THE SURE CURE®

4L60 (700-R4)

Transmission Reconditioning Kit

sonnax®

Part No. SC-4L60

FULL COMPATIBILITY 1982 THRU 1993:

- Helps cure 3-4 clutch failure
- Helps cure poor line rise
- Helps cure delayed reverse
- Helps cure low line pressure
- Helps cure excessive endplay

IMPORTANT NOTE:

- This Sure Cure® Kit requires a reamer (NOT included) for oversized pressure regulator valve. To purchase reamer order Sonnax part number: 77917-TL.

VALVE BODY CARD

1 (1-2) accumulator spring
1 Servo check valve
2 Accumulator pistons with steel balls for plugging pin
9 Imidized checkballs
1 TV plunger #94 ratio
1 TV cable link
1 TV cable corrector

PUMP CARD

1 Oversized pressure regulator valve
1 Pump pivot pin
1 Teflon® coated pump bushing
1 Rear stator bushing
1 Reverse boost valve assembly
1 TV boost valve assembly

REASSEMBLY PARTS

4 Endplay shims
5 Viton® rubber D-rings for 2-4 servo

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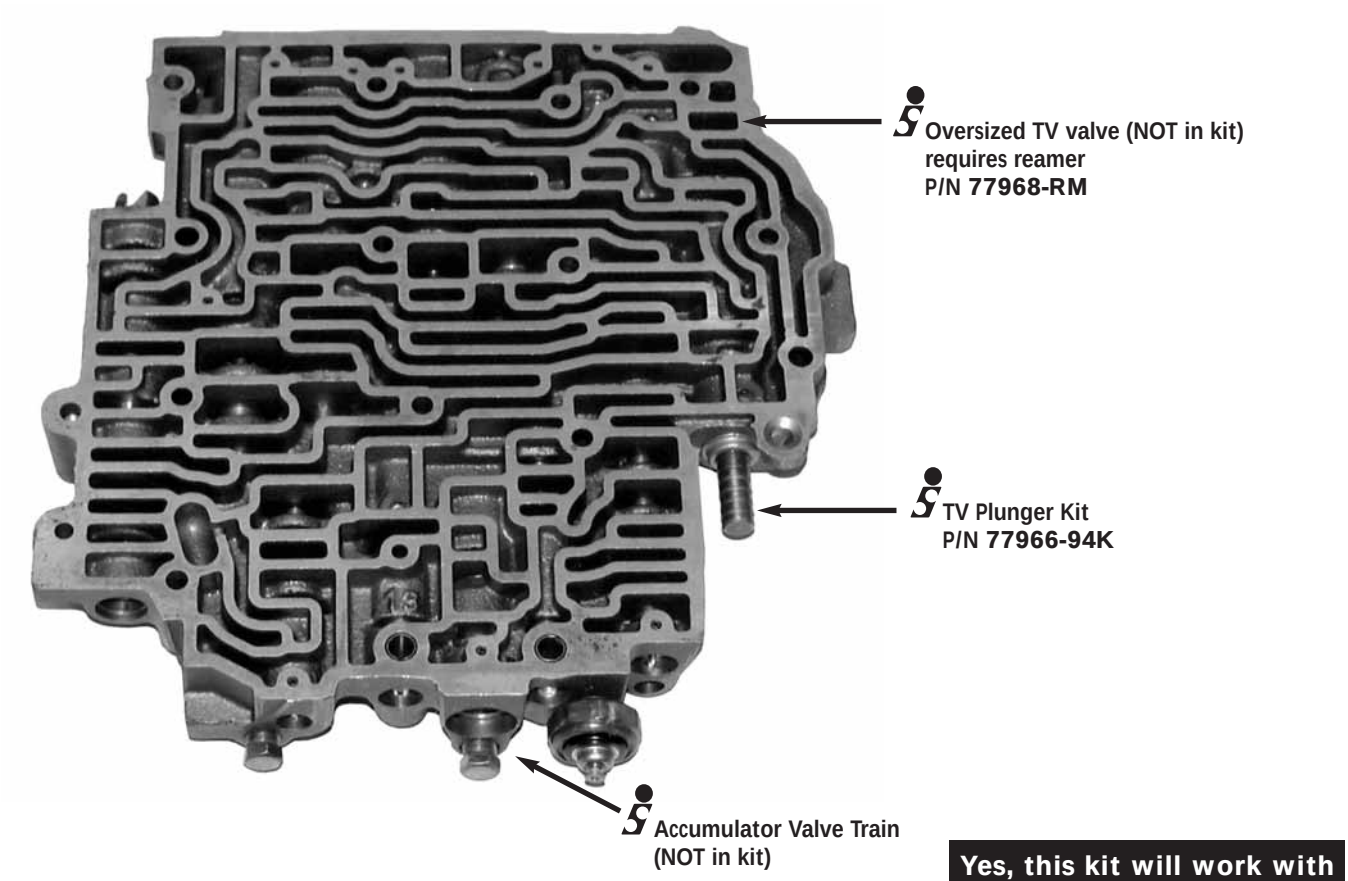
VALVE BODY PART LOCATIONS & INSTALLATION CHECK LIST



Yes, this kit will work with other valve body kits

Sure Cure® Fast Version

If you need to get this job out the door in a hurry then just follow highlighted steps below. The other steps are repair info (to help prevent NO GO's and CB's) & OEM part #'s that you can read at your convenience.

1. Check bearings. Install reverse piston orifice.
2. Inspect planets.
3. Flat stone case/valve body & Scotchbrite™ bores.
4. Check servo for wear/install D-rings.
5. Wet Air Test servo assembly for cross leaks.
6. Install rear endplay shim.
7. Install front unit endplay shim.
8. Enlarge drainback hole in pump.
9. Install Teflon® pump bushing & slide pivot pin.
10. Check TCC bore in stator for wear.
11. Ream PR bore/tool not in kit.
12. Install PR assembly.
13. Install rear stator bushing.
14. Modify accumulators.
15. Reassemble accumulator/purple spring goes in 1-2 accumulator.
16. Modify servo check valve if needed & install case.
17. Enlarge 3-4 clutch feed hole.
18. Check TV valve bore for wear.
19. Install #94 TV plunger & check accumulator control sleeve for wear.
20. Inspect accumulator sleeve for wear.
21. Install plastic checkballs into valve body.
22. Install plastic checkballs into case.
23. Replace OEM TV link/install TV cable corrector.

