Morris Eight Oil Leaks, and the Vexed Question of Scrolls

"The time has come," the Walrus said,
"To talk of many things:
Of shoes—and ships—and sealing-wax—
Of cabbages—and kings—
And why the sea is boiling hot—
And whether pigs have wings."

From *Through the Looking-Glass, and What Alice Found There*

To judge from the number of times this evergreen subject has cropped up in this forum, and on the MVS (mutual aid email group) that preceded it, the time has certainly come to talk about the tendency of the Morris Eight to disgorge oil from various mechanical components. Invariably such enquiries emanate from those new to Morris ownership, pleading for advice about why oil is dribbling from diverse nether regions—a matter seemingly as imponderable as, but less well loved than, Lewis Carroll's curious tales. Experience suggests that owners who've not been down this bumpy path are scarcer than flying pigs.

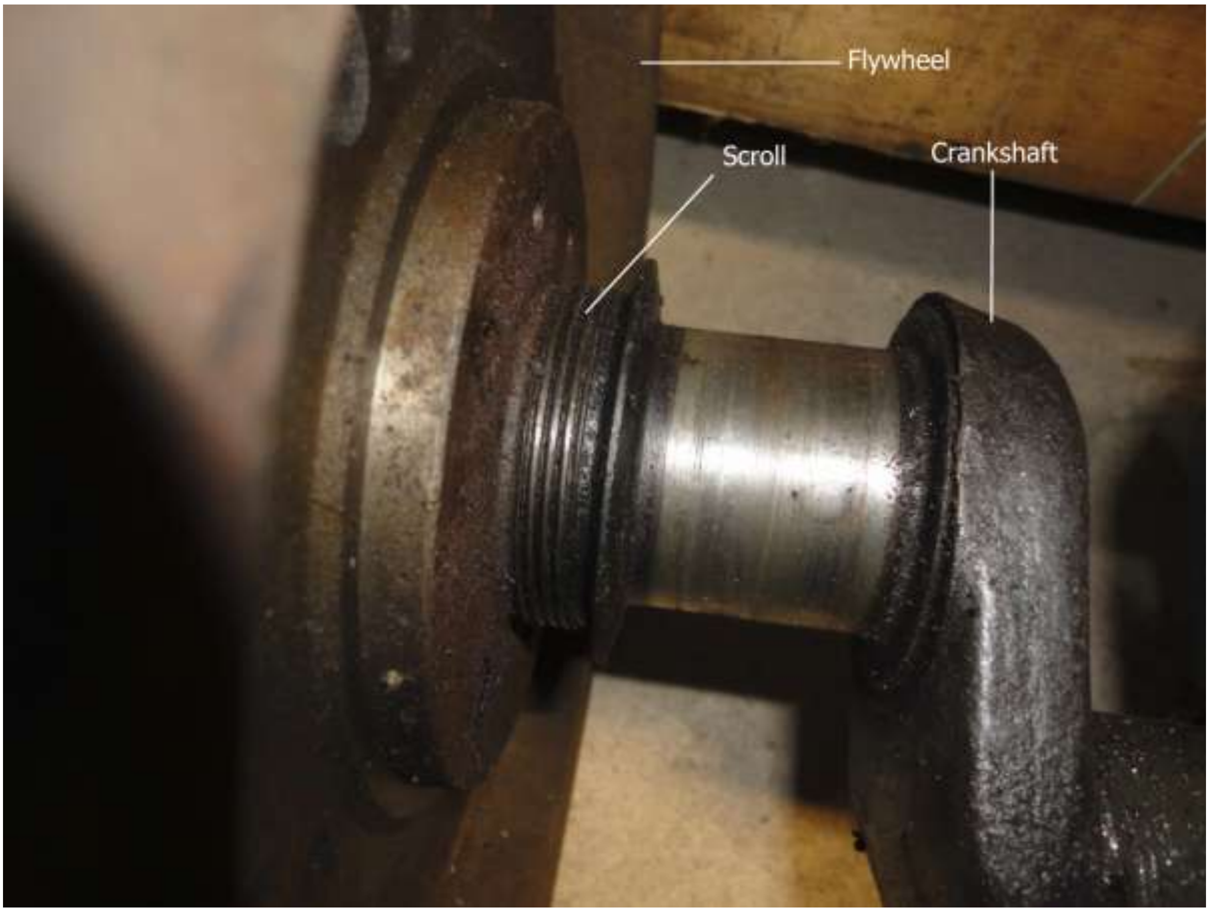
Oily puddles under rear of engine.

