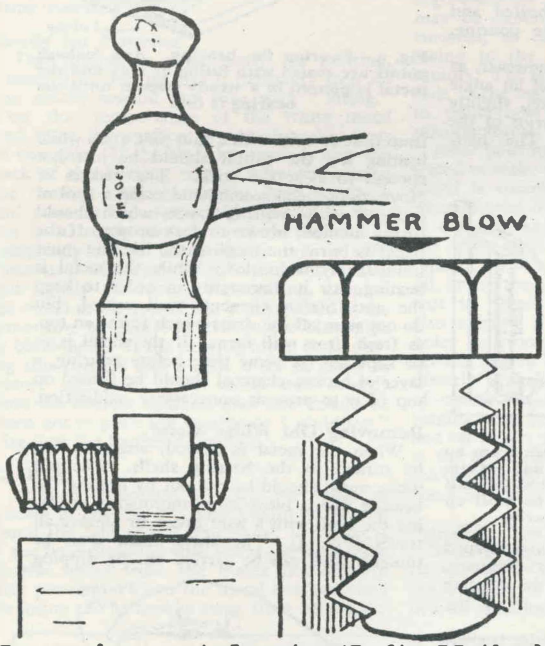
BEARING UP

The adjoining article on renewing poured bearings will serve as an introduction to the topic for members. It is worth noting that these days, even the replaceable thin-shell or slipper bearings are becoming hard to find for some cars, especially to suit undersized journals.
Early D-series Citroens are a case in point, of interest to owners of Ds and "transplanted" Tractions. You may be interested to know then that one local Citroen expert is investigating the remetalling of old shells back to standard and undersized dimensions. Watch out for more details later.

TECH TIPS

"FROZEN" THREADS BEATEN

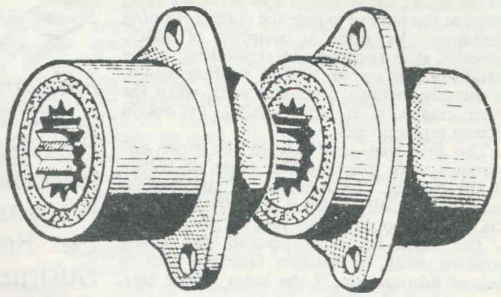
TIGHT or rusted bolts and nuts can often be loosened before the spanner or screwdriver is applied by tapping with a hammer. The exaggerated sketch shows that usually a screw, stud, or bolt has only one side of the thread in a state of compression and intimate contact. A sharp hammer blow on the head of the screw or bolt tends to break the thread faces apart, and a spanner or screwdriver can then be used as normally.



Loosening rusted nuts. (Left) Method of "stretching" nut which is tight on bolt. (Right) Usually only one side of thread is in state of compression: hammer blow on head of nut will free it.

Not only does this save a lot of effort, but it also prevents damaging the flats or screw slots by straining against them. Nuts which are tight on bolts can be loosed by "stretching" them. With one flat on a hard surface, tap the opposite flat with a hammer—working right around the nut—then just turn off with a spanner.—(A. J. Barnes, Dundas, N.S.W.).

DOING YOUR BLOCKS



While holidaying recently along the Gippsland coast, I happened to meet up with CCOCA member, Mel Carey, together with his wife Pauline and their delightful brood of small ankle-biters. Based on rural land just east of Bairnsdale, they run a mobile vehicle -servicing business in the district, and Mel still picks up the odd bit of work out on the oil-rigs of Bass Strait. As well as the meeting providing the opportunity to "drown a worm or two" together, conversation ranged at times over matters Citroenish. Mel is, as you probably recall, the possessor of two Big Sixes both well along the road to restoration. Mel also has an interesting family association with the marque, going back many years - of which more anon.

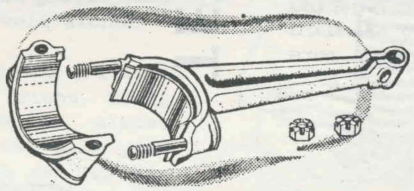
Perhaps though, many may not be aware that over several years, Mel has been experimenting to develop what is now an excellent methodology for restoring Traction silentblocs - the often sorrily mangled devices of metal and rubber which act as pivots in both the front and rear suspensions. Working closely with Spare Parts Officer, Peter Boyle, it is intended to have these items available as a change-over set-up "off-the-shelf". Mel's efforts in this regard have been greatly appreciated in the club. It is intended to provide more detailed coverage of Mel in a later issue in the form of a Technical Note/Member Profile/Member's Cars. In the meantime, best wishes to the family and thanks from CCOCA for your inspiring efforts on our behalf.

Bill Graham.

