



# 2-3 Flare in the 5R55E

## 5R55E Solenoid Application

| Solenoid Operation: 5R55E |                 |                  |                  |                  |                                 |                |                               |                |
|---------------------------|-----------------|------------------|------------------|------------------|---------------------------------|----------------|-------------------------------|----------------|
| Selector Position         | Gear Range      | Shift Solenoid 1 | Shift Solenoid 2 | Shift Solenoid 3 | 1997 Only Coast Clutch Solenoid | Engine Braking | 1998-On Coast Clutch Solenoid | Engine Braking |
| Park/Neutral              | P/N             | On               | Off              | Off              | Off                             | No             | Off                           | No             |
| Reverse                   | R               | On               | Off              | Off              | On                              | Yes            | On                            | Yes            |
| Drive; Overdrive Enabled  | 5 <sup>th</sup> | Off              | Off              | On               | Off                             | Yes            | Off                           | Yes            |
|                           | 4 <sup>th</sup> | Off              | Off              | Off              | Off                             | No             | Off                           | No             |
|                           | 3 <sup>rd</sup> | On               | On               | Off              | Off                             | No             | Off                           | No             |
|                           | 2 <sup>nd</sup> | On               | Off              | On               | Off                             | No             | Off                           | No             |
| Drive; Overdrive Disabled | 1 <sup>st</sup> | On               | Off              | Off              | Off                             | No             | Off                           | No             |
|                           | 4 <sup>th</sup> | Off              | Off              | Off              | On                              | Yes            | On                            | Yes            |
|                           | 3 <sup>rd</sup> | On               | On               | Off              | Off                             | No             | On                            | Yes            |
| Manual 2                  | 2 <sup>nd</sup> | On               | Off              | On               | Off                             | No             | Off                           | No             |
|                           | 1 <sup>st</sup> | On               | Off              | Off              | Off                             | No             | Off                           | No             |
| Manual 2                  | 2 <sup>nd</sup> | On               | Off              | Off              | On                              | Yes            | On                            | Yes            |
| Low                       | 1 <sup>st</sup> | On               | Off              | Off              | On                              | Yes            | On                            | Yes            |

Differences between 1997 and later models highlighted by dark band.

Fig 1

## 4R44E and 4R55E Solenoid Operation

| Solenoid Operation: 4R44E / 4R55E |                 |                  |                  |                  |                       |                |
|-----------------------------------|-----------------|------------------|------------------|------------------|-----------------------|----------------|
| Selector Position                 | Gear Range      | Shift Solenoid 1 | Shift Solenoid 2 | Shift Solenoid 3 | Coast Clutch Solenoid | Engine Braking |
| Park/Neutral                      | P/N             | On               | Off              | Off              | Off                   | No             |
| Reverse                           | R               | On               | Off              | Off              | Off                   | Yes            |
| Drive; Overdrive Enabled          | 4 <sup>th</sup> | Off              | Off              | On               | Off                   | Yes            |
|                                   | 3 <sup>rd</sup> | Off              | Off              | Off              | Off                   | No             |
|                                   | 2 <sup>nd</sup> | On               | On               | Off              | Off                   | No             |
|                                   | 1 <sup>st</sup> | On               | Off              | Off              | Off                   | No             |
| Drive; Overdrive Disabled         | 3 <sup>rd</sup> | Off              | Off              | Off              | On                    | Yes            |
|                                   | 2 <sup>nd</sup> | On               | On               | Off              | On                    | Yes            |
|                                   | 1 <sup>st</sup> | On               | Off              | Off              | On                    | No             |
| Manual 2                          | 2 <sup>nd</sup> | On               | On               | Off              | Off                   | Yes            |
| Low                               | 1 <sup>st</sup> | On               | Off              | Off              | Off                   | Yes            |

