

## Up To Standards

By Mike Weinberg  
Contributing Editor

In recent months we have noticed a large increase in tech hotline calls about clutch problems. Just as transmissions have become more complex, the design and construction of cars and trucks have made R & R operations more difficult and time consuming. A routine clutch replacement can turn into a profit-

# The Problem With Clutches

robbing, time-wasting monster that will put shop morale into the toilet. Installing the clutch is only part of the story, with proper adjustment, bleeding the hydraulic system, and restoring proper pedal and linkage travel being critical to producing a quality repair.

The basics of good clutch work starts with a careful road test and undercar inspection. ANY TIME a manual transmission is removed from a vehicle, the clutch should be inspected. A good percentage of manual-transmission problems

begin at the clutch, and even if the clutch performs well on a road test it should be inspected. Leaking rear main engine seals, leaking transmission front seals, damaged splines, or worn pilot or release bearings will turn up on most inspections. The few minutes spent in an examination of the clutch components will be well spent if you don't have to do the R & R again, and the added parts sale fattens up your bottom line while providing your customer with added value and peace of mind.

A quality clutch repair starts with a properly ground flywheel. If the clutch components do not have a flat surface with a proper microfinish that is concentric to the centerline of the crankshaft and transmission, nothing else you do will make the job come out right.

Next, you need a quality clutch replacement set. At this time with NEW OEM clutch sets readily available, I believe there is no reason to be using rebuilt components. Original-equipment suppliers like LuK have made new factory clutch sets available at very reasonable prices. The sets include the pressure plate, correctly damped clutch disc, pilot bearing or bushing, a release bearing and, in some cases, a slave cylinder. LuK in particular has invested a good deal of time and money in creating an excellent catalog that includes tech bulletins, flywheel step measurements, parts interchanges, other necessary parts such as cables etc., along with an 800 number for its excellent technical department and a solid warranty.



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Having determined that there are no sources of oil leakage to damage the new clutch, it is time to inspect the splines on the input shaft, the clutch fork, the front bearing retainer that the release bearing will ride on, cross shaft and bushings, bellhousing for corrosion or cracks, and engine-block dowel pins. Installing a new pilot bushing, release bearing and slave cylinder, if the vehicle is so equipped, completes the upgrading of the release system at the transmission end. Properly torquing the pressure-plate bolts in a star sequence, and installing the transmission without leaving it unsupported to bend the disc marcel plate, will ensure a smooth release and proper clamp load from the pressure plate.

At this point a careful inspection of the clutch pedal and all attached linkage makes the difference between a quality repair and a comeback. Remember that 3-4 inches of travel at the clutch pedal translates into 0.0050 inch at the disc. Any worn bushings, Z-bars, linkage arms, etc. will complicate a simple process.

Clutch cables and hydraulics are more common today and present their own set of problems. Cables are prone to cracking, stretching, and heat and water damage, and occasionally they become a ground path for battery voltage if the chassis grounds are weak or broken. Hydraulics bring their own problems to the game. In order to work properly they must be leak free and bled properly to remove all air from the system. This is sometimes easier said than done with the current designs of internal slave cylinders and complex plumbing that routes fluid from the master cylinder to the slave.

It is important to check firewalls for cracking or flex at the base of the master cylinder. Some systems have an adjustable rod to ensure

proper pedal stroke, and all master cylinders should be inspected for contamination. Pull the rubber float out of the master cylinder and get a finger as far down in the reservoir as possible, rub the bottom and the sides, and inspect your fingertip for a black, soot-like deposit. This accumulation indicates a fair amount of wear on the master-cylinder internal seals.

In any event the fluid should be drained and replaced with fresh DOT 3 or 4 brake fluid. You have to bleed the system anyway, and now is the chance to get rid of the water. What water? Brake fluid has, by design, a high boiling point but is a hygroscopic compound, which means that it readily absorbs water (in the form of humidity) from the atmosphere. The accumulations are usually slight, but water does not have a high boiling point, and if any of the plumbing is routed next

to a heat-producing component in the engine compartment, the water will boil, putting air into the sealed system. Air in the lines causes numerous clutch-release problems, and proper bleeding technique is important.

Gravity bleeding will not get the air out of today's hydraulic systems. The old "pump the pedal, hold and bleed" method doesn't do much but build up your left leg. Vacuum and power bleeding are better, but the best tool I have found is the Phoenix Systems fluid injector. It consists of a hand pump with a small nozzle that fits inside the open bleed valve, allowing fluid to be injected under considerable pressure from the bottom to the top. Since air tends to rise in liquid, the bubbles rise to the top of the reservoir.

