

SECTION A

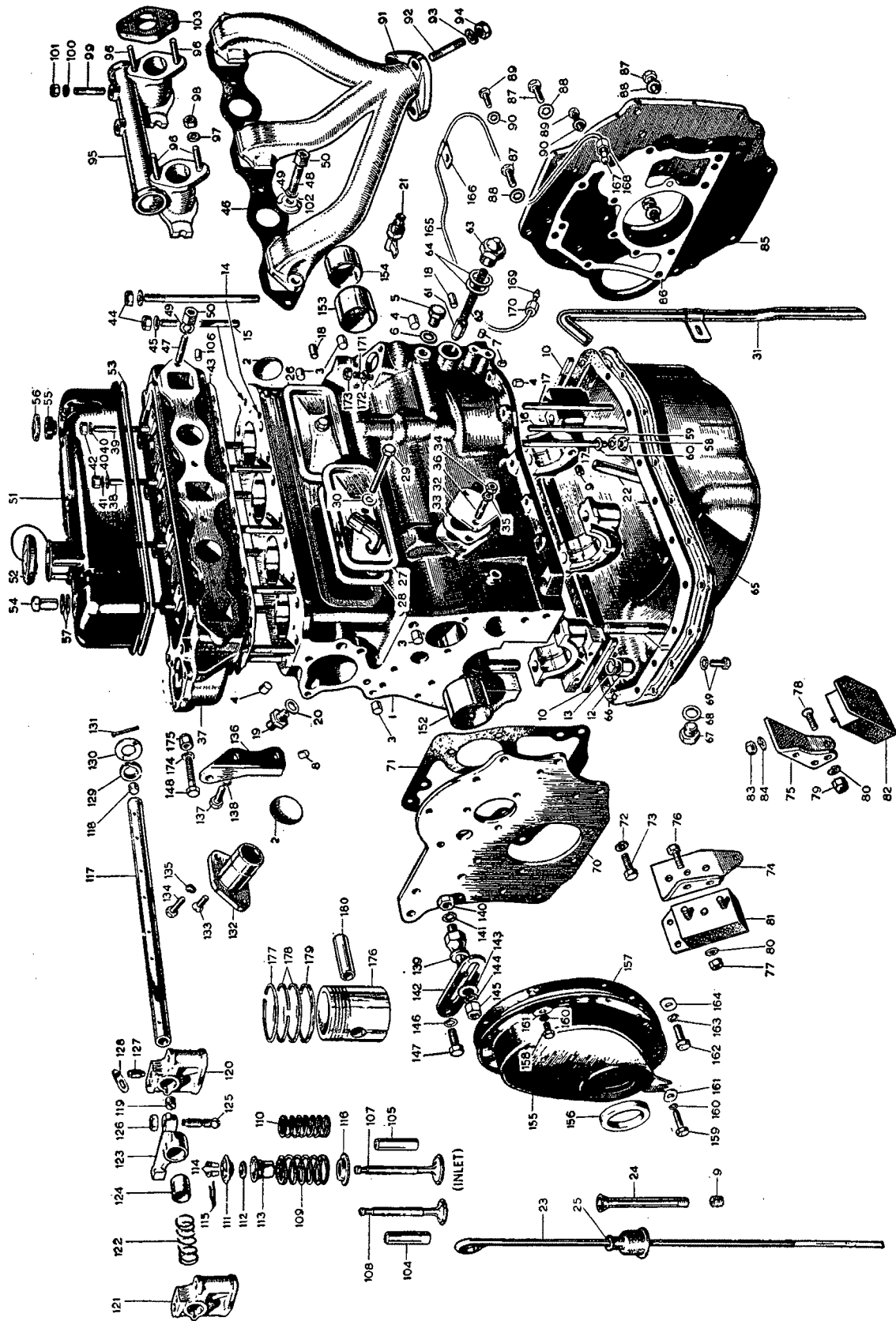
THE ENGINE

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THE ENGINE COMPONENTS



KEY TO THE ENGINE COMPONENTS

No.	Description	No.	Description	No.	Description
1.	Block assembly—cylinder.	89.	Set screw—plate to block.	133.	Screw—to block.
2.	Plug—core hole.	90.	Lock washer—set screw.	134.	Screw—distributor to housing.
3.	Plug—oil gallery.	91.	Manifold—exhaust.	135.	Washer—spring—screw.
4.	Plug—taper—crankcase oil hole.	92.	Stud—exhaust pipe flange.	136.	Bracket—dynamo—rear.
5.	Plug—screwed—transverse oil hole.	93.	Washer.	137.	Screw—bracket to crankcase.
6.	Washer—plug.	94.	Nut.	138.	Washer—spring.
7.	Plug—oil relief valve hole.	95.	Manifold—induction.	139.	Adjusting link pillar.
8.	Plug—oil filler boss.	96.	Cap—oil filler and cable.	140.	Nut—pillar to front plate.
9.	Plug—redundant dipper boss (and rear main bearing cap).	97.	Washer—spring.	141.	Washer.
10.	Joint—front/rear main bearing cap.	98.	Nut—carburettor stud.	142.	Adjusting link.
11.	Stud—main bearing cap stud.	99.	Stud—inlet manifold (accelerator adjustment bracket).	143.	Washer—plain.
12.	Nut—main bearing cap stud.	100.	Washer—spring.	144.	Washer—spring.
13.	Washer—spring.	101.	Nut—inlet manifold stud.	145.	Nut—link to pillar.
14.	Stud (long)—cylinder head.	102.	Yoke—manifold.	146.	Washer—spring—link to dynamo.
15.	Stud (short)—cylinder head.	103.	Washer—carburettor insulating.	147.	Screw—link to dynamo.
16.	Stud (long)—oil pump.	104.	Guide—valve—exhaust.	148.	Bolt—dynamo to bracket.
17.	Stud (short)—oil pump.	105.	Guide—valve—inlet.	152.	Liner—front camshaft bearing.
18.	Dowel—gearbox mounting plate.	106.	Plug—oil hole.	153.	Liner—centre camshaft bearing.
19.	Union—oil gauge pipe.	107.	Valve—inlet.	154.	Liner—rear camshaft bearing.
20.	Washer—union.	108.	Valve—exhaust.	155.	Cover complete—crankcase (front).
21.	Tap—water drain.	109.	Spring—valve (outer).	156.	Felt ring.
22.	Pipe—drain—rear bearing cap.	110.	Spring—valve (inner).	157.	Joint—crankcase front cover.
23.	Dipper rod.	111.	Cup—valve spring.	158.	Set screw—cover to engine plate.
24.	Tube—dipper rod.	112.	Packing ring—valve.	159.	Set screw—cover and plate to bearing cap.
25.	Dust cap.	113.	Shroud—valve guide.	160.	Washer—spring.
26.	Cover—side—rear.	114.	Cotters—valve.	161.	Washer—plain.
27.	Cover—side—front—with elbow.	115.	Circlip—cotter.	162.	Set screw—cover and plate to crankcase.
28.	Joint—side covers.	116.	Collars—valve spring (bottom).	163.	Washer—set screw.
29.	Set screw—covers.	117.	Shaft.	164.	Washer—set screw.
30.	Washer—set screw.	118.	Plug—plain.	165.	Pipe—ignition control.
31.	Pipe—vent with clip—crankcase.	119.	Plug—screwed.	166.	Clip—pipe.
32.	Plate—cylinder block blanking—N/S.	120.	Bracket—tapped hole.	167.	Nipple.
33.	Joint—blanking plate.	121.	Bracket—plain.	168.	Nut—carburettor end.
34.	Nut—blanking plate stud.	122.	Spring—rocker shaft spacing.	169.	Olive—distributor end.
35.	Washer—blanking plate stud.	123.	Rocket.	170.	Nut—distributor end.
36.	Stud—L/H side crankcase blanking plate.	124.	Bush.	171.	Stud—tachometer pinion housing.
37.	Cylinder head.	125.	Screw—tappet adjusting.	172.	Washer—housing stud.
38.	Stud—rocker bracket—short.	126.	Locknut—screw.	173.	Nut—housing stud.
39.	Stud—rocker bracket—long.	127.	Screw—shaft—locating.	174.	Washer—dynamo bolt.
40.	Washer—stud.	128.	Plate—locking—locating screw.	175.	Nut—dynamo bolt.
41.	Washer—spring—stud.	129.	Washer—double coil.	176.	Piston assembly.
42.	Nut—rocker bracket studs.	130.	Washer—plain.	177.	Ring—compression—first.
43.	Joint—head to block.	131.	Split pin.	178.	Ring—compression—second and third.
44.	Nut—cylinder head stud.	132.	Housing—distributor.	179.	Ring—scraper.
				180.	Gudgeon pin.

GENERAL DESCRIPTION

The M.G. (Series MGA) overhead-valve engine is built in unit construction, with an 8 in. (20.3 cm.) single-plate dry clutch.

The valves are set in line in the detachable cylinder head and are operated by rockers and push-rods from the camshaft in the left-hand side of the engine. Oil seals are fitted to the valves and there is the normal provision for clearance adjustment. The camshaft, running in three steel-backed white-metal bearings, is chain-driven and has a synthetic rubber chain silencer. The oil pump, distributor and engine revolution indicator are driven from the camshaft; each component has its own drive shaft.

The solid-skirt pistons are of aluminium alloy with anodized finish, and carry three compression rings and a slotted oil control ring. The gudgeon pins are clamped in connecting rods, which have steel-backed indium-lead renewable big-end bearings. Three steel-backed white-metal renewable bearings support the forged-steel counterbalanced crankshaft. The thrust is taken by special washers at the centre main bearing. The renewable element full-flow oil filter is secured by its centre bolt to the right-hand side of the engine.

A centrifugal water pump and fan are driven from the crankshaft by the dynamo belt.

Two semi-downdraught S.U. carburetters are supplied with fuel by an electric high-pressure S.U. pump. Air enters the carburetters through twin filters.

LUBRICATION SYSTEM

An eccentric-type oil pump inside the crankcase is driven from the camshaft by a short vertical shaft. Oil is drawn into the pump through a gauze strainer and is delivered through crankcase drillings to a non-adjustable plunger-type relief valve located at the rear of the engine on the left-hand side. From the relief valve the oil passes through an internal drilling across the rear of the block and through an external oil pipe to the main oil filter. From the filter the oil passes to the main oil gallery and drillings supply oil to the main, big-end and camshaft bearings. The connecting rod ends are drilled and supply oil to the cylinder walls.

From the rear camshaft bearing oil passes through the block and a drilling in the rear rocker shaft bracket to lubricate the rockers, returning to the sump via the push-rod holes.

Two grooves in the front camshaft journal register with small holes in the camshaft thrust plate as the camshaft turns, allowing a small amount of oil for chain and wheel lubrication to pass into the timing case twice in each revolution of the camshaft. A drain is provided to return oil from the timing case to the sump.

The filter bowl is filled with oil at full pressure which passes through the element into the annular space around the centre bolt and from there into the main oil gallery.

Section A.1

DRAINING THE SUMP

The sump on new and reconditioned engines must be drained and then filled with new oil after the first 500 miles (800 km.) and at intervals of every 3,000 miles (4800 km.). The hexagon-headed drain plug is at the rear of the sump on the right-hand side. The sump should be drained when the engine is hot as the oil will flow more readily; allow to drain for at least 10 minutes before the drain plug is replaced.

Every 6,000 miles (9600 km.) or every alternate oil change remove and wash out the filter bowl before filling the sump with new oil. Fit a new filter element and replace the bowl.

When the sump has been drained, approximately $7\frac{1}{2}$ pints (9 U.S. pints, 4.26 litres) of oil are required to fill it.

The capacity of the filter is approximately $\frac{1}{2}$ pint (.6 U.S. pint, .28 litre), giving a total of 8 pints (9.6 U.S. pints, 4.54 litres).

