



INSTALLATION MANUAL

For engines originally equipped with dual row IMS bearing

WHAT FACTORY BEARING DOES MY ENGINE HAVE?

1997-1999: This engine featured a dual row bearing IMS.

2000-2001: These engines came from the factory with either a dual row or a single row bearing IMS. A single row flange measures 19.27mm deep and a dual row flange measures 13.34mm deep.

2002-2005: This engine featured a single row bearing IMS. Some late production 2005 models will have a non-servicable IMS.

2006-2008: These engines were fitted with a larger bearing, readily identifiable by the 22mm center nut, that is not serviceable without a complete teardown of the engine. Removal of the IMS bearing grease seal will ensure proper lubrication of the original bearing.

If the engine in your car has been replaced, it will have whatever IMS bearing was in production for that model year of manufacture for the replacement engine.

It is important to identify which bearing your engine has before ordering or attempting installation of a replacement IMS bearing. The correct kit must be used for your engine otherwise engine damage or failure may occur.



Thank you for purchasing the RS Roller Bearing Kit, developed by RND Engines. This kit includes all the components necessary to retrofit all M96 Porsche® engines with a cylindrical roller bearing.

In these instructions you will learn the basics associated with fitment of the RND Engines RS Roller Bearing Kit. The developers of the product have also added many “silver bullets” to the instructions based on frequently asked questions posed by installers to help deliver excellent results.

Regardless of how many replacement bearings you may have fitted, it is imperative that all installers review the provided instructions to ensure a proper and successful installation.



IMS BEARING REPLACEMENT PRE-QUALIFICATION PROCEDURE

The following eleven step IMS Pre-Qualification procedure was developed by Jake Raby at Flat 6 Innovations. During the initial development of the original IMS Retrofit Procedure and components, some items of concern were noted from the very beginning. Over the years these procedures have been updated to address them, thus increasing the effectiveness of IMS procedures.

This procedure has been employed at Flat 6 Innovations since the very first IMS Replacement was performed, and to date it has resulted in a 100% success rate for the Flat 6 Innovations Preventative Service program. Having performed the very first IMS Replacement, and after performing more IMS Replacements than any other facility, a perfect record has been maintained by Flat 6 Innovations by employing these procedures verbatim. This means that today roughly 20% of all engines that are inspected will fail this pre-qualification, and will require extensive repairs to be made prior to the IMS replacement being performed.

The biggest mistake that can be made is assuming that every vehicle is healthy enough to have the IMS bearing replaced. The second biggest mistake that can be made is not taking the pre-qualification procedure seriously. **Please pay attention to each and every engine and realize that not every engine is a viable candidate for an IMS bearing replacement.**

- ➔ ☐ Perform controller interrogation (check for any Fault Codes, engine over-revs, Camshaft deviation #'s, etc...)
- ➔ ☐ Five (5) chain M96 engines are known for high camshaft deviation values due to abnormally high wear found on the timing chain adjuster wear pads. This can occur at low mileage points. **Camshaft deviations found over 6 degrees must be addressed prior to performing any IMS procedure.** Failure to do this may result in a loss of valve timing during the procedure, or a Check Engine Light illumination immediately following the IMS procedure. This will be due to camshaft deviations that are operating out of range.
- ➔ ☐ Perform Crankcase Manometer test. Healthy engines with healthy Air/ Oil Separators at sea level will test at 5" of water. (Use CR Tools Manometer for best results)
- ➔ ☐ Check over car completely, perform vehicle safety inspection, and listen to engine to determine overall condition. Inspect for any engine and/or gearbox oil and/or coolant leaks and document. Driving the car prior to the procedure is recommended, as issues may be caught prior to the process.
- ➔ ☐ Drain engine oil, inspect how the oil looks while draining, and inspect engine oil drain plug closely. Inspect for ANY debris. **Again, any debris is concerning and must be taken seriously.** Engines can run perfectly and exhibit no other symptoms of imminent failure, yet can be slowly dying due to debris laden oil.
- ➔ ☐ Remove engine oil filter, cut open and inspect for ANY debris. Look closely at the bottom of the factory filter canister, where debris is often collected. If ANY debris is present, the procedure must be aborted; the source of the debris must be identified. Action must be taken to address these issues prior to the process being carried out. **Replacing the IMSB of ANY engine that has wear metals or other debris in the oil, will lead to collateral damages that can destroy the replacement IMS Bearing, as well as all other internally lubricated engine components.**

