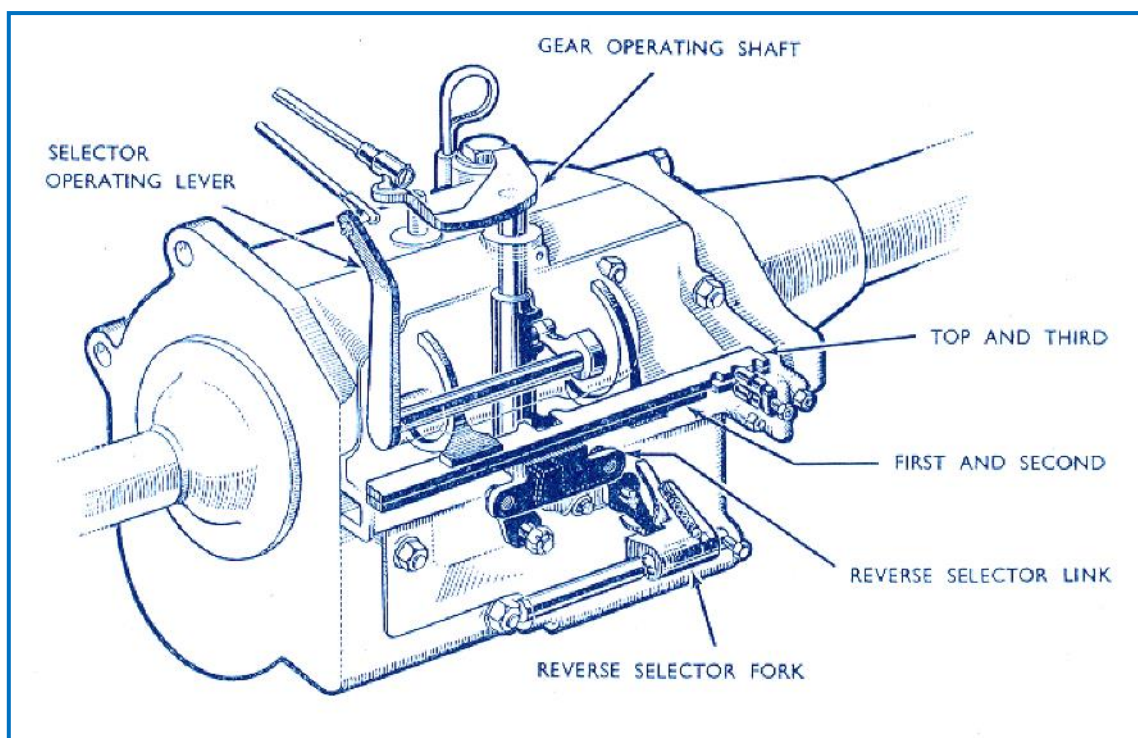


# TECHNICAL NOTES SERIES

## JOWETT JAVELIN – PA, PB, PC, PD & PE JOWETT JUPITER – SA & SC



*Illustration shows general gear selection arrangement.*

## PART XXVIII – GEARBOX OIL LEAKS

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*Compiled by Mike Allfrey – January, 2007.*

## Introduction

Unfortunately, due to the design, age and to assembly methods, the gearbox has 59 potential oil leakage points. This may seem a large number of areas where oil leaks can be expected. However, in most circumstances, oil leakage may be from one or two areas. These notes have been prepared so that leak source detection will be an easier task. A good understanding of the source of an oil leak makes the task of rectifying it so much easier.

To start the oil leak source identification, a list of known oil leakage points and their origin follow.

Note: Part numbers are shown in brackets.

## Known Sources Of Oil Leakage And Their Remedies

1. Blockage at the gearbox breather tract in front face of gearbox casing (AS50001) and rear face of clutch housing (50836). As the gearbox warms with use, the oil and air inside expand. If the breather tract is blocked it can cause leakage at other points, such as the rear seal, side cover gaskets, speedometer drive bearing and the oil level dipstick to name a few.

