

Forward Control Valve Kit



Part No.

96201-16K

- Valve
- Spring
- Retaining Clip

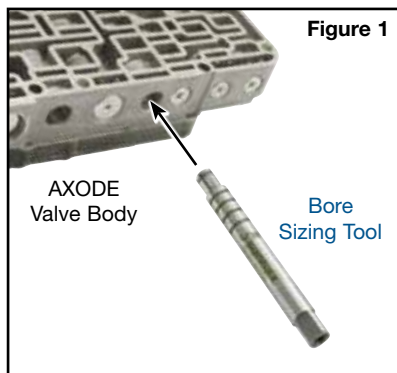
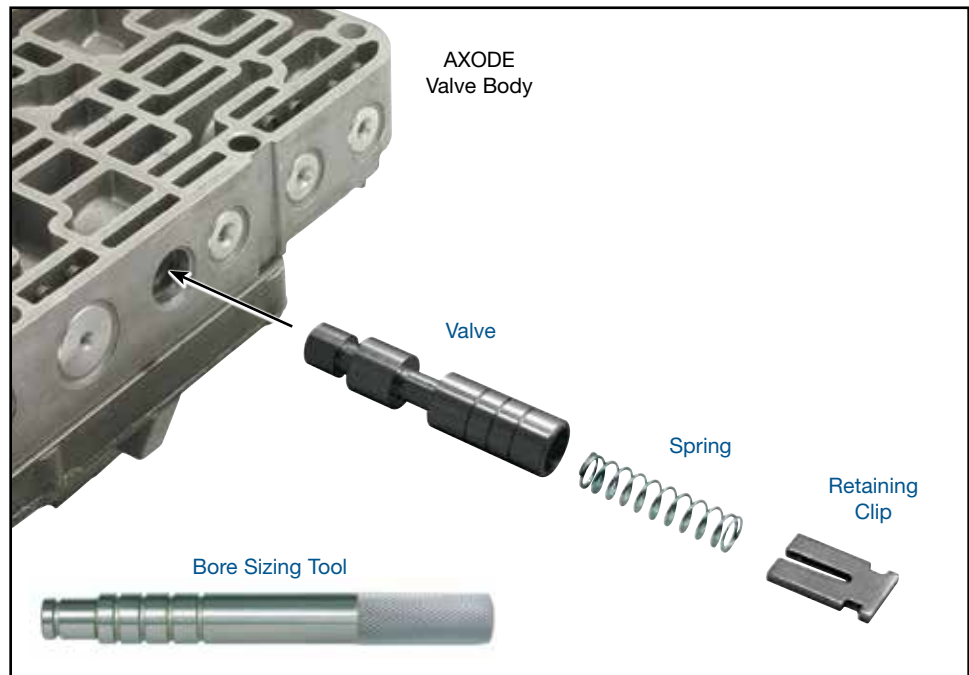
Recommended

Bore Sizing Tool

Part No.

96201-BST

Ford AX4S, AXODE

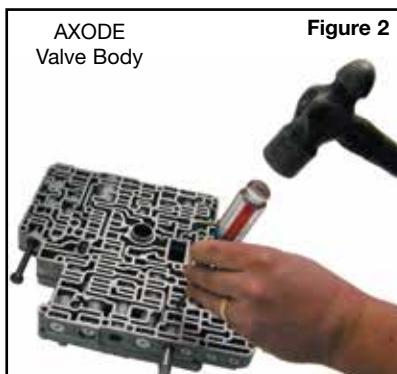


1. Bore Sizing Test

- Stroke the OE forward clutch control valve the full length of the bore.
- Rotate the OE valve 90° and stroke the valve again, several times.
- Check the OE valve for sticking in several positions. If it sticks, replace the valve.
- Check if Sonnax forward control valve sticks. If it does, resize the bore with Sonnax bore sizing tool (**Figure 1**).

2. Bore Sizing Instructions

- Lubricate the bore-sizing tool with ATF.
- Carefully push the tool into the bore until it bottoms out.
- While the bore sizing tool is bottomed out in the bore, try tapping lightly on the tool with a screwdriver and hammer. Then place the screwdriver through several valve body passages and tap on the tool in several places and from different angles (**Figure 2**).
- Stroke tool in bore several times until it moves freely with no binding.



3. Installation & Assembly

- Be certain all debris has been removed from the valve bore and valve body.
- Insert Sonnax valve, small end first, into the bore followed by Sonnax spring in the open end of valve.
- Secure components in bore with Sonnax retaining clip.

Ford AX4S, AXODE

Sure Cure® Kit

Part No.

