

Conversion to a Hydraulic Clutch

by Dick Harrington

The “Z-bar” clutch linkage that is used on Falcons and Comets might have been ok when these cars were born, but modern technology has given us many better alternatives. Early in the process of the ground up restoration of my 1963 Sprint hardtop, elimination of the “Z-bar” clutch linkage was one of the modern upgrades desired. Long tube headers and duel exhaust were also planed and the “Z-bar “was in the way. Previously, Mustang cast iron “Hi-Po” headers were installed on our Comet and it took a full day of fabrication to get an exhaust pipe snaked around the “Z-bar”. Additionally, the only time I ever had a serious road problem with my original Sprint was when the “Z-bar” split at the frame rail mount, driving home 20 miles bump starting the car at every traffic light is not something worth repeating. Consideration of a cable operated clutch was considered, but this conversion has had problems with cables burning because of the close proximity to the left exhaust manifold. Cables can also be notchy in their operation and do not offer the feel of a hydraulic activated clutch.

The first job was to find a compatible hydraulic clutch system. The first system considered was a 1983 Ranger pickup (my daily driver). The clutch in it has been maintenance free for over 20 years and has a very nice linear feel. Ranger



1991 Mazda 626 clutch master cylinder, slave cylinder, hydraulic hose and push rod. Attached to the slave cylinder is the fabricated bracket.

parts presented two problems; the master cylinder mounts on an angled firewall (the Falcon firewall is straight) and the slave cylinder has no flanged mounting points. So off to the junk yard/recycling center to see what could be found.

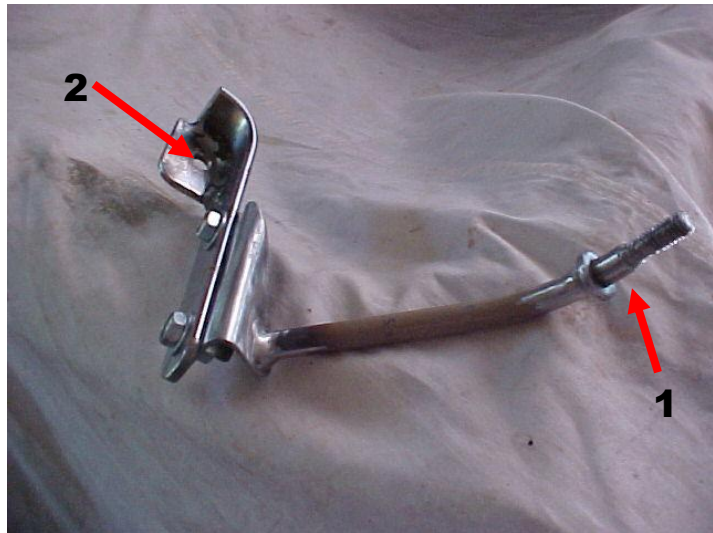
Several cars were checked out before finding a 1991 Mazda 626. The transmission had been removed (front wheel drive) but the slave cylinder was

resting on the radiator. It was still attached by the hydraulic hose and had what looked like a perfect mounting flange. The master cylinder also seemed compact enough. Opening the door and quick check under the dash showed that removing two nuts and a hitch pin would release it. One additional bolt held the hydraulic hose to the firewall. It took all of five minutes to free the hydraulic clutch system and it was off to the home garage. All the parts were still attached

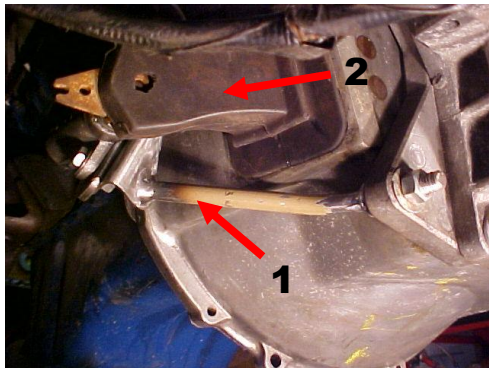
to each other and operational. If new parts were desired, the master cylinder is about \$44.00 and slave cylinder about \$26.00. 3/16" hydraulic brake line could be used to plumb the master cylinder to the slave cylinder. Cheaper than a new "Z-bar"! My objective was to have all Ford parts on the Falcon. A compromise was made in using the Mazda parts, but Ford owns 50% of Mazda, so it is mostly ok.

Once home the parts were cleaned, rebuilt and painted (M/C rebuild kit - \$13.99 and S/C rebuild kit -\$6.99).

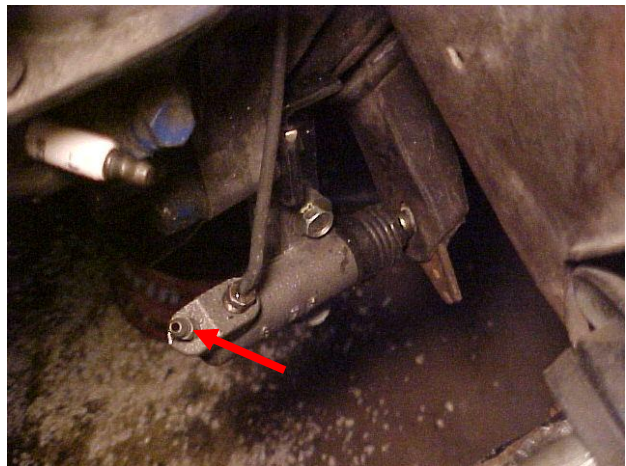
The first project was to fabricating a slave cylinder mounting bracket. My philosophy has always been to not drill holes if there is one close by. Taking advantage of an existing bell housing bolt and an extra hole in T-5 (5-speed) transmission mounting plate adaptor a two piece mounting bracket with a rod welded to it was fabricated. The two piece bracket is held together by the two bolts that attach the slave cylinder. (With an original 3 or 4-speed transmission, a bracket that uses the lower corner of the transmission to bell housing bolt could substitute for the T-5 adaptor plate location). The bracket positions the slave cylinder so it pushes the clutch fork in the same manner as the "Z-bar".