The most common question is, "Why is oil dribbling from the split pin hole at the back of the sump?" While I've no wish to spread alarm and despondency, the short answer is, "Because it's an old British vehicle". That's not the whole story, however.

First things first—we need to establish where the oil is coming from. Presuming the car has not been so grievously neglected that lubricants haven't been changed within living memory, if the leaking oil is clean it's coming from the gearbox. More likely it will be discoloured, indicating that it's engine oil. Quite often new owners jump to the conclusion that the problem lies with sump's rear seal, and go to considerable trouble to correct something that's not faulty. In by far the majority of cases the leak is from the rear of the crankshaft, where there is NO SEAL.

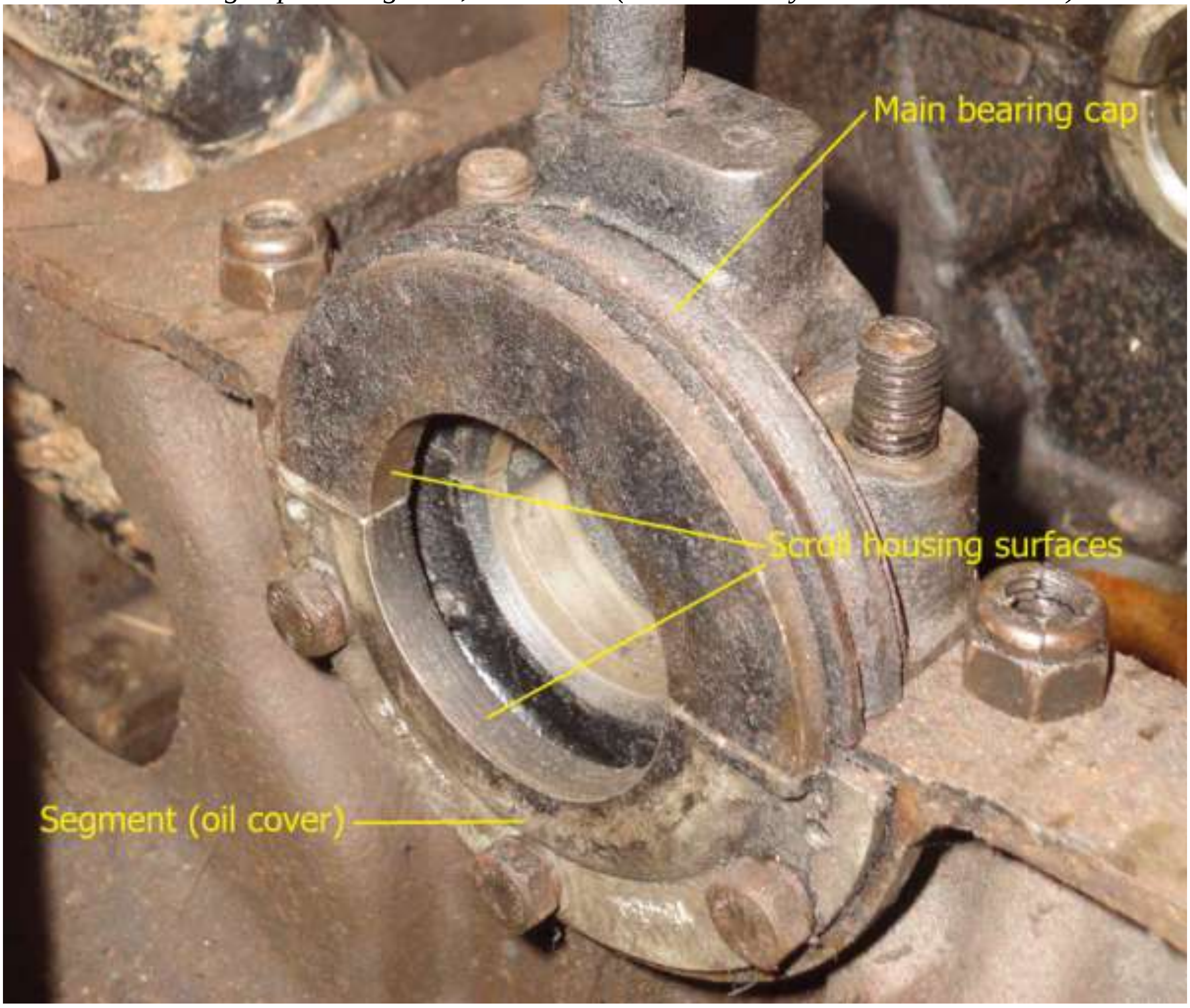
It's important to remember that this engine (and its derivatives—Series E, MM Minor, Brockhurst industrial engine, and marine variants) was designed well before the modern type of lip seal had been invented. For those unfamiliar with the terminology, 'lip' refers to the innermost part of a neoprene or viton rotating-shaft seal that tapers to a knife edge on the shaft. In the 1930s the materials and options for preventing fluids escaping past rotating shafts were limited and less than ideal. For the rear end of the crankshaft Morris chose the scroll system, in essence an Archimedes screw working in reverse—more or less a very short, very fine spiral screw thread whose effect is to prevent oil from the rear main bearing escaping into the flywheel bell housing. Clearly, this arrangement cannot be considered a seal, a fact that must influence what can be reasonably expected from it.

