Form B1002-2 2022

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.**

SETUP DIAGRAM – WORKSHEET – DOWNLOAD AND PRINT THE SHEET ON THE NEXT PAGE BEFORE BEGINNING YOUR INSTALLATION ON ANY RAM HYDRAULIC BEARING KIT. IF YOU NEED TECHNICAL ASSISTANCE WITH YOUR INSTALL, WE WILL REQUIRE THIS INFO IN ORDER TO HELP.

Form RB-1

FITTING YOUR CLUTCH WITH A RAM HYDRAULIC BEARING

SETTING UP YOUR RAM HYDRAULIC BEARING - *Take your time with these measurements and insure success the FIRST time!*

1. Measure the crank flange protrusion from the back of the engine block. Be sure to include the block plate if you are using one. Record this as dimension 'A'.

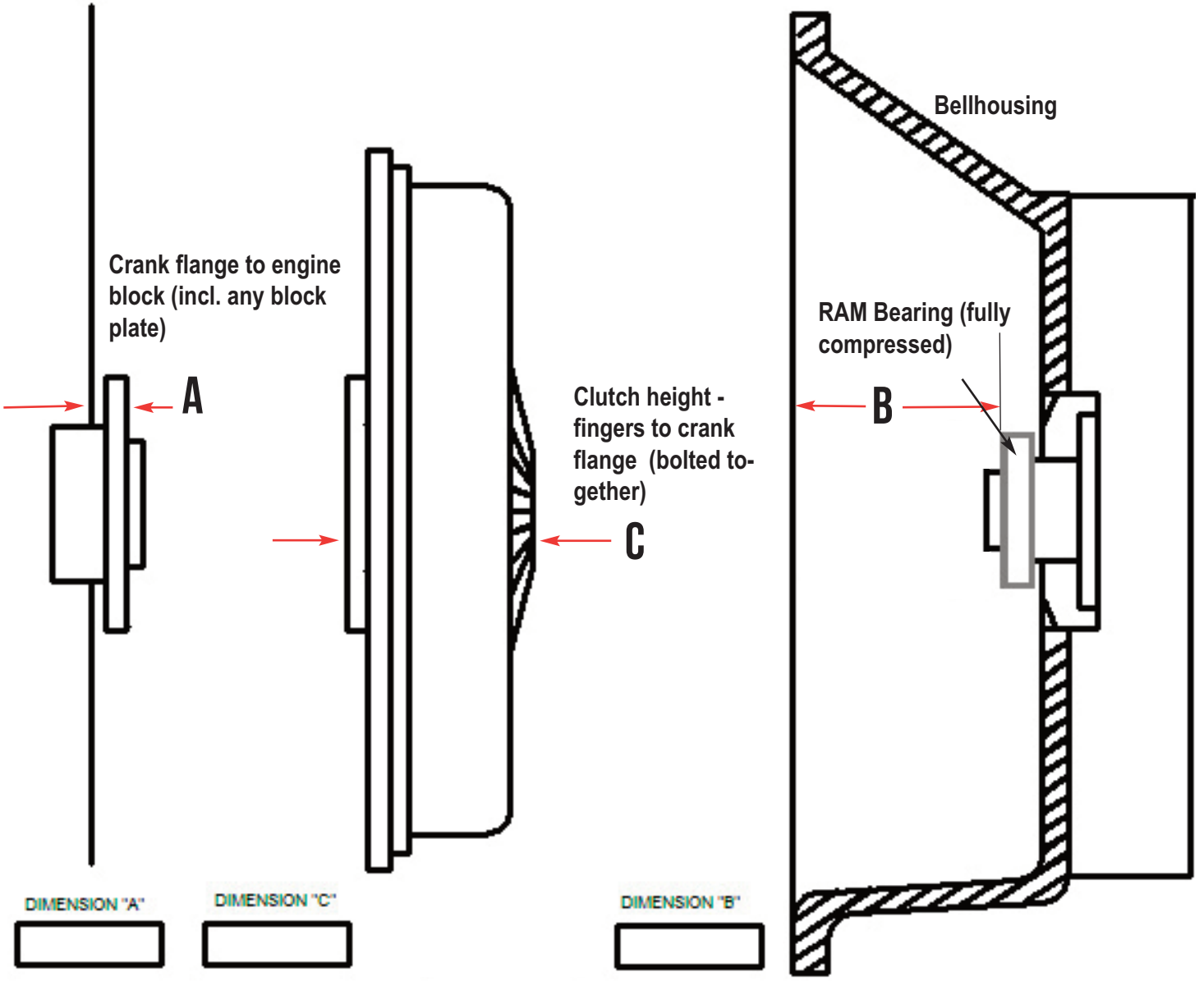
2. Bolt the clutch assembly together on the flywheel **just as it would be installed in the car.** Measure from the fingers of the clutch to the backside of the flywheel flange where it mounts to the engine. **Note that in some cases this flywheel flange is recessed from the outer diameter of the flywheel.** Record this as dimension 'C'.

3. Now is the time to make sure the snap ring on the RAM bearing clears your clutch fingers. Set the bearing up to the clutch fingers and check this clearance. Remove the snap ring if does not clear the fingers.

4. Install the included bearing input collar (if applicable) and install the RAM release bearing on the collar, making sure it is fully retracted to its minimum height. Measure from the face of the bellhousing (where it mounts to the engine block) to the face of the bearing. Record this as dimension 'B'.

5. In the gray box, record the 'B' dimension. Then add the 'A' and 'C' dimensions together and record in the 'A+C' block. Subtracting the 'A+C' number from the 'B' number will give you the clearance or gap setting.

