

Introducing the 6-Speed 6F35 Transmission



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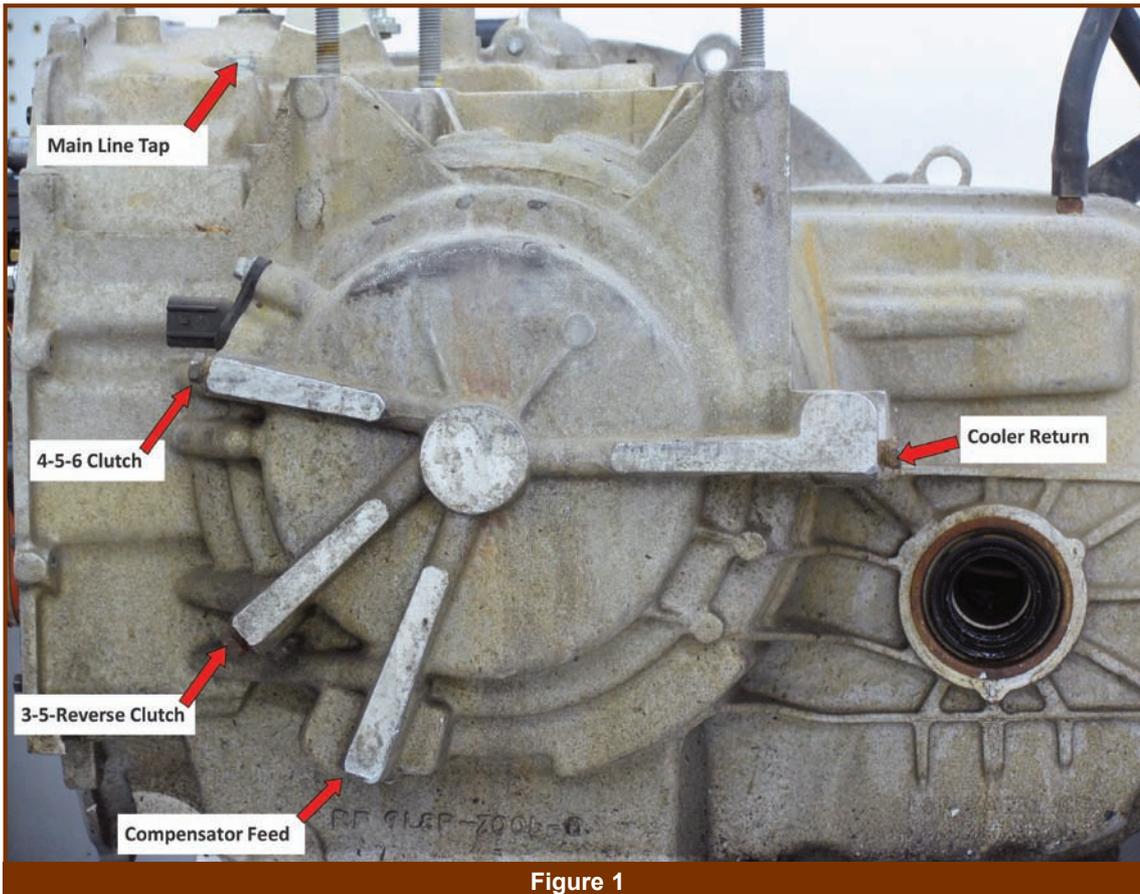


Figure 1

Starting in 2009, Ford Escape, Mercury Mariner, and Mazda Tribute will be equipped with a new 6F35 6-speed transaxle. Externally it looks like a cross between a CD4E and an AF21B. Internally it looks like a little Allison LCT 1000 with three sets of planets and five sets of clutches. But the clutches operate the geartrain differently than an Allison.

This unit may be a preproduction or a test unit, since there were no external tags or labels to identify it. But each internal part was carefully scribed with a part number.

Some of the general features of this unit include:

- A fill tube with a dipstick.
- No access to the filter unless the case is split.
- A fluid drain plug located at the bottom of the case.

There's a pass-through electrical connector on the side pan. It has a line tap, and additional taps for checking lube pressure, compensator feed, 3-5-reverse clutch, and 4-5-6 clutch (figure 1).