TECH TOPICS

March, 1955 PRACTICAL MOTORIST AND MOTOR CYCLIST

RE-METALLING the BEARINGS



Although Most Modern Cars are Fitted with Easily Renewed Thin-shell Bearings, it is Sometimes Necessary for Them to be Re-metalled and the Suggestions Given in This Article Will Assist the Owner-driver in the Task

By L. ANDERSON

THE majority of modern engines use main and connecting rod bearings of the thin shell steel-backed, or full-ring directly metalled type; thin-shell bearings are replaced without scraping and fitting, while the directly metalled connecting rods are normally exchanged for re-metalled rods, bored at the factory to give the correct running clearance. In quite a number of cases, however, it is necessary to recondition white metal-lined brass or bronze bearing shells, or directly metalled rods and caps, when for some reason it is not possible to obtain factory replacements.

The first step—and one of the most important—is to diagnose the cause of failure of the bearing. Examination of the bearing metal will usually indicate whether the metal has broken up owing to fatigue, the surface of the metal becoming cracked and finally breaking away, or whether failure is due to lack of lubrication. If the latter is the case,

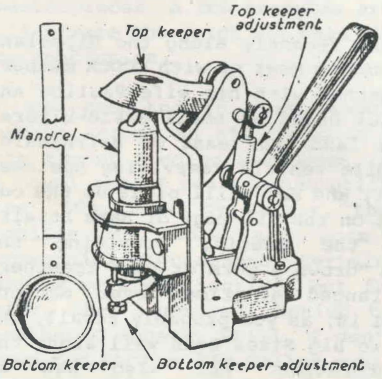


Fig. 1.—An Ammco universal jig which enables re-metalling to be carried out in rapid sequence on bearing shells of varying sizes.

the cause of the stoppage of the oil feed to the faulty bearing must be ascertained.

In any case, when a big-end or main bearing fails, it is essential to examine the crankshaft for the presence of small particles of white metal which may be lodged in the oilways.

Cleaning Oil Passages

Strictly speaking the crankshaft must be removed from the engine, when the oil passages should be blown out by connecting the nozzle of an air-gun to the oil inlet in the cylinder block or crankcase. If air pressure is not available oil can be injected under pressure at the main feed inlet from the pump without removing the crankshaft, after undoing all the connecting-rod bearing caps, although this is something of a makeshift. If oil does not escape freely from each oil feed hole in the journals, the crankshaft must certainly be removed from the crankcase in order to extract the sealing plugs, so that the oilways can be cleaned out with a length of stiff wire. It may even be necessary to drill out the oilways, but in this case it is usually preferable to return the crankshaft to the works.

If the crankshaft is not removed from the engine, do not attempt to clear out the oilways by injecting the oil through the oil feed hole in the journal, as this will only force any foreign matter further into the oilway.

Re-metalling Equipment

Having made sure that the crankshaft oilways are clear and that the crankpins are not badly scored, the necessary equipment for re-metalling must be assembled. First, let us assume that detachable bearing shells for the connecting rods or main bearing are to be dealt with. A proprietary re-metalling jig should preferably be used (Fig. 1). Most types are adaptable to take a wide range of bearings, and some are gas-heated and water-cooled in order to facilitate pouring, as will be described later.

A simple jig can be made up, however, as shown in Fig. 2. This consists of an angle plate, against which a half-mandrel, slightly smaller in diameter than the interior of the finished bearing, is clamped. The half-

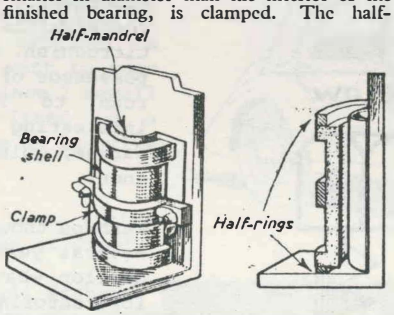


Fig. 2.—A simple pouring jig made from an angle-plate sheet, iron mandrel and clamp. The sectional sketch shows the use of the half rings if the bearing metal is to be built up over the edges of the bearing.

mandrel can be made of sheet iron shaped around a piece of tube of the correct diameter. Around the mandrel is placed the bearing shell clamped against the plate by a bar secured by wing nuts and bolts.

If it is necessary to build up the bearing metal over the edges of the shell, half-rings of the desired thickness, and of slightly smaller diameter than the exterior diameter of the flange of the shell, should be placed at the top and bottom of the mandrel. As it may be difficult to prevent leakage of the molten metal from an improvised jig, any gaps can be stopped up with clay, putty or asbestos "luting" made by pulping asbestos millboard in water (Fig. 3); the asbestos luting, however, must be dried thoroughly with a blow-lamp before pouring the metal.

