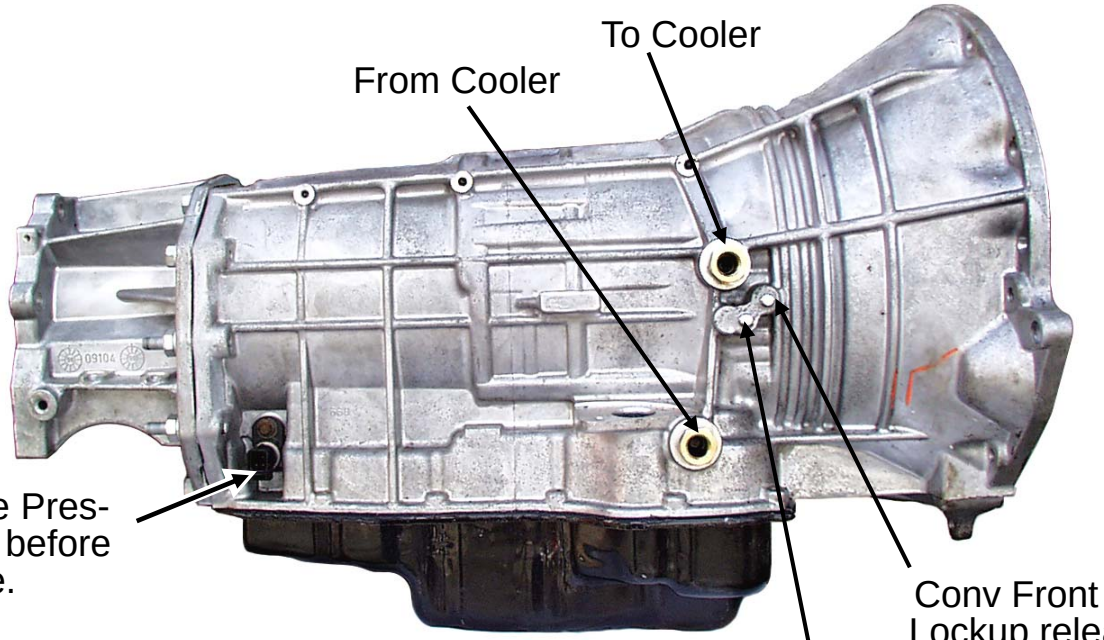
Identification

45RFE



Use scan tool to read line pressure transducer.

Drive min 35PSI max 160PSI

Reverse min 45PSI max 250PSI

SK® Kit Upgrades: Pages 6-7-18

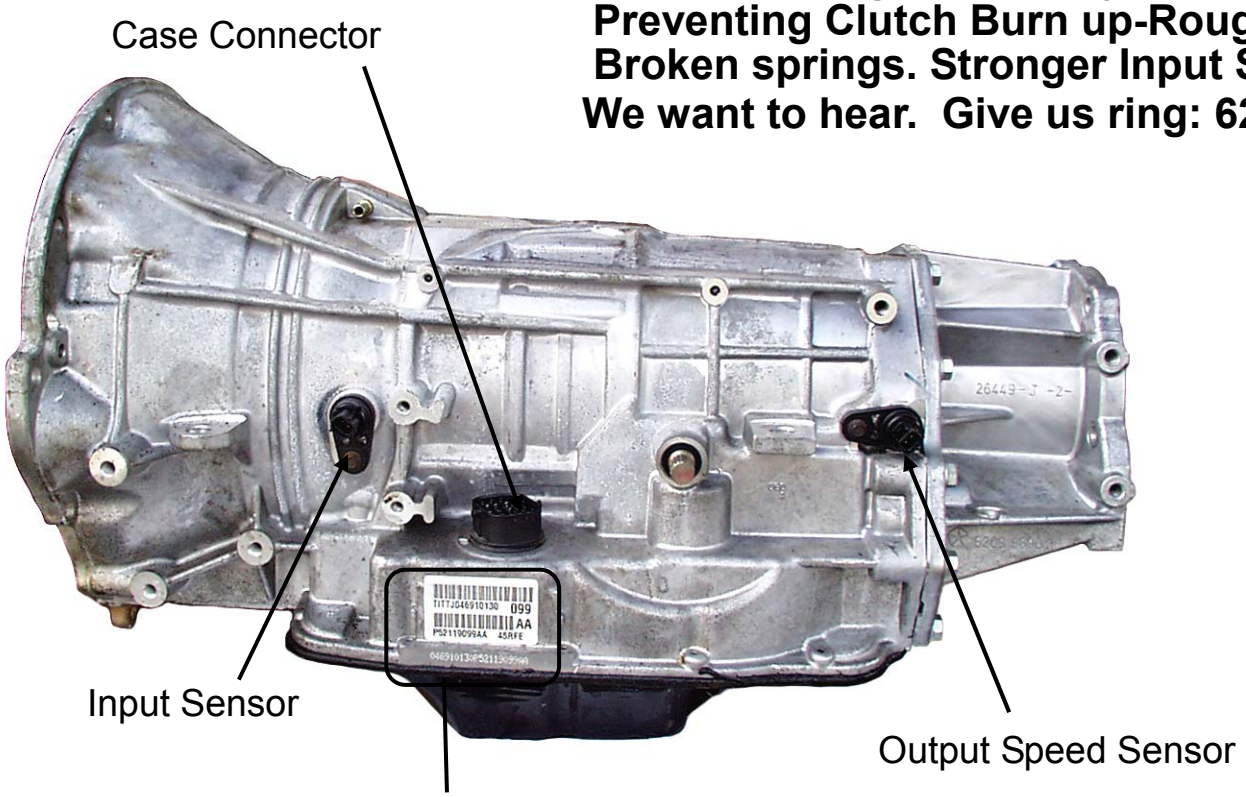
Identification

Remove the Sensors before washing the Case.

SK® 45RFE Shift Kit®

Shift Kit® is about:

Repairing Valve body and Pump.
Preventing Clutch Burn up-Rough Lockup.
Broken springs. Stronger Input Snap Ring.
We want to hear. Give us ring: 626] 443-7451

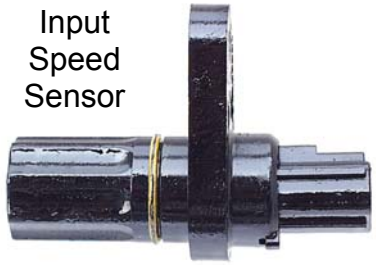


Identification Numbers

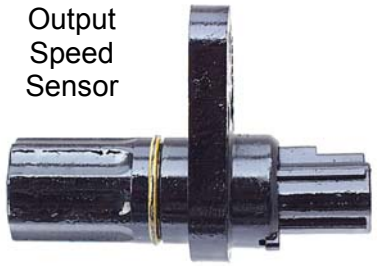
Identification

The Input and Output Speed Sensors are identical. They are mounted on the left side of the transmission and are considered primary inputs to the Transmission Control Module. (TCM)

Input Speed Sensor



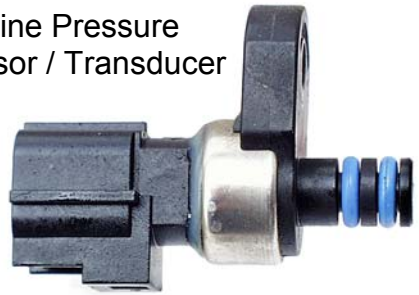
Output Speed Sensor



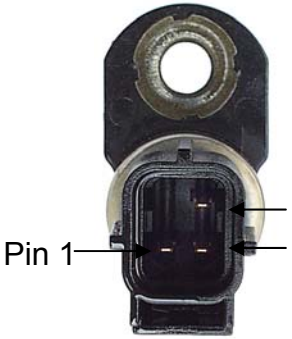
Both Sensors should measure 0.555 K Ohms pin to pin

Pin 1= Signal
Pin 2=Ground

Line Pressure Sensor / Transducer



The Line Pressure Sensor is a variable pressure style sensor which gives direct input to the TCM. The Line Pressure Sensor works in conjunction with the Pressure Control Solenoid and the TCM uses this information to achieve desired pressure.

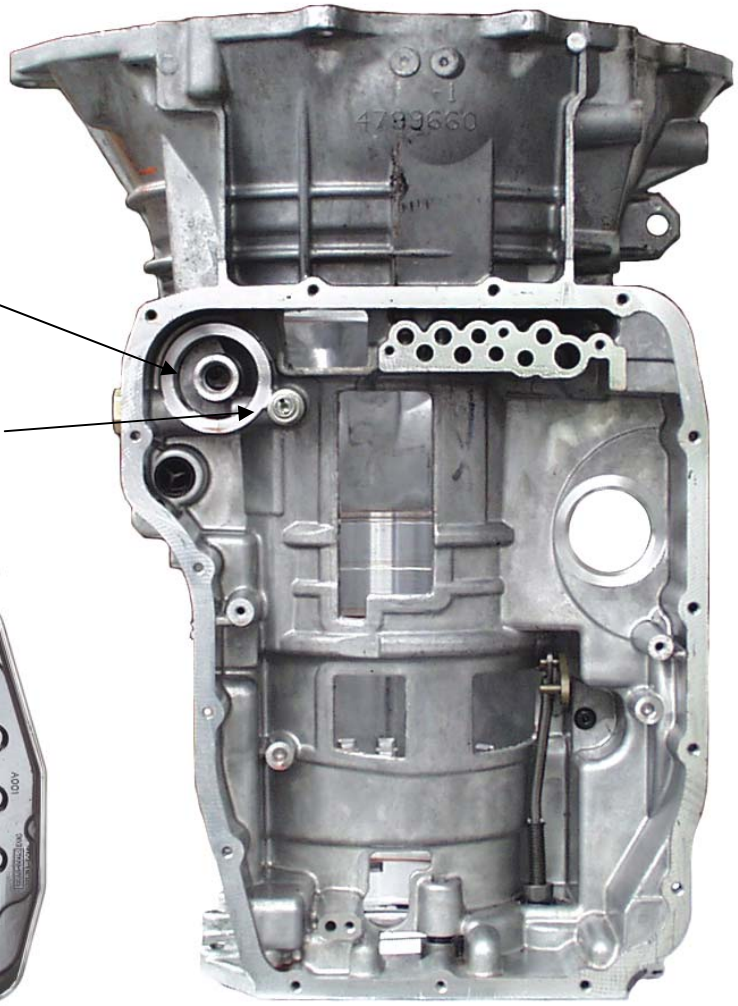


Pin 1=Ground
Pin 2=5Volts
Pin 3=Signal

Identification

Cooler Filter

Cooler Filter

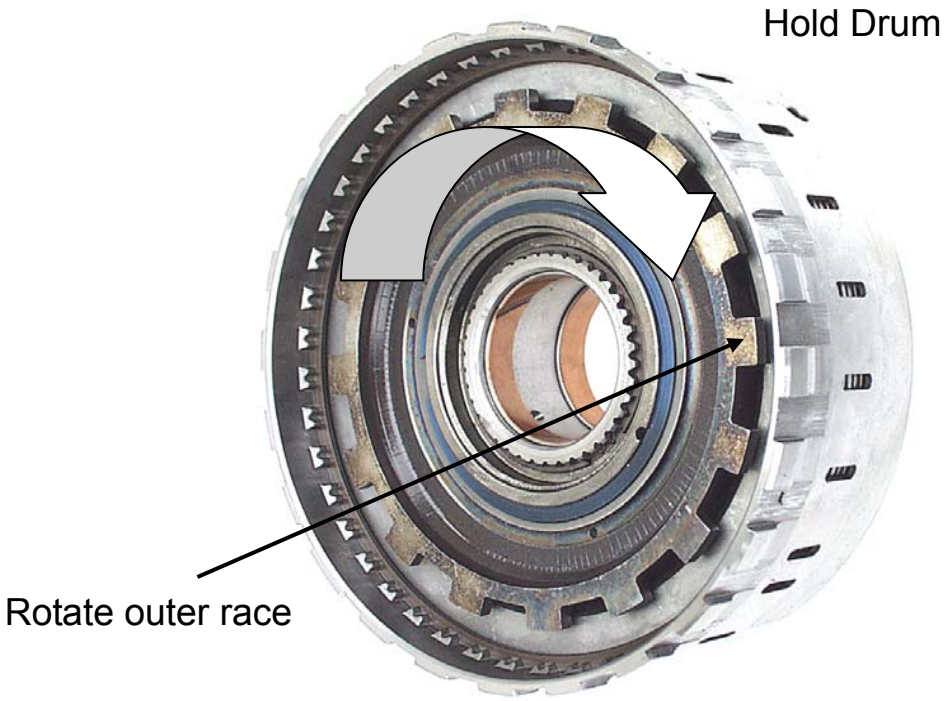


Primary oil filter [Top & Bottom]

Pan, front and back
(Shown smaller for I.D. only)

Fast Reference

Low-Rev Clutch Assembly



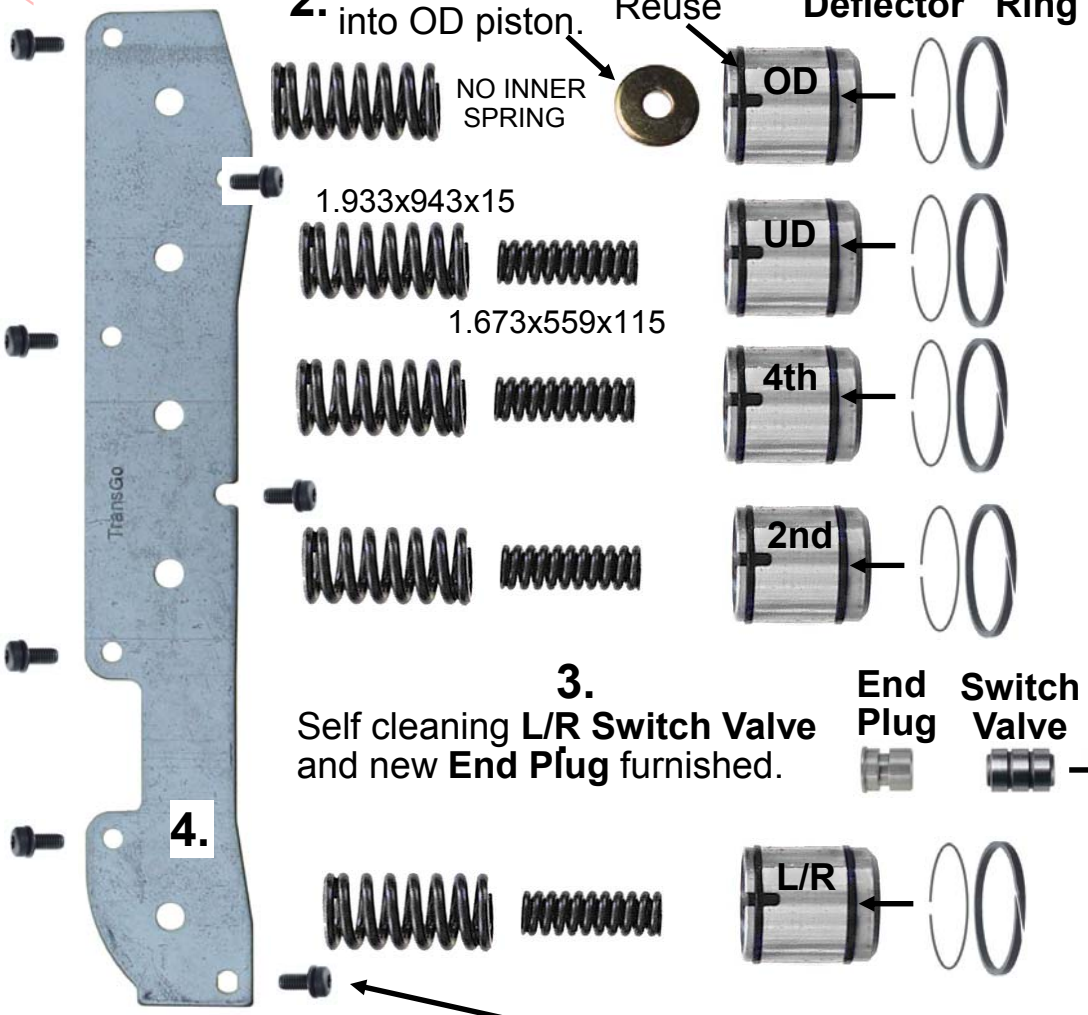
SK® Kit has:
Spare accumulator springs.

LISTEN: This is SK® Kit instruction page.
1,2,3, and 4 are SK® Kit upgraded parts.

Fast Reference

1. Install **Wire Deflector** and **Ring** into inboard ring groove--all *Five* pistons.

2. Install **Washer** into OD piston.



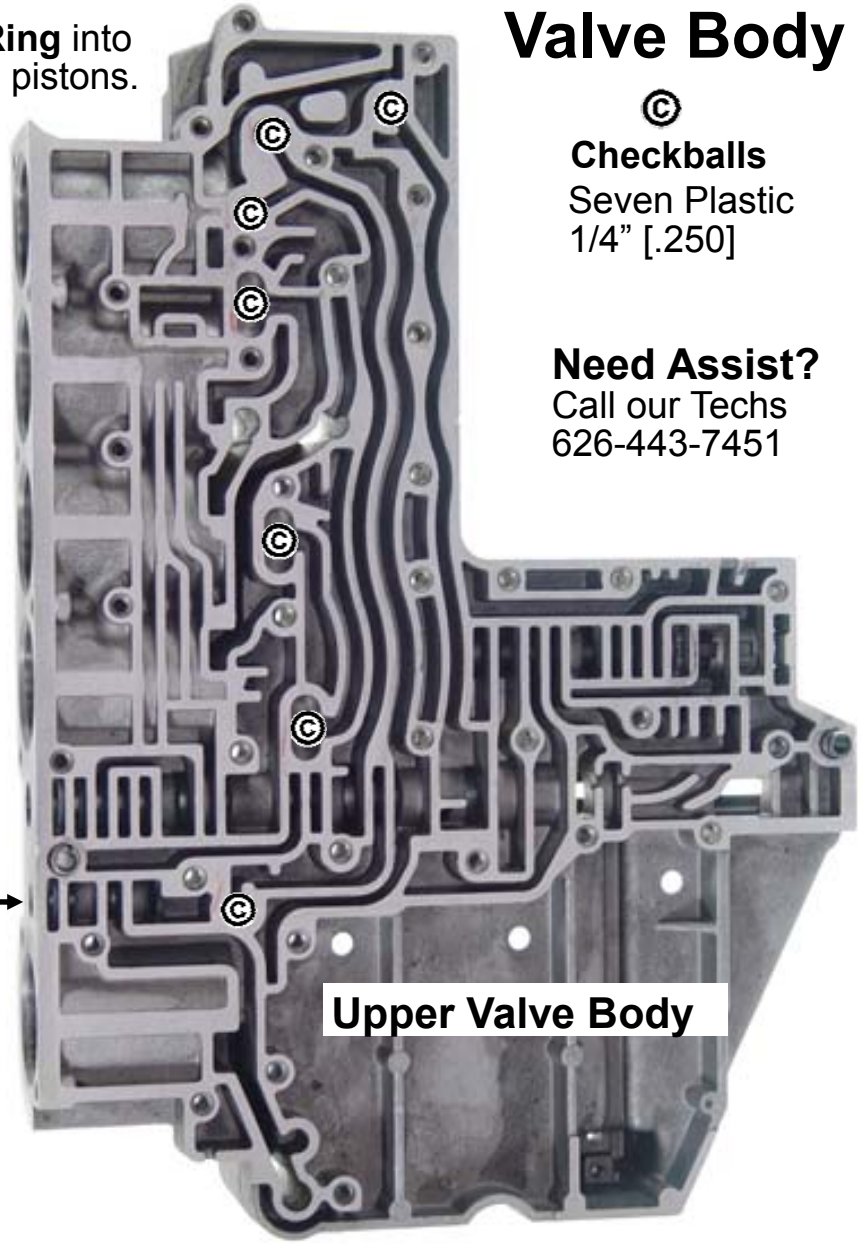
3.
Self cleaning **L/R Switch Valve** and new **End Plug** furnished.

4. Tougher Cover

LISTEN UP: Loctite cover screws, tighten to 40 in-lbs.

End plate screws from 470-670-604-42LE are same size.
Stripped threads? Tap 1/4-20
Use 1/4-20 x 1/2 bolt w/washer.

Valve Body



Checkballs
Seven Plastic
1/4" [.250]

Need Assist?
Call our Techs
626-443-7451

Page 3

Cover & Valves

Pump

Broken Spring causes a
Bangy Lockup Complaint.

Converter Control

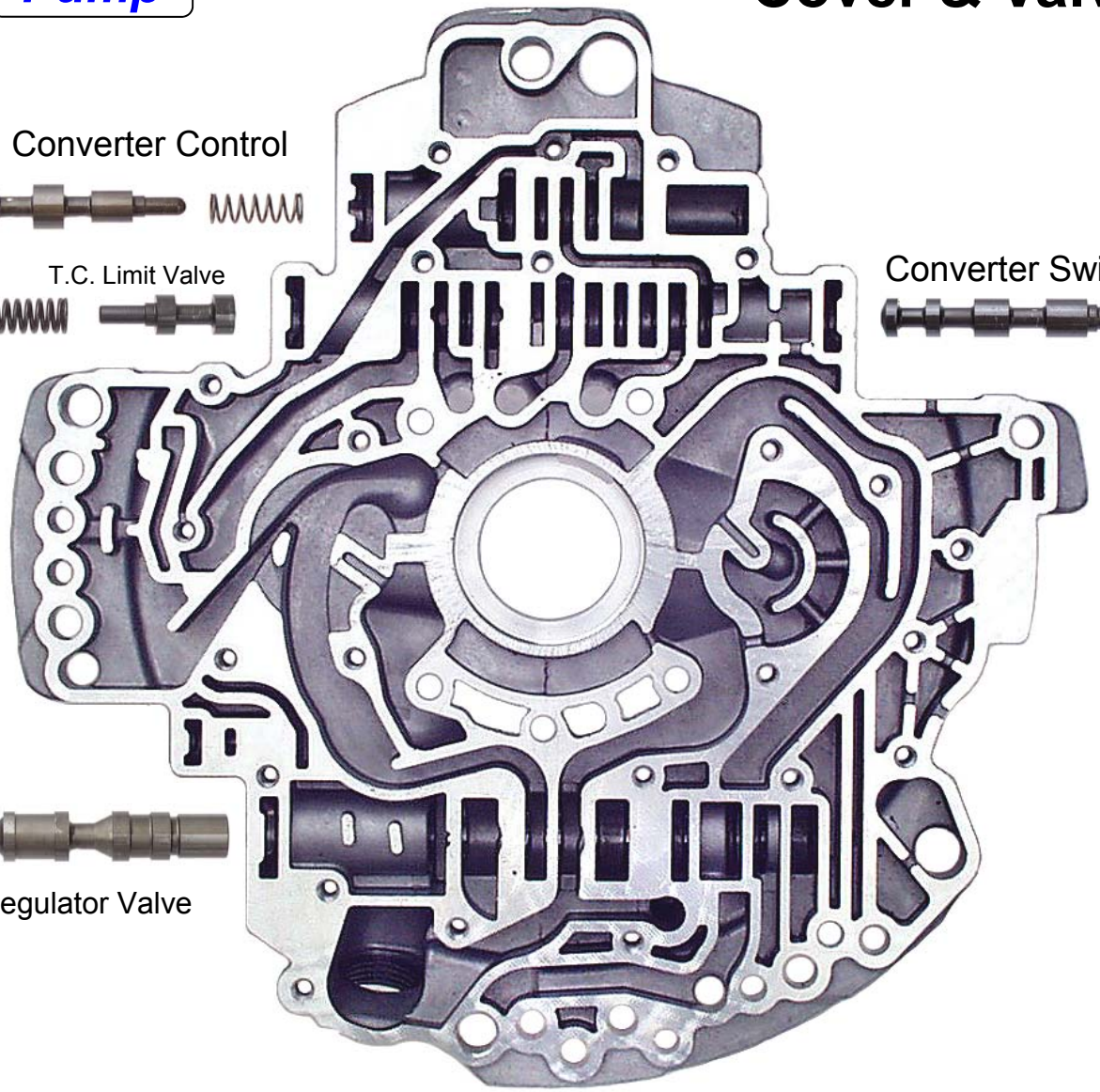
T.C. Limit Valve

Converter Switch Valve

Shift Kit® upgrade here.
Triple Spring and new Clip.

Prevents losing clip and
FIXES Rough Lockup.

Pressure Regulator Valve



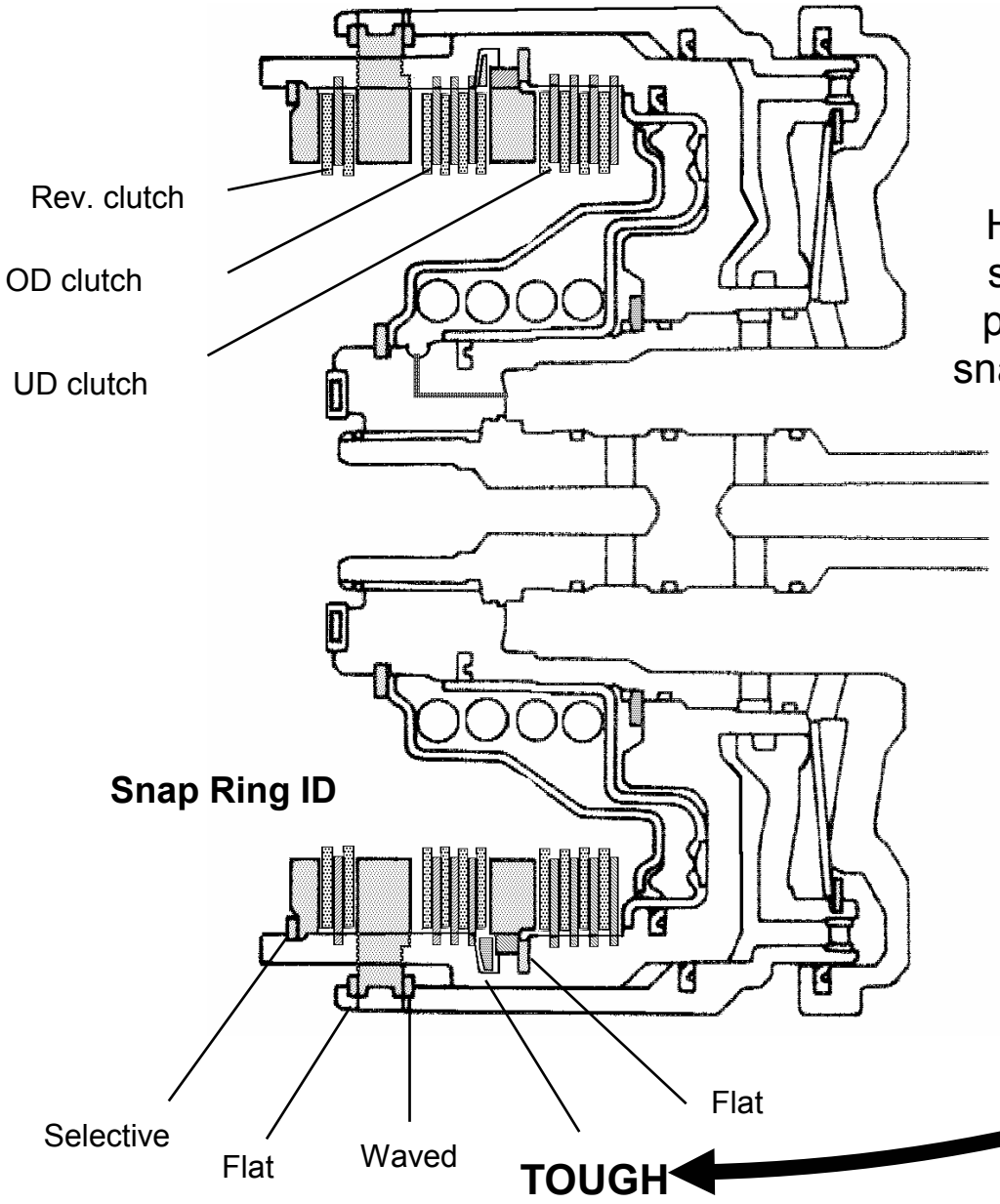
Fast Reference

45RFE-HD2 Kit

Hard working Trucks and all Hi-Perf uses
Every time I find a good running engine with this kit behind it, I AM impressed.