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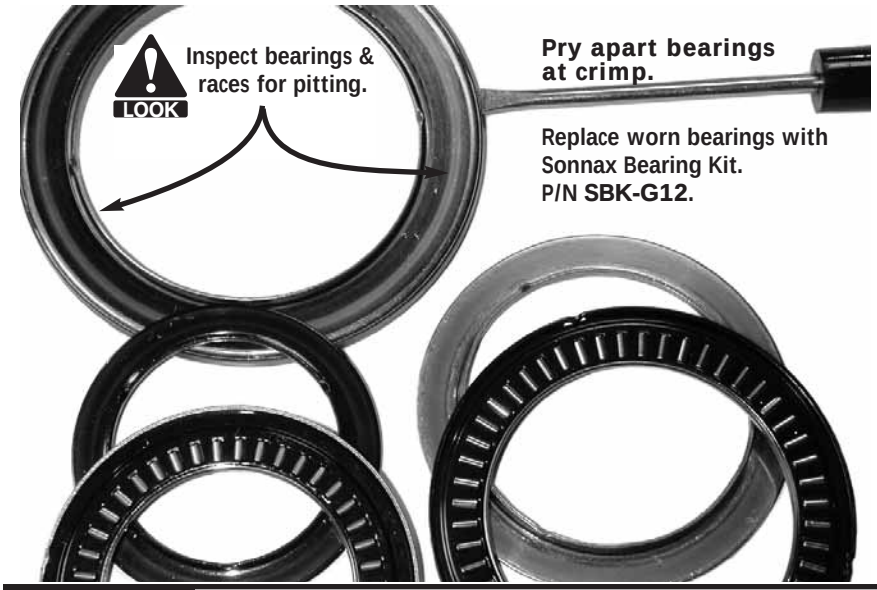
STEP 1 CHECK BEARINGS/RACES

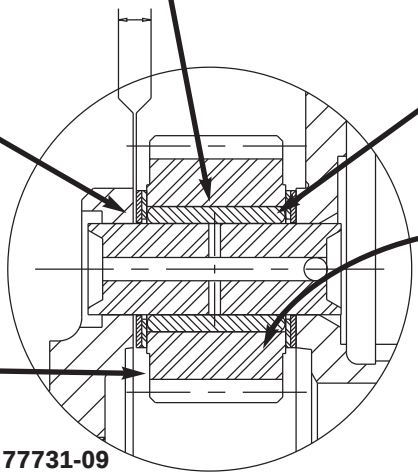


STEP 2 REAR REACTION PLANETARY PARTS

"Bat Wing" Thrust Washer
solid bronze, eliminates washer spin and rapid wear.
P/N **77731-05**

Pinion Pin
lube holes reduce planetary burn-up.
P/N **77731-02K**

Pinion Thrust Washer
through-hardened steel helps eliminate needle rollers thrust wear.
P/N **77731-04**

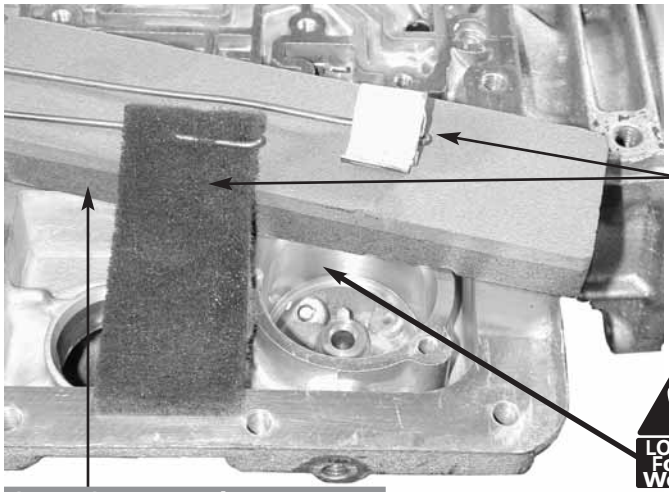


Helical Pinion Gear
case-hardened alloy steel
P/N **77731-01**

Needle Rollers
closely toleranced to be used specifically with matching pins and gears.
P/N **77731-03**

Not Shown:
Oil Deflector P/N **77731-08**, Inner Bearing P/N **77731-09**

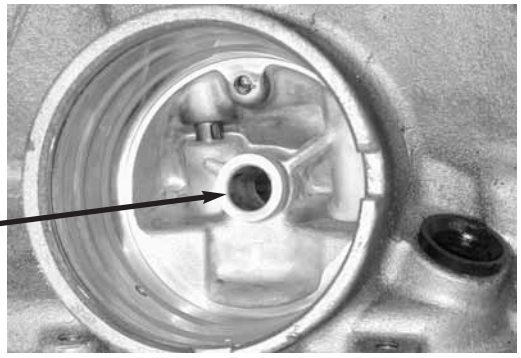
STEP 3 FLAT STONE CASE/VALVE BODY & SCOTCHBRITE™ BORES



Scotchbrite™ Bores Like This:

1. Use red colored Scotchbrite™ to scuff bores.
2. Next, use a piece of gasket cardboard to polish the 2-4 servo bore. This gets rid of sharp edges which can tear up the new rubber D-rings.

Helpful tools – you can use a drill to speed things up if you wrap the material in a stiff wire or rod.



Stop Cross Leaks

Use fine side of stone to remove **HIGH SPOTS** on case & valve body.

NOTE It's best to do this step at tear-down time. Also, keep the stone & Scotchbrite™ wet with solvent.

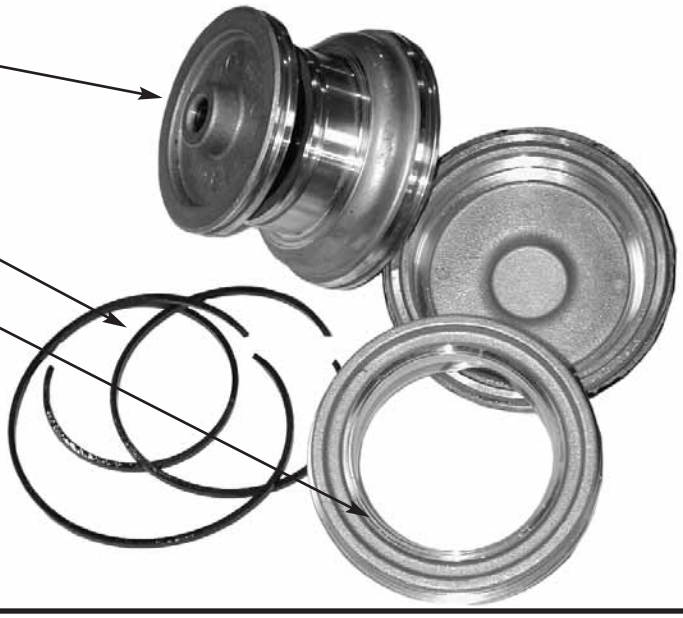
STEP 4 SERVO SEALS

Install Viton® Servo D-ring seals.

