

Article No.: TCTIP-03-10

Author: Ed Lee

Total Pages: 2

More Torque Converter Forensics 4L80-E Overheating/740 Codes

Try to imagine the difficult job tech line technicians have. They are asked to decipher bits and pieces of information that may or may not be accurate and then come up with the correct answer. The information the technicians collected for the following two scenarios seemed to be as different as night and day. The information even originated in different countries. The amazing thing about these different complaints and symptoms was that they all had the same root cause.

Vehicle #1

Vehicle #1 was a 1992 GM 3500 4 x 4 equipped with a utility body. The vehicle would not move forward and was towed to the shop. Upon tear down, the forward clutches were found to be completely burned up, and a complete overhaul including a rebuilt torque converter was recommended. The customer approved the overhaul and requested a temperature gauge be installed at the same time. The repair seemed to be progressing routinely until the R&R technician noticed that the temperature gauge had climbed to 190°F while the vehicle was still on the lift. At first the gauge was thought to be defective, but a replacement gauge showed the same temperature. The technician suspected a restricted cooler and a flow monitoring device was installed before the vehicle was road tested. On the shop's usual 6-mile test loop, the vehicle had a good cooler flow rate of 3.2 gallons per minute (G.P.M.), but reached transmission temperatures in excess of 285°F. (**Figure 1**).

The only time the temperature would go down was on a downhill coast, but that was only a 15 to 20 degree drop. The technician even burned his hand when he was removing the flow monitoring device. After an external cooler was added, the temperature was about 20°F cooler, but



Figure 1

was still considered excessive at 265°F. At this point the converter was removed for evaluation.

Vehicles #2 and #3

The second scenario involved two GM vehicles. One vehicle was a 2004 2500 series equipped with a 6.0L engine. The second vehicle was a 3500 series cube van equipped with the same size engine. The vehicles had 164,000 and 178,000 kilometers respectively. Both vehicles had their 4L80E transmissions overhauled and their converters replaced with remanufactured units, and both vehicles were returned later because of 740 codes. When scan tools were placed on the vehicles, they recorded TCC slip rates of 50 to 80 RPM under normal driving conditions. When any additional load was placed on the vehicles, such as hilly terrain or towing, the slip rates would climb to over 250 RPM. After the normal in-vehicle checks - including cooler flow measurement - yielded satisfactory results, the converters were removed for evaluation.

Evaluating the Converters

The overall height and end play of the converters was checked before the

sonnax®

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

©2010 Sonnax Industries, Inc.

converters were cut apart. The overall height was correct for all three converters, and although the end play was on the high side at .025" (normal is .005" to .010"), it was not off enough to raise any red flags. When the converters were cut apart, the internal clearances and clutch release clearances were checked. The internal clearance was well within the proper parameters (.100" to .110"), but the clutch release clearance for the first converter was zero and the other two converters were at minus .005". Normal release clearance is .030" to .035".

How is a "negative clearance" possible? In this design, a clutch release clearance target of .030" to .035" (the piston travel from full apply to full release) is adjusted separately from the end-play. Clutch release clearance is calculated based on two dimensions. Dimension A is the distance between the leading edge of the turbine hub and the surface the piston will rest on when it is in the fully released position. **See Figure 2.**



Dimension B is the distance between the lock up piston seal bore edge and the front thrust washer. **See Figure 3.**



This represents the piston's location in the fully applied position. Clutch release

clearance is the difference between the two measurements, or A minus B. If B is larger than A, then the negative number is "negative clearance". There is no clutch release clearance at all and the negative dimension is actually how far the turbine hub is being held back from its normal position of contacting the cover.

The Causes

What caused the zero and negative clearances in the three converters? All three converters originally had .040" friction material, and all were rebuilt using .075" friction material during the rebond process. The .035" difference in the thickness of the friction material caused the loss of clutch clearance. One way to resolve the clearance issue would have been to machine .035" from the reaction surface of the cover. For the three vehicles discussed here, the issue was resolved by returning to the original .040" thickness friction material.

What caused the overheating and 740 codes? Inadequate clearance prevented sufficient fluid flow between the cover and piston while in the release position. The overheating converter in the first vehicle simply could not pass enough fluid internally, and the temperature gauge showed it.

Inadequate clearance took its toll on the 740 code converters as well. Inadequate fluid flow and dragging of the clutch material while in the release mode deteriorated the lining to the point that it could no longer function properly during apply.

Diagnostic Differences

The diagnostic information provided for these vehicles was different because the technicians used different diagnostic tools. Vehicle #1 was diagnosed with the help of a temperature gauge and a flow monitoring device. In this case, a catastrophic failure was averted without ever knowing that the converter had a higher-than-normal slip rate. Vehicles #2 and #3 were

diagnosed with the help of a scan tool. Catastrophic failures were averted in these cases, without the knowledge that the transmissions were overheating. After all three converters were replaced with converters with the correct clutch release clearance, the temperature of vehicle #1 never went higher than 150°F, and the slip rates on the other two vehicles returned to normal.

Ed Lee is a Sonnax Technical Specialist who writes on issues of interest to torque converter rebuilders.

Sonnax supports the Torque Converter Rebuilders Association. Learn more about the group at www.tcraonline.com.