Your Truck and Performance customer's are gonna Grin for you. Gil

Fast Reference



Shift Kit®
Has a really tough snap Ring that replaces the tapered snap ring that breaks.

The Technology IS the Ethic

If the sign on the building or any advertising says, “Transmissions” that is declaration to the Universe that you know how to fix them.

When a product or service is offered, the offer itself is a specific claim by the seller that he is accepting the MORAL and TECHNICAL responsibility for correct function, for a reasonable length of time, in exchange for money.

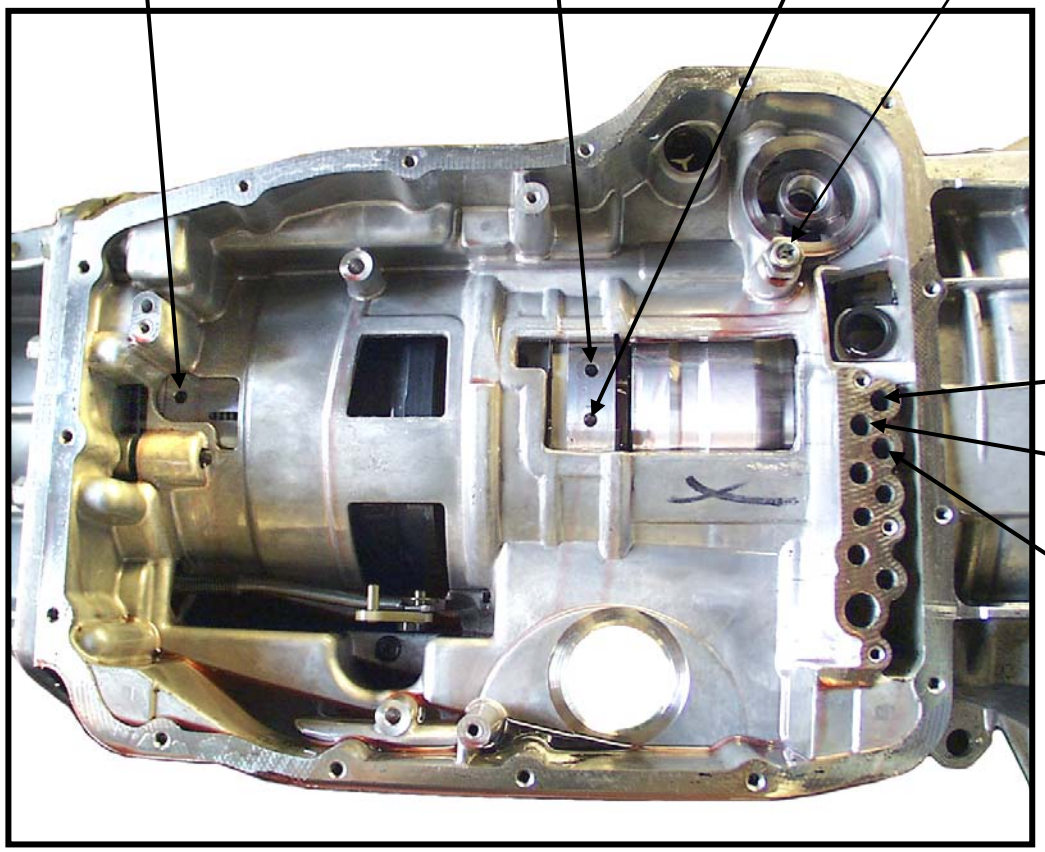
Regardless what you may call your repair, the job is in your shop to have the complaints and failures corrected. It doesn’t matter how honest you are, as a person, if you do not fix the causes of the complaints and failures where is the ethic?

Each transmission develops 3 to 5 complaints and failures you see over and over again and again.

A service is ethical and deserving to the exact extent that your service corrects the causes of those complaints and failures; and does not include a whole bunch of parts that were not needed.

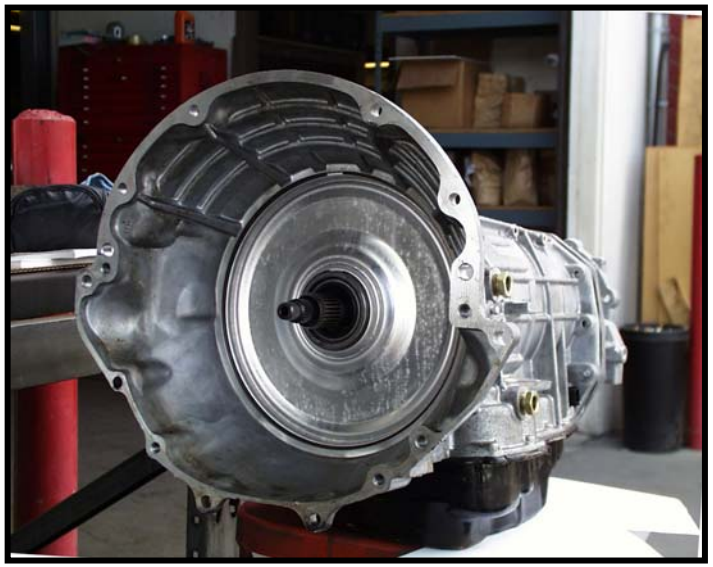
No more and no less, Gil

Fast Reference



Cooler relief  ← Blow into relief it should blow off at 20 PSI.
Suck here and ball should be airtight.

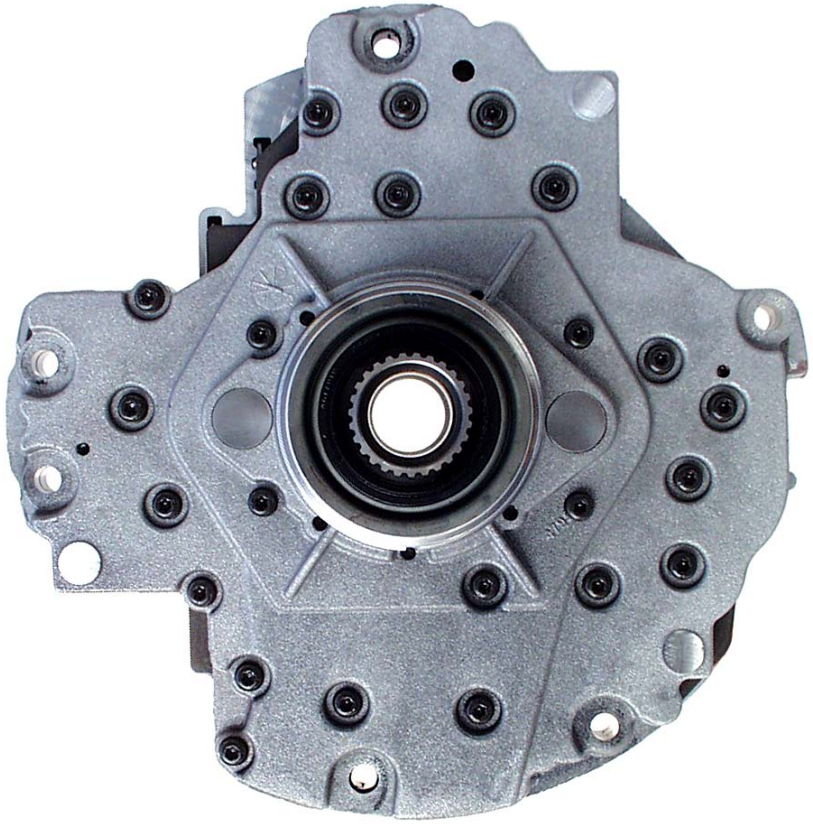
Pump

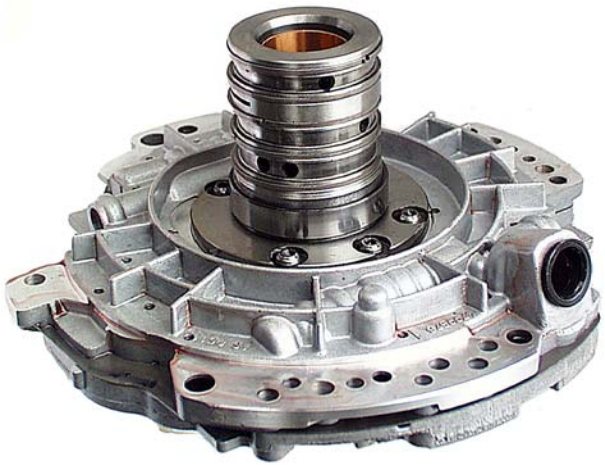


Front cover with snap rings

45RFE Pump: Dual stage positive displacement pump. The pump consists of two independent pumps. At low speeds both pumps supply fluid. As the speed of engine increases, the pressure output of both pumps increases until the pump pressure reaches the point where it can close of the check valve located between the two pumps. When the check valve is closed, the secondary pump is shut down and primary pump supplies all the fluid to the transmission.

Pump



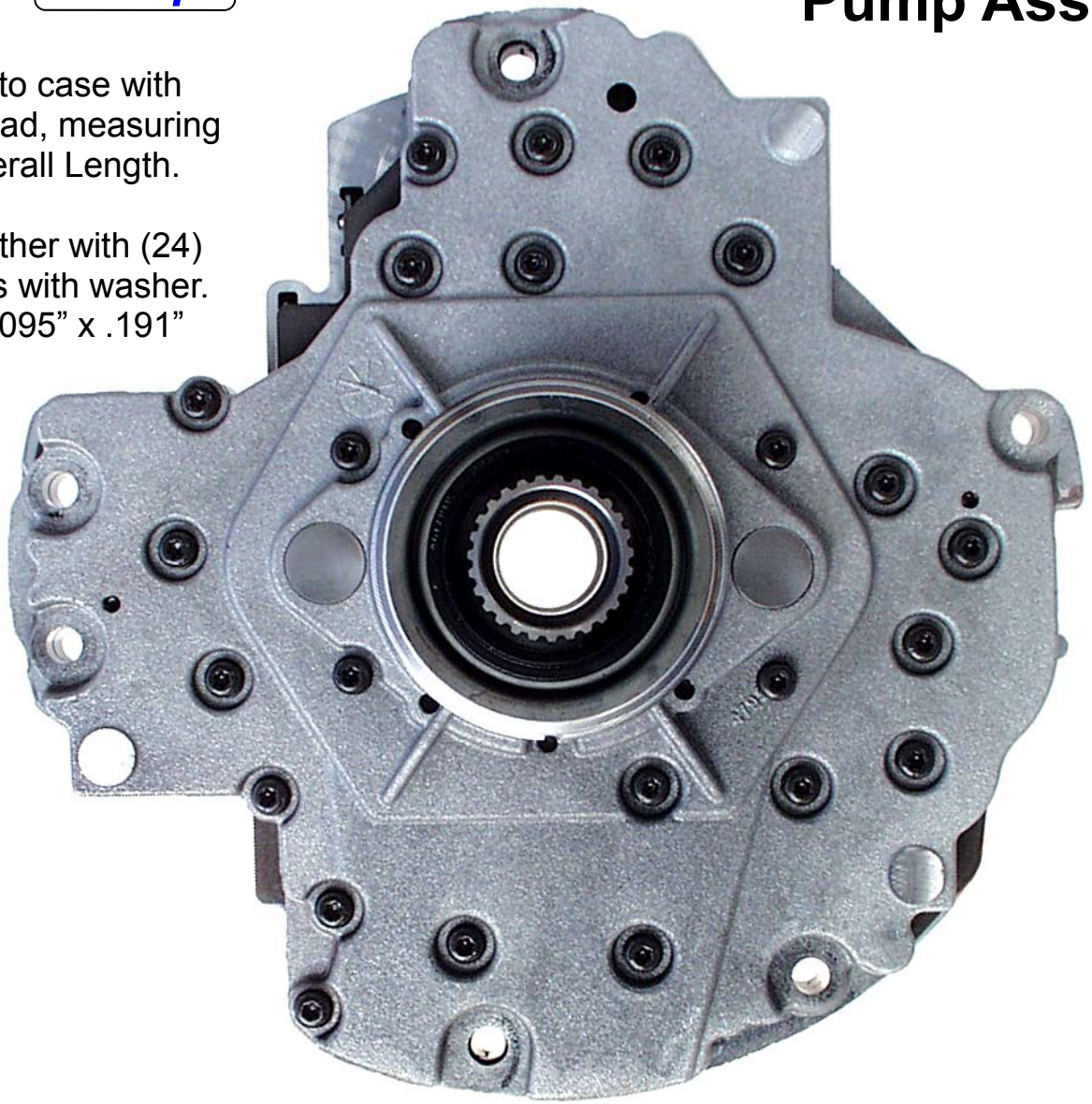


Pump

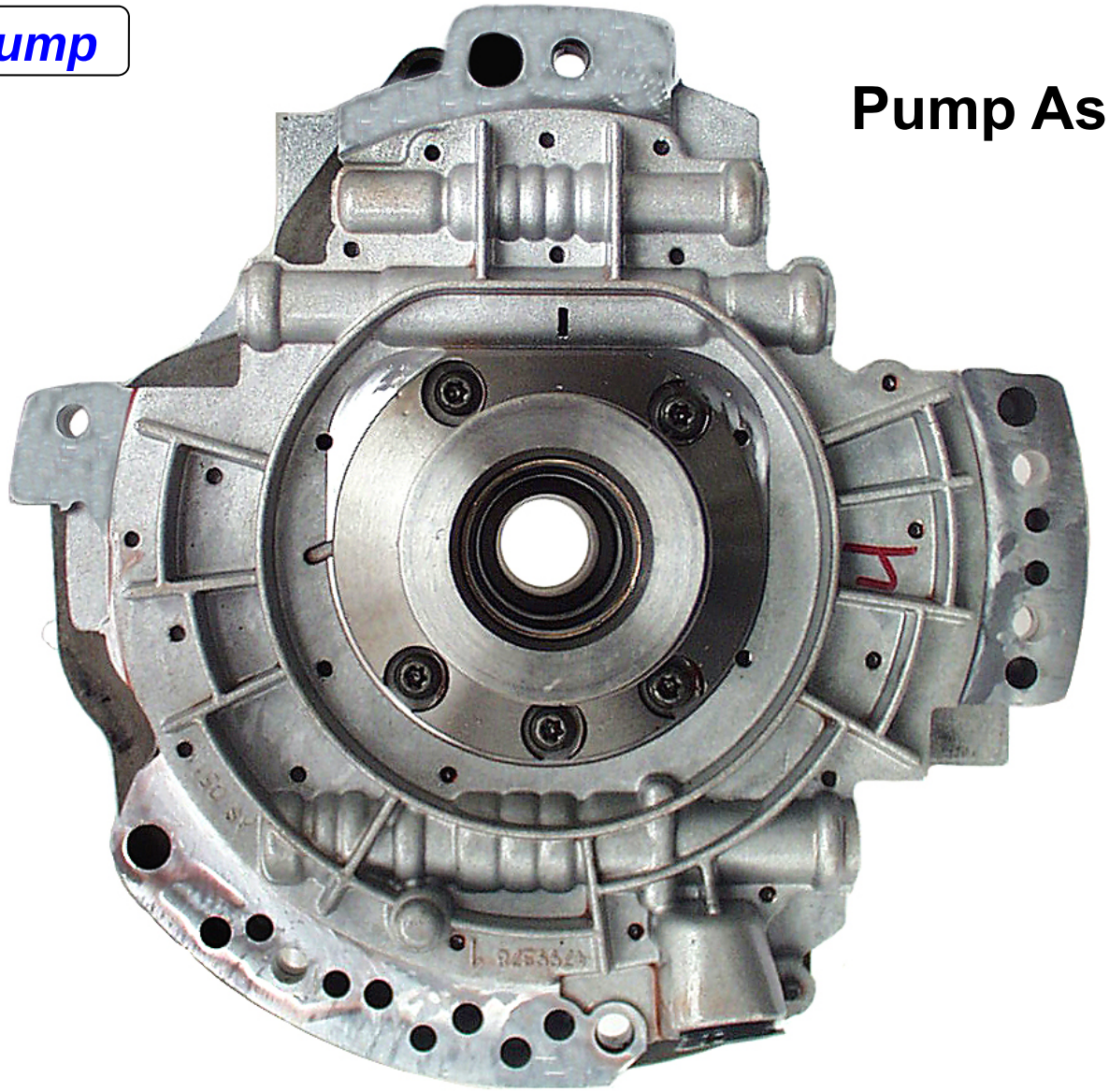
Pump Assembly

Pump is attached to case with (6) bolts 10mm head, measuring 1.660” x .310” Overall Length.

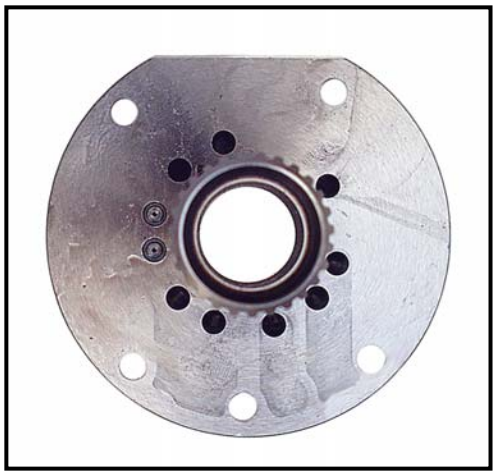
Pump is held together with (24) Torx 25 head Bolts with washer. Bolts measures 1.095” x .191” Overall Length.

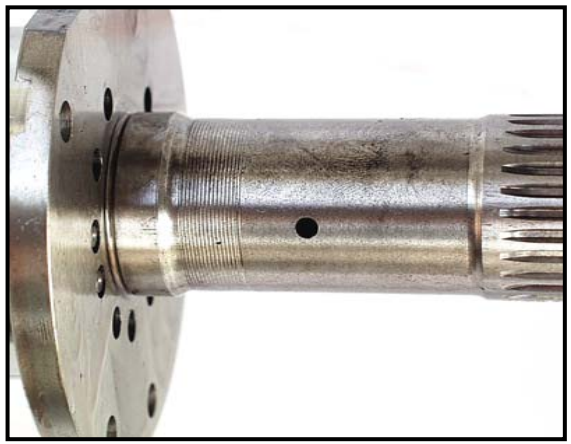


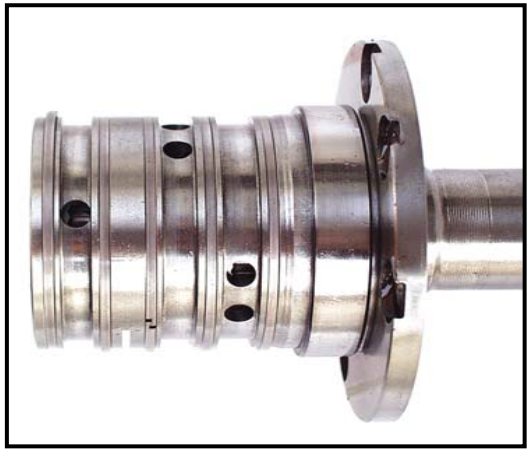
Pump Assembly



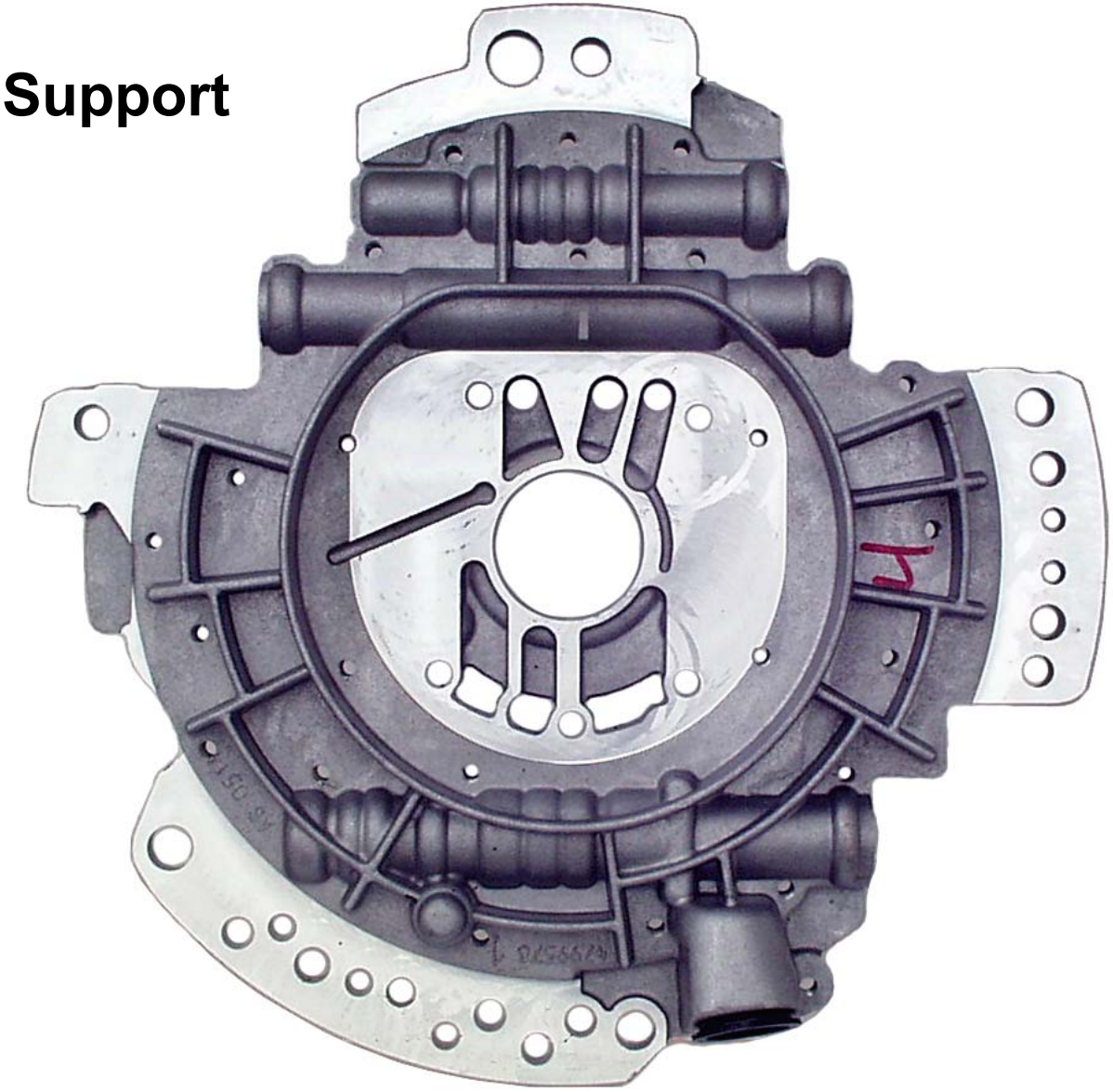
Stator- Pump Shaft



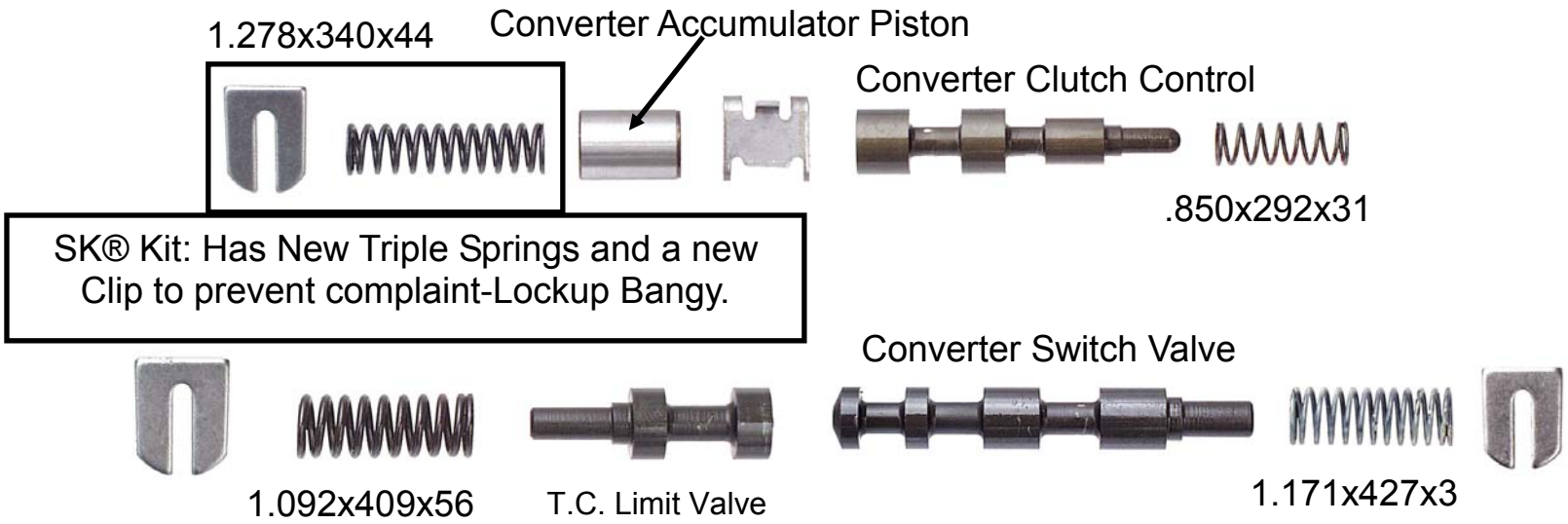




Pump Support



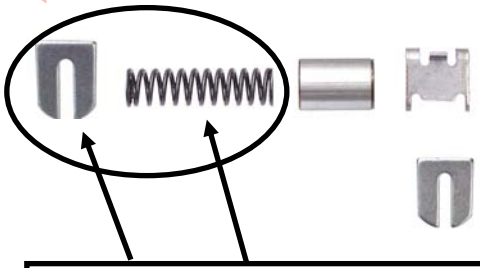
Pump Valves



Pump

Cover & Valves

Broken Spring causes a
Bangy Lockup Complaint.



