TCRA 2008

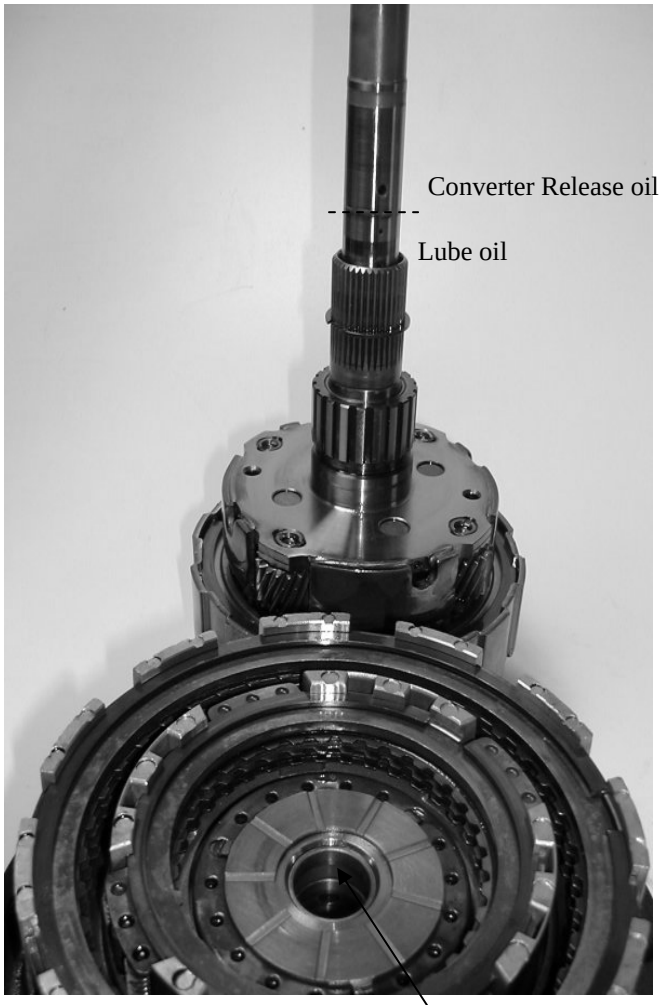
A.W. 55 50 SN/GM AF23/33

Complaints:

- TCC hunting or RPM cycling at 35-38mph
- Repeated converter, fluid or lining overheat
- Fluid metallic contamination
- TCC slip codes
- Harsh TCC apply, coasting TCC chuggle or harsh downshifts.
- Firm and late TCC apply

Causes:

- Excess heat build up due to loss of valve body control.
- Improper adjustment of SLU solenoid.
- Worn valve body (see illustrations)
- Metal contamination on turbine speed sensor
- Incorrect fluid type or level. This unit will work better with synthetic fluid.
- Rear pump bushing wear (illus. #1)



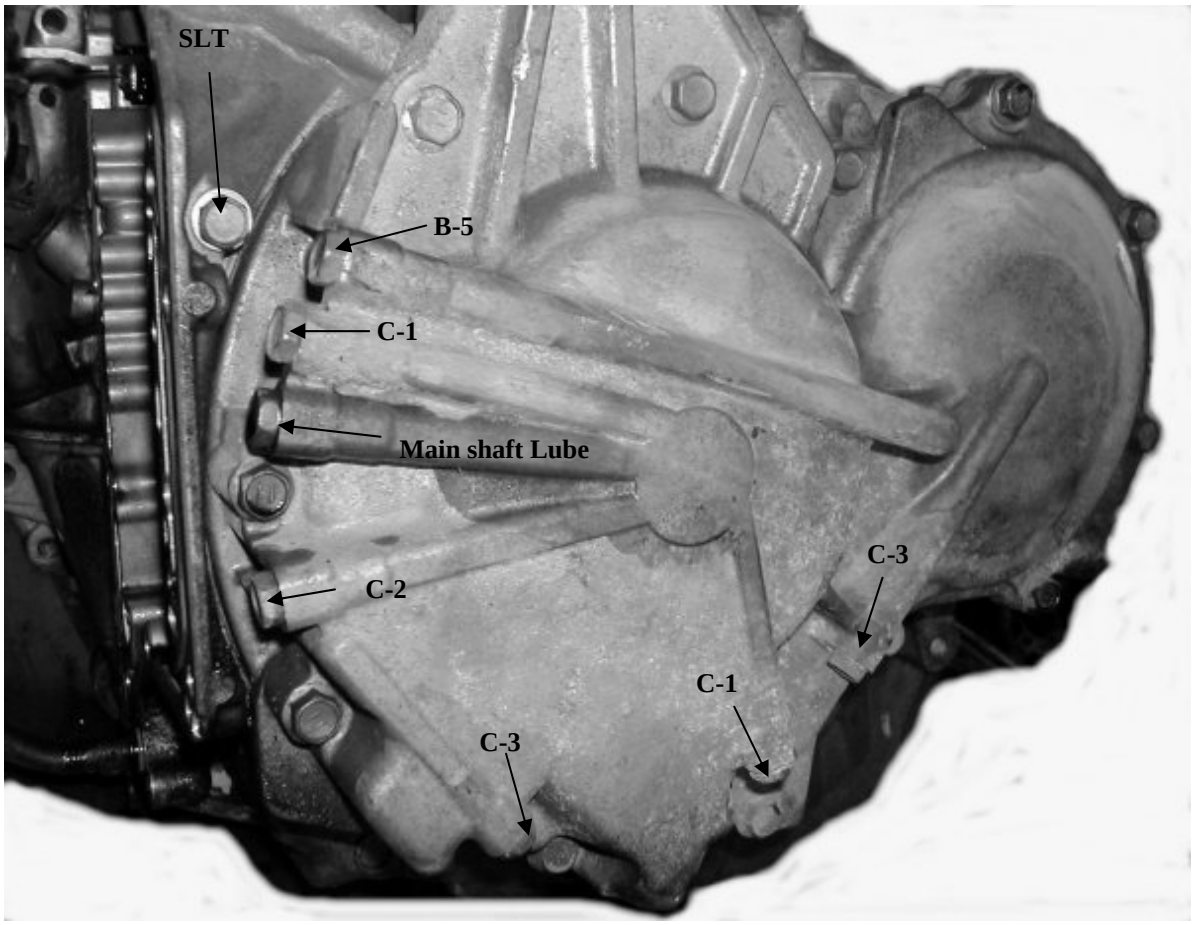
A.W. 55 50 SN/GM AF23/33

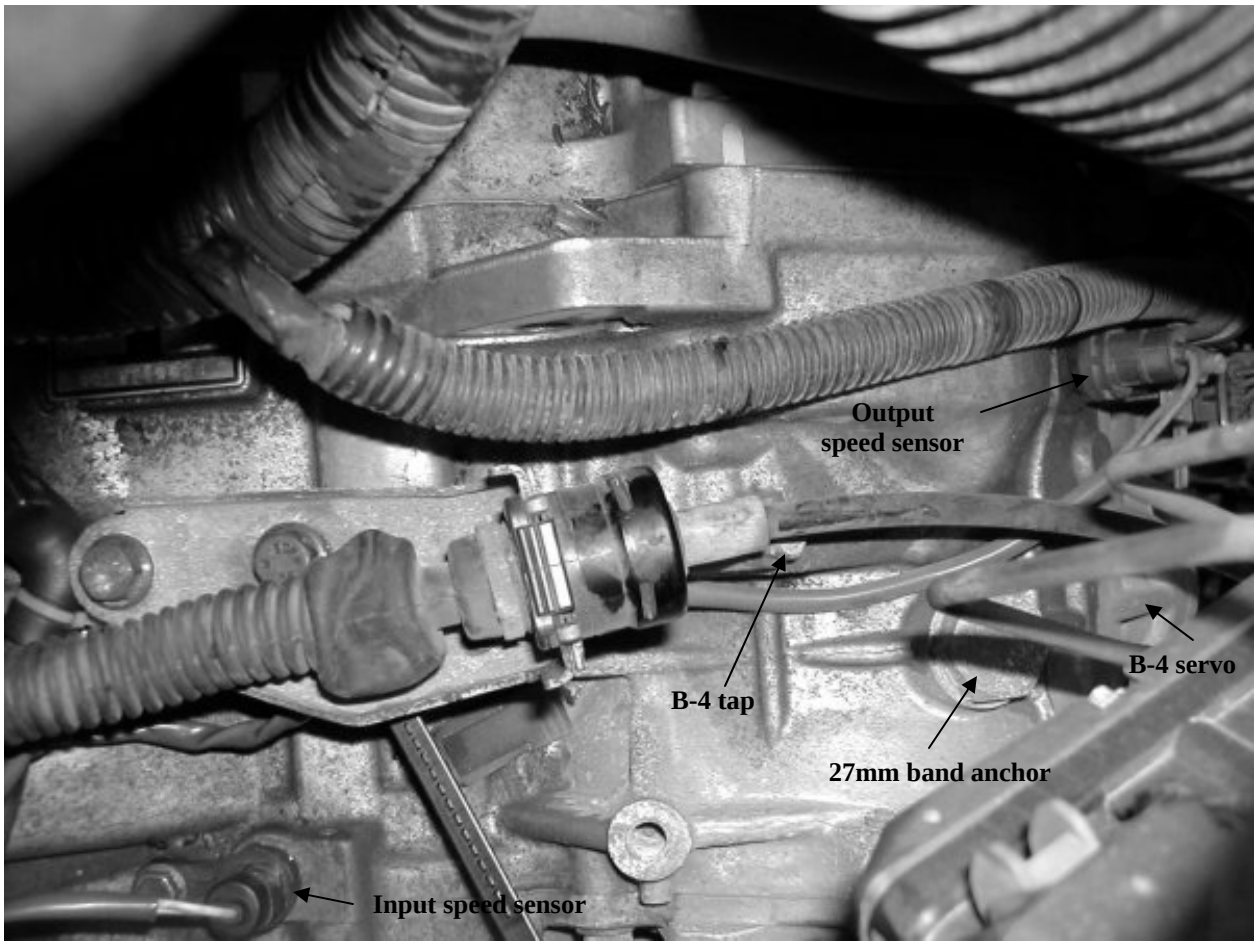
The 55 50/51 SN is installed into a multitude of vehicles and there will be variations to the unit and this data. A similar valve body will bolt to a GM, Volvo, Saturn, Nissan, Saab, Opel or Renault. Failure to test and recognize can create hours of additional effort.

Pressure and fill:

All the pressure plugs have a 12mm head. Do not mistake the 27mm band anchor (see Figures 1 and 2)for a fill plug or pressure tap. If that anchor is removed, the band will have to be recaptured. Positioning the band requires removal of the servo, at best and possibly the complete transmission.

The turbine sensor hole can be use to improve the fill speed. Low fluid or excessive overfill, can create erratic pressure and poor linear solenoid control, eventually forcing a TCM high pressure strategy.





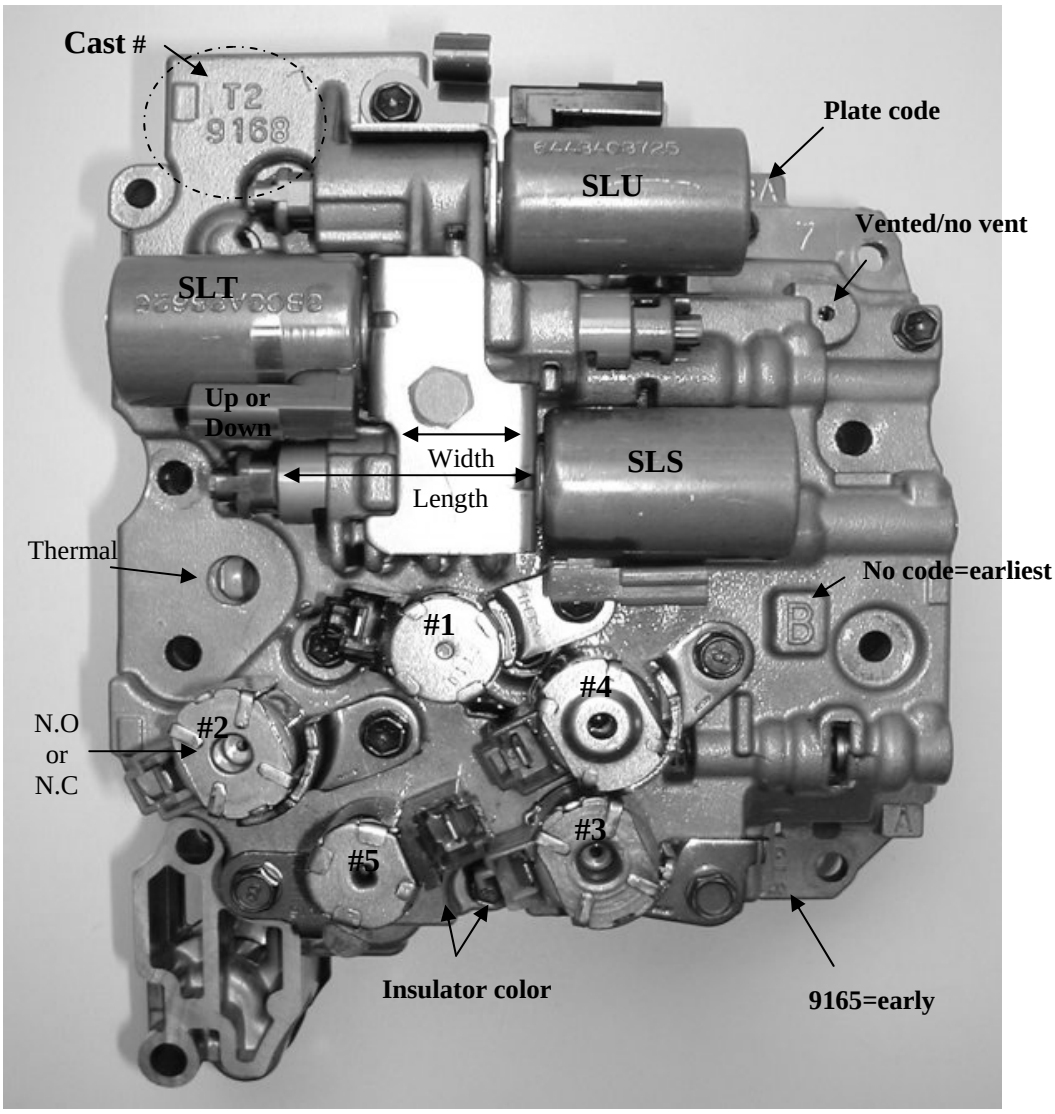
If the transmission is in the vehicle, “test the ice” per say, at the pressure taps relative to these complaints:

- TCC RPM fluctuation and overheated fluid

Check lube pressure. The lube pressure tap is between the secondary regulator valve and the main shaft bushings. Lube pressure will be affected by the fluid viscosity (flow rate) and the bushing to shaft clearance. Sufficient pressure at operating temperature indicates the filter, pump and both primary and secondary regulators are functioning. Normal lube pressure at the port indicated; -10 f. lube pressure can be as high as 30 psi. At 150 f, normal lube will be 5 psi. in Drive and 8 psi. in Reverse. This indicates the bushings are in place and can retain some of the source pressure. Lube pressure that starts low and stays at zero psi, would indicate your pump output is low, the regulator valve bore is worn or your bushings are bad.

