Welcome To Today's Presentation Sponsored By:

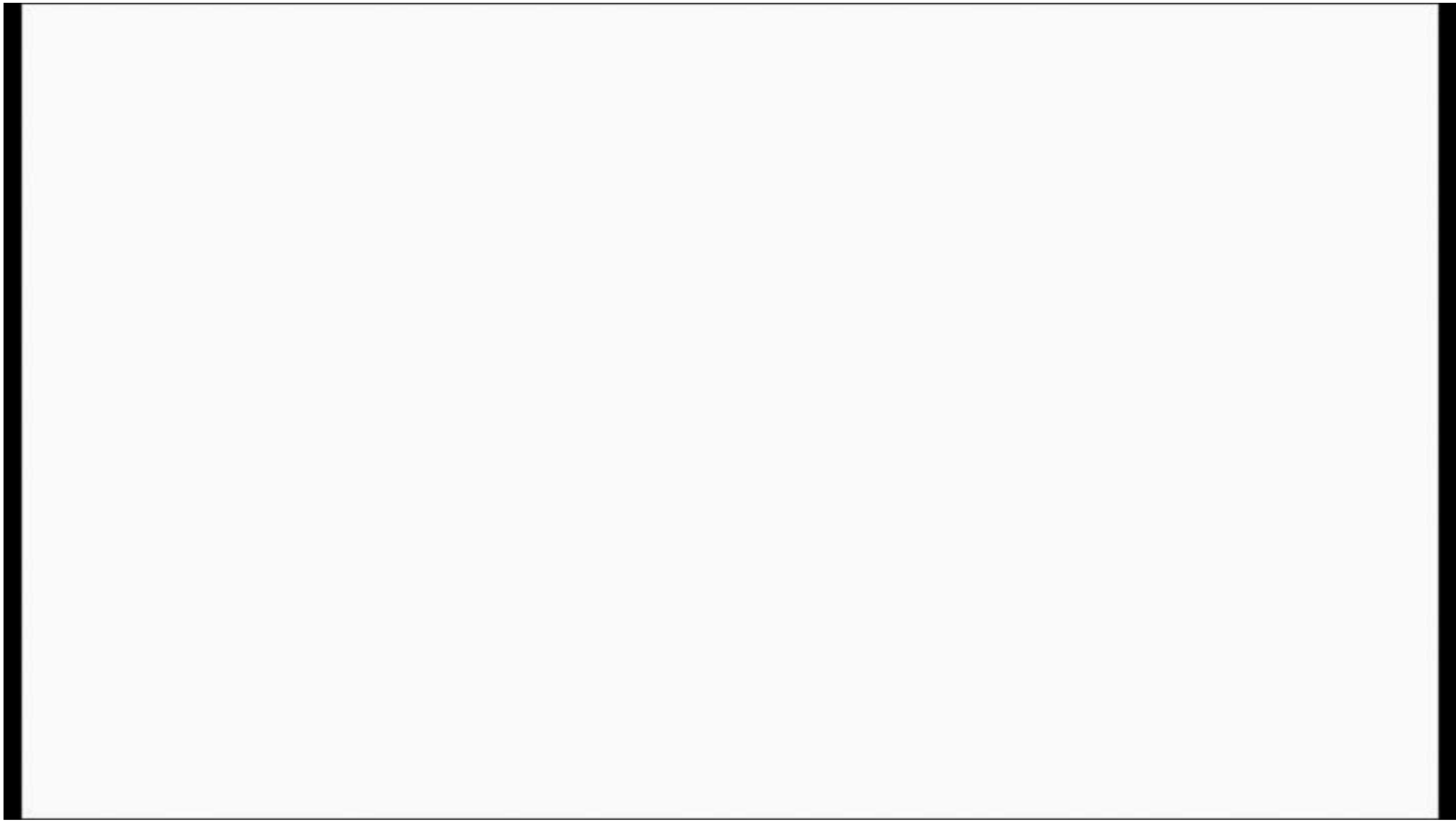
ATRA
AUTOMATIC TRANSMISSION REBUILDERS ASSOCIATION

SEAL AFTERMARKET PRODUCTS

TK TOLEDO TRANS-KIT

GEARS
FOR THE TRANSMISSION REBUILDING INDUSTRY

WIT
WHATEVER IT TAKES
TRANSMISSION PARTS, INC



Any Questions Or Comments Please Send Emails To webinars@atra.com

Any Questions That You May Have During The Webinar Please Feel Free To Text Them In At Any Time

Free Webinar Schedule

Sept 15/16	5R110W	Problems & Fixes
Sept 29/30	6R60 - ZF6HP	Comparison
Oct 13/14	A760/AB60	Comparison Intro

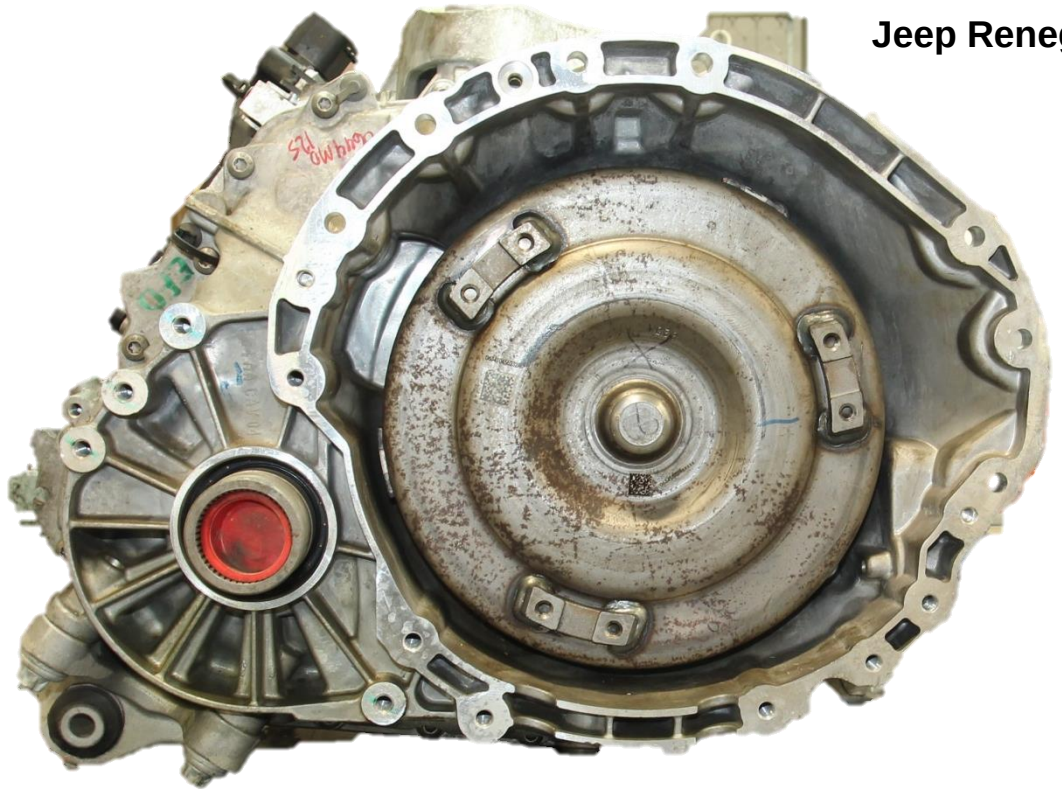
ZF9HP48 / 948TE Internal

Presented by:
Mike Souza
ATRA Senior
Research Technician

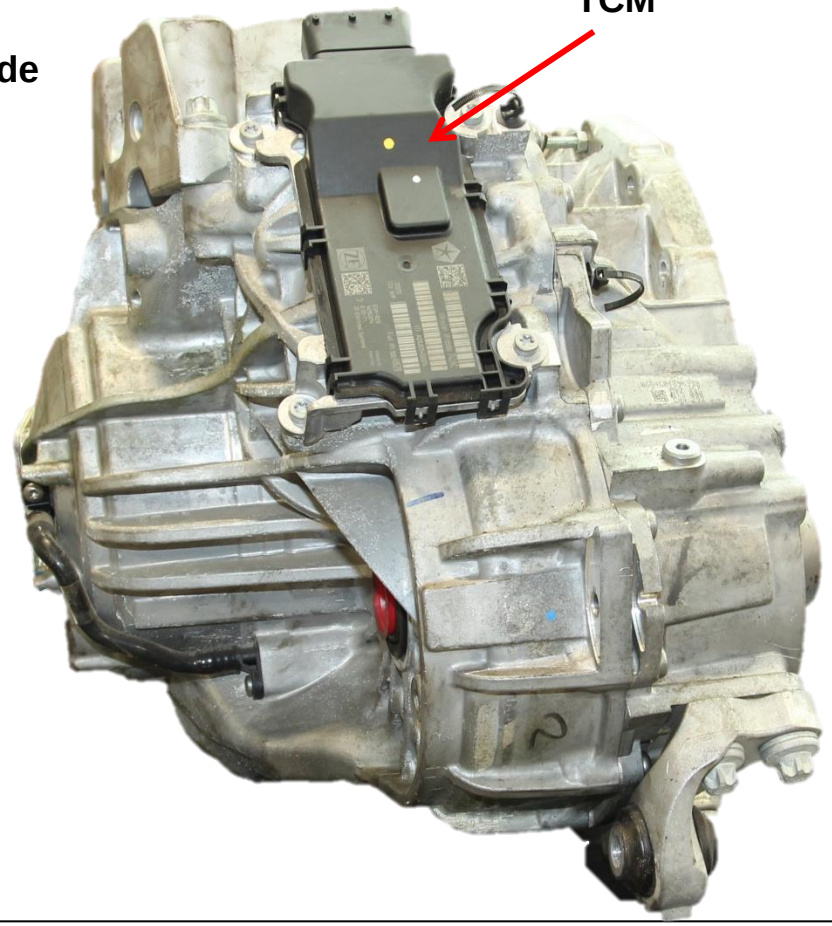
Disassembly Hints

The units that we got to disassemble were from a Jeep Renegade and a Range Rover with the TCM located just above the differential.

The Range Rover was a Proto Type with a badly busted up case, so most of the photos were taken from the Renegade, some from the Range Rover.



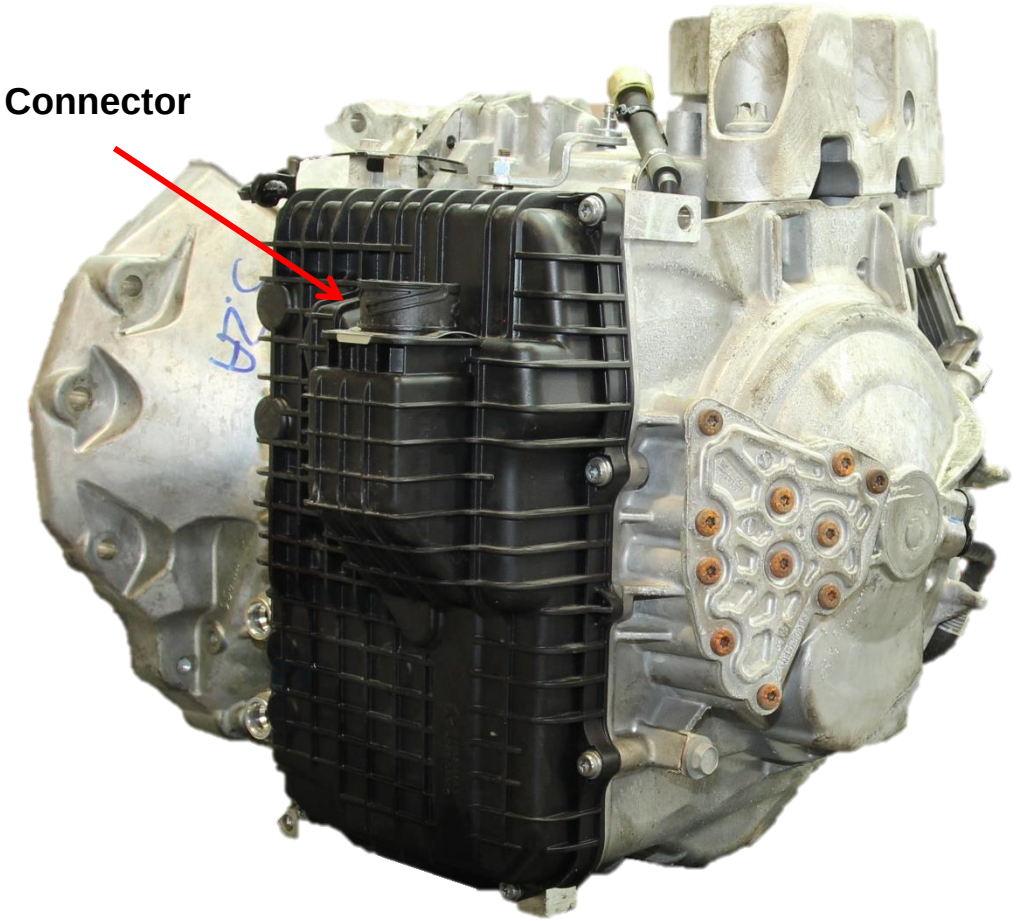
Jeep Renegade



The electronic connector is located on the side cover.

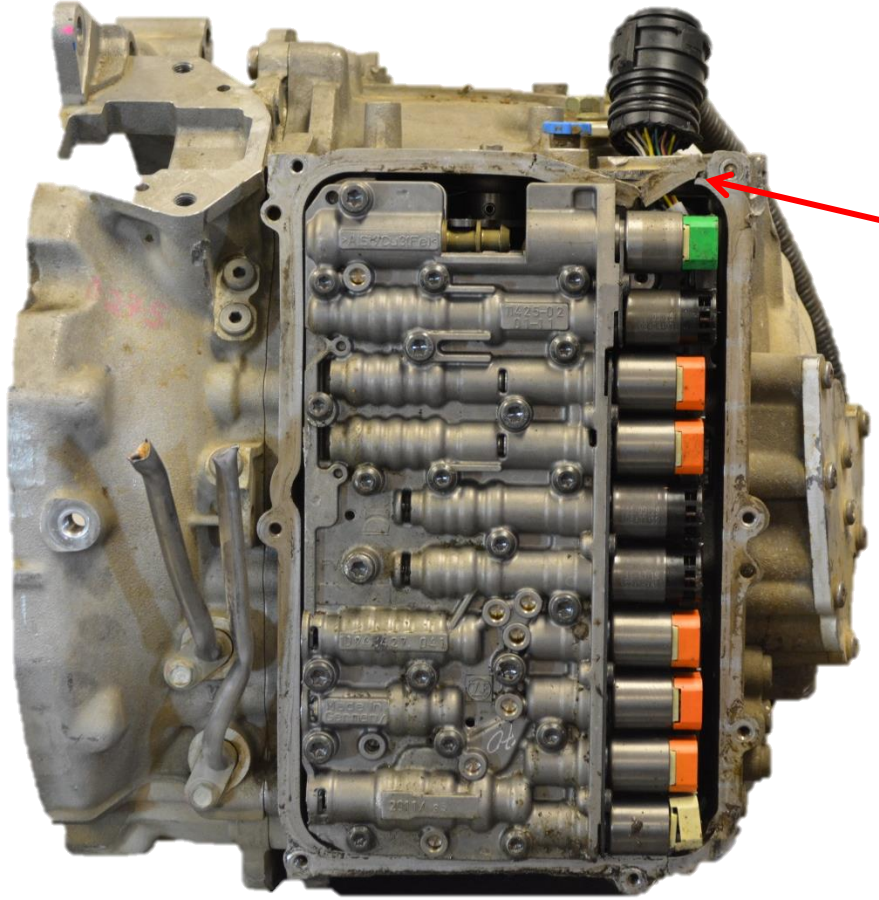
The retainer clip holding the connector will have to be removed before the side cover.

Connector



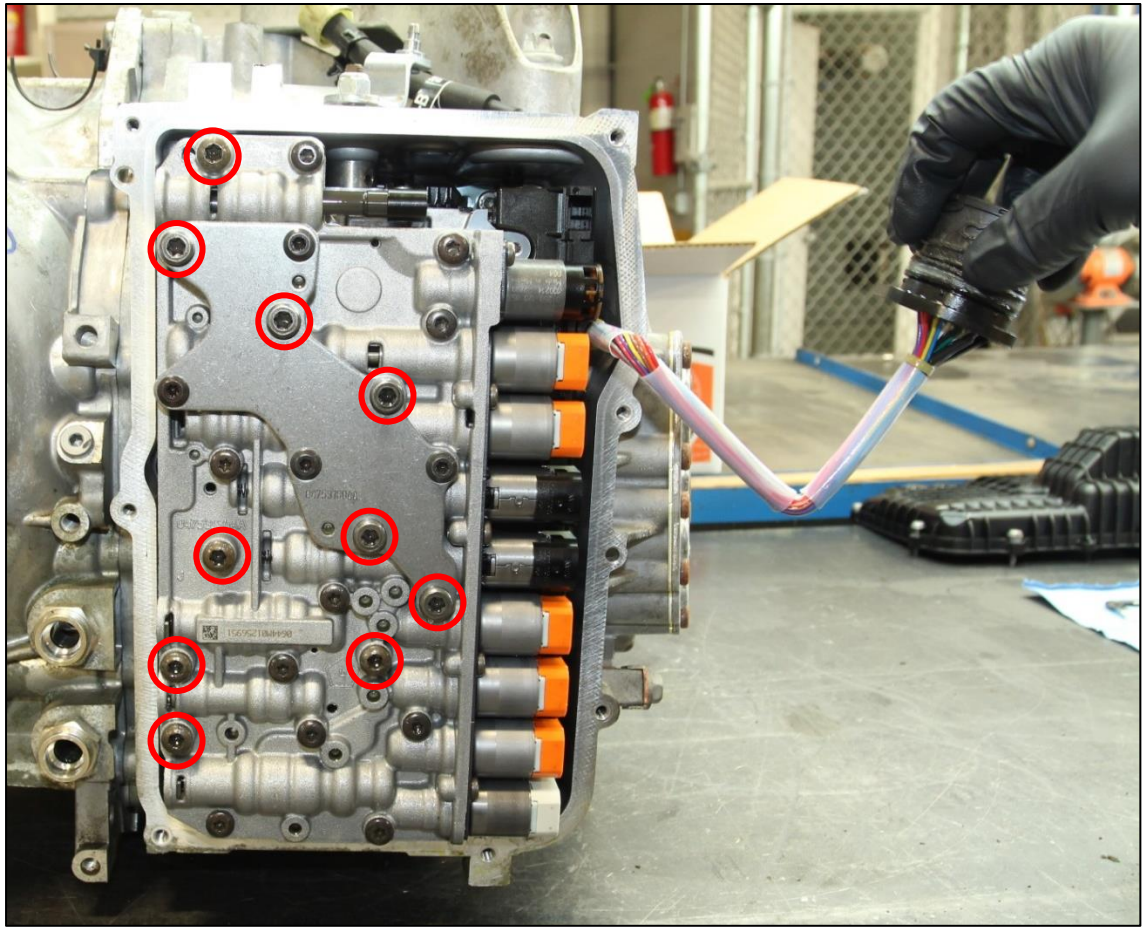
On the Range Rover it would be found on top of the case next to the side cover.

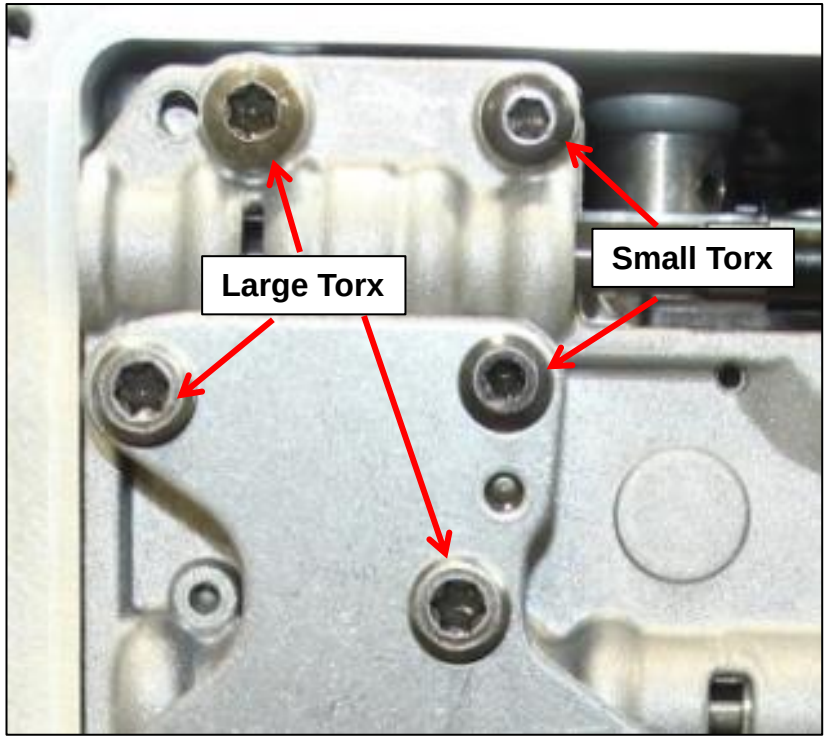
As you can see the case on this unit was purposely broken so it could not be used.



After removing the TCM and side cover we started with the valve body next. Only remove the 10 bolts with the larger Torx size. All the rest have smaller Torx size.

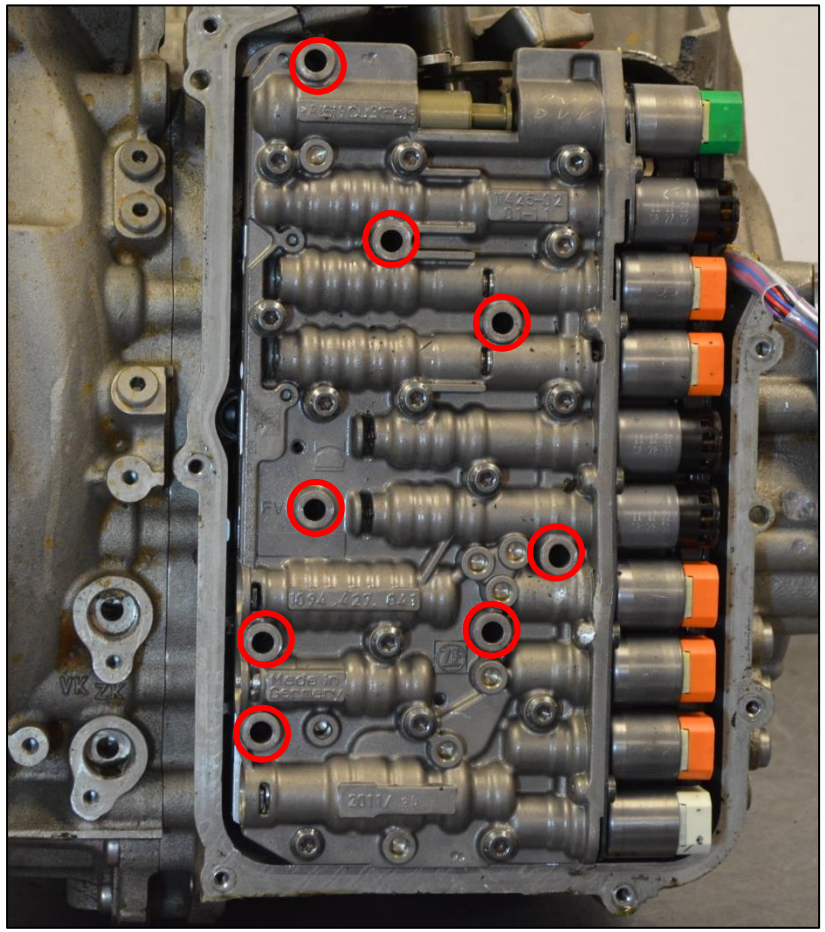
Renegade





There are only 8 large Torx bolts to remove on the Range Rover .

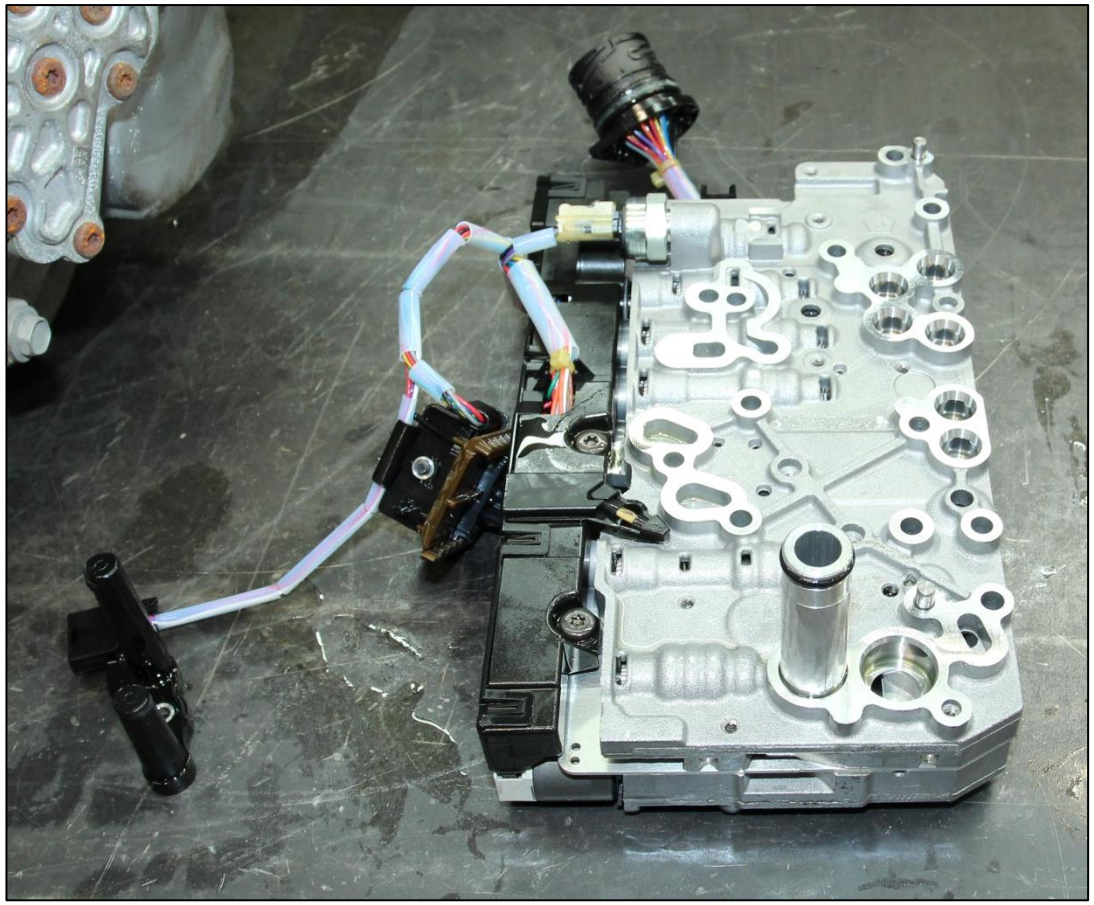
Range Rover



8 Bolts

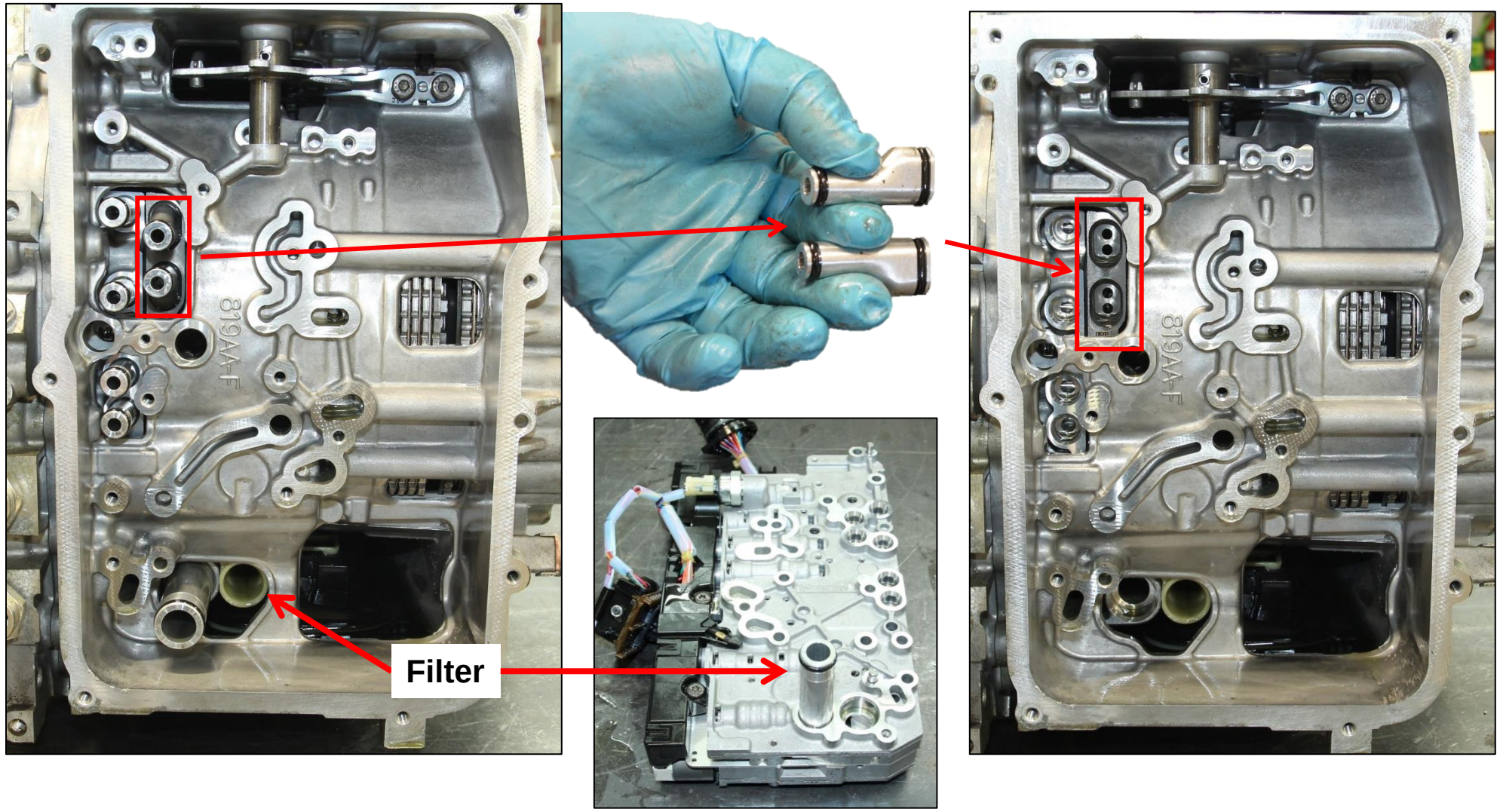
We found it much easier to cut the wire tie and swing the valve body out of the way.

