

WORKSHOP MANUAL

Alfetta



ENGINE



*This publication is intended
for the use by ALFA ROMEO Service Organisation
and contains instructions for adjusting, repairing and
overhauling the transmission, suspension, brakes and steering.*

*The operations are fully illustrated in order
to facilitate the identification of the parts or units in question,
of the tool or jig to use, and the correct way to proceed.*

*The replacement of separate units or parts must be carried
out using only **genuine ALFA ROMEO components**. Only by this means
can the complete interchangeability and perfect performance
of the various parts be ensured.*

*When ordering please specify not only
the type of car and the part number from the Spare Parts Catalogue,
but also the chassis and engine serial numbers,*

*When repairing and overhauling we also recommend strongly the
use of special tools. Finally, this Manual should always be kept
up-to-date with the data and information received through the
"Service Information Sheets" and the "Up-dating Instructions"
which are issued periodically by the Technical Service Department.*

Alfa Romeo Service Department



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WORKSHOP STANDARDS

When dismantling and reassembling, always use appropriate spanners, extractors and tools (both general and special tools) and not improvised devices, so as to prevent damaging the parts.

To release tight components, tap lightly using only a copper or aluminium hammer, if the parts concerned are made of ferrous materials, or a wood or plastic head mallet, if the parts are made of light alloy (covers, housing, etc.).

Neatly separate the parts belonging to the various units and partially screw the nuts on their corresponding studs or screws.

When dismantling, check that the parts that are to be aligned have a reference number or a distinctive mark on them. If it is discovered that a previously replaced part has not been aligned with such a mark, one should be applied.

Before washing the parts, remove all dirt with a brush and rags (to avoid excessive contamination of the cleaning fluid). Then wash the parts with paraffin or a suitable fluid. Remove any surplus with a compressed air jet. Dry the parts immediately after washing, to avoid corrosion.

After sandblasting or grinding with abrasive discs, etc., wash the parts thoroughly and blow off with compressed air to remove completely all traces of abrasive material. When reassembling, use compressed air or a dry clean brush to clean the parts (especially those that have been machined or ground).

When re-assembling, lubricate the parts adequately (except graphited bushes) to avoid seizure during the initial running period.

When coating parts with a lubricant use specially clean brushes and oil. Protect the containers from dust and use them exclusively for this purpose.

When re-assembling, replace oil seals, gaskets, flexible washers, lockwashers and lock plates, "Palmutter" locknuts and any other parts that appear to be in a doubtful condition.

Protect those parts of the engine which remain uncovered during assembly and which leave opening for the ingress of dust and foreign body with adhesive tape or with clean rag.

Use exclusively genuine ALFA ROMEO spare parts



TECHNICAL SPECIFICATIONS

The Alfetta models are powered by a four stroke cycle, four in-line cylinder engine.

The cylinder block, having special cast iron removable liners, is of light alloy.

The cylinder head, of the same light alloy as the block, has cast iron valve seat inserts and hemispherical combustion chambers.

The treated alloy steel crankshaft has five main bearings and oilways for lubrication of main journals and crankpins.

The connecting rods are in alloy steel with bronze small end bushing; the pistons are in light alloy with compression ring, oil scraper ring and oil control ring; the gudgeon pin make a close running fit with both piston and con. rod.

The main and connecting rod bearings have thin steel shells lined with antifriction metal.

The oil sump is in light alloy

VALVE GEAR

The valve gear includes overhead valves, two per cylinder directly operated by two camshafts acting through oil-bath cups. Valve clearance adjustment is by means of adjusting pads inserted between valve and cup.

FUEL FEED

Fuel is fed from the tank to the carburetter via a diaphragm-type mechanical pump driven by a push-rod in turn actuated by a cam on the oil pump & distributor drive shaft.

The twin, horizontal carburetters are fitted with an accelerator pump.

The ram air intake, with a dry-element air cleaner is provided with a manually controlled valve for feeding of fresh air in summer and preheated air in winter.

A bowl filter is connected across petrol pump and carburetter.

LUBRICATION

The engine is pressure lubricated by a gear pump mounted on the front cover of crankcase.

The pump shaft is driven directly by the crankshaft via a pair of gears.

The oil pressure is adjusted by a relief valve in the pump body.

To remove impurities the engine oil is filtered by a strainer in the suction head and a full-flow filter.

The filter is fitted with a valve that bypasses the element if it should become clogged.

The camshaft cover has unions for crankcase ventilation system piping.

COOLING SYSTEM

The system is of the forced circulation type with a centrifugal pump belt driven by crankshaft.

A thermostatic valve at the outlet from manifold allows for a quicker engine warming up from a cold starting since the valve spool opens only when coolant reaches a temperature of about 81-85°C.

In addition to the ram effect of air, the coolant passing through the radiator is cooled by an electric fan controlled by a thermostatic switch in the radiator.

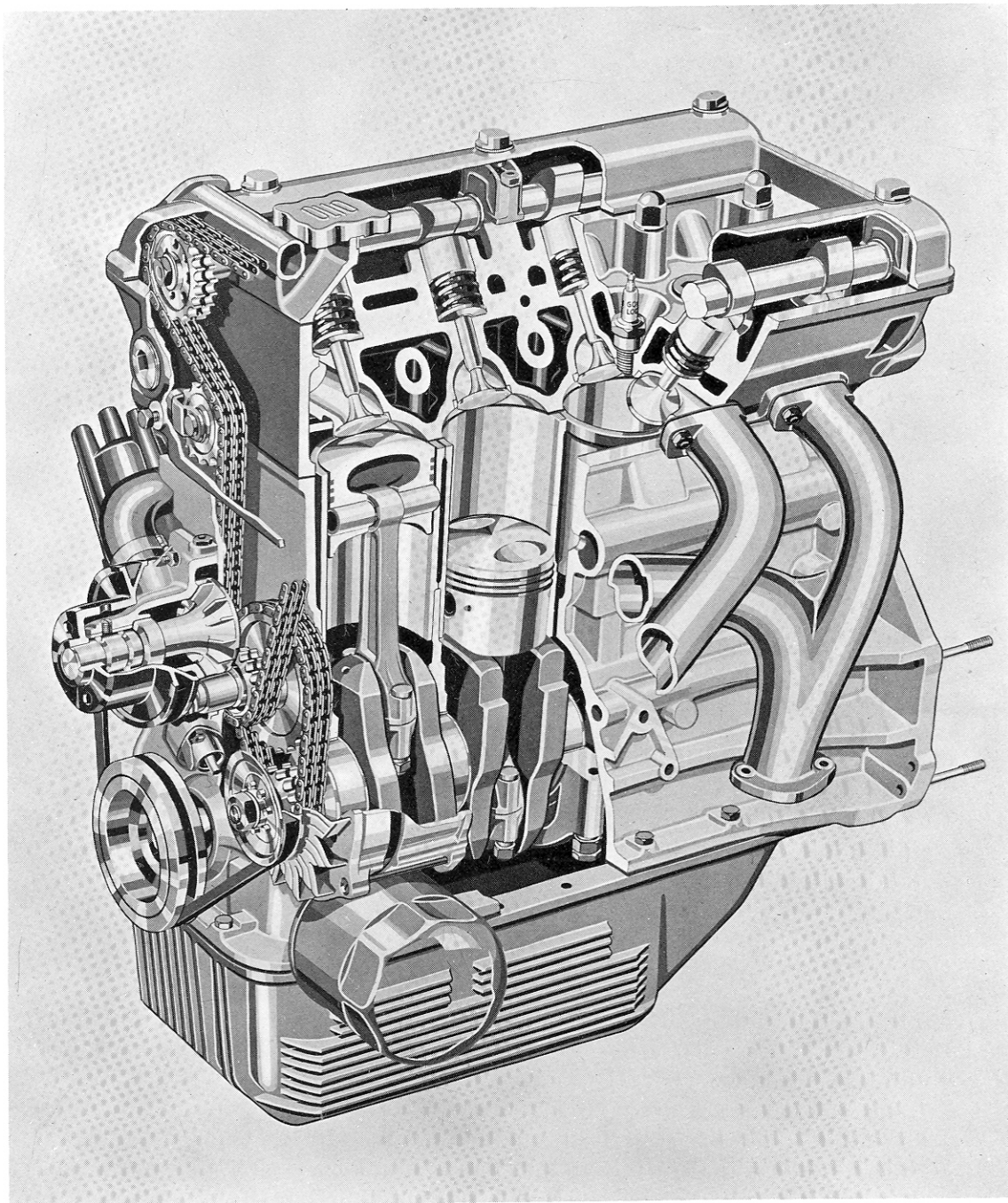
The system is provided with a sender which senses the coolant temperature and operates the thermometer.

When normal operating temperature is exceeded, a thermal switch at the fourth cylinder lights up a warning light.

IGNITION

The ignition system is of the battery and coil type with a centrifugal advance governor.

The negative terminal of the 12 Volt - 60 Ah. battery is earthed.



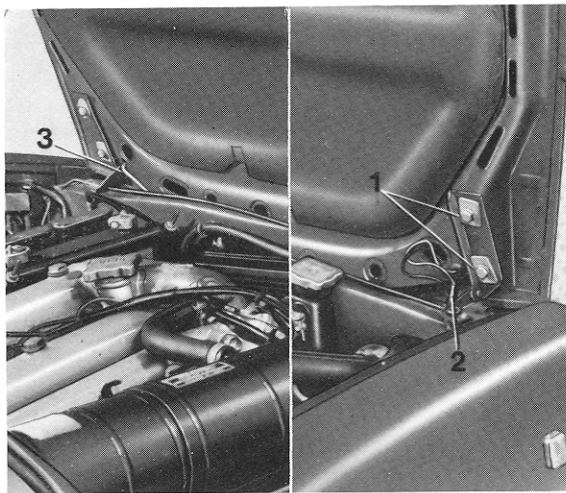


REMOVAL OF ENGINE

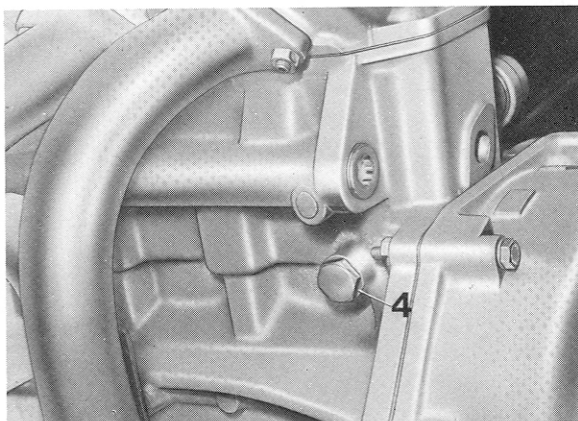
Disconnect engine compartment light wire **2**, screen washer pipe **3**, undo the screws **1** fixing bonnet to hinges and remove the bonnet.

Retain the shims, if any, between bonnet and hinges for re-alignment of bonnet on refitment.

Disconnect battery cables and remove battery from its housing.



Remove drain plug from radiator and plug **4** from crankcase; let coolant drain off. For a thorough draining, remove radiator filler cap, open the heater valve and disconnect the pipe across radiator and header tank.



Remove the air intake and disconnect the wires from alternator.

Remove the protection and detach H.V. and L.V. cables from distributor cap.

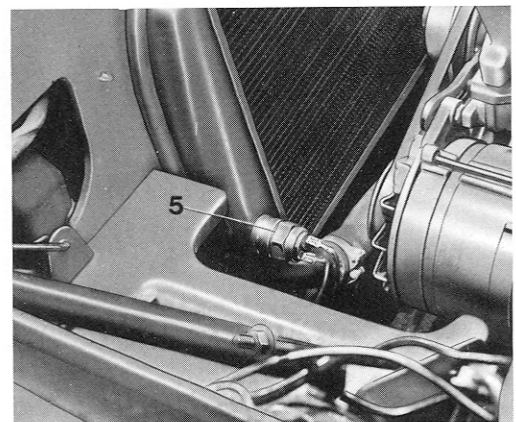
Disconnect the sparking plug cables.

Disconnect wires from oil pressure switch on crankcase.

Perform the following preliminary steps, then detach the radiator complete with electric fan and shroud.

Disconnect wires from electric fan thermal switch **5**.

From radiator adapters disconnect the pipes from thermostat housing and water pump.

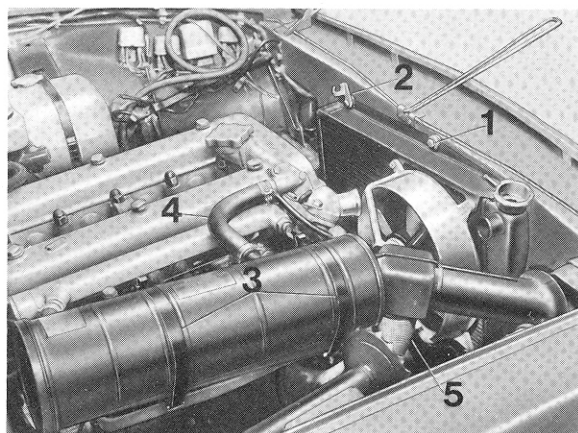




Slacken screws **1** fixing radiator to body and retain the mounting pads with spacers and brackets **2**.

Remove the radiator.

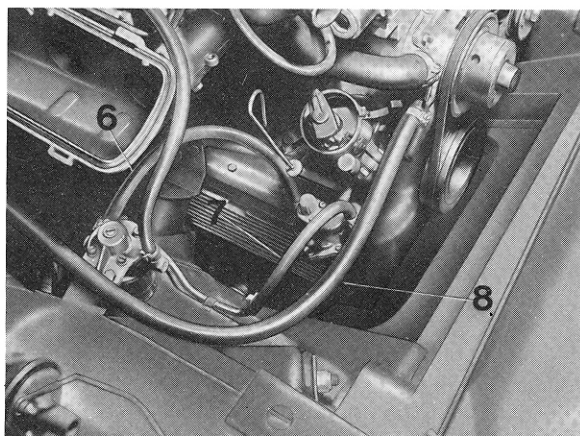
To remove the air cleaner, slacken the clamps **3**, disconnect the oil vapors recirculating hose **4** and the warm air duct **5**.



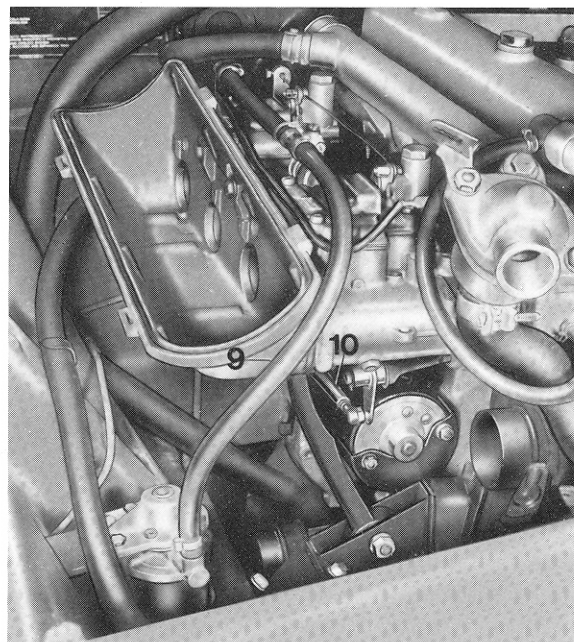
Disconnect wires from starter motor.

From fuel pump disconnect: pipe **6** for delivery of fuel to filter and pump inlet pipe **7**.

Disconnect heater return pipe **8** from coolant pump adapter.

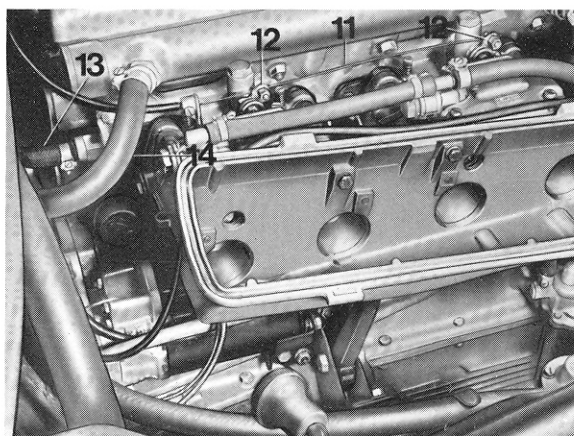


Disconnect the inlet pipe **9** from carburettor. Remove the retainers and detach the accelerator control rod **10**.



