

BRUCE COUTURE'S **MODERN DRIVE LINE**

"FIVE AND SIX SPEED CONVERSION SPECIALISTS"

Generic

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. This is a generic instruction set designed to aid in the installation and bleeding of a hydraulic clutch system.



1.0 Tools and Notes

- 1.1 Drill motor, #7 drill bit, 21/64" drill bit, Sharpie marker, 3/8" 7/16" 1/2" 9/16" 5/8" 3/4" wrenches and/or socket/ratchet, 1 3/8" hole saw, silicone sealant, loc-tite, a second person. Some tools may not be required. The second person will be required.
- 1.2 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.
- 1.3 The most effective way for a hydraulic system to operate is the minimal bore required with the longest stroke available. This will provide you with the least amount of pedal effort that can be obtained (based on the pressure plate you have) and potentially eliminate the need for a pedal stop. Those things combined will help you achieve a smooth actuating pedal and CONTROL of your clutch during release (in traffic / feathering).
- 1.4 You will need a pedal stop if the stroke of your pedal (attach point) is greater than the stroke of the clutch master cylinder. Know this! It will prevent you from damaging your clutch master cylinder.

1.5 FYI - Ideally you want your pedal ratio to be between 6:1 and 7:1 for the stroke of the pedal/attach point of the clutch master cylinder. Anything less than 6:1 will result in a heavier pedal.

1.6 No matter what... it is recommended to add a load distribution plate to reduce stress on the attach holes for the clutch master cylinder going thru a firewall to prevent cracking. For firewall mounted clutch master cylinders we recommend a 3/16" (.187) thick plate. This will be installed (no special fastening required) in the inside under the dash, OR "welded" to either side. For floor mounted pedals, utilize an existing frame or aftermarket bracket system to support the clutch master cylinder.

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 Do not remove the clutch pedal or clutch fork. Remove all clutch linkage or automatic linkage from engine, transmission, frame and clutch pedal.

2.2 Warning: Clutch pedal spring is under pressure. Use caution when removing. If your vehicle is equipped with one... remove the clutch pedal spring and all associated hardware. Do not remove the clutch pedal stop. The spring and spring attaching hardware will not be reinstalled.

3.0 Assembly

3.1 Prior to drilling, visually locate the master cylinder so there is no interference with electrical wiring, brake lines, brake boosters, brake master cylinders, headers or manifolds, exhaust, valve covers, ducting, etc. Anticipate the movement of the clutch pedal and the attach point of the rod end to the pedal and the arc of travel it will have once installed.

3.2 Locate the clutch master cylinder to the mounting location and drill (2) 5/16" mounting holes and one 1 3/8" hole.

3.3 Locate and drill (or use existing) a 5/16" hole in the pedal.

3.4 Attach all hardware and secure. Seal any open holes in firewall to prevent air/liquid transfer to the inside of the vehicle.

3.5 Re-install brake master cylinder, booster, brake lines and distribution block as required.

3.6 Reset your insulation and carpeting, trimming to clear the new clutch master cylinder location as required.

3.7 If not already installed, install clutch pedal. The starting height of the clutch pedal will be the same height of the brake pedal against the brake pedal stop.

3.8 Verify actuation – 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. Actuation should be smooth.

Verify the master cylinder rod travels the full stroke of 1.35" to 1.4" for proper clutch release. You'll want to be sure the master cylinder push-rod does not interfere with the retaining washer under the dust boot of the clutch master cylinder. Remove dust boot to verify once the linkage is attached to the pedal.

3.9 If you do have interference you'll need to raise or lower the installation point of the clutch master cylinder, or the attach point on the pedal.

3.10 Re-install dust boot.

3.11 Locate and mount the reservoir anywhere above the master cylinder. Mark the hole locations with a Sharpie. Using 1/4" sheet metal screws, pre-drill holes using a #7 drill bit prior to attaching reservoir. Install reservoir using 3/8" wrench or socket/ratchet. Do not over-tighten. Attach the reservoir line to the barbed inlet fitting on the master cylinder. Make sure reservoir line does not interfere with any moving parts.



