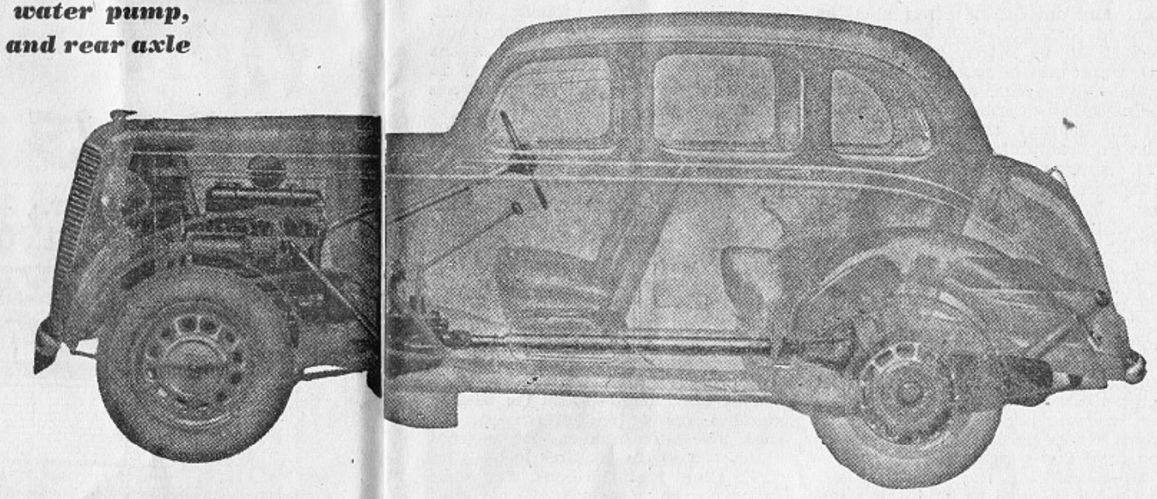
Overhauling the MORRIS 10 Series M

Part 2. Valve timing, carburettor adjustments, water pump, engine and gearbox removal. Also clutch, brakes and rear axle



VALVE TIMING

VALVE timing is: inlet opens 5 deg. before T.D.C.; closes 45 deg. after B.D.C.; exhaust opens 45 deg. before B.D.C.; closes 5 deg. after T.D.C. Valve clearance, if timing is being checked, should be .027 in., when the inlet valve should open at T.D.C. The 5 deg. before T.D.C. corresponds to .214in. piston movement with the running valve clearance of .019in. (engine hot). The distributor driving gear is fixed on the shaft and engages direct with the camshaft, so slightly more care is required in removing and replacing the distributor than is required for some cars. If the timing is correct, the dowel setscrew securing the clamp plate to the crankcase should be removed, and not the clamp loosened, since removing the dowel setscrew will preserve the fitting of the distributor in relation to the crankcase. Before the distributor is pulled out, the engine should be turned so that the points are just breaking and the rotor arm is pointing to the electrode feeding No. 1 sparking plug wire. The distributor shaft will turn as the distributor is removed, and must also turn in refitting—owing to the angle of the teeth on the driving gear.

To retime the distributor, having lost the timing, No. 1 sparking plug should be removed, a thumb placed in the hole, and the engine turned until compression is felt, then the engine slowly turned until the mark on the crankshaft pulley is opposite the pointer on the timing cover. This is T.D.C. compression stroke.

The distributor should then be fitted to the crankcase, so that it is in approximately the original attitude with the flat side of the body to the front of the engine. The points should just be opening and the rotor arm pointing to the No. 1 electrode. Several attempts might have to be made to obtain the proper meshing of the gear; then the distributor can be rotated slightly with the clamp loosened to obtain the fine setting. This setting can be obtained by attaching a wire with a 12 volt bulb in circuit from the distributor terminal to earth and switching on the ignition; as the distributor is moved to obtain the exact position at which the points break, the bulb will light—since the current will then pass through the wire and the bulb.