SC-AXODE

Valve Body Parts

Boost Valve Kit

96201-01K

Bypass TCC Control Plunger Valve Kit

96206-01K

Forward Control Valve Kit

96201-16K

3-2 Timing Valve Saver Cap Kit

96201-15K

3-2 Timing Valve Retainer

1-2 Capacity Modulator Valve Retainer

96201-10

Backout Valve Clip

96201-11

Reassembly Parts

Relief Valves (2) Low Radius
10000-01

Retaining Ring Rear Ring Gear
96730-RR

Low/Intermediate Servo Spring Retainer Clip

96945R

Servo Tube Bracket

96806



The following tool kit is not required but is highly recommended for proper installation:

Part No.

96201-BST

Bore Sizing Tool

NOTE: See page 4 step 3 for instructions on using bore sizing tool. Failure to use this tool could result in sticking valve.

TORQUE SPECIFICATIONS

VB to channel plate, pump to valve body, stiffener plate
7 - 9 ft. lbs

Separator plate bolts
7 - 9 ft. lbs

Oil pan & side cover
7 - 9 ft. lbs (rubber gasket)
8 - 11 ft. lbs (cork gasket)

Reverse clutch anchor bolt & nut
7 - 9 ft. lbs (bolt) & 25 - 35 ft. lbs (lock-nut)

CLEARANCE AND ENDPLAY

Main unit endplay
.005" to .015" (selective #8 thrust washer) Check with the final drive pushed up and the overdrive drum removed.

Overdrive drum endplay
.005" to .015" (selective #5 thrust washer) Check with the final drive pushed up. Push down on sprocket support and reach through case check overdrive drum movement.

Differential unit end play
.005" to .015" selective washer between governor gear and bearing.

PUMP CLEARANCE

Pump clearance, rotor slide and vanes
.0005" to .002"

Super Important: Too loose = low pressure, while too tight = no line rise (slide stuck)

CLUTCH CLEARANCE

Forward clutch
3.0L & 3.8L (.060" to .075"), selective snap rings
3.2L SHO (.040" to .060"), selective snap rings

Intermediate clutch
3.0L & 3.8L (.045" to .067"), selective snap rings
3.2L SHO (.050" to .070"), selective snap rings

Reverse input
.038" to .064"

Direct
3.0L & 3.8L (.041" to .061"), selective snap rings
3.2L SHO (.050" to .070"), selective snap rings

BAND ADJUSTMENT

Low & intermediate band
.110" to .120" (recommended) Check piston travel by drilling off-center hole in spare cover (selective servo pins).

OD band
.070" to .149" (selective servo pins)

TECH TIP

* Cooler return line = lower line

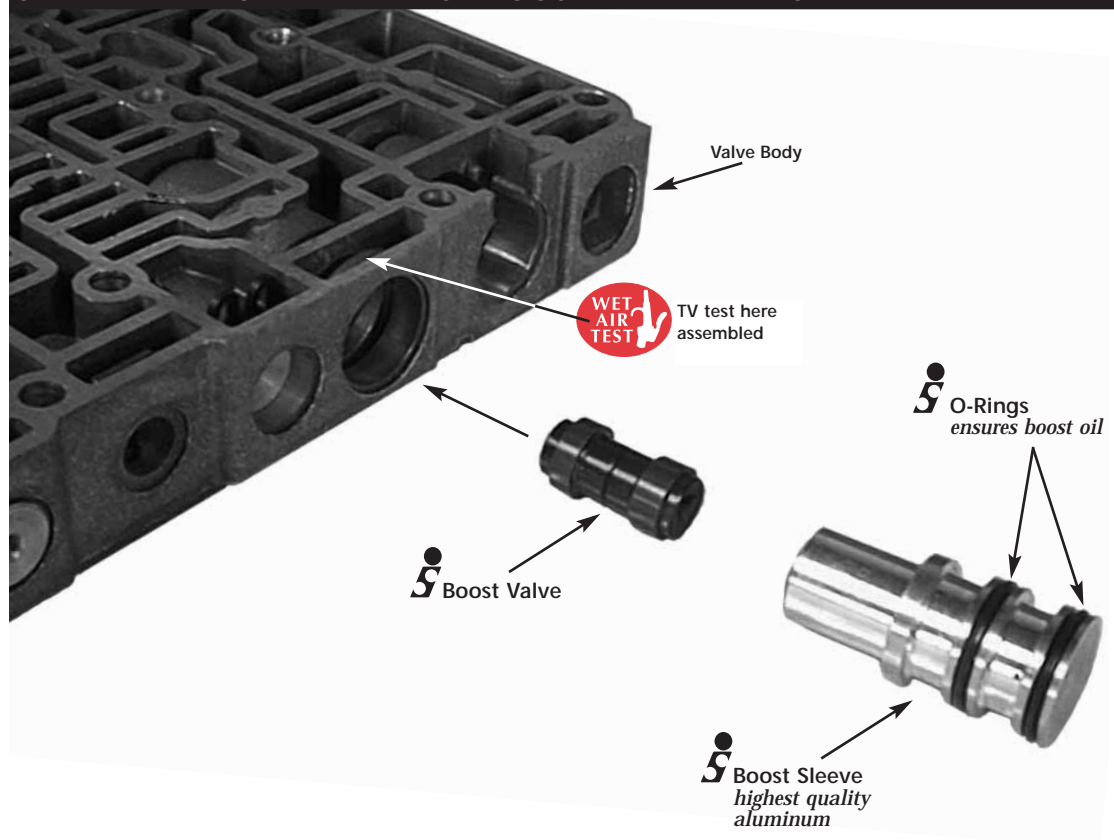
* Always clean Mass Air Flow sensor wire. Fuzz/dirt on wire = low line pressure.

