Tips and Techniques for Standard-Transmission Diagnosis, Part 1

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Our profession is concerned almost exclusively with problem solving. It is important that we learn to diagnose and correct the problems that our customers bring us in a proficient manner, because time is money. Once you have agreed with your customer on a price for your labor, any extra time spent on the repair costs you twice over. The reason for this is that you cannot charge for any further time spent on the project, and you could put that same time to use on a paying job. This should be common sense, but every technician will attack a problem or comeback in a different manner.

The thrust of this article is to create a systematic approach to correcting problems in as short a time span as possible. There are a number of issues that must be addressed in a specific order on a consistent basis. To resolve problems efficiently you must have a game plan that is followed in the same manner every time, by all the people in the shop who will be associated with the problem.

Make a checklist that thoroughly outlines the concern of the customer, and use the following steps to organize a solution. It is extremely important that this procedure be followed the same way in every case. Most shops have more than one employee, and these people have different areas of responsibility. A rebuilder will rarely get to talk with a customer, as the manager or sales person usually handles this job. A great deal of time and effort is wasted because various job functions in the shop do not always communicate with each other effectively. First we need to set proper priorities for ourselves.

Communication

You must make every effort to make sure you completely understand the customer's complaint. The front man who is in contact with the customer must make sure that he understands what the customer needs in order to be satisfied. Sometimes we have imaginary problems caused by the customer's ignorance of the proper operation of the vehicle, or a problem that is unrelated to the transmission but affects its operation. There are obvious problems such as a vehicle that will not move. It is still critical to question the customer about the events that led up to the failure. How was it operating before it stopped moving? Were there any noises, shift problems, loss of power etc. The customer doesn't know much about how the vehicle works, but he knows the vehicle better than anyone else. It would be nice to know the events preceding the car's being brought to the shop.

The issue of communication does not stop here. Information gained from the customer is useless unless relayed to the other people in the shop who will be involved in solving the problem. Put it in written form for all concerned to use.

Problem Identification

This is the most-important part of creating a solution. If the vehicle is drivable, a thorough road test to identify the cause of the problem is a must. Always try to have the customer with you at this time. If you cannot re-create the problem, let the customer drive and make it happen. You may find that they are doing something to the vehicle that you would not. Make arrangements to drive the vehicle for an extended period if necessary. Do nothing until you are absolutely sure of what the customer is talking about. Once you understand the customer's complaint, you can evaluate the vehicle properly and find the correct answer for the complaint.

Vehicle Evaluation

Once you thoroughly understand the customer's concern, you have to go over the vehicle completely. Resist the impulse to remove the transmission or transfer case. This is without a doubt the biggest time waster in a problem situation. Use the vehicle as your test bed to understand what it will take to make this complaint go away.

Again go back to your checklist. Are

the tires the same, correct size? Is the tire pressure correct on all four? Is there excessive tire wear? I get at least one tech call a week from a shop that has taken apart a 242 transfer case because "it was stuck in 4WD" only to find nothing wrong inside the transfer case. Correcting the tire pressures cures the problem.

Note how the engine runs, check the transmission lube, and note the quantity and type. The wrong type of lube is responsible for 50% of the shift complaints in the field. Check the clutch operation and hydraulics if the vehicle is so equipped.

Has the vehicle been modified in any way? Lift kits, wider rubber, reversed wheels, changes in differential ratio and many other modifications will create new sets of problems. We have seen many four-wheel-drive vehicles with lift kits installed that change the angle of the shifter. In many instances the floor actually will interfere with the shifter, not allowing complete engagement of the gear selected and resulting in gear damage and noise. This is particularly common on Jeep vehicles equipped with the Peugeot BA 10 transmission; the shifter will hit the floor when the driver is selecting reverse. This will engage the reverse gears about halfway across the width of the tooth, and when the driver engages the clutch, immediate failure of the reverse gearset will occur. The solution is to cut the floor to allow full travel of the shift lever, but you will never know to do this unless you really check out the vehicle. This creates an expensive comeback and a new set of reverse gears. You could save the time and expense by thoroughly examining the truck before starting any repairs.

Again, commit all of your findings to writing. Some of you are thinking that this will take too much time. Remember the old saying: "There is never enough time to do it right, but there is always enough time to do it over."

Understanding Theory

A lot of people employed in the field do not understand how the transmission they are repairing functions. It is unimportant to know where the parts go. Replacing parts alone does not solve problems; knowing how the assembly functions and the power flow are the keys to being able to fix anything. Every manufacturer has service manuals to show where the parts go and the various assembly steps needed to put the unit together.