Slave cylinder mounting bracket, threaded rod (1) goes into the T-5 mounting plate and the hole at the top picks up an existing bell housing bolt (2).



Looking up at the bracket (1) with the clutch fork above (2).



Looking down on the slave cylinder from above. Note bleed screw.



The slave cylinder pushes against the clutch fork.

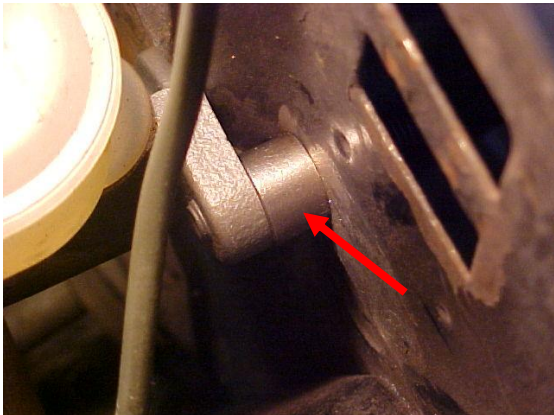
Mounting the clutch master cylinder was going to be a challenge. There is not a lot of space to the right of the brake master cylinder. Attaching to the clutch pedal would also be tricky. A lot of time was spent trial fitting before drilling any holes. Once satisfied about the location, holes were drilled and the master cylinder was mounted. A spacer was required to keep the m/c perpendicular to the firewall and a washer was welded to the corner of the pedal bracket to minimize firewall flexing.



Close up of the clutch m/c; notice the hole for the brake m/c to the left.



Looking down on clutch m/c. The hydraulic line is very close to the inner fender on the right. Also notice that the cowl is apart for repair leaving a nice access hole for the trial fitting.



A spacer was necessary between the m/c and the firewall due to a bend in the firewall.

The finished master cylinder installation. Note the close proximity to the dual brake master cylinder. You can see the hydraulic line above the master cylinders.





Looking at the m/c from the inside



A washer was welded on the pedal support bracket to relieve stress on the firewall.

Once the clutch master cylinder was mounted, the last hurdle was to attach the m/c push rod to the pedal. The fulcrum distance on the Mazda pedal was transferred to the Falcon pedal. The push rod location on the Mazda pedal was very close to the original Falcon pedal, but it was on the left side of the pedal, opposite of the Falcon push rod. A hole was drilled through the pedal for a 5/16" grade 8 bolt. Two nuts were used on the bolt for safety with the second nut being a lock nut (overkill?). 3/8" copper pipe (handy) provided spacers so the push rod had no lateral movement. Notice that the push rod has length adjustment, so there is the ability to make adjustments on the pedal height. The original tension spring was removed from the pedal as it is no longer necessary to pull the pedal back.



Push rod attached to the clutch pedal. The wire in the picture was for hanging the pedal to allow the new paint to dry.

The original hydraulic lines were used. The hard lines were re-bent and shortened; this required making a new flair. The clutch came with a soft line and that was also used. The soft line absorbs the engine movement and vibration so the hard lines do not fatigue crack. The hydraulic lines go up and over both the brake and the clutch master cylinders along the firewall and then run down to the slave cylinder behind the engine block.



Side view of the pedal and push rod

Dot 3 brake fluid is used as the hydraulic fluid. Fill the jar on top of the master cylinder and open the bleed screw on the slave cylinder. The system took only a couple of pumps of the pedal to remove the air from the lines. Comparing clutch fork travel with my other Falcon indicated that there would be no issues with clutch plate disengagement.

It was about 18 months between when the hydraulic clutch was fabricated and the Sprint was first driven. Never having done a ground up restoration before and having made so many modifications during the build, you wonder if it will work in harmony together! The first time the Falcon was started and backed out of the garage, it was obvious that this part of the project was a success. It works perfectly and has a smooth linear action (when compared to the old tension spring). In addition, the long tube headers slide in and out without interference from the original "Z-bar". When installing the headers previously, the "Z-bar had to be removed simultaneously since it weaves in between the tubes.

The only uncommon tool required is a welder used to fabricate the slave cylinder bracket, a drill is necessary for holes and wrenches are necessary to bolt the system together. The time spent fabricating was well worth the effort. If you ever had to replace or rebuild your Z-bar mechanism, you will find this a very welcome modification.

There are many possible donor vehicles for a hydraulic clutch setup that will work in a Falcon. Look for a narrow master cylinder since it will need to fit tightly against the brake master cylinder. A master cylinder that has a remote reservoir might free up some more space. There are many options for a slave cylinder, including an integral s/c that replaces the throw out bearing.