* Be careful when hooking up harness; it is possible to cross wires. All 3 shift solenoids should have 1 red wire. (EPC = green & blue) (TCC = green & brown) Clicking noise and high line pressure occur if wires are crossed.

* Check converter hub seal surface to bushing inner diameter concentricity with a pair of vernier calipers. Measure in several spots. All should be within .002"

* Always use pump centering and valve body alignment pins during assembly.

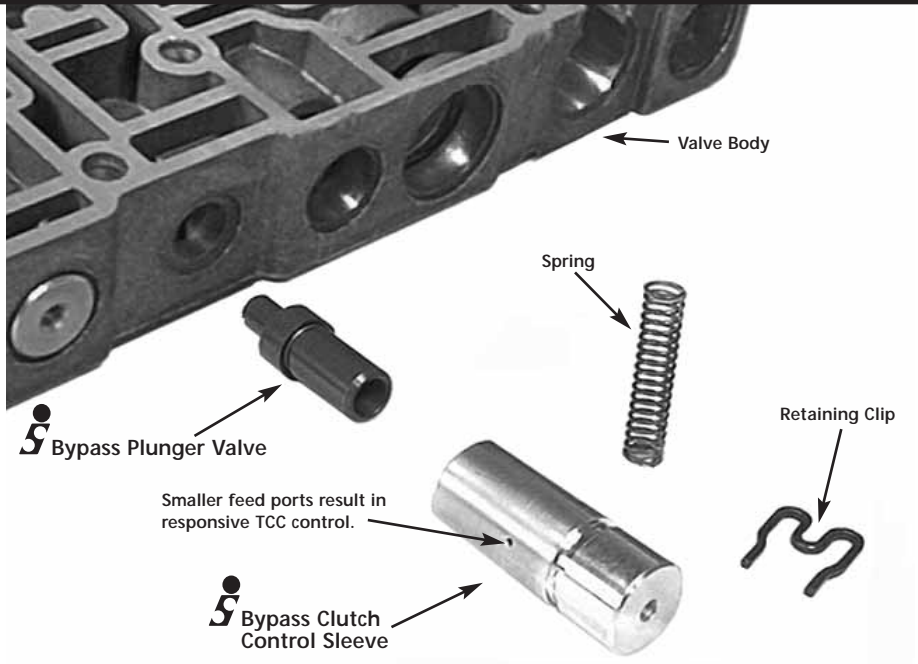
STEP 1 INSTALL REVERSE BOOST VALVE AND SLEEVE



1. Remove worn boost valve and boost sleeve from valve body and discard.
2. Set aside the springs and retainer clip for re-use.
3. Place o-rings in two grooves on boost sleeve assembly.
4. Boost valve assembly includes boost valve properly oriented in the boost sleeve.
5. Return the springs to the valve body with the smallest spring on the plunger.
6. Push boost valve assembly into the valve body, open end toward springs, and replace retainer clip.

