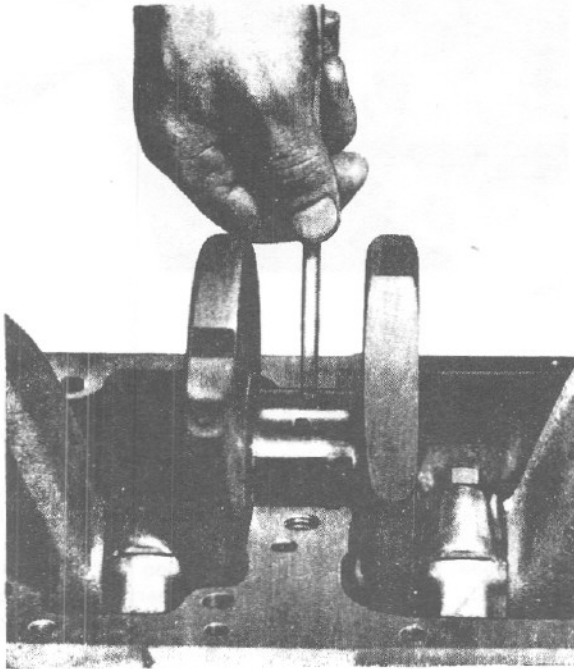


SECTION H

Crankshaft and Main Bearings



H1

Description

The crankshaft runs in three pre-finished replaceable thinwall, steel backed, aluminium tin lined bearings. Crankshaft end float is controlled by thrust washers located either side of the rear main bearing. 0.0075 in

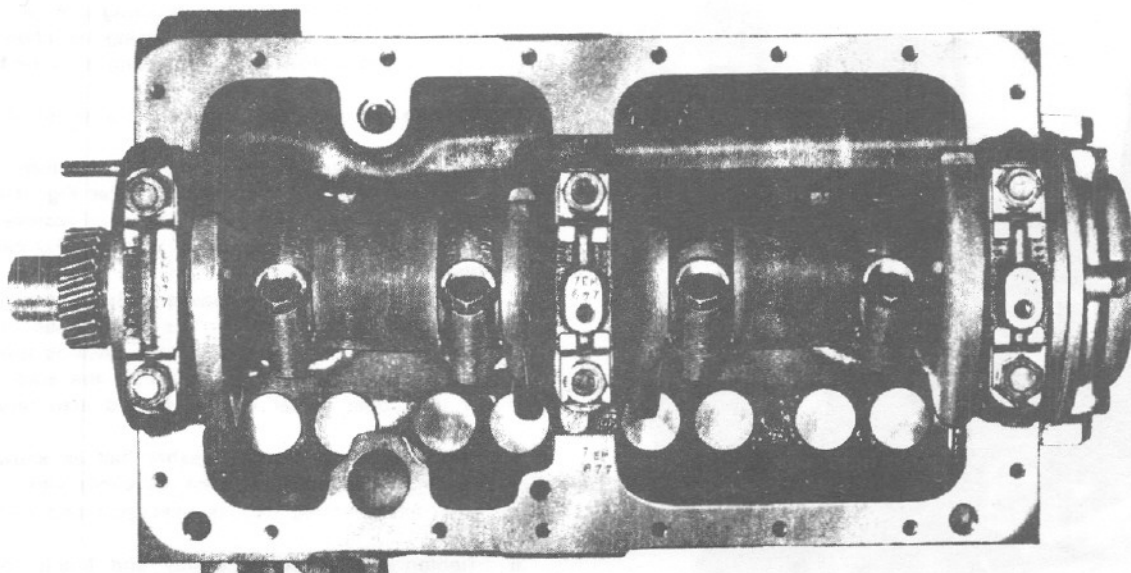
(0,19 mm oversize) thrust washers are available which if used on one side of the rear main bearing only will reduce crankshaft end float by 0.0075 in (0,19 mm) and by 0.015 in (0,38 mm) if used on both sides. The limits for the crankshaft end float are given on Page B.6.

The main bearing caps are numbered and are not interchangeable. The main bearing shells are located by means of tabs which locate in slots in the bearing housings.

