TRANSMISSION

5 Spd. Manual Transmission 01A All Wheel Drive

00 GENERAL, TECHNICAL DATA

TRANSMISSION IDENTIFICATION

Transmission identification

Manual transmission 01A all wheel drive is a 5-speed transmission installed in connection with the 4-cylinder turbo engines and the 6-cylinder injection engines in the Audi A4 from 2002.

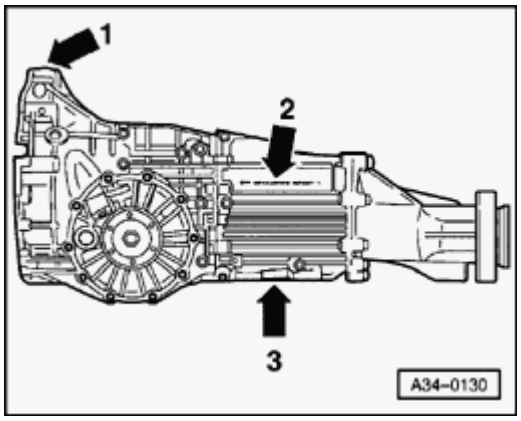


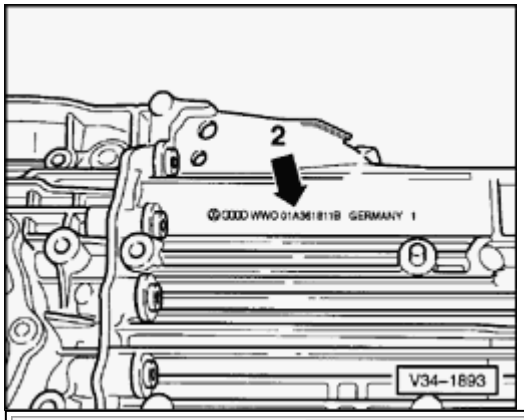
Fig. 1: Transmission Identification
Courtesy of VOLKSWAGEN UNITED STATES, INC.

Location on transmission

Code letters and date of manufacture (arrow 1)

Manual transmission 01A (arrow 2)

code letters (arrow 3)



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Fig. 2: Manual transmission 01A All Wheel Drive
Courtesy of VOLKSWAGEN UNITED STATES, INC.

Manual transmission 01A (arrow 2)

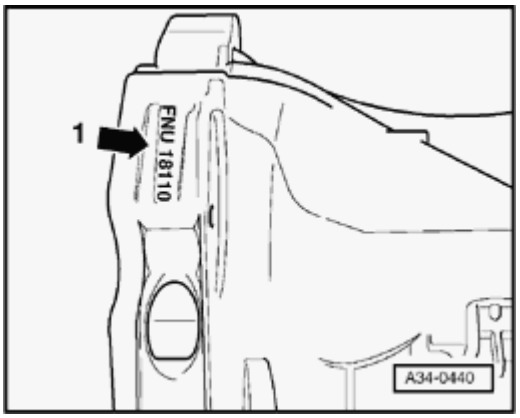


Fig. 3: Code Letters And Date Of Manufacture Of Transmission
Courtesy of VOLKSWAGEN UNITED STATES, INC.

Code letters and date of manufacture of transmission (arrow 1)

Example:	FNU	18	11	0
	I	I	I	I
	I	I	I	I
	Code letters	Day	Month	Year (2000) of production

Additional data depend on manufacture.

NOTE: Additionally, the code letters of the transmission are embossed on the underside of the transmission cover and listed in the data carriers of the vehicle.

Code letters, assignment of mechanical units, transmission ratios and capacities

Manual transmission		**5-speed 01A all wheel drive**	
Code letters		**FJV**	**FNU**
Manufactured	from to	09.00	09.00
Assignment	Type	**Audi A4 from 2002**	**Audi A4 from 2002**
	Engine	3.0 l - 162 kW	1.8 l - 110 kW 1.8 l - 125 kW 1)
Transmission ratio: Z2 : Z1	Final drive	35 : 9 = 3.889	35 : 9 = 3.889

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	1st gear	35 : 10 = 3.500	34 : 9 = 3.778
	2nd gear	35 : 18 = 1.944	37 : 17 = 2.176
	3rd gear	34 : 25 = 1.360	40 : 28 = 1.429
	4th gear	30 : 29 = 1.034	36 : 33 = 1.091
	5th gear	27 : 32 = 0.844	32 : 36 = 0.889
	6th gear	-	-
	Reverse gear	31 : 9 = 3.444	31 : 9 = 3.444
	Speedometer	Electronic	Electronic

Code letters	**FJV**	**FNU**
Capacity	2.75 liters	
Specification	Gear oil G 052 911 A 1 SAE 75 W 90 (synthetic oil)	
Clutch mechanism	Hydraulic	Hydraulic
Clutch plate diameter	240 mm	228 mm
Drive axle flange diameter	75.5 mm	100 mm
i total in top gear	3.281	3.457
Rear final drive assignment Code letters	ETS	ETT

REAR FINAL DRIVE, IDENTIFICATION

Rear final drive, identification

The final drive 01R is assigned to the manual transmission 01A all wheel drive.

Assignment of mechanical units

Refer to **00 GENERAL, TECHNICAL DATA**

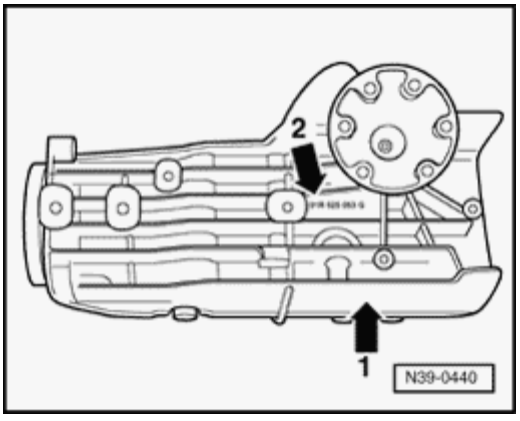


Fig. 4: Locations Of Final Drive Identification
Courtesy of VOLKSWAGEN UNITED STATES, INC.

Location on final drive

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Code letters and date of manufacture (arrow 1)

Final drive 01R (arrow 2)

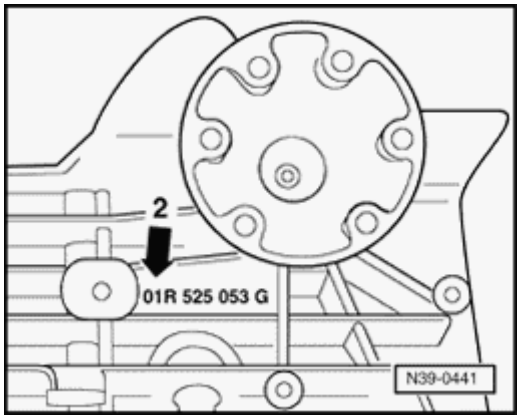


Fig. 5: Final Drive 01R
Courtesy of VOLKSWAGEN UNITED STATES, INC.

Final drive 01R (arrow 2)

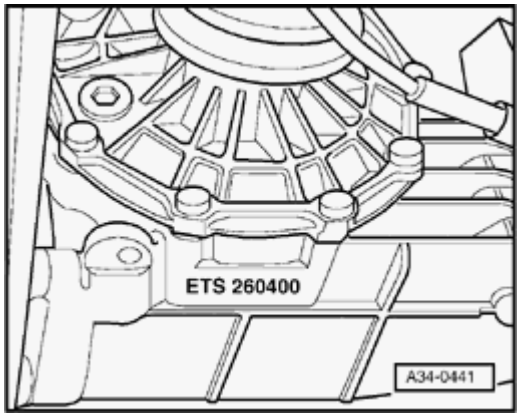


Fig. 6: Code Letters And Date Of Manufacture Of Final Drive
Courtesy of VOLKSWAGEN UNITED STATES, INC.

Code letters and date of manufacture of final drive

Example:	ETS	26	04	00
	I	I	I	I
	I	I	I	I
	Code letters	Day	Month	Year (2000) of production

Additional data depend on manufacture.

Code letters, transmission ratios, capacities

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Refer to **00 GENERAL, TECHNICAL DATA**

TRANSMISSION LAYOUT

Transmission layout

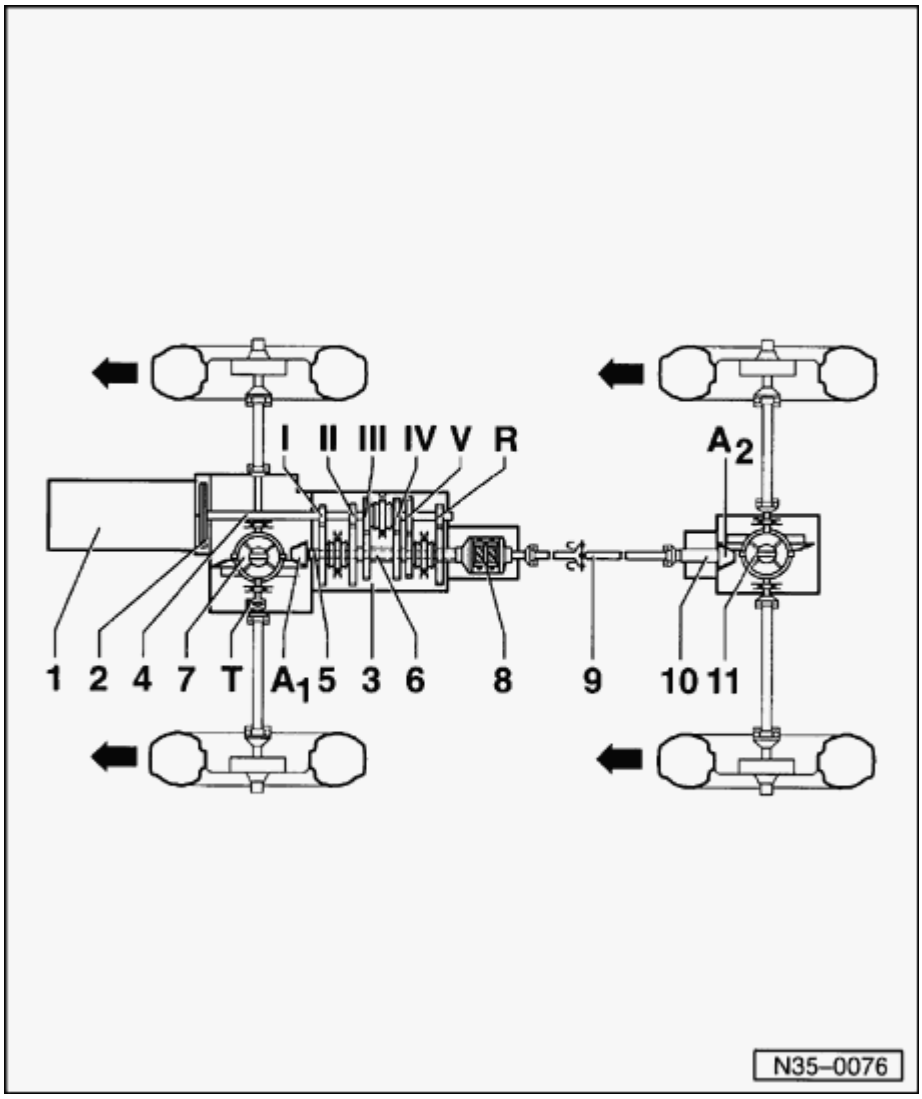


Fig. 7: Power Transfer, Overview
Courtesy of VOLKSWAGEN UNITED STATES, INC.

1 - Engine

2 - Clutch

3 - Manual transmission

4 - Input shaft (main shaft)

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5 - Front pinion (output shaft)

6 - Hollow shaft

7 - Front differential

8 - Torsen differential

9 - Drive shaft

10 - Rear pinion

11 - Rear differential

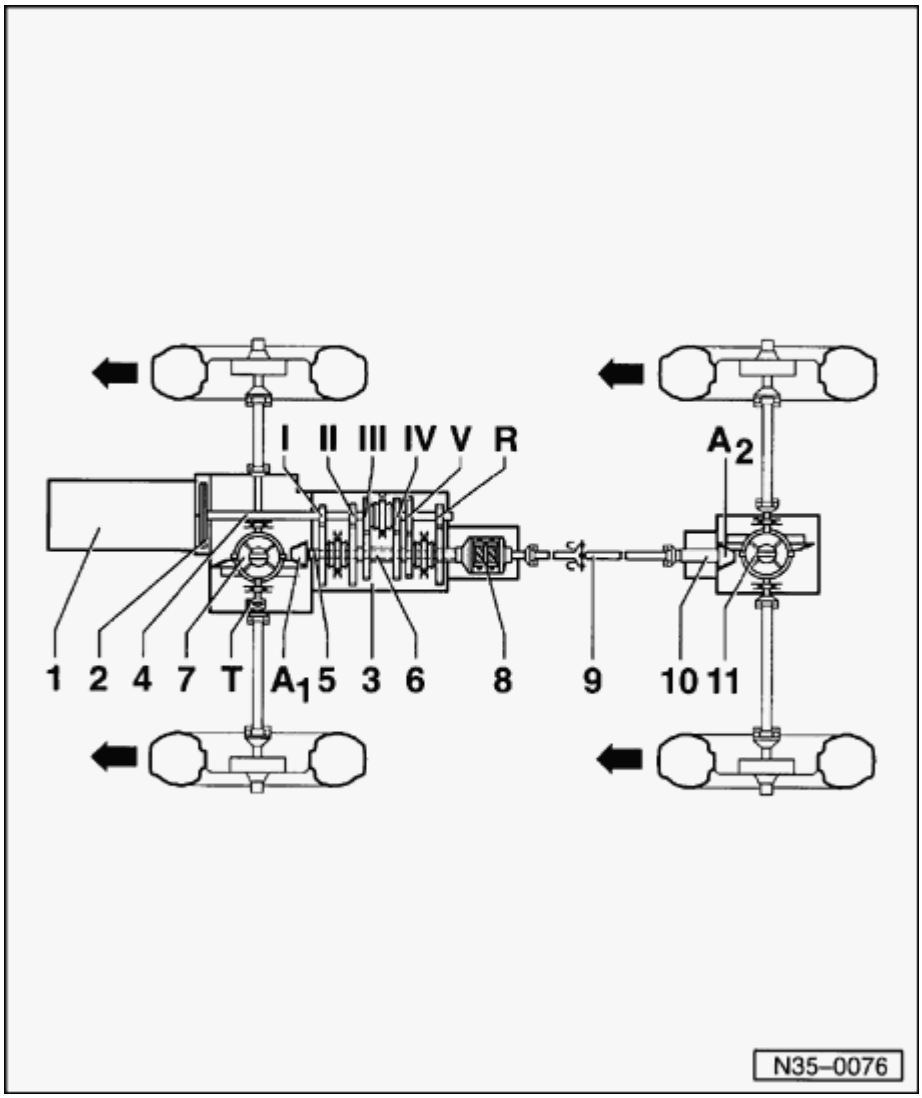


Fig. 8: Power Transfer, Overview
Courtesy of VOLKSWAGEN UNITED STATES, INC.

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I - 1st gear

II - 2nd gear

III - 3rd gear

IV - 4th gear

V - 5th gear

R - Reverse gear

A1 - Front final drive

A2 - Rear final drive

T - Speedometer drive

NOTE: Arrows point in direction of travel.

CALCULATIONS

Calculation of transmission ratios "i"

Transmission ratio

Transmission ratio	=	No. of teeth on driven gear	:	No. of teeth on driving gear

Transmission ratios			**Formula**
iG	=	gear ratio	ZG2 : ZG1
iA	=	final drive ratio	ZA2 : ZA1
i total	=	overall gear ratio	iG x iA

Example:		
	5th gear	**Final drive**
Driving gear	ZG1 = 36	ZA1 = 9
Driven gear	ZG2 = 32	ZA2 = 35

Calculations:			
iG	=	32 : 36 = 0.889	
iA	=	35 : 9 = 3.889	
i total	=	0.889 x 3.889 = 3.457	

GENERAL REPAIR INSTRUCTIONS

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General repair instructions

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

A number of general instructions for individual repair procedures - otherwise listed several times in many places in the article - are grouped together in the following paragraphs and apply to this article.

Transmission

- When replacing manual transmission, check oil level and top up as necessary. Refer to **Transmission oil level, checking**.
- Capacities and specifications. Refer to **Code letters, assignment of mechanical units, transmission ratios and capacities** onward
- When replacing rear final drive, check and adjust oil level in rear final drive as necessary:

Refer to **39 FINAL DRIVE, DIFFERENTIAL**

- Carefully clean all joints and adjacent areas before disconnecting.
- When installing transmission ensure proper seating of the dowel sleeves.

O-rings, oil seals, gaskets

- Always replace O-rings, oil seals and gaskets.
- After removing gaskets, examine contact surface on housing/shaft for burrs resulting from removal or for other signs of damage.
- Carefully clean sealing surfaces of housing before assembly.

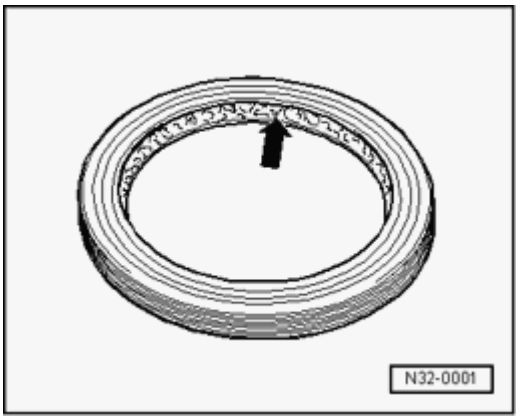


Fig. 9: Identifying Space Between Oil Seal Sealing Lips
Courtesy of VOLKSWAGEN UNITED STATES, INC.

- Before installing radial shaft oil seals, lubricate outer diameter slightly and half fill space between sealing lips (arrow) with sealing grease G 052 128 A1.
- Open side of oil seal faces fluid.

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- Press in new oil seal such that sealing lip is not at same location as sealing lip of old oil seal (make use of insertion depth tolerance).
- Lubricate O-rings slightly beforehand to prevent their being pinched on assembly.
- Check oil level after replacing gaskets and oil seals. Refer to **Transmission oil level, checking**.

Sealant

- Carefully clean sealing surfaces of housing before applying sealing paste.
- Apply sealing paste AMV 188 001 02 evenly and not too thickly.
- Sealing paste must not enter vent holes.

Locking elements

- Take care not to overstretch circlips.
- Always replace damaged or overstretched circlips.
- Circlips must be properly positioned in groove.

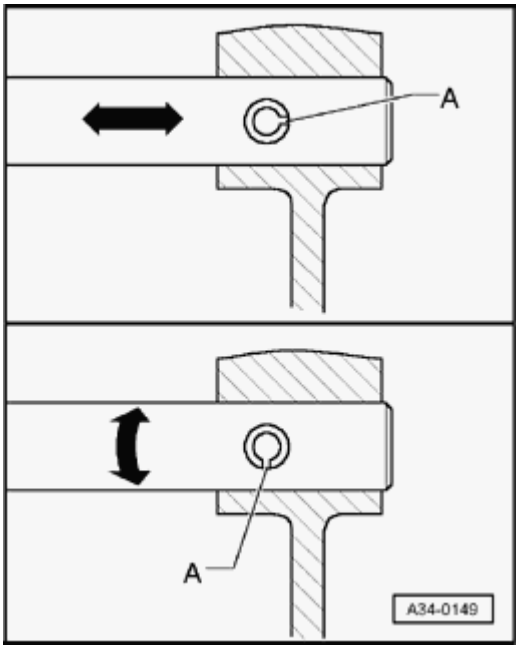


Fig. 10: Identifying Locking Elements
Courtesy of VOLKSWAGEN UNITED STATES, INC.

- Replace spring pins. Installation position: Slot -A- in line with direction of force (arrow).

Nuts and bolts

- Remove nuts and bolts in reverse of tightening sequence.
- Loosen and tighten nuts and bolts for securing covers and housings in diagonal sequence.

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- Particularly delicate parts - e.g. clutch pressure plates - must be kept straight and should be loosened off and tightened gradually in diagonal sequence.
- Tightening torques specified apply to non-lubricated nuts and bolts.

- Always replace self-locking nuts and bolts.
- Clean threads of bolts screwed in with a locking agent with a wire brush. Then install bolts using AMV 185 101 A1.
- Threaded holes which held self-locking bolts or bolts with locking agent need to be cleaned (e.g. using a thread tap). Otherwise bolts will be at risk of stripping when removed.

Bearings

- Install needle bearings with labelled side (thicker metal) facing installation tool.
- Grease needle bearing for rear transmission input shaft in flywheel.
- Lubricate all bearings for installation in transmission housing with gear oil.
- Heat inner races of tapered roller bearings to approx. 100 ° C before installing. Press home as far as stop on assembly so that there is no axial clearance.

- Never confuse outer and inner races of bearings of the same size.
- Always replace tapered roller bearings on one shaft together, and use parts from the same manufacturer.
- Tapered roller bearings in the transmission for the output shaft and differential are low-friction. Do not treat new tapered roller bearings with oil before the friction torque measurement. The bearings have been treated with a special oil at the factory for this purpose.

Shims

- Perform a dimensional check at several points on shims using a micrometer. Different tolerances make it possible to obtain the exact shim thickness required.
- Check for burrs and damage.
- Only install undamaged shims in perfect condition.

Gears, synchro-hubs, inner races for sliding gears

- Heat gears and sychro-hubs to approx. 100 ° C before installing. Press home as far as stop on assembly so that there is no axial clearance.
- Heat inner races for sliding gears to approx. 100 ° C before installing.
- The temperature can be checked using temperature probe V.A.G 1558.
- Note installation position.

Sliding gears

- After installation check sliding gears for 1st to 5th gear and sliding gear for reverse gear for axial clearance of 0.15 to 0.35 mm and check for ease of movement.

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Synchro-rings

- Do not confuse synchro-rings, assign to the same gear wheel when re-using.
- Check for wear and replace if necessary.
- Apply transmission oil before installing.

Clutch mechanism

- For removal of transmission remove clutch slave cylinder without opening hydraulic circuit.
- If slave cylinder is removed with hydraulic pipe attached, do not depress clutch pedal. Otherwise piston will be pushed out of slave cylinder.
- Make sure clutch pressure plate is kept straight; loosen and tighten bolts gradually in a diagonal sequence.
- To reduce the odor nuisance of a scorched clutch, thoroughly clean bell housing, flywheel and parts of engine facing transmission.

30 CLUTCH

CLUTCH MECHANISM COMPONENTS (ON CHASSIS)

Clutch mechanism components (on chassis)

CAUTION: Before beginning repairs on the electrical system:

- **Obtain the anti-theft radio security code.**
- **Switch the ignition off.**
- **Disconnect the battery Ground (GND) strap.**
- **On vehicles equipped with Audi Telematics by OnStar ® , switch-off the emergency (back-up) battery for the Telematic/Telephone Control Module prior to disconnecting vehicle battery. Refer to**
  - **91 - COMMUNICATION**
  - **91 RADIO, TELEPHONE, NAVIGATION, TRIP COMPUTER for Cabriolet**

  .
- **After reconnecting vehicle battery, re-code and check operation of anti-theft radio. Also check operation of clock and power windows according to article and/or Owner's Manual.**
- **After reconnecting vehicle battery on vehicles equipped with Audi Telematics by OnStar ® , switch-on the emergency (back-up) battery for the Telematic/Telephone Control Module. Refer to**
  - **91 - COMMUNICATION**
  - **91 RADIO, TELEPHONE, NAVIGATION, TRIP COMPUTER for**

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Clutch mechanism components (on chassis), servicing

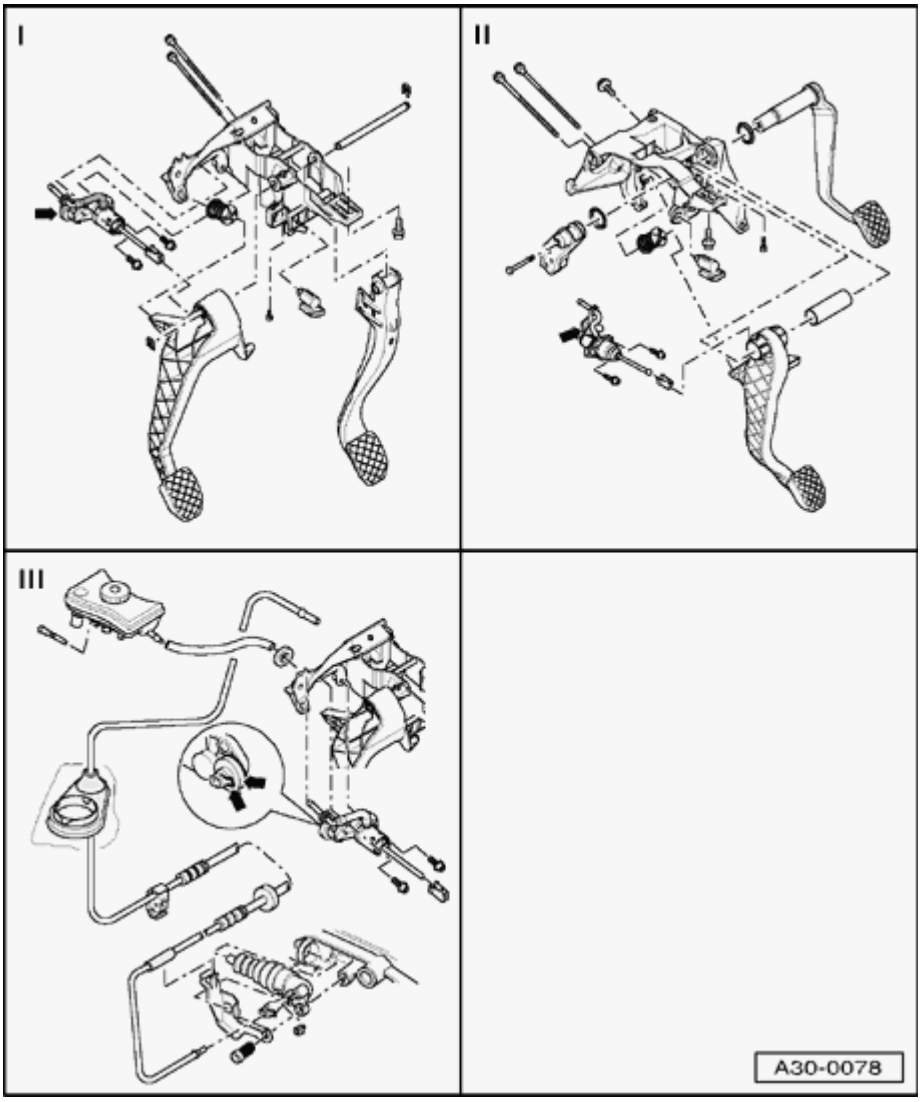


Fig. 11: Exploded View Of Pedal Cluster And Exploded View Of Hydraulic System
Courtesy of VOLKSWAGEN UNITED STATES, INC.

I - Exploded view of pedal cluster. Refer to Pedal cluster, assembly overview

II - Exploded view of hydraulic system. Refer to Hydraulic system, component overview

NOTE:

- **Lubricate all bearing and contact surfaces with polycarbamide grease G 052 142 A 2.**
- **Remove cover panel under instrument panel before carrying out work on**

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pedal cluster:

Refer to

- **68 - INTERIOR EQUIPMENT**
- **68 - INTERIOR EQUIPMENT for Cabriolet**

- **Make sure brake fluid does not escape into footwell or plenum chamber or onto transmission below. If it does, clean affected area thoroughly.**
- **When working in footwell, cover carpet with cloths to protect it from brake fluid spillage.**

Pedal cluster, assembly overview

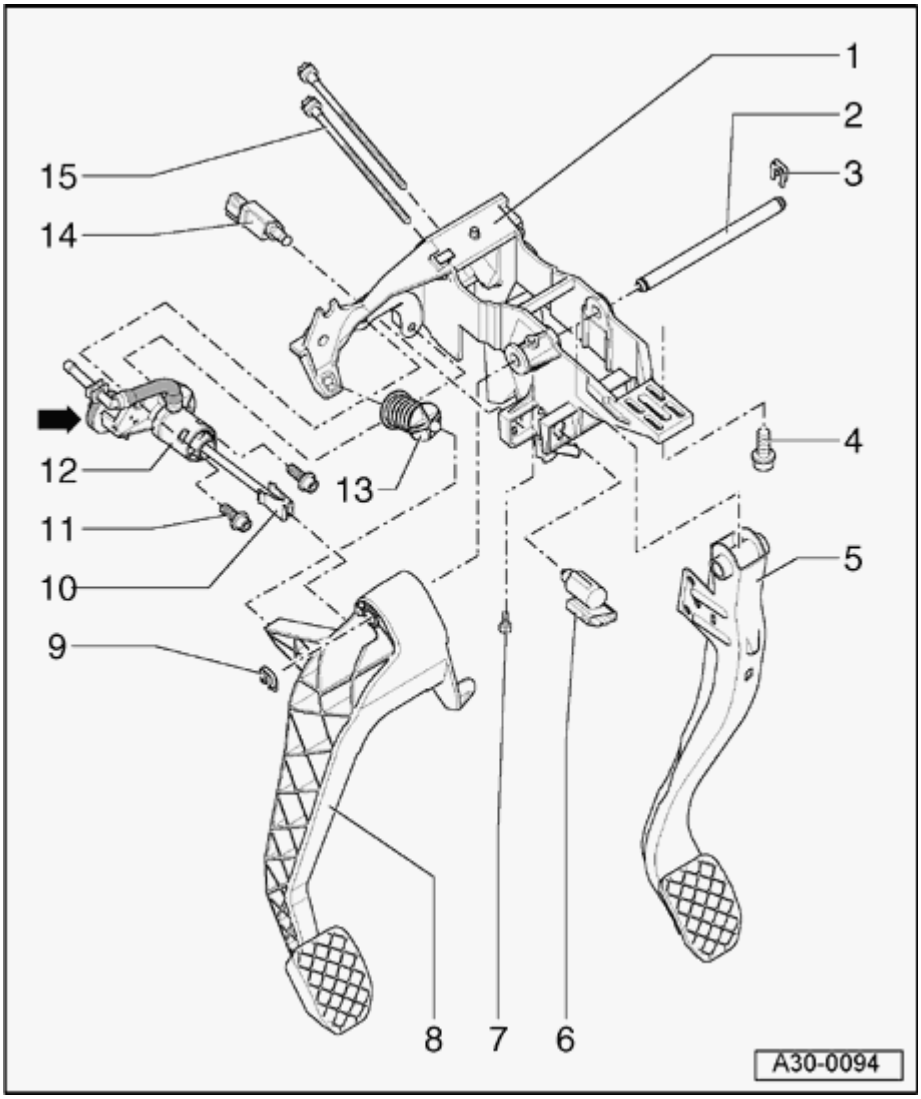


Fig. 12: Pedal Cluster, Assembly Overview
Courtesy of VOLKSWAGEN UNITED STATES, INC.

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1 - Mounting bracket

- Removing and installing. Refer to **Master cylinder, removing and installing**

2 - Mounting pin for clutch and brake pedal

3 - Locking element

4 - Hex socket-head bolt, 25 Nm

5 - Brake pedal

- Attachment maintenance-free, do not lubricate

6 - Clutch pedal switch

- Do not install more than one time

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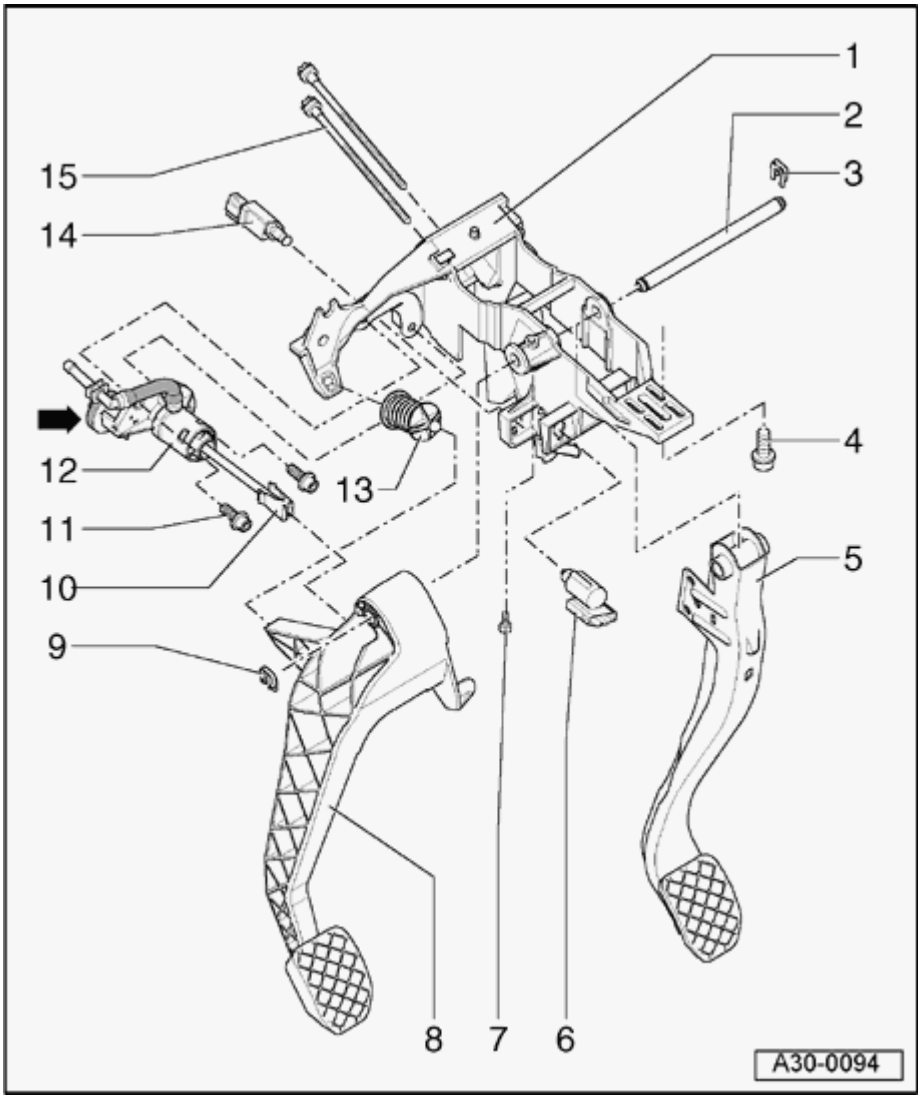


Fig. 13: Pedal Cluster, Assembly Overview
Courtesy of VOLKSWAGEN UNITED STATES, INC.

7 - Hex socket-head bolt, 5Nm

- For securing mounting pin for clutch and brake pedal

8 - Clutch pedal

- Removing and installing. Refer to **Master cylinder, removing and installing**

9 - Locking element

10 - Mount

- Removing and installing. Refer to **Hydraulic system, component overview**

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11 - Hex socket-head bolt, 20Nm

12 - Master cylinder

- Removing and installing. Refer to **Master cylinder, removing and installing**
- Do not remove gasket (arrow)

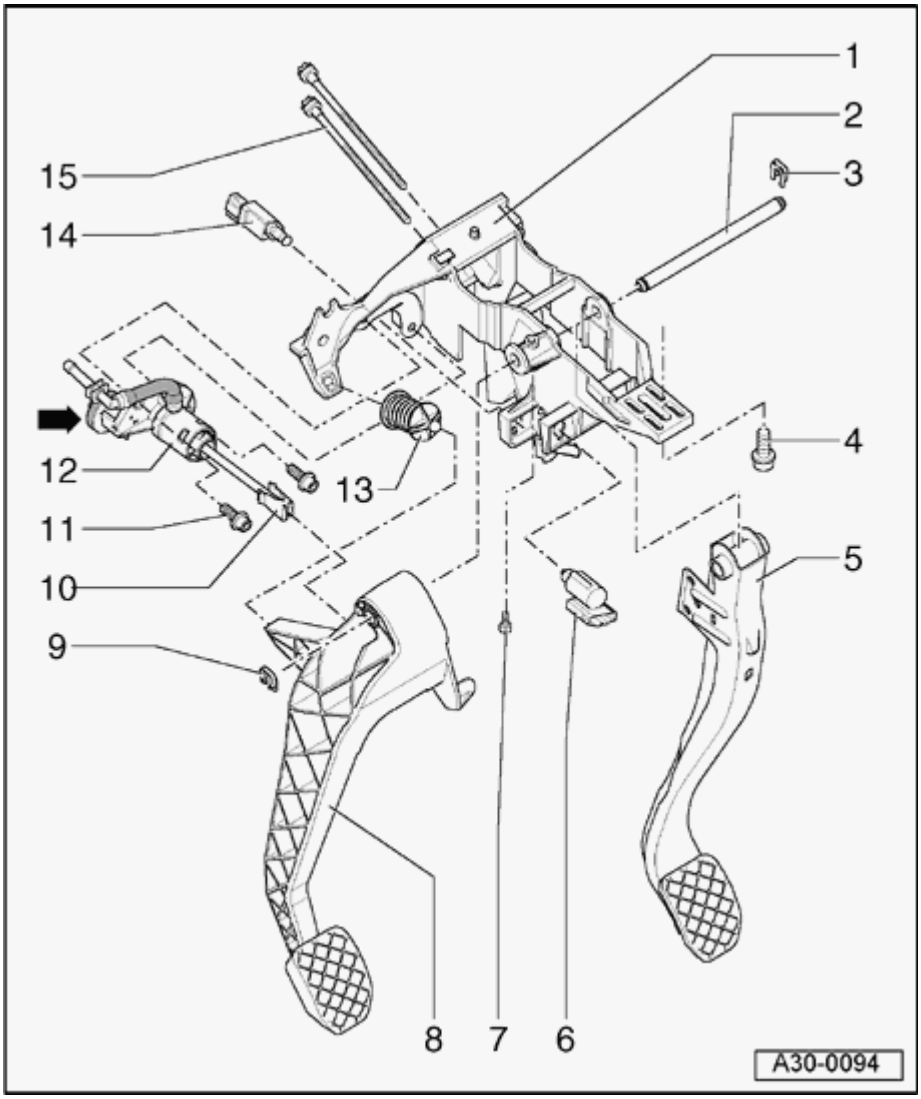


Fig. 14: Pedal Cluster, Assembly Overview
Courtesy of VOLKSWAGEN UNITED STATES, INC.

13 - Over-center spring

- Black side facing clutch pedal
- Removing and installing. Refer to **Over-center spring, removing and installing**
- Assignment

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14 - Clutch pedal starter interlock switch -F194-

- Do not install more than one time

15 - TORX bolt, 25 Nm

- For attaching brake master cylinder/brake booster to mounting bracket

Over-center spring, removing and installing

Special tools and equipment

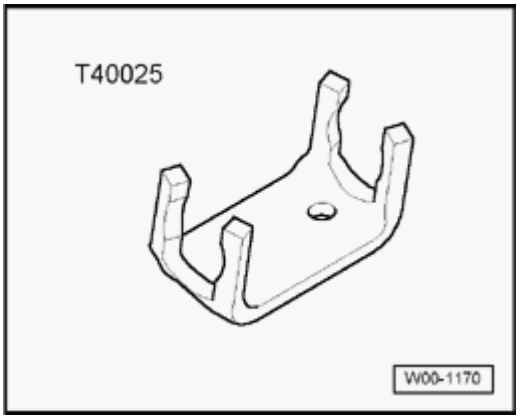


Fig. 15: T40025 Installation Clamp
Courtesy of VOLKSWAGEN UNITED STATES, INC.

- T40025 Mounting clip

Removing

- Remove driver's storage compartment:

Refer to

- **68 - INTERIOR EQUIPMENT**
- **68 - INTERIOR EQUIPMENT** for Cabriolet

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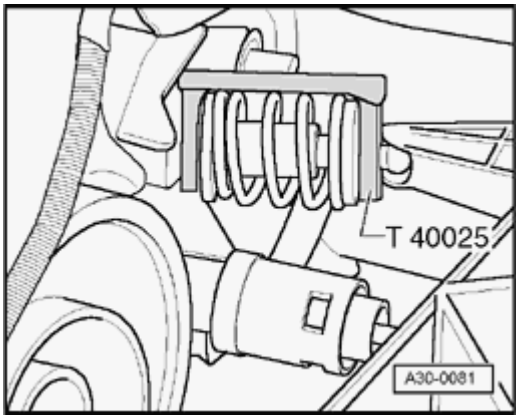


Fig. 16: Installation Clamp T40025 Installed On Over-Center Spring
Courtesy of VOLKSWAGEN UNITED STATES, INC.

- Tension over-center spring with clutch pedal and press on mounting clip T40025.
- Move clutch pedal to home position and pull over-center spring together with mounting clip T40025 downward to remove.

Installing

- Pull clutch pedal into passenger compartment.

Installation position of over-center spring:

- Black side of over-center spring faces clutch pedal.

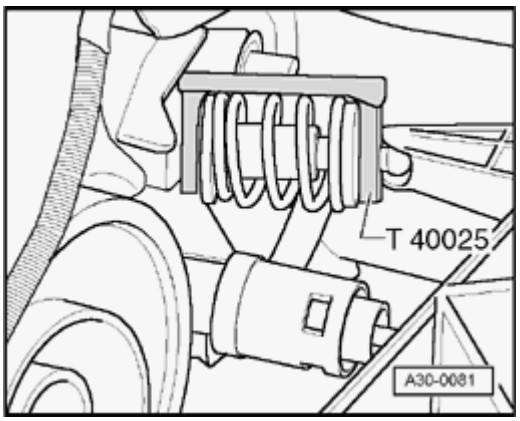


Fig. 17: Installation Clamp T40025 Installed On Over-Center Spring
Courtesy of VOLKSWAGEN UNITED STATES, INC.

- Install over-center spring with mounting clip T40025, press clutch pedal and remove mounting clip.

Hydraulic system, component overview

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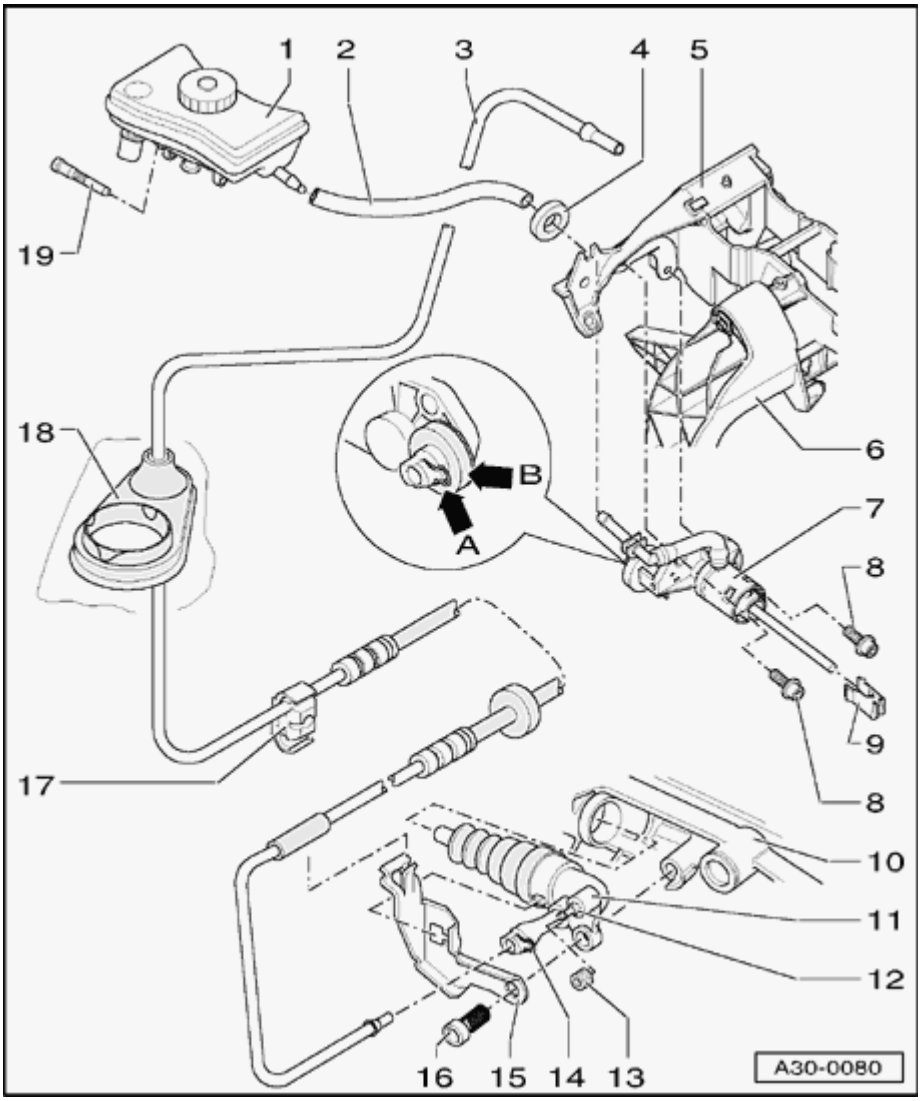


Fig. 18: Hydraulic System, Assembly Overview
Courtesy of VOLKSWAGEN UNITED STATES, INC.

1 - Brake fluid reservoir

2 - Supply hose

- For master cylinder

3 - Hose/line assembly

- For push-on connections on master/slave cylinder
- Separating from master cylinder and installing. Refer to **Master cylinder, removing and installing**
- Separating from slave cylinder. See **Separating slave cylinder from hose/pipe assembly**

4 - Grommet

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5 - Mounting bracket

6 - Clutch pedal

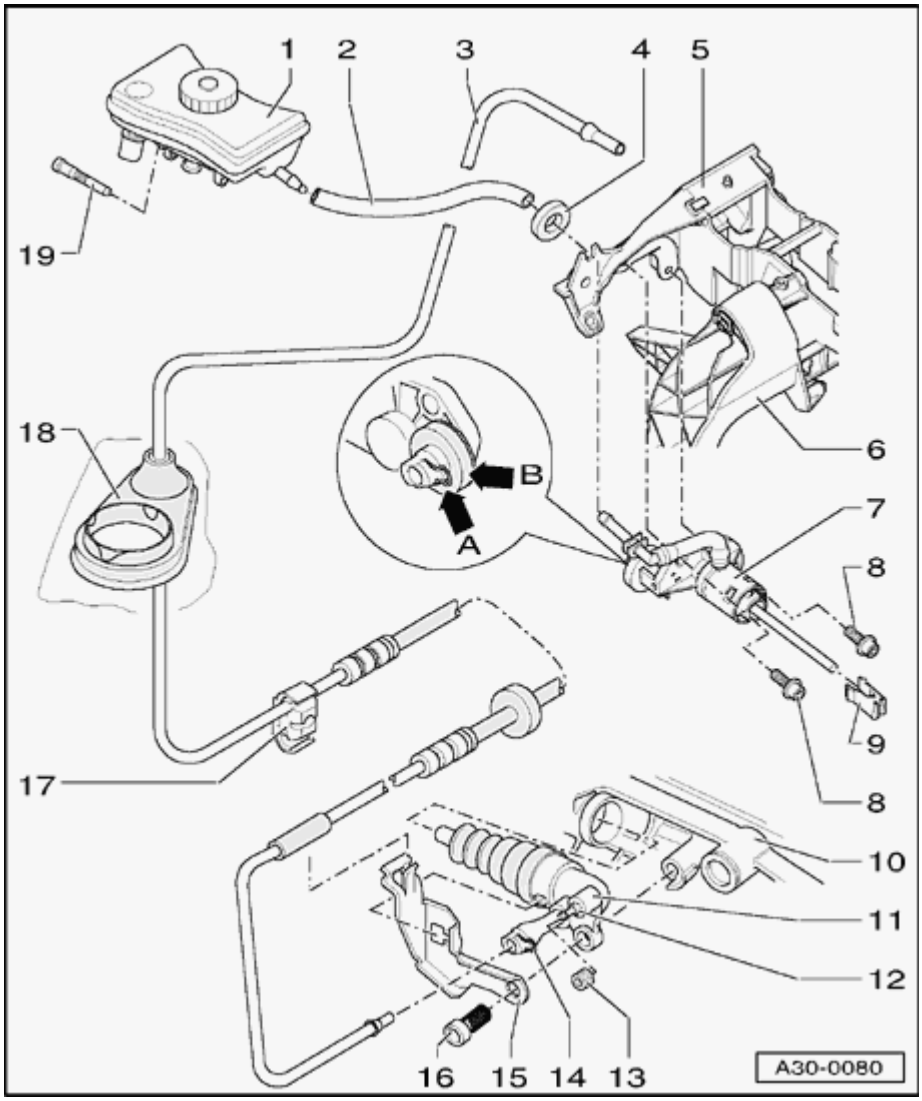


Fig. 19: Hydraulic System, Assembly Overview
Courtesy of VOLKSWAGEN UNITED STATES, INC.

7 - Master cylinder

- Removing and installing. Refer to **Master cylinder, removing and installing**
- Do not remove clip (arrow A) or gasket (arrow B)
- To remove hose/pipe assembly pull out clip (arrow A) as far as it will go.

8 - Hex socket-head bolt, 20Nm

9 - Mount

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- Only replace when master cylinder removed
- Detaching. See **Prying off mount**
- Pressing on. See **Pressing master cylinder operating rod into mount**

10 - Transmission

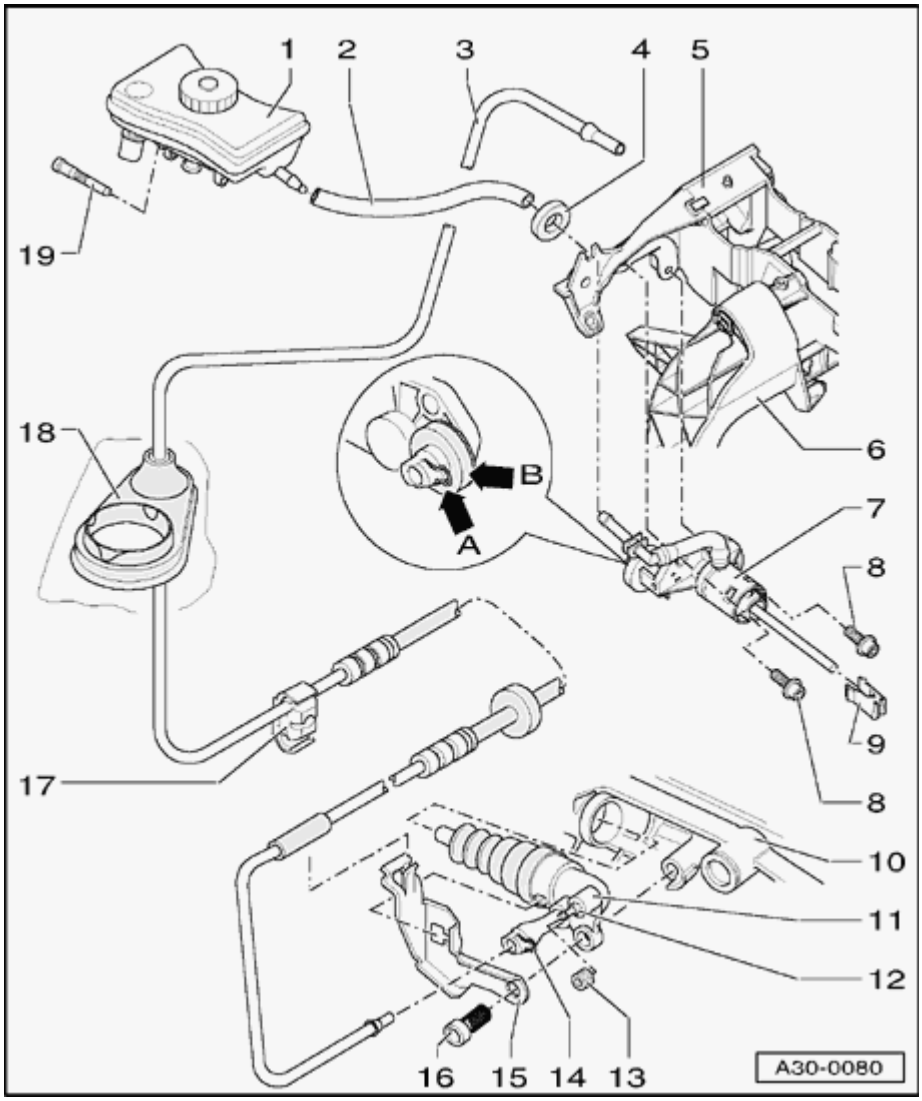


Fig. 20: Hydraulic System, Assembly Overview
Courtesy of VOLKSWAGEN UNITED STATES, INC.

11 - Slave cylinder

- Do not press clutch pedal after removal
- Removing and installing. Refer to **Lubricating clutch slave cylinder with grease before installing**
- Bleed slave cylinder after working on hydraulic clutch mechanism. Refer to **Clutch system, bleeding**
- Separate from hose/line assembly. See **Separating slave cylinder from hose/pipe assembly**

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- Brake fluid must not escape onto transmission

12 - Bleeder valve

- Tighten to 4.5 Nm
- Follow work sequence for bleeding. Refer to **Clutch system, bleeding**

13 - Dust cap

14 - Clip

- To remove tube pull out clip as far as it will go. Refer to **Separating slave cylinder from hose/pipe assembly**.

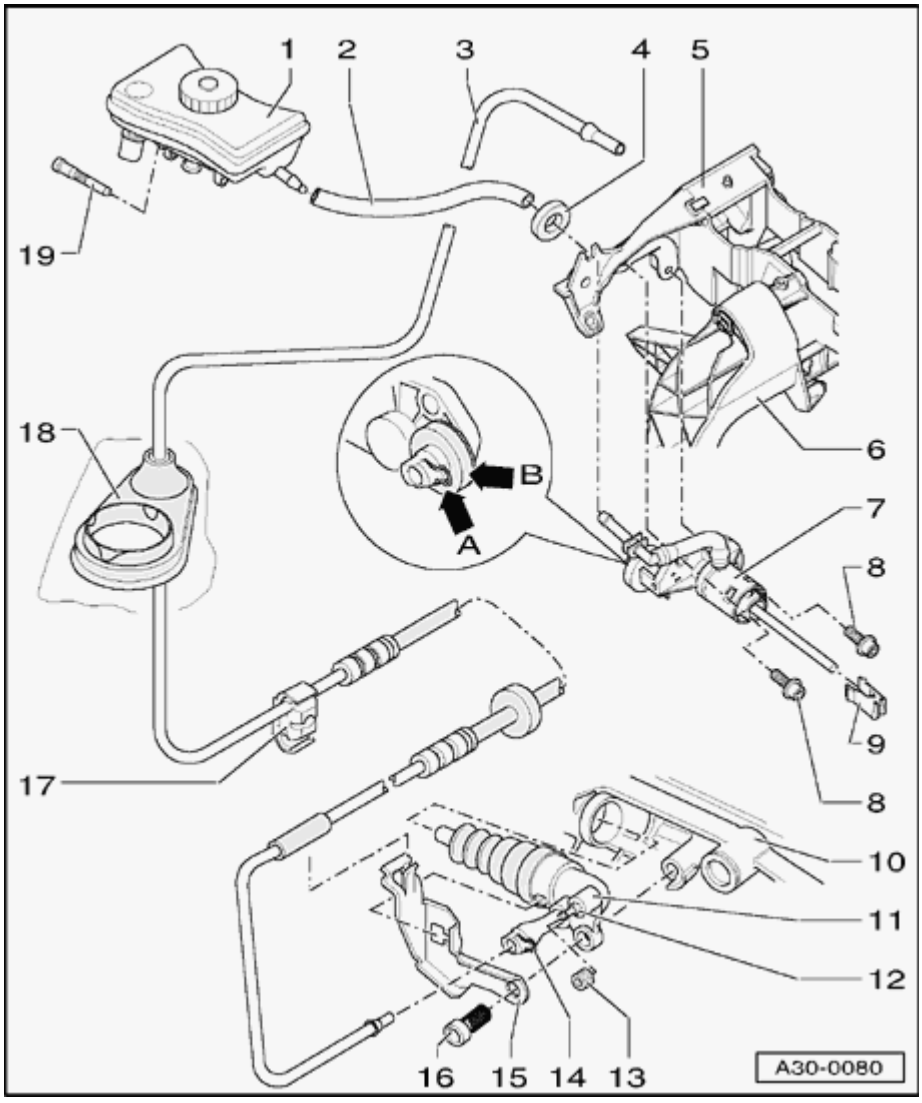


Fig. 21: Hydraulic System, Assembly Overview
Courtesy of VOLKSWAGEN UNITED STATES, INC.

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15 - Bracket

- For hose/pipe assembly
- Attached to transmission together with slave cylinder

16 - Hex socket-head bolt, 25 Nm

- Slave cylinder to transmission
- Self-locking
- Always replace

17 - Holding clip

18 - Gasket

19 - Bolt

- For brake fluid reservoir

Prying off mount

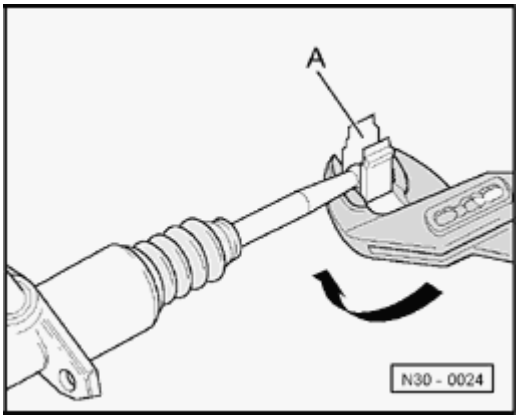


Fig. 22: Removing Retainer By Prying
Courtesy of VOLKSWAGEN UNITED STATES, INC.

Pressing master cylinder operating rod into mount

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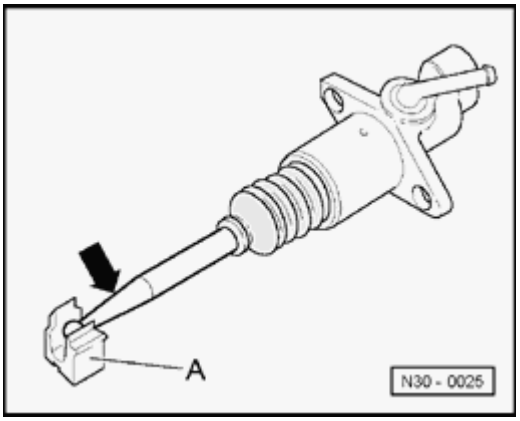


Fig. 23: Installing Clutch Master Cylinder Operating Rod In Retainer
Courtesy of VOLKSWAGEN UNITED STATES, INC.

Separating slave cylinder from hose/pipe assembly

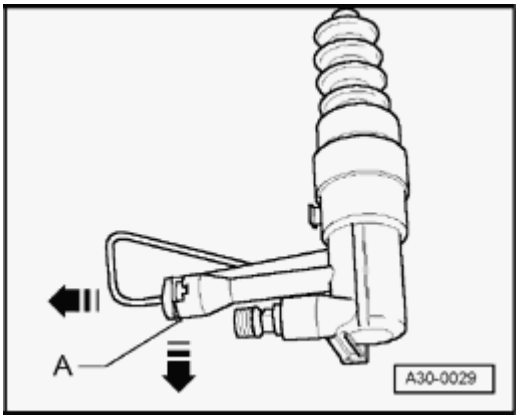


Fig. 24: Removing Hydraulic Line From Slave Cylinder
Courtesy of VOLKSWAGEN UNITED STATES, INC.

Removing

To remove the hose/pipe assembly use a screwdriver to pry out clip -A- as far as it will go. Only then can the hose/pipe assembly be pulled out.

Installing

- Push in clip -A- as far as it will go.
- Insert hose/pipe assembly in slave cylinder until it clicks into position.
- Check proper installation by pulling hose/pipe assembly.

Master cylinder, removing and installing

Special tools, testers and other items required

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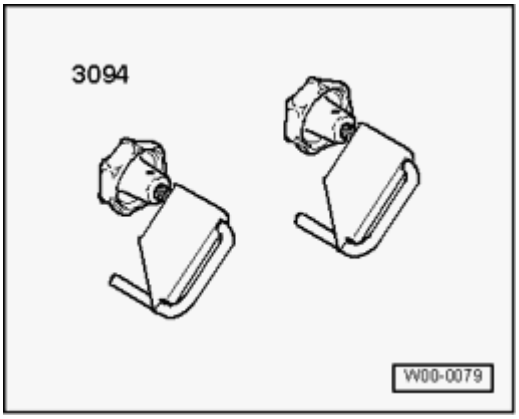


Fig. 25: Identifying Hose Clamps 3094
Courtesy of VOLKSWAGEN UNITED STATES, INC.

- 3094 Hose clamp

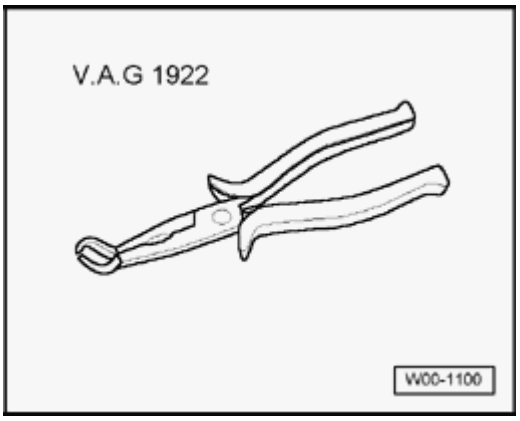


Fig. 26: Identifying Spark Plug Connector Pliers V.A.G 1922
Courtesy of VOLKSWAGEN UNITED STATES, INC.

- VAG 1922 Pliers

Removing

- Pull off gasket on plenum chamber in direction of arrow.

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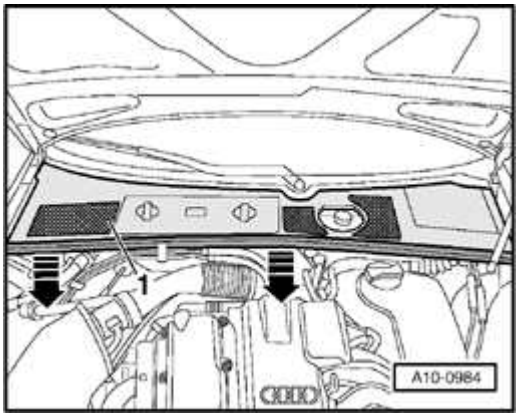


Fig. 27: Removing Cover Over Plenum Chamber
Courtesy of VOLKSWAGEN UNITED STATES, INC.

- Remove cover -1- on top of plenum chamber.
- First check if a coded radio is installed. In this case obtain anti-theft code.

See Caution for disconnecting Telematics battery. Refer to **Clutch mechanism components (on chassis)**

- Disconnect battery Ground strap with ignition switched off.

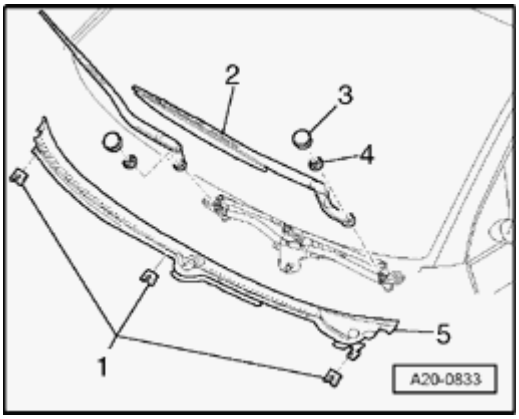


Fig. 28: Removing Securing Clips And Cowl
Courtesy of VOLKSWAGEN UNITED STATES, INC.

- Pry off two covers -3- with a screwdriver.
- Remove nuts -4- and two wiper arms -2-.
- Pull off clips -1- and remove cowl panel grille -5-.

Remove electronics box in plenum chamber as follows:

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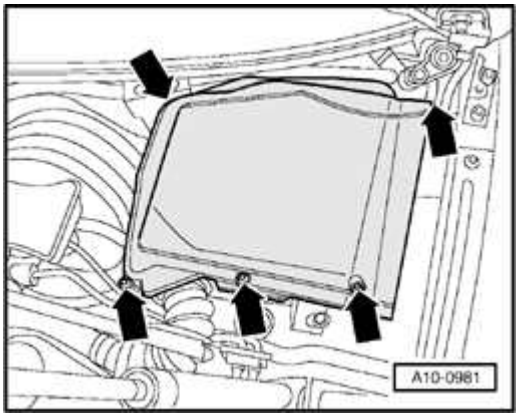


Fig. 29: Electronics Box Sealing Cover
Courtesy of VOLKSWAGEN UNITED STATES, INC.

- Remove bolts (arrows) and take off cover lid.

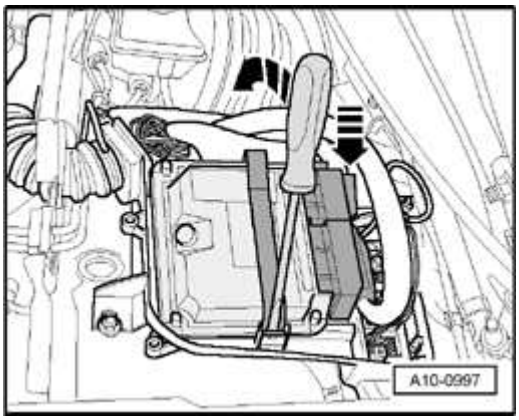


Fig. 30: Using Screwdriver To Remove Retainer Bar And Engine Control Module (ECM) J623
Courtesy of VOLKSWAGEN UNITED STATES, INC.

- Carefully pry off mount bar with screwdriver (arrow).

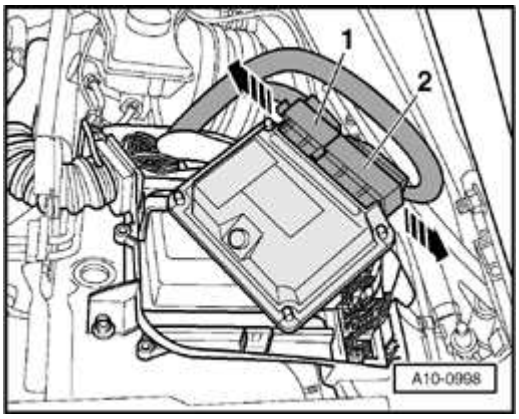


Fig. 31: Releasing Connector Latches And Pulling Off Connectors On Engine Control Module
Courtesy of VOLKSWAGEN UNITED STATES, INC.

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- Loosen connector locks (arrows) and unplug connectors -1- and -2- from engine control module.

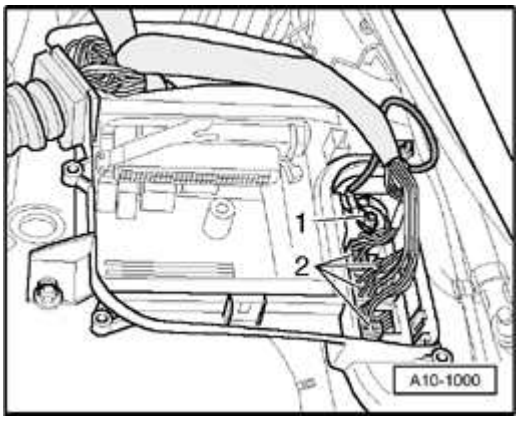


Fig. 32: Connector At Connector Rail And Wire
Courtesy of VOLKSWAGEN UNITED STATES, INC.

- Remove connectors -2- from connector strip.
- Disconnect electrical connection -1-.

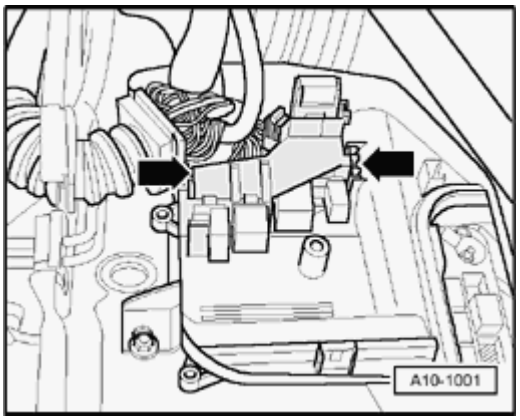


Fig. 33: Locating Auxiliary Relay Carrier Catches
Courtesy of VOLKSWAGEN UNITED STATES, INC.

- Release locks (arrows) and pull auxiliary relay carrier in electronics box upward and off.
- Pull engine wiring harness together with grommet out of recess in electronics box.

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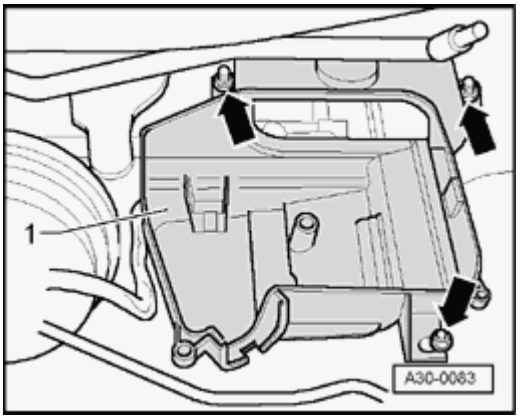


Fig. 34: Electronics Box Nuts
Courtesy of VOLKSWAGEN UNITED STATES, INC.

- Remove nuts (arrows) and lift out electronics box -1-.

NOTE:

- **During the following steps make sure that brake fluid does not escape into plenum chamber or onto transmission below. If it does, clean affected area thoroughly.**
- **When working in footwell, cover carpet with cloths to protect it from brake fluid spillage.**

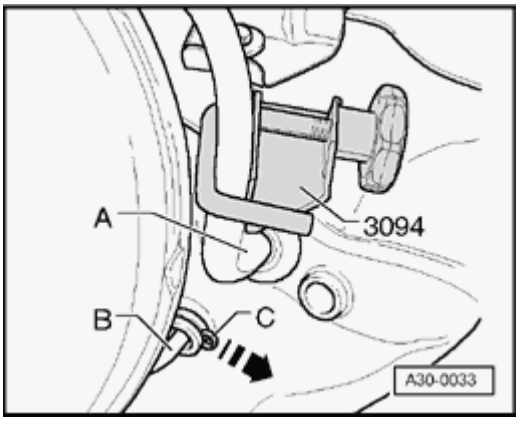


Fig. 35: Identifying Brake Fluid Reservoir Return Hose Grommet
Courtesy of VOLKSWAGEN UNITED STATES, INC.

- Disconnect supply hose -A- to brake fluid reservoir with special tool 3094, disconnect from master cylinder and seal with plug.
- On bulkhead remove grommet above connecting tube for supply hose.
- Pry out securing clip -C- with screwdriver and then pull tube -B- out slightly.

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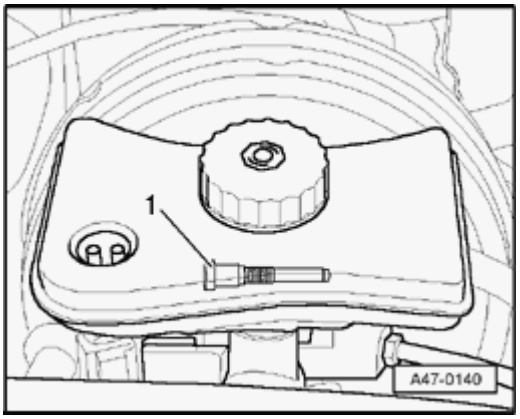


Fig. 36: Location Of Brake Fluid Reservoir Dowel Bolt
Courtesy of VOLKSWAGEN UNITED STATES, INC.

- Remove bolt for brake fluid reservoir -1- and unplug connector for monitoring fluid level by pulling downward.

NOTE: Do not remove brake fluid reservoir.

NOTE:

- **Brake fluid reservoir not shown for purpose of clearer illustration.**
- **To remove the top TORX bolt; swivel brake fluid reservoir sideways slightly.**

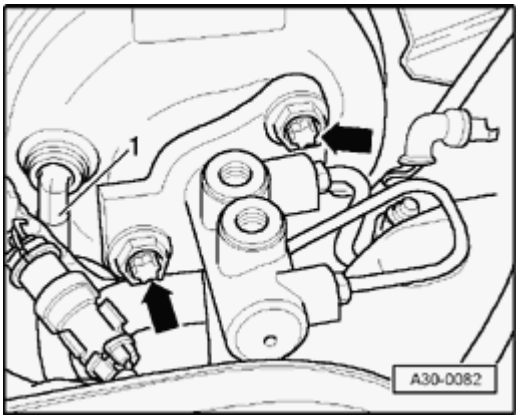


Fig. 37: Location Of Brake Servo Securing Bolts
Courtesy of VOLKSWAGEN UNITED STATES, INC.

- Remove two TORX bolts (arrows).
- Remove vacuum tube to brake booster -1-.
- Remove driver's storage compartment.

Refer to

- **68 - INTERIOR EQUIPMENT**

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- **68 - INTERIOR EQUIPMENT** for Cabriolet

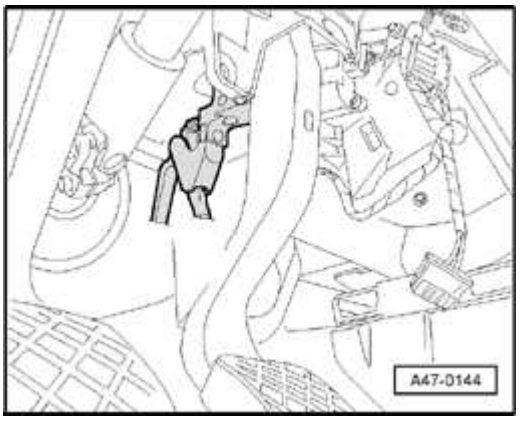


Fig. 38: Brake Pedal At Brake Servo
Courtesy of VOLKSWAGEN UNITED STATES, INC.

- Separate brake pedal from brake booster.

Refer to **47 - BRAKES - HYDRAULIC COMPONENTS**

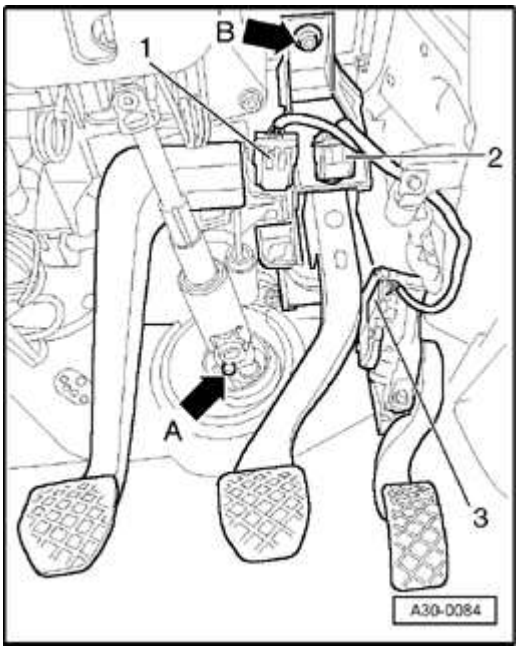


Fig. 39: Locating Steering Column At Steering Gear And Disconnecting Connector On Clutch Pedal Switch, Brake Pedal Switch And On Accelerator Pedal Module
Courtesy of VOLKSWAGEN UNITED STATES, INC.

- Separate steering column from steering box (arrow A).

Refer to **48 - STEERING**

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- Disconnect connectors from clutch pedal switch -1-, brake pedal switch -2- and accelerator pedal module -3-.
- Remove bolt for mounting bracket (arrow B) and remove pedal cluster assembly.

Release master cylinder operating rod from clutch pedal as follows:

- Remove over-center spring. Refer to **Over-center spring, removing and installing**.

NOTE:

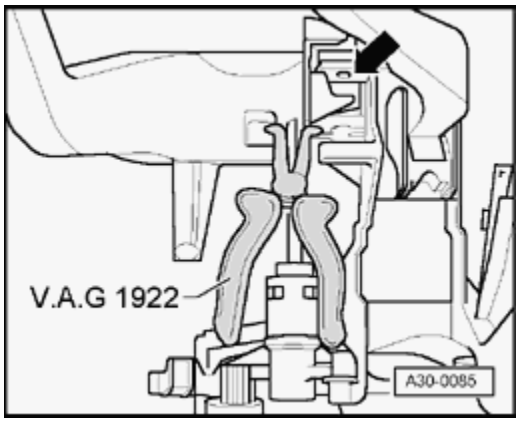
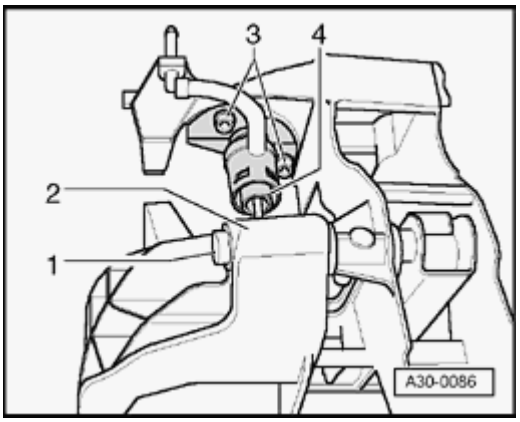


Fig. 40: Pressing Retainer Together And Detaching Clutch Pedal From Master Cylinder Using VAG 1922
Courtesy of VOLKSWAGEN UNITED STATES, INC.

- **When releasing make sure clutch pedal does not bounce against clutch pedal switch mount (arrow). Otherwise the mount might break.**
- **In order to assure sufficiently secure fitting of clutch pedal switch. Refer to Pedal cluster, assembly overview Item 6- as well as Clutch pedal starter interlock switch -F194-. Refer to Pedal cluster, assembly overview Item 14- in pedal cluster, these switches must not be installed more than once.**

- Insert pliers VAG 1922 into recesses in clutch pedal, compress mount (arrows) and separate clutch pedal from master cylinder.



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Fig. 41: Identifying Retaining Clip, Clutch Pedal, Bolts And Master Cylinder
Courtesy of VOLKSWAGEN UNITED STATES, INC.

- Remove securing clip -1- and clutch pedal -2-.
- Remove bolts -3- and master cylinder -4-.

Installing

Install in reverse order, paying attention to the following:

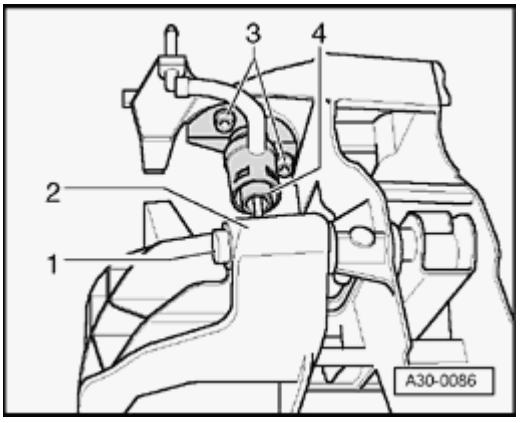


Fig. 42: Identifying Retaining Clip, Clutch Pedal, Bolts And Master Cylinder
Courtesy of VOLKSWAGEN UNITED STATES, INC.

- Insert master cylinder and tighten bolts -3- to 20 Nm.

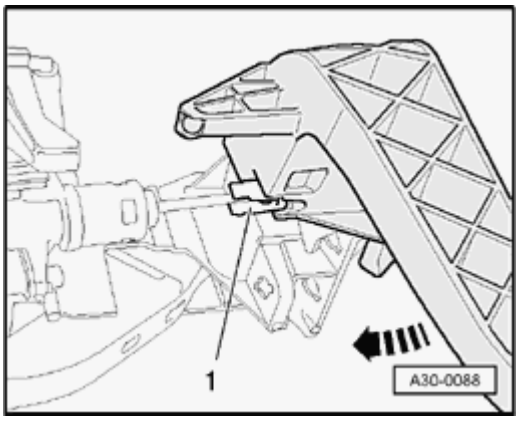


Fig. 43: Pushing Clutch Pedal To Lock Into Place, While Making Sure Mount Is Properly Secured In Clutch Pedal
Courtesy of VOLKSWAGEN UNITED STATES, INC.

- Insert mount -1- in clutch pedal.
- Push clutch pedal in direction of arrow to lock into place, while making sure mount -1- is properly secured in clutch pedal.
- Installing over-center spring. Refer to **Over-center spring, removing and installing**.

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For the next step a second technician is required.

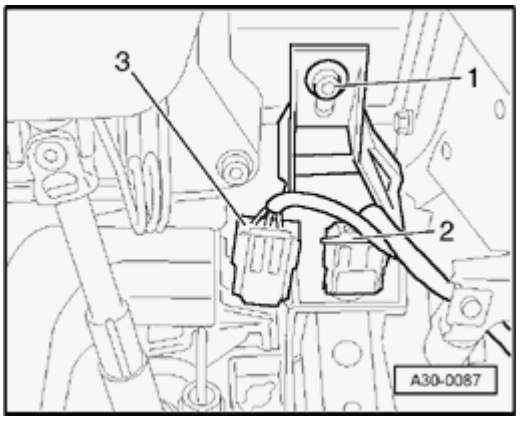


Fig. 44: Location Of Clutch Pedal Switch F36 And Pedal Assembly Securing Bolt
Courtesy of VOLKSWAGEN UNITED STATES, INC.

- Insert pedal cluster assembly and tighten bolt -1- hand-tight. Simultaneously, second technician feeds tube from plenum chamber side into master cylinder.

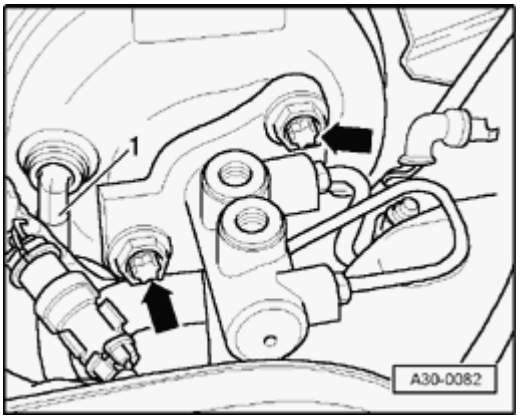


Fig. 45: Location Of Brake Servo Securing Bolts
Courtesy of VOLKSWAGEN UNITED STATES, INC.

- Tighten brake booster bolts (arrows) to 25 Nm.

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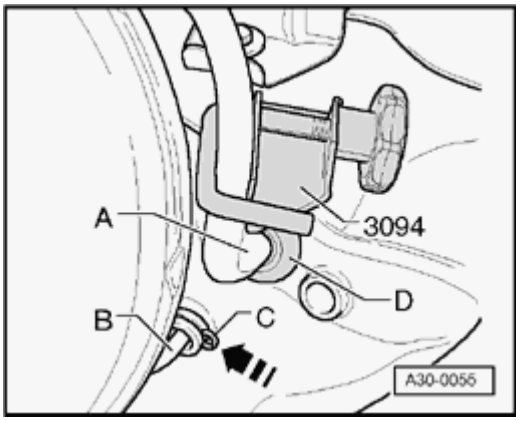


Fig. 46: Installing Rubber Grommet And After-Run Hose
Courtesy of VOLKSWAGEN UNITED STATES, INC.

- Push in securing clip -C- as far as it will go.
- Insert tube -B- in master cylinder until it clicks into position.
- Install grommet -D- over connecting tube/supply hose -A- and into bulkhead.
- Push on supply hose -A- to brake fluid reservoir as far as it will go.

- Remove special tool 3094.
- Screw in brake fluid reservoir bolt.

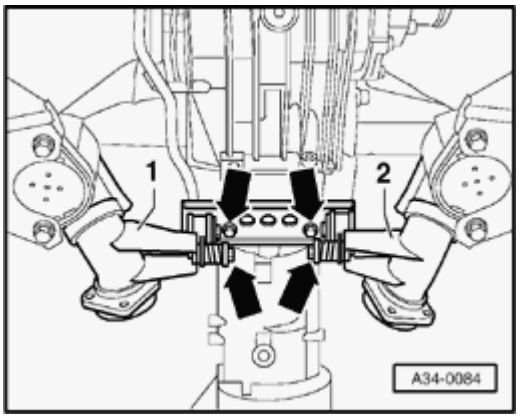


Fig. 47: Locating Connectors
Courtesy of VOLKSWAGEN UNITED STATES, INC.

- Tighten hex socket-head bolt (arrow B) which secures pedal cluster to instrument panel carrier to 25 Nm.
- Attach connectors -1-, -2- and -3-.
- Connect brake pedal to brake booster.

Refer to **47 - BRAKES - HYDRAULIC COMPONENTS**

- Attach steering column to steering box (arrow A).

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Refer to **48 - STEERING**

- Install driver's storage compartment:

Refer to

- **68 - INTERIOR EQUIPMENT**
- **68 - INTERIOR EQUIPMENT** for Cabriolet

- Bleed clutch system. Refer to **Clutch system, bleeding**.

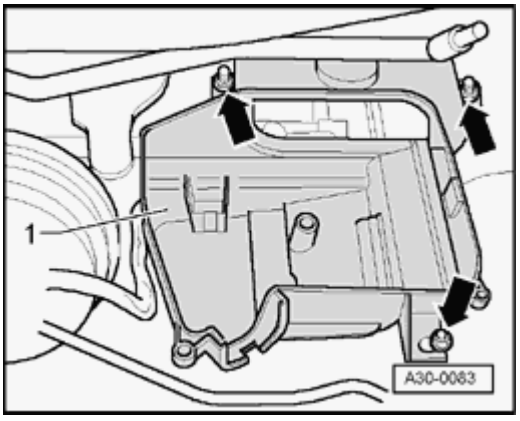


Fig. 48: Electronics Box Nuts
Courtesy of VOLKSWAGEN UNITED STATES, INC.

- Insert electronics box and tighten nuts (arrows) to 4 Nm.
- Route engine wiring harness and attach connection in connector station.
- Install engine control module plus auxiliary relay carrier and auxiliary fuse holder, if installed.

Refer to **97 WIRING** r.

- Push on cover lid by hand and tighten bolts diagonally - 4 Nm.

See Caution for connecting Telematics battery. Refer to **Clutch mechanism components (on chassis)**

NOTE: If the battery is reconnected remember to check and activate vehicle equipment (radio, clock, convenience electronics etc.).

Refer to

- **01 - MAINTENANCE**
- **01 - MAINTENANCE** for Cabriolet

Clutch system, bleeding

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Special tools, testers and other items required

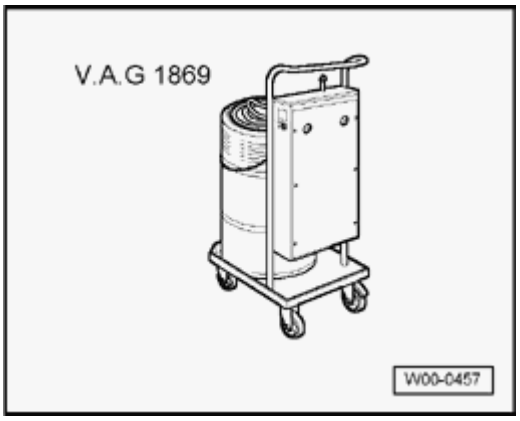


Fig. 49: Identifying Brake Filler And Bleeder Unit V.A.G 1869
Courtesy of VOLKSWAGEN UNITED STATES, INC.

- Brake system brake filler and bleeder unit VAS 5234

Brake fluid specification:

Refer to **47 - BRAKES - HYDRAULIC COMPONENTS**

NOTE:

- **Open bleeder valve before switching on bleeding equipment.**
- **Make sure no brake fluid escapes onto transmission when performing subsequent work.**
- **Bleed system after working on hydraulic clutch mechanism.**
- **Before bleeding the system pull out clutch pedal and fill brake fluid reservoir with brake fluid up to "max".**

- Connect brake system brake filler and bleeder unit VAS 5234, but do not switch on at this point.
- Remove sound insulation below transmission, if installed.

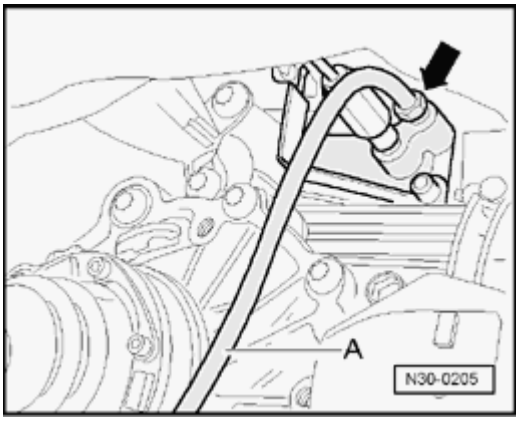


Fig. 50: Connecting Bleeder Hose To Clutch Slave Cylinder

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Courtesy of VOLKSWAGEN UNITED STATES, INC.

- Attach bleeder hose -A- to slave cylinder (arrow) and open bleeder valve.
- Connect bleeder hose to pressure hose of collecting bottle.
- Then switch on bleeding appliance and allow approx. 100 cm3 of brake fluid to drain out.

- Working pressure 2.5 bar

NOTE: Make sure bleed hose is correctly installed when bleeding.

- Tighten bleeder valve to 4.5 Nm.
- Press clutch pedal several times following completion of bleeding process.
- Bleed system again if necessary.

CLUTCH RELEASE MECHANISM COMPONENTS (ON TRANSMISSION), SERVICING

Clutch release mechanism components (on transmission), servicing

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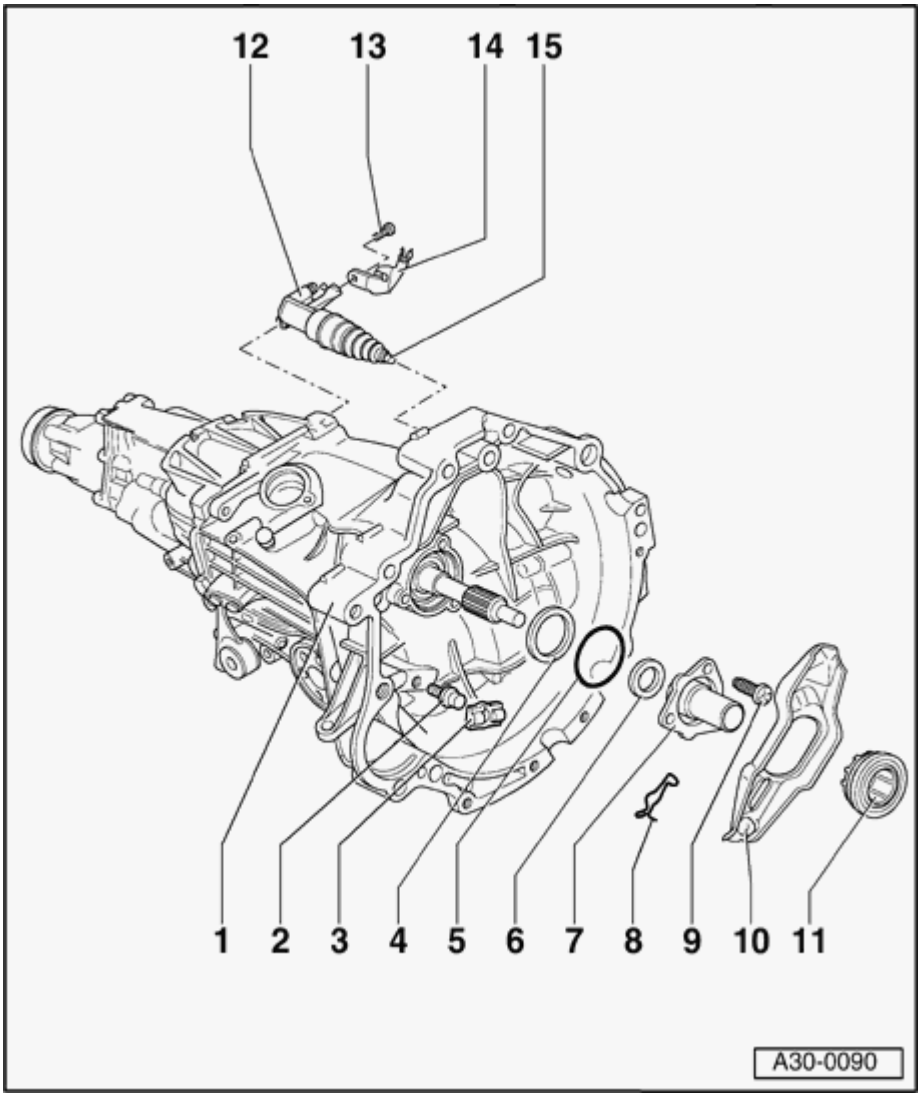


Fig. 51: Clutch Release Mechanism Components (On Transmission), Servicing
Courtesy of VOLKSWAGEN UNITED STATES, INC.

1 - Transmission

2 - Ball pivot, 25 Nm

- Lubricate with MoS2 grease

3 - Intermediate piece

4 - Dished washer

- Small diameter (convex side) facing guide sleeve

5 - O-ring

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- Always replace

6 - Oil seal for input shaft

- Available together with guide sleeve -item 7 as one part

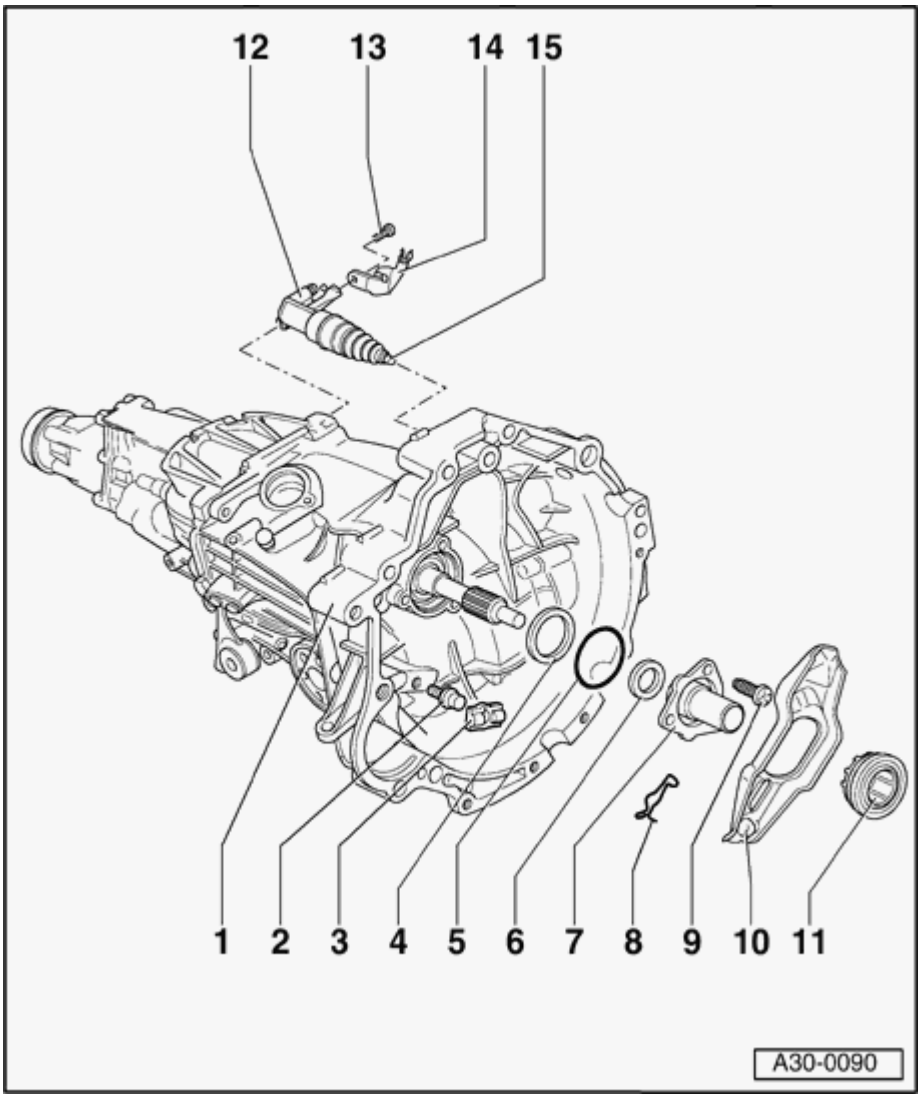


Fig. 52: Clutch Release Mechanism Components (On Transmission), Servicing
Courtesy of VOLKSWAGEN UNITED STATES, INC.

7 - Guide sleeve

- Available together with oil seal -item 6 as one part
- Installation position: Oil drain hole facing downward
- To protect oil seal -item 7 place shrink down tube over input shaft splines

8 - Retaining spring

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- Attach to clutch release lever

9 - Internal TORX head bolt, 35 Nm

- Self-locking
- Always replace

10 - Clutch release lever

- Before installing lubricate locating recess for plunger of clutch slave cylinder with copper paste e.g. Z 381 351 TE

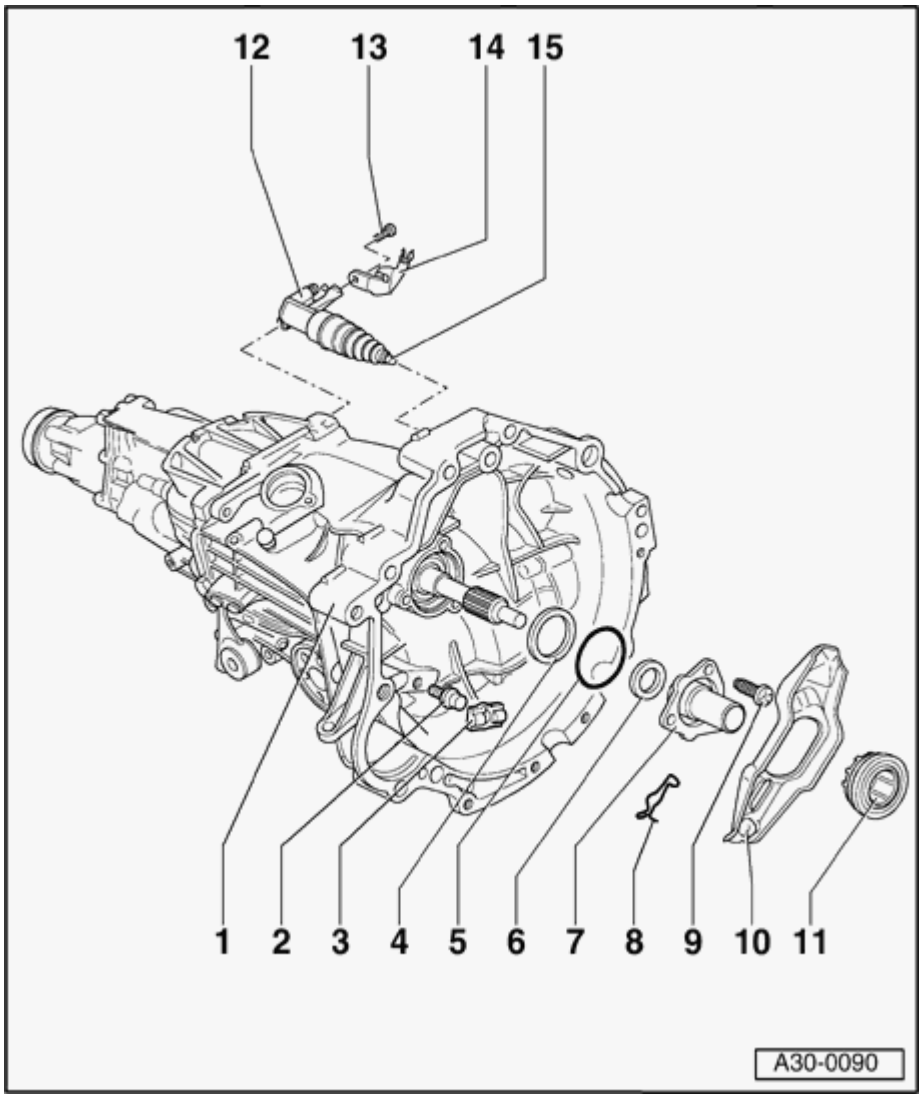


Fig. 53: Clutch Release Mechanism Components (On Transmission), Servicing
Courtesy of VOLKSWAGEN UNITED STATES, INC.

11 - Release bearing

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- With or without plastic ring. See **Servicing release bearing with plastic ring**, depending on design
- Glue on detached plastic ring. See **Servicing release bearing with plastic ring**
- Never wash out bearing; only wipe
- Replace noisy bearings

- Lock retaining tabs on release bearing in release lever

12 - Slave cylinder

- Do not press clutch pedal after removal
- Separating from hose/pipe assembly. See **Separating slave cylinder from hose/pipe assembly**
- Installing. See **Lubricating clutch slave cylinder with grease before installing** and see **Installing clutch slave cylinder**
- Pre-load slave cylinder so that securing bolt can be installed easily

- Tighten bleeder valve to 4.5 Nm
- Bleed clutch system. Refer to **Clutch system, bleeding**

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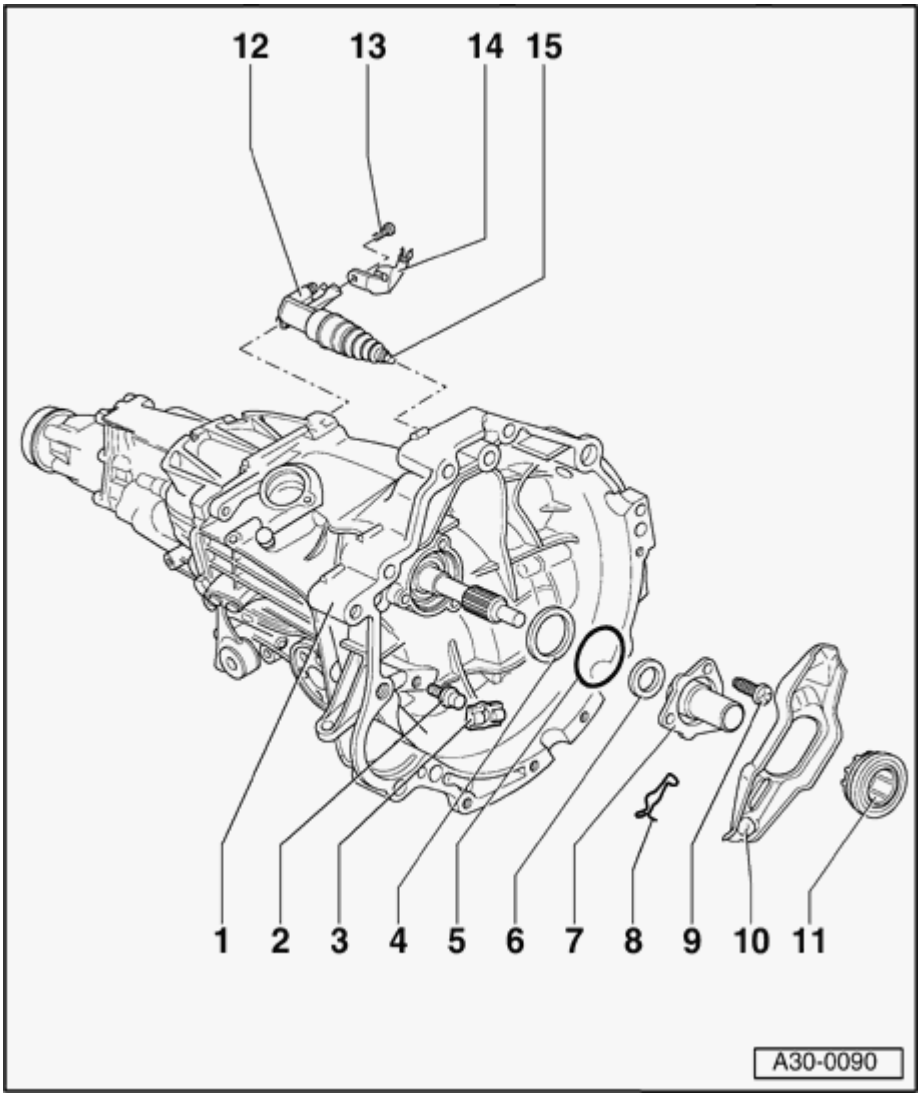


Fig. 54: Clutch Release Mechanism Components (On Transmission), Servicing
Courtesy of VOLKSWAGEN UNITED STATES, INC.

13 - Hex socket-head bolt, 23Nm

- Slave cylinder to transmission
- Self-locking
- Always replace

14 - Bracket

- For hose/pipe assembly
- Attached to transmission together with slave cylinder
- Installing. See **Installing clutch slave cylinder**

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15 - Plunger

- Lubricate end of plunger with copper paste, e.g. Z 381 351 TE

Separating slave cylinder from hose/pipe assembly

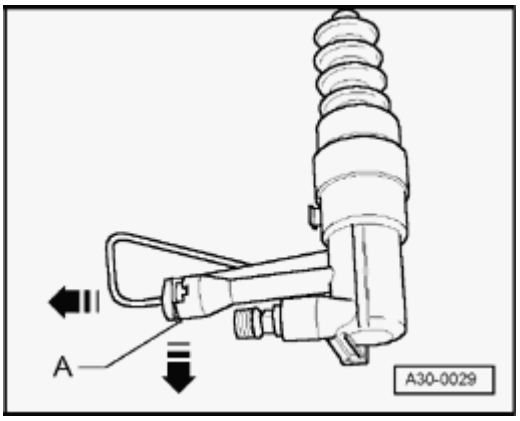


Fig. 55: Removing Hydraulic Line From Slave Cylinder
Courtesy of VOLKSWAGEN UNITED STATES, INC.

Removing

To remove hose/pipe assembly use a screwdriver to pry out clip -A- as far as it will go. Only then can the hose/pipe assembly be pulled out.

Installing

- Push in clip -A- as far as it will go.
- Insert hose/pipe assembly in slave cylinder until it clicks into position.
- Check proper installation by pulling hose/pipe assembly.

Lubricating clutch slave cylinder with grease before installing

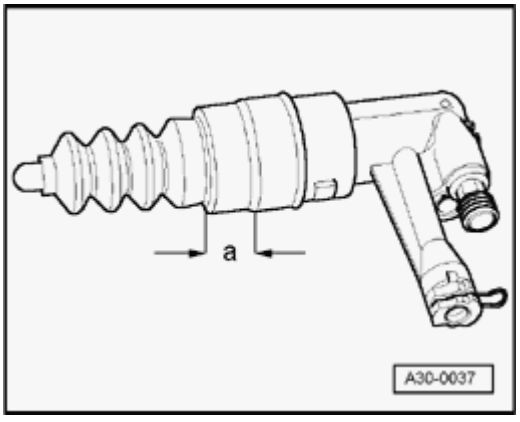


Fig. 56: Coat Boot Area Of Clutch Slave Cylinder With Lithium Grease

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Courtesy of VOLKSWAGEN UNITED STATES, INC.

- Apply a thin layer of copper paste, e.g. Z 381 351 TE, to contact surface for plunger on clutch release lever
- Before installing slave cylinder in transmission housing lubricate area -a- of boot with lithium base grease G 052 150 A2.

Installing clutch slave cylinder

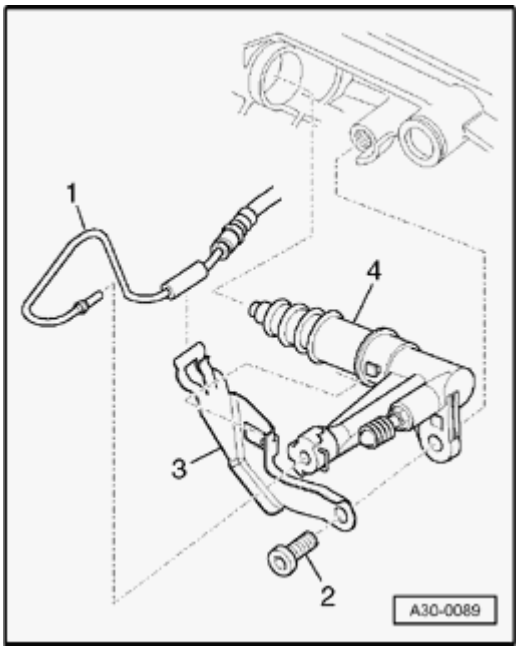


Fig. 57: Clutch Slave Cylinder, Bracket And Hose/Line Assembly
Courtesy of VOLKSWAGEN UNITED STATES, INC.

- Lock bracket for hose/pipe assembly -3- on slave cylinder -4- and bolt onto transmission together with slave cylinder.
- Insert clutch slave cylinder into hole of transmission housing without major lateral deviation from direction of motion of plunger.

NOTE:

- **If clutch slave cylinder -4- is not kept straight during insertion there is a risk that the plunger might move past the clutch release lever.**
- **Pre-load clutch slave cylinder so that securing bolt can be installed easily.**
- **Replace securing bolt -2-.**

Servicing release bearing with plastic ring

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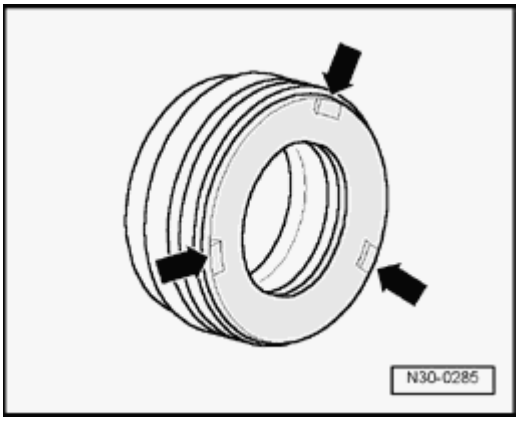


Fig. 58: Servicing Release Bearing With Plastic Ring
Courtesy of VOLKSWAGEN UNITED STATES, INC.

In the case of release bearings with plastic ring, the latter may become detached from the release bearing during the removal of the transmission or the release bearing. This does not mean that the release bearing has to be replaced.

- Before installing transmission glue loose plastic ring onto bearing ring with adhesive AMV 195 KD1 01.

Three square lugs (arrows) of plastic ring locate in recesses of bearing ring.

NOTE: If running face of plastic ring is worn by more than 0.5 mm, replace the release bearing.

CLUTCH, SERVICING

Clutch, servicing

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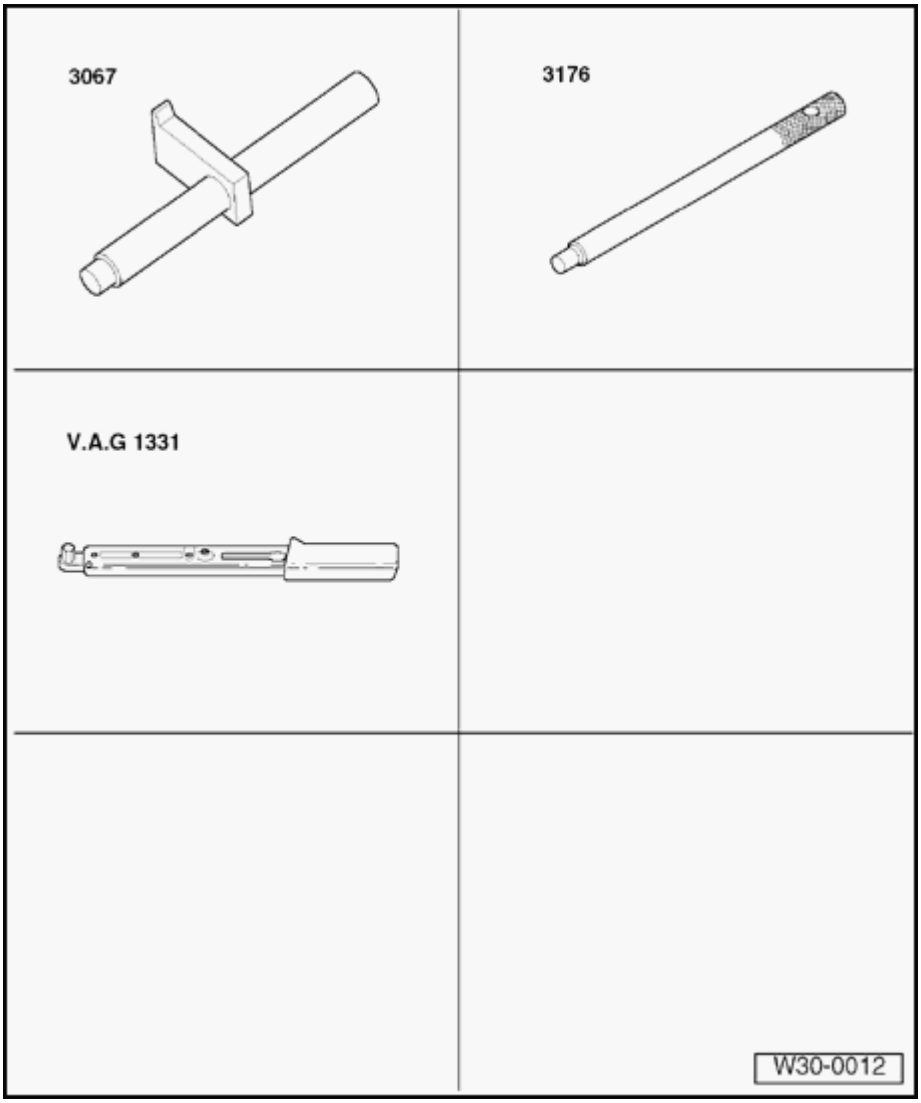


Fig. 59: Identifying Special Tools - Clutch, Servicing
Courtesy of VOLKSWAGEN UNITED STATES, INC.

Special tools and equipment

- 3067 Counterhold
- 3176 Centering mandrel
- VAG 1331 Torque wrench

NOTE:

- **Follow general repair instructions. Refer to General repair instructions.**
- **Replace clutch plates and pressure plates where riveted joint is damaged or loose.**
- **Assign clutch plate and pressure plate by way of engine code.**
- **Clean input shaft splines and - in the case of used clutch plates - hub**

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splines, remove corrosion and apply extremely thin layer of grease G 000 100 to splines. Then move clutch plate back and forth on input shaft until hub moves freely on shaft. Excess grease must be removed.

- **Pressure plates have an anti-corrosion coating and are greased. Only the contact surface may be cleaned, as otherwise the clutch service life will be considerably shortened.**
- **To reduce the odor nuisance of a scorched clutch, thoroughly clean bell housing, flywheel and parts of engine facing transmission.**

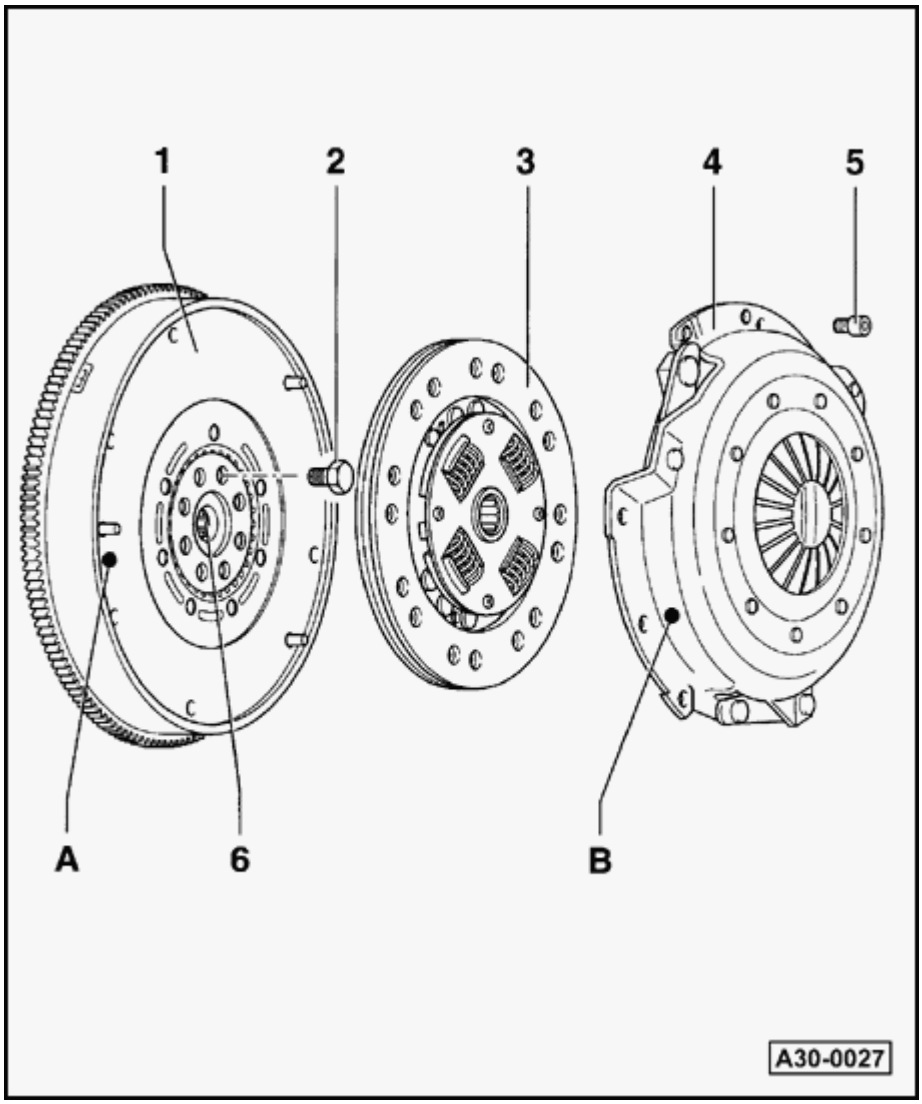


Fig. 60: Clutch Remove/Install Components
Courtesy of VOLKSWAGEN UNITED STATES, INC.

For servicing the clutch first remove the transmission. Refer to **Transmission, removing and installing**.

A - Paint dot on dual-mass flywheel

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- If present, white paint dot -A- on dual-mass flywheel must be aligned with white paint dot -B- on pressure plate

B - Paint dot on pressure plate

- If present, white paint dot -A- on dual-mass flywheel must be aligned with white paint dot -B- on pressure plate

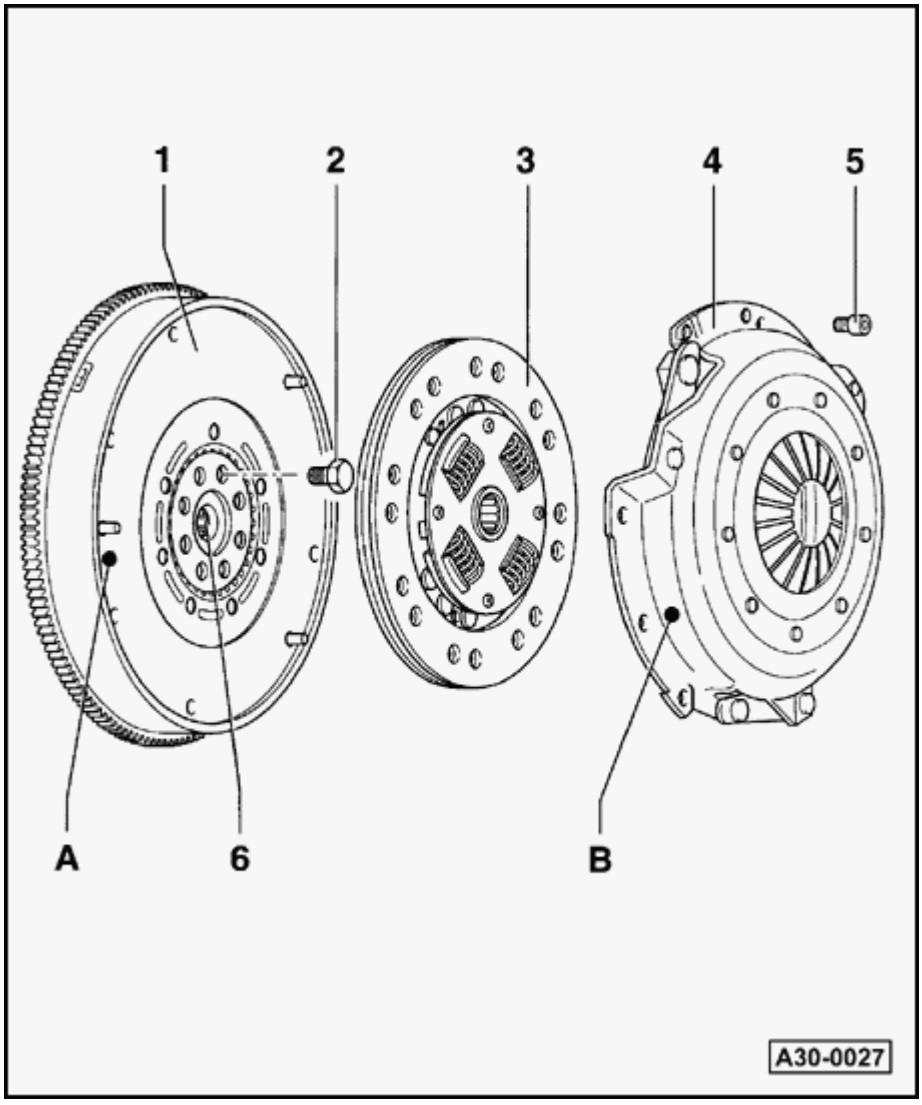


Fig. 61: Clutch Remove/Install Components
Courtesy of VOLKSWAGEN UNITED STATES, INC.

1 - Dual-mass flywheel

- Make sure centering pins are a tight fit
- Locating face for clutch lining must be free from grooves, oil and grease
- Removing and installing

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Refer to **13 - ENGINE - CRANKSHAFT, CYLINDER BLOCK**

2 - Bolt for flywheel

- Always replace
- Bolt length 22.5 mm: 60 Nm 1/4turn (90 °)
- Bolt length 43 mm: 60 Nm plus 1/2 turn (180 °)

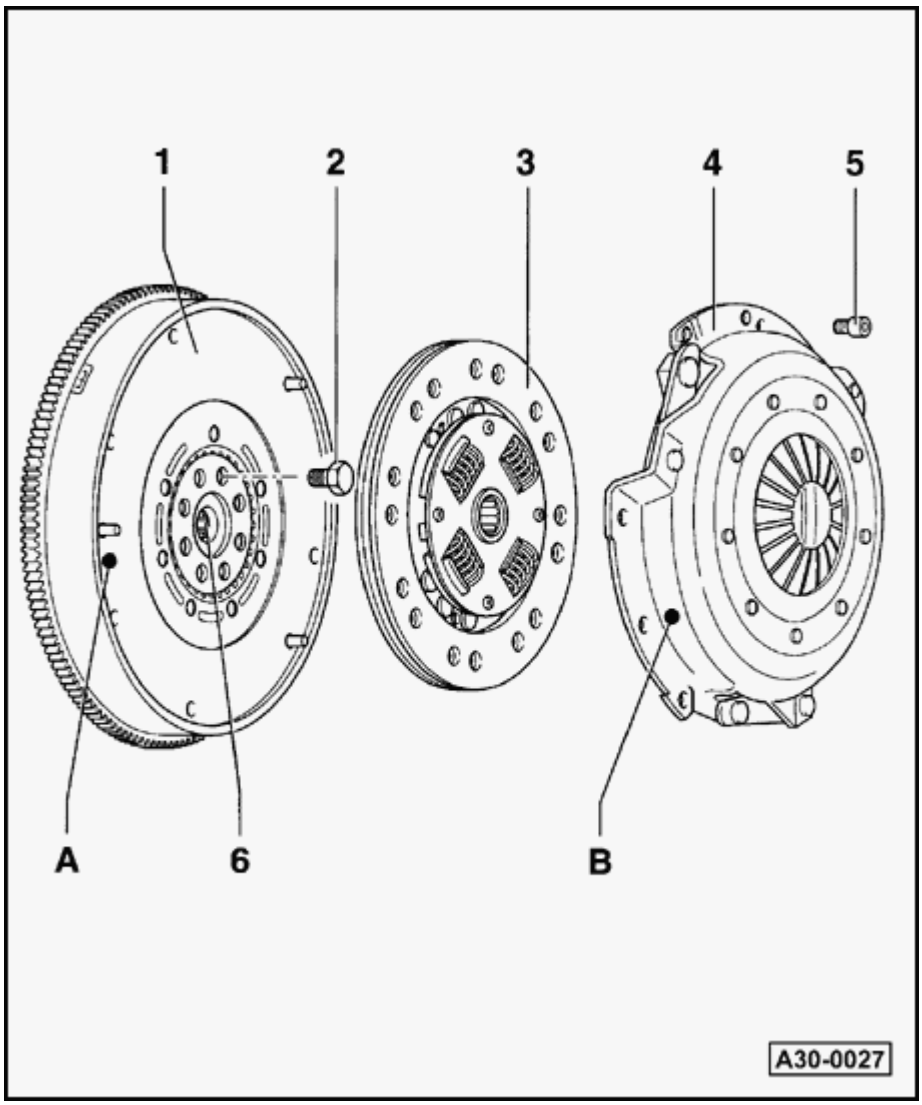


Fig. 62: Clutch Remove/Install Components
Courtesy of VOLKSWAGEN UNITED STATES, INC.

3 - Clutch plate

- Installation position:

  - Damping set (coil springs) toward pressure plate or transmission

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- Lining of clutch plate must be located against flywheel
- Writing "Getriebeseite", if present, toward pressure plate or transmission

- Do not lubricate
- Diameter of clutch plate. Refer to **Code letters, assignment of mechanical units, transmission ratios and capacities** onward
- Centering. See **Centering clutch plate and removing/installing pressure plate**
- Slightly lubricate splines

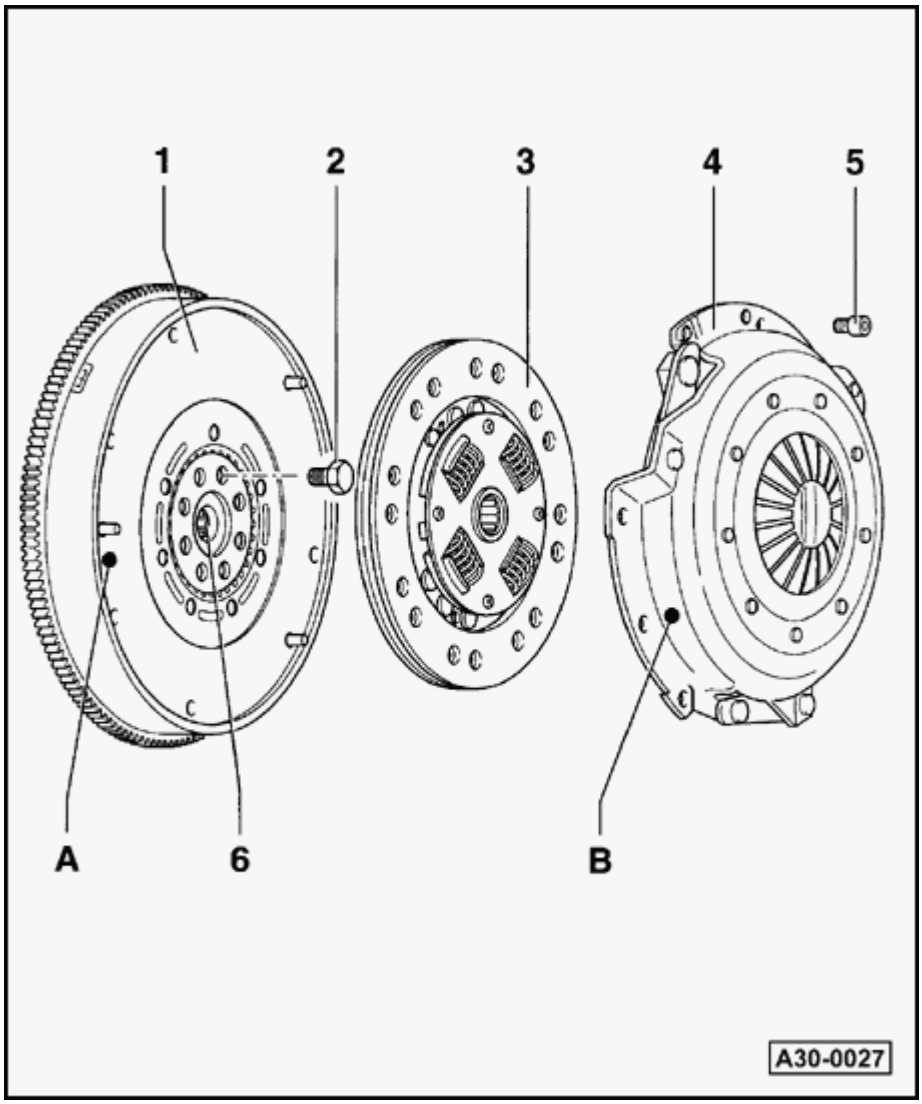


Fig. 63: Clutch Remove/Install Components
Courtesy of VOLKSWAGEN UNITED STATES, INC.

4 - Pressure plate

- Removing and installing. See **Centering clutch plate and removing/installing pressure plate**

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- Checking ends of diaphragm spring. See **Checking ends of diaphragm spring**
- Checking spring attachment and rivet attachments. See **Checking spring attachment and rivet attachments**
- If present, line up white paint dots on flywheel -A- and pressure plate -B-, with one another during assembly.

5 - Bolt, 25 Nm

- Loosen and tighten gradually in diagonal sequence

6 - Needle bearing

- Removing and installing

Refer to **13 - ENGINE - CRANKSHAFT, CYLINDER BLOCK**

Centering clutch plate and removing/installing pressure plate

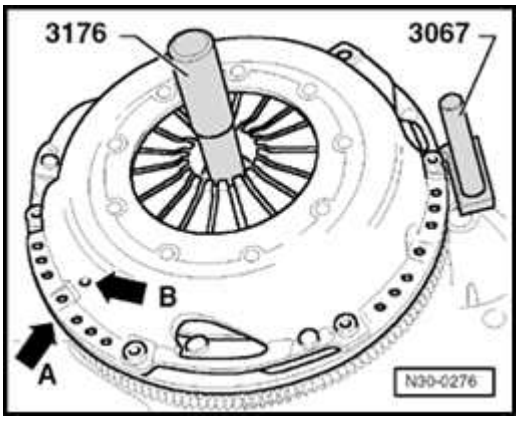


Fig. 64: Centering Clutch Plate And Removing And Installing Pressure Plate
Courtesy of VOLKSWAGEN UNITED STATES, INC.

- Loosen and tighten bolts gradually in diagonal sequence, 25 Nm.

NOTE:

- **Reverse position of counterhold 3067 when removing.**
- **Installation position of clutch plate: Damping set (coil springs) or writing "Getriebeseite" must face pressure plate or transmission.**
- **Only install attachment bolts once contact surface of pressure plate and lining of clutch plate are located completely on flywheel.**
- **Use centering mandrel 3176 to center clutch plate.**
- **During assembly ensure that white paint dots, if present, on dual-mass flywheel -A- and pressure plate -B- are lined up with one another.**

Checking ends of diaphragm spring

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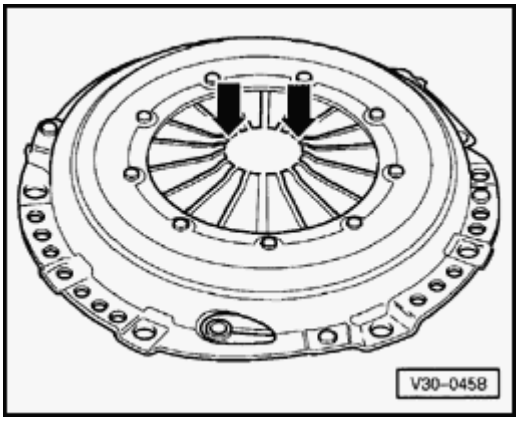


Fig. 65: Checking Ends Of Diaphragm Spring
Courtesy of VOLKSWAGEN UNITED STATES, INC.

- Wear down to half the diaphragm spring thickness is permissible.

NOTE: When performing repairs, always assign clutch pressure plate and clutch plate by way of engine code.

