

Pump Parts

- Line Pressure Booster Kit
- Lube Regulated Pressure Regulator Valve

Valve Body Parts

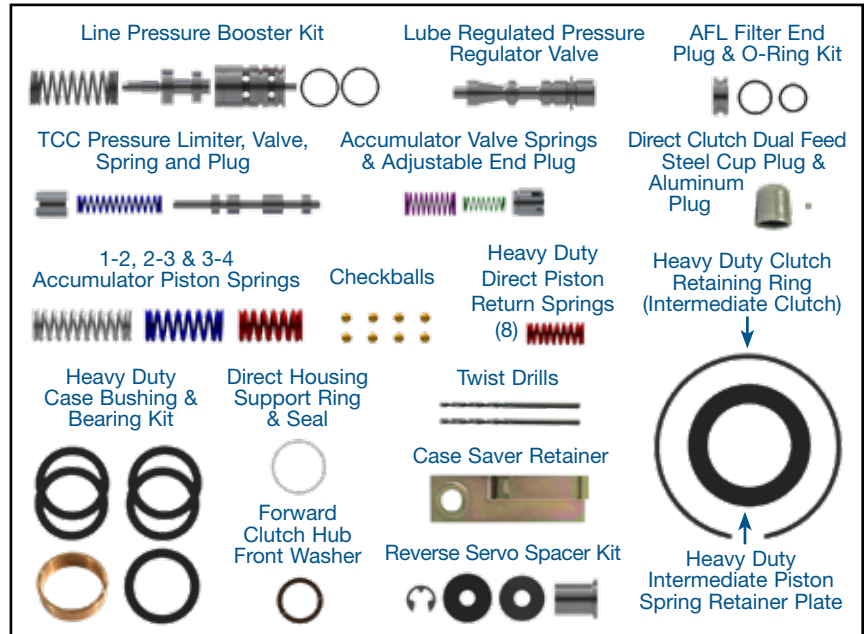
- TCC Pressure Limiter, Valve, Spring & Plug
- Accumulator Valve Springs & Adjustable End Plug 2 Springs
- AFL Filter End Plug & O-Ring Kit
- Direct Clutch Dual Feed Steel Cup Plug
- Direct Clutch Dual Feed Aluminum Plugs (3) 2 Extra
- 1-2, 2-3 & 3-4 Accumulator Piston Springs (3)
- Checkballs (8)
- Twist Drill .062"
- Twist Drill .086"

Internal Parts

- Heavy Duty Case Bushing & Bearing Kit
- Direct Housing Support Ring and Seal
- Heavy Duty Intermediate Piston Spring Retainer Plate
- Heavy Duty Clutch Retaining Ring Intermediate Clutch
- Case Saver Retainer
- Heavy Duty Direct Piston Return Springs (8)
- Forward Clutch Hub Front Washer

Servo Part

- Reverse Servo Spacer Kit



Before You Begin

What to know about torque converter pressure, transmission pump wear and other issues.

The torque converter operates in two basic modes. The first mode is “TCC released” where converter oil pressure is regulated by the converter limit valve in the pump. This valve restricts pressure in the torque converter to about 110 psi regardless of how high line pressure rises. The second mode is when “TCC is applied” where TCC oil pressure comes from the TCC regulator valve in the valve body. Normal TCC apply pressure varies between 30 psi–80 psi by controlling PWM TCC solenoid duty cycle.

Common modifications to the converter limit valve spring, TCC regulator valve or when the TCC solenoid is operated at 100% duty cycle with aftermarket programming, aftermarket controllers or on-off type switching will cause converter pressure to far exceed intended values.

When converter pressure is increased beyond intended limits, it puts increased load on the crank shaft thrust bearing and contributes to extra in and out movement of the torque converter. Excessive in and out movement of the torque converter is related to damaged transmission pumps as the inner gear gets pulled back and forth by the converter drive hub. Additionally, there is no performance benefit in either TCC released or TCC applied modes from increased pressure.

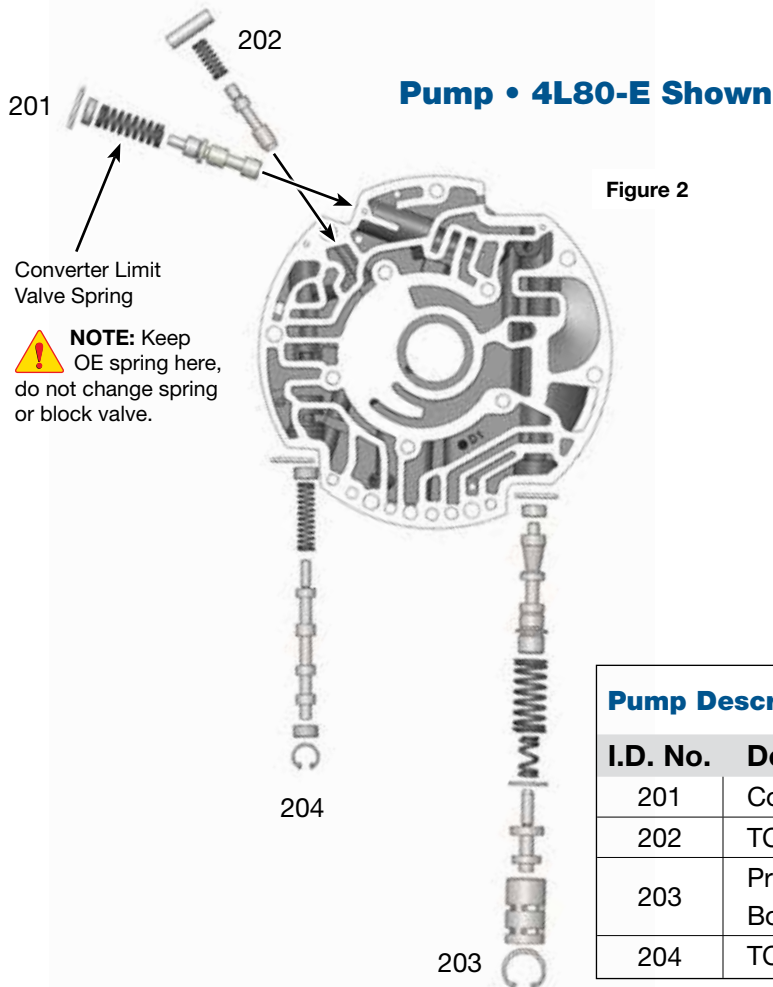
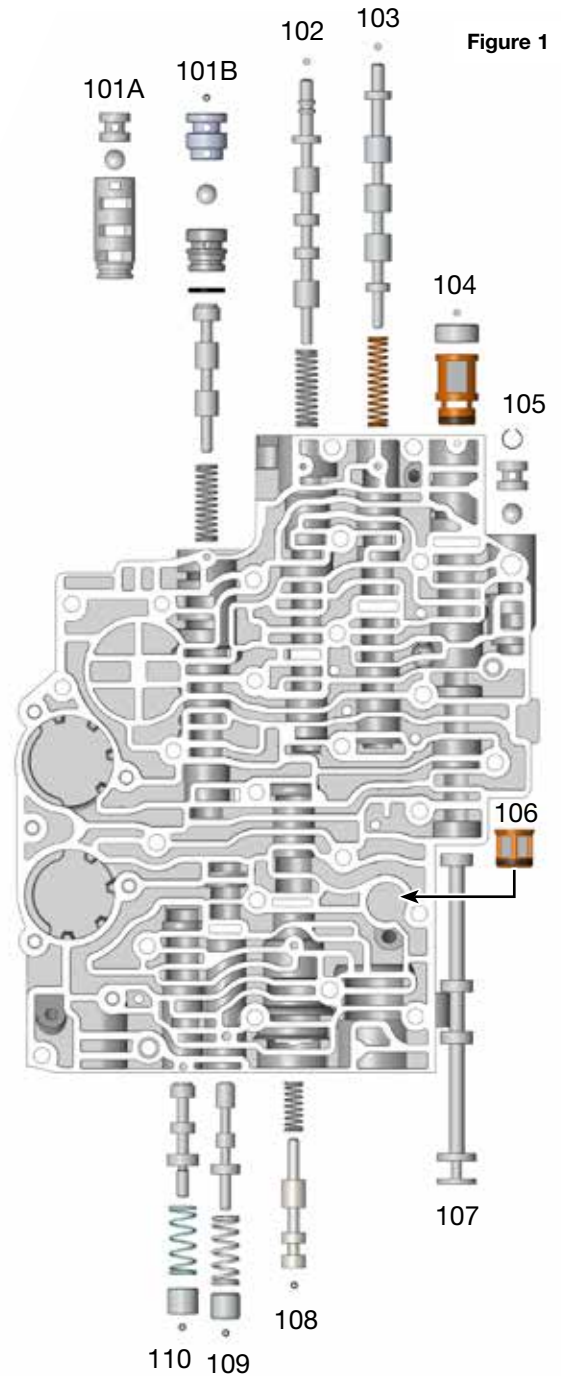
This kit includes a Sonnax TCC pressure limit valve located in the valve body that converts the PWM variable pressure TCC regulator valve to on-off non-PWM system that always limits TCC apply pressure to a safe 100 psi.

At the converter limit valve in pump (**Figure 2**), do not block this valve or install stronger spring. This eliminates the valves ability to regulate pressure leading to excess converter pressure.