If you are diagnosing a TCC complaint perform a cooler flow test. Normal flow in Drive with TCC released is 1.3 gpm and during TCC apply it drops to .7 gpm. The Saab, cooler element will require an adapter, but most units are easily accessible.

Lube pressure and flow on the 55 50SN, is low in comparison to other units. This converter requires multiple valves, along with the rear pump bushing, to control modulated TCC apply (see Figure 3). The converter clutch may remain fully applied at very low speed and high load, which taxes the fluid and lining, creating a break-away slip or RPM fluctuation.

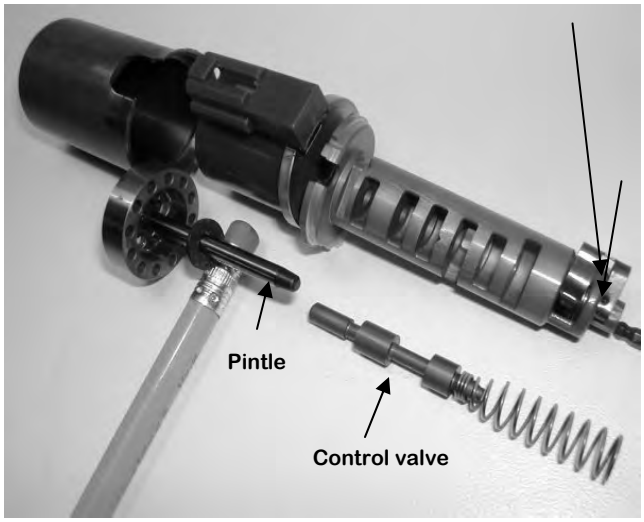


Measurement:
End of solenoid manifold to shoulder on adjuster

SLT-SLS
Preliminary adjustments:
.010"-.050", record prior to removal.
Measurement taken with retainer removed.
Shoulder of adjuster to end of manifold.
Turning screw inward, raises SLT & SLS pressure
6 clicks = 1/2 turn.

Turning screw inward, reduces SLU
6 clicks = 1/2 turn.

- Adjustment clicks are created by the increments on exterior of threaded allen, 3mm
- With control valve removed, shaking the coil should result in a free pintle movement.



Linear Lock-up Solenoid (SLU)

This solenoid affects:

- 1-2 up-shift. i.e.; too firm or bumpy
- 2-1 downshift. i.e.; harsh, bump
- Light throttle TCC modulation. i.e.; cycling rpm or cooler flow
- Full TCC lockup. I.e.; late, bump on coast down release
- TCC release on coast; too early, loss of engine braking

Refer to the pressure chart for examples of operation.

SLU service and adjustment at the bench:

- Pre-measure the adjuster, remove the threaded adjuster, then the valve from the solenoid.
- Verify the pintle (shaft passing through coil), is free floating by performing a shake test.
- Re-assemble and turn the adjuster to the original position.

Drive-ability and VBT test stand verification:

- The SLU is pulsed during 1-2, 2-1, 2-3, 3-2 shift, also during engagement into Drive or Reverse and TCC apply. Monitoring cooler flow with a Sonnaflow will indicate if the SLU is adjusted properly. A quick flow reduction of 50% and then a return, indicates the SLU is reacting to TCC valves. For example, 1.0 gpm. in Park, then upon Drive engagement, a sharp drop to .06, and a quick return, identifies the correct action.
- If you have harsh up/down shifts and you do not see a cooler flow toggle, the SLU is not adjusted or working properly.
- The correct adjustment on SLU will increase cooler flow. Improper adjustment will reduce cooler flow, substantially.

SLU adjustment in the vehicle:

- The solenoid can be adjusted if a pass-through hole has been located in the cover during bench rebuild. The SLU access will be at the top, left corner. A 3 mm Allen wrench, will pass approximately 1.60" or 40.9 mm. through the cover, when it's inserted into the adjuster. You should be able to feel the Allen engagement. As you turn the Allen wrench you will feel the retainer click over the index. Always count your rotations, in clockwise (CW) or counterclockwise (CCW), so you know where you start /stop.

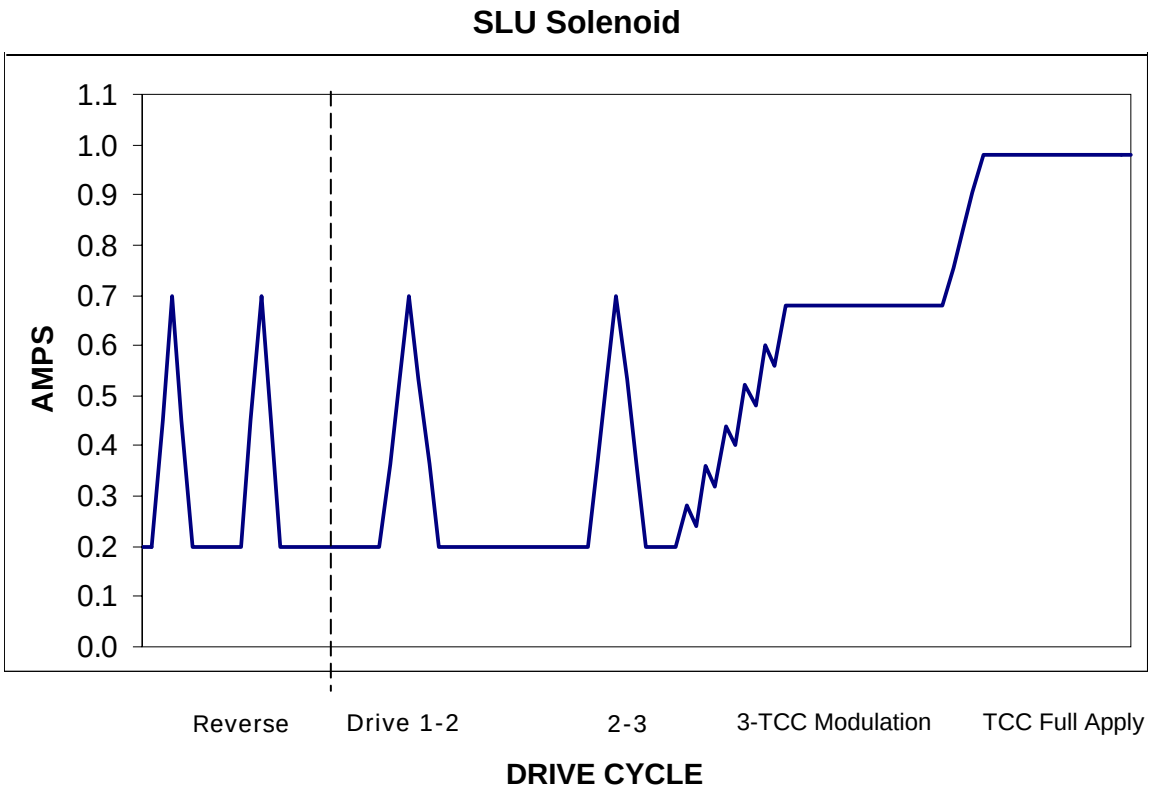
  CW/ In : Reduces SLU output.

  Resulting in: hard 1-2, 2-1 shifts and firmer/later TCC

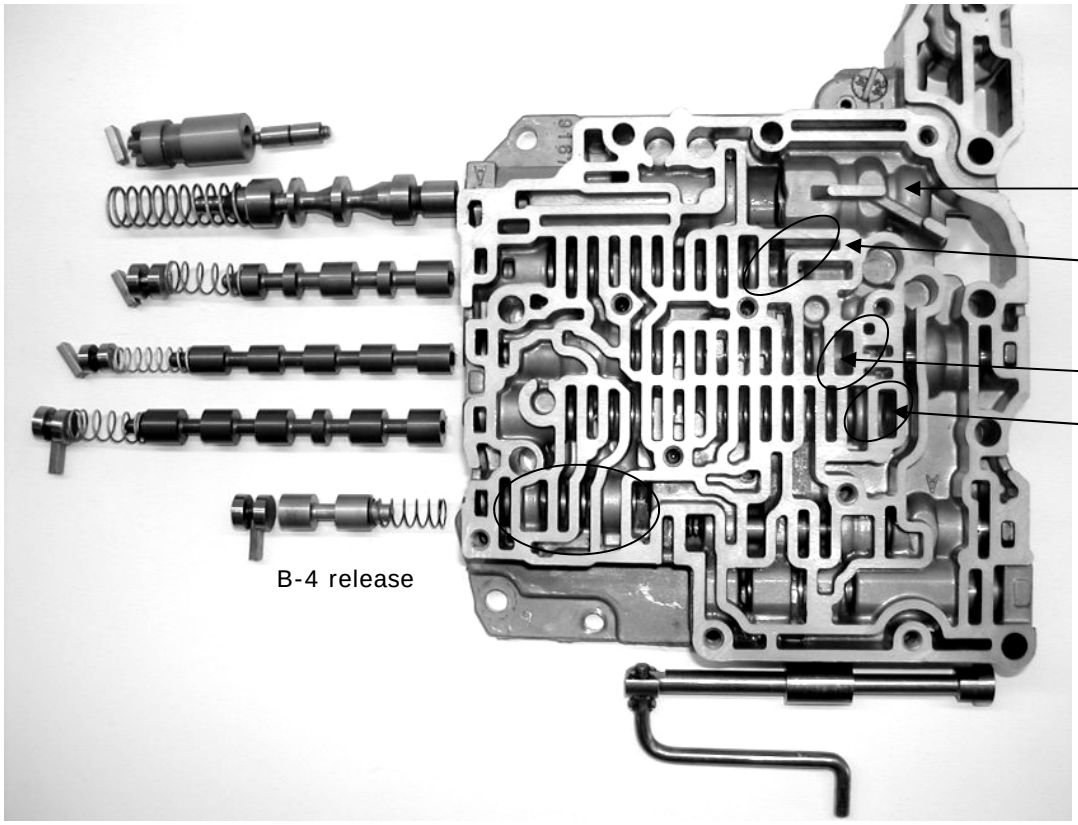
  CCW/ Out: Increases SLU output. Resulting in softer shifts and earlier TCC

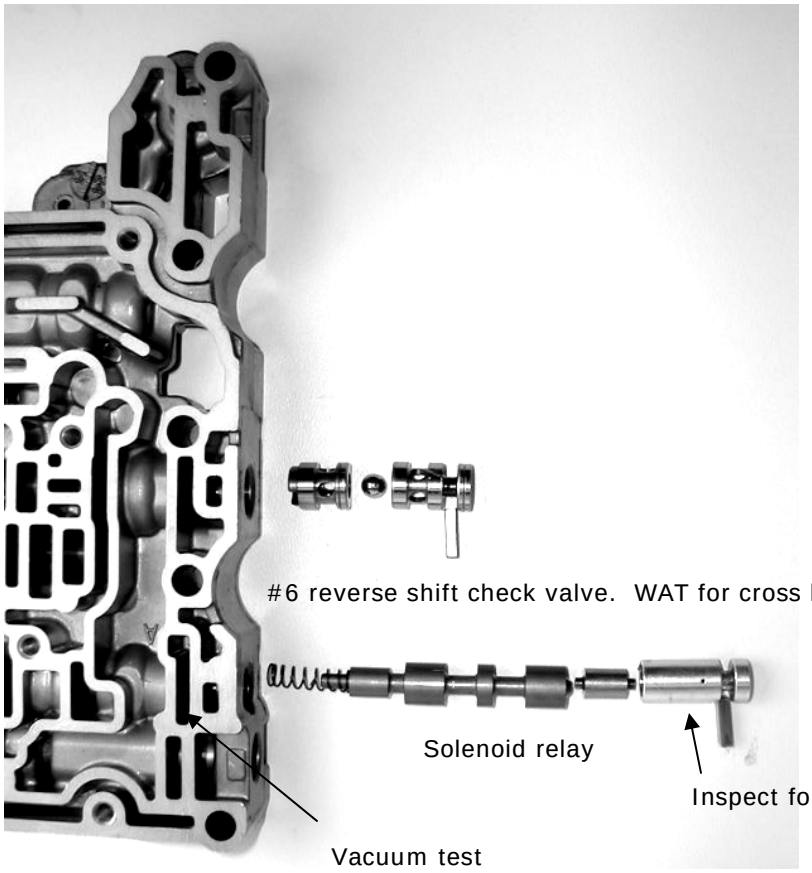
Road test:

- If your TCC control, 1-2 and 2-1 are good, cooler flow drops properly as noted above, leave the adjustment as is. If not, adjust accordingly.
- Slight bump on 2-1 down-shift… and/or TCC rpm fluctuates at 30-40 MPH during modulated apply….and/or excess TCC slip at full lockup…and/or Sonnaflow sensor indicates TCC control valve is continually toggling on-off.
  If so… turn adjuster screw in/clockwise 1.0 turn.
- Harsh 2-1 downshift….and/or heavy TCC RPM fluctuation at 30-40 mph…and/or late and firm full TCC apply. If so…turn adjuster in/clockwise 1.5 to 2.0 turns.
- TCC will apply not modulate slip RPM at 30-40 mph. Beyond 40 mph, TCC apply is short and harsh…. and/or a harsh TCC release on coast and/or 1-2 shift is too harsh. The adjuster is too far inward, back it out/ counter clockwise as required 1.5 to 2.5 turns.
- Low cooler flow when in lockup. No TCC flow drop upon engagement or shifting. Adjuster may be too far out/CCW.

