



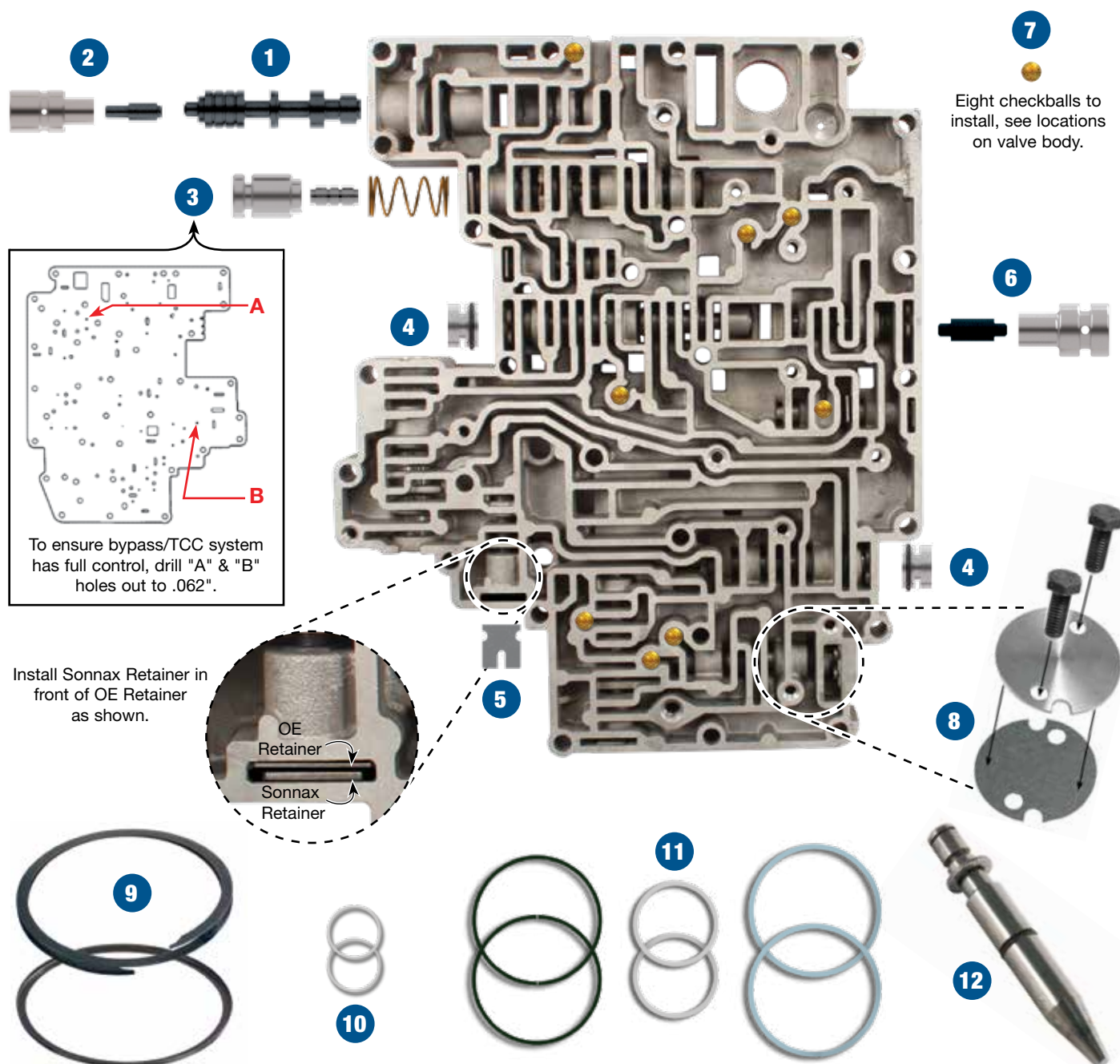
FORD 4R70E, 4R70W, 4R75E, 4R75W, AODE ZIP KIT®

PART NUMBER AODE-4R75E-ZIP

QUICK GUIDE

Parts are labeled here in order of installation. See other side of sheet for details on kit contents.

INSTALLATION DIAGRAM



See corresponding Technical booklet for installation of additional unit components.

In addition to general rebuilding tips and technical information, the technical booklet included in this kit contains vacuum testing and additional repair options for higher mileage units or for repairing specific complaints which are beyond the scope of this kit.

Kit Contents & Installation Steps

Step 1 Replace OE Main Pressure Regulator Valve

Packaging Pocket 1

- Valve

Step 2 Replace OE Boost Sleeve & Valve



NOTE: Some early applications have a spring between the boost valve and boost sleeve. It is ok to reuse this OE spring if present, but not necessary.

Packaging Pocket 2

- Valve • Sleeve

Step 3 Replace OE Bypass Clutch Control Sleeve, Plunger Valve & Spring. Perform Separator Plate Modifications.

Reference page 2 in technical booklet for detailed instructions.

Packaging Pocket 3

- Valve • Sleeve • Spring • Drill bit, .062" (not shown)

Step 4 Replace OE 2-3 & 3-4 Shift Valve End Plugs

Place O-ring in shallow grooves on end plugs, lubricate with Sonnax Slippery Stick O-LUBE and roll on bench to size. Large O-ring fits the 2-3 shift valve end plug, small O-ring fits the 3-4 shift valve end plug. Install O-ringed land inboard.

Packaging Pocket 4

- Plugs (2) • O-Rings (4) 2 Extra

Step 5 Install Solenoid Regulator Valve Retainer

Reference page 2 in technical booklet for detailed instructions.