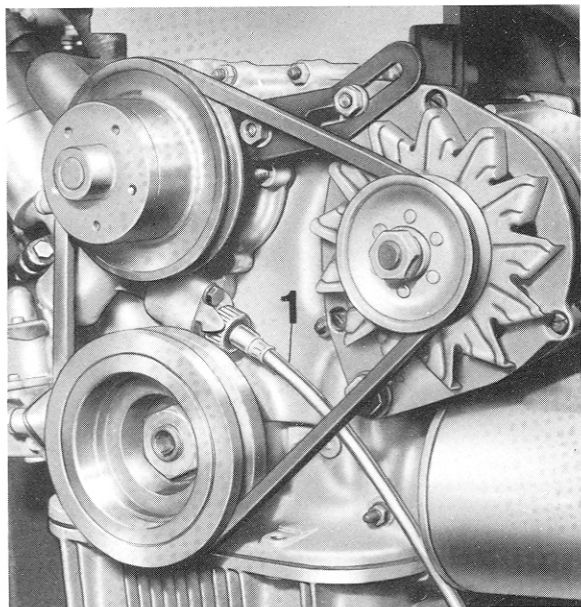
Disconnect the choke control cable **11** from levers **12** on carburetors.

From intake manifold adapters disconnect the brake servo vacuum hose **13** and the heater water hose **14**.

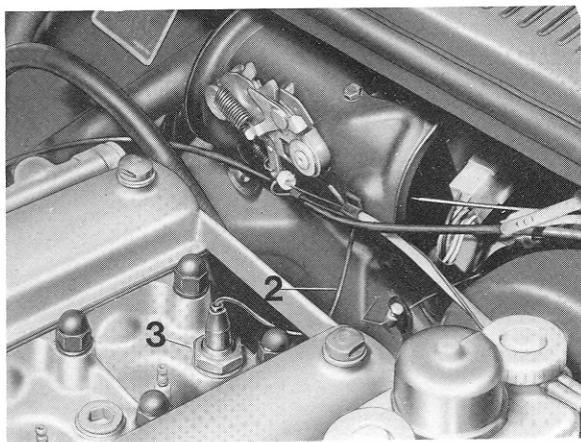




Disconnect the speedometer flexible shaft **1** from drive on water pump.



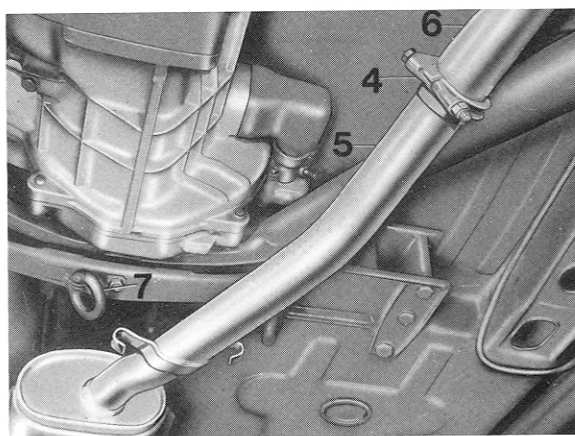
Disconnect wire **2** from thermal switch **3** of coolant temperature warning light.



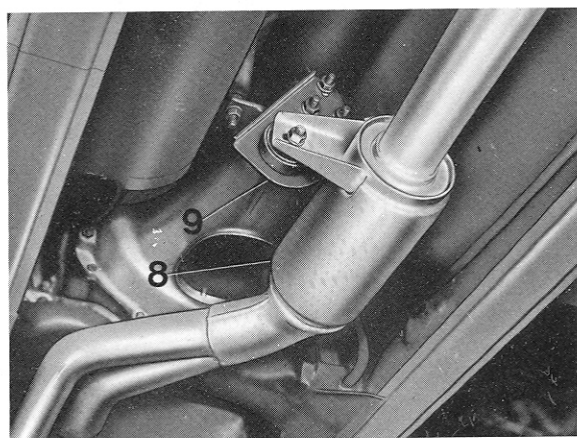
Remove drain plug from oil sump and let oil drain off; clean the plug and refit it.

To remove the front section of exhaust pipes perform the following preliminary steps:

- Slacken clamp **4** by removing the fixing bolt and detach front section **5** of pipe from tail section **6**.
- Free the pipe from flexible mounts **7** securing it to the gearbox supporting cross-member.



Slacken the nut and remove front section **8** of exhaust pipe from rubber mount on bracket **9**.



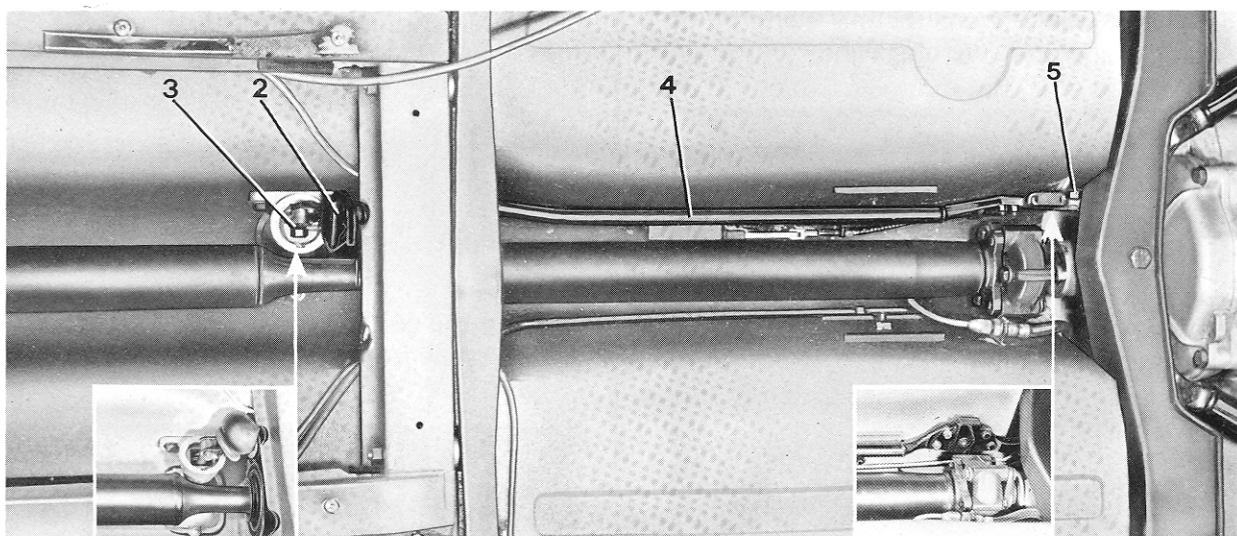


Slacken fixing nuts and remove pipes **1** from exhaust manifold.

Remove the front section of exhaust pipe.



Remove boot **2** from gearlever support; undo and remove screw and washer **3** connecting link rod **4** to gear lever, the nuts and washers **5** of joint between link rod and gear selector lever.



Rotate the propeller shaft so as to gain access for removing both one of the screws fixing prop. shaft to flywheel and one of the screws fixing prop. shaft to clutch yoke. Remove rear flywheel cover. Lock the flywheel by fitment of tool **A.2.0290** in place of flywheel cover.

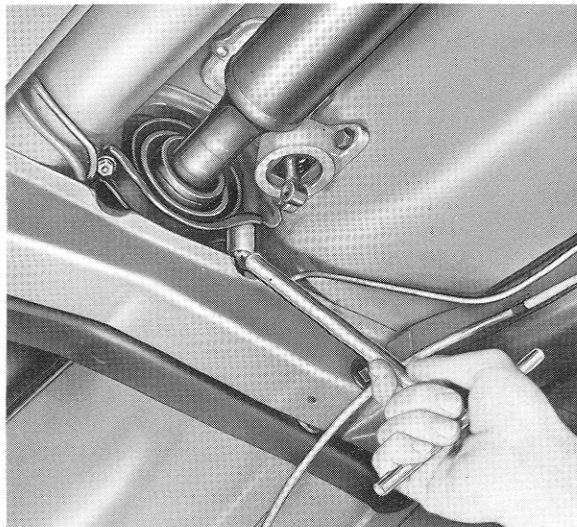


Undo and remove the prop. shaft fixing bolts with the aid of spanner A.5.0192. (1)



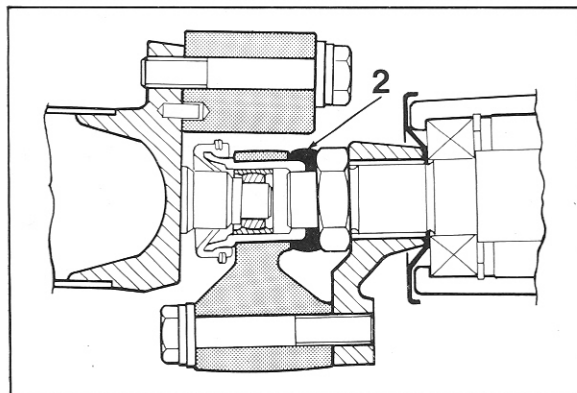
Remove the flywheel locking tool then slacken the remainder of prop. shaft fixing bolts in the same way as above.

Undo and remove the nuts fixing the prop. shaft: centre support to the studs.



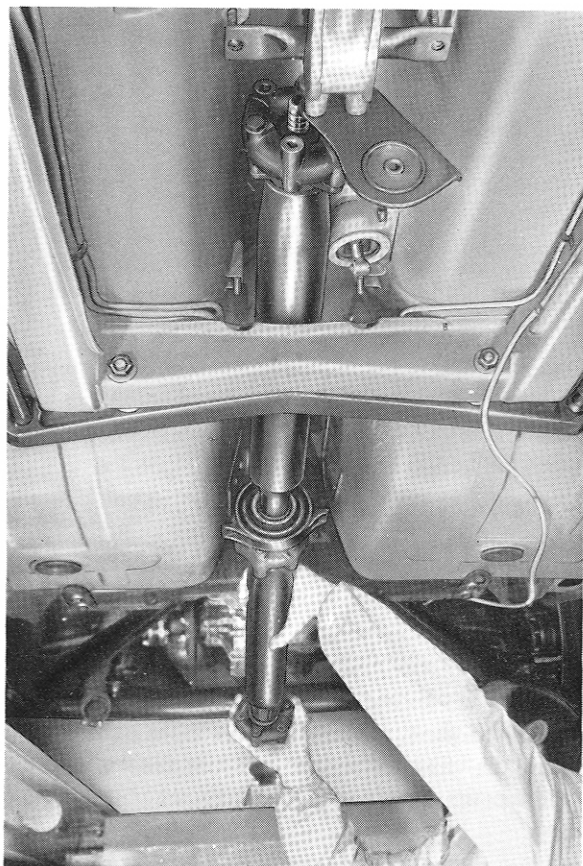
Undo the fixing nuts and remove the rear engine mount. Retain the washers as they are used, on reassembly, to set the clearance between prop. shaft and rear mount top at 7 ± 1 mm.

Withdraw the prop. shaft from clutch spindle shank; great care should be taken not to damage the grease seal 2 between flexible coupling and clutch yoke.



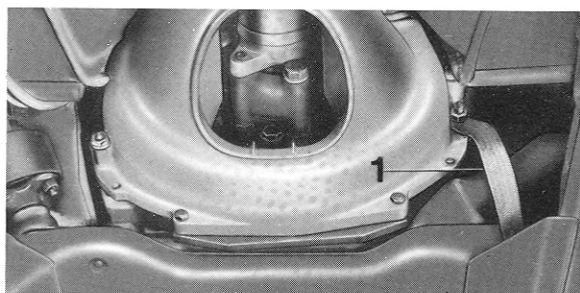


To remove the prop. shaft, free the centre support from studs and slide the front bushing out of flywheel together with the front flexible coupling; withdraw the prop. shaft from car's tail.

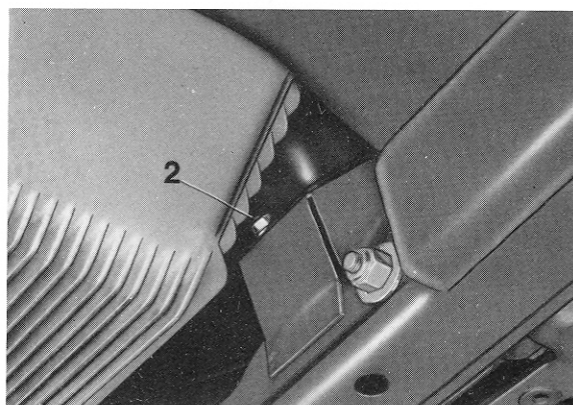


The removal of components from the underside of car is completed by detaching :

- the earth strap **1** from the bolt fixing rear engine mount to engine unit.

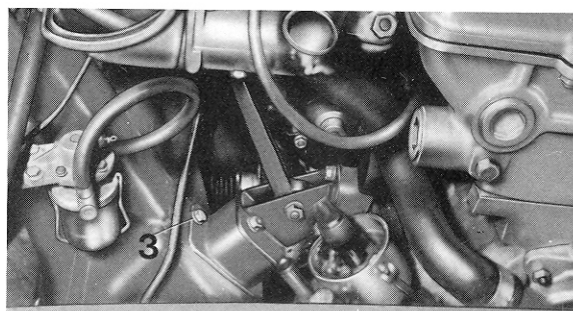


- The lower front protection so as to facilitate the subsequent removal operations
- the heat shield of engine mount at exhaust side
- the nuts **2** fixing the bottom of engine mounts to body.



To remove the engine proceed as follows:

- with a hoisting device relieve engine mounts of the weight of engine and undo screws **3** fixing the mounts at the top.



- Remove engine from car by lifting and tilting it conveniently.



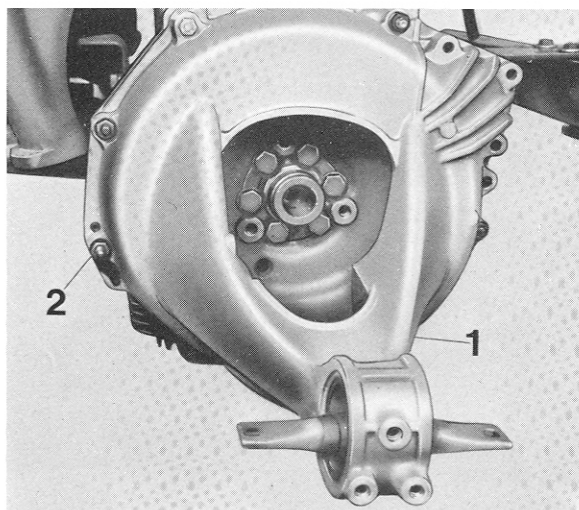


DISMANTLING ON BENCH

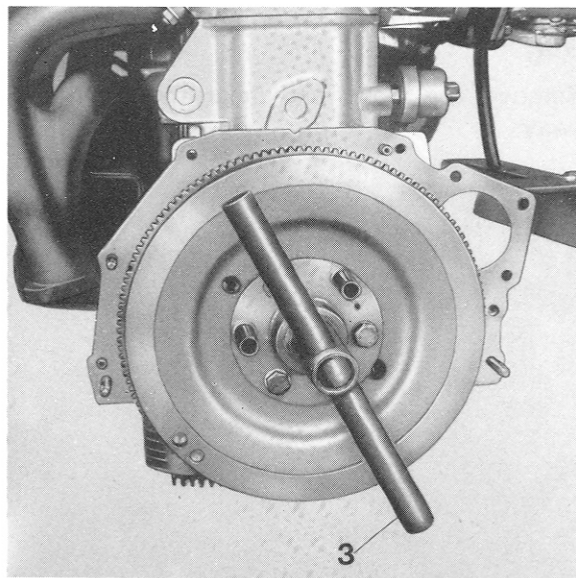
With engine hoisted up, perform the following:

- Remove carburettor supporting strut by slackening and removing the strut attaching parts.
- Undo the starter motor bracket fixing screws and remove the motor together with its mounting plate.
- Remove the engine mount at the intake side; undo and remove the hot air stove fixing screws and take away the stove.
- Undo the nuts fixing the exhaust manifolds to head and remove manifolds and gaskets.
- Undo the fixing nuts and remove engine mount at exhaust side.
- In place of mounts previously removed fit bracket **R.4.0127** for installing engine on stand **R.4.0151**.

Proceed in dismantling the engine as follows:
Undo and remove rear cover fixing bolts **2** and remove rear cover **1** together with its spacer flange.



Fit tool **A.2.0256 (3)** to flywheel.



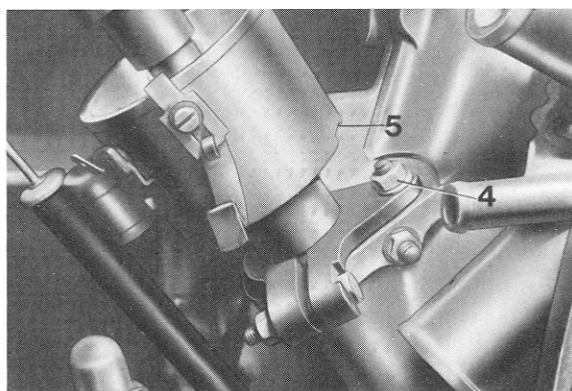
Engine is dismantled further by proceeding as follows:

Disconnect sparking plug wires: then, free the wire bundle from the retaining clip.

