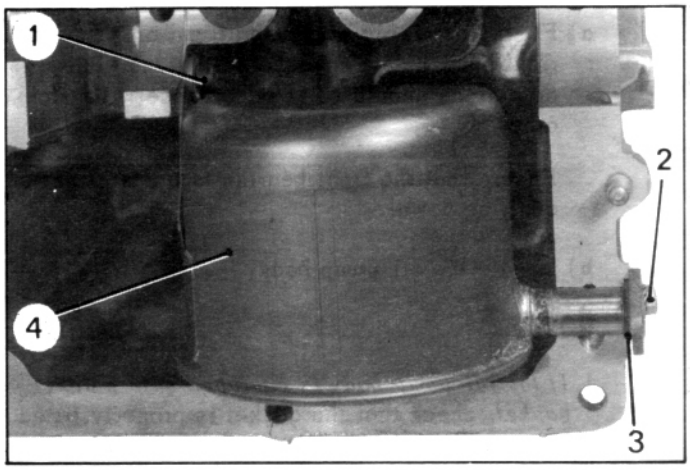
a) *If the oil filter screen is not fitted with O-ring seal,* apply Masti-joint HD 37 to securing clamp.

b) *If the oil filter screen is equipped with O-ring seal,* (1), the oil tightness of the clamp is achieved by the seal which must be renewed each time it is dismantled.

NOTE : It is not possible to fit an O-ring seal on crankcases not reamed for the seating of the seal.

c) Position oil filter screen (2) with oil entry hole positioned towards the base of crankcase ((do not use Masti-joint).

d) Screw on the securing screw (spring washer).



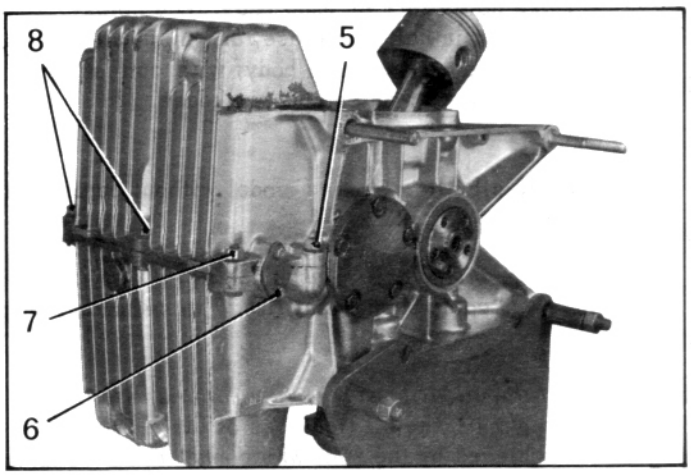
34. **Fit oil filter screen** (with filter cartridge incorporated) :
NOTE : This filter must be replaced whenever the engine is dismantled).
a) Position O-ring seal (3), passing it through screen clamp.
(replace gasket whenever it is dismantled)

b) Offer screen in half crankcase and fit the securing screw (2) for clamp (spring washer).

c) Smear threads of securing lug of screen (1) with LOCTITE GX 01 45901 A.
Screw on the screw (1) (flat washer).
Ensure that the clamp tubular bracket is set in bore of half crankcase and that there is a small float between the bottom of the screen and the central rib at the bottom of the crank case.

If not, slightly turn the screen within the limits allowed by the play between holes and securing screws.

d) Tighten the screw securing the lug (1) to 10 mΛN (1 m.kg).



35. **Fit left-hand half crankcase :**

Smear the contact faces of both crankcase halves with Masti-joint HD 37.
NOTE : Coat only half the width of the joint face (outwards) : Masti-joint must not run between bearings and crankcase.

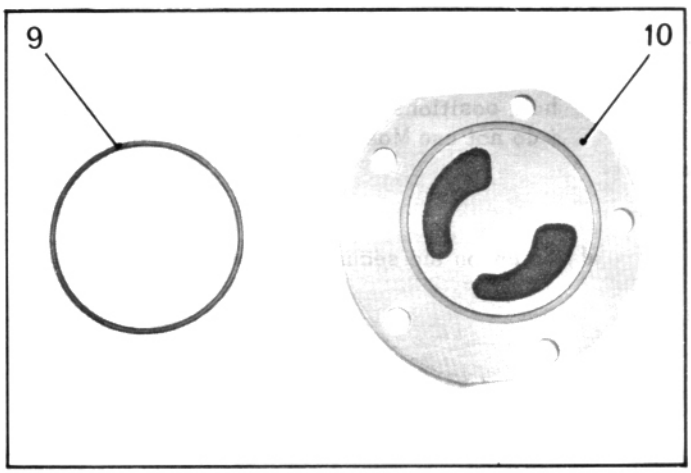
Place left-hand half against right-hand segment. Screw on the securing nuts for the bearing studs (flat washers).

Position second securing screw (6) for bearing studs without tightening them (spring washer)

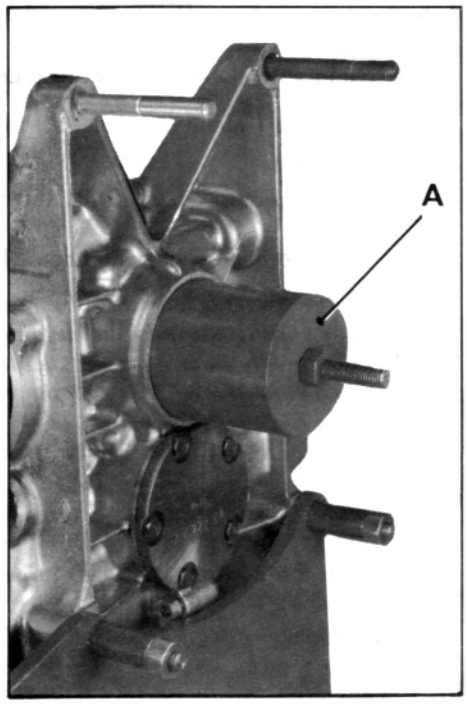
NOTE : Position the two crankcase halves by aligning the machined sections (thrust face for oil pump, crankshaft bearings), the projection of one crankcase half in relation to the other one must not exceed 0.05 mm.

Position the five screws (8) and (7) for assembling the crankcase halves (with flat washers under nuts).
Tighten to 19 mΛN (1.9 m.kg).

NOTE : Screw (7) has a straight portion which ensures the correct centring of the crankcase halves.
Tighten nut (5) to 19 mΛN (1.9 m.kg). (flat washer).
Tighten the two oil screen screws to 5 mΛN (0.5 m.kg) (spring washer).



36. **Fit oil pump cover :**
Before fitting, run a line of Masti-joint HD 35 around the circumference of the inner face of the pump cover.
(Cover without O-ring seal).
This should be a thin line so that the Masti-joint is not squeezed into interior of pump when cover is tightened down.
Fit cover. Tighten screws to 13 - 15 mΛN (1.3 to 1.5 m.kg).
NOTE : *Fit as applicable.* O-ring seal (9) on oil pump cover (10). (Renew seal whenever unit is dismantled).



37. Free engine from stand MR. 630-43/4 and set up as illustrated.

Tighten the bearing stud securing nuts (2) (flat washers) to 45 mΛN (4.5 m.kg).

38. Fit seal rings :

a) Fit rear seal ring :
Grease with high-melting point grease, interior and exterior of seal.

Position seal with face bearing name and reference of manufacturer towards exterior of engine.

