

TRANSMISSION**Servicing 5 Spd. Automatic Transmission 01L****00 GENERAL, TECHNICAL DATA****NOTE FOR THIS ARTICLE****Note for this article**

Descriptions of this vehicle assembly group for servicing the Automatic Transmission 01L were provided by Audi and adopted by Volkswagen.

General Repair Notes

The maximum possible care, cleanliness and proper tools are essential to ensure satisfactory and successful transmission repairs. The usual basic safety precautions also apply when carrying out vehicle repairs.

A number of generally applicable instructions for individual repair procedures, which are otherwise mentioned at various points in the article, are summarized here. They apply to this article.

Transmission

- Rules of cleanliness for working on automatic transmissions --> **Rules of cleanliness for working on automatic transmissions.**
- Secure torque converter on removed transmission to keep it from falling out.
- Thoroughly clean all connections and surrounding area before disconnecting.
- Place parts that have been removed on a clean surface and cover. Use foils and paper. Use lint-free cloths only!
- Carefully cover over opened components or seal, if repairs are not carried out immediately.
- Only install clean components: Only unpack replacement parts immediately prior to installation.
- After repair work on the transmission, clean ATF lines and ATF cooler, replace ATF strainer.

O-rings, gaskets, seals

- Always replace O-rings, gaskets and sealing rings.
- After removing gaskets and seals, always inspect the contact surfaces at housing or shaft for burrs resulting from removal or for other signs of damage.
- The open side of the seals face toward the fluid to be sealed in.
- To install, thinly coat sealing rings along outer circumference and on sealing lip with ATF.
- Lightly lubricate O-rings with ATF or Vaseline before installing, this prevents the rings from being pinched when inserting.
- Use only ATF or Vaseline in areas near ATF. Other lubricating substances cause functional problems in

the hydraulic transmission control.

- When pressing in new seals, make sure the sealing lip does not run on the same point as the sealing lip of the old seal (use insertion depth tolerances).
- Replace paper seals, always clean sealing surfaces and remove old seals completely.

Nuts, bolts

- Loosen bolts in reverse order of tightening.
- Tighten and loosen bolts or nuts for securing covers and housings without tightening sequence in diagonal sequence and in stages.
- The tightening torques stated apply to non-oiled nuts and bolts.
- Always replace self-locking nuts and bolts.

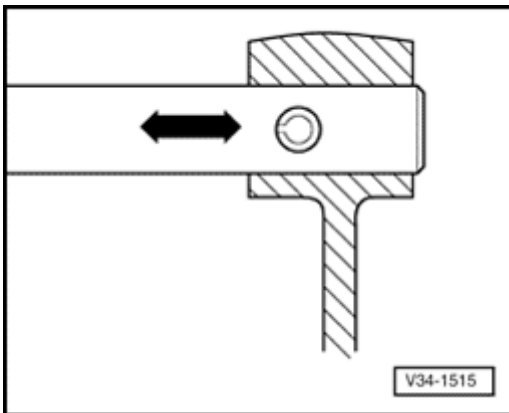


Fig. 1: Identifying Spring Pins Installation Position
Courtesy of VOLKSWAGEN UNITED STATES, INC.

Circlips

- Do not over-stretch circlips.
- Always replace damaged or over-stretched circlips.
- Circlips must be fully seated in groove.
- Replace roll pins. Installation position: Slot is longitudinal to line of force.

Mount

- Slightly grease mount with ATF before inserting.
- Attach mount and adjustment shims only with Vaseline. Other lubricating substances lead to functional problems in the hydraulic transmission control.

Oil tubes

- Once removed, oil tubes must always be replaced.
- If transmission is very dirty, oil tubes must be replaced.

Special tools

Special tools and equipment

Special tools, testers and auxiliary items required

- Holding plate VW 309
- Measuring bar VW 382/7 from Special socket measuring tools VW 382
- Dial gauge holder VW 387
- Thrust plate VW 401

- Thrust plate VW 402
- Shackle 10-222 A/12
- Hanging and holding device 3311
- Old oil collecting and extracting device V.A.G 1782

- Dial gauge VAS 6080
- Digital depth gauge VAS 6087
- Engine and Transmission Holder VAS 6095
- Shop crane VAS 6100

- Dial gauge extension T10170/1
- Puller for ATF supply T10270
- Extracting handle T10271
- Lifting device T10272

- M8 Guide pin T10273
- Drive-in tool T10274
- Drive-in tool T10275
- Installation bracket T10276

- Installation bracket T10277
- Installation bracket T10278
- Plate T10279
- Plate T10280

- Plate T10281
- Mounting device T10282
- Mounting device T10283
- Adapter for torque converter T10284

- Pre-tensioning tool T10285

- M6 Guide pins T10288/4
- Internal puller Kukko 21/6
- Support Kukko 22/2
- Torque wrench with gradation dial gauge 3 to 23 Nm (commercially available)
- Protective glasses

RULES OF CLEANLINESS FOR WORKING ON AUTOMATIC TRANSMISSIONS

Rules of cleanliness for working on automatic transmissions

- Thoroughly clean all connections and surrounding area before disconnecting.
- Place parts that have been removed on a clean surface and cover. Use foils and paper. Use lint-free cloths only!
- Carefully cover over opened components or seal, if repairs are not carried out immediately.
- Only install clean components: Only unpack replacement parts immediately prior to installation.
- Always replace O-rings, gaskets and sealing rings.
- Lightly lubricate O-rings before installing, this prevents the rings from being pinched when inserting.
- Use only ATF in areas near ATF. Other lubricating substances cause functional problems in the hydraulic transmission control.
- Check the following fluid levels after installing, top off if necessary. ATF in planetary gear --> **37 - AUTOMATIC TRANSMISSION - CONTROLS, HOUSING** --> **39F - FRONT FINAL DRIVE, DIFFERENTIAL** --> **39R - FINAL DRIVE, REAR DIFFERENTIAL** --> Capacities and specifications --> **00 - GENERAL, TECHNICAL DATA** .

FREQUENT DAMAGES

Reverse gear without traction

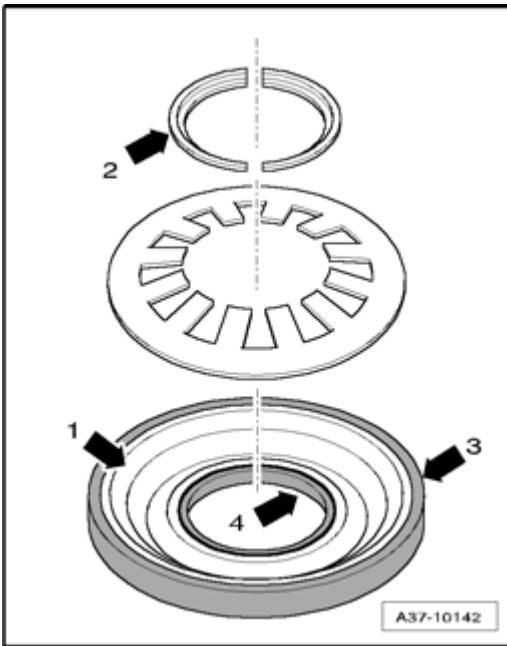


Fig. 2: Piston Clutch "F" Deformed, Sealing Lips Damaged, Retaining Rings Deformed
Courtesy of VOLKSWAGEN UNITED STATES, INC.

- Damage:

Piston clutch "F" deformed - **arrow 1** - , sealing lips damaged - **arrow 3** - and - **arrow 4** - , retaining rings deformed - **arrow 2** -.

- Cause:

Main pressure valve in valve body is worn, thus pressure on piston "F" is too high, piston "F" is deformed - sealing lips on piston "F" are damaged, split retaining ring is bent.

- Required actions:

- Disassemble transmission completely and clean, replace ATF oil tubes.
- Clean ATF lines and ATF cooler.
- Disassemble and check all clutches.
- Check friction lining of torque converter clutch --> **Torque converter clutch friction lining, checking.**
- If there is a suspicion of heavy soiling --> **Evaluating wear by evaluating ATF color and impurities** , replace torque converter (cannot be cleaned).
- Replace valve body.
- Check cylinder "F" for wear grooves, repair wear grooves, replace cylinder "F" if necessary.
- Replace ATF strainer.

Hard shifting, slipping problems in 4th and 5th gear

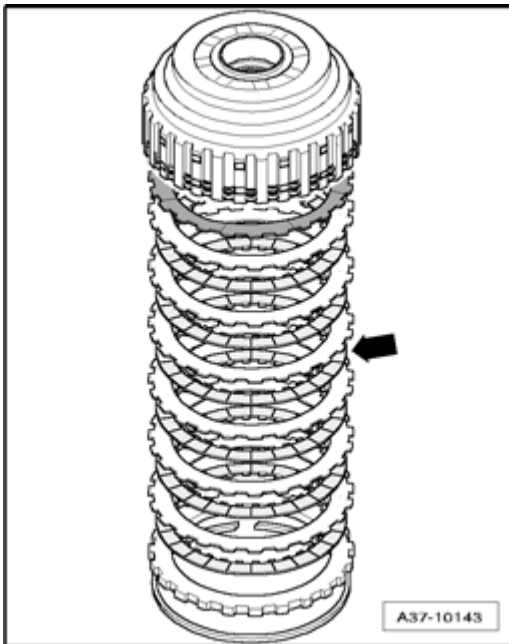


Fig. 3: Multiple-Disc Clutch "B" Burnt Out
 Courtesy of VOLKSWAGEN UNITED STATES, INC.

- Damage:

Multiple-disc clutch "B" burnt out - **arrow** -.

- Cause:

Wear or malfunctioning of torque converter clutch

- Required actions:
 - Disassemble transmission completely and clean, replace ATF oil tubes.
 - Clean ATF lines and ATF cooler.
 - Disassemble and check all clutches.
 - Check friction lining of torque converter clutch --> **Torque converter clutch friction lining, checking.**
 - If there is a suspicion of heavy soiling --> **Evaluating wear by evaluating ATF color and impurities** , replace torque converter (cannot be cleaned).
 - Replace multiple-disc clutch "B".
 - Replace overheated cylinder "B" (bluish).
 - Check clutch "A" , replace clutch "A" if necessary.
 - Replace ATF strainer.

Slipping problems in 4th and 5th gear, ATF pump noise

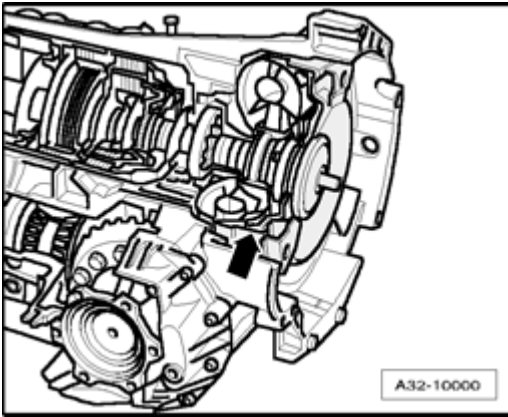


Fig. 4: Friction lining of torque converter clutch
Courtesy of VOLKSWAGEN UNITED STATES, INC.

- Damage:

Friction lining - **arrow** - of torque converter clutch worn

In advanced state: ATF pump noise at idle because of intruded lining parts

- Cause

Converter lining loosened or worn

- Required actions:
 - Disassemble transmission completely and clean, replace ATF oil tubes.
 - Disassemble and check all clutches.
 - Disassemble and check ATF pump.
 - Check friction lining of torque converter clutch --> **Torque converter clutch friction lining, checking** , replace torque converter clutch if necessary --> **32 - TORQUE CONVERTER** .

NOTE:

- **With very high mileage, it is recommended to always replace the torque converter while servicing the transmission because of worn torque converter clutch.**

- If there is a suspicion of heavy soiling, replace valve body (cannot be cleaned).
- Replace ATF strainer.

All gears without slipping

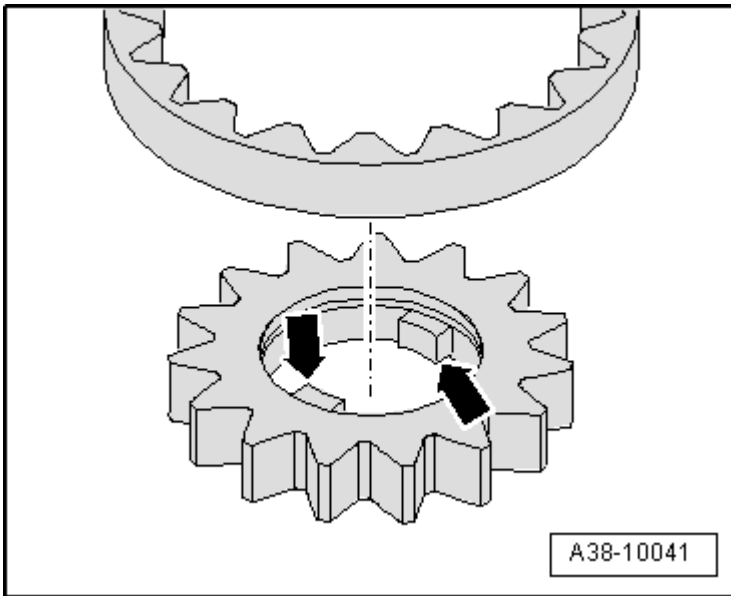


Fig. 5: Coupling Plate On ATF Pump Wheel
Courtesy of VOLKSWAGEN UNITED STATES, INC.

- Damage:

Coupling plate - **arrows** - on ATF pump wheel broken off

- Cause

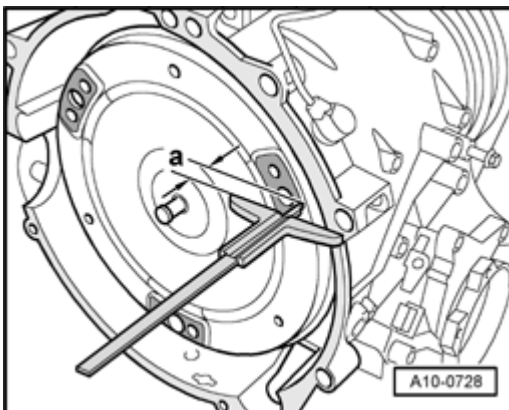


Fig. 6: Measuring Torque Converter
Courtesy of VOLKSWAGEN UNITED STATES, INC.

A - Improper mounting; torque converter not completely inserted during transmission or engine installation.
Checking installation dimension --> **32 - TORQUE CONVERTER**

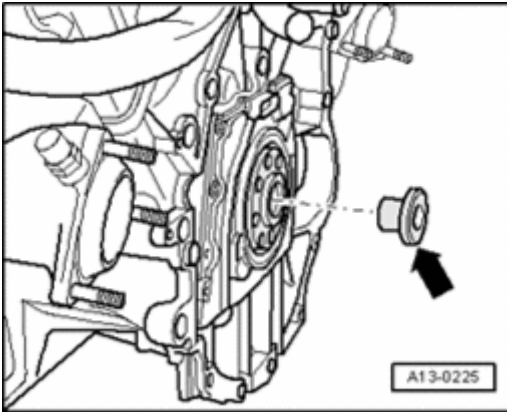


Fig. 7: Torque Converter Centering Bushing

Courtesy of VOLKSWAGEN UNITED STATES, INC.

B - Incomplete mounting; centering torque converter bushing - **arrow** - not properly installed in crankshaft -->

13 - ENGINE - CRANKSHAFT, CYLINDER BLOCK

- Required actions:
 - Disassemble and check ATF pump, remove broken coupling plates.

CAUTION: Always check for broken coupling plates and remove.

Shifting to reverse gear approx. 5 to 6 seconds delayed after selecting driving mode

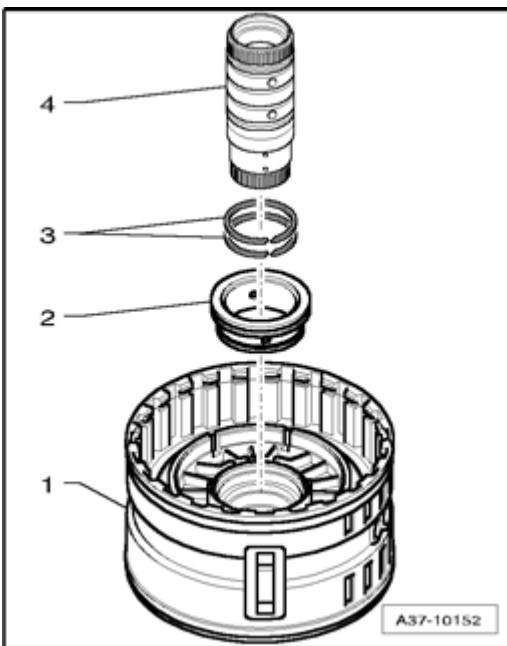


Fig. 8: Rectangular Rings, Bushing And Cylinder "D/E"

Courtesy of VOLKSWAGEN UNITED STATES, INC.

- Damage:

Rectangular rings - **3** - on sun shaft are radially worn.

- Cause:

Bushing - **2** - in cylinder "D/E" - **item 1** - indicates roughness on inner circumference of running surface that is not permissible.

- Required actions:

- Check bushing for roughness at inner circumference, replace if necessary, replace rectangular rings.

32 TORQUE CONVERTER

TORQUE CONVERTER

Torque converter clutch friction lining, checking

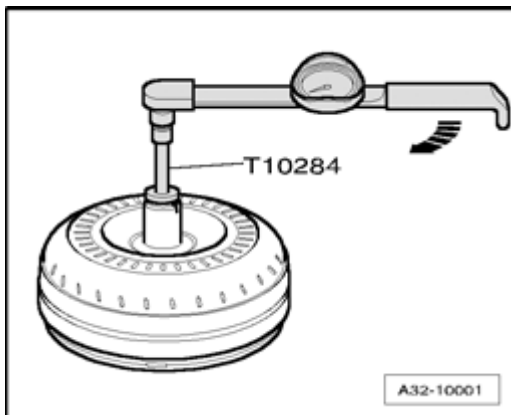


Fig. 9: Checking Torque Converter Clutch Friction Lining
Courtesy of VOLKSWAGEN UNITED STATES, INC.

- Insert Adapter for torque converter T10284 in splines of torque converter.
- Mount torque wrench with gradation dial gauge 3 to 23 Nm (commercially available) onto adapter.

NOTE:

- If necessary, use reducing piece of $\frac{1}{4}$ on $\frac{1}{2}$.

- Turn torque wrench in direction of - **arrow** - while a second technician holds torque converter.

- Specified value: at least 10 Nm.

If specified value is not obtained, torque converter clutch is faulty:

- Replace torque converter.

If there is a suspicion of heavy soiling in the ATF area caused by a worn converter lining --> **Evaluating wear by evaluating ATF color and impurities** :

- Disassemble transmission completely and clean, replace ATF oil tubes.
- Disassemble and check all clutches.
- Replace torque converter (cannot be cleaned).
- Replace valve body (cannot be cleaned).

Torque converter, draining

Special tools, testers and auxiliary items required

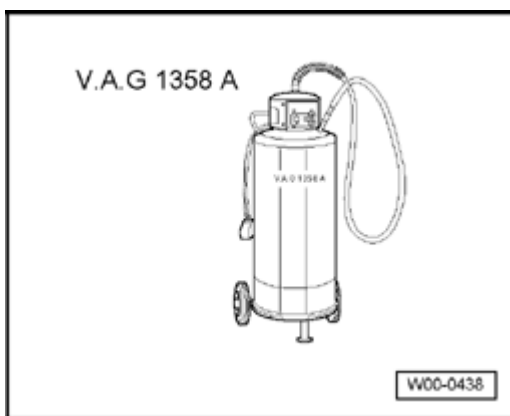


Fig. 10: Oil Extractor V.A.G 1358 A
Courtesy of VOLKSWAGEN UNITED STATES, INC.

- Oil extraction device V.A.G 1358 A
- Oil extraction sensor V.A.G 1358 A/1

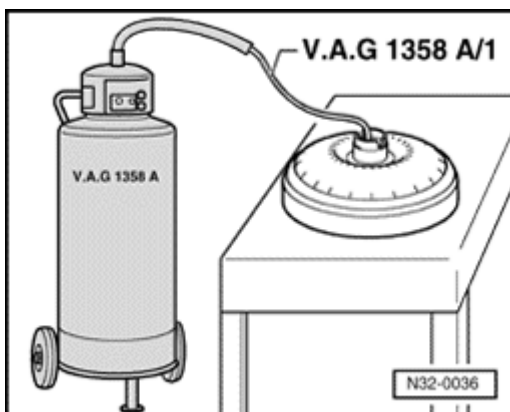


Fig. 11: Extracting ATF From Torque Converter
Courtesy of VOLKSWAGEN UNITED STATES, INC.

In case of soiling of ATF via shavings or during a major transmission overhaul, torque converter must be drained.

- Extract ATF using oil extraction device V.A.G 1358 A and oil extraction sensor V.A.G 1358 A/1 from torque converter.

Torque converter, checking

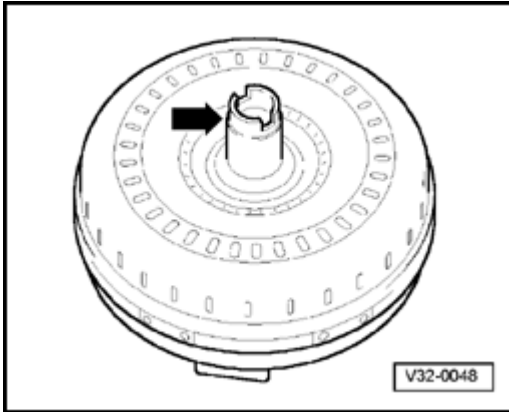


Fig. 12: Inspect Torque Converter Hub For Irregular Grooves
Courtesy of VOLKSWAGEN UNITED STATES, INC.

- Check torque converter hub - **arrow** - for wear.

If wear on torque converter can be recognized:

- Replace torque converter.

37 AUTOMATIC TRANSMISSION - CONTROLS, HOUSING

TRANSMISSION, ATTACHING TO ASSEMBLY STAND

- Transmission removed.
- Remove torque converter.
- Attach Holding plate VW 309 to Hanging and holding device 3311.

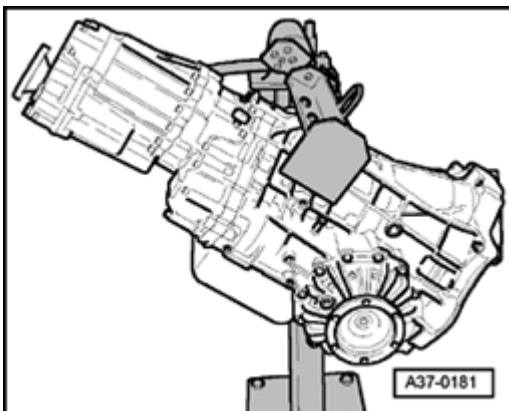


Fig. 13: Transmission, Attaching To Assembly Stand
Courtesy of VOLKSWAGEN UNITED STATES, INC.

- Secure transmission to Hanging and holding device 3311 and insert into Engine and transmission holder VAS 6095 using Shop crane VAS 6100.

NOTE:

- Ventings for the transmission housing and final drive must be closed before turning a filled transmission with oil pan upward on the engine and transmission holder.

PLANETARY GEAR, DISASSEMBLING AND ASSEMBLING

Planetary gear, disassembling and assembling

NOTE:

- General repair notes --> Note for this article.
- Rules of cleanliness for working on automatic transmissions --> Rules of cleanliness for working on automatic transmissions.
- Coat O-rings and sealing rings with ATF or Vaseline. Other lubricating substances lead to functional problems in the hydraulic transmission control.
- Attach mount and adjustment shims only with Vaseline. Other lubricating substances lead to functional problems in the hydraulic transmission control.

Planetary gear, assembly overview

NOTE:

- Some of the depicted components are part of component groups and are not available separately as replacement part.

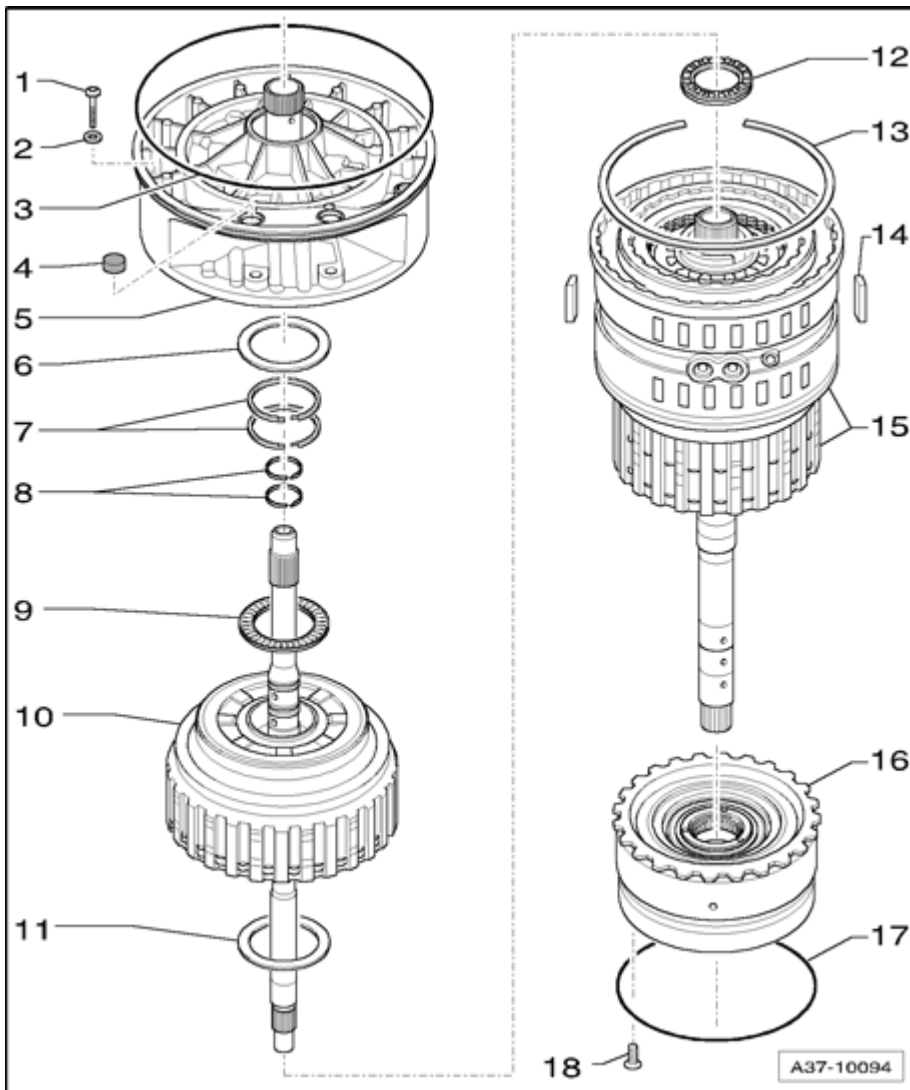


Fig. 14: Planetary Gear, Assembly Overview
 Courtesy of VOLKSWAGEN UNITED STATES, INC.

- 1 - Bolt, 10 Nm
- 2 - Sealing washer
 - Replace
- 3 - O-ring
 - Replace
- 4 - Cap
 - Replace

5 - ATF supply

- With ATF pump
- Disassembling and assembling --> **ATF pump, disassembling and assembling**

6 - Adjustment shim

- Determine thickness **Fig. 71**

7 - Rectangular ring for ATF supply

- Replace

8 - Rectangular ring for input shaft

- Replace

9 - Axial needle bearing

10 - Tower "II"

- Disassembling and assembling --> **Tower "II", disassembling and assembling**

11 - Thrust washer

12 - Axial needle bearing

13 - Circlip

14 - Fitted key

15 - Tower "I"

- Disassembling and assembling --> **Tower "I", disassembling and assembling**

16 - Clutch "F" with freewheel

- Disassembling and assembling --> **Clutch "F" with free-running hub. disassembling and assembling**

17 - O-ring

- Replace

18 - Bolt

- Countersunk screw or oval head bolt (dependent on construction version)
- Tightening torque **Fig. 48**

Planetary gear, disassembling and assembling**Disassembling**

- Transmission attached to assembly stand --> **Transmission, attaching to assembly stand.**
- Place old oil collecting and extracting device V.A.G 1782 beneath transmission.

CAUTION: Wear protective glasses.

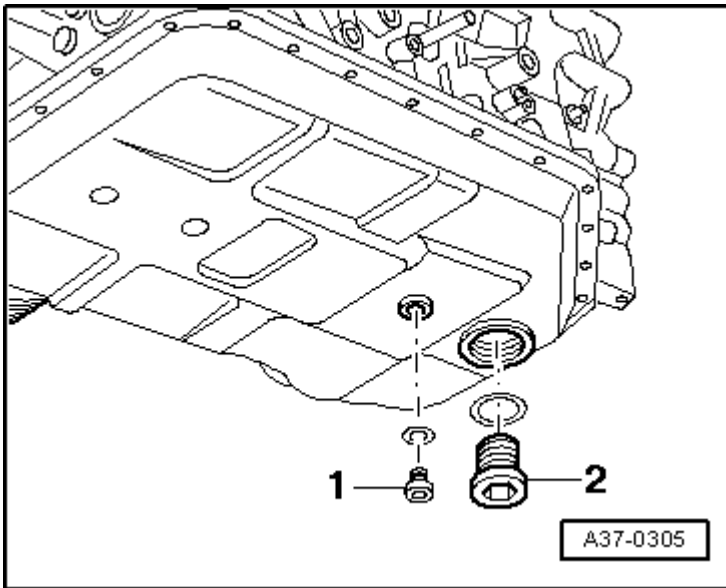


Fig. 15: Identifying ATF Drain Plug And ATF Level Inspection Plug
Courtesy of VOLKSWAGEN UNITED STATES, INC.

- Remove ATF drain plug - 1 - and allow ATF to drain.

NOTE:

- **Observe disposal regulations.**
- **Rest of ATF remains in the oil pan.**

- Remove torque converter.
- Extract ATF from torque converter --> **Torque converter, draining.**
- Allow ATF to drain in rear final drive.
- Attach transmission to assembly stand --> **Transmission, attaching to assembly stand.**

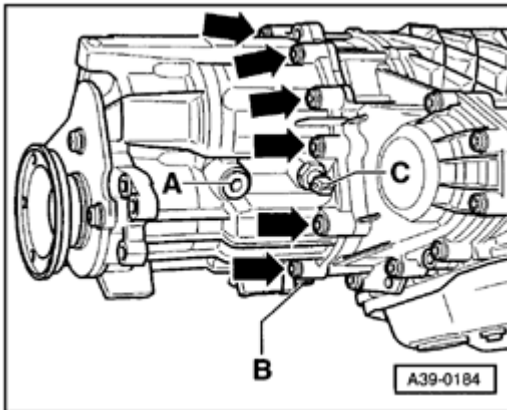


Fig. 16: Transfer Case Bolts

Courtesy of VOLKSWAGEN UNITED STATES, INC.

- Place old oil collecting and extracting device V.A.G 1782 beneath transfer case
- Remove locking bolt - **B** - and allow axle oil to drain.
- Remove Transmission Output Speed (RPM) Sensor G195.
- Loosen bolts - **arrows** - of transfer case housing in diagonal sequence.
- Remove bolts.

CAUTION: Carefully and slowly pull transfer case housing off of transmission toward rear. The Torsen differential could otherwise fall out of the transmission.

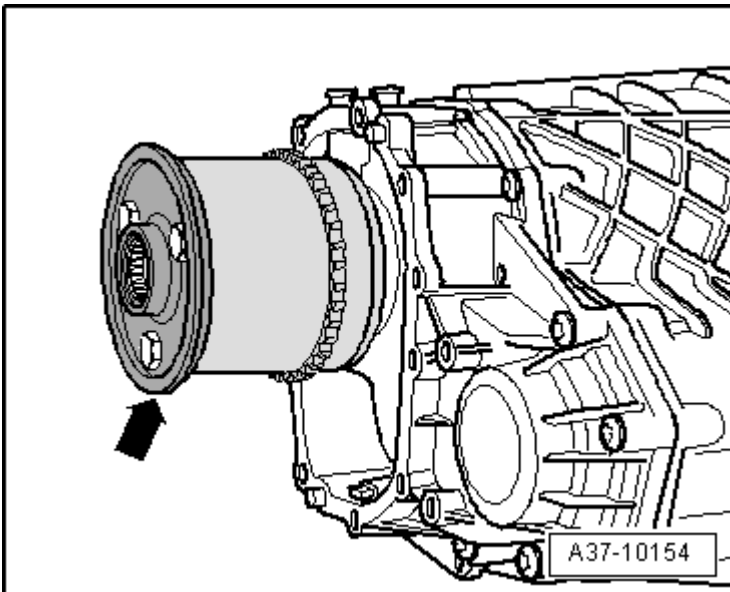


Fig. 17: Removing/Installing Torsen Differential At Input Shaft

Courtesy of VOLKSWAGEN UNITED STATES, INC.

- Remove Torsen differential - **arrow** - completely from output shaft toward rear.

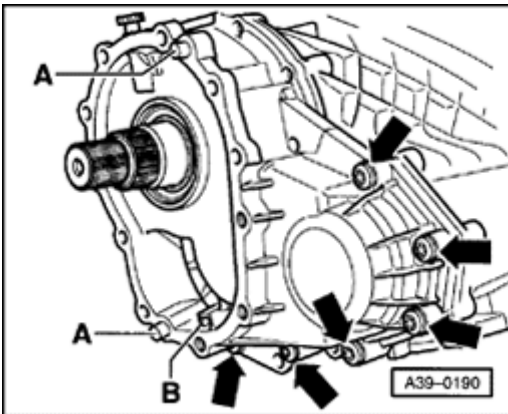


Fig. 18: Seal In Front Final Drive Intermediate Flange, Replacing
Courtesy of VOLKSWAGEN UNITED STATES, INC.

- Remove bolts - **arrows** - at intermediate flange for front final drive.

CAUTION:

- **Slowly and carefully remove intermediate flange for front final drive from transmission housing. The spur gears can otherwise fall out of the transmission.**
- **Do not reinstall spur gears that have fallen out. When spur gears have fallen out, transmission must be replaced.**

- Lift off intermediate flange for front final drive.

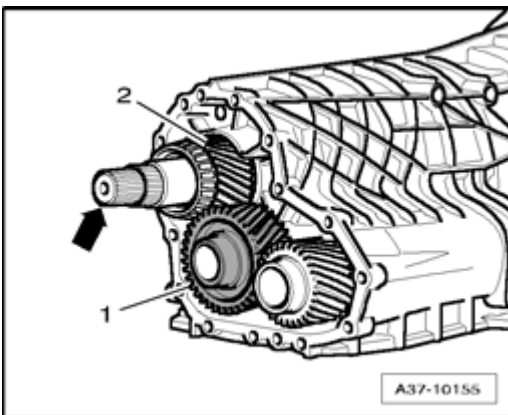


Fig. 19: Intermediate Pinion And Drive Pinion
Courtesy of VOLKSWAGEN UNITED STATES, INC.

- Cover splines completely on end of input shaft - **arrow** - with insulating tape without creasing or overlapping the tape to prevent damage to seal when sliding off drive pinion.
- Mark installed position of intermediate pinion - **1** -.

CAUTION:

- **The intermediate pinion - 1 - is built symmetrically but must be reinserted in the same position to maintain running direction.**

- Therefore, mark installed position of intermediate pinion or note whether marking on ring gear faces transmission or toward rear.

- Remove drive pinion - 2 - together with intermediate pinion.

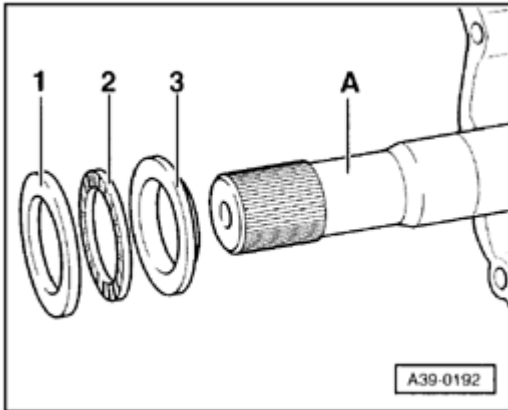


Fig. 20: Input Shaft Discs

Courtesy of VOLKSWAGEN UNITED STATES, INC.

- Pull off discs - 1 to 3 - of input shaft - A - .
1. Adjustment shim
 2. Roller bearing
 3. Thrust washer with cone (cone faces transmission)

NOTE:

- All three elements are pre-determined and may not be replaced with just any other element.

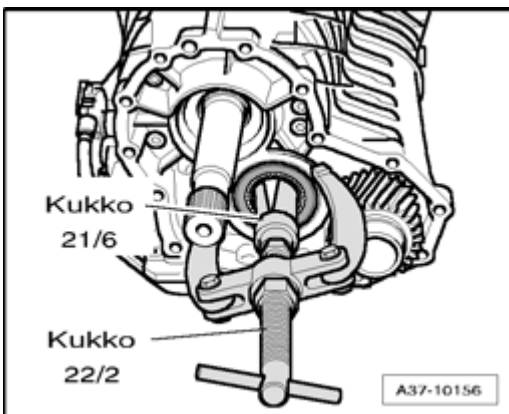


Fig. 21: Pulling Out Bearing For Intermediate Pinion Using Kukko Extractor Kukko 21/6 And Kukko Support Kukko 22/2

Courtesy of VOLKSWAGEN UNITED STATES, INC.

- Pull out bearing for intermediate pinion - 1 - using Kukko extractor Kukko 21/6 and Kukko support

Kukko 22/2.

NOTE:

- Bearing for intermediate shaft is pulled off so that bolts for clutch "F" with "free-running hub 1st gear" are accessible.

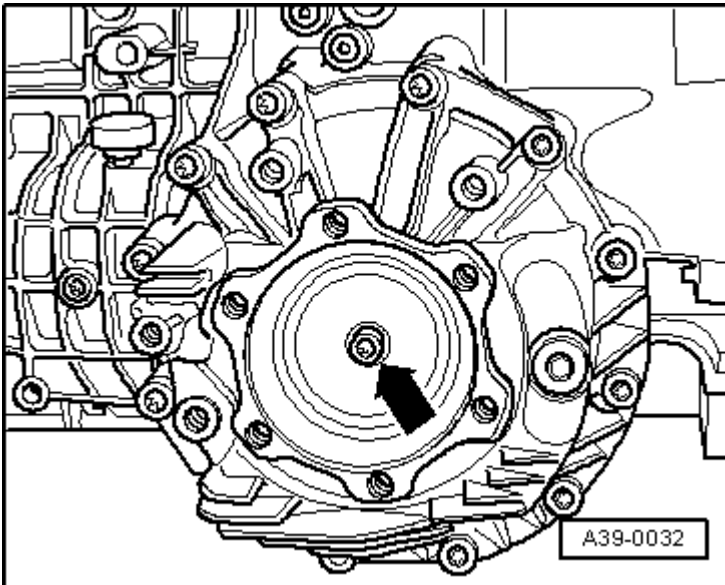


Fig. 22: Flange Shaft Bolt

Courtesy of VOLKSWAGEN UNITED STATES, INC.

- Remove flange shaft bolt - **arrow** - , secure flange shaft against turning using drift.
- Place old oil collecting and extracting device V.A.G 1782 beneath transmission.

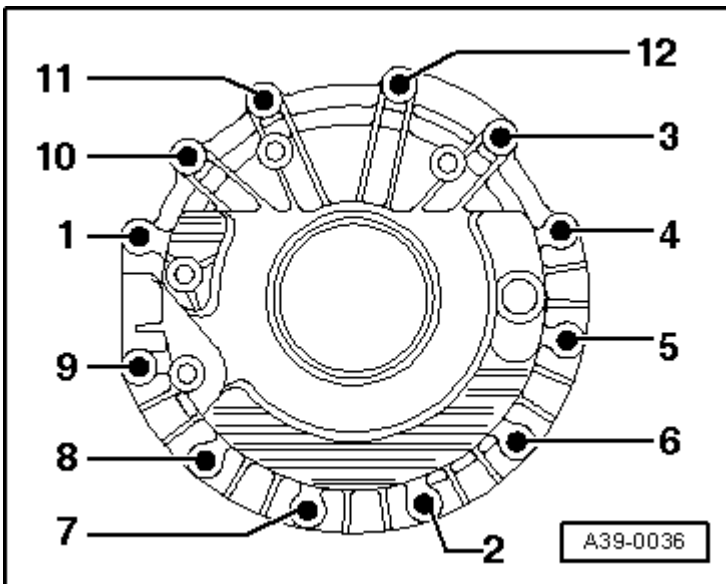


Fig. 23: Installing Cover For Front Final Drive, Tightening Sequence

Courtesy of VOLKSWAGEN UNITED STATES, INC.

- Pull out right flange shaft.
- Unscrew bolts for differential cover in sequence - **12 to 1** -.
- Remove differential cover.

CAUTION:

- **Slowly and carefully remove differential cover from transmission housing. The Torsen differential could otherwise fall out of the transmission.**
- **A differential that has fallen out must not be reinstalled. When differential has fallen out, transmission must be replaced.**
- **Make sure that bearing rings and adjustment shims for differential do not fall out of transmission housing and differential cover.**
- **Bearing rings and adjustment shims that have fallen out cannot be relocated with workshop equipment.**

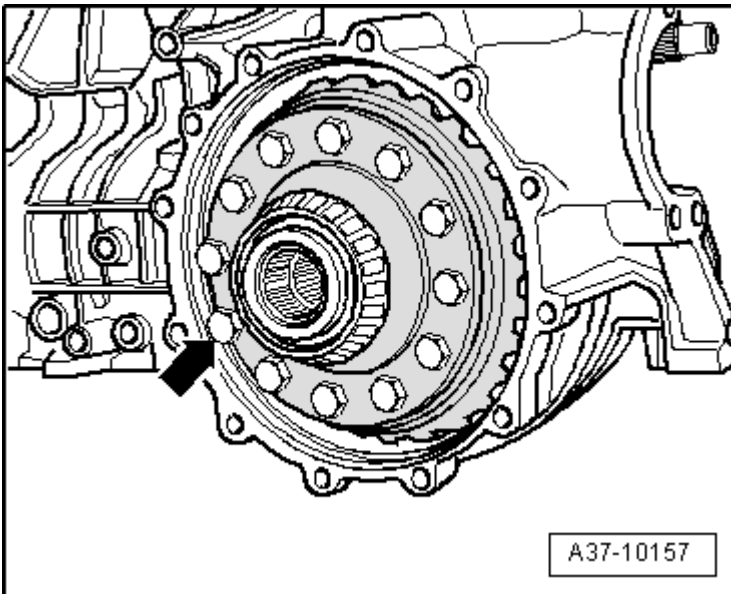


Fig. 24: Removing/Installing Differential
Courtesy of VOLKSWAGEN UNITED STATES, INC.

- Carefully remove differential - **arrow** -.

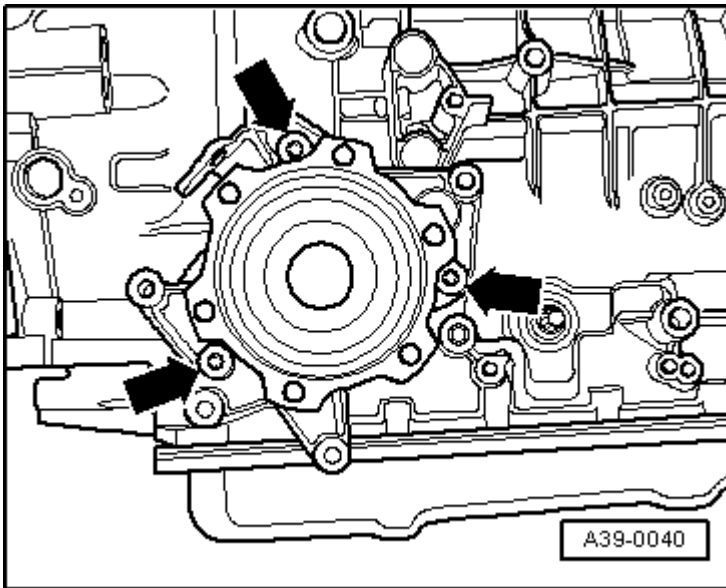


Fig. 25: Removing/Installing Left Drive Flange Mounting Bracket
 Courtesy of VOLKSWAGEN UNITED STATES, INC.

- Remove left drive flange mounting bracket - **arrows** -.
- Pull out left flange shaft.

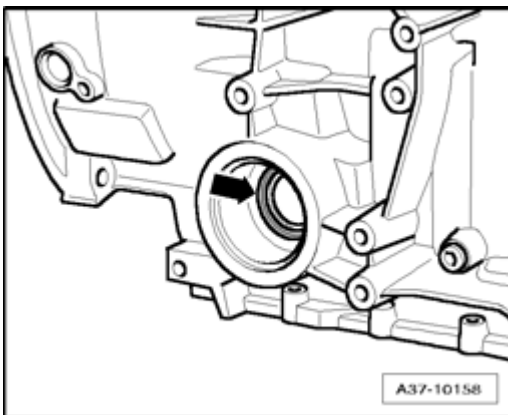


Fig. 26: Locating Securing Ring For Protective Tube On Left Transmission Side
 Courtesy of VOLKSWAGEN UNITED STATES, INC.

- Pry out securing ring for protective tube on left transmission side using a screwdriver - **arrow** -.

NOTE:

- On transmission housings without a cast groove for positioning the screwdriver, a cast groove can be ground afterward using an electric grinder.
- Remove metal shavings.

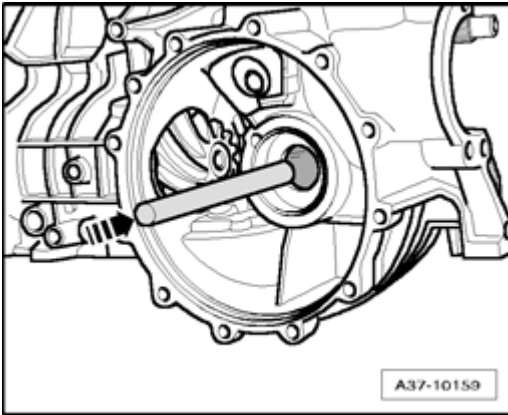


Fig. 27: Pressing Protective Tube From Differential Side, Sideways Out Of Transmission Using A Suitable Drift

Courtesy of VOLKSWAGEN UNITED STATES, INC.

- Press protective tube - **1** - from differential side, sideways out of transmission - **arrow** - using a suitable drift.
- Remove O-rings from protective tube and out of transmission housing.

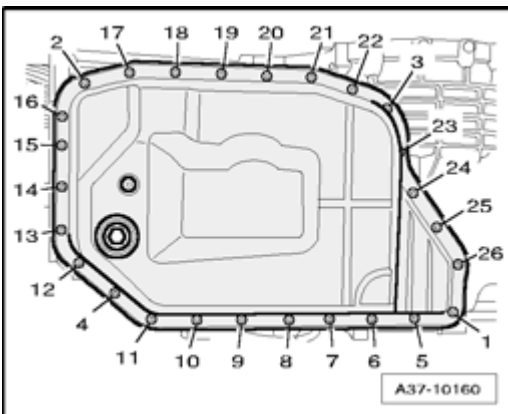


Fig. 28: ATF Oil Pan Bolts

Courtesy of VOLKSWAGEN UNITED STATES, INC.

- Remove ATF oil pan bolts in diagonal sequence - **26 to 1** -.
- Remove ATF oil pan.

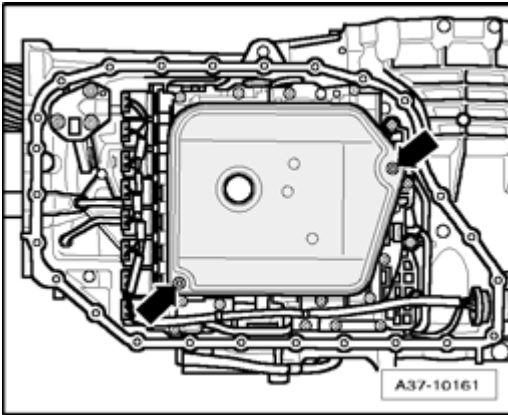


Fig. 29: ATF Strainer bolts

Courtesy of VOLKSWAGEN UNITED STATES, INC.

- Remove two bolts - **arrows** - of ATF strainer.
- Pull ATF strainer off of valve body.

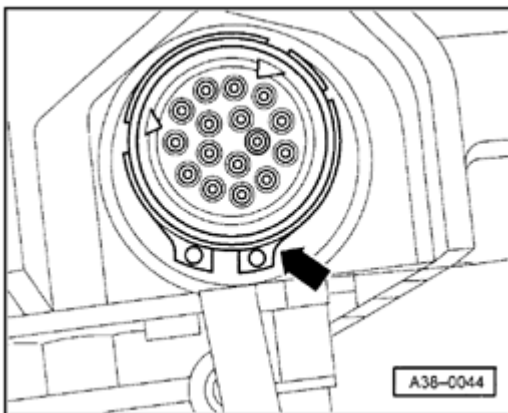


Fig. 30: Securing Ring For Wiring Harness Connector

Courtesy of VOLKSWAGEN UNITED STATES, INC.

- Remove circlip - **arrow** - for wiring harness/harness connector.
- Remove wiring harness/harness connector by pressing inward.

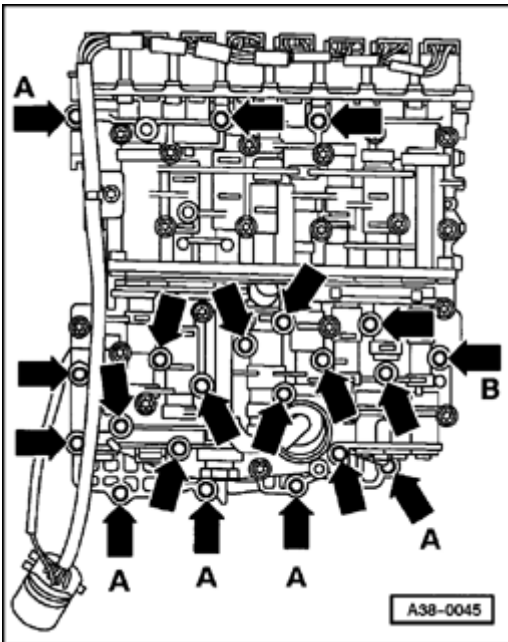


Fig. 31: Valve Body Bolts

Courtesy of VOLKSWAGEN UNITED STATES, INC.

- Loosen bolts - arrows -.

NOTE:

- Only loosen bolts with bigger bolt head - arrows -.
- When loosening other bolts, the function of the valve body can be influenced or the valve body splits up.
- Note the different lengths of the bolts.

- Carefully remove valve body from transmission.

CAUTION: Do not place removed valve body on Transmission Input Speed (RPM) Sensor G182 on rear side of valve body. Danger of damage.

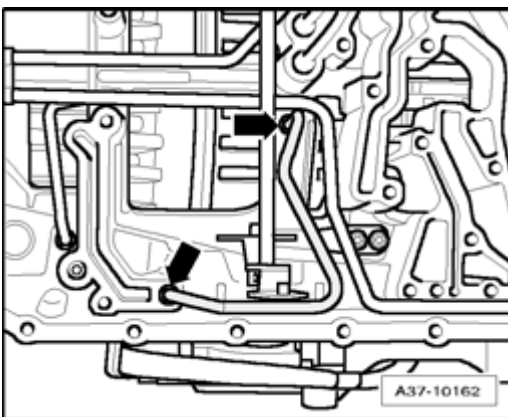


Fig. 32: Clutch ATF Oil Tube "E"

Courtesy of VOLKSWAGEN UNITED STATES, INC.

- Press off clutch ATF oil tube "E" evenly from transmission housing - **arrows** -.

CAUTION:

- As there is the danger of soiling, it is recommended to replace all ATF oil tubes --> Oil tubes , remove shift rod to do so --> Shift rod, removing and installing.
- ATF clutch oil tube "E" must always be replaced when "Tower II" is removed.

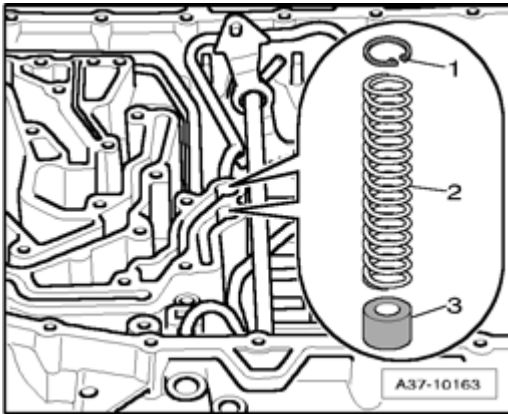


Fig. 33: Securing Rings, Coil Springs And Sealing Sleeve
Courtesy of VOLKSWAGEN UNITED STATES, INC.

- Remove two securing rings - **1** -.
- Remove coil springs - **2** -.
- Pull out sealing sleeve - **3** - , using extracting handle T10271.

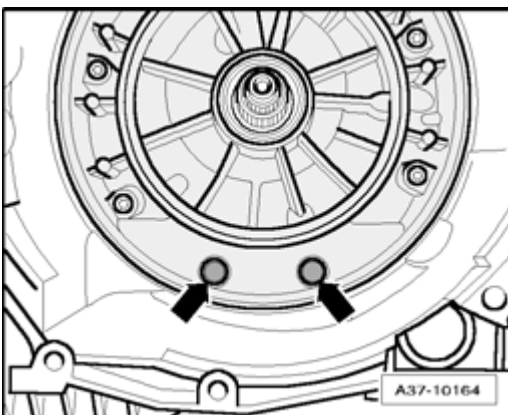


Fig. 34: Caps For Threaded Connection Of ATF Supply At Bottom Of Converter Housing
Courtesy of VOLKSWAGEN UNITED STATES, INC.

- Swing transmission on assembly stand.
- ATF supply faces upward.

- Drive out downward 2 caps - **arrows** - for threaded connection of ATF supply at bottom of converter housing.
- Remove caps to side out of hole in housing for flange shaft.

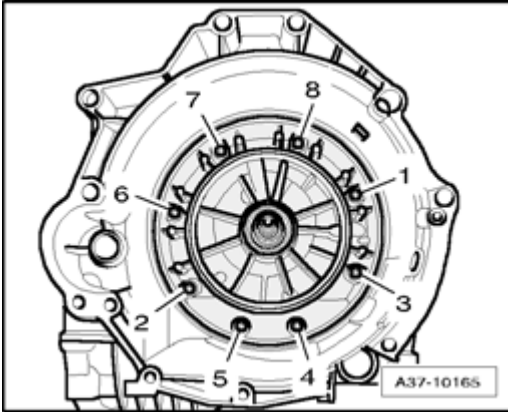


Fig. 35: ATF Supply Bolts

Courtesy of VOLKSWAGEN UNITED STATES, INC.

- Remove bolts for ATF supply in sequence - **8 to 1** -.
- Remove bolts with sealing washers.

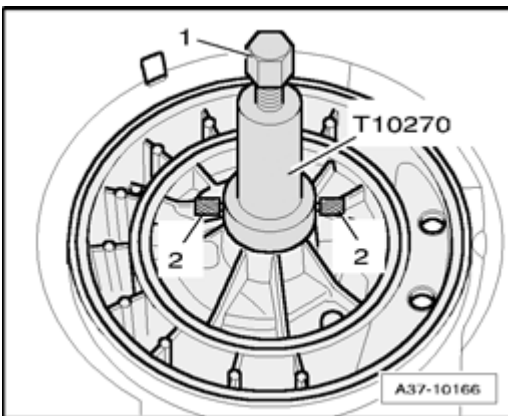


Fig. 36: Puller Spindle And Knurled Bolts

Courtesy of VOLKSWAGEN UNITED STATES, INC.

