

By Mike Weinberg
Rockland Standard Gear Inc.

Taking A Standard Transmission To The Doctor

Much has been written about diagnosing and troubleshooting automatic transmissions and this two-part article will be devoted to solving manual transmission problems. As with automatics, it is critically important to find the cause of

the problem and not just cure the symptoms.

We start by making sure we have the right tools. Our list should include all the tools necessary to disassemble and rebuild a standard transmission. Next we must have a good set of measuring tools. These should include a good set of feeler gauges, a micrometer, a vernier caliper, a dial indicator and a good set of repair manuals. Yes, I said repair manuals. They are a tool as important as anything you can buy from your tool supplier. Within their pages you will find the specs, parts diagrams, order of tear-down and re-assembly and usually some troubleshooting tips. I believe the single most important investment a rebuilder can make is in a good set of thorough repair manuals. One other tool you might want to keep handy is a Polaroid camera. You can buy one very cheaply and park it in your tool box. When you are taking apart a unit you haven't worked on before, it really helps to

be able to take some pictures of a linkage set up, or other parts that will help you in putting it back together. By the way, this works great on automatic valve

bodies for check-ball locations.

The next order of business is to get sharp on the powerflow of

standard transmissions. It is impossible to figure out what is wrong unless we know how they work. You cannot cure a problem in today's automatic units unless you are familiar with the powerflow, hydraulics and electronics involved with their operation (See Illustrations). Sticks are no different. Throwing parts at the problem becomes expensive and can turn into a costly waste of shop production time.

Okay, we have a car with a standard trans problem, where do we

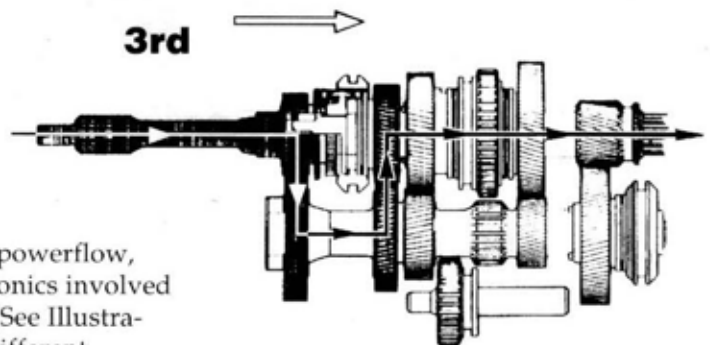
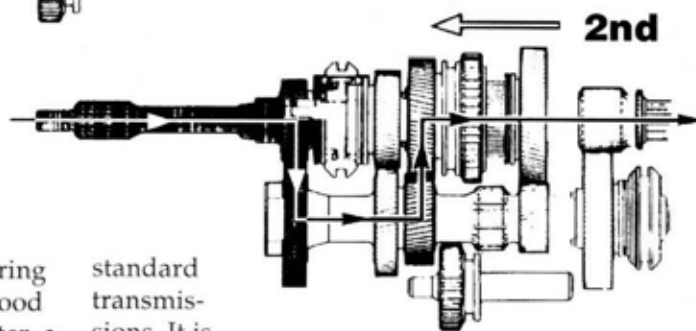
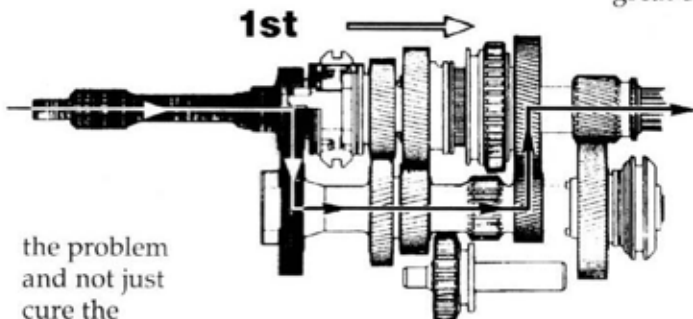
start? The last place to look is the gear box. Start with the vehicle itself. What do we know about the problem? Communication with the customer is the first step. It is vital to find out as much about the problem as possible from the driver. We are in business to satisfy the customer, and the more times we do that, the better our business will be. The driver probably knows nothing about transmissions, but he drives

the car every day and knows it better than anyone. Ask the right questions, take the time to identify the problem THROUGH the customer's eyes.

