



Mechanical & Hydraulic Clutch Linkage Set-Up Tips

Setting the Stage

Before getting to the actual clutch linkage system itself, it is assumed that you are using all of the correct clutch components that are known to be compatible with each other such as the flywheel, pilot bearing, clutch disc, pressure plate, bellhousing, clutch fork, clutch fork ball stud, and throw out bearing. It is advisable to purchase all of these components from the same source and that the clutch and pressure plate are a matched set (same brand). Further it is assumed, that all of these parts are either new or in good working order and that they have been installed correctly. Here is a brief checklist of items that must be properly installed for your clutch entire system to operate properly:

- pilot bearing properly installed without damaging it
- flywheel re-surfaced within spec or new flywheel
- bellhousing properly aligned with crank (very important!!)
- pressure plate bolts properly torqued
- clutch disc installed using clutch alignment tool

Make sure to carefully follow the instructions provided with your Classic Motorsports Group kit to properly install these components. For additional, in-depth information on each of the components in the clutch system as well as how to properly install and inspect all components before installation, here is an excellent article:

http://www.novak-adapt.com/knowledge/clutches_etc.htm.

Setting Up Your Clutch Linkage

Assuming that you are using the correct components and have properly installed them as discussed above, you are now ready to set up your clutch linkage system. The first step is to achieve the proper clutch fork angle. This step involves installing the clutch fork, clutch fork ball stud, and throw out bearing.

Note: If you are using all stock components (flywheel, clutch, bellhousing, clutch fork, and mechanical linkage, etc.) it is likely that you can simply re-install these parts without going through any extra steps as these parts were designed by GM to work together properly. However, it is always good practice to go through the following procedures to be sure that everything is done correctly.

With that said, most of us are using at least some aftermarket components whether it be a scattershield, a billet flywheel, a high performance clutch, or a hydraulic clutch linkage system – all of which can, or will, effect your clutch linkage geometry in one way or

another and will require you to carefully check your clutch installation process at each step.

In many occasions, the use of high performance, aftermarket components is either required due to high horsepower or special use applications or it is simply more fun to incorporate the latest and greatest aftermarket components as you build your dream car. It is in these instances where most of the clutch installation problems arise. When applicable, there is a lot to be said for using stock replacement GM components. They are proven to work together and installation becomes much easier! If you have a base level motor or only a slightly modified motor and you use your car mainly for casual street cruising and general transportation purposes, we **strongly recommend** using stock GM, or stock replacement, clutch components including your stock mechanical linkage. In the end, using stock components will typically be the least expensive and easiest clutch system to install. Although it is not as impressive to say that you are using stock clutch components in your muscle car, from a practical standpoint these components simply work correctly and will give you thousands of miles of hassle free performance.



Mechanical clutch linkage



Hydraulic TO bearing kit

Step 1: Creating the proper clutch fork angle

This is possibly the most important step in the clutch linkage installation process. Be sure to take your time!!

With the flywheel, pilot bearing, clutch disc, pressure plate and bellhousing all properly installed, the following steps will guide you through the clutch fork aligning process (these steps take place before the transmission is installed).

1. Install the clutch fork ball stud into the bellhousing.
Note: If you are using an adjustable ball stud there will be excess stud protruding through the back of the bellhousing towards the transmission – this is to be expected at this stage of the process. At the end of the clutch fork aligning process you will be cutting off any excess stud to finalize this portion of the process. Using an adjustable ball stud is one method of helping you to achieve a proper clutch fork angle.

2. Properly secure the throw out bearing onto the clutch fork (**Fig. 1**) and secure the clutch fork onto the ball stud.