- Loosen spindle - **1** - of Puller for ATF supply T10270 a few turns.
- Position Puller for ATF supply T10270 at stator shaft.
- Install knurled bolts - **2** - in hole of stator shaft.
- Check Puller for ATF supply T10270 for proper seating.
- For removing ATF supply, turn spindle - **1** - of Puller for ATF supply T10270 in a clockwise direction.
- Remove ATF supply.

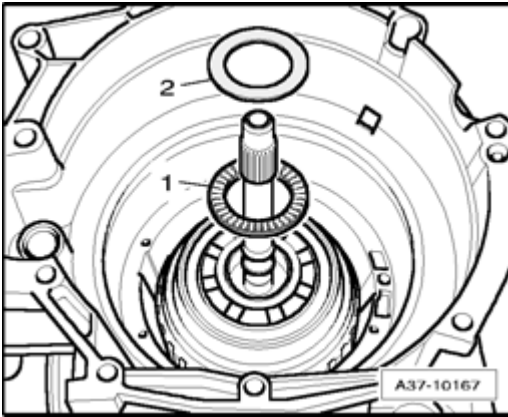


Fig. 37: Adjustment Shim And Axial Needle Bearing
Courtesy of VOLKSWAGEN UNITED STATES, INC.

- Remove adjustment shim - 2 - and axial needle bearing - 1 -.

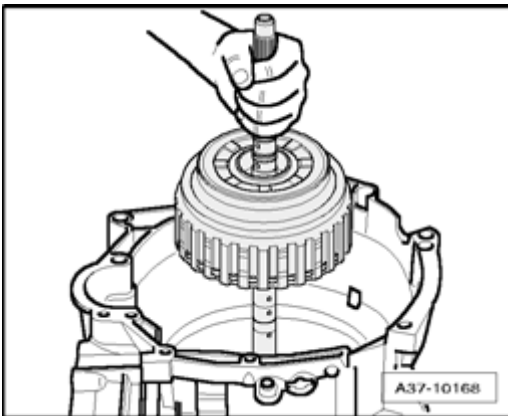


Fig. 38: Removing/Installing Tower "II"
Courtesy of VOLKSWAGEN UNITED STATES, INC.

- Lift tower "II" out of transmission housing.

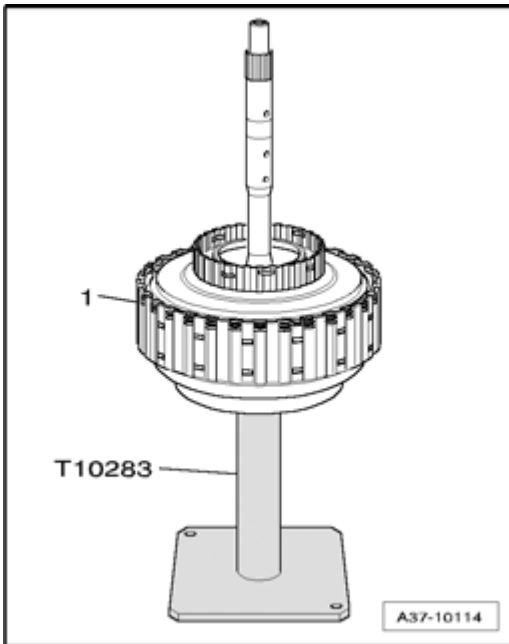


Fig. 39: Tower "II" Placed On Mounting Device T10283
 Courtesy of VOLKSWAGEN UNITED STATES, INC.

- Twist tower "II" - 1 - and place in Mounting device T10283 (ATF pump side faces downward).

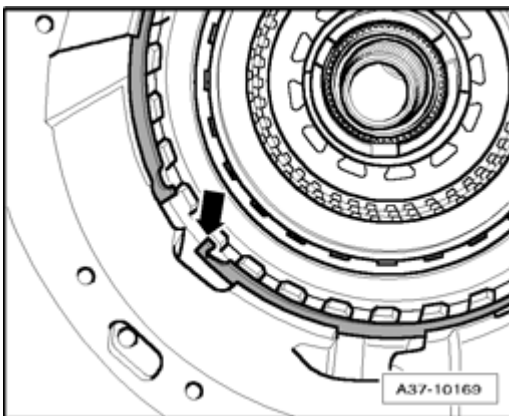


Fig. 40: Tower "I" Circlip
 Courtesy of VOLKSWAGEN UNITED STATES, INC.

- Remove circlip - **arrow** - for tower "I".

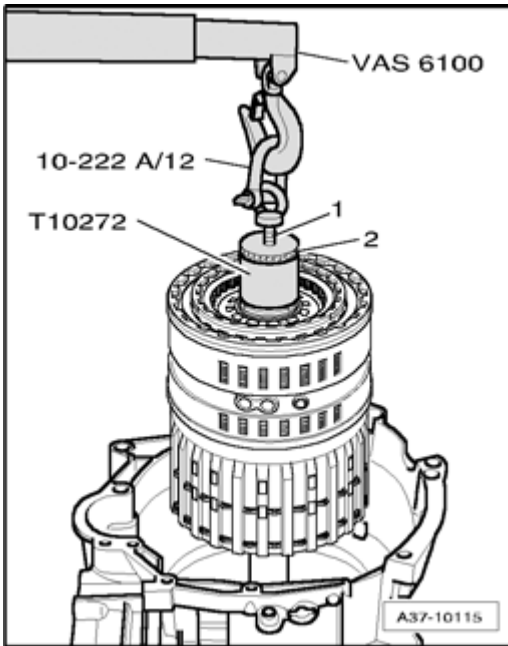


Fig. 41: Removing/Installing Tower "I" Using Shop Crane VAS 6100
 Courtesy of VOLKSWAGEN UNITED STATES, INC.

- Turn threaded spindle - 1 - of Lifting device T10272 for tower "I" in threaded hole of tower "I" until stop.
- Secure individual components of tower "I" from pulling apart, turn sleeve - 2 - on threaded spindle completely down by hand.
- Connect eye of Lifting device T10272 for tower "I" via Shackle 10-222 A/12 using Shop crane VAS 6100.
- Lift tower "I" out of transmission housing using Shop crane VAS 6100.

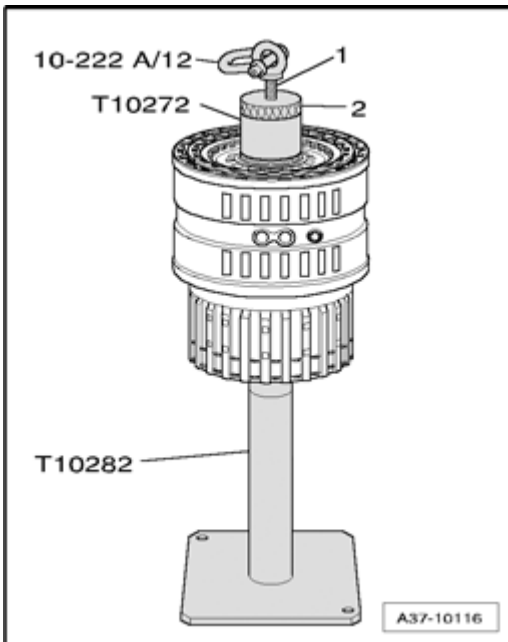


Fig. 42: Tower "I" Placed In Mounting Device T10282

Courtesy of VOLKSWAGEN UNITED STATES, INC.

- Place tower "I" in mounting device T10282.

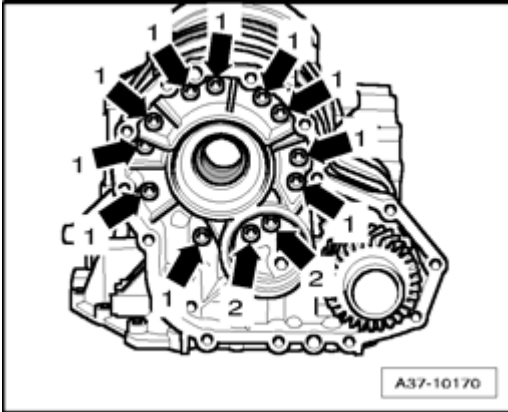


Fig. 43: Transmission Bolts

Courtesy of VOLKSWAGEN UNITED STATES, INC.

- Swing transmission on assembly stand back to horizontal position.
- Loosen bolts - **arrows 1** - and - **arrows 2** - for clutch "F" in diagonal sequence.
- Remove bolts.

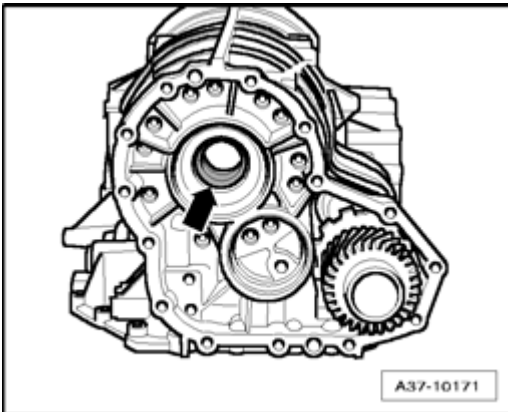


Fig. 44: Locating Clutch "F"

Courtesy of VOLKSWAGEN UNITED STATES, INC.

- Loosen clutch "F" from rear in transmission housing - **arrow** - by tapping clutch lightly using a hammer handle.
- Remove clutch "F" from transmission housing toward front.

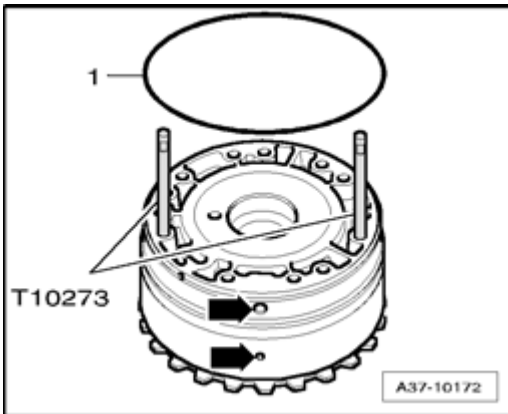


Fig. 45: Clutch "F" O-Ring And Guide Pins T10273
 Courtesy of VOLKSWAGEN UNITED STATES, INC.

Assembling

NOTE:

- Always replace seals, gaskets and O-rings.
- Coat O-rings and sealing rings with Vaseline. Use only Vaseline, other lubricating substances cause functional problems in the hydraulic transmission control.

- Replace O-ring - 1 - on cylinder of clutch "F".
- Turn guide pins T10273 in two holes of clutch "F" that are opposite to each other.
- Bring cylinder of clutch "F" into installation position.
- Oil bores - **arrows** - face toward underside of transmission (valve body).

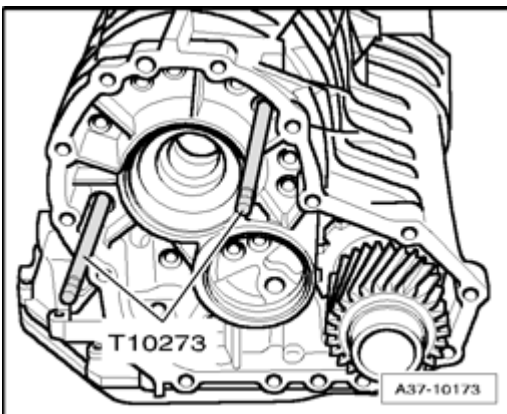
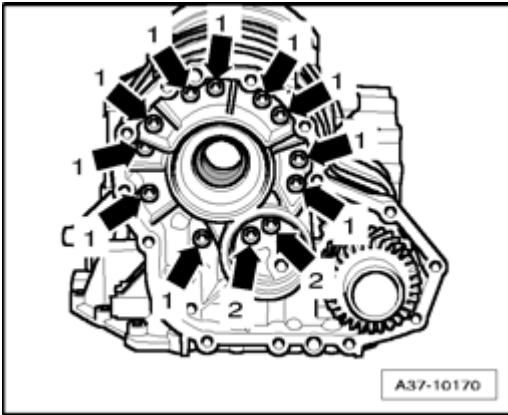


Fig. 46: Guide Pins T10273 Inserted Into Bores On Transmission Housing
 Courtesy of VOLKSWAGEN UNITED STATES, INC.

- Insert clutch "F" into transmission housing, insert Guide pins T10273 into bores on transmission housing while doing so.
- The arrangement of bores on clutch "F" and transmission housing must be the same.

**Fig. 47: Transmission Bolts**

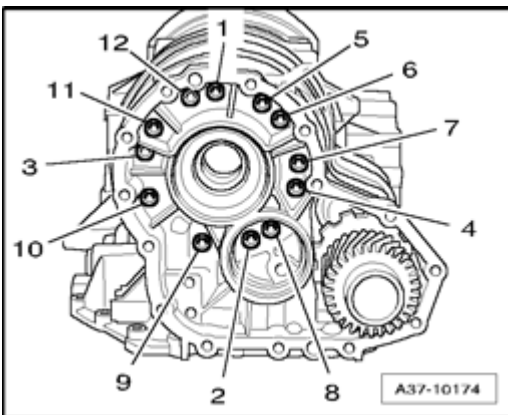
Courtesy of VOLKSWAGEN UNITED STATES, INC.

NOTE:

- The transmission housing determines the type of bolts used - arrows 1 - (countersunk screw or oval head bolt).
- For installing, always use the same type of bolt which was found during disassembly.
- Always replace oval head bolts.
- Always use countersunk screws for screwed connections - arrows 2 -.

- Hand-tighten bolts - **arrow 1** - and - **arrow 2** - for clutch "F" in diagonal sequence, turn Guide pins T10273 out.

Tightening sequence for transmission with countersunk screws.

**Fig. 48: Transmission Bolts Tightening Sequence (1 Of 2)**

Courtesy of VOLKSWAGEN UNITED STATES, INC.

- Tighten bolts as follows:

Stage	Tightening
I	○ Tighten countersunk screws in sequence - 1 to 12 - to 23 Nm.

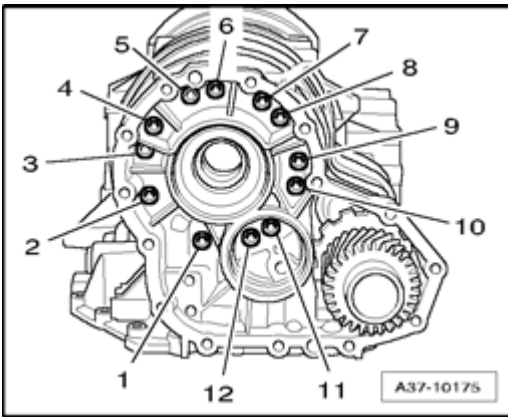


Fig. 49: Transmission Bolts Tightening Sequence (2 Of 2)
 Courtesy of VOLKSWAGEN UNITED STATES, INC.

Tightening sequence for transmission with oval head bolts and countersunk screws

- Tighten bolts as follows:

Stage	Tightening
I	○ Tighten bolts - 6 - and - 12 - to 12 Nm.
II	○ Tighten oval head bolts in sequence - 1 to 10 - to 13.2 Nm.
III	○ Tighten oval head bolts in sequence - 1 to 10 - 65 ° further using rigid wrench.
IV	○ Tighten countersunk screws - 11 - and - 12 - to 23 Nm.

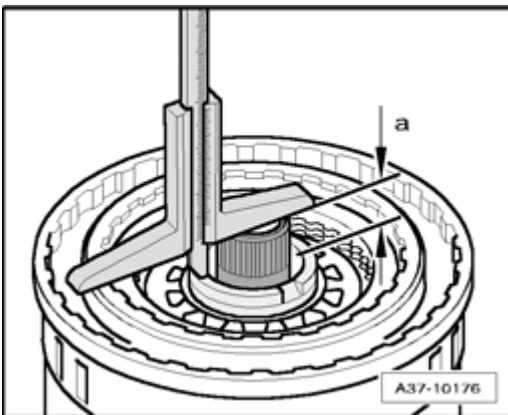


Fig. 50: Measuring Tower "I" Position
 Courtesy of VOLKSWAGEN UNITED STATES, INC.

- Check correct positioning for tower "I".
- Dimension - a - = 21.7 mm max.

NOTE:

- If dimension - a - is not reached, tower assembly "I" must be checked -->

Assembling tower "I".

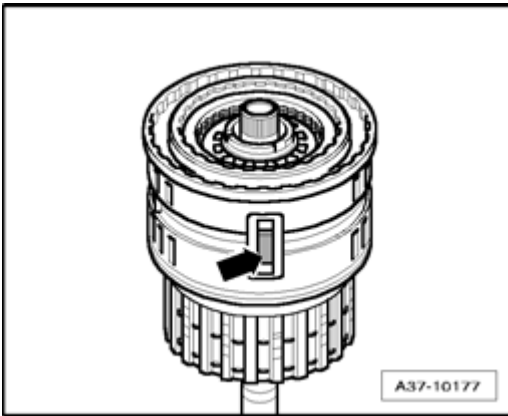


Fig. 51: Locating Fitted Keys

Courtesy of VOLKSWAGEN UNITED STATES, INC.

- Check whether fitted keys - **arrow** - are inserted centrally on both sides of cylinder "D/E".

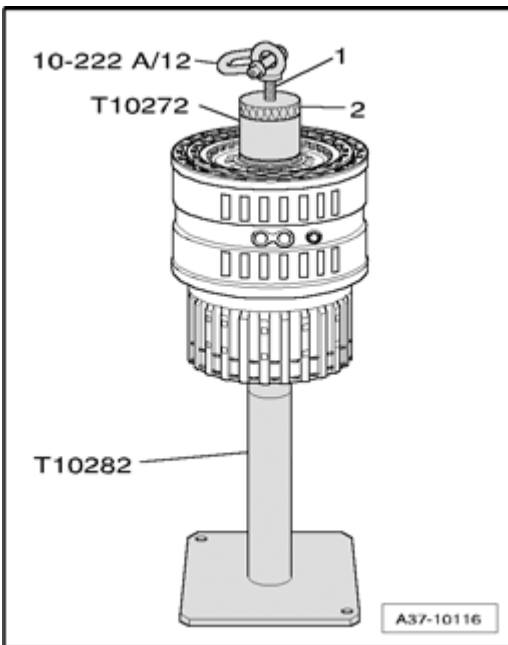


Fig. 52: Tower "I" Placed In Mounting Device T10282

Courtesy of VOLKSWAGEN UNITED STATES, INC.

- Turn threaded spindle - **1** - for Lifting device for tower I T10272 in threaded hole of tower "I" until stop.
- Secure individual components of tower "I" from pulling apart, turn sleeve - **2** - on threaded spindle completely down by hand.

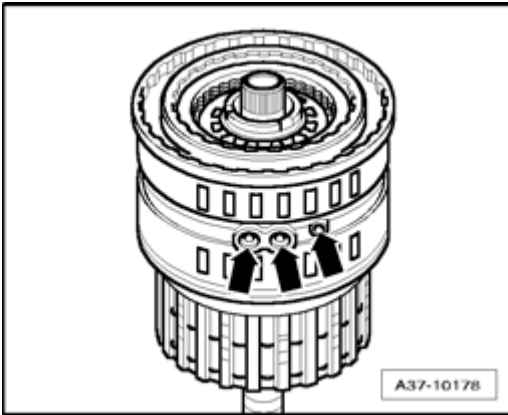


Fig. 53: Oil Bores On Cylinder "D/E" Face
 Courtesy of VOLKSWAGEN UNITED STATES, INC.

- Bring tower "I" into installation position.
- Oil bores - **arrows** - on cylinder "D/E" face toward underside of transmission (valve body).

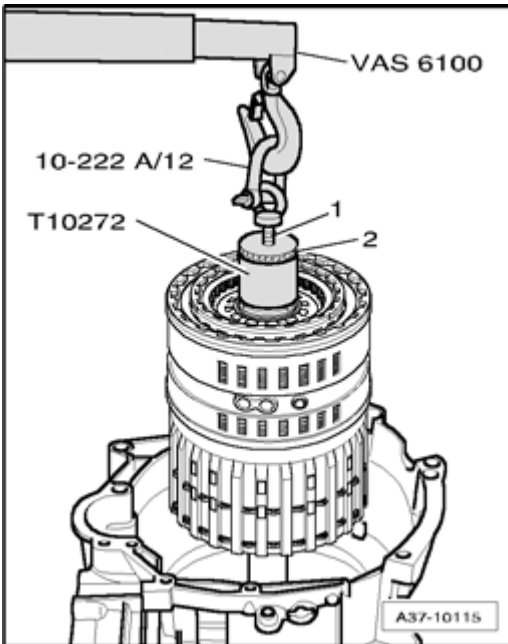


Fig. 54: Removing/Installing Tower "I" Using Shop Crane VAS 6100
 Courtesy of VOLKSWAGEN UNITED STATES, INC.

- Connect eye of Lifting device for tower I T10272 via Shackle 10-222 A/12 using Shop crane VAS 6100.
- Lower tower "I" into transmission housing using Shop crane VAS 6100.

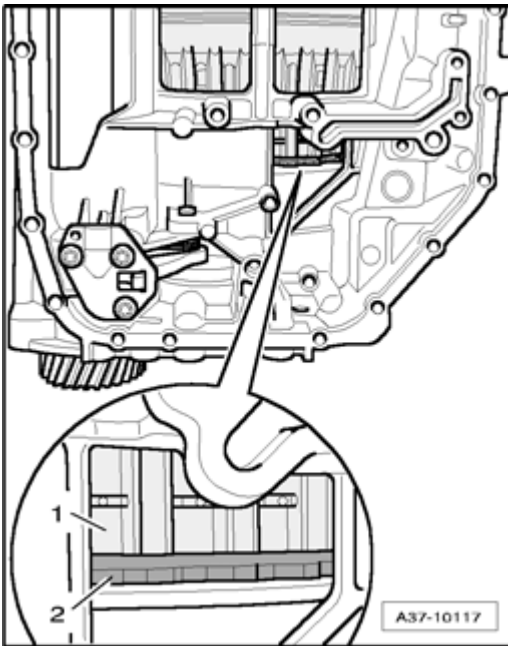


Fig. 55: Freewheel Splines In Cylinder "F" Engaged In Splines Of Ring Gear Of Planetary Bar
Courtesy of VOLKSWAGEN UNITED STATES, INC.

- When installing tower "I" , make sure that splines - 2 - of freewheel in cylinder "F" engages in splines of ring gear of planetary bar - 1 -.
- Visible from valve body side of transmission.

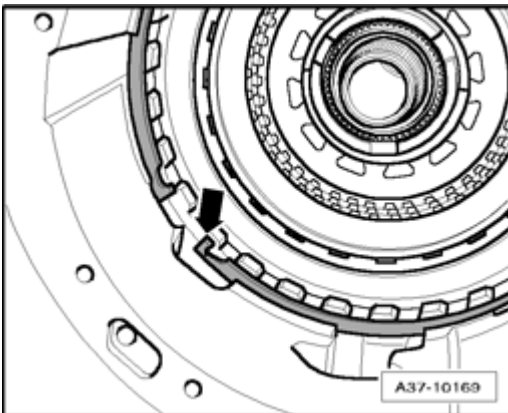


Fig. 56: Tower "I" Circlip
Courtesy of VOLKSWAGEN UNITED STATES, INC.

- Carefully insert circlip - **arrow** - for tower "I" into transmission housing.
- Make sure that circlip is seated evenly all around in groove of transmission housing, if necessary, drive circlip into groove all around using drift.

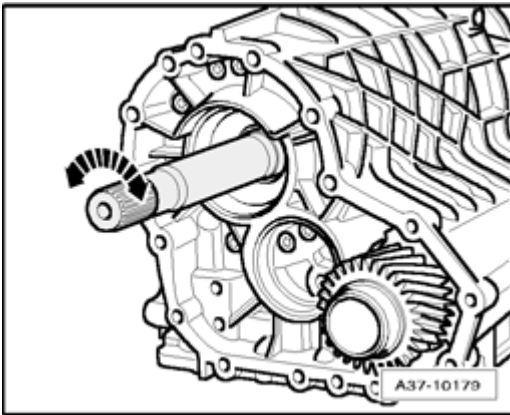


Fig. 57: Rotating Input Shaft

Courtesy of VOLKSWAGEN UNITED STATES, INC.

- Check tower "I" for proper installation.
- Make sure that input shaft can be rotated by hand - **arrow** -.

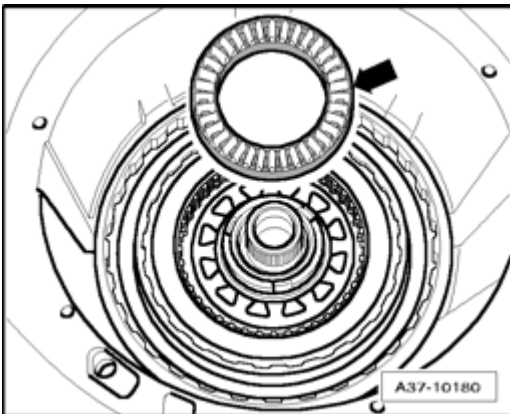


Fig. 58: Needle Bearing For Tower "II" Placed On Cylinder "C" Of Tower "I"

Courtesy of VOLKSWAGEN UNITED STATES, INC.

- Place needle bearing - **arrow** - for tower "II" on cylinder "C" of tower "I".

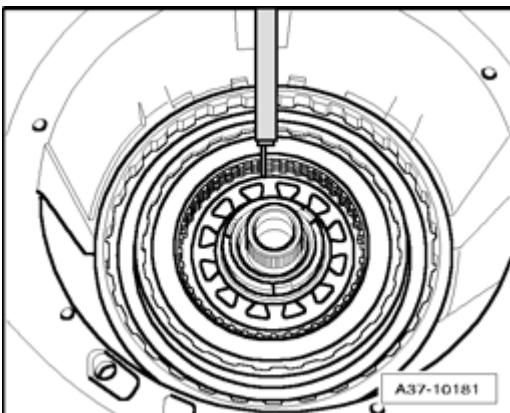


Fig. 59: Clutch Plate "C" Positioned Vertically Using Measuring Tongue Of Caliper Gauge
Courtesy of VOLKSWAGEN UNITED STATES, INC.

- Position clutch plate "C" vertically using e.g. measuring tongue of caliper gauge.

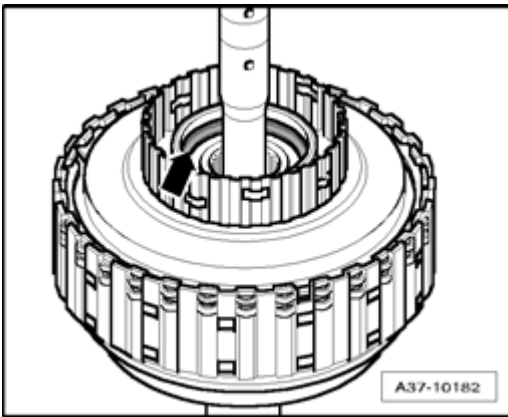


Fig. 60: Thrust Washer For Needle Bearing Inserted In Tower "II" At Bottom
Courtesy of VOLKSWAGEN UNITED STATES, INC.

- Check whether thrust washer - **arrow** - for needle bearing is inserted in tower "II" at bottom.

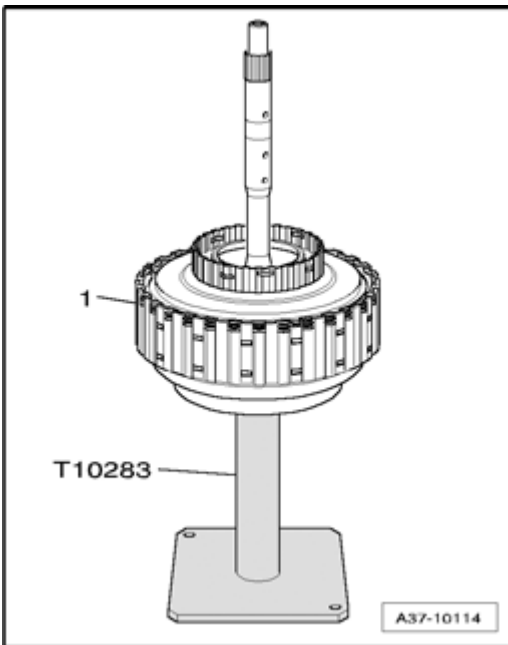


Fig. 61: Tower "II" Placed On Mounting Device T10283
Courtesy of VOLKSWAGEN UNITED STATES, INC.

- Remove "tower II" from Mounting device for tower II T10283 and turn to installation position.
- ATF pump side faces upward.

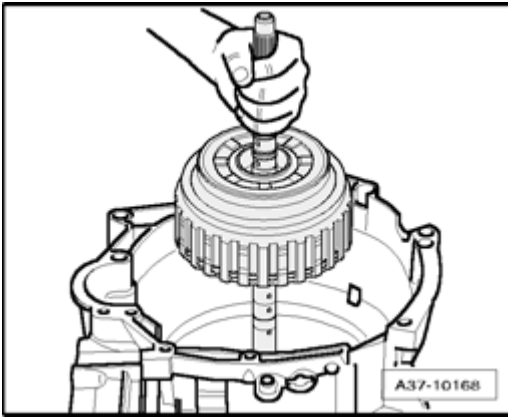


Fig. 62: Removing/Installing Tower "II"
Courtesy of VOLKSWAGEN UNITED STATES, INC.

- Insert "tower II" into transmission by hand.
- Let carrier on tower "II" engage in sequence into all clutch plate "C" using short lifting/turning motions.

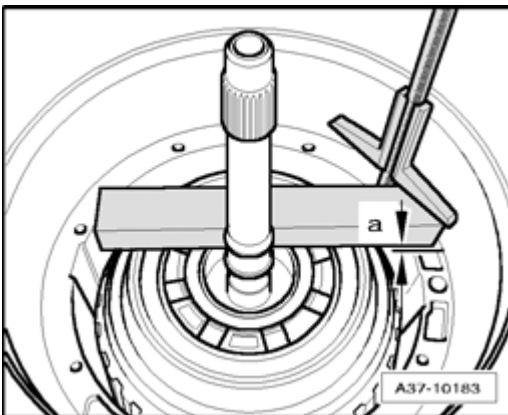


Fig. 63: Measuring Projection Of Upper Edge Of Tower "II" To Contact Surface For ATF Pump
Courtesy of VOLKSWAGEN UNITED STATES, INC.

- Check tower "II" for proper installation.
- Measure projection of upper edge of tower "II" to contact surface for ATF pump.
- Dimension - **a** - = 8 mm max.

If dimension - **a** - is exceeded, parts of the transmission are not inserted correctly - repeat installation.

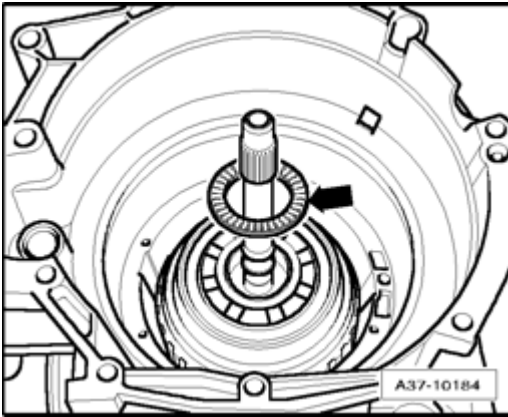


Fig. 64: Needle Bearing Placed On Tower "II"
 Courtesy of VOLKSWAGEN UNITED STATES, INC.

- Place needle bearing - **arrow** - on tower "II".

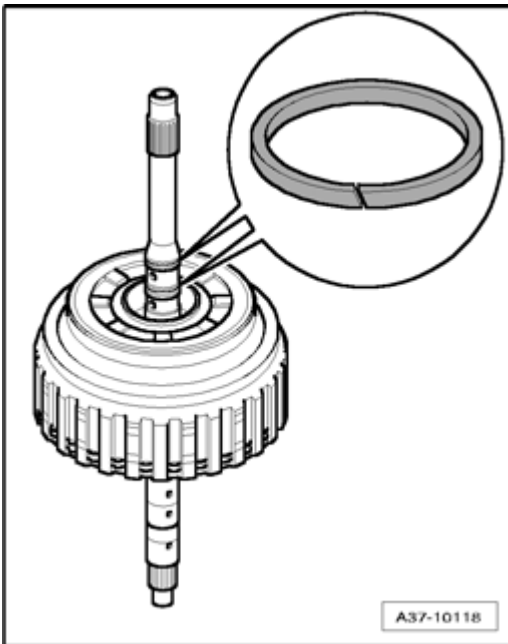


Fig. 65: Locating Rectangular Rings On Input Shaft Of Tower "II"
 Courtesy of VOLKSWAGEN UNITED STATES, INC.

- Replace 2 rectangular rings on input shaft of tower "II".
- Before inserting, thinly coat 2 rectangular rings on input shaft of tower "II" with Vaseline. Use only Vaseline, other lubricating substances cause functional problems in the hydraulic transmission control.
- Make sure that rectangular rings are fully seated all around in the input shaft groove.

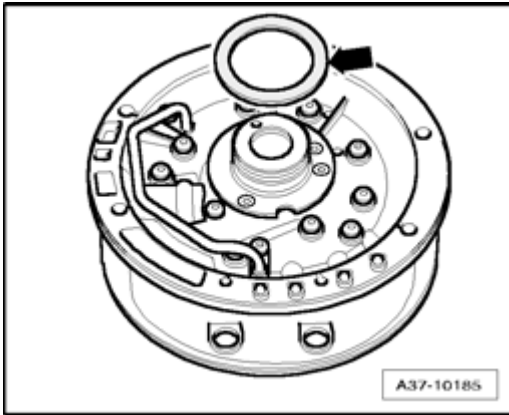


Fig. 66: Locating Shim

Courtesy of VOLKSWAGEN UNITED STATES, INC.

- Thinly coat previously installed adjustment shim - **arrow** - with Vaseline. Use only Vaseline, other lubricating substances cause functional problems in the hydraulic transmission control.
- Append adjustment shim for axial clearance of tower "I" and tower "II" on ATF supply from rear.

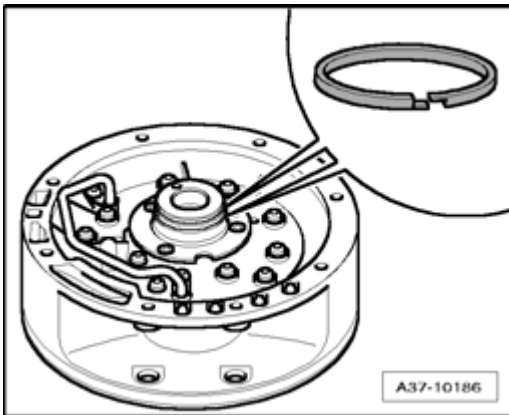


Fig. 67: Rectangular Rings On Stator Shaft

Courtesy of VOLKSWAGEN UNITED STATES, INC.

- Replace 2 rectangular rings on stator shaft.
- Before inserting, thinly coat 2 rectangular rings on ATF supply with Vaseline. Use only Vaseline, other lubricating substances cause functional problems in the hydraulic transmission control.
- Make sure that rectangular rings are fully seated all around in the stator shaft grooves.

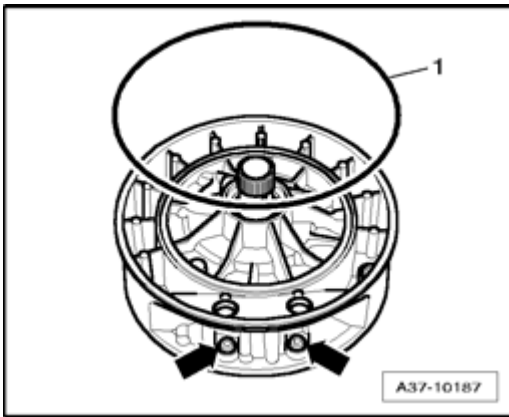


Fig. 68: ATF Supply O-Ring

Courtesy of VOLKSWAGEN UNITED STATES, INC.

- Replace O-ring - **1** - on ATF supply.
- Insert 2 lower bolts for ATF supply together with new sealing washers into ATF supply housing.
- Insert all other bolts for ATF supply together with new sealing washers into transmission housing.

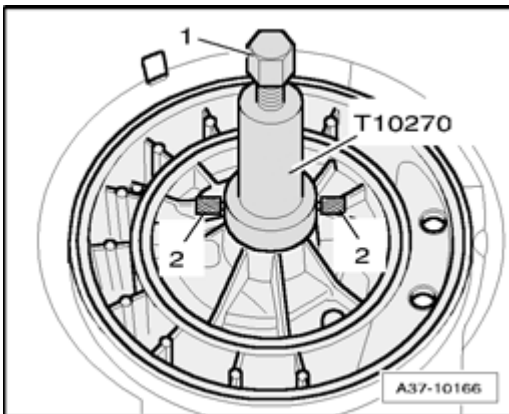
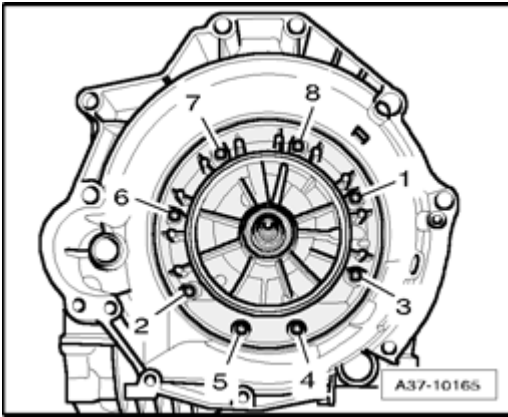


Fig. 69: Puller Spindle And Knurled Bolts

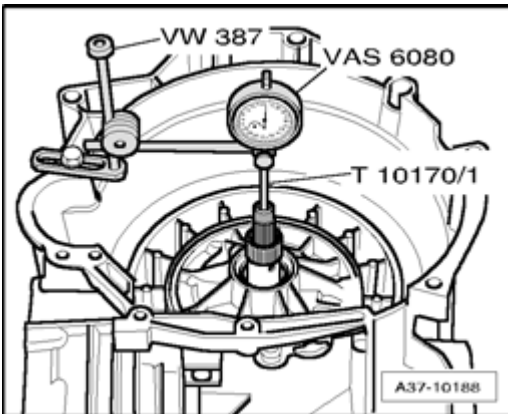
Courtesy of VOLKSWAGEN UNITED STATES, INC.

- Loosen spindle - **1** - of Puller for ATF supply T10270 a few turns.
- Position Puller for ATF supply T10270 at stator shaft.
- Install knurled bolts - **2** - in hole of stator shaft.
- Check Puller for ATF supply T10270 for proper seating.
- Insert ATF supply into transmission housing.
- Recess for flange shaft tube faces underside of transmission (valve body side).
- Remove Puller for ATF supply T10270.

**Fig. 70: ATF Supply Bolts**

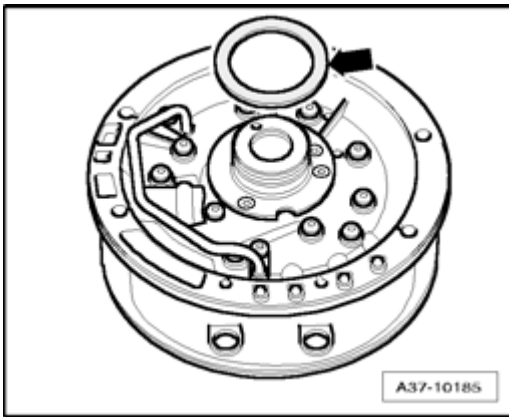
Courtesy of VOLKSWAGEN UNITED STATES, INC.

- Bolt on ATF supply in sequence - **1 to 8** -.
- Tightening torque: 10 Nm.

**Fig. 71: Measuring Axial Clearance On Input Shaft**

Courtesy of VOLKSWAGEN UNITED STATES, INC.

- Attach Dial gauge VAS 6080 with Dial gauge holder VW 387 to transmission flange.
- Insert Dial gauge VAS 6080 with Dial gauge extension T10170/1 into bore of input shaft of transmission, as depicted in illustration.
- To protect against damage, cover input shaft with insulating tape.
- Move input shaft up and down using pliers, avoid lateral movement while doing so.
- Read value of axial clearance on input shaft.
- Specified value: 0.15 to 0.45 mm.
- If specified value is not obtained, remove ATF supply again.

**Fig. 72: Locating Shim**

Courtesy of VOLKSWAGEN UNITED STATES, INC.

- Determine correct adjustment shim - **arrow** - according to table.
- Measured axial clearance too small: Install respectively thinner shim.
- Measured axial clearance too large: Install respectively thicker shim.

Available adjustment shims:

Shim thickness in mm		
1.4	2.0	2.6
1.6	2.2	
1.8	2.4	

- Reinstall ATF supply with new adjustment shim, new sealing washers and new O-ring thinly coat previously installed adjustment shim.
- Check axial clearance of input shaft again.

If specified value is again not obtained:

- Repeat adjustment.

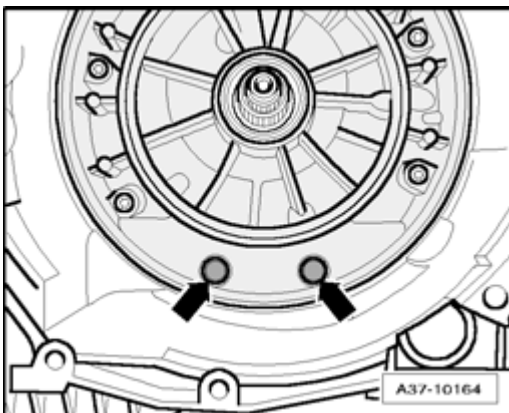


Fig. 73: Caps For Threaded Connection Of ATF Supply At Bottom Of Converter Housing
Courtesy of VOLKSWAGEN UNITED STATES, INC.

- If specified value is reached, press sealing plug - **arrows** - flush in using appropriate drift.

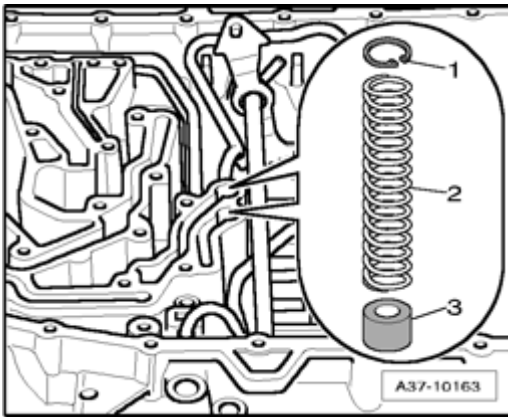


Fig. 74: Securing Rings, Coil Springs And Sealing Sleeve
Courtesy of VOLKSWAGEN UNITED STATES, INC.

- Swing transmission on assembly stand.
- Valve body side points upward.
- Slide sealing sleeve - **3** - and coil springs - **2** - into bores of transmission housing.
- Secure coil springs in bores using circlips - **1** -.
- Installation depth of circlips = 2 to 5 mm.

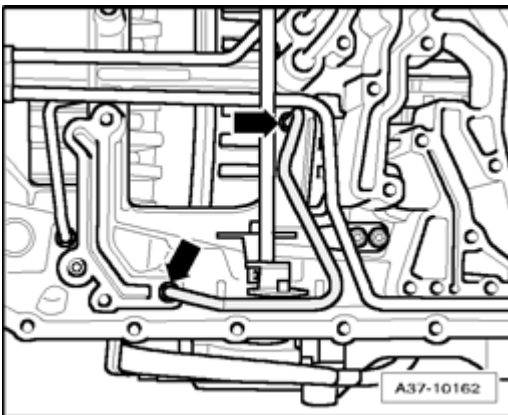


Fig. 75: Clutch ATF Oil Tube "E"
Courtesy of VOLKSWAGEN UNITED STATES, INC.

- Replace ATF oil tube for clutch "E".

NOTE:

- Do not cant ATF oil tube when driving in.

- Drive ATF oil tube for clutch "E" gradually, alternating between sides, into transmission housing - **arrows** - using drive-in tool T10274.

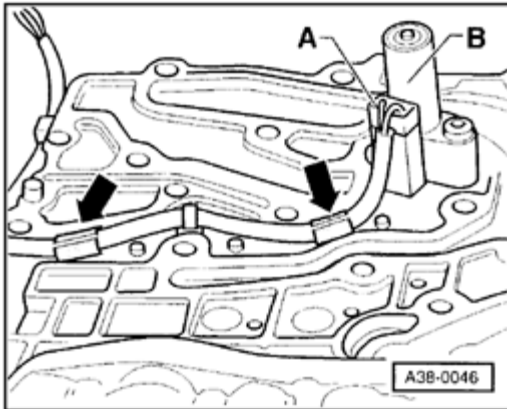


Fig. 76: Transmission RPM And Retaining Clamps
Courtesy of VOLKSWAGEN UNITED STATES, INC.

- Check whether electrical harness connectors of wiring harness are connected to corresponding solenoid valves.

NOTE:

- **Retaining tabs must be engaged.**

- Connector - **A** - for Transmission Input Speed (RPM) Sensor G182 - **item B** - must be connected on rear side of valve body.
- Check whether wiring harness is secured with holding clips - **arrows** -.

CAUTION:

- **Replace damaged holding clips.**
- **Route wiring harness as shown in figure.**
- **In case of deviations, the wiring harness can be pinched and damaged during installation of the valve body.**

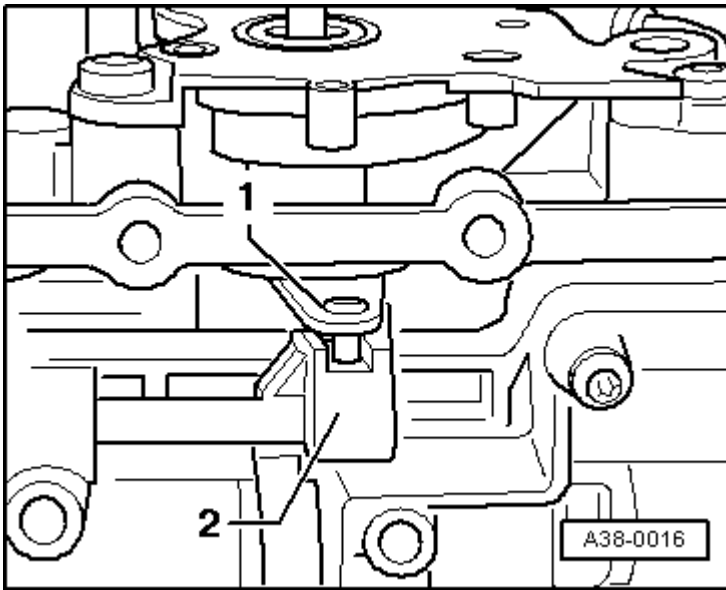


Fig. 77: Position Valve Body On Transmission Housing While Inserting Notched Disc Pins -1- Into Selector Slide Groove -2-

Courtesy of VOLKSWAGEN UNITED STATES, INC.

- Place valve body onto transmission housing without force.
- Set pin of notched disc - 1 - into groove of selector register - 2 -.

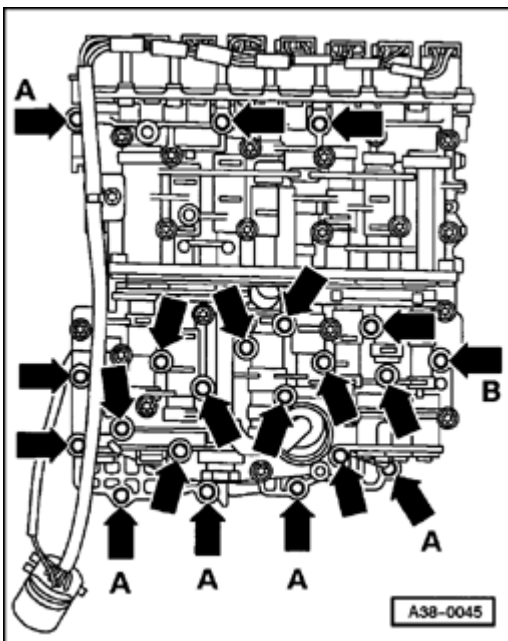


Fig. 78: Valve Body Bolts

Courtesy of VOLKSWAGEN UNITED STATES, INC.

- Hand-tighten bolts - **arrows** -.

2005 Volkswagen Phaeton

TRANSMISSION Servicing 5 Spd. Automatic Transmission 01L

NOTE:

- Note different length of bolts. Allocation:

Position		Quantity	Bolt length
- Arrow -	=	15	M6x60
- Arrow A -	=	5	M6x30
- Arrow B -	=	1	M6x55 (chromated, silver)

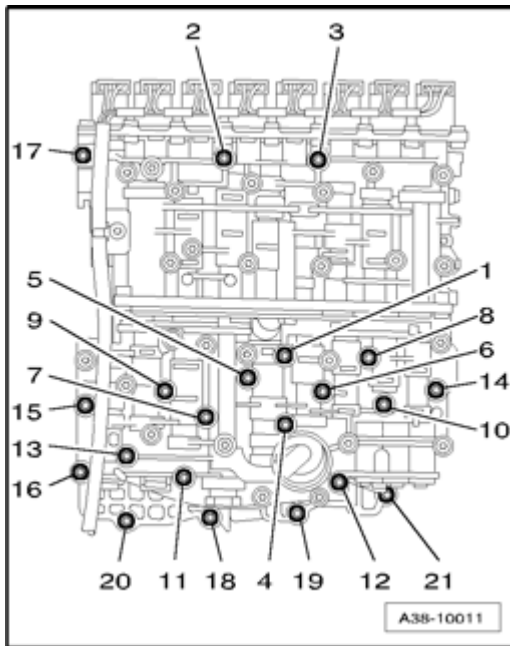


Fig. 79: Valve Body Bolt Tightening Sequence

Courtesy of VOLKSWAGEN UNITED STATES, INC.

- Tighten bolts in sequence - **1 to 28** -.
- Tightening torque: 8 Nm.

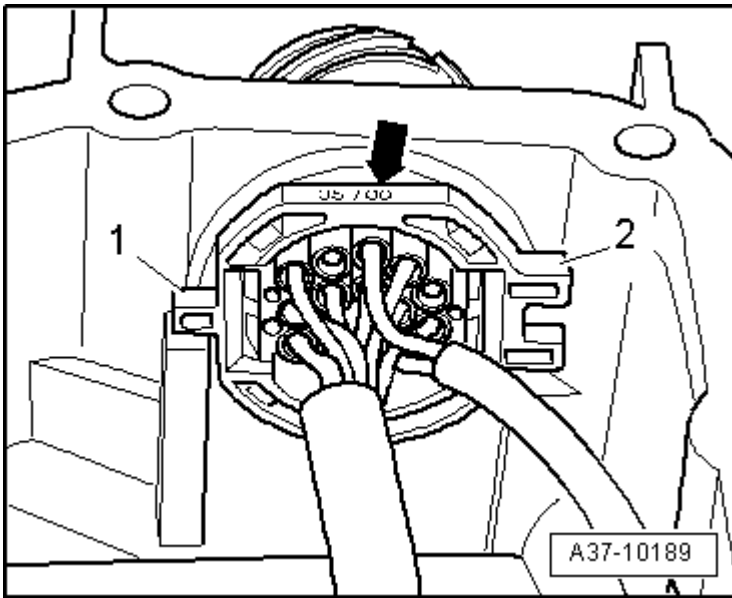


Fig. 80: Location Of Transmission Harness Connector and Connector O-ring
 Courtesy of VOLKSWAGEN UNITED STATES, INC.

- Replace O-rings for wiring harness connector.
- Connect wiring harness connector to transmission housing.
- Installation position: Retainers - 1 - and - 2 - at collar are horizontal, leveled side - **arrow** - of connector must be parallel to oil pan sealing surface.

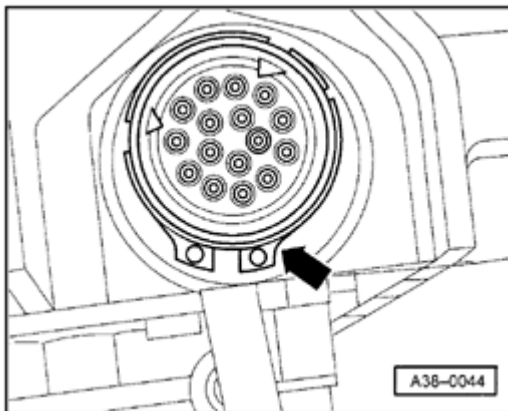


Fig. 81: Securing Ring For Wiring Harness Connector
 Courtesy of VOLKSWAGEN UNITED STATES, INC.

- Connect circlip - **arrow** - for wiring harness connector.

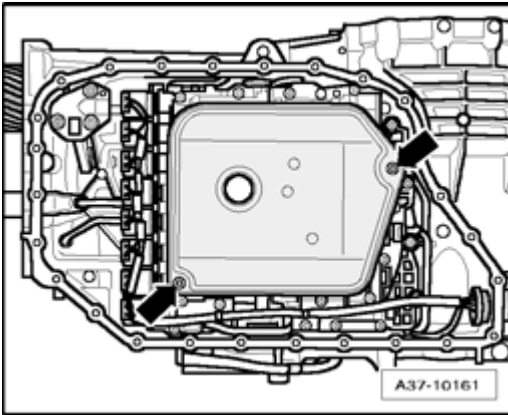


Fig. 82: ATF Strainer bolts

Courtesy of VOLKSWAGEN UNITED STATES, INC.

- Attach ATF filter to valve body.
- Bolt on ATF filter.
- Tightening torque: 6 Nm.

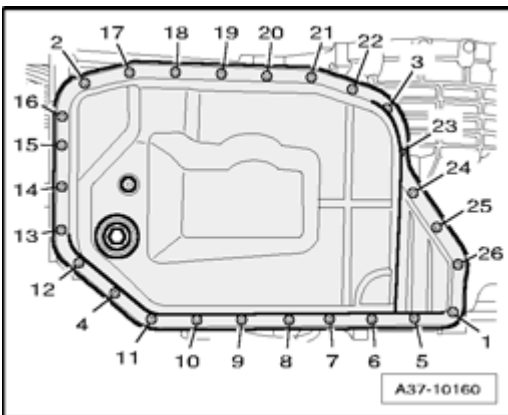


Fig. 83: ATF Oil Pan Bolts

Courtesy of VOLKSWAGEN UNITED STATES, INC.

NOTE:

- Clean magnets (4x) in oil pan.
- Ensure full surface contact of the magnets in the oil pan.
- Install ATF oil pan with a new seal.
- Tighten bolts for ATF oil pan in diagonal sequence - **1 to 26** -.
- Tightening torque: 11 Nm.

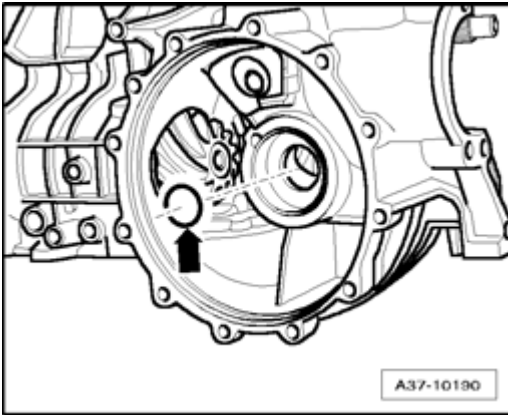


Fig. 84: Transmission Housing O-Ring On Differential Side
 Courtesy of VOLKSWAGEN UNITED STATES, INC.

- Thinly coat new O-ring with Vaseline. Use only Vaseline, other lubricating substances cause functional problems in the hydraulic transmission control.
- Insert new O-ring - **arrow** - into transmission housing on differential side.

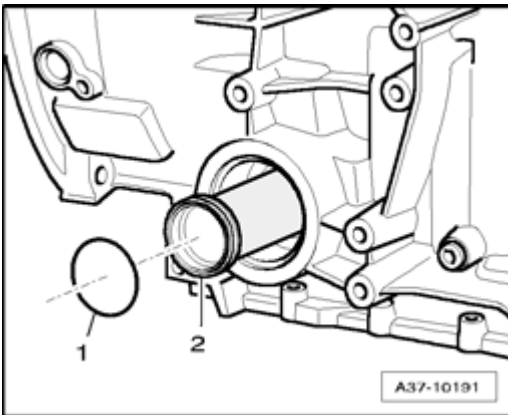


Fig. 85: O-Ring Positioned On Protective Tube
 Courtesy of VOLKSWAGEN UNITED STATES, INC.

