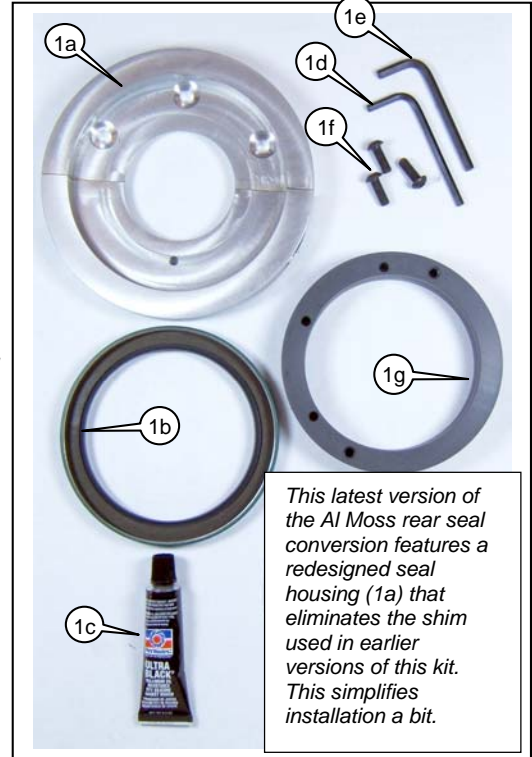


Supplemental Information & Instructions for 433-421 **Improved Oil Seal Conversion Kit** MG T Series Engines

Contents of Kit

Ref No.	Description	Qty
1a 433-407	Seal Housing, aluminum	1 EACH
1b 433-422	Seal (12K RPM)	1 EACH
1c 433-416	Permatex Ultra-Black Gasket Maker	1 EACH
1d 433-412	Allen Wrench, 4 MM	1 EACH
1e 433-413	Allen Wrench, 3/16"	1 EACH
1f 323-715	Screw, Button Head, Allen Drive	3 EACH
1g 433-406	Seal housing alignment tool	1 EACH
980-379	Instructions (this document)	1 EACH



Lawrie Alexander (Moss Technical Services and long-time T-Series specialist) installed enough of the original Al Moss oil seal conversions to become familiar with the various odd problems that cropped up when fitting the kit to 50+ year old engines. He developed some modifications to make it easier for him to deliver a leak-free installation. We have upgraded the Oil Seal Conversion Kit and instructions to include these modifications.

IMPORTANT: Even if you have previously installed one of these kits, please read all of the following instructions thoroughly and carefully, as they describe a much improved approach to the task. Yes, we know they appear wordy, but for the installation to be successful, it is necessary to read, understand and then follow each and every step.

MOST PROBLEMS REPORTED HAVE BEEN FROM NOT READING AND FOLLOWING THESE INSTRUCTIONS! We suggest that each step be reviewed, then checked off or lined out when completed.

It is assumed that your engine is out of your car and is dismantled, at least to the point of having the crankshaft out and the flywheel removed from the crankshaft. Also, the engine must be in an inverted position. There are four separate steps to the task: preparation of (1) the crankshaft, (2) the block, (3) the seal and (4) the flywheel. Dealing with them in the following order will give you the best results.

PREPARING THE CRANKSHAFT

If you are installing a brand new crankshaft

Only two steps are necessary

- Make sure the outer surface of the rear flange is perfectly clean and smooth, and
- Size the flywheel taper pins to fit the holes in the flange (see *Preparing the Flywheel*, below). If your new flange is not perfectly smooth, read the next paragraph.

If you are re-using an original crankshaft:

- Carefully examine the outer surface of the rear flange to ascertain that it is free from nicks or scratches. This is the surface on which the new seal will be riding. If you can make the flange perfectly smooth by carefully sanding with fine emery paper, or have your local auto machine shop polish the flange on their crankshaft grinding machine, well and good. However, it is highly unlikely that the flange will ever be smooth enough to make a perfect seal. To maximize your chances for a leak-free installation, we strongly recommend fitting a Speedi-Sleeve (Moss p/n 433-425). You should also buy a tube of Permatex 64000 High Strength Sleeve Retainer from your local auto parts store, which will prevent the Speedi-Sleeve from working loose.

