Figure 129-1  A typical automatic transmission dipstick (fluid level indicator). Many use a clip to keep it from being forced upward due to pressure changes inside the automatic transmission. A firm seal also helps keep water from getting into the fluid, which can cause severe damage to the clutches and bands.

Figure 129-2  The “add” mark on most automatic transmission dipsticks indicates the level is down 0.5 quart (0.5 liter). Always follow the instructions stamped or printed on the dipstick.
TECH TIP: Quick-and-Easy Automatic Transmission/Transaxle Diagnosis

An experienced technician told the beginning technician that automatic transmission/transaxle diagnosis is often very easy. For example:

- If the vehicle does not move in drive or reverse, remove the transmission/transaxle for service because the problem is likely mechanical rather than hydraulic (valve body) or electrical (computer, solenoids, or sensors). If the unit will not power the vehicle, the unit will more than likely require removal for a thorough mechanical inspection and repair.

- If the vehicle moves, but does not shift correctly, the problem is likely electrical (computer, solenoids, or sensors) or hydraulic (valve body) rather than mechanical. This is usually true because if the vehicle is able to move forward and backward, the major mechanical components are at least able to function. Therefore, correcting the nonmechanical problem should be the technician’s first consideration.

Figure 129-3 Use all shift modes when diagnosing automatic transmission/transaxle concerns to help pinpoint the area where the fault is located.

Chart 129-1 Transmission/transaxle-related diagnostic trouble codes (DTCs): For transmission-related codes on vehicles older than 1996, check service information on how to retrieve and read the codes.
CHART 129–1 (continued)  Transmission/transaxle-related diagnostic trouble codes (DTCs). For transmission/transaxle diagnostic trouble codes for vehicles older than 1996, check service information on how to retrieve and read the codes.

Figure 129-4  Most factory or factory-level scan tools are capable of bidirectional control of the automatic transmission or transaxle.

Figure 129-5  A Tech 2 scan tool is able to display shift solenoid current. Use this information and check service information for the specified current to help diagnose shift solenoid-related faults.
CHART 129–2 Typical automatic transmission/transaxle sensor values as displayed on a scan tool.

### TECH TIP: You’d Ask a Friend, Wouldn’t You?

If you were stuck on a difficult transmission problem, you would probably ask a technician friend for ideas. Think of the service information as a friend with some inside information. It is written by the people who know how the system works in detail.

Such advice is available in service information. If the technician follows the recommended steps, chances are excellent of finding the problem—just like getting the advice of an experienced technician. SEE FIGURE 129–6.

### TECH TIP: Quick-and-Easy Automatic Transmission/Transaxle Diagnosis

An experienced technician told the beginning technician that automatic transmission/transaxle diagnosis is often very easy. For example:

- If the vehicle does not move in drive or reverse, remove the transmission/transaxle and inspect it closely because the problem is likely mechanical rather than hydraulic (valve body) or electrical (computer, solenoids, or sensors). If the unit will not power the vehicle, the unit will more than likely require removal for a thorough mechanical inspection and repair.

- If the vehicle moves, but does not shift correctly, the problem is likely electrical (computer, solenoid, or sensor) or hydraulic (valve body) rather than mechanical. This is usually true because if the vehicle can move forward and backward, the major mechanical components, though not in like-new condition, are at least able to function. Therefore, correcting the electrical or hydraulic problem should be the technician’s first consideration.
Figure 129-6 Checking service information for how to perform diagnosis on an automatic transmission fault is a wise step.

Figure 129-7 A torque converter clutch (TCC) solenoid. This TCC can be replaced on a General Motors vehicle without having to remove the transaxle/transaxle from the vehicle.