Melting Pot

The next requirement will be a pot in which to melt the white metal and a ladle. Practically any pot capable of holding the necessary amount of metal will do, although a commercial melting pot, preferably of the muffle-heated type, will give the best results. If the pot is heated by an open gas ring, a casing around the ring and the base of the pot can be made up from sheet iron, to distribute the heat evenly. For general use any recognised form of bearing metal, such as Hoyt, Findlay's Motor Metal, or "Vulcan" brand white metal can be used, but the best plan is to get in touch with the manufacturers of the white metal, who will be able to advise the most suitable grade for the work in hand.

Temperature

At the same time the correct temperature to which the metal should be heated can be ascertained. A special thermometer should normally be used, and the metal should be heated to between 320 deg. C. to 430 deg. C. with most types of metal. If a thermometer is not available, test the metal

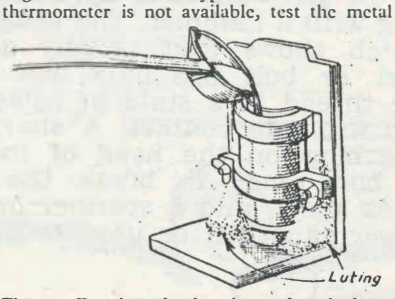


Fig. 3.—Pouring the bearing. Any leakage points are sealed with luting or clay and the metal is poured in a steady stream until the bearing is full.

from time to time with a thin pine stick while heating it; the babbit should be just hot enough to clear the stick. The makers of Hoyt white metal recommend using a spill of ordinary white writing paper, which should turn a medium brown to dark brown. If the paper is burnt the metal is too hot and must immediately be cooled. While the metal is heating, stir it thoroughly in order to keep the anti-friction elements well mixed, but do not skim off the dross which forms on top, as fresh dross will form. If the metal is to be kept hot for some time before pouring, a layer of broken charcoal should be floated on top of it to prevent unnecessary oxidisation.

Removing Old White Metal

When the metal is heated, attention can be turned to the bearing shells. The old white metal should be run out by heating the bearing with a blow-lamp, thoroughly brushing the shell with a wire brush to remove all traces (Fig. 4). The shells must then be tinned. This can be carried out by dipping

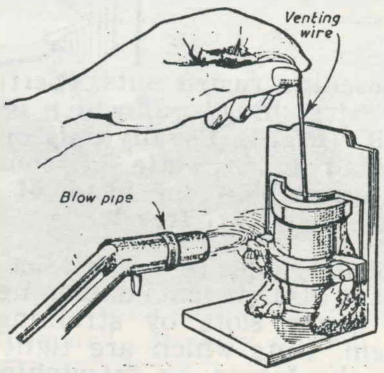


Fig. 4.—Venting or puddling. While the top of the bearing metal is kept fluid by the application of gentle heat from a blow lamp, a stiff wire is dipped lightly and rapidly in and out around the bearing.

them in a pot of molten tinman's solder, after first thoroughly brushing the bearing surfaces with liquid flux, killed spirits, or any other soldering fluid. In order to prevent the tinning adhering to the back of the shell, this should be painted with whitewash before fluxing. The shell is then dipped in the pot of molten solder, removed immediately, given a fresh coating of flux, and again placed in the tinning pot. The surplus solder can

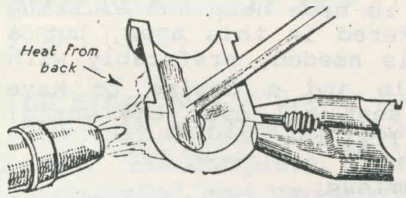


Fig. 5.—Tinning the bearing shell by heating it from the back while a stick of solder is rubbed over the bearing surface.

then be brushed off with a clean bristle brush —not the flux brush—and the bearing again coated with flux to prevent oxidisation until it is required.

As an alternative to dipping the bearings, the shells can be carefully heated from the back, fluxed and tinned by rubbing a stick of solder over the bearing surface (Fig. 5). Great care must be taken to keep the flame from the surface to be tinned. Preferably a gas blow-lamp should be used, but if this is not available a spirit blow-lamp should be employed in preference to the paraffin type, as the flame is cleaner. A paraffin blow-lamp can, however, be used if care is taken to regulate the flame correctly.

Ready for Pouring

The bearing is then ready for pouring. Clamp it in the jig and if necessary stop up any cracks around the base with "luting." Test the temperature of the white metal and skim the surface by scraping the dross to one side. If the shell has cooled, heat the back of the bearing with a blow-lamp until the tinning becomes molten, heat the ladle and pour in the metal fairly gently at first, but in a steady stream, until the bearing is completely filled. Immediately take a stiff, clean steel wire and dip it in and out rapidly and lightly all around the bearing, keeping the metal at the top of the bearing fluid at the same time by gentle heat from the blow-pipe or blow-lamp. If the bearing metal sinks during this process add a little more in order to restore the level. The metal will solidify from the bottom upward, and care should be taken not to push the venting or "puddling" wire into the hardening metal.

