Ford's TorqShift 6

by Pete Huscher
members.atra.com

In this issue of Keep Those Trannys Rolling, we're going to look at some of the benefits and problems encountered with Ford Motor Company's TorqShift 6 transmission. Ford's introduction of the TorqShift 6 in 2011 ushered in a new era of medium-to-heavy duty truck transmissions. The TorqShift 6 transmission was designed to compete with the Allison, used in most medium-to-heavy duty GM trucks.

The TorqShift 6 is manufactured at Ford's award-winning transmission plant in Sharonville, Ohio, and was specifically designed to partner with the newly designed 6.7L diesel engine and the 6.2L gas engine.

Let's take a look at some of the benefits the TorqShift 6 transmission brings to Ford's medium-to-heavy duty truck line.

TORQSHIFT 6 BENEFITS

- SelectShift — Automatic functionality, including progressive range select and manual functions. SelectShift provides conventional automatic operation or a manual shift mode that gives the driver complete control over gear selection. The system synchronizes the engine and transmission speeds to allow fast, crisp shifts.
- Progressive Range Select — allows the driver to reduce the range of available gears in drive, to limit the use of upper gears when the truck is heavily loaded or while towing on grades. Drivers can also pull the shift lever into M for full manual mode and select the gear desired.
- Live Drive PTO (Power Take Off) — enabled with Super Duty diesels with the PTO prep option. This segment-exclusive feature allows the transmission to power auxiliary equipment, such as cement mixers, aerial lifts, tow truck lifts, or dump trucks. Power is available any time the engine's running.
- High Capacity filtration system — provides longer fluid life (150,000 service interval).
- Low speed torque converter lockup — for increased fuel economy and performance.

Now that we've seen some of the benefits the TorqShift 6 transmission has to offer, it's time to take a look at some of the problems encountered with it over the past year on the ATRA Technical HotLine.

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With today's electronic transmissions relying heavily on computer programming, it's getting harder and harder to differentiate between a computer control problem and a mechanical problem.

PROGRAMMING ISSUES

The TorqShift 6 transmission relies heavily on computer programming to control its operation, using inputs from both the PCM and TCM. Engine performance problems can interfere with transmission operation. Some of the problems we've encountered specifically related to computer system programming are:

- False codes being set in the PCM and TCM
- Delayed forward and reverse engagements
- Shift problems, such as flared, harsh, or abrupt shifts, or gear hunting
- These problems can usually be corrected by reprogramming the PCM and TCM with the latest updates and resetting the adaptive strategy.

TORQSHIFT 6 PROBLEMS

- The TorqShift 6 transmission has also been plagued with several non-computer related problems, such as:
- Solenoid function. Solenoids aren't interchangeable and must be reinstalled in their correct locations. You can identify solenoids by body color and band-width identification number (2-5) marked on solenoid (figure 1).
- Torque converter hub and pump bearing failure (figure 2).
- Valve body wear.

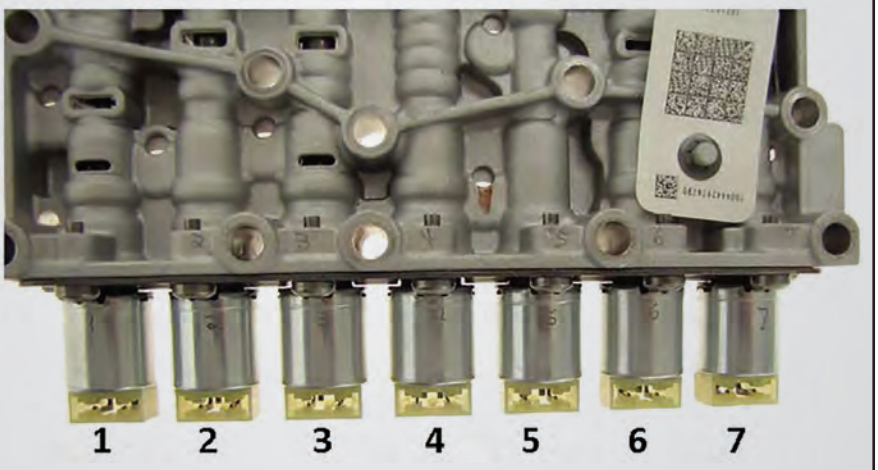
These problems can usually be corrected by replacing the faulty solenoid, worn torque converter and pump bearing, or repairing or replacing the worn valve body.