The most common cause of breather tract blockage is the use of excessive sealant during assembly, or the use of a gasket that does not have a hole to coincide with the tract drillings in the gearbox front face and in the clutch housing rear face.

Over many years' use, the breather tract can become blocked due to front end oil leakage attracting dust and accumulating in the inside rear face of the clutch housing. This condition can be particularly active if the clutch cover plate (50861) is not in place.

2. At the rear speedo housing extension tube oil seal (50039) lip. There can be a degree of confusion here. The seal lip runs directly on the surface of the gearbox third motion shaft – not on the machined surface of the output flange (50120). In most cases, oil leakage here is due to a seal with sealing lip material that has hardened with age.

3. At the rear of the speedo housing extension tube oil seal (50039), between the seal casing and the extension housing tube. This can be due to poor installation of the seal into the tube. It can also be due to the loose fit of a modern seal. The original style seal is no longer available and the modern substitute can be loose in the extension tube.

To effect a good seal, the seal outside diameter and the extension tube bore should be thoroughly cleaned and given a final wipe with methylated spirits. Once dry, a 2 mm triangular bead of Loctite Blue RTV sealant should be applied to the rear inner edge of the of the extension tube bore. As the seal is pushed in, the sealant bead is pushed ahead until the seal and sealant lodges against the main shaft extension bearing locating washer. Once the seal is home, place the housing aside for the sealant to cure overnight.

4. Rear extension housing gasket. Great care needs to be taken with this joint.

There is a strong temptation to delete the gasket altogether and rely only on silicone based sealant to take up the gaps. Before attempting such a

procedure, accurate measurements should be taken at the bearing locating ring (50015) thickness, typically 0.083", and at the rear bearing (50014) protrusion from the gearbox rear face. Accurate measurements should then be taken for the circlip and bearing recess counter bores in the front face of the speedo housing extension. If there is interference (the counter bored recesses are not deep enough for the housing to hold the bearing forward and make even contact with the rear gearbox face), consideration must be given to installing a gasket of appropriate thickness. The use of a silicone sealant will mean that as the joint is tightened, a film of sealant, 0.001" – 0.002" thick, will 'build-up between the two components. The sealant and/or gasket should not allow end float that the third motion shaft, by the same token, the shaft and bearing should not be under the influence of pre-load.

5. At the selector cover gaskets (50057 and 50058), four leak points here, where the gasket ends butt against the clutch housing, and speedo housing faces.

Short gasket ends should be avoided, if they can't be, then a suitable sealant should be used to fill the gaps that could become oil tracks. Ideally, the clamped gasket ends should protrude by 0.001". If protrusion is greater, the surplus gasket can be shaved off with a sharp blade while a feeler gauge is held against the gasket side. The ends of the gaskets should be compressed when the front and rear housing joints are made.

6. Along the gasket surfaces due to age, loose selector cover hardware or pressure build up inside the gearbox due to a blocked breather tract.

To effect repairs, new gaskets should be installed against flat clean surfaces, using Loctite 515 Master Gasket sealant.

7. At the selector cover securing studs, eight leak points, where oil can migrate through the gasket material and along the stud to exit at the securing nut threads.

To effect repairs, clean the threads with methylated spirits and place a trace bead of Loctite 518 Master Gasket sealant. Install clean plain washers and Nyloc nuts.

8. Again, at the selector cover securing studs, the stud holes break through into the oil-wet casing.

To effect a repair, the selector cover should be removed and the eight studs removed. The threads should be thoroughly cleaned with methylated spirits. A smear of Loctite 518 should be applied to each stud before threading it fully home. Wipe away excess sealant.

9. Furthermore, at the selector cover securing studs, local distortion due to over-tightened studs pulling parent metal outwards. Such distortion can, in extreme cases, hold the cover away from the gasket.