- Thinly coat new O-ring with Vaseline. Use only Vaseline, other lubricating substances cause functional problems in the hydraulic transmission control.
- Position O-ring - **2** - on protective tube - **1** -.
- Slide protective tube from left transmission side into transmission housing.

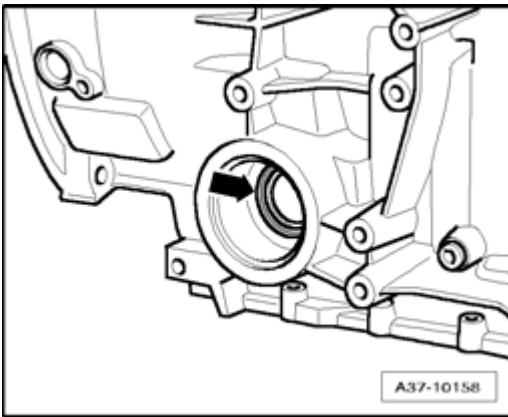


Fig. 86: Locating Securing Ring For Protective Tube On Left Transmission Side
Courtesy of VOLKSWAGEN UNITED STATES, INC.

- Secure protective tube using circlip - **arrow** -.

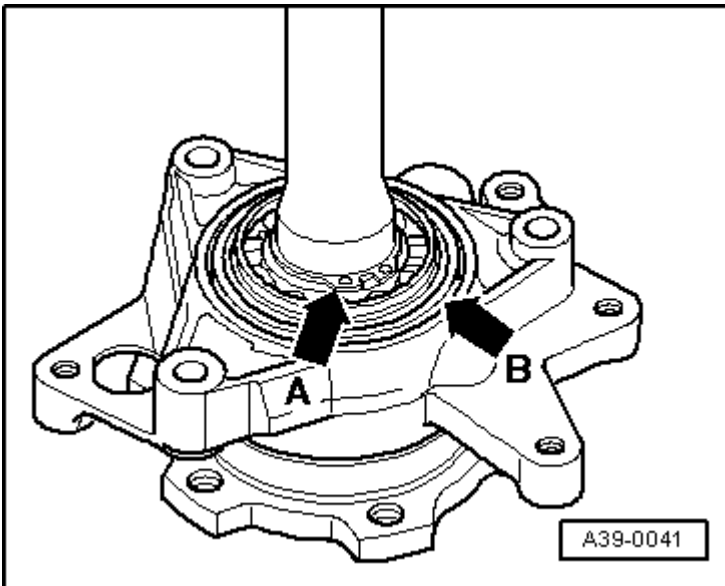


Fig. 87: Removing/Installing Circlip And Seal At Grooved Ball Bearing
Courtesy of VOLKSWAGEN UNITED STATES, INC.

- If necessary, replace gasket for left flange shaft --> **39F - FRONT FINAL DRIVE, DIFFERENTIAL** or **39R - FINAL DRIVE, REAR DIFFERENTIAL** .
- Replace O-ring - **arrow B** - in mounting bracket for left flange shaft.

NOTE:

- Disregard - **arrow A** -.

- Check left drive flange for burrs and sharp edges at transmission side shaft end (at end of splining) and deburr if necessary.
- Insert left flange shaft into transmission.

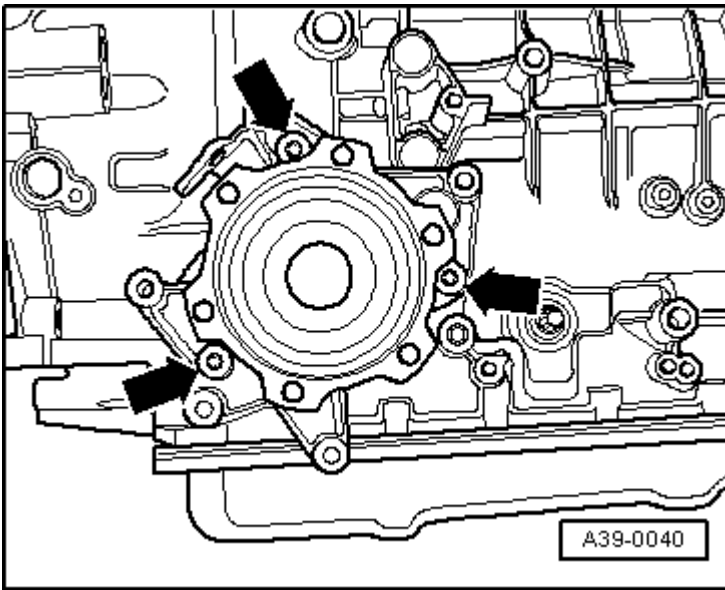


Fig. 88: Removing/Installing Left Drive Flange Mounting Bracket
Courtesy of VOLKSWAGEN UNITED STATES, INC.

- Tighten bolts on mounting bracket for left flange shaft - **arrows** -.
- Tightening torque: 23 Nm.

CAUTION:

- Make sure that bearing rings and adjustment shims for differential do not fall out of transmission housing and differential cover.
- Bearing rings and adjustment shims that have fallen out cannot be relocated with shop equipment.

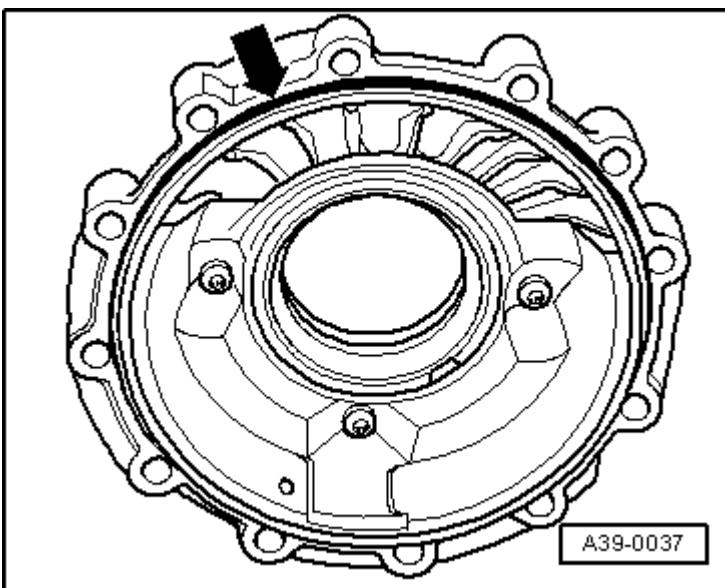


Fig. 89: Differential Cover O-Ring
Courtesy of VOLKSWAGEN UNITED STATES, INC.

- Replace O-ring - **arrow** - in differential cover.

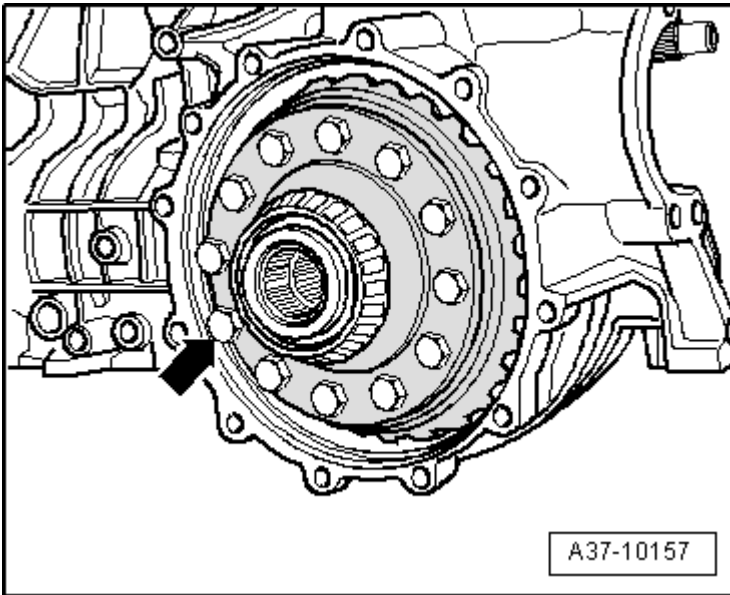


Fig. 90: Removing/Installing Differential
Courtesy of VOLKSWAGEN UNITED STATES, INC.

- Carefully insert differential.

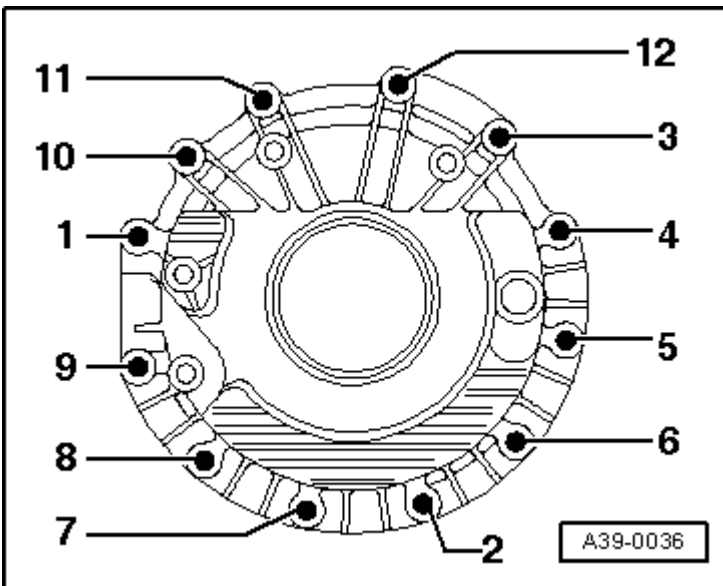


Fig. 91: Installing Cover For Front Final Drive, Tightening Sequence
Courtesy of VOLKSWAGEN UNITED STATES, INC.

- Position differential cover at transmission housing.
- Tighten bolts on differential cover in 2 stages in tightening sequence shown as follows:
- Hand-tighten bolts - **1** - , - **2** - and - **3** -.

- Tighten bolts - **1 to 12** -.
- Tightening torque: 23 Nm.

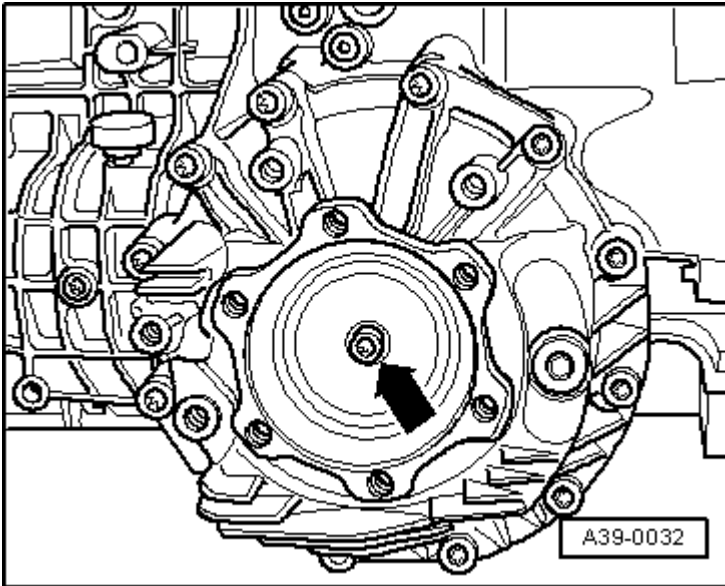


Fig. 92: Flange Shaft Bolt

Courtesy of VOLKSWAGEN UNITED STATES, INC.

- If necessary, replace gasket for right flange shaft --> **39F - FRONT FINAL DRIVE, DIFFERENTIAL** or **39R - FINAL DRIVE, REAR DIFFERENTIAL** .
- Tighten bolt for flange shaft - **arrow** - , secure flange shaft against turning using drift.
- Tightening torque: 25 Nm.

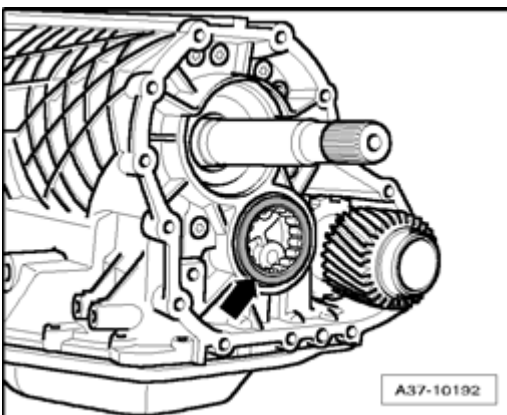


Fig. 93: Intermediate Pinion Roller Bearing

Courtesy of VOLKSWAGEN UNITED STATES, INC.

- Replace roller bearing - **arrow** - for intermediate pinion.
- Carefully drive in roller bearing for intermediate pinion all around until stop using plastic hammer.

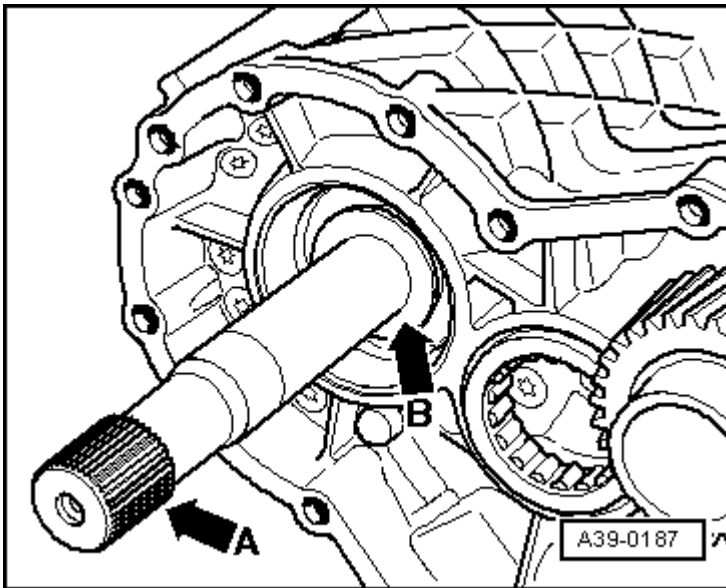


Fig. 94: Cover Splines On Input Shaft (To Prevent Damage To Gasket)

Courtesy of VOLKSWAGEN UNITED STATES, INC.

- Completely cover splines on end of input shaft - **arrow A** - with insulating tape without creasing or overlapping the tape to prevent damage to gasket when sliding on drive pinion.

NOTE:

- Disregard - arrow B -.

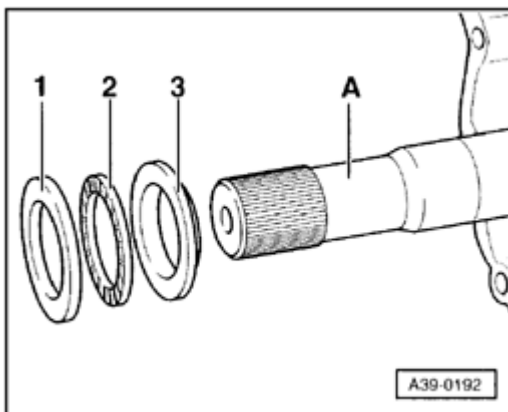


Fig. 95: Input Shaft Discs

Courtesy of VOLKSWAGEN UNITED STATES, INC.

- Position discs - **1 to 3** - on input shaft - **A** -.
1. Adjustment shim
 2. Roller bearing
 3. Thrust washer with cone (cone faces transmission)

NOTE:

- All three elements are pre-determined and may not be replaced with just

any other element.

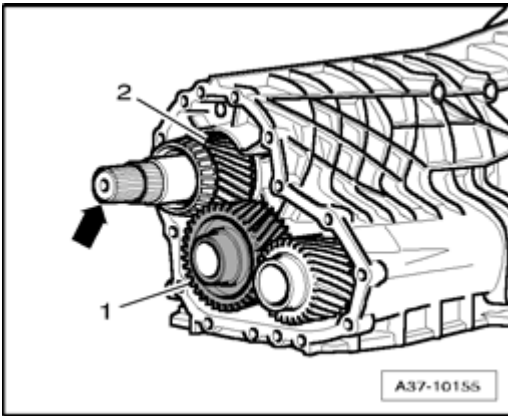


Fig. 96: Intermediate Pinion And Drive Pinion

Courtesy of VOLKSWAGEN UNITED STATES, INC.

- Insert drive pinion - 2 - together with intermediate pinion - 1 - into transmission housing, as marked when removing.

CAUTION:

- The intermediate pinion - 1 - is built symmetrically but must be reinserted in the same position, as marked when removing, to maintain running direction.
- When installing drive pinion - 2 - carelessly, double seal in drive pinion can be damaged. Replace double seal --> 39F - FRONT FINAL DRIVE, DIFFERENTIAL or 39R - FINAL DRIVE, REAR DIFFERENTIAL

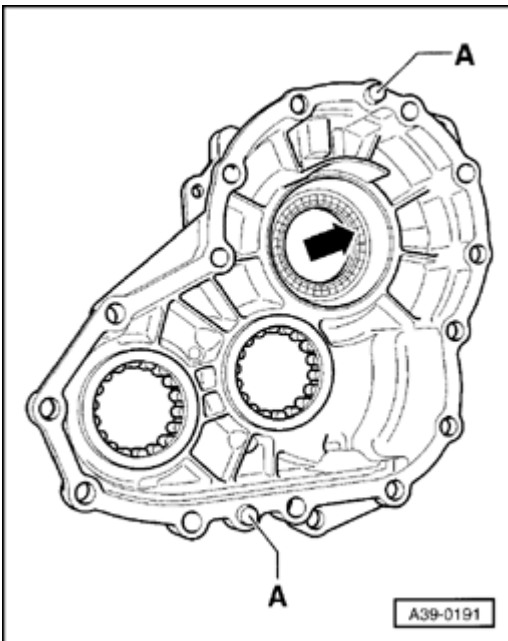


Fig. 97: Centering Sleeves Present In Intermediate Flange

Courtesy of VOLKSWAGEN UNITED STATES, INC.

- Check whether centering sleeves - **A** - are present in intermediate flange for front final drive.
- Install new gasket.

NOTE:

- **Apply thin coat of axle oil on sealing surface before installing gasket to avoid slipping of the gasket.**

- Carefully place intermediate flange for front final drive.

CAUTION: When installing the intermediate flange to the input shaft carelessly, the sealing lip of the sealing ring - arrow - can be damaged.

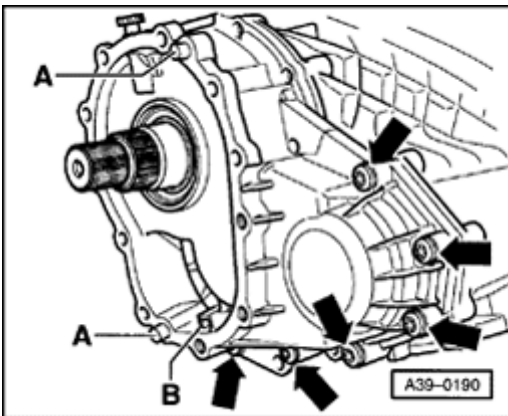


Fig. 98: Seal In Front Final Drive Intermediate Flange, Replacing
Courtesy of VOLKSWAGEN UNITED STATES, INC.

- Hand-tighten bolts - **arrows** -.

NOTE:

- **When tightening bolts by hand, make sure the housing gap between intermediate flange for front final drive and transmission housing decreases evenly all around.**

- Tighten bolts.
- Tightening torque: 23 Nm.
- Check whether centering sleeves - **A** - are present in intermediate flange.
- Install new gasket.

NOTE:

- **Apply thin coat of axle oil on sealing surface before installing gasket to avoid slipping of the gasket.**

- Slide cleaned solenoid in cast-on holding pocket - **B** - in intermediate flange.

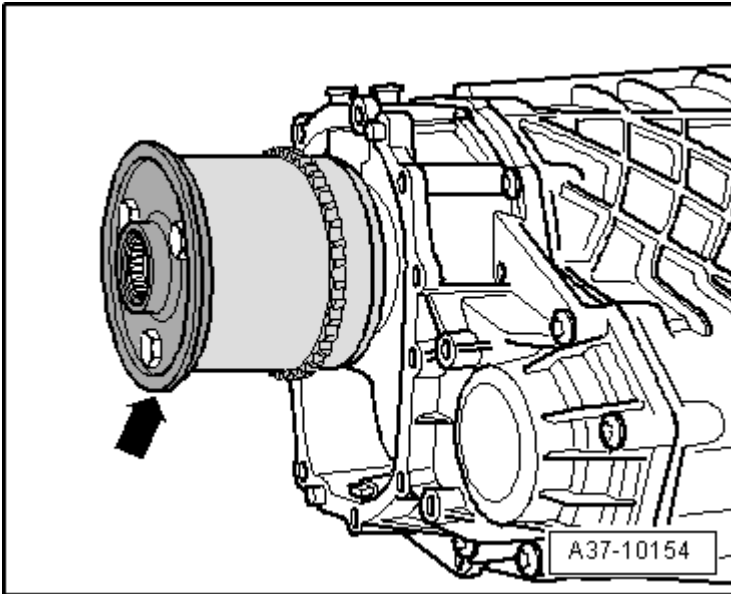


Fig. 99: Removing/Installing Torsen Differential At Input Shaft
Courtesy of VOLKSWAGEN UNITED STATES, INC.

- Attach Torsen differential - **arrow** - onto output shaft.

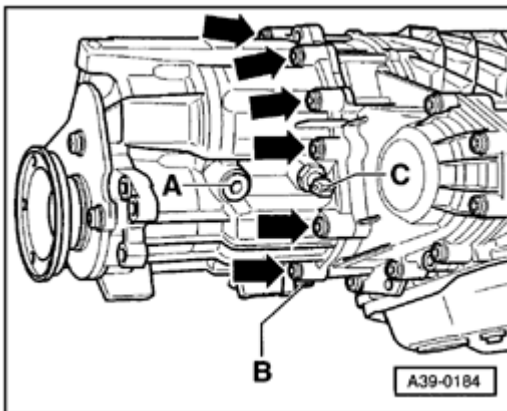


Fig. 100: Transfer Case Bolts
Courtesy of VOLKSWAGEN UNITED STATES, INC.

- Attach transfer case housing with installed spur gears and rear output flange to transmission.
- Hand-tighten bolts for transfer housing - **arrows** -.

NOTE:

- When tightening bolts by hand, make sure the housing gap between transfer housing and transmission housing decreases evenly all around.

- Tighten bolts in diagonal sequence.
- Tightening torque: 23 Nm.

- Remove transmission from assembly stand.
- Insert torque converter and secure so that it cannot fall out.
- Check installation dimension of torque converter --> **32 - TORQUE CONVERTER** .
- Check ATF level and top off --> **37 - AUTOMATIC TRANSMISSION - CONTROLS, HOUSING** .
- Top off axle oil in front final drive and check oil level --> **39F - FRONT FINAL DRIVE, DIFFERENTIAL** or **39R - FINAL DRIVE, REAR DIFFERENTIAL** .
- Top off axle oil in transfer case and check --> **39F - FRONT FINAL DRIVE, DIFFERENTIAL** or **39R - FINAL DRIVE, REAR DIFFERENTIAL** .

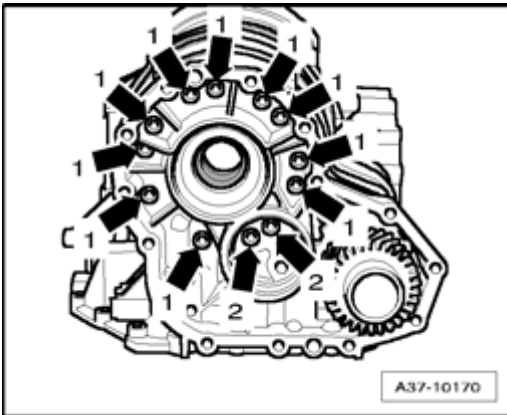


Fig. 101: Transmission Bolts

Courtesy of VOLKSWAGEN UNITED STATES, INC.

Tightening torques

Component		Nm
Bolts - arrows 1 -	Countersunk	23
	Oval head	16.2 + 65 ° * See note
Bolts - arrows 2 -	Countersunk	23
ATF supply on transmission housing		10
Valve body at transmission housing		8
ATF filter on valve body		6
ATF oil pan on transmission housing		11
Mounting bracket for left drive flange on transmission		23
Differential cover on transmission		23
Right drive flange		25
Intermediate flange on transmission		23
Transfer housing on transmission		23

*Replace bolts.

CLUTCH "F" WITH FREE-RUNNING HUB. DISASSEMBLING AND ASSEMBLING

Clutch "F" with free-running hub, assembly overview

NOTE:

- Some of the depicted components are part of component groups and are not available separately as replacement part.
- Check individual components of clutch "F" for wear and damage --> Clutch "F" with freewheel.

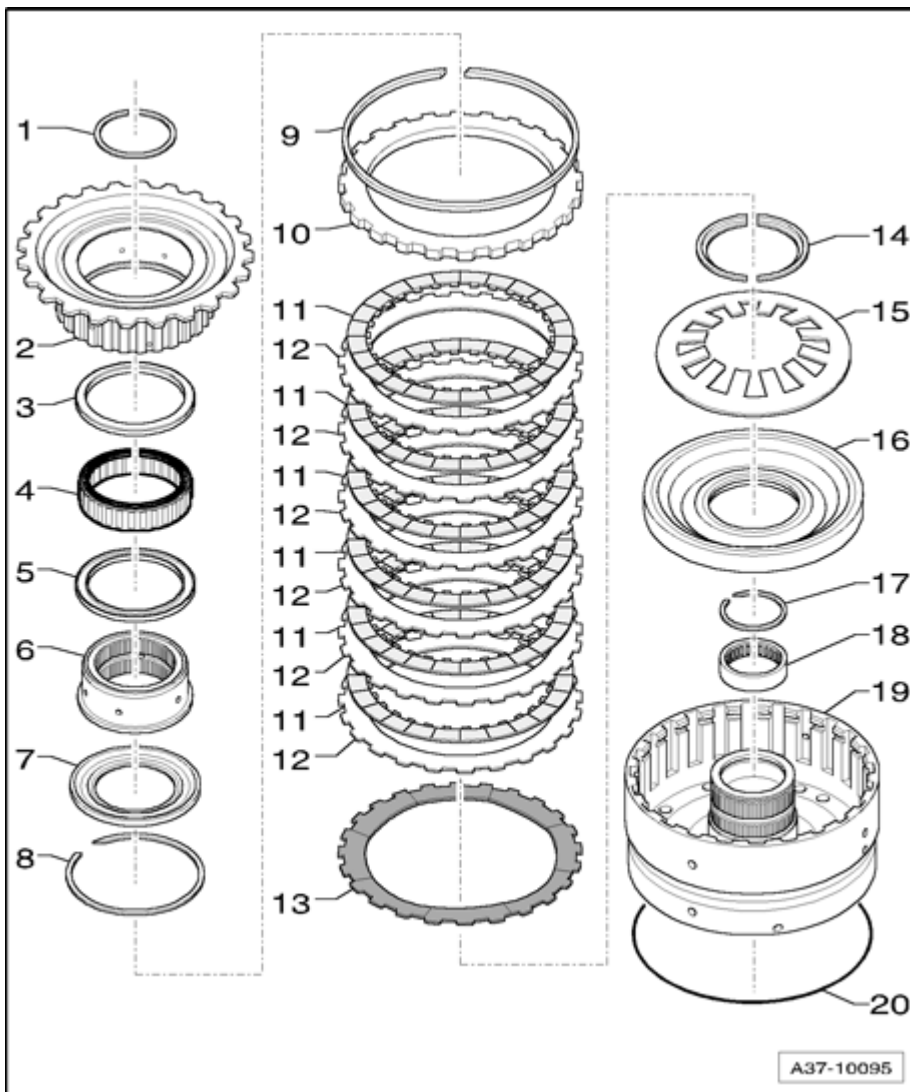


Fig. 102: Clutch "F" With Free-Running Hub, Assembly Overview
 Courtesy of VOLKSWAGEN UNITED STATES, INC.

1 - Circlip

2 - Freewheel 1st gear

3 - Upper cover plate

- Open side faces freewheel housing

4 - Freewheel housing

5 - Lower cover plate

- Open side faces freewheel housing

6 - Freewheel inner race

7 - Holding plate

8 - Circlip

9 - Circlip

- Determining thickness of circlip **Fig. 123**

10 - Thick outer plate

11 - Coated plate

12 - Outer plate

13 - Locking washer

14 - Split retaining ring

- Bent side at right angle faces dished washer

15 - Dished washer

16 - Piston "F"

- Always replace piston "F" , part no. 0 501 208 317, until transmission no. 069 312 with new version, part no. 0 501 212 967
- The part no. is stamped on gummed side of piston

17 - Circlip

18 - Needle bearing

19 - Cylinder "F"

20 - O-ring

- Replace

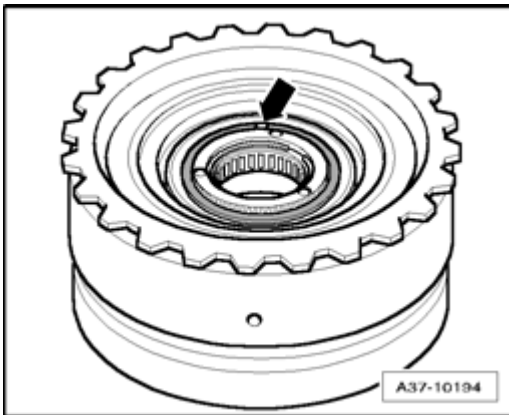
Clutch "F" , disassembling

Fig. 103: Clutch "F" Circlip
Courtesy of VOLKSWAGEN UNITED STATES, INC.

- Remove circlip - **arrow** -.

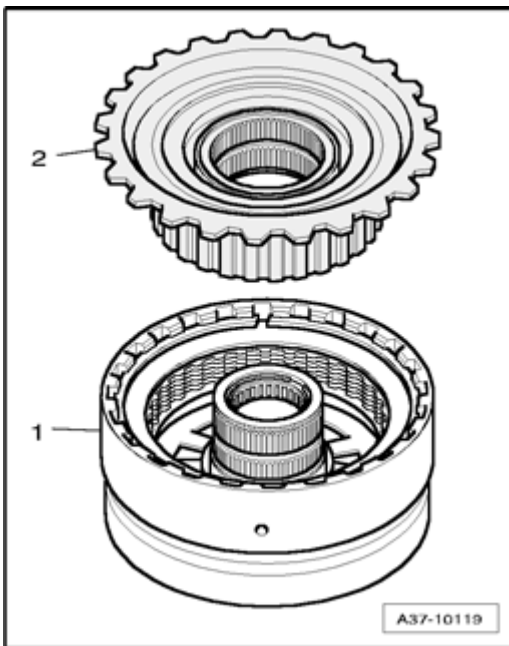


Fig. 104: Freewheel 1st Gear And Cylinder "F"
Courtesy of VOLKSWAGEN UNITED STATES, INC.

- Pull freewheel 1st gear - **2** - off cylinder "F" - **1** -.

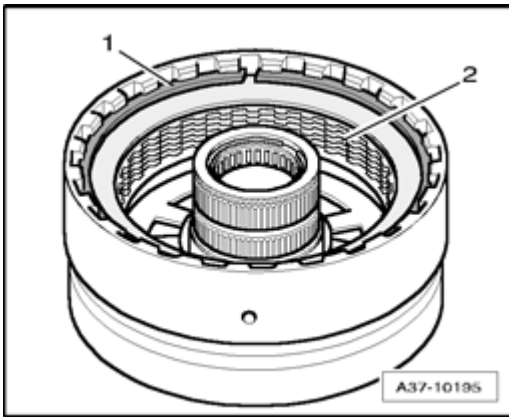


Fig. 105: Cylinder "F" Circlip And Disc Pack
 Courtesy of VOLKSWAGEN UNITED STATES, INC.

- Remove circlip - 1 - and remove disc pack - 2 - from cylinder "F".

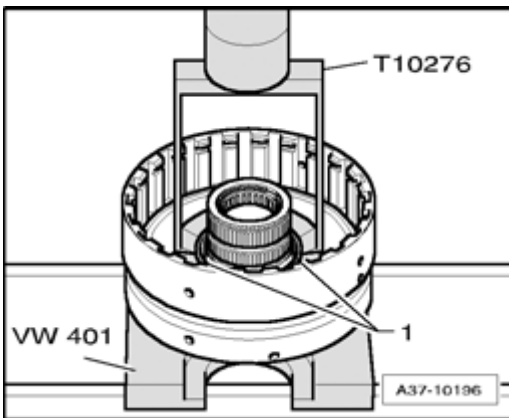


Fig. 106: Installation Bracket T10276 And Split Retaining Ring
 Courtesy of VOLKSWAGEN UNITED STATES, INC.

- Press dished washer down under shop press using installation bracket T10276.
- Remove split retaining ring - 1 - and release shop press.

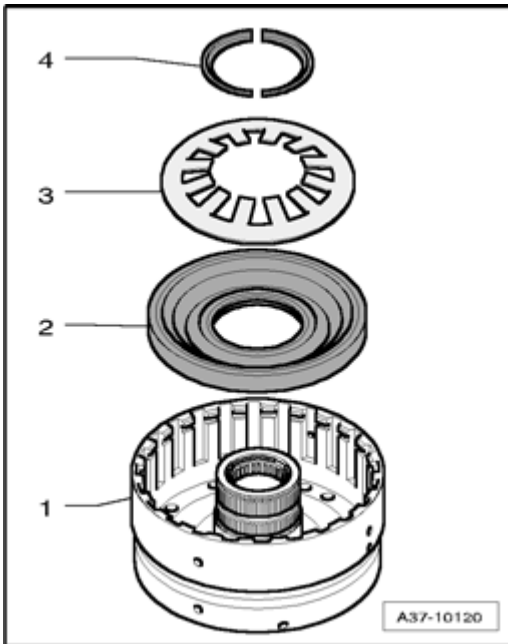


Fig. 107: Cylinder "F", Piston "F" And Dished Washer
Courtesy of VOLKSWAGEN UNITED STATES, INC.

- Remove dished washer - 3 -.
- Remove piston "F" - 2 - from cylinder "F" - 1 -.

4 - Split retaining ring

NOTE:

- In case of difficulty of movement, press piston "F" out from rear using 2 plastic drifts.

Freewheel, disassembling

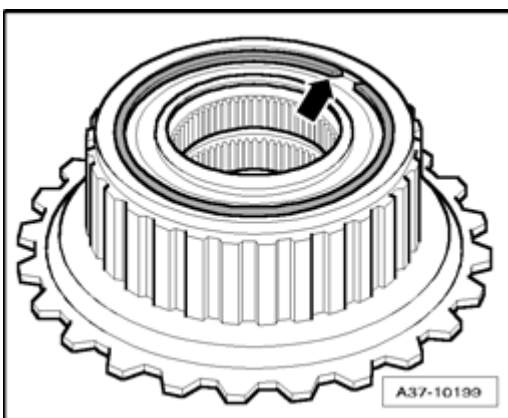


Fig. 108: Freewheel Circlip
Courtesy of VOLKSWAGEN UNITED STATES, INC.

- Pry off circlip - **arrow** -.

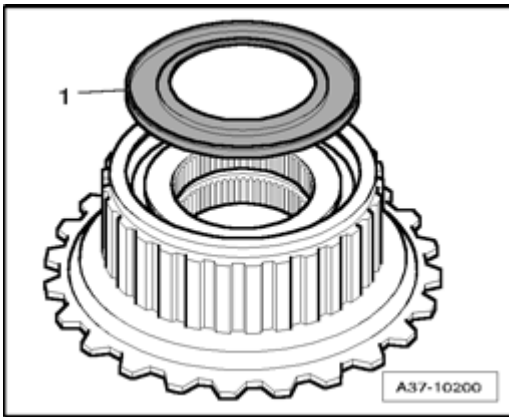


Fig. 109: Holding Plate

Courtesy of VOLKSWAGEN UNITED STATES, INC.

- Remove holding plate - 1 -.

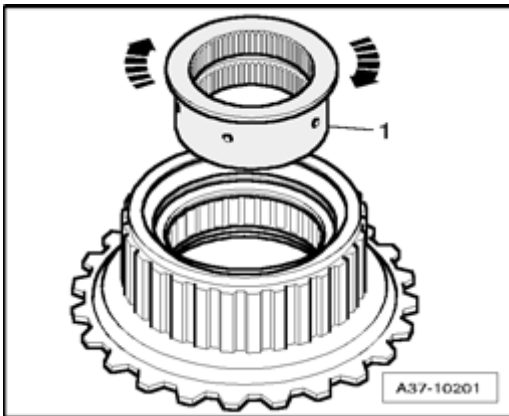


Fig. 110: Freewheel Inner Race

Courtesy of VOLKSWAGEN UNITED STATES, INC.

- Pull out freewheel inner race - 1 - , turn in a clockwise direction.

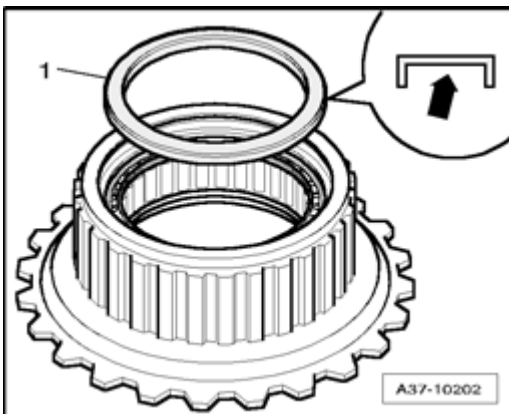
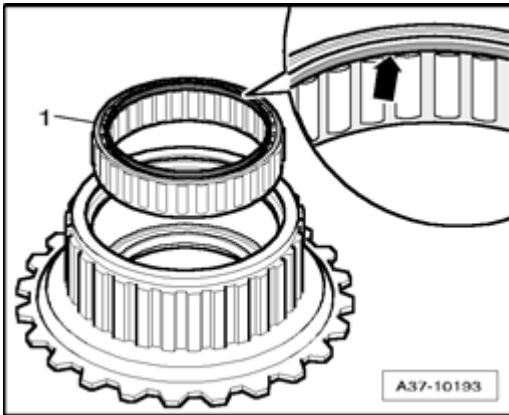


Fig. 111: Upper Holding Plate

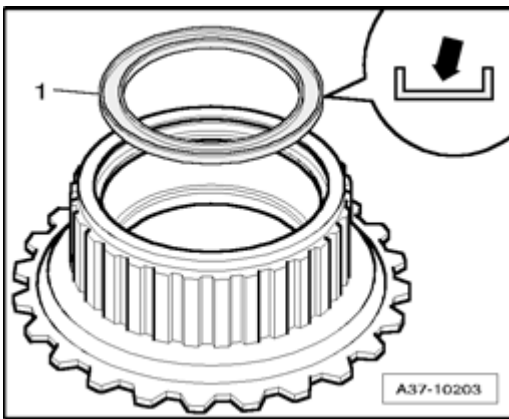
Courtesy of VOLKSWAGEN UNITED STATES, INC.

- Remove upper holding plate - 1 -.

**Fig. 112: Freewheel Housing**

Courtesy of VOLKSWAGEN UNITED STATES, INC.

- Remove freewheel housing - 1 -.

**Fig. 113: Lower Holding Plate**

Courtesy of VOLKSWAGEN UNITED STATES, INC.

- Remove lower holding plate - 1 -.

Freewheel, assembling

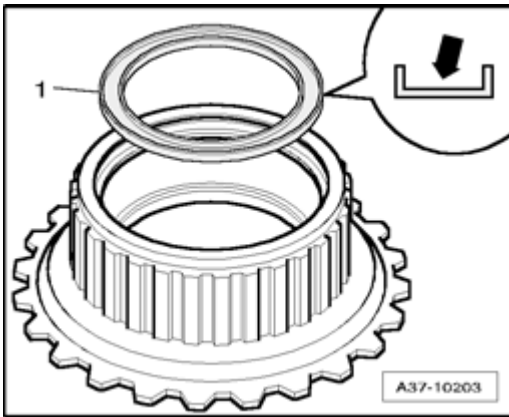


Fig. 114: Lower Holding Plate

Courtesy of VOLKSWAGEN UNITED STATES, INC.

- Insert lower holding plate - **1** -.
- Open side - **arrow** - faces upward.

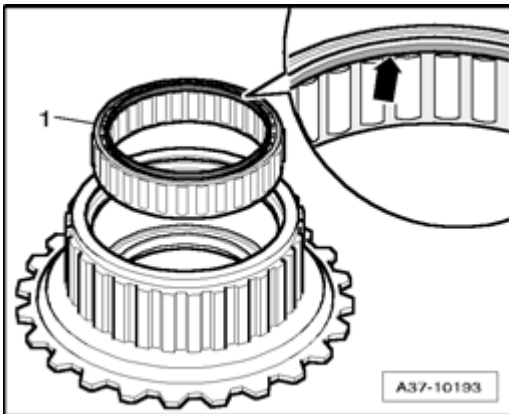


Fig. 115: Freewheel Housing

Courtesy of VOLKSWAGEN UNITED STATES, INC.

- Slide in freewheel housing - **1** - , slightly press on freewheel segments.
- Shoulder - **arrow** - on inner race faces upward.

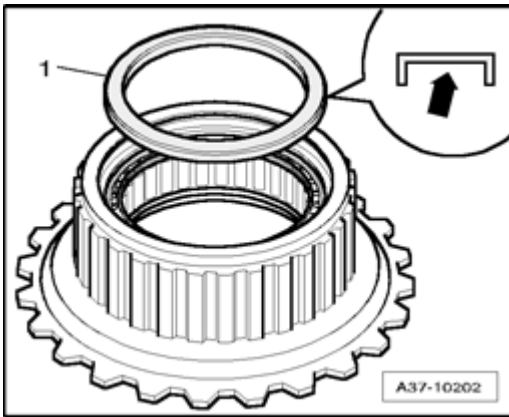


Fig. 116: Upper Holding Plate

Courtesy of VOLKSWAGEN UNITED STATES, INC.

- Insert upper holding plate - 1 -.
- Open side - **arrow** - faces downward.

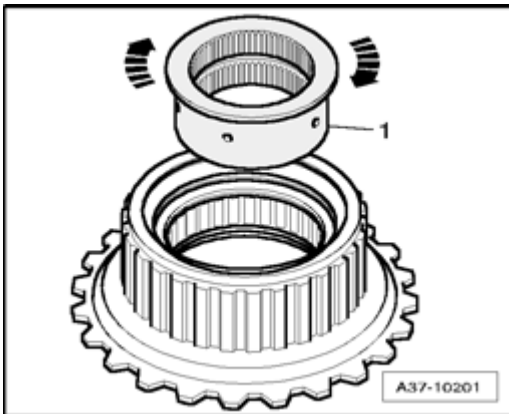


Fig. 117: Freewheel Inner Race

Courtesy of VOLKSWAGEN UNITED STATES, INC.

- Insert freewheel inner race - 1 - , turn in a clockwise direction.

CAUTION: Check installed position of freewheel.

- Inner race must be able to turn in a clockwise direction and must lock in a counter-clockwise direction when turned.

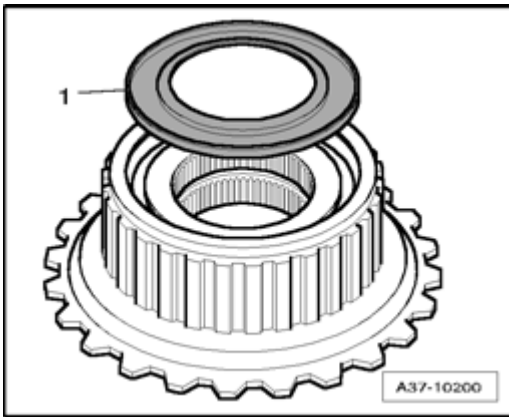


Fig. 118: Holding Plate

Courtesy of VOLKSWAGEN UNITED STATES, INC.

- Position holding plate - 1 -.

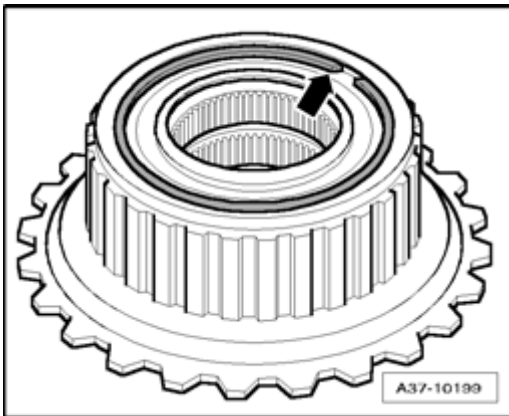


Fig. 119: Freewheel Circlip

Courtesy of VOLKSWAGEN UNITED STATES, INC.

- Install circlip - arrow -.

Clutch "F" , assembling

CAUTION: Check individual components of clutch "F" for wear and damage --> Clutch "C" with sun shaft.

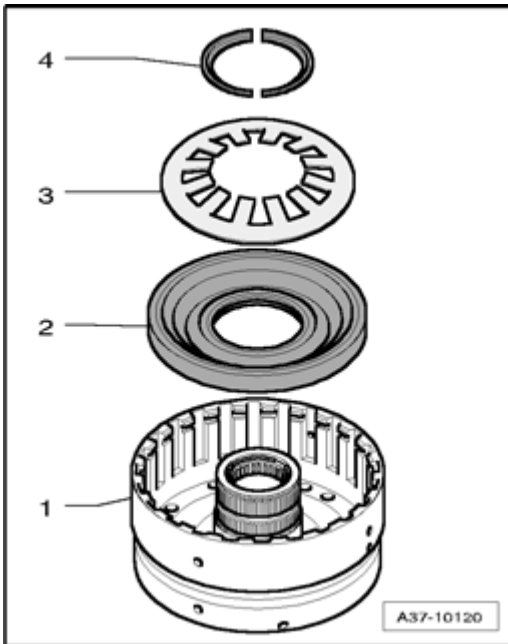


Fig. 120: Cylinder "F", Piston "F" And Dished Washer
Courtesy of VOLKSWAGEN UNITED STATES, INC.

- Always replace piston "F" , part no. 0 501 208 317, until transmission no. 069 312 with new version, part no. 0 501 212 967; the part no. is stamped on the gummed side of piston.
- Insert piston "F" item - 2 - into cylinder "F" item - 1 -.
- Gummed side faces downward.
- Position dished washer - 3 -.

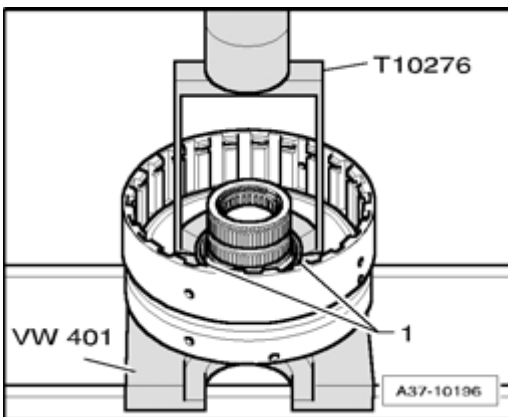


Fig. 121: Installation Bracket T10276 And Split Retaining Ring
Courtesy of VOLKSWAGEN UNITED STATES, INC.

- Press dished washer down under shop press using installation bracket T10276 and insert split retaining ring.

- Bent side at right angle of split retaining ring faces downward.
- Release shop press.

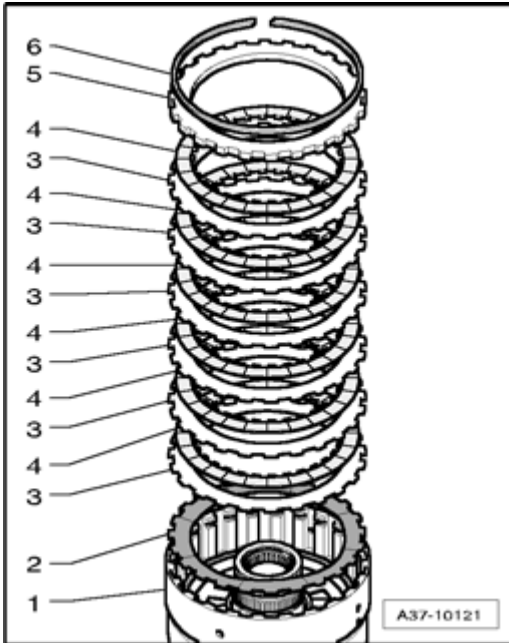


Fig. 122: Clutch "F" Assembly

Courtesy of VOLKSWAGEN UNITED STATES, INC.

- Insert wave washer - 2 - into cylinder "F" - **item 1** -.
- Install outer plate - 3 - and coated plate - 4 - alternately.
- Install thick outer plate - 5 -.
- Insert circlip - 6 -.

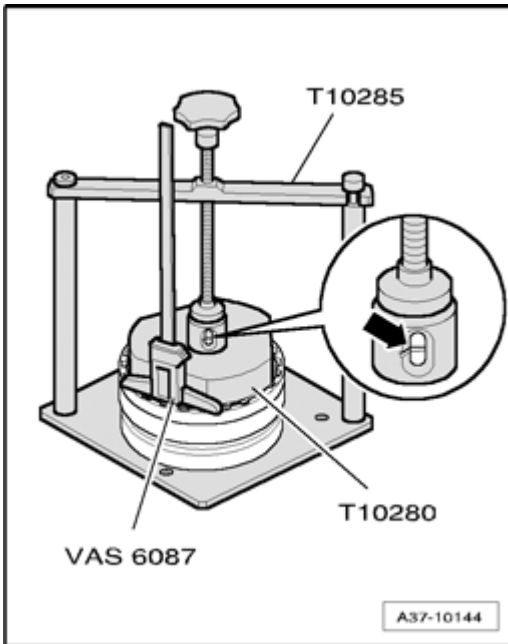


Fig. 123: Adjust Air Gap Clutch "F"

Courtesy of VOLKSWAGEN UNITED STATES, INC.

Adjust air gap clutch "F"

- Place cylinder "F" on pre-tensioning tool T10285.
- Place plate T10280 on outer plate clutch "F".
- Plate must not touch circlip.
- Insert pressure unit T10285/1 with centering pin into bore of plate.
- Align cylinder "F" on plate of pre-tensioning tool.
- The pressure unit must be centrally positioned under spindle thrust piece.
- Turn spindle of pre-tensioning tool downward.
- The markings at the inspection hole of the pressure unit must align - **arrow** -.
- Apply Digital depth gauge VAS 6087 at upper edge of cylinder "F" , as depicted in illustration.
- Apply measuring tongue on outer plate and note measuring value.
- Mark contact point on cylinder "F".
- Repeat measurement at 2 other points of outer plate, 120 ° offset each, and mark contact points.
- Average over 3 measured values under load.
- Release spindle and remove plate.

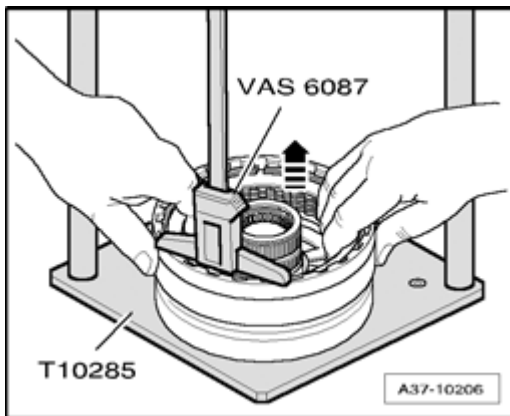


Fig. 124: Pulling Disc Pack Upward Using Hands
 Courtesy of VOLKSWAGEN UNITED STATES, INC.

- Reach with both hands into clutch "F" and pull disc pack upward until stop.
- When disc pack is pulled up, measure distance between upper edge of cylinder "F" and outer plate (2nd technician required) at one of the marked points.
- Repeat measurement at 2 other marked points of outer plate.
- Average over 3 measured values when disc pack is pulled up.
- Determine air gap on basis of the following calculations:

	Average of measured values under load (value 1 + value 2 + value 3): 3
	Measurement when disc pack is pulled up (value 1 + value 2 + value 3): 3
=	Air gap

- Subtract average of measured values when disc pack is pulled up from average of measured values under load.
- Specified value: 2.40 to 2.90 mm.

If specified value is not obtained:

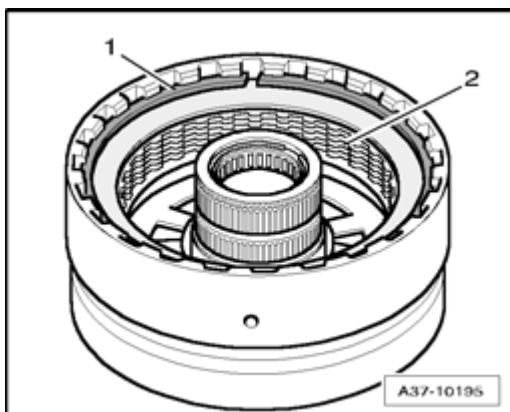


Fig. 125: Cylinder "F" Circlip And Disc Pack

Courtesy of VOLKSWAGEN UNITED STATES, INC.

- Determine new circlip - **1** -.

NOTE:

- Disregard - **2** -.
- Measured value too small: Install respectively thinner circlip.
- Measured value too large: Install respectively thicker circlip.

The following circlips are available:

Available circlips in mm	
2.6	3.4
3.0	3.8

- Check air gap of circlip again after inserting.
- Install freewheel 1st gear - **2** - in clutch "F" - **1** - , turn clockwise.
- Groove for circlip must become visible, then all plates for clutch "F" are engaged.

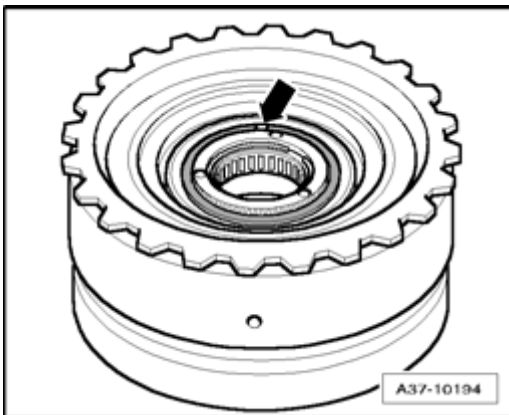


Fig. 126: Clutch "F" Circlip

Courtesy of VOLKSWAGEN UNITED STATES, INC.

- Insert circlip - **arrow** -.

TOWER "I", DISASSEMBLING AND ASSEMBLING

Clutch "C" with sun shaft, assembly overview

NOTE:

- Some of the depicted components are part of component groups and are not available separately as replacement part.
- Check individual components of clutch "C" for wear and damage --> Clutch "C" with sun shaft.