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- Although somewhat unorthodox, we recommend installing the Speedi-Sleeve backwards for two reasons. First, this allows the sleeve to be pushed further onto the flange which increases the surface on which the new seal can ride. This in turn gives you more flexibility when positioning the seal. Second, it is very hard to cut off the curved portion of the Speedi-Sleeve when it is unsupported. Putting it on backwards positions the curved portion on the flange, making it easier to trim it off.
 - To install the Speedi-Sleeve, lube the main bearings and set the crankshaft in the block.
 - Install and snug up the main bearing cap bolts.
 - Apply a thin film of the Permatex 64000 High Strength Sleeve Retainer onto the flange.
 - Carefully fit the Speedi-Sleeve over the flange with the curved portion outwards or away from the block. (Fig 1) *Note: You do not use the installation "cup" supplied with the sleeve.*
 - Very gently tap around the curved edge of the Speedi-sleeve with a soft-faced mallet and work it onto the flange. (Fig 1)
 - Select a flat piece of wood that will completely cover the Speedi-Sleeve. Hold the wood up against the edge of the Speedi-Sleeve and tap the wood gently with the mallet until the wood makes contact with the rear of the crank. Make sure the wood is touching the entire face of the crankshaft flange. This will ensure that the curved portion of the Speedi-Sleeve is parallel with the face of the flange. (Fig 2)
 - Locate the groove that separates the curved portion from the flat of the Speedi-Sleeve. Take a sharp box cutter or utility knife and, while rotating the crankshaft with one hand, press the blade deeply into the groove. (Fig 3)
 - Continue until you have cut through the groove and can peel off the curved portion (4a) without damaging the surface of the sleeve (4b) on the flange. *This is very important because the rubber lip of the new seal will ride on this surface.*
 - If any part of the sleeve edge becomes raised up, carefully tap it flat against the flange and, if necessary, gently file off any burrs.
 - Your crankshaft is now prepared for installation. To obtain full access to the block, the crank needs to come out. Undo the main caps and take it out of the block.