Checking spring attachment and rivet attachments

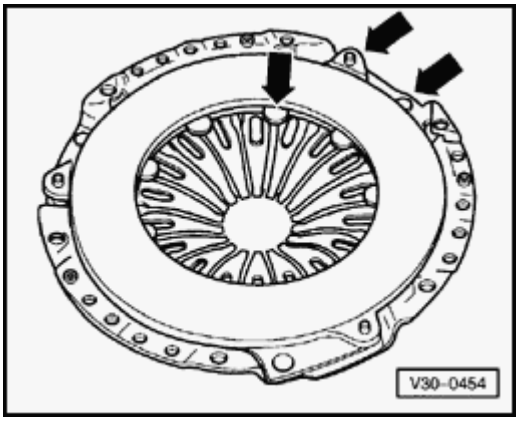


Fig. 66: Checking Spring Connections And Rivet Connections
Courtesy of VOLKSWAGEN UNITED STATES, INC.

- Check spring attachment between pressure plate and cover for cracks, check rivet attachments are secure.
- Replace clutches showing damaged springs or loose rivet attachments (arrows).

34 MANUAL TRANSMISSION - CONTROLS, HOUSING

SHIFT MECHANISM, SERVICING

Shift mechanism, servicing

CAUTION: Before beginning repairs on the electrical system:

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- **Obtain the anti-theft radio security code.**

- **Switch the ignition off.**
- **Disconnect the battery Ground (GND) strap.**
- **On vehicles equipped with Audi Telematics by OnStar ® , switch-off the emergency (back-up) battery for the Telematic/Telephone Control Module prior to disconnecting vehicle battery. Refer to**
  - **91 - COMMUNICATION**
  - **91 RADIO, TELEPHONE, NAVIGATION, TRIP COMPUTER for Cabriolet**

  .
- **After reconnecting vehicle battery, re-code and check operation of anti-theft radio. Also check operation of clock and power windows according to article and/or Owner's Manual.**

- **After reconnecting vehicle battery on vehicles equipped with Audi Telematics by OnStar ® , switch-on the emergency (back-up) battery for the Telematic/Telephone Control Module. Refer to**
  - **91 - COMMUNICATION**
  - **91 RADIO, TELEPHONE, NAVIGATION, TRIP COMPUTER for Cabriolet**

  .

Shift mechanism, installation position

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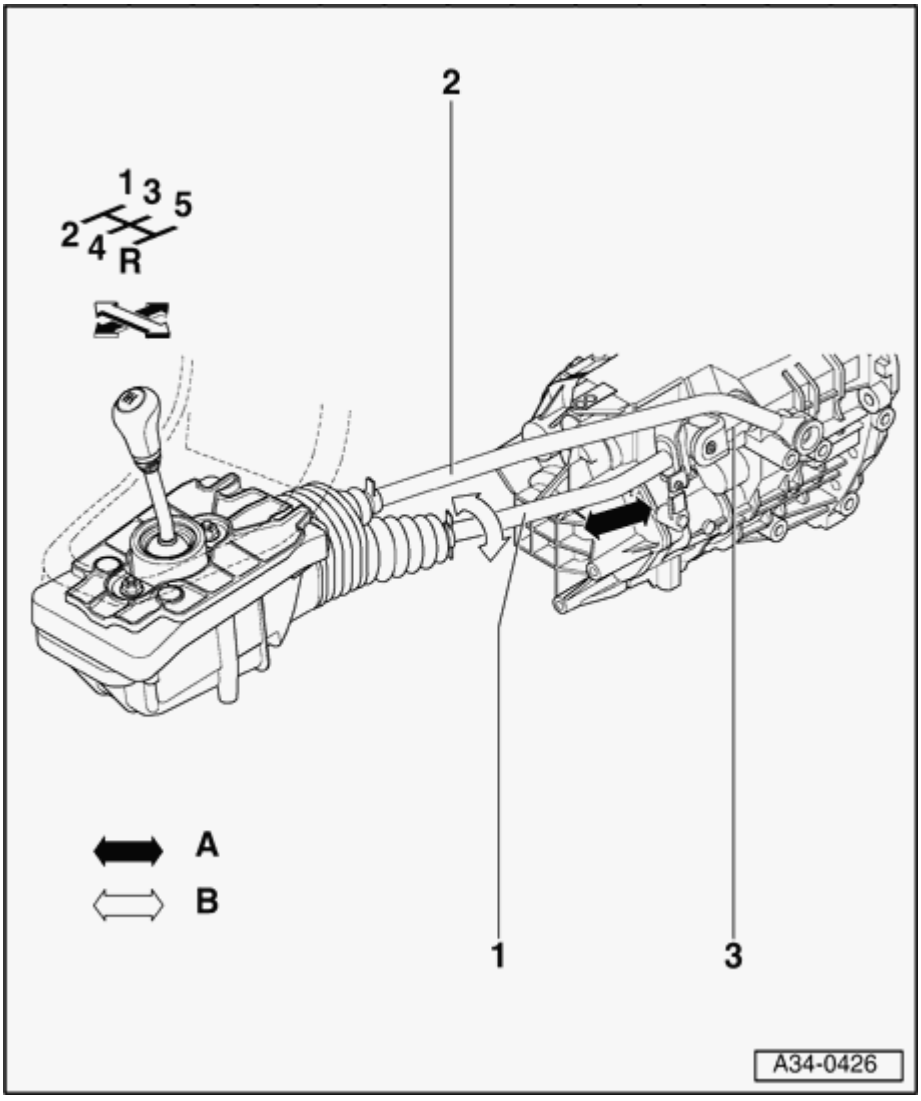


Fig. 67: Installation Position Of Gear Selector Mechanism
Courtesy of VOLKSWAGEN UNITED STATES, INC.

1 - Selector rod

2 - Front push rod

3 - Selector lever on transmission

Arrow -A- Gear selection movement

Arrow -B- Gate selection movement

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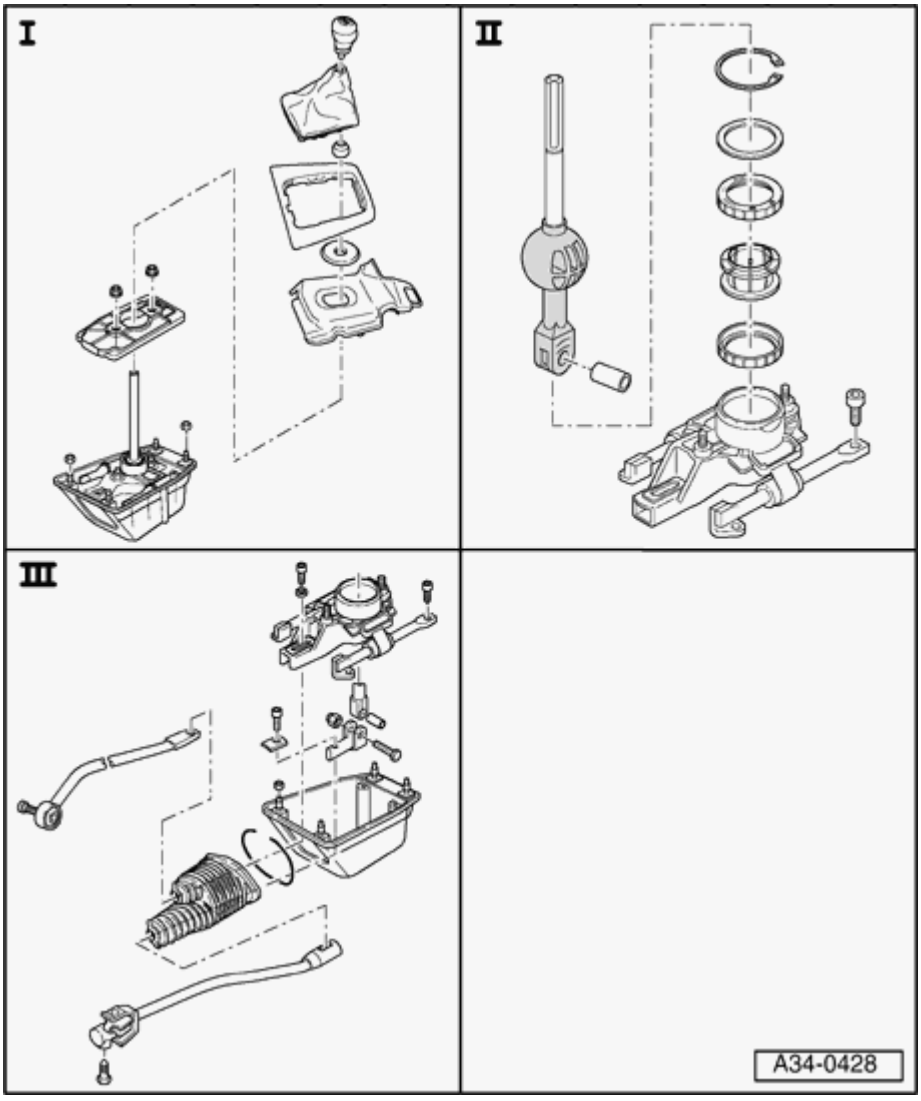


Fig. 68: Shift Lever Knob And Protective Boot Remove/Install Components, Shift Lever And - Rear Push Rod And Shift Lever And - Front Push Rod
Courtesy of VOLKSWAGEN UNITED STATES, INC.

I - Removing and installing gear shift knob and cover. Refer to Gear shift knob and cover, removing and installing

II - Servicing gear shift and rear push rod. Refer to Gear shift and rear push rod, servicing

III - Servicing selector rod and front push rod. Refer to Selector rod and front push rod, servicing

Removing and installing shift mechanism. Refer to **Shift mechanism, removing and installing**

Adjusting shift mechanism. Refer to **Shift mechanism, adjusting**

See Caution for disconnecting Telematics battery. Refer to **Shift mechanism, servicing**

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NOTE:

- **Disconnect Ground strap from battery in engine compartment before working on shift mechanism.**
- **Heed radio code on vehicles with encoded radio.**

Gear shift knob and cover, removing and installing

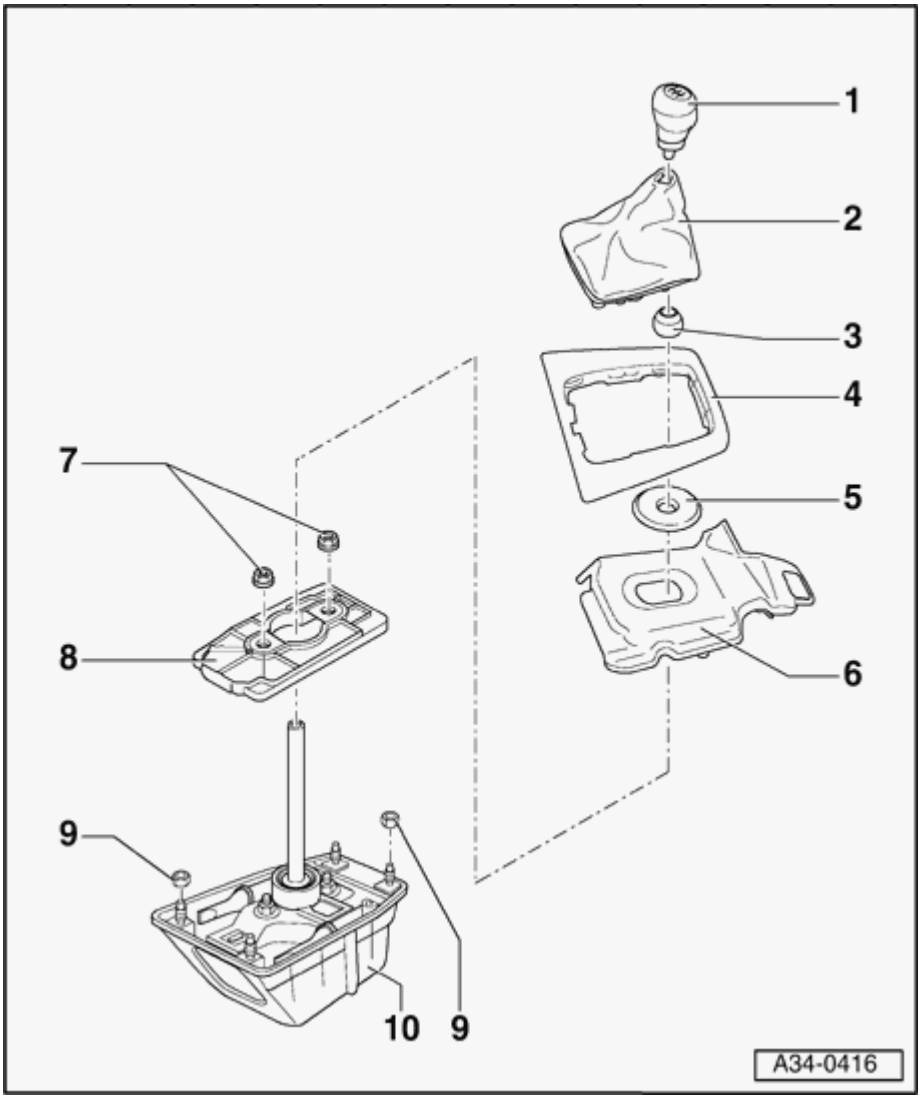


Fig. 69: Shift Lever Knob And Protective Boot Remove/Install Components
Courtesy of VOLKSWAGEN UNITED STATES, INC.

1 - Gear shift knob

- Detach and install together with cover
- Removing. Refer to **Removing**

2 - Cover

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- Detach and install together with gear shift knob
- Removing. Refer to **Removing**

3 - Connection piece

- For locking gear shift knob onto gear shift
- Opening catch. Refer to **Fig. 78**
- Connects cover to gear shift knob

4 - Cover for center console

- Removing and installing. Refer to **Removing**

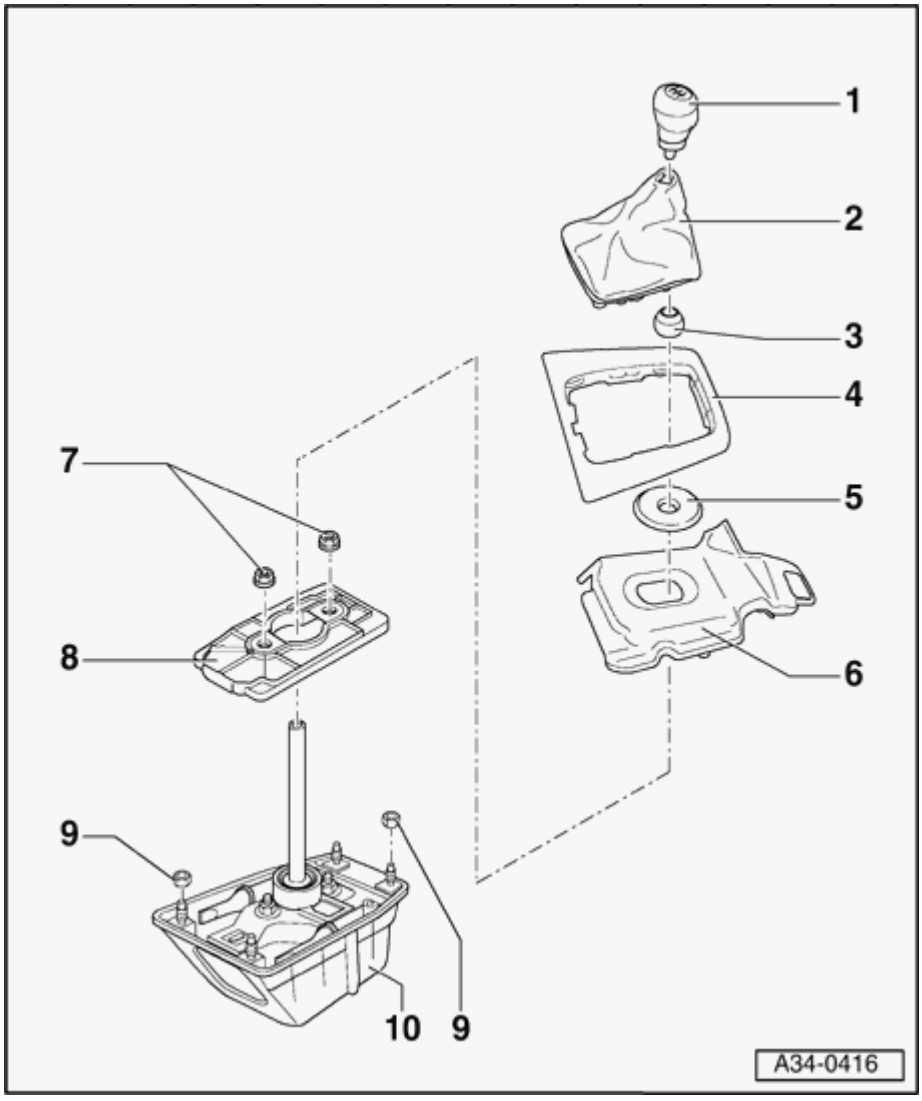


Fig. 70: Shift Lever Knob And Protective Boot Remove/Install Components
Courtesy of VOLKSWAGEN UNITED STATES, INC.

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5 - Damping washer

- Installation position: Convex side face up

6 - Noise insulation

- Installation position: Arrow on noise insulation points in direction of travel

7 - Hex nut, 10 Nm

8 - Anti-noise cover

9 - Hex nut, 10 Nm

10 - Gear shift

- Removing and installing. Refer to **Shift mechanism, removing and installing**

Gear shift and rear push rod, servicing

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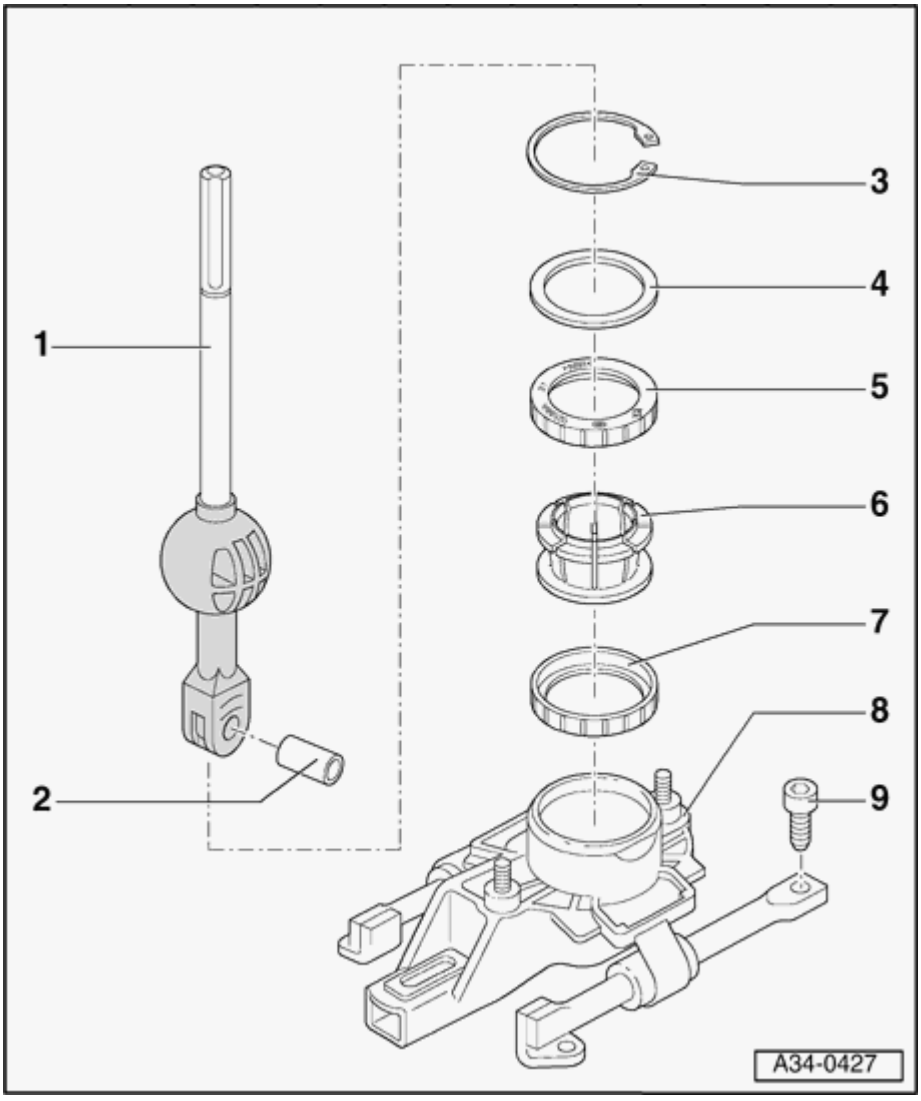


Fig. 71: Shift Lever And Rear Push Rod Remove/Install Components
Courtesy of VOLKSWAGEN UNITED STATES, INC.

NOTE: Lubricate bearing and contact surfaces with polycarbamide grease, part no. G 052 142 A2.

1 - Gear shift

- Lubricate area around hole at bottom with polycarbamide grease G 052 142 A2
- Lubricate ball with polycarbamide grease G 052 142 A2

2 - Spacer tube

- Lubricate with polycarbamide grease G 052 142 A2

3 - Circlip

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- Always replace

4 - Washer

- Collar faces ball guide (item 6)

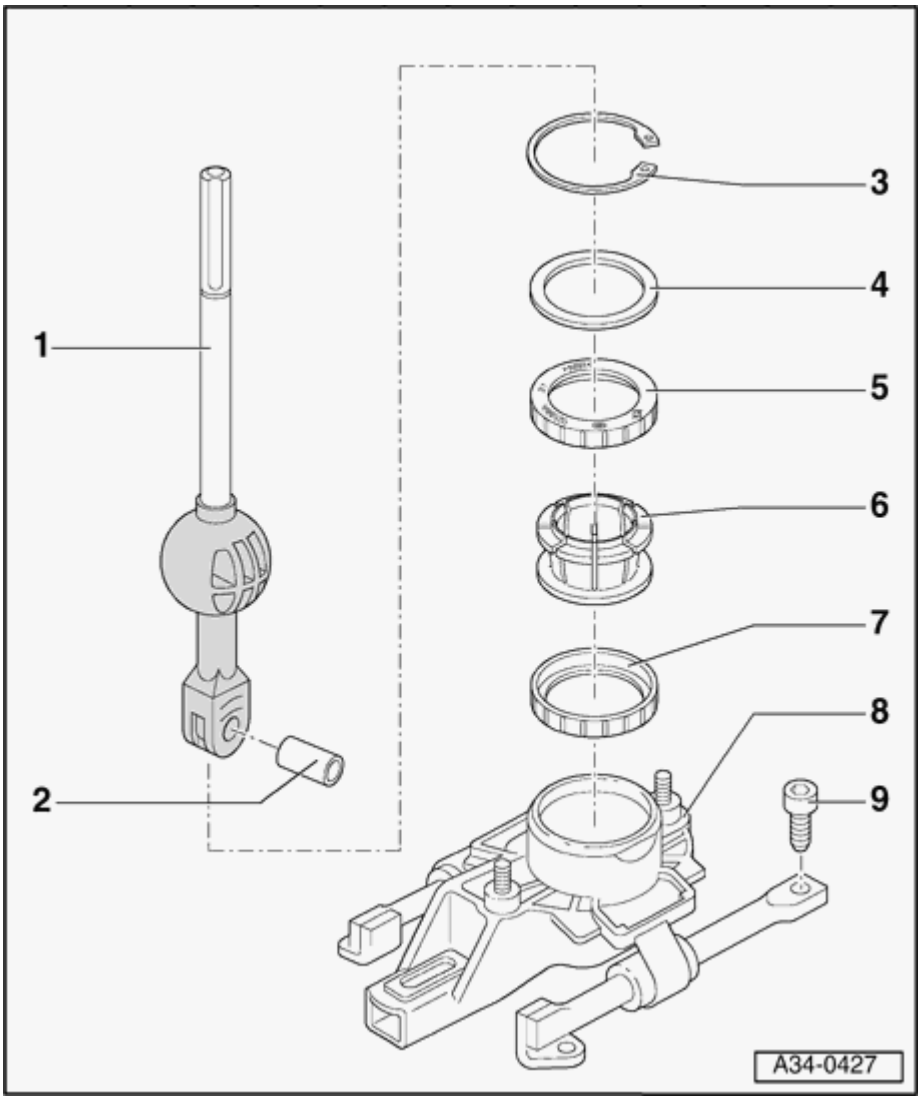


Fig. 72: Shift Lever And Rear Push Rod Remove/Install Components
Courtesy of VOLKSWAGEN UNITED STATES, INC.

5 - Rubber ring

6 - Ball guide

- Removing and installing. Refer to **Gear shift and rear push rod, removing and installing**

7 - Rubber ring

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8 - Rear push rod

- With ball housing
- Removing and installing. Refer to **Gear shift and rear push rod, removing and installing**

9 - Bolt, 6 Nm

- Qty. 4
- For fixing rear push rod to gear shift housing

Selector rod and front push rod, servicing

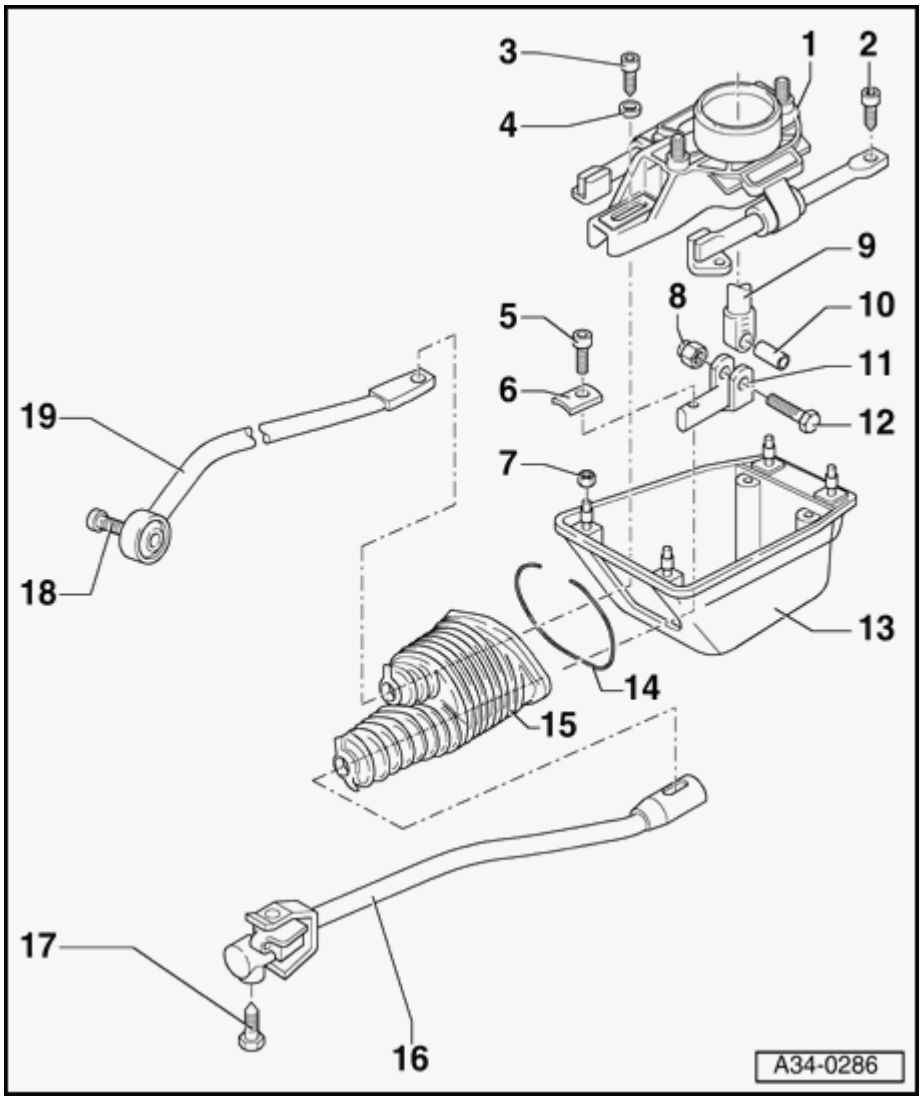


Fig. 73: Shift Rod And Pivot Rod, Overview
Courtesy of VOLKSWAGEN UNITED STATES, INC.

1 - Rear push rod

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2 - Bolt, 6 Nm

- Qty. 4
- For fixing rear push rod to gear shift housing

3 - Hex socket-head bolt, 25Nm

4 - Washer

5 - Hex socket-head bolt, 25Nm

6 - Clamp

7 - Hex nut, 10 Nm

- Qty. 4
- For fixing gear shift housing to body

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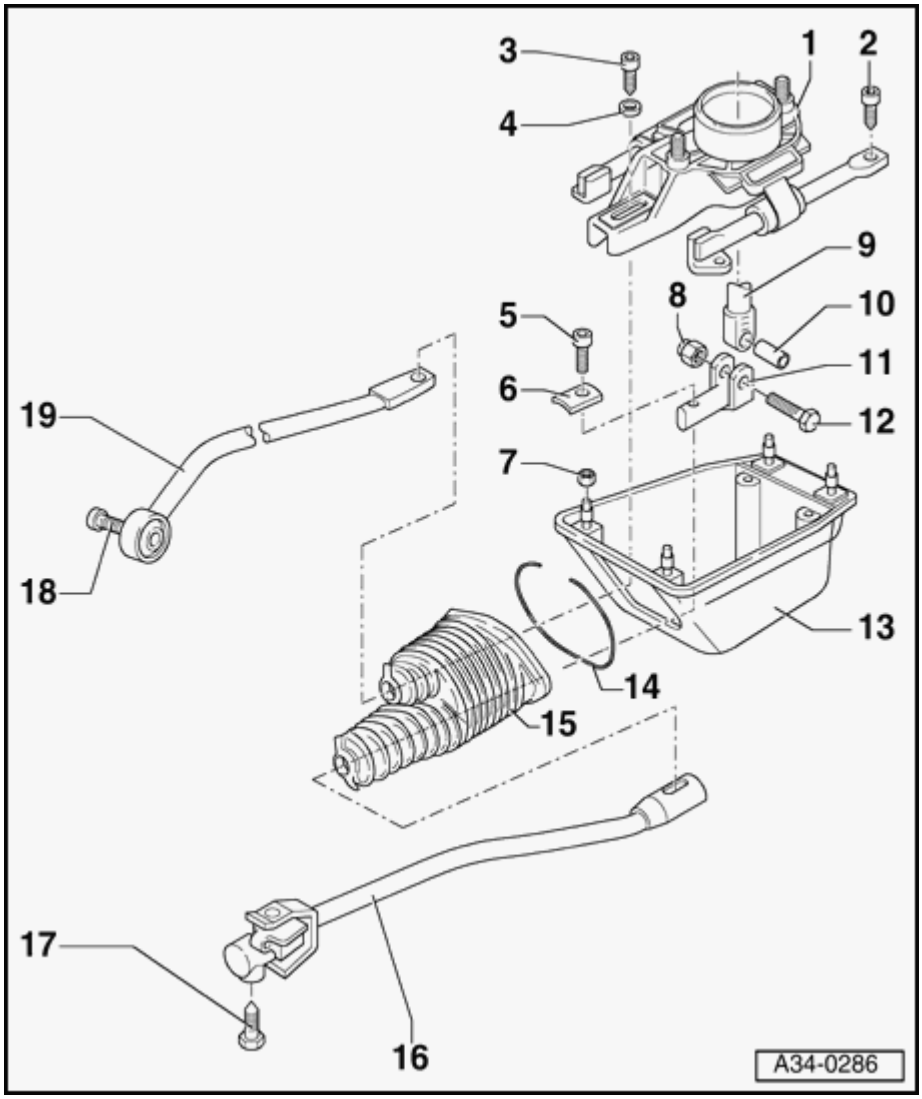


Fig. 74: Shift Rod And Pivot Rod, Overview
Courtesy of VOLKSWAGEN UNITED STATES, INC.

8 - Hex nut, 10 Nm

- Self-locking
- Always replace

9 - Gear shift

10 - Spacer tube

- Lubricate with polycarbamide grease G 052 142 A2

11 - Selector fork

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12 - Bolt

13 - Gear shift housing

14 - Tensioning ring

15 - Boot

- Remove catalytic converter and front heat shield before removal and assembly

NOTE:

- **Carefully pull boot over selector rod**
- **Position boot on markings of selector rod and push rod**

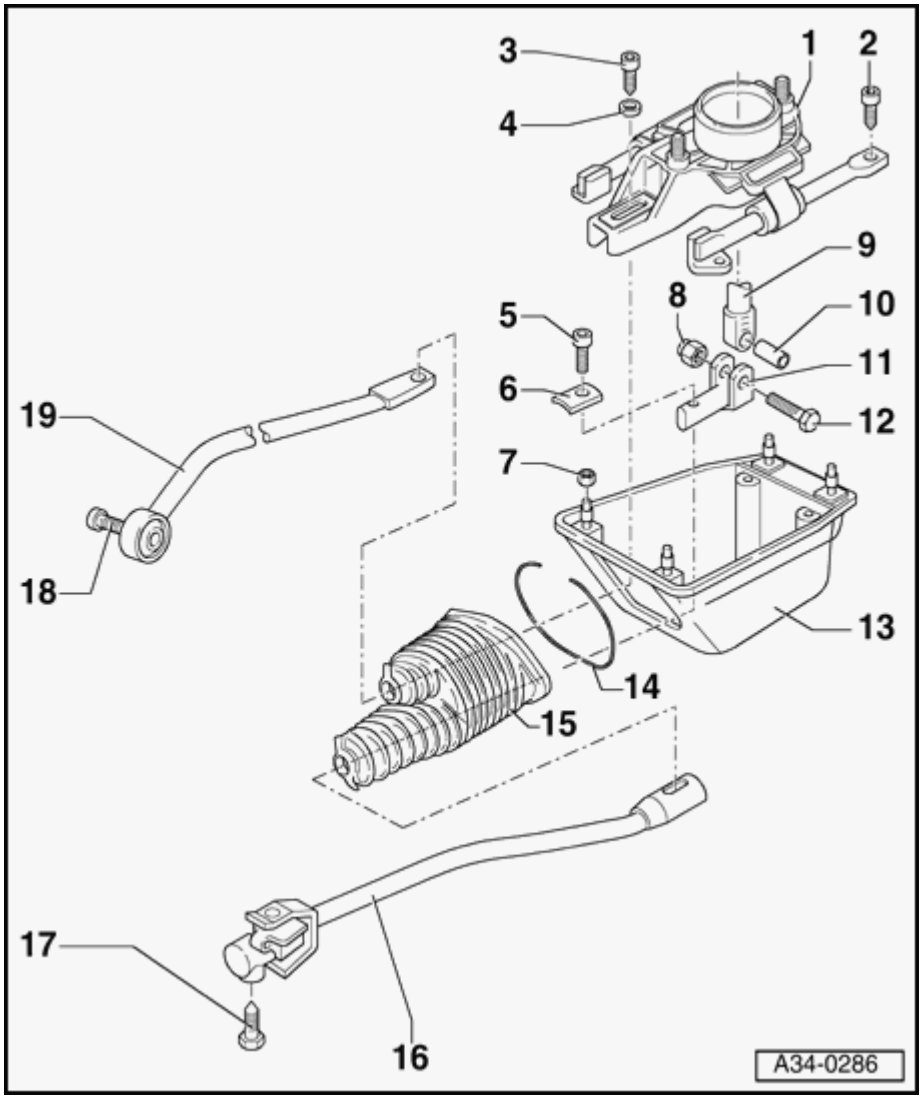


Fig. 75: Shift Rod And Pivot Rod, Overview
Courtesy of VOLKSWAGEN UNITED STATES, INC.

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16 - Selector rod

- With gearshift linkage

17 - Bolt, 23 Nm

- Self-locking
- Always replace

18 - Hex socket-head bolt, 40Nm

- Cannot be removed from mounting bushing of front push rod

19 - Front push rod

Gear shift and rear push rod, removing and installing

Removing

Remove gear shift knob together with gear shift cover and cover of center console.

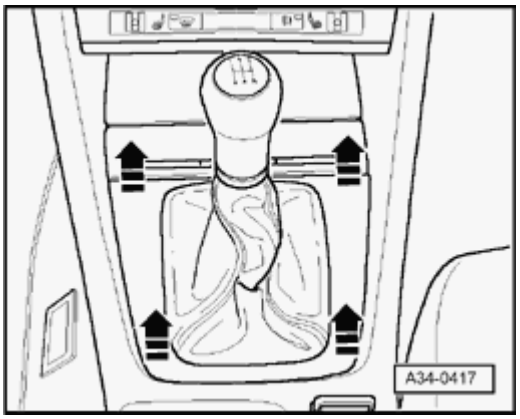


Fig. 76: Lifting Cover For Center Console Upward
Courtesy of VOLKSWAGEN UNITED STATES, INC.

- Lift cover of center console upward (arrows) and off.

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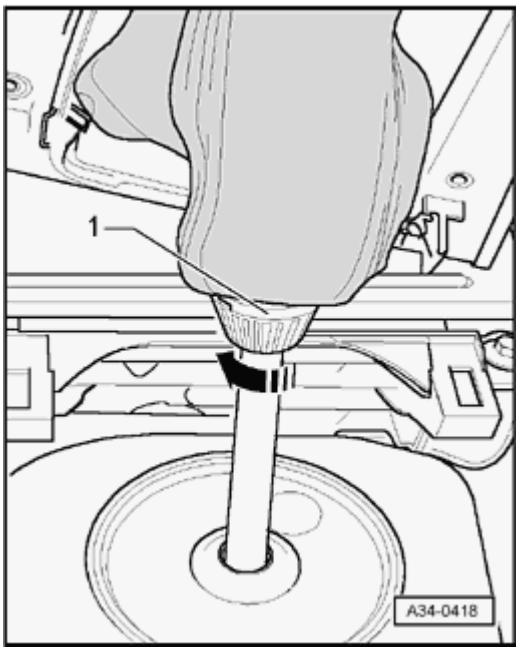


Fig. 77: Releasing Connector Piece
Courtesy of VOLKSWAGEN UNITED STATES, INC.

- Release connection piece -1- in direction of arrow and pull gear shift knob together with gear shift cover upward to remove.

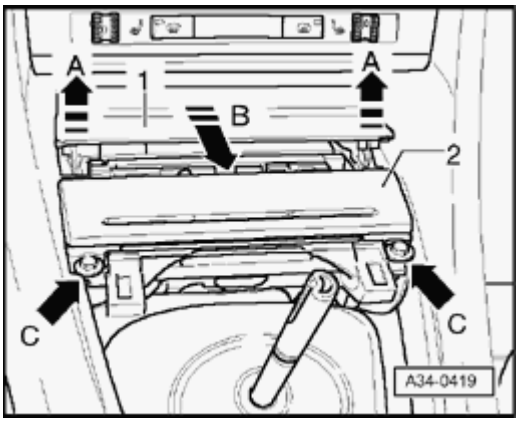


Fig. 78: Lifting Cover And Pulling Out And Removing Bolts And Pulling Ashtray From Center Console
Courtesy of VOLKSWAGEN UNITED STATES, INC.

- First lift cover -1- up in direction of arrow -A- and pull out in direction of arrow -B-.
- Remove bolts (arrows C) and then remove ashtray -2- from center console.

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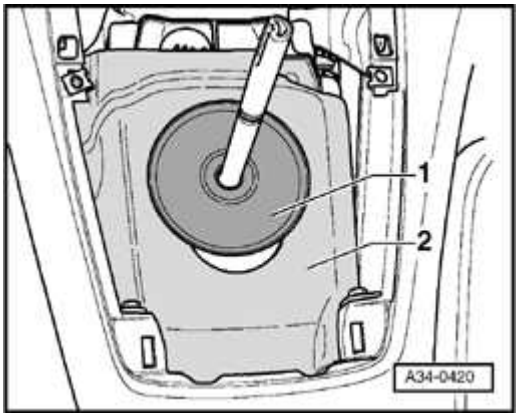


Fig. 79: Lifting Out Damping Washer And Noise Insulation
Courtesy of VOLKSWAGEN UNITED STATES, INC.

- Lift damping washer -1- and noise insulation -2- upward and out.

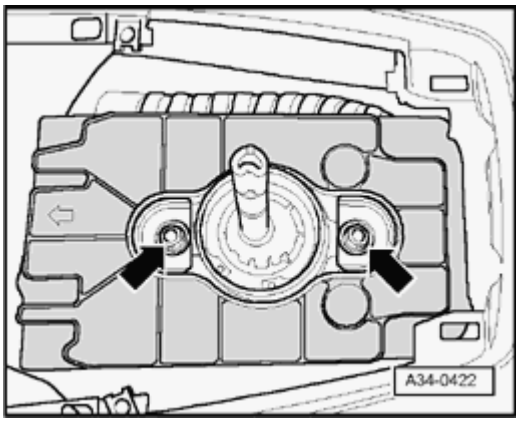


Fig. 80: Locating Noise Insulation For Shift Lever Housing Bolts
Courtesy of VOLKSWAGEN UNITED STATES, INC.

- Remove noise insulation for gear shift housing (arrows).

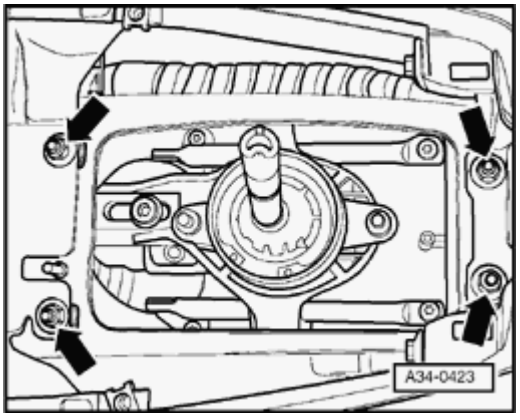


Fig. 81: Locating Securing Nuts For Shift Lever Housing
Courtesy of VOLKSWAGEN UNITED STATES, INC.

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- Remove securing nuts (arrows) for gear shift housing.

This lowers the gear shift housing.

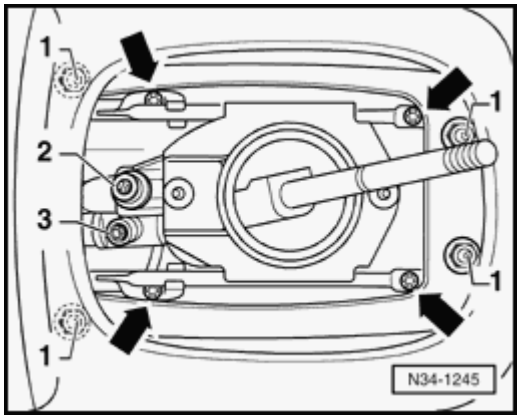


Fig. 82: Shift Mechanism Housing Fasteners
Courtesy of VOLKSWAGEN UNITED STATES, INC.

- Disconnect push rod by unscrewing hex socket-head bolt -2-.
- Disconnect selector rod by unscrewing hex socket-head bolt -3-.
- Disconnect rear push rod assembly from gear shift housing (arrows).
- Remove gear shift and rear push rod from gear shift housing.

Installing

Install in reverse order, paying attention to the following:

- Adjusting shift mechanism. Refer to **Shift mechanism, adjusting**.

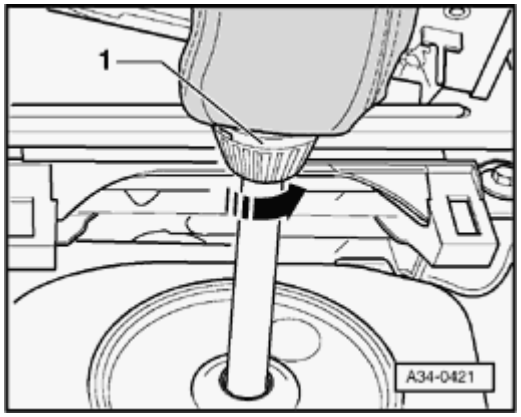


Fig. 83: Turning Connector Piece Till It Stops
Courtesy of VOLKSWAGEN UNITED STATES, INC.

- Position gear shift knob together with gear shift cover on gear shift and turn connection piece -1- in direction of arrow as far as it will go.

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Tightening torques

Rear push rod to gear shift housing	6 Nm
Selector rod to selector fork/gear shift	25 Nm
Front push rod to rear push rod	25 Nm
Gear shift housing to body	10 Nm
Cover to rear push rod	10 Nm

Shift mechanism, removing and installing

Removing

NOTE: Remove gear shift knob together with gear shift cover and cover of center console.

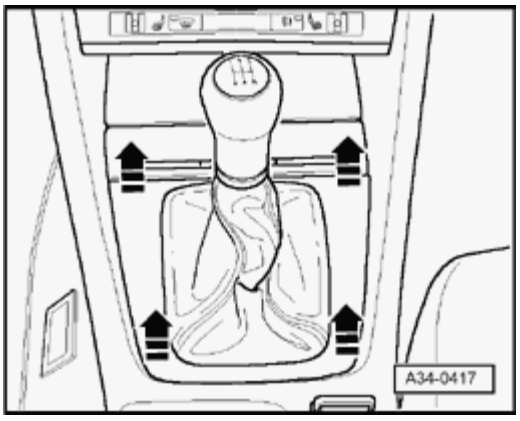


Fig. 84: Lifting Cover For Center Console Upward
Courtesy of VOLKSWAGEN UNITED STATES, INC.

- Lift cover of center console upward (arrows) and off.

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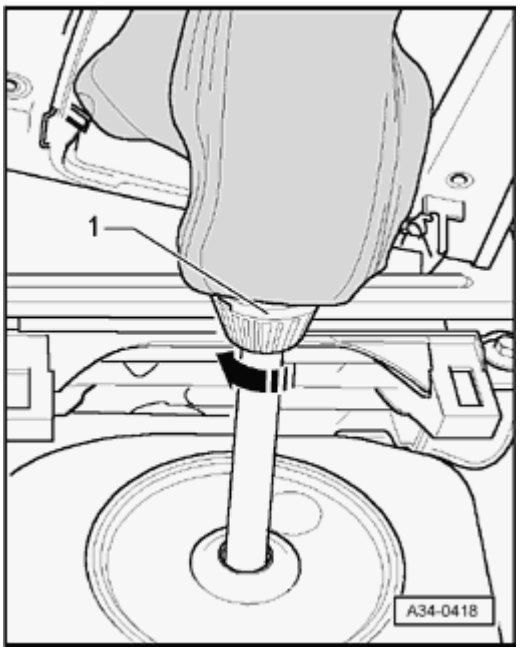


Fig. 85: Releasing Connector Piece
Courtesy of VOLKSWAGEN UNITED STATES, INC.

- Release connection piece -1- in direction of arrow and pull gear shift knob together with gear shift cover upward to remove.

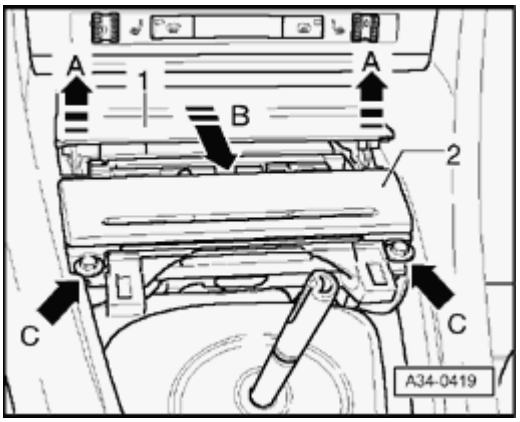


Fig. 86: Lifting Cover And Pulling Out And Removing Bolts And Pulling Ashtray From Center Console
Courtesy of VOLKSWAGEN UNITED STATES, INC.

- First lift cover -1- up in direction of arrow -A- and pull out in direction of arrow -B-.
- Unscrew bolts (arrows C) and then remove ashtray -2- from center console.

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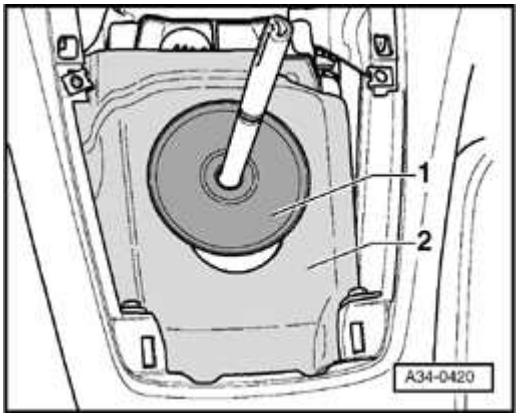


Fig. 87: Lifting Out Damping Washer And Noise Insulation
Courtesy of VOLKSWAGEN UNITED STATES, INC.

- Lift damping washer -1- and noise insulation -2- upward and out.

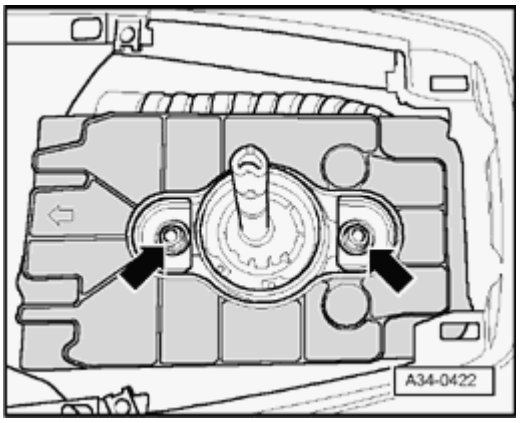


Fig. 88: Locating Noise Insulation For Shift Lever Housing Bolts
Courtesy of VOLKSWAGEN UNITED STATES, INC.

- Unscrew noise insulation for gear shift housing (arrows).

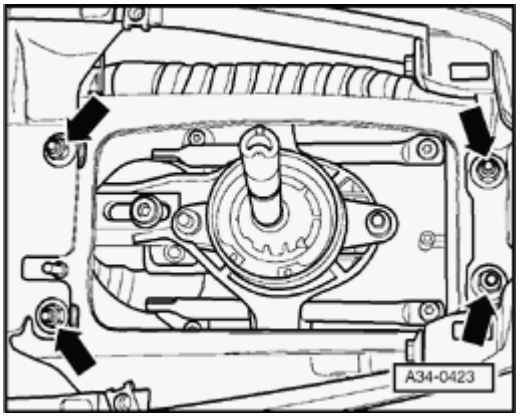


Fig. 89: Locating Securing Nuts For Shift Lever Housing
Courtesy of VOLKSWAGEN UNITED STATES, INC.

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- Unscrew securing nuts (arrows) for gear shift housing.

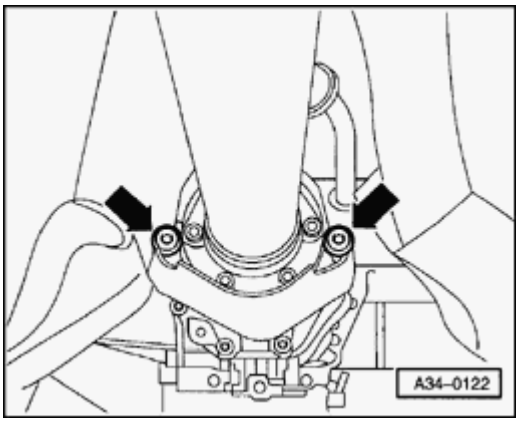


Fig. 90: Identifying Heat Shield Fasteners For Torsen Differential
Courtesy of VOLKSWAGEN UNITED STATES, INC.

- Unscrew heat shield for drive shaft from Torsen differential housing (arrows).

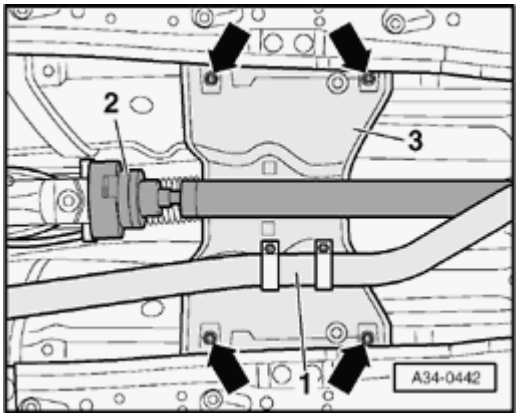


Fig. 91: Locating Heat Shield, Exhaust System Clamp And Driveshaft At Transmission
Courtesy of VOLKSWAGEN UNITED STATES, INC.

- Disconnect exhaust system from clamp(s) -1- onward.
- Disconnect driveshaft -2- from transmission and secure at side with wire. Refer to **Fig. 92**.

Driveshaft, removing and installing:

Refer to **39 FINAL DRIVE, DIFFERENTIAL**

- Remove heat shield -3- above exhaust system (arrows).

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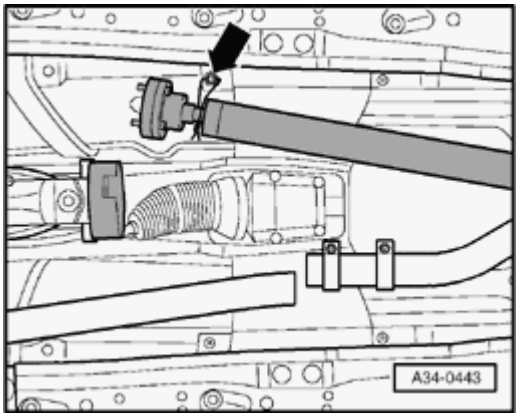


Fig. 92: Drive Shaft Secured With Wire And Locating Speed Nut
Courtesy of VOLKSWAGEN UNITED STATES, INC.

- Re-insert speed nut which was previously removed (arrow) and attach drive shaft to it with a wire.

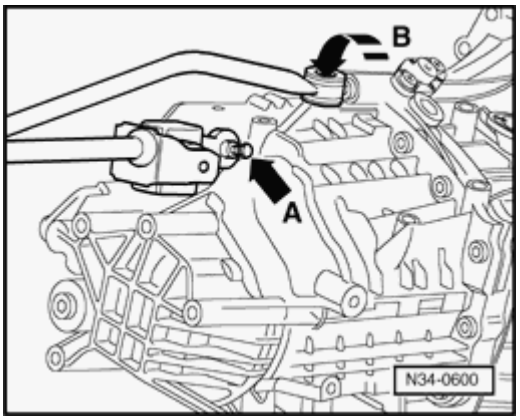


Fig. 93: Identifying Transmission Shift And Pivot Rods
Courtesy of VOLKSWAGEN UNITED STATES, INC.

- Remove gearshift linkage (arrow -A-).
- Unscrew hex socket head bolt of push rod (arrow -B-).
- Swivel gear shift housing with selector rod and push rod down and remove.

Installing

Install in reverse order.

- Push on gearshift linkage until bolt is located in counterbore of selector shaft.

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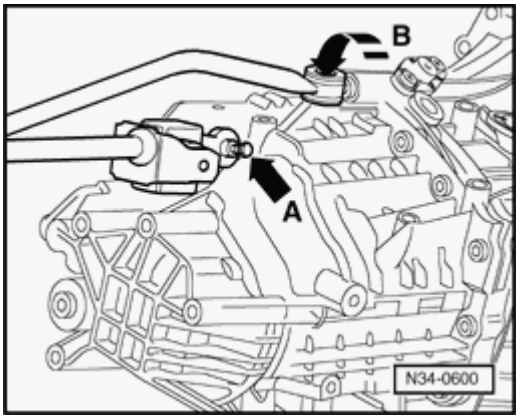


Fig. 94: Identifying Transmission Shift And Pivot Rods
Courtesy of VOLKSWAGEN UNITED STATES, INC.

- Bolt selector rod firmly in place (arrow -A-).
- Secure push rod to transmission (arrow -B-).

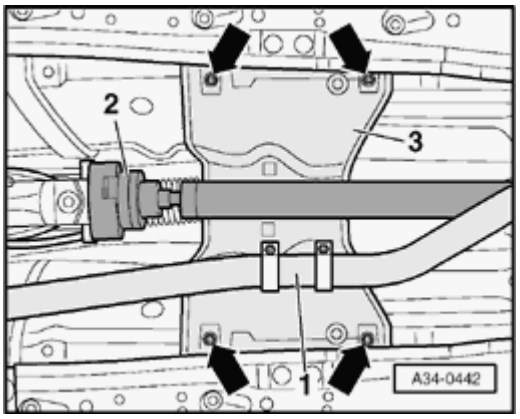


Fig. 95: Locating Heat Shield, Exhaust System Clamp And Driveshaft At Transmission
Courtesy of VOLKSWAGEN UNITED STATES, INC.

- Install heat shield -3- above exhaust system (arrows).
- Bolt driveshaft -2- to transmission.

Driveshaft, removing and installing:

Refer to **39 FINAL DRIVE, DIFFERENTIAL**

- Secure clamp(s) -1-.

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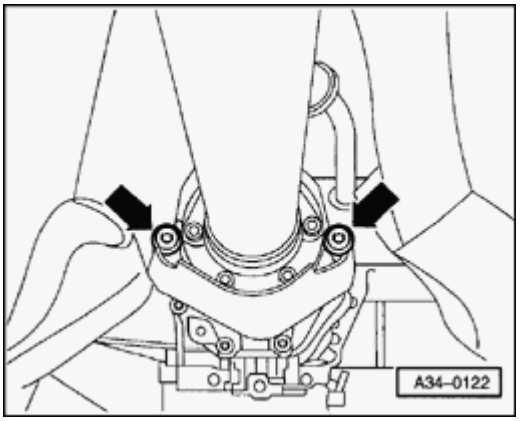


Fig. 96: Identifying Heat Shield Fasteners For Torsen Differential
Courtesy of VOLKSWAGEN UNITED STATES, INC.

- Secure heat shield for drive shaft to Torsen differential housing (arrows).
- Adjust shift mechanism. Refer to **Shift mechanism, adjusting**.

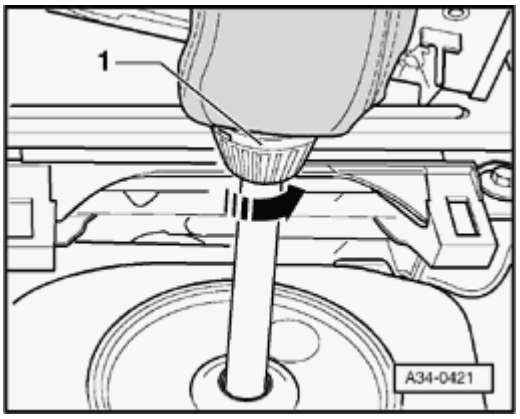


Fig. 97: Turning Connector Piece Till It Stops
Courtesy of VOLKSWAGEN UNITED STATES, INC.

- Position gear shift knob together with gear shift cover on gear shift and turn connection piece -1- in direction of arrow as far as it will go.

Tightening torques

Component	Nm
Gear shift housing to body	10
Gearshift linkage to transmission 1)	23
Push rod to transmission	40
Driveshaft to transmission 1)	55
Heat shield for drive shaft to Torsen differential housing	25
Clamp for exhaust pipe	40
Noise insulation for gear shift housing to rear push rod	10

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1) Replace bolt

Shift mechanism, adjusting

NOTE: The following points are essential to ensure proper adjustment:

- **Moving parts of shift mechanism and transmission elements are in perfect condition**
- **Shift mechanism moves freely**
- **Transmission, clutch and shift mechanism are in perfect condition.**
- **Transmission in neutral.**

Removing

NOTE: Remove gear shift knob together with gear shift cover and cover of center console.

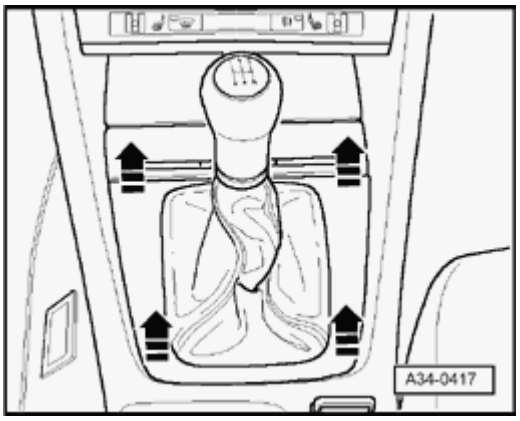


Fig. 98: Lifting Cover For Center Console Upward
Courtesy of VOLKSWAGEN UNITED STATES, INC.

- Lift cover of center console upward (arrows) and off.

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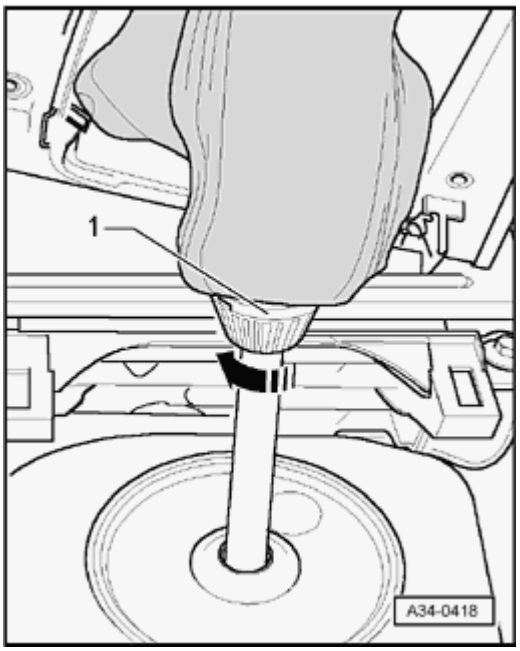


Fig. 99: Releasing Connector Piece
Courtesy of VOLKSWAGEN UNITED STATES, INC.

- Release connection piece -1- in direction of arrow and pull gear shift knob together with gear shift cover upward to remove.

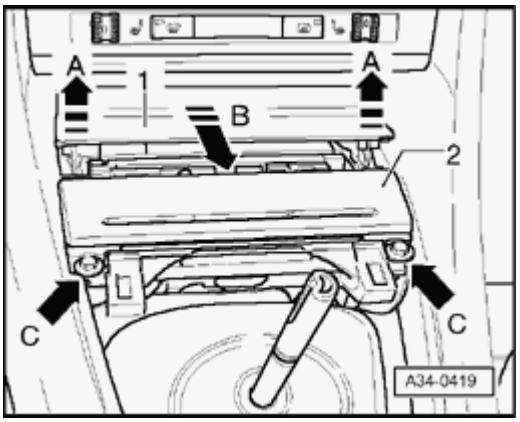


Fig. 100: Lifting Cover And Pulling Out And Removing Bolts And Pulling Ashtray From Center Console
Courtesy of VOLKSWAGEN UNITED STATES, INC.

- First lift cover -1- up in direction of arrow -A- and pull out in direction of arrow -B-.
- Remove bolts (arrows -C-) and then remove ashtray -2- from center console.

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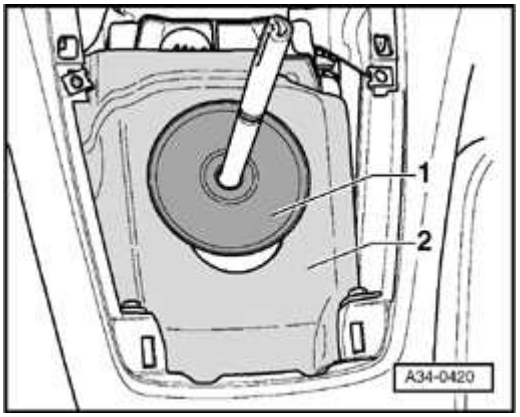


Fig. 101: Lifting Out Damping Washer And Noise Insulation
Courtesy of VOLKSWAGEN UNITED STATES, INC.

- Lift damping washer -1- and noise insulation -2- upward and out.

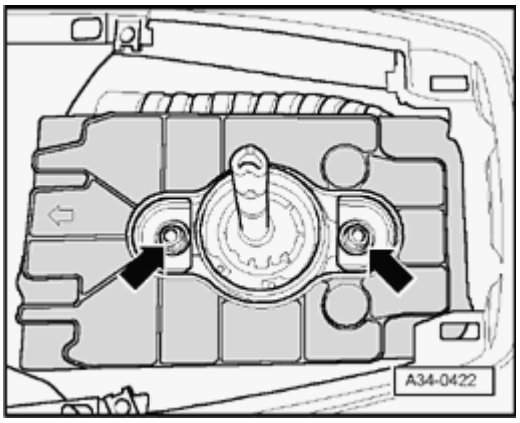


Fig. 102: Locating Noise Insulation For Shift Lever Housing Bolts
Courtesy of VOLKSWAGEN UNITED STATES, INC.

- Remove noise insulation for gear shift housing (arrows).
- Measure distance -a- between two studs in shift mechanism

NOTE: Measure from center of stud to center of stud.

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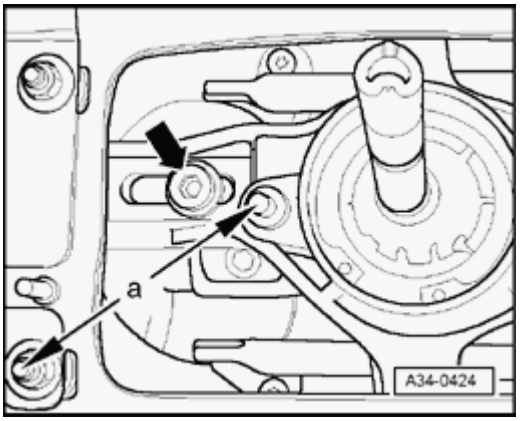


Fig. 103: Shift Mechanism Measurement And Bolts
Courtesy of VOLKSWAGEN UNITED STATES, INC.

- Specification: Dimension a = 85 mm

- If specification is not obtained, produce distance -a- as follows:
- Loosen bolt (arrow) for push rod.

- Rear push rod (in shift mechanism) must move easily backward and forward on slider

- Adjust dimension -a- by moving rear push rod (in shift mechanism).
- Tighten bolt for push rod (arrow) to 25 Nm.

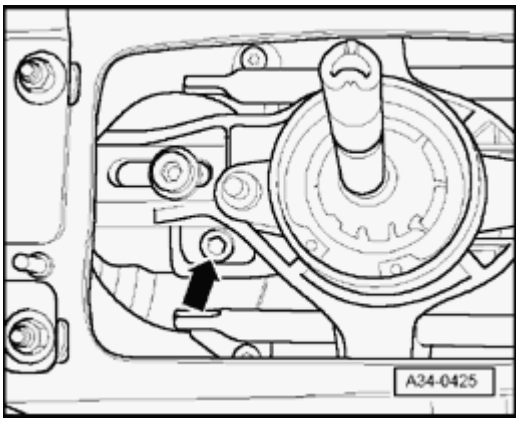


Fig. 104: Selector Rod Bolt
Courtesy of VOLKSWAGEN UNITED STATES, INC.

- Loosen bolt for selector rod (arrow).

- Selector rod/shift mechanism connection must move freely

Aligning gear shift

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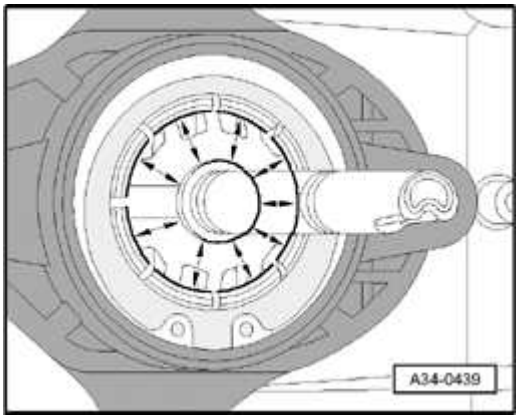


Fig. 105: Centering Bottom Of Shift Lever Centered In Ball Housing
Courtesy of VOLKSWAGEN UNITED STATES, INC.

- Center bottom of gear shift in ball socket.

- Bottom of gear shift must be at same distance from all points of ball socket (arrows).
- Gear shift is vertical in direction of travel.

- Secure gear shift in this position.

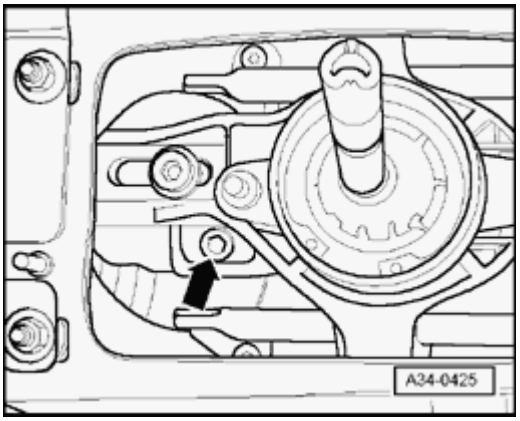


Fig. 106: Selector Rod Bolt
Courtesy of VOLKSWAGEN UNITED STATES, INC.

- Tighten bolt for selector rod (arrow) to 25 Nm.

NOTE: Take care not to alter position of gear shift when tightening the bolt.

- Install covers and gear shift knob.

Shift adjustment, checking

- Gear shift must be in 3rd/4th gear gate with transmission in neutral.

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- Press clutch.
- Check shifting to all gears.

- Gear shift must not come into contact with cover of center console when shifting.
- Gear shift must automatically return from 5th/reverse gear gate to 3rd/4th gear gate.
- Reverse gear can only be selected when gear shift is in 3rd/4th gear gate with transmission in neutral beforehand.
- It is not possible to shift from 5th gear directly to reverse gear.

NOTE: If gear shift can be shifted directly from 5th gear to reverse, or if only 5th gear and reverse gear cannot be engaged, check locking unit for 5th and reverse gear and replace if necessary. Refer to Removing and installing locking unit for 5th gear and reverse gear.

TRANSMISSION, REMOVING AND INSTALLING

Transmission, removing and installing

CAUTION: Before beginning repairs on the electrical system:

- **Obtain the anti-theft radio security code.**
- **Switch the ignition off.**
- **Disconnect the battery Ground (GND) strap.**
- **On vehicles equipped with Audi Telematics by OnStar ® , switch-off the emergency (back-up) battery for the Telematic/Telephone Control Module prior to disconnecting vehicle battery. Refer to**
  - **91 - COMMUNICATION**
  - **91 RADIO, TELEPHONE, NAVIGATION, TRIP COMPUTER for Cabriolet**

  .
- **After reconnecting vehicle battery, re-code and check operation of anti-theft radio. Also check operation of clock and power windows according to article and/or Owner's Manual.**
- **After reconnecting vehicle battery on vehicles equipped with Audi Telematics by OnStar ® , switch-on the emergency (back-up) battery for the Telematic/Telephone Control Module. Refer to**
  - **91 - COMMUNICATION**
  - **91 RADIO, TELEPHONE, NAVIGATION, TRIP COMPUTER for Cabriolet**

  .

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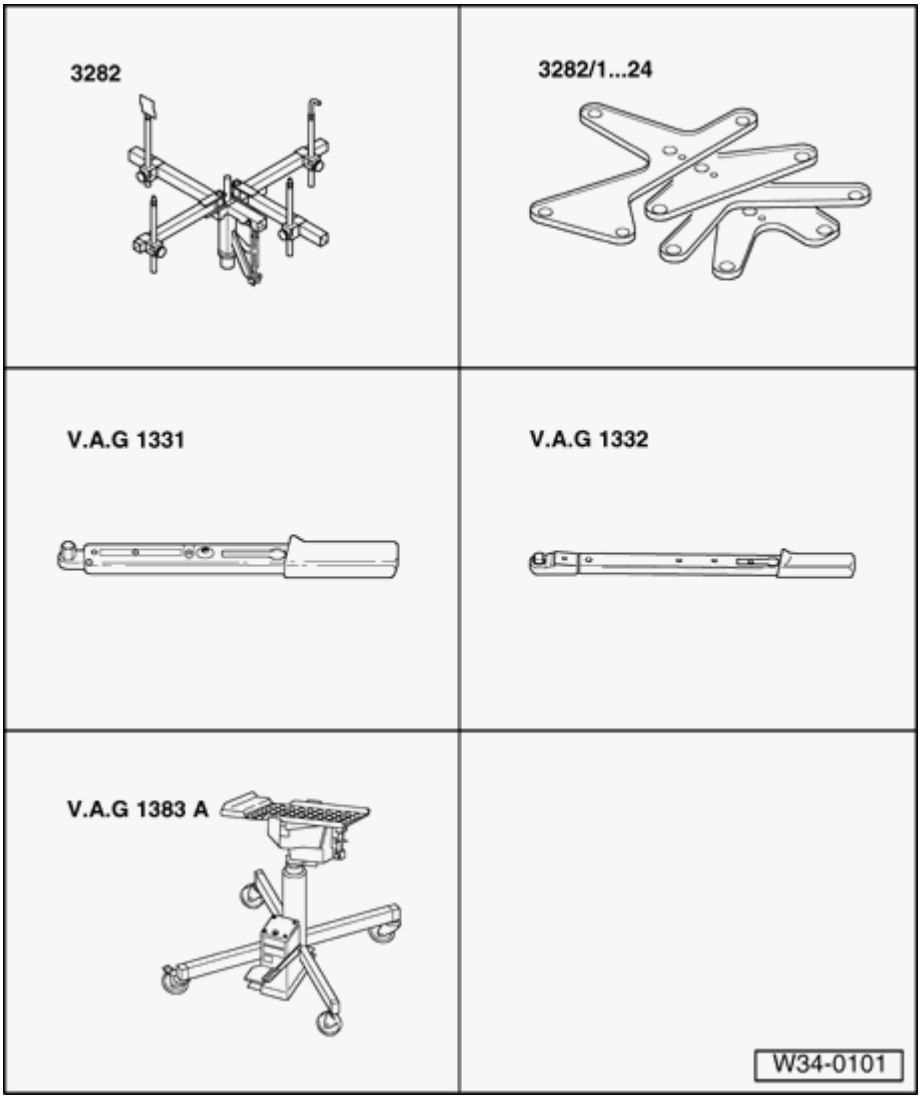


Fig. 107: Identifying Special Tools - Transmission, Removing And Installing
Courtesy of VOLKSWAGEN UNITED STATES, INC.

Special tools and equipment

- 3282 Transmission support
- 3282/10 Adjustment plate
- V.A.G 1331 Torque wrench
- V.A.G 1332 Torque wrench
- V.A.G 1383 A Engine/transmission lifter

Special tools and workshop equipment required

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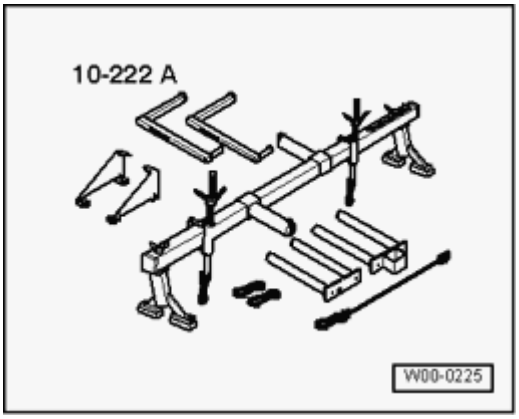


Fig. 108: Identifying 10-222A Engine Support Bridge With 10-222A/8 Bracket For Engine
Courtesy of VOLKSWAGEN UNITED STATES, INC.

- 10-222A Support bar

Transmission, removing

See Caution before beginning repairs on the electrical system. Refer to **Transmission, removing and installing**

- Disconnect battery Ground strap with ignition switched off.

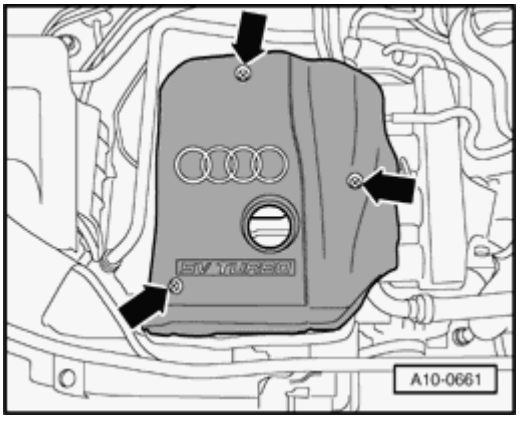


Fig. 109: Removing Engine Cover
Courtesy of VOLKSWAGEN UNITED STATES, INC.

- Remove engine cover (arrows).

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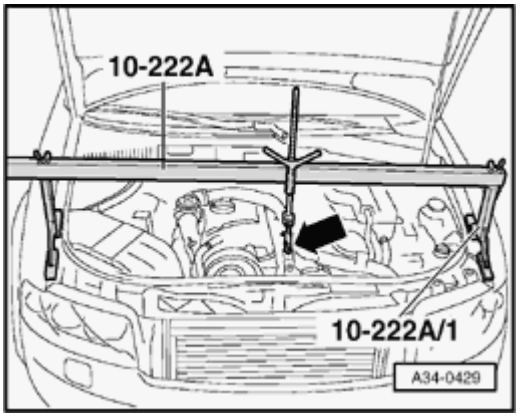


Fig. 110: Support Bar 10-222 A With Supports 10-222 A/1 Installed On Engine
Courtesy of VOLKSWAGEN UNITED STATES, INC.

- Set up support bar 10-222 A with supports 10-222 A/1.
- Pre-tension engine slightly using spindle of support bar.

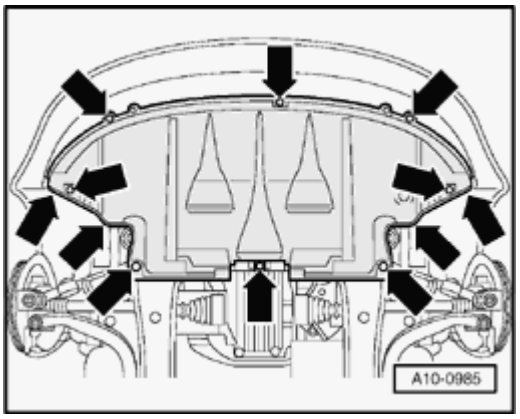


Fig. 111: Removing Sound Insulation
Courtesy of VOLKSWAGEN UNITED STATES, INC.

- Remove sound insulation (arrows).

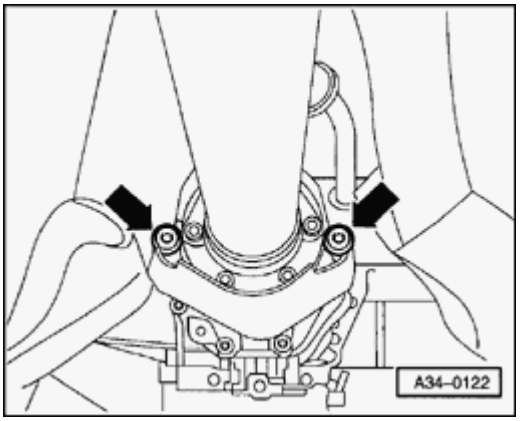


Fig. 112: Identifying Heat Shield Fasteners For Torsen Differential

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Courtesy of VOLKSWAGEN UNITED STATES, INC.

- Remove heat shield for driveshaft from Torsen differential housing (arrows).

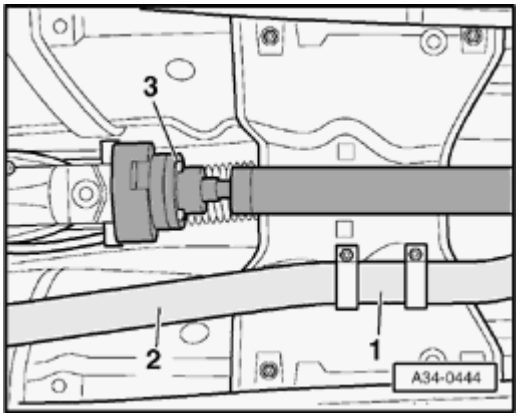


Fig. 113: Exhaust Pipe Clamp And Driveshaft At Transmission
Courtesy of VOLKSWAGEN UNITED STATES, INC.

- Release clamp -1- and remove front part of exhaust pipe -2-.

Refer to **26 - EXHAUST SYSTEM, EMISSION CONTROLS**

- Disconnect driveshaft -3- from transmission and secure at side with wire (see following illustration).

Driveshaft, removing and installing:

Refer to **39 FINAL DRIVE, DIFFERENTIAL**

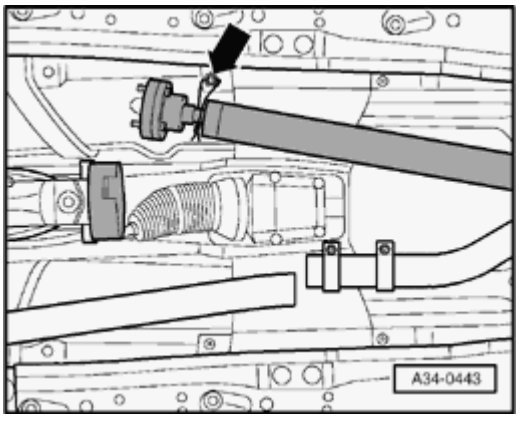


Fig. 114: Drive Shaft Secured With Wire And Locating Speed Nut
Courtesy of VOLKSWAGEN UNITED STATES, INC.

- Re-insert speed nut (arrow) slightly and secure drive shaft with wire.

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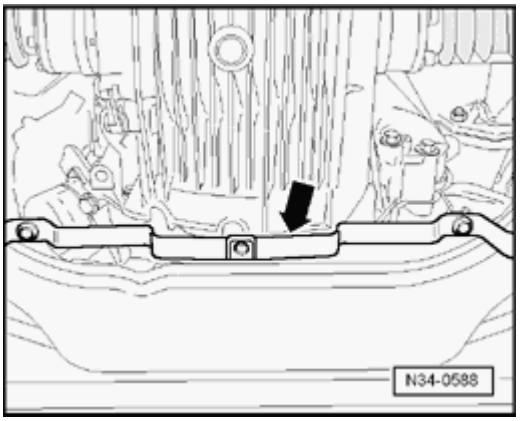


Fig. 115: Removing Noise Insulation Bracket
Courtesy of VOLKSWAGEN UNITED STATES, INC.

- Remove bracket for sound insulation (arrow).

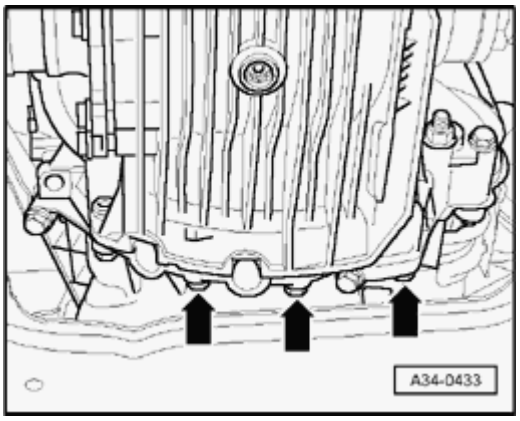


Fig. 116: Three Lower Engine And Transmission Connecting Bolts
Courtesy of VOLKSWAGEN UNITED STATES, INC.

- Remove three engine/transmission connecting bolts underneath (arrow).

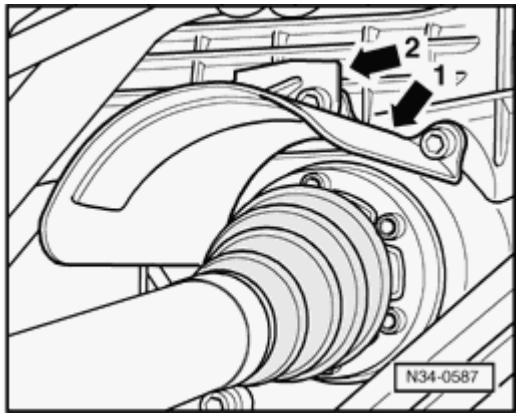


Fig. 117: Detaching Heat Shields And Right-Hand Axle Shaft
Courtesy of VOLKSWAGEN UNITED STATES, INC.

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- Remove heat shields (arrow -1- and arrow -2-) above right drive axle.

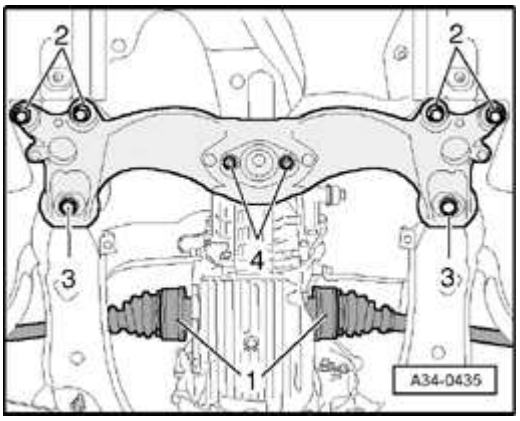


Fig. 118: Drive Shafts And Flange Shafts
Courtesy of VOLKSWAGEN UNITED STATES, INC.

- Disconnect drive axles -1- from drive flanges and tie up out of way.

NOTE: Take care not to damage surface protection of drive axles.

- Support transmission slightly with engine/transmission lifter V.A.G 1383 A.

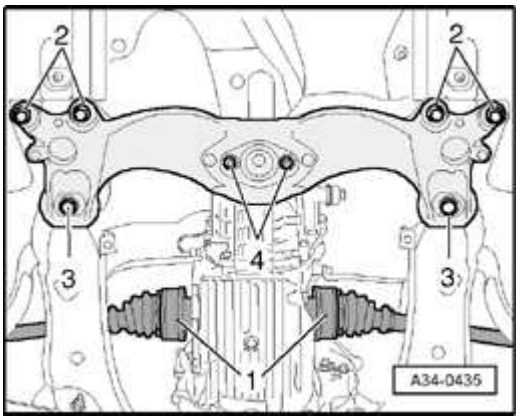


Fig. 119: Drive Shafts And Flange Shafts
Courtesy of VOLKSWAGEN UNITED STATES, INC.

- Remove bolts -2-, then bolts -3- on tunnel crossmember.
- Remove two nuts -4- and remove tunnel crossmember.
- Lower engine/transmission lifter V.A.G 1383 A and place to one side.

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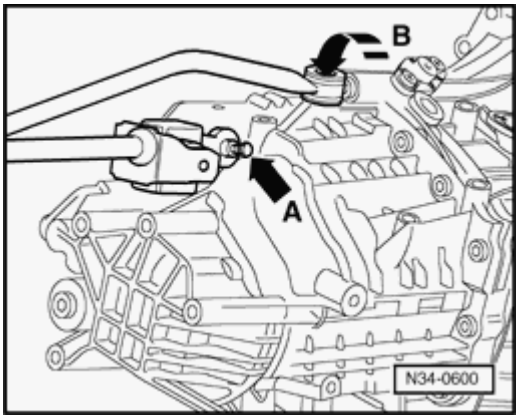


Fig. 120: Identifying Transmission Shift And Pivot Rods
Courtesy of VOLKSWAGEN UNITED STATES, INC.

- Disconnect selector rod (arrow A-).
- Remove hex socket head bolt of push rod (arrow -B-).

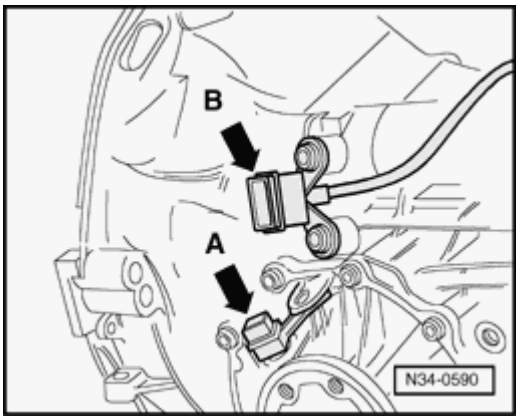


Fig. 121: Identifying Connectors For Vehicle Speed Sensor (VSS) And Back-Up Lights
Courtesy of VOLKSWAGEN UNITED STATES, INC.

- Disconnect connector from speedometer vehicle speed sensor (arrow -A-).
- Disconnect connector from back-up light switch (multi-function sensor, arrow B-).
- Disconnect all other electrical connections and Ground wires from transmission and from engine/transmission connecting bolts.

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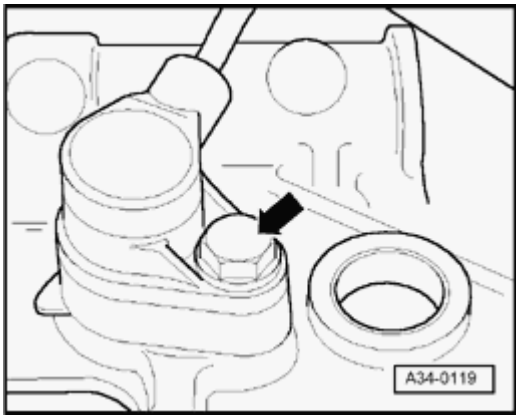


Fig. 122: Location Of Engine Speed (RPM) Sensor G28 On Coupling Housing
Courtesy of VOLKSWAGEN UNITED STATES, INC.

- If installed, remove Engine speed (RPM) sensor -G28- from left of transmission (arrow) and place to one side.

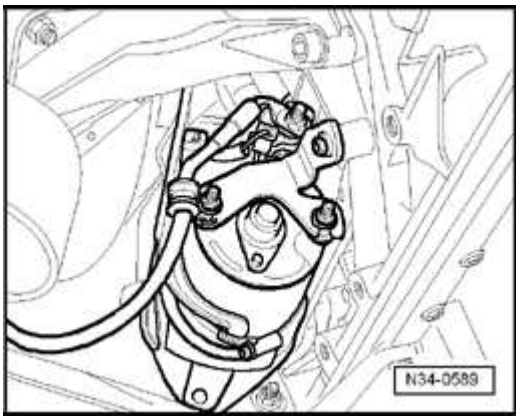


Fig. 123: Removing Starter Bolt
Courtesy of VOLKSWAGEN UNITED STATES, INC.

- Disconnect engine/transmission starter and secure against inadvertent operation if necessary.

Refer to **27 BATTERY, STARTER, GENERATOR, CRUISE CONTROL**

NOTE: There is no need to disconnect starter cables.

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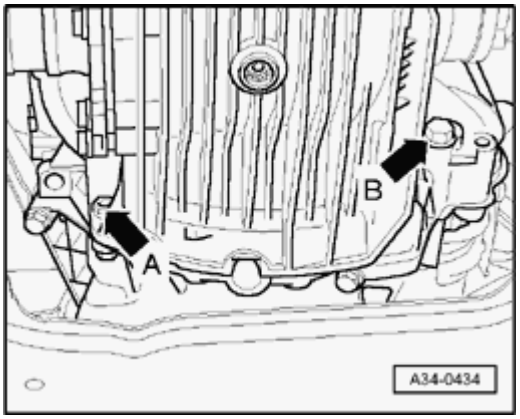


Fig. 124: Lower Engine And Transmission Connecting Bolts Which Should Not Be Removed
Courtesy of VOLKSWAGEN UNITED STATES, INC.

- Remove engine/transmission connecting bolts underneath with exception of bolts (arrow -A- and arrow -B-).

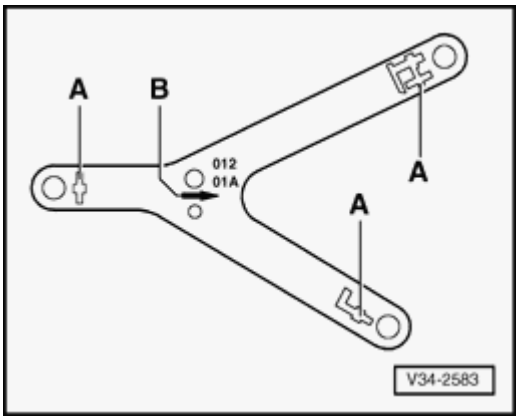


Fig. 125: Transmission Support 3282 Attachment Plate
Courtesy of VOLKSWAGEN UNITED STATES, INC.

- To remove manual transmission 012, align transmission support 3282 using adjustment plate 3282/10 and position on transmission lifter V.A.G 1383 A.

A - Support elements

NOTE:

- **Drawing shows only symbolic representation of support elements -A-. Arrow -B- points in direction of travel.**
- **Adjustment plate 3282/10 only fits in one position.**

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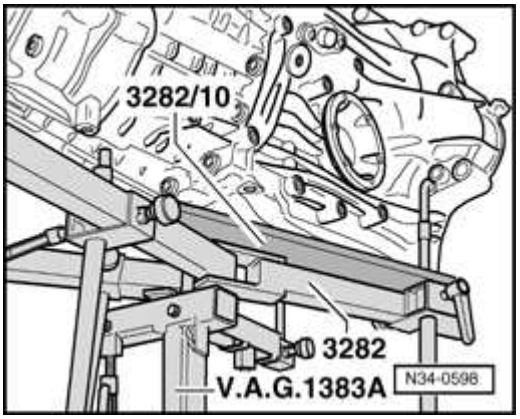


Fig. 126: Setting Transmission Jack Under Vehicle
Courtesy of VOLKSWAGEN UNITED STATES, INC.

- Position transmission jack under vehicle with arrow symbol -B- (Refer to **Fig. 125**) on adjustment plate pointing in direction of travel/vehicle.

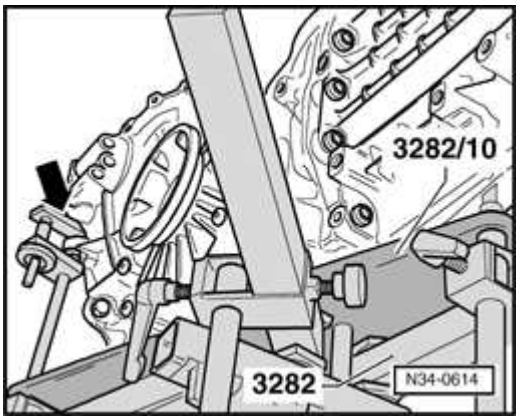
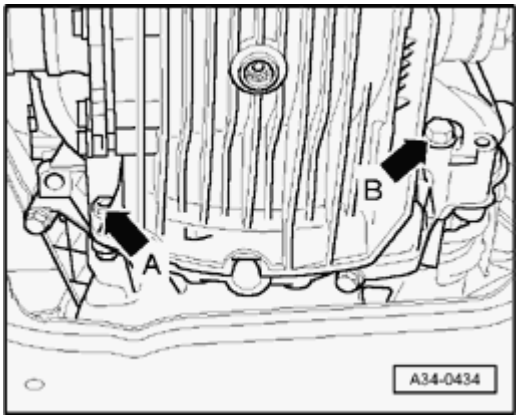


Fig. 127: Aligning Adjustment Plate Parallel To Transmission And Lock Safety Support On Transmission
Courtesy of VOLKSWAGEN UNITED STATES, INC.

- Align adjustment plate parallel to transmission and lock safety support (arrow) on transmission.



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Fig. 128: Lower Engine And Transmission Connecting Bolts Which Should Not Be Removed
Courtesy of VOLKSWAGEN UNITED STATES, INC.

- Remove remaining engine/transmission connecting bolts (arrows -A- and -B-).
- Press transmission out of dowel sleeves and carefully lower slightly using transmission lifter V.A.G 1383 A until slave cylinder is just about accessible.

NOTE: When lowering transmission take care not to damage hydraulic pipe to slave cylinder.

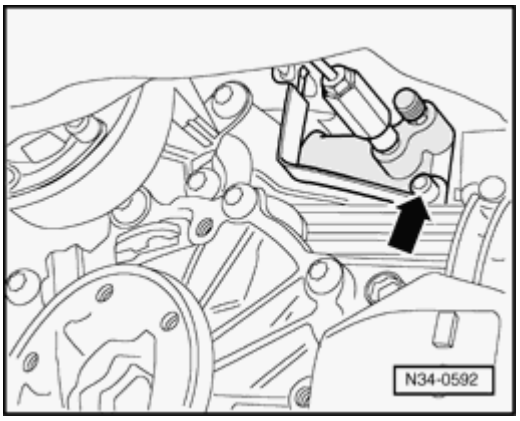


Fig. 129: Identifying Clutch Slave Cylinder Bracket And Fastener
Courtesy of VOLKSWAGEN UNITED STATES, INC.

- Remove clutch slave cylinder (arrow) and secure with wire, do not open hydraulic circuit.

NOTE: Do not press clutch pedal once slave cylinder has been removed.

- Lower transmission completely.

NOTE: When lowering ensure clearance from drive axles.

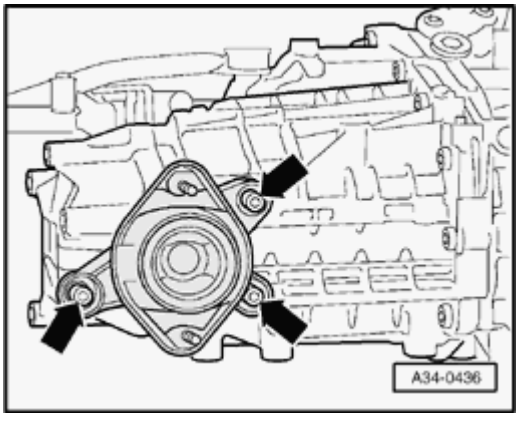


Fig. 130: Transmission Mount

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Courtesy of VOLKSWAGEN UNITED STATES, INC.

- If removed transmission is to be replaced, first modify transmission mount to suit replacement transmission (arrows).

For repairs, secure transmission to repair stand by means of transmission support VW 353 and retaining plate VW 309.

Transmission, transporting

Lifting tackle 2024 A in conjunction with auxiliary hook 10-222 A can be used for transporting the transmission.

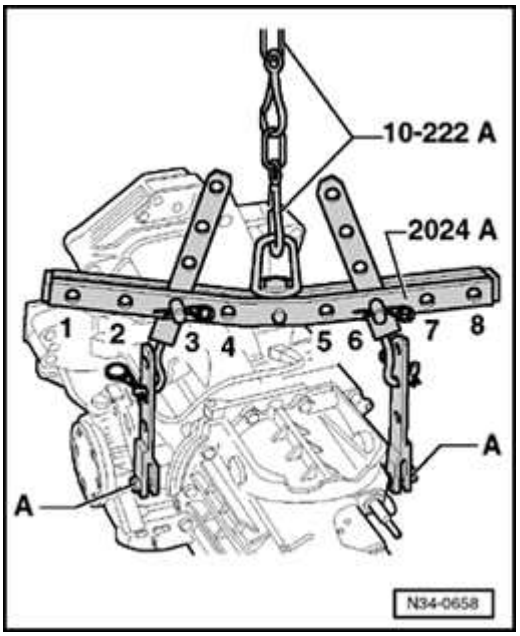


Fig. 131: Lifting Engine With 2024A Engine Sling
Courtesy of VOLKSWAGEN UNITED STATES, INC.

- Bolt on two brackets of lifting tackle 2024 A using bolts -A- M10 x 50.
- Attach lifting tackle 2024 A and raise slightly with workshop crane.
- Hook 4th hole of each hole rail into position -3- and position -6- of lifting tackle 2024 A.

CAUTION: Use locking pins for hooks and setting pins.

Transmission, installing

Install in reverse order, paying attention to the following:

- Clean splines of input shaft and apply a little lubricating grease G000 100.

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Clutch plate must slide easily back and forth on input shaft.

- Apply a thin coat of copper grease, e.g. Z 381 351 TE, to contact surface for plunger on clutch release lever.
- Check clutch release bearing for wear and replace if necessary.

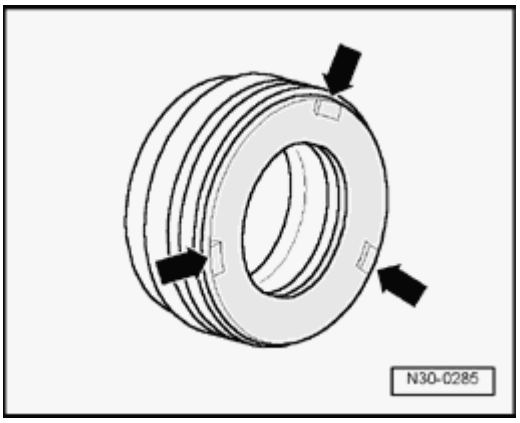


Fig. 132: Servicing Release Bearing With Plastic Ring
Courtesy of VOLKSWAGEN UNITED STATES, INC.

- If plastic ring of release bearing is loose, stick back onto bearing ring with adhesive AMV 195 KD1 01.

Three rectangular lugs (arrows) on plastic ring engage in recesses in bearing ring.

If scores deeper than 0.5 mm are present, replace release bearing.

- Check whether dowel sleeves for centering engine/transmission in cylinder block have been installed and install if necessary.
- Make sure intermediate plate, if installed, is correctly positioned at engine.
- Using a thread tap, remove residual locking fluid from all threaded holes bearing self-locking bolts.
- Replace all self-locking nuts.

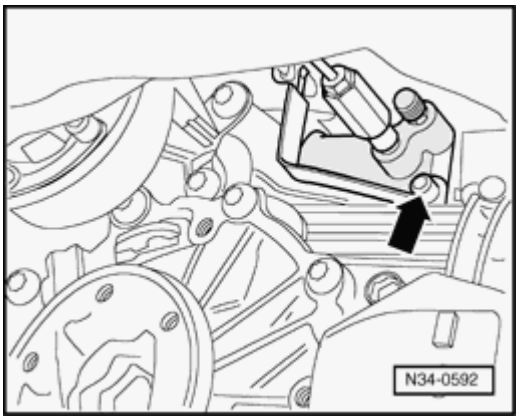


Fig. 133: Identifying Clutch Slave Cylinder Bracket And Fastener
Courtesy of VOLKSWAGEN UNITED STATES, INC.

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- Raise transmission until clutch slave cylinder can be installed together with holder for hose/pipe assembly (arrow).
- Install bolts for lower engine/transmission connection and for starter; to do so, insert starter.

Refer to **27 BATTERY, STARTER, GENERATOR, CRUISE CONTROL**

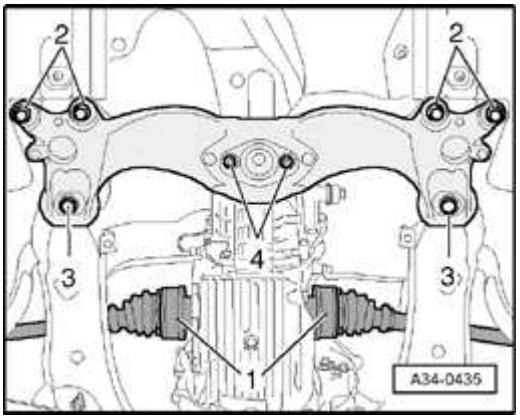


Fig. 134: Drive Shafts And Flange Shafts
Courtesy of VOLKSWAGEN UNITED STATES, INC.

- Bolt tunnel crossmember onto transmission mount -4-.
- Lift transmission using engine/transmission lifter V.A.G 1383 A and firmly bolt tunnel crossmember to body.
- Bolt driveshaft to transmission:

Refer to **39 FINAL DRIVE, DIFFERENTIAL**

- Align exhaust system free of stress:

Refer to **26 - EXHAUST SYSTEM, EMISSION CONTROLS**

- Check oil level in manual transmission. Refer to **Transmission oil level, checking**.
- Check shift adjustment, re-adjust if necessary. Refer to **Shift mechanism, adjusting**.

See Caution for connecting Telematics battery. Refer to **Transmission, removing and installing**

- After connecting battery, enter radio anti-theft code.

Refer to Radio operating instructions

- Connect battery.

NOTE: On re-connecting the battery, remember to check and activate vehicle equipment (radio, clock, convenience electronics etc.).

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Refer to

- **01 - MAINTENANCE**
- **01 - MAINTENANCE** for Cabriolet

Tightening torques

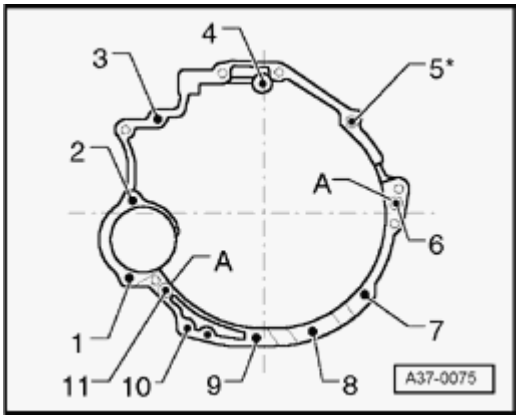


Fig. 135: 4Identifying Engine/Transmission Mountings (Automatic/Manual Transmission)
Courtesy of VOLKSWAGEN UNITED STATES, INC.

1.8 Liter engine to transmission

Item	Bolt	Nm
1, 3, 4	M12 x 67	65
2, 6	M12 x 90	65
5, 11	M12 x 110	65
7 through 10	M10 x 45	45

A: Dowel sleeves for centering

Transmission mount with console to transmission (arrows)	23 Nm

1 - Drive axle to drive flange	M8	40 Nm
	M10	70 Nm
2 - Tunnel crossmember to body 1)	M10	55 Nm
3 - Tunnel crossmember to body 1)		110 Nm + 90 °
4 - Tunnel crossmember to transmission mount		23 Nm

1) Always replace bolt and washer

Component	Nm

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Engine speed (RPM) sensor -G28-	10
Clutch slave cylinder to transmission1)	23
Heat shields above drive axles to transmission	23
Gearshift linkage to transmission 1)	23
Push rod to transmission	40
Driveshaft to transmission 1)	55
Heat shield for driveshaft to cover plate for Torsen differential	25
Clamp for exhaust pipe	40
Bracket for sound insulation to subframe	10

1) Replace bolt

TORSEN DIFFERENTIAL HOUSING, REMOVING AND INSTALLING

Torsen differential housing, removing and installing

CAUTION: Before beginning repairs on the electrical system:

- **Obtain the anti-theft radio security code.**
- **Switch the ignition off.**
- **Disconnect the battery Ground (GND) strap.**
- **On vehicles equipped with Audi Telematics by OnStar ® , switch-off the emergency (back-up) battery for the Telematic/Telephone Control Module prior to disconnecting vehicle battery. Refer to**
  - **91 - COMMUNICATION**
  - **91 RADIO, TELEPHONE, NAVIGATION, TRIP COMPUTER for Cabriolet**

  .
- **After reconnecting vehicle battery, re-code and check operation of anti-theft radio. Also check operation of clock and power windows according to article and/or Owner's Manual.**
- **After reconnecting vehicle battery on vehicles equipped with Audi Telematics by OnStar ® , switch-on the emergency (back-up) battery for the Telematic/Telephone Control Module. Refer to**
  - **91 - COMMUNICATION**
  - **91 RADIO, TELEPHONE, NAVIGATION, TRIP COMPUTER for Cabriolet**

  .

- Transmission installed

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Special tools, testers and other items required

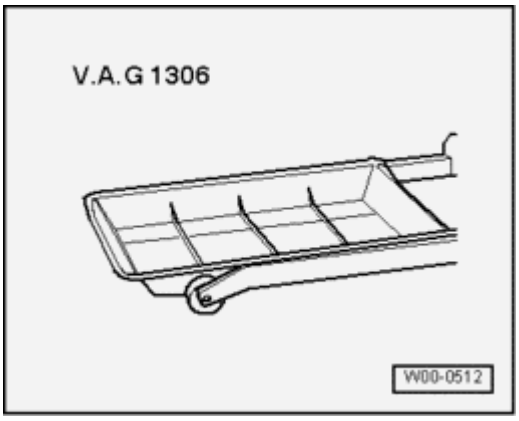


Fig. 136: Identifying Drip Tray V.A.G 1306
Courtesy of VOLKSWAGEN UNITED STATES, INC.

- Drip tray V.A.G 1306

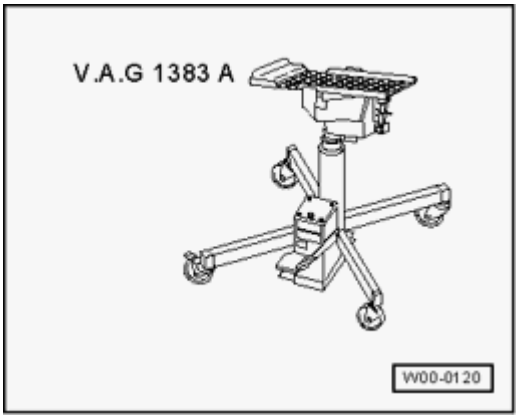


Fig. 137: Identifying Engine/Transmission Jack V.A.G. 1383 A
Courtesy of VOLKSWAGEN UNITED STATES, INC.

- V.A.G 1383 A Engine/transmission lifter

Removing

- Obtain (if necessary) radio code for vehicles with encoded radio.
- Disconnect battery Ground strap with ignition switched off.
- Place drip tray V.A.G 1306 underneath and drain gear oil.

Vehicles with 4-cylinder engine

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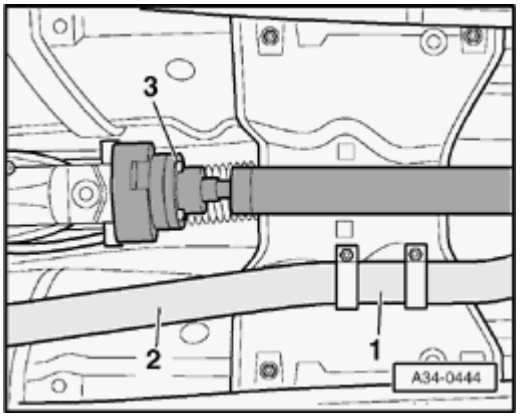


Fig. 138: Exhaust Pipe Clamp And Driveshaft At Transmission
Courtesy of VOLKSWAGEN UNITED STATES, INC.

- Separate exhaust system at clamp -1-.

Refer to **26 - EXHAUST SYSTEM, EMISSION CONTROLS**

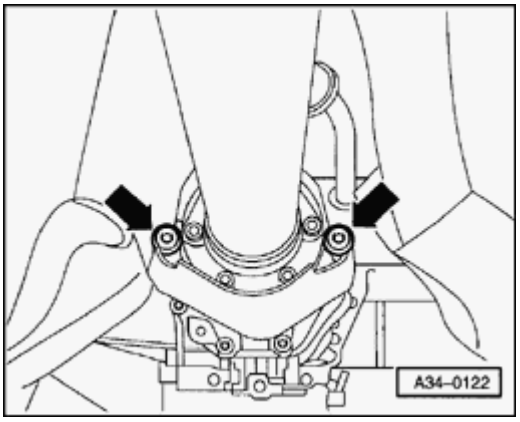


Fig. 139: Identifying Heat Shield Fasteners For Torsen Differential
Courtesy of VOLKSWAGEN UNITED STATES, INC.

- Unscrew heat shield for drive shaft from Torsen differential housing (arrows).
- Disconnect driveshaft from transmission.

Driveshaft, removing and installing:

Refer to **39 FINAL DRIVE, DIFFERENTIAL**

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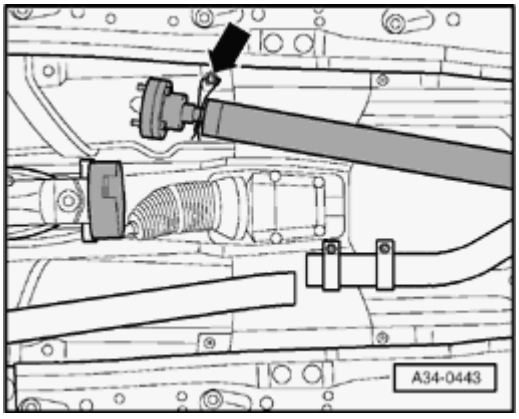


Fig. 140: Drive Shaft Secured With Wire And Locating Speed Nut
Courtesy of VOLKSWAGEN UNITED STATES, INC.

- Re-insert speed nut (arrow) slightly and secure drive shaft to stud with wire.
- Support transmission slightly with engine/transmission lifter V.A.G 1383 A.

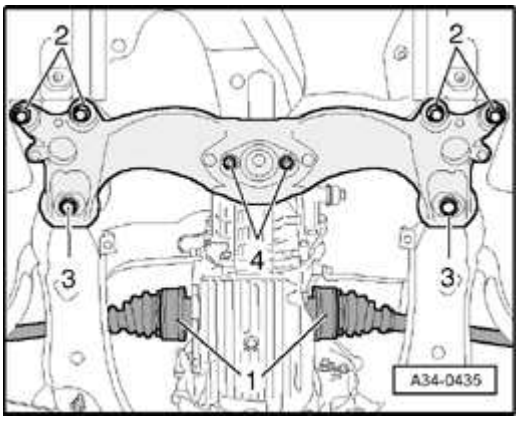


Fig. 141: Drive Shafts And Flange Shafts
Courtesy of VOLKSWAGEN UNITED STATES, INC.

- Remove bolts -2-, then bolts -3- on tunnel crossmember.
- Lower engine/transmission lifter V.A.G 1383 A
- Remove two nuts -4- and remove tunnel crossmember.

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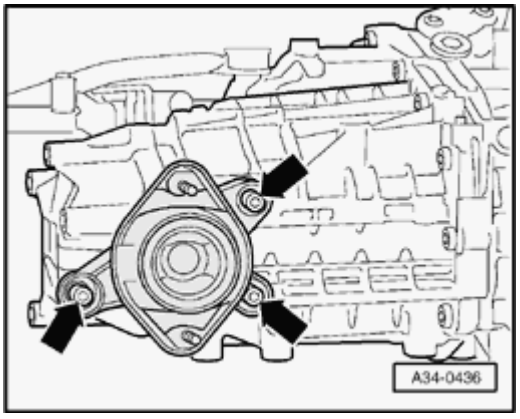


Fig. 142: Transmission Mount
Courtesy of VOLKSWAGEN UNITED STATES, INC.

- Remove transmission mount (arrows).

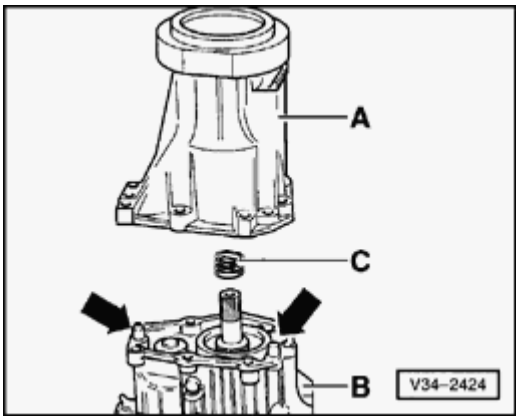


Fig. 143: Identifying Cover, Transmission Cover , and Compression Spring
Courtesy of VOLKSWAGEN UNITED STATES, INC.

- Remove Torsen differential housing -A- from transmission cover -B-.

NOTE: Shown in illustration with transmission removed.

- Remove spring -C- from pinion.

Removing and installing Torsen differential. Refer to **Torsen differential housing, servicing, and Torsen differential, removing and installing**.

Servicing housing. Refer to **Torsen differential housing, servicing, and Torsen differential, removing and installing**

Installing

Install in reverse order, paying attention to the following:

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- Clean sealing surface and coat with AMV 188 001 02.

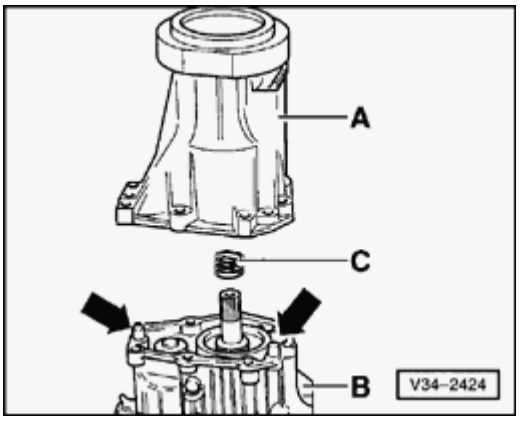


Fig. 144: Identifying Cover, Transmission Cover , and Compression Spring
Courtesy of VOLKSWAGEN UNITED STATES, INC.

- Check whether dowel sleeves for housing -A- (arrows) are present in transmission cover -B-.
- Place spring -C- over pinion on hollow shaft.
- Lift transmission with engine/transmission lifter V.A.G 1383 A.
- Install transmission mount.

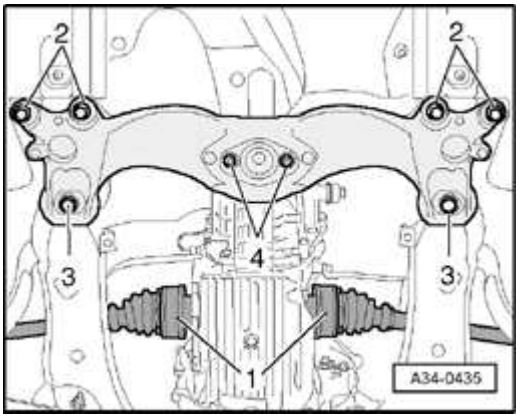


Fig. 145: Drive Shafts And Flange Shafts
Courtesy of VOLKSWAGEN UNITED STATES, INC.

- Install tunnel crossmember onto transmission mount -4- and body -2- and -3-.
- Top up gear oil and check oil level in transmission. Refer to **Transmission oil level, checking**.
- Bolt driveshaft to transmission.

Driveshaft, removing and installing:

Refer to **39 FINAL DRIVE, DIFFERENTIAL**

- Align exhaust system stress-free

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Refer to **26 - EXHAUST SYSTEM, EMISSION CONTROLS**

See Caution for connecting Telematics battery. Refer to **Torsen differential housing, removing and installing**

- Connect battery.

NOTE: On re-connecting battery, remember to check and activate vehicle equipment (radio, clock, convenience electronics etc.).

Refer to

- **01 - MAINTENANCE**
- **01 - MAINTENANCE** for Cabriolet

- After connecting battery, enter radio anti-theft code.

Refer to Radio operating instructions

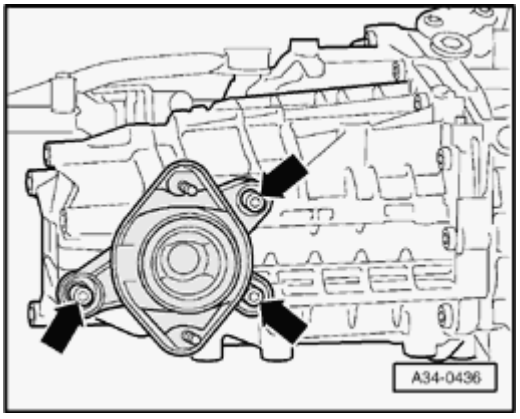


Fig. 146: Transmission Mount
Courtesy of VOLKSWAGEN UNITED STATES, INC.

Tightening torque

Component	Nm
Transmission mount with console to transmission (arrows)	23 Nm

2 - Tunnel crossmember to body 1)	M10	55 Nm
3 - Tunnel crossmember to body 1)		110 Nm + 90 °
4 - Tunnel crossmember to transmission mount		23 Nm

1) Always replace bolt including washer

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Torsen differential housing to transmission	25
Driveshaft to transmission 1)	55
Heat shield for driveshaft to Torsen differential housing	25

1) Replace bolt

TRANSMISSION OIL LEVEL, CHECKING

Transmission oil level, checking

Special tools, testers and other items required

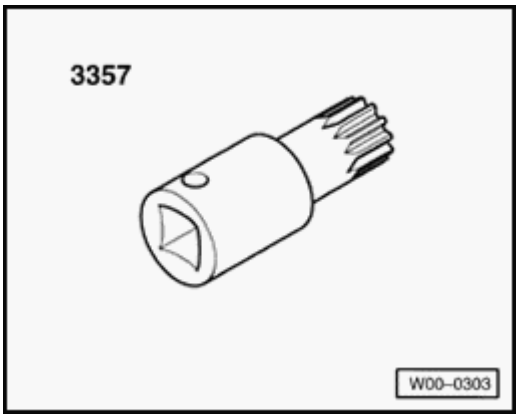


Fig. 147: Identifying Triple Square Socket Driver 3357
Courtesy of VOLKSWAGEN UNITED STATES, INC.

- 3357 Allen key extension

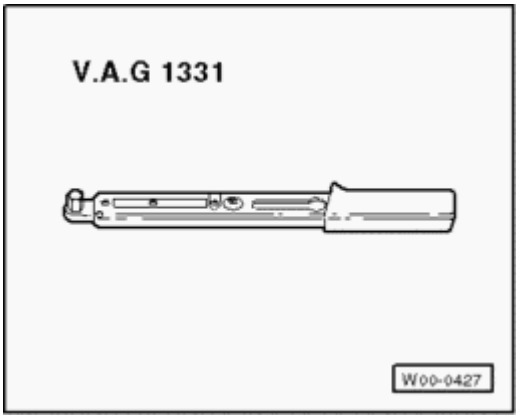


Fig. 148: Identifying Torque Wrench V.A.G. 1331
Courtesy of VOLKSWAGEN UNITED STATES, INC.

- V.A.G 1331 Torque wrench

NOTE:

- **The vehicle must be level for checking the oil level. An inspection pit or 4-**

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pillar lifting platform are the most suitable methods.

- **The oil filler plug is situated on the left of the transmission below the speedometer vehicle speed sensor and may be concealed by the heat shield for the drive axle.**
- **Use special tool 3357 to loosen oil drain plug.**

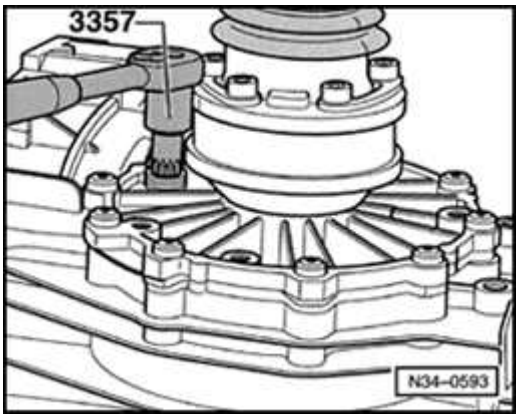


Fig. 149: Checking Oil Level At Oil Filler Hole
Courtesy of VOLKSWAGEN UNITED STATES, INC.

- Remove oil filler plug to check gear oil level (arrow).
- Specification: Oil level up to lower edge of filler hole
- Top up gear oil if necessary. Specification. Refer to **Code letters, assignment of mechanical units, transmission ratios and capacities** onward.
- Install oil filler plug.

Tightening torque

Component	Nm
Oil filler plug	25

TRANSMISSION, DISASSEMBLING AND ASSEMBLING

Transmission, disassembling and assembling

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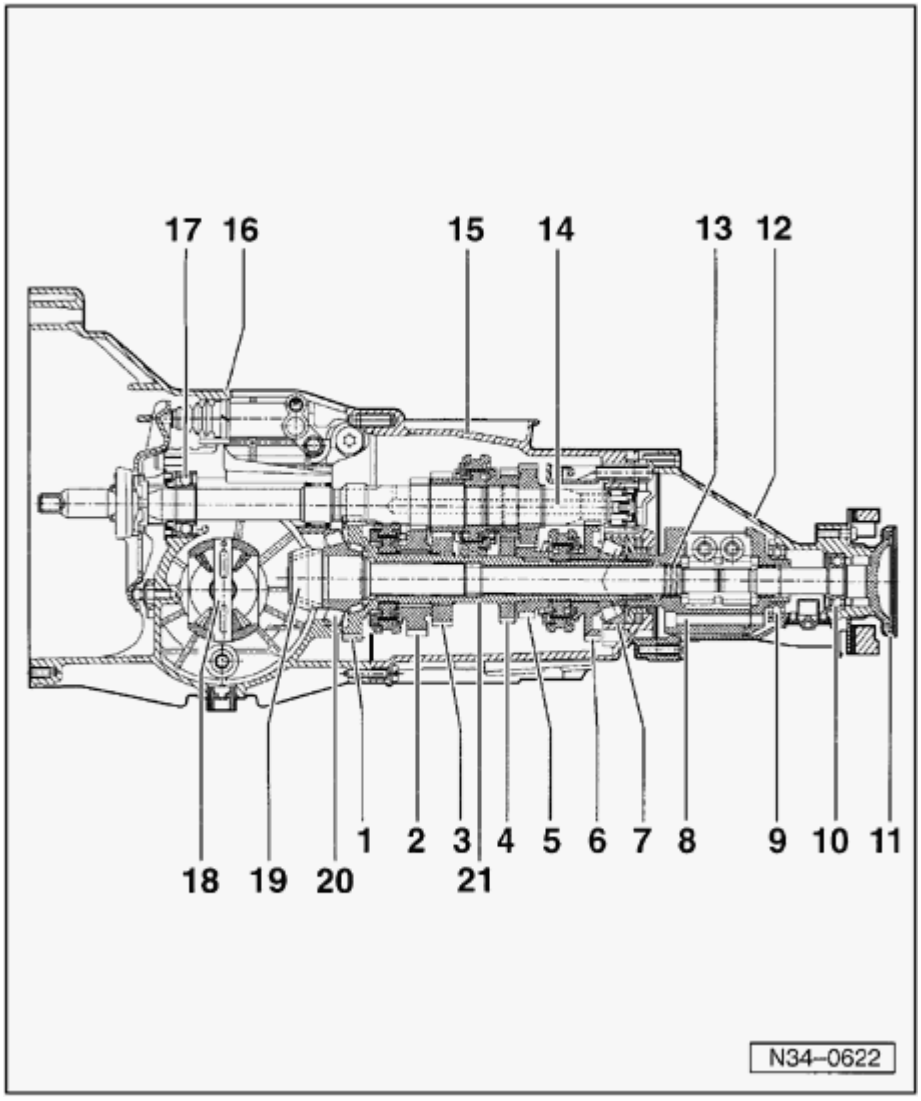


Fig. 150: Transmission, Overview
Courtesy of VOLKSWAGEN UNITED STATES, INC.

Assembly sequence. Refer to **Ball bearing for input shaft, multi-function sensor, pinion, selector rods, transmission cover and Torsen differential housing, removing and installing**.

Transmission, assembly overview

1 - 1st gear

2 - 2nd gear

3 - 3rd gear

4 - 4th gear

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5 - 5th gear

6 - Reverse gear

- Removing and installing reverse idler gear. Refer to **Reverse idler gear, removing and installing**

7 - Tapered roller bearing

- Adjusting. Refer to **Pinion, adjusting** onward

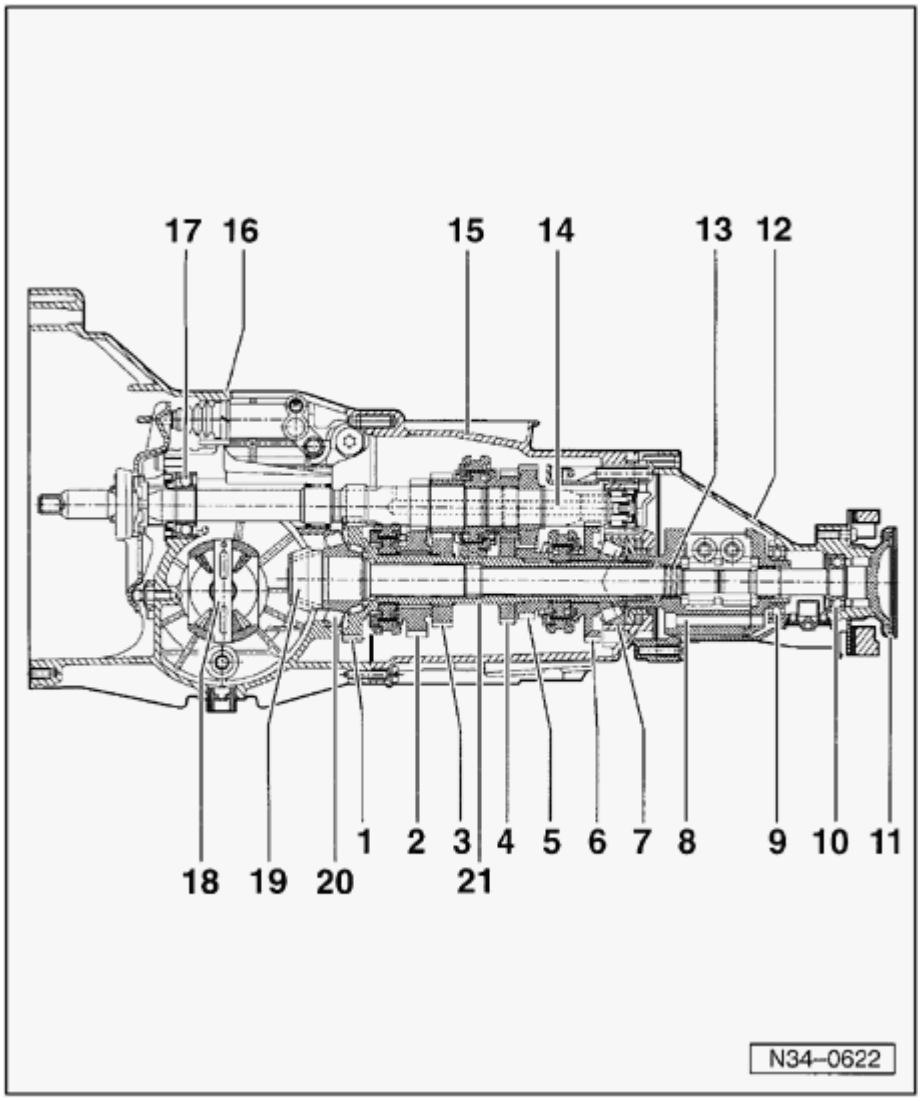


Fig. 151: Transmission, Overview
Courtesy of VOLKSWAGEN UNITED STATES, INC.

8 - Torsen differential

- Only repaired at factory

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- Removing and installing with housing. Refer to **Torsen differential housing, removing and installing**

9 - Ball bearing

10 - Ball bearing

11 - Drive flange

12 - Torsen differential Housing

13 - Spring

- Between Torsen differential and hollow shaft

14 - Input shaft

- Disassembling and assembling. Refer to **Input shaft, disassembling and assembling**

15 - Transmission cover

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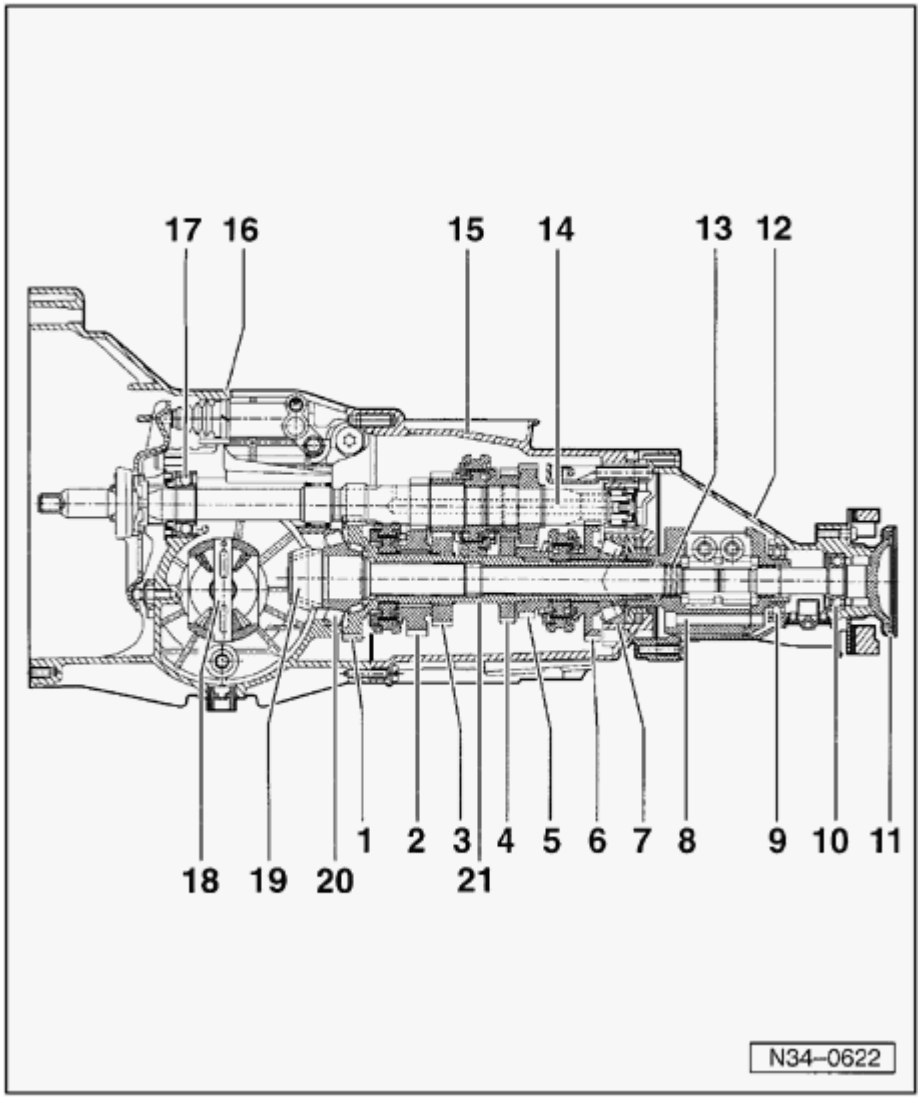


Fig. 152: Transmission, Overview
Courtesy of VOLKSWAGEN UNITED STATES, INC.