Remove the distributor covers by slackening the fastening springs.

Slacken the fasteners fixing the distributor cap to body; remove the cap together with the ignition wires.

Undo the nut **4** fixing the clamp of distributor **5** to the front cover; remove the distributor.

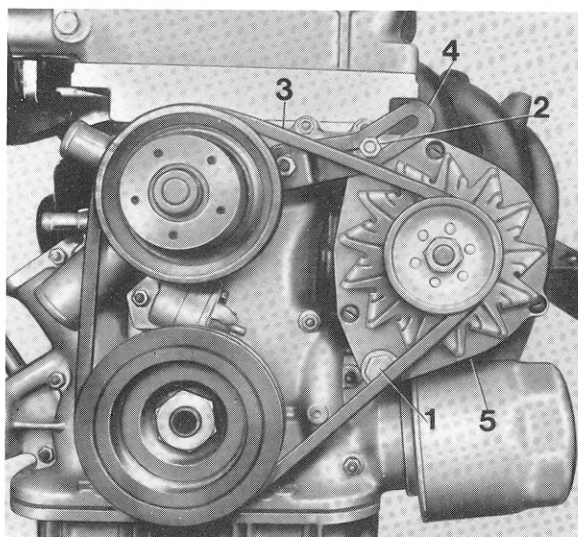


Remove the sparking plugs with the aid of spanner **A.5.0115**.



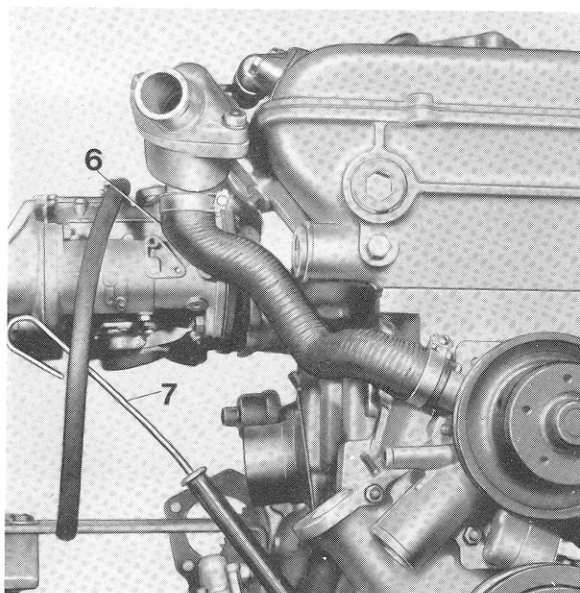
Undo bolts **1** and **2** fixing the alternator **5** to front cover and to link **4**; remove drive belt **3**. Slacken the nut fixing link **4** to water pump body.

Remove the bolts and take the alternator away.

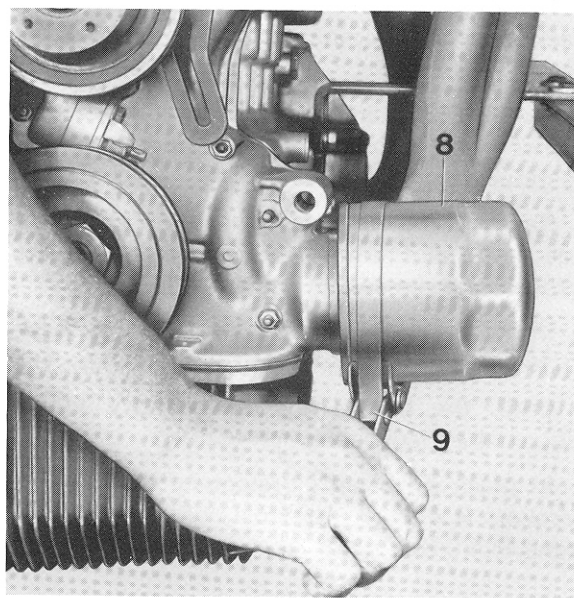


Slacken the clamps and disconnect the bypass hose **6** from thermostatic valve adapter and from water pump adapter.

Remove oil dipstick **7**.

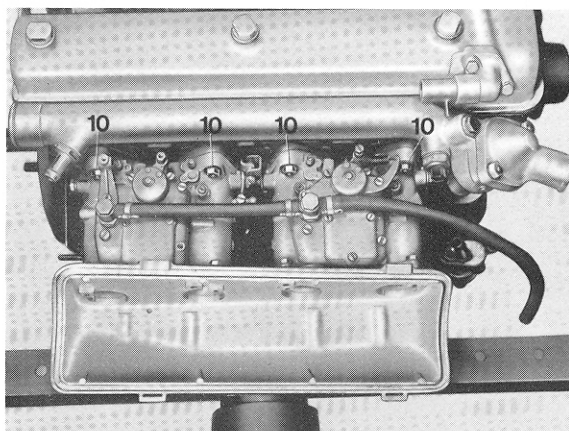


Remove oil filter **8** with tool **A.2.0130 (9)**.



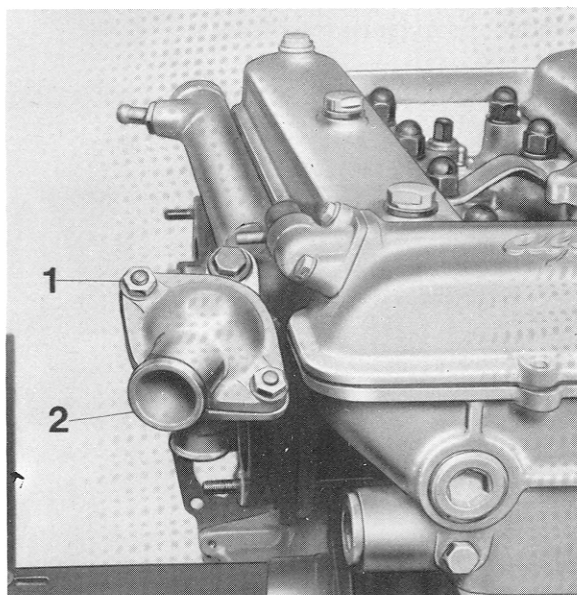
Remove the retainers from throttle link rod and detach the rod from throttle lever.

Undo and remove nuts **10** fixing carburetters to rubber mounts; remove carburetters and air intake as a unit.

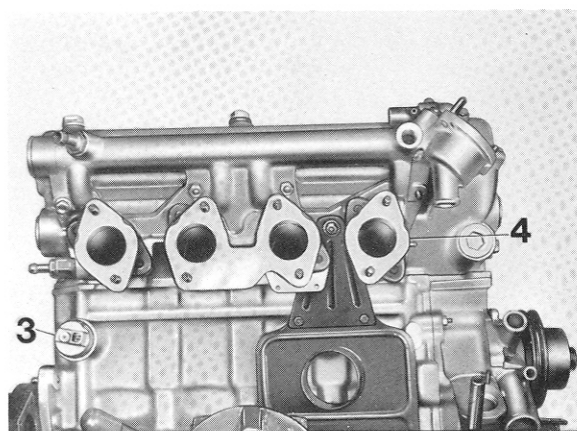




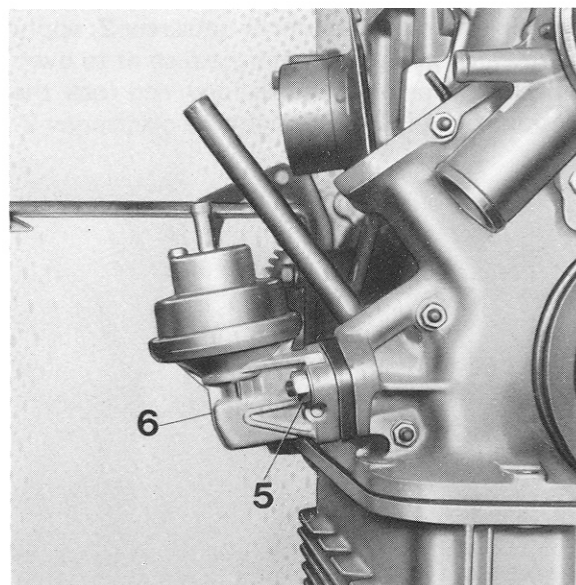
Slacken nuts **1** fixing thermostatic valve cover **2**; then, remove cover, gasket and the thermostatic valve.



Remove coolant temperature sender **3**. Undo and remove nuts fixing intake manifold **4** to cylinder head; take away the hot air stove bracket and remove the intake manifold.



Slacken nuts **5** fixing petrol pump **6** to front cover; remove pump, gasket, distance piece and push rod.

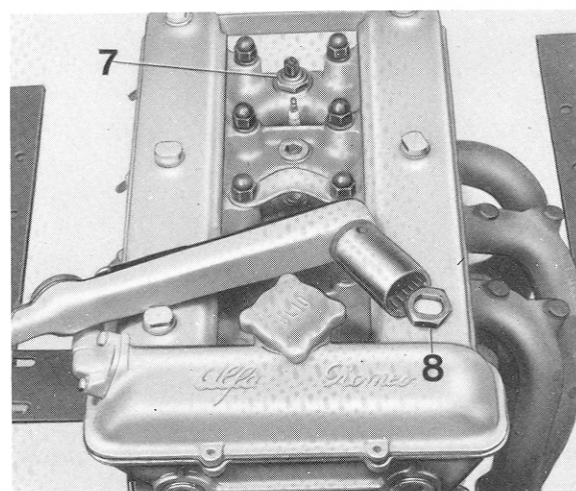


Remove the oil pressure switch.

Remove the coolant temperature telltale switch **7**.

Undo the bolts fixing at the front the camshaft cover to cylinder head.

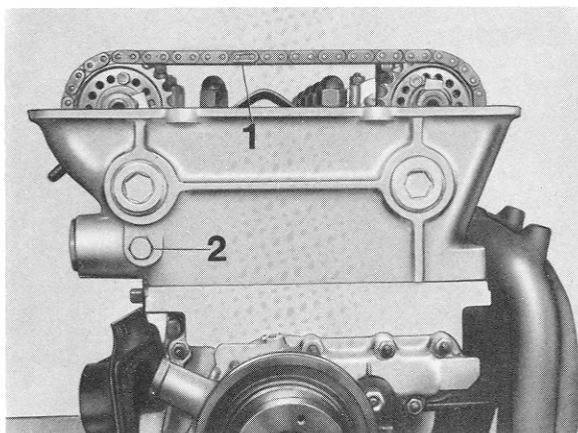
With spanner **A.5.0180 (8)** undo the screws fixing camshaft cover to head; remove camshaft cover.





Rotate the crankshaft until the detachable link **1** is at the position shown below and the reference marks on front camshaft journals and caps are aligned.

Slacken the chain tensioner setscrew **2**; apply downward pressure to the chain so as to overcome the tensioner spring load and lock the tensioner in place by retightening setscrew **2**.

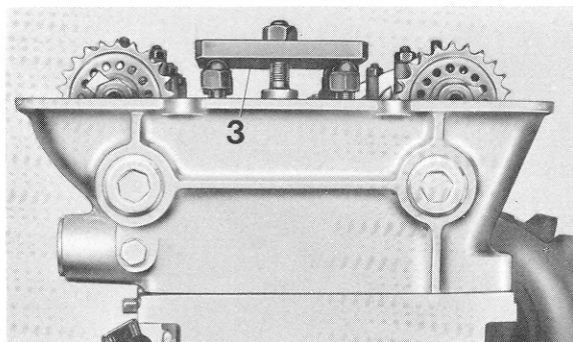


Remove the detachable link, free the chain from camshaft sprockets; then, withdraw the chain.

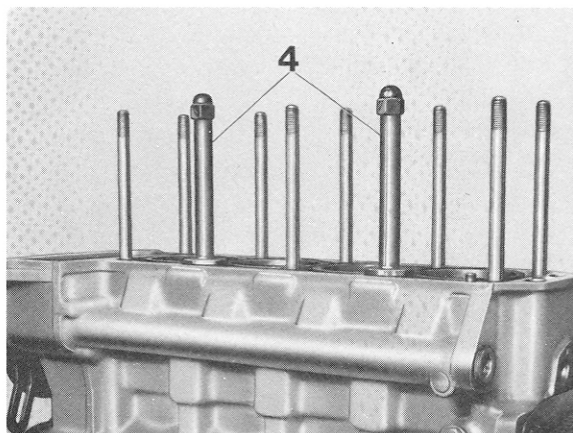
Undo the nuts fixing head to cylinder block; remove the engine lifting bracket.

If the head is stuck to the block, use tool **A.2.0146 (3)** so as to take the head off the block and off the liners as well.

Remove tool **A.2.0146**; undo fixing nuts and remove the exhaust manifold.



Position the tool **A.2.0117 (4)** on liners; secure liners in place with the head fixing nuts.

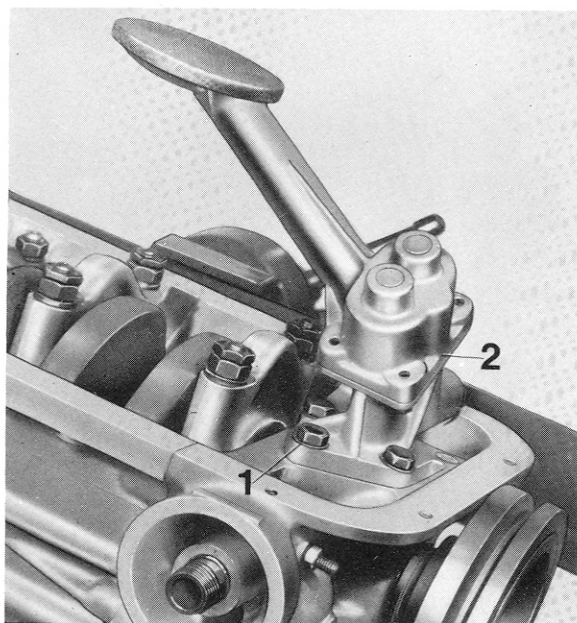




Undo and remove screws and bolts fixing oil sump to block; remove sump and gasket.

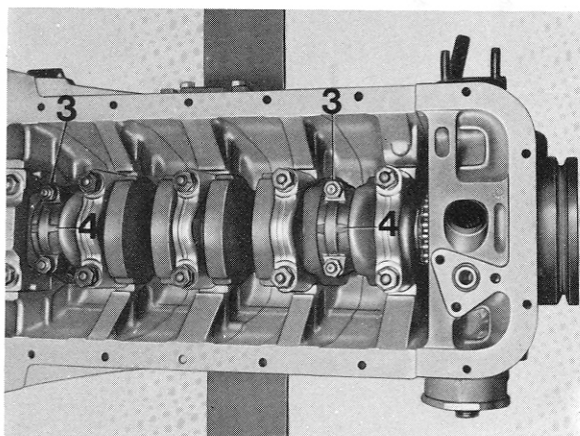
Undo and remove screws 1 securing oil pump 2 to front cover.

Remove pump and sealing ring.



Rotate crankshaft so as to gain access to nuts 3 of con. rod bearing caps 4; undo the nuts and remove caps.

Withdraw con. rod & piston assemblies and keep them in proper order for correct refitment.

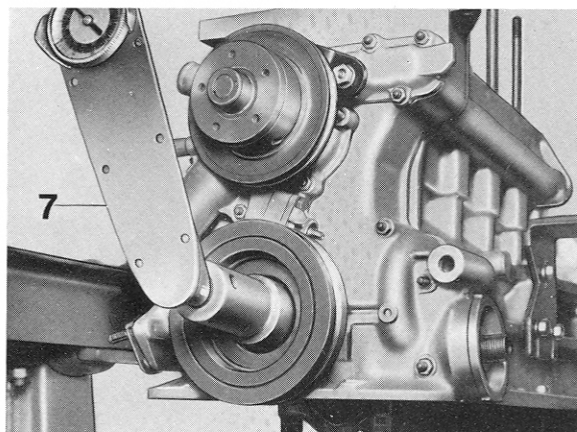
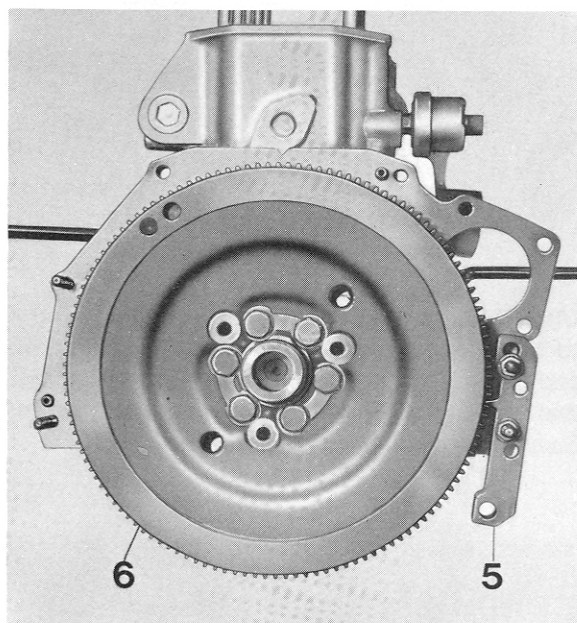


Remove gudgeon pin circlips and keep them with the piston for ease of refitting; slide out the pin.

