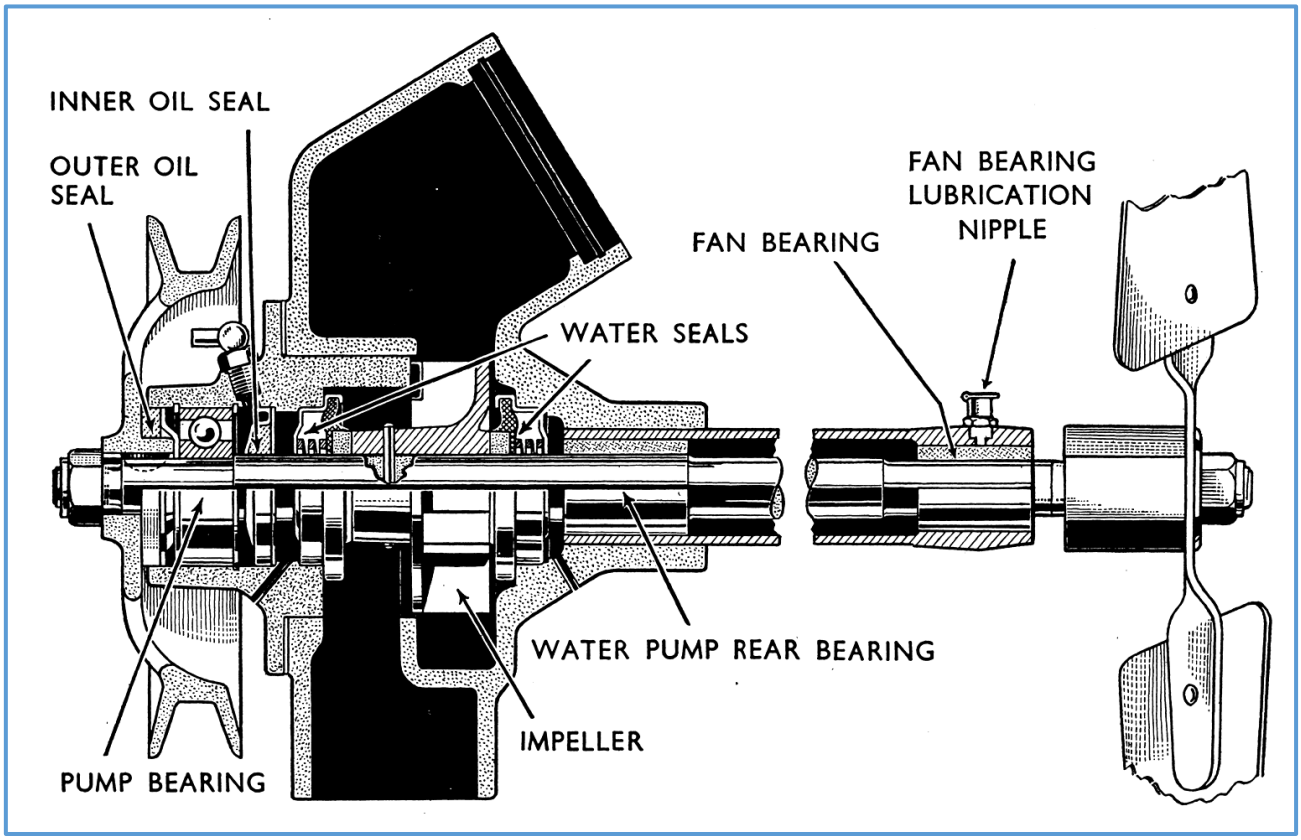
TECHNICAL NOTES SERIES

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



PART XXII – WATER PUMP SERVICE NOTES

The Jowett Car Club of Australia Incorporated is not responsible for any inaccuracies or changes that may occur within this document. Every effort has been made to ensure total accuracy. It is not a Jowett Car Club publication and, therefore, the Club has no control over its contents. These Technical Notes have been compiled by using the latest information available.

ACKNOWLEDGMENT IS ACCORDED TO TONY GEORGE FOR HIS WELCOME INPUT

Compiled by Mike Allfrey – Revised, April, 2017.

Water Pump History

When Jowett Cars Limited released the Javelin motor car to the world, they also released a set of Engineering Specifications to accompany it. These specifications were provided to furnish motoring press journalists with accurate information about the all-new motor car. In those specifications, the cooling system is described thus:

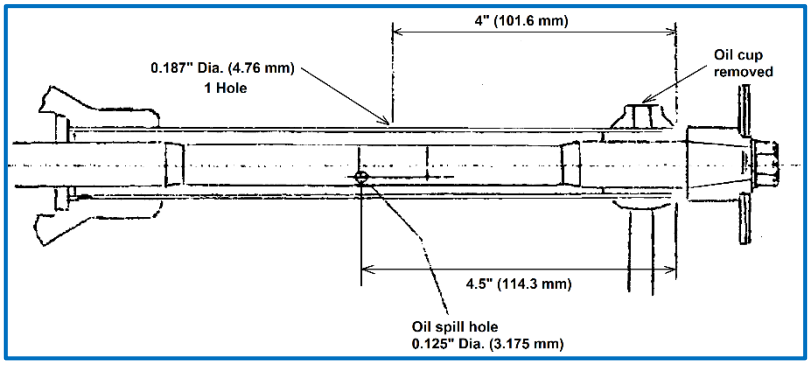
"Thermo-syphon, assisted by a water pump".

The water pump, as fitted to the Javelin and Jupiter motor cars appears to be, very much, an 'added on' item. It is rather illogically located so that it pushes very hot coolant to the radiator. This is not the same method as employed by other types and makes of engine that employ a water pump to push cooled coolant into the lowest point of the cylinder block water jacket and on up through the cylinder head – taking an in-line four-cylinder engine as an example.

Now, nearly sixty years on, we have to 'make do' with what Jowett Cars Limited provided. Before the procedure for converting the pump so that more modern mechanical seals can be installed successfully, it is appropriate to list the changes that were made to the water pump assembly during its production life:

1. The first known change to the water pump assembly, was the incorporation of an oil cup fitted above the rear fan spindle Oilite bush.
2. A slip ring fitted to the water pump impeller to control and increase circulated volume.
3. The internal diameter of the rear fan spindle bearing, Part Number 50600, has been increased to give additional bearing surface.
4. Threaded studs on the fan spindle bearing housing for the fitting of the fan support struts with the use of 'Oddie' (self-locking) nuts. Note $^{5}/_{16}$" BSF Nyloc nuts can be used

   Note: To allow a certain amount of flexibility on the water pump supporting stays, the 'Oddie' nuts must not be tightened fully down.
5. Service Bulletin No. 65 – Single pressing fan with a taper fitting to the water pump spindle.
6. Further to Bulletin Item Number 65, from Javelin Engine Number E2 PD 20379 and Jupiter Engine Number E2 SA 575, a non-stick taper has been introduced to the water pump spindle to facilitate the removal of the fan. This modification incorporates a sharper taper at the fan location end of the spindle. The new type fan and spindle are fully interchangeable as a pair with the types previously fitted, but not as individual items.
7. With the introduction of the radiator mounted oil cooler the fan support tube oil cup, Part Number J54011, was inaccessible and therefore removed. A $^{3}/_{16}$" (4.7625 mm) hole is now incorporated in the fan support tube for lubrication purposes together with a ⅛" (3.175 mm) spill hole to prevent over lubrication.



