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# Don't Guess: Test! Ford's 4F27E, FN4A-EL, FNR5

The 4F27E transmission family has been around for more than ten years, and has become a fairly common sight in today's shops.

Ford calls this transmission the 4F27E; it comes in the Focus and Transit Connect. Mazda also has their version: Called the FN4A-EL, it comes in the Mazda 2, Mazda 3, and Mazda 5. Then you have the 5-speed FNR5 that comes in the Ford Fusion and Mazda 6.

These units have some very common wear areas, which can cause some very common problems. In this article, we'll look at how to test for that wear, using air testing, vacuum testing, and wet air testing procedures. These tests will help you identify problem areas and repair them... before they become a bigger problem.

We'll look at the servo pin bore, pressure regulator valve, solenoid pressure regulator valve, converter relief valve, and the rear cover.

### Servo Pin Bore

While it's called a 2-4 band, the servo and band operation are critical for 2<sup>nd</sup>, 3<sup>rd</sup>, and 4<sup>th</sup> gears. Here's why: The band is applied in 2<sup>nd</sup> and 4<sup>th</sup> gears. But on the 2-3 upshift, direct apply oil is sent to the *back* of the 2-4 servo.

For that shift, the 2-4 servo acts as

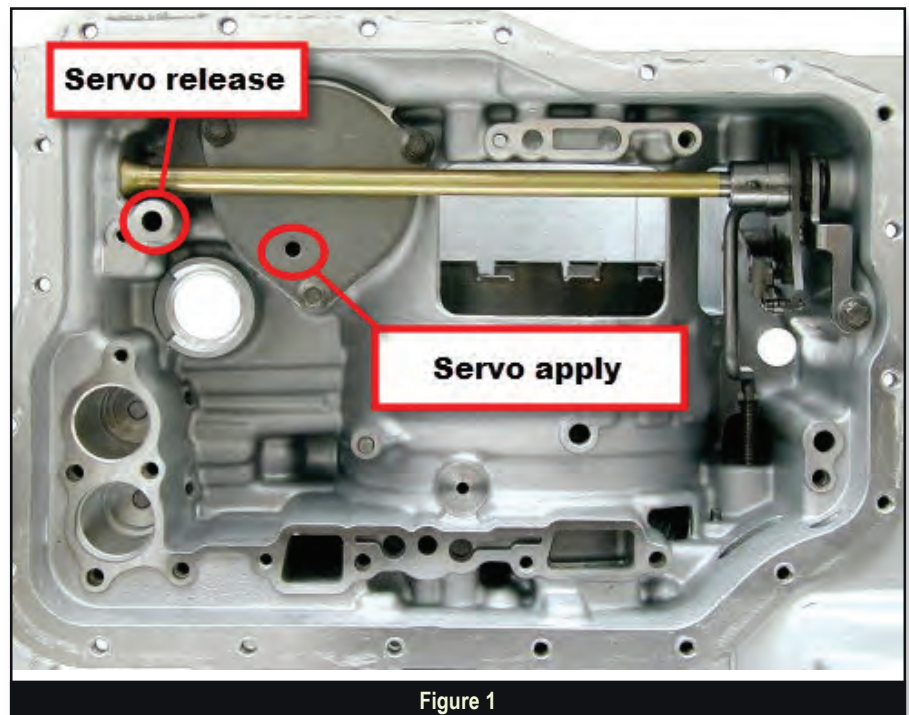


Figure 1

a 3<sup>rd</sup> gear accumulator, because it still has the 2<sup>nd</sup> gear oil applied to the front of the servo. Spring pressure combined with 3<sup>rd</sup> apply oil overcome the band apply oil and the band releases as the direct clutches come on.

On the 3-4 shift, forward clutch oil is released. That cuts off the servo release oil, so the band reapplies for 4<sup>th</sup> gear.

When the servo pin bore wears, direct clutch apply oil leaks to the sump. This can cause the direct clutches to fail.

