

Time = Money; Waste = Loss: A Survival Guide

By Mike Weinberg
Contributing Editor

The economy is in a terrible slump, and for the first time people in our industry are beginning to realize that we are no longer recession proof. Zero down with 0% financing has transmission shops around the country losing jobs to new-car purchases or leases. The carmakers have become major competitors for vehicle-repair dollars with sales of reman and new units at competitive prices. General-repair shops are now doing transmission work that they used to farm out to transmission shops.

This is not meant to depress you, but it is a true statement of current conditions in our industry. Once we know what the problems are, we can take action to become more competitive. The quickest way to add to the bottom line is to cut waste. Every dollar saved through waste reduction goes directly to the bottom line, whereas if you were fortunate enough to be able to double your sales you would see only about a 25% increase in your profits.

Comebacks, improper diagnosis and poor installation technique all lead to a tremendous loss of time and money. Add to this what is known as "lost opportunity cost," which occurs when you are busy doing a job over and cannot work on a job that generates profit, and it is easy to see that more money is lost. This article covers a number of common failures that are easily preventable and can save shops a lot of money and time.

Electrolysis

Many standard-transmission failures are caused by bad grounds. Here is the common problem: A shop rebuilds or repairs a stick transmission, and within a few months (under warranty) the job comes back, usually with a noise complaint. When the unit is disassembled, the input bearing is pitted and destroyed, the pilot bearing in the crank is ruined and there may be damage to the pilot journal on the input shaft and the geartrain. Everyone scratches their heads trying to figure out a cause, with the

parts becoming the usual suspects.

The cause is simple, and so is the solution: Add a new ground strap to every transmission you work on. When there is a weak or poor ground, the transmission can become a ground path. Every time the engine is shut off, electricity flowing through the transmission causes tiny spot welds to occur in the bearings. When the vehicle is driven again these tiny welds break, and as the cycle continues you begin to see pitting on the bearings, with a complaint of bearing noise. This phenomenon is most prevalent in Nissan, Toyota and Aisin Warner transmissions but can be the cause of many strange failures such as wheel bearings. A \$3 ground strap and five minutes of your time can save you hundreds of dollars.

Improper lubricants

Many shift complaints and unit failures are caused by putting an incorrect lubricant into the gearbox. In our high-tech world at least 20 different types of fluids are specified for standard transmissions and transfer cases. The fluids are designed to work with the different types of synchronizer rings used in modern transmissions. Virtually NO transmissions on the market today will run on typical 90-weight gear lube. If you put an incorrect fluid in the gearbox, you will at the very least have the customer back with shift complaints and at the worst massive gear failure.

Once an incorrect fluid gets into the unit, the compound lined synchro rings absorb it like a sponge. Even if you change the fluid immediately, it will take some time to work its way through the surface area of the rings unless you disassemble the unit and replace the rings.

With clutch-type transfer cases, an incorrect lube will create complaints of clutch chatter and noise during four-wheel-drive operation.

Some transmissions will fail catastrophically with an incorrect oil. If you are working on an NV 4500 truck transmission and use anything but Castrol

Syntorque, expect the unit back welded together. If you are working on a Dodge Neon and use anything but Mopar Manual Transaxle Fluid, part number 04874465, you will have noise complaints and failed synchronizer rings in short order.

Do the research and get the right fluid for the job. Too many shops don't pay attention to this and try to make one fluid work on all units, or they are in a hurry to get the job out the door and wind up with an expensive comeback. Helpful hint: Any unit that is specified to run on 90-weight will work better with GM Synchronmesh fluid.

We sell fluid. We didn't want to be in the oil business, but so many customers had difficulty obtaining the correct fluid for the job that we began to stock it to help prevent comebacks.

Transmission misalignment

Many noise complaints and "4th-gear jump-out" complaints are caused by a misaligned bellhousing. Missing engine dowel pins, corrosion on the block or bellhousing, or a warped bellhousing is to blame. This is a known factory defect in the NV535 (2500) 5-speed used in the small Dodge pickups. The common complaint starts with a freshly rebuilt transmission that is noisy immediately upon installation. Typically, either the unit is disassembled with nothing found to be wrong or it is returned to the remanufacturer and a second unit is installed, with the same noise complaint.