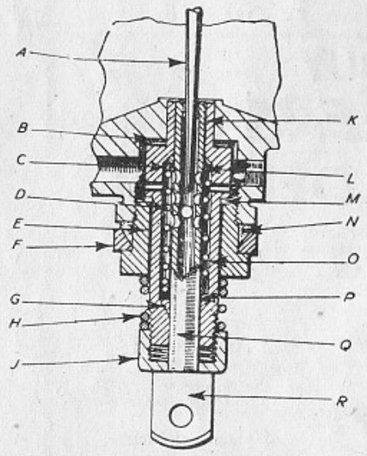


Fig 5.—Jet assembly of the S.U. carburettor. A. Taper needle. B. Copper packing washed. C. Packing washer. D. Spring. E. Jet holding screw. F. Conical sealing washer. G. Packing washer. H. Jet locking spring. J. Jet adjusting nut. K. Top half jet bearing. L. Gland washer. M. Copper packing washer. N. Sealing washer. O. Bottom half jet bearing. P. Gland washer. Q. Jet. R. Jet head.

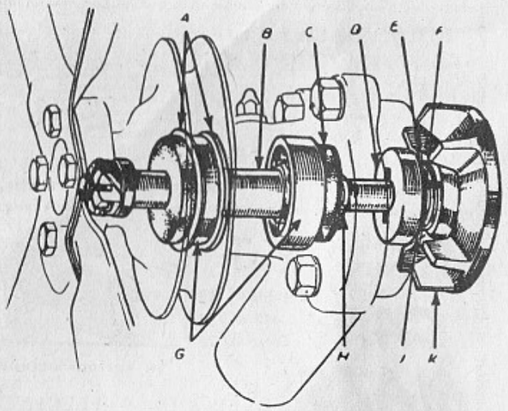


Fig. 6.—Water pump details. A, Bearing circlips; B, spacer; C, felt washer; D, carbon seal; E, washer; F, spring; G, bearings; H, circlip; J, rubber seal; K, pump vane.

CARBURETTOR ADJUSTMENTS

If the carburettor is functioning satisfactorily there is no need to dismantle it even during a top overhaul such as decarbonising. Accumulations of oil and dirt can be carefully scraped off and the outside of the carburettor wiped with a kerosene or petrol cloth. The float chamber top can be removed, the chamber wiped out and sediment scraped out of the bottom with a wire or small screwdriver. The filter in the top can be cleaned, washing in petrol, and the whole top rinsed in petrol and blown dry. Shaking the float will reveal if there is petrol inside—which would indicate it is leaking and requires renewing.

Replenishment of the piston dash pot with oil has already been mentioned.

Should the piston stick at any time a few drops of thin oil such as cycle oil can be applied to the piston rod. Should trouble be experienced from slight flooding it will probably be caused by particles of foreign matter in the fuel obstructing the needle valve from seating properly. The top of the float chamber may be damp, or fumes may be noticed in the car. The remedy is to clean the pump and carburettor filters.

A similar effect may occur with a worn needle valve and seating—which can be renewed. The setting of the needle operating arm is also important. With the flat portion of the arm causing the needle valve to close on its seating, it should then be possible to pass a test bar 8in. diameter across the float chamber cover between the cover and the two curved portions of the arm. If the needle valve is not on its seating with the bar in place the fuel level will be high, and some slight flooding might result; conversely, if there is clearance between the bar and the curved portions of the lever, the level will be low, and slight difficulty may be experienced with slow-running adjustments. Correction to the arm is made by bending the curved portions at the position where they join the flat portion, maintaining this portion flat.

To remove the piston or needle, the suction chamber must be removed, taking out the two holding screws, having marked the chamber and body for refitting correctly. Should the chamber prove tight, care must be exercised to lift it as squarely as possible. A key locates the piston in the carburettor—a point to note for refitting.

The needle is held by a screw from the side of the piston, and loosening the screw enables the needle to be removed. The correct fitting is when the shoulder of the needle is flush with the bottom of the piston; a small straightedge can be placed across the piston face to check. The setting for a needle which has a chamfer instead of a square shoulder is with the lower edge of the chamfer flush with the bottom of the piston.

