Converter Conundrums

Conundrum=A riddle involving a pun

The top 3 converter vs. transmission issues of 2010

Conundrum 1- 722.6 Engine stumble, TCC shudder/drone

Conundrum 2- Honda B7TA-Overheated converter, TCC slip

Conundrum 3- Aisin Warner 6 FWD-Overheated linings, harsh shift, sprag failure

TCRA 2010

Presented by:
Bob Warnke

Conundrum 1
722.6- W5A- W5J- NAG 1
Applications:
Mercedes ’00 to 2012
Sprinter, Dodge, Jeep, Freightliner

Complaints:
Engine stumble at cool temperatures (gas or diesel)
Rough idle when cool
Driveline vibration (NVH) during TCC modulation
TCC shudder or drone between 35-48 mph

Cause:
Transmission related
1: Leakage of converter pressure into the TCC piston area
2: Low converter apply pressure, due to valve bore wear
3: Defective TCC solenoid

Converter related
4: TCC lining flake, due to water or Glycol
5: TCC clutch clearance and friction material

Correction:
1: Air test the transmission and valve body circuits (see details on following pages.)
2: Visual or vacuum test the working pressure regulator, the lube/converter limit, the torque converter control and the TCC damper piston.
3: Test, replace Y3 lockup solenoid.

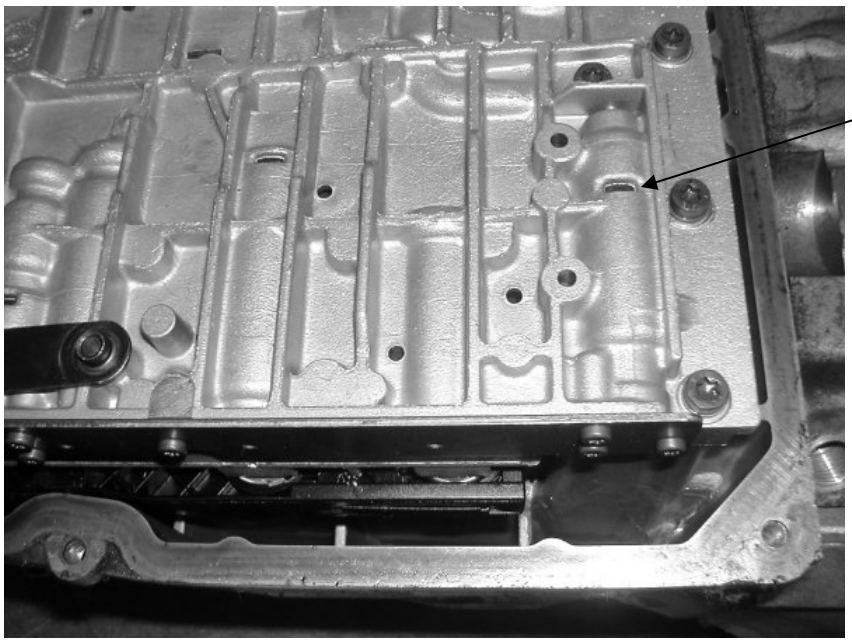
4: Refer to Glycol test kit

5: The TCC piston must return to release the converter clutch. A problem arises when centrifugal force reacts on fluid trapped behind the clutch piston. The residual pressure plus the force walks the piston toward the clutch. Within the 722.6 converter, oil trapped behind the TCC piston cannot be vented. This problem is increased by charge pressure of 50-100 psi. working its way into the low pressure TCC circuit.
Fluid from the valve body to pump stator can exhaust at the control valve, but fluid trapped behind the piston loads it toward the clutch.

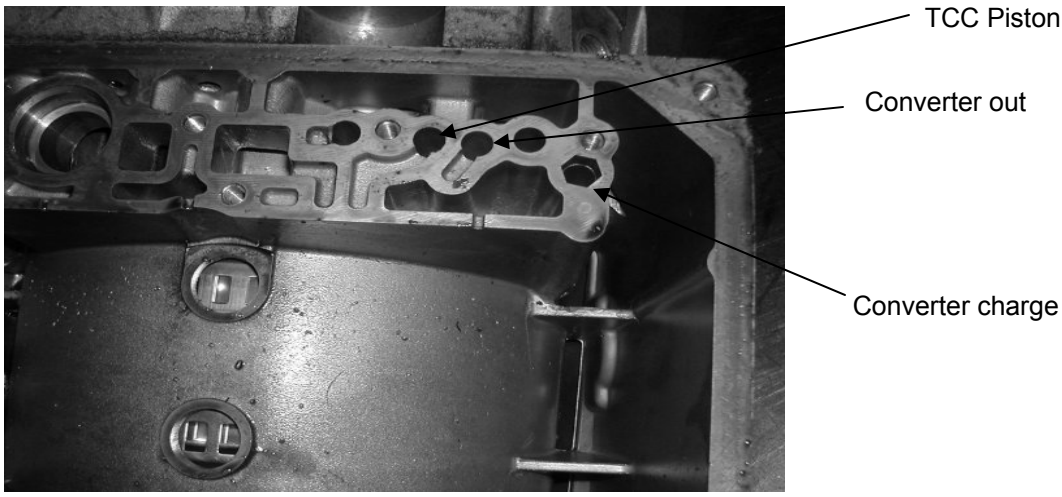
Alternatives:
Force the piston to release.
Use higher flow friction plates .

1. Air Testing:

The TCC apply circuit can be air tested, (30-60 psi.) with the unit in the vehicle and the valve body in place. Charge the exhaust hole. The air supplied will push remaining fluid into the converter TCC piston. Minimal leakage should come out cooler lines or other valve body locations.