Section A.2

OIL PRESSURE

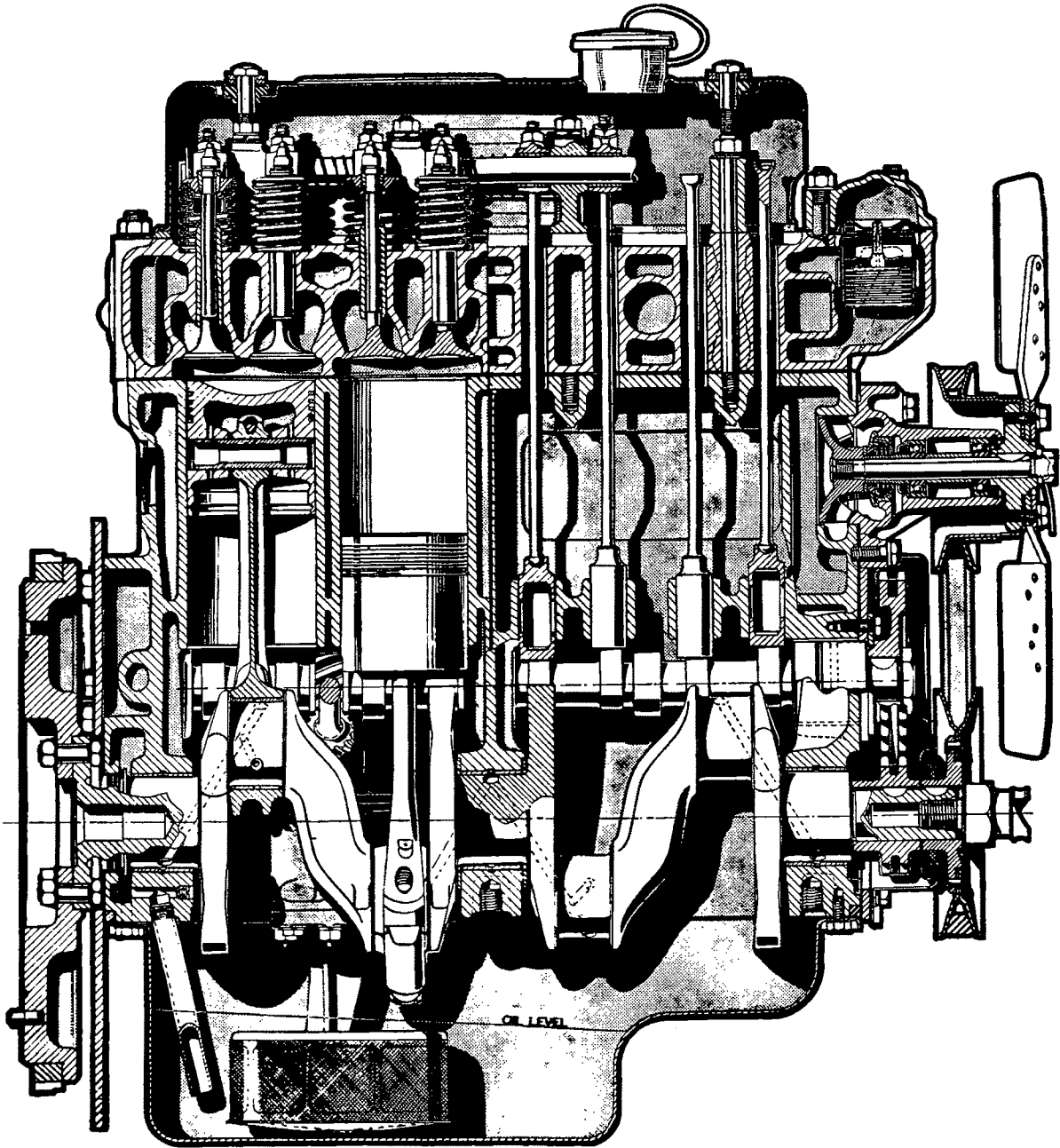
Under normal running conditions the oil pressure should not drop below 30 lb./sq. in. (2.1 kg./cm.²) on the gauge at normal road speeds, whilst approximately 10 lb./sq. in. (.7 kg./cm.²) should be shown when the engine is idling. New engines with new oil will give considerably higher readings at low speeds.

Should there be a noticeable drop in pressure, the following points should be checked:

- (1) That there is a good supply of the correct grade of oil in the engine sump.
- (2) That the strainer in the sump is clean and not choked with sludge.
- (3) That the bearings, to which oil is fed under pressure, have the correct working clearances. Should the bearings be worn and the clearances excessive, the oil will escape more readily from the sides of the bearings, particularly when the oil is warm and becomes more fluid. This will cause a drop in pressure on the gauge as compared with that shown when the bearings are in good order.

The automatic relief valve in the lubrication system deals with any excessive oil pressure when starting from cold. When hot the pressure drops as the oil becomes more fluid.

THE M.G. (Series MGA) ENGINE



Should the oil filter become blocked, two relief valves in the filter blow off to enable the oil to by-pass the filter and pass direct into the main gallery.

Continuous cold-running and unnecessary use of the mixture control are often the cause of serious oil dilution by fuel with a consequent drop in pressure.

Particular attention is called to the recommended change of oil every 3,000 miles (4800 km.).

Section A.3

OIL PRESSURE RELIEF VALVE

The non-adjustable oil pressure relief valve is situated at the rear of the left-hand side of the cylinder block and is held in position by a domed hexagon nut sealed by two fibre washers. The relief valve spring maintains a valve cup against a seating machined in the block.

The valve should be examined to ensure that the cup is seating correctly and that the relief spring has not lost its tension. The latter can be checked by measuring the length of the spring. To give the correct relief pressure of 75 to 80 lb. per sq. in. (5.3 to 5.6 kg./cm.²) this should not be less than 3 in. (7.6 cm.). Fit a new cup and spring if necessary.

Section A.4

REMOVING AND REPLACING THE WATER PUMP

The water pump is of the centrifugal impeller type and is mounted on a common spindle with the fan in a casting bolted to the front of the cylinder block.

The water pump and fan assembly is attached to the front of the cylinder block by four bolts and may be withdrawn and serviced as detailed in Sections C.7, C.8 and C.9.

If the gasket is damaged as the pump body is withdrawn from the cylinder block, ensure that all traces of it are removed before a new gasket is fitted and the pump replaced.

Section A.5

REMOVING AND REPLACING THE CARBURETTERS

Release the spring clips and detach the breather hose from the air cleaner and rocker cover.

Disconnect the fuel supply pipe at the rear carburetter banjo union.

Remove the split pin and flat washer and release the mixture cable and clevis pin from the mixture control linkage and release the mixture outer cable abutment from its bracket.

Detach the throttle return spring and release the throttle cable.

Unscrew the union nut and disconnect the ignition vacuum control pipe from the rear carburetter.

Remove the nut and flat washer to release the vent pipe from the top of each float-chamber.

Remove the four nuts securing the carburetter flanges and withdraw the carburetters and air cleaners as an assembly.

Replacement is a reversal of the above instructions.

Section A.6

REMOVING AND REPLACING THE MANIFOLDS

Remove the air cleaners and carburetters as detailed in Section A.5.

Remove the nut, bolt and washers securing the exhaust pipe to the steady bracket on the rear engine plate.

Release the distributor suction advance pipe and, if fitted, the heater pipe, from the manifold.

Remove the three exhaust pipe to manifold clamp bolts and spring washers and release the pipe.

Six studs and nuts secure the manifolds to the cylinder head.

The four centre nuts have large washers enabling them to secure both the inlet and exhaust manifolds. The two remaining nuts, one at each end of the manifolds, have small washers and secure the exhaust manifold only.

Replacement of the manifolds is a reversal of these instructions.

Use a new gasket.

Section A.7

REMOVING AND REPLACING THE ROCKER ASSEMBLY

Drain the cooling system, using a clean container for the coolant if it contains anti-freeze which is to be used again.

Release the breather pipe from the front of the rocker cover.

Slacken the clamping nut and withdraw the throttle cable from the lever and outer cable abutment. Unscrew the two nuts and lift off the rocker cover, taking care not to damage the cork gasket or lose the washers and rubber seals. Notice that under the right-hand rear rocker stud nut is a special locking plate. Unscrew the eight rocker-shaft bracket fixing nuts gradually, a turn at a time, until all load has been released.

It is necessary to drain the radiator and slacken the seven external cylinder head securing nuts because four of the rocker-shaft bracket fixing nuts also secure the

cylinder head, and if the seven external cylinder head fixing nuts are not slackened distortion may result and water find its way from the cooling system into the cylinders and sump.

Completely unscrew the eight rocker shaft bracket nuts and remove the rocker assembly, complete with brackets and rockers. Withdraw the eight push-rods, storing them carefully so that they may be replaced in the same positions. To dismantle the rocker shaft assembly, first remove the grub screw which locates the

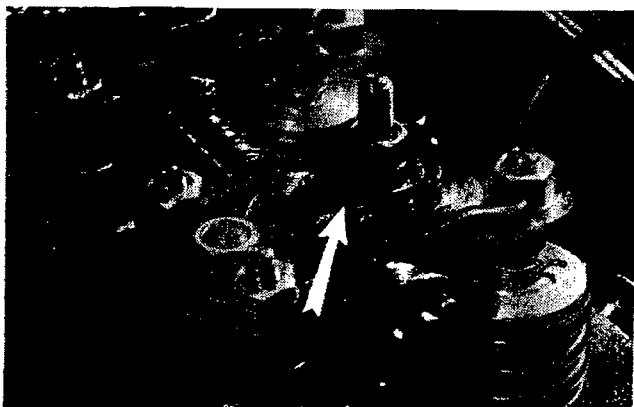


Fig. A.1

The rocker shaft locating screw is locked by this plate on the rear rocker shaft bracket

rocker shaft in the rear rocker mounting bracket and remove the split pins, flat washers and spring washers from each end of the shaft. Slide the rockers, brackets and springs from the shaft.

Unscrew the plug from the front end of the shaft and clean out the oilways.

Reassembly and replacement is a reversal of the above procedure, replacing the rockers and springs in their original positions on the shaft. Remember to replace the rocker shaft locating screw lock plate. Replace the rocker cover with the vent pipe to the front. Check that the two cap nut rubber bushes and the rocker cover cork gasket are undamaged; if they are found to be faulty, fit new ones or oil leaks may result.

Section A.8

REMOVING AND REPLACING THE CYLINDER HEAD ASSEMBLY

Drain the water from the cooling system. One drain tap is at the base of the radiator on the right-hand side and the other is at the rear of the engine on the right-hand side. If anti-freeze mixture is being used it should be drained into a suitable clean container and carefully preserved for future use.

Remove the top water hose. Remove the three thermostat housing securing nuts and washers and remove the housing and thermostat.

Remove the air cleaners and carburetters as detailed in Section A.5.

Remove the inlet and exhaust manifolds as detailed in Section A.6.

Remove the rocker assembly as detailed in Section A.7 and remove the seven external cylinder head nuts at the same time. Withdraw the push-rods, keeping them in the order of their removal.

Detach the high-tension cables and remove the sparking plugs, taking care not to damage the porcelain insulators. If fitted, remove the heater hose from the water valve on the right-hand side of the cylinder head by slackening the retaining clip.

Unscrew the thermal transmitter from the front of the cylinder head and release the conductor from its supporting clip.

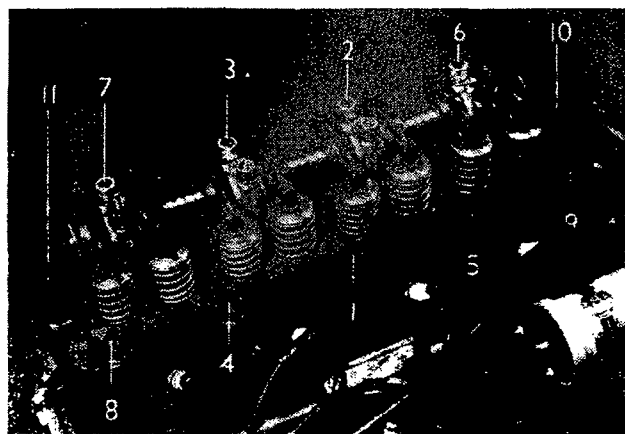


Fig. A.2

The correct order of tightening and slackening the cylinder head retaining nuts

Slacken the clips and disconnect the hoses from the water pipe on the left-hand side of the cylinder head and remove the pipe. Release the ignition vacuum control pipe from the rear cylinder head stud and remove the cylinder head.

To facilitate breaking the cylinder head joint, tap each side of the head with a hammer, using a piece of wood interposed to check the blow. When lifting the head a direct pull should be given to withdraw it evenly up the studs.

Refitting the cylinder head

Make sure that the surfaces of both the cylinder head and the cylinder block are clean. It will be noticed that the cylinder head gasket is marked 'FRONT' and 'TOP' to assist in replacing it correctly with the copper side

uppermost. Having slipped the gasket over the studs, next lower the cylinder head into position. Replace the vacuum control pipe clip and fit the seven cylinder head external nuts finger-tight.

Replace the push-rods in the positions from which they were taken. Replace the rocker assembly and securing nuts, finger-tight. Tighten the 11 cylinder head nuts, a turn at a time, in the order given in Fig. A.2. Finally tighten the four rocker assembly nuts.

Reassembly continues in the reverse order to the dismantling procedure.

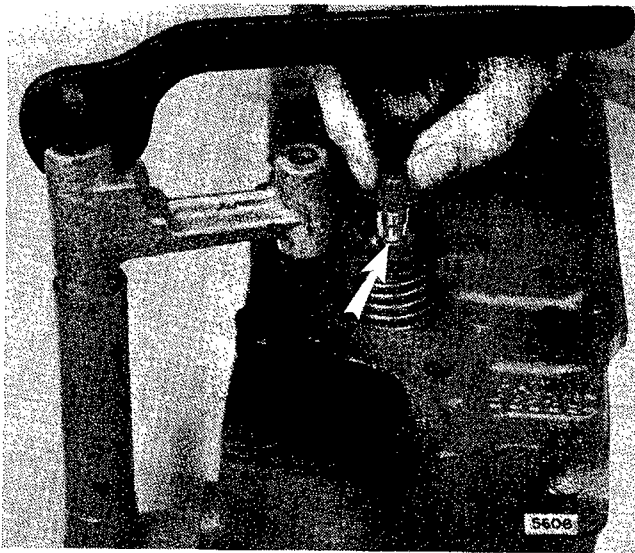


Fig. A.3

The use of the spring compressor (special tool 18G45) while replacing the cotters is shown in this illustration. The arrow indicates the position of the valve packing ring in the cotter groove below the valve cotters

Switch on the ignition and check the fuel system for leaks. Start the engine and run it until the normal working temperature is reached. Remove the rocker cover and check the valve clearances (see Section A.14). Replace the rocker cover and connect the breather hose.