Books on transmission theory and operation are available, but you have to find them. If you are to be successful, you must understand how the parts you are working on function. If you don't understand how a synchronizer works, or the function of detent balls and springs, gear-ratio changes, bearing preload, gear backlash, the effect of lubricants on shifting, you are not alone. The first step to personal growth and improvement is to understand your weak areas and to educate yourself to become knowledgeable in those things you don't fully understand. It is important to get your ego in touch with reality. All the really brilliant people I have met have one trait in common: They never stop learning. They are perpetually curious and never believe that they are all they can be.

Remove all emotion from the job at hand. We all have done it at one time or another, but it is ridiculous to become angry at an inanimate object. This job requires constant research and a dedication to learning that will never cease. Most of the frustration involved comes from not understanding the theory of transmission operations.

The Process of Elimination

Logic dictates that we take steps to fix a problem by the process of elimination. You cannot afford to use a "shotgun" approach with labor as expensive as it is. Your previous checklist for the vehicle now should begin to lead you in the right path. What do we know for sure about the problem, and what is unknown? You must begin by eliminating those things that cannot be causing the complaint.

Here is a real-world case to make the point. We sold a franchise shop an M5R2 remanufactured transmission for a two-wheel-drive Ford pickup. Some months into the warranty period, the shop owner called me saying that the vehicle owner had called with a complaint that the unit was making noise and that because of distance he had taken it to a Ford dealership. We contacted the Ford dealer and spoke with the technician, who claimed that the noise was present in every gear and said he believed it was definitely in the transmission. The technician seemed very sure of himself, and we arranged to ship another unit to take care of the problem.

Several days later the Ford technician called us back and said the vehicle still had exactly the same noise problem. I spoke with this man and tried to explain

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to him that it was very unlikely that two freshly remanufactured gearboxes would do the same thing. I asked him to do several tests to isolate the noise and make sure it wasn't coming from the driveshaft, differential or wheel bearings. It is difficult to believe that the noise would not change in 4th gear, which is direct drive with no power going through the counter gear.

Now ego reared its ugly head, and he told me he had been doing this for 10 years and I didn't know what I was talking about. There was no point in arguing with someone whose mind was made up, so I contacted the transmission shop that was our customer and explained the situation. The owner of the shop contacted the customer and asked him to bring the truck back to him and he would straighten it out.

I called the shop owner several days later, and he said the Ford dealer had found that the truck had a defective two-piece driveshaft and installed an updated one-piece driveshaft, but the noise got worse. At this point the customer was so disgusted that he traded the vehicle in for a newer model. We got the original unit back and put it on the test machine, and it spun quietly. Complete teardown showed no signs of wear or noise. We knew the unit was not the cause of the problem, but the vehicle had changed hands and it seemed as if the problem would never be found.

About a month later I got a call from a used-car dealer in Orange County, NY, who had bought this same truck wholesale from the Ford dealer and was stuck with a noisy vehicle. He had gotten our name and number from the ID tag on the unit and wanted to know whether we could help him. I explained the history and asked him whether he could bring it to our facility and let us road-test the truck and make our own diagnosis. He was more than happy to do so and in conversation explained that he had it looked at by a local transmission shop and a general-repair facility, and both shops had assured him the problem was transmission related.

The truck arrived at our plant the next day, and I went for the initial road test. The truck was noisy, and the noise seemed to come from the transmission area. The noise was constant in all gears and neutral, and once the truck was at road speed it would make noise with the engine off and the clutch disengaged. On the ride back to our plant I told the car dealer that the problem was in the differential. He couldn't understand why it would make the noise appear to be at the transmission. I explained that the noise was traveling from the differential through the driveshaft and that the shaft was acting like a stereo speaker. I offered to repair the differential, but he declined, saying his mechanic would do it.

Three days later the dealer returned with the worst-looking pair of carrier bearings you ever saw in his hand and with a quiet truck, and he thanked me for leading him in the right direction. We installed a ground strap from the transmission to the block, because the bearings appeared to be damaged by electrolysis, and a bad ground can make any of the powertrain components become a ground path for the electrical system.

How much time did all parties in this exercise waste? How could three different technicians make the same mistake in diagnosis? The first technician looked at the vehicle and decided a reman unit was the problem, and when the problem did not go away he became defensive. Assumption is the mother of all screw-ups. I can't explain why the other two mechanics came to the same conclusion, but I believe that once they saw the fresh reman gearbox, they stopped looking further into the situation.

The moral of this story is that none of these people took the time to eliminate all the possibilities that could create the problem. This goes to show the importance of keeping an open mind and using a step-by-step process of elimination to locate the problem.

In the next issue we will continue this article with a step-by-step diagnostic routine for the most-common stick and transfer-case problems and comebacks. There really are no problems; there are only solutions. TD

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