VALVE BODY WEAR

Now that the TorqShift 6 has been in service for five years, valve body wear problems are becoming pretty common. Valve body wear can cause numerous transmission-related conditions such as:

- Delayed engagements
- Flared shifts
- Harsh or abrupt shifts
- Shift hunting
- Neutrals when coming to a stop

Let's take a look at a specific condition caused by a worn valve body.



Torqshift 6/6R140 Solenoid Identification (Function)	
1	Shift Solenoid E (SSE) Overdrive (4,5,6) Clutch, Normally High
2	Shift Solenoid C (SSC) Intermediate (2,6) Clutch, Normally Low
3	Shift Solenoid A (SSA) Forward (1,2,3,4) Clutch, Normally Low
4	Shift Solenoid B (SSB) Direct (3,5,R) Clutch, Normally High
5	Torque Converter Clutch (TCC) Solenoid, Normally Low
6	LIne Pressure Control (LPC) Solenoid, Normally Open
7	Shift Solenoid D (SSD) Low/Reverse (1,R) Clutch, Normal Low

Figure 1

HARSH 1-2 UPSHIFT OR 2-1 DOWNSHIFT

This condition was brought to our attention after the repair shop had exhausted every means at its disposal to correct a harsh 1-2 upshift or harsh 2-1 downshift. The vehicle was a 2011 F250 with a 6.7L diesel engine and a TorqShift 6 transmission.

The customer brought the vehicle to the shop complaining about a harsh 1-2 upshift and a harsh 2-1 downshift. After further inspection, the shop determined that the fluid was discolored and the transmission needed to be rebuilt.

They removed and rebuilt the transmission, replacing worn clutches, seals, and torque converter. After the

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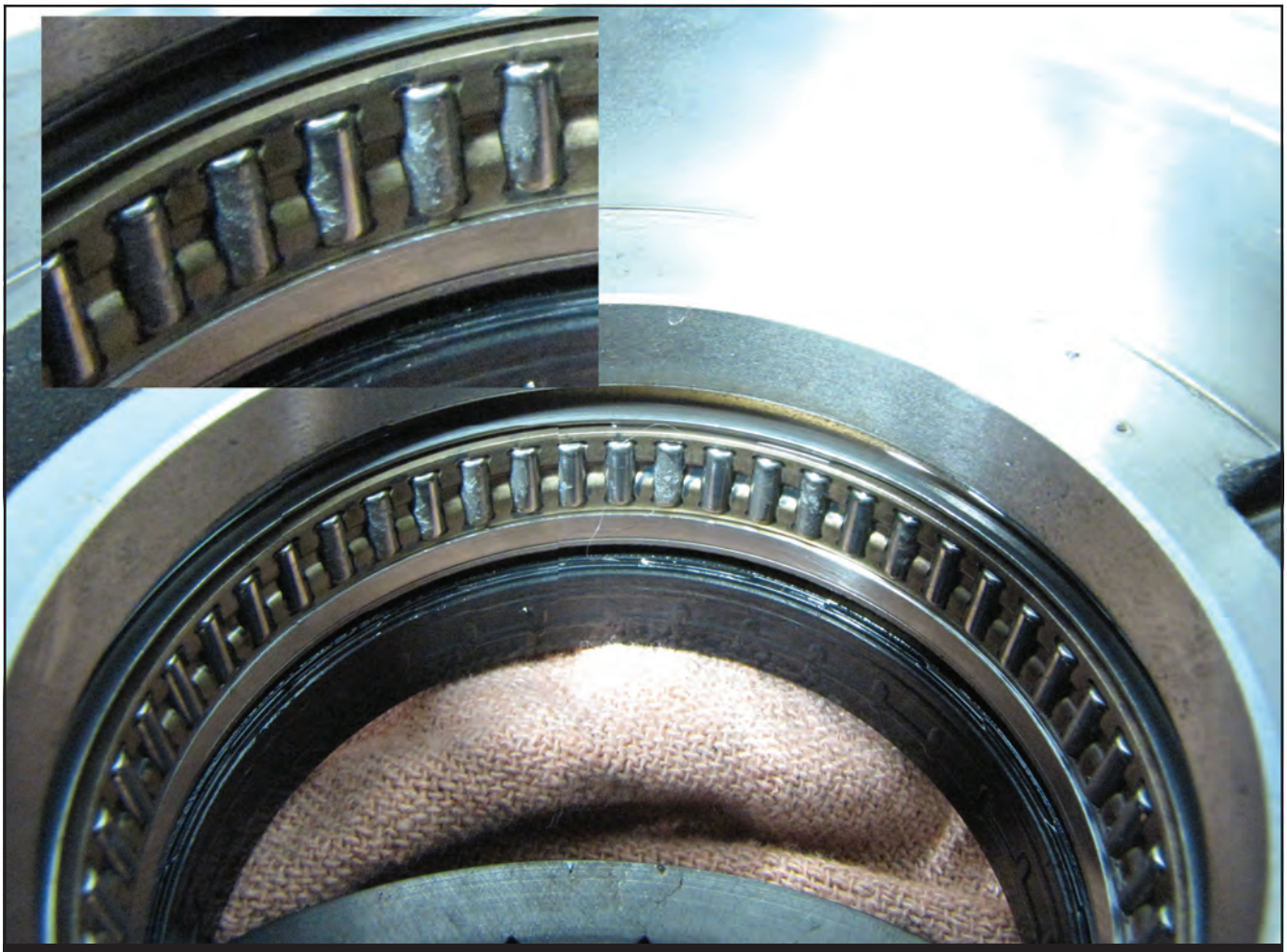