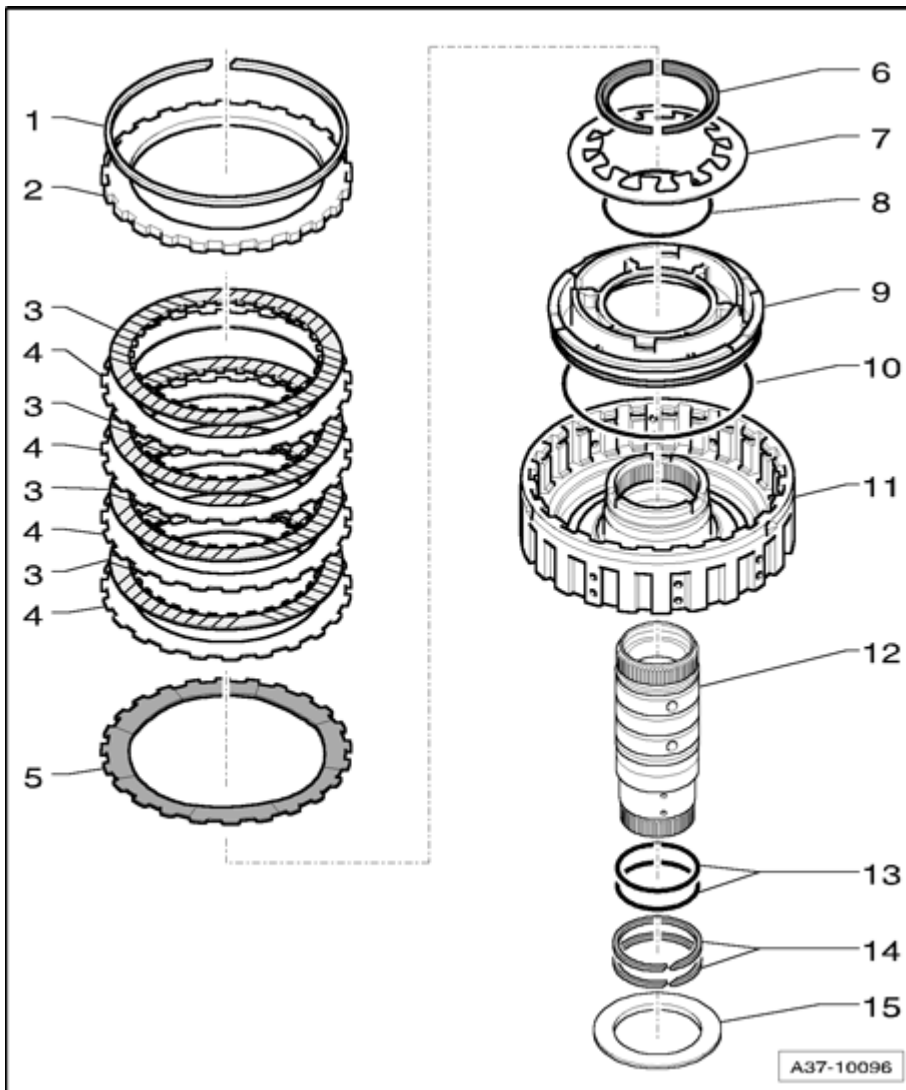


Fig. 127: Clutch "C" With Sun Shaft, Assembly Overview
 Courtesy of VOLKSWAGEN UNITED STATES, INC.

1 - Circlip

- Determining thickness **Fig. 138**

2 - Thick outer plate

3 - Coated plate

4 - Outer plate

5 - Wave washer

6 - Split retaining ring

- Bent side at right angle faces dished washer

7 - Dished washer

8 - O-ring

- Replace

9 - Piston "C"

10 - O-ring

- Replace

11 - Cylinder "C"

12 - Sun shaft

13 - O-rings

- Replace

14 - Rectangular rings

- Replace

15 - Axial needle bearing

Clutch "C" with sun shaft, disassembling and assembling

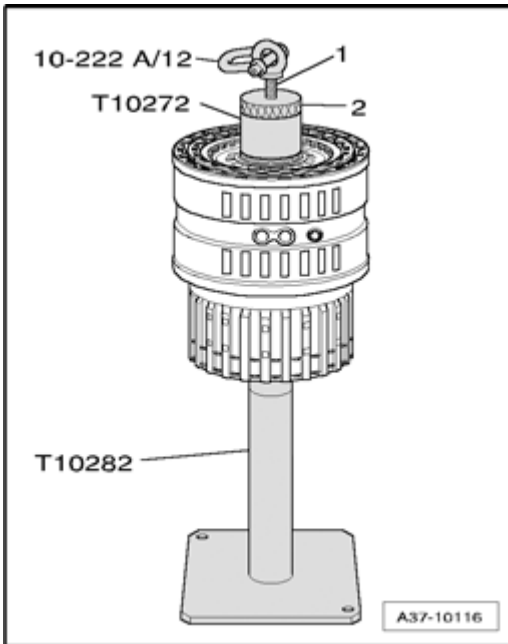


Fig. 128: Tower "I" Placed In Mounting Device T10282
 Courtesy of VOLKSWAGEN UNITED STATES, INC.

- Remove lifting device for tower I T10272 from tower "I".

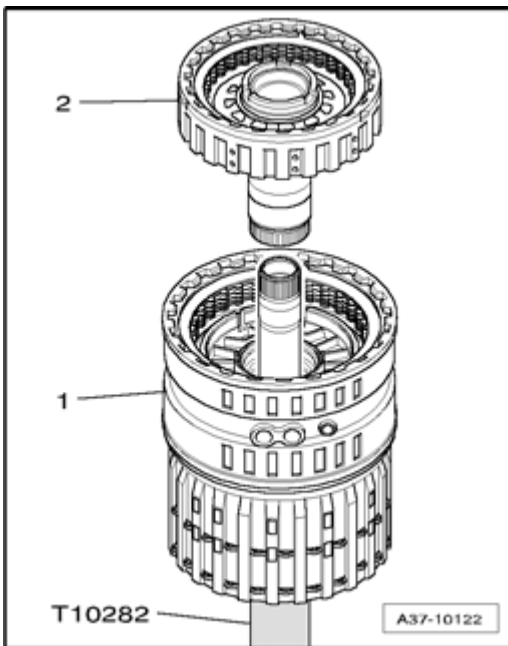


Fig. 129: Removing/Installing Clutch "C" With Sun Shaft From Cylinder "D/E"
 Courtesy of VOLKSWAGEN UNITED STATES, INC.

- Remove clutch "C" - 2 - with sun shaft from cylinder "D/E" - 1 -.

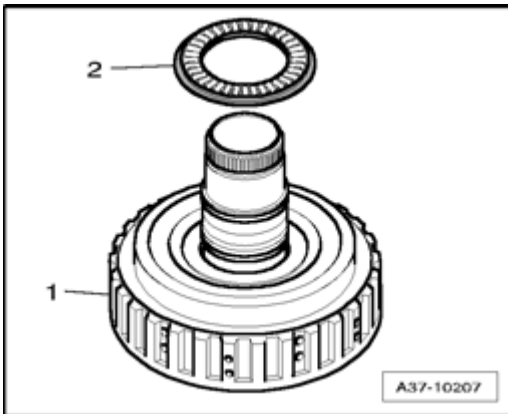


Fig. 130: Axial Needle Bearing And Clutch "C"
 Courtesy of VOLKSWAGEN UNITED STATES, INC.

- Twist clutch "C".
- Remove axial needle bearing - 2 - from clutch "C" - 1 -.

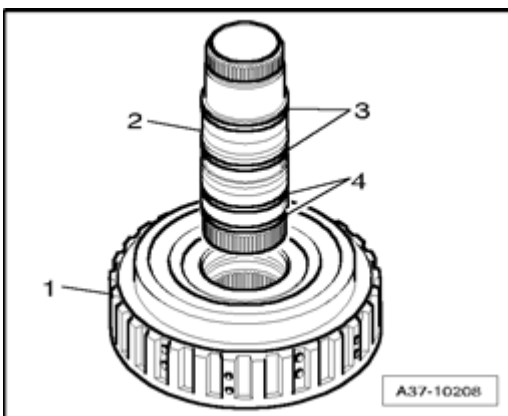


Fig. 131: Sun Shaft, Clutch "C" And Circlips
 Courtesy of VOLKSWAGEN UNITED STATES, INC.

- Pull sun shaft - 2 - out of clutch "C" - 1 - , drive out using soft drift if necessary.

NOTE: • Disregard - 3 - and - 4 -.

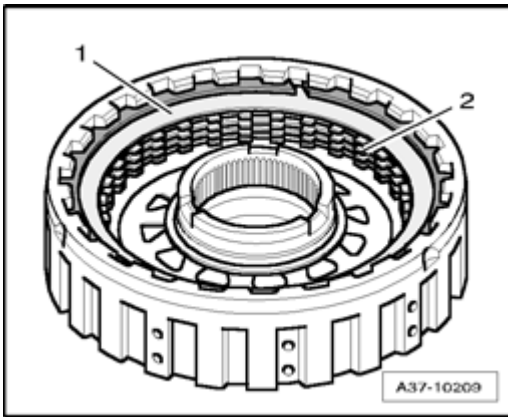


Fig. 132: Cylinder "C" Circlip And Disc Pack
Courtesy of VOLKSWAGEN UNITED STATES, INC.

- Twist clutch "C".
- Remove circlip - 1 - and remove disc pack - 2 - from cylinder "C".

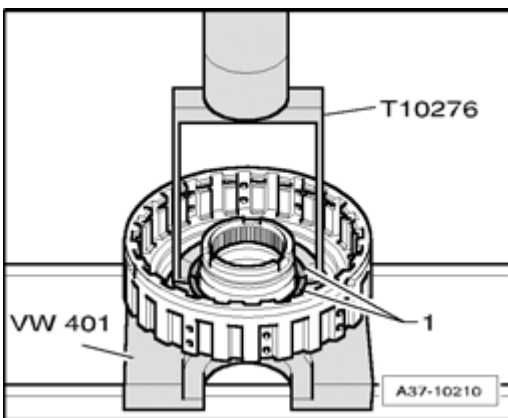


Fig. 133: Installation Bracket T10276 And Split Retaining Ring
Courtesy of VOLKSWAGEN UNITED STATES, INC.

- Press dished washer down under shop press using installation bracket T10276.
- Remove split retaining ring - 1 - and release shop press.
- Remove dished washer.

CAUTION: Wear protective glasses.

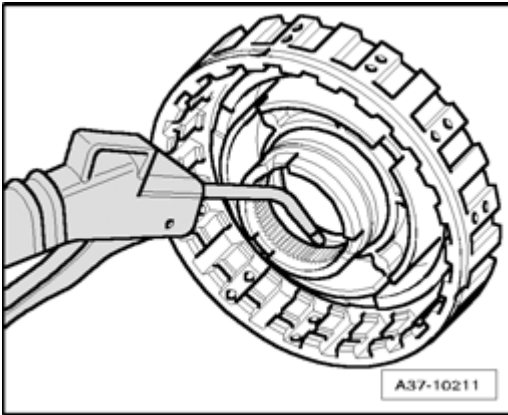


Fig. 134: Pressing Piston "C" Out Of Cylinder "C" With Compressed Air
 Courtesy of VOLKSWAGEN UNITED STATES, INC.

- Carefully press piston "C" out of cylinder "C" with compressed air, to do so plug two other oil bores using fingers.

CAUTION: Check individual components of clutch "C" for wear and damage --> Clutch "C" with sun shaft.

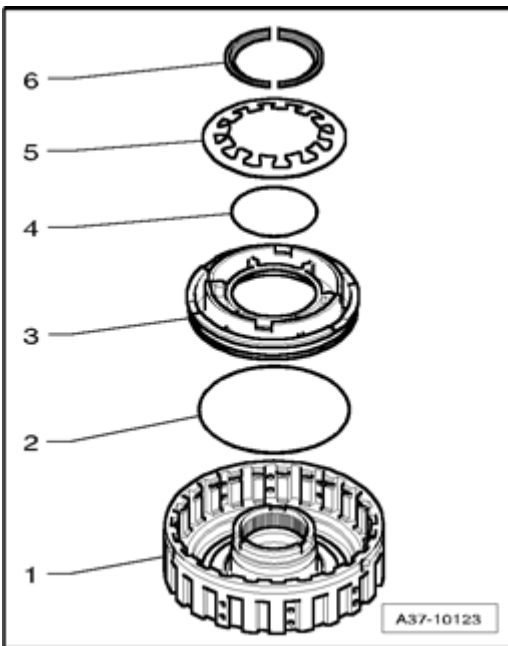


Fig. 135: Clutch "C" Components
 Courtesy of VOLKSWAGEN UNITED STATES, INC.

- Replace O-rings - 2 - and - 4 - for piston "C" - 3 -.
- Press piston "C" - 3 - into cylinder "C" - 1 - until stop.
- Position dished washer - 5 -.

6 - Split retaining ring

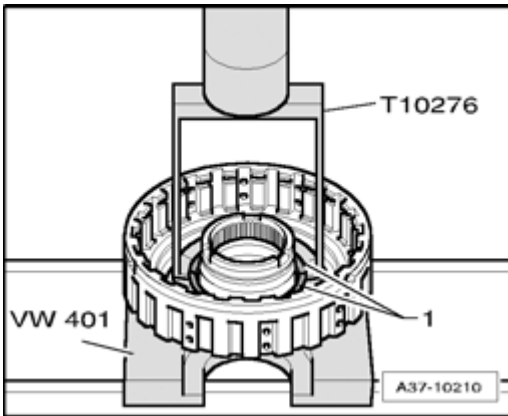


Fig. 136: Installation Bracket T10276 And Split Retaining Ring
Courtesy of VOLKSWAGEN UNITED STATES, INC.

- Press dished washer down under shop press using installation bracket T10276.
- Install split retaining ring - 1 -.
- Bent inner side at right angle of retaining ring faces downward.
- Release shop press.

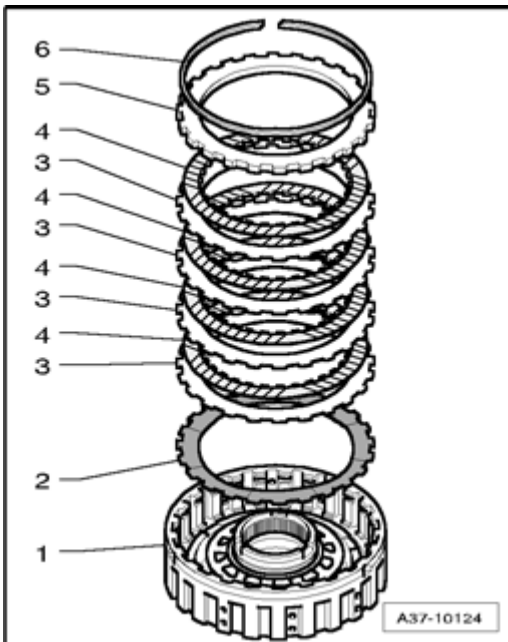


Fig. 137: Cylinder "C" Components
Courtesy of VOLKSWAGEN UNITED STATES, INC.

- Insert wave washer - 2 - into cylinder "C" - 1 -.
- Install outer plate - 3 - and coated plate - 4 - alternately.

- Install thick outer plate - **5** -.
- Insert circlip - **6** -.

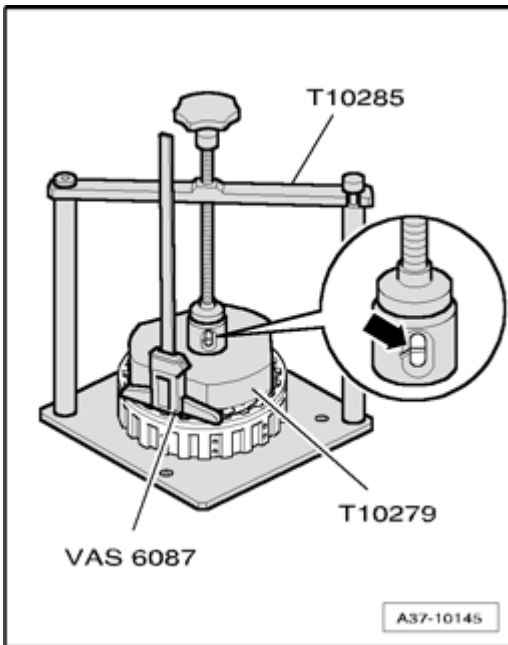


Fig. 138: Adjusting Air Gap Clutch "C"

Courtesy of VOLKSWAGEN UNITED STATES, INC.

Adjust air gap clutch "C"

- Place cylinder "C" on pre-tensioning tool T10285.
- Place plate T10279 on outer clutch plate "C".
- Plate must not touch circlip.
- Insert pressure unit T10285/1 with centering pin into bore of plate.
- Align cylinder "C" on plate of pre-tensioning tool.
- The pressure unit must be centrally positioned under spindle thrust piece.
- Turn pre-tensioning tool spindle downward.
- The markings at inspection hole of pressure unit must align - **arrow** -.
- Apply Digital depth gauge VAS 6087 at upper edge of cylinder "C" , as depicted in illustration.
- Apply measuring tongue on outer plate and note measuring value.
- Mark contact point on cylinder "C".
- Repeat measurement at 2 other points of outer plate, 120 ° offset each, and mark contact points.

- Average over 3 measured values under load.
- Release spindle and remove plate.

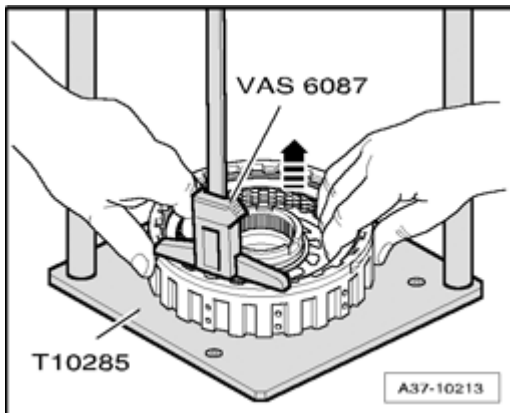


Fig. 139: Pulling Disc Pack Upward Using Hands
 Courtesy of VOLKSWAGEN UNITED STATES, INC.

- Reach with both hands into clutch "C" and pull disc pack upward until stop.
- When disc pack is pulled up, measure distance between upper edge of cylinder "C" and outer plate (2nd technician required) at one of the marked points.
- Repeat measurement at 2 other marked points of outer plate.
- Average over 3 measured values when disc pack is pulled up.
- Determine air gap on basis of the following calculations:

	Average of measured values under load (value 1 + value 2 + value 3): 3
	Measurement when disc pack is pulled up (value 1 + value 2 + value 3): 3
=	Air gap

- Subtract average of measured values when disc pack is pulled up from average of measured values under load.
- Specified value: 1.35 to 1.65 mm.

If specified value is not obtained:

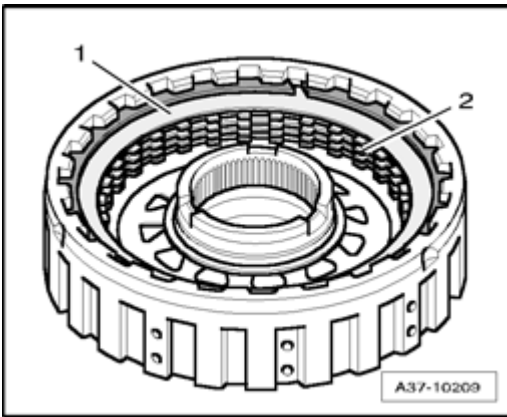


Fig. 140: Cylinder "C" Circlip And Disc Pack
 Courtesy of VOLKSWAGEN UNITED STATES, INC.

- Determine new circlip - 1 -.

NOTE:

- Disregard - 2 -.
- Measured value too small: Install respectively thinner circlip.
- Measured value too large: Install respectively thicker circlip.

The following circlips are available:

Available circlips in mm		
2.2	2.8	3.4
2.4	3.0	
2.6	3.2	

- Check air gap of circlip again after inserting.

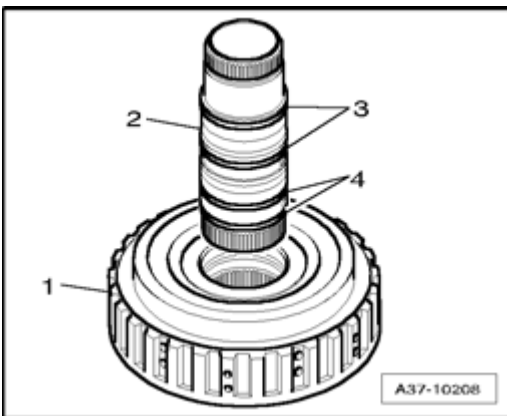


Fig. 141: Sun Shaft, Clutch "C" And Circlips
 Courtesy of VOLKSWAGEN UNITED STATES, INC.

- Replace rectangular rings - 3 - and O-rings - 4 - on sun shaft.

- Press sun shaft - 2 - into clutch "C" - item 1 - until stop.

Clutch "D" , assembly overview

NOTE:

- Some of the depicted components are part of component groups and are not available separately as replacement part.
- Check individual components of clutch "D" for wear and damage --> Clutch "D".

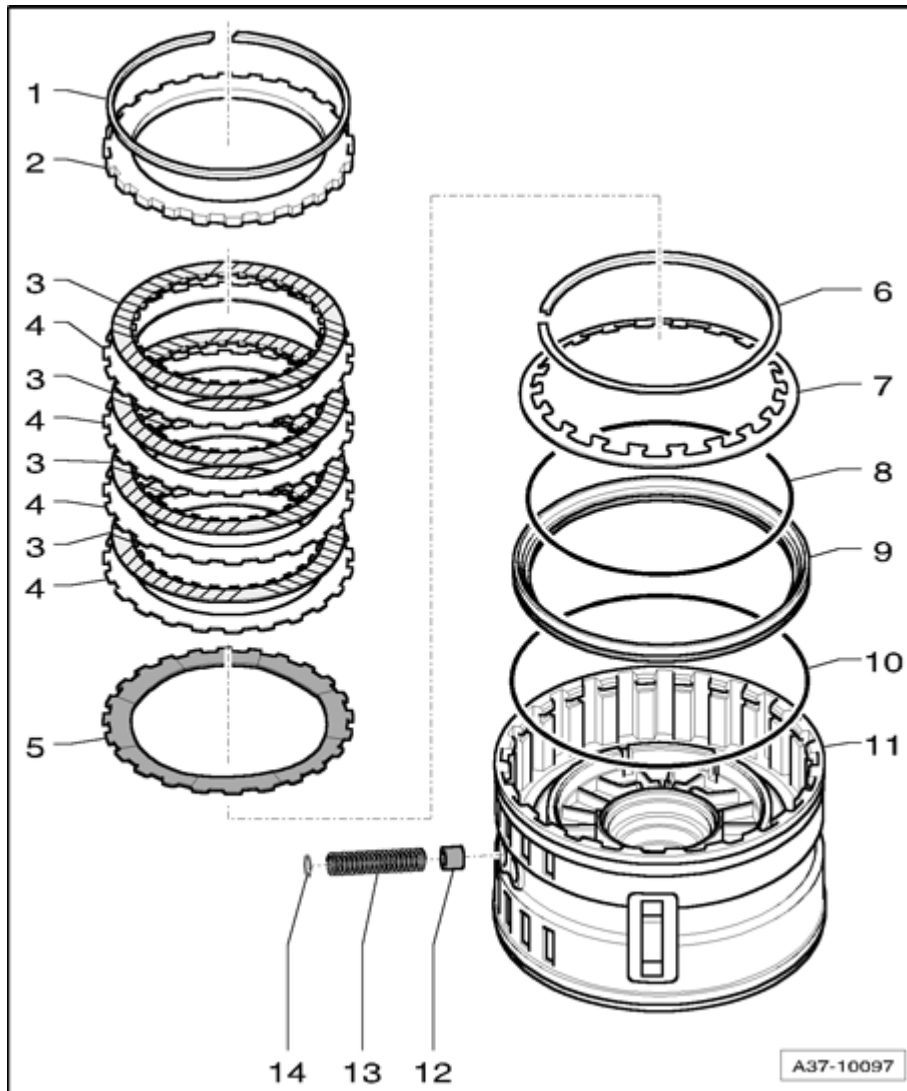


Fig. 142: Clutch "D" , Assembly Overview

Courtesy of VOLKSWAGEN UNITED STATES, INC.

1 - Circlip

- Determining thickness **Adjust air gap clutch** under Fig. 158

2 - Thick outer plate

3 - Coated plate

4 - Outer plate

5 - Wave washer

6 - Circlip

- Bent side at right angle faces dished washer

7 - Dished washer

8 - O-ring

- Replace

9 - Pistons

10 - O-ring

- Replace

11 - Cylinder "D/E"

12 - Sealing sleeve

- Replace

13 - Coil spring

14 - Circlip

Clutch "E" - component overview

NOTE:

- Some of the depicted components are part of component groups and are not available separately as replacement part.
- Check individual components of clutch "E" for wear and damage --> Clutch "E".

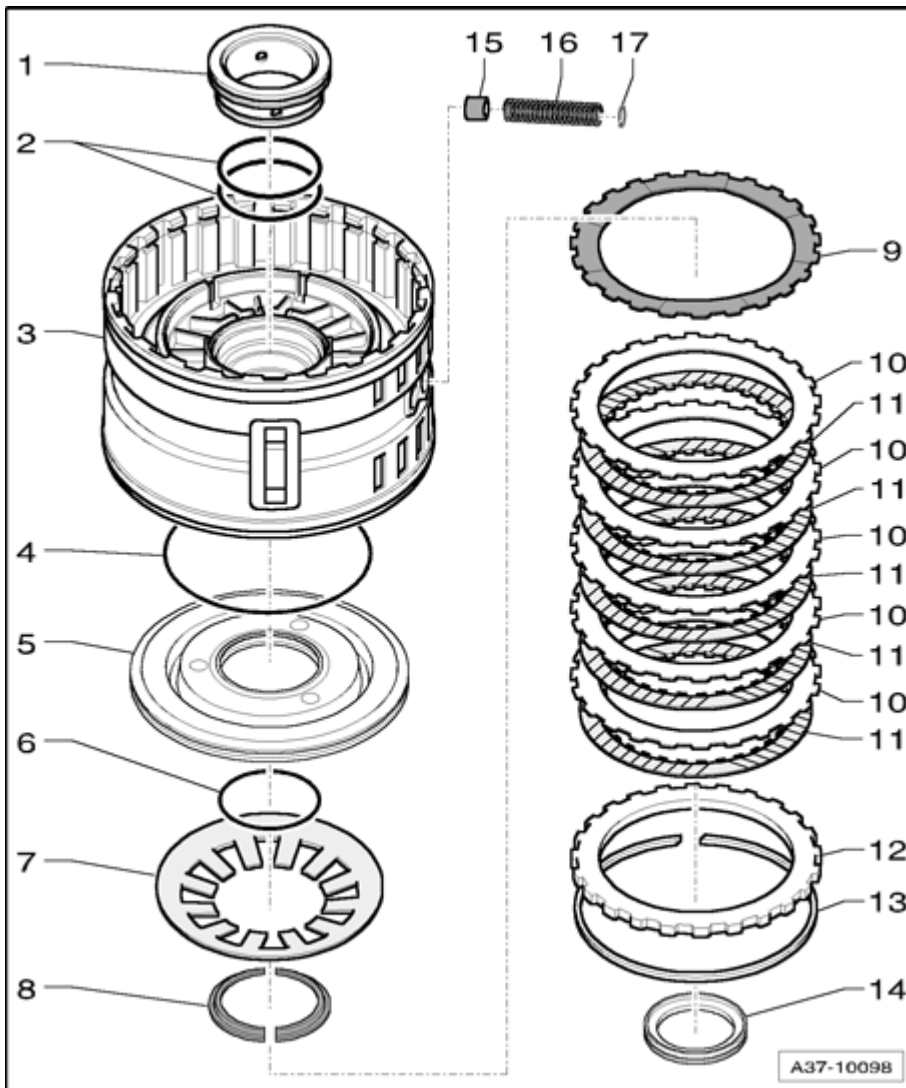


Fig. 143: Clutch "E" - Component Overview

Courtesy of VOLKSWAGEN UNITED STATES, INC.

1 - Bearing bushing

2 - O-rings

- Replace

3 - Cylinder "D/E"

4 - O-ring

- Replace

5 - Piston "E"

6 - O-ring

- Replace

7 - Dished washer

8 - Split retaining ring

- Bent side at right angle faces dished washer

9 - Wave washer

10 - Outer plate

11 - Coated plate

12 - Thick outer plate

13 - Circlip

- Determining thickness **Fig. 164**

14 - Axial needle bearing

15 - Sealing sleeve

- Replace

16 - Coil spring

17 - Circlip

Clutch "D/E" , disassembling and assembling

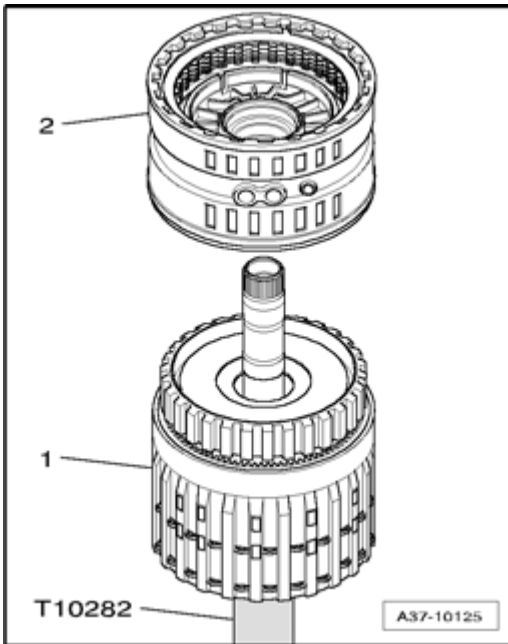


Fig. 144: Cylinder "D/E" And Planetary Gear
 Courtesy of VOLKSWAGEN UNITED STATES, INC.

Disassembling clutch "E"

- Remove cylinder "D/E" - 2 - from planetary gear - 1 -.

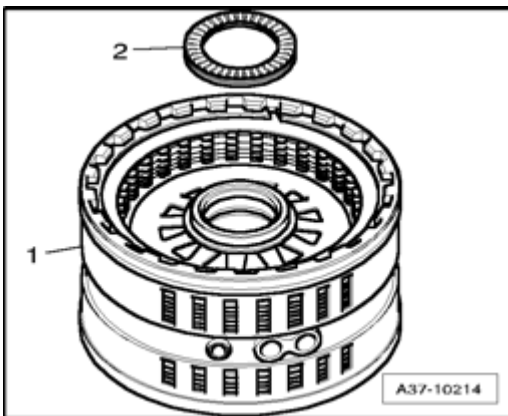


Fig. 145: Cylinder "D/E" And Clutch
 Courtesy of VOLKSWAGEN UNITED STATES, INC.

- Twist cylinder "D/E" - 1 -.
- Remove axial needle bearing "2" from clutch - E -.

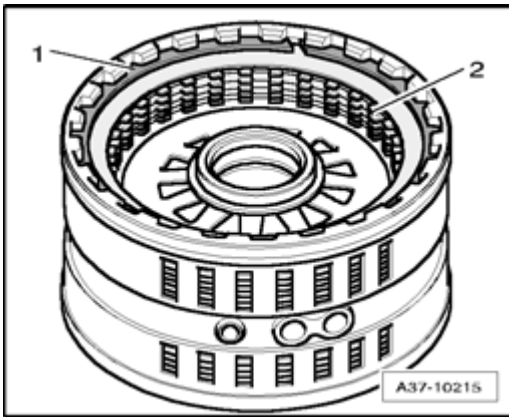


Fig. 146: Circlip And Disc Pack

Courtesy of VOLKSWAGEN UNITED STATES, INC.

- Remove circlip - 1 - and remove disc pack - 2 - from cylinder "E".

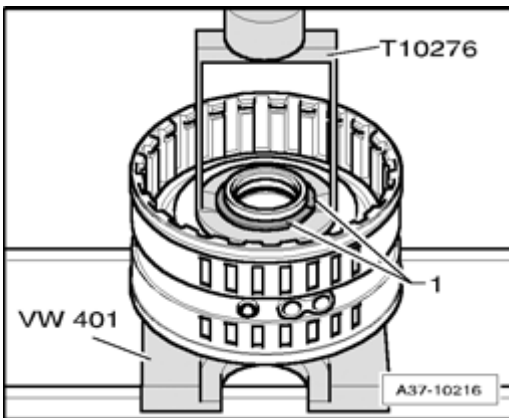


Fig. 147: Installation Bracket T10276 And Split Retaining Ring

Courtesy of VOLKSWAGEN UNITED STATES, INC.

- Press dished washer down under shop press using installation bracket T10276.
- Remove split retaining ring - 1 - and release shop press.
- Remove dished washer.

CAUTION: Wear protective glasses.

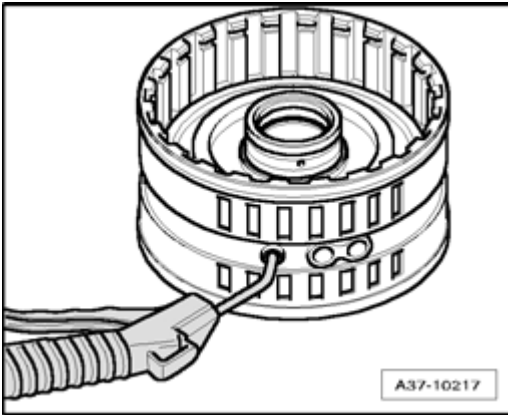


Fig. 148: Pressing Piston "E" Out Of Cylinder "E" With Compressed Air
 Courtesy of VOLKSWAGEN UNITED STATES, INC.

- Carefully press piston "E" out of cylinder "E" with compressed air.

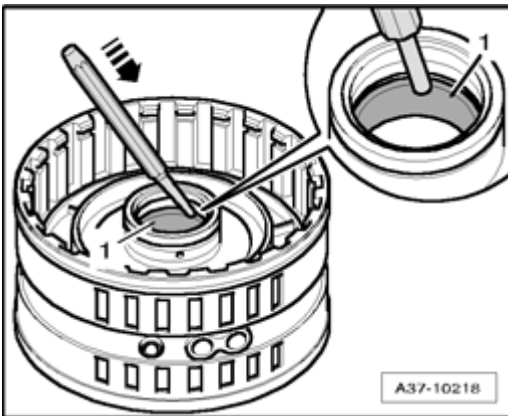


Fig. 149: Striking On Bearing Sleeve To Drive Out Of Cylinder "D/E"
 Courtesy of VOLKSWAGEN UNITED STATES, INC.

- Carefully strike on bearing sleeve to drive out of cylinder "D/E" all around.

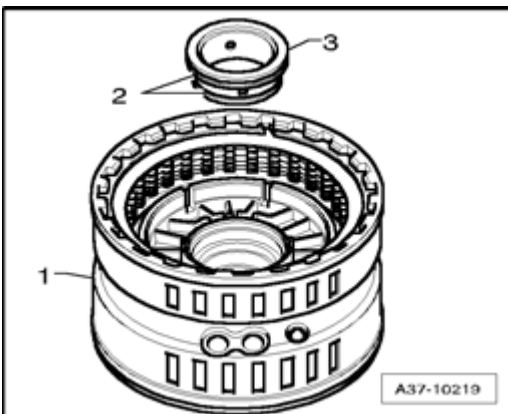


Fig. 150: Cylinder "D/E" And Bushing
 Courtesy of VOLKSWAGEN UNITED STATES, INC.

Disassembling clutch "D"

- Twist cylinder "D/E" - **1** -.
- Remove bushing - **3** - from cylinder "D/E".

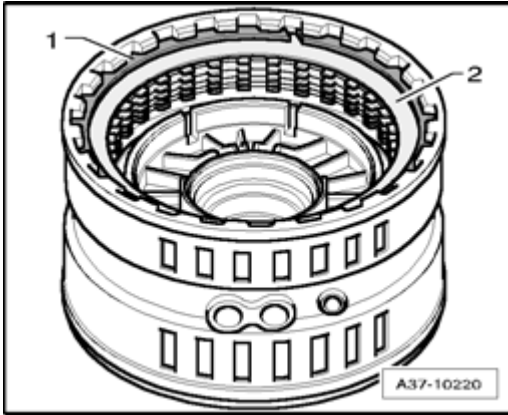


Fig. 151: Circlip And Disc Pack

Courtesy of VOLKSWAGEN UNITED STATES, INC.

- Remove circlip - **1** - and remove disc pack - **2** - from cylinder "D".

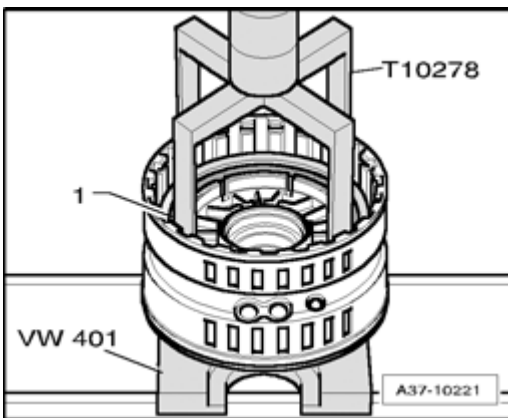


Fig. 152: Installation Bracket T10278 And Circlip

Courtesy of VOLKSWAGEN UNITED STATES, INC.

- Press dished washer down under shop press using installation bracket T10278.
- Remove circlip - **1** - and release shop press.
- Remove dished washer.

CAUTION: Wear protective glasses.

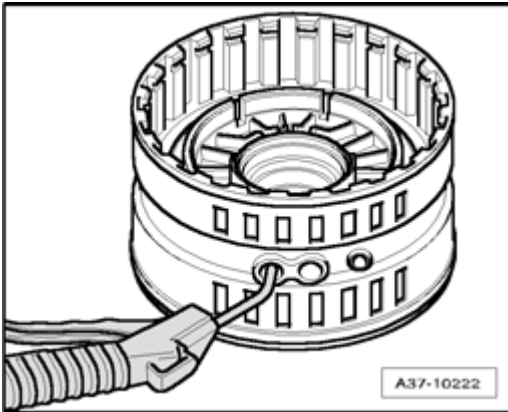


Fig. 153: Pressing Piston "D" Out Of Cylinder "D" With Compressed Air
Courtesy of VOLKSWAGEN UNITED STATES, INC.

- Carefully press piston "D" out of cylinder "D" with compressed air.

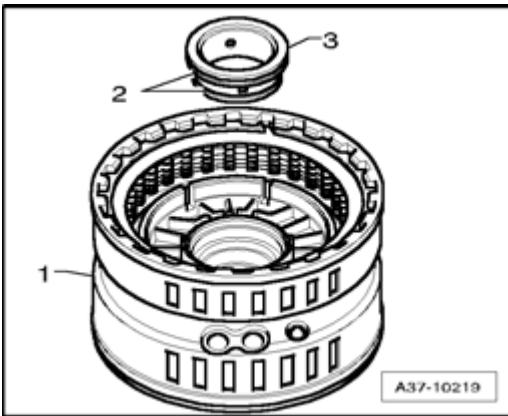


Fig. 154: Cylinder "D/E" And Bushing
Courtesy of VOLKSWAGEN UNITED STATES, INC.

Assembling clutch "D"

CAUTION: Check individual components of clutch "D" for wear and damage -->
Clutch "C" with sun shaft.

- Replace O-rings - 2 - on bushing - 3 -.
- Press bushing - 3 - in cylinder "D/E" - item 1 -.

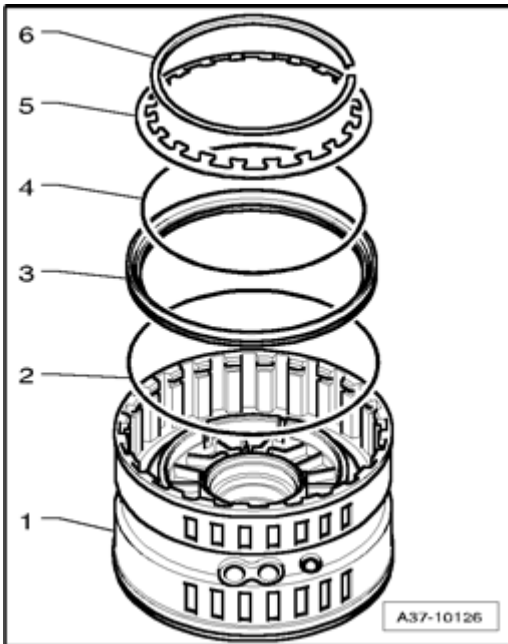


Fig. 155: Clutch "D" Components

Courtesy of VOLKSWAGEN UNITED STATES, INC.

- Replace O-rings - 2 - and - 4 - for piston "D" - item 3 -.
- Press piston "D" - 3 - into cylinder "D" - 1 - until stop.
- Position dished washer - 5 -.

6 - Circlip

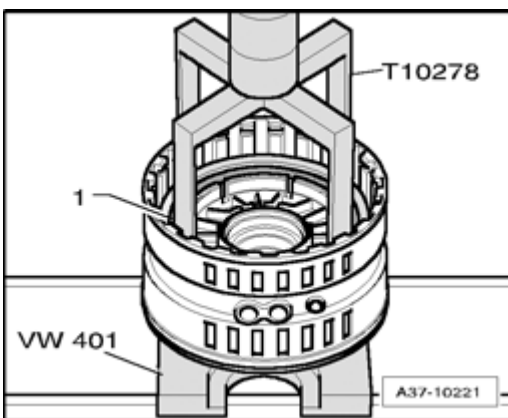


Fig. 156: Installation Bracket T10278 And Circlip

Courtesy of VOLKSWAGEN UNITED STATES, INC.

- Press dished washer down under shop press using installation bracket T10278.
- Insert circlip - 1 -.
- Bent inner side at right angle of circlip faces downward.

- Make sure that circlip is seated evenly all around in groove of cylinder "D/E" , if necessary, press circlip into groove all around using screwdriver.
- Release shop press.

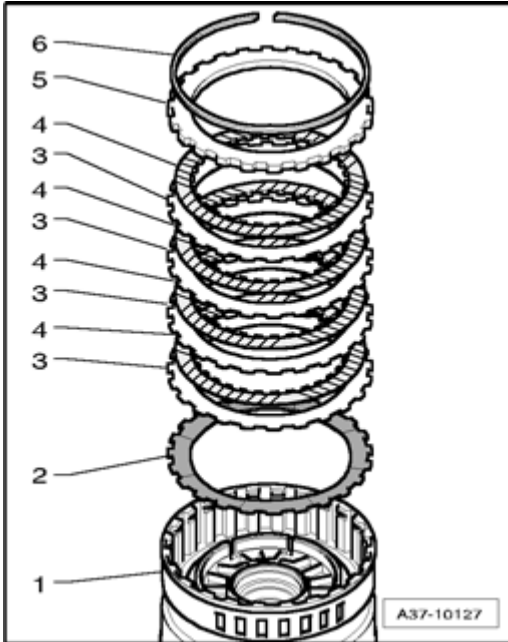


Fig. 157: Cylinder "D" Components

Courtesy of VOLKSWAGEN UNITED STATES, INC.

- Insert wave washer - 2 - into cylinder "D" - **item 1** -.
- Install outer plate - 3 - and coated plate - 4 - alternately (3, 4 or 5 outer and coated plate, depending on transmission).
- Install thick outer plate - 5 -.
- Insert circlip - 6 -.

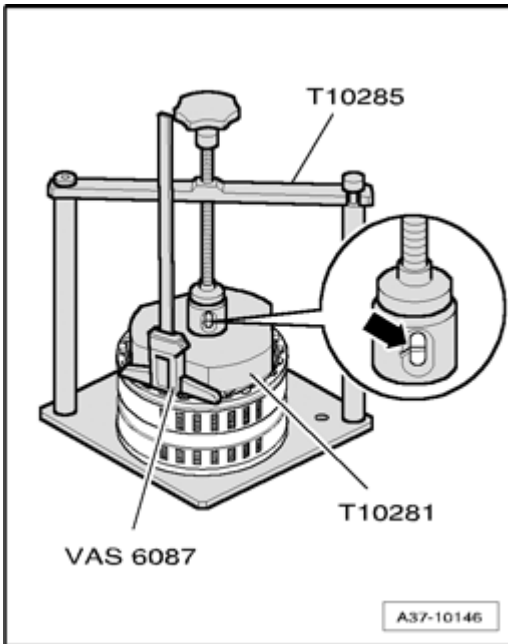


Fig. 158: Adjusting Air Gap Clutch "D"

Courtesy of VOLKSWAGEN UNITED STATES, INC.

Adjust air gap clutch "D"

- Place cylinder "D/E" on pre-tensioning tool T10285.
- Clutch "D" faces upward.
- Position plate T10281 on outer clutch plate "D".
- Plate must not touch circlip.
- Insert pressure unit T10285/1 with centering pin into bore of plate.
- Align cylinder "D/E" on plate of pre-tensioning tool.
- The pressure unit must be centrally positioned under spindle thrust piece.
- Turn spindle of pre-tensioning tool downward.
- The markings at the inspection hole of the pressure unit must align - **arrow** -.
- Apply Digital depth gauge VAS 6087 at upper edge of cylinder "D/E" , as depicted in illustration.
- Apply measuring tongue on outer plate to measuring value.
- Mark contact point on cylinder "D/E".
- Repeat measurement at 2 other points of outer plate, 120 ° offset each, and mark contact points.
- Average over 3 measured values under load.

- Release spindle and remove plate.

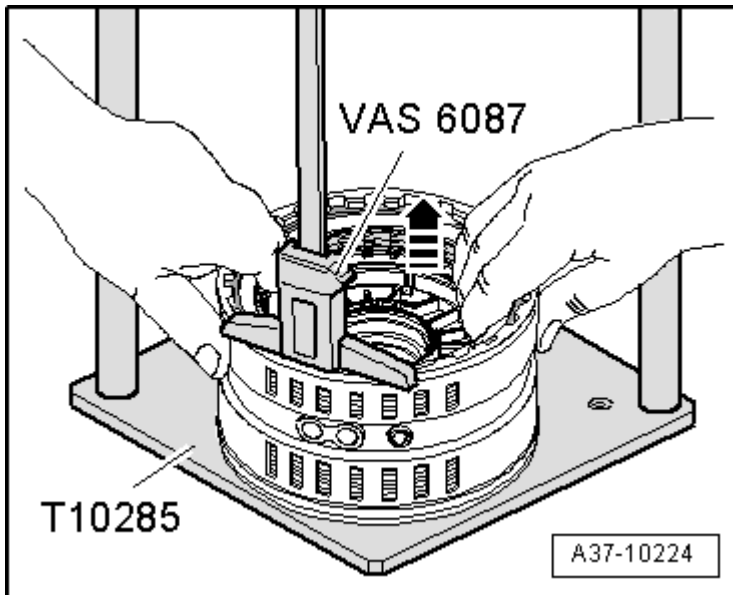


Fig. 159: Apply Digital Depth Gauge VAS 6087 At Upper Edge Of Cylinder "D/G"
 Courtesy of VOLKSWAGEN UNITED STATES, INC.

- Reach with both hands into clutch "D" and pull disc pack upward until stop.
- When disc pack is pulled up, measure distance between upper edge of cylinder "D/E" and outer plate (2nd technician required) at one of the marked points.
- Repeat measurement at 2 other marked points of outer plate.
- Average over 3 measured values when disc pack is pulled up.
- Determine air gap on basis of the following calculations:

	Average of measured values under load (value 1 + value 2 + value 3): 3
	Measurement when disc pack is pulled up (value 1 + value 2 + value 3): 3
=	Air gap

- Subtract average of measured values when disc pack is pulled up from average of measured values under load.

Air gap clutch "D" for transmission with code letters CUE, DPZ, DSL, DSM, DTD, DTE, DYM, ECX:

- With 4 coated plates: 1.35 to 1.65 mm.

Air gap clutch "D" for transmission with code letters ECY, ECZ and the following:

- With 4 coated plates: 1.55 to 1.85 mm.
- With 5 coated plates: 1.93 to 2.22 mm.

If specified value is not obtained:

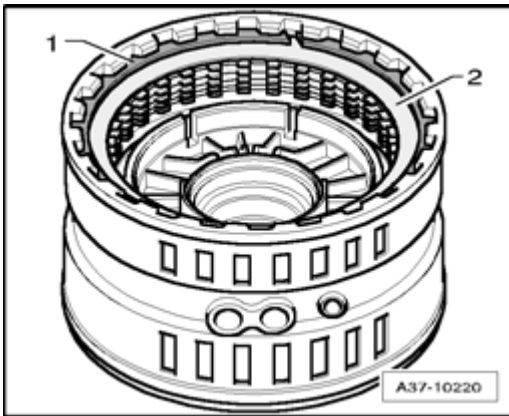


Fig. 160: Circlip And Disc Pack

Courtesy of VOLKSWAGEN UNITED STATES, INC.

- Determine new circlip - 1 -.

NOTE:

- Disregard - 2 -.
- Measured value too small: Install respectively thinner circlip.
- Measured value too large: Install respectively thicker circlip.

The following circlips are available:

Available circlips in mm		
2.4	3.2	4.0
2.6	3.4	4.2
2.8	3.6	
3.0	3.8	

- Check air gap of circlip again after inserting.

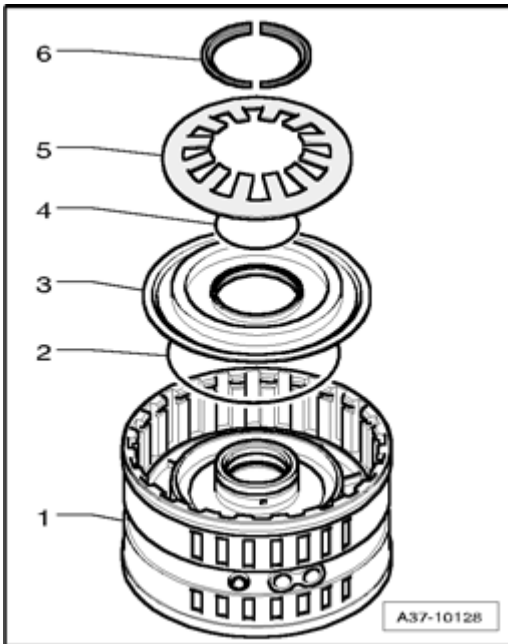


Fig. 161: Clutch "E"

Courtesy of VOLKSWAGEN UNITED STATES, INC.

Assembling clutch "E"

CAUTION: Check individual components of clutch "E" for wear and damage --> Clutch "C" with sun shaft.

- Twist cylinder "D/E".
- Clutch "E" faces upward.
- Insert O-ring - **2** - into cylinder "E" - **item 1** -.
- Insert O-ring - **4** - into piston "E" - **item 3** -.
- Insert piston "E" into cylinder "E".
- Position dished washer - **5** -.

6 - Split retaining ring

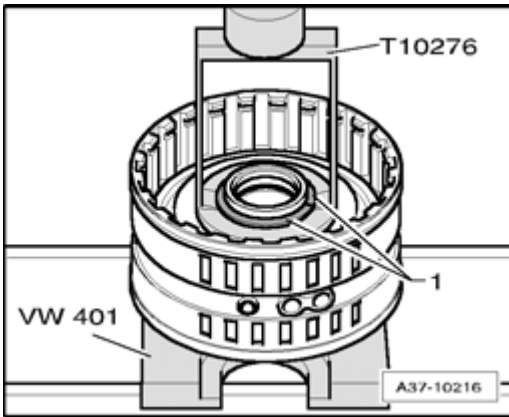


Fig. 162: Installation Bracket T10276 And Split Retaining Ring
 Courtesy of VOLKSWAGEN UNITED STATES, INC.

- Press dished washer down under shop press using installation bracket T10276.
- Install split retaining ring - 1 -.
- Bent inner side at right angle of split retaining ring faces downward.
- Release shop press.

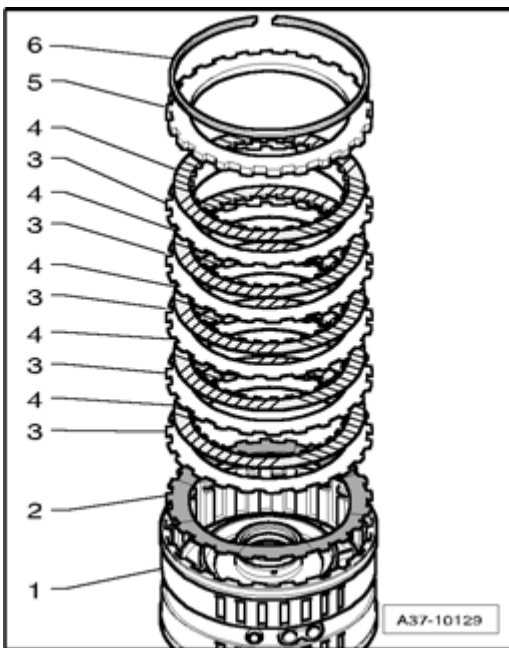


Fig. 163: Clutch "E" Components
 Courtesy of VOLKSWAGEN UNITED STATES, INC.

- Insert wave washer - 2 -.
- Install outer plate - 3 - and coated plate - 4 - alternately (4 or 5 outer and coated plate each, depending on transmission).
- Install thick outer plate - 5 -.

- Insert circlip - 6 -.

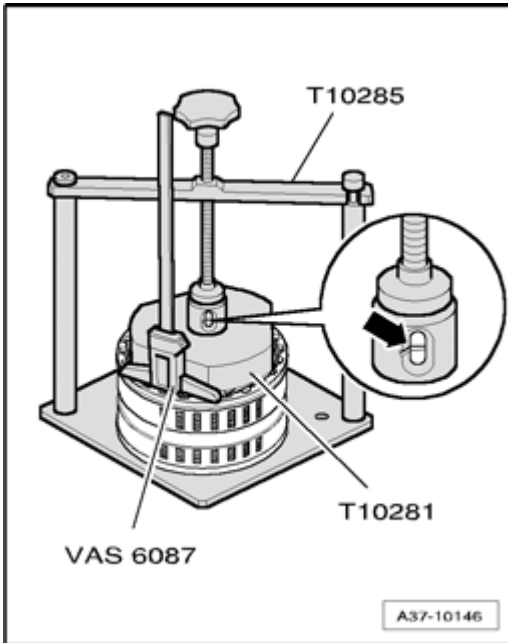


Fig. 164: Adjusting Air Gap Clutch "D"
 Courtesy of VOLKSWAGEN UNITED STATES, INC.

Adjust air gap clutch "E"

- Place cylinder "D/E" on pre-tensioning tool T10285.
- Clutch "E" faces upward.
- Position plate T10281 on outer plate clutch "E".
- Plate must not touch circlip.
- Insert pressure unit T10285/1 with centering pin into bore of plate.
- Align cylinder "D/E" on plate of pre-tensioning tool.
- The pressure unit must be centrally positioned under spindle thrust piece.
- Turn spindle of pre-tensioning tool downward.
- The markings at the inspection hole of the pressure unit must align - **arrow** -.
- Apply Digital depth gauge VAS 6087 at upper edge of cylinder "D/E" , as depicted in illustration.
- Apply measuring tongue on outer plate and note measuring value.
- Mark contact point on cylinder "D/E".
- Repeat measurement at 2 other points of outer plate, 120 ° offset each, and mark contact points.

- Average over 3 measured values under load.
- Release spindle and remove plate.

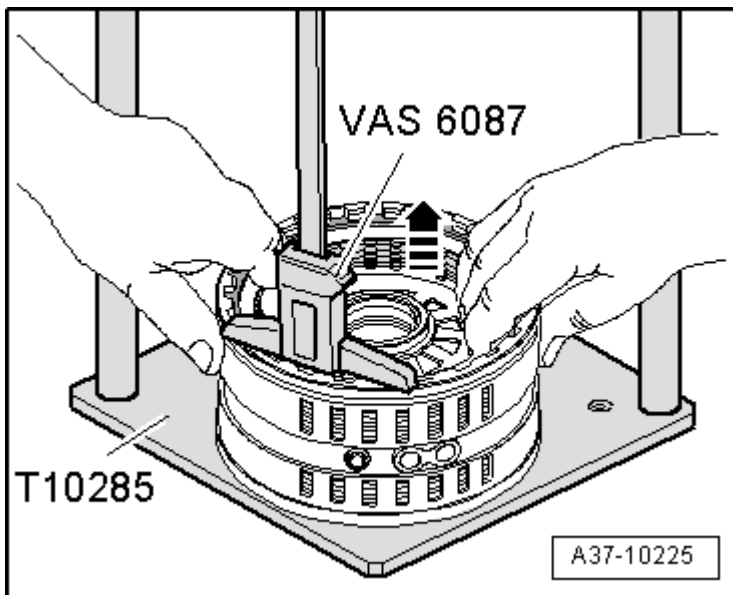


Fig. 165: Reach With Both Hands Into Clutch "G" and Pull Plate Pack Upward Until Stop
 Courtesy of VOLKSWAGEN UNITED STATES, INC.