Remove tool retaining the liners and withdraw them.

Remove tool A.2.0256 from flywheel.

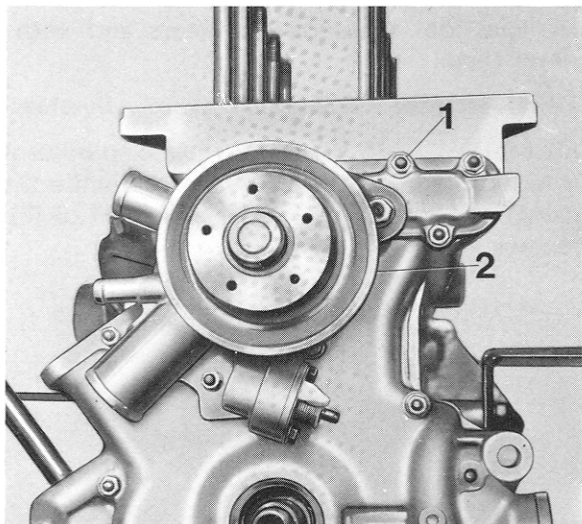
Fit tool A.2.0145 (5) to flywheel 6 to prevent rotation; bend up the safety tab and undo the damper fixing nut with spanner A.5.0126 (7); remove damper.



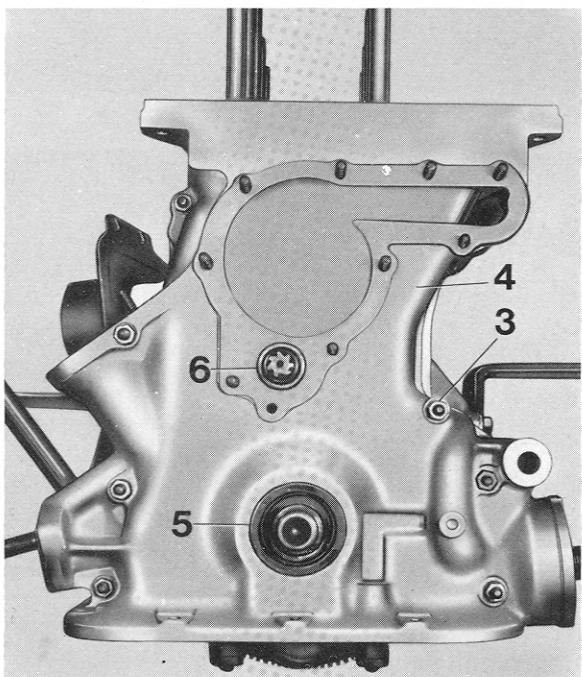
Remove flywheel stopping tool.



Undo the nuts **1** securing water pump **2** to front cover; remove pump.

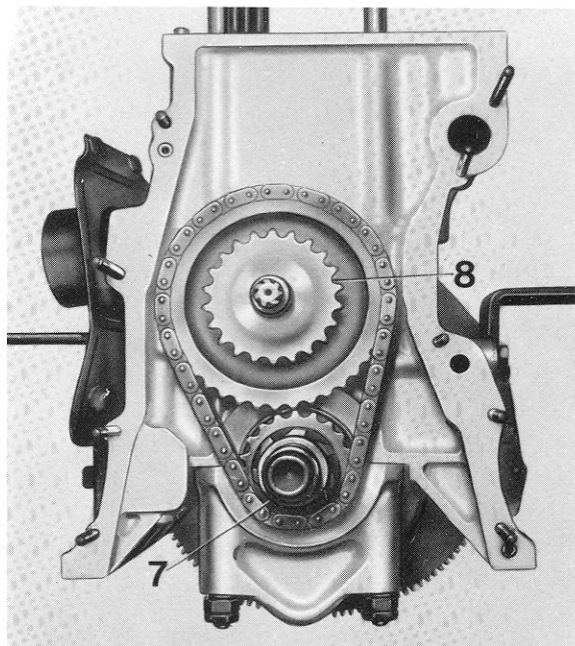


Undo and remove nuts **3** fixing front cover **4** to cylinder block; remove front cover, gaskets and sealing ring. Then, remove crankshaft oil seal packing **5** from cover and guide bushing **6** with the aid of tool **A.3.0210**.

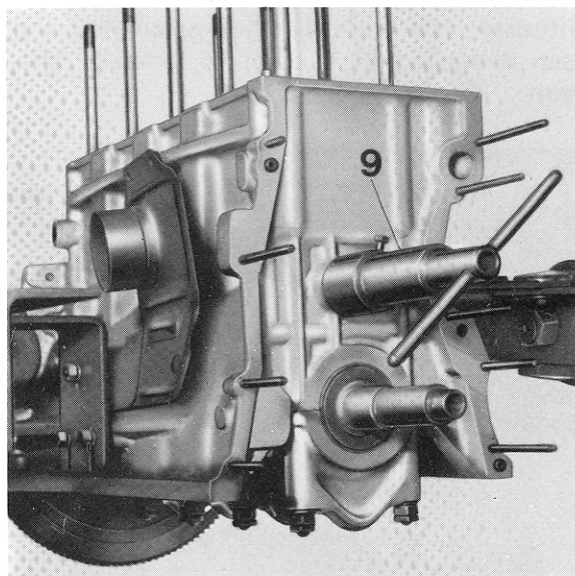


Remove the metal ring, the oil pump drive gear **7** together with idler gear **8** and timing chain.

Retain the idler gear thrust washer.



With the aid of tool **A.3.0210** (**9**) remove the idler gear guide bushing from cylinder block.

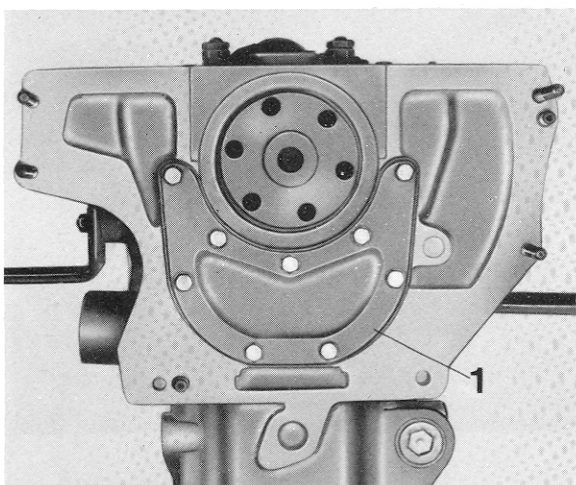




Refit tool **A.2.0145** for locking the flywheel; undo and remove the screws securing flywheel to crankshaft; remove tool **A.2.0145** first, then the flywheel.

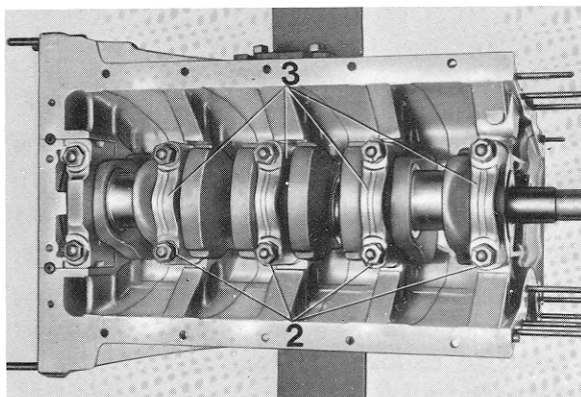
With the aid of a press and a punch, remove the prop. shaft centring bushing from flywheel; for late type flywheel, prior to remove the bushing, take away the studs.

Undo and remove the screws fixing rear cover **1**; remove cover and gasket.



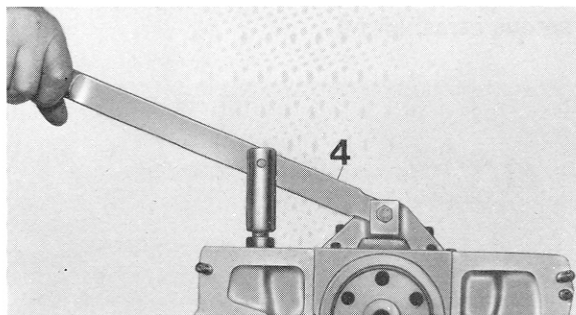
Undo and remove locknuts **2** from bolts securing the main bearing caps **3**.

Bend up the safety tabs at the nuts securing rear main bearing cap; undo and remove the main bearing cap fixing nuts.

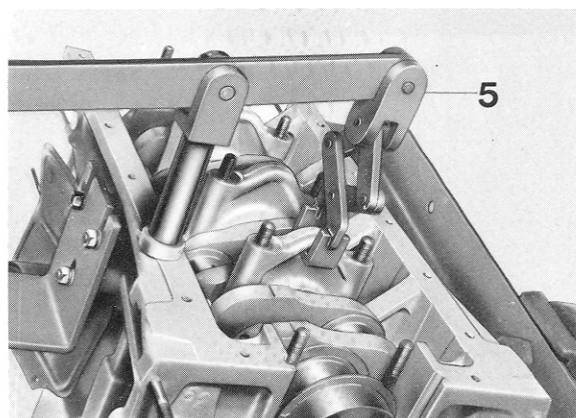


To remove the rear main bearing cap, use tool **A.3.0139 (4)**.

Remove rubber seals and rear oil sealing ring.



Use tool **A.3.0182 (5)** to remove the remaining main bearing caps.



On removing the centre main cap, retain the crankshaft lower half thrust rings.

Remove crankshaft from crankcase.

Remove, in proper order for an easier refitting, the upper half thrust rings and the bearing shells both from bearings and caps.

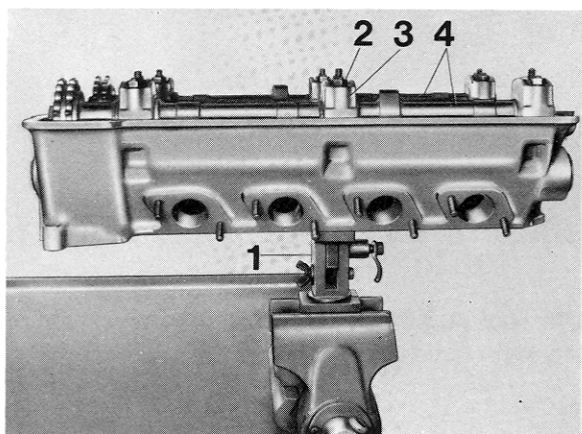
Finally remove, if required, the crankshaft oil gallery plugs by drilling them through.



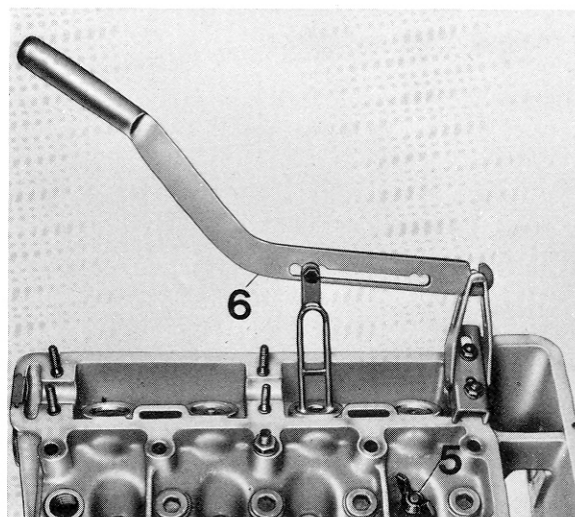
DISMANTLING CYLINDER HEAD ON BENCH

To dismantle the head proceed as follows:
Clamp tool **A.2.0195 (1)** in a vice and install head on tool.

Undo and remove nuts **2** securing caps **3** then remove camshafts **4**.



With the aid of tools **A.2.0192 (5)** and **A.3.0324 (6)**, depress the valve springs and remove valve cotters; then, keeping them in assembly order for refitting in the original position, remove upper spring seats, inner & outer springs and intake valve guide seals; with tool **A.3.0247**, remove lower spring seats and shims. Remove intake and exhaust valves.



Dismantle the camshaft as follows:

Take away the split pin and remove bolt.

Undo and remove the nut securing chainwheel to camshaft.

Remove chainwheel, flange and key.

The cylinder head is dismantled further as follows:

Remove, in proper order for an easier refitting, the valve cups from their seats in the head and the valve adjusting pads.

Dismantle the chain tensioner as follows:

Hold the tensioner in its seat while slackening the setscrew then, unload the spring and withdraw tensioner and spring.

Remove tensioner setscrew and locking wedge.

If required, remove the intake and exhaust valve guides with the aid of tool **A.3.0134** and a press; to remove the valve seat inserts use the special tool **A.0.0012**.



CHECKING AND INSPECTION

Prior to removing valve seats and guides, inspect them for sound conditions as follows.

Valve seats

Check that valve seat inserts show no signs of dents, cracks or burnings and are properly seated.

If seat inserts are damaged, re-cut them with the aid of tool **A.1.0002**. Seat inserts can be reworked provided the minimum limit is not exceeded.

After valve guide renewal, check valves for leaks as follows:

- place the cylinder head complete with valves and springs on a level surface with combustion chambers upwards;
- carefully clean the surfaces of combustion chambers;
- fill combustion chambers with petrol and check for leaks past the valves.

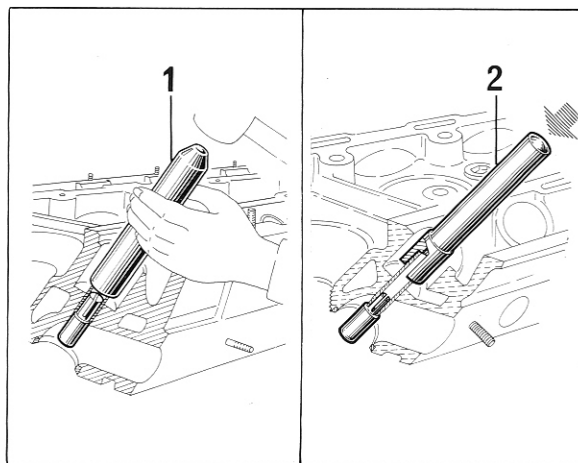
If valves are leaking, check whether the valve heads are properly seated into the inserts and repeat the leak test. If leaks persist, valve lapping should be repeated.

Valve guides

Check for no sign of dents, seizing and incorrect positioning in cylinder head.

Renew the guides, if necessary.

Valve guide protrusion must be: 13.3/13.5 mm at intake side and 16.3/16.5 mm at the exhaust side; such a protrusion is automatically set on fitment when tools **A.3.0246** (1) and **A.3.0133** (2) are used.



On renewal, the valve guides must be re-bored to 9.000/9.015 mm; this value should be checked with tool **C.1.0028**.

Whenever the valve guides are renewed, the seat inserts must be re-cut so as to ensure that they are true and valves work properly.

If the head surface is scored or warped out of flat, it must be reworked.

Cylinder head height after re-working should not be less than 111.5 mm.

Check valve cup seats for no sign of scratching, seizing or excessive wear.

Check camshaft journals and caps for sound conditions.



Springs – cups – valves

Visually inspect valve springs for no sign of cracking or yielding.

Check the valve cups outside diameter, the top surface abutting against the cams and the adjusting pads for no sign of seizing scoring or excessive wear.

Check the valves for no sign of scoring, burning or indentation into the relevant seat insert; renew the valves, if necessary.

Camshafts

Carefully inspect the working surfaces of cams and camshaft journals for no sign of scratching, seizing, overheating or excessive wear; renew camshafts, if necessary.

Crankshaft

Check the working surfaces of crankpins and main journals for no sign of excessive wear, scoring, seizing or overheating.

Thoroughly clean the oil galleries, if needed, as follows.

Remove the oilway plugs and all traces of previous peenings and stakings. Clean the oil passages with the aid of a steel swab, flush the crankshaft and passages with petrol or similar solvent and dry with compressed air.

Crankpin and main bearing shells

Check bearing shells for excessive wear; the working surfaces should show no sign of scratching or seizing.

If shells are worn down unevenly, it is essential to renew all shells.

Red and blue painted marks are provided at the crankshaft next to the crankpins and main journals.

Red or blue marks are also provided on the edge of both crankpins and main bearing shells.

