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The Mystery of the Rotating Bearing!

Toyota U660E shift problems traced back to case wear and damage; the fix requires replacing the case.

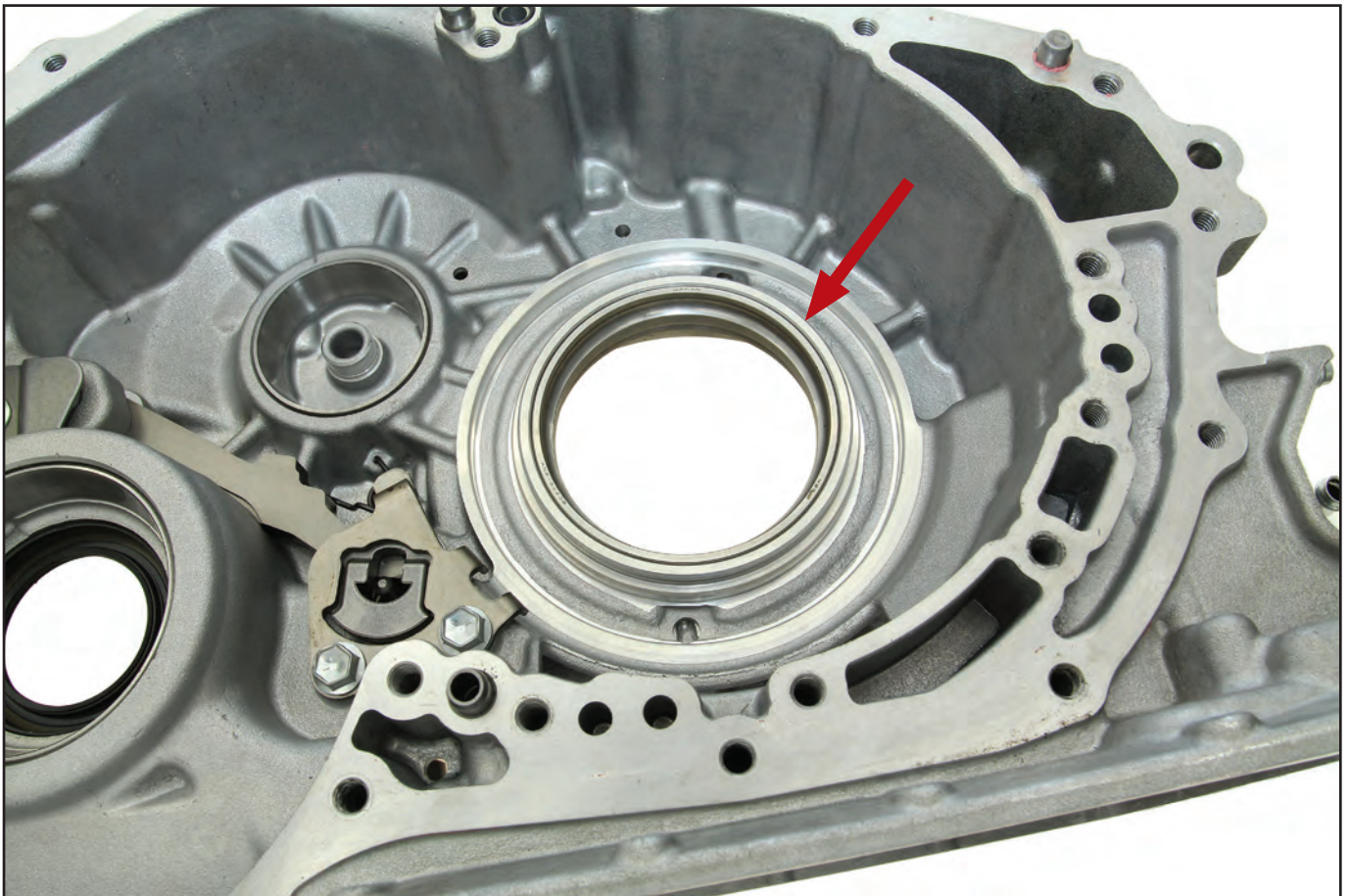


Figure 1

There are days when you spend lots of time investigating problems only to come up short or the trail runs dry. Today we're dealing with U660E issues that, until now, were a mystery.

The U660E appeared in the Lexus ES350 and the Toyota Camry in 2007 and were followed by five additional

models in the U.S. over the next four years:

- RX350 2010-13
- Avalon 2008-12
- Highlander 2008-12
- Sienna 2010-13
- Venza 2009-13

About six months ago we started seeing Toyotas with multiple com-

plaints: harsh or erratic shifts, engagement problems, and converter clutch issues. All of the transmissions were torn down for repair. The only problems found were sticking valves and a fine metal in the pan.