Fig 1

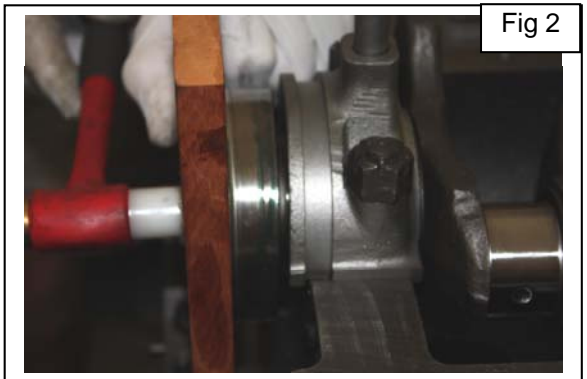


Fig 2



Fig 3

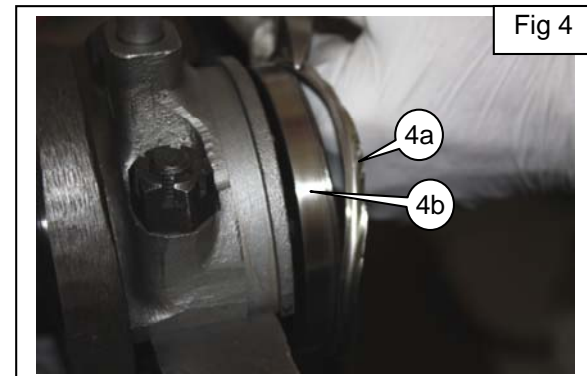
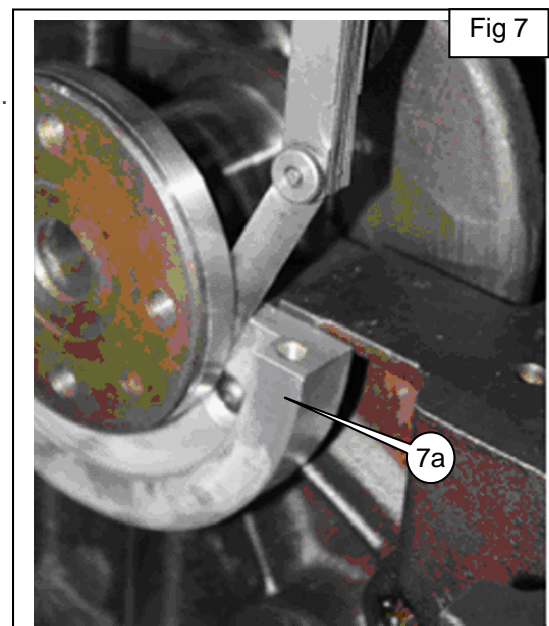


Fig 4

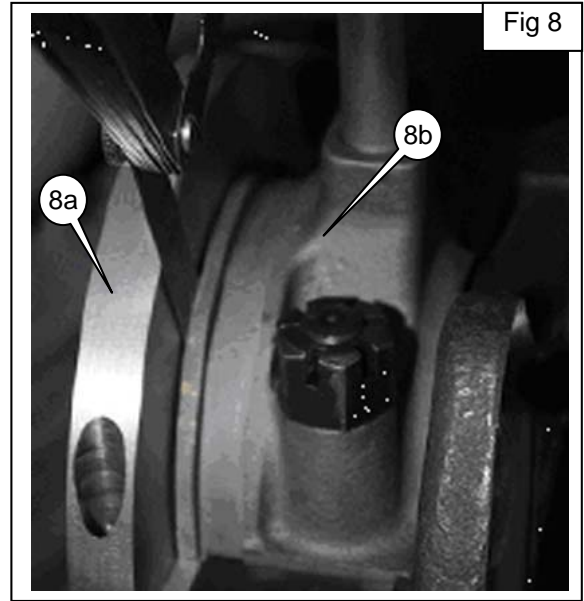
PREPARING THE BLOCK

- Remove the three hex bolts securing the original pot metal upper oil slinger (5a). Remove the slinger and set it aside. Remove all traces of the original gasket from the block. *Keep the slinger handy - you may need it as a template for a gasket later on. Note that the two hardened guide pins do not have to be removed. There are holes in the back of the retainer large enough to accommodate the pins. The holes are large enough to allow the retainer to move about as you center the seal & housing on the crankshaft flange.*
- The three threaded holes that held the original upper slinger will be reused. It helps to run a 6 mm x 1 tap (Moss 385-710) into each threaded hole in the block before trying to insert the new screws.
- Position the thicker half of the new seal retainer against the block and insert the three button-head cap screws. Determine that these screws will not bottom out in the block by tightening them one at a time and checking whether the retainer is now held tightly. If the retainer is loose with the screw tight, it means the end of the screw has hit the bottom of the tapped hole. Since it is impractical to deepen the holes in the block, cut or grind a bit off the ends of the screws as necessary, so that each one can be fully tightened and the seal retainer is held tightly against the block. (Fig 6)
- When you are sure all three button-head screws tighten properly, make sure that the retainer is not touching any of the five "webs" cast into the block (like 6a). If they appear to be close, pour a little solvent or light oil into the retainer and see if it leaks out, or shine a light the other side of the retainer and check whether you can see the light. Relieve the webs by grinding if necessary and then tighten the retainer half in place.
- Lubricate the main bearing shells again.
- Lower the crankshaft into the block.
- Install the front and center caps, and tighten the bolts.
- Using a feeler gauge, measure the distance from either the front of the crankshaft flange or the leading edge of the Speedi-Sleeve to the face of the seal retainer half you just installed (7a). It should be between 0.020" and 0.025" in order for the seal to be properly positioned on the flange. (Fig 7)
- If the gap is wider than 0.025", lift out the crankshaft, remove the seal retainer half (7a) and make a gasket to go between it and the block to achieve the requisite clearance. (Auto parts stores sell gasket paper in a variety of thicknesses.) Use the original slinger you removed as a pattern for the gasket. At this time, do not use any sealer or gasket cement when you attach the seal retainer to the block. Tighten the button-head cap screws.