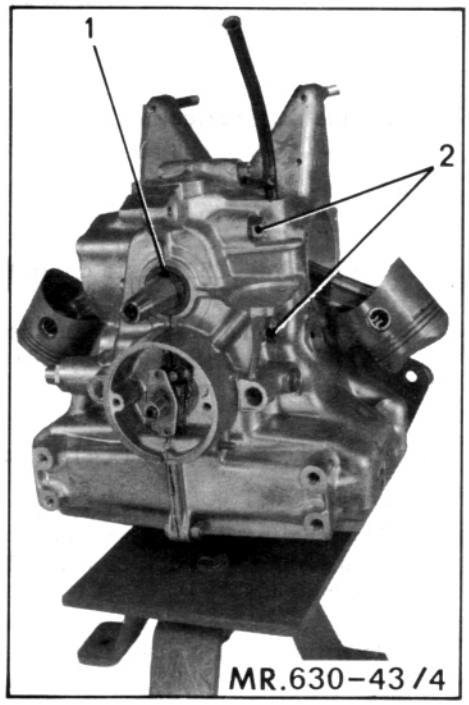
To position seal, use tool A :
- MR. 630-34/25 (for engines A 53 - A 79/0 and A 79/1),
- 3004-T (engine M 4),
- 3007-T a (engines M 28 and M 28/1).

(Oil interior cone of tool with engine oil).

The ring flange should come into contact with the crankcase.

b) Fit front seal ring :
Grease with high melting point grease, interior and exterior of seal.
Position seal with face bearing reference and manufacturer's name towards exterior of engine.

Locate ring seal (1) using a tube of exterior diameter 45 mm, interior diameter 31 mm, and length 100 mm.

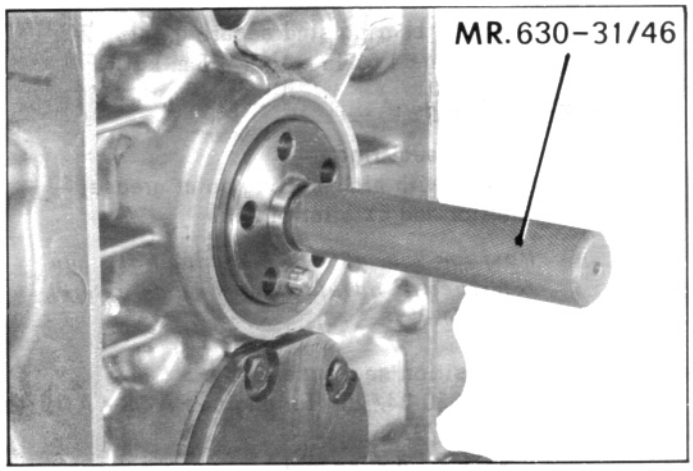


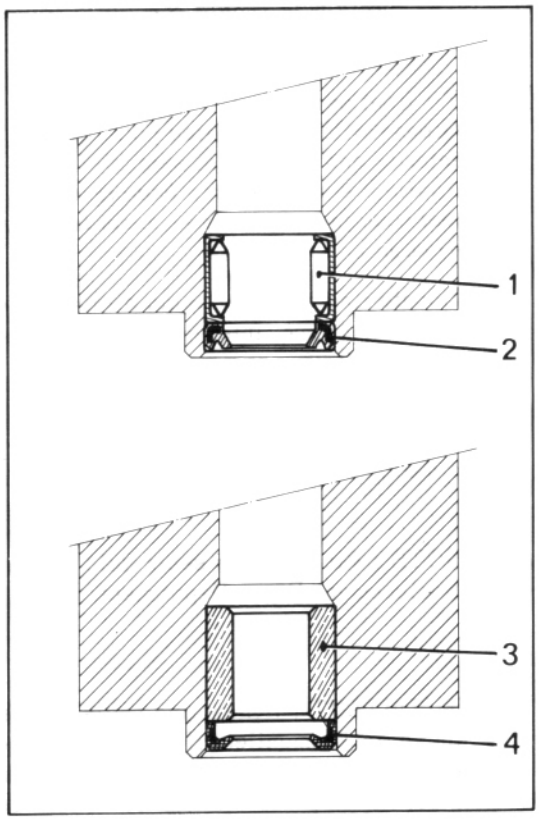
The ring recess in relation to the face of crankcase should not exceed 1 mm.

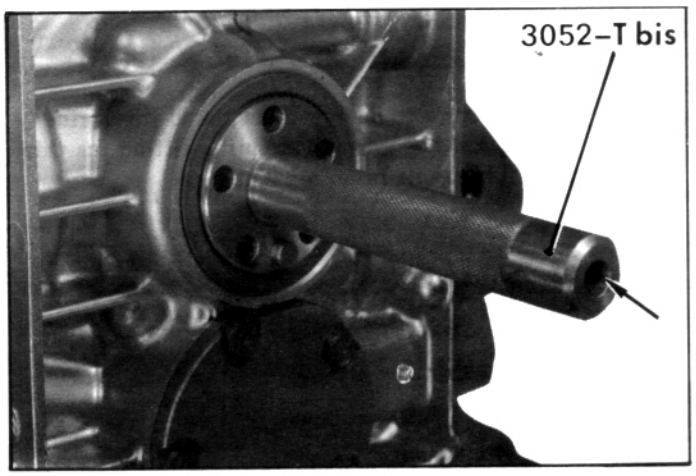
NOTE : Fit only ring seals sold by our Replacement Parts Department

IMPORTANT : Renew ring seals whenever these are dismantled. Never fit ring seals before assembling crankcase halves, this in order not to pinch them, which would cause oil leaks.

Take care to ensure that ground lip of ring has not been damaged during fitting, as this would result in an oil leak.







39. Centring the mainshaft in the crankshaft :

NOTE : Correct centring of the mainshaft in the crankshaft is assured by using either a needle bearing cage or a self-lubricating bush.

A. Fitting with the needle bearing cage :

Apply grease (about 3 grammes) to the needle bearing cage.

Use only silicon grease (G.S.I 160).

a) Place the needle bearing cage (1) in position.

Arrange the side carrying the reference and maker's name towards the outside. The end of the needle bearing cage should stand down 5 mm below the end face of the crankcase.

Use mandrel MR. 630-31/46 to attain this.

b) Place the sealing bush (2) in position.

Arrange the face carrying the reference and maker's name towards the needle bearing cage side and in contact with it.

B. Fitting with self-lubricating bush :

Immerse this bush for one hour in engine oil SAE 20, at ambient temperature.
Allow it to drip.

a) Fit the self-lubricating bush (3) in position.
It should stand down 5 mm from the end face of the crankcase.

Use mandrel 3052-T a, to attain this.

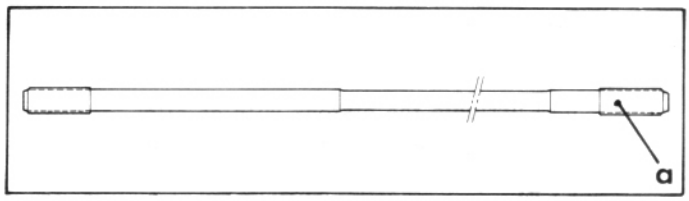
After inserting the bush, free the mandrel with the aid of its central screw at « a ».

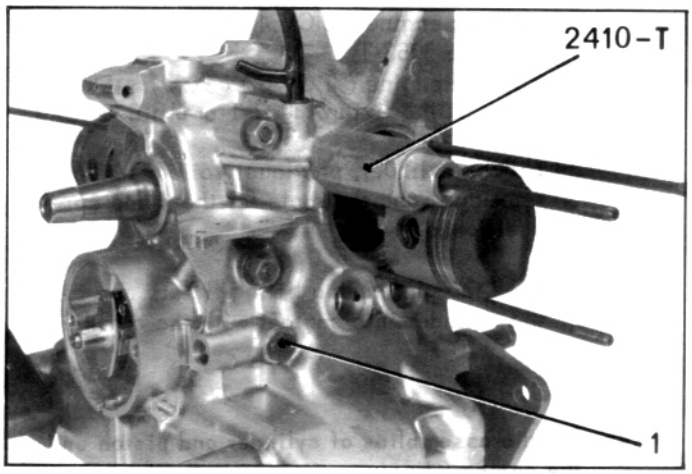
b) Place the sealing bush (4) in position.

