

INSTALLATION INSTRUCTIONS

400-Series Hydraulic Release Bearing

A. Description

Tilton's 400-Series Hydraulic Release Bearings are designed to mount inside the bell housing. This allows it to stay fastened to the bell housing when the transmission is removed. Many Tilton bell housings are designed for use with this assembly, but it can also be adapted for use with other bell housings.



B. How It Works

The hydraulic release bearing assembly is self-adjusting in that the bearing stays close to the clutch spring at all times, although the spring changes position with clutch wear. There is no extra return spring that pulls the piston back all the way to the bottomed position. In this respect, the piston in the hydraulic bearing assembly works like the piston in a disc brake caliper, returning only as far as forced. This is why with a Tilton Hydraulic Release Bearing assembly the clutch pedal feel does not change with clutch wear allowing the driver to make more consistent shifts.

C. As Received

1. An extra long hydraulic line has been provided to make both the supply and bleed lines.
2. The bearing piston is not fully retracted. You will need to compress it before taking any measurements.

D. Installation

Bearing clearance and mounting

1. **Cut the pilot tube off the transmission input shaft bearing retainer if it is still in place.** You will need to remove the bearing retainer from the transmission to do this.
2. **Fully compress the piston** into the body of the release bearing assembly.
3. **Position the bearing assembly** in the housing so one port points towards the left side of the car and the other port points up. Both ports are identical in design, but the top port will be used for the bleeder line and the left port will connect to the master cylinder supply line. See **Diagram 3** for modifying a non-Tilton bellhousing to accept the bearing assembly.
4. **Bolt the bearing into position.** The bolt is installed into the housing from the transmission end. When tightened, the bolt head must pull below the transmission mounting face.
5. **Check the bearing clearance.** Install the flywheel and new clutch assembly as directed in their instructions. A clutch assembly with worn friction discs will not provide accurate results. Bolt the bellhousing to the engine without the release bearing assembly. Measure the distance, as shown as **Dimension A** of **Figure 1**, from the bellhousing transmission face to the tips of the clutch spring fingers. Remove the bell housing and install the release bearing assembly. Make sure that the piston is fully compressed. Then measure the distance, as shown as **Dimension B** of **Figure 2**, from the bellhousing transmission face to the top of the bearing.

$$\text{Dimension A} - \text{Dimension B} = \text{Bearing Clearance}$$

The bearing clearance must be in the range of **.170"-.230"** when using 5.5", 7.25", and 8.5" clutches. A range of **.140"-.230"** is acceptable for 4.5" clutch. For 10.5" and 11" diaphragm type clutches the clearance should be **.100" - .150"**. If the clearance is above this range there is a chance that the piston will be over-extended. If the clearance is below the range there will not be enough room to allow for the full wear range of the clutch since clearance reduces with clutch wear. Shims are provided that can be placed under the four legs to reduce the bearing clearance.

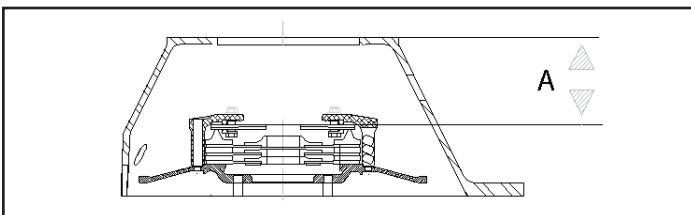


Figure 1

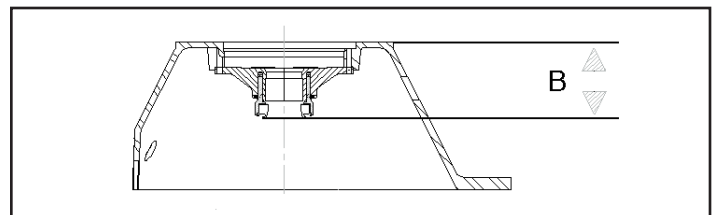


Figure 2

Hydraulic lines and fittings

Diagram 1 gives complete instructions on how to properly cut your lines to the required length and attach fittings. Route both lines clear of the exhaust system, oil lines and other heat sources to avoid pedal fade. These fittings are made to seal on the tapered section and not the threads. **Do not use pipe tape or other sealants.**

Bellhousing mounting

Install the bellhousing assembly onto the engine. Torque hardware to the specifications provided with the bellhousing. Connect the hydraulic line to the master cylinder.