Then removed the speed and range sensors by unbolting them from the case leaving them connected to the main harness.



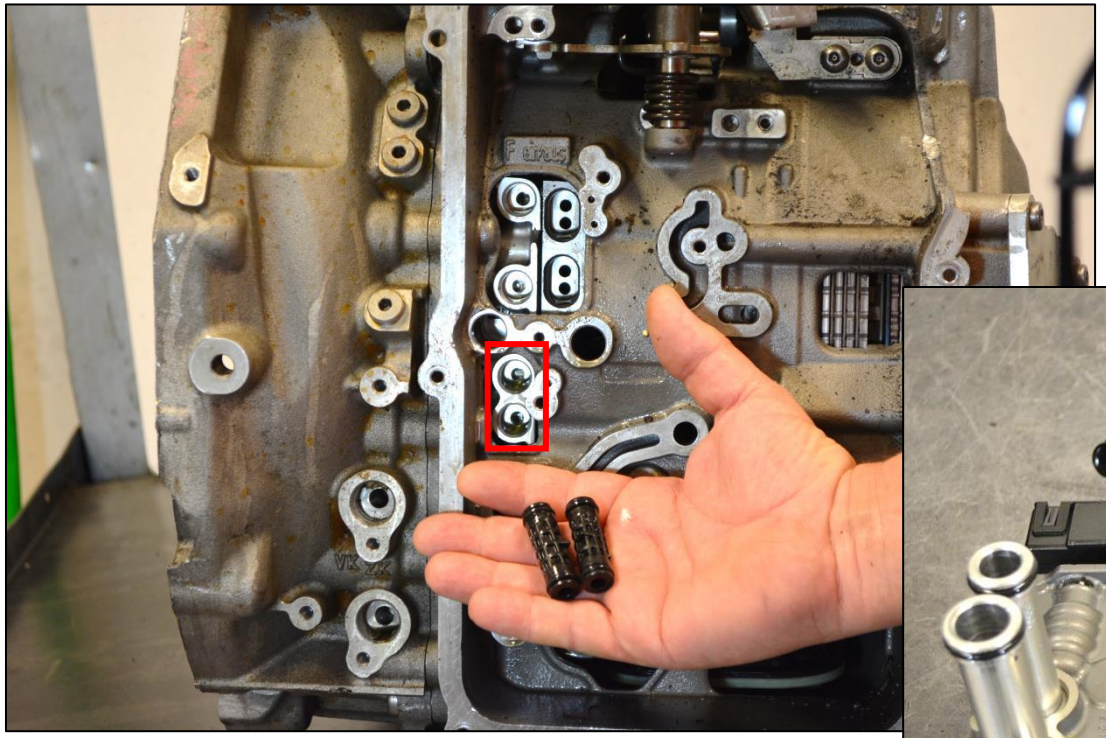
There are 8 aluminum feed tubes found under the valve body.

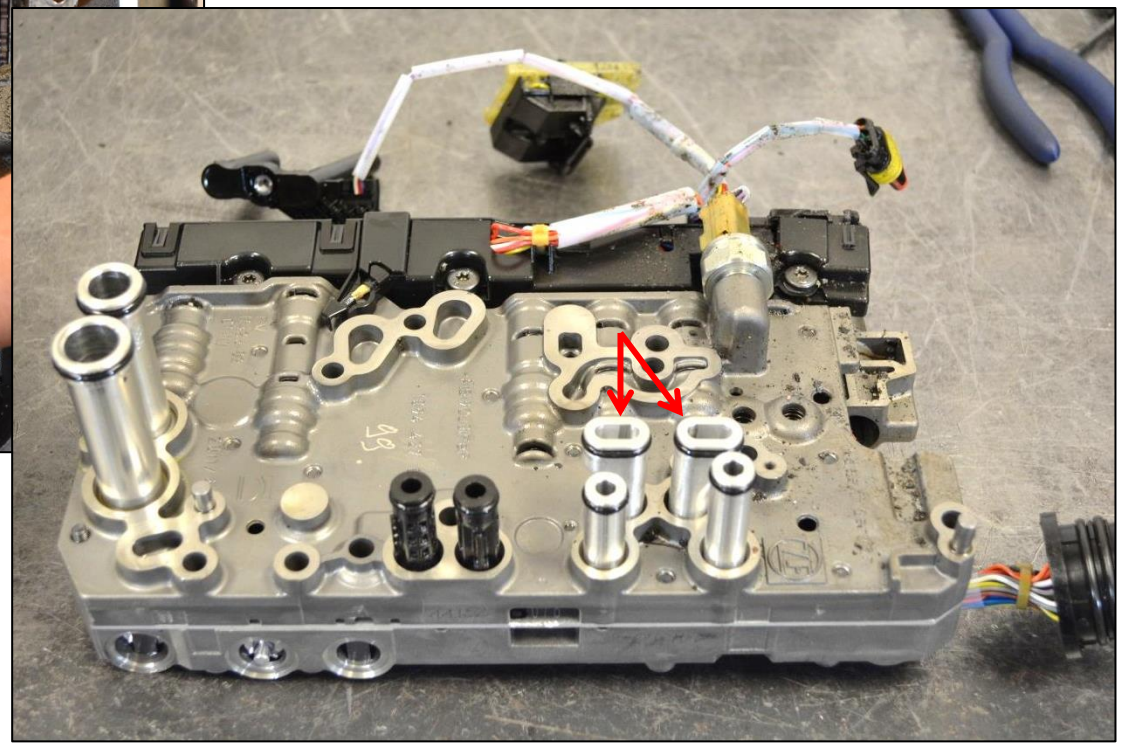
Two of the feed tubes are unique but identical in shape. They feed the “F” Dog Clutch.



There are 6 aluminum and 2 plastic feed tubes found under the valve body in the unit we had from a Range Rover.

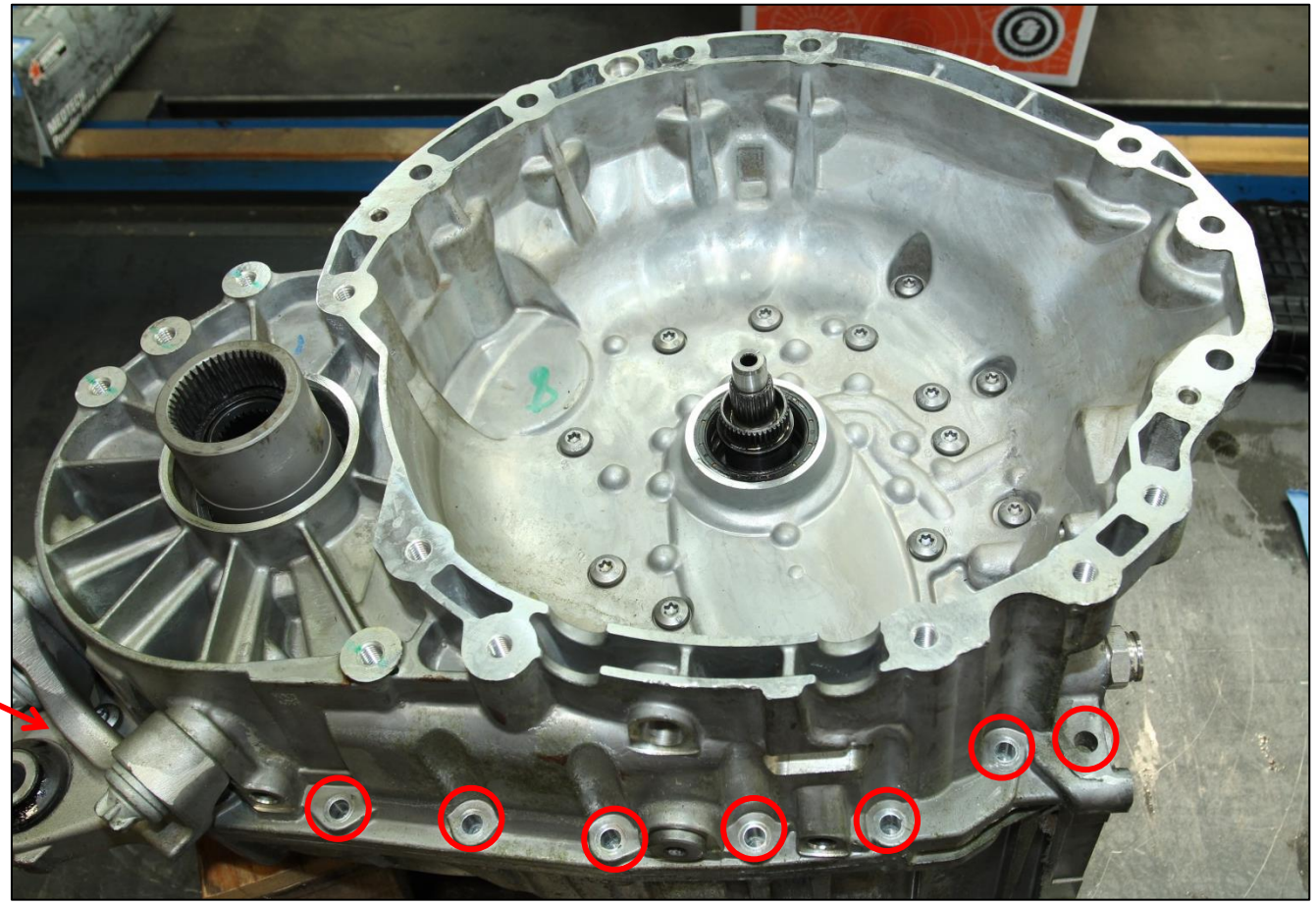
The same two of the unique feed tubes for the “F” Dog Clutch were found here also.



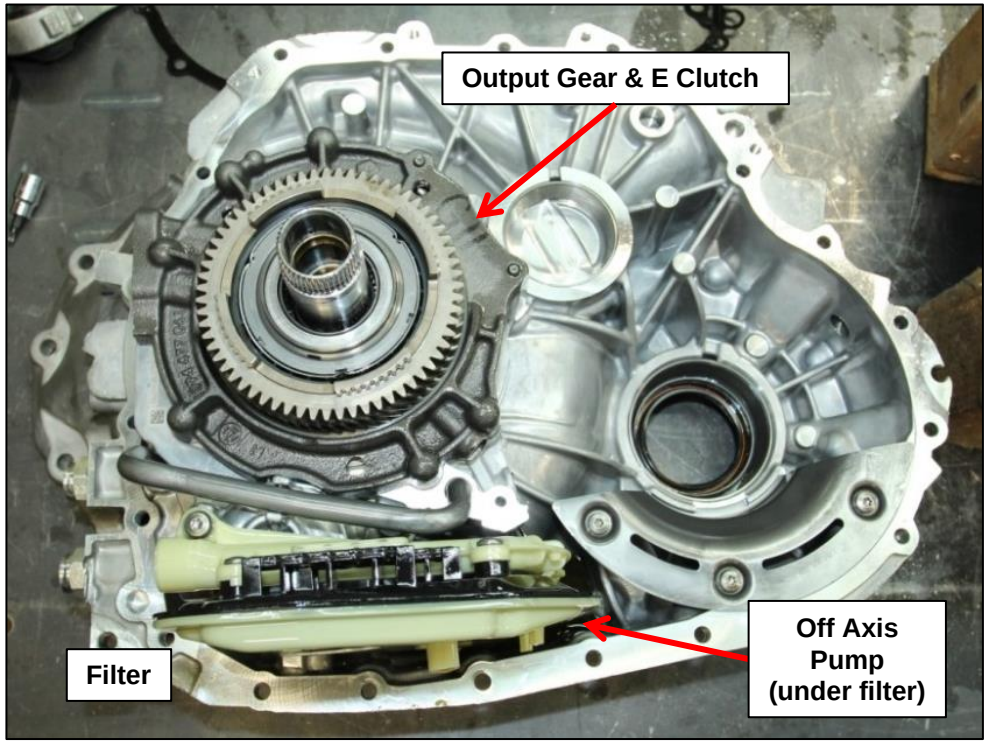


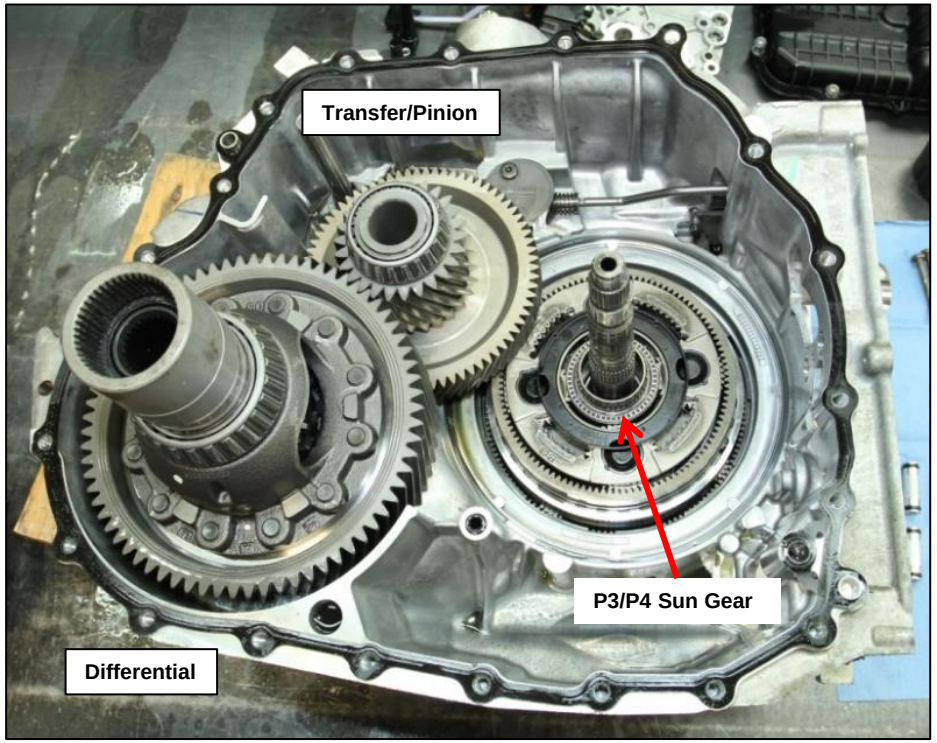
So now we went to the front of the transmission and removed the bracket and all the outer retaining bolts holding it to the main case.

With the cover off we can remove the differential and transfer gear.

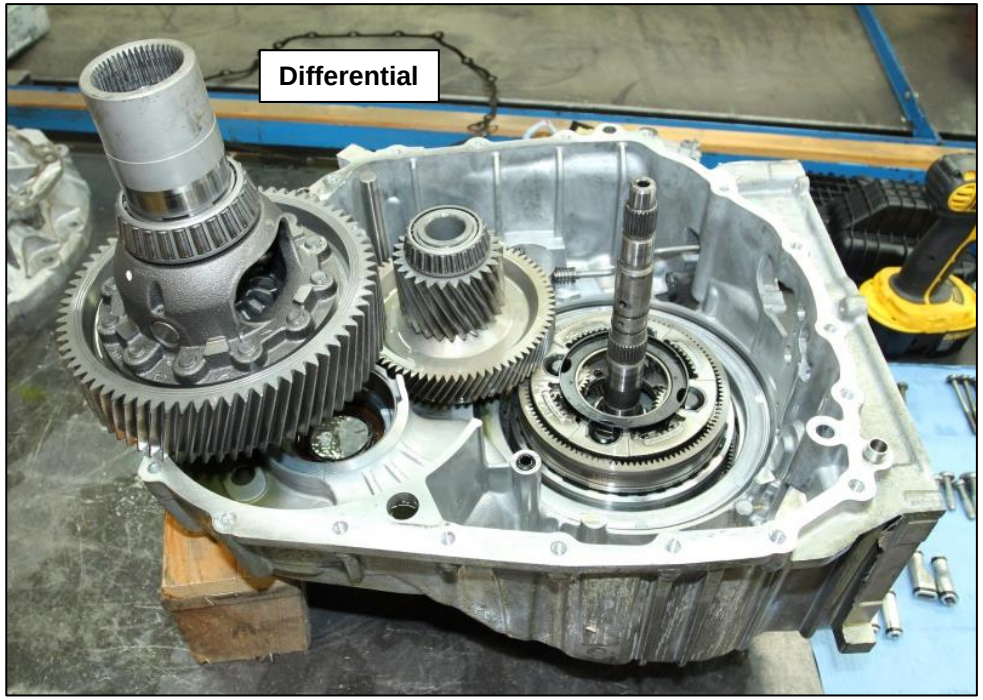


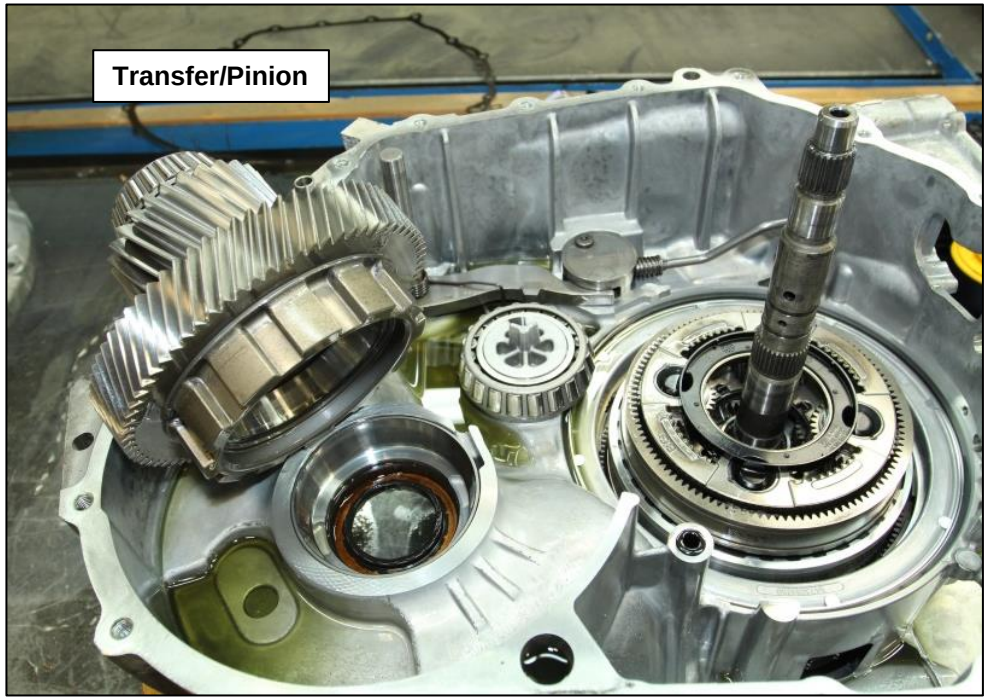
The output gear, E clutch assembly, filter and off axis chain driven pump assembly remained in the bellhousing because we didn't remove the retaining bolts on the inside area of the bell housing. Much easier this way.





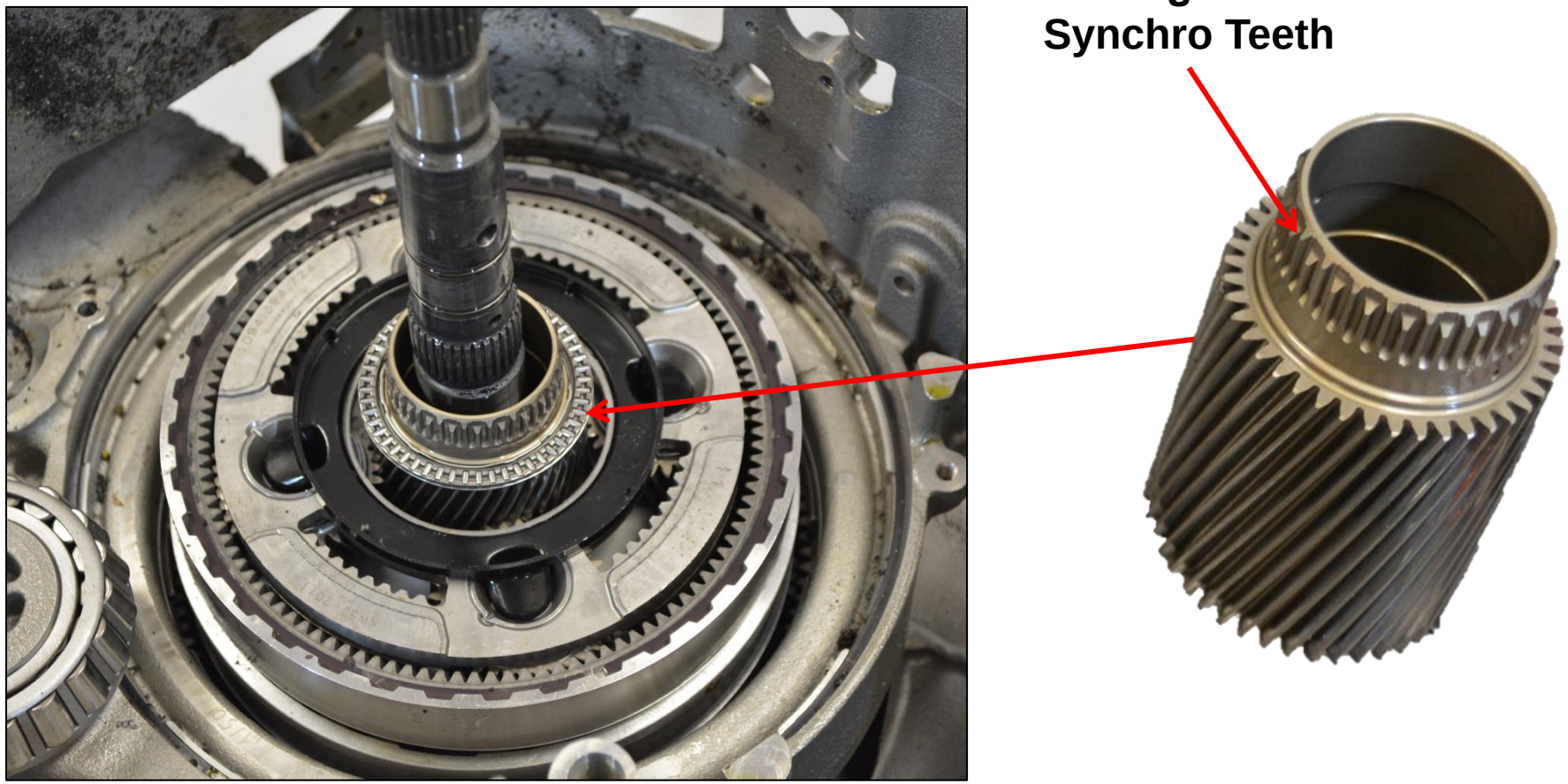
With the bellhousing off the differential, transfer/pinion and P3/P4 sun gear can be lifted right out of the case.



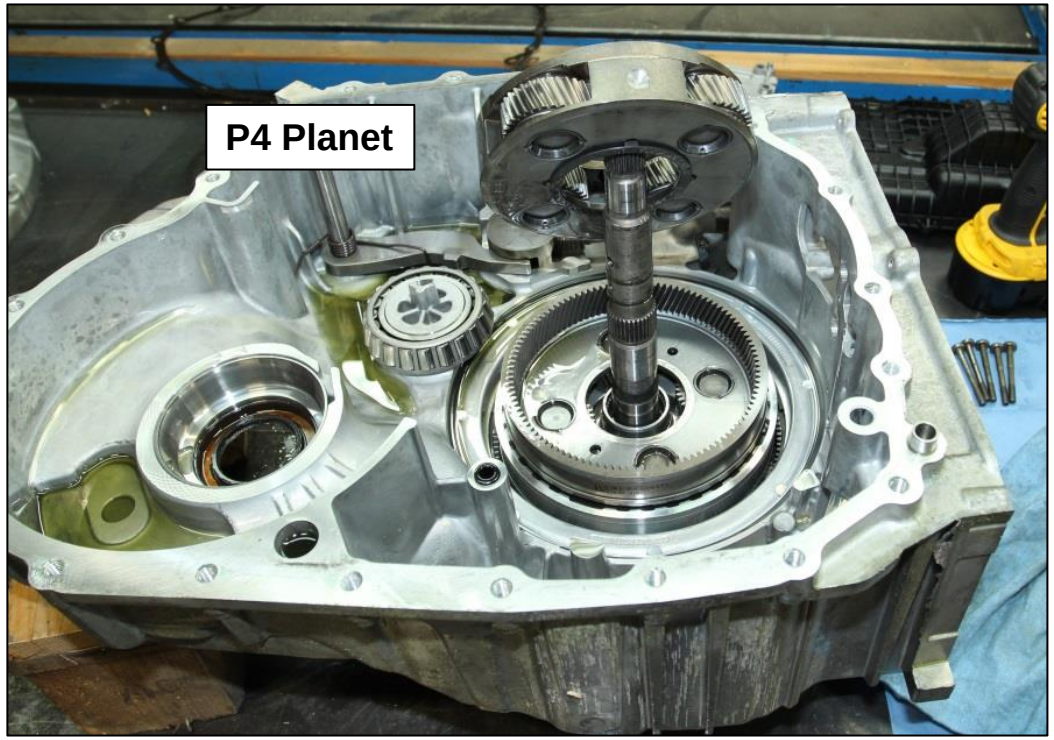


A closer looker at the location of the P3/P4 sun gear sitting in the P3/ & P4 planet.

We'll get to the F Dog clutch function later in the webinar.

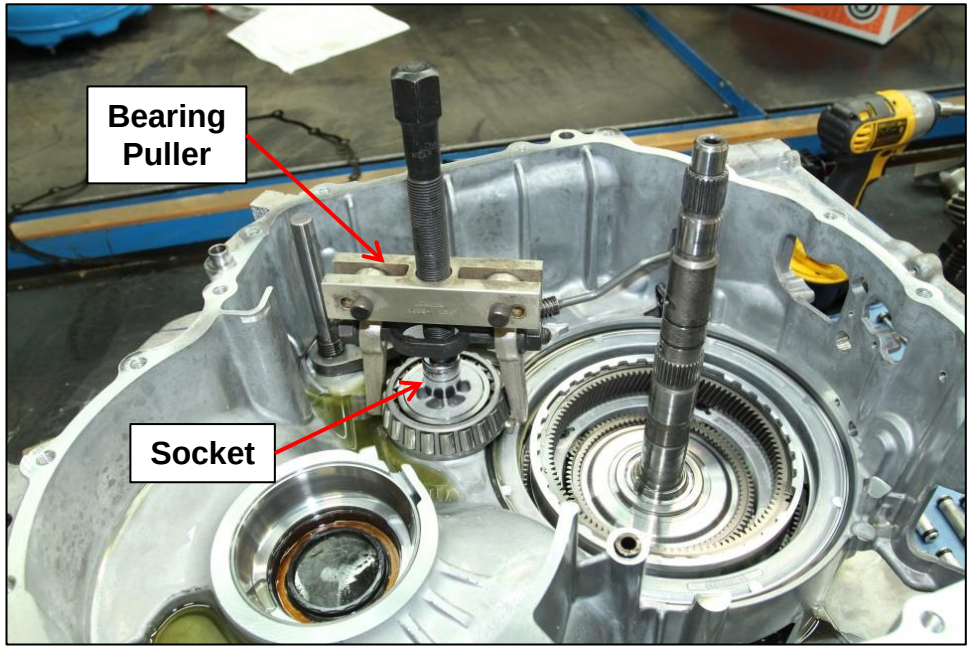


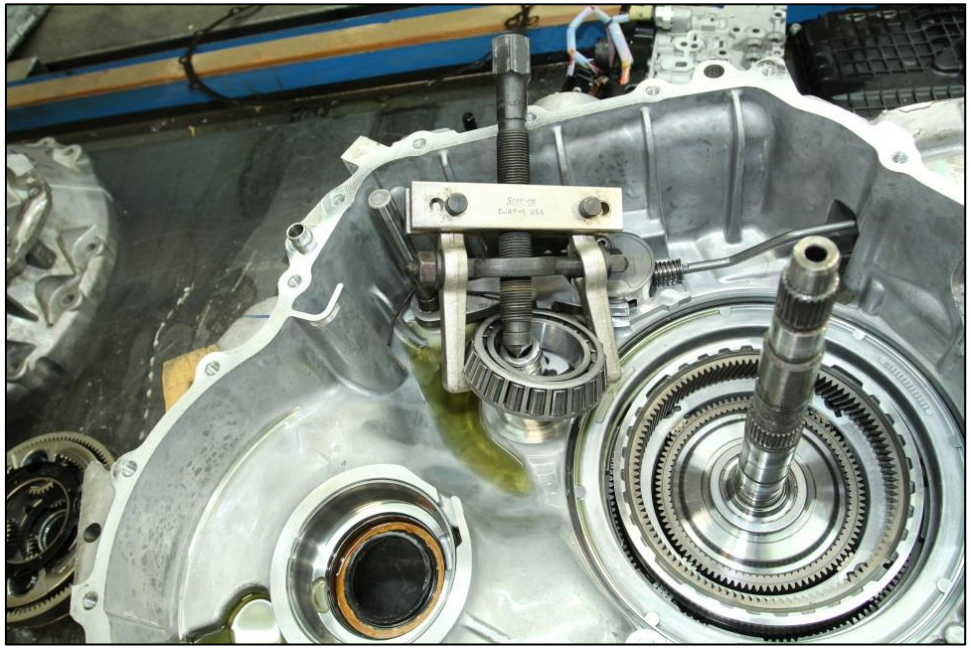
Then the two planets can be removed.



Before you can go any further you must use a small socket and bearing puller to remove the pinion bearing.

Then you can begin to remove the D clutch housing and piston.