Converter Control

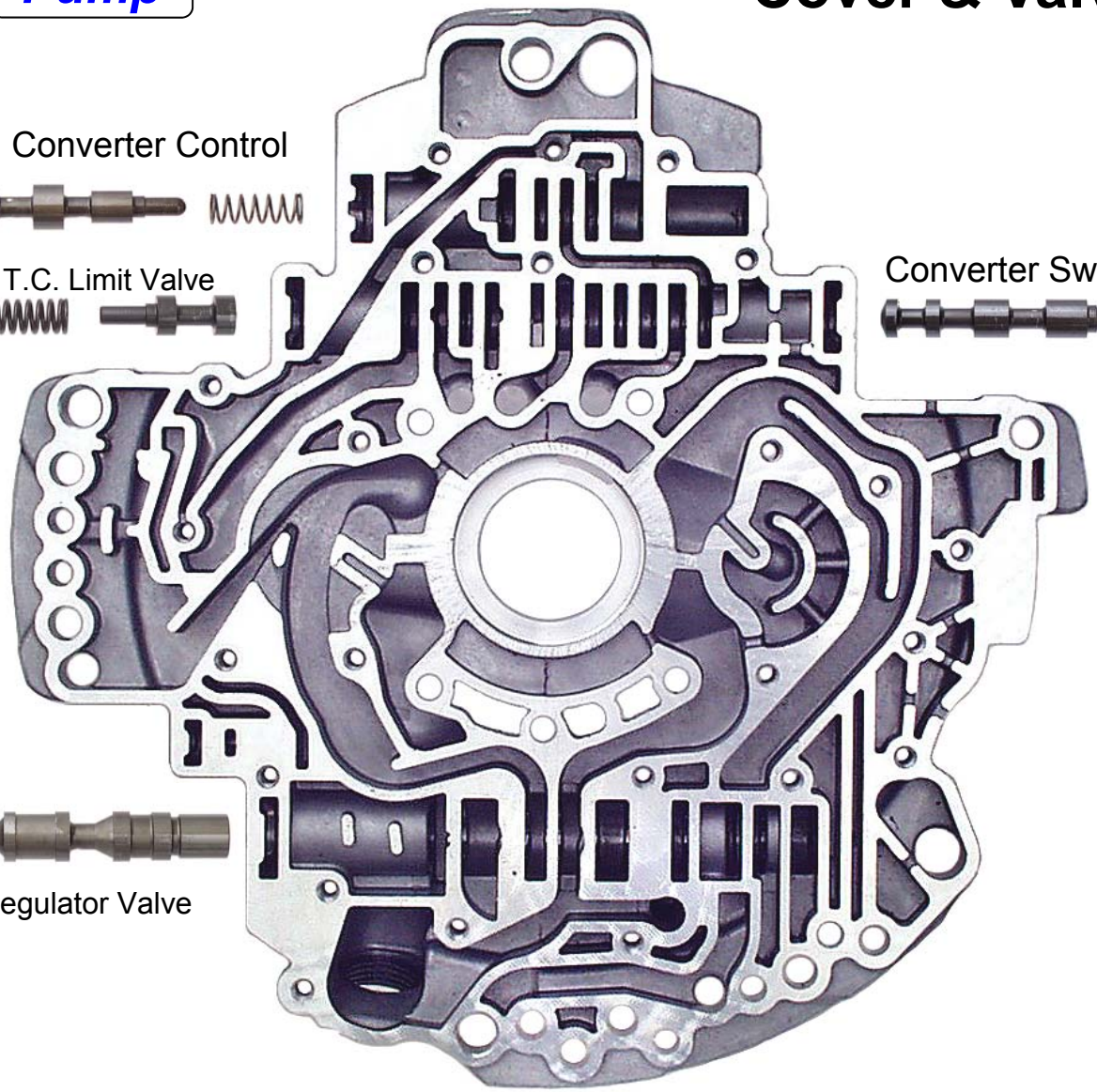
T.C. Limit Valve

Converter Switch Valve

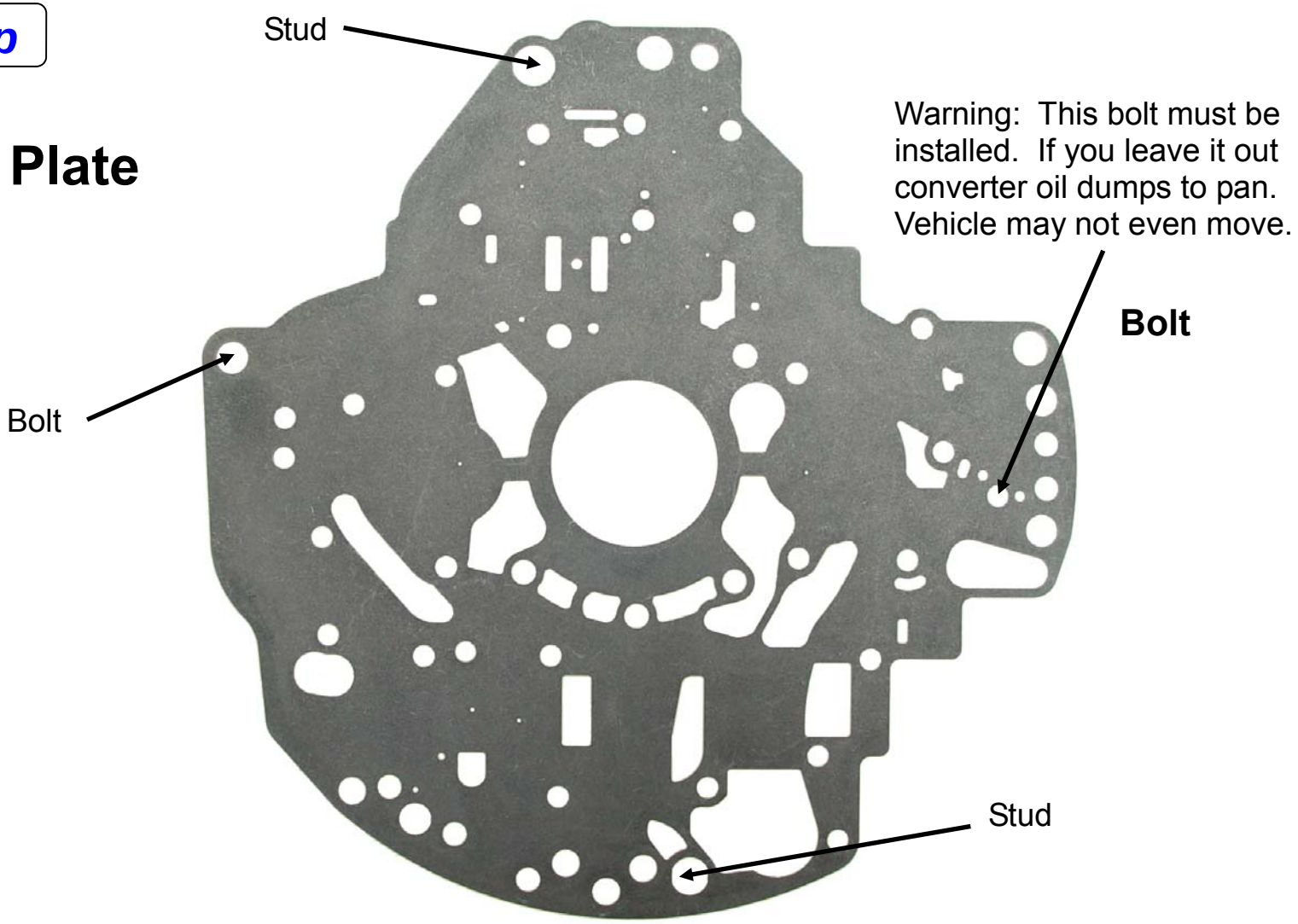
Shift Kit® upgrade here.
Triple Spring and new Clip.

Prevents losing clip and
FIXES Rough Lockup.

Pressure Regulator Valve



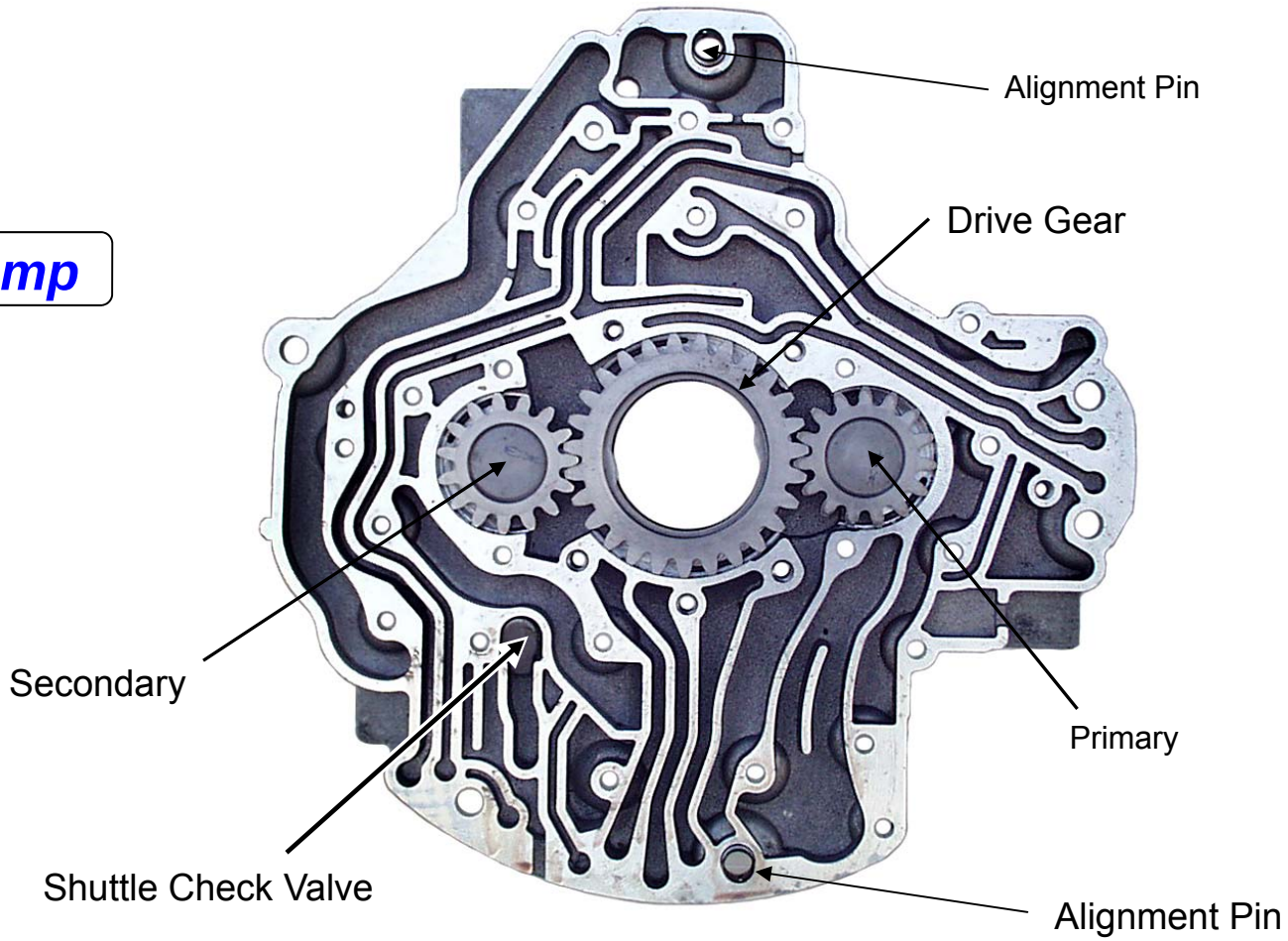
Pump Plate



Separator Plate is attached to the pump body with (2) Torx 25 Head bolts with washer. Bolts measure .610” x .191”.

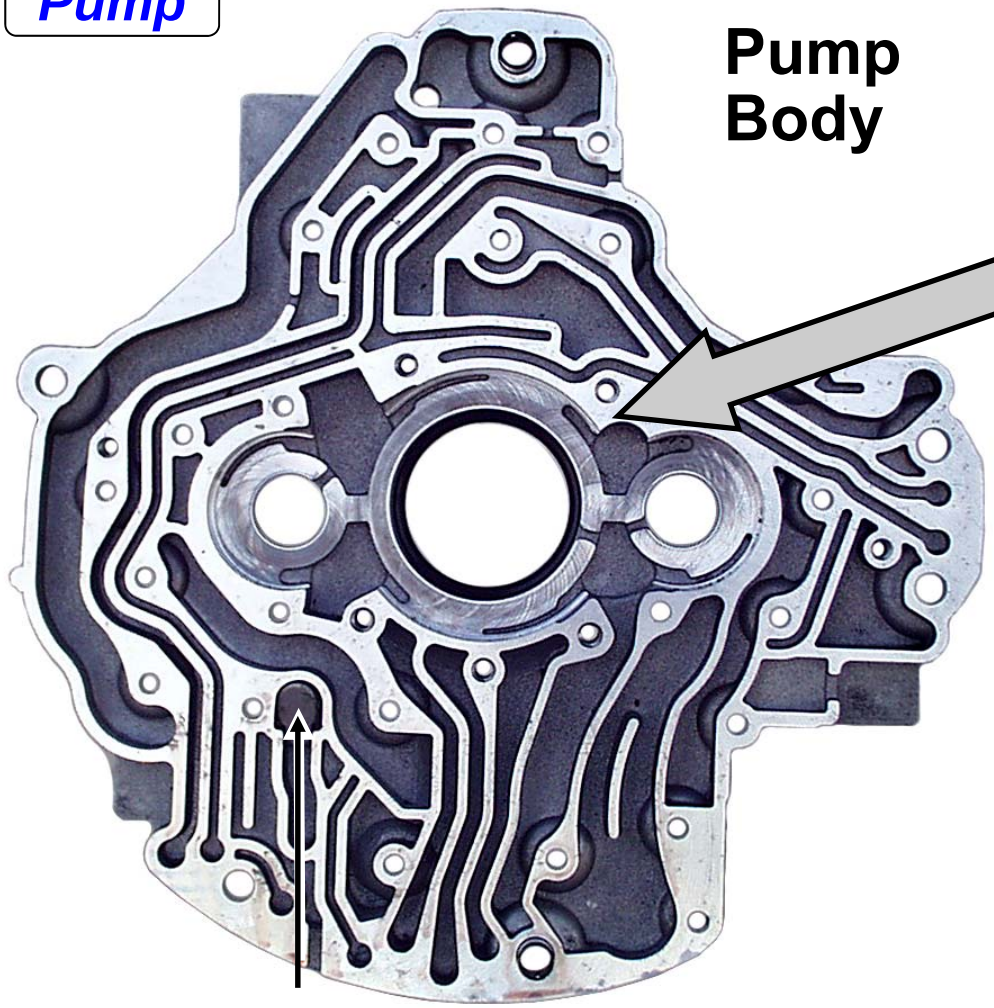
2 Rolled steel alignment studs is also attached to Pump Body.

Pump

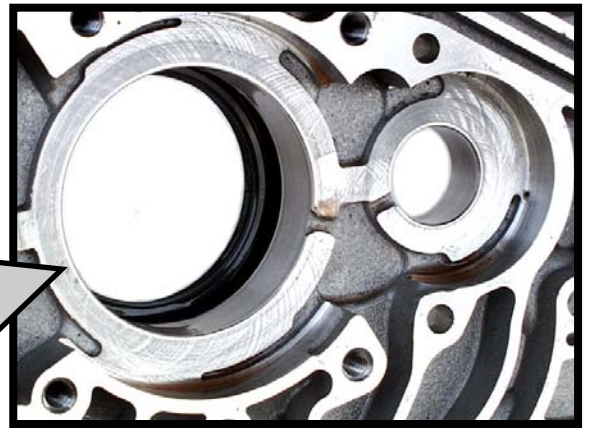


The 45RFE pump is a dual stage positive displacement pump. Both stages of the pump work during idle and low engine speeds. The second is vented whenever engine speed increases to a point where one side of the pump can supply the necessary pressure. The check valve controls on/off of the secondary pump.

Pump



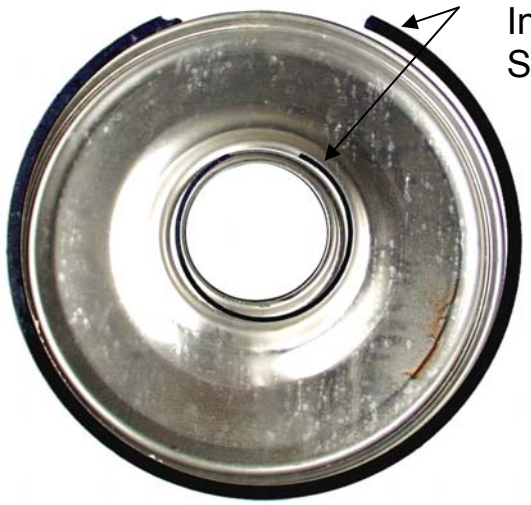
Pump Body



Gears shown side and top view. Gears rotate in the aluminum. Primary and Secondary gears are identical in size and shape. Gears are select fit, if they are to be reused, return them to original location.

Shuttle Check Valve
Controls secondary pump On/Off

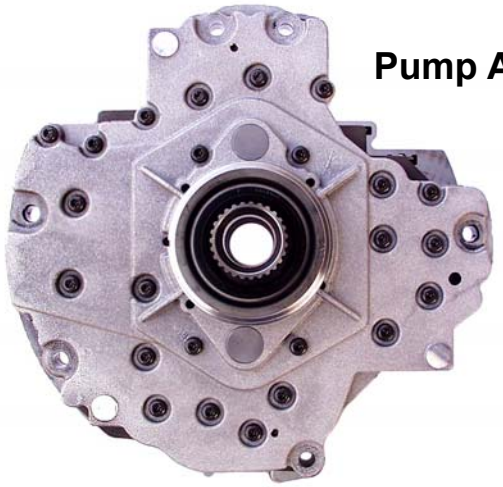
Internal Parts



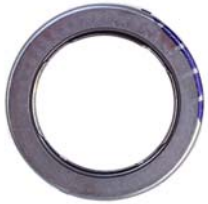
Inner/Outer
Snap rings

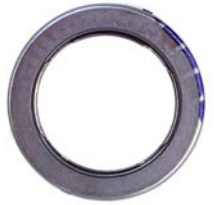
Pump Cover

Pump Assm



Input Drum





Snap ring

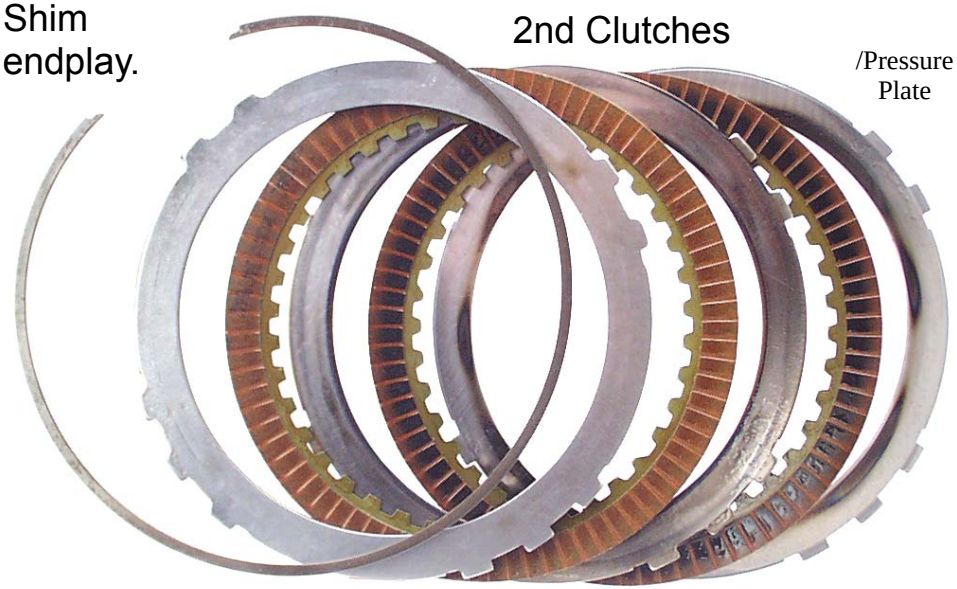
Center Support
4C Retainer

Outer Race towards Center
Support/4C Retainer

Internal Parts

Selective Shim
Output shaft endplay.

2nd Clutches /Pressure Plate



Reaction Drum

Reaction Planetary Carrier

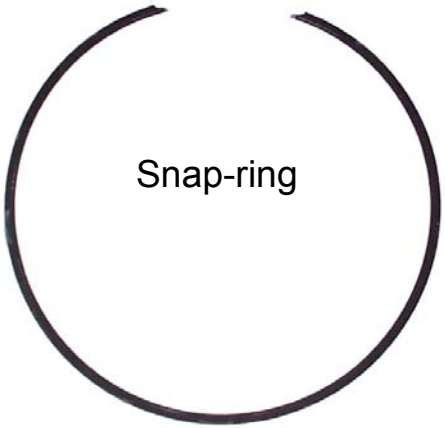
Bearing
Outer race towards reaction drum

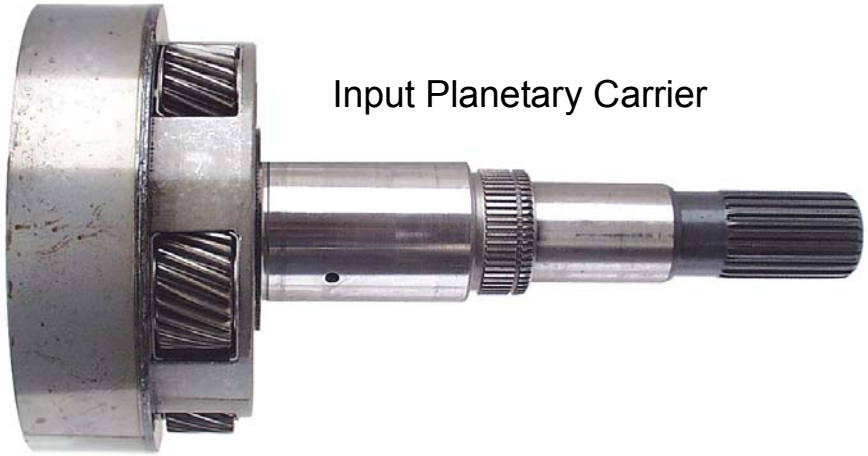
Bearing Outer race against planetary carrier.