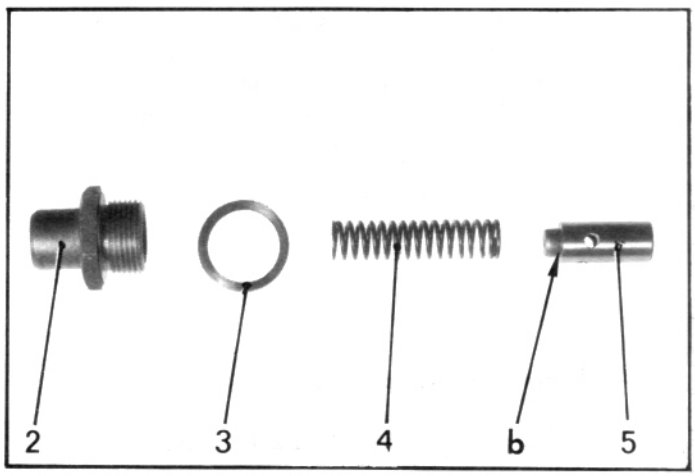
IMPORTANT :
This sealing bush (4 mm thick) differs from bush (2) (3 mm thick) used with the needle bearing cage.

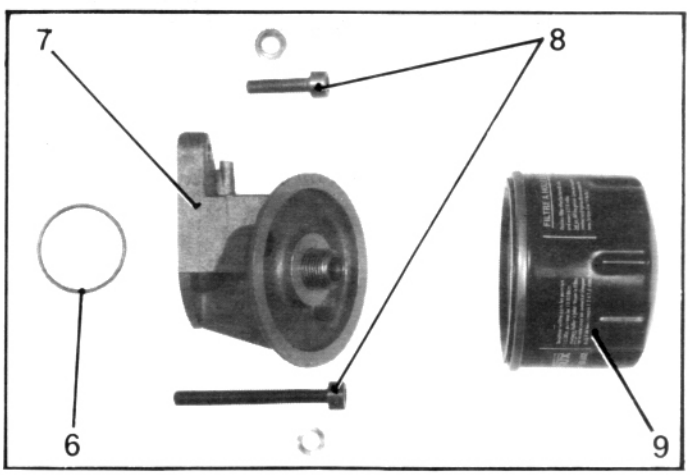
Its fitting is also different.

Arrange the sealing bush (4) with the face carrying the reference number and maker's name towards the ouside of the engine.









40. Fit the cylinder heads studs :

The threaded portion of the larger diameter « a » should be fitted on the crankcase side.

The shortest stud is placed on the lower part (stud driver 2410-T)

Place stud-driver at the base of the stud to avoid damaging it (bending it).

Fit :
- the oil drain plug (metalloplastic washer),
- the plug (1), or the oil pressure switch (copper gasket). Tighten to 30 mΛN (3m.kg).

41. Fit the relief valve :

Oil parts (engine oil).

a) *Engine fitted with ball type relief valve :*

Position :
- adjusting washers and spring in plug,
- ball

Tighten plug (copper gasket) to 40 - 45mΛN (4 to 4 5 m kg)

b) *Engine fitted with piston type relief valve :*

Position :
- piston (5) with end « b » outwards,
- spring (4),
- plug (2) and its copper joint (3)

Tighten plug to 40 - 45 mΛN (4 to 4 5m.kg)

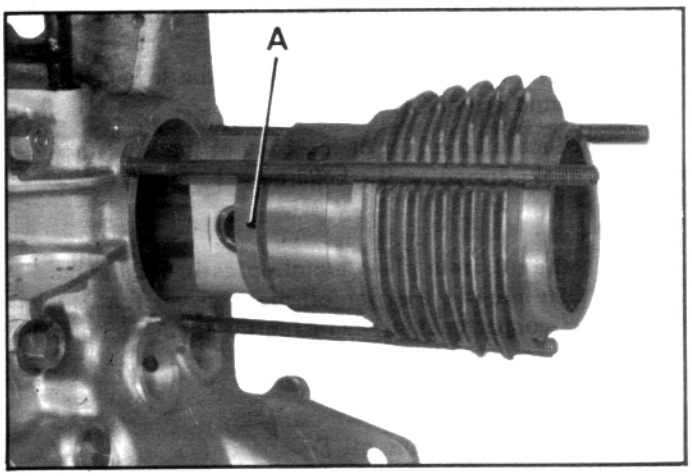
42. Fit the filter cartridge support (if necessary) :

Fit O-ring seal (6) on the support for the filter cartridge (7).
Fit the two securing screws (8) for the support (copper washer on lower screw-contact washer on upper screw).
Fit the filter cartridge (9)
Tighten as indicated by manufacturer.

43. Fit tappets :

Oil tappets before fitting

NOTE : If the engine crankcase carries the letter B stamped between guide tube bosses, the diameter of tappets is 24.2 mm



44. Fit cylinders *(Engines equipped with conventional scraper-collector rings) :*

a) Lubricate the pistons with an oiler, arranging the gaps in the three pistons rings at 120°.

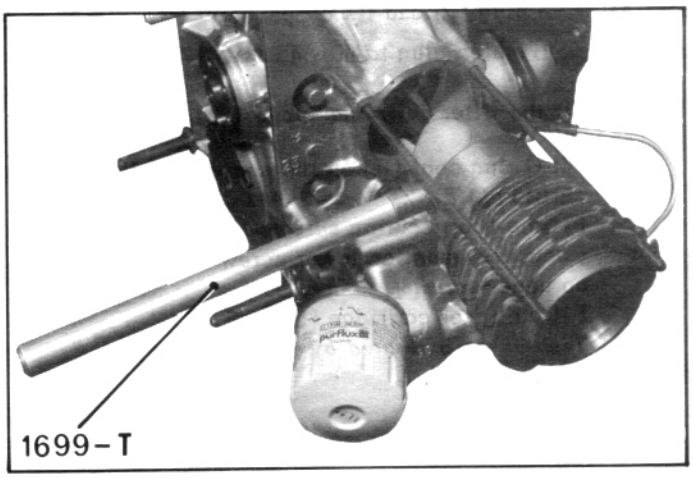
b) Place piston ring fitting fixture A on the piston :
- 425 cc engine (2 CV) piston ring fitting fixture 1654-T
- 435 cc engine (2 CV 4) piston ring fitting fixture 3063-T
- 602 cc engine (2 CV 6) (3 CV) piston ring fitting fixture 3002-T or MR.630-65/7.

c) Fit the cylinder, previously oiled, without rotating it and the slots for the studs correctly positioned.

d) Free the piston ring fitting fixture and bring the cylinder into contact with the crankcase.

45. Fit the assemblies of cylinder and piston on the engine *(Engines fitted with U-FLEX scraper collector).*

Oil connecting rod small end.
Offer the assembly cylinder piston on connecting rod, so that arrow on piston is pointing towards the front of the engine.
Complete, if need be, positioning the gudgeon pin, by using the mandrel 1699-T.
Fit the second gudgeon pin, circlip.
Complete fitting of cylinder.

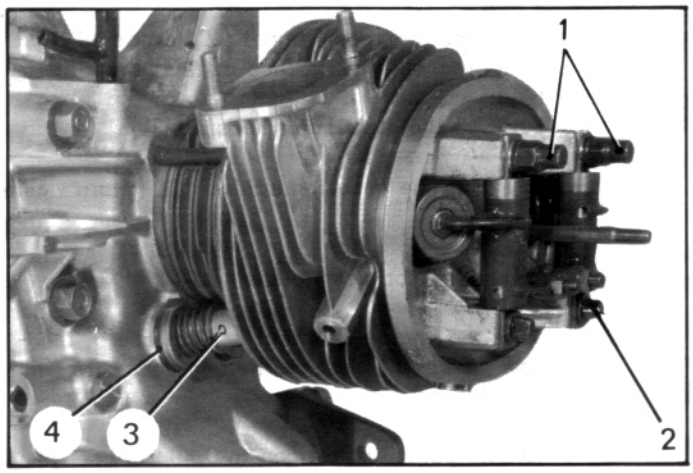


46. Fitting the cylinder heads :

a) Unscrew the adjusting screws for the rockers.

b) Check and lubricate the balls ends of the rocker push rods which must be free from burrs, scratches, and signs of wear.

c) *Insert the push-rods in the guide tubes.*
(coppered ball end on the rocker arm side).



d) Fit the cylinder heads :

Place in position the three securing nuts (1) (copper washer under the upper nuts, steel washer under the lower nut).