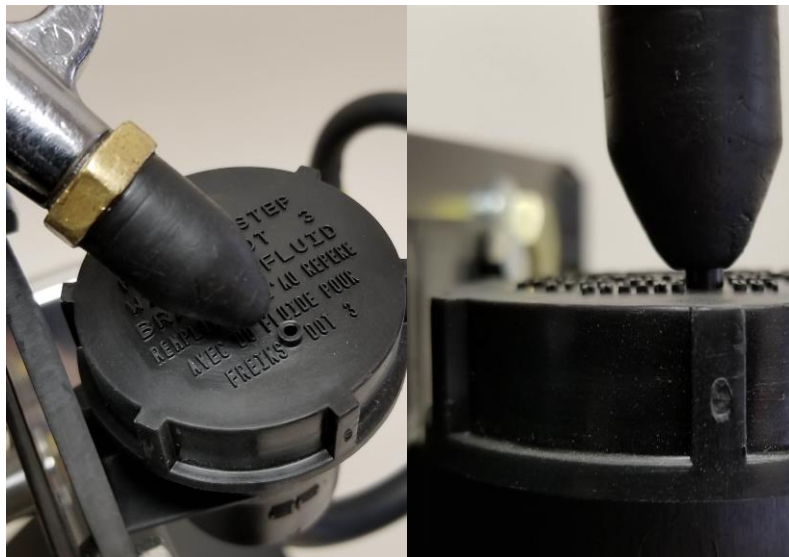
3.12 Do not over tighten fittings – this will cause damage to the seat of the hose end and fittings. Attach the steel braided line to the 90-degree elbow on the master cylinder and slave cylinder or hydraulic throw out bearing making sure line has clearance to exhaust system and will not interfere with any moving parts. Once steel braided line is positioned for routing and clearance, tighten jam nut on the 90-degree fitting in the master cylinder. Note: There is an o-ring under the jam nut. **Do not adjust 90-degree elbow more than 1/2 turn in either direction.**

3.13 Close the bleed screw on the slave cylinder or hydraulic throw out bearing. Remove the bladder & fill reservoir with DOT 3 brake fluid. Do not install bladder at this time. Install cap tightly.

3.14 **Caution: Always wear ANSI approved goggles/glasses when working with fluids. Wear proper gloves when working with corrosive fluids.** Purging of air and filling the hydraulic system. Pressure bleeding is the only way to remove all the air from the system. Pedal pumping will not work as it causes air bubbles to be trapped in the line and will not pass.

3.14.1 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.

3.14.2 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 ~10 psi for safety.**



3.14.3 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.

3.14.4 Top off fluid to the step line in the reservoir and install bladder and cap. Do not overfill or brake fluid will spill over.

3.15 With the **NOT** running and system full of fluid, cycle the clutch pedal a few times. You should have clutch *feel* but it will not be a *heavy clutch*. If the slave cylinder does not move at the beginning of the clutch pedal movement, there is still air in the system. Repeat the above process as necessary.

3.16 Apply emergency brake. With transmission in neutral, start car. Push in clutch pedal. Transmission should go into gear easily. Slowly release clutch pedal. Pedal should start to engage the clutch at a comfortable level of the pedal travel (about 1.0"-1.5" from floor). Adjust slave cylinder first, master cylinder second, to change clutch engage/release point. A new or rebuilt transmission should have all the gears run thru (in the driveway, partially releasing clutch) before road testing the new hydraulic clutch.

- 3.17 Release emergency brake and test drive. Upon return, verify steel braided line clearance and support. The line should never come in contact with the exhaust.
- 3.18 If the clutch feels spongy or releases too close to the floor, repeat the above bleeding steps. FYI – micro bubbles may be present in the system due to actuation, accumulation on rubber parts, and machining marks within the system. Repeating the bleeding step is recommended, before or after test driving.
- 3.19 Further assistance and tech support is available by calling Modern Driveline at 208-453-9800 M-F 8-5 Mountain time or E-mail Tech@modern driveline.com
- 3.20 Enjoy your new hydraulic system and Thank You for “Making it Modern” We appreciate your business.

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