STEP 2 INSTALL BYPASS CLUTCH CONTROL SLEEVE AND PLUNGER VALVE

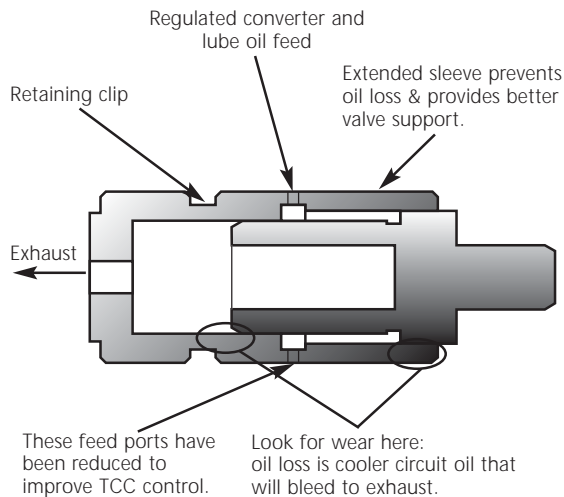
1. Remove the worn bypass clutch control sleeve and plunger valve assembly from the valve body and discard.
2. Lubricate the replacement sleeve and plunger valve.
3. Place the OEM compression spring into the hole in the replacement plunger valve.
4. Insert this spring and valve assembly into the Sonnax sleeve, spring end first.
5. Return this assembly to the valve body bore, with the nubbed end of the valve first.
6. Press this assembly into the bore just far enough to return the retaining clip.



Notes:

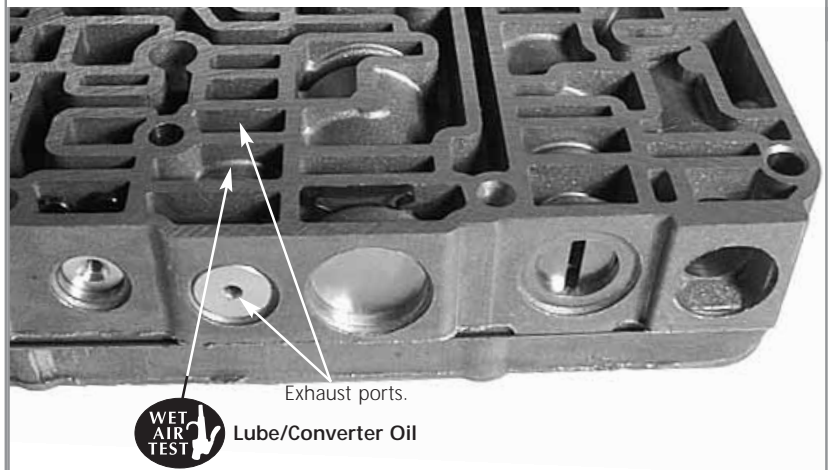
- In AX4S and AXODE units, the size of the feed orifices in the Sonnax sleeve has been decreased to improve TCC control. If the TCC apply is too firm, the speed of the TCC apply can be slowed by enlarging the feed ports. Using a $\frac{3}{32}$ " to $\frac{1}{8}$ " bit, drill through the existing hole, exiting out the other side. Do not drill larger than $\frac{1}{8}$ " diameter.
- Inspect TCC bypass valve bore at the location of largest diameter spool. The valve can be flipped end-to-end and installed with largest diameter spool into same location it lives during use. If there is excessive wiggle, clearance or sag, the bore is worn and body needs replacement or repair.