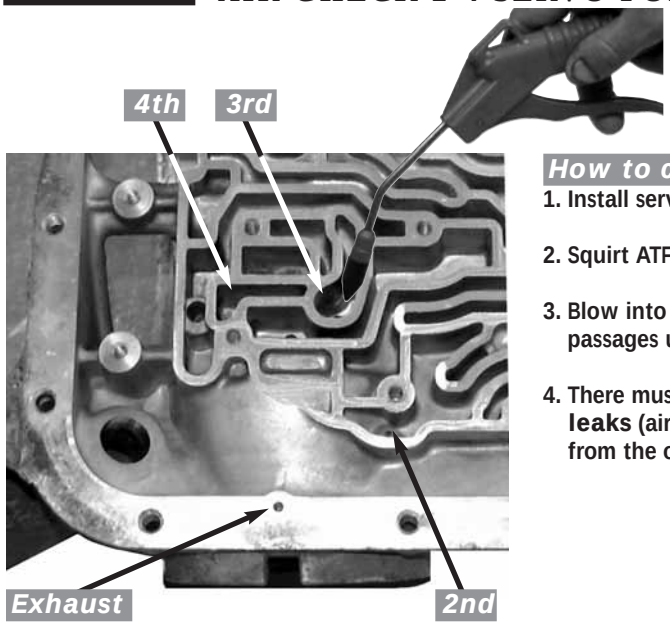
Discard OEM Teflon®

Prepare the seal surfaces on cover and inner housing as mentioned in previous step.

To convert #554 servos into desired #553 servos, purchase Sonnax kit 77911-01 (machining required).



STEP 5 AIR CHECK 2-4 SERVO FOR CROSS LEAKS

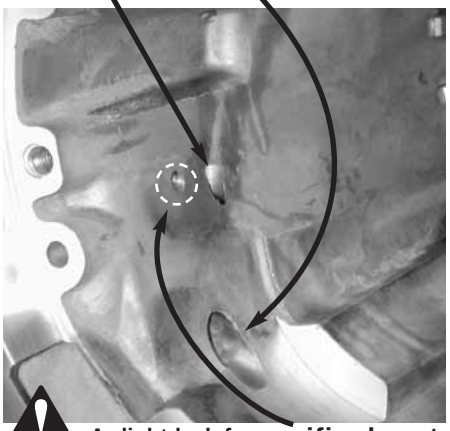


How to check servo

1. Install servo into case.
2. Squirt ATF into apply holes.
3. Blow into one of the apply passages using 30-60 psi.
4. There must be **NO cross leaks** (air/ATF) coming from the other apply holes!

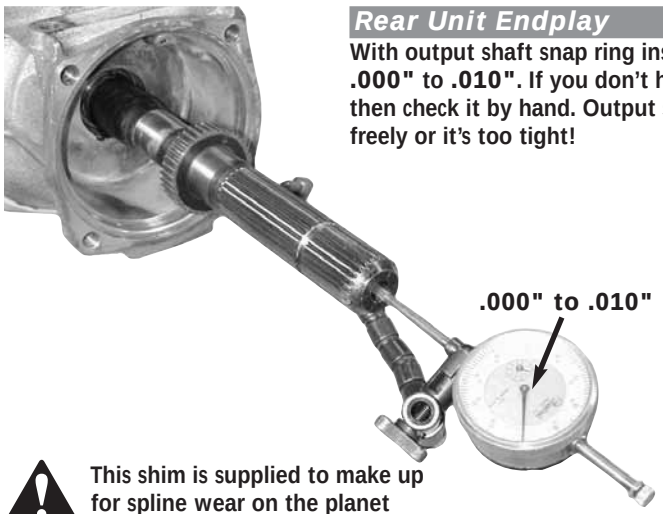
3rd capsule & servo pin bore

Check down inside case while air checking servo. **NO LEAKAGE** is allowed from **3rd capsule** or **servo pin bore**!



NOTE A slight leak from **orificed vent** on Wet Air Check is **NORMAL.**

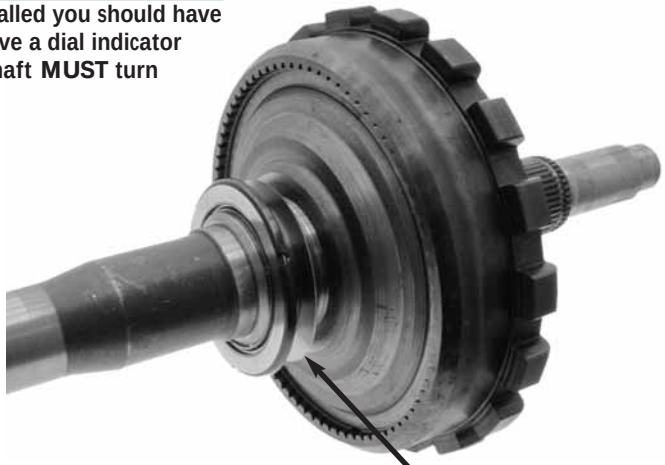
STEP 6 INSTALL REAR UNIT ENDPLAY SHIM OR SHIMS



Rear Unit Endplay

With output shaft snap ring installed you should have **.000"** to **.010"**. If you don't have a dial indicator then check it by hand. Output shaft **MUST** turn freely or it's too tight!

NOTE This shim is supplied to make up for spline wear on the planet assembly. For minor wear install one .010" shim. For heavier wear install two .010" shims.



Endplay Shim

Install shim between ring gear & output shaft bearing.

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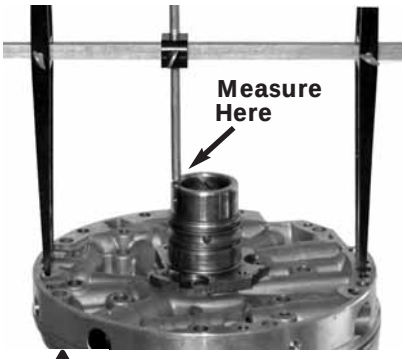
STEP 7 CHECK FRONT UNIT ENDPLAY

Endplay shim

Install shim between selective washer and bearing.



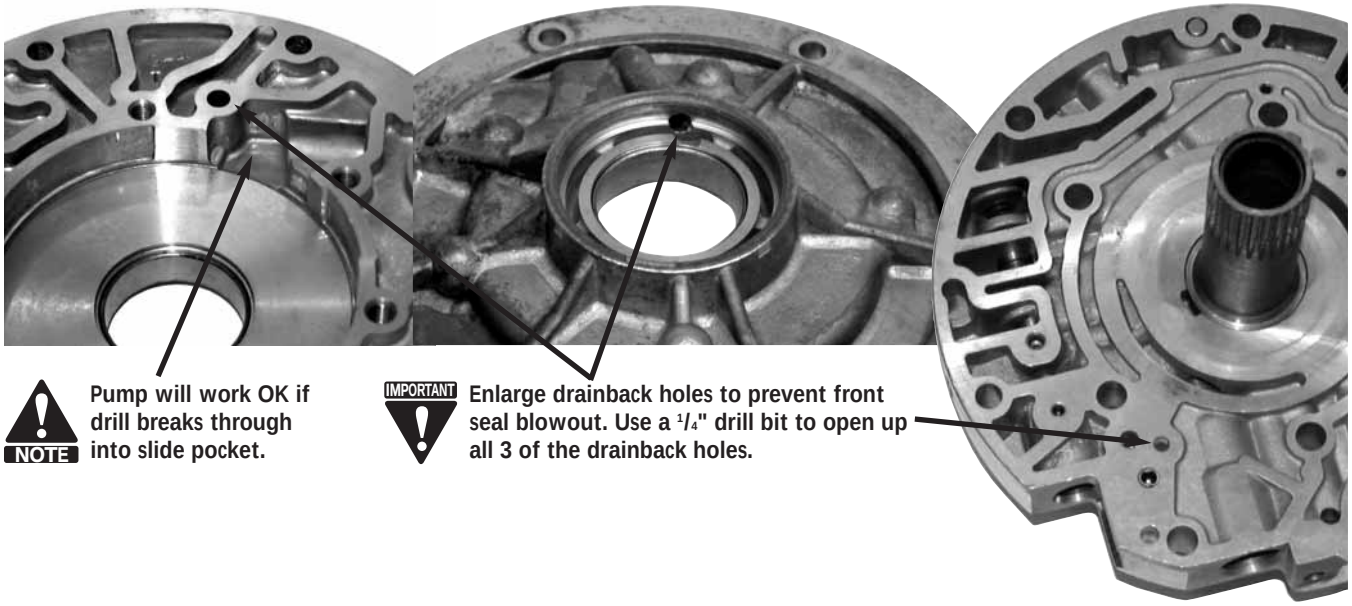
NOTE H gauge is available from most parts suppliers.