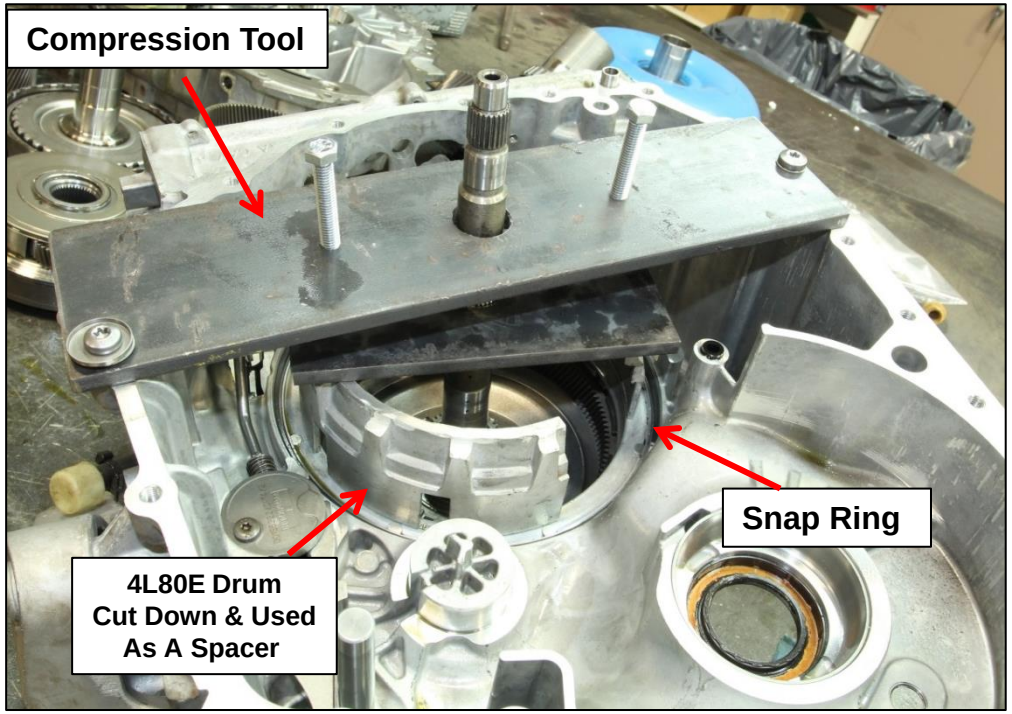
D Clutch Housing & Piston

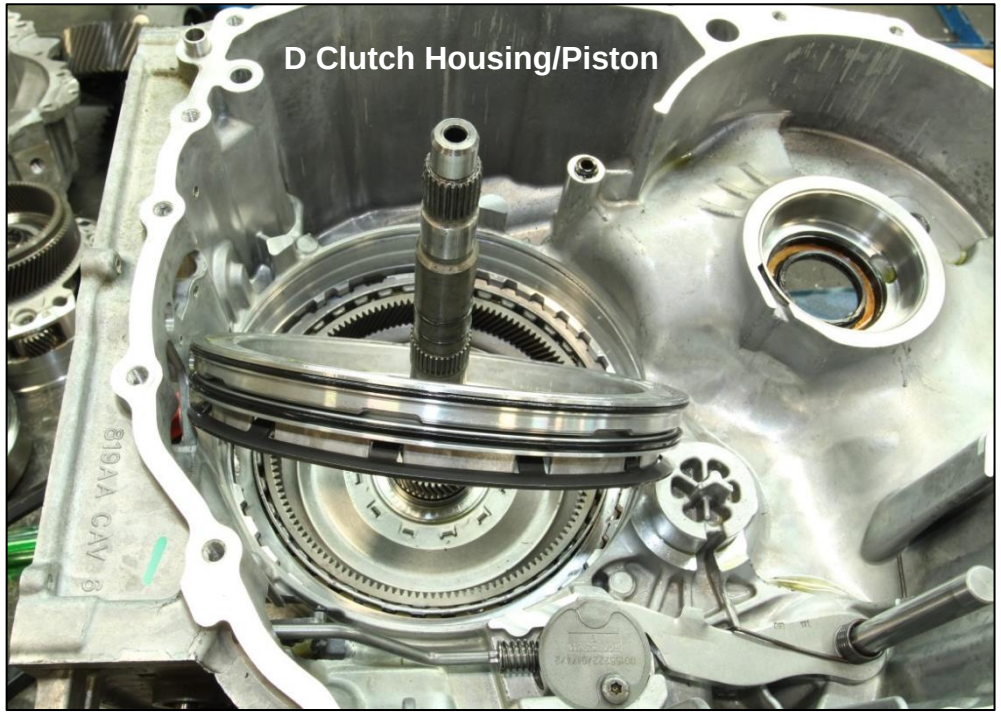
Bill Brayton using a couple of pieces of steel plate, some bolts and a 4L80E 4th clutch housing, cut down as a spacer made up a compression tool kit to remove/install the snap ring to the D clutch housing/piston assembly.

This is one tough snap ring to remove without it. There is a lip on the housing that keeps the snap ring into the groove. The beveled return spring is very strong and makes it difficult to push the piston down by hand far enough to pry the snap ring out.

It can be done but it is much easier with the tool and no chance of damaging the lip on the housing.

Ask me how I know.

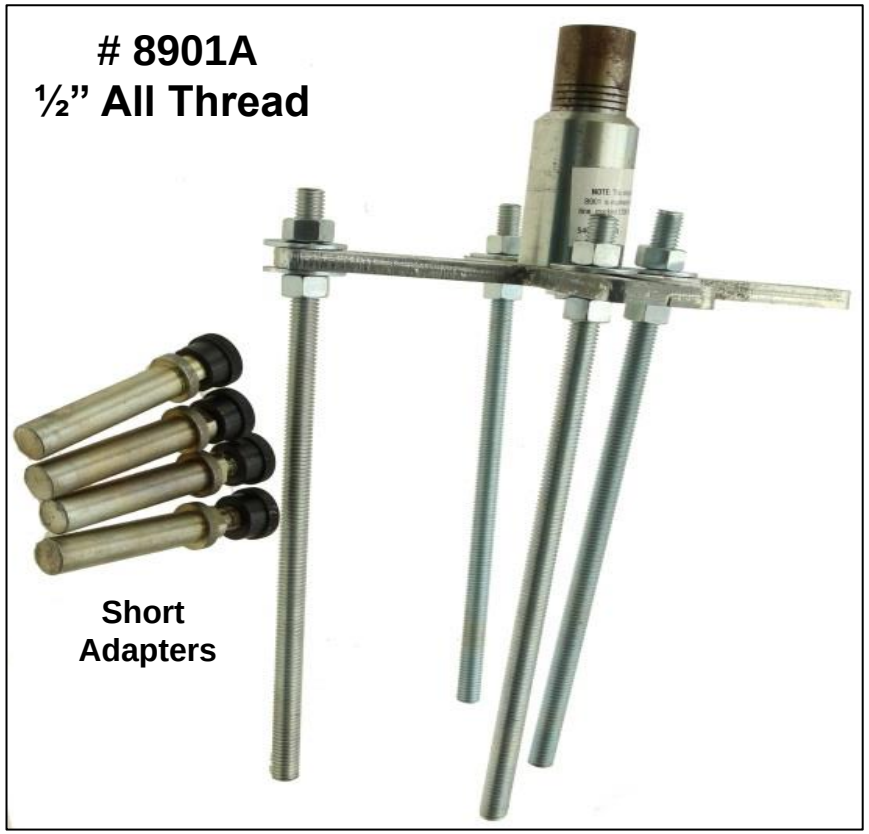




Bill Brayton's Compression Tool Kit.

There is a special tool # 8901A, but at the time there were only short attachments available for the tool. We needed longer attachments. The tool was purchased on E-bay ($35.00-$82.00) with short attachments.

A quick trip to the hardware store for a length of ½ inch all thread and that problem was fixed.



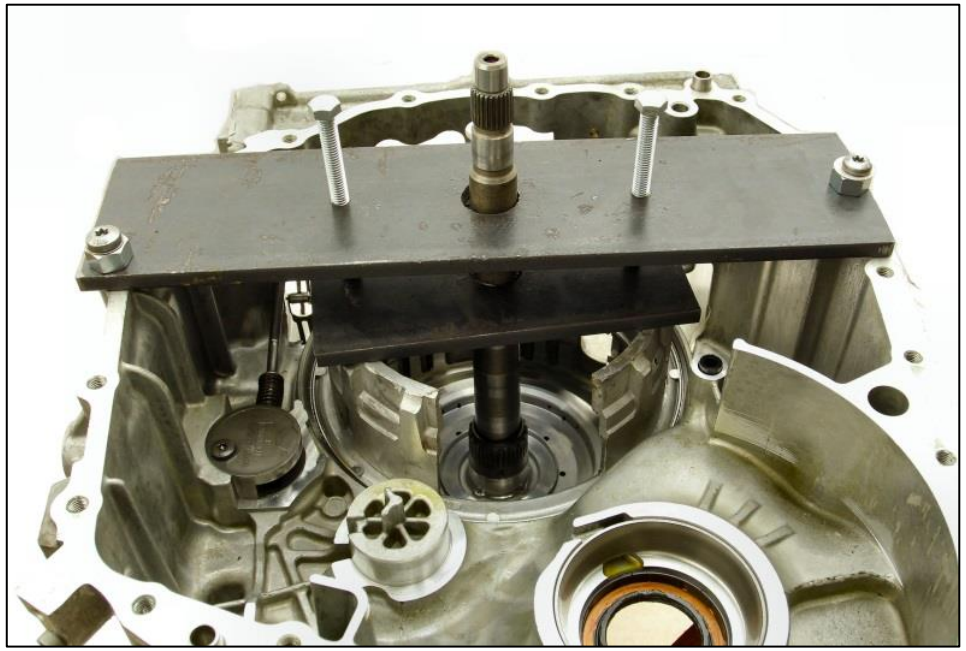
Tool To Install/Remove The D Clutch Housing/Piston Assembly Snap Ring

With a couple of 3/8 inch plate steels with a hole cut out in the center of the plates to 1 1/8” inch.

Using the 16” inch piece of steel plate the next step is to center the plate on the case and mark where to drill the hold down holes. This is followed by drilling and tapping holes for the 3/8” X 4” inch long bolts. These bolts are used to compress the beveled return spring.

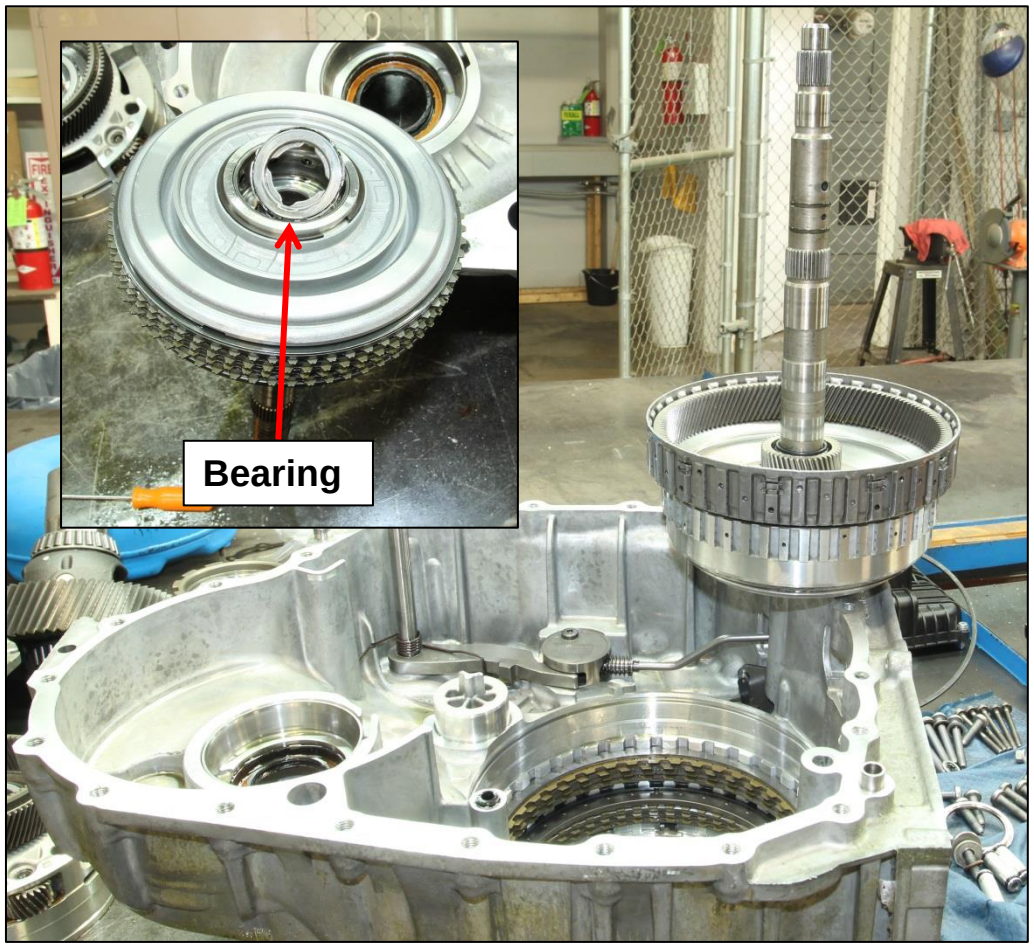
We also have a 4” X 8” inch piece of steel with the hole punched in it as well. We could use longer bolts but why not use a part that we have laying around the shop. Like a 4L80E overdrive housing, which fits well down in this case.

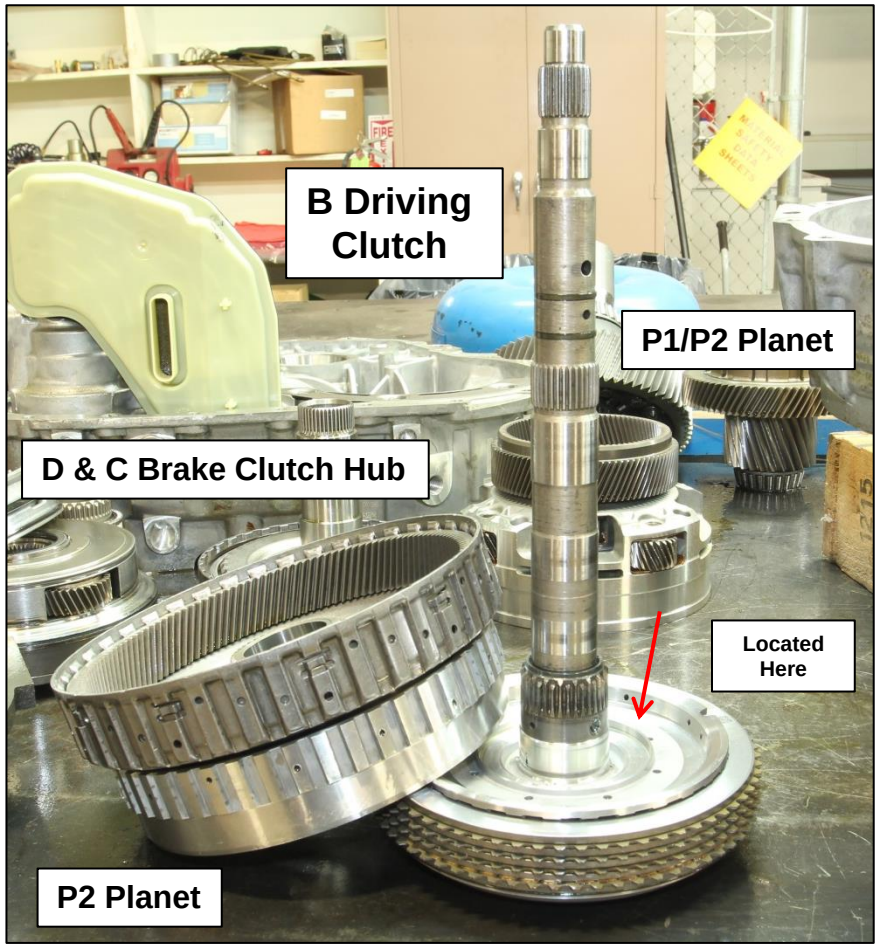
Using this tool the unit stays on the bench and is much easier to work with than putting the case into a press.



Now the B driving clutch assembly can be lifted out of the case with the D & C brake clutch hub/P2 planet and P1 planet.

There is a thrust bearing on the bottom of the drum.

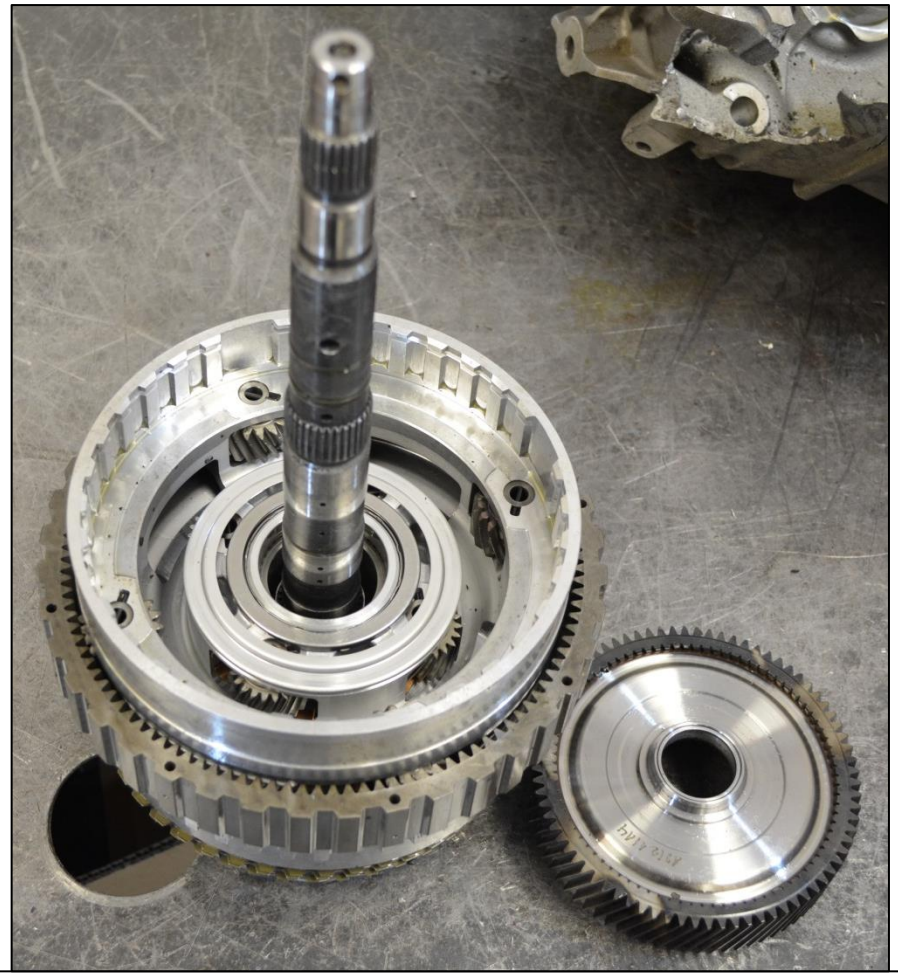




Using the Range Rover as an example, you can see they look quite similar.

We removed the snap ring, P3 ring gear and then the P2 sun gear/P1 ring gear.

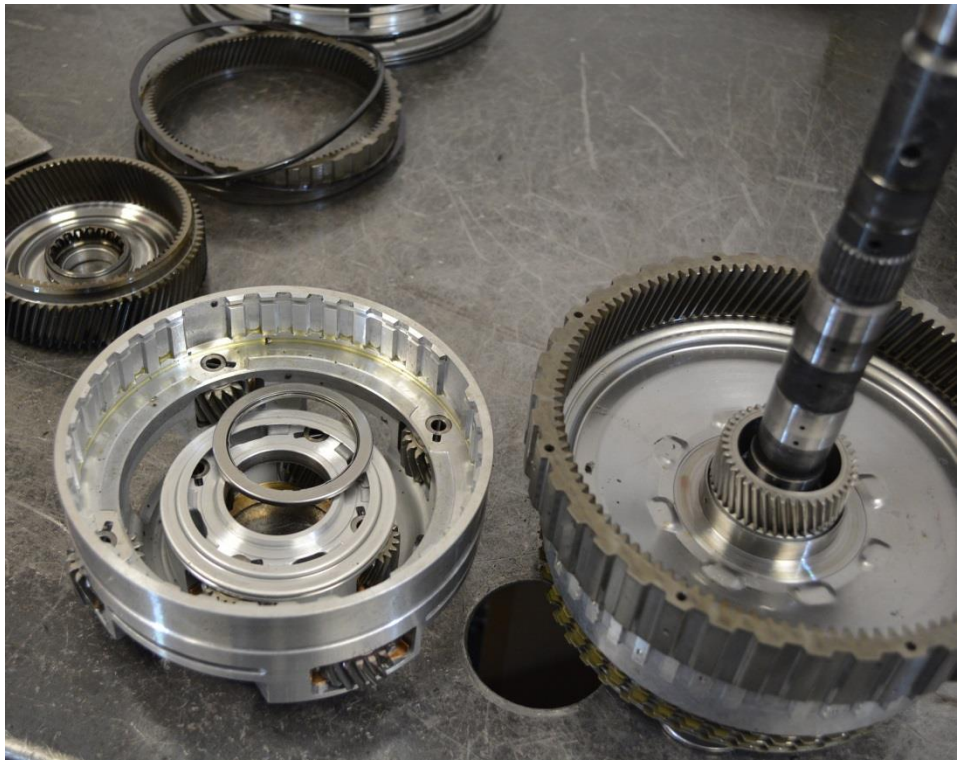
Although you can just lift the P1/P2 planet off the B clutch drum as one assembly without removing the ring gear.



On the other side of the P2 sun gear/P1 ring gear is where the synchronizer teeth are found for the A Dog clutch.

We'll get to that function a little later.

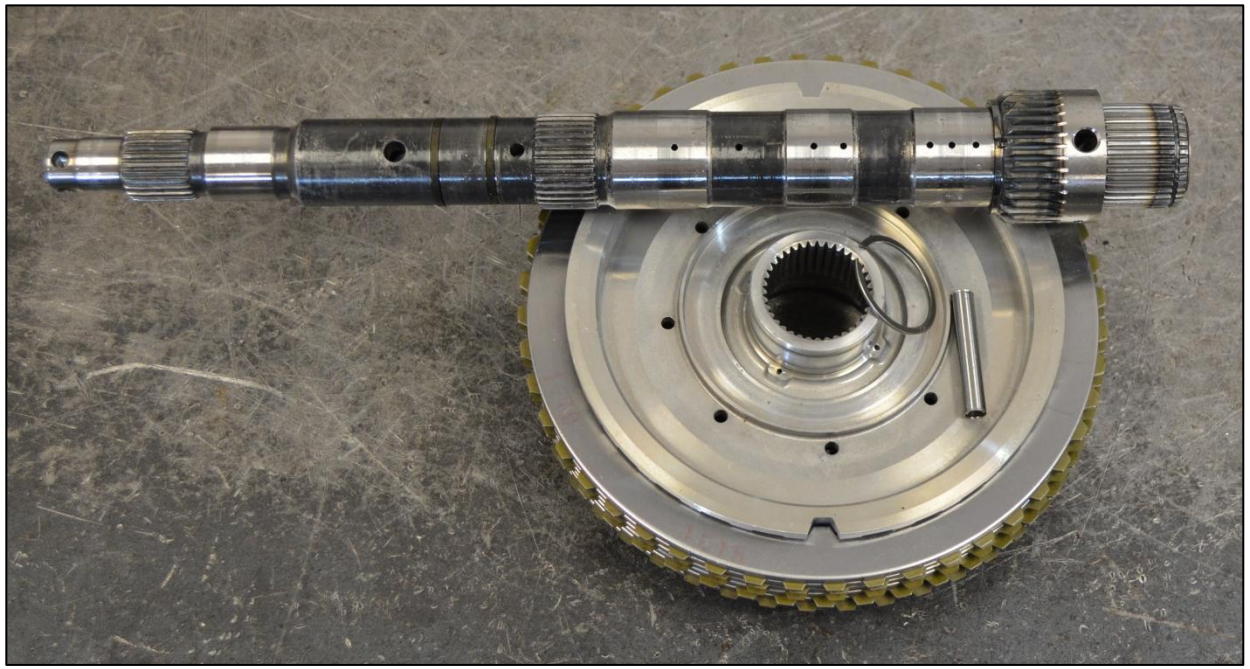
Next we removed the P1/P2 planet assembly.



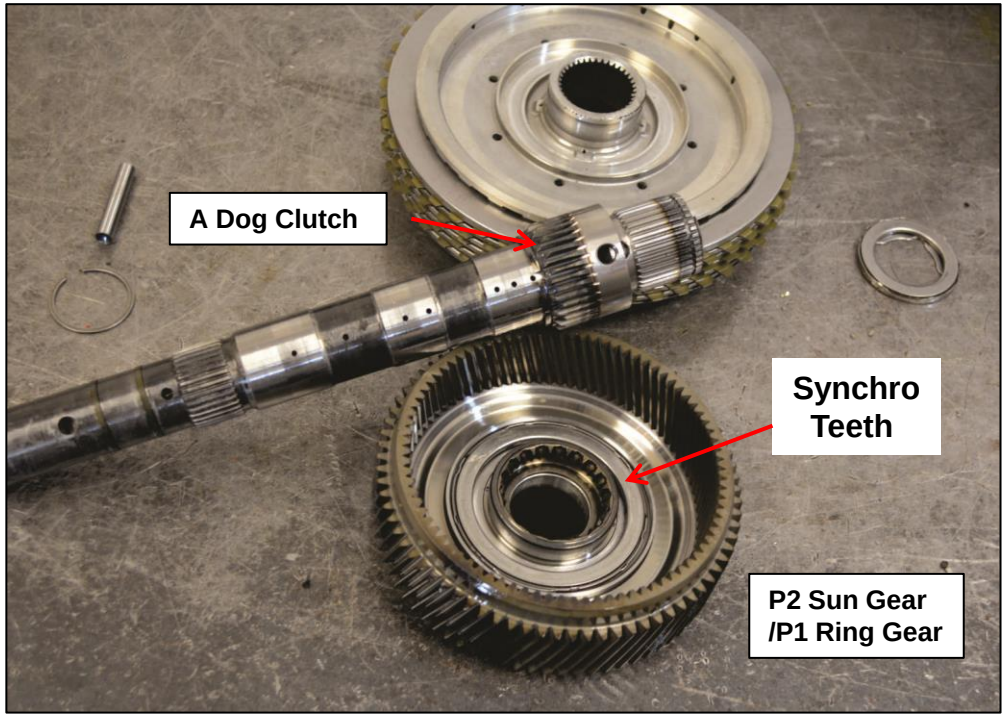
Then just lift off the P2 ring gear and P1 sun gear.

There is a bearing that sits inside the bottom of the B clutch drum.

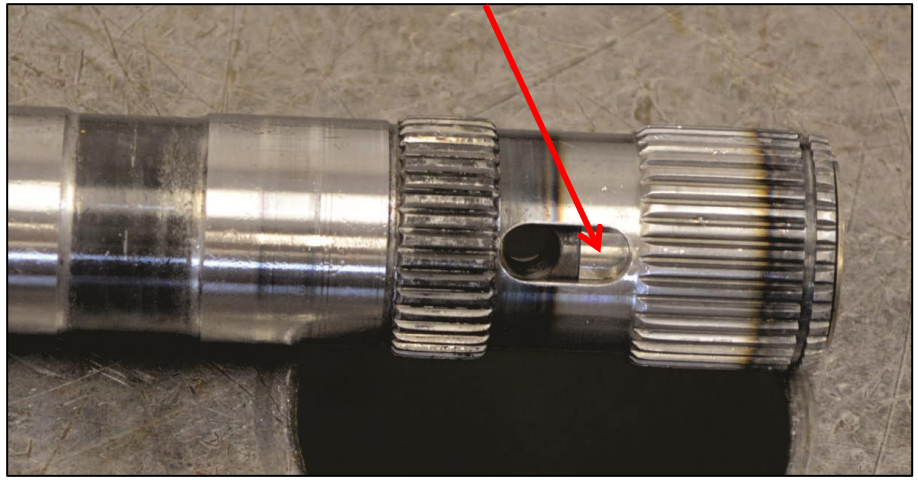
Then we removed the input shaft and A Dog clutch retainer pin to get a closer look at the apply piston.



The piston moves the A Dog clutch back and forth to engage the synchronizer teeth inside the P2 sun gear/P1 ring gear.

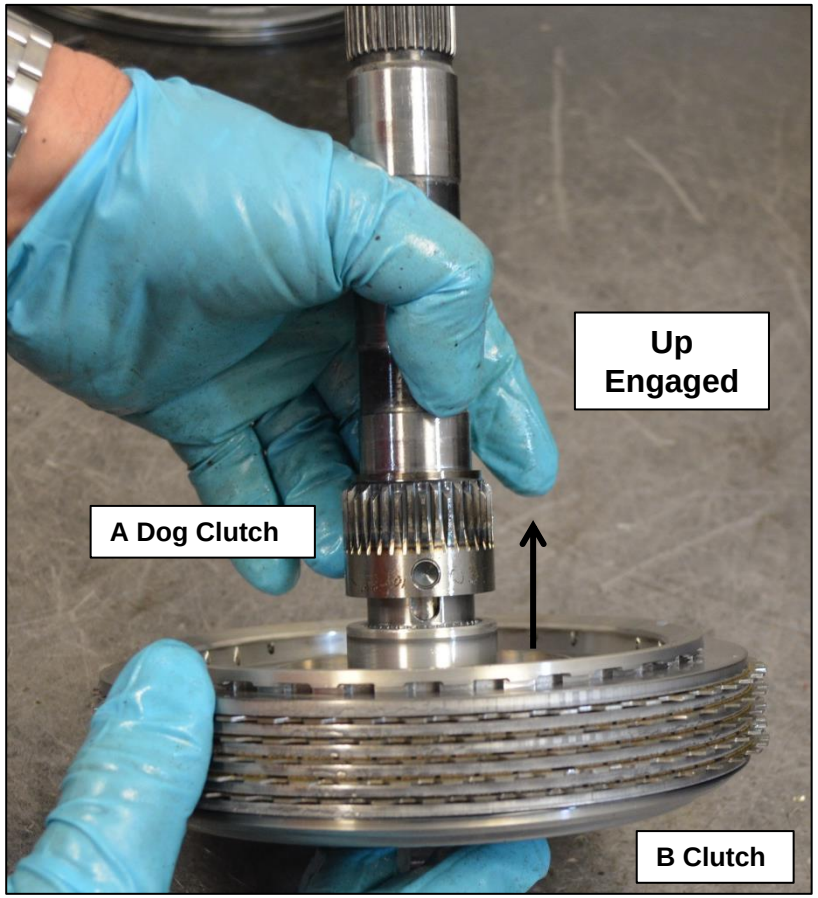


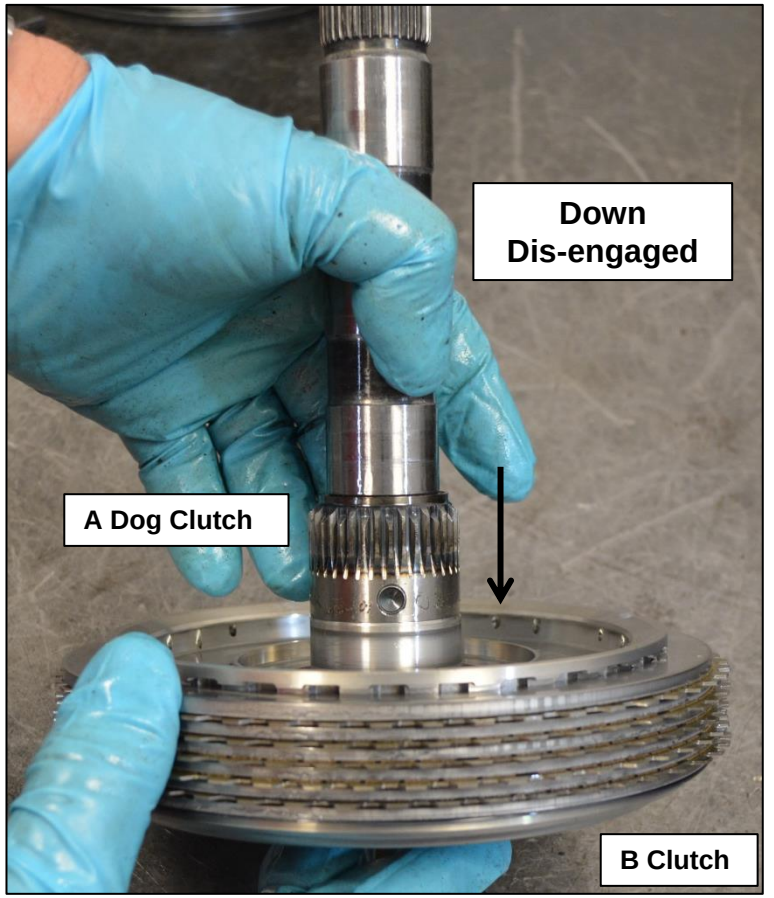
Apply Piston



When engaged oil pressure will flow into the end of the shaft a move the A Dog clutch upward.