- ➔ ☐ Remove Engine Oil Sump plate, inspect for debris. Removal of the sump plate is highly encouraged, as debris will lurk here that is not notable in the oil or in the filter. Again, ANY debris of any sort is concerning and must be investigated.
- ➔ ☐ During all oil, sump, and filter inspections, remember that the tiniest particles are just as concerning as larger pieces. This is because they are even more easily mixed into and suspended from the engine oil, allowing the debris to circulate all throughout the engine with damaging effects.
- ➔ ☐ Perform bore scope inspection of all cylinder bores. Watch closely for scoring and any signs of wear. Wear debris from failing / failed cylinders has been proven to be very damaging to all engine internals, including IMS bearings.
- ➔ ☐ With the transaxle removed, inspect the Rear Main Seal bore to ensure the engine does not have a factory defect known as "crankshaft sag". If this exists oil leakage at the RMS will be a terminal condition that can't ever be remedied.
- ➔ ☐ Once the IMS flange is removed, inspect the original IMS Bearing for signs of failure. Also, check for signs that the engine may have already experienced an IMS Bearing failure and may have had another bearing fitted. Engines that have IMS shaft assemblies that have been through a failure are always damaged; it is very important that these shafts are not fitted with any IMS replacement bearing.

NOTE: Any and all fault codes, and or symptoms of rough running, etc. must be addressed prior to any IMS procedure. It is imperative that ONLY healthy, good running engines be retrofitted.

NEVER, UNDER ANY CIRCUMSTANCE, IS IT PERMISSABLE TO REMOVE A FAILED OR FAILING IMS BEARING AND REPLACE IT WITH A NEW IMS BEARING. IMS COMPONENTS AND PROCEDURES WERE DESIGNED FOR PREVENTATIVE PURPOSES ONLY.

STEP 1

The procedure begins with a vehicle with the engine removed for better illustrative purposes.



TIP

You do not have to remove the engine to install the RS Roller Bearing Kit. The process can be accomplished by only removing the transaxle, clutch assembly, and flywheel.

STEP 2

Rotate engine clockwise to locate cylinder #1 TDC



TIP

Tear drop opening in pulley indicates TDC.



NOTE

Cylinder 1 TDC and Cylinder 4 TDC have the same crankshaft position. The IMS bearing replacement process can be carried out at cylinder 1 or cylinder 4 TDC without issues. This is due to the relaxed state of the valve train that is a constant between these two crankshaft positions.

STEP 3

Lock engine in TDC position using crankshaft locking pin supplied with IMS Pro Tool Kit.

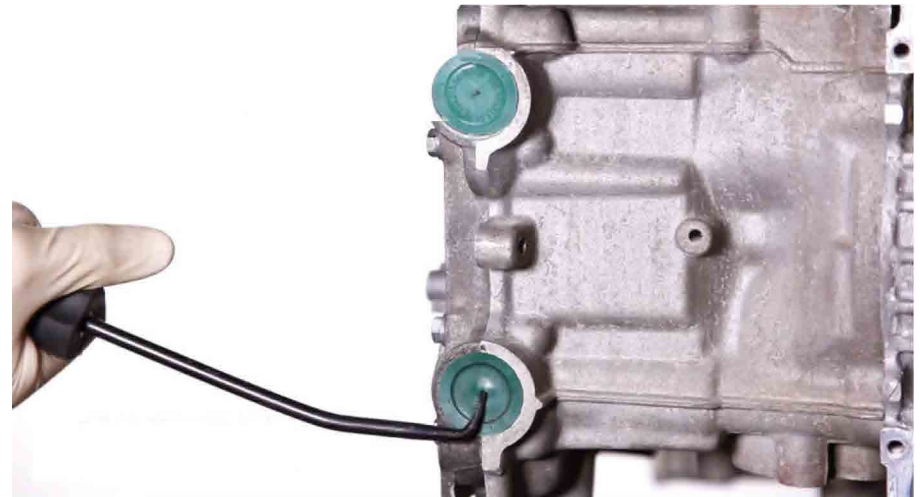


NOTE

The IMS Pro Tool Kit is the same as used for IMS Retrofit installations. The Faultless IMS Tool can also be used to install the replacement bearing.