Fig 2

## 5R55E Clutch and Band Application

| Gear                      | Forward Clutch  | Direct Drum | Intermed Band | Overdrive Band | 1997 Coast Cl | 1998-on Coast Cl | Low/Rev Band | Overdrive Sprag | Low Sprag | Gear Ratio |
|---------------------------|-----------------|-------------|---------------|----------------|---------------|------------------|--------------|-----------------|-----------|------------|
| Park                      |                 |             |               |                |               |                  |              |                 |           |            |
| Reverse                   |                 |             |               |                |               |                  |              |                 |           | 2.10:1     |
| Neutral                   |                 |             |               |                |               |                  |              |                 |           |            |
| Drive; Overdrive Enabled  | 5 <sup>th</sup> |             |               |                |               |                  |              | FW              | FW        | 0.75:1     |
|                           | 4 <sup>th</sup> |             |               |                |               |                  |              |                 | FW        | 1.00:1     |
|                           | 3 <sup>rd</sup> |             |               |                |               |                  |              |                 | FW        | 1.47:1     |
|                           | 2 <sup>nd</sup> |             |               |                |               |                  |              | FW              | FW        | 1.86:1     |
| Drive; Overdrive Disabled | 1 <sup>st</sup> |             |               |                |               |                  |              |                 |           | 2.47:1     |
|                           | 4 <sup>th</sup> |             |               |                |               |                  |              |                 | FW        | 1.00:1     |
|                           | 3 <sup>rd</sup> |             |               |                |               |                  |              |                 | FW        | 1.47:1     |
|                           | 2 <sup>nd</sup> |             |               |                |               |                  |              | FW              | FW        | 1.86:1     |
| Manual 2                  | 1 <sup>st</sup> |             |               |                |               |                  |              |                 |           | 2.47:1     |
|                           | 2 <sup>nd</sup> |             |               |                |               |                  |              | FW              | FW        | 1.86:1     |
| Low                       |                 |             |               |                |               |                  |              |                 |           | 2.47:1     |

■ = Applied F/W = Freewheeling

Fig 3

Welcome to *Street Smart* — a new column that'll examine real-world solutions to the problems that face technicians every day. Those of us who've been working on automobiles for most of our lives know that how we go about fixing a problem might not always follow the textbook solution. Because, when you get right down to it, textbooks don't fix cars: Technicians do. And, in the real world, we often find that following the textbook only ends up leading us in circles. That's when we need to start thinking... using our *Street Smarts*.

In this issue of *Street Smart*, we're going to look at 2-3 flare problems in the 5R55E transmission. The 5R55E is a 5-speed automatic transmission, introduced by Ford in 1997. It's used with the 4.0L engine in Rangers, Aerostars, Explorers and Mountaineers.

The 5R55E is mechanically the same as the 4R44E and the 4R55E. The difference is in how the computer commands the upshifts (figures 1 and 2). I've been on the ATRA HelpLine for two years now, and in that time I've heard problems with this unit nearly every day. Is it in the transmission? Computer? Wiring?... and so on. One call we seem to hear over and over is the 5R55E with a 2-3 flare.

The call comes in like this:

"I have a 1999 Ford Explorer that has a 2-3 flare. There's a code P0733 (No 3<sup>rd</sup> Gear) in memory. I've adjusted the EPC solenoid, went through the unit and replaced both servo pistons, but I still have a flare on the 2-3 shift."

## 2-3 Flare in the 5R55E

Okay, let's stop and look at what's going on in the transmission. The solenoid application chart (figures 1 and 2) shows that in 1<sup>st</sup> gear, only shift solenoid 1 is energized, which applies the forward clutch. To shift into 2<sup>nd</sup>, rather than energizing solenoid 2, the computer energizes solenoid 3, applying the OD band. This actually overdrives 1<sup>st</sup> gear.

Then, to shift into 3<sup>rd</sup> gear, the computer turns shift solenoid 3 off and solenoid 2 on. So to shift into 3<sup>rd</sup> gear, the unit releases the OD band and applies the intermediate band (figures 3 and 4).

With that in mind, what could happen that would create a flare on the 2-3 shift? Unlike the 4R44E and 4R55E, the 5R55E applies the *intermediate band* for 3<sup>rd</sup> gear; *not* the direct clutch. At the same time, it releases the overdrive band. So if the OD band releases before the intermediate applies, you get a 2-3 flare. The flare is a timing issue; the intermediate band is applying too slowly.