Packaging Pocket 5

- Retainer

Step 6 Replace OE Overdrive Servo Regulator Valve & Sleeve



NOTE: '01-Later applications only.

Reference page 2 in technical booklet for important inspection note.

Packaging Pocket 6

- Valve • Sleeve

Step 7 Replace OE Checkballs

Packaging Pocket 7

- Checkballs (8)

Step 8 Install Valve Body Retainer Plate



NOTE: Used on '01-later applications only. Installation requires drilling of separator plate and drilling and threading of valve body casting.

Reference pages 2 and 3 in technical booklet for detailed instructions.

Packaging Pocket 8

- Retainer Plate • Gasket • Bolts, 13/64" (2)

Step 9 Install Intermediate Clutch Spiral Snap Ring

Reference page 3 in technical booklet for detailed instructions.

Packaging Pocket 9

- Spiral Retaining Ring • Locking Ring

Step 10 Replace Output Shaft Seals. Inspect Direct Piston & Direct Clutch Drum.

Reference page 3 and 4 in technical booklet for detailed instructions.

Packaging Pocket 10

- Output Shaft Seals (2)

Step 11 Install Pump Cover & Input Shaft Seals



NOTE: There are 2 types of seals for the stator '02-earlier and '03-later.

Reference pages 4 and 5 in technical booklet for detailed instructions.

Packaging Pocket 11

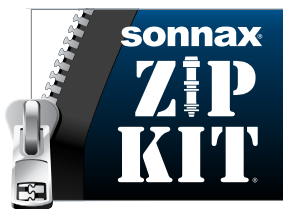
- Pump Cover Seals; Early (2), Late (2) • Input Shaft Seals (2)

Step 12 Replace Overdrive Servo Pin

Reference page 4 and 5 in technical booklet for detailed instructions.

Packaging Pocket 12

- Servo Pin • O-Rings; Large (1), Medium (1) • Washer



FORD 4R70E, 4R70W, 4R75E, 4R75W, AODE ZIP KIT®

PART NUMBER AODE-4R75E-ZIP

INSTALLATION & TESTING BOOKLET

Technical Specifications

| | |
|---|--|
| Pump-to-Stator Bolts 15 ft-lb | Valve Body to Case Bolts 106 in-lb |
| Pump-to-Case Bolts 15 ft-lb | OE Endplay .005-.020" |
| Valve Body Plate Bolts 106 in-lb | |

10 Pin Electronic Checks

| Solenoid | Terminals | Ohm Value |
|--------------|-----------|-----------|
| Solenoid 1/A | 1 & 2 | 20-30 |
| Solenoid 2/B | 6 & 2 | 20-30 |
| TCC Solenoid | 3 & 8 | 10-16 |
| EPC Solenoid | 7 & 10 | 2-5 |

10 Pin Terminal Location & Function

| Pin | Terminal Function |
|-----|--|
| 1 | Shift Solenoid 1/A Ground |
| 2 | 12 Volt Power Supply for Shift Solenoids |
| 3 | TCC Solenoid Ground |
| 4 | Not Used |
| 5 | Transmission Oil Temp Sensor Ground |
| 6 | Shift Solenoid 2/B Ground |
| 7 | EPC Power Supply |
| 8 | TCC Power Supply |
| 9 | Transmission Oil Temp Sensor Power |
| 10 | EPC Ground |

8 Pin Electronic Checks

| Solenoid | Terminals | Ohm Value |
|--------------|-----------|-----------|
| Solenoid 1/A | 4 & 7 | 20-30 |
| Solenoid 2/B | 4 & 8 | 20-30 |
| TCC Solenoid | 4 & 3 | 10-16 |
| EPC Solenoid | 4 & 6 | 2-5 |

8 Pin Terminal Location & Function

| Pin | Terminal Function |
|-----|-------------------------------------|
| 1 | Not used |
| 2 | Transmission Oil Temp Sensor Ground |
| 3 | TCC Solenoid Ground |
| 4 | 12 Volt Power Supply for Solenoids |
| 5 | Transmission Oil Temp Sensor Power |
| 6 | EPC Ground |
| 7 | Shift Solenoid 1/A Ground |
| 8 | Shift Solenoid 2/B Ground |

Valve Body Identification

This kit fits '96-later units. It will not work on '91-'95 units. Rough forging must begin with RF-F6 or 1L3P located below stiffener plate (Figure 1).

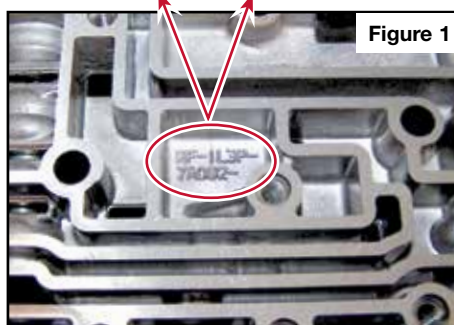


Figure 1

Solenoid Application Chart

| Gear | SS1/A | SS2/B | TCC |
|--------------------|-------|-------|-----|
| P | ON | OFF | |
| R | ON | OFF | |
| OD-1 st | ON | OFF | ON* |
| OD-2 nd | OFF | OFF | ON* |
| OD-3 rd | OFF | ON | ON* |
| OD-4 th | ON | ON | ON* |

ON* = Based on PCM command.

