

Water, water everywhere

Many of us are familiar with the “strawberry milkshake” you see when a transmission cooler ruptures in the radiator and mixes engine coolant and transmission fluid. In recent years we have seen other problems that can be traced back to water intrusion. A massive leak is easy to find. Let’s look at some causes that are often less obvious.

How do we know we have water intrusion? A good question. When a transmission is disassembled, you may find moisture present in a variety of places. Often you’ll find a milky, slimy residue, which is a mixture of water and transmission fluid. It is not uncommon to find this in the Allison LCT 1000 transmissions used in Chevy HD pickup trucks. I inquired of Allison and other industry experts and could not come up with a reasonable explanation for the presence of this moisture.

Then it occurred to me that the vent was drawing moisture in (usually during rainstorms or periods of high humidity). Vacuum is created when a quick increase in transmission pressure is commanded. The pump begins drawing fluid into the pump to supply the demand of higher pressure. When this occurs, a vacuum is created inside the transmission and slowly equalizes through the vent. This is the point at which moisture can enter the sump! We have confirmed this vacuum on our dyno. On 2x4 models, Chevrolet removed the vent Allison provided and installed a 90-degree fitting and a hose extended down to the oil pan. Allison’s recommendation is to replace the fitting and



FIGURE 1

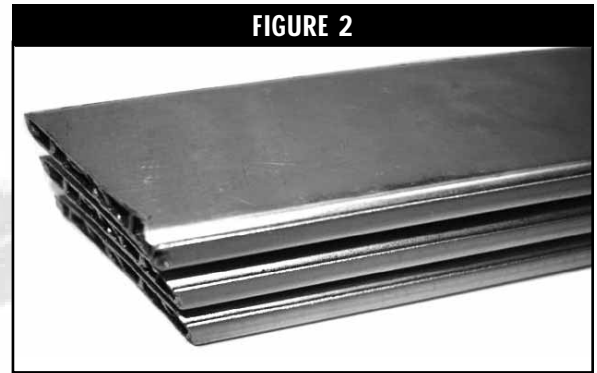


FIGURE 2

hose with the original design vent.

We have seen similar evidence of water in some imports such as Jatco/NPR. Careful placement of vent hoses on Jatco/NPR can reduce water intrusion. In any case, be sure that the hose does not extend to or below the oil pan. Remember that while a vent may provide a direct path for water to enter, other seemingly more indirect paths also exist. Close inspection of all electrical components is important! Water can enter in several ways, including through the filler tube.

When we have found minimal amounts of moisture in these units, we have found converter lockup friction deterioration. When the water content exceeds .2 percent, Allison requires a full rebuild and converter replacement. The Raybestos Web site has a great summary on this titled “A little water can hurt you.”

Another problem traced to water intrusion is rusty transmission parts. We have seen this most frequently in 4L60-E units. However, it has shown up in other GM units and occasionally units from other manufacturers. Look closely at Figure 1. The steel parts begin to develop a rusty “grit” on the surfaces. Valve body separator plates, steel pistons, solenoid frames, and so on will have this rusty grit on exposed surfaces. It’s interesting that this “corrosion” occurs on parts immersed in ATF!

Hmm ... water and air, that’s the normal way we get rusty parts, but this is not the case here. We had the parts tested and found that water was indeed the culprit. But how do we get the corrosion? ATF often has sulfur content, and

Article No.: T3_WR_03_05

Author: Wayne Russell

Date Written:

Total Pages: 2

sonnax®

Automatic Drive • P. O. Box 440 • Bellows Falls, VT 05101-0440 USA • 800-843-2600, 802-463-9722 • fax: 802-463-4059 • email: info@sonnax.com • www.sonnax.com

This TASC Force Tech Tip was
reprinted with permission from
Transmission Digest®, May 1998

water and sulfur combine (in certain quantities, temperatures and time) to form sulfuric acid. Engines have the same issues when crankcase ventilation systems are not working properly. Sheet metal parts (valve covers, etc.) get rusty in the same way. OK, but where did the water come from?

GM has a bulletin stating that water intrusion can enter through the filler tube on Blazers (and other models) when the windshield washer hoses leak. I agree that this is possible, but I find it unlikely – especially with the “toggle lock” dipsticks! I am sure we all have experienced these getting “stuck” and finding them difficult to remove. So, getting water via the dipstick seems unlikely. Like the examples listed above, the vent can be another source of water. However, this condition has occurred in arid regions as well. Why some and not all?

Knowing water was the culprit, I was curious to find where the source was. We heat our shop with waste oil. In our collection tank, we have a drain valve on the bottom to remove water. I have been draining off water every week since we installed the system more than 16 years ago! This led me to the transmission cooler. GM coolers are of a stacked plate design (see

Figure 2). The seam along the plates can have tiny leaks that are small enough that molecules of coolant can get through but ATF may not. When the vehicle is running, transmission cooler pressure is present and exceeds coolant pressure. If leakage occurs, ATF would leak into coolant and show up in radiator and expansion tank. Now, the interesting part! When the vehicle is shut off, transmission cooler pressure goes to zero and coolant system pressure will max out as heat dissipates from engine and radiator (temperature peaks out). This higher pressure is what can move molecules of coolant through the cooler and into the ATF.

Regardless of where water enters the system from, be certain to perform a full overhaul. Replace all clutches, gaskets, seals and converter and strongly consider replacing all electrical components! We have found solenoid coil solder joints fail when reused.

Wayne S. Russell is president of Russell Auto Inc., in Manchester, N.H., and a member of the TASC Force (Technical Automotive Specialties Committee), a group of recognized industry technical specialists, transmission rebuilders and Sonnax Industries Inc. technicians.