NOTE: Before renewal of the main bearings is attempted make absolutely certain that the correct replacements are available, reference to the relevant parts list will ensure this, but for identification purposes the new bearings should have an annular groove machined in the inner (bearing) face along the centre line of the feed holes, when the bearings are correctly located these feed holes will correspond exactly with those machined in the cylinder block.

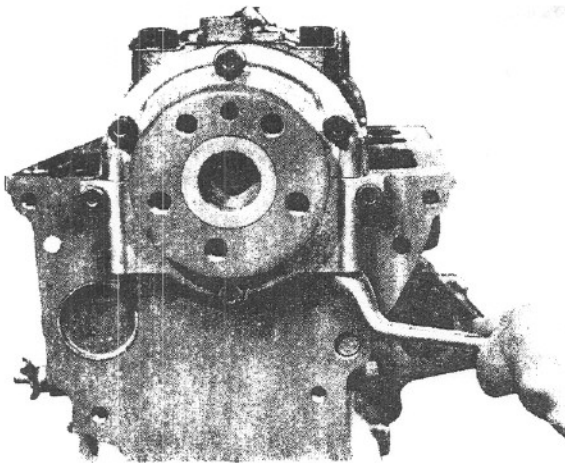
On later 4.107 and 4.99 engines, the annular oil groove in the main bearing parent bore (cylinder block and bearing cap) has been deleted. Adequate lubrication is maintained by repositioning the oil feed holes radially in the shell bearings and continuing to machine the annular groove in the bearing on the centre line of these feed holes.

These later type shell bearings may be used on both early and later type engines, whereas the early type of shell bearings must NOT on any account, be fitted to later engines where the annular groove in the main bearing parent bore has been deleted.

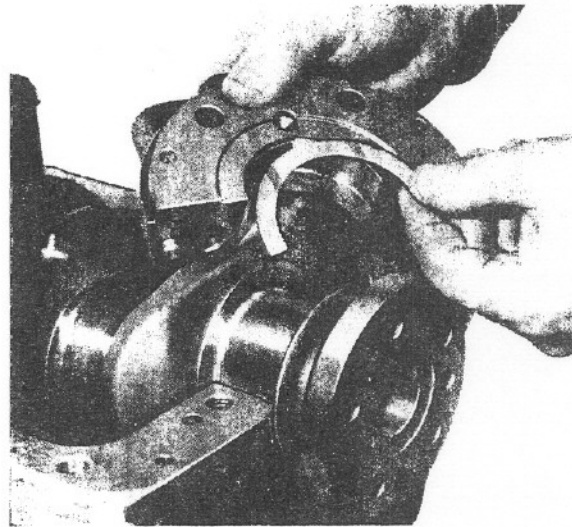


H2

CRANKSHAFT AND MAIN BEARINGS—H.2



H3



H4

To Renew Main Bearings and Thrust Washers

Removal of the main bearings and thrust washers can be carried out without removing the crankshaft by the following procedure:—

1. Remove the engine from its application.
2. Remove the sump and suction pipe assembly.
3. Slacken the setscrews which secure the main bearing caps.
4. Remove completely one of the main bearing caps and remove the bearing shell from the cap.
5. Remove the top half of the bearing shell by pushing it, on the opposite side to the one having the locating tag, with a suitable strip of wood and rotating it on the crankshaft as shown in Fig. H.1.
6. Inspect the bearing shells and if replacements are necessary continue by lightly lubricating and inserting the new top half bearing shell, plain end first, into the side having the tag location.
7. Rotate the bearing shell on the crankshaft until it locates correctly with the tag in the machined slot.
8. Locate the lower half bearing shell in the main bearing cap, liberally lubricate and refit.
9. Tighten the two securing setscrews to positively locate the bearing shells then slacken a turn or two.
10. Repeat items 3—8 for the remaining two bearings.

NOTE: To enable the rear main bearing cap to be removed, first remove the two oil seal housing setscrews as shown in Fig. H.3.