You know that the chance of two units being noisy is remote, so the problem is outside of the unit. On the NV535 it is common to have to shim the bellhousing, even a brand-new one, to get the alignment correct and the transmission to be quiet.

Common low-lubricant failures

Here is a typical scenario that is very common on the Mazda-built M5R1 two-wheel-drive transmissions in Ford Rangers and Explorers: The unit is installed and filled with oil, and it comes back in a month or two with no oil and with damage to the input and cluster gears. There are no obvious leaks until you inspect the rear-extension-housing seal. This is a booted seal, and the dust boot makes inspecting the seal lip difficult. It is very common for the inner sealing lip to get "rolled" when the driveshaft is installed.

If you get a comeback of this type, tear the dust boot off the seal and make sure that the lip of the inner seal did not roll. The preventive measure is to lubricate the yoke on the driveshaft before installa-

tion and slowly turn the yoke during installation to prevent rolling or tearing the inner seal lip. A little care and attention to detail will result in less wasted time and money.

M5R1 single-switch shift covers

This one does not cause comebacks but is a big time waster. Early M5R1 units were equipped with two electric switches in the shift cover. It is common during replacement of a transmission with a rebuilt or new unit to get a later-model unit with only one switch. This results in phone calls and delays, and many shops end up swapping the old cover onto a new unit.

One switch is the backup-light switch, and the other is a neutral-position switch. Ford eliminated the neutral switch, so the single-switch cover will work on any unit. The neutral switch was used to tell the computer during a scan test that the transmission was in neutral. It will not set a code and has no useful function.

If you have to change a unit to a single-switch model, simply tie the extra wire connector safely out of harm's way and finish the job. You can't imagine how many phone calls we receive on this, including calls from Ford dealers.

Units with burned-up input and cluster gears

This is a common failure on many standard transmissions and results in much wasted time. If you build or repair a standard transmission and it comes back with the input and cluster "black and blue," the failure always is a result of a low-oil condition. When the oil volume is below the fill line, every time the vehicle accelerates, oil will obey the laws of physics and move to the back of the transmission case, allowing the input and cluster to run "dry" momentarily. It doesn't take a lot of this to overheat the input and cluster and cause major damage.

Customers will NEVER check the oil in a stick transmission or transfer case unless it is equipped with a dipstick. Any leak or drip in a standard gearbox will become a nightmare in short order. Educate your customer in the need to have you periodically check and service the gearbox, and make clear that it is the customer's responsibility to keep the fluid at the required level.

NP231 chain failures

The NP231 transfer case is widely used in GM, Dodge and Jeep vehicles, and ATF is the oil specified

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for it. It is common to see these units with the chain hanging out after it has stretched and damaged the case. The chain, stretched from overheating, will be a brownish color.

The early models were equipped with a front-axle disconnect in two-wheel drive so that the chain would turn only during 4WD operation. Later models have no front-axle disconnect, so the chain is turning whenever the vehicle is in motion. This causes the ATF lube fill to become aerated and form a mist, which can leave the transfer case through the breather vent. The unit eventually runs low on oil and goes into nuclear meltdown. Cure: Whenever servicing or rebuilding an NP231 transfer case, use 30W motor oil as the lube fill. 30W motor oil will not form a mist and leave through the vent, so the ever-moving chain is protected.

Broken transmission cases and extension housings

A transmission or transfer case commonly will come back with a broken case or extension housing. Everyone will look at the powertrain mounts but will not pay the correct attention to the driveshaft. It is always the driveshaft that will cause this type of failure if the mounts are all good and tight. Inspecting the driveshaft and U-joints visually is not enough, as you will not see bends or out-of-balance conditions. Do not risk expensive repeat failures; send the driveshaft out to be checked for balance and alignment.