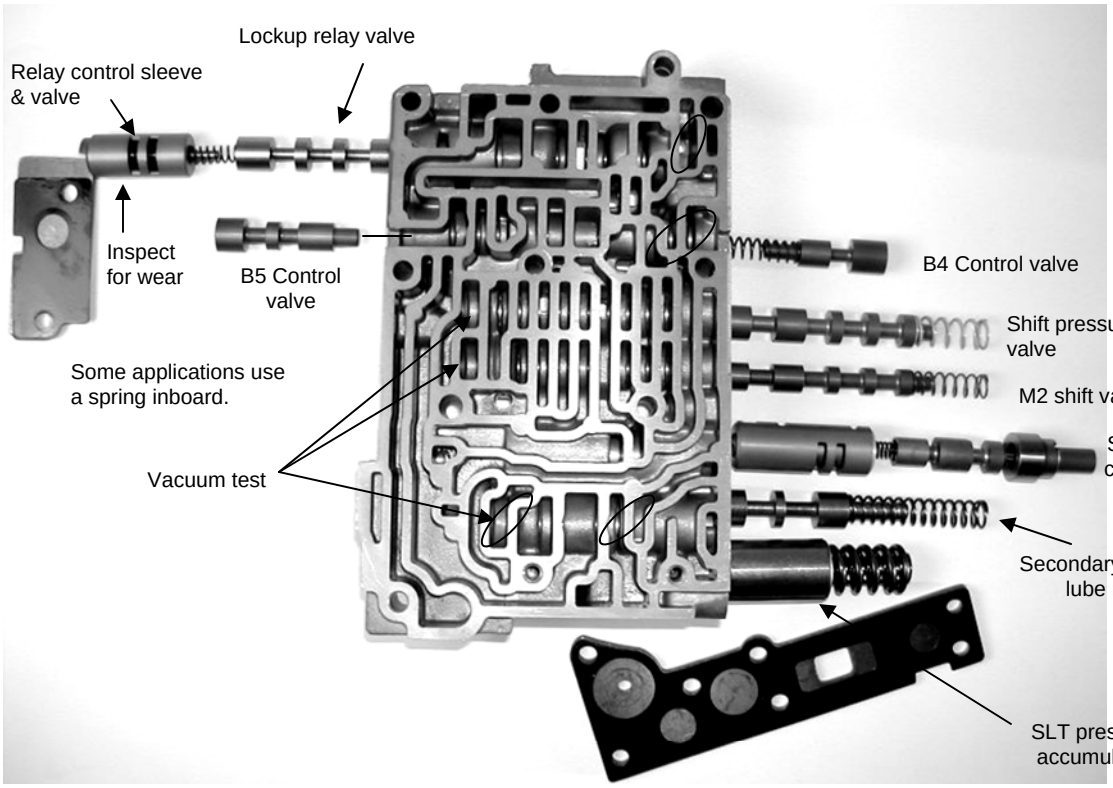


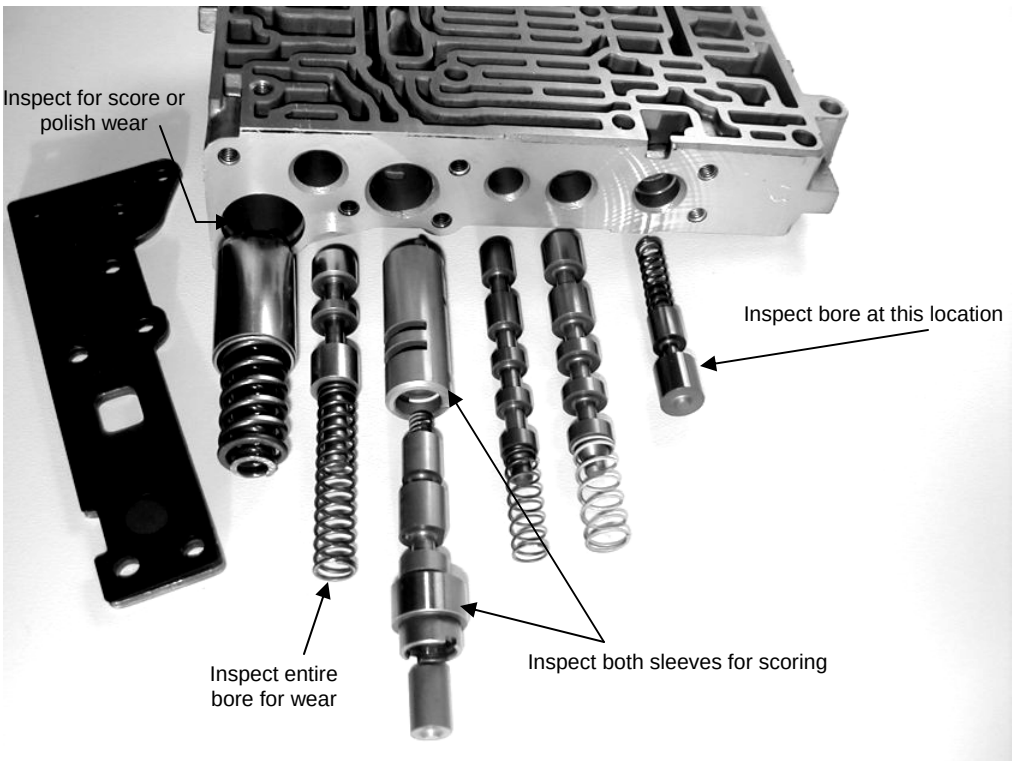
High current causes high pressure
Solenoid is Normally closed (N.C.)
300 Hz operating frequency 15%-48% duty 1 AMP, TCC is off.
SLU controls 2nd clutch (B-2) and low reverse (B-3). Manual low for engine, braking
SLU– Has been know to create 1-2 slip, 2-1 harsh downshift if not adjusted or defective. It also can over heat fluid and affect TCC apply.
SLU generally controls TCC right after 2-3, and will maintain TCC apply coasting or cruise at 25 mph.

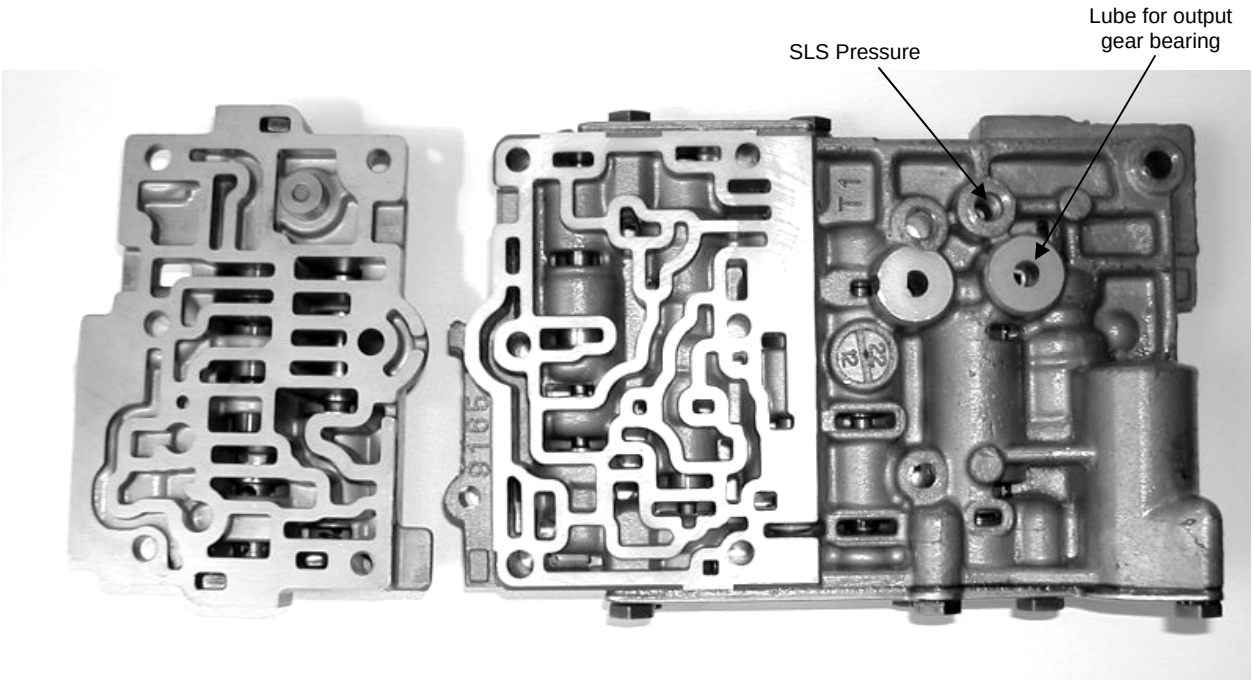

Main pressure regulator & boost
U-2 shift
M-1 shift
U-1 shift
B-4 release


#6 reverse shift check valve. WAT for cross leaks, when assembled
Solenoid relay
Inspect for wear inside sleeve.
Vacuum test