Figure 2

rebuild, they installed the transmission and filled it with the recommended fluid. They then performed the adaptive strategy reset procedure and took the truck for a test drive.

During the test drive, the technician noticed that the transmission still had a harsh 1-2 upshift and a harsh 2-1 downshift at light-to-medium throttle. The technician was familiar with the adaptive strategy reset and knew it might take a few test drives to get the computer system to adapt the transmission shifts.

The technician performed several lengthy test drives, hoping the computer system would adapt and correct the harsh 1-2 upshift and 2-1 downshift. It didn't.

Certain that this was a computer system problem, the technician reprogrammed the PCM and TCM with the latest update and then took it for another test drive. The harsh 1-2 upshift and a harsh 2-1 downshift were still there.

At that point the technician believed the condition had to have been caused by a valve body problem.

VALVE BODY INSPECTION

After talking to the technician, I asked him to send us the valve body for further inspection.

The valve body arrived the next day by special courier. I inspected the valve body and solenoids for any signs of damage. Then I disassembled it, inspecting each valve and valve bore for wear. I performed three proven testing methods on the valve body.

I performed a wiggle test on each valve. I used a light source behind each valve to see if any light would pass by and lastly I used vacuum. After all three tests, I discovered the intermediate clutch regulator valve, the forward clutch regulator valve, the solenoid feed pressure regulator valve, the line pressure regulator valve, and their respective bores were all worn excessively (Figure 2 & 4).

Due to the extent of the valve and valve bore wear, I recommended replacing the valve body.

REPLACING VALVE BODY

After informing the technician of our findings, he replaced the valve body with a new, OEM valve body from Ford. He installed the new valve body and downloaded the new solenoid body strategy into the TCM. Then he was ready to take the truck for a test drive.

During the first few minutes of the test drive, the transmission shifts were a little firm. As the test drive continued, the transmission started to shift normally. After several miles of driving, the transmission began working properly and it appeared the new valve body eliminated the harsh 1-2 upshift and 2-1 downshift.

It appeared we had the problem whooped.

