

# RAM HYDRAULIC RELEASE BEARING INSTALLATION INSTRUCTIONS

VIDEO: <https://ramclutches.com/technical/video>



## PRELIMINARY INSTALLATION NOTES

**IMPORTANT! DO NOT RETURN THIS PRODUCT TO YOUR DISTRIBUTOR.** If you have questions, please review additional information available on our website and/or contact the factory directly. **Read these instructions CAREFULLY as there are many details to the install that must be followed for success.**

## IMPORTANT NOTES

### INNER PISTON O-RING



An inner piston o-ring is included with your bearing kit, but not installed. After doing your measurement calculations but prior to final installation, this o-ring should be coated with a light lubricant or brake fluid and installed into the inner piston groove, where it pilots onto the transmission.

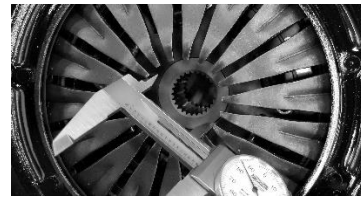
## BELLOUSING ALIGNMENT

Your RAM bearing is a floating assembly. Misalignment of the transmission input shaft and engine block may cause o-ring failure. Aftermarket bellhousings **MUST** be dial indicated to the engine to insure proper alignment. Follow you bellhousing manufacturer's instructions to complete this procedure.

## HYDRAULIC FLUID

You **MUST** use a DOT 3 or 4 fluid with RAM hydraulic bearings or damage to the o-rings will occur. If the hydraulic system had another type of fluid prior to installing this bearing, **THOROUGHLY** flush the system before installing this product.

## POTENTIAL CONTACT OF SNAP RING ON CLUTCH FINGERS



The RAM hydraulic bearing is engineered to be compatible with most RAM clutch systems. If you are using a clutch other than RAM, you will need to verify that the bearing piston/snap ring will not make contact with the clutch fingers on your clutch. To check this, bolt your clutch to the flywheel and measure the center hole opening of the fingers. The bearing snap ring measures 1.630". Make sure your center hole is larger than this dimension to avoid this contact. If you should decide to remove the snap ring to increase your clearance, special attention must be paid in setup not to overtravel the cylinder and extend it off the end of the piston. **IF USING WITH A RAM CONCEPT 10.5 DUAL DISC CLUTCH, THE SNAP RING MUST BE REMOVED.**

## POTENTIAL CONTACT WITH WEIGHTS ON CENTERFORCE CLUTCHES

Verify clearance of the RAM hydraulic bearing cylinder with weights on Centerforce pressure plates. Contact is possible with these units. If you need a compatible pressure plate, contact RAM

technical assistance. No warranty will be allowed on bearing cylinders that show evidence of contact with outside sources.

### PROPERLY SEALED INLET/OUTLET FITTINGS

The inlet and outlet fittings on the bearing cylinder must be properly sealed to avoid potential leaks. Use Teflon tape ONLY on these fittings. Do NOT use any liquid, PST, or other types of sealants. **THIS IS THE NUMBER ONE CAUSE OF LEAKAGE IN HYDRAULIC BEARING UNITS.**

### SETUP HEIGHTS/CLEARANCES

Proper setup height is critical to allow for clutch wear and achieve proper clutch release, as well as avoid o-ring damage. Proper setup gap is .150 minimum for single disc and .200" minimum for dual disc. Do not exceed .250" clearance.

### GUIDE STUD LENGTH

Once you have measured and fitted the bearing, make sure the guide stud is not too long or short by manually extending the bearing to its full stroke and visually inspecting. The bearing must stay on this stud, but the stud length may need to be trimmed to avoid contact with the pressure plate housing.

### HARD PEDAL AT THE BOTTOM OF THE STROKE

If you set up the bearing with more than .200" gap, or use a master cylinder that is too large, the bearing may bottom out on the snap ring. Use a pedal stop or adjust the master cylinder rod if necessary.

### 6 SPEED BEARING RETAINER



6 speed bearing kits include a collar that mounts to the front plate of the transmission. This plate is designed so that it can be mounted in several positions in order to align the bearing ports to point to the

opening in your bellhousing.

### ALUMINUM BEARING SPACERS

Your 6 speed RAM hydraulic bearing may have shipped with an aluminum collar spacer in  $\frac{1}{2}$  to  $1\frac{1}{4}$  thickness. We have determined that many applications similar to yours require this spacer for proper bearing gap. If you received this spacer, you should install it prior to taking your setup measurements. All applications may not require this depending on your clutch choice.