STEP 4

Working at right side cylinder head, remove lower camshaft bore plug using a large pick. Remove and discard these bore plugs. Do not attempt to reuse them.

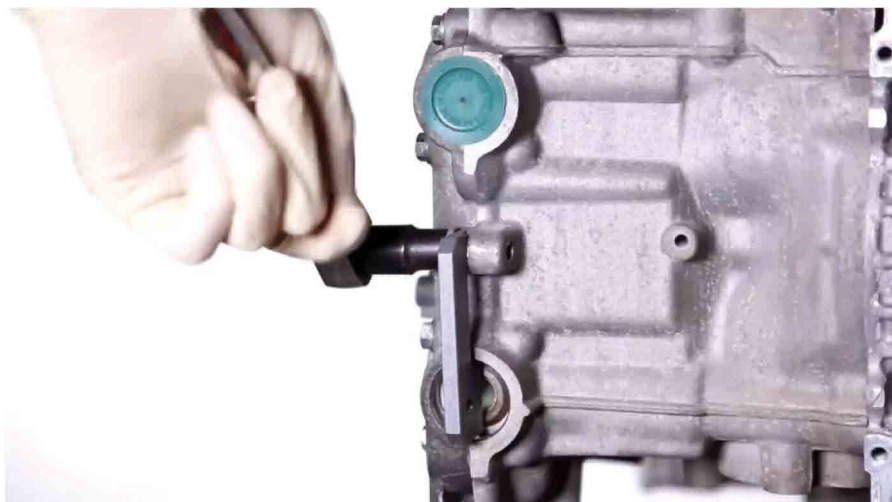


NOTE

Right side determined when facing flywheel

STEP 5

Lock right side camshaft in place using IMS Pro Tool Kit camshaft timing jig.



TIP

If jig does not fit into camshaft easily, the engine may be out 180°. Remove crankshaft locking pin and rotate engine one full rotation and try to install camshaft jig again



NOTE

Some installers prefer to lock camshafts on BOTH banks of the engine. This is a practice that is not required, and is a matter of personal preference. With the crankshaft and one bank of camshafts locked, all timing chains will be held tightly in the proper position for a successful IMS Retrofit procedure.

STEP 6

Remember to mark the original location of each timing chain tensioner for reinstallation. Be prepared to catch any dripping oil in a rag.



STEP
7

Working at left side cylinder head, remove timing chain tensioner.



STEP
8

Working at right side cylinder head, remove timing chain tensioner.



NOTE

Be prepared to catch any dripping oil with a rag.

STEP
9

Working at right side cylinder head, remove timing chain tensioner nearest to oil filter.



NOTE

Be prepared to catch any dripping oil with a rag.