The scroll



In order for the scroll to function as intended it must operate at close tolerance in its housing, which comprises two halves: the main bearing cap below, and the detachable semi-circular segment above. The latter is referred to in Morris literature as part A3, “oil seal cover”. It’s secured to the rear of the cylinder block by three hex-head set screws; since the segment’s screw holes are enlarged it can and must be carefully adjusted on assembly, before the main bearing cap is installed, to a 0.004″ clearance by sliding a feeler gauge around the scroll and holding the segment firmly against it while tightening the set screws. Too much clearance, or damage to the scroll or either half of the housing, and this far from perfect device cannot perform as it should. Even when these parts are in brand-new condition they cannot provide a perfect seal.

Rear main bearing cap and segment, assembled (shown with cylinder block inverted)

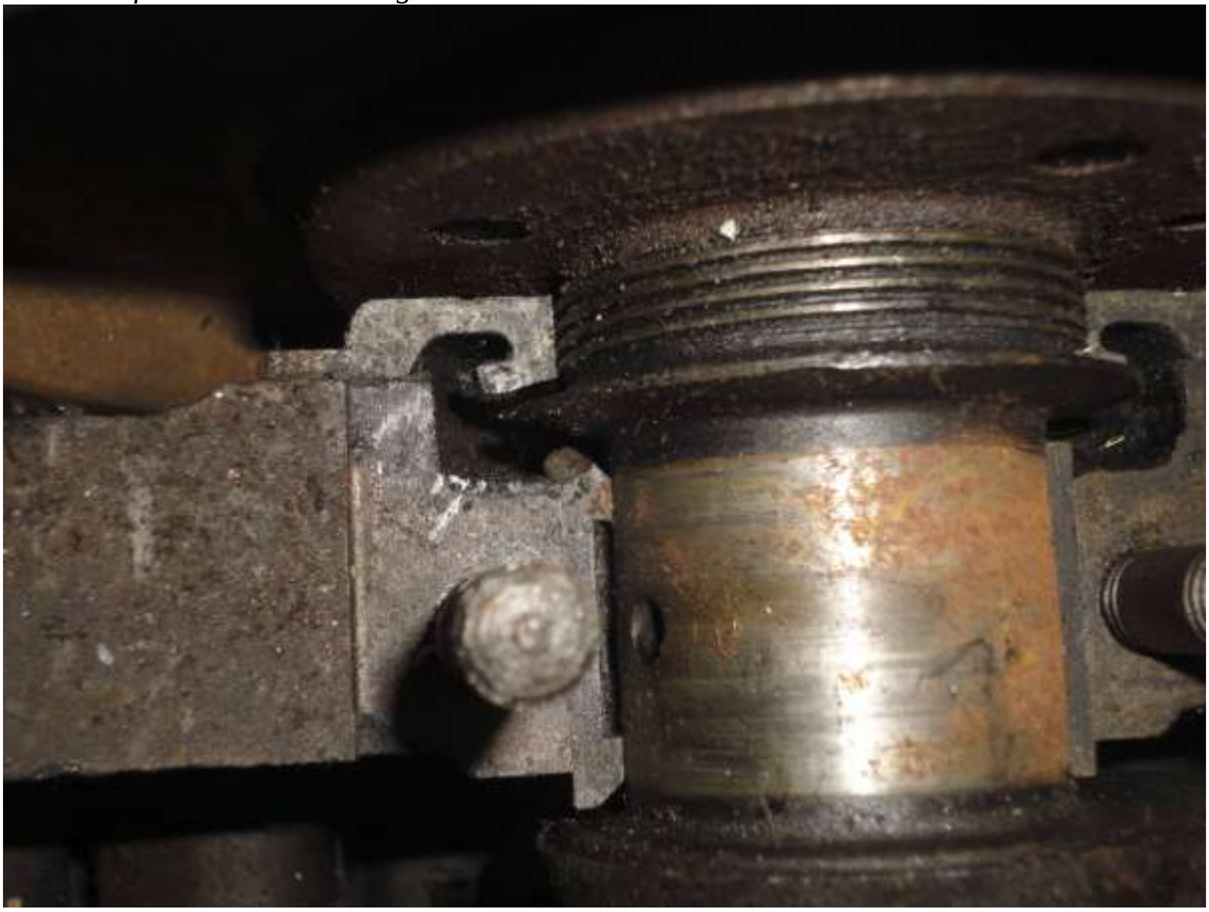


In my experience scrolls are invariably imperfect, and more often than not they seem to wear slightly eccentric. Theoretically, since the scroll runs with a 0.004" clearance it should not wear at all, but I've yet to see an Eight crankshaft with a perfect scroll, and wear marks on the main bearing cap and detachable segment are proof positive that the parts have made contact.

If scoring is evident in the housing halves it may be repaired by filling with Loctite Magic Metal or an equivalent and sanding back to a smooth finish, though this should not be considered a permanent fix. That can best be achieved when the engine is overhauled, by having both halves white metalled and line bored to suit the scroll. Do not be tempted to substitute a main bearing cap in better condition from another engine. Each cylinder block with its bearing caps is line bored individually, and they are not considered interchangeable unless you're rebuilding an engine from scratch and having it line bored to suit, just as it was done originally by Morris Motors.