To effect a repair for this cause of oil leakage, remove all of the studs and make sure that the gasket surface on the gearbox housing is absolutely flat.

10. At the selector cover where the selector operating lever and shaft assembly (AS50101) enters the

cover. Oil leakage here usually indicates wear at either the shaft or the shaft's bore in the cover.

To effect a repair, it may be necessary to bore the housing and install a bronze bush.

11. At loose hardware securing the studs (50077 and 50125) where they exit the selector cover.

To effect a repair, remove the cover, remove the slotted nuts and apply a smear of Loctite 518 beneath the plain washer. Fully tighten the slotted nuts and install the split pins. Do not back off the nuts to align split pin holes. Try swapping the two slotted nuts to achieve tight nuts with split pin holes aligned.

12. At the selector detent plunger housing (50107), oil leakage due to poor fitting and/or loose securing hardware.

To effect a repair, carefully remove the housing, ensure that mating surfaces are flat and the housing is secured with Loctite 515 sealant. Apply sealant to bolt threads as well.

13. At the front and rear of the reverse gear selector shaft (50093) in the base of the selector cover.

A repair here may be seen as a difficult repair job – but it is relatively simple. First, the gearbox should be fully drained. Next, the shaft locating peg bolt should be removed. Wash both ends of the shaft with methylated spirits and, while still wet, using a compressed air jet, blow the methylated spirits into the shaft locating bores. Repeat this several times. Hold down the gear change operating shaft (50095), against its spring, and, while holding the shaft down, tap the reverse selector shaft forward until it contacts the cover securing nut. The selector shaft is actually engaging reverse gear. The third motion shaft may have to be rotated for the reverse idler gear (AS50075) to mesh with first gear.

The exposed shaft at the front and the cover bore at the rear can now be cleaned with methylated spirits and dried. Apply a smear of Loctite 518 sealant around the protruding shaft and the rear cover bore. Tap the shaft back into its home position and, apply a smear of sealant under a clean plain washer, and fully tighten the peg bolt. Wipe of excess sealant from both ends of the reverse selector shaft and leave to cure over night.

14. At the unsupported portion of the speedo housing extension tube (50044). The machined front face may be distorted, and not effectively clamping the gasket over the reverse idler shaft (50074) and the layshaft (54409 & 50048).

To effect a repair, the gasket contact face of the speedo housing must be absolutely flat. The thin lower portion can be gently bent forwards. Check that the reverse idler shaft and the lay shaft re slightly forward of the rear gearbox housing face.

15. At the bronze welded joint between the cast iron portion and the tubular rear portion. This joint has been known to crack at high mileage use. If the tube is a loose fit, the housing should be scrapped.

To effect a repair, wash thoroughly to remove all traces of oil. Grind away the existing bronze weld material and have the joint re-welded with bronze

weld rod. After the welding activity, make sure that the front face is flat.

16. There are three holes drilled into the cast iron portion of the speedo housing. Some of these holes have been filled with bronze weld material, some have not.

To effect a repair, thoroughly clean the holes and, in turn with each hole vertical, wick-in Loctite 290 sealant and allow each to cure in turn.

17. At the front of the gearbox where the layshaft protrudes and 'spigots' into the clutch housing. This is a common leak point and no amount of sealant seems to effect a sound repair.

This is an interesting one. It seems that the dimensional tolerance between the layshaft and first motion shaft bores could not be maintained in production. To get over this inability to maintain tolerance, the hole in the clutch housing is a big clearance hole.

To effect a sound repair, thoroughly clean the bore in the clutch housing, obtain a 0.875" OD cup type core plug and install it in the layshaft bore. The convex end of the plug should face the clutch and, a method of installation is to start the plug with a large 'G' clamp. Once the plug is started in the bore, it can be driven in with a suitable drift until the front face is nearly level with the front face of the clutch housing inner face. The inside diameter of the core plug is such that the layshaft will spigot into it. Once the plug is installed, wick-in Loctite 290 sealant. This is a permanent repair and should need no further attention.