Section A.9

REMOVING AND REPLACING VALVES

Remove the cylinder head as in Section A.8.

Remove the valve circlip. Compress the double valve springs, using special tool 18G45, and remove the two valve cotters. Release the valve springs and remove the compressor, valve spring cap, shroud, inner and outer springs, and bottom collar.

Remove the valve packing ring from the cotter groove and withdraw the valve from the guide.

Keep the valves in their relative positions when

removed from the head to ensure replacement in their original valve guides. The exhaust valve heads are concave and are smaller in diameter than the inlet valves.

To replace the valves place each valve into its guide and fit the bottom collars, inner and outer valve springs, shrouds, and caps. Compress the valve springs and push a new synthetic rubber packing ring over the tip of the valve stem down to the bottom of the cotter groove (see Fig. A.3). Refit the two valve cotters and remove the compressor. Replace the valve circlip.

NOTE.—Do not fit old valve packing rings, or oil sealing may suffer. The rings are fitted more easily if they have been soaked in clean engine oil for a short period before use.

Section A.10

DECARBONIZING

Remove the cylinder head as described in Section A.8. Withdraw the valves as described in Section A.9.

Remove the cylinder head gasket and plug the waterways with a clean rag.

If special equipment is not available for decarbonizing it will be necessary to scrape the carbon deposit from the piston crowns, cylinder block and cylinder head, using a blunt scraper.

A ring of carbon should be left round the periphery of the piston crown and the rim of carbon round the top of the cylinder bore should not be touched. To facilitate this, an old piston ring can be sprung into the bore so that it rests on top of the piston.

The cylinder head is next given attention. The sparking plugs must be cleaned and adjusted. Clean off the carbon deposit from the valve stems, valve ports and combustion spaces of the cylinder head. Remove all traces of carbon dust with compressed air or by the vigorous use of a tyre pump and then thoroughly clean with paraffin (kerosene) and dry off.

Fit a new cylinder head gasket when replacing the head if the old has been damaged, noting that the gasket is marked to indicate the top face and the front end.

Section A.11

GRINDING AND TESTING VALVES AND SEATINGS

Remove the valves as in Section A.9.

Each valve must be cleaned thoroughly and carefully examined for pitting. Valves in a pitted condition should be refaced with a suitable grinder or new valves should be fitted.

If valve seats show signs of pitting or unevenness they should be trued by the use of a suitable grinder or

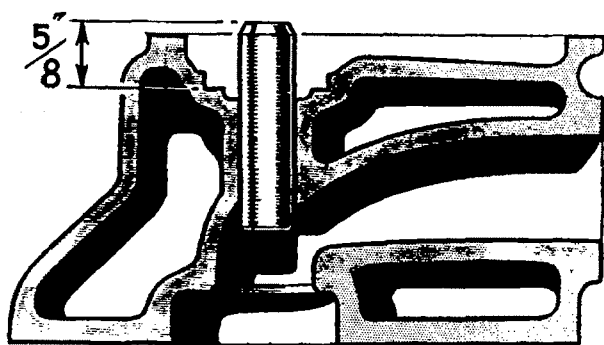


Fig. A.4

Showing the correct fitting of a valve guide

special cutter. When using a cutter, care must be exercised to remove only as little metal as is necessary to ensure a true surface.

When grinding a valve onto its seating the valve face should be smeared lightly with fine or medium grade carborundum paste and then lapped in with a suction grinder (special tool, Part No. 18G328). Avoid the use of excessive quantities of grinding paste and see that it remains in the region of the valve seating only.

A light coil spring placed under the valve head will assist considerably in the process of grinding. The valve should be ground to its seat with a semi-rotary motion and occasionally allowed to rise by the pressure of the light coil spring. This assists in spreading the paste evenly over the valve face and seat. It is necessary to carry out the grinding operation until a dull, even, matt surface, free from blemish, is produced on the valve seat and valve face.

On completion, the valve seat and ports should be cleaned thoroughly with a rag soaked in paraffin (kerosene), dried, and then thoroughly cleaned by compressed air. The valves should be washed in paraffin (kerosene) and all traces of grinding paste removed.

Fit a new oil seal when refitting the valves (see Section A.9) and ensure that the chamfered side of the seal is downwards.

Section A.12

REMOVING AND REPLACING VALVE GUIDES

Remove the cylinder head as shown in Section A.8.

Remove the appropriate valve and springs as in Section A.9. Rest the cylinder head with its machined face downwards on a clean surface and drive the valve guide downwards into the combustion space with a suitable-sized drift. This should take the form of a hardened steel punch $\frac{1}{8}$ in. (14 mm.) in diameter and not less than 4 in. (10 cm.) in length, with a locating

spigot $\frac{1}{16}$ in. (7.9 mm.) diameter machined on one end for a length of 1 in. (2.5 cm.) to engage the bore of the guide.

When fitting new valve guides, these should be pressed in from the top of the cylinder head. The inlet valve guides must be inserted with the end having the largest chamfer at the top, and the exhaust valve guides should have their counterbored ends at the bottom. The valve guides should be driven into the combustion spaces until they are $\frac{1}{8}$ in. (15.8 mm.) above the machined surface of the valve spring seating (see Fig. A.4).

Section A.13

REMOVING AND REPLACING TAPPETS

Remove the carburetters (see Section A.5) and the rocker cover.

Remove the manifolds (see Section A.6).

Disconnect the high-tension leads from the sparking plugs.

Remove the rocker assembly as in Section A.7, and withdraw the push-rods, keeping them in their relative positions to ensure their replacement onto the same tappets. Release the breather pipe and remove the tappet covers and lift out the tappets, also keeping them in their relative positions.

New tappets should be fitted by selective assembly so that they just fall into their guides under their own weight when lubricated.

Assembly is a reversal of the above procedure, but care should be taken to see that the tappet cover joints are oiltight and that the rockers are adjusted to give the correct valve clearance.

Section A.14

ADJUSTING VALVE ROCKER CLEARANCES

If the engine is to give its best performance and the valves are to retain their maximum useful life, it is essential to maintain the correct valve clearance. Accordingly it is recommended that the clearance be checked at regular intervals and any necessary adjustments made.

For the correct valve rocker clearance refer to 'GENERAL DATA'. The engine has been designed to operate with this clearance and no departure from it is permissible. An additional .001 in. (.025 mm.) must be allowed when the engine is cold.

Provision for adjusting the valve clearance is made in the rocker arm by an adjustable screw and locknut.

The rocker adjusting screw is released by slackening the hexagon locknut with a spanner, while holding the screw against rotation with a screwdriver. The valve clearance can then be set by carefully rotating the rocker

screw while checking the clearance with a feeler gauge. This screw is then re-locked by tightening the hexagon locknut while again holding the screw against rotation.

It is important to note that while the clearance is being set the tappet of the valve being operated upon is on the back of its cam, i.e. opposite to the peak.

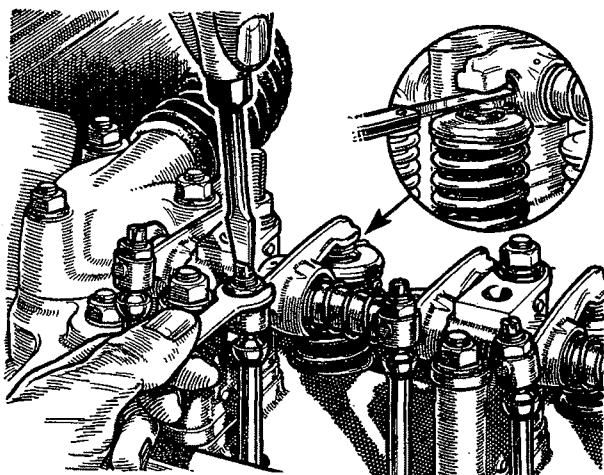


Fig. A.5

The method of adjusting the valve rocker clearance and the correct position for measuring it

As this cannot be observed accurately, the rocker adjustment is more easily carried out in the following order, and this also avoids turning the engine over more than is necessary:

Adjust No. 1 rocker with No. 8 valve fully open.

„ No. 3	„	„	No. 6	„	„	„
„ No. 5	„	„	No. 4	„	„	„
„ No. 2	„	„	No. 7	„	„	„
„ No. 8	„	„	No. 1	„	„	„
„ No. 6	„	„	No. 3	„	„	„
„ No. 4	„	„	No. 5	„	„	„
„ No. 7	„	„	No. 2	„	„	„

Section A.15

CHECKING VALVE TIMING

Set No. 1 cylinder inlet valve to .060 in. (1.52 mm.) clearance with the engine cold, and then turn the engine until the valve is about to open.

The indicating notch in the flange of the crankshaft pulley should then be opposite the longest of the three pointers on the timing cover, i.e. the No. 1 valve should be about to open at T.D.C. and No. 4 piston will be at T.D.C. on its compression stroke.

Do not omit to reset the inlet valve clearance to the recommended clearance (see 'GENERAL DATA') when the timing check has been completed. The clearance of .060 in. is necessary to bring the opening position of the

valve to T.D.C. It is not possible to check the valve timing accurately with the normal running valve clearance.

Section A.16

REMOVING AND REPLACING THE TIMING CHAIN COVER

Drain the cooling system and remove the radiator (see Section C.4).

Slacken the dynamo attachment bolts and remove the belt.

Bend the tab on the starting dog nut locking washer. Unscrew the starting dog nut and remove the locking washer.

Pull off the crankshaft pulley.

The timing cover is secured by nine bolts. Each bolt has a shakeproof washer and a plain washer. Remove all nine bolts with their washers and remove the timing cover.

Care should be taken not to damage the timing cover gasket. If it is damaged, clean the face of the cover flange and the front engine mounting plate and fit a new gasket when reassembling.

The felt washer situated in the timing cover should also be renewed if necessary.

It should be noted that the oil thrower, which is located behind the crankshaft pulley, is fitted with its concave side facing away from the engine.

Replacement of the timing cover is a reversal of the above procedure.

Section A.17

REMOVING AND REPLACING THE TIMING CHAIN

Remove the timing cover and oil thrower as in Section A.16.

Unlock and remove the camshaft chain wheel nut and remove the nut and lock washer. Note that the locating tag on the lock washer fits into the keyway of the camshaft chain wheel.

The camshaft and crankshaft chain wheels may now be removed, together with the timing chain, by easing each wheel forward, a fraction at a time, with suitable smaller levers.

As the crankshaft gear wheel is withdrawn care must be taken not to lose the gear packing washers immediately behind it. When reassembling replace the same number of washers as was found when dismantling, unless new camshaft or crankshaft components have been fitted which will disturb the alignments of the two gear wheels. To determine the thickness of washers required, place a straight-edge across the sides of the

camshaft wheel teeth and measure with a feeler gauge the gap between the straight-edge and the crankshaft gear. Subtract .005 in. (.13 mm.) from the feeler gauge reading and add the resultant thickness of crankshaft gear packing washers.

When replacing the timing chain and gears, set the crankshaft with its keyway at T.D.C., and the camshaft with its keyway approximately at the one o'clock position when seen from the front. Assemble the gears into the timing chain with the two marks on the gear wheels opposite to each other, as in Fig. A.6. Keeping the gears in this position, engage the crankshaft gear keyway with the key on the crankshaft and rotate the camshaft until

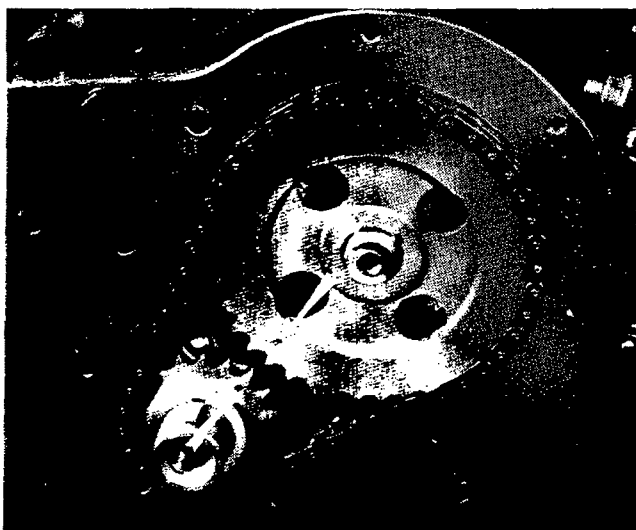


Fig. A.6

When replacing the chain wheels the timing marks indicated by the arrows must be in line to give correct valve timing

the camshaft gear keyway and key are aligned. Push the gears onto the shafts as far as they will go and secure the camshaft gear with the lock washer and nut.

Replace the oil thrower, concave side forward, and the remaining components as detailed in Section A.16.

Section A.18

REMOVING AND REPLACING THE POWER UNIT

Drain the oil from the engine and gearbox. Mark the propeller shaft and rear axle drive flange and disconnect the propeller shaft from the axle.

Mark the hand brake cable operating lever and splined shaft to assist replacing the lever in its original position.

Remove the clamping nut and bolt from the lever and prise the lever from the splined shaft.

Remove the nuts, bolts and spring washers and with-

draw the reinforcement bracket from inside the propeller shaft tunnel.