16 - Transmission housing

17 - Ball bearing

- Adjusting. Refer to **Input shaft, adjusting**

18 - Differential

- Removing and installing. Refer to **Differential, removing and installing**
- Disassembling and assembling. Refer to **Differential, disassembling and assembling**

19 - Pinion

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- Disassembling and assembling hollow shaft and pinion. Refer to **Pinion and hollow shaft, disassembling and assembling**

20 - Radial-tapered roller bearing

- Adjusting. Refer to **Pinion, adjusting** onward

21 - Hollow shaft

- Disassembling and assembling hollow shaft and pinion. Refer to **Pinion and hollow shaft, disassembling and assembling**

Transmission, sub-assembly overviews

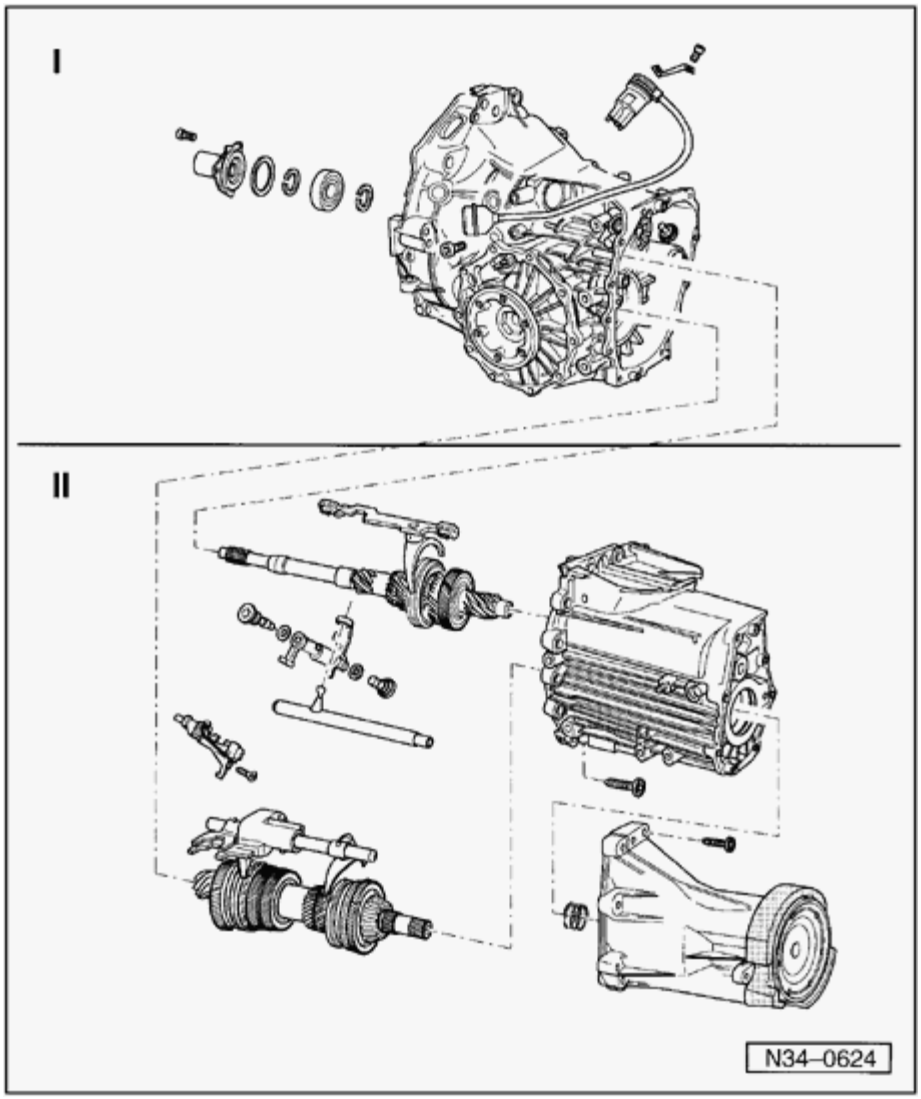


Fig. 153: Transmission, Assembly Overview
Courtesy of VOLKSWAGEN UNITED STATES, INC.

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I - Removing and installing ball bearing for input shaft and multi-function sensor. Refer to Ball bearing for input shaft and multi-function sensor, removing and installing

II - Removing and installing input shaft, pinion, hollow shaft, selector rods, transmission cover and Torsen differential housing. Refer to Input shaft, pinion, hollow shaft, selector rods, transmission cover and Torsen differential housing, removing and installing

Ball bearing for input shaft and multi-function sensor, removing and installing

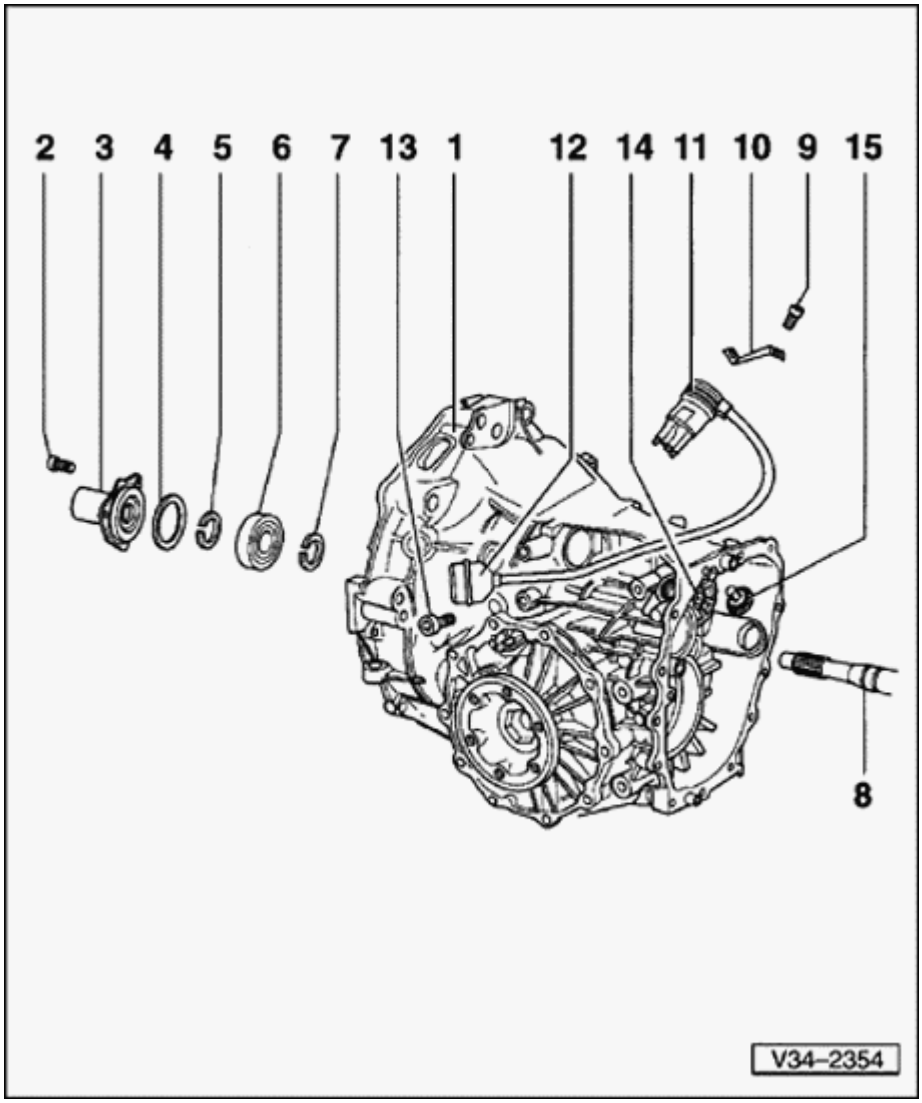


Fig. 154: Transmission Housing, Input Shaft Ball Bearing And Multi-Function Sensor, Overview
Courtesy of VOLKSWAGEN UNITED STATES, INC.

1 - Transmission housing

- With differential and drive flanges
- Removing and installing drive flanges. Refer to **Oil seal for drive flange, replacing**

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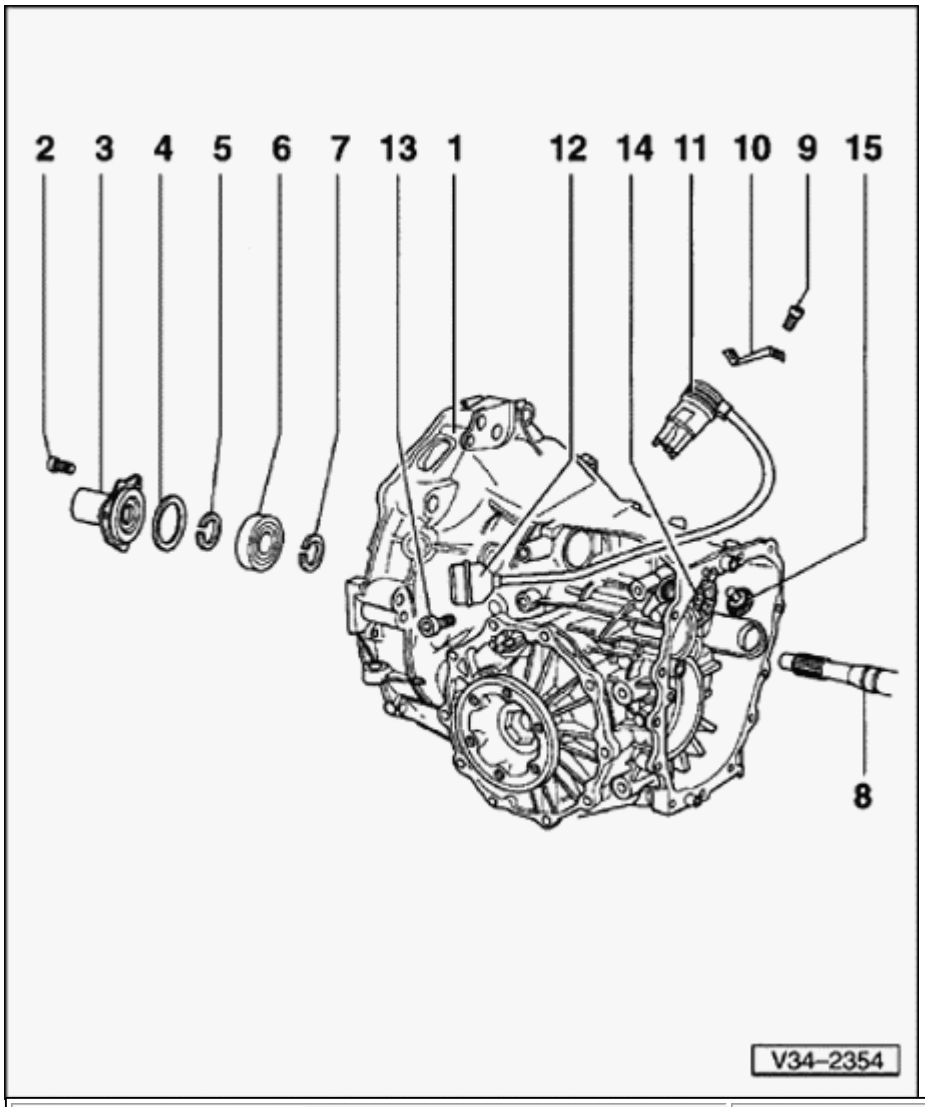
- Removing and installing differential. Refer to **Differential, removing and installing**
- Removing and installing sensor and driving gear for speedometer. Refer to **Speedometer vehicle speed sensor and drive-wheel, removing and installing**
- Installation position of bleeder valve. See **Installation position of bleeder valve**

2 - Internal TORX screw, 35 Nm

- Self-locking
- Replace

3 - Guide bushing

- With O-ring and oil seal for input shaft. Refer to **Clutch release mechanism components (on transmission), servicing**



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Fig. 155: Transmission Housing, Input Shaft Ball Bearing And Multi-Function Sensor, Overview
Courtesy of VOLKSWAGEN UNITED STATES, INC.

4 - Dished washer

- Small diameter (convex side) facing guide bushing

5 - Circlip

- Defining thickness. Refer to **Input shaft, adjusting**

6 - Ball bearing

- Removing and installing. Refer to **Ball bearing for input shaft, multi-function sensor, pinion, selector rods, transmission cover and Torsen differential housing, removing and installing**

7 - Circlip

- Defining thickness. Refer to **Input shaft, adjusting**

8 - Input shaft

- Removing and installing. Refer to **Input shaft, pinion, hollow shaft, selector rods, transmission cover and Torsen differential housing, removing and installing**
- Disassembling and assembling. Refer to **Input shaft, disassembling and assembling**
- Adjusting. Refer to **Input shaft, adjusting**
- Servicing mounting for input shaft. Refer to **Input shaft, disassembling and assembling**

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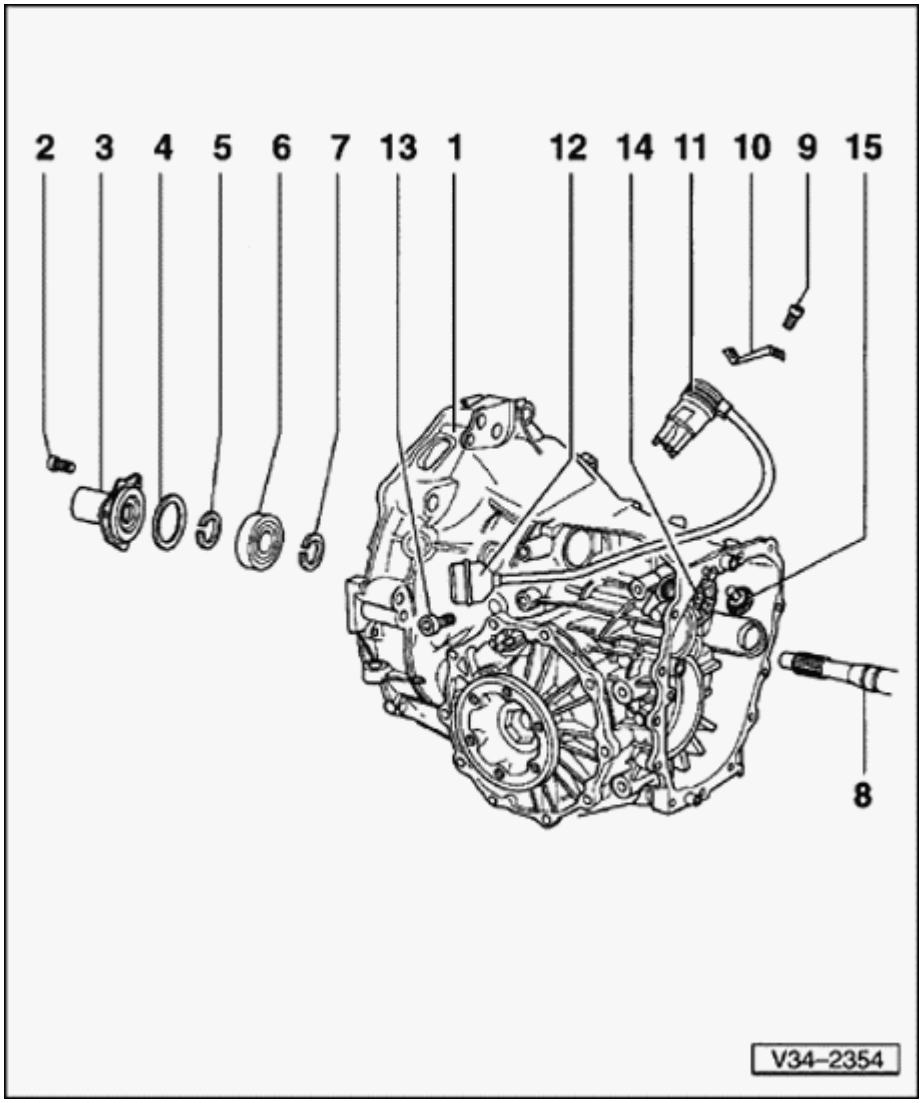


Fig. 156: Transmission Housing, Input Shaft Ball Bearing And Multi-Function Sensor, Overview
Courtesy of VOLKSWAGEN UNITED STATES, INC.

9 - Bolt, 25 Nm

10 - Locking plate

- For multi-function sensor

11 - Multi-function switch

12 - Connector

- For multi-function switch

13 - Bolt, 10 Nm

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14 - Cover for selector shaft

- Removing and installing. Refer to **Transmission shift mechanism, disassembling and assembling**

15 - Locking unit for 5th gear and reverse gear

- Removing and installing. Refer to **Removing and installing locking unit for 5th gear and reverse gear**

Installation position of bleeder valve

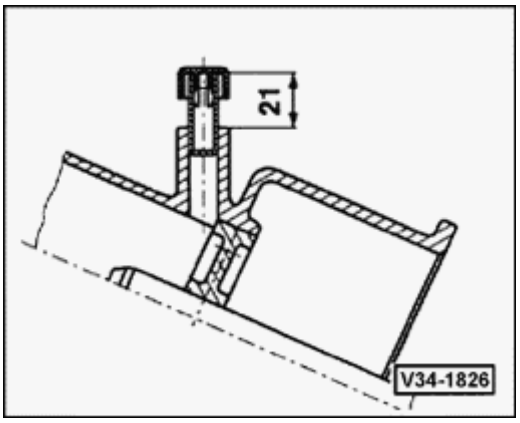


Fig. 157: Identifying Installed Position Of Breather
Courtesy of VOLKSWAGEN UNITED STATES, INC.

When pressed in, bleeder valve must protrude 21 mm out of housing.

Input shaft, pinion, hollow shaft, selector rods, transmission cover and Torsen differential housing, removing and installing

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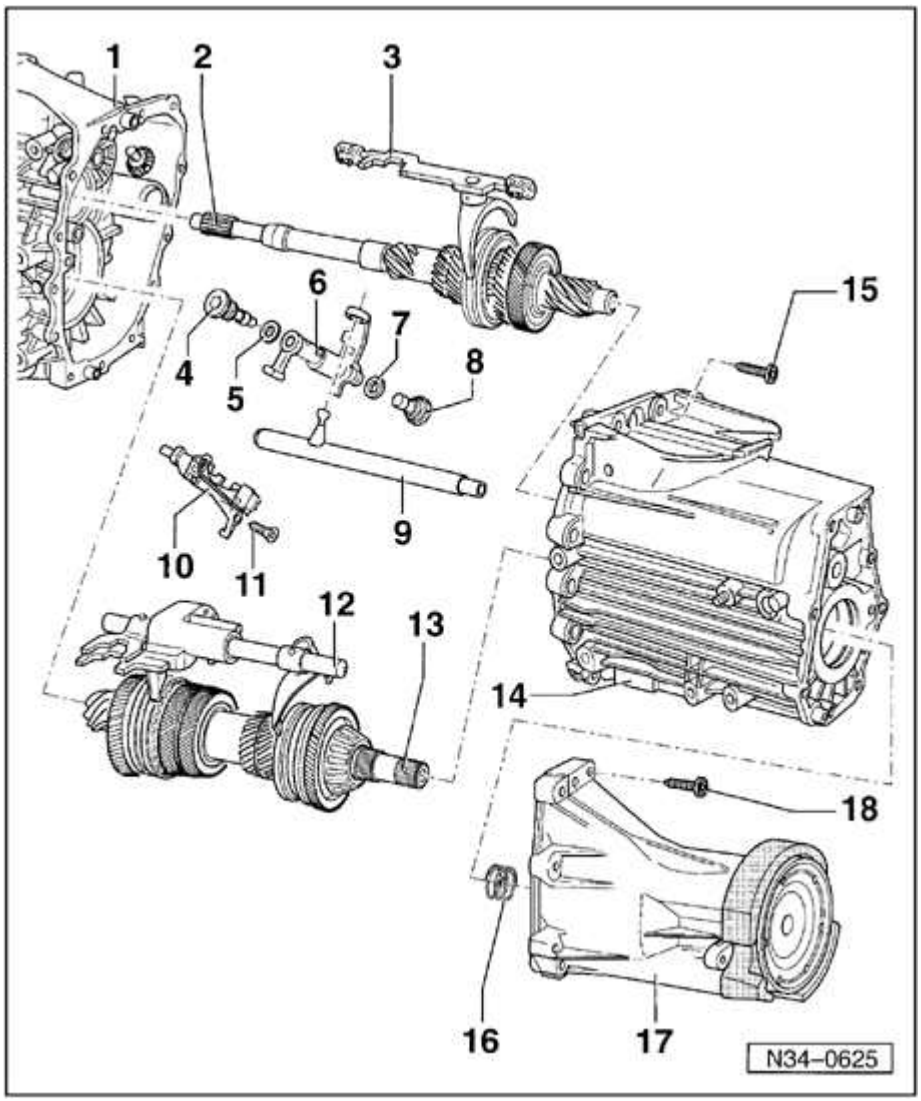


Fig. 158: Input Shaft, Pinion Shaft, Hollow Shaft, Shift Rods, Transmission Cover And Cover With Torsen Differential, Removing And Installing
Courtesy of VOLKSWAGEN UNITED STATES, INC.

1 - Transmission housing

2 - Input shaft

- Disassembling and assembling. Refer to **Input shaft, disassembling and assembling**
- Adjusting. Refer to **Input shaft, adjusting**
- Servicing mounting for input shaft. Refer to **Input shaft, disassembling and assembling**

3 - Selector rod with 3rd and 4th gear selector fork

- Disassembling and assembling. Refer to **Transmission shift mechanism, disassembling and assembling**

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- Replacing mounting bushings. Refer to **Transmission shift mechanism, disassembling and assembling**

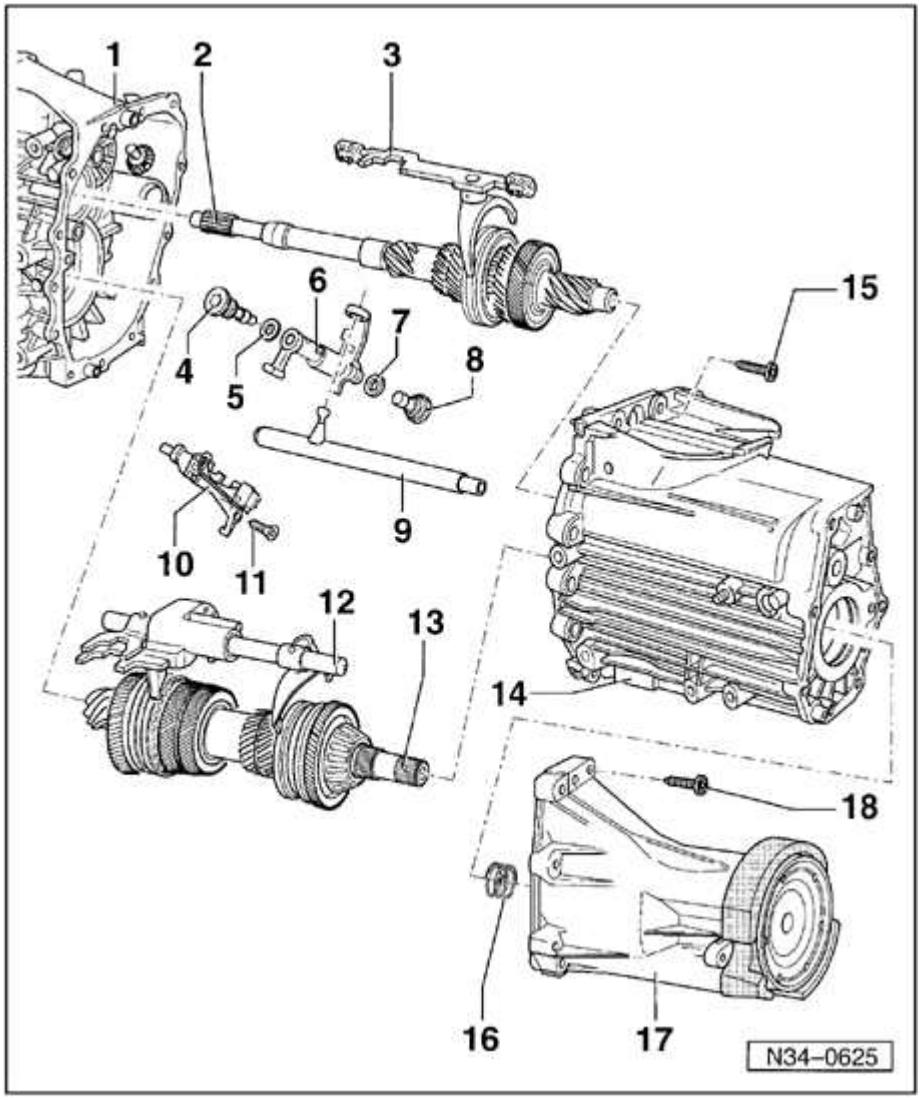


Fig. 159: Input Shaft, Pinion Shaft, Hollow Shaft, Shift Rods, Transmission Cover And Cover With Torsen Differential, Removing And Installing
Courtesy of VOLKSWAGEN UNITED STATES, INC.

4 - Left stop bolt, 40 Nm

5 - Damping washer

6 - Guide shaft

- Installation position. Refer to **Transmission shift mechanism, disassembling and assembling**

7 - Damping washer

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8 - Right stop bolt, 40 Nm

9 - Selector shaft

- Installation position. Refer to **Transmission shift mechanism, disassembling and assembling**
- Replacing oil seal for selector shaft. Refer to **Torsen differential housing, servicing, and Torsen differential, removing and installing**

10 - Detent segment

- Installation position. Refer to **Transmission shift mechanism, disassembling and assembling**

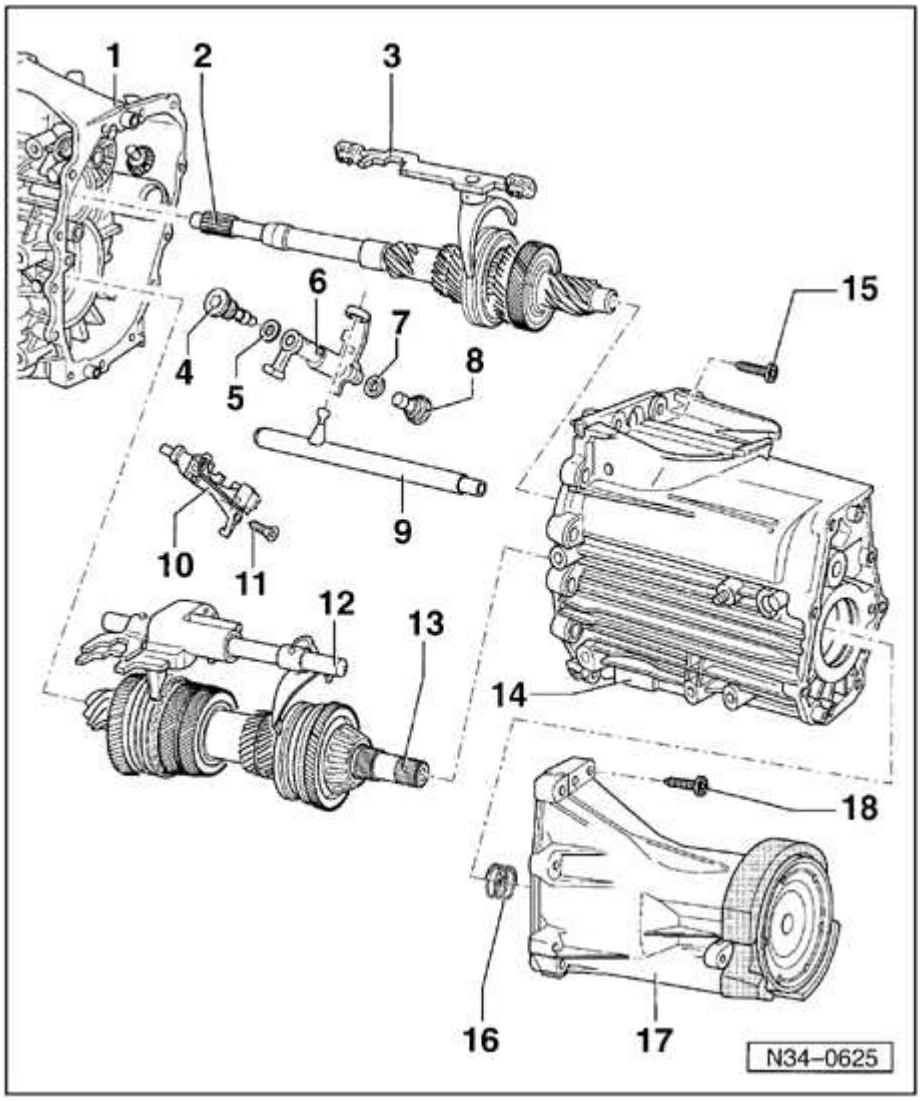


Fig. 160: Input Shaft, Pinion Shaft, Hollow Shaft, Shift Rods, Transmission Cover And Cover With Torsen Differential, Removing And Installing
Courtesy of VOLKSWAGEN UNITED STATES, INC.

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11 - TORX bolt, 25 Nm

- With collar for securing spring of detent segment

12 - Selector rod with selector fork for 1st/2nd/5th and reverse gears

- Disassembling and assembling. Refer to **Transmission shift mechanism, disassembling and assembling**
- Removing and installing ball sleeves. Refer to **Removing and installing ball sleeve**

13 - Pinion with hollow shaft

- Disassembling and assembling. Refer to **Pinion and hollow shaft, disassembling and assembling**
- Adjusting. Refer to **General**
- Servicing mounting for pinion and hollow shaft. Refer to **Pinion and hollow shaft, disassembling and assembling**

14 - Transmission cover

- Removing and installing oil drain plug. See **Removing and installing oil drain plug**

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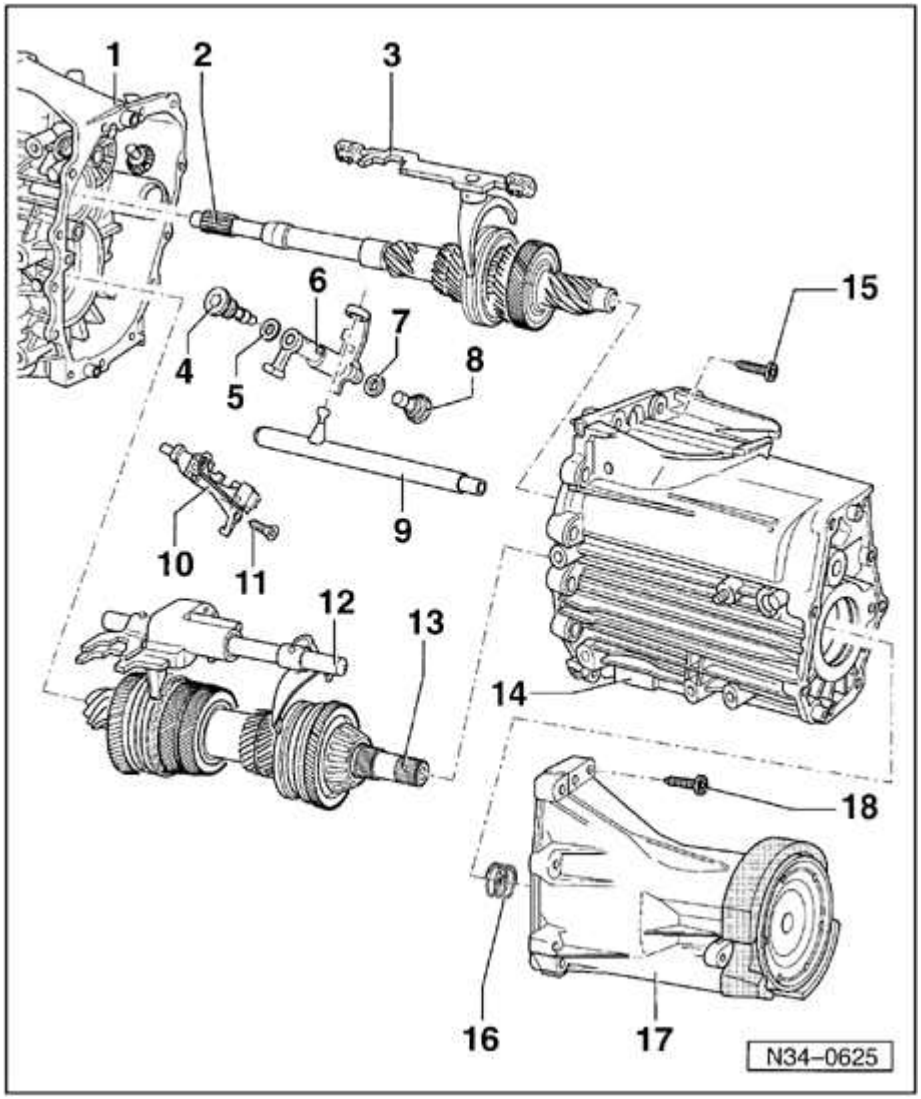


Fig. 161: Input Shaft, Pinion Shaft, Hollow Shaft, Shift Rods, Transmission Cover And Cover With Torsen Differential, Removing And Installing
Courtesy of VOLKSWAGEN UNITED STATES, INC.

15 - TORX bolt, 22 Nm

16 - Spring

17 - Torsen differential housing

- Removing and installing with transmission installed. Refer to **Torsen differential housing, removing and installing**
- Removing Torsen differential from housing, installing. Refer to **Torsen differential housing, servicing, and Torsen differential, removing and installing**
- Servicing housing. Refer to **Torsen differential housing, servicing, and Torsen differential, removing and installing**

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18 - TORX bolt, 22 Nm

Removing and installing oil drain plug

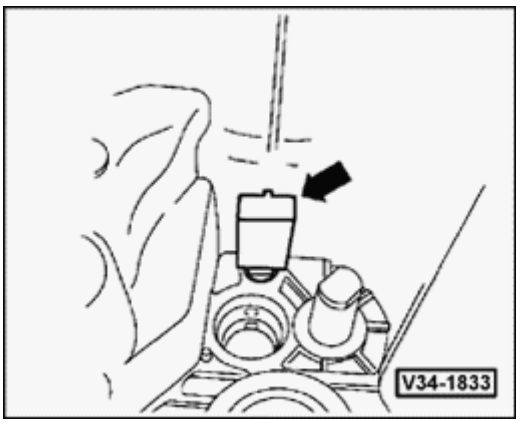


Fig. 162: Identifying Oil Collector Tray
Courtesy of VOLKSWAGEN UNITED STATES, INC.

Removing

- Turn oil drain plug (arrow) and pull out.

Installing

- Push oil drain plug into transmission cover until catch engages.
- Installation position: Oil drain plug faces upward in transmission cover

Ball bearing for input shaft, multi-function sensor, pinion, selector rods, transmission cover and Torsen differential housing, removing and installing

NOTE:

- **The differential does not have to be removed in order to remove the above-mentioned components.**
- **Removal is only necessary when adjustment work must be performed. Refer to Adjustment table.**

Special tools, testers and other items required

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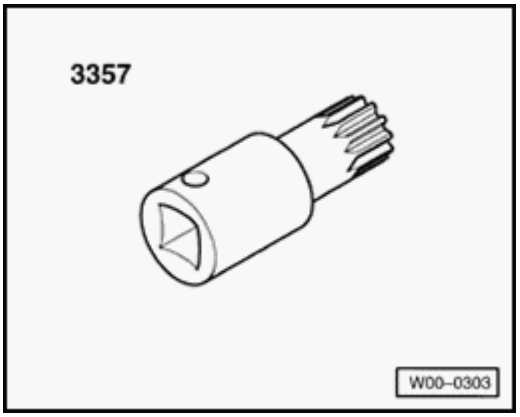
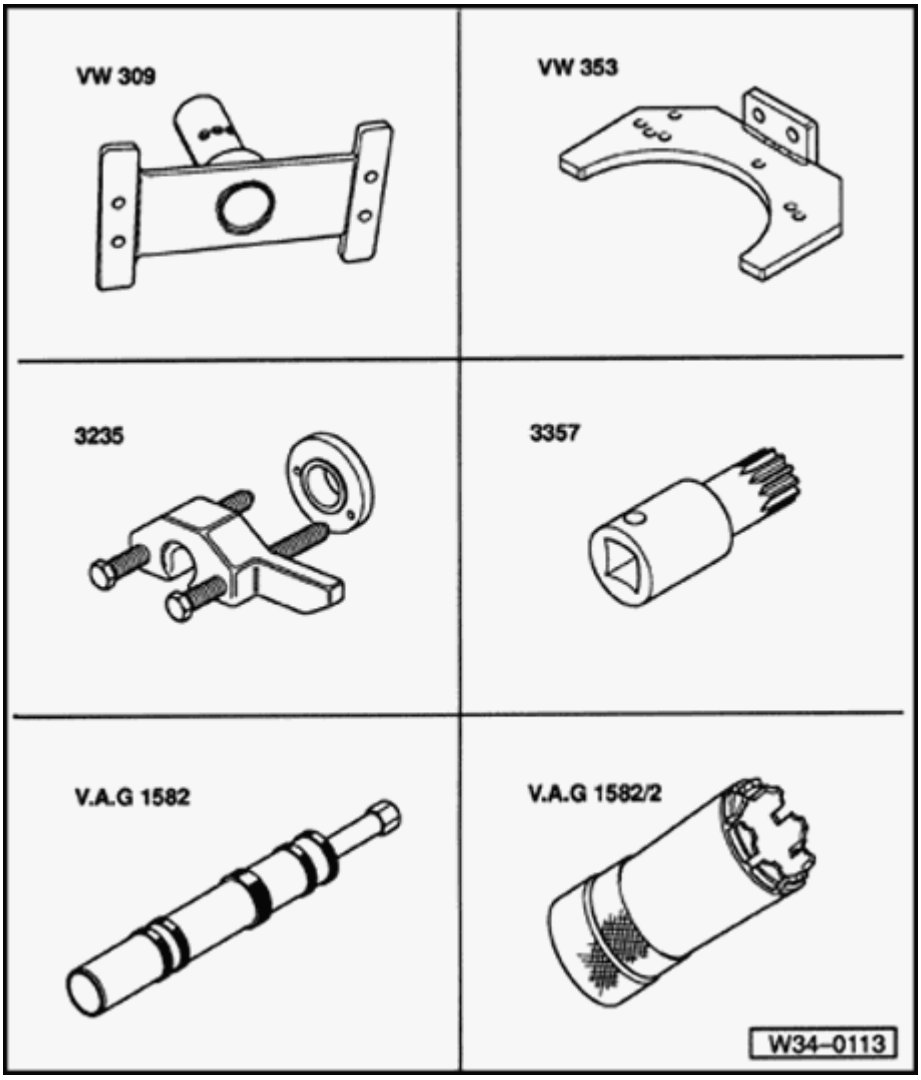


Fig. 163: Identifying Triple Square Socket Driver 3357
Courtesy of VOLKSWAGEN UNITED STATES, INC.

- Allen key extension 3357



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Fig. 164: Identifying Special Tools - Disassembly And Assembly
Courtesy of VOLKSWAGEN UNITED STATES, INC.

Special tools and workshop equipment required

- VW 309 Holding plate
- VW 353 Transmission support
- 3235 Pressing-in tool
- 3357 Allen key extension
- V.A.G 1582 Tapered roller bearing puller
- V.A.G 1582/2 Gripper

Special tools and workshop equipment required

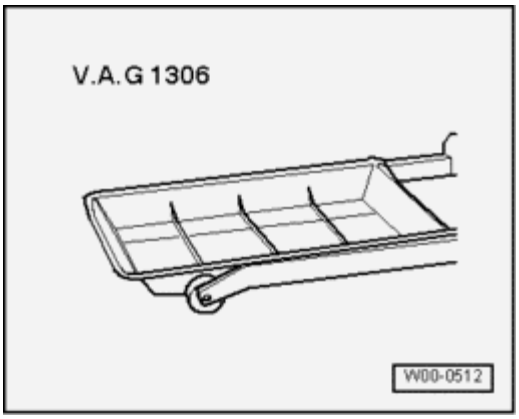


Fig. 165: Identifying Drip Tray V.A.G 1306
Courtesy of VOLKSWAGEN UNITED STATES, INC.

- V.A.G 1306 Drip tray

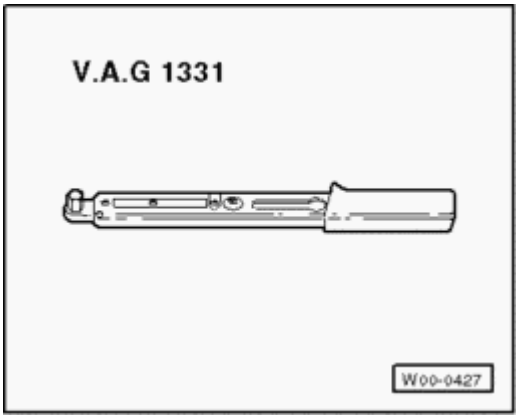


Fig. 166: Identifying Torque Wrench V.A.G. 1331
Courtesy of VOLKSWAGEN UNITED STATES, INC.

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- V.A.G 1331 Torque wrench
- Sealant AMV 188 001 02

Removing

- Place drip tray V.A.G 1306 under transmission.
- Drain oil using Allen key extension 3357.

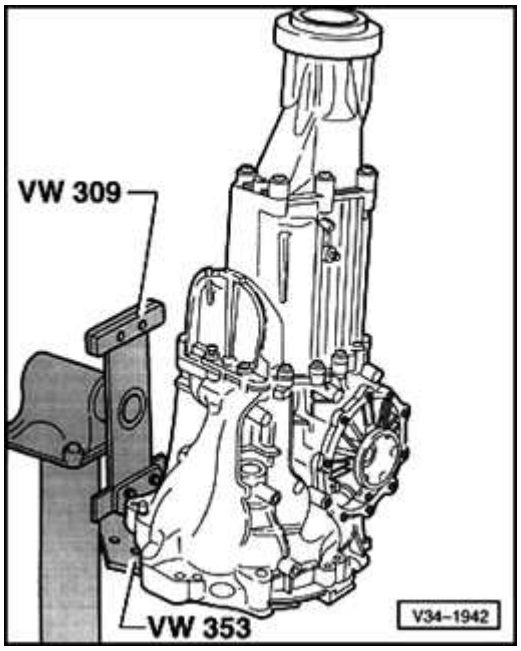
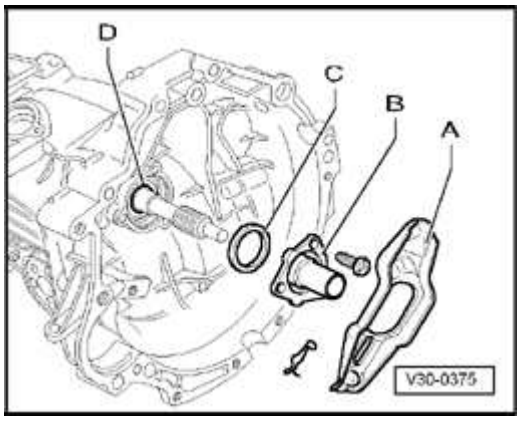


Fig. 167: Securing Transmission In Assembly Stand
Courtesy of VOLKSWAGEN UNITED STATES, INC.

- Clamp transmission in repair stand.

NOTE:

- **To protect oil seal, pull shrink down tube over splines of input shaft before pulling off guide sleeve.**



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Fig. 168: Clutch Release Lever Components
Courtesy of VOLKSWAGEN UNITED STATES, INC.

- Remove clutch release lever -A- with release bearing.
- Remove guide sleeve -B-.
- Remove washer -C-.
- Remove circlip -D- in front of input shaft ball bearing.

- Make a note of thickness of circlip if not replacing ball bearing, input shaft or transmission housing.

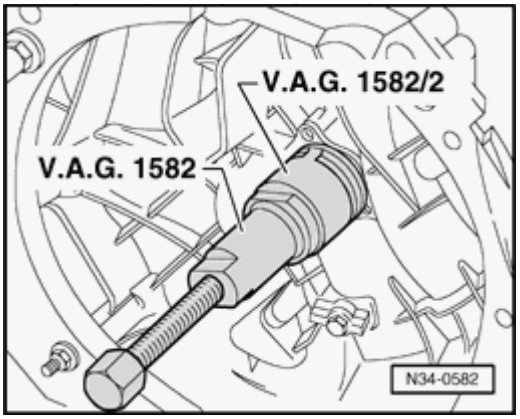


Fig. 169: Pulling Input Shaft Ball Bearing Out Of Transmission Housing
Courtesy of VOLKSWAGEN UNITED STATES, INC.

- Pull ball bearing of input shaft out of transmission housing.

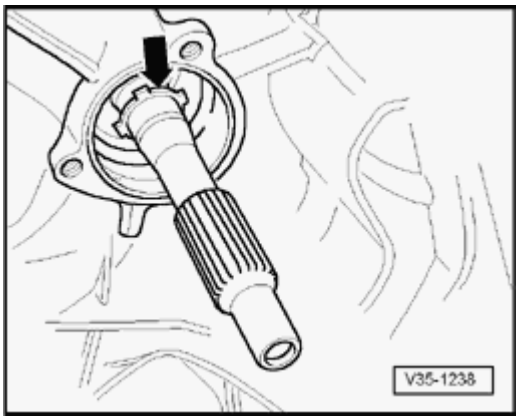


Fig. 170: Location Of Rear Circlip For Input Shaft Ball Bearing
Courtesy of VOLKSWAGEN UNITED STATES, INC.

- Remove circlip (arrow) behind input shaft ball bearing.
- Make a note of thickness of circlip if not replacing ball bearing, input shaft or transmission housing.

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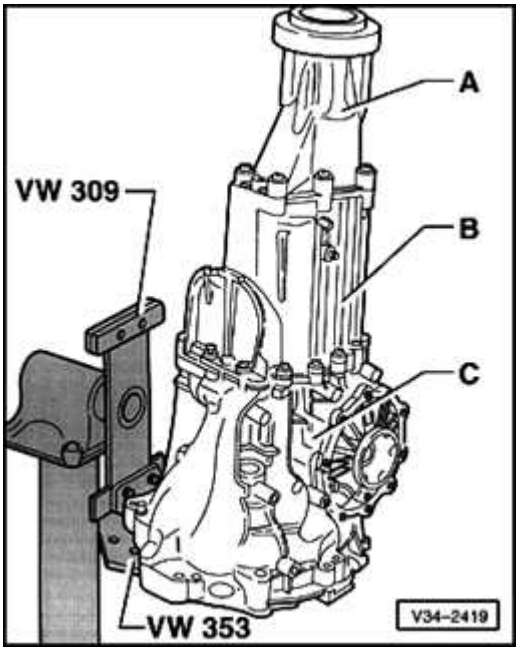


Fig. 171: Identifying Cover, Transmission Cover , and Transmission Housing
Courtesy of VOLKSWAGEN UNITED STATES, INC.

- Disconnect Torsen differential housing -A- from transmission cover -B-.
- Remove spring from pinion.
- Remove transmission cover -B- from transmission housing -C-.

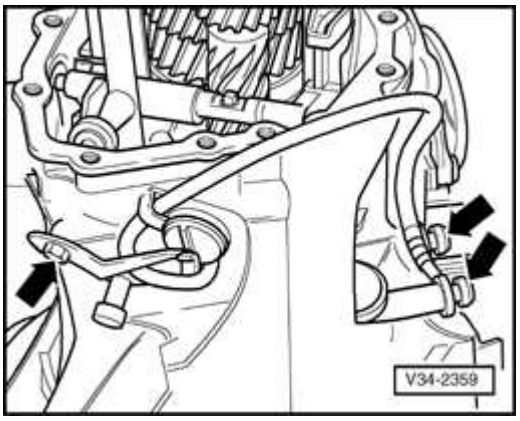


Fig. 172: Location Of Multi-Function Sensor
Courtesy of VOLKSWAGEN UNITED STATES, INC.

- Remove bolts (arrows) and pull out multi-function switch.

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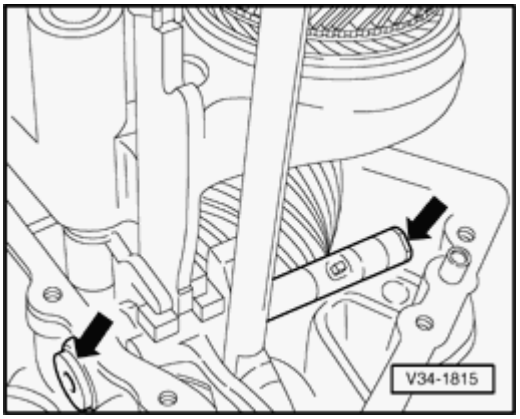


Fig. 173: Identifying Threaded Bolts At Both Ends Of Relay Shaft
Courtesy of VOLKSWAGEN UNITED STATES, INC.

- Remove bolts for guide shaft (arrows).

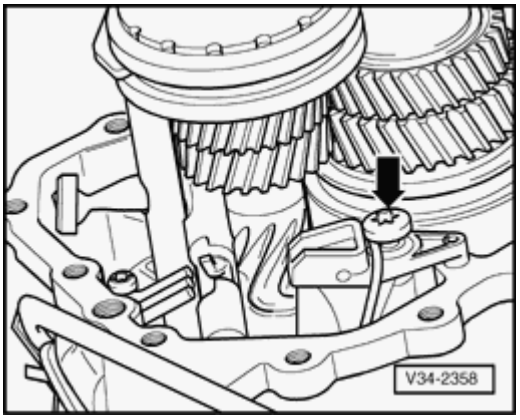


Fig. 174: Identifying Shift Detent Fastener
Courtesy of VOLKSWAGEN UNITED STATES, INC.

- Remove screw for detent segment (arrow) and remove segment by swivelling out.

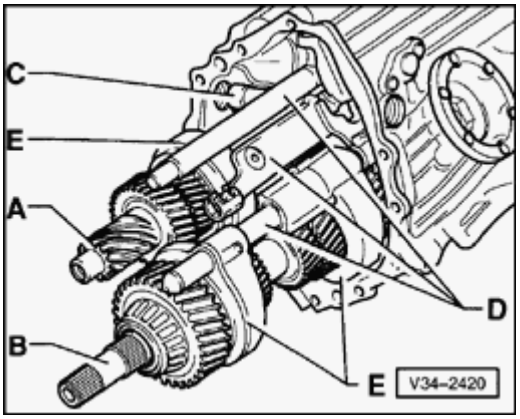


Fig. 175: Identifying Input Shaft, Pinion Shaft , Relay Shaft , Shift Rods and Shift Forks
Courtesy of VOLKSWAGEN UNITED STATES, INC.

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- Carefully pull out input shaft -A-, pinion -B-, guide shaft -C-, selector rods -D- and selector shaft and selector forks -E- altogether.

Installing

NOTE: If the input shaft ball bearing, the input shaft or the transmission housing have been replaced, first define the thickness of the circlips for the input shaft. Refer to Input shaft, adjusting.

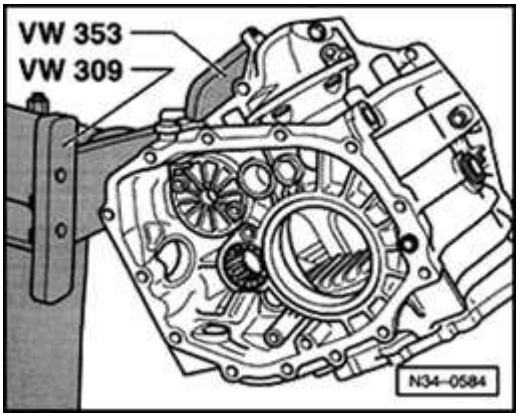


Fig. 176: Swing Transmission Housing Into Position Shown
Courtesy of VOLKSWAGEN UNITED STATES, INC.

- Swivel transmission housing into position as illustrated. It is then easier to insert components mentioned below.

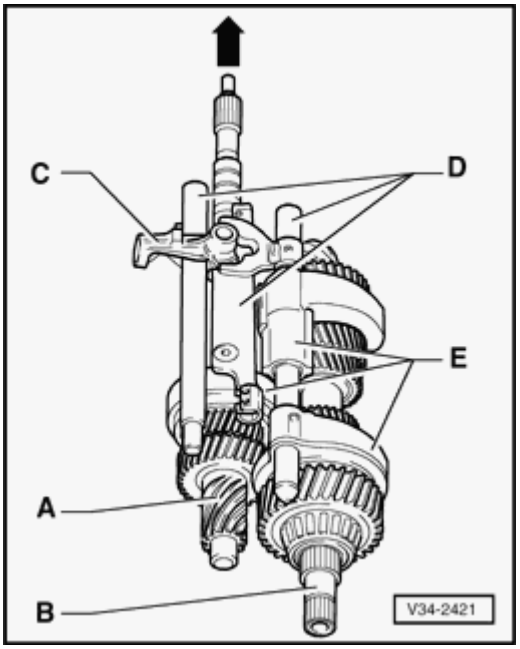


Fig. 177: Identifying Input Shaft, Pinion Shaft , Relay Shaft , Selector Rods and Selector Forks
Courtesy of VOLKSWAGEN UNITED STATES, INC.

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- Assemble input shaft -A-, pinion -B-, guide shaft -C-, selector rods -D- and selector shaft and selector forks -E-.
- Insert these components in transmission housing altogether.

NOTE: Guide shaft -C- and selector shaft can also be inserted afterward if necessary. Refer to Fig. 178 and Fig. 180.

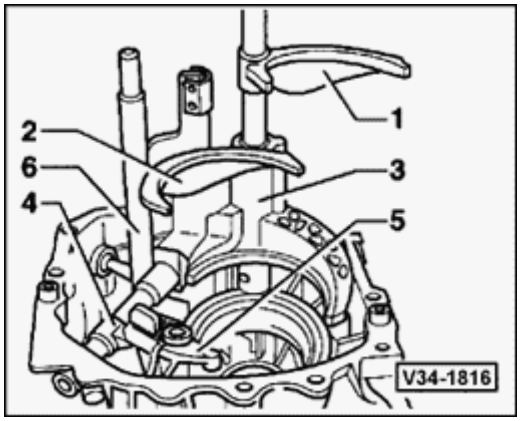


Fig. 178: Identifying Installed Position Of Complete Selector Mechanism In Transmission
Courtesy of VOLKSWAGEN UNITED STATES, INC.

Position of shift mechanism in transmission

1 - 5th and reverse gear selector fork

2 - 3rd and 4th gear selector fork

3 - 1st and 2nd gear selector fork

4 - Guide shaft

5 - Shifting catch

6 - Selector shaft

NOTE: Shown in illustration without input shaft and pinion.

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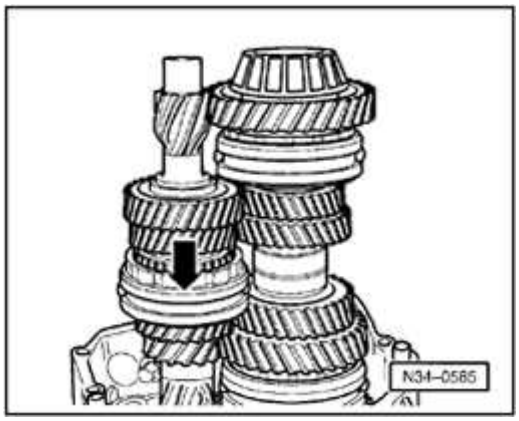


Fig. 179: Move Transmission To Engage 3rd Gear
Courtesy of VOLKSWAGEN UNITED STATES, INC.

- Swivel transmission housing and then engage 3rd gear (direction of arrow).

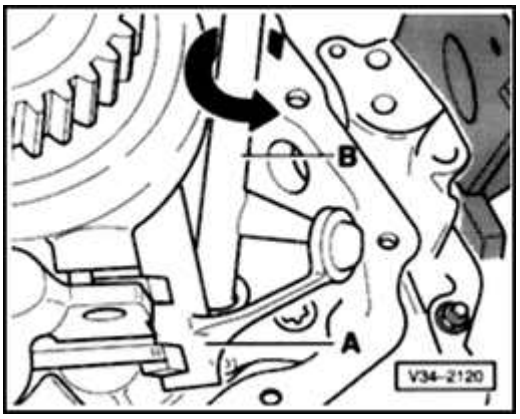


Fig. 180: Installing Relay Shaft And Shift Rod
Courtesy of VOLKSWAGEN UNITED STATES, INC.

- Insert guide shaft -A-.
- Place selector shaft -B- sideways in hole in transmission housing and join to retaining eyelet.
- Swivel selector shaft carefully in direction of arrow.

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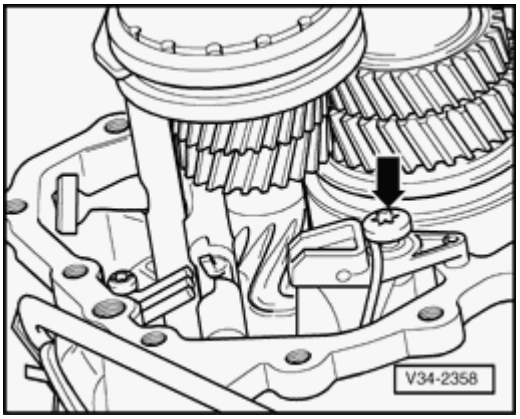


Fig. 181: Identifying Shift Detent Fastener
Courtesy of VOLKSWAGEN UNITED STATES, INC.

- Insert detent segment and tighten screw (arrow).

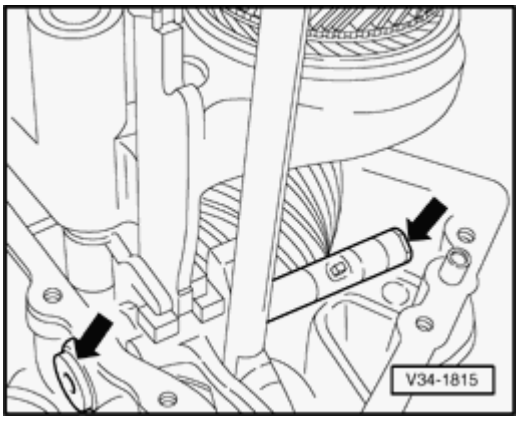


Fig. 182: Identifying Threaded Bolts At Both Ends Of Relay Shaft
Courtesy of VOLKSWAGEN UNITED STATES, INC.

- Install bolts for guide shaft (arrows)
- Replace O-ring for multi-function switch.

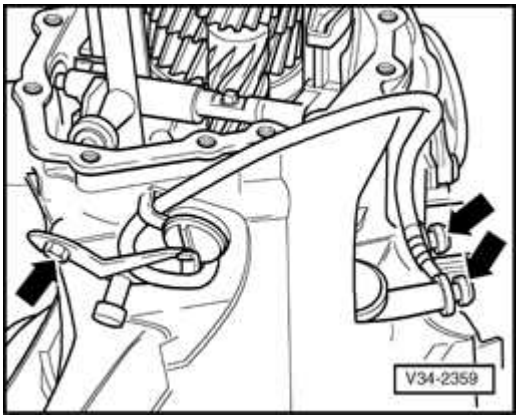


Fig. 183: Location Of Multi-Function Sensor

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Courtesy of VOLKSWAGEN UNITED STATES, INC.

- Carefully insert multi-function switch and tighten screws (arrows).

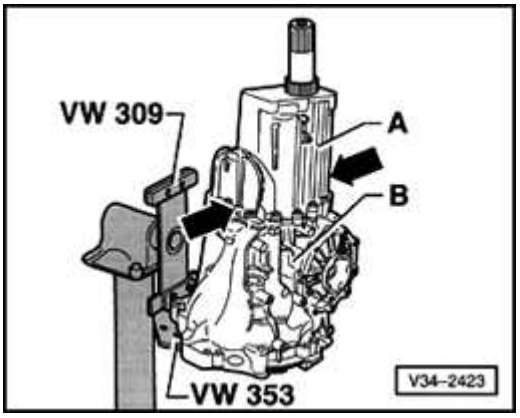


Fig. 184: Identifying Cover and Transmission Cover
Courtesy of VOLKSWAGEN UNITED STATES, INC.

- Check whether dowel sleeves for transmission cover -A- (arrows) are present in transmission housing -B-.
- Install transmission cover on transmission housing.

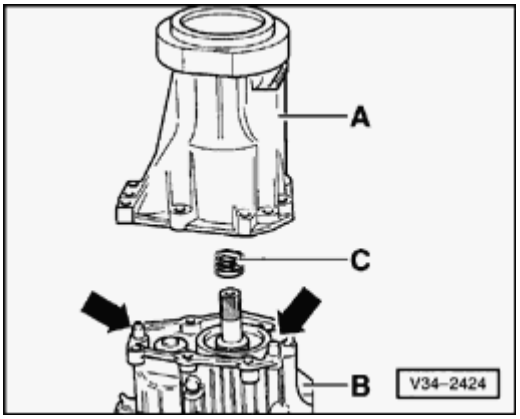


Fig. 185: Identifying Cover, Transmission Cover , and Compression Spring
Courtesy of VOLKSWAGEN UNITED STATES, INC.

- Check whether dowel sleeves for housing -A- (arrows) are present in transmission cover -B-.
- Install spring -C-.
- Install Torsen differential housing -A- on transmission cover -B-.

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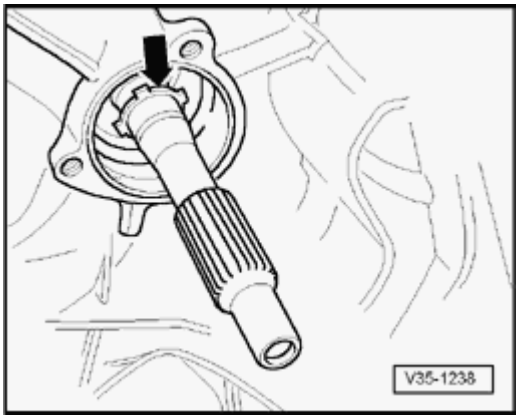


Fig. 186: Location Of Rear Circlip For Input Shaft Ball Bearing
Courtesy of VOLKSWAGEN UNITED STATES, INC.

- Remove rear circlip (arrow) for input shaft ball bearing.
- Push ball bearing onto input shaft.

- Installation position: Solid side of ball cage faces transmission housing

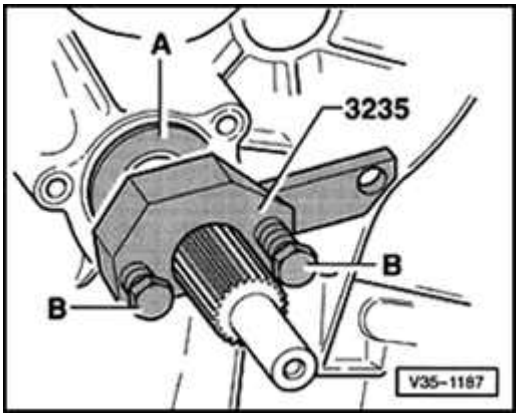


Fig. 187: Pressing In Ball Bearing
Courtesy of VOLKSWAGEN UNITED STATES, INC.

- Press in ball bearing:

- Push thrust pad -A- of pressing-in tool onto input shaft.
- Position pressing-in tool behind splines for clutch plate.
- Pre-load bolts -B-.

- Bolts are supported in counterbores of thrust pad -A-

- Press ball bearing in as far as it will go by tightening bolts alternately (1/2 turn).

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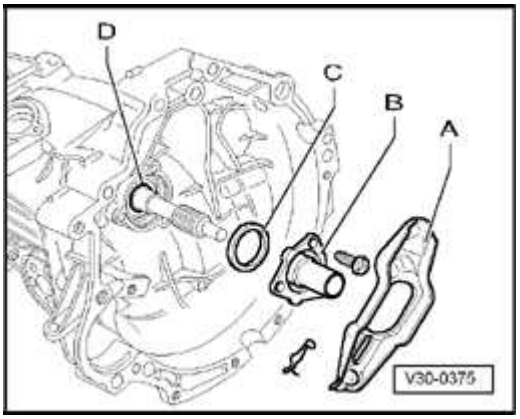


Fig. 188: Clutch Release Lever Components
Courtesy of VOLKSWAGEN UNITED STATES, INC.

- Install front circlip -D- for input shaft ball bearing.
- Mount dished washer -C-.

- Installation position: Convex side faces guide sleeve -B-

NOTE:

- **To protect oil seal, pull shrink down tube over splines of input shaft before pushing on guide sleeve.**
- **Replace guide sleeve together with oil seal and O-ring.**

- Install new guide sleeve -B- for release bearing.
- Install clutch release lever -A- and release bearing.

TORSEN DIFFERENTIAL HOUSING, SERVICING, AND TORSEN DIFFERENTIAL, REMOVING AND INSTALLING

Torsen differential housing, servicing, and Torsen differential, removing and installing

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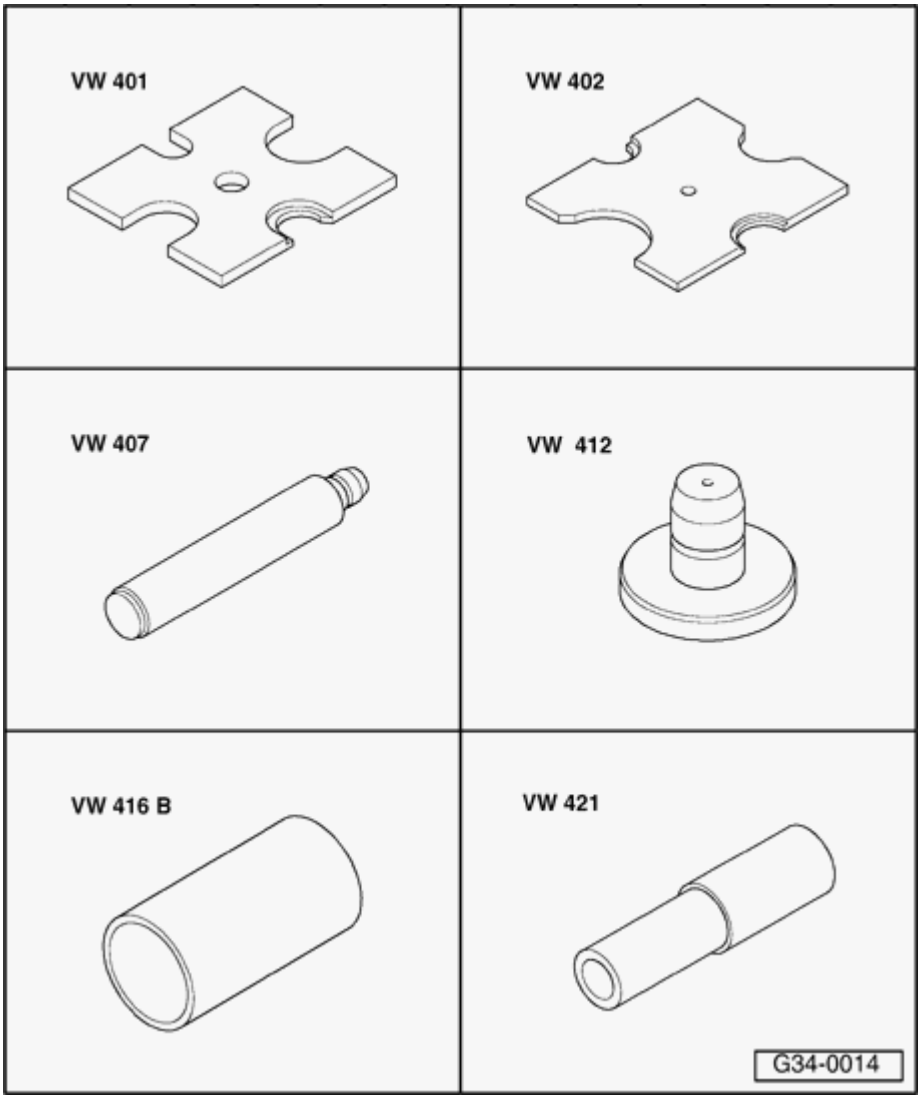


Fig. 189: Identifying Special Tools - Torsen Differential Housing, Servicing, And Torsen Differential, Removing And Installing (1 Of 2)
Courtesy of VOLKSWAGEN UNITED STATES, INC.

Special tools and workshop equipment required

- VW 401 Pressure plate
- VW 402 Pressure plate
- VW 407 Press tool
- VW 412 Press tool
- VW 416 B Tubular section
- VW 421 Tubular section

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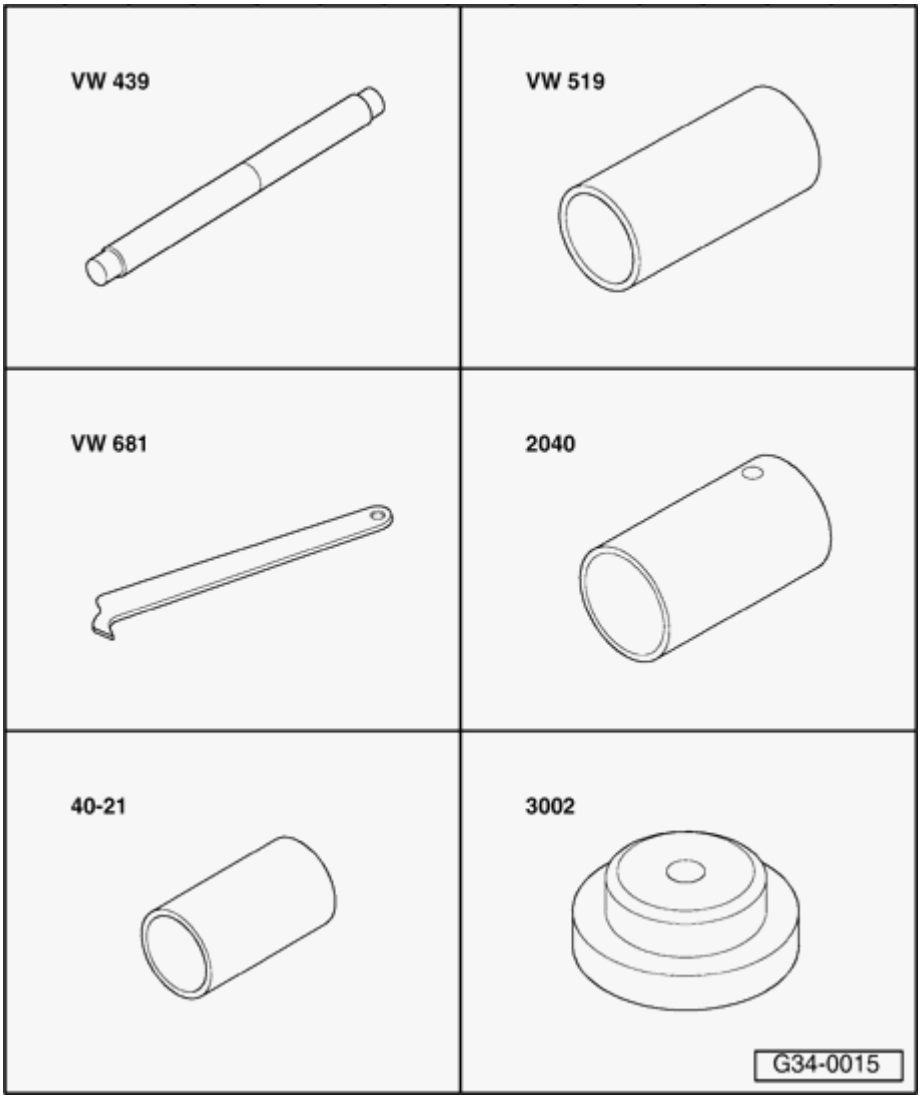


Fig. 190: Identifying Special Tools - Torsen Differential Housing, Servicing, And Torsen Differential, Removing And Installing (2 Of 2)
Courtesy of VOLKSWAGEN UNITED STATES, INC.

- VW 439 Guide section
- VW 519 Tubular section
- VW 681 Extractor lever
- 40-21 Sleeve
- 2040 Tubular section
- 3002 Pressure piece

Special tools, testers and other items required

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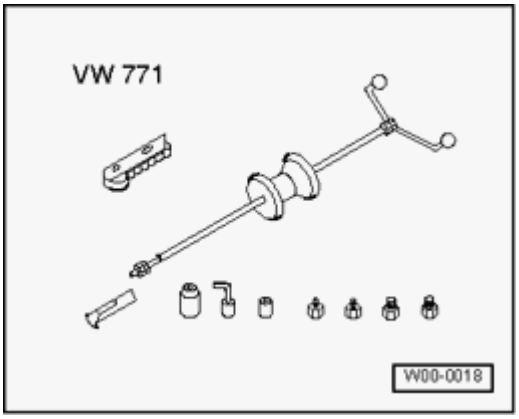


Fig. 191: Slide Hammer-Multi-Purpose Tool Set VW 771
Courtesy of VOLKSWAGEN UNITED STATES, INC.

- VW 771/15 from universal tools VW 771

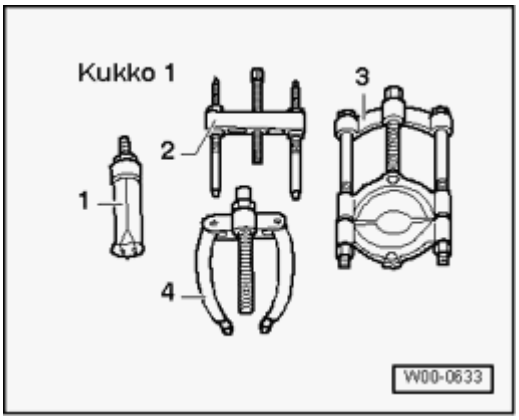


Fig. 192: Kukko 21/2 Internal puller, Kukko 21/4 Internal puller, Kukko 22/2 Counter support
Courtesy of VOLKSWAGEN UNITED STATES, INC.

- Separating tool Kukko 17/2
- Internal puller Kukko 21/4

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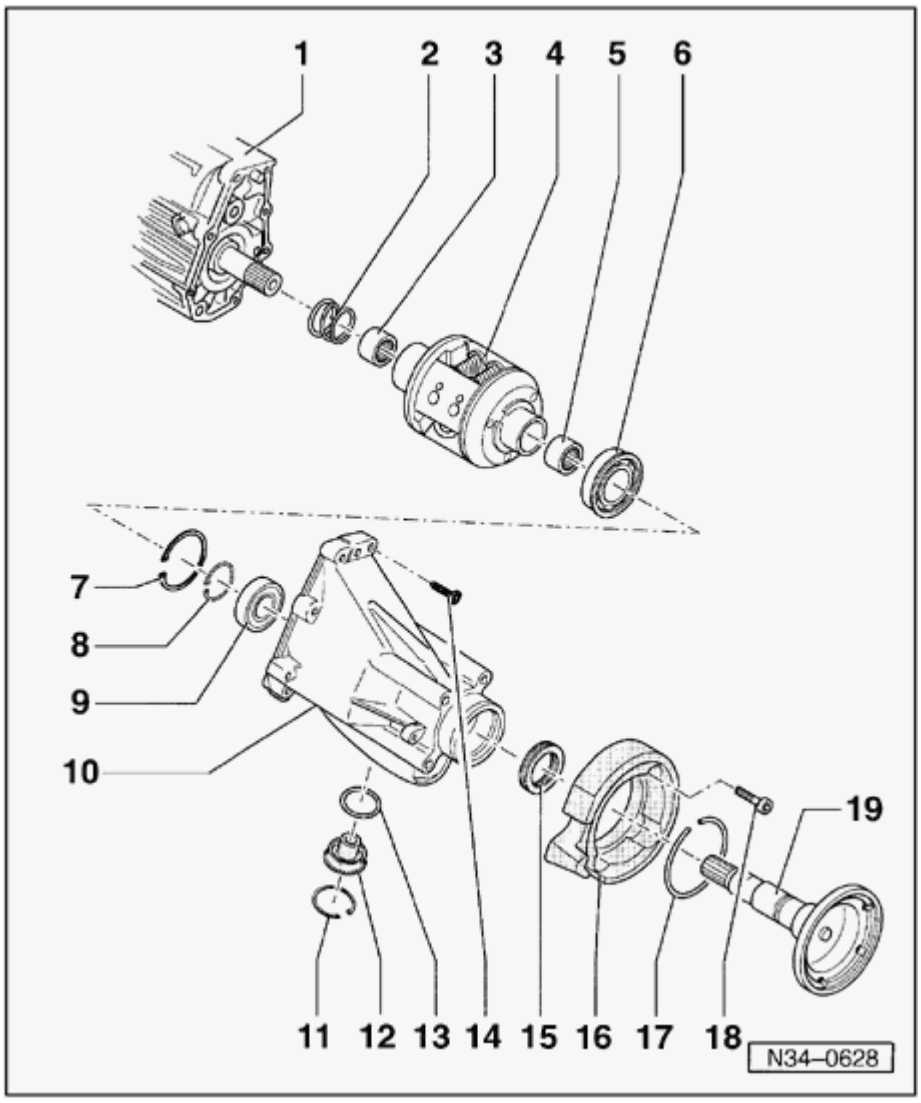


Fig. 193: Transmission Cover, Overview
Courtesy of VOLKSWAGEN UNITED STATES, INC.

1 - Transmission cover

2 - Spring

3 - Front needle bearing

- Extracting. See **Extracting needle bearing**
- Installation position. See **Installation position of front needle bearing**
- Pressing in. See **Pressing in needle bearing**

4 - Torsen differential

- Do not disassemble

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- Press out after removing flange shaft. See **Pressing out Torsen differential**
- Replace if damaged
- Pressing in. See **Pressing in Torsen differential**

5 - Rear needle bearing

- Extracting. See **Extracting needle bearing**
- Installation position. See **Installation position of rear needle bearing**
- Pressing in. See **Pressing in needle bearing**

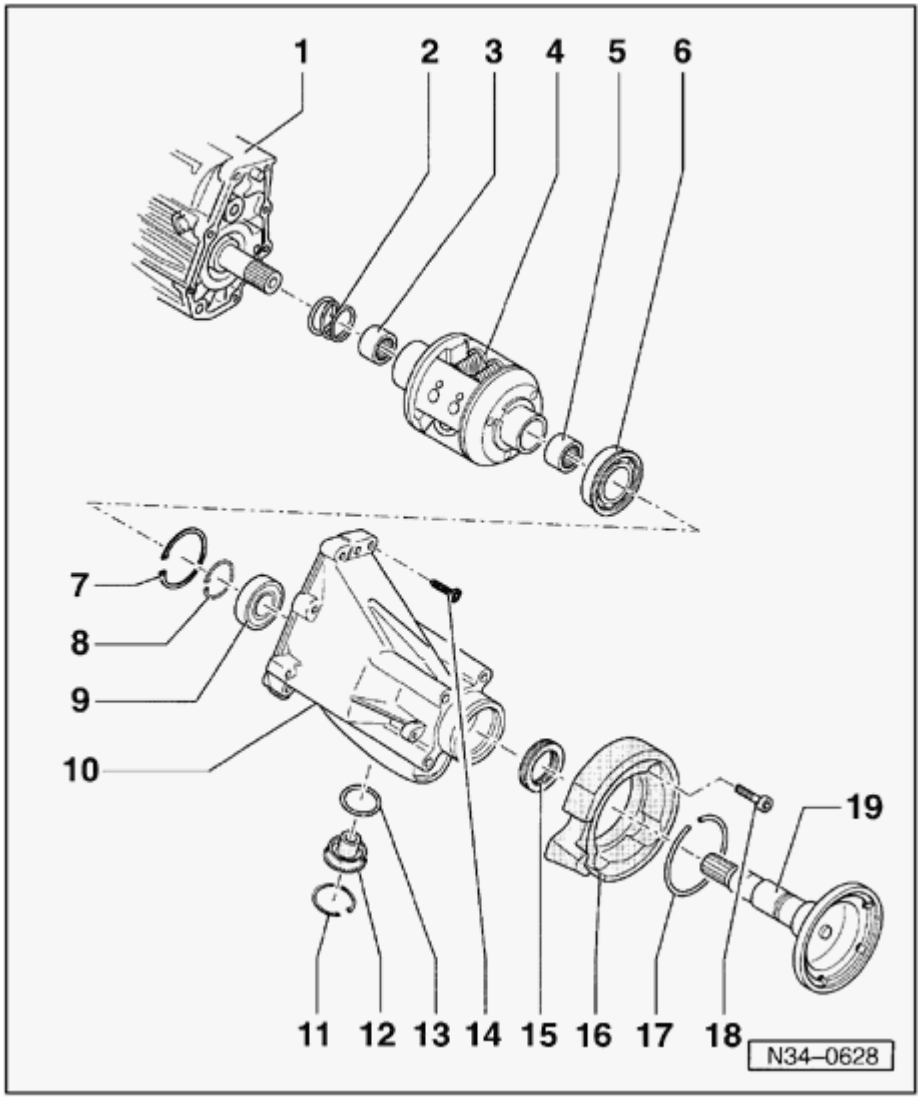


Fig. 194: Transmission Cover, Overview
Courtesy of VOLKSWAGEN UNITED STATES, INC.

6 - Ball bearing

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- For Torsen differential
- Pressing off. See **Pressing off ball bearing of Torsen differential**
- Pressing on. See **Pressing ball bearing onto Torsen differential**

7 - Circlip

8 - Circlip

- Remove and install together with drive flange. See **Removing and installing drive flange**

9 - Ball bearing

- For drive flange
- Pressing out. See **Pressing out ball bearing for drive flange**
- Pressing in. See **Pressing in ball bearing for drive flange**

10 - Torsen differential housing

- For Torsen differential

11 - Circlip

12 - Sealing cap

- Removing. See **Removing sealing cap**

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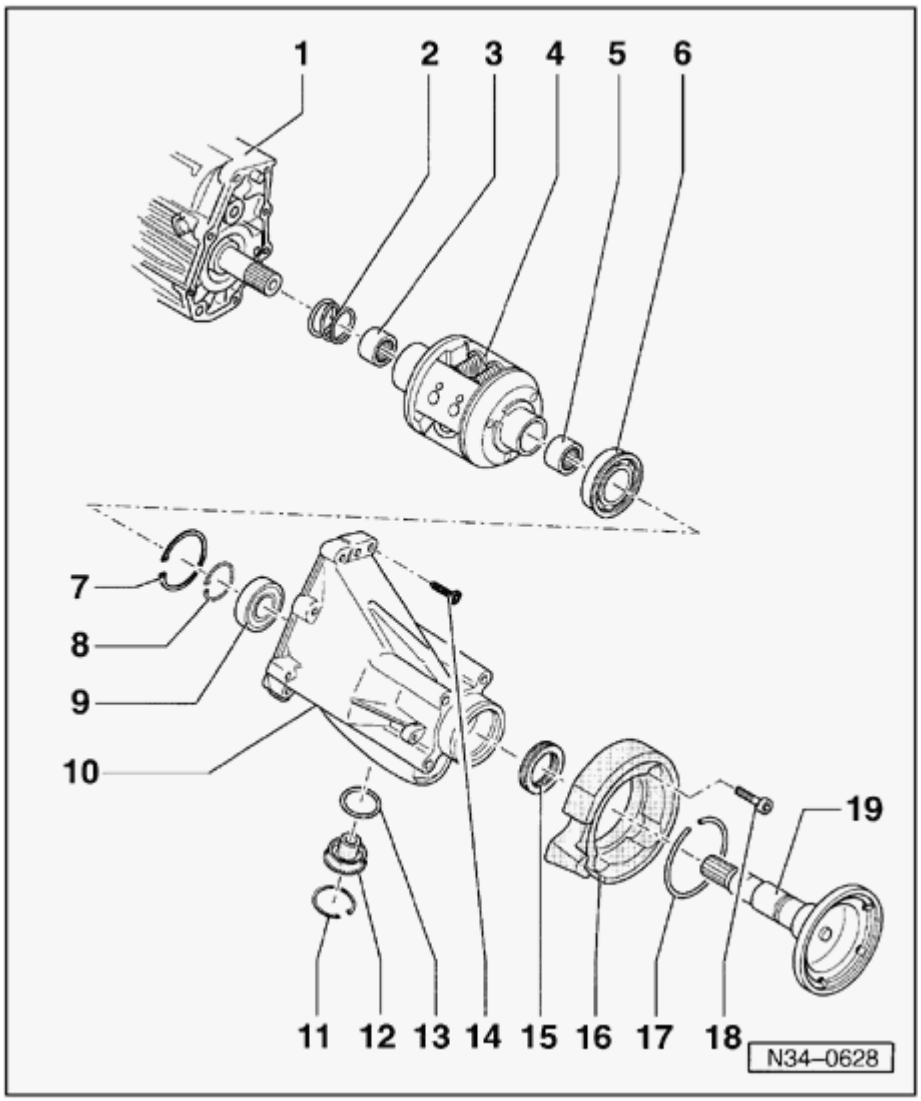


Fig. 195: Transmission Cover, Overview
Courtesy of VOLKSWAGEN UNITED STATES, INC.

13 - O-ring

- Always replace
- Install with grease

14 - TORX bolt, 22 Nm

15 - Oil seal

- Extract with extractor lever VW 681
- Driving in. See **Driving in oil seal**

16 - Dampener

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17 - Circlip

18 - TORX bolt, 35 Nm

- Self-locking
- Always replace

19 - Drive flange

- Removing and installing. See **Removing and installing drive flange**

Removing sealing cap

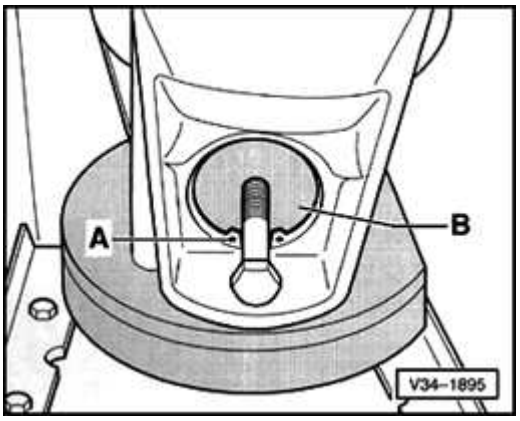


Fig. 196: Identifying Circlip And Sealing Cap
Courtesy of VOLKSWAGEN UNITED STATES, INC.

- Remove circlip -A-.
- Install an M8 bolt into threaded hole of sealing cap -B-.
- Pull out sealing cap -B- with bolt.

Removing and installing drive flange

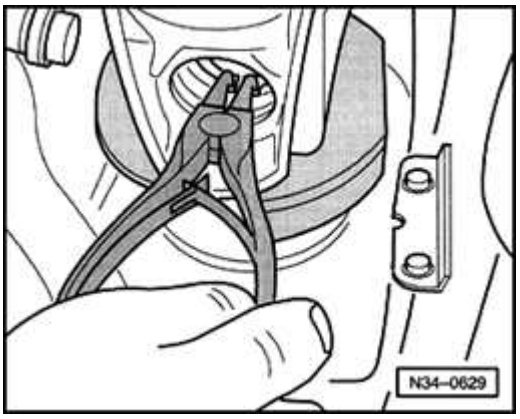


Fig. 197: Drive Flange, Removal And Installation

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Courtesy of VOLKSWAGEN UNITED STATES, INC.

- Expand circlip and pull out drive flange.

NOTE:

- **When installing drive flange circlip must be installed at same time.**
- **Circlip must be properly positioned in groove.**

Pressing out Torsen differential

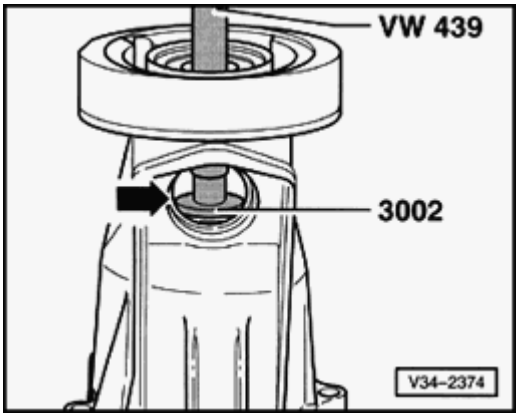


Fig. 198: Pressing Out Torsen Differential
Courtesy of VOLKSWAGEN UNITED STATES, INC.

- Place pressure piece 3002 through hole (arrow) directly onto Torsen differential.

Pressing off ball bearing of Torsen differential

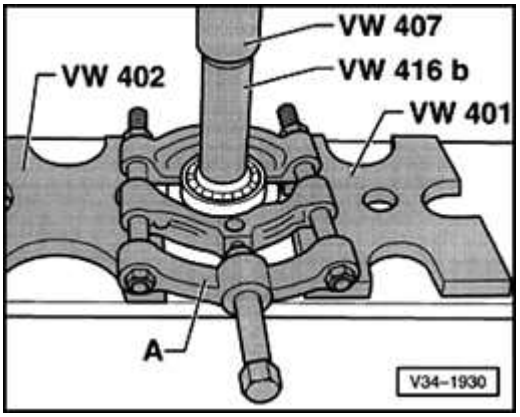


Fig. 199: Pressing Off Ball Bearing From Torsen Differential
Courtesy of VOLKSWAGEN UNITED STATES, INC.

A - Separating tool 22 to 115 mm, e.g. Kukko 17/2

Pressing ball bearing onto Torsen differential

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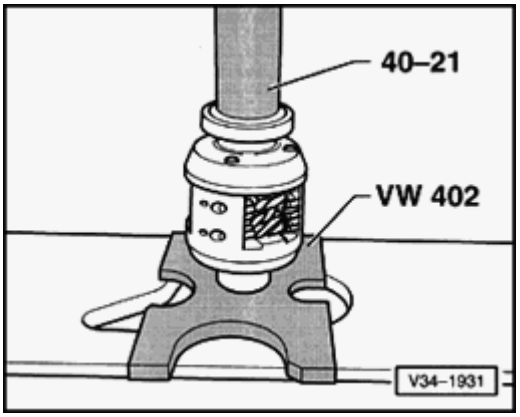


Fig. 200: Pressing On Ball Bearing On Torsen Differential
Courtesy of VOLKSWAGEN UNITED STATES, INC.

- Press on ball bearing as far as it will go.

Pressing out ball bearing for drive flange

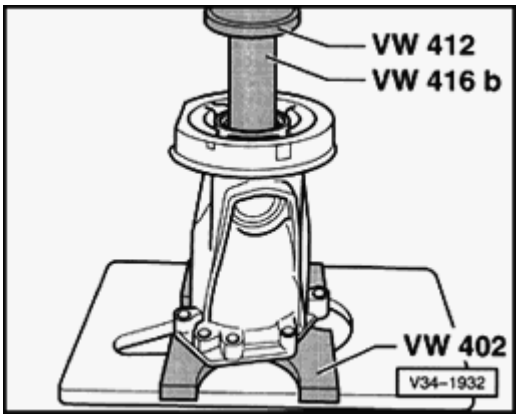


Fig. 201: Pressing Out Ball Bearing For Flange Shaft
Courtesy of VOLKSWAGEN UNITED STATES, INC.

- Remove circlip before pressing out.

Pressing in ball bearing for drive flange

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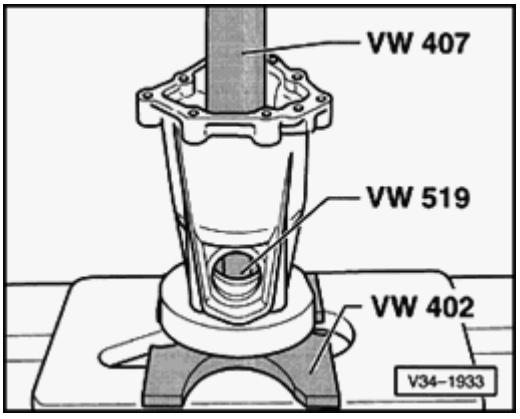


Fig. 202: Pressing In Ball Bearing For Flange Shaft
Courtesy of VOLKSWAGEN UNITED STATES, INC.

- Install circlip after pressing in.

Extracting needle bearing

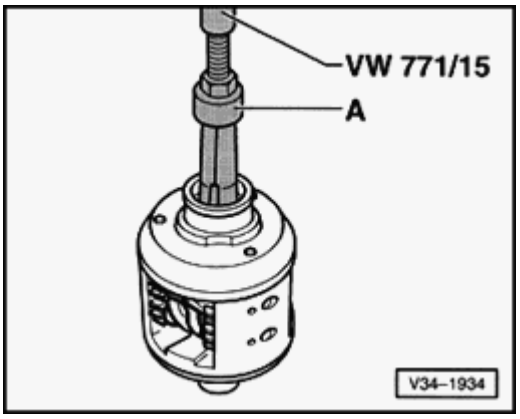


Fig. 203: Pulling Out Needle Bearing
Courtesy of VOLKSWAGEN UNITED STATES, INC.

A - Internal puller, e. g. Kukko 21/4, 22 to 28 mm

Both needle bearings in Torsen differential are extracted using the same internal puller.

Installation position of front needle bearing

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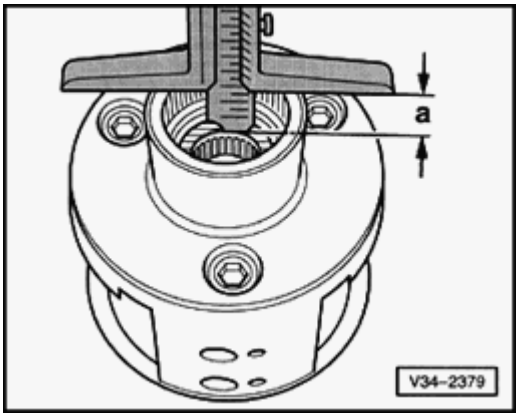


Fig. 204: Installation Position Of Front Needle Bearing
Courtesy of VOLKSWAGEN UNITED STATES, INC.

- Dimension a = 32.5 mm

Installation position of rear needle bearing

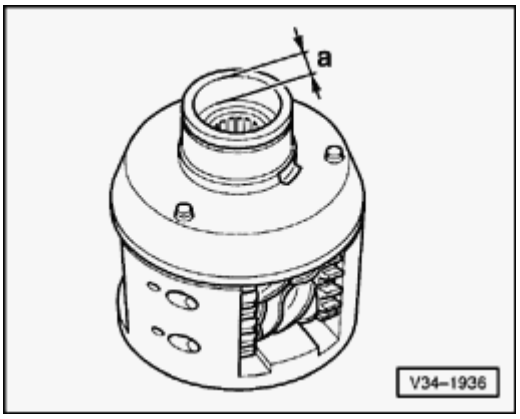


Fig. 205: Installation Position Of Rear Needle Bearing, Dimension
Courtesy of VOLKSWAGEN UNITED STATES, INC.

- Dimension a = 14 mm

Pressing in needle bearing

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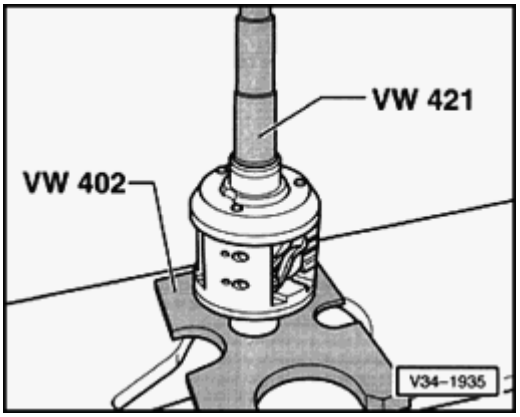


Fig. 206: Pressing In Needle Bearing
Courtesy of VOLKSWAGEN UNITED STATES, INC.

Both needle bearings in Torsen differential are pressed in using the same special tool.

Pressing in Torsen differential

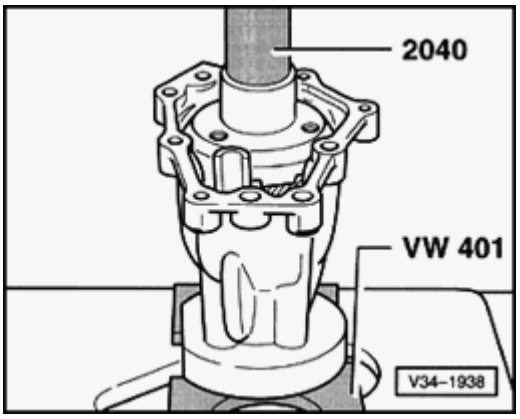


Fig. 207: Pressing In Torsen Differential
Courtesy of VOLKSWAGEN UNITED STATES, INC.

Driving in oil seal

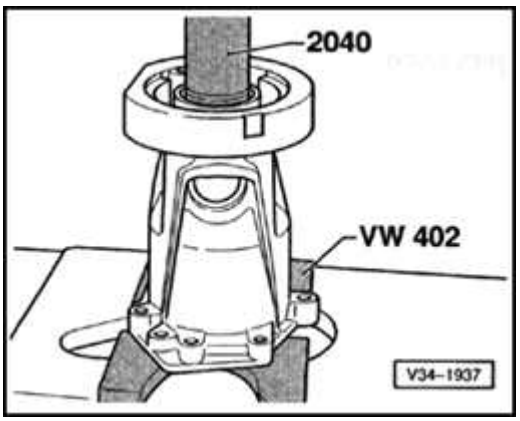


Fig. 208: Driving In Sealing Ring

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Courtesy of VOLKSWAGEN UNITED STATES, INC.

- Slightly oil circumference of oil seal.
- Installation position: 2 mm below surface of housing
- Fill space between sealing lip and dust lip with sealing grease G 052 128 A1.

TRANSMISSION SHIFT MECHANISM, DISASSEMBLING AND ASSEMBLING

Transmission shift mechanism, disassembling and assembling

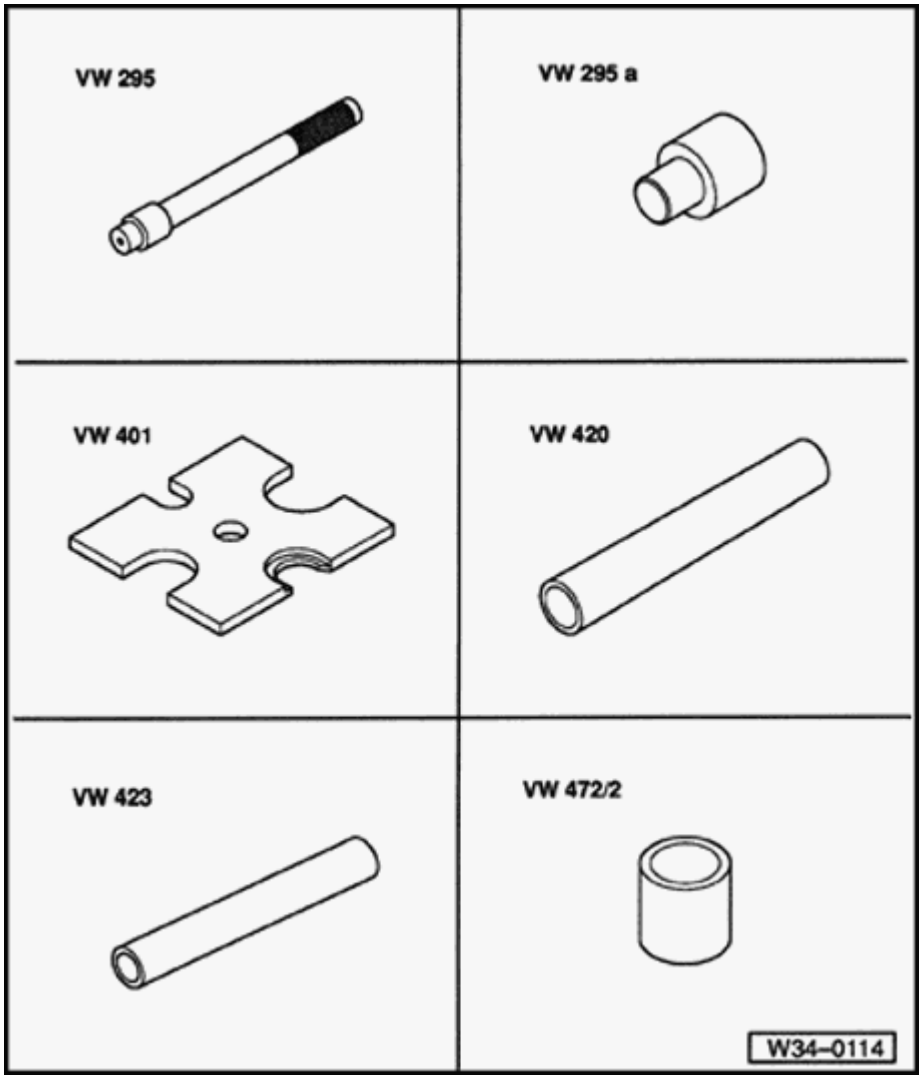


Fig. 209: Identifying Special Tools - Shift Mechanism On Transmission Side, Disassembling And Assembling
Courtesy of VOLKSWAGEN UNITED STATES, INC.

Special tools and workshop equipment required

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- VW 295 Mandrel
- VW 295 A Adapter
- VW 401 Pressure plate
- VW 420 Tubular section
- VW 423 Tubular section
- VW 472/2 Spacer sleeve

Special tools and workshop equipment required

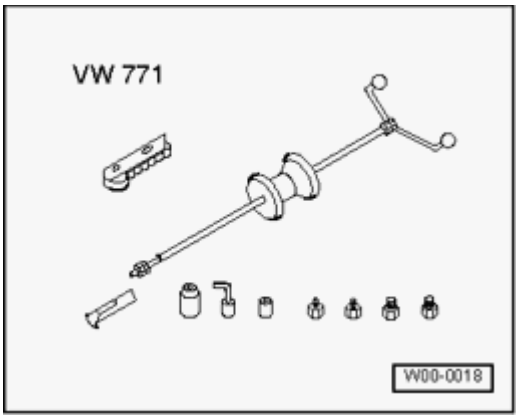


Fig. 210: Slide Hammer-Multi-Purpose Tool Set VW 771
Courtesy of VOLKSWAGEN UNITED STATES, INC.

- VW 771 Multi-purpose tool

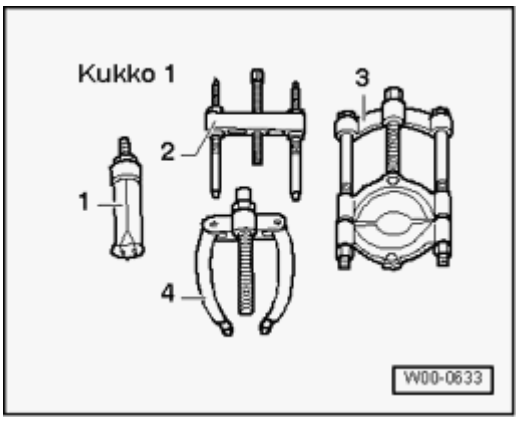


Fig. 211: Kukko 21/2 Internal puller, Kukko 21/4 Internal puller, Kukko 22/2 Counter support
Courtesy of VOLKSWAGEN UNITED STATES, INC.

- 1 - Kukko 21/4 Internal puller

NOTE: **Installation position of shift mechanism assembly in transmission. See Installation position of shift mechanism assembly in transmission**

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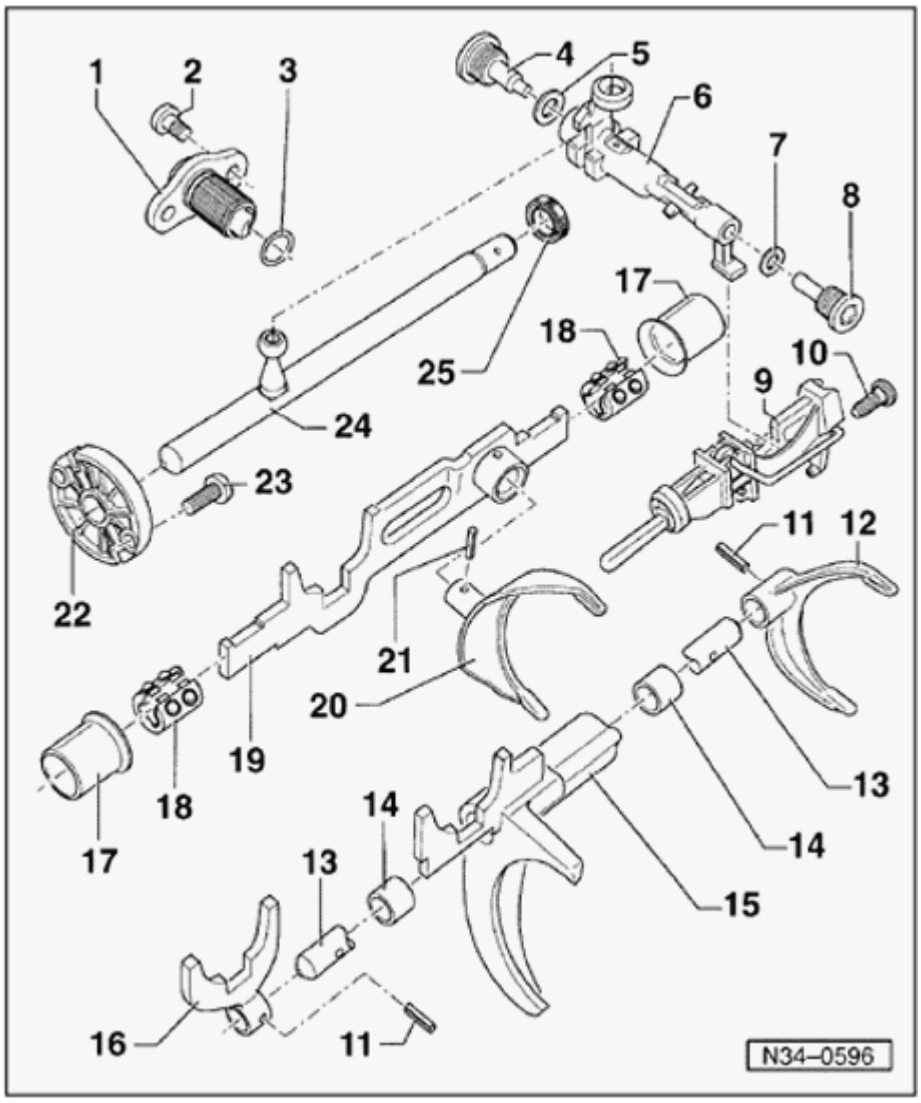


Fig. 212: Shift Mechanism In Transmission, Overview
Courtesy of VOLKSWAGEN UNITED STATES, INC.

1 - Locking unit for 5th gear and reverse gear

- Removing and installing. Refer to **Removing and installing locking unit for 5th gear and reverse gear**

2 - TORX bolt, 10 Nm

3 - O-ring

- Always replace

4 - Right stop bolt, 40 Nm

5 - Damping washer

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6 - Guide shaft

7 - Damping washer

8 - Left stop bolt, 40 Nm

9 - Detent segment

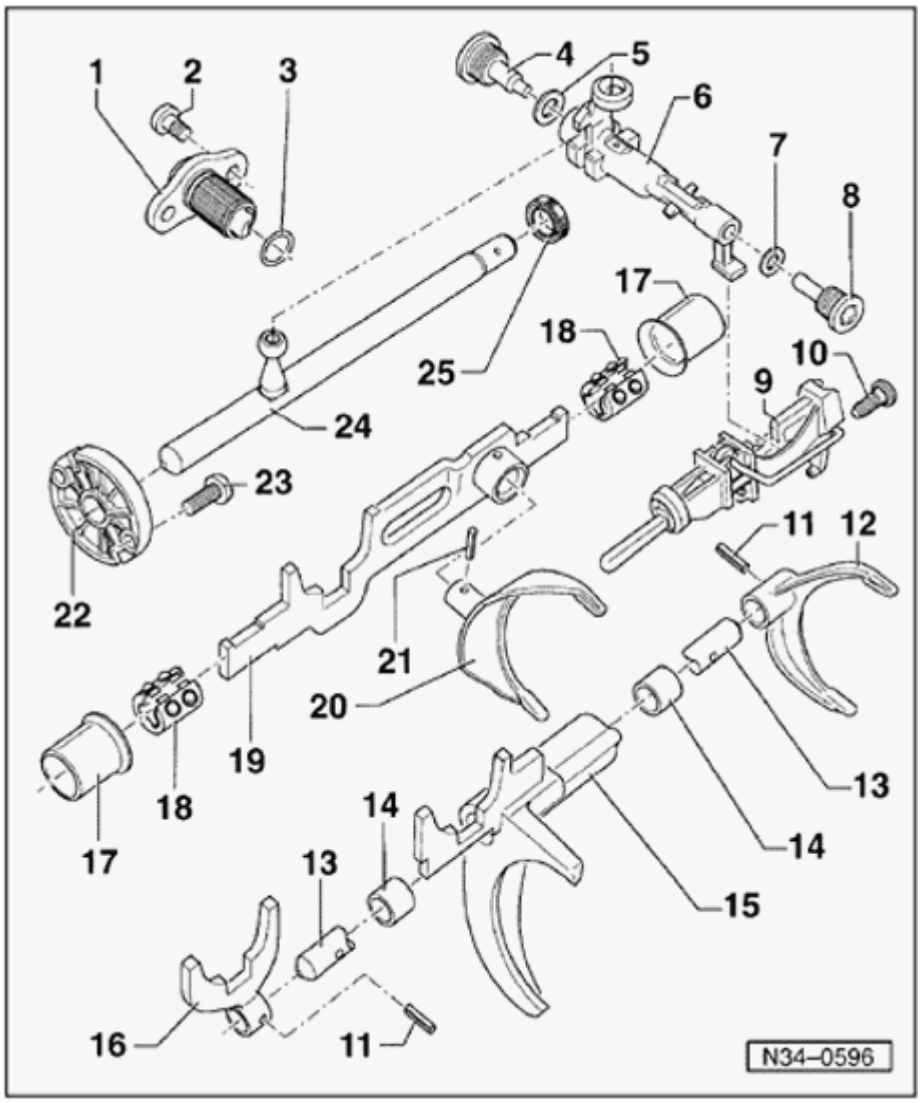


Fig. 213: Shift Mechanism In Transmission, Overview
Courtesy of VOLKSWAGEN UNITED STATES, INC.

10 - TORX bolt, 25 Nm

11 - Spring pin

12 - 5th and reverse gear selector fork

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- Installation position. See **Installation position of 5th and reverse gear selector fork and of driver for selector rod**

13 - Selector rod for 1st and 2nd gear and for 5th and reverse gear

14 - Ball sleeve

- Removing and installing. See **Removing and installing ball sleeve**

15 - 1st and 2nd gear selector fork

16 - Driver

- Installation position. See **Installation position of 5th and reverse gear selector fork and of driver for selector rod**

17 - Mounting bushing for 3rd and 4th gear

- Extracting. See **Pulling out mounting bushing for 3rd and 4th gear selector rod**
- Driving in. See **Driving in mounting bushing for 3rd and 4th gear selector rod as far as it will go**

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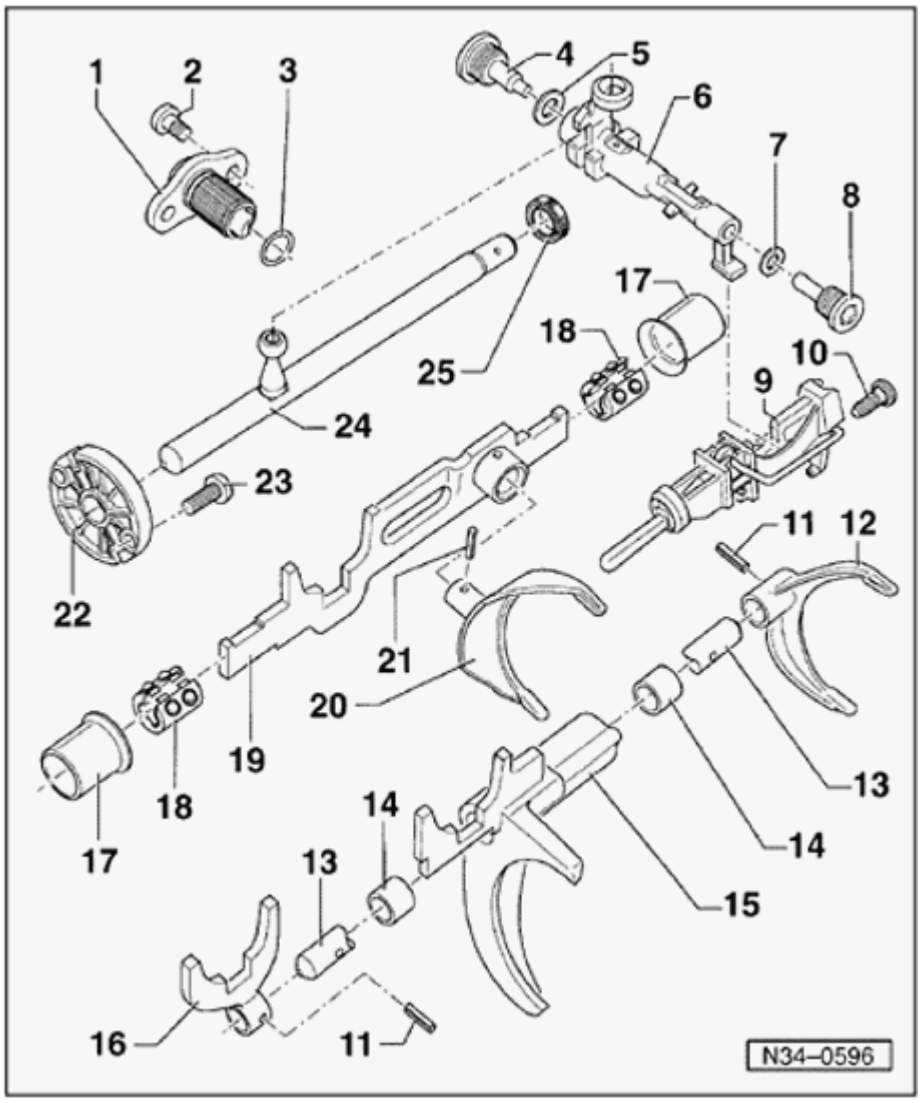


Fig. 214: Shift Mechanism In Transmission, Overview
Courtesy of VOLKSWAGEN UNITED STATES, INC.

18 - Ball sleeve

- Pry away from selector rod using a screwdriver
- Press onto selector rod

19 - Selector rod for 3rd. and 4th gear

20 - 3rd and 4th gear selector fork

21 - Spring pin

22 - Cover

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- For selector shaft

23 - TORX bolt, 20 Nm

24 - Selector shaft

25 - Oil seal

- Pry out with screwdriver
- Installation position. See **Installation position of oil seal**

Installation position of 5th and reverse gear selector fork and of driver for selector rod

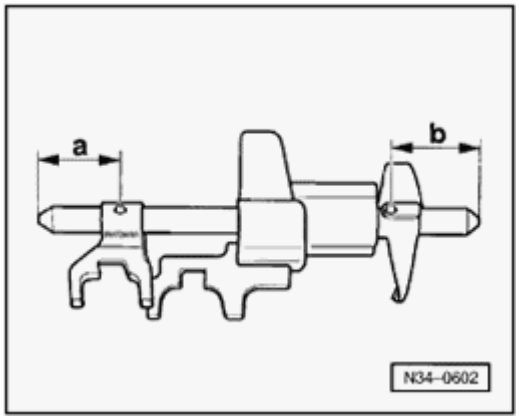


Fig. 215: Identifying Installed Position For 5th/Reverse Gear Shift Fork And Coupling Plate For Shift Rod
Courtesy of VOLKSWAGEN UNITED STATES, INC.

- Dimension a = 55 mm
- Dimension b = 60 mm

Removing and installing ball sleeve

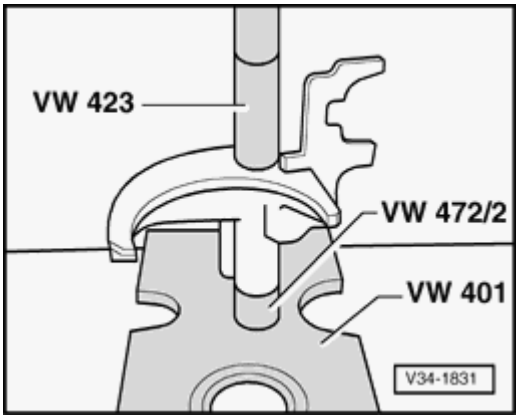


Fig. 216: Removing/Installing Ball Sleeve

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Courtesy of VOLKSWAGEN UNITED STATES, INC.

Pulling out mounting bushing for 3rd and 4th gear selector rod

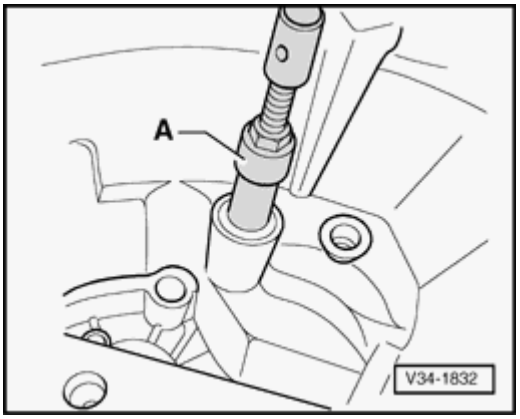


Fig. 217: Removing Bushing For 3rd And 4th Gear Shift Rod
Courtesy of VOLKSWAGEN UNITED STATES, INC.

A - Internal puller 22 to 28 mm, e.g. Kukko 21/4 in conjunction with multi-purpose tool VW 771

Driving in mounting bushing for 3rd and 4th gear selector rod as far as it will go

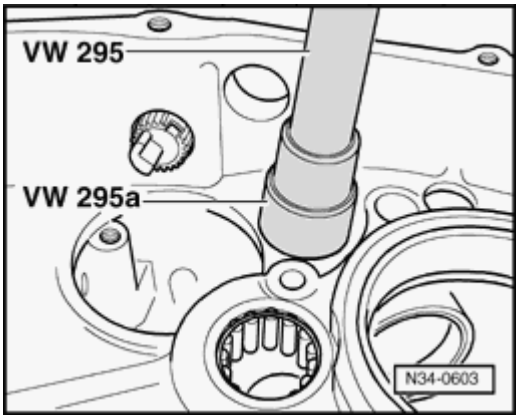


Fig. 218: Driving In Bushing For 3rd And 4th Gear Shift Rod
Courtesy of VOLKSWAGEN UNITED STATES, INC.

Installation position of oil seal

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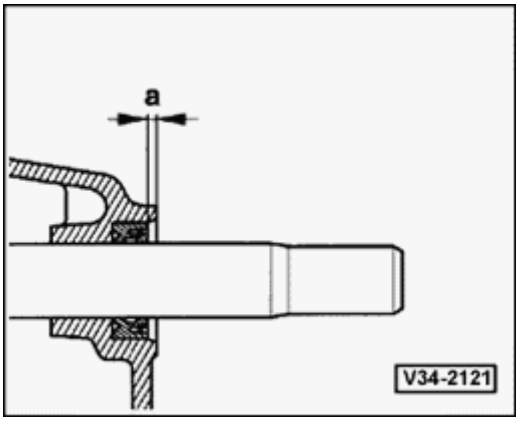


Fig. 219: Identifying Installed Position Of Sealing Washer
Courtesy of VOLKSWAGEN UNITED STATES, INC.

- Half-fill space between sealing lip and dust lip with sealing grease G 052 128 A1.
- Slightly oil circumference of sealing ring.
- Insert oil seal with tubular section VW 420

- Dimension a = 1 mm

Installation position of shift mechanism assembly in transmission

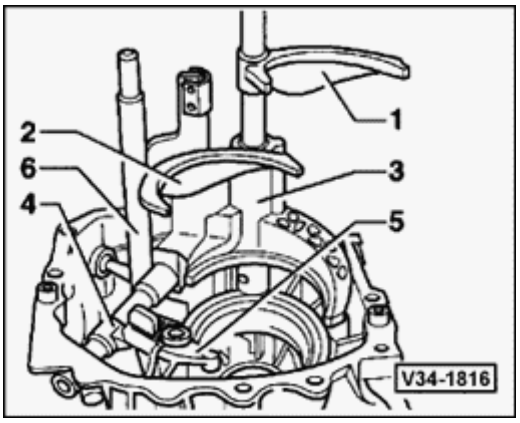


Fig. 220: Identifying Installed Position Of Complete Selector Mechanism In Transmission
Courtesy of VOLKSWAGEN UNITED STATES, INC.

1 - 5th and reverse gear selector fork

2 - 3rd and 4th gear selector fork

3 - 1st and 2nd gear selector fork

4 - Guide shaft

5 - Shifting catch

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6 - Selector shaft

Removing and installing locking unit for 5th gear and reverse gear

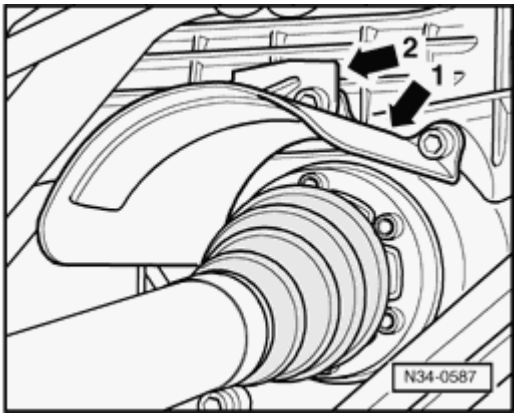


Fig. 221: Detaching Heat Shields And Right-Hand Axle Shaft
Courtesy of VOLKSWAGEN UNITED STATES, INC.

- Detach heat shield (arrow -2-) above right drive axle.
- Loosen heat shield (arrow -1-) above right drive axle and swivel downward.

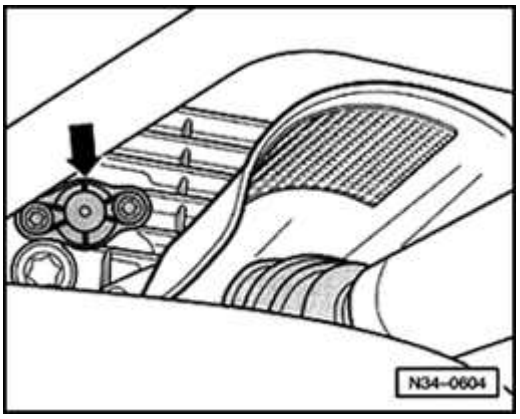


Fig. 222: Identifying Gear Lock
Courtesy of VOLKSWAGEN UNITED STATES, INC.

- Remove locking unit (arrow).

Assembling locking unit

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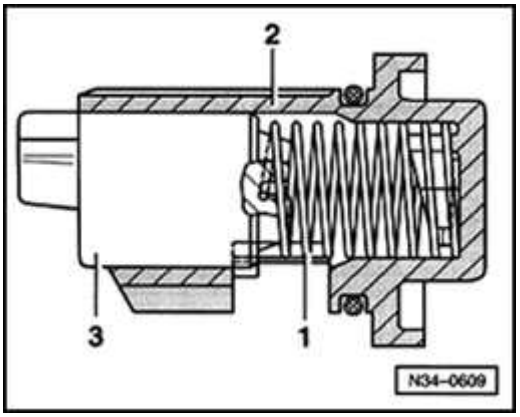


Fig. 223: Assembling Gear Lock
Courtesy of VOLKSWAGEN UNITED STATES, INC.

- Insert spring -1- in housing -2- and turn counter-clockwise with slight pressure until spring engages in base of housing.
- Position bushing -3- on spring in such a way that bent end of spring is located in the groove intended for this purpose.
- With bushing -3-, compress spring and rotate approx. 1 turn counter-clockwise until lug of bushing is located above groove in housing -2-.
- Press lug of bushing -3- into groove of housing -2- as far as it will go.
- Turn bushing -3- clockwise and release, bushing -3- jumps into installation position.

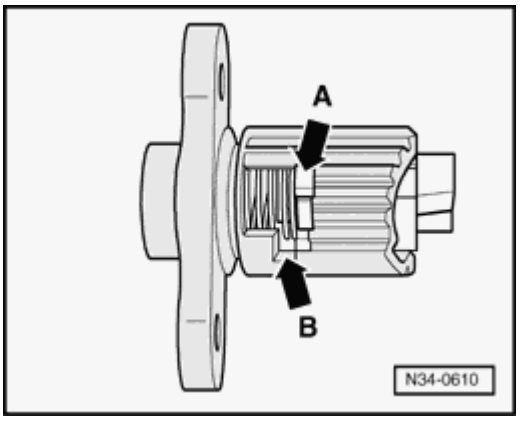


Fig. 224: Assembling Gear Lock
Courtesy of VOLKSWAGEN UNITED STATES, INC.

Installation position of bushing:

Lug (arrow -A-) of bushing must always be positioned opposite groove (arrow -B-) of housing.

Checking installation position:

- Turn bushing counter-clockwise and release.

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- Bushing must always spring back into position, lug must be pushed on as far as it will go -direction of arrow A-

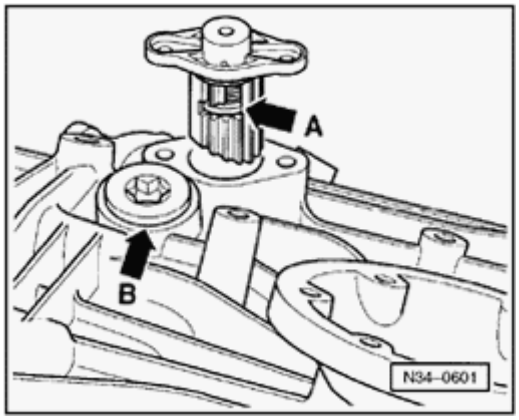


Fig. 225: Installed Position Of Complete Gear Lock In Transmission
Courtesy of VOLKSWAGEN UNITED STATES, INC.

Installation position of locking unit assembly in transmission:

Recess (arrow -A-) faces bolt (arrow -B-)

35 MANUAL TRANSMISSION - GEARS, SHAFTS

INPUT SHAFT, DISASSEMBLING AND ASSEMBLING

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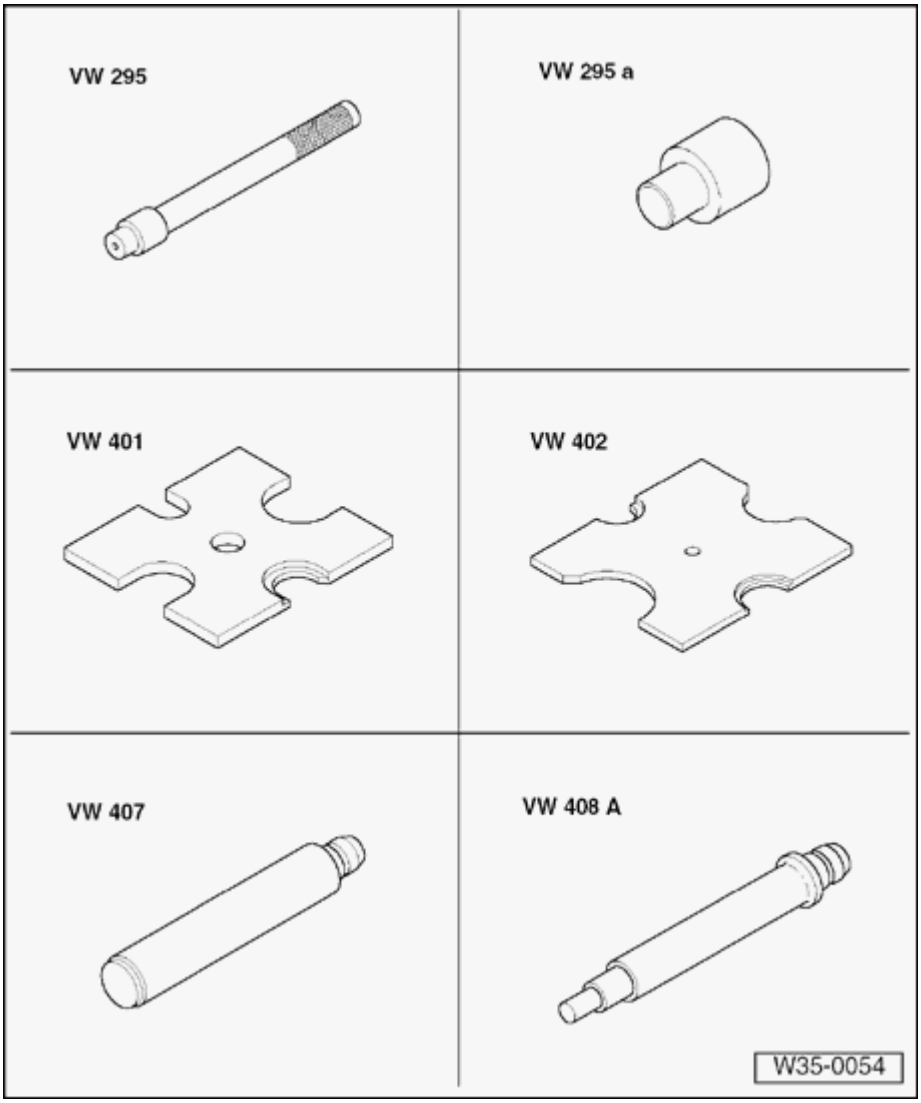


Fig. 226: Identifying Special Tools - Input Shaft, Disassembling And Assembling
Courtesy of VOLKSWAGEN UNITED STATES, INC.

Special tools and equipment

- VW 295 Mandrel
- VW 295 A Adapter
- VW 401 Pressure plate
- VW 402 Pressure plate
- VW 407 Press tool
- VW 408 A Press tool

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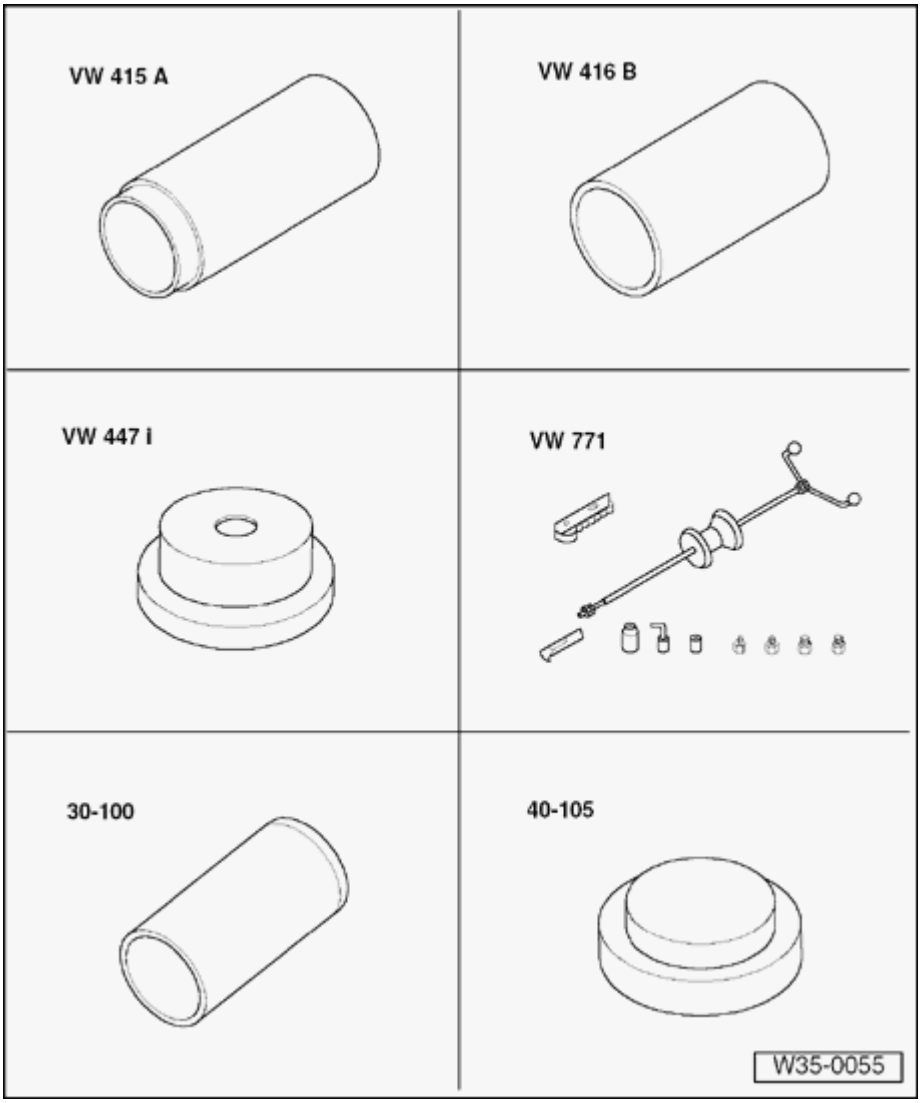


Fig. 227: Identifying Special Tools - Input Shaft, Disassembling And Assembling
Courtesy of VOLKSWAGEN UNITED STATES, INC.