18. At the gearbox to clutch housing joint.

Originally there was a gasket between the two faces. In most cases, the gasket has been deleted and the joint sealed with propriety sealants. Care needs to be taken when deleting the gasket, to ensure that the first motion shaft bearing (50014) has room to be held in the clutch shaft cover (50007) and that there is sufficient space for the bearing locating ring (50015). The same accurate measurements should be made here as for the speedo housing at Item 4.

To effect a repair, a suitable gasket should be cut and installed with sealant. It is important that a hole be cut for the breather tract.

19. At the lower gearbox mounting studs (50123). The threaded holes for these studs break through into the oil wet interior of the gearbox casing.

To effect a repair, drain the gearbox oil, remove the studs and thoroughly clean them. Apply a smear of Loctite 518 sealant to the stud thread and install the studs.

20. At over-tightened lower gearbox mounting studs. In extreme cases, the metal around the stud shanks could be distorted and holding the front of the gearbox away from the clutch housing rear face.

To effect a repair, drain the oil, remove the studs and locally file the area around the studs so that the surface is absolutely flat. The studs should be tightened into the gearbox casing to 20% of the installed securing nut's torque value.

21. At the first motion shaft (50020). There is not a conventional oil seal at the front of the gearbox. There is a close fitting clutch shaft cover (50007),

with a machined reverse scroll on the first motion shaft. There are causes that have been identified:

The clutch shaft cover bore is worn.

The reverse scroll is gummed up due to sludge and age of oil.

Worn bearings (50014 and 50017).

Absence of oil thrower plate (50016).

Over-filled gearbox oil level.

Loose bearing retaining nut (50037), allowing the shaft to move backwards and forwards.

Clutch housing that does not match gearbox bearing bores.

Methods of repair are selectable for the above mentioned conditions. There is the option of installing a new sealed bearing (50014) with seal left in place at front face of bearing to effect a repair for a worn clutch shaft cover.

22. At the gear operating shaft (50097) at the top of the gearbox casing.

The bore for this shaft wears and allows oil to escape.

To effect a repair, the gearbox casing should be carefully bored and bushed top and bottom.

23. At the gear operating shaft welch plug (54246).

To effect a repair, the existing plug, if still tight, can be wick-in sealed with Loctite 290 sealant. If plug is loose or distorted, it should be replaced.

24. At the gear lever stop (50094). The stop is threaded into the gearbox casing and breaks through into the oil wet area.

To effect a repair, the stop can be unscrewed by withdrawing the adjustment pin and unscrewing the stop. Thoroughly clean the threads with methylated spirits and apply a smear of Loctite 518 sealant prior to reassembly. Make sure that the stop is adjusted to its original position.

25. At the oil filler plug gasket (52692).

To effect a repair, install a new gasket.

26. At the dipstick (50059). The dipstick hole can become worn.

To effect a repair, bore and bush the hole so that the dipstick is a snug fit, but can be easily withdrawn when the gearbox is installed in the car.

27. Finally, at the gearbox drain plug (50299).

To effect a repair, drain the oil, clean the threads with methylated spirits and apply a smear of Loctite 518 sealant to the plug before threading it home. Do not over-tighten the plug.

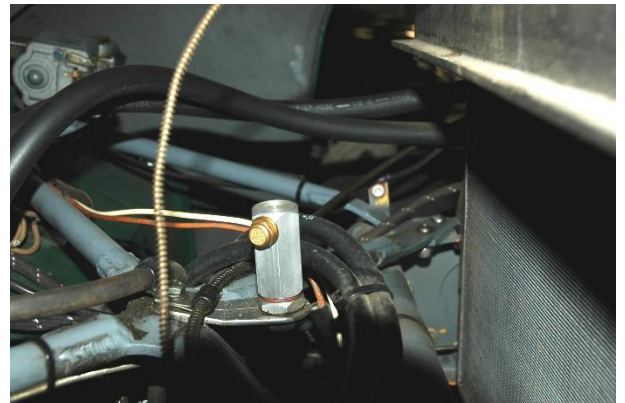
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## SOME STEPS TAKEN TO ENSURE A LEAK-FREE JUPITER GEARBOX.