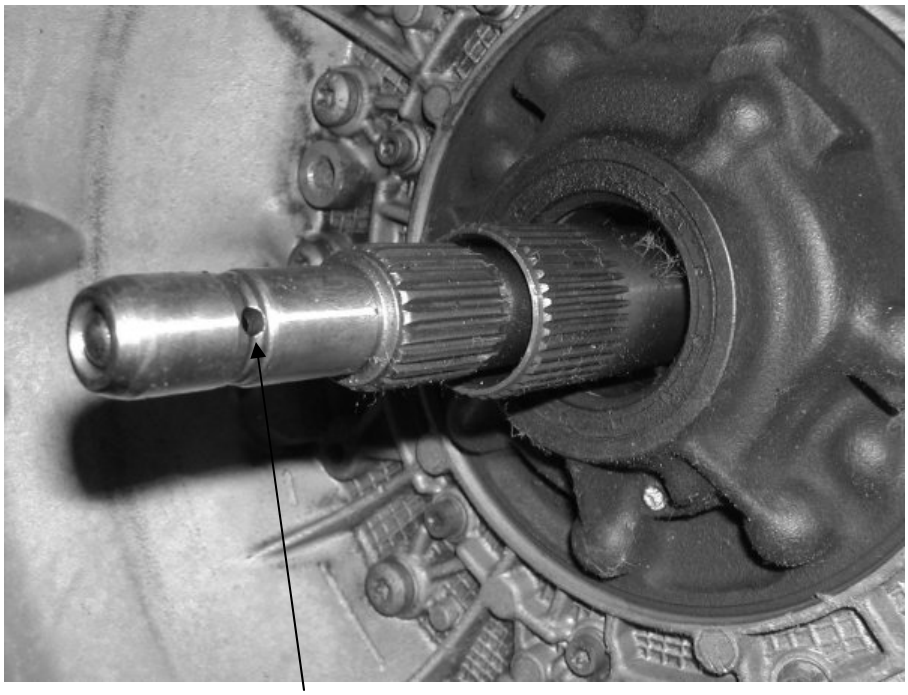


If the valve body is removed, the three converter circuits can be isolated. Any leakage from converter charge or converter out, is from cross leak at the pump or within the converter.

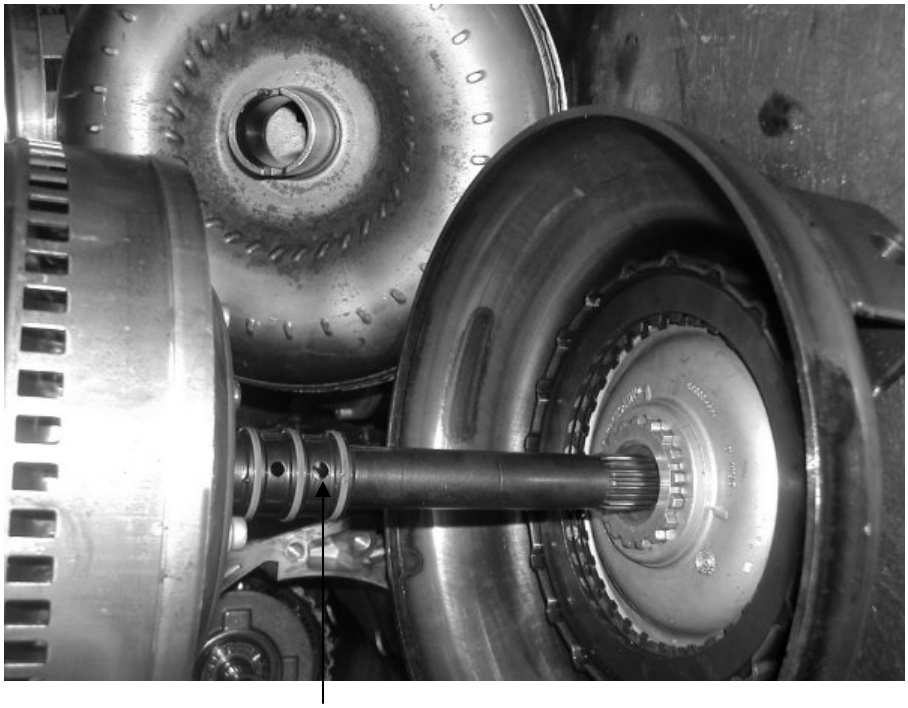


Note: Teflon type of sealing rings require fluid to lift. If air testing with a dry circuit, they will cross leak. Turbine shaft sealing rings should be the OE overlap design. Valve body must be flat and the pump stator or converter cross leaks should be eliminated. Internal transmission bushings insure the turbine shaft runs true, a requirement for the rings to seal.

The turbine shaft can also be installed into the converter and the clutch tested as well.