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- Join the thin half of the seal retainer (8a) to the thick half with the two long Allen screws provided in the kit. The correct Allen wrench is included in the kit.
 - Try to install the rear main bearing cap (8b) over its studs. The rear face of the rear main cap was never a machined surface and can be quite uneven. Most main caps are very thick in this area and it will most likely be necessary to remove some material from this surface to allow the cap to fit over its studs. This can be done with a grinder, disk or belt sander, etc. You need to take off enough material so that you have between 0.010" to 0.015" between the main cap and the seal retainer when the main cap is tightened down. Don't worry if you end up with a surface that is a bit uneven; the sealer which you will use in a later step will take care of this. (Fig 8)
 - When you have achieved the requisite gap between the main bearing cap and the seal retainer, remove the crankshaft and both halves of the seal retainer.
 - (Fig 9) Find the small tube of Permatex Ultra Black sealer included in the kit. Apply a thin coating of the sealer on the block (and gaskets if you made some).
 - Attach the thick half of the seal retainer to the block using the three button-head cap screws supplied in the kit. Tighten the screws, then loosen them just enough to allow the seal retainer to move in any direction. *If the retainer is not free to move, the alignment tool will not work and the seal will not be centered.*
 - After making sure there is still some lube on the main bearing surfaces, re-install the crankshaft and firmly tighten the main bearing caps but **do not** torque them yet.
 - Thoroughly clean the two semicircular grooves in the back (forward) surface of the thin half of the retainer. These grooves must be clean – no oil or grease. (Fig 10)
 - Squeeze a small bead of the Permatex Ultra Black Sealer into the two semicircular grooves in the back (forward facing) surface of the thin half of the retainer. These beads should protrude at least 1/16" above the surface. You are really making two half "O" rings. (Fig 10)

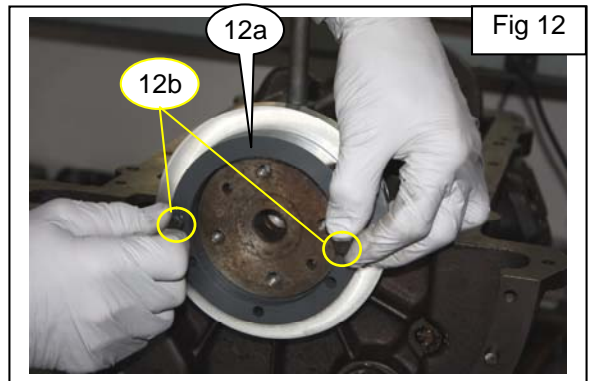


209 ➤ Now slide this half of the seal retainer behind the
210 crankshaft flange and up to the cap, being careful
211 not to disturb the beads of sealer any more than
212 necessary. (Fig 11)



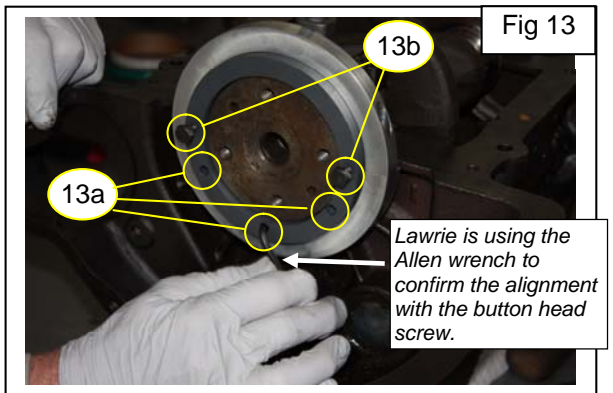
214 ➤ Install and tighten the two Allen screws which join
215 the two halves of the seal retainer.