In addition to the above listed known Service Bulletin items, the following changes were introduced:

8. A shroud was added to the front cover. The effect of the shroud was to guide the coolant through the impeller, thus making the pump more efficient.
9. An additional oil cup was introduced at the front spindle Oilite (Shorlube) bush.
10. At some point, probably at the introduction of the Series III engine, the nose on the drive pulley was extended forwards. This change meant that the front shoulder of the spindle was extended by the same amount.

The Jupiter Water Pump

The Jupiter water pump differs from the Javelin pump only by the length of the fan spindle and fan extension tube. The rear mounting for the Jupiter installation, is a pressed steel bracket with a large section 'O' ring employed as a flexible mounting for the fan.

Deciding On Which Pump Format

Thought of all the changes that were carried out on the water pump during its production life, suggests that certain decisions need to be made prior to overhauling a water pump. There are changes that must be made, and there are some changes that are of an optional nature. First, the mandatory changes.

1. A pump being considered for overhaul will need to have a front cover that features an extended shroud to ensure that the coolant passes through the impeller.
2. The impeller should be fitted with a slip ring.
3. The extension tube should be drilled for lubrication of the spindle bushes. The theory is that the oil level should be such that oil can soak into the ends of the Oilite (Shorelube) bushes. When the car is travelling down hill, the front bush will receive its share of oil.

The optional changes:

1. Use of an extension tube that features 5/8" diameter bushes at both ends.

2. A spindle that has two 5/8” diameter journals for the Oilite (Shorelube) bushes.
3. A fan of the St George’s cross rather than the more common St Andrew’s cross. This option requires that the spindle have a matching taper.

Also in need of consideration are Jowett Car Club of Australia improvements:

1. Front cover – machined to accept a sealed for life front bearing. Part Number 52710-SB. The use of a sealed for life bearing makes the inner oil seal assembly redundant.
2. Front cover and pump body machined to accept Bearing Service Company mechanical seals (PR3440 or C3440). The correct style seal is now available from JCCA Spares.

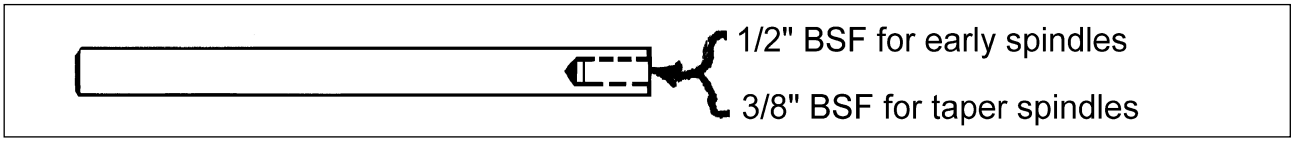
   Note: New-manufacture mechanical seals are now stocked by the club.

   It should be noted that the original style mechanical seal, if available, could have hardened rubber and could start to leak after a short period of use.

   Note: Club stocked mechanical seals are supple.
3. A good quality corrosion inhibitor will need to be added to the coolant.

Dismantling And Assembly Notes

An old, well dried out water pump can be difficult to disassemble. The front cover can become severely corroded within the pump body. Forcing the components apart can cause the flange of the front cover to break. It is a good idea to soak the assembly in either vinegar or diesel fuel for several days, prior to pressing the assembly out from the fan end. Should this operation have to be carried out using a hammer, then the mandrel shown below will be of excellent use.



Screw the mandrel on firmly. It should screw against the end of the ½” spindles, or against the shoulder of a taper end spindle. Doing this will ensure that the threaded portion of the spindle does not absorb load from the hammer blows.

In those instances where front cover setscrew threads in the pump body are stripped, the stripped holes should be tapped out to accept ¼” BSF Recoil inserts. Non-standard, larger diameter setscrews should not be used.

Spindles With A Taper End

It is true to say that taper end spindles are, in Australia, comparatively rare. For this reason alone they require special treatment. In those cases where the extension tube bushing journals are worn, they can be metal sprayed and ground back to the standard diameter. Using this method of spindle reclamation is a cheaper option than having a new spindle machined.

Using the same type of procedure, a worn keyway at the front of the spindle can be fill welded and a new Woodruff keyway cut after the drive pulley and bearing shoulder has been finish-ground to size.

In the event of a taper end spindle being introduced, then it is important that the taper in the fan to be used, must match that of the spindle. If miss-matched, it will be impossible to keep the fan secure.

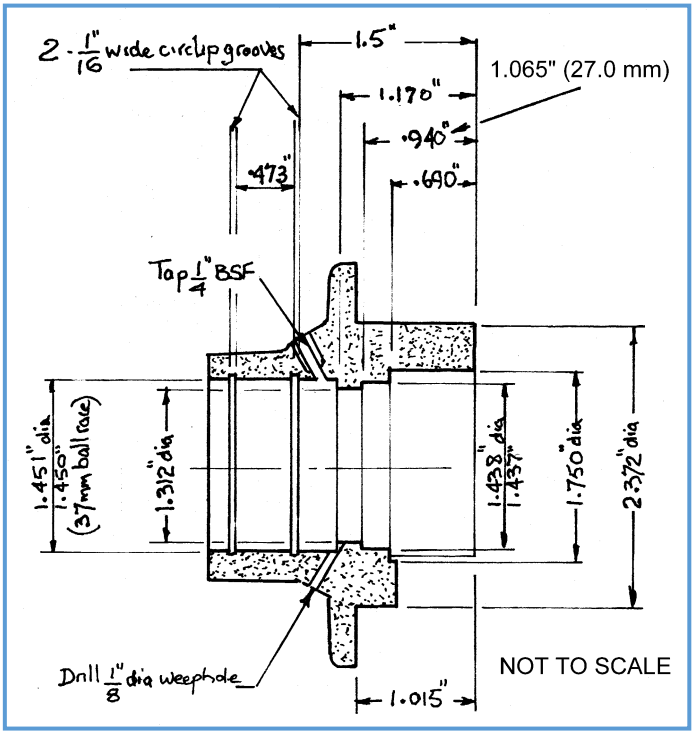
Modern Style Mechanical seals (See also Page 11 for information about mechanical seals)

The authentic style water pump mechanical seal is no longer commonly available. In the past, the Jowett Car Club of Australia has used automotive style mechanical seals sourced from other vehicles. These mechanical seals have gone through an evolutionary change, in that the gland bellows is now within the pressure spring, whereas previously it was external. The mechanical seals supplied by the club, are the modern type.

The Part Number of the currently stocked mechanical seal is 50602-PR3440, and it is a dedicated part number. Two are required per water pump assembly.

Figure 1. Machining dimensions for front cover.

Because the new design mechanical seal has limited crush properties and is slightly different from the original Payen mechanical seal, modifications to the water pump front cover, and the water pump housing, must be made. If these modifications are not incorporated, a binding of the pressure seating spring could occur, thus rupturing the internal flexible gland.