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## Chatter-Free Transfer Case Lubricant

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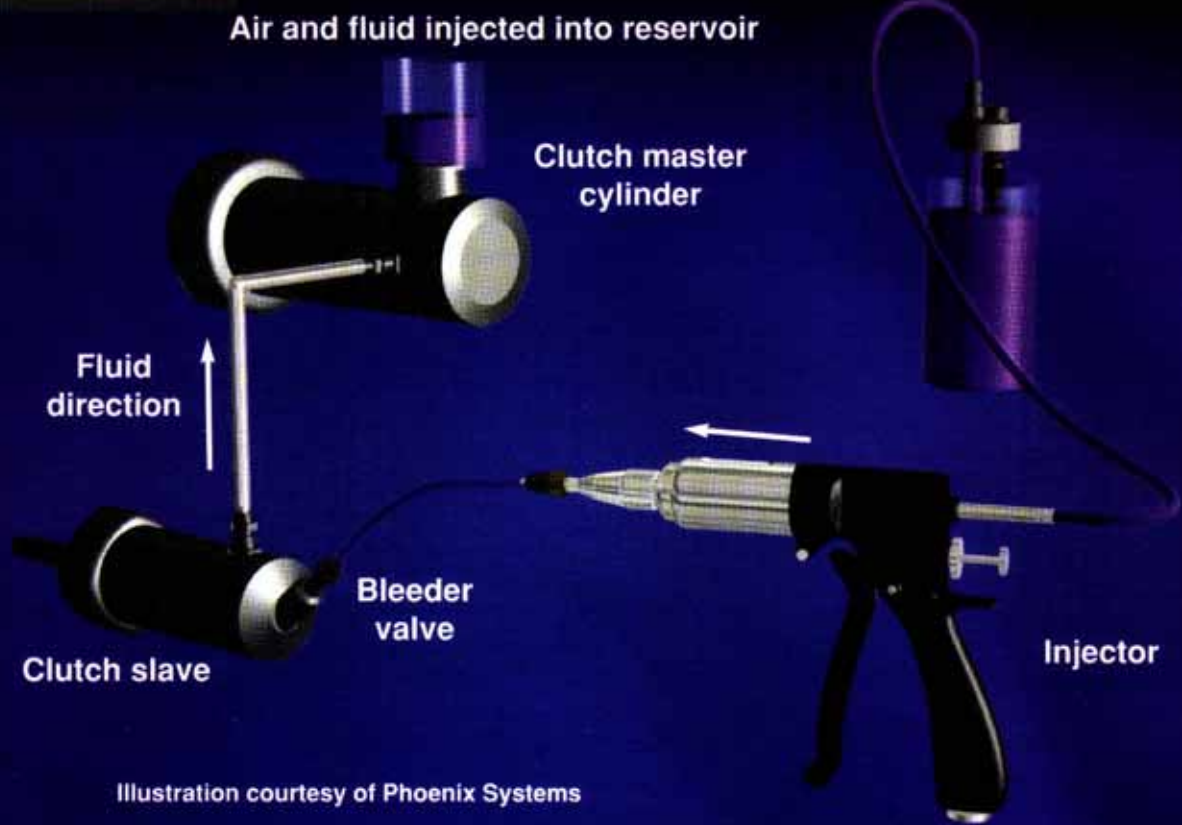


Illustration courtesy of Phoenix Systems

This system also will bleed brakes and, best of all, makes the job a one-man deal – well worth the investment as a shop tool. If you work on pickup trucks, sport/ute vehicles and a number of imports, be advised that you may have to alter the vehicle attitude to get rid of all the air. To get a good pedal on many of these vehicles, you'll need to jack the vehicle up from the rear, the side or sometimes even the front. Look at the angle at which the master cylinder sits on the firewall and examine all the twists and turns the plumbing takes. Every bend, angle or difference from level is a spot at which air will collect. Changing the vehicle angle will give the air an upward path to exit the system.

Another clutch-related problem that causes havoc in a shop is neutral gear rattle. You occasionally will have a customer with a complaint of transmission noise at idle in neutral with the clutch engaged. The secret here is to start the vehicle and listen to the

noise at idle. Then raise the engine speed slowly and see whether the noise goes away at about double the idle speed. If the noise floats out at increased speed it is NOT in the transmission. Do not promise to quiet this condition, and don't take the unit apart as you will see nothing wrong.

The noise is coming from harmonic engine vibrations that are transmitted through the clutch components and make the geartrain rattle. Ask some questions of your customer and see when the noise began. It could come from a worn-out or incorrect clutch damper, a broken or worn dual-mass flywheel, an engine in need of a tune-up, or a diesel with a bad or out-of-time injector pump. Outside of being obnoxious to listen to, this noise in no way will affect the operation of the transmission. If the unit is in a truck and has PTO covers, you can idle the vehicle on a lift with the oil drained and a PTO cover removed and watch the gears dance. This

generally puts to rest any doubt on the customer's part.

Another really good idea for self-preservation is to take a ride with the customer when they pick up the vehicle. Let the customer drive, and observe how they operate the clutch. In some cases it will be an eye-opener for you to see who rides the clutch, who shifts into 5th gear at 30 mph and who takes off from a stop light as if the green flag just fell. Ask every clutch customer to return to the shop in two weeks for a free follow-up road test to make sure the clutch does not need further adjustment as it breaks in, and have them come back in six months for the same service. It will be obvious to your customer that you care about your work, and you can nip some potential problems before they become expensive. **TD**

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