The scroll itself needs to be clean and in good condition. As already mentioned, scoring in the housing halves is a sign that it's probably worn slightly eccentric. Obviously this should be rectified at overhaul time, by having the engine reconditioner lightly polish the scroll (machining would leave burrs) to restore concentricity. The re-metalled housing halves are then bored to suit, as already described.

Position of scroll relative to segment



We should also consider whether the scroll may be working against other factors, such as excessive crankcase pressure caused by worn piston rings or blocked breathers. It should go without saying that the bearing cap drain pipe must be completely free from blockage. There will always be a certain amount of seepage from this imperfect arrangement, but “seepage” is the operative word—it should not become a flow. Incidentally, the “split pin” is actually a jiggle pin—being able to jiggle within the hole prevents the latter from becoming clogged.

Other applications of the scroll.

Before moving on to other engine oil leaks it might be as well to mention that the crankshaft scroll has partners in crime in other parts of the power train, namely at the rear of the gearbox and on the pinion shaft at the front of the differential. These are less likely to cause concern since they’re not subjected to the same pressures as those in the crankcase, but they’re equally imperfect as a means of keeping oil where it belongs. In both cases it should be remembered that while the scroll will do a reasonable job with the car in forward motion, when reversing it will have the opposite effect and drive out any oil that may have collected around it. Thus it’s quite usual to find a few drops of oil left behind after the car has been reversed.