Three needles are available as follows: Rich 3, Standard E.F., Weak A.D. The jet assembly appears in Fig. 5, where can be seen the various glands and seals. Only in case of leakage or to renew the jet should the assembly be dismantled. The mixture is adjusted by means of the jet adjusting nut (J) maintaining the jet head (R) in contact all the time. Once set, the mixture is correct for the whole operating range when the engine is warmed up. The jet is, of course, pulled down by the head (R) to enrich the mixture for starting and warming up.

The method of adjusting the mixture is straightforward. The engine is warmed to running temperature, and the throttle stop set to give a steady idling speed, then the adjusting nut (J) is screwed down to enrich the mixture until the engine runs unevenly from the mixture being too rich. The adjusting nut is then turned slowly upwards, with the jet head kept in contact with the underside, until the engine fires evenly. If the piston is then raised about 1/32in. the engine should pick up slightly. If the pick-up continues when the piston is lifted farther, the mixture is too rich, and the adjusting nut should be screwed up slightly farther. Should the engine stop, however, the mixture is weak and the nut should be turned slightly downwards. Final idling speed is set on the throttle stop. If after this setting the engine pulls better on the road with a small degree of mixture strength increase, a richer needle would probably prove beneficial. Should the performance not be satisfactory, however, and enriching the mixture not prove effective, it is possible that a weaker needle would effect an improvement.

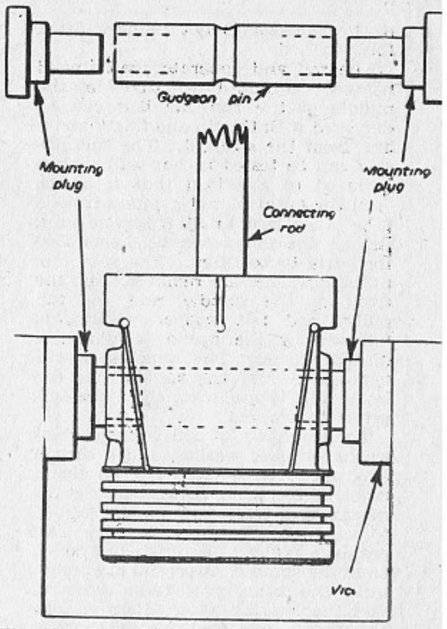


Fig. 7.—Method of mounting piston and connecting rod in vice.

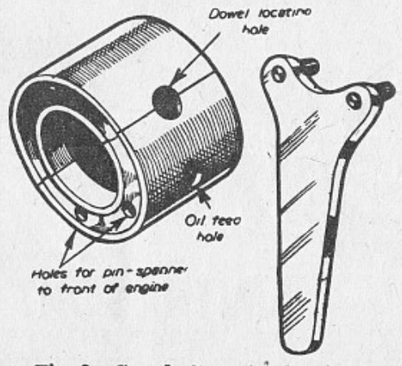


Fig. 8.—Camshaft centre bearing.

WATER PUMP

Any trouble from overheating is only possible in exceptional circumstances, the thermo-siphon cooling system being assisted by an impeller-type pump.

It is a wise precaution, of course, to flush the cooling system with clean soft water from time to time, and during a complete overhaul when the engine is dismantled to clean the block thoroughly and run water through the radiator. If the radiator is removed at any time it should be maintained upright, or sediment may run back into the tubes and dry

if the radiator is not to be refitted for a period.

The fan and generator belt should be kept adjusted so that in the middle of the run the belt can be deflected with thumb and finger about ½in. from the straight. The thermostat can be tested in hot water when removed to ascertain that it opens.

In the event of water pump trouble it is often best to fit a service unit, though the pump can be dismantled for parts to be fitted. The split pin, nut and washer are removed from the front of the spindle, and the fan pulley and felt washer withdrawn, followed by the driving key and a dished washer. The impeller at the opposite end of the spindle has the taper pin tapped out, then the impeller is removed.