WEAR CHECK

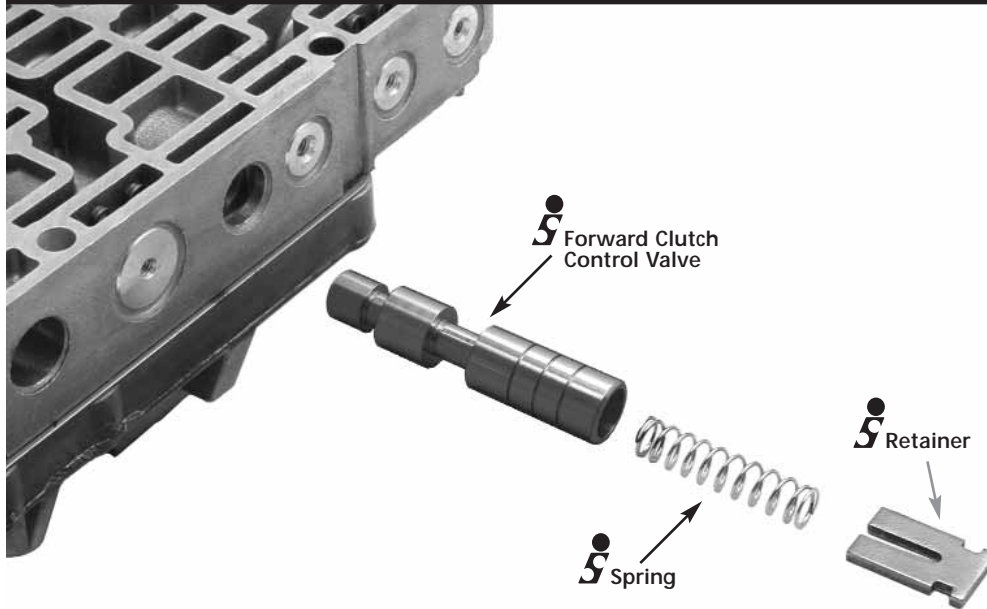


WET AIR TEST

Place a small amount of lube/converter oil into the indicated regulated converter feed circuit. Follow with low air pressure. There should be no oil leakage past the plunger valve through either of the indicated exhaust ports.



STEP 3 INSTALL FORWARD CONTROL VALVE AND BORE SIZING TOOL

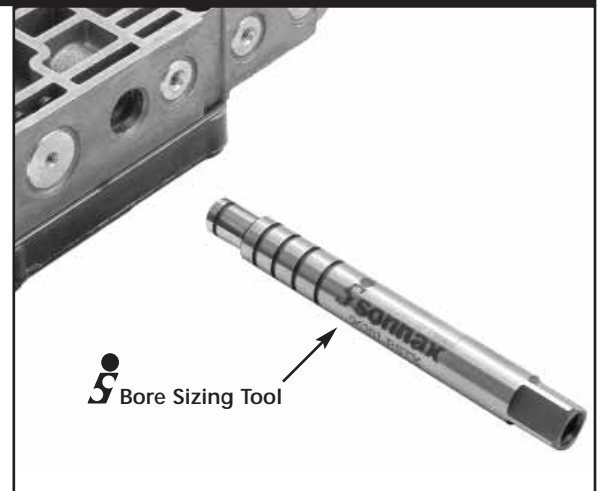


SPECIAL TESTS

Stroke the original forward clutch control valve the full length of the bore (see photo of Sonnax and OEM valves below). Rotate the valve 90°, and then stroke the valve again, several times. Check the valve for sticking in several positions. If it ever sticks, replace the valve. If the Sonnax replacement valve sticks, resize the bore. Follow the instructions below.

BORE SIZING INSTRUCTIONS

1. Lubricate the bore-sizing tool with ATF.
2. Carefully push the tool into the bore until it bottoms out.
3. Stroke the tool in the bore several times, until it strokes freely. Remove the tool.
4. Clean the bore and install the new Sonnax valve. Make sure to lubricate it with ATF. If the new valve sticks in the bore, repeat the resizing process.



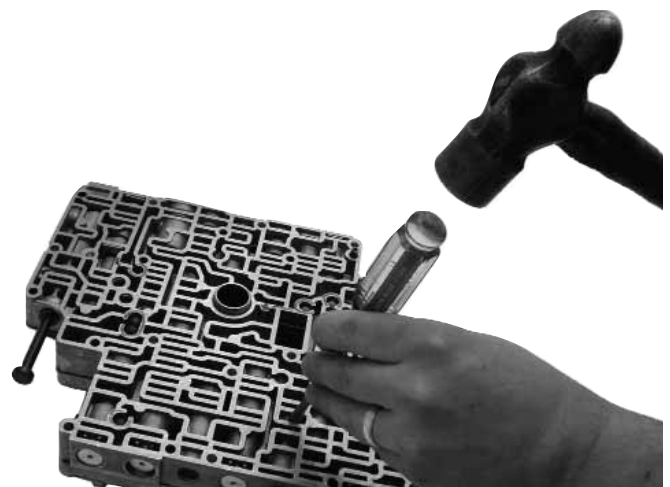
Tip: While the resizing tool is bottomed out, try tapping lightly on the tool with a screwdriver and hammer. Place the screwdriver through several valve body passages and tap on the tool in several places, and from different angles.

