

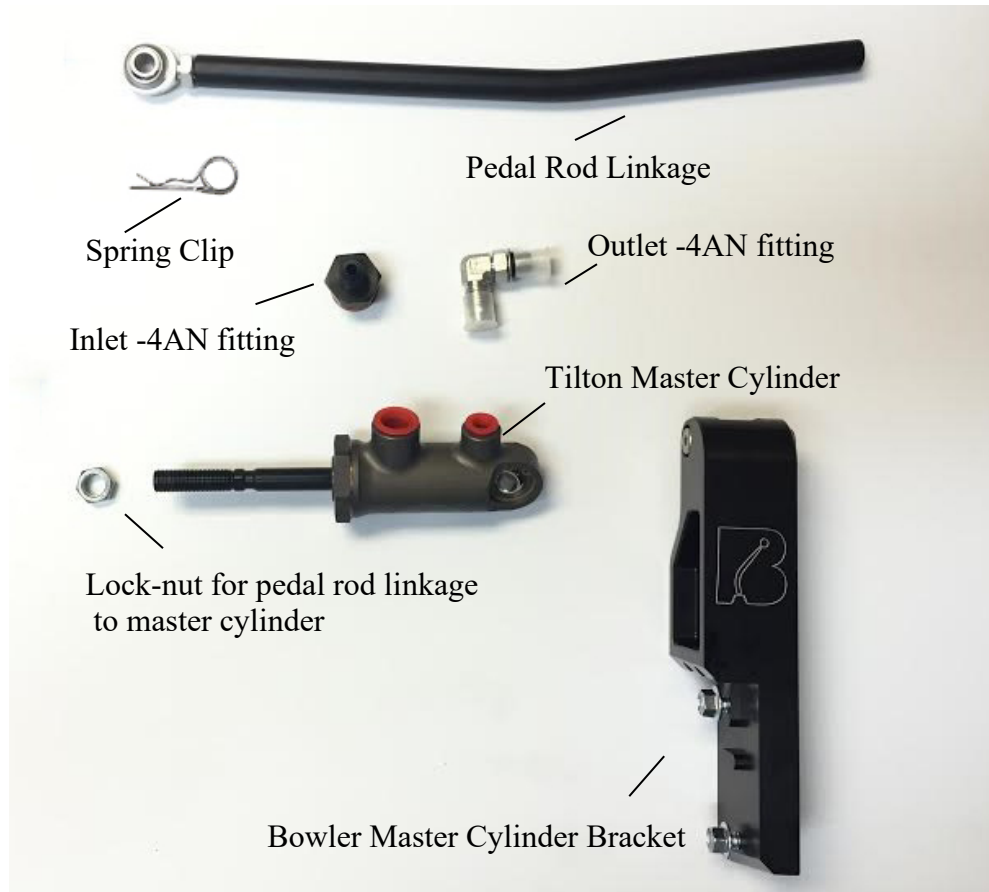


'68-'79 Corvette C3

Hydraulic Clutch Master Cylinder Installation Instructions

Read These Instructions Completely Before Beginning

These instructions are for hydraulic master cylinder installations using an external slave cylinder or a hydraulic throw-out bearing. If your car has been modified from a stock configuration, certain steps may not apply. Existing alterations to your vehicle are your responsibility.



If equipped with power brake booster use the included banjo fitting in place of the Inlet -4 fitting