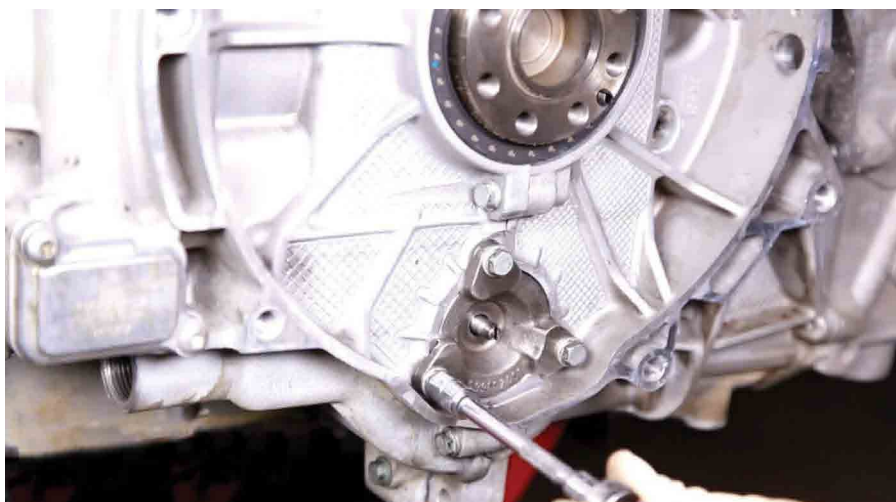
STEP
10

Using a flatblade screwdriver and a wrench, remove IMS center stud mounting nut.



STEP
11

Next, remove IMS flange mounting fasteners.



STEP
12

Using two flatblade screwdrivers, gently and evenly lever off the IMS bearing flange, then remove from engine.



STEP
13

Using a pair of snap ring pliers, remove IMS bearing snap ring.

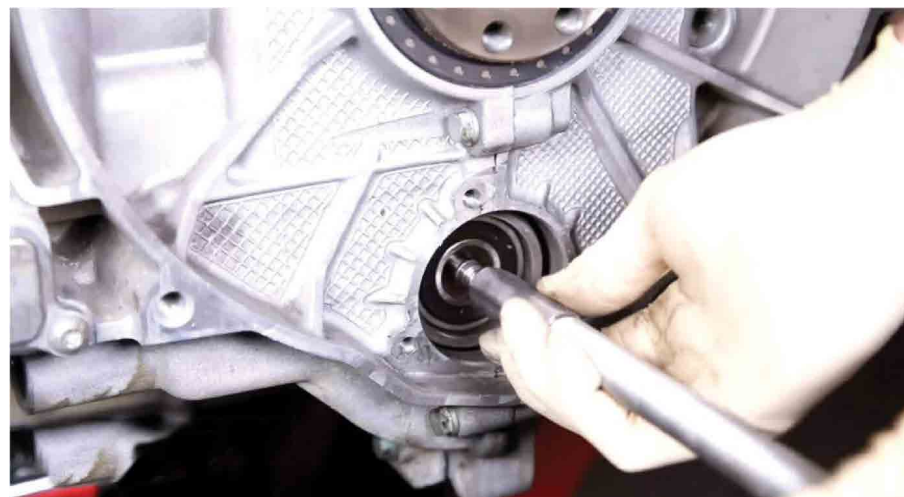


TIP

Placing your finger or a flatblade screwdriver in the center of the snap ring when removing it will prevent it from falling into the crankcase.

STEP
14

Screw the IMS Pro Tool Kit threaded rod on to the IMS bearing flange center stud.

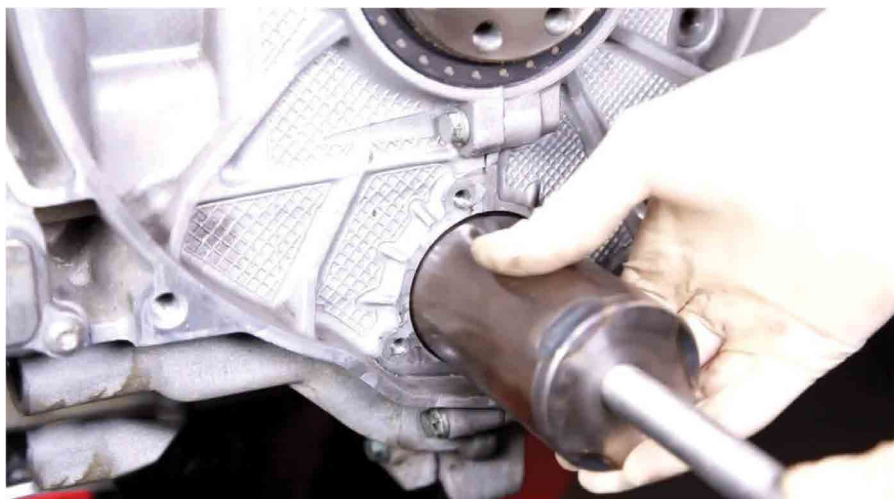


TIP

If the bearing has already been replaced with an LN IMS retrofit product, use the LN hex adapter provided in your IMS Pro Tool Kit. This same adapter can be used to remove the new RS Roller IMS Bearing as well.