OE Exploded View

Valve Body Descriptions		Figure 1
I.D. No.	Description	
101A	3rd/Reverse Checkball & Sleeve (Outboard, Early Style) 3-4 Shift Valve (Inboard)	
101B	Reverse Checkball Sleeve (Outboard), 3rd Checkball Sleeve (Center), 3-4 Shift Valve (Inboard)	
102	2-3 Shift Valve	
103	1-2 Shift Valve	
104	Actuator Feed Limit Solenoid Filter & End Plug	
105	Checkball	
106	Force Motor Feed Filter	
107	Manual Valve	
108	TCC Regulator Valve	
109	Actuator Feed Limit Valve	
110	Accumulator Control Valve	

Valve Body • 4L80-E Shown



Pump Descriptions		Figure 2
I.D. No.	Description	
201	Converter Limit Valve	
202	TCC Enable Valve	
203	Pressure Regulator Valve (Inboard) Boost Valve Assembly (Outboard)	
204	TCC Valve	

Pump Parts (Figure 3)

1. Lube Regulated Pressure Regulator Valve & Line Pressure Booster Kit Installation

NOTE: Sonnax lube regulated pressure regulator valve provides a significant increase in cooler flow under low RPM and high pressure conditions and includes an internal check valve to prevent converter drain back.

Disassembly

Remove and discard OE boost valve, sleeve, large diameter pressure regulator spring and main pressure regulator valve. Retain OE bumper spring, spring seat, end plug, and retaining clip.

Bore Preparation

NOTE: O-Rings included in this kit provide extra insurance for preventing cross-leaks and should always be installed.

- Carefully inspect snap ring grooves, feed holes or bore edges and deburr if necessary to reduce possibility of cutting O-rings during installation. A non-abrasive tool such as a radial wire brush (Figure 4) works best. The bore should always be thoroughly cleaned after any deburring.
- Place O-rings into grooves on boost sleeve, roll sleeve over bench to resize O-rings, then pre-lube O-rings. Sonnax Slippery Stick (O-LUBE) or Door Ease® are ideal for this purpose.

Installation

- Install Sonnax line-to-lube regulated pressure regulator valve, Sonnax pressure regulator spring, OE small bumper spring (used '92-later) and OE spring seat into pump cover (Figure 3).
- Carefully push Sonnax large ratio boost assembly into pump body, just deep enough to reinstall retaining ring.
- Install retaining ring into pump cover.

4L80-E Pump with Sonnax & OE Components

Figure 3

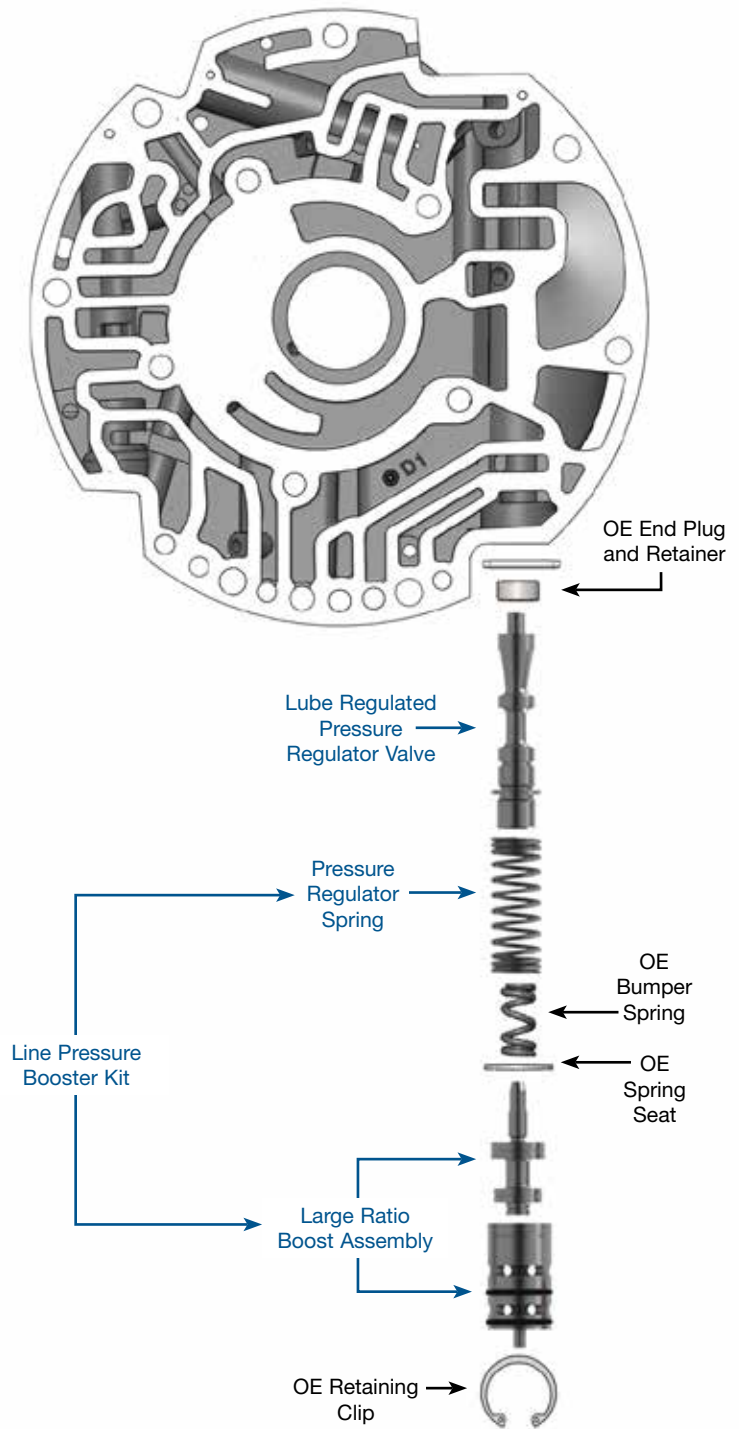
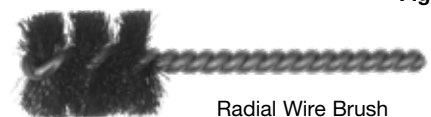


Figure 4



Valve Body Parts

2. TCC Pressure Limiter Valve & Spring Installation

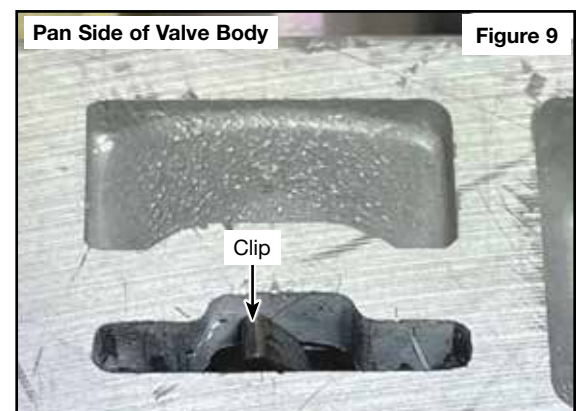
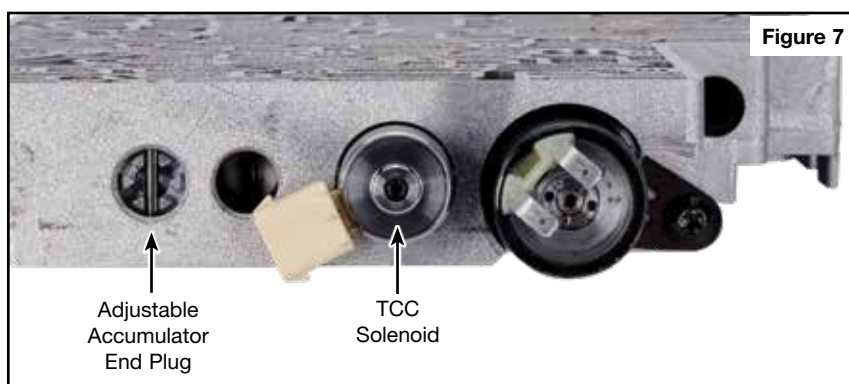
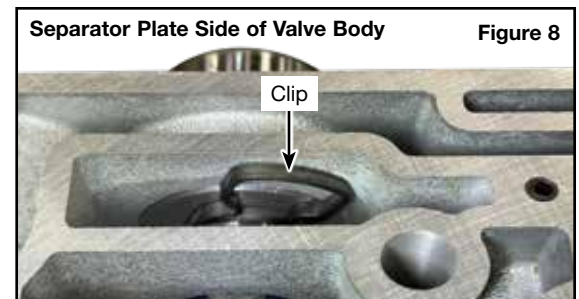
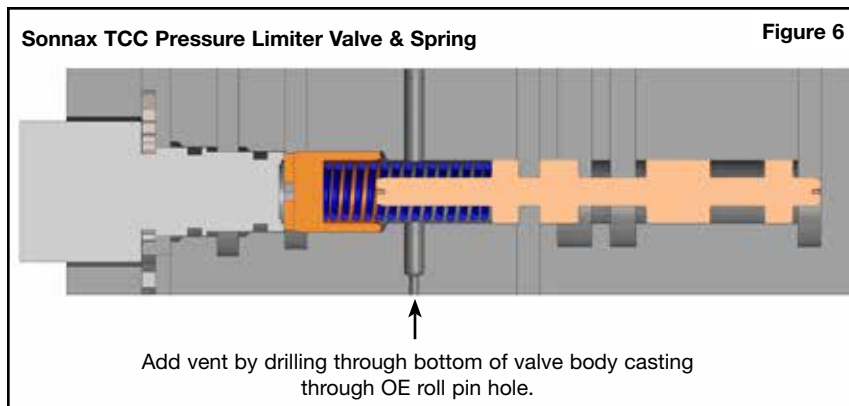
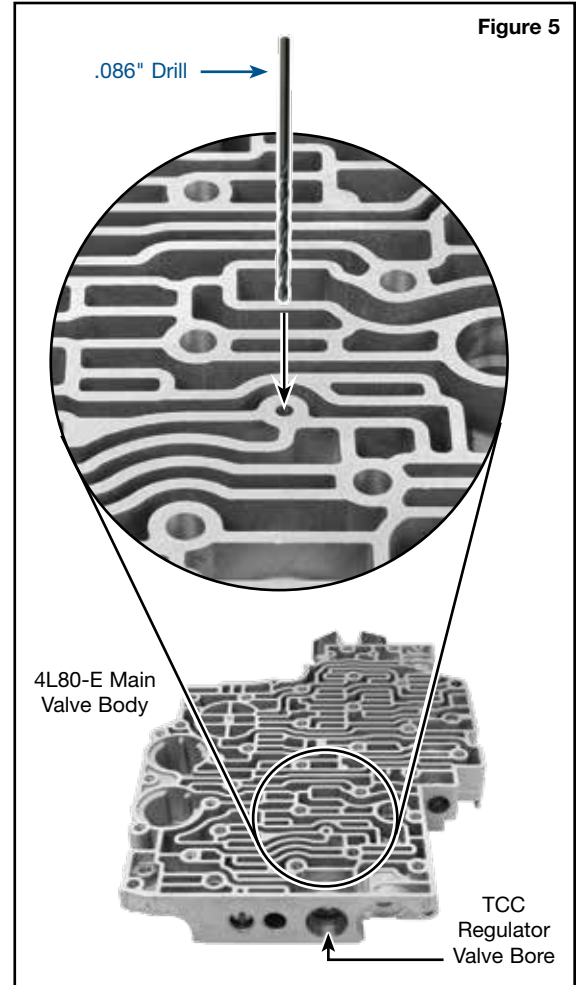
Disassembly & Drilling