1.0 Tools and Notes

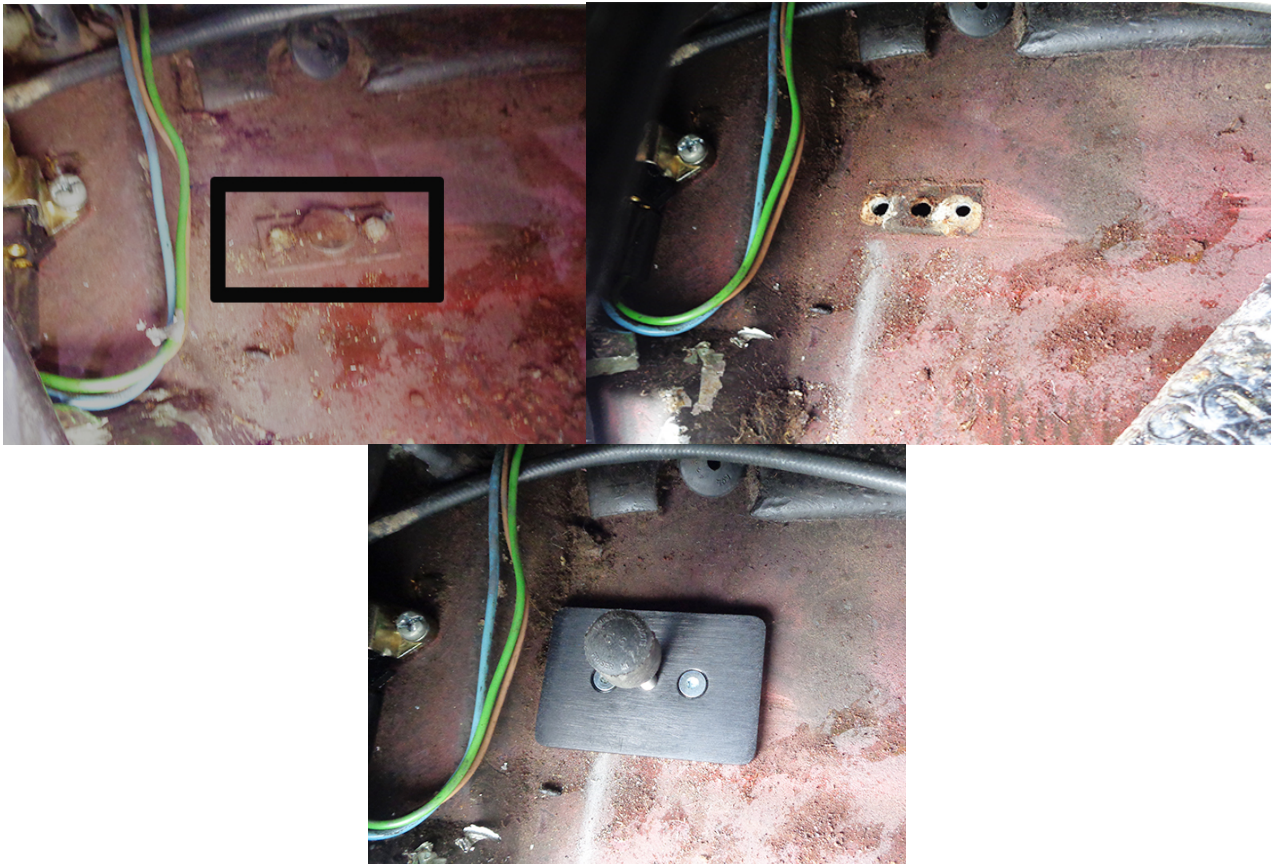
- 1.1 3/8", 7/16", 1/2", 9/16", 13/16" wrenches and/or socket/ratchet and a 5/32" allen wrench / socket.
- 1.2 This Hydraulic Master Cylinder Kit utilizes the original cross shaft bracket on the factory frame rail (if you are installing this on an aftermarket chassis or an original automatic frame you will need to find or fabricate a mounting bracket.(* see Fig. 1) and weld into place.
- 1.3 Safety Equipment – Always wear approved ANSI approved safety goggles/glasses when working with metal and fluids. Wear proper gloves when working with hot surfaces and corrosive fluids.

2.0 Disassembly - If your vehicle is already disassembled, skip to the Assembly Instructions. If you are converting an automatic car, some disassembly steps do not apply.

- 2.1 Remove factory clutch linkage, spring & pedal linkage.
- 2.2 Do not remove the clutch pedal.

3.0 Assembly

- 3.1 Note: our mock-up vehicle has certain items removed for clarity.
- 3.2 Remove the factory pedal stop from beneath the carpet. You will likely have to drill out the rivets holding the pedal stop to the floor pan for removal. Then install the new adjustable pedal stop provided in the kit. Don't worry about the final adjustment of the stop until everything has been installed.