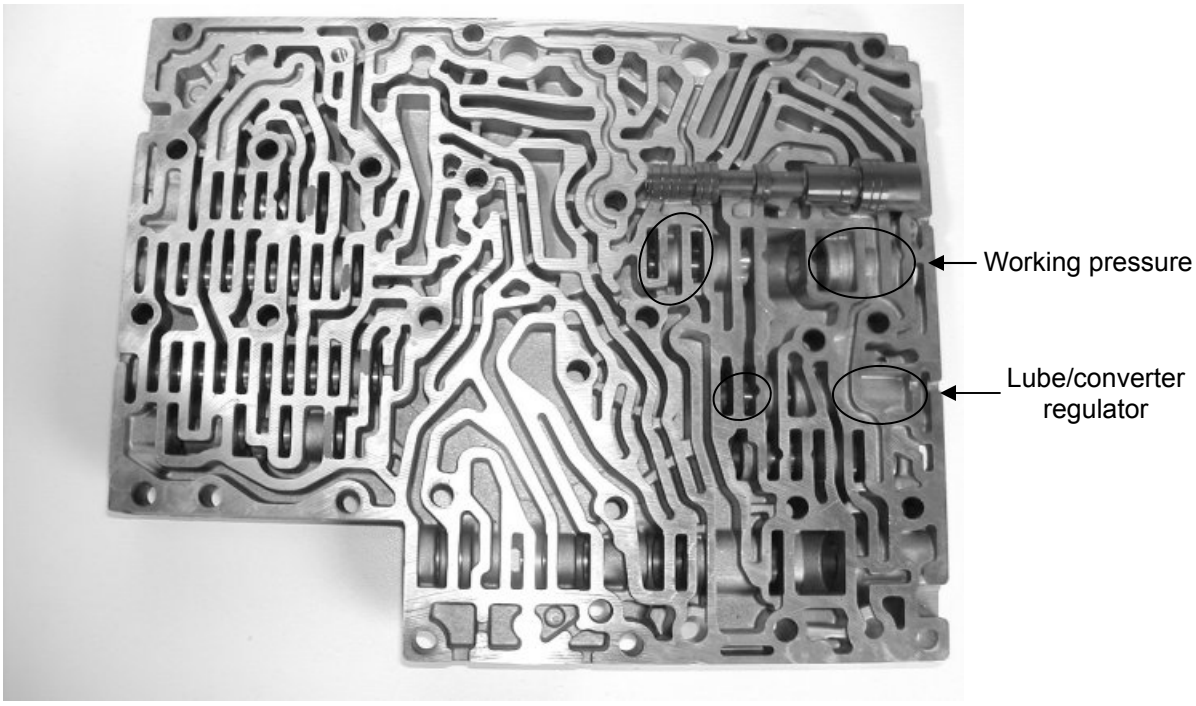


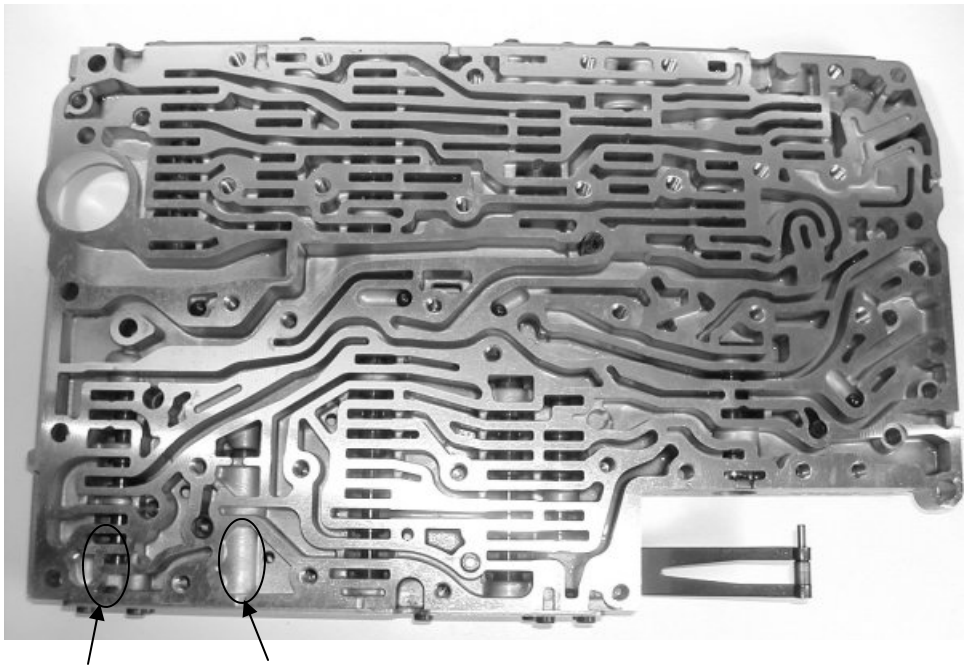
TCC Piston Apply



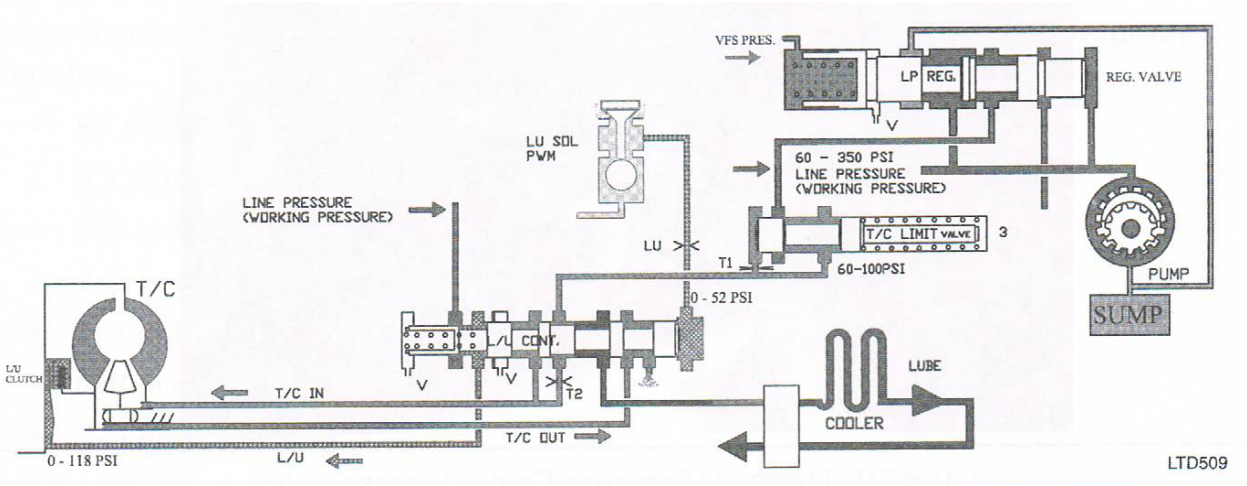
TCC Piston Apply

2: Low converter apply pressure extends from the main/working pressure regulator bore and the Lube/converter limit valve. Wear at either area affects TCC and converter charge psi. Critical wear points within circles (shown in photos below.)
The TC control valve must stroke for full apply. Bore wear at either location reduces the TCC solenoid's ability to stroke the valves.



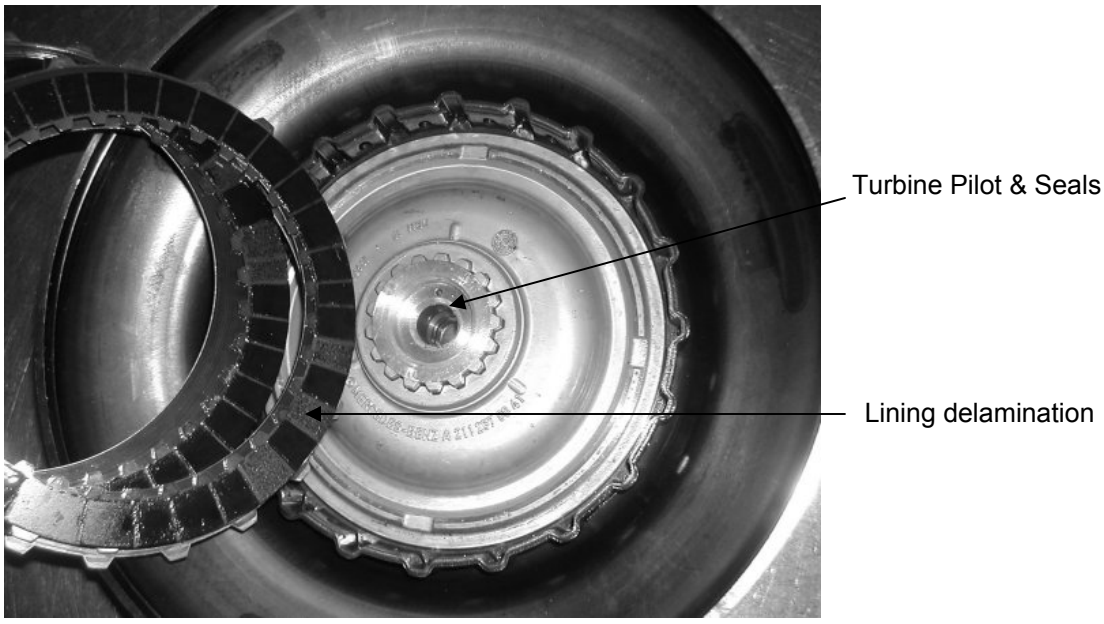


3: The normally closed, Y3/ 6y6, TCC solenoid strokes the torque converter lockup valve. If the Y3 solenoid leaks into the control valve circuit, the valve may rest in a partial apply position.