Screw up lower nut until the cylinder head is in contact with the cylinder and the cylinder on the crankcase.

Guide the tubes (3) so that the shoulders of the rubber seals (4) enter correctly in the crankcase bore.

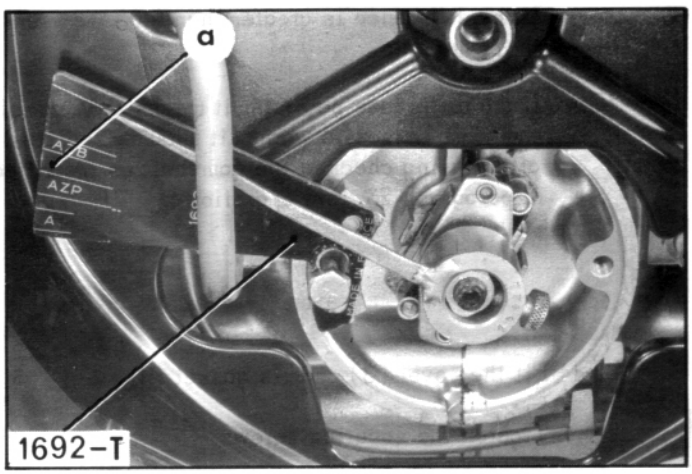
Screw up the upper nuts (1).

Provisionally tighten the three nuts securing the cylinder head to 10 mΛN (1 m.kg).

47. Fit the engine flywheel :

Fit new securing screws after each dismantling and tighten them to 40 - 45 mΛN (4 to 4.5 m.kg) while holding the flywheel with the aid of a screwdriver.

Ensure that the assembly turns freely.



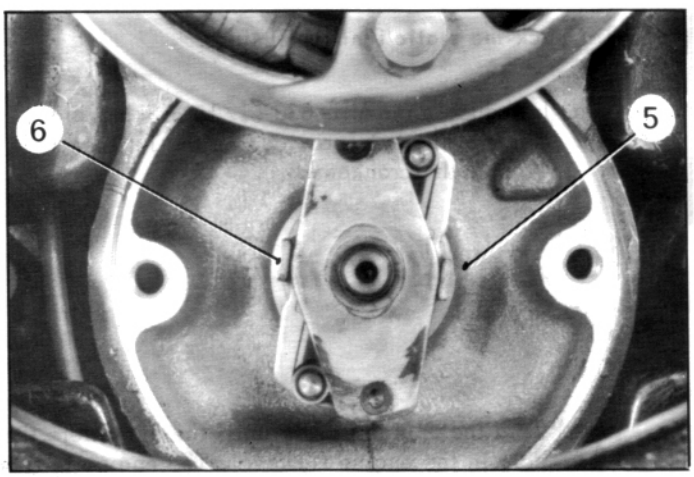
48. Fit distributor :

a) Check and adjust centrifugal advance :

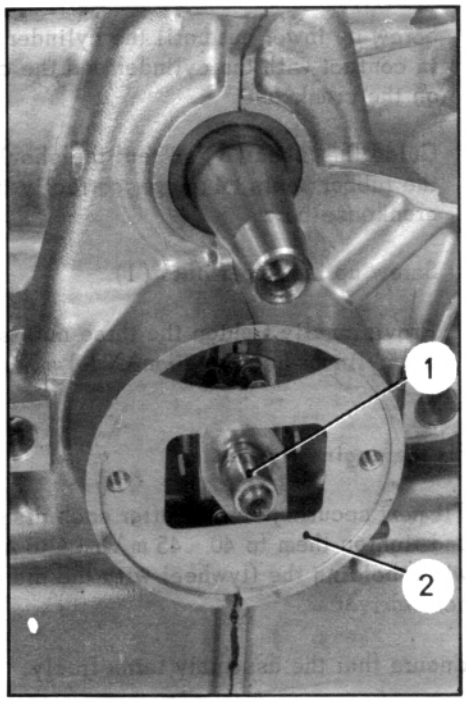
- Check the angle of rotation of the cam, in relation to the camshaft, using graduated scale 1692-T.
- Fit indicator needle on cam, pressing it down to fullest extent, and slightly tighten the retaining screw.
- Turn flywheel to bring indicator needle of checking tool opposite mark O.
- Gently rotate from right to left, on needle shaft without forcing.

At the end of its travel the needle should be ;

- in zone « AZB » for distributors fitted on engines A 53 and M 4.
- At point « a » between zones « AZB » and « AZP » for distributors fitted on engines A 79/0.
- In zone « AZP » for distributors fitted on engines A 79/1 - M 28/1 and M 28.



If the indicator needle comes to rest outside the zone corresponding to the type of distributor as indicated above, the travel of the weights must be adjusted by bending the clips (5) and (6) of the stops.



b) Fit the distributor :

Place the protection panel (2) (smeared lightly with grease, with its face against the distributor).
Offer up the distributor housing (6).

Screw up the securing screws (5) (plain washer).

c) Adjust the contact breaker gap :

Turn the engine flywheel so that one of the cam bosses (1) raises the contact to its maximum height.

At this point, adjust gap to 0.40 mm (set of feeler).

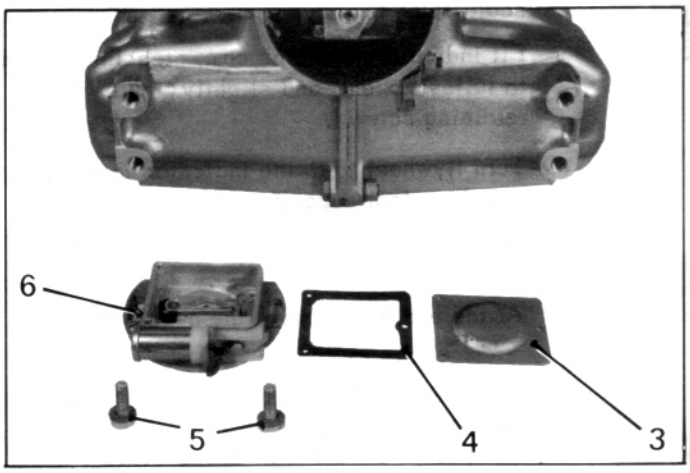
Turn the flywheel again, so that the second boss of the cam raises the contact to its maximum height. Again check the gap.

If the difference is greater than 0.05 mm, turn the cam again.

If the difference persists, it means that one of the cam bosses is worn. (it must be replaced after having checked the camshaft as indicated in paragraph 25, this operation).

d) Fit the cover (3) and its gasket (4).

Tighten the securing screws.



49. Check the static ignition timing :

a) Introduce a pin MR. 630-51/15 of 6 mm diameter in the hole provided on the left-hand side of the crankcase.

b) Turn the engine slowly until the pin enters the hole in the engine flywheel. The engine is then at the ignition point.