Testing the servo pin bore is easy and takes very little time:

- Remove the valve body.
- Locate the 2-4 band release port (figure 1).
- Apply air to the servo release during teardown.

You shouldn't see any signs of a leak between the servo band pin and the inside of the case. The servo shown had a large leak around the pin bore that needed to be addressed (figure 2).

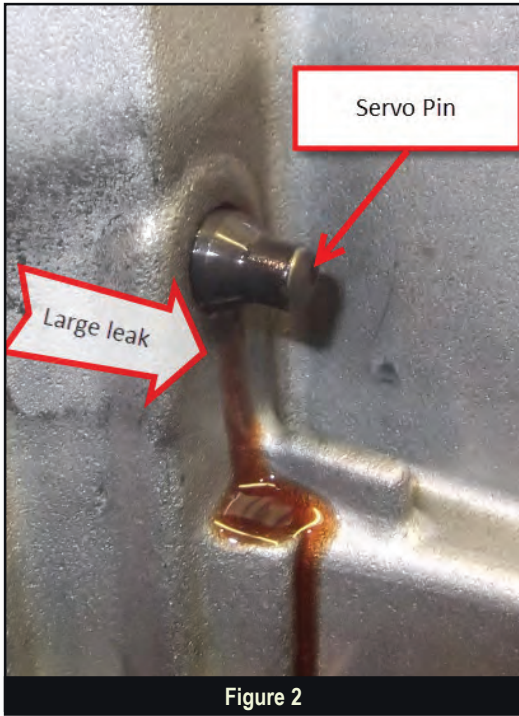


Figure 2

There are aftermarket kits available for servo pin bore wear: Check with your aftermarket suppliers for the repair.

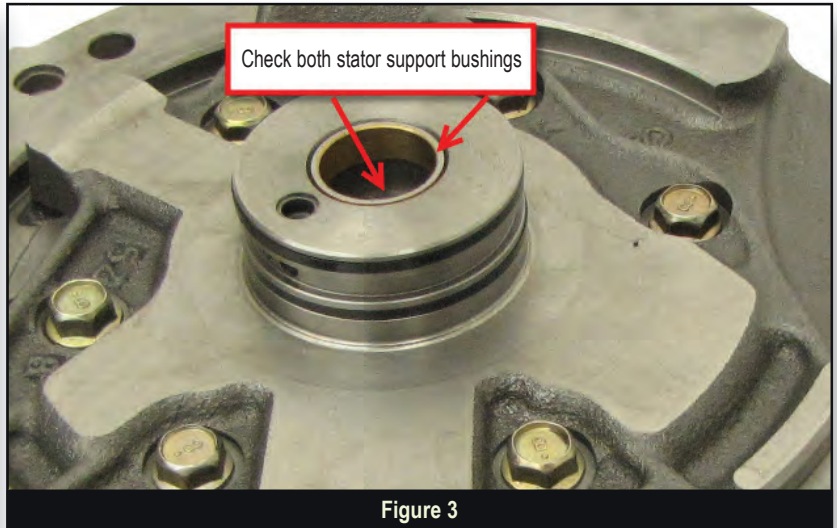


Figure 3

### Torque Converter Clutch Performance

A common problem is code P0741 — TCC stuck off.

Let's talk about this code. Just a little testing before the transmission hits the bench will save time and money.

Look at the freeze frame data when the code set: usually you'll see the torque converter clutch solenoid com-

manded on. The solenoid and valve are functioning normally, but the converter can't keep the slip rate down. The two areas you should check are the TCC circuit and the converter itself.