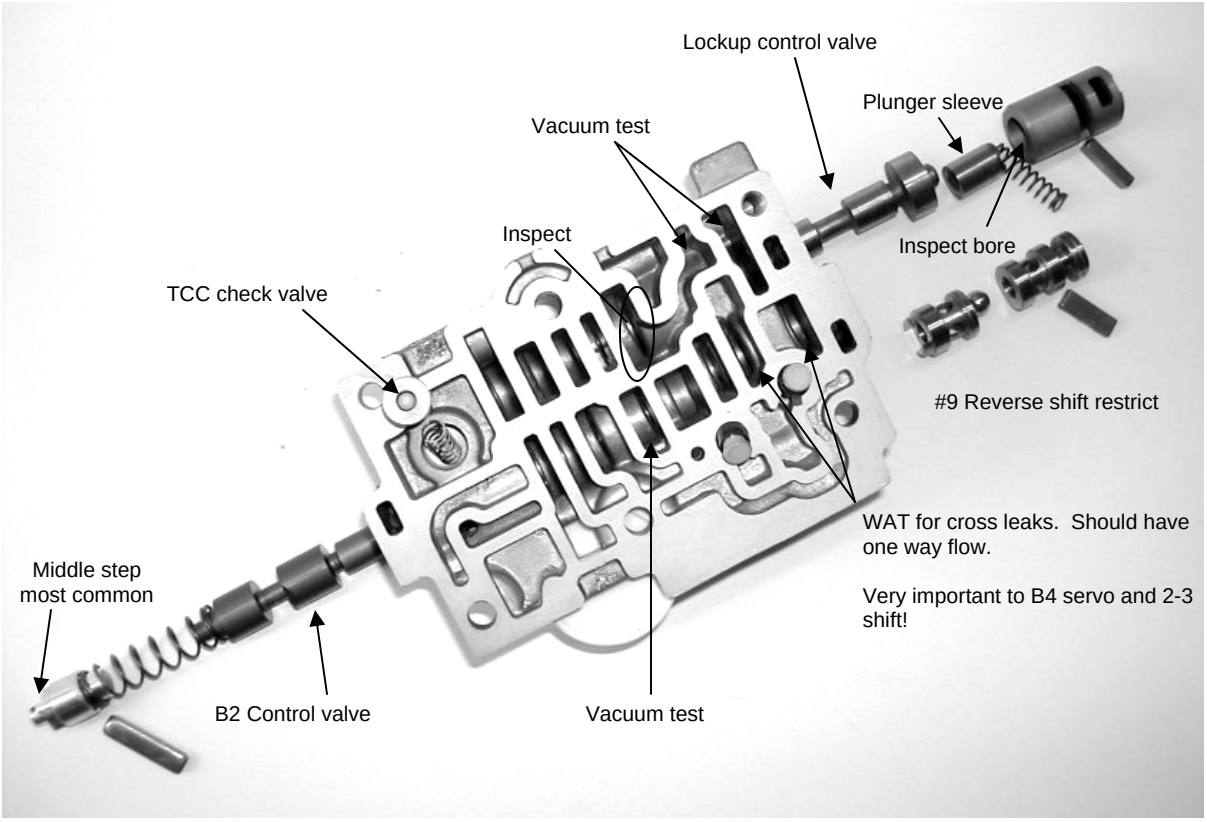
Rear Control Body







#2 Rear Control Valve Body

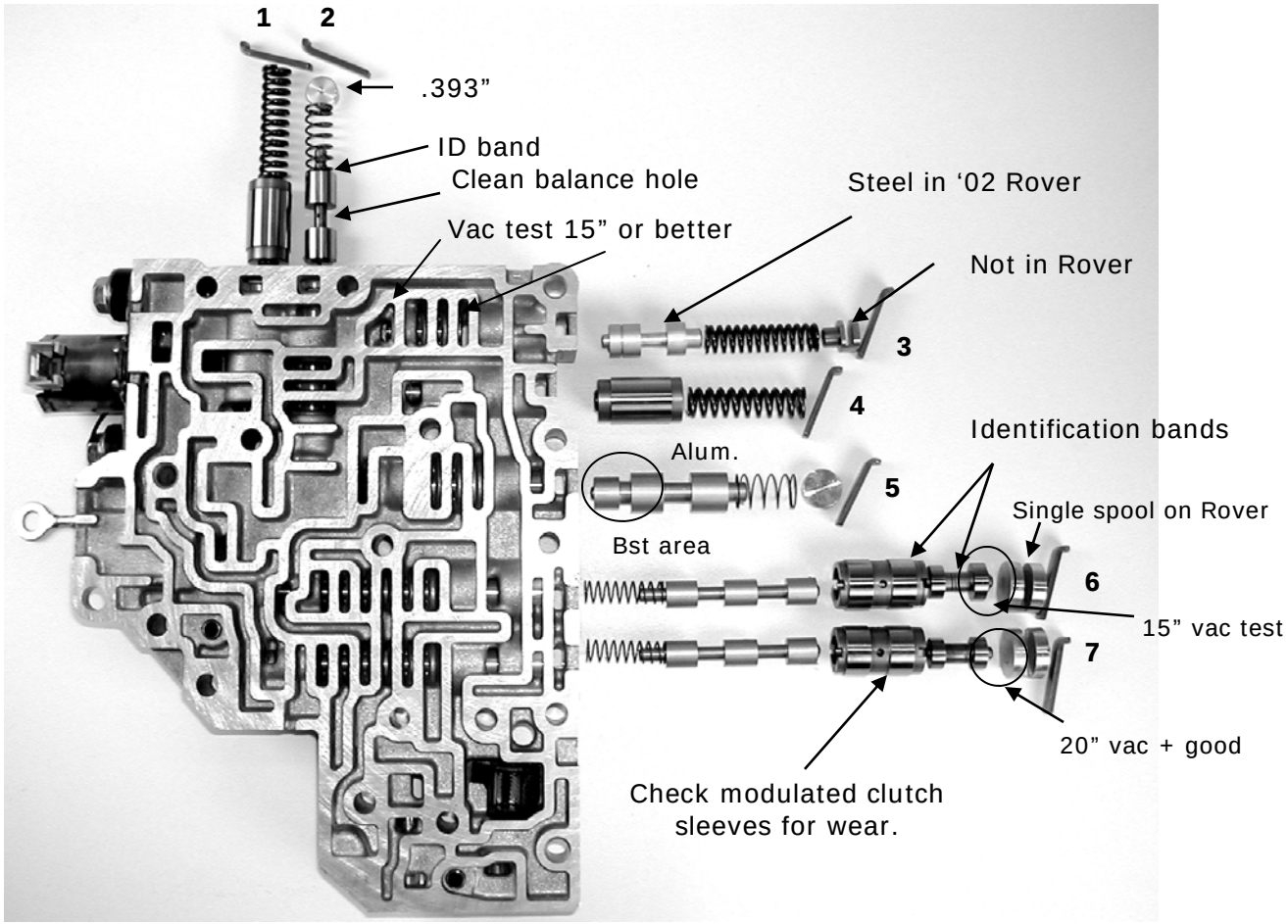


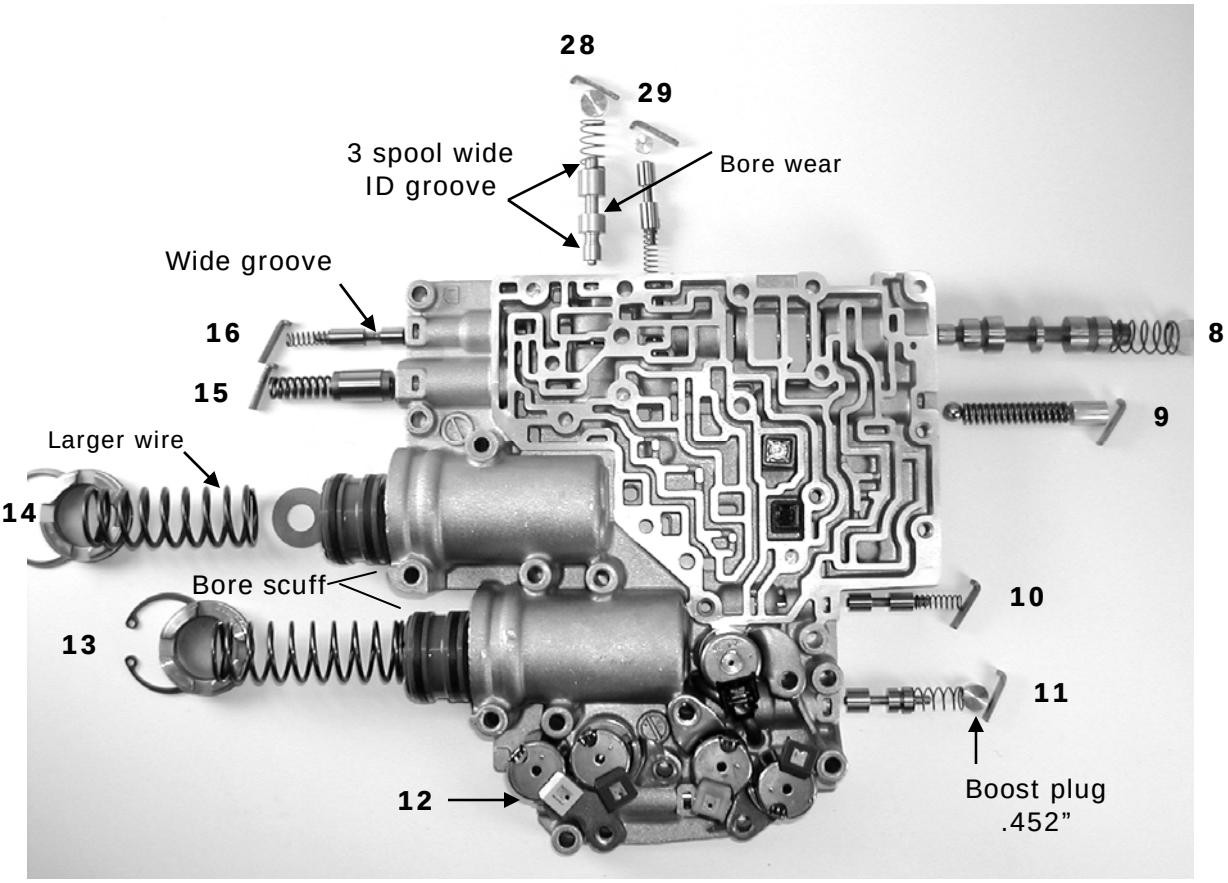
JF506E

Complaint:
- Engine stall on engagement
- Excess TCC slip
- Fluid overheat. Poor converter charge

Cause:
- Cooler restriction
- Valve body wear

Correction:
- By-pass and/or replace cooler
- Inspect valve body as indicated





- Also check case bore & accumulator.
- Suggest .017 wire expanders under accumulator (tag wire) seals (outer/spring side)

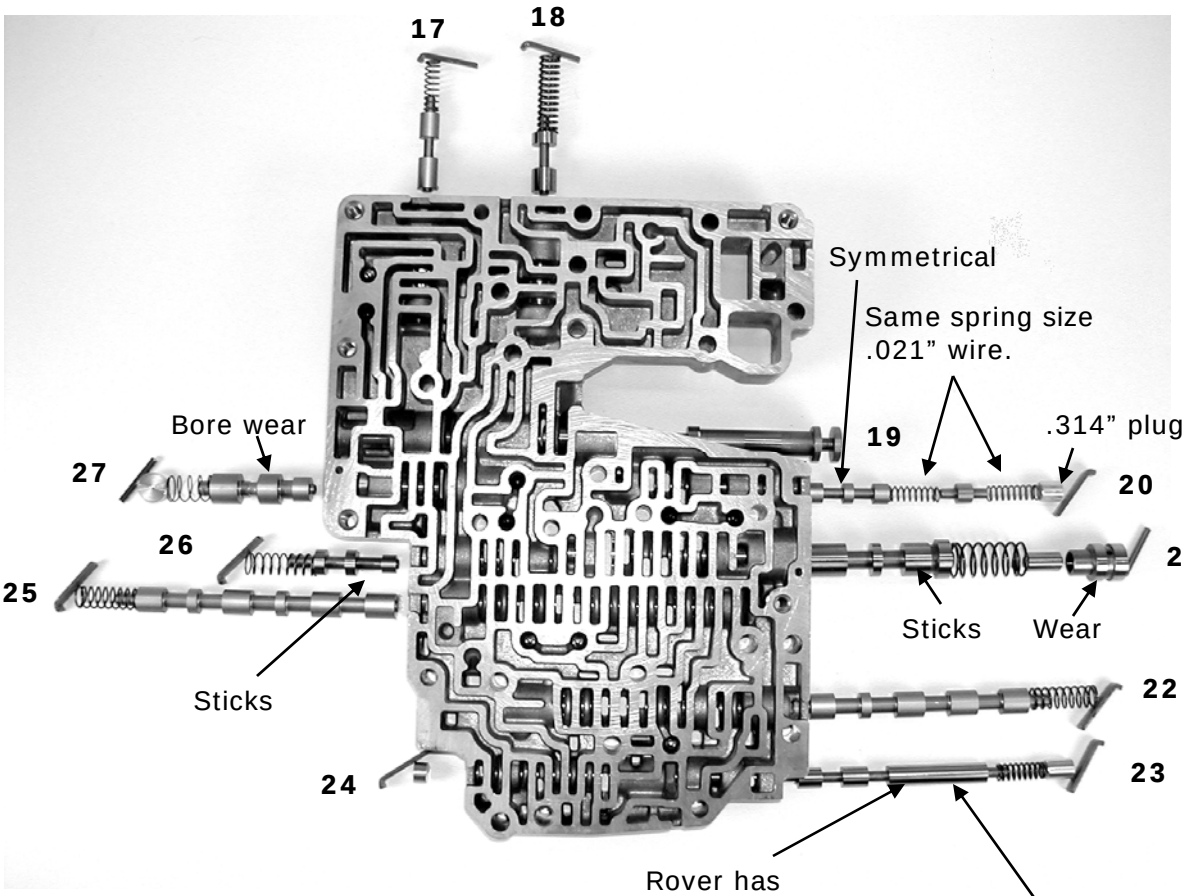
Suggestion: 2 rounds, not overlapping but parallel each other.

#28-Rover
1 stem, deep wide groove

Spools:
.312”
.469”
.469”

#28 Valve size may vary with application.

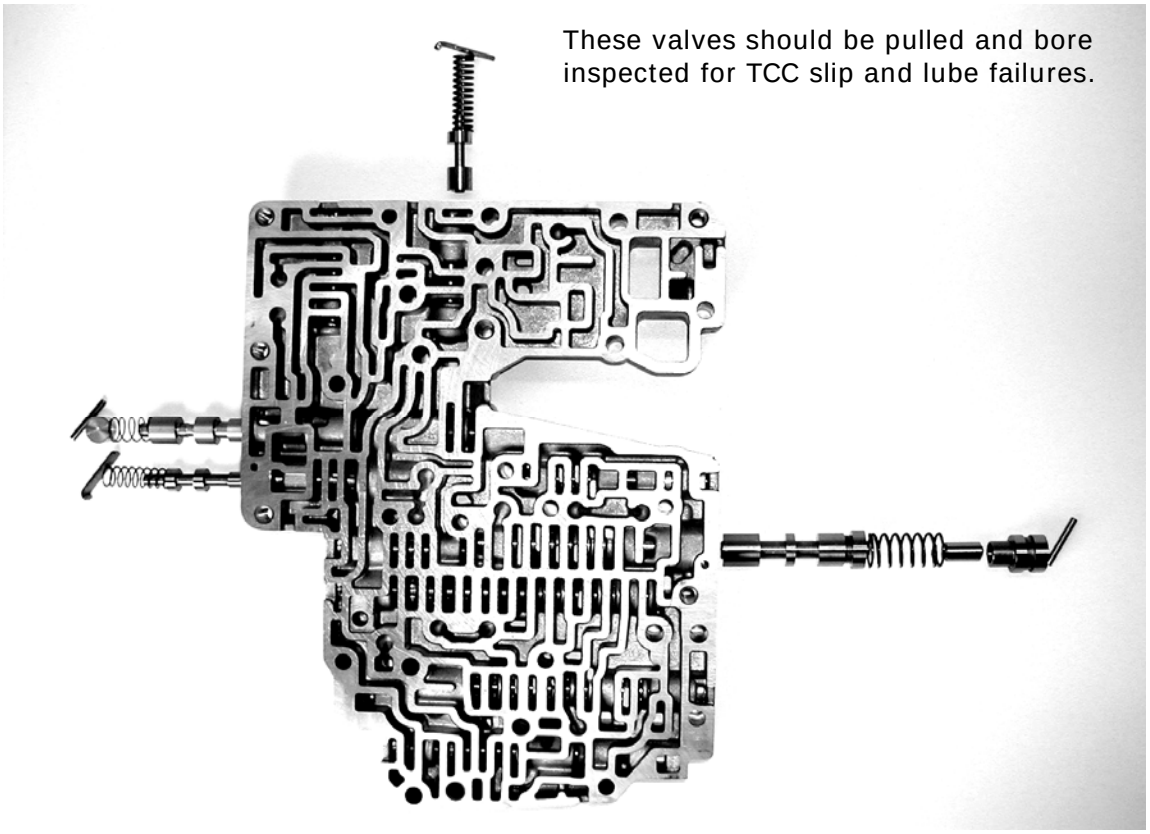
JF506E VW & Rover



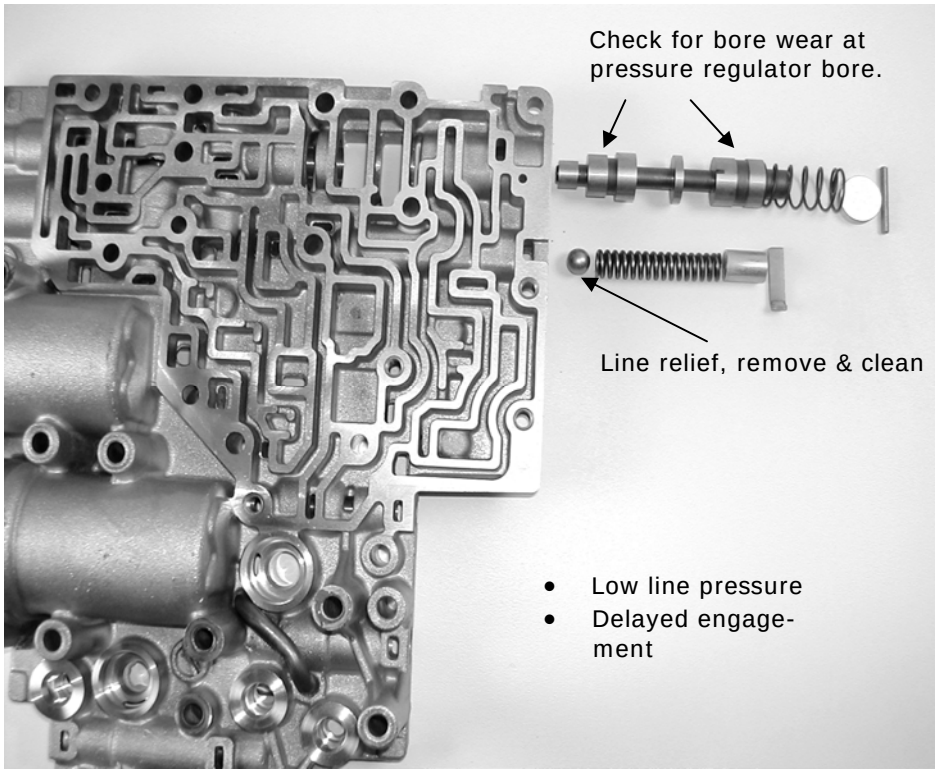
OE pressure Spec .		
Pressure:	Neutral Idle	30 bar
	Stall D	132-155 bar
	Revs clutch in D	57-78 bar
	Stall Revs in D	160-181 bar

PSI to Bar
X .0689
bar

Bar to PSI
X 14.5
PSI


These valves should be pulled and bore inspected for TCC slip and lube failures.

JF 506 E FP-VW


Check for bore wear at pressure regulator bore.
Line relief, remove & clean
• Low line pressure
• Delayed engage-ment

722.6

Complaint:

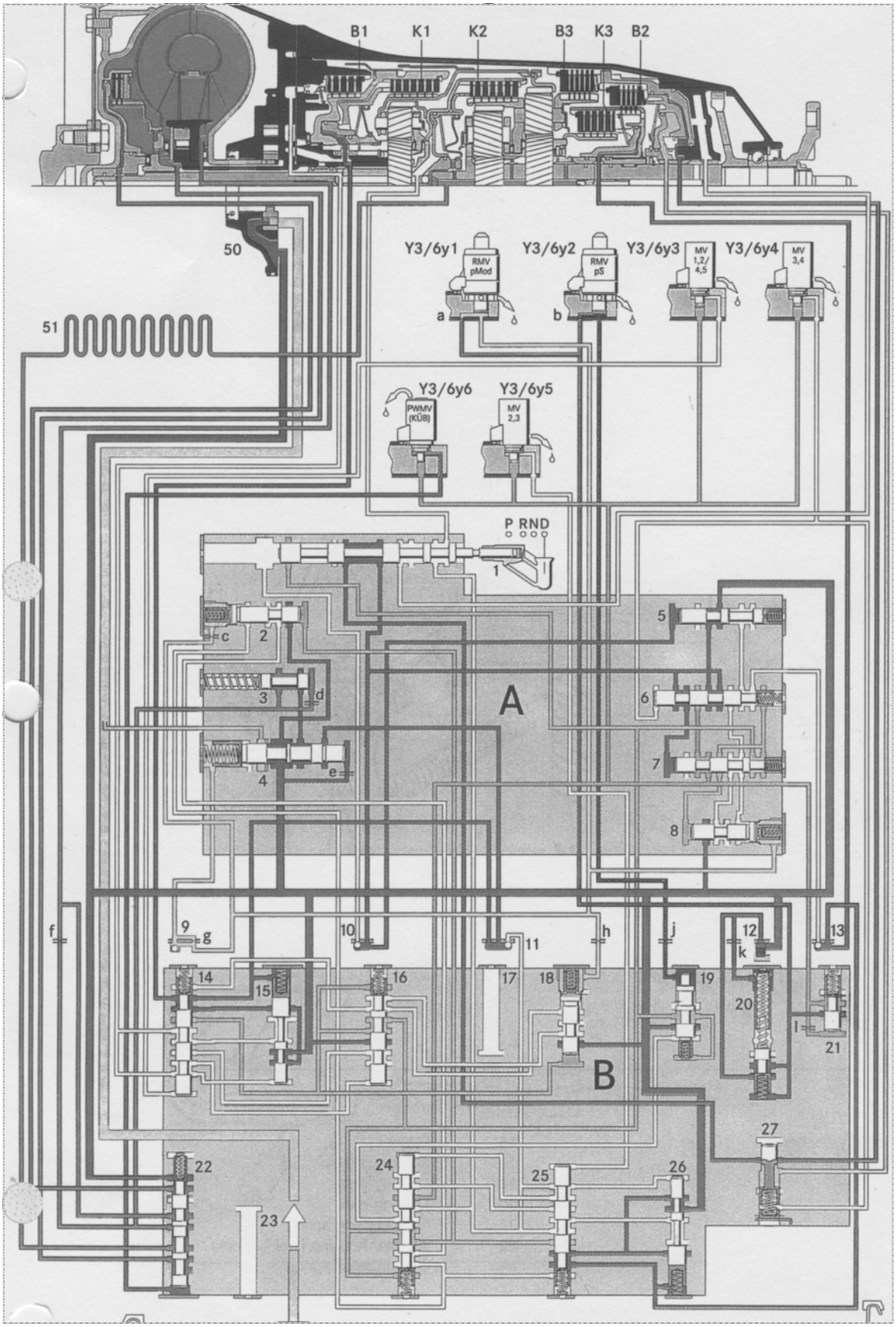
- Converter shudder on coast down or apply.
- No TCC Apply
- Poor acceleration, due to low converter charge psil