The next step is a road test. Even if the car came in on a hook, go out

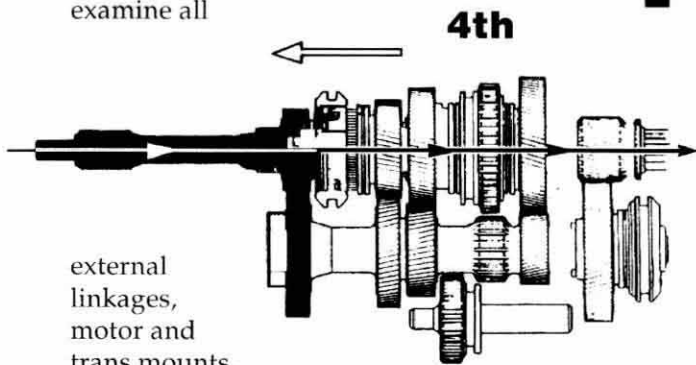
and try and drive it. A real good idea at this point is a clip board with a clean sheet of paper on it. Note all aspects of the vehicle function in general and the specifics of

T5 Powerflow



the trans operation. Find out what works and what doesn't work. For instance, more than one shop has pulled a gear box out for repair only to find nothing wrong. The car wouldn't drive, but the speedometer would register miles-per-hour standing still. Because nobody checked, they looked at the trans instead of the differential, or the axles. If the car drives, record all aspects of operation – clutch performance, upshifts, downshifts, shifter operation, noises, reverse light function, etc. Hopefully, we can confirm the customer's complaint and possibly identify a few more problems that only a trained professional would notice.

Now we are ready to examine the car thoroughly under the hood and under the chassis. This is the time for step-by-step analysis, because we must separate external problems from those inside the unit. Is the shift linkage properly adjusted? Is the clutch correctly adjusted and functioning properly? Now is the time to examine all

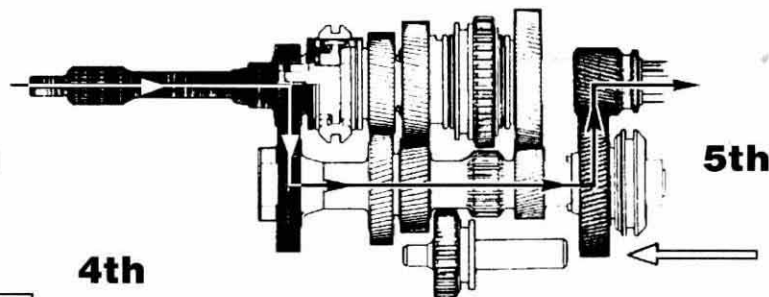


external linkages, motor and trans mounts, drive shafts, CV joints or axles, bell housing bolts, shifter bolts, bushings, etc. On transfer cases and transmissions like the KM 160 series that use vacuum and electronic inputs to shift, we must verify correct function of the external controls before we can determine an internal problem. Now this may seem very time consuming, but pulling units apart that

don't need to come apart is a real bad way to spend the day.

A complete external check has told us that the problem is internal. The next order of business is to drain the trans. Verify that the right amount of lube is in the box and that it is the correct type. Taking a good look at the oil can tell you a lot. Put a small flexible magnet in through the drain plug and troll around for some telltale debris.

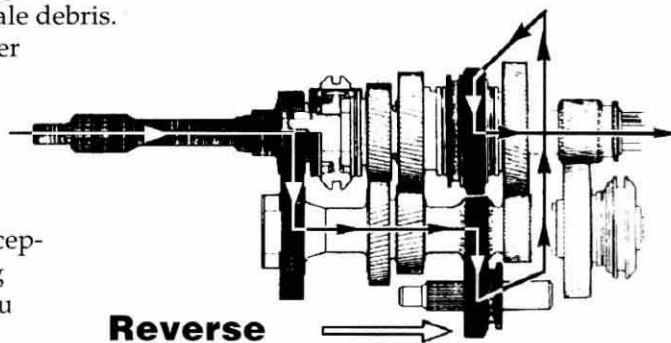
Now we call the owner and get permission for the teardown. Whenever you pull a stick trans out, pull the clutch at the same time. No exceptions. The worst thing that can happen is you will confirm that all the



clutch components are OK, and most of the time you will sell a clutch job, or find a related problem. About 75% of all standard trans failures start with the clutch.

We now have the trans on the bench and before tearing it down take a good look at the box itself. Is it the right trans for the car? Many a trans has been swapped with a "will fit" unit from the bone yard. The unit will fit, but is not the correct one for this model car. Note any cracks, broken or stripped bolts, worn shift rails, grooved

front bearing retainers, etc. that may explain the failure or why it happened. Turn the shafts and note their operation. Take an ENDPLAY reading before you lay a wrench on this unit. Knowing where the endplay is before teardown will help to understand the problems we are about to uncover. OK, you can finally crank up your airgun and take this unit



apart. Now "apart" means to the nitty gritty. Disassemble and thoroughly wash all the parts and only then can we inspect them and come up with an estimate. Right now someone is

laughing out there saying that this is a waste of time. The truth is, you only have one shot to sell the customer. If you miss something you will end up eating it. If you miss something on a common automatic trans, you can generally buy the part as "good used" for low dollars. Not so with sticks. The gear that you didn't take off the mainshaft to inspect the bore and the shift teeth probably will cost more than Saturday night's bar tab. Make sure the customer pays for his damage and you have a fair profit for your labor.

Next month we will analyze the parts damage, find the causes of the failure and complete the overhaul. We also will discuss troubleshooting after the repair and the rebuilder's worst enemy – noise. ■