Not one component appeared to be damaged, but the valve body bores and solenoids were clogged with a fine

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aluminum. As the investigation went from days, to weeks, to months, shops were being inundated with this problem.

As with any investigation you need the facts. Here are the facts of this situation:

- We have metal throughout the transmission; fine metal.
- We have sticking valves and worn bores caused by this metal.
- We have torque converter slip and ratio codes associated with it.

I made sure that the next time a U660E failure occurred I would be there. Then it happened: We got a transmission in with the exact conditions we were hearing about. It was time to interrogate the subject!

During the unit teardown I found a very interesting issue with the counterdrive gear double ball bearing in the case (figure 1). It moved! It rotated in the case, freely, without resistance. But, when I attempted to remove the bearing, it felt like something was holding it in place.

Turns out the bearing is installed in the case and has a snap ring to secure it (figure 2). It's supposed to be a non-removable bearing, but Toyota sells a replacement.

So the bearing was spinning in the case, which created the fine metal, which, in turn, caused the shifting issues and torque converter slip. But we hadn't discovered why the bearing was spinning in the case. It was time to dig a little deeper!

Then we noticed something even more interesting: Nothing was damaged except the case where the center bearing rides. A closer examination revealed the front of the case was close to specification but the rear was way off (Figure 3).



Figure 2

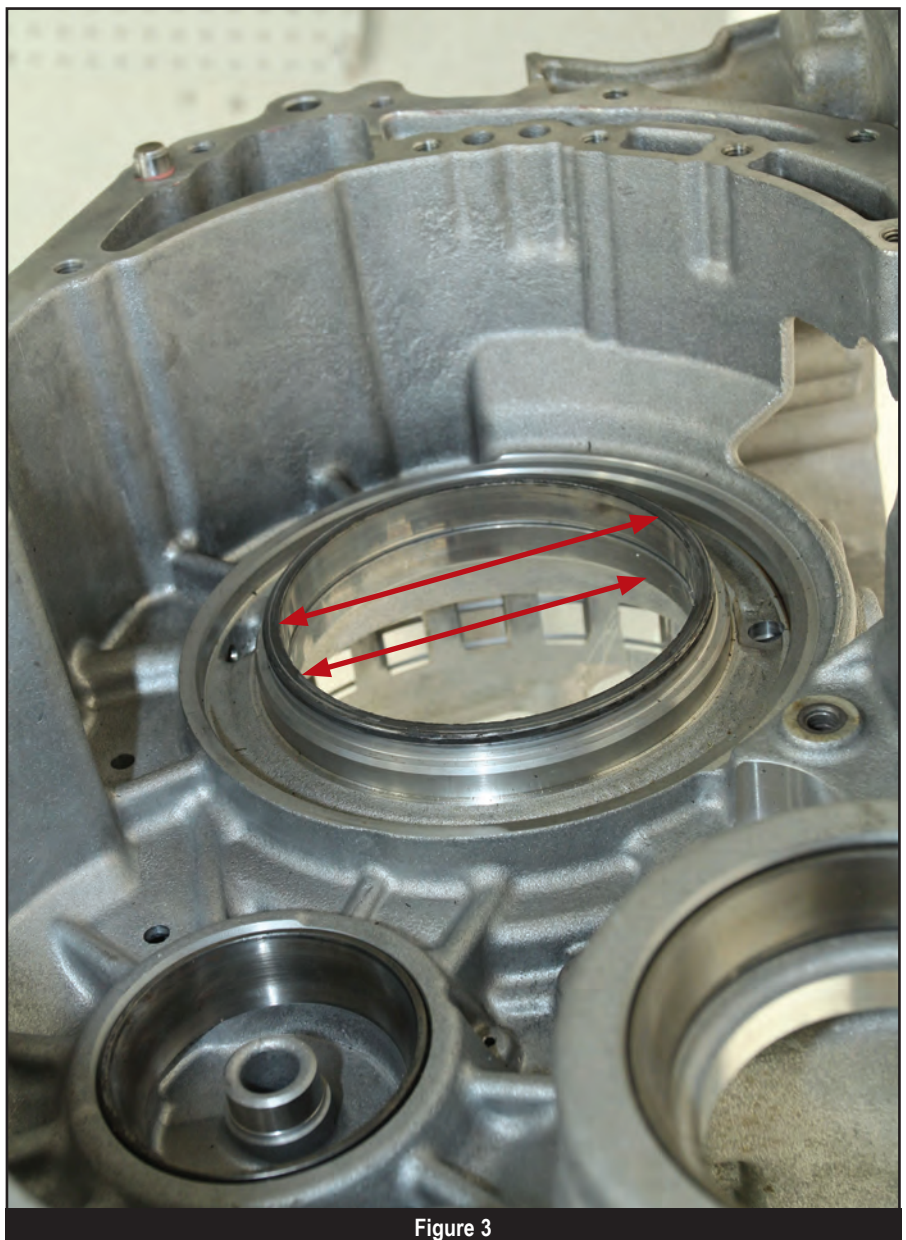


Figure 3

The ring gear and carrier weigh 45 lbs. and the two transfer gears are fairly stout. That's all at the front of the transmission. It's the back half that's having the issue.