The torque converter clutch circuit has a problem built into it: It uses two bushings in the pump stator support to separate the torque converter clutch release oil and converter apply pressure. Worse yet, the bushings are close

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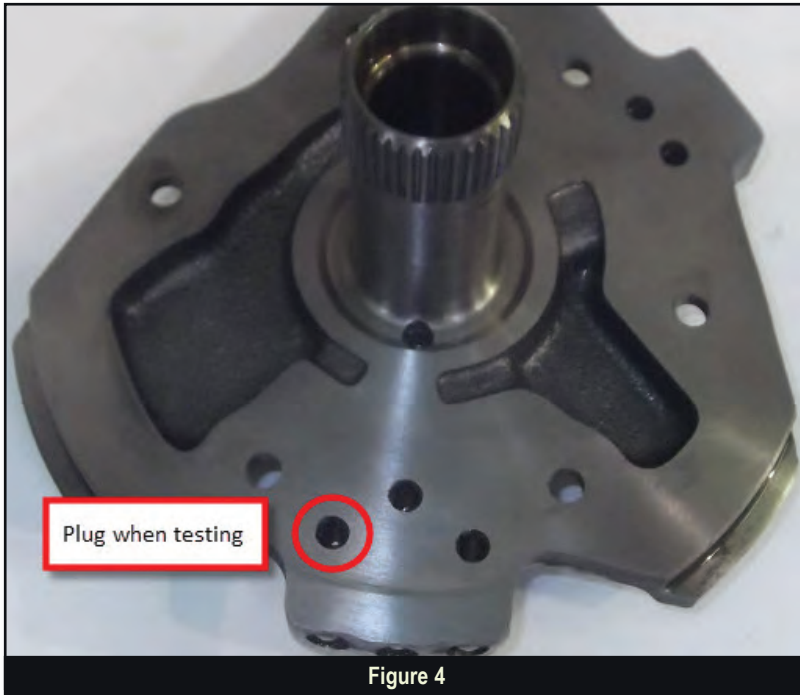


Figure 4

together and wear quickly because they have so little support (figure 3).

To test the bushings, first you'll need to plug the hole in the stator support (figure 4).

- Slide the stator support onto the input drum.
- Pour ATF into the input shaft.
- Apply low air pressure into the tip of input shaft.

There should be no oil or air leaking around the shaft and bushings (Figure 5).

You can also check the stator support bushings with a vacuum test stand:

- Clean and dry the shaft and the stator support.
- Plug the hole in the stator support.
- Apply a vacuum to the tip of the input shaft.

Testing with vacuum will give you numbers to work with and lets you keep track of pass and fail results.

After you install new bushings in the stator support, repeat the test to confirm your fix.

## Valve Body

Let's test the pressure regulator valve and converter relief valve in the main section of valve body (figure 6).

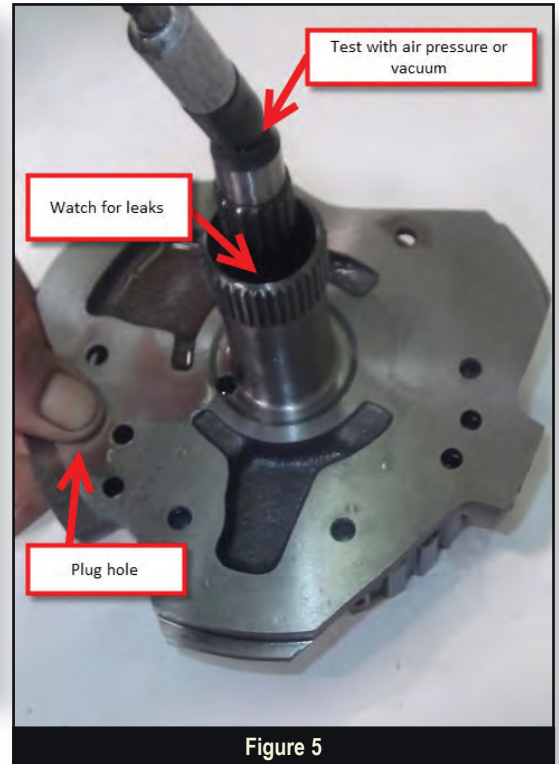


Figure 5

The pressure regulator valve is almost always worn on this transmission. Here's an easy, quick test:

- Pour ATF into the test port.
- Cover the test location.
- Apply low air pressure.