- Remove TCC solenoid retaining clip and solenoid.
- Remove and discard roll pin, valve and spring.
- Create vent hole with included .086" drill by drilling down through roll pin hole and out bottom of valve body casting (Figures 5 and 6).

Installation

- Install Sonnax TCC limit valve with long stem outwards (Figure 6).
- Install Sonnax spring, followed by Sonnax plug.
- Install solenoid.
- Install retaining clip from separator plate side (Figure 8).

- CAUTION:** Orient solenoid as shown (Figure 7). Carefully position retaining clip as shown (Figure 8 and 9).
- Make sure retaining clip is evenly/squarely seated against valve body casting wall.



3. Accumulator Valve Springs & Adjustable End Plug Installation

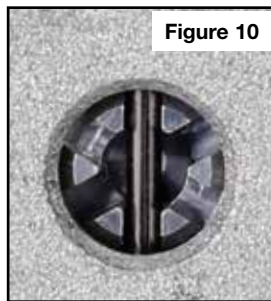
NOTE: The Sonnax adjustable accumulator regulator valve end plug has three positions that allows for adjustment of accumulator pressure and shift feel of 1-2, 2-3 and 3-4 upshifts without removing the valve body.

Disassembly & Preparation

- Remove accumulator regulator valve roll pin (Figure 11).
- Remove and discard OE end plug and springs.
- Remove and inspect OE accumulator valve.

Assembly

- Install OE accumulator valve (Figure 11).
- Install Sonnax inner and outer springs.
- Install Sonnax adjustable end plug.
- Install OE roll pin, position end plug at middle step of three available adjustment positions (Figure 10).



In-Vehicle Adjustment

Using small pick, push end plug into valve body and rotate to desired position (Figure 10).

- **Shallow step = Softer shifts**
Plug positioned deepest into valve body.
- **Deepest step = Firmer shift**
Plug positioned furthest outwards.

4. AFL Plug Installation

CAUTION: Always replace AFL filter, early years were known crack and fail.

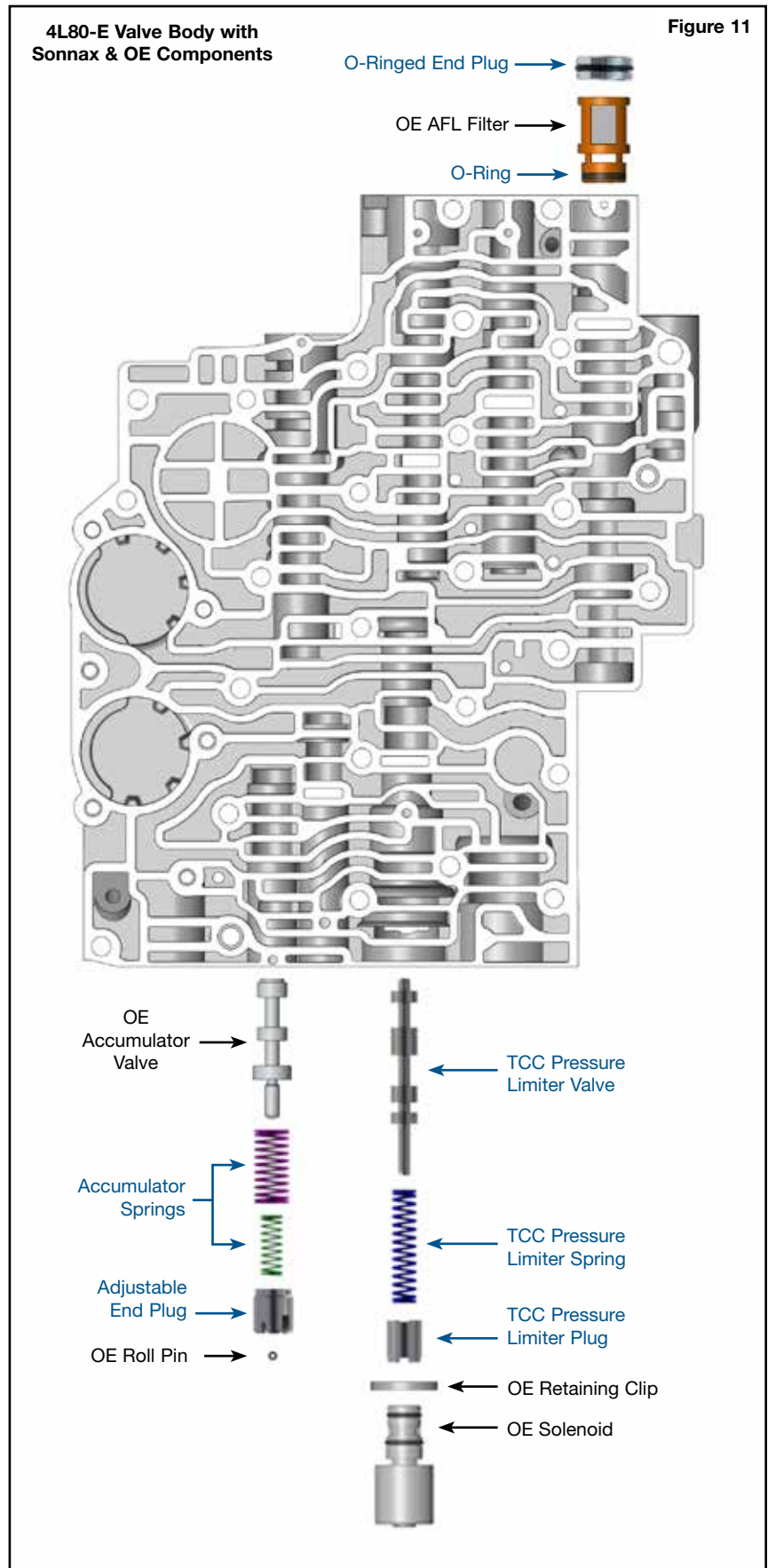
NOTE: AFL fluid feeds the solenoids, including main pressure EPC solenoid and in '97-later, it feeds part of the lubrication circuit. Preventing leaks in the AFL circuit is critical for maintaining shift solenoid function, max line pressure and lubrication. Always replace the 3rd/Reverse checkball sleeve inner O-ring (101A and B, Figure 1, Page 2) and inspect AFL valve bore (108, Figure 1, Page 2) in valve body.

Disassembly & Preparation

- Remove AFL plug roll pin.
- Remove AFL plug and filter.

Assembly

- Install O-ring on AFL aluminum plug.
- Install O-ring on AFL filter.
- Install AFL filter into valve body (Figure 11).
- Install aluminum plug with O-ring.
- Install OE roll pin.



5. Separator Plate Adjustments

Drill 1-2, 2-3, 3-4 and Reverse holes with Sonnax provided .086" drill bit (Figure 12).

6. Direct Clutch Dual Feed Modifications

Do NOT install second sealing ring on center support, (Figure 26, page 9).

NOTE: Blocking feed to the reverse side of direct piston can be done at either of two locations depending on builder preference.

- **OPTION 1:** Use Sonnax small aluminum plug in the separator plate (Figure 12).
- **OPTION 2:** Use Sonnax steel cup plug in the center support (Figure 26, page 9).

