When a patient comes into the hospital with ailments such as an aggressive 1-2 shift, it’s important to know what strain of the gene pool you’re dealing with. In this issue of GEARS, we’re combining Street Smart and Doctor, Doctor to look at the basic differences between the AX4N and the 4F50N when it comes to identifying neurological (valve body) differences between these families.

Way back in the 2003 ATRA Technical Seminar manual we discussed harsh 1-2 shifts. In the 2004 ATRA Technical Seminar manual we discussed valve body changes, with illustrations for the AX4S and AX4N from early to late models. In the 2005 ATRA Technical Seminar we discussed TCC problems in the AX4S and AX4N transmissions. These issues included but were not limited to:

- Wrong Separator Plate
- Gaskets
- Wrong Separator Plates
- Damaged Accumulator Piston
- Wrong Accumulator Springs
- Valve Body Wear

The gaskets are bonded to the plate, so identifying these gaskets became a chore. It was easier simply to order a new plate from Ford, so we gave out the plate ID numbers and the part numbers from Ford for the replacement plates (see chart to the right).

As with any printed part number, always check with your parts supplier before ordering, using the ID stamped number (figure 1).
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Know Your Patient: AX4N vs 4F50N

The Accumulator Piston, Bore and Pin

Inspect these areas for wear. If there’s wear on any of these three areas, repair or replace them (figure 2).

Wrong Accumulator Spring (1-2 Accumulators)

The 1-2 accumulator spring is where you can get mixed up fairly easily. That’s because these springs are color coded, but the color can wash off in your parts washer.

How can you keep from mixing them up during assembly? Mark the springs before cleaning. Here’s an idea: Wrap a piece of wire around the spring, pin and piston before cleaning them. Use one wire for the 1-2 accumulator; two wires for the 2-3 accumulator, and so on.

If by chance the colors happen to be there after cleaning, here are the color IDs for the AX4N:

<table>
<thead>
<tr>
<th>AX4N 1-2 ACCUMULATOR</th>
<th>Vehicle</th>
<th>Part Number</th>
<th>Color</th>
</tr>
</thead>
<tbody>
<tr>
<td>1995-02 Non SHO</td>
<td>F5DZ-7G267-A</td>
<td>Orange</td>
<td></td>
</tr>
<tr>
<td>1995-96 SHO Only</td>
<td>F6DZ-7G267-A</td>
<td>Purple</td>
<td></td>
</tr>
<tr>
<td>1997-01 SHO Only</td>
<td>F7DZ-7G267-AA</td>
<td>Plain</td>
<td></td>
</tr>
</tbody>
</table>

One of the main reasons this accumulator circuit is fussy on the AX4N during the 1-2 shift is there’s no 1-2 capacity modulator valve to slow down the oil flow into the 2nd clutch during the shift.

Another issue with this 1-2 accumulator system is that the “regulating oil” used on the spring side of the accumulator to fine tune the shift quality is controlled by the line modulator valve.

The AX4S accumulators and controls are different: All the accumulators have two springs, and it uses a 1-2 capacity modulator valve to adjust the apply pressure for the second clutch.

To that end, we’re going to follow a call that came into the ATRA HotLine regarding a 2001 Ford Windstar with a 4F50N transmission. The customer was complaining that the Malfunction Indicator Lamp (MIL) was lit. The shop took the necessary information and the customer left the van for diagnosis.

John (our technician) pulled the vehicle into the shop and connected his scan tool; code P1744 (TCC excessive slip) was stored in memory. Since this vehicle had over 100k miles, the vehicle owner agreed to let the shop pull the transmission and rebuild it. With the transmission apart on the bench, John couldn’t see anything wrong that would cause this problem. That’s when he called the ATRA HotLine.

Day 1

Mike Brown gets the call. After talking with John about the problem and the code P1744, Mike advised John of the common problem areas around the TCC. He also reminded John that “out and apart on the bench isn’t the time to be diagnosing a transmission problem.”

At that point, Mike explained that they’d have to get the transmission assembled and back into the vehicle for testing. John realized they jumped the gun by pulling the unit. Before assembling it, John decided to replace the solenoids and completely clean the valve body (valves removed).