Reaction Sun Gear

Bearing: Inner race towards sun gear

Internal Parts

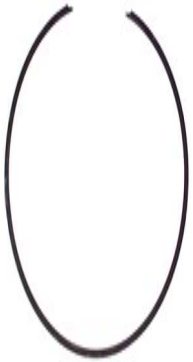


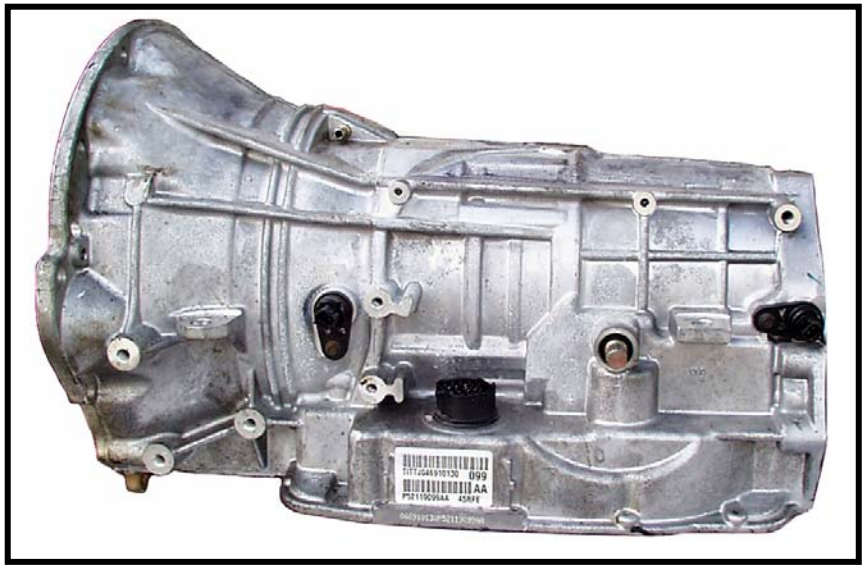


Internal Parts

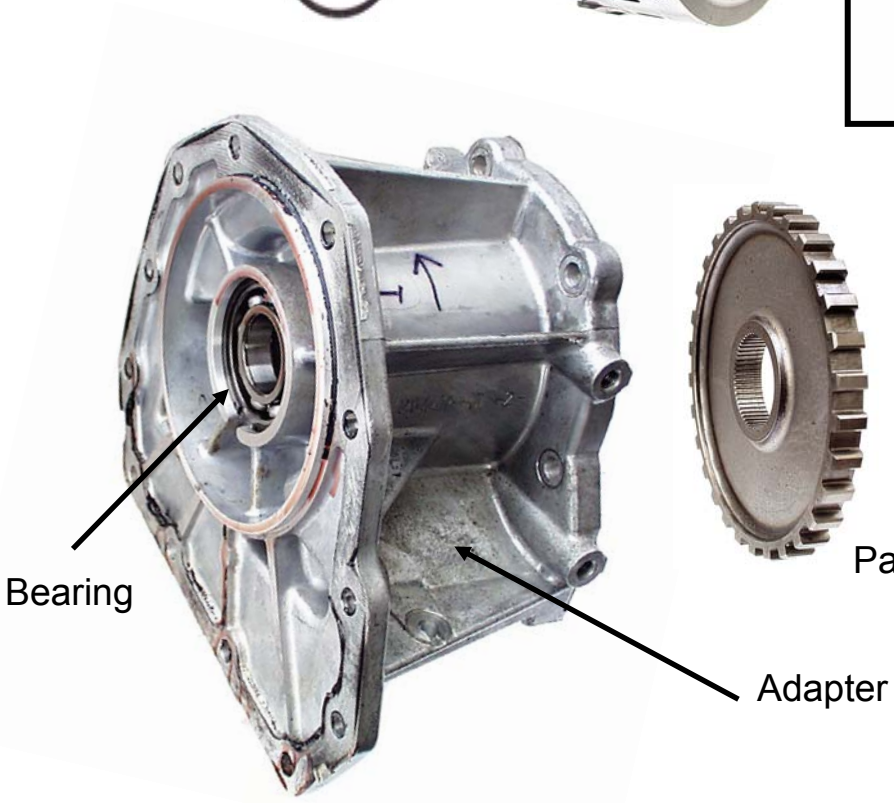
Low/Reverse Assembly

Snap-ring





Case



Bearing

Adapter Housing

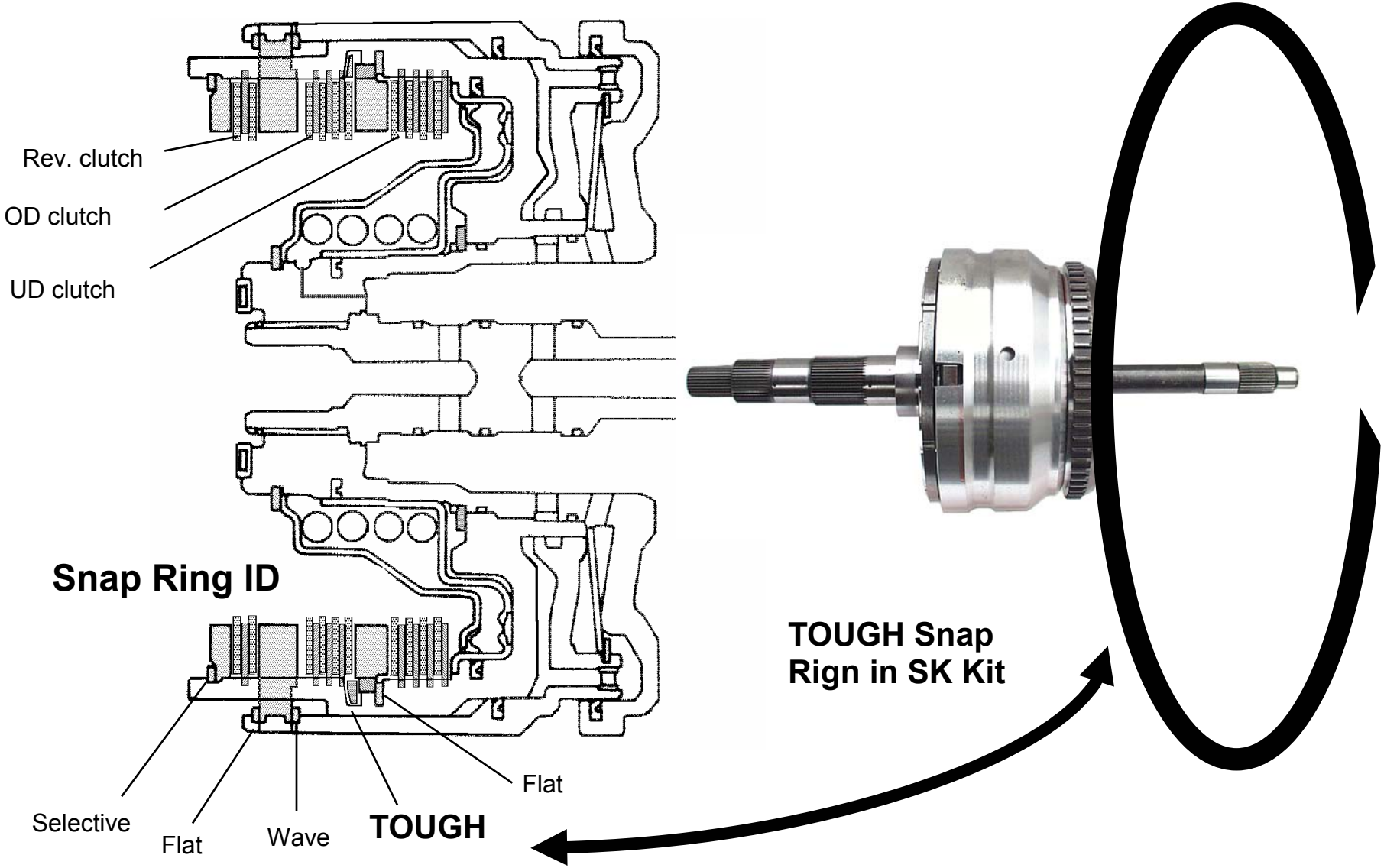
Park gear

Rubber Spacers

Snap-ring
Installs on the output shaft

Input Clutch Assembly

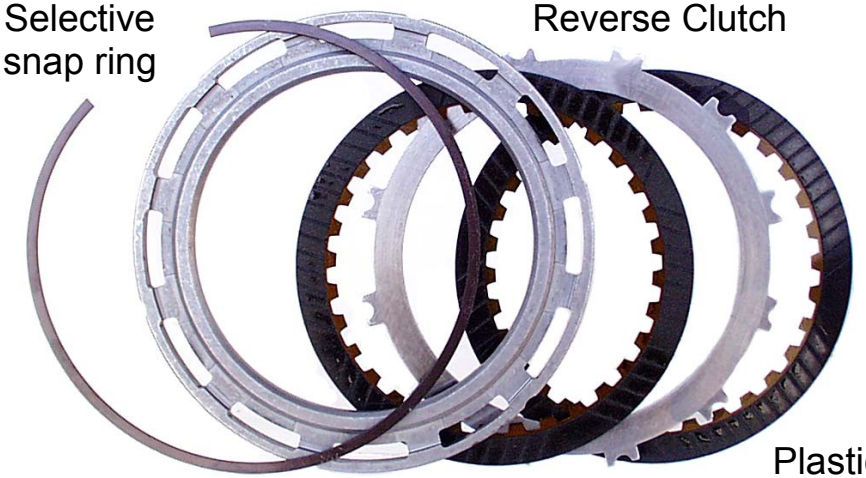
The Underdrive, Overdrive and Reverse Clutches are located in the input clutch assembly. All three clutch packs are splined to their respective hubs. The clutch packs are separated by snap rings and reaction plates. Although they are the same diameter, the overdrive clutch plates are thicker than the underdrive and reverse plates and are not interchangeable.



Input Clutch Assembly

Selective snap ring

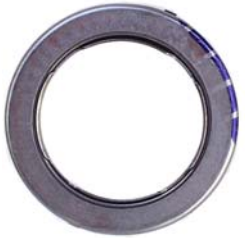
Reverse Clutch



Thrust washer/Bearing
Bearing side to hub.

Plastic cover to the bearing is a selective shim for setting the input shaft endplay.

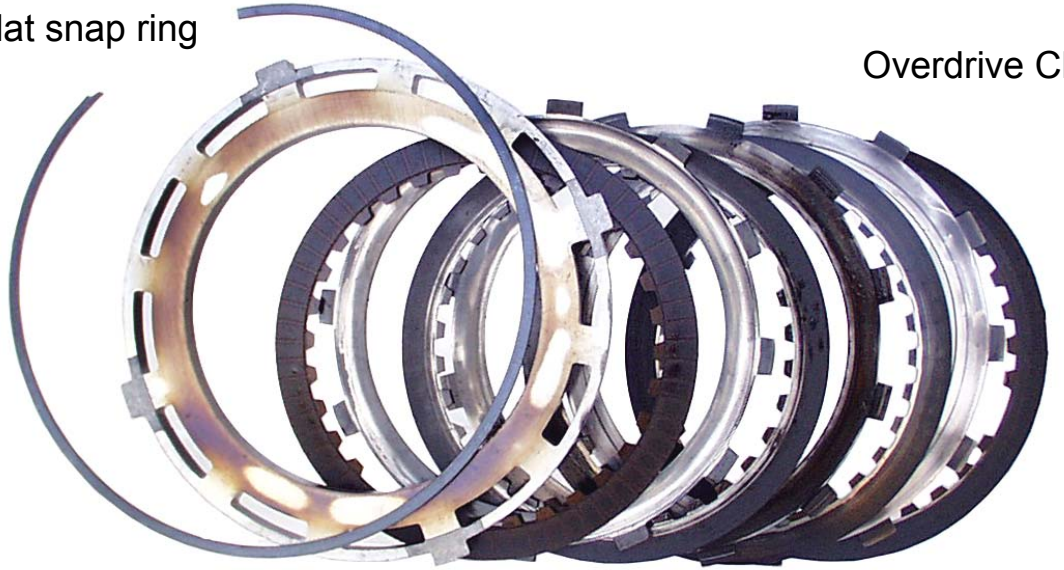
Overdrive Clutch Hub



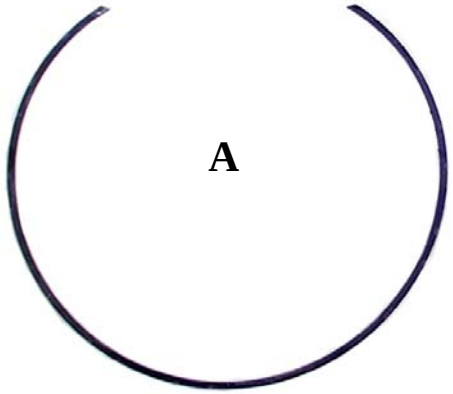
Outer Race towards hub

Flat snap ring

Overdrive Clutch

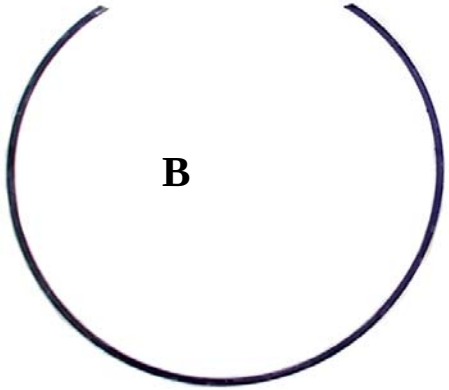


Input Clutch Assembly



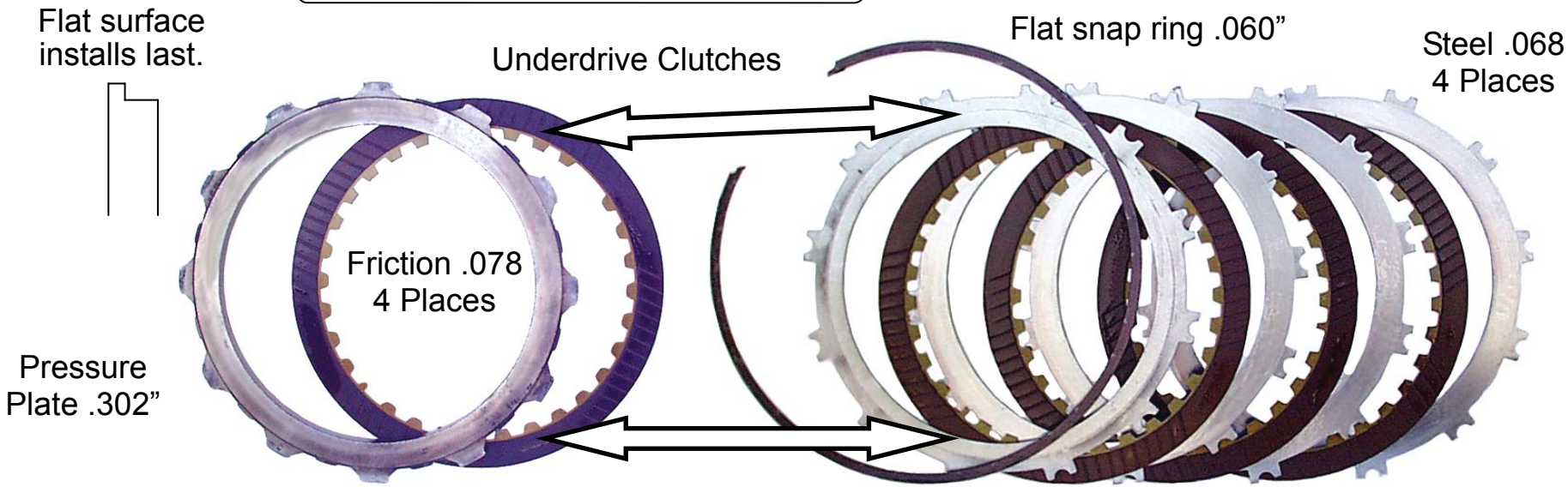
Snap Rings

See page 28 for exact location



Input Clutch Assembly

Underdrive Clutch



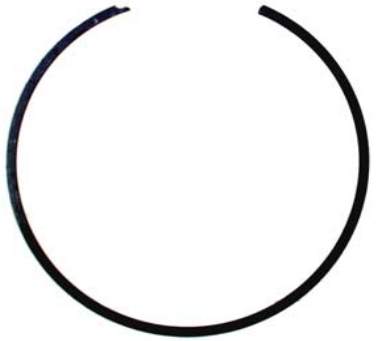
Input Clutch Assembly

Drum to Input Clutch Hub Snap ring. inside edge is tapered for ease of installation

Install tapered edge up.

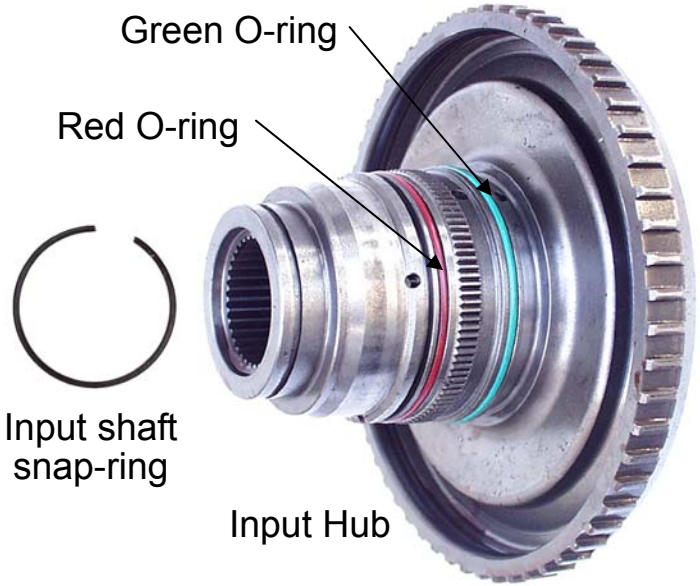
Use a new one

Clutch piston return spring is Tapered install inside edge down



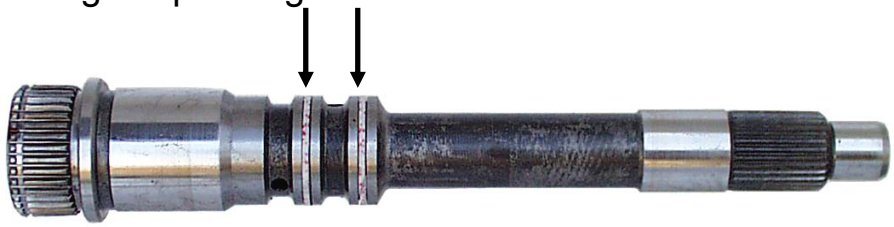
Snap ring .060”

Input Clutch Assembly

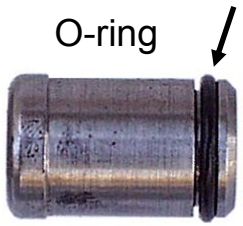


The Input hub uses 2 O-rings, a red smaller one and a green larger one. Hub may use different color O-rings depending on model.

Bearing: The Inner race towards Hub



The Input shaft has 2 Teflon rings



Back-flow Valve.

Back-flow Valve is in the input shaft. To remove it, use a drill bit and tap into one of the top holes, then pull it out. Before installation make sure it's clean and that the check ball operates freely.

Input Clutch Assembly

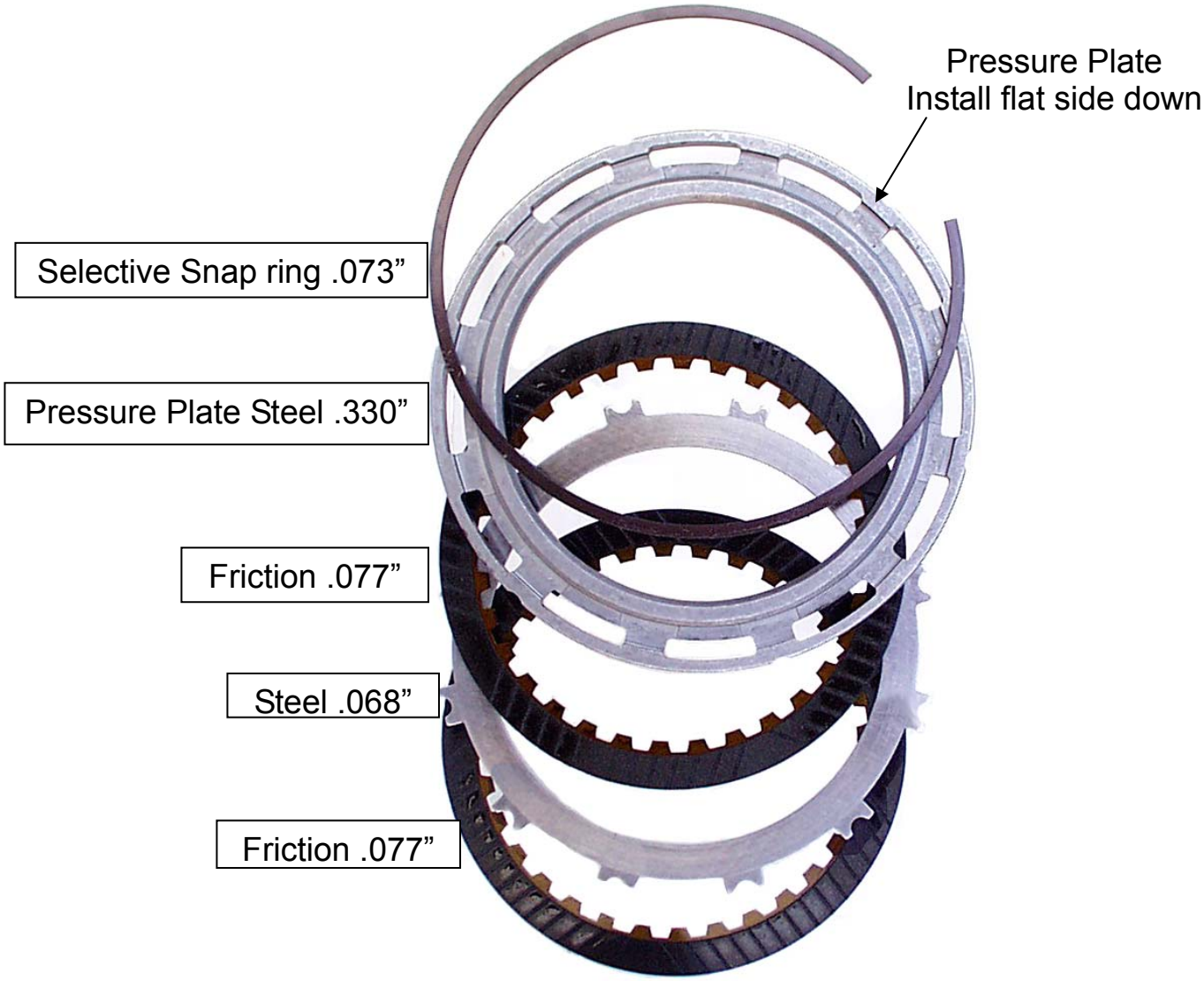
B:

Location of Tapered snap ring,
second groove from outside
Note direction of taper.

A: Location of
Waved snap ring

Input Clutch Assembly

Reverse Clutch

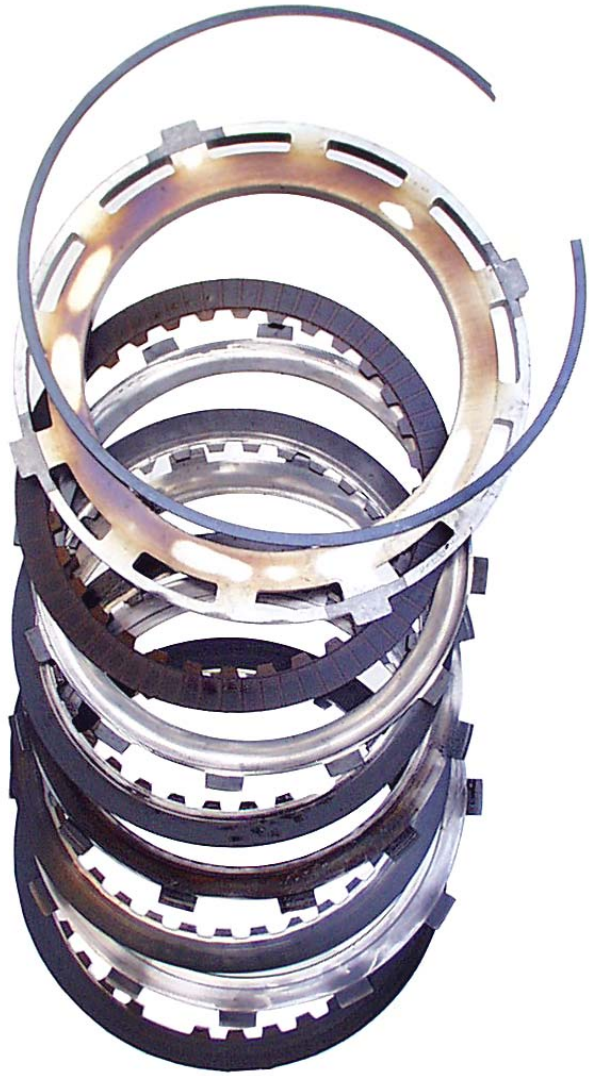


Input Clutch Assembly

Input Clutch Assembly
Overdrive Clutch

Underdrive Clutch
See Page 29

- Flat snap ring .061”
- Pressure Plate .386”
- Friction .084”
- Steel .087”
- Friction .084”
- Steel .087”
- Friction .084”
- Steel .087”
- Friction .084”



Center Support Assembly

Center Support Assembly

Retainer Bulkhead

4C Piston

Seal

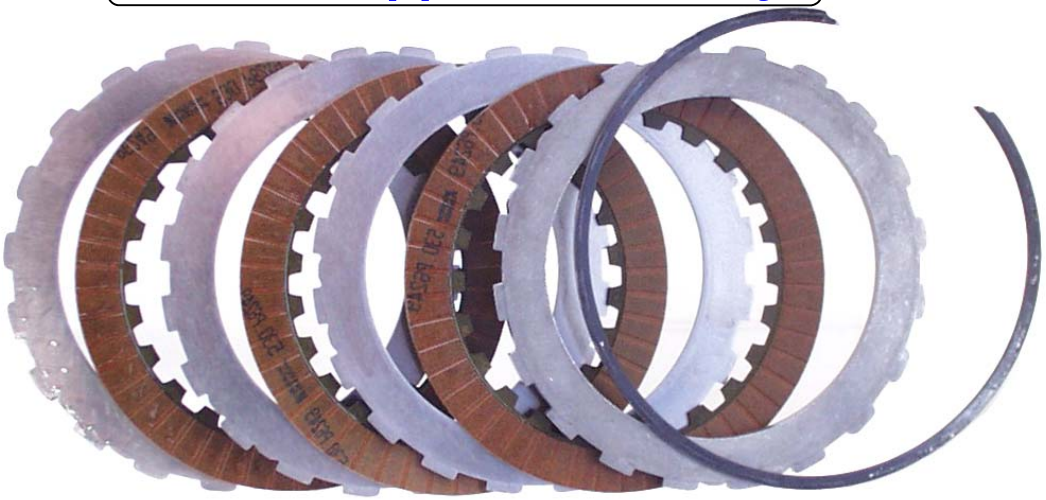
Springs Return

Snap-ring

Find two air bleed plugs.
If missing causes 2 or 4 clutch slip.