Then follows a coil spring, brass washer, rubber washer, and a carbon ring and driving pin. The circlip in front of the front ball bearing is removed, and the pump spindle tapped forward to clear the bearing and permit a puller to be fitted to draw it from the spindle. A second circlip behind the bearing is then removed, and the bearing spacer then can be extracted, spindle rear bearing, dished washer, felt, plain washer and circlip on the spindle. Careful note should be taken of the fitting of all components and washers. Should the pump squeak or tend to run roughly a few drops of brake fluid may be applied. Oil or grease should not be used on the pump-sealing face or carbon ring.

ENGINE AND GEARBOX REMOVAL

A complete overhaul of engine or gearbox demands removal of these units, and one or the other must be removed if a centre plate or thrust block is to be fitted to the clutch. Either unit may be removed separately or the two together as required. For engine removal either with or without the gearbox, the bonnet, bonnet sides and radiator should be removed and components cleared, the battery being disconnected early in the process. When removing the engine alone, the gearbox inspection cover in the car is removed (after the gear lever knob and rubber cowl) and the engine detached from the bell housing.

A wire rope sling and tackle are required for lifting the engine, one loop round the front and beneath the sump and the other round the rear and beneath the clutch casing. With the weight taken, the engine is brought forward clear of the gearbox shaft and raised from the chassis.

When refitting the engine a gear should be engaged to hold the primary shaft still while the centre plate splines align to those on the shaft. To bring the splines into line the engine may be slightly oscillated in the sling, the crankshaft pulley turned (with a spanner on the nut), or the handbrake let off and the car gently rocked backwards and forwards.

Additional work is required when removing the engine with the gearbox, of which the following are the chief items. The propeller shaft, speedometer cable and clutch pedal chain are detached. The top of the gearbox is removed (with care not to lose three selector balls and springs located in the rear of the cover at the joint face with the gearbox casing), then the gearbox is covered with a piece of stout cardboard attached with the nuts. The gearbox support member is removed from the chassis by taking out four bolts, two each side, and two setscrews, one each side. As the engine is raised the rear of the gearbox is allowed to descend, then the whole unit raised towards the front.

When refitting the unit, it is useful to use small taper punches to bring the holes into alignment in the gearbox support member and the chassis member ready for entering a bolt each side. To remove the gearbox alone, the engine requires to be tilted down slightly at the back, and some extra clearance below the car may be advisable so the front and rear should be jacked up. Also, the top hose might be strained if left connected; the cooling system should, therefore, be partly emptied and the hose detached. The gearbox inspection cover inside the car is removed and the top of the gearbox—with attention to the three selector balls and springs already mentioned. With the weight of the engine taken on jack or tackle, the gearbox support member, also already mentioned, is removed from the chassis and the engine lowered slightly for removing the bolts round the bell housing. The gearbox should be drawn squarely back from the engine and lowered, for which work an assistant inside the car can be helpful. Finally, the gearbox is extracted from underneath. When removing any major component, care should be exercised that all parts, pipes, wires, etc. are clear so that nothing is broken or strained in the process.

PISTONS, CONNECTING RODS

Dismantling the engine should not present any great problem once it is removed, since many operations have already been dealt with—removal of sump and oil pick-up, oil pump, distributor, cylinder head, tappets, timing case and chain, pistons and connecting rods.

The clutch can be removed completely from the flywheel by loosening and evenly removing the setscrews round the cover, the centre plate will fall free and require a mandrel during assembly for realigning to the flywheel. A pair of dowels locate the flywheel and these should be tapped out with a suitable punch—from the crankshaft flange to the rear of the flywheel. Previously the rear main bearing cap and bearing should have been removed, and care should be taken not to damage the oil thrower or return thread on the crankshaft—to preserve their oil-retaining effect. The flywheel holding bolts having been removed, the flywheel will free from the flange by striking with a mallet, rotating meanwhile so it comes squarely.

