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BLAME THE TORQUE CONVERTER

Society often influences us to try to blame others for our problems. From an early age we try to place blame with friends or siblings. Our training usually continues into our school age when the guilty person is always "the other guy". It seems only natural for this mind set to continue into the work place. This is especially true if your workplace happens to be in the automatic transmission industry. The mysterious inside of a sealed torque converter is easily substituted for the "big dumb kid" in the back of the classroom. The following are examples of a torque converter being unjustly blamed for a transmission problem.

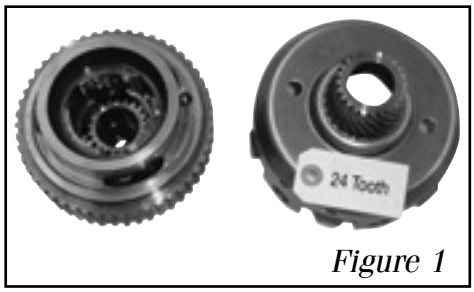


Figure 1

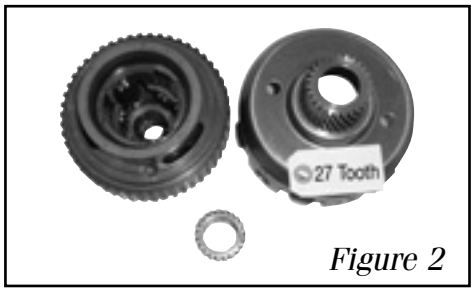


Figure 2

2001 Jetta 740 code

A 2001 Volkswagen Jetta equipped with a 2.0L engine and 01M transmission was returned to a transmission shop. The transmission and torque converter had been rebuilt recently and now the vehicle had a 740 trouble code. The 740 code had been one of the many codes present when the vehicle was first brought to the transmission shop. Now that the vehicle had returned, the technician thought that something had been missed on the original rebuild of either the transmission or torque converter. The torque converter was returned to the original shop to be checked. The owner of the converter shop said when the converter was serviced the first time, they found that the friction material had begun to flake off, and it had been replaced as part of the rebuild process. At that time, the converter had to have a major cleaning because of metal contamination, but the friction material was the only thing replaced. Inspection on this return trip did not show any sign of problems inside the converter.

The transmission was also disassembled and thoroughly checked. The inside of the transmission appeared to be pristine. The transmission was reassembled and the value body was replaced with a reman unit. The transmission was reinstalled into the vehicle and road tested, but after about 35 miles, the 740 code returned. The technician was convinced that the problem was inside the converter, so the converter was replaced with another reman unit. The 740 code returned on the next road test. The technician road tested the vehicle yet another time, but this time he did not allow the transmission to shift into the OD range. With OD inhibited the 740 code did not return. The technician began looking for an OD ratio difference. He found that during the first rebuild the original OD planetary with a 24 tooth sun gear ***(Figure 1)*** had been replaced with an OD planetary with a 27 tooth sun gear ***(Figure 2)*** and that turned out to be the problem.

Continued on page 2

INSIDE

Prior to the original repair, the 740 code was being set when the computer commanded Overdrive and lockup, but the transmission could not attain desired overdrive ratio because of the failed planetary. The second time around, the 740 code was being set because the overdrive ratio did not match what was expected. The converter was not the cause of the 740 code in either situation.

2002 Toyota Tundra –
No Lock-up, Hot-TCC slip, 0770 code

A 2002 Tundra equipped with a 4.7L V8 engine and 340 automatic transmission was towed to a transmission shop in Hawaii. The customer complained that the engine would run fine when the transmission was in the park or neutral range, but would stall when the selector was placed into any drive range. The fluid appeared very metallic, so the transmission pan was dropped. The pan did contain a large amount of metal debris. The customer was sold a complete transmission rebuild including a rebuilt torque converter.

When the transmission shop disassembled the unit, they discovered that the overdrive planetary gear set had failed, and a small piece of metal contamination from the failed gear set had blocked the TCC control value in the applied position. This explained why the engine would stall when the transmission was placed into gear. The transmission was completely rebuilt which included the replacement of the OD planet and completely cleaning the value body.

The torque converter was sent to the converter shop where it was rebuilt. The converter looked good inside except for the metal contamination.

The rebuilt transmission and torque converter were reinstalled into the vehicle. The vehicle was successfully road tested and returned to the customer. The vehicle worked fine while it was cold; however the customer noticed that after the vehicle was warmed up the check engine light would come on.