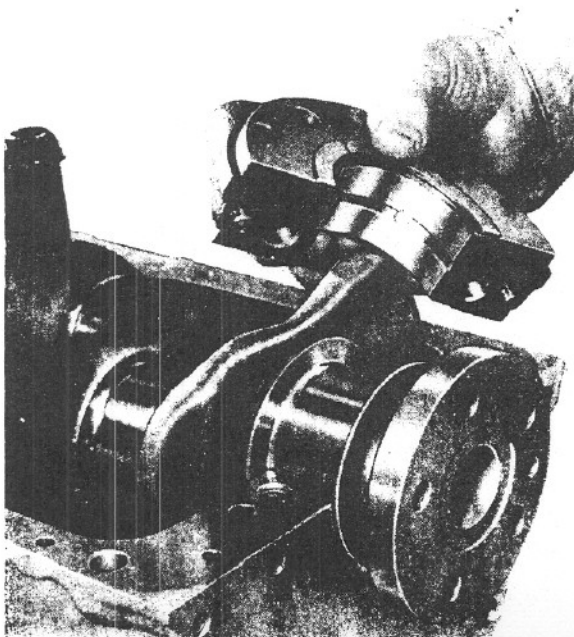
11. Finally tighten the main bearings to the torque given on Page B.2.

Renewal of the thrust washers is accomplished by carrying out the following procedure:—

1. Remove the two setscrews securing the two rear main bearing oil seal half housing as shown in Fig. H.3 and remove the half housing from the bearing cap.
2. Remove the rear main bearing cap securing setscrews.
3. Remove the rear main bearing cap and from it the two lower half thrust washers. (Refer Fig. H.4).
4. The single upper half thrust washer is removed by rotating it with a thin piece of wood until it can be lifted out of its recess.

NOTE: The new thrust washers should be lightly lubricated before fitting. The steel faces of the lower thrust washers should face inwards towards the bearing cap. (Refer Fig. H.5). The steel face of the upper thrust washer should also face inwards.

5. Locate the upper thrust washer half as shown in Fig. H.6, place the lower halves either side of the rear main bearing cap as described and refit the cap.
6. Tighten the setscrews evenly and finally to the torque given on Page B.2.



H5

7. Check that the crankshaft end float is within the limits given on Page B.6 by means of feeler gauges as shown in Fig. H.7. If incorrect, oversize thrust washers are available to give an overall reduction of 0.015 in (0.38 mm). (Refer to Page H.2).
8. Refit the rear main oil seal half housing.
NOTE: If any leakage of oil is apparent from this seal then new seals should be fitted to the half housings as described under the heading "Crankshaft Rear End Oil Seal" or fit a new assembly
9. Refit the suction pipe assembly and sump.

To Remove the Crankshaft

To remove the crankshaft it will be necessary to remove the engine from the vehicle or application.

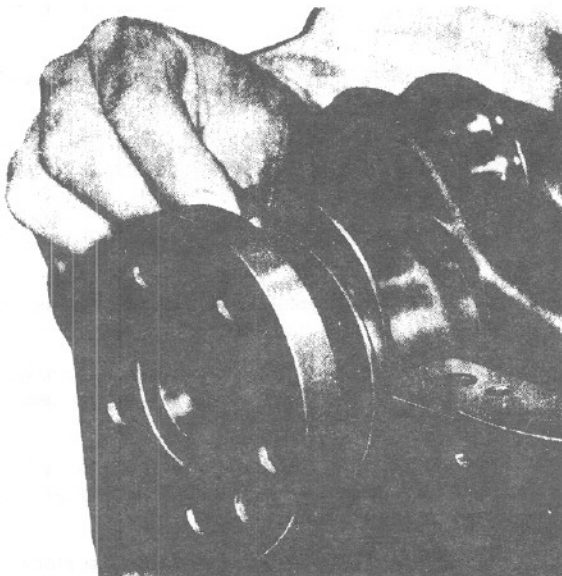
1. Remove the starter motor, flywheel and flywheel housing. (Refer to Page J.1 for details of flywheel and flywheel housing removal).
2. Remove the crankshaft front pulley, timing case cover, timing gears and fuel pump drive hub (Refer to Page K.1 for details of their removal)
3. Remove the timing case back plate.
4. Remove the sump and lubricating oil pump complete with suction and delivery pipes. (Refer to Page M.1 for removal of these).
5. Remove all the connecting rod setscrews, connecting rod caps and bearing shells. (Refer to Page F.1).