- Reach with both hands into clutch "E" and pull disc pack upward until stop.
- When disc pack is pulled up, measure distance between upper edge of cylinder "D/E" and outer plate (2nd technician required) at one of the marked points.
- Repeat measurement at 2 other marked points of outer plate.
- Average over 3 measured values when disc pack is pulled up.
- Determine air gap on the basis of the following calculations:

	Average of measured values under load (value 1 + value 2 + value 3): 3
	Measurement when disc pack is pulled up (value 1 + value 2 + value 3): 3
=	Air gap

- Subtract average of measured values when disc pack is pulled up from average of measured values under load.

Air gap clutch "E" for transmission with code letters CUE, DPZ, DSL, DSM, DTD, DTE, DYM, ECX:

- With 4 coated plates: 1.1 to 1.4 mm.
- With 5 coated plates: 1.4 to 1.7 mm.

Air gap clutch "E" for transmission with code letters ECY, ECZ and the following:

- With 4 coated plates: 1.55 to 1.85 mm.
- With 5 coated plates: 1.93 to 2.10 mm.

If specified value is not obtained:

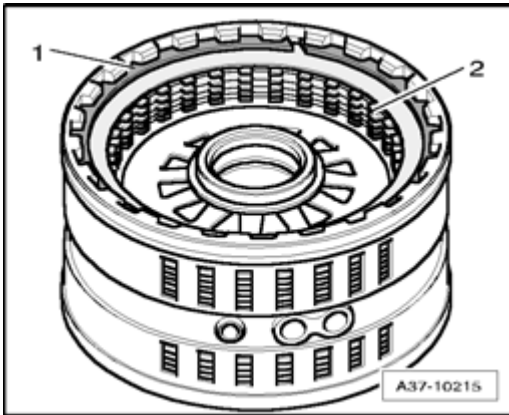


Fig. 166: Circlip And Disc Pack

Courtesy of VOLKSWAGEN UNITED STATES, INC.

- Determine new circlip - 1 -.

NOTE:

- **Disregard - 2 -.**
- **Measured value too small: Install respectively thinner circlip.**
- **Measured value too large: Install respectively thicker circlip.**

The following circlips are available:

Available circlips in mm		
2.2	2.8	3.4
2.4	3.0	3.6
2.6	3.2	3.8

Planetary drive, assembly overview

NOTE:

- **Some of the depicted components are part of component groups and are not available separately as replacement part.**

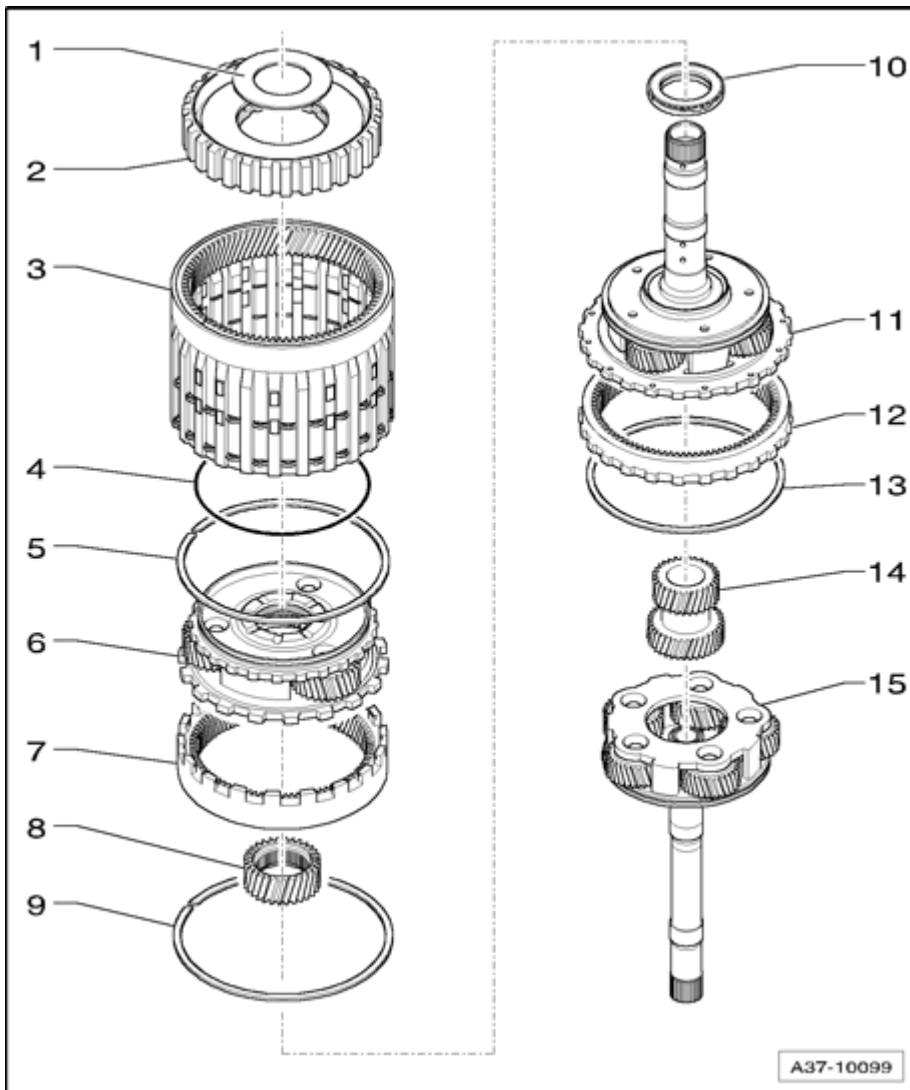


Fig. 167: Planetary Drive, Assembly Overview
 Courtesy of VOLKSWAGEN UNITED STATES, INC.

- 1 - Thrust washer
- 2 - Plate carrier "E"
- 3 - Ring gear "I"
- 4 - O-ring
 - Replace
- 5 - Circlip
 - Replace

- 6 - Planetary carrier "I"
- 7 - Ring gear - II -
- 8 - Sun gear 1
- 9 - Circlip
- 10 - Axial needle bearing
- 11 - Planetary carrier "II"
- 12 - Ring gear "II"
- 13 - Circlip
- 14 - Sun gear 2 and 3
- 15 - Planetary carrier "III"

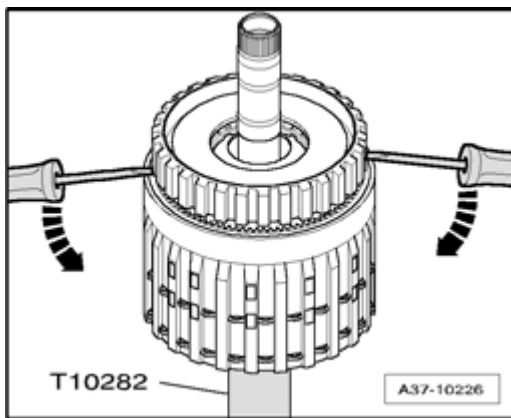
Planetary drive, disassembling and assembling

Fig. 168: Prying Off Plate Carrier "E" From Planetary Drive Using 2 Screwdrivers
Courtesy of VOLKSWAGEN UNITED STATES, INC.

Disassembling

- Pry off plate carrier "E" from planetary drive using 2 screwdrivers.

NOTE:

- **Do not insert screwdriver too deep, attach only at edge of planetary carrier "E".**

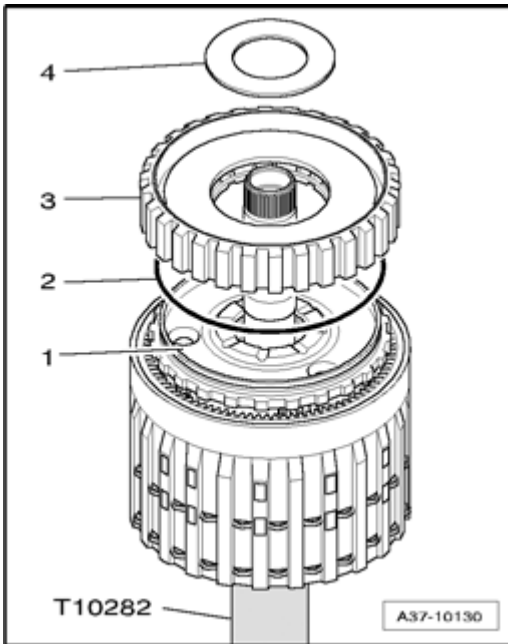


Fig. 169: Planetary Carrier "I", O-Ring, Plate Carrier "E" And Thrust Washer
Courtesy of VOLKSWAGEN UNITED STATES, INC.

- Remove plate carrier "E" - item 3 - and pull thrust washer - 4 - out of plate carrier "E".
- Remove O-ring - 2 - from planetary carrier "I" - 1 -.

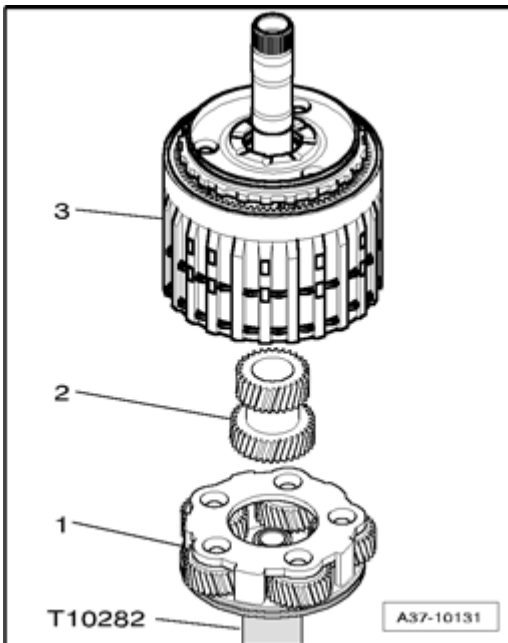


Fig. 170: Planetary Carrier "I", Planetary Drive "I" + "II" And Sun Gear
Courtesy of VOLKSWAGEN UNITED STATES, INC.

- Lift off planetary drive "I" + "II" - 3 - from planetary carrier "I" - 1 -.
- Remove sun gear - 2 -.

- Remove planetary carrier "III" from mounting device T10282.

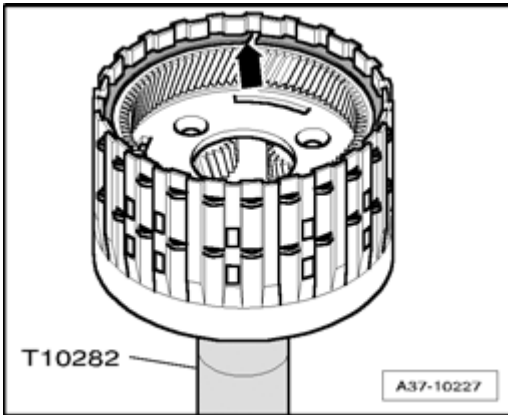


Fig. 171: Identifying "I" + "II" Placed In Mounting Device T10282 And Circlip
 Courtesy of VOLKSWAGEN UNITED STATES, INC.

- Twist planetary drive "I" + "II" and place in mounting device T10282.
- Remove circlip - **arrow** -.

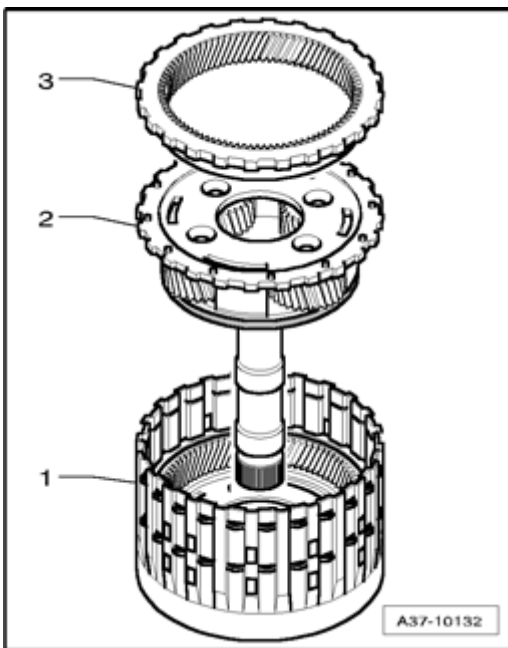


Fig. 172: Ring Gear "III", Planetary Carrier "II" And Ring Gear "I"
 Courtesy of VOLKSWAGEN UNITED STATES, INC.

- Remove ring gear "III" - 3 - and planetary carrier "II" - 2 - from ring gear "I" - 1 -.

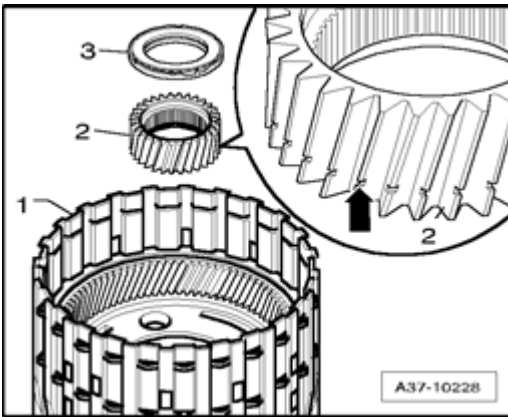


Fig. 173: Axial Needle Bearing, Sun Gear And Ring Gear "I"
 Courtesy of VOLKSWAGEN UNITED STATES, INC.

- Remove axial needle bearing - 3 - and sun gear - 2 - from ring gear "I" - 1 -.

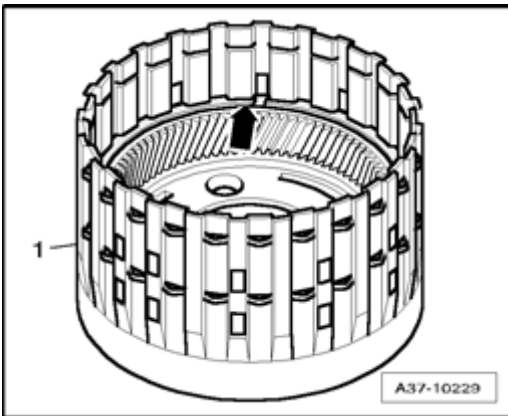


Fig. 174: Circlip And Ring Gear "I"
 Courtesy of VOLKSWAGEN UNITED STATES, INC.

- Remove circlip - **arrow** - , hold ring gear "I" - 1 - and set aside downward.

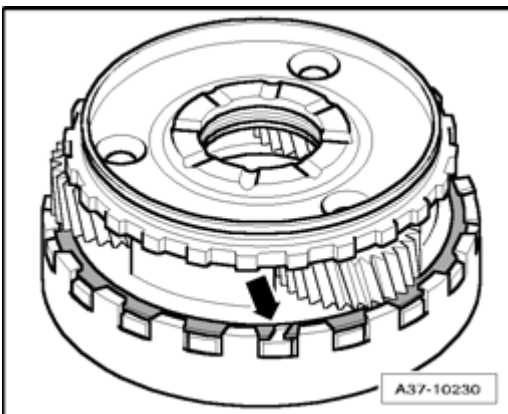


Fig. 175: Planetary Carrier "I" Circlip
 Courtesy of VOLKSWAGEN UNITED STATES, INC.

- Twist planetary carrier "I" and place on workbench.
- Remove circlip - **arrow** - and remove ring gear "II" from planetary carrier "I".

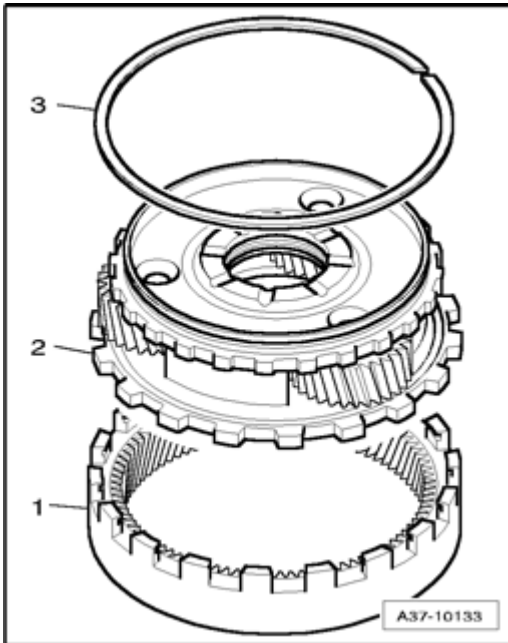


Fig. 176: Planetary Carrier "I", Ring Gear "II" And Circlip
 Courtesy of VOLKSWAGEN UNITED STATES, INC.

Assembling

- Install planetary carrier "I" - 2 - in ring gear "II" - 1 -.
- Replace circlip - 3 - and install.

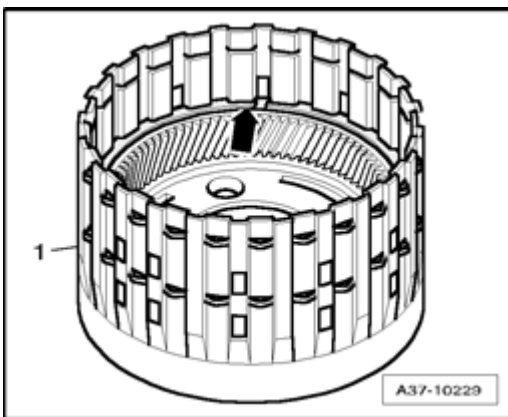


Fig. 177: Circlip And Ring Gear "I"
 Courtesy of VOLKSWAGEN UNITED STATES, INC.

- Twist planetary carrier "I" , install in ring gear "I" - 1 - and secure with circlip - **arrow** -.
- Place ring gear "I" with planetary carrier "I" in mounting device T10282.

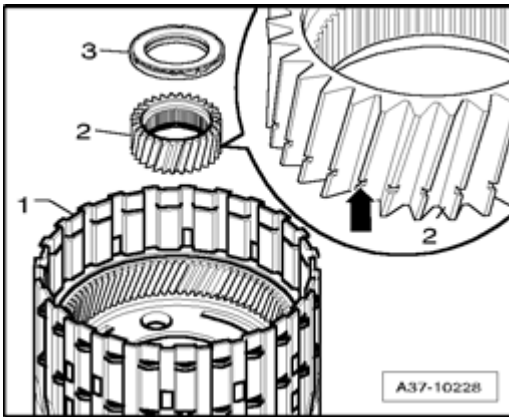


Fig. 178: Axial Needle Bearing, Sun Gear And Ring Gear "I"
 Courtesy of VOLKSWAGEN UNITED STATES, INC.

- Install sun gear - 2 - in planetary carrier "I" in ring gear "I" - 1 -.
- Notches - **arrow** - on teeth face downward.
- Insert axial needle bearing - 3 -.
- Open side points upward.

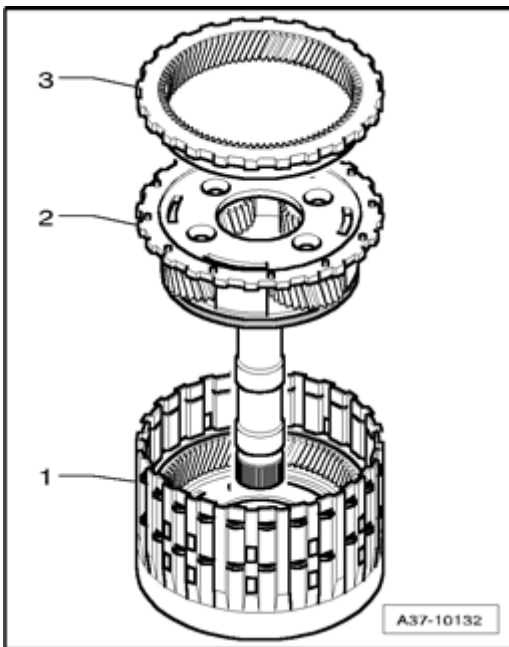


Fig. 179: Ring Gear "III", Planetary Carrier "II" And Ring Gear "I"
 Courtesy of VOLKSWAGEN UNITED STATES, INC.

- Install planetary carrier "II" - 2 - in ring gear "I" - 1 -.
- Install ring gear III - 3 - in ring gear "I" - 1 -.

- Outer coupling plate on ring gear III faces upward.

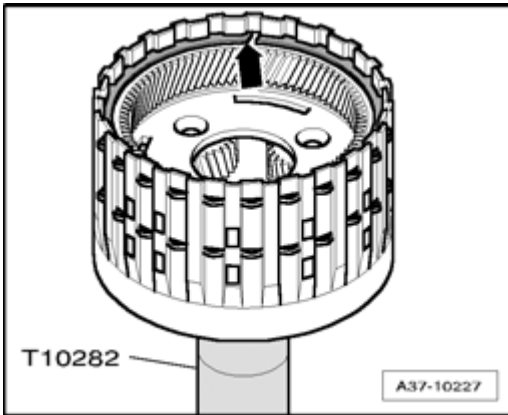


Fig. 180: Identifying "I" + "II" Placed In Mounting Device T10282 And Circlip
 Courtesy of VOLKSWAGEN UNITED STATES, INC.

- Insert circlip - arrow -.
- Remove planetary drive "I" + "II" from mounting device T10282.

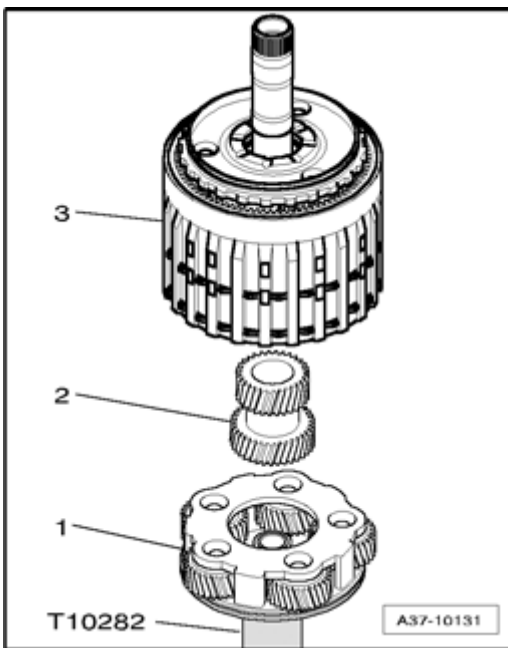


Fig. 181: Planetary Carrier "I", Planetary Drive "I" + "II" And Sun Gear
 Courtesy of VOLKSWAGEN UNITED STATES, INC.

- Install planetary carrier "III" in mounting device T10282.
- Install sun gear 2 in planetary carrier "III" - 1 -.
- Install planetary drive "I" + "II" - 3 - on planetary carrier "III" using turning motions.

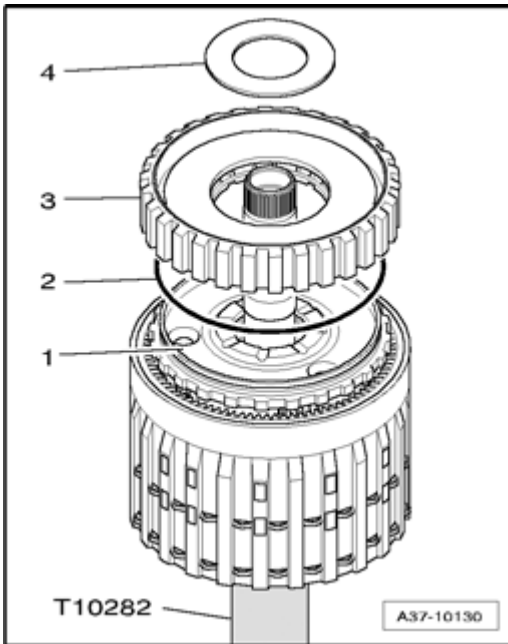


Fig. 182: Planetary Carrier "I", O-Ring, Plate Carrier "E" And Thrust Washer
Courtesy of VOLKSWAGEN UNITED STATES, INC.

- Place new O-ring - 2 - on planetary carrier "I" - 1 -.
- Press plate carrier "E" - 3 - onto planetary carrier "I".
- Position thrust washer - 4 -.

Assembling tower "I"

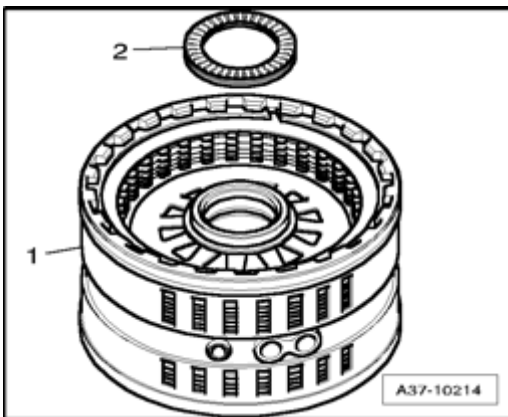


Fig. 183: Cylinder "D/E" And Clutch
Courtesy of VOLKSWAGEN UNITED STATES, INC.

- Affix axial needle bearing - 2 - with Vaseline to clutch "E" (in cylinder "D/E" - 1 -). Use only Vaseline, other lubricating substances cause functional problems in the hydraulic transmission control.

NOTE:

- Clutch "E" can be determined by the visible dished washer and split retaining ring.

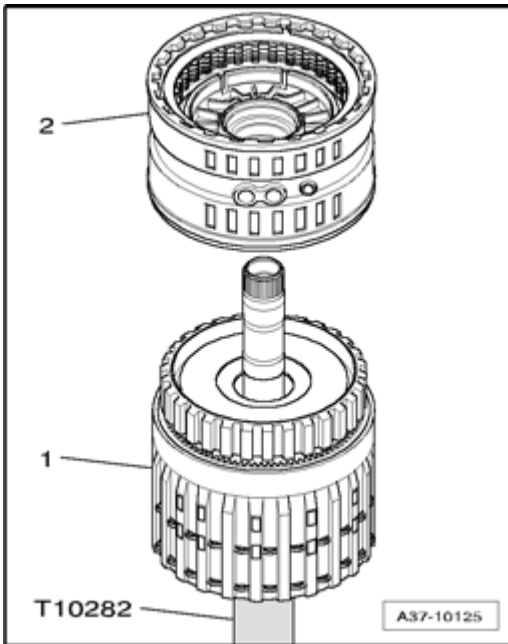


Fig. 184: Cylinder "D/E" And Planetary Gear
 Courtesy of VOLKSWAGEN UNITED STATES, INC.

- Twist cylinder "D/E" - 2 -.
- Clutch "E" faces downward.
- Install cylinder "D/E" onto planetary drive - 1 - using short lifting/turning motions.
- All clutch plate "E" must engage in sequence in plate carrier of planetary drive.
- Check whether all plates are engaged, lift cylinder "D/E" a few millimeters and let fall.
- If this produces a metallic sound, all plates are engaged.
- If only a muted sound is heard, not all plates are engaged.

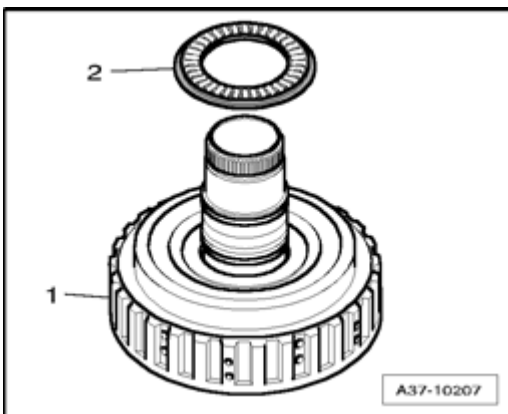


Fig. 185: Axial Needle Bearing And Clutch "C"

Courtesy of VOLKSWAGEN UNITED STATES, INC.

- Thinly coat axial needle bearing - 2 - with Vaseline on flat side. Use only Vaseline, other lubricating substances cause functional problems in the hydraulic transmission control.
- Affix axial needle bearing to clutch "C" - 1 - at rear.

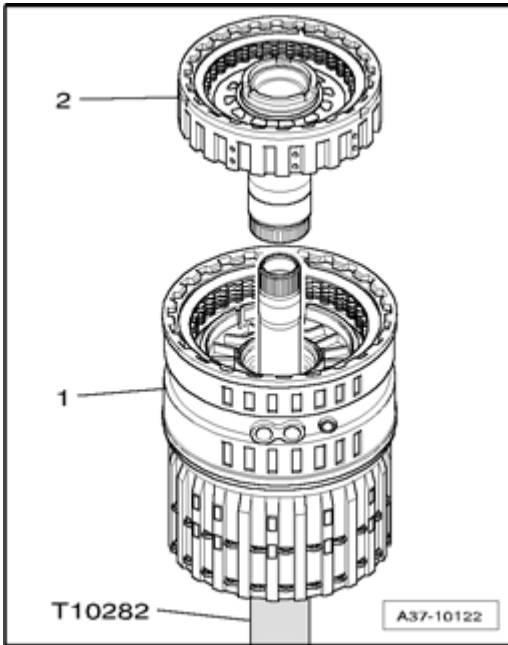


Fig. 186: Removing/Installing Clutch "C" With Sun Shaft From Cylinder "D/E"
 Courtesy of VOLKSWAGEN UNITED STATES, INC.

- Install clutch "C" with sun shaft - 2 - in cylinder "D/E" - 1 -.
- Let cylinder "C" engage into all clutch plate "D" , using short lifting/turning motions.
- Check whether all plate are engaged, lift cylinder "D/E" a few millimeters and let fall to do so.
- If this produces a metallic sound, all plates are engaged.
- If only a muted sound is heard, not all plates are engaged.

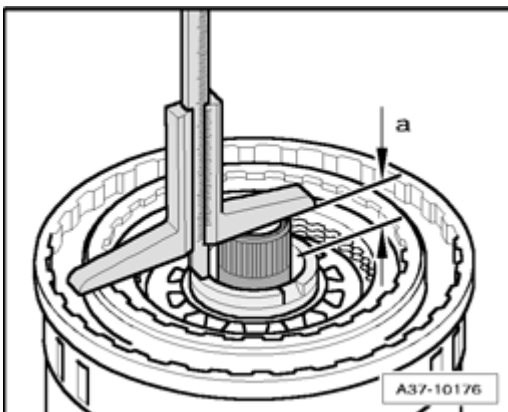


Fig. 187: Measuring Tower "I" Position

Courtesy of VOLKSWAGEN UNITED STATES, INC.

- Check correct positioning for "tower I".
- Dimension - a - = 21.7 mm max.

NOTE:

- If dimension - a - is not reached, assembly of tower "I" must be checked --
> Assembling tower "I".

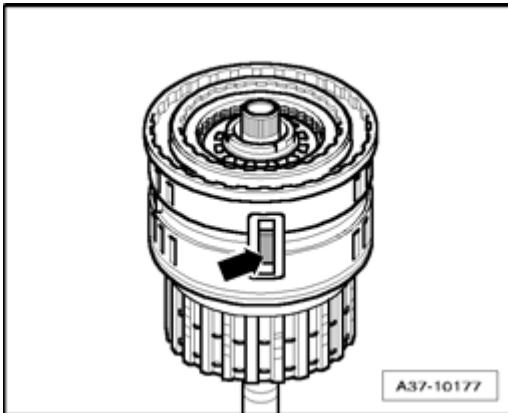


Fig. 188: Locating Fitted Keys

Courtesy of VOLKSWAGEN UNITED STATES, INC.

- Check whether fitted keys - **arrow** - are inserted centrally on both sides of cylinder - **D to E** -.

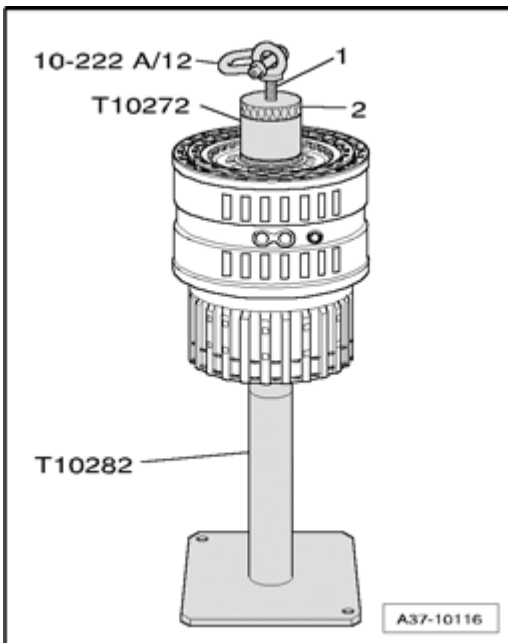


Fig. 189: Tower "I" Placed In Mounting Device T10282

Courtesy of VOLKSWAGEN UNITED STATES, INC.

- Turn threaded spindle - **1** - of Lifting device T10272 for tower "I" in threaded hole of tower "I" until stop.
- Secure individual components of "tower I" from pulling apart, turn sleeve - **2** - on threaded spindle completely down by hand.

TOWER "II", DISASSEMBLING AND ASSEMBLING

Tower "II" , assembly overview

NOTE:

- Some of the depicted components are part of component groups and are not available separately as replacement part.

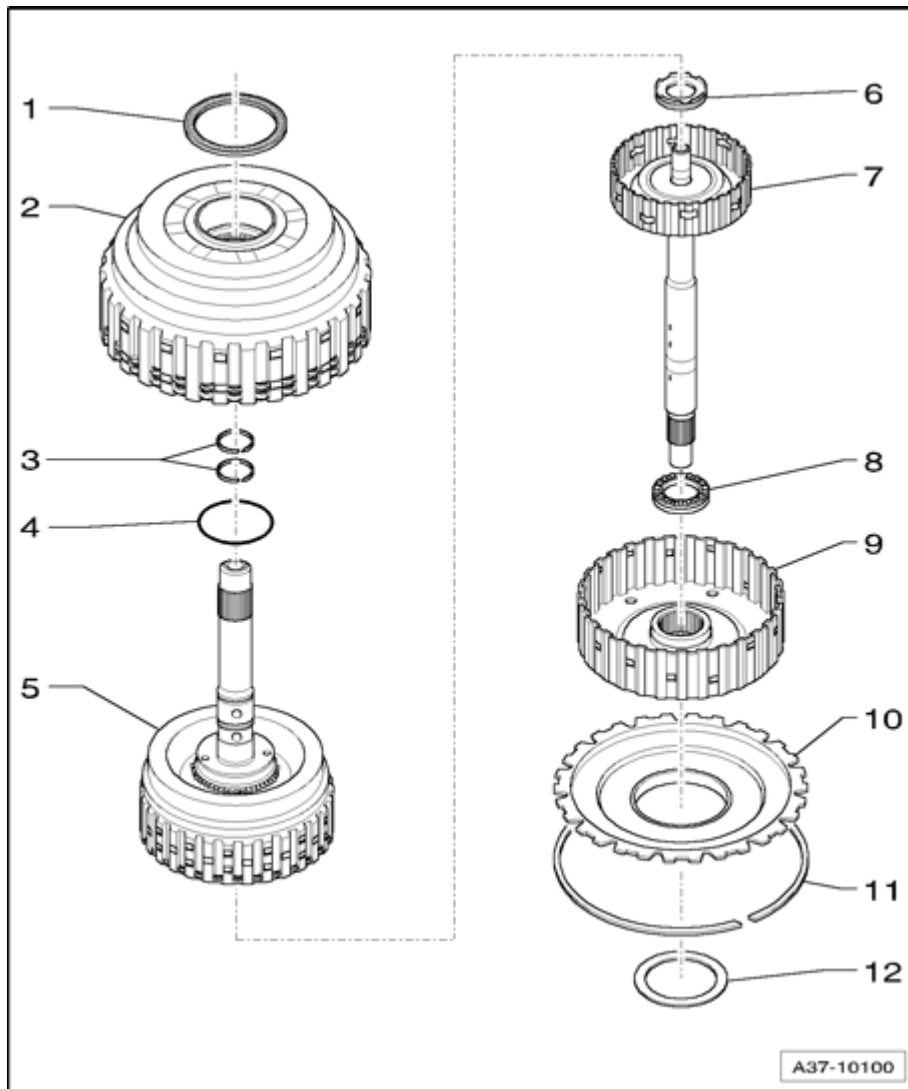


Fig. 190: Tower "II" , Assembly Overview

Courtesy of VOLKSWAGEN UNITED STATES, INC.

1 - Axial needle bearing

2 - Clutch "B"

3 - Rectangular ring

- Replace

4 - O-ring

- Replace

5 - Clutch "A"

6 - Axial needle bearing

7 - Intermediate shaft with inner plate carrier "A"

8 - Axial needle bearing

9 - Inner plate carrier "B"

10 - Inner plate carrier "C"

11 - Circlip

12 - Thrust washer for needle bearing tower "II"

Tower "II" , disassembling

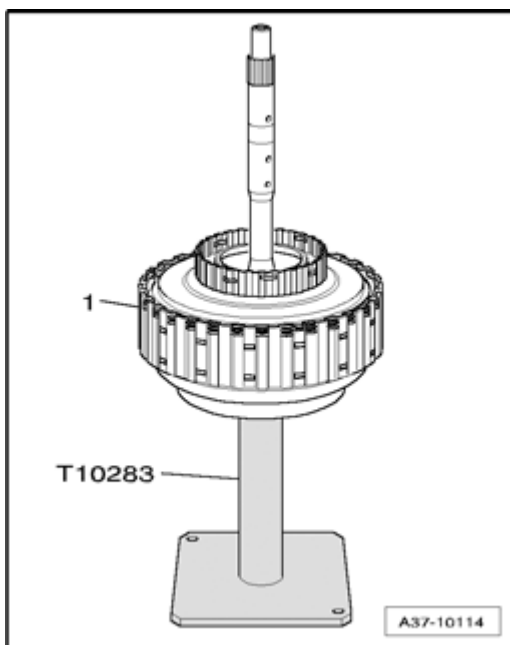


Fig. 191: Tower "II" Placed On Mounting Device T10283

Courtesy of VOLKSWAGEN UNITED STATES, INC.

- Place tower "II" in mounting device T10283 (ATF pump side faces downward).

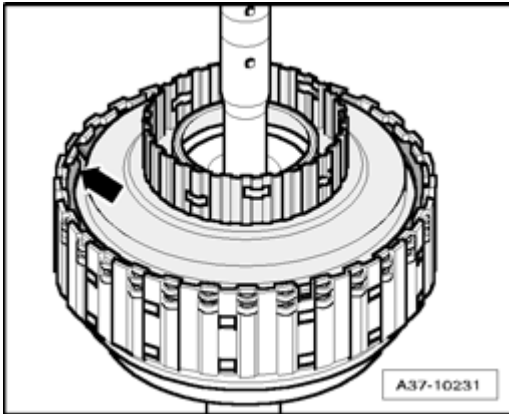


Fig. 192: Tower "II" Circlip

Courtesy of VOLKSWAGEN UNITED STATES, INC.

- Remove circlip - **arrow** -.

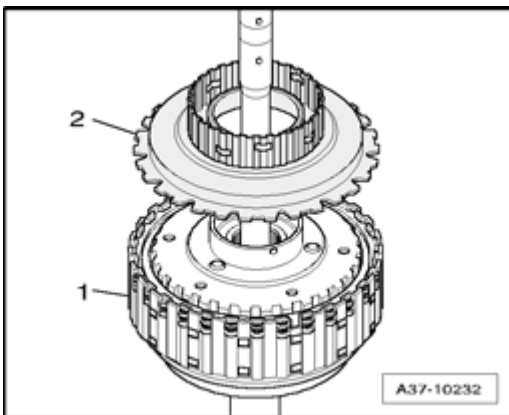


Fig. 193: Inner Plate Carrier "C" And Clutch "A/B"

Courtesy of VOLKSWAGEN UNITED STATES, INC.

- Remove inner plate carrier "C" - **2** - from clutch "A/B" - **1** -.

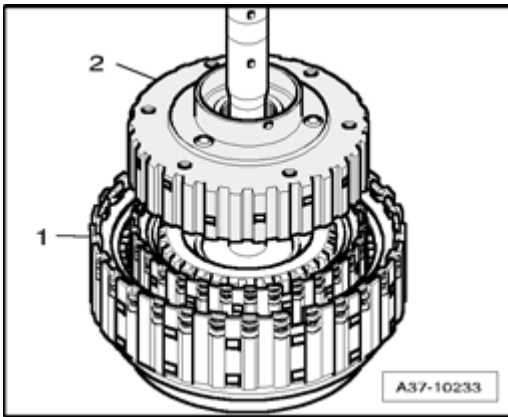


Fig. 194: Inner Plate Carrier "B" And Clutch "A/B"
 Courtesy of VOLKSWAGEN UNITED STATES, INC.

- Remove inner plate carrier "B" - 2 - from clutch "A/B" - 1 -.

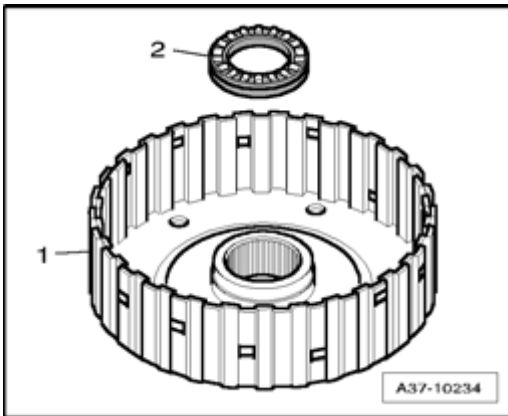


Fig. 195: Inner Plate Carrier "B" And Axial Needle Bearing
 Courtesy of VOLKSWAGEN UNITED STATES, INC.

- Twist inner plate carrier "B" - 1 - and remove axial needle bearing - 2 -.

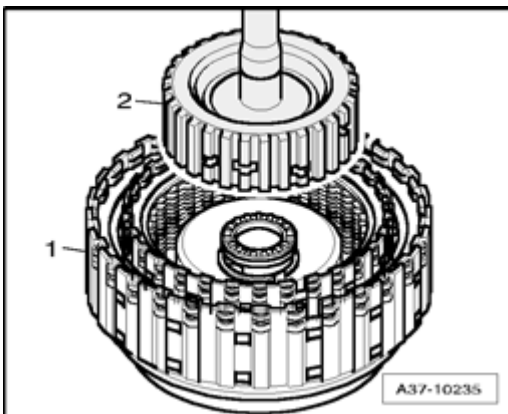


Fig. 196: Intermediate Shaft With Inner Plate Carrier "A" And Clutch "A/B"
 Courtesy of VOLKSWAGEN UNITED STATES, INC.

- Remove intermediate shaft with inner plate carrier "A" - 2 - from clutch "A/B" - 1 -.

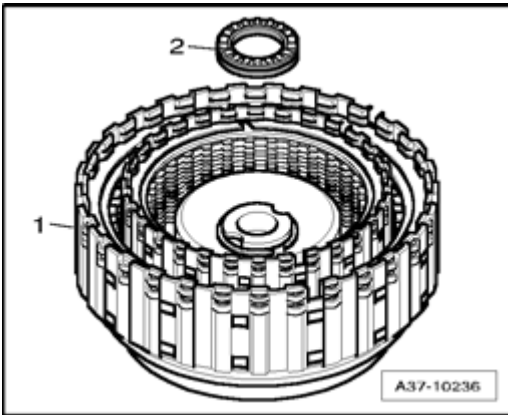


Fig. 197: Axial Needle Bearing And Clutch "A/B"
Courtesy of VOLKSWAGEN UNITED STATES, INC.

- Remove axial needle bearing - 2 - from clutch "A/B" - 1 -.

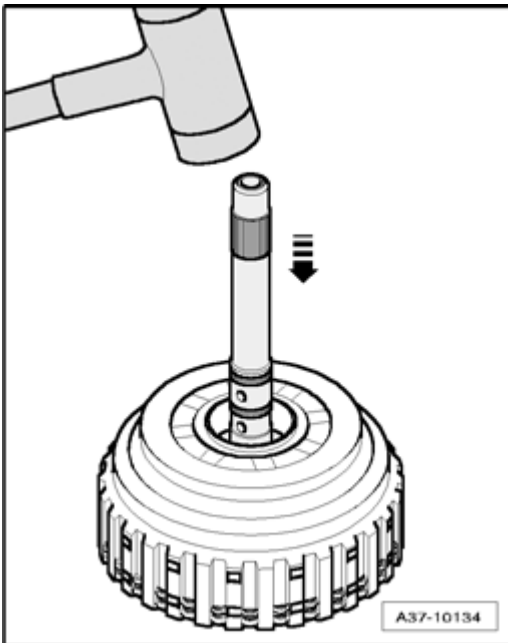


Fig. 198: Hitting Input Shaft Using A Plastic Hammer
Courtesy of VOLKSWAGEN UNITED STATES, INC.

- Remove clutch "A/B" from mounting device T10282.
- Twist clutch "A/B" and place on workbench.
- Lightly hit input shaft using a plastic hammer.

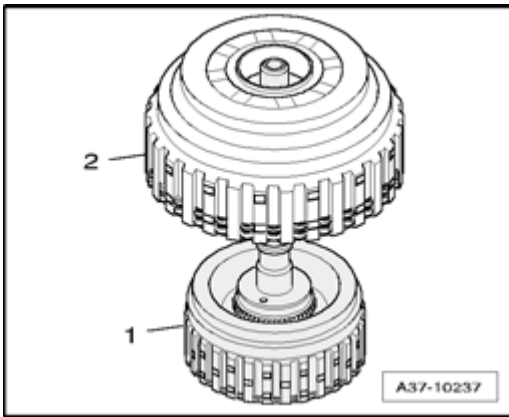


Fig. 199: Clutch "B" And Clutch "A"

Courtesy of VOLKSWAGEN UNITED STATES, INC.

- Remove clutch "B" - 2 - from clutch "A" - 1 -.

Clutch "A" , assembly overview

NOTE:

- Some of the depicted components are part of component groups and are not available separately as replacement part.
- Check individual components of clutch "A" for wear and damage --> Clutch "A".

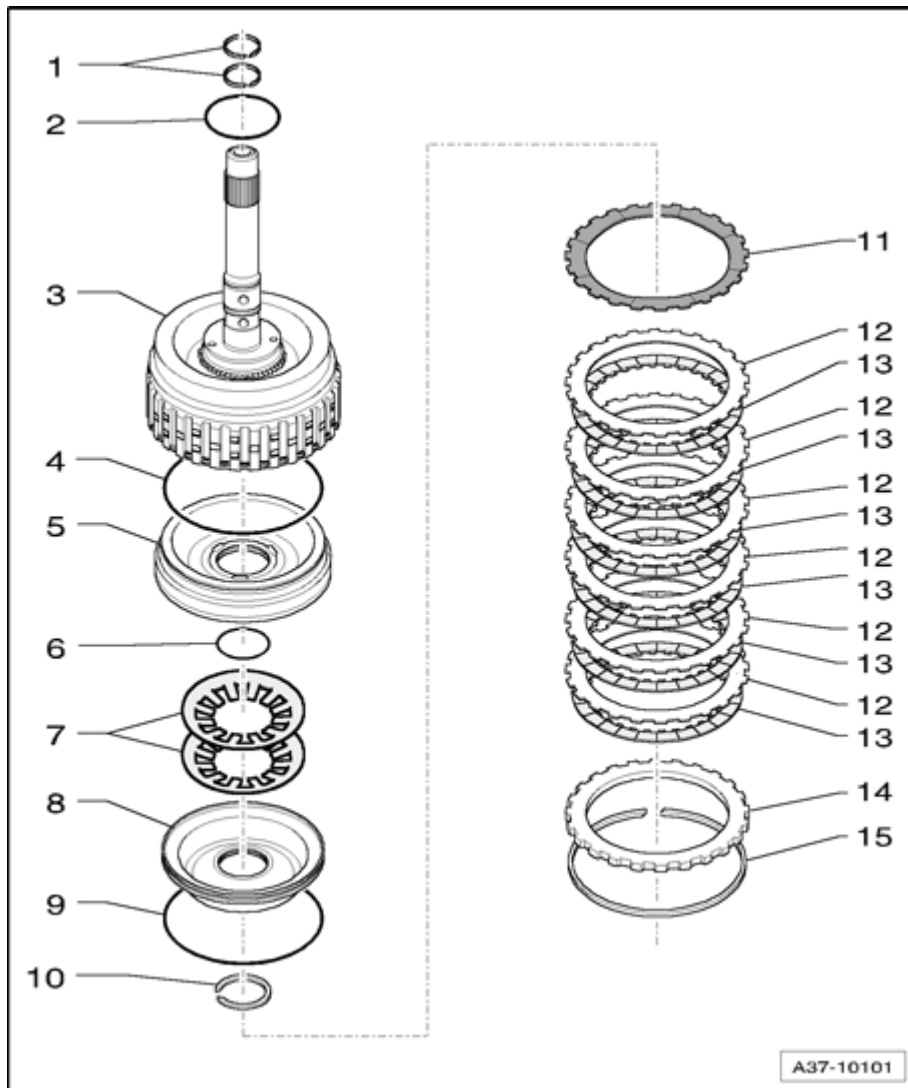


Fig. 200: Clutch "A" , Assembly Overview

Courtesy of VOLKSWAGEN UNITED STATES, INC.

1 - Rectangular ring

- Replace

2 - O-ring

- Replace

3 - Cylinder "A"

4 - O-ring

- Replace

5 - Piston "A"

6 - O-ring

- Replace

7 - Dished washer

- Dependent on construction version 1 or 2

8 - Diaphragm plate

9 - O-ring

- Replace

10 - Circlip

- Replace

11 - Locking washer

12 - Outer plate

13 - Coated plate

14 - Thick outer plate

15 - Circlip

Clutch "A" , disassembling and assembling

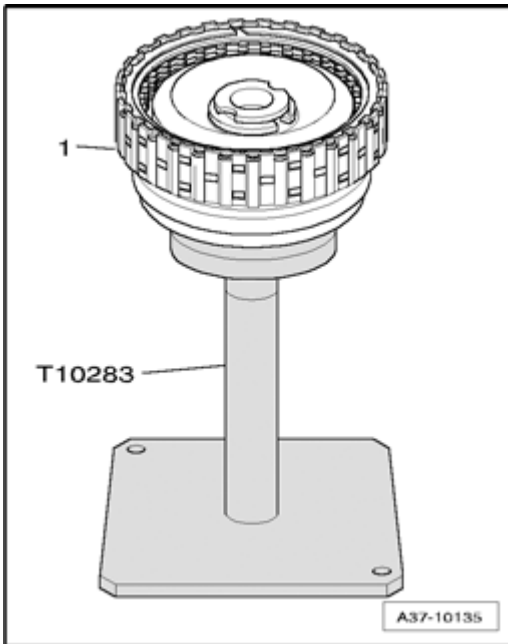


Fig. 201: Clutch "A" Placed In Mounting Device T10282
Courtesy of VOLKSWAGEN UNITED STATES, INC.

- Place clutch "A" - 1 - in mounting device T10282.

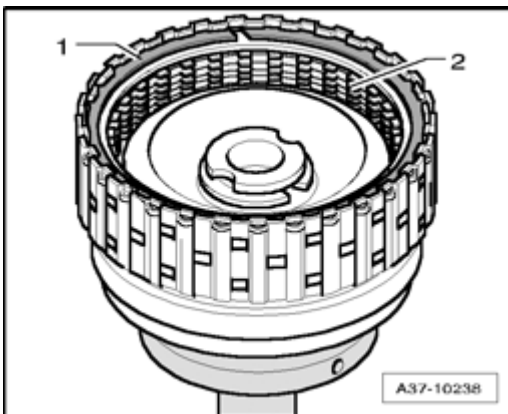


Fig. 202: Circlip And Disc Pack From Cylinder "A"
Courtesy of VOLKSWAGEN UNITED STATES, INC.

- Remove circlip - 1 - and remove disc pack - 2 - from cylinder "A".

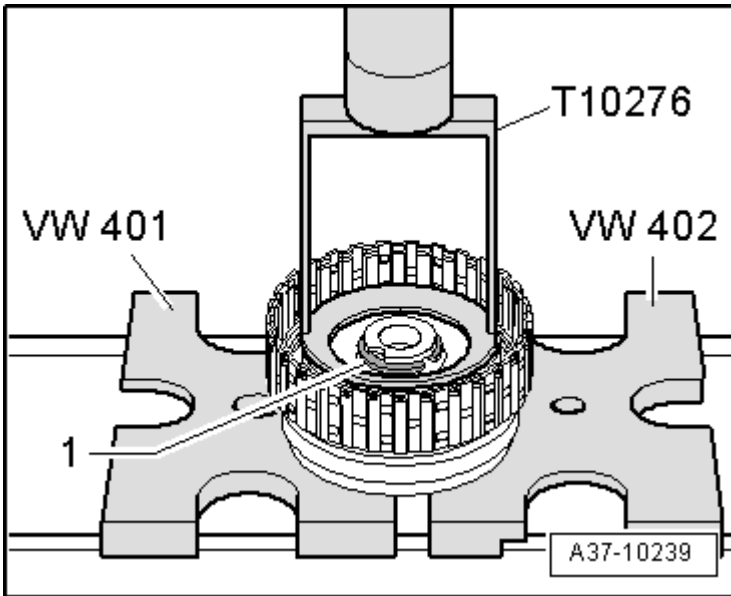


Fig. 203: Press Diaphragm Plate Down Under Shop Press Using Installation Bracket T10276
Courtesy of VOLKSWAGEN UNITED STATES, INC.

- Press diaphragm plate down under shop press using installation bracket T10276.
- Remove circlip - 1 -.

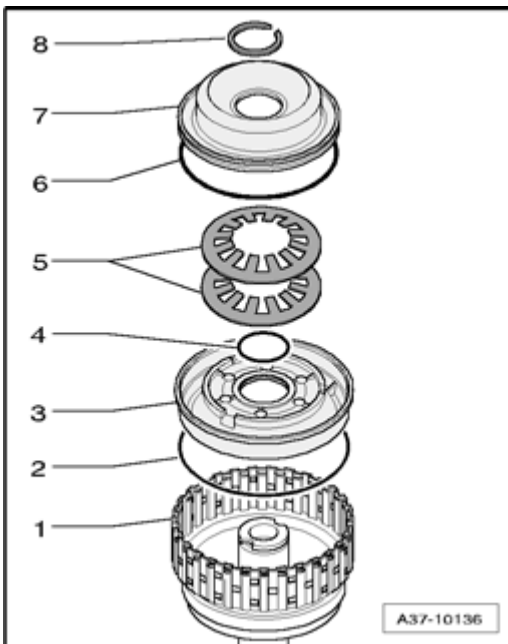


Fig. 204: Cylinder "A", O-Rings, Piston "A" And Dished Washers
Courtesy of VOLKSWAGEN UNITED STATES, INC.

- Remove diaphragm plate - 7 -.
- Remove dished washers - 5 -.

NOTE:

- Dependent on construction version, 1 or 2 dished washers - 5 - are installed. When installing, use same quantity of dished washers as were found when removed.

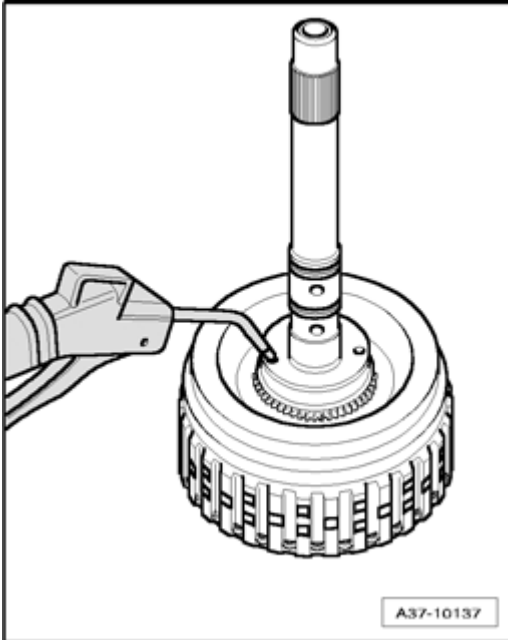


Fig. 205: Pressing Piston "A" Out Of Cylinder "A" With Compressed Air
Courtesy of VOLKSWAGEN UNITED STATES, INC.