Remove both seats and frames. Remove all the floor covering from the toeboards, floorboards and gearbox cover. Remove the floorboards and toeboards. Remove the gear lever knob and draught excluder cover and the propeller shaft and gearbox covers.

Disconnect the speedometer drive cable.

Remove the banjo bolt to release the flexible supply pipe from the clutch slave cylinder.

Detach the bonnet from the bonnet hinges.

Drain the water from the radiator and disconnect and remove the top and bottom water hoses. Remove the three bolts with spring and flat washers, securing each side of the radiator, and withdraw the radiator.

Remove the carburettors as detailed in Section A.5.

Disconnect the engine revolution indicator drive from the left-hand side of the engine. Release the exhaust pipe from the exhaust manifold and from the steady bracket on the engine rear mounting plate.

Unscrew the thermal transmitter from the cylinder head and release the conductor from its support clip.

Disconnect the flexible oil gauge pipe from the union at the rear of the cylinder block on the right-hand side.

Disconnect the cables from the dynamo, ignition coil, distributor, and starter motor. Remove the gearbox remote control assembly from the gearbox extension.

Place a rope sling around the power unit and attach the lifting tackle. Arrange the sling so that the unit may be lifted slightly and moved forward, and finally lifted from the frame at a sharp angle with the front considerably higher than the rear.

Take the weight of the unit, release the engine from the two front mounting rubbers and remove the rubbers. Remove the nut, bolt and spring washer to release the gearbox from the mounting bracket on the frame cross-member.

Replacement is a reversal of the above instructions, not forgetting to refill the engine and gearbox with oil to Ref. A (page P.2).

Section A.19

REMOVING AND REPLACING THE SUMP AND OIL PUMP STRAINER

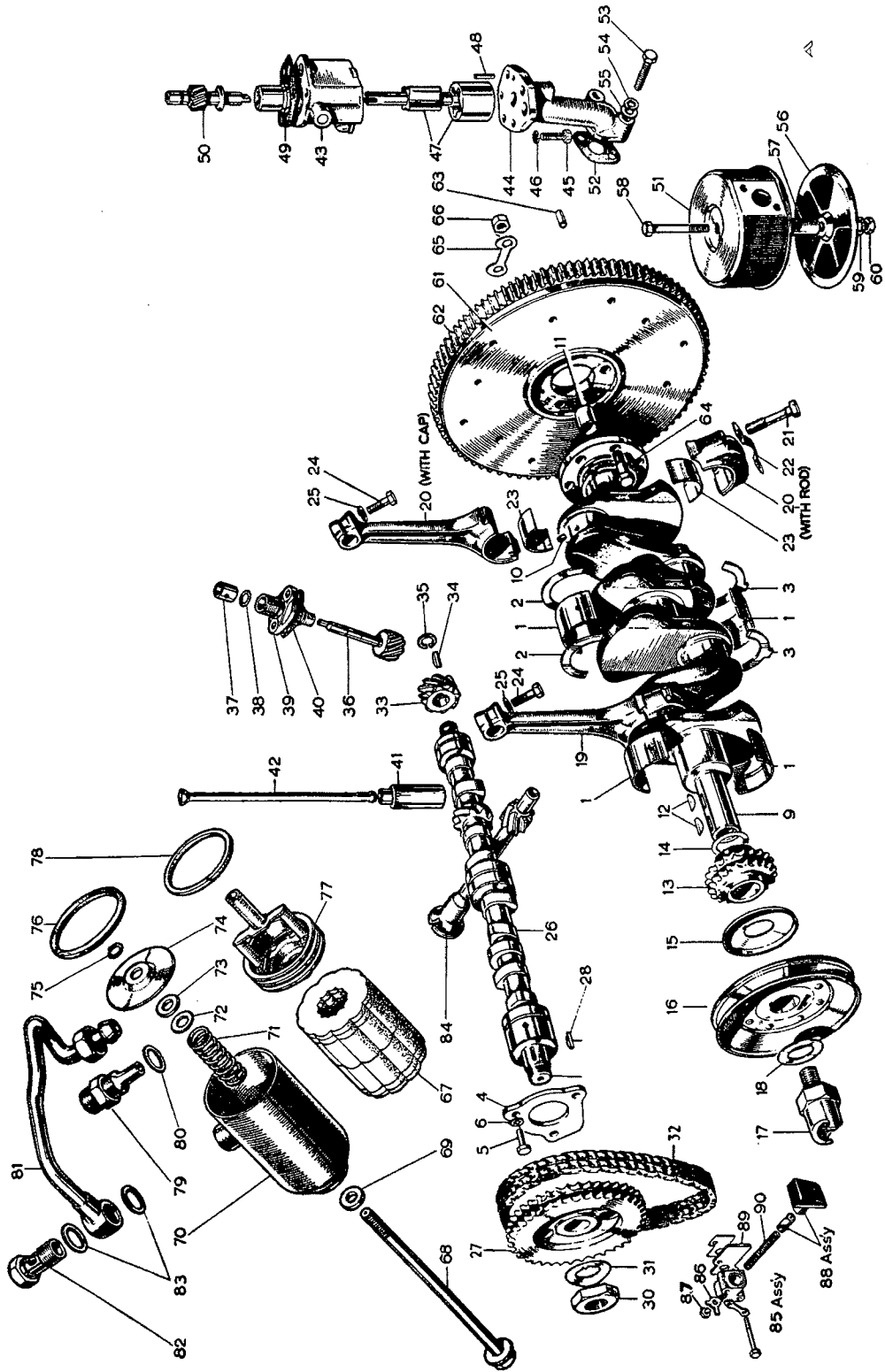
Drain the oil from the engine sump.

Remove the bolts and withdraw the sump from the crankcase.

To remove the oil strainer, remove the two bolts securing it to the pump cover.

The strainer may be dismantled for cleaning by removing the centre nut and bolt and the two delivery

THE CAMSHAFT, CRANKSHAFT, AND OIL PUMP COMPONENTS



KEY TO THE CAMSHAFT, CRANKSHAFT, AND OIL PUMP COMPONENTS

No.	Description	No.	Description	No.	Description
1.	Bearing—main—standard.	33.	Gear—tachometer drive.	63.	Dowel—clutch.
2.	Thrust washer—upper.	34.	Key—gear.	64.	Bolt—flywheel to crankshaft.
3.	Thrust washer—lower.	35.	Spring ring.	65.	Lock washer—bolt.
4.	Plate—camshaft locating.	36.	Pinion—tachometer drive.	66.	Nut—bolt.
5.	Screw—plate to engine.	37.	Oil seal—pinion.	67.	Element—oil filter.
6.	Washer—spring—plate screw.	38.	Retaining ring.	68.	Bolt—centre.
9.	Crankshaft.	39.	Housing pinion.	69.	Washer—sealing—small.
10.	Restrictor—oil.	40.	Joint washer—housing.	70.	Container.
11.	Bush—first motion shaft.	41.	Tappet—valve.	71.	Spring.
12.	Key—gear/fan pulley.	42.	Push-rod.	72.	Washer.
13.	Gear.	43.	Body and plug.	73.	Washer—felt.
14.	Washer—gear packing.	44.	Cover.	74.	Pressure plate.
15.	Oil thrower—front.	45.	Set screw.	75.	Circlip.
16.	Pulley—crankshaft fan.	46.	Spring washer.	76.	'O' ring.
17.	Nut—starting dog.	47.	Shaft—driving—with rotors.	77.	Valve assembly.
18.	Lock washer—nut.	48.	Dowels—cover.	78.	Washer—sealing—large.
19.	Rod and cap—Nos. 1 and 3.	49.	Joint—pump to block.	79.	Adaptor—oil filter connection.
20.	Rod and cap—Nos. 2 and 4.	50.	Spindle—oil pump driving.	80.	Joint washer—pipe to crankcase.
21.	Set screw—cap.	51.	Body complete—oil strainer.	81.	Pipe assembly—filter to crankcase.
22.	Lock washer.	52.	Joint—strainer to pump.	82.	Screw—banjo union.
23.	Bearings—standard.	53.	Set screw—strainer to pump.	83.	Washer—banjo union screw.
24.	Screw—gudgeon pin clamp.	54.	Spring washer.	84.	Spindle—distributor drive.
25.	Spring washer—screw.	55.	Plain washer.	85.	Tensioner—timing chain.
26.	Camshaft.	56.	Cover—oil strainer.	86.	Lock washer—plug.
27.	Gear—camshaft.	57.	Distance piece—cover.	87.	Plug—body.
28.	Key—gear.	58.	Bolt—cover.	88.	Slipper head and cylinder.
29.	Tensioner ring—gear.	59.	Washer—shakeproof.	89.	Back plate—body.
30.	Nut—gear.	60.	Nut—cover bolt.	90.	Spring.
31.	Lock washer—nut.	61.	Flywheel.		
32.	Chain—camshaft timing.	62.	Ring—starter.		

pipe flange bolts. Note that there is a locating tongue on the side of the cover which must be positioned correctly when replacing. Remember also to replace the distance tube.

Clean out the sump and strainer with paraffin (kerosene) and a stiff brush; never use rag.

When refitting the sump to the engine give particular attention to the sealing gaskets for the crankcase face and the two oil seal packings for the crankcase which fit into recesses in the crankcase.

If the gaskets are in good condition and have not been damaged during removal of the sump they may be used again, but it is always advisable to fit new ones. Before fitting new gaskets, remove all traces of the old ones from the sump and crankcase faces. Smear the faces of the crankcase joint with grease and fit the two halves of the large gasket. Lift the sump into position on the crankcase, insert the 19 bolts and tighten them evenly.

Section A.20

REMOVING AND REPLACING MAIN AND BIG-END BEARINGS

Unless the bearing journals are badly worn the big-end bearings may be renewed without removing the crankshaft. To renew the main bearings it is necessary to withdraw the crankshaft. Liners are used both for the main and the big-end bearings, which are of the shimless type and therefore non-adjustable.

Big-end bearings

Drain the engine oil and remove the sump as in Section A.19.

As the bearings are of the shimless type it is essential that no attempt should be made to adjust bearings which are worn. Always fit new bearings in place of worn parts. If the crankshaft journals are found to be in a worn condition it is advisable to fit a service reground crankshaft, complete with main and big-end bearings, as supplied by the Factory.

Both the big-end and main bearings liners are located in the bearing housings by a small tag on one side of each half-bearing; it should be noted that the bearings are fitted so that the tags come on the same joint edge of the bearing housing although on opposite corners.

To detach the big-end bearings, bend down the locking strips so that the bolts may be removed. Remove the connecting rod caps and extract the bearings. Care should be taken to see that the bearing journals are thoroughly cleaned before installing new bearings. No scraping is required, as the bearings are machined to give the correct diametrical clearance of .0016 in. (.04 mm.).

Main bearings

Remove the engine from the car and remove the flywheel and clutch, the timing chain (Section A.17), the sump and strainer (Section A.19), and the rear engine mounting plate (Section A.31).

Remove the self-locking nuts securing the main bearing caps to the cylinder block and the two bolts securing the front cap to the front engine bearer plate.

Note that a thrust washer is fitted on each side of the centre main bearing to take the crankshaft end-thrust. These thrust washers each consist of two semicircular halves, one having a lug which is located in a recess in the detachable half of the bearing and the other being plain.

When fitting new bearings no scraping is required as the bearings are machined to give the correct diametrical clearance of .0005 in. (.0127 mm.).

In the case of a 'run' bearing it is always essential to clean out thoroughly all the oilways in the crankshaft and block, wash out the engine sump with paraffin (kerosene) and clean the oil pump and sump strainer to ensure that no particles of metal are left anywhere in the lubricating system. The rear main bearing cap horizontal joint surfaces should be thoroughly cleaned and lightly covered with Wel-Seal (manufactured by Messrs. Wellworthy Ltd.) sealing compound before the cap is fitted to the cylinder block. This will ensure a perfect oil seal when the cap is bolted down to the block. Replace each main bearing and cap, replacing the thrust washers in their correct positions at the centre main bearing with the oil grooves towards the bearing. Refit the locking strip or locking plates to each bearing cap and bend them to lock the bolts after tightening. Note that the two bolts securing the front main bearing cap to the front bearer plate are locked by a common plate.

Section A.21

REMOVING AND REPLACING PISTONS AND CONNECTING RODS

Remove the cylinder head as in Section A.8. Drain and remove the sump and oil strainer as in Section A.19.

The pistons and connecting rods must be withdrawn from the top of the cylinder block.

Unlock and remove the big-end bolts and remove the bearing caps. Release the connecting rod from the crankshaft.

Withdraw the piston and connecting rod from the top of the cylinder block and refit the bearing cap. The big-end bearing caps are offset, and the caps on the big-ends in Nos. 1 and 3 cylinders are interchangeable when new, as are those for Nos. 2 and 4 cylinders. When used parts are replaced after dismantling it is essential that they should be fitted in their original positions. In order to ensure this, mark the caps and connecting rods on their

sides which are fitted together with the number of the cylinder from which each was taken.

Replacement of the piston and connecting rod is a direct reversal of the above, but the piston ring gaps should be set at 180° to each other.

If the piston rings have been removed from the piston they must be replaced as detailed in Section A.24.

It is essential that the connecting rod and piston assemblies should be replaced in their own bores and fitted the same way round, i.e. with the gudgeon pin clamp screw on the camshaft side of the engine. The piston crowns are marked 'FRONT' to assist correct assembly to the connecting rods.