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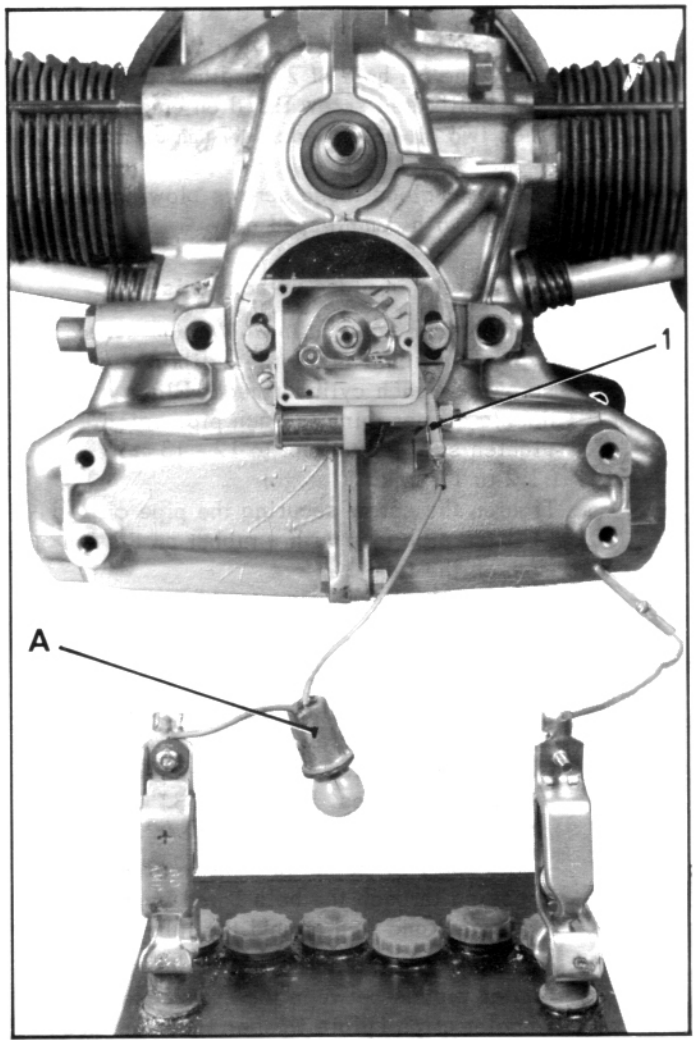


c) Connect the positive terminal of a battery (6 or 12 volts) to the terminal (1) of the distributor outlet inserting a test lamp of 6 or 12 volts in series.

Connect the negative terminal of the battery to the engine earth.

d) Check that the centrifugal advance weights are at their position rest.

e) Loosen the two securing screws of the distributor.
Find the exact point of opening of the contact breaker by turning the housing.
The lamp will go out at this precise moment.

f) Tighten the distributor securing screws.

g) *Remove the pin from the engine flywheel.*

h) Turn the engine (by the flywheel) in the direction of running, when the lamp will light.

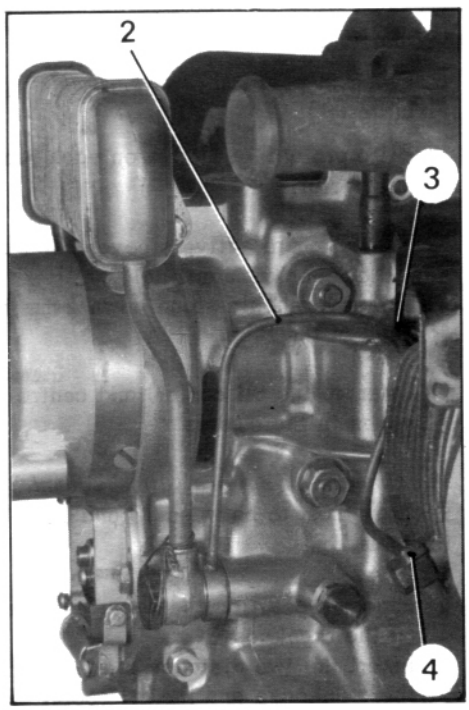
Stop at the precise moment when the lamp goes out for the second time (at this point the engine will have made one revolution). It should be possible to insert the pin in the engine flywheel.

If the hole in the flywheel has passed the pin the ignition is retarded : It will be necessary to re-adjust the ignition timing on this cylinder.

In no circumstances must the initial advance be less than :
- 12° (A 53 - A 79/0 - A 79/1 - M 4 engines)
- 8° (M 28/1 - M 28 engines).

The variation should not be more than 3° (1 1/2 teeth on the starter ring) between the static setting on one cylinder and that on the other.
If it is, them cam must be replaced.

Remove the pin and the test lamp from the battery.

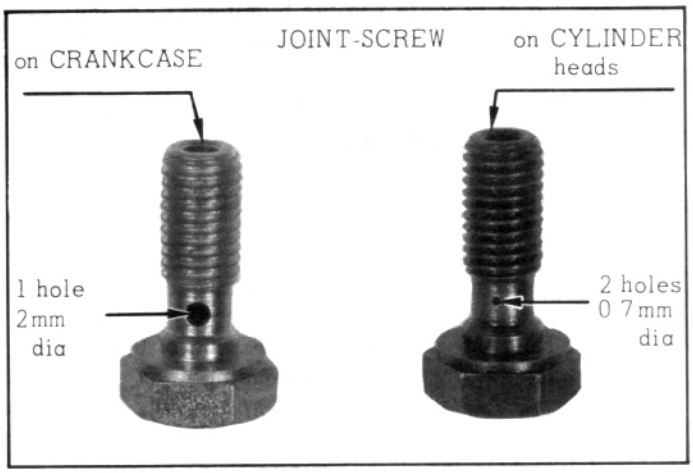


50. Fit the cylinder head lubrication tubes :

a) *Engines fitted with earliest model oil cooler :*

- Fit the cylinder head lubrication tubes (2). (Place double gasket (4) on cylinder head joint).

- Tighten the screws for the lugs securing the tubes (3) on the front cylinder head studs. Fit the protective sleeve on the tube.



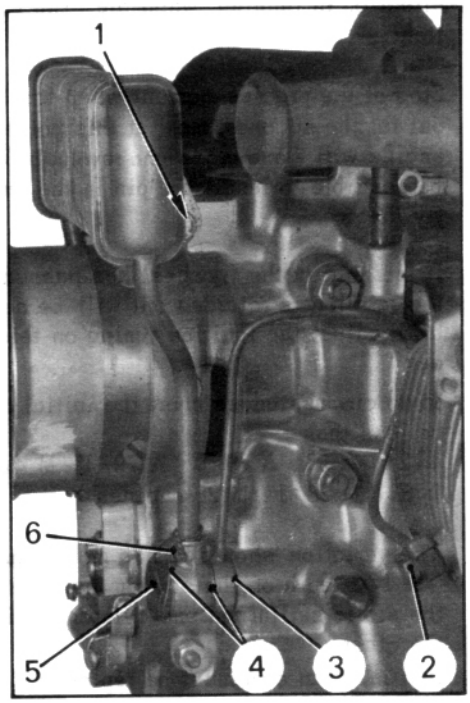
b) *Engines fitted with second type oil cooler :*

CARE : Do not reverse the calibrated union screws :
- the calibrated screw on the crankcase has only one oil hole of 2 mm diameter.
- the calibrated screw fitted on each cylinder has two oil holes, each 0.7 mm diameter.

Thoroughly clean these screws blowing them through with compressed air.

Fit the tube in place without twisting.

Fit (by hand) the calibrated union screw on the crankcase, then the calibrated union screws on each cylinder head. Place a double copper joint on each pipe union.
Tighten screwed unions to 12 - 13 mAN (1.2 to 1.3 m.kg)
Tighten the screw securing the pipe clip (11) (Fit the pipe clip with a rubber protection bush on the tube).



51. Fit the oil cooler :

a) *First type oil cooler :*
- Place in position the cooler fitted with joints (4) and screws (5).
- Insert the screws (5) into the cylinder head lubrication tubes. Fit joints (3) and tighten screws (5) to 27 - 30 mAN (2.7 to 3 m.kg).
- Lock them by means of a piece of wire (6) passing through the hole bored in the head of screw and tied around the tube.
- Fit the securing screw (1). Insert the distance pieces between the crankcase and the cooler clips (plain washer under the head of the screw under the nut). Tighten the screw (1). Tighten the calibrated union screw (2) to between 12 and 13 mAN (1.2 to 1.3 m.kg).

b) *Second type oil cooler :*

1° Place in position *(as applicable)* protection plate (9).

2° Fit a protective sleeve on each tube of the oil cooler.

NOTE : The protective sleeves must be renewed at each dismantling.
This sleeve should stand down 2 mm below the end of the tube.