3.3 Pre-assemble the Master Cylinder, pedal rod linkage and Bowler master cylinder bracket. See Fig 2. You may install the fittings now or after you have installed the master cylinder to the frame bracket.

Caution: If you have a factory power brake car, you will use the included banjo fittings for better clearance

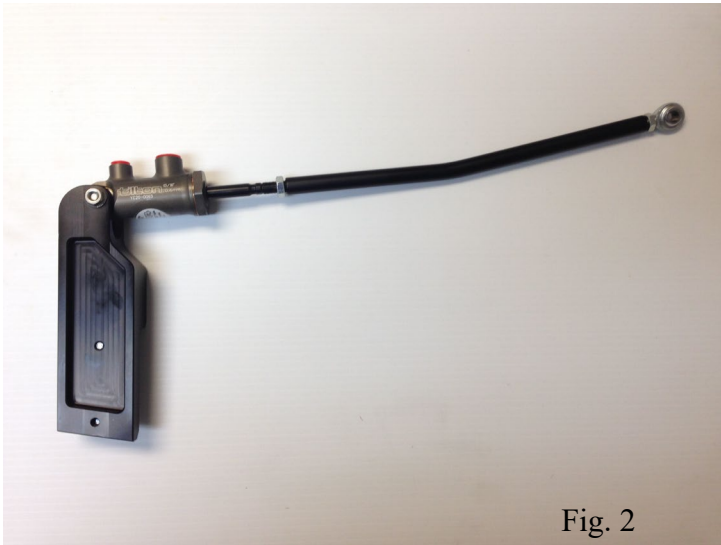


Fig. 2



Fig. 1

3.4 Feed the pedal rod linkage through the factory clutch rod linkage firewall opening, then install the master cylinder bracket on frame bracket with the included bolts.



Fig. 4

- 3.5 Attach pedal rod linkage to the factory pedal with the included spring clip. If your factory pedal stud is loose, you can replace it with a bolt and nut to hold the pedal linkage to the pedal



- 3.6 The rod-end and pedal rod linkage will need to be adjusted to have the correct pedal height that you desire. *See more about setting the proper pedal height later in these instructions.
- 3.7 Verify actuation – the clutch pedal should bottom out on the pedal stop right before the master cylinder bottoms out. If the pedal stops moving downward before hitting the pedal stop, adjust male rod end to lower the clutch pedal. Adjust pedal stop as necessary and know the pedals may not be at the same height. Verify no binding of rod-end and clutch pedal.
- 3.8 Locate and mount your reservoir anywhere above the master cylinder. Use the 12” braided stainless line to attach the reservoir to the master cylinder. This will attach to either the straight or banjo style fitting in the larger port of the master cylinder closest to the firewall.



- 3.9 Attach the 24” stainless steel braided line to the 90 degree elbow in the smaller master cylinder port closest to the front end, and the other end to the slave cylinder or hydraulic throw out bearing, making sure line has clearance around the exhaust system and will not interfere with any moving parts.

- 3.10 Do not over tighten fittings – this will cause damage to the seat of the hose end and fittings.
- 3.11 Close the bleed screw on the slave cylinder or hydraulic throw out bearing. Remove the bladder & fill reservoir with DOT 3 or DOT 4 brake fluid. ****DO NOT USE A SYNTHETIC FLUID**** Install cap tightly without the rubber bladder until system is completely bled out.
- 3.12 **Caution: Always wear ANSI approved goggles/glasses when working with fluids. Wear proper gloves when working with corrosive fluids.** Purging the system – Pressure bleeding is the only way to remove all the air from the system. Loosen the bleed screw on the slave cylinder or hydraulic throw-out bearing. Allow gravity to fill the system until fluid comes out the bleed screw then close. Top-off reservoir and re-install cap. Using a second person, open the bleed screw and apply 5-10 psi thru the vent hole in the reservoir cap using a rubber tipped air nozzle. **Air pressure must be regulated to 5-10 psi or you could damage components.** Since the reservoir is small, the bleed screw should only be open for about 5 seconds. You will see a solid stream of fluid come out, followed by air bubbles, followed by another solid stream of fluid. Immediately close the bleed screw when you see the second solid stream of fluid to prevent draining the reservoir. Top off fluid to the step line in the reservoir and install bladder and cap. Do not overfill or brake fluid will spill over.