Refit the big-end bearings in their original positions.

Section A.22

DISMANTLING AND REASSEMBLING PISTON AND CONNECTING ROD ASSEMBLIES

The gudgeon pin is rigidly held in the split little-end of the connecting rod by a clamp bolt engaging the central groove of the gudgeon pin.

Before the piston and gudgeon pin can be dismantled from the connecting rod it is necessary to remove the clamp screw. To enable the assembly to be held in a vice for this operation without damage, holding plugs should be inserted in each end of the gudgeon pin.

Unscrew the gudgeon pin clamp and remove it completely.

Push out the gudgeon pin.

Reassembly is a reversal of the above.

IMPORTANT.—Attention must be given to the following points when assembling the piston to the connecting rod:

- (1) That the piston is fitted the correct way round on the connecting rod. The crown of the piston is marked 'FRONT' to assist this, and the connecting rod is fitted with the gudgeon pin clamp screw on the camshaft side.
- (2) That the gudgeon pin is positioned in the connecting rod so that its groove is in line with the clamp screw hole.
- (3) That the clamp screw spring washer has sufficient tension.
- (4) That the clamp screw will pass readily into its hole and screw freely into the threaded portion of the little-end, and also that it will hold firmly onto the spring washer.

Section A.23

FITTING GUDGEON PINS

A certain amount of selective assembly must be used when fitting new gudgeon pins. They must be a thumb-

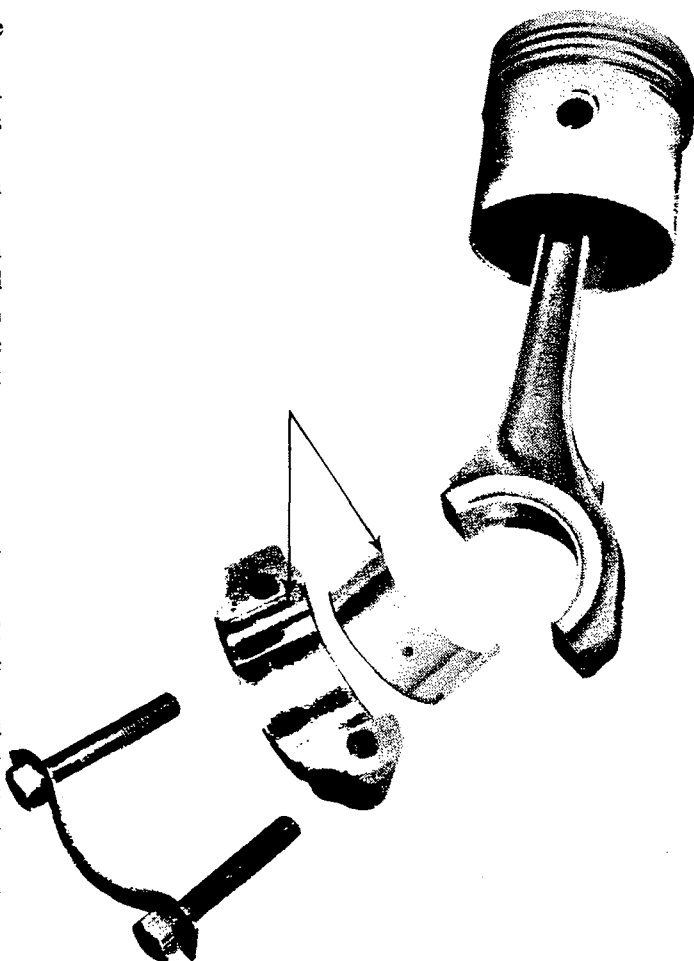


Fig. A.8

A piston and connecting rod assembly. Note the bearing locating tab

push fit for three-quarters of their travel, to be finally tapped in with a raw-hide mallet. This operation should be carried out with the piston and gudgeon pin cold.

Section A.24

REMOVING AND REPLACING PISTON RINGS

If no special piston ring expander is available, use a piece of thin steel such as a smoothly ground hacksaw blade or a disused .020 in. (.50 mm.) feeler gauge.

Raise one end of the ring out of its groove. Insert the steel strip between the ring and the piston. Rotate the strip around the piston, applying slight upward pressure to the raised portion of the ring until it rests on the land above the ring grooves. It can then be eased off the piston.

Do not remove or replace the rings over the piston skirt, but always over the top of the piston.

Before fitting new rings, clean the grooves in the piston to remove any carbon deposit. Care must be taken not to remove any metal or sideplay between the ring and the groove will result, with consequent excessive oil consumption and loss of gastightness.

The cylinder bore glazing should be removed before fitting new rings to a worn bore.

When refitting the rings note that the second and third compression rings are tapered and marked with the letter 'T' (top) for correct reassembly.

New rings must be tested in the cylinder bore to ensure that the ends do not butt together. The best way to do this is to insert the piston approximately 1 in. (2.54 cm.) into the cylinder bore and push the ring down onto the top of the piston and hold it there in order to keep the ring square with the bore. The correct ring gap is .008 to .013 in. (.20 to .33 mm.).

Section A.25

PISTON SIZES AND CYLINDER BORES

In addition to the standard pistons there is a range of four oversize pistons available for service purposes.

Oversize pistons are marked with the actual oversize dimensions enclosed in an ellipse. A piston stamped +.020 is only suitable for a bore .020 in. (.508 mm.) larger

<i>Piston marking</i>	<i>Suitable bore size</i>	<i>Metric equivalent</i>
Standard	2.8757 in. 2.8760 in.	73.043 mm. 73.050 mm.
Oversize		
+ .010 in. (.254 mm.)	2.8857 in. 2.8860 in.	73.297 mm. 73.304 mm.
+ .020 in. (.508 mm.)	2.8957 in. 2.8960 in.	73.551 mm. 73.558 mm.
+ .030 in. (.762 mm.)	2.9057 in. 2.9060 in.	73.805 mm. 73.812 mm.
+ .040 in. (1.016 mm.)	2.9157 in. 2.9160 in.	74.059 mm. 74.066 mm.

than the standard bore; similarly pistons with other markings are only suitable for the oversize bore indicated.

The piston markings indicate the actual bore size to which they must be fitted, the requisite running clearance being allowed for in the machining.

After reboring an engine, or whenever fitting pistons differing in size from those removed during dismantling, ensure that the size of the piston fitted is stamped clearly on the top of the cylinder block alongside the appropriate cylinder bore.

Pistons are supplied in the sizes indicated in the table on this page.

Section A.26

REMOVING AND REPLACING THE CAMSHAFT

Disconnect the battery.

Remove the inlet and exhaust manifold assembly (see Section A.6).

Remove the push-rods and take out the tappets (see Section A.13).

Remove the timing cover, timing chain and gears (see Section A.16 and Section A.17).

Disconnect the suction advance unit pipe from the distributor and take out the two bolts with flat washers securing the distributor to the housing. Do not slacken the clamping plate bolt or the ignition timing setting will be lost.

Withdraw the distributor.

Take out the bolt securing the distributor housing to the cylinder block. Using one of the tappet cover bolts as an extractor screwed into the tapped end of the distributor drive spindle, withdraw the spindle.

Remove the sump, oil pump and oil pump drive shaft (see Section A.28).

Disconnect the engine revolution indicator drive, remove the securing nuts and washers and withdraw the indicator drive gear.

Take out the three set screws and shakeproof washers which secure the camshaft locating plate to the cylinder block, and withdraw the camshaft.

If the camshaft bearing clearances are excessive new bearings should be fitted. To do this, the power unit should be removed. Drift out the old bearing towards the rear of the engine and press in a new one. Ensure

that the oil holes in the bearing line up with the oil passages in the cylinder block. The front bearing must be reamed to give .001 to .002 in. (.025 to .051 mm.) diametrical clearance.

Replacement of the camshaft is a reversal of the above procedure.

Note that the three set screws securing the camshaft thrust plate are not evenly spaced to ensure the correct alignment of the oil hole supplying the timing gear.

Section A.27

REFITTING THE DISTRIBUTOR DRIVE GEAR

Turn the engine until No. 1 piston is at T.D.C. on its compression stroke. When the valves on No. 4 cylinder are 'rocking' (i.e. exhaust just closing and inlet just opening), No. 1 piston is at the top of its compression stroke. If the engine is set so that the notch in the crankshaft pulley is in line with the long pointer on the timing chain cover, or the 'dimples' in the crankshaft and camshaft gears are in line, the piston is exactly at T.D.C.

Turn the engine back so that the notch in the pulley is 7° before the long pointer on the timing cover. This is the correct ignition setting giving a 7° advance. As a guide to the 7° position the two short pointers on the timing cover are 5° and 10° B.T.D.C. respectively.

Screw one of the tappet cover bolts into the threaded end of the distributor drive gear and, holding the drive



Fig. A.8

The arrow indicates the oil supply hole for the timing gear. The crankshaft and camshaft wheel keys should be in the positions shown when timing the engine

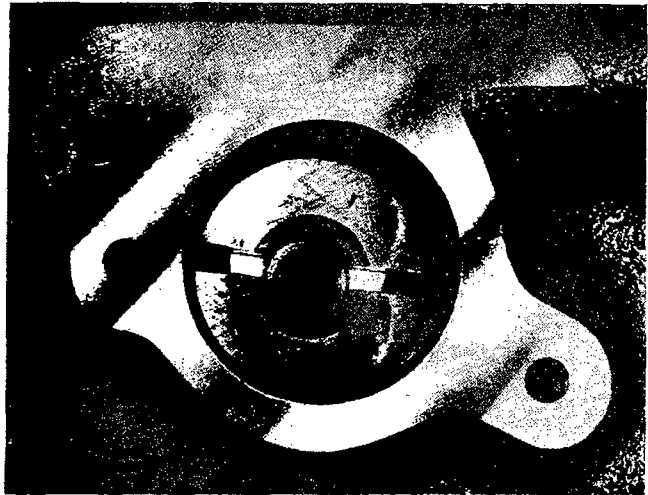


Fig. A.9

Replacing the distributor drive gear. Notice the slot angle. The large offset is uppermost

gear with the slot just below the horizontal and the large offset uppermost, enter the gear.

As the gear engages with the camshaft the slot will turn in an anti-clockwise direction until it is approximately in the one o'clock position.

Remove the bolt from the gear, insert the distributor housing and secure it with the special bolt and washer. Ensure that the correct bolt is used and that the head does not protrude above the face of the housing.

Refit the distributor, referring to Section B.7 for retiming instructions if the clamp plate has been released.

Section A.28

REMOVING AND REPLACING THE OIL PUMP

Remove the sump and oil sump strainer (see Section A.19).

Two bolts secure the oil pump cover and three studs secure the pump to the crankcase. Unscrew the stud nuts and remove the pump and drive shaft.

When refitting the pump use a new joint washer.

Section A.29

DISMANTLING AND REASSEMBLING THE OIL PUMP

Remove the oil pump from the engine.

The oil pump cover is attached to the body of the pump by two bolts and spring washers, and when these bolts are removed the oil pump cover, the outer rotor

and the combined oil pump shaft and inner rotor may be extracted. The component parts are shown on the right-hand side of the illustration on page A.12.

Section A.30

REMOVING AND REPLACING THE FLYWHEEL (Engine Out of Car)

Remove the clutch by unscrewing the six bolts and spring washers securing it to the flywheel. Release the bolts a turn at a time to avoid distortion of the cover flange. Two dowels locate the clutch cover on the flywheel.

To release the special flywheel bolts the engine sump and rear main bearing cap must also be removed.

Unlock and remove the six nuts and three lock plates which secure the flywheel to the crankshaft and remove the flywheel.

When replacing the flywheel, ensure that the 1 and 4 timing mark on the periphery of the flywheel is in line with and on the same side as the first and fourth throws of the crankshaft.

To assist correct location of the flywheel, the depression in the crankshaft flange face is stamped with a similar timing mark which should be in line with the one on the flywheel periphery.

Section A.31

REMOVING AND REPLACING THE CRANKSHAFT (Engine Out of Car)

Remove the engine from the car (see Section A.18).

Take off the clutch and the flywheel (see Section A.30), the timing cover (see Section A.16), the timing wheels and chain (see Section A.17), the sump and the oil pump strainer (see Section A.19), and the rear engine mounting plate.

Remove the big-end bearing cap and then take off the main bearing caps (see Section A.21).

Mark each big-end bearing cap and bearing to ensure that it is reassembled to the correct journal, taking care, in the case of the bearings, that they are not damaged or distorted when marking. Punches should not be used for this purpose.

Lift the crankshaft out of the bearings.

Replacement of the crankshaft is a reversal of the above operations.

Before replacing the crankshaft, thoroughly clean out all oilways.

Note that each main bearing cap is stamped with a common number which is also stamped on the centre web of the crankcase near the main bearing.

Remember to fit the packing washers behind the crankshaft chain wheel (see Section A.17).