Special tools and workshop equipment required

- VW 415 A Tubular section
- VW 416 B Tubular section
- VW 447 i Thrust pad
- VW 771 Multi-purpose tool

- 30-100 Press tube
- 40-105 Thrust plate

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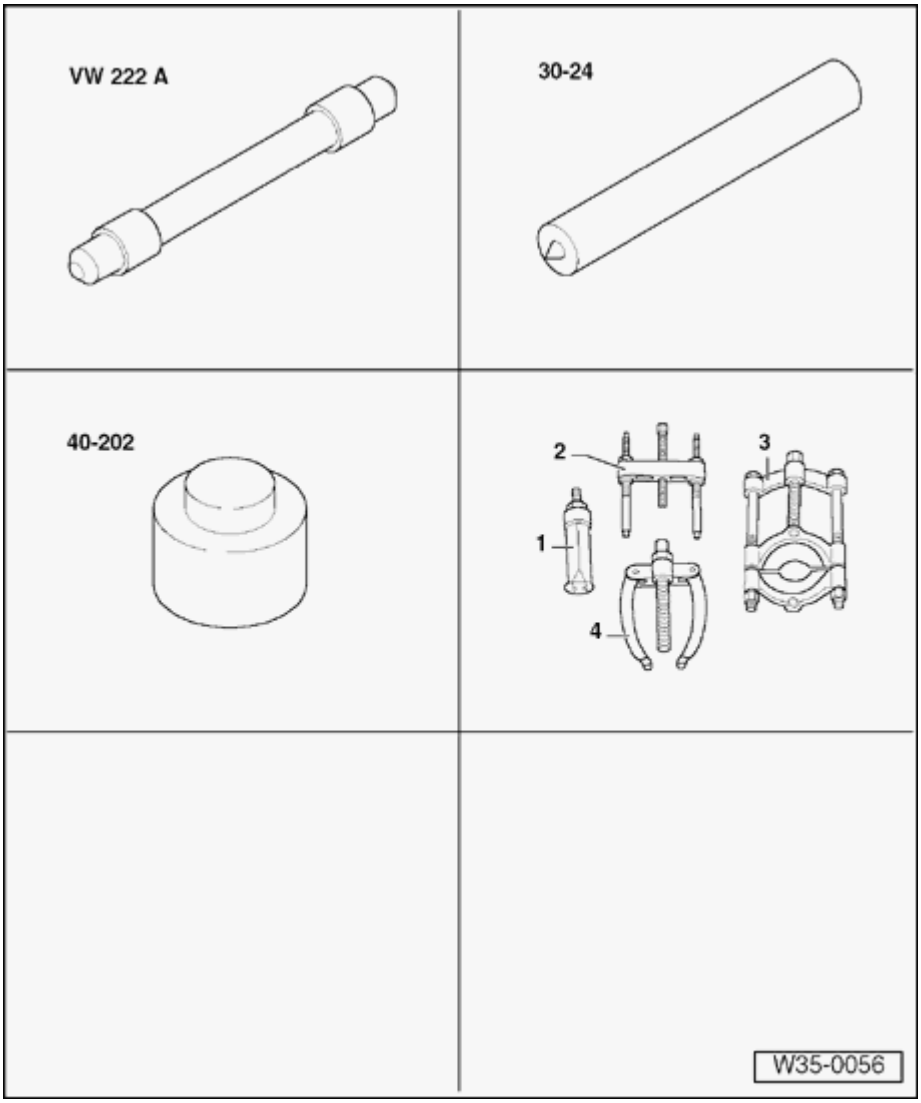


Fig. 228: Identifying Special Tools - Input Shaft, Disassembling And Assembling
Courtesy of VOLKSWAGEN UNITED STATES, INC.

Special tools and workshop equipment required

- VW 222 A Mandrel
- 30-24 Mandrel
- 40-202 Pressing-out element
- 1 - Kukko 21/4 Internal puller
- 3 - Kukko 17/2 Separating tool

NOTE:

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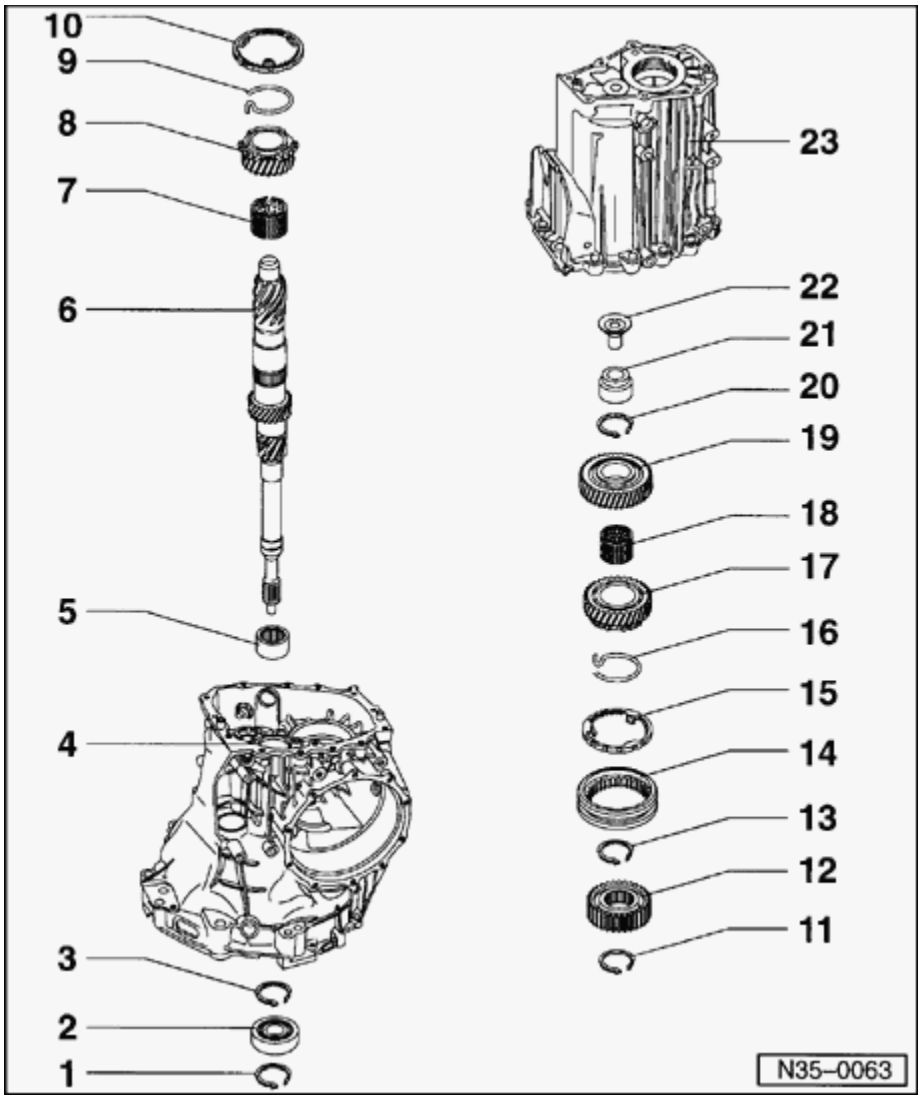


Fig. 229: Input Shaft, Overview
Courtesy of VOLKSWAGEN UNITED STATES, INC.

- **Observe technical data when installing new gear wheels or the input shaft. Refer to Code letters, assignment of mechanical units, transmission ratios and capacities.**
- **Replacing components -items 2, 4 and 6 --> Input shaft, disassembling and assembling influences the position of the ball bearing. In this case, input shaft must be re-adjusted. Refer to Input shaft, adjusting.**

1 - Circlip

- Mark
- Installation position **Installation position of circlips**- item 1
- Determining thickness. Refer to Adjusting input shaft: Refer to **Input shaft, adjusting**

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2 - Ball bearing

- Removing and installing. Refer to **Ball bearing for input shaft, multi-function sensor, pinion, selector rods, transmission cover and Torsen differential housing, removing and installing**

3 - Circlip

- Mark
- Installation position **Installation position of circlips** - item 2
- Determining thickness. Refer to Adjusting input shaft: Refer to **Input shaft, adjusting**

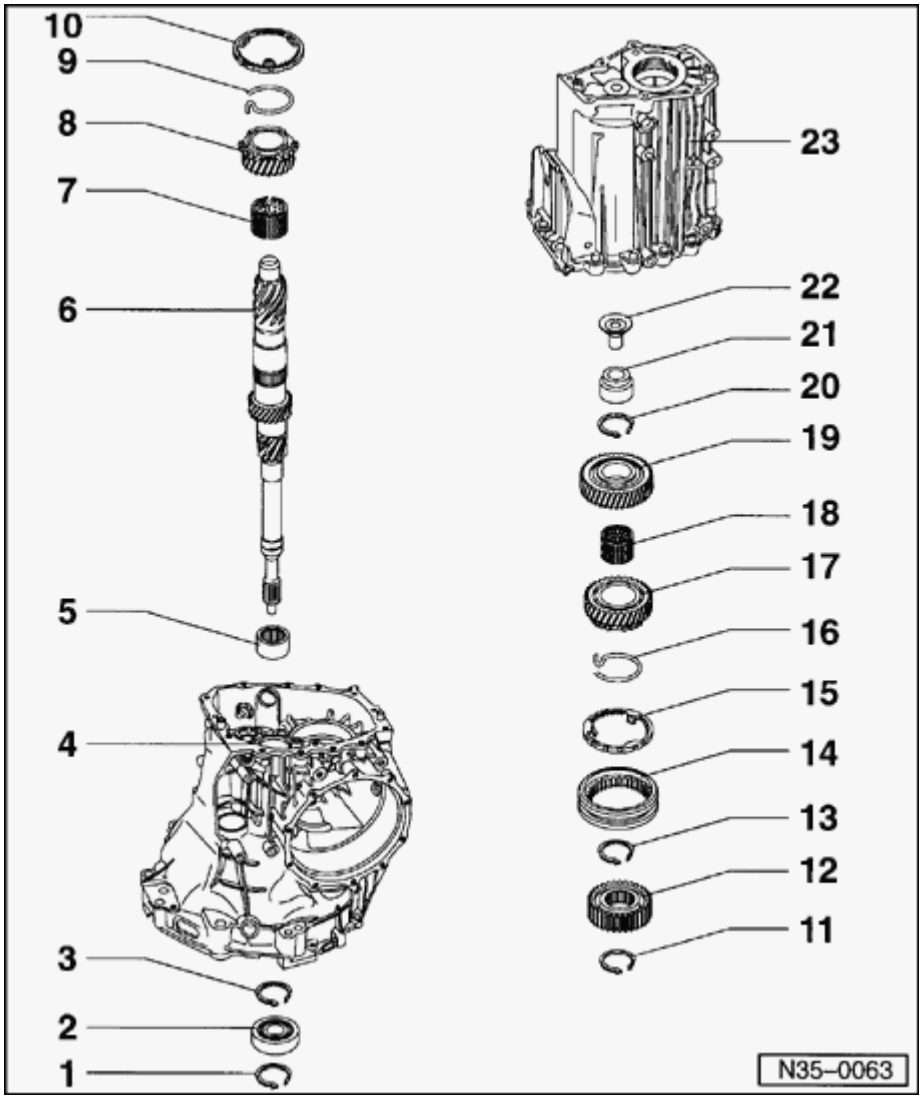


Fig. 230: Input Shaft, Overview
Courtesy of VOLKSWAGEN UNITED STATES, INC.

4 - Transmission housing

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5 - Needle bearing

- Secured with bolt. See **Locking bolt for needle bearing**
- Extracting. See **Extracting needle bearing**
- Installation position. See **Installation position of needle bearing**
- Pressing in. See **Pressing in needle bearing**

6 - Input shaft

- With oiling sleeve
- Driving in oiling sleeve. See **Driving oiling sleeve into input shaft**
- Adjusting. Refer to **Input shaft, adjusting**

7 - Needle bearing for 3rd gear

8 - Sliding gear for 3rd gear

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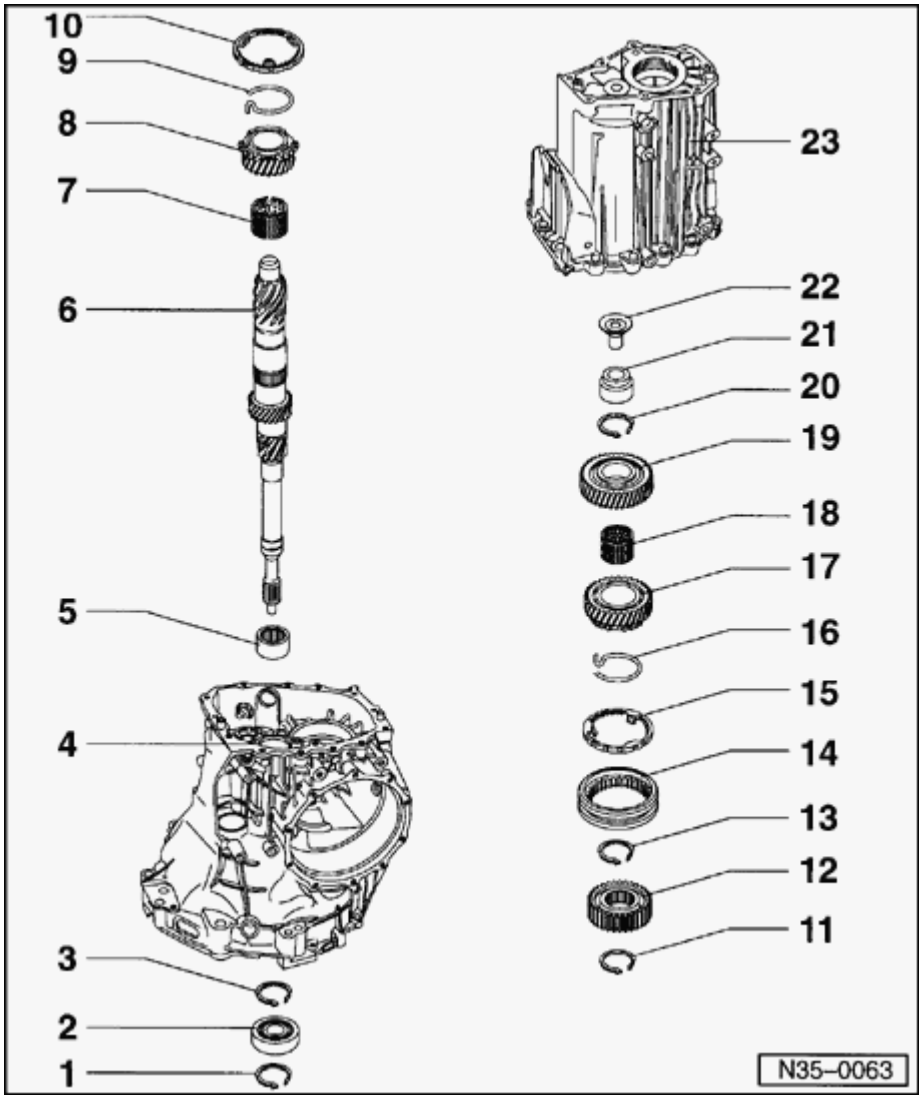


Fig. 231: Input Shaft, Overview
Courtesy of VOLKSWAGEN UNITED STATES, INC.

9 - Spring

- Inserting in 3rd gear sliding gear. See **Inserting spring into sliding gear**
- Assignment to sliding gear

10 - 3rd gear synchro-ring

- Checking for wear. See **Checking synchro-ring for wear**

11 - Circlip

- Mark
- Installation position **Installation position of circlips** - item 3

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12 - 3rd and 4th gear synchro-hub

- High collar faces 3rd gear
- Pressing off. See **Pressing out 3rd and 4th gear synchro-hub**
- Pressing on. See **Pressing on 3rd and 4th gear synchro-hub**

13 - Circlip

- Mark
- Installation position **Installation position of circlips**- item 4
- Re-determine when replacing synchro-hub. See **Determining circlip**

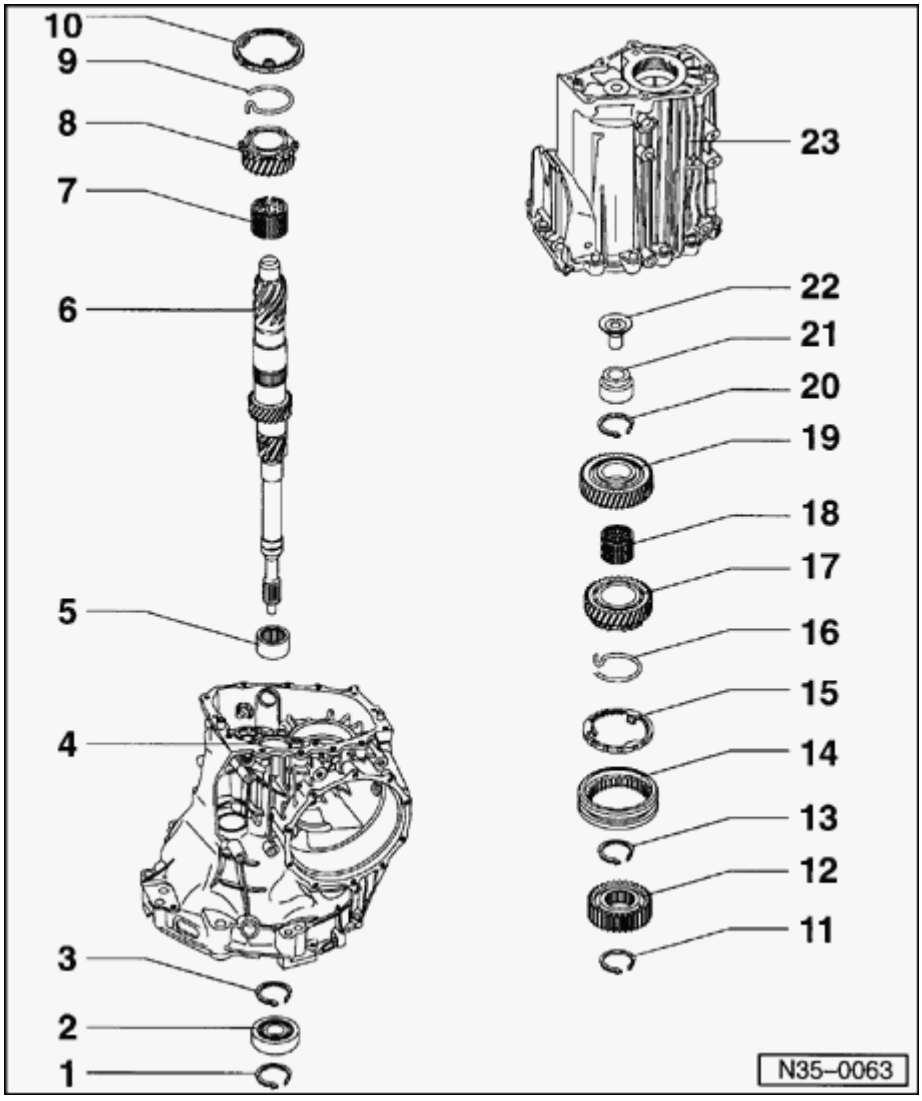


Fig. 232: Input Shaft, Overview
Courtesy of VOLKSWAGEN UNITED STATES, INC.

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14 - 3rd and 4th gear locking collar

- Installation position. See **Installation position of locking collar**

15 - 4th gear synchro-ring

- Checking for wear. See **Checking synchro-ring for wear**

16 - Spring

- Inserting in 4th gear sliding gear. See **Inserting spring into sliding gear**
- Assignment to sliding gear

17 - 4th gear sliding gear

18 - 4th gear needle bearing

19 - 5th gear wheel

- Pressing off. See **Pressing out 5th gear wheel**
- Pressing on. See **Pressing on 5th gear wheel**

20 - Circlip

- Mark
- Installation position **Installation position of circlips**- item 5
- Re-determine when replacing 5th gear wheel. See **Determining circlip**

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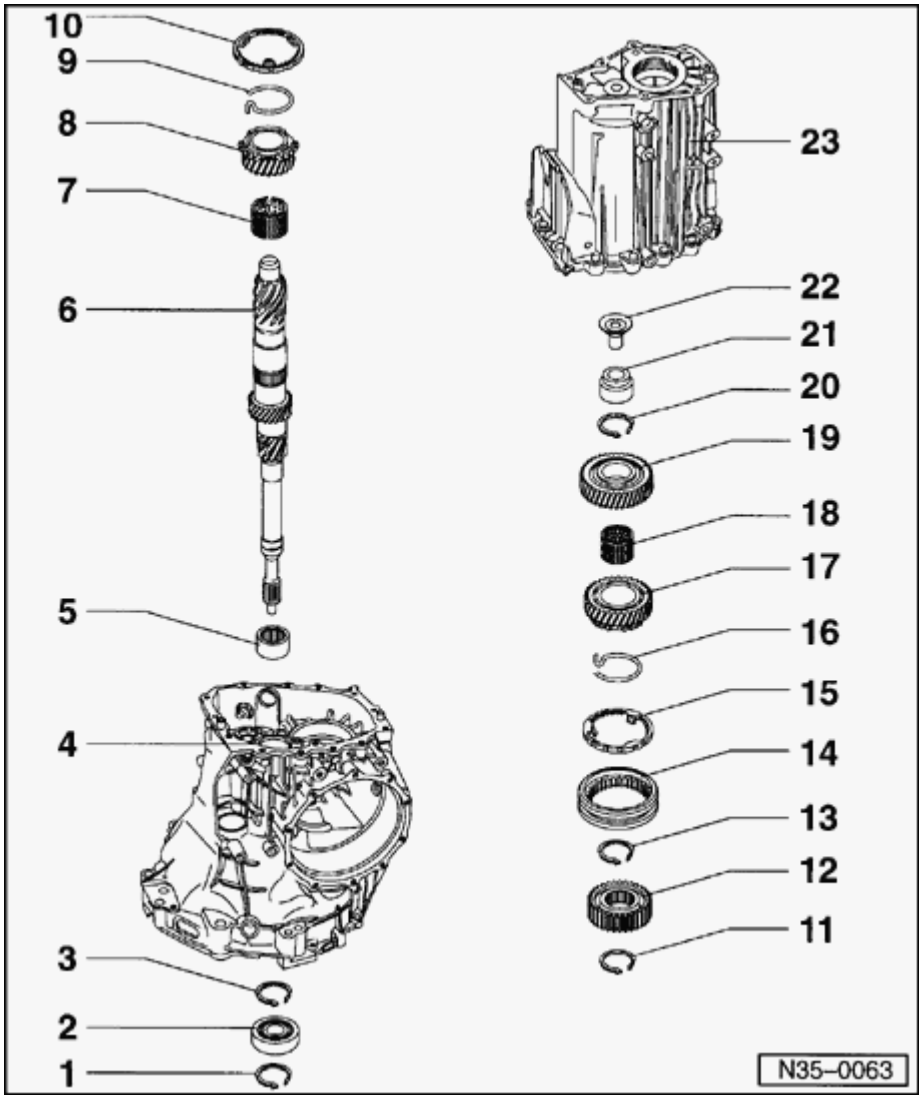


Fig. 233: Input Shaft, Overview
Courtesy of VOLKSWAGEN UNITED STATES, INC.

21 - Roller sleeve

- Replace
- Is damaged on removal
- Extracting. See **Extracting roller sleeve**
- Installation position. See **Installation position of roller sleeve**
- Driving in. See **Driving in roller sleeve**

22 - Sleeve

- Plastic

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23 - Transmission cover

Locking bolt for needle bearing

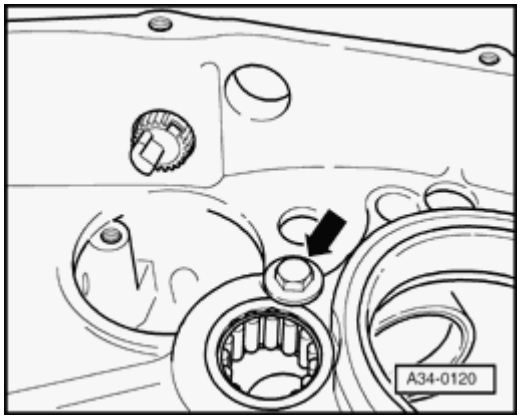


Fig. 234: Location Of Securing Bolt
Courtesy of VOLKSWAGEN UNITED STATES, INC.

- Remove locking bolt (arrow).

NOTE: Bolt is not always installed.

Extracting needle bearing

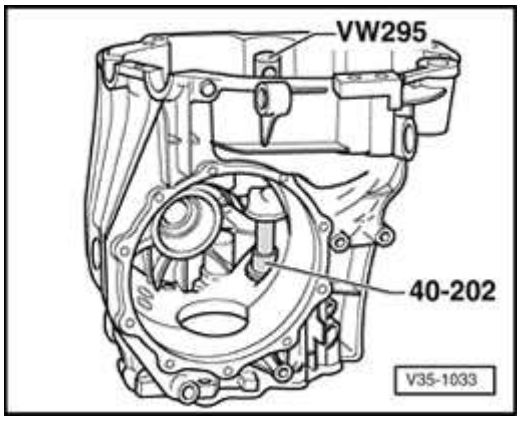


Fig. 235: Driving Out Needle Bearing
Courtesy of VOLKSWAGEN UNITED STATES, INC.

Installation position of needle bearing

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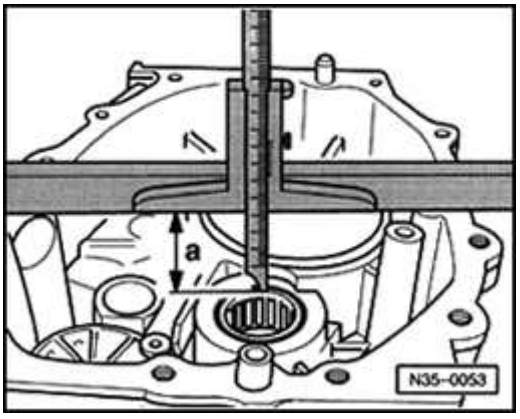


Fig. 236: Installation Position Of Needle Bearing
Courtesy of VOLKSWAGEN UNITED STATES, INC.

Dimension -a- from bottom edge of rule to top edge of needle bearing = 39.5 mm

NOTE: Measure from top edge of rule and subtract height of rule from measured value.

Pressing in needle bearing

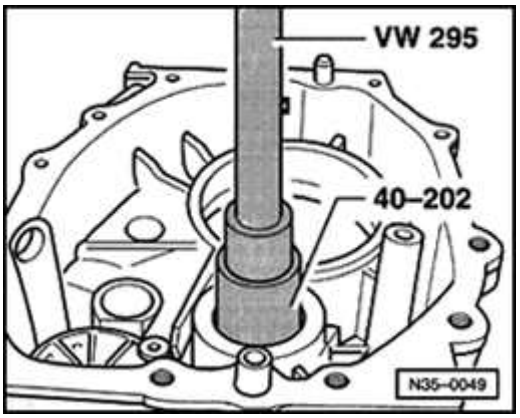


Fig. 237: Pressing In Needle Bearing
Courtesy of VOLKSWAGEN UNITED STATES, INC.

Locking bolt for needle bearing

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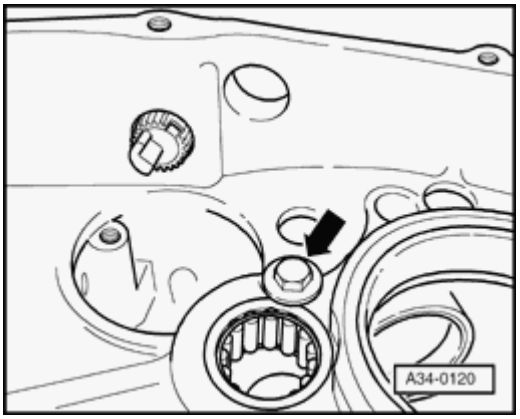


Fig. 238: Location Of Securing Bolt
Courtesy of VOLKSWAGEN UNITED STATES, INC.

- If installed, screw in locking bolt and tighten to 25 Nm.

Driving oiling sleeve into input shaft

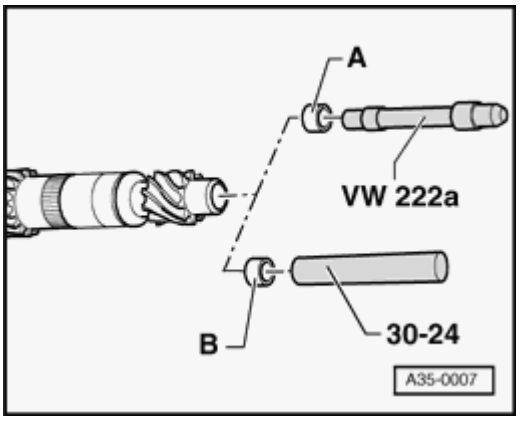


Fig. 239: Driving In Oiling Sleeve Into Input Shaft
Courtesy of VOLKSWAGEN UNITED STATES, INC.

Item	Oiling sleeve diameter	Driving-in tool
A	14 mm	VW 222 A
B	16 mm	30-24

- Installation position:

Flared edge of oiling sleeve faces driving-in tool

- Drive-in depth:

3.5 mm below top edge

Extracting roller sleeve

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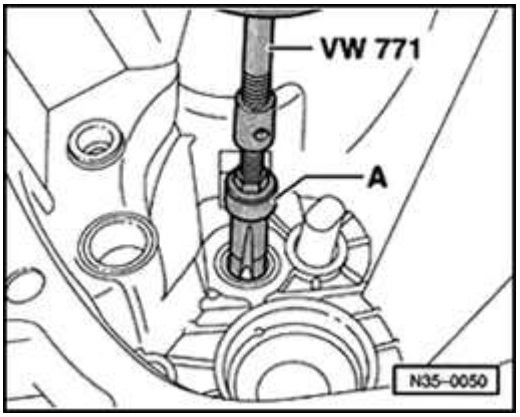


Fig. 240: Removing Roller Sleeve
Courtesy of VOLKSWAGEN UNITED STATES, INC.

A - Internal puller 22 to 28 mm, e.g. Kukko 21/4

- Before installing internal puller, destroy plastic bushing inside roller sleeve.

Installation position of roller sleeve

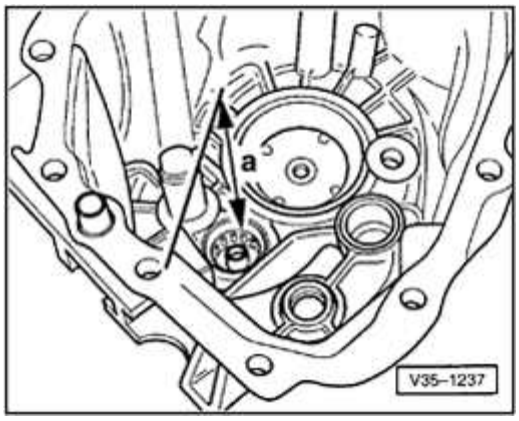


Fig. 241: Installed Position Of Roller Sleeve
Courtesy of VOLKSWAGEN UNITED STATES, INC.

- Dimension a = 216 mm

Driving in roller sleeve

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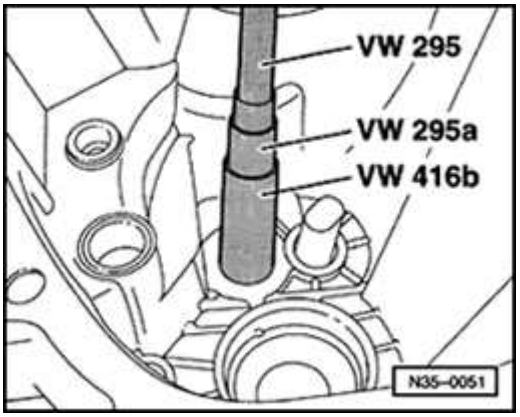


Fig. 242: Driving In Roller Sleeve
Courtesy of VOLKSWAGEN UNITED STATES, INC.

Pressing out 5th gear wheel

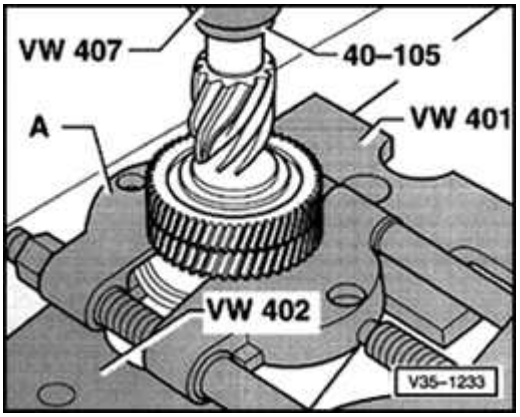


Fig. 243: Pressing Off 5th Gear
Courtesy of VOLKSWAGEN UNITED STATES, INC.

- Remove circlip before pressing out.

A - Separating tool 22 to 115 mm, e.g. Kukko 17/2

Pressing out 3rd and 4th gear synchro-hub

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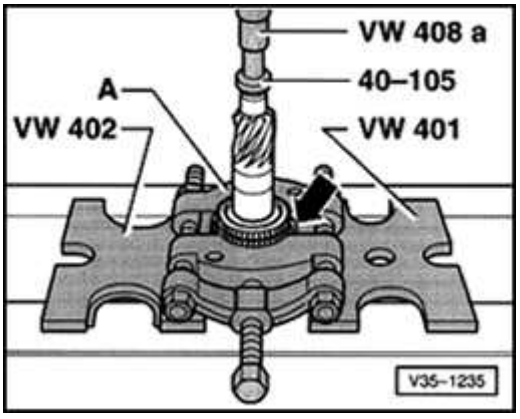


Fig. 244: Pressing Off Synchro-Hub For 3rd And 4th Gear
Courtesy of VOLKSWAGEN UNITED STATES, INC.

- Remove circlip before pressing out.
- Push 3rd gear synchro-ring (arrow) toward sliding gear for 3rd gear, then install separating tool -A-.

A - Separating tool 22 to 115 mm, e.g. Kukko 17/2

Inserting spring into sliding gear

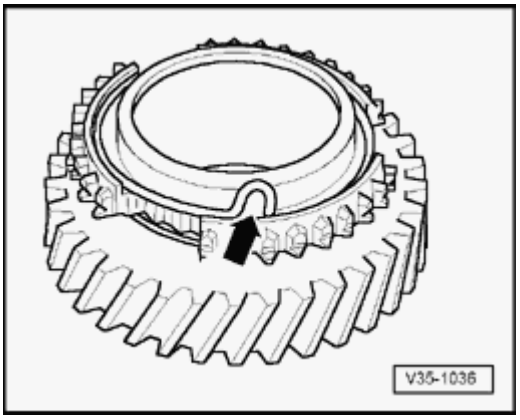


Fig. 245: Inserting Spring Into Gear
Courtesy of VOLKSWAGEN UNITED STATES, INC.

Bent end of spring (arrow) must be hooked into hole of sliding gear.

Checking synchro-ring for wear

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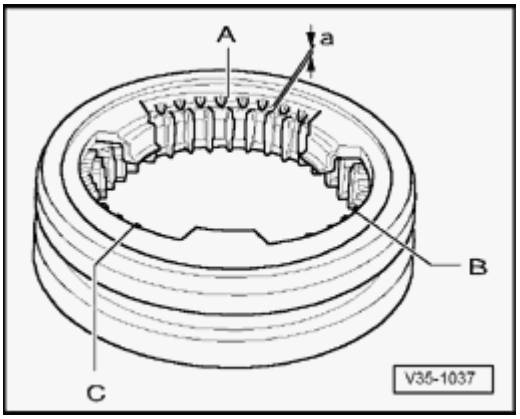


Fig. 246: Checking Synchronizer For Wear
Courtesy of VOLKSWAGEN UNITED STATES, INC.

- Push synchro-ring into locking collar and use feeler gauge to measure gap -a- at positions -A-, -B- and -C-.
- Add up measured values and divide by 3.

Obtained value must not be lower than 0.5 mm.

Installation position of circlips

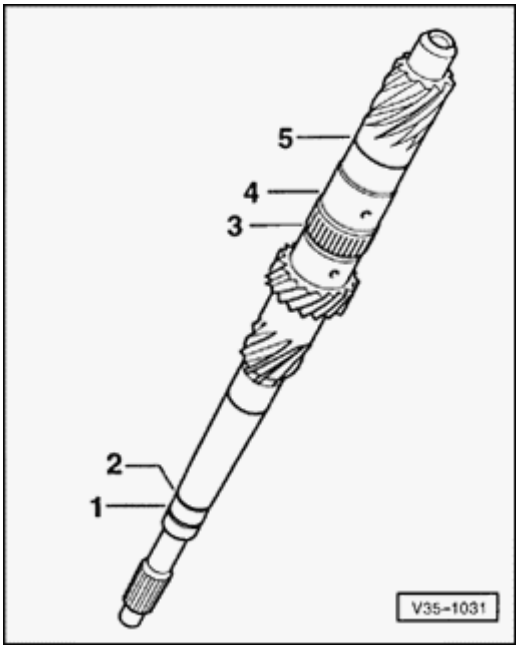


Fig. 247: Identifying Installed Positions Of Circlips
Courtesy of VOLKSWAGEN UNITED STATES, INC.

- Circlips -1- and -2- secure ball bearing of input shaft.

Determining thickness. Refer to **Input shaft, adjusting**.

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- Circlip -3- secures synchro-hub for 3rd and 4th gear.

Thickness 2.00 mm. Identifiable by: Color brown.

- Circlip -4- secures synchro-hub for 3rd and 4th gear.

Determining thickness. Refer to **Available circlips for 3rd and 4th gear synchro-hub**. Identifiable by: Color blue.

- Circlip -5- secures 5th gear wheel.

Determining thickness. Refer to **Available circlips for 5th gear wheel**.

Determining circlip

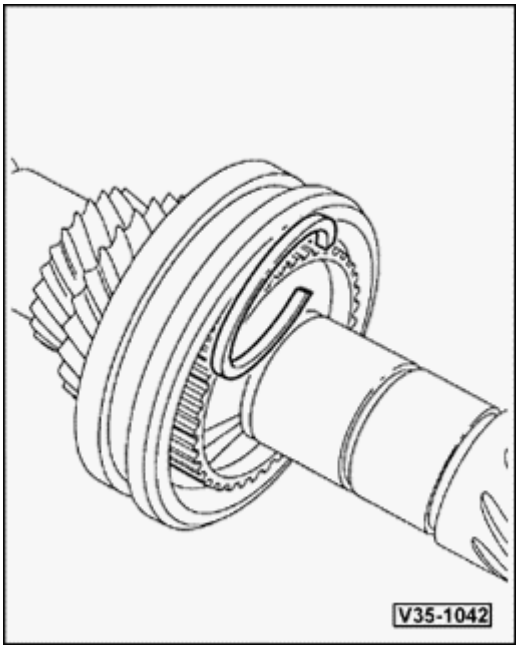


Fig. 248: Determining Circlip Fit
Courtesy of VOLKSWAGEN UNITED STATES, INC.

- Determine and install thickest circlip which can be inserted.
- Determine circlip as accurately as possible using chart. Part numbers:

Available circlips for 3rd and 4th gear synchro-hub

Circlip thickness (mm)		
1.90	1.96	2.02
1.93	1.99	2.05

Available circlips for 5th gear wheel

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Circlip thickness (mm)		
1.90	1.96	2.02
1.93	1.99	

Pressing on 3rd and 4th gear synchro-hub

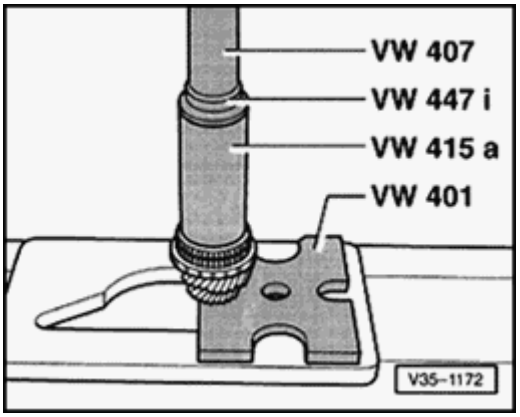


Fig. 249: Pressing On Synchronizer Hub For 3rd And 4th Gears
Courtesy of VOLKSWAGEN UNITED STATES, INC.

- Installation position:

High collar on inside faces 3rd gear

Installation position of locking collar

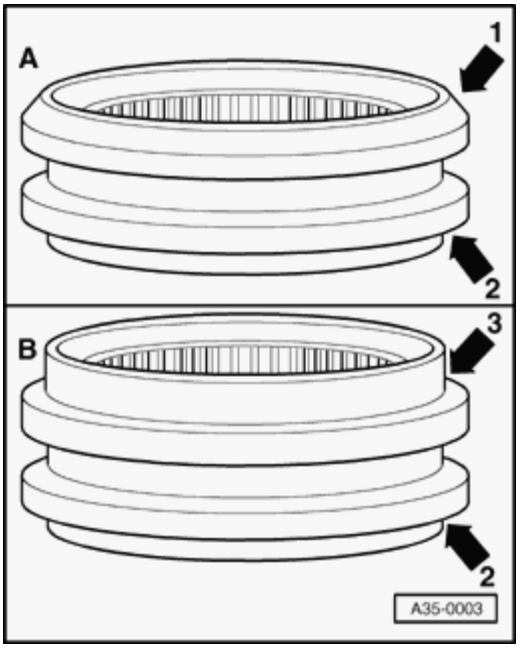


Fig. 250: Identifying Installed Position Of Operating Sleeve Up To Transmission Manufacture Date 22 06 3

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Courtesy of VOLKSWAGEN UNITED STATES, INC.

Locking collars with chamfer -A- and locking collars with high shoulder -B- are used for assembly.

- Installation position:

Chamfer (arrow -1-) faces 4th gear

Low shoulder (arrow -2-) faces 3rd gear

High shoulder (arrow -3-) faces 4th gear

Pressing on 5th gear wheel

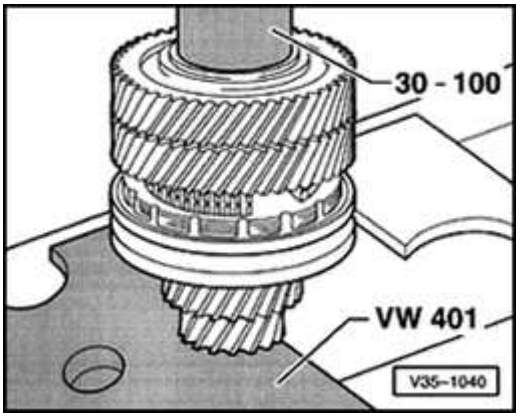


Fig. 251: Pressing On 5th Gear
Courtesy of VOLKSWAGEN UNITED STATES, INC.

WARNING: Wear protective gloves.

- Heat 5th gear wheel to approx. 100 ° C before pressing on.
- Installation position:

High collar faces reverse gear

INPUT SHAFT, ADJUSTING

Input shaft, adjusting

(Determining input shaft circlips)

Special tools and workshop equipment required

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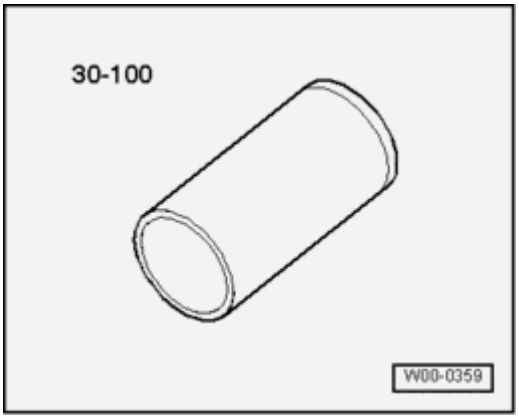


Fig. 252: Press Tube 30-100Identifying Special Tools - Oil Pump/Front Sealing Flange, Drive Chain And Chain Sprocket For Oil Pump, Removing And Installing
Courtesy of VOLKSWAGEN UNITED STATES, INC.

- 30-100 Press tube

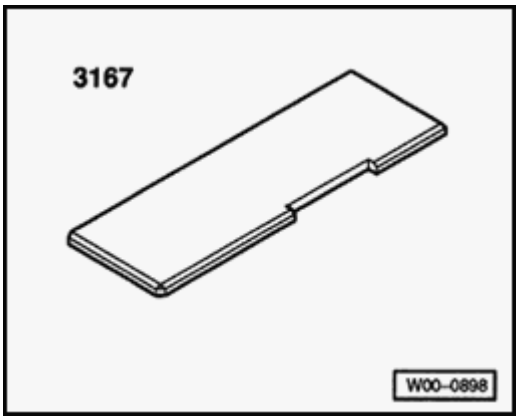


Fig. 253: Spacer Gauge 3167
Courtesy of VOLKSWAGEN UNITED STATES, INC.

- 3167 Distance gauge
- Depth slide gauge

Input shaft must be re-adjusted if

- Transmission housing
- Input shaft

or

- Ball bearing

is/are replaced.

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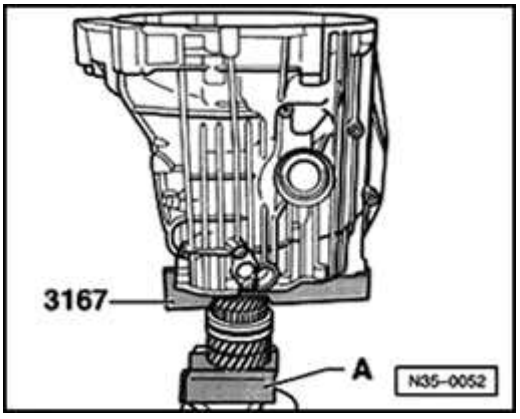


Fig. 254: Placing Transmission Housing Over Input Shaft Onto Spacer Gauge
Courtesy of VOLKSWAGEN UNITED STATES, INC.

- Clamp input shaft with soft jaws -A- in vice.
- Position distance gauge 3167 on 3rd gear sliding gear.
- Position transmission housing over input shaft onto distance gauge.

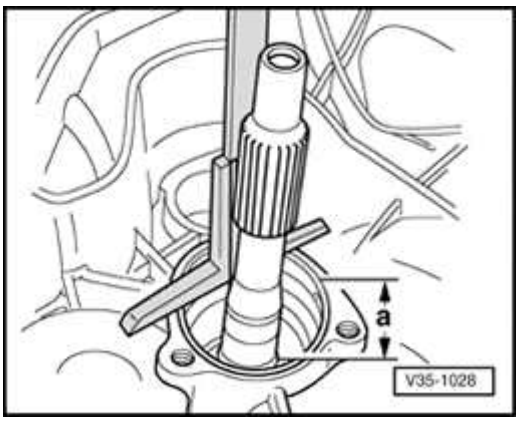


Fig. 255: Determining Circlip Thickness, Measuring Value "a"
Courtesy of VOLKSWAGEN UNITED STATES, INC.

- Position depth slide gauge on transmission housing and measure up to lower groove for circlip in input shaft.

- Measured value in following example: -a- = 28.50 mm

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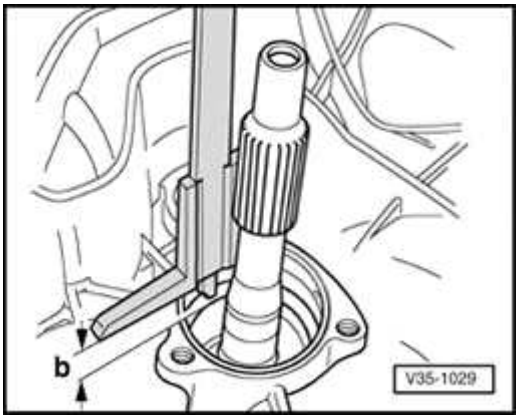


Fig. 256: Determining Circlip Thickness, Measuring Value "b"
Courtesy of VOLKSWAGEN UNITED STATES, INC.

- Position depth slide gauge on transmission housing and measure up to contact surface of ball bearing.
- Measured value in following example: -b- = 26.80 mm

Determining circlip behind ball bearing for input shaft

Formula:		
"x"	**=**	**dimension "a" - dimension "b"**

Example:		
	Dimension "a"	28.50 mm
-	Dimension "b"	26.80 mm
=	Dimension "x" (circlip thickness)	1.70 mm

- Determine circlip using chart. Part numbers

Available circlips

Dimension "x"	Thickness (mm)
1.48 to 1.56	1.54
1.57 to 1.65	1.63
1.66 to 1.74	1.72
1.75 to 1.83	1.81
1.84 to 1.92	1.90
1.93 to 2.01	1.99
2.02 to 2.10	2.08
2.11 to 2.20	2.17
2.21 to 2.27	2.25
2.28 to 2.35	2.33

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Determining circlip in front of ball bearing for input shaft

- Drive determined rear circlip and ball bearing onto input shaft using Press tube 30-100.

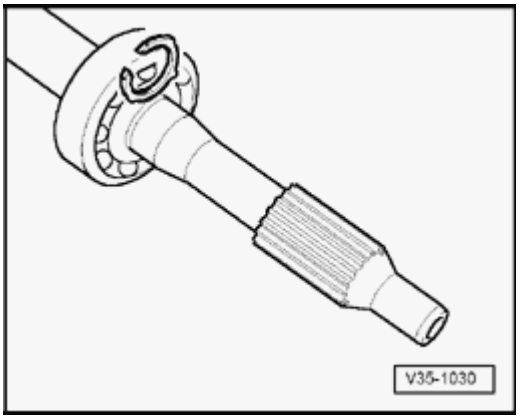


Fig. 257: Input Shaft And Thickest Circlip Which Can Still Just Be Installed
Courtesy of VOLKSWAGEN UNITED STATES, INC.

- Determine and install thickest circlip which can be inserted.
- Determine circlip as accurately as possible using chart. Part numbers:

Available circlips

Circlip thickness (mm)		
1.45	1.72	1.99
1.54	1.81	2.08
1.63	1.90	2.17

PINION AND HOLLOW SHAFT, DISASSEMBLING AND ASSEMBLING

Pinion and hollow shaft, disassembling and assembling

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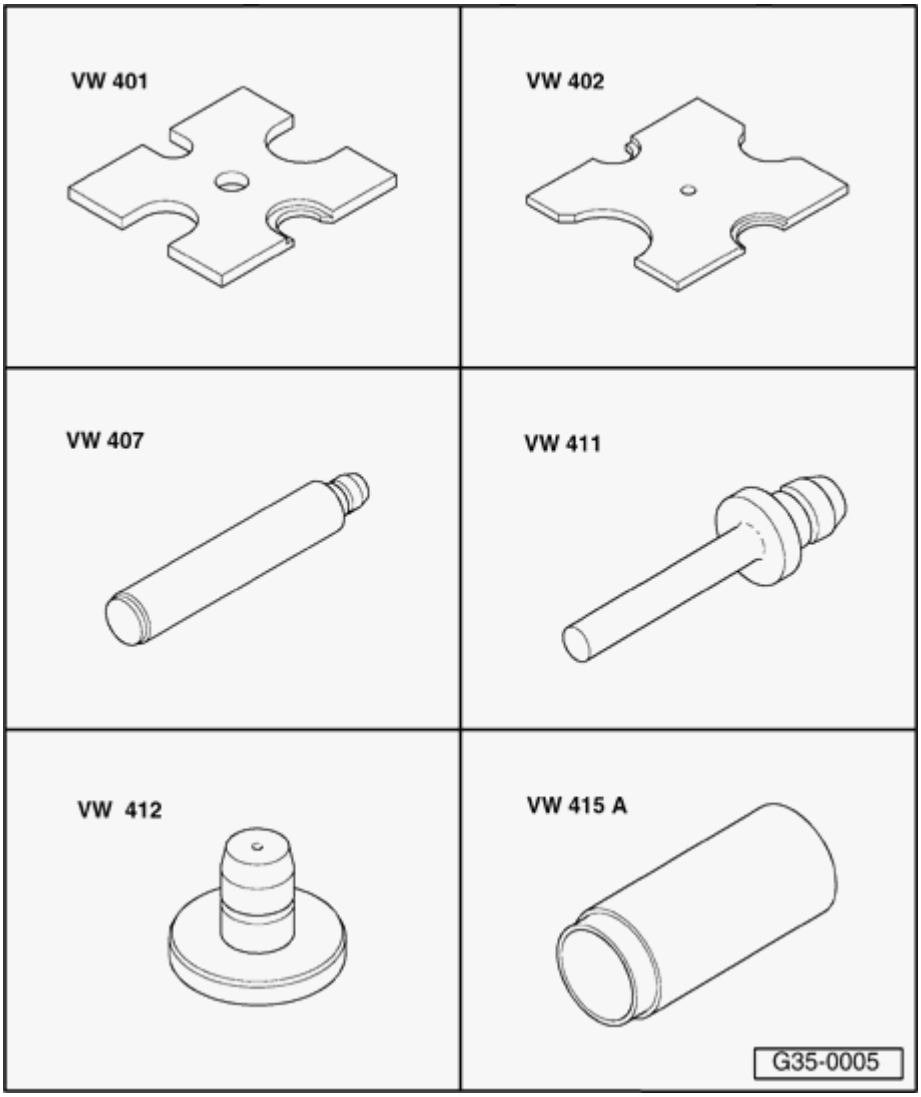


Fig. 258: Identifying Special Tools - Pinion Shaft And Hollow Shaft, Disassembling And Assembling
Courtesy of VOLKSWAGEN UNITED STATES, INC.

Special tools and workshop equipment required

- VW 401 Pressure plate
- VW 402 Pressure plate
- VW 407 Press tool
- VW 411 Press tool
- VW 412 Press tool
- VW 415 A Tubular section

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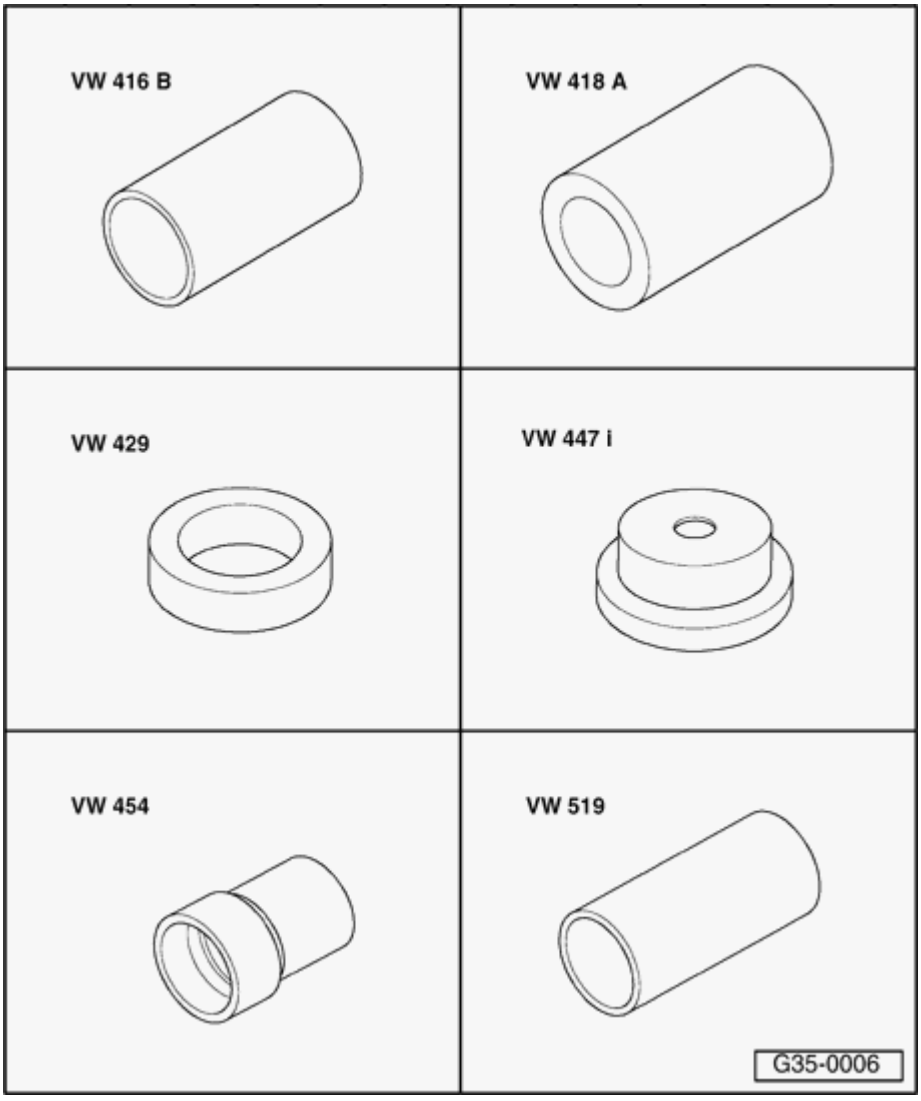


Fig. 259: Identifying Special Tools - Pinion Shaft And Hollow Shaft, Disassembling And Assembling
Courtesy of VOLKSWAGEN UNITED STATES, INC.

- VW 416 B Tubular section
- VW 418 A Tubular section
- VW 429 Thrust collar
- VW 447i Thrust pad
- VW 454 Pressure piece
- VW 519 Tubular section

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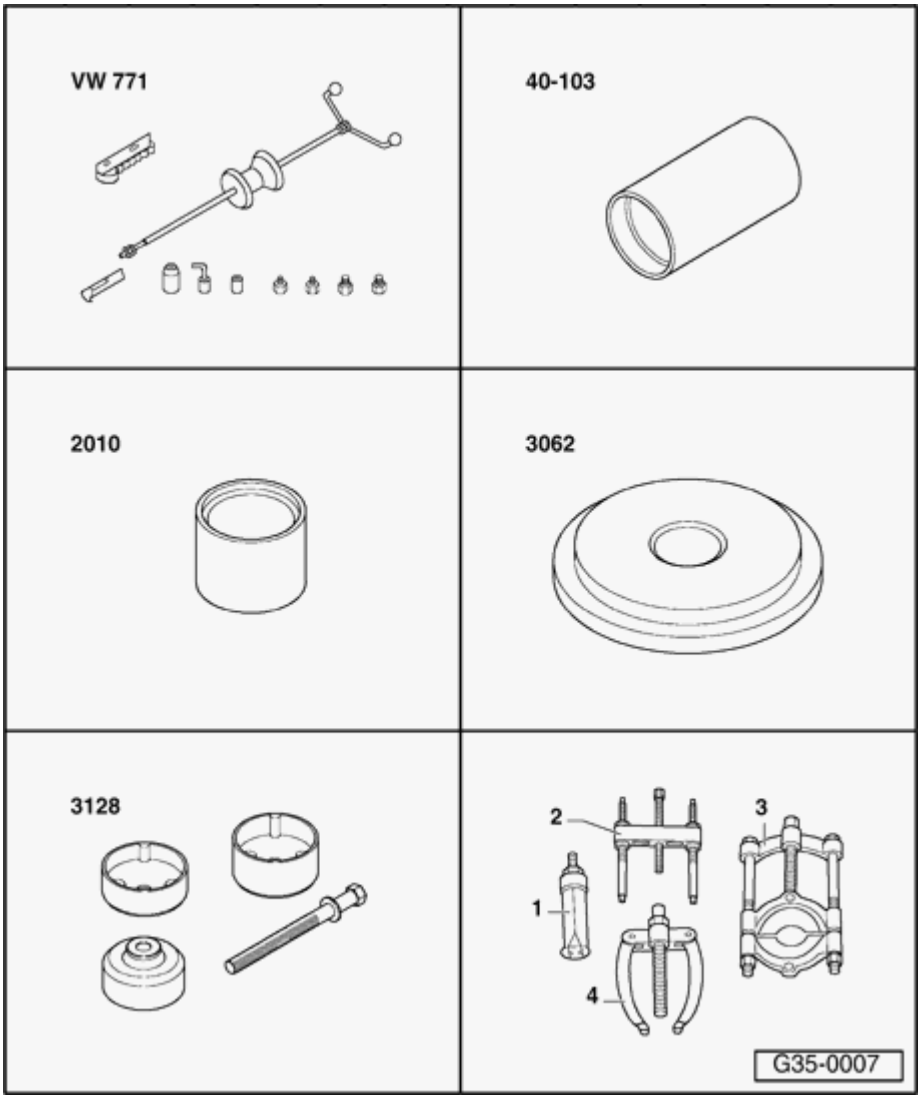


Fig. 260: Identifying Special Tools - Pinion Shaft And Hollow Shaft, Disassembling And Assembling
Courtesy of VOLKSWAGEN UNITED STATES, INC.

- VW 771 Multi-purpose tool
- 40-103 Base
- 2010 Tubular section
- 3062 Thrust pad

- 3128 Puller
- Kukko 17/2 Separating tool
- Kukko 21/1 Internal puller

NOTE:

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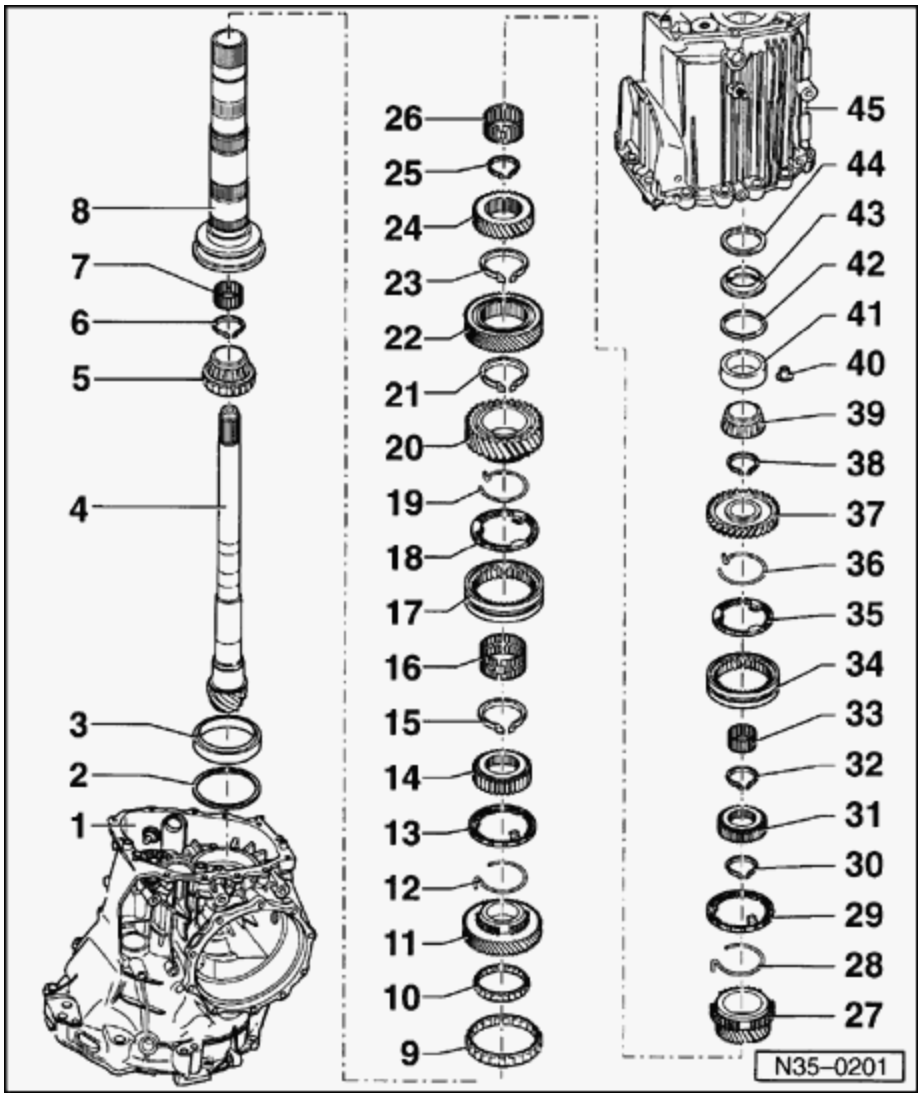


Fig. 261: Transmission Housing, Overview
Courtesy of VOLKSWAGEN UNITED STATES, INC.

- **Observe technical data when installing new gear wheels or drive unit. Refer to Code letters, assignment of mechanical units, transmission ratios and capacities.**
- **When replacing parts marked 1) adjustments are required. Refer to Adjustment table.**

1 - Transmission housing

2 - Shim "S3"

- Adjustment table. Refer to **Adjustment table**

3 - Outer race for double tapered roller bearing 1)

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- Replace together with -item 5
- Extracting. See **Extracting outer race for double tapered roller bearing**
- Pressing in. See **Pressing in outer race for double tapered roller bearing**

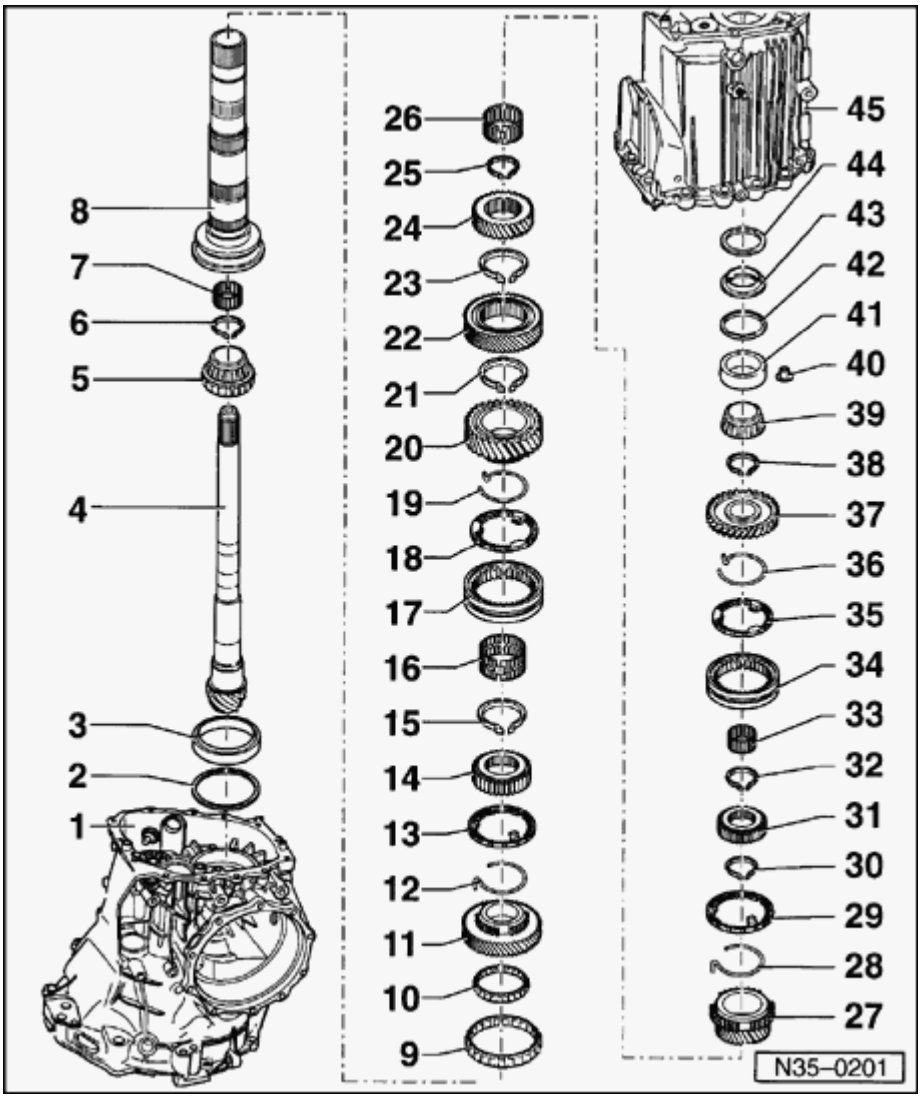


Fig. 262: Transmission Housing, Overview
Courtesy of VOLKSWAGEN UNITED STATES, INC.

4 - Pinion1)

- Paired with ring gear, replace as assembly
- Adjusting pinion and ring gear. Refer to **General**

5 - Inner race for double tapered roller bearing 1)

- Replace

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- Gets damaged on removal
- Pressing off. See **Pressing off inner race for double tapered roller bearing**
- Pressing on. See **Pressing on inner race for double tapered roller bearing**

6 - Circlip

- Determine thickness when replacing double tapered roller bearing. See **Determining circlip**

7 - Needle bearing

- For pinion in hollow shaft
- Lubricate with MoS2 grease

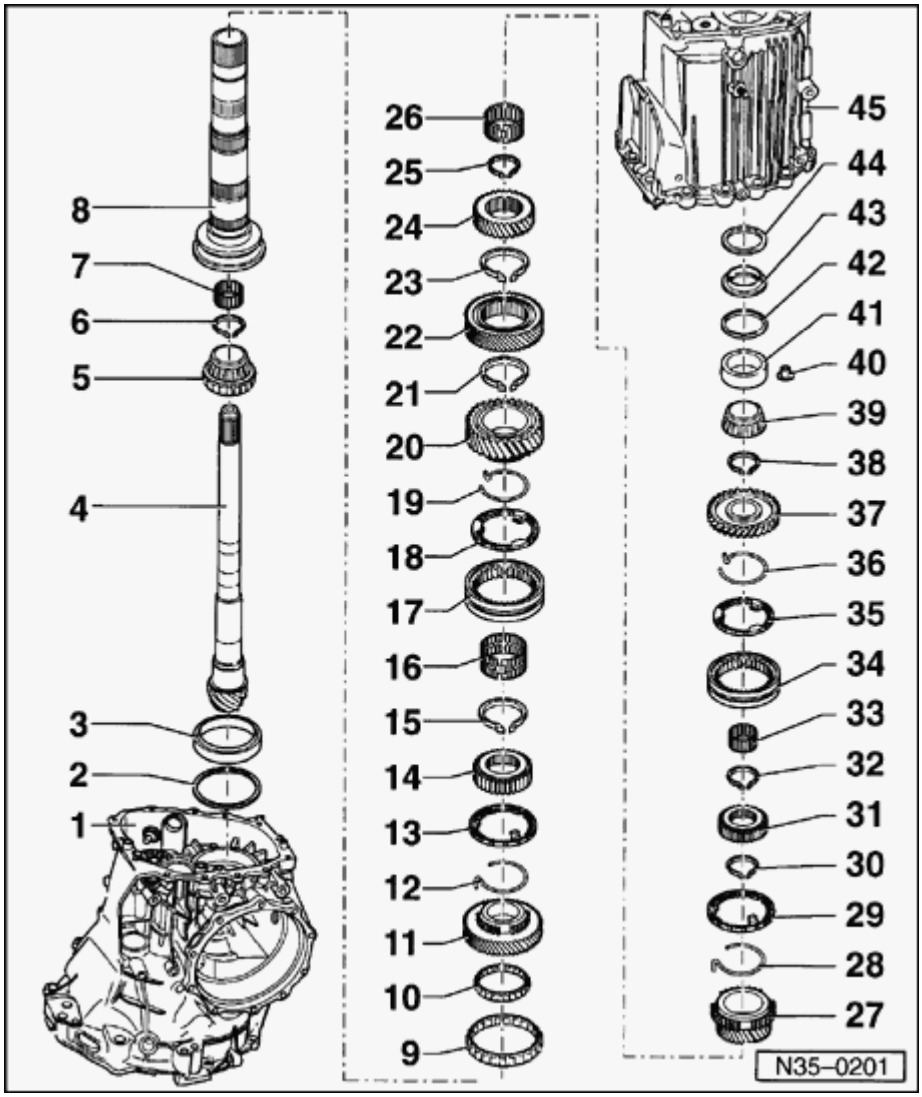


Fig. 263: Transmission Housing, Overview
Courtesy of VOLKSWAGEN UNITED STATES, INC.

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8 - Hollow shaft 1)

9 - Needle bearing for 1st gear

10 - Needle bearing for 1st gear

11 - 1st gear sliding gear

12 - Spring

- Inserting in 1st gear sliding gear. See **Inserting spring into sliding gear**
- Assignment to sliding gear

13 - 1st gear synchro-ring

- Checking for wear. See **Checking synchro-ring for wear**

14 - 1st and 2nd gear synchro-hub

- Pressing off. See **Pressing off 1st and 2nd gear synchro-hub**
- Pressing on. See **Pressing on synchro-hub for 1st and 2nd gear**

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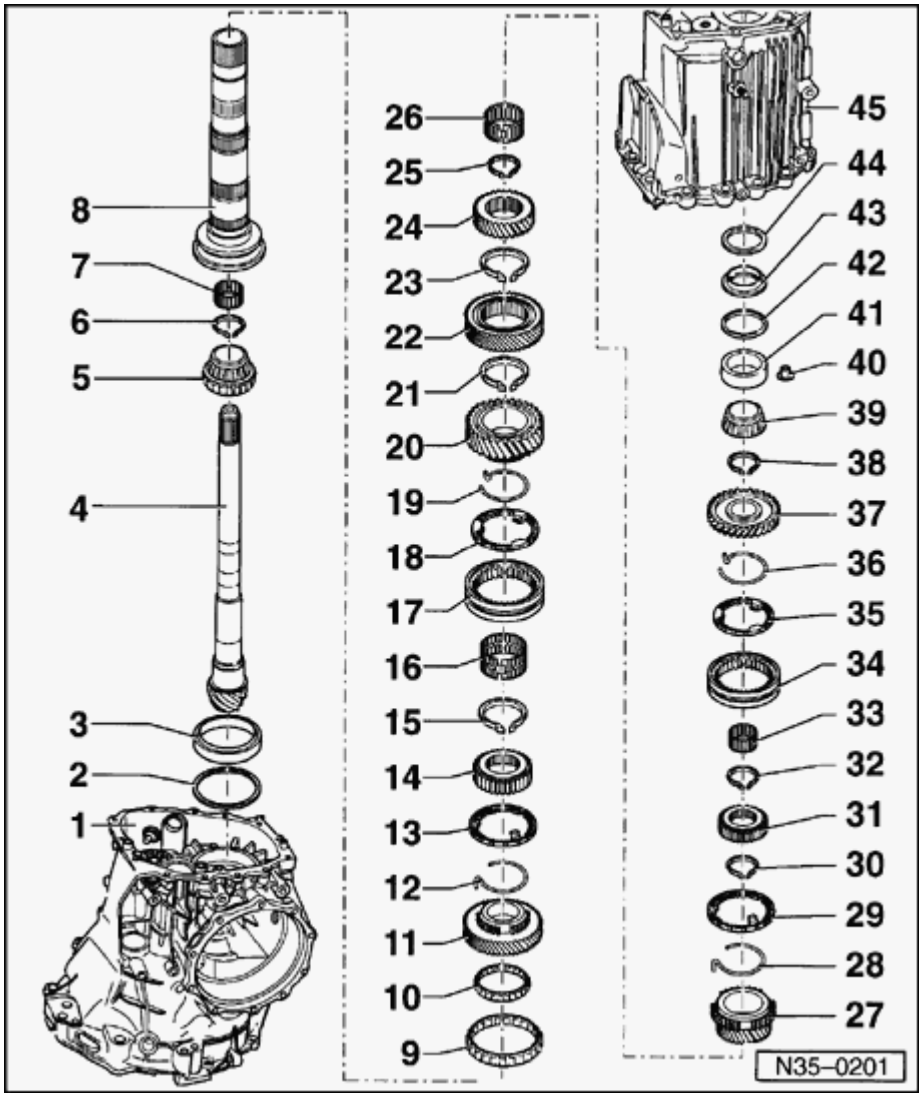


Fig. 264: Transmission Housing, Overview
Courtesy of VOLKSWAGEN UNITED STATES, INC.

15 - Circlip

- Mark
- Installation position **Installation position of circlips** - item 1
- Re-determining when replacing synchro-hub. See **Determining circlip**

16 - Needle bearing for 2nd gear

17 - 1st and 2nd gear locking collar

- Installation position. See **Installation position of locking collar for 1st and 2nd gear**

18 - 2nd gear synchro-ring

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- Checking for wear. See **Checking synchro-ring for wear**

19 - Spring

- Inserting in 2nd gear sliding gear. See **Inserting spring into sliding gear**
- Assignment to sliding gear

20 - 2nd gear sliding gear

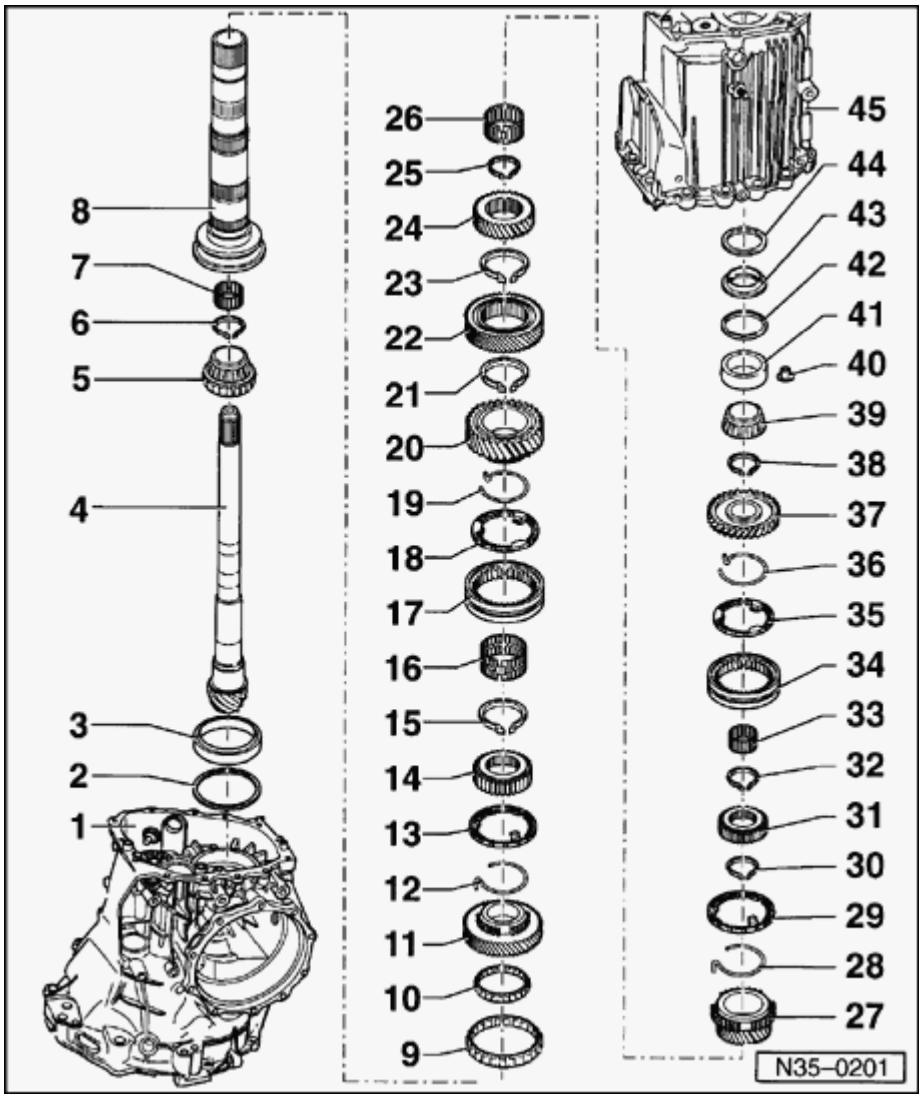


Fig. 265: Transmission Housing, Overview
Courtesy of VOLKSWAGEN UNITED STATES, INC.

21 - Circlip

- Mark
- Installation position **Installation position of circlips** - item 2

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22 - 3rd gear wheel

- Pressing off. See **Pressing off 3rd gear wheel**
- Pressing on. See **Pressing on 3rd gear wheel**

23 - Circlip

- Mark
- Installation position **Installation position of circlips**- item 3
- Re-determining when replacing 3rd gear wheel. See **Determining circlip**

24 - 4th gear wheel

- Pressing off. See **Pressing off 4th gear wheel**
- Pressing on. See **Pressing on 4th gear wheel**

25 - Circlip

- Mark
- Installation position **Installation position of circlips** - item 4
- Re-determining when replacing 4th gear wheel. See **Determining circlip**

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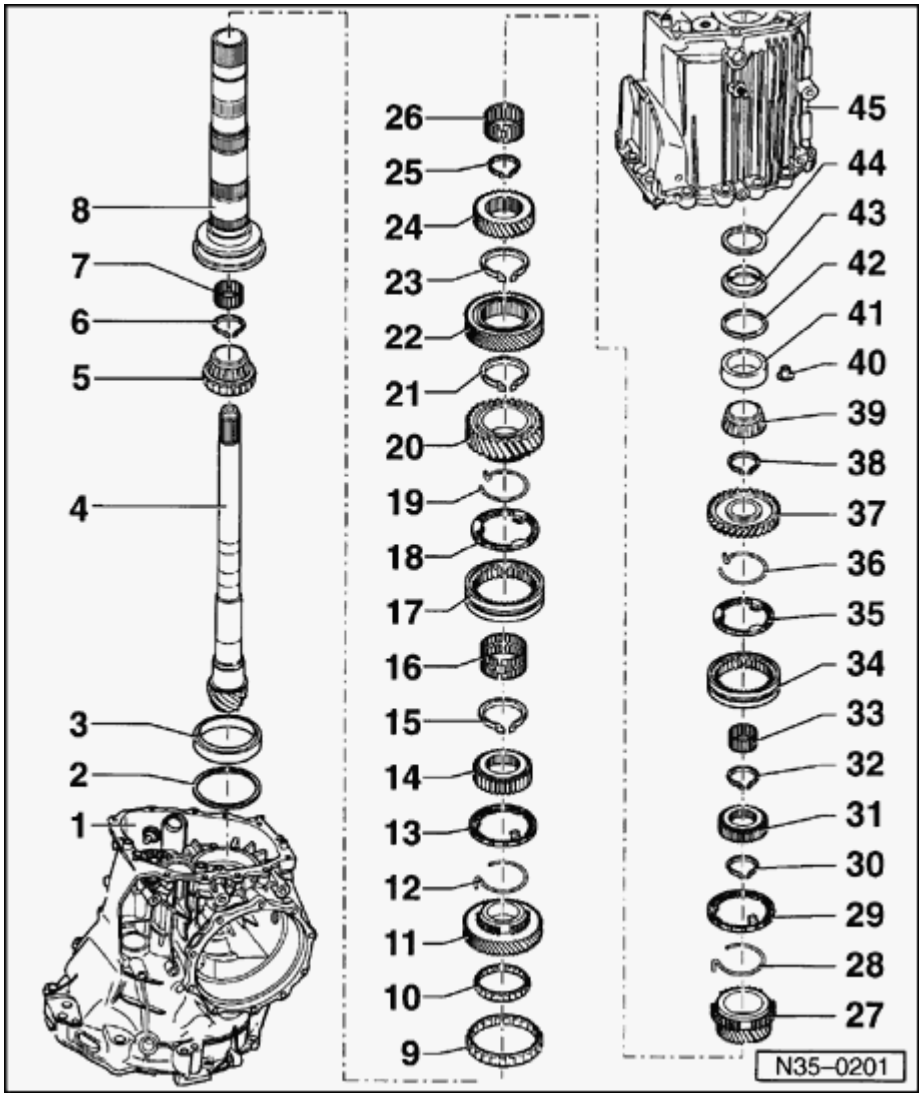


Fig. 266: Transmission Housing, Overview
Courtesy of VOLKSWAGEN UNITED STATES, INC.

26 - Needle bearing

27 - 5th gear sliding gear

28 - Spring

- Inserting in 5th gear sliding gear. See **Inserting spring into sliding gear**
- Assignment to sliding gear

29 - 5th gear synchro-ring

- Checking for wear. See **Checking synchro-ring for wear**

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30 - Circlip

- Mark
- Installation position **Installation position of circlips** - item 5

31 - Synchro-hub 5th gear and reverse gear

- Pressing off. See **Pressing off 5th gear and reverse gear synchro-hub**
- Pressing on. See **Pressing on synchro-hub for 5th gear and reverse gear**

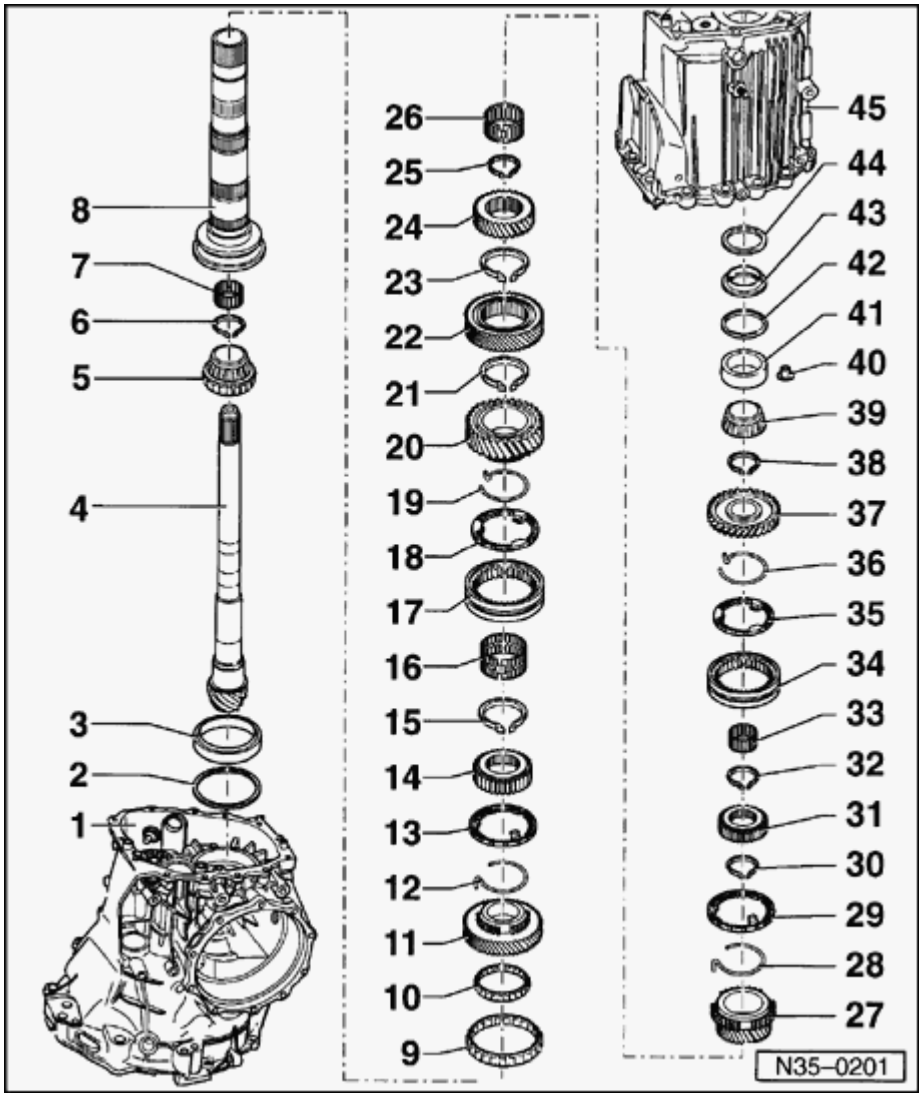


Fig. 267: Transmission Housing, Overview
Courtesy of VOLKSWAGEN UNITED STATES, INC.

32 - Circlip

- Mark

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- Installation position **Installation position of circlips**- item 6
- Re-determining when replacing synchro-hub. See **Determining circlip**

33 - Needle bearing

- For reverse gear

34 - Locking collar for 5th gear and reverse gear

- Installation position. See **Installation position of locking collar for 5th gear and reverse gear**

35 - Reverse gear synchro-ring

- Checking for wear. See **Checking synchro-ring for wear**

36 - Spring

- Inserting in reverse gear sliding gear. See **Inserting spring into sliding gear**
- Assignment to sliding gear

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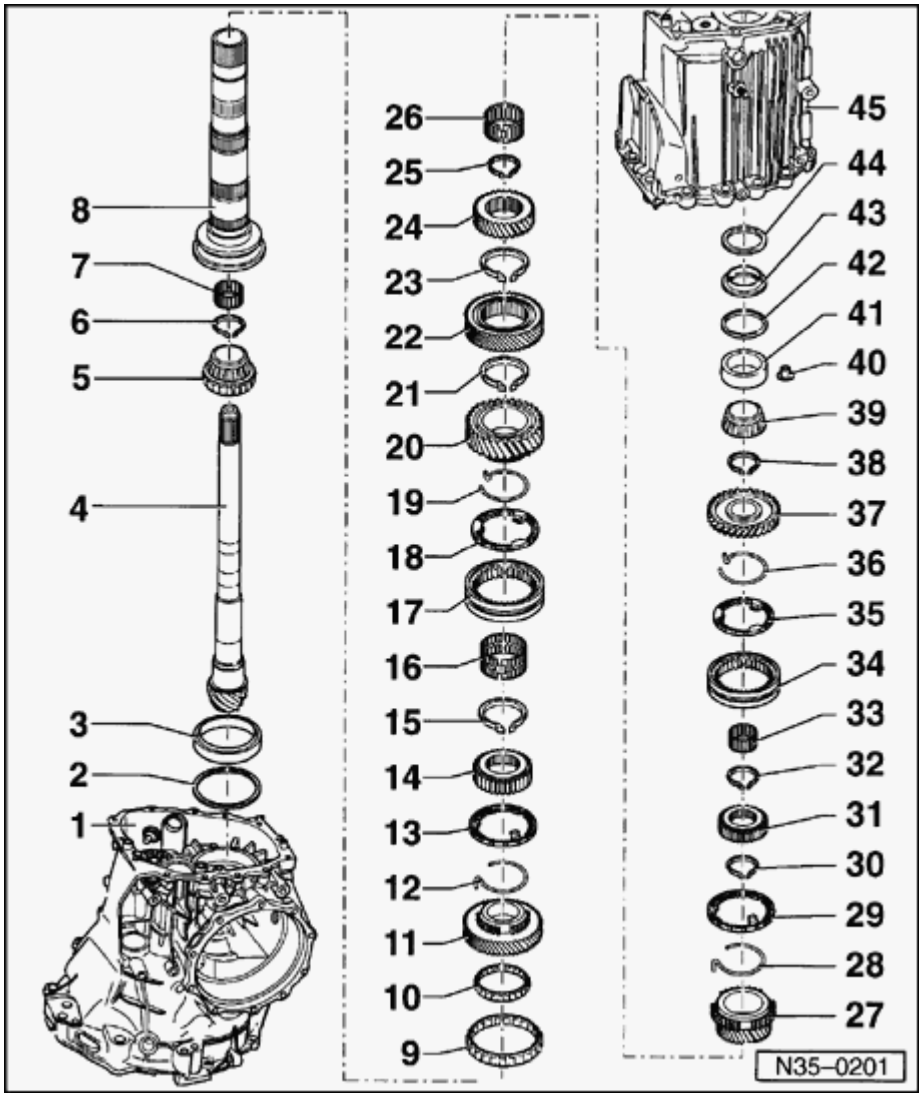


Fig. 268: Transmission Housing, Overview
Courtesy of VOLKSWAGEN UNITED STATES, INC.

37 - Reverse gear sliding gear

38 - Circlip

- Mark
- Installation position **Installation position of circlips** item 7

39 - Inner race for tapered roller bearing 1)

- Pressing off. See **Pressing off inner race for tapered roller bearing**
- Pressing on. See **Pressing on inner race for tapered roller bearing**

40 - Bushing

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- For securing outer race of small tapered roller bearing
- Extracting. See **Pulling out locking bushing for outer race of small tapered roller bearing**
- Does not need to be installed after small tapered roller bearing has been replaced

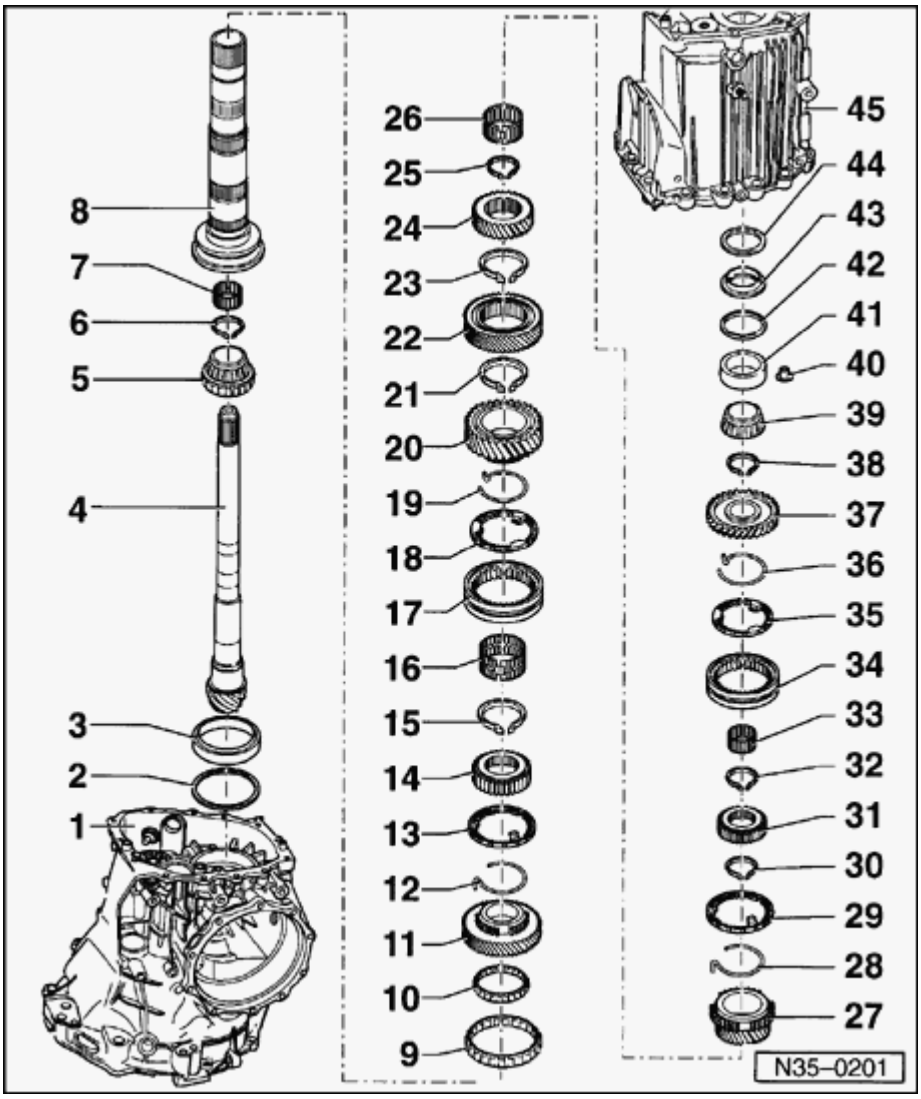


Fig. 269: Transmission Housing, Overview
Courtesy of VOLKSWAGEN UNITED STATES, INC.

41 - Outer race for tapered roller bearing1)

- Pressing out. See **Pressing out outer race for tapered roller bearing**
- Pressing in. See **Pressing in outer race for tapered roller bearing**

42 - Shim "S4"

- Adjustment table. Refer to **Adjustment table**

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43 - Ring

- For holding rubber washer
- Assignment

44 - Rubber washer

- For length compensation
- Assignment

45 - Transmission cover

Extracting outer race for double tapered roller bearing

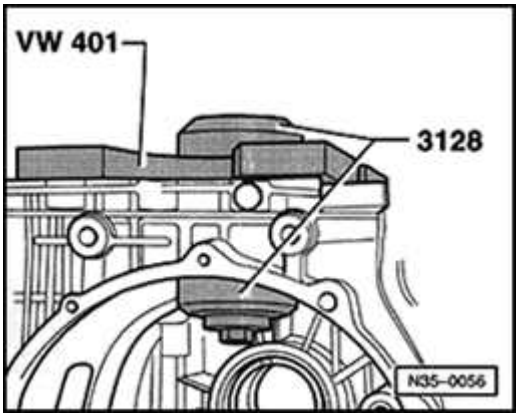


Fig. 270: Pulling Out Outer Race For Double Tapered Roller Bearing
Courtesy of VOLKSWAGEN UNITED STATES, INC.

Removing differential. Refer to **Differential, removing and installing**.

- Position pressure piece of puller 3128 beneath outer race.
- Install threaded section of puller 3128 together with pressure plate VW 401 onto transmission housing.

When bolt is tightened, outer race is pulled out of housing.

Pressing off inner race for double tapered roller bearing

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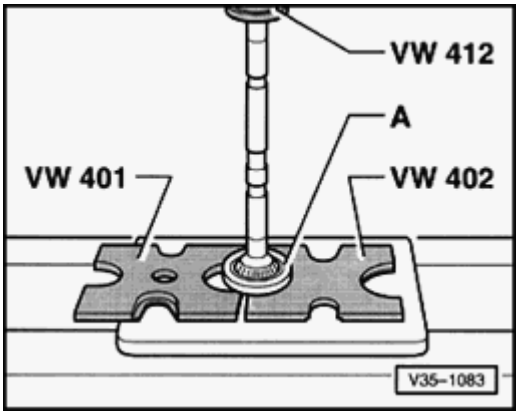


Fig. 271: Pressing Off Inner Race For Double Tapered Roller Bearing
Courtesy of VOLKSWAGEN UNITED STATES, INC.

- Remove circlip before pressing off.

NOTE:

- **Outer race -A- must be mounted before inner race can be removed.**
- **Inner race of double tapered roller bearing will be destroyed during pressing off.**

Pressing in outer race for double tapered roller bearing

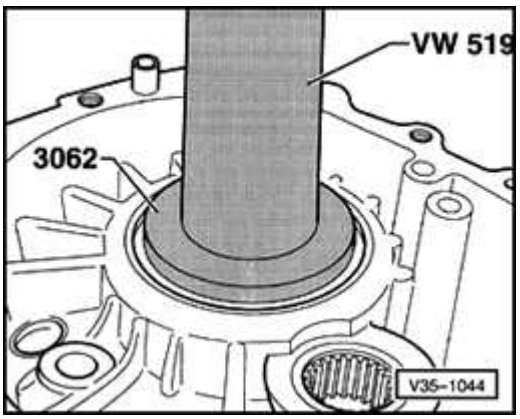


Fig. 272: Pressing In Outer Race For Double Tapered Roller Bearing
Courtesy of VOLKSWAGEN UNITED STATES, INC.

Smaller diameter of thrust pad 3062 faces outer race.

Pressing on inner race for double tapered roller bearing

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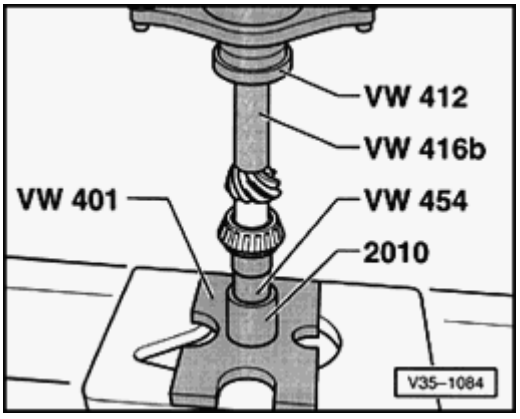


Fig. 273: Pressing On Inner Race For Double Tapered Roller Bearing
Courtesy of VOLKSWAGEN UNITED STATES, INC.

Determining circlip

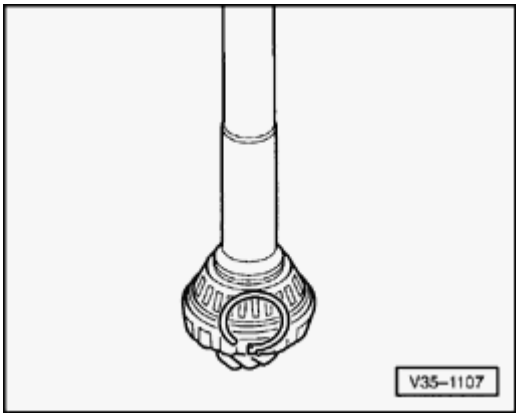


Fig. 274: Determining Circlip To Be Installed
Courtesy of VOLKSWAGEN UNITED STATES, INC.

- Determine and install thickest circlip which can be inserted.
- Determine circlips for synchro-hubs, needle bearings and gear wheels of individual gears as shown for double tapered roller bearing.

Available circlips and their part numbers:

Pulling out locking bushing for outer race of small tapered roller bearing

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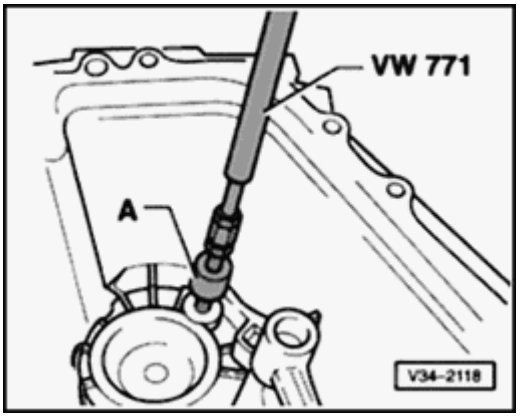


Fig. 275: Pulling Off Securing Bushing For Small Tapered Roller Bearing Outer Race
Courtesy of VOLKSWAGEN UNITED STATES, INC.

A - Internal puller, e. g. Kukko 21/1, 12 to 16 mm

Pressing out outer race for tapered roller bearing

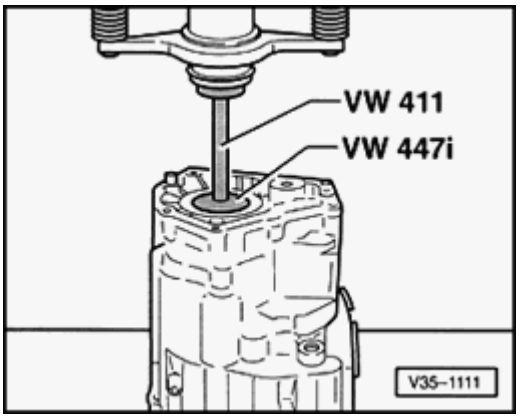


Fig. 276: Pressing Out Outer Race For Tapered Roller Bearing
Courtesy of VOLKSWAGEN UNITED STATES, INC.

- Press outer race out together with ring -item 43: Refer to **Pinion and hollow shaft, disassembling and assembling**, shim "S4" -item 42: Refer to **Pinion and hollow shaft, disassembling and assembling** and rubber washer for length compensation -item 44: Refer to **Pinion and hollow shaft, disassembling and assembling**.

Pressing in outer race for tapered roller bearing

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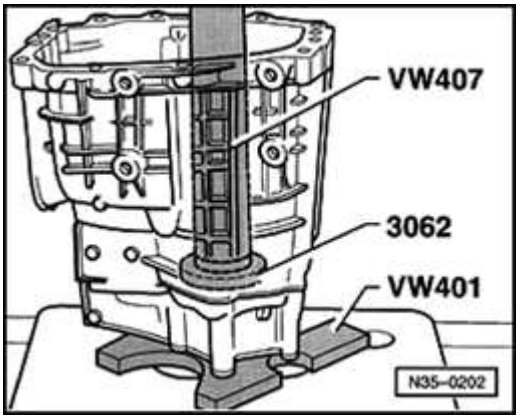


Fig. 277: Pressing In Tapered Roller Bearing Outer Race
Courtesy of VOLKSWAGEN UNITED STATES, INC.

Pressing off inner race for tapered roller bearing

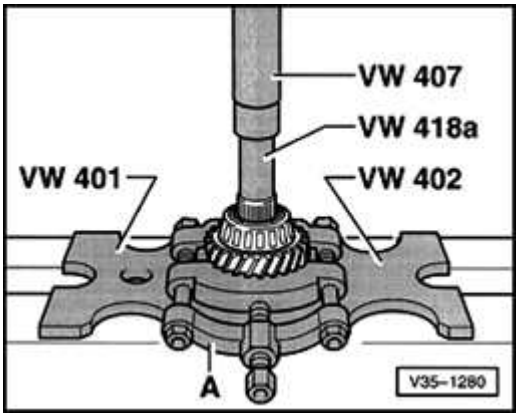


Fig. 278: Pressing Off Inner Race For Tapered Roller Bearing
Courtesy of VOLKSWAGEN UNITED STATES, INC.

- Press off inner race together with reverse gear sliding gear.

A - Separating tool 22 to 115 mm, e.g. Kukko 17/2

Pressing on inner race for tapered roller bearing

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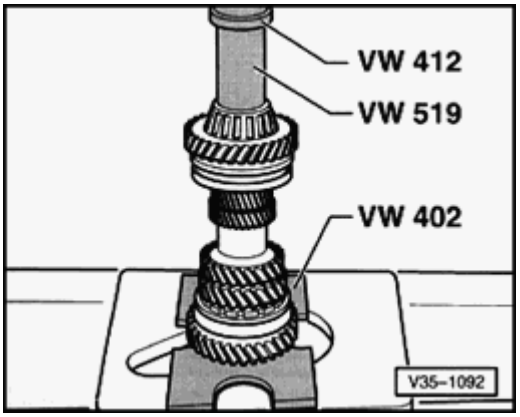


Fig. 279: Pressing On Tapered Roller Bearing Inner Race
Courtesy of VOLKSWAGEN UNITED STATES, INC.

- Install circlip before pressing on inner race.

Pressing off 5th gear and reverse gear synchro-hub

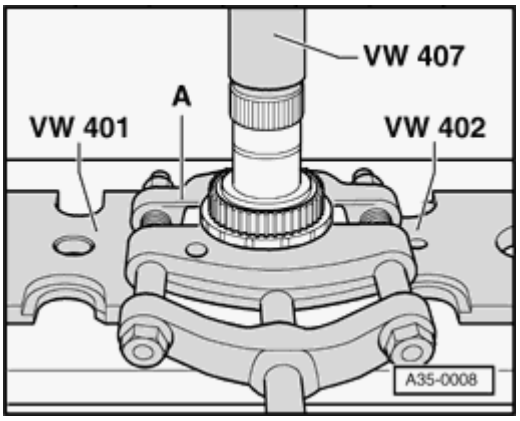


Fig. 280: Pressing Off Synchronizer Hub For 5th Gear And Reverse Gear
Courtesy of VOLKSWAGEN UNITED STATES, INC.

- Remove circlip before pressing off.
- Press off synchro-hub together with 5th gear sliding gear.

A - Separating tool 22 to 115 mm, e.g. Kukko 17/2

Pressing off 4th gear wheel

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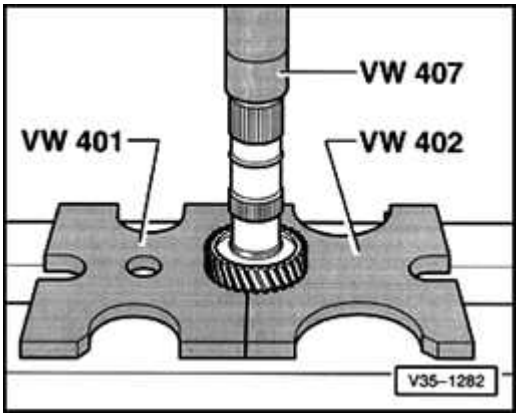


Fig. 281: Pressing Off 4th-Gear Gear Wheel
Courtesy of VOLKSWAGEN UNITED STATES, INC.

- Remove circlip before pressing off.

Pressing off 3rd gear wheel

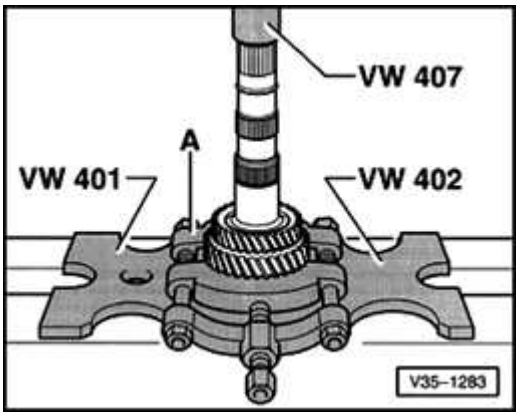


Fig. 282: Pressing Off 3Rd-Gear Gear Wheel
Courtesy of VOLKSWAGEN UNITED STATES, INC.

- Remove circlip before pressing off.
- Press off 3rd gear wheel together with 2nd gear sliding gear.

A - Separating tool 22 to 115 mm, e.g. Kukko 17/2

Pressing off 1st and 2nd gear synchro-hub

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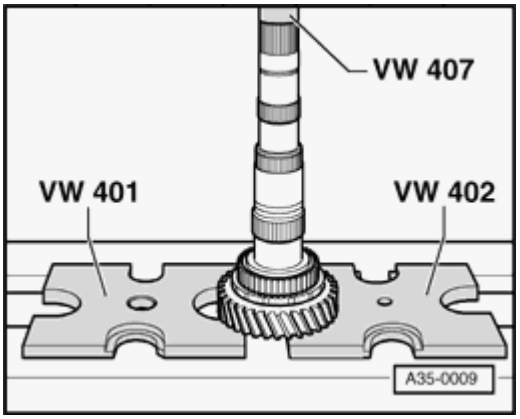


Fig. 283: Pressing Off 1st And 2nd Gear Synchro-Hub
Courtesy of VOLKSWAGEN UNITED STATES, INC.

- Remove circlip before pressing off.
- Press off synchro-hub together with 1st gear sliding gear.

Installation position of circlips

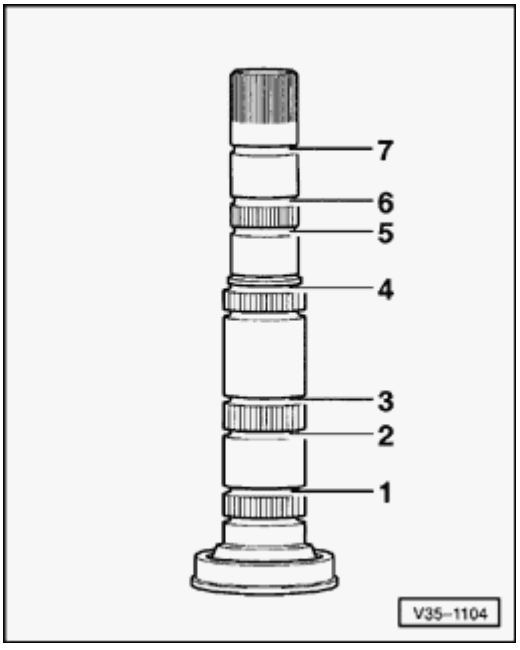


Fig. 284: Identifying Installed Position Of Circlips
Courtesy of VOLKSWAGEN UNITED STATES, INC.

- Determine circlips for synchro-hubs, needle bearings and gear wheels of individual gears as shown in. See **Determining circlip**.

- Circlip -1- secures synchro-hub for 1st and 2nd gear.

Identifiable by color: blue

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Circlip thickness (mm)		
1.90	1.96	2.02
1.93	1.99	

- Circlip -2- secures 2nd gear needle bearing/sliding gear.

Identifiable by color: blue

Circlip thickness (mm)
2.50

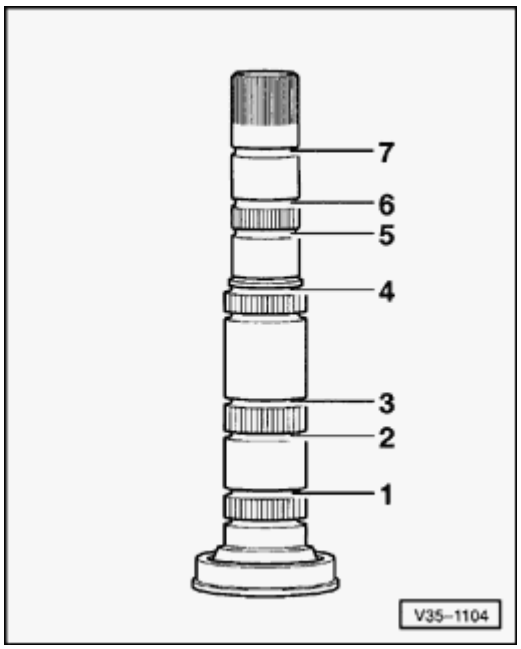


Fig. 285: Identifying Installed Position Of Circlips
Courtesy of VOLKSWAGEN UNITED STATES, INC.

- Circlip -3- secures 3rd gear wheel.

Circlip thickness (mm)		
1.90	1.98	2.06
1.94	2.02	

- Circlip -4- secures 4th gear wheel.

Circlip thickness (mm)		
1.86	1.94	
1.90	1.98	

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- Circlip -5- secures 5th gear needle bearing/sliding gear.

Identifiable by color: brown

Circlip thickness (mm)
2.00

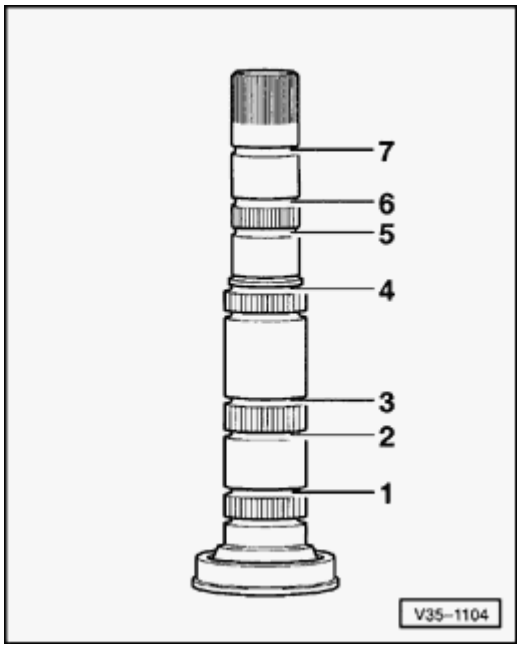


Fig. 286: Identifying Installed Position Of Circlips
Courtesy of VOLKSWAGEN UNITED STATES, INC.

- Circlip -6- secures synchro-hub for 5th gear and reverse gear.

Identifiable by color: blue

Circlip thickness (mm)		
1.90	1.96	2.02
1.93	1.99	2.05

- Circlip -7- secures needle bearing for reverse gear sliding gear.

Circlip thickness (mm)
2.50

- If necessary determine circlips using chart. Part numbers

Inserting spring into sliding gear

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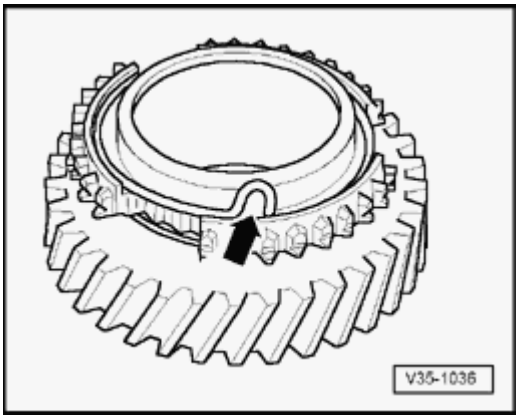


Fig. 287: Inserting Spring Into Gear
Courtesy of VOLKSWAGEN UNITED STATES, INC.

Bent end of spring (arrow) must be hooked into hole of sliding gear.

Checking synchro-ring for wear

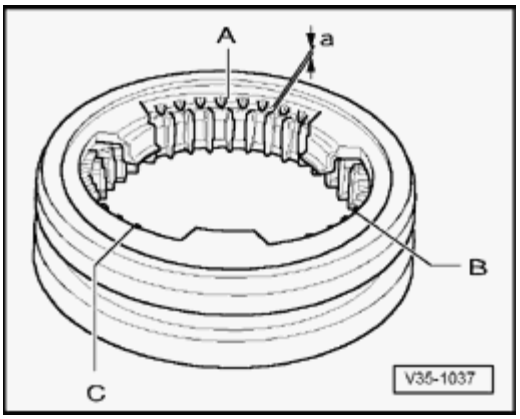


Fig. 288: Checking Synchronizer For Wear
Courtesy of VOLKSWAGEN UNITED STATES, INC.

- Push synchro-ring into locking collar and use feeler gauge to measure gap -a- at positions -A-, -B- and -C-.
- Add up measured values and divide by 3.

Obtained value must not be lower than 0.5 mm.

Pressing on synchro-hub for 1st and 2nd gear

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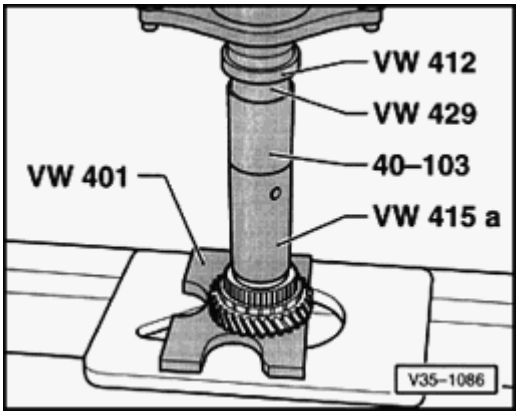


Fig. 289: Pressing On Synchronizer Hub For 1st And 2nd Gears
Courtesy of VOLKSWAGEN UNITED STATES, INC.

- Installation position:

High collar on inside faces 2nd gear

Installation position of locking collar for 1st and 2nd gear

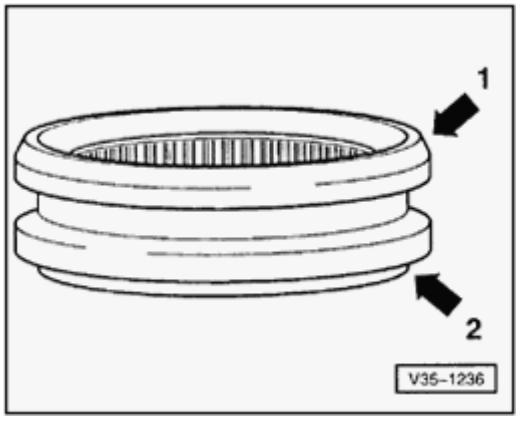


Fig. 290: Identifying Installed Position Of Operating Sleeve For 1st And 2nd Gear
Courtesy of VOLKSWAGEN UNITED STATES, INC.

- Installation position:

Chamfer (arrow -1-) faces 2nd gear

Shoulder (arrow -2-) faces 1st gear

Pressing on 3rd gear wheel

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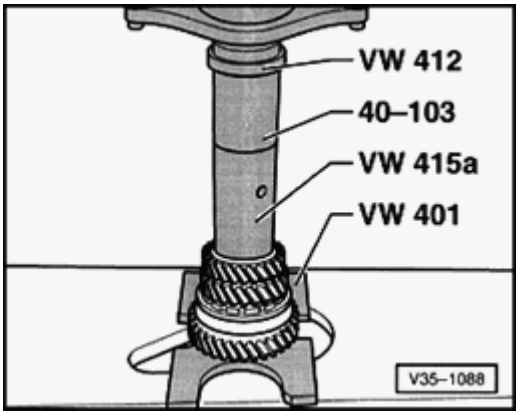


Fig. 291: Pressing On 3rd-Gear Gear Wheel
Courtesy of VOLKSWAGEN UNITED STATES, INC.

- Installation position:

Groove on gear wheel faces 4th gear

Pressing on 4th gear wheel

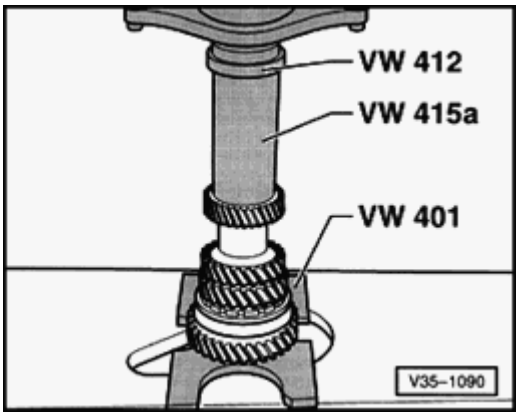


Fig. 292: Pressing On 4th-Gear Gear Wheel
Courtesy of VOLKSWAGEN UNITED STATES, INC.

- Installation position:

High collar on inside faces 3rd gear

Pressing on synchro-hub for 5th gear and reverse gear

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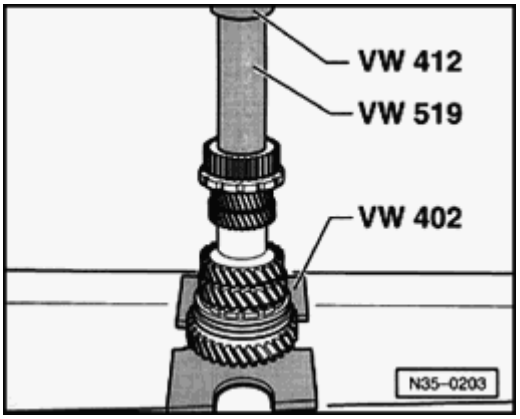


Fig. 293: Pressing On Synchronizer Hub For 5th Gear And Reverse Gear
Courtesy of VOLKSWAGEN UNITED STATES, INC.

- Installation position:

High collar on inside faces 5th gear

Installation position of locking collar for 5th gear and reverse gear

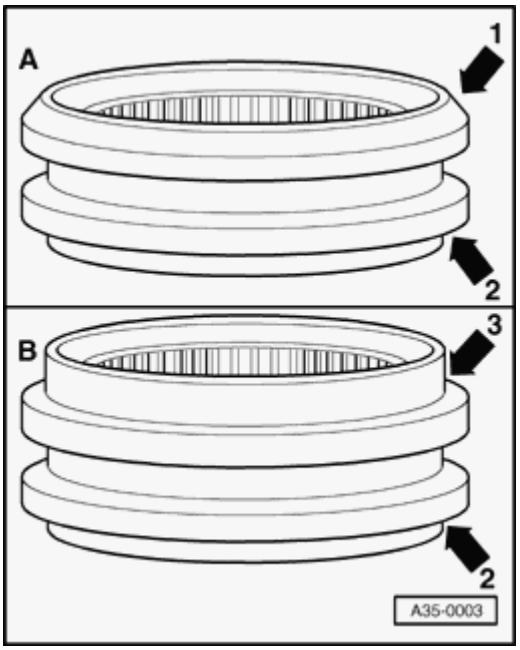


Fig. 294: Identifying Installed Position Of Operating Sleeve Up To Transmission Manufacture Date 22 06 3
Courtesy of VOLKSWAGEN UNITED STATES, INC.

Locking collars with chamfer -A- and locking collars with high shoulder -B- are used for assembly.

- Note locking collar assignment to reverse idler gear. See **Locking collar assignment to reverse idler gear**

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- Installation position:

Chamfer (arrow -1-) faces reverse gear

Low shoulder (arrow -2-) faces 5th gear

High shoulder (arrow -3-) faces reverse gear

Locking collar assignment to reverse idler gear

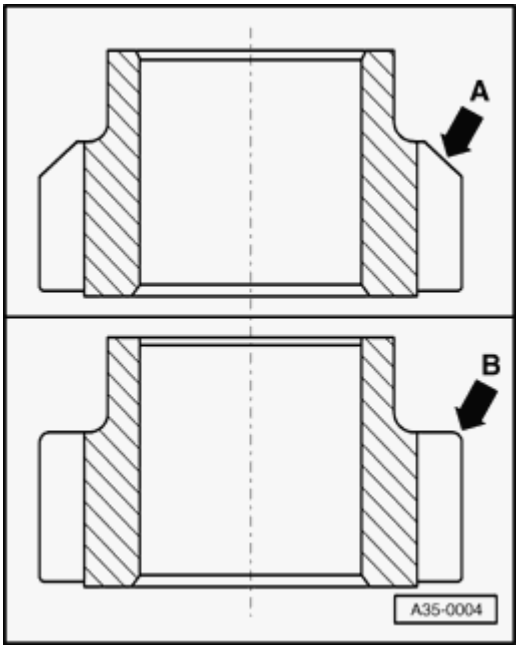


Fig. 295: Allocation Of Operating Sleeve To Reverse Idler Gear
Courtesy of VOLKSWAGEN UNITED STATES, INC.

A	Reverse idler gear with chamfer	Either locking collar type (with chamfer or high shoulder) can be used for assembly
B	Reverse idler gear without chamfer	Only locking collars with high shoulder can be used for assembly. Do not use locking collars with chamfer.

REVERSE IDLER GEAR, REMOVING AND INSTALLING

Reverse idler gear, removing and installing

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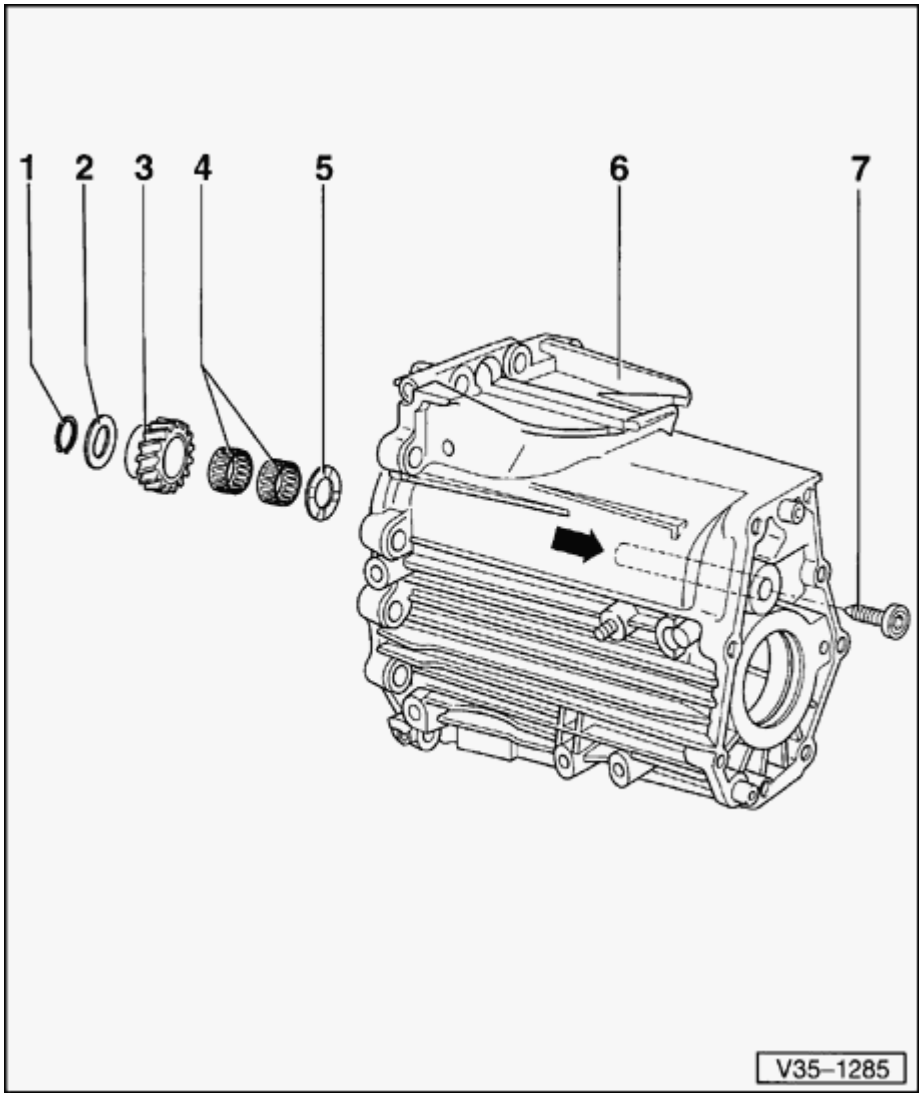


Fig. 296: Reverse Idler Gear, Overview
Courtesy of VOLKSWAGEN UNITED STATES, INC.

1 - Circlip

2 - Support plate

3 - Reverse idler gear

- Different versions, Assignment. See **Locking collar assignment to reverse idler gear**

4 - Needle bearing

5 - Thrust washer

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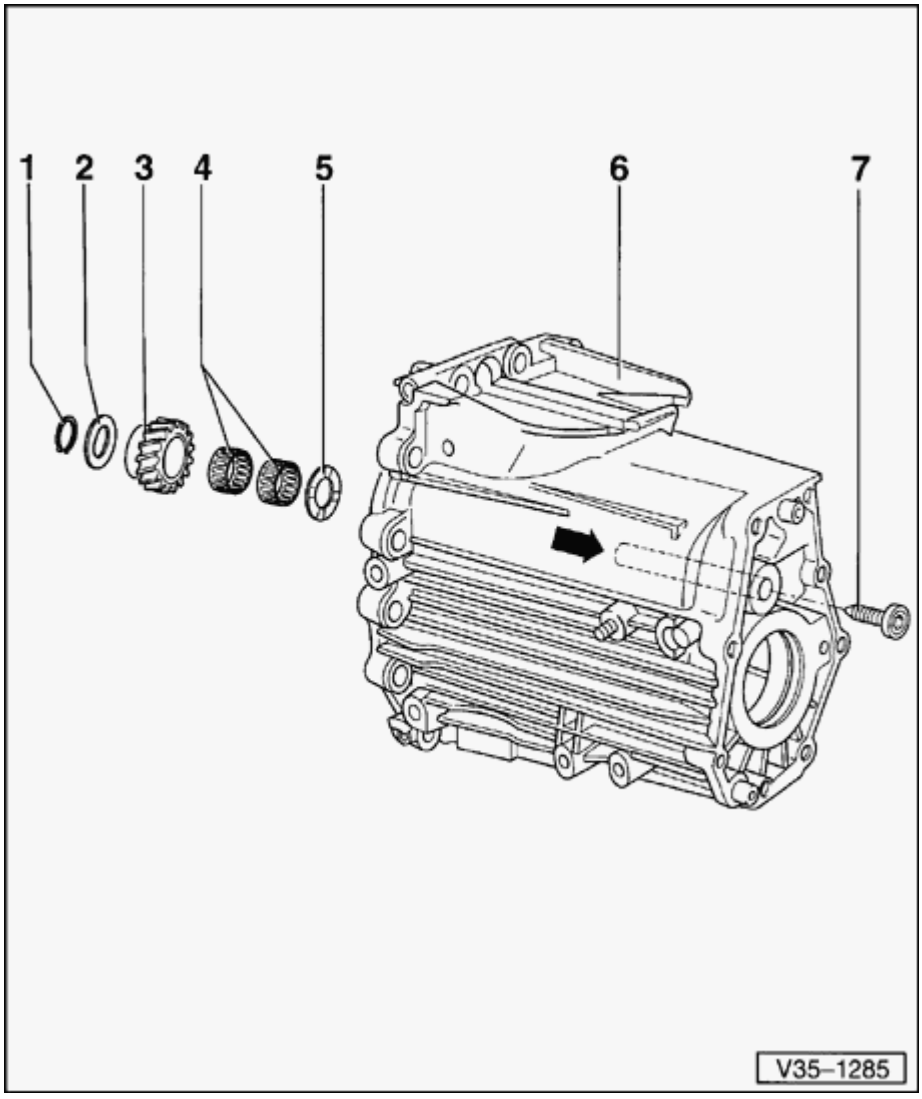


Fig. 297: Reverse Idler Gear, Overview
Courtesy of VOLKSWAGEN UNITED STATES, INC.