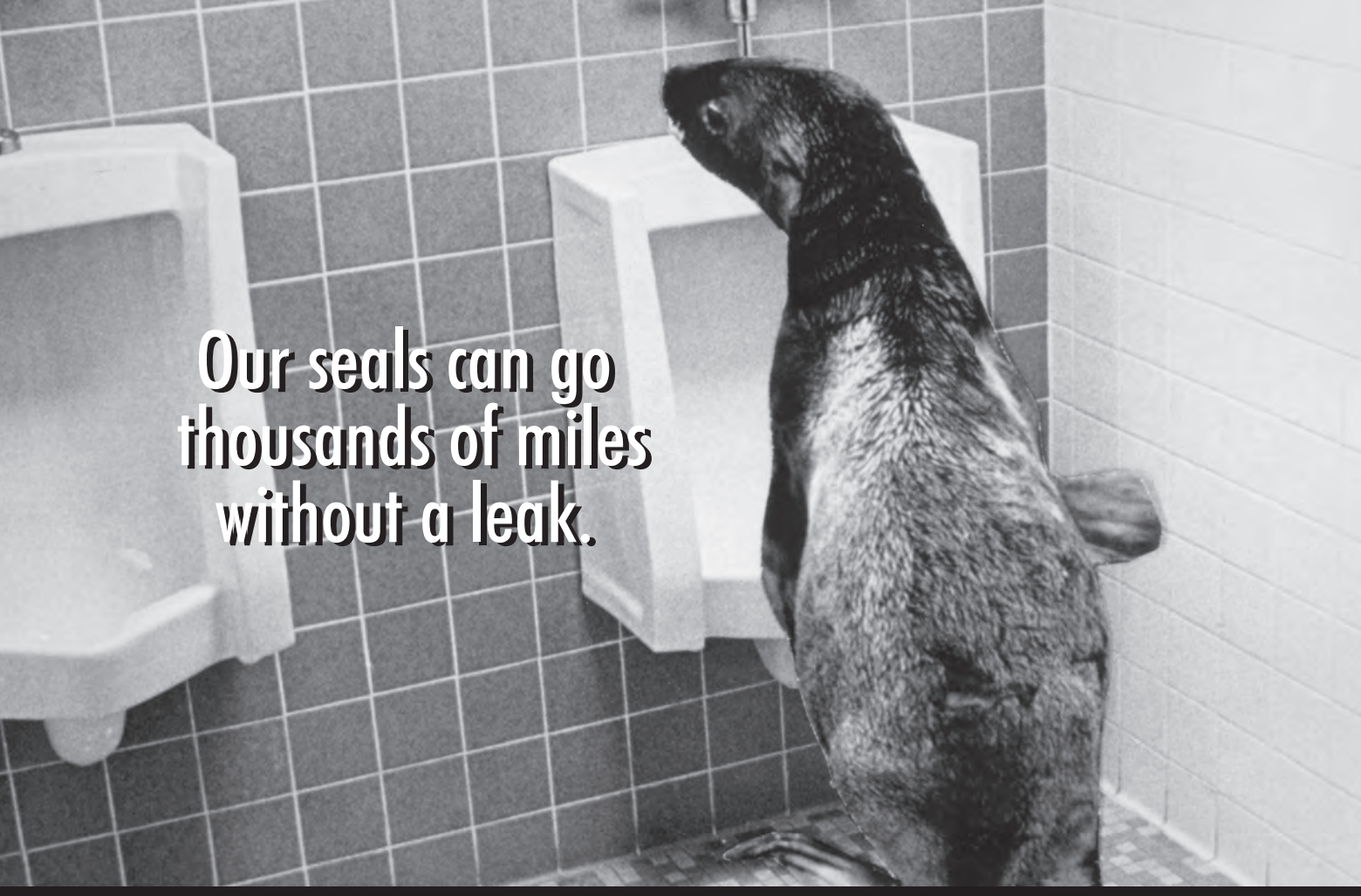

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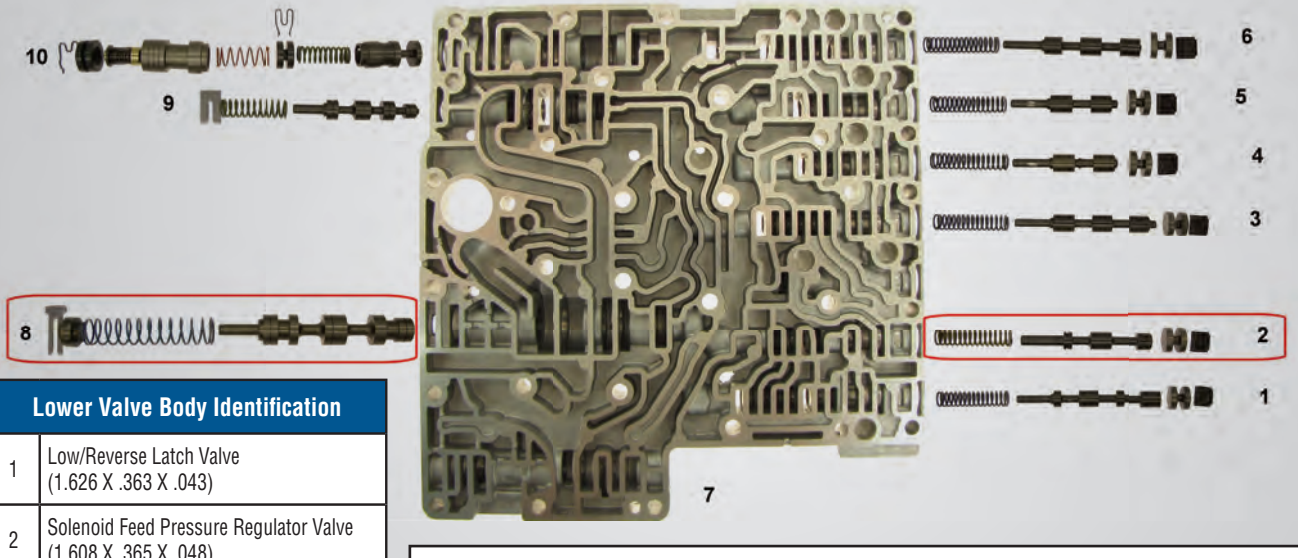
Figure 3