If ATF and air leak into the passages next to the test port (figure 7), the bore needs to be addressed.

If you like to compare test results, you can perform a simple vacuum test on the same test port. This can save you time and money, because it'll show what valves need to be repaired and where you can save money on unneeded repairs.

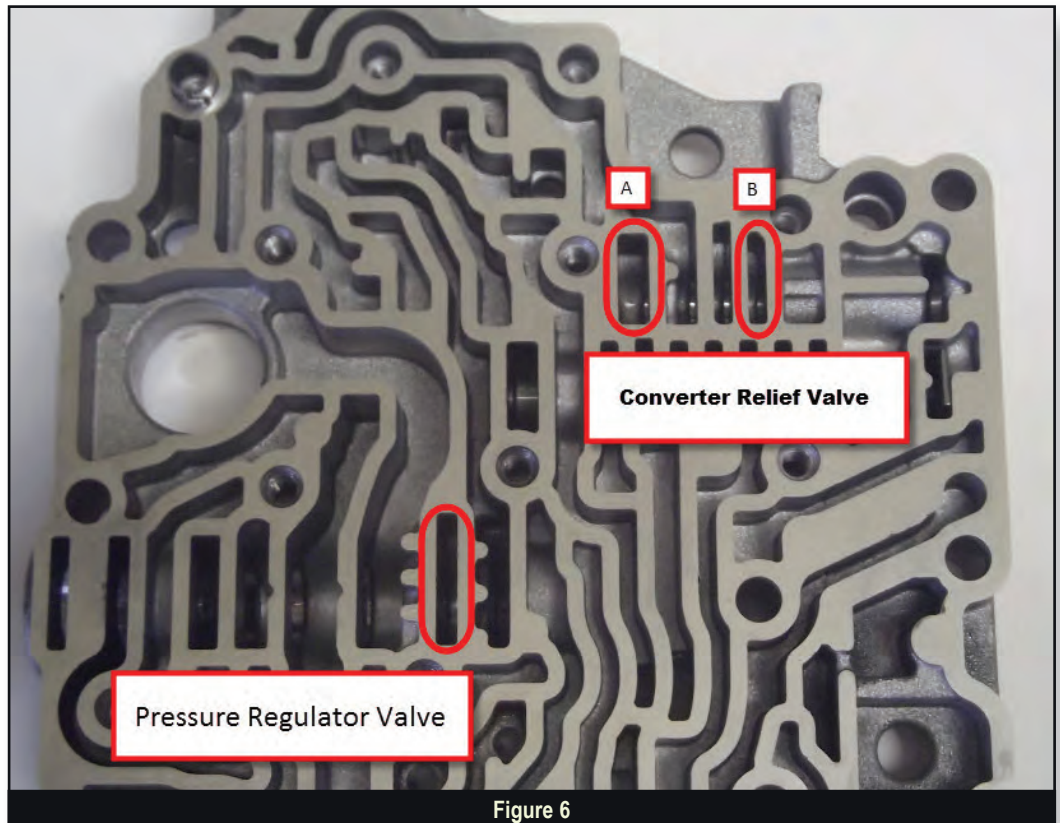


Figure 6



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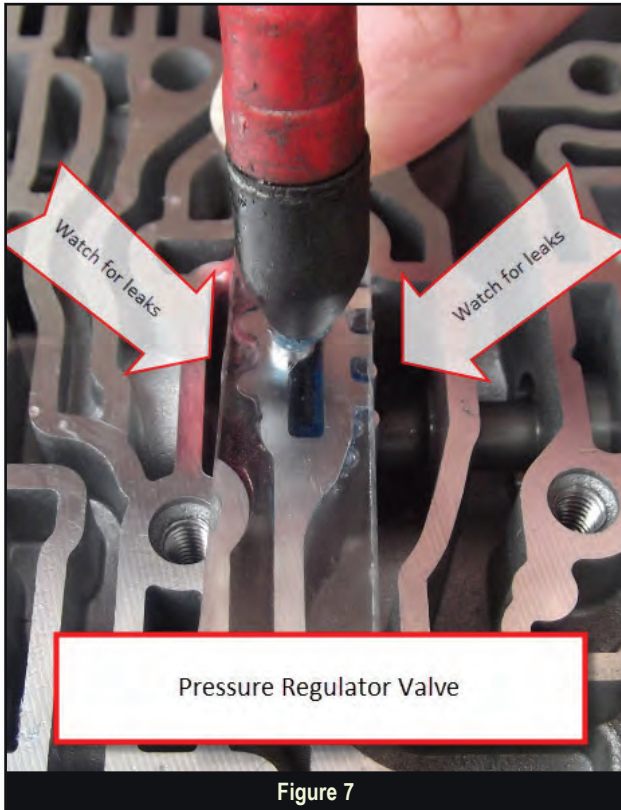


Figure 7

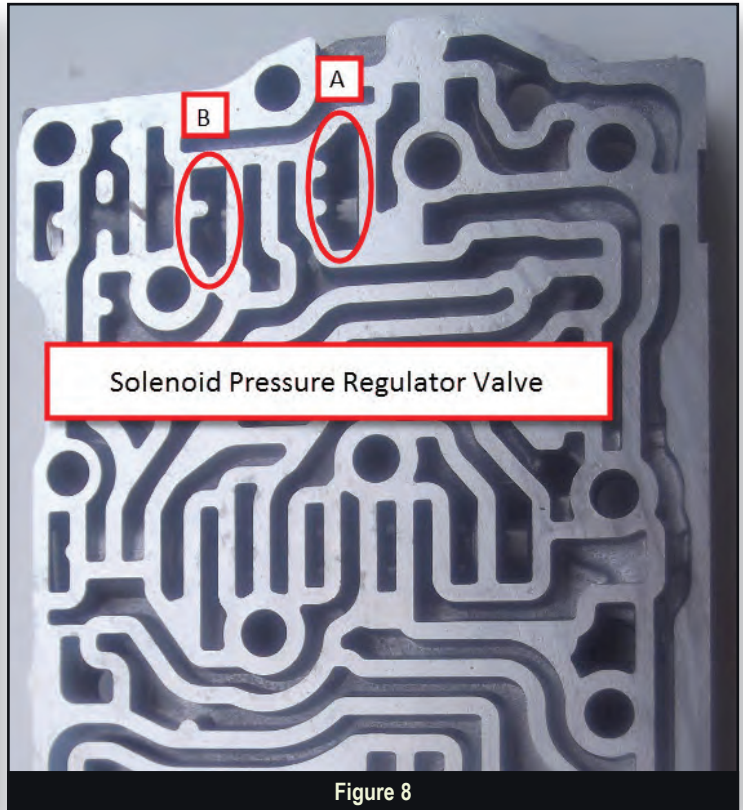


Figure 8

Wear in the pressure regulator valve may cause unstable line pressure, hard shifts, and problems with converter pressure and lube.

The converter relief valve has two ports that need to be tested. When worn, this valve will affect the torque converter clutch apply and release, and may set converter slip codes.

A vacuum or wet air test at both locations will show whether this bore needs to be repaired. When testing the converter relief valve port A, you're only checking one valve bore land; when checking location B you're testing two valve bore lands at the same time. So test port B will always leak more than A; this is normal.

### Upper Valve Body

In this section of the valve body you need to pay attention to the solenoid pressure regulator valve. A worn solenoid pressure regulator valve will cause low line pressure and low clutch pressure. This valve commonly wears out and sticks.

The test locations (figure 8) can be vacuum or wet air tested.

There are two locations to test; at location B you'll need to block the passage on the back of the valve body while testing. The test at location B is

measuring the wear at two valve bore lands at the same time, so test port B will always leak more than A; this is normal.