6 - Transmission cover

- With axle for reverse idler gear (arrow)
- Axle for reverse idler gear does not have to be removed in order to remove reverse idler gear
- Axle for reverse idler gear is not available as replacement part

7 - TORX bolt, 35 Nm

- For additional fastening of axle for reverse idler gear

39 FINAL DRIVE, DIFFERENTIAL

OIL SEAL FOR DRIVE FLANGE, REPLACING

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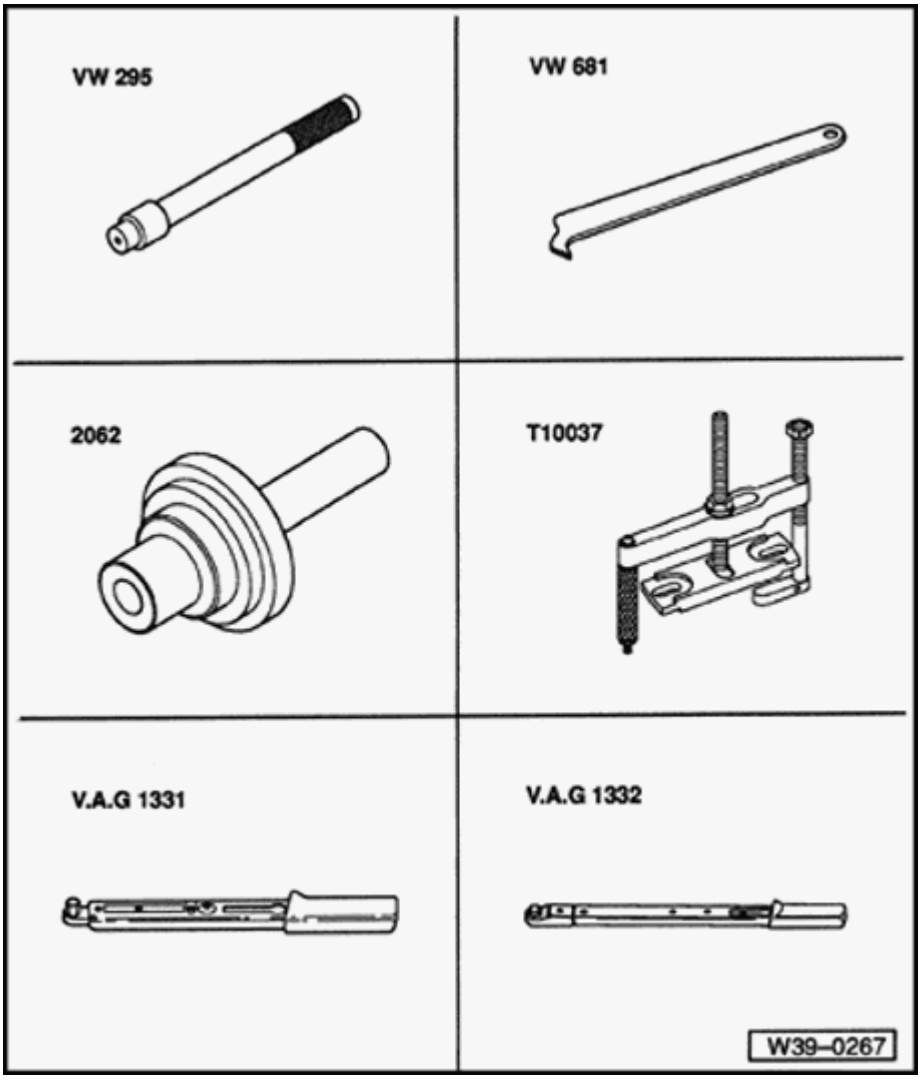


Fig. 298: Identifying Special Tools
Courtesy of VOLKSWAGEN UNITED STATES, INC.

(Transmission installed)

- Pay attention to general repair instructions. Refer to **General repair instructions**.

Special tools and equipment

- VW 295 Mandrel
- VW 681 Extractor lever
- 2062 Insertion mandrel
- T10037 Puller

- VAG 1331 Torque wrench
- VAG 1332 Torque wrench

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Special tools, testers and other items required

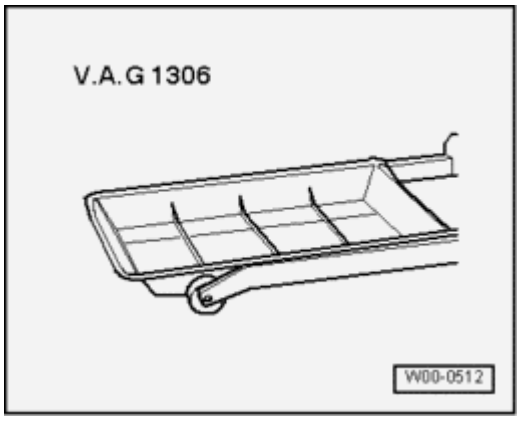


Fig. 299: Identifying Drip Tray V.A.G 1306
Courtesy of VOLKSWAGEN UNITED STATES, INC.

- VAG 1306 Drip tray

NOTE:

- **Use the same procedure for removing both left and right oil seals.**
- **It is not necessary to remove the exhaust system.**

Removing

- Turn steering wheel to left lock.

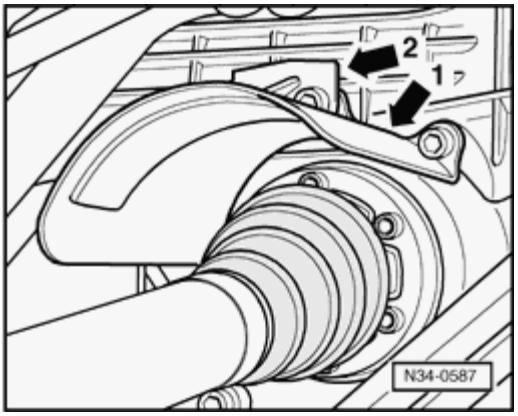


Fig. 300: Detaching Heat Shields And Right-Hand Axle Shaft
Courtesy of VOLKSWAGEN UNITED STATES, INC.

- Remove cover plates above drive axle (arrows 1 + 2).
- Disconnect drive axle from transmission flange:
- Tie drive axle up as far out of the way as possible. Take care not to damage paintwork on drive axle.
- Place drip tray VAG 1306 under transmission.

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Replacing left oil seal

Remove left drive flange

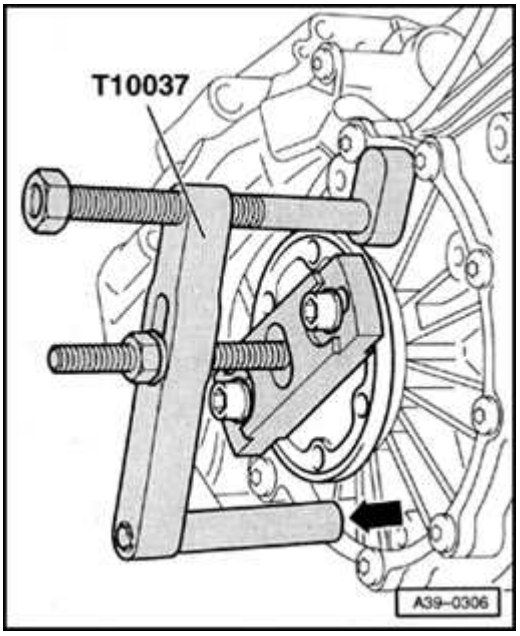


Fig. 301: Removing Drive Flange (Left Side)
Courtesy of VOLKSWAGEN UNITED STATES, INC.

- Remove drive flange by firmly screwing puller T10037 to cover of differential (arrow).

Replacing right oil seal

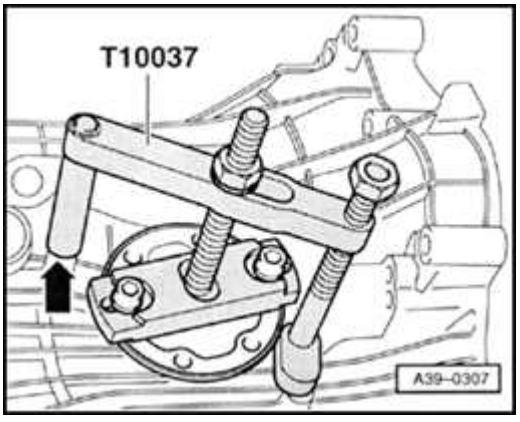


Fig. 302: Removing Drive Flange (Right Side)
Courtesy of VOLKSWAGEN UNITED STATES, INC.

- Remove drive flange by firmly screwing puller T10037 to transmission housing (arrow).

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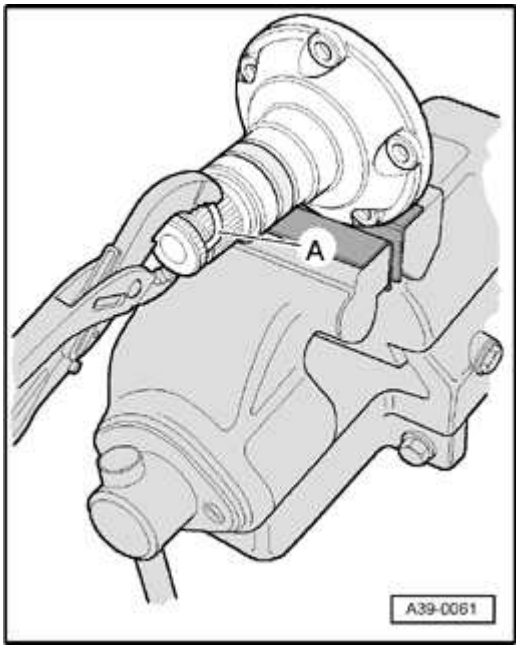


Fig. 303: Removing And Installing Securing Ring
Courtesy of VOLKSWAGEN UNITED STATES, INC.

- Always replace circlip of drive flange.
- Clamp drive flange with soft jaws in vice. Press circlip out of drive flange groove using new circlip -A-.
- Pull out oil seal of drive flange using VW 681.

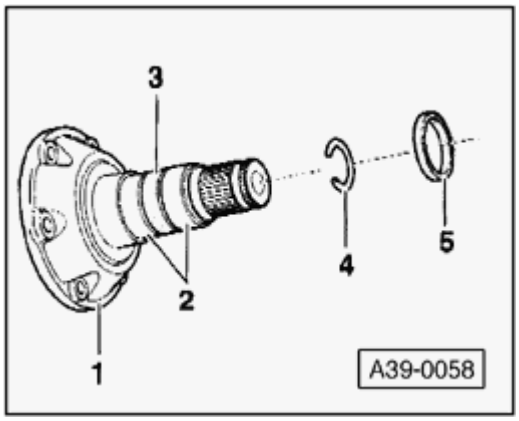


Fig. 304: Flange Shaft Design
Courtesy of VOLKSWAGEN UNITED STATES, INC.

Drive flange assembly with mounted polygonal bearing

1 - Drive flange

2 - Needle bearing (polygonal bearing)

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3 - Spacer ring

4 - Circlip

5 - Spacer ring - additionally installed if splined shaft diameter = 30 mm

NOTE:

- **Polygonal bearings run roughly when drive flange is not installed. This does not indicate faulty bearings. An acoustic test can only be conducted when drive flange is installed.**
- **Look out for damages to polygonal bearings (e.g. cracks in outer race of bearing)**
- **Polygonal bearings can only be replaced together with drive flange.**
- **Drive flanges with a splined shaft diameter of 30 mm have a spacer ring -5- installed between polygonal bearing and planet pinion.**

Installing

NOTE: Repair rim offset 6.5 mm if employing used drive flange.

- Slightly oil circumference of oil seal.

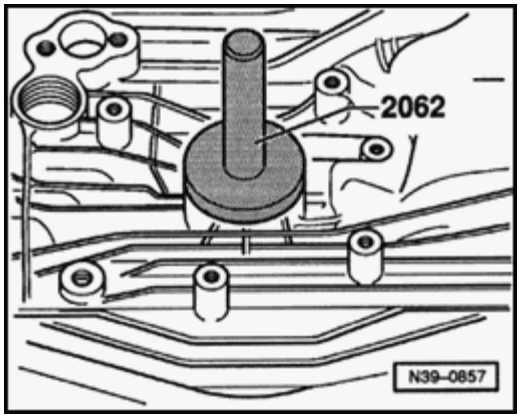


Fig. 305: Installing Right-Hand Drive Flange Seal
Courtesy of VOLKSWAGEN UNITED STATES, INC.

- Drive in new oil seal for right drive flange 5.5 mm below surface of housing, taking care not to tilt it.
- Fill space between sealing lip and dust lip with sealing grease G 052 128 A1.

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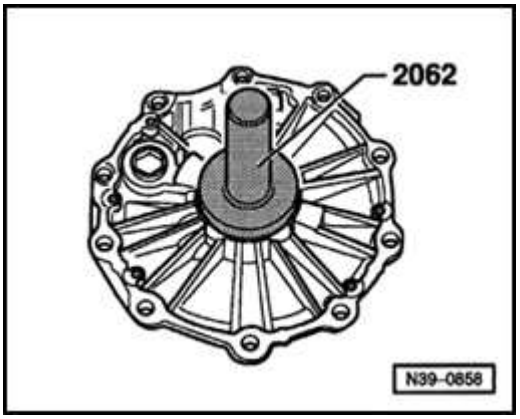


Fig. 306: Installing Left-Hand Drive Flange Seal
Courtesy of VOLKSWAGEN UNITED STATES, INC.

- Drive in new oil seal for left drive flange 5.5 mm below surface of cover, taking care not to tilt it.
- Drive in drive flange using mandrel VW 295.
- Screw drive axle to drive flange.
- Screw on cover plates for drive axle, if installed.

- Checking oil level in manual transmission. Refer to **Transmission oil level, checking**.

Tightening torques

Component		Nm
Drive axle to drive flange	M8	40
	M10	70
Heat shields for drive axles		23

SPEEDOMETER VEHICLE SPEED SENSOR AND DRIVE-WHEEL, REMOVING AND INSTALLING

Speedometer vehicle speed sensor and drive-wheel, removing and installing

- Transmission installed

- Pay attention to general repair instructions. Refer to **General repair instructions**.

Speedometer vehicle speed sensor -G22-, removing and installing

Removing

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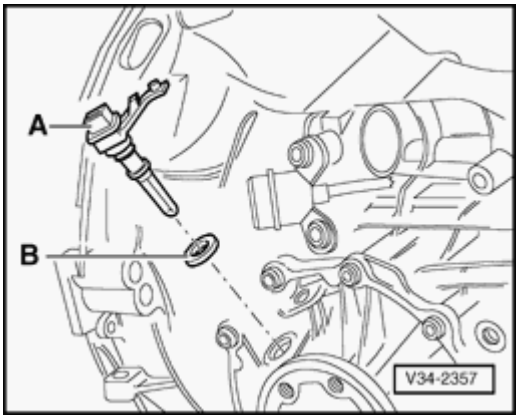


Fig. 307: Identifying Speedometer Vehicle Speed Sensor (VSS) and O-ring
Courtesy of VOLKSWAGEN UNITED STATES, INC.

- Unplug connector of sender -A-.
- Press down retainer, swivel sensor to one side and pull upward and out.

Installing

- Replace O-ring -B- during installation.
- Insert sensor and engage.

NOTE: Handle sender with care. If damaged, speed values can no longer be precise.

Speedometer drive wheel, removing and installing

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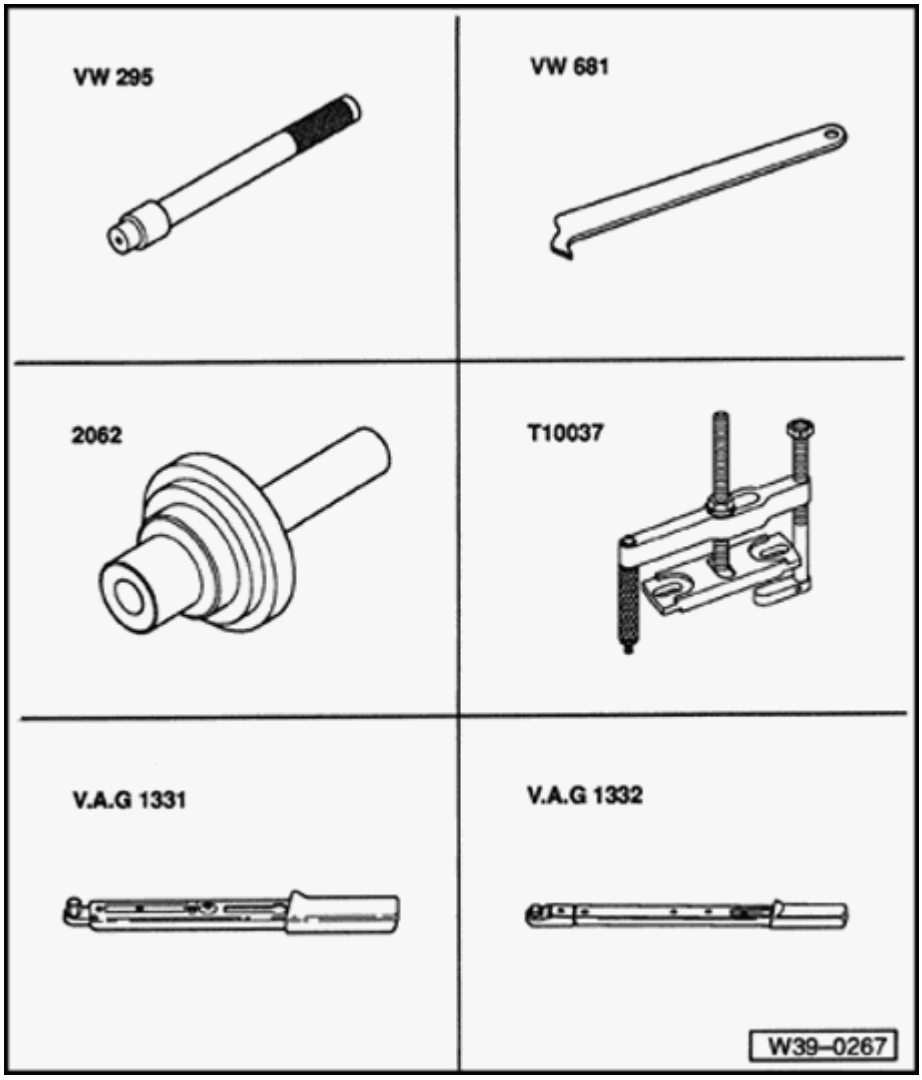


Fig. 308: Identifying Special Tools
Courtesy of VOLKSWAGEN UNITED STATES, INC.

(Transmission installed)

Special tools and equipment

- VW 295 Mandrel
- VW 681 Extractor lever
- 2062 Insertion mandrel
- T10037 Puller
- VAG 1331 Torque wrench
- VAG 1332 Torque wrench

Special tools, testers and other items required

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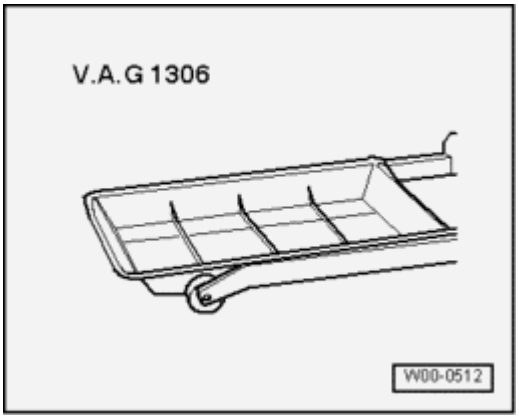


Fig. 309: Identifying Drip Tray V.A.G 1306
Courtesy of VOLKSWAGEN UNITED STATES, INC.

- VAG 1306 Drip tray

Removing

- Turn steering wheel to left lock.
- If installed, remove cover plate above left drive axle.
- Disconnect drive axle from drive flange.
- Place drip tray in position.

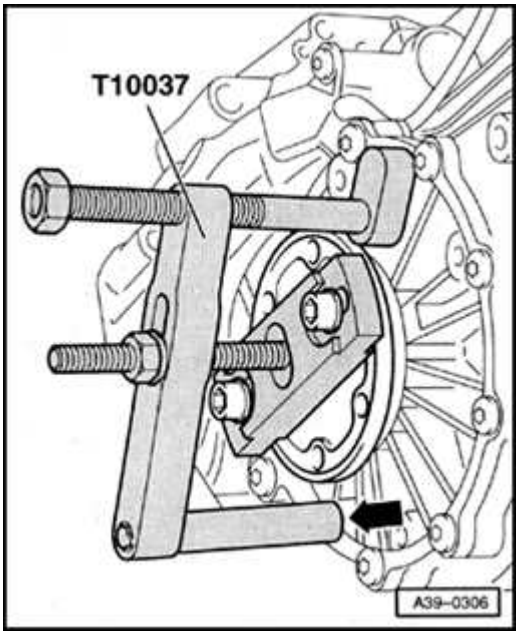


Fig. 310: Removing Drive Flange (Left Side)
Courtesy of VOLKSWAGEN UNITED STATES, INC.

- Remove drive flange by firmly screwing puller T10037 to cover of differential (arrow).
- Pull out oil seal of drive flange using VW 681.

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- Remove speedometer vehicle speed sensor. Refer to **Speedometer vehicle speed sensor -G22-, removing and installing**.

Removing speedometer driving gear:

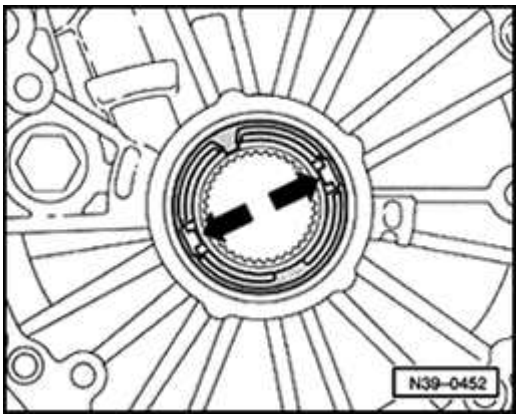


Fig. 311: Press Drive Gear Retaining Clips In Direction Of Arrows Using Screwdriver
Courtesy of VOLKSWAGEN UNITED STATES, INC.

- Press clips in direction of arrow using a screwdriver.
- Remove driving gear by prying out on all sides.

Installing

Install in reverse order, paying attention to the following:

NOTE: Install the driving gear carefully ensuring it is not crooked on the differential. Do not use force or the driving gear could break.

Installation position:

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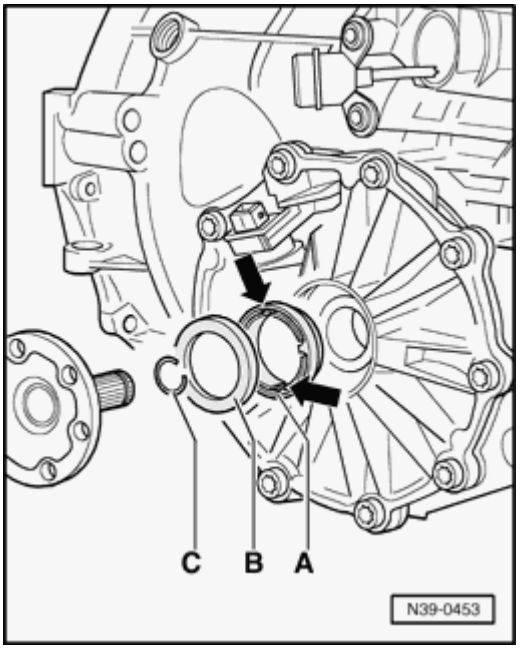


Fig. 312: Identifying Installed Position Of Drive Gear, Retaining Clip And Seal
Courtesy of VOLKSWAGEN UNITED STATES, INC.

Driving tab of driving gear -A- faces oil seal -B- and locks in place in groove of differential.

The clips (arrows) engage in circumferential groove of differential.

- Always replace oil seal -B- and circlip -C-.
- Drive in drive flange using mandrel VW 295.
- Top up manual transmission with oil and check oil level. Refer to **Transmission oil level, checking**.

Tightening torques

Component		Nm
Drive axle to drive flange	M8	40
	M10	70
Heat shields above drive axles to transmission		23

OIL SEAL FOR DRIVE FLANGE/DRIVE SHAFT, REPLACING

Oil seal for drive flange/drive shaft, replacing

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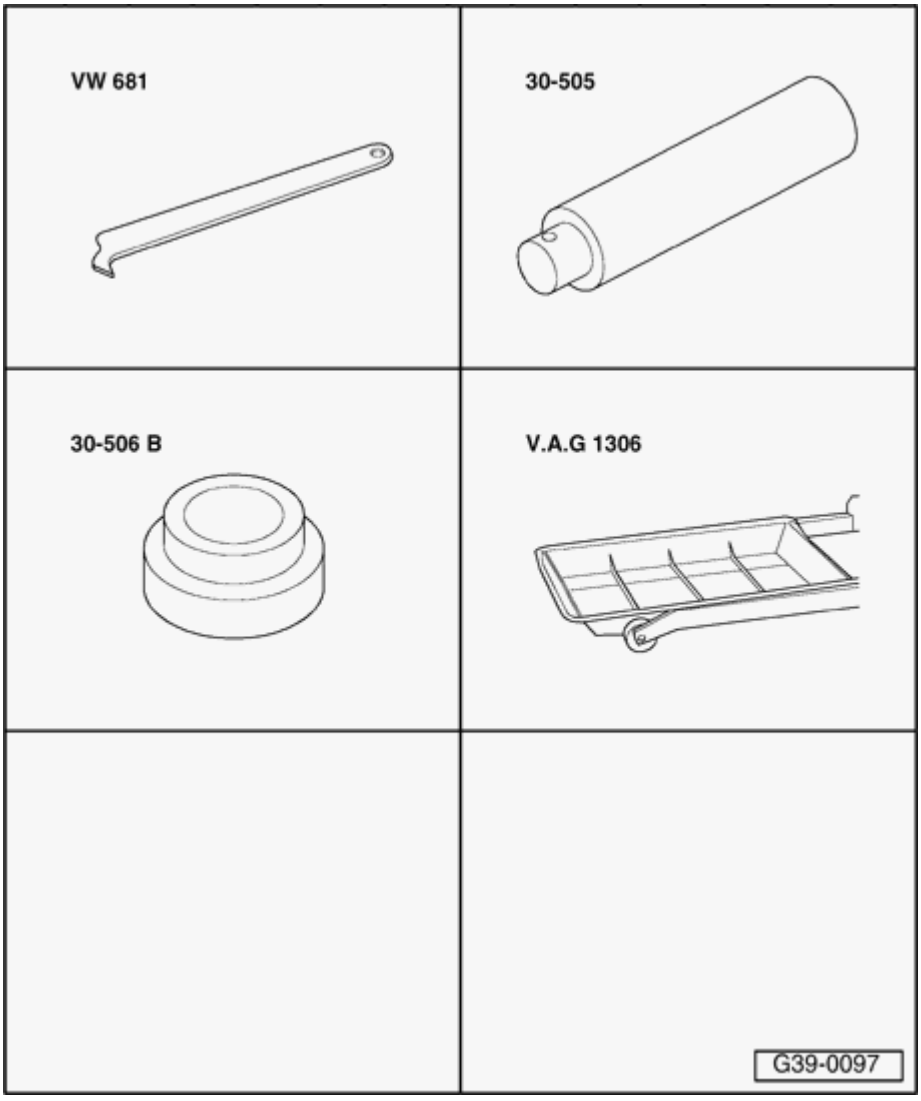


Fig. 313: Identifying Special Tools - Oil Seal For Drive Flange/Drive Shaft, Replacing
Courtesy of VOLKSWAGEN UNITED STATES, INC.

(Transmission installed)

Special tools and equipment

- VW 681 Extractor lever
- 30-505 Insertion mandrel
- 30-506 B Press tool
- VAG 1306 Drip tray

Removing

- Pay attention to general repair instructions. Refer to **General repair instructions**.

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- Place drip tray VAG 1306 underneath and drain gear oil.

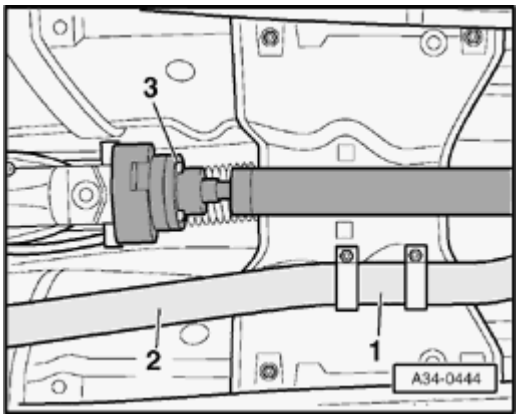


Fig. 314: Exhaust Pipe Clamp And Driveshaft At Transmission
Courtesy of VOLKSWAGEN UNITED STATES, INC.

- Separate exhaust system at clamp -1-.

Refer to **26 - EXHAUST SYSTEM, EMISSION CONTROLS**

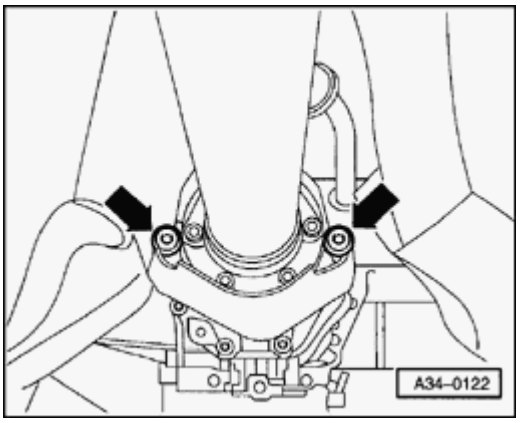


Fig. 315: Identifying Heat Shield Fasteners For Torsen Differential
Courtesy of VOLKSWAGEN UNITED STATES, INC.

- Unscrew heat shield for driveshaft from cover of Torsen differential (arrows).
- Disconnect driveshaft from transmission.

Refer to **39 FINAL DRIVE, DIFFERENTIAL**

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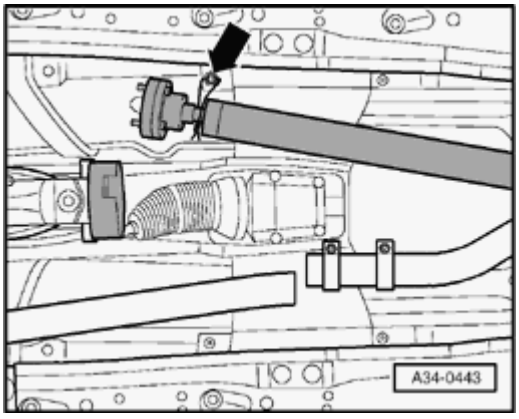


Fig. 316: Drive Shaft Secured With Wire And Locating Speed Nut
Courtesy of VOLKSWAGEN UNITED STATES, INC.

- Re-insert speed nut (arrow) slightly and secure driveshaft to stud with wire.
- Place drip tray VAG 1306 below cap.

NOTE:

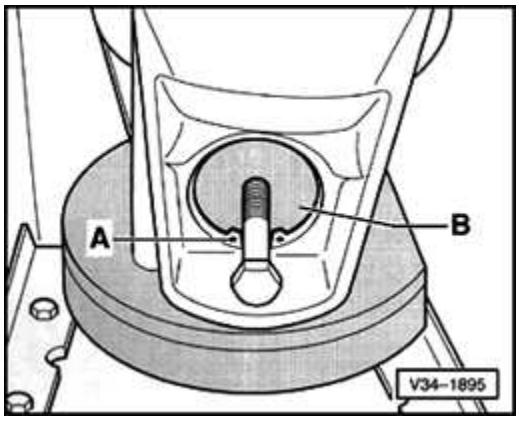


Fig. 317: Identifying Circlip And Sealing Cap
Courtesy of VOLKSWAGEN UNITED STATES, INC.

Oil escapes when cap -B- is taken off.

- Remove circlip -A-.
- Install an M8 bolt into threaded hole of cap.
- Remove cap by means of bolt.

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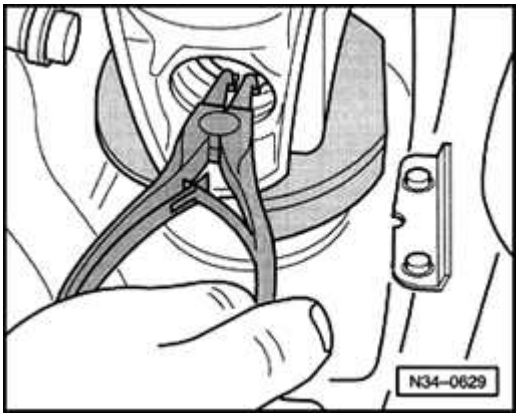


Fig. 318: Drive Flange, Removal And Installation
Courtesy of VOLKSWAGEN UNITED STATES, INC.

- Expand circlip and pull out drive flange.

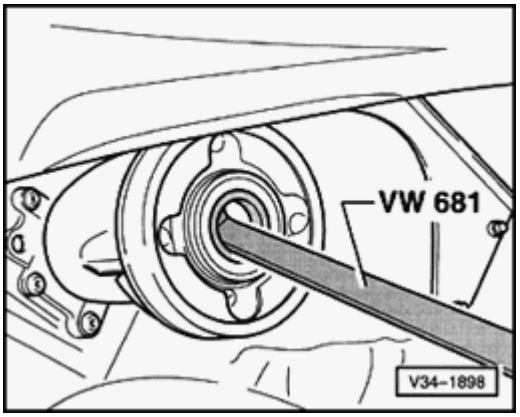


Fig. 319: Pulling Out Oil Seal For Drive Flange Using VW 681
Courtesy of VOLKSWAGEN UNITED STATES, INC.

- Pull out oil seal for drive flange using VW 681.

Installing

- Slightly oil circumference of oil seal.

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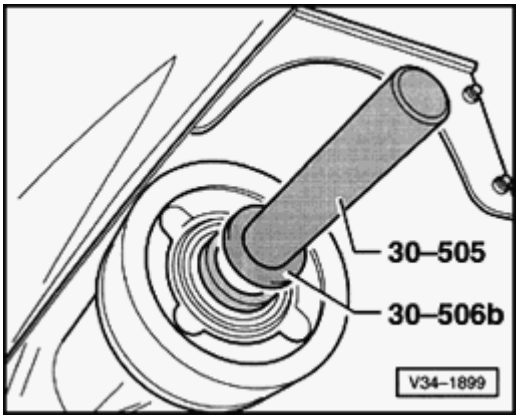


Fig. 320: Driving In New Flange Shaft Seal
Courtesy of VOLKSWAGEN UNITED STATES, INC.

- Drive in new oil seal for drive flange 2 mm below surface of housing, taking care not to tilt it.
- Fill space between sealing lip and dust lip with sealing grease G 052 128 A1.
- Insert drive flange.

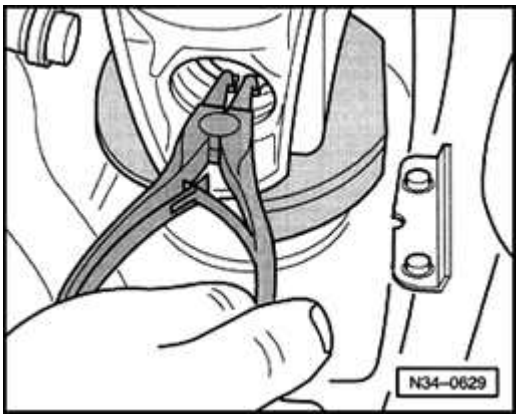


Fig. 321: Drive Flange, Removal And Installation
Courtesy of VOLKSWAGEN UNITED STATES, INC.

- Insert drive flange circlip at same time as shaft.

- Circlip must be properly positioned in groove.

- Insert cap with a new O-ring and secure.
- Bolt driveshaft to transmission.

Refer to **39 FINAL DRIVE, DIFFERENTIAL**

- Top up manual transmission with oil and check oil level. Refer to **Transmission oil level, checking**.
- Align exhaust system stress-free:

Refer to **26 - EXHAUST SYSTEM, EMISSION CONTROLS**

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Tightening torques

Component		Nm
Drive shaft to manual transmission 1)		55
Heat shield for driveshaft to cover plate for Torsen differential		25

1) Replace bolt

DIFFERENTIAL, REMOVING AND INSTALLING

Differential, removing and installing

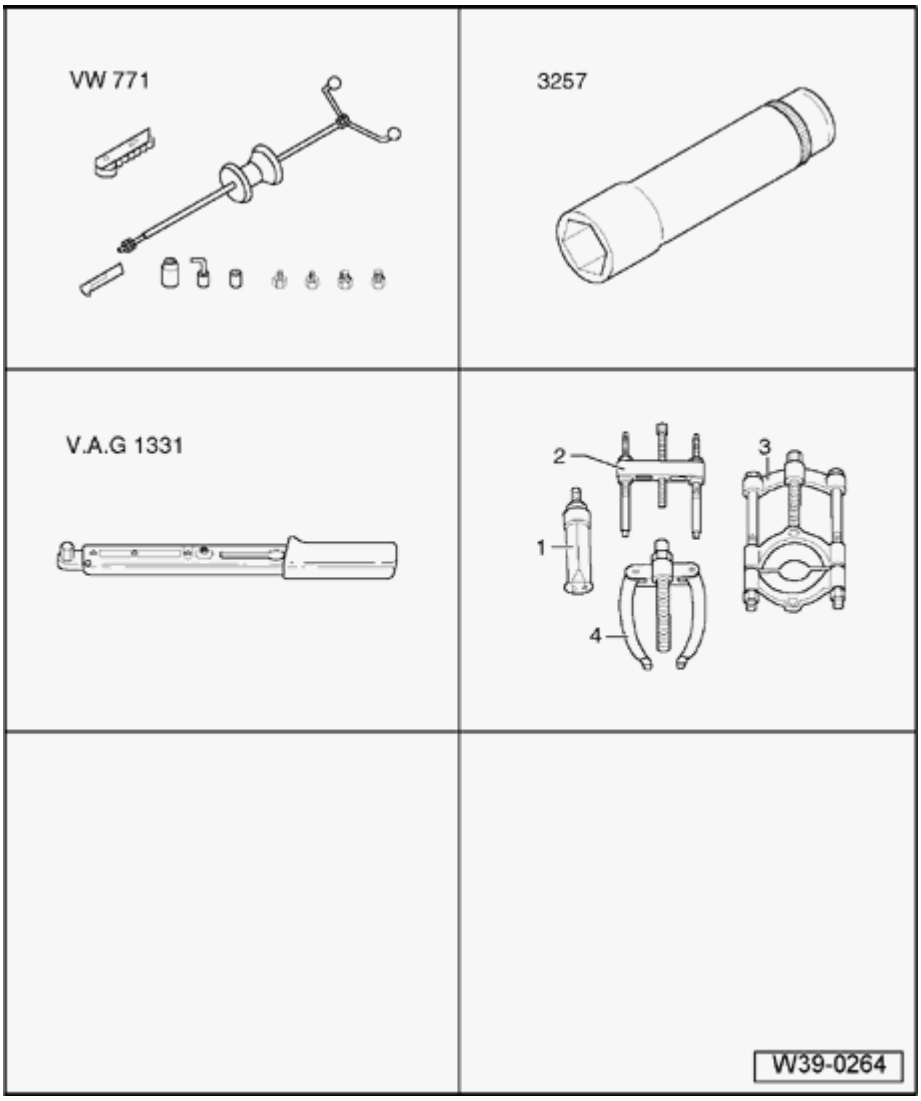


Fig. 322: Identifying Special Tools - Differential, Removing And Installing
Courtesy of VOLKSWAGEN UNITED STATES, INC.

Special tools and equipment

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- VW 771 Multi-purpose tool
- 3257 6 mm Allen key extension
- VAG 1331 Torque wrench
- 1 - Kukko 21/3 Internal puller

NOTE:

- **The differential can also be removed and installed with the transmission installed.**
- **The differential can be removed and installed without disassembling the transmission, input shaft, pinion or transmission housing. The above-mentioned parts must be disassembled if the differential is to be adjusted.**
- **Watch out for visible damages to the polygonal bearings.**
- **Polygonal bearings can only be replaced together with drive flange.**
- **Polygonal bearings run roughly when drive flange is not installed. This does not indicate faulty bearings. An acoustic test can only be conducted when drive flange is installed.**
- **Drive flanges with a splined shaft diameter of 30 mm have a spacer ring installed between polygonal bearing and bevel gear. See Drive flange assembly with polygonal bearings, -item 5-.**
- **When replacing parts marked 1) adjustments are required. Refer to Adjustment table.**

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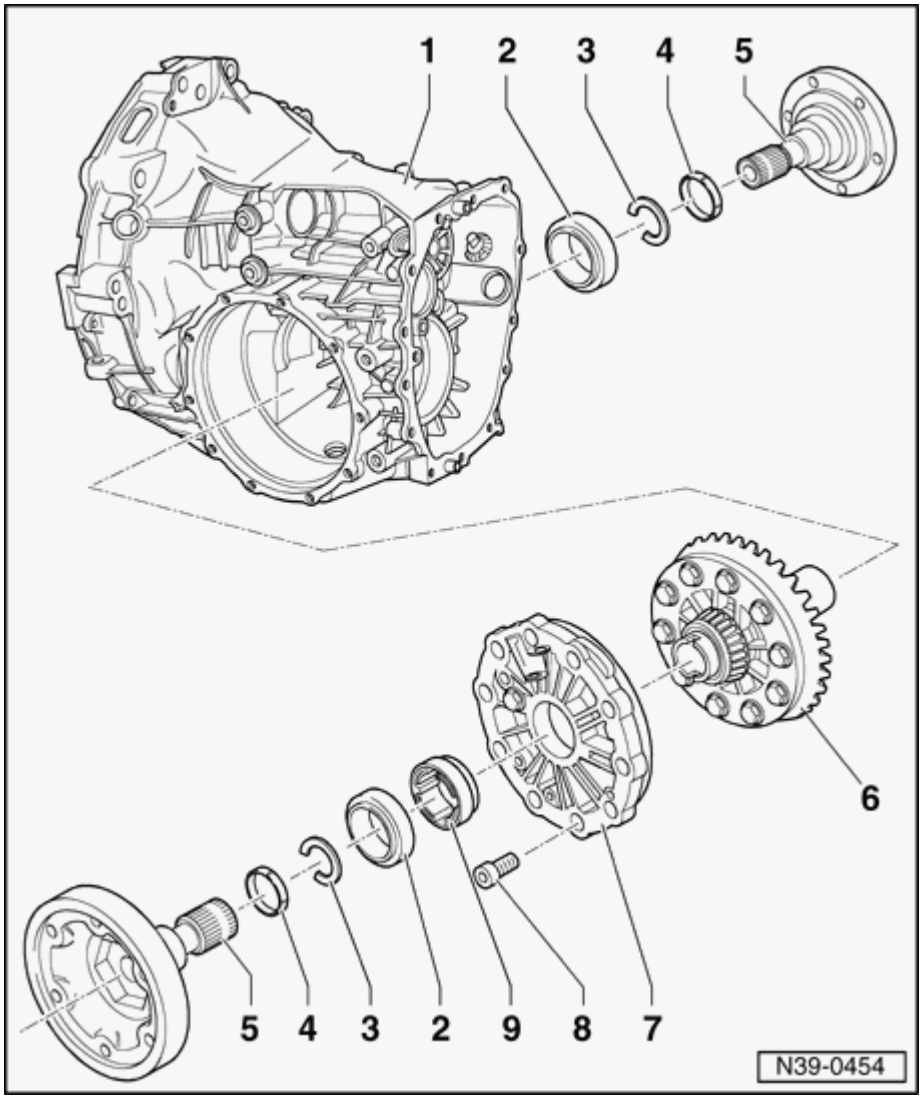


Fig. 323: Differential, Removal And Installation, Overview
Courtesy of VOLKSWAGEN UNITED STATES, INC.

1 - Transmission housing 1)

2 - Oil seal

- Replacing. Refer to **Oil seal for drive flange, replacing**

3 - Circlip

- Replace
- Removing and installing. See **Removing and installing circlip**

4 - Spacer ring

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- Only installed on drive flanges with polygonal bearings and splined diameter 30 mm
- Removing. See **Removing spacer ring**
- Installing. See **Installing spacer ring**

5 - Drive flange

- Removing and installing. Refer to **Oil seal for drive flange, replacing**
- Drive flange assembly: See **Drive flange assembly with polygonal bearings**

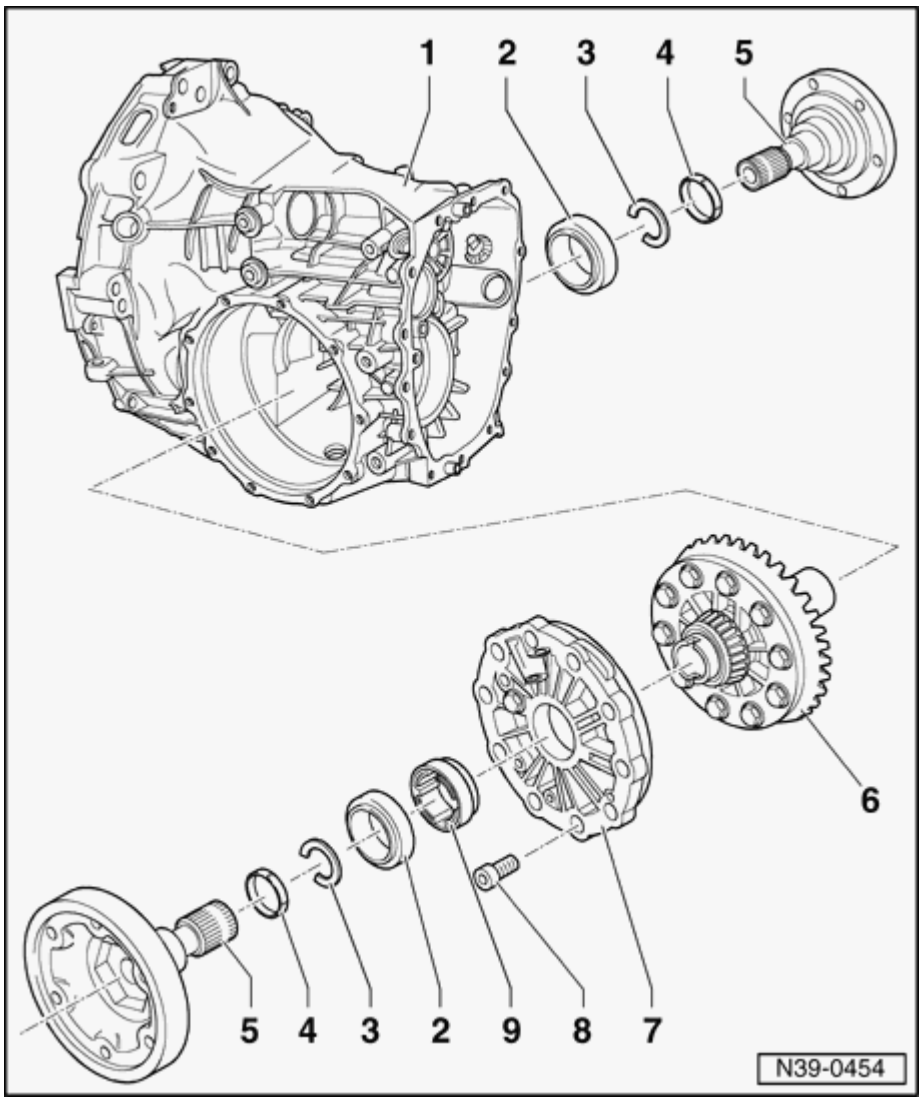


Fig. 324: Differential, Removal And Installation, Overview
Courtesy of VOLKSWAGEN UNITED STATES, INC.

6 - Differential with ring gear 1)

- Can also be removed without removing manual transmission

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- Disassembling and assembling. Refer to **Differential, disassembling and assembling**

7 - Final drive cover 1)

- Apply a thin coat of sealing paste AMV 188 001 02 to sealing surfaces

8 - TORX bolt, 25 Nm

9 - Speedometer driving gear

- Removing and installing. Refer to **Speedometer drive wheel, removing and installing**
- Mount on differential carefully and without tilting. Do not use force, the driving gear could break

Removing and installing circlip

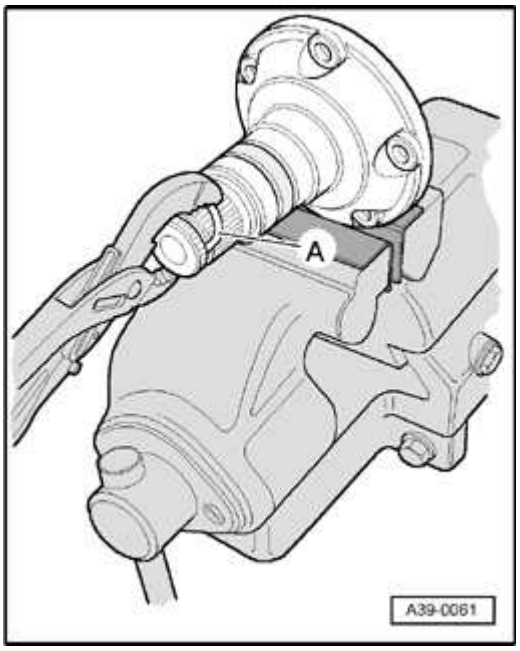


Fig. 325: Removing And Installing Securing Ring
Courtesy of VOLKSWAGEN UNITED STATES, INC.

- Clamp drive flange with soft jaws in vice. Press circlip out of drive flange groove using new circlip -A-.

Removing spacer ring

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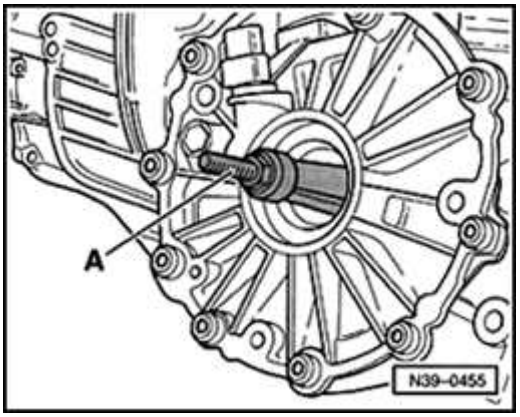


Fig. 326: Removing Spacer Ring
Courtesy of VOLKSWAGEN UNITED STATES, INC.

A - Internal puller 18.5 to 23.5 mm, e.g. Kukko 21/3

- If difficult to move, pull out spacer ring using multi-purpose tool VW 771.

Installing spacer ring

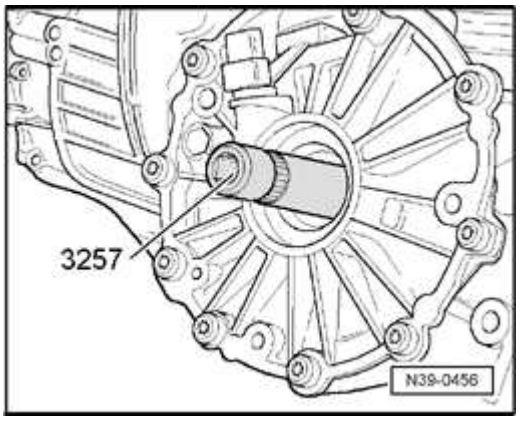


Fig. 327: Installing Spacer Ring
Courtesy of VOLKSWAGEN UNITED STATES, INC.

- Push spacer ring in as far as it will go, ensuring it is not crooked.

Drive flange assembly with polygonal bearings

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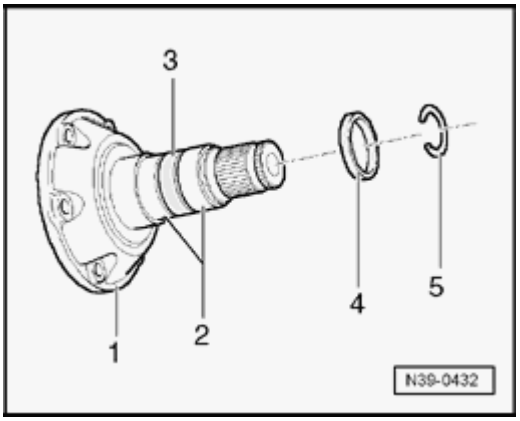


Fig. 328: Flange Shaft Assembly, Overview
Courtesy of VOLKSWAGEN UNITED STATES, INC.

1 - Drive flange

2 - Needle bearing (polygonal bearing)

3 - Spacer ring

4 - Spacer ring - additionally installed if splined shaft diameter = 30 mm

5 - Circlip

NOTE: Needle bearings (polygonal bearings) do not move freely when drive flange is removed. This does not indicate faulty bearings.

DIFFERENTIAL, DISASSEMBLING AND ASSEMBLING

Differential, disassembling and assembling

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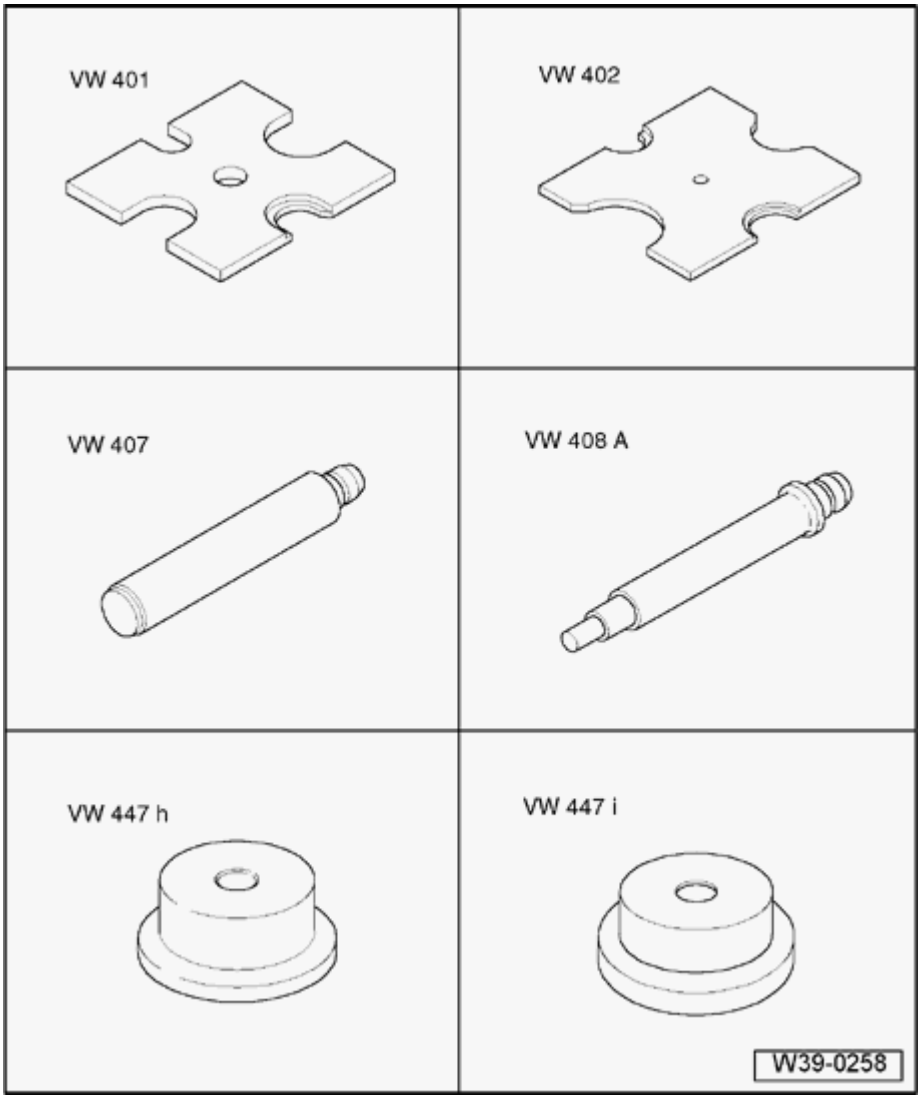


Fig. 329: Identifying Special Tools - Differential, Disassembling And Assembling
Courtesy of VOLKSWAGEN UNITED STATES, INC.

Special tools and workshop equipment required

- VW 401 Pressure plate
- VW 402 Pressure plate
- VW 407 Press tool
- VW 408 A Press tool
- VW 447 H Thrust pad
- VW 447i Thrust pad

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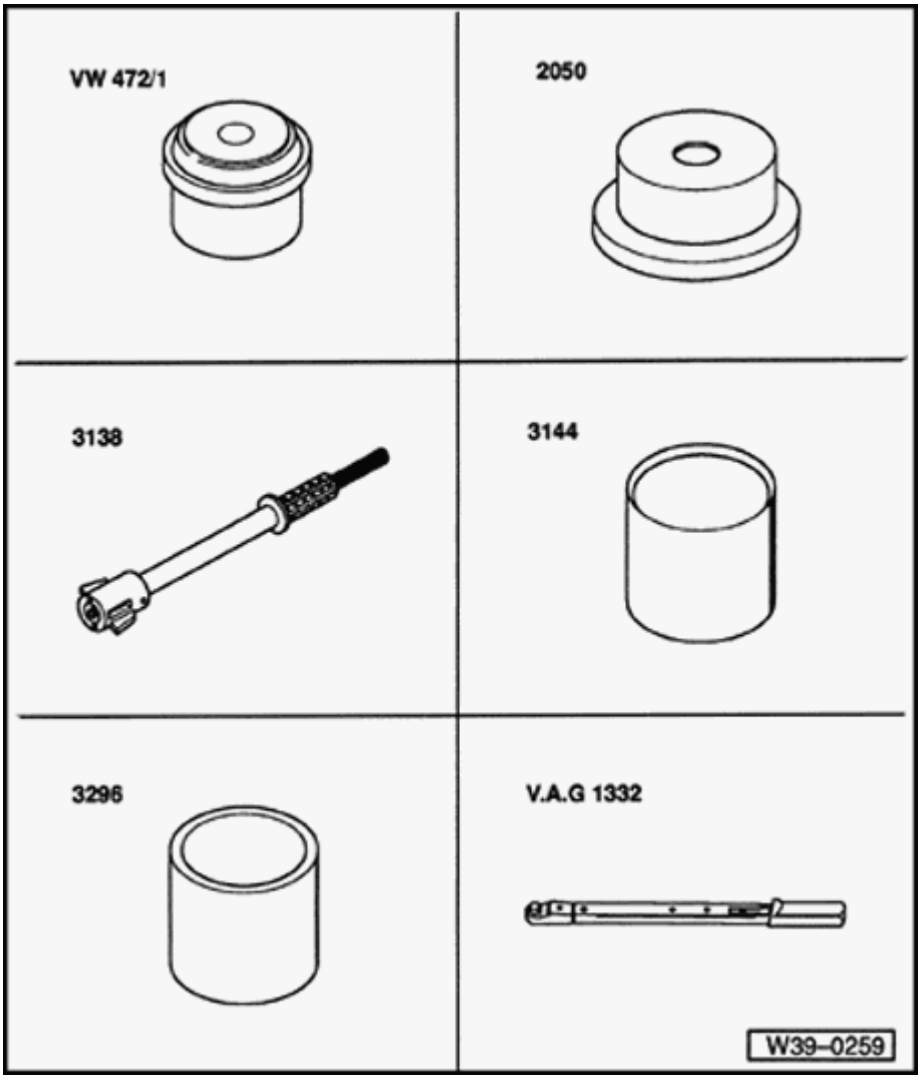


Fig. 330: Identifying Special Tools - Differential, Disassembling And Assembling
Courtesy of VOLKSWAGEN UNITED STATES, INC.

Special tools and equipment

- VW 472/1 Pressure piece
- 2050 Pressure piece
- 3138 Punch-out tool
- 3144 Sleeve
- 3296 Pipe
- VAG 1332 Torque wrench

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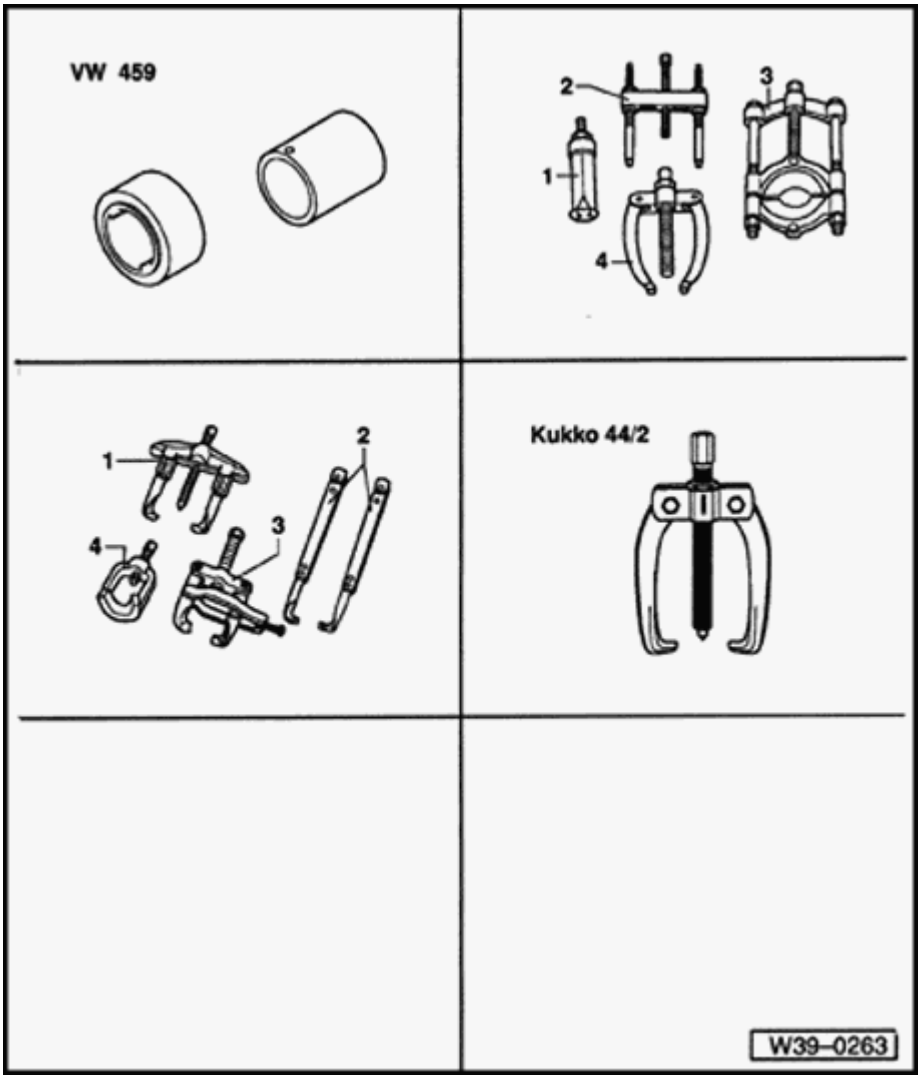


Fig. 331: Identifying Special Tools - Differential, Disassembling And Assembling
Courtesy of VOLKSWAGEN UNITED STATES, INC.

Special tools and equipment

- VW 459 Pressing-out and pressing in tool
- 1 - Kukko 21/7 Internal puller
- 3 - Kukko 204/2 Puller
- 4 - Kukko 22/2 Counter-support
- Kukko 44-2 Two-arm puller

NOTE:

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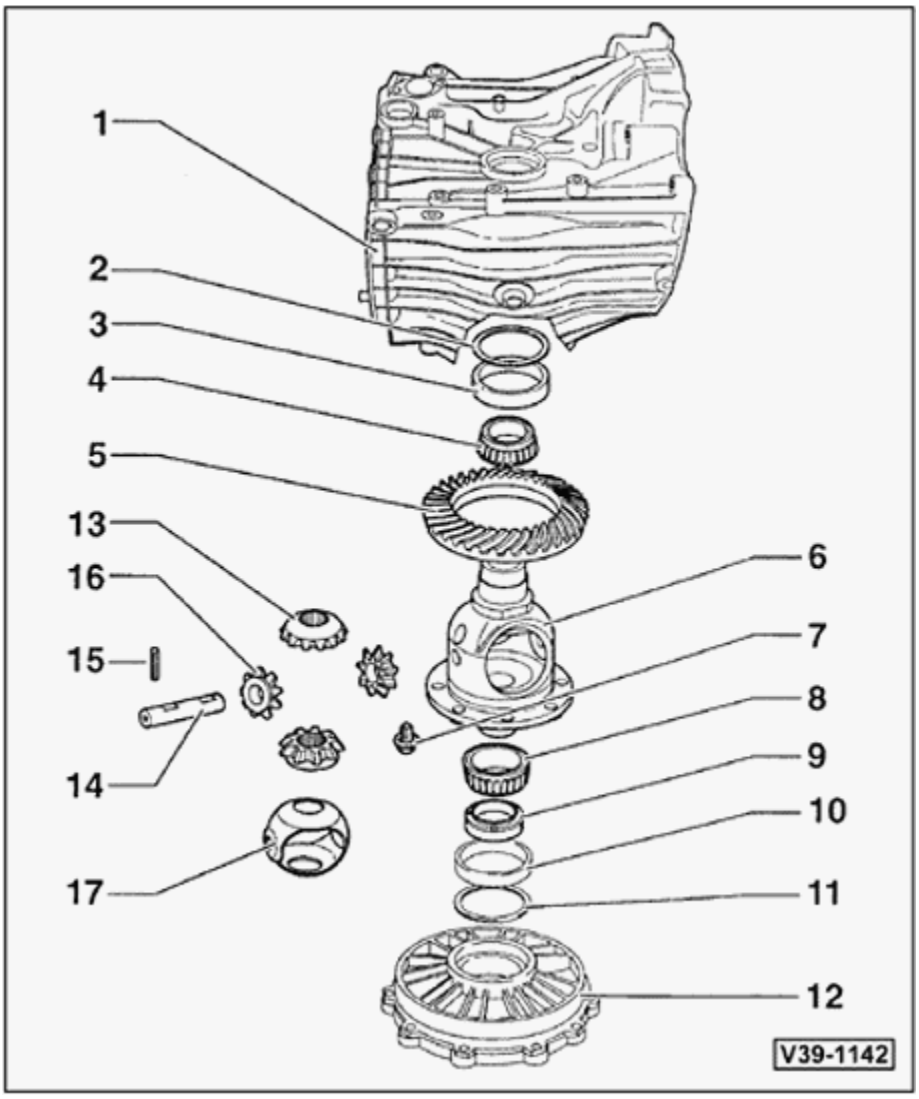


Fig. 332: Differential, Disassembling And Assembling, Overview
Courtesy of VOLKSWAGEN UNITED STATES, INC.

- **Removing and installing differential. Refer to Differential, removing and installing.**
- **Replace both tapered roller bearings together.**
- **When replacing parts marked 1) adjustments are required. Refer to Adjustment table.**

1 - Transmission housing 1)

2 - Shim "S2"

- Make note of thickness
- Adjustment table. Refer to **Adjustment table**

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3 - Outer race for right tapered roller bearing 1)

- Extracting. See **Extracting tapered roller bearing outer race from transmission housing**
- Pressing in. See **Pressing tapered roller bearing outer race into transmission housing**

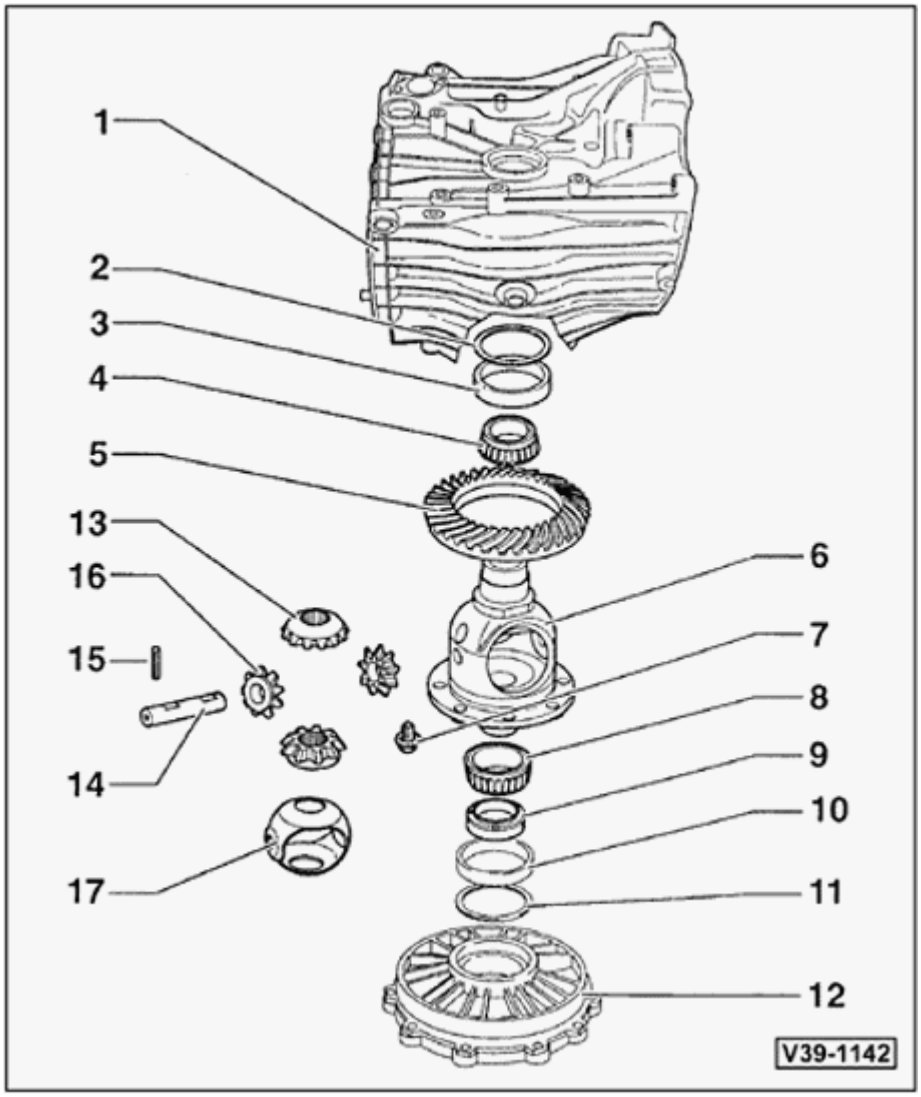


Fig. 333: Differential, Disassembling And Assembling, Overview
Courtesy of VOLKSWAGEN UNITED STATES, INC.

4 - Inner race for right tapered roller bearing 1)

- Pulling off. See **Extracting inner race for right tapered roller bearing**
- Pressing on. See **Pressing on inner race for right tapered roller bearing**

5 - Ring gear 1)

- Paired with pinion (drive unit)

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- Assigning by way of transmission code letters. Refer to **Code letters, assignment of mechanical units, transmission ratios and capacities**
- Driving out of housing using mandrel. See **Driving ring gear out of housing**
- Installing to differential housing **HEATING RING GEAR TO APPROX. 100 ° C and installing** 10

6 - Differential housing 1)

- Assigning by way of transmission code letters. Refer to **Code letters, assignment of mechanical units, transmission ratios and capacities**
- Assignment

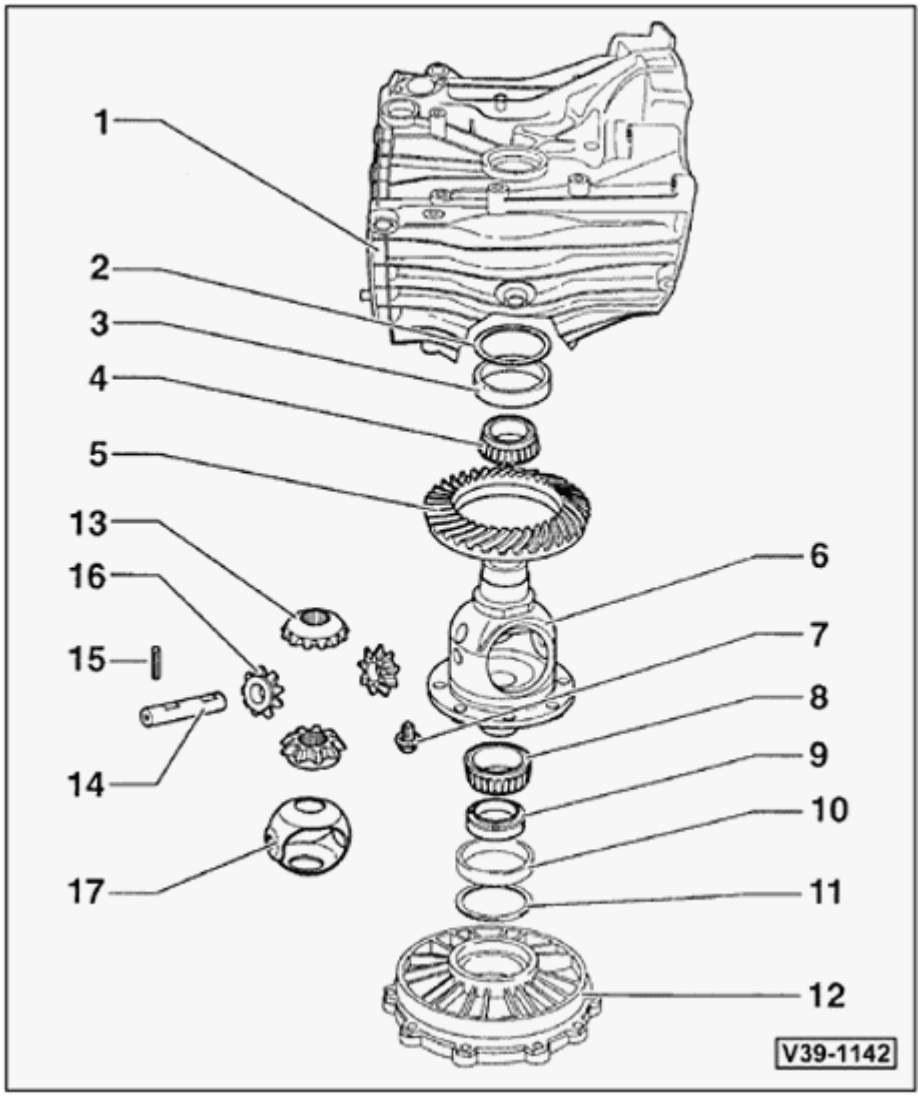


Fig. 334: Differential, Disassembling And Assembling, Overview
Courtesy of VOLKSWAGEN UNITED STATES, INC.

7 - Bolt, 60 Nm plus 1/8 turn (45)

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- Always replace
- Screw in bolts evenly and tighten to torque in diagonal sequence

8 - Inner race for left tapered roller bearing 1)

- Pulling off. See **Extracting inner race for left tapered roller bearing**
- Pressing on. See **Mounting inner race for left tapered roller bearing**
- Assignment

9 - Speedometer driving gear

- Removing and installing. Refer to **Speedometer drive wheel, removing and installing**
- Mount on differential carefully and without tilting. Do not use force, the driving gear could break

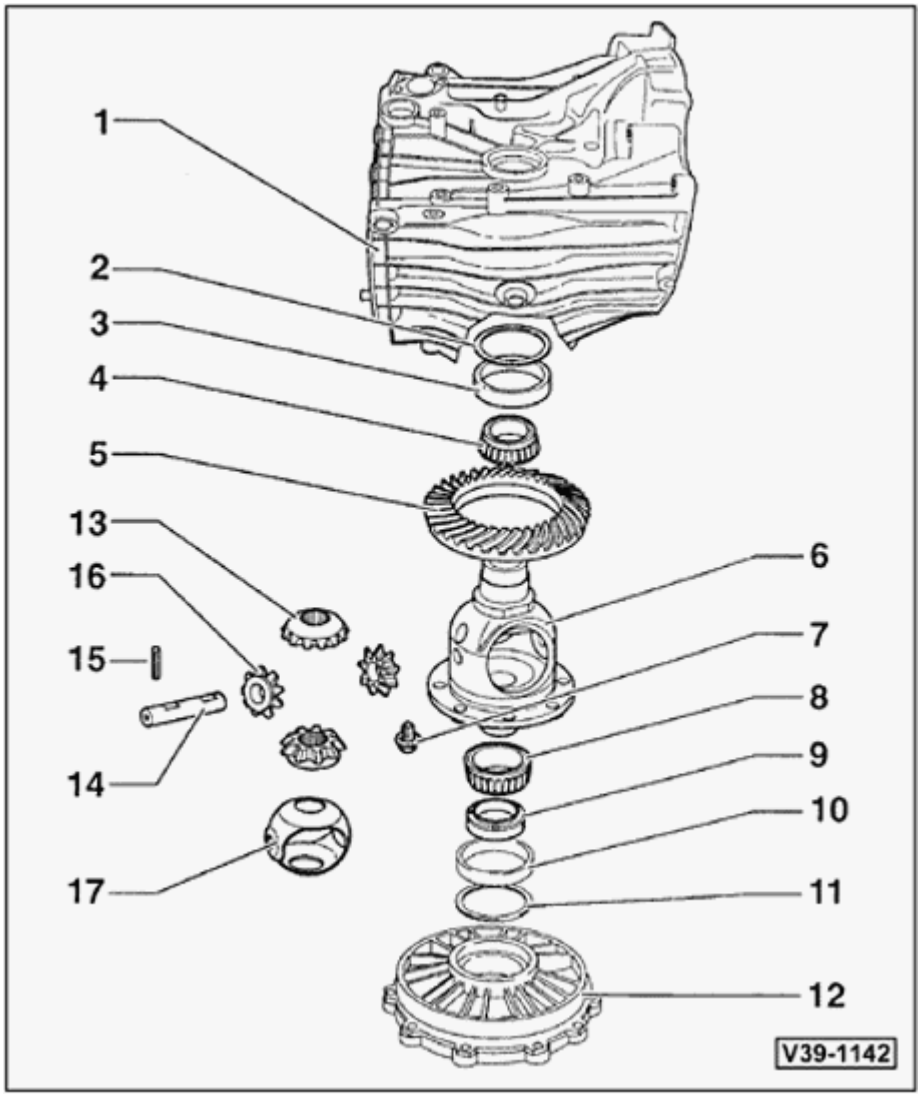


Fig. 335: Differential, Disassembling And Assembling, Overview

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Courtesy of VOLKSWAGEN UNITED STATES, INC.

10 - Outer race for left tapered roller bearing 1)

- Driving out. See **Driving outer race of left tapered roller bearing out of cover**
- Pressing in. See **Driving outer race of left tapered roller bearing into cover**
- Assignment

11 - Shim "S1"

- Make note of thickness
- Adjustment table. Refer to **Adjustment table**
- Assignment

12 - Final drive cover 1)

- Apply a thin coat of sealing paste AMV 188 001 02 to sealing surfaces
- Assignment

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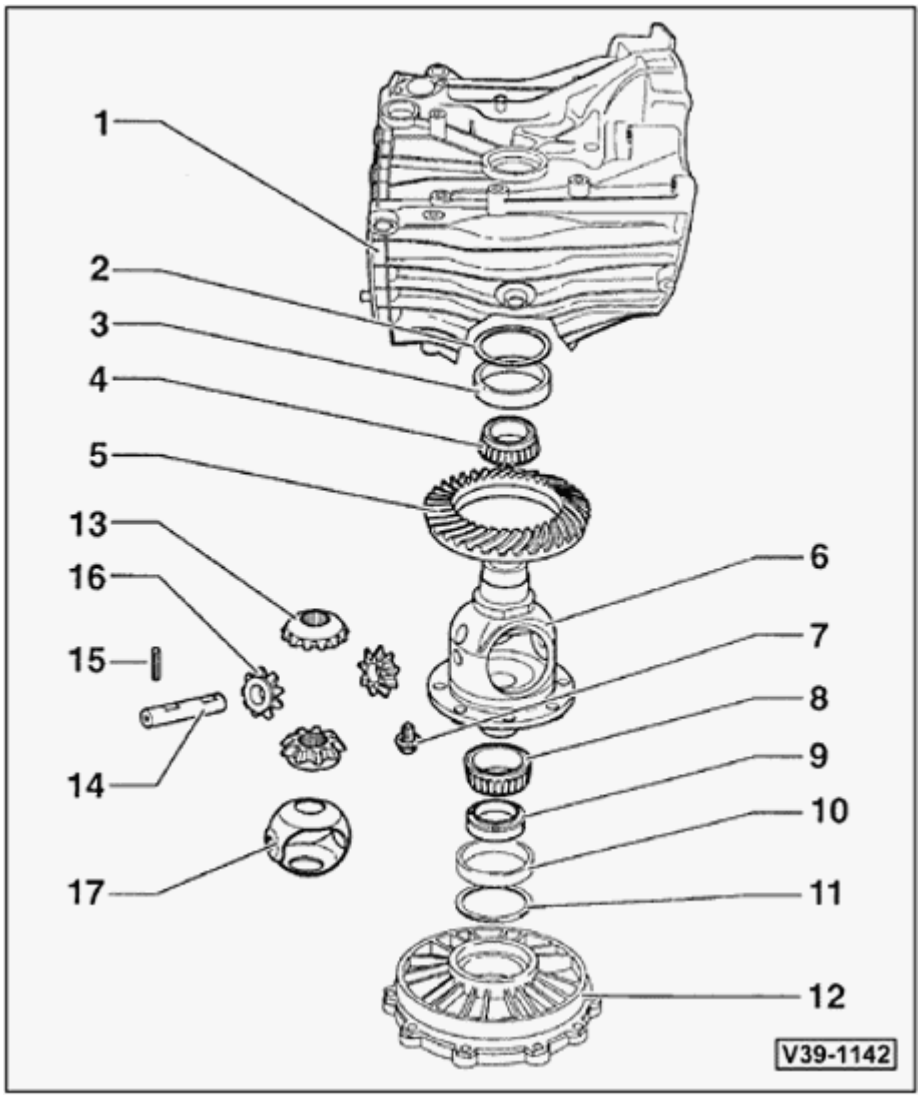


Fig. 336: Differential, Disassembling And Assembling, Overview
Courtesy of VOLKSWAGEN UNITED STATES, INC.

13 - Large bevel gear

- Installing. See **Installing bevel gears**

14 - Differential bevel gear shaft

- Drive out with mandrel after removing spring pin

15 - Spring pin

- For securing bevel gear shaft
- With circumferential groove: Removing and installing. See **Removing and installing spring pin**
- Without circumferential groove: Drive out with mandrel

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16 - Small bevel gear

- Installing. See **Installing bevel gears**

17 - One-piece thrust washer

- Apply gear oil on insertion

Extracting tapered roller bearing outer race from transmission housing

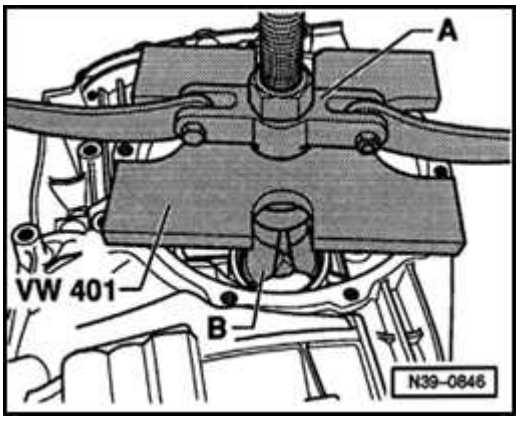


Fig. 337: Pulling Outer Race/Tapered Roller Bearing Out Of Transmission Housing
Courtesy of VOLKSWAGEN UNITED STATES, INC.

A - Counter-support, e.g. Kukko 22/2

B - Internal puller 46 to 58 mm, e.g. Kukko 21/7

- Check shims for damage after removal.

Pressing tapered roller bearing outer race into transmission housing

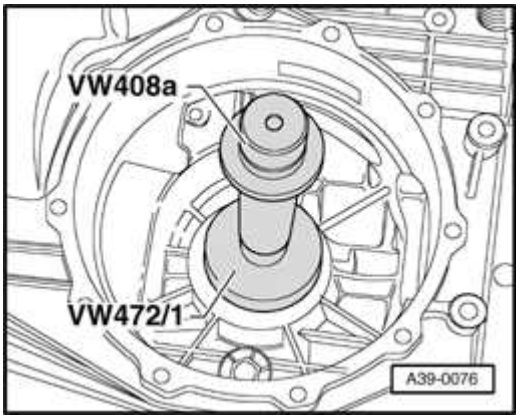


Fig. 338: Pressing Outer Race/Tapered Roller Bearing Into Transmission Housing
Courtesy of VOLKSWAGEN UNITED STATES, INC.

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- Insert tapered section of pressure piece VW 472/1 into outer race.

Extracting inner race for right tapered roller bearing

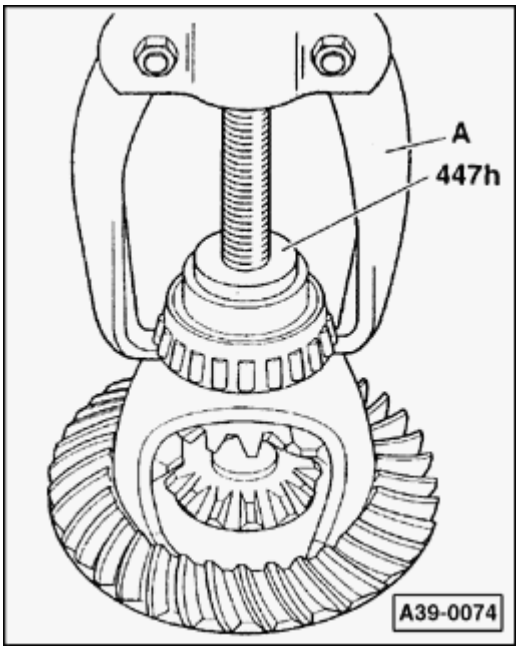


Fig. 339: Pulling Off Right Tapered Roller Bearing Inner Race
Courtesy of VOLKSWAGEN UNITED STATES, INC.

A - Two-arm puller, e.g. Kukko 20/10 or Kukko 44/2

NOTE: The differential features a recess under the bearing seat for applying the puller -A-.

Pressing on inner race for right tapered roller bearing

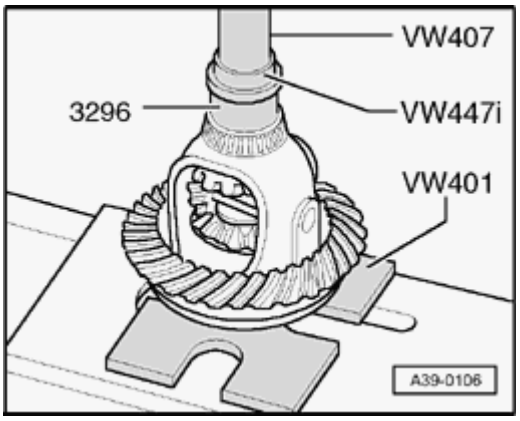


Fig. 340: Pressing On Right Tapered Roller Bearing Inner Race
Courtesy of VOLKSWAGEN UNITED STATES, INC.

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WARNING: Wear protective gloves.

- Heat inner race to approx. 100 ° C, mount and press into place.

Extracting inner race for left tapered roller bearing

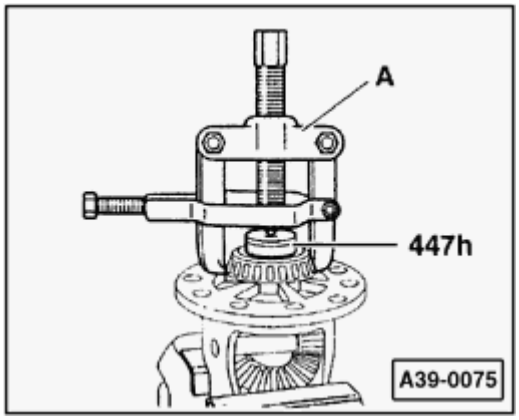


Fig. 341: Pulling Off Left Tapered Roller Bearing Inner Race
Courtesy of VOLKSWAGEN UNITED STATES, INC.

A - Two-arm puller, e.g. Kukko 204/2

NOTE: The differential features a recess under the bearing seat for applying the puller - A-.

Mounting inner race for left tapered roller bearing

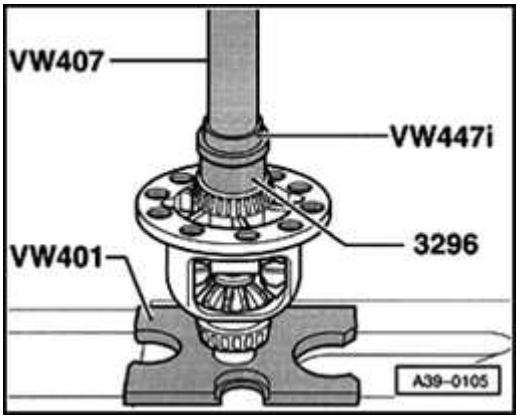


Fig. 342: Installing Left Tapered Roller Bearing Inner Race
Courtesy of VOLKSWAGEN UNITED STATES, INC.

WARNING: Wear protective gloves.

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- Heat inner race to approx. 100 ° C, mount and press into place.

Driving outer race of left tapered roller bearing out of cover

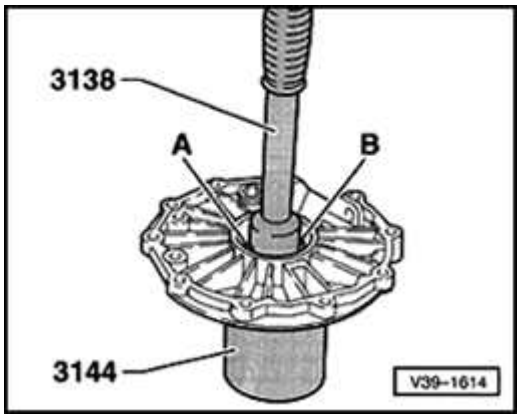


Fig. 343: Driving Out Outer Race Of Left Tapered Roller Bearing From Cover
Courtesy of VOLKSWAGEN UNITED STATES, INC.

- Screw out webs -A- and -B- until they are positioned on outer race inside recess in housing.
- Check shims for damage after removal.

Driving outer race of left tapered roller bearing into cover

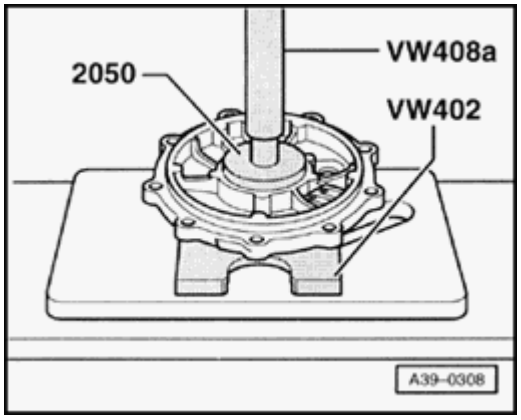


Fig. 344: Driving In Outer Race Of Tapered Roller Bearing Into Cover
Courtesy of VOLKSWAGEN UNITED STATES, INC.

- Press outer race of left tapered roller bearing into cover using pressure piece 2050.
- Insert tapered section of pressure piece 2050 into outer race.

Driving ring gear out of housing

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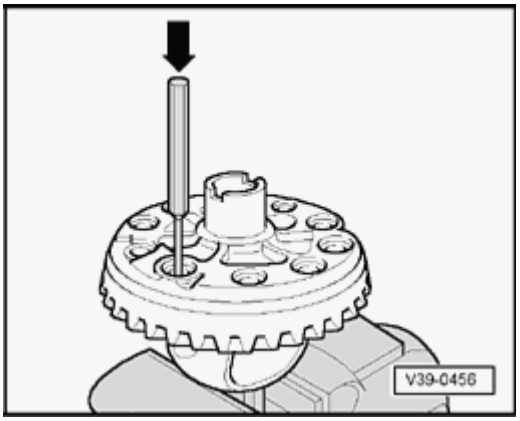


Fig. 345: Driving Out Ring Gear From Housing
Courtesy of VOLKSWAGEN UNITED STATES, INC.

Heating ring gear to approx. 100 ° C and installing

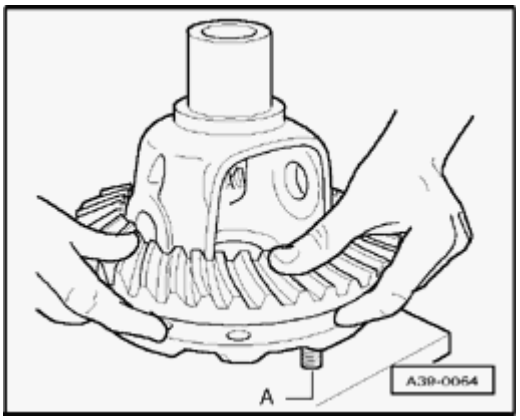


Fig. 346: Installing Ring Gear
Courtesy of VOLKSWAGEN UNITED STATES, INC.

WARNING: Wear protective gloves.

- Use locating pins -A- (self-made) to guide ring gear when installing.
- Allow to cool somewhat before screwing in bolts. Then tighten to torque.

Installing bevel gears

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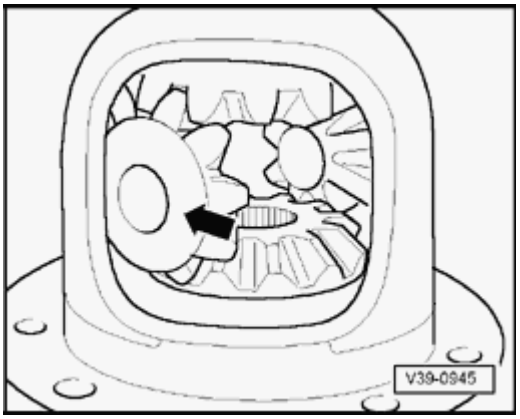


Fig. 347: Installing Small Differential Bevel Gears
Courtesy of VOLKSWAGEN UNITED STATES, INC.

- Lubricate one-piece thrust washer with gear oil and insert.
- Insert large bevel gears.
- Insert small bevel gears offset by 180 ° and swivel into place (arrow).
- Drive bevel gear shaft into final position and secure.

Removing and installing spring pin

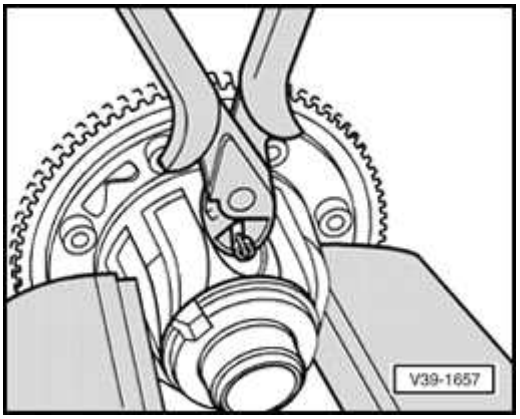


Fig. 348: Pulling Out Spring Pin With Side Cutting Pliers
Courtesy of VOLKSWAGEN UNITED STATES, INC.

Removing

- Extract spring pin with circumferential groove using side-cutting pliers.
- Knock out spring pin without circumferential groove from behind with mandrel.

Installing

- Drive in spring pin as far as it will go.

PINION AND RING GEAR, ADJUSTING

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General

- Careful adjustment of the pinion and ring gear is a decisive factor as regards the service life and smooth running of the final drive. Even during production, the pinion and ring gear are checked together to ensure a good seating position and low noise in both directions of rotation. The position which achieves the smoothest running is determined by moving the pinion axially, so that the ring gear is never absolutely tight against the pinion but remains within the specified tolerance for torsional side clearance.
- The objective of adjustment is to once more achieve the position for smoothest running, which was originally ascertained on the testing machine during production.
- The dimension "r" referenced to controller "Ro" is written on the circumference of the ring gear. Only replace drive unit components (pinion and ring gear) together.

Drive units, adjusting and marking

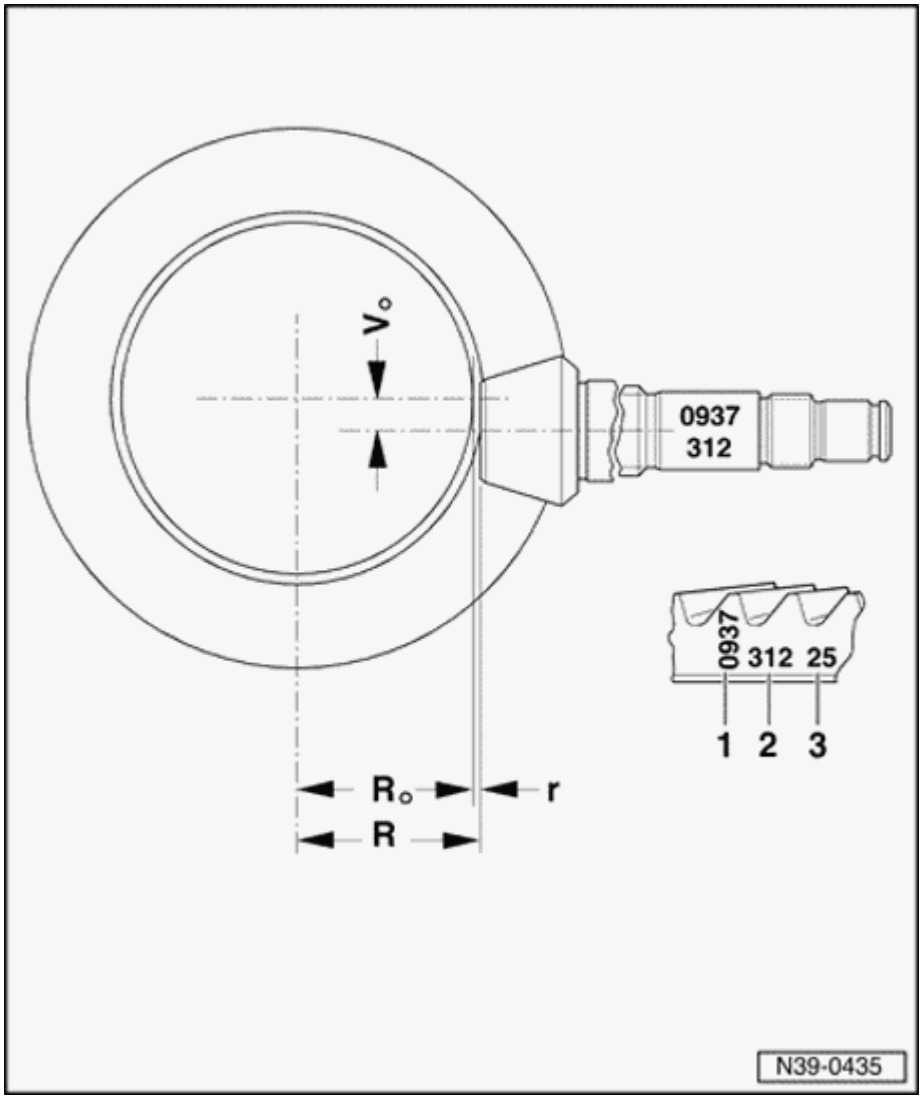


Fig. 349: Identifying Gear Set Markings And Adjustment Dimensions
Courtesy of VOLKSWAGEN UNITED STATES, INC.

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1 - Code "0937" stands for Oerlikon drive unit with transmission ratio 37 : 9.

2 - Pair number (312) of drive set

3 - Dimension "r" referenced to controller of testing machine used in production. Dimension "r" is always stated in 1/100 mm. Example: "25" stands for r = 0.25 mm

Ro - Length of testing machine controller used.

Ro - Ring gear diameter 170 mm = 54.95 mm

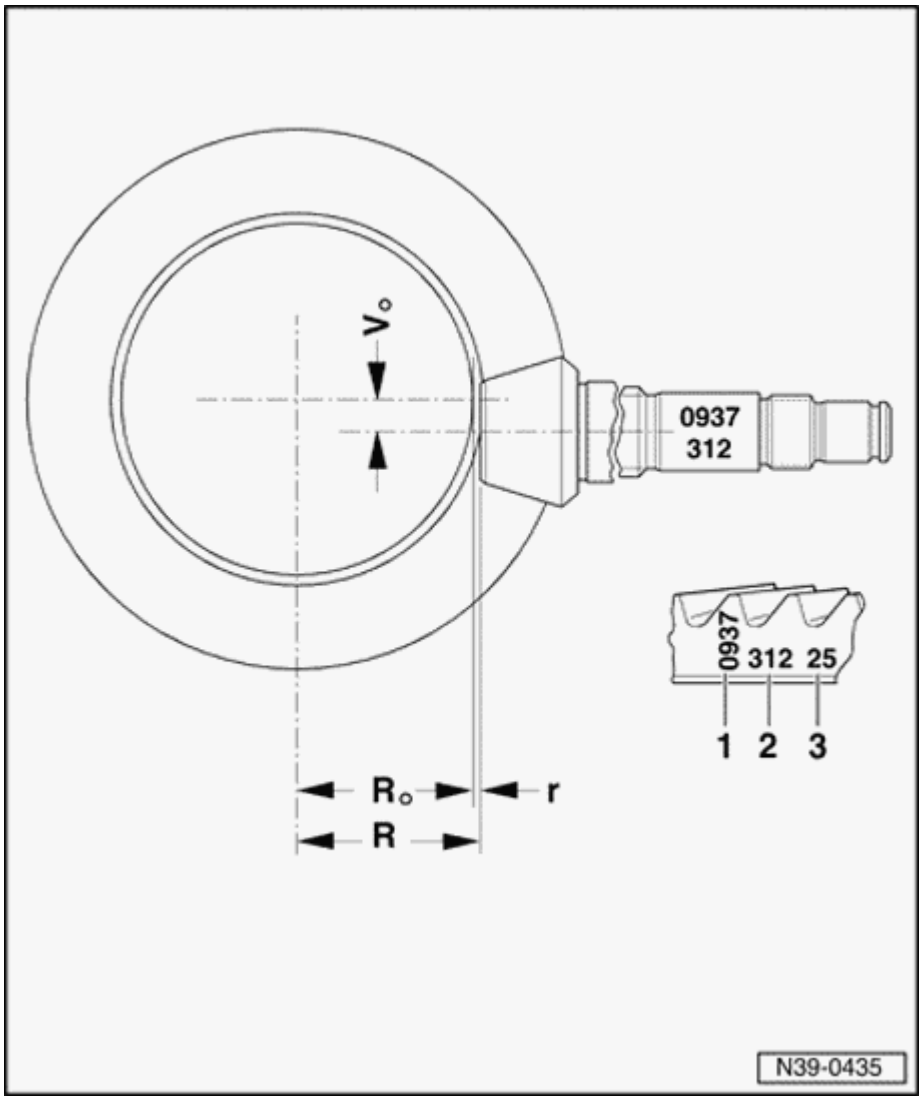


Fig. 350: Identifying Gear Set Markings And Adjustment Dimensions
Courtesy of VOLKSWAGEN UNITED STATES, INC.

R - Actual dimension between ring gear axis and end face of pinion at the point of smoothest running for this one drive set

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Vo - Hypoid offset

Position of shims

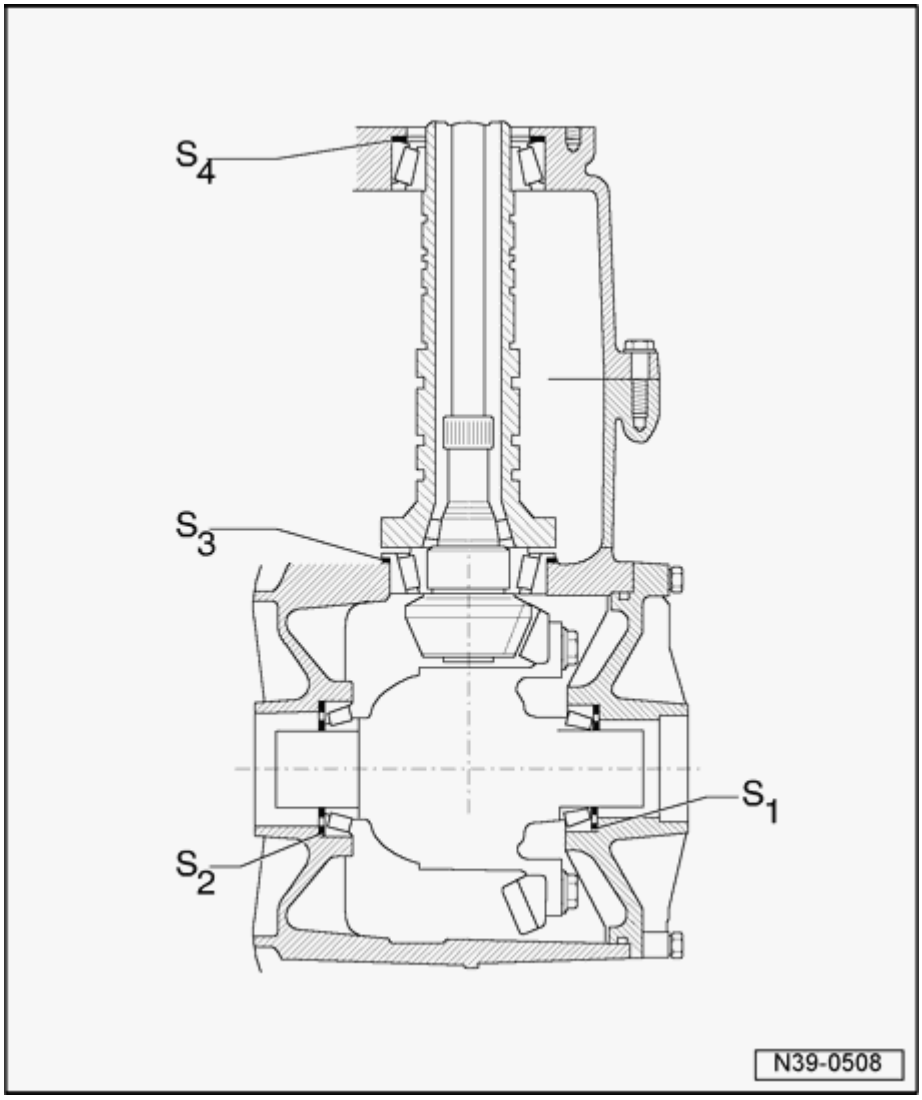


Fig. 351: Identifying Shim Locations
Courtesy of VOLKSWAGEN UNITED STATES, INC.

NOTE: **Adjustment table for replacing individual transmission components. Refer to Adjustment table.**

S1 - Shim for ring gear in final drive cover

S2 - Shim for ring gear in transmission housing

S3 - Shim for pinion in transmission housing

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S4 - Shim for pinion in transmission cover

Adjustment table

NOTE: When performing transmission repair work, the pinion, ring gear or drive unit must only be re-adjusted if you are replacing components which directly influence the setting of the final drive. Refer to the following table so as to avoid unnecessary adjustment.

	To be adjusted:			
Replaced component:	Ring gear "S1"+"S2" 1) Refer to **Ring gear, adjusting**	Pinion "S3"+"S4" 1) over dimension "r" Refer to **Pinion, adjusting**	Pinion "S4" 1) Refer to **Shim "S4", re-determining when replacing transmission cover**	Torsional side clearance Checking Refer to **Measuring torsional side clearance**
Transmission housing 3)	X	X		X
Transmission cover			X	
Differential housing	X			X
Double tapered roller bearing for pinion and hollow shaft		X		X
Differential tapered roller bearing	X			X
Drive unit 2)	**X**	X		X
Final drive cover	X			X

1) Shims, installation position. Refer to **Position of shims**

2) Pinion and ring gear, only replace together

3) If transmission housing is replaced, input shaft must also be adjusted. Refer to **Input shaft, adjusting**.

Drive unit, re-adjustment sequence

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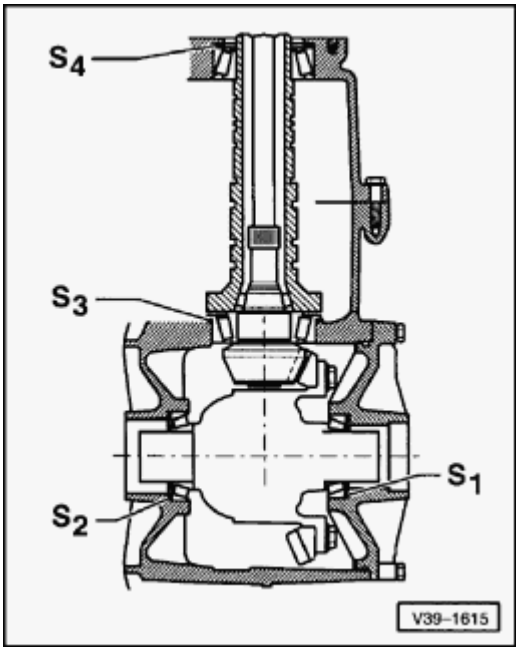


Fig. 352: Adjusting Gear Set, Sequence
Courtesy of VOLKSWAGEN UNITED STATES, INC.

If the pinion and ring gear require re-adjustment, please follow the sequence described below in the interest of rationalized work procedure:

1.)	Define total shim thickness "Stotal" of "S1" + "S2" (adjusting pre-load of tapered roller bearing for differential). Refer to **Defining total shim thickness "Stotal" of shims "S1" + "S2"** onward.
2.)	Define total shim thickness "Stotal" of "S3" + "S4" (adjusting pre-load of tapered roller bearing for differential). Refer to **Defining total shim thickness "Stotal" of shims "S3" + "S4"** onward.
3.)	Distribute total shim thickness "Stotal" of "S3" + "S4" in such a way that dimension from center of ring gear to end face of pinion corresponds to mounting dimension "R" as defined during production. Refer to **Defining thickness of shim "S3"** onward.
4.)	Distribute total shim thickness "Stotal" of "S1" + "S2" in such a way that the specified torsional side clearance is present between ring gear and pinion. Refer to **Defining thickness of shim "S2"** onward.

NOTE: List of components and shims. Refer to Position of shims.

Pinion, adjusting

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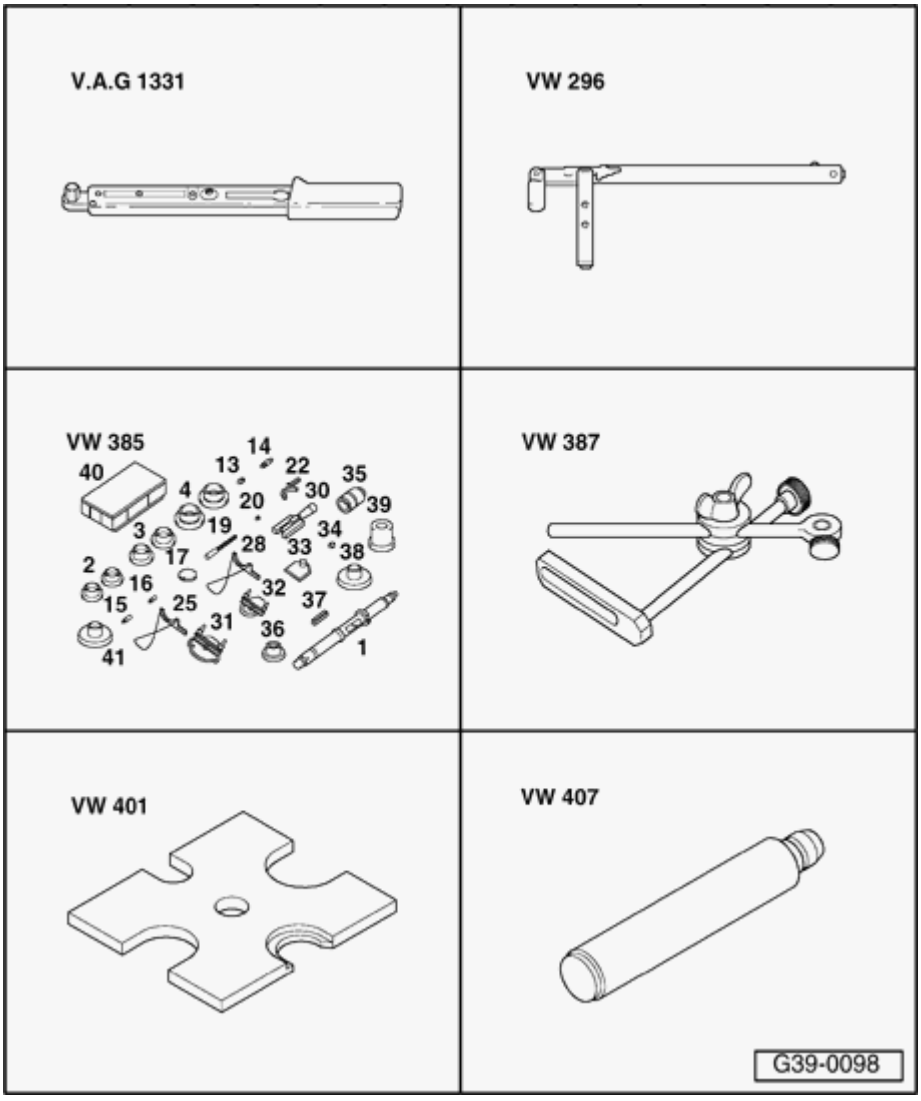


Fig. 353: Identifying Special Tools - Pinion Shaft, Adjusting
Courtesy of VOLKSWAGEN UNITED STATES, INC.

(Adjusting pinion and hollow shaft)

Work after which pinion must be adjusted see Table. Refer to **Adjustment table**.

Special tools and equipment

- VAG 1331 Torque wrench
- VW 296 Extractor lever
- VW 385 Universal measuring device
- VW 387 Universal dial indicator holder
- VW 401 Pressure plate

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- VW 407 Press tool

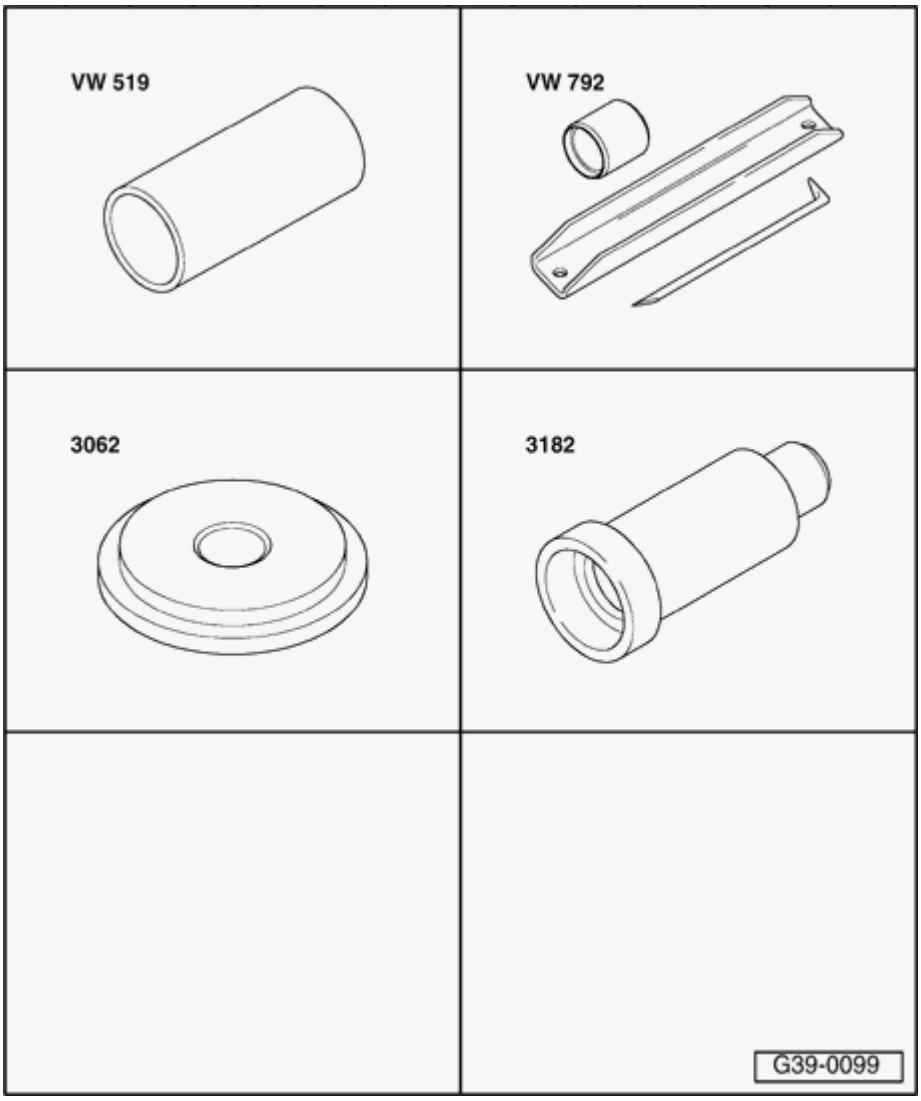


Fig. 354: Identifying Special Tools - Pinion Shaft, Adjusting
Courtesy of VOLKSWAGEN UNITED STATES, INC.

- VW 519 Tubular section
- VW 792 Assembly device
- 3062 Thrust pad
- 3182 Insertion sleeve

Defining total shim thickness "Stotal" of shims "S3" + "S4"

(Adjusting pre-load of tapered roller bearing for pinion and hollow shaft)

- Differential removed

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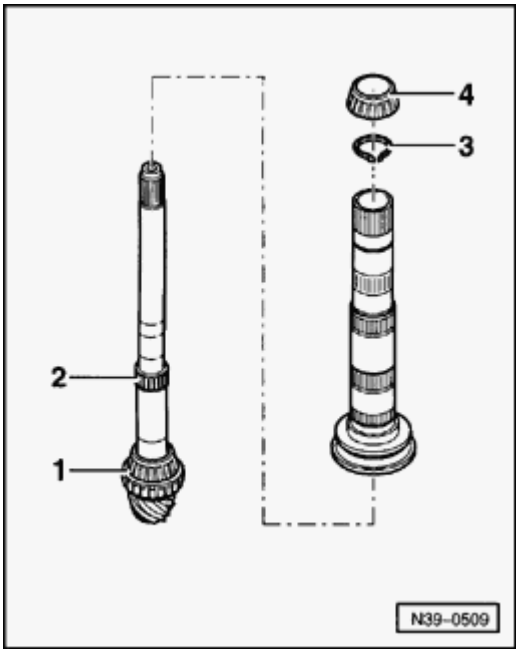


Fig. 355: Pinion Shaft Component, Overview
Courtesy of VOLKSWAGEN UNITED STATES, INC.

- Press inner race -1- of double tapered roller bearing onto pinion and secure. Refer to **Pinion and hollow shaft, disassembling and assembling** onward.

- Install needle bearing -2-.
- Position circlip -3- on hollow shaft and press on inner race of tapered roller bearing -4-. Refer to **Pinion and hollow shaft, disassembling and assembling** onward.
- Insert pinion shaft in hollow shaft.

NOTE: In the illustration the hollow wheel is shown without gears. The pinion can be set either with or without gears.

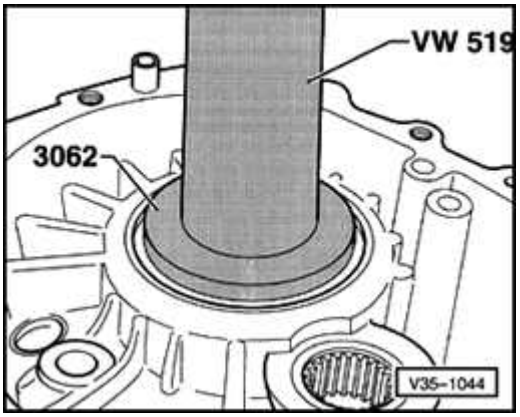


Fig. 356: Pressing In Outer Race For Double Tapered Roller Bearing
Courtesy of VOLKSWAGEN UNITED STATES, INC.

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- Insert outer race of double tapered roller bearing for pinion in transmission housing without shims.

Smaller diameter of pressure plate 3062 faces outer race.

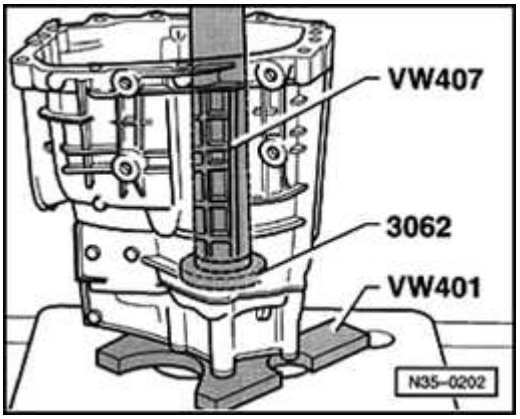


Fig. 357: Pressing In Tapered Roller Bearing Outer Race
Courtesy of VOLKSWAGEN UNITED STATES, INC.

- Insert outer race of pinion tapered roller bearing together with shim "S4*" (1.0 mm thick) in transmission cover.

NOTE:

- **A shim "S4" 1.0 mm thick is used provisionally as a reference value. It is referred to below as "S4*". Once measured value "e" has been determined, "S4*" will be replaced by actual shim "S4".**
- **For measurement, always insert rubber washer together with ring for rubber washer. Refer to item 44 Pinion and hollow shaft, disassembling and assembling.**

- Insert fully assembled pinion and hollow shaft in transmission housing.
- Install transmission cover and tighten bolts to 22 Nm.
- Turn transmission so that transmission cover faces downward.

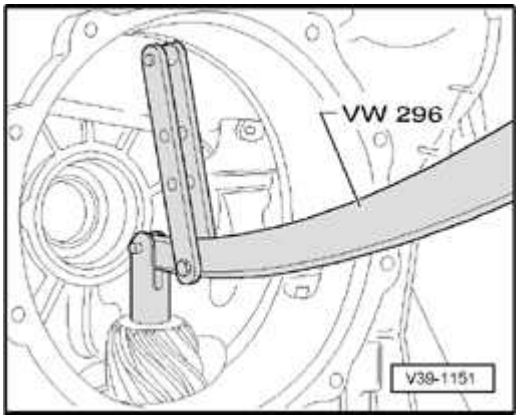


Fig. 358: Pressing Down On Drive Pinion Head Using Removal Tool VW 296

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Courtesy of VOLKSWAGEN UNITED STATES, INC.

- Press head of pinion with lever VW 296 until outer race of tapered roller bearing makes contact with transmission housing.
- Maintaining same pressure, rotate pinion in opposite direction to hollow shaft 5 turns in both directions, so that double tapered roller bearing slips into place.
- Next, rotate pinion and hollow shaft together 5 turns in both directions, so that tapered roller bearing slips into place.

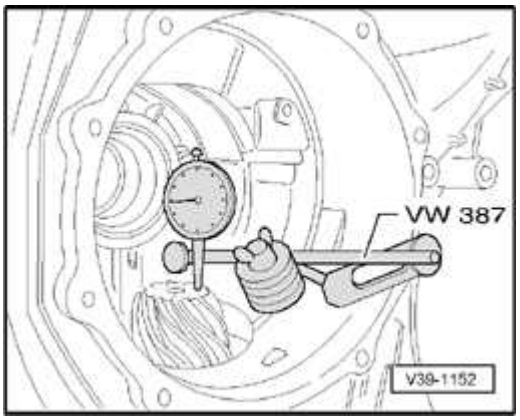


Fig. 359: Installing Dial Gauge (3 Mm Range) And Set To "0" With 2 Mm Pre-Load
Courtesy of VOLKSWAGEN UNITED STATES, INC.

- Install dial indicator and set to "0" with 1 mm pre-load.

NOTE: Dial indicator extension must be situated on ground surface of pinion head.

- Turn transmission 180 ° so that transmission cover faces upward.
- Rotate pinion and hollow shaft together 5 turns in both directions, so that tapered roller bearing slips into place. Otherwise, measurement results will be incorrect.

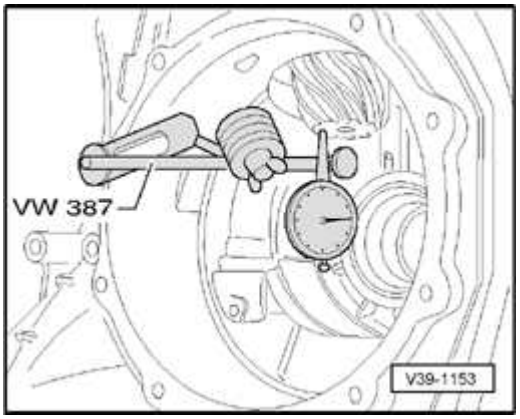


Fig. 360: Turn Transmission 180 Degrees, Settle Tapered Roller Bearing And Read Play On Dial Gauge
Courtesy of VOLKSWAGEN UNITED STATES, INC.

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- Read off and note down clearance indicated on dial indicator.

- Example measured value: 0.45 mm

NOTE: If the measurement is repeated, first rotate the pinion and hollow shaft once more 5 turns in each direction. Set dial indicator to "0" with 1 mm pre-load once again.

Formula:		
"Stotal"	**=**	**"S4*" + measured value + bearing pre-load**

Example:		
	Inserted shim "S4*"	1.00 mm
+	measured value (example)	0.45 mm
+	bearing pre-load (constant value)	0.15 mm
=	Total shim thickness "Stotal" of "S3" + "S4"	1.60 mm

Defining thickness of shim "S3*"

Formula:		
"S3*"	**=**	**"Stotal" - "S4*"**

Example:		
	Total shim thickness "Stotal" of "S3" + "S4"	1.60 mm
-	inserted shim "S4*"	1.00 mm
=	Thickness of shim "S3*"	0.60 mm

- Remove outer race of tapered roller bearing, insert shim "S3*" in transmission housing and re-install outer race. See **Pressing in outer race for double tapered roller bearing**
- Re-insert fully assembled pinion in transmission housing.
- Install transmission cover and tighten bolts to 22 Nm.
- Rotate pinion in same direction and in opposite direction to hollow shaft 5 turns in both directions, so that tapered roller bearings slip into place.

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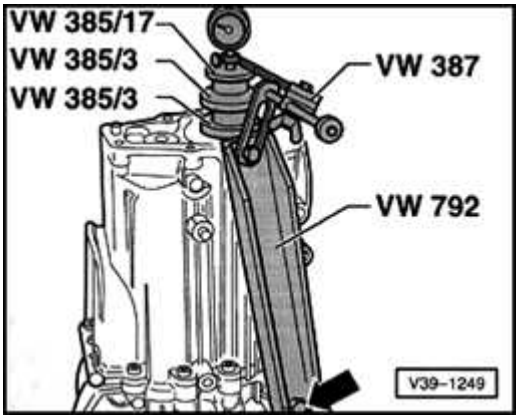


Fig. 361: Installing Measuring Tools And Secure To Transmission Housing
Courtesy of VOLKSWAGEN UNITED STATES, INC.

- Install measuring tools and secure with bolt (arrow) to transmission housing.
- Set dial indicator (3 mm measuring range) to "0" with 2 mm pre-load.
- Loosen bolts of transmission cover and turn pinion freely.

If correct shims were selected, the dial indicator should show the following value:

- 0.05 to 0.15 mm

- Tighten bolts of transmission cover to 22 Nm.
- Remove measuring tools.
- Rotate pinion in same direction and in opposite direction to hollow shaft 5 turns in both directions, so that tapered roller bearings slip into place.

Defining dimension "e"

NOTE: Dimension "e" is required to determine the definitive shim thickness of "S3" and "S4".

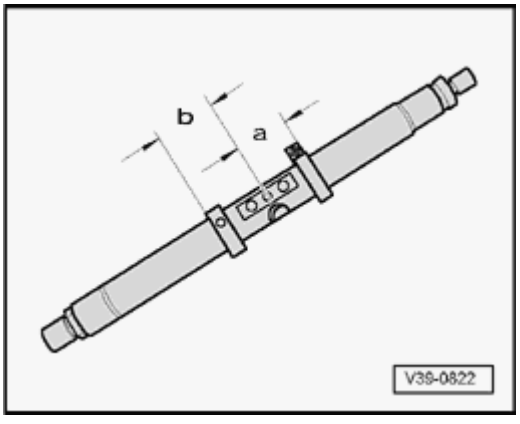


Fig. 362: Setting Adjusting Rings Of Measuring Bar VW 385/1

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Courtesy of VOLKSWAGEN UNITED STATES, INC.

- Adjust set rings of multi-purpose measuring mandrel VW 385/1 to following values:

- Dimension a = 35 mm
- Dimension b = 75 mm

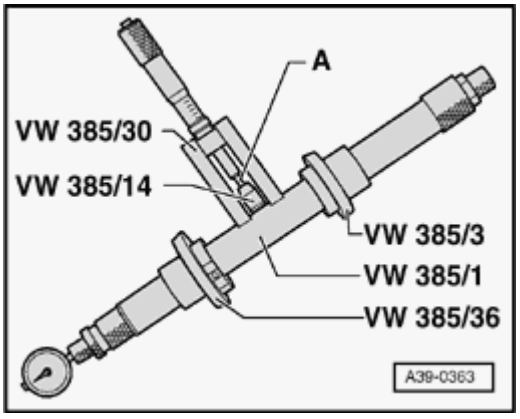


Fig. 363: Assembling Measuring Bar VW 385/1
Courtesy of VOLKSWAGEN UNITED STATES, INC.

- Assemble multi-purpose measuring mandrel VW 385/1 as shown in illustration:

- Dial indicator extension -A-, 6.5 mm long

- Adjust controller VW 385/30 to Ro in line with ring gear diameter and place on measuring mandrel.

Ring gear diameter 170 mm = 54.95 mm

- Set dial indicator (3 mm measuring range) to "0" with 2 mm pre-load.

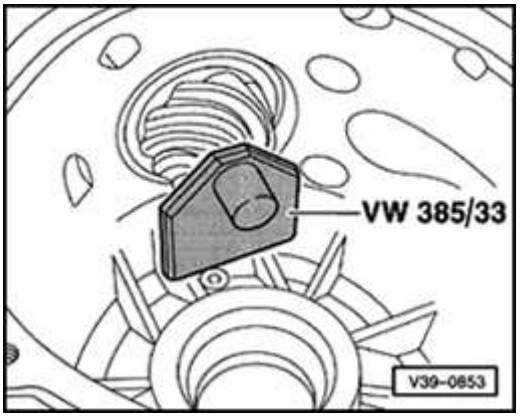


Fig. 364: Placing End Gauge On Drive Pinion Face
Courtesy of VOLKSWAGEN UNITED STATES, INC.

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- Place gauge block plate on pinion head.

NOTE: Make sure plate fits exactly and contact area is oil free.