218 ➤ Inspect the seal retainer alignment tool (12a)
219 provided in the kit. You will see that it has two
220 inside diameters. If you have fitted a Speedi-
221 Sleeve to your crank flange, the larger diameter
222 will go into the seal retainer first. Otherwise, the
223 smaller diameter will go into the seal retainer first



225 ➤ To manipulate the alignment tool, you need
226 something to hang onto. There are two threaded
227 holes in the alignment tool that will accept two of
228 the hex bolts which originally held the original pot-
229 metal oil slinger on the block. Thread the bolts
230 (12b, 13b) into the alignment tool from the side that
231 is away from the seal retainer. Grasp the bolt
232 heads and align the other three holes (13a) in the
233 alignment tool with the heads of the button-head
234 cap screws securing the seal retainer.

236 ➤ Holding the two hex bolt heads (Fig 12b, 13b),
237 carefully push the tool onto the flange and into the
238 seal retainer. *This action will cause the seal
239 retainer to slide into position, perfectly centered on
240 the crankshaft flange.*



242 ➤ Insert the smaller Allen wrench through the three
243 holes (13a) in the alignment tool and fully tighten
244 the button-head cap screws to lock the seal
245 retainer in place. *With the seal retainer centered
246 on the crankshaft flange, the seal will also be
247 centered when it is fitted.*

249 ➤ After allowing the sealer to set up for a minimum
250 of six hours, undo the rear main bearing cap nuts
251 and the two Allen screws securing the two halves
252 of the new seal retainer. Remove the alignment
253 tool and carefully remove the main bearing cap
254 with the retainer half attached to it.

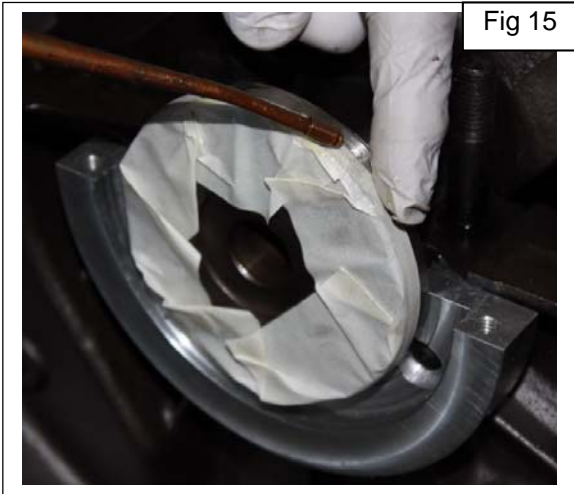
256 ➤ At this point it is necessary to drill a 3/16" hole
257 through the web of the rear main cap to allow the oil that
258 collects in the cavity around the new seal to drain into
259 the trough in the main cap and back into the sump.
260 Carefully drill directly through the 3/16" hole in the
261 retainer with a drill press or hand drill. (Fig 14)



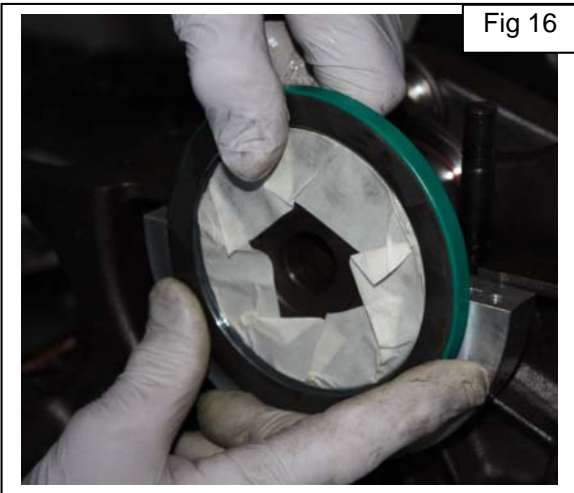
263 ➤ Make certain that the drilled hole goes through the web of the rear main cap into the trough in the main cap. Be sure to remove all drill chips. (If it is ever decided to no longer use the seal retainer, the hole in the main cap can be plugged with JB Weld or a similar product.)