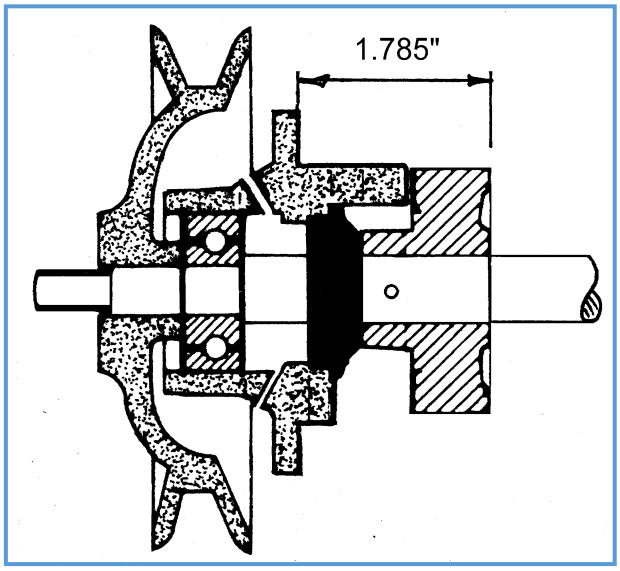


Front Cover Machining

Figure 1, Page 3, shows a cross section drawing of the water pump front cover. The only dimensions of concern are the diameter and depth of the mechanical seal recess in the front cover.

The modification calls for the dimension 0.940”, *Figure 1*, to be increased to 1.065” deep from the rear face of the shroud. The mechanical seal’s seating flange diameter should be 1.750”, The mechanical seal recess diameter should be 1.438” – 1.437” diameter. The mechanical seal body needs to be a snug fit in this dimension to prevent coolant leakage.

Front Housing Assembly Check



Right: Figure 2. Front cover assembly check.

This check provides confirmation that the impeller (cross-hatched) is set to the correct penetration into the water pump body – dimension shown in *Figure 2*. This should be:

1) Gasket face of front cover to rear end of Impeller 1.785" (45.38 mm).
2) Thickness of cover gasket 0.031" (0.8 mm).

Therefore actual projection of impeller into pump body 1.755” (44.58 mm) i.e. (1) minus (2).

Water Pump Body Modification

With the water pump mechanical seal fully pressed into the water pump body, the relaxed front face of the mechanical seal must be 1.616” (41.06 mm) to the rear of the front gasket face, *Figure 3*, refer to Page 6.

Setting the mechanical seal to this dimension ensures that the assembled 'crush' on the spring loaded portion of the mechanical seal is correct. The mechanical seal recess diameter is the same as that for the front cover. The recess for the mechanical seal body and the face for the mechanical seal lip to seat on will have to be machined to provide the 1.616” (41.06 mm) dimension between the front faces of the mechanical seal and water pump body.

Machining Technique – Front Cover

If there is a lathe chuck small enough, the housing can be gripped inside the bearing bore. If the lathe chuck is too large for the method described, a steel mandrel should be machined to fit the bearing bore. The diameter should be such that, if the aluminium housing is warmed, it will shrink securely on to the mandrel as it cools.

Machining Technique – Water Pump Body

The front face and the bore for the front cover spigot must be clean and in good condition. The body assembly should then be mounted on a chuck with the jaws inside the front cover bore. For some lathes, it may be necessary to press out the extension housing, after noting the overall length from front cover gasket face to the rear face of the shaft bush. The orientation of the oil cup should also be carefully noted. The rear boss for the tube can then be lightly machined to provide a concentric grip for the lathe chuck when machining for the new mechanical seal.

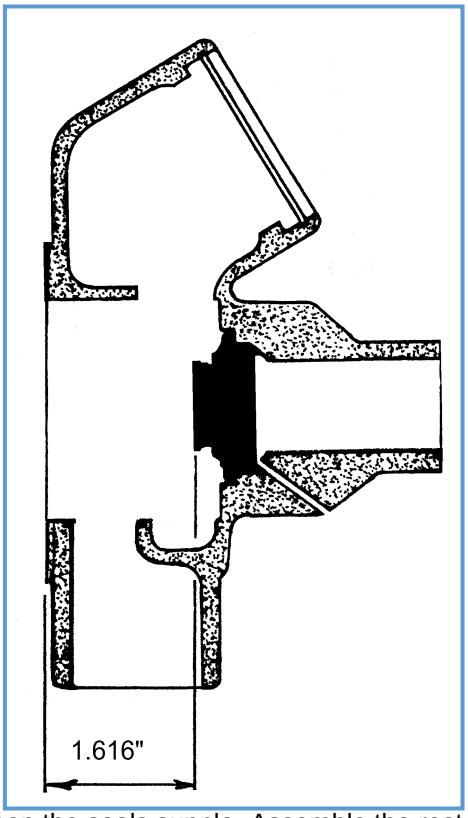


Figure 3. Dimension taken from front face of relaxed mechanical seal, with the seal in its ‘home’ position.

Assembly of the Components

Both gasket surfaces must be absolutely clean prior to assembly. Apply a light smear of sealant to the body of each mechanical seal before they are pressed into the housings. Both mechanical seals must be pressed fully home, using the correct mandrel, so that the flange lip of the body seats on the machined recess. A genuine gasket at the front cover should be used. A smear of Loctite 587 Superflex Ultra Blue should be applied to the spigot of the front cover and its shroud where it fits into the water pump body. This will make future dismantling easier. Apply a light smear of Loctite 587 sealant to the joint faces and some good quality grease to the fan shaft where it runs in the support bushings.

The front housing, seals, shaft and impeller assembly should be assembled into the water pump housing as an assembly. The front cover grease nipple should be aligned at the top and the cover bolts tightened evenly. Check that the shaft is free to turn with a slight resistance. It is worthwhile applying a smear of high temperature grease to both faces of the sealed bearing to help keep the seals supple. Assemble the rest of the water pump as described in the Jowett Maintenance Manual.

IMPORTANT: After assembling the water pump, the simmons nut at the front that secures the drive pulley, outer oil seal pressing and the bearing must be dead tight. Failure to ensure this will cause damage to the pulley, drive key and the spindle.

WARNING! The water pump 'modern' mechanical seals supplied by the Jowett Car Club of Australia Inc. are the result of a great amount of research and, therefore, are of consistent quality. There are a number of mechanical seals imported by the automotive trade that are of very similar external dimensions, but do have varying amounts of spring loaded travel. In some cases mechanical seals can become over stressed during assembly and leakage or damage to other components will occur.

VERY IMPORTANT! A good quality corrosion inhibitor must be used with the modified mechanical seal. In this design, the spring is exposed to the coolant and, if no action is taken, will quickly corrode.