So let's recap on what we've done so far:

1. We went through the unit. The forward clutch, direct clutch and coast clutch all air check okay.
2. We've installed new servos, and new intermediate and overdrive bands. The bands are adjusted properly and air check fine.
3. Line pressure tests are within specs (figures 5 and 6). We even bumped the pressure up a little by adjusting the EPC solenoid.
4. All shift solenoids are well between 22–48 ohms of resistance (figure 7).

Let's do more than just look at the valve body; let's disassemble it completely. Take the time to flat sand the valve body, making sure it's nice and flat. This will help prevent crossleaks. Don't just check the valves for wear, inspect the bores too, and make sure the end plugs fit snug into the valve body.

An important point to remember is

## 4R44E; 4R55E Clutch & Band Appl.

| Gear                      | Forward Clutch  | Direct Drum | Intermediate Band | Overdrive Band | Coast Clutch | Low/Reverse Band | Overdrive Sprag | Low Sprag | Gear Ratios |
|---------------------------|-----------------|-------------|-------------------|----------------|--------------|------------------|-----------------|-----------|-------------|
| Park                      |                 |             |                   |                |              |                  |                 |           |             |
| Reverse                   |                 |             |                   |                |              |                  |                 |           | 2.10:1      |
| Neutral                   |                 |             |                   |                |              |                  |                 |           |             |
| Drive; Overdrive Enabled  | 4 <sup>th</sup> |             |                   |                |              |                  | F/W             | F/W       | 0.75:1      |
|                           | 3 <sup>rd</sup> |             |                   |                |              |                  |                 | F/W       | 1.00:1      |
|                           | 2 <sup>nd</sup> |             |                   |                |              |                  |                 | F/W       | 1.47:1      |
|                           | 1 <sup>st</sup> |             |                   |                |              |                  |                 |           | 2.47:1      |
| Drive; Overdrive Disabled | 3 <sup>rd</sup> |             |                   |                |              |                  |                 | F/W       | 1.00:1      |
|                           | 2 <sup>nd</sup> |             |                   |                |              |                  |                 | F/W       | 1.47:1      |
|                           | 1 <sup>st</sup> |             |                   |                |              |                  |                 |           | 2.47:1      |
| Manual 2                  |                 |             |                   |                |              |                  | F/W             | 1.47:1    |             |
| Manual 1                  |                 |             |                   |                |              |                  |                 |           | 2.47:1      |

■ = Applied      F/W = Freewheeling

Fig 4

| Transmission     | Gear Range | Mainline Pressure (PSI) |         | EPC Pressure (PSI) |         |
|------------------|------------|-------------------------|---------|--------------------|---------|
|                  |            | Idle                    | WOT     | Idle               | WOT     |
| 4R44E 2.3L, 2.5L | OD, 2, L   | 75–100                  | 225–260 | 20–30              | 110–135 |
|                  | Rev        | 115–145                 | 280–350 | 35–45              | 110–135 |
| 4R44E 3.0L       | OD, 2, L   | 105–135                 | 225–260 | 30–40              | 110–135 |
|                  | Rev        | 150–180                 | 280–350 | 45–55              | 110–135 |
| 4R55E 4.0L       | OD, 2, L   | 85–100                  | 225–260 | 25–35              | 110–135 |
|                  | Rev        | 95–160                  | 280–350 | 55–65              | 110–135 |
| 5R55E 4.0L OHV   | OD, 2, L   | 80–115                  | 225–260 | 25–35              | 110–135 |
|                  | Rev        | 135–165                 | 280–350 | 55–65              | 110–135 |
| 5R55E 4.0L SOHC  | OD, 2, L   | 95–125                  | 225–260 | 40–50              | 110–135 |
|                  | Rev        | 100–130                 | 280–350 | 55–65              | 110–135 |