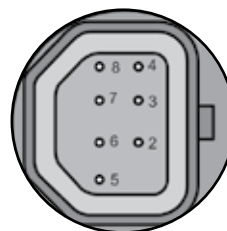
Component Application Chart

| Gear | Int. Clutch | Int. Sprag | Rev Clutch | Fwd Clutch | Over-drive Band | Low Roller Clutch | Low Reverse Band | Direct Clutch |
|--------------------|-------------|------------|------------|------------|-----------------|-------------------|------------------|---------------|
| P | | | | | | | | |
| R | | | ON | | | | ON | |
| OD-1 st | | | | ON | | Holding | | |
| OD-2 nd | ON | Holding | | ON | | | | |
| OD-3 rd | ON | | | ON | | | | ON |
| OD-4 th | ON | Holding | | | ON | | | ON |
| M2 | ON | Holding | | ON | ON | | | |
| M1 | | | | ON | | Holding | ON | |

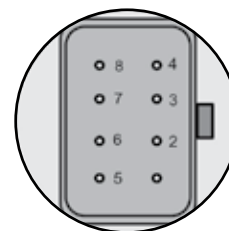
Case Connector Pin Side '97-Earlier



Case Connector Pin Side 1998-2008



Case Connector Pin Side '09-Later



Solenoid Locations

NOTE:
EPC solenoid located in case

SS2/B

TOT sensor in harness or molded lead frame

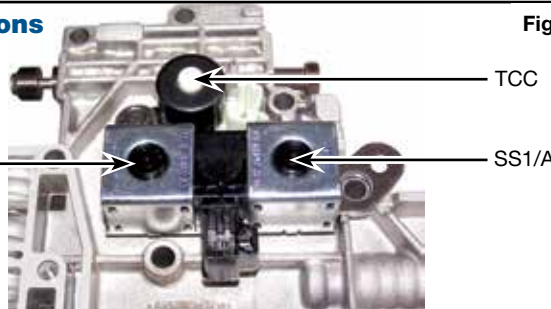


Figure 2

Valve Body & Unit Rebuild Tips & Techniques

Bore-by-bore tips for removal, installation, options and checks of components. The detailed instructions below correlate to the quick guide steps.

1. Replace OE Main Pressure Regulator Valve

Reuse OE spring.

2. Replace OE Boost Sleeve & Valve

Reference quick guide for details.

3. Replace OE Bypass Clutch Control Sleeve, Plunger Valve & Spring. Perform Separator Plate Modifications.

- Remove plunger valve from Sonnax sleeve, set aside for reuse.
- With enclosed sonnax drill bit, drill thru existing Sonnax sleeve cross orifice hole and out other side of sleeve. Remove debris and burrs. Reinstall Sonnax plunger valve into sleeve.
- Install Sonnax orange spring, plunger valve and sleeve assembly into bore and draw a line on the back of the sleeve indicating the two orifice hole locations and place at the 3 and 9 o'clock position (**Figure 3**) and retain with OE clip.
- Drill separator plate holes marked "A" and "B" out to .062" with enclosed drill bit.

4. Replace OE 2-3 & 3-4 Shift Valve End Plugs

Reference quick guide for details.

5. Install Solenoid Regulator Valve Retainer

- Check bore for wear, and repair with Sonnax oversized valve (76948-47K, not included) if required.
- If not worn, check OE valve for sticking or hanging up.
- Resize bore with bore sizing tool (76948-BST2, not included) if required.
- Install Sonnax retainer outboard of OE retainer, as shown in quick guide inset photo.

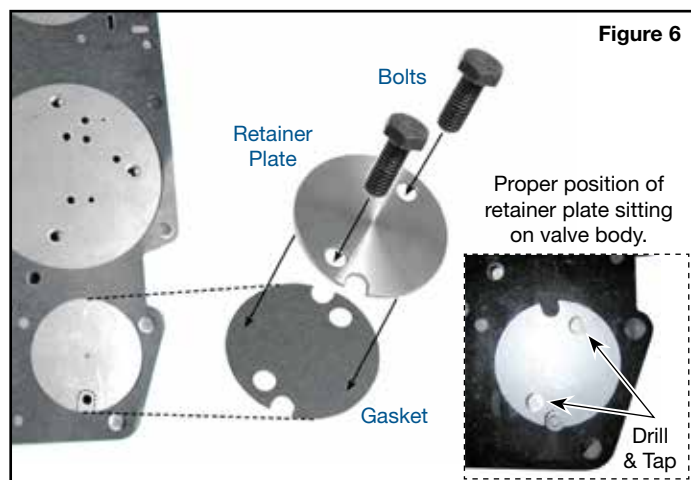
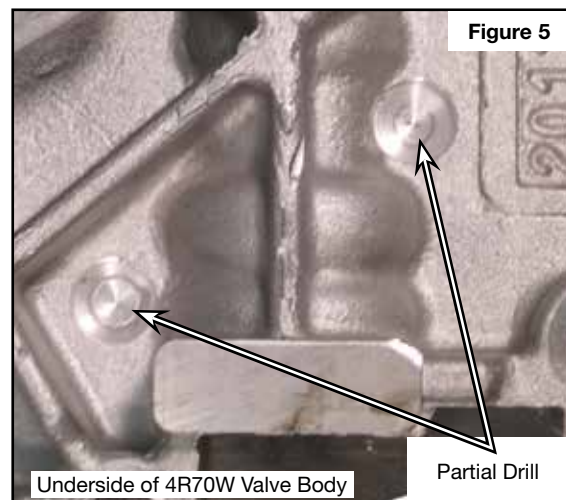
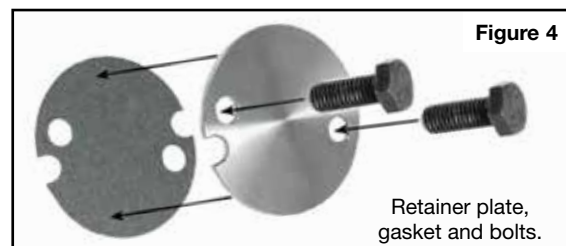
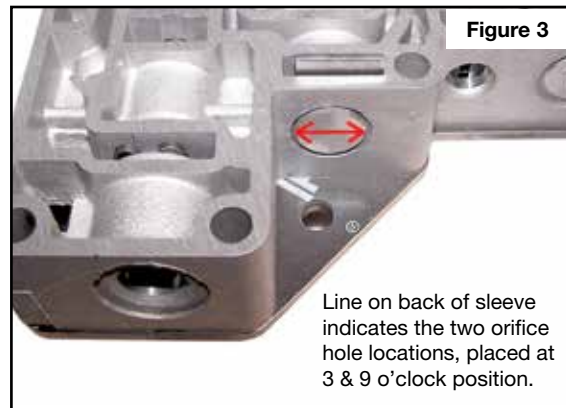
6. Replace OE Overdrive Servo Regulator Valve & Sleeve