Center Support Assembly

2C/4C Clutches

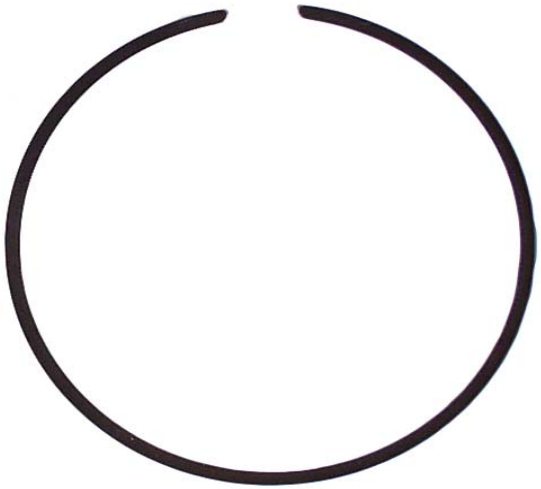


2C Piston

Seals

Belleville spring

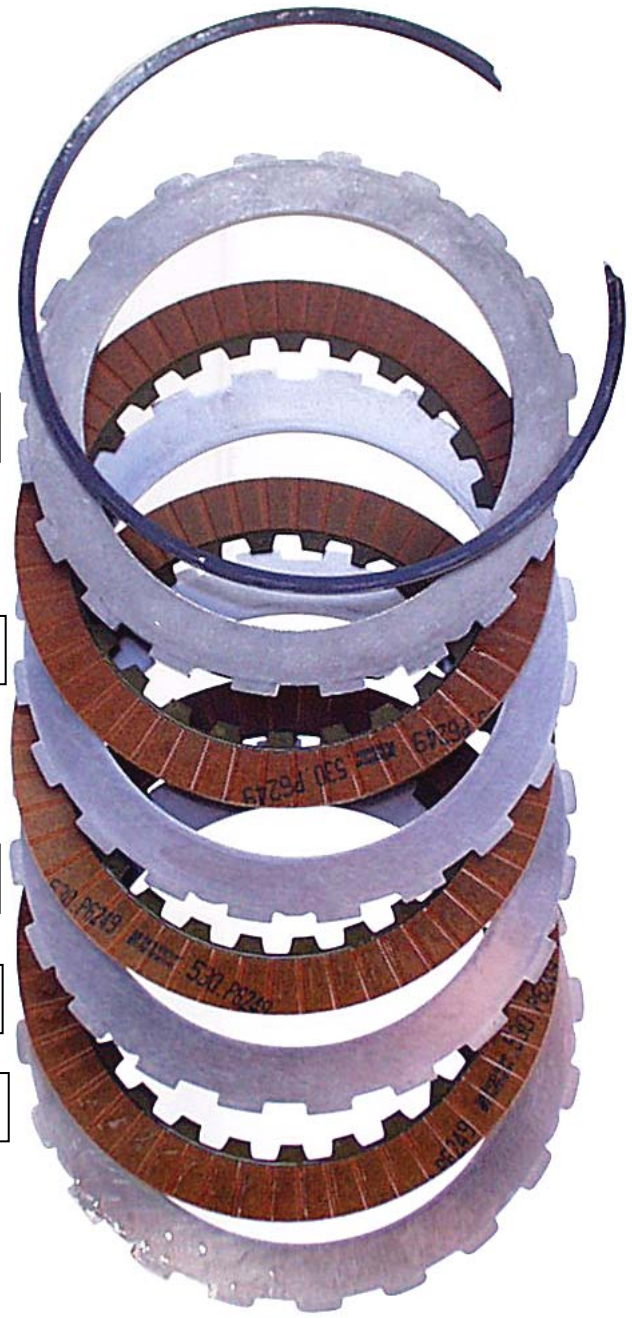
Snap ring (select)



Center Support Assembly

4C Clutches

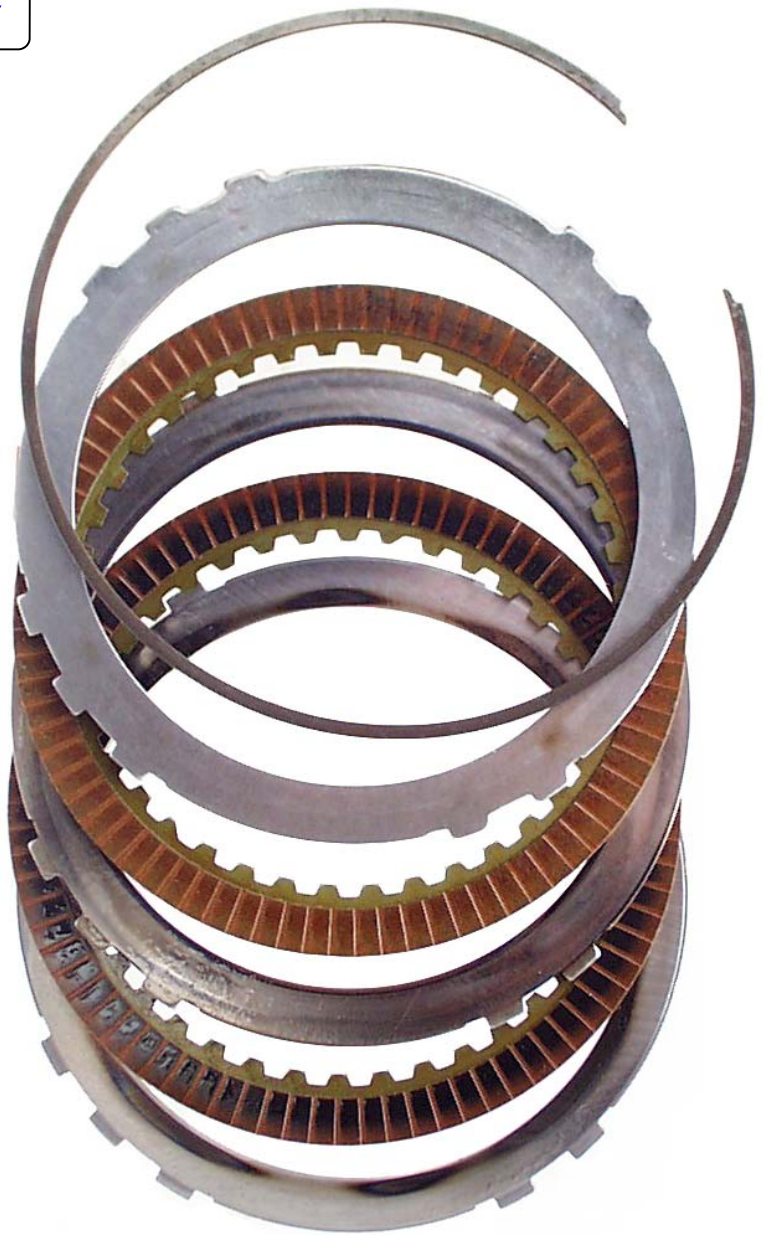
- Selective snap ring .061”
- Pressure Plate .386”
- Friction .084”
- Steel .087”
- Friction .084”
- Steel .087”
- Friction .084”
- Steel .087”



Center Support Assembly

2C Clutches

- Snap Ring .062”
- Steel .128”
- Friction .092”
- Steel .128”
- Friction .092”
- Pressure Plate .326”



Low-Rev Drum Assembly

Low/Reverse Clutch Pack

Snap ring

Split retainer ring

Belleville Spring

Low/Reverse Piston

Clutch Retainer/Drum

Low-Rev Drum Assembly

Low Rev Drum

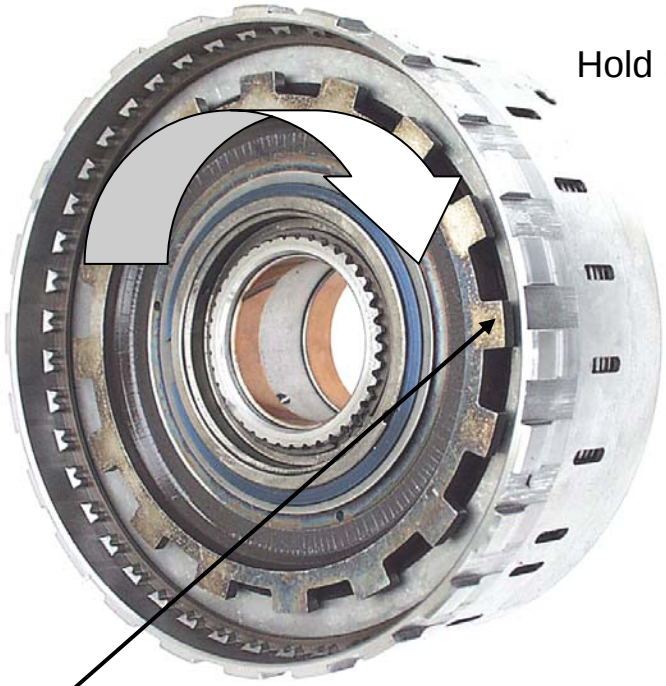
Snap Ring

Snap ring

Spacer
Note: Tab lines up with slot in roller clutch hub

Outer Race

Roller Clutch and inner race assembly



Hold Drum

Rotate outer race

Low Rev Drum

Low-Rev Clutches

Snap ring .082” (Selective)
Steel Pressure .310”
Friction .079”
Steel .069”
Friction .079”
Steel .069”
Friction .079”
Steel .069”
Friction .079”
Steel .069”
Friction .079”
Steel .069”
Friction .079”
Steel .069”

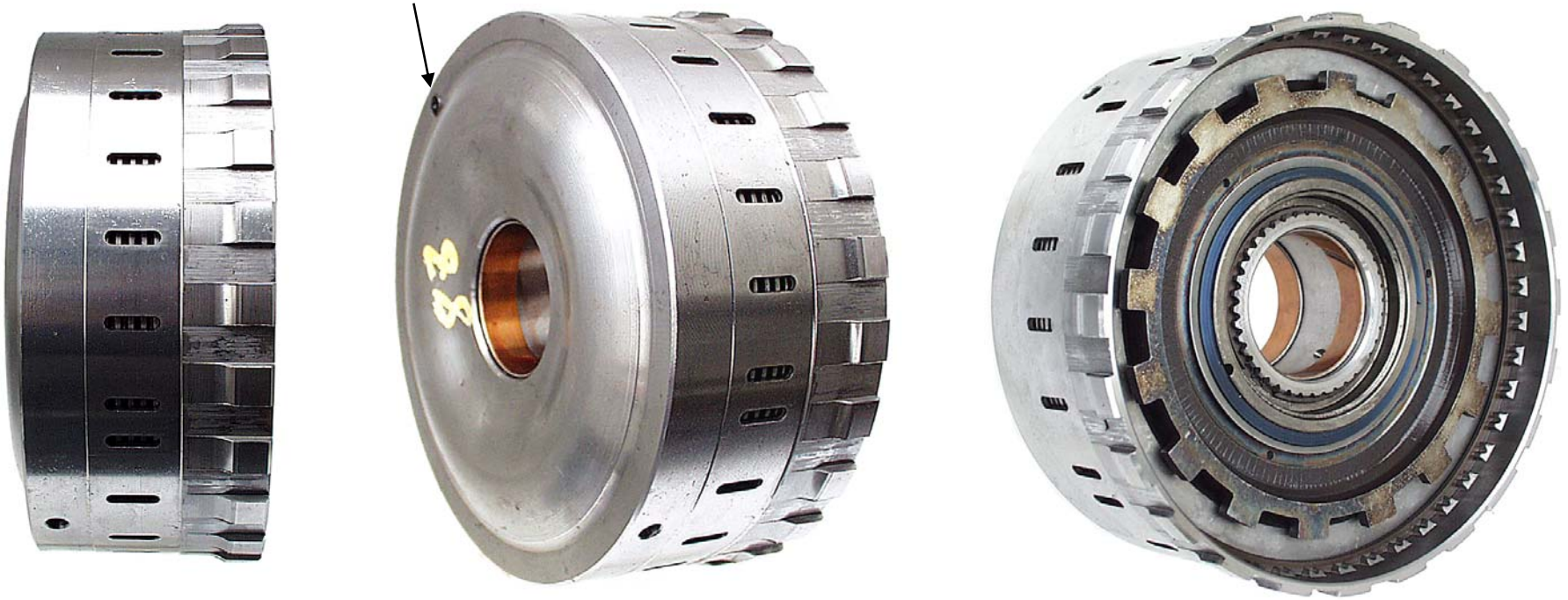
Pressure plate has a taper on inside edge

Install flat side down

Low-Rev Drum Assembled

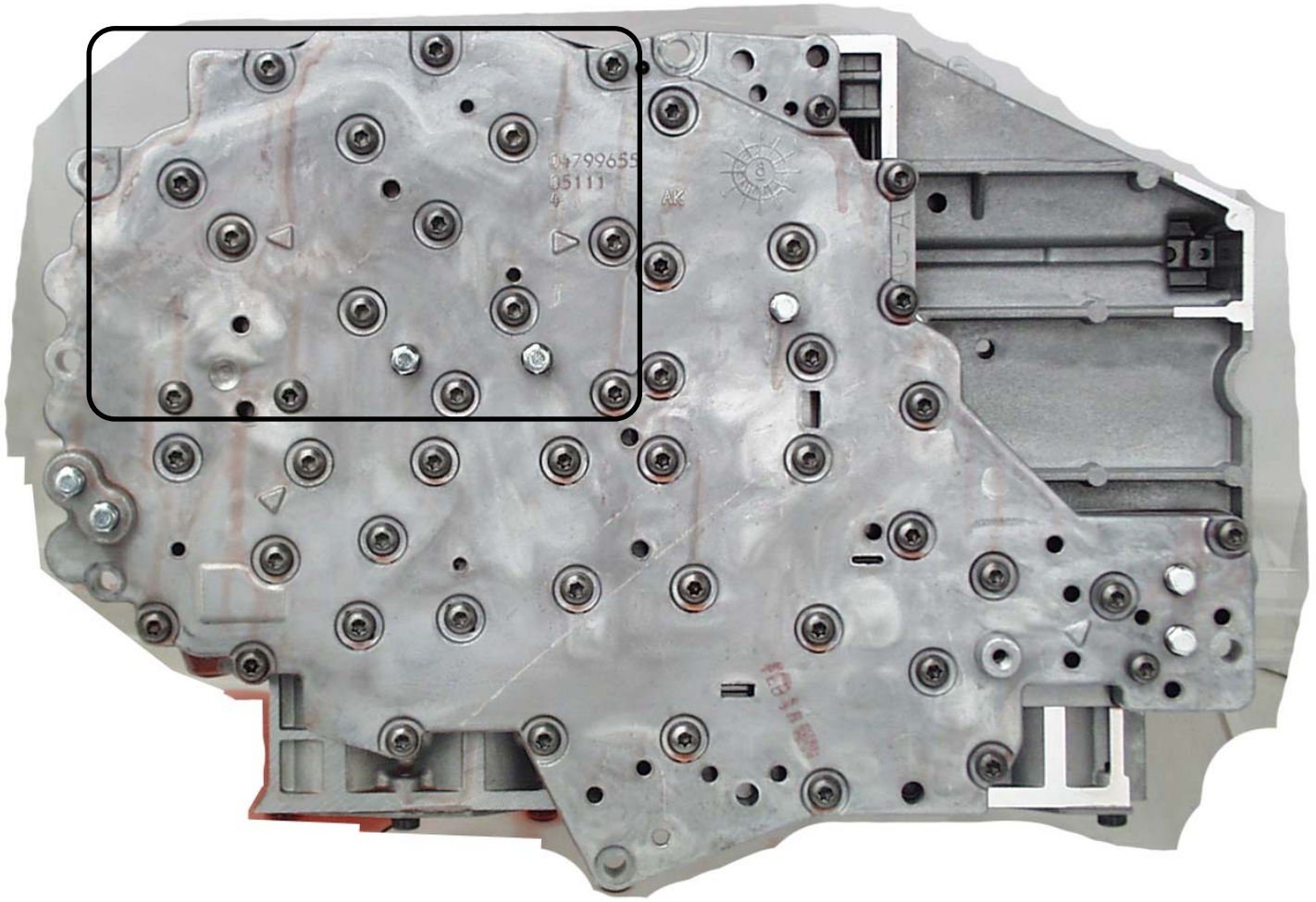
The Low/Reverse Clutch is located in the rear of the transmission. The L/R Clutch takes the place of a band. It is applied in Park, Neutral, Low and Reverse.

Reverse clutch air bleed plug
No reverse if plug is missing.

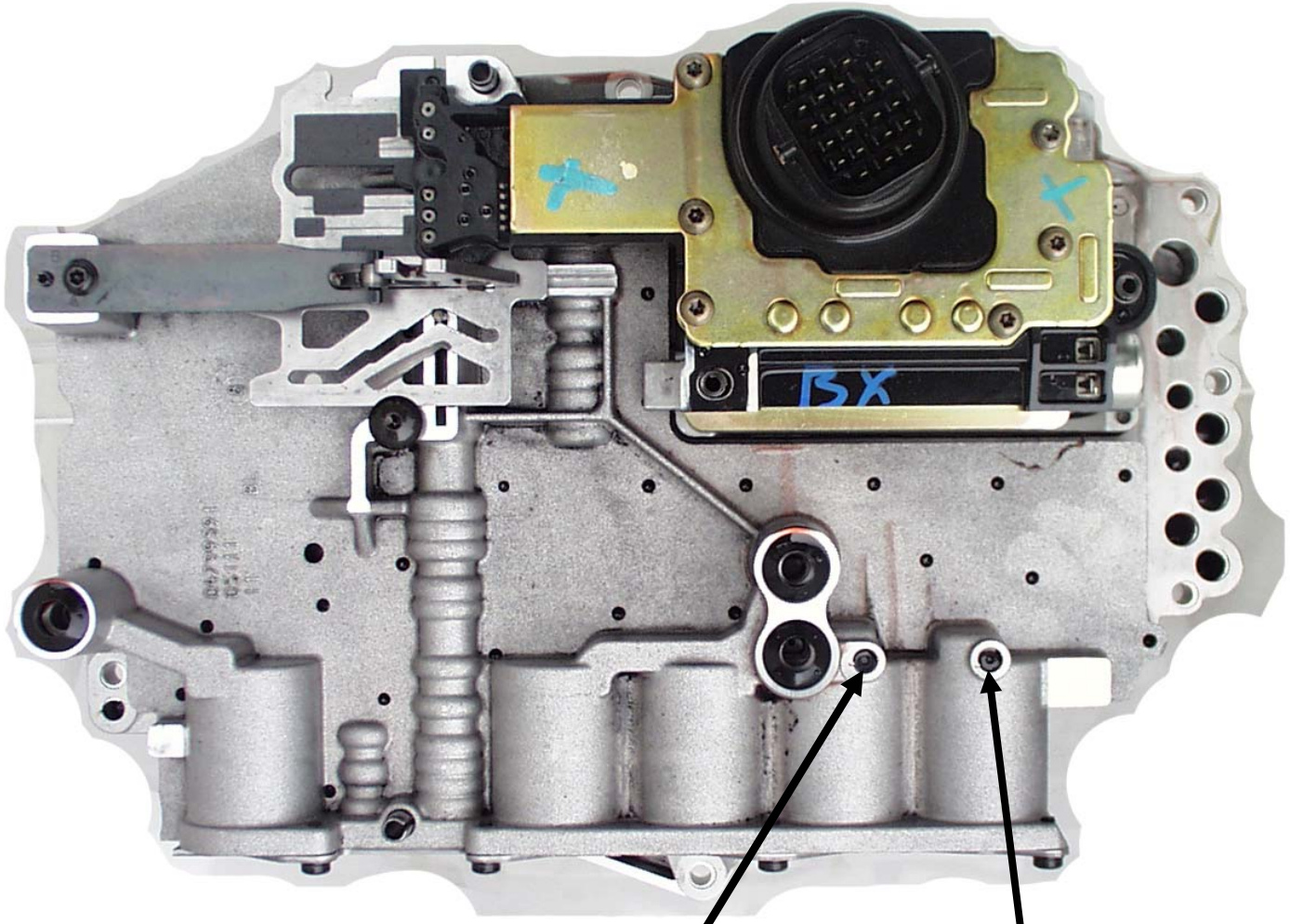


Valve Body: Bottom

Bolts in this area are solenoid body bolts.



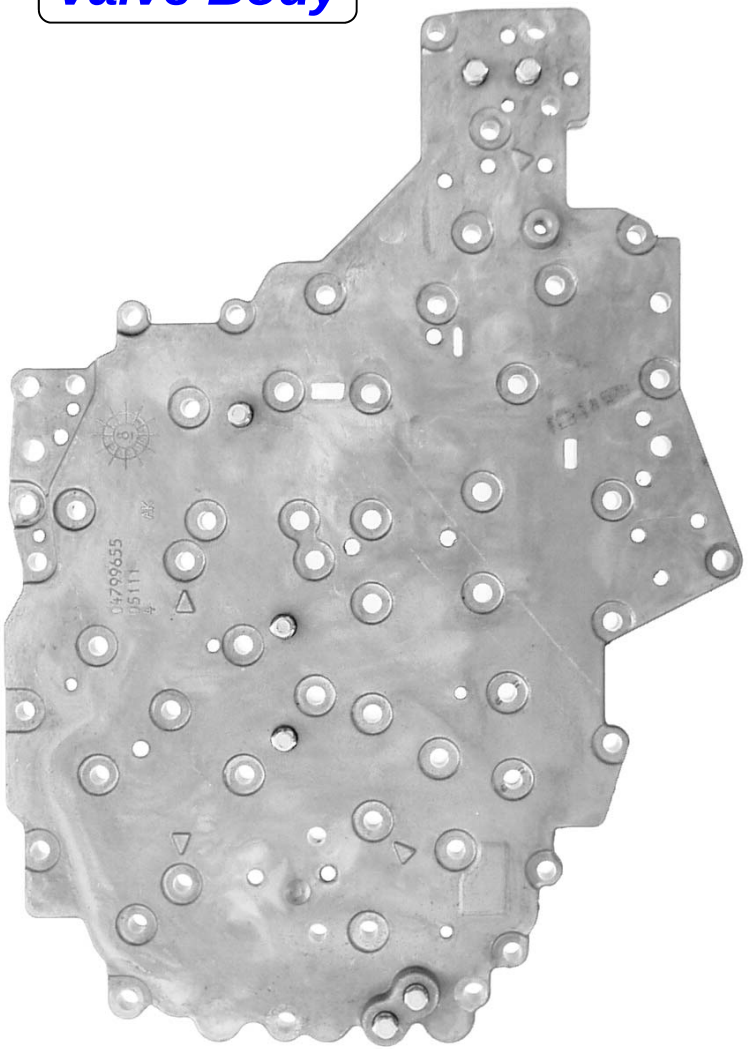
Valve Body: Top



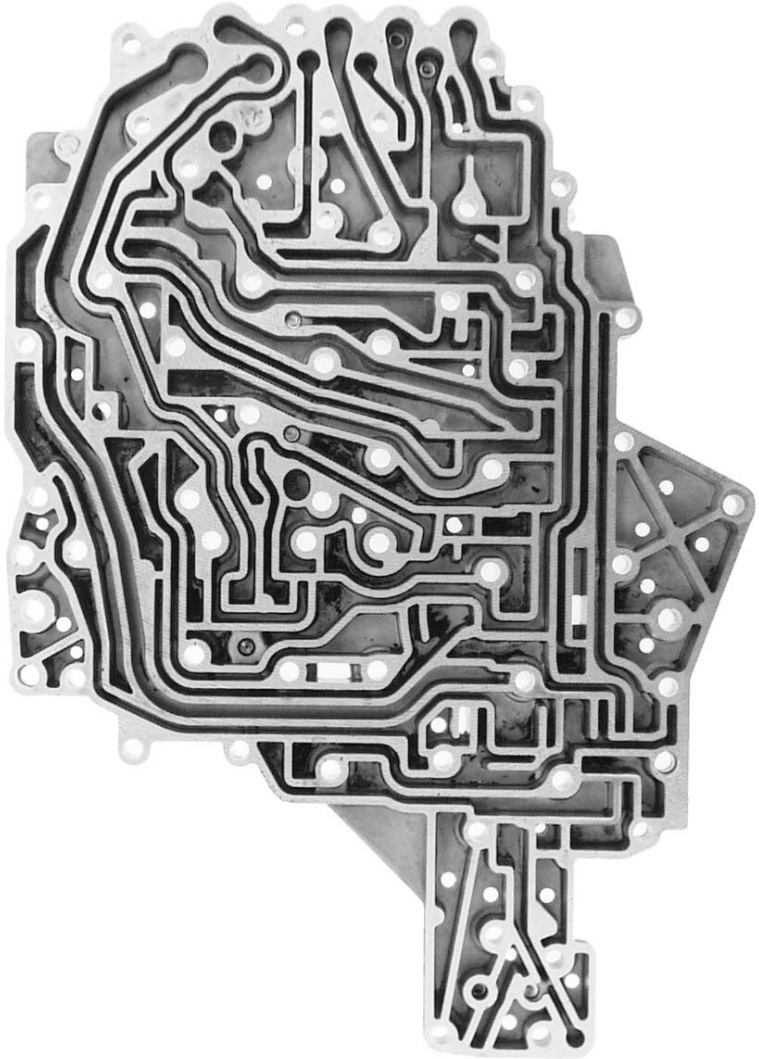
Underdrive air bleed plug.
No UD clutch application if missing.

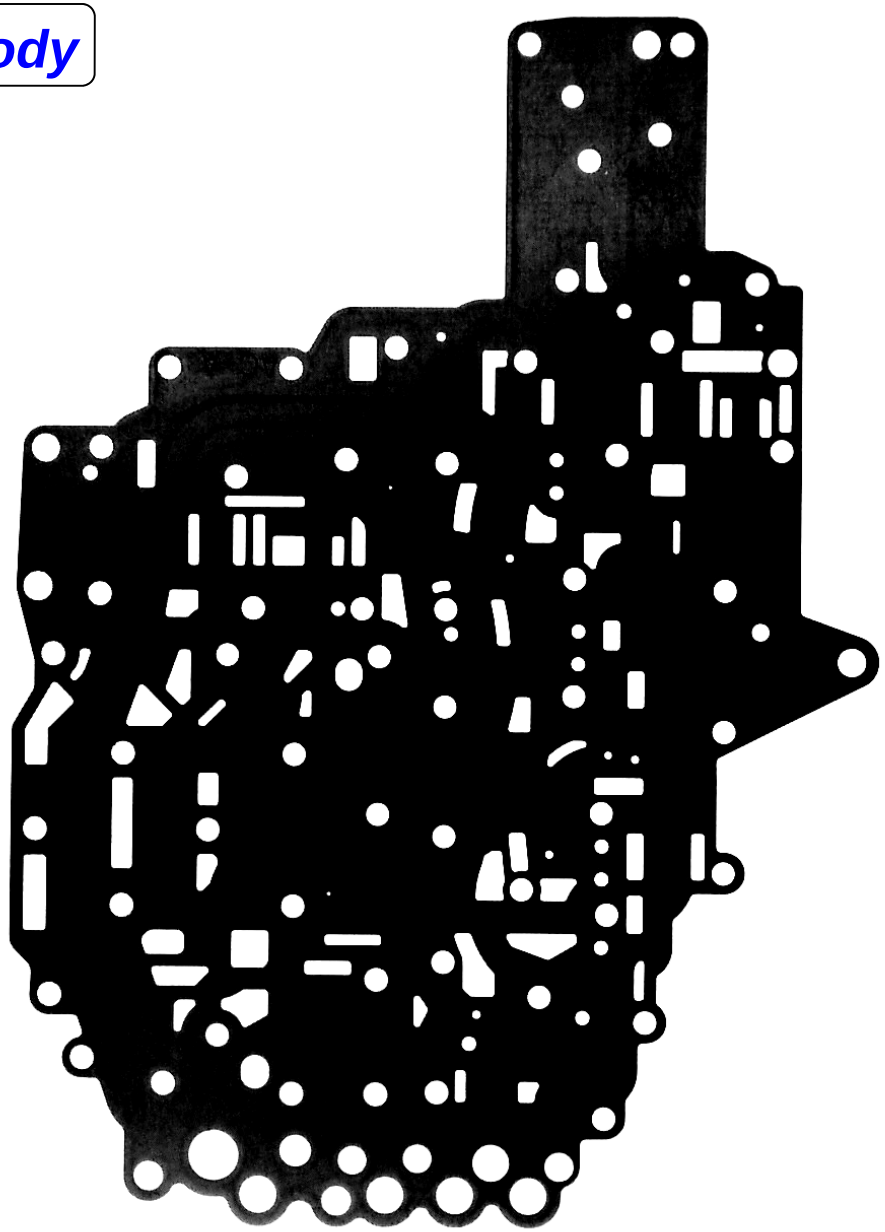
Overdrive air bleed plug.
No OD clutch application if missing.

Valve Body



Channel Casting





Separator Plate

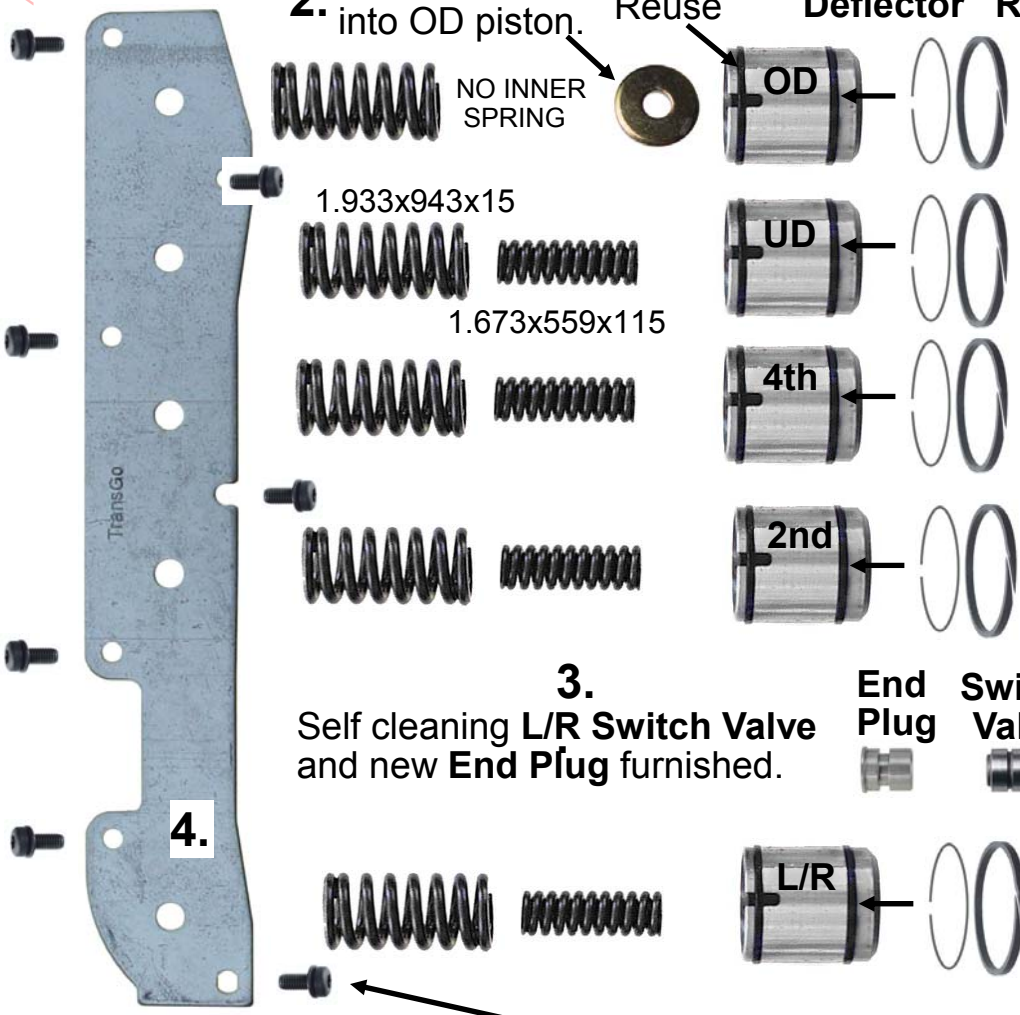
SK® Kit has:
Spare accumulator springs.