On re-building the shells must be matched to journals and crankpins according to the colour marks.

The shells for con. rod of 4th. cylinder piston must be fitted with the chamfer facing the flywheel.

Liners - pistons - con. rods

Liners and pistons must be matched according to the colour marks on piston crown and on outer surface of liners. Colour marks are the following:

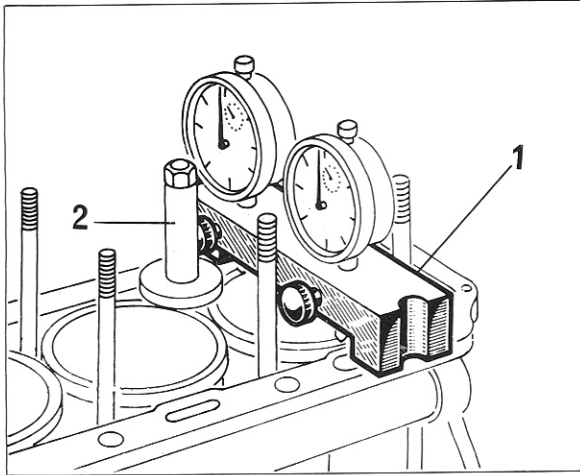
CLASS	A	B	C
COLOUR CODE	Blue	Pink	Green

Gudgeon pins and pistons must be matched according to the black or white painted dot on the inner face of gudgeon pin and the outer face of bosses in piston.

On rebuilding, fit con. rods with big end offset facing the intermediate main bearings and pistons so that arrow stamped on the dome points to the exhaust side.



On refitting liners to cylinder block, lock the liners in place by tightening tool **A.2.0117 (2)** to 1.0/1.5 Kgm and check cylinder liner protrusion with the aid of tool **C.6.0148 (1)**



Liner protrusion should neither be less than 0.01 mm nor exceed 0.06 mm.

Flywheel

Check that teeth of starter ring are not badly worn and show no sign of seizing otherwise the ring must be renewed by heating the new one to 120/140°C.

Check also that starter motor pinion is not damaged.

Oil pump

Check pump gears for uneven or excessive wear and gear teeth for no sign of dents and scoring.

Also check the driven gear spindle for traces of binding or scratches.

Check the oil pressure relief valve for no sign of sticking in its seat.

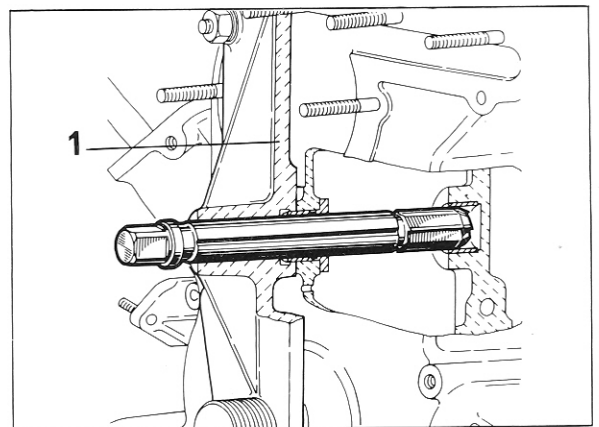
If pressure relief valve spring should prove stressed to yielding it must be renewed. Ensure that pump driven gear is properly fitted to the oil pump spindle and that drive gear is properly secured with the keying pin.

Finally, check that there are no scratches or traces of binding on the spindle or the cover, on the cam controlling the petrol pump actuating rod and on the ignition distributor coupling dog.

Timing idler gear bushes

Check the idler gear bushes, for sound conditions. If bushes have been renewed, ream them as follows:

Provisionally refit crankshaft and front cover; fit tool **A.4.0112 (1)** and, with reamers **U.2.0040** & **U.2.0041** ream the bushes to a bore diameter of 20.637/20.698 mm; diameter and alignment of bushes should be checked with tool **C.8.0103**.





REBUILDING ENGINE

As a general rule, re-assemble the engine unit by proceeding in reverse order of dismantling and following the directions on inspection and testing procedures and the use of special tools.

If crankshaft oilway plugs have been removed, prior to fit new plugs make sure there are no traces of previous peenings; fit new plugs with the aid of tool **A.2.0103**; then, caulk them in place with a suitable tool.

Proceed as follows in re-assembling the engine:

Select crankpin and main bearing shells according to colour marks on crankshaft and fit shells to relevant bearings.

Lubricate crankpin and main bearing shells with engine oil and install the crankshaft onto its bearings.

Fit upper half thrust rings to centre bearing; make sure the oilways are facing the crankshaft shoulders.

Fit main bearing caps according to location figures marked on them; ensure the safety notches of shells face intake side.

Fit lower half thrust rings to cap before installing the centre cap.

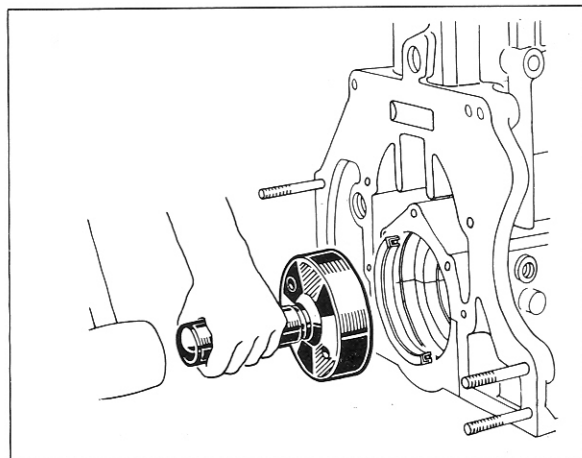
Lubricate studs with engine oil and fit washers.

Fit the safety plate to rear cap; torque the nuts to 4.7/5 Kgm (Nm 47/49). Then, tighten the locknuts and secure them with the safety plate.

Lubricate the rubbers seals with a suitable lube (50 HB 5100 by UNION CARBIDE CHEMICALS CO. - MILLOIL grease, or similar) and fit the seals into holes in rear main bearing with tool **A.3.0113**.

Cut the excess seals flush with cylinder block surface.

Lubricate the rear crankshaft sealing ring and fit it with the aid of tool **A.3.0178**.



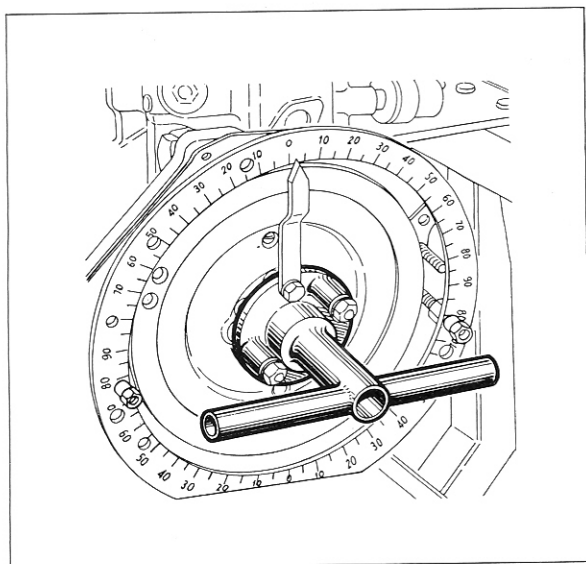


Fit the connecting screws to the flywheel in such a way as not to foul the crankshaft. Position the crankshaft so that the first crank-pin is at its T.D.C. point.

Apply Loctite 241 to the flywheel fixing screws.

Place the flywheel in position on crankshaft so as to align the reference mark on it with that on rear cover.

Fit safety plates to screws and torque the screws to 11.2-11.5 (Nm 110-113); lock crankshaft with tool **A.2.0145**. Fit tool **A.2.0256** to flywheel to facilitate crankshaft rotation.



Lubricate cylinder liner bore and outer surfaces as well with engine oil; fit the sealing ring.

Fit liners to cylinder block complying with the directions of the chapter "Checking and inspection".

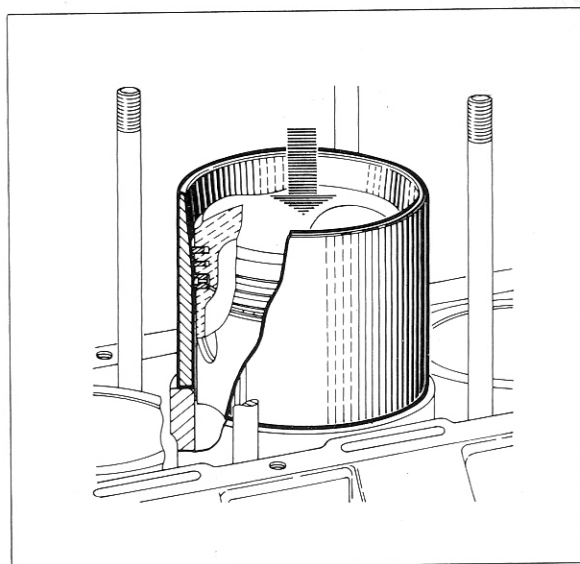
Fit con. rods to pistons, according to the directions given under "checking and inspection", after having lubricated gudgeon pins, piston bosses and small end bush with engine oil.

If removed, refit piston rings with the aid of suitable pliers making certain those marked "TOP" have this side fitted to the top;

Fit bearing shells previously selected to big end of rods and to relevant caps;

With engine oil lubricate the piston outer surfaces and piston rings, big end bearing shells and cap bolts.

Position the piston rings so that gaps are staggered and install the con. rod/piston assy into liner with the aid of tool **A.3.0252/0800**.



Lubricate crankpins and big end caps with engine oil.

Fit caps so that the notches for the insert face the same side as the notch on the con. rod.

Torque the cap bolts to 5-5.3 Kgm (Nm 49-52).



Complete engine re-building as follows:

Grease the shim and fit it to timing chain idler sprocket.

Mount timing chain on idler and drive sprockets and fit the unit so assembled to the cylinder block.

Fit the oil pump/distributor drive gear to crankshaft.

Mount the camshaft drive chain onto idler sprocket.

Install the oil pump onto front cover; ensure that, both during and after tightening the fixing screws, the pump shaft is free to rotate without binding.

Install the ignition distributor onto front cover so that reference mark for ignition to first cylinder is pointing toward the front of engine.

Rotate crankshaft to bring no. 1 piston at T.D.C.

Place the sealing ring in position on cover and keep it there with some grease.

Place the seal in position on cover and the gaskets on cylinder block.

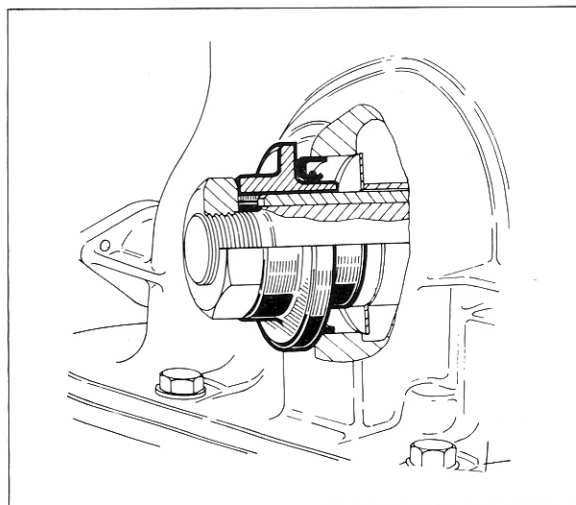
Rotate oil pump spindle in such a way that, when drive gear on pump spindle is eased into mesh with the gear on crankshaft, the distributor rotor arm points toward the front, parallel to the axis of the engine for Marelli make distributors; for Bosch distributors, the rotor arm should be at an angle of 22° as shown on page 35.

Install front cover onto engine and ensure that rotor arm is positioned as mentioned above; tighten the distributor fixing nut.

Install the water pump onto the front cover.

Lubricate the sealing lip of the front crankshaft seal packing with Molykote BR2 by ISECO and fit the packing with the aid of tool **A.3.0146**.

Lubricate the seat of damper, install the damper onto crankshaft and torque the fixing nut to 19-20 Kgm with spanner **A.5.0126**.



Bend the lockplate tab.

Ensure no. 1 piston is at T.D.C.

Remove liner securing tools, fit the cylinder head gaskets and place the sealing rings in position on oil passages.

Install cylinder head assembly.

Fit engine lifting bracket to centre studs.

Lubricate studs with engine oil; tighten the nuts in proper sequence to a torque of 7.2-7.4 Kgm (Nm 70-72).



Lubricate the cylinder head front fixing screws with CURIL by Diring. Fit the screws and tighten them in place.

Put the chain on camshaft and tensioner sprockets.

Rotate intake valve camshaft inwards as related to reference mark.

Reconnect chain ends with joint link. Put chain under tension by acting on tensioner set-screw.

Ensure the no. 1 piston is at T.D.C. on compression stroke checking that reference mark on flywheel is in line with the pointer on block.

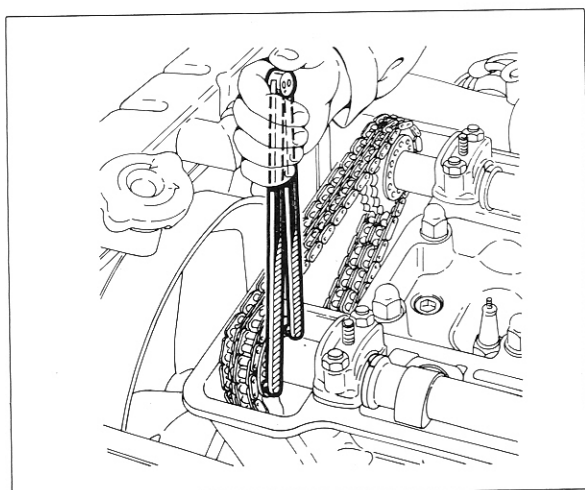
Check that reference marks on camshafts are aligned with those on journals and that 1st cylinder cams are pointing outwards.

Check that mark P on damper is in line with pointer on front cover; adjust pointer on cover, if necessary.

If camshaft setting requires adjustment, proceed as follows:

Remove locating bolt from flange and sprocket.

Slacken the nut securing sprocket to camshaft and rotate the camshaft with tool **A.5.0103** until marks line up.



Refit the locating bolt and secure the sprocket in place by tightening the nut and bending the lockplate.

Fit the oil sump with its gasket.

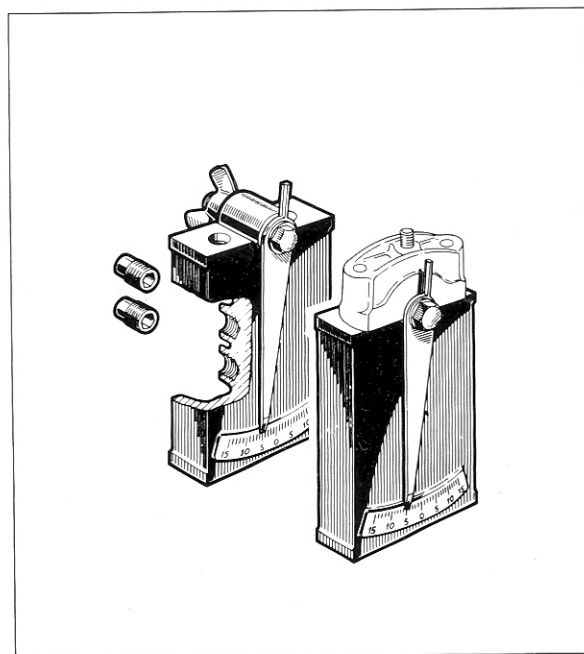
Fit the seals to the head and put 0.415 Kgs of engine oil into camshaft housings.

Apply Heldite by Diring to the camshaft cover gasket.

Install camshaft cover; torque the cover fixing screws to about 1.8-2 Kgm. (Nm 17-19).

Lubricate sparking plug threads with Molykote A by Iseco and torque plugs to 2.5-3.5 Kgm (Nm 25-34) with spanner **A.5.0115**.

Important: should the head be renewed, scribe reference marks on front caps with the aid of tool **A.4.0129**.



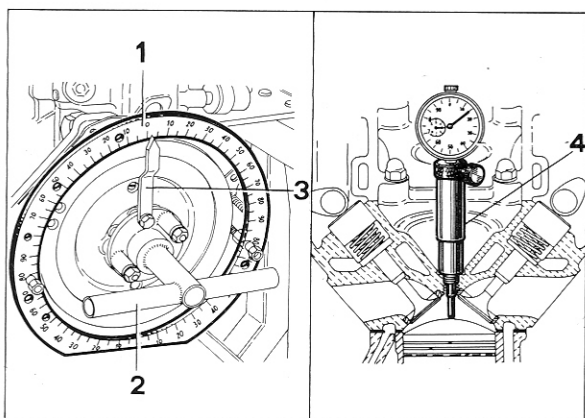


Checking the valve timing

Install the protractor **C.6.0111** (1) on engine at flywheel side; then, fit handle **A.2.0255** (2) and pointer **A.2.0254** (3).