Sonnax Valve

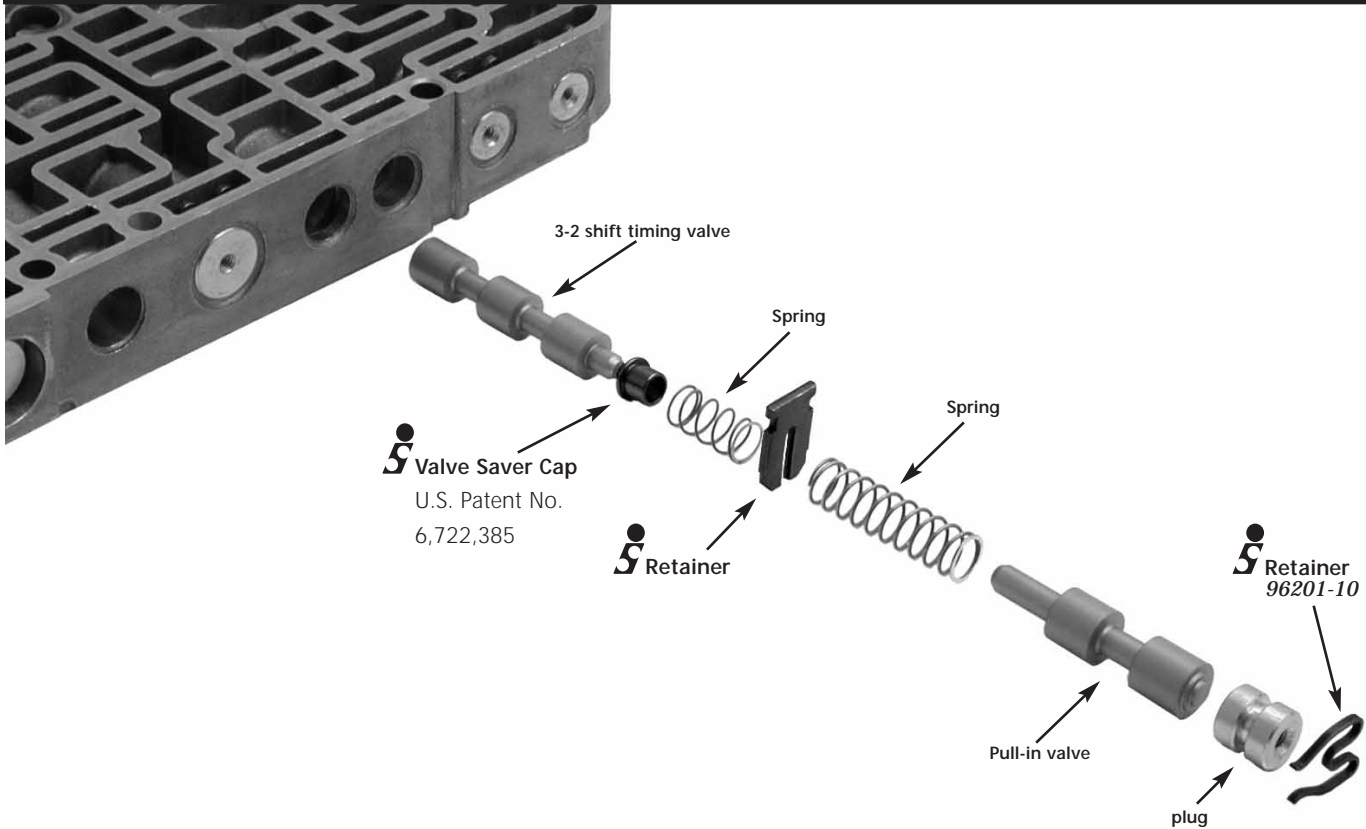


Improved spool design prevents future valve or retainer damage

OEM Valve



STEP 4 INSTALL VALVE SAVER CAP



1. Remove the pull-in assembly and clip to get to the 3-2 control valve.
2. Remove the 3-2 timing valve to verify it is not bent and ensure stroke action is complete.
3. Verify that the Sonnax valve saver cap 96201-15K* will be able to move freely over the end of the valve.

Note: Assemble with Trans-Gel™ to keep the cap from coming off the valve during installation.

REASSEMBLY OVERVIEW

1. OEM 3-2 shift valve, Sonnax valve saver cap
2. OEM spring, Sonnax retainer clip
3. OEM spring
4. OEM pull-in valve
5. OEM end plug
6. Sonnax retainer clip 96201-10

STEP 5 INSTALL RETAINER CLIPS



For 3-2 timing valve in step 4



96201-10 For pull-in valve in step 4



96201-11 Multiple locations, reuse as needed

*U.S. Patent No. 6,722,385

STEP 6 INSTALL RELIEF VALVES



S Relief Valve
Low Radius 10000-01K
(2 included in kit)
1 for drainback,
1 as needed elsewhere

REPLACES



AXODE



AOD

Sonnax now offers replacements 10000-01K and 10000-02K for the various relief valves and drainback valves that are found in valve bodies. The design of the OEM valves causes the separator plate and valve bore to wear. The result is leakage or valve sticking. The Sonnax valve is rounded so it seals against an unworn part of the separator plate and eliminates sticking problems.