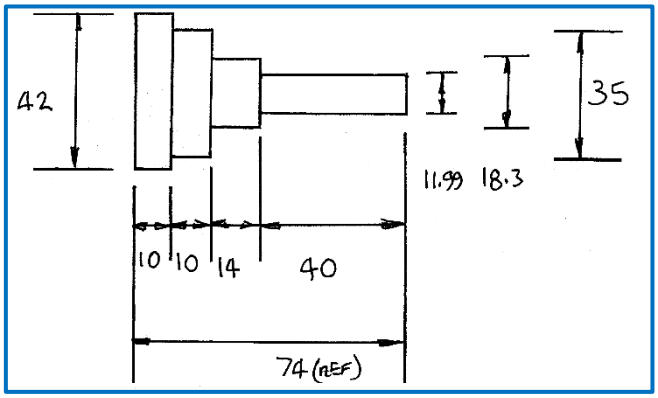
WATER PUMP MECHANICAL SEAL CONVERSION – INSTALLATION MANDRELS

NOTE: The latest style (Holden type with internal gland) water pump mechanical seal requires pressing into the water pump housings. To do this accurately, suitable mandrels are required to, firstly, correctly align the mechanical seal assembly and, secondly, provide an accurate pressing device to press the mechanical seal into its home position. These mandrels rely on the front bearing inner race, and the rear bushing, to provide accurate alignment.

Right: Water pump mechanical seal installation mandrel – front seal.

Do not scale. All dimensions are millimetres. Dimension 11.99 mm after finish grinding.

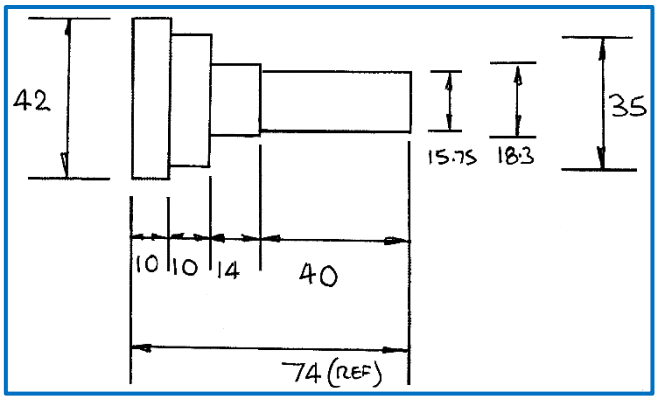
Dimensions 11.99 mm, 18.3 mm, 35 mm and 42 mm are all diameters



Right: Water pump mechanical seal installation mandrel – rear seal.

Do not scale. All dimensions are millimetres. Dimension 15.75 mm after finish grinding.

Dimensions 15.75 mm, 18.3 mm, 35 mm and 42 mm are all diameters.

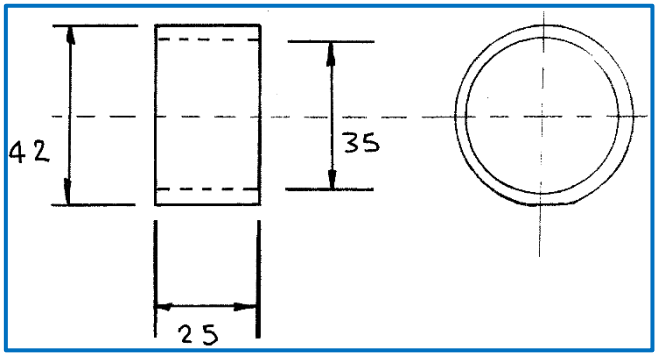


Right: Water pump mechanical seal installation mandrel – spacer ring (2 off per set).

Do not scale. All dimensions are millimetres. End view not concentric, this is a sketch.

Dimensions 35 mm and 42 mm are both diameters

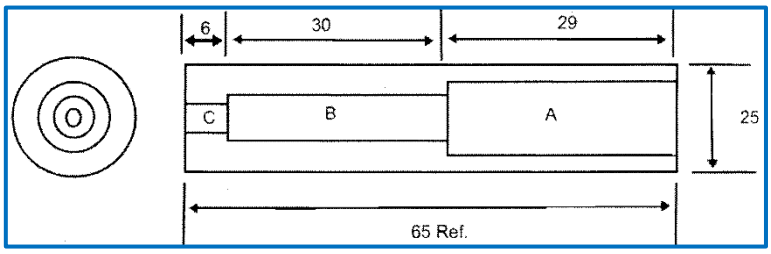
NOTE: Ring to be a snug fit on the 35 mm diameters of front and rear mechanical seal installation mandrels



Mechanical Seal Fitting Instruction

The mechanical seals must be installed using a mandrel and a suitable press. Locate the mechanical seal inside the cavity in the mandrel and install the assembly into the bearing or bushing. Once the mechanical seal is correctly aligned, gently press fully home. Do not use a hammer to install these mechanical seals, irreparable damage will result. Use a suitable sealant around the mechanical seal's locating flange prior to installation.

Right: Jowett water pump impeller location gauge.



NOTES: All dimensions in millimetres:

Dimension ‘A’ = 16 mm Diameter.

Dimension ‘B’ = 12 mm Diameter.

Dimension ‘C’ = 10 mm Diameter.

Drawing is not to scale.

This gauge has been designed to ensure that the impellor can be correctly located on the spindle. The front face of the impeller, that which contacts the front mechanical seal must be set at 29 mm from the bearing shoulder on the spindle to the impellor front face. The gauge should be placed on the shaft, after pressing the impeller on to the spindle to 35 mm from the shoulder, and located with a nut and washer, to hold firmly in position. The impeller can then be pressed home against the gauge, drilled and pinned while the front face is held firmly against the gauge.

ADDED INFORMATION

Original Style Mechanical Seal

The Jowett Car Club of Australia is always observant of the best spare parts options for its members. This keen observance has brought many benefits. In the case of the Javelin and Jupiter water pump, being vigilant has really paid off. It was true that mechanical seals to the original Payen specification became very difficult to procure. There were some stocks of new old-stock mechanical seals that had been in, very likely, nondescript storage for many years. These mechanical seals had suffered hardening of the rubber component and were being sold at inflated prices. The hardened rubber tended to split not long after installation, calling for yet another water pump strip down.

The Jowett Car Club of Australia now stocks mechanical seals manufactured in the old style. These mechanical seals are manufactured using modern materials, but are visually the same as the original mechanical seal. The Jowett Car Club has obtained a large stock of these mechanical seals. They can be easily identified by their yellow packaging boxes that bear the legend, ‘Avon Seals Pvte Ltd’.

It is important to note that the Avon Mechanical Seal will fit in place of the Bearing Service Company’s mechanical seal PR3440. It can be seen from the modifications and drawings that go before, were made to accommodate the deeper casing of the modern mechanical seal. The drawing kindly supplied by Avon Seals Private Ltd, shows reasonable clearance behind the mechanical seal’s casing. In actual fact, on the drawing, the mechanical seal sits only on its seating flange. This is important, in that it ensures that the sealing rings are properly aligned with the faces on the impeller.

April, 2008.

Original Type Mechanical Seals

From 2008 the Jowett Car Club of Australia Inc., has held good stocks of original-style mechanical water pump seals. The type we know as Payen mechanical seals. This means that, if the new-manufacture seals are employed, there is no requirement to machine water pump components, unless corrosion affected areas are being repaired.

The new-manufacture mechanical seals are vastly superior in performance than the ‘modern’ (cheaper) style seals currently available in Australia.