NOTE: All the bearing shells should be marked to indicate "top" or "bottom" and number of the rod assembly.

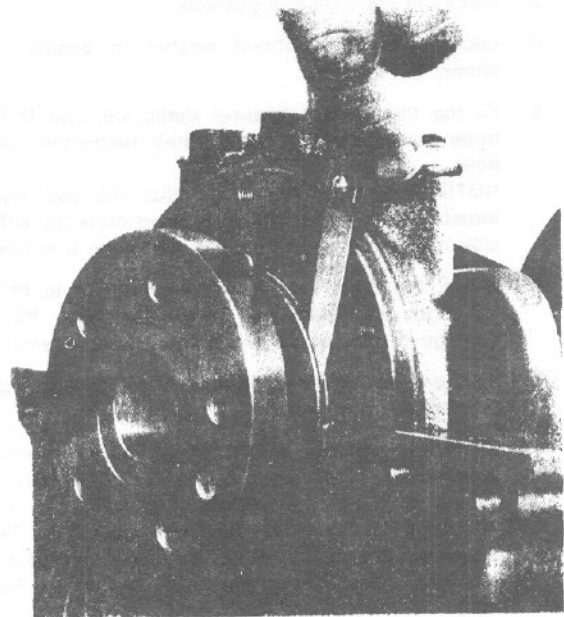
6. Unscrew the main bearing caps.

NOTE: The rear seal half housing securing setscrews will require removal to enable the rear main bearing cap to be removed. (Refer to Fig. H.3).

7. Lift out the crankshaft and place where it is not likely to be damaged ready for inspection.
8. Remove the top half main bearing shells.
9. Finally, remove the top half oil seal housing.



H6



H7

Crankshaft Regrinding

The crankshafts fitted to 4.108 and some 4.107 engines are Tufftrided and these crankshafts must be re-hardened after regrinding. If facilities are not available for Tufftriding, the crankshaft can be re-hardened by the 20 hour nitriding process but if this cannot be carried out, then a replacement crankshaft should be fitted. The Tufftrided crankshafts can be recognised by the part number that is stamped on the crankshaft nose or No. 1 web. The part numbers of the Tufftrided crankshafts are 31315741, 31315827, 31315828, 31315829, 31315831 and 31315836.

The crankshafts fitted to 4.99 and most 4.107 engines are induction hardened and do not require re-hardening after regrinding.

The crankpin and main journal diameters can be re-ground to 0.010 in (0.25 mm), 0.020 in (0.51 mm) or 0.030 in (0.76 mm) undersize from the production limits given on Page B.6. The length of the rear main journal should not exceed 1.516 in (38.51 mm) and the crankpin length should not exceed 1.1945 in (30.34 mm) after regrinding.

When regrinding, only very light cuts should be used and adequate cooling must be maintained, especially around the fillet radii. The crankshaft should be crack detected and de-magnetised before and after regrinding and the fillet radii and the surface finish must be maintained to within the limits given on Page B.6. After regrinding and before polishing and where necessary, rehardening, the oil holes should be chamfered 0.020/0.060 in (0.51/1.52 mm) at 45° to blend smoothly into the crankpin and main journal diameters.

To Refit the Crankshaft

1. First ensure that crankshaft oilways are clear.
2. Place the three top bearing shells in position then oil liberally with clean engine oil.

NOTE: Unless a new set of main bearings is being fitted, those removed must be returned to their original locations.