- Twist cylinder "A".

CAUTION: Wear protective glasses.

- Carefully press piston "A" out of cylinder "A" with compressed air, to do so plug free oil bore using finger.

CAUTION: Check individual components of clutch "A" for wear and damage --> Clutch "A".

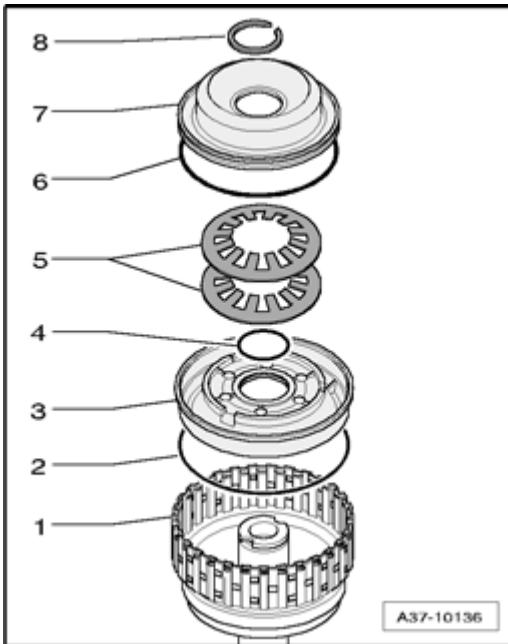


Fig. 206: Cylinder "A", O-Rings, Piston "A" And Dished Washers
 Courtesy of VOLKSWAGEN UNITED STATES, INC.

- Replace O-rings - 2 - and - 4 - for piston "A" - 3 -.
- Press piston "A" - 3 - into cylinder "A" - 1 - until stop.
- Insert dished washers - 5 -.

NOTE:

- **Dependent on construction version, 2 dished washers - 5 - are installed. When installing, use same quantity of dished washers as were found when removed.**

- Replace O-ring - 6 - in diaphragm plate - 7 -.
- Insert diaphragm plate - 7 -.

8 - Circlip

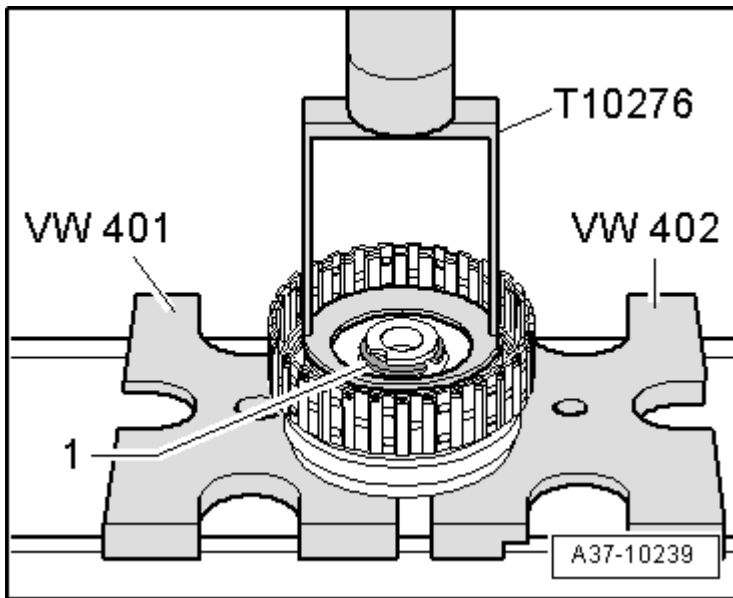


Fig. 207: Press Diaphragm Plate Down Under Shop Press Using Installation Bracket T10276
 Courtesy of VOLKSWAGEN UNITED STATES, INC.

- Press diaphragm plate down under shop press using installation bracket T10276.

CAUTION: Do not over-stretch circlip.

- Replace circlip - 1 - and install carefully.

CAUTION: After installing, check proper seating of circlip:

- Circlip must no longer be moved and must contact base of groove.

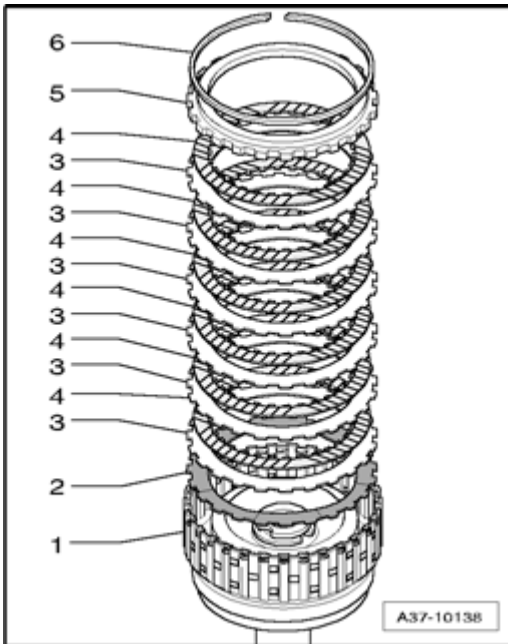


Fig. 208: Cylinder "A", Wave Washer, Outer Plates, Coated Plates And Outer Plate
Courtesy of VOLKSWAGEN UNITED STATES, INC.

- Insert wave washer - **2** - into cylinder "A" - **1** -.
- Install outer plates - **3** - (6x) and coated plates - **4** - (6x) alternately.
- Install thick outer plate - **5** -.
- Smooth side faces last coated plate.
- Insert circlip - **6** -.

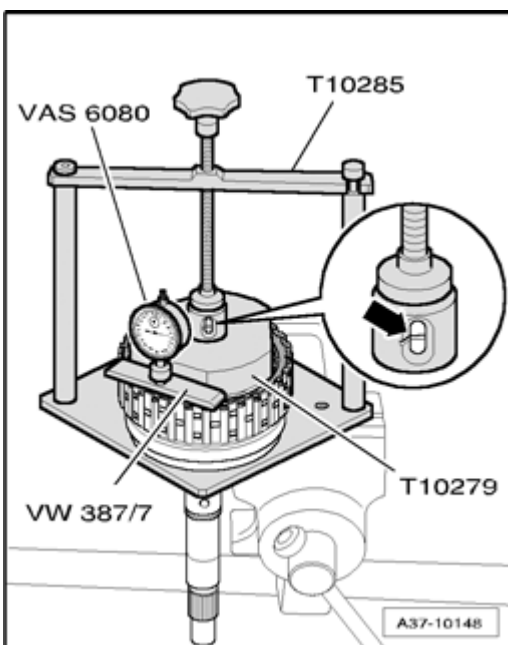


Fig. 209: Adjusting Air Gap Clutch "A"**Courtesy of VOLKSWAGEN UNITED STATES, INC.**

Adjust air gap clutch "A"

- Secure pre-tensioning tool T10285 with wide base in vise.
- Install cylinder "A" in pre-tensioning tool.
- Input shaft projects through bore in base plate.
- Position plate T10279 on outer clutch plate "A".
- Plate must not touch circlip all around.
- Insert pressure unit T10285/1 with centering pin into bore of plate.
- Align cylinder "A" on plate of pre-tensioning tool.
- The pressure unit must be centrally positioned under spindle thrust piece.
- Turn spindle of pre-tensioning tool downward.
- The markings at the inspection hole of the pressure unit must align - **arrow** -.
- Insert dial gauge VAS 6080 into measuring bar VW 382/7 and tighten knurled nut.
- Apply measuring bar at upper edge of cylinder "A", as depicted in illustration.
- Check whether measuring bar makes proper contact at edge of cylinder "A".
- Position measuring tip on outer plate and note measuring value.
- Mark exact contact point on cylinder "A".
- Repeat measurement at 2 other points of outer plate, 120 ° offset each, and mark contact points.
- Average over 3 measured values under load.
- Release spindle and remove plate.

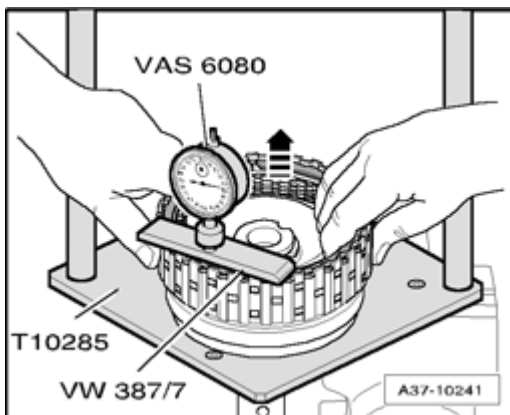


Fig. 210: Pulling Disc Pack Upward Using Hands

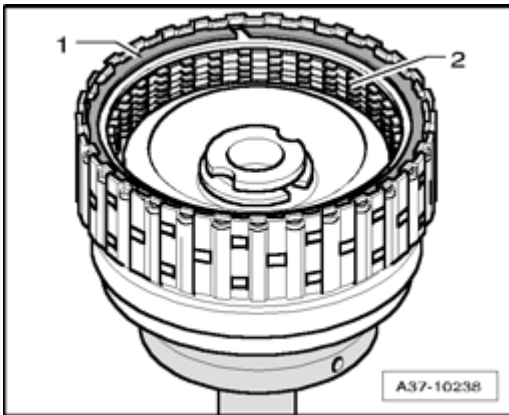
Courtesy of VOLKSWAGEN UNITED STATES, INC.

- Reach with both hands into clutch "A" and pull disc pack upward until stop.
- When disc pack is pulled up, measure distance between upper edge of cylinder "A" and outer plate (2nd technician required) at one of the marked points.
- Repeat measurement at 2 other marked points of outer plate.
- Average over 3 measured values when disc pack is pulled up.
- Determine air gap on the basis of the following calculations:

	Average of measured values under load (value 1 + value 2 + value 3): 3
	Measurement when disc pack is pulled up (value 1 + value 2 + value 3): 3
=	Air gap

- Subtract average of measured values when disc pack is pulled up from average of measured values under load.
- Specified value: 1.95 to 2.25 mm.

If specified value is not obtained:

**Fig. 211: Circlip And Disc Pack From Cylinder "A"**

Courtesy of VOLKSWAGEN UNITED STATES, INC.

- Determine new circlip - 1 -.

NOTE:

- Disregard - 2 -.
- Measured value too small: Install respectively thinner circlip.
- Measured value too large: Install respectively thicker circlip.

The following circlips are available:

2005 Volkswagen Phaeton

TRANSMISSION Servicing 5 Spd. Automatic Transmission 01L

Available circlips in mm

1.8	2.6	3.4
2.0	2.8	3.6
2.2	3.0	
2.4	3.2	

- Check air gap of circlip again after inserting.

Clutch "B" , assembly overview

NOTE:

- Some of the depicted components are part of component groups and are not available separately as replacement part.
- Check individual components of clutch "B" for wear and damage --> Clutch "B".

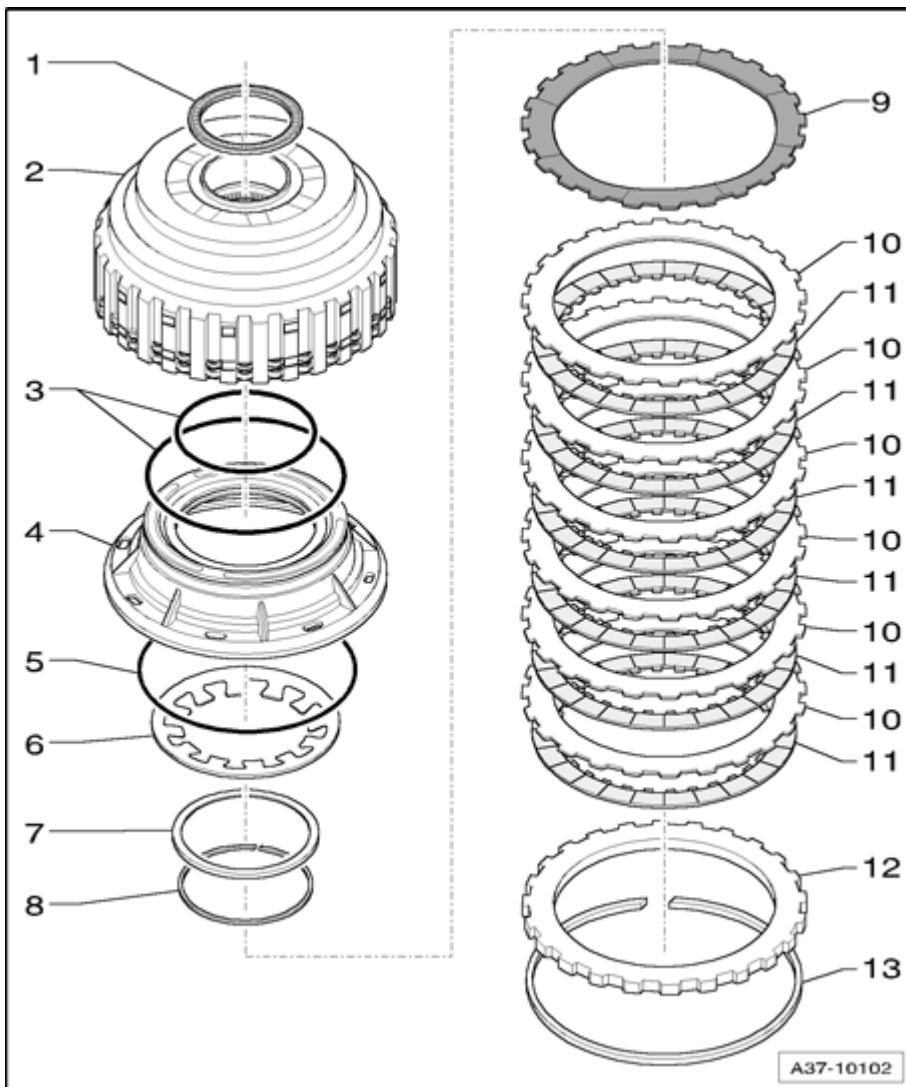


Fig. 212: Clutch "B" , Assembly Overview**Courtesy of VOLKSWAGEN UNITED STATES, INC.**

1 - Axial needle bearing

2 - Cylinder "B"

3 - O-rings

- Replace

4 - Piston "B"

5 - Seal

- Replace

6 - Dished washer

- Replace

7 - Retaining ring

8 - Circlip

9 - Wave washer

10 - Outer plate

11 - Coated plate

12 - Thick outer plate

13 - Circlip

- Determining thickness **Fig. 220**

Clutch "B" , disassembling and assembling

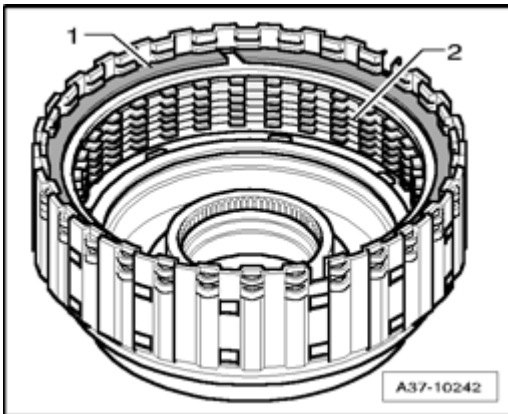


Fig. 213: Circlip And Disc Pack From Cylinder "B"
 Courtesy of VOLKSWAGEN UNITED STATES, INC.

- Twist clutch "B" and place on workbench.
- Remove circlip - 1 - and remove disc pack - 2 - from cylinder "B".

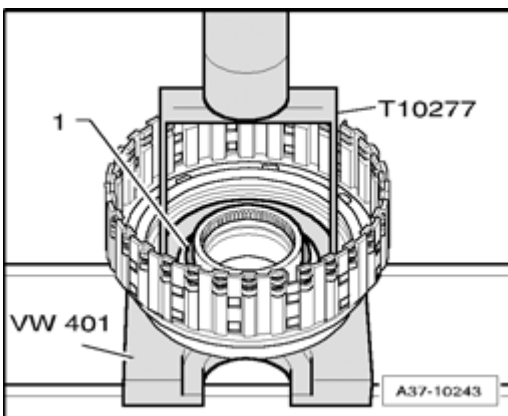


Fig. 214: Dished Washer, Installation Bracket T10277 And Circlip
 Courtesy of VOLKSWAGEN UNITED STATES, INC.

- Press dished washer down under shop press using installation bracket T10277.
- Remove circlip - 1 -.

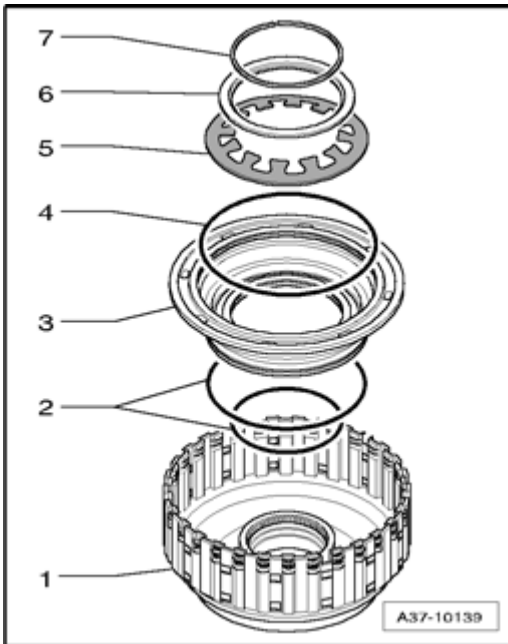


Fig. 215: Cylinder "B", O-Rings For Piston "B", Gasket, Dished Washer And Retaining Ring
Courtesy of VOLKSWAGEN UNITED STATES, INC.

- Remove retaining ring - 6 -.
- Remove dished washer - 5 -.

CAUTION: Wear protective glasses.

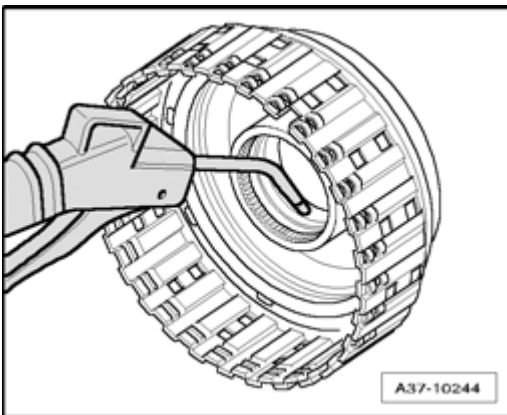


Fig. 216: Pressing Piston "B" Out Of Cylinder "B" With Compressed Air
Courtesy of VOLKSWAGEN UNITED STATES, INC.

- Carefully press piston "B" out of cylinder "B" with compressed air, to do so plug free oil bore using finger.

CAUTION: Check individual components of clutch "B" for wear and damage -->

Clutch "C" with sun shaft.

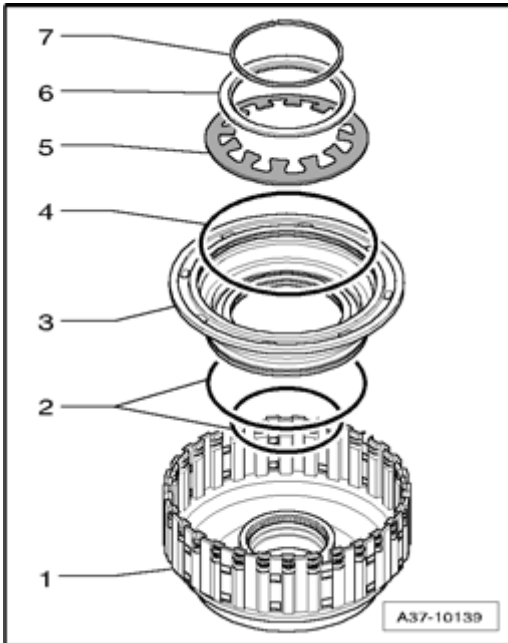


Fig. 217: Cylinder "B", O-Rings For Piston "B", Gasket, Dished Washer And Retaining Ring
 Courtesy of VOLKSWAGEN UNITED STATES, INC.

- Replace O-rings - 2 - for piston "B" - 3 -.
- Replace gasket - 4 - in piston "B".
- Press piston "B" - 3 - into cylinder "B" - 1 - until stop.
- Replace dished washer - 5 - and place dished washer as well as retaining ring - 6 -.

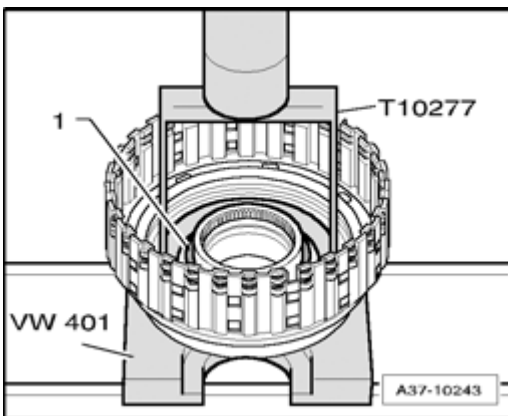


Fig. 218: Dished Washer, Installation Bracket T10277 And Circlip
 Courtesy of VOLKSWAGEN UNITED STATES, INC.

- Press dished washer down under shop press using installation bracket T10277.
- Insert circlip - 1 -.

NOTE:

- Do not over-stretch circlip. After installing, check proper seating of circlip.

- Release shop press.

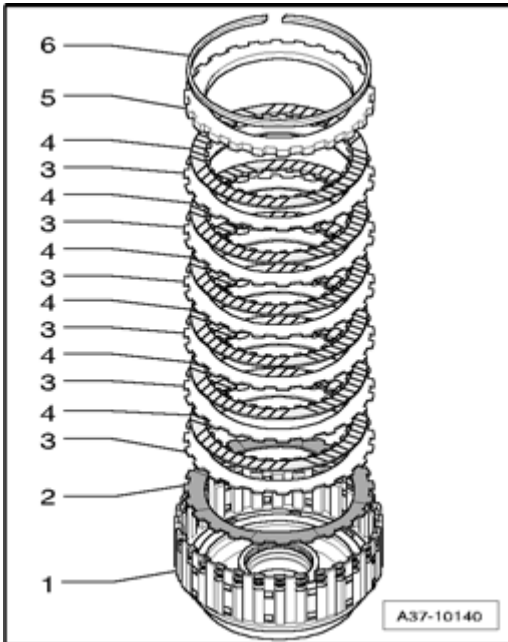


Fig. 219: Cylinder "B", Wave Washer, Outer Plate, Coated Plate And Thick Outer Plate
Courtesy of VOLKSWAGEN UNITED STATES, INC.

- Insert wave washer - 2 - into cylinder "B" - 1 -.
- Install outer plate - 3 - and coated plate - 4 - alternately.
- Install thick outer plate - 5 -.
- Smooth side faces last coated plate.
- Insert circlip - 6 -.

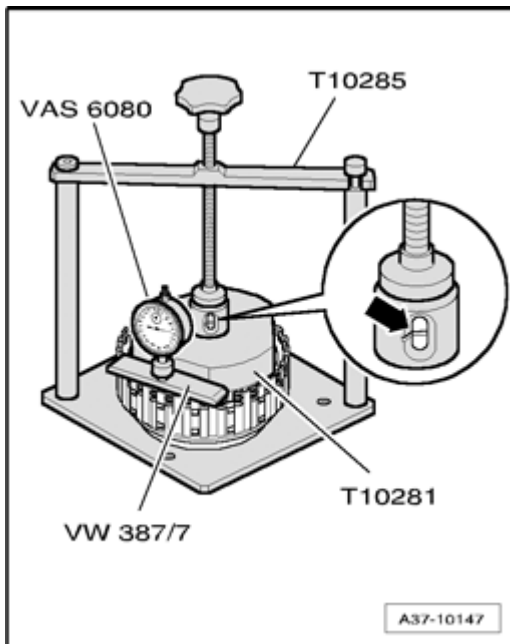


Fig. 220: Adjusting Air Gap Clutch "B"

Courtesy of VOLKSWAGEN UNITED STATES, INC.

Adjust air gap clutch "B"

- Place cylinder "B" on pre-tensioning tool T10285.
- Position plate T10281 on outer clutch plate "B".
- Plate must not touch circlip.
- Insert pressure unit T10285/1 with centering pin into bore of plate.
- Align cylinder "B" on plate of pre-tensioning tool.
- The pressure unit must be centrally positioned under spindle thrust piece.
- Turn spindle of pre-tensioning tool downward.
- The markings at the inspection hole of the pressure unit must align - **arrow** -.
- Insert dial gauge VAS 6080 into measuring bar VW 382/7 and tighten knurled nut.
- Apply measuring bar at upper edge of cylinder "B", as depicted in illustration.
- Check whether measuring bar makes proper contact at edge of cylinder "B".
- Position measuring tip on outer plate and note measuring value.
- Mark exact contact point on cylinder "B".
- Repeat measurement at 2 other points of outer plate, 120 ° offset each, and mark contact points.
- Average over 3 measured values under load.

- Release spindle and remove plate.

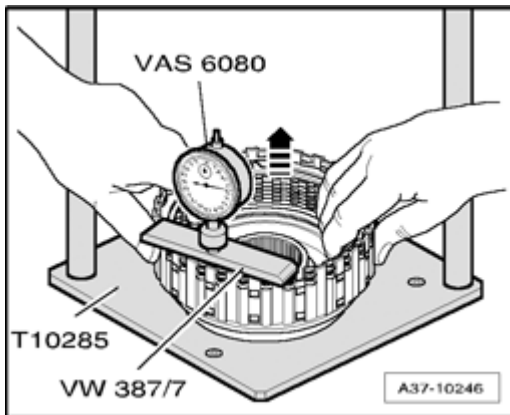


Fig. 221: Pulling Disc Pack Upward Using Hands

Courtesy of VOLKSWAGEN UNITED STATES, INC.

- Reach with both hands into clutch "B" and pull disc pack upward until stop.
- When disc pack is pulled up, measure distance between upper edge of cylinder "B" and outer plate (2nd technician required) at one of the marked points.
- Repeat measurement at 2 other marked points of outer plate.
- Average over 3 measured values when disc pack is pulled up.
- Determine air gap on the basis of the following calculations:

	Average of measured values under load (value 1 + value 2 + value 3): 3
	Measurement when disc pack is pulled up (value 1 + value 2 + value 3): 3
=	Air gap

- Subtract average of measured values when disc pack is pulled up from average of measured values under load.

Air gap clutch "B" for transmission with code letters CUE, DPZ, DSL, DSM, DTD, DTE, DYM, ECX:

- 1.95 to 2.25 mm.

Air gap clutch "B" for transmission with code letters ECY, ECZ and the following:

- 2.15 to 2.45 mm.

If specified value is not obtained:

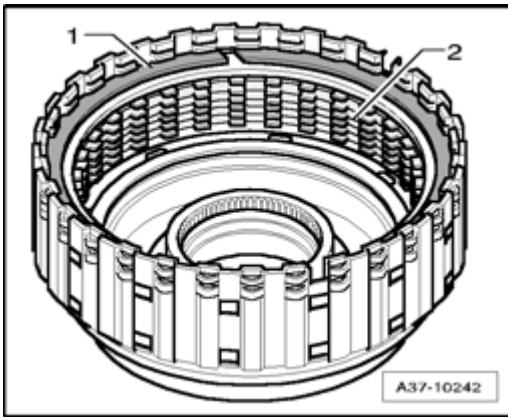


Fig. 222: Circlip And Disc Pack From Cylinder "B"
 Courtesy of VOLKSWAGEN UNITED STATES, INC.

- Determine new circlip - 1 -.

NOTE:

- Disregard - 2 -.
- Measured value too small: Install respectively thinner circlip.
- Measured value too large: Install respectively thicker circlip.

The following circlips are available:

Available circlips in mm		
2.6	3.4	4.2
2.8	3.6	4.4
3.0	3.8	4.6
3.2	4.0	

- Check air gap of circlip again after inserting.

Tower "II" , assembling

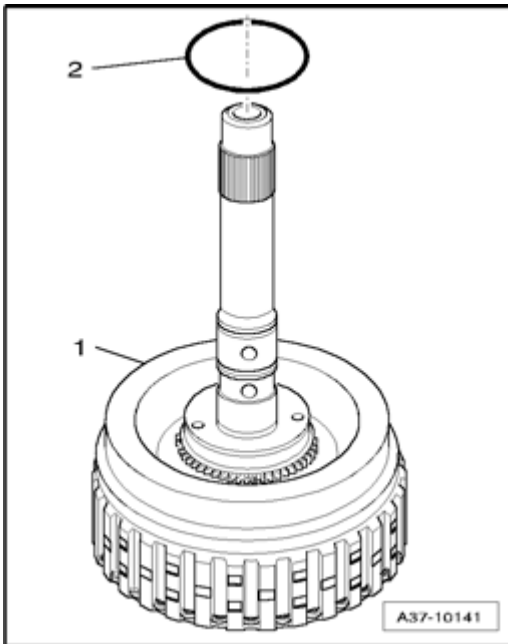


Fig. 223: O-Ring And Into Cylinder "A"

Courtesy of VOLKSWAGEN UNITED STATES, INC.

- Insert O-ring - 2 - into cylinder "A" - 1 - with Vaseline. Use only Vaseline, other lubricating substances cause functional problems in the hydraulic transmission control.

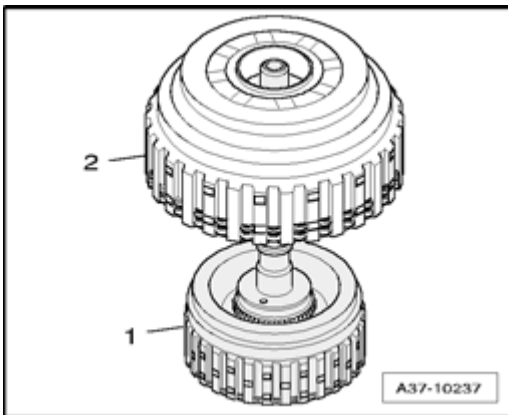


Fig. 224: Clutch "B" And Clutch "A"

Courtesy of VOLKSWAGEN UNITED STATES, INC.

- Press clutch "B" - item 2 - onto clutch "A" - 1 - until stop.
- Twist clutches "A/B" and place in mounting device T10283.

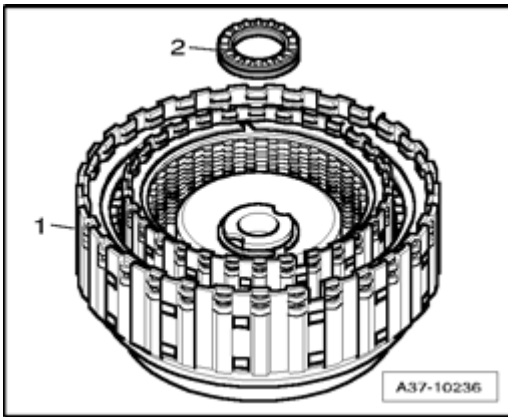


Fig. 225: Axial Needle Bearing And Clutch "A/B"
 Courtesy of VOLKSWAGEN UNITED STATES, INC.

- Place axial needle bearing - 2 - on clutches "A/B".
- Position clutch plate "B" vertically using e.g. measuring tongue of caliper gauge.

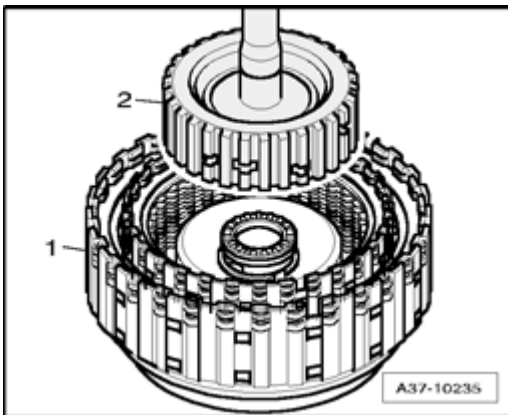


Fig. 226: Intermediate Shaft With Inner Plate Carrier "A" And Clutch "A/B"
 Courtesy of VOLKSWAGEN UNITED STATES, INC.

- Insert inner plate carrier "A" - 2 - into clutch plate pack "A" , using short lifting/turning motions.
- All clutch plate "A" must engage in sequence in plate carrier of planetary drive.
- Check whether all plates are engaged, lift inner plate carrier "A" a few millimeters and let fall.
- If this produces a metallic sound, all plates are engaged.
- If only a muted sound is heard, not all plates are engaged.

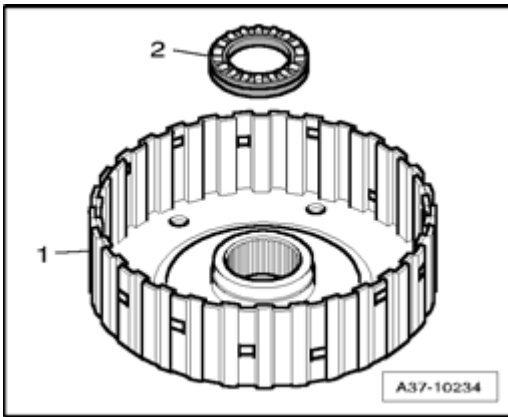


Fig. 227: Inner Plate Carrier "B" And Axial Needle Bearing
 Courtesy of VOLKSWAGEN UNITED STATES, INC.

- Thinly coat axial needle bearing - 2 - with Vaseline on flat side. Use only Vaseline, other lubricating substances cause functional problems in the hydraulic transmission control.
- Affix axial needle bearing to inner plate carrier "B" - **item 1** - at rear.

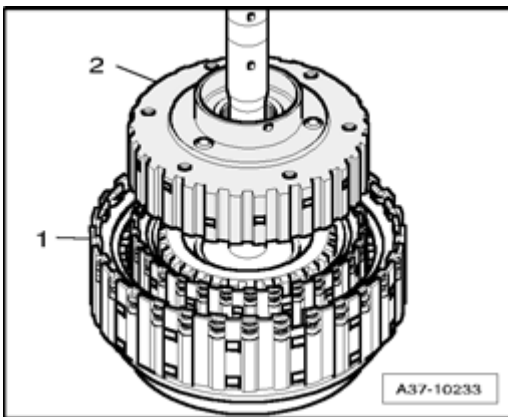


Fig. 228: Inner Plate Carrier "B" And Clutch "A/B"
 Courtesy of VOLKSWAGEN UNITED STATES, INC.

- Position clutch plate "B" vertically using e.g. measuring tongue of caliper gauge.
- Twist inner plate carrier "B" - 2 - and insert into clutch plate pack "B" , using short lifting/turning motions.
- All clutch plates "B" must engage in sequence in plate carrier of planetary drive.
- Check whether all plates are engaged, lift inner plate carrier "A" a few millimeters and let fall.
- If this produces a metallic sound, all plates are engaged.
- If only a muted sound is heard, not all plates are engaged.

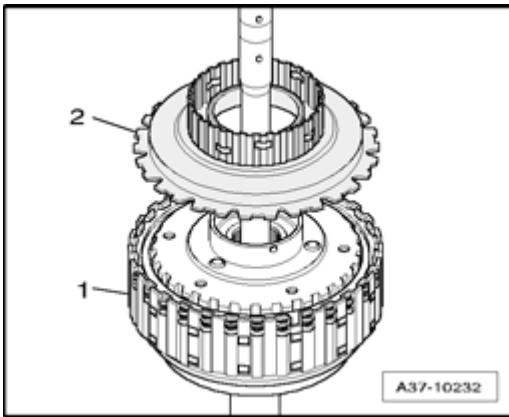


Fig. 229: Inner Plate Carrier "C" And Clutch "A/B"
 Courtesy of VOLKSWAGEN UNITED STATES, INC.

- Place inner plate carrier "C" - 2 - on clutch "A/B" - 1 -.

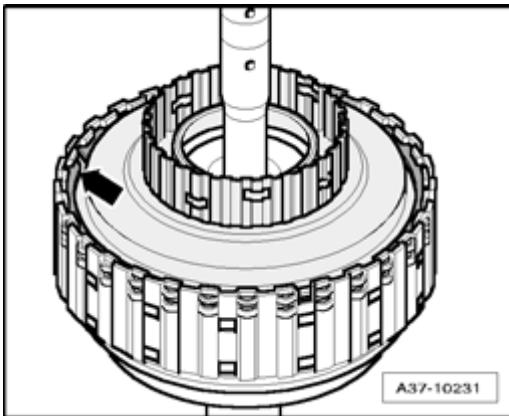


Fig. 230: Tower "II" Circlip
 Courtesy of VOLKSWAGEN UNITED STATES, INC.

- Insert circlip - **arrow** -.

SHIFT ROD, REMOVING AND INSTALLING

Shift rod, removing and installing

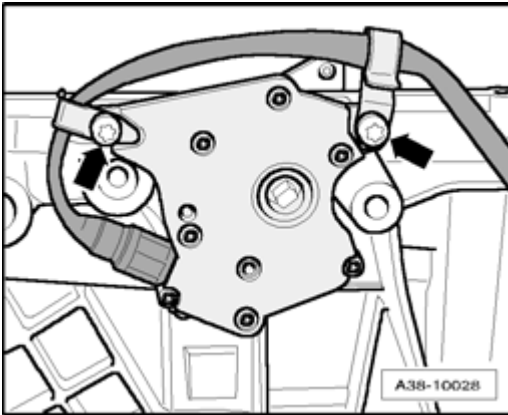


Fig. 231: Multi-Function Transmission Range Switch F125 Bolts
Courtesy of VOLKSWAGEN UNITED STATES, INC.

Removing

- Valve body removed.
 - Place transmission selector lever in position "P" (transmission selector lever points toward rear).
 - Remove Multi-Function Transmission Range (TR) Switch F125 from transmission - **arrows** -.

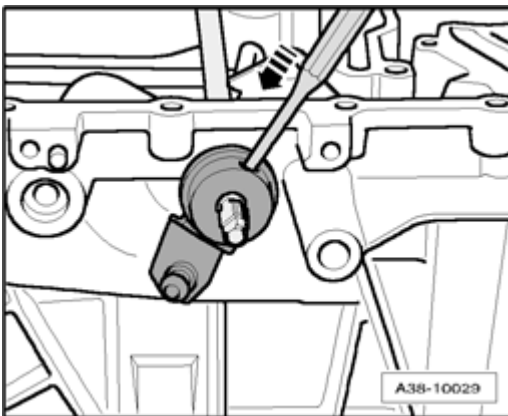


Fig. 232: Driving Out Roll Pin For Transmission Selector Lever
Courtesy of VOLKSWAGEN UNITED STATES, INC.

- Drive out roll pin for transmission selector lever - **arrow** -.

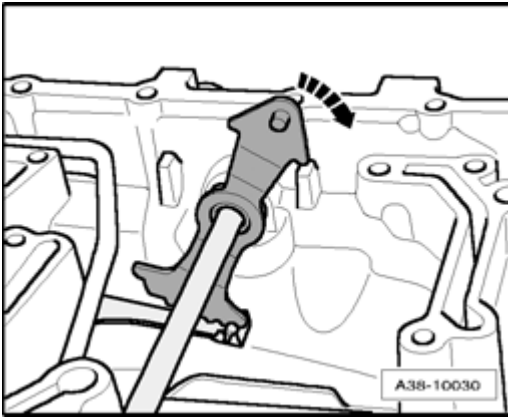


Fig. 233: Bringing Shift Rod Into Position "1"

Courtesy of VOLKSWAGEN UNITED STATES, INC.

- Bring shift rod into position "1" - **arrow** -.
- Push beyond last detent stage until stop to make use of the entire shift rod path in direction of - **arrow** -.

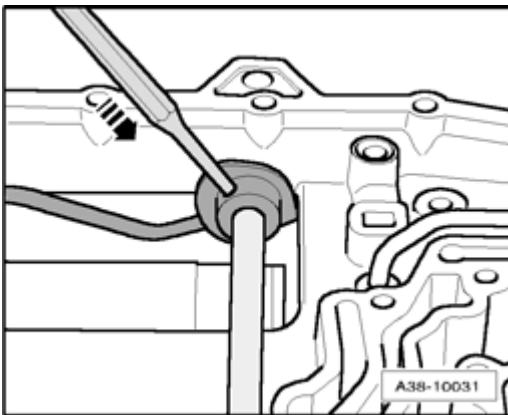


Fig. 234: Driving Roll Pin For Operating Lever For Parking Lock Downward

Courtesy of VOLKSWAGEN UNITED STATES, INC.

- Carefully drive roll pin for operating lever for parking lock downward - **arrow** - just enough so that operating lever can be slid on shift rod.

NOTE:

- **Do not drive in roll pin further, otherwise seal for input shaft could be damaged. Seal cannot be replaced separately.**

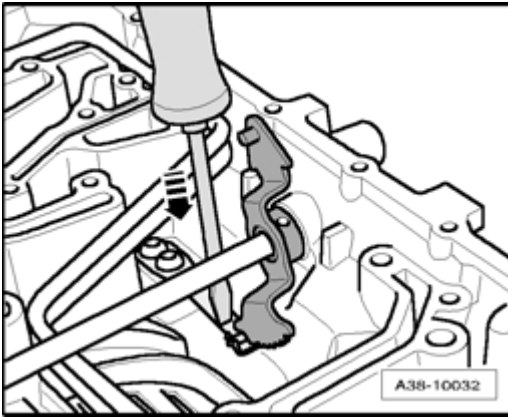


Fig. 235: Pressing Catch Spring Downward Using Screwdriver
 Courtesy of VOLKSWAGEN UNITED STATES, INC.

- Bring shift rod into position "P".

NOTE:

- Mounting bolts for catch spring must not be removed under any circumstances adjustment in not possible using workshop equipment.

- Press catch spring downward - **arrow** - using screwdriver and lightly tap shift rod a little toward right transmission side (differential side).

NOTE:

- Plug for shift rod will be pushed out on right transmission side while doing so.

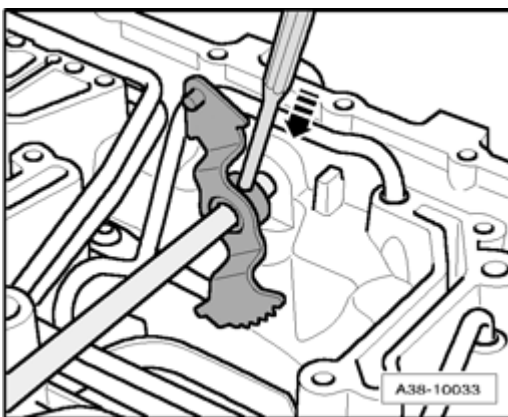


Fig. 236: Driving Roll Pin For Notched Disc Downward So That Notched Disc Can Be Slid On Shift Rod
 Courtesy of VOLKSWAGEN UNITED STATES, INC.

- Carefully drive roll pin for notched disc downward just enough so that notched disc can be slid on shift rod.

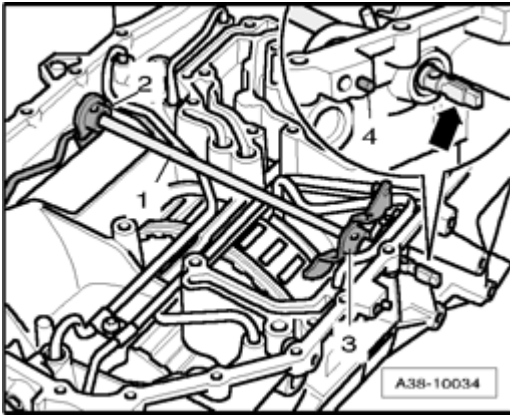


Fig. 237: Shift Rod, Operating Lever And Notched Disc
Courtesy of VOLKSWAGEN UNITED STATES, INC.

- Pull shift rod - 1 - out of transmission housing.
- Remove operating lever - 2 - with activating rod for parking lock.
- Remove notched disc - 3 -.
- Pull roll pins out of operating lever and notched disc.

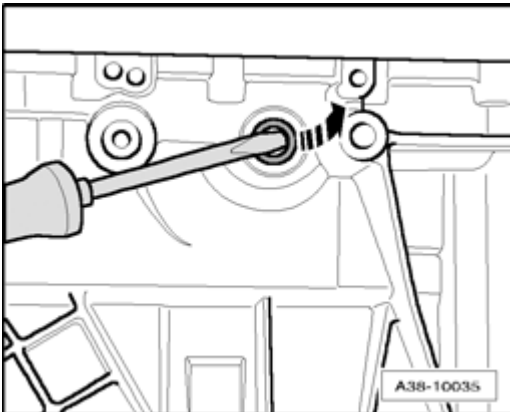


Fig. 238: Prying Out Sealing Ring For Shift Rod
Courtesy of VOLKSWAGEN UNITED STATES, INC.

- Pry out sealing ring for shift rod.

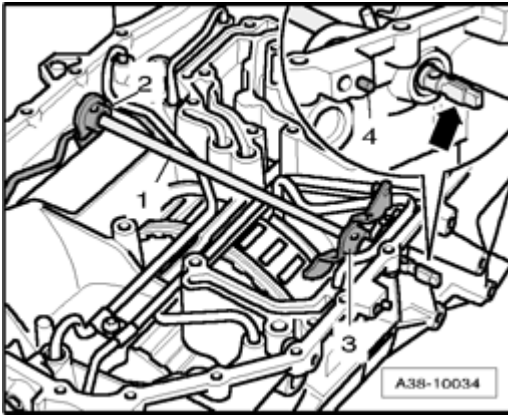


Fig. 239: Shift Rod, Operating Lever And Notched Disc
Courtesy of VOLKSWAGEN UNITED STATES, INC.

Installing

- Push shift rod - 1 - into transmission housing, attach notched disc - 3 - and operating lever for parking lock - 2 -.
- Note installation position of shift rod:
 - Flat side of shift rod - **arrow** - points toward centering pin - 4 - for Multi-Function Transmission (TR) Switch F125.

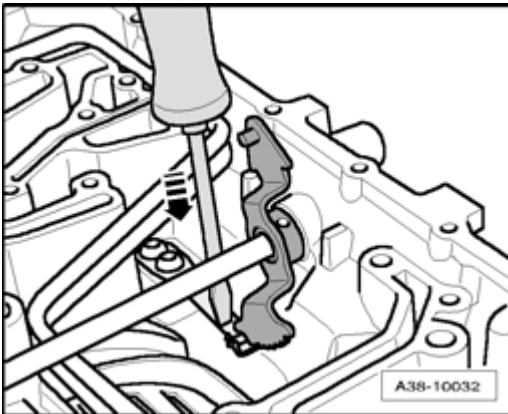


Fig. 240: Pressing Catch Spring Downward Using Screwdriver
Courtesy of VOLKSWAGEN UNITED STATES, INC.

- Press catch spring downward using screwdriver and slide notched disc into position "P" onto roller of catch spring.
- Drive in catch spring roll pin flush.

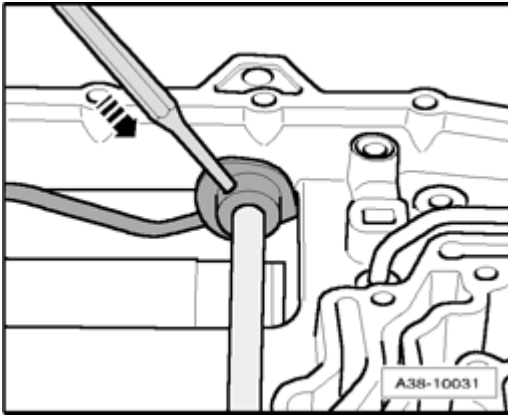


Fig. 241: Driving Roll Pin For Operating Lever For Parking Lock Downward
 Courtesy of VOLKSWAGEN UNITED STATES, INC.

- Bring shift rod with notched disc into position "D" (center position).
- Drive in roll pin for operating lever for parking lock flush - **arrow** -.

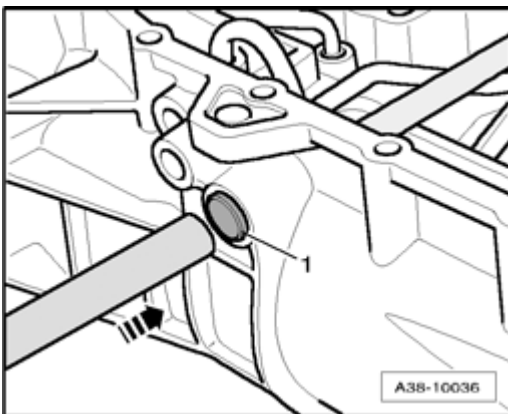


Fig. 242: Driving Sealing Plug For Shift Rod In Using Drift That Fits
 Courtesy of VOLKSWAGEN UNITED STATES, INC.

- Drive sealing plug - **1** - for shift rod in - **arrow** - using drift that fits.

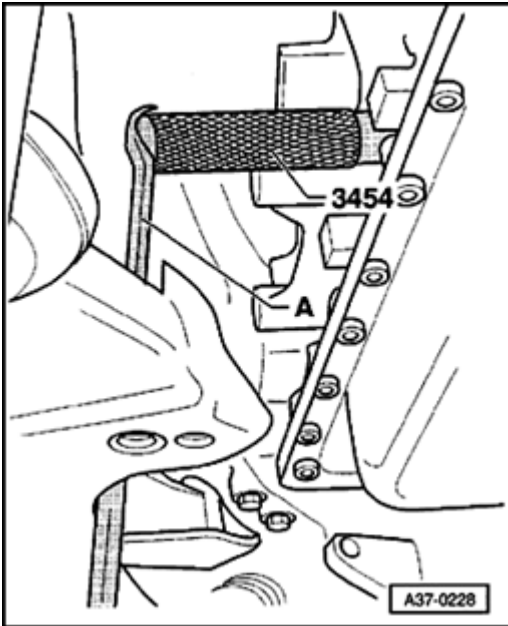


Fig. 243: Sliding Sealing Ring Onto Assembly Sleeve 3454 And Pressing In Until Stop
Courtesy of VOLKSWAGEN UNITED STATES, INC.

- Slide new sealing ring onto Assembly sleeve 3454 and press in until stop.

NOTE:

- The illustration shows the installation with lever - A - with transmission installed.

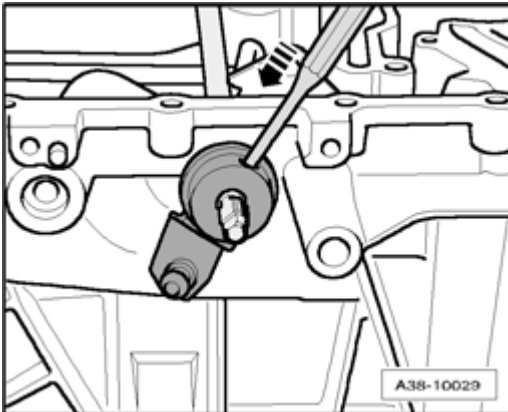


Fig. 244: Driving Out Roll Pin For Transmission Selector Lever
Courtesy of VOLKSWAGEN UNITED STATES, INC.

- Attach transmission selector lever and drive in roll pin, as depicted in illustration.

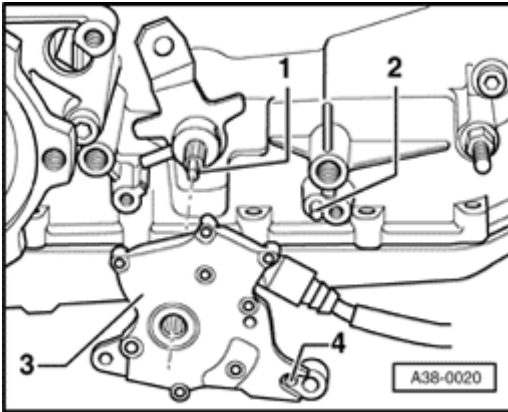


Fig. 245: Location Of 10 Pin Harness Connector & Multi-Function Transmission Range (TR) Switch
 Courtesy of VOLKSWAGEN UNITED STATES, INC.

- Place transmission selector lever in position "P" (transmission selector lever points toward rear).
- Place Multi-Function Transmission Range (TR) Switch F125 - **3** - on shift rod.
- Flat part at splines in Multi-Function Transmission Range (TR) Switch F125 must rest on flat part of shift rod - **1** -.
- Place Multi-Function Transmission Range (TR) Switch F125 in center on shift rod.

NOTE:

- **Do not tilt Multi-Function Transmission Range (TR) Switch F125 and do not attach with force, otherwise switch contacts can be damaged.**

- Rotate Multi-Function Transmission Range (TR) Switch F125 until the alignment bore - **4** - at switch housing can be installed on alignment pin - **2** - at transmission housing.

39F FINAL DRIVE, DIFFERENTIAL (FRONT)

ATF PUMP, DISASSEMBLING AND ASSEMBLING

ATF pump, assembly overview

NOTE:

- **Some of the depicted components are part of component groups and are not available separately as replacement part.**
- **Check individual components of ATF pump for wear and damage --> ATF pump.**

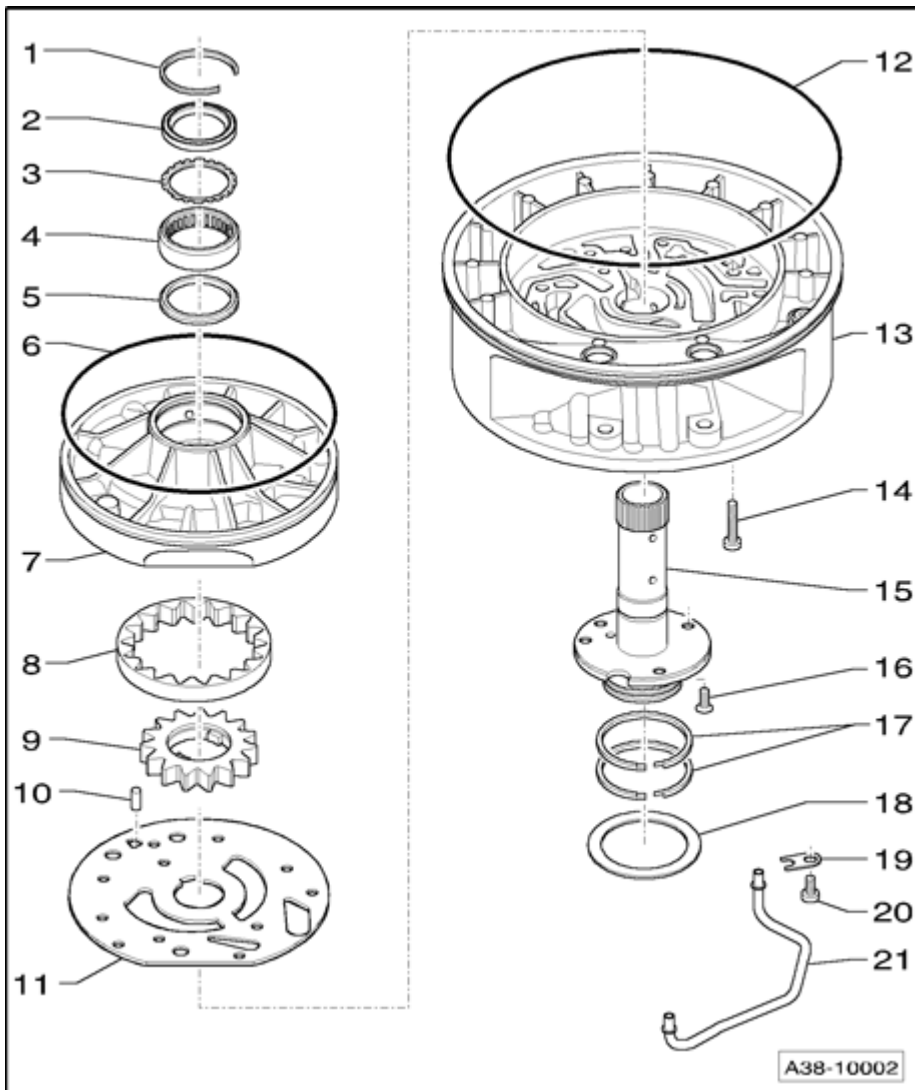


Fig. 246: ATF Pump, Assembly Overview

Courtesy of VOLKSWAGEN UNITED STATES, INC.