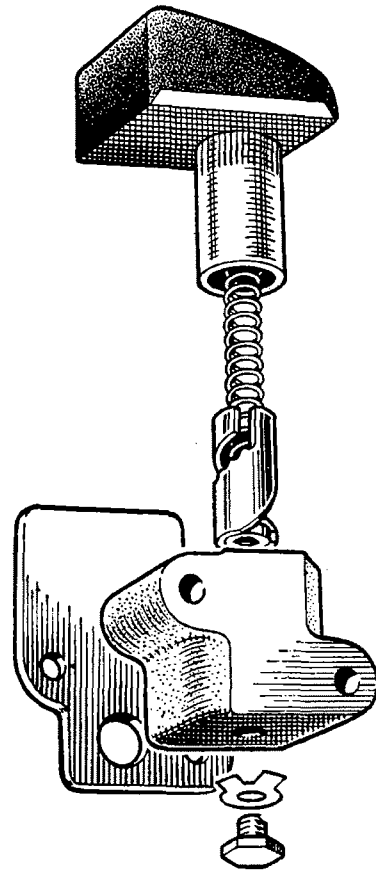


Fig. A.10

The chain tensioner components

Section A.32

TIMING CHAIN TENSIONER

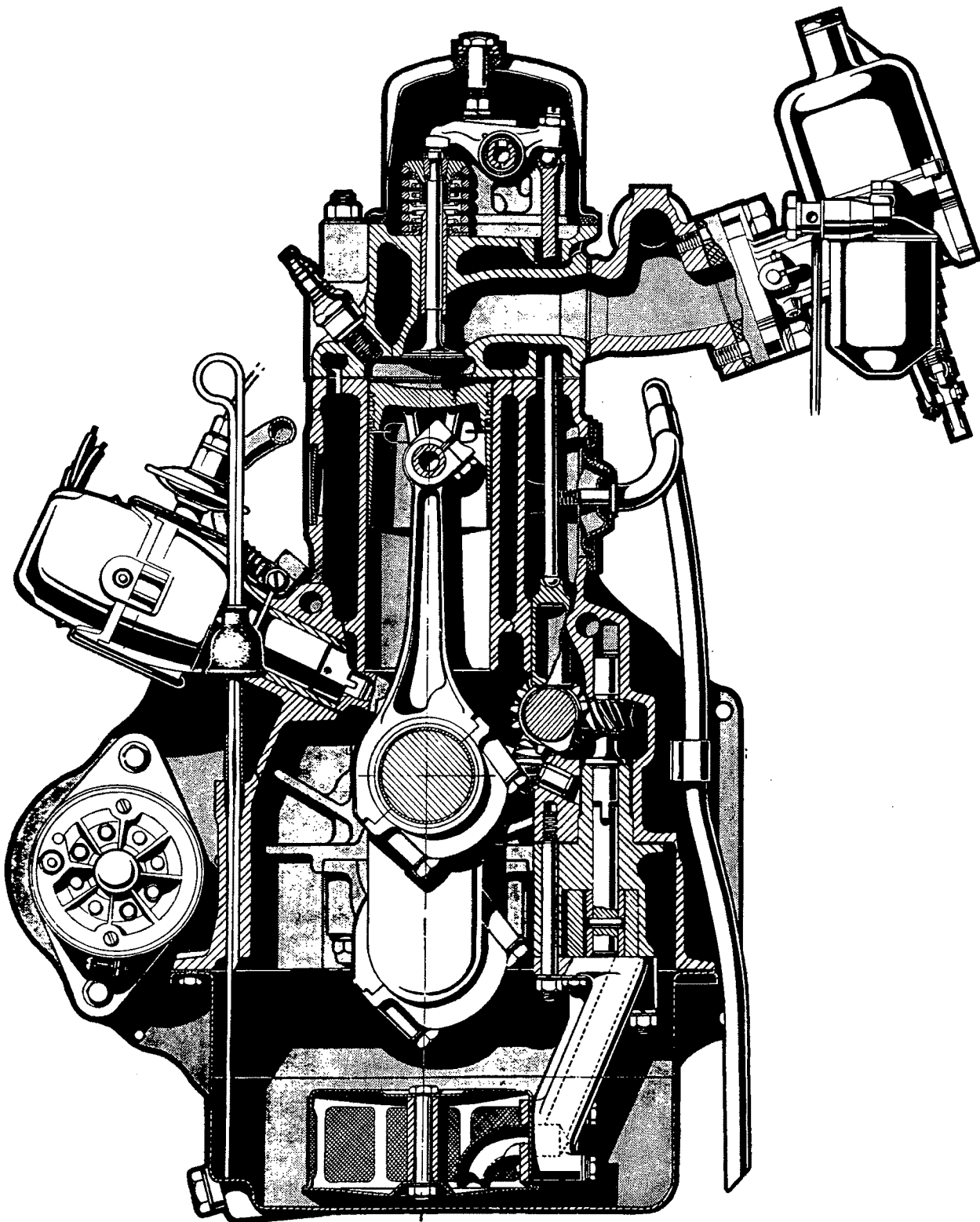
Commencing at Engine No. 259, a timing chain tensioner, as illustrated in Fig. A.10, is fitted to the engine front mounting plate and secured by two bolts and a locking plate.

Also fitted are a modified camshaft locating plate and a camshaft timing gear in which the rubber tensioner ring is deleted. The timing chain now receives lubrication via the tensioner slipper and not as previously by an ejection of oil from the camshaft locating plate. The chain tensioner cannot be fitted to earlier vehicles.

Before removing the assembly from the engine, unlock the tab washer and remove the bottom plug from the tensioner body. Insert a $\frac{1}{4}$ in. Allen key to engage the cylinder and turn the key clockwise until the rubber slipper is fully retracted and locked behind the limit peg. Between a half and one full turn is all that is necessary.

Unlock and remove the bolts to release the chain tensioner assembly and the backplate.

A TRANSVERSE SECTION OF THE M.G. (Series MGA) ENGINE



Withdraw the plunger and slipper assembly from the tensioner body and engage the lower end of the cylinder with the Allen key. Turn the key clockwise, holding the key and plunger securely until the cylinder and spring can be withdrawn from inside the plunger.

The components should be cleaned thoroughly in fuel and the .125 in. (3.18 mm.) diameter inlet oil hole in the spigot and the .040 in. (1.02 mm.) outlet oil hole in the slipper should be cleaned with compressed air before reassembling.

Check the bore in the tensioner body for ovality. If ovality is greater than .003 in. (.0762 mm.) when measured on diameters near the mouth of the bore, then the complete chain tensioner must be renewed.

Inspect the slipper head for wear. If it is badly worn a new slipper head and cylinder assembly must be fitted to the existing body, provided the bore of the body is within the limits given above.

When the tensioner is in operation and the engine is running, oil from the lubrication system enters the spigot on the back face under pressure and lubricates the bearing surface through a hole in the slipper pad. The pad is held against the chain by spring and oil pressure.

Should the chain stretch with use, the slipper plunger rises and the limiting peg, bearing on the top of the helical slot, rotates the cylinder until the next recess in the lower edge of the slot comes into line with the limiting peg and prevents the plunger returning to its original position and allowing the chain to become slack again.

When reassembling, insert the spring in the plunger and place the cylinder on the other end of the spring.

Compress the spring until the cylinder enters the plunger bore, engaging the helical slot with the peg in the plunger. Hold the assembly compressed in this position and engage the Allen key. Turn the cylinder clockwise until the end of the cylinder is behind the peg and the spring is held compressed. Withdraw the key and insert the plunger assembly in the body. Replace the backplate and secure the assembly to the cylinder block.

When the timing chain is in position the tensioner is released for operation by inserting the key and turning it clockwise, allowing the slipper head to move forward under spring pressure only.

After refitting the tensioner check the slipper head for freedom of movement and ensure that it does not bind on the back plate when it is moved in the body.

Secure the bolts with the locking plate; replace the bottom plug and lock with a tab washer.

Section A.33

MODIFIED GEARBOX MOUNTING PLATE

Commencing at Engine No. 3289, the gearbox mounting plate has an oil escape recess and groove machined in the front face to relieve the air depression around the rear main bearing oil seal and prevent oil being drawn into the clutch housing.

The plate is interchangeable and retains the same part number.

Section A.34

MODIFIED TAPPETS AND PUSH-RODS

Commencing at Engine No. 5504, the ball ends of the push-rods and the seats in the tappets are increased in spherical diameter. The tappets and push-rods are interchangeable in sets and the new part numbers are :

Tappet	1H822
Push-rod	11G241

Section A.35

PISTON RINGS WITH CHROME PERIPHERY

At Engine No. 5682 the top compression ring on the piston is superseded by a piston ring with a chrome periphery to improve the life of the piston ring and to improve oil consumption.

The later piston ring is interchangeable with the old.

Section A.36

MODIFIED OIL FILTER

Commencing at Engine No. 15GB/U/H26661 to 15GB/U/H26700 then 26933 onwards, a new oil filter is fitted. The element may be removed from a later-type oil filter without disconnecting the oil pipe. Tecalemit and Purolator filters are used, and the elements, which are interchangeable, bear the B.M.C. Part No. 8G683 (Tecalemit and Purolator).

Section A.37

MODIFIED CRANKSHAFT

Originally the diameter of the oil return thread on the crankshaft was 2.139/2.1405 in. (54.33/54.37 mm.), but at Engine No. BP15GB/6615 this was reduced to 2.138/2.1385 in. (54.305/54.32 mm.).

For the correct functioning of the oil return thread it is imperative that it should be concentric with the bore of the housing and have between .003 and .006 in. (.075 and .15 mm.) clearance measured from the crest of the thread to the housing. This may be checked with the aid of a long feeler gauge and a mandrel.

Section A.38

MODIFIED PISTON AND GUDGEON PIN

Commencing at Engine No 15GB/U/H38484, a new piston (Part No. 1H1114) with a modified gudgeon pin (Part No. 1H1113) is introduced, the gudgeon pin having a reduced internal diameter to give increased strength.

The later pistons and gudgeon pins are interchangeable with the originals but only as complete sets.

Section A.39

MODIFIED OIL PUMP AND STRAINER

On later engines a modified oil pump (Part No. 1H1191) and an oil strainer assembly of simplified construction (Part No. 1H1192) are fitted. The oil suction pipe position is now moved forward towards the front of the engine to eliminate any possibility of oil starvation during cornering or braking.

The new units are interchangeable as complete assemblies with the oil pumps and strainers previously used. The three oil pump to crankcase studs, however, have been lengthened to accommodate the greater thickness of the oil pump bottom cover, their part number now being 51K267.

These modifications were introduced at Engine No. 15GB/U/H46045 to 46100 and then 46342 onwards.

Section A.40

FITTING FLYWHEEL STARTER RINGS

To remove the old starter ring from the flywheel flange split the ring gear with a cold chisel, taking care not to damage the flywheel. Make certain that the bore of the new ring and its mating surface on the flywheel are free from burrs and are perfectly clean.

To fit the new ring it must be heated to a temperature of 300 to 400° C. (572 to 752° F.), indicated by a light-blue surface colour. If this temperature is exceeded the temper of the teeth will be affected. The use of a thermostatically controlled furnace is recommended. Place the heated ring on the flywheel with the lead of the ring teeth uppermost. The expansion will allow the ring to be fitted without force by pressing or tapping it lightly until the ring is hard against its register.

This operation should be followed by natural cooling, when the 'shrink fit' will be permanently established and no further treatment required.

Section A.41

FITTING VALVE SEAT INSERTS

Should the valve seatings become so badly worn or pitted that the normal workshop cutting and refacing tools cannot restore them to their original standard of efficiency, special valve inserts can be fitted.

The seating of the cylinder head must be machined to the dimensions given in Fig. A.11. Each insert should have an interference fit of .0025 to .0045 in. (.063 to .11 mm.) and must be pressed and not driven into the cylinder head.

After fitting, grind or machine the new seating to the dimensions given in Fig. A.11. Normal valve grinding may be necessary to ensure efficient valve seating.

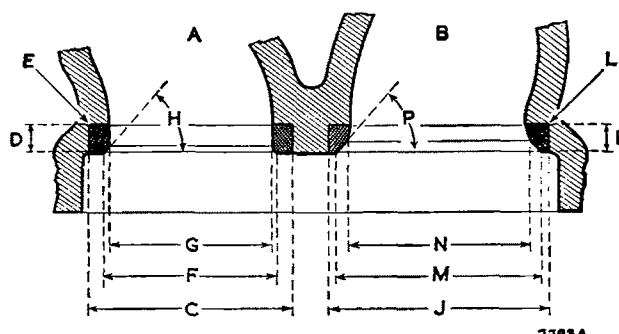


Fig. A.11

Valve seat machining dimensions

Exhaust (A)		Inlet (B)	
C.	1.437 to 1.438 in. (36.5 to 36.52 mm.).	J.	1.530 to 1.531 in. (38.86 to 38.88 mm.).
D.	.186 to .188 in. (4.72 to 4.77 mm.).	K.	.186 to .188 in. (4.72 to 4.77 mm.).
E.	Maximum radius .015 in. (.38 mm.).	L.	Maximum radius .015 in. (.38 mm.).
F.	1.286 to 1.288 in. (32.20 to 32.71 mm.).	M.	1.487 to 1.507 in. (37.77 to 38.27 mm.).
G.	1.165 to 1.175 in. (29.59 to 29.84 mm.).	N.	1.302 to 1.322 in. (33.07 to 33.57 mm.).
H.	45°.	P.	45°.