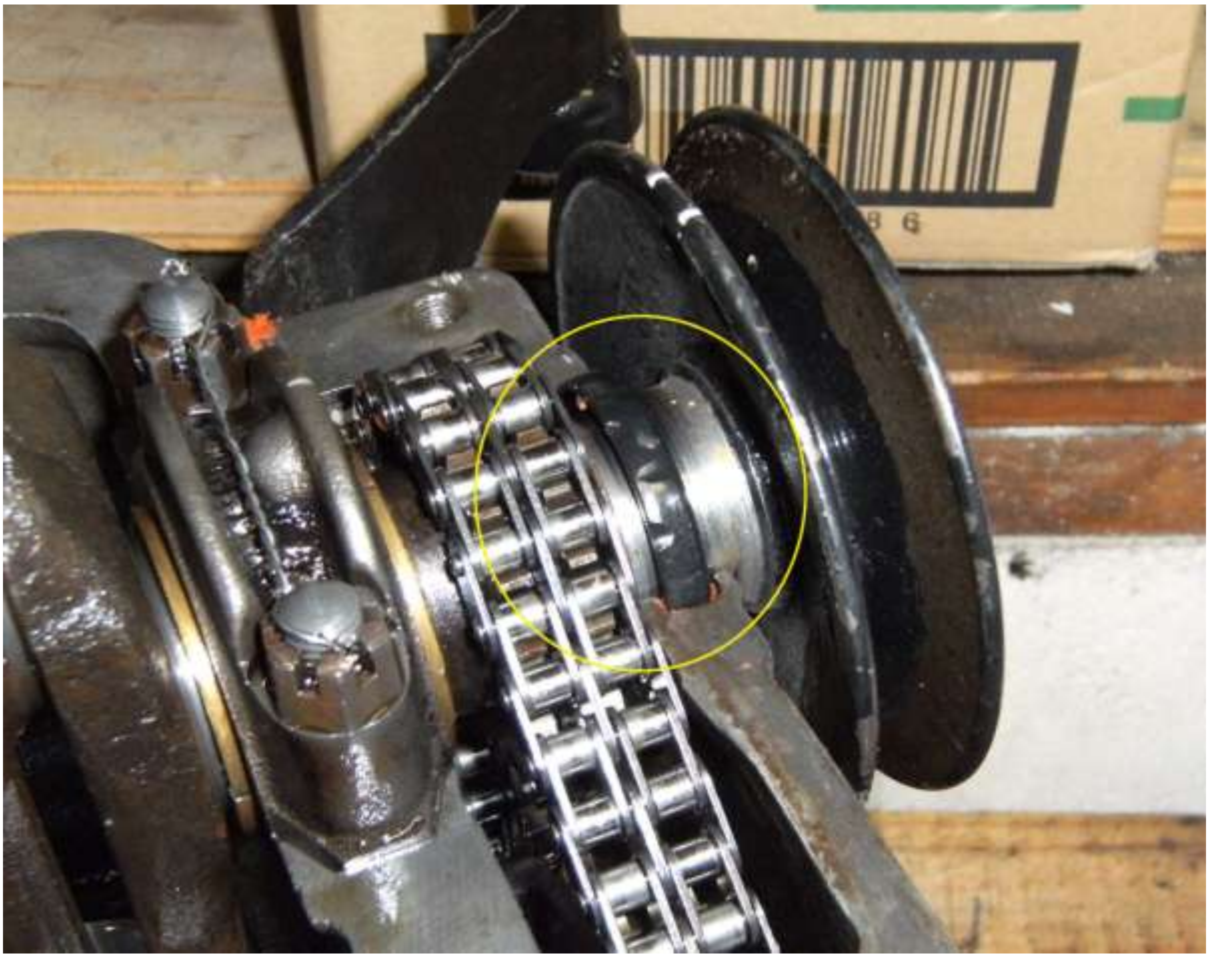
A permanent solution is possible for both gearbox and diff, because it’s a fairly simple job to convert to modern lip seals by machining off the scroll and machining a recess to suit an appropriate seal in the housing or cover. On the gearbox this may also be done at the front end by machining the detachable cover containing the felt seal. While such procedures may offend the purist by departing from original, they are relatively simple and virtually invisible modifications that go some way towards making the car more robust from a maintenance perspective, with greatly reduced concern for leaving unwelcome mementoes whenever it's parked or reversed.

4-speed gearbox modified for lip seal

Differential modified for lip seal

The front end of the engine.
Here we have a different but equally imperfect attempt at keeping the oil where it belongs. It comprises two short lengths of a woven rope-like material, fitted into grooves in the sump and timing cover respectively where they surround the shank of the pulley. Note that they are of unequal length because the join is located slightly below the crankshaft centreline. This arrangement may have worked with some degree of effectiveness when the engine was assembled at the factory, but in my experience all the rope seals supplied nowadays are oversized (in section) and therefore impossible to pack down adequately into their grooves. The result is that it becomes difficult to insert the pulley if the sump is already bolted up, and if the sump is tightened up around the pulley shank the seals tend to spread over the lips of the grooves, the excess becoming pinched between the groove lips and the pulley shank. At best the arrangement cannot then work as well as intended, and at worst it could cause the alloy sump to crack when tightened up.

Once again a fairly easy solution in the form of a lip seal is possible. There are two ways of tackling this: either the grooves could be machined to fit the seal; or a seal with smaller outer diameter can be used, packed out and set in place by high-temperature red silicone sealer. The latter method, while less elegant from an engineering standpoint, eliminates the need for expensive and tricky machining, and works just as well; an example is shown in the picture below. Note that small notches have been filed into the outer rim of the seal to aid retention by the surrounding silicone and ensure it doesn't turn with the crankshaft.