### TROUBLESHOOTING LEAKS

- **If you should develop a leak with your bearing, it is imperative to determine where the leak is occurring and why prior to removal.**
- Check your fluid. Contaminated fluid can cause deterioration of o-rings, which will lead to failure or leakage. The fluid should be clear and free of any debris or water, and should not smell burnt.
- Should the fluid appear burnt or have debris, make sure all hydraulic lines are routed away from headers and exhaust that can heat the fluid.
- Remove or pull back the transmission so you have sight access to the release bearing, or allow the bearing to hang and manually push the bearing all the way back into the base.
- Have someone actuate the clutch pedal while you watch. Identify the location of the leak. Make sure it is not coming from any of the fittings, connections, or lines.
- Once you have determined the nature of the leak:
- Leaking fittings – remove fittings and re-tape. Make sure tape extends to the end of the fitting but does not overlap the bottom. Securely tighten the feed and bleed lines to the bearing.
- O-rings – after noting the position of the leak, examine the top and bottom o-rings for damage. If damaged, order the proper replacement set for your part number bearing.

## BEARING DISASSEMBLY/O-RING REPLACEMENT

If you must disassemble your RAM bearing for any reason, extreme care must be taken when reinserting the base into the cylinder so as not to damage the o-rings. A step by step video for o-ring replacement can be found at

<https://ramclutches.com/technical/video>

- Retract the bearing fully and carefully remove the snap ring on the front of the bearing piston.
- When installing new o-rings or re-assembling the bearing, liberally coat o-rings and piston with Parker super o-lube lubricant\*.
- Clean and inspect the piston and cylinder, inspecting for any damage.
- Rotate the piston into the housing to avoid pinching the o-rings. Pushing it straight on can easily cut the o-rings.
- Carefully re-install the snap ring.

## REPLACEMENT O-RINGS

- Part number for the replacement o-ring set is 78509 (78505 for 78125 ONLY).
- Use instructions included for replacement.

*\*RAM recommends using Parker Super 'O-Lube' o-ring lubricant ONLY for assembly of the bearing. Do not use any petroleum based lubricant as these will damage and deteriorate the o-rings.*

## INSTALLING YOUR RAM HYDRAULIC RELEASE BEARING

It is critical to understand how your hydraulic release bearing operates and to get the bearing set up properly to avoid any future problems. As your clutch system wears, the fingers of the clutch get taller, or closer to the release bearing. It is important to make sure you have the proper gap between the release bearing and the fingers of the clutch. Following these procedures will guide you through properly determining if the bearing will fit your application, setting up the bearing, and testing

the operation of the system. **A detailed installation video is available at**

<https://ramclutches.com/technical/video>.

## DETERMINING THE FITMENT OF YOUR CLUTCH WITH THE RAM HYDRAULIC BEARING

TOOLS NEEDED:

- 18 inch straight edge or steel ruler
- Minimum 6 inch, preferably 12 inch dial (Vernier) caliper

Use the provided setup worksheet to record your measurements and make your calculations.

### DETERMINE THE CRANK FLANGE PROTRUSION (A)

Measure the amount that the crank flange protrudes from the back of the engine block. If you are using any type of block plate, this should be in place when taking this measurement. Record this as Dimension A on the worksheet.

### DETERMINE THE BELLHOUSING DEPTH TO THE RELEASE BEARING (B)

Attach the bellhousing to the transmission with a few bolts to make this measurement. Slide the hydraulic release bearing over the input collar, making sure it is fully retracted on the piston. Using the straight edge, lay it across the clock mounting flange of the bellhousing and measure from the straight edge down to the face of the release bearing. Be sure to subtract the thickness of the straight edge, and record this measurement on the setup sheet as dimension B.

### DETERMINE THE SETUP HEIGHT OF YOUR CLUTCH (C)

The clutch setup height is the height of your clutch system as it will be installed in the vehicle. It is measured with the clutch bolted to the flywheel with the disc in place. Set the assembly so that the crank flange of the flywheel is flush on the backside to a solid point. Now measure from the tip of the clutch fingers, down through the spline center of the disc, to the backside of the flywheel. Take an average reading in 3 or 4 positions. Record this as dimension C.

## SAMPLE SETUP – DO THE MATH

Dimension A = .300"

Dimension B = 3.750"

$B - A = 3.450"$  – this is the available space in the bellhousing to fit the clutch system

Now to determine fit/current gap:

Dimension C = 3.050"

$(B-A) - C = .400"$

This number is the setup gap, or distance between the bearing and clutch fingers. The proper setup gap is .150-.200", so in this example we will need to add shims behind the bearing to achieve the desired setup gap.

If the setup gap is less than .150", or even possibly a negative number, adjustments will have to be made to achieve proper fit. This may include but not be limited to using a thinner flywheel (RAM offers a full selection), spacing the bellhousing or transmission back, or machine the base of the input collar to allow the bearing to sit further back in the bellhousing.

Once you have completed these measurements and double checked your math, you are ready to proceed with testing and final installation.

## TESTING THE BEARING TRAVEL AND PRESSURE CONNECTIONS

***You may be tempted to skip these procedures. It is HIGHLY recommended that you take the extra time and complete this section to insure you do not have any problems on final install.***

The next step is to measure the total travel of the bearing with your master cylinder as well as check for any leaks.