Reference quick guide for details.

NOTE: Remove inboard overdrive servo regulator valve and insure it is free in bore. The inboard valve is commonly stuck as overdrive servo retaining ring often breaks and pieces of the retaining ring lodge in this bore.

7. Replace OE Checkballs

Reference quick guide for details.



8. Install Valve Body Retainer Plate (Figure 4)



NOTE: Used on '01-later applications only. Installation requires drilling of separator plate and drilling and threading of valve body casting.

- Install separator plate onto valve body and align plate with OE alignment bolts.
- Locate the two cast in-place bolt hole locations on underside of valve body (Figure 5).
- In a drill press use a 5/16" drill bit to clean up the cast in-place bolt hole locations and establish a true center for drilling further with 13/64" or #9 drill (Figure 5).



WARNING: Do Not drill deeper than 1/16" with the 5/16" drill bit (Figure 5).

- After true center is established, use a 13/64" or #9 drill to drill all the way through the valve body AND separator plate with a piece of wood underneath to prevent the plate from deforming as the drill bit cuts through.
- Remove the separator plate and enlarge the two drilled holes with a 1/4" drill bit. De-burr the new holes in the separator plate.
- With a 6.0 x 1.0mm thread tap, cut new threads in the drilled holes in the valve body. De-burr the gasket surface, making sure there are no high spots.
- With Sonnax checkballs installed per quick guide, assemble valve body gaskets and separator plate using OE procedures.
- Install the Sonnax gasket, valve body retainer plate and two screws. Torque to 80-100 in-lb (Figure 6).

9. Install Intermediate Clutch Spiral Snap Ring

- Remove and discard OE snap ring from the intermediate roller clutch or mechanical diode assembly on reverse clutch drum.
- Install Sonnax locking ring, cup side facing up as shown (Figure 7 & 8).
- Walk Sonnax spiral ring into retaining groove as pictured (Figure 8).



NOTE: The locking ring may need to be moved for correct spiral ring positioning.

- Ensure Sonnax spiral ring is fully seated in groove all the way around assembly.
- Stake locking ring in six equally spaced places around outside as shown (Figure 9).

10. Replace Output Shaft Seals. Inspect Direct Piston & Direct Clutch Drum.

Installation:

- Remove and discard OE output shaft sealing rings and replace with Sonnax seals as shown (Figure 10).



CAUTION: Be careful not to nick the sealing ring lands as this can cause ring damage.

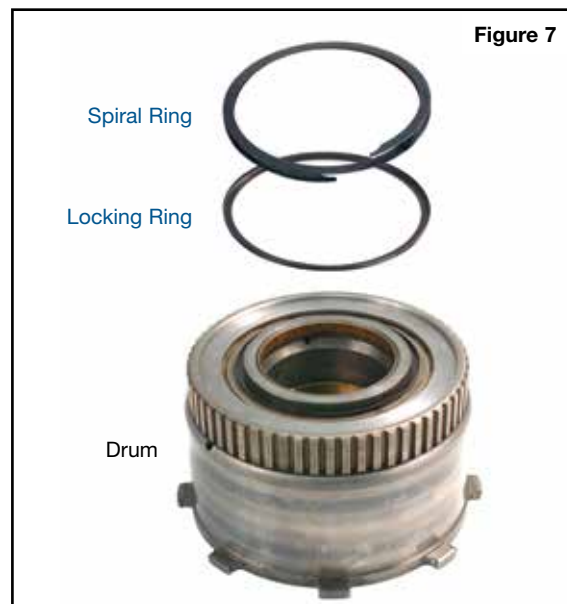


Figure 7



Figure 8

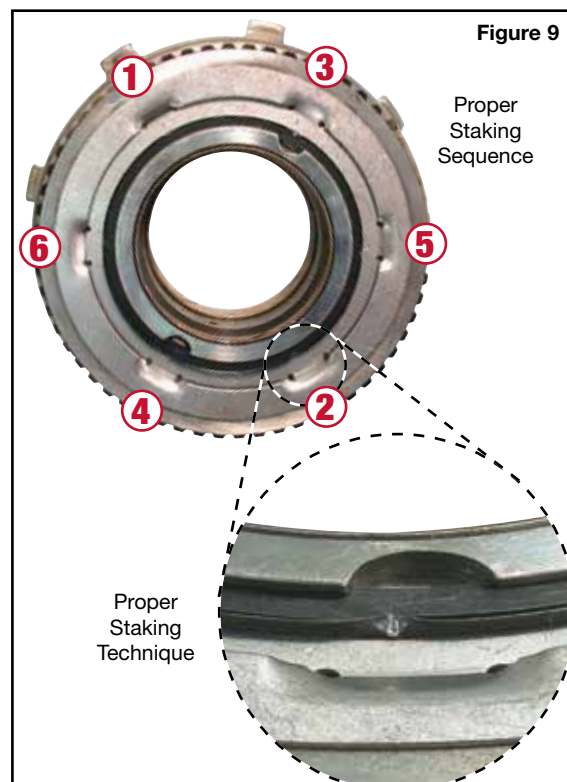


Figure 9

- b. Inspect checkball in direct piston (**Figure 11**), as it is prone to sticking. Clean and flush with solvent or WD-40® and reseal with a small punch and hammer.