Section A.42

FITTING CYLINDER LINERS

Should the condition of the cylinder bores be such that they cannot be cleaned up to accept standard

Engine type	Liner Part No.	Machine bores of cylinder block to this dimension before fitting liner	Outside diameter of liner	Interference fit of liner in cylinder block bore	Machine liner bore to this dimension after fitting
'B' 1500 c.c.	1H641	3.0165 to 3.017 in. (76.619 to 76.631 mm.)	3.0185 to 3.01925 in. (76.669 to 76.688 mm.)	.0015 to .00275 in. (.038 to .069 mm.)	2.8745 to 2.876 in. (73.01 to 73.04 mm.)

oversize pistons, dry cylinder liners can be fitted. This operation may be carried out by the use of specialized proprietary equipment or with a power press using pilot adaptors to the dimensions shown in Fig. A.12. The press must be capable of 3 tons (3048 kg.) pressure to fit new liners and 5 to 8 tons (5080 to 8128 kg.) to remove old liners.

Remove the engine from the vehicle as detailed in Section A.18. Dismantle the engine and remove the cylinder head studs. If liners have not previously been fitted the bores must be machined and honed to the dimensions given in the table below.

To remove worn liners

Place the cylinder block face downwards on suitable wooden supports on the bed of the press, making sure that there is sufficient space between the block and the bed of the press to allow the worn liner to pass down.

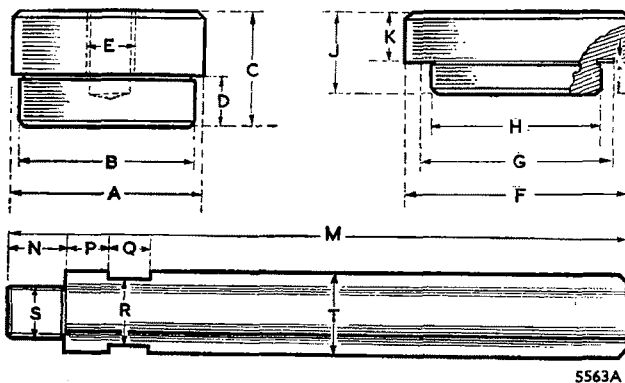


Fig. A.12

Cylinder liner pilots should be made to the above dimensions from 55-ton hardening and tempering steel and hardened in oil at a temperature of 550° C. (1,022° F.)

Pressing-out pilot

- A. $2\frac{3}{4} \pm_{-0}^{+0.005}$ in. (75.8 $\pm_{-0}^{+0.127}$ mm.).
- B. $2.862 \pm_{-0.005}^0$ in. (72.69 $\pm_{-0.127}^0$ mm.).
- C. $1\frac{1}{2}$ in. (44.45 mm.).
- D. $\frac{3}{4}$ in. (19.05 mm.).
- E. $\frac{3}{4}$ in. B.S.W. thread.

Pressing-in pilot

- F. $3\frac{1}{8}$ in. (87.31 mm.).
- G. $3\frac{3}{8}$ in. (77.39 mm.).
- H. $2.850 \pm_{-0.005}^0$ in. (72.39 $\pm_{-0.127}^0$ mm.).
- J. $1\frac{1}{2}$ in. (31.75 mm.).
- K. $\frac{3}{4}$ in. (19.05 mm.).
- L. .015 in. (.38 mm.).

Pilot extension

- M. $14\frac{1}{2}$ in. (36.83 cm.).
- N. $\frac{7}{8}$ in. (22.22 mm.).
- P. $\frac{5}{8}$ in. (15.87 mm.).
- Q. $\frac{5}{8}$ in. (15.87 mm.).
- R. 1 in. (25.4 mm.) flats.
- S. $\frac{3}{4}$ in. B.S.W. thread.
- T. $1\frac{1}{2}$ in. (31.75 mm.).

Insert the pilot in the bottom of the liner and carefully press the liner from the bore.

To press in new liners

Thoroughly clean the inside of the bores and the outside of the liners. Stand the cylinder block upright on the bed of the press, insert the pilot guide in the top of the liner, and position the liner with its chamfered end in the top of the bore. Make certain that the liner is square with the top of the block and that the ram of the press is over the centre of the pilot. Press the liner into the bore.

Each liner must be machined to the dimensions given in the table on page A.21 after pressing into position.

Section A.43

MODIFIED PISTONS AND RINGS

New piston assemblies with compression and oil control rings of increased radial thickness (see 'GENERAL DATA') are introduced at Engine No. 15GB/U/H40824. The compression ring grooves are of reduced diameter. These changes have been made to reduce oil consumption.

The piston assemblies complete with gudgeon pins and rings are interchangeable in sets with those previously used. The new and old oil control rings are also interchangeable in sets, and the earlier-type compression rings may be used with the later-type pistons. It is not permissible, however, to fit the new-type compression rings to the old-type pistons.

Section A.44

MODIFIED POWER UNIT

A new power unit, having the type designation 15GD, is fitted from Car No. 61504 and to certain earlier cars.

The engine incorporates the various modifications made to the 15GB unit and has the starter motor placed higher on the gearbox mounting plate.

Modifications have also been made to the gearbox (see Section F.10), to the propeller shaft (see Section G.8), to the gearbox cover, and to the right-hand toeboard, so that neither the engine, the gearbox, nor the propeller shaft is interchangeable with those previously fitted.

The above changes involve alteration to the procedure for power unit removal and replacement.

Follow the instructions given in Section A.18, but note that the propeller shaft need not be disconnected from the rear axle flange. When the floorboards, toeboards, gearbox cover, and propeller shaft cover have been removed mark the propeller shaft and gearbox flanges and disconnect the propeller shaft from the gearbox.

Section A.45

OIL COOLER KITS

Oil cooler kits are now fitted as standard equipment to all export cars from Car No. 102737 and are available as an optional extra for Home Trade cars. All bodies are now drilled to accept the oil cooler and its associated equipment.

The kits are available under Part No. 8G2282 for standard cars and Part No. 8G2325 for cars fitted with disc brakes all round.

The oil capacity of the cooler is approximately $\frac{3}{4}$ pint (-42 litre) and this quantity must be added to the sump when the cooler is fitted.

The fitting instructions, including the drilling of unmodified bodies, is as follows:

- (1) Jack up and support the front of the car and remove the front off-side wheel.
- (2) Remove the radiator case and grille to gain access to the horns and radiator duct panel.
- (3) Disconnect and remove the horns complete with their brackets.
- (4) Disconnect and remove the filter to crankcase pipe assembly.
- (5) Mark out and drill two $\frac{11}{32}$ in. (8.73 mm.) holes in

each front suspension member for repositioning the horns as shown in Fig. A.13 (c).

- (6) Mark out and drill four $\frac{3}{32}$ in. (7.14 mm.) holes and cut two $1\frac{3}{8}$ in. (34.9 mm.) holes in the radiator duct panel to accept the oil cooler (Fig. A.13 [a]).
- (7) Mark out and drill two $\frac{3}{16}$ in. (5.5 mm.) holes in the front off-side wheel arch for the fitting of the oil cooler pipe clips (Fig. A.13 [b]).
- (8) Fit the packing-piece and oil cooler to the radiator duct panel and secure it with the four $\frac{1}{2}$ in. UNF. hexagon-headed screws, washers, and Aerotight nuts.
- (9) Fit the two oil pipes to the cooler and secure the pipes to the wheel arch with the two clips, No. 10 UNF. screws, plain washers, spring washers, and nuts provided.
- (10) Fit the two flexible pipes to the oil cooler pipes and then connect them to the oil filter and crankcase as shown in Fig. A.13.
- (11) Refit, connect, and test the horns, replace the radiator grille and case, and refit the front road wheel. Remove the supports and jack.
- (12) Add $\frac{3}{4}$ pint (-42 litre) of oil to the sump, run the engine, and check all pipe unions for leakage.

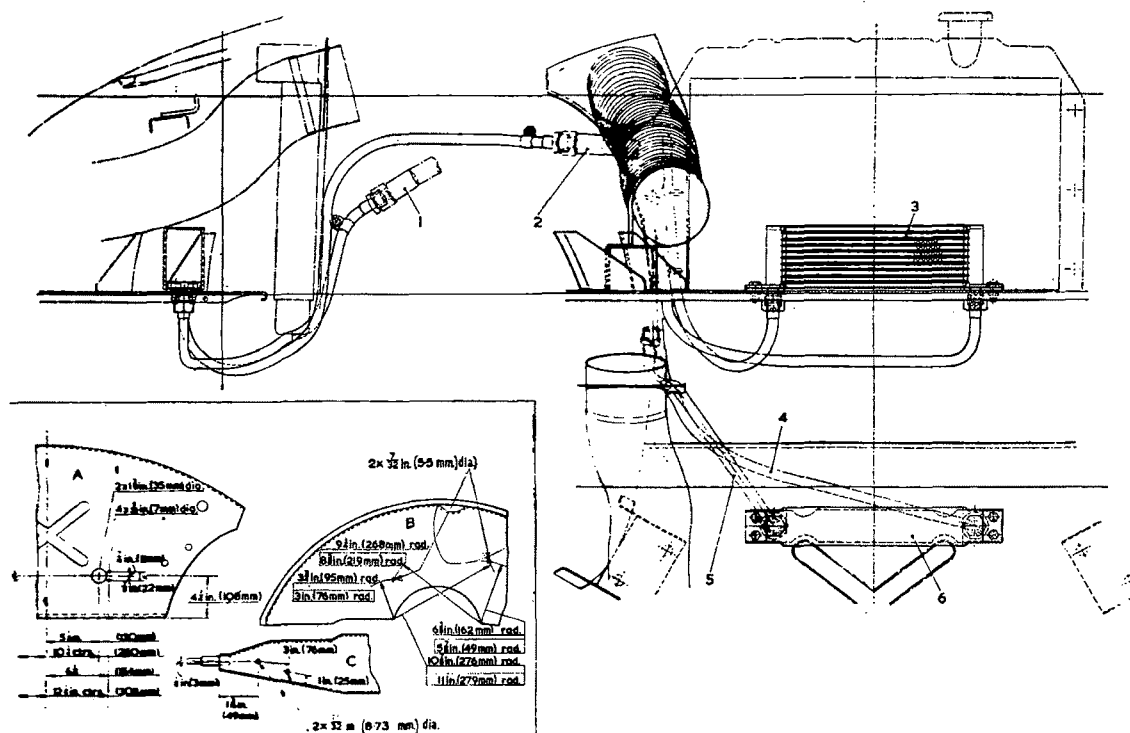


Fig. A.13

The general arrangement of the oil cooler, together with the installation dimensions

- | | | |
|------------------------------------|-------------------------------|------------------------------|
| 1. Flexible pipe—cooler to filter. | 3. Oil cooler. | 5. Oil pipe—cooler to block. |
| 2. Flexible pipe—cooler to block. | 4. Oil pipe—cooler to filter. | 6. Oil cooler packing. |

SECTION AA

THE ENGINE

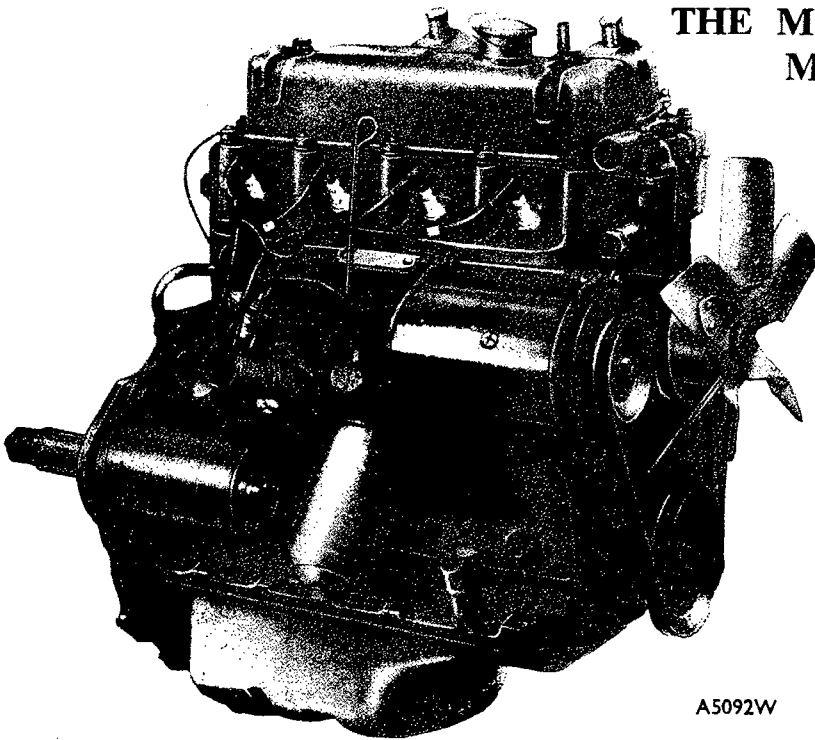
(MGA 1600 [Mk. II])

This Section is a Supplement to Section A

Section No. AA.1 Piston sizes and cylinder bores.