Cause:

- Friction material of converter clutch is not compatible to fluid. May have coolant mixed into ATF.
- Converter control valve bore worn
- Main working pressure regulator valve bore wear

Correction:

- Test fluid: Mercedes had a test kit or us a “Perk Test”
- Replace friction material
- Inspect converter cover bushing & seal
- Inspect valve body at bore numbers 3,4 & 22


B1
K1
K2
B3
K3
B2
50
51
Y3/6y1
RMV pMod
Y3/6y2
RMV pS
Y3/6y3
MV 1,2/ 4,5
Y3/6y4
MV 3,4
a
b
Y3/6y6
PWMV (KÜB)
Y3/6y5
MV 2,3
P RND
1
2
c
3
d
4
e
5
6
7
8
A
9
g
f
10
11
h
j
12
k
13
14
15
16
17
18
19
20
l
21
B
22
23
24
25
26
27

722.6 Valve Wear Points, continued

Components of the electro hydraulic control

A Electrical control unit

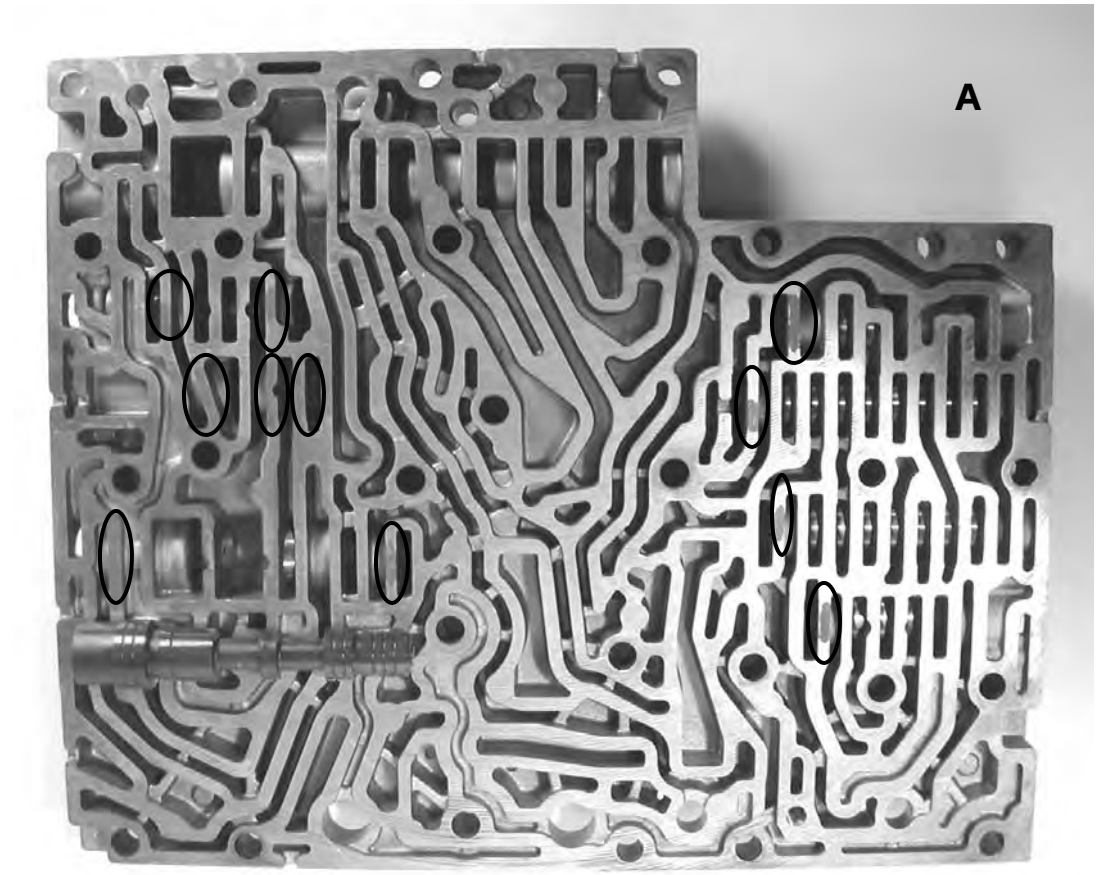
Y3/6y1 Modulating pressure regulating solenoid valve
Y3/6y2 Shift pressure regulating solenoid valve
Y3/6y3 1-2/4-5 shift solenoid valve
Y3/6y4 3-4 shift solenoid valve
Y3/6y5 2-3 shift solenoid valve
Y3/6y6 PWM solenoid valve

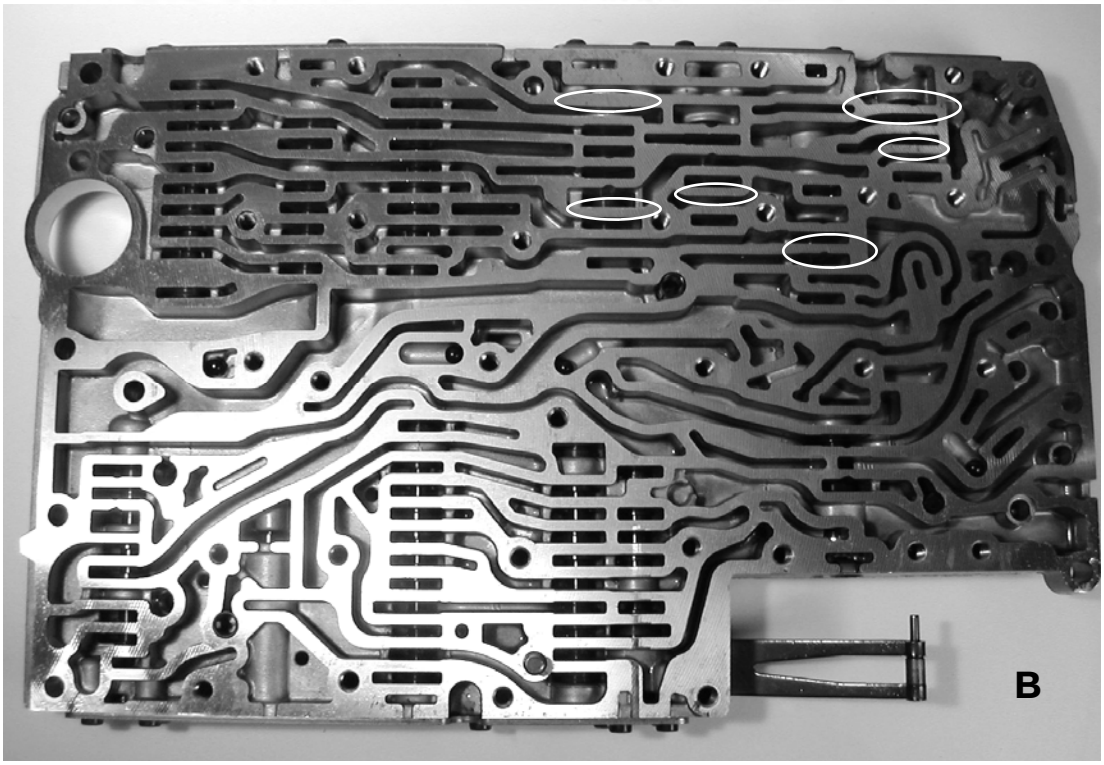
1. Selector valve
2. 2-3 pressure overlap control valve with sleeve and piston
3. Lubricating pressure control valve
4. Working pressure control valve
5. Holding pressure shift valve
6. 3-4 command valve
7. 3-4 shift pressure shift valve
8. 3-4 pressure overlap control valve with sleeve and piston

B Valve body

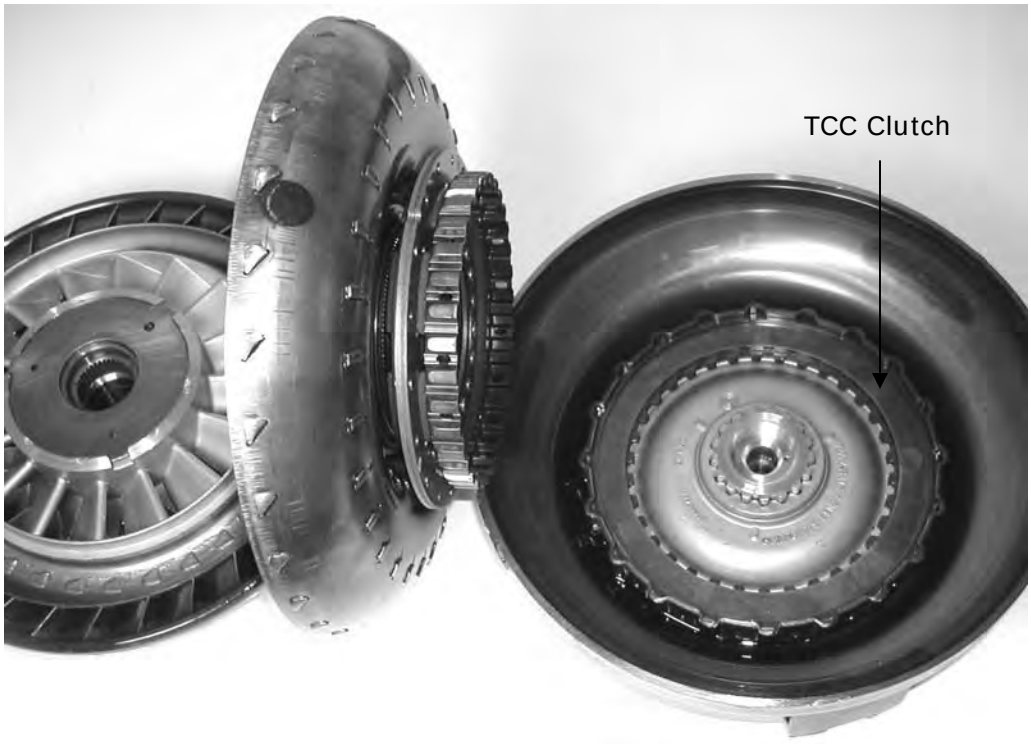
9. One way throttle valve
10. Ball switchover valve
11. Ball switchover valve
12. Filter screen, supply to regulating valve pressure control valve
13. Ball switchover valve
14. 1-2/4-5 command valve
15. 1-2/4-5 holding pressure shift valve
16. 1-2/4-5 shift pressure shift valve
17. Bore for later use
18. 1-2/4-5 pressure overlap control valve with sleeve and piston
19. Shift pressure control valve
20. Regulating valve pressure control valve
21. Shift valve pressure control valve
22. Torque converter lock-up clutch control valve
23. Bore for later use
24. 2-3 shift pressure shift valve
25. 2-3 command valve
26. 2-3 holding pressure shift valve
27. B2 shift valve
28. “a” to “l” = Orifices

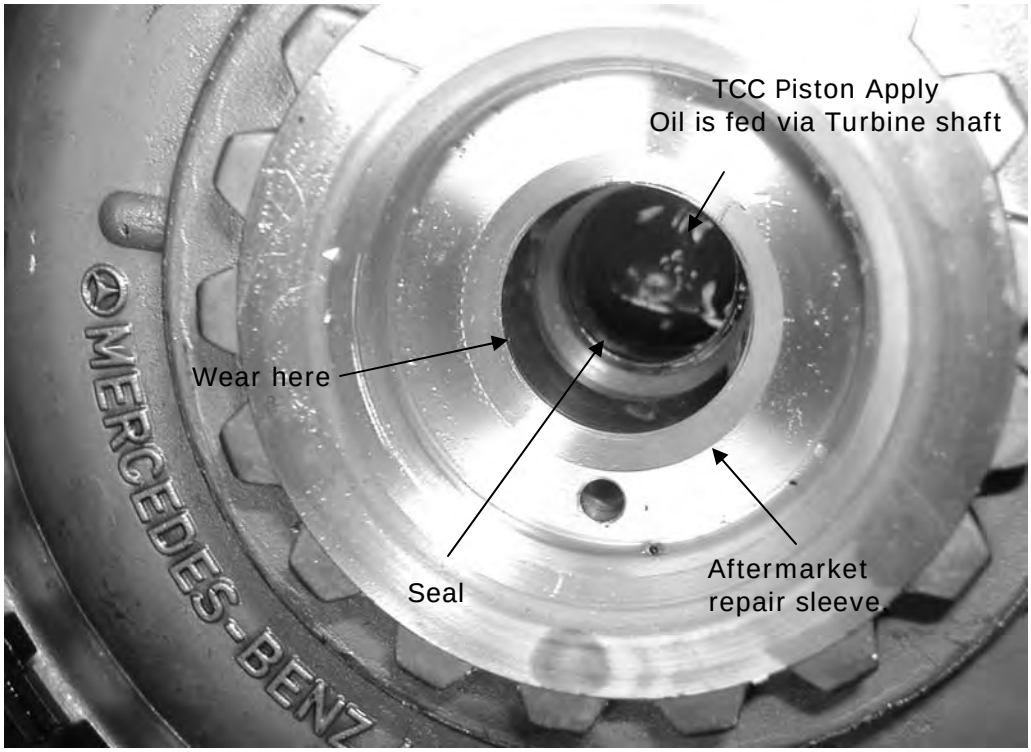
722.6 Valve Body Wear Points, circled
Note: These pictures match the oil circuit