Behind the side pan is a valve body with seven solenoids and electrical connectors for the Transmission Range sensor (TR) and Turbine Speed Sensor (TSS). After disconnecting the connectors and removing several bolts, the

valve body comes right off.

The case splits easily. When pulling the front case, which includes the differential ring gear and pump assembly, the differential, chain assembly, and some of the drive shells and planets came out, too. This was probably because the unit was on its side. If it were vertical, just the front case assembly half would have come off.

One of the other unusual features for this unit is its ability to provide lubrication when flat towed behind another vehicle. When the differential rotates, the chain picks up fluid and allows some of the fluid to fall into a trough at the upper part of the case.

With the engine off and being flat towed, fluid in the trough can flow past the lube checkball and lubricate the rear planet assembly (figure 2). If you see one of these with a planetary failure, make sure the lube checkball is present and not stuck.

Inside, the unit looked very clean and straightforward. It looks like the only tricky part to assemble would be the Belleville spring under the 2-6 clutch span ring. Other than that, it

We change the parts others only clean

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looks very easy. The pump assembly is a basic gear pump in an aluminum housing. The housing also includes the pressure regulator valve, converter control valve, and a couple of relief checkballs (figure 3).

The 6F35 includes a sprag for first gear operation in drive range (figure 4). The sprag is a ratchet or diode type and looks like it can only go in one way.

The clutch names follow gear apply, so the low and reverse clutch is applied in L (Manual 1) or R. The 2-6 clutch only holds in 2nd and 6th gears. The forward clutch holds in 1st through 4th and is called the 1-2-3-4 clutch.

Valve body issues can be a hassle. Let's take a good look at some of the conditions that might affect it. The valve body assembly includes seven