Final Testing:

- Assemble the direct clutch drum on to the output shaft (**Figure 12**).
- Squirt ATF into the direct clutch feed hole (**Figure 12**).
- Apply 30-60 psi. of air pressure into the feed hole.
- Verify that there are no leaks.



NOTE: If there are leaks, look for a worn bushing in the drum or leaks in the ring grooves or the checkball seat.

11. Install Pump Cover & Input Shaft Sealing Rings

- Install rings onto the pump cover (**Figure 13**).



NOTE: Two sets of seals are included. Select the correct size/style for the application. The early style is a solid ring (.110" width), the late style is a butt-cut ring (.083" width). Sizing of the early/solid style is required after installation. A mixture of ATF and STP can be used to lubricate the solid sealing rings while sizing with finger pressure.

- Press input shaft out of the forward clutch drum. Sand forward drum ring surface lightly with 320 grit sand paper, using a crosshatch pattern.
- Install solid PTFE seals onto the input shaft. Resize with your fingers. Pre-lube seals and install into the stator for final sizing (**Figure 13**).
- Inspect the checkballs in the forward clutch drum (**Figure 15**), as they are prone to sticking. Flush with solvent or WD-40®. Also be sure that the orifice shown, is free of debris that can come from parts washers.
- An AOD forward drum can be used to size the early stator seals (**Figure 14**). The seals can also be sized with the forward clutch drum, although it may take a little longer. Carefully use the back of a pick to work the seals into the drum and let sit for a while so the seals will stay conformed.
- Verify correct forward piston return spring for the application you are working on (**Figure 16**).

12. Replace Overdrive Servo Pin (Assembly illustration Figure 17)

- Use bore brush to remove sharp edges of overdrive servo pin bore in case.
- Install O-rings on Sonnax servo pin.
- Lubricate O-rings and roll pin on clean flat surface to size O-rings into pin grooves.

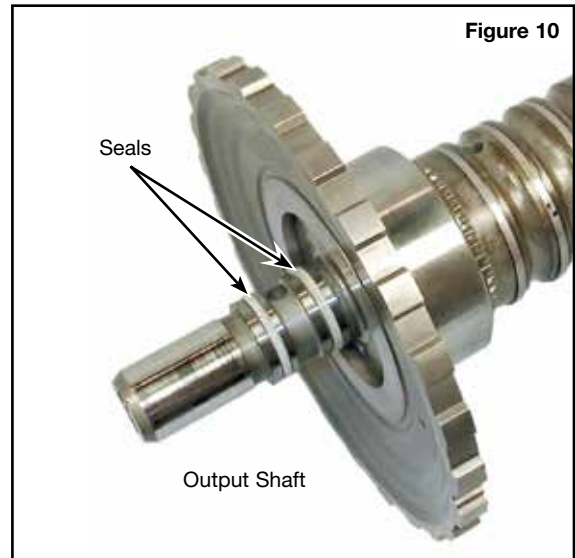
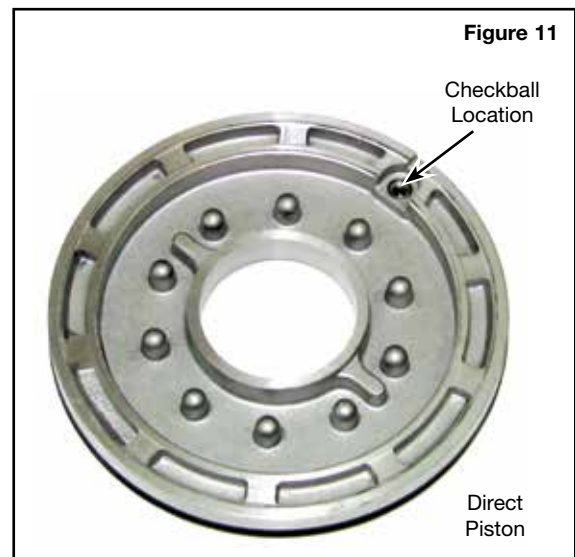
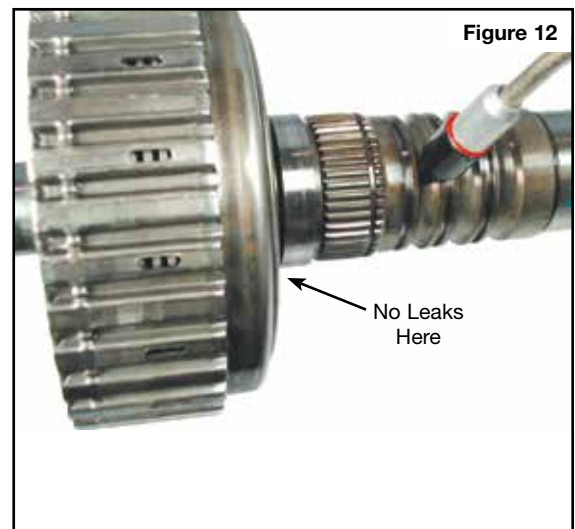