On cars equipped with flywheel having threaded holes for attachment of prop. shaft, fit pointer **A.2.0289**.

Fit support **C.6.0122** (4) to the seat of 4th. cylinder spark plug.



Install a dial gauge onto the support 4; bring 4th. piston to T.D.C. and set dial gauge to zero.

Move the flywheel 10° to the right and 10° to the left on the zero line and read the dial indicator in each position.

If both readings are the same the protractor is in the correct position and the TDC of the piston corresponds to the zero of the graduated scale.

If this is not the case, adjust the protractor on the crankcase until the two readings coincide and then lock the scale in position.

Remove the dial gauge with its support.

Check the valve opening and closing angles

Place the tool **A.2.0120** on no. 1 cylinder at intake side first, then at exhaust side. Fit a dial gauge to the tool and an extension for probing at valve cup top.

Ensure the dial gauge extension is properly in contact with valve cup top.

Rotate the crankshaft anti-clockwise (as viewed from flywheel end) until a valve lift of 20 mm is indicated on the dial gauge.

The reading on protractor scale should be 21° 30' - 24° 30' before T.D.C.

Continue to turn the crankshaft anticlockwise (flywheel end) until the intake valve is completely closed.

Then rotate the crankshaft clockwise for about half a turn; again rotate it counter-clockwise until a valve lift of .20 mm is indicated.

The reading on protractor scale should be 40° 30' - 43° 30' after T.D.C.

If adjustment is needed, slacken the nut securing the chainwheel to the camshaft and change as required the position of the locating bolt.

The same procedure applies to the camshaft at exhaust side, ensuring that the valve lift is 0.15 mm and protractor readings are 49° 30' - 52° 30' before T.D.C. on opening and 12° 30' - 15° 30' after T.D.C. on closing.

Lubricate the petrol pump push rod with engine oil; fit push rod with spacer and seal and then the pump.

Lubricate oil filter seal with engine oil; then, start filter by hand tighten it securely with spanner **A.2.0130**.



REBUILDING CYLINDER HEAD

Place the alternator in position on front cover and link; fit the drive belt and move the alternator outwards so as to put the belt under tension; lock the alternator in place.

Fit the cap to the distributor and connect the sparking plug cables.

Install the rear cover and its spacer flange; ensure the starter motor cable clips are properly positioned.

Connect the hose across pump and thermostatic valve.

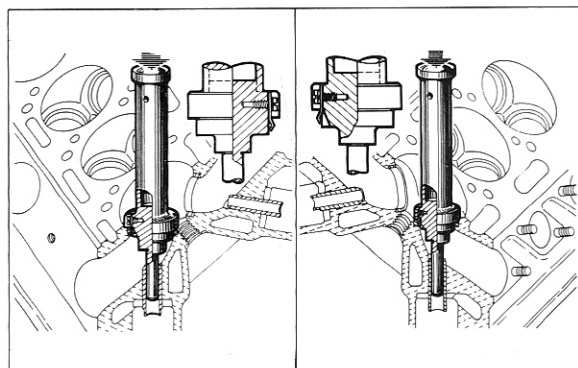
Connect the petrol pump-to-filter pipe to the pump.

Fit the crankcase ventilation pipe.

Proceed as follows:

Heat cylinder head to 100°C.

Fit intake and exhaust valve seats with tools **A.3.0461** and **A.3.0462** respectively.

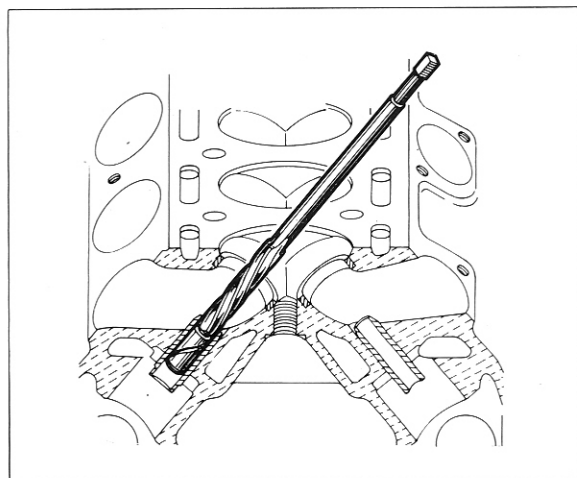


Fit intake and exhaust valve guides with tools **A.3.0246** and **A.3.0133** respectively.

Place the head on tools **A.2.0195** and **A.2.0196**.

If cylinder head resurfacing is needed, remove lower exhaust manifold fixing studs and regrind head taking care not to exceed the limits stated under "Checking and inspection".

Ream valve guides to dimensions given under "Checking and inspection" with tool **U.6.0009**.





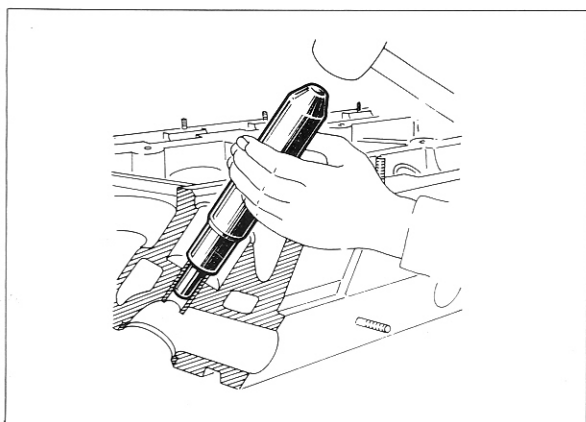
Lap each valve in its seat with the aid of tool **G.1.0004** and Sibal Arexon paste; prior to lapping lubricate valve stem with engine oil.

Carefully clean the head to remove any trace of emery powder.

Proceed by refitting:

— The cups and the intake valve spring lower seats.

— The intake valve guide seals with tool **A.3.0244**.



Insert valves into guides and fit springs, spring seats and cotters in reverse order of removal.

Check valves for tightness as outlined under "Checking and inspection"; place adjusting pads on valve stems.

Lubricate cups with engine oil and fit them into the head.

Lubricate camshaft journal bearings; fit camshafts to their original positions.

Fit caps according to location numbers; oilways must be inwards.

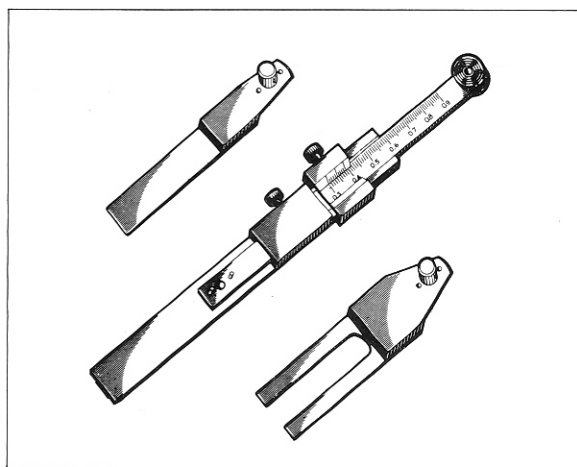
Lubricate studs and torque cap fixing nuts to 2-2.25 Kg (Nm 20-21).

With gauge **C.6.0168** check that clearance between heel of cam lobe and cup top is:

Intake cams 0.475 - 0.500 mm

Exhaust cams 0.525 - 0.550 mm

If clearance is not as specified change thickness of adjusting pad.



To check adjusting pad thickness use tool **C.1.0108**.

Complete head rebuilding as follows:

Grease chain tensioner spring and insert spring into tensioner; place the tapered lock-plate in position on tensioner; fit tensioner so assembled into its seat in the head; tighten the fixing screws.

Install gasket and the intake manifold/carburettor unit after having assembled it as follows:

- fit the brake servo non-return valve;
- fit the thermostatic valve;
- fit coolant temperature sender;
- fit accelerator linkage bracket;
- apply sealing compound, Heldite by Diring, to the gaskets of carburettor rubber mounts.



- fit rubber mounts and earth cable
- install the air intake and carburettors as a unit and connect the control rod.

Prior to fit gasket to air intake, apply one of these sealants:

- Pluricolla Alpha 75 TRSP by I.C.I.R.
- B 400 AR by D.E.B.
- Carstik 04 by I.C.A.D.

Install the cylinder head onto engine; see page 26.

Remove tool **A.2.0256** from crankshaft.

Remove the engine from stand by hoisting it up with a shop crane; install the exhaust manifold, the hot air ducting, and the engine mounts ensuring that the mount marked with an N is at the exhaust side.

Install the starter motor.

COOLING SYSTEM

Thermostatic valve setting

Check valve for proper operation as follows:

- dip the valve in a water container
- heat the water and check whether the valve starts to open at a temperature of 81–85°C.
- Check also that at 96°C the valve is fully open and that the stroke of valve poppet is 7.5–10.5 mm.

Radiator leak test

Test the radiator for leaks as follows:

- close the radiator outlet adapter and the adapter for connection to header tank with the suitable plugs.
- fit the plug to the radiator inlet adapter and make connections with a compressed air equipment;
- immerse the radiator in a tank full of water and check for air leaks by supplying compressed air up to a pressure of 1-1.1 kg/cm²;
- if leaks are found, clean the area to be soldered with a wire brush and apply "baked" chloric acid (zinc chloride);
- solder up the leaking area;
- test again radiator for leaks then re-finish it with black synthetic enamel.



RE-INSTALLING THE ENGINE

Proceed in reverse order of removal and according to the following directions:

Position the engine in its compartment. Start screws and nuts of front mounts. Place the rear mount in position with spacer and washers retained on removal; then, lock screws and nuts of front mounts.

Refit prop. shaft after having lubricated the front and rear bush, respectively with 5 and 7 cc. of Molykote B R 2.

On fitting the rear coupling to clutch yoke, ensure the rubber seal is properly fitted.

Lock flywheel using tool **A.2.0290**; with the aid of the extension **A.5.0192** and a torque spanner having a 300-400 mm lever arm, torque the shaft-to-flywheel and shaft-to-clutch yoke fixing screws (for shaft so fitted) to 4.1-4.5 Kgm (41-44 Nm) and the interference-fit bolts (for shaft so fitted) to 3.8-4.2 Kgm (38-41 Nm).

Clean threads of studs securing coupling to gear selection rod and torque nuts to 2-3.25 Kgm (Nm 20-31). This applies only to elastic-type couplings; for rigid-type couplings, proceed as follows:

Screw in the coupling fixing nuts only hand tight; then shift into 5th speed and tighten the nuts to the above specified torque values.

Remove tool **A.2.0290** and in its place fit flywheel cover. Refit rear engine mount to body using washers retained on removal to reset 6/8 mm clearance between prop. shaft and rear mount top.

Refilling the cooling system

Refill the system with coolant according to the specifications given below.

To refill, pour coolant through tank filler port and proceed according to the following directions:

Slacken the bleed screws on water pump and intake manifold.

Pour coolant mixture through filler port until coolant escapes from bleed screw on pump; then close this screw and again add coolant until it escapes from screw on manifold.

Start the engine and keep it running for a few seconds in order to bleed air completely.

Close the bleed screw on manifold and add mixture to radiator filler port until full.

Add mixture also to tank until "MAX" level is reached.

Put caps on tank and radiator filler ports.

TEMPERAT.	ANTIFREEZE	Q.TY cc.
down to -20°C	Concentrated antifreeze (Std no. 3681 - 69956) distilled water	3500 4500
	Antifreeze ready for use (Std no. 3681 - 69958)	8000

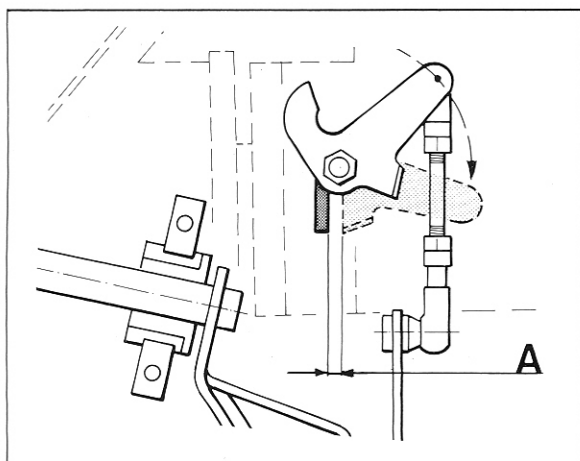
The antifreeze mixture can be made stronger by varying its concentration. To this end, a certain amount of mixture should be drained off the circuit and replaced with the same quantity of concentrated antifreeze. The quantities of antifreeze to be added to radiator and reservoir, depending on the lowest anticipated temperature, are as shown below.

Temperature °C	Radiator cc.	Header tank cc.	Total cc.
-30	1.000	200	1.200
-40	2.200	450	2.650



ADJUSTING THE ACCELERATOR LINKAGE

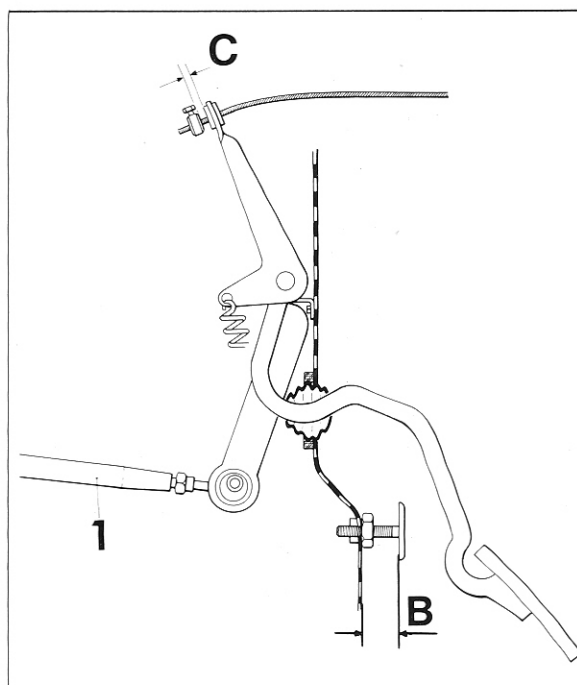
Check that, with the accelerator pedal fully depressed, clearance A between throttle control lever and limit stop on carburettor is 1-2 mm. Should the pedal fail to stop its travel against the limit stop screw, act on the adjuster 1; protrusion of accelerator pedal limit stop



screw should be: 15-22 mm (B).

Check that, with hand lever in at-rest position, the clearance C between clamp on hand throttle cable and pedal lever is 5-6 mm.

Check feed system for leaks.





IDLE SPEED

Throttle alignment and idle speed adjustment

— Remove circlip and detach the control rod from throttle lever 1.

— Fully slacken the throttle opening adjusting screw 2.

— Slacken screw 3, at the same time pushing lever 1 upwards, until the throttles of both front and rear carburetter are fully closed; then, while keeping the lever 1 pushed upwards, screw in the screw 3 until contact is made thus aligning the throttles of both carburetters.

— Rotate screw 2, until it just touches lever 1, then screw it in one more turn.

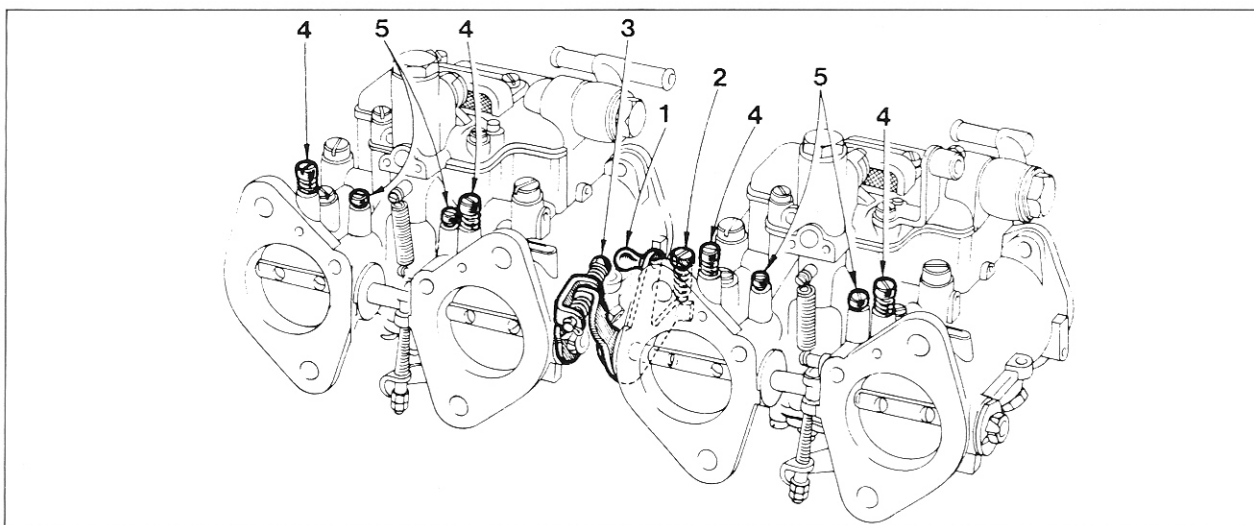
— Screw all the way in the screws 4 (without straining them though); then, back them up by four turns.