- 1 - Circlip
- 2 - Sealing ring for torque converter
 - Replace
- 3 - Locking washer
- 4 - Needle bearing
- 5 - Seal
- 6 - O-ring

- Replace

7 - ATF pump housing

8 - Ring gear

9 - Pump wheel

10 - Positioning sleeve

11 - Intermediate panel

12 - O-ring

13 - ATF pump

14 - Bolt

- Tightening torque M5 - 5 Nm; M6 - 10 Nm

15 - Stator shaft

- Removing and installing --> **Stator shaft, removing and installing**

16 - Countersunk screw -10 Nm

17 - Rectangular ring for ATF pump

- Replace

18 - Adjustment shim

19 - Angle bracket for ATF oil tube

20 - Bolt, 10 Nm

21 - ATF oil tube

- Carefully insert alternately using drive-in tool T10274
- Replace

ATF pump, disassembling and assembling

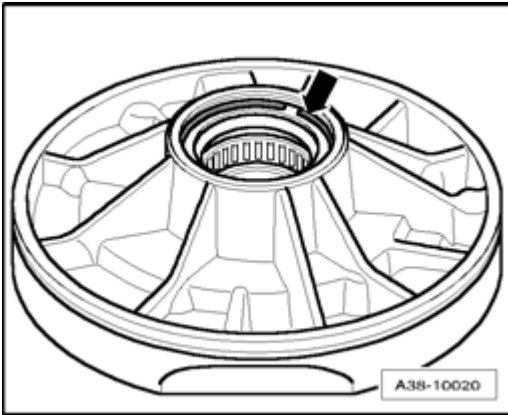


Fig. 247: Torque Converter Circlip
Courtesy of VOLKSWAGEN UNITED STATES, INC.

Removing seal for torque converter

- Remove circlip - **arrow** -.

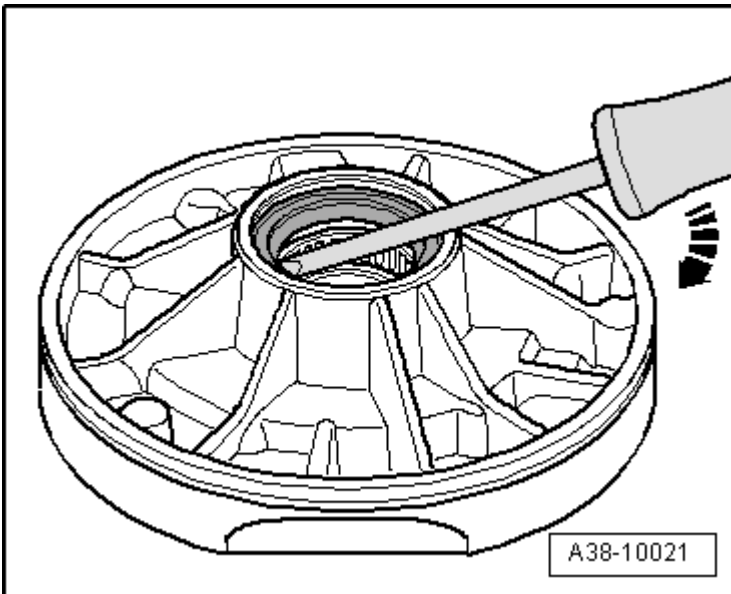


Fig. 248: Pry Off Shaft Seal Using Screwdriver
Courtesy of VOLKSWAGEN UNITED STATES, INC.

NOTE:

- **Attach screwdriver only at gasket but not at locking washer lying underneath.**

- Pry off shaft seal using screwdriver - **arrow** -.

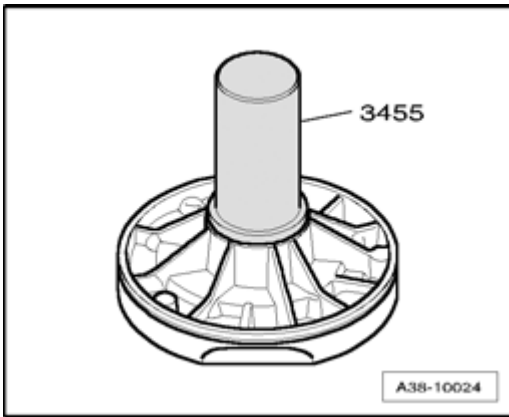


Fig. 249: Driving In New Shaft Seal To Stop Using Thrust Piece 3455
Courtesy of VOLKSWAGEN UNITED STATES, INC.

Installing gasket for torque converter

- Check locking washer lying underneath for damage.
- Drive in new shaft seal to stop using thrust piece 3455.

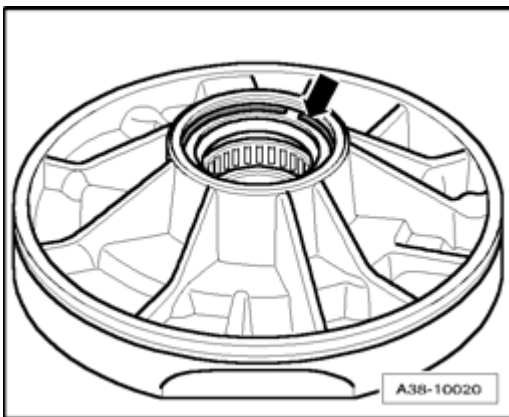


Fig. 250: Torque Converter Circlip
Courtesy of VOLKSWAGEN UNITED STATES, INC.

- Install circlip - **arrow** -.

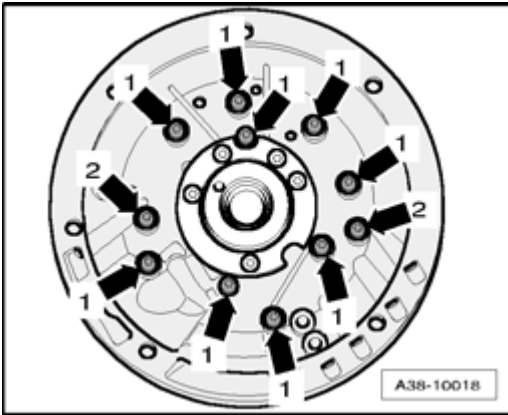


Fig. 251: ATF Pump To ATF Supply Housing Bolts
Courtesy of VOLKSWAGEN UNITED STATES, INC.

Remove ATF pump from ATF supply housing.

- Remove bolts - **arrows 1** -.
- Unscrew bolts - **arrows 2** - approx. 5 rotations.

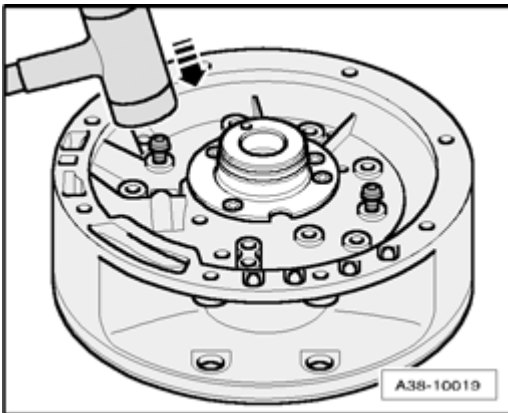


Fig. 252: Tapping On ATF Pump Bolt Heads Using A Plastic Hammer
Courtesy of VOLKSWAGEN UNITED STATES, INC.

- Loosen ATF pump by lightly tapping on bolt heads - **arrow** - using a plastic hammer.
- Remove remaining 2 bolts.

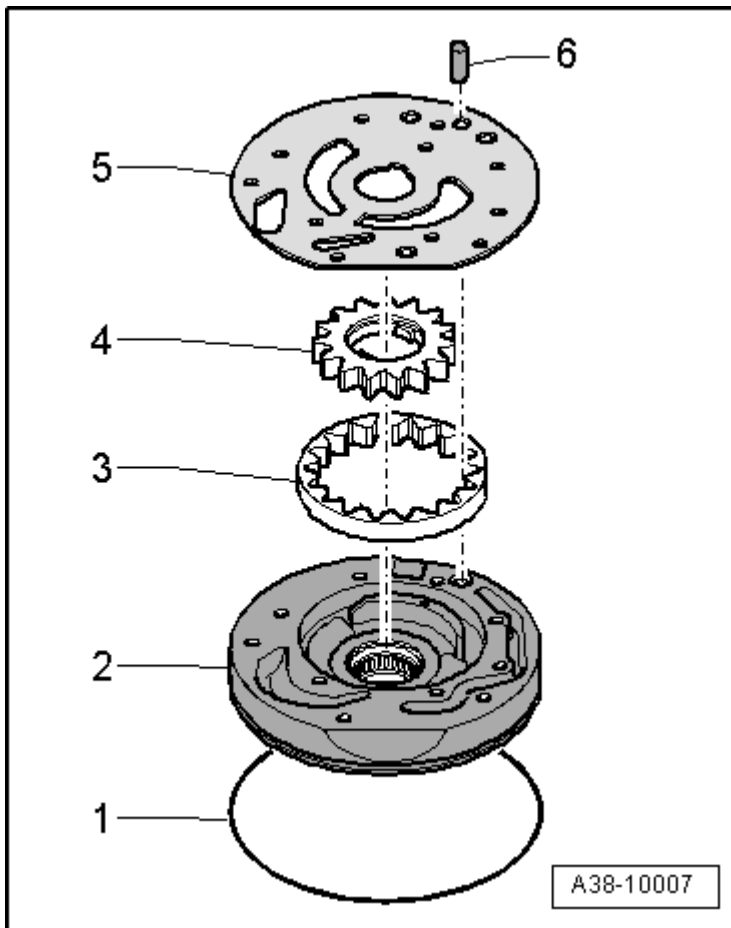


Fig. 253: ATF Pump Component, Overview

Courtesy of VOLKSWAGEN UNITED STATES, INC.

- Remove intermediate plate - 5 - and positioning sleeve - 6 -.
- Remove ATF pump wheels - 3 - and - 4 - from ATF pump housing - 2 -.

1 - O-ring

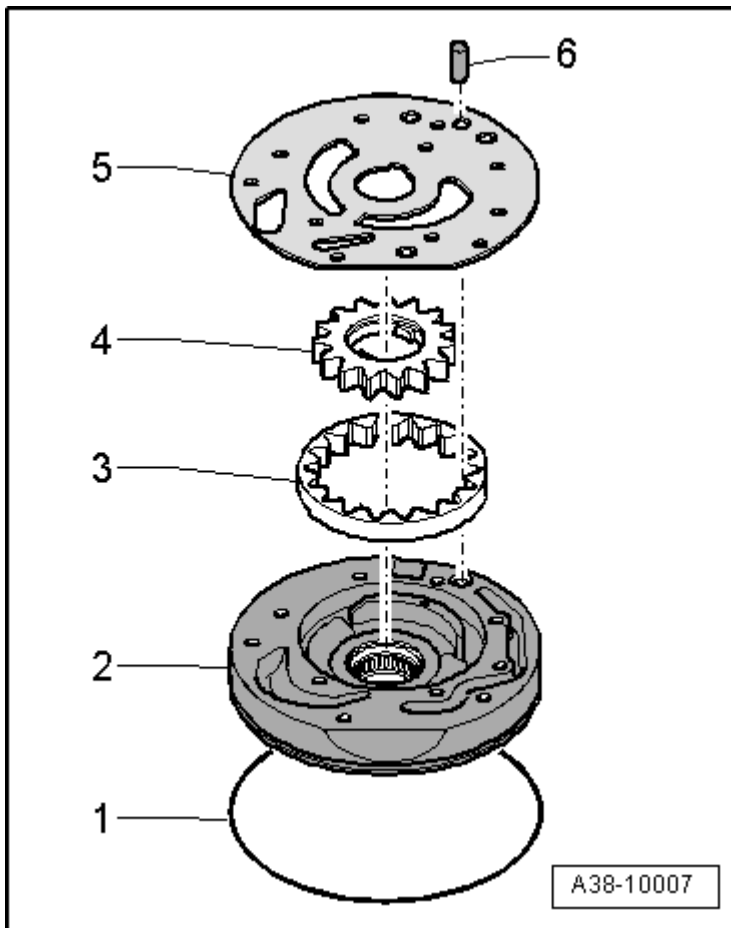


Fig. 254: ATF Pump Component, Overview
 Courtesy of VOLKSWAGEN UNITED STATES, INC.

Install ATF pump in ATF supply housing.

CAUTION: Check individual components of ATF supply for wear and damage --> ATF pump.

- Replace O-ring - **1** - on ATF pump housing.
- Insert ATF pump wheels - **3** - and - **4** - into ATF pump housing - **2** -.
- Markings (points) on pump wheels point toward intermediate panel - **5** -.
- Place intermediate panel and insert positioning sleeve - **6** -.

Installed position of intermediate panel:

- The flat part of the intermediate plate must be aligned with flat part of ATF pump housing.
- Positioning sleeve engages in rectangular bore on intermediate panel.

- Insert ATF pump into ATF supply housing.

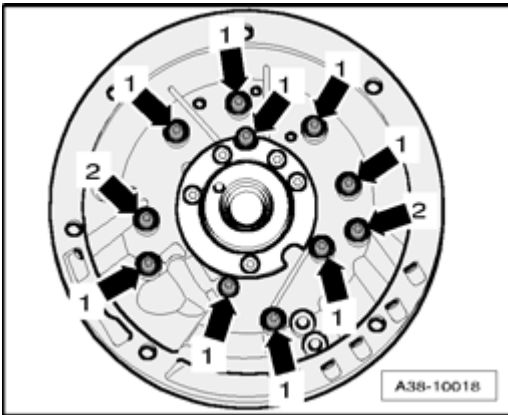


Fig. 255: ATF Pump To ATF Supply Housing Bolts
Courtesy of VOLKSWAGEN UNITED STATES, INC.

- Tighten bolts in stages - **arrows 1** - and - **arrows 2** - in diagonal sequence.

Tightening torque

- M5 bolts: 5 Nm
- M6 bolts: 10 Nm

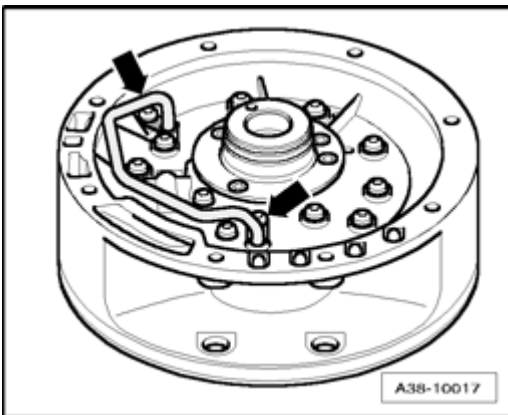


Fig. 256: ATF Oil Tube
Courtesy of VOLKSWAGEN UNITED STATES, INC.

Removing oil tube

- Remove bolts - **arrows** - and carefully pry ATF oil tube out of ATF pump using screwdriver.

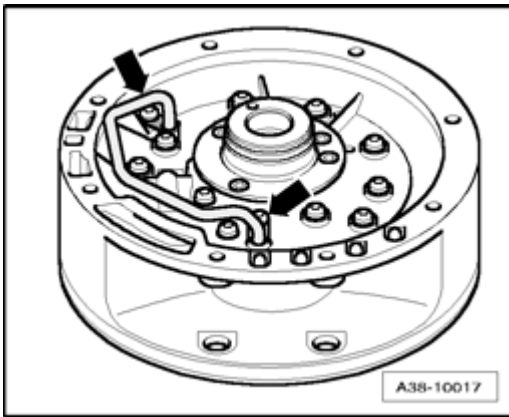


Fig. 257: ATF Oil Tube

Courtesy of VOLKSWAGEN UNITED STATES, INC.

Installing oil tube

- Gradually insert ATF oil tube with light and careful taps alternately in bores on ATF pump until stop, using drive-in tool T10274.
- Tighten angle bracket for ATF oil tube - **arrows** -.
- Tightening torque: 10 Nm.

Stator shaft, removing and installing

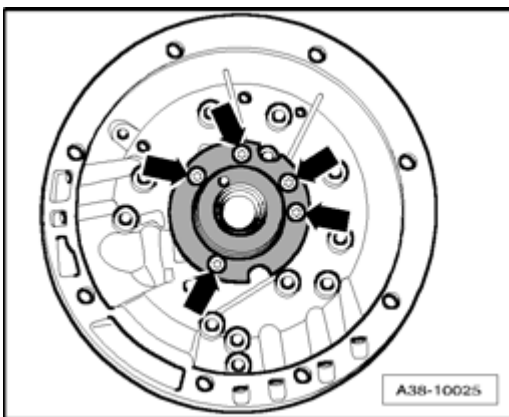


Fig. 258: ATF Pump Bolts

Courtesy of VOLKSWAGEN UNITED STATES, INC.

Removing

- ATF pump removed from oil supply.
- Remove bolts - **arrows** -.

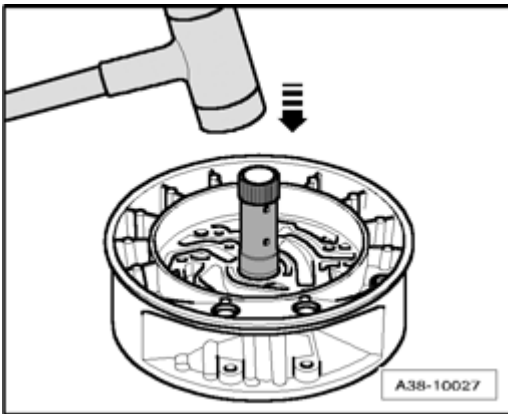


Fig. 259: Driving Out Stator Shaft Downward

Courtesy of VOLKSWAGEN UNITED STATES, INC.

- Heat area of oil pump all around stator shaft to approx. 70 ° C using heat gun.
- Drive out stator shaft downward.

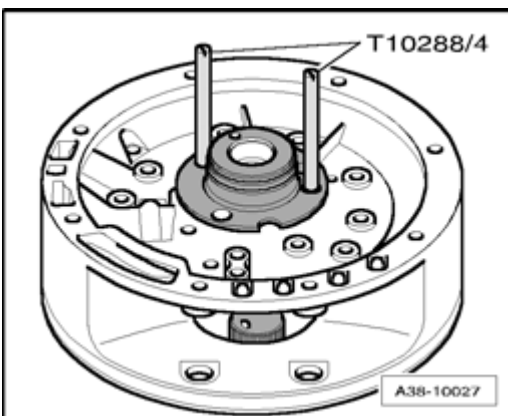


Fig. 260: M6 Guide Pins T10288/4

Courtesy of VOLKSWAGEN UNITED STATES, INC.

Installing

CAUTION: Check individual components of ATF supply for wear and damage --> ATF pump.

- Turn in M6 guide pins T10288/4 and attach stator shaft.
- Heat area of oil pump all around stator shaft to approx. 70 ° C using heat gun.
- Press in stator shaft under shop press.

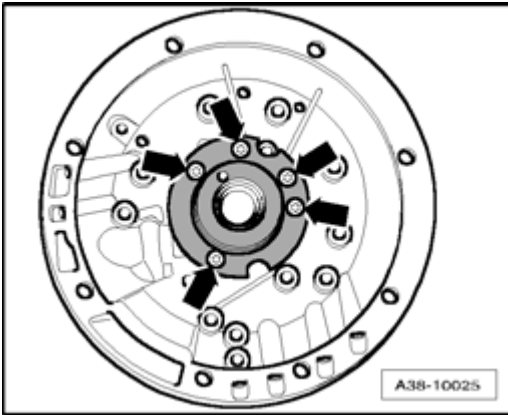


Fig. 261: ATF Pump Bolts

Courtesy of VOLKSWAGEN UNITED STATES, INC.

- Tighten bolts - arrows -.
- Tightening torque: 10 Nm.

Volume controlling valve in ATF pump, checking

- ATF pump removed from ATF supply housing.

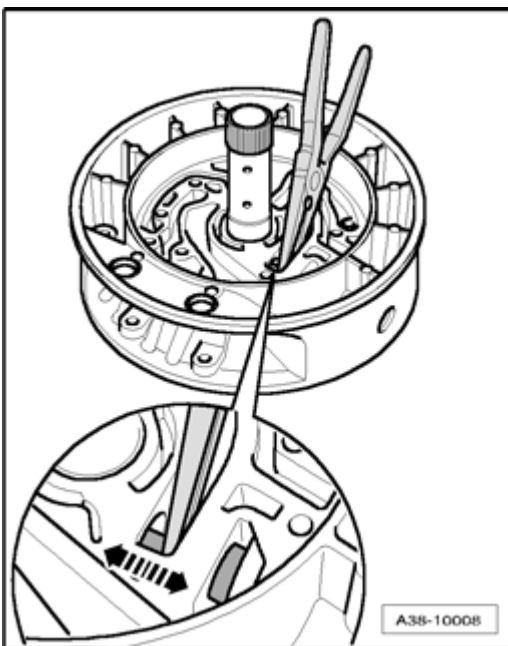


Fig. 262: Moving Valve Piston Against Spring Pressure

Courtesy of VOLKSWAGEN UNITED STATES, INC.

Check volume controlling valve as follows:

- Move valve piston against spring pressure.

- Valve must move freely.
- Valve must not have grooves.

OIL TUBES

ATF oil tubes, removing and installing

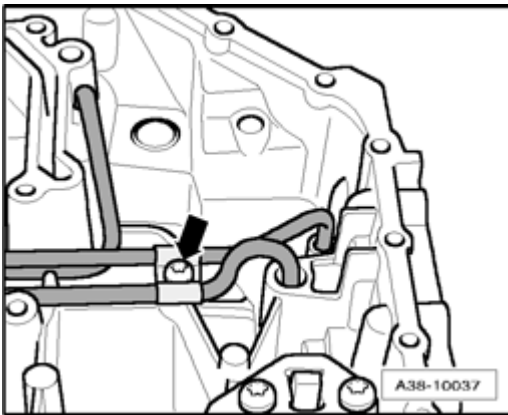


Fig. 263: Retaining Plate Bolt

Courtesy of VOLKSWAGEN UNITED STATES, INC.

Removing

- Valve body removed.
- Shift rod removed.
- Remove bolt - **arrow** - and remove retaining plate.

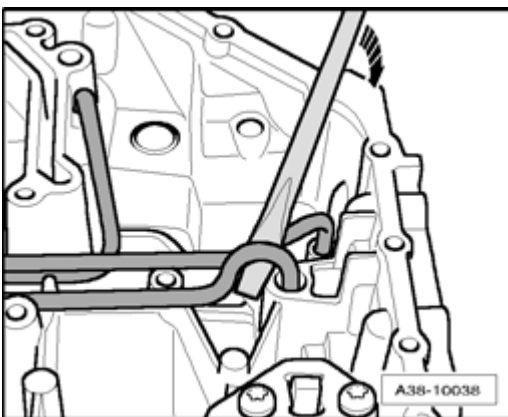


Fig. 264: Pressing Off ATF Oil Tubes Evenly From Transmission Housing Using Screwdriver

Courtesy of VOLKSWAGEN UNITED STATES, INC.

- Press off ATF oil tubes evenly from transmission housing - **arrow** - using screwdriver.

Installing

NOTE:

- Once removed, oil tubes must always be replaced.
- Flush ATF oil passages and blow through with pressurized air.

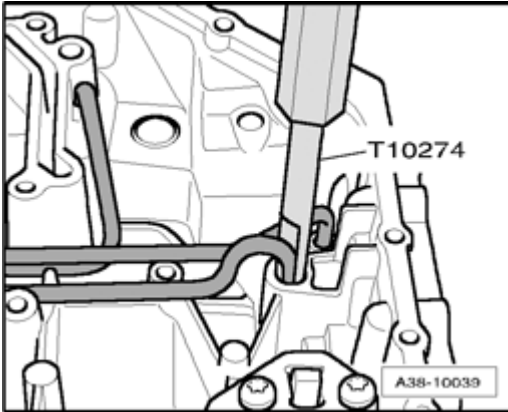


Fig. 265: Drive ATF Oil Tubes Into Transmission Housing With Light And Careful Taps, Alternating Between Sides, Using Drive-In Tool T10274

Courtesy of VOLKSWAGEN UNITED STATES, INC.

- Drive ATF oil tubes gradually into transmission housing with light and careful taps, alternating between sides, using drive-in tool T10274.

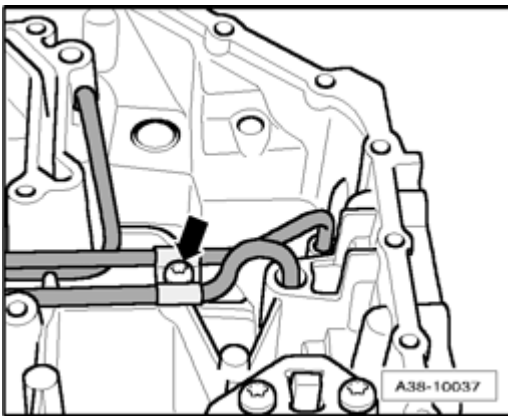


Fig. 266: Retaining Plate Bolt

Courtesy of VOLKSWAGEN UNITED STATES, INC.

- Place retaining plate and tighten bolt - **arrow** -.
- Tightening torque: 10 Nm.

Oil tube for rear final drive, removing and installing

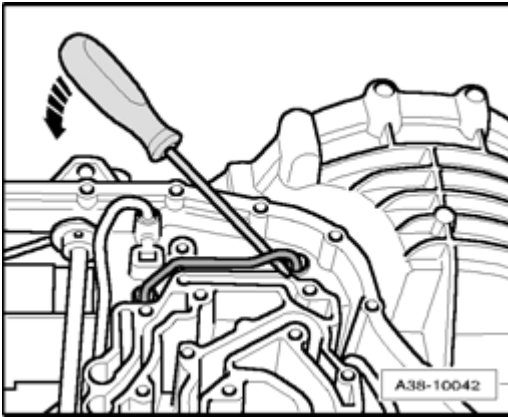


Fig. 267: Pressing Off Oil Tube For Rear Final Drive Evenly From Transmission Housing Using Screwdriver

Courtesy of VOLKSWAGEN UNITED STATES, INC.

Removing

- Valve body removed.
- Press off oil tube for rear final drive evenly from transmission housing - **arrow** - using screwdriver.
- Remove 2 O-rings for oil tube from transmission housing.

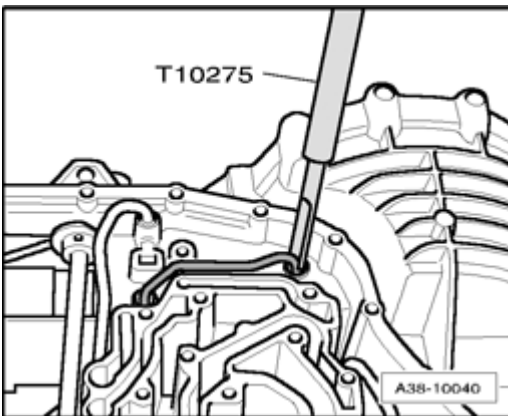


Fig. 268: Driving Oil Tube For Rear Final Drive Gradually Into Transmission Housing Using Drive-In Tool For Oil Tube Rear Final Drive T10275

Courtesy of VOLKSWAGEN UNITED STATES, INC.

Installing

NOTE:

- Once removed, oil tubes must always be replaced.

- Replace 2 O-rings.
- Drive oil tube for rear final drive gradually into transmission housing with light and careful taps, alternating between sides, using drive-in tool for oil tube rear final drive T10275.

TRANSMISSION COMPONENTS, EVALUATING WEAR**Evaluating wear by evaluating ATF color and impurities****ATF color**

- Yellow color: New ATF.
- Brown color: Used ATF (from approx. 60,000 km).
- Black color: Transmission is malfunctioning, e.g. torque converter clutch overheated, clutch lining burnt out.

Shavings in ATF

- Metal shavings smaller than 0.1 mm diameter up to a maximum of 1 cm³ at solenoid in oil pan or in ATF are normal.
- Metal shavings larger than 2.0 mm diameter at solenoid in oil pan or in ATF indicate a mechanical malfunction or strong wear in transmission.

Measures for contaminated ATF area

If ATF area is heavily soiled (ATF black or shavings **Shavings in ATF**):

- Completely disassemble and clean transmission.
- Replace ATF oil tubes in transmission.
- Flush ATF oil passages and blow through with pressurized air.
- Disassemble and check all clutches.
- Replace torque converter (cannot be cleaned).
- Replace valve body (cannot be cleaned).
- Clean ATF lines and ATF cooler, replace ATF filter.

Clutch "F" with freewheel

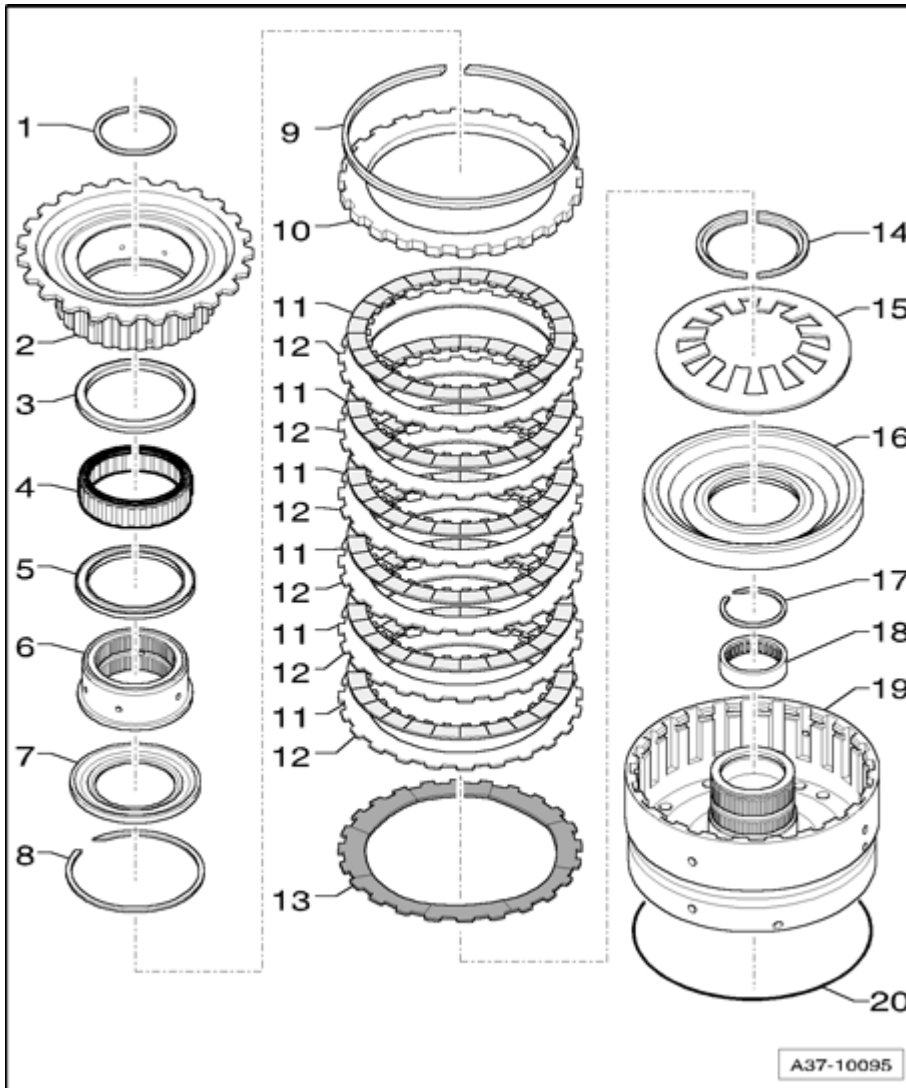


Fig. 269: Clutch "F" With Free-Running Hub, Assembly Overview
 Courtesy of VOLKSWAGEN UNITED STATES, INC.

2 - Freewheel 1st gear

- Checking rotating and locking direction of freewheel **Checking rotating and locking direction of freewheel**

4 - Freewheel housing

- Checking rotating and locking direction of freewheel **Checking rotating and locking direction of freewheel**

6 - Freewheel inner race

- Checking rotating and locking direction of freewheel **Checking rotating and locking direction of freewheel**

- Checking splines

11 - Coated plate

- Checking for wear **Checking coated and outer plate for wear**

12 - Outer plate

- Checking for wear **Checking coated and outer plate for wear**

14 - Split retaining ring

- Checking whether retaining ring is bent, replace if necessary

15 - Dished washer

- Replace in case of signs of wear or if dished washer tips are bent

16 - Piston "F"

- Checking for deformation or damaged sealing lips **Checking piston "F" for deformation or damaged sealing lips**
- Always replace piston "F" , part no. 0 501 208 317, until transmission no. 069 312 with new version, part no. 0 501 212 967
- The part no. is stamped on the gummed side of the piston

18 - Needle bearing

- Perform visual check for damage: Needle bearing must be in mint condition, replace if necessary

19 - Cylinder "F"

- Checking for signs of wear on track for piston "F" ; light scores:
 - Sandpaper (600 grit, oiled) contact surface 1 to 2 times.
 - Carefully wipe off with a clean rag and check contact surface. Contact surface must now be like new.
 - If scores cannot be removed in this manner, replace cylinder "F".
- Checking for signs of wear caused by coated plate **Signs of wear at cylinder "F" caused by coated plate**
- Checking splines
- Checking freedom of movement of valve ball (no spring) **Checking freedom of movement of valve ball in cylinder "F"**

Checking rotating and locking direction of freewheel

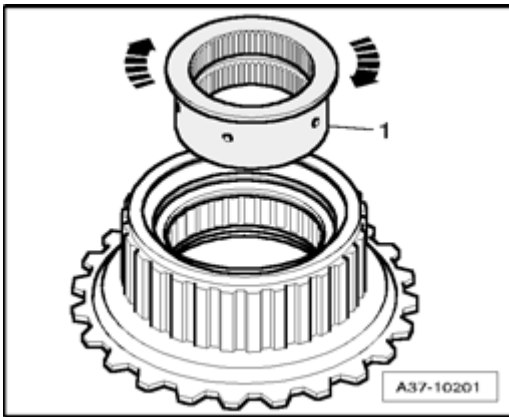


Fig. 270: Freewheel Inner Race

Courtesy of VOLKSWAGEN UNITED STATES, INC.

Freewheel inner race - 1 - must be able to turn in a clockwise direction and must lock in a counter-clockwise direction when turned.

If there is no locking effect:

- Replace freewheel housing.

NOTE:

- A faulty freewheel causes traction problems in reverse gear.

Checking coated and outer plate for wear

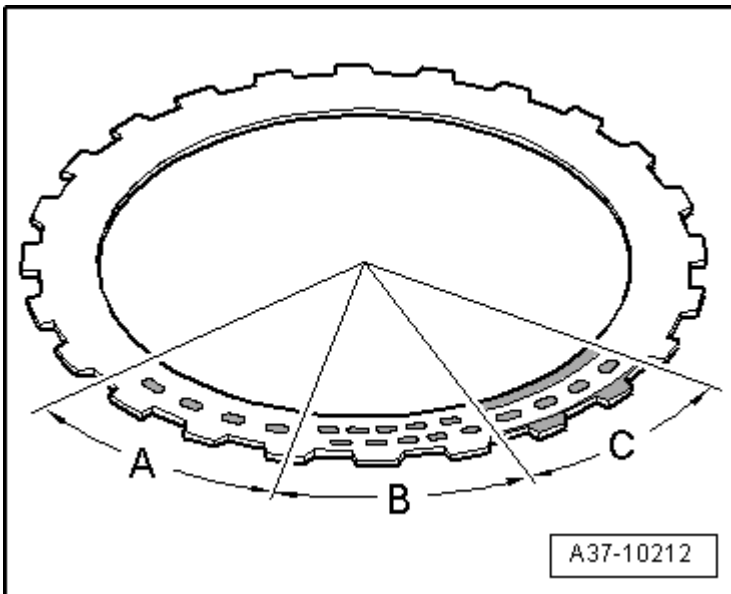


Fig. 271: Checking Coated And Outer Plate For Wear And Overheating

Courtesy of VOLKSWAGEN UNITED STATES, INC.

Signs of overheating on outer plate point to worn coated plate. Evaluate signs of wear as follows:

A - Sports of discoloration of outer plate caused by overheating in distance of more than 20 mm: Outer and coated plate OK, can be reused.

B - Spots of discoloration of outer plate caused by overheating in distance of less than 20 mm: Outer and coated plate worn, must be replaced.

C - Tarnish blue/brown at outer and/or inner area of outer plate: Outer and coated plate overheated and worn, must be replaced.

Checking piston "F" for deformation or damaged sealing lips

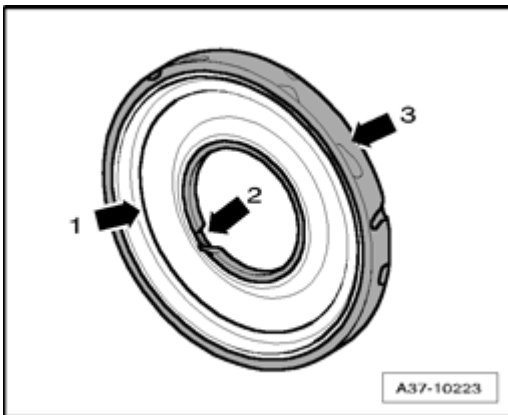


Fig. 272: Checking Piston "F" For Deformation Or Damaged Sealing Lips
Courtesy of VOLKSWAGEN UNITED STATES, INC.

- Check piston "F" for the following:
 - Deformation of sheet metal body - **arrow 1** -.
 - Damaged inner sealing lip - **arrow 2** -.
 - Damaged outer sealing lip - **arrow 3** -.

Checking freedom of movement of valve ball in cylinder "F"

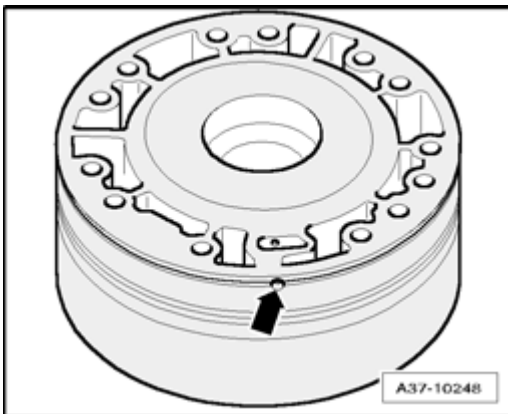


Fig. 273: Checking Freedom Of Movement Of Valve Ball In Cylinder "F"
Courtesy of VOLKSWAGEN UNITED STATES, INC.

CAUTION: Wear protective glasses.

- Lightly coat bore for valve ball - **arrow** - at front side with oil.
- Charge valve ball from rear with compressed air.
- Only small ball stroke (hardly visible).
- Ball is not spring-loaded (moves back slowly).

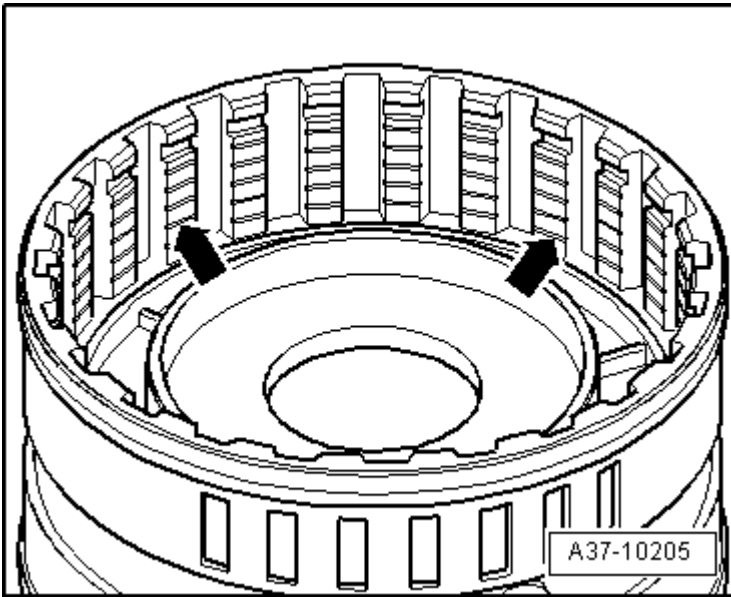
Signs of wear at cylinder "F" caused by coated plate

Fig. 274: Signs Of Wear At Cylinder "F" Caused By Coated Plate
Courtesy of VOLKSWAGEN UNITED STATES, INC.

- Check cylinder at inner circumference for signs of wear caused by coated plate.
- Coated plate must not get caught in scoring.
- If scoring caused by coated plate are greater than 0.5 mm, cylinder "F" must be replaced.

Clutch "C" with sun shaft

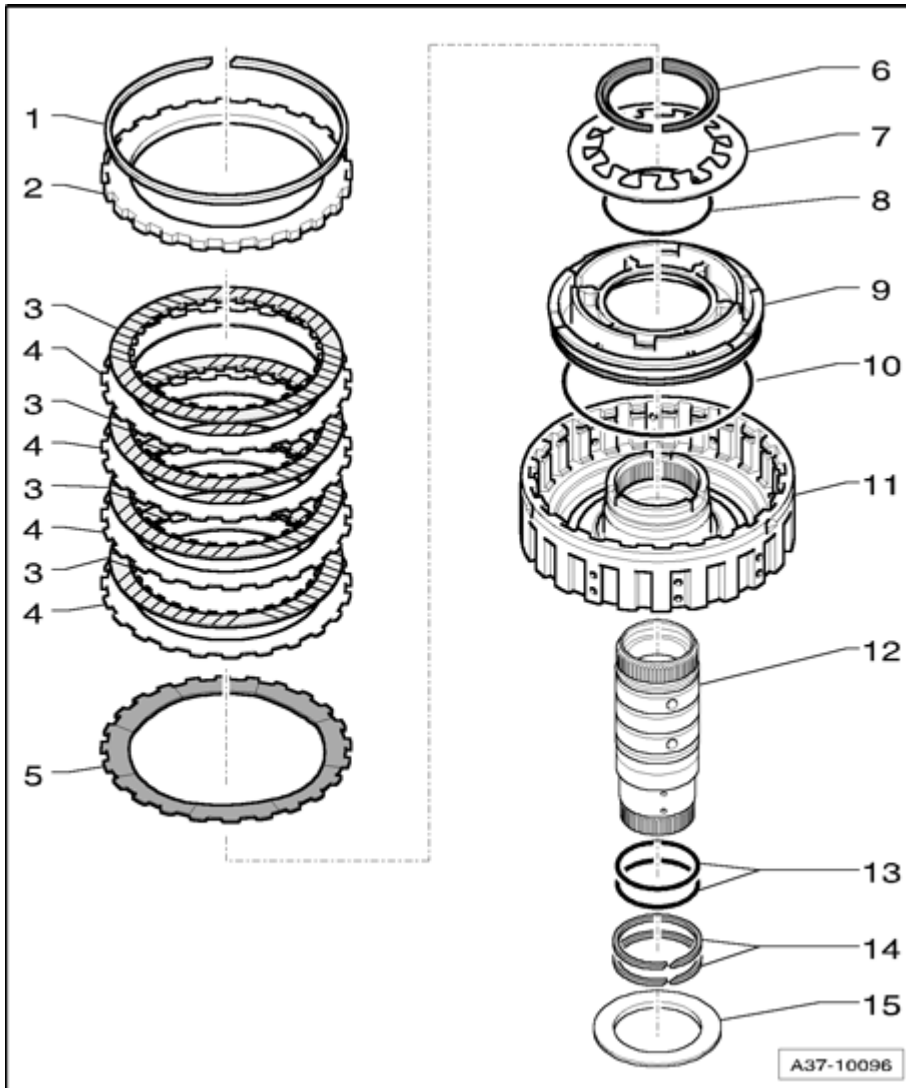


Fig. 275: Clutch "C" With Sun Shaft, Assembly Overview
 Courtesy of VOLKSWAGEN UNITED STATES, INC.

3 - Coated plate

- Checking for wear Checking coated and outer plate for wear

4 - Outer plate

- Checking for wear Checking coated and outer plate for wear

9 - Piston "C"

- Checking freedom of movement of valve balls Checking freedom of movement of valve ball in piston "C"

11 - Cylinder "C"

- Checking for signs of wear at inner circumference caused by coated plate **Signs of wear at inner circumference of cylinder "C" caused by coated plate**
- Checking for signs of wear at outer circumference caused by coated plate **Signs of wear at outer circumference of cylinder "C" caused by coated plate**
- Checking splines

12 - Sun shaft

- Checking brass sleeves for wear and proper seating **Checking brass sleeves of sun shaft for wear**

14 - Rectangular rings

- Checking for wear **Checking rectangular rings for wear**

15 - Axial needle bearing

- Perform visual check for damage: Axial needle bearing and their contact surfaces must be like new, replace if necessary

Checking coated and outer plate for wear

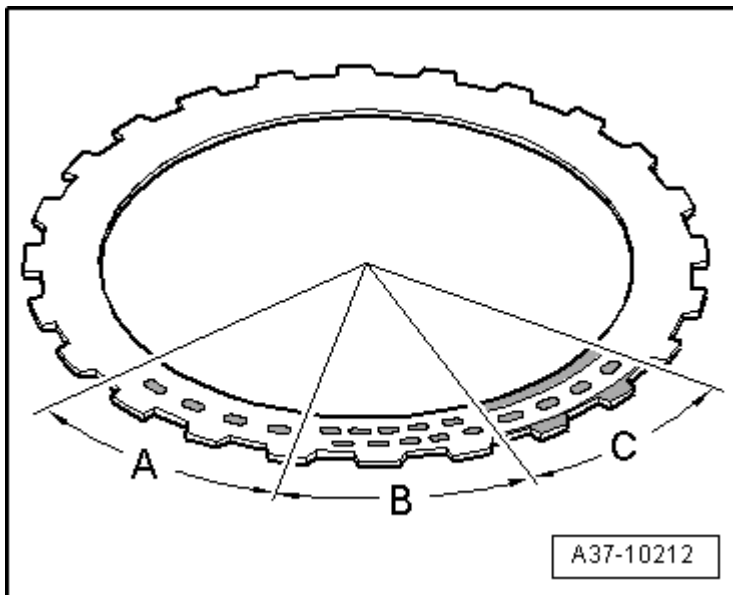


Fig. 276: Checking Coated And Outer Plate For Wear And Overheating
 Courtesy of VOLKSWAGEN UNITED STATES, INC.

Signs of overheating on outer plate point to worn coated plate. Evaluate signs of wear as follows:

A - Spots of discoloration of outer plate caused by overheating in distance of more than 20 mm: Outer and coated plate OK, can be reused.

B - Spots of discoloration of outer plate caused by overheating in distance of less than 20 mm: Outer and coated

plate worn, must be replaced.

C - Tarnish blue/brown at outer and/or inner area of outer plate: Outer and coated plate overheated and worn, must be replaced.

Checking freedom of movement of valve ball in piston "C"

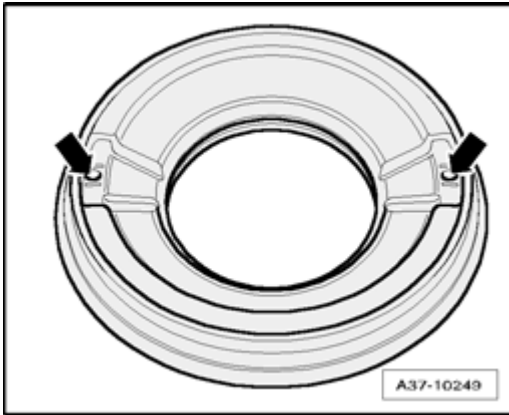


Fig. 277: Checking Freedom Of Movement Of Valve Ball In Piston "C"
 Courtesy of VOLKSWAGEN UNITED STATES, INC.

Check freedom of movement of valve balls - **arrows** - by swaying piston "C"

- Ball is not spring-loaded (does not spring back).
- Only little ball stroke (hardly visible).

Signs of wear at inner circumference of cylinder "C" caused by coated plate

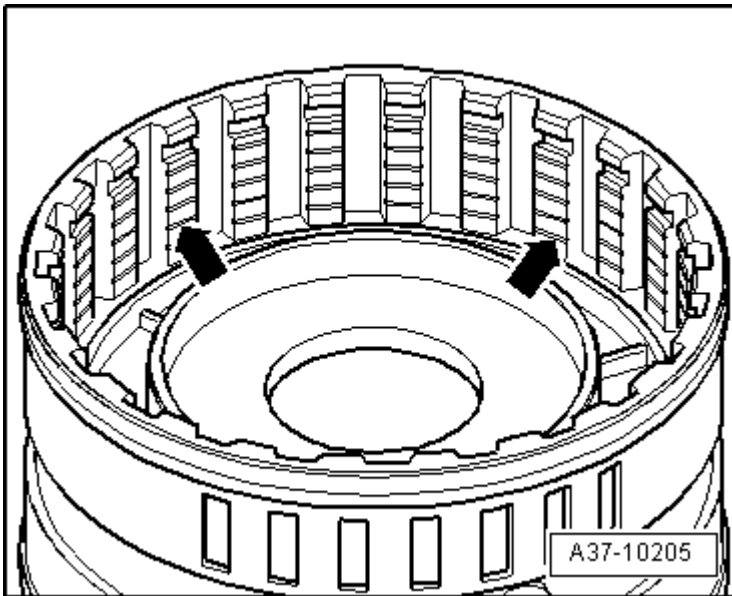


Fig. 278: Signs Of Wear At Cylinder "F" Caused By Coated Plate
 Courtesy of VOLKSWAGEN UNITED STATES, INC.

- Check cylinder at inner circumference for signs of wear caused by coated plate.
- Coated plate must not get caught in scoring - **arrows** -.
- If scoring - **arrows** - caused by coated plate is greater than 0.5 mm, cylinder "C" must be replaced.

Signs of wear at outer circumference of cylinder "C" caused by coated plate

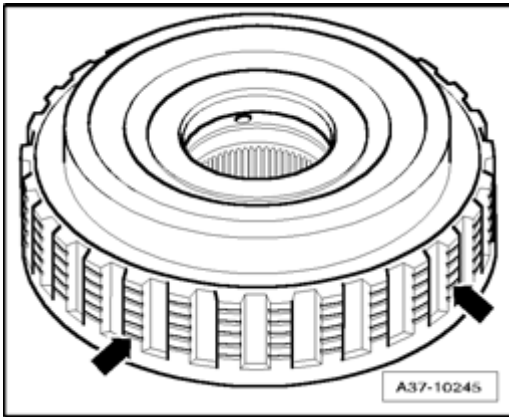


Fig. 279: Identifying Scoring

Courtesy of VOLKSWAGEN UNITED STATES, INC.

- Check cylinder at outer circumference for signs of wear caused by coated plate.
- Coated plate must not get caught in scoring - **arrows** -.
- If scoring - **arrows** - caused by coated plate is greater than 0.5 mm, cylinder "C" must be replaced.

Checking brass sleeves of sun shaft for wear

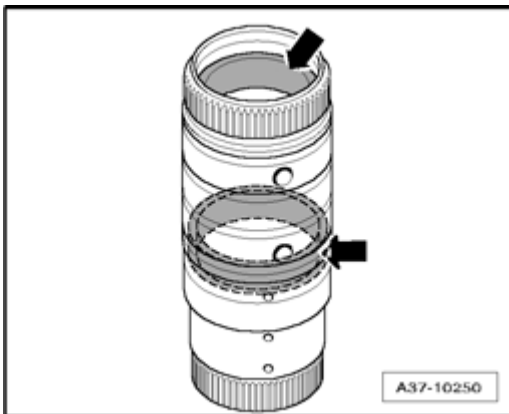


Fig. 280: Checking Brass Sleeves Of Sun Shaft For Wear

Courtesy of VOLKSWAGEN UNITED STATES, INC.

- Check contact surfaces of brass sleeves - **arrows** - at inside of sun shaft for wear and proper seating.
- If heavily scored and/or if blue discoloration of brass sleeves or loose brass sleeves are detected:

- Replace sun shaft.
- If no blue discoloration and only small grooves can be seen on brass sleeves, proceed as follows:
 - Sandpaper (600 grit, oiled) contact surface 1 to 2 times.
 - Carefully wipe off with a clean rag and check contact surface. Contact surface must now be like new.
 - If scores cannot be removed in this manner, replace sun shaft.

Checking rectangular rings for wear

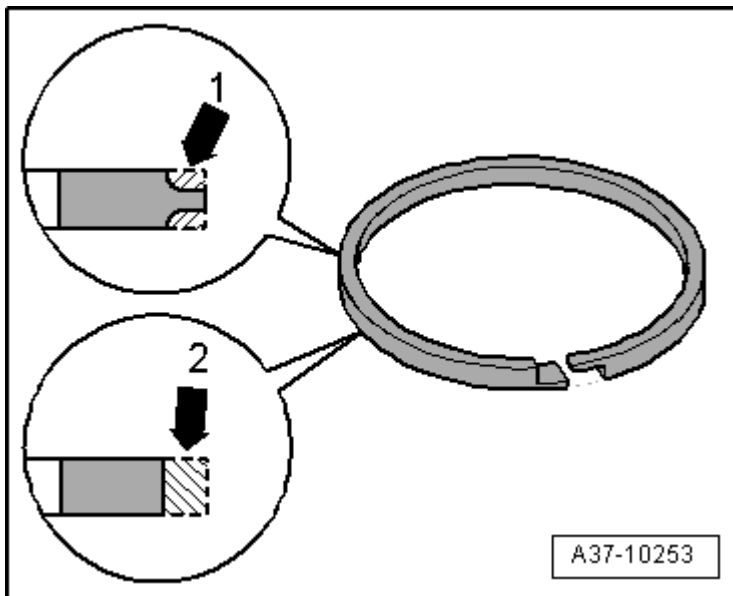


Fig. 281: Checking Rectangular Rings For Wear
Courtesy of VOLKSWAGEN UNITED STATES, INC.

Always replace rectangular rings. However, conclusions can be drawn from signs of wear of rectangular rings regarding the quality of contact surface for rectangular rings. Evaluating rectangular rings for wear is therefore essential.

- If rectangular rings show strong axial wear - **arrow 1** - (slight wear of outer edges is normal):
 - Replace sun shaft.
- If rectangular rings show strong radial wear of more than 0.3 mm - **arrow 2** - (for comparison, measure thickness of new rectangular ring):
 - Replace bushing.

Clutch "D"

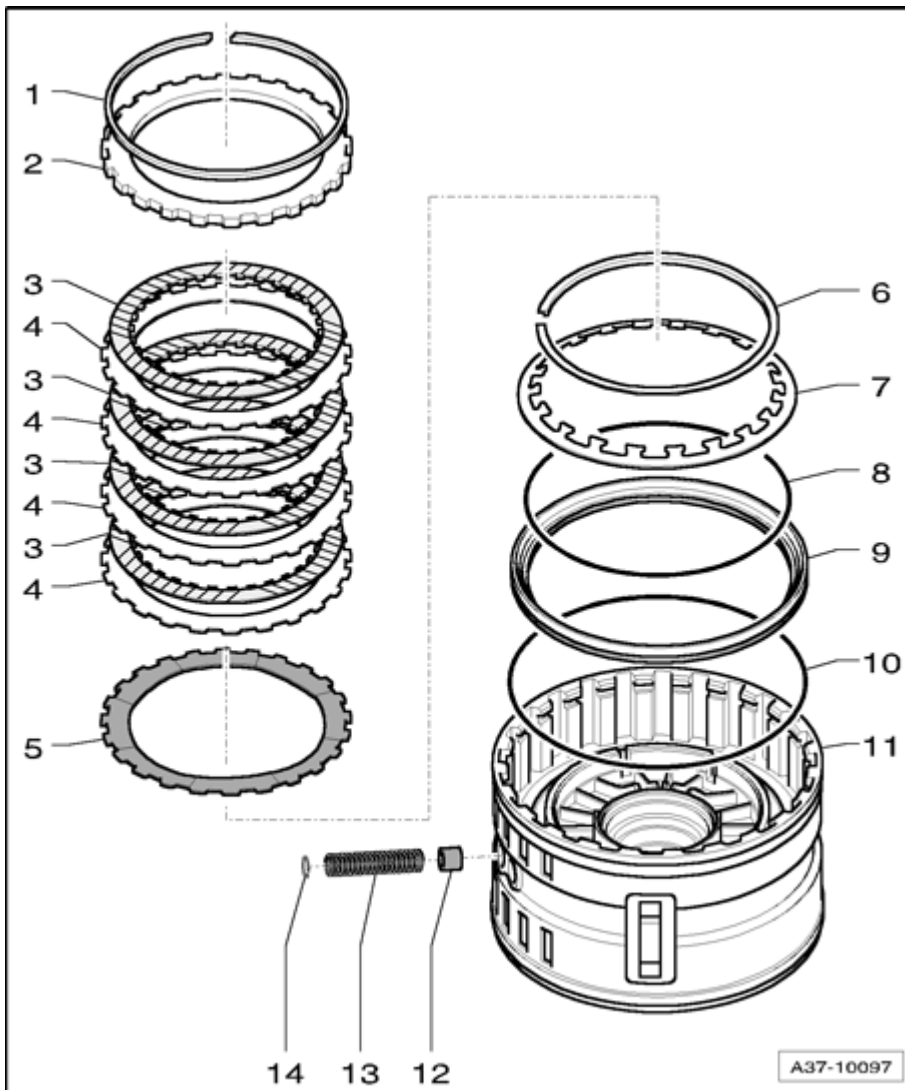


Fig. 282: Exploded View Of Clutch "D"

Courtesy of VOLKSWAGEN UNITED STATES, INC.