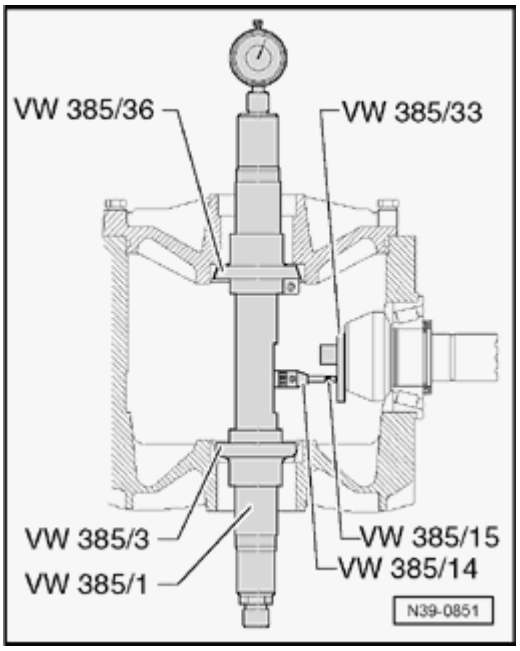
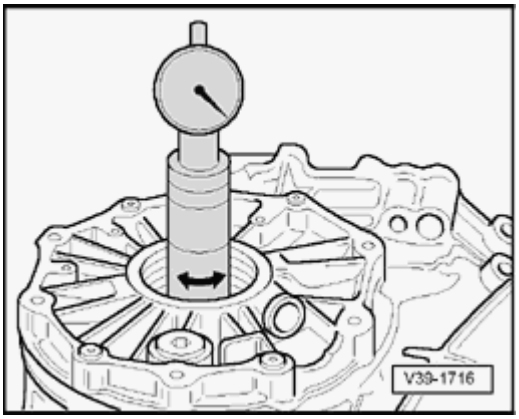


Fig. 365: Inserting Measuring Mandrel VW 385/1 Into Housing
Courtesy of VOLKSWAGEN UNITED STATES, INC.

- Remove controller and insert measuring mandrel in housing.

- Dial indicator extension -A- = 6.5 mm long must be screwed in
- Dial indicator faces cover of final drive

- Position cover of final drive and tighten 4 bolts to 22 Nm.
- Pull 2nd centering disc outward using moveable set ring until measuring mandrel can only just be turned by hand.



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Fig. 366: Turning Measuring Mandrel Until Dial Gauge Plunger Tip Touches End Gauge On Pinion Shaft Head And Measure Maximum Runout
Courtesy of VOLKSWAGEN UNITED STATES, INC.

- Turn measuring mandrel until tip of dial indicator runs into gauge block plate on pinion head and gauge displays maximum deflection (point of return).

- Measured value in following example: "e" = 0.26 mm (red zone)

NOTE: After removing multi-purpose measuring mandrel, check again whether dial indicator with controller VW 385/30 in position is still set to "0" with 2 mm pre-load.

Defining thickness of shim "S3"

- The dimension "r" referenced to controller "Ro" is measured for the drive units which are delivered as replacement parts and written on the circumference of the ring gear.
- If measurement is performed in red zone measured value "e" must be deducted.
- If measurement is performed in black zone measured value "e" must be added on.

Formula:		
"S3"	**=**	**"S3*" + "r" + "e"**
("e" in black zone)		
"S3"	**=**	**"S3*" + "r" - "e"**
("e" in red zone)		

Example:		
	Inserted shim "S3*"	0.60 mm
+	dimension "r"	0.38 mm
-	obtained value "e" (red zone)	0.26 mm
=	Thickness of shim "S3"	0.72 mm

- Define shim(s) as accurately as possible using chart. Part numbers

Available shims for "S3"

Shim thickness (mm) 1)		
0.40	0.55	0.70
0.45	0.60	0.75
0.50	0.65	

1) Due to shim tolerances any shim thickness can be obtained. Insert 2 shims if required.

Defining thickness of shim "S4"

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Formula:		
"S4"	**=**	**"Stotal" - "S3"**

Example:		
	Total shim thickness "Stotal" of "S3" + "S4"	1.60 mm
-	thickness of shim "S3"	0.72 mm
=	Thickness of shim "S4"	0.88 mm

- Define shim(s) as accurately as possible using chart. Part numbers

Available shims for "S4"

Shim thickness (mm) 1)		
0.45	0.65	0.85
0.50	0.70	0.90
0.55	0.75	
0.60	0.80	

1) Due to shim tolerances any shim thickness can be obtained. Insert 2 shims if required.

Checking measurement

Checking dimension "r"

- Install pinion/hollow shaft with defined shims "S3" and "S4".
- Rotate hollow shaft against pinion 5 turns in both directions, so that tapered roller bearing slips into place.
- Rotate pinion and hollow shaft together 5 turns in both directions, so that tapered roller bearing slips into place.

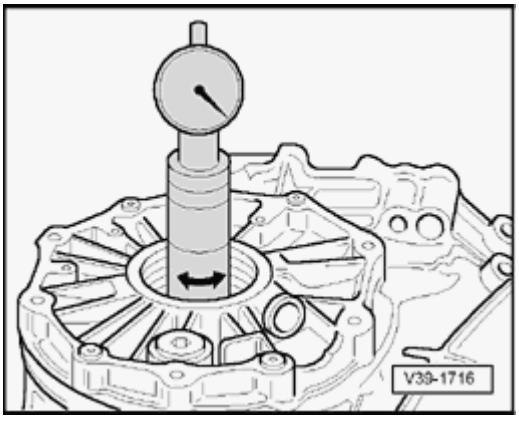


Fig. 367: Turning Measuring Mandrel Until Dial Gauge Plunger Tip Touches End Gauge On Pinion Shaft Head And Measure Maximum Runout
Courtesy of VOLKSWAGEN UNITED STATES, INC.

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- Insert multi-purpose measuring mandrel. Refer to **Defining dimension "e"**, and check measurement.
- Read off dial indicator counter-clockwise (red zone).

- If correct shims were selected, dimension "r" (written on circumference of ring gear) must be displayed showing a tolerance of ± 0.04 mm

Shim "S4", re-determining when replacing transmission cover

Special tools, testers and other items required

- 2 x centering disc VW 385/3
- Measuring plate VW 385/17
- Universal dial indicator holder VW 387
- Assembly device VW 792

- Dial indicator
- Dial indicator extension
- Depth caliper gauge with minimum measuring accuracy of 5/100 mm

- Clean joint surfaces of cover.

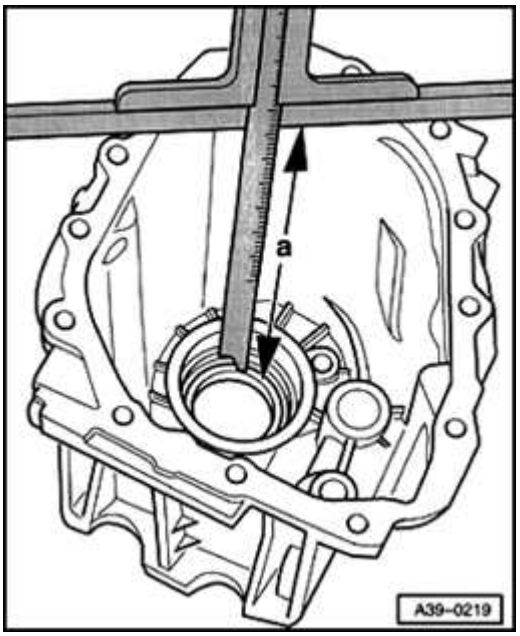


Fig. 368: Measuring Difference In Depth On Old And New Transmission Cover
Courtesy of VOLKSWAGEN UNITED STATES, INC.

- Measure difference in depth "a" on old and new transmission covers.

Example:

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	Depth "a" of old transmission cover	257.40 mm
	Depth "a" of new transmission cover	257.55 mm
=	Difference	0.15 mm

- Install thicker shim "S4" if new transmission cover is deeper.
- Install thinner shim "S4" if old transmission cover is deeper.

Example:

	Old shim "S4"	0.95 mm
+	Difference	0.15 mm
=	New shim "S4"	1.10 mm

Available shims. Refer to **Available shims for "S4"**.

- Insert outer race for tapered roller bearing together with shim "S4" in transmission cover. See **Pressing in outer race for tapered roller bearing**
- Re-insert fully assembled pinion in transmission housing.
- Install transmission cover and tighten bolts to 22 Nm.
- Rotate pinion in same direction and in opposite direction to hollow shaft 5 turns in both directions, so that tapered roller bearings slip into place.

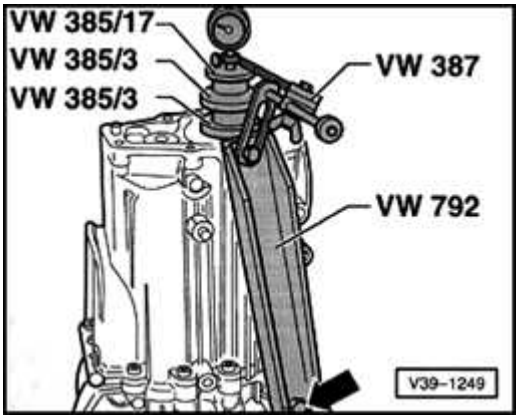


Fig. 369: Installing Measuring Tools And Secure To Transmission Housing
Courtesy of VOLKSWAGEN UNITED STATES, INC.

- Install measuring tools and secure with bolt (arrow) to transmission cover.
- Set dial indicator (3 mm measuring range) to "0" with 2 mm pre-load.
- Loosen bolts of transmission cover and turn pinion freely.

If correct shims were selected, the dial indicator should show the following value:

- 0.05 to 0.15 mm

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If this value is not obtained, the setting must be corrected.

Ring gear, adjusting

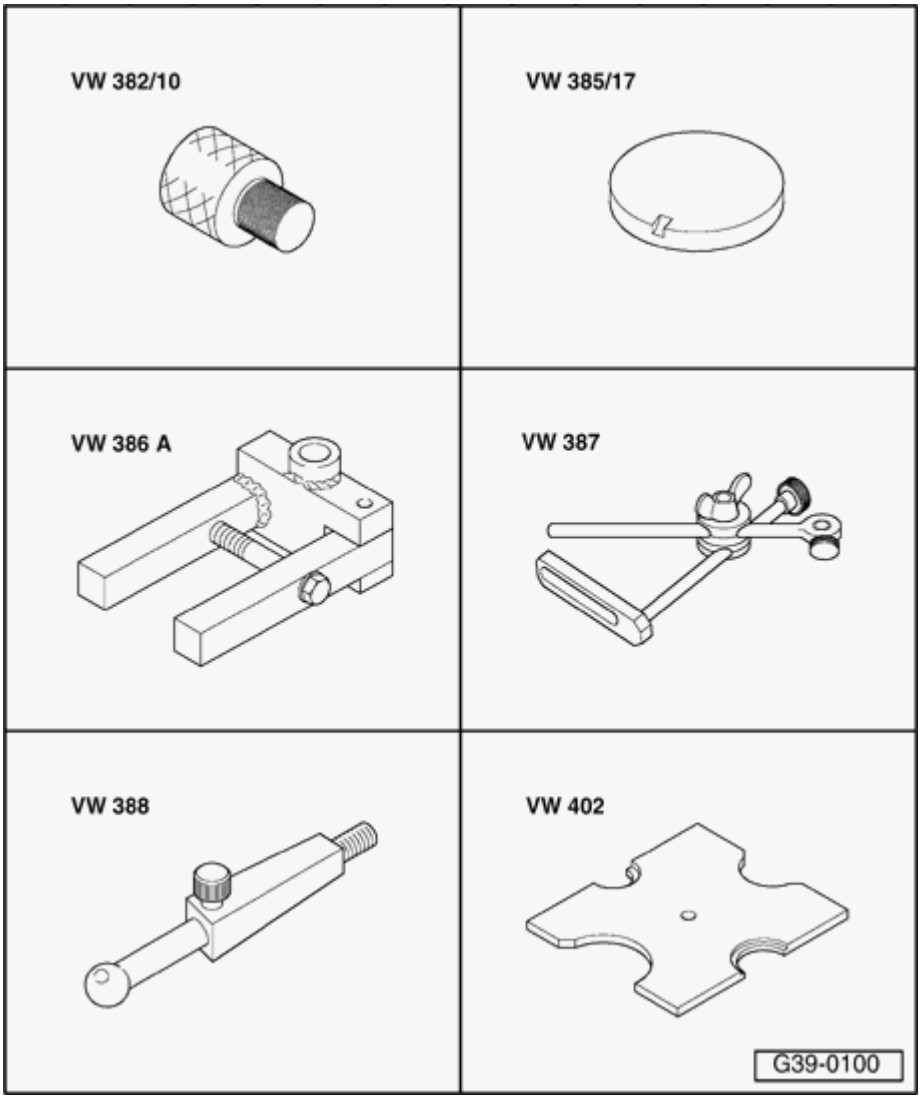


Fig. 370: Identifying Special Tools - Ring Gear, Adjusting
Courtesy of VOLKSWAGEN UNITED STATES, INC.

(Adjusting differential)

Special tools and equipment

- VW 382/10 Dial indicator extension
- VW 385/17 Gauge block plate
- VW 386 A Clamp for pinion
- VW 387 Universal dial indicator holder

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- VW 388 Measuring lever
- VW 402 Pressure plate

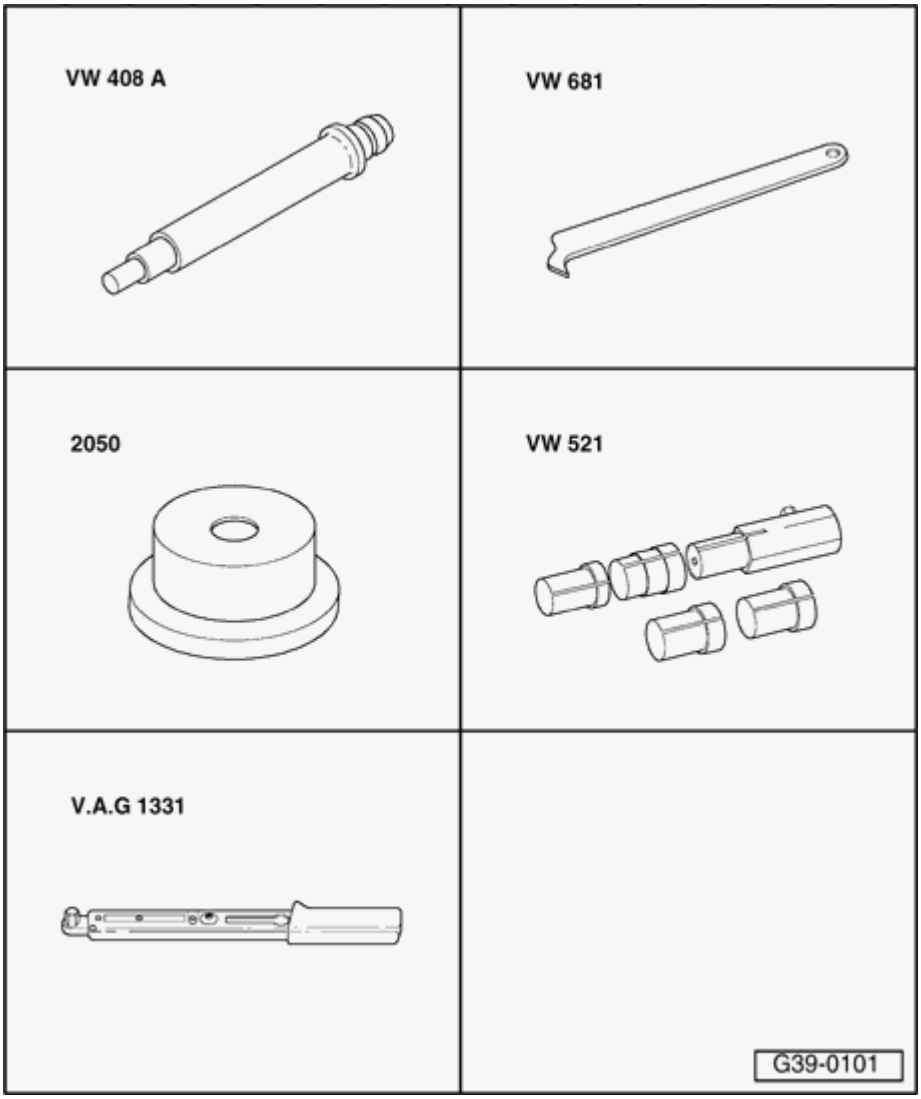


Fig. 371: Identifying Special Tools - Ring Gear, Adjusting
Courtesy of VOLKSWAGEN UNITED STATES, INC.

- VW 408 A Press tool
- VW 681 Extractor lever
- 2050 Pressure piece
- VW 521 Adjusting device for ring gear
- VAG 1331 Torque wrench
- Dial indicator

The ring gear must be re-adjusted if:

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transmission housing, final drive cover, differential tapered roller bearing, differential housing or drive unit are replaced.

Adjustment table. Refer to **Adjustment table**

Defining total shim thickness "Stotal" of shims "S1" + "S2"

(Adjusting pre-load of differential tapered roller bearing)

- Pinion removed
- If only differential tapered roller bearings are replaced, the ring gear can be removed from the differential housing. In this case, the pinion does not have to be removed.

- Pull out oil seals for drive flanges using extractor lever VW 681.
- Remove outer races of differential tapered roller bearings and take out shims. Refer to **Differential, disassembling and assembling**.

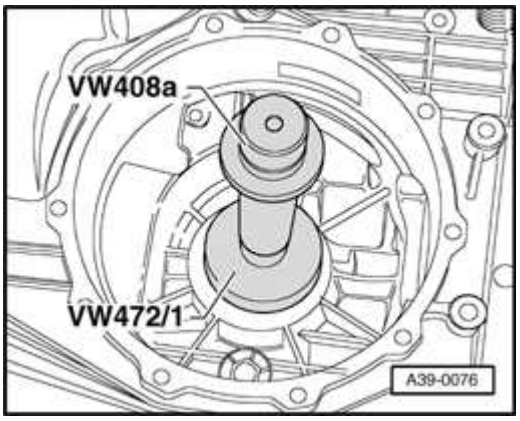


Fig. 372: Pressing Outer Race/Tapered Roller Bearing Into Transmission Housing
Courtesy of VOLKSWAGEN UNITED STATES, INC.

- Drive outer race of small tapered roller bearing and shim "S2" into transmission housing. For measurement purposes, a shim "S2*" 1.20 mm thick is used (2 shims of 0.60 mm).

NOTE: A shim "S2" 1.20 mm thick is used provisionally as a reference value. It is referred to below as "S2*". Once torsional side clearance is determined, "S2*" is replaced by the definitive "S2".

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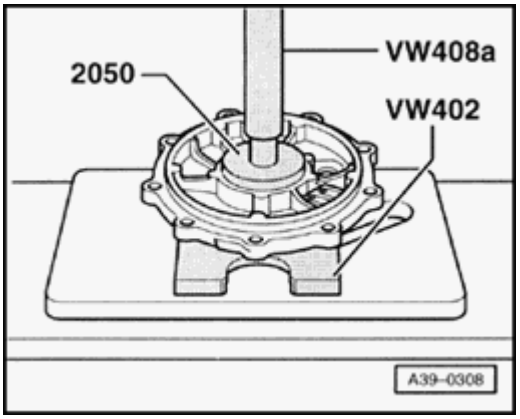


Fig. 373: Driving In Outer Race Of Tapered Roller Bearing Into Cover
Courtesy of VOLKSWAGEN UNITED STATES, INC.

- Press outer race of tapered roller bearing into cover of differential without shim "S1".
- Insert differential without driving gear for sender of speedometer -G22 in transmission housing.
- Install cover of differential using 4 bolts (25 Nm).
- Position transmission so that cover of differential faces upward.

- Rotate differential 5 turns in both directions, so that tapered roller bearing slips into place.
- Lay measuring plate VW 385/17 on differential.

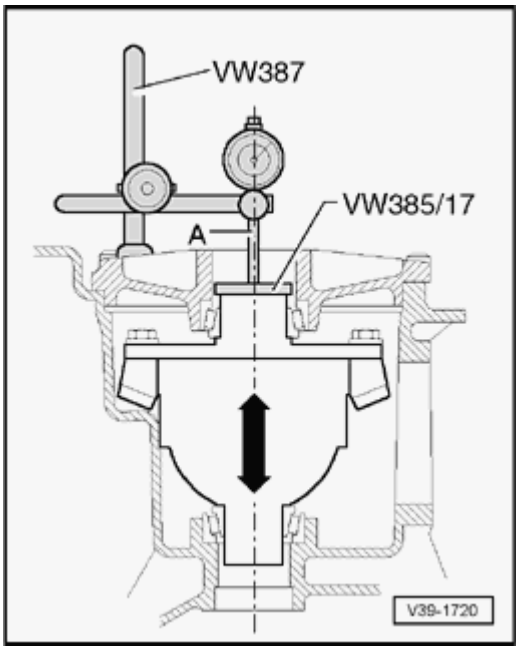


Fig. 374: Installing Magnetic Plate 50Mm Dia. VW 385/17 And Dial Gauge
Courtesy of VOLKSWAGEN UNITED STATES, INC.

- Set up measuring tools using a 30 mm dial indicator extension.
- Set dial indicator (3 mm measuring range) -A- to "0" with 2 mm pre-load.

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NOTE: Measuring tip of dial indicator must be positioned on center of differential.

- Lift differential without turning; read and note clearance indicated on dial indicator.
- Measured value in following example: 0.62 mm

NOTE:

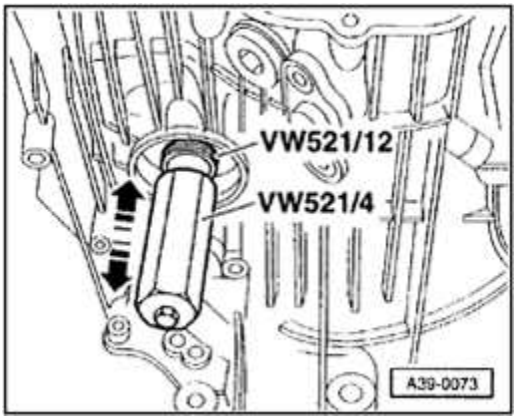


Fig. 375: Securing Special Tools VW 521/4 And VW 521/12 At Right On Differential (Housing Side)
Courtesy of VOLKSWAGEN UNITED STATES, INC.

- **To raise differential, fasten special tools VW 521/4 and VW 521/12 to right of differential (housing side).**
- **If the measurement is repeated, first rotate the pinion and hollow shaft once more 5 turns in each direction, so that the tapered roller bearing slips into place.**

Formula:		
"Stotal"	=	**"S2*" + measured value + bearing pre-load**

Example:		
	Inserted shim(s) "S2*"	1.20 mm
+	measured value	0.62 mm
+	bearing pre-load (constant value)	0.30 mm
=	Total shim thickness "Stotal" for "S1" + "S2"	2.12 mm

Defining thickness of shim "S1*"

NOTE:

- **Provisional shim "S1*" is replaced by definitive "S1" after torsional side clearance has been determined.**
- **Total shim thickness "Stotal" remains unchanged.**

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Formula:		
"S1*"	**=**	**"Stotal" - "S2*"**

Example:		
	Total shim thickness "Stotal" for "S1" + "S2"	2.12 mm
-	inserted shim(s) "S2*"	1.20 mm
=	Thickness of shim "S1*"	0.92 mm

Assigning shims

Measuring torsional side clearance

- Pinion installed with shims "S3*" and "S4*"

- Install differential with ring gear: S1* is installed on cover side, S2* in transmission housing.
- Mount final drive cover and tighten bolts to 25 Nm.
- Insert adjustment tool for ring gear VW 521/4 and VW 521/12.
- Rotate differential 5 turns in both directions, so that tapered roller bearings slip into place.

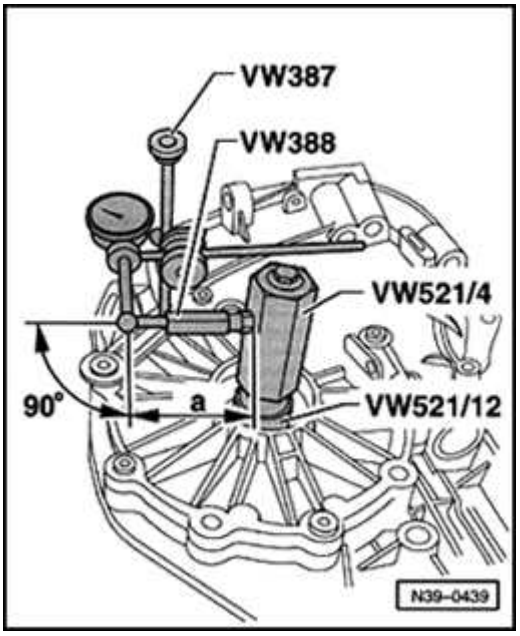


Fig. 376: Measuring Backlash
Courtesy of VOLKSWAGEN UNITED STATES, INC.

- Secure dial indicator holder VW 387 to housing.
- Insert dial indicator together with dial indicator extension VW 382/10 (6 mm plane).
- Set measuring lever VW 388 to dimension "a" = 67 mm (for ring gear diameter 170 mm).
- Determine clearance between flanks of teeth as follows:

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- Rotate ring gear until it makes contact with one tooth flank (end of clearance).
- Set dial indicator to "0" with 2 mm pre-load.
- Turn ring gear back until it makes contact with opposite tooth flank (torsional side clearance).
- Read off torsional side clearance and note down measured value.

- Turn ring gear additional 90 ° turn in each direction and repeat measurement 3 times.

NOTE:

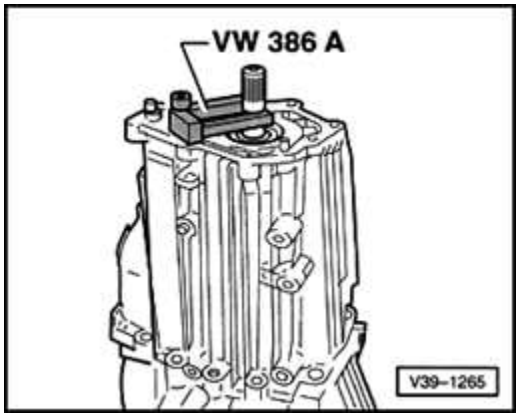


Fig. 377: Installing Clamping Piece VW 386 A
Courtesy of VOLKSWAGEN UNITED STATES, INC.

- **If pinion turns when differential is rotated, install VW 386 A to ensure that exact torsional side clearance can be measured.**
- **Release clamp for turning ring gear.**

Determining mean torsional side clearance

- Add up 4 measured values and divide total by 4.

Example:		
	1st measured value	0.28 mm
+	2nd measured value	0.30 mm
+	3rd measured value	0.30 mm
+	4th measured value	0.28 mm
=	Sum total of measured values	1.16 mm

- Result: The mean torsional side clearance equals 1.16 mm : 4 = 0.29 mm

NOTE: **If during measurement the individual values differ from one another by more than 0.06 mm, the ring gear or drive unit itself have not been correctly installed. Check repair work and replace drive unit if necessary.**

Defining thickness of shim "S2"

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Formula:		
"S2"	**=**	**"S2*" - torsional side clearance + lift**

Example:		
	Inserted shim "S2*"	1.20 mm
-	mean torsional side clearance	0.29 mm
+	lift (constant value)	0.15 mm
=	Thickness of shim "S2"	1.06 mm

- Define shim(s) as accurately as possible using chart. Part numbers

Available shims for "S2"

Shim thickness (mm) 1)		
0.45	0.65	0.85
0.50	0.70	0.90
0.55	0.75	
0.60	0.80	

1) Due to shim tolerances any shim thickness can be obtained. Insert 2 shims if required.

Defining thickness of shim "S1"

Formula:		
"S1"	**=**	**"Stotal" - "S2"**

Example:		
	Total shim thickness "Stotal" for "S1" + "S2"	2.12 mm
-	thickness of shim "S2"	1.06 mm
=	Thickness of shim "S1"	1.06 mm

- Define shim(s) as accurately as possible using chart. Part numbers

Available shims for "S1"

Shim thickness (mm) 1)		
0.45	0.65	0.85
0.50	0.70	0.90
0.55	0.75	
0.60	0.80	

1) Due to shim tolerances any shim thickness can be obtained. Insert 2 shims if required.

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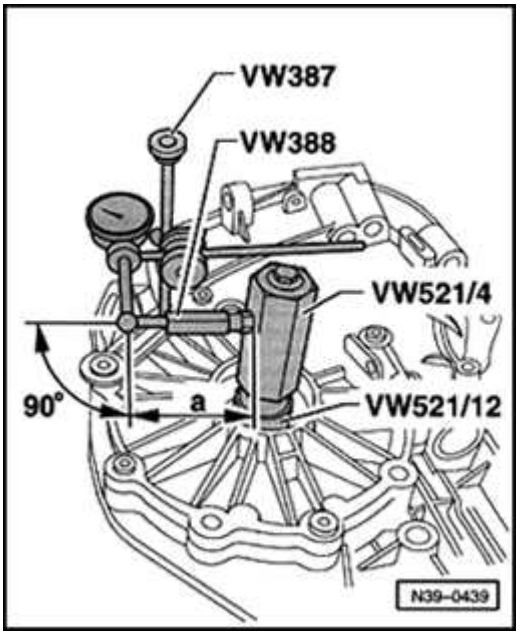


Fig. 378: Measuring Backlash
Courtesy of VOLKSWAGEN UNITED STATES, INC.

Checking measurement

- After shims "S1" and "S2" have been installed, rotate differential 5 turns in each direction so that tapered roller bearings slip into place.
- Measure torsional side clearance 4 times at circumference.

- Specification: 0.12 to 0.22 mm

NOTE:

- **If torsional side clearance is outside tolerance, repeat adjustments. But do not change total shim thickness "Stotal".**
- **Individual measured values may only differ from one another by max. 0.06 mm.**

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34 MANUAL TRANSMISSION - CONTROLS, HOUSING

SHIFT MECHANISM, SERVICING

Shift mechanism, servicing

CAUTION: Before beginning repairs on the electrical system:

- **Obtain the anti-theft radio security code.**
- **Switch the ignition off.**
- **Disconnect the battery Ground (GND) strap.**
- **On vehicles equipped with Audi Telematics by OnStar ® , switch-off the emergency (back-up) battery for the Telematic/Telephone Control Module prior to disconnecting vehicle battery. Refer to**
  - **91 - COMMUNICATION**
  - **91 RADIO, TELEPHONE, NAVIGATION, TRIP COMPUTER for Cabriolet**

  .
- **After reconnecting vehicle battery, re-code and check operation of anti-theft radio. Also check operation of clock and power windows according to article and/or Owner's Manual.**
- **After reconnecting vehicle battery on vehicles equipped with Audi Telematics by OnStar ® , switch-on the emergency (back-up) battery for the Telematic/Telephone Control Module. Refer to**
  - **91 - COMMUNICATION**
  - **91 RADIO, TELEPHONE, NAVIGATION, TRIP COMPUTER for Cabriolet**

  .

Shift mechanism, installation position

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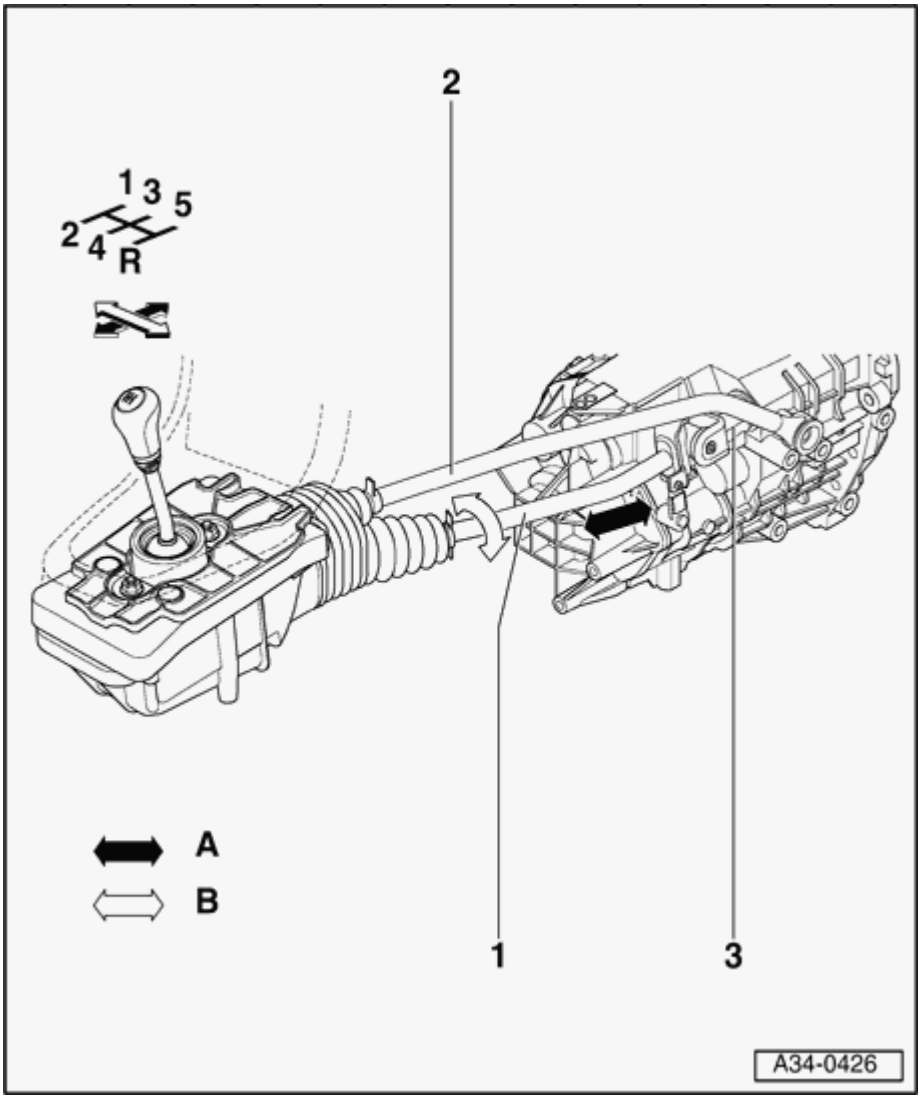


Fig. 67: Installation Position Of Gear Selector Mechanism
Courtesy of VOLKSWAGEN UNITED STATES, INC.

1 - Selector rod

2 - Front push rod

3 - Selector lever on transmission

Arrow -A- Gear selection movement

Arrow -B- Gate selection movement

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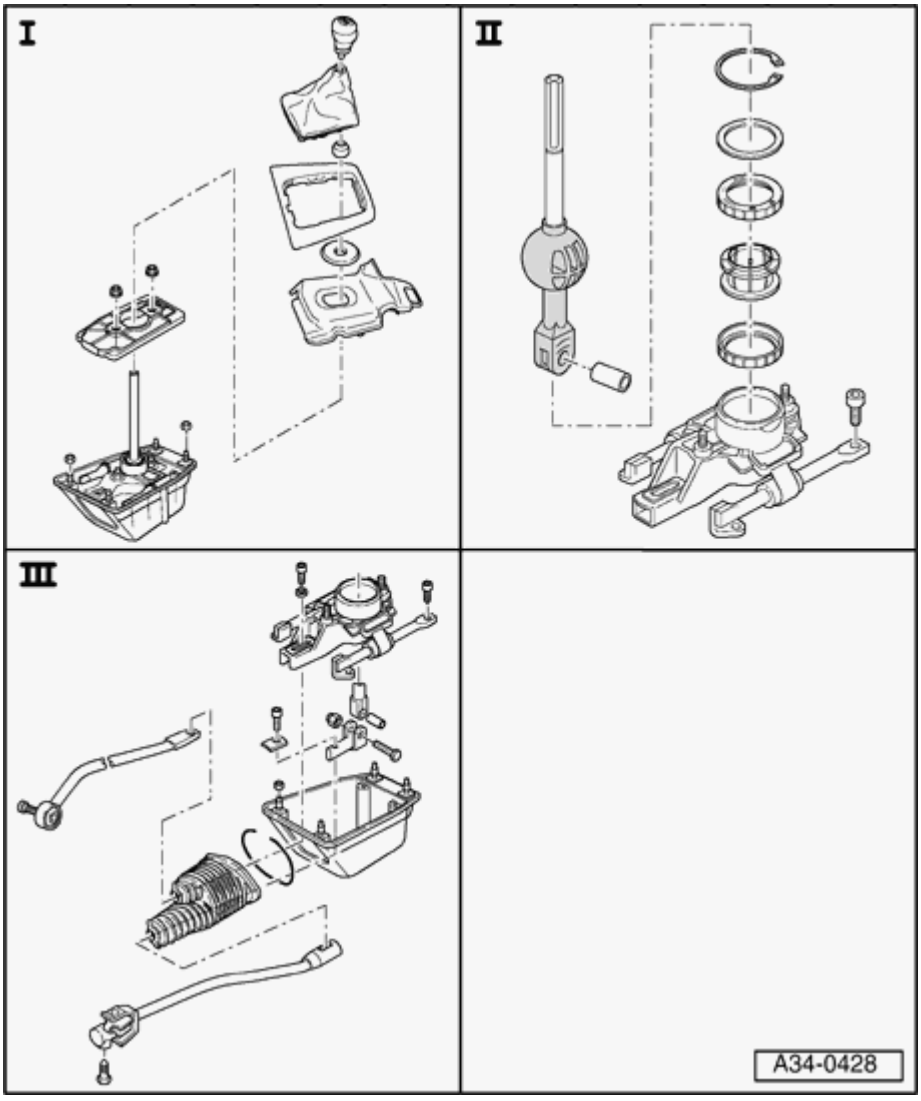


Fig. 68: Shift Lever Knob And Protective Boot Remove/Install Components, Shift Lever And - Rear Push Rod And Shift Lever And - Front Push Rod
Courtesy of VOLKSWAGEN UNITED STATES, INC.

I - Removing and installing gear shift knob and cover. Refer to Gear shift knob and cover, removing and installing

II - Servicing gear shift and rear push rod. Refer to Gear shift and rear push rod, servicing

III - Servicing selector rod and front push rod. Refer to Selector rod and front push rod, servicing

Removing and installing shift mechanism. Refer to **Shift mechanism, removing and installing**

Adjusting shift mechanism. Refer to **Shift mechanism, adjusting**

See Caution for disconnecting Telematics battery. Refer to **Shift mechanism, servicing**

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NOTE:

- **Disconnect Ground strap from battery in engine compartment before working on shift mechanism.**
- **Heed radio code on vehicles with encoded radio.**

Gear shift knob and cover, removing and installing

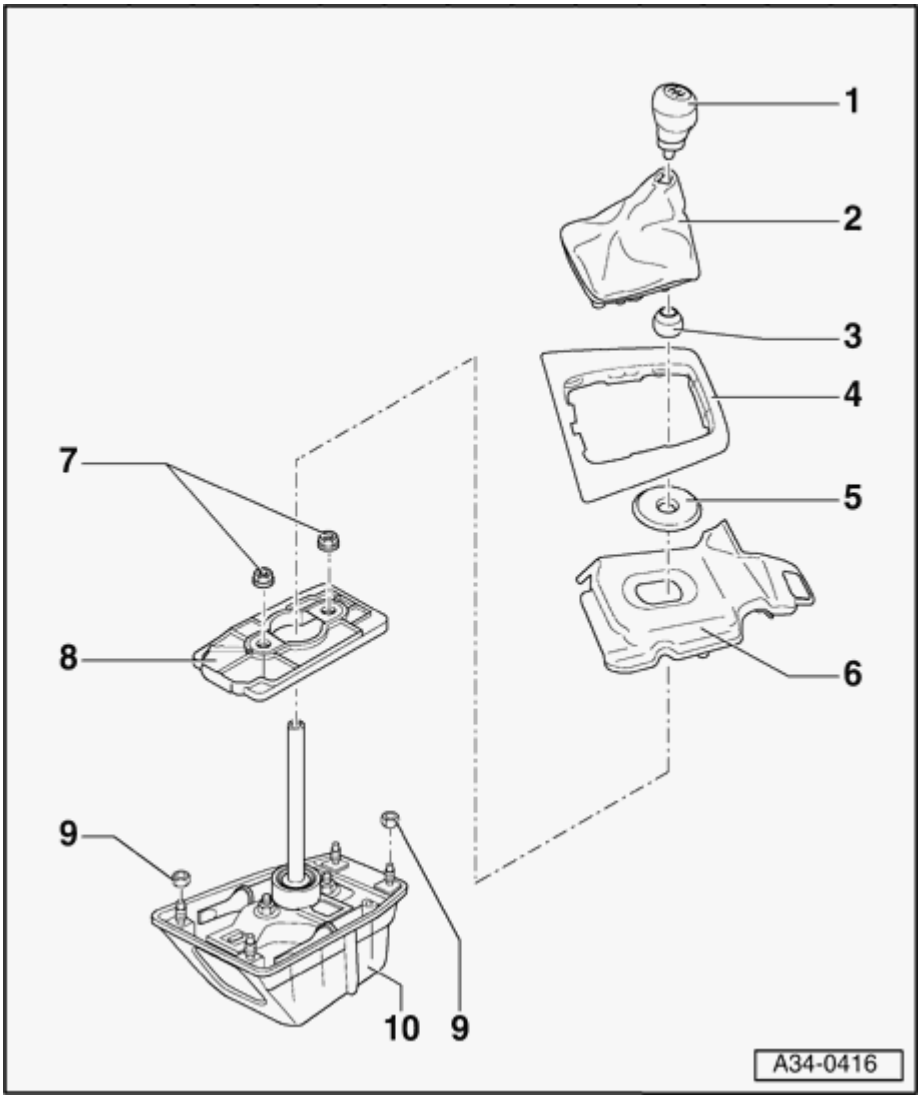


Fig. 69: Shift Lever Knob And Protective Boot Remove/Install Components
Courtesy of VOLKSWAGEN UNITED STATES, INC.

1 - Gear shift knob

- Detach and install together with cover
- Removing. Refer to **Removing**

2 - Cover

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- Detach and install together with gear shift knob
- Removing. Refer to **Removing**

3 - Connection piece

- For locking gear shift knob onto gear shift
- Opening catch. Refer to **Fig. 78**
- Connects cover to gear shift knob

4 - Cover for center console

- Removing and installing. Refer to **Removing**

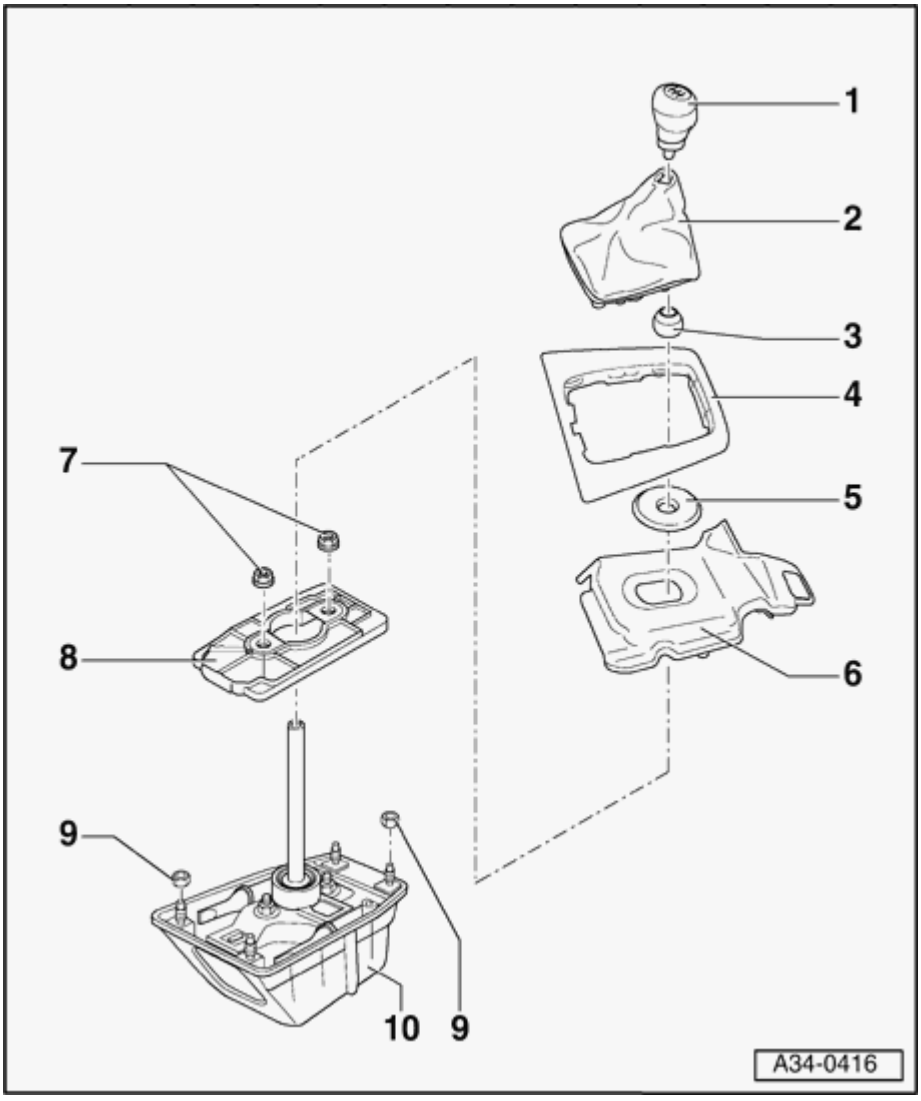


Fig. 70: Shift Lever Knob And Protective Boot Remove/Install Components
Courtesy of VOLKSWAGEN UNITED STATES, INC.

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5 - Damping washer

- Installation position: Convex side face up

6 - Noise insulation

- Installation position: Arrow on noise insulation points in direction of travel

7 - Hex nut, 10 Nm

8 - Anti-noise cover

9 - Hex nut, 10 Nm

10 - Gear shift

- Removing and installing. Refer to **Shift mechanism, removing and installing**

Gear shift and rear push rod, servicing

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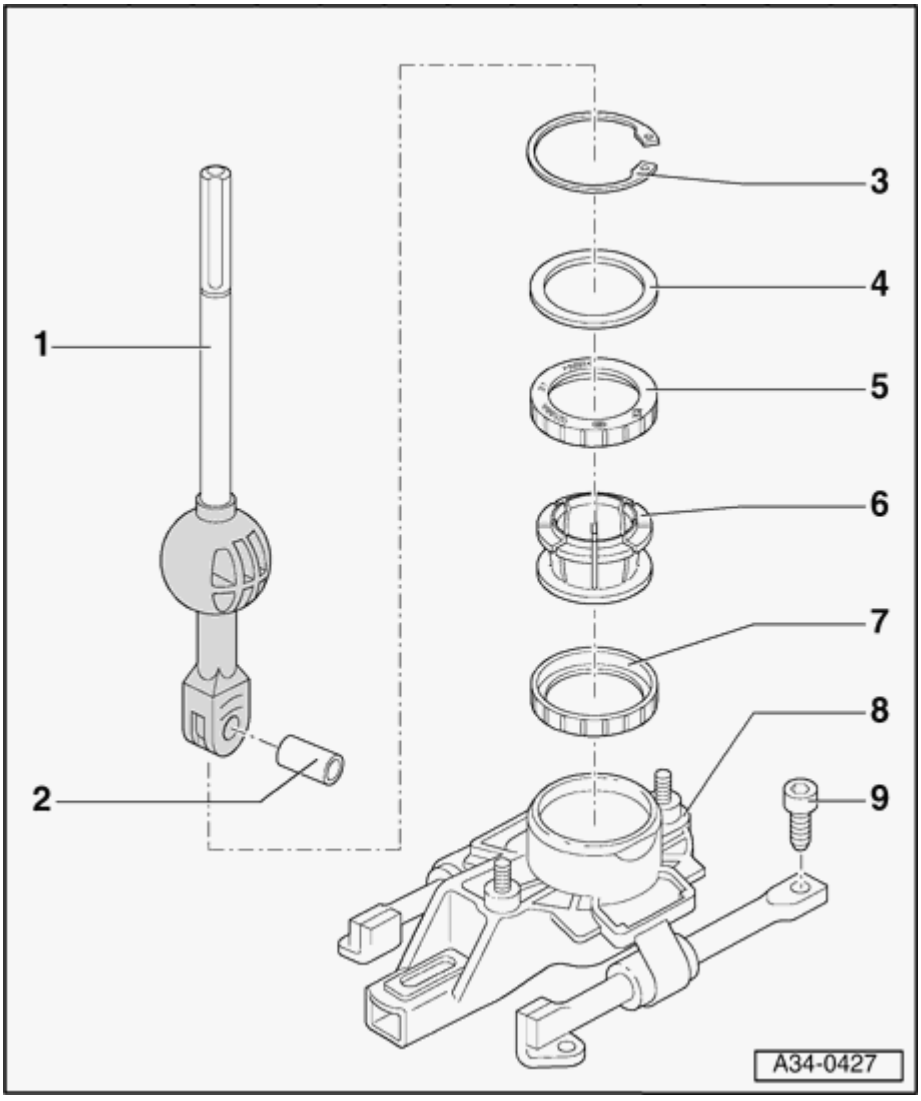


Fig. 71: Shift Lever And Rear Push Rod Remove/Install Components
Courtesy of VOLKSWAGEN UNITED STATES, INC.

NOTE: Lubricate bearing and contact surfaces with polycarbamide grease, part no. G 052 142 A2.

1 - Gear shift

- Lubricate area around hole at bottom with polycarbamide grease G 052 142 A2
- Lubricate ball with polycarbamide grease G 052 142 A2

2 - Spacer tube

- Lubricate with polycarbamide grease G 052 142 A2

3 - Circlip

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- Always replace

4 - Washer

- Collar faces ball guide (item 6)

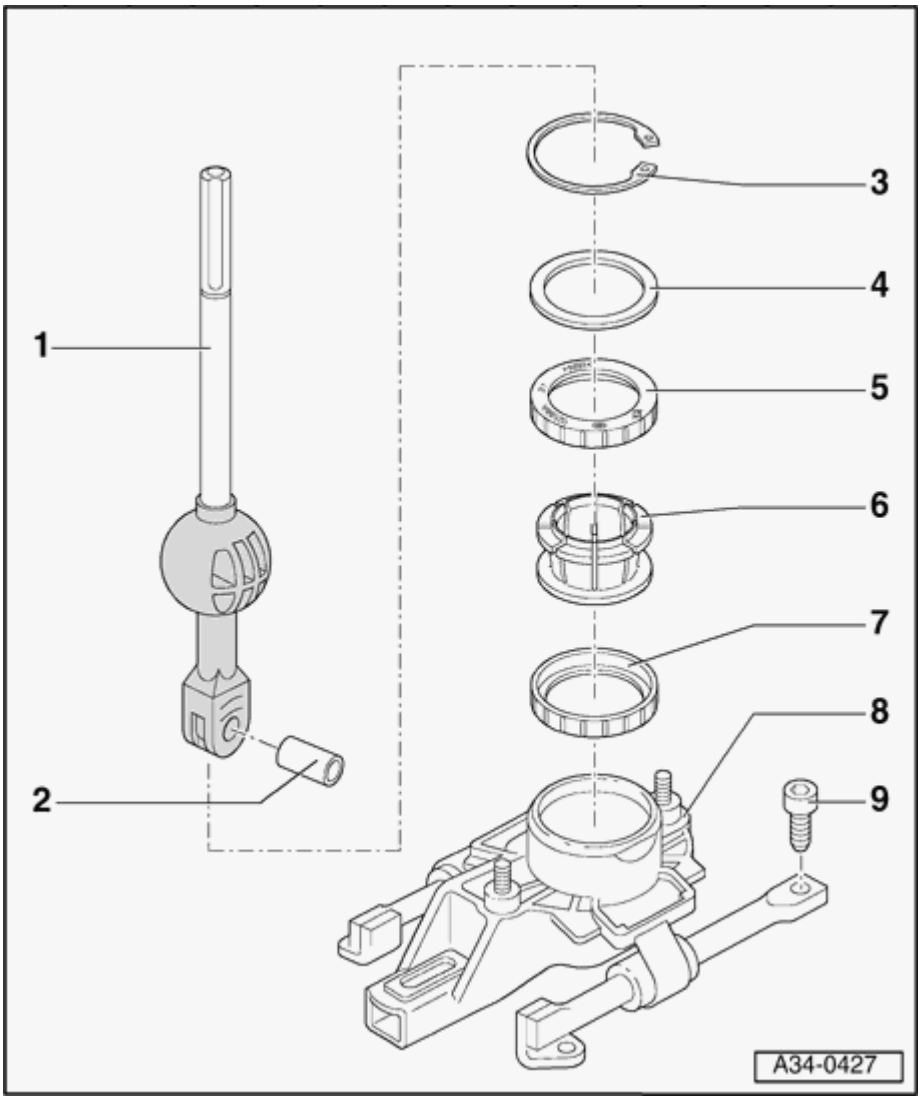


Fig. 72: Shift Lever And Rear Push Rod Remove/Install Components
Courtesy of VOLKSWAGEN UNITED STATES, INC.

5 - Rubber ring

6 - Ball guide

- Removing and installing. Refer to **Gear shift and rear push rod, removing and installing**

7 - Rubber ring

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8 - Rear push rod

- With ball housing
- Removing and installing. Refer to **Gear shift and rear push rod, removing and installing**

9 - Bolt, 6 Nm

- Qty. 4
- For fixing rear push rod to gear shift housing

Selector rod and front push rod, servicing

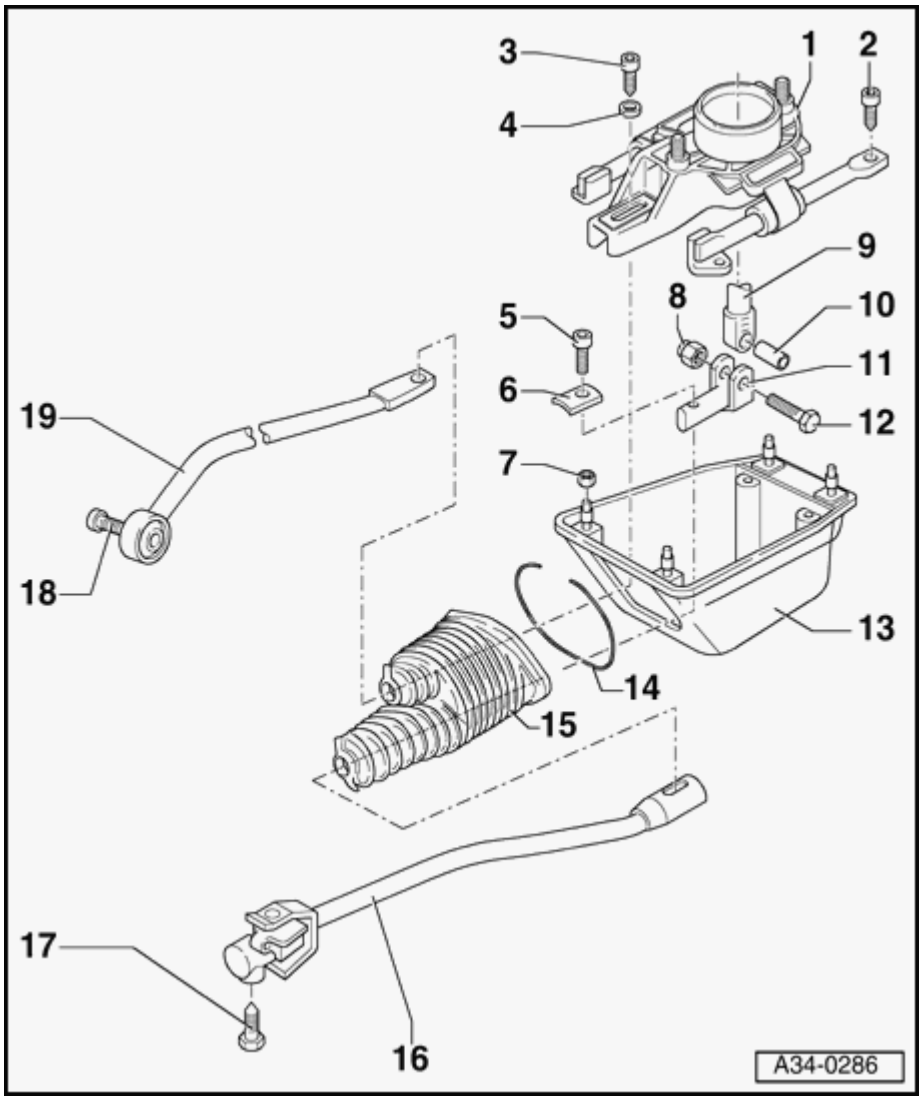


Fig. 73: Shift Rod And Pivot Rod, Overview
Courtesy of VOLKSWAGEN UNITED STATES, INC.

1 - Rear push rod

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2 - Bolt, 6 Nm

- Qty. 4
- For fixing rear push rod to gear shift housing

3 - Hex socket-head bolt, 25Nm

4 - Washer

5 - Hex socket-head bolt, 25Nm

6 - Clamp

7 - Hex nut, 10 Nm

- Qty. 4
- For fixing gear shift housing to body

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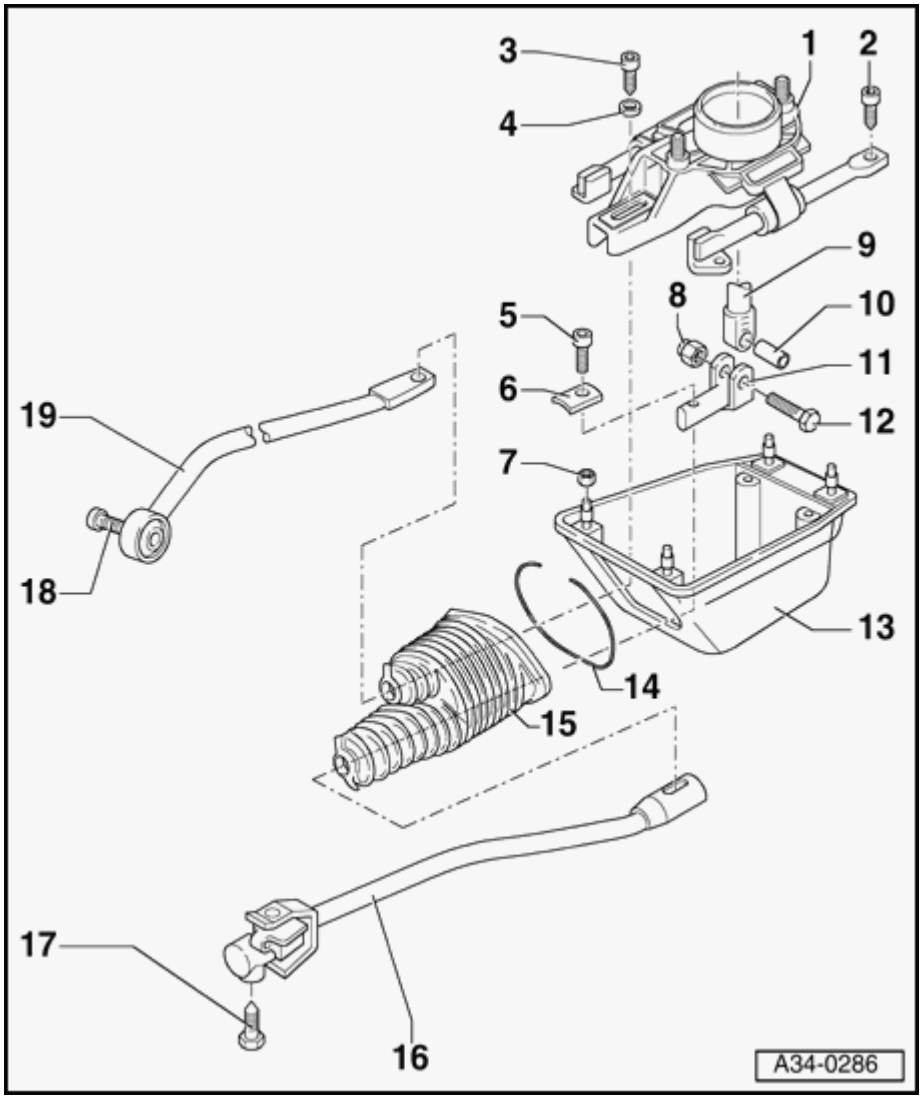


Fig. 74: Shift Rod And Pivot Rod, Overview
Courtesy of VOLKSWAGEN UNITED STATES, INC.

8 - Hex nut, 10 Nm

- Self-locking
- Always replace

9 - Gear shift

10 - Spacer tube

- Lubricate with polycarbamide grease G 052 142 A2

11 - Selector fork

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12 - Bolt

13 - Gear shift housing

14 - Tensioning ring

15 - Boot

- Remove catalytic converter and front heat shield before removal and assembly

NOTE:

- **Carefully pull boot over selector rod**
- **Position boot on markings of selector rod and push rod**

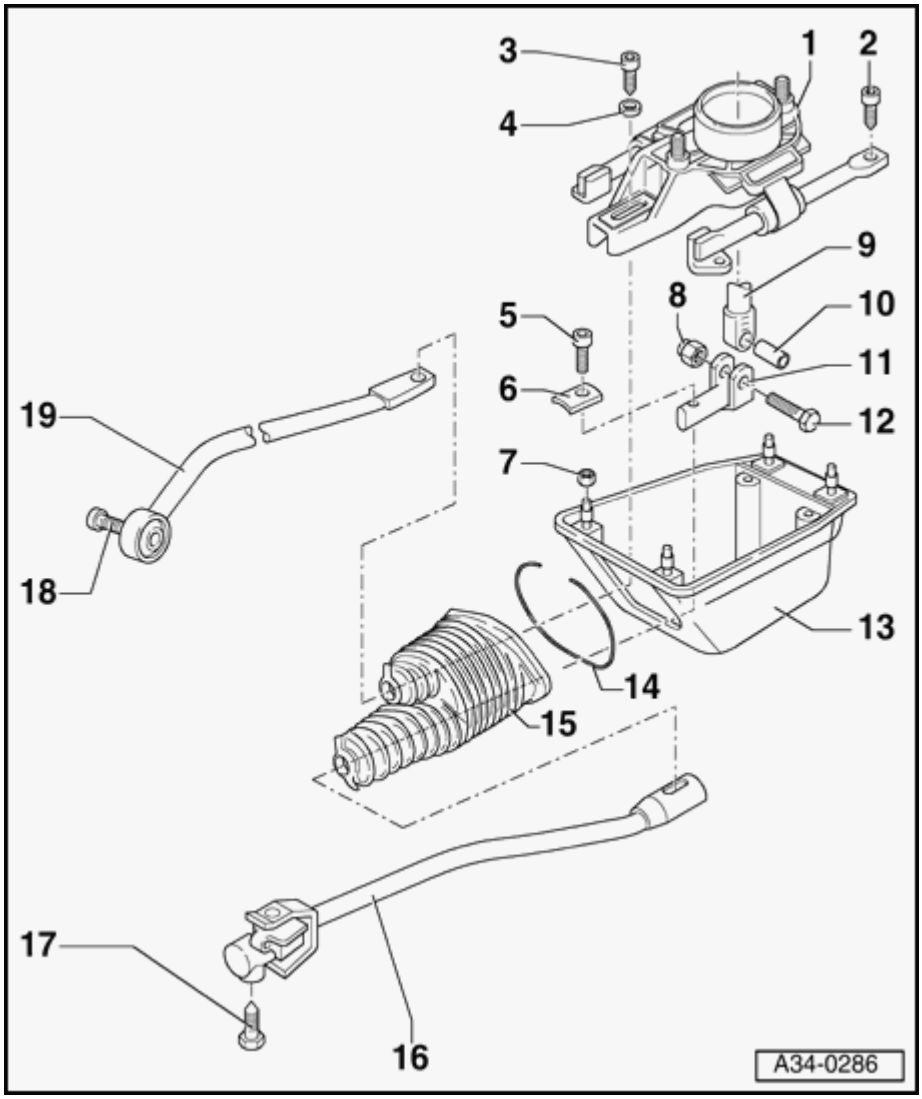


Fig. 75: Shift Rod And Pivot Rod, Overview
Courtesy of VOLKSWAGEN UNITED STATES, INC.

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16 - Selector rod

- With gearshift linkage

17 - Bolt, 23 Nm

- Self-locking
- Always replace

18 - Hex socket-head bolt, 40Nm

- Cannot be removed from mounting bushing of front push rod

19 - Front push rod

Gear shift and rear push rod, removing and installing

Removing

Remove gear shift knob together with gear shift cover and cover of center console.

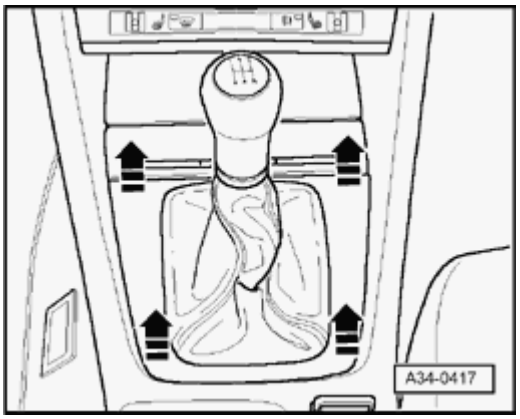


Fig. 76: Lifting Cover For Center Console Upward
Courtesy of VOLKSWAGEN UNITED STATES, INC.

- Lift cover of center console upward (arrows) and off.

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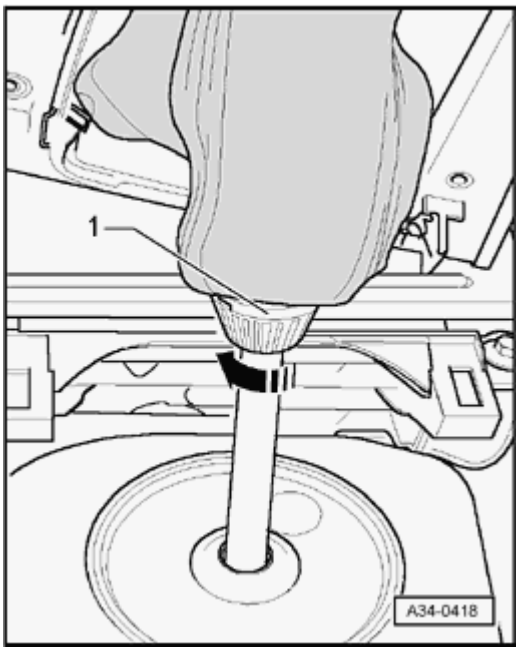


Fig. 77: Releasing Connector Piece
Courtesy of VOLKSWAGEN UNITED STATES, INC.

- Release connection piece -1- in direction of arrow and pull gear shift knob together with gear shift cover upward to remove.

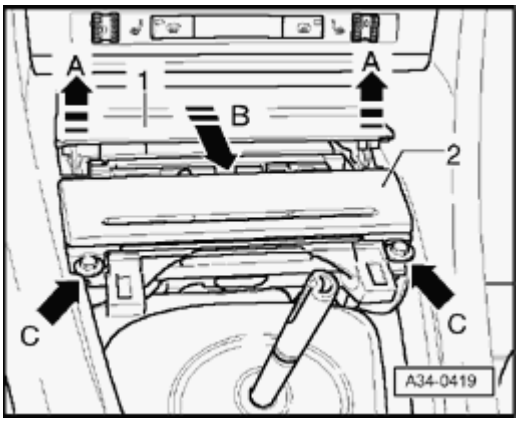


Fig. 78: Lifting Cover And Pulling Out And Removing Bolts And Pulling Ashtray From Center Console
Courtesy of VOLKSWAGEN UNITED STATES, INC.

- First lift cover -1- up in direction of arrow -A- and pull out in direction of arrow -B-.
- Remove bolts (arrows C) and then remove ashtray -2- from center console.

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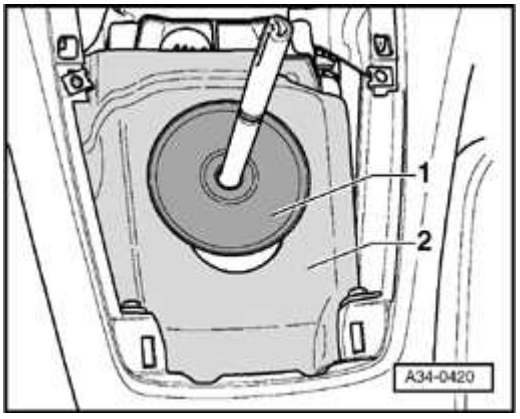


Fig. 79: Lifting Out Damping Washer And Noise Insulation
Courtesy of VOLKSWAGEN UNITED STATES, INC.

- Lift damping washer -1- and noise insulation -2- upward and out.

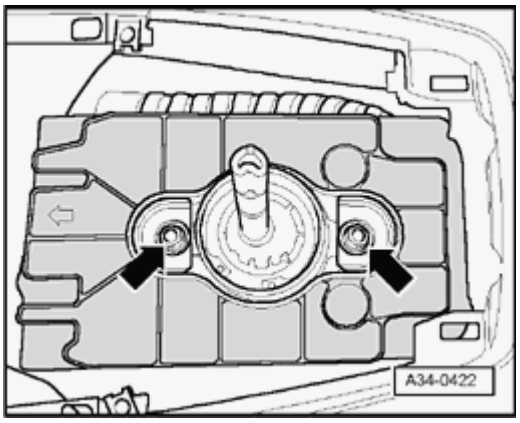


Fig. 80: Locating Noise Insulation For Shift Lever Housing Bolts
Courtesy of VOLKSWAGEN UNITED STATES, INC.

- Remove noise insulation for gear shift housing (arrows).

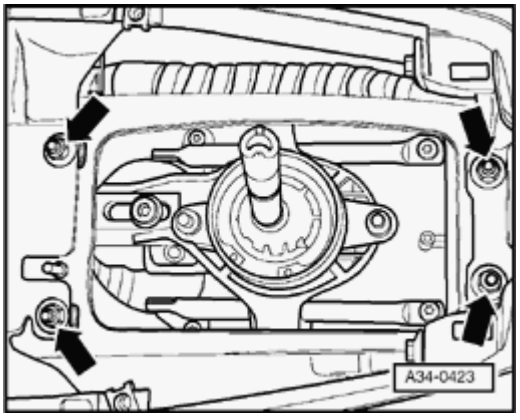


Fig. 81: Locating Securing Nuts For Shift Lever Housing
Courtesy of VOLKSWAGEN UNITED STATES, INC.

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- Remove securing nuts (arrows) for gear shift housing.

This lowers the gear shift housing.

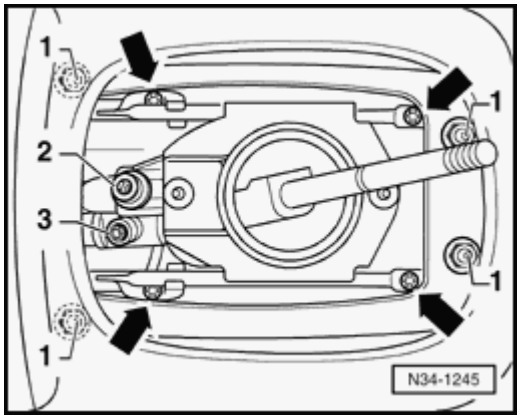


Fig. 82: Shift Mechanism Housing Fasteners
Courtesy of VOLKSWAGEN UNITED STATES, INC.

- Disconnect push rod by unscrewing hex socket-head bolt -2-.
- Disconnect selector rod by unscrewing hex socket-head bolt -3-.
- Disconnect rear push rod assembly from gear shift housing (arrows).
- Remove gear shift and rear push rod from gear shift housing.

Installing

Install in reverse order, paying attention to the following:

- Adjusting shift mechanism. Refer to **Shift mechanism, adjusting**.

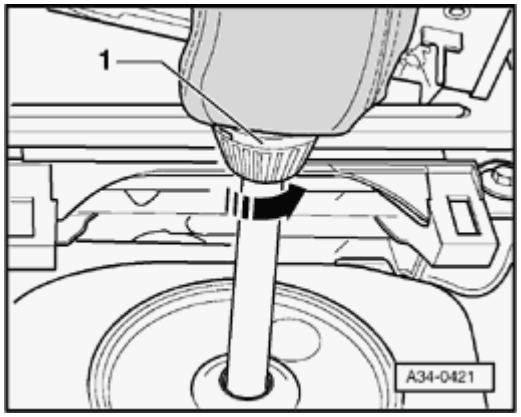


Fig. 83: Turning Connector Piece Till It Stops
Courtesy of VOLKSWAGEN UNITED STATES, INC.

- Position gear shift knob together with gear shift cover on gear shift and turn connection piece -1- in direction of arrow as far as it will go.

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Tightening torques

Rear push rod to gear shift housing	6 Nm
Selector rod to selector fork/gear shift	25 Nm
Front push rod to rear push rod	25 Nm
Gear shift housing to body	10 Nm
Cover to rear push rod	10 Nm

Shift mechanism, removing and installing

Removing

NOTE: Remove gear shift knob together with gear shift cover and cover of center console.

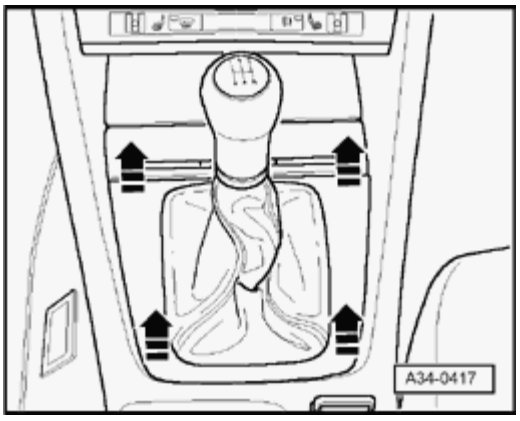


Fig. 84: Lifting Cover For Center Console Upward
Courtesy of VOLKSWAGEN UNITED STATES, INC.

- Lift cover of center console upward (arrows) and off.

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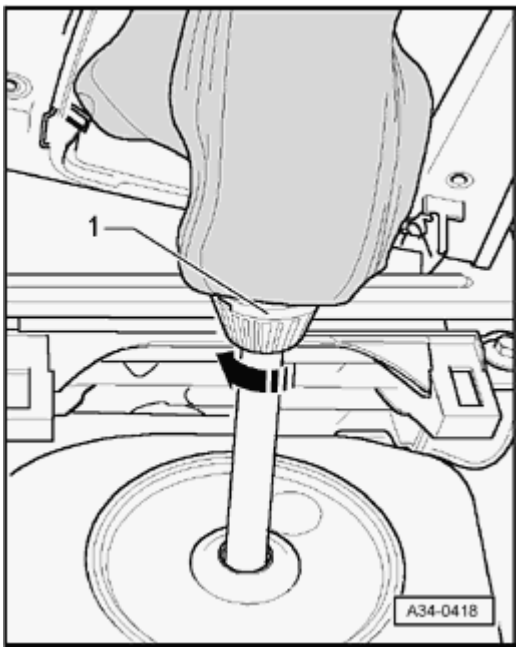


Fig. 85: Releasing Connector Piece
Courtesy of VOLKSWAGEN UNITED STATES, INC.

- Release connection piece -1- in direction of arrow and pull gear shift knob together with gear shift cover upward to remove.

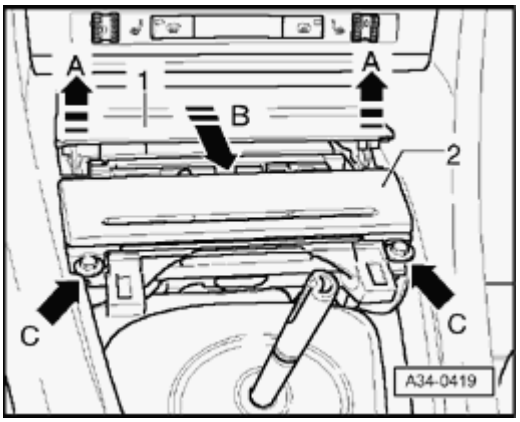


Fig. 86: Lifting Cover And Pulling Out And Removing Bolts And Pulling Ashtray From Center Console
Courtesy of VOLKSWAGEN UNITED STATES, INC.

- First lift cover -1- up in direction of arrow -A- and pull out in direction of arrow -B-.
- Unscrew bolts (arrows C) and then remove ashtray -2- from center console.

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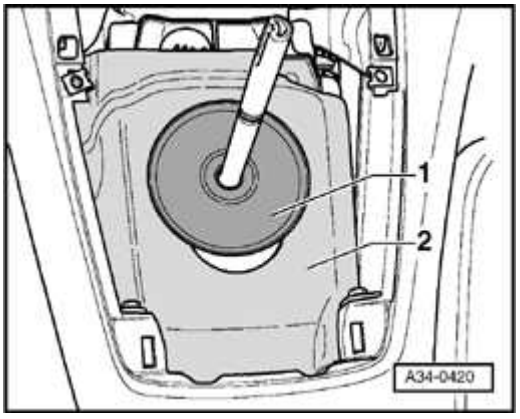


Fig. 87: Lifting Out Damping Washer And Noise Insulation
Courtesy of VOLKSWAGEN UNITED STATES, INC.

- Lift damping washer -1- and noise insulation -2- upward and out.

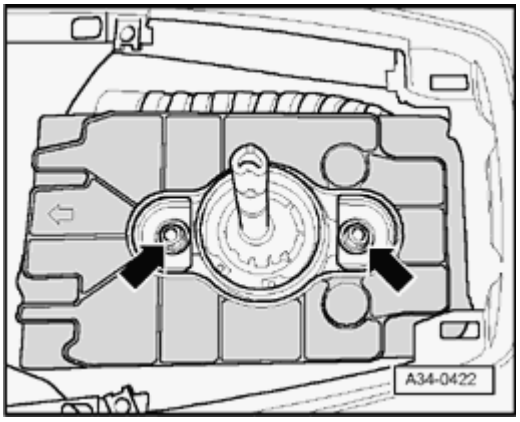


Fig. 88: Locating Noise Insulation For Shift Lever Housing Bolts
Courtesy of VOLKSWAGEN UNITED STATES, INC.

- Unscrew noise insulation for gear shift housing (arrows).

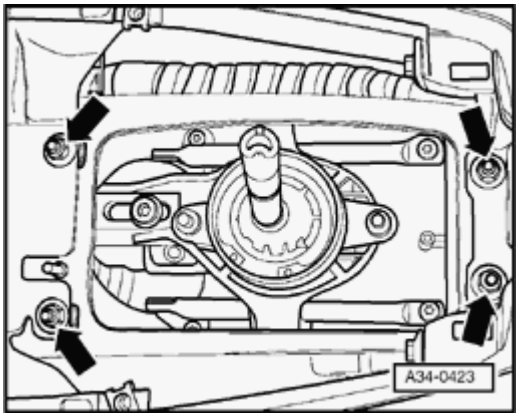


Fig. 89: Locating Securing Nuts For Shift Lever Housing
Courtesy of VOLKSWAGEN UNITED STATES, INC.

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- Unscrew securing nuts (arrows) for gear shift housing.

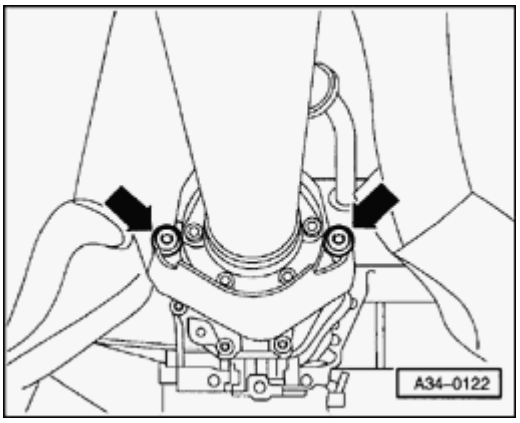


Fig. 90: Identifying Heat Shield Fasteners For Torsen Differential
Courtesy of VOLKSWAGEN UNITED STATES, INC.

- Unscrew heat shield for drive shaft from Torsen differential housing (arrows).

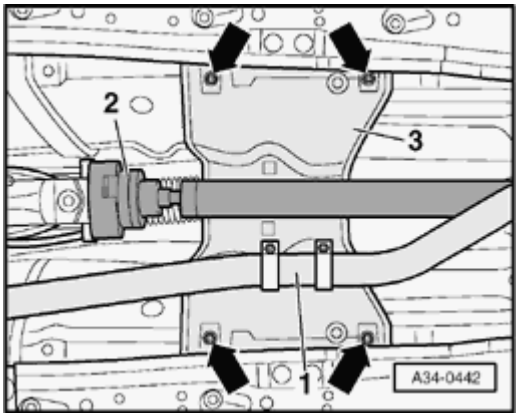


Fig. 91: Locating Heat Shield, Exhaust System Clamp And Driveshaft At Transmission
Courtesy of VOLKSWAGEN UNITED STATES, INC.

- Disconnect exhaust system from clamp(s) -1- onward.
- Disconnect driveshaft -2- from transmission and secure at side with wire. Refer to **Fig. 92**.

Driveshaft, removing and installing:

Refer to **39 FINAL DRIVE, DIFFERENTIAL**

- Remove heat shield -3- above exhaust system (arrows).

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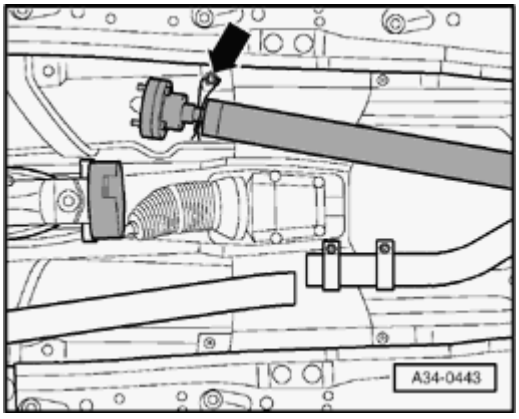


Fig. 92: Drive Shaft Secured With Wire And Locating Speed Nut
Courtesy of VOLKSWAGEN UNITED STATES, INC.

- Re-insert speed nut which was previously removed (arrow) and attach drive shaft to it with a wire.

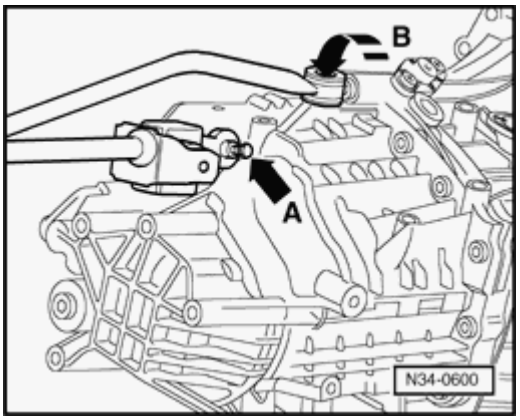


Fig. 93: Identifying Transmission Shift And Pivot Rods
Courtesy of VOLKSWAGEN UNITED STATES, INC.

- Remove gearshift linkage (arrow -A-).
- Unscrew hex socket head bolt of push rod (arrow -B-).
- Swivel gear shift housing with selector rod and push rod down and remove.

Installing

Install in reverse order.

- Push on gearshift linkage until bolt is located in counterbore of selector shaft.

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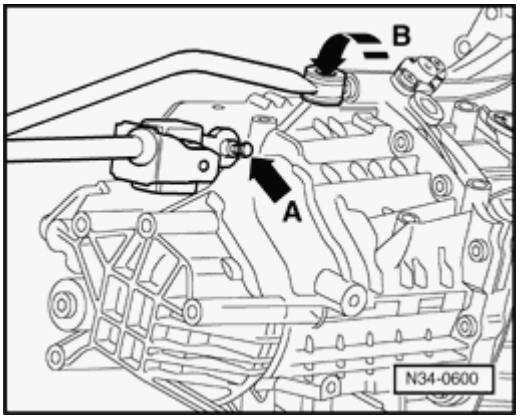


Fig. 94: Identifying Transmission Shift And Pivot Rods
Courtesy of VOLKSWAGEN UNITED STATES, INC.

- Bolt selector rod firmly in place (arrow -A-).
- Secure push rod to transmission (arrow -B-).

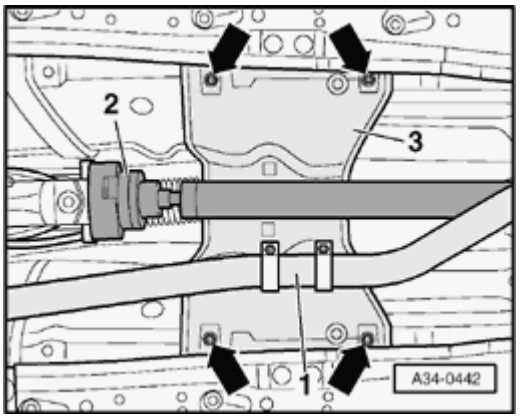


Fig. 95: Locating Heat Shield, Exhaust System Clamp And Driveshaft At Transmission
Courtesy of VOLKSWAGEN UNITED STATES, INC.

- Install heat shield -3- above exhaust system (arrows).
- Bolt driveshaft -2- to transmission.

Driveshaft, removing and installing:

Refer to **39 FINAL DRIVE, DIFFERENTIAL**

- Secure clamp(s) -1-.

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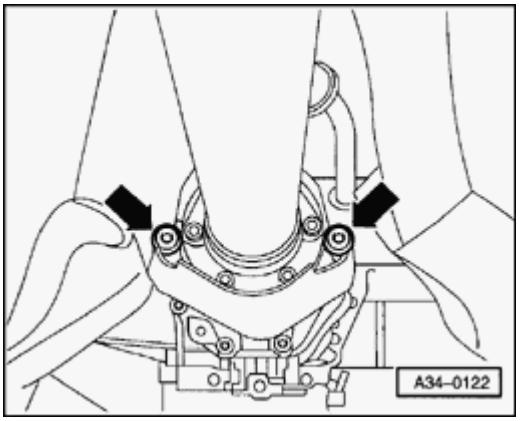


Fig. 96: Identifying Heat Shield Fasteners For Torsen Differential
Courtesy of VOLKSWAGEN UNITED STATES, INC.

- Secure heat shield for drive shaft to Torsen differential housing (arrows).
- Adjust shift mechanism. Refer to **Shift mechanism, adjusting**.

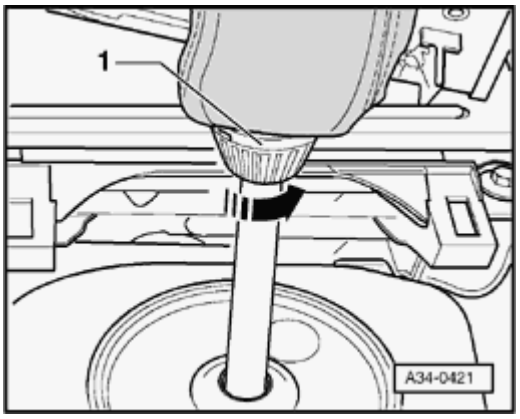


Fig. 97: Turning Connector Piece Till It Stops
Courtesy of VOLKSWAGEN UNITED STATES, INC.

- Position gear shift knob together with gear shift cover on gear shift and turn connection piece -1- in direction of arrow as far as it will go.

Tightening torques

Component	Nm
Gear shift housing to body	10
Gearshift linkage to transmission 1)	23
Push rod to transmission	40
Driveshaft to transmission 1)	55
Heat shield for drive shaft to Torsen differential housing	25
Clamp for exhaust pipe	40
Noise insulation for gear shift housing to rear push rod	10

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1) Replace bolt

Shift mechanism, adjusting

NOTE: The following points are essential to ensure proper adjustment:

- **Moving parts of shift mechanism and transmission elements are in perfect condition**
- **Shift mechanism moves freely**
- **Transmission, clutch and shift mechanism are in perfect condition.**
- **Transmission in neutral.**

Removing

NOTE: Remove gear shift knob together with gear shift cover and cover of center console.

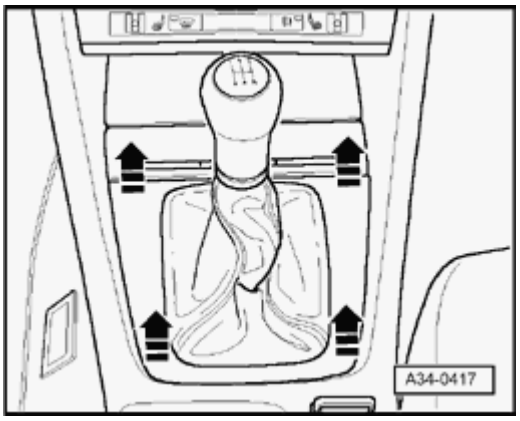


Fig. 98: Lifting Cover For Center Console Upward
Courtesy of VOLKSWAGEN UNITED STATES, INC.

- Lift cover of center console upward (arrows) and off.

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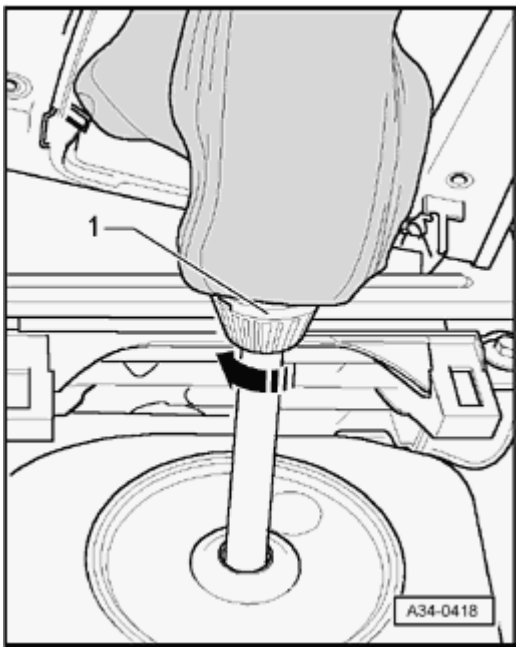


Fig. 99: Releasing Connector Piece
Courtesy of VOLKSWAGEN UNITED STATES, INC.

- Release connection piece -1- in direction of arrow and pull gear shift knob together with gear shift cover upward to remove.

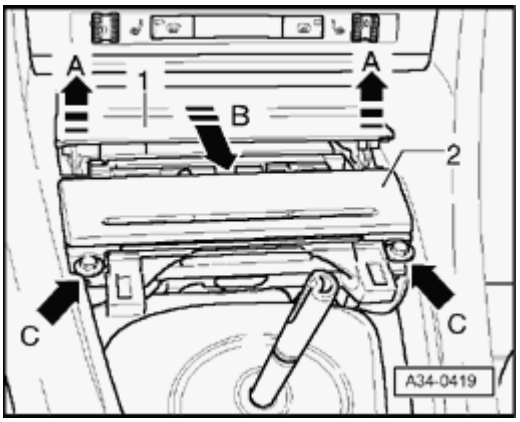


Fig. 100: Lifting Cover And Pulling Out And Removing Bolts And Pulling Ashtray From Center Console
Courtesy of VOLKSWAGEN UNITED STATES, INC.

- First lift cover -1- up in direction of arrow -A- and pull out in direction of arrow -B-.
- Remove bolts (arrows -C-) and then remove ashtray -2- from center console.

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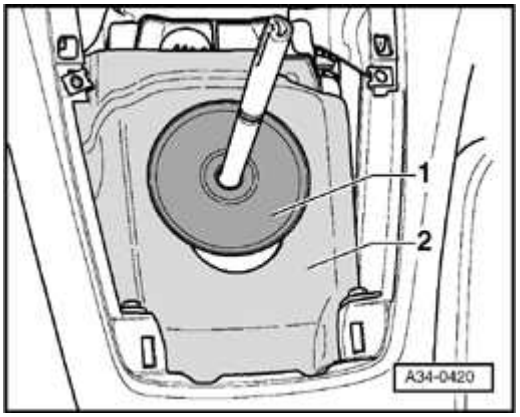


Fig. 101: Lifting Out Damping Washer And Noise Insulation
Courtesy of VOLKSWAGEN UNITED STATES, INC.

- Lift damping washer -1- and noise insulation -2- upward and out.

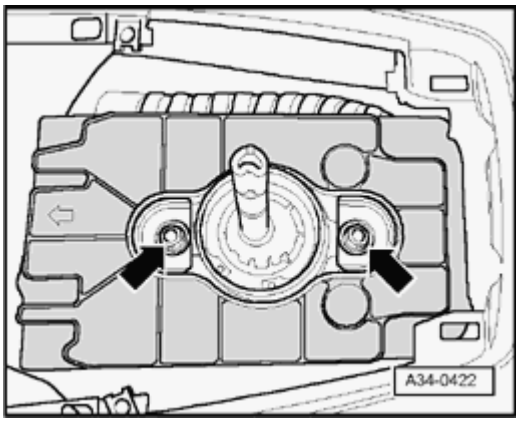


Fig. 102: Locating Noise Insulation For Shift Lever Housing Bolts
Courtesy of VOLKSWAGEN UNITED STATES, INC.

- Remove noise insulation for gear shift housing (arrows).
- Measure distance -a- between two studs in shift mechanism

NOTE: Measure from center of stud to center of stud.

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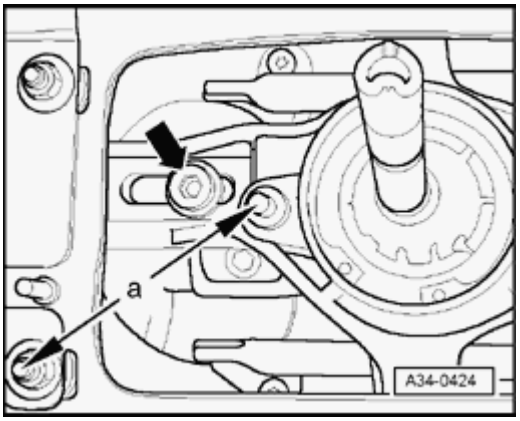


Fig. 103: Shift Mechanism Measurement And Bolts
Courtesy of VOLKSWAGEN UNITED STATES, INC.

- Specification: Dimension a = 85 mm

- If specification is not obtained, produce distance -a- as follows:
- Loosen bolt (arrow) for push rod.

- Rear push rod (in shift mechanism) must move easily backward and forward on slider

- Adjust dimension -a- by moving rear push rod (in shift mechanism).
- Tighten bolt for push rod (arrow) to 25 Nm.

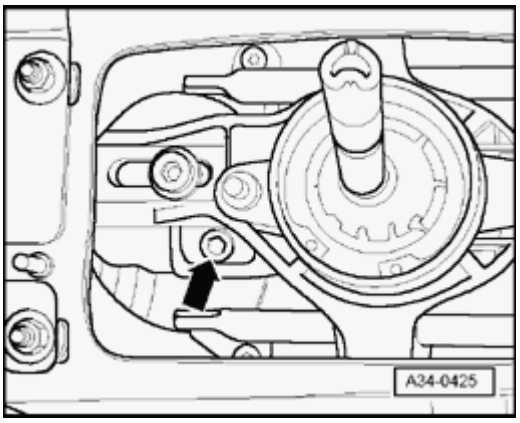


Fig. 104: Selector Rod Bolt
Courtesy of VOLKSWAGEN UNITED STATES, INC.

- Loosen bolt for selector rod (arrow).

- Selector rod/shift mechanism connection must move freely

Aligning gear shift

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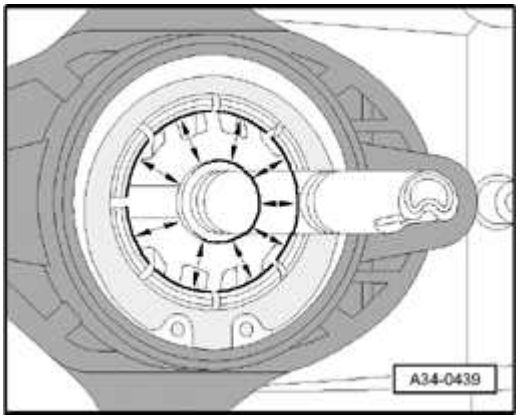


Fig. 105: Centering Bottom Of Shift Lever Centered In Ball Housing
Courtesy of VOLKSWAGEN UNITED STATES, INC.

- Center bottom of gear shift in ball socket.

- Bottom of gear shift must be at same distance from all points of ball socket (arrows).
- Gear shift is vertical in direction of travel.

- Secure gear shift in this position.

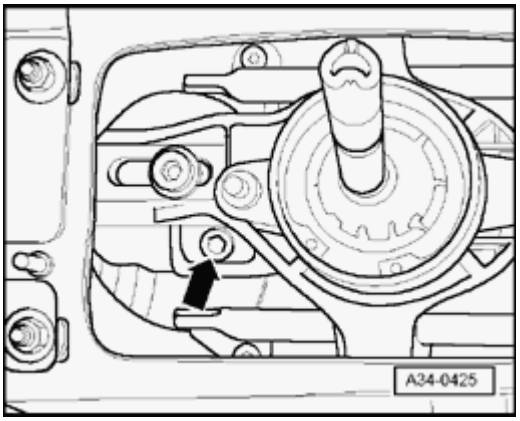


Fig. 106: Selector Rod Bolt
Courtesy of VOLKSWAGEN UNITED STATES, INC.

- Tighten bolt for selector rod (arrow) to 25 Nm.

NOTE: Take care not to alter position of gear shift when tightening the bolt.

- Install covers and gear shift knob.

Shift adjustment, checking

- Gear shift must be in 3rd/4th gear gate with transmission in neutral.

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- Press clutch.
- Check shifting to all gears.

- Gear shift must not come into contact with cover of center console when shifting.
- Gear shift must automatically return from 5th/reverse gear gate to 3rd/4th gear gate.
- Reverse gear can only be selected when gear shift is in 3rd/4th gear gate with transmission in neutral beforehand.
- It is not possible to shift from 5th gear directly to reverse gear.

NOTE: If gear shift can be shifted directly from 5th gear to reverse, or if only 5th gear and reverse gear cannot be engaged, check locking unit for 5th and reverse gear and replace if necessary. Refer to Removing and installing locking unit for 5th gear and reverse gear.

TRANSMISSION, REMOVING AND INSTALLING

Transmission, removing and installing

CAUTION: Before beginning repairs on the electrical system:

- **Obtain the anti-theft radio security code.**
- **Switch the ignition off.**
- **Disconnect the battery Ground (GND) strap.**
- **On vehicles equipped with Audi Telematics by OnStar ® , switch-off the emergency (back-up) battery for the Telematic/Telephone Control Module prior to disconnecting vehicle battery. Refer to**
  - **91 - COMMUNICATION**
  - **91 RADIO, TELEPHONE, NAVIGATION, TRIP COMPUTER for Cabriolet**

  .
- **After reconnecting vehicle battery, re-code and check operation of anti-theft radio. Also check operation of clock and power windows according to article and/or Owner's Manual.**
- **After reconnecting vehicle battery on vehicles equipped with Audi Telematics by OnStar ® , switch-on the emergency (back-up) battery for the Telematic/Telephone Control Module. Refer to**
  - **91 - COMMUNICATION**
  - **91 RADIO, TELEPHONE, NAVIGATION, TRIP COMPUTER for Cabriolet**

  .

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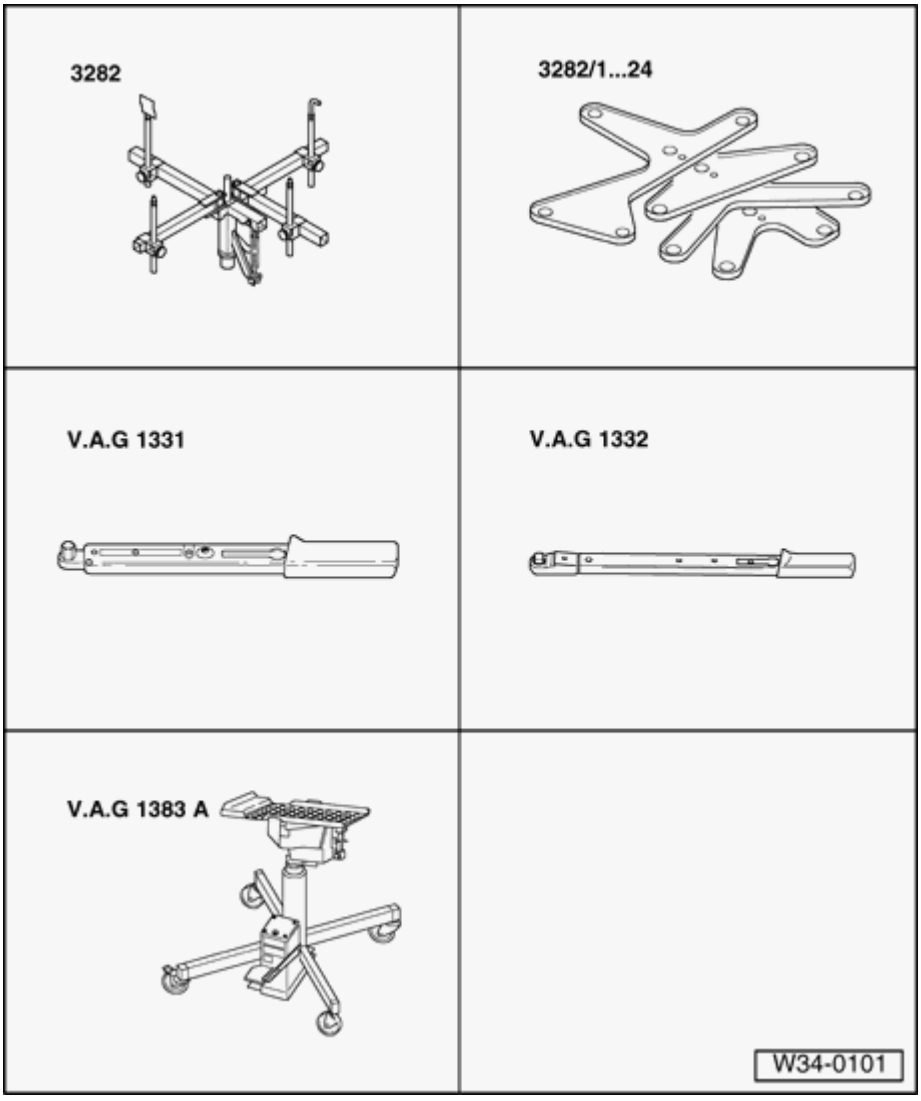


Fig. 107: Identifying Special Tools - Transmission, Removing And Installing
Courtesy of VOLKSWAGEN UNITED STATES, INC.

Special tools and equipment

- 3282 Transmission support
- 3282/10 Adjustment plate
- V.A.G 1331 Torque wrench
- V.A.G 1332 Torque wrench
- V.A.G 1383 A Engine/transmission lifter

Special tools and workshop equipment required

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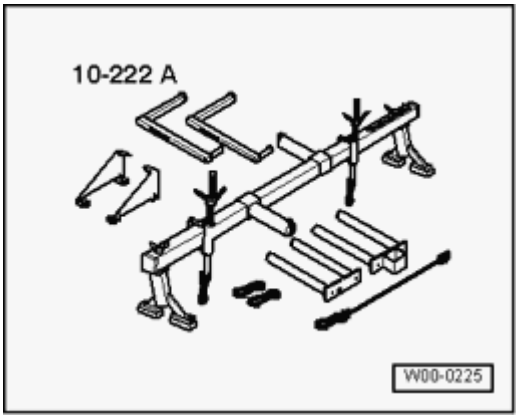


Fig. 108: Identifying 10-222A Engine Support Bridge With 10-222A/8 Bracket For Engine
Courtesy of VOLKSWAGEN UNITED STATES, INC.

- 10-222A Support bar

Transmission, removing

See Caution before beginning repairs on the electrical system. Refer to **Transmission, removing and installing**

- Disconnect battery Ground strap with ignition switched off.

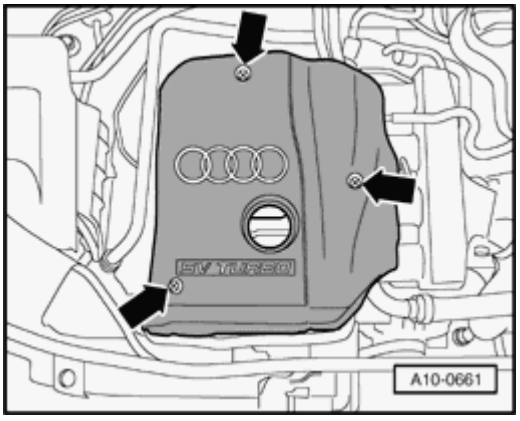


Fig. 109: Removing Engine Cover
Courtesy of VOLKSWAGEN UNITED STATES, INC.

- Remove engine cover (arrows).

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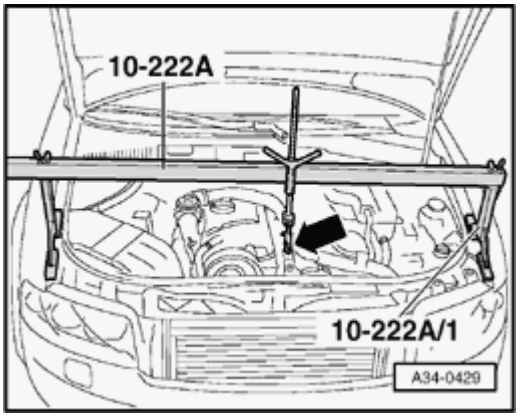


Fig. 110: Support Bar 10-222 A With Supports 10-222 A/1 Installed On Engine
Courtesy of VOLKSWAGEN UNITED STATES, INC.

- Set up support bar 10-222 A with supports 10-222 A/1.
- Pre-tension engine slightly using spindle of support bar.

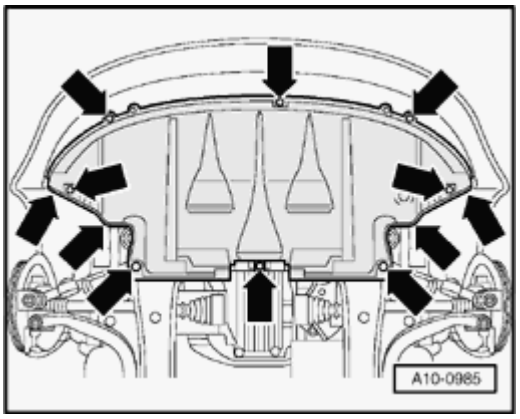


Fig. 111: Removing Sound Insulation
Courtesy of VOLKSWAGEN UNITED STATES, INC.

- Remove sound insulation (arrows).

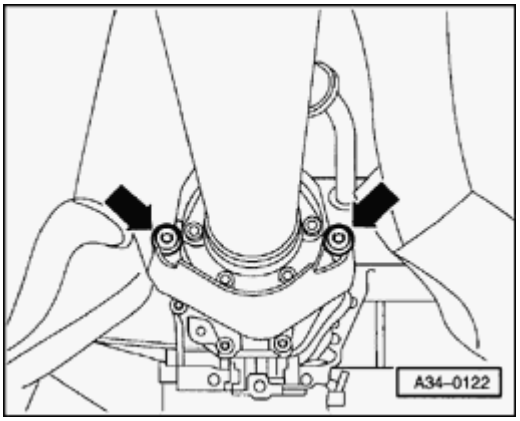


Fig. 112: Identifying Heat Shield Fasteners For Torsen Differential

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Courtesy of VOLKSWAGEN UNITED STATES, INC.

- Remove heat shield for driveshaft from Torsen differential housing (arrows).

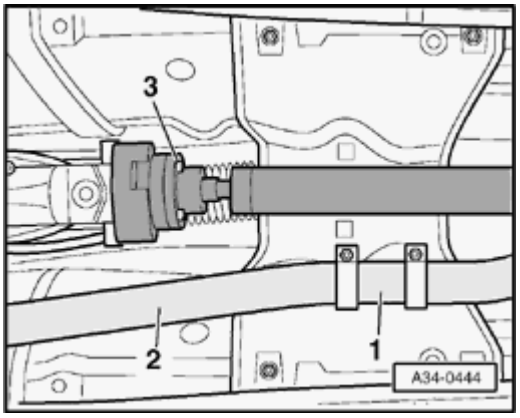


Fig. 113: Exhaust Pipe Clamp And Driveshaft At Transmission
Courtesy of VOLKSWAGEN UNITED STATES, INC.

- Release clamp -1- and remove front part of exhaust pipe -2-.

Refer to **26 - EXHAUST SYSTEM, EMISSION CONTROLS**

- Disconnect driveshaft -3- from transmission and secure at side with wire (see following illustration).

Driveshaft, removing and installing:

Refer to **39 FINAL DRIVE, DIFFERENTIAL**

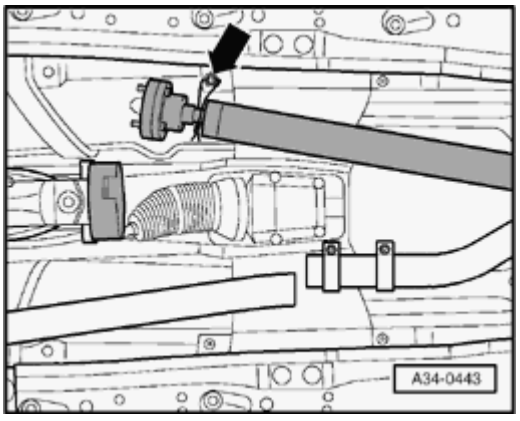


Fig. 114: Drive Shaft Secured With Wire And Locating Speed Nut
Courtesy of VOLKSWAGEN UNITED STATES, INC.

- Re-insert speed nut (arrow) slightly and secure drive shaft with wire.

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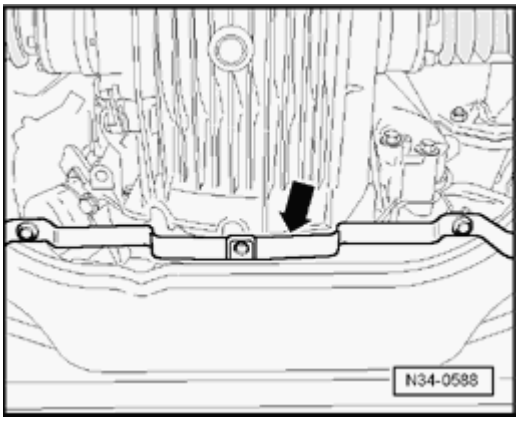


Fig. 115: Removing Noise Insulation Bracket
Courtesy of VOLKSWAGEN UNITED STATES, INC.

- Remove bracket for sound insulation (arrow).

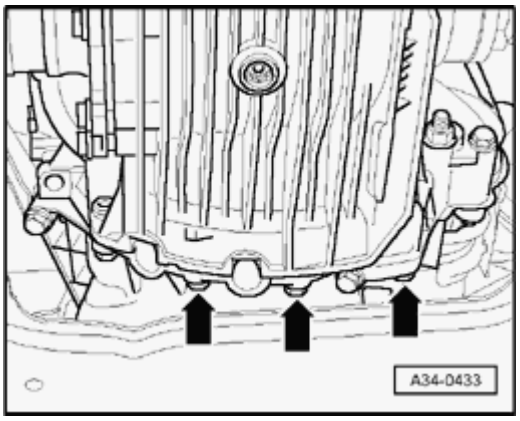


Fig. 116: Three Lower Engine And Transmission Connecting Bolts
Courtesy of VOLKSWAGEN UNITED STATES, INC.

- Remove three engine/transmission connecting bolts underneath (arrow).

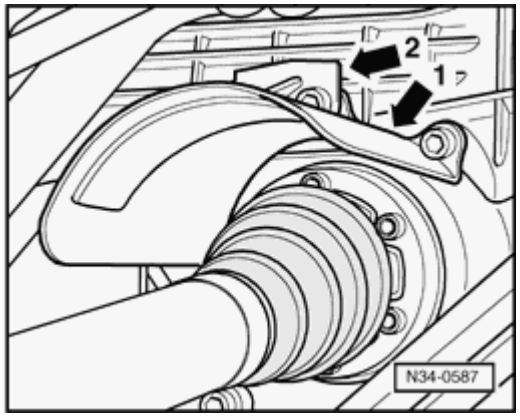


Fig. 117: Detaching Heat Shields And Right-Hand Axle Shaft
Courtesy of VOLKSWAGEN UNITED STATES, INC.

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- Remove heat shields (arrow -1- and arrow -2-) above right drive axle.

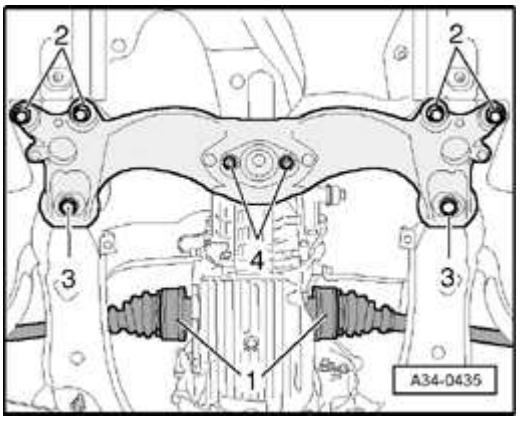


Fig. 118: Drive Shafts And Flange Shafts
Courtesy of VOLKSWAGEN UNITED STATES, INC.

- Disconnect drive axles -1- from drive flanges and tie up out of way.

NOTE: Take care not to damage surface protection of drive axles.

- Support transmission slightly with engine/transmission lifter V.A.G 1383 A.

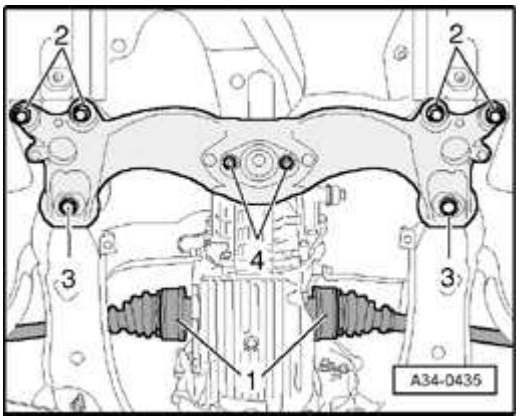


Fig. 119: Drive Shafts And Flange Shafts
Courtesy of VOLKSWAGEN UNITED STATES, INC.

- Remove bolts -2-, then bolts -3- on tunnel crossmember.
- Remove two nuts -4- and remove tunnel crossmember.
- Lower engine/transmission lifter V.A.G 1383 A and place to one side.

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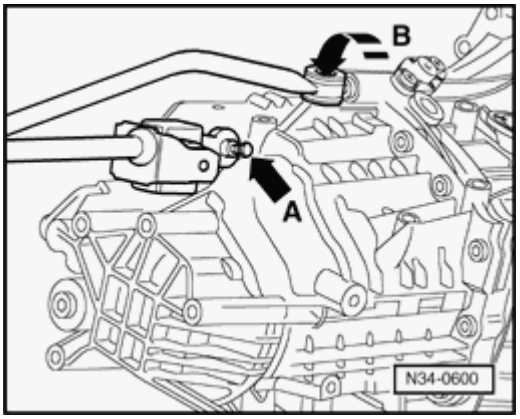


Fig. 120: Identifying Transmission Shift And Pivot Rods
Courtesy of VOLKSWAGEN UNITED STATES, INC.

- Disconnect selector rod (arrow A-).
- Remove hex socket head bolt of push rod (arrow -B-).

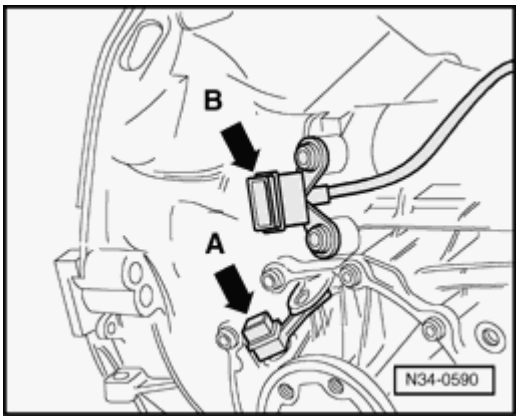


Fig. 121: Identifying Connectors For Vehicle Speed Sensor (VSS) And Back-Up Lights
Courtesy of VOLKSWAGEN UNITED STATES, INC.

- Disconnect connector from speedometer vehicle speed sensor (arrow -A-).
- Disconnect connector from back-up light switch (multi-function sensor, arrow B-).
- Disconnect all other electrical connections and Ground wires from transmission and from engine/transmission connecting bolts.

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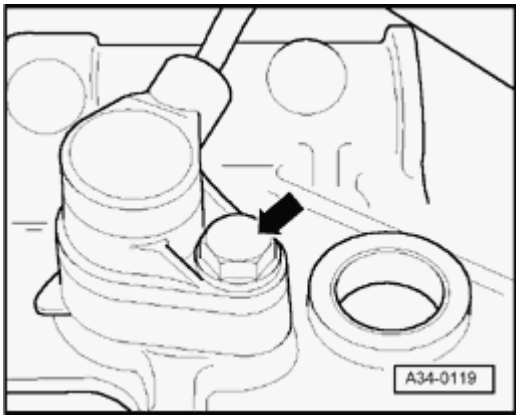


Fig. 122: Location Of Engine Speed (RPM) Sensor G28 On Coupling Housing
Courtesy of VOLKSWAGEN UNITED STATES, INC.

- If installed, remove Engine speed (RPM) sensor -G28- from left of transmission (arrow) and place to one side.

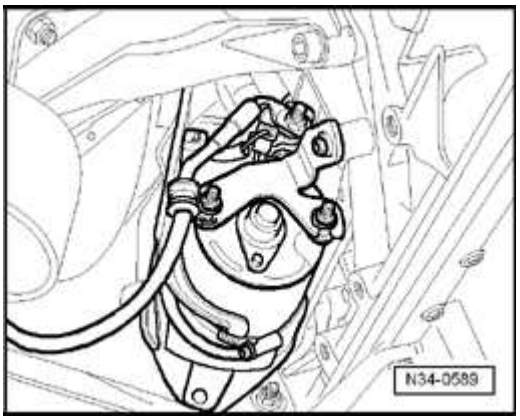


Fig. 123: Removing Starter Bolt
Courtesy of VOLKSWAGEN UNITED STATES, INC.

- Disconnect engine/transmission starter and secure against inadvertent operation if necessary.

Refer to **27 BATTERY, STARTER, GENERATOR, CRUISE CONTROL**

NOTE: There is no need to disconnect starter cables.

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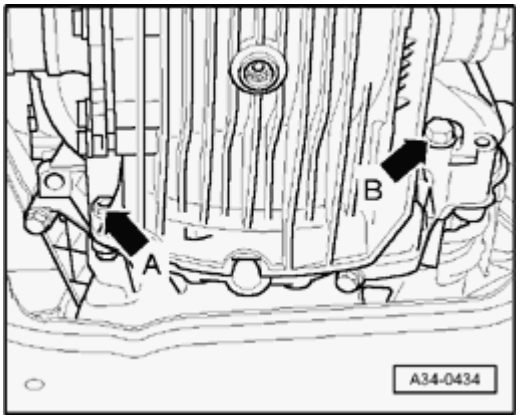


Fig. 124: Lower Engine And Transmission Connecting Bolts Which Should Not Be Removed
Courtesy of VOLKSWAGEN UNITED STATES, INC.

- Remove engine/transmission connecting bolts underneath with exception of bolts (arrow -A- and arrow -B-).

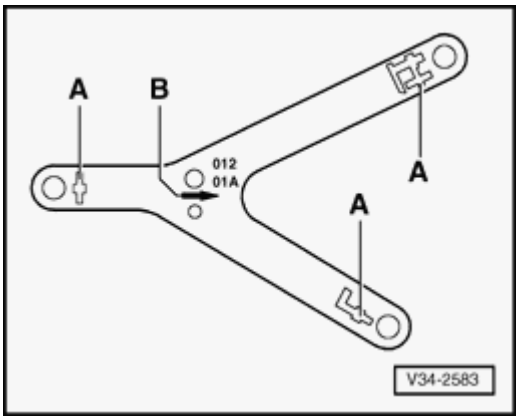


Fig. 125: Transmission Support 3282 Attachment Plate
Courtesy of VOLKSWAGEN UNITED STATES, INC.

- To remove manual transmission 012, align transmission support 3282 using adjustment plate 3282/10 and position on transmission lifter V.A.G 1383 A.

A - Support elements

NOTE:

- **Drawing shows only symbolic representation of support elements -A-. Arrow -B- points in direction of travel.**
- **Adjustment plate 3282/10 only fits in one position.**

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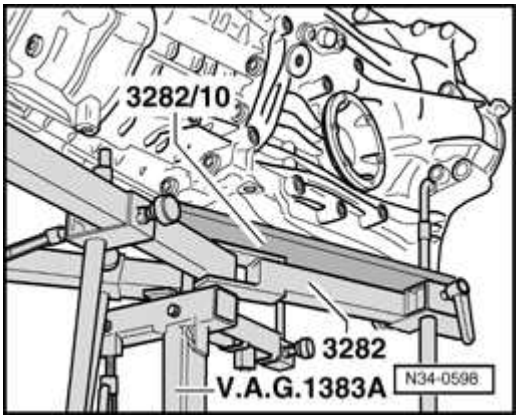


Fig. 126: Setting Transmission Jack Under Vehicle
Courtesy of VOLKSWAGEN UNITED STATES, INC.

- Position transmission jack under vehicle with arrow symbol -B- (Refer to **Fig. 125**) on adjustment plate pointing in direction of travel/vehicle.

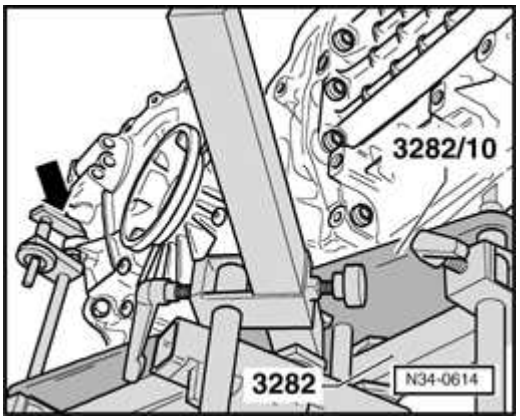
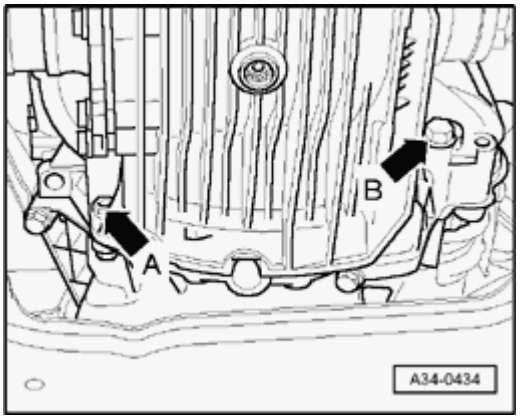


Fig. 127: Aligning Adjustment Plate Parallel To Transmission And Lock Safety Support On Transmission
Courtesy of VOLKSWAGEN UNITED STATES, INC.

- Align adjustment plate parallel to transmission and lock safety support (arrow) on transmission.



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Fig. 128: Lower Engine And Transmission Connecting Bolts Which Should Not Be Removed
Courtesy of VOLKSWAGEN UNITED STATES, INC.

- Remove remaining engine/transmission connecting bolts (arrows -A- and -B-).
- Press transmission out of dowel sleeves and carefully lower slightly using transmission lifter V.A.G 1383 A until slave cylinder is just about accessible.

NOTE: When lowering transmission take care not to damage hydraulic pipe to slave cylinder.

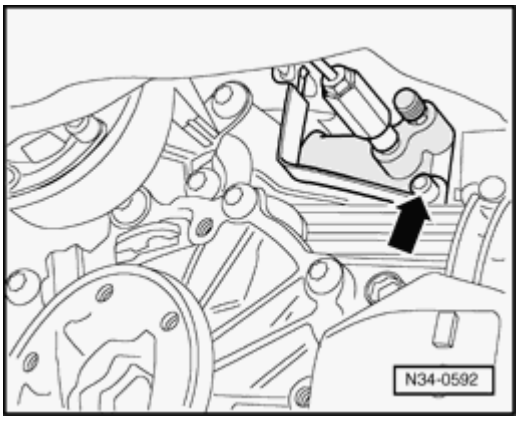


Fig. 129: Identifying Clutch Slave Cylinder Bracket And Fastener
Courtesy of VOLKSWAGEN UNITED STATES, INC.

- Remove clutch slave cylinder (arrow) and secure with wire, do not open hydraulic circuit.

NOTE: Do not press clutch pedal once slave cylinder has been removed.

- Lower transmission completely.

NOTE: When lowering ensure clearance from drive axles.

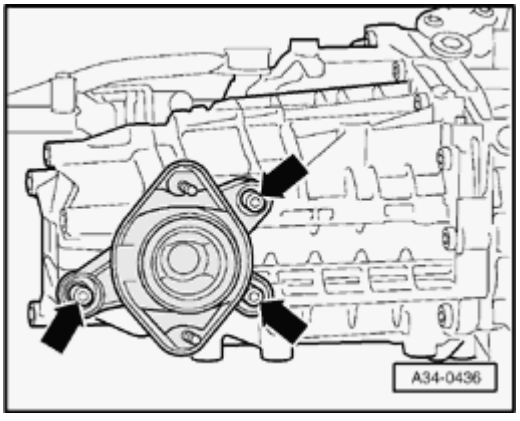


Fig. 130: Transmission Mount

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Courtesy of VOLKSWAGEN UNITED STATES, INC.

- If removed transmission is to be replaced, first modify transmission mount to suit replacement transmission (arrows).

For repairs, secure transmission to repair stand by means of transmission support VW 353 and retaining plate VW 309.

Transmission, transporting

Lifting tackle 2024 A in conjunction with auxiliary hook 10-222 A can be used for transporting the transmission.

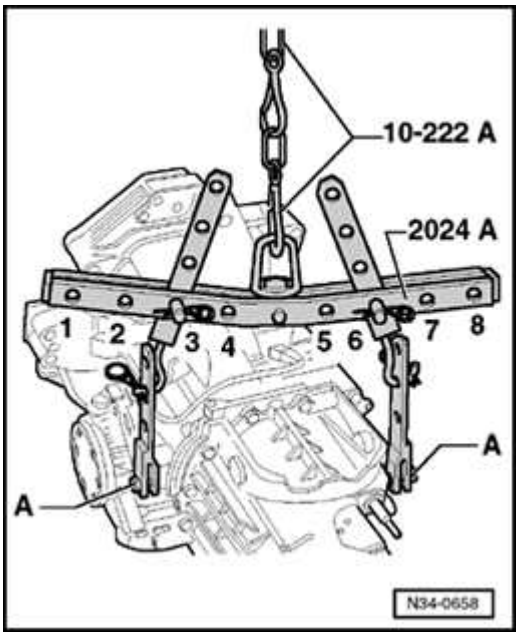


Fig. 131: Lifting Engine With 2024A Engine Sling
Courtesy of VOLKSWAGEN UNITED STATES, INC.

- Bolt on two brackets of lifting tackle 2024 A using bolts -A- M10 x 50.
- Attach lifting tackle 2024 A and raise slightly with workshop crane.
- Hook 4th hole of each hole rail into position -3- and position -6- of lifting tackle 2024 A.

CAUTION: Use locking pins for hooks and setting pins.

Transmission, installing

Install in reverse order, paying attention to the following:

- Clean splines of input shaft and apply a little lubricating grease G000 100.

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Clutch plate must slide easily back and forth on input shaft.

- Apply a thin coat of copper grease, e.g. Z 381 351 TE, to contact surface for plunger on clutch release lever.
- Check clutch release bearing for wear and replace if necessary.

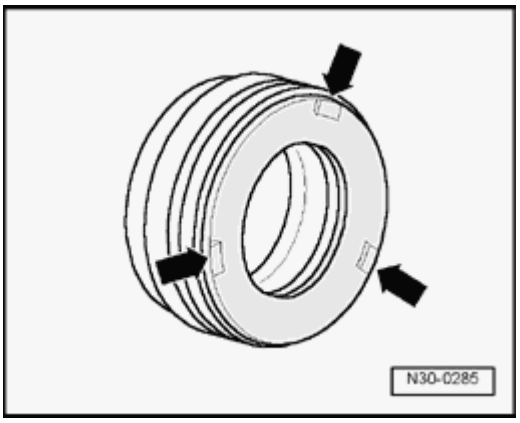


Fig. 132: Servicing Release Bearing With Plastic Ring
Courtesy of VOLKSWAGEN UNITED STATES, INC.

- If plastic ring of release bearing is loose, stick back onto bearing ring with adhesive AMV 195 KD1 01.

Three rectangular lugs (arrows) on plastic ring engage in recesses in bearing ring.

If scores deeper than 0.5 mm are present, replace release bearing.

- Check whether dowel sleeves for centering engine/transmission in cylinder block have been installed and install if necessary.
- Make sure intermediate plate, if installed, is correctly positioned at engine.
- Using a thread tap, remove residual locking fluid from all threaded holes bearing self-locking bolts.
- Replace all self-locking nuts.

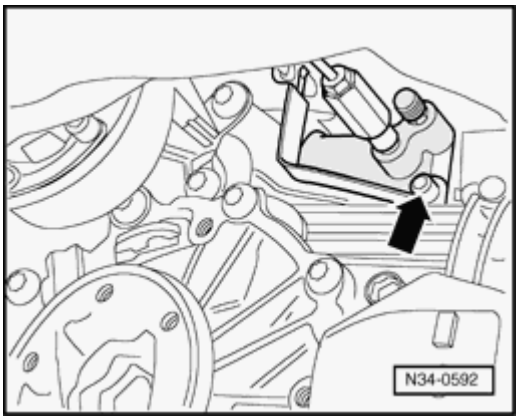


Fig. 133: Identifying Clutch Slave Cylinder Bracket And Fastener
Courtesy of VOLKSWAGEN UNITED STATES, INC.

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- Raise transmission until clutch slave cylinder can be installed together with holder for hose/pipe assembly (arrow).
- Install bolts for lower engine/transmission connection and for starter; to do so, insert starter.

Refer to **27 BATTERY, STARTER, GENERATOR, CRUISE CONTROL**

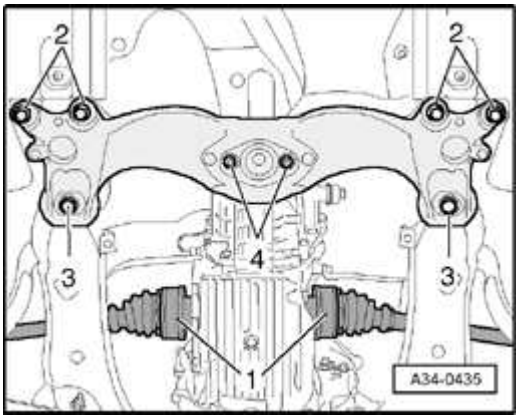


Fig. 134: Drive Shafts And Flange Shafts
Courtesy of VOLKSWAGEN UNITED STATES, INC.

- Bolt tunnel crossmember onto transmission mount -4-.
- Lift transmission using engine/transmission lifter V.A.G 1383 A and firmly bolt tunnel crossmember to body.
- Bolt driveshaft to transmission:

Refer to **39 FINAL DRIVE, DIFFERENTIAL**

- Align exhaust system free of stress:

Refer to **26 - EXHAUST SYSTEM, EMISSION CONTROLS**

- Check oil level in manual transmission. Refer to **Transmission oil level, checking**.
- Check shift adjustment, re-adjust if necessary. Refer to **Shift mechanism, adjusting**.

See Caution for connecting Telematics battery. Refer to **Transmission, removing and installing**

- After connecting battery, enter radio anti-theft code.

Refer to Radio operating instructions

- Connect battery.

NOTE: On re-connecting the battery, remember to check and activate vehicle equipment (radio, clock, convenience electronics etc.).

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Refer to

- **01 - MAINTENANCE**
- **01 - MAINTENANCE** for Cabriolet

Tightening torques

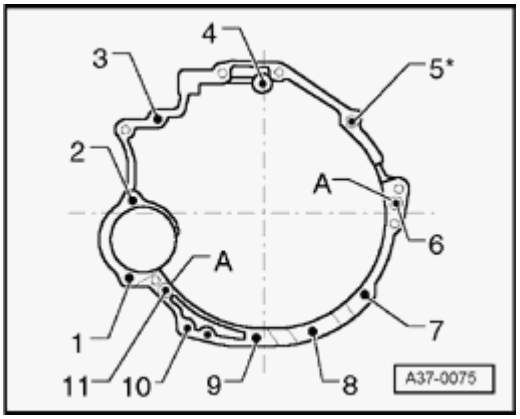


Fig. 135: 4Identifying Engine/Transmission Mountings (Automatic/Manual Transmission)
Courtesy of VOLKSWAGEN UNITED STATES, INC.