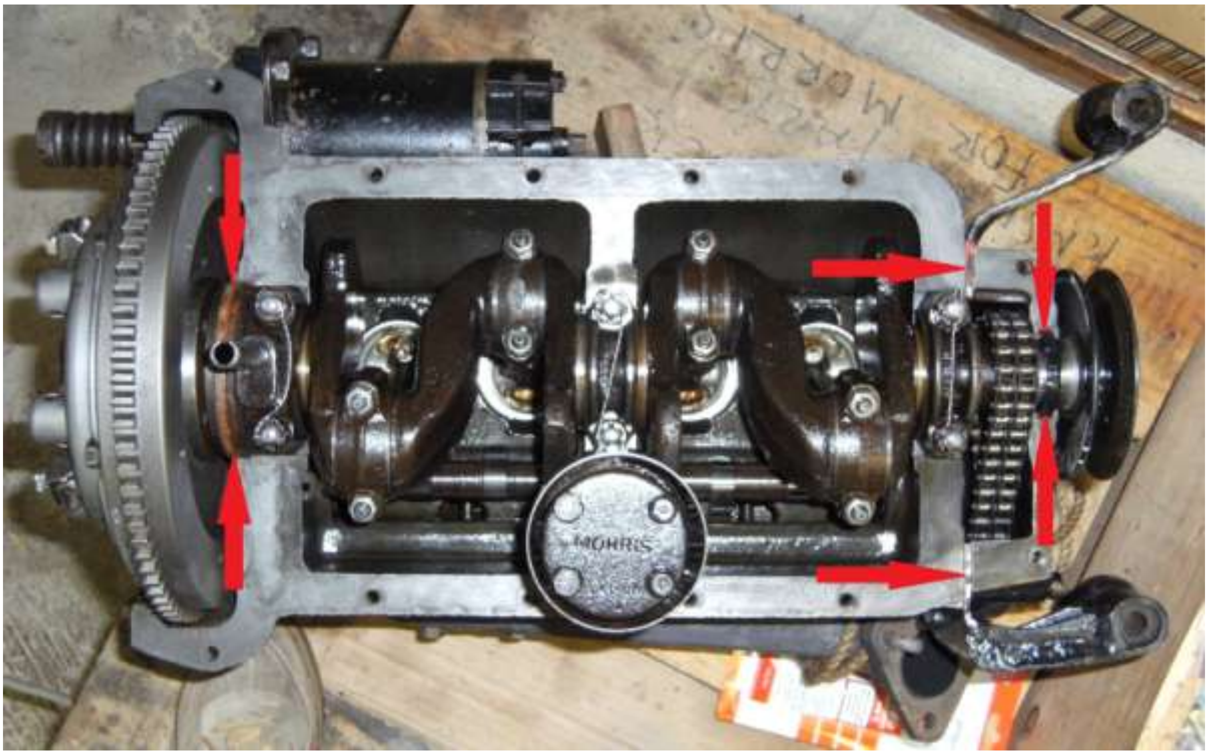


The sole drawback with this arrangement is that it makes sump removal and replacement more difficult; but how often does that need to be done? With a proper seal at the front, careful assembly of the gaskets, and regular oil changes it should be required only at long intervals—probably several years, at the very least, with the sort of annual mileage most of these cars accumulate. Personally I won't attempt it with the engine in the car, not least because the task of fitting the sump and its assortment of gaskets with the degree of care and precision needed to ensure reasonable oil-tightness (discussed below) is much less likely to succeed when undertaken while lying on your back under the car with oil dripping onto your face, regardless of what type of sump/timing cover seal is used.

As an aside not directly related to oil leaks, while working on this part of the engine a useful idea is to replace the bottom right timing cover bolt (shown as A58 in the Parts List and Information Manual) with an Allen cap screw M8 x 1.0 x 55mm. The head of the standard hex-headed bolt has a screwdriver slot because it sits in a recess that prevents any kind of spanner or even socket from being used. A cap screw can be properly tightened and will not look out of place because it's all but invisible behind the pulley.

Accurate fitting of the sump.
With the engine inverted on the bench it's *so* much easier to work carefully and ensure that things are done properly. From an oil-retention perspective the whole arrangement is not well engineered. Potential trouble spots are where the side gaskets' ends meet the front crankshaft seal, where they cross the double joint created by the engine bearer and timing cover, and

where they meet the cork seal around the rear main bearing cap. These are highlighted by red arrows in the picture below.



Particular attention should be paid to proper fitting of the rear cork seal. The official diagram below explains the procedure, emphasising correct orientation of the stepped ends in relation to the side gaskets.