Cooling

As it is important to chill the metal as quickly as possible wet rags should be placed round the foot of the bearing or, if the jig is of the type provided with water passages, turn on the water from the mains immediately after pouring. When the metal has hardened the luting can be broken away from round the foot of the jig, the clamps undone and the shell removed.

When dealing with directly metalled connecting rod caps, most of the foregoing points apply. The best method of removing the old white metal, however, is to immerse the complete big-end in a pot of scrap metal heated to about 400 degrees C., afterwards thoroughly brushing the bearing surfaces with a wire brush to remove all traces of the old metal. Tinning should be carried out by dipping, although the surface can be heated by a blow-lamp if preferred. If the big-ends are dipped they can be left in the tinning pot until the jig is ready; dipping is advisable since the heating is more uniform, thus reducing the risk of distorting the rods.

Duralumin Rods

When pouring directly lined bearings, the use of a proprietary jig is generally to be preferred, since it is a simpler matter to pour the two halves of the bearing accurately, although it is possible to carry out the work

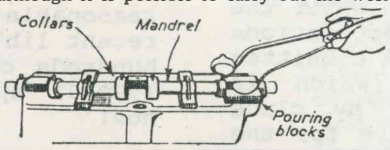


Fig. 6.—Re-metalling Ford main bearings in the crankcase with the re-metalling fixture in place.

in an improvised jig of the type already described. A point which should be borne in mind is that when the connecting rods are made of duralumin, as in the case of certain high-efficiency sports car engines, difficulty may be experienced in tinning the bearing surfaces, as ordinary fluxes are unsuitable owing to the fact that duralumin oxidises rapidly. The safest plan is to return duralumin rods to the manufacturers for re-metalling, or to send them to a firm of bearing-metal manufacturers, who will undertake this work.

After pouring the bearings, they should be tested to make sure that adhesion of the white metal is complete. They should ring true when tapped with a light wooden article, such as a pencil, and if they emit a cracked note the metal should be run out and the bearing relined. If the shells are impregnated with oil, or are themselves cracked, it may be difficult to obtain a good ringing note; this also applies if there are a number of oil holes or grooves in the bearings, so that a certain degree of discretion is necessary. A directly metalled connecting rod cannot, of course, be satisfactorily checked by the ringing test, but if both the connecting rod and cap halves of the bearing have been poured at the same time, the ringing test applied to the bearing cap will give some indication of the condition of the other half of the bearing.

Paraffin Test

The well-known paraffin test can, of course, be applied to any type of bearing. Immerse the bearings or shells in paraffin for at least half an hour, carefully dry them, and sprinkle them with french chalk. If the paraffin has penetrated at any point at which the white metal does not adhere perfectly, it will emerge, and stain the chalk.

Main Bearings

The remarks regarding re-metalling bearing shells apply, of course, to detachable shells for the main bearings in the crankcase. If, on the other hand, the crankshaft halves of the main bearings are re-metalled directly in the crankcase, as in the case of Ford cars, and a number of American models, the work is hardly within the scope of the average owner or small garage, which is not equipped with the necessary re-metalling jig.

This consists in essentials of a long bar or mandrel which is clamped into place in the crankcase bearing housings. To that bar are clamped collars, which are slid up against the sides of the bearings, while special pouring blocks are placed in position above the bearing housing when pouring the metal (Fig. 6). Special grades of white metal must usually be used, the Ford metal, for instance, having a high percentage of copper. As the method of setting up the mandrel, checking the alignment and procedure in pouring varies in different engines, the work should be placed in the hands of the service department of the maker of the car, or a firm specialising in this class of work.

After re-metalling the bearings in the crankcase it is usually necessary to bore them in line, and this again is a job for the specialist. Actually, even in the case of connecting rod bearings and detachable shell main bearings,

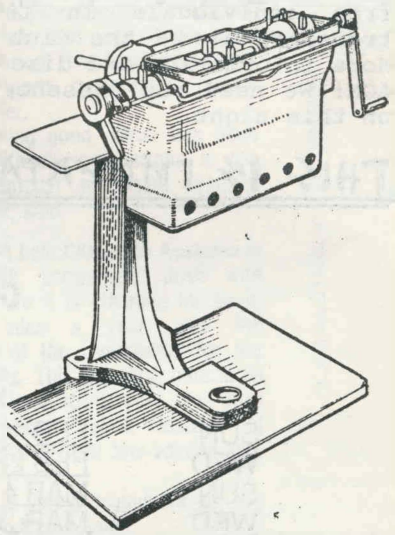


Fig. 7.—Boring the main bearings in line with a hand-operated boring bar. A V.C.L. engine stand is used to carry the engine.

boring the bearings accurately to size with the aid of a special boring bar is the accepted practice of the majority of car manufacturers (Fig. 7).