How to check endplay

1. Stack unit up to the input drum.
2. Install selective washer, **SHIM** & bearing.
3. With pump gasket in place put the H-gauge into case (long legs down). Make sure end of rod touches bearing before you tighten lock on H-gauge.
4. Take H-gauge out of case. Place it against pump (short legs down). Measure distance between end of rod & top of ring tower. **This is your endplay.**

Total Unit Endplay is .005" to .0036".

STEP 8 DRILL OUT DRAINBACK HOLE



NOTE Pump will work OK if drill breaks through into slide pocket.

IMPORTANT Enlarge drainback holes to prevent front seal blowout. Use a 1/4" drill bit to open up all 3 of the drainback holes.

STEP 9 INSTALL TEFLON® PUMP BUSHING & PIVOT PIN

DO NOT install bushing with a hammer!
It will cock.
Slide/Rotor/Vane clearance: .0008" - .002" MAX!

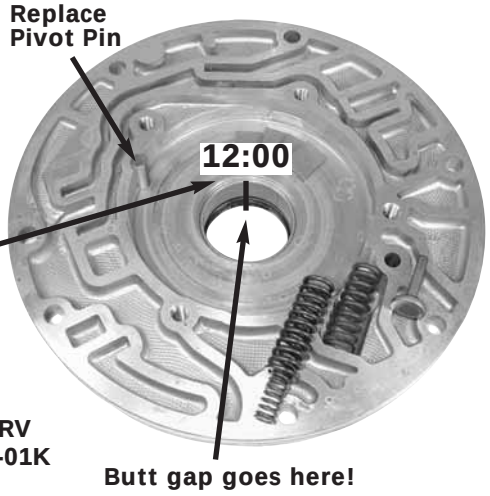
IMPORTANT This bushing **should only be used** on pump bodies that have a lip to prevent bushing pullout.

Bushing Installation

Brake clean the bushing & the bore in pump body.

Apply Loctite® #609 (green colored) to bushing.

Butt gap on bushing **MUST** be installed at 12:00 position, using an **ARBOR PRESS**.



NOTE Sonnax also has available:

Slide spring shim	P/N **77917-RV**
HD Slide spring	P/N **77722-01K**
Vanes	P/N **1280**

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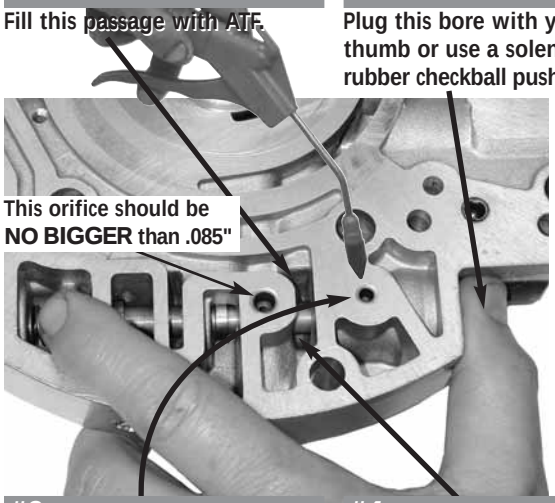
STEP 10 CHECK FOR WORN TCC BORE (PART NOT INCLUDED IN KIT)

#1
Fill this passage with ATF.

#2
Plug this bore with your thumb or use a solenoid with a rubber checkball pushed into it.



#3
Use a rubber tipped gun to blow (30-60 psi) air into this hole.

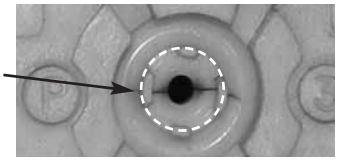
#4
Any leaks (air/oil) into this passage means the **TCC valve bore is worn out!**

TCC/PWM Warning
If you install a 4L60-E TCC/PWM valve into a 700-R4 the converter will **instantly overheat.**


700-R4 valve has **5 lands.**


4L60-E PWM valve has **4 lands.**

Check solenoid seat for cracks.



NOTE Worn TCC bore = NO LU & converter burn up! To repair bore order P/N **77805-K**/contains TCC valve with Teflon® seal. Sonnax aluminum TCC solenoid snout P/N **77942-01** is also available.

STEP 11 REAM PR BORE USING TOOL #77917-TL (SOLD SEPARATELY) & CLEAN OUT BLOW-OFF SEAT

Use reamer in low rpm drill only!

Here's how to ream PR Bore:
Fill passages with cutting oil. Use a **500-600 RPM drill** to turn the reamer in a **clockwise** direction only! **Do not** push sideways on reamer while cutting or bore will end up egg-shaped. Blow chips out first and then pull reamer straight out of bore, without turning the reamer.

IMPORTANT **DO NOT** use a **high-speed** drill to ream bore. Reamer will not cut smoothly!

NOTE If the new Sonnax valve fits too tightly in bore, ream bore a second time.

Pressure Blow off
ALWAYS remove pressure relief ball & clean the ball seat in stator.

With major parts damage - reform seat by tapping ball into it with a punch.

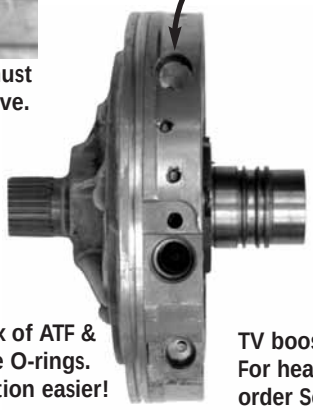
Don't forget filter & new o-ring.