REAL WORLD FIX: The Stalling Impala
The owner of a Chevrolet Impala complained that the vehicle would occasionally stall when slowing to a stop. The problem only occurred after at least 20 miles and occurred more frequently in warm weather. The owner also indicated the shift through the vehicle was就像是 a manual transmission, even though this vehicle was equipped with an automatic transmission. It felt like the throttle was not being depressed on a manual transmission. Thankfully, the service technician was aware of this common problem and installed a new torque converter clutch (TCC) solenoid. When the original solenoid got hot, it became stuck in the applied position. Even though the voltage was removed from the solenoid when the brakes were applied, the solenoid and the torque converter clutch (TCC) remained applied. See Figure 129–7.
REAL WORLD FIX: The Rough Idle Story

The owner of a Chevrolet pickup truck equipped with a V-6 engine complained of a rough idle. The idle was smooth when the gear selector was placed in park or neutral, but became rough when the gear selector was placed in any drive gear position. The service technician could not find the cause of the problem, but did notice that the engine seemed to be under a heavy load at idle set due to a high MAP sensor reading. The customer was questioned again about the possibility of a repair that may have had an effect on the idle. The customer said that the automatic transmission had been replaced recently but did not think that could have an effect on the rough idle problem. A quick check of the stall speed indicated a much lower stall speed—1400 RPM versus 1850 RPM normal stall speed. Obviously, either the torque converter was defective or a torque converter from a V-8 was installed in the V-6 truck. After returning to the transmission shop and getting a replacement torque converter installed, the rough idle problem was solved.

Figure 129-8

This 4-cylinder General Motors vehicle has a stall speed of about 2350 RPM. Notice that the gear selector is in drive and the speedometer is reading zero.

Figure 129-9

Sometimes the location of a transmission fluid leak is easy to see, but with others it can be difficult to find. Look closely at places where O-rings or gaskets are used, as these are the most common areas where fluid leaks occur.
TECH TIP: Vibration—Engine or Transmission?

A vibration is often difficult to diagnose. One method is to separate (unbolt) the torque converter from the engine drive flex plate. Push the torque converter as far toward the transmission/transaxle as possible, then start the engine. If the vibration is gone, the problem is due to a fault in the torque converter, pump assembly, or other component that is constantly rotating with the engine running. If the vibration is still present, then the cause is due to an engine or accessory problem.

TECH TIP: Look at the Command and the Engine Speed

Using a scan tool is very helpful when diagnosing automatic transmission problems. However, the display often shows when the shift has been commanded and may not show if the shift or the TCC engagement actually occurred. To help ensure that the shifts have in fact occurred, also watch the engine speed. Many factory or enhanced scan tools can also display the engagement speed. A slow engagement is usually caused by worn clutches. Check service information for the exact parameters and range of proper operation for the vehicle being diagnosed.
**CHART 129–3**

This typical range chart shows the forward clutch is applied in all forward gears. Notice that if the low-reverse clutch were to fail, it would prevent the vehicle from moving in both reverse and forward.

**Figure 129-11**

The locations (taps) for connecting a pressure gauge to measure the pressure of the various hydraulic circuits are usually found on the side of the automatic transmission/transaxle. Check service information for the exact locations for the vehicle being tested.

**CHART 129–4**

A pressure chart for the Ford 6F50N/GM 6T70 transaxle.
Six pressure gauges are installed on this vehicle to show students how the pressures vary and how the gauges can be used to find faults or possible problem areas before the unit is removed and disassembled.

REAL WORLD FIX: The Customized Van Story

The owner of a customized General Motors van equipped with an electronically controlled automatic transmission (4L80-E) complained that the automatic transmission downshifted into second gear and stayed in second gear whenever the headlights were turned on. The transmission was first diagnosed when the headlights were turned on while the van was in traffic. To assist in troubleshooting the problem, the technician discovered that 4 volts DC were on the one wire leading from the vehicle speed (VS) sensor to the vehicle computer whenever the headlights were turned on. Obviously, this shut down the computer. Instead of disassembling the van, the technician decided to replace the wire with a new one, and the problem was solved. The 4 volts DC apparently shut down the computer, thus the control was stepped out of control and remained on. In the van, the electronic control computer was installed in the dashboard and connected to the control computer. When the headlights were turned on, the control computer relay was stepped on by the vehicle computer, allowing the driver to drive at night and in the daytime.
FREQUENTLY ASKED QUESTION

What Is Wrong When My Automatic Transmission Does Not Upshift?
The following examples can cause the automatic transmission/transaxle to fail to upshift.

- A defective governor (if so equipped) will often not allow any automatic transmission/transaxle to shift out of first gear or stuck in high gear.
- A defective vacuum modulator (if so equipped) or misadjusted throttle valve will often delay the shift until a very high speed is achieved.
- A fault in the PCM, TCM, or a speed sensor on electronically controlled automatic transmissions/transaxles will occur when one gear, usually second or third, is selected and the unit will not shift out of that gear.