Option 1 (Figure 12)

- Drill feed hole with Sonnax provided .062" drill bit.
- With Sonnax provided .086" drill bit create a very slight chamfer on both sides of plate.
- Insert Sonnax aluminum plug into hole and with a hammer lightly peen on both sides to secure plug in place.

Option 2 (Figure 26, Page 9)

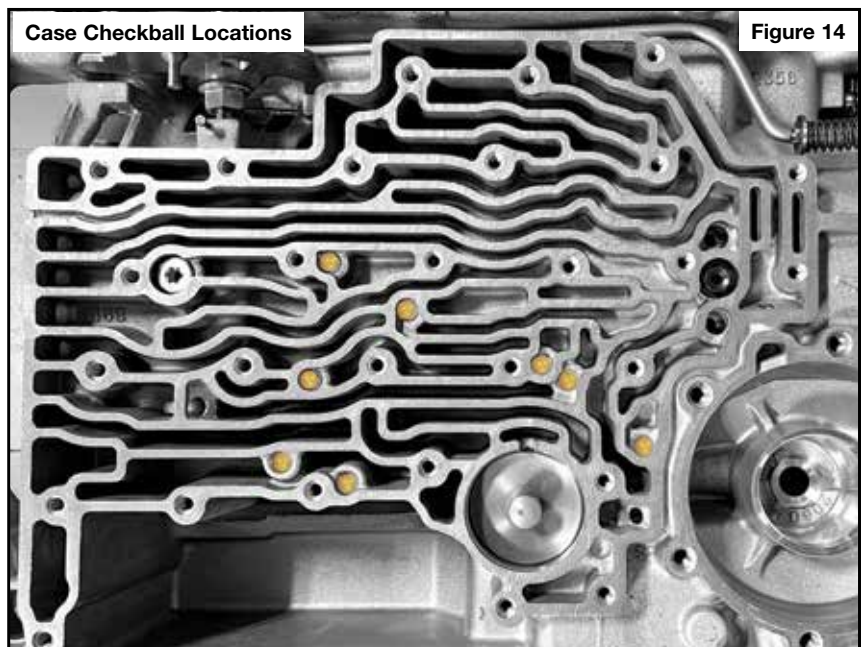
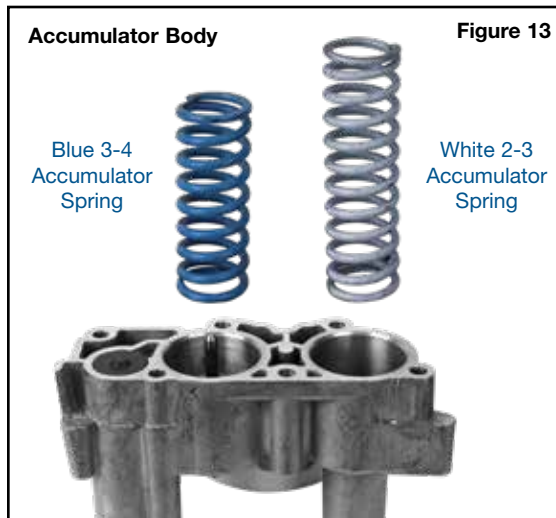
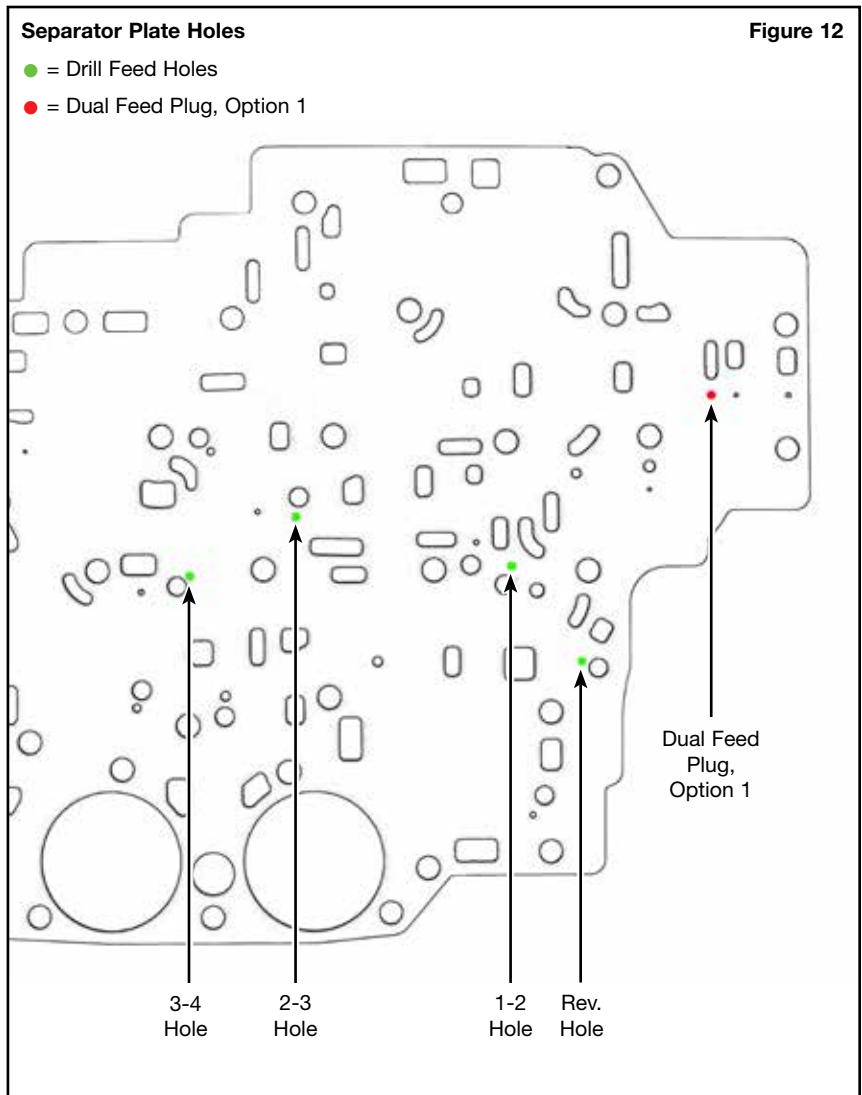
Install Sonnax cup plug center support feed passage.

7. Accumulator Piston Spring Installation

- Install blue 3-4 and white 2-3 accumulator springs into accumulator body (Figure 13).
- Install red 1-2 accumulator spring into reverse servo and 1-2 accumulator assembly (Figure 17).

8. Checkball Installation (Figure 14)

Insert Sonnax checkballs in the 8 locations shown.



9. Reverse Servo Spacer Kit Installation

WARNING: For use with '96-later reverse servo ONLY.
Do not use these parts with earlier style piston (Figure 15).

NOTE: Reverse servo spacer kit prevents breakage of '96-later servo pistons (Figures 16 & 18).

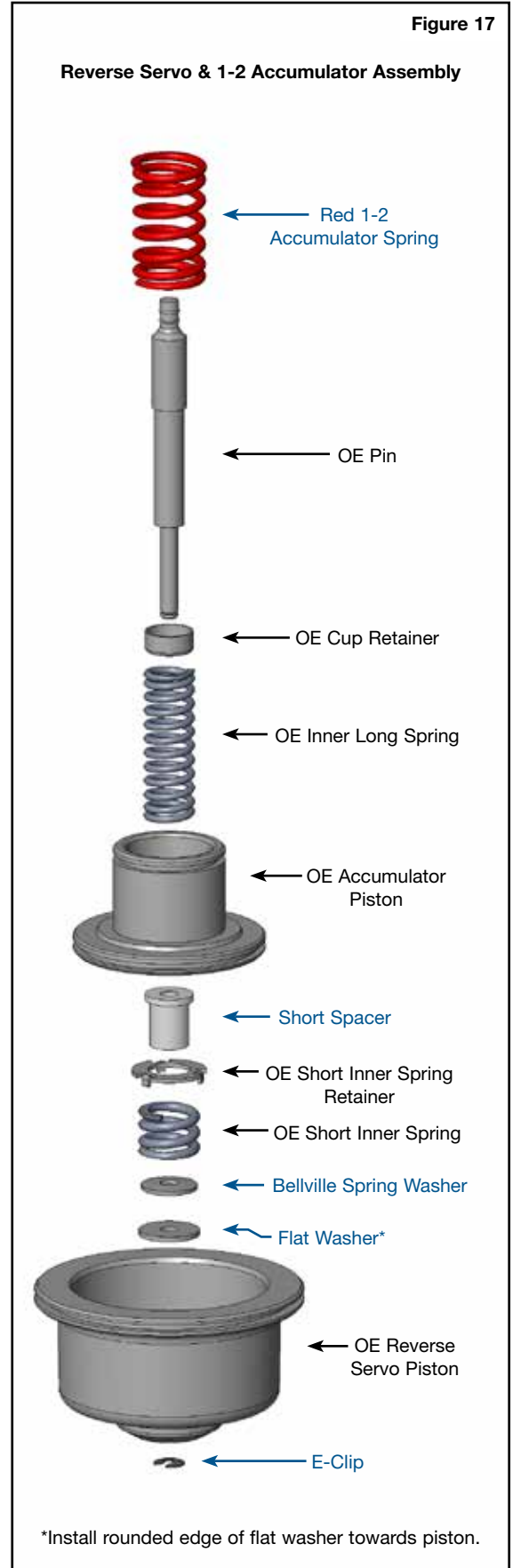
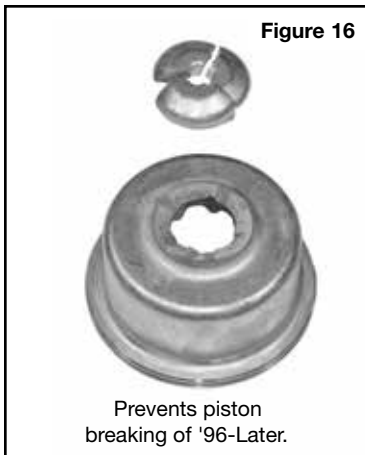
Disassembly

- Disassemble OE Low/Reverse servo assembly.
- Discard OE spacer and E-clip.
- Inspect reverse piston for cracks and replace if necessary.