The Sonnax valve is ideally suited for replacing the drainback valve on AXOD, AXODE, AX4N and AX4S units. The OEM drainback valve frequently sticks in the bore. A common shop practice is to replace the OEM drainback valve with a checkball. However, this practice requires shortening the spring. The Sonnax valve solves the sticking problem and is designed to work with the existing spring. No spring modifications are needed.

Although either part number can be used in multiple locations, it is suggested to use a relief with a radius close to original, maintaining the spring rate. On a severely worn plate or bore, the higher radius will allow for better plate contact and less bore hang-up.



S Relief Valve
High Radius 10000-02K
(available separately)

REPLACES



A4LD



4R44

STEP 7 CLEAN OIL PUMP SHAFT

The oil pump shaft's inner tube may have moved or may be restricted due to debris build-up. This can result in delayed engagements, no movement and/or reduced cooler flow. It is highly recommended that the pump shaft be thoroughly cleaned prior to reassembly. Included in the kit is a replacement end plug for the pump shaft.

1. Press out the inner tube and end plug by using a $1\frac{1}{64}$ " (.265" diameter) transfer punch or blunted drill bit (Figure 1).
2. Remove all debris from the pump shaft and inner tube.
3. Reinstall the inner tube by pressing in place using a $1\frac{3}{64}$ " (.297" diameter) transfer punch or blunted drill bit. Take care to fully seat the inner tube in the pump shaft. The installed height should be approximately 1.54" from the end of the pump shaft (Figure 2).
4. The Sonnax pump shaft 96855-02K has a unique design to increase cooler flow and minimize debris-related restrictions. The inner tube is not round in cross section, but oval. When reinstalling a Sonnax oval inner tube, 96855-03 (patent pending), it is critical to have the flat sides of the inner tube facing the pump shaft cross holes (Figure 3).
5. Install the enclosed end plug by pressing in place using a $1\frac{1}{64}$ " (.297" diameter) transfer punch or blunted drill bit. The end plug should be installed until about .07" below flush with the end of the pump shaft (Figure 4).