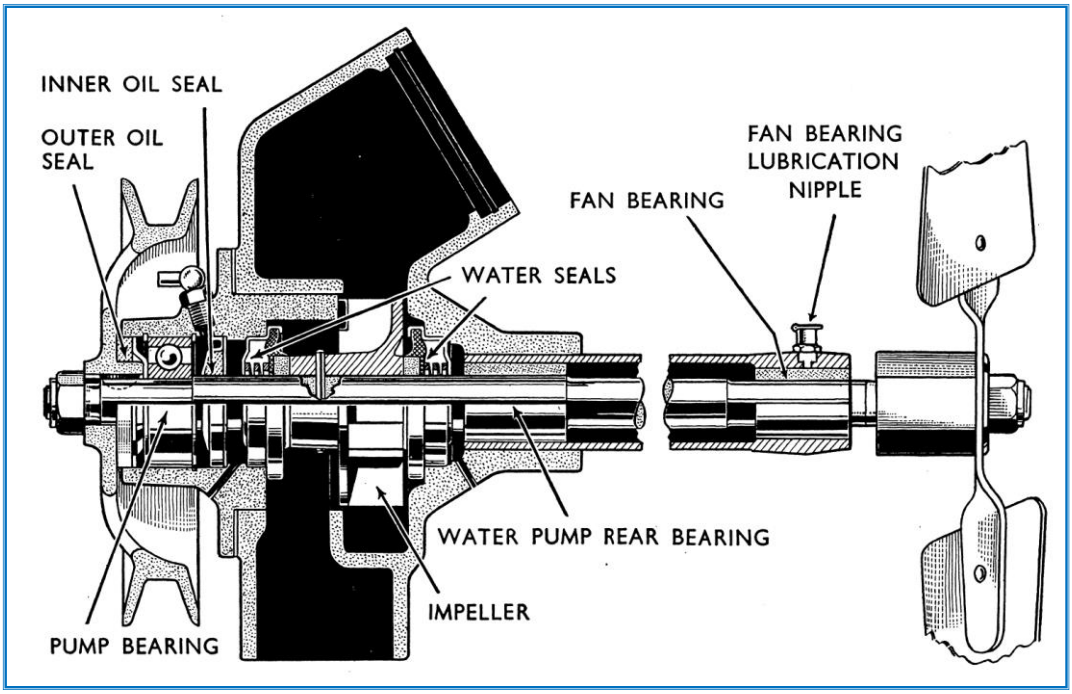
Be sure to use mechanical seals stocked by the Jowett Car Club of Australia Inc.

14th December, 2010.

NOTE:

On Page 8, there commences a description of options for fitting Avon Mechanical Seals.

A MATTER OF IMPORT – A VIRTUAL NON-EVENT



A cross section of the Jowett water pump assembly.

Introduction

I have been asked to write in a non-technical manner about the water pump mechanical seal saga. This will be quite difficult in that our research into an alternative seal has been purely technical! As they always say, "You can't please them all, all of the time!" However, anyone contemplating work on a Jowett water pump, should have a basic understanding and also be aware of the amount of voluntary work put in by such members as Tony George, Brian Holmes, Tim Kelly, Peter Coakley and, to a certain extent, myself. It is also evident that our Jupiter has a sixth sense, in that it waited for some decent quality mechanical seals to become available, before it decided to exhaust its front bearing's grease all over the front of a nice clean engine.

This last episode has triggered a thorough overhaul, yet again, of the recalcitrant pump. However, before we start to discuss that matter, let's have a look at the mechanica seal situation. First a spot of history and then there will be a description of the pump's overhaul. The mechanical seals discussed here are those that are fitted to the fron and rear of the pump's impeller. The seals stop the escape of coolant by having spring loaded carbon rings that, due to their matching faces permit the impeller to rotate and yet, in theory, keep the coolant in its proper place.

So, first up, a fairly technical drawing, from the Javelin and Jupiter Maintenance Manual, of the Jowett water pump assembly. The drawing, at the top of the page, contains several cross sections. But it best illustrates what is being discussed here. The pump shown here, taken from the Javelin/Jupiter Maintenance Manual, shows what is actually a compromise combining various upgrades. The illustration has also been digitally doctored to include the extension shroud on the front cover. In truth, showing a taper fitting of the fan in conjunction with a small diameter rear spindle is not correct. The seals discussed here are shown as 'Water Seals' in the drawing above.

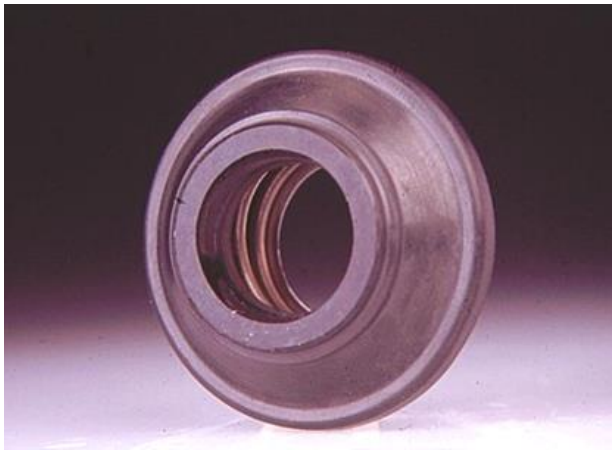
There have been several stages in the saga of the Javelin/Jupiter water pump mechanical seal project. The pump, that '*assists a thermosiphon cooling system*', to use words issued by Jowett Cars Limited, is but a small component part of the entire motor car – but its importance in two disciplines, circulating coolant and keeping that coolant inside the system, is well known. For some time now, our club has manufactured pump components such as pullies, spindles, impellers, front covers and pump housing bodies. All of this to ensure that our beloved Javelins and Jupiters are kept in reliable order. Lately, beyond our control and in the continuing march of progress, it had become very difficult to obtain mechanical seals of the same type as the originals. A great amount of research was put in by Tony George, to ensure that a 'modern' type seal could be installed in the front cover and the pump body. This required some machining to ensure that the new style mechanical seal had sufficient room for its deeper spring housing. This was all very well, until it was found that mechanical seals purchased from various vendors, to suit the one Holden specification, were in fact very different. The Jowett pump, being virtually on its own having two seals, was a candidate for double misfortune. It was discovered that, even though, ostensibly, seals were supposedly the same, they most certainly were not. Two mechanical seals that appeared visually the same, could have different amounts of spring travel.

In the Jowett application, this meant that, in some cases, during assembly, the gland spring could become coil-bound and rupture the rubber internally located sealing gland – before the pump had even done any work! Tony George put in a great amount of research to find a mechanical seal supplier who could supply seals that were consistent in spring travel and in spring tension. He found that the seals stocked by Bearing Service Company stores met our demanding criteria. I have to say that, even after such research, there is an element of doubt about the BSC seal assembly. Firstly, at the same price, some come complete with a ceramic ring and rubber ring

sleeve, some don't, even though they carry the same part number! Secondly, a pair of BSC seals were installed in Richard Homersham's water pump. Within two years they leaked profusely – both of them. After dismantling the pump, it was found that the seals had seized and the springs could not exert carbon ring contact pressure on the impeller faces, hence copious leakage of coolant.