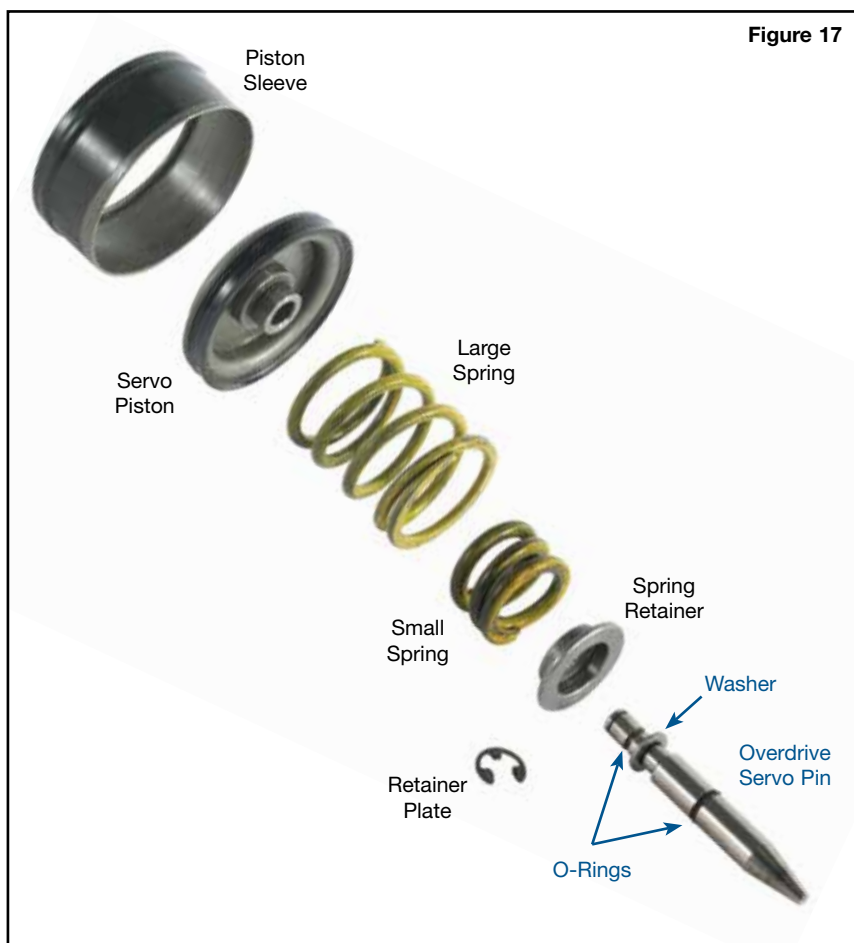
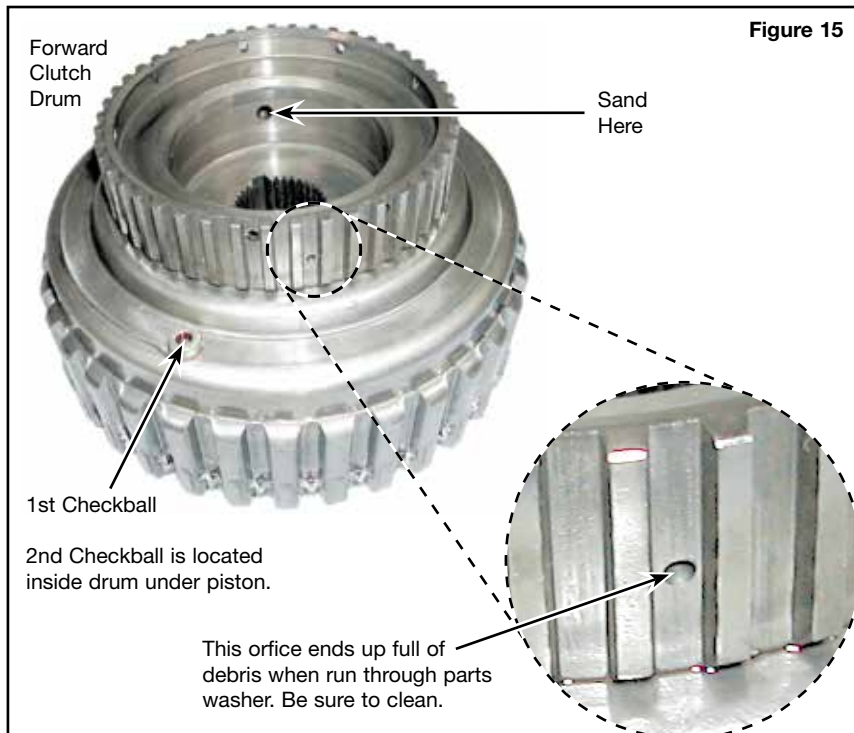
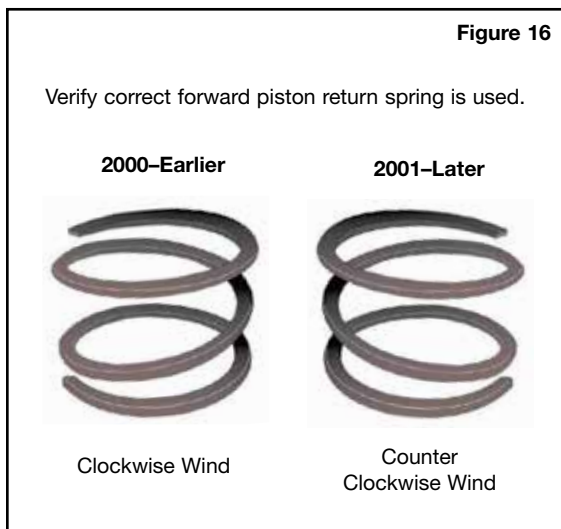
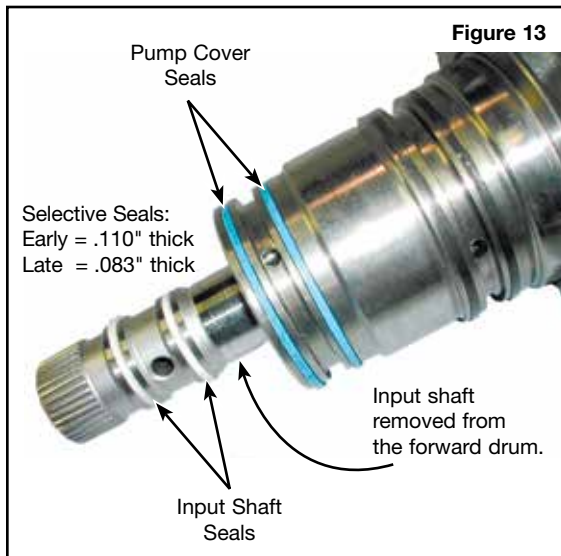
TECH TIP: If a firmer 3-4 shift is desired, place Sonnax washer on pin against shoulder to pre-load spring.