E. Master Cylinder Selection

Table 1 lists the master cylinder recommendation for use with Tilton 400-Series hydraulic release bearings.

Tilton Master Cylinder Push Rod Stroke			
	5/8" M/C Bore	7/10" M/C Bore	3/4" M/C Bore
4.5"/4.9" /5.5" Clutch with 38mm bearing	.80" recommended	.65"	.57"
7.25" Clutch with 44mm bearing	Not recommended	.90"	.79" recommended

Table 1
Master Cylinder Selection

F. Master Cylinder Priming

1. Fill the master cylinder with brake fluid. Use a DOT 3, DOT 4 or other non-silicone based fluid. **Avoid DOT 5 (silicone-based) fluids since they are not compatible with the seals.**
2. Open the bleed fitting at the master cylinder while the line port is closed.
3. Gently depress the clutch pedal, close the bleed screw and release the clutch pedal.
4. Repeat Steps 1 and 2 until fluid free of air bubbles emerges. **Do not stroke a Tilton master cylinder more than 1".**

G. Hydraulic Release Bearing Bleeding

1. Fill master cylinder reservoir with fluid.
2. Apply approximately 3 lbs of force on the clutch pedal. You want enough force to hold the bearing out against the clutch diaphragm spring, but not enough to compress it.
3. Open the bleed screw that is attached to the bleed line on the hydraulic release bearing.
4. Completely stoke the pedal.
5. Close the bleed screw.
6. Let the pedal return to its relaxed position and wait a few seconds.
7. Repeat Steps 2 through 6 while keeping an eye on the fluid level until all air is removed from the system.

1. Cut the line to the required length. We recommend the use of a radiac wheel but it can be done satisfactorily with a 32 teeth-per-inch hacksaw blade. In either case, the line must be tightly wrapped with electrical masking tape and the cut be made through the tape. **DO NOT** cut SPEED-FLEX line with a chisel, snips, pliers or a shear as these may crush the Teflon liner.

2. Deburr the Teflon and trim any loose ends of braid with sharp snips or diagonal cutting pliers.

3. Install the socket on the hose with the threaded end of the socket toward the cut end of line. This will be a lot easier and you will end up with fewer holes in your hand if you clamp the socket in a vise. Push socket on well beyond end.

4. Place the hex portion of the nipple in the vise. Insert the end of the line onto the nipple and bottom of the hose against the chamfer seat of the nipple with a rotary motion of the line. This will size the I.D. of the Teflon tube.

5. Separate the braid from the O.D. of the Teflon tube. The best way is to use a braid spreader tool. In the absence of the tool, separate the braid with a small screwdriver or a scribe. Be careful not to scratch or nick the Teflon.

6. Install the sleeve between the braid and the Teflon tube. Make sure that none of the braid is trapped between the Teflon and the sleeve. Bottom the tube against the shoulder of the sleeve and make sure that the sleeve is inserted square.

7. With the nipple held in the vise, push the line and the sleeve onto the nipple until the sleeve bottoms. Remove the line and make sure that the Teflon tube is still bottomed against the shoulder of the sleeve and that the sleeve is square.

8. Push the line and the sleeve back onto the nipple and bottom against the chamfer. Start the socket onto the nipple threads and hand tighten.

9. Place the socket in the vise and complete the assembly by tightening the nipple onto the socket with a wrench until the gap between the face of the socket and the hex of the nipple is .023" - .046", using a feeler gauge.

10. Blow the assembly clean and pressure test before running driving the car.

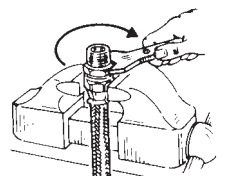
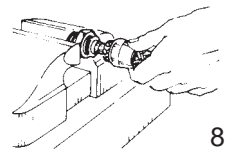
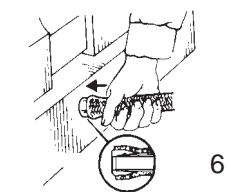
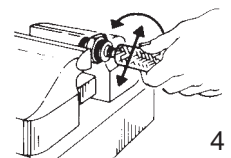
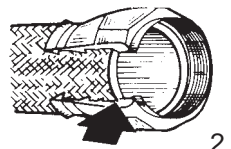
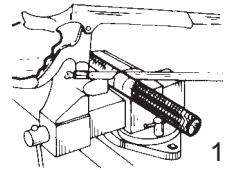