With timing chain, pistons and connecting rods removed the crankshaft can be removed also, after the caps of the front and centre main bearings. Original sizes are main journals 52 mm. (2.047in.), crankpins 45 mm. (1.772in.). Main end and big-end bearings as supplied do not require any fitting, and caps should not be filed. Main bearing clearances are .001in. diametral and .001in. to .004in. side clearance. On the big-ends the diametral clearance is .001in. and the side clearance .004in. to .006in. The running surfaces of bearings should be smeared with engine oil when re-assembling. Clearance between the oil return thread on the crankshaft and the oil thrower cover should be .005in. For loosening and tightening the small end clamping screws of the connecting rods, a mounting should be effected in the vice, employing stepped plugs, as in Fig. 7. If the connecting rod is gripped there is a danger of distortion.

At a standard room temperature of 68 deg. F. the gudgeon pins should be a thumb press fit nearly home, requiring at the finish slight tapping from a soft punch and small hammer. Pistons can be warmed in hot water in the usual manner for fitting gudgeon pins. Cylinder bore sizes are marked on the bottom face of the crankcase on the nearside, and the piston markings should agree; after a rebore the markings should be altered. Piston clearances are .012in. top land, .008in. bottom land, .003in. skirt.

Piston rings should be without perceptible vertical movement in their grooves, although they should move round easily. Gap clearance should be .003in. to .0065in., tested well down in the individual bores, and aligned squarely by pushing the piston behind them. Pistons and rings should be smeared with engine oil before inserting in the cylinders and the ring gaps should be placed at 180 degrees to avoid a direct path for any blow-by gases.

CAMSHAFT REMOVAL

With the camshaft sprocket, tappets, oil pump and distributor removed it is now possible to remove the camshaft. A thrust plate is fitted at the front of the camshaft, held by hexagon-headed bolts to the crankcase; this is removed. The camshaft centre bearing is a split type, and located by a bolt and locknut from outside the crankcase; this bolt must be removed, then the camshaft can be withdrawn forward.

Before this is done, however, a small reference mark may be made on the housing of the split bearing with a small chisel or centre punch. The mark should be exactly on the joint line of the two halves, so that when the bearing is being refitted the farther side of the joint line can be set to the mark. (Making a reference mark on the bearing will not suffice, since it will not come into line with the housing until the bearing is home—when it may not be in alignment.)

Holes are provided in the face of the bearing for a pin spanner, Fig. 8, to twist the bearing slightly if it requires this after fitting in order for the locating bolt to be entered correctly without force from the outside. The two pin spanner holes should be towards the front of the engine, and in the lower half when the bearing is correctly fitted. Incorrectly fitted, the oil hole will be blanked off. The camshaft should be free after the bearing is fitted; If not the locating bolt may have been screwed too tightly so as to nip the bearing.

CLUTCH AND GEARBOX

In normal use, the only adjustment required for the clutch is to maintain free play on the pedal pad at 1in. This adjustment is effected by means of the nuts on the threaded rod passing through the lever on the cross-shaft.

"There's plenty of room on this side!"

At the other end of the lever is the screw and locknut for limiting the clutch movement. When play is taken up on the clutch, and resistance commences there should be ⅛in. clearance between the head of the screw and its stop. This limits clutch movement and prevents the springs being closed solid and the clutch mechanism strained—with probable rapid wear of the graphite thrust block.

In most instances of trouble with the clutch linings or centre plate it is advisable to renew the plate complete, since wear will most likely have occurred on the splines and spring hub. Wobble on a centre plate should not exceed .015in. when the plate is fitted on an accurate mandrel and tested on vee blocks or between centres. A gauge is officially employed for setting the clutch levers, though in cases of clutch judder caused by slightly incorrect adjustment of the clutch levers, it is usually found that the small pressure plate carried by the levers is wobbling. Truing the plate by small degrees of adjustment to the levers, checking with a pointer close to the plate, or a dial indicator with its foot touching the plate, is generally satisfactory. If this plate wobbles, the run-out is transmitted through the levers to the pressure plate gripping the centre plate, and this causes an intermittent snatch giving rise to judder.

Should the gear lever or its movement seem free the main coil spring in the gearbox top and the three selector springs at the rear should be examined. These—already mentioned in connection with engine and gearbox removal—are accessible by removing the gearbox top. Their renewal can cure slight trouble of a gear disengaging from time to time.