Oil pressure between the sealing rings towards the other end of the shaft will move the piston downward.



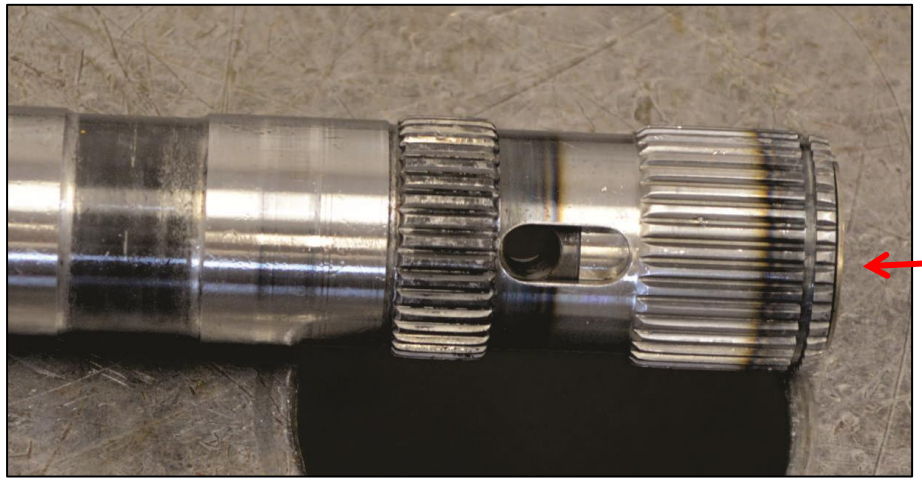


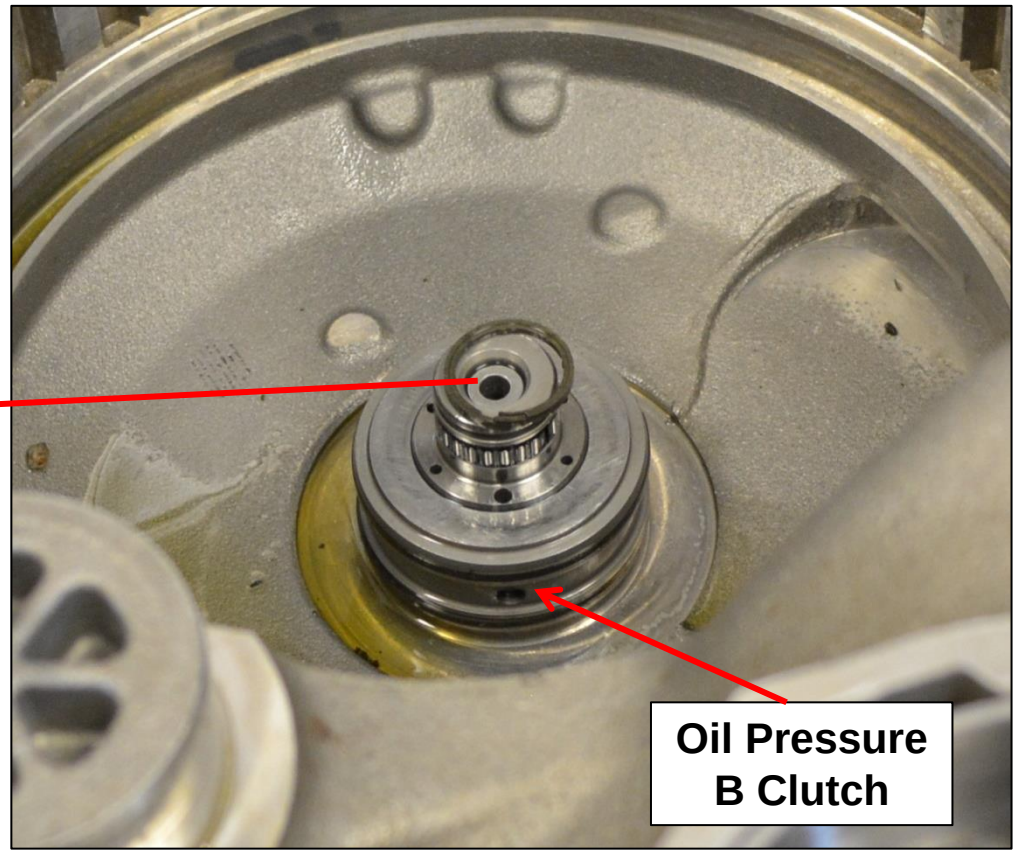
We covered the Hydraulics in the previous 948TE Introduction webinar.

There is a sealing ring to hold the apply pressure at the end of the shaft a move the A Dog clutch upward.

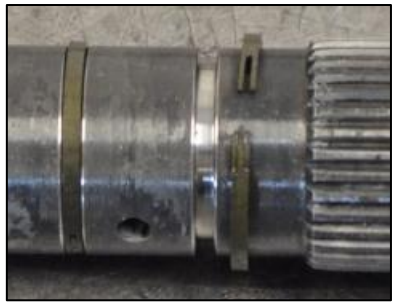
The apply pressure for the B clutch is sent through the orifice between the two lower rings.

Oil Pressure
A Dog Clutch



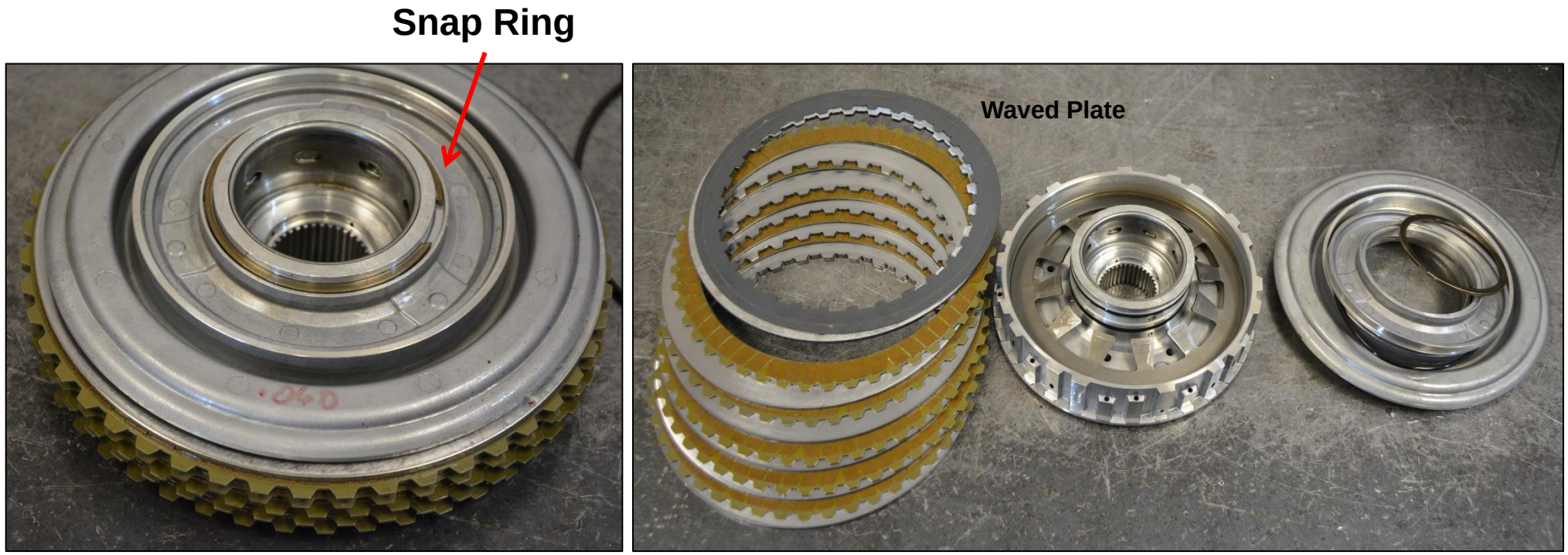


All the Sealing Rings Found On These Units Were Torlon Finger Joint Type Rings.



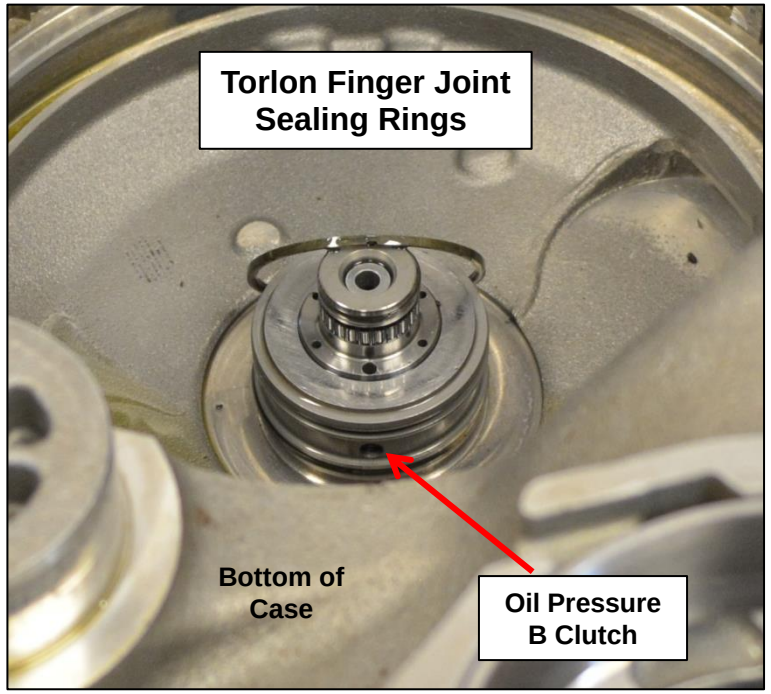
Now flip the B clutch drum over compress the beveled return spring and remove the snap ring.

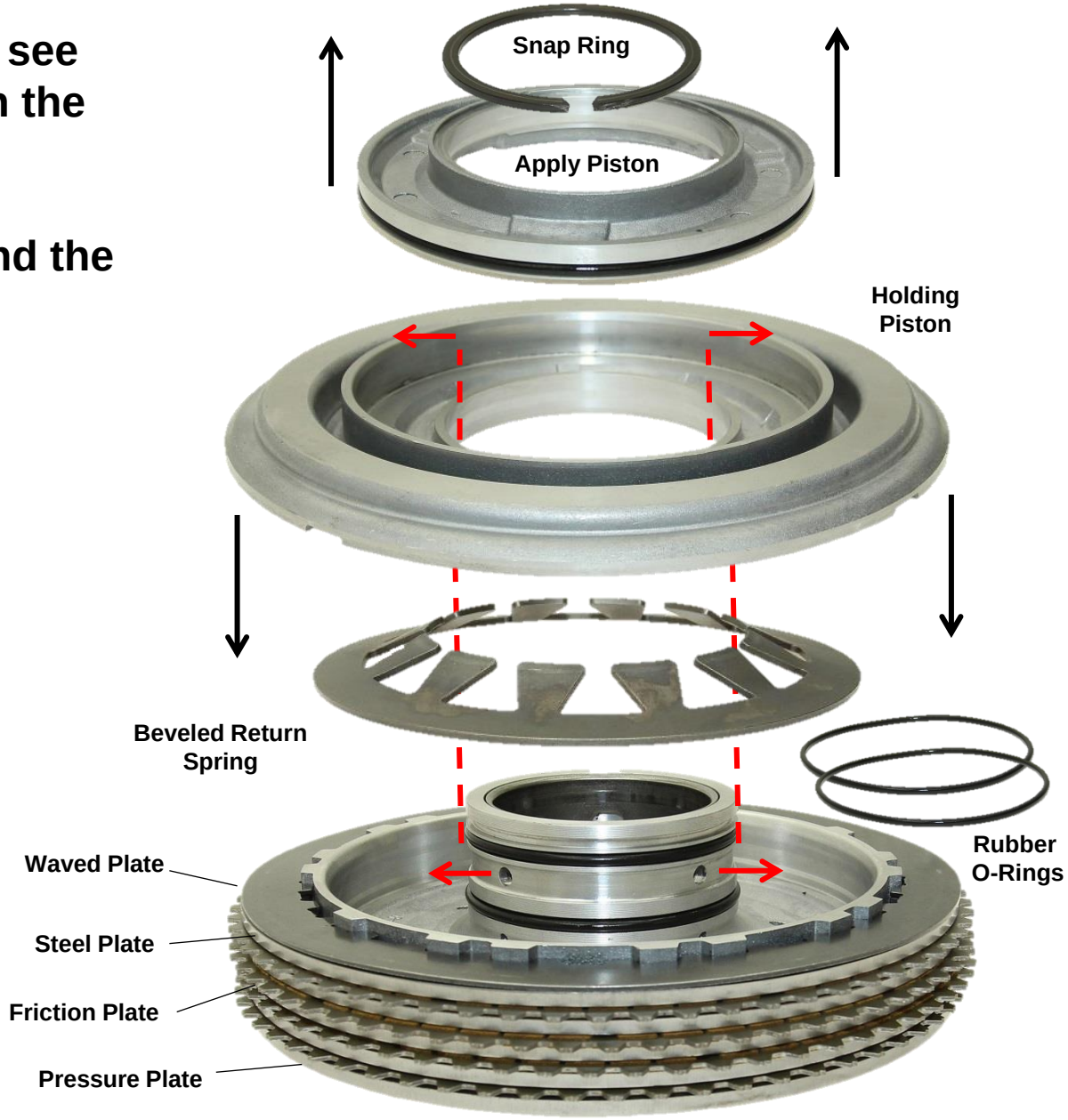
The clearance that we measured on this proto type was 0.060”.



If you look at the stack up, you can see that oil pressure is applied between the two seals on the drum.

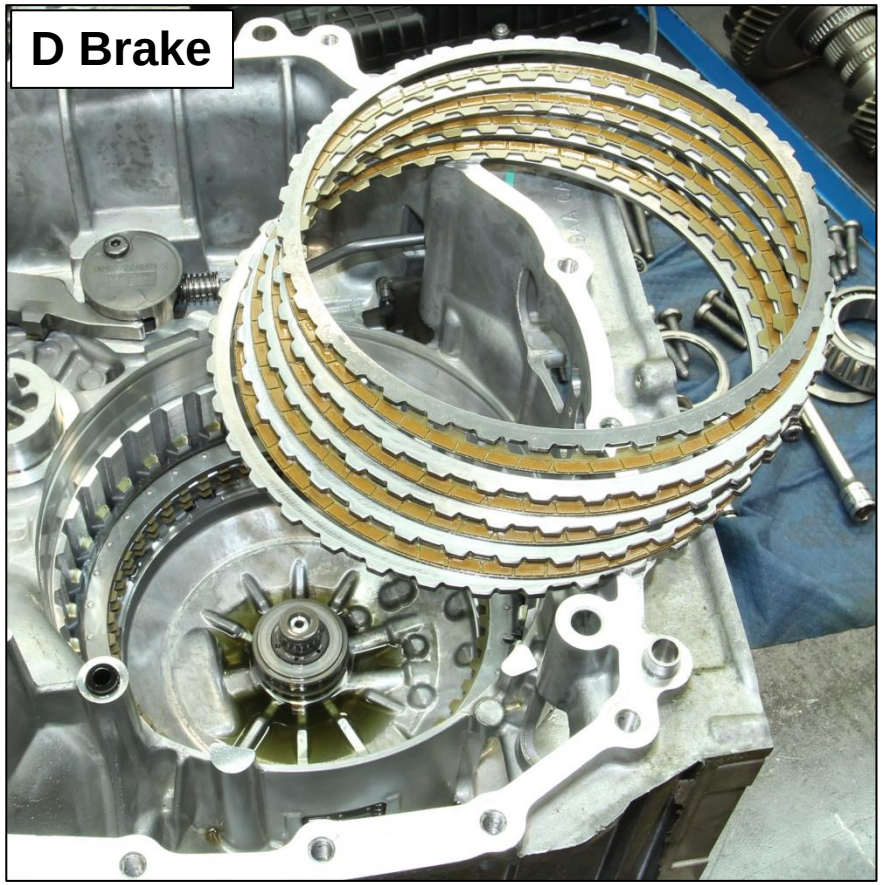
This push the lower piston down and the upper piston will pull the drum up compressing the clutch assembly.

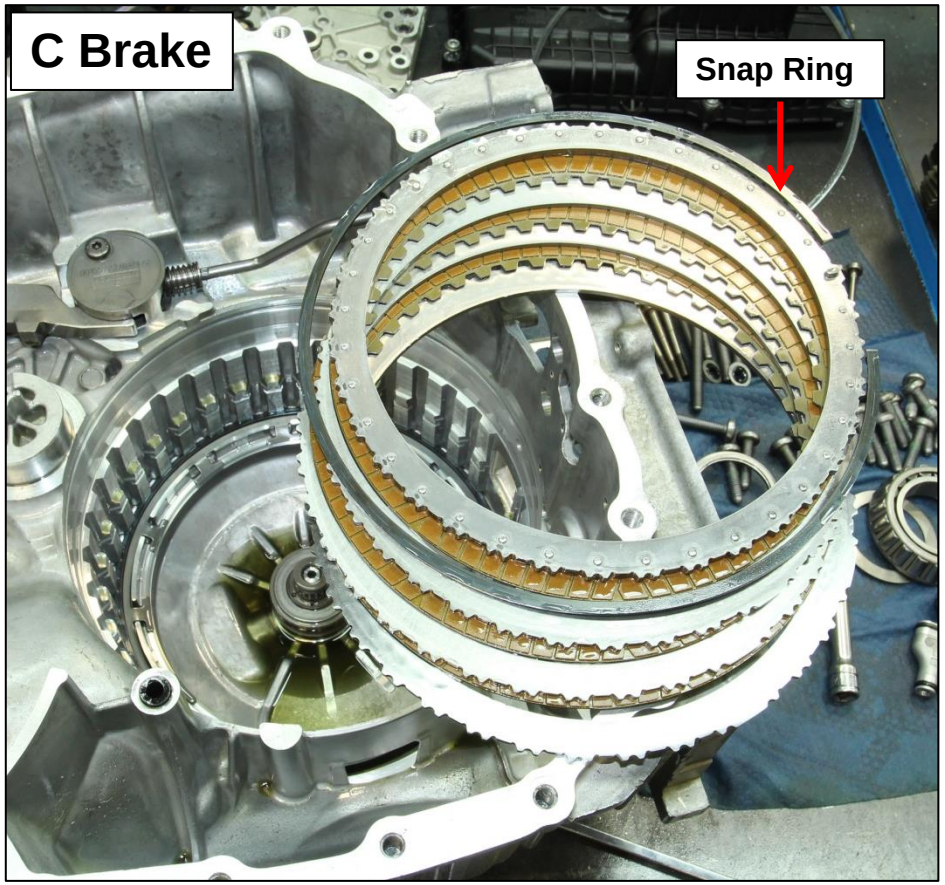




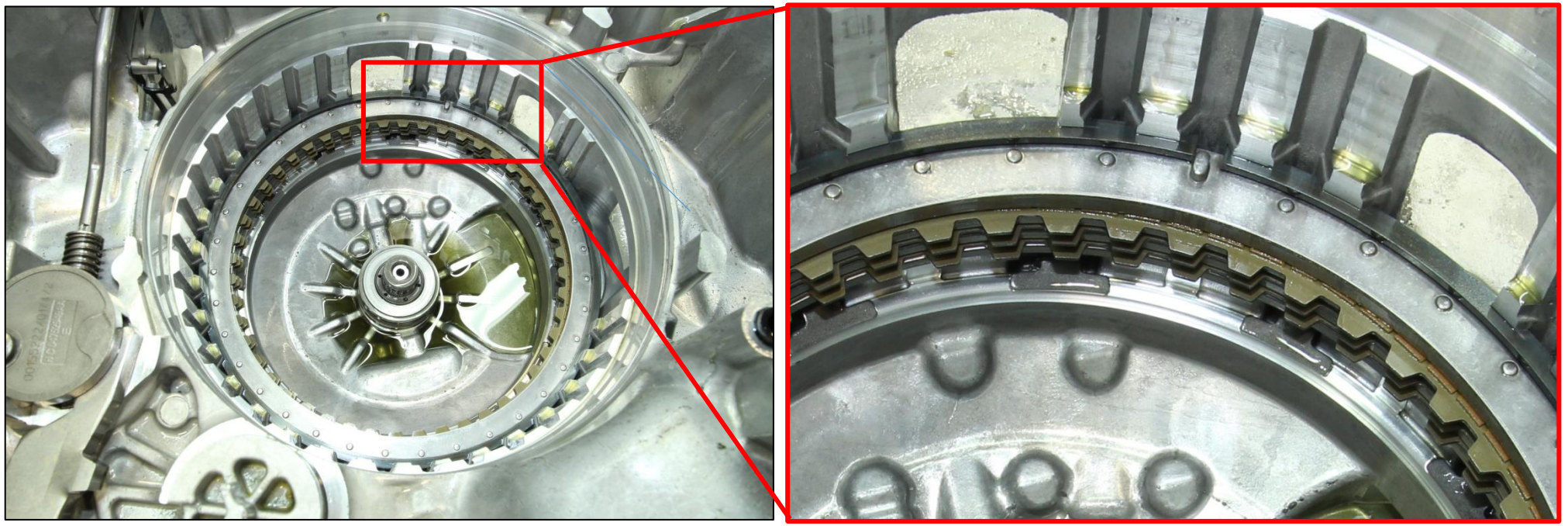
The D brake clutch assembly can just be lifted out of the case (no retainer).

Then remove the retainer snap ring and C brake clutch assembly.





The C brake clutch retainer snap ring opening has to align with the tab on the top of the pressure plate during re-assembly.



The endplay on our Range Rover proto type was 0.035”
which can vary from model to model
We will have more information on this transmission at EXPO
& our upcoming rebuild book

Tool To Install/Remove The C Clutch Piston Retainer Snap Ring

Taking the snap ring out for the C clutch piston is not too difficult. The biggest problem is when its time to install the snap ring. The Bellville return spring is extremely strong, so it would be very difficult to get the snap ring back in with brute strength.

The second tool we had to bite the bullet and find it on the internet. We did not have the resources to cut a piece of 3/8 inch steel plate into such a design. This is Miller Tool number #10504, C Clutch Spring Compressor is easily found on the web for about $90.00.

We can still use our cross bar instead of having to hassle with taking the case over to the press.

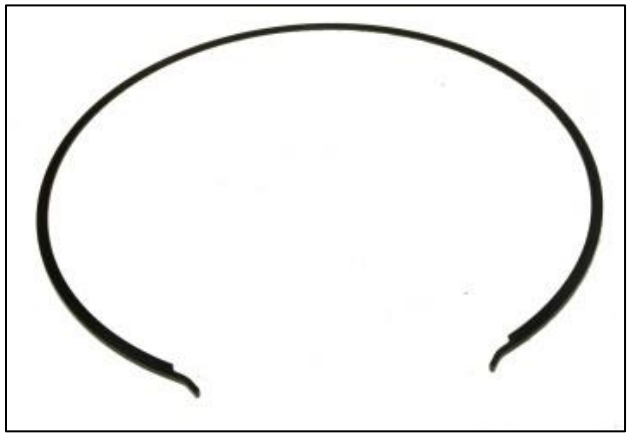
This time we used a reverse reaction drum (often referred to as a “cookie cutter” or “stove pipe”) from a 4T65E and a smaller 1 ¼” X 7 ¼” inch crossbar from a previously fabricated special tool.

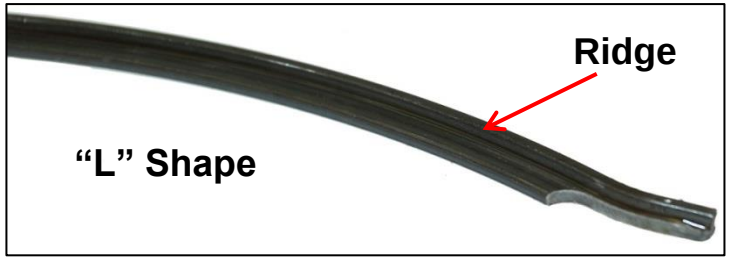
To Install the Snap Ring C Clutch Piston

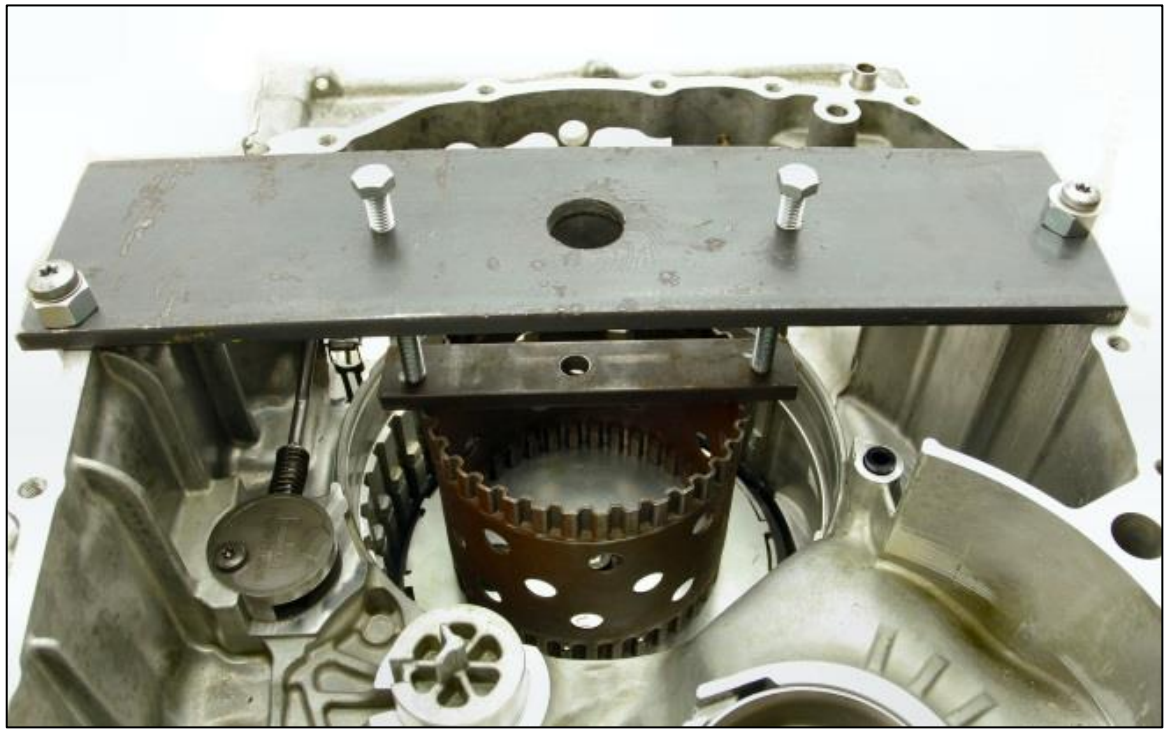
Place the C Clutch Compressor tool onto the C clutch Bellville spring. Set the reaction drum and the small steel bar onto the compressor tool and finally attach the large crossbar to the case.

Compress the C clutch Bellville spring remove the snap ring.

This type of snap ring is “L” shaped snap ring and always difficult to install without the correct tools.