When the vehicle was returned to the transmission shop a scan check showed that the trouble code was P0770. Since the OD planet was the only hard part that was replaced, and there are (2) different OD ratios available for the 340 transmission, the technician reasoned that the wrong ratio may have been installed. When the technician tried to prove his theory by counting the teeth on the OD sun gear, he found that the original OD planetary gear set had been thrown away. The technician decided to use another method to prove his theory. He road tested the vehicle, but he did not allow the vehicle to shift into the OD range. If the computer commanded lockup and a code was not set when the transmission was in the (3) or (Drive) range, he would know that the OD ratio was incorrect. He found that the TCC code was set even with the OD inhibited. This convinced the technician that the problem was inside the converter. To further prove his new theory he decided to control the TCC solenoid himself. Since the TCC solenoid is grounded at the valve body, all he had to do was supply his own 12 volt signal to the solenoid. Being able to control TCC and observe results, he now noticed that the engine would only drop 160 RPM when the solenoid was engaged. Remembering that prior to the first rebuild, the TCC clutch would cause the engine to stall when it was blocked in the apply mode, he reasoned that the TCC did not have enough clamping force (some type of internal leak). The converter was removed from the vehicle and returned to the converter shop. When the owner of the converter shop opened the converter, there was nothing wrong inside. He knew that the OD planet had been replaced and also knew that the input shaft was an integral part of the OD planet. He decided to check the OD planet to see if there was some type of flow difference with the replacement input shaft. What he found was that the replacement OD planetary was ⅝" shorter than the original. The tip of the input shaft was just making contact with the seal in the turbine hub. No wonder full clamping force could not be attained. Multiple ratios are not the only differences in the OD planets used in the 340 transmissions. Some ratios are also available in more than one length. The 4 cylinder OD planet measures 8⅛" long ***(Figure 3)*** and the V6 and V8 OD

Figure 3

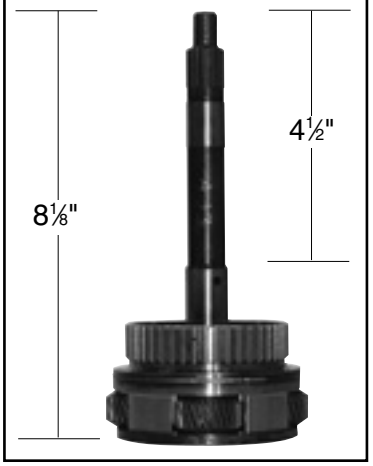
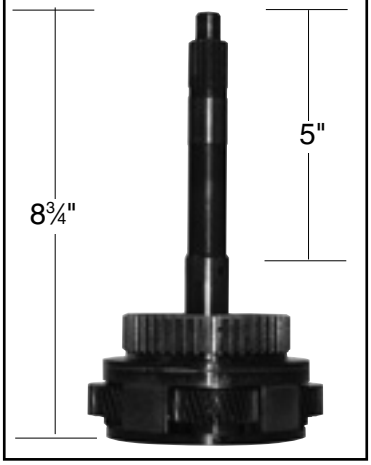


Figure 4



planets measure 8¾" long ***(Figure 4)***.

In this situation, putting the 4 cylinder planetary into the V8 transmission had caused the problem. Once again, the converter was not to blame.

2001 Chevrolet Impala 1811 and 741 Codes

A 2001 Chevy Impala equipped with a 3.4L V6 engine and a 4T65-E transmission was towed to a transmission shop. The initial visual inspection revealed that the vehicle had the common differential failure, but since there were more than 100,000 miles on the odometer the customer was sold a complete rebuild. This turned out to be an excellent call on the shop's part because the failure was more widespread than could be seen from the outside. When the unit was disassembled, the technician found that the splines on the 4th hub were almost totally stripped off and the plastic thrust washer that separates the drive sprocket from the drive sprocket support had disintegrated allowing metal to metal contact.

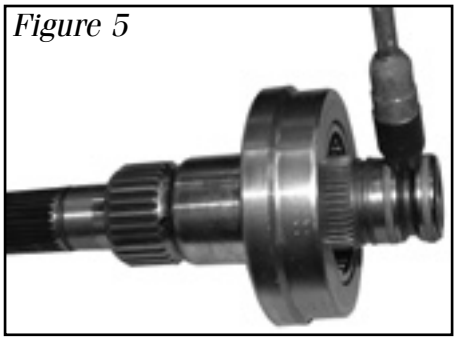
The rebuilding of the transmission and torque converter seemed to proceed routinely, and after a successful road test the vehicle was returned to the customer. About two weeks later the customer returned the vehicle with a P0741 code. The technician who had originally performed the work on the vehicle was on vacation so the vehicle was checked by the shop owner. The shop owner remembered having a similar problem with another vehicle that turned out to be a defective TCC solenoid, so he replaced the solenoid as a safeguard. He kept the vehicle for a couple of days, but was not able to duplicate the problem. Two weeks later the vehicle again returned to the shop with the same 741 code. The technician initially thought that the differential may have been replaced with the wrong ratio. He remembered the original differential had a sun gear with 42 teeth, and when he checked the replacement he found that it also had 42 teeth. He then turned his attention to a possible leak in the TCC circuit. A wet air test showed that the AFL and TCC control valves did show signs of leaks. The AFL, TCC control, and TCC regulator valves were replaced. The torque converter was also replaced with another rebuilt unit.

At 65% duty cycle, the slip rate went from 650-700 RPM to 400-500 RPM. Although the TCC slip rate did improve after replacing the valves and converter, it was still high enough to cause the 741 code.