3° Offer up the oil cooler, and centre the tubes in their bores.

Start the union screws (10) by hand.
Tighten them to between 10 and 14 mAN (1 to 1.4 m.kg).

4° Place in position the securing screw (7) on the crankcase,
Insert the two distance pieces (8) between the crankcase and the oil cooler clips (plain washers under the screw head - plain and shakeproof washers under the nut).

Tighten the screw (7).

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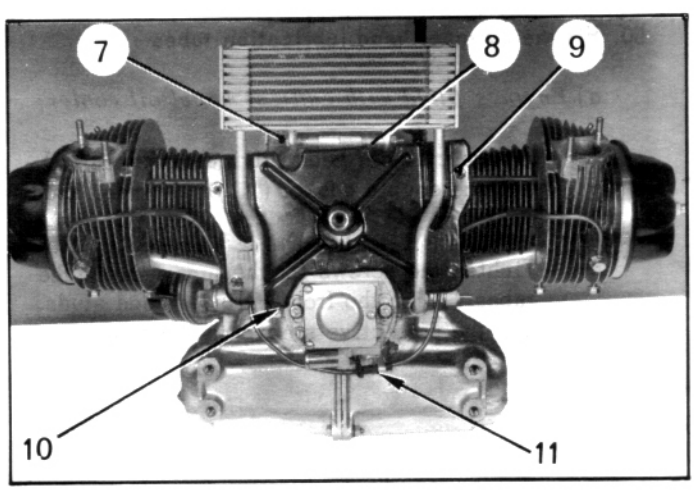
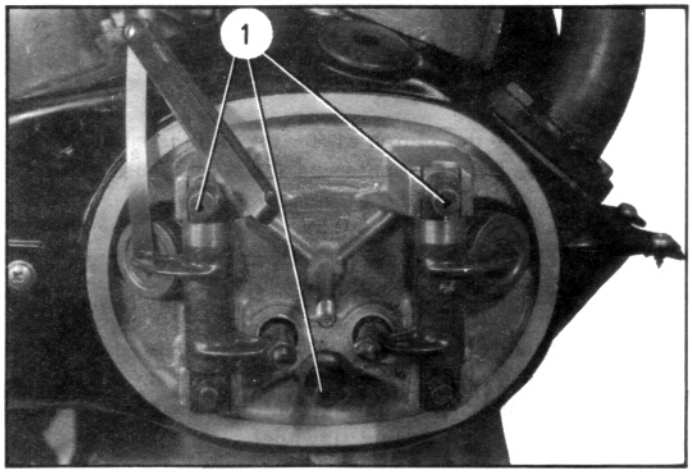




52. Assemble the engine :
(See relevant operation)

Fit :
- dynamo and its armature *(as applicable)*.
- petrol pump,
- fan cowl and cylinder cooling plates,
- inlet and exhaust manifolds,
- carburettor,
- breather,
- fan and drive belt for alternator,
- alternator *(as applicable)*.

Tension the belt.

53. Tighten finally the cylinder heads :

IMPORTANT : The final tightening of the cylinder heads must only be carried out after fitting and tightening the manifolds.

Tighten the three securing screws (1) to between 20 and 23 mΛN (2 to 2.3 m.kg)

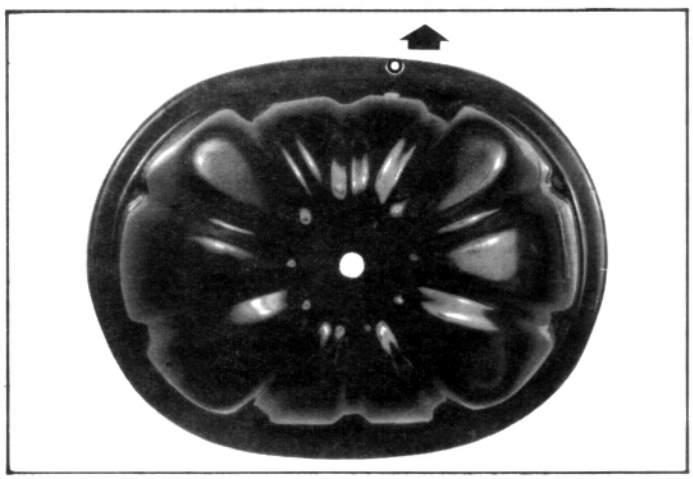
Respect order of tightening as below :

- upper front nut,
- upper rear nut,
- lower nut.

54. Adjust the rocker clearance :

This adjustment must be made with the engine cold.

Adjust one valve of cylinder, when the corresponding valve of the opposite cylinder is at maximum opening.



Inlet and exhaust = 0.20 mm

55. Fit the cylinder head covers :

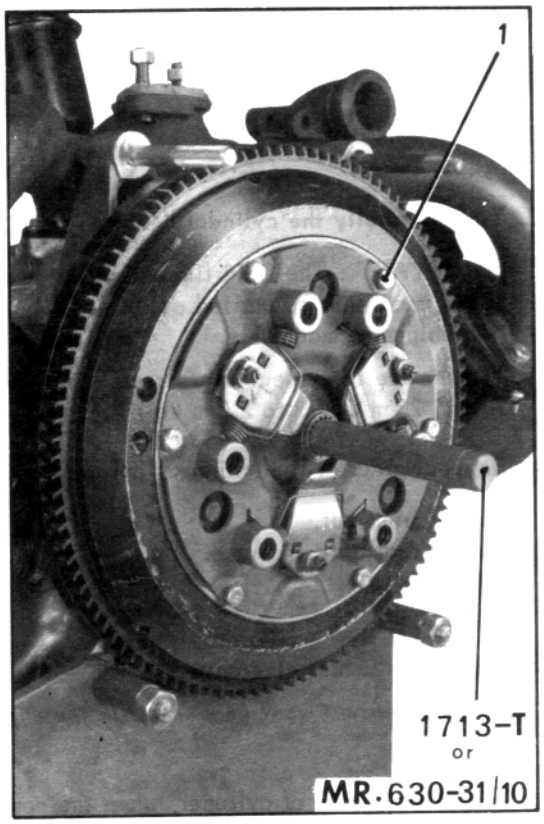
Check that there is no roughness on the joint faces.

Stick the rubber gasket on the cylinder head cover only. (using BOSTIK 1400 or MINNESOTA F 10).

NOTE : On a certain number of engines, cylinder head covers are marked with the letter « O » cold stamped on the cover. This mark should be placed towards the top.

Moderately tighten nuts to between 5 and 7 mΛN (0.5 to 0.7 m kg).

NOTE : A badly fitting rubber joint, or incorrect tightening of the nut, may entail a total loss of the engine oil.



56. Fitting the clutch :

a) *Centrifugal clutch :*

- Fit the centrifugal clutch coupling ring with lined segments
- Tighten the screws to between 9 and 14 mN (0.9 to 1.4 m kg)

b) *Conventional clutch :*

Check the clutch disc : the linings must be dry, free from oil spots and the rivets must stand down below the linings.

Ensure that the disc slides freely on the gearbox mainshaft splines.

Ensure that the contact faces of the disc on the flywheel and the clutch plate are perfectly clean as well as the contact faces on the housings and engine flywheel.