Converter related:

4: Test for water or antifreeze in ATF. In some applications, one drop is sufficient to degrade clutch linings.



Mercedes kit # 000-989-009 and 000-989-0014
ESP Chemicals Inc. Ph; 520-622-4087 #HI 3859 @ $75.00
Chrysler cannot cross reference this number.
An alternative is to use a hot plate and check for a sizzle noise as the water burns off.

5: Aggressive converter friction plates, poor turbine shaft pilot and/or lack of piston return can create the condition.

Download Ed Lee's 722.6 Transmission Digest converter articles at www.sonnax.com.

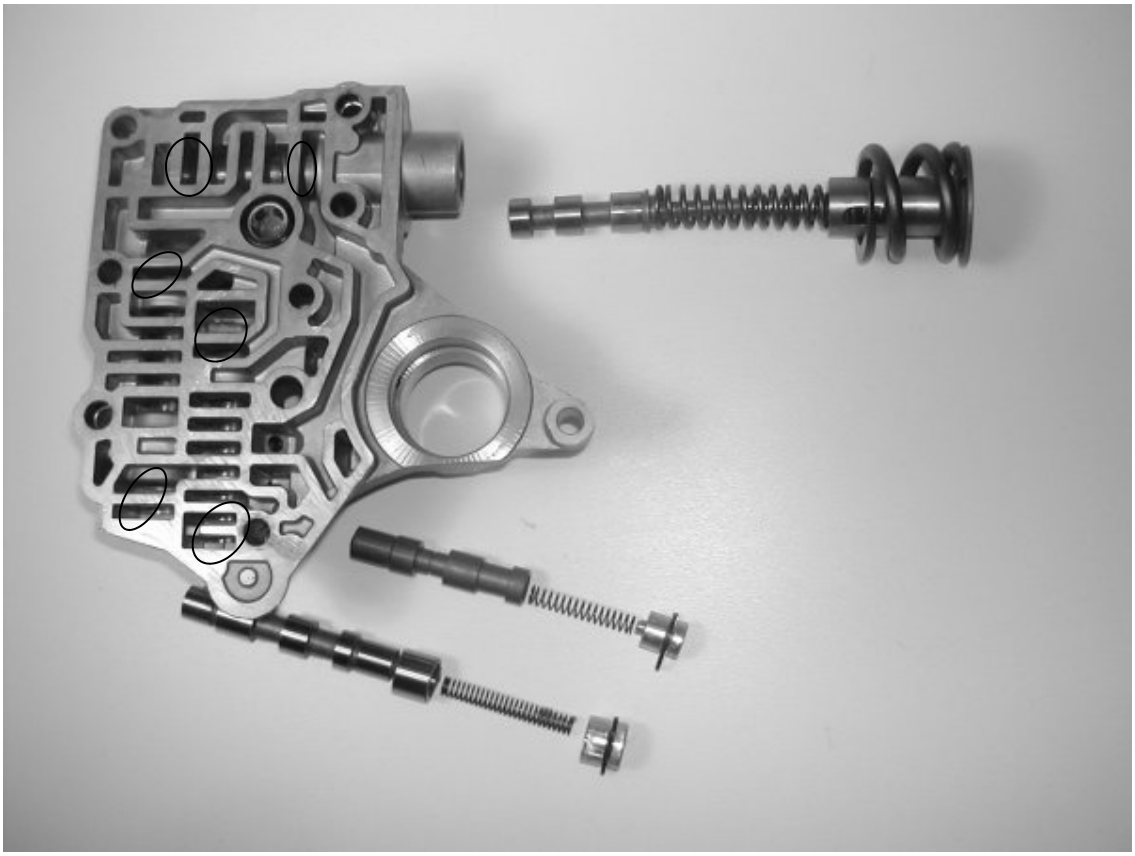
Conundrum 2
Honda B7TA

Applications:
Odyssey
Similarities to other 4 speed designs

Complaint:
TCC slip codes
No TCC apply
Overheated converters

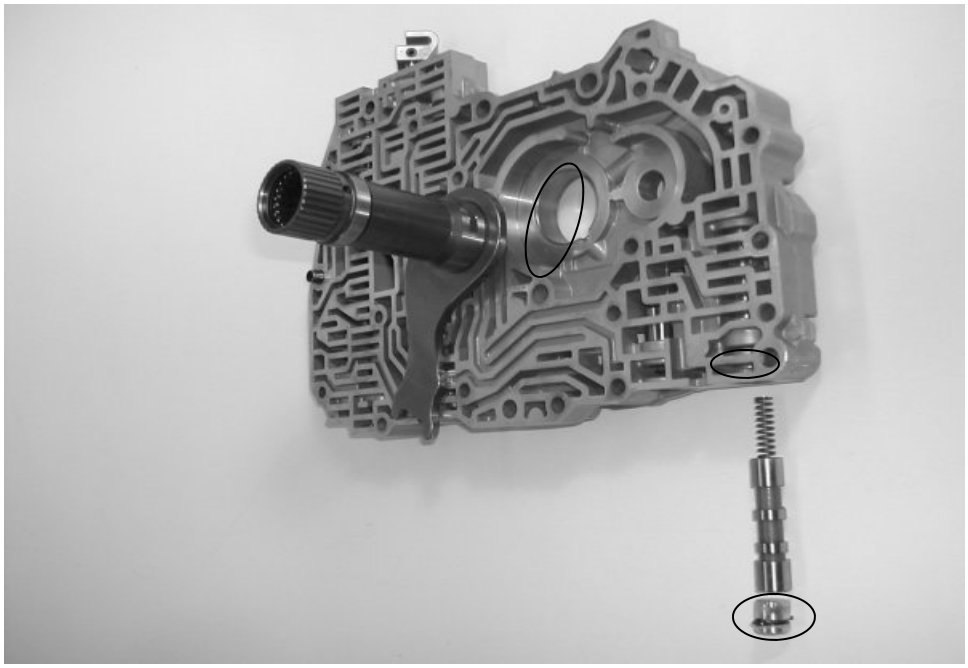
Cause:
1: Valve body bore wear
2: Restricted Coolers
3: Defective linear solenoid
4: Converter hub orings too small

Correction:
1: Main control body bore wear (critical points at circles.)