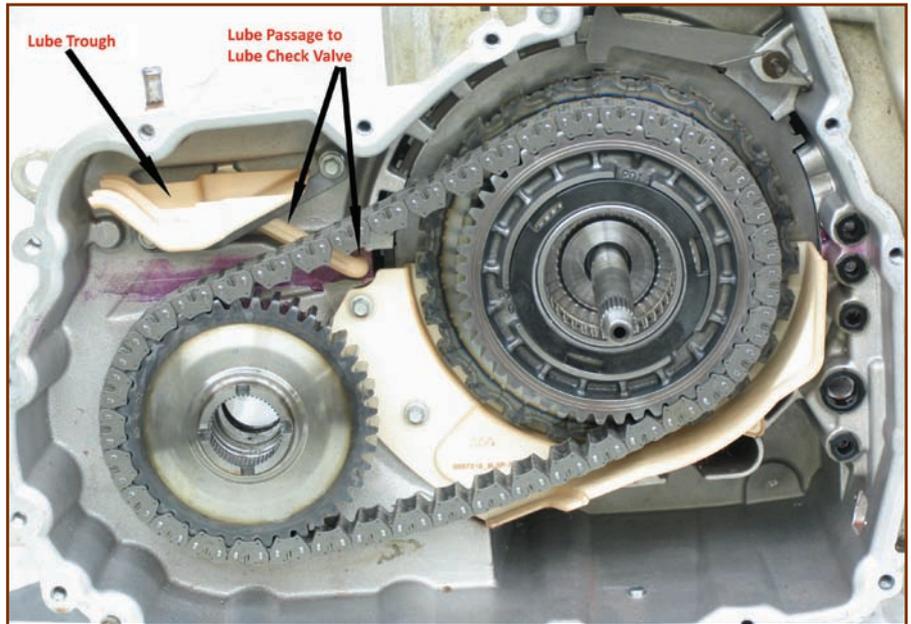


Figure 2

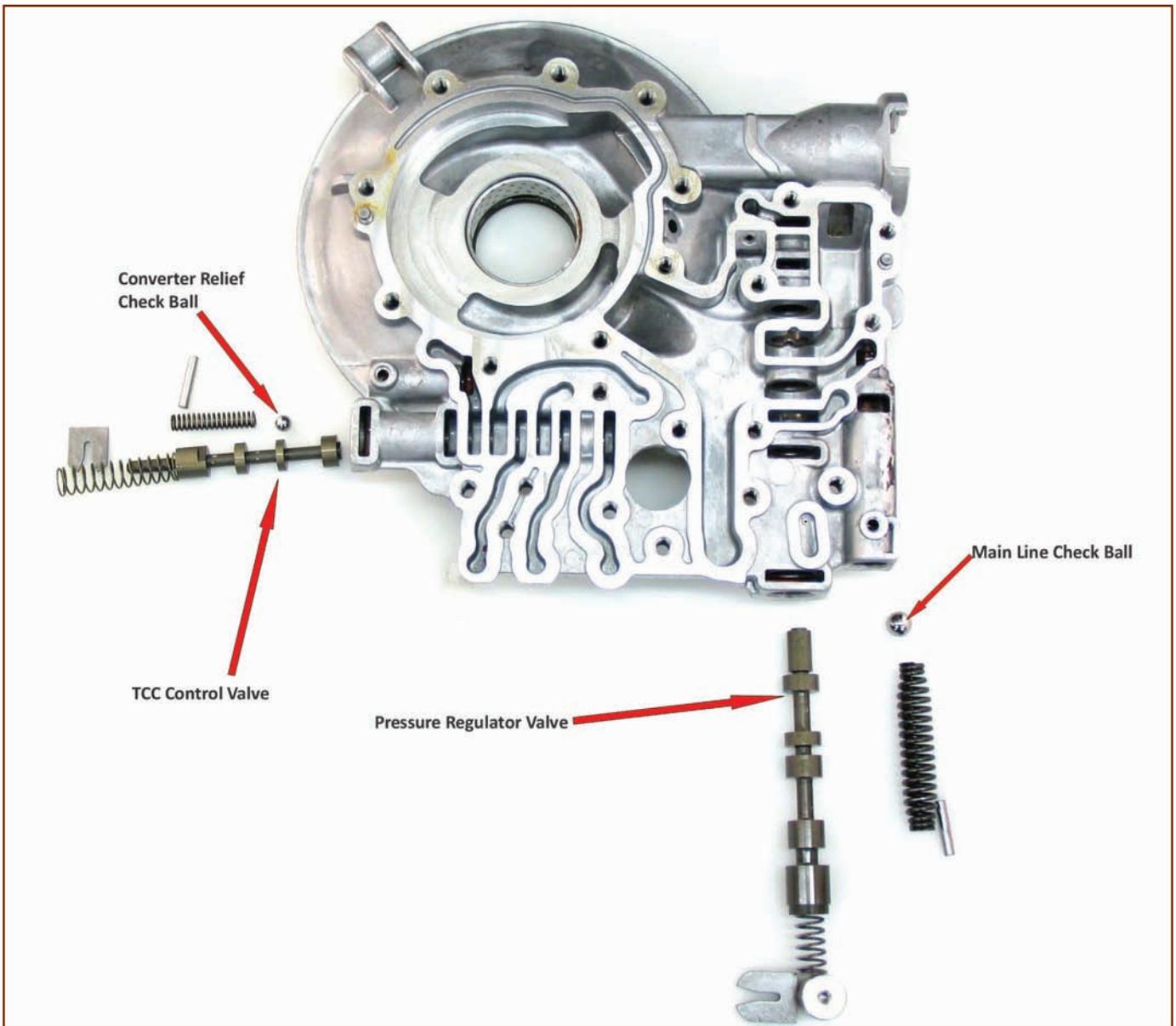


Figure 3

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solenoids which are a Bosch design and known to be fairly reliable.

The engineers really put some thought into simplifying the job of troubleshooting this valve body. In this design, there's one solenoid and one regulator valve that control each of the four shifting clutches. Keep in mind that each shift is accomplished by releasing one clutch and applying another. The one shift that isn't a clutch-to-clutch shift is the downshift from 2nd to 1st, because the low sprag is holding.

In diagnosing a transmission for general slips, flares or bangs, you'll probably be dealing with an overall pressure or computer strategy problem. If you're dealing with a shift problem that only affects one clutch, all you need to focus on is one solenoid, one regulator valve, or one clutch.

There is an exception to this: A compensator piston is mounted inside the clutch housing on the 3-5-reverse and 4-5-6 clutch pistons (figure 5). The compensator is there to assist the return springs of both clutches during release. So if the compensator piston or circuit fails, the transmission might develop a slower or faster clutch action during some situations.