A VIDEO GUIDE TO COMPLETING THIS PROCEDURE IS AVAILABLE AT https://youtu.be/o-rKpvfb_og



B [ ] - A + C [ ] = [ ] CLEARANCE/ SETUP GAP

Bearing compressed

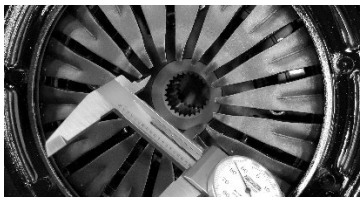
Total clutch inst. height

The recommended clearances for RAM hydraulic bearings are .150" for single disc clutches, .200" for dual disc clutches. If the minimum clearance cannot be attained, other midifications will be needed to increase space. This could include using a shorter flywheel or a spacer between the engine and transmission.

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.

POTENTIAL CONTACT OF SNAP RING ON CLUTCH FINGERS



The RAM hydraulic bearing is engineered to be compatible with **most** 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.**

IMPORTANT NOTES

TECHNICAL ASSISTANCE

All technical assistance for RAM products is **initiated** online. Use the Support form at the link below and a RAM representative will be in contact quickly to help you with your questions:

https://ramclutches.com/hydraulic-bearing-troubleshooting-form

APPLICATION SPECIFIC INSTRUCTIONS – 78130-78192

Be sure to access and read additionally, the following instruction supplement for specific details on each application specific hydraulic bearing kit listed above. Find instruction supplements here:
https://ramclutches.com/instructions/hydraulic-bearings/

BELLHOUSING 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 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.**

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 engaged with this stud, and the stud length may need to be trimmed to avoid contact with the pressure plate housing.

HARD PEDAL AT THE BOTTOM OR BEFORE THE END 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. Over travelling the bearing can cause hydraulic fluid leakage.

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 positons in order to align the bearing ports to point to the opening in your bellhousing. Use the supplied bolts and spacer (if applicable) to install this collar on the front of your transmission housing.

ALUMINUM BEARING SPACERS

Your 6 speed RAM hydraulic bearing may have shipped with an aluminum collar spacer in ½ to 1 ¼ inch thicknesses. 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 or contacting us for support.**
- 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. The bearing may need to be disassembled and cleaned, and the system flushed and re-bled.
- 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://www.youtube.com/watch?v=ihzQGOS-Xkc**

- Retract the bearing fully and carefully remove the snap ring on the front of the bearing piston.
- If your bearing utilizes white Teflon wiper rings, these may be cleaned and reused, or replaced under part number 78509-1.
- 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 for most bearings is 78509 (78505 for 78125 **ONLY**).
- 78141 and 78142 use replacement o-ring set 78508.
- Use instructions included for replacement or see video link above.

**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://www.youtube.com/watch?v=qrF0BBgSv4Y&t=13s**.

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 setup worksheet referenced at the beginning of these instructions 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. Complete instructions for this procedure are located on the next page.

PROCEDURE TO TEST THE TRAVEL OF YOUR RAM HYDRAULIC RELEASE BEARING

If you are having difficulty getting your RAM hydraulic release bearing to operate properly with your clutch system, it may be necessary to test the actual travel that your master cylinder is providing to the bearing. RAM recommends a minimum ¾" bore master cylinder with a minimum of 1.1" of stroke to operate the bearing to approximately .500" of movement.

To test the bearing travel, slide the transmission back from the bellhousing or engine, slide the bearing off the front of the collar or retainer tube while maintain the line connections. If it is necessary to disconnect the feed line, you will need to re-bleed the bearing prior to doing this test.

With the bearing assembly hanging under the car, manually push the bearing back on the inner sleeve until it is full retracted.

Measure how far out the rear of the bearing housing the piston is protruding. This may be flush on some models, or protruding on others at the fully compressed position.

Bearing retracted

Bearing extended

Now have an assistant stroke the clutch pedal one full push.

Measure how far the piston pushes out the rear of the housing. The difference of these two measurements is the amount of travel you are getting from your master cylinder.

IF THE TRAVEL IS NOT AT **LEAST** .450"

- Your bleed may not be complete and there could be air still in the system

You can re-bleed the bearing in this hanging position by manually retracting the bearing and having an assistant work the clutch pedal to make sure this is not the issue. Also make sure you have the bleeder line on the uppermost fitting in the hydraulic bearing when it is in the same clock position as installed on the transmission as this allows for the easiest bleeding.

- Your master cylinder may not be of sufficient size, stroke, or volume to operate the bearing

Check to make sure your master cylinder is of sufficient size. Inspect to see if the push rod is adjustable and if it is possible to increase the stroke length, which would in turn move more fluid.

If you are still having problems after performing these tests, use the E-Tech form located at http://ramclutches.com/hydraulic-bearing-troubleshooting-form to provide us with further details.

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 drive stud so as to point bearing inlet and outlet fittings towards an opening in the bellhousing.

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)

If not already in place, 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. **For easiest bleeding, install the bleed line on the uppermost fitting**.

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. **For easiest bleeding, install the bleed line on the uppermost fitting.** Then install the transmission to the engine. Connect the feed line to the master cylinder and bleed the system.

BLEEDING THE SYSTEM

Bleed the hydraulic bearing in a similar manner to bleeding your brake system. We have found it easiest to simply pump the pedal with the bleeder screw closed many times, until you begin to get a pedal, before opening the bleed screw. This gets a good supply of fluid into the lines and makes final bleeding easier. Make sure someone is paying attention to the fluid level in the reservoir as you do this so it does not run dry.

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. Bleed the 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 ad 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 BLED 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.

If enough 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.