STEP
15

Slide puller body over threaded rod. Install puller washer and nut onto puller and lubricate.



STEP
16

Using IMS Pro Tool Kit puller, extract bearing from intermediate shaft.



NOTE

Hold threaded rod still while tightening nut on puller to extract bearing from intermediate shaft. Once bearing is extracted, thoroughly clean the inside of the intermediate shaft using a lint-free cloth.



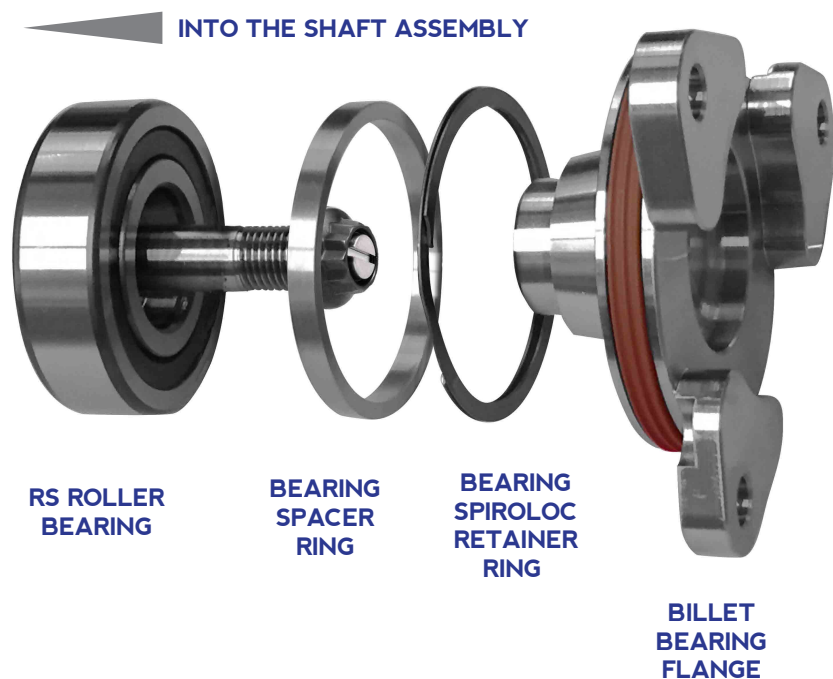
TIP

Watch for an oil release when the IMS Bearing is extracted. Black, dirty oil in the tube is a sign of extended drain intervals and failed IMS bearing seals.

STEP 17

From the RS roller bearing kit, remove the bearing spacer ring, RS Roller Bearing, bearing retainer ring (spiroloc style) and the billet, heavy duty bearing flange.

These items will be assembled into the intermediate shaft in the order that is pictured here, with the RS Roller IMS Bearing fitted into the shaft first, followed by the bearing spacer ring.



STEP 18

Next, prepare the RS roller bearing for installation into the intermediate shaft. Place RS roller bearing onto stud (in some instances the stud is pre-installed, as delivered).



RS Roller bearing fitted to the installation tool, and ready for step 20.



NOTE

Ensure the RS roller bearing, and installation tool are debris free, and that all work is done in a clean environment!

STEP 19

If your driver has a provision to accept the 12-point nut, install and tighten the center nut into the installation tool using an 11mm (12-point) socket and short extension. Tighten by hand only at this point! Shown is the 12 point nut being inserted into the driver tool.



Tightening the 12 point nut by hand, to hold it inside the installation tool. Being careful not to over-tighten.



NOTE

Later driver tools have had the counterbore to install 12-point nut eliminated to prevent installers from damaging the replacement bearing.