STEP 12 INSTALL PRESSURE REGULATOR & BOOST VALVES

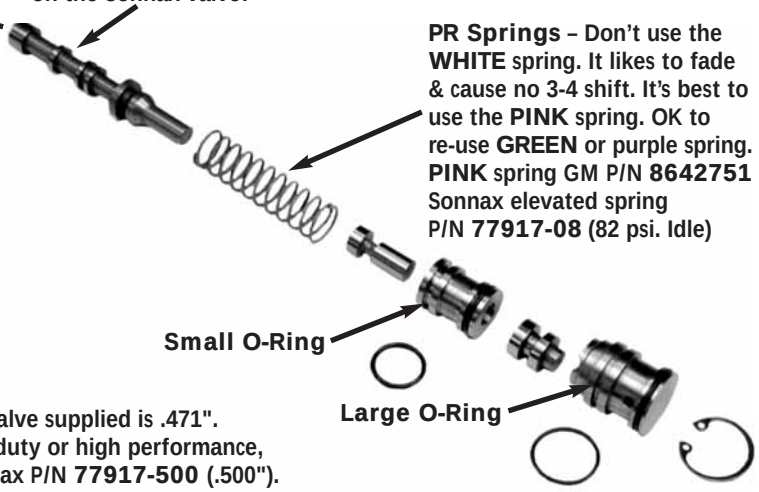
IMPORTANT PR snap ring must go in 2nd groove.

NOTE 4L60-E PR valve will not interchange with 700-R4/4L60.

Do not modify this land on the Sonnax valve!



PR Springs – Don't use the **WHITE** spring. It likes to fade & cause no 3-4 shift. It's best to use the **PINK** spring. OK to re-use **GREEN** or purple spring. **PINK** spring GM P/N **8642751** Sonnax elevated spring P/N **77917-08** (82 psi. Idle)



NOTE Use a 50/50 mix of ATF & STP to lube the O-rings. Makes installation easier!

TV boost valve supplied is .471". For heavy duty or high performance, order Sonnax P/N **77917-500** (.500").

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STEP 13 INSTALL REAR STATOR BUSHING & CHECK PUMP CLEARANCE

IMPORTANT

Replace Bushing

Don't skip this step! This bushing is always worn out and allows lube oil to dump = planet failure.

Torque Pump halves

Torque pump halves to **18ft. lbs.** Don't use impact, it causes the slide to bind up.

Pump clearance

ALWAYS check pump clearance. Rebuilt pumps are usually too tight or too loose.

Slide/Rotor/Vane Clearance .0008" to .002" Max!

Check for Rebuilt pumps

1. Install bare slide into body.
2. Bolt stator to body.
3. Shake pump assemble. You should hear slide rattle back & forth. If not, it's **TOO TIGHT!**
4. Do same test with rotor.

Shake pump and listen for rattle.

STEP 14 PINLESS ACCUMULATORS®

Modify Accumulators

1. Use a punch to drive the pins out from the backside of accumulators.
2. Plug the pin holes by driving one of the steel checkballs into it. 3-4 accumulator in case has a blind hole so you don't need to plug it.

Scotchbrite™ Bores

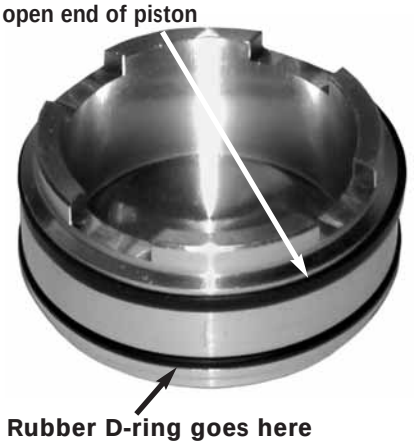
Remove pins & replace with steel checkball!

NOTE

Only 2 pinless accumulators® are in the kit. 1987 & up units use 3 accumulators. On these years use the pinless accumulators® for the 1-2 and forward. If you want to install a pinless accumulator® in the 3-4 order Sonnax P/N **77998-03K** (patent pending).

Install seals on piston

Teflon® ring goes here open end of piston



Rubber D-ring goes here closed end of piston

IMPORTANT

Make sure bores have no chatter marks or wear!

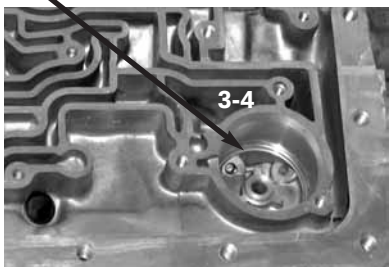
STEP 15 PINLESS ACCUMULATORS REASSEMBLY

Pistons

Pistons install **closed end 1st,** then the spring.

Purple Spring

Replace OEM spring.



NOTE

Note #1

You can repair worn accumulator holes in OEM pistons with kit P/N **77754-02K.** Contains 10 oversized pins & reamer.

Note #2

If 3-4 accumulator bore in case is scored up, salvage it by installing a Sonnax sleeve kit P/N **77998-01K.**

STEP 16 SERVO CHECK VALVE

Orifice "A" Modification

If last 3 digits on casting # are:

- 553 or 554 – install valve as is.
- 093 or 1 piece aftermarket enlarge **orifice A** in servo check valve to .120" to .125".

Valve Installation

Tapered end of valve installs into case first. Drive valve into bore until **FLUSH**. It **MUST** be tight!

IMPORTANT

Sonnax valve installs on **TOP** of OEM 3rd accumulator valve (GM part #8634400). Valve will also work if OEM has been replaced with a cup plug. Sonnax valve **CANNOT BE USED** used by itself!

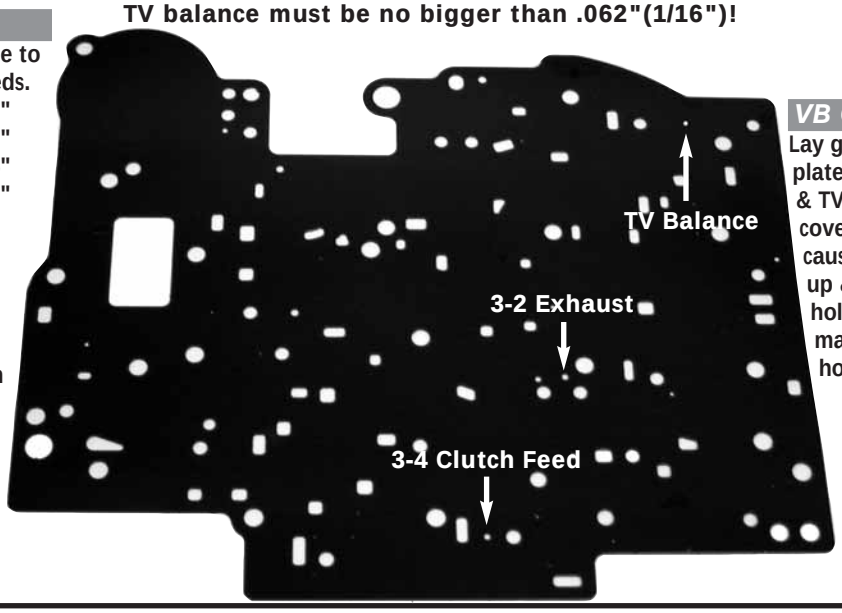
STEP 17 SPACER PLATE 3-4 CLUTCH FEED MODIFICATION

2-3 Shift feel

Enlarge 3-4 clutch feed hole to match your customer's needs.