722.6 Converter Design

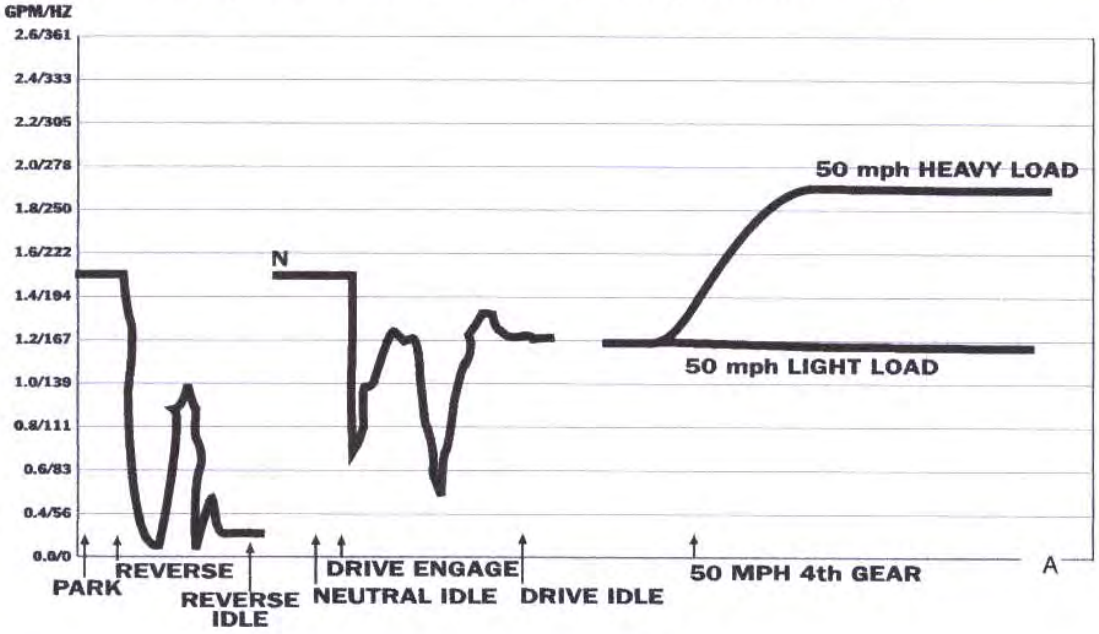




722.6 Turbine shaft seal & pilot wear causes engine stall. TCC shudder.

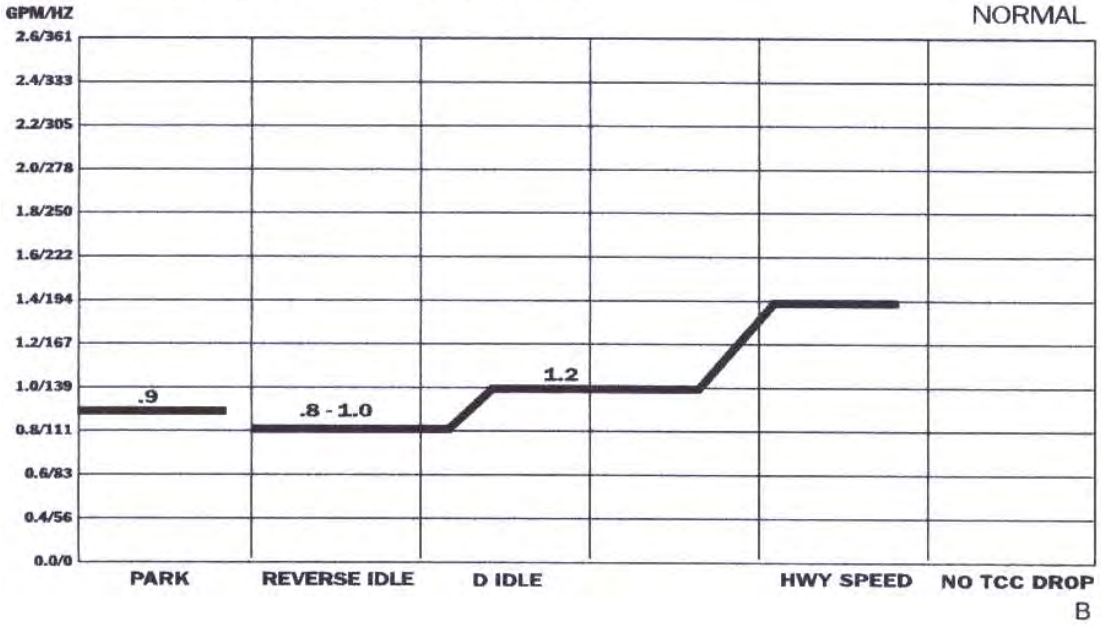
SONNAFLOW®

MERCEDES (300E 2.9L 6 CYL. 113,000 MILES)



Notes: Very similar to '95 S-320 with 722.6

MERCEDES 722.6 ('95 S-320)



4L40E/5L40E

Complaint:

- TCC damper/piston breakage
- Converter lining or fluid overheat
- Excess TCC slip RPM, No lockup (often combined with loss of reverse)

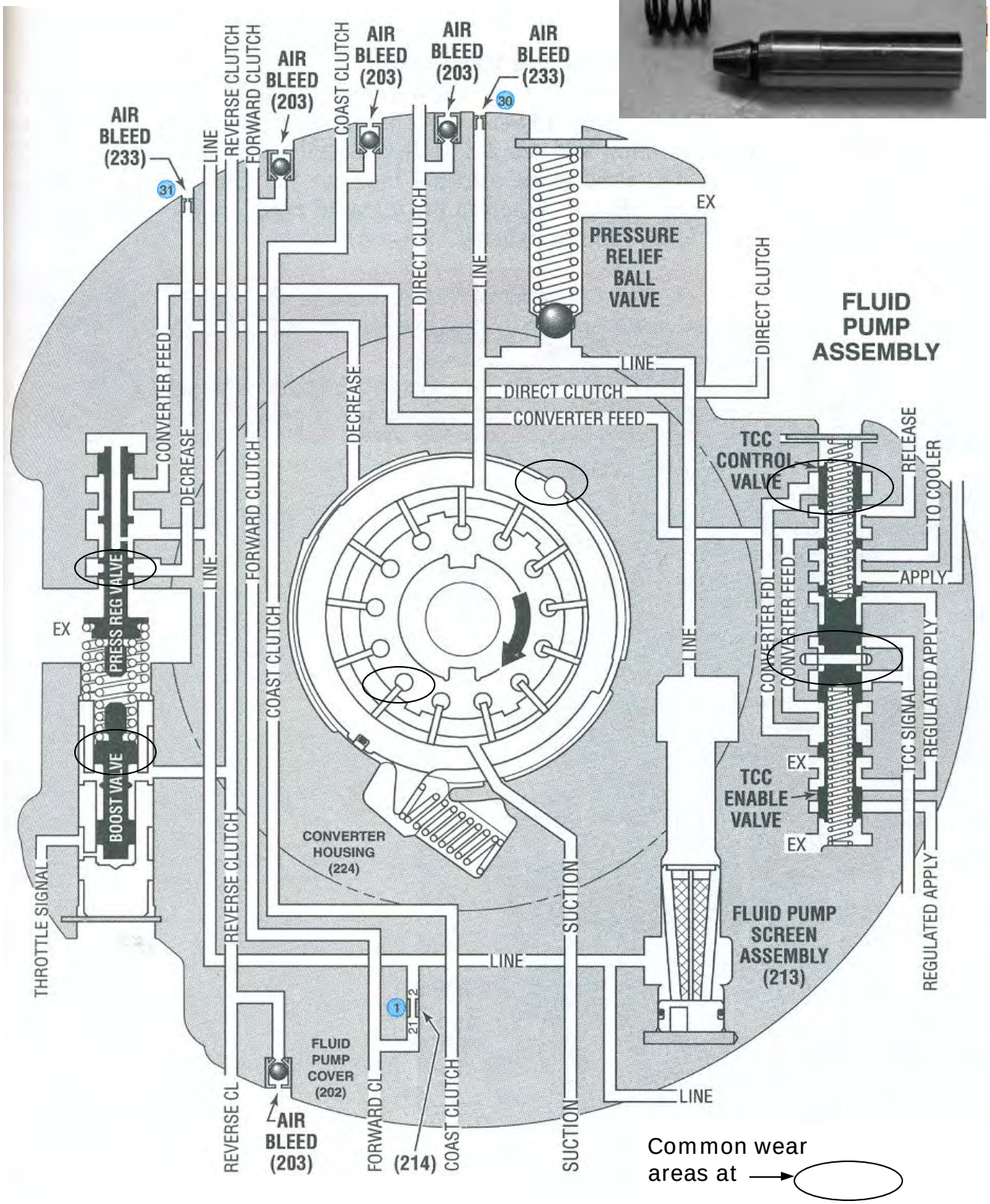
Cause:

- TCC solenoid not holding internal pressure and bleeding into TCC apply oil
- TCC enable valves partially stroked
- Valve body cross leaks at reverse lock-out valve or TCC regulator.
- Pump cross leaks.

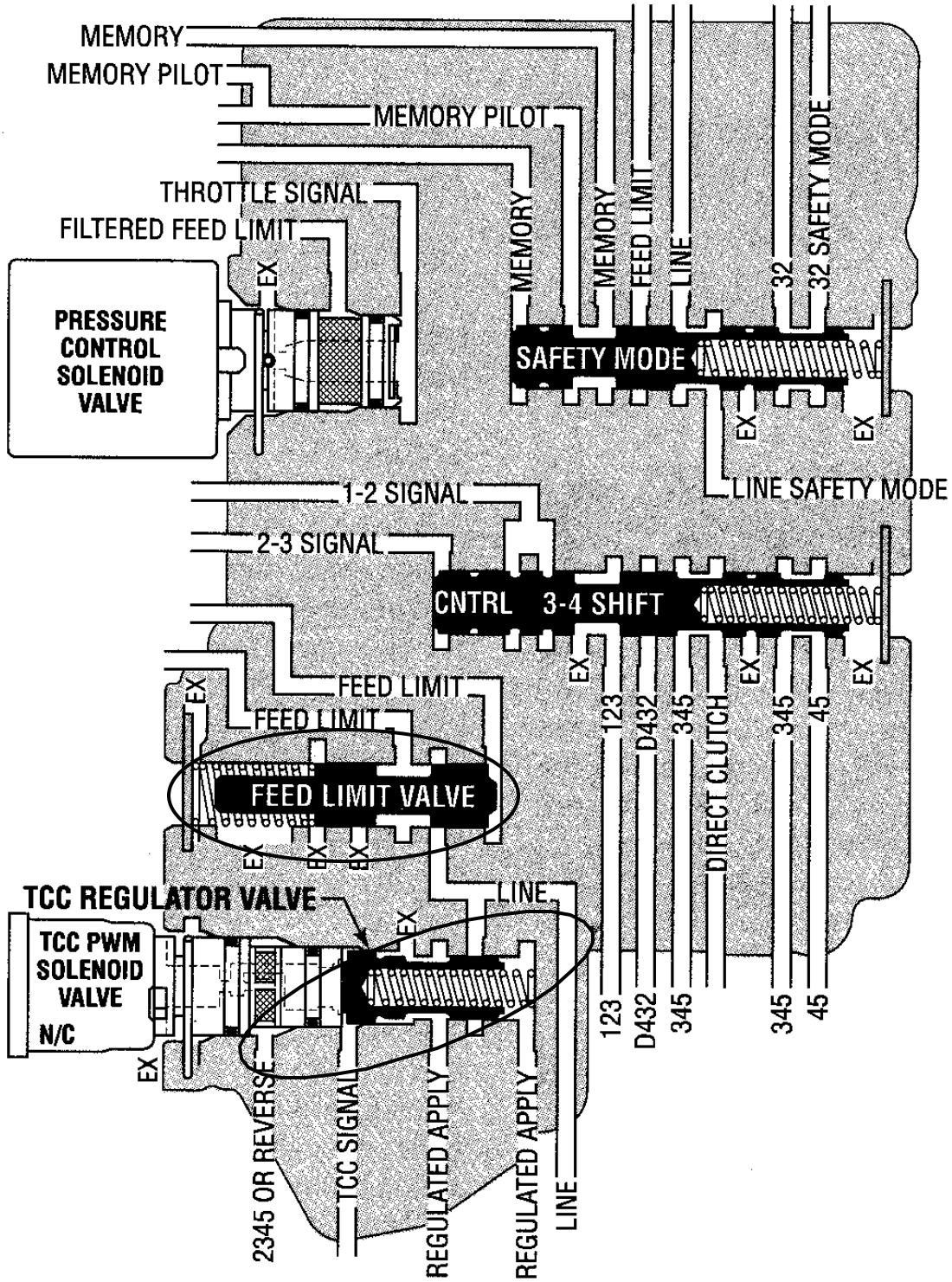
Corrections:

- Resurface pump halves and valve body.
- Install quality OE BMW TCC solenoid, or Borg Warner (Ill#1)
- Rebuild TCC valve bore and AFL bore or replace valve body

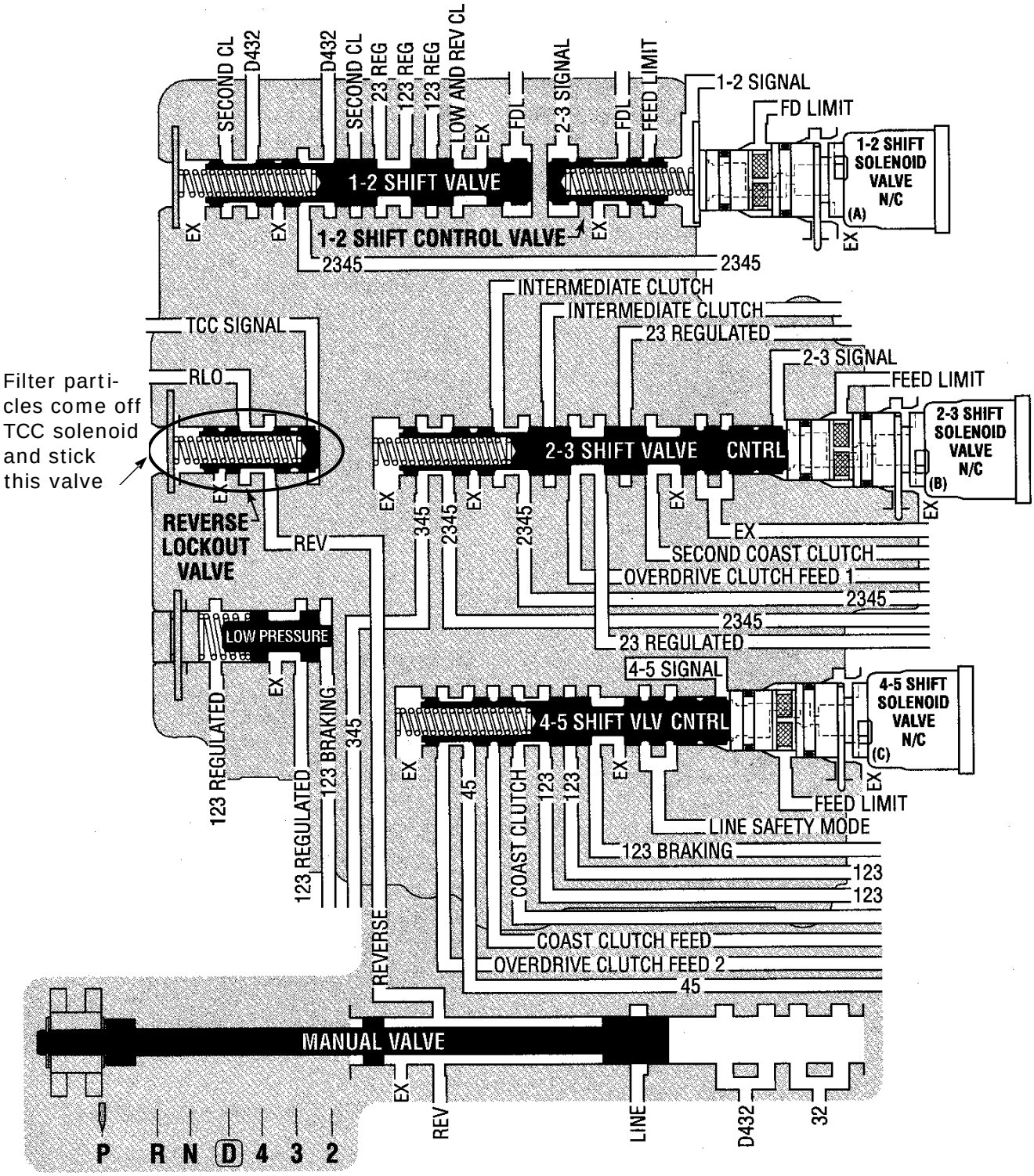
5L40E Pump


AIR BLEED (233)
AIR BLEED (203)
AIR BLEED (203)
AIR BLEED (203)
AIR BLEED (233)
REVERSE CLUTCH
FORWARD CLUTCH
COAST CLUTCH
LINE
DIRECT CLUTCH
PRESSURE RELIEF BALL VALVE
FLUID PUMP ASSEMBLY
CONVERTER FEED
DECREASE
TCC CONTROL VALVE
RELEASE
TO COOLER
APPLY
PRESS REG VALVE
BOOST VALVE
EX
CONVERTER FDL
REGULATED APPLY
TCC SIGNAL
TCC ENABLE VALVE
CONVERTER HOUSING (224)
THROTTLE SIGNAL
SUCTION
FLUID PUMP SCREEN ASSEMBLY (213)
FLUID PUMP COVER (202)
REVERSE CL
FORWARD CL
(214)
Common wear areas at