Figure 129-14
This is a normal amount of wear material in the bottom of an automatic transmission pan.

Figure 129-15
Always check that the filter is secured by a clip or other fastener to keep it from dropping out of location.
WARNING: The automatic transmission fluid may be hot enough to cause personal injury. Wear protective clothing and avoid contact with the hot fluid.

Figure 129-16 A fluid exchange machine uses the engine and the transmission pump to force the fluid into the machine where the old fluid is used to push against a diaphragm, which then forces new fluid back through the transmission. A sight glass is used to show the technician the fluid, so the process can be stopped when only clean, new fluid is seen flowing through the cooler line.

Figure 129-17 In this case, the cork-rubber gasket is glued to the pan and is ready to be installed. The retaining bolts need to be tightened in sequence, but the arrows that indicate the order will depend on the manufacturer's recommendation. Never use an RTV sealer and a gasket together.
To check for proper operation of the vacuum modulator, follow these steps:

STEP 1: Hoist the vehicle safely and locate the vacuum modulator (if equipped).

STEP 2: Remove the vacuum hose from the vacuum modulator. If automatic transmission fluid drips out when the hose is removed, the vacuum modulator is defective and must be replaced.

STEP 3: Use a hand-operated vacuum pump to apply vacuum to the vacuum modulator. If the modulator is okay, the vacuum reading will hold steady and not drop. If the vacuum modulator will not hold vacuum, the modulator should be replaced.

STEP 4: Connect a vacuum gauge to the vacuum line from the vacuum modulator (if equipped). If automatic transmission fluid drips out when the hose is removed, the vacuum modulator is defective and must be replaced.

NOTE: A defective vacuum modulator can cause automatic transmission fluid (ATF) to be drawn by engine vacuum into the intake manifold. When ATF burns, it produces white smoke. The white smoke is often confused with steam. Therefore, the smart technician should check if the vehicle is equipped with a properly functioning vacuum modulator before continuing the diagnosis for steam coming from the tailpipe.

FREQUENTLY ASKED QUESTION

How Is a Vacuum Modulator Tested?

A vacuum modulator is used on many hydraulically controlled automatic transmissions/transaxes. Most vacuum modulators affect shift points, so if shift timing is delayed on most units that have a vacuum modulator, then it should be tested. Higher engine loads (lower vacuum to the vacuum modulator) result in a firmer shift occurring later than normal; and at light engine loads, the shift is softened and will occur earlier.

If the vehicle is equipped with a properly functioning vacuum modulator before continuing the diagnosis for steam coming from the tailpipe.

Therefore, the smart technician should check if the vehicle is equipped with a properly functioning vacuum modulator before continuing the diagnosis for steam coming from the tailpipe.
TECH TIP: Use Old Headlights to Check Wiring

The proper operation of any electronically controlled automatic transmission/transaxle depends on having electrical power available to operate the solenoids. Before removing the unit from the vehicle, use a headlight to check if there is enough current being sent to the unit. Unplug the electrical connection that supplies 12 volts, usually from the ignition switch. Use a headlight and attach wires to the ground and the bright filament terminals. Attach one test lead from a headlight to the terminal that supplies 12 volts to the unit. Attach the other lead from the headlight to a good clean chassis or transmission ground such as the case. Turn ignition key on, engine off (KOEO) and observe the headlight.

- If the headlight is dim, there is a voltage drop between the source (battery) and the transmission feed. Check the wires directly leaving the ignition switch or transmission control relay. If the headlight is still dim, replace the ignition switch or transmission feed relay. - SEE FIGURE 129–19.

- If the headlight is off, then there is an open circuit between the battery and the transmission/transaxle. Follow electrical troubleshooting procedures to find and repair the open circuit.

- If the headlight is bright, there is enough voltage and current being supplied to the transmission/transaxle to correctly operate all of the solenoids. - SEE FIGURE 129–20.
Figure 129-20  A bright headlight indicates that there should be sufficient current flow available in the automatic transmission/transaxle to operate all the solenoid circuits.