266 **PREPARING THE SEAL**

267 ➤ If you fitted a Speedi-Sleeve to your flange, it is
268 very likely that the very thin, very sharp edge of
269 the sleeve will slice into the lip of the seal as you
270 install it. To prevent this, cover only the rearmost
271 edge of the Speedi-Sleeve with one layer of
272 masking tape (Fig 15). Apply a light coating of
273 engine oil onto the tape and crankshaft flange
274 (or Speedi-Sleeve).

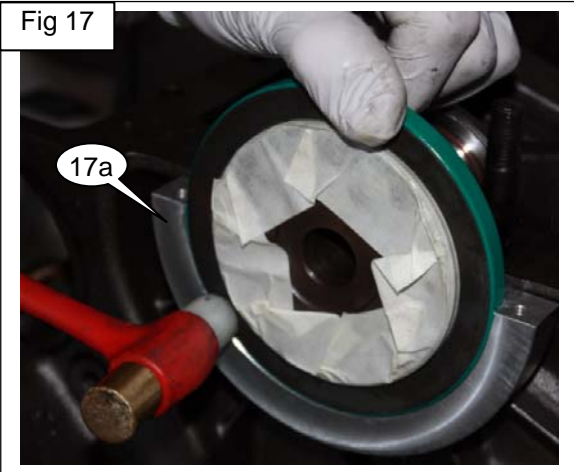


285 ➤ (Fig 16) Hold the seal with the lip (open part)
286 of the seal facing forward (toward the engine).
287 Carefully work the new oil seal over the Speedi-
288 Sleeve or flange. When the seal is on the flange,
289 make sure the rubber portion has not rolled
290 back onto itself. Remove the masking tape (if
291 used).



293 ➤ It is important to make sure the seal will seat
294 properly on the crankshaft flange. There is a
295 “step” machined into the seal retainer that the
296 seal must be pressed against. This “step” will
297 position the seal so the lip will ride on the
298 smooth surface of the crankshaft flange, or on
299 the smooth surface of the Speedi-Sleeve

302 ➤ With a soft hammer tap around the lower half
303 of the seal to make sure it is fully seated into
304 the retainer (17a). Inspect the visible portion of
305 the rubber seal on the engine side and make sure
306 it is nicely seated on the crankshaft flange or
307 the Speedi-sleeve. **Note:** If it has come off
308 the front of the flange, you will need to go
309 back to the Step covered on Page 3, lines 117
310 forward, to reposition the retainer so it sets
311 the seal firmly on the flange.