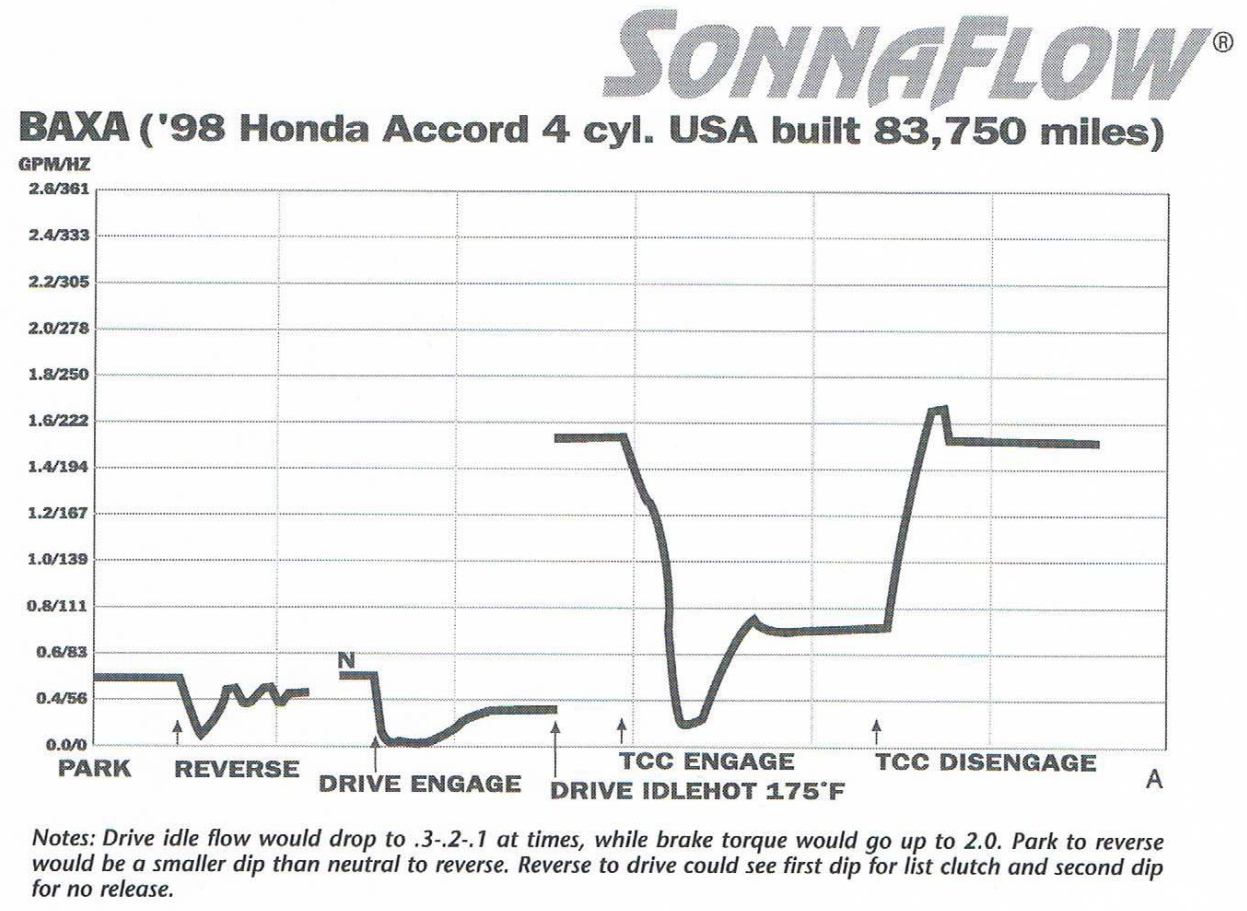


Control valve body worn at the converter relief bore.
To isolate prior to removal, compare scanner data to the cooler flow. You should see the TCC command and amperage change in parallel to a cooler flow change on a SonnaFlow.

Loss of TCC or TCC slip: Created by end plug loose at the TCC control valve. A cross leak of converter charge oil into TCC control negatively affects TCC control. Inspect the stator for cross leakage at the finished area, where it passes through the casting.



2: Restricted coolers create back pressure on the hydraulics and either slow the stroke of the valve or cause it to stop midstroke.



Other 4 speed Hondas have similar cooler flow charts

Conundrum 3
Aisin Warner six speed, front wheel drive.

Applications:
TF-60SN / 09G/09K VW
TF-80SC / AF 40 Volvo, Saab
TF-81SC / AF21 Ford, Mazda

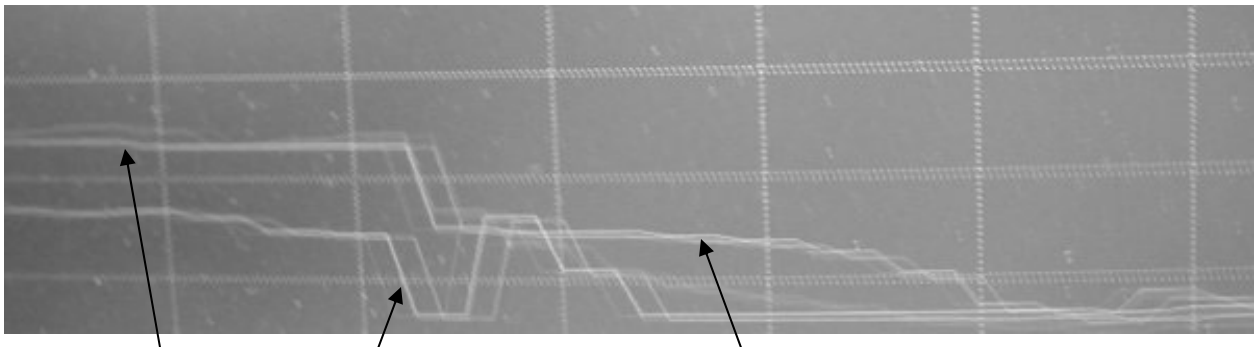
Complaint:
1: Harsh shift (relative to converter release)
2: Overheated fluid
3: TCC cycling, RPM fluctuation
4: No move, no power

Cause:
1: TCC control valve bore wear.
The converter is opened briefly during upshifts and some downshifts. If the clutch does not release, the shifts are very firm. The lack of release can be valve, solenoid or converter related.

2: Primary and secondary regulator valve bore wear.
The feed for converter apply and release starts at the main regulator which then feeds the secondary regulator valve. Both of these bores are known to wear. This wear positions the valve in a low flow state, reducing converter feed and lube.