- Light duty .090"
- Regular duty .100"
- Heavy duty .115"
- High performance .130"

TV balance must be no bigger than .062"(1/16")!



IMPORTANT

Enlarging the 3-4 feed hole will firm up the 2-3 shift. However, **too large** of a hole will cause a bumpy 2-3 shift!

VB Gaskets

Lay gaskets over spacer plate & make sure 3-2 Ext. & TV balance holes are not covered up. Moisture causes gaskets to swell up & plug off these two holes. Also, check to make sure all other holes are open.

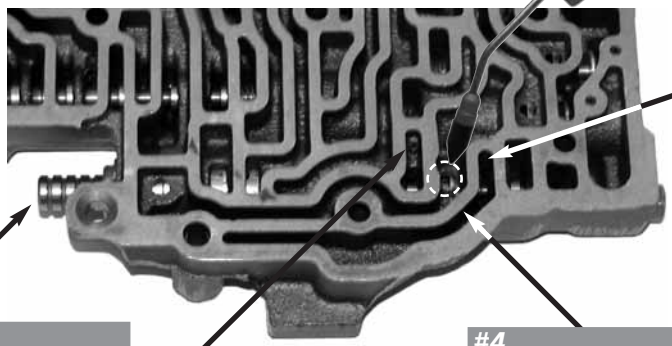
STEP 18 CHECK FOR WORN TV BORE (PART NOT INCLUDED IN KIT)

IMPORTANT

A worn TV valve bore causes **LOW** throttle valve boost oil which smokes the band & 3-4 clutch. Take the time to check it!

#3

Use a rubber tipped gun to blow (30-60 psi) air into this hole.



#1

Fill this passage with ATF.

#2

Depress plunger with left index finger. At the same time use you're thumb to **plug off** the roll pin that holds TV valve in place.

#4

Any leaks (air/oil) into this passage means the **TV valve bore is worn out**! Bore can be repaired with oversized TV valve – P/N **77968** which requires reamer P/N **77968-RM.**

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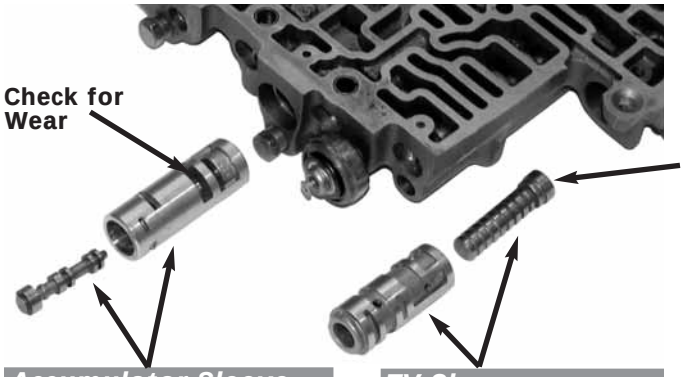
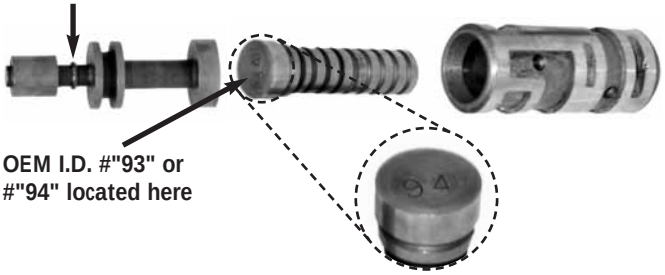
STEP 19 REPLACE TV SLEEVE & PLUNGER/CHECK ACCUMULATOR FOR WEAR



TV valve match up – No Rib TV Valve = #93 Plunger / 1 Rib TV Valve = #94 Plunger



Accumulator Sleeve

Remove accumulator sleeve & check down inside bore for wear. This part **IS NOT** included in kit! See step 20 (if sleeve is worn out) for part numbers.

TV Sleeve

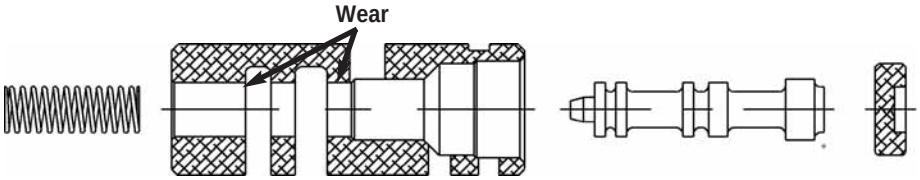
Remove & discard the old TV sleeve & plunger. Replace with the NEW ones supplied in kit.

IMPORTANT

The TV sleeve & plunger that we supply in the kit can only be used if your plunger is stamped #94 on the face. #94 is the most common. **If your plunger is #93**, Order Sonnax P/N **77966-93K**

For High Performance (allows WOT 3-4 upshift), order Sonnax P/N **77966-94MK** (#94 plunger only!).

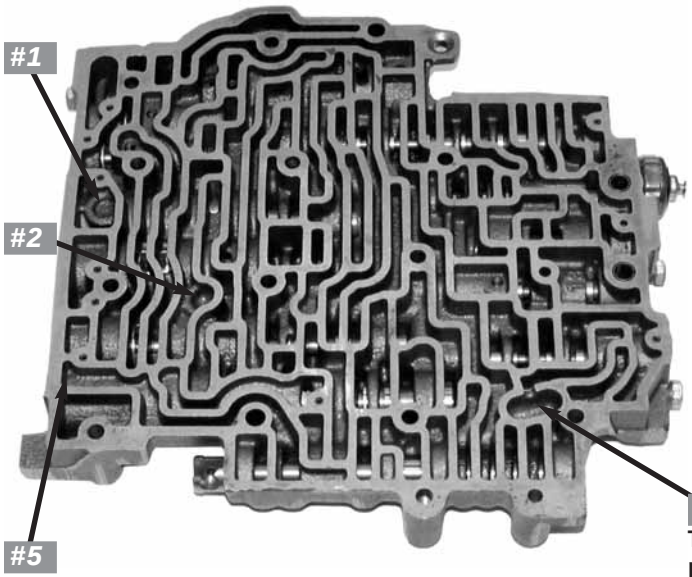
STEP 20 ACCUMULATOR CONTROL SLEEVE

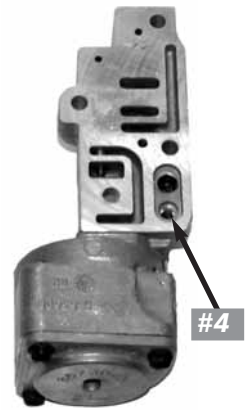


Remove and inspect 1-2 accumulator control sleeve for wear (items not in kit).