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PREPARING THE FLYWHEEL

- The surface of the flywheel which will mate with the rear surface of the crankshaft flange must be perfectly flat and smooth. There must not be any metal protruding around any of the six holes. This may be checked visually or with a razor blade, or a new blade for a utility knife. Any metal found protruding may be removed with a small grinder. (Fig 18)
- It is imperative to determine that both tapered pins will fit snugly in both the flywheel and the crankshaft. We now know that when these engines were originally assembled at the MG factory, both holes were reamed with a tapered reamer *after* the flywheel was installed. If you are using your original crankshaft, your taper pins will likely fit properly. However, replacement crankshafts have always been supplied with straight holes and, as the metal is too hard to be reamed, this presents a problem. One suggested method is to tap both pins into the flywheel and measure how far they protrude. Remove them from the flywheel and, with a file or belt sander, very carefully shape the protruding ends of the pins to the size of the holes in the crankshaft. (New taper pins are available from Moss-order one 325-328, a set of 2 pins)
- The back of the flywheel is recessed so it overhangs the end of the crankshaft flange. On most flywheels, this overhang is 0.125" or more. This overhang brings the back of the flywheel very close to the new rear seal.
- There must be at least a .015" gap between the seal and the back of the flywheel so it is necessary to have the back of the flywheel machined to leave a depth of .080" between the rear face and the surface which fits against the crank flange (Fig 19). Your local automotive machine shop will be able to do this when they re-surface the clutch face of the flywheel.
- When this has been done, mount the flywheel on the crankshaft without using the dowel pins, insert and - one by one - tighten the four bolts. Note carefully whether each bolt protrudes through the crankshaft flange. If they do, they will hit the seal retainer and so it is necessary to shorten them by grinding the ends so that they are flush with the back of the flange. Note: Original bolts are often stretched; you will see that the bolt near the head is narrower and the threads are wider apart than the rest. New bolts are essential if yours are at all questionable (Moss 321-108 is a set of 4 flywheel bolts).
- The flywheel is now prepared so remove it for later installation.



Fig 18

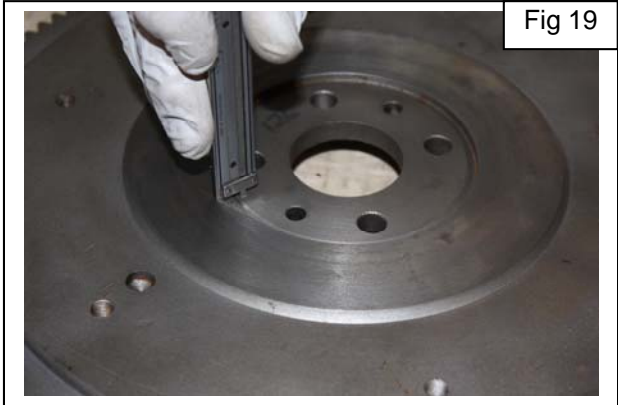


Fig 19

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FINAL ASSEMBLY

- Remove the front and center main caps and lift out the crankshaft with the seal still in place and lay it on the bench. Be careful not to disturb the seal.
- Apply a thin bead of Permatex Ultra Black sealer in the annular grooves in the seal retainer half bolted to the block. (Fig 20) Next, lower the crankshaft and seal into place. Make sure the seal is still seating correctly on the flange. Pushing the seal forward hard against the step in the seal retainer will keep the seal at 90 degrees to the axis of the crankshaft. Carefully eyeball the seal to be sure it is not misaligned.
- Now install the front and center main bearing caps and tighten them firmly.
- Apply a thin bead of Permatex Ultra Black sealer in the annular grooves in the seal retainer half on the rear main cap and a very thin smear of sealer on the mating faces where the two halves of the seal retainer bolt together. (Fig 21)
- Install the rear main cap, making sure the seal is still at 90 degrees to the axis of the flange. Tighten the two nuts on the main cap and install the two Allen screws which join the two halves of the retainer but do not fully tighten them.
- Using the seal alignment tool and your soft hammer, tap against the seal to make sure it is fully seated against the step in the retainer.
- Remove the alignment tool and fully tighten the two Allen screws which join the two halves of the retainer.
- Torque the main bearing cap nuts. The Shop Manual says "62.5 ft. lbs or next split pin hole"; we have found that selective fitting of the nuts (swapping them from stud to stud) often enables the pin holes to line up more accurately, so do this before over-tightening the nuts.
- Fit the flywheel to the crank flange. Install and hand-tighten the four flywheel bolts.
- Carefully check the gap between the flywheel and the seal housing- there must be no contact!
- Remove the flywheel bolts one at a time and smear a light coating of the black Permatex on the threads. Reinstall and hand-tighten the four flywheel bolts.
- Put a smear of Permatex on each taper pin, insert them in their holes and drive them home firmly with a hammer.
- Place a block of wood or a large soft hammer head between one of the crankshaft webs and the edge of the block to prevent the crank from rotating while you tighten the flywheel bolts. Now fully tighten the flywheel bolts and safety wire them in place. No torque spec is given for these bolts but they must be really tight.