**THE M.G. (Series MGA 1600
Mk. II) ENGINE**

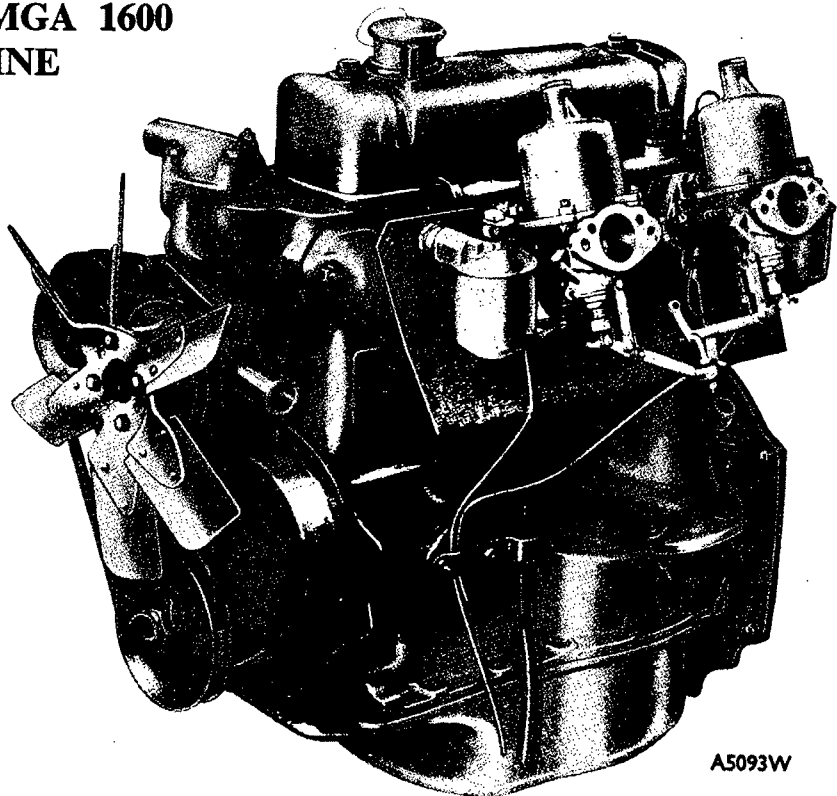
(R.H. SIDE)



A5092W

**THE M.G. (Series MGA 1600
Mk. II) ENGINE**

(L.H. SIDE)



A5093W

Section AA.1

PISTON SIZES AND CYLINDER BORES

In production, pistons are fitted by selective assembly, and to facilitate this the pistons are stamped with identification figures on their crowns.

The number enclosed in a diamond, e.g. a piston stamped with a figure 2, is for use with a block having a similar stamp adjacent to the bore.

In addition to the standard pistons there is a range of four oversize pistons available for service purposes.

Oversize pistons are marked with the actual oversize dimensions enclosed in an ellipse. A piston stamped $\cdot 020$ is only suitable for a bore $\cdot 020$ in. ($\cdot 508$ mm.) larger than the standard bore; similarly, pistons with other markings are only suitable for the oversize bore indicated.

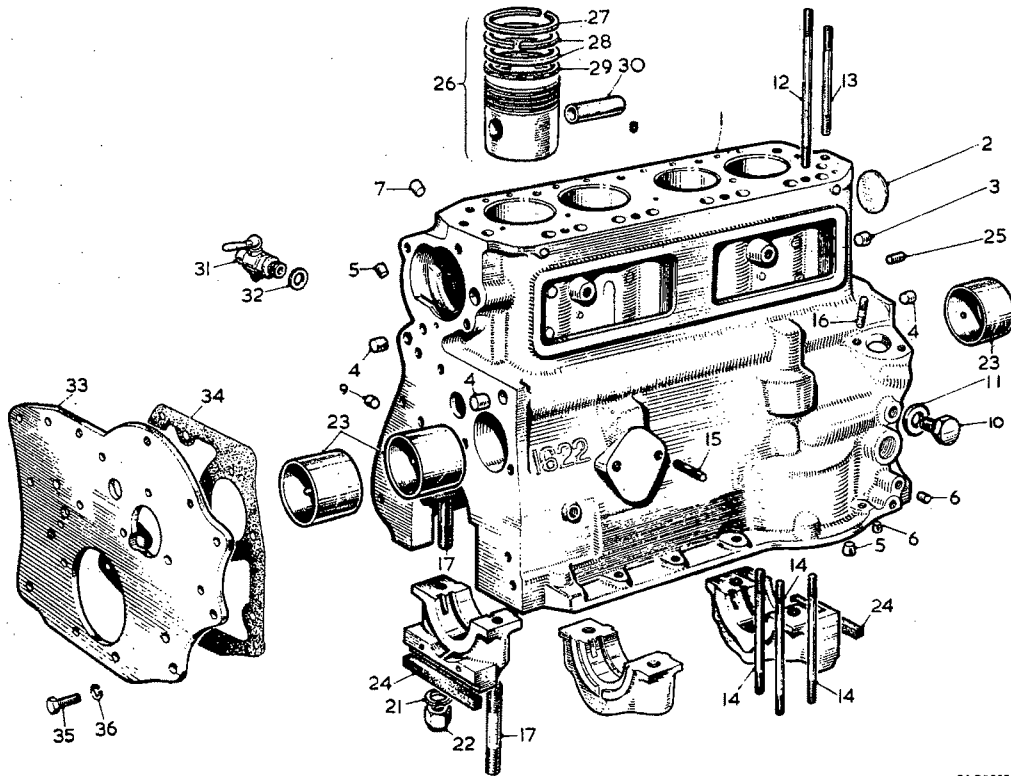
The piston markings indicate the actual bore size to which they must be fitted, the requisite running clearance being allowed for in the machining.

After reboring an engine, or whenever fitting pistons differing in size from those removed during dismantling, ensure that the size of the piston fitted is stamped clearly on the top of the cylinder block alongside the appropriate cylinder bore.

Pistons are supplied in the sizes indicated in the table below.

<i>Piston marking</i>	<i>Suitable bore size</i>	<i>Metric equivalent</i>	
Standard	3-0011 in.	76-227 mm.	
	3-0014 in.	76-235 mm.	
Oversize +·010 in. ($\cdot 254$ mm.)	3-0111 in.	76-481 mm.	
	3-0114 in.	76-489 mm.	
	+·020 in. ($\cdot 508$ mm.)	3-0211 in.	76-735 mm.
		3-0214 in.	76-743 mm.
	+·030 in. ($\cdot 762$ mm.)	3-0311 in.	76-989 mm.
		3-0314 in.	76-997 mm.
	+·040 in. ($1\cdot 016$ mm.)	3-0411 in.	77-243 mm.
		3-0414 in.	77-251 mm.

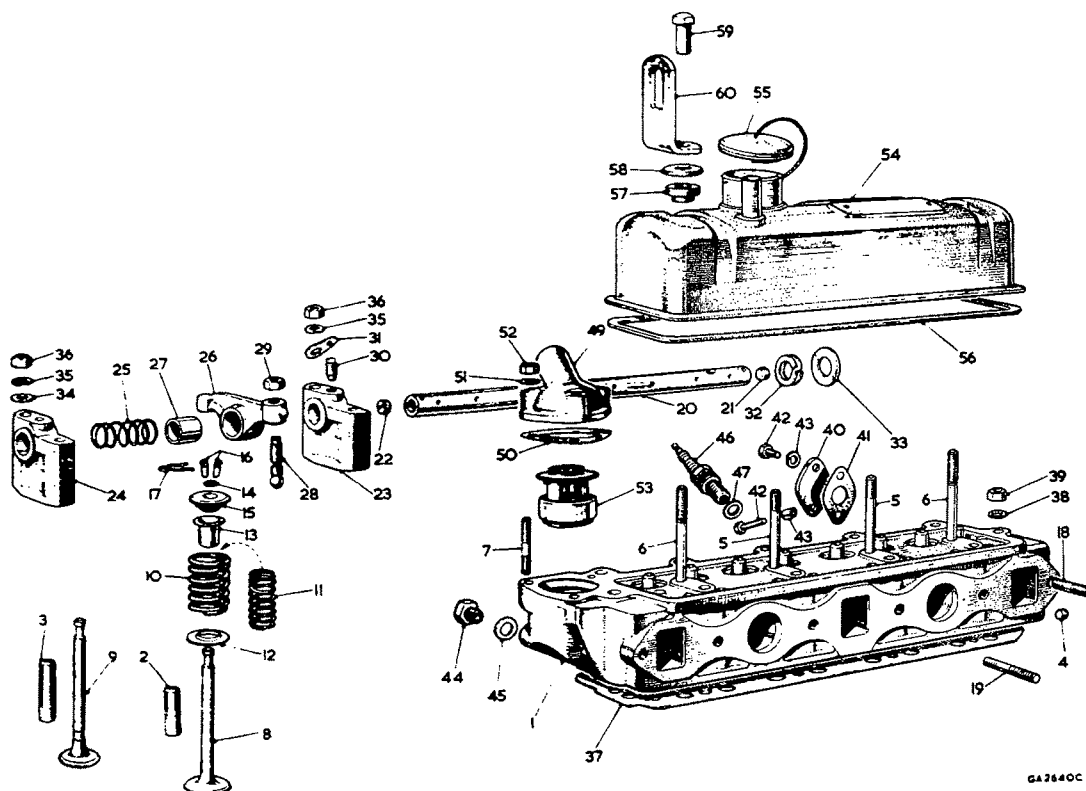
THE CYLINDER BLOCK AND CRANKCASE



GA 0805F

<i>No.</i>	<i>Description</i>	<i>No.</i>	<i>Description</i>
1.	Cylinder block assembly.	22.	Nut for main bearing stud.
2.	Plug—welch.	23.	Liner—camshaft bearing.
3.	Plug—oil gallery.	24.	Joint—front and rear main bearing cap.
4.	Plug—oil gallery.	25.	Dowel—gearbox mounting plate.
5.	Plug—taper—crankcase oil hole.	26.	Piston assembly (standard).
6.	Plug—oil relief valve vent hole.	27.	Ring—compression—top (standard).
9.	Plug—chain tensioner oil feed.	28.	Ring—compression—second and third (standard).
10.	Plug for oil hole (screwed).	29.	Ring—scraper (standard).
11.	Washer for screwed plug.	30.	Pin—gudgeon (standard).
12.	Stud—cylinder head (long).	31.	Tap—cylinder block drain.
13.	Stud—cylinder head (short).	32.	Washer for drain tap.
14.	Stud—oil pump (short).	33.	Plate—engine mounting.
15.	Stud—crankcase vent pipe clip.	34.	Joint washer for mounting plate.
16.	Stud—tachometer drive spindle housing.	35.	Screw—mounting plate to crankcase.
17.	Stud—main bearing.	36.	Washer—spring—for screw.
21.	Washer—spring—for main bearing stud.		

THE CYLINDER HEAD



G42640C

No.	Description
-----	-------------

- | | |
|-----|---|
| 1. | Cylinder head with valve guides. |
| 2. | Guide—inlet valve. |
| 3. | Guide—exhaust valve. |
| 4. | Plug—oil hole. |
| 5. | Stud—rocker bracket (short). |
| 6. | Stud—rocker bracket (long). |
| 7. | Stud—water outlet elbow. |
| 8. | Valve—inlet. |
| 9. | Valve—exhaust. |
| 10. | Spring—valve (outer). |
| 11. | Spring—valve (inner). |
| 12. | Collar—valve spring. |
| 13. | Shroud—valve guide. |
| 14. | Ring—valve packing. |
| 15. | Cup—valve spring. |
| 16. | Cotter—valve (halves). |
| 17. | Circlip for valve cotter. |
| 18. | Stud—exhaust manifold to cylinder head. |
| 19. | Stud—inlet and exhaust manifold to cylinder head. |
| 20. | Shaft—valve rocker (plugged). |
| 21. | Plug—valve rocker (plain). |
| 22. | Plug—valve rocker (screwed). |
| 23. | Bracket—rocker shaft (tapped). |
| 24. | Bracket—rocker shaft (plain). |
| 25. | Spring—rocker spacing. |
| 26. | Rocker—valve—bushed. |
| 27. | Bush—valve rocker. |
| 28. | Screw—tappet adjusting. |
| 29. | Nut—tappet adjusting screw (lock). |
| 30. | Screw—rocker shaft locating. |

No.	Description
-----	-------------

- | | |
|-----|---|
| 31. | Plate—locating screw (lock). |
| 32. | Washer—spring—rocker shaft. |
| 33. | Washer—rocker shaft. |
| 34. | Washer—plain—for rocker bracket stud. |
| 35. | Washer—spring—for rocker bracket stud. |
| 36. | Nut—rocker bracket stud. |
| 37. | Joint—cylinder head. |
| 38. | Washer—plain—for cylinder head stud. |
| 39. | Nut for cylinder head stud. |
| 40. | Plate—heater outlet elbow blanking. |
| 41. | Joint washer for blanking plate. |
| 42. | Screw—plate to cylinder head. |
| 43. | Washer—spring—for screw. |
| 44. | Plug—thermal transmitter boss. |
| 45. | Washer for plug. |
| 46. | Plug—sparking. |
| 47. | Gasket for plug (steel). |
| 49. | Elbow—water outlet. |
| 50. | Joint—elbow to cylinder head. |
| 51. | Washer—plain—for stud in cylinder head. |
| 52. | Nut for stud. |
| 53. | Thermostat. |
| 54. | Cover—valve rocker. |
| 55. | Cap and cable—oil filler. |
| 56. | Joint for cover. |
| 57. | Bush—cover (rubber). |
| 58. | Washer—cup—for nut. |
| 59. | Nut—cover. |
| 60. | Bracket—engine sling. |