NOTE: Following step is easier if piston is compressed in bench vise to facilitate retaining clip installation.

- Install OE spring seat followed by springs, piston and retaining clip.
- Set servo travel according to OE specifications.

Figure 10

Figure 11

Figure 12




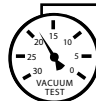
Critical Wear Areas & Vacuum Test Locations



Drop-In Zip Valve™
Parts Available

NOTE: OE valves are shown in rest position and should be tested in rest position unless otherwise indicated. Test locations are pointed to with an arrow. Springs are not shown for visual clarity. Low vacuum reading indicates wear and Sonnax parts are noted for replacement.

4R75E Valve Body • Shown



For specific vacuum test information, refer to individual part instructions included in kits and available at www.sonnax.com.

Boost Valve

- Low Reverse boost • Reverse slip
- No Reverse • Low line rise in Reverse
- Delayed Reverse • Burnt Reverse clutch

Replace with Sonnax Part No. **76948-02K***

NOTE: Fits all '91-later applications.

Main Pressure Regulator Valve

- Poor shift quality • Soft shifts • Low line rise
- Erratic buzz • Premature clutch/band failure

Replace with Sonnax Part No.
76948-01 or 76948-16K (1991-1995)

76948-16K Requires F-76948-TL & VB-FIX

76948-09 or 76948-17K (1996-Later)

76948-17K Requires F-76948-TL & VB-FIX

Bypass Clutch Control Valve

- Code 628, 741, 1741, 1744
- No lockup • TCC slip
- Low cooler flow

Replace with Sonnax Part No.

76948-31 Requires 76948-TL6 or F-76948-FL6

Bypass Clutch Control Plunger Valve & Sleeve

- Shudder • Code 628 • No lockup
- TCC apply & release concerns
- Delayed lockup

Replace with Sonnax Part No.
76948-04K*

Converter Pressure Limit Valve

- Low converter pressure
- Lube failures

Replace with Sonnax Part No.
76948-58K

Requires F-76948-TL47 & VB-FIX

2-3 Shift Valve

- Erratic shift timing
- Oil leaks

Center this valve land in the passage as indicated.

Manual Valve

- Delayed engagement
- Low line pressure
- Burnt bands/clutches

Replace with Sonnax Part No.
76948-46 Requires F-76948-TL46

Solenoid Regulator Valve

- Erratic shifts • 2-3 Neutral • Neutral after 4th
- 3rd & Reverse only • No 2nd
- Loss Forward under hard acceleration from a stop

Replace with Sonnax Part Nos.