This completes the installation of the Improved AL Moss Rear Main Seal Conversion Kit.

417 **NOTES REGARDING OIL LEAKS FROM THE REAR OF A T-SERIES ENGINE**

418 Over the past few years there have been many reported cases of leakage from the rear camshaft core
419 plug, either from its being improperly installed or from fitting replacement plugs which are not made to the
420 exact original specifications. To have a chance of fitting and sealing, the hole for the plug must be
421 absolutely clean, free of scale, rust, and anything but bare metal. This is not easily accomplished, but the
422 effort you put in here will pay off with zero leaks later. There are two schools of thought on "hedging your
423 bets" with sealers. One group favors RTV silicone sealer, while a second group suggests placing a small
424 amount of JB Weld around the plug prior to installation and also around the edge of the plug after
425 installation. They are pretty much mutually exclusive- adherents of one method will often advise against
426 the other. But no one will suggest you can save time cleaning the hole by using a sealant. Never pound
427 directly on the plug to flatten it. Rather, place the flat end of a large ball pein hammer (aka "ball peen")
428 directly on the plug and strike the round ball sharply with a second hammer. The plug should not end up
429 completely flat or "reversed", but must be securely tight.

430
431 Another source of leaks is the plug at the rear of the side oil gallery. If this has been removed during hot-
432 tanking of an engine, make sure it is securely tightened and it also helps to put sealant on its threads.

433
434 Other oil leaks have been reported from the cork seal on the rear main cap or rear of the pan gasket.
435 When reinstalling the pan, be sure to use liberal amounts of a sealer such as Permatex Ultra Copper on
436 the cork seal and, particularly, where the ends of the pan gasket fit against it.

437
438 The front seal of the gearbox can also leak and allow oil to drip out of the hole at the back of the oil pan.
439 Do not confuse this with an engine oil leak! Check your gearbox bell-housing for evidence of any leak
440 from this seal before re-installing the engine, and replace the seal if you have any doubts.

441 **A Little History...**

442 *When AL Moss first developed the rear seal for the T Series, he was quite enthusiastic and justifiably*
443 *proud of his "Dry TC". He'd drive to various gatherings of the faithful and park his car, confident that his*
444 *TC would not drip on someone's nice concrete driveway.. While he was kept occupied looking at*
445 *someone else's car, a co-conspirator would carefully spoon a tablespoon of oil onto the pavement right*
446 *under the hole in the bell housing. As the meeting broke up someone would ask Al (with a straight face)*
447 *how that rear main seal of his was working. Al, not suspecting a conspiracy, would lead the curious back*
448 *to his car, where, much to his surprise, there was that telltale oil spot. Al would be down on hands and*
449 *knees, perplexed as to how the car could manage to drip oil only when others were watching.... It is*
450 *assumed that he eventually figured it out.*

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459 **Although every effort has been made to ensure the accuracy and clarity of this information, any**
460 **suggestions that you may have that will improve the information (especially detailed installation**
461 **notes and photos) are welcome. These instructions were developed and written by Moss Technical**
462 **Adviser Lawrie Alexander. If you have any questions or difficulties with your installation of this seal**
463 **conversion, telephone Lawrie at 530-676-7226 between 9:30 a.m. and 4:00 p.m., Pacific Time for**
464 **assistance**
465



Moss Motors, Ltd.

440 Rutherford Street, Goleta, California 93117
In the US & Canada Toll Free (800) 667-7872 FAX (805) 692-2510 (805) 681-3400

Moss Europe Ltd.

Hampton Farm Industrial Estate, Hampton Road West, Hanworth Middlesex, TW13 6DB
In the UK: 020-8867-2020 FAX:- 020-8867-2030