STEP 20

With the RS roller bearing attached to the installer, the unit can be positioned for assembly into the IMS shaft housing.



NOTE

The intermediate shaft is being shown in some photos outside of the engine for better clarity.

STEP 21

Then, using a soft face hammer, drive the RS roller bearing into the intermediate shaft.



NOTE

The installation tool is designed to be used with a soft faced hammer; however some housing bore installations are tighter than others. A hard faced hammer may be required to transfer enough energy into the installer to allow for insertion deep enough into the housing.

STEP 22

Once bearing is fully installed and bottomed out, remove the installation tool from intermediate shaft.



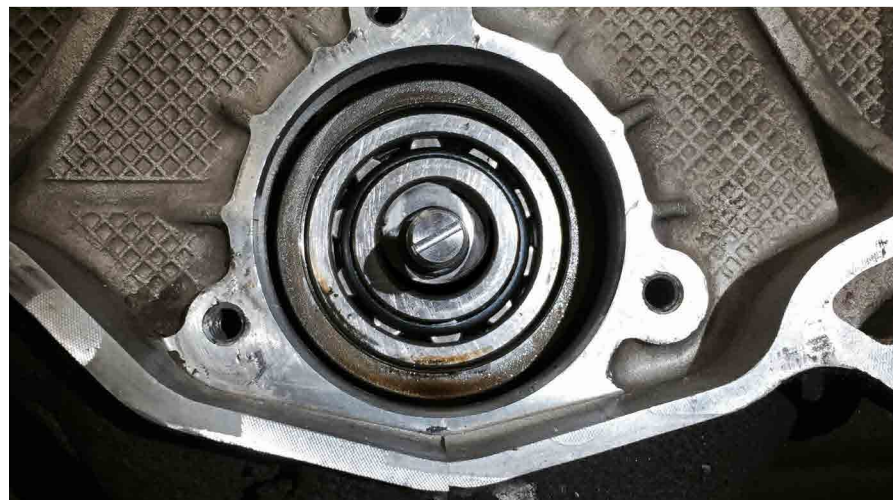
STEP
23

Remove installation driver from the RS Roller Bearing.



STEP
24

The properly installed RS Roller Bearing will be fitted to the IMS Shaft assembly as shown. It is imperative that the bearing be fully seated; otherwise it will not be possible to fit the spacer ring or the retention snap ring in the following steps.



STEP 25

Following the insertion of the RS Roller IMS Bearing, the next component in the assembly is the spacer ring. The spacer ring sometimes fits tightly into the IMS shaft housing bore and may need to be tapped into place. Resistance is normal in some cases.



NOTE

It is imperative that the RS Roller Bearing be completely seated into the housing bore, before the spacer ring is inserted, and that the spacer ring is seated squarely against the RS roller bearing. If either of these are not seated, the groove that the spiroloc retaining ring locks into will be partially covered, creating difficulty during installation.

STEP 26

Once center stud nut has been installed finger tight, torque IMS flange bolts. Once the IMS flange bolts have been torqued, torque the IMS flange center nut.



NOTE

IMS flange bolts torque: 10Nm (7.5 ft-lb)



NOTE

Center stud nut torque: 12Nm (9 ft-lb)

INSTALLATION **COMPLETE**

Installation is now complete. Shown is the properly installed RS Roller bearing, complete with heavy duty flange and microencapsulated hardware. Once the engine is reassembled and other components have been reinstalled, start engine and run until oil light is no longer illuminated.



TIP

Quickly starting and shutting off the engine 4-5 times will help to achieve oil pressure faster. Repeat this step two additional times. Check and top up engine oil as needed.