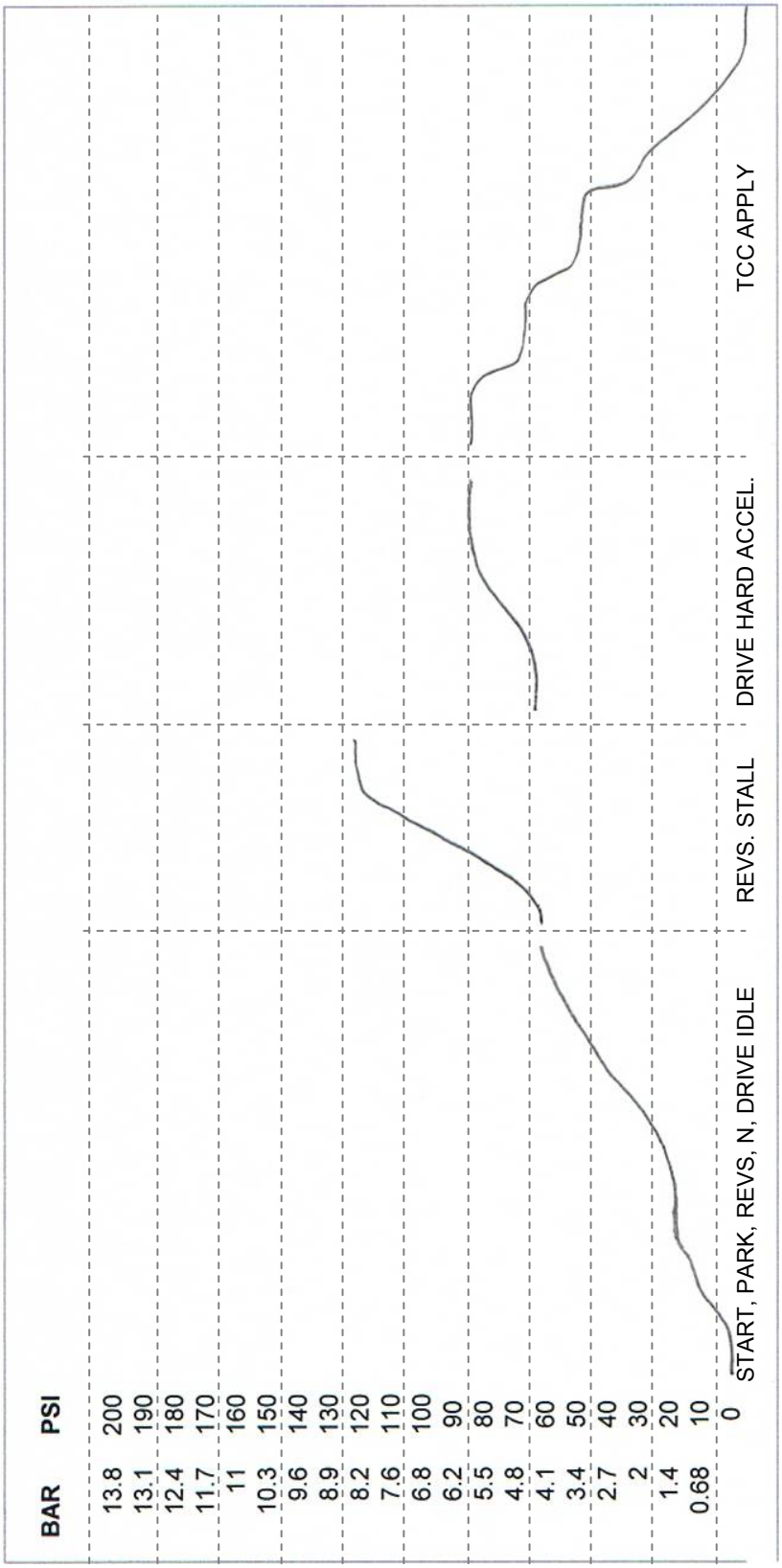
In-Vehicle testing:
It is possible to isolate the Electro-Hydraulic control over the converter clutch.

With a scanner; monitor the TCC solenoid. You should see amperage change as it's modulated briefly to open the converter.



With pressure gauge; tap into TCC release. You should see the control valve stroke at the same time the Scanner identifies the amperage command.

AW6 CONVERTER RELEASE PRESSURE (Typical)



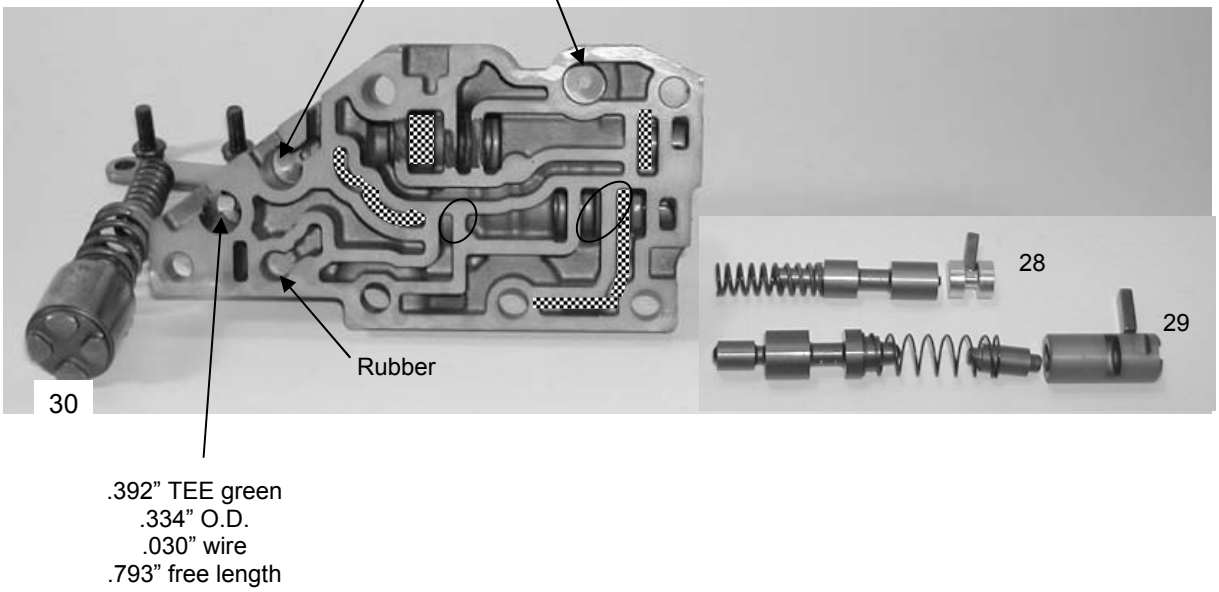
Note: Tapping release pressure is a good method to verify operation of #4-N 91 solenoid.
TCC modulates off-on during 4-5-6 gear shifts. This tap is a method to verify TCC is affecting shift quality.
TCC modulates on after 1-2 shift.
TCC cut off during Tip-Tronic up & down shifts
TCC remains on during coast down.
If cooler release pressure is low, check fluid level!