Install the 1/8 pipe to -3AN fittings into the bearing assembly using TEFLON TAPE. Do NOT use any other type of sealant or leakage will occur.

Connect the hydraulic lines to the bearing and the master cylinder. Let the bearing hang under the vehicle and have a helper assist you in bleeding the system. You will need to manually retract the

bearing back to its compressed position between each stroke of the pedal until a full bleed is achieved.

Once fully bled, you can measure the bearing travel. Compress the bearing to its shortest height. From the backside of the bearing, measure with calipers from the outer housing to the inner piston. Record this number. Have your helper stoke the pedal one full cycle. Re-measure from the outer housing to the piston and record this number. The difference between these two numbers is the total bearing travel with your master cylinder, and this number should be between .450" and .550".

### EXAMPLE:

Total available travel (fixed): .800"

Retracted measurement: .050"

Extended measurement: .550"

$.550" - .050" = .500"$  actual travel

NOW THIS IS IMPORTANT! The amount of actual travel plus the setup gap (freeplay) must NOT exceed the available travel number (.800"). If it does, the bearing will bottom out on the front snap ring when operated and cause possible leakage from over-pressurization.

Most clutch systems require between .400" and .500" travel to disengage properly. If you are not getting at least .450" travel movement of the bearing, re-bleed and re-test. If you still do not get adequate travel, it may be necessary to change the master cylinder to a larger bore size to increase the fluid volume movement and travel.

## INSTALLING THE HYDRAULIC BEARING

4 AND 5 SPEED – remove one of the 4 input collar bolts and install the provided stud so that the bearing is positioned with the inlet and outlet fittings pointing towards the bellhousing opening.

6 SPEED – install the provided collar to the front plate of the transmission and install drive stud so as to point bearing inlet and outlet fittings towards the bellhousing opening.

Slide your pre-determined shims and the bearing assembly over the input collar.

Now check the drive stud length. Manually extend the bearing to its full travel. If the stud is protruding from the slot on the bearing, mark it and trim so that it does not protrude (this stud could contact the clutch cover if too long).

#### **INSTALLING THE TRANSMISSION (4 and 5 speed)**

Install the inner sleeve o-ring into the piston that was included with the bearing kit.

Attach one end of the feed line for the master cylinder and the bleed line with screw to the bearing and tighten securely.

Lubricate the inner o-ring and start the bearing on the input collar until the o-ring contacts the collar. Start the transmission into the bellhousing, routing the lines through the fork hole opening. As you continue in with the transmission, make sure the bearing housing slot locates onto the drive stud.

Connect the other end of the feed line to the master cylinder and bleed the system.

#### **INSTALLING THE TRANSMISSION (6 speed)**

Since the 6 speed installs with the bellhousing attached, the transmission install is easier. Assemble the bearing onto the 6 speed collar, connect the lines, and route through the appropriate opening. Then install the transmission to the engine. Connect the feed line to the master cylinder and bleed the system.

#### **FINALIZING THE INSTALL**

At this point you have properly tested and set up your new hydraulic release system and given yourself the best chance for trouble free operation. Make sure your feed line to the master cylinder is not located too close to any high heat sources such as headers. If you have any doubts, use a heat insulating wrap around the line.

Now enjoy your smooth operating hydraulic clutch system!

## **TROUBLESHOOTING**

### ***MY HYDRAULIC BEARING IS LEAKING.***

The first thing to determine is WHERE is the leak coming from. 99% of the leaks we encounter occur at the fittings or hoses, yet can seem like it is coming from the bearing since the fluid flows down onto the bearing.

To trouble shoot your leak, follow the instructions under 'TROUBLESHOOTING LEAKS' earlier in this instruction sheet.

### ***MY HYDRAULIC BEARING WON'T RELEASE MY CLUTCH.***

Make sure you have a complete bleed and the pedal feels solid from top to bottom. If you completed the steps to measure the travel of your bearing and you have at least .450" of movement, you will need to recheck your setup measurements to insure you have a gap of .150"-.200". If all of these check out correctly, you will need to test your clutch itself to make sure it is releasing properly under the given travel parameters.

### ***I BLEED THE BEARING, BUT MY CLUTCH PEDAL IS MUSHY.***

If the pedal feels mushy or softer at the top, you do not have a complete bleed and need to repeat the bleeding procedures.

### ***I DID ALL THE MEASUREMENTS, AND THE BEARING IS TOO TALL TO WORK WITH MY CLUTCH SYSTEM.***

The minimum height of the RAM bearing is 1.75", and allowing for a .150" air gap means you need a minimum of 1.9" of available space to fit the bearing. If this space is not available, you will need to either find a way to shorten the clutch/flywheel system, or space the bellhousing/transmission back to accommodate the install. Typical factory flywheels are thicker than RAM aftermarket or lightweight models, so often you can pick up as much as .250" of space by making a flywheel change. Other methods of increasing space include using or doubling up block saver plates, spacers available through the aftermarket transmission suppliers, or machining some material from the base of the transmission collar.