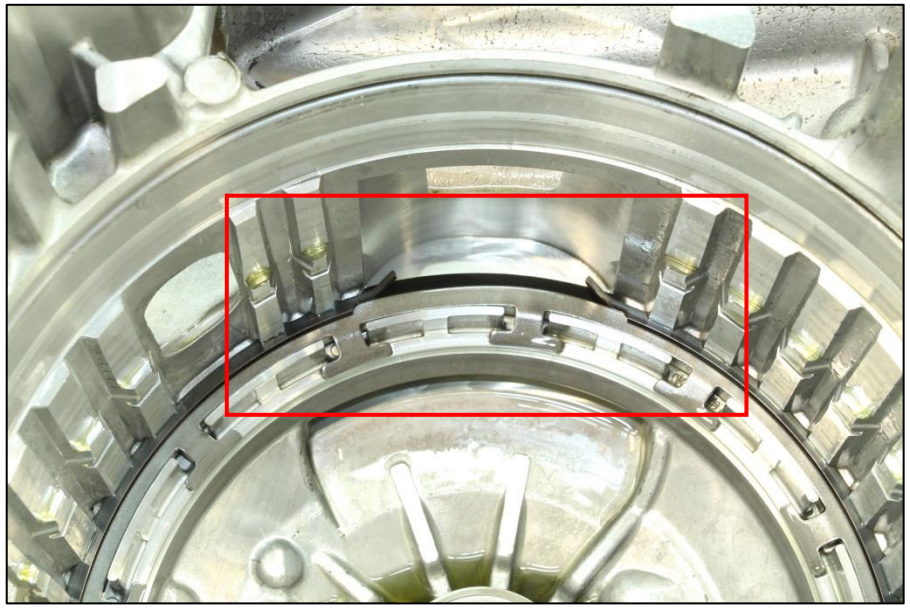


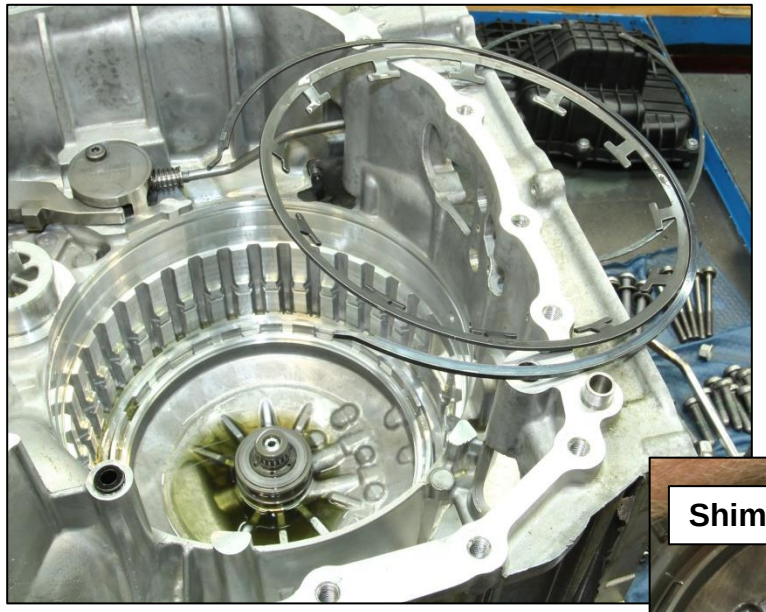


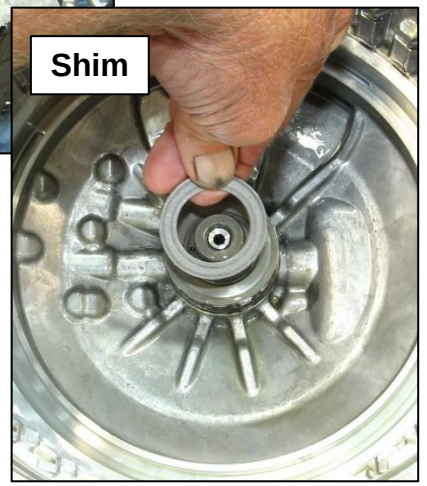


The C brake clutch apply piston retainer snap ring opening is aligned to the open area at the top of case.

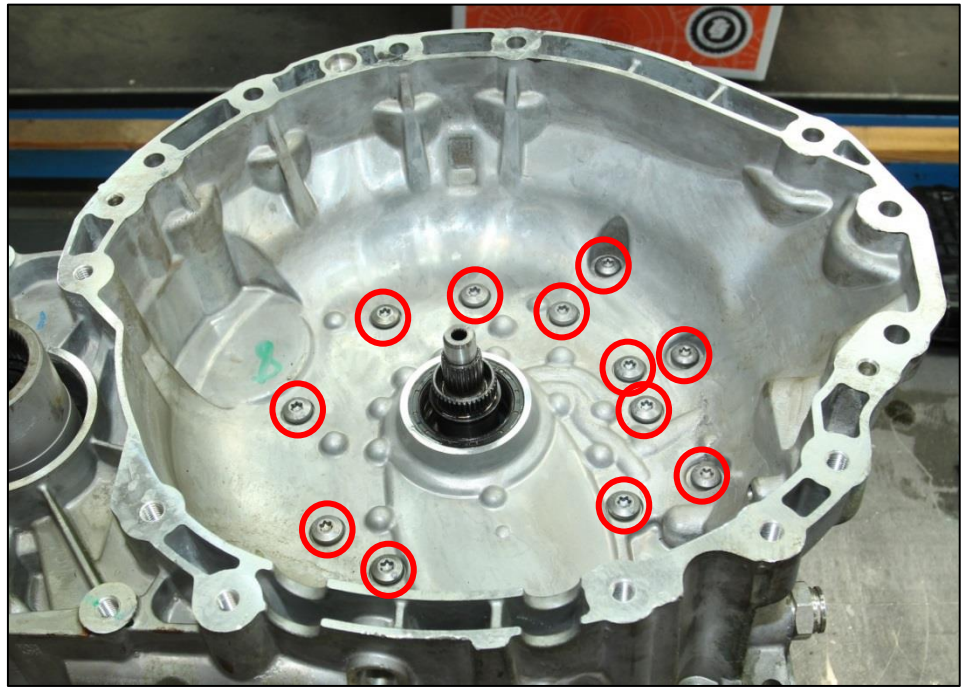
The last thing to remember is there is a shim (for the thrust bearing under the B clutch drum) on the top of the sealing ring support at the bottom of the case.

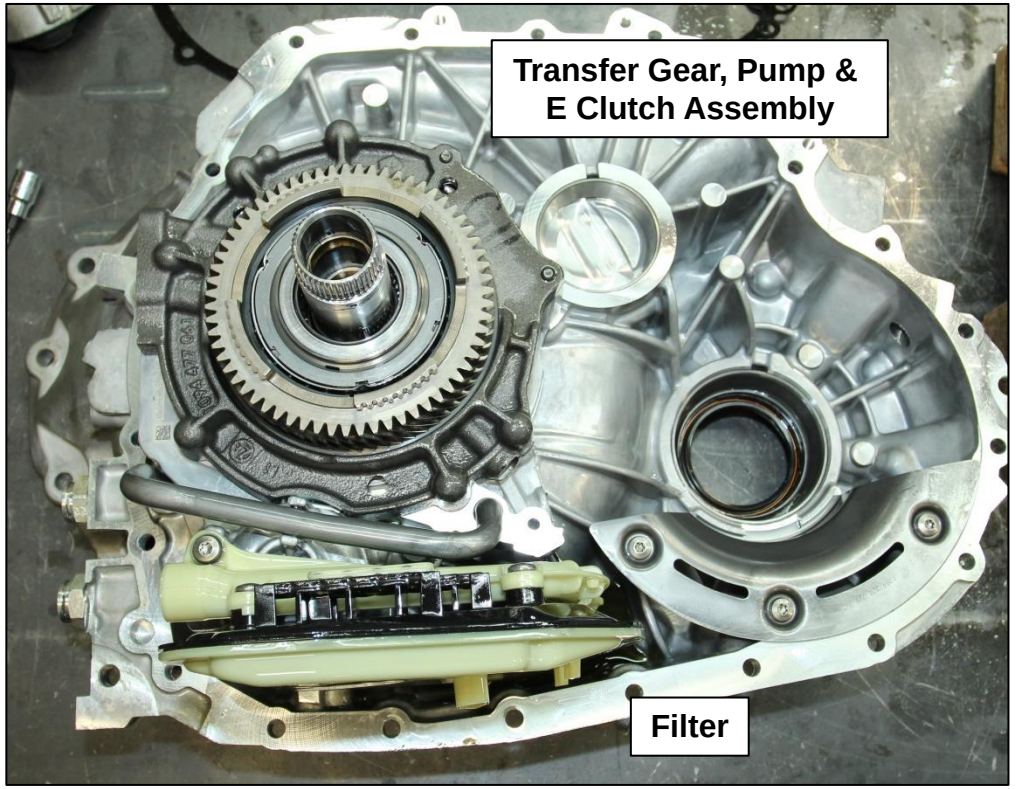






The next step we did was flip the bellhousing over and remove the retaining bolts for the transfer gear, pump and E clutch assembly.





One thing we would like to point at this moment is ISS & OSS speed sensors. The ISS sensor monitors the windows on the E clutch drum, while the OSS monitors the teeth on the output gear.

ATRA AUTOMATIC TRANSMISSION REBUILDERS ASSOCIATION

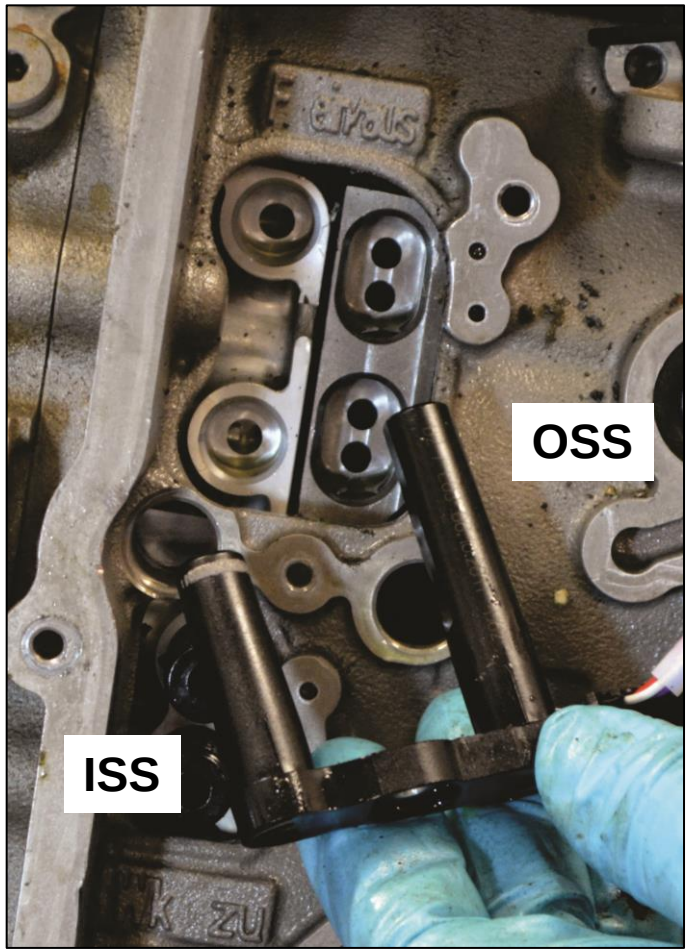
SEAL AFTERMARKET PRODUCTS

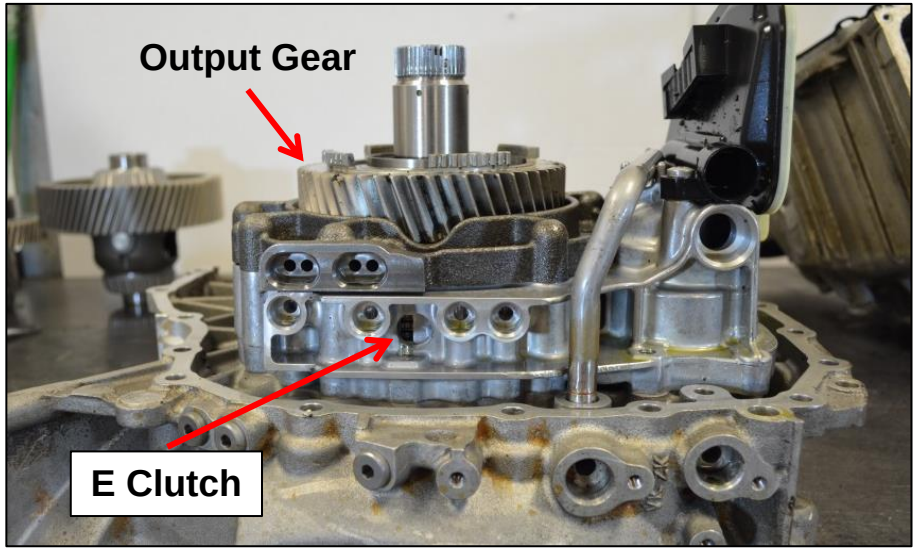
TOLEDO TRANS-KIT

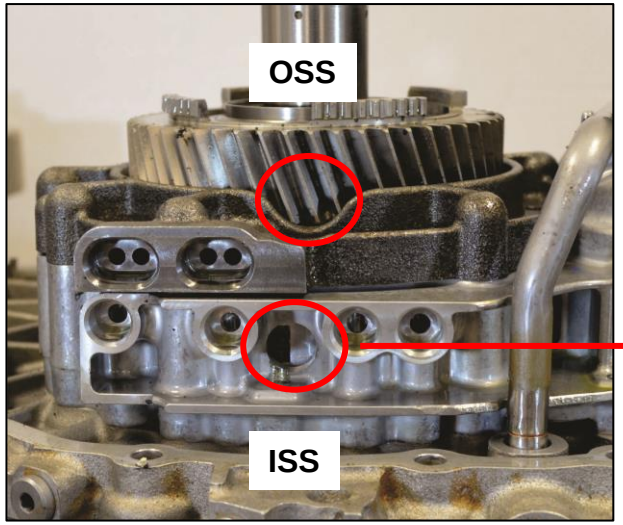
GEARS FOR THE TRANSMISSION REBUILDING INDUSTRY

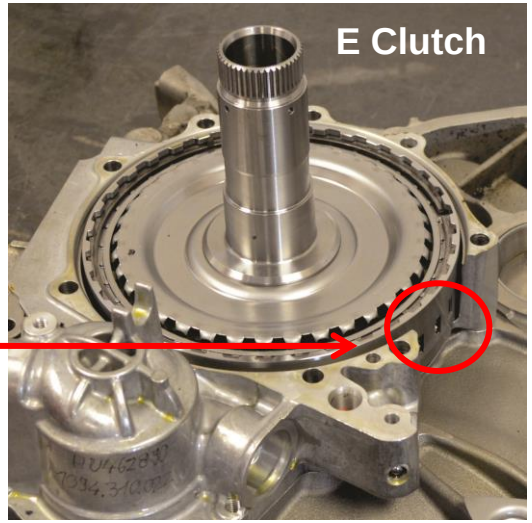
WIT WHATEVER IT TAKES TRANSMISSION PARTS, INC

Pictures from Range Rover





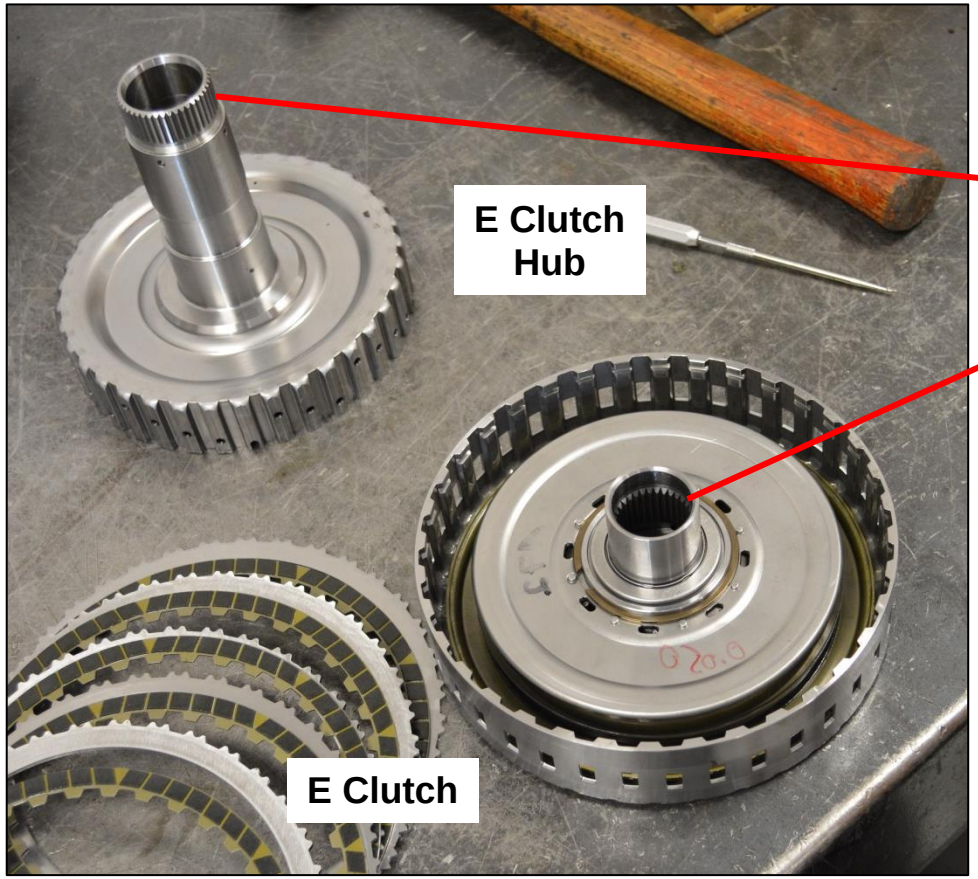


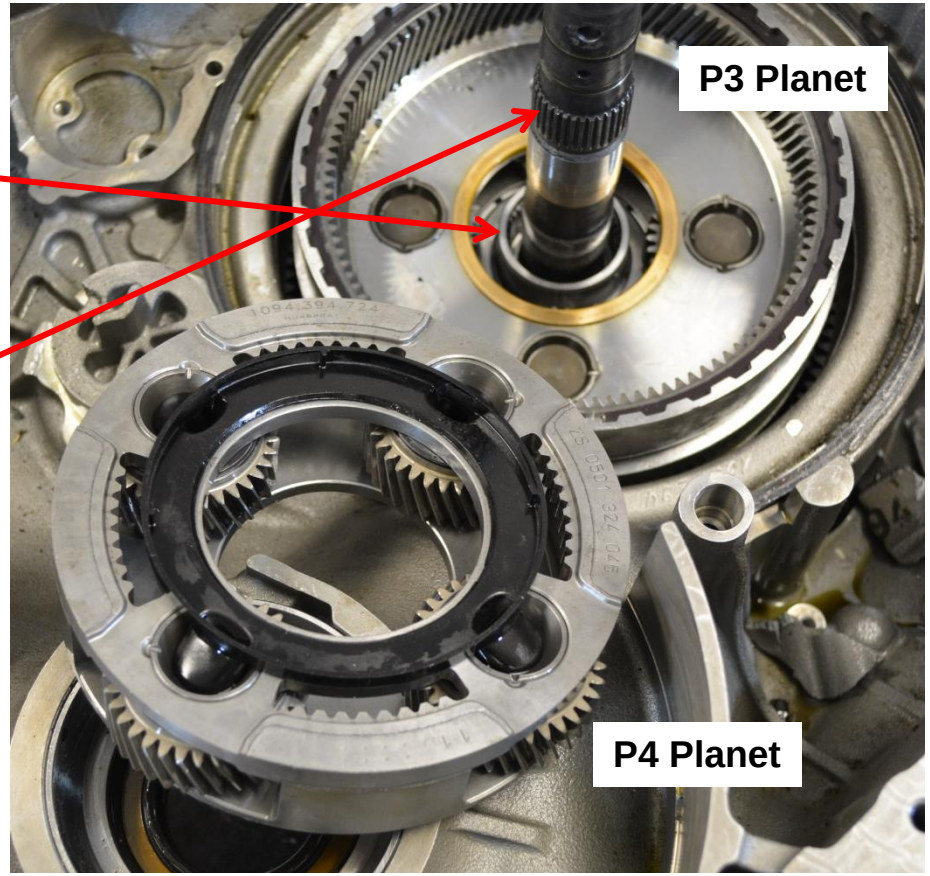


The E clutch drum is splined to the input shaft and turns with the torque converter.

When the E clutch is applied the E clutch hub drives the P3 planet.

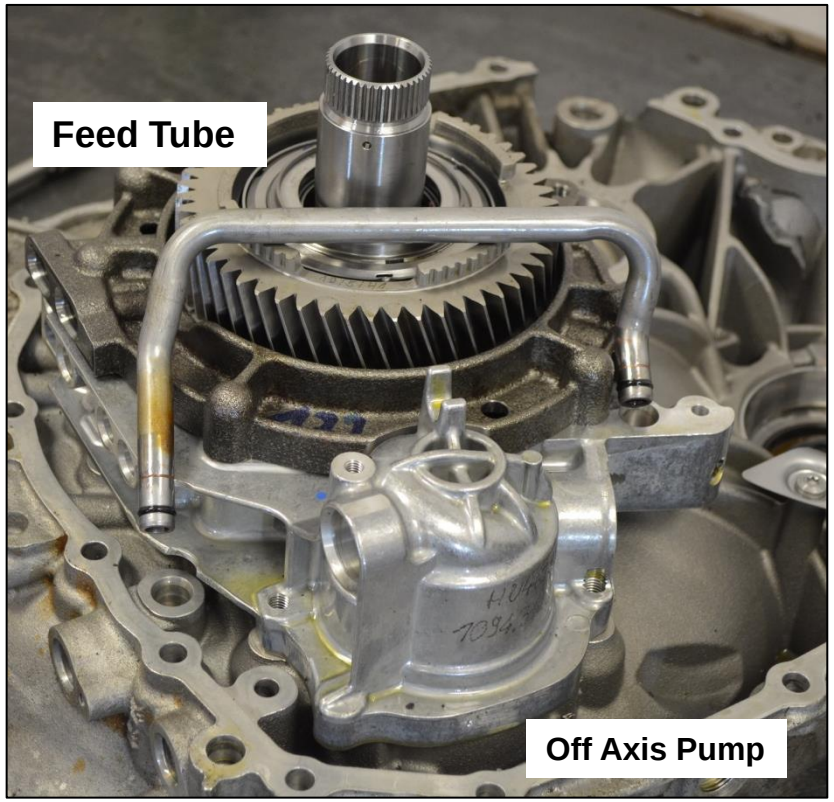
Pictures from Range Rover

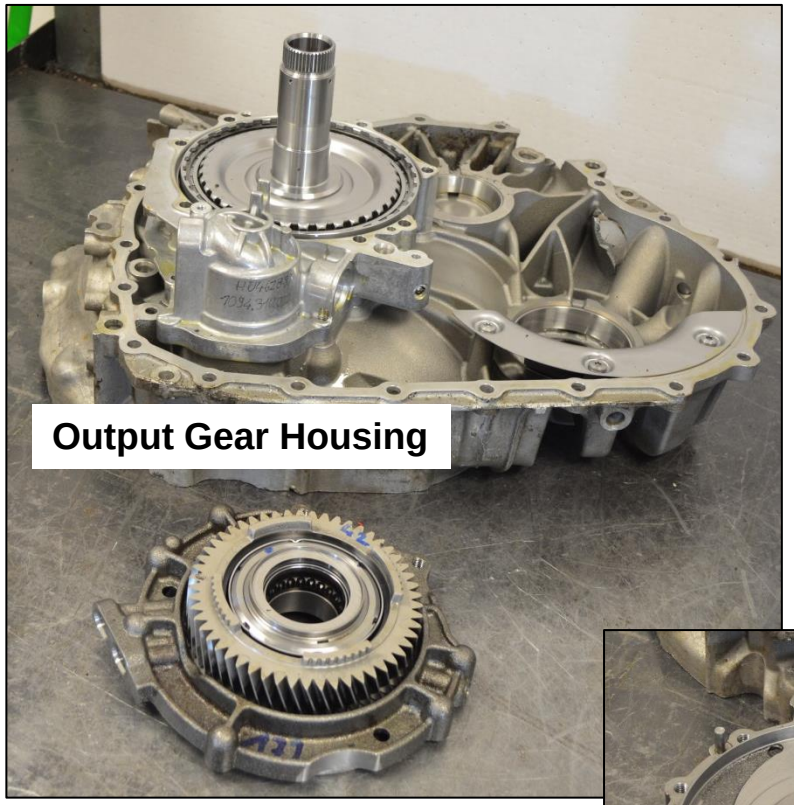




You will need to remove the feed tube first then the output gear housing.

There are two o-ring seals on each end of the feed tube.

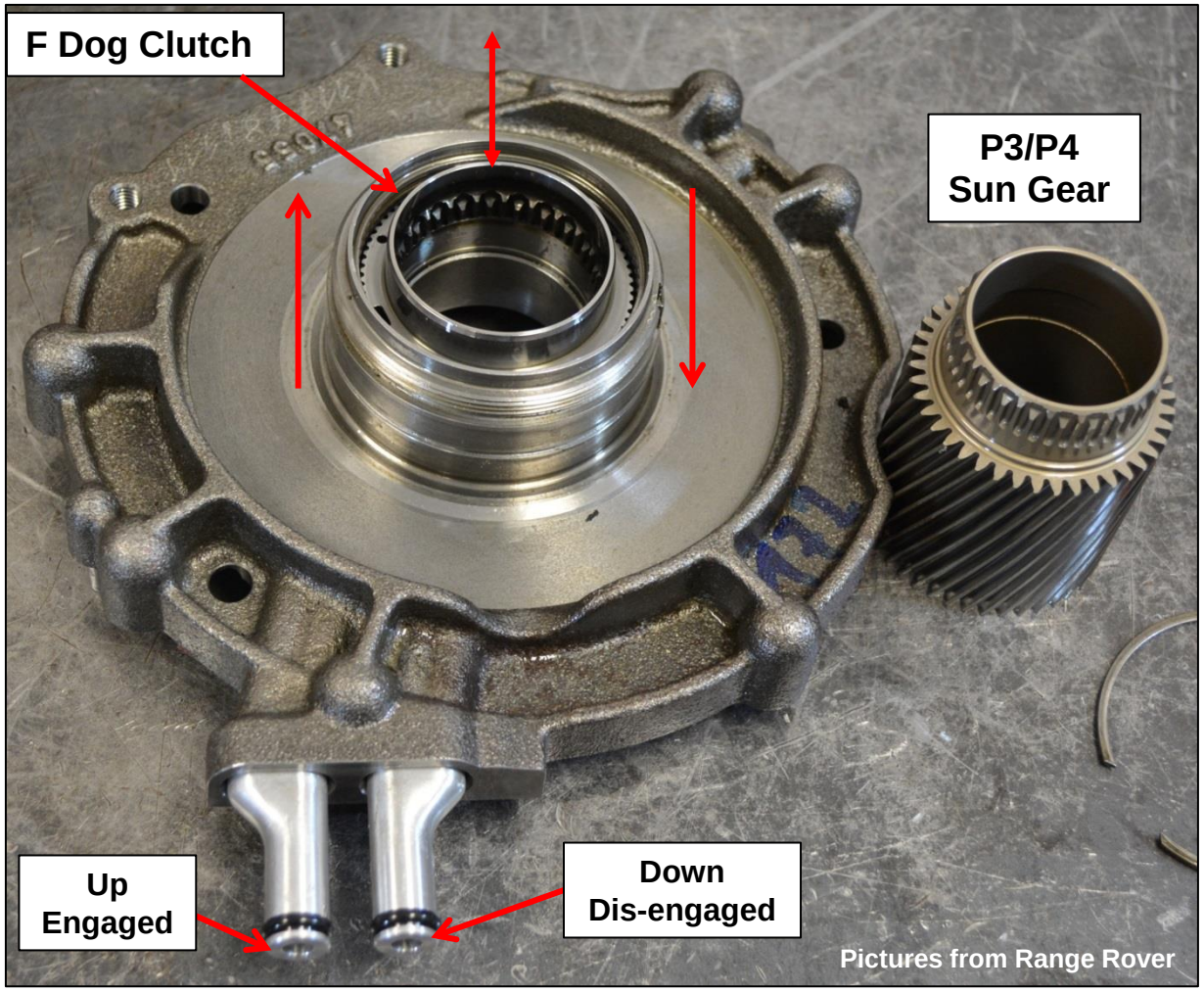


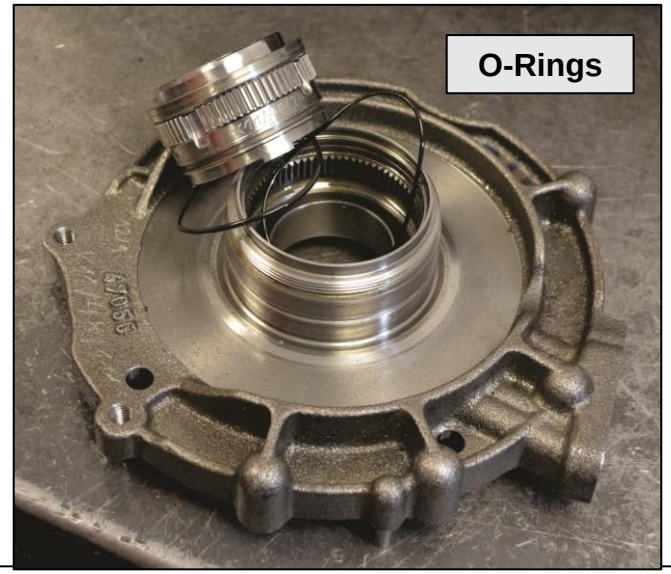


Pictures from Range Rover

Bottom Side of Output Gear Housing

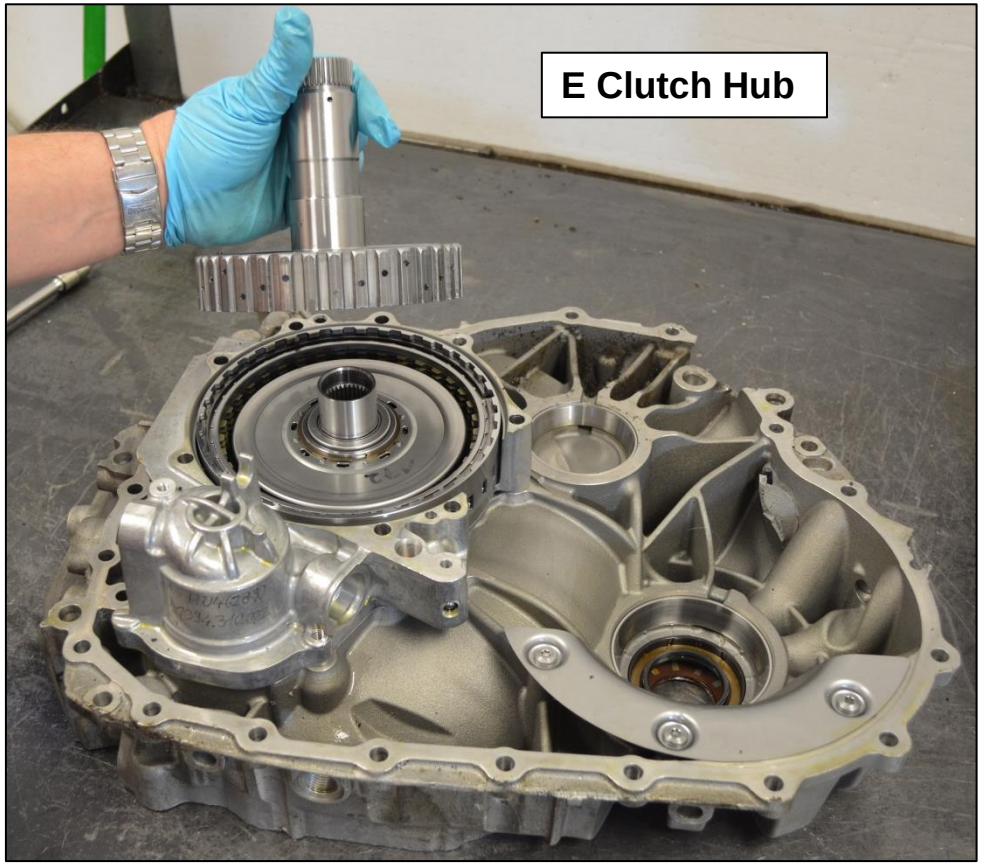
The P3/P4 sun gear is stationary, the F Dog clutch moves back and forth in the transfer gear housing.
When compressed air is blown into the port on the left it will engage the F Dog clutch, when blown into the right side dis-engages the F Dog clutch.