LISTEN: This is SK® Kit instruction page.
1,2,3, and 4 are SK® Kit upgraded parts.

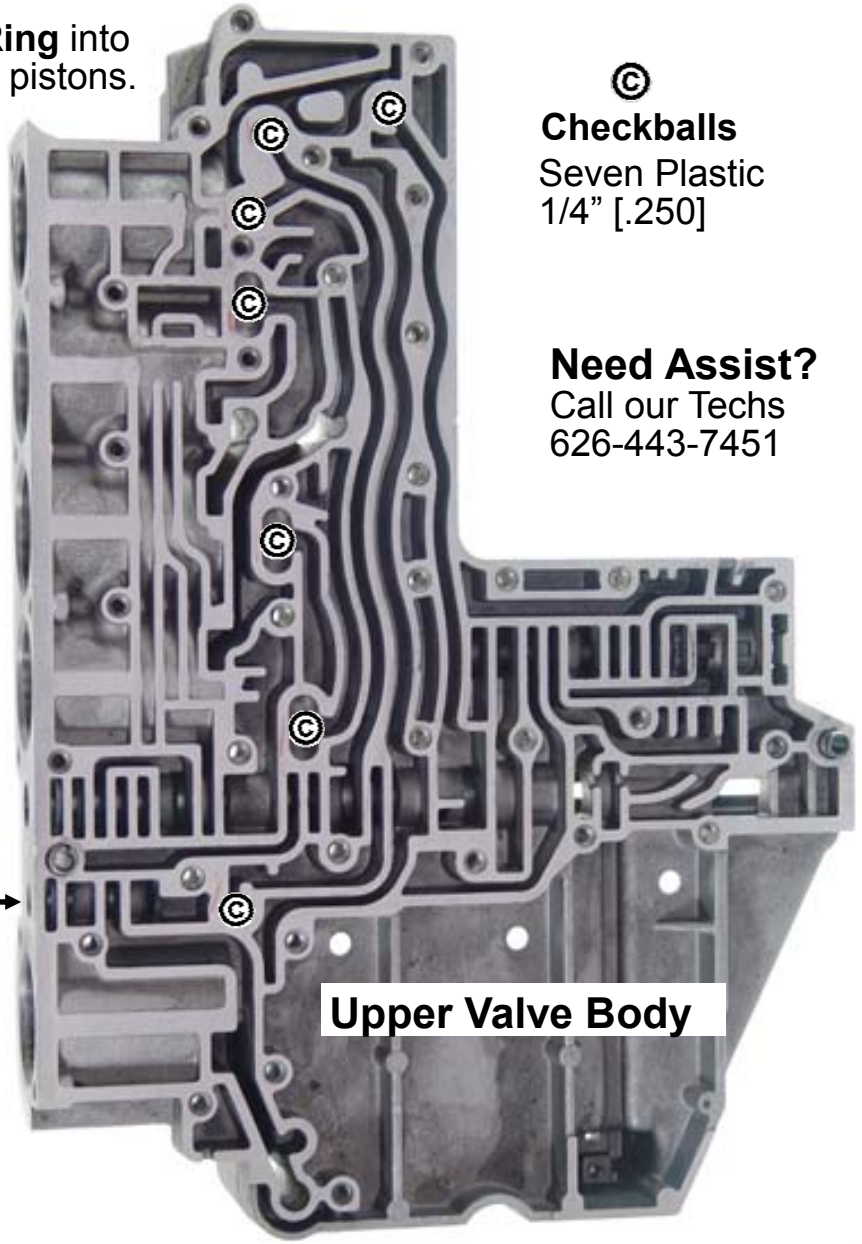
Valve Body

1. Install **Wire Deflector** and **Ring** into inboard ring groove--all *Five* pistons.

2. Install **Washer** into OD piston.



3.
Self cleaning **L/R Switch Valve** and new **End Plug** furnished.



©
Checkballs
Seven Plastic
1/4" [.250]

Need Assist?
Call our Techs
626-443-7451

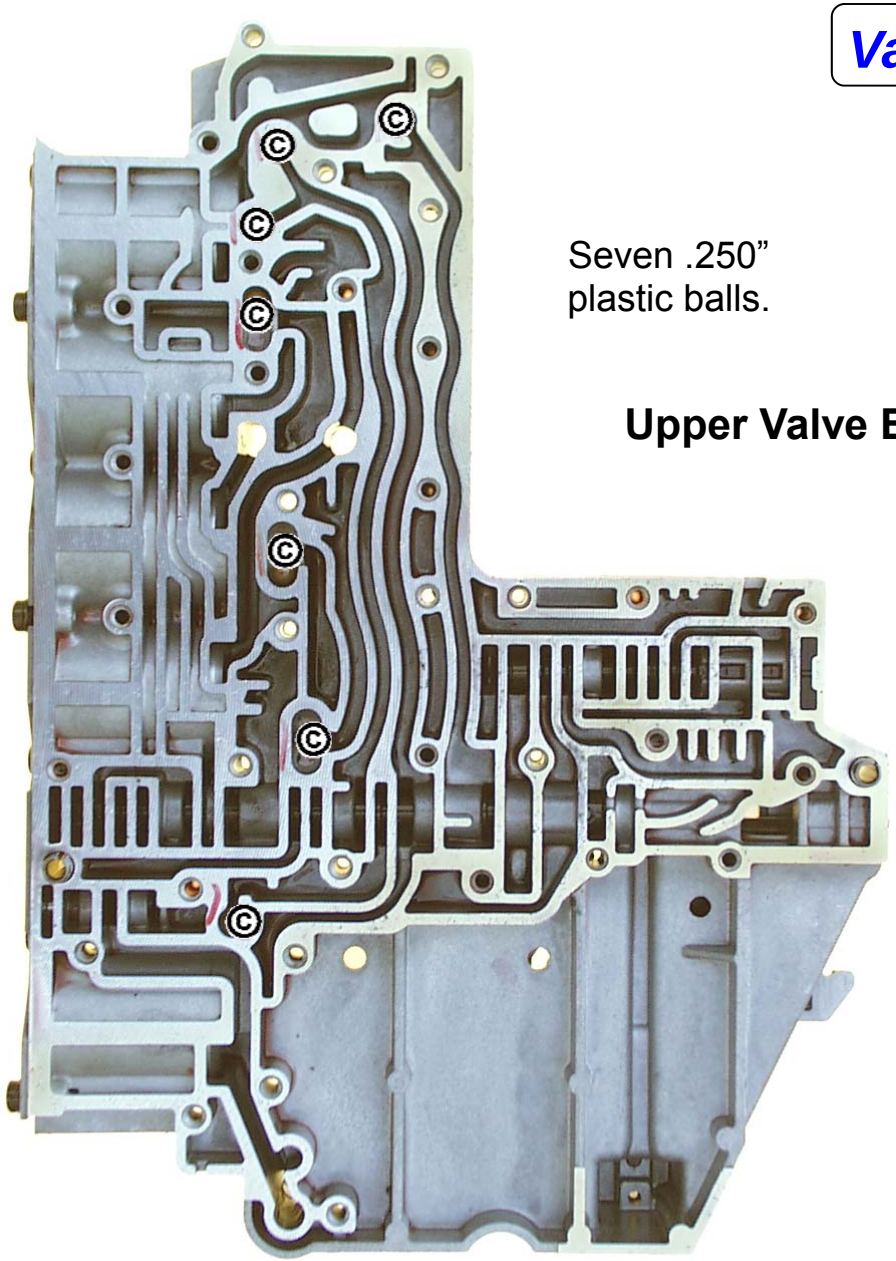
4. Tougher Cover

LISTEN UP: Loctite cover screws, tighten to 40 in-lbs.

End plate screws from 470-670-604-42LE are same size.
Stripped threads? Tap 1/4-20
Use 1/4-20 x 1/2 bolt w/washer.

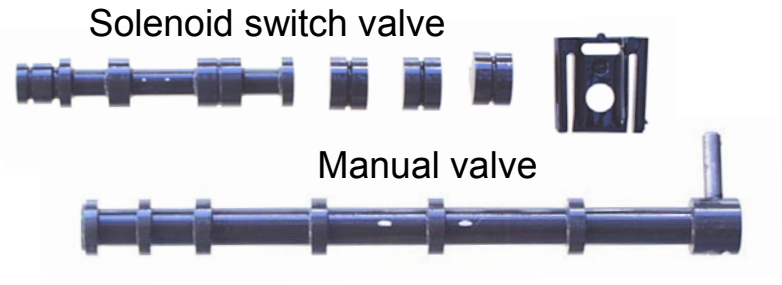
Page 3

Valve Body



Seven .250”
plastic balls.

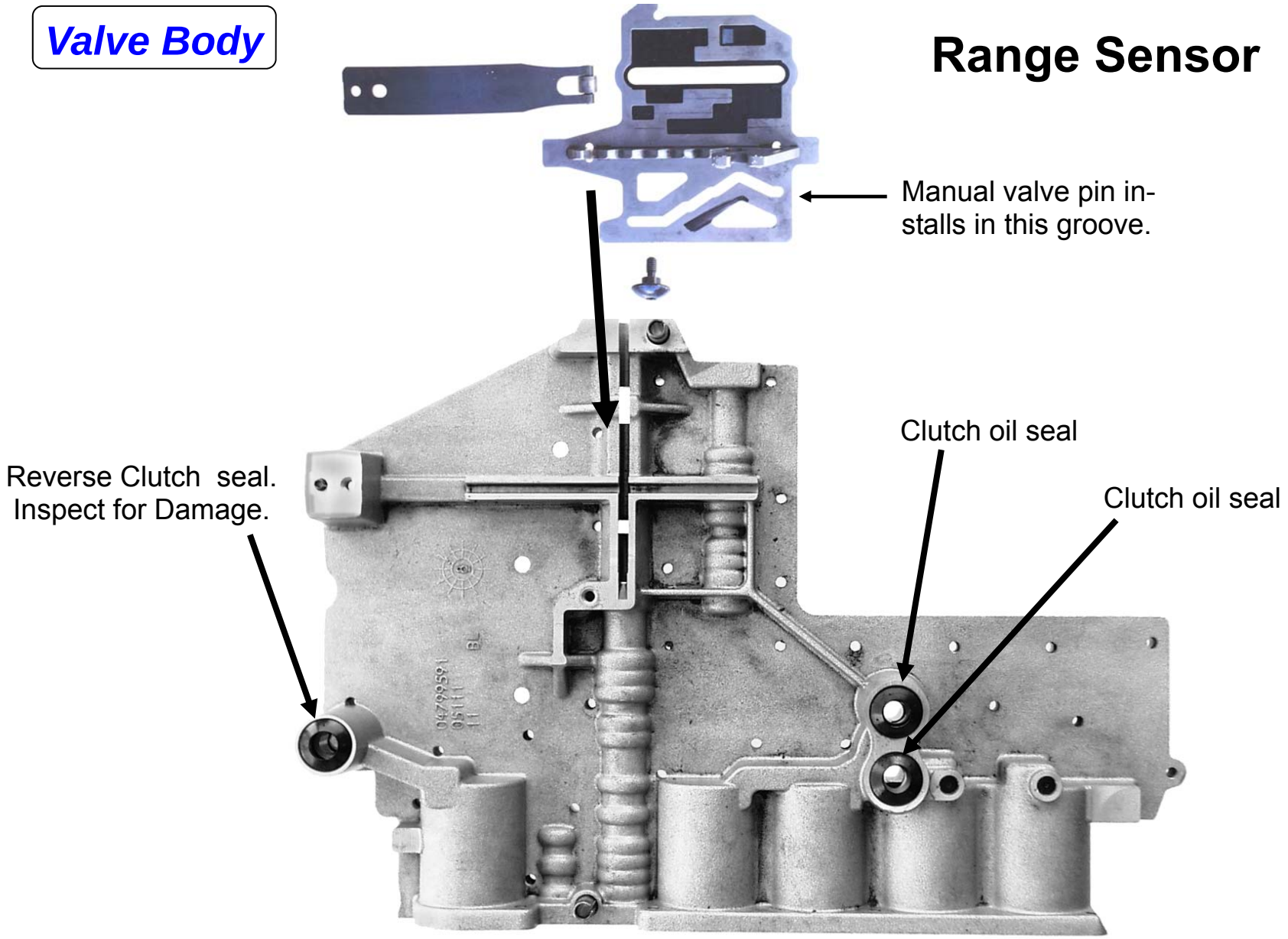
Upper Valve Body



Transmission Range Sensor (TRS) on other side of the valve body must be removed before the Manual valve can be removed.

Valve Body

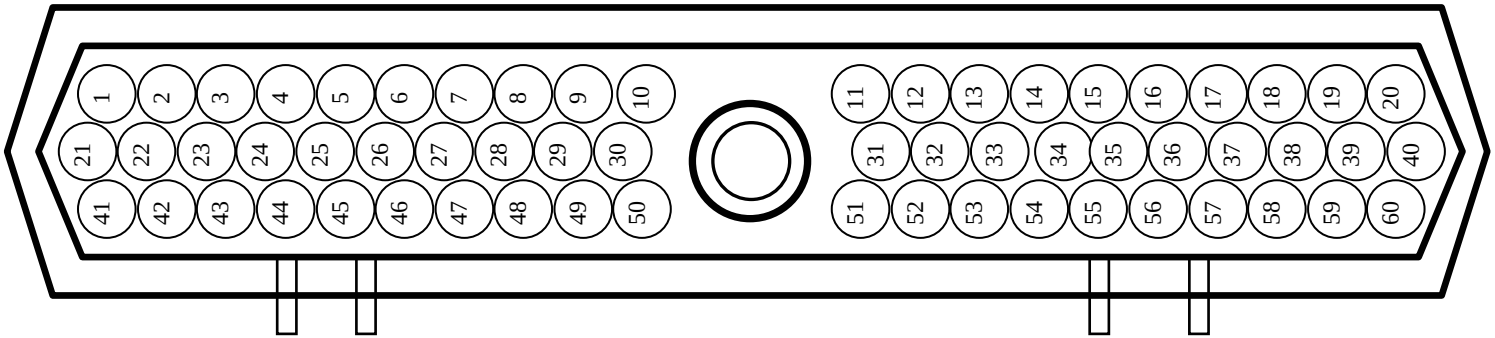
Range Sensor



Connector-Pin Function

Pin	Function
1	Fused Ignition switch battery voltage
2	LR/TC clutch solenoid control
3	Park/Neutral position switch
4	Transmission range sensor (T41) signal
5	Transmission range sensor (T42) signal
6	Back-up lamp feed
7	Overdrive clutch solenoid control
8	Transmission range sensor (T3) signal
9	Transmission range sensor (T1) signal
10	Transmission control relay output
11	4th clutch pressure switch signal
12	Line pressure control solenoid circuit
13	Transmission range sensor (T2) signal
14	Low/Rev clutch pressure switch signal
15	2nd clutch pressure switch signal
16	Overdrive clutch pressure switch signal
17	Underdrive clutch solenoid control
18	Underdrive clutch pressure switch signal
19	4th clutch solenoid control
20	2nd clutch solenoid control
21	Multi-select solenoid control
22	Speed sensor ground
23	Transmission oil temp sensor signal

60 Pin Identification—Controller Connector



1 Range sensor T1 signal
2 Back-up lamp relay control
3 Range sensor T3 signal
6 Crankshaft position sensor signal
7 SCI transmit
8 Fused ignition output (start)
9 Overdrive clutch pressure switch signal
10 Torque management request
11 Fused ignition switch output (start-run)
12 Overdrive clutch solenoid control
13 Speed sensor ground
14 Output speed sensor signal
15 Transmission control relay control
16 Transmission control relay output
17 Transmission control relay output
18 Line pressure control solenoid control
19 2nd clutch solenoid control
20 L/R – TCC clutch solenoid control
28 Vehicle speed sensor signal
29 Underdrive clutch pressure switch signal
30 Line pressure sensor signal
36 Transmission control relay output
37 Ground
38 5 volt supply
39 Ground
40 Multi-select solenoid control
41 Range sensor (T41) signal
42 Range sensor (T42) signal
43 PCI bus
46 SCI receive
47 2nd clutch pressure switch signal
48 4th clutch pressure switch signal
49 Overdrive off switch signal
50 Low/Reverse clutch pressure switch signal
51 Sensor ground
52 Input speed sensor signal
53 Ground
54 Transmission oil temperature sensor ground
55 Underdrive clutch solenoid control
56 Fused battery voltage
57 Ground
59 4th clutch solenoid control
60 Overdrive clutch solenoid control

Clutch Application Chart

Shift lever Position	Park sprag	Under drive	Over drive	Reverse	2nd	4th	Low/ reverse	Overrun clutch
P-Park	X						X	
R-Reverse				X			X	
N-neutral							X	
D-OD First		X					X*	X
Second		X			X			
Second prime		X				X		
Third		X	X					
Fourth			X			X		
Limp-in		X	X					
2-First		X					X*	X
Second		X			X			
Limp-in		X			X			
1-Low		X					X	X

* The L/R clutch is on in Overdrive and Manual 2 when output speed is below 150 RPM

The 2nd prime gear ratio is used as a transition between 4th and 2nd kick-down. This avoids having 2 set of clutches releasing and two set of clutches applying at once (can create neutral or bang feel). The 2nd prime gear ratio is not as low at 1.50 to 1 instead of the 1.67 to 1 ratio in 2nd gear.

Shift Strategies

Shifting Overview

Adaptive Learning:

45RFE uses “Adaptive Learning” which allows the TCM to modify the clutch application strategies to maintain consistent shift quality. This compensates for clutch and transmission wear. Within certain limits TCM will adjust the Clutch Volume to achieve a smooth gear change.

TRD – Torque Reduction

TCM requests Torque Reduction “TRD” during high throttle shifts. It will reduce engine torque shutting off certain fuel injectors and retarding engine spark timing. This strategy may give the driver a shift feel that will feel lay down type shift, a partial application of converter clutch or some feeling of engine shake or misfire. A worn trans with high CVI’s may have some protective modes making “TRD” strategies more noticeable.

Drive-ability concerns for the engine should include an evaluation of trans CVI’s.

Code P1793 is a bus communication problem with the TRD link circuit. This code does not illuminate the MIL but will cause early upshifts with hard throttle and no Highspeed kickdown. The operator may complain of early shifts and loss of power.

Solenoid Noise

The 45RFE uses modulated solenoids as did the A604. It is normal the to hear an occasional buzzing noise coming from the solenoid body.

Overheating and Shift Strategies

Overheat light will illuminate at 275 F. This will not set a DTC or illuminate MIL and does not result in a limp mode. When temperature drops below 265 F the transmission overheat light will shut off.

OVERHEAT: Mode will occur with traqns temp of 240F aor engine with 244F. This causes late 2-3 and 3-4 shifts and lockup will stay on in 2nd, 3rd, and 4th and will only release with no throttle

Cold Strategies

At “EXTREME COLD” transmission oil temperatures at -16 F or below the transmission will shift 1-3 in “Drive” and have no TCC. In the “2” or “L” position will have 2nd gear only.

At “SUPER COLD” transmission oil temperatures between –12 F and 10 F the transmission will have a delayed 2-3 shift and a delayed 3-4 shift. A higher 4-3 coast throttle downshift and hard throttle kick-down shifts are prevented. Hard throttle shifts are early and no TCC.

At “COLD” transmission oil temperatures between 10 F and 36 F shift schedule is the same as “SUPER COLD” except 2-3 shift is not delayed.

At “WARM” transmission oil temperatures between 40 F and 80 F all shift timing is normal but there is no TCC.

At “HOT” transmission oil temperatures between 80 F and 240 F (normal operating temperatures) all shift and TCC strategies are normal.

Functional Operation and Quick Learn

The TCM continually checks for electrical, mechanical and hydraulic problems. When a problem is sensed TCM stores a DTC. Some of these cause LIMP-IN MODE or DEFAULT MODE.

45RFE has three different default modes.

Immediate Shutdown [Limp]

TCM de-energies the trans current control relay. This causes system to default to 3rd gear if the shift lever is in the "DRIVE" position, or 2nd gear if the lever is in the "2" or "L". Limp Mode.

Orderly Shutdown

If TCM recognizes a problem that does not require immediate shutdown, the trans will remain in the current gear and current control relay will not de-energize until a speed is reached that will not cause the engine to over-speed. When the vehicle slows down the TCM will de-energize the trans current control relay causing Limp Mode same as above.

Logical Shutdown

TCM does not de-energize the transmission control relay. Instead the transmission will utilize 1st & 3rd gear while in the "DRIVE" position and will use 2nd gear while in "2" & "L" lever positions. All operation in this mode is at a preset line pressure (open loop).

The transmission will resume normal operation (recover) if the detected problem goes away. Three recoveries are permitted in a given key cycle, after the fourth occurrence the operation described above will be maintained.

Quick Learn

This function customizes the parameters of the TCM to the transmission and characteristics. This gives the operator improved shift quality over the as delivered parameters stored in the TCM.

Quick Learn function should be performed:

Upon the installation of a new TCM

After replacing or rebuilding of the transmission or replacing the torque converter.

Switching TCM's – Not recommended.

If one or more of the CVI's are outside parameter due to abnormal conditions.

The following conditions must be met to perform the Quick Learn Procedure.

With oil level correct and the engine running shift the trans to the "N" or "P" position.

The brakes must be applied. The engine idling.

The throttle angle (TP Sensor) must be less than 3degrees. [No throttle or cold fast idle]

The shift lever position must stay in neutral until prompted to shift into OD.

The shift lever must stay in OD after the "Shift to Overdrive" prompt until the Scan tool indicates the procedure is complete.

The oil temperature must be between 60 – 200 F.

The above conditions must be maintained during the procedure to keep the procedure from being aborted.

Task Manager: is the program installed in the PCM

The PCM is responsible for coordinating all emission-related components and diagnostic systems. The software that carries out these functions is Task Manager.

Test Sequence **MIL Illumination** **Diagnostic Trouble Codes**

Trip Indicator **Freeze Frame Data Storage** **Similar Conditions Window**

When PCM sets a DTC that is emission related it illuminates the MIL. PCM will illuminate MIL for emission related DTC's only. Some emission components require two consecutive trips with a detected fault to illuminate the MIL. The MIL will flash or illuminate continuously if a the PCM detects an active continuous engine misfire.

The PCM may reset or turn off the MIL if it does not detect the malfunction for 3 consecutive trips except for engine misfire and fuel system monitors. It may reset engine and fuel system monitors after passing 3 consecutive PCM tests. Erasing DTC's and freeze frame data can be done with the scan tools or by disconnecting the battery.

Similar Conditions Window: A time based parameter the PCM uses to mature a fault or to log a good trip.

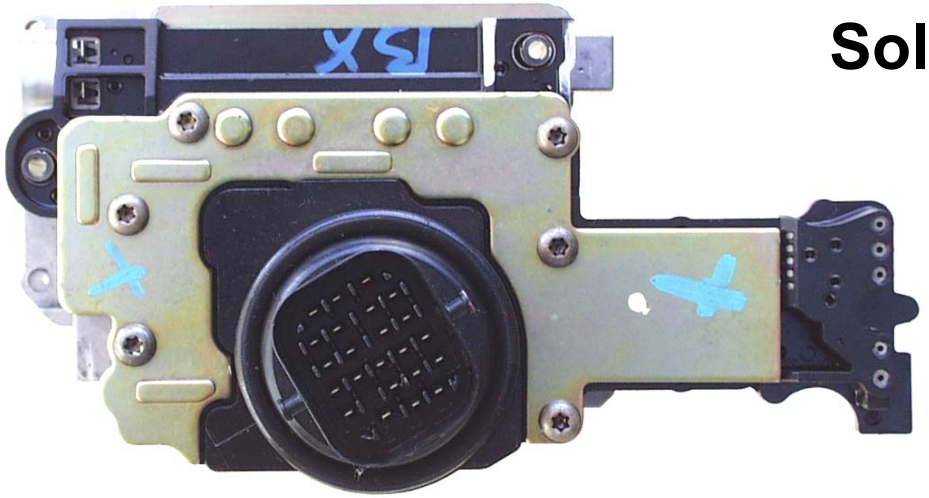
The TCM will illuminate the MIL for a transmission concern if it determines the DTC can cause transmission damage. This will also cause the Transmission Control Module (TCM) to shut down the ground to the transmission control relay. This "no power" to the TCM places the transmission in Limp Mode. During Limp Mode the transmission will be in third gear when the shifter is in the "DRIVE" position and in the "2" or "L" position it will be in second gear.