76948-14K or 76948-47K Recommends F-76948-TL & VB-FIX

Overdrive Servo Regulator Valve

- No 4th
- Burnt OD band
- 4-3 Neutral

Overdrive Servo Regulator Valve & Sleeve

- 4-3 Neutral • No 4th
- Burnt OD band

Replace with Sonnax Part No.
76948-29K*

NOTE:
'01-Later

1-2 Shift Valve

- No 2nd
- Wrong gear starts
- Gear ratio codes

3-4 Capacity Modulator Valve

- 3-4 Flare
- Slips in manual Low

3-4 Shift Valve End Plug

- Burnt bands
- No Reverse • No 4th

Replace with Sonnax Part No. **76948-49K**

3-4 Shift Valve

- No 4th
- Gear ratio codes

2-3 Backout Valve

- No 2-3 • 2-3 Quality poor
- Gear ratio codes

2-3 Capacity Modulator Valve

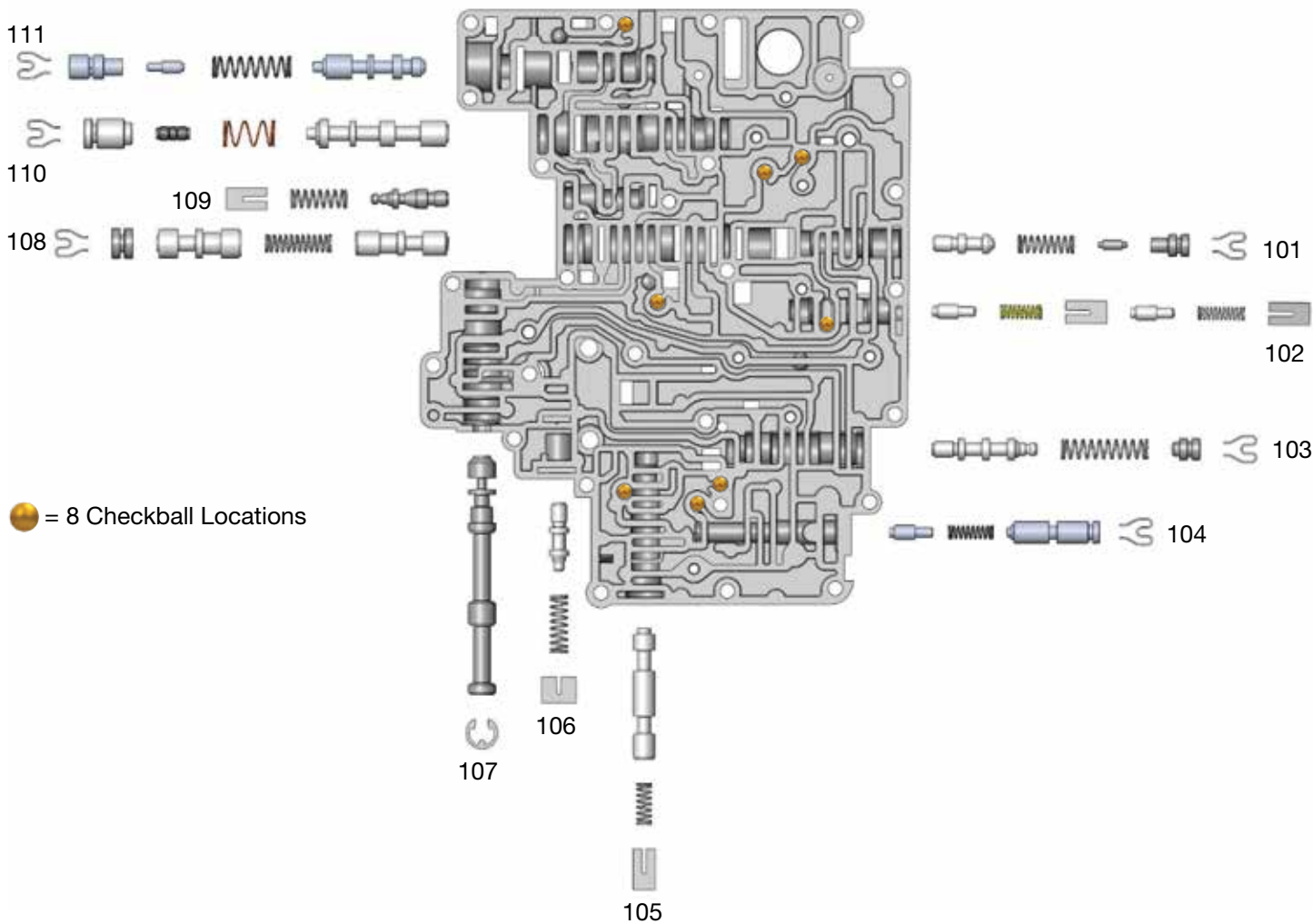
- 2-3 Flare • No 3rd & 4th

NOTE: Not used in '01-Later

Part numbers with an asterisk () are included in this Zip Kit.

OE Exploded View

4R75E Valve Body



Valve Body Descriptions

| I.D. No. | Description |
|----------|--|
| 101 | Overdrive Servo Regulator Valve (Inboard), Overdrive Servo Regulator Valve & Sleeve (Outboard) |
| 102 | 3-4 Capacity Modulator Valve (Inboard), 2-1 Capacity Modulator Valve (Outboard) |
| 103 | 3-4 Shift Valve |
| 104 | 2-3 Capacity Modulator Valve |
| 105 | 2-3 Backout Valve |
| 106 | Solenoid Regulator Valve |
| 107 | Manual Valve |
| 108 | 1-2 Shift Valve (Inboard), 2-3 Shift Valve (Outboard) |
| 109 | Converter Pressure Limit Valve |
| 110 | Bypass Clutch Control Valve (Inboard), Bypass Clutch Control Plunger Valve & Sleeve (Outboard) |
| 111 | Main Pressure Regulator Valve (Inboard), Boost Valve & Sleeve (Outboard) |

Problem...

A common failure of the Ford 4R70W series transmission is breakage of the forward drum at the snap ring groove.

Pressure on the forward clutch piston creates a high stress load at the snap ring groove, causing the upper portion of the drum to split and break away.



...Solution

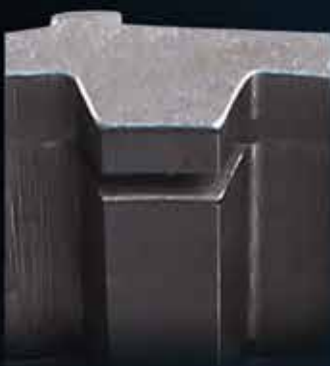


Part No. 76654-01K
Patent 9,562,573

OE Drum



Smart-Tech Drum



4R70W Smart-Tech® Forward Clutch Drum

- One-piece forged material for more strength and durability.
- Increased groove depth for additional ring support.

The Sonnax forged forward clutch drum design provides increased strength in all areas, most importantly at the ring groove, preventing the breakage and subsequent transmission damage associated with OE stamped steel drums.

sonnax®

Visit www.sonnax.com for details. • 800-843-2600 • 802-463-9722



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