So what was happening was simply a torque issue. The unit is pretty beefy for a front wheel drive: The ring gear and carrier weigh 45 lbs. and the two transfer gears are fairly stout (Figure 4). That's all at the front of the transmission. It's the back half that's having the issue.

From the center of the case the planetary is connected to the transfer gear by splines and a lock nut. The planetary is then splined to the sun gear, direct ring gear, and finally to the end clutch (Figures 5 & 6). The sheer torque of the unit, especially those mated to



Figure 4

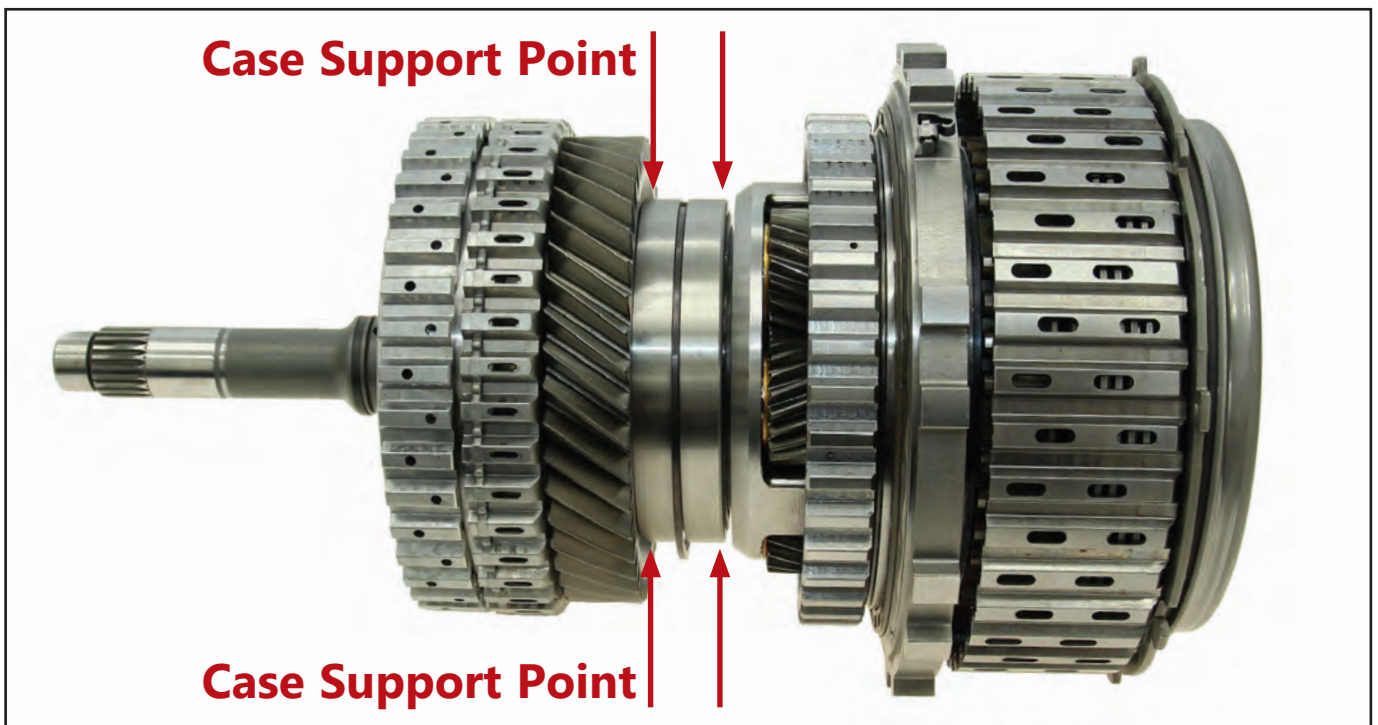


Figure 5

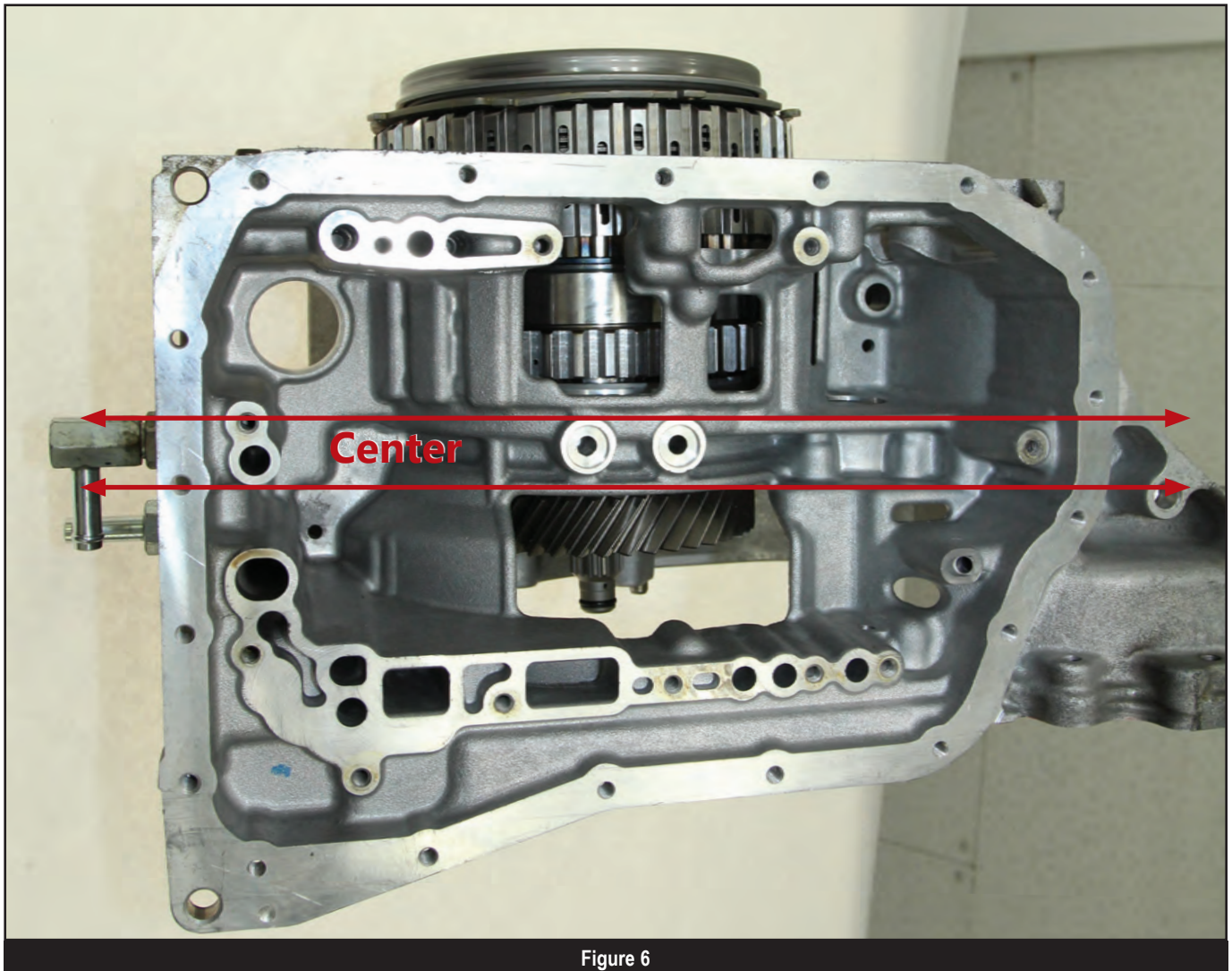


Figure 6

As it stands right now there's no aftermarket fix for this condition. It's a costly repair, requiring you to replace the case. And there's nothing to stop it from happening again.

3.5L and 3.7L V6 engines, is what's causing the issue. It's literally flexing the case where the bearing contacts it.

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For now you can get a used case for about \$175. Make sure the bearing is tight; if the bearing moves, that case is bad, too.

If a good used case isn't available, you'll need a new case from the dealer, part #35141-07011, at a cost of nearly \$1,200. You'll also need a bearing for about \$110, part #90369-72001, and a new snap ring for another \$2.43; part #90520-99110.

The Toyota service manual says you can press the bearing out and replace it with a one. You can't! We tried to cut it out with die grinders but that didn't work. So we used a cutting

torch to cut it out, just to check the case, measure it, and report the information to the industry.

When the bearing starts to rotate, it sends metal throughout the unit, solenoids, valve body bores, planets — everywhere you look, it's there. That's followed by a flare on the shift because the solenoid is clogged with metal from the planet.

Book 'em Dan-O! We found the answer to our mystery... well the cause at least. I'm sure it won't be long before the aftermarket comes up with sleeves or boring tools with a new sleeve and bearing, but, until then, be aware of this issue. If you miss it, it'll cost you a comeback.

Case closed!