5L40E Front Control Body



5L40E Rear Control Body



4T80E

Complaints:

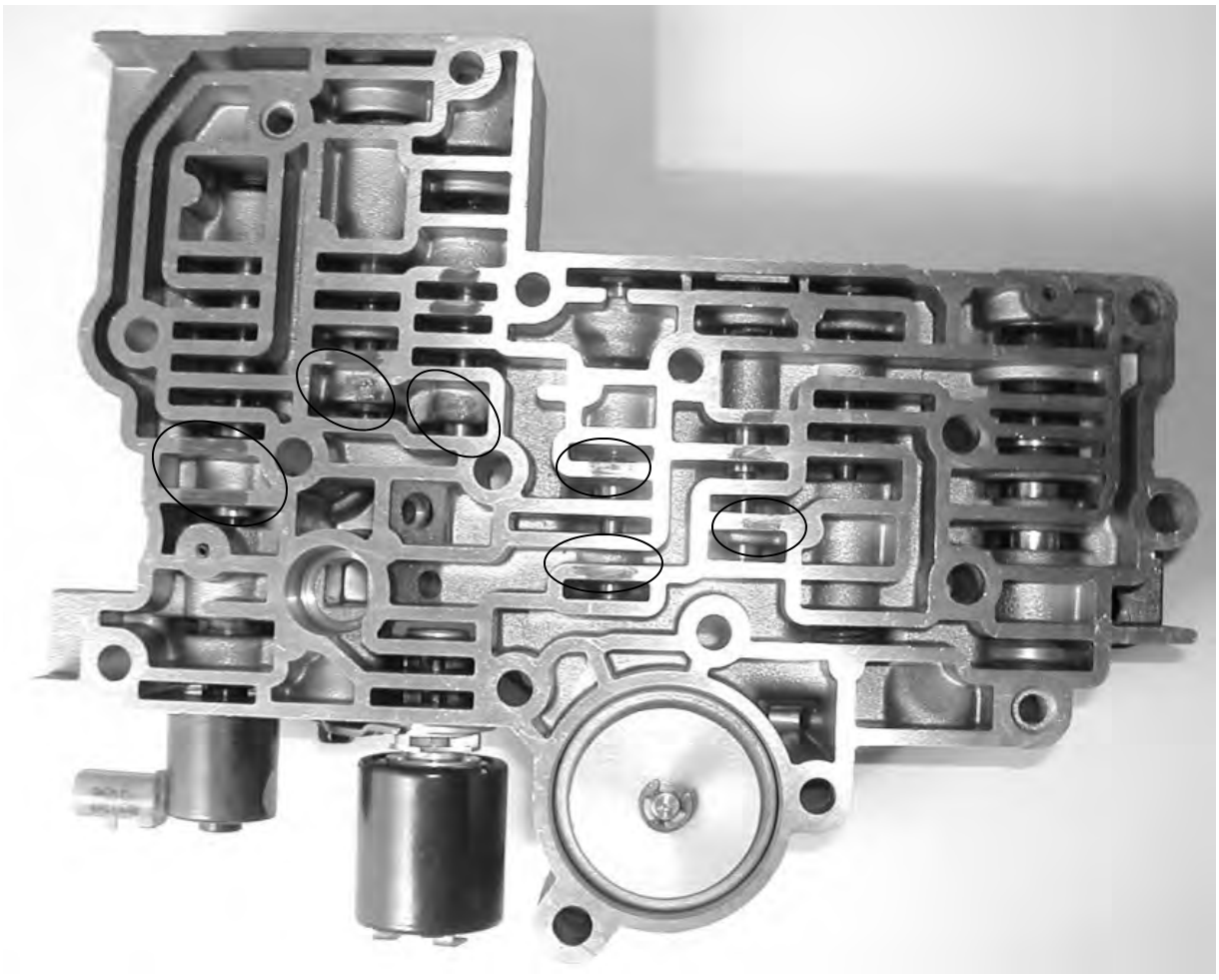
- Code 741
- Drive-line bump: TCC apply or release
- Excess TCC slip
- Fluid overheat, Trans service code
- Poor converter charge
- Impeller hub bushing wear
- Hydraulic buzz noise during TCC apply

Cause:

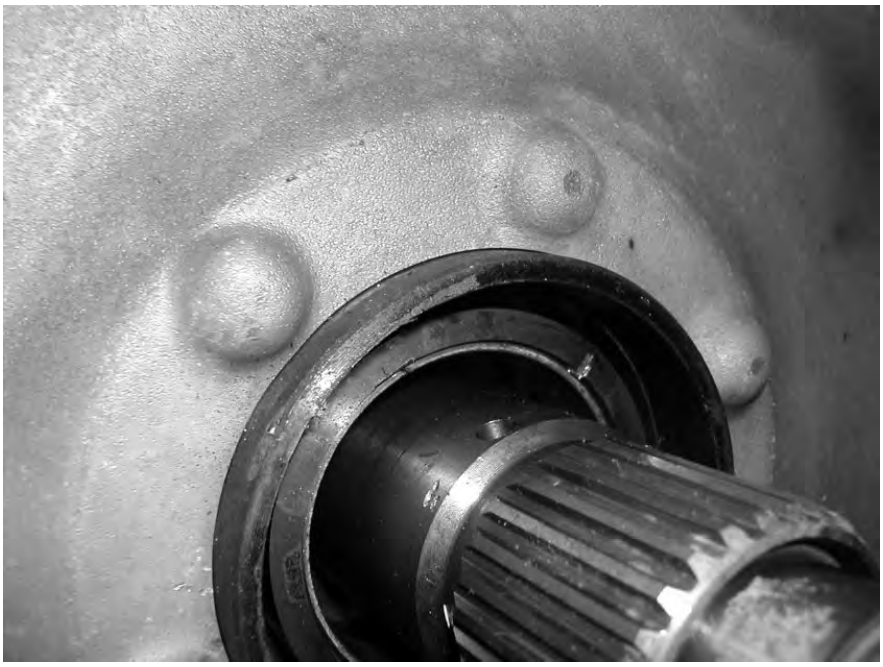
- Mis-calibration and lack of control between valve body and converter.

Correction:

- Wear at the TCC control valves (ills.#1)



- Stator support bushing to converter Impeller hub wear. (Ills. #2)



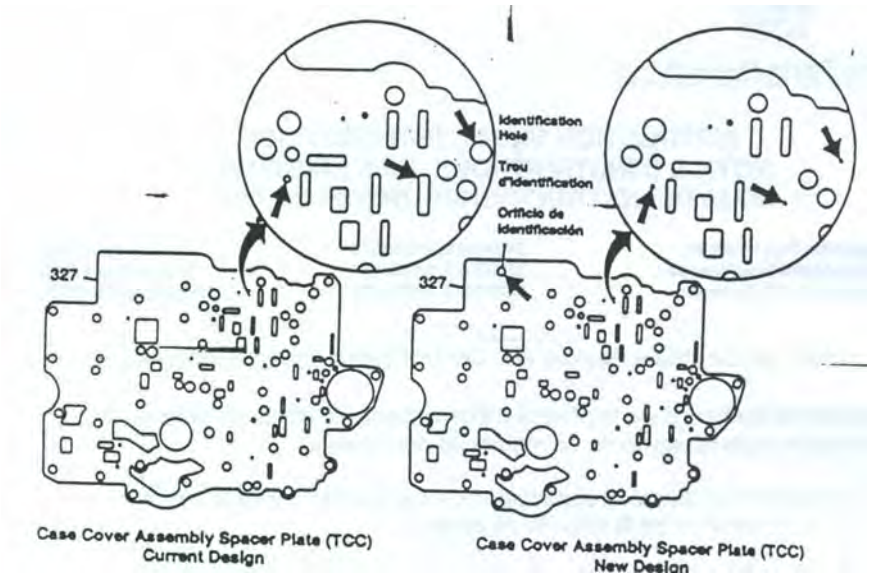
Mis-calibration of TCC valve springs and separator plates.
For units prior to 3-15-05.
After '05 GM went to woven carbon lining on 4T80E.

Following is a copy of service package part number 24233678 cost is $255.00, 24233679 cost is $45.00.

These ECCC components will service certain non ECCC 4T80E transaxles. Non-ECCC 4T80E transaxles have a unique TCC Control Valve Spring, and a unique TCC Enable Valve Spring. Remove both Springs from the Upper Control Valve Body Asm and discard them. Install one of the Control Valve Springs included in this kit at the TCC Control Valve, and install the other Control Valve Spring included in this kit at the TCC Enable Valve. The (2) Control Valve Springs included in this kit are identical.

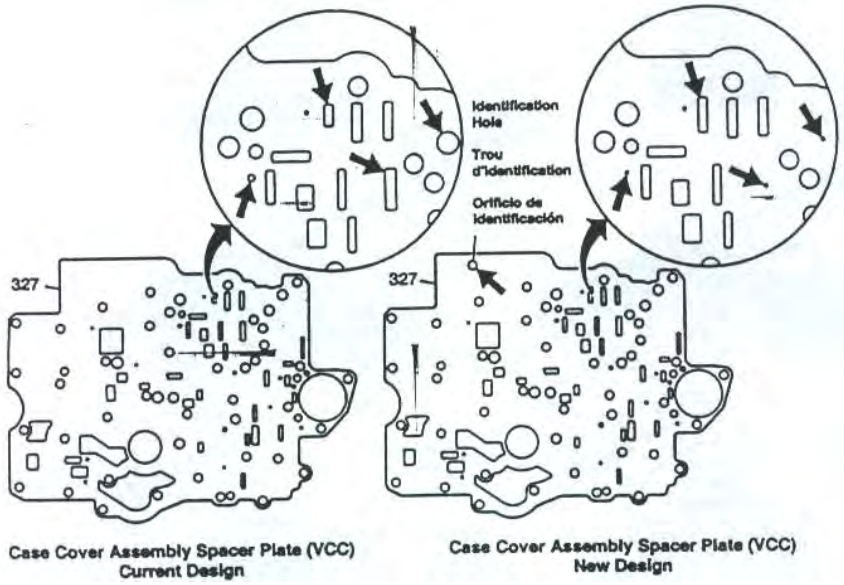
WARNING: When servicing a non-ECCC 4T80E Transaxle, reassemble it with an ECCC auxiliary control valve body spacer plate, ECCC auxiliary control valve body gasket (lower), ECCC control valve body gasket (upper), and ECCC control valve springs as a set. Do not reassemble non-ECCC 4T80E transaxles with any combination of ECCC and non-ECCC components (auxiliary control valve body spacer plate, auxiliary control valve body gasket (lower), control valve body gasket (upper), and control valve springs).

The transaxle will not function properly with wrong combinations of ECCC and Non-ECCC components installed. Please review the included graphics for ECCC and Non-ECCC component identification features and correct usage.



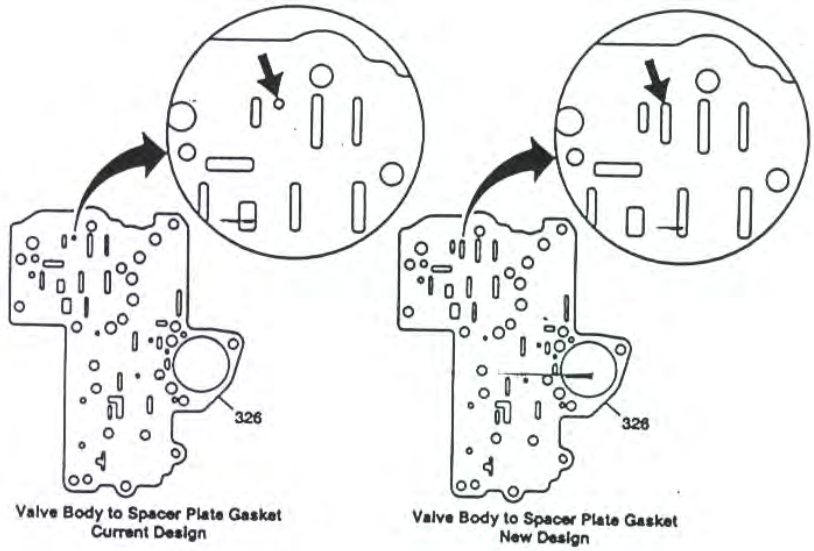
Case Cover Assembly Spacer Plate (TCC)
Current Design