The transmission was again removed from the vehicle and placed on the bench. The technician remembered robbing the drive sprocket support from a 4T60-E transmission. He checked with his hard part supplier to make sure that the 4T60-E and 4T65-E sprocket supports had the same part number. When he found out that the part numbers were different, he was sure that he had solved the problem.

Mike Souza from ATSG wrote a great article (Transmission Digest April 2008) explaining this problem. The technician used the article as a reference to prove that this was causing the P0741 code, but when he applied air pressure to the TCC apply port on the 4T65-E turbine shaft ***(Figure 5)***, he got a full stream of air out of the TCC apply port on the 4T60-E drive sprocket support. At that point he was no longer sure that he had found the problem.

Figure 5



The Answer

There is enough clearance between the 4T60-E drive sprocket support and the 4T65-E turbine shaft to allow enough flow to pass an air check. The customer did not drive in any hilly areas and did not carry any passengers, so the lockup apply pressure

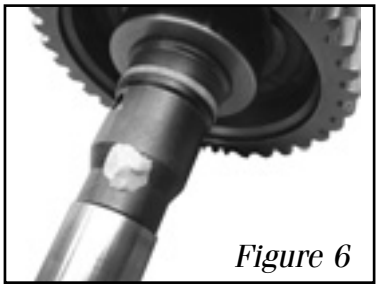


Figure 6

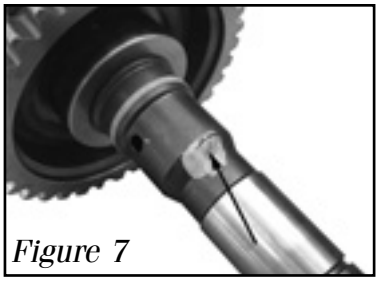


Figure 7

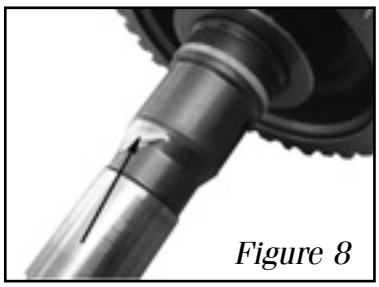


Figure 8

demand was low. In this situation there was sufficient oil flow most of the time and the vehicle would only set a code every week or two.

The figures illustrate the flow area difference created by the two different supports. ***Figure 6*** shows a small amount of plumbers putty placed on the 4T65-E turbine shaft before it was inserted into a 4T60-E drive sprocket support. The putty is being used like Plastigauge® to visually demonstrate the different clearances. ***Figure 7*** shows the putty compressed or removed by the support. Notice how much more putty remains after the same shaft with new putty was inserted into the 4T65-E support ***(Figure 8)***.

2001 Volvo 740 Code

A 2001 Volvo equipped with a 1.9L engine and 55-50SN transmission was brought to a transmission shop. The customer complaint was fluid leaking out of the front of the transmission. The vehicle had high mileage but performed very well. This was a typical soft part overhaul and torque converter rebuild. The only hard part that was replaced was the pump. On the road test there was no lockup and a P0740 code was set. Of course the converter came under suspicion immediately, but it was hard to ignore the fact that replacing the pump was the only change made to the unit. The replacement pump was found to be the reason for the 740 code. There are two different diameter input shafts, .844" and .870", and two different pumps with stator bushings to mate to the shafts.

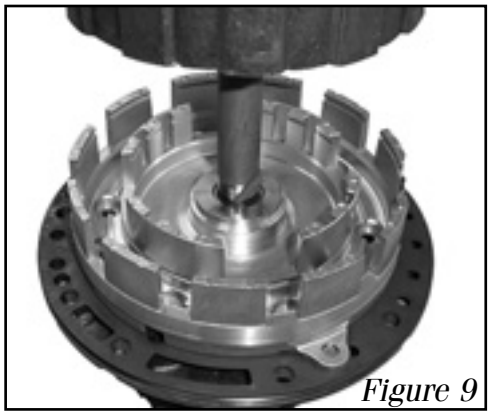


Figure 9

Photo courtesy of Hardparts For Transmissions.

Figure 9 shows a piece of gasket material fitted into the overly large clearance that results when a small shaft is used in the large pump bushing.

Seasoned transmission technicians will remember similar problems with worn bushings or incorrect turbine shaft rings on the 125C transmissions. The part of the TCC apply circuit that caused problems in the early 1980's is still important today.

Transmission Digest had a TECH TIP about this problem written by Hardparts for Transmissions in the June 2006 issue, and ATSG covered it in their red seminar book in 2007. Today most hard part suppliers ask for specific applications for this part or at least the dimensions of the shaft or stator bushings.

The four vehicles in this article had TCC related trouble codes: 770, 741, or 740. With the exception of the Volvo, each vehicle had the converter replaced at least one time, and in every case the converter was blamed but found to be not guilty. ■