Fit the clutch mechanism to the engine flywheel : Centralize the disc using mandrel 1713-T (for discs with splined tube) or MR 630-31/10 (for discs with toothed hub rings)

While tightening the screws (1) ensure that the mandrel slides freely

Tighten the screws to between 10 and 13 mN (1 to 1.3 m kg) (spring washer)

Free mandrel

57. Remove the engine from its support MA 630-43/4.

58. Fit the two centring dowels on the gearbox coupling studs.

NOTES : After fitting the engine in the vehicle :

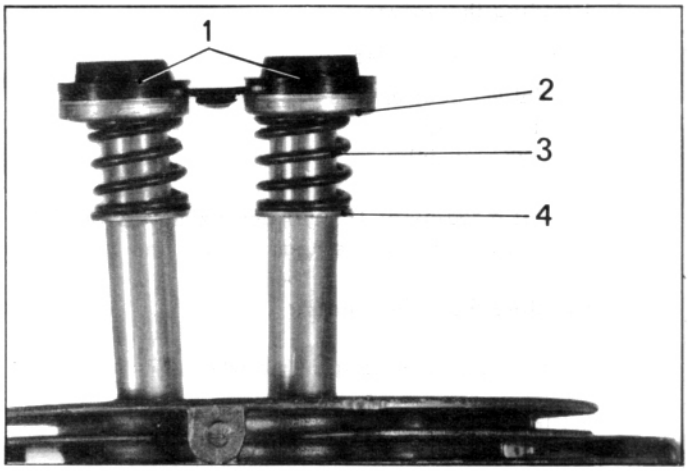
1° Fill up with engine oil (TOTAL altigrade GTS 20 W 50 or GT 20 W 40).

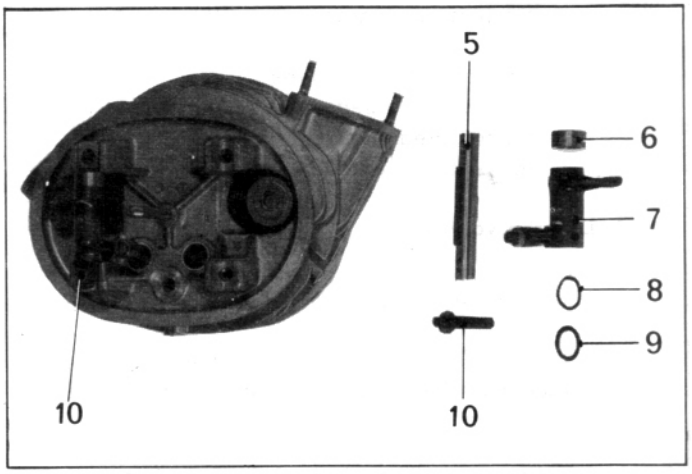
2° Check the oil pressure.

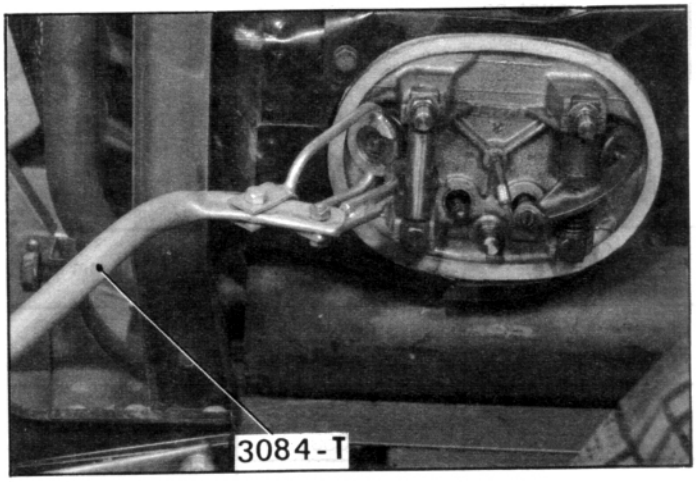
3° Adjust the slow running.

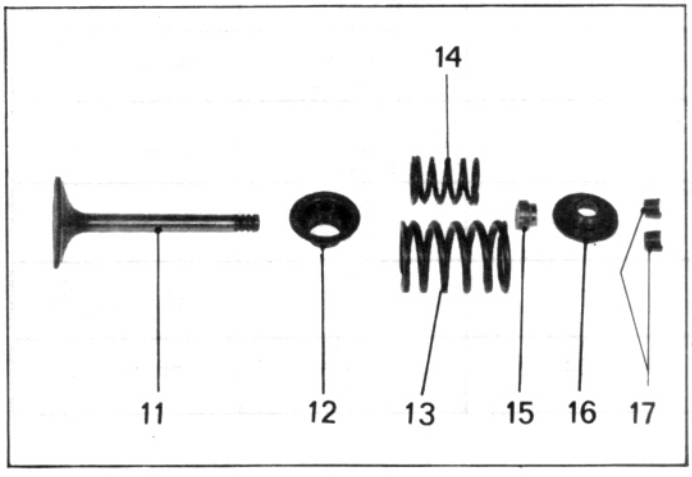
A 53 engine	: 600 to 650 rpm
A 79/0 engine	: 800 to 850 rpm
A 79/1 engine	: 800 to 850 rpm
M 4 engine	: 750 ± 50 rpm
M 28/1 engine	: 750 to 800 rpm
M 28 engine	: 750 to 800 rpm

OVERHAULING A CYLINDER HEAD









DISMANTLING

1. Strip the cylinder head :

Free :
- rubber gaskets (1),
- cups (2),
- springs (3),
- thrust washers (4)

2. Remove the rocker spindles :

a) Remove the securing screws (10) (using spanner 1677-T) (if necessary).

b) Free :

thrust washers (9),
- flexible washers (8) or springs *(early type cylinder head)*
- rockers (7),
- distance pieces (6).

3. Hold the cylinder head in vice (support 3001-T bis)

Bring cylinder head supports stop screw in contact with valves, screwing by hand.

4. Remove the valves :

a) Place the spindles in position and secure them with the support screws.

Compress the valve springs, using tool 3084-T applying pressure under the rocker spindles.

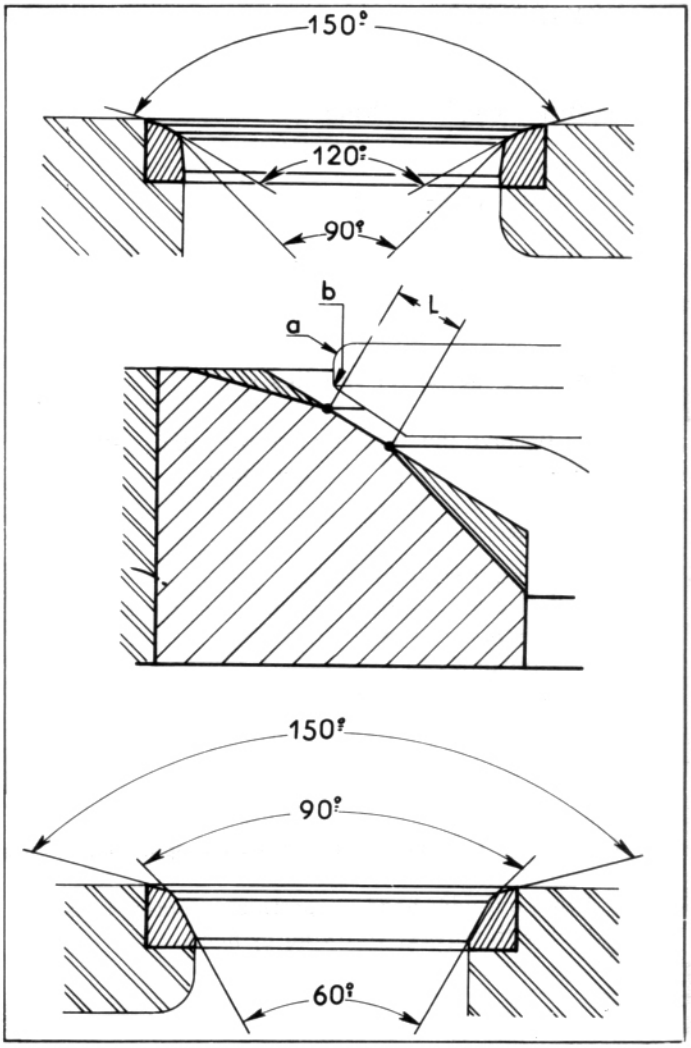
b) Free :

- cotters (17),
- cups (16),
- springs (13) and (14),
- centring collars (12),
- valve stem seals (15).

c) Remove the cylinder head from support

Free :
- valves (11),
- rocker spindles (5).