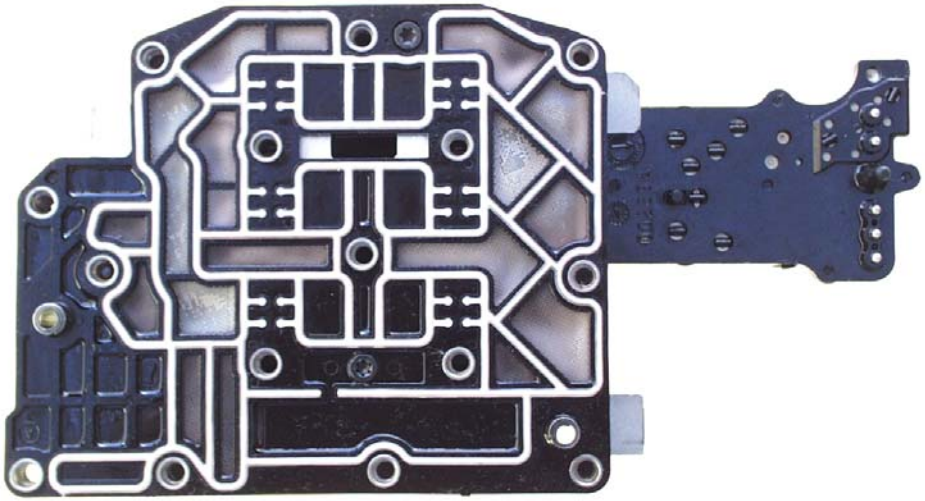
Clearances and Clutch Volumes

Component	Clearance	Clutch Volume
2C clutch pack	.021” - .050”	25 - 85
4C clutch pack	.032” - .053”	30 – 85
L/R clutch Pack	.045” - .075”	45 - 134
OD clutch pack	.040” - .065”	30 - 100
UD clutch pack	.030” - .063”	30 - 100
Reverse clutch pack	.032” - .049”	
Output shaft endplay	.021” - .031”	
Input shaft end play	.031"- .042"	

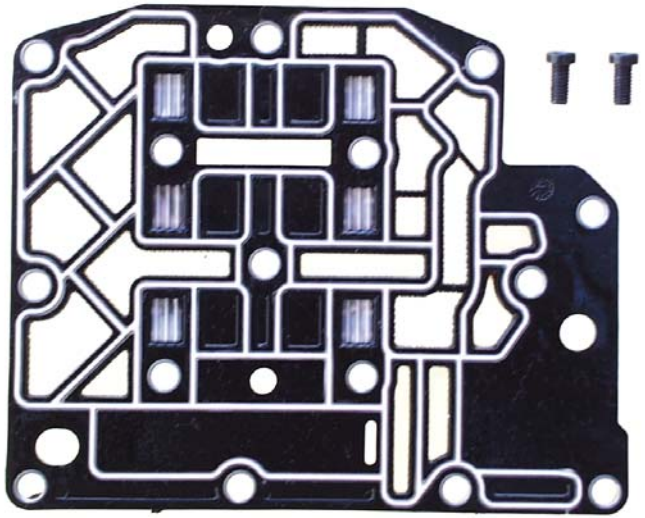
Solenoid Assembly

Solenoid Body

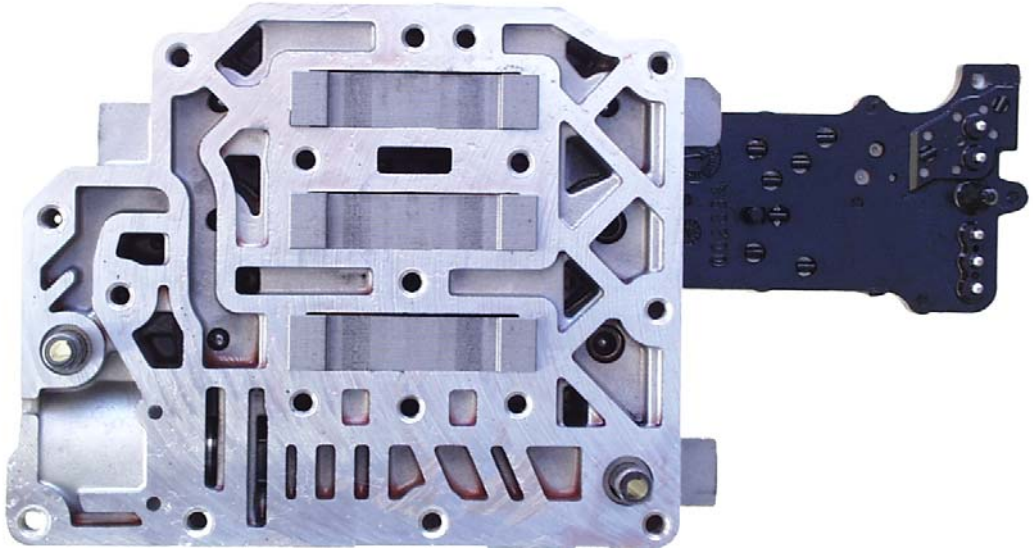


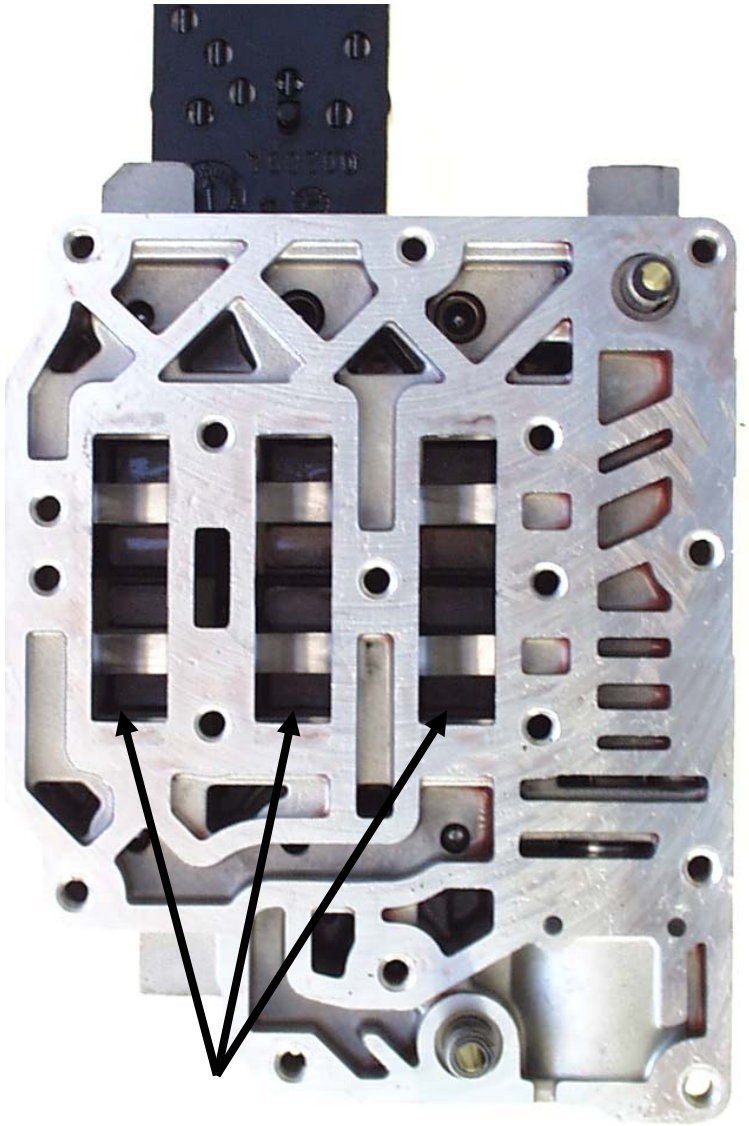


Solenoid Assembly



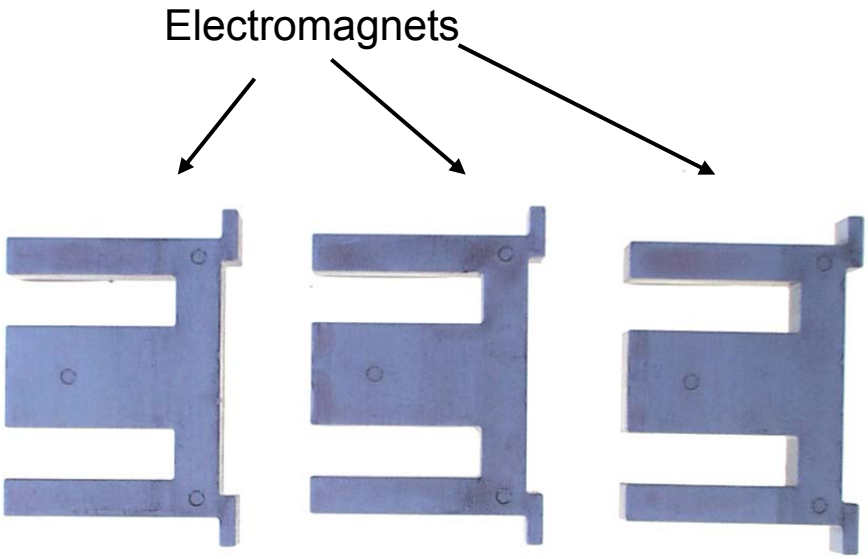
Screen Gasket



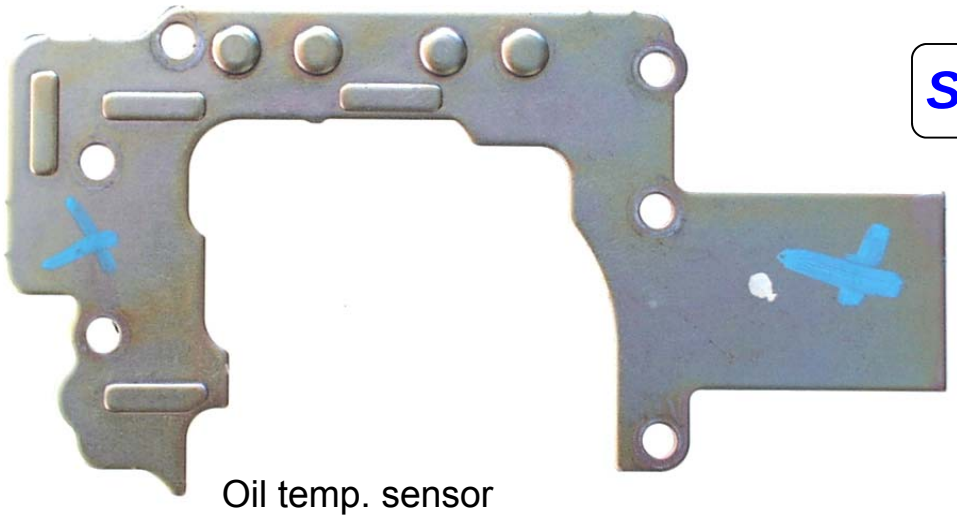


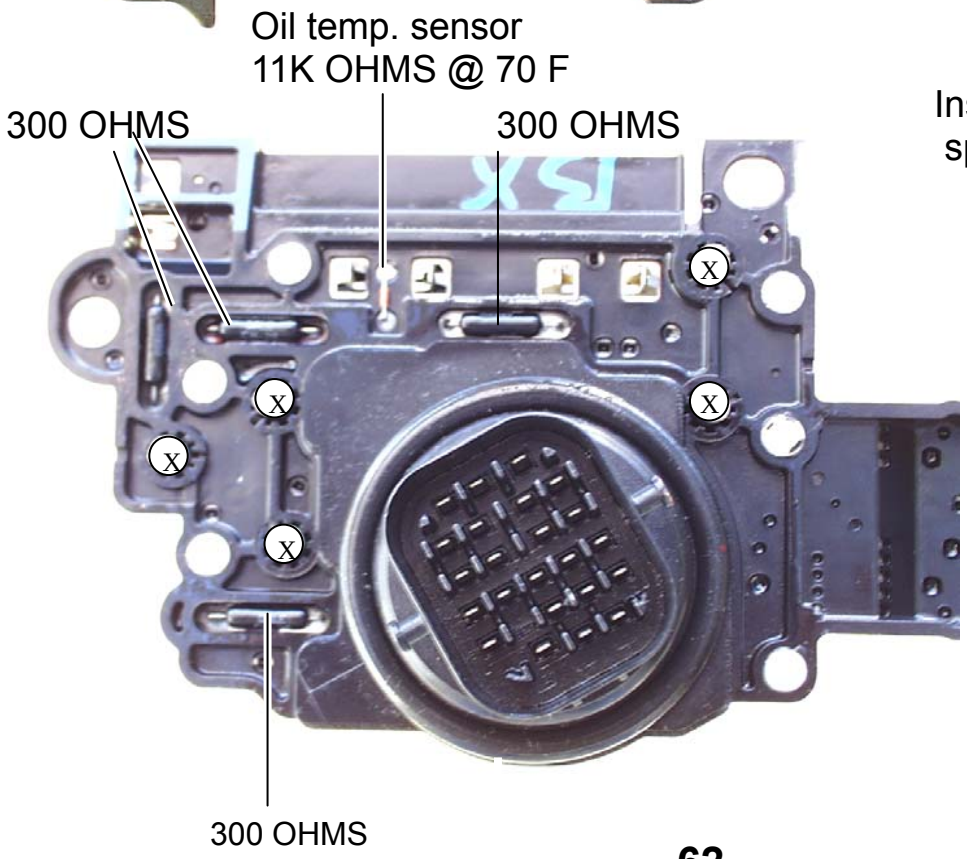
Install electromagnets
at these locations.

Solenoid Assembly

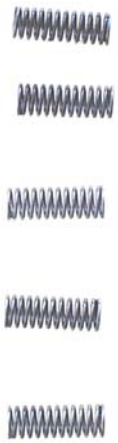


Solenoid Assembly

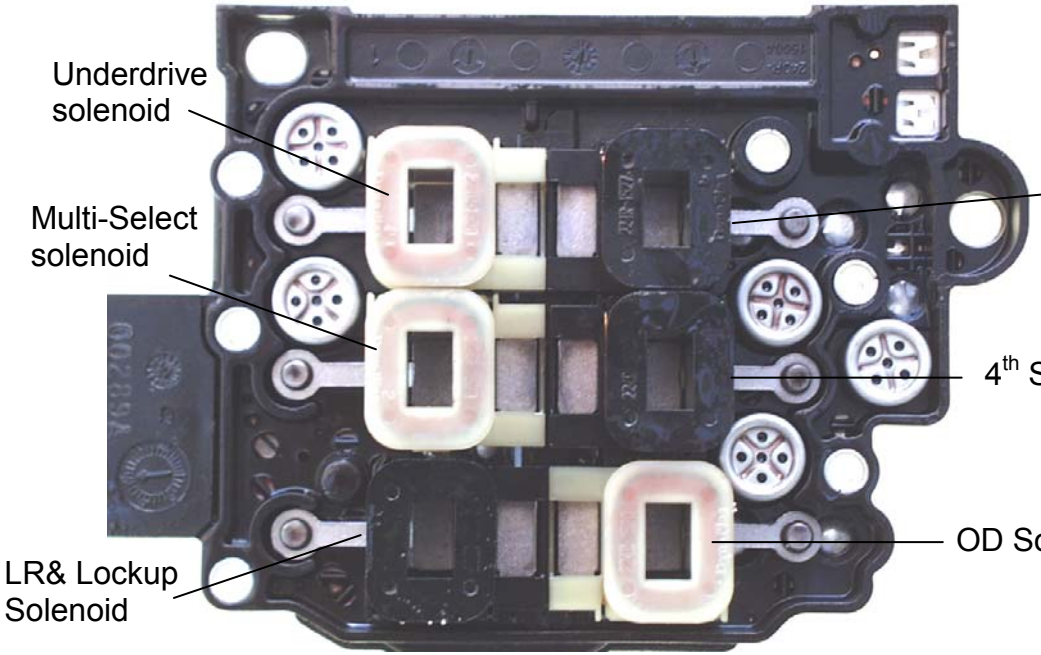




Install five .662x.230x.027 springs at “X” locations.

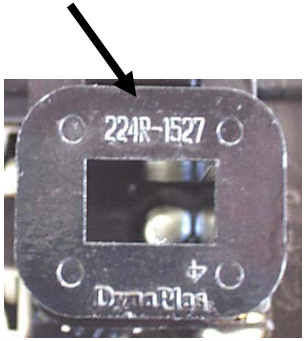


Solenoid Assembly



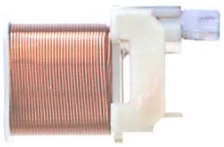
All solenoids
1.5 – 1.7 OHMS.

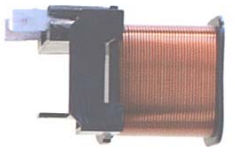
Look on tops of solenoids for calibration numbers.



Solenoids are individually marked and calibrated
DO NOT MIX!!

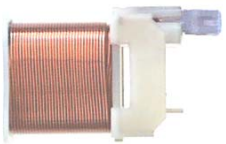
224R-1520 2 DynaPlas

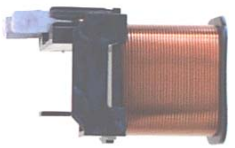




224R-1527 4 DynaPlas

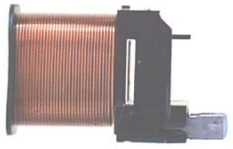
224R-1520 2 DynaPlas

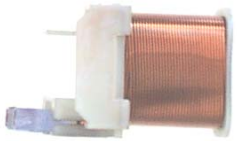




224R-1527 9 DynaPlas

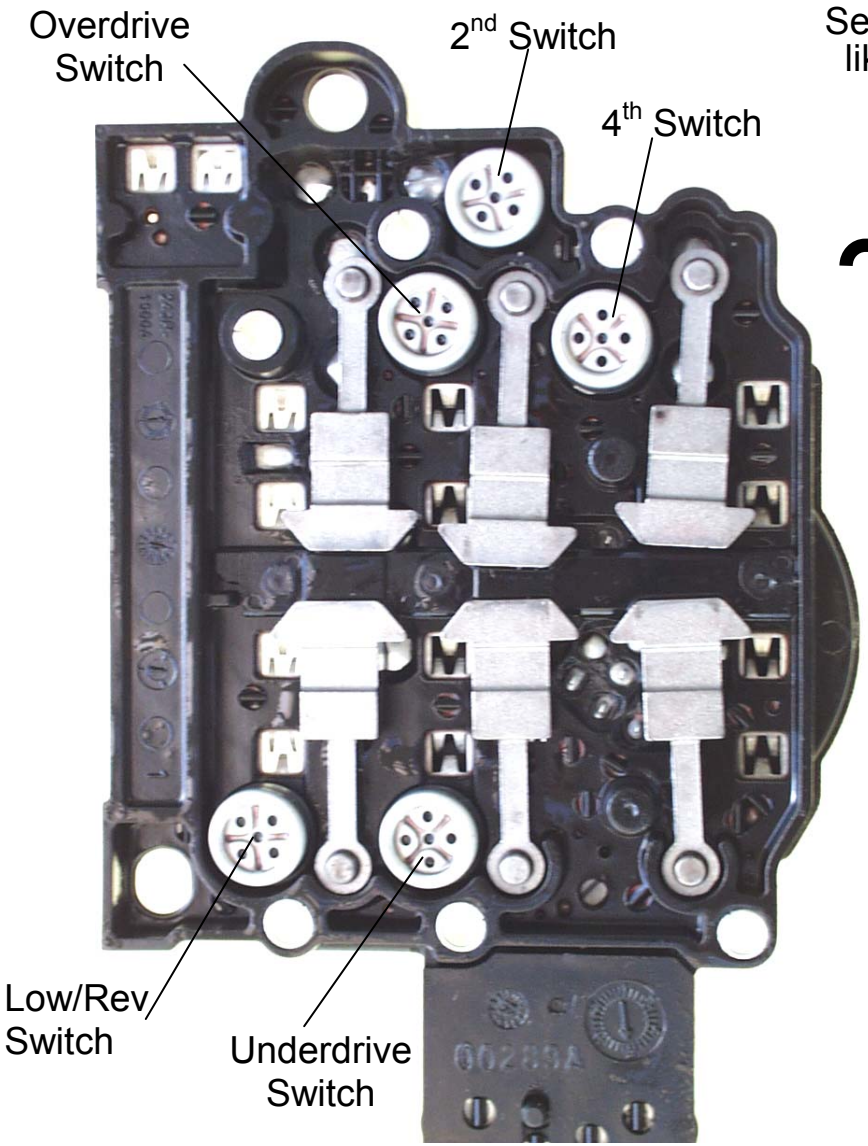
224R-1527 1 DynaPlas





224R-1520 7 DynaPlas

Solenoid Assembly

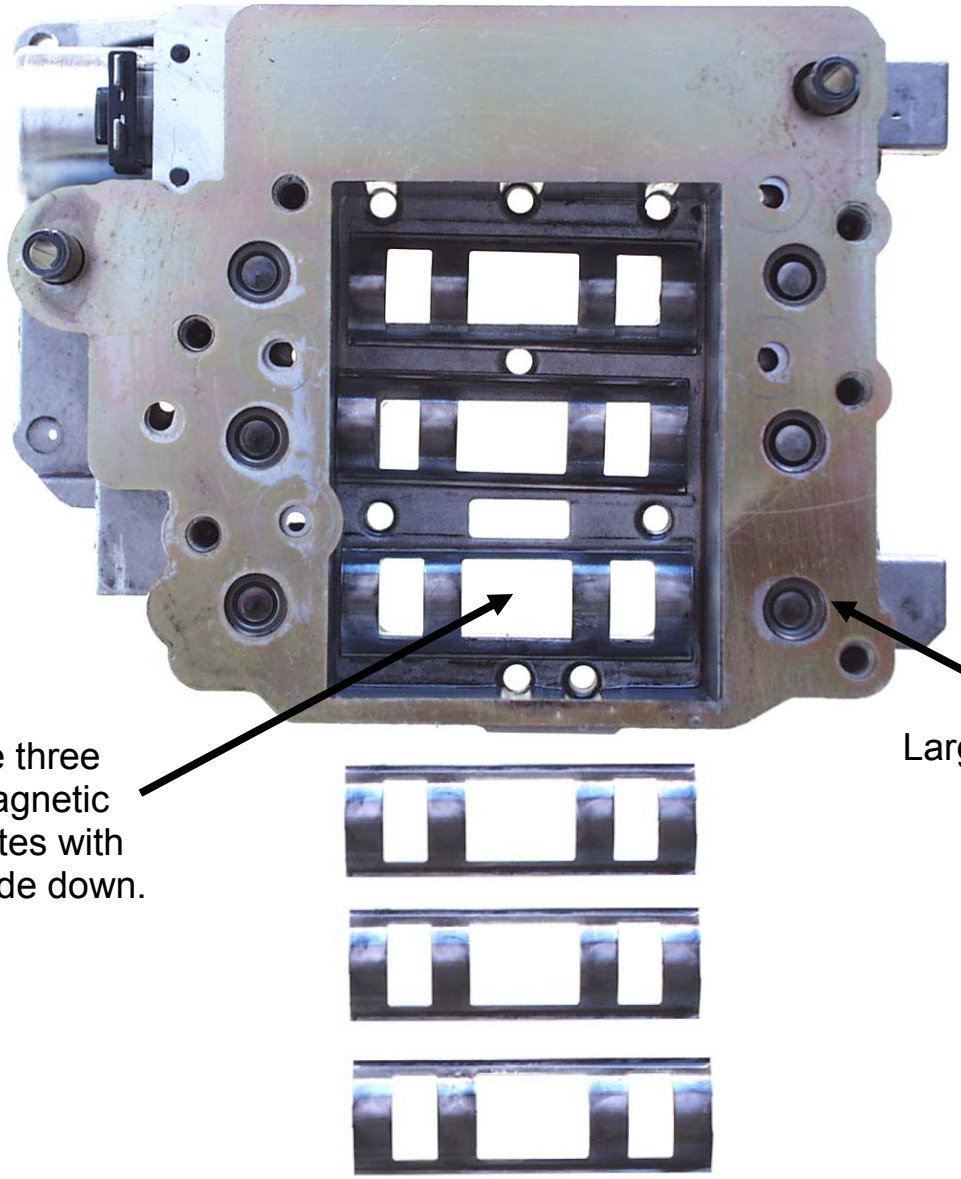


Seal faces like this.

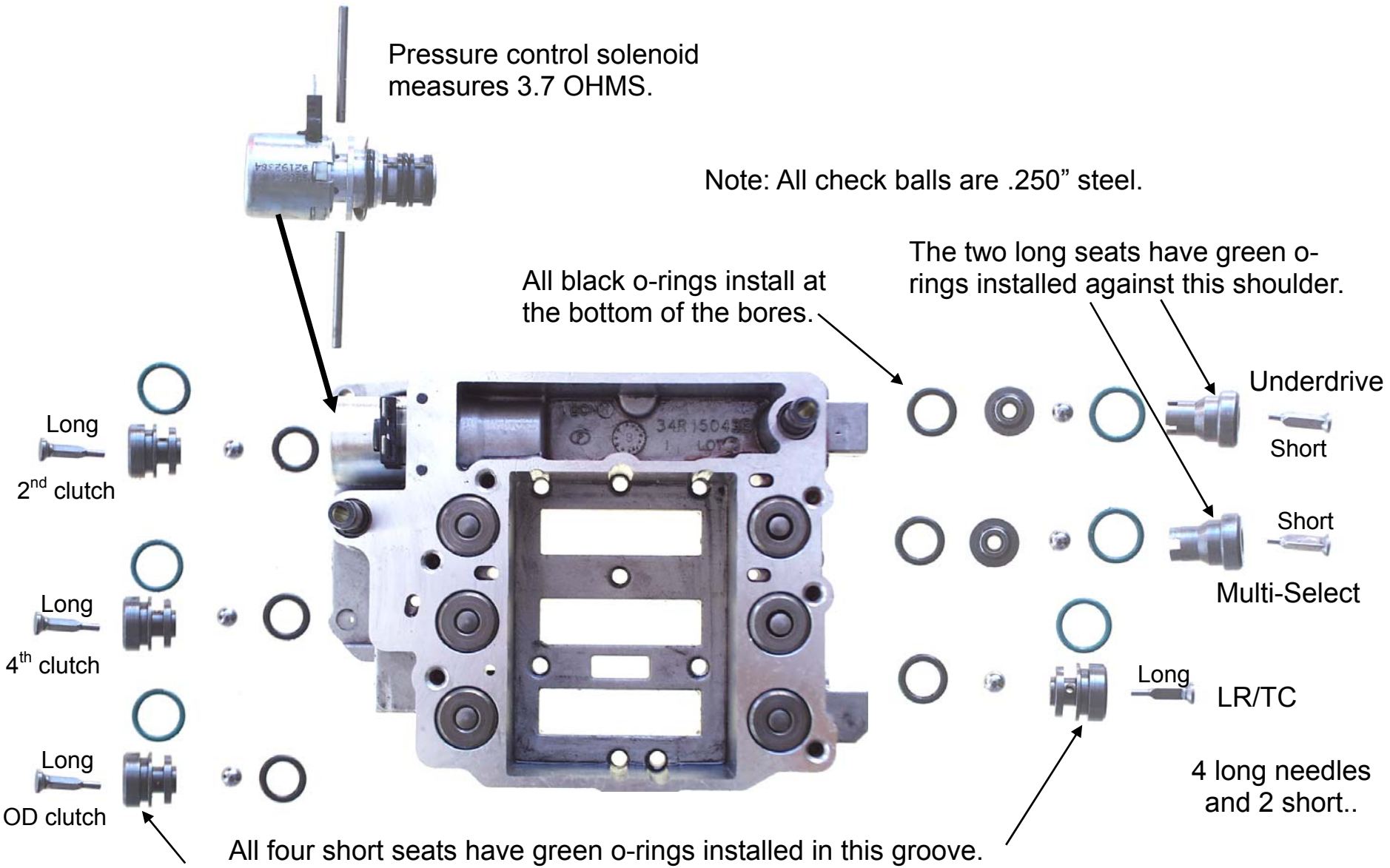
Lip side of the seals face brass switches.

Install six rockers as shown.

Solenoid Assembly



Solenoid Assembly



Converter

The 45RFE torque converter consists of an outer shell with an internal turbine, a stator, an overrunning clutch, an impeller and an electronically applied converter clutch. The torque converter hub contains an O-ring seal to better control oil-flow.

Silicon O'ring

Converter Assembly

Clutch Volumes and Updating

Clutch volume updating occurs when the transmission is above 110 degrees F.