NOTE: Do not reuse a cracked piston.

Installation & Assembly

- Reassemble the Low/Reverse servo with Sonnax components (Figure 17).
- Sonnax flat washer is installed with rounded edge against reverse piston.
- Sonnax Belleville spring washer is placed on top of flat washer with open-dish side towards flat washer.
- Sonnax short spacer is installed through OE short bumper spring assembly. The small OD of Sonnax spacer goes against the Belleville spring washer.
- Install Sonnax E-clip to retain the reverse piston on the apply pin.



Internal Parts

10. Heavy Duty Case Bushing Kit with Bearing Installation (Figure 19)

Disassembly

Remove OE case bushing from transmission case. Check the case bore for burrs, deburr the leading (inward) edge as needed.

NOTE: If the OE bushing has spun, measure the case bore. For an ideal fit, the bore should not measure more than 2.1285" in diameter.

Assembly

- Press Sonnax no-walk bushing into the case bore from inside the transmission so bushing flange is seated on the transmission case.
- Discard OE 3-tab selective washer and 4-tab thrust washer.
- Two .010" and two .015" Sonnax shims are included to set the rear unit endplay in accordance with OE specifications. These shims allow adjustment in .005" increments, covering the common range of OE selective washers. Install the required combination of selective shims around the bushing's flange and against the face of the case.

- 4L80-E Rear End Play Specifications: .005-.025"

- Install Sonnax thrust bearing around the bushing's flange and against the shims in proper orientation (Figure 20).

NOTE: On some applications, the output shaft may be snug during reassembly. Tap on the shaft at spline area to reform the bushing high spots.

11. Optional Direct Drum Support Seal Modification

Note: This modification improves long term durability by adding support to the direct drum and preventing wear from contact with the center support. Installation is a bit tedious the first time but the results are worth the effort.

Trim Flat Steel Insert to Size (Figure 21)

- Temporarily install sealing ring into direct housing bore.
- Carefully place flat steel insert inside seal ring.
- Mark point where flat steel insert over laps itself.
- Carefully trim flat steel insert so there is a small gap of 1mm or less (Figure 22).

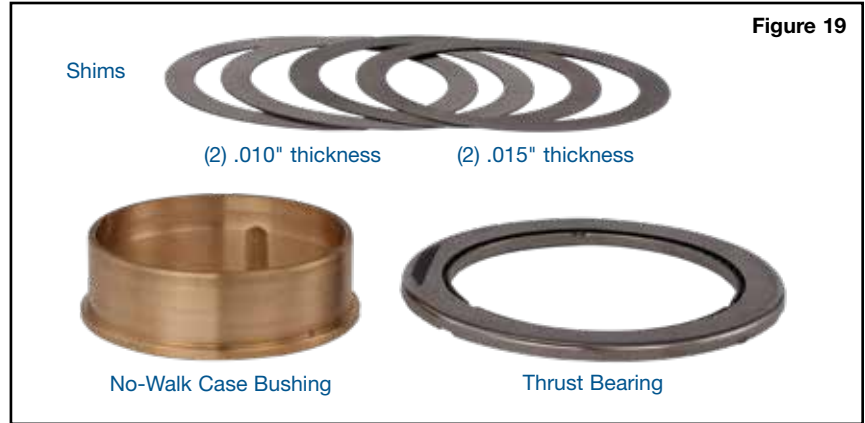


Figure 19

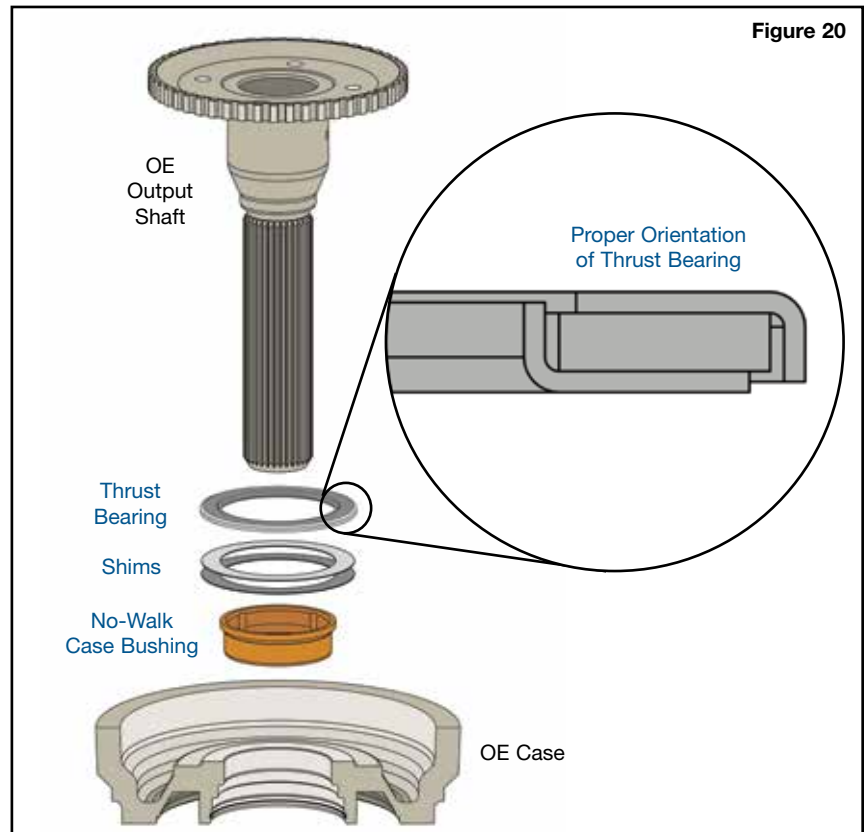


Figure 20

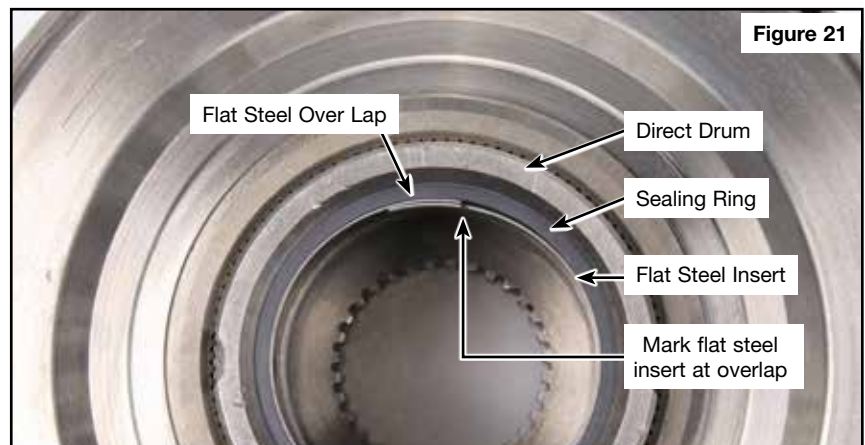


Figure 21

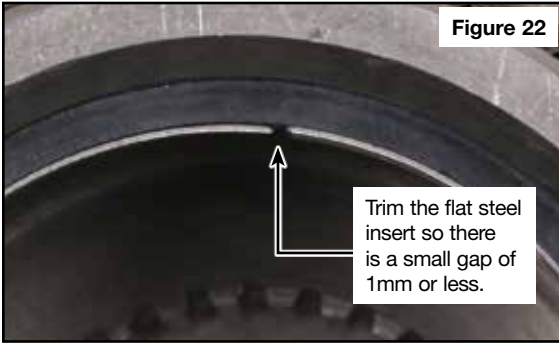


Figure 22

Trim the flat steel insert so there is a small gap of 1mm or less.

11. Optional Direct Drum Support Seal Modification (continued)

Installation

- Install trimmed flat steel insert into lower seal ring groove of center support (Figure 23).
- Install solid PTFE seal ring over flat steel insert (Figure 24).
- If appropriate sizing tool is not available, wrap tightly with vinyl electrical tape and let sit for 15 minutes.
- Ensure drum slides easily over sealing ring before final assembly.



Figure 23

Flat Steel Insert

12. Heavy Duty Intermediate Piston, Spring Retainer Plate Installation

- Use 3/16" drill to remove crimps holding springs to retainer. Ensure not to damage or distort springs (Figure 25).
- Install springs into intermediate piston (Figure 26).
- Install Sonnax heavy duty intermediate piston and spring retainer.
- Install OE intermediate spring retainer snap ring.