*****IMPORTANT*****

Important information regarding setting pedal stop, free play, and height adjustment.

****Note that this information is specific to the Tilton 6000 series hydraulic release bearing used by Bowler Performance Transmissions. If you are using a hydraulic release bearing by another manufacturer please refer to their instructions on setting up the clutch pedal.****

The Tilton 6000 hydraulic release bearing assembly is self-adjusting in that the bearing stays close to the clutch spring at all times, even though 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. The piston of this assembly has .700” of total stroke. Precision measurement of clearances and the correct adjustment of the pedal stop are extremely important to the correct function of this unit.

RELEASE BEARING FREE PLAY AND HEIGHT ADJUSTMENT

At this point of the installation you should already have the flywheel, clutch and bellhousing onto the engine. Tighten all components in place following their respective manufacturer’s instructions. Do not install the transmission at this time. Using a pair of dial calipers or a depth micrometer, measure the distance from the transmission face of the bellhousing to the bearing contact point of the clutch spring. Record this distance as Dimension A. Subtract .125” from Dimension A. This new number will be Dimension B. This should be the installed distance (with the bearing and piston completely compressed into the hydraulic base) from the face of the release bearing to the face of the transmission where it contacts the bellhousing. Install the supplied threaded sleeve into the bearing base and push these onto the bearing retainer sleeve or bolt on the threaded base to the front of your transmission. A small amount of petroleum jelly may be used during assembly. (For slip on adjusters, the o-ring end of the sleeve

should be towards the transmission.) Thread the bearing onto the threaded sleeve until Dimension B is achieved. There is a small ear and slot machined into the hydraulic base. The supplied stud fits through this slot to prevent rotation. Once the correct height of the HRB has been determined, locate and remove the transmission bearing retainer bolt closest to the ear. The removed bolt will be replaced by the anti-rotation stud provided. Remove HRB and threaded sleeve from bearing retainer, being careful not to change HRB height adjustment on the threaded sleeve. Install anti-rotation stud through the slot on the hydraulic base and reinstall HRB and sleeve onto bearing retainer. Using Loctite 272 (red) thread locking compound, install anti-rotation stud into hole that original retainer bolt was removed. Torque to 16 lb-ft. DO NOT OVERTIGHTEN. Note: If anti-rotation stud is too long and extends past face of release bearing, cut shorter to avoid any interference with clutch. If you have a bolt on bearing adjuster use one of the supplied bolts and utilize one of the threaded holes provided in the bolt on adjuster to prevent bearing rotation. The hydraulic lines supplied have been installed at the factory using the proper tooling and assembly lubricant. They are designed to rotate once while installed. There is no need to remove these prior to assembly. Double check that the bearing to clutch clearance is .125" (tolerance +/- .025").

DRIVELINE ASSEMBLY

While installing the transmission, carefully route both lines through either the release fork window or holes that have been drilled to accommodate the lines. Ensure that the lines do not interfere with the clutch or flywheel. A string may be used to help guide the lines around any obstacles during installation. Once the transmission is seated, confirm that all parts of the release bearing clear the clutch and flywheel. Complete the driveline installation.

HYDRAULIC LINES

This bearing is supplied with two identical lines installed for the supply and bleed ports. Both lines are sized AN-4 and should only be used with AN type fittings. It is important that whichever line is on the bottom is used as the supply line (connected to the master cylinder) and whichever line is on top is used as the bleeder. 1. Attach the supply line to the master cylinder using supplied stainless braided line and fittings. If using a Tilton master cylinder (which have AN-3 outlets) you will need a AN-3 male to AN-4 male adapter that is supplied in the master cylinder kit. Attach the supplied bleed adapter and bleed fitting to the bleed line.