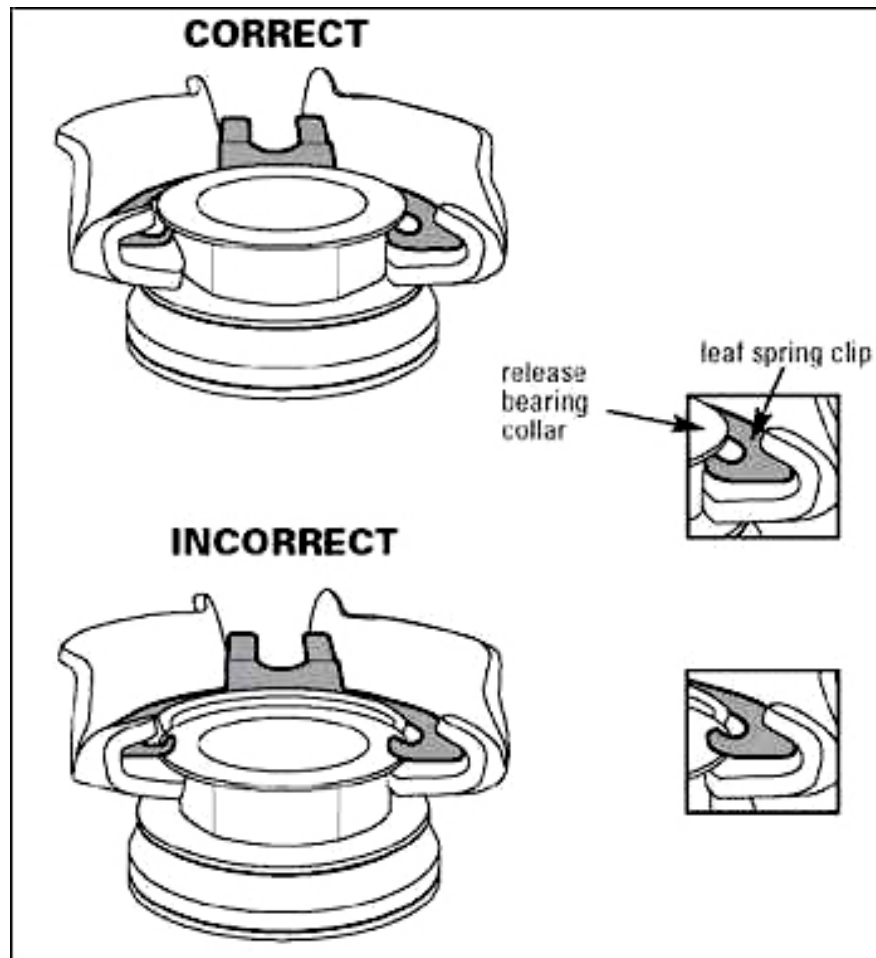


Fig. 1

3. Referring to **figure 2** below, with the clutch fork and throw out bearing installed on the ball stud, simulate the function of the clutch fork push rod by positioning your finger in the dimple of the clutch fork (**location A on diagram**) and pushing the clutch fork rearward until the throw out bearing moves forward and comes into contact with the fingers of the pressure plate. At this point check the angle of the clutch fork between the throw out bearing and the ball stud (**location B on diagram**). The clutch fork should be at an angle of approximately 5*-7* forward of parallel (angled towards the motor). To achieve the proper clutch fork angle, use the adjustability feature of the adjustable ball stud to achieve the required angle. Simply screw in or screw out the ball stud to achieve the proper clutch fork angle.