Investigation into another source of seal supply commenced. Peter Coakley kindly offered sample MAN bus engine seals for evaluation. A pair of these seals have been working for a long time in his Javelin, without any sign of leakage. This resulted in a visit to a MAN dealership in Dandenong and we found out that the seals were part of a kit that cost $85.00 each. It is very likely that there would not be a single Jowetteer willing to fork out $170.00 to resurrect his water pump! We did try to obtain a broken-down part number for the MAN seal, but it was not possible. The Internet's guru, Google, was consulted to try and find the maker of the MAN seals. This was a dead end, and it was found that most avenues finished up in China. The MAN seal looked really well made and, if made in Germany instead of Brazil, would have possibly justified the $85 on its own!

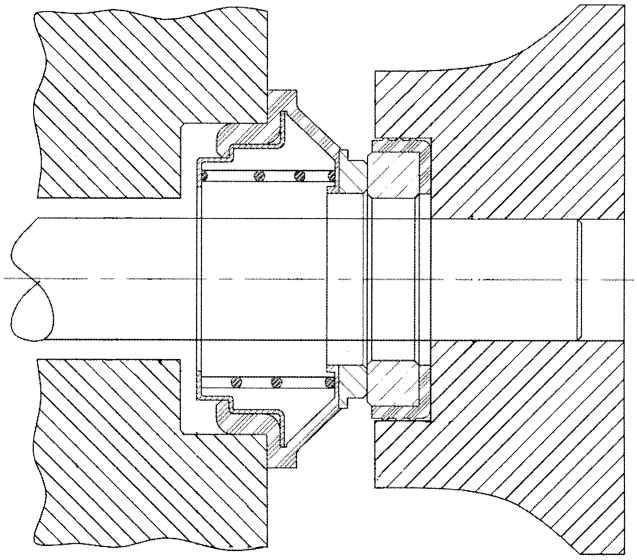
The Avon Mechanical Seal Assembly



Above: The Avon Seals 'B' type mechanical seal.

Then I had a brainwave. I Googled "Automotive Water Pump Seals" and surfed a few Websites until I came upon a very interesting site – Avon Seals Private Ltd. Lo! and behold! There on the screen was an image of our original style seal! I had a look at their seal for 16 mm shaft size and up came all the pertinent dimensions that matched our water pump. So much work had been done, over the past few years, that the dimensions were well known. The "Contact Us" tab was clicked upon, and an E-mail address was presented. An initial enquiry drew the response that yes, the seals are still being manufactured and, yes, Avon were prepared to sell small quantities direct to our club. They also advised that the seals are still used in the Hindustan Ambassador (1956 Morris Oxford to us) motor car that is still in volume production. Because of that this style seal should remain in production well into the foreseeable future. The locals get really long lives out of their cars!

Avon Seals' sales department very kindly E-mailed an engineering drawing of the mechanical seal installation, so at last we had a drawing that informed us just how much crush should be applied to the spring loaded carbon ring.



Right: Part of the mechanical seal installation drawing. At left is the stationary component – pump housing or front cover. At right is one face of the impeller, with a ceramic ring installed.

Avon Seals, as you may have worked out by now, is based in India, and through relatives in Bombay, four seals have arrived for evaluation. One was quickly sent over to Tony and he has expressed great excitement about our 'find'. The seal discovery has also banished our concerns with the 'modern' type of mechanical seal. All of this has worked out most conveniently, having relatives in India willing to pay for the seals locally, and the fact that I will be in India in November to pay for them, means that our club can enjoy really cheap water pump seals of the original type, without having to pay crippling bank transfer fees. A large quantity has been ordered and they are now in club stock.

One point that should be noted is that the Avon mechanical seal will fit in a cover or pump body that has been machined to accept the 'modern' type seal. The Avon drawing shows a typical seal installation with open space behind the seal's spring casing and the seal seated on its lip for location purposes.

Getting Technical

For those of us who have no desire to read technical matters, you can now skip to Grumpy Doug's next juicy item of non-technical stuff.

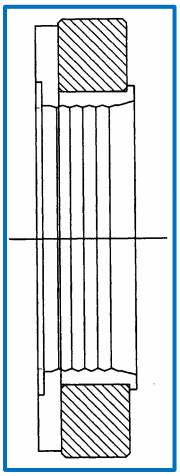
Avon Seals, as mentioned above, have sent us an installation drawing of their 16B36 mechanical seal. In this drawing there is shown a section through an impeller which shows a ceramic ring and rubber boot type seal, that is employed as a replaceable wear surface at the impeller. The ceramic ring is shown as being sealed inside the counter bore in the impeller.

After receiving this drawing, Avon Seals were asked if they could supply a ceramic ring and seal assembly that fitted on the spindle itself. Another drawing, illustrating such a ceramic ring installation was soon sent over the ether. The overall diameter is somewhat smaller and is the same diameter as the nose of the Jowett impeller. Its rubber mounting boot is a good sealing fit on the spindle,

and incorporates a vertical leg that seals against the impeller face. There are four major attractions that justify its use in a Jowett water pump:

1. With the mechanical seal's carbon face against the revolving ceramic face, wear is restricted to a replaceable component.
2. With the rubber seal being a sealing fit against the face of the impeller and on the spindle diameter, coolant can not migrate along the spindle. This may sound strange, but corrosion inhibitors contain ethylene glycol which has self seeking qualities that can be envied, or – in our application – utterly frustrating. Corrosion inhibitor can migrate through machining marks, and if an impeller is only marginally a tight fit on the spindle, migration will most certainly occur! The same applies at the locating Mills pin.
3. An impeller using ceramics as wear surfaces, can be run dry for long periods. Not much of a bonus for my application – but it is there.
4. Bedding in time for the carbon ring is greatly reduced,

Four of the spindle mounted ceramic rings were ordered and came with the sample seals. A couple of new impellers were also ordered from club stock. Initial investigation has shown that it will be a simple matter to machine sufficient metal from the front face of the impeller to allow for the thickness of the ceramic ring assembly. The rear face could be a bit more difficult, in that a recess, as deep as the ring thickness, will need machining into the face of the impeller. It appears that there is enough metal to allow a recess to be machined, Setting up a water pump in this way is very attractive.



Left: Ceramic ring that mounts on the spindle. The right hand face is that which contacts the carbon ring on the mechanical seal. The ceramic ring alone, is cross-hatched.

*Note the sealing ribs on the inside diameter of the rubber '***L***' seal.*

The assembly drawing that Avon Seals have sent shows that the 'crush' at the carbon ring face should be 2.5 to 3.0 mm. This is the dimension that will be aimed for during pump assembly. This crush factor will be used in close conjunction with Tony's research dimensions. It has to be remembered that a certain amount of Tony's research was based on guesswork and a degree of assumption. We have never had the luxury of a Jowett Cars Limited assembly drawing for neither the water pump nor the mechanical seal.

Now it gets a bit personal. Over the forty-plus years of ownership, several mechanical seals have been installed in my Jupiter's pump. The first time, I used a pair of Ferguson TE-20 tractor seals. Simply because they looked the same and were cheap. Having never seen, nor used, a genuine Jowett Cars Limited seal, I have often wondered if I had used the correct specification seal. While installing the Ferguson seals, it was felt that the crush was excessive. When the pump was dismantled for a subsequent overhaul, inspection of the seals showed that the carbon ring had been pushed flush with the seal's mounting lip – probably 7 mm of crush. Here in Australia, Holden water pump seals have been used for close to fifty years, but on dismantling local pumps, the seals have been found to have worked with the same amount of crush as the Ferguson seals. The Jupiter Owners Auto Club currently use Triumph seals. Triumph? The sports car with a tractor engine! Ferguson. The Standard Motor Company built Ferguson tractors as well as Triumph cars, and it would be certain that there would have been commonality with respect to those seals.