1.8 Liter engine to transmission

Item	Bolt	Nm
1, 3, 4	M12 x 67	65
2, 6	M12 x 90	65
5, 11	M12 x 110	65
7 through 10	M10 x 45	45

A: Dowel sleeves for centering

Transmission mount with console to transmission (arrows)	23 Nm

1 - Drive axle to drive flange	M8	40 Nm
	M10	70 Nm
2 - Tunnel crossmember to body 1)	M10	55 Nm
3 - Tunnel crossmember to body 1)		110 Nm + 90 °
4 - Tunnel crossmember to transmission mount		23 Nm

1) Always replace bolt and washer

Component	Nm

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Engine speed (RPM) sensor -G28-	10
Clutch slave cylinder to transmission1)	23
Heat shields above drive axles to transmission	23
Gearshift linkage to transmission 1)	23
Push rod to transmission	40
Driveshaft to transmission 1)	55
Heat shield for driveshaft to cover plate for Torsen differential	25
Clamp for exhaust pipe	40
Bracket for sound insulation to subframe	10

1) Replace bolt

TORSEN DIFFERENTIAL HOUSING, REMOVING AND INSTALLING

Torsen differential housing, removing and installing

CAUTION: Before beginning repairs on the electrical system:

- **Obtain the anti-theft radio security code.**
- **Switch the ignition off.**
- **Disconnect the battery Ground (GND) strap.**
- **On vehicles equipped with Audi Telematics by OnStar ® , switch-off the emergency (back-up) battery for the Telematic/Telephone Control Module prior to disconnecting vehicle battery. Refer to**
  - **91 - COMMUNICATION**
  - **91 RADIO, TELEPHONE, NAVIGATION, TRIP COMPUTER for Cabriolet**

  .
- **After reconnecting vehicle battery, re-code and check operation of anti-theft radio. Also check operation of clock and power windows according to article and/or Owner's Manual.**
- **After reconnecting vehicle battery on vehicles equipped with Audi Telematics by OnStar ® , switch-on the emergency (back-up) battery for the Telematic/Telephone Control Module. Refer to**
  - **91 - COMMUNICATION**
  - **91 RADIO, TELEPHONE, NAVIGATION, TRIP COMPUTER for Cabriolet**

  .

- Transmission installed

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Special tools, testers and other items required

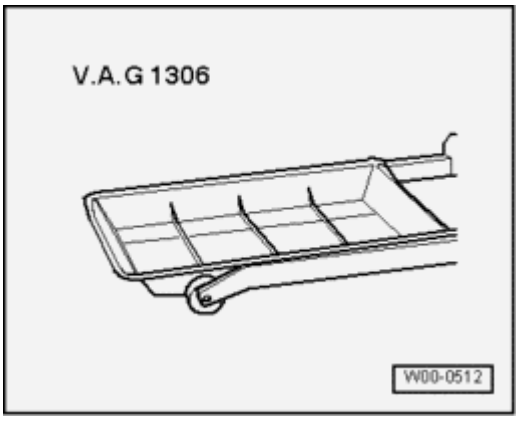


Fig. 136: Identifying Drip Tray V.A.G 1306
Courtesy of VOLKSWAGEN UNITED STATES, INC.

- Drip tray V.A.G 1306

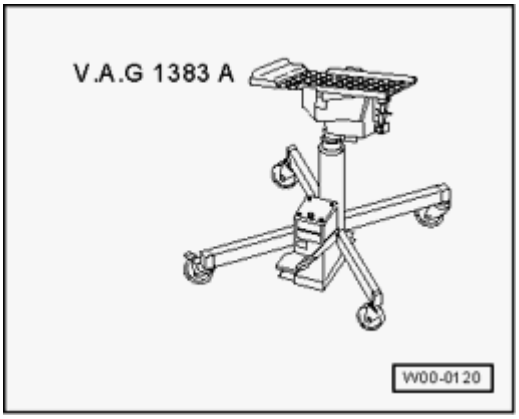


Fig. 137: Identifying Engine/Transmission Jack V.A.G. 1383 A
Courtesy of VOLKSWAGEN UNITED STATES, INC.

- V.A.G 1383 A Engine/transmission lifter

Removing

- Obtain (if necessary) radio code for vehicles with encoded radio.
- Disconnect battery Ground strap with ignition switched off.
- Place drip tray V.A.G 1306 underneath and drain gear oil.

Vehicles with 4-cylinder engine

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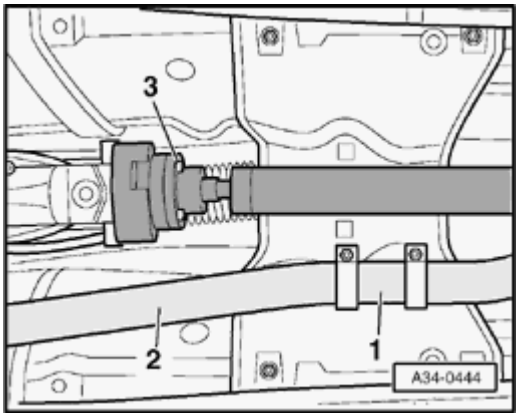


Fig. 138: Exhaust Pipe Clamp And Driveshaft At Transmission
Courtesy of VOLKSWAGEN UNITED STATES, INC.

- Separate exhaust system at clamp -1-.

Refer to **26 - EXHAUST SYSTEM, EMISSION CONTROLS**

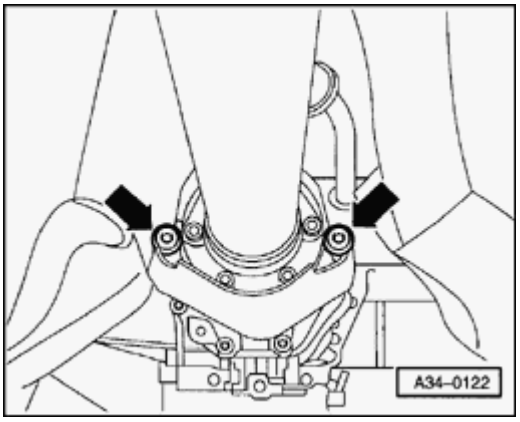


Fig. 139: Identifying Heat Shield Fasteners For Torsen Differential
Courtesy of VOLKSWAGEN UNITED STATES, INC.

- Unscrew heat shield for drive shaft from Torsen differential housing (arrows).
- Disconnect driveshaft from transmission.

Driveshaft, removing and installing:

Refer to **39 FINAL DRIVE, DIFFERENTIAL**

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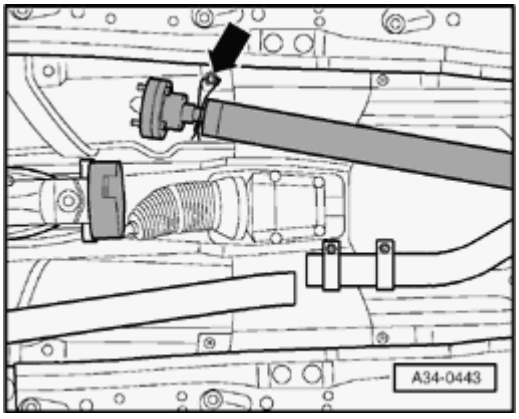


Fig. 140: Drive Shaft Secured With Wire And Locating Speed Nut
Courtesy of VOLKSWAGEN UNITED STATES, INC.

- Re-insert speed nut (arrow) slightly and secure drive shaft to stud with wire.
- Support transmission slightly with engine/transmission lifter V.A.G 1383 A.

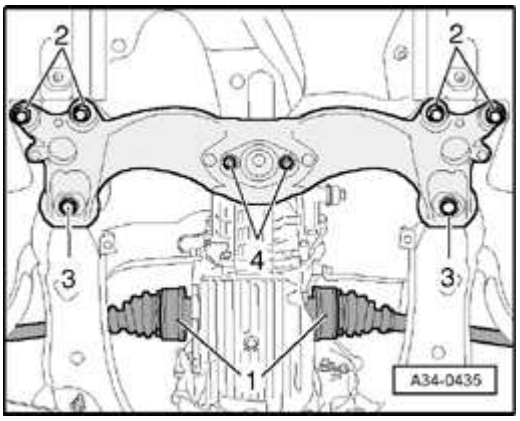


Fig. 141: Drive Shafts And Flange Shafts
Courtesy of VOLKSWAGEN UNITED STATES, INC.

- Remove bolts -2-, then bolts -3- on tunnel crossmember.
- Lower engine/transmission lifter V.A.G 1383 A
- Remove two nuts -4- and remove tunnel crossmember.

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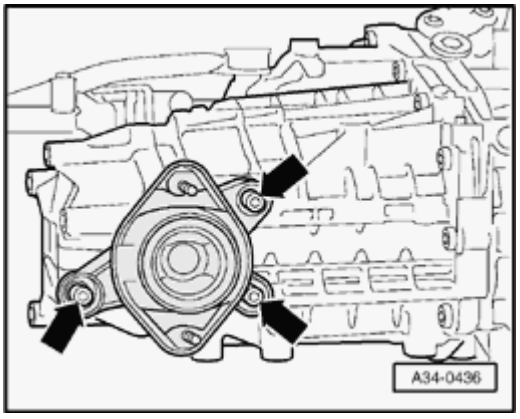


Fig. 142: Transmission Mount
Courtesy of VOLKSWAGEN UNITED STATES, INC.

- Remove transmission mount (arrows).

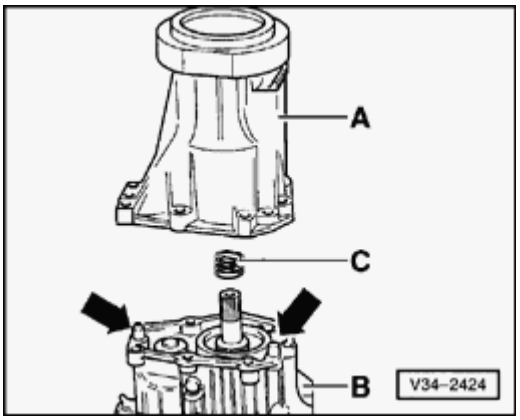


Fig. 143: Identifying Cover, Transmission Cover , and Compression Spring
Courtesy of VOLKSWAGEN UNITED STATES, INC.

- Remove Torsen differential housing -A- from transmission cover -B-.

NOTE: Shown in illustration with transmission removed.

- Remove spring -C- from pinion.

Removing and installing Torsen differential. Refer to **Torsen differential housing, servicing, and Torsen differential, removing and installing**.

Servicing housing. Refer to **Torsen differential housing, servicing, and Torsen differential, removing and installing**

Installing

Install in reverse order, paying attention to the following:

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- Clean sealing surface and coat with AMV 188 001 02.

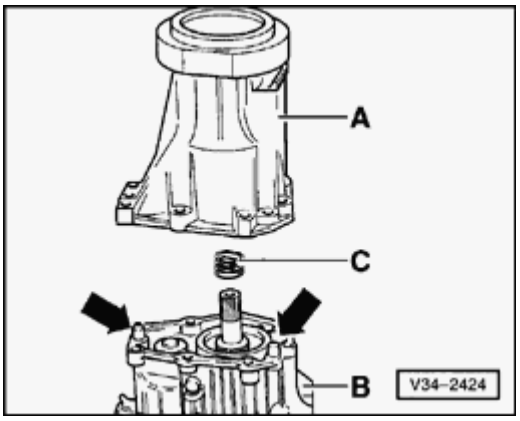


Fig. 144: Identifying Cover, Transmission Cover , and Compression Spring
Courtesy of VOLKSWAGEN UNITED STATES, INC.

- Check whether dowel sleeves for housing -A- (arrows) are present in transmission cover -B-.
- Place spring -C- over pinion on hollow shaft.
- Lift transmission with engine/transmission lifter V.A.G 1383 A.
- Install transmission mount.

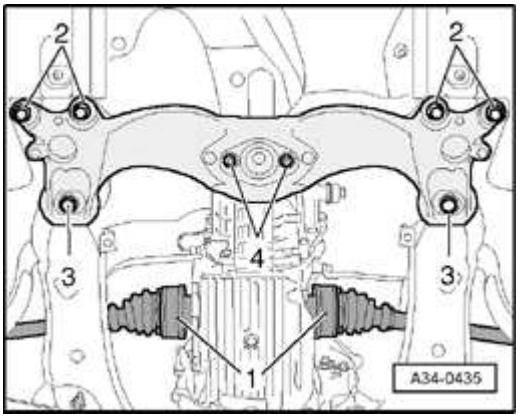


Fig. 145: Drive Shafts And Flange Shafts
Courtesy of VOLKSWAGEN UNITED STATES, INC.

- Install tunnel crossmember onto transmission mount -4- and body -2- and -3-.
- Top up gear oil and check oil level in transmission. Refer to **Transmission oil level, checking**.
- Bolt driveshaft to transmission.

Driveshaft, removing and installing:

Refer to **39 FINAL DRIVE, DIFFERENTIAL**

- Align exhaust system stress-free

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Refer to **26 - EXHAUST SYSTEM, EMISSION CONTROLS**

See Caution for connecting Telematics battery. Refer to **Torsen differential housing, removing and installing**

- Connect battery.

NOTE: On re-connecting battery, remember to check and activate vehicle equipment (radio, clock, convenience electronics etc.).

Refer to

- **01 - MAINTENANCE**
- **01 - MAINTENANCE** for Cabriolet

- After connecting battery, enter radio anti-theft code.

Refer to Radio operating instructions

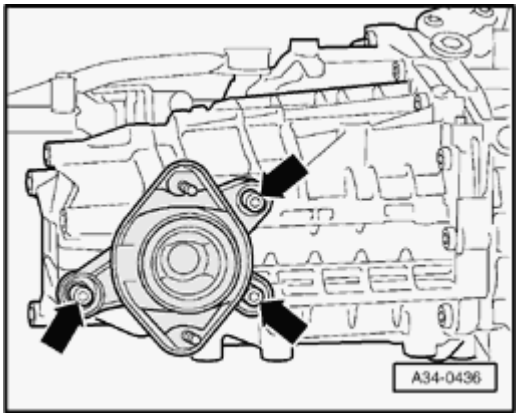


Fig. 146: Transmission Mount
Courtesy of VOLKSWAGEN UNITED STATES, INC.

Tightening torque

Component	Nm
Transmission mount with console to transmission (arrows)	23 Nm

2 - Tunnel crossmember to body 1)	M10	55 Nm
3 - Tunnel crossmember to body 1)		110 Nm + 90 °
4 - Tunnel crossmember to transmission mount		23 Nm

1) Always replace bolt including washer

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Torsen differential housing to transmission	25
Driveshaft to transmission 1)	55
Heat shield for driveshaft to Torsen differential housing	25

1) Replace bolt

TRANSMISSION OIL LEVEL, CHECKING

Transmission oil level, checking

Special tools, testers and other items required

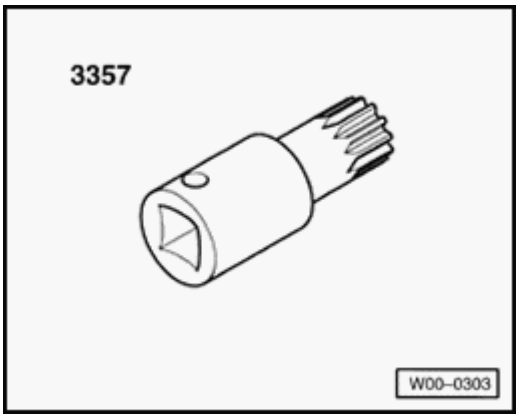


Fig. 147: Identifying Triple Square Socket Driver 3357
Courtesy of VOLKSWAGEN UNITED STATES, INC.

- 3357 Allen key extension

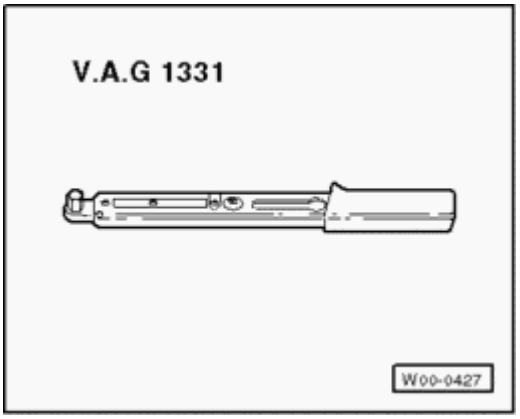


Fig. 148: Identifying Torque Wrench V.A.G. 1331
Courtesy of VOLKSWAGEN UNITED STATES, INC.

- V.A.G 1331 Torque wrench

NOTE:

- **The vehicle must be level for checking the oil level. An inspection pit or 4-**

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pillar lifting platform are the most suitable methods.

- **The oil filler plug is situated on the left of the transmission below the speedometer vehicle speed sensor and may be concealed by the heat shield for the drive axle.**
- **Use special tool 3357 to loosen oil drain plug.**

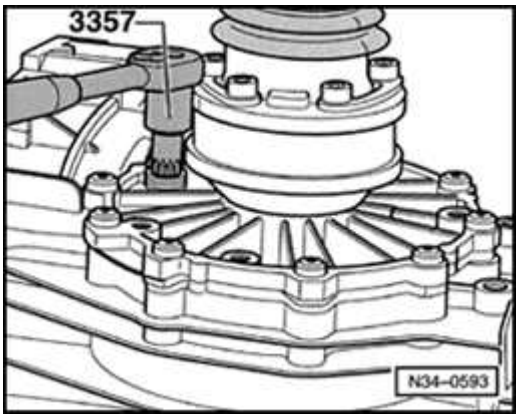


Fig. 149: Checking Oil Level At Oil Filler Hole
Courtesy of VOLKSWAGEN UNITED STATES, INC.

- Remove oil filler plug to check gear oil level (arrow).

- Specification: Oil level up to lower edge of filler hole

- Top up gear oil if necessary. Specification. Refer to **Code letters, assignment of mechanical units, transmission ratios and capacities** onward.
- Install oil filler plug.

Tightening torque

Component	Nm
Oil filler plug	25

TRANSMISSION, DISASSEMBLING AND ASSEMBLING

Transmission, disassembling and assembling

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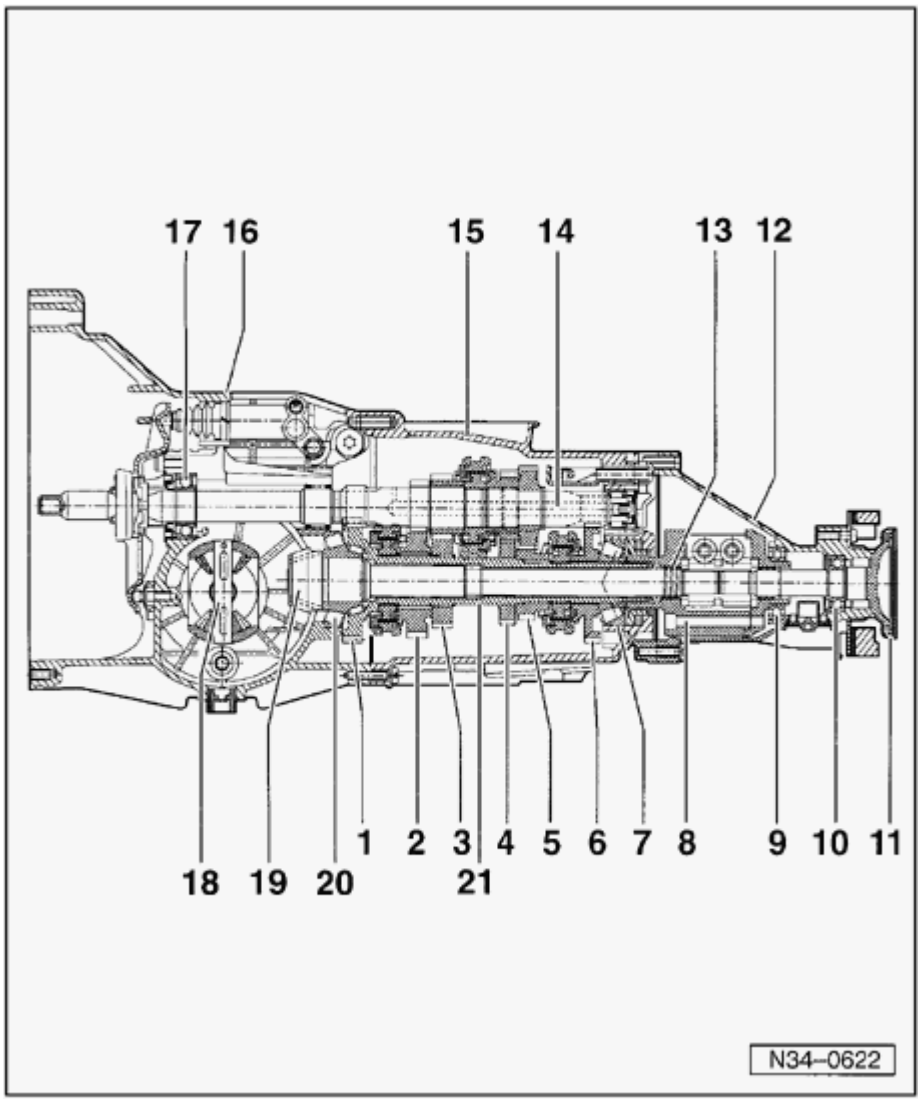


Fig. 150: Transmission, Overview
Courtesy of VOLKSWAGEN UNITED STATES, INC.

Assembly sequence. Refer to **Ball bearing for input shaft, multi-function sensor, pinion, selector rods, transmission cover and Torsen differential housing, removing and installing**.

Transmission, assembly overview

1 - 1st gear

2 - 2nd gear

3 - 3rd gear

4 - 4th gear

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5 - 5th gear

6 - Reverse gear

- Removing and installing reverse idler gear. Refer to **Reverse idler gear, removing and installing**

7 - Tapered roller bearing

- Adjusting. Refer to **Pinion, adjusting** onward

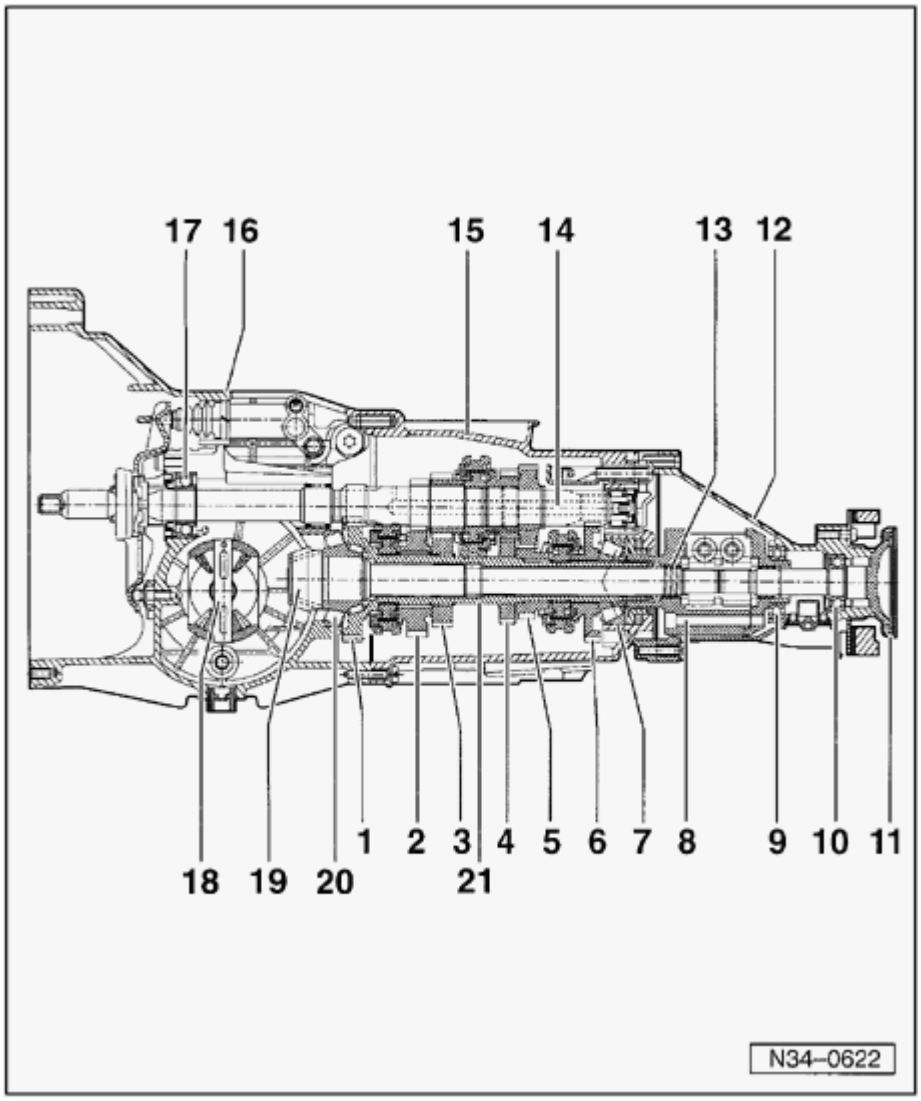


Fig. 151: Transmission, Overview
Courtesy of VOLKSWAGEN UNITED STATES, INC.

8 - Torsen differential

- Only repaired at factory

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- Removing and installing with housing. Refer to **Torsen differential housing, removing and installing**

9 - Ball bearing

10 - Ball bearing

11 - Drive flange

12 - Torsen differential Housing

13 - Spring

- Between Torsen differential and hollow shaft

14 - Input shaft

- Disassembling and assembling. Refer to **Input shaft, disassembling and assembling**

15 - Transmission cover

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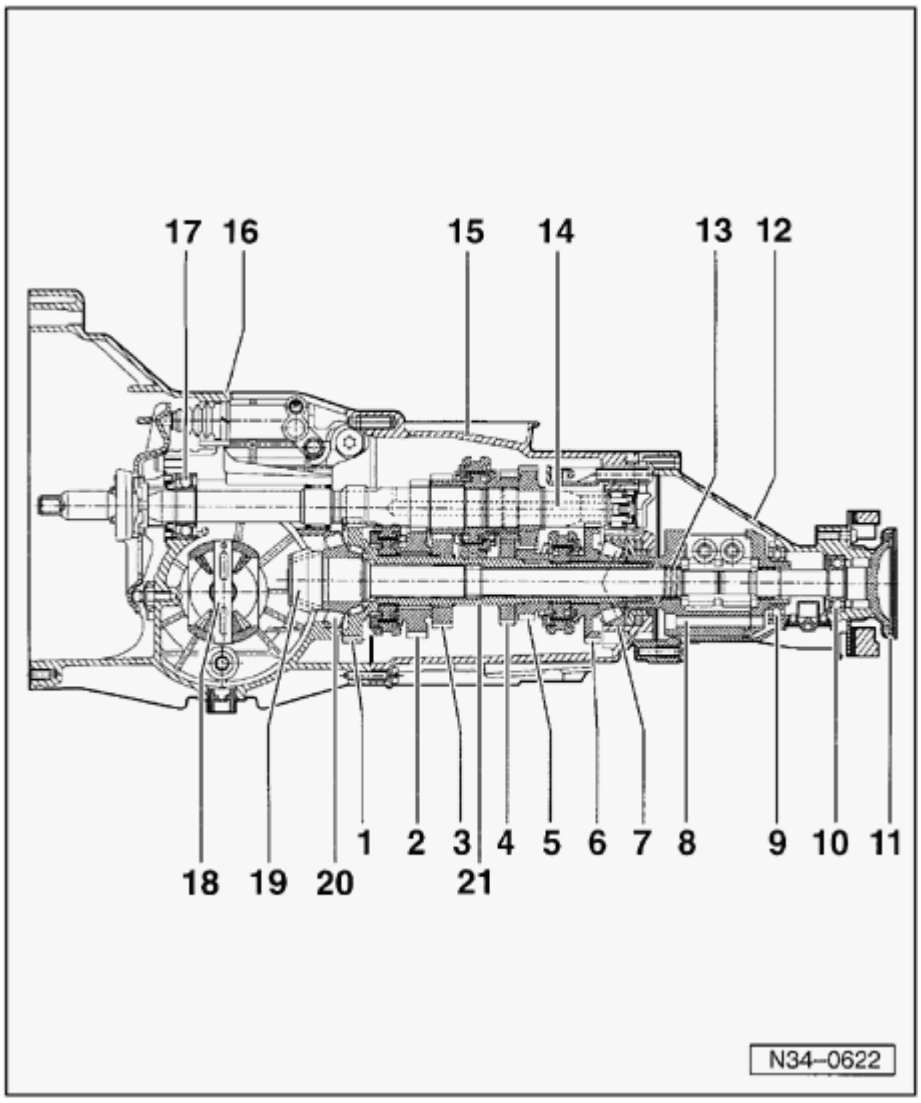


Fig. 152: Transmission, Overview
Courtesy of VOLKSWAGEN UNITED STATES, INC.

16 - Transmission housing

17 - Ball bearing

- Adjusting. Refer to **Input shaft, adjusting**

18 - Differential

- Removing and installing. Refer to **Differential, removing and installing**
- Disassembling and assembling. Refer to **Differential, disassembling and assembling**

19 - Pinion

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- Disassembling and assembling hollow shaft and pinion. Refer to **Pinion and hollow shaft, disassembling and assembling**

20 - Radial-tapered roller bearing

- Adjusting. Refer to **Pinion, adjusting** onward

21 - Hollow shaft

- Disassembling and assembling hollow shaft and pinion. Refer to **Pinion and hollow shaft, disassembling and assembling**

Transmission, sub-assembly overviews

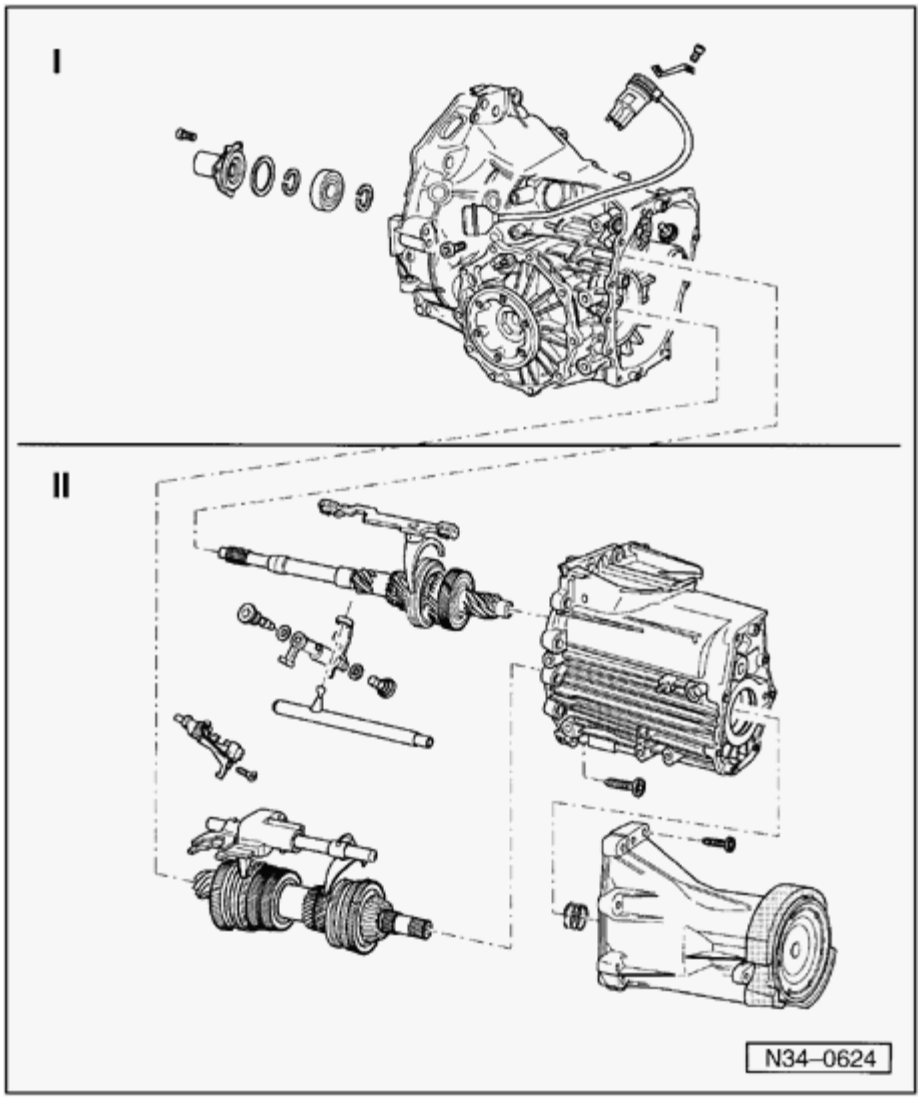


Fig. 153: Transmission, Assembly Overview
Courtesy of VOLKSWAGEN UNITED STATES, INC.

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I - Removing and installing ball bearing for input shaft and multi-function sensor. Refer to Ball bearing for input shaft and multi-function sensor, removing and installing

II - Removing and installing input shaft, pinion, hollow shaft, selector rods, transmission cover and Torsen differential housing. Refer to Input shaft, pinion, hollow shaft, selector rods, transmission cover and Torsen differential housing, removing and installing

Ball bearing for input shaft and multi-function sensor, removing and installing

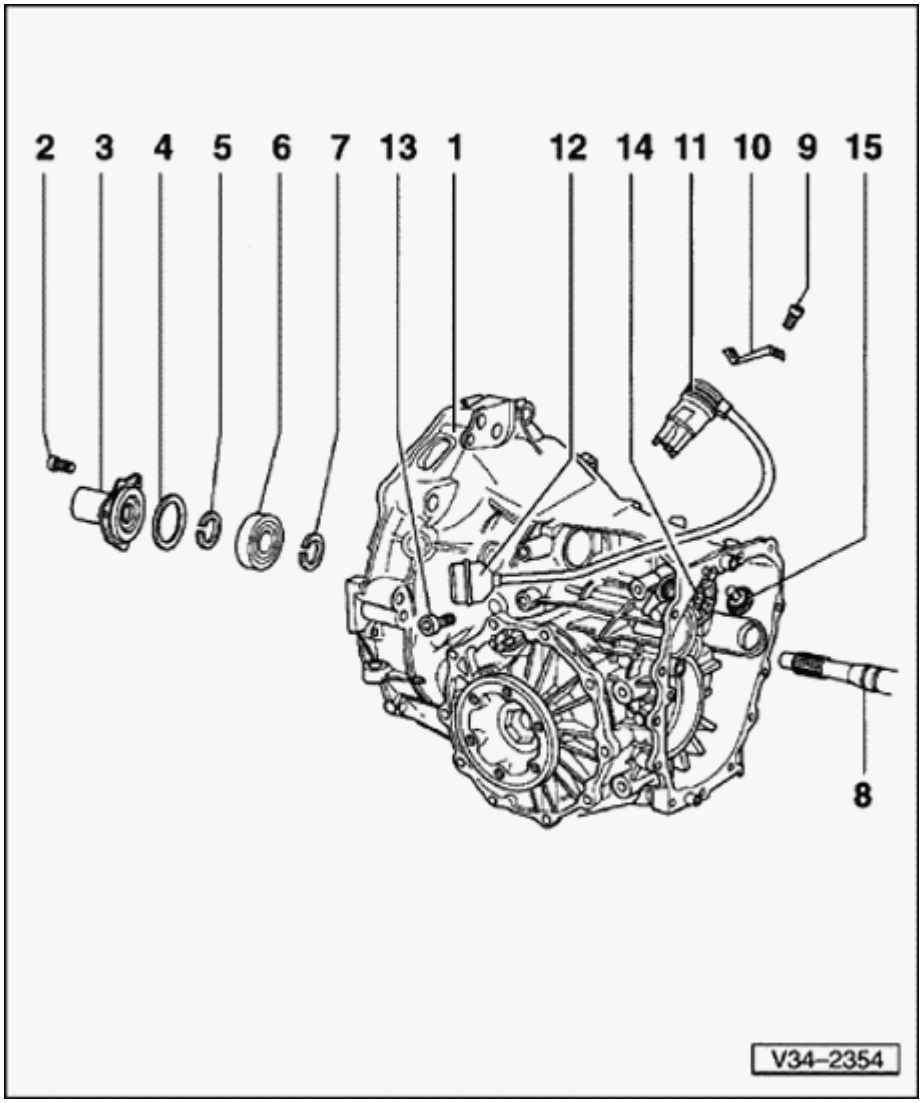


Fig. 154: Transmission Housing, Input Shaft Ball Bearing And Multi-Function Sensor, Overview
Courtesy of VOLKSWAGEN UNITED STATES, INC.

1 - Transmission housing

- With differential and drive flanges
- Removing and installing drive flanges. Refer to **Oil seal for drive flange, replacing**

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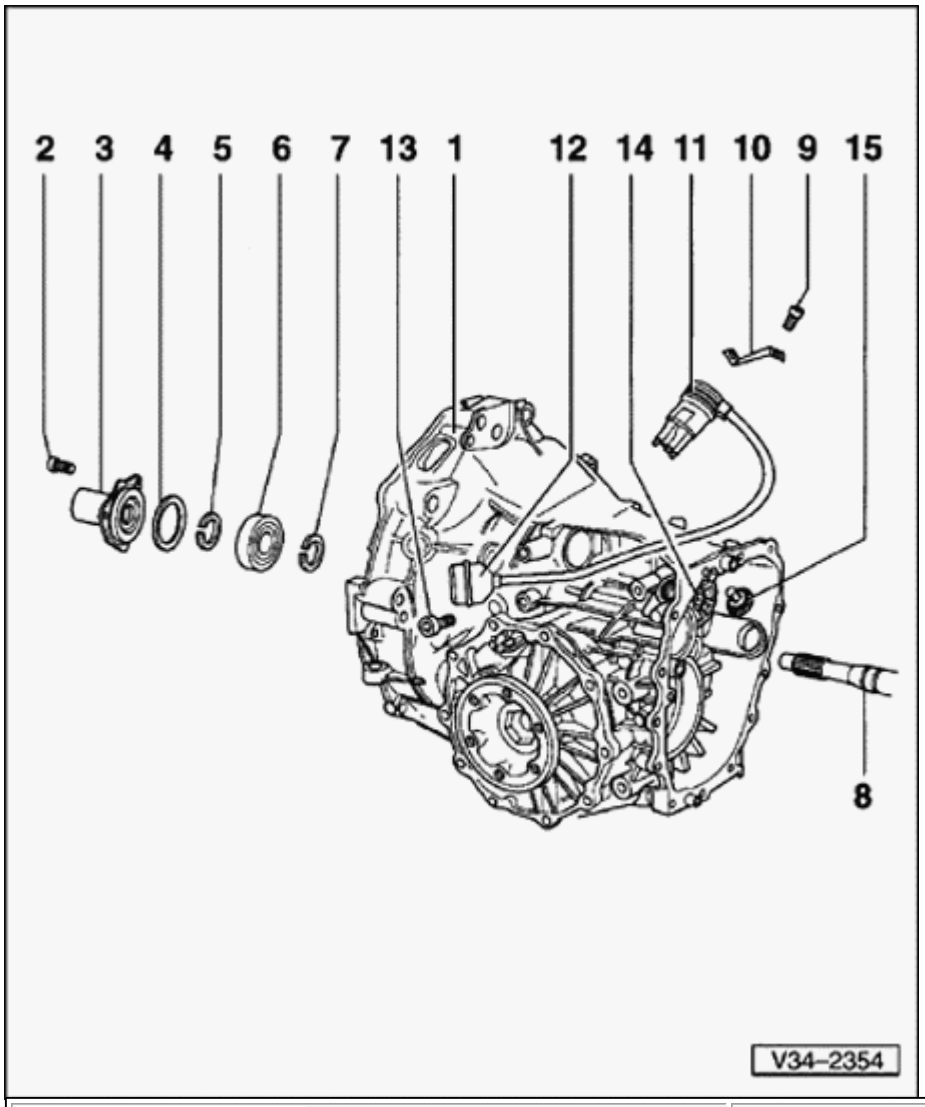
- Removing and installing differential. Refer to **Differential, removing and installing**
- Removing and installing sensor and driving gear for speedometer. Refer to **Speedometer vehicle speed sensor and drive-wheel, removing and installing**
- Installation position of bleeder valve. See **Installation position of bleeder valve**

2 - Internal TORX screw, 35 Nm

- Self-locking
- Replace

3 - Guide bushing

- With O-ring and oil seal for input shaft. Refer to **Clutch release mechanism components (on transmission), servicing**



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Fig. 155: Transmission Housing, Input Shaft Ball Bearing And Multi-Function Sensor, Overview
Courtesy of VOLKSWAGEN UNITED STATES, INC.

4 - Dished washer

- Small diameter (convex side) facing guide bushing

5 - Circlip

- Defining thickness. Refer to **Input shaft, adjusting**

6 - Ball bearing

- Removing and installing. Refer to **Ball bearing for input shaft, multi-function sensor, pinion, selector rods, transmission cover and Torsen differential housing, removing and installing**

7 - Circlip

- Defining thickness. Refer to **Input shaft, adjusting**

8 - Input shaft

- Removing and installing. Refer to **Input shaft, pinion, hollow shaft, selector rods, transmission cover and Torsen differential housing, removing and installing**
- Disassembling and assembling. Refer to **Input shaft, disassembling and assembling**
- Adjusting. Refer to **Input shaft, adjusting**
- Servicing mounting for input shaft. Refer to **Input shaft, disassembling and assembling**

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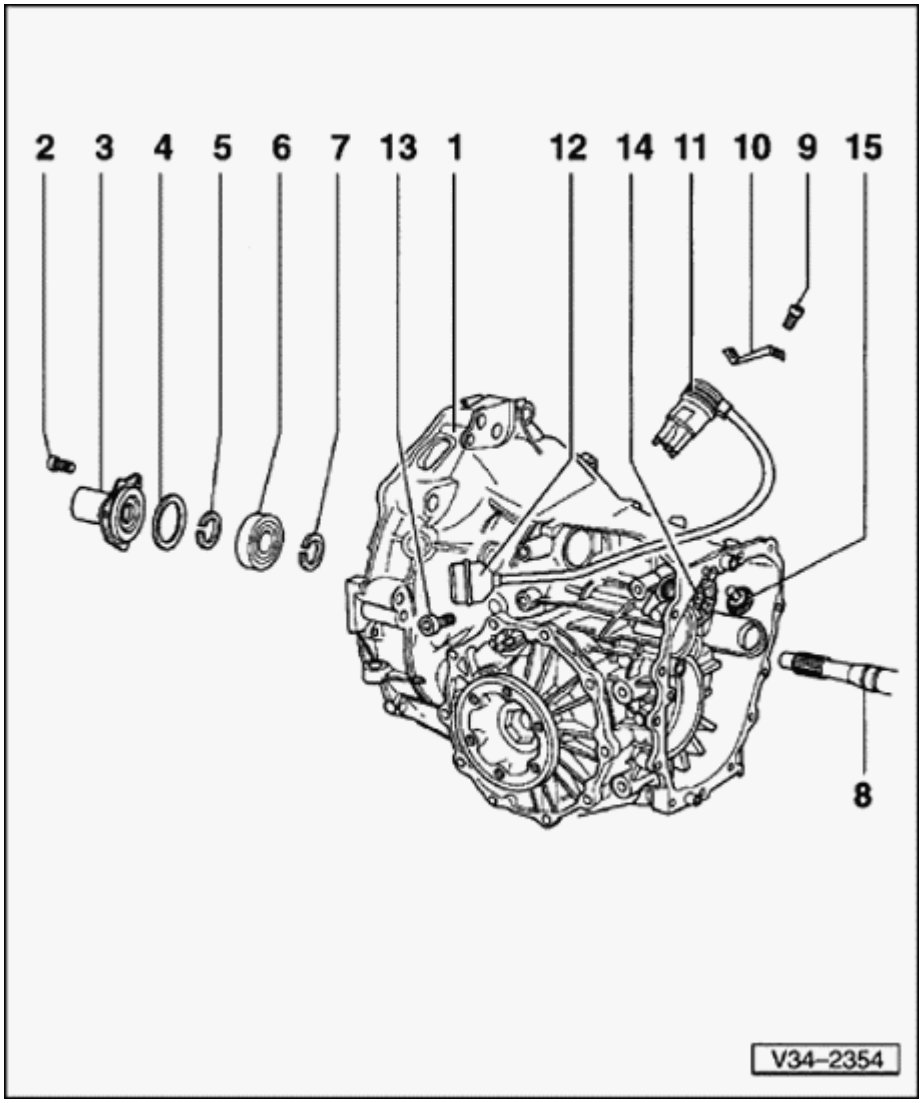


Fig. 156: Transmission Housing, Input Shaft Ball Bearing And Multi-Function Sensor, Overview
Courtesy of VOLKSWAGEN UNITED STATES, INC.

9 - Bolt, 25 Nm

10 - Locking plate

- For multi-function sensor

11 - Multi-function switch

12 - Connector

- For multi-function switch

13 - Bolt, 10 Nm

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14 - Cover for selector shaft

- Removing and installing. Refer to **Transmission shift mechanism, disassembling and assembling**

15 - Locking unit for 5th gear and reverse gear

- Removing and installing. Refer to **Removing and installing locking unit for 5th gear and reverse gear**

Installation position of bleeder valve

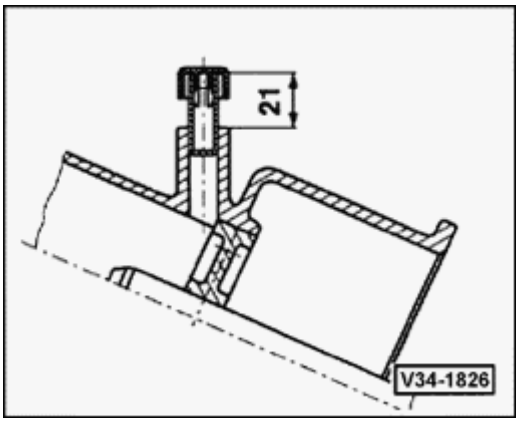


Fig. 157: Identifying Installed Position Of Breather
Courtesy of VOLKSWAGEN UNITED STATES, INC.

When pressed in, bleeder valve must protrude 21 mm out of housing.

Input shaft, pinion, hollow shaft, selector rods, transmission cover and Torsen differential housing, removing and installing

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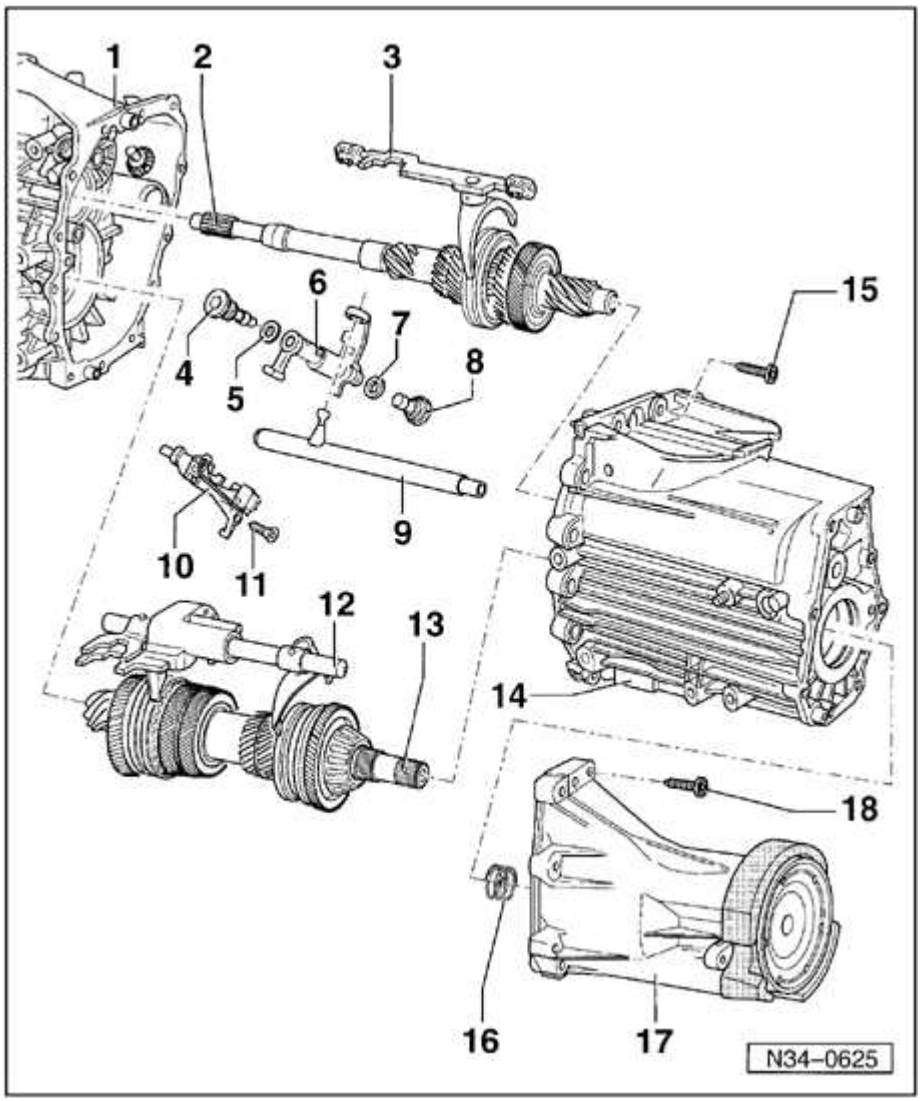


Fig. 158: Input Shaft, Pinion Shaft, Hollow Shaft, Shift Rods, Transmission Cover And Cover With Torsen Differential, Removing And Installing
Courtesy of VOLKSWAGEN UNITED STATES, INC.

1 - Transmission housing

2 - Input shaft

- Disassembling and assembling. Refer to **Input shaft, disassembling and assembling**
- Adjusting. Refer to **Input shaft, adjusting**
- Servicing mounting for input shaft. Refer to **Input shaft, disassembling and assembling**

3 - Selector rod with 3rd and 4th gear selector fork

- Disassembling and assembling. Refer to **Transmission shift mechanism, disassembling and assembling**

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- Replacing mounting bushings. Refer to **Transmission shift mechanism, disassembling and assembling**

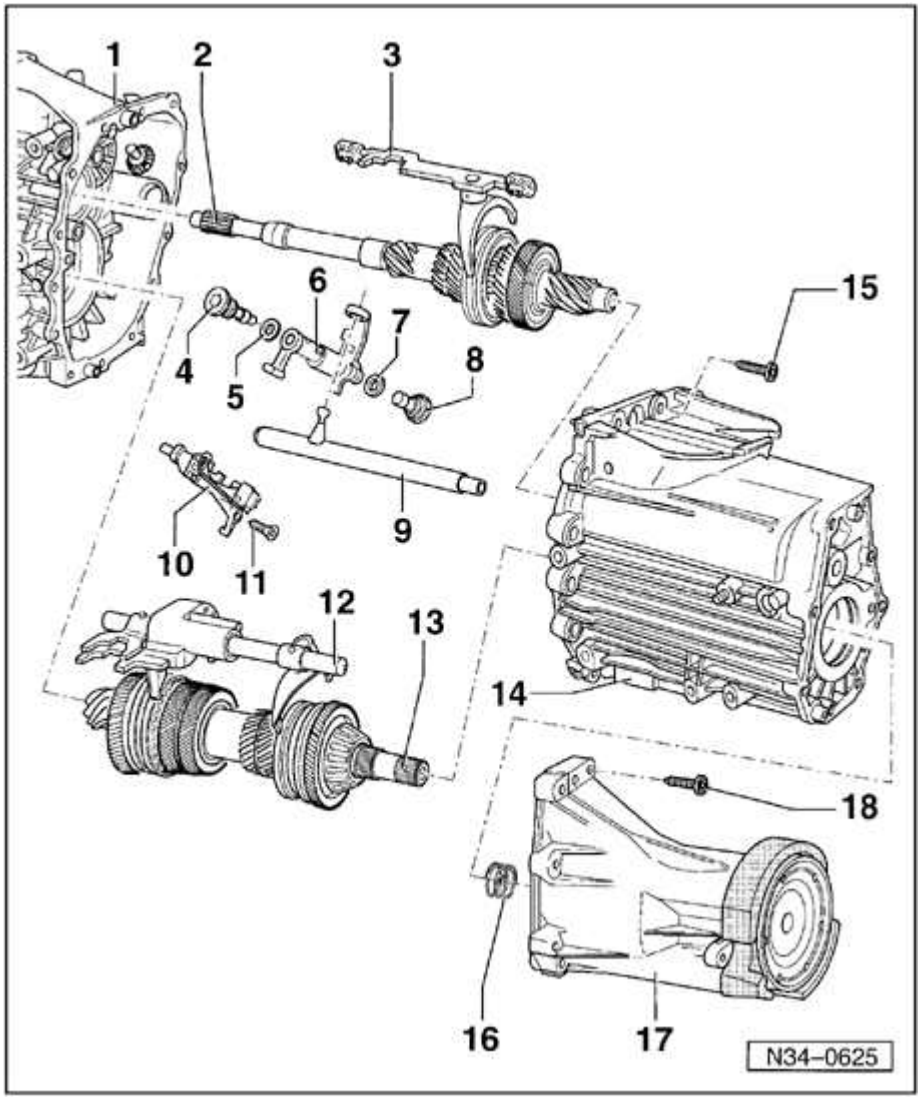


Fig. 159: Input Shaft, Pinion Shaft, Hollow Shaft, Shift Rods, Transmission Cover And Cover With Torsen Differential, Removing And Installing
Courtesy of VOLKSWAGEN UNITED STATES, INC.

4 - Left stop bolt, 40 Nm

5 - Damping washer

6 - Guide shaft

- Installation position. Refer to **Transmission shift mechanism, disassembling and assembling**

7 - Damping washer

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8 - Right stop bolt, 40 Nm

9 - Selector shaft

- Installation position. Refer to **Transmission shift mechanism, disassembling and assembling**
- Replacing oil seal for selector shaft. Refer to **Torsen differential housing, servicing, and Torsen differential, removing and installing**

10 - Detent segment

- Installation position. Refer to **Transmission shift mechanism, disassembling and assembling**

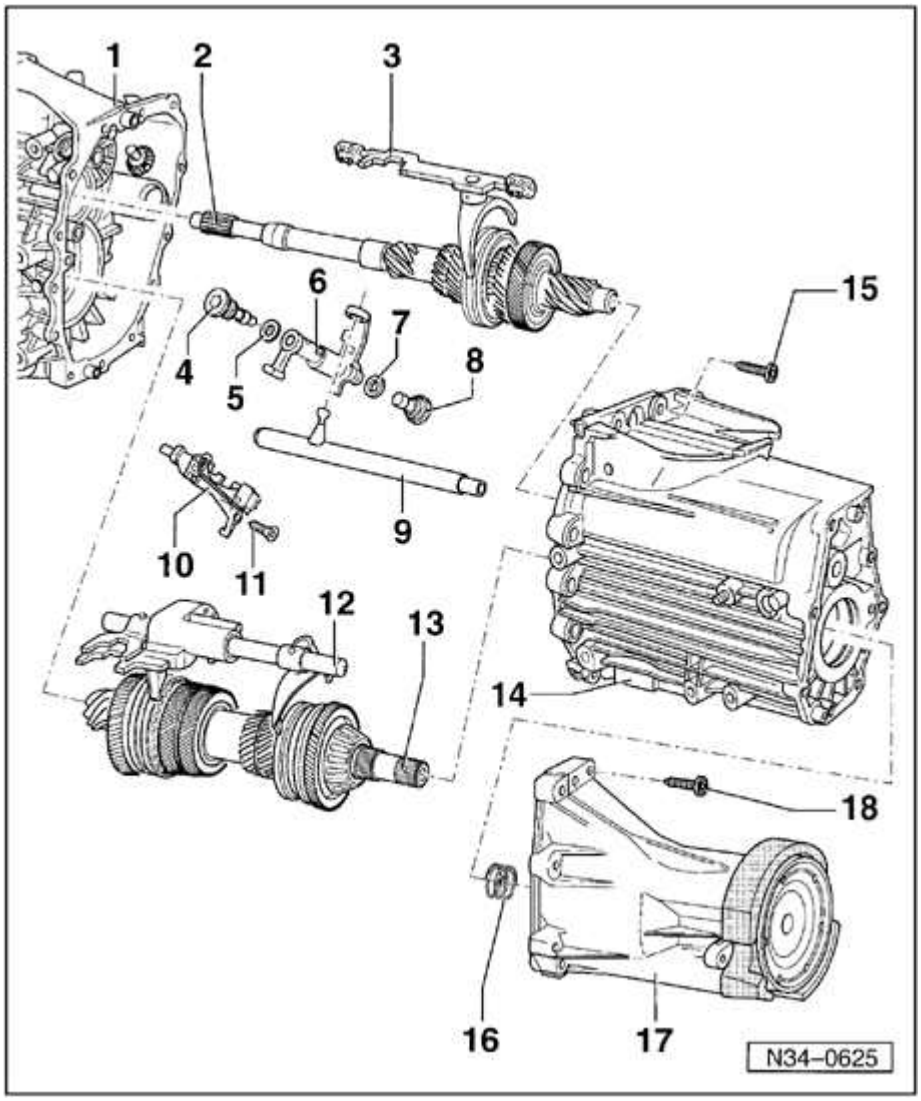


Fig. 160: Input Shaft, Pinion Shaft, Hollow Shaft, Shift Rods, Transmission Cover And Cover With Torsen Differential, Removing And Installing
Courtesy of VOLKSWAGEN UNITED STATES, INC.

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11 - TORX bolt, 25 Nm

- With collar for securing spring of detent segment

12 - Selector rod with selector fork for 1st/2nd/5th and reverse gears

- Disassembling and assembling. Refer to **Transmission shift mechanism, disassembling and assembling**
- Removing and installing ball sleeves. Refer to **Removing and installing ball sleeve**

13 - Pinion with hollow shaft

- Disassembling and assembling. Refer to **Pinion and hollow shaft, disassembling and assembling**
- Adjusting. Refer to **General**
- Servicing mounting for pinion and hollow shaft. Refer to **Pinion and hollow shaft, disassembling and assembling**

14 - Transmission cover

- Removing and installing oil drain plug. See **Removing and installing oil drain plug**

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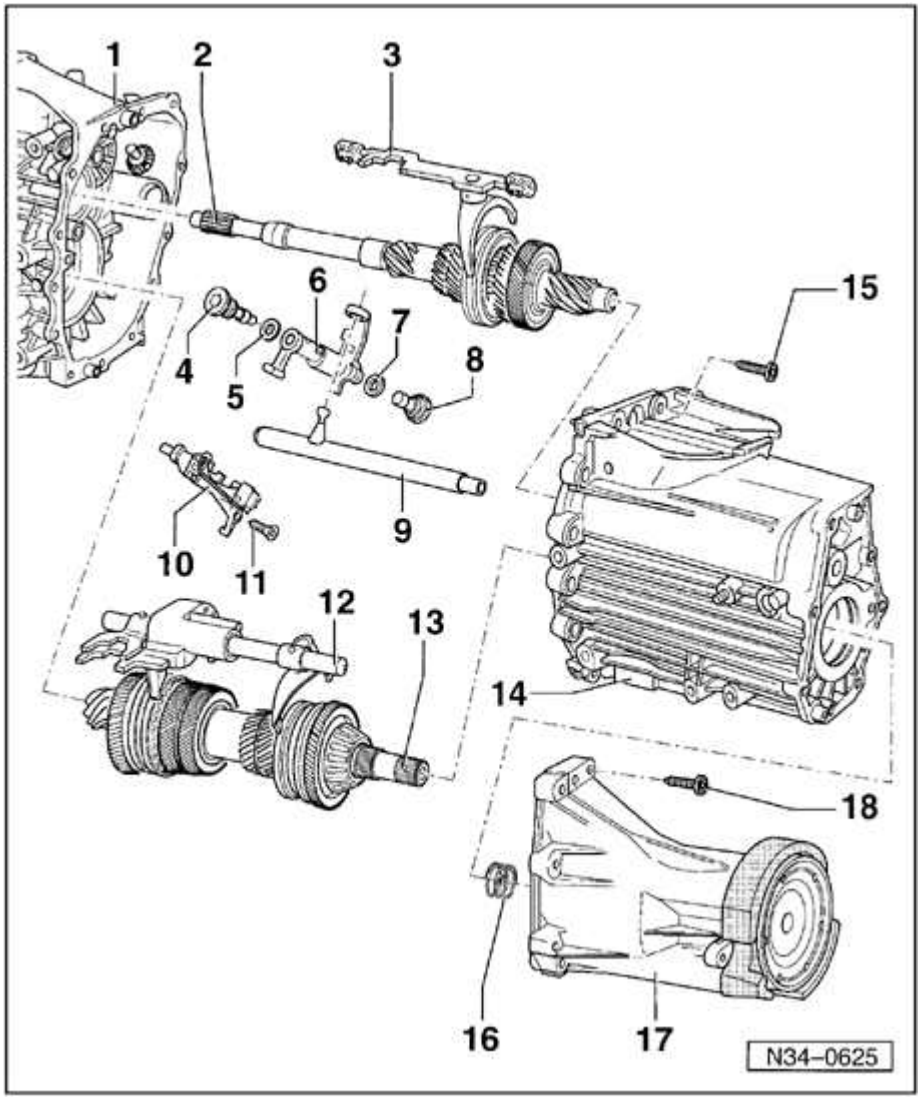


Fig. 161: Input Shaft, Pinion Shaft, Hollow Shaft, Shift Rods, Transmission Cover And Cover With Torsen Differential, Removing And Installing
Courtesy of VOLKSWAGEN UNITED STATES, INC.

15 - TORX bolt, 22 Nm

16 - Spring

17 - Torsen differential housing

- Removing and installing with transmission installed. Refer to **Torsen differential housing, removing and installing**
- Removing Torsen differential from housing, installing. Refer to **Torsen differential housing, servicing, and Torsen differential, removing and installing**
- Servicing housing. Refer to **Torsen differential housing, servicing, and Torsen differential, removing and installing**

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18 - TORX bolt, 22 Nm

Removing and installing oil drain plug

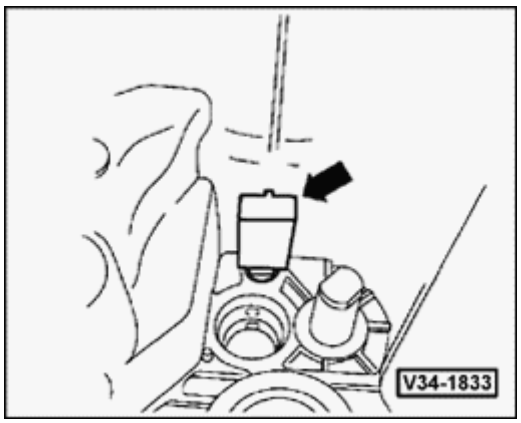


Fig. 162: Identifying Oil Collector Tray
Courtesy of VOLKSWAGEN UNITED STATES, INC.

Removing

- Turn oil drain plug (arrow) and pull out.

Installing

- Push oil drain plug into transmission cover until catch engages.
- Installation position: Oil drain plug faces upward in transmission cover

Ball bearing for input shaft, multi-function sensor, pinion, selector rods, transmission cover and Torsen differential housing, removing and installing

NOTE:

- **The differential does not have to be removed in order to remove the above-mentioned components.**
- **Removal is only necessary when adjustment work must be performed. Refer to Adjustment table.**

Special tools, testers and other items required

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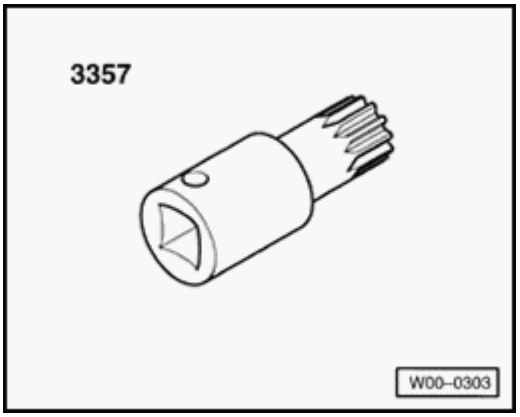
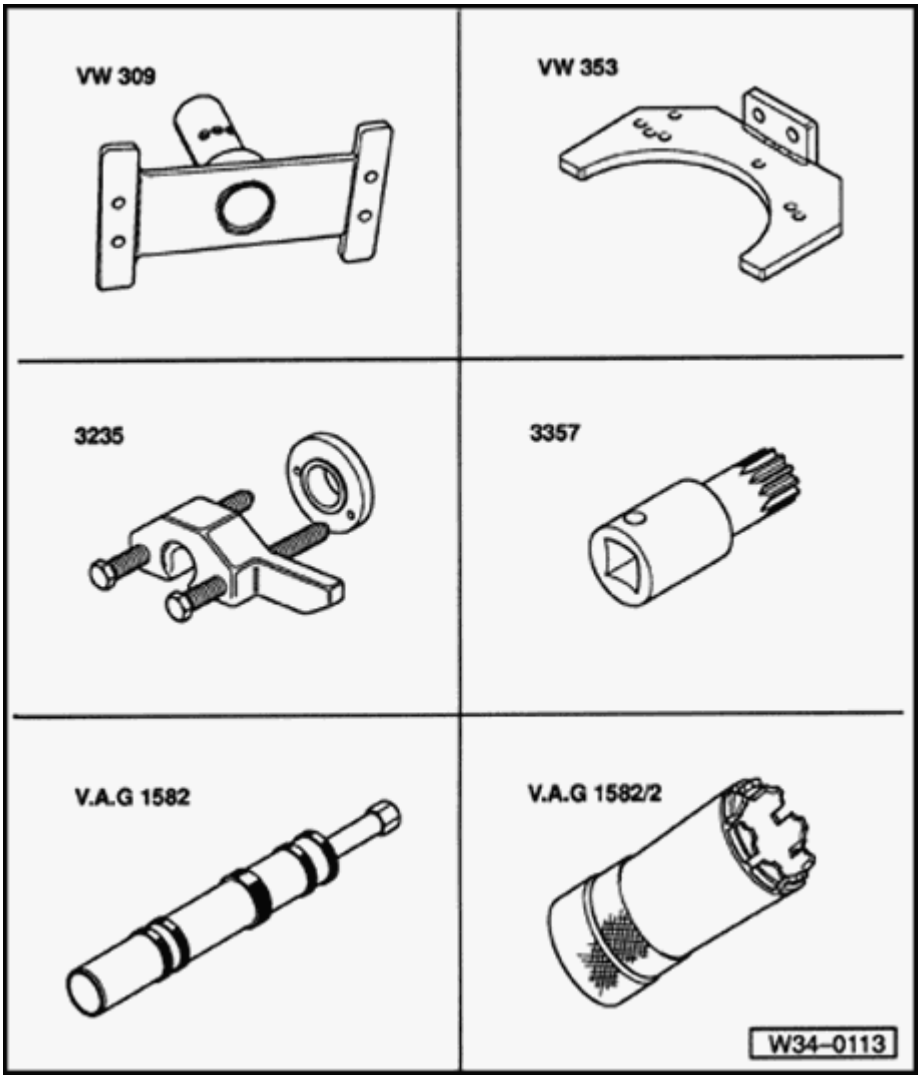


Fig. 163: Identifying Triple Square Socket Driver 3357
Courtesy of VOLKSWAGEN UNITED STATES, INC.

- Allen key extension 3357



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Fig. 164: Identifying Special Tools - Disassembly And Assembly
Courtesy of VOLKSWAGEN UNITED STATES, INC.

Special tools and workshop equipment required

- VW 309 Holding plate
- VW 353 Transmission support
- 3235 Pressing-in tool
- 3357 Allen key extension
- V.A.G 1582 Tapered roller bearing puller
- V.A.G 1582/2 Gripper

Special tools and workshop equipment required

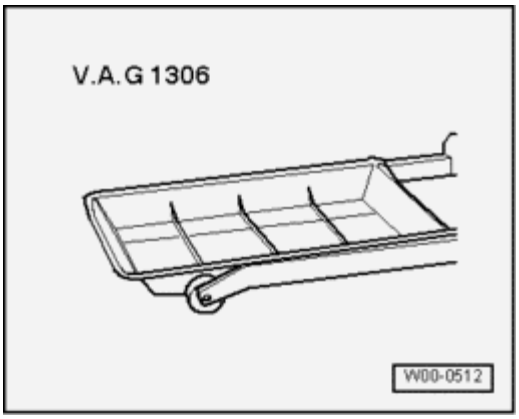


Fig. 165: Identifying Drip Tray V.A.G 1306
Courtesy of VOLKSWAGEN UNITED STATES, INC.

- V.A.G 1306 Drip tray

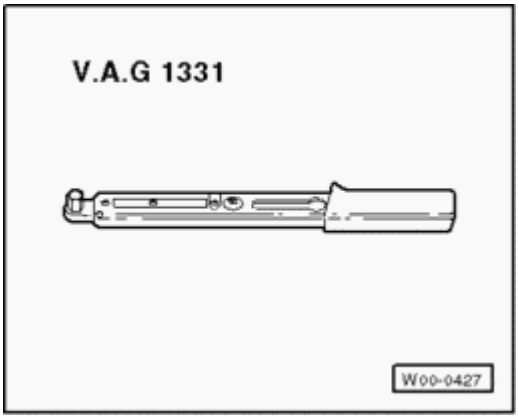


Fig. 166: Identifying Torque Wrench V.A.G. 1331
Courtesy of VOLKSWAGEN UNITED STATES, INC.

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- V.A.G 1331 Torque wrench
- Sealant AMV 188 001 02

Removing

- Place drip tray V.A.G 1306 under transmission.
- Drain oil using Allen key extension 3357.

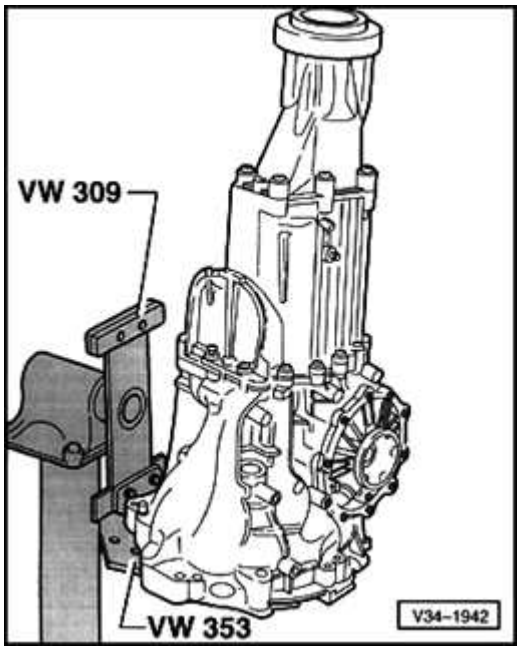
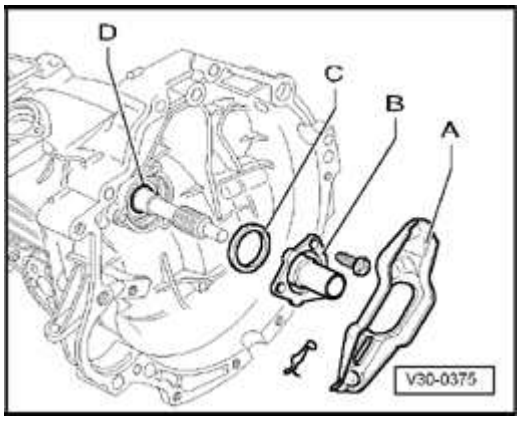


Fig. 167: Securing Transmission In Assembly Stand
Courtesy of VOLKSWAGEN UNITED STATES, INC.

- Clamp transmission in repair stand.

NOTE:

- **To protect oil seal, pull shrink down tube over splines of input shaft before pulling off guide sleeve.**



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Fig. 168: Clutch Release Lever Components
Courtesy of VOLKSWAGEN UNITED STATES, INC.

- Remove clutch release lever -A- with release bearing.
- Remove guide sleeve -B-.
- Remove washer -C-.
- Remove circlip -D- in front of input shaft ball bearing.

- Make a note of thickness of circlip if not replacing ball bearing, input shaft or transmission housing.

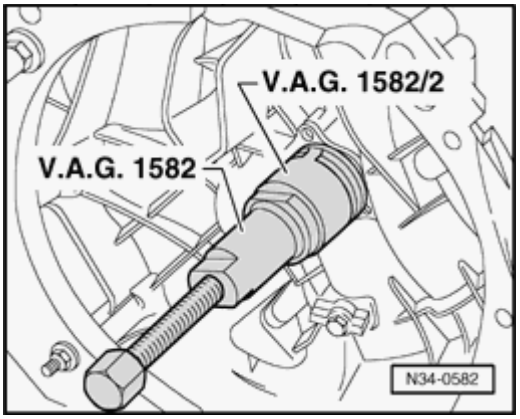


Fig. 169: Pulling Input Shaft Ball Bearing Out Of Transmission Housing
Courtesy of VOLKSWAGEN UNITED STATES, INC.

- Pull ball bearing of input shaft out of transmission housing.

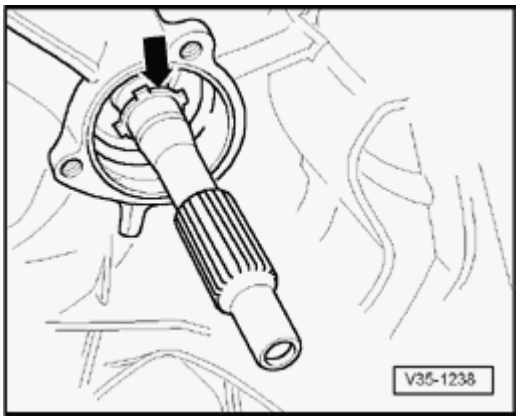


Fig. 170: Location Of Rear Circlip For Input Shaft Ball Bearing
Courtesy of VOLKSWAGEN UNITED STATES, INC.

- Remove circlip (arrow) behind input shaft ball bearing.
- Make a note of thickness of circlip if not replacing ball bearing, input shaft or transmission housing.

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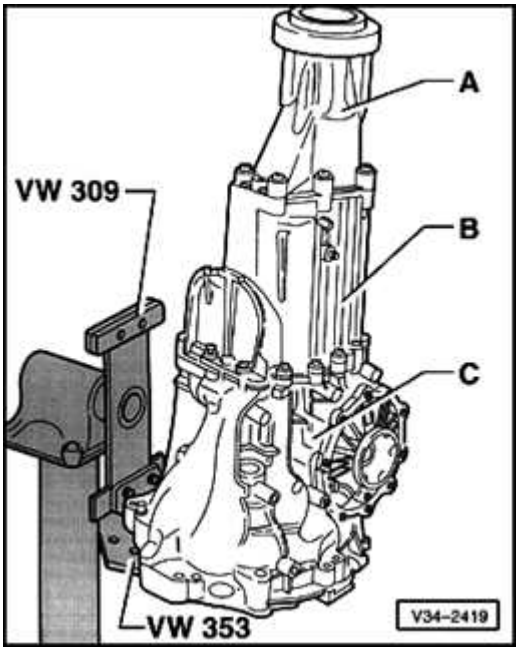


Fig. 171: Identifying Cover, Transmission Cover , and Transmission Housing
Courtesy of VOLKSWAGEN UNITED STATES, INC.

- Disconnect Torsen differential housing -A- from transmission cover -B-.
- Remove spring from pinion.
- Remove transmission cover -B- from transmission housing -C-.

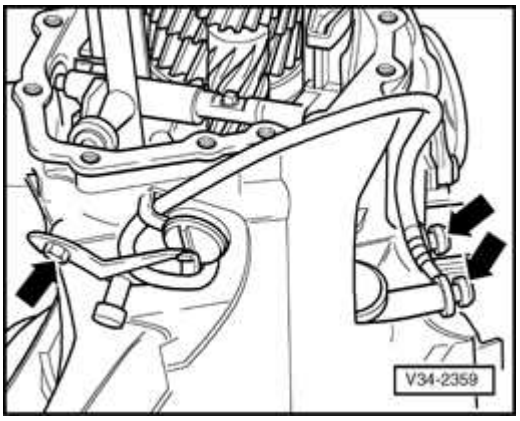


Fig. 172: Location Of Multi-Function Sensor
Courtesy of VOLKSWAGEN UNITED STATES, INC.

- Remove bolts (arrows) and pull out multi-function switch.

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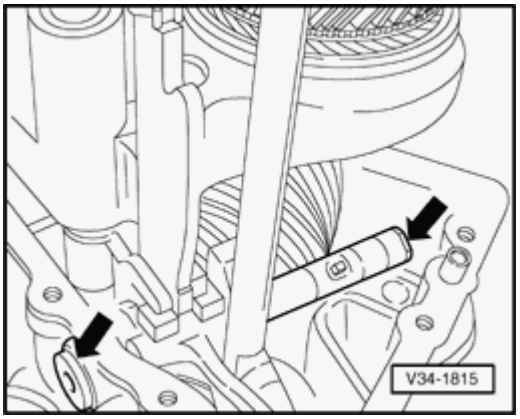


Fig. 173: Identifying Threaded Bolts At Both Ends Of Relay Shaft
Courtesy of VOLKSWAGEN UNITED STATES, INC.

- Remove bolts for guide shaft (arrows).

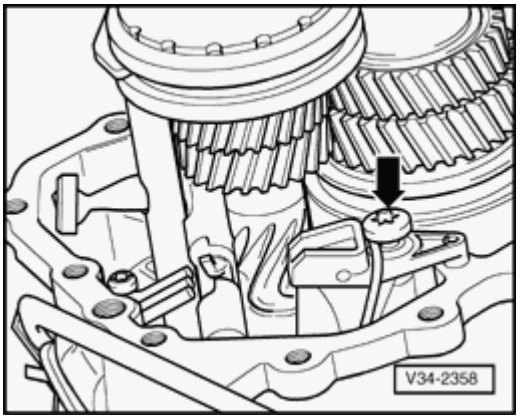


Fig. 174: Identifying Shift Detent Fastener
Courtesy of VOLKSWAGEN UNITED STATES, INC.

- Remove screw for detent segment (arrow) and remove segment by swivelling out.

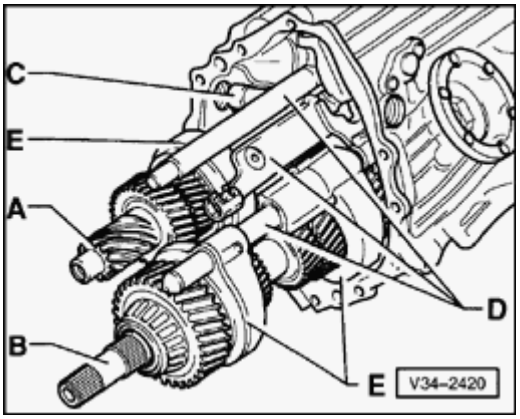


Fig. 175: Identifying Input Shaft, Pinion Shaft , Relay Shaft , Shift Rods and Shift Forks
Courtesy of VOLKSWAGEN UNITED STATES, INC.

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- Carefully pull out input shaft -A-, pinion -B-, guide shaft -C-, selector rods -D- and selector shaft and selector forks -E- altogether.

Installing

NOTE: If the input shaft ball bearing, the input shaft or the transmission housing have been replaced, first define the thickness of the circlips for the input shaft. Refer to Input shaft, adjusting.

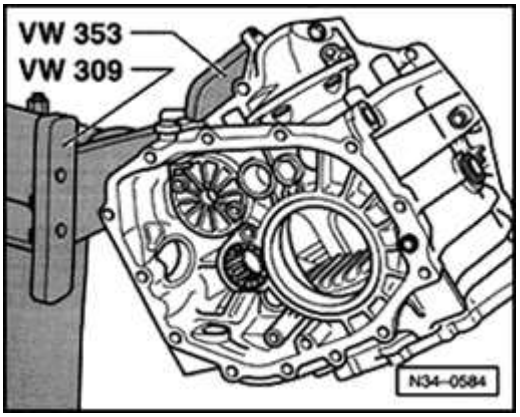


Fig. 176: Swing Transmission Housing Into Position Shown
Courtesy of VOLKSWAGEN UNITED STATES, INC.

- Swivel transmission housing into position as illustrated. It is then easier to insert components mentioned below.

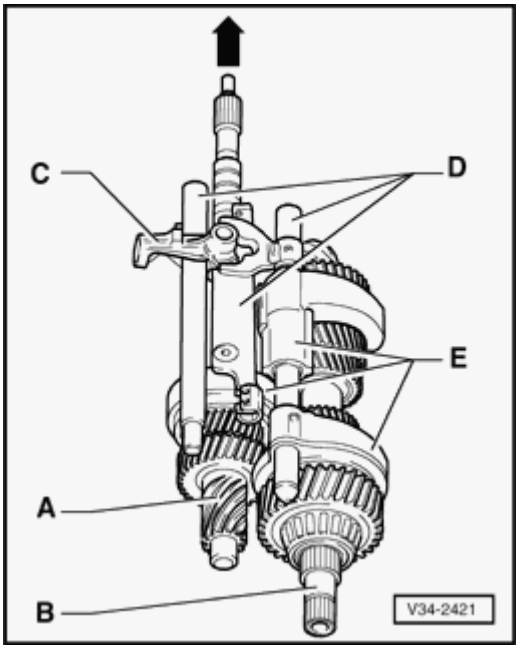


Fig. 177: Identifying Input Shaft, Pinion Shaft , Relay Shaft , Selector Rods and Selector Forks
Courtesy of VOLKSWAGEN UNITED STATES, INC.

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- Assemble input shaft -A-, pinion -B-, guide shaft -C-, selector rods -D- and selector shaft and selector forks -E-.
- Insert these components in transmission housing altogether.

NOTE: Guide shaft -C- and selector shaft can also be inserted afterward if necessary. Refer to Fig. 178 and Fig. 180.

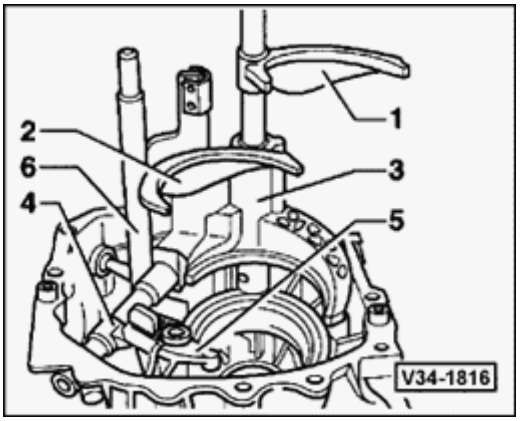


Fig. 178: Identifying Installed Position Of Complete Selector Mechanism In Transmission
Courtesy of VOLKSWAGEN UNITED STATES, INC.

Position of shift mechanism in transmission

1 - 5th and reverse gear selector fork

2 - 3rd and 4th gear selector fork

3 - 1st and 2nd gear selector fork

4 - Guide shaft

5 - Shifting catch

6 - Selector shaft

NOTE: Shown in illustration without input shaft and pinion.

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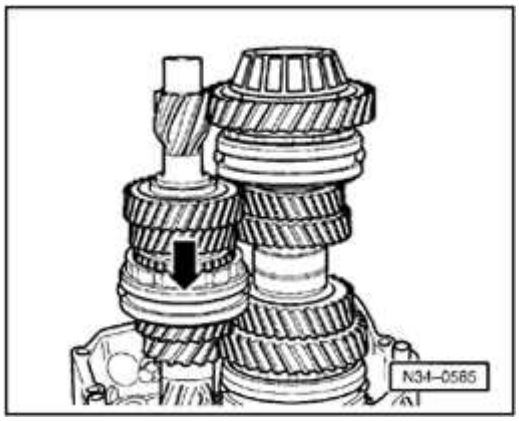


Fig. 179: Move Transmission To Engage 3rd Gear
Courtesy of VOLKSWAGEN UNITED STATES, INC.

- Swivel transmission housing and then engage 3rd gear (direction of arrow).

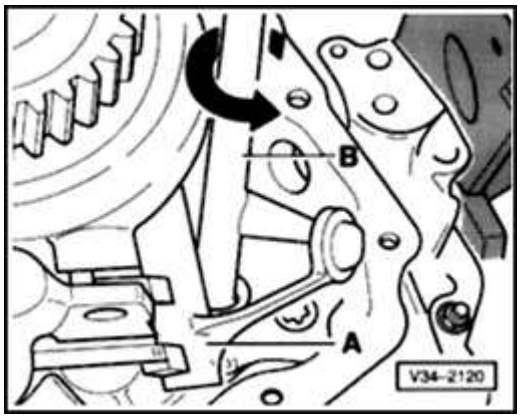


Fig. 180: Installing Relay Shaft And Shift Rod
Courtesy of VOLKSWAGEN UNITED STATES, INC.

- Insert guide shaft -A-.
- Place selector shaft -B- sideways in hole in transmission housing and join to retaining eyelet.
- Swivel selector shaft carefully in direction of arrow.

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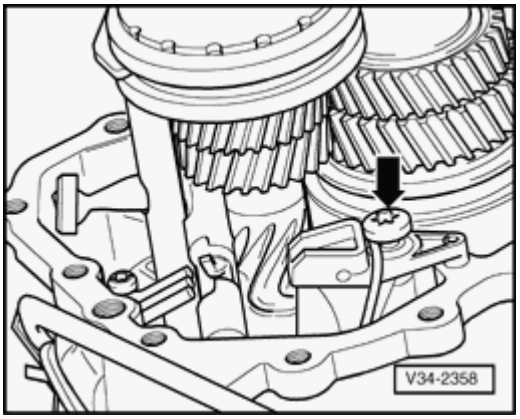


Fig. 181: Identifying Shift Detent Fastener
Courtesy of VOLKSWAGEN UNITED STATES, INC.

- Insert detent segment and tighten screw (arrow).

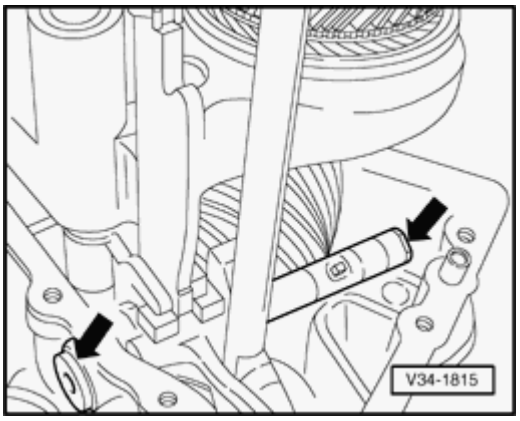


Fig. 182: Identifying Threaded Bolts At Both Ends Of Relay Shaft
Courtesy of VOLKSWAGEN UNITED STATES, INC.

- Install bolts for guide shaft (arrows)
- Replace O-ring for multi-function switch.

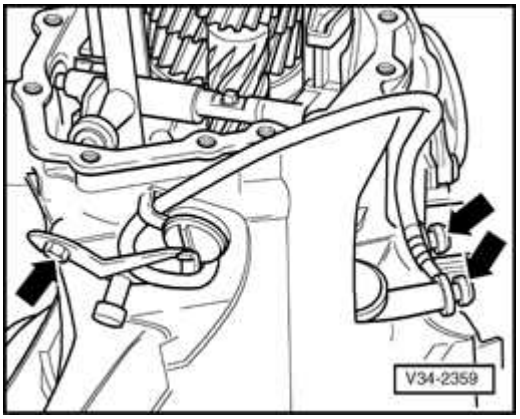


Fig. 183: Location Of Multi-Function Sensor

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Courtesy of VOLKSWAGEN UNITED STATES, INC.

- Carefully insert multi-function switch and tighten screws (arrows).

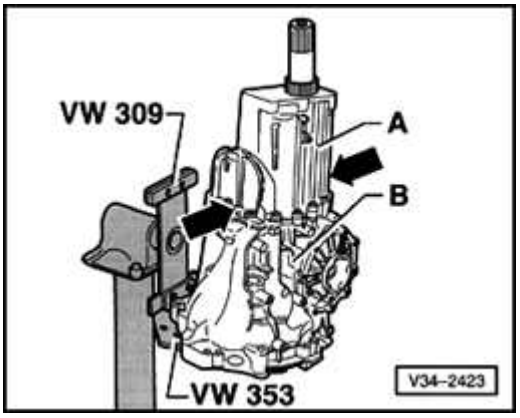


Fig. 184: Identifying Cover and Transmission Cover
Courtesy of VOLKSWAGEN UNITED STATES, INC.

- Check whether dowel sleeves for transmission cover -A- (arrows) are present in transmission housing -B-.
- Install transmission cover on transmission housing.

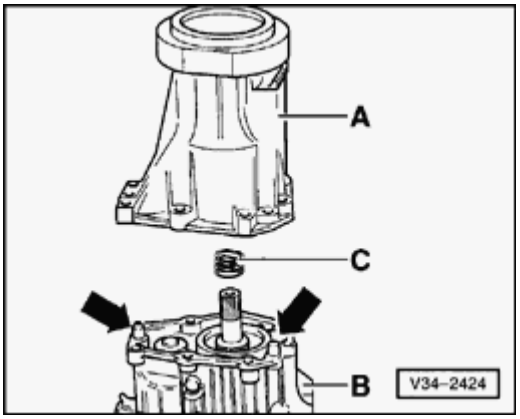


Fig. 185: Identifying Cover, Transmission Cover , and Compression Spring
Courtesy of VOLKSWAGEN UNITED STATES, INC.

- Check whether dowel sleeves for housing -A- (arrows) are present in transmission cover -B-.
- Install spring -C-.
- Install Torsen differential housing -A- on transmission cover -B-.

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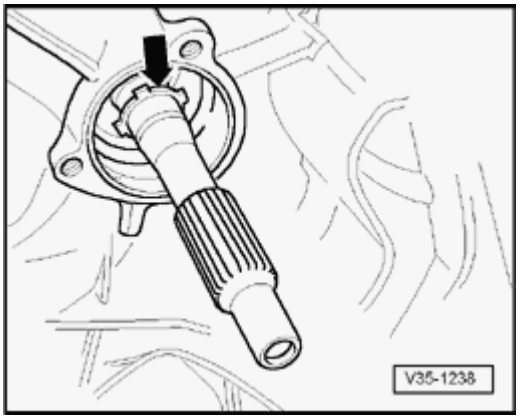


Fig. 186: Location Of Rear Circlip For Input Shaft Ball Bearing
Courtesy of VOLKSWAGEN UNITED STATES, INC.

- Remove rear circlip (arrow) for input shaft ball bearing.
- Push ball bearing onto input shaft.

- Installation position: Solid side of ball cage faces transmission housing

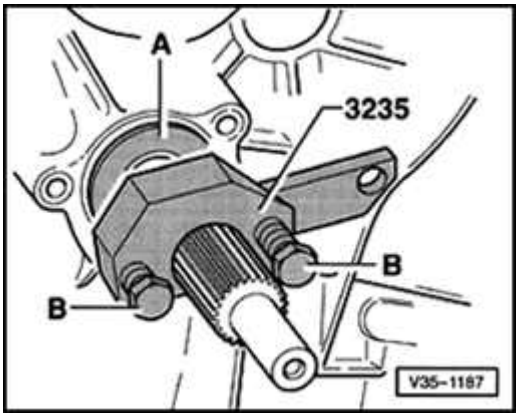


Fig. 187: Pressing In Ball Bearing
Courtesy of VOLKSWAGEN UNITED STATES, INC.

- Press in ball bearing:

- Push thrust pad -A- of pressing-in tool onto input shaft.
- Position pressing-in tool behind splines for clutch plate.
- Pre-load bolts -B-.

- Bolts are supported in counterbores of thrust pad -A-

- Press ball bearing in as far as it will go by tightening bolts alternately (1/2 turn).

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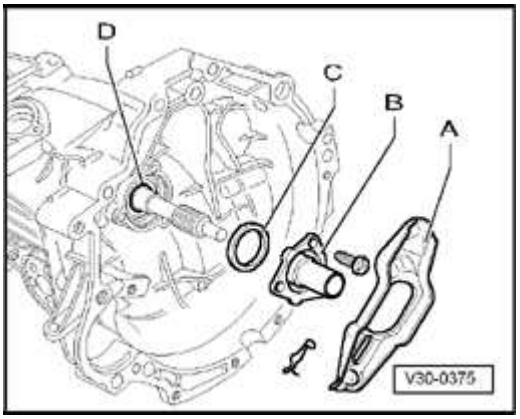


Fig. 188: Clutch Release Lever Components
Courtesy of VOLKSWAGEN UNITED STATES, INC.

- Install front circlip -D- for input shaft ball bearing.
- Mount dished washer -C-.

- Installation position: Convex side faces guide sleeve -B-

NOTE:

- **To protect oil seal, pull shrink down tube over splines of input shaft before pushing on guide sleeve.**
- **Replace guide sleeve together with oil seal and O-ring.**

- Install new guide sleeve -B- for release bearing.
- Install clutch release lever -A- and release bearing.

TORSEN DIFFERENTIAL HOUSING, SERVICING, AND TORSEN DIFFERENTIAL, REMOVING AND INSTALLING

Torsen differential housing, servicing, and Torsen differential, removing and installing

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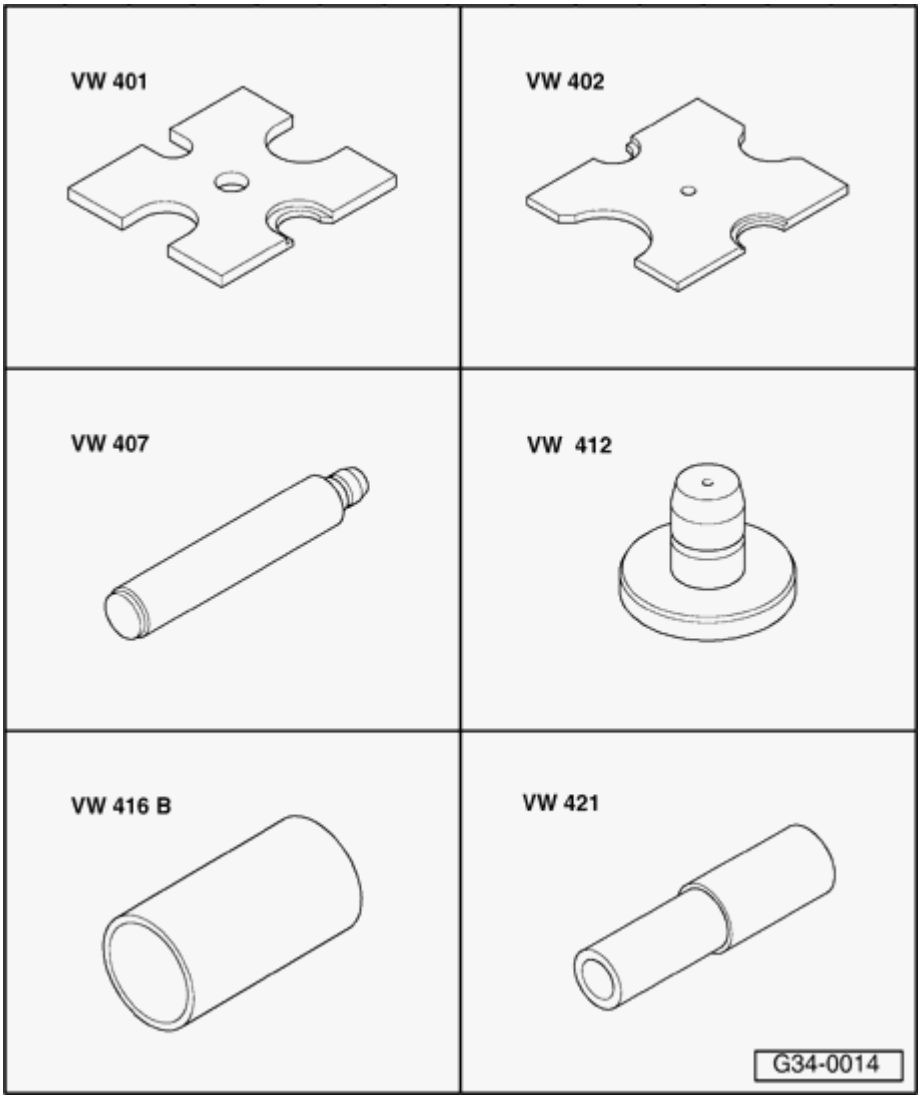


Fig. 189: Identifying Special Tools - Torsen Differential Housing, Servicing, And Torsen Differential, Removing And Installing (1 Of 2)
Courtesy of VOLKSWAGEN UNITED STATES, INC.

Special tools and workshop equipment required

- VW 401 Pressure plate
- VW 402 Pressure plate
- VW 407 Press tool
- VW 412 Press tool
- VW 416 B Tubular section
- VW 421 Tubular section

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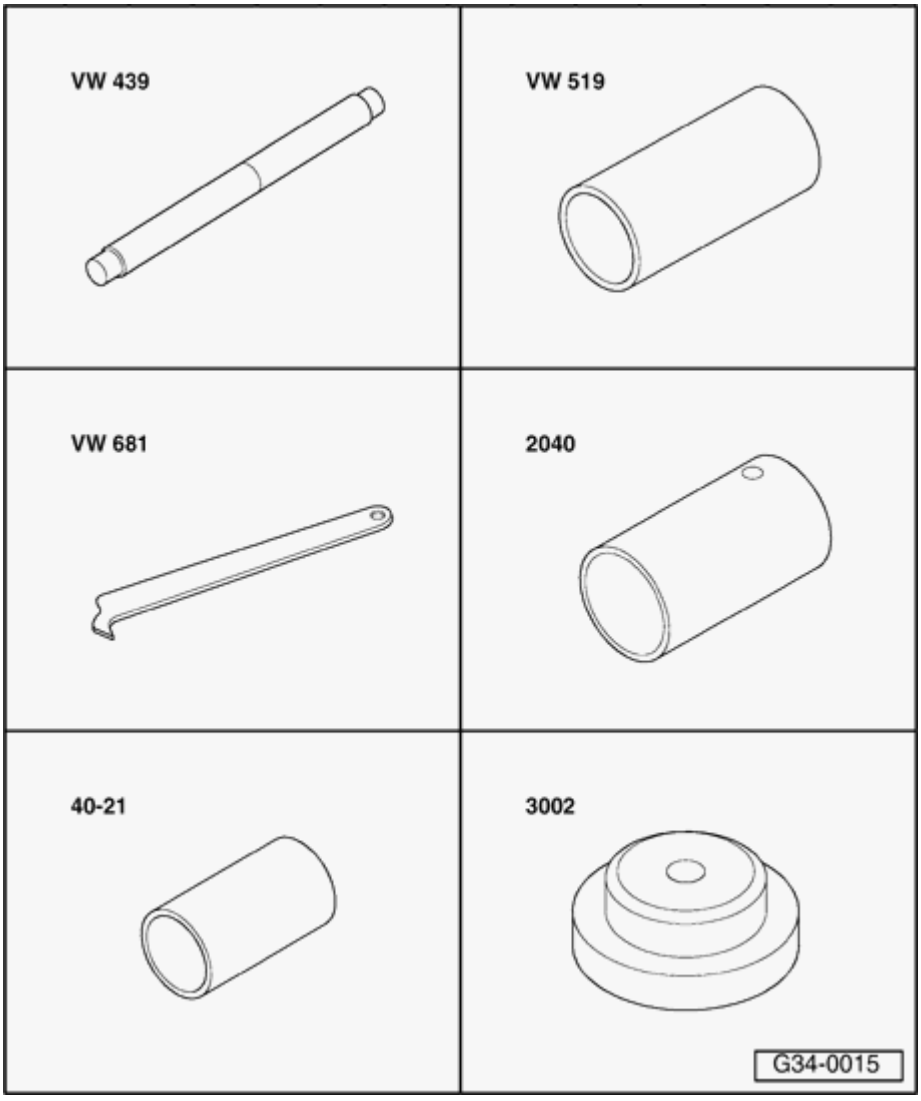


Fig. 190: Identifying Special Tools - Torsen Differential Housing, Servicing, And Torsen Differential, Removing And Installing (2 Of 2)
Courtesy of VOLKSWAGEN UNITED STATES, INC.

- VW 439 Guide section
- VW 519 Tubular section
- VW 681 Extractor lever
- 40-21 Sleeve
- 2040 Tubular section
- 3002 Pressure piece

Special tools, testers and other items required

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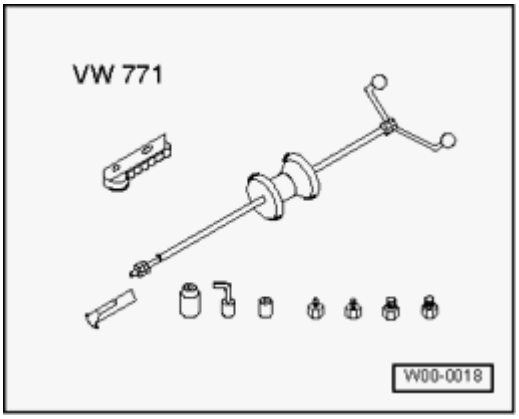


Fig. 191: Slide Hammer-Multi-Purpose Tool Set VW 771
Courtesy of VOLKSWAGEN UNITED STATES, INC.

- VW 771/15 from universal tools VW 771

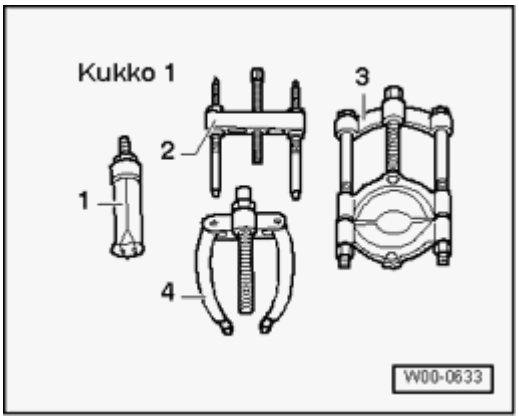


Fig. 192: Kukko 21/2 Internal puller, Kukko 21/4 Internal puller, Kukko 22/2 Counter support
Courtesy of VOLKSWAGEN UNITED STATES, INC.

- Separating tool Kukko 17/2
- Internal puller Kukko 21/4

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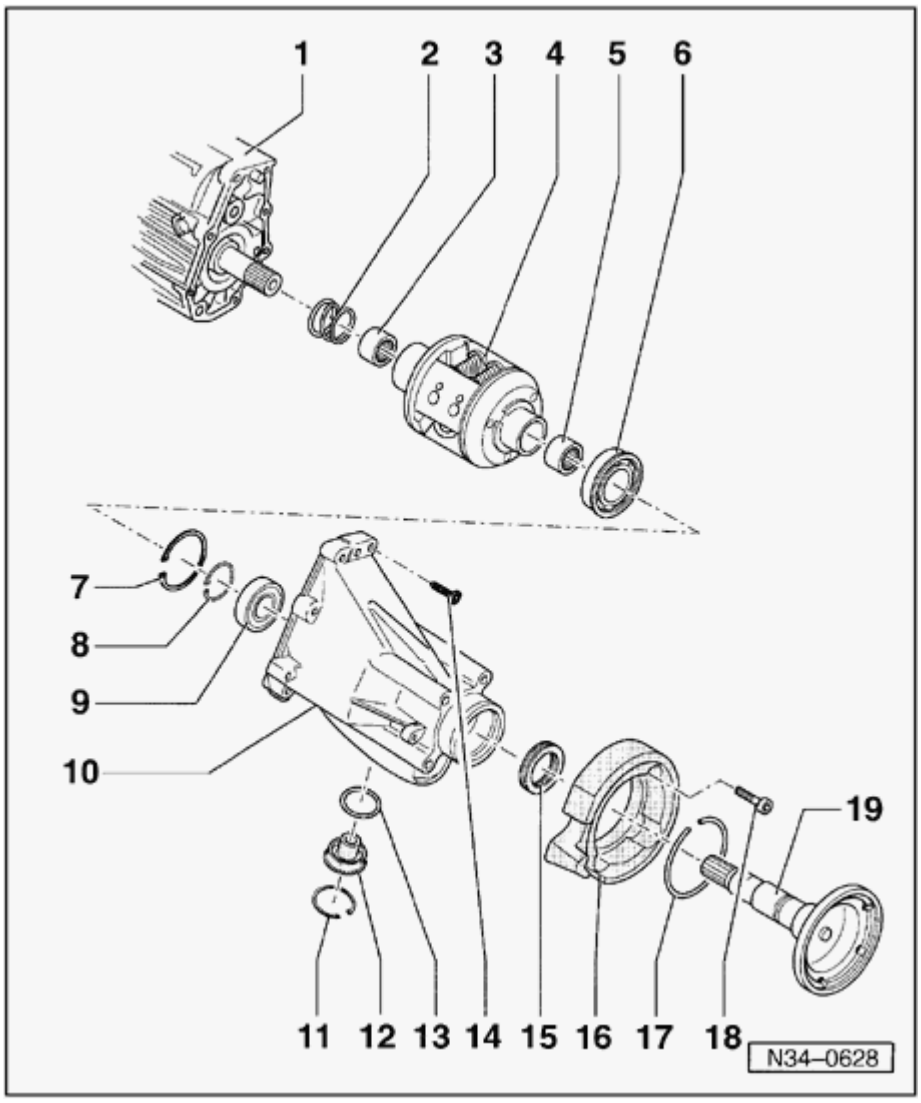


Fig. 193: Transmission Cover, Overview
Courtesy of VOLKSWAGEN UNITED STATES, INC.

1 - Transmission cover

2 - Spring

3 - Front needle bearing

- Extracting. See **Extracting needle bearing**
- Installation position. See **Installation position of front needle bearing**
- Pressing in. See **Pressing in needle bearing**

4 - Torsen differential

- Do not disassemble

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- Press out after removing flange shaft. See **Pressing out Torsen differential**
- Replace if damaged
- Pressing in. See **Pressing in Torsen differential**

5 - Rear needle bearing

- Extracting. See **Extracting needle bearing**
- Installation position. See **Installation position of rear needle bearing**
- Pressing in. See **Pressing in needle bearing**

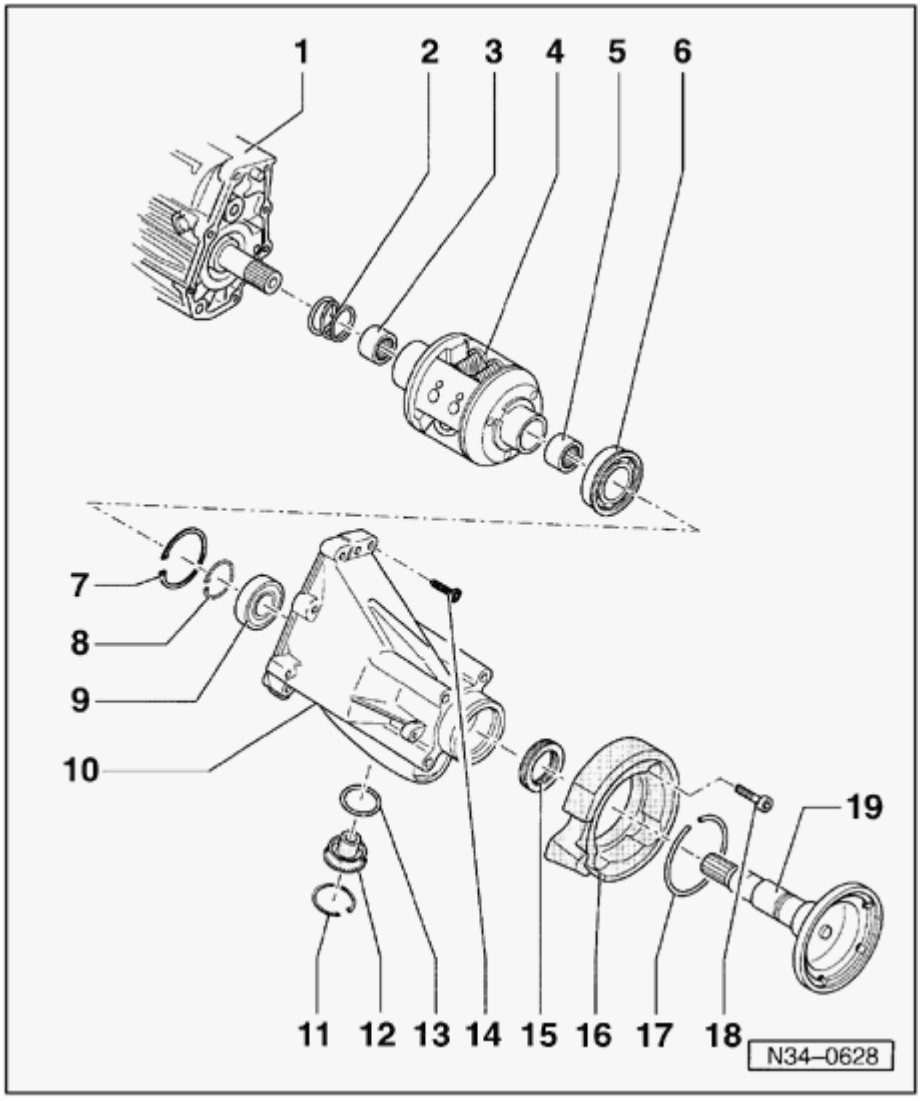


Fig. 194: Transmission Cover, Overview
Courtesy of VOLKSWAGEN UNITED STATES, INC.

6 - Ball bearing

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- For Torsen differential
- Pressing off. See **Pressing off ball bearing of Torsen differential**
- Pressing on. See **Pressing ball bearing onto Torsen differential**

7 - Circlip

8 - Circlip

- Remove and install together with drive flange. See **Removing and installing drive flange**

9 - Ball bearing

- For drive flange
- Pressing out. See **Pressing out ball bearing for drive flange**
- Pressing in. See **Pressing in ball bearing for drive flange**

10 - Torsen differential housing

- For Torsen differential

11 - Circlip

12 - Sealing cap

- Removing. See **Removing sealing cap**

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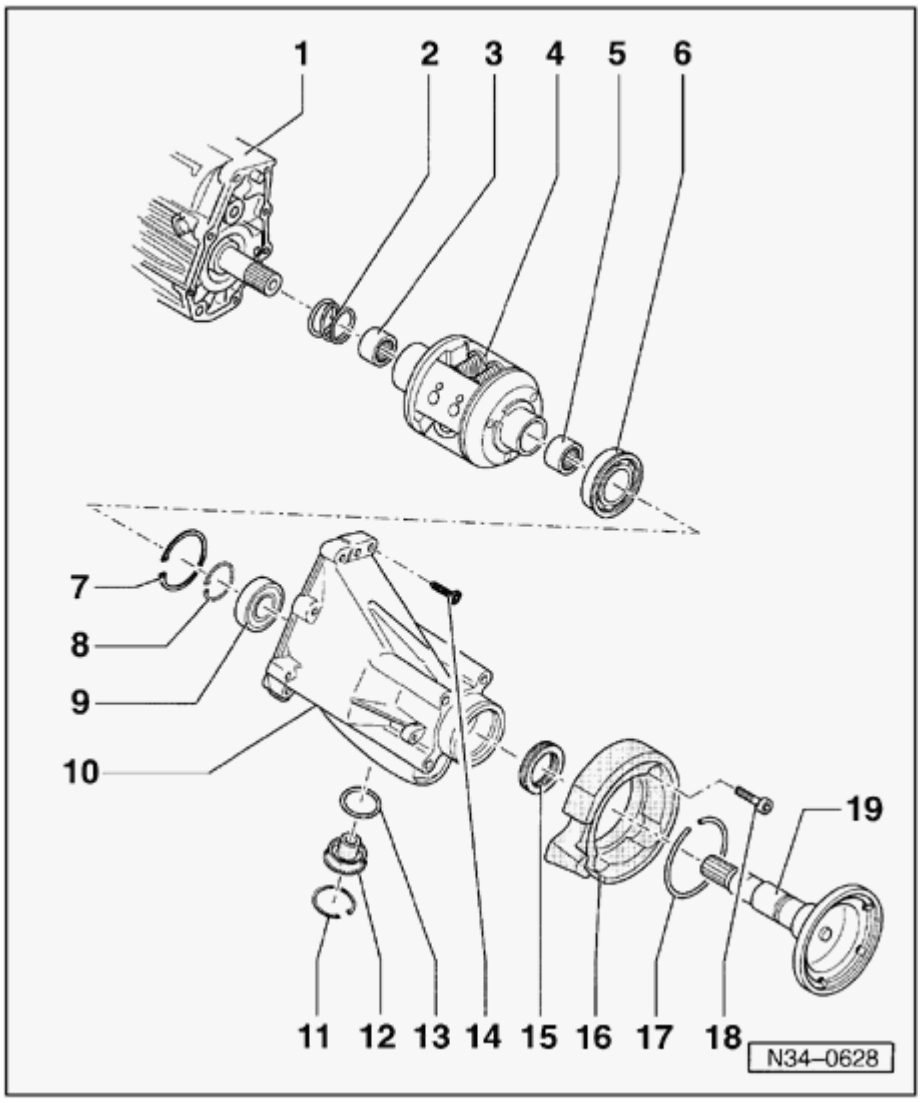


Fig. 195: Transmission Cover, Overview
Courtesy of VOLKSWAGEN UNITED STATES, INC.

13 - O-ring

- Always replace
- Install with grease

14 - TORX bolt, 22 Nm

15 - Oil seal

- Extract with extractor lever VW 681
- Driving in. See **Driving in oil seal**

16 - Dampener

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17 - Circlip

18 - TORX bolt, 35 Nm

- Self-locking
- Always replace

19 - Drive flange

- Removing and installing. See **Removing and installing drive flange**

Removing sealing cap

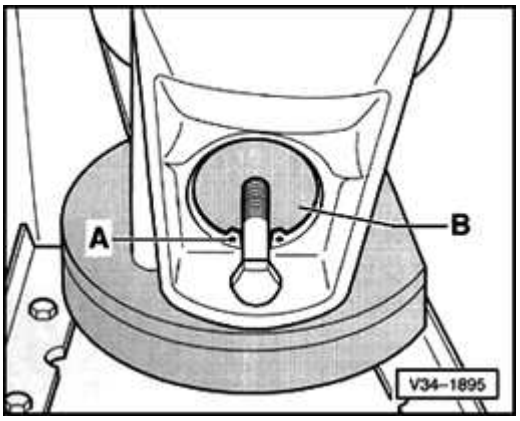


Fig. 196: Identifying Circlip And Sealing Cap
Courtesy of VOLKSWAGEN UNITED STATES, INC.

- Remove circlip -A-.
- Install an M8 bolt into threaded hole of sealing cap -B-.
- Pull out sealing cap -B- with bolt.

Removing and installing drive flange

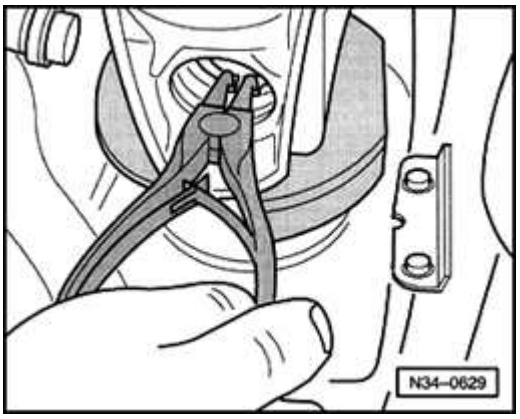


Fig. 197: Drive Flange, Removal And Installation

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Courtesy of VOLKSWAGEN UNITED STATES, INC.

- Expand circlip and pull out drive flange.

NOTE:

- **When installing drive flange circlip must be installed at same time.**
- **Circlip must be properly positioned in groove.**

Pressing out Torsen differential

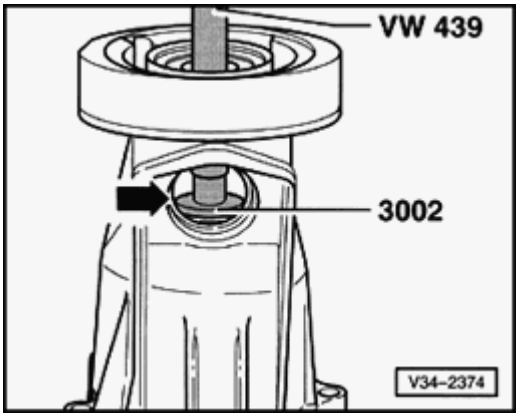


Fig. 198: Pressing Out Torsen Differential
Courtesy of VOLKSWAGEN UNITED STATES, INC.

- Place pressure piece 3002 through hole (arrow) directly onto Torsen differential.

Pressing off ball bearing of Torsen differential

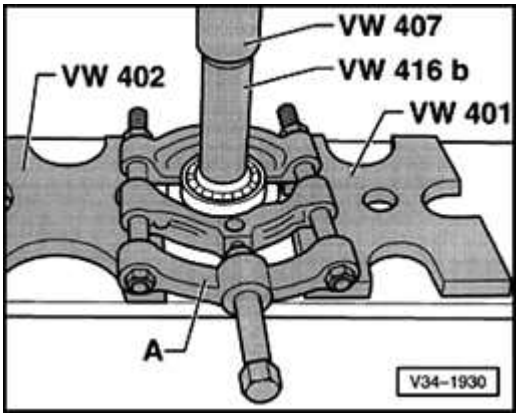


Fig. 199: Pressing Off Ball Bearing From Torsen Differential
Courtesy of VOLKSWAGEN UNITED STATES, INC.

A - Separating tool 22 to 115 mm, e.g. Kukko 17/2

Pressing ball bearing onto Torsen differential

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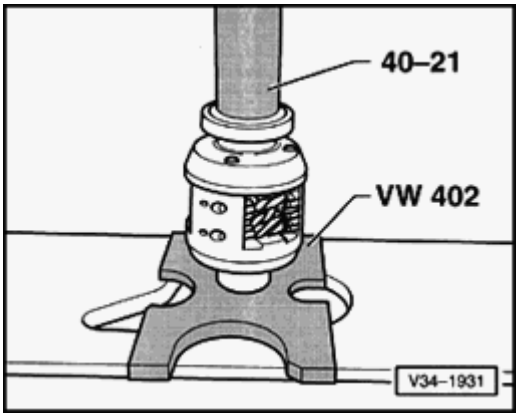


Fig. 200: Pressing On Ball Bearing On Torsen Differential
Courtesy of VOLKSWAGEN UNITED STATES, INC.

- Press on ball bearing as far as it will go.

Pressing out ball bearing for drive flange

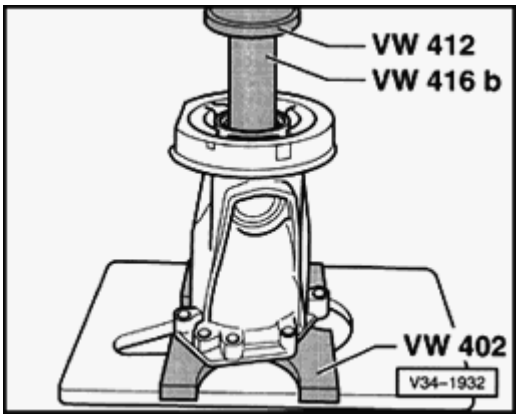


Fig. 201: Pressing Out Ball Bearing For Flange Shaft
Courtesy of VOLKSWAGEN UNITED STATES, INC.

- Remove circlip before pressing out.

Pressing in ball bearing for drive flange

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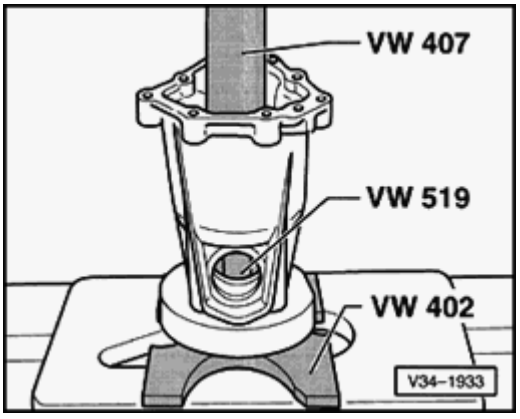


Fig. 202: Pressing In Ball Bearing For Flange Shaft
Courtesy of VOLKSWAGEN UNITED STATES, INC.

- Install circlip after pressing in.

Extracting needle bearing

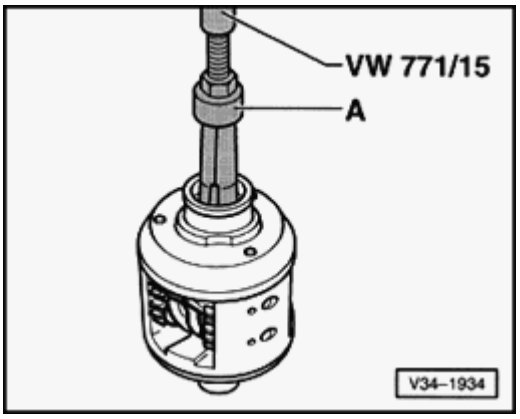


Fig. 203: Pulling Out Needle Bearing
Courtesy of VOLKSWAGEN UNITED STATES, INC.

A - Internal puller, e. g. Kukko 21/4, 22 to 28 mm

Both needle bearings in Torsen differential are extracted using the same internal puller.

Installation position of front needle bearing

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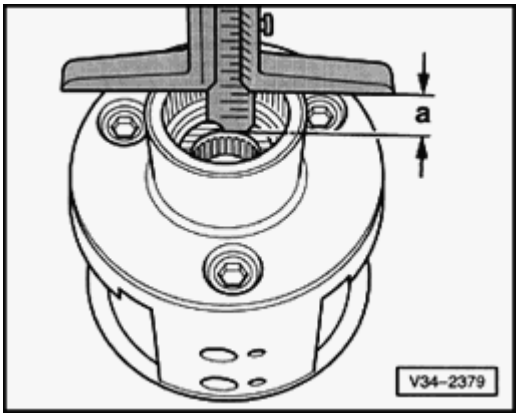


Fig. 204: Installation Position Of Front Needle Bearing
Courtesy of VOLKSWAGEN UNITED STATES, INC.

- Dimension a = 32.5 mm

Installation position of rear needle bearing

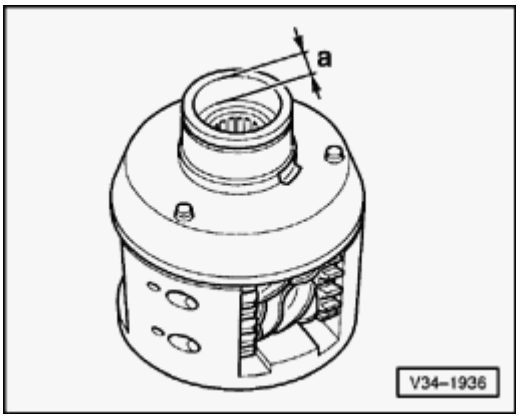


Fig. 205: Installation Position Of Rear Needle Bearing, Dimension
Courtesy of VOLKSWAGEN UNITED STATES, INC.

- Dimension a = 14 mm

Pressing in needle bearing

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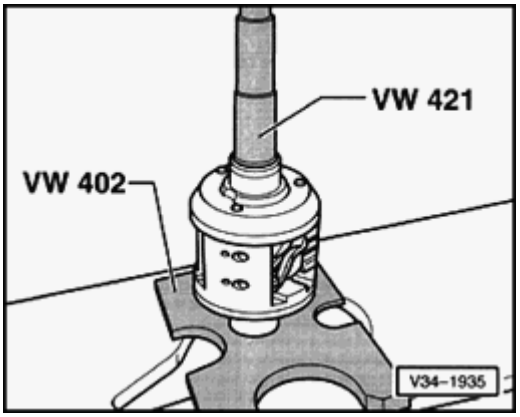


Fig. 206: Pressing In Needle Bearing
Courtesy of VOLKSWAGEN UNITED STATES, INC.

Both needle bearings in Torsen differential are pressed in using the same special tool.

Pressing in Torsen differential

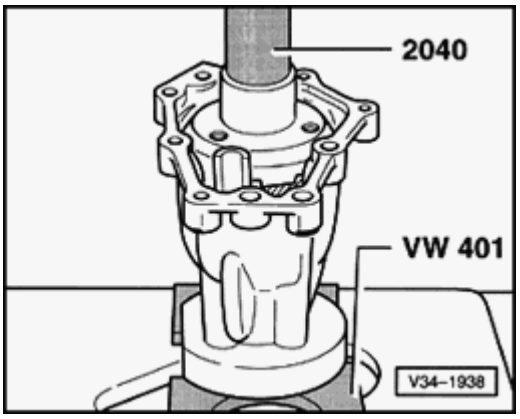


Fig. 207: Pressing In Torsen Differential
Courtesy of VOLKSWAGEN UNITED STATES, INC.

Driving in oil seal

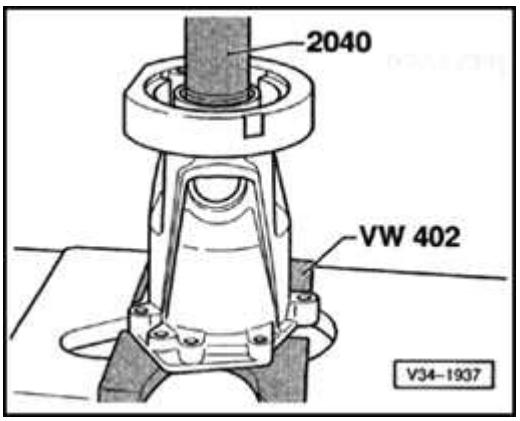


Fig. 208: Driving In Sealing Ring

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Courtesy of VOLKSWAGEN UNITED STATES, INC.

- Slightly oil circumference of oil seal.
- Installation position: 2 mm below surface of housing
- Fill space between sealing lip and dust lip with sealing grease G 052 128 A1.

TRANSMISSION SHIFT MECHANISM, DISASSEMBLING AND ASSEMBLING

Transmission shift mechanism, disassembling and assembling

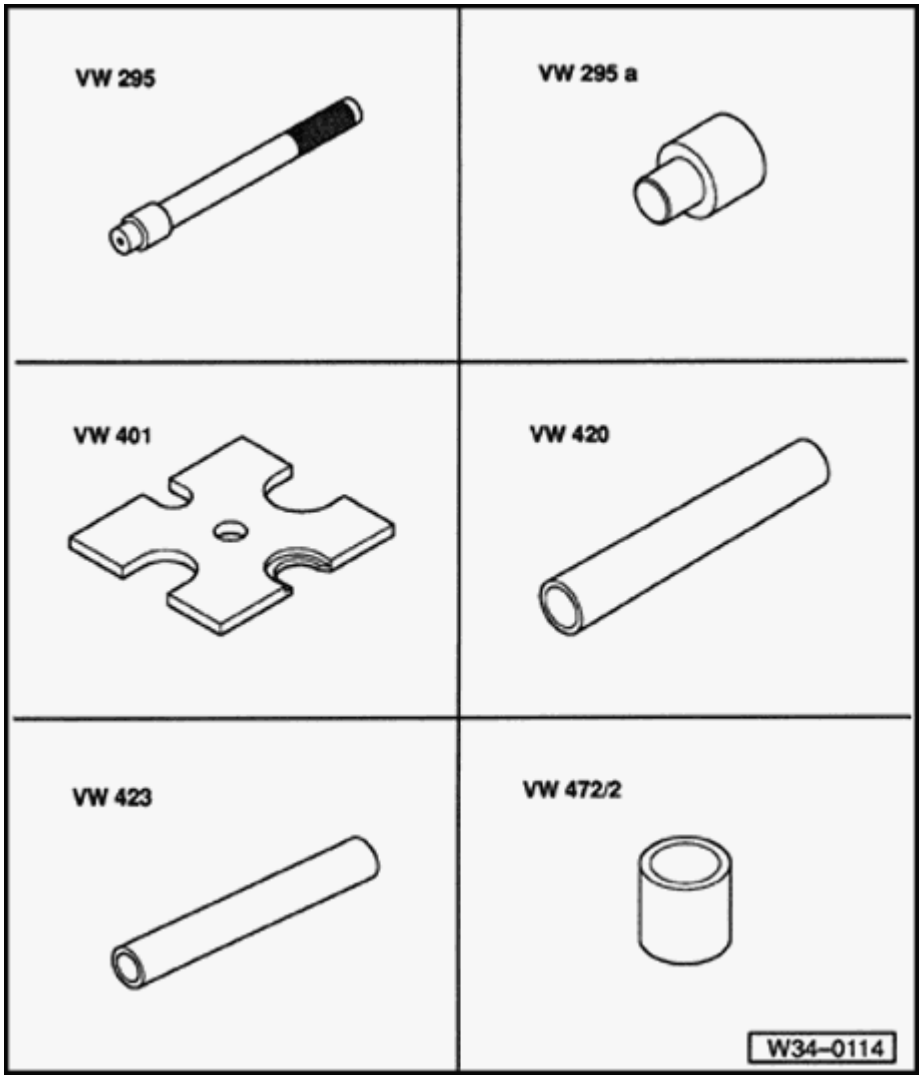


Fig. 209: Identifying Special Tools - Shift Mechanism On Transmission Side, Disassembling And Assembling
Courtesy of VOLKSWAGEN UNITED STATES, INC.

Special tools and workshop equipment required

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- VW 295 Mandrel
- VW 295 A Adapter
- VW 401 Pressure plate
- VW 420 Tubular section
- VW 423 Tubular section
- VW 472/2 Spacer sleeve

Special tools and workshop equipment required

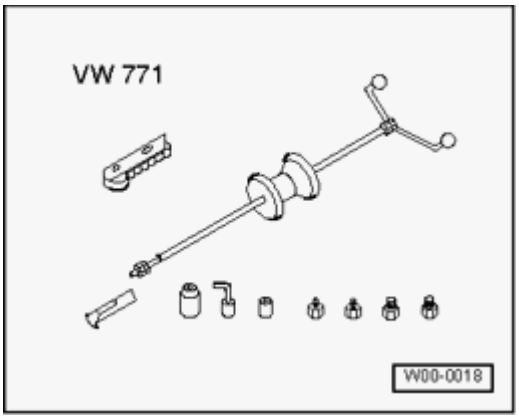


Fig. 210: Slide Hammer-Multi-Purpose Tool Set VW 771
Courtesy of VOLKSWAGEN UNITED STATES, INC.

- VW 771 Multi-purpose tool

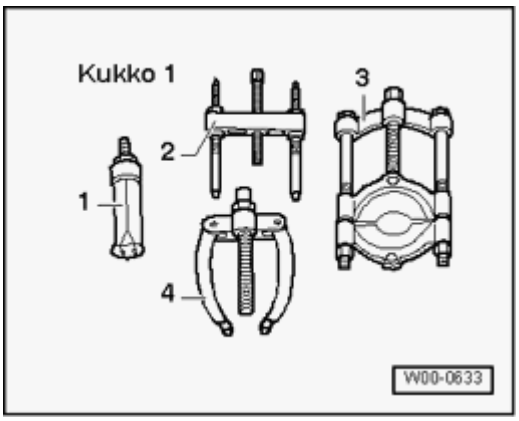


Fig. 211: Kukko 21/2 Internal puller, Kukko 21/4 Internal puller, Kukko 22/2 Counter support
Courtesy of VOLKSWAGEN UNITED STATES, INC.