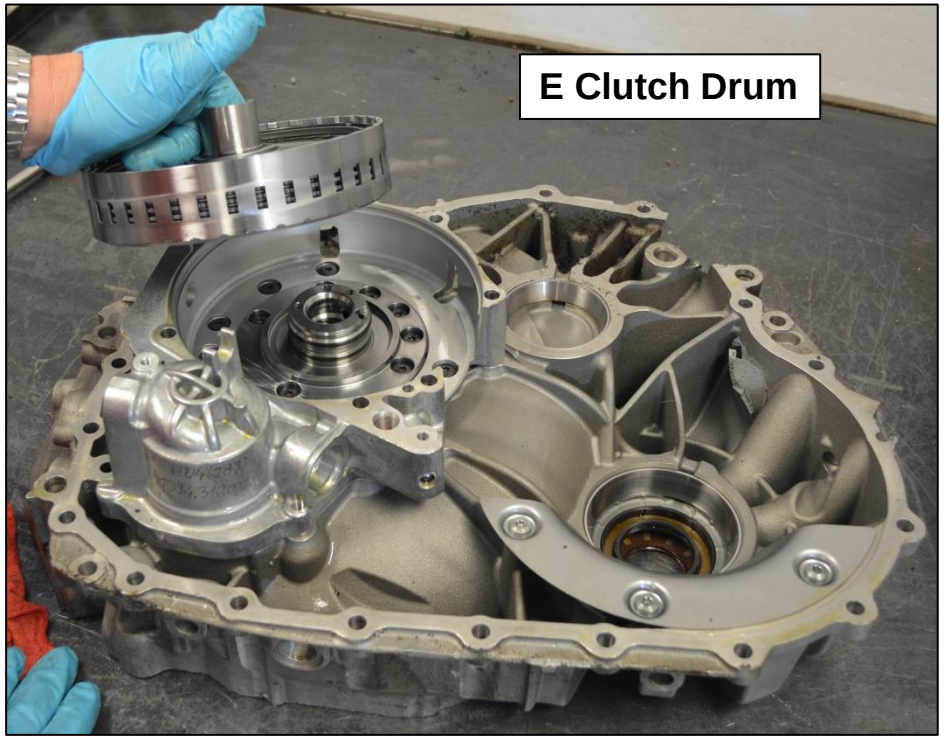




Then remove the E clutch hub and E clutch assembly

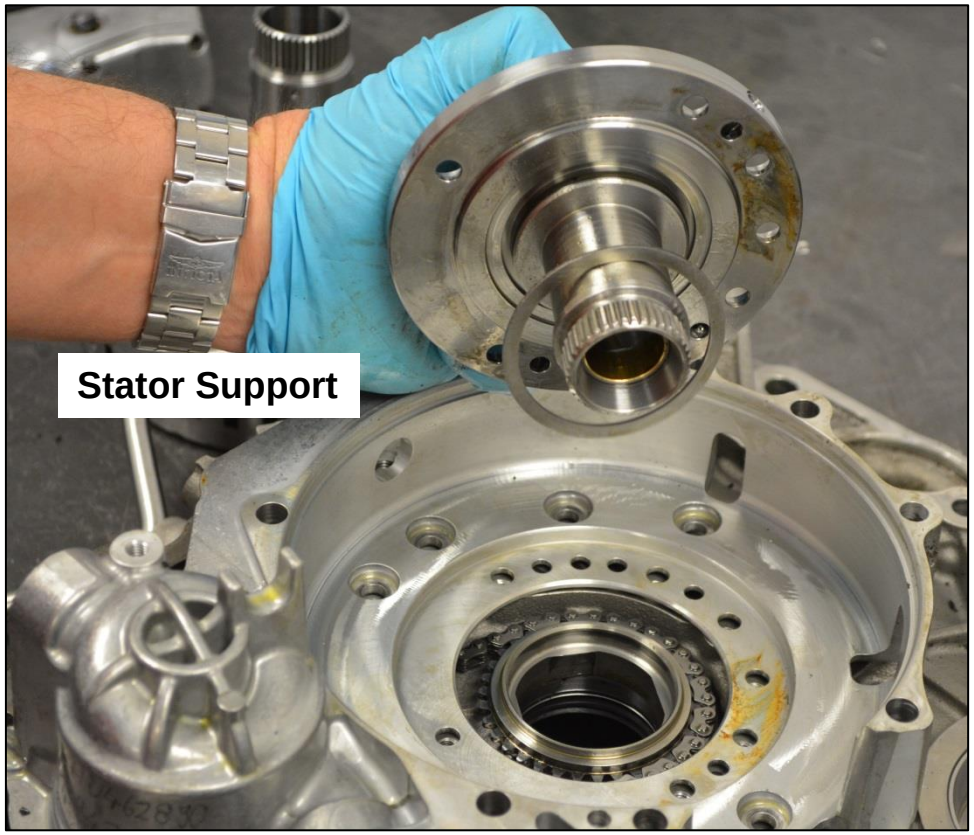
Pictures from Range Rover

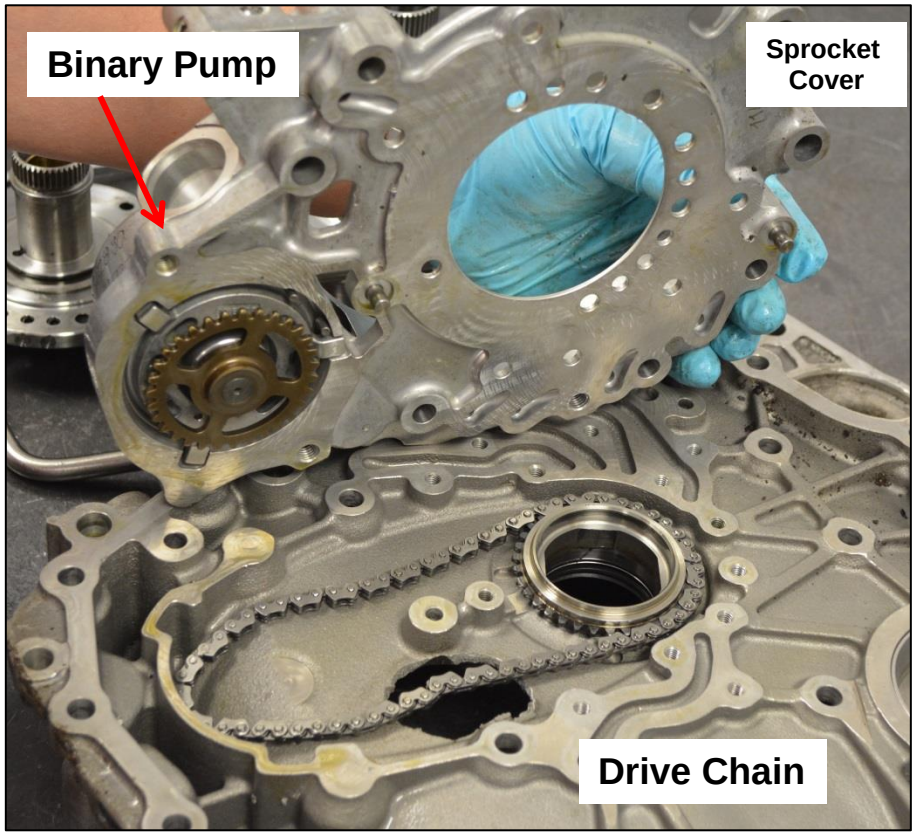




After removing the bolts from the stator support. Lift the support and the chain driven off axis binary pump and sprocket/chain cover from the bellhousing.

Pictures from Range Rover





Squeeze the to ends of the retainer ring inward and gently pry up on the three tabs.

Take care not to break the tabs while prying up on the pump while sliding the pump out evenly.

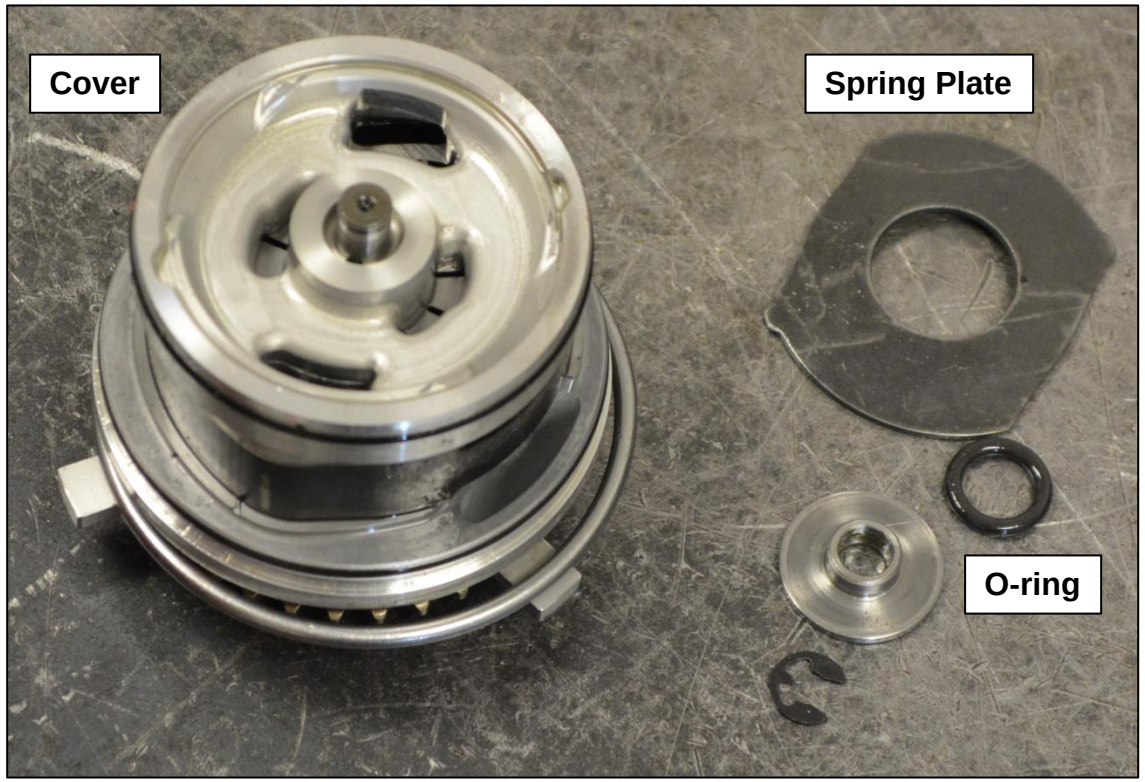
It's sounds much easier than it is to do.

Pictures from Range Rover

The off axis pump assembly is basically the same type found on the ZF8HP series transmission (not interchangeable).

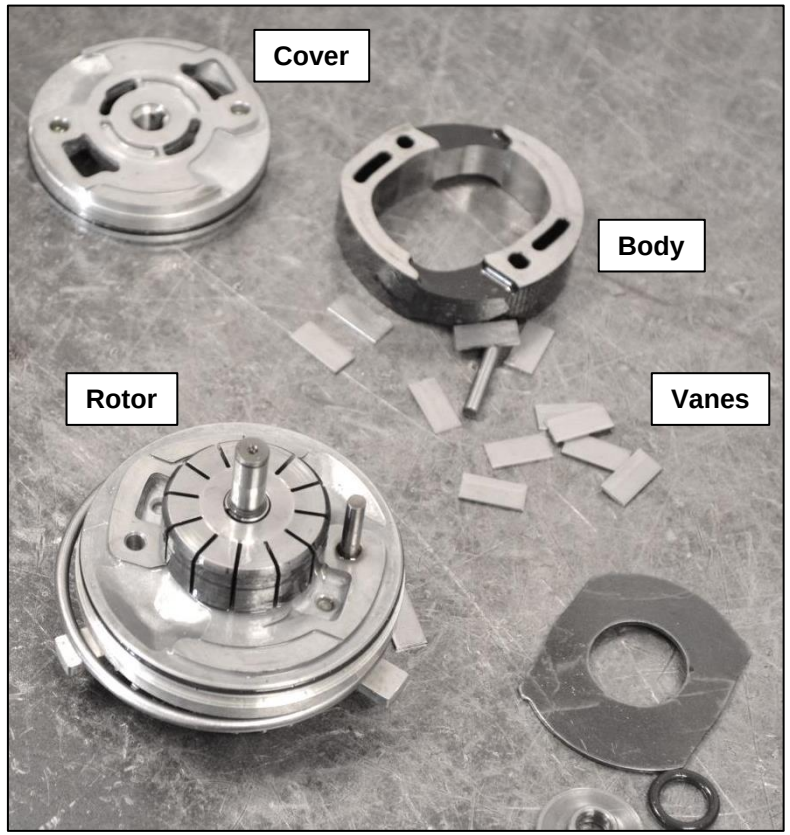
Push down on the spring plate and remove the E clip shown here to begin disassembly. The spring plate has an alignment tab.

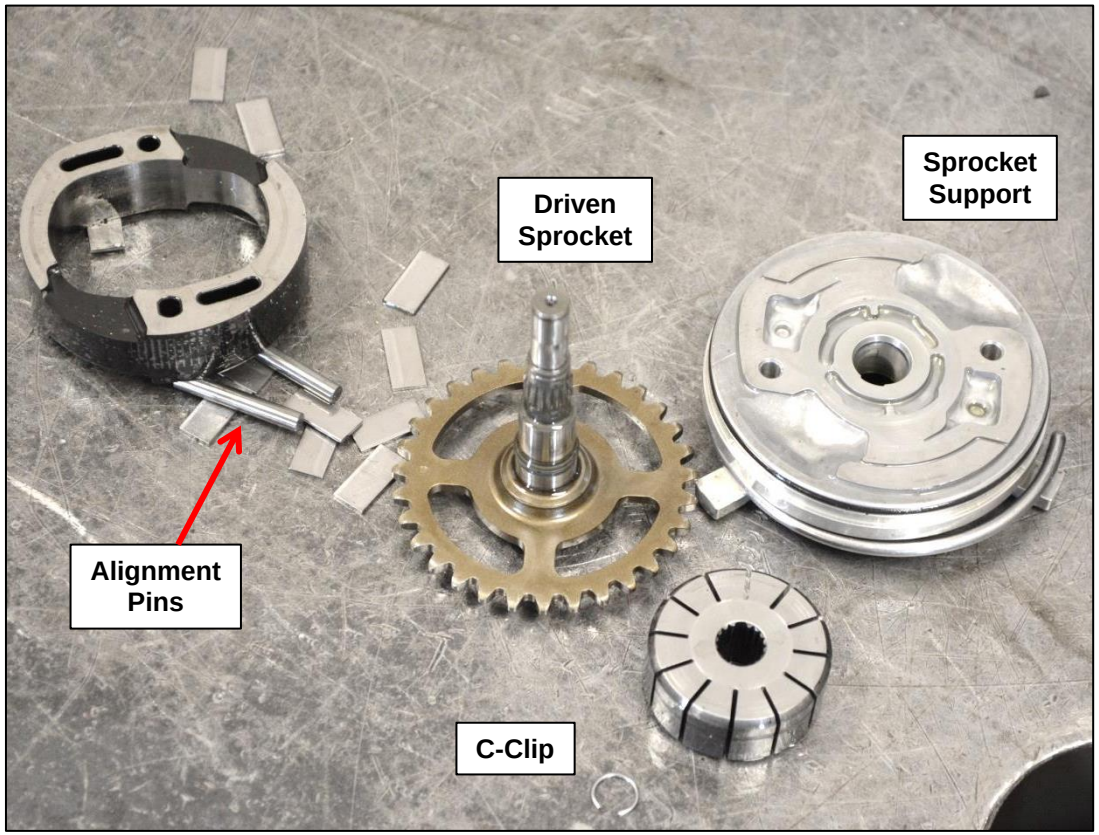
Pictures from Range Rover



Remove the cover, and body to expose the rotor and vanes along with the two alignment pins. One C clip holds the rotor to the driven sprocket.

Pictures from Range Rover





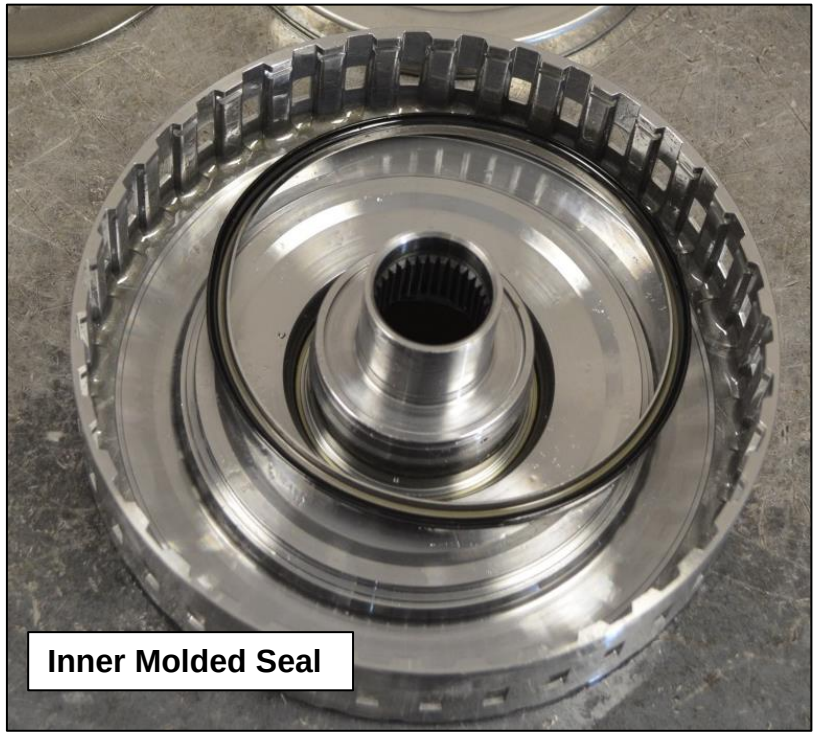
This is the E clutch drum dis-assembled. There is a molded piston in this assembly as well as the E drum found in the Renegade.

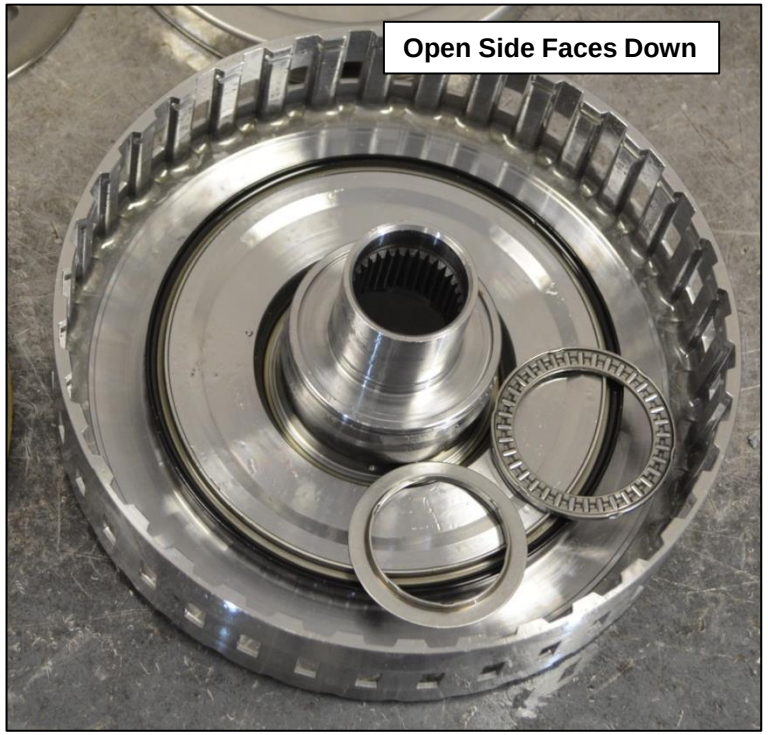
Pictures from Range Rover

There is another inner molded seal in this assembly and in the Renegade. We were extremely careful removing the inner seal so it would not get damaged.

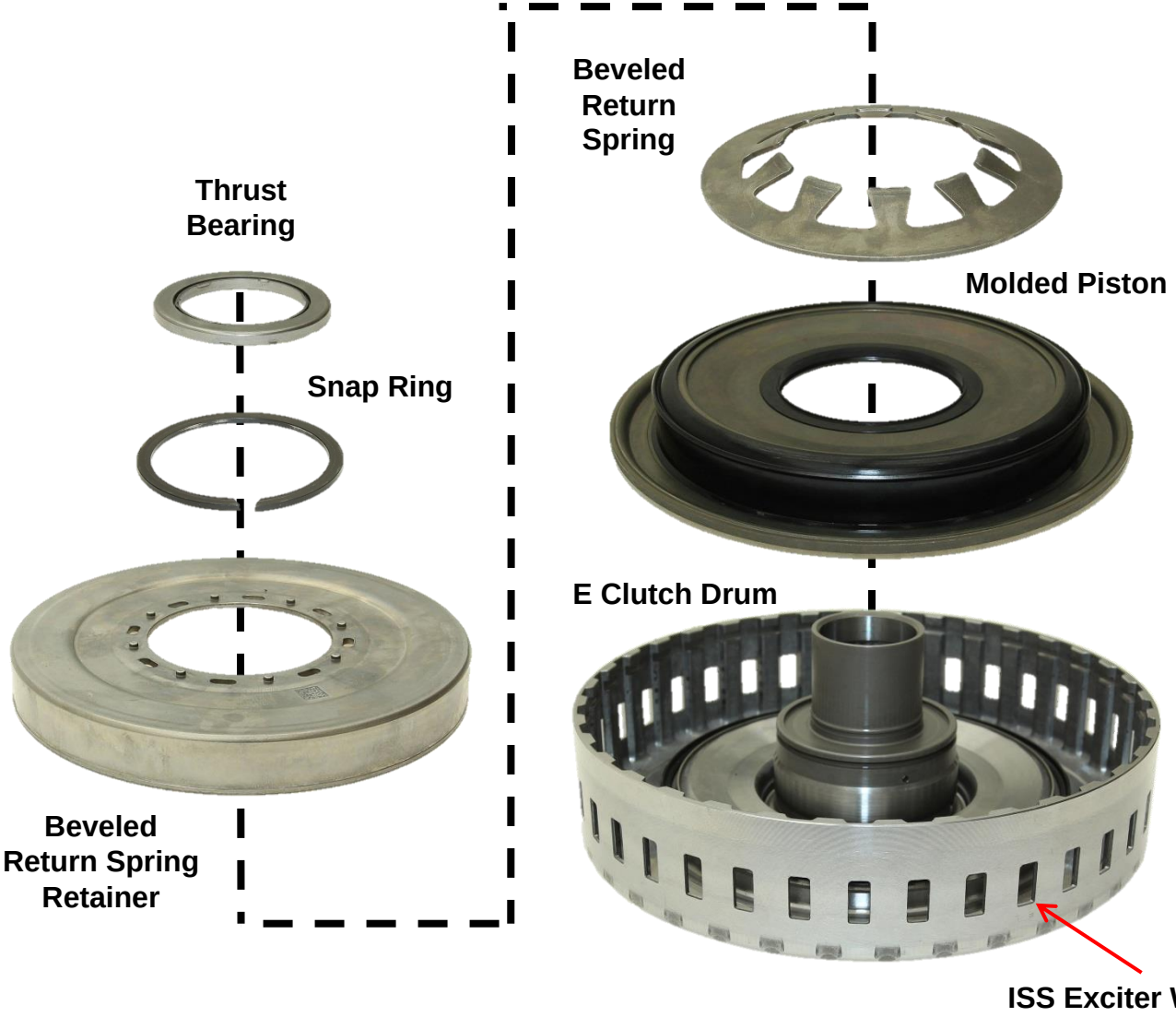
The open side of the thrust bearing faces down onto the race (see previous slide), then placed into the drum.

Pictures from Range Rover



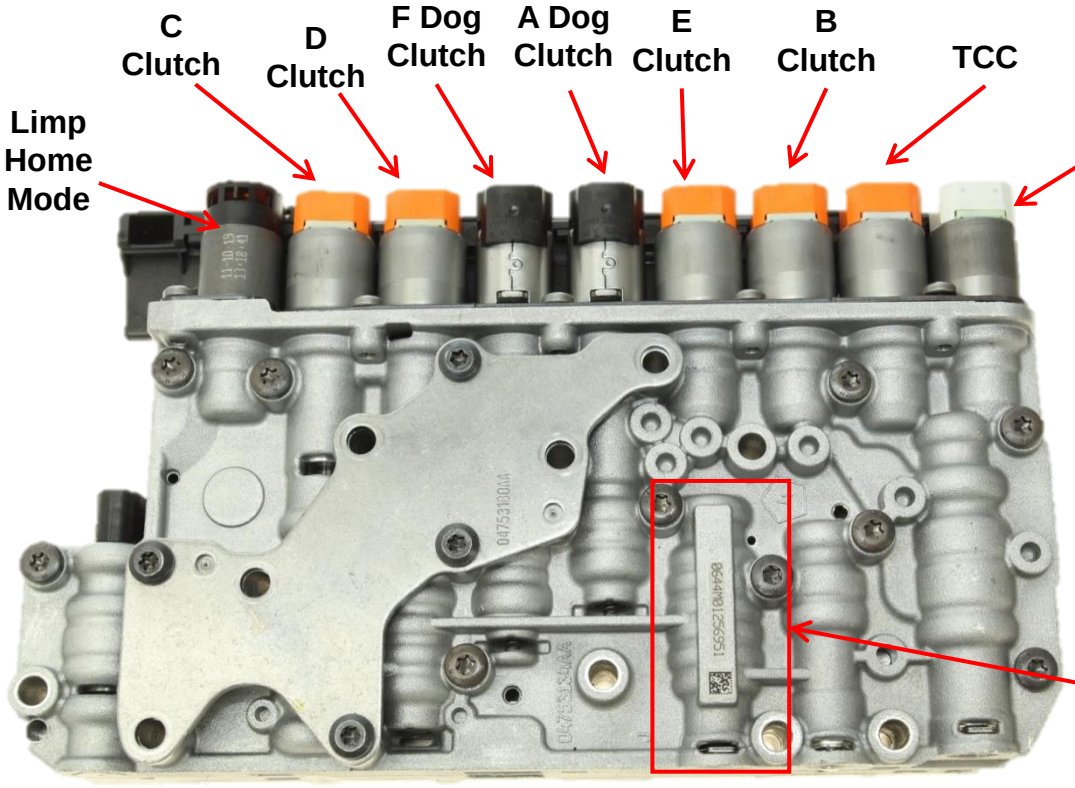


E clutch assembly layout. The clearance on our proto type was 0.050”.



E Clutch Drum Assembly

Jeep Renegade manual shift valve body (9 solenoids).

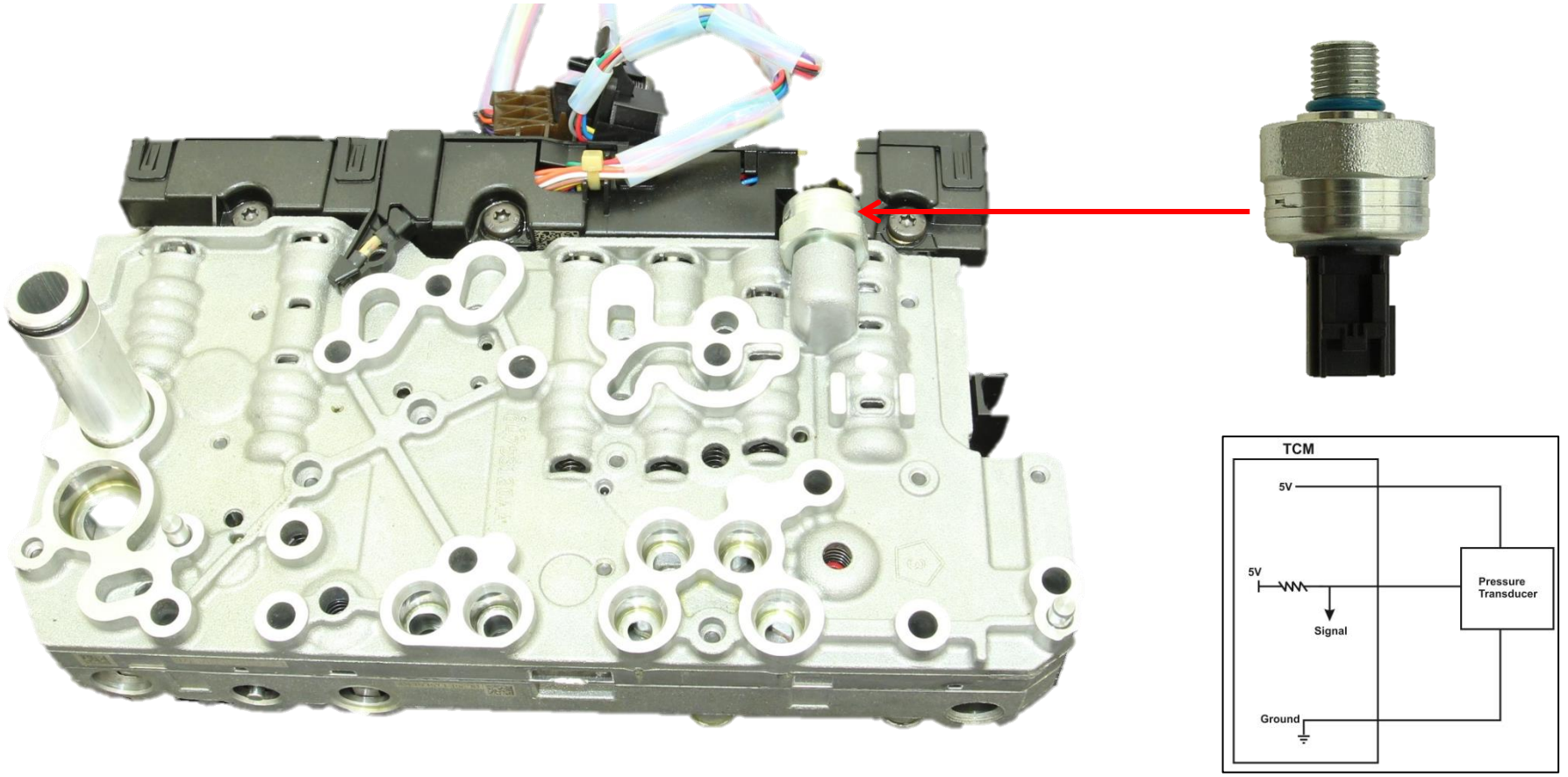


Valve Body Identification

Jeep Renegade pressure transducer is mounted to the valve body and is used by the TCM to monitor release pressure of both dog clutches.