Figure 24

Solid PTFE Direct Housing Support Ring

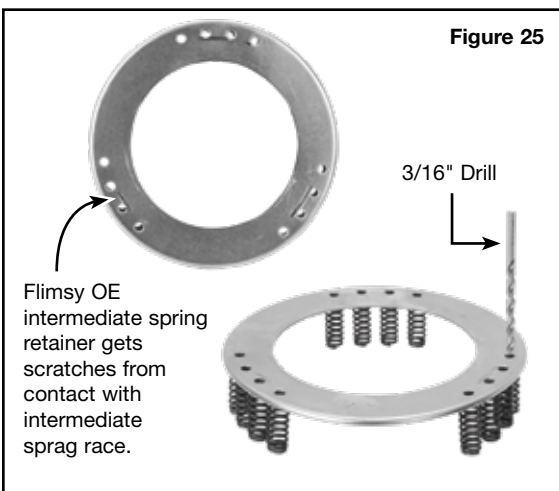


Figure 25

Flimsy OE intermediate spring retainer gets scratches from contact with intermediate sprag race.

3/16" Drill

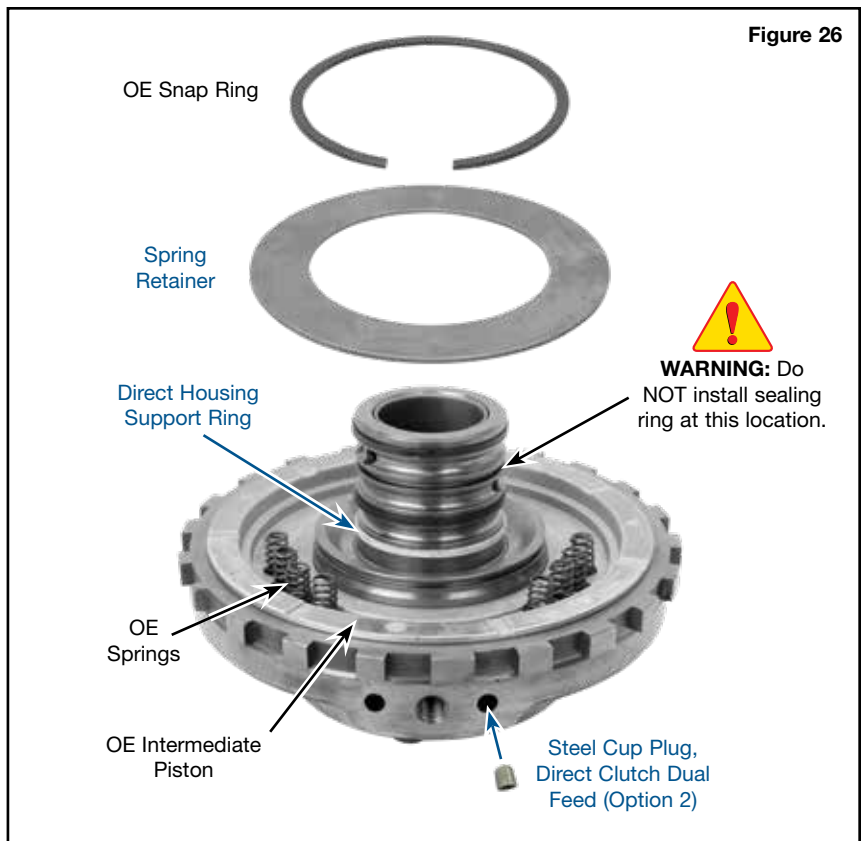


Figure 26

OE Snap Ring

Spring Retainer

Direct Housing Support Ring

OE Springs

OE Intermediate Piston

Steel Cup Plug, Direct Clutch Dual Feed (Option 2)

WARNING: Do NOT install sealing ring at this location.

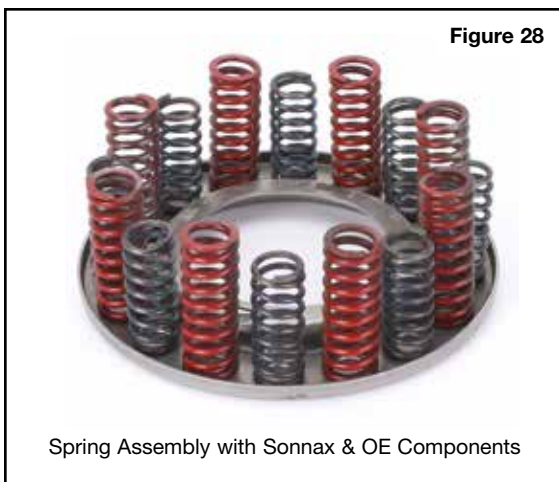
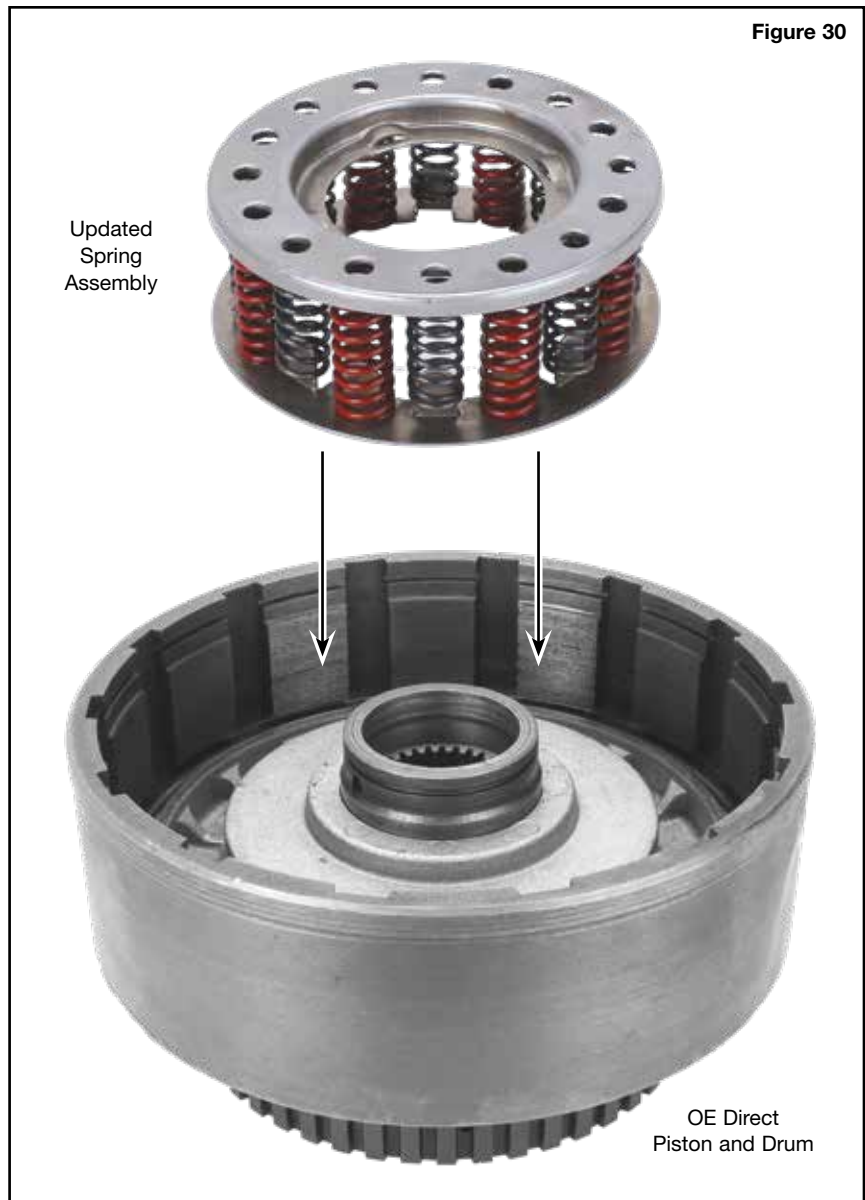
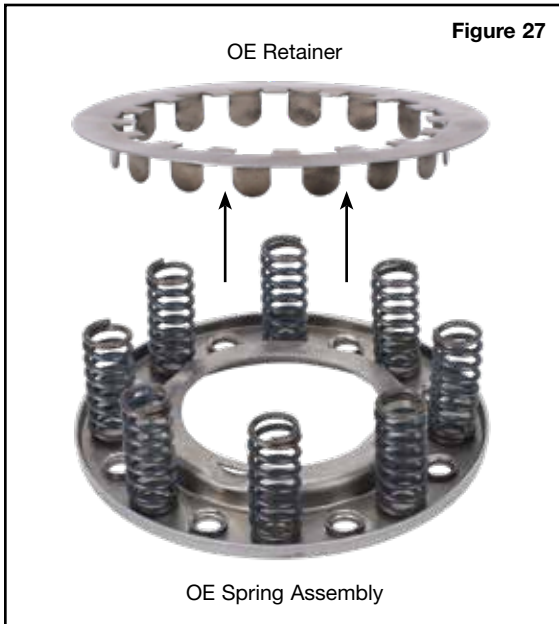
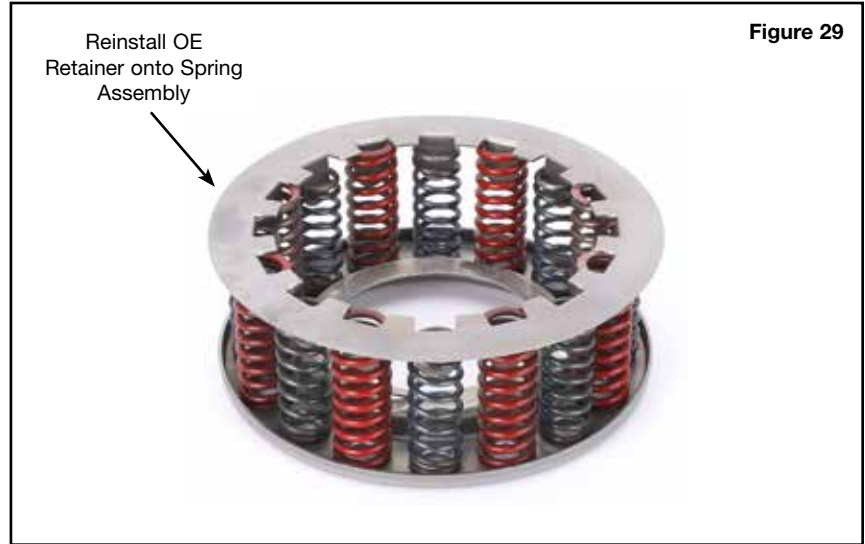
13. Heavy Duty Direct Piston Return Spring Installation

Disassembly

- a. Carefully pry off OE retainer from spring assembly (Figure 27).
- b. Remove every other OE spring (Figure 27).