### End Cover

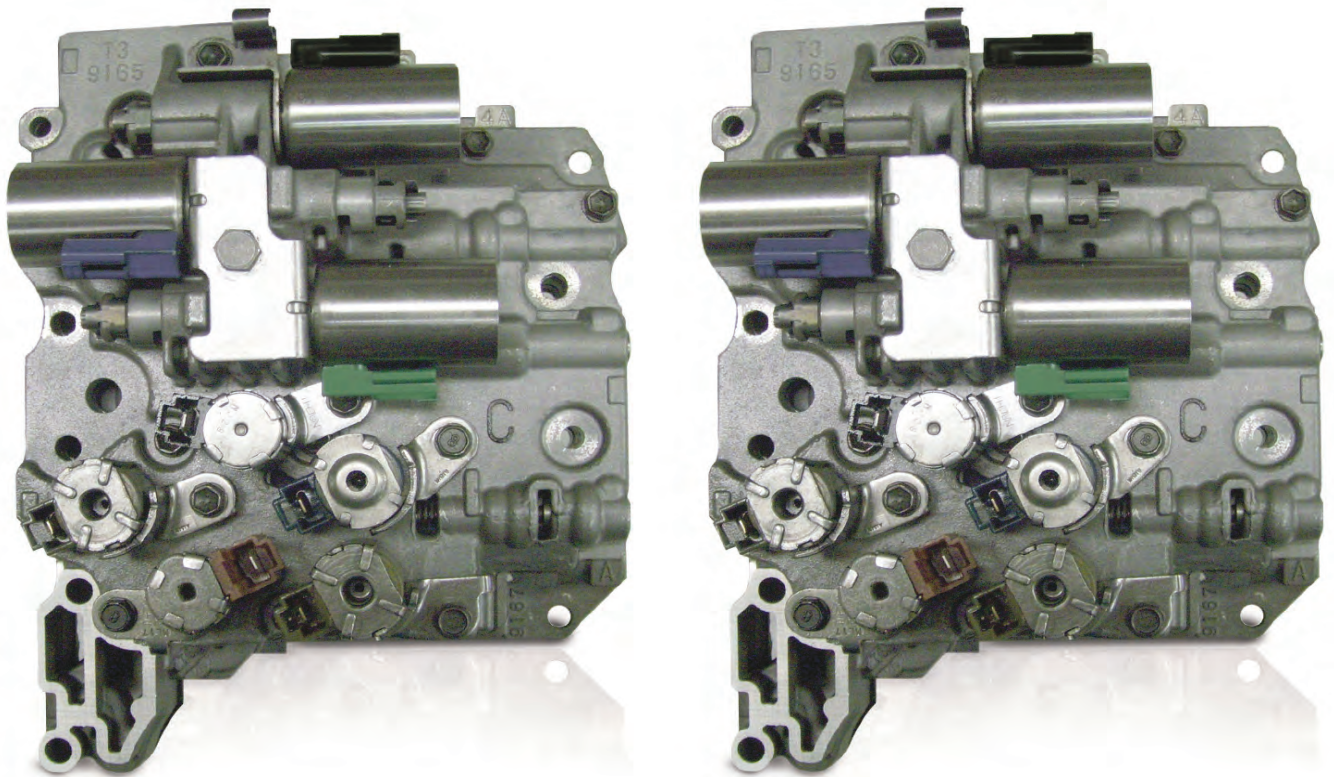
Check the ring lands on the end cover closely, because wear in this area is very common. Figure 9 shows a worn cover at the top ring land. Also inspect the direct drum for ring land wear. This

will cause a 2-3 flare or cause a slip in 3<sup>rd</sup> gear.

By testing these areas and identifying wear, you'll be able to target the root cause of the condition, instead of simply guessing. Because testing is more effective... and more profitable... than guessing, any day!



Figure 9



# Can You See the Difference?

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