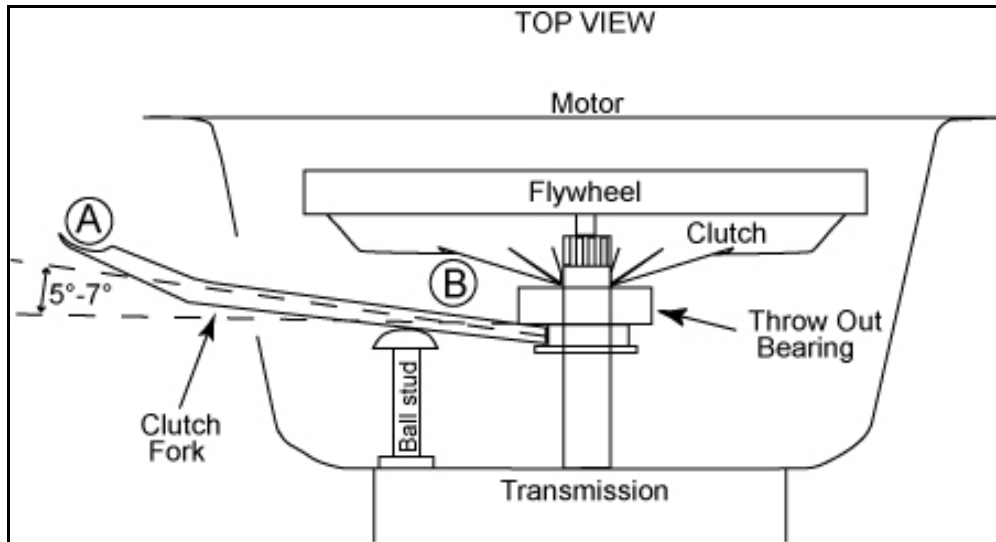


Fig. 2

4. Once you have achieved the proper angle, mark the ball stud where it is protruding through the bellhousing towards the transmission, remove the ball stud, and cut off the excess at the mark.
5. Re-install the ball stud and secure with provided locking nut. Place a small amount of grease on the head of the ball stud and re-attach the clutch fork to ball stud.
6. With the clutch fork properly aligned, you are now ready to install the transmission. Refer to the instructions provided with your transmission kit to properly install your transmission to the bellhousing.
7. With the transmission installed, the TO bearing needs to be able to move away from the fingers of the pressure plate by approximately 1/16" to 1/8" This is what is know as "free play" and is measurable as 1" – 1 1/2" of clutch pedal travel from the top, or end of travel, down to the point where you feel the throw out bearing contact the pressure plate.

At this point you should be able to move the TO bearing back and forth by pushing and pulling the clutch fork. As described in step 3 above, when the TO bearing is against the pressure plate, the clutch fork should be angled at approximately 5*-7* towards the motor. If this condition does not exist, you will need to remove the transmission and re-set the clutch fork angle properly. It is possible that you may have an in-correct clutch fork, throw out bearing, or ball stud or you did not properly follow the instructions.

Note: Each of the Classic Motorsports Group clutch kit components (that are part of our complete transmission kits) have been proven to work together as long as you follow the proper installation procedures. If you are using all CMG provided clutch parts, you are 100% certain that you have not made any errors during the installation process, and your clutch is still not operating properly, the only explanation is a defective part, a mis-boxed part by the manufacturer, or we sent the wrong part by mistake. If this is the case call us and we will correct the error.

Step 2: Installing the remainder of your clutch linkage

If you are using stock mechanical linkage, simply re-install it per your factory service manual and other than slight adjustments to the clutch fork push rod length, everything should work just fine. This is the main benefit to using good old fashioned mechanical linkage as opposed to using hydraulic linkage. Properly installed mechanical clutch linkage is the least expensive type of clutch linkage, is highly dependable, and easy to service. With this in mind, the following information will cover the issues associated with installing hydraulic linkage.

If you decide for fitment reasons or for “cool factor” reasons to use hydraulic clutch linkage, installing hydraulics will almost always be more challenging, more expensive, and will often times require some fabrication and/or modification.

If you are using the CMG internal hydraulic throw out bearing kit refer to the detailed instructions provided with the kit.

Note: Each of the Classic Motorsports Group hydraulic clutch kit have been proven to work together as long as you follow the proper installation procedures.

Important hydraulic clutch linkage concepts:

- **Master cylinder mounting**

Achieving proper geometry when installing the master cylinder is critical to a properly functioning hydraulic clutch system. It is important to make sure that master is mounted securely to the firewall and at the correct angle. Proper placement of the master cylinder push rod on the clutch pedal is also critical. If positioned too high on the pedal, there will not be enough push rod travel which will not allow the clutch disc to disengage when the pedal is depressed. If positioned too low on the pedal, the pedal will become hard to depress.

Note: The custom firewall mounting bracket and the modified master cylinder in the CMG hydraulic kits create the proper geometry for a correct installation.