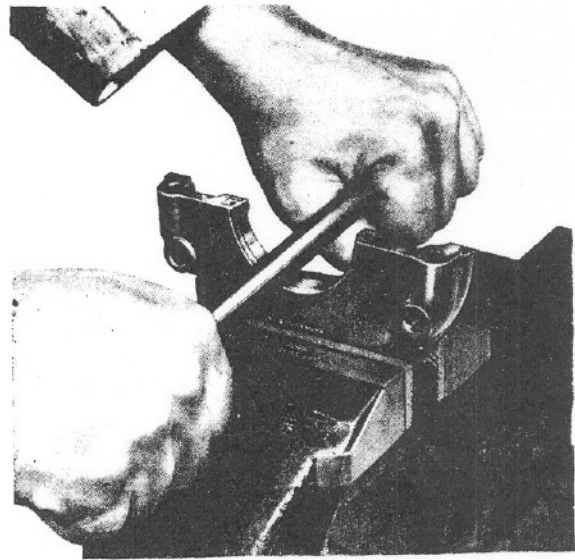
CRANKSHAFT AND MAIN BEARINGS—H.4

3. Place the crankshaft in position.
4. Locate the upper thrust washer in position as shown in Fig. H.6.
5. Fit the three lower bearing shells, oil, and fit the three main bearing caps in their respective locations.
NOTE: Ensure at this stage that the two lower thrust washer halves are positioned correctly either side of the rear main bearing cap when it is fitted.
6. Check the main bearing setscrews prior to fitting for signs of stretch or thread damage. Where damage or any doubt exists fit new replacements.
7. Fit the setscrews then tighten evenly to the torque tension given on Page B.2.
8. Check that the crankshaft can be rotated freely, if satisfactory check the crankshaft end float by means of feeler gauges as shown in Fig. H.7. Should it not be within the limits quoted on Page B.6, then oversize thrust washers are available to give the necessary adjustment. (Refer to Page H.2).
9. Fit new sealing strips to the rear main bearing oil seal housings and refit the housings as described under the heading "Crankshaft Rear End Oil Seal" below.
10. Liberally oil the crankpins, locate the connecting rod bearing shells, again ensuring their correct relative positions, then fit the connecting rod caps as described on Page F.5. The crankcase should now be as shown in Fig. H.2.
11. Refit the lubricating oil pump complete with suction and delivery pipes. (Refer to Page M.4).
12. Refit the sump using new seals and joints. (Refer to Page M.1).
13. Refit the timing case back plate, fuel pump drive hub, timing gears, timing cover and crankshaft front pulley. (Refer to later text commencing on Page K.1 for their reassembly).
14. Refit and correctly align the flywheel housing as described on Page J.2.
15. Refit the flywheel and starter motor.

CRANKSHAFT REAR END OIL SEAL

This sealing arrangement consists of two half housings bolted around the rear of the crankshaft. The bore of these housings is machined to accommodate a rubber cored asbestos strip which, in conjunction with a right hand helix machined between the thrust collar and the flywheel mounting flange to the dimensions given on Page B.6, acts to return the surplus oil reaching the seal. The two half housings fit over this helix and the contact of the sealing strips with the crankshaft prevents leakage beyond this point.

NOTE: When traces of oil become apparent from behind the flywheel and a faulty rear oil seal is suspected, first ensure that the crankcase is breathing normally. Any build up in crankcase pressure could cause oil to be forced past the rear sealing arrangement. If crankcase pressure is normal and new seals require to be fitted the following procedure should be adopted with the crankshaft in position.



H8

1. Set up a half housing in the vice with the seal recess uppermost.
2. Settle approximately 1 in (25 mm) of the strip, at each end, into the ends of the groove ensuring that each end of the strip projects 0.010/0.020 in (0.25/0.50 mm) beyond the half housing joint face.
3. With the thumb or finger press the remainder of the strip into the groove, working from the centre, then use any convenient round bar to further bed in the strip by rolling and pressing its inner diameter as shown in Fig. H.8. This procedure takes advantage of the friction between the strip and the groove at the ends to compact the rope, whilst ensuring that the projections of the end faces of the rope remain as set.
4. Fit the sealing strip to the other half housing in a similar manner.
5. Remove all traces of the old joint from the cylinder block rear face and fit a new joint treated with a suitable jointing compound.
6. Lightly coat the faces of the housing with a suitable jointing compound.
7. Spread a film of graphite grease over the exposed inside diameter surface of the strip.
8. Assemble the half housings around the crankshaft rear journal and fasten together by the two setscrews (See Fig. H.3).
9. Swivel the complete seal housing on the shaft to bed in the strips, and to establish that the assembly turns on the crankshaft.
10. Bolt the seal housing in position on the block and the rear main bearing cap then finally tighten the securing setscrews.