— Connect the control rod to throttle lever 1.

— Start the engine and warm it up; stop the engine and install the vacuum meter **C.2.0014** with its bracket **R.4.0139** and connect meter hoses to carburetter vacuum ports, after removal of screws 5, by means of the adapters **C.2.0015** (or **C.2.0031** if detoxed carburetters are concerned).

Again start the engine and adjust the throttles coupling screw 3 to equalize vacuum of 1st and 2nd ducts with that of 3rd and 4th ducts while keeping idle speed at 850 ± 50 R.P.M. (to be checked with an accurate electronic tachometer).

If engine runs unevenly, adjust screw 4 taking care not to disturb idle speed and vacuum setting.



TESTING CO EMISSION

— Take readings of CO percentage in the exhaust gases of detoxed engine either at the exhaust pipe end or at the manifold tap, if any, with a CO tester. The CO percentage should not exceed 4.5% .

To reset the CO percentage adjust the mixture

screws 4; care should be taken not to alter the idle speed and vacuum setting.

On completion of adjustment stop the engine and disconnect vacuum meter and CO tester.

Refit plugs 5.



IGNITION SYSTEM

Breaker points gap

To check proceed as follows:

- Remove carburettor's air intake;
- Remove the fastener and take away the distributor protection cover;
- Remove distributor cap;
- Remove rotor arm (on Marelli distributors to remove rotor arm undo the fixing bolt);
- Rotate crankshaft so that distributor drive shaft causes the points to open fully;
- with a feeler gauge check that the gap is as specified, i.e.: 0.4 – 0.5 mm.

If necessary, adjust as follows:

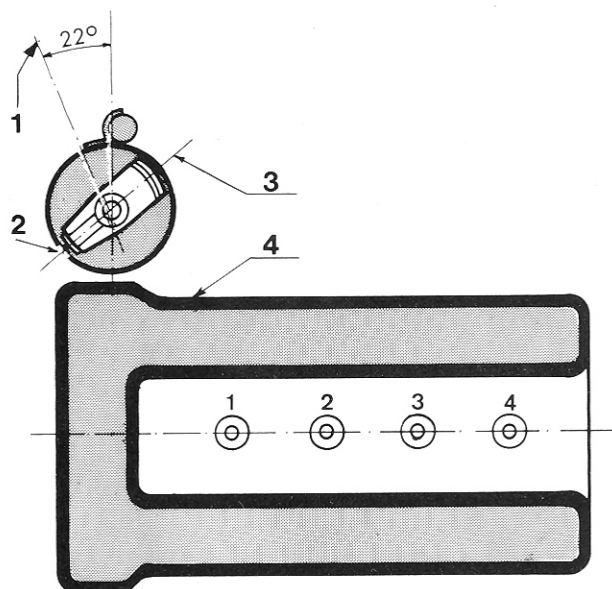
- slacken stationary point fixing screw;
- rotate distributor shaft so as to position cam and follower for maximum opening of points;
- insert a feeler gauge of proper thickness between points;
- adjust point gap and retighten the fixing screw;
- check for correct point gap and refit rotor arm.

Ignition timing

To check ignition timing proceed as follows:

- connect a test lamp across distributor low tension terminal and earth; rotate crankshaft in normal direction of rotation to bring the static advance mark F cut in the crankshaft pulley into line with reference pointer on front cover (no. 1 cylinder piston at T.D.C. of compression stroke - both valves closed);
- check that in this position the points are about to open (test lamp coming on) and the rotor arm is pointing toward mark on distributor body;

Important: The rotor arm must point toward the front, parallel to the axis of the engine for Marelli distributors and as shown below for Bosch distributors.



- 1 – Position of mark on cap
- 2 – Current to no. 1 cylinder
- 3 – Position of rotor
- 4 – Engine



If the timing requires adjustment proceed as follows:

- unscrew the nut on the bolt securing the distributor body;
- rotate the distributor body anti-clockwise or clockwise according to whether it is necessary to respectively advance or retard the ignition setting; retighten the nut.
- remove the test lamp and refit the distributor cap;
- Reconnect wires.

Check static and maximum advance as follows:

- connect the ignition system to the tester;
- start the engine and check, with an electronic tachometer, that, at the specified R.P.Ms., the pointer on front cover lines up with the reference marks on crankshaft pulley identified with

F for static advance - M for max. advance;

- stop the engine.

If timing marks and pointer are not aligned, slacken the distributor body fixing bolt and rotate the body clockwise to retard or anti-clockwise to advance.

Fit the protection covers.

In the event the above said adjustment should not allow to obtain proper advance setting, the distributor should be renewed.

Testing distributor on bench

Reconditioned distributors or distributors failing to perform as specified should be tested on bench for proper advance setting.

Prior to test:

- with special tool **C.5.0114** and a test lamp check that contact pressure is as specified;
- check points gap and adjust if necessary as outlined on page 35.

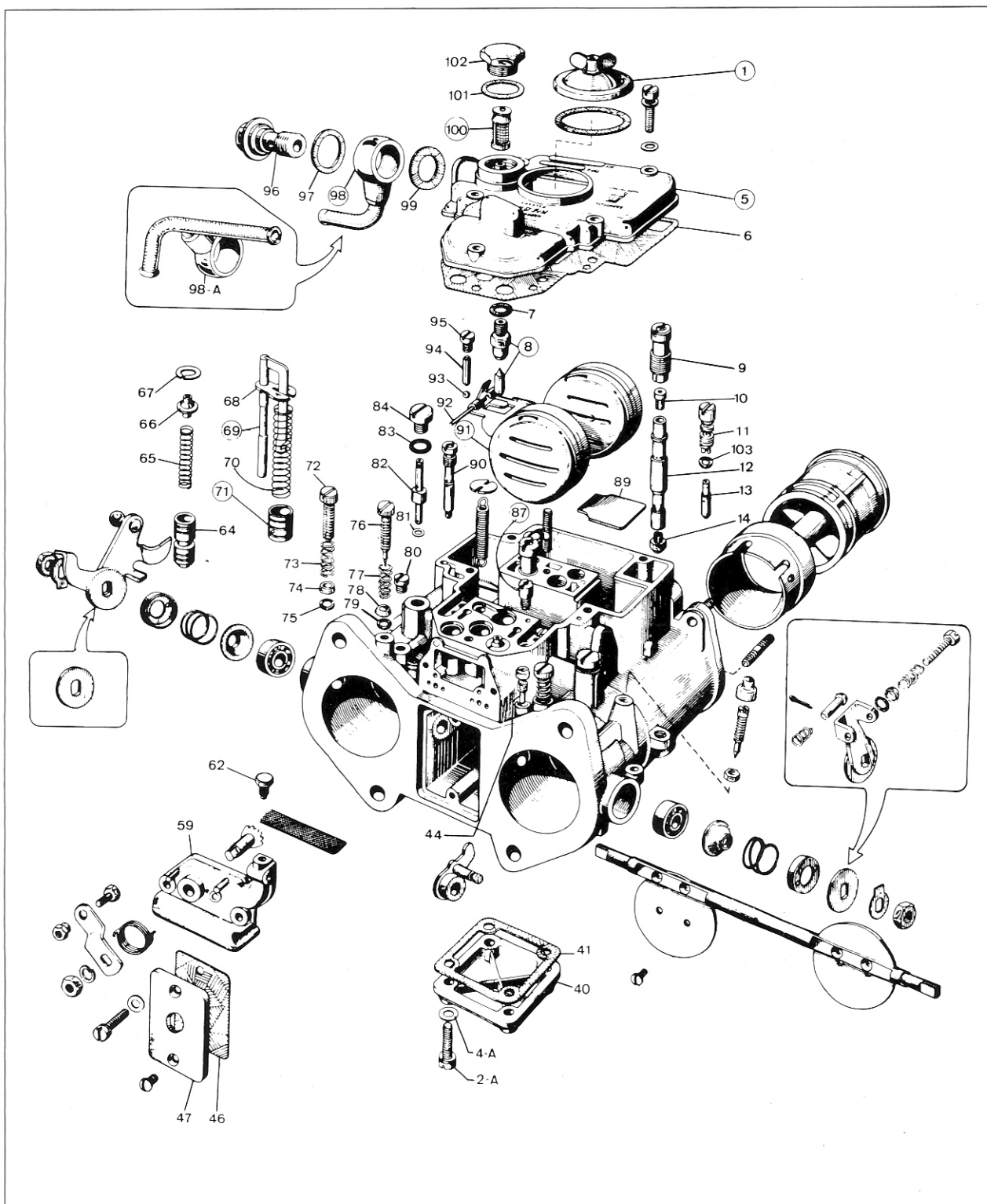
Then, proceed as follows:

- install the ignition distributor on a test bench and make connections;
- zero set the spark at the graduations of the disc on bench by driving the distributor either by hand or bench motor provided not to exceed 50 r.p.m.;
- check that dwell angle is as specified; also plot down the automatic advance curve.



FEED SYSTEM

WEBER 40 DCOE 72-73 CARBURETTOR





STRIPPING

Wash the outside of carburetter with petrol then dry with compressed air.

Carefully strip the carburetter as follows:

- unscrew the banjo bolt **96** and remove the banjo union **98** or **98A** from cover of rear and front carburetter respectively, with the relevant seals **97** and **99**;
 - remove idle and main jet inspection cover **1**;
 - remove strainer plug **102** and its washer **101**; withdraw strainer **100**;
 - remove screws securing cover **5**, float **91** and gasket **6**;
 - withdraw plate **89** from float chamber;
 - slide out pin **92** and remove float **91**; then remove gasket **6**, needle valve **8** and the relevant seal **7**.
 - remove idle jet **13**, its carrier **11** and seal **103**;
 - remove the emulsion tubes **12** together with jet carriers **9**, main air metering jets **10** and main jets **14**;
 - from float chamber remove the accelerator pump inlet valve **87**;
 - remove accelerator pump components, i.e. control rod **69**, spring retainer **68** spring **70** and plunger **71**;
 - remove plug **84** and washer **83** and withdraw accelerator pump jet **82** and the relevant washer **81**;
 - remove plugs **95**, weights **94** and balls **93** and take out the accelerator pump outlet valves;
 - remove choke jets **90**;
 - remove the choke device cover **59**; take away circlip **66** and spring seat **67** then remove choke valve **64** and relevant spring **65**;
- Further, remove the following components from carburetter's body:
- throttle opening adjusting screw **72** together with spring **73**, spring seat **74**, seal **75** and sheath fixing screw **62**;
 - the idle mixture adjusting screw **76** together with spring **77**, spring seat **78** and seal **79**;
 - the progression holes plugs **80**;
 - the vacuum ports plugs **44**;
 - the float chamber bottom **40** with its gasket **41**, the fixing screws **2A** and washers **4A**;
 - the accelerator pump housing cover **47** and its gasket **46**.

If required, remove throttle coupling screw and its spring from front carburetter.

Important: **Never** remove the by-pass screws at the outside of carburetter's body; also do **not** remove venturis from carburetter's body.



INSPECTION AND CHECKING

Prior to perform checks, wash thoroughly jets and valves with petrol and blow them through with compressed air; flush and dry the carburettor body, passages, bowl and cover in the same way. For cleaning, avoid using metal objects, probes or similar, which could easily

alter the orifice diameter.

Check that the figures stamped on the jets are as shown in the table.

Inspect all components for no sign of damage; renew as necessary.

SETTING DATA – WEBER CARBURETTOR

DATA	ALFA ROMEO P.N. { SUPPLIER'S DESIGNATION	116.08.04.010.00 116.08.04.011.00	116.08.04.010.06 116.08.04.011.06
		40 DCOE 80/81	40 DCOE 72/73 (1)
Venturi		32	32
Main jet		1.35	1.35
Main emulsion tube		F 34	F 34
Main air metering jet		2.10	2.10
Idle jet		0.55	0.55
Idle air metering jet		F 17	F 17
Progression holes		4 holes ϕ 1.20/1.60/1.60/1.50	4 holes ϕ 1.20/1.60/1.60/1.50
Choke jet		0.65 F 5	0.65 F 5
Choke air metering jet		2.00	2.00
Angled bush for choke mixture		1.00	1.00
Accelerator pump jet		0.35 horiz.	0.35 horiz.
Leak off for accelerator pump inlet valve		0.60	0.60
Accelerator pump delivery per 20 strokes each barrel cm ³		3.5 - 4.5 (3 - 4) * (2.5 - 3.5) *	3.5 - 4.5 (3 - 4) * (2.5 - 3.5) *
Accelerator pump control rod	{ travel mm length mm	18 (16) * (13.5) * 63 (61) * (58.5) *	18 (16) * (13.5) * 63 (61) * (58.5) *
Needle valve		1.50	1.50
Float weight g		26	26

NOTES (1) - Detoxed carburettor

(*) - Value prior to modification



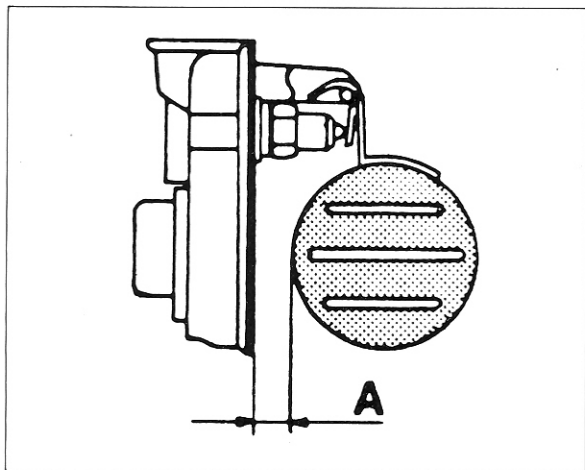
RE-BUILDING

Proceed in reverse order of stripping and in accordance with the setting procedures outlined below.

Level of fuel on bowl

This level should be checked by measuring the distance between float and cover mating surface with the gasket fitted, the cover vertical and the float tongue in light contact with the ball as shown.

Distance "A" should be 7.5 mm.



If the distance is not as stated above, slightly bend the float tongue shown at the illustration. When the level has been set, check that float travel is as stamped on needle valve (in millimetres); adjust tongue, if necessary.

To check float travel turn cover from vertical to horizontal position.

Accelerator pump delivery

Place the carburetter on tool **C.4.0101**.

Connect the petrol feed pipe to the adapter on carburetter cover.

Feed the carburetter and place the measuring vessels **C.4.0105** under the carburetters.

Operate several times and fully the throttle lever to ensure proper replenishing of petrol feed lines.