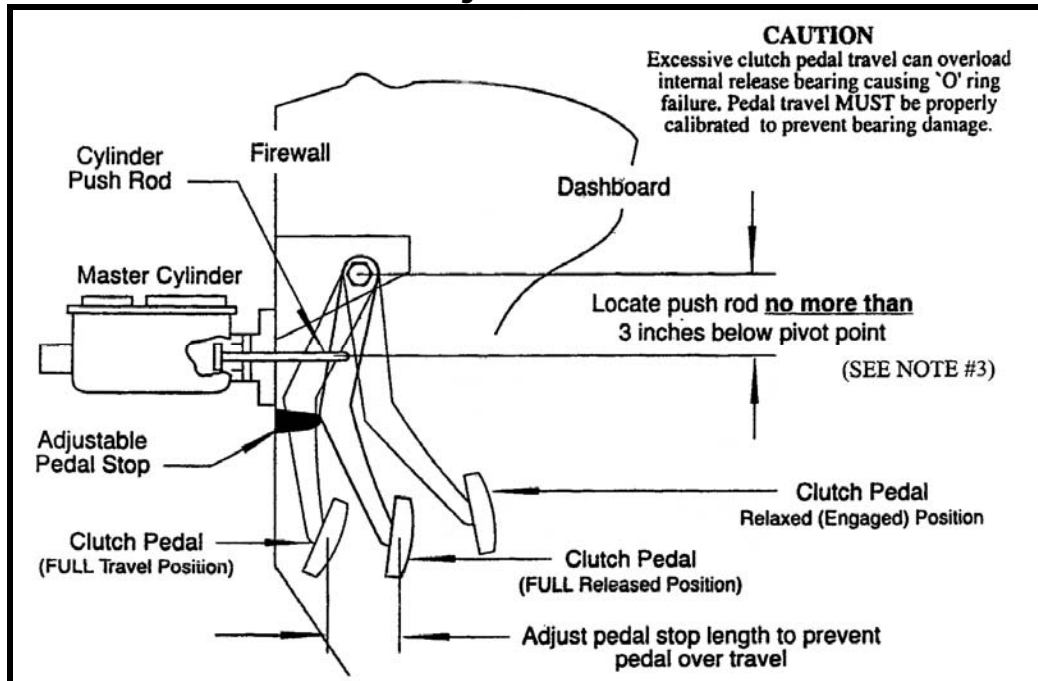
- **Bleeding the hydraulic clutch system**

Bleeding a hydraulic clutch system tends to be more difficult than bleeding a brake system. To help make bleeding as easy as possible, make sure that the fluid line running from your master cylinder down to your slave cylinder or hydraulic TO bearing does not have a loop in it. A loop in the line tends to trap air at the top of the loop making it difficult to bleed. Additionally, a pressure bleeder is recommended as opposed to using the “pump the clutch pedal” method.

- **Using a pedal stop with a hydraulic TO bearing system**

Failure to use a positive pedal stop can cause bearing “O” ring failure if the clutch pedal is depressed too far. A failed “O” ring requires removal of the transmission to replace it.

Hydraulic Master Cylinder and Clutch Pedal Adjustment



1. Park vehicle on slight incline so that when the clutch is fully released, vehicle will start to roll.
2. Depress clutch pedal slowly until vehicle starts to roll, indicating that the clutch is disengaged. At that point, set the brakes.
3. ****IMPORTANT**** Accurately measure the distance between the pedal and the firewall, and adjust travel stop so pedal does not exceed the distance of full clutch release. If your vehicle does not have an adjustment for pedal travel, then you will have to fabricate a pedal stop. ***Excess pedal travel after clutch disengagement can cause the master cylinder or slave cylinder to fail.***

NOTES

1. A pedal stop may be attached to the pedal or the firewall. A bracket with a bolt and a jam nut work nicely so that the stop is adjustable for more or less travel.
2. A 6 to 1 ratio is recommended with a 3/4" or 13/16" bore master cylinder. Example: If your pedal measures 12" from the pivot point to the pedal foot pad, you should NOT connect your push rod to the pedal any further than 2" down from the pivot point of the pedal.

These installation notes are provided to help you with the installation process. To the best of our knowledge, this information is accurate; however it is in no way guaranteed. Every car is unique and will represent unique challenges. There is no guarantee of proper fitment in your particular vehicle and you need to take responsibility for your own installation. When installing your transmission, be sure to follow proper torque & alignment specifications. Also, it is important to follow proper break-in procedures. Classic Motorsports Group is not responsible, in any way, for any damage, financial or otherwise, to you or your vehicle.

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