Assembly

- a. Install 8 red Sonnax springs making sure they fit over OE crimps (Figure 28)
- b. Reinstall OE retainer onto spring assembly (Figure 29)
- c. Verify individual springs are straight and top and bottom retainers are flat and parallel.
- d. Install spring assembly onto direct piston (Figure 30).



14. Universal Case Saver Retainer Installation

NOTE: Sonnax case saver retainer is the only intermediate clutch retaining ring case saver that allows the intermediate band to be retained. This universal version can be used in both '99-later 4L80-E and modified '98-earlier applications.

Verify Year & Case Version

The distance between the front band anchor pin inside the case and the intermediate clutch backing plate retainer ring varies depending on year of the case.

- **'99-Later** units have wider (1.250") intermediate band, .041" shim under rear sun gear bearing and 'flat' .275" thick intermediate backing plate. If your unit is '99-later, no case saver modification is needed.
- **'98-Earlier** units, the retainer must be modified by removing two tips explained below.

Modify Case Saver ('98-Earlier Only)

Using a cut off wheel or file (**Figure 31**), carefully remove the two tips from the case saver (**Figures 32**).

Modify Backing Plate with Additional Notch (All Years) (Figure 33)

- Apply machinist layout fluid, a black marking pen or other marking material to both sides of the intermediate backing plate (**Figure 34**).
- Lay an intermediate steel plate over the friction face of the backing plate and align the lugs as accurately as possible.
- Scribe the new lug notch (**Figure 34**).
- Repeat on other side of backing plate.
- With a fine tooth hacksaw, cut up to the scribed lines on the pressure plate with a series of cuts (**Figure 35**).
- Break out the sections between cuts.
- Use a file to clean up the added notch. Recheck with steel plate, filing as necessary (**Figure 33**).

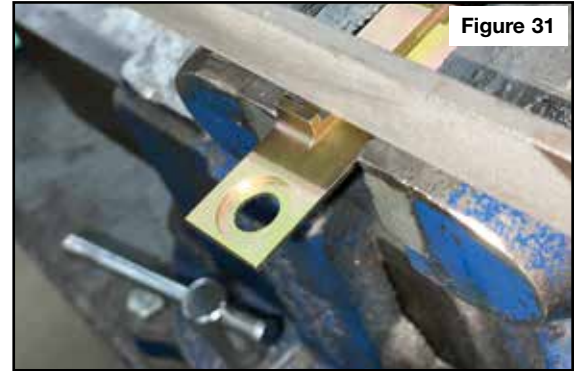


Figure 31

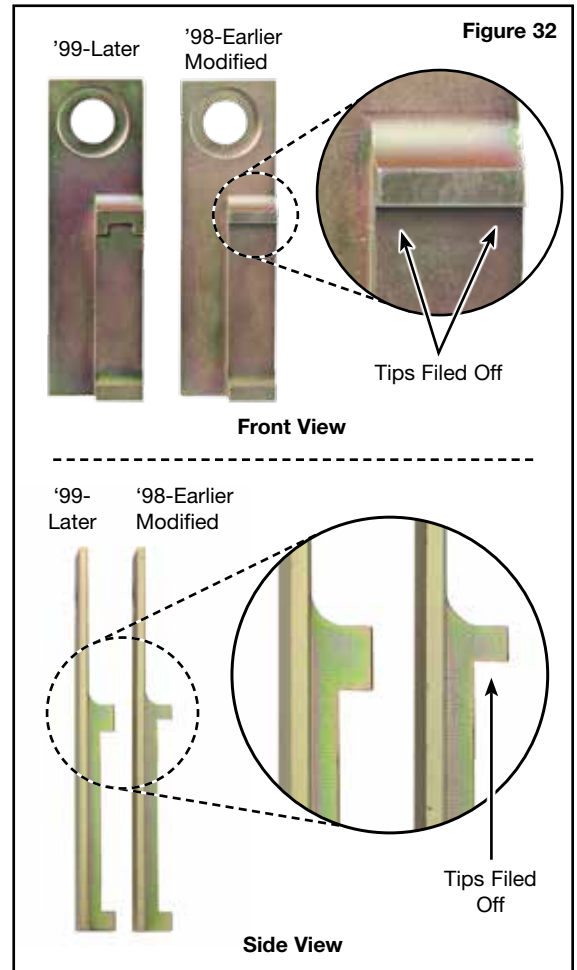


Figure 32

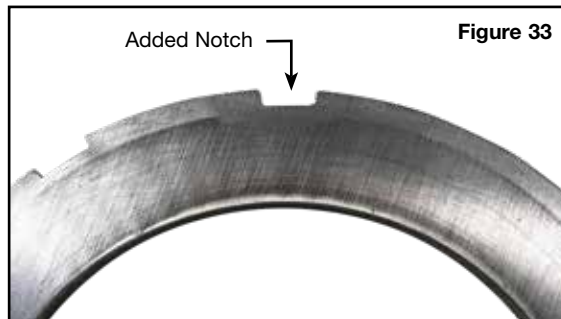


Figure 33



Figure 34

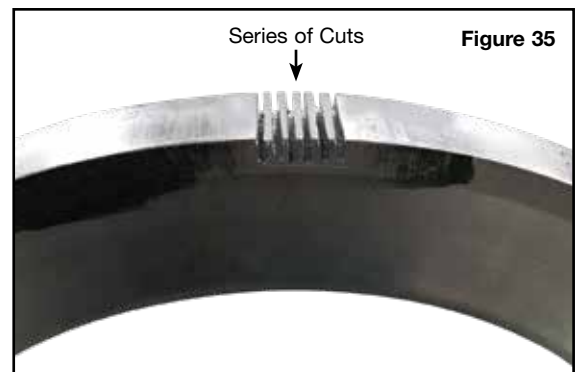
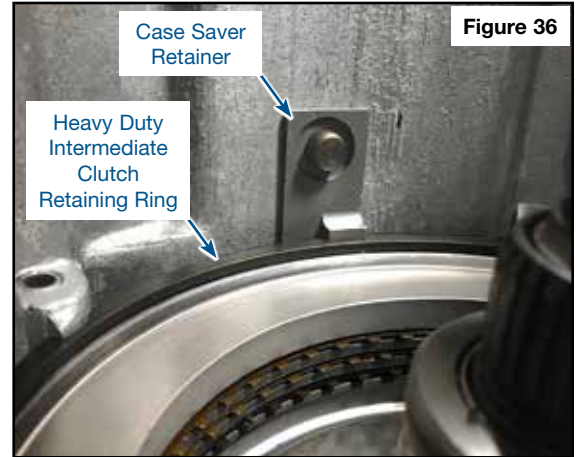


Figure 35

14. Universal Case Saver Retainer Installation (continued)

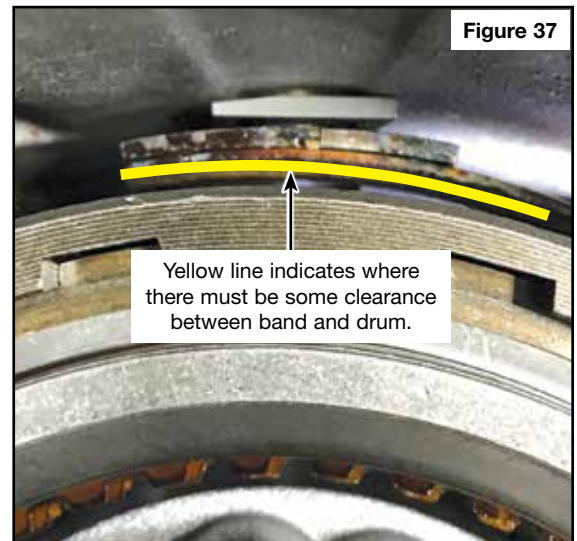
Installation (Figure 36)

- Before installing the beveled center support retaining ring, place the Sonnax case saver over front band anchor pin and between exposed center support lugs.
- Install the beveled center support retaining ring with the opening at the 9 o'clock position and so one end of the retaining ring holds the case saver against the inside of the case.
- Install intermediate clutches and modified backing plate.
- Install the Sonnax heavy duty intermediate clutch retaining ring with open end at 12 o'clock position.