### Gearbox Breather

The Jowett designed gearbox breathing system is rather tortuous and, if a home made gasket is installed, can easily be blocked-off completely. With old age having crept up on me, it was decided to install a remote oil filler. This took the form of a hose barb being inserted in the drilled and tapped original filler cap, a hose with an 8 mm bore was attached and routed up to the St Andrew's cross firewall to chassis brace in the centre. A capped fitting was machined from aluminium hexagon bar, with a brass barb for the oil bottle tube so that mess-free oil filling could take place. Into the side of the fitting, a hydraulic breather filter was screwed in. The cap is sealed to the fitting with a fibre washer.

This system, due to the frequency of filling, works well and the breather filter is washed and dried once a year, to ensure there is no blockage due to oil vapour attracting dust. *The breather is shown at right, located in tall filler cap.*



### Gearbox to Clutch Housing Joint

Some time ago, I read about John Blazé's modification to the clutch shaft (first motion shaft), using a flexible face lip seal of the Forsheda type. See Figure 2, Page 7. The modification involved machining of the brass clutch shaft cover, Part Number 50007 or J50007, inside the bell for the seal lip to run on. The depth of the machining was calculated to provide 2 mm 'crush' at the seal lip. This amount of crush was determined in discussion with the seal supplier. The machining data was as follows:

1. The depth of the seal lip contact face in the bell of the cover is 0.687" (17.45 mm) from the bearing recess. The machined surface to be smooth for lip seal running.  
The bearing recess is the smallest machined diameter recess, the dimension 0.687" must be taken from this face, not the circlip recess. The bearing recess face has been found to be consistent.
2. The machined diameter is to be 1.60" (40.64 mm).
3. An 'O' ring groove, square bottomed, 2.94" (74.79 mm) is machined into the front face of the clutch shaft housing bell. This dimension is the centre of the groove section.  
The width of the groove is 0.110" (2.90 mm) wide and is 0.090" (2.20 mm) deep to accept an 'O' ring formed from 2.5 mm diameter 'O' ring cord. The arrow shows location of 'O' ring groove.
4. At the flywheel/clutch housing, at the gearbox joint face, fill breather hole with weld.

5. Looking at gearbox joint face, with straight edge at bottom, fill the LHS notch that breaks into the clutch shaft cover recess with weld.  
Note: For left hand drive cars, fill the RHS notch. These notches are for the lever ball pivot, Part Number 50837.
6. Machine surplus weld material from the clutch shaft cover recess – maintain original diameter and depth of the recess.
7. Machine the entire gearbox face so that when clutch shaft cover is fully home, its outer surface is absolutely flush with the gearbox face. This operation will also clean up the weld filled breather opening.
8. Machine into the joint surface an 'O' ring groove. The width of the groove is 0.110" (2.90 mm) wide and is 0.090" (2.20 mm) deep to accept an 'O' ring formed from 2.5 mm diameter 'O' ring cord. The groove will be pear shaped to encompass the clutch shaft cover recess, the RHS throw-out bearing lever pivot and the gearbox layshaft spigot opening. See accompanying photograph, Figure 3 on Page 7. Total length of the groove is free, because of the use of 2.50 mm 'O' ring cord.
9. The bore in the clutch housing for the layshaft spigot is  $\frac{7}{8}$ " diameter, the layshaft spigot has  $\frac{3}{4}$ " diameter. A cup type core plug (pressed steel or brass) with an outside diameter of  $\frac{7}{8}$ " can be used to make an effective seal. The inside diameter of the plug is a snug fit over the layshaft spigot. The plug can be installed by using a screw clamp and suitable plates to hold the clamp square. A smear of Loctite Master Gasket 518 should be applied before installing the plug.