One of the first questions Mike asked was, “When did it set the code?” John replied “It sets the moment the TCC is commanded on.” “That’s good,” Mike said (well, not really good, but it should make it easier to find the problem). So the testing began:

- Test 1 — Lockup commanded on stall test. To do this you unplug the case connector (wrong gear start) and energize the TCC solenoid by supplying both the power and ground to the solenoid. This should stall the engine when you put the selector into drive. It didn’t.
- Test 2 — Determine whether the valve strokes when the solenoid is commanded on. To do this, you can either install a pressure gauge on a cooler line, or simply hold onto one of the rubber hoses and feel for a pulse in pressure when the TCC solenoid is commanded on. There was a pulse in the cooler line: The valve was moving (now we’re getting somewhere!)

The results of these tests indicated that the problem was in the release oil side of this circuit, keeping the TCC from engaging. So, back out of the vehicle the transmission came for a closer inspection.

Since he now knew where to look for the problem (in the exhaust side of converter release), John found a small piece of rubber blocking the release passage of the pump driveshaft. This is...
an easy thing to miss if you don’t know to look for it, or are in a hurry to get the transmission back into the vehicle.

After clearing the passage, John asked Mike if there was anything else he could do to prevent having to pull this “AX4N” out again. (This is where good communication is essential. John asked for information on an “AX4N,” when this van actually had the later 4F50N. Two different transmissions with many of the same components, but still different).

Mike went over several tips for the AX4N:
• It’s a good idea to block the pressure failsafe valve. Remove the spring and install a check ball in front of the valve. This will prevent many different shifting problems.
• Check the pump and the accumulators carefully for wear.
• Always use a torque wrench when fitting the valve body onto the channel cover and use the proper alignment pins.

These tips are laid out in the 2005 ATRA Technical Seminar manual and also in ATRA Technical Bulletin #637. Both of these references illustrate the checks for both the AX4S and AX4N transmissions dealing with TCC issues.

John said his goodbyes and went off to finish the job.

Day 3

John called back into the HotLine, sounding very frustrated. “Mike,” John said, “this thing is driving me nuts. Now the code is gone, but I have a new problem. When this transmission shifts into second gear it ‘barks the tires.’ It has very aggressive shifts into 2nd gear, to the point of wanting to break the mounts. I didn’t have this problem before; what could I have done?” John said he followed the information in the ATRA Technical Bulletin #637, figure 3 to the letter.

“Well, okay,” Mike said, “let’s look at what you did.”

Then Mike asked John about each of these points, one at a time:
• Did you check to make sure the 1-2 accumulator spring was correct? John replied he did.
• Did you inspect or make any modifications to the line modulator valve? (Mike reminded John that the AX4S has a 1-2 capacity modulator valve and the AX4N didn’t.) John said no, he didn’t mess with that valve and didn’t see one that looked like the one illustrated.
• Did you block the pressure failsafe valve? John said he did. It just didn’t make any sense: John hadn’t touched any areas that could have caused a harsh 1-2 shift; at least, not in an AX4N.

With all that information in hand, Mike decided to find out exactly which valve was blocked, so he faxed a picture of the AX4N valve body to John and asked him to circle the valve that he blocked. John replied that this wasn’t the same valve body; the valves were different.

Ah-Hah! Red Flag! Changes in the gene pool. “Ok, which valve did you
Know Your Patient: AX4N vs 4F50N

The phone is silent as Mike and John examine the illustrations. John said (grumbling) “I used the illustration for the AX4S in blocking the pressure failsafe valve.” (So he’d blocked the wrong valve: This was the line modulator valve, which didn’t look like the one in the AX4N illustration).

“Wow, there are three different setups?” John asked. “No, there are actually four different setups,” replied Mike. As it turned out, John was actually working on a 4F50N, first design, and he’d blocked the line modulator valve, basically locking the accumulators. No accumulation: No wonder the 1-2 shift was aggressive.

Communication and understanding what you’re working on are very important when asking for technical help. All along, John was working on a 4F50N and he was asking for technical information about an AX4N. Mike went over the information for John to straighten out all the miss-assemblies and to unblock the line modulator valve. John said he’d call back the following day with an update.

Day 4

Call back from John: “Mike, this thing is fixed. The customer swears that it’s never been so smooth. Thanks for all the help.”

To clear up this clog in the gene pool, let’s look at the two different valve bodies used with the 4F50N.

- 2004-up (figure 4). Notice the line modulator valve lineup: spring – valve – plug – retaining clip. Also notice in the 2004-up valve body that the 1-2 modulator capacity valve was reintroduced and is sitting on top of the 2-3 modulator capacity valve. These are differences that can set you back when building these late model units, if you aren’t aware of the differences… especially when changing parts.

Until next time, keep those transmissions in good working health (the Doctor) and remember, sometimes in this fast paced world we live in, you just have to slow down… and that’s not just smart… that’s Street Smart!
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