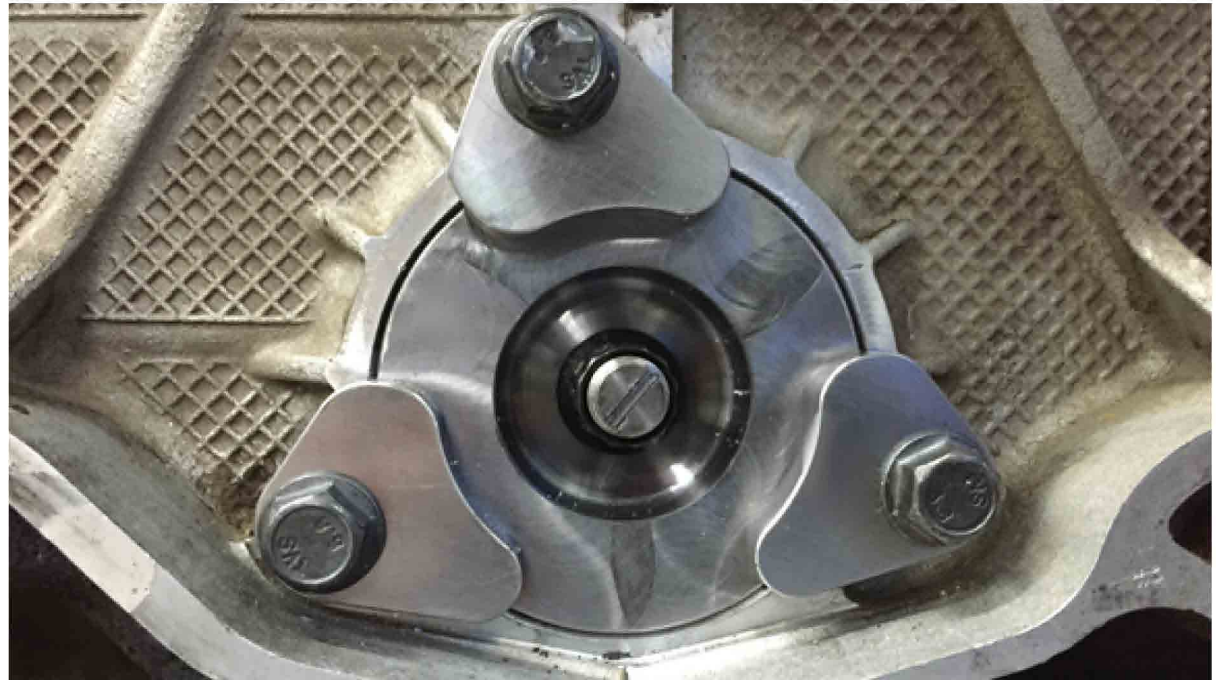
TIP

Do not pull the DME or Fuel Pump relays in hope of achieving oil pressure without the engine starting, the M96 engine will seldom achieve oil pressure in this manner.



NOTE

Oil change intervals for RND Engines RS Roller Bearing Kit: 5,000 miles / 6 months. Bearing replacement is recommended every 4 years / 50,000 miles (whichever comes first).



**IT IS IMPORTANT TO READ AND UNDERSTAND CRITICAL POST PROCEDURE NOTES.
PLEASE SEE NEXT PAGE.**



CRITICAL POST PROCEDURE NOTES

NEVER, UNDER ANY CIRCUMSTANCE, RETROFIT AN ENGINE THAT HAS SUFFERED AN IMS BEARING FAILURE! This includes engines that only have extremely worn original bearings which have created heavy amounts of debris that has extended from their wear over time.

ALWAYS use the eleven step IMS Pre-Procedure checklist when qualifying any vehicle for an IMS procedure.

ALWAYS perform an oil service when carrying out any IMS Retrofit procedure. Never reuse old oil, no matter how clean you believe it may be.

When sealing up crankcase sump plates following the pre-procedure inspection, use a nominal amount of sealant. Liberal amounts of sealant will mix into the oil and find their way to the oil pick up tube, blocking oil flow, and killing the engine.

After initial start up of the engine that has been retrofitted, check all flange surfaces and oil lines for signs of oil leakage.

Use common sense, take your time, and pay attention! You can't rush success, but you can rush failure!

Failures and extreme wear contaminates the oil supply at a level that is impossible to clean with any method other than complete engine disassembly.

Ensure the proper registration documents are filed with LN Engineering to activate your limited warranty. For complete warranty details visit the RND Engines website.