After all of that, there is still a doubt in my mind that the Ferguson/Triumph/Holden seal is not the same as that used by Jowett. Or, did Gerald Palmer opt for extra crush for good measure? 'One for the pot', thinking? It is understood that the original seals were made by Payen. Did Payen manufacture several versions of the mechanical seal? Would Jowett's production level have justified a different (unique) seal?

A virtual non-event? Well, we have put in a fair amount of work into sourcing a 'modern' type mechanical seal that was consistent in specification, while all the time an original style seal was still being manufactured! Special thanks are due to Tony, Brian, Peter and Tim for the research that has been put in to this project.

It is my intention to overhaul my water pump, without delay if possible, while incorporating modification of the Jowett impeller so that ceramic wear surfaces can be installed. Watch out for how this is done.

Mike Allfrey.

A MATTER OF IMPORT

(*The Second Instalment*)

At the conclusion of the first part, it was mentioned that the Jupiter's water pump would be overhauled without delay. If possible. Well there have been delays, but they have been very useful delays and, such delays will be recorded in detail. Before the delays are discussed, I will endeavour to describe in detail the circumstances surrounding our Jupiter's pump problem(s).

It was while driving to Camperdown for the 2007 Jowett Jaunt, that the rev-counter indicator needle settled back on its stop for a spell of a few seconds. The weather was atrocious and, having the hood down, we elected to keep going as we were only a short distance from our motel and dryness. While the rev-counter was enjoying its rest, there was a drop in engine power, the ammeter went absolutely ballistic and there was a loud clacking sound from the voltage regulator. Quite entertaining stuff really!

Suddenly, as we entered Camperdown, the situation returned to normal. Next morning a quick look revealed nothing except some grease thrown over the distributor body. A spot of over enthusiasm with the grease gun just before we left was thought to be the cause. The Jupiter's next important outing was to the British Motoring Show and there, the bonnet was opened for the non-believers. It was quickly closed again after noting the amount of grease over the front of the engine!

All of this was the instigator, as well as Richard Homersham's pump leakage, for the search for a half-decent mechanical seal, as explained in the first

installment. The water pump was removed from the car and dismantled. This was a most revealing episode. The following points were noted:

- The front ball race had completely collapsed. The cage locating the balls had broken up and the spindle had been effectively running in the Shorlube bushes alone.
- The pressing that is located in front of the bearing had cut a groove in the front cover.
- The two Bearing Service Company ('modern') mechanical seals fell to pieces.
- There was very uneven wear at the bush journals on the spindle. Somewhat baffling.
- The two Shorlube bushes were excessively worn.
- The spindle was bent, just forward of the front bush.
- The impeller faces where the carbon rings had made contact were worn.

The incredible thing about the whole situation was that, in the described condition, the pump did not leak coolant while stationary! There was evidence of coolant having entered the chamber behind the bearing and having migrated into the bearing. In spite of that, there was no sign of external leakage. The pump had been overhauled two years previously, and the current situation was not at all good. This time around, it was going to get a thorough overhaul – no matter what!

It was very fortunate that, right at this time, our club was embarking on a production run of front covers. Straight away I placed an order for two of them. That was the first step. Then the spindle had to be dealt with. The old worn impeller was removed and the spindle was taken to Wagma Engineering to have the bushing journals metal sprayed and ground back to the standard nominal ⅝" diameter. This was when the bend was discovered. Thankfully, Wagma are experts in reclaiming machined shafts and they did a splendid job on the spindle, even restoring the corrosion pitted portion of the shaft in front of the impeller. It was a very expensive operation, but probably better than risking a mismatch of fan tapers if new shaft had been bought from the Jupiter Owners Auto Club. First delay, Wagma were extremely busy and could only fit my job in between bigger jobs. No matter, so long as it was right when they had finished with it.

The next delay was getting the two new impellers that had been ordered, machined to accept the ceramic rings for the Avon mechanical seals. Once I had a pair of the ceramic rings in my hand, the decision was readily made to use them. This entailed creating a cross section drawing of the machining required. The old impeller was cut through along its axis to verify that there was enough metal to cope with a recessed, flush-fitting ceramic ring.

It was found that the task could be done successfully, and the recess was designed so that the ceramic ring and boot assembly fitted as a sliding fit into the recess and sat flush with the rear face of the impeller when pushed fully home. It was then a simple matter of removing sufficient metal from the impeller nose so that the front face of the ceramic ring would replace the existing cast iron. It has to be appreciated that machining the recess and the nose had, actually shortened the effective length of the impeller. The club supplied impellers have been bored to match the smallest diameter spindle that was in club stock at the time. On my re-claimed spindle this provided a 0.002" press fit. It was decided at this time to dispense with the Mills pin and instead use a single 5 mm grub screw to secure the impeller in position. The machined impeller was installed on to the spindle using a smear of Loctite Antisieze anti galling compound. Not having a press, I was in a spot of trouble. Then I developed the notion that I could use my hydraulic jack under the work bench which has a very heavy plate in the middle. To my dismay, the entire work bench lifted and not much happened at the impeller, a considerable weight.

Figure 1: Rear face of impeller with machined recess.

After a while, it was decided that the frame of my independent work bench could be adapted. This worked well and the impeller was pressed too far onto the spindle. With my 'press' set up, it was too difficult to observe the impeller's actual position. The spindle was clamped in the bench vice and a three-legged puller was used to pull the impeller forward. Before the puller was attached, a large outside diameter half-inch plain washer was clamped against the ball bearing shoulder with spacers and a well tightened nut. Using a vernier calliper to measure the distance from the bearing shoulder to the nose of the impeller. As the puller exerted force, the impeller slid forward on the spindle.

The impeller was pulled forward until the dimension from the front face to the bearing shoulder was 34.45 mm. This, with the front ceramic ring in place, provides exactly 29 mm. This is a key dimension when working on a Jowett water pump! Once the impeller was set correctly, the grub screw was installed and tightened. A minimal smear of rubber grease was applied to the ceramic ring boot and the assembly was slid over the shaft and pushed into the recess. Care needed to be taken to ensure that not too much grease was applied, otherwise a hydraulic lock could prevent the ceramic ring from being pushed fully home into the recess.

The front ceramic ring was pushed into place against the nose of the impeller. So far so good. This assembly was put aside and delay number three came into play. I had ordered and received two of the new water pump front covers. It was a surprise to find that the machined diameter for the mechanical seal to seat against, was not

continuous in its diameter; at the area where the shroud opening is. This seems to be a dimensional error that has carried through earlier production runs. It is thought that the pattern used for making the castings should have about 0.040" added at the shroud opening shoulder between 'A' and 'B', *Figure 3*. (Right)

In *Figure 3*, is shown the deeper machining that was carried out to provide a flat surface for the mechanical seal lip's seat. Having the luxury of two front covers to play around with, the one shown here was machined to just clean up the seating area, The second cover was more adventurous, it was machined 0.080" deeper to effectively reduce crush at the mechanical seal. This action was purely experimental so that differing crush settings could be made using shims under the mechanical seal lip. Using this cover a suitable shim has provided an ideal 0.114" (2.9 mm) of crush That is a useful 0.020" less crush than would have been there with the less machined cover.