### **Assembling the Components**

10. The 'O' ring cord should be cut squarely to length so that, when installed in the grooves, it will not fall out during the assembly process. Butt join the ends of the cord using Loctite 406 Instant Adhesive. After adhesive has fully cured, carefully shave off with a sharp blade, excess adhesive residue. The prepared joint must be seamless, so that when the 'O' ring is compressed, an oil tight joint is formed.
11. After making sure that the clutch shaft bearing securing nut is absolutely tight, install the Forsheda seal with a bead of Loctite Blue RTV (Part Number 34248) to fill the oil scroll groove in the shaft.
12. Apply a smear of Teflon grease to the seal lip surface at the clutch shaft cover bell.
13. During the assembly of the gearbox to the clutch housing, there are two areas that require sealant, the layshaft spigot and the lever ball pivot. Care needs to be taken here, to ensure that no sealant comes between the two joining surfaces. Clean the layshaft spigot, its bore in the clutch housing, the lever ball pivot shank and the bore for that shank. Finish clean with methylated spirits and apply a smear of Loctite 518 Master Gasket sealant to the two bores.
14. Assemble the gearbox to the clutch housing and tighten the four 7/16" BSF nuts progressively until fully tightened. The finished joint should be sound and there should be no gaps.
15. Wipe away excess sealant from the layshaft spigot. Clean-up with a rag soaked in methylated spirits and allow to dry. Apply single coat engine paint to the cup plug installed in the clutch housing – the sealant is anaerobic and only cures when sealed from air entry, the paint forms this seal.
16. Apply the same technique as at Item 12, to seal the lever ball pivot shank to seal that area. The use of an artist's fine paint brush is recommended.

Adopting the foregoing procedure is, very likely, similar to an elephant attempting to mate with an ant! In theory there should not be any pressure within the gearbox to force oil out at the front. This situation is dependant on a free air flow breather attached to the oil filler hose. The use of 'O' rings makes the use of liberal amounts of sealant at the joint surfaces redundant.

### **Final Comment**

Prior to carrying out this modification, the gearbox jumped out of second gear regularly. The layshaft was found to be a loose fit in the gearbox housing. Since the layshaft has been spigotted into the cup type plug installed in the clutch housing bore, the gearbox has not jumped out of second gear – with about 4,000 miles of use.

To date the gearbox has been oil tight.

