TECHNICALLY Speaking

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Food for thought: How hot is hot?

How long have you been in the transmission business? Have you ever honestly sat down and thought about how an automatic transmission heats up? I mean, how hot does it get and how fast does it get there? Does the temperature stabilize like it does in an engine or is it always changing? Did you ever take a car for a nice long drive to be sure you "got it hot" and weren't able to reproduce the problem? I'm sure you always figured that stop-and-go city driving creates more heat than driving on the highway but how much more?

I have been in the transmission business for more than 30 years now, I've written articles for the trade magazines and I have lived and worked in hot and cold climates. I'm not the sharpest tool in the shed but I'm not the dullest either. The funny thing is that I have apparently always sort of assumed that I knew about temperature. I recently had the opportunity to extensively drive a vehicle (my own) with a digital temperature gauge attached. I found that I wasn't entirely wrong about my long-held assumptions, but I wasn't entirely right either.

In case you've ever wondered, here's what I found. (Warning: Your results may vary ... but then again, that's kind of my point!)

The transmission starts out about the same temperature as the outside air after sitting all night. (Well, duh, but I had to start somewhere.)

If you live somewhere, as I do, where you can pretty much just hop on the road and do 50 mph or so without a lot of stop-and-go, then the transmission temperature will go up and hit a plateau that depends on the outside temperature. This temperature is less than that of the engine. On a 65-degree morning my transmission will get to around 145 degrees. Bear in mind that it will stay at this temp as long as I am driving at that sustained speed.

When I do get stuck at a traffic light, the temp will rise around 5 to 10 degrees while I'm idling in gear at the light. It will then stay at this new temperature again as long as I am once again maintaining a steady speed. It has reached another plateau. If I have to stop again, it will again rise to another plateau, and so it goes until it finally gets to engine temperature, around 195, where it seems to stabilize a bit. On my drive to work this rise takes place over 20 miles and 30 minutes of driving and the transmission usually only gets to 160 degrees

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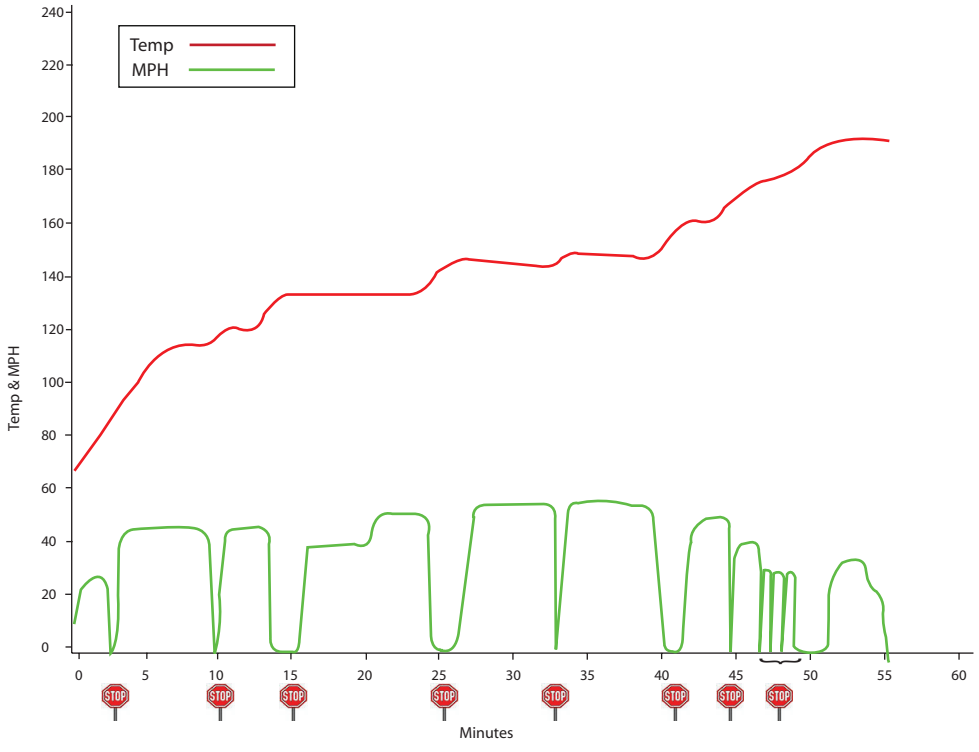

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until I get into town! Kind of makes you wonder if those nice long test drives are really telling you anything, doesn't it?

After the transmission temperature has stabilized around engine temp, it takes a little more than just an occasional stoplight to get the temp to rise. If I get into some "in-town" traffic that lasts for 10 to 15 minutes or more, then the temperature will once again begin to rise. Normally it will get to around 205 degrees. If the traffic opens up a bit, I found that we have once again hit a plateau. The temperature stays at 205 degrees unless I really get a chance to cruise at 50 mph for an extended period, in which case the temp drops back to around that of the engine.

The one chance I had to get stuck in really hot, inner-city-style bumper-to-bumper traffic with my air conditioner on, I was able to get the transmission up to 230 degrees. This is the first time that I did not see the plateau effect. As soon as I could break free and get up to 25 mph or so, the temp would start to drop back to the 205 area and rise again when stuck back in traffic.

This information is probably not very surprising to anyone but I think it is useful in as much as it shows that actual, measured transmission temperature should not be dismissed as a non-issue when diagnosing. Transmission temperature is not necessarily a stable or even predictable thing. It heats up in steps and even a few degrees difference in outside temperature affects the process quite a bit.

So if, while looking to reproduce a problem, you are assuming that you are reproducing a customer's driving conditions, you may be laboring under an assumption that might produce the fabled "ass-u-me" results. The moral? Just like when dealing with pressure or flow, an actual measurement is always better than a guess.

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