Diagram 1

H. Clutch Pedal Stop

A positive clutch pedal stop must be used to prevent over-stroking the hydraulic release bearing piston and the clutch. Reference **Table 1** for the amount of master cylinder stroke required for your clutch and master cylinder combination. For access reasons, in many cars it is not easy to determine how far the master cylinder is being stroked.

The method listed below provides a very effective method for adjusting the pedal stop.

1. Lift the drive wheels off the ground and support the car on jack stands.
2. With the engine off, place the transmission in first gear and have someone attempt to rotate the drive wheels.
3. Depress the clutch pedal slowly until the clutch disengages and the drive wheels can be rotated. This is labeled as Position A in Diagram 2.
4. Adjust the pedal stop to allow travel of the clutch pedal a 1/4" past Position A in Diagram 2 to Position B. *The distance shown in Diagram 2 is exaggerated for clarity.* **Do not stoke the pedal any further than Position B throughout the procedure or you will over-stroke the clutch.**

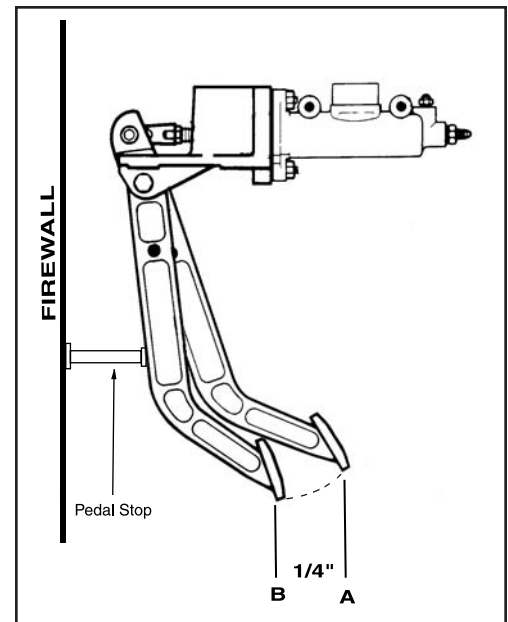


Diagram 2
Clutch Pedal Stop

I. Maintenance

A few basic procedures will help to ensure that your hydraulic release assembly will provide a long and dependable life.

1. Spin the bearing race and check how it feels. If it has a higher than normal resistance or has a slightly notchy feel, replace the bearing.
2. The piston can be removed and replaced without breaking the hydraulic seal or requiring bleeding. Periodically, remove the piston and check for any scores in the bore or on the piston surface. Wipe the piston and orange dust wiper seal before reinstalling. You may find that the piston is not dry. This could be the rubber grease used when installing the new seal. Do not mistake this for brake fluid.
3. If the seal needs replacing, order Tilton's replacement seal kit (P/N 62-905). Remove the existing black hydraulic seal by blocking off one port and applying air pressure to the other port to push the seal out of the assembly body. **Wear safety glasses, use low pressure and point the seal's exist path away from you.** Never try to pry-out the seal with sharp objects. The smooth side of the hydraulic seal rides against the piston. Always use rubber grease, such as Tilton P/N RG-17, when installing the seal. Take care not to damage the seals during installation.

J. Service Information

1. Contact Tilton's Repair Department (805-688-2353) and describe the problem or the service that is required.
2. If the bearing assembly needs to be sent in, a Returned Goods Authorization (RGA) number is required and will be provided by a Tilton representative.
3. Write the RGA number on the *Repair Information Card* and on the outside of the package.
4. Complete the *Repair Information Card* with the required information.
5. Ship the bearing assembly, with the *Repair Information Card*, to the address found at the bottom of the next page.

Repair Information Card

RGA# _____

Name _____ Phone _____ Date _____

Address _____ City _____ State _____ Zip _____

Vehicle information

Make _____ Year _____ Engine _____

Transmission _____ Bellhousing _____

Reason for return (details please) _____