There's one on-off shift solenoid. Its job is to apply the low-reverse clutch and block the TCC apply circuit. So if lockup comes on in low or reverse and kills the motor, the problem is most likely a crossleak in the pump, a stuck TCC control valve, or a restricted cooler.

Hydraulically, we see potential for problems in the pump assembly and valve body. Any wear in the pump pocket will have a big effect on pressure, due to the small size of the pump gears. And the pressure regulator valve doesn't have a wear sleeve, so any wear in this bore will

require an oversized valve or a new pump assembly.

At the moment it's hard to predict which bushings or hard parts are going to be weak links inside this unit. I'd expect the pump assembly to cause pressure and lockup problems.

As for the valve body, look for worn Actuator Feed Limit (AFL) and

compensator valves. I'd also suspect both the 2-6 clutch regulator and 3-5-R clutch regulator valves to wear, since each valve has to stoke eight times shifting up to sixth gear and then back down to first (figure 6).

During a rebuild, watch out for the Teflon seal at the back of the stator shaft. If it's cut or nicked, you could have a converter circuit leak.

Use extra care with the Belleville spring and snap ring for the 2-6 clutch at the bottom of the case. Someone could easily damage the snap ring seat and ruin the case.

But in general, it looks like a fairly easy transmission to deal with: So until football season starts up again, don't be afraid to tackle a 6F35.



Figure 4

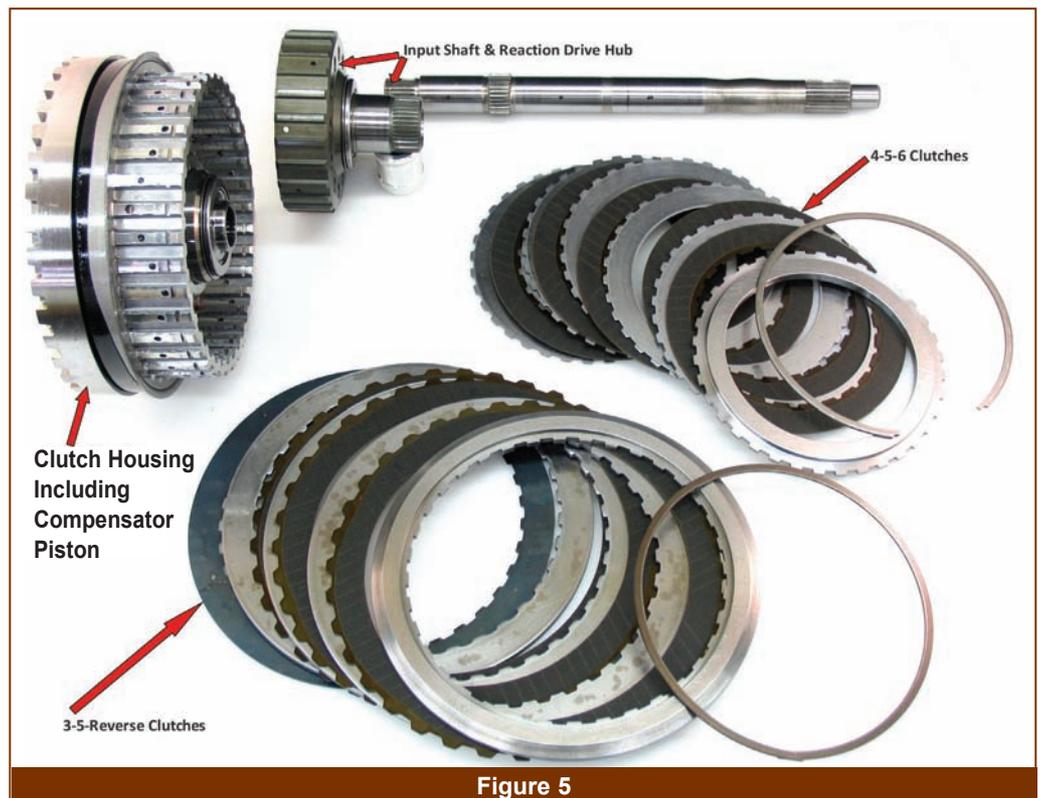


Figure 5



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