This is a common problem on ZF Ford truck transmissions, and 231 and 241 Dodge transfer cases, but it is by no means restricted to just these units. Any bend, imbalance or misalignment of a driveshaft will increase severely as shaft speeds increase. The resulting increase in side loading of the extension housing and case will cause severe damage. It is not uncommon to see ZF truck units with the bell-housing torn off the transmission and still bolted to the block. Nothing internal to the unit can cause these problems.

Mismatched tire sizes or pressures

For some unknown reason, technicians are more willing to take apart complex units than look at the whole vehicle before making a diagnosis. Ignoring tire pressure and size results in a huge waste of time and money during diagnosis of many transfer-case problems. Example: A vehicle with an NV242 transfer case comes into a shop with a complaint that it is locked in 4WD. Even when the shifter is placed in

2WD, the transfer case is still in 4WD.

Too often, a technician removes and inspects the transfer case, only to find that nothing is wrong internally. The cause of the problem is mismatched tire sizes or pressures. A tire that is 5 psi low on air pressure will cause the transfer case to get "spline locked" and not release from 4WD to 2WD. Simply making sure that tire pressures are equal solves the problem without wasting labor by chasing a non-existent internal cause.

Example 2: A shop builds an NP249 transfer case for a customer and the unit fails under warranty. The viscous coupling, which had been replaced during the rebuild, is destroyed because of overheating. The shop now has to buy another viscous coupling (list price \$820), which also will fail shortly. After spending a lot of time and money, the shop discovers that one tire on the vehicle is a wrong size. In any "active" transfer case that uses clutch packs, differentials or viscous couplings to transfer torque to the front wheels, all the tires must be exactly the same diameter. If they aren't, the transfer case interprets the difference in tire speed as a slipping wheel and kills itself trying to send power to correct the slip. Before you work on any of these transfer cases, make sure that all tire pressures and diameters are the same.

Example 3: A late-model GM SUV comes into a shop with a transfer-case trouble code. The technician replaces speed sensors, checks wiring and probes computer harnesses; five hours later, the problem still exists.

In the late-model GM electronic transfer cases, a 15-rpm difference in speeds between front and rear driveshafts will set a trouble code. A 15-rpm difference in shaft speeds translates into $\frac{1}{16}$ inch difference in tread wear. You have to measure the vehicle's tire diameters with a stagger gauge or their circumferences with a tape measure around the center of the tread. When the tires are all the same diameter, the problem goes away. Think "outside the box," and don't get trapped into looking at only the unit. Many external parts of the vehicle can affect the operation of transmissions and transfer cases, and if you aren't using a standard procedure to eliminate external problems before going into the labor-intensive work, you are going to lose most of the time.

Gear rattle and transmission noise

Another common waste of time and effort is noise complaints that are misdiagnosed. Be aware that noises occurring in a transmission when it is in neu-

Up To Standards

tral need to be diagnosed carefully. With the engine running, the vehicle in neutral and the clutch engaged, slowly raise the idle speed to 2,500 rpm. If the noise goes away, it is not in the transmission. The cause of the noise is harmonic vibrations from the engine causing the geartrain in the transmission to rattle. Higher engine speed gets rid of the harmonics, and there is no need to go inside the gearbox. Look for a bad clutch damper spring, worn-out dual-mass flywheel, a missing or out-of-tune engine, or a bad diesel injector pump.

The second major cause of misdiagnosed noise complaints is that noise travels. Be very careful when diagnosing noise problems, as a noise in the rear differential easily can travel up the driveshaft and create the illusion that it is in the gearbox. Use the vehicle as a dyno and pinpoint the source of the noise before you begin to remove components. Driveshafts, grounded mounts and body panels all will act like speakers on a stereo to magnify and direct noise away from the component that is bad.

Time is one commodity that we all share equally. Only so much of it is available to us, and we can never get it back. If you consider the cost of your labor and overhead and the fact that getting eight actual hours of work performed in an eight-hour day is impossible, the value of time becomes greater. Every hour wasted on not-for-profit jobs costs you dearly.

There was a great line in the movie "The Godfather" where Don Corleone told his son, "Women and children can be careless, but men can't afford to be careless." The more careful you are with your time and your money, the more successful you will be. Cut the waste out of your work, and the bank account will grow more rapidly. **TD**

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