3 - Coated plate

- Checking for wear Checking coated and outer plate for wear

4 - Outer plate

- Checking for wear Checking coated and outer plate for wear

11 - Cylinder "D/E"

- Checking for signs of wear on track for piston "D" caused by coated plate Signs of wear at cylinder "D/E" caused by coated plate
- Checking metal sleeve for signs of wear Checking metal sleeve for wear in cylinder "D/E"

- Checking freedom of movement of valve ball **Checking freedom of movement of valve ball in cylinder "D/E"**

Checking coated and outer plate for wear

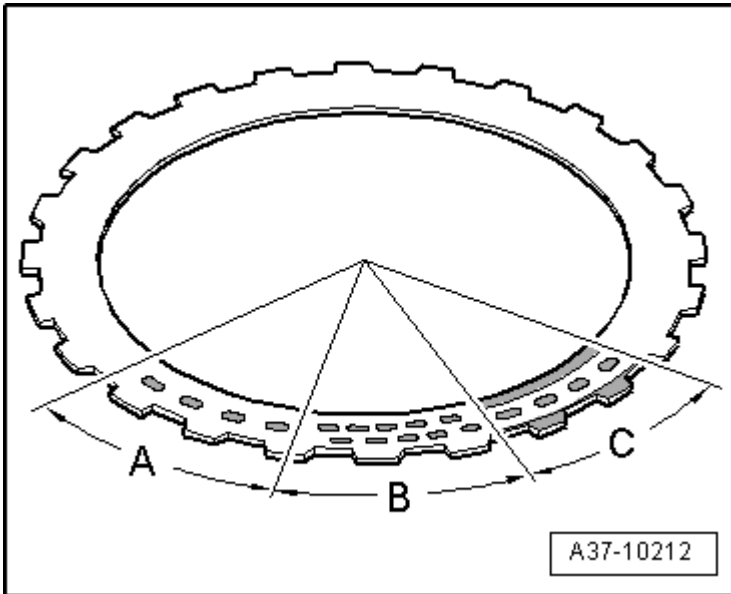


Fig. 283: Checking Coated And Outer Plate For Wear And Overheating
Courtesy of VOLKSWAGEN UNITED STATES, INC.

Signs of overheating on outer plate point to worn coated plate. Evaluate signs of wear as follows:

A - Spots of discoloration of outer plate caused by overheating in distance of more than 20 mm: Outer and coated plate OK, can be reused.

B - Spots of discoloration of outer plate caused by overheating in distance of less than 20 mm: Outer and coated plate worn, must be replaced.

C - Tarnish blue/brown at outer and/or inner area of outer plate: Outer and coated plate overheated and worn, must be replaced.

Signs of wear at cylinder "D/E" caused by coated plate

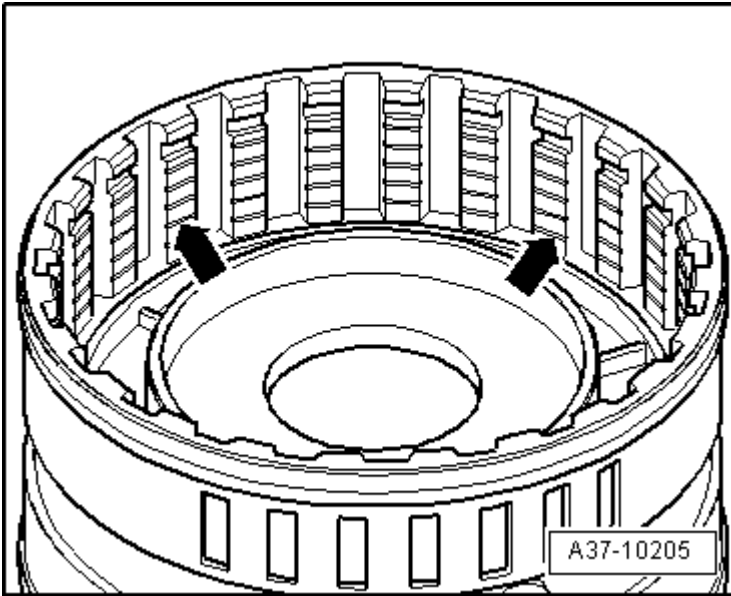


Fig. 284: Signs Of Wear At Cylinder "F" Caused By Coated Plate
 Courtesy of VOLKSWAGEN UNITED STATES, INC.

- Check cylinder at inner and outer circumference for signs of wear caused by coated plate.
- Coated plate must not get caught in scoring.
- If scoring caused by coated plate is greater than 0.5 mm, cylinder "D/E" must be replaced.

Checking metal sleeve for wear in cylinder "D/E"

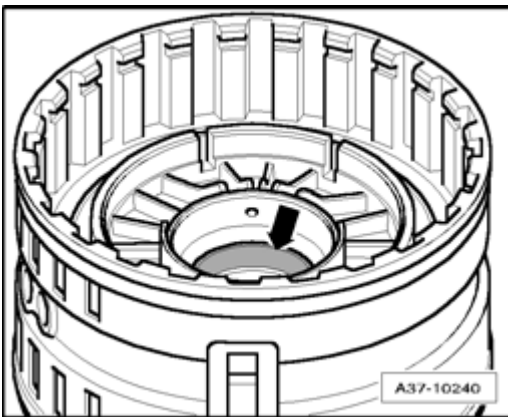
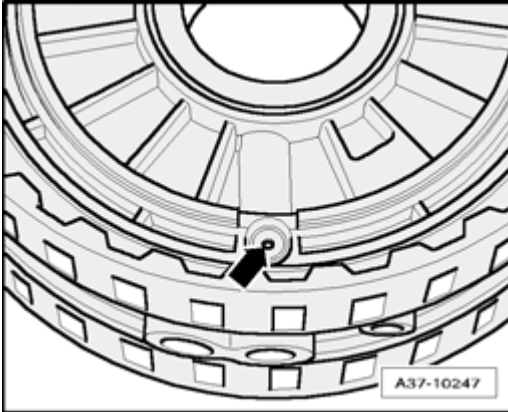


Fig. 285: Checking Metal Sleeve For Wear In Cylinder "D/E"
 Courtesy of VOLKSWAGEN UNITED STATES, INC.

- Check contact surface of metal sleeve for wear - **arrow** - in cylinder "D/E".
- If strong scores and/or blue discoloration of metal sleeve can be seen:
- Replace cylinder "D/E".

- If no blue discoloration and only small grooves can be seen on metal sleeve, proceed as follows:
 - Sandpaper (600 grit, oiled) contact surface 1 to 2 times.
 - Carefully wipe off with a clean rag and check contact surface. Contact surface must now be like new.
 - If scores cannot be removed in this manner, replace cylinder "D/E".

Checking freedom of movement of valve ball in cylinder "D/E"**Fig. 286: Valve Ball Bore**

Courtesy of VOLKSWAGEN UNITED STATES, INC.

CAUTION: Wear protective glasses.

- Lightly coat bore for valve ball - **arrow** - at front side with oil.
- Charge valve ball from rear with compressed air.
- Only little stroke of ball (hardly visible)
- Ball is not spring-loaded (moves back slowly)

Clutch "E"

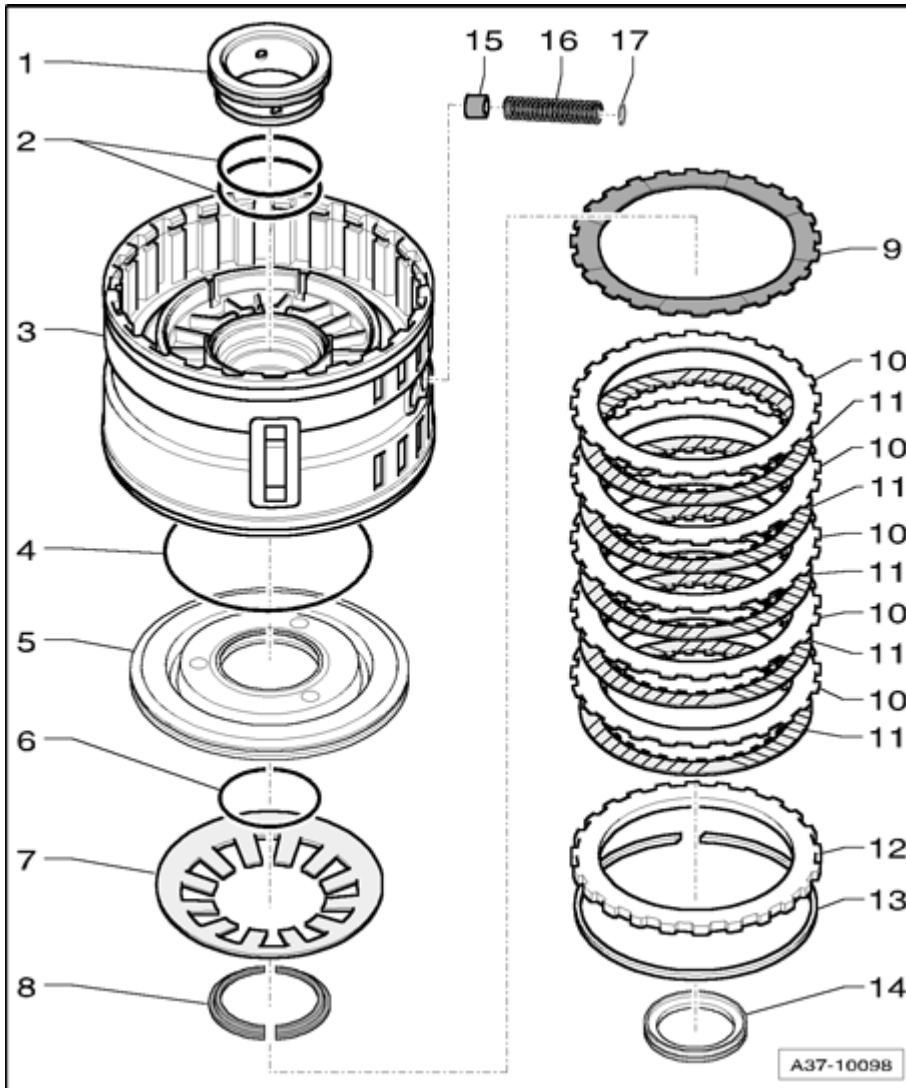


Fig. 287: Exploded View Of Clutch "E"

Courtesy of VOLKSWAGEN UNITED STATES, INC.

1 - Bearing bushing

- Checking for incorrect roughness of contact surface at inner circumference by evaluating wear of rectangular rings **Checking rectangular rings for wear**

3 - Cylinder "D/E"

- Checking for signs of wear caused by coated plate **Clutch "E"**
- Checking freedom of movement of valve ball **Checking freedom of movement of valve ball in cylinder "D/E"**

5 - Piston "E"

- Checking for wear

8 - Split retaining ring

- Checking whether retaining ring is bent, replace if necessary

10 - Outer plate

- Checking for wear Checking coated and outer plate for wear

11 - Coated plate

- Checking for wear Checking coated and outer plate for wear

14 - Axial needle bearing

- Perform visual check for damage: Axial needle bearing and their contact surfaces must be like new, replace if necessary

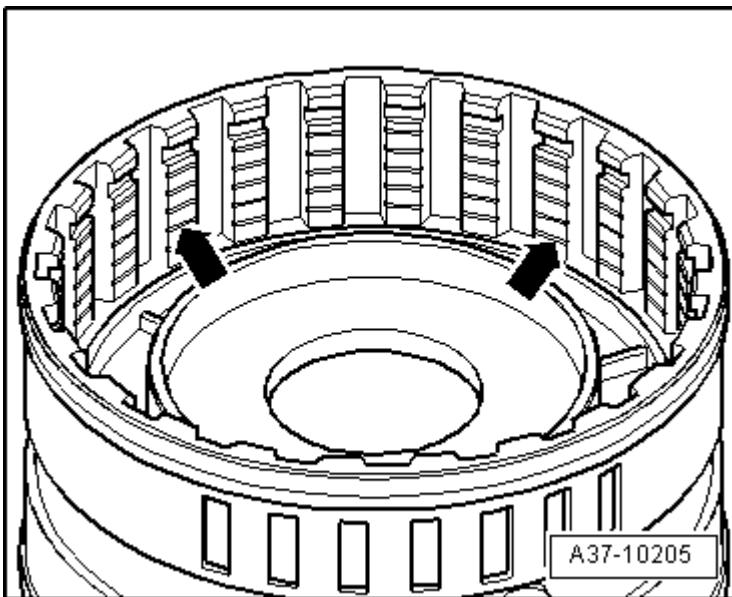


Fig. 288: Signs Of Wear At Cylinder "F" Caused By Coated Plate
Courtesy of VOLKSWAGEN UNITED STATES, INC.

Signs of wear at cylinder "D/E" caused by coated plate

- Check cylinder at inner and outer circumference for signs of wear caused by coated plate.
- Coated plate must not get caught in scoring.
- If scoring caused by coated plate is greater than 0.5 mm, cylinder "D/E" must be replaced.

Checking freedom of movement of valve ball in cylinder "D/E"

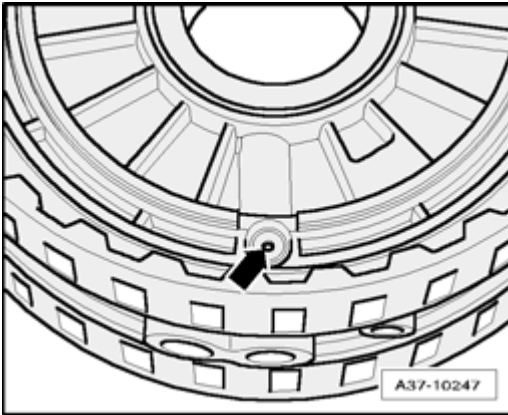


Fig. 289: Valve Ball Bore

Courtesy of VOLKSWAGEN UNITED STATES, INC.

CAUTION: Wear protective glasses.

- Lightly coat bore for valve ball - **arrow** - at front side with oil.
- Charge valve ball from rear with compressed air.
- Only little ball stroke (hardly visible).
- Ball is not spring-loaded (moves back slowly).

Checking coated and outer plate for wear

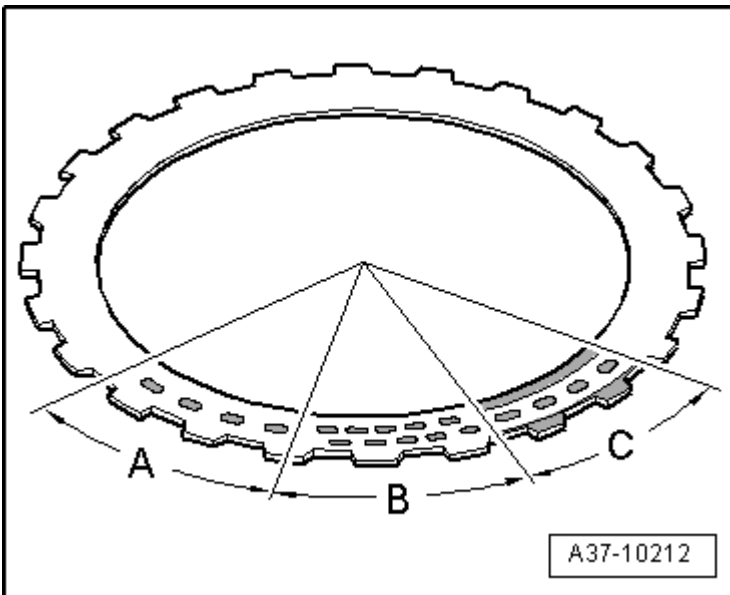


Fig. 290: Checking Coated And Outer Plate For Wear And Overheating

Courtesy of VOLKSWAGEN UNITED STATES, INC.

Signs of overheating on outer plate point to worn coated plate. Evaluate signs of wear as follows:

A - Spots of discoloration of outer plate caused by overheating in distance of more than 20 mm: Outer and coated plate OK, can be reused.

B - Spots of discoloration of outer plate caused by overheating in distance of less than 20 mm: Outer and coated plate worn, must be replaced.

C - Tarnish blue/brown at outer and/or inner area of outer plate: Outer and coated plate overheated and worn, must be replaced.

Planetary drive

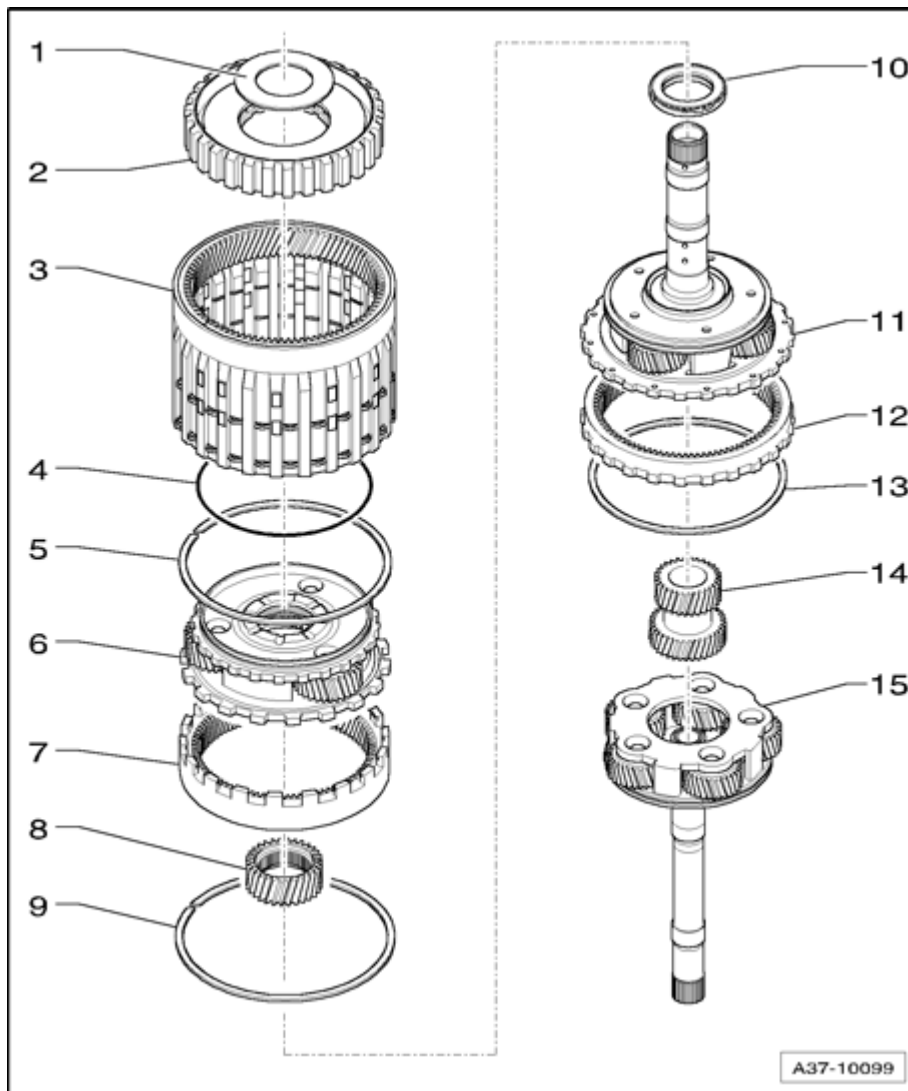


Fig. 291: Planetary Drive, Assembly Overview
Courtesy of VOLKSWAGEN UNITED STATES, INC.

2 - Plate carrier "E"

- Checking outer splines for notches caused by coated plate **Checking outer splines of plate carrier "E"**

for notches caused by coated plate

6 - Planetary carrier "I"

- Checking splines of planetary drive, replace planetary drive if splines are damaged
- Checking needle bearing for wear **Checking needle bearing of shaft planetary carrier "I" for wear**

7 - Ring gear "II"

- Checking splines of planetary drive, replace planetary drive if splines are damaged

8 - Sun gear "I"

- Checking splines of planetary drive, replace planetary drive if splines are damaged

10 - Axial needle bearing

- Perform visual check for damage: Axial needle bearing and their contact surfaces must be like new, replace if necessary

11 - Planetary carrier "II"

- Checking contact surfaces, brass sleeve and needle bearing of shaft for wear **Checking contact surfaces, brass sleeve and needle bearing of shaft planetary carrier "II" for wear**
- Checking splines of planetary drive, replace planetary drive if splines are damaged

12 - Ring gear "II"

- Checking splines of planetary drive, replace planetary drive if splines are damaged

14 - Sun gear "II" and "III"

- Checking splines of planetary drive, replace planetary drive if splines are damaged

15 - Planetary carrier "III"

- Checking contact surfaces, brass sleeve and needle bearing of shaft as well as needle bearing for wear **Checking contact surfaces, brass sleeve and needle bearing of shaft planetary carrier "III" for wear**
- Checking splines of planetary drive, replace planetary drive if splines are damaged

Checking outer splines of plate carrier "E" for notches caused by coated plate

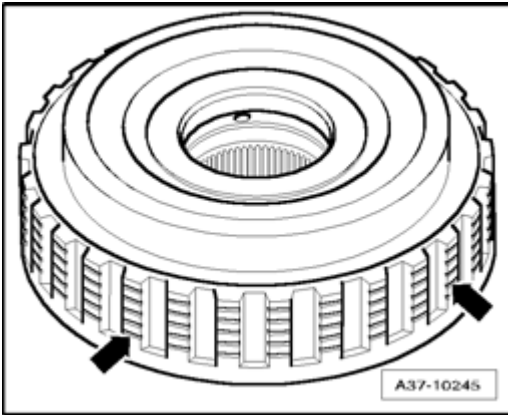


Fig. 292: Identifying Scoring

Courtesy of VOLKSWAGEN UNITED STATES, INC.

- Check outer splines of plate carrier "E" for signs of wear caused by coated plate.
- Coated plate must not get caught in scoring.
- If scoring caused by coated plate is greater than 0.5 mm, cylinder "E" must be replaced.

Checking needle bearing of shaft planetary carrier "I" for wear

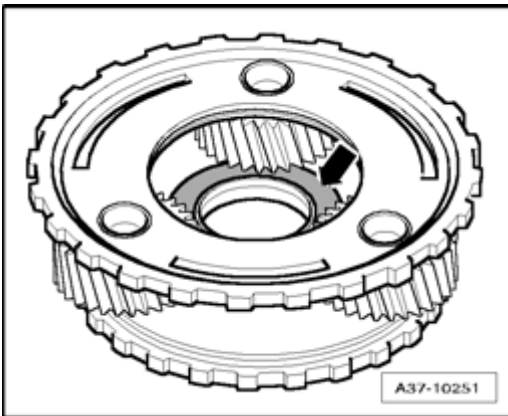


Fig. 293: Locating Needle Bearing

Courtesy of VOLKSWAGEN UNITED STATES, INC.

- Check needle bearing - **arrow** - for wear.
- Make sure that the needle bearing can be smoothly rotated with a finger.

Needle bearing cannot be rotated smoothly:

- Replace planetary drive.

Checking contact surfaces, brass sleeve and needle bearing of shaft planetary carrier "II" for wear

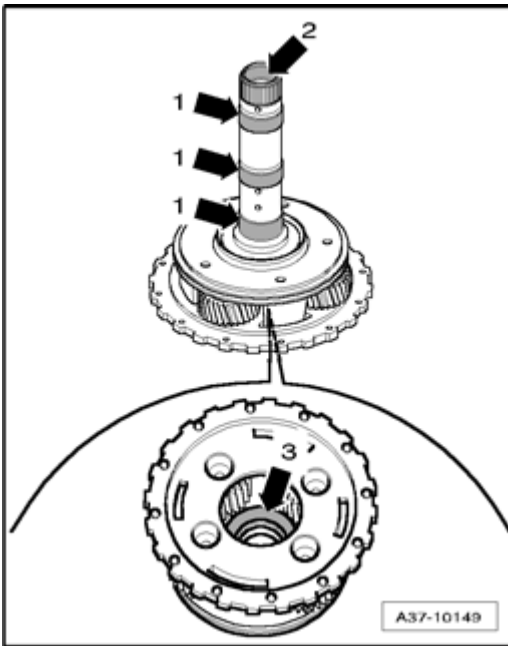


Fig. 294: Contact Surfaces Of Brass Sleeve And Of Shaft
 Courtesy of VOLKSWAGEN UNITED STATES, INC.

- Check contact surfaces - **arrow 1** - of shaft for wear.
- Check contact surfaces of brass sleeve - **arrow 2** - at inside of shaft for wear.
- If strong scores and/or blue discoloration are detected:
 - Replace planetary drive.
- If no blue discoloration and only small grooves are detected, proceed as follows:
 - Sandpaper (600 grit, oiled) contact surface 1 to 2 times.
 - Carefully wipe off with a clean rag and check contact surface. Contact surfaces must now be like new.
 - If scores cannot be removed in this manner, replace planetary drive.
 - Check needle bearing - **arrow 3** - for wear.
- Make sure that the needle bearing can be smoothly rotated with a finger.

Needle bearing cannot be rotated smoothly:

- Replace planetary drive.

Checking contact surfaces, brass sleeve and needle bearing of shaft planetary carrier "III" for wear

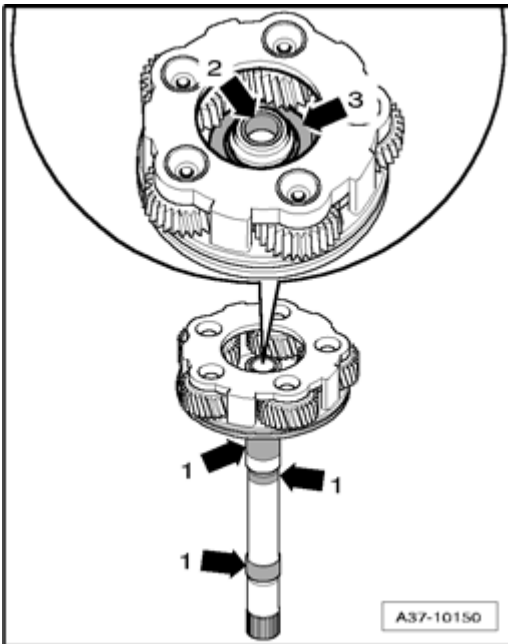


Fig. 295: Contact Surfaces Of Brass Sleeve And Shaft
Courtesy of VOLKSWAGEN UNITED STATES, INC.

- Check contact surfaces - **arrow 1** - of shaft for wear.
- Check contact surfaces of brass sleeve - **arrow 2** - at inside of shaft for wear.
- If strong scores and/or blue discoloration are detected:
 - Replace planetary drive.
- If no blue discoloration and only small grooves are detected, proceed as follows:
 - Sandpaper (600 grit, oiled) contact surface 1 to 2 times.
 - Carefully wipe off with a clean rag and check contact surface. Contact surfaces must now be like new.
 - If scores cannot be removed in this manner, replace planetary drive.
 - Check needle bearing - **arrow 3** - for wear.
- Make sure that the needle bearing can be smoothly rotated with a finger.

Needle bearing cannot be rotated smoothly:

- Replace planetary drive.

Clutch "A"

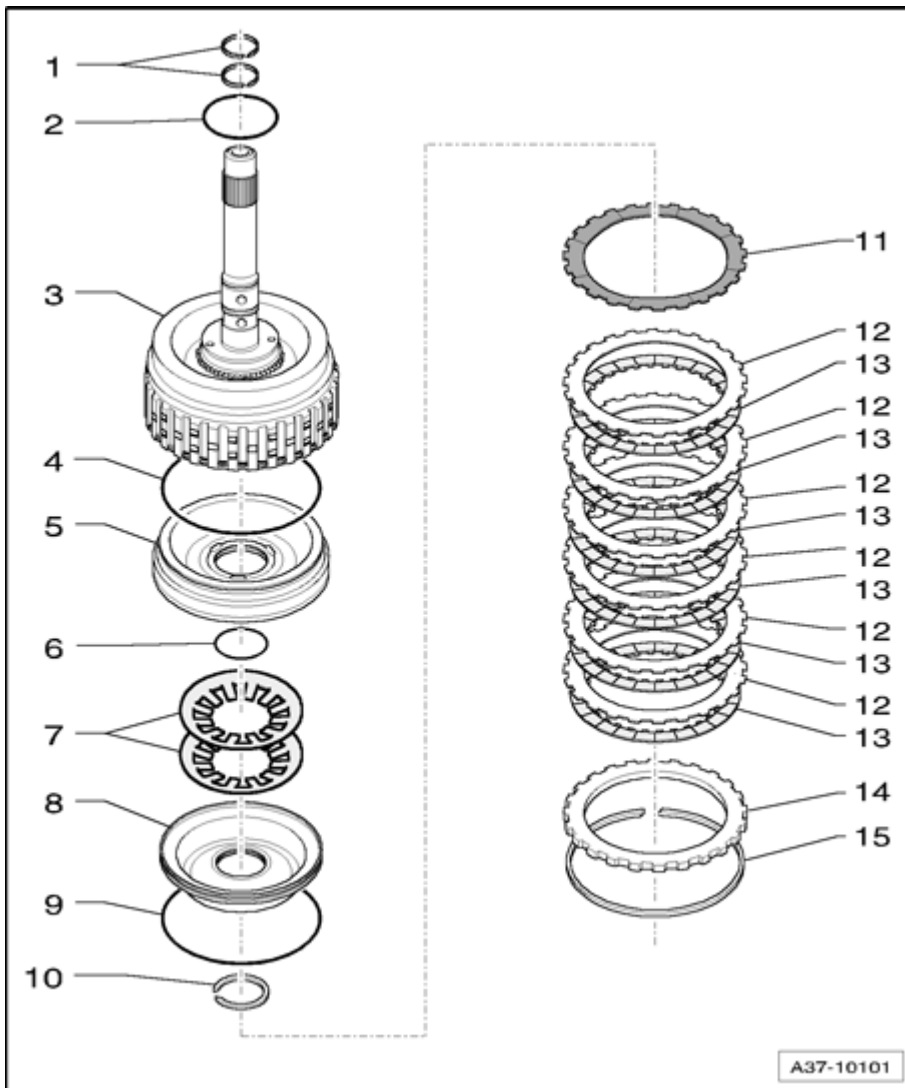


Fig. 296: Clutch "A" , Assembly Overview

Courtesy of VOLKSWAGEN UNITED STATES, INC.

1 - Rectangular rings

- Checking for wear **Checking rectangular rings for wear**

3 - Cylinder "A"

- Checking contact surface of shaft for wear **Checking contact surface of shaft cylinder "A" for wear**

10 - Circlip

- Replace
- Do not over-stretch circlip when installing.

12 - Outer plate

- Checking for wear Checking coated and outer plate for wear

13 - Coated plate

- Checking for wear Checking coated and outer plate for wear

Checking rectangular rings for wear

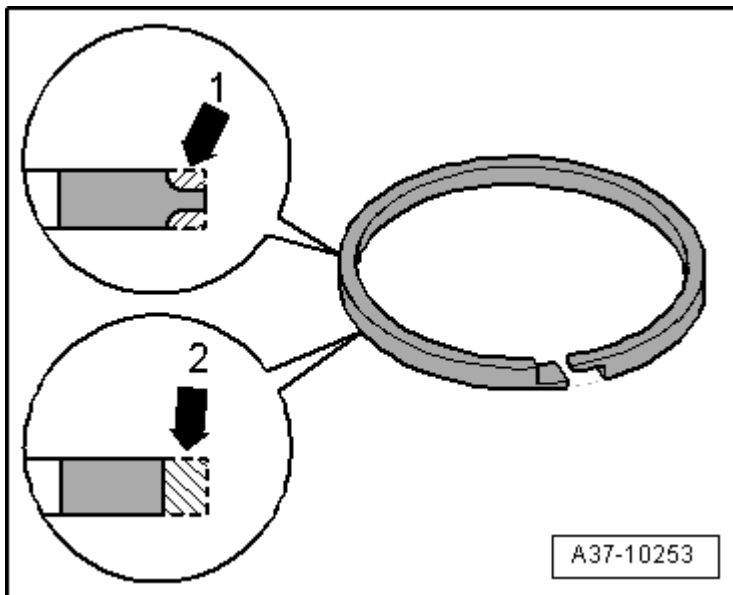


Fig. 297: Checking Rectangular Rings For Wear
 Courtesy of VOLKSWAGEN UNITED STATES, INC.

Always replace rectangular rings. However, conclusions can be drawn from the signs of wear of the rectangular rings regarding the quality of contact surface for rectangular rings. Evaluating the rectangular rings for wear is therefore essential.

- If rectangular rings show strong axial wear of more than 0.3 mm - **arrow 1** - (slight wear of outer edges is normal):
 - Replace cylinder "A".
- If rectangular rings show strong radial wear of more than 0.3 mm - **arrow 2** - (for comparison, measure thickness of new rectangular ring):
 - Replace stator shaft of ATF supply.

Checking contact surface of shaft cylinder "A" for wear

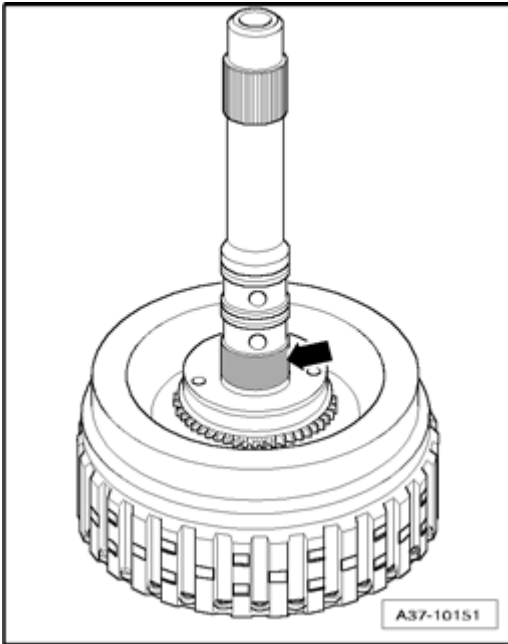


Fig. 298: Contact Surface Of Shaft For Wear
Courtesy of VOLKSWAGEN UNITED STATES, INC.

- Check contact surface - **arrow** - of shaft for wear.
- If strong scores and/or blue discoloration are detected:
 - Replace cylinder "A".
- If no blue discoloration and only small grooves are detected, proceed as follows:
 - Sandpaper (600 grit, oiled) contact surface 1 to 2 times.
 - Carefully wipe off with a clean rag and check contact surface. Contact surfaces must now be like new.
 - If scores cannot be removed in this manner, replace planetary drive.

Checking coated and outer plate for wear

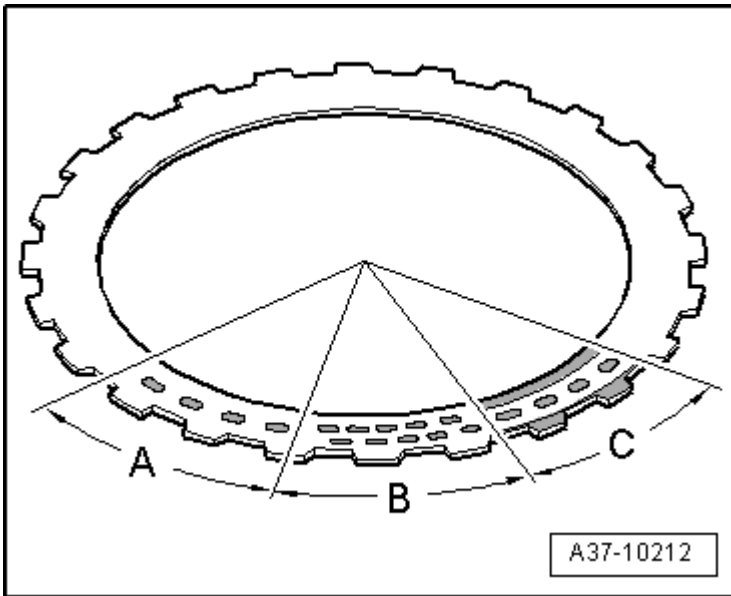


Fig. 299: Checking Coated And Outer Plate For Wear And Overheating
Courtesy of VOLKSWAGEN UNITED STATES, INC.

Signs of overheating on outer plate point to worn coated plate. Evaluate signs of wear as follows:

A - Spots of discoloration of outer plate caused by overheating in distance of more than 20 mm: Outer and coated plate OK, can be reused.

B - Spots of discoloration of outer plate caused by overheating in distance of less than 20 mm: Outer and coated plate worn, must be replaced.

C - Tarnish blue/brown at outer and/or inner area of outer plate: Outer and coated plate overheated and worn, must be replaced.

Clutch "B"

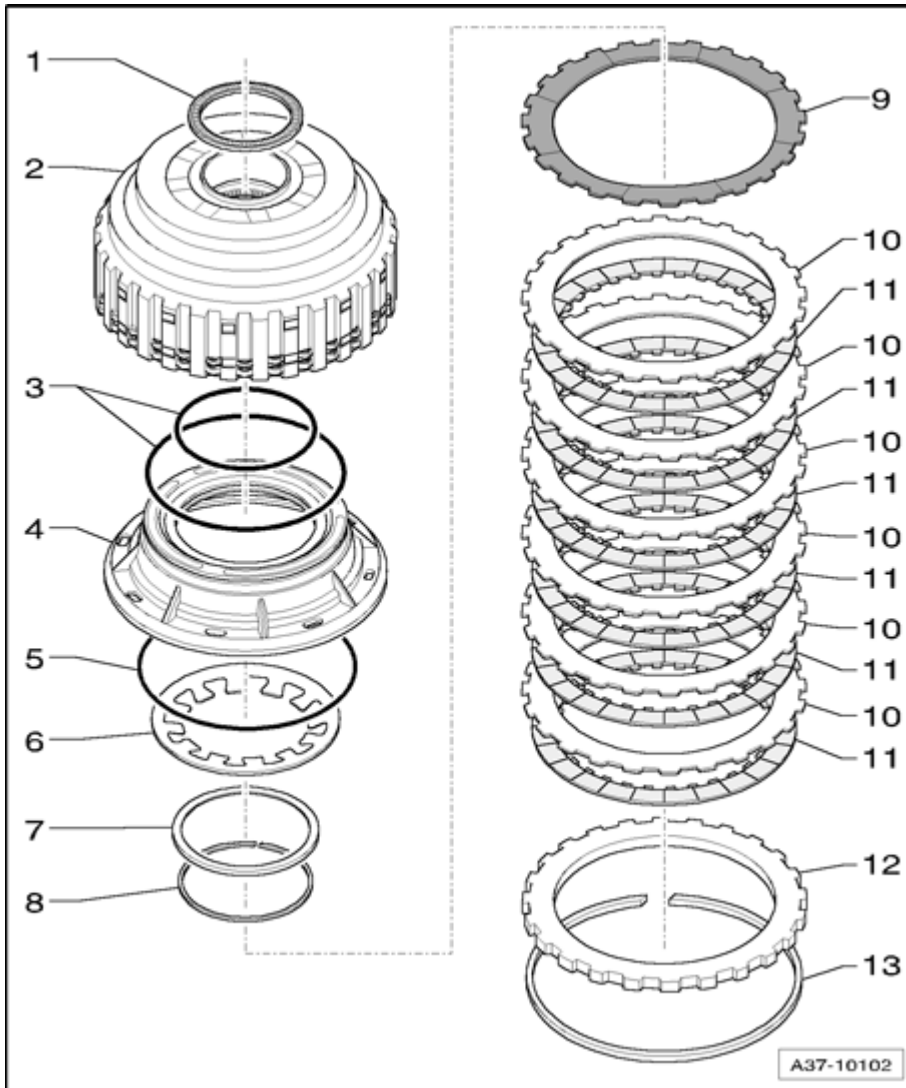


Fig. 300: Clutch "B" , Assembly Overview

Courtesy of VOLKSWAGEN UNITED STATES, INC.

2 - Cylinder "B"

- Replacing overheated cylinder (blue color)
- When cylinder is overheated, clutch "A" must also be checked

10 - Outer plate

- Checking for wear **Checking coated and outer plate for wear**

11 - Coated plate

- Checking for wear **Checking coated and outer plate for wear**

Checking coated and outer plate for wear

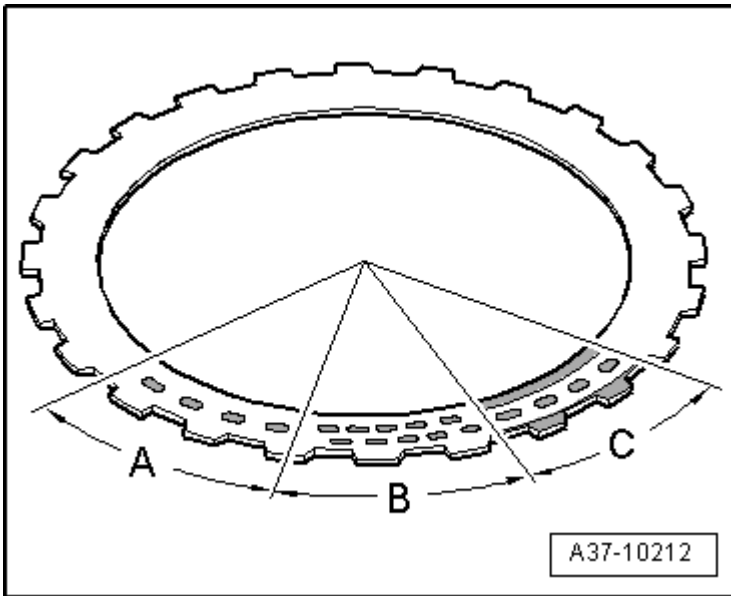


Fig. 301: Checking Coated And Outer Plate For Wear And Overheating
Courtesy of VOLKSWAGEN UNITED STATES, INC.

Signs of overheating on outer plate point to worn coated plate. Evaluate signs of wear as follows:

A - Spots of discoloration of outer plate caused by overheating in distance of more than 20 mm: Outer and coated plate OK, can be reused.

B - Spots of discoloration of outer plate caused by overheating in distance of less than 20 mm: Outer and coated plate worn, must be replaced.

C - Tarnish blue/brown at outer and/or inner area of outer plate: Outer and coated plate overheated and worn, must be replaced.

ATF pump

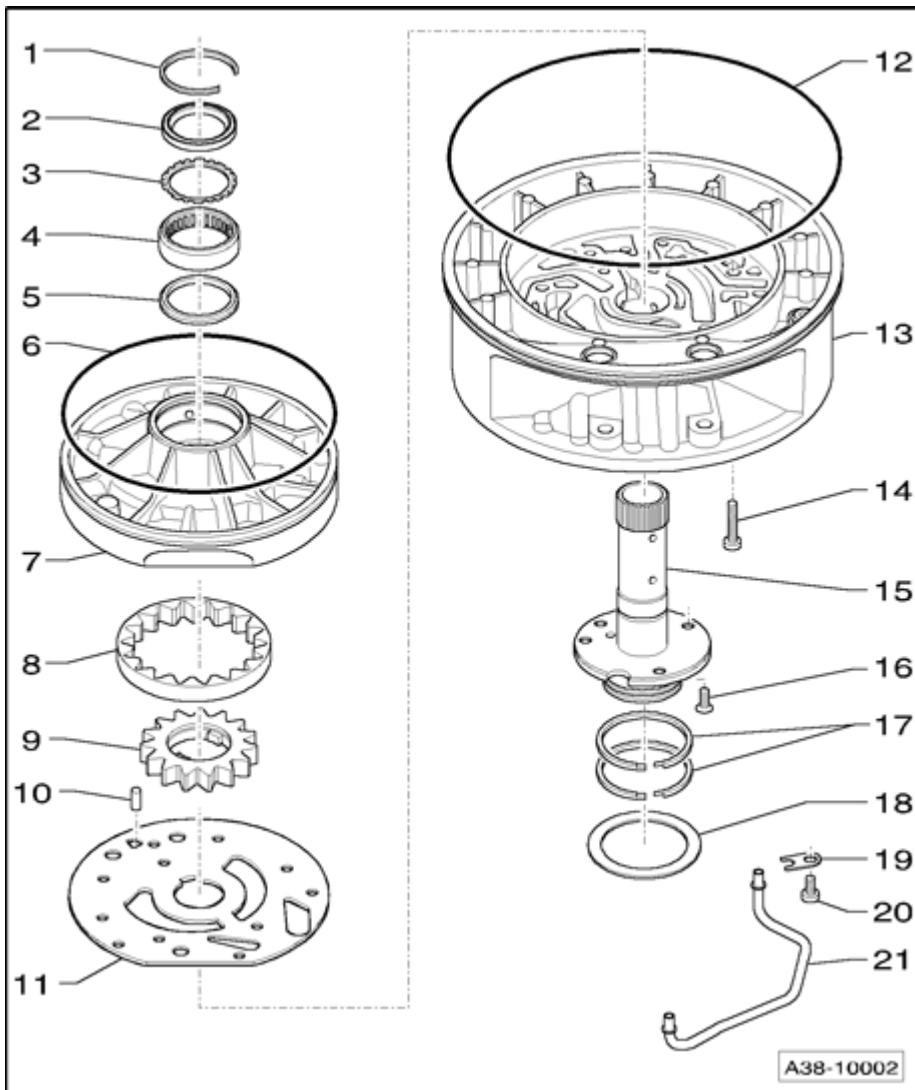


Fig. 302: ATF Pump, Assembly Overview

Courtesy of VOLKSWAGEN UNITED STATES, INC.

7 - ATF pump housing

- Checking contact surfaces for grooves and signs of wear **Checking components of ATF pump for grooves and signs of wear**

8 - Ring gear

- Checking contact surfaces for grooves and signs of wear
- Checking coupling plate in pump wheel **Checking coupling plate in pump wheel**

9 - Pump wheel

- Checking contact surfaces for grooves and signs of wear **Checking components of ATF pump for grooves and signs of wear**

11 - Intermediate panel

- Checking contact surfaces for grooves and signs of wear **Checking components of ATF pump for grooves and signs of wear**

13 - ATF supply

- Checking volume controlling valve of ATF supply for freedom of movement --> **Volume controlling valve in ATF pump, checking**

15 - Stator shaft

- Checking brass sleeve for wear **Checking brass sleeve of stator shaft for wear**
- Checking splines for wear

17 - Rectangular rings

- Checking for wear **Checking rectangular rings for wear**

Checking components of ATF pump for grooves and signs of wear

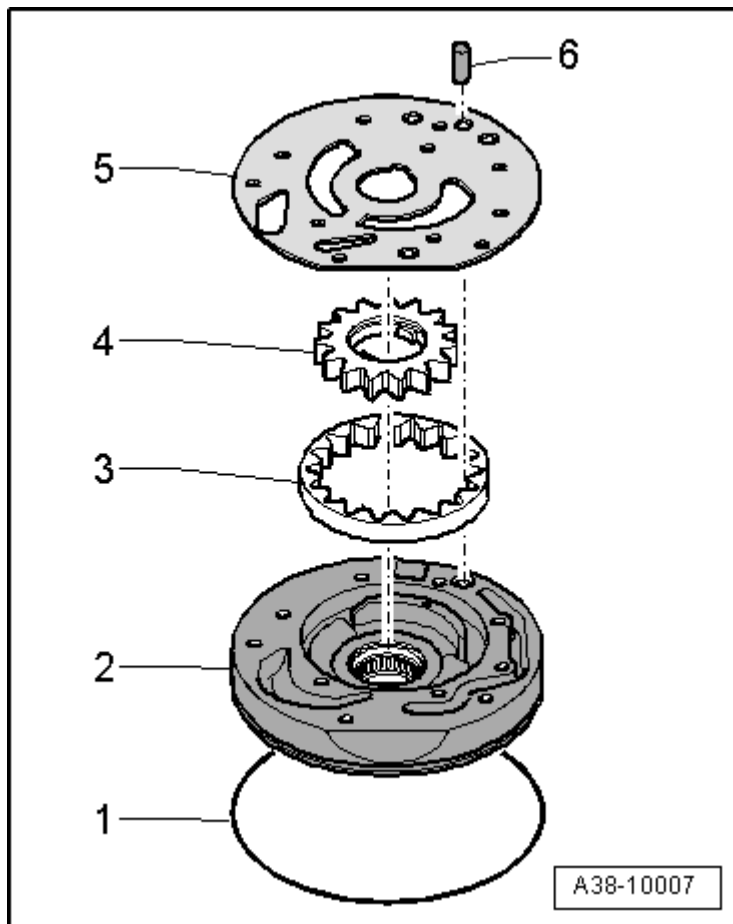


Fig. 303: ATF Pump Component, Overview

Courtesy of VOLKSWAGEN UNITED STATES, INC.

- Check contact surfaces of the following components for grooves and signs of wear:

2 - ATF pump housing

3 - Ring gear

4 - Pump wheel

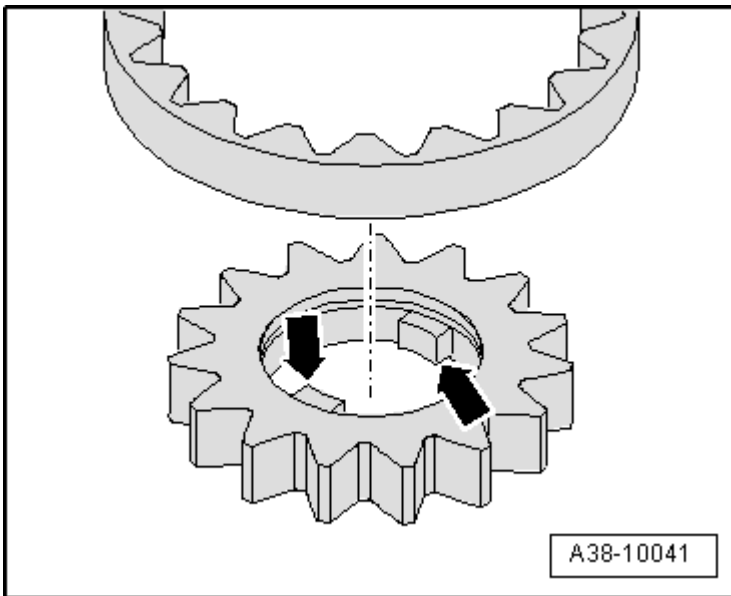
5 - Intermediate panel

- Surfaces of contact surfaces must be matt or shiny but without any sign of grooves.

NOTE:

- A faulty ATF pump will cause delays in drive and shifting procedures.

Checking coupling plate in pump wheel

**Fig. 304: Coupling Plates On ATF Pump Wheel**

Courtesy of VOLKSWAGEN UNITED STATES, INC.

- Check whether coupling plates - **arrows** - on ATF pump wheel are broken off, replace ATF pump if necessary.

Causes:

- A - Torque converter not completely inserted during transmission or engine installation
- B - Centering sleeve for torque converter not inserted in crankshaft

CAUTION: Always check for broken coupling plates and remove.

Checking brass sleeve of stator shaft for wear

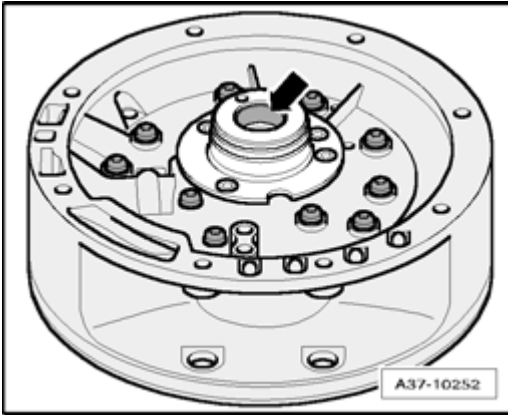


Fig. 305: Contact Surfaces Of Brass Sleeve At Inside Of Shaft
Courtesy of VOLKSWAGEN UNITED STATES, INC.

- Check contact surfaces of brass sleeve - **arrow** - at inside of shaft for wear.
- If strong scores and/or blue discoloration are detected:
 - Replace stator shaft.
- If no blue discoloration and only small grooves are detected, proceed as follows:
 - Sandpaper (600 grit, oiled) contact surface 1 to 2 times.
 - Carefully wipe off with a clean rag and check contact surface. Contact surfaces must now be like new.
 - If scores cannot be removed in this manner, replace stator shaft.

Checking rectangular rings for wear

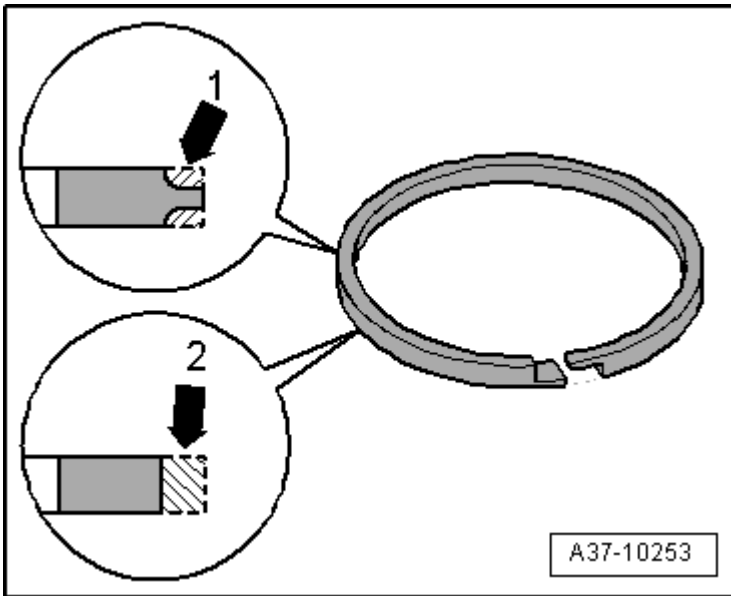


Fig. 306: Checking Rectangular Rings For Wear
Courtesy of VOLKSWAGEN UNITED STATES, INC.

Always replace rectangular rings. However, conclusions can be drawn from the signs of wear of the rectangular rings regarding the quality of contact surface for rectangular rings. Evaluating the rectangular rings for wear is therefore essential.

- If rectangular rings show strong axial wear of more than 0.3 mm - **arrow 1** - (slight wear of outer edges is normal):
 - Replace stator shaft.
- If rectangular rings show strong radial wear of more than 0.3 mm - **arrow 2** - (for comparison, measure thickness of new rectangular ring):
 - Replace cylinder "B".

39R FINAL DRIVE, DIFFERENTIAL (REAR)

FINAL DRIVE, REAR DIFFERENTIAL, SERVICING

Descriptions on this can be found in --> **39F - FRONT FINAL DRIVE, DIFFERENTIAL** or **39R - FINAL DRIVE, REAR DIFFERENTIAL**