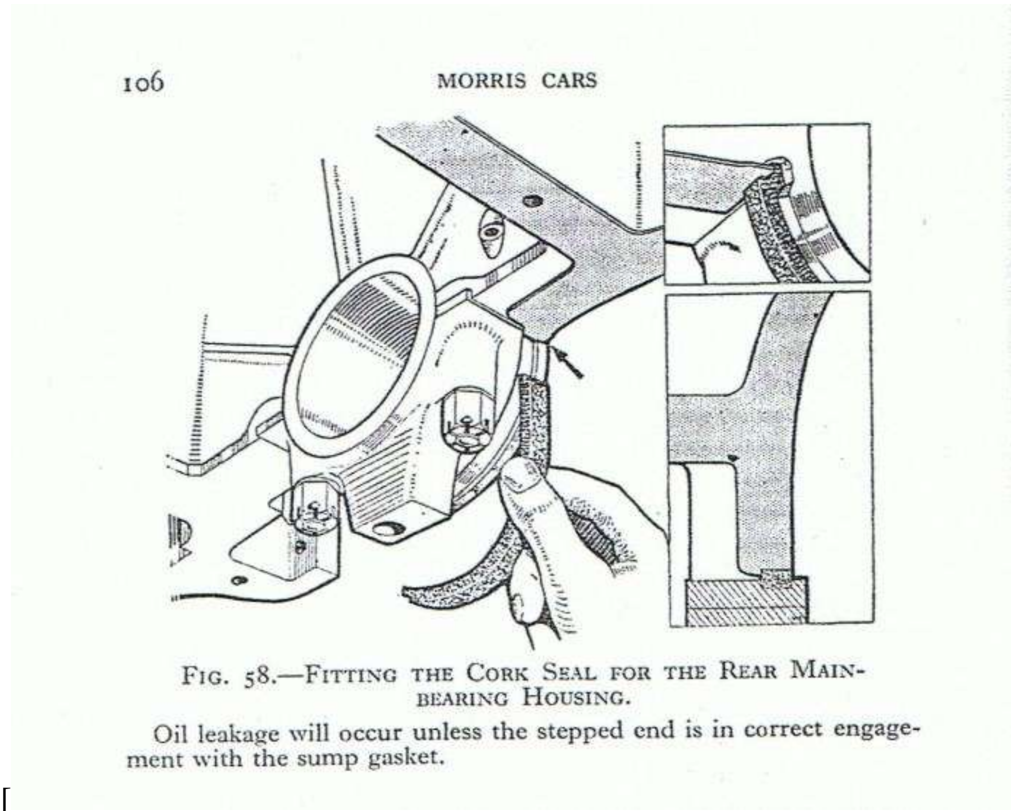
[]

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FIG. 58.—FITTING THE CORK SEAL FOR THE REAR MAIN-BEARING HOUSING.

Oil leakage will occur unless the stepped end is in correct engagement with the sump gasket.

While generally I'm not in favour of silicone sealer, these weak spots cry out for some means of improving their chances, so it makes sense to apply a thin bead of the same high-temperature red sealer as described above for retaining the pulley lip seal—just enough to accomplish the job, taking great care not to have so much that when the sump is tightened down it squeezes out towards the inside of the sump, where it could become dislodged and end up clogging the oil pump gauze. Any excess on the outside can of course simply be wiped off before it sets.

The alloy sump can be notoriously fragile, so care should be taken when tightening it down to work progressively in stages, starting with a middle bolt and crossing in a diagonal pattern to the opposite side, working out towards each end. Be careful not to over-tighten, but as with many gasketed joints it tends to settle after a little use, so it's sensible to re-tension the bolts after a few dozen miles or so.

The valve chest (tappet) cover.
Anything more serious than a very slight weep from this area is most likely caused by a distorted pressed steel cover and/or incorrectly fitted gasket. The cork gasket is the same size as the cover and therefore fits over the two cover retaining studs, but since these are off-centre in the vertical plane it's necessary to ensure that the gasket is fitted the right way up. The mating faces of the block and cover should be bare metal, and a light smear of grease applied to these will ensure the gasket does not stick and can be easily removed next time.

UB engines prior to engine no. 97610 had a plain tappet cover without a breather pipe. Clearly Morris considered this a shortcoming, so if you have one of these it makes sense to find and fit one of the later type. All other factors being equal, the more freely the crankcase can breathe the less oil will come out.

Cork gasket material.
Avoid gaskets made from ordinary cork, which dries out over time and shrinks. I have a new plain cork tappet cover gasket that's useless because it's shrunk and the holes are now too close together to fit over the studs. Rubberised cork is a far superior material which does not dry out and remains pliable. Sheets of this material are available in varying thicknesses from motor factors.