Vehicle Type	Accumulator Valve Assembly	Yellow 3 lb.	White 5 lb.	Pink 7 lb.
Heavy Cars & Trucks	"M" Version	Light Shift	Medium Shift	Firm Shift
with High Axle Ratio (3.08-3.23-3.42) Sonnax P/N 77777M-K				
Medium Weight Cars	"L" Version	Light Shift	Medium Shift	Firm Shift
(such as Camaro & Firebird) with Mid Axle Ratio (3.42-3.55-3.73) Sonnax P/N 77777L-K				
Lighter Weight Cars	"K" Version	Light Shift	Medium Shift	Firm Shift
(under 3,200 lbs) with Mid to Low Axle Ratio (3.73-4.11-4.33) Sonnax P/N 77777K-K				

STEP 21 INSTALL PLASTIC CHECKBALLS





1982-1986

Install checkballs #1, #2, #3

1987-1992

Install checkballs #1. #2, #4

1993 Only!

Install checkballs #1, #2, #4, #5

#3

This bathtub uses the **LARGER** $^{5}/_{16}$" plastic ball. All other locations us $^{1}/_{4}$".

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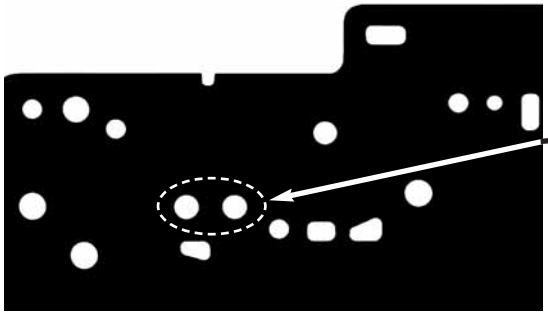
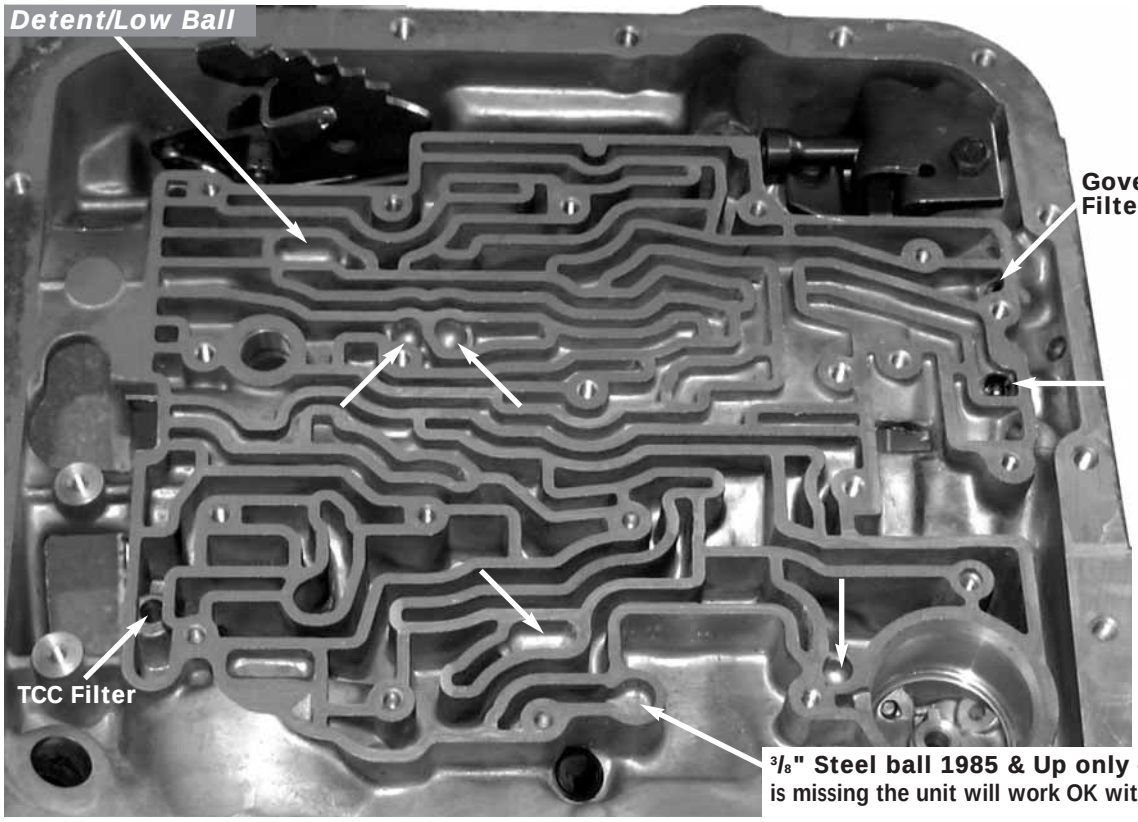
STEP 22 INSTALL 4 OR 5(1/4") PLASTIC BALLS & 1(3/8") STEEL BALL



Detent/Low checkball location

Lay spacer plate over bathtub for detent/low checkball.

- If plate has **2 holes** – install ball.
- If plate has **1 hole** – do not install ball.



STEP 23 INSTALL TV LINK & TV CABLE CORRECTOR

TV Link

Replace OEM link with shorter one from kit.

#1

Remove **TV CABLE CLIP** from throttle arm.

#2

Slide clip back on cable slightly.

#3

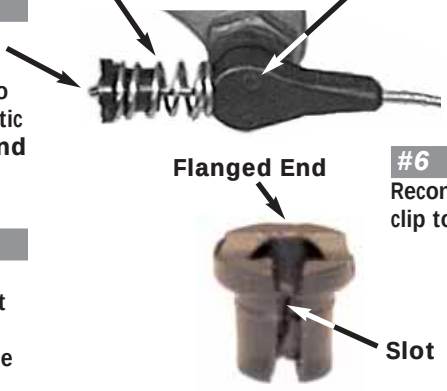
Slide the spring over the **end of the cable** until it butts up against the TV cable clip

#4

Pull TV cable end forward past the spring. Next slide TV cable into the slotted end of plastic grommet. **Flanged end** of the grommet faces away from the spring.

#5

Slide spring over the plastic grommet until it snaps into place and **butts up against** the TV cable clip.



#6

Reconnect TV cable clip to throttle arm.