TF-60SN / 09G

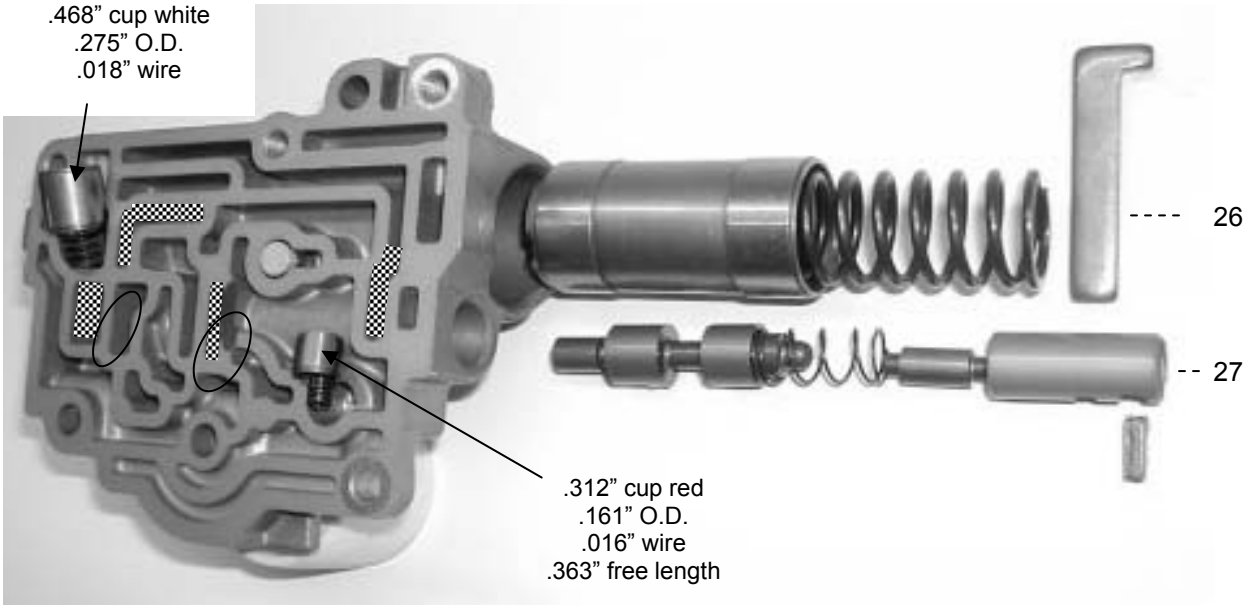
Correction:

1: Visual inspection, WAT or vacuum test the TCC control bore at the inboard end and the outboard sleeve. If worn ream or replace the valve body. Aftermarket valve body rebuilders generally have these in stock.

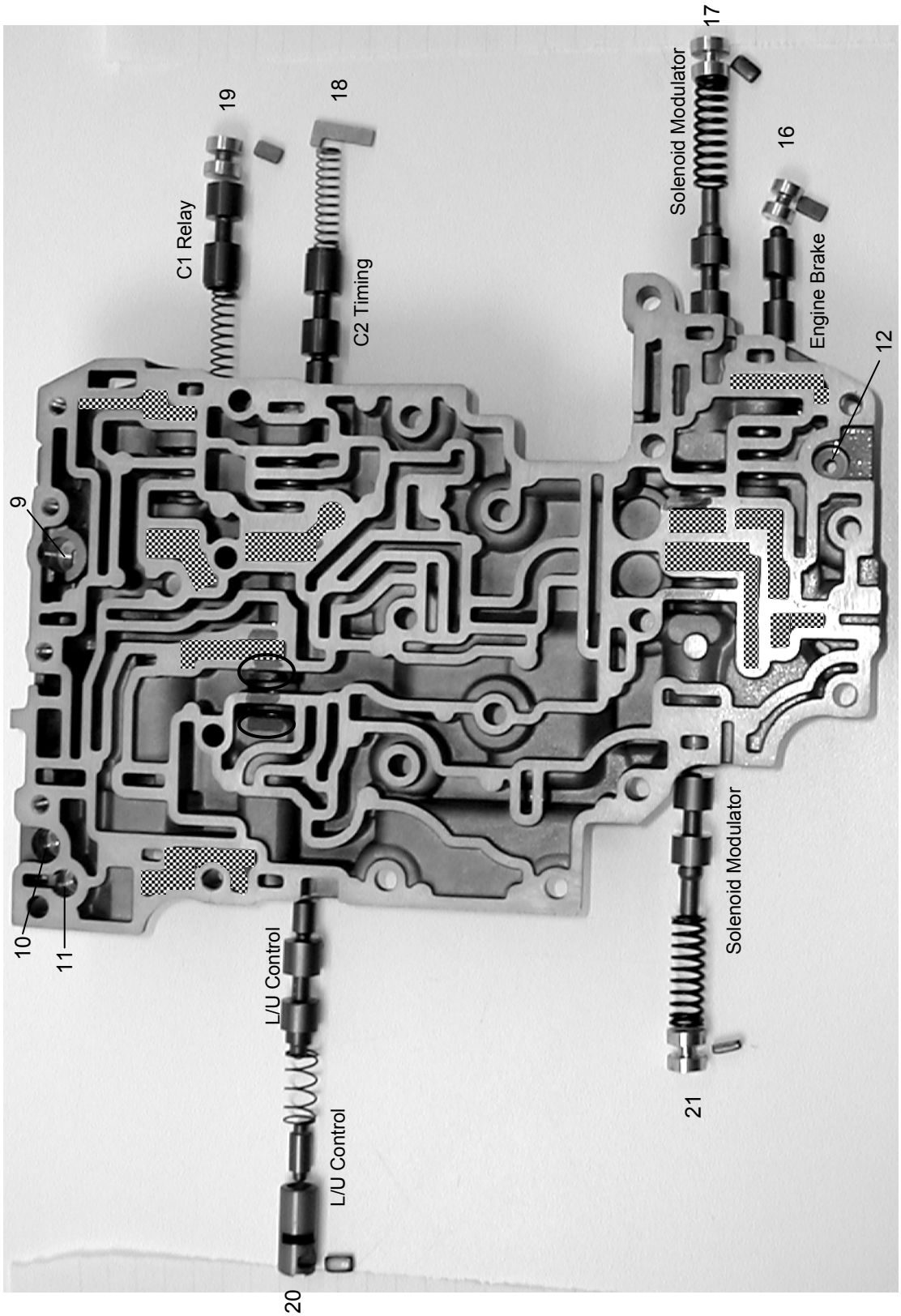
(The dotted areas indicate vacuum test points. Circles indicate visual bore wear.)