The steering box.
Leaks from the bottom of the housing where the shaft exits are quite common once the shaft and/or housing become a bit worn. Bushing the housing and, if necessary, building up and machining the shaft, not only decreases steering play but will also reduce the tendency to leak. Originally SAE140 oil was specified, but a superior modern substitute, Penrite Steering Box Lube, makes an excellent alternative. This is a semi-fluid grease ideal for the job, and is much less likely to find its way out. If in doubt, however, the felt seal where the shaft exits the housing can be replaced by a lip seal.

A word of caution here. One Eight I know of had been modified by a previous owner to stop oil leaking from the steering box by machining a groove in the shaft for an o-ring. This is NOT the way to do things, because the groove weakened the shaft, which failed without warning, resulting in complete loss of steering. Fortunately for the current owner this occurred during a slow u-turn, but obviously could well have proved fatal in different circumstances.

The rear axle.

The *bête noir* of oil getting onto the rear brakes competes with the crankshaft scroll for being the biggest oil-leak headache. Any differential oil that manages to get past the tubular cork half-shaft seals will find its way into the hub, and from there into the brake drums and onto the shoes. While modern brake lining materials are reasonably impervious and can usually be washed clean, original-type woven riveted linings might well be ruined.

The first precaution in not to overfill the diff housing. It can be safely run with the level about 1/8" above the low mark on the dipstick, provided this is checked regularly. Filling above the halfway mark is asking for trouble.

The cork half-shaft seals feature an internal scroll groove to help restrain oil from getting out, but as with the pinion shaft this works in the opposite sense when the car is reversed, so it makes sense to reverse the car as little as possible. Having found the cork seals ineffective during my early Morris years, and new replacements no better, I switched to a lip seal modification which in my view is a significant improvement. This involves making an adapter bush to fit the internal diameter of the axle tube and accept a 1 x 1¼ x ¼" lip seal; shown below are those Dave Lawton made for his Series E. On the earlier Eights it's advisable to mount the seal further into the axle housing to be clear of the hub splines.

Wherever a lip seal is used it's vital to ensure that the knife edge of the lip is running on a perfectly smooth surface, so the shaft in this area should be polished to a fine finish. Lip seals are easily damaged, and these ones will be if care is not taken to protect them from the tendency of the splines at the diff end of the shaft to wear fine, sharp edges in normal operation, which could cut the seal lip when the shaft is withdrawn. This can be overcome by partially withdrawing the shaft and then feeding a strip of thin oiled paper wound spirally around the shaft under the seal, before withdrawing the shaft through the paper. Needless to say, this precaution should also be taken when installing the shaft. Colonial members in Australia, New Zealand, or Canada will find the best material for this is a bank note, since these are printed on a plasticised base that's thin, tough, and slippery, from which the oil is easily cleaned off. I understand these will only be available in Sterling sometime next year (2016).

As already mentioned, any oil that gets past the half-shaft seals will reach the hub and fill the cavity around the bearing, from where it will work its way through the bearing and past the felt seal behind it, to be flung around the brake drum by centrifugal force.

Although the bearing was originally intended to be lubricated with SAE140 oil from the Enots oil gun supplied in the toolkit, frankly it's expecting too much of simple a felt seal to constrain a hubful of oil. It makes more sense to pack the bearing with a modern wheel bearing grease, which will remain within the bearing. The rest of the hub cavity can (and should, in my opinion) be left clean. Better still are sealed bearings.

For a belt and braces approach, the felt seal may be replaced by a lip seal without the need for machining. The MR Spares Shop stocks the C291 lip seal, which is Payen's recommendation to replace the original felt seal. In practice, however, the depth of the seal recess in the bearing housing may be insufficient for the seal to lie flush, which will prevent the bearing from being pressed fully home. The depth of the recess must be at least 0.2" (5.08mm), and this should be carefully checked before purchasing the C291 lip seal.

Should the recess prove too shallow the answer is to have seals custom made. Any moderately large seal specialist should have a purpose-built CNC machine that, after a few minutes' setting-up, can churn out a couple of lip seals in a matter of seconds.

As a final note, it's a good idea to use a non-setting gasket sealer on the paper gasket between the hub halves. While it's tempting to think that with all the above precautions it wouldn't be necessary, the advantage is that, in addition to providing another line of defence, the gasket absorbs the sealer and becomes both more effective and more durable, so it can be reused many times as long as care is taken that it's not damaged when separating the hub halves.

Grateful acknowledgement to Tom Bourne for photographs of the crankshaft scroll, and to Dave Lawton for photographs of the half-shaft seal modification.

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