HYDRAULIC RELEASE BEARING BLEEDING

1. Fill the master cylinder reservoir with DOT3 or DOT 4 brake fluid. **Do not use DOT 5, silicone based or high temperature resistant brake fluids designed for more than 550°F as some will cause the seals to swell.** 2. Apply light force on the clutch pedal. You want enough force to hold the bearing out against the clutch diaphragm spring, but not enough to compress the clutch diaphragm spring. 3. Open the bleedscrew that is attached to the bleed line on the hydraulic release bearing. 4. Completely stroke the pedal and hold the pedal down. 5. Close the bleed screw that is attached to the bleed line on the hydraulic release bearing. 6. Let the pedal return to its relaxed position and wait a few seconds. Repeat Steps 2 through 6 until all air is removed from the system. **Note: Do not stroke the pedal again before the pedal stop is set.**

SETTING THE CLUTCH PEDAL STOP

You **MUST** use a pedal stop to limit the amount of bearing travel. Failure to do this WILL result in clutch, bearing and/or transmission damage and will not be covered under warranty. It may be necessary to fabricate a pedal stop for your application as most cars with a factory mechanical linkage did not have a pedal stop. 1. Lift the drive wheels off the ground and support the car on jackstands. 2. With the engine off, put the transmission into 1st gear and have someone attempt to rotate the drive

wheels. 3. Depress the clutch pedal slowly until the clutch disengages and the drive wheel can be rotated. Do not push it any further. 4. Note the clutch pedal position at this point. Measure for and/or adjust the pedal stop to allow an additional 1/4" of pedal travel.

- 1.1 The clutch pedal should bottom out on the carpeting at the same time the master cylinder bottoms out. If you have no carpeting or insulation under the clutch pedal, a stop block is recommended so the master cylinder will not be damaged. If the pedal bottoms out on the carpeting without bottoming out the master cylinder no further adjustments are necessary until the hydraulic system is activated with the clutch. If the pedal stops before hitting the carpeting, adjust male rod end to lower the clutch pedal. Adjust pedal stop as necessary and know the pedals may not be at the same height. Verify no binding of rod-end and clutch pedal. Verify parallel alignment of all the components. Actuation should be smooth. Verify the master cylinder rod travels the full stroke of 1.4" with the FBody & Willwood and 1.12" with the Tilton for proper clutch release.
- 1.2 If you find the clutch pedal does not have enough travel up, the end of the bracket may be trimmed to accommodate more pedal stroke as needed.
- 1.3 Do not over tighten fittings – this will cause damage to the seat of the hose end and fittings. Attach the steel braided line to the master cylinder and slave cylinder or hydraulic throw out bearing making sure line has clearance to exhaust system and will not interfere with any moving parts.
- 1.4 If the clutch feels spongy or releases too close to the floor, repeat the bleeding procedure. Repeating the bleeding is recommended, before or after test driving.

BEARING MAINTENANCE

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. The piston can be removed and replaced without having to break the hydraulic seal or performing the bleeding procedure. Remove the piston assembly and check for any scoring in the bore or on the piston surface. Wipe the piston and orange wiper seal before installing. You may find that the piston is not dry. This could be the rubber grease used when installing the new seal at the factory. Do not mistake this for brake fluid. If the seal needs to be replaced, the seal replacement kit is Tilton part number 62-905. Remove the piston assembly to access the hydraulic seal. Inspect the piston and hydraulic assembly bore for scratches. To remove the hydraulic seal from the release bearing assembly, block one hydraulic port and apply 5 PSI of air pressure to the other port. Wear safety glasses and point the seal exit path away from you! Never try to pry the seal out of the assembly. Always use rubber grease, such as Tilton P/N RG-17, when installing the seal. Take care not to damage the seals during installation.

- 1.5 Further assistance and tech support is available by calling Bowler Performance at 618-943-4856 M-F 8-4 CST time. Please call us first for any issues.

1.6 Thank you for your trust in our company.