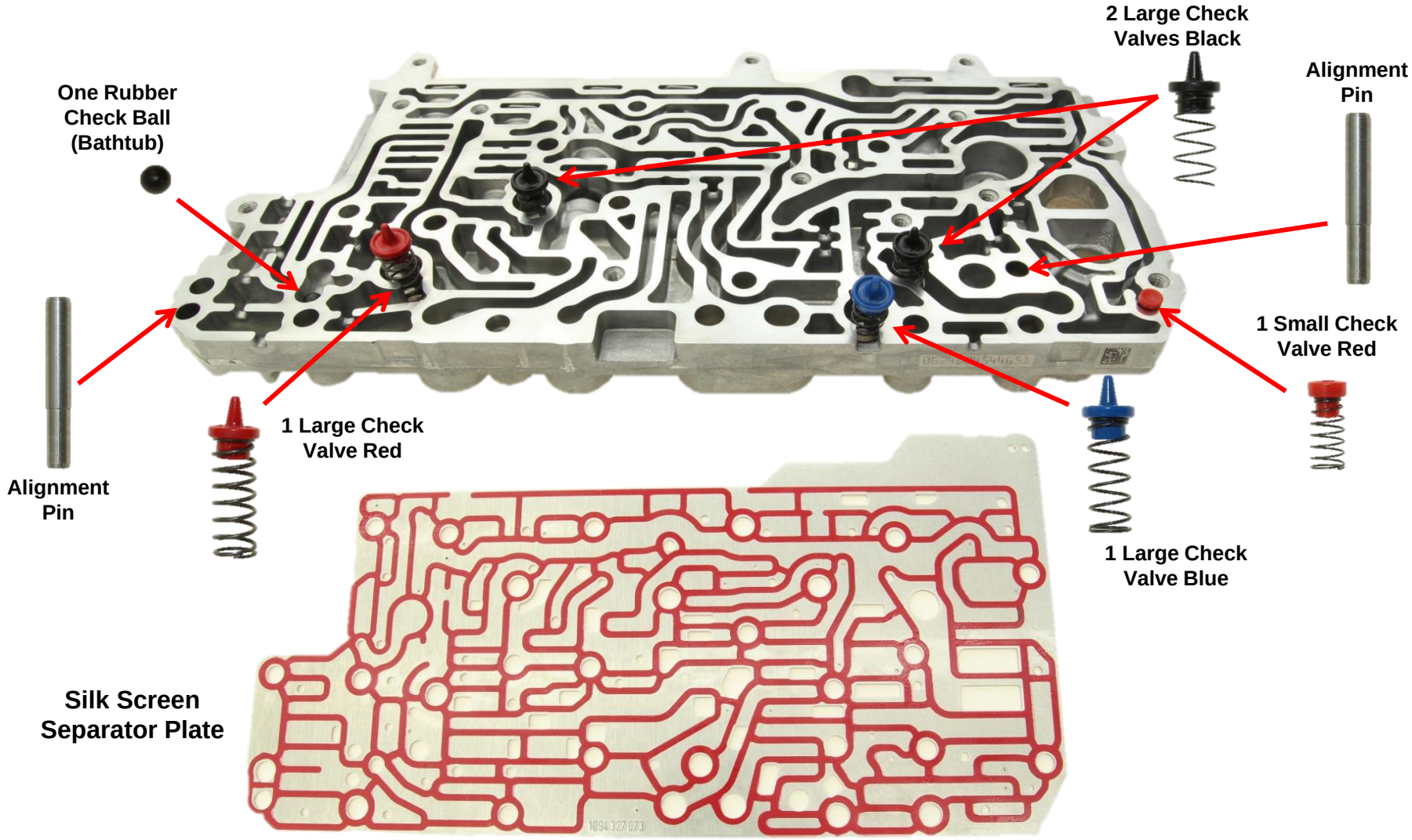
When one of the dog clutches releases, there is a momentary increase in the dog clutch exhaust circuit pressure.

The transducer signal pattern is monitored by the TCM for control and diagnostics.

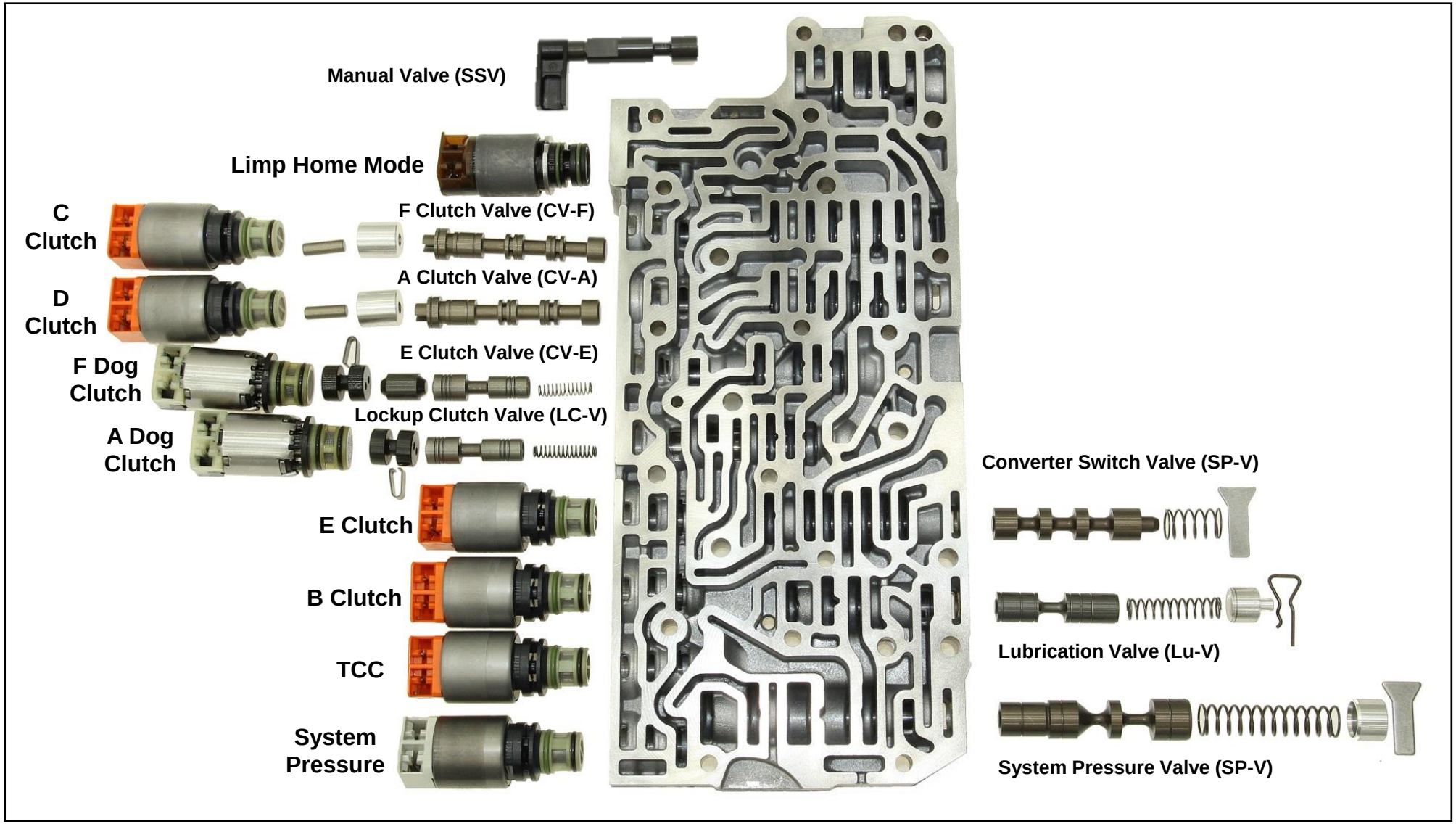


Jeep Renegade manual shift valve body small parts locations.

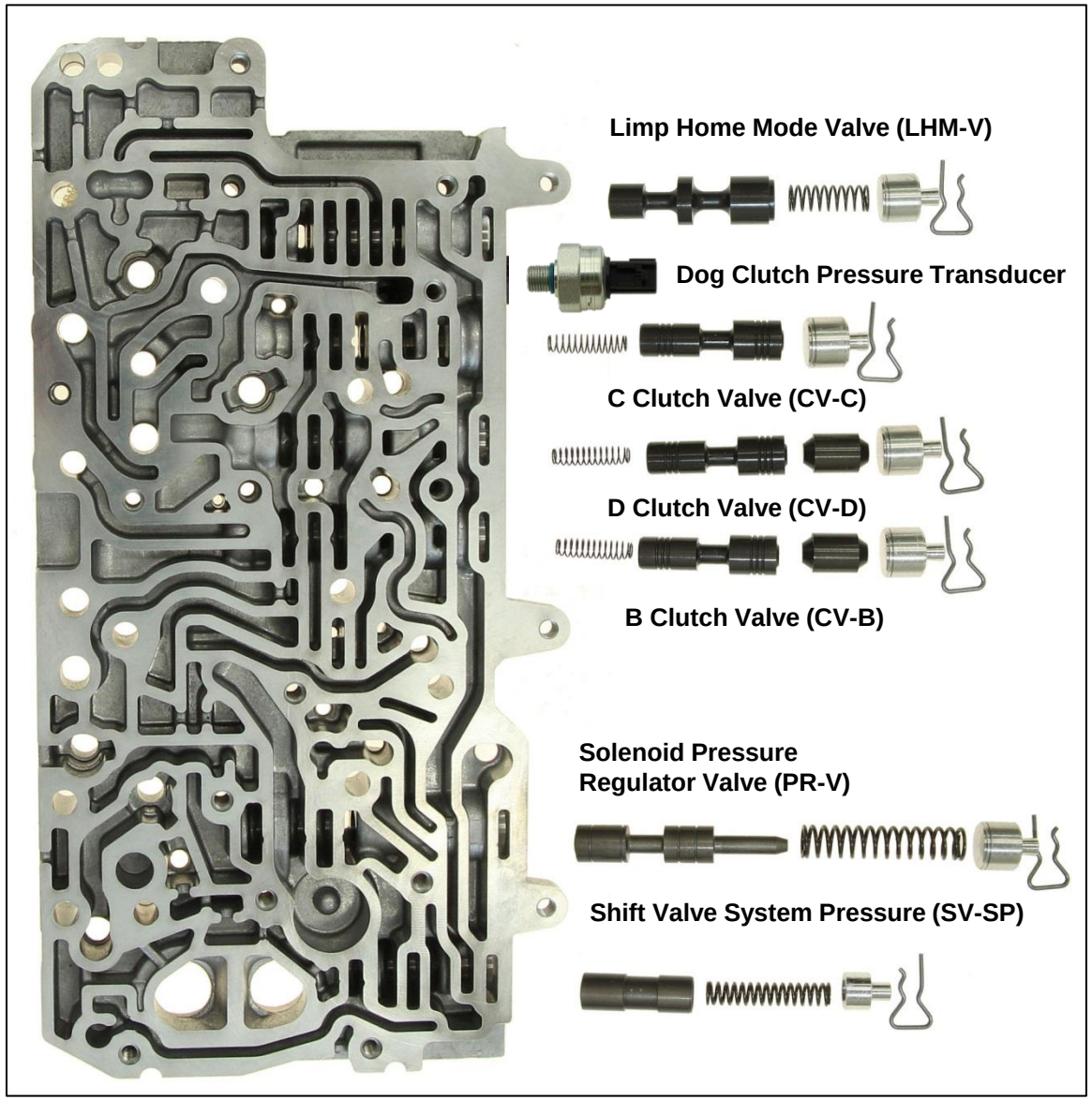
One rubber check ball located in the bathtub, one large check valve (red), two large check valves (black), one large check vale (blue) and one small check valve (red).



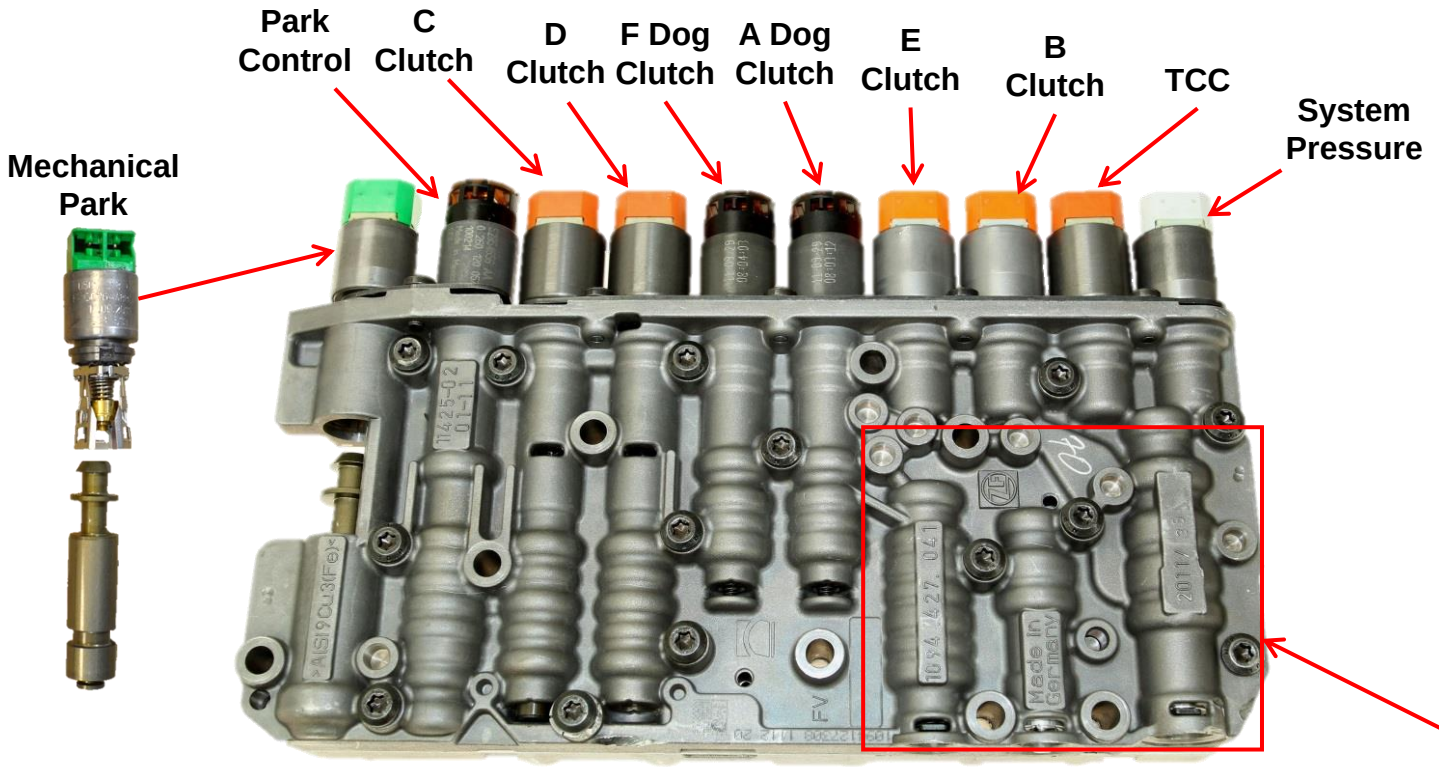
Jeep Renegade manual shift lower valve body exploded view.



Jeep Renegade manual shift upper valve body exploded view.



Range Rover “E” shift valve body.

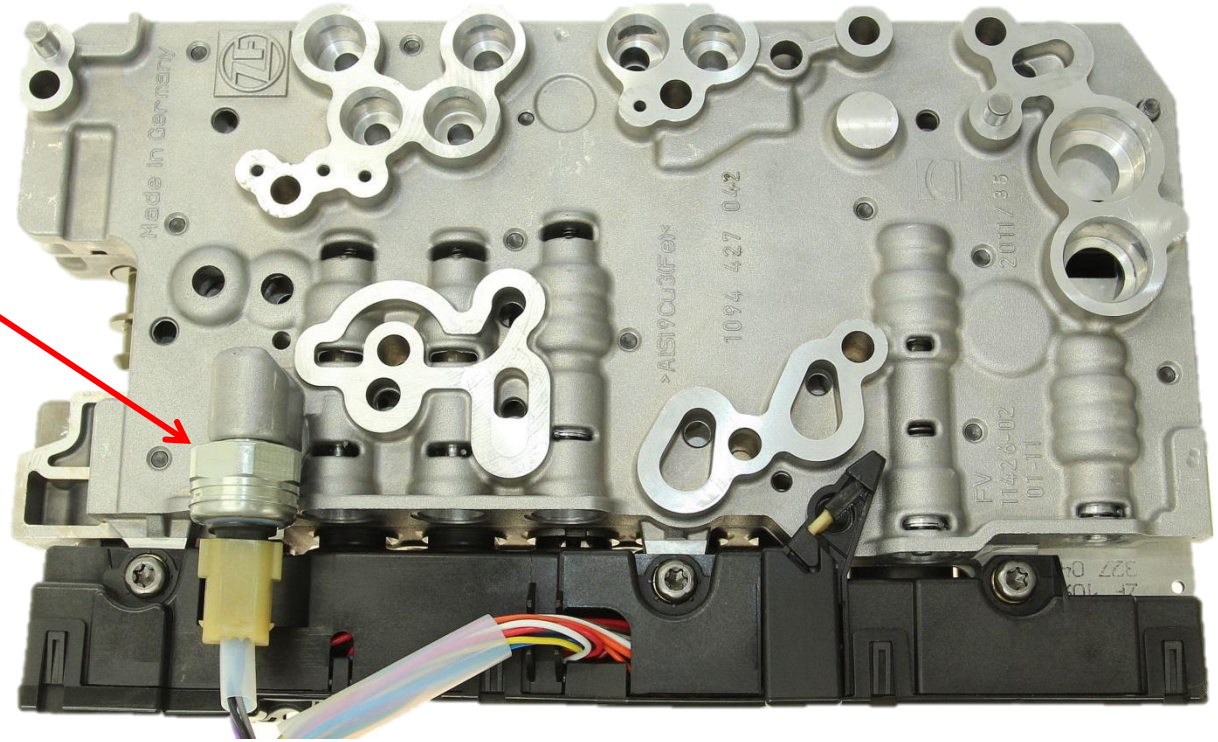


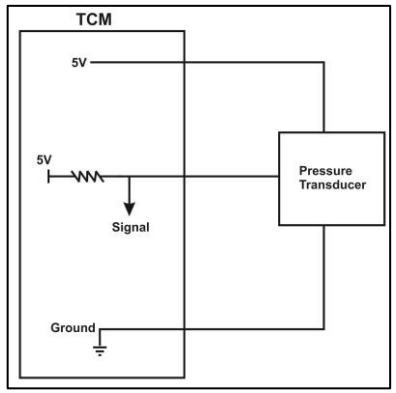
Valve Body Identification

Range Rover pressure transducer is mounted to the valve body and is used by the TCM to monitor release pressure of both dog clutches.

When one of the dog clutches releases, there is a momentary increase in the dog clutch exhaust circuit pressure.

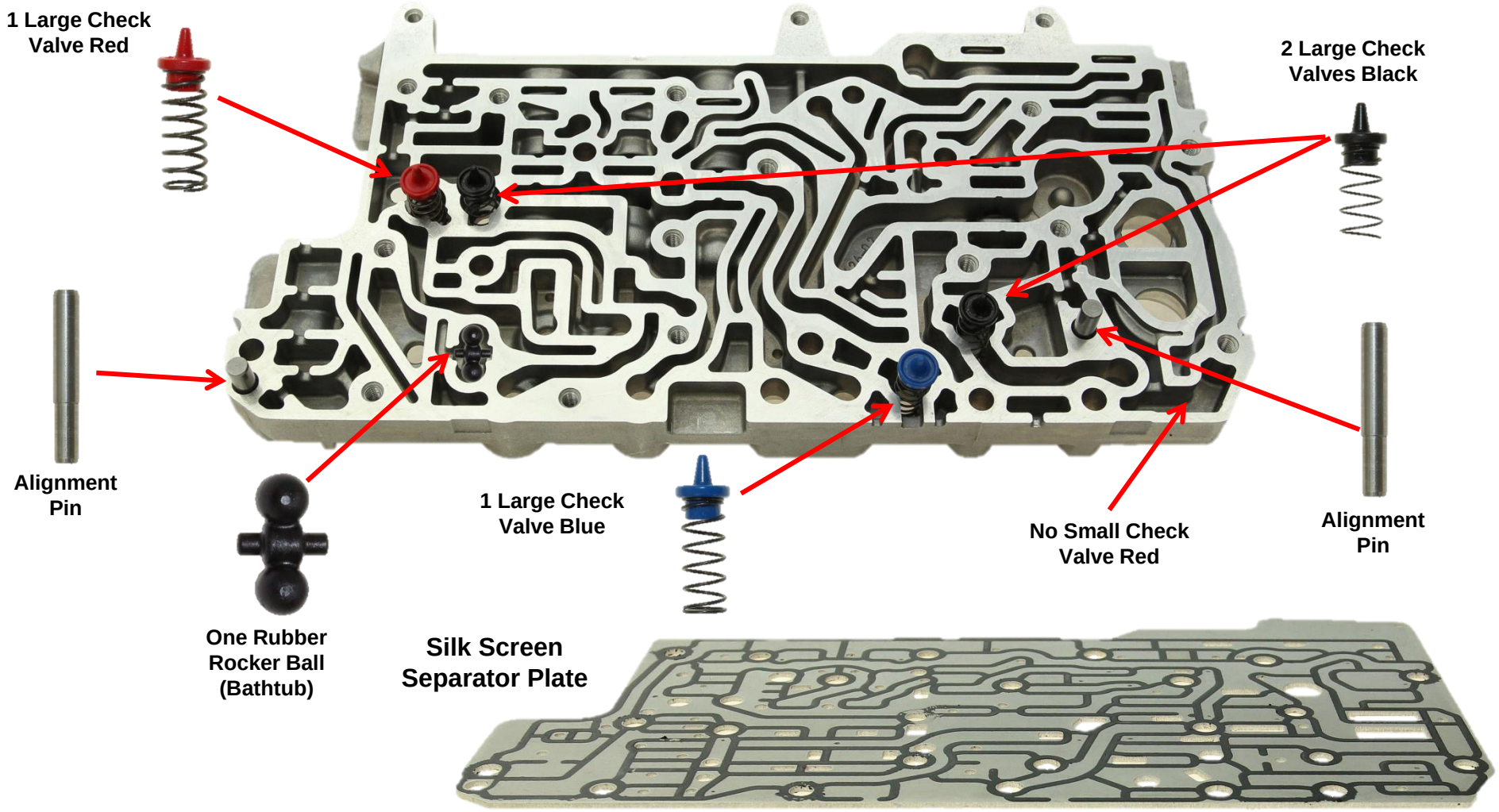
The transducer signal pattern is monitored by the TCM for control and diagnostics.



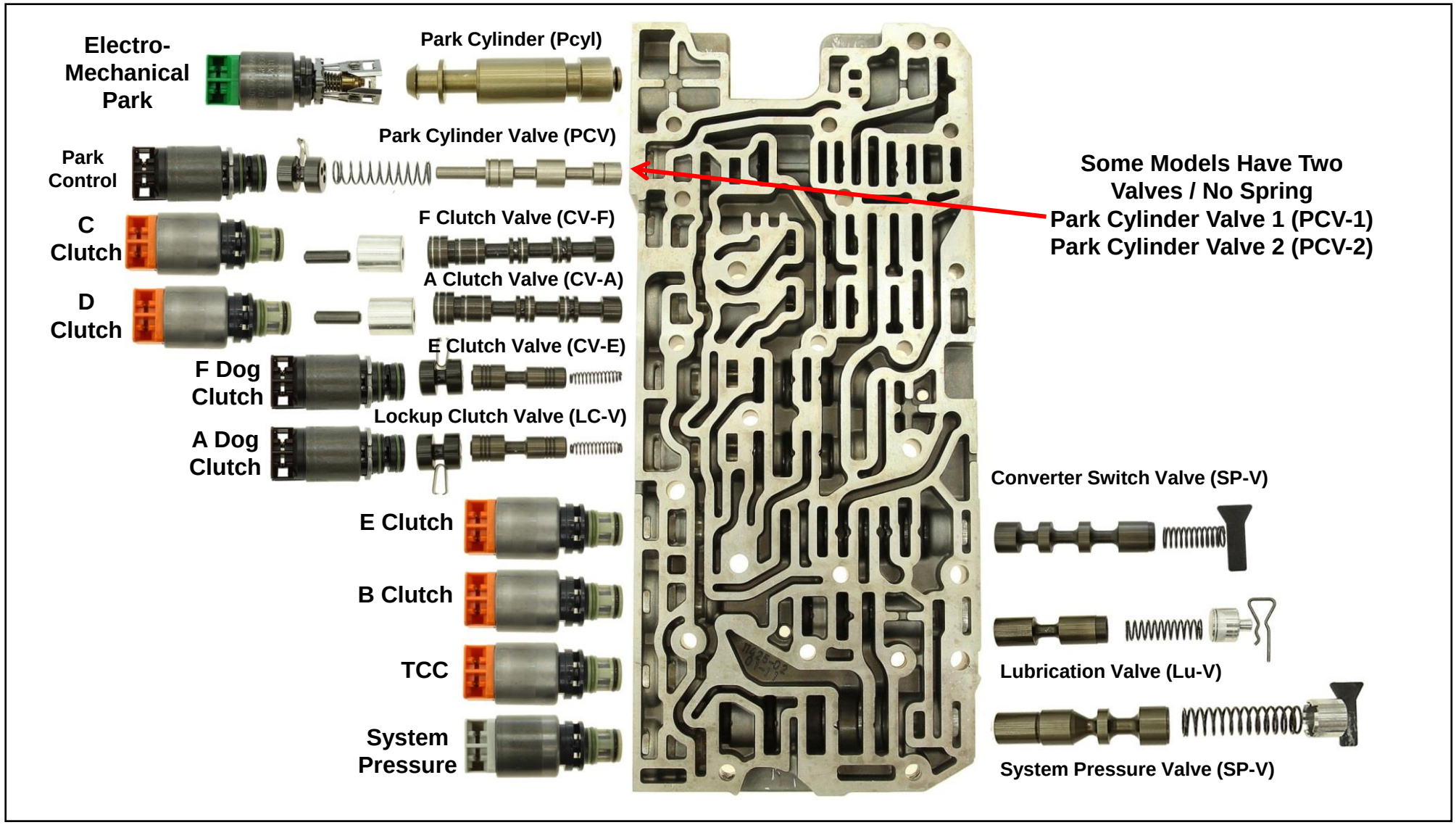


Range Rover “E” shift valve body small parts locations.

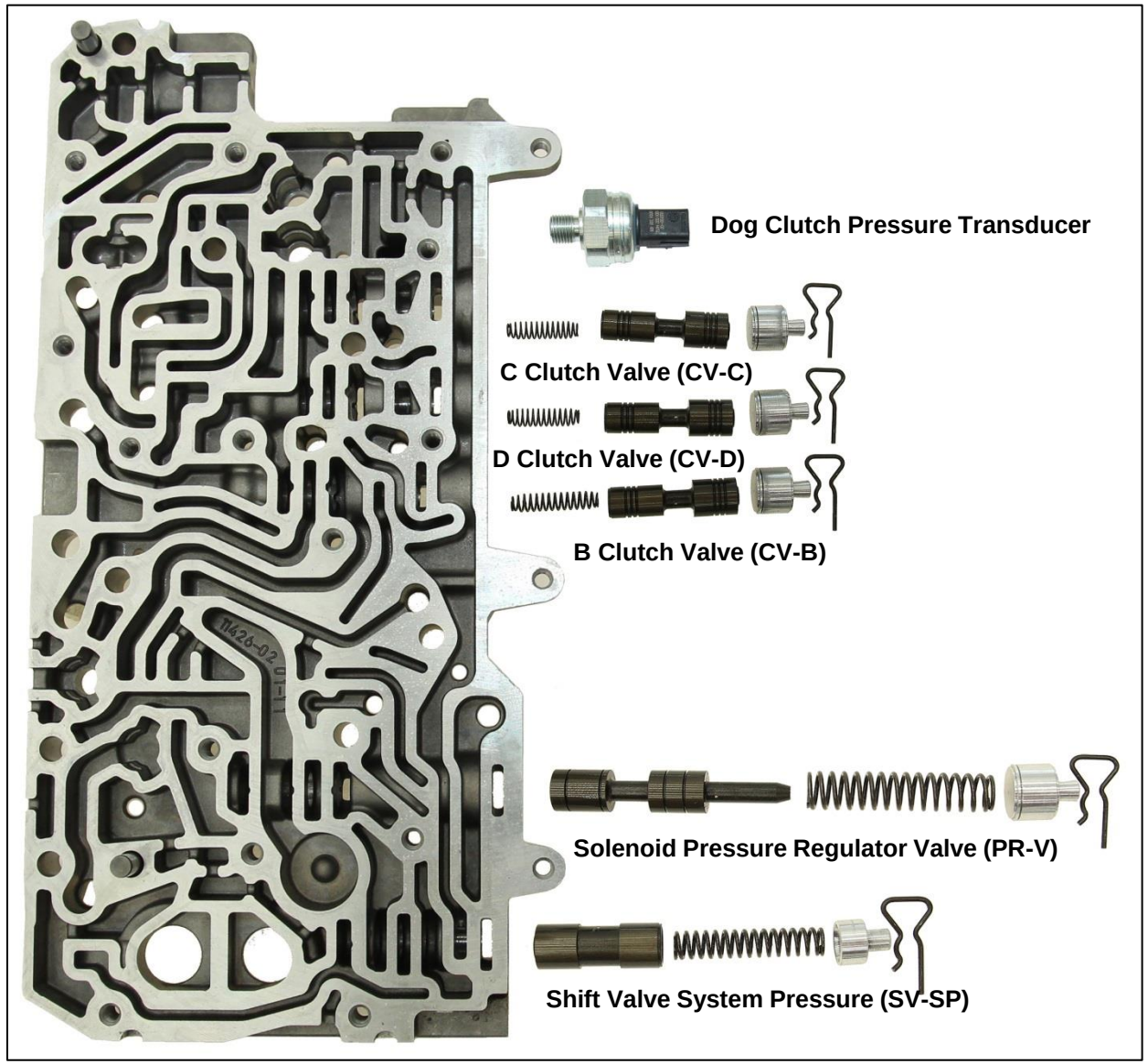
One rubber rocker ball located in the bathtub, one large check valve (red), two large check valves (black), one large check vale (blue) and no small check valve (red).