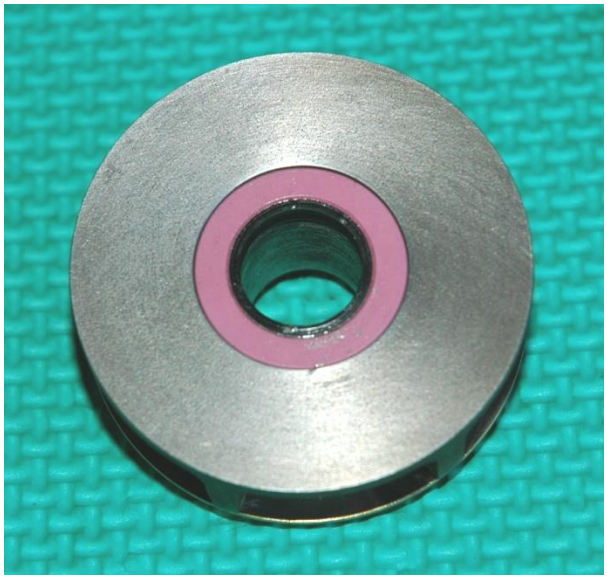


Figure 2. Ceramic ring in impeller.

The method used for measuring the crush at the mechanical seal was as follows:

1. Assemble ball bearing and circlip in front housing.
2. With ceramic ring installed on spindle, fit front cover assembly to spindle assembly/.
3. Using suitable spacers, and a ⅜: BSF nut, tighten the bearing against the spindle shoulder. Note that the mechanical seal has not yet been installed.
4. Using good quality feeler gauges, accurately measure the gap between the rear face of the shroud and the front face of the impeller. Record this measurement.
5. Remove the front cover assembly from the spindle assembly.
6. Install the front mechanical seal, making sure that it is seated all the way round its lip.
7. Clamp the spindle in a soft jawed bench vice. Offer up the front cover assembly and, using the spacers and nut, tighten the nut until the mechanical seal ring just contacts the front face of the ceramic ring. This can be observed through the front cover shroud opening.

   Note: The mechanical seal and the ceramic ring must be pushed firmly into place.
8. Using the feeler gauge set, measure the gap as described in Step 4. Record this measurement.
9. To calculate actual crush at the mechanical seal, subtract the measurement taken at Step 4 from that taken at Step 8. The result is the amount of crush there will be when the pump is assembled.

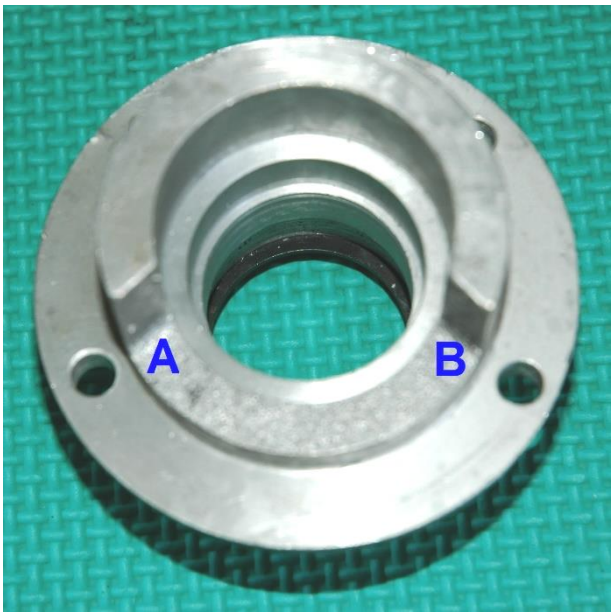


Figure 3: Front cover showing area machined.

The front cover and spindle assemblies were then clamped firmly, and, essentially, the same exercise was carried out for establishing the crush at the rear seal:

1. Oil the spindle bush journals and ensure that the spindle is a free spinning fit in the extension housing Shorlube bushes.
2. Push the rear mechanical seal fully home in the pump body.
3. Insert the spindle assembly rearwards until the ceramic ring just contacts the mechanical seal, use the front cover setscrews, without spring washers, to hold this position.
4. Using the feeler gauges to measure the gap between the gasket faces of the front cover and pump body. Record this measurement.
5. Accurately measure the thickness of the gasket. (typically 0.070")
6. To calculate the amount of crush, subtract the measurement taken in Step 5 from that recorded in Step 4. The result of this calculation is the actual crush at the rear mechanical seal.

In the case for my pump, the crush at the front seal is measured at 0.114" and for the rear, was measured at 0.116" – probably as equal as can be achieved! A variance of just 0.002" is not worth worrying about. This is a most satisfying result, and fills me with confidence in the water pump's increased durability.

Figure 4 shows the relationship of the front ceramic ring and the mechanical seal after installation. The ceramic ring can be seen, in this illustration, just above the glint of the impeller's brass shroud. The mechanical seal can be seen just above the ceramic ring.

As mentioned in the first installment of this article, I have never seen a genuine Jowett water pump seal. John Blazé in deepest Cornwall picked up this comment and very kindly sent a used genuine seal for direct comparison with the Avon mechanical seal.

Figure 4: The assembled front cover.

The only difference found between the two mechanical seals was that the original Jowett seal had a slightly gentler spring tension. This could be for a couple of reasons. Firstly, because the seal tension is relied upon for holding the ceramic rings in place. Secondly, engines are running hotter these days. This extra tension, in the 'modern' style CBC mechanical seals probably accounts for the wear observed at the original impeller.

The next delay, self imposed this time, has been the scheduling of our *Workshop Wisdom* Saturday afternoon session to show members of the Victorian group the steps that have been taken to make our Jupiter's water pump more durable and, with that, supremely reliable. The pump now sports new Shorlube bushes that have been soaking in oil for a long time, new mechanical seals of the proper type, a new fully sealed front bearing (made in Germany), a new front cover and bearing retaining circlip, new impeller and a fully reclaimed spindle. Surely this package will be reliable, providing yet another trouble-free aspect of Jupiter motoring.

The major worry that has come out of the whole story, is the falling to pieces of the 'modern' BSC type seals. The front seal did allow coolant to enter the front bearing. What is not known is whether the coolant penetrated the bearing chamber after the bearing had collapsed and its sealing ring had been forced out of the rear face of the bearing, when it collapsed. Coolant had been disappearing for a while and it now has to be assumed that it was at the water pump front mechanical seal. There was minimal evidence of leakage at the drain hole, but if it was leaking while the engine was running and the bearing was damaged to the extent that the spindle could chatter, then, dynamically, coolant could bypass the drain hole. All very ponderable.

The title of this article, *A Matter of Import – A Virtual Non-event* is very apt. After all of the good work in researching 'modern' mechanical seals, we are, essentially, back where it all started. Our club now has good stocks and further supply of genuine style mechanical seals – if only we had known sooner!

PS – As of 2nd April, 2017 not a drop of coolant has escaped at the modified seal installation.

Mike Allfrey.