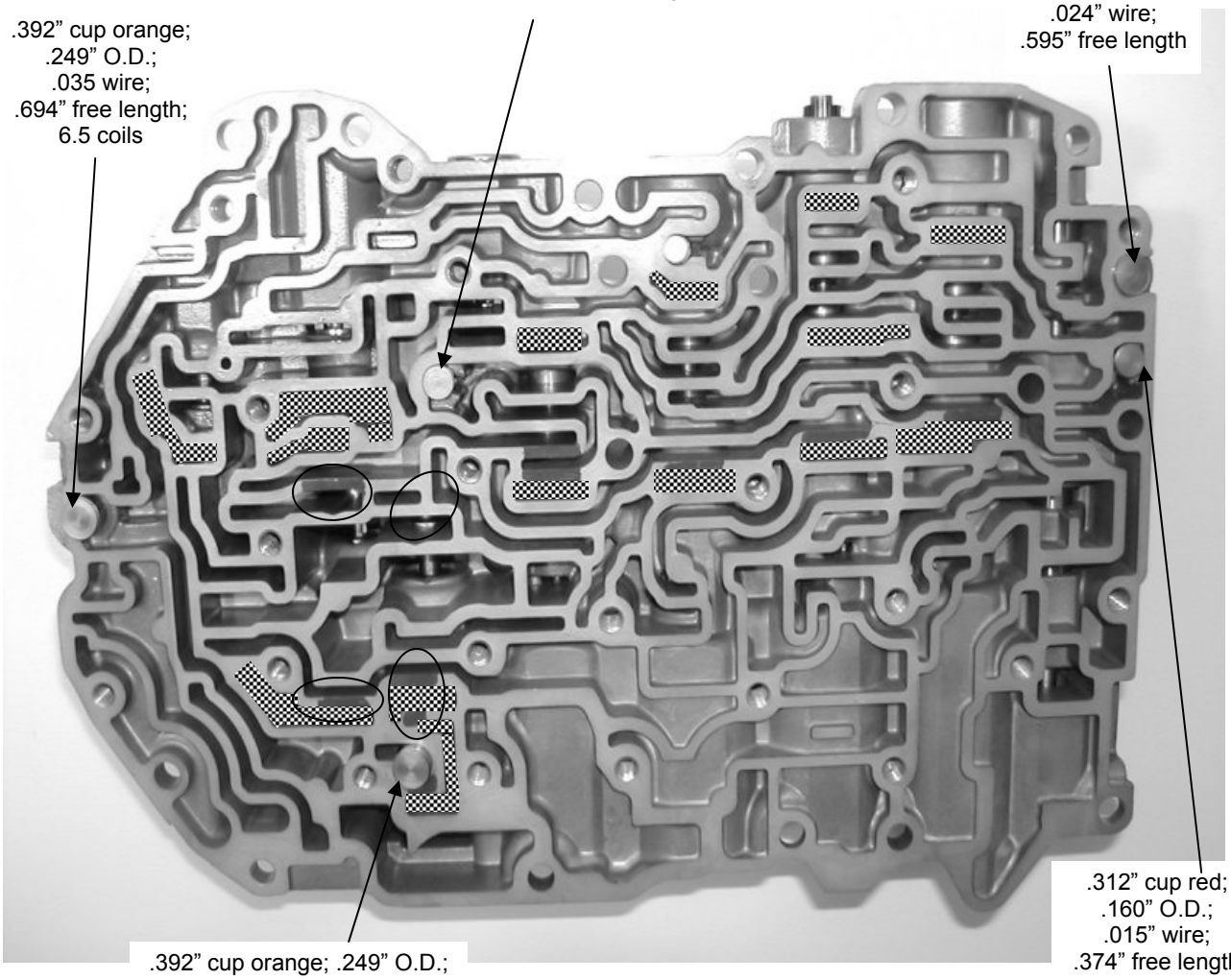
TF-80SC / AF 40/AM6



Ford/Mazda Rear Cover, Front Side



TF-60SN / 09G



Relief is not in all TF60 units.
No hole in plate=no relief.

Vacuum test location	Main regulator & secondary Regulator bore wear.

What's Coming:
722.9 8 speed:
OE information notes:
- The torque converter is the same as the 722.6 with the addition of a turbine damper.
- The 722.6, in some Dodge applications (300 Magnum) had a damper assembly.
- 722.9, is noted to have an open, high flow converter. During TCC slip, flow will be reduced. We presume this is due to the position of the TCC control valve.
- It can/ will be slipped in all 7 gears, with the intention not to go 1:1. It will generally be open in 1st and 2nd gear.
- The last year of the 722.6 will be 2012.
- 722.9 requires special fluid is required; Shell or Fuch's, ATF 3353, MB# AOO1 989 45 03 10

Ford 6R140:
- F-350 trucks. 6.7 dsl, 6.2 ltr gas.
- This six speed unit has a PTO, which is driven off the inner pump gear. The inner gear drives the PTO idler, which is supported by the pump stator bearings.
- Ford noted the design requires a close tolerance control over converter hub run-out.
- The converter has a closed piston converter clutch, comparable to a disc shaped piston within a transmission housing.

ZF 8:
OE information notes:
- TCC apply after second gear and remaining on. Generally these clutches are modulated open briefly during upshifts. In some instances they are not modulated/ opened in order to reduce duration of the shift and improve drive-ability and econ-omy.
- Appears ZF continues the use of tabbed multiplate with two circuit fluid path and the release oil exiting from the turbine shaft.

DCT:
- Dry clutch, dual dampened input clutch.
- Replaces torque converter and/or wet clutch.
- Ford will have a substantial production number of these dry clutch transmissions.

Honda 6 speed:
- Multiplate converter clutch for expanded torque capacity and lower speed modula-tion. TCC can be applied from 20 kmh / 12 mph upward.
- The cover has a separate floating piston with multiplate slotted frictions.
- The operation could be compared to the RE5R05A or 722.6.