Check Intermediate Band-to-Drum Clearance

- Install intermediate band.
- Install direct drum.
- Partially apply and release band by inserting screwdriver through band servo pin hole in case.
- Check band anchor end to ensure there is some clearance between band friction lining and drum. Ensure band is not dragging on direct drum (Figure 37).
- If additional band-to-drum clearance is needed, a small amount of material can be removed from back of band anchor lug (Figure 38).

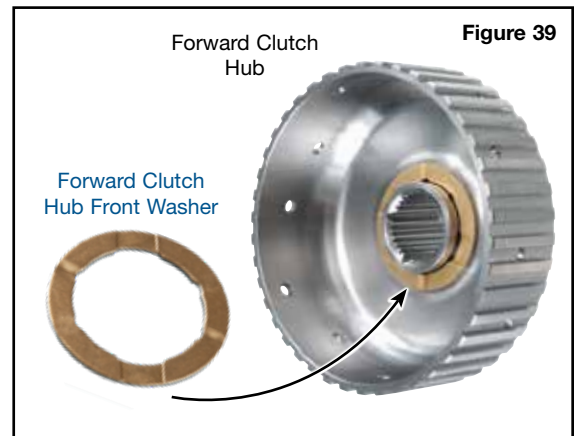


15. Forward Clutch Hub Front Washer

- Install Sonnax washer between forward clutch drum and forward clutch hub (Figure 39).
- Push up on rear output shaft to take up rear endplay.
- Check front unit endplay and verify .005–.025" travel.
- Further adjustments can be done in combination with selective OE pump washers (see chart).



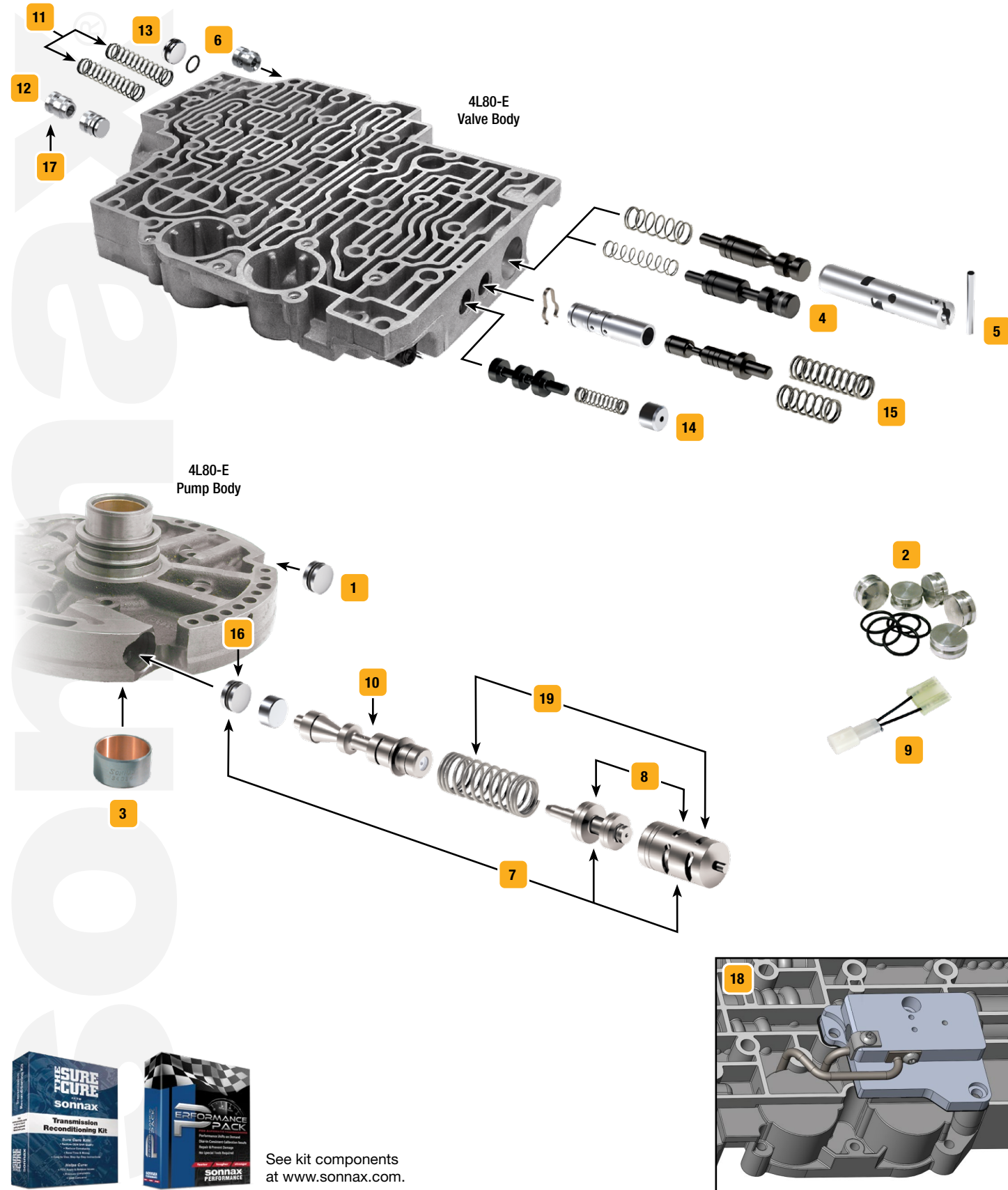
Front Unit Endplay	
Selective OE Pump Washer Thickness	Color
.057–.061"	Blue
.073–.077"	Red
.089–.093"	Brown
.105–.109"	Green
.121–.125"	Plain



GM 4L80-E, 4L85-E, TH400



Click on part numbers for product details or visit www.sonnax.com to see all products for the unit(s) shown here.



Symptoms/Part Type	Product Name	Part No.	Details	Tooling
Multiple Symptoms				
Comprehensive kit for big problems you don't want back	The Sure Cure® Kit	SC-4L80E		77754-TL
TCC/Lockup Symptoms				
No converter apply, Burnt converter	O-Ringed End Plug Kit	1 34994-13	ZIP Fits TCC valve bore with .497" dia., includes 5 end plugs	
No converter apply, 1-2, 2-3, 4-5 Flares	O-Ringed End Plug Kit	2 34994-14K	ZIP Fits TCC valve bore with .668" dia., includes 5 end plugs	
TCC slip codes, No lockup, Overheated fluid, No Overdrive	Stator Support Bushing	3 34016-W	Wider than OE, precision, 4/bag	
TCC codes, TCC apply & release concerns, Converter shudder, Burnt converter	TCC Regulator Valve Kit	4 34994-01K	ZIP	
	Oversized TCC Regulator Valve Kit	5 34994-18K		F-34994-TL18*
Pressure Problems				
Burnt Reverse band, Delayed/No Reverse, No engine braking in manual low	#7 Low/Reverse Checkball Seat	6 34200-52	ZIP '95-Later, 5/bag	
Uncontrollable line rise, High line pressure, Broken parts, Broken clutch piston	Boost Valve Kit	7 34200-01K	ZIP O-Ring style	
	Boost Valve Kit	7 34200-03K	ZIP Factory style	
	Boost Valve Kit	8 34200-10K	ZIP With encapsulated relief valve	
Line pressure instability	EPC Solenoid Harness Adapter	9 34435-01K	For use with early-style ('92-'02) EPC solenoid in late-style ('03-later) units	
Engine surge at idle, Low cooler flow, Low TCC release pressure	Lube Regulated Pressure Regulator Valve	10 34200-14K	ZIP	
Shift/Engagement Concerns				
Repeated Solenoid B code 86, Repeated Solenoid B code 87, 2nd Gear starts, No 4th, No 3rd	1-2 & 2-3 Shift Valve Spring Kit	11 34994-02K		
3rd Slip, 4th Slip, Gear ratio codes, Direct clutch burned, Reverse slip	3rd & Reverse Checkball Sleeve Kit	12 34200-47K	ZIP '95-Later	
Broken AFL filters, 2nd Gear starts, Leaking AFL end plug, Code 68, 85, 86, 87, No upshifts	AFL Filter End Plug & O-Ring Kit	13 34994-17K	ZIP	
Soft shift & low accumulator pressure, High line pressure in Drive	Oversized Accumulator Control Valve Kit	14 34994-22K	Upgrades '91-'96 units to '97 calibration	F-34994-TL22*
Wrong gear starts, Clutch failure, Solenoid performance codes, No 4th, Band failure	Actuator Feed Limit Valve Kit	15 34200-16K		77754-TL
Pressure loss, TCC apply concerns, Burnt clutches, Harsh shifts, Soft shifts	O-Ringed End Plug Kit	16 34200-05K	ZIP Fits TCC & PR bores, includes 5 end plugs	
Reverse slip, Gear ratio codes, 3rd Slip, 4th Slip, Direct clutch burned, No Reverse	Reverse Checkball Sleeve	17 34200-38	ZIP '95-Later, 4/bag	
Component Damage/Failure				
OD roller clutch failure, No Forward, Overrun clutch distress	Smart-Tech® Overrun Clutch Valve Kit	18 34200-40K	'97-Later	
High Performance/Heavy Duty Upgrades				
Classic, large-ratio boost valve for crisp, clean shifts without harshness	Line Pressure Booster Kit	19 4L80E-LB1	ZIP	
Heavy duty, high performance calibration kit	Performance Pack	HP-4L80E-01	4L80-E, 4L85-E only	
Tools				
	Vacuum Test Plate Kit	34994-VTP		VACTEST-01K

* VB-FIX Required