Lower Valve Body Identification	
1	Low/Reverse Latch Valve (1.626 X .363 X .043)
2	Solenoid Feed Pressure Regulator Valve (1.608 X .365 X .048)
3	Direct (3,5,R) Clutch Latch Valve (1.626 X .363 X .043)
4	Forward (1,2,3,4) Clutch Latch Valve (1.626 X .363 X .043)
5	Intermediate (2,6) Clutch Latch Valve (1.626 X .363 X .043)
6	Overdrive (4,5,6) Clutch Latch Valve (1.626 X .363 X .043)
7	Manual Valve
8	Line Pressure Regulator Valve (3.114 x .719 X .057)
9	TCC Charge Limit Valve (1.163 X .481 X .056)
10	Cooler Bypass Valve Orange Spring (1.267 X .492 X .038 Yellow Spring (1.263 X .433 X .038

Upper Valve Body Identification	
1	Overdrive (4,5,6) Clutch Regulator Valve
2	Intermediate (2,6) Clutch Regulator Valve
3	Forward (1,2,3,4) Clutch Regulator Valve
4	Direct (3,5,R) Clutch Regulator Valve
5	Low/Reverse Clutch Regulator Valve
6	Torque Converter Clutch (TCC) Regulator Valve
7	TCC Apply Regulator Valve

CONCLUSION

With today's electronic transmissions relying heavily on computer programming, it's getting harder and harder to differentiate between a computer control problem and a mechanical problem. That's why it's always a good idea to verify that the computer system has the latest calibration updates before jumping into a mechanical repair.

With a better understanding of how the computer system controls the transmission, and having the recommended diagnostic equipment — you should have no problem keeping those trannys rolling.

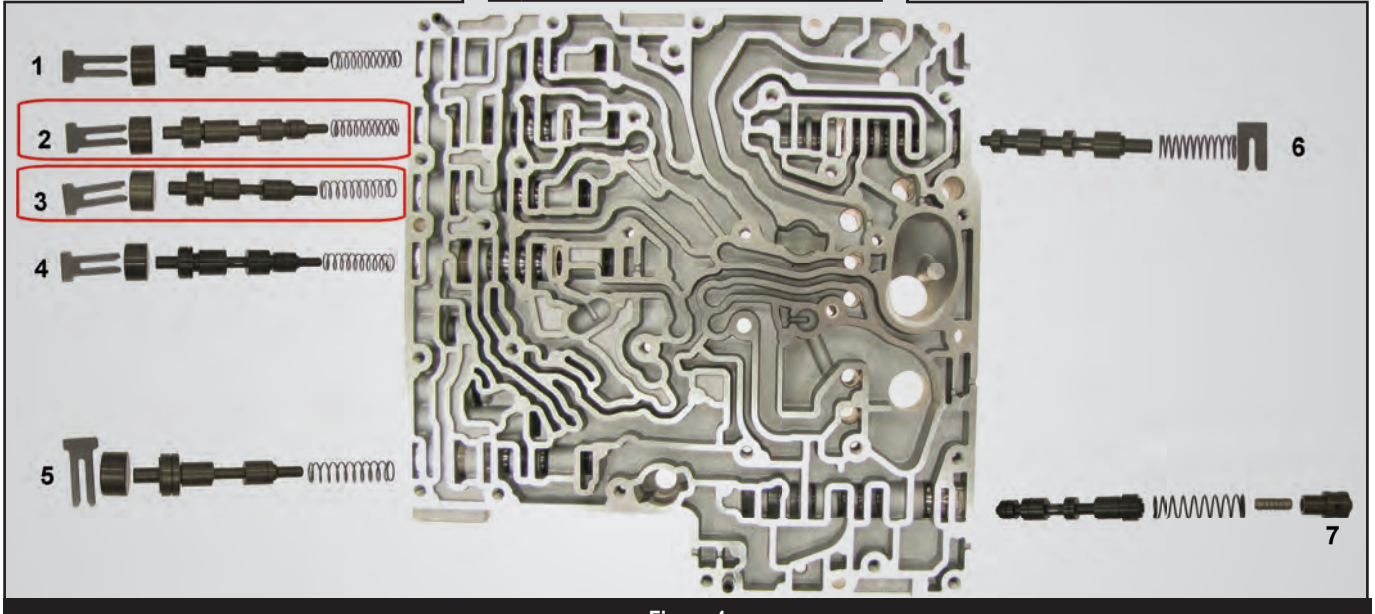


Figure 4

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