LR clutch volume is updated when doing a manual pull-down into 1st gear with throttle angle is below 5◦
Clutch volume should be between 82 – 134.

2C clutch volume is updated when doing a 3-2 shift with throttle angle between 5◦ and 54◦
Clutch volume should be between 25 – 64.

OD clutch volume is updated when doing a 2-3 shift with throttle angle between 5◦ and 54◦
Clutch volume should be between 30 – 64.

4C clutch volume is updated when doing a 3-4 shift with throttle angle between 5◦ and 54◦
Clutch volume should be between 30 – 64.

UD clutch volume is updated when doing a 4-3 shift with throttle angle between 5◦ and 54◦
Clutch volume should be between 44 – 92.

After performing Quick Learn, road testing within these parameters.
A final best shift strategy is adaptation then occurs.

Remember updating clutch volumes can only occur above 110◦ F.
In cold areas this may mean that spin-ups, bangs and clunks may occur for some time while driving after a repair.

Torque Management and Complaints

Torque management is extensive with the 45RFE. Tech's need to know some things in advance with this one.

The vehicle is going to come in with the complaints of loss of power during shifts and the transmission is slipping. During a road test the engine may have a slight shaking or feeling of misfire during shifting. This will be the seat of the pants feel on a road test.

Know that this is torque management and the correction will be to fix the trans not the engine. Some of what will help in this decision is that it will likely be just one shift that has a big problem and the other shifts just have the normal lazy lay down feel. Don't forget that these units have a lazy feeling shift BRAND NEW, so this is to be considered NORMAL. It is not something that a Tech is going to fix during rebuild.

When there is the one shift that is terrible it will probably be the OD clutch, it works 3rd gear. This seems to be the most failed clutch so far with this trans. So it will show up with a shaking feeling in 3rd and may have no power in 3rd. Since the OD clutch is a torque path holding clutch for 4th gear, it will probably have a similar feel.

The scan tool can be your friend here. If it is a 1999 Grand Cherokee the transmission data stream is available. Here clutch volumes can be viewed outside of their index and the line pressure control solenoid activity with high line strategy viewed through the line pressure sensor switch. Plus codes that would indicate slipping or ratio errors.

Failed OD clutch has been common enough for the dealer to offer a re-flash for that complaint. It would be a good idea to have the controller re-flashed on any 1999 model. This trans is so new it would be a good idea to check with the dealer for any re-flash upgrades that might be available for any of them.

There has been some rough reverse complaints on the early models that also has been corrected by re-flashing, check with the dealer.

Abreviations

2C	2nd clutch
4C	4th clutch
BTS	Battery temperature sensor
CKP	Crankshaft position sensor
CVI	Clutch volume index
DRB	Diagnostic readout box
DTC	Diagnostic trouble code
ECT	Engine coolant temperature sensor
EMCC	Electronically Modulated conv clutch
ESL	Energy saving logic
FEMCC	Fully electric modulated conv clutch
IAC	Idle air control motor
LPS	Line pressure solenoid
L/R	Low/Reverse clutch
MAP	Manifold absolute pressure sensor
MIL	Malfunction indicator lamp
OD	Overdrive clutch
ORC	Overrunning clutch
PCI	Programmable controller interface
PCM	Powertrain control module
PCS	Pressure control solenoid
PEMCC	Partially electric modulated conv clutch
PWM	Pulse width modulation
SLP	Shift lever position
SSV	Solenoid switch valve
TCC	Torque converter clutch
TPS	Throttle position sensor
TRD	Torque reduction link
TTS	Transmission temperature sensor
TRS	Transmission range sensor
TSB	Technical service bulletin
UD	Underdrive clutch

CODES

OBD-II Standardized Diagnostic Trouble Codes (DTC)

EXPLANATION OF CODES:

P 1 7 11

Code Area

P = Powertrain

B = Body

C = Chassis

Code Creator

0 = SAE

1 = Manufacturer

System

0 = Total System

1 = Air/Fuel Control

2 = Air/Fuel Control

3 = Ignition System or Misfire

4 = Auxiliary Emission Controls

5 = Idle or Speed Controls

6 = Computer System (PCM or I/O)

7 = Transmission

8 = Non-computer Controlled Powertrain

Specific Problem Area

Last Two Digits in Code

Meaning of the Example:

P 1 7 11

P = Powertrain
1 = Manufacturer-defined code
7 = Transmission Code
11 = Transmission oil temperature circuit is out of range

TROUBLE CODES: SAE-DEFINED. DTC = DIAGNOSTIC Trouble Codes

PO1XX Fuel & Air Metering

PO100	Mass or Volume Airflow Circuit Problem
PO101	Mass or Volume Airflow Circuit Range or Performance Problem
PO102	Mass or Volume Airflow Circuit Low Input
PO103	Mass or Volume Airflow Circuit High Input
PO105	Manifold Absolute Pressure or Barometric Pressure Circuit Problem
PO106	Manifold Absolute Pressure or Barometric Pressure Circuit Range or Performance Problem
PO107	Manifold Absolute Pressure or Barometric Pressure Circuit Low Input
PO108	Manifold Absolute Pressure or Barometric Pressure Circuit High Input
PO110	Intake Air Temperature Circuit Problem
PO111	Intake Air Temperature Circuit Range or Performance Problem
PO112	Intake Air Temperature Circuit Low Input
PO113	Intake Air Temperature Circuit High Input
PO115	Engine Coolant Temperature Circuit Problem
PO116	Engine Coolant Temperature Circuit Range or Performance Problem
PO117	Engine Coolant Temperature Circuit Low Input
PO118	Engine Coolant Temperature Circuit High Input
PO120	Throttle Position Circuit Problem
PO121	Throttle Position Circuit Range or Performance Problem
PO122	Throttle Position Circuit Low Input
PO123	Throttle Position Circuit High Input
PO125	Excessive Time to Enter Closed Loop Fuel Control

Cont'd: SAE-DEFINED DIAGNOSTIC TROUBLE CODES (DTC)

PO130	02 Sensor Circuit Problem	(Bank 1 *Sensor 1)
PO131	02 Sensor Circuit Low Voltage	(Bank 1 *Sensor 1)
PO132	02 Sensor Circuit High Voltage	(Bank 1 *Sensor 1)
PO133	02 Sensor Circuit Slow Response	(Bank 1 *Sensor 1)
PO134	02 Sensor Circuit No Activity Detected	(Bank 1 *Sensor 1)
PO135	02 Sensor Heater Circuit Problem	(Bank 1 *Sensor 1)
PO136	02 Sensor Circuit Problem	(Bank 1 *Sensor 2)
PO137	02 Sensor Circuit Low Voltage	(Bank 1 *Sensor 2)
PO138	02 Sensor Circuit High Voltage	(Bank 1 *Sensor 2)
PO139	02 Sensor Circuit Slow Response	(Bank 1 *Sensor 2)
PO140	02 Sensor Circuit No Activity Detected	(Bank 1 *Sensor 2)
PO141	02 Sensor Heater Circuit Problem	(Bank 1 *Sensor 2)
PO142	02 Sensor Circuit Problem	(Bank 1 *Sensor 3)
PO143	02 Sensor Circuit Low Voltage	(Bank 1 *Sensor 3)
PO144	02 Sensor Circuit High Voltage	(Bank 1 *Sensor 3)
PO145	02 Sensor Circuit Slow Response	(Bank 1 *Sensor 3)
PO146	02 Sensor Circuit No Activity Detected	(Bank 1 *Sensor 3)
PO147	02 Sensor Heater Circuit Problem	(Bank 1 *Sensor 3)
PO150	02 Sensor Circuit Problem	(Bank 2 *Sensor 1)
PO151	02 Sensor Circuit Low Voltage	(Bank 2 *Sensor 1)
PO152	02 Sensor Circuit High Voltage	(Bank 2 *Sensor 1)
PO153	02 Sensor Circuit Slow Response	(Bank 2 *Sensor 1)
PO154	02 Sensor Circuit No Activity Detected	(Bank 2 *Sensor 1)
PO155	02 Sensor Heater Circuit Problem	(Bank 2 *Sensor 1)

Cont'd: SAE-DEFINED DIAGNOSTIC TROUBLE CODES (DTC)

PO156	02 Sensor Circuit Problem	(Bank 2 *Sensor 2)
PO157	02 Sensor Circuit Low Voltage	(Bank 2 *Sensor 2)
PO158	02 Sensor Circuit High Voltage	(Bank 2 *Sensor 2)
PO159	02 Sensor Circuit Slow Response	(Bank 2 *Sensor 2)
PO160	02 Sensor Circuit No Activity Detected	(Bank 2 *Sensor 2)
PO161	02 Sensor Heater Circuit Problem	(Bank 2 *Sensor 2)
PO162	02 Sensor Circuit Problem	(Bank 2 *Sensor 3)
PO163	02 Sensor Circuit Low Voltage	(Bank 2 *Sensor 3)
PO164	02 Sensor Circuit High Voltage	(Bank 2 *Sensor 3)
PO165	02 Sensor Circuit Slow Response	(Bank 2 *Sensor 3)
PO166	02 Sensor Circuit No Activity Detected	(Bank 2 *Sensor 3)
PO167	02 Sensor Heater Circuit Problem	(Bank 2 *Sensor 3)
PO170	Fuel Trim Problem	(Bank 1 *)
PO171	System Too Lean	(Bank 1 *)
PO172	System Too Rich	(Bank 1 *)
PO173	Fuel Trim Problem	(Bank 2)
PO174	System Too Lean	(Bank 2)
PO175	System Too Rich	(Bank 2)
PO176	Fuel Composition Sensor Circuit Problem	
PO177	Fuel Composition Sensor Circuit Range or Performance	
PO178	Fuel Composition Sensor Circuit Low Input	
PO179	Fuel Composition Sensor Circuit High Input	
PO180	Fuel Temperature Sensor Circuit Problem	
PO181	Fuel Temperature Sensor Circuit Range or Performance	
PO182	Fuel Temperature Sensor Circuit Low Input	
PO183	Fuel Temperature Sensor Circuit High Input	

Cont'd: SAE-DEFINED DIAGNOSTIC TROUBLE CODES (DTC)

PO2XX Fuel & Air Metering

PO201	Injector Circuit Problem — Cylinder 1
PO202	Injector Circuit Problem — Cylinder 2
PO203	Injector Circuit Problem — Cylinder 3
PO204	Injector Circuit Problem — Cylinder 4
PO205	Injector Circuit Problem — Cylinder 5
PO206	Injector Circuit Problem — Cylinder 6
PO207	Injector Circuit Problem — Cylinder 7
PO208	Injector Circuit Problem — Cylinder 8
PO209	Injector Circuit Problem — Cylinder 9
PO210	Injector Circuit Problem — Cylinder 10
PO211	Injector Circuit Problem — Cylinder 11
PO212	Injector Circuit Problem — Cylinder 12
PO213	Cold Start Injector 1 Problem
PO214	Cold Start Injector 2 Problem

PO3XX Ignition System or Misfire

PO300	Random Misfire Detected
PO301	Cylinder 1 Misfire Detected
PO302	Cylinder 2 Misfire Detected
PO303	Cylinder 3 Misfire Detected

Cont'd: SAE-DEFINED DIAGNOSTIC TROUBLE CODES (DTC)

PO304	Cylinder 4 Misfire Detected
PO305	Cylinder 5 Misfire Detected
PO306	Cylinder 6 Misfire Detected
PO307	Cylinder 7 Misfire Detected
PO308	Cylinder 8 Misfire Detected
PO309	Cylinder 9 Misfire Detected
PO310	Cylinder 10 Misfire Detected
PO311	Cylinder 11 Misfire Detected
PO312	Cylinder 12 Misfire Detected
PO320	Ignition or Distributor Engine Speed Input Circuit Problem
PO321	Ignition or Distributor Engine Speed Input Circuit Range or Performance
PO322	Ignition or Distributor Engine Speed Input Circuit No Signal
PO325	Knock Sensor 1 Circuit Problem
PO326	Knock Sensor 1 Circuit Range or Performance
PO327	Knock Sensor 1 Circuit Low Input
PO328	Knock Sensor 1 Circuit High Input
PO330	Knock Sensor 2 Circuit Problem
PO331	Knock Sensor 2 Circuit Range or Performance
PO332	Knock Sensor 2 Circuit Low Input
PO333	Knock Sensor 2 Circuit High Input
PO335	Crankshaft Position Sensor Circuit Problem
PO336	Crankshaft Position Sensor Circuit Range or Performance
PO337	Crankshaft Position Sensor Circuit Low Input
PO338	Crankshaft Position Sensor Circuit High Input

Cont'd: SAE-DEFINED DIAGNOSTIC TROUBLE CODES (DTC)

PO4XX Auxiliary Emission Controls

PO400	Exhaust Gas Recirculation Flow Problem	
PO401	Exhaust Gas Recirculation Flow Insufficient Detected	
PO402	Exhaust Gas Recirculation Flow Excessive Detected	
PO405	Air Conditioner Refrigerant Charge Loss	
PO410	Secondary Air Injection System Problem	
PO411	Secondary Air Injection System Insufficient Flow Detected	
PO412	Secondary Air Injection System Switching Valve or Circuit Problem	
PO413	Secondary Air Injection System Switching Valve or Circuit Open	
PO414	Secondary Air Injection System Switching Valve or Circuit Shorted	
PO420	Catalyst System Efficiency Below Threshold	(Bank 1 *)
PO421	Warm-up Catalyst Efficiency Below Threshold	(Bank 1 *)
PO422	Main Catalyst Efficiency Below Threshold	(Bank 1 *)
PO423	Heated Catalyst Efficiency Below Threshold	(Bank 1 *)
PO424	Heated Catalyst Temperature Below Threshold	(Bank 1 *)
PO430	Catalyst System Efficiency Below Threshold	(Bank 2)
PO431	Warm-up Catalyst Efficiency Below Threshold	(Bank 2)
PO432	Main Catalyst Efficiency Below Threshold	(Bank 2)
PO433	Heated Catalyst Efficiency Below Threshold	(Bank 2)
PO434	Heated Catalyst Temperature Below Threshold	(Bank 2)
PO440	Evaporative Emission Control System Problem	
PO441	Evaporative Emission Control System Insufficient Purge Flow	
PO442	Evaporative Emission Control System Leak Detected	

Cont'd: SAE-DEFINED DIAGNOSTIC TROUBLE CODES (DTC)

PO443	Evaporative Emission Control System Purge Control Valve Circuit Problem
PO444	Evaporative Emission Control System Purge Control Valve Circuit Open
PO445	Evaporative Emission Control System Purge Control Valve Circuit Shorted
PO446	Evaporative Emission Control System Vent Control Problem
PO447	Evaporative Emission Control System Vent Control Open
PO448	Evaporative Emission Control System Vent Control Shorted
PO450	Evaporative Emission Control System Pressure Sensor Problem
PO451	Evaporative Emission Control System Pressure Sensor Range or Performance
PO452	Evaporative Emission Control System Pressure Sensor Low Input
PO453	**Evaporative Emission Control System Pressure Sensor High Input**

PO5XX Vehicle Speed Control & Idle Control System

PO500	Vehicle Speed Sensor Problem
PO501	Vehicle Speed Sensor Range or Performance
PO502	Vehicle Speed Sensor Low Input
PO505	Idle Control System Problem
PO506	Idle Control System RPM Lower Than Expected
PO507	Idle Control System RPM Higher Than Expected
PO510	Closed Throttle Position Switch Problem

PO6XX Computer & Output Circuits

PO600	Serial Communication Link Problem
PO605	Internal Control Module (Module Identification Defined by J1979)

Cont'd: SAE-DEFINED DIAGNOSTIC TROUBLE CODES (DTC)

PO7XX Transmission

PO703	Brake Switch Input Problem
PO705	Transmission Range Sensor Circuit Problem (PRNDL Input)
PO706	Transmission Range Sensor Circuit Range or Performance
PO707	Transmission Range Sensor Circuit Low Input
PO708	Transmission Range Sensor Circuit High Input
PO710	Transmission Fluid Temperature Sensor Circuit Problem
PO711	Transmission Fluid Temperature Sensor Circuit Range or Performance
PO712	Transmission Fluid Temperature Sensor Circuit Low Input
PO713	Transmission Fluid Temperature Sensor Circuit High Input
PO715	Input or Turbine Speed Sensor Circuit Problem
PO716	Input or Turbine Speed Sensor Circuit Range or Performance
PO717	Input or Turbine Speed Sensor Circuit No Signal
PO720	Output Speed Sensor Circuit Problem
PO721	Output Speed Sensor Circuit Range or Performance
PO722	Output Speed Sensor Circuit No Signal
PO725	Engine Speed Input Circuit Problem
PO726	Engine Speed Input Circuit Range or Performance
PO727	Engine Speed Input Circuit No Signal
PO730	Incorrect Gear Ratio
PO731	Gear 1 Incorrect Ratio
PO732	Gear 2 Incorrect Ratio
PO733	Gear 3 Incorrect Ratio
PO734	Gear 4 Incorrect Ratio
PO735	Gear 5 Incorrect Ratio

Cont'd: SAE-DEFINED DIAGNOSTIC TROUBLE CODES (DTC)

PO736	Reverse Incorrect Ratio
PO740	Torque Converter Clutch System Problem
PO741	Torque Converter Clutch System Performance or Stuck Off
PO742	Torque Converter Clutch System Stuck On
PO743	Torque Converter Clutch System Electrical
PO745	Pressure Control Solenoid Problem
PO746	Pressure Control Solenoid Performance or Stuck Off
PO747	Pressure Control Solenoid Stuck On
PO748	Pressure Control Solenoid Electrical
PO750	Shift Solenoid A Problem
PO751	Shift Solenoid A Performance or Stuck Off
PO752	Shift Solenoid A Stuck On
PO753	Shift Solenoid A Electrical
PO755	Shift Solenoid B Problem
PO756	Shift Solenoid B Performance or Stuck Off
PO757	Shift Solenoid B Stuck On
PO758	Shift Solenoid B Electrical
PO760	Shift Solenoid C Problem
PO761	Shift Solenoid C Performance or Stuck Off
PO762	Shift Solenoid C Stuck On
PO763	Shift Solenoid C Electrical
PO765	Shift Solenoid D Problem
PO766	Shift Solenoid D Performance or Stuck Off
PO767	Shift Solenoid D Stuck On
PO768	Shift Solenoid D Electrical
PO770	Shift Solenoid E Problem
PO771	Shift Solenoid E Performance or Stuck Off
PO772	Shift Solenoid E Stuck On
PO773	Shift Solenoid E Electrical

Dodge– Chrysler TROUBLE CODES (DTC)

P1110	Decreased engine performance due to high intake air temperature.
P1180	Decreased engine performance due to high injection pump temp.
P1195	1/1 bank 02 sensor slow during catalyst monitor.
P1196	2/1 bank 02 sensor slow during catalyst monitor.
P1197	1/2 bank 02 sensor slow during catalyst monitor.
P1198	Radiator temperature sensor volts too high.
P1199	Radiator temperature sensor volts too low.
P1281	Engine is cold too long.
P1282	Fuel pump relay control circuit.
P1283	Idle select signal invalid.
P1284	Fuel injection pump battery voltage out of range.
P1285	Fuel injection pump controller always on.
P1286	Accelerator position sensor (APPS) supply voltage too high.
P1287	Fuel injection pump controller supply voltage low.
P1288	Intake manifold shot runner solenoid circuit.
P1289	Manifold tune valve solenoid circuit.
P1290	CNG fuel system pressure too high.
P1291	No temperature rise seen from intake heaters.
P1292	CNG pressure sensor voltage too high.
P1293	CNG pressure sensor voltage too low.
P1294	Target idle not reached.

Dodge– Chrysler TROUBLE CODES (DTC)

P1295	No 5 volts or low volts to TP sensor.
P1296	No 5 volts to MAP sensor.
P1297	No change in MAP from start to run.
P1298	Lean operation at wide open throttle.
P1299	Vacuum leak found (IAC fully seated).
P1388	Auto shutdown relay control circuit.
P1389	No ASD relay output voltage at PCM.
P1390	Timing belt skipped 1 tooth or more.
P1391	Intermittent loss of CMP or CKP.
P1398	Mis-fire adaptive numerator at limit.
P1399	Wait to start lamp circuit.
P1403	No 5 volt to EGR sensor.
P1475	Aux 5 volt supply voltage high.
P1476	Too little secondary air.
P1477	Too much secondary air.
P1478	Battery temp sensor volts out of limit.
P1479	Transmission fan relay circuit.
P1480	PVC solenoid circuit.
P1481	EATX RPM pulse performance.
P1482	Catalyst temperature sensor circuit shorted low.
P1483	Catalyst temperature sensor circuit shorted high.
P1484	Catalytic converter overheat detected

Dodge– Chrysler TROUBLE CODES (DTC)

P1485	Air injection solenoid circuit.
P1486	Evaporative leak monitor pinched hose found.
P1487	Hi speed radiator fan controller #2 relay circuit open or shorted.
P1488	Auxiliary 5 volt supply output too low.
P1489	High speed fan controller relay circuit.
P1490	Low speed fan controller relay circuit.
P1491	Radiator fan control relay circuit.
P1492	Ambient battery temperature sensor volts too high.
P1493	Ambient battery temp. sensor volts too low. Can also be set by external temp. sensor.
P1494	Leak detection pump switch or mechanical fault.
P1495	Leak detection pump solenoid circuit.
P1496	5 volt supply less than 4 volt for 4 seconds.
P1498	High speed radiator fan ground controller relay circuit.
P1594	Charging system voltage too high.
P1595	Speed control solenoid circuits, speed control vacuum solenoid or vent solenoid circuits.
P1596	Speed control switch always high.
P1597	Speed control switch always low.
P1598	A/C pressure sensor volts too high.
P1599	A/C pressure sensor volts too low.
P1680	Clutch released switch circuit.

P1681	No I/P cluster CCD/J1850 messages received from cluster control module.
P1682	Charging system voltage too low.
P1683	Speed control power relay or an open/short in the speed control servo power control unit.
P1684	Battery disconnected within last 50 starts.
P1685	Engine controller has received an invalid key from the SKIM.
P1686	No CCD/J1850 messages received from the Smart Key Immobilizer Module (SKIM).
P1687	No Mechanical Instrument Cluster module BUS communication.
P1688	Internal fuel injection pump controller failure.
P1689	No communication between ECM and injection pump module.
P1690	Problem in fuel sync signal. Possible injection pump timing problem.
P1691	Fuel injection pump controller calibration error.
P1692	Companion DTC set in both ECM and PCM.
P1693	DTC detected in companion engine control module.
P1694	Fault in companion module or no CCD messages received from ECM.
P1695	No CCD/J1850 messages from body control module.
P1696	Unsuccessful attempt to write to an EEPROM location by the PCM.
P1697	Unsuccessful attempt to update Service Reminder Indicator (SRI or EMR) mileage in the control module EEPROM.
P1698	No CCD/J1850 messages from the ECM, PCM or Aisin control module.
P1719	Skip shift solenoid circuit. Open or short in the 2-3 gear lock out solenoid control circuit.

2 Digit Transmission Code Listings

Chrysler 2 digit codes	OBDII SAE & MFG	Fault description	Limp-in	Light MIL	Failure Type
29	P0120	Throttle position signal	no	no	c,e,s,
17	P0604	Internal trans controller-ram fail	yes	yes	c
16	P0605	Internal trans controller-rom fail	yes	yes	c
11	P0700	Internal trans controller watchdog	yes	yes	c
28	P0705	Trans range sensor circuit	no	no	c,e,s
56	P0715	Input speed sensor error	yes	yes	c,e,s
57	P0720	Output speed sensor error	yes	yes	c,e,s
18	P0725	Engine speed sensor circuit	yes	yes	c,e,s
51	P0731	Gear ratio error in 1st	yes	yes	c,e,s,t
52	P0732	Gear ratio error in 2nd	yes	yes	e,s,t,
53	P0733	Gear ratio error in 3rd	yes	yes	e,s,t
54	P0734	Gear ratio error in 4th	yes	yes	e,s,t,
50	P0736	Gear ratio error in reverse	yes	yes	c,e,s,t
38	P0740	TCC control circuit error	no	yes	t
C1	P0750	LR solenoid circuit error	yes	yes	c,e,s
C2	P0755	2C solenoid circuit error	yes	yes	c,e,s
C3	P0760	OD solenoid circuit error	yes	yes	c,e,s
C5	P0765	UD solenoid circuit error	yes	yes	c,e,s
C4	P0770	4C solenoid circuit error	yes	yes	c,e,s
65	P1715	Restricted manual valve in T3	no	no	t
19	P1716	No communication with ECU	no	no	c,e
C8	P1720	Line pressure fault	no	no	c,e,s
CA	P1721	Line pressure sensor fault	no	no	c,e,s
C9	P1722	Line pressure low fault	no	no	c,e,s
CB	P1724	Line pressure high fault	no	no	c,e,s
BO	P1726	UD hydraulic pressure switch CKT	yes	yes	e,s,t
A8	P1727	4C hydraulic pressure switch CKT	yes	yes	e,s,t
A2	P1728	2C hydraulic pressure switch CKT	yes	yes	e,s,t
90	P1732	UD pressure switch circuit	yes	yes	c,e,s,t
88	P1733	4C pressure switch circuit	yes	yes	c,e,s,t

82	P1734	2C pressure switch circuit	yes	yes	c,e,s,t
64	P1735	Inadequate element volume 4C	no	no	t
55	P1736	Gear ratio error in 2nd prime	yes	yes	e,s,t
C6	P1737	MS solenoid circuit	yes	yes	c,e,s
75	P1738	High temp operation activated	no	no	
76	P1739	Power-up at speed	no	no	
80	P1765	Switch battery failure	yes	yes	c,e,s
14	P1767	Trans relay output always on	yes	yes	c,e,s
15	P1768	Trans relay output always off	yes	yes	c,e,s
60	P1770	Inadequate LR element volume	no	no	t
61	P1771	Inadequate 2C element volume	no	no	t
62	P1772	Inadequate OD element volume	no	no	t
63	P1773	Inadequate UD element volume	no	no	t
37	P1775	Solenoid switch valve stuck in TCC	no	yes	t
47	P1776	Solenoid switch valve stuck in L/R	yes	yes	t
84	P1781	OD pressure switch circuit	yes	yes	c,e,s,t
81	P1784	LR pressure switch circuit	yes	yes	c,e,s,t
A4	P1787	OD hydraulic pressure switch CKT	yes	yes	e,s,t
36	P1790	Fault immediately after shift	no	no	t
35	P1791	Loss of prime	no	no	t
12	P1792	Battery has been disconnected	no	no	
48	P1793	TRD link communication error	no	no	c,e
58	P1794	Speed sensor ground error	yes	yes	c,e
45	P1795	Internal trans controller – EEPROM	no	no	c
70	P1796	Check autostick input circuit	no	no	e,s
71	P1797	Manual shift overheat	no	no	
74	P1799	Calculated oil temperature in use	no	no	c,e,s

C = Controller
E = Electrical
S = Sensor / Actuator
T = Transmission