Fig 5

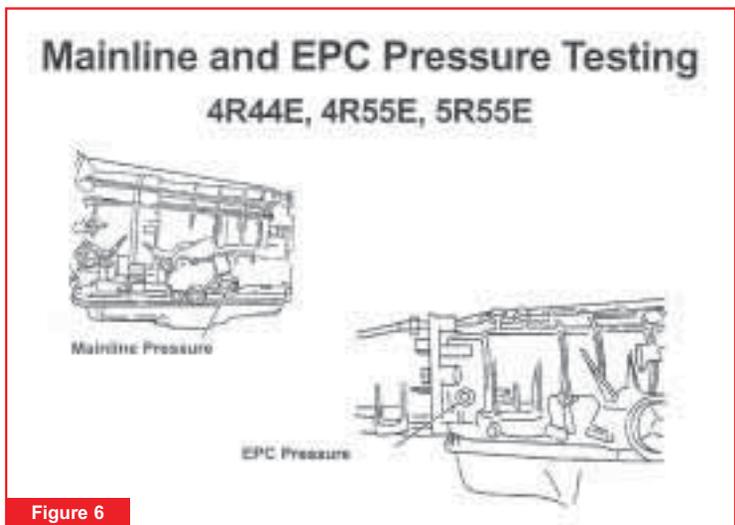


Figure 6

that even if a solenoid has good resistance, it can still fail a functional test or leak test. If you don't have the tools for testing solenoids, you're throwing money down the drain. With today's transmissions, not having a dynamic solenoid tester is like removing and installing a transmission using only hand tools, or without a lift.

We've had a lot of calls on 5R55E with a 2–3 flare and code P0733 (No 3<sup>rd</sup> Gear). Code P0733 takes you to pinpoint test A: Shift solenoid electrical circuit test. Remember, this unit has 3<sup>rd</sup> gear; the problem it has is a 2–3 flare.

Most of the time it turns out that shift solenoid 2 is leaking out the end, which delays the stroke of the 2–3 shift

valve (figures 8 and 9). When the computer doesn't see the RPM drop right after it energizes the solenoid, it assumes the unit didn't shift into 3<sup>rd</sup> gear, so it sets code P0733.

Replacing all the solenoids during a rebuild is one way to prevent this type of problem. But it's not really practical, due to the high price and lack of availability of most solenoids. And remember, just because a solenoid is new doesn't guarantee it'll function properly. The only way to be completely sure that all of the solenoids are working properly is to test them... electrically *and* mechanically.

Testing solenoids is a sure way to save time and money. It'll help you track down many problems that don't show up using a typical electrical diagnosis. And that'll help keep you from pulling units a second time. That's not just smart... that's *Street Smart!*

(See figures 8 and 9 on page 54.)

### Solenoid I.D and Resistance

|          |              |          |            |
|----------|--------------|----------|------------|
| 1. E P C | 3.1-5.7 ohms | 3. S S 4 | 22-48 ohms |
| 2. S S 2 | 22-48 ohms   | 4. T C C | 9-16 ohms  |
|          |              | 5. S S 3 | 22-48 ohms |
|          |              | 6. S S 1 | 22-48 ohms |

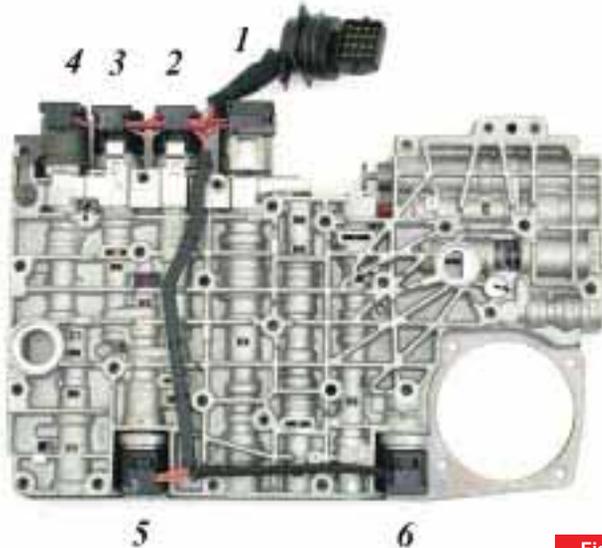


Figure 7



Subaru All Wheel Drive Differential:



## What Makes H.F.T. So Special?

Experience The Difference!

Subaru All Wheel Drive Differentials come with:

1. New Ring and Pinion
2. New Seals and O-Rings
3. New Bearings and Races
4. New Seal Pipe
5. Pump & Case inspected and assembled with the utmost of care, ensuring proper set-up

**I-800-776-4433**

**Fax: I-856-222-4169**

[www.wesellhardparts.com](http://www.wesellhardparts.com)