Range Rover “E” shift lower valve body exploded view.

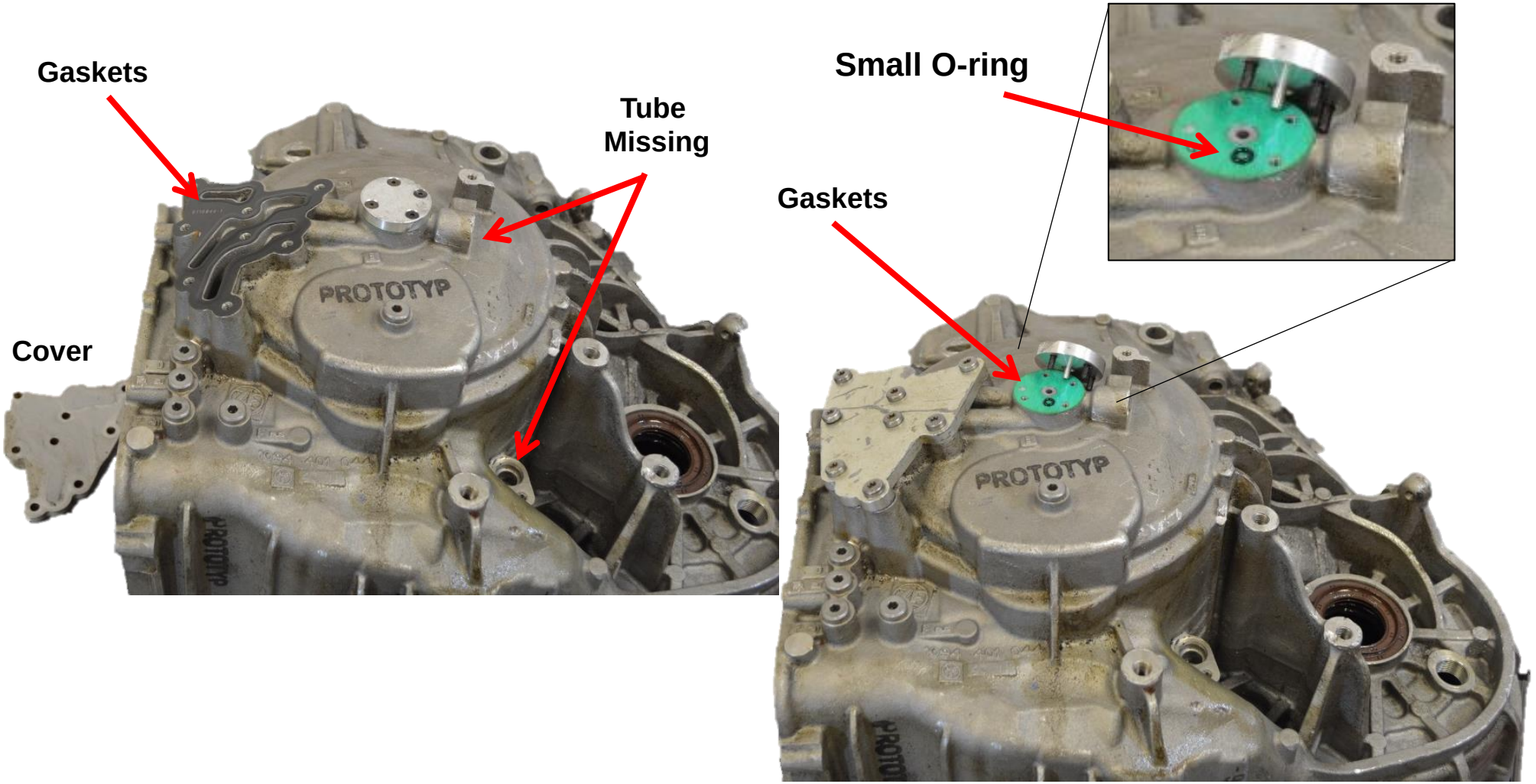


Range Rover “E” shift upper valve body exploded view.

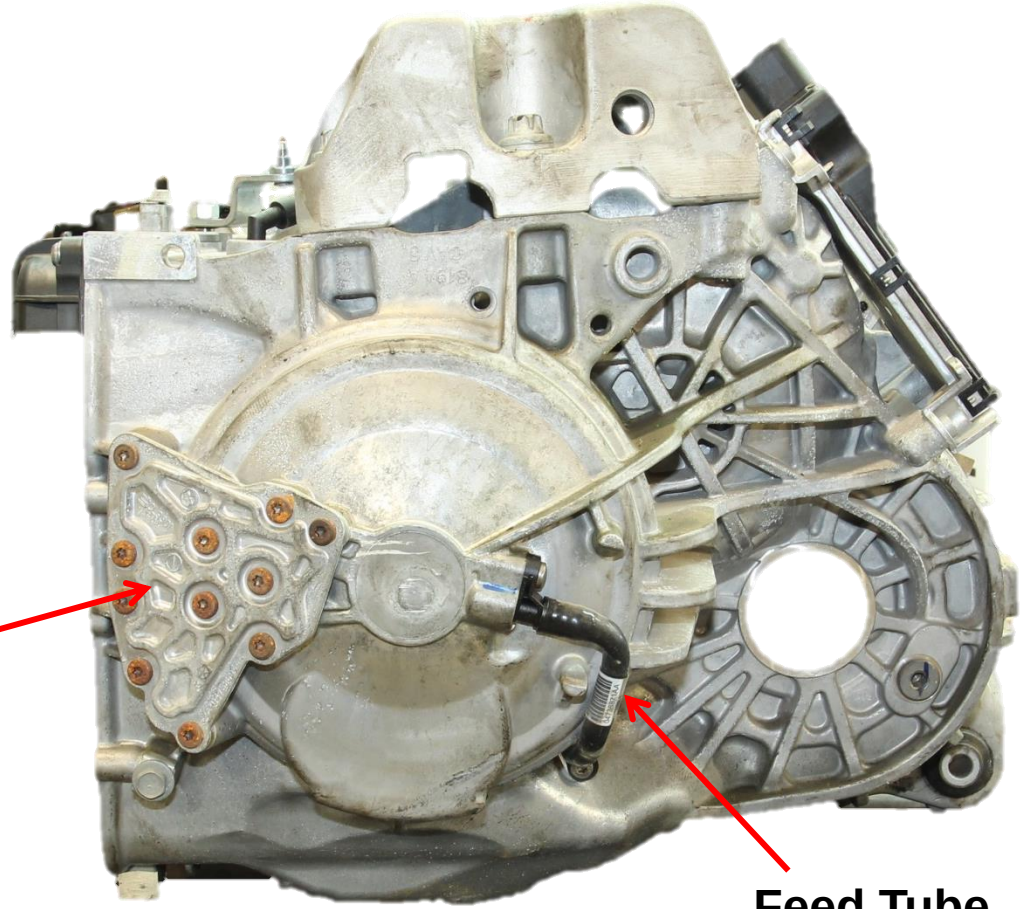


There isn't much on the back of the Range Rover unit except for two small covers and a couple of gaskets and one small o-ring. As you can see this unit was a proto-type.

The tube was missing on this unit.

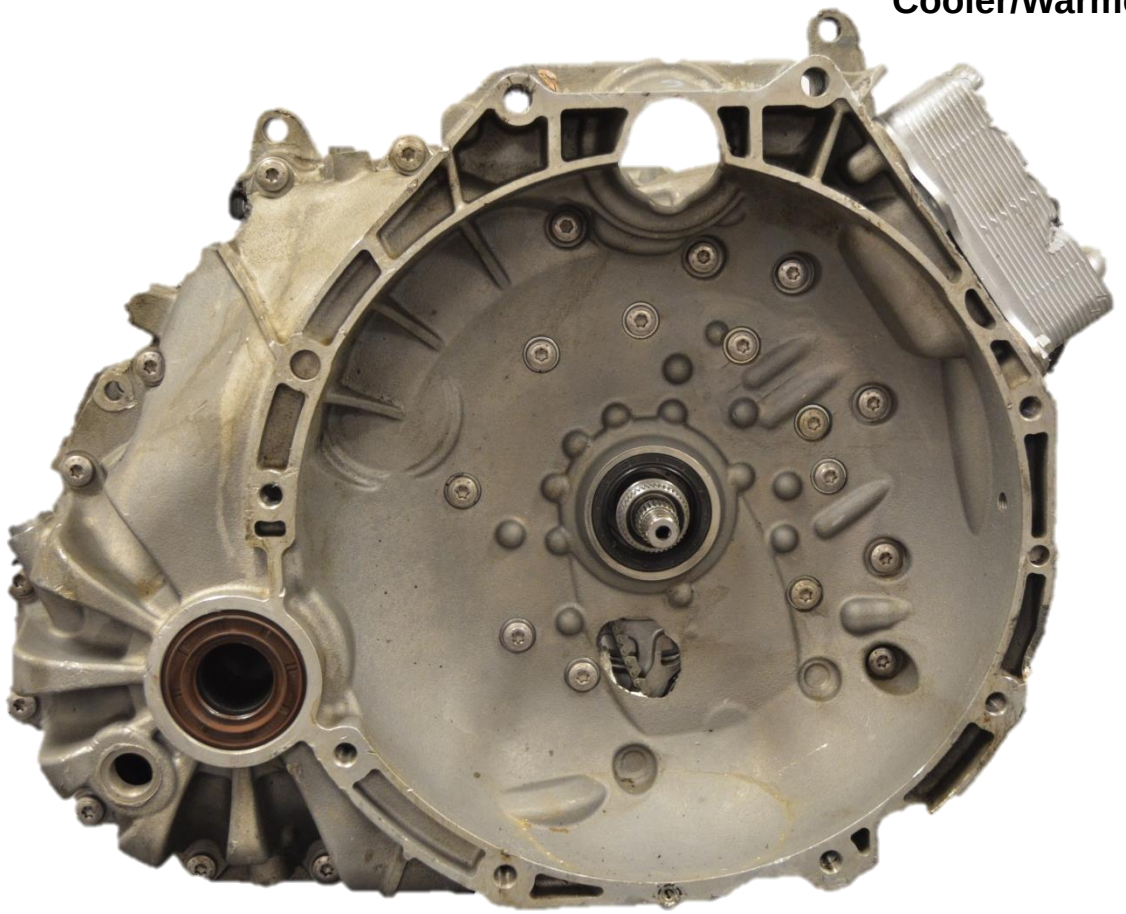


On the back of the Renegade unit there is only one large cover and a feed tube.



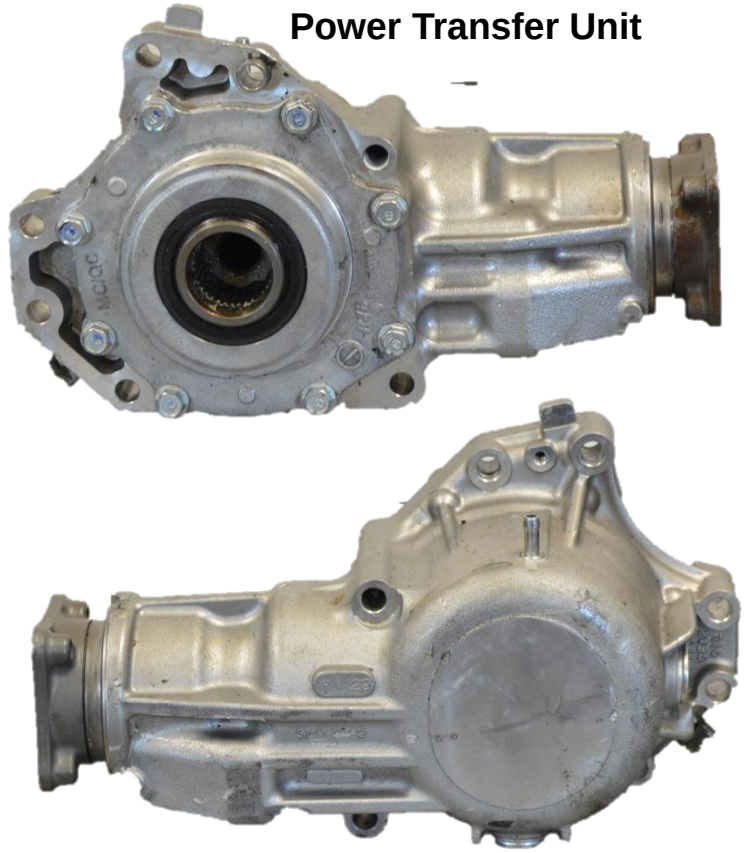
Some models may have a cooler/warmer attached to the case and/or an all wheel drive power transfer unit.

Cooler/Warmer

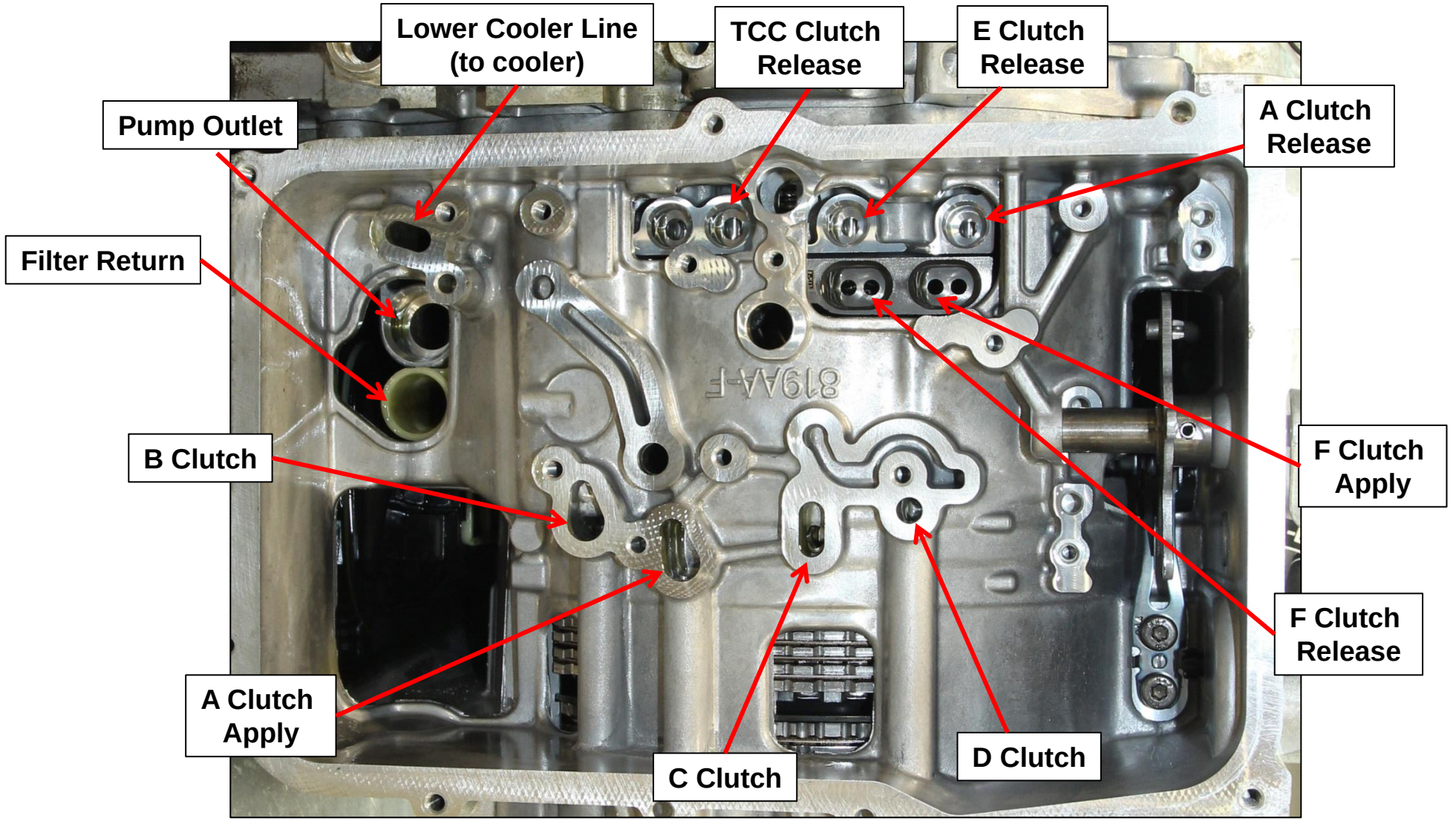


2WD Model shown here

Power Transfer Unit

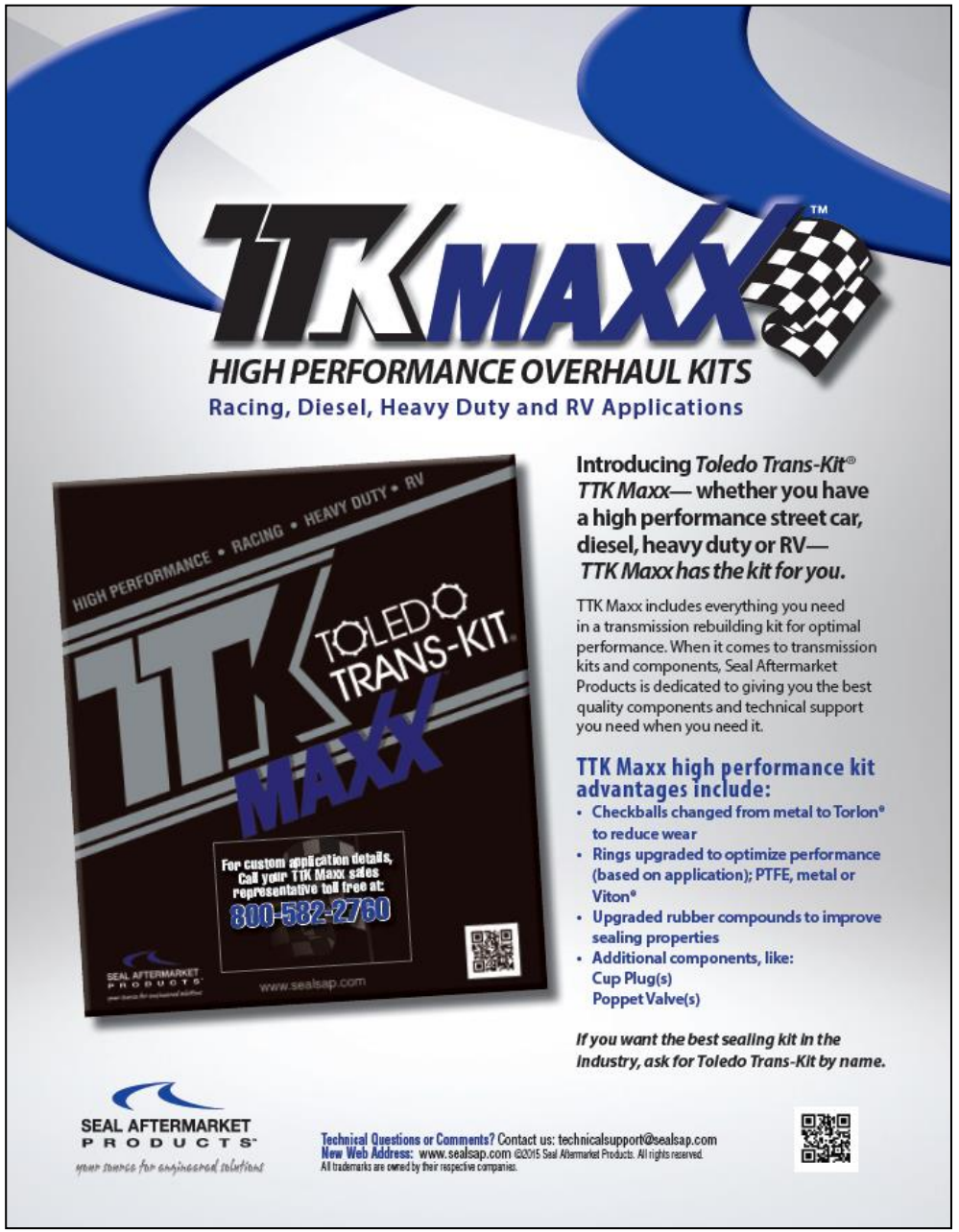


Case Air Checks



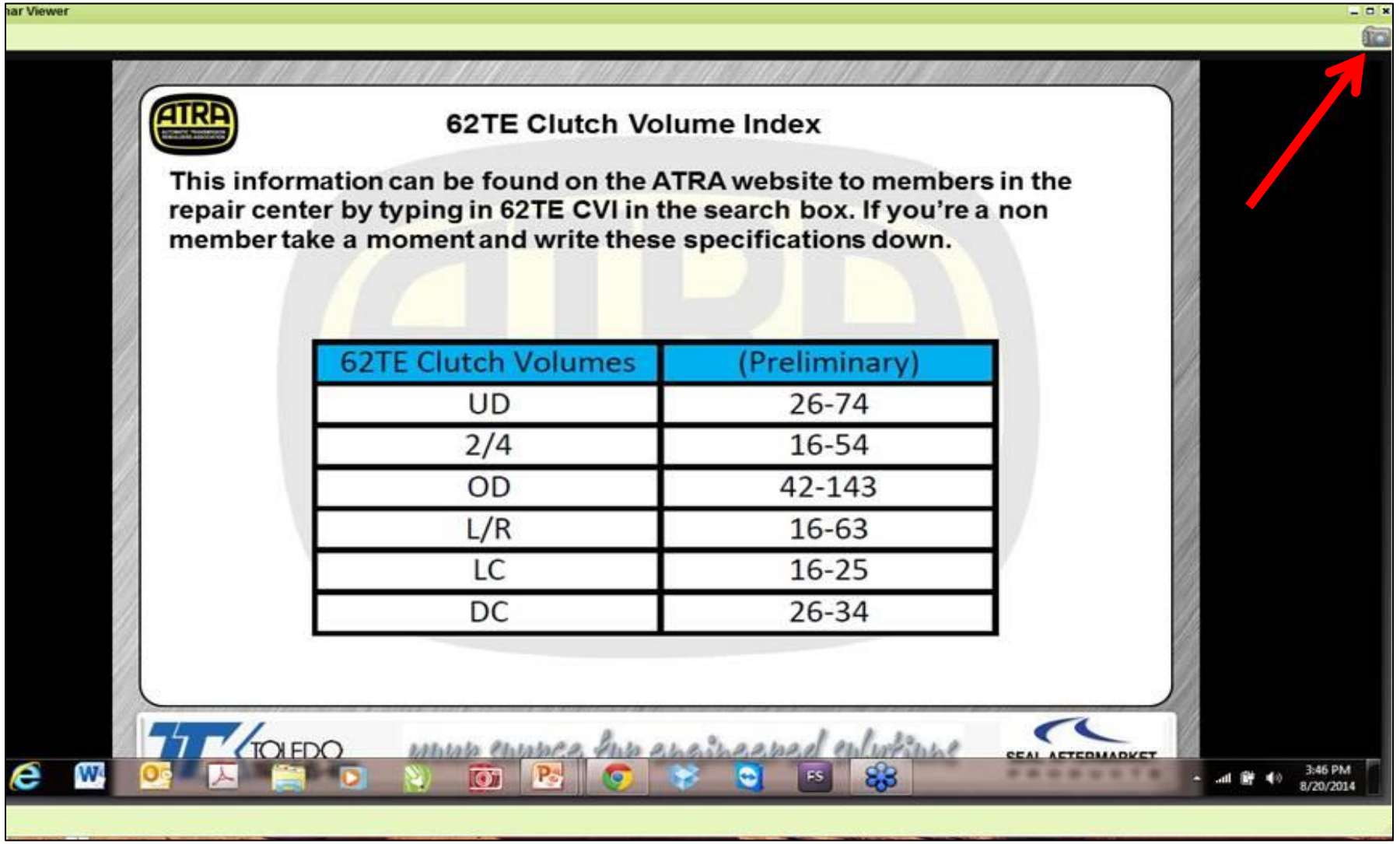
Today's Presentation Sponsored By:

Any Questions? Thank You For Attending



SEAL AFTERMARKET PRODUCTS your source for engineered solutions
TTK TOLEDO TRANS-KIT Transmission Kits
TTK MAXX High Performance Transmission Kits
Hi-Per Blue Reengineered High Performance Pistons
VOLT Electronics
www.sealsap.com (800) 582-2760

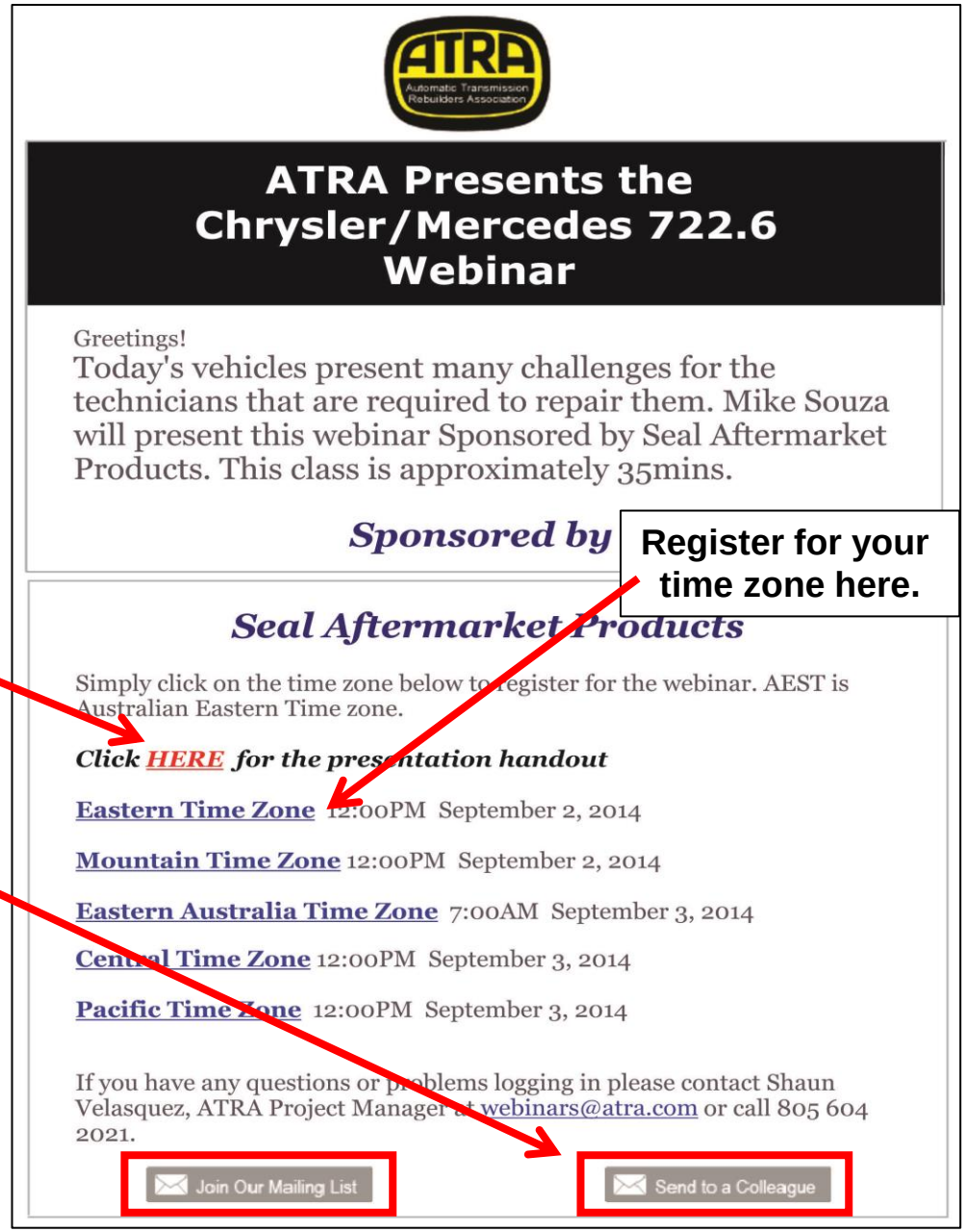
If you see material that is not shown in your handout just double click on the camera icon at the top right of your screen and it will leave a picture (jpg. file) on your desktop.



When you received the email invitation to the webinar, there should be a place to click and download the Adobe (pdf file) of the presentation handout material.

Also there is an icon that you can click on to be placed onto the email list for future webinars. An invitation will be emailed automatically when future webinars are scheduled.

You can also invite a friend.



ATRA Presents the Chrysler/Mercedes 722.6 Webinar

Greetings!
Today's vehicles present many challenges for the technicians that are required to repair them. Mike Souza will present this webinar Sponsored by Seal Aftermarket Products. This class is approximately 35mins.

Sponsored by

Register for your time zone here.

Seal Aftermarket Products

Simply click on the time zone below to register for the webinar. AEST is Australian Eastern Time zone.

Click HERE for the presentation handout

Eastern Time Zone 12:00PM September 2, 2014

Mountain Time Zone 12:00PM September 2, 2014

Eastern Australia Time Zone 7:00AM September 3, 2014

Central Time Zone 12:00PM September 3, 2014

Pacific Time Zone 12:00PM September 3, 2014

If you have any questions or problems logging in please contact Shaun Velasquez, ATRA Project Manager at webinars@atra.com or call 805 604 2021.

Join Our Mailing List

Send to a Colleague