Case Cover Assembly Spacer Plate (TCC)
New Design



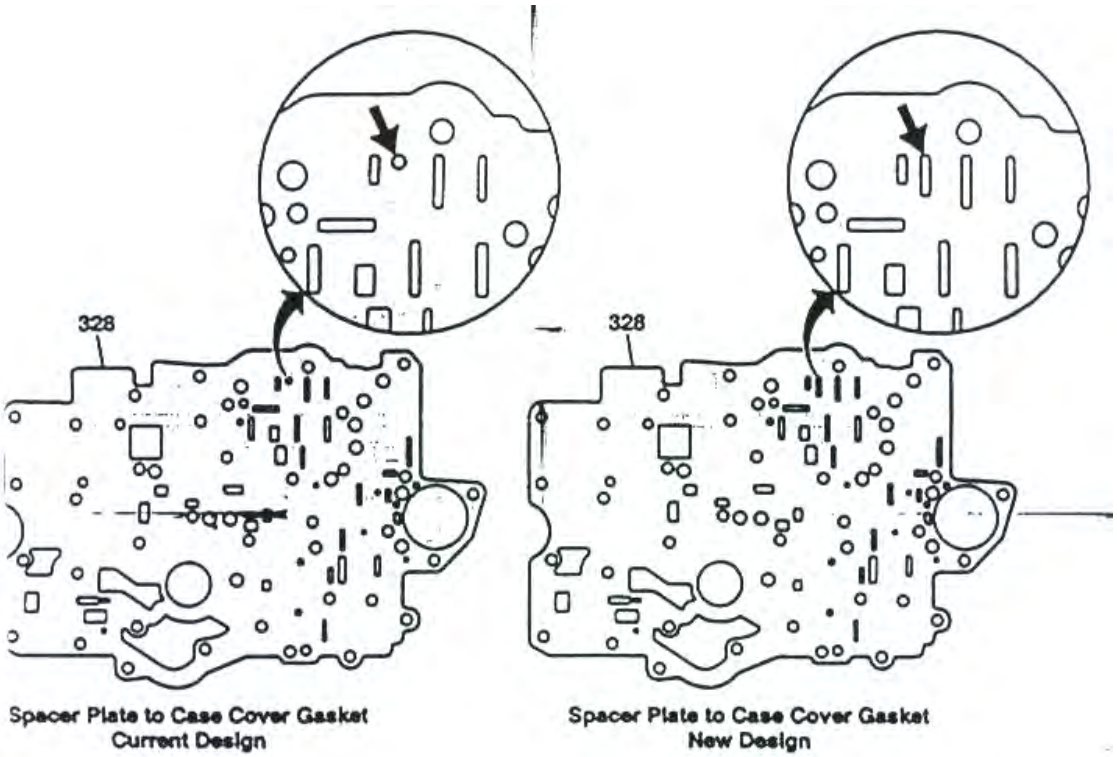
Case Cover Assembly Spacer Plate (VCC)
Current Design

Case Cover Assembly Spacer Plate (VCC)
New Design



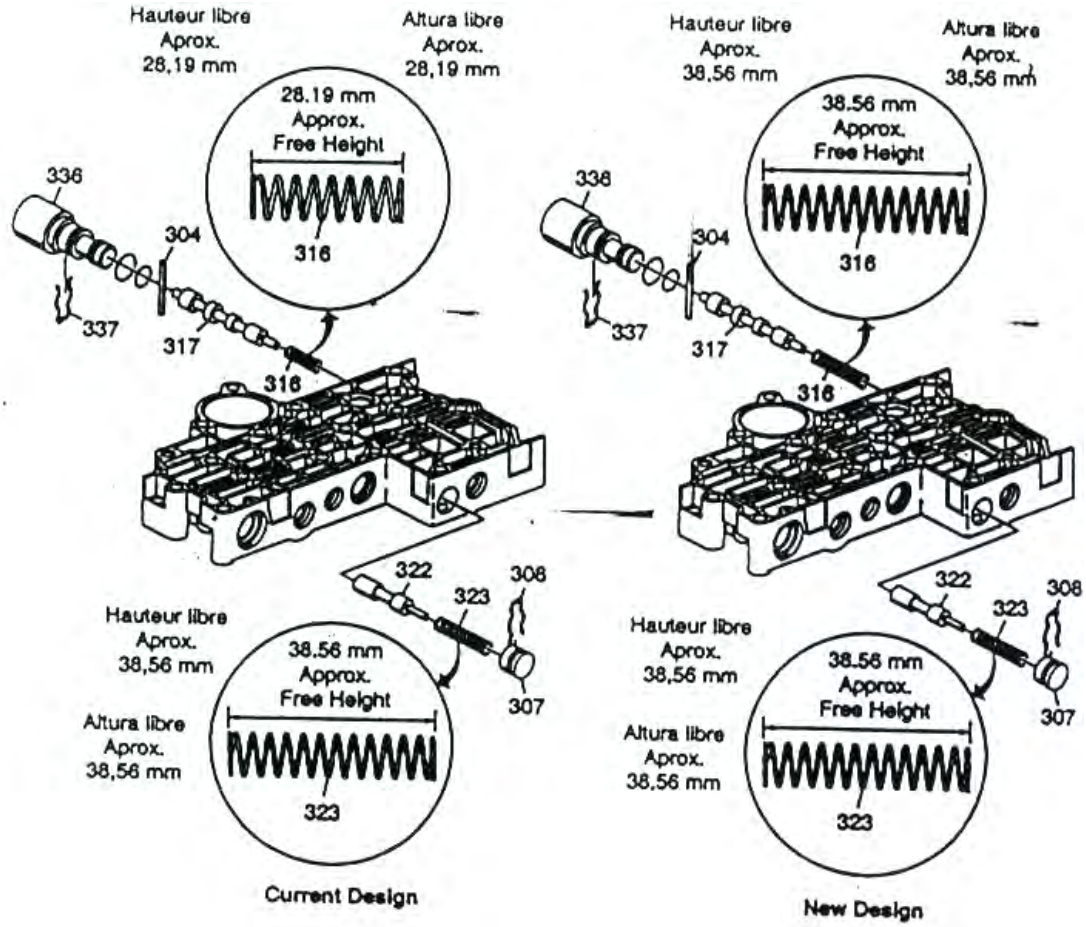
Valve Body to Spacer Plate Gasket
Current Design

Valve Body to Spacer Plate Gasket
New Design



Spacer Plate to Case Cover Gasket
Current Design

Spacer Plate to Case Cover Gasket
New Design



Current Design

New Design

46-48RE

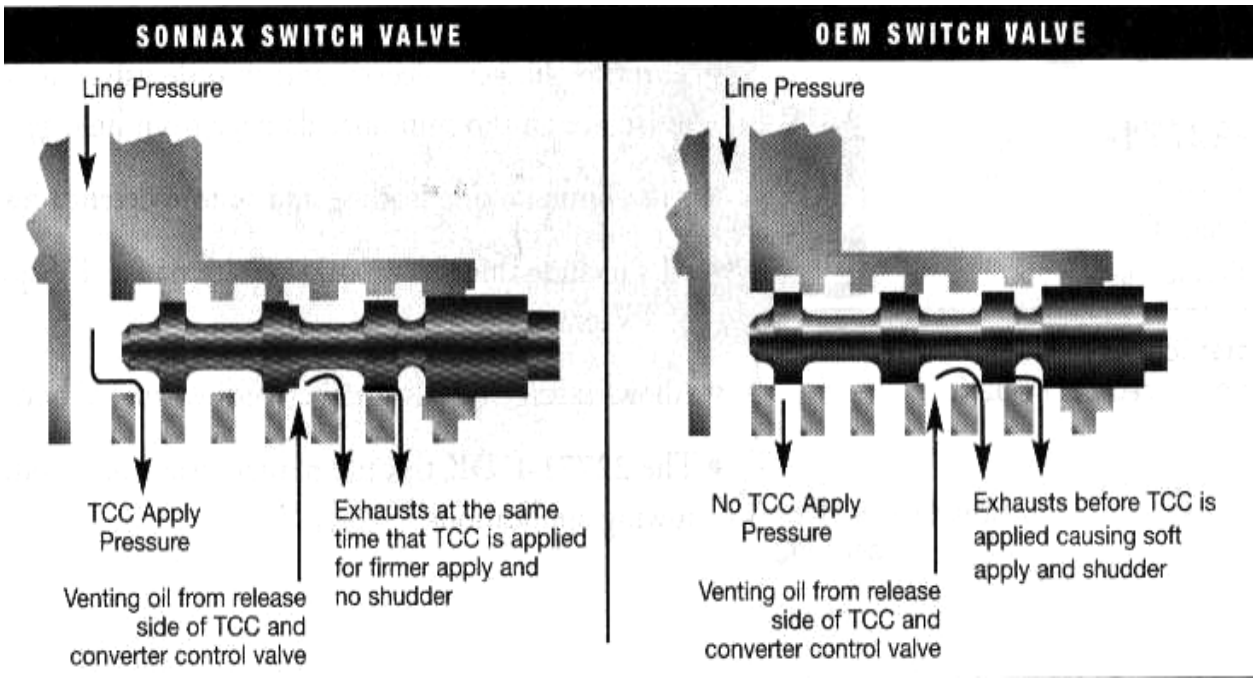
Complaint:

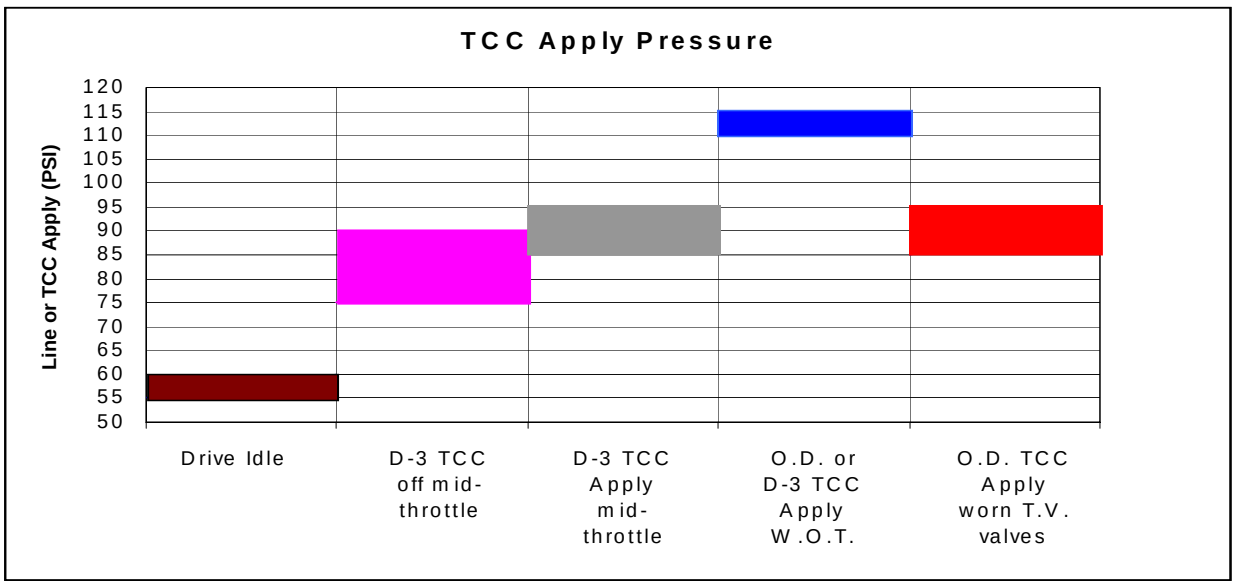
- TCC shudder
- Excess slip rate
- No TCC apply

Cause:

- Numerous! See previous Sonnax materials in '05 TCRA on how to diagnose.
- Recent trend has been in area of witch valve bore. Wear at the inboard end is loss of apply oil pressure. Wear at the outer spring end affects timing of release and reduces the sharp application.

Correction: Repair valve bore with oversized valve.





5R110 Torqshift

Application:
- Ford super duty trucks, 250-550 series w/diesel, Excursion

Complaint:
- TCC slippage
- Code PO 1744
- Delayed engagement
- Converter crowd/chuggle at Idle or Coast
- No lock-up

Cause:
- Contamination at TCC solenoid or its feed orifice in the valve body.

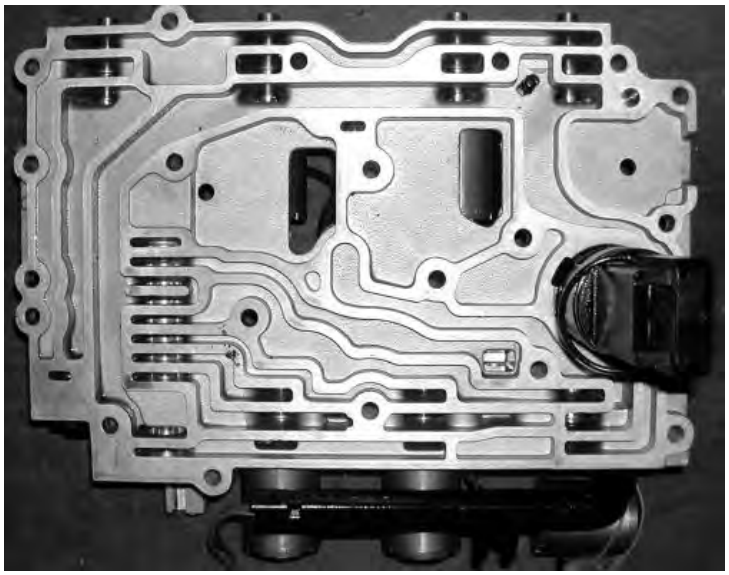


Fig 1

- The thermal valve in pump may be stuck or not fully open. It should be fully open after 125 degrees f.

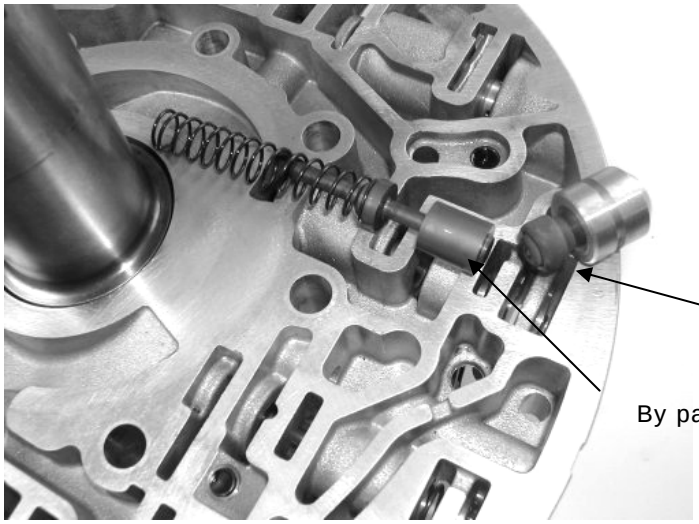
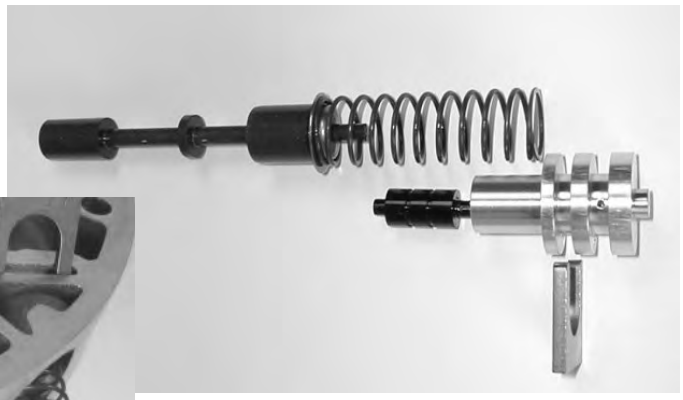


Fig 2

- Worn TCC modulator sleeve or retainer in wrong location.



Cause:

- Pictured is an early 03-04 pump casting. It is suggested all pumps be updated to the '05. Circuitry has been changed and does not look like this picture. The '05 will have improved pressure, flow and TCC apply.

Inspect for bore wear here.

AX4S-AX4N4F50N

Complaint:

- Erratic line pressure
- TCC slip code 740-741
- No converter fill, no move

Cause:

- Applications after '98 have a different design converter regulator valve. It will be a two spool valve with heavy spring(s). This design wears the valve body casting.

Correction:

- This circuit can be vacuum tested easily to verify wear. Upon dis-assembly, it the valve is loose, discolored or sticks upon removal, the bore is worn.

Note: Even though this has been a widely publicized problem, many shops mis this wear and often reuse OE!