*Mike Allfrey.*

### **Illustrations**



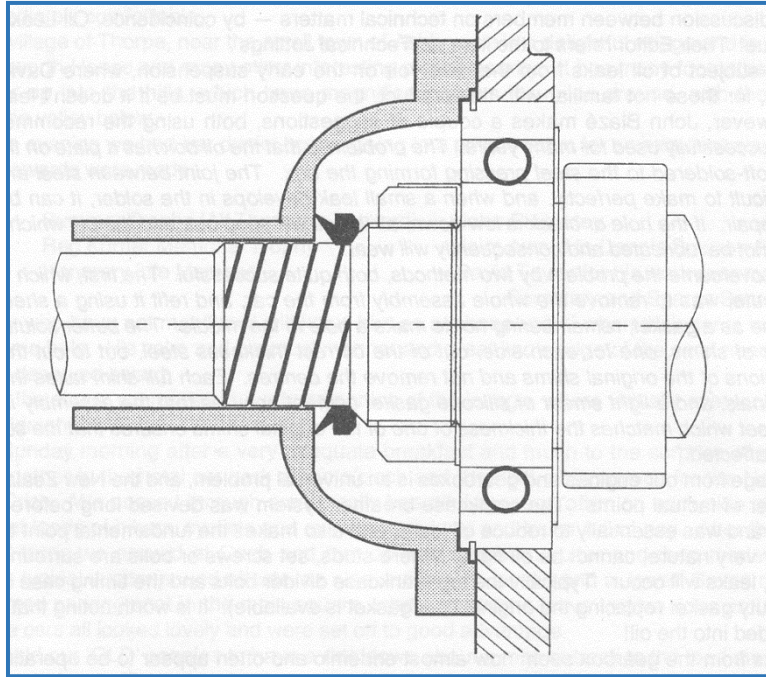


Figure 2. Drawing of Forsheda type seal installation.  
NOT TO SCALE

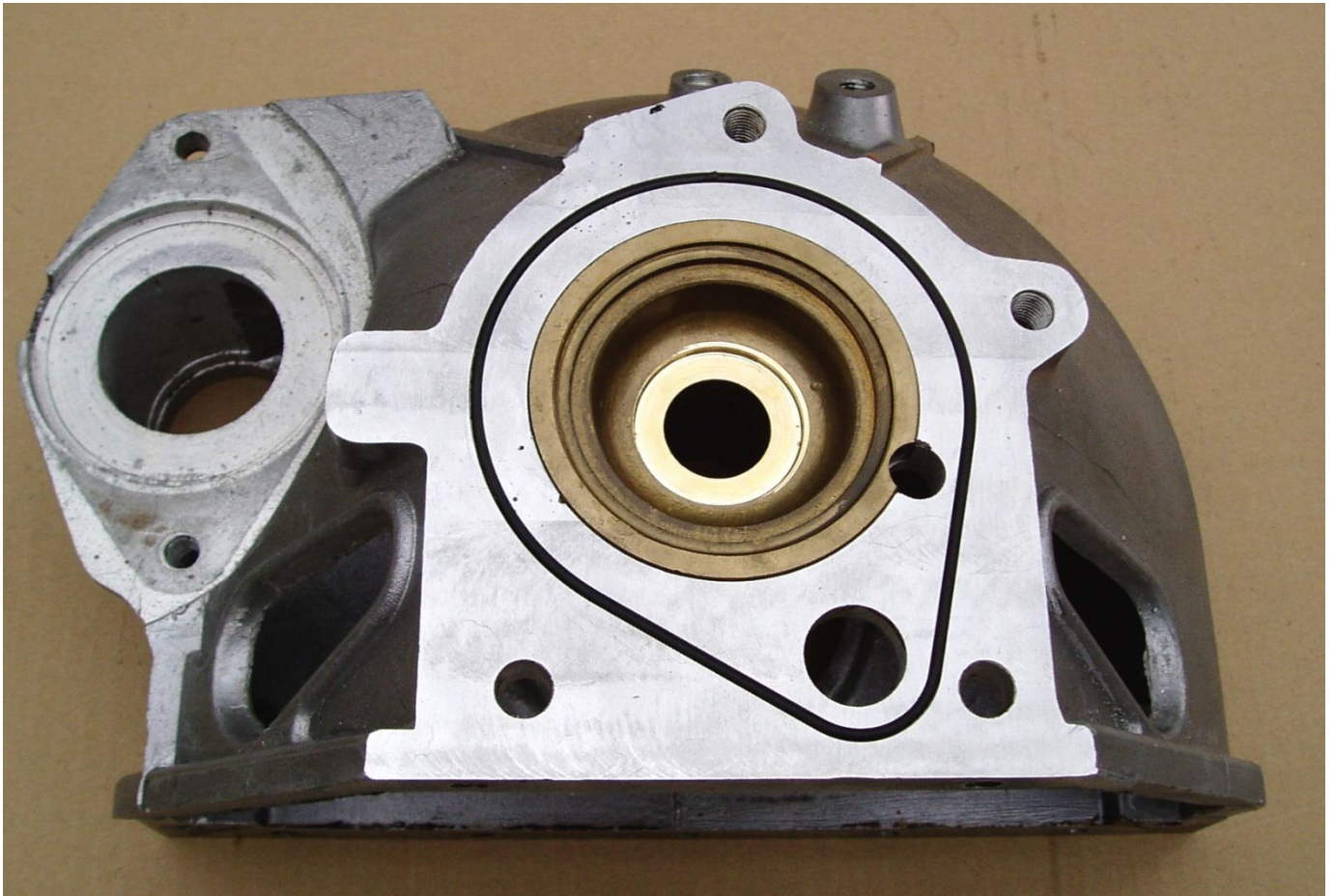
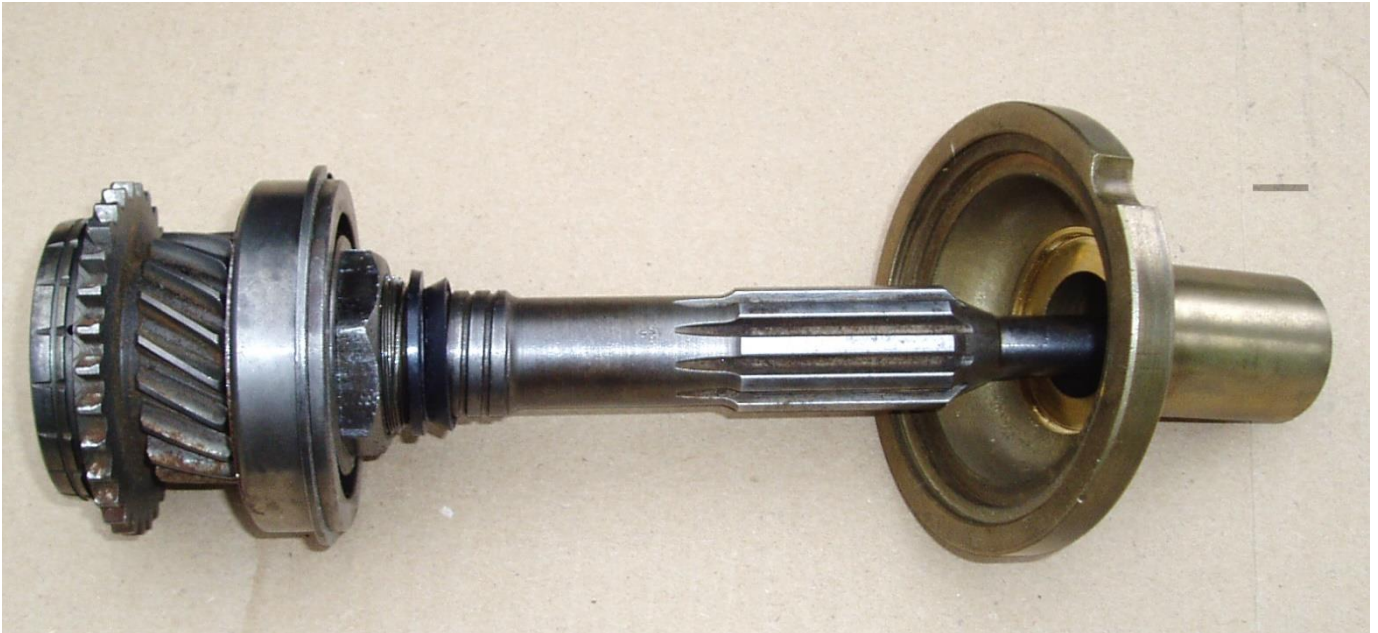


Figure 3. Showing filled breather tract, filled clutch lever pivot hole and 'O' ring cord.  
Also illustrates the machined surface for the Forsheda type seal.



*Figure 4. Illustrates the installation of the Forsheda type seal on the first motion shaft.*



*Figure 5. Illustrates the 'O' ring installed in groove.*