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Specifications and Rebuild Information:

R&R INFORMATION

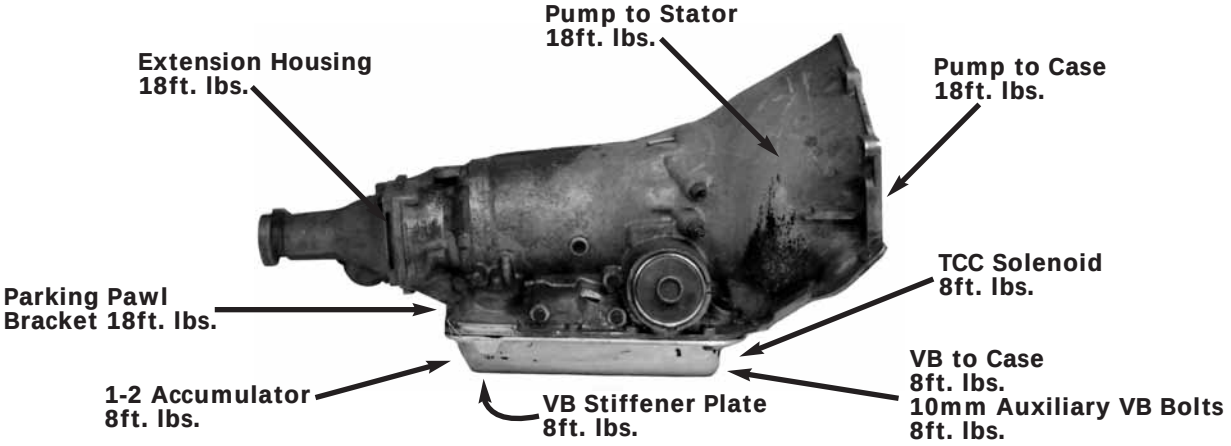
Cooler return line: Top Line

Correct Sonnaflow™ readings: 1.5-1.7 gpm TCC off, 2.0-2.6 TCC applied

Fluid capacity: Pan drop 5 qts./overhaul 11 qts.

Line Pressure: P-N-OD-D3 idle 65 to 75/max TV 180
D2-D1: idle & max TV 160-180
Reverse idle 106 to 123/max TV 218-275

TORQUE SPECIFICATIONS



OEM CLUTCH CLEARANCE, ENDPLAY SPECIFICATIONS

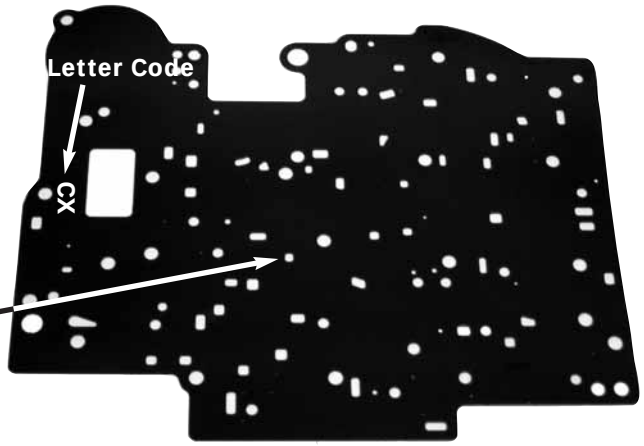
Forward clutch	1987 & up: .025"-.050"
3-4 clutch	.050"-.075"
Reverse input	1982-86: .080"-.110"/1987 & up: .045"-.075"
Low/Reverse component stack on bench	1987 & up: 1.150"-1.180"
Servo travel	.075-.125" (band must freewheel over drum when turning output shaft)
Pump slide/rotor/vane clearance	.0008"-.002" Max
3rd accumulator capsule depth	1.653"
Planet side gear clearance	.024" Max
Endplay	.005" - .036" total unit (combined)

LINE BIAS – SPACER PLATE MATCH-UP / SPACER PLATE I.D.

Line Bias Valve

- If this land is **ROUND** then spacer plate must have a hole here!
- If this land has a flat spot ground across it then plate **MUST NOT** have this hole.

Mismatch between valves and plate = No line rise



Use the letter code to ID spacer plate

1 digit only! = 1982-1986

2 digits starting with letter A = 1987 Only! / 2 digits starting with B, C, D, E, or H = 1988-1993

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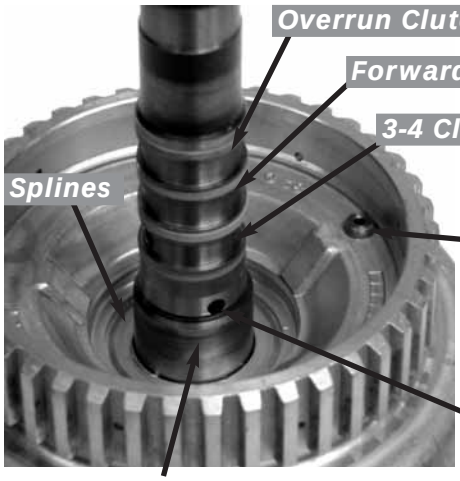
WET AIR TESTS – USE ATF IN PASSAGES & 30-60 PSI OF AIR PRESSURE

Important
Shaft must be tight in drum & no leaks or bubbles allowed at splines or checkball on 3-4 WAT!



Lube - Make sure this passage is FREE of debris.

Bushing Journal - Must be PERFECT

Reverse
With clutch applied NO leaks allowed from Reverse check ball, MTV hole or stator sealing rings.

Overrun
Plug off forward clutch hole then apply overrun clutch. 3-4 clutch must not move.

3-4
Overrun clutch must not apply when 3-4's are on.

TCC Valve
Apply air & TCC valve will move.

Forward
Apply clutch & make sure 3-4 clutch does not come on.

Forward on Auxiliary Pumps

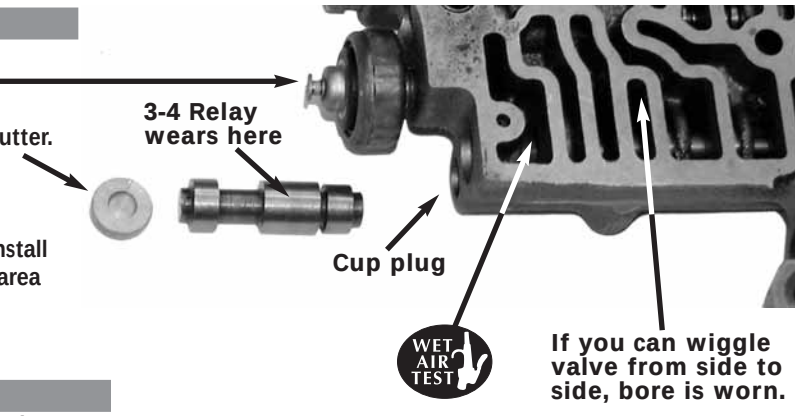
No 4th
Can be caused by:

1. Leaking 4th switch/replace switch

2. Loose end plug/ridge outside of plug with tubing cutter.

3. Loose cup plug/replace or epoxy plug.

4. Worn 3-4 relay valve bore/replace valve body! Or install Sonnax 4th servo (P/N 77767K) with larger apply area to overcome leak!



Stator Inspection:
If you had an overheated converter or stator, inspect tube sleeves for cross leaks. These leaks can be identified by the WAT and testing the tube by itself.

Note: A 100% leak tested shaft, 77918S-K, is available from Sonnax.

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