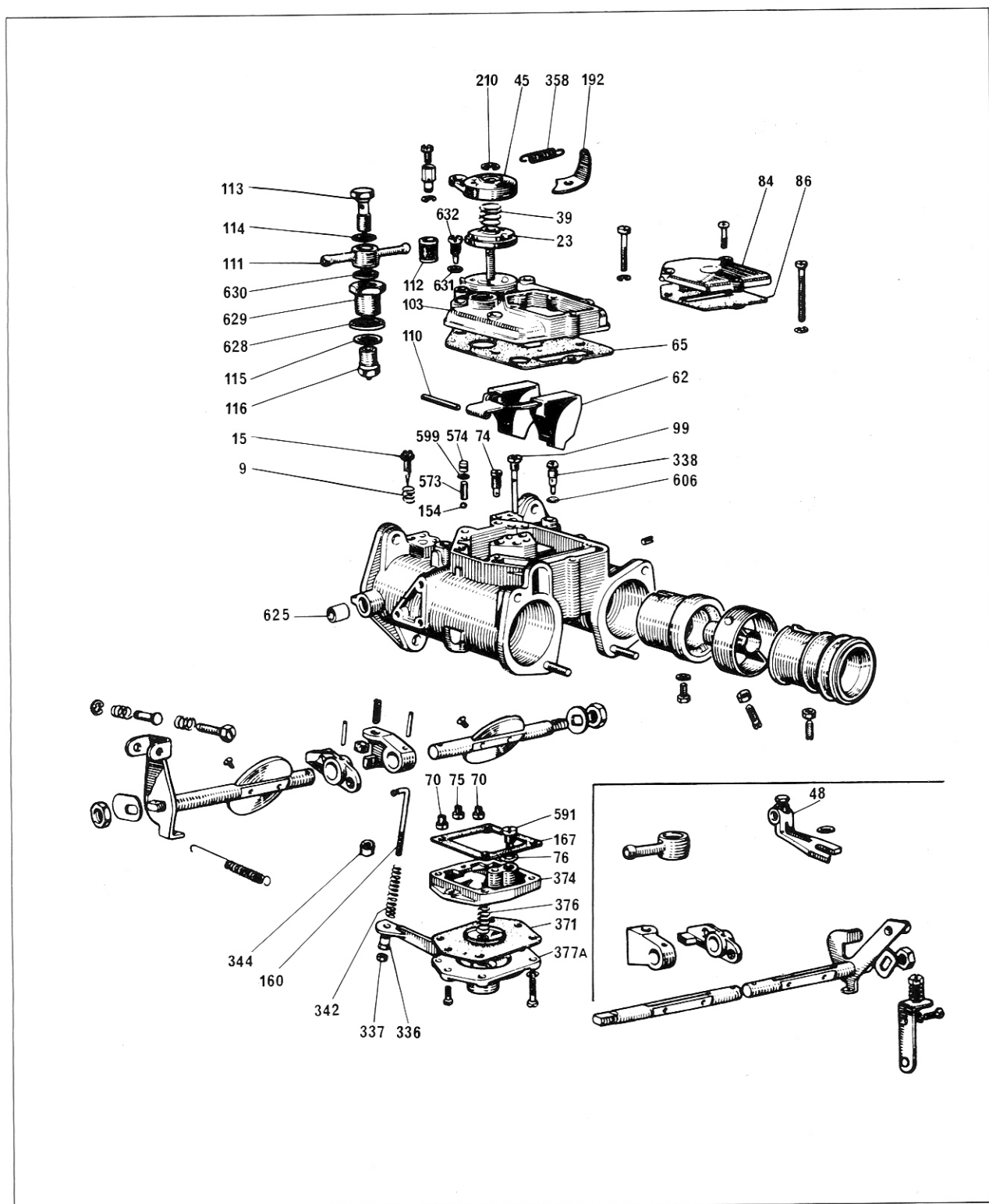
Empty the measuring vessels and ensure there is no petrol in the passages.

Operate the throttle lever for twenty strokes, staying momentarily at rest at maximum opening and fully closed position.

Check that delivery is as specified (3.5-4.5 cc.).



SOLEX 40 DDH-8 CARBURETTOR





STRIPPING

Wash the outside of carburettor with petrol then dry with compressed air.

Carefully strip the carburettor as follows:

- unscrew the banjo bolt **113** and remove the banjo union **111** with the relevant seals **630** and **114**;

- remove choke valve return spring **358** from front carburettor;

- undo screws fixing nameplates and jet inspection cover **84** to carburettor's cover **103**; remove inspection cover with its gasket **86**;

- undo the screws securing cover **103** and remove cover with its screw **65**;

- remove choke valve, return spring bracket **192** from front carburettor; from rear carburettor remove the choke cable sheath bracket **48**;

- remove float **62** with its pin **110**;

- remove needle valve **116** and its seal **115** from cover **103**; then remove the inlet adapter **629** with its gasket **628**;

If required, remove circlip **210**, cover **45**, spring **39** and choke valve **23** from cover **103**; remove vacuum ports plugs **632** with seals **631**.

Remove from carburettor's body:

- the main emulsion tubes **99**;

- the idle jets **74**;

- the accelerator pump outlet valve consisting of plugs **574**, seals **599**, weights **573** and balls **154**;

- accelerator pump jets **338** and their seals **606**;

- the idle mixture screws **15** with springs **9** and relevant seals and washers.

From front carburettor remove the throttle coupling screw with its spring and, from rear carburettor, the throttle opening adjusting screw with spring.

Remove locknut **337** and nut **336** from accelerator pump control rod **160**.

Undo the screws securing the accelerator pump to carburettor; remove the pump with gasket **167** by detaching control rod **160**; retain springs **342** and bushes **344**.

Undo the fixing screws and take the cover **377** apart from pump body **374**; retain spring **376** and diaphragm **371**.

Remove valve **591** with its gasket **76**.

From bottom of carburettor's body remove main jet **70** and choke jet **75**.

Important: Never remove the by-pass screw at the outside of carburettor's body; also **do not** remove venturis from carburettor's body.



INSPECTION AND CHECKING

Prior to perform checks, wash thoroughly jet and valves with petrol and blow them through with compressed air; flush and dry the carburettor body, passages, bowl and cover in the same way.

For cleaning, avoid using metal objects, probes or similar, which could easily alter the orifice diameter.

Check that the figures stamped on the jets are as shown in the table.

Inspect all components for no sign of damage; renew as necessary.

Check diaphragm of accelerator pump for sound conditions and that relevant spring is not overstressed; renew damaged parts as necessary.

SETTING DATA – SOLEX CARBURETTER

DATA	ALFA ROMEO P.N. { SUPPLIER'S DESIGNATION	116.08.04.010.04 116.08.04.011.04
		C 40 DDH-8
Ventury		32
Main jet		1.40
Main emulsion tube		1 hole ϕ 0.8
		2 holes ϕ 2
		(2 holes ϕ 1.5) *
Main air metering jet		1.59 (1,50) *
Idle jet		0.50
Idle emulsion tube		1.30
Choke jet		1.40
Choke air metering jet		6.00 (emulsion holes ϕ 1.25)
Accelerator pump jet		0.35
Leak-off for accelerator pump inlet valve		0
Accelerator pump delivery per 20 strokes each barrel	cm ³	6 $\pm$ 1
Needle valve		1.60 (reduced pitch)
Washer under needle valve		1.00
Float weight	g	13.6 $\pm$ 0.5

NOTE (*) - Value prior to modification



RE-BUILDING

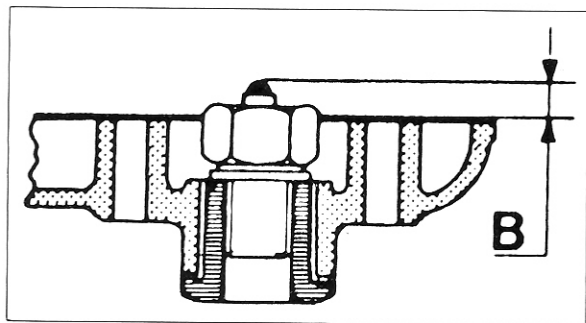
Proceed in reverse order of stripping and in accordance with the setting procedures outlined below.

Level of fuel in bowl

The test of fuel level in bowl should be performed as a check of needle valve ball protrusion from cover flange and a check of float alignment.

For both checks use gauge **C.6.0169**.

First check: make sure the valve ball protrusion **B** is 4.4–4.6 mm; adjust by adding or removing shims.



Second check: ensure the float is not distorted. Renew any defective or damaged parts as required.

Accelerator pump delivery

Place the carburetter on tool **C.4.0101**.

Connect the petrol feed pipe to the adapter on carburetter cover.

Feed the carburetter and place the measuring vessels **C.4.0105** under the carburetters.

Operate several times and fully the throttle lever to ensure proper replenishing of petrol feed lines.

Empty the measuring vessels and ensure there is no petrol in the passages.

Operate the throttle lever for twenty strokes staying momentarily at rest at maximum opening and fully closed position.

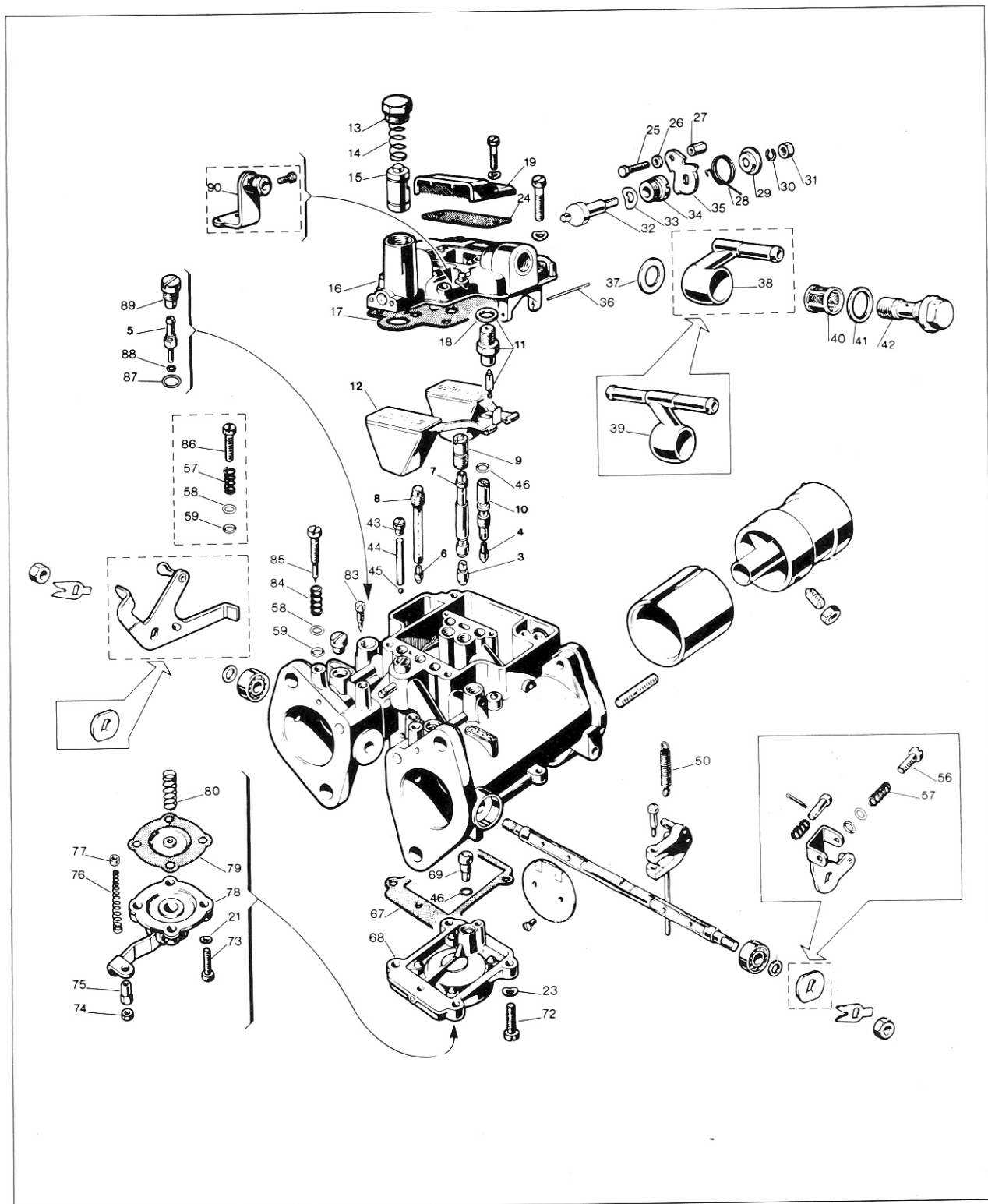
Check that delivery is as specified (5–7 cc.).

To adjust delivery, screw in or unscrew the adjusting nut to diminish or increase flow.

When pump delivery is as specified, tighten nut and locknut.



DELLORTO DHLA 40F CARBURETTOR





STRIPPING

Wash the outside of carburettor with petrol then dry with compressed air.

Carefully strip the carburettor as follows:

- unscrew the banjo bolt 42 and remove banjo union 38 or 39 from rear and front carburettor respectively with seals 37 and 41 and strainer 40;
- remove cover 19 with its gasket 24;
- undo screws fixing cover 16 and remove it together with float 12; remove choke cable bracket 90 from rear carburettor;
- slide out pivot pin 36, free float from needle valve 11 and remove float.
- remove gasket 17, needle valve 11 and its seal 18;
- if required, dismantle choke device by removing from spindle 32 the nut 31, washer 30, bush 29, spring 28 and lever 35 with screw 25, washer 26 and nut 27;
- unscrew plug 34 and take away spindle 32 with washer 33;
- slacken plug 13 and remove spring 14 and valve 15.

Remove from carburettor's body :

- emulsion tubes 7, main jets 3 and air jets 9 as a unit;
- idle jets 4 with jet carriers 10 and gaskets 46;
- emulsion tube 8 and choke jet 6
- idle mixture screws 85 together with springs 84, washer 58 and seals 59
- vacuum ports plugs 83;
- plugs 89, accelerator pump jets 5 and seals 88 and 87.
- the accelerator pump outlet valve consisting of ball 45, plug 43 and weight 44;
- the throttle coupling screw 56 with its spring 57; front carburettor throttle spindle ring and washers;
- the throttle opening screw 86 with spring 57, washer 58 and ring 59 of rear carburettor

- from accelerator pump rod remove locknut 74 and nut 75

- undo screws 72 with washers 23 fixing accelerator pump 68 to carburettor's body and remove pump with gasket 67. Withdraw spring 76 and bush 77 from pump rod;

- remove inlet valve 69 and washer 46 from pump 68;

- undo screws 73 and washer 21 securing cover 78, remove diaphragm 79 with its spring 80;

- unhook throttle spindle return spring 50 from both spindle and carburettor's body.

Important: Never remove the by-pass screw at the outside of carburettor's body; also **do not** remove venturis from carburettor's body.



INSPECTION AND CHECKING

Prior to perform checks, wash thoroughly jets and valves with petrol and blow them through with compressed air; flush and dry the carburettor body, passages, bowl and cover in the same way.

For cleaning, avoid using metal objects, probes or similar, which could easily alter the orifice diameter.

Check that the figures stamped on the jets are as shown in the table.

Inspect all components for no sign of damage; renew as necessary.

Check diaphragm of accelerator pump for sound conditions and that relevant springs is not overstressed; renew damaged parts as necessary.

SETTING DATA – DELLO RTO CARBURETTER

DATA	ALFA ROMEO P.N.	116.08.04.010.02 116.08.04.011.02 116.08.04.010.05 (1) 116.08.04.011.05 (1)	116.42.04.010.00 (1) 116.42.04.011.00 (1)	116.08.04.010.11 (1) 116.08.04.011.11 (1)
	SUPPLIER'S DESIGN.	DHLA 40 F	DHLA 40 F	DHLA 40 F
Venturi		32	32	32
Main jet		1.45	1.45	1.45
Main emulsion tube		7772.08.28	7772.08.28	7772.08.28
Main air metering jet		2.10	2.10	2.10
Idle jet		0.55	0.52	0.55
Idle air metering jet		2.20	2.20	2.20
Progression holes		5 holes ϕ 1.2/1.6/1.6/1.5/1.5	5 holes ϕ 1.2/1.6/1.6/1.5/1.5	5 holes ϕ 1.2/1.6/1.5/1.5
Choke jet		0.70	0.80	0.80
Choke air metering jet		3.00	1.50	3.00
Choke emulsion tube		7482.01.28	7482.3	7482.3
Accelerator pump jet		0.33 radial jet	0.33 radial jet	0.33 radial jet
Accelerator pump delivery per 20 strokes each barrel	cm ³	$8 \begin{matrix} +1.5 \\ -0.5 \end{matrix} \left\{ \begin{matrix} 5.5 +0.5 \\ -0.5 \end{matrix} \right\} *$	$8 \begin{matrix} +1.5 \\ -0.5 \end{matrix}$	$8 \begin{matrix} +1.5 \\ -0.5 \end{matrix}$
Needle valve		1.50	1.50	1.50
Float weight	g	10	10	10

NOTE (1) – Detoxed carburetter

(*) – Value prior to modification



RE-BUILDING

Proceed in reverse order of stripping and in accordance with the setting procedures outlined below.

Level of fuel in bowl

This level should be checked by measuring the distance between float and cover mating surface with the gasket fitted, the cover vertical and the float tongue in light contact with the ball as shown.

Distance A should be 14.5–15 mm.

If not so, renew the float.

Accelerator pump delivery

To test the accelerator pump delivery proceed as outlined on page 44.

Pump delivery should be as stated in the setting data table on page. 47.

PETROL PUMP

Testing outlet pressure

This test should be carried out at diagnosis stage to trace the cause for carburettor flooding when valve ball protrusion and float alignment are correct.

Proceed as follows:

- connect a pressure gauge, with hoses and a valve, across pump and filter;
- start the engine and check whether pump outlet pressure is 0.3/0.4 kg/cm² for FISPA make pumps, P.N. **4033.01** and SAVARA make pumps, P.N. **2.06.033.00** and 0.3–0.45 kg/cm² for FISPA make pumps, P.N. **4053.01**.

Test conditions should be as follows:

- No delivery (outlet valve downstream of the gauge closed);
- engine running at 5000–6000 RPM.
- gauge height level with pump.

If outlet pressure is not as specified, the petrol pump should be renewed.

Alfa Romeo

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