INLET



EXHAUST

ASSEMBLY

5. Grinding the valves :

Use a valve grinder

a) Valves seat angles
Inlet 120°
Exhaust 90°

b) Put a radius of 0 5 mm approximately on the edges of the valve head at « a » and « b ».

6. Grinding the valve seats :

Using the following grinding wheels

a) Inlet valve seats
- for the valve seat face : 120°
- for top clearance : 150°
- for bottom clearance : 90°

b) Seats for exhaust valves
- for the valve seat face : 90°
- for top clearance : 150°
- for bottom clearance : 60°

7. Lap the valves :

Use lapping tool 1615-T

- Valve : The large diameter of the valve seat face must be equal to the large diameter of the valve

- Valve seat : The width of the valve seat face must be :

Inlet L = 1.45 mm max.
Exhaust L = 1.80 mm max.

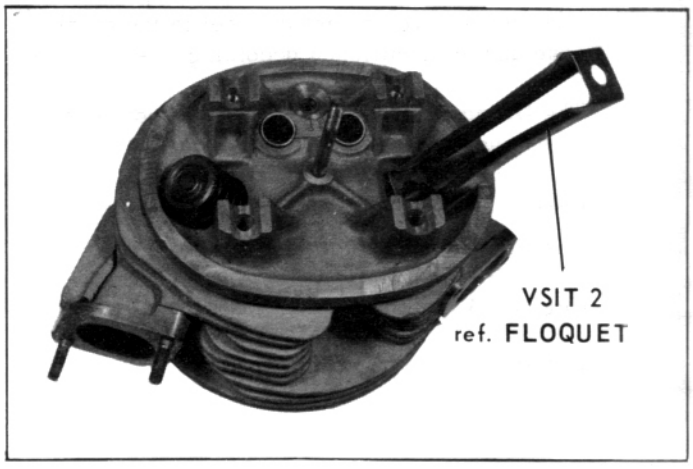
ENGINES	Valves	Angle	ϕ of head (mm)	ϕ of stem (mm) (under head)	Length (mm)
A 53 - A 79/0	Inlet	120°	39	$8\ ^{-0.025}_{-0.040}$	90.8 ± 0.25
(435 cc)	Exhaust	90°	32	$8.5\ ^{-0.035}_{-0.050}$	88.65 ± 0.25
A 79/1	Inlet	120°	39	$8\ ^{-0.005}_{-0.035}$	$89.57\ ^{+0.45}_{-0.25}$
(435 cc)	Exhaust	90°	34	$8.5\ ^{-0.020}_{-0.050}$	$88.18\ ^{+0.45}_{-0.25}$
M 4	Inlet	120°	39	$8\ ^{-0.025}_{-0.040}$	88.8 ± 0.25
(602 cc 1968)	Exhaust	90°	34	$8.5\ ^{-0.035}_{-0.050}$	86.5 ± 0.25
M 28/1 - M 28	Inlet	120°	40	$8\ ^{-0.020}_{-0.035}$	$88.5\ ^{+0.45}_{-0.25}$
(602 cc 1968 ⟶)	Exhaust	90°	34	$8.5\ ^{-0.035}_{-0.050}$	$86.95\ ^{+0.45}_{-0.25}$

8. Clean very carefully the cylinder heads in order to remove all traces of emery in the gas ducts. Blow these passages and lubrication ducts through with compressed air.
If the latter are obstructed, soak the cylinder head in a bath of cellulose solvent for about one hour. Then blow the ducts through again with compressed air.

9. **Calibrate the valve :**

Engines	Springs		Length decom - pressed	Length com- pressed	Load in kilos	Length under load	Load in kilos
A 53 A 79/0 M 4	Up to September 1963	outer	38 mm	24 mm	38 to 42	31 mm	18 to 21
		inner	28 mm	14.5 mm	7.5 to 8.3	21.5 mm	3.6 to 4.4
	From September 1963	outer	38.6 mm	24.4 mm	47.3 to 48.3	31.7 mm	21.2 to 24.6
		inner	28.8 mm	15 mm	9 to 10	22.3 mm	3.7 to 4.7

Engines	Springs	Length under load	Load in kilos	Length under load	Load in kilos	Direction of spiral
A 79/1 M 28/1 M 28	Outer	31.4 mm	28 ± 1.5	24.15 mm	42.5 ± 2	right-hand
	Inner	24.4 mm	12 ± 1	17.15 mm	25 ± 1.5	left-hand



10. **Fit the valves :**

a) Oil the valve stems and seat faces. Place the valves in position.

b) Secure the cylinder head in the vice using stand 3001-T bis and fit the spindles.

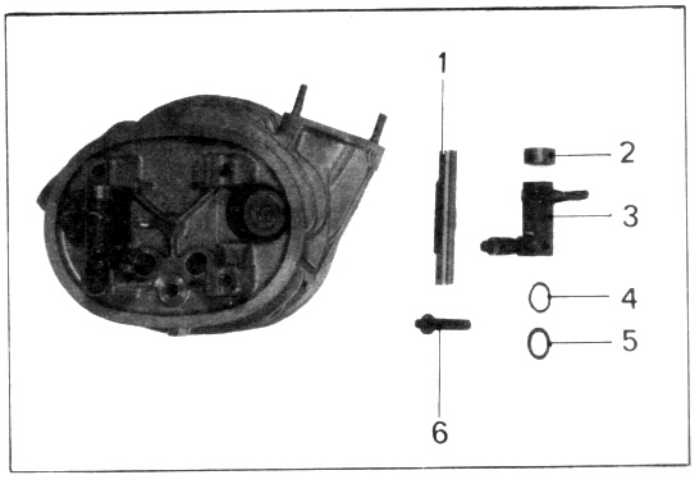
Bring the end of the stop screw into contact with the valve, screwing by hand.

c) Place in position the valve stem seals : Fit the plastic centring cap on the end of each valve stem.

Slide the seal on the cap.

Lower the seal onto the guide.

Use compressed tool VSIT 2, reference FLOQUET, to finish the assembly.



d) Fit :
- centring collars,
- springs,
- cups

Compress the springs using spring compressor 3084-T

Fit the locking cotters

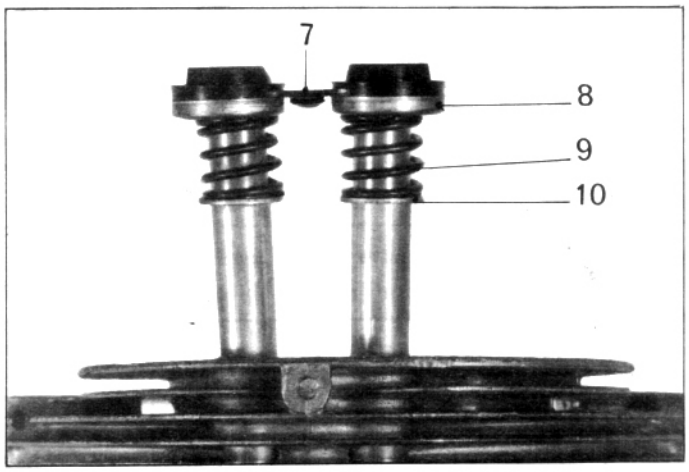
Remove the cylinder head from the stand

11. Fit the rockers :

Remove the rocker spindles

Place on each spindle (1) :
- a thrust washer (5),
- a flexible washer (4) *(new type cylinder head)*,
- or a spring *(old type cylinder head)*,
- the rocker (3),
- the distance piece (2)

Fit the rocker spindle thus equipped on the cylinder head, tighten the screw (6) (using spanner 1677-T, if necessary)



12. Place in position on the push-rod tubes :

thrust washers (10),
springs (9),
cups (8),
double joint (7)

NOTE : As from December 1972, the push rod tube joints have no centring heel in the crank case and are positioned according to engine type.

The fitting of this type of gasket is not possible on engines produced before this date

Engines M 28 and M 28/1 (602 cc) :

Position flats « a » upwards

Engines A 79/1 (435 cc) :

Position flats « b » downwards.