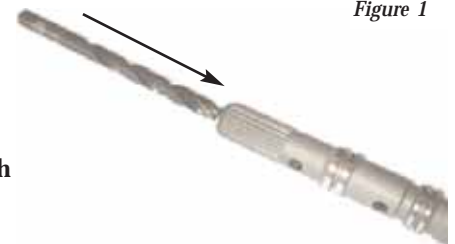


Figure 1

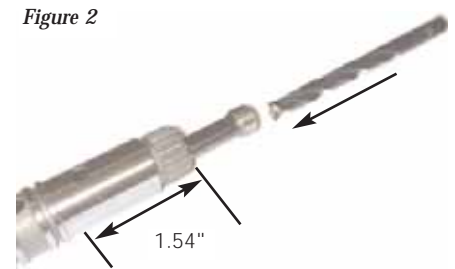


Figure 2

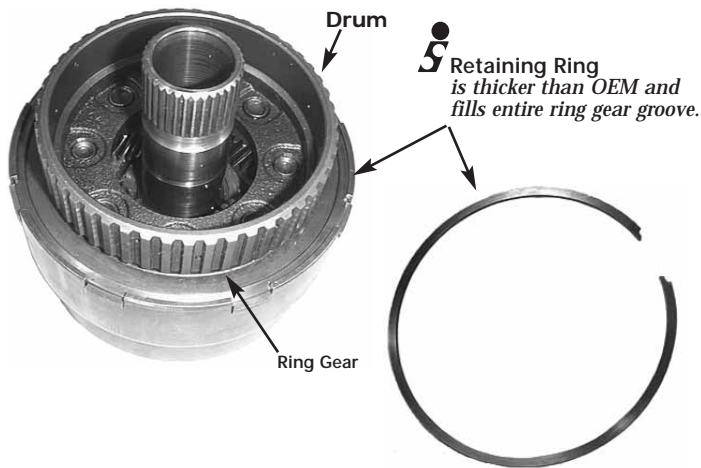


Figure 3



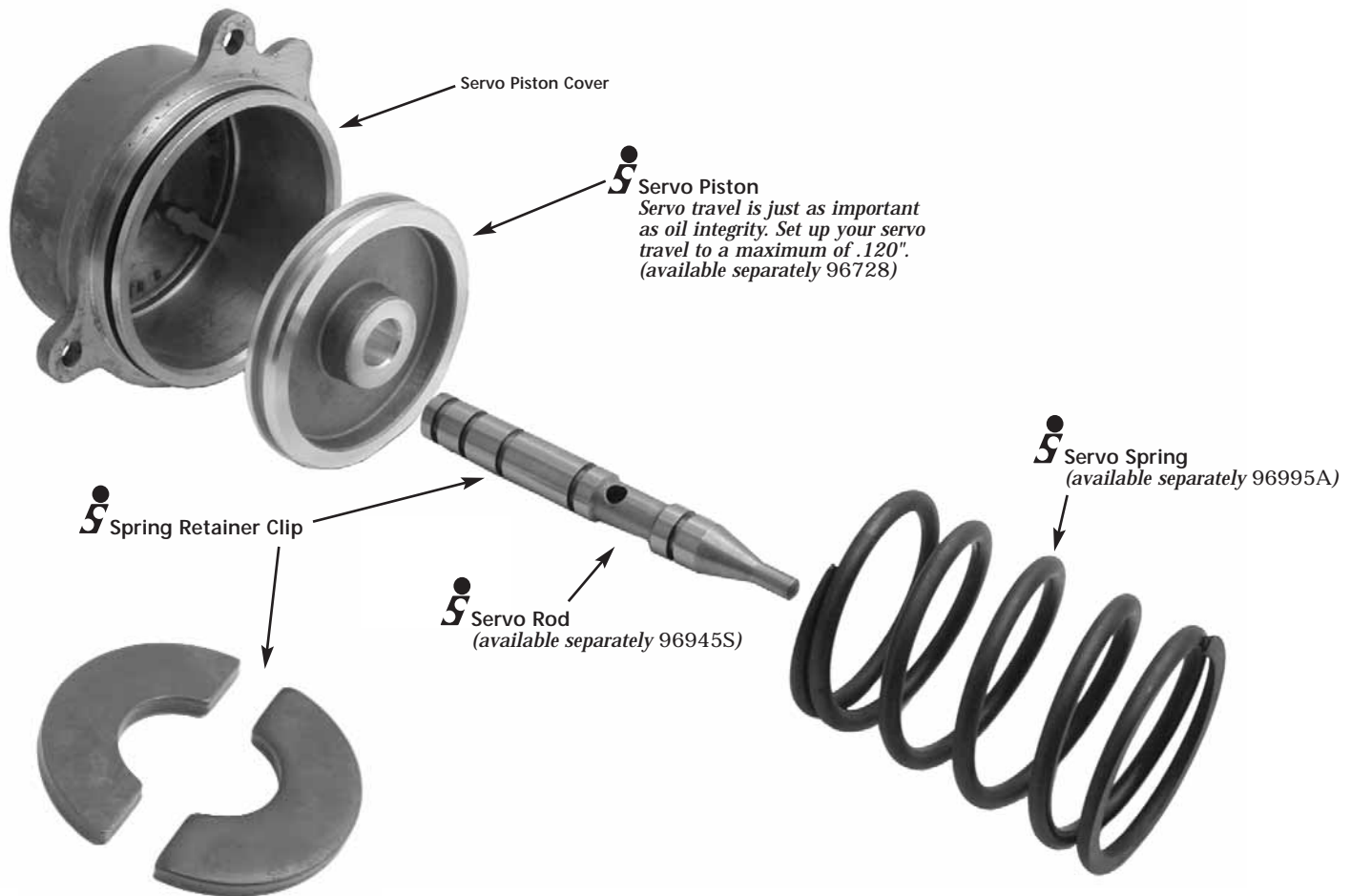
Figure 4

STEP 8 INSTALL RING GEAR RETAINING RING



1. Remove the front/reverse planetary assembly from the transmission.
2. Remove the retaining ring from the rear ring gear and discard.
3. For severely worn assemblies, install the Sonnax retaining ring.
4. Return the front/reverse planetary assembly to the transmission.
5. In some instances, material may need to be removed from the planetary lug surface area to ensure the retaining ring will fit securely in the groove. If this is the case, chuck the planet assembly in a lathe and remove .010" from the lug surface area before installing the retaining ring.

STEP 9 INSTALL SPLIT RING RETAINER



1. Remove OEM E-clip.
2. Place both halves of the split washer in the E-clip groove.
3. Put the piston on the pin.
4. Install the E-clip on the end of the pin.

STEP 10 INSTALL SERVO TUBE BRACKET

1. Remove filter bracket mounting screw.
2. Place tube support bracket over filter bracket and replace screw.
3. Align tube support bracket with tubes and tighten mounting screw.
4. Confirm that the bracket contacts servo tubes and bottom of pan, but does not interfere with the mounting of pan or oil filter.