- 1 - Kukko 21/4 Internal puller

NOTE: **Installation position of shift mechanism assembly in transmission. See Installation position of shift mechanism assembly in transmission**

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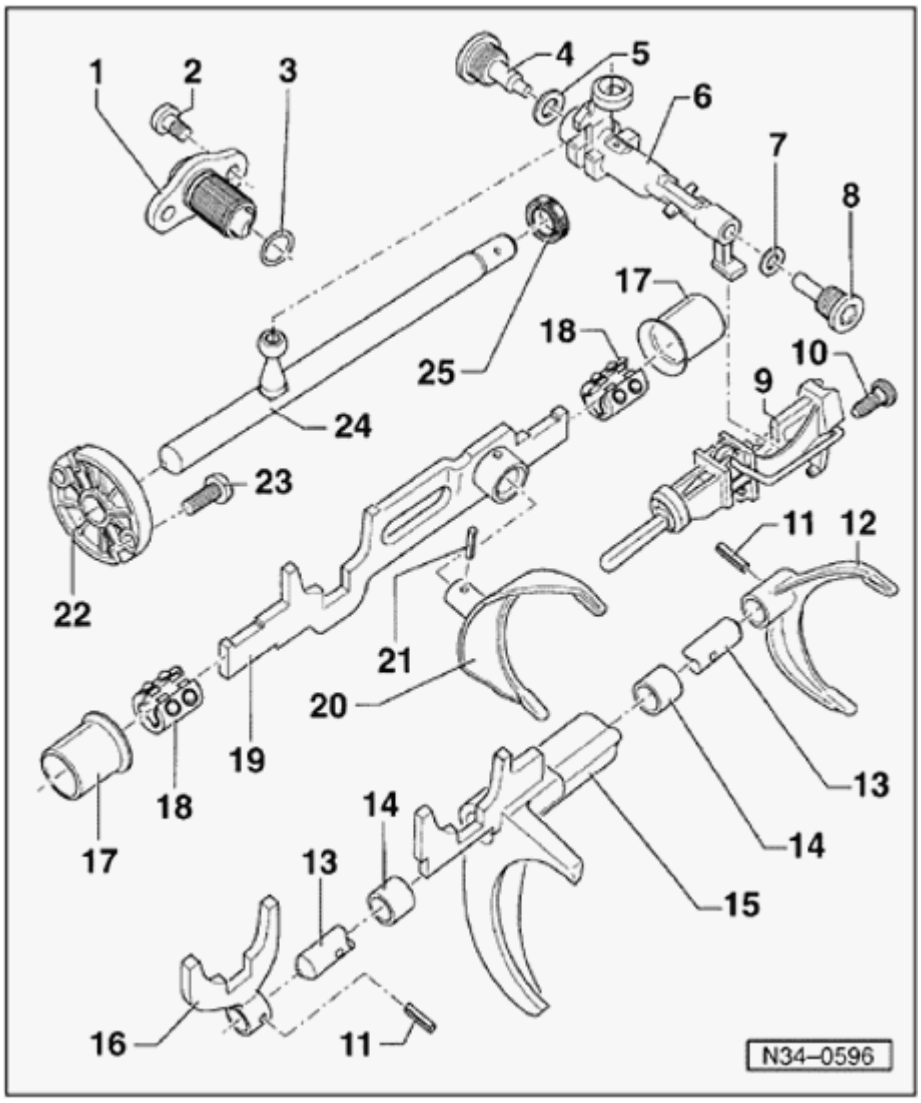


Fig. 212: Shift Mechanism In Transmission, Overview
Courtesy of VOLKSWAGEN UNITED STATES, INC.

1 - Locking unit for 5th gear and reverse gear

- Removing and installing. Refer to **Removing and installing locking unit for 5th gear and reverse gear**

2 - TORX bolt, 10 Nm

3 - O-ring

- Always replace

4 - Right stop bolt, 40 Nm

5 - Damping washer

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6 - Guide shaft

7 - Damping washer

8 - Left stop bolt, 40 Nm

9 - Detent segment

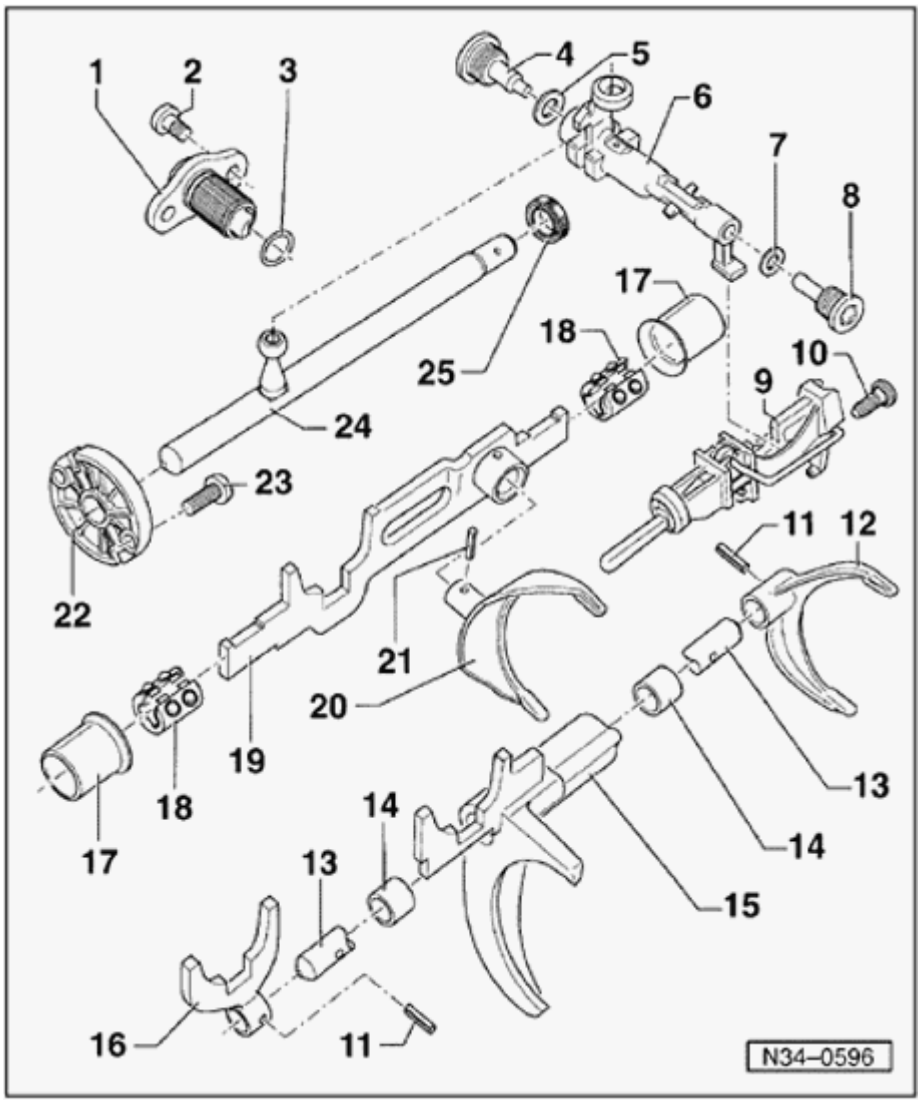


Fig. 213: Shift Mechanism In Transmission, Overview
Courtesy of VOLKSWAGEN UNITED STATES, INC.

10 - TORX bolt, 25 Nm

11 - Spring pin

12 - 5th and reverse gear selector fork

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- Installation position. See **Installation position of 5th and reverse gear selector fork and of driver for selector rod**

13 - Selector rod for 1st and 2nd gear and for 5th and reverse gear

14 - Ball sleeve

- Removing and installing. See **Removing and installing ball sleeve**

15 - 1st and 2nd gear selector fork

16 - Driver

- Installation position. See **Installation position of 5th and reverse gear selector fork and of driver for selector rod**

17 - Mounting bushing for 3rd and 4th gear

- Extracting. See **Pulling out mounting bushing for 3rd and 4th gear selector rod**
- Driving in. See **Driving in mounting bushing for 3rd and 4th gear selector rod as far as it will go**

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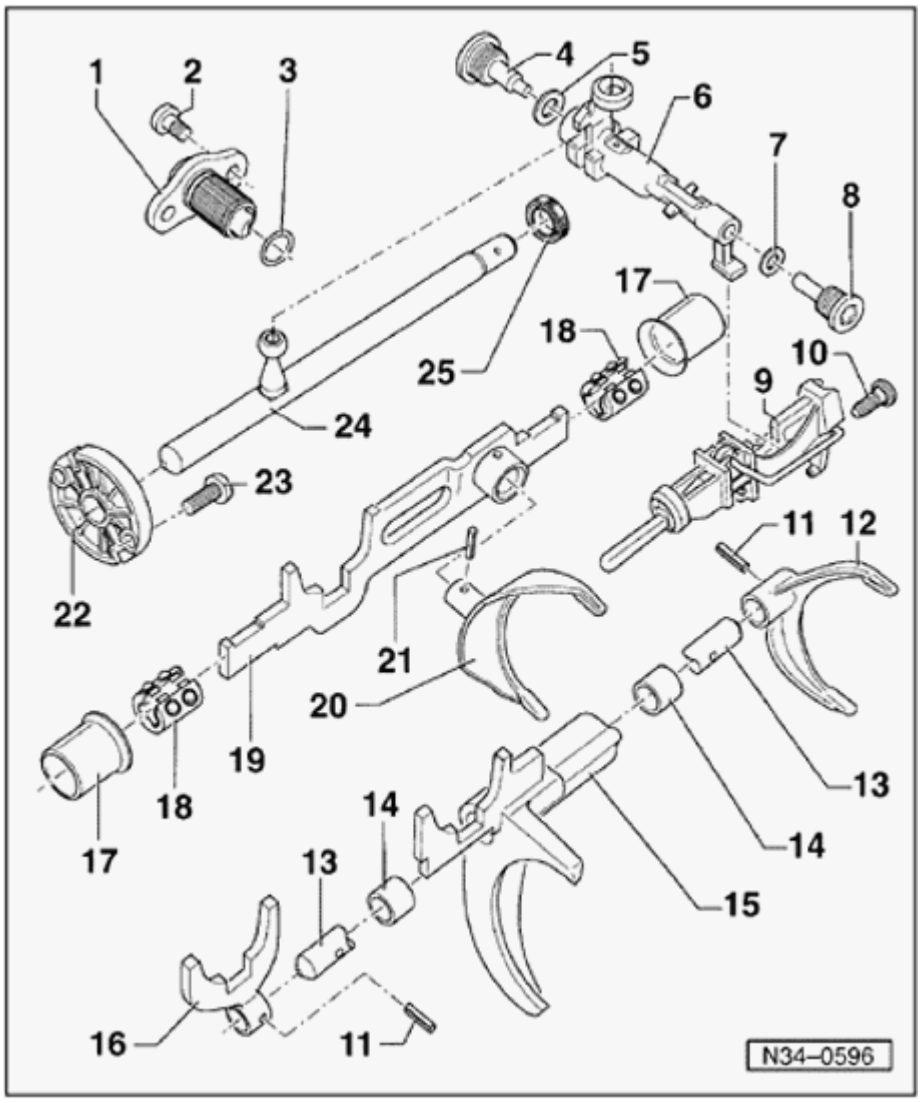


Fig. 214: Shift Mechanism In Transmission, Overview
Courtesy of VOLKSWAGEN UNITED STATES, INC.

18 - Ball sleeve

- Pry away from selector rod using a screwdriver
- Press onto selector rod

19 - Selector rod for 3rd. and 4th gear

20 - 3rd and 4th gear selector fork

21 - Spring pin

22 - Cover

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- For selector shaft

23 - TORX bolt, 20 Nm

24 - Selector shaft

25 - Oil seal

- Pry out with screwdriver
- Installation position. See **Installation position of oil seal**

Installation position of 5th and reverse gear selector fork and of driver for selector rod

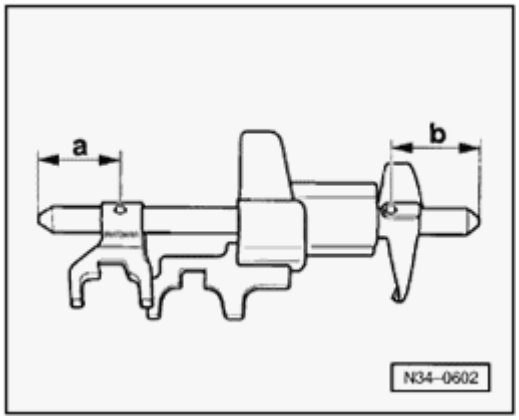


Fig. 215: Identifying Installed Position For 5th/Reverse Gear Shift Fork And Coupling Plate For Shift Rod
Courtesy of VOLKSWAGEN UNITED STATES, INC.

- Dimension a = 55 mm
- Dimension b = 60 mm

Removing and installing ball sleeve

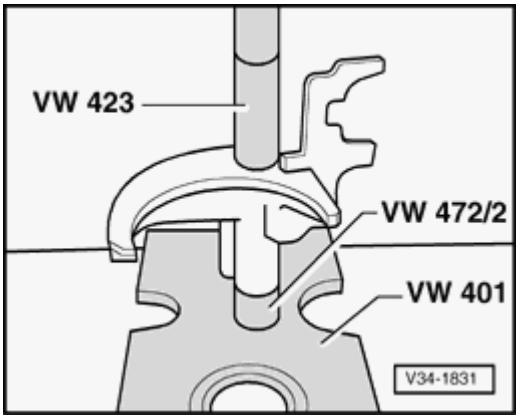


Fig. 216: Removing/Installing Ball Sleeve

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Courtesy of VOLKSWAGEN UNITED STATES, INC.

Pulling out mounting bushing for 3rd and 4th gear selector rod

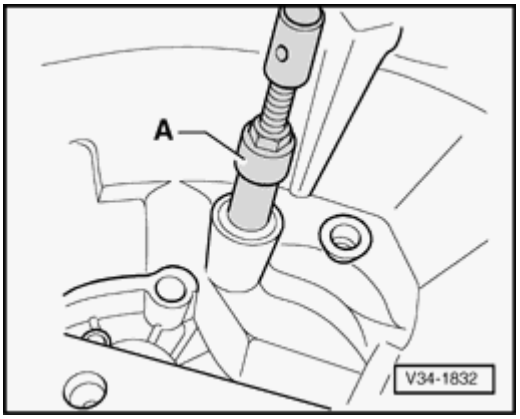


Fig. 217: Removing Bushing For 3rd And 4th Gear Shift Rod
Courtesy of VOLKSWAGEN UNITED STATES, INC.

A - Internal puller 22 to 28 mm, e.g. Kukko 21/4 in conjunction with multi-purpose tool VW 771

Driving in mounting bushing for 3rd and 4th gear selector rod as far as it will go

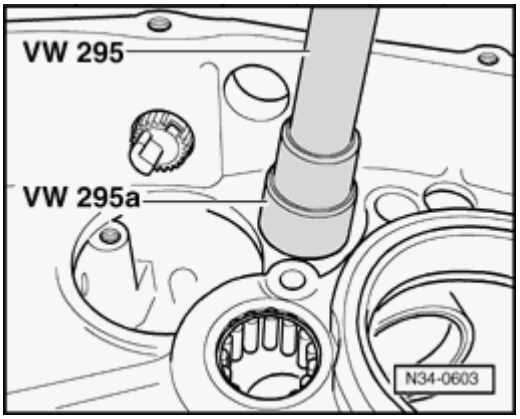


Fig. 218: Driving In Bushing For 3rd And 4th Gear Shift Rod
Courtesy of VOLKSWAGEN UNITED STATES, INC.

Installation position of oil seal

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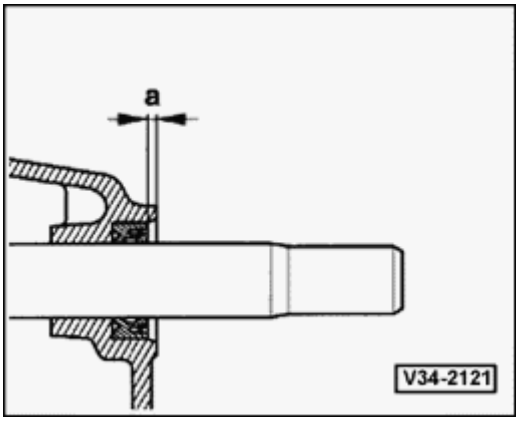


Fig. 219: Identifying Installed Position Of Sealing Washer
Courtesy of VOLKSWAGEN UNITED STATES, INC.

- Half-fill space between sealing lip and dust lip with sealing grease G 052 128 A1.
- Slightly oil circumference of sealing ring.
- Insert oil seal with tubular section VW 420

- Dimension a = 1 mm

Installation position of shift mechanism assembly in transmission

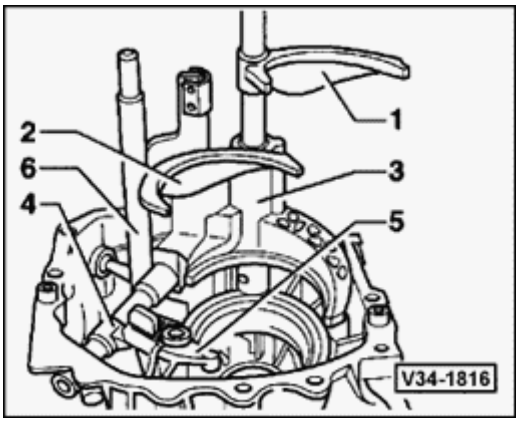


Fig. 220: Identifying Installed Position Of Complete Selector Mechanism In Transmission
Courtesy of VOLKSWAGEN UNITED STATES, INC.

1 - 5th and reverse gear selector fork

2 - 3rd and 4th gear selector fork

3 - 1st and 2nd gear selector fork

4 - Guide shaft

5 - Shifting catch

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6 - Selector shaft

Removing and installing locking unit for 5th gear and reverse gear

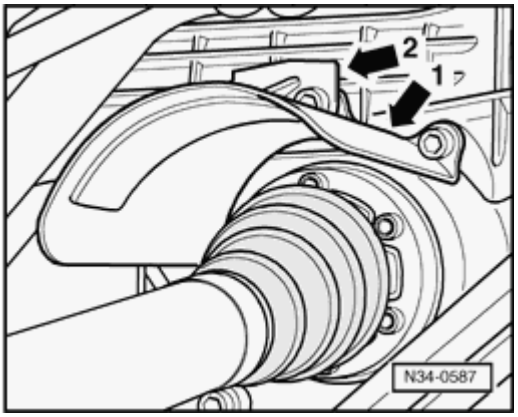


Fig. 221: Detaching Heat Shields And Right-Hand Axle Shaft
Courtesy of VOLKSWAGEN UNITED STATES, INC.

- Detach heat shield (arrow -2-) above right drive axle.
- Loosen heat shield (arrow -1-) above right drive axle and swivel downward.

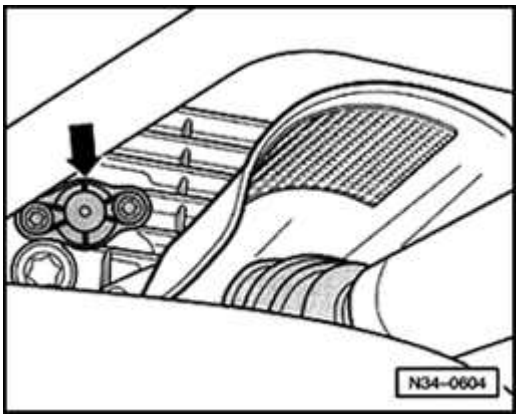


Fig. 222: Identifying Gear Lock
Courtesy of VOLKSWAGEN UNITED STATES, INC.

- Remove locking unit (arrow).

Assembling locking unit

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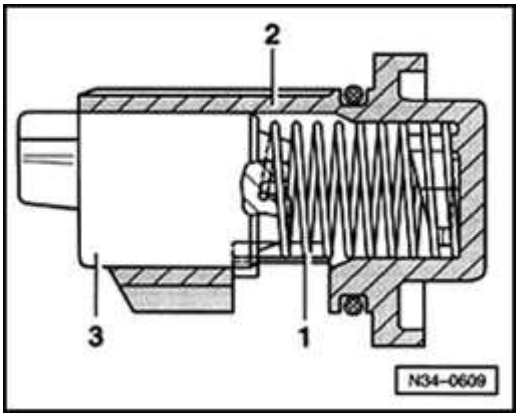


Fig. 223: Assembling Gear Lock
Courtesy of VOLKSWAGEN UNITED STATES, INC.

- Insert spring -1- in housing -2- and turn counter-clockwise with slight pressure until spring engages in base of housing.
- Position bushing -3- on spring in such a way that bent end of spring is located in the groove intended for this purpose.
- With bushing -3-, compress spring and rotate approx. 1 turn counter-clockwise until lug of bushing is located above groove in housing -2-.
- Press lug of bushing -3- into groove of housing -2- as far as it will go.
- Turn bushing -3- clockwise and release, bushing -3- jumps into installation position.

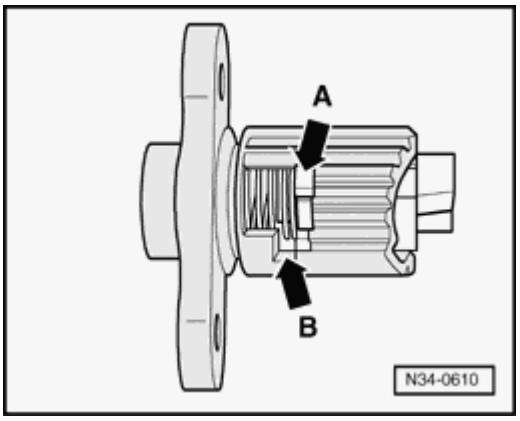


Fig. 224: Assembling Gear Lock
Courtesy of VOLKSWAGEN UNITED STATES, INC.

Installation position of bushing:

Lug (arrow -A-) of bushing must always be positioned opposite groove (arrow -B-) of housing.

Checking installation position:

- Turn bushing counter-clockwise and release.

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- Bushing must always spring back into position, lug must be pushed on as far as it will go -direction of arrow A-

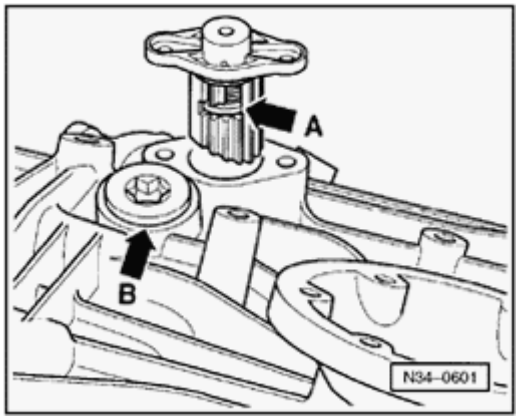


Fig. 225: Installed Position Of Complete Gear Lock In Transmission
Courtesy of VOLKSWAGEN UNITED STATES, INC.

Installation position of locking unit assembly in transmission:

Recess (arrow -A-) faces bolt (arrow -B-)

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35 MANUAL TRANSMISSION - GEARS, SHAFTS

INPUT SHAFT, DISASSEMBLING AND ASSEMBLING

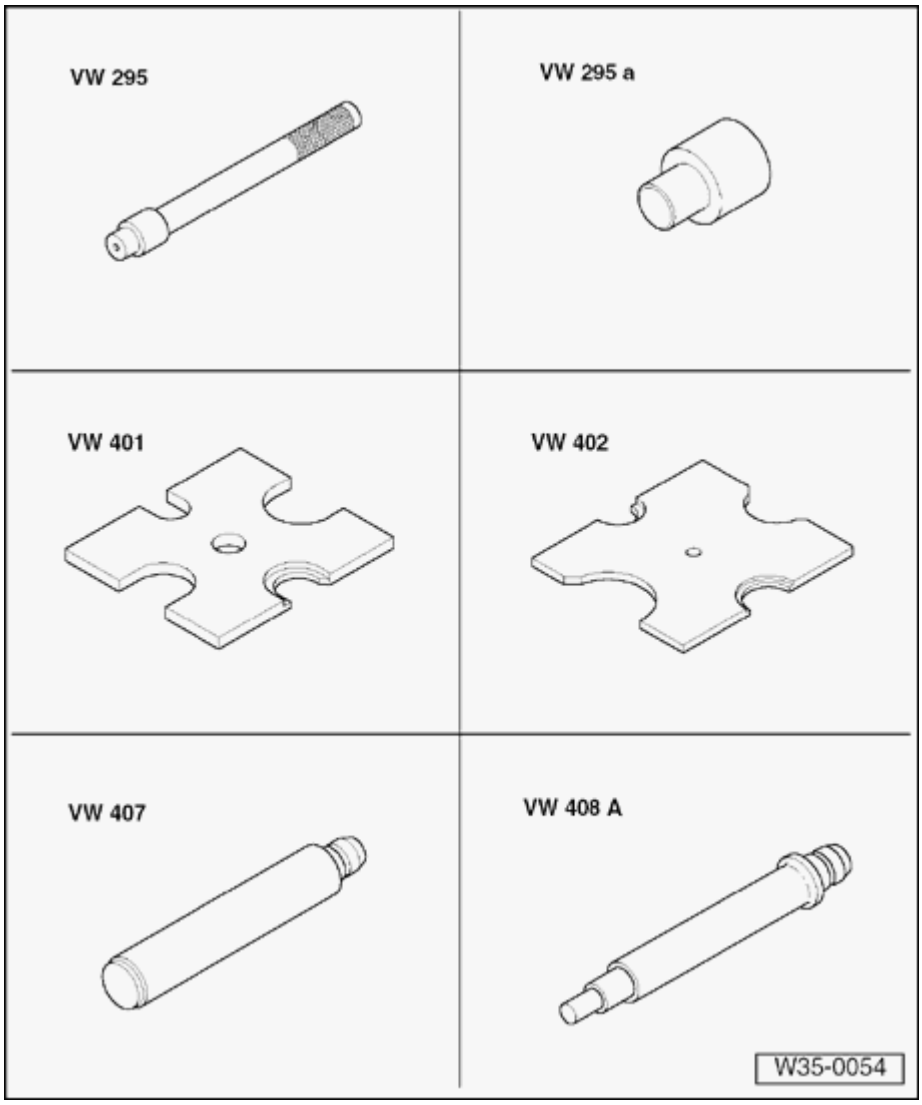


Fig. 226: Identifying Special Tools - Input Shaft, Disassembling And Assembling
Courtesy of VOLKSWAGEN UNITED STATES, INC.

Special tools and equipment

- VW 295 Mandrel
- VW 295 A Adapter
- VW 401 Pressure plate
- VW 402 Pressure plate
- VW 407 Press tool

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- VW 408 A Press tool

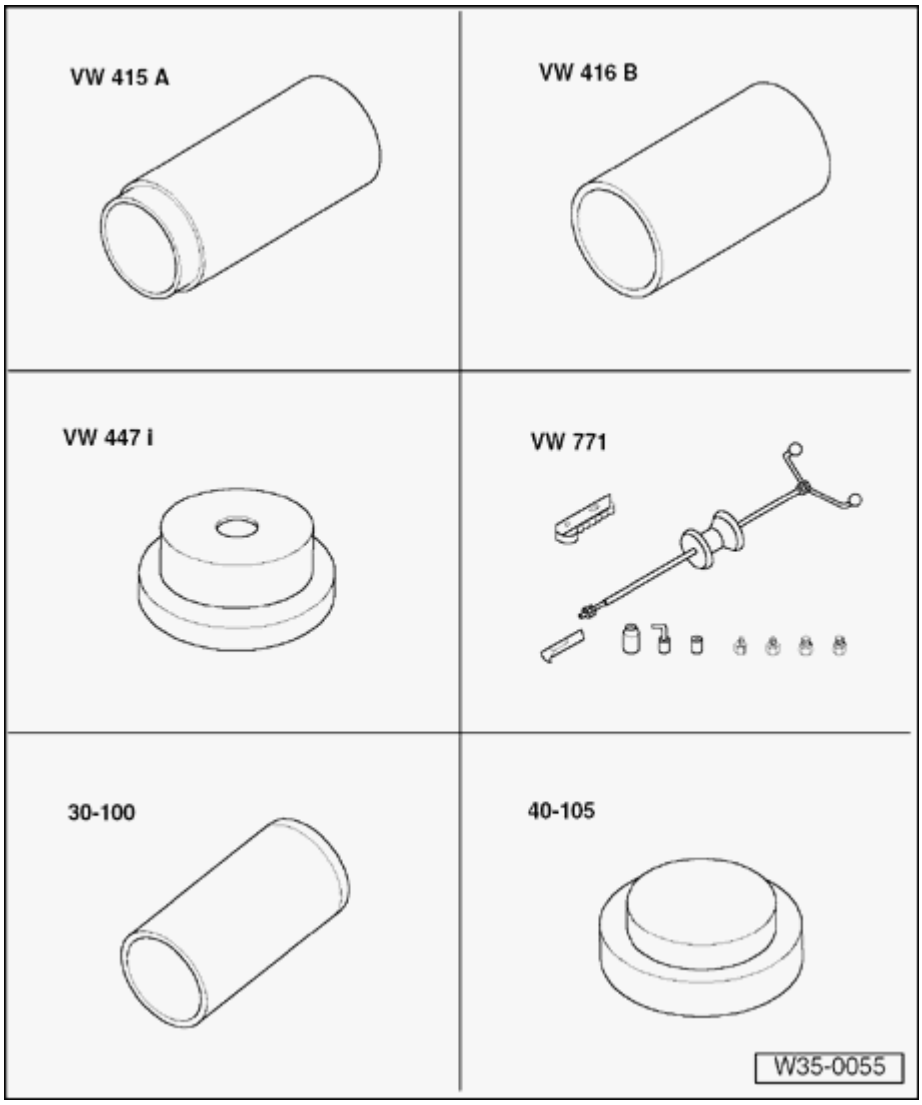


Fig. 227: Identifying Special Tools - Input Shaft, Disassembling And Assembling
Courtesy of VOLKSWAGEN UNITED STATES, INC.

Special tools and workshop equipment required

- VW 415 A Tubular section
- VW 416 B Tubular section
- VW 447 i Thrust pad
- VW 771 Multi-purpose tool

- 30-100 Press tube
- 40-105 Thrust plate

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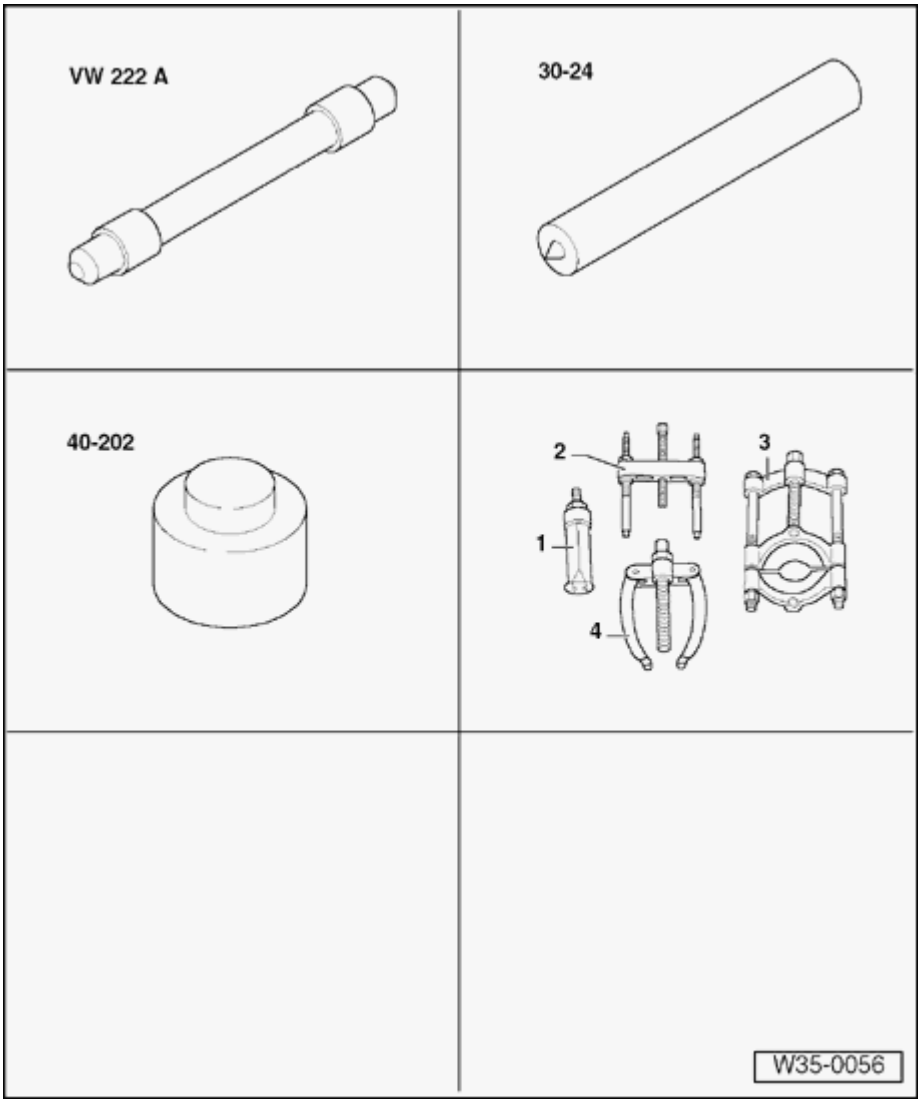


Fig. 228: Identifying Special Tools - Input Shaft, Disassembling And Assembling
Courtesy of VOLKSWAGEN UNITED STATES, INC.

Special tools and workshop equipment required

- VW 222 A Mandrel
- 30-24 Mandrel
- 40-202 Pressing-out element
- 1 - Kukko 21/4 Internal puller
- 3 - Kukko 17/2 Separating tool

NOTE:

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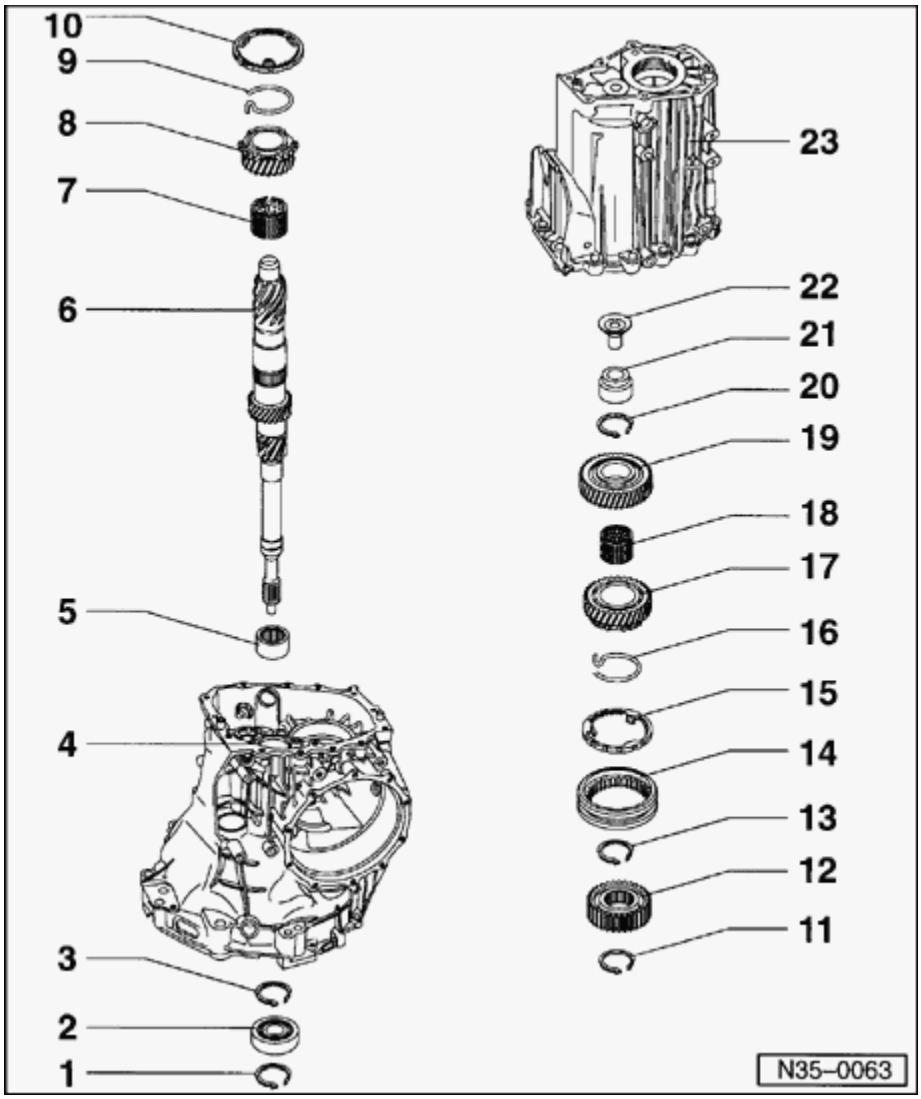


Fig. 229: Input Shaft, Overview
Courtesy of VOLKSWAGEN UNITED STATES, INC.

- **Observe technical data when installing new gear wheels or the input shaft. Refer to Code letters, assignment of mechanical units, transmission ratios and capacities.**
- **Replacing components -items 2, 4 and 6 --> Input shaft, disassembling and assembling influences the position of the ball bearing. In this case, input shaft must be re-adjusted. Refer to Input shaft, adjusting.**

1 - Circlip

- Mark
- Installation position **Installation position of circlips**- item 1
- Determining thickness. Refer to Adjusting input shaft: Refer to **Input shaft, adjusting**

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2 - Ball bearing

- Removing and installing. Refer to **Ball bearing for input shaft, multi-function sensor, pinion, selector rods, transmission cover and Torsen differential housing, removing and installing**

3 - Circlip

- Mark
- Installation position **Installation position of circlips** - item 2
- Determining thickness. Refer to Adjusting input shaft: Refer to **Input shaft, adjusting**

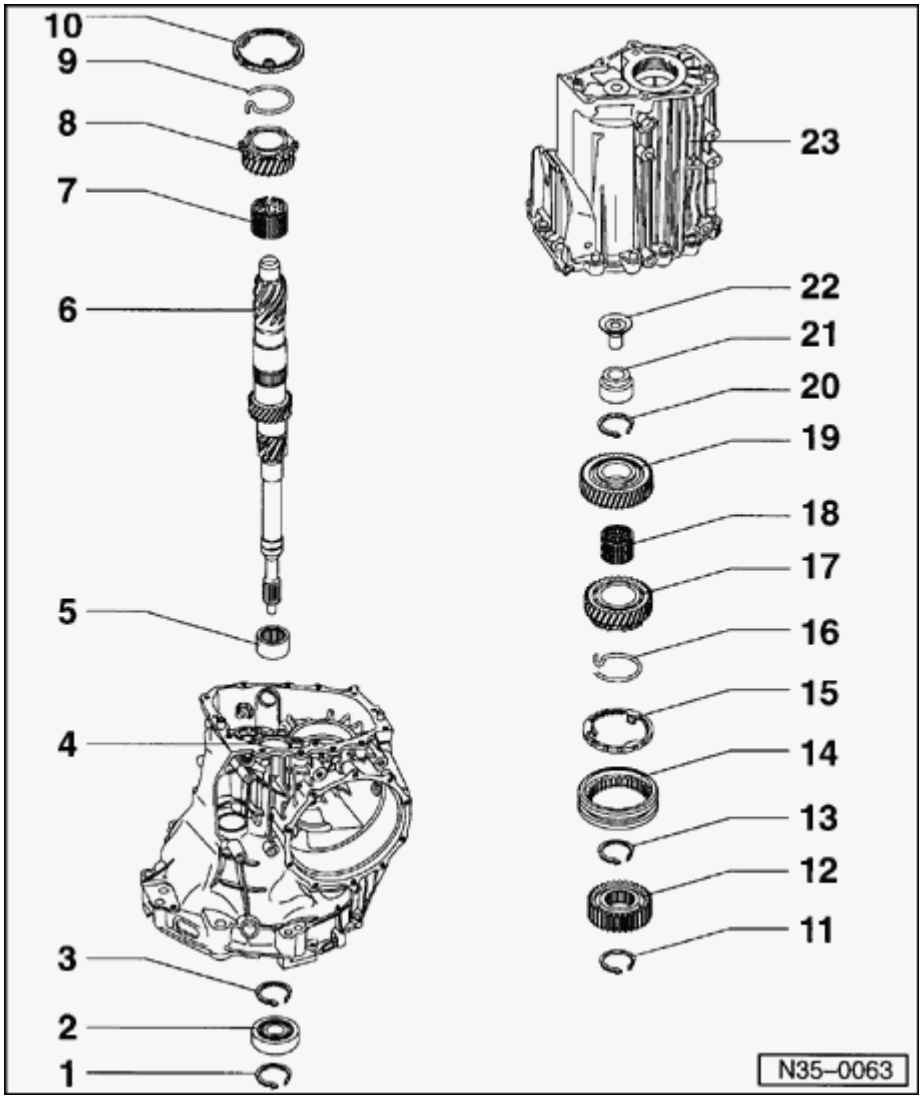


Fig. 230: Input Shaft, Overview
Courtesy of VOLKSWAGEN UNITED STATES, INC.

4 - Transmission housing

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5 - Needle bearing

- Secured with bolt. See **Locking bolt for needle bearing**
- Extracting. See **Extracting needle bearing**
- Installation position. See **Installation position of needle bearing**
- Pressing in. See **Pressing in needle bearing**

6 - Input shaft

- With oiling sleeve
- Driving in oiling sleeve. See **Driving oiling sleeve into input shaft**
- Adjusting. Refer to **Input shaft, adjusting**

7 - Needle bearing for 3rd gear

8 - Sliding gear for 3rd gear

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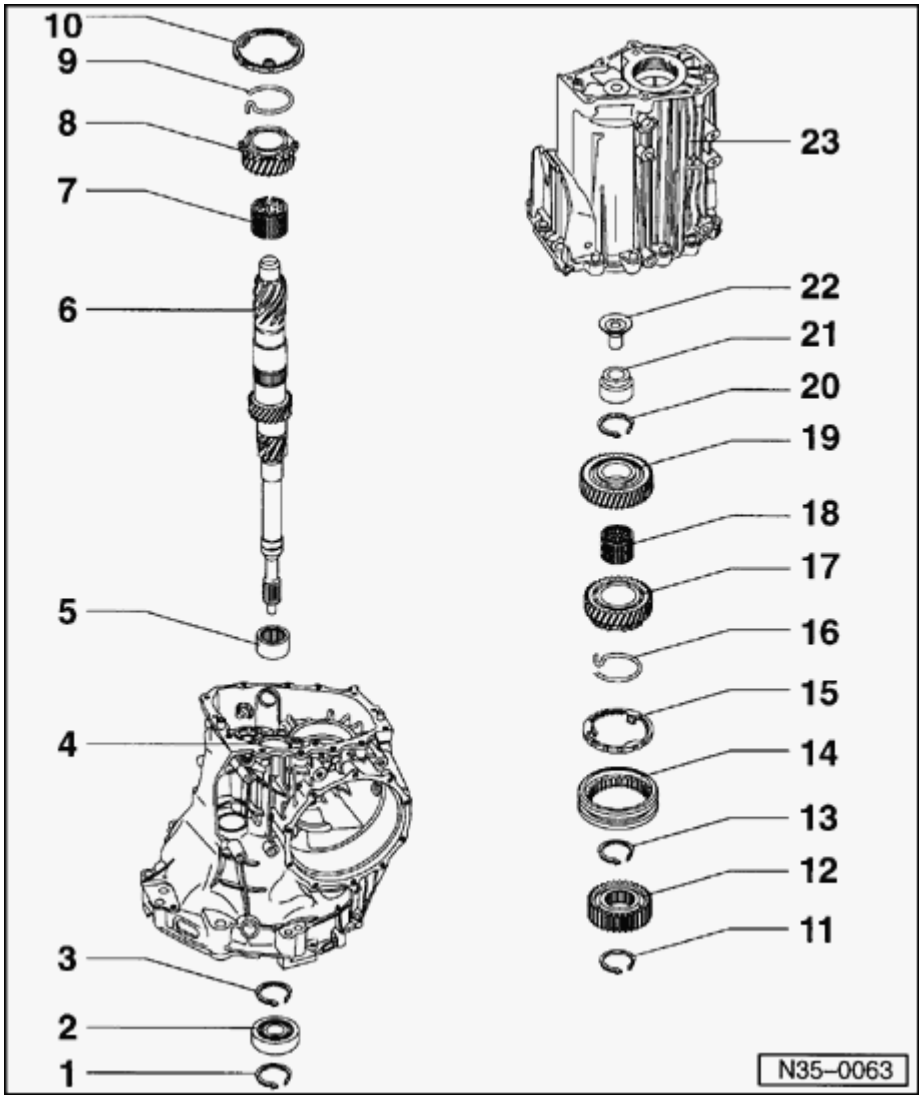


Fig. 231: Input Shaft, Overview
Courtesy of VOLKSWAGEN UNITED STATES, INC.

9 - Spring

- Inserting in 3rd gear sliding gear. See **Inserting spring into sliding gear**
- Assignment to sliding gear

10 - 3rd gear synchro-ring

- Checking for wear. See **Checking synchro-ring for wear**

11 - Circlip

- Mark
- Installation position **Installation position of circlips** - item 3

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12 - 3rd and 4th gear synchro-hub

- High collar faces 3rd gear
- Pressing off. See **Pressing out 3rd and 4th gear synchro-hub**
- Pressing on. See **Pressing on 3rd and 4th gear synchro-hub**

13 - Circlip

- Mark
- Installation position **Installation position of circlips**- item 4
- Re-determine when replacing synchro-hub. See **Determining circlip**

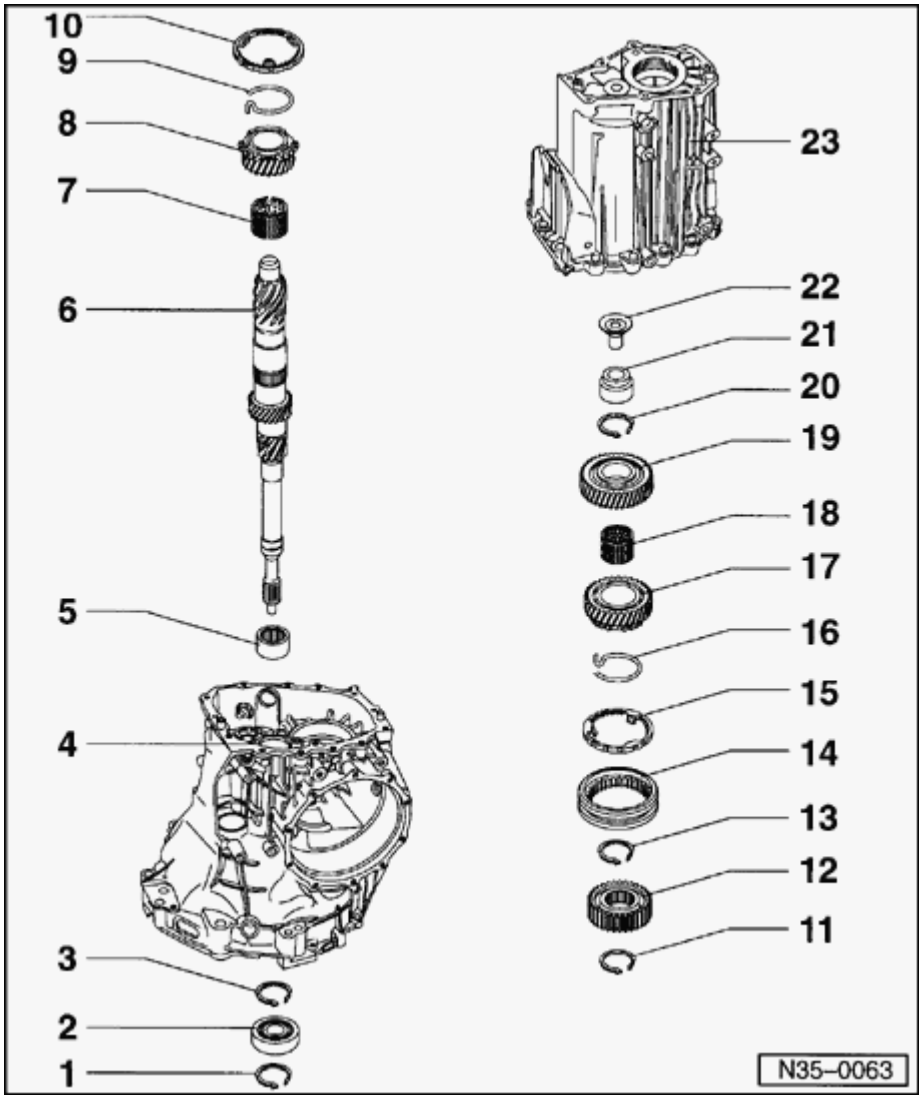


Fig. 232: Input Shaft, Overview
Courtesy of VOLKSWAGEN UNITED STATES, INC.

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14 - 3rd and 4th gear locking collar

- Installation position. See **Installation position of locking collar**

15 - 4th gear synchro-ring

- Checking for wear. See **Checking synchro-ring for wear**

16 - Spring

- Inserting in 4th gear sliding gear. See **Inserting spring into sliding gear**
- Assignment to sliding gear

17 - 4th gear sliding gear

18 - 4th gear needle bearing

19 - 5th gear wheel

- Pressing off. See **Pressing out 5th gear wheel**
- Pressing on. See **Pressing on 5th gear wheel**

20 - Circlip

- Mark
- Installation position **Installation position of circlips**- item 5
- Re-determine when replacing 5th gear wheel. See **Determining circlip**

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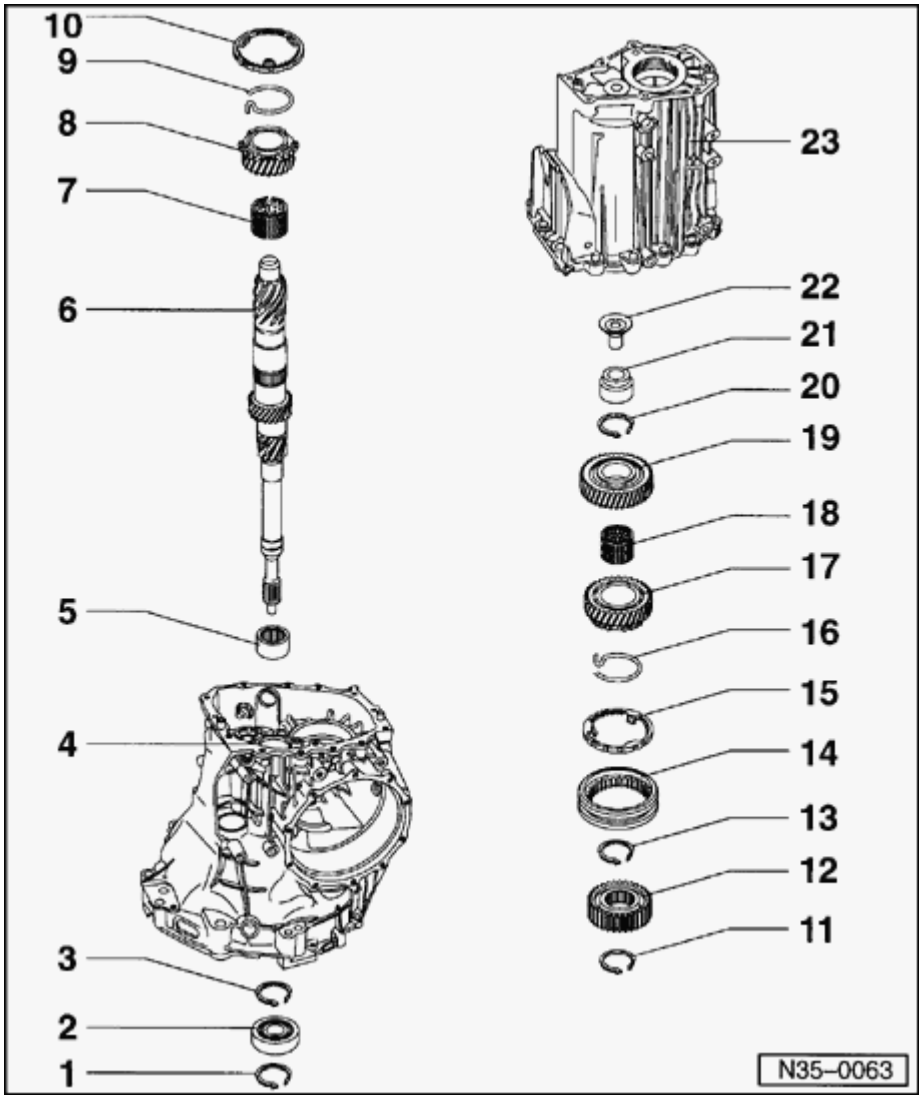


Fig. 233: Input Shaft, Overview
Courtesy of VOLKSWAGEN UNITED STATES, INC.

21 - Roller sleeve

- Replace
- Is damaged on removal
- Extracting. See **Extracting roller sleeve**
- Installation position. See **Installation position of roller sleeve**
- Driving in. See **Driving in roller sleeve**

22 - Sleeve

- Plastic

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23 - Transmission cover

Locking bolt for needle bearing

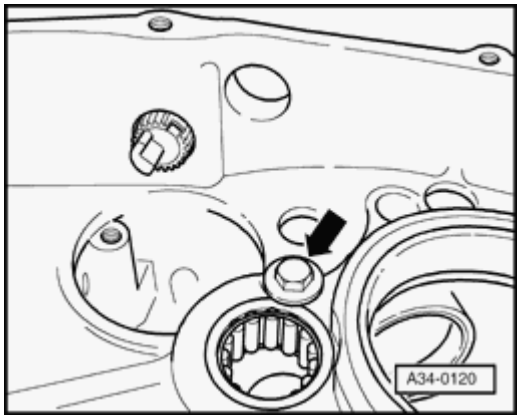


Fig. 234: Location Of Securing Bolt
Courtesy of VOLKSWAGEN UNITED STATES, INC.

- Remove locking bolt (arrow).

NOTE: Bolt is not always installed.

Extracting needle bearing

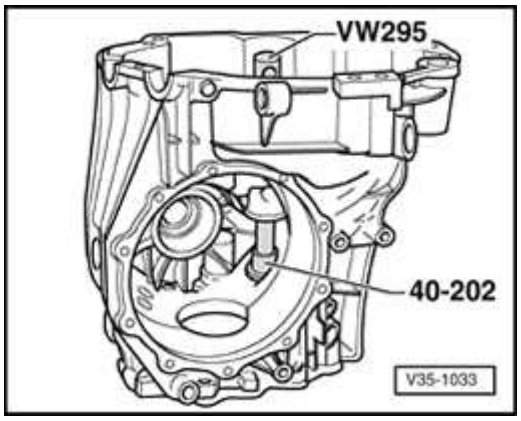


Fig. 235: Driving Out Needle Bearing
Courtesy of VOLKSWAGEN UNITED STATES, INC.

Installation position of needle bearing

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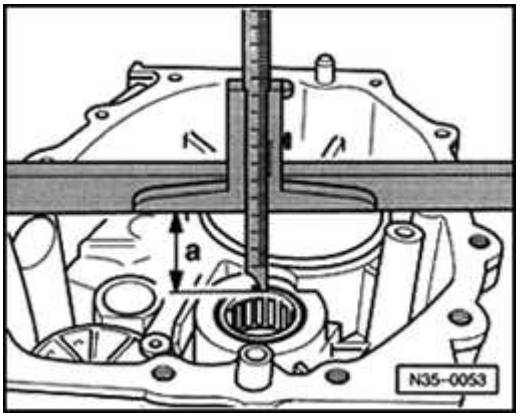


Fig. 236: Installation Position Of Needle Bearing
Courtesy of VOLKSWAGEN UNITED STATES, INC.

Dimension -a- from bottom edge of rule to top edge of needle bearing = 39.5 mm

NOTE: Measure from top edge of rule and subtract height of rule from measured value.

Pressing in needle bearing

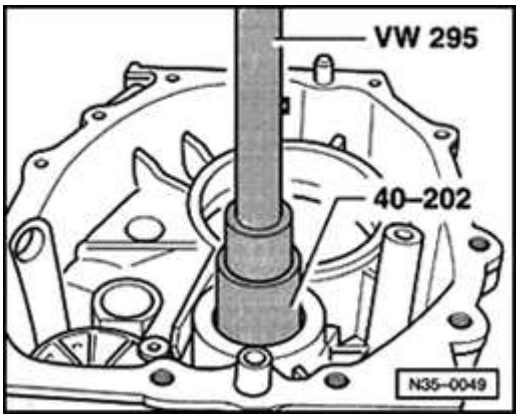


Fig. 237: Pressing In Needle Bearing
Courtesy of VOLKSWAGEN UNITED STATES, INC.

Locking bolt for needle bearing

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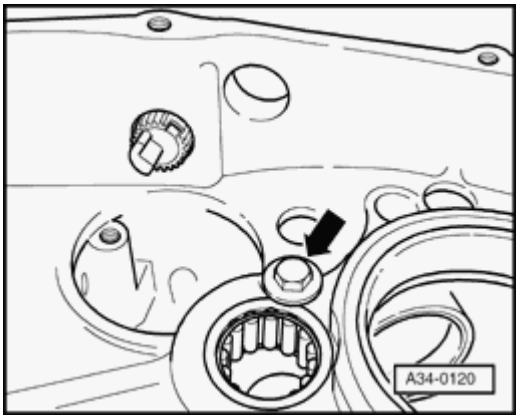


Fig. 238: Location Of Securing Bolt
Courtesy of VOLKSWAGEN UNITED STATES, INC.

- If installed, screw in locking bolt and tighten to 25 Nm.

Driving oiling sleeve into input shaft

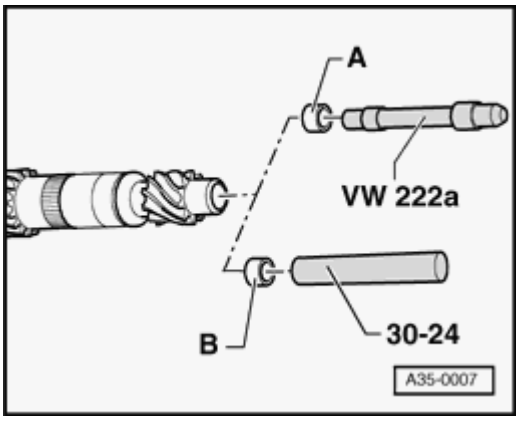


Fig. 239: Driving In Oiling Sleeve Into Input Shaft
Courtesy of VOLKSWAGEN UNITED STATES, INC.

Item	Oiling sleeve diameter	Driving-in tool
A	14 mm	VW 222 A
B	16 mm	30-24

- Installation position:

Flared edge of oiling sleeve faces driving-in tool

- Drive-in depth:

3.5 mm below top edge

Extracting roller sleeve

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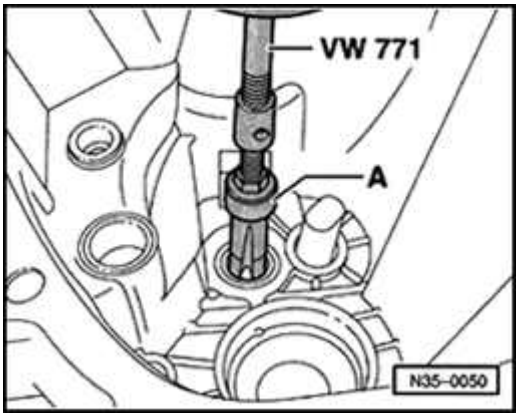


Fig. 240: Removing Roller Sleeve
Courtesy of VOLKSWAGEN UNITED STATES, INC.

A - Internal puller 22 to 28 mm, e.g. Kukko 21/4

- Before installing internal puller, destroy plastic bushing inside roller sleeve.

Installation position of roller sleeve

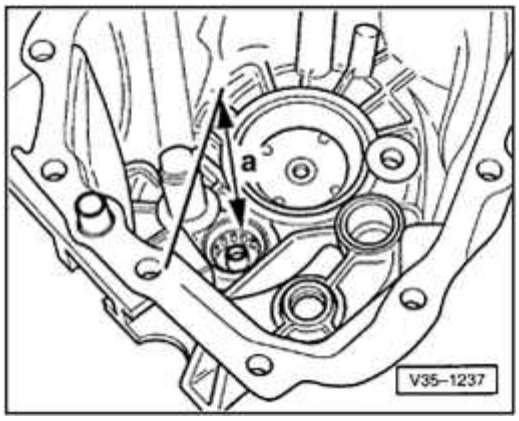


Fig. 241: Installed Position Of Roller Sleeve
Courtesy of VOLKSWAGEN UNITED STATES, INC.

- Dimension a = 216 mm

Driving in roller sleeve

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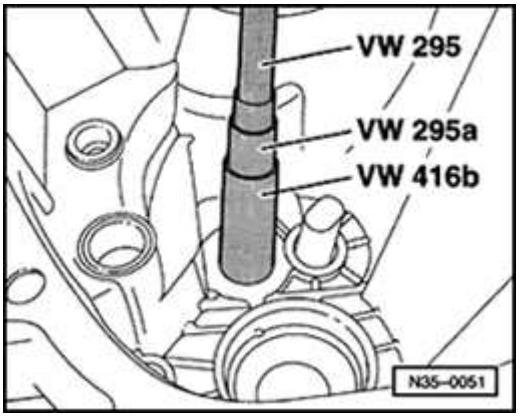


Fig. 242: Driving In Roller Sleeve
Courtesy of VOLKSWAGEN UNITED STATES, INC.

Pressing out 5th gear wheel

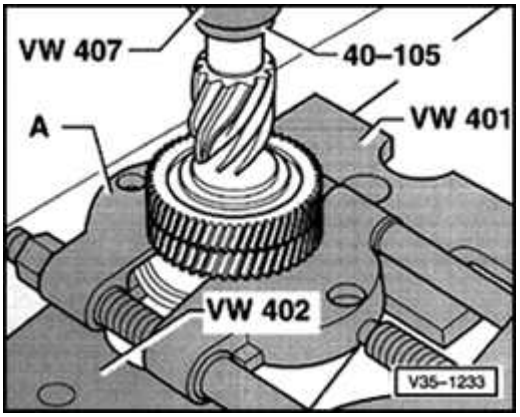


Fig. 243: Pressing Off 5th Gear
Courtesy of VOLKSWAGEN UNITED STATES, INC.

- Remove circlip before pressing out.

A - Separating tool 22 to 115 mm, e.g. Kukko 17/2

Pressing out 3rd and 4th gear synchro-hub

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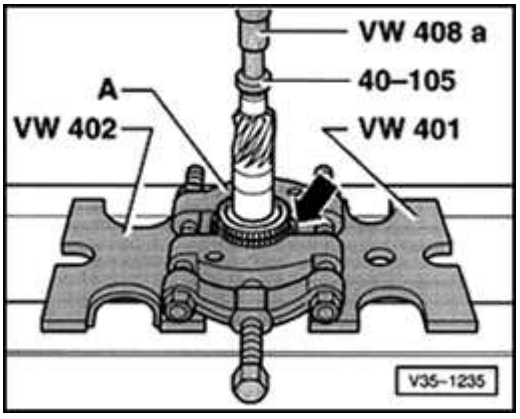


Fig. 244: Pressing Off Synchro-Hub For 3rd And 4th Gear
Courtesy of VOLKSWAGEN UNITED STATES, INC.

- Remove circlip before pressing out.
- Push 3rd gear synchro-ring (arrow) toward sliding gear for 3rd gear, then install separating tool -A-.

A - Separating tool 22 to 115 mm, e.g. Kukko 17/2

Inserting spring into sliding gear

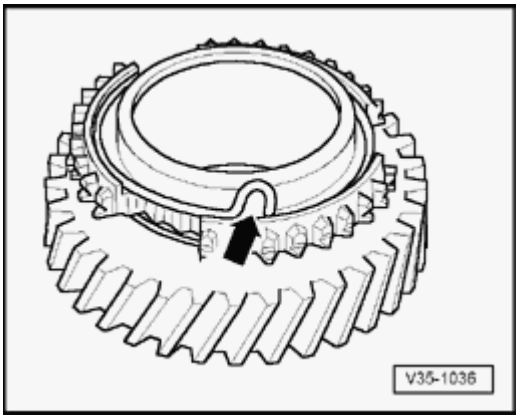


Fig. 245: Inserting Spring Into Gear
Courtesy of VOLKSWAGEN UNITED STATES, INC.

Bent end of spring (arrow) must be hooked into hole of sliding gear.

Checking synchro-ring for wear

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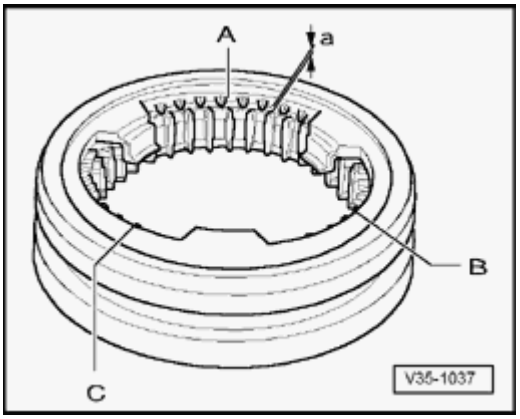


Fig. 246: Checking Synchronizer For Wear
Courtesy of VOLKSWAGEN UNITED STATES, INC.

- Push synchro-ring into locking collar and use feeler gauge to measure gap -a- at positions -A-, -B- and -C-.
- Add up measured values and divide by 3.

Obtained value must not be lower than 0.5 mm.

Installation position of circlips

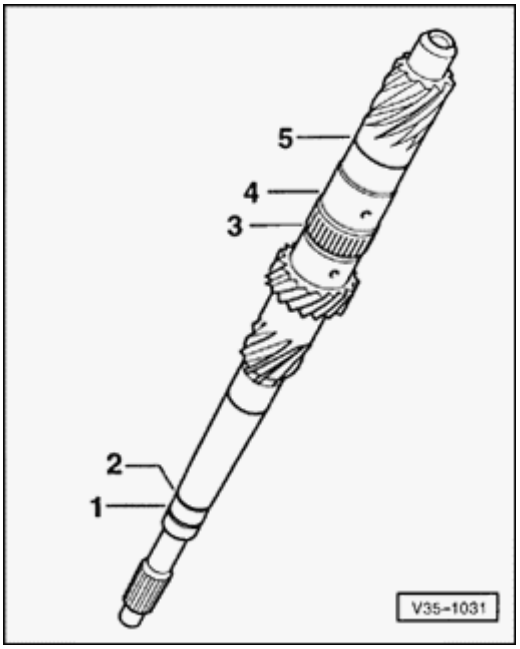


Fig. 247: Identifying Installed Positions Of Circlips
Courtesy of VOLKSWAGEN UNITED STATES, INC.

- Circlips -1- and -2- secure ball bearing of input shaft.

Determining thickness. Refer to **Input shaft, adjusting**.

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- Circlip -3- secures synchro-hub for 3rd and 4th gear.

Thickness 2.00 mm. Identifiable by: Color brown.

- Circlip -4- secures synchro-hub for 3rd and 4th gear.

Determining thickness. Refer to **Available circlips for 3rd and 4th gear synchro-hub**. Identifiable by: Color blue.

- Circlip -5- secures 5th gear wheel.

Determining thickness. Refer to **Available circlips for 5th gear wheel**.

Determining circlip

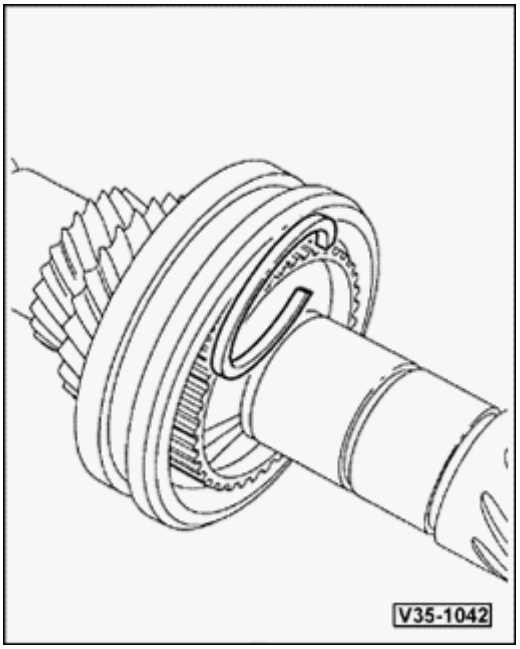


Fig. 248: Determining Circlip Fit
Courtesy of VOLKSWAGEN UNITED STATES, INC.

- Determine and install thickest circlip which can be inserted.
- Determine circlip as accurately as possible using chart. Part numbers:

Available circlips for 3rd and 4th gear synchro-hub

Circlip thickness (mm)		
1.90	1.96	2.02
1.93	1.99	2.05

Available circlips for 5th gear wheel

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Circlip thickness (mm)		
1.90	1.96	2.02
1.93	1.99	

Pressing on 3rd and 4th gear synchro-hub

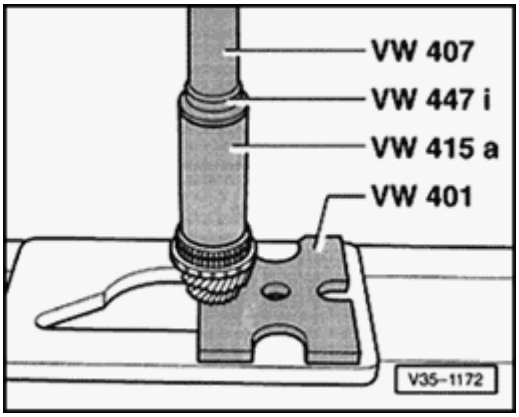


Fig. 249: Pressing On Synchronizer Hub For 3rd And 4th Gears
Courtesy of VOLKSWAGEN UNITED STATES, INC.

- Installation position:

High collar on inside faces 3rd gear

Installation position of locking collar

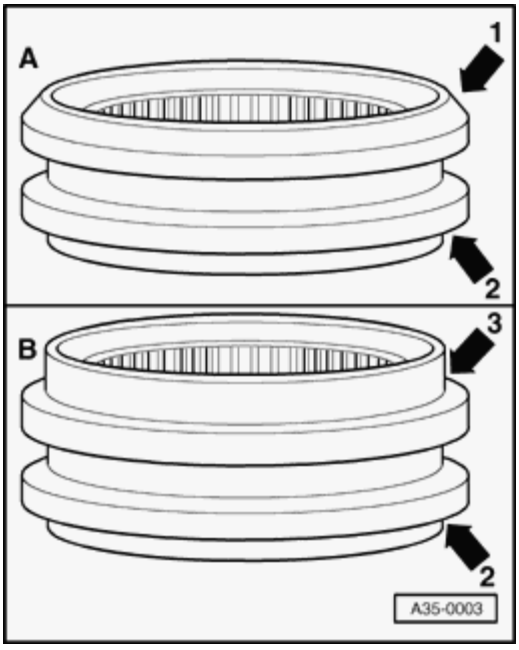


Fig. 250: Identifying Installed Position Of Operating Sleeve Up To Transmission Manufacture Date 22 06 3

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Courtesy of VOLKSWAGEN UNITED STATES, INC.

Locking collars with chamfer -A- and locking collars with high shoulder -B- are used for assembly.

- Installation position:

Chamfer (arrow -1-) faces 4th gear

Low shoulder (arrow -2-) faces 3rd gear

High shoulder (arrow -3-) faces 4th gear

Pressing on 5th gear wheel

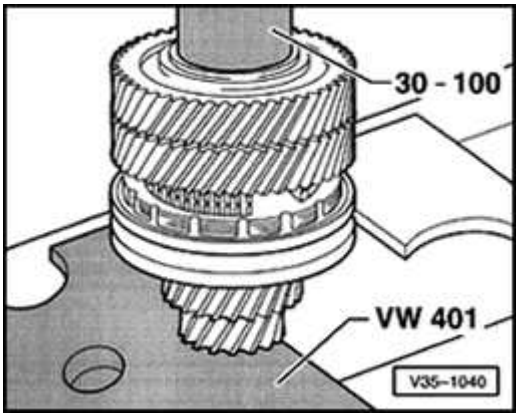


Fig. 251: Pressing On 5th Gear
Courtesy of VOLKSWAGEN UNITED STATES, INC.

WARNING: Wear protective gloves.

- Heat 5th gear wheel to approx. 100 ° C before pressing on.
- Installation position:

High collar faces reverse gear

INPUT SHAFT, ADJUSTING

Input shaft, adjusting

(Determining input shaft circlips)

Special tools and workshop equipment required

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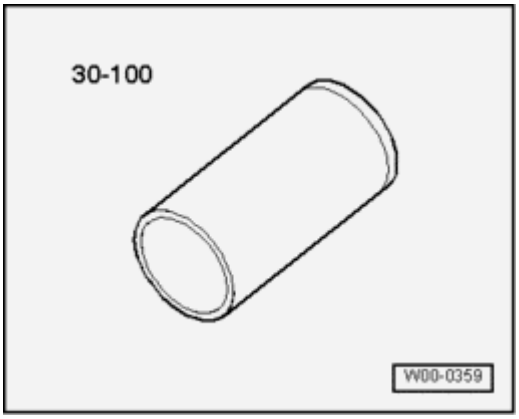


Fig. 252: Press Tube 30-100Identifying Special Tools - Oil Pump/Front Sealing Flange, Drive Chain And Chain Sprocket For Oil Pump, Removing And Installing
Courtesy of VOLKSWAGEN UNITED STATES, INC.

- 30-100 Press tube

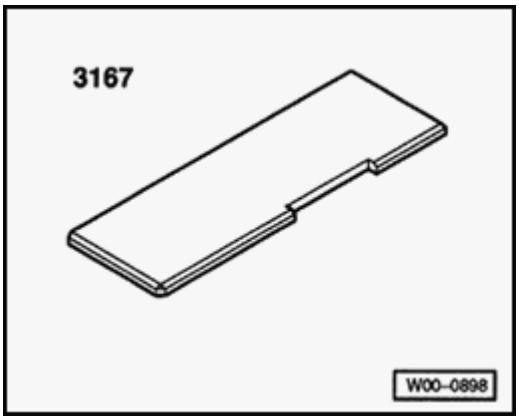


Fig. 253: Spacer Gauge 3167
Courtesy of VOLKSWAGEN UNITED STATES, INC.

- 3167 Distance gauge
- Depth slide gauge

Input shaft must be re-adjusted if

- Transmission housing
- Input shaft

or

- Ball bearing

is/are replaced.

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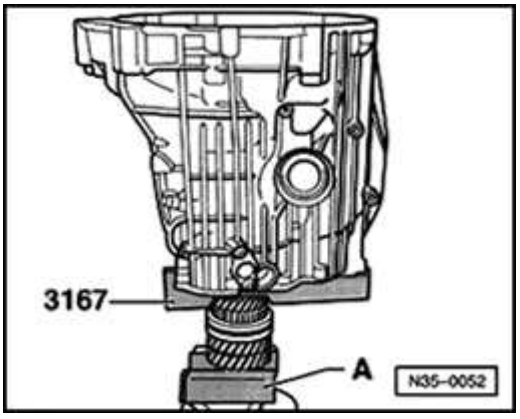


Fig. 254: Placing Transmission Housing Over Input Shaft Onto Spacer Gauge
Courtesy of VOLKSWAGEN UNITED STATES, INC.

- Clamp input shaft with soft jaws -A- in vice.
- Position distance gauge 3167 on 3rd gear sliding gear.
- Position transmission housing over input shaft onto distance gauge.

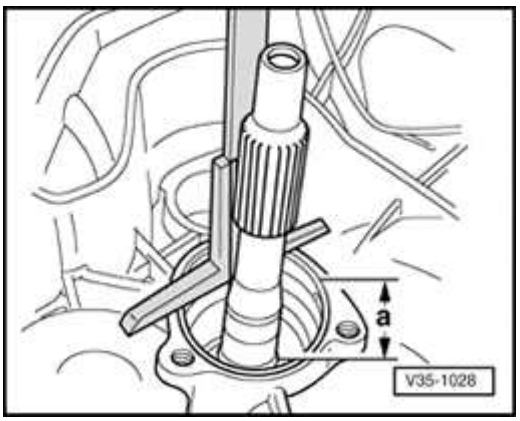


Fig. 255: Determining Circlip Thickness, Measuring Value "a"
Courtesy of VOLKSWAGEN UNITED STATES, INC.

- Position depth slide gauge on transmission housing and measure up to lower groove for circlip in input shaft.

- Measured value in following example: -a- = 28.50 mm

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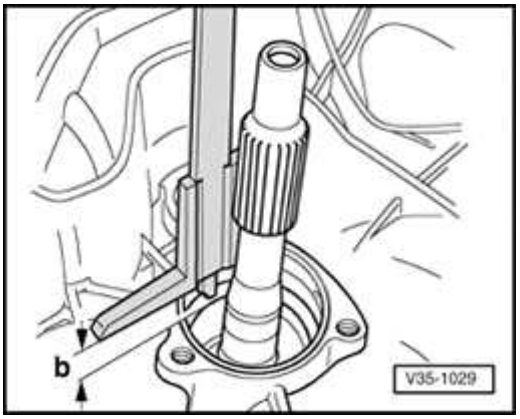


Fig. 256: Determining Circlip Thickness, Measuring Value "b"
Courtesy of VOLKSWAGEN UNITED STATES, INC.

- Position depth slide gauge on transmission housing and measure up to contact surface of ball bearing.
- Measured value in following example: -b- = 26.80 mm

Determining circlip behind ball bearing for input shaft

Formula:		
"x"	**=**	**dimension "a" - dimension "b"**

Example:		
	Dimension "a"	28.50 mm
-	Dimension "b"	26.80 mm
=	Dimension "x" (circlip thickness)	1.70 mm

- Determine circlip using chart. Part numbers

Available circlips

Dimension "x"	Thickness (mm)
1.48 to 1.56	1.54
1.57 to 1.65	1.63
1.66 to 1.74	1.72
1.75 to 1.83	1.81
1.84 to 1.92	1.90
1.93 to 2.01	1.99
2.02 to 2.10	2.08
2.11 to 2.20	2.17
2.21 to 2.27	2.25
2.28 to 2.35	2.33

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Determining circlip in front of ball bearing for input shaft

- Drive determined rear circlip and ball bearing onto input shaft using Press tube 30-100.

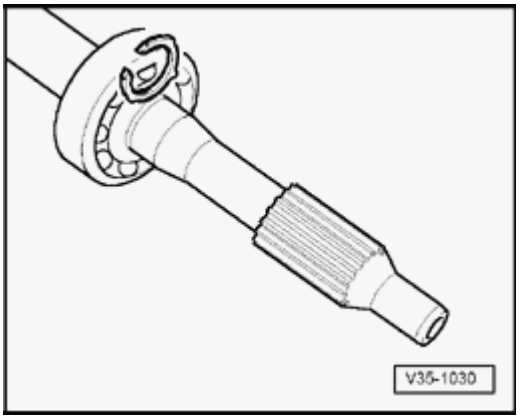


Fig. 257: Input Shaft And Thickest Circlip Which Can Still Just Be Installed
Courtesy of VOLKSWAGEN UNITED STATES, INC.

- Determine and install thickest circlip which can be inserted.
- Determine circlip as accurately as possible using chart. Part numbers:

Available circlips

Circlip thickness (mm)		
1.45	1.72	1.99
1.54	1.81	2.08
1.63	1.90	2.17

PINION AND HOLLOW SHAFT, DISASSEMBLING AND ASSEMBLING

Pinion and hollow shaft, disassembling and assembling

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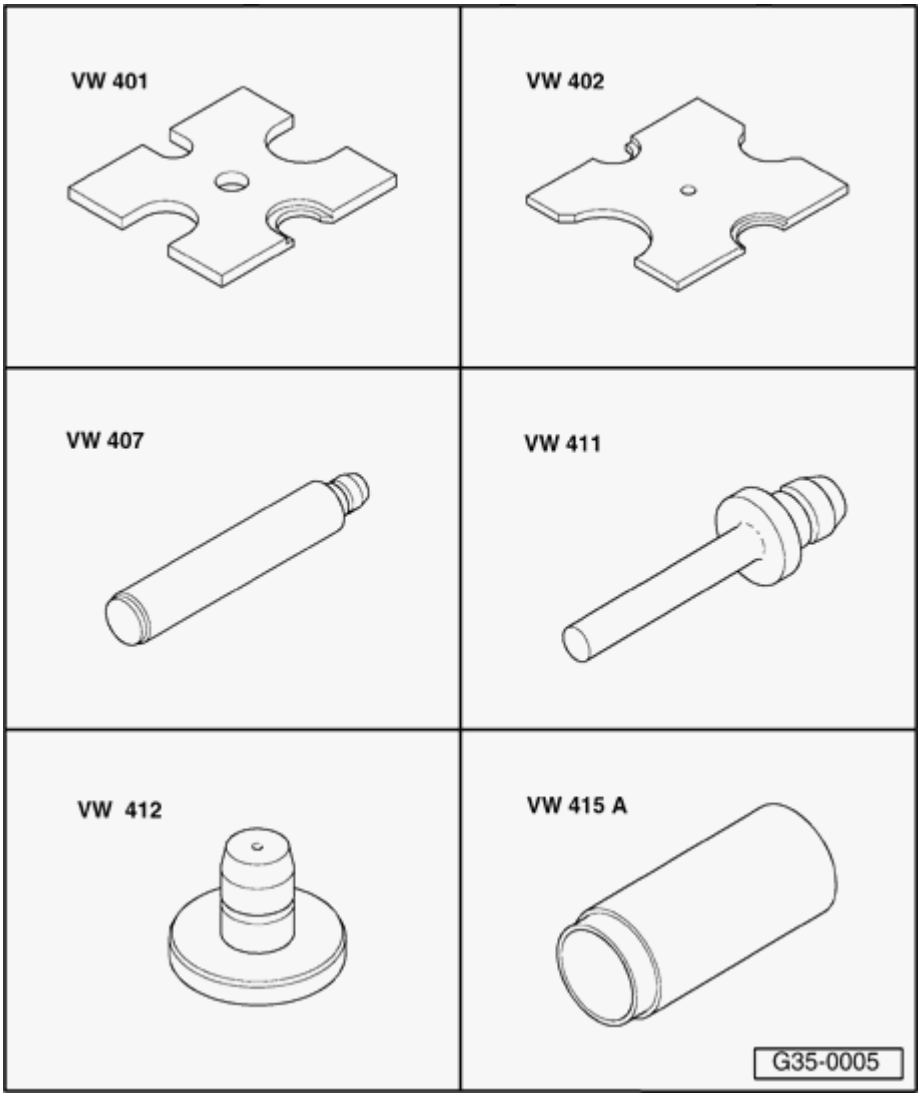


Fig. 258: Identifying Special Tools - Pinion Shaft And Hollow Shaft, Disassembling And Assembling
Courtesy of VOLKSWAGEN UNITED STATES, INC.

Special tools and workshop equipment required

- VW 401 Pressure plate
- VW 402 Pressure plate
- VW 407 Press tool
- VW 411 Press tool
- VW 412 Press tool
- VW 415 A Tubular section

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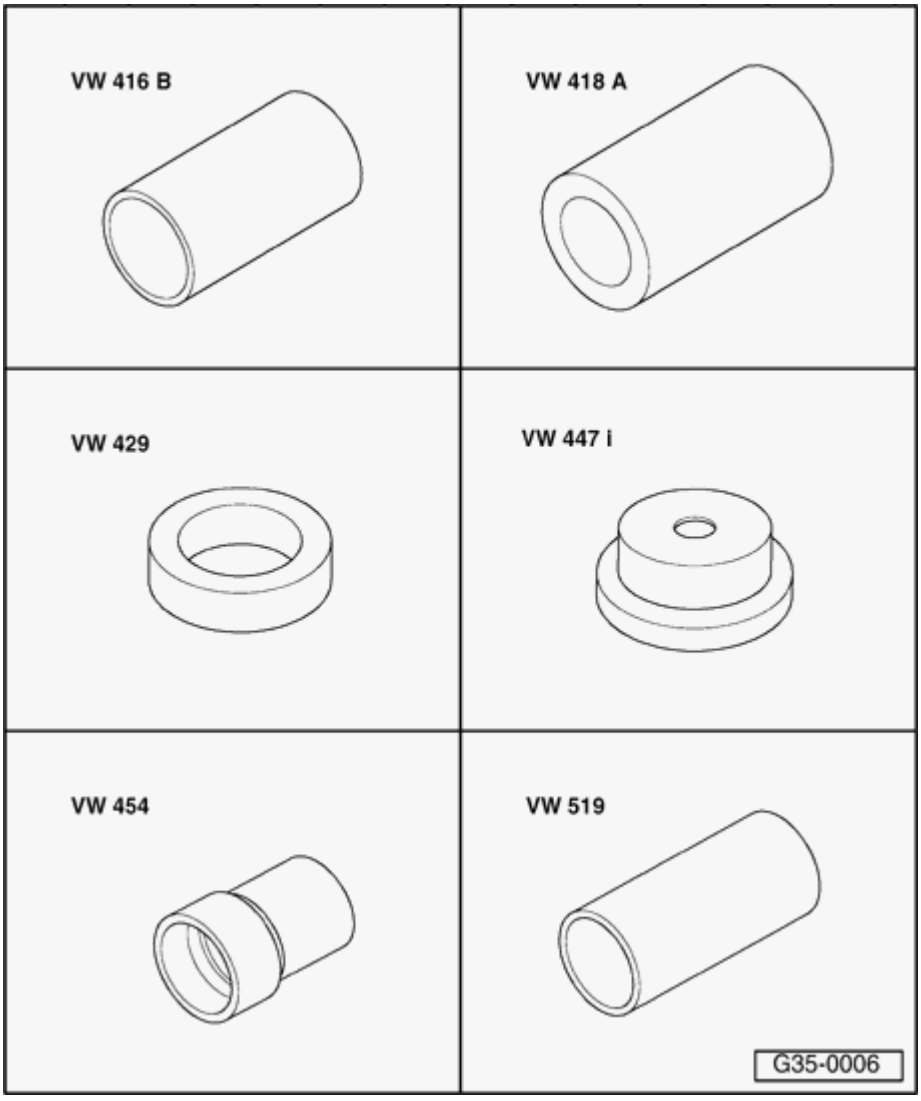


Fig. 259: Identifying Special Tools - Pinion Shaft And Hollow Shaft, Disassembling And Assembling
Courtesy of VOLKSWAGEN UNITED STATES, INC.

- VW 416 B Tubular section
- VW 418 A Tubular section
- VW 429 Thrust collar
- VW 447i Thrust pad
- VW 454 Pressure piece
- VW 519 Tubular section

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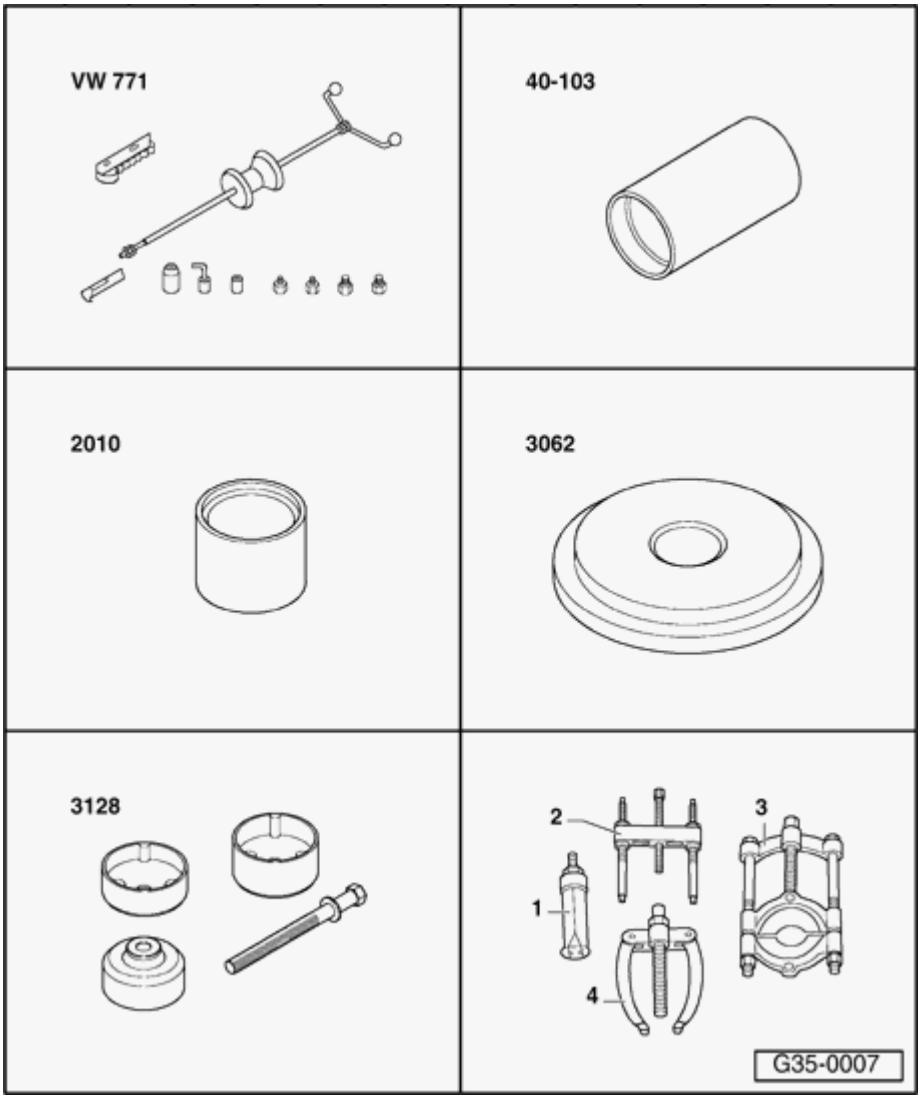


Fig. 260: Identifying Special Tools - Pinion Shaft And Hollow Shaft, Disassembling And Assembling
Courtesy of VOLKSWAGEN UNITED STATES, INC.

- VW 771 Multi-purpose tool
- 40-103 Base
- 2010 Tubular section
- 3062 Thrust pad

- 3128 Puller
- Kukko 17/2 Separating tool
- Kukko 21/1 Internal puller

NOTE:

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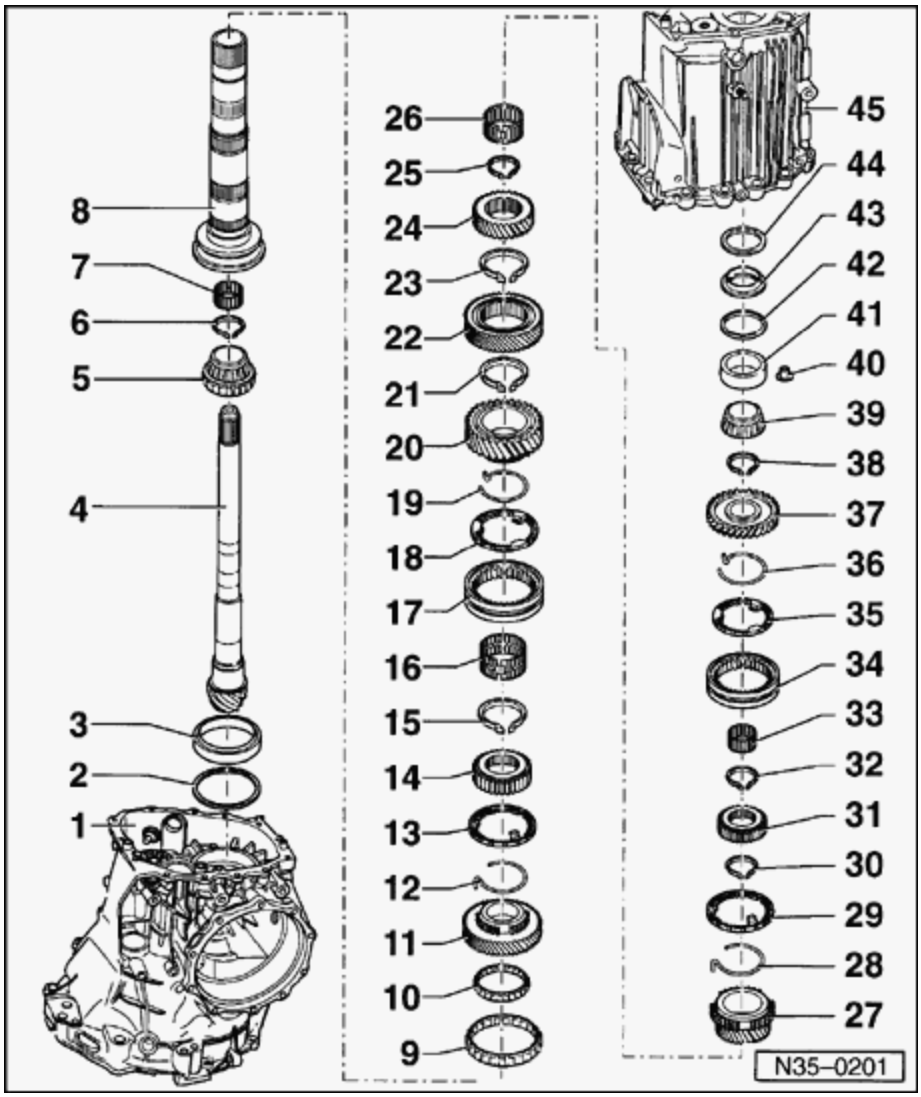


Fig. 261: Transmission Housing, Overview
Courtesy of VOLKSWAGEN UNITED STATES, INC.

- **Observe technical data when installing new gear wheels or drive unit. Refer to Code letters, assignment of mechanical units, transmission ratios and capacities.**
- **When replacing parts marked 1) adjustments are required. Refer to Adjustment table.**

1 - Transmission housing

2 - Shim "S3"

- Adjustment table. Refer to **Adjustment table**

3 - Outer race for double tapered roller bearing 1)

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- Replace together with -item 5
- Extracting. See **Extracting outer race for double tapered roller bearing**
- Pressing in. See **Pressing in outer race for double tapered roller bearing**

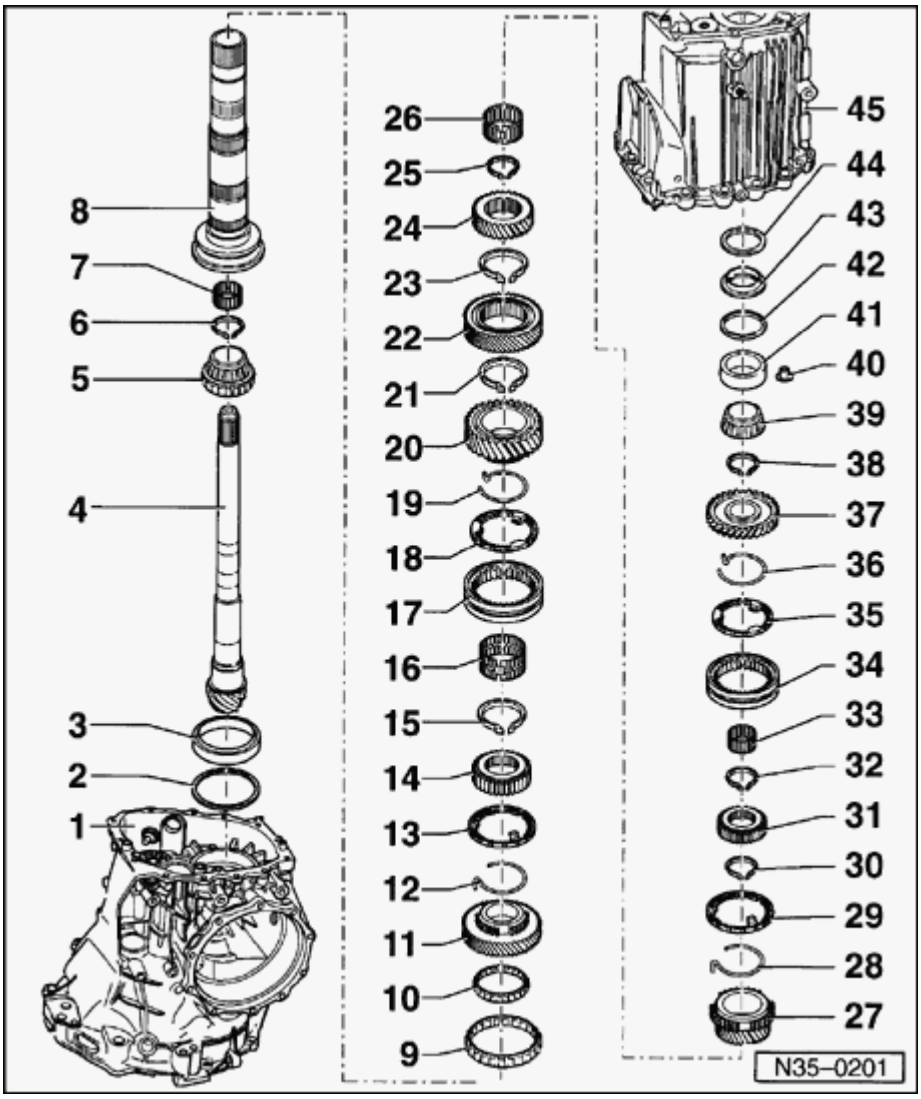


Fig. 262: Transmission Housing, Overview
Courtesy of VOLKSWAGEN UNITED STATES, INC.

4 - Pinion1)

- Paired with ring gear, replace as assembly
- Adjusting pinion and ring gear. Refer to **General**

5 - Inner race for double tapered roller bearing 1)

- Replace

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- Gets damaged on removal
- Pressing off. See **Pressing off inner race for double tapered roller bearing**
- Pressing on. See **Pressing on inner race for double tapered roller bearing**

6 - Circlip

- Determine thickness when replacing double tapered roller bearing. See **Determining circlip**

7 - Needle bearing

- For pinion in hollow shaft
- Lubricate with MoS2 grease

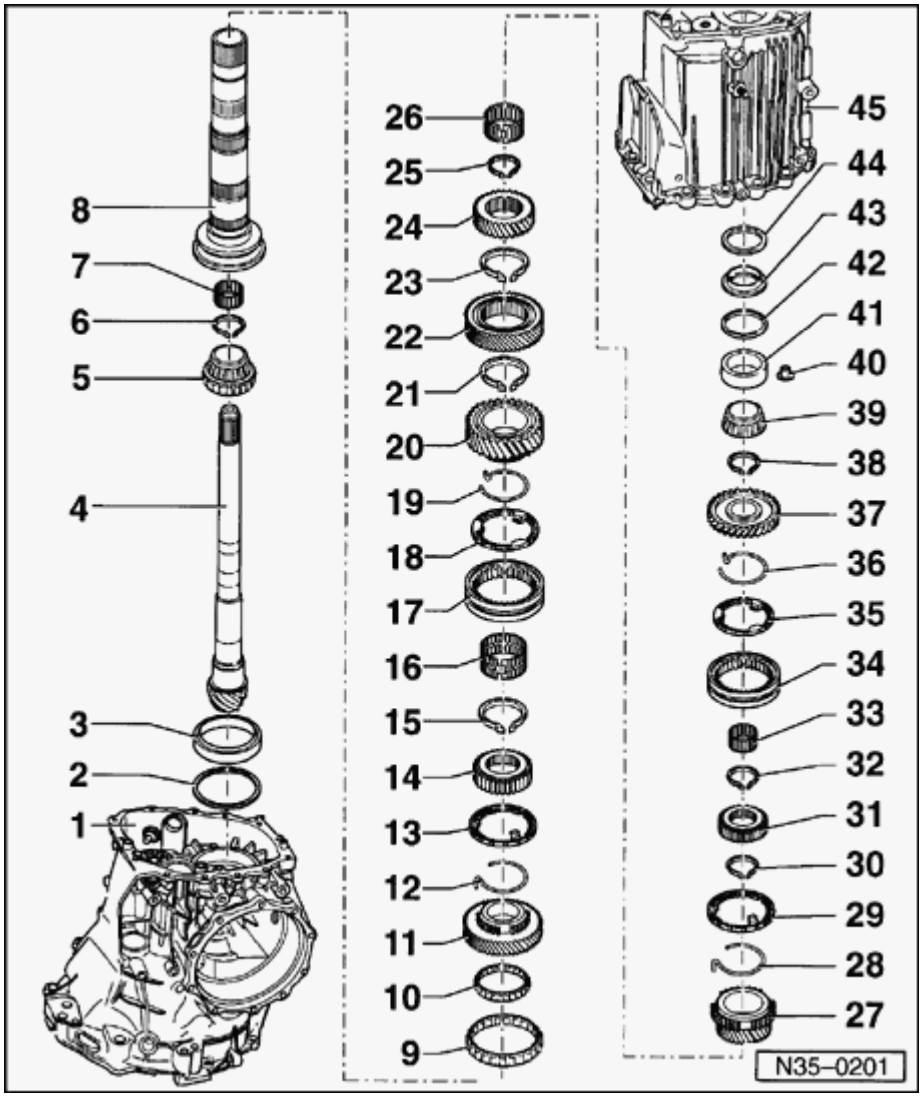


Fig. 263: Transmission Housing, Overview
Courtesy of VOLKSWAGEN UNITED STATES, INC.

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8 - Hollow shaft 1)

9 - Needle bearing for 1st gear

10 - Needle bearing for 1st gear

11 - 1st gear sliding gear

12 - Spring

- Inserting in 1st gear sliding gear. See **Inserting spring into sliding gear**
- Assignment to sliding gear

13 - 1st gear synchro-ring

- Checking for wear. See **Checking synchro-ring for wear**

14 - 1st and 2nd gear synchro-hub

- Pressing off. See **Pressing off 1st and 2nd gear synchro-hub**
- Pressing on. See **Pressing on synchro-hub for 1st and 2nd gear**

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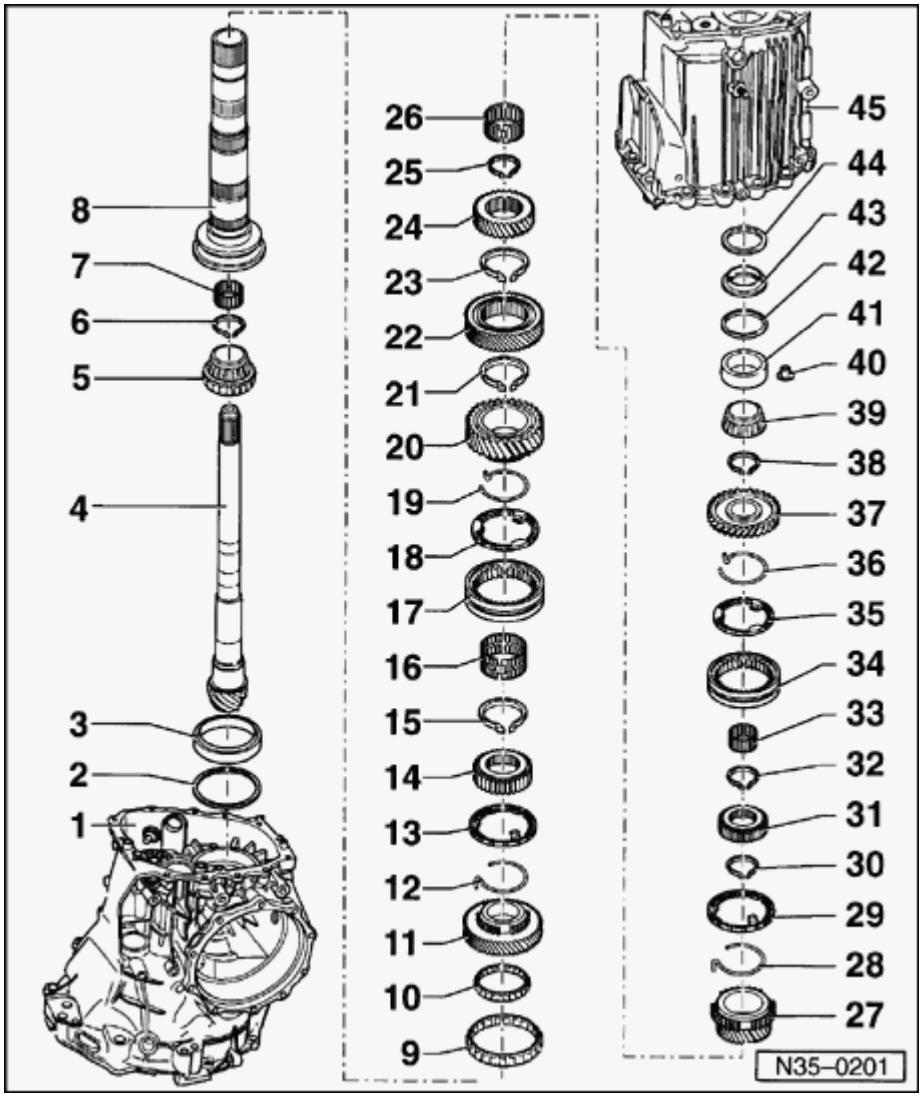


Fig. 264: Transmission Housing, Overview
Courtesy of VOLKSWAGEN UNITED STATES, INC.

15 - Circlip

- Mark
- Installation position **Installation position of circlips** - item 1
- Re-determining when replacing synchro-hub. See **Determining circlip**

16 - Needle bearing for 2nd gear

17 - 1st and 2nd gear locking collar

- Installation position. See **Installation position of locking collar for 1st and 2nd gear**

18 - 2nd gear synchro-ring

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- Checking for wear. See **Checking synchro-ring for wear**

19 - Spring

- Inserting in 2nd gear sliding gear. See **Inserting spring into sliding gear**
- Assignment to sliding gear

20 - 2nd gear sliding gear

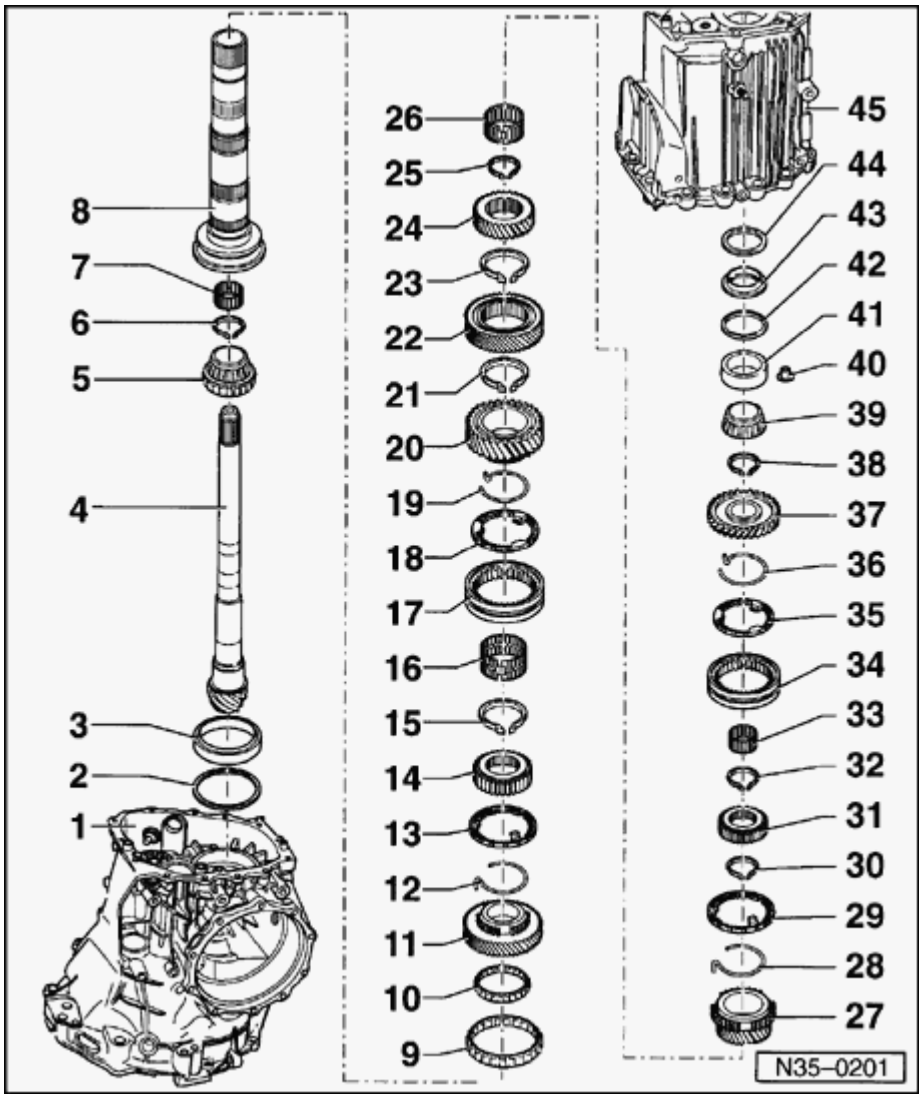


Fig. 265: Transmission Housing, Overview
Courtesy of VOLKSWAGEN UNITED STATES, INC.

21 - Circlip

- Mark
- Installation position **Installation position of circlips** - item 2

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22 - 3rd gear wheel

- Pressing off. See **Pressing off 3rd gear wheel**
- Pressing on. See **Pressing on 3rd gear wheel**

23 - Circlip

- Mark
- Installation position **Installation position of circlips**- item 3
- Re-determining when replacing 3rd gear wheel. See **Determining circlip**

24 - 4th gear wheel

- Pressing off. See **Pressing off 4th gear wheel**
- Pressing on. See **Pressing on 4th gear wheel**

25 - Circlip

- Mark
- Installation position **Installation position of circlips** - item 4
- Re-determining when replacing 4th gear wheel. See **Determining circlip**

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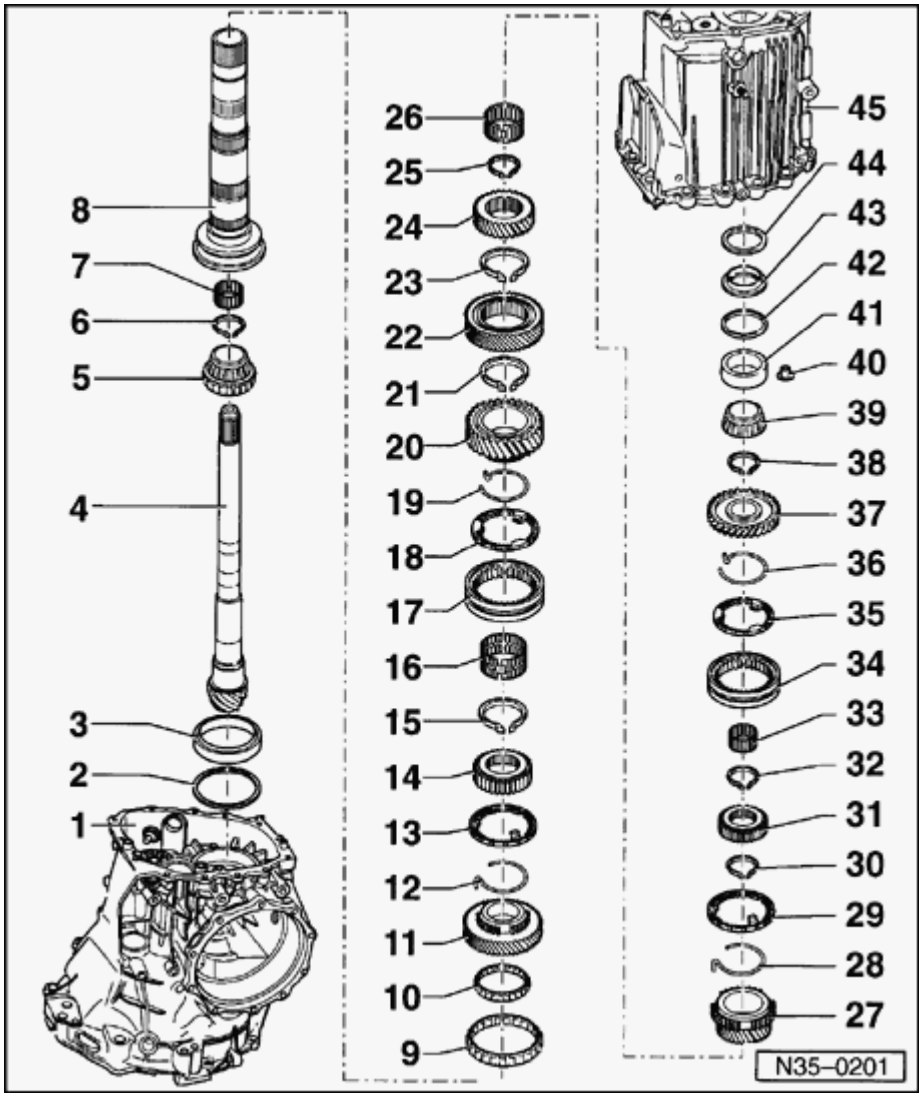


Fig. 266: Transmission Housing, Overview
Courtesy of VOLKSWAGEN UNITED STATES, INC.

26 - Needle bearing

27 - 5th gear sliding gear

28 - Spring

- Inserting in 5th gear sliding gear. See **Inserting spring into sliding gear**
- Assignment to sliding gear

29 - 5th gear synchro-ring

- Checking for wear. See **Checking synchro-ring for wear**

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30 - Circlip

- Mark
- Installation position **Installation position of circlips** - item 5

31 - Synchro-hub 5th gear and reverse gear

- Pressing off. See **Pressing off 5th gear and reverse gear synchro-hub**
- Pressing on. See **Pressing on synchro-hub for 5th gear and reverse gear**

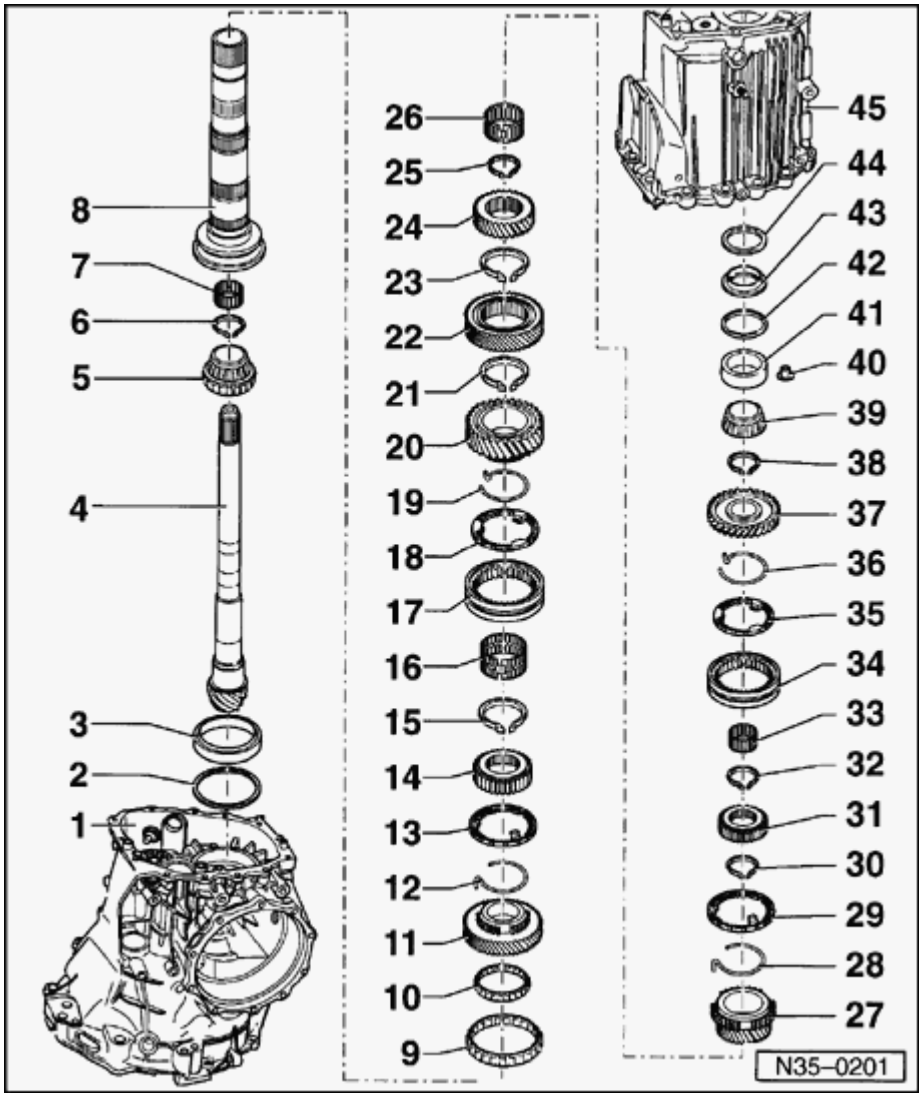


Fig. 267: Transmission Housing, Overview
Courtesy of VOLKSWAGEN UNITED STATES, INC.

32 - Circlip

- Mark

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- Installation position **Installation position of circlips**- item 6
- Re-determining when replacing synchro-hub. See **Determining circlip**

33 - Needle bearing

- For reverse gear

34 - Locking collar for 5th gear and reverse gear

- Installation position. See **Installation position of locking collar for 5th gear and reverse gear**

35 - Reverse gear synchro-ring

- Checking for wear. See **Checking synchro-ring for wear**

36 - Spring

- Inserting in reverse gear sliding gear. See **Inserting spring into sliding gear**
- Assignment to sliding gear

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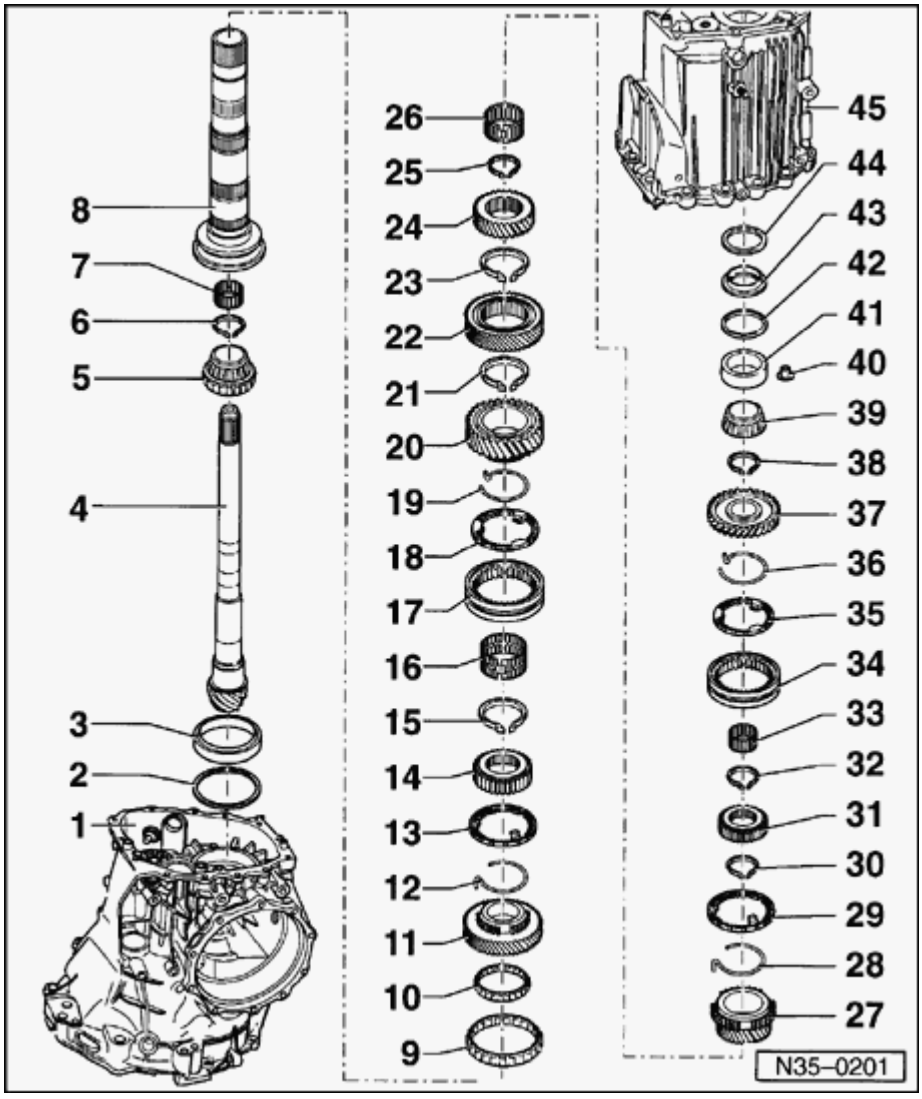


Fig. 268: Transmission Housing, Overview
Courtesy of VOLKSWAGEN UNITED STATES, INC.

37 - Reverse gear sliding gear

38 - Circlip

- Mark
- Installation position **Installation position of circlips** item 7

39 - Inner race for tapered roller bearing 1)

- Pressing off. See **Pressing off inner race for tapered roller bearing**
- Pressing on. See **Pressing on inner race for tapered roller bearing**

40 - Bushing

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- For securing outer race of small tapered roller bearing
- Extracting. See **Pulling out locking bushing for outer race of small tapered roller bearing**
- Does not need to be installed after small tapered roller bearing has been replaced

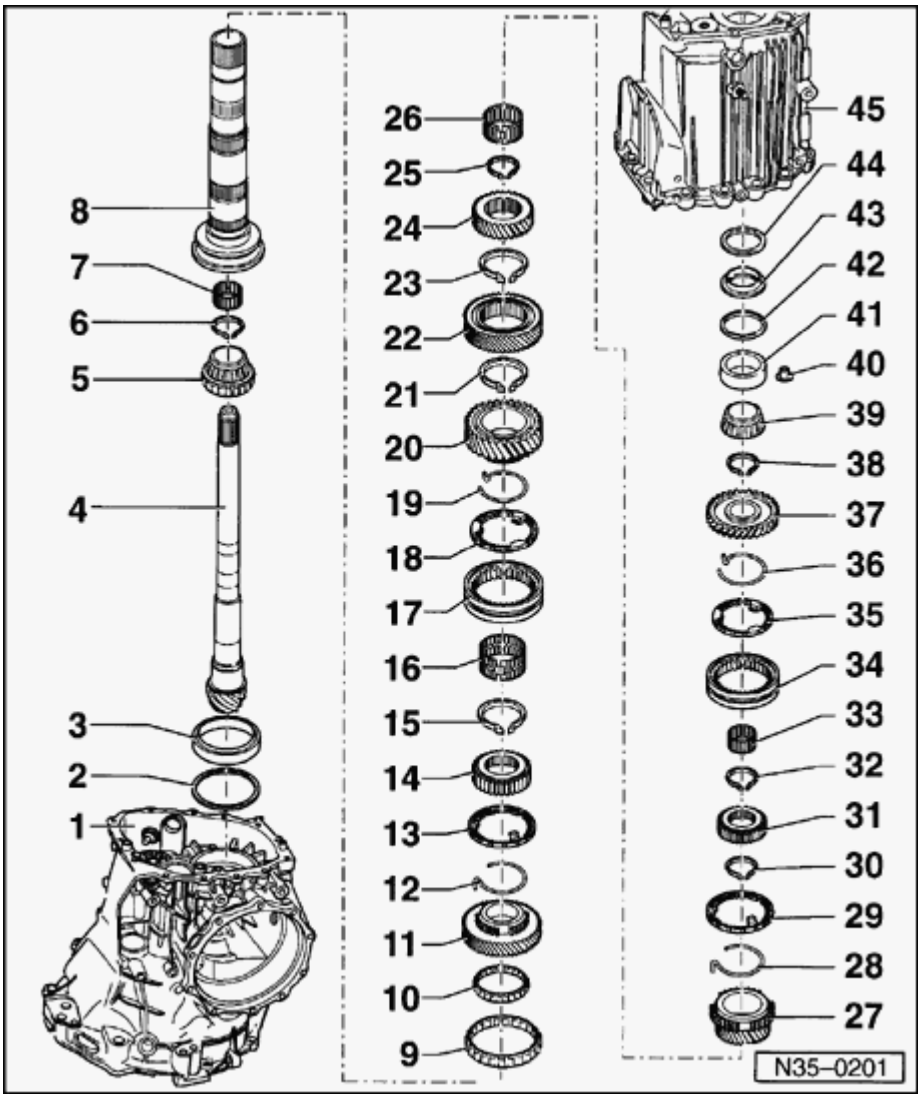


Fig. 269: Transmission Housing, Overview
Courtesy of VOLKSWAGEN UNITED STATES, INC.

41 - Outer race for tapered roller bearing1)

- Pressing out. See **Pressing out outer race for tapered roller bearing**
- Pressing in. See **Pressing in outer race for tapered roller bearing**

42 - Shim "S4"

- Adjustment table. Refer to **Adjustment table**

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43 - Ring

- For holding rubber washer
- Assignment

44 - Rubber washer

- For length compensation
- Assignment

45 - Transmission cover

Extracting outer race for double tapered roller bearing

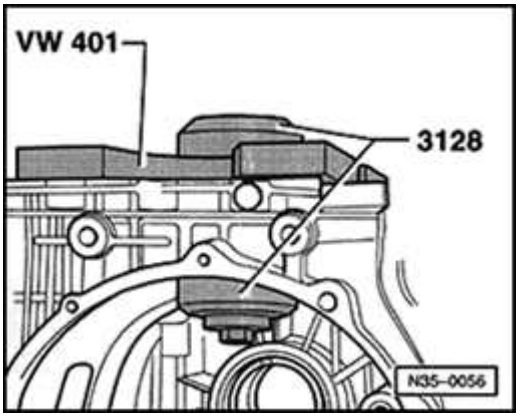


Fig. 270: Pulling Out Outer Race For Double Tapered Roller Bearing
Courtesy of VOLKSWAGEN UNITED STATES, INC.

Removing differential. Refer to **Differential, removing and installing**.

- Position pressure piece of puller 3128 beneath outer race.
- Install threaded section of puller 3128 together with pressure plate VW 401 onto transmission housing.

When bolt is tightened, outer race is pulled out of housing.

Pressing off inner race for double tapered roller bearing

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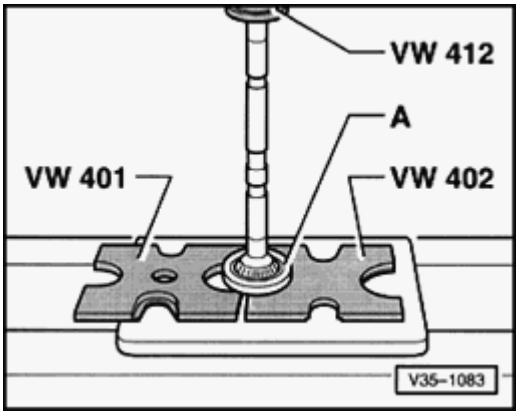


Fig. 271: Pressing Off Inner Race For Double Tapered Roller Bearing
Courtesy of VOLKSWAGEN UNITED STATES, INC.

- Remove circlip before pressing off.

NOTE:

- **Outer race -A- must be mounted before inner race can be removed.**
- **Inner race of double tapered roller bearing will be destroyed during pressing off.**

Pressing in outer race for double tapered roller bearing

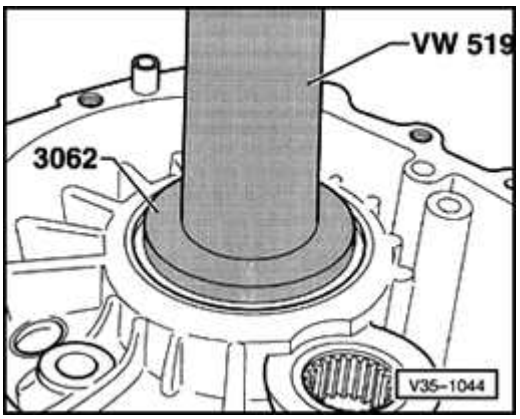


Fig. 272: Pressing In Outer Race For Double Tapered Roller Bearing
Courtesy of VOLKSWAGEN UNITED STATES, INC.

Smaller diameter of thrust pad 3062 faces outer race.

Pressing on inner race for double tapered roller bearing

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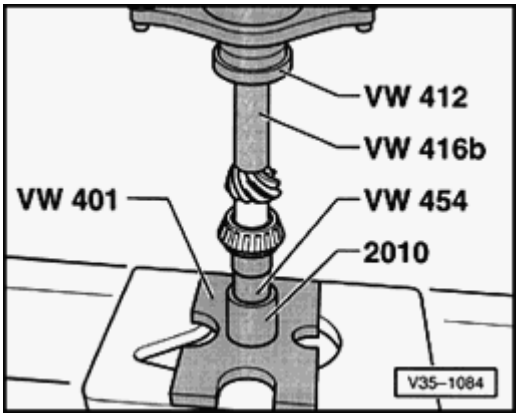


Fig. 273: Pressing On Inner Race For Double Tapered Roller Bearing
Courtesy of VOLKSWAGEN UNITED STATES, INC.

Determining circlip

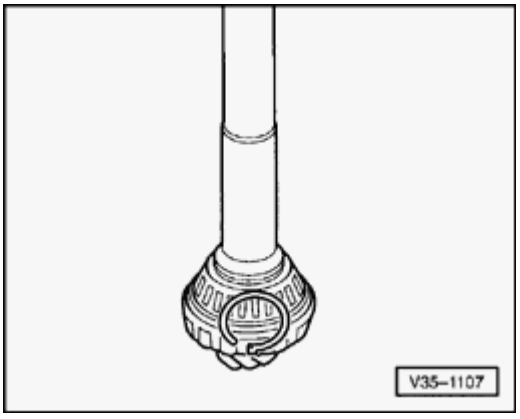


Fig. 274: Determining Circlip To Be Installed
Courtesy of VOLKSWAGEN UNITED STATES, INC.

- Determine and install thickest circlip which can be inserted.
- Determine circlips for synchro-hubs, needle bearings and gear wheels of individual gears as shown for double tapered roller bearing.

Available circlips and their part numbers:

Pulling out locking bushing for outer race of small tapered roller bearing

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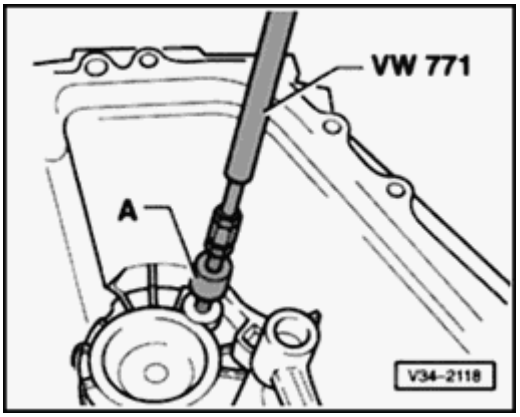


Fig. 275: Pulling Off Securing Bushing For Small Tapered Roller Bearing Outer Race
Courtesy of VOLKSWAGEN UNITED STATES, INC.

A - Internal puller, e. g. Kukko 21/1, 12 to 16 mm

Pressing out outer race for tapered roller bearing

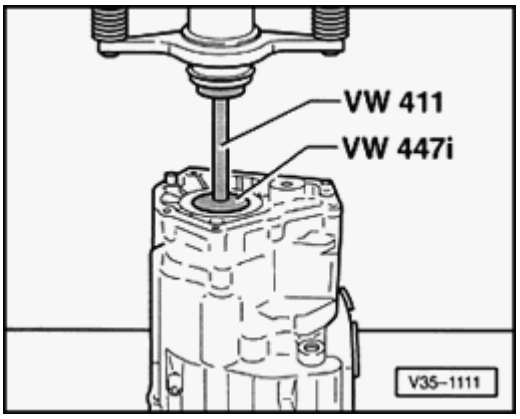


Fig. 276: Pressing Out Outer Race For Tapered Roller Bearing
Courtesy of VOLKSWAGEN UNITED STATES, INC.

- Press outer race out together with ring -item 43: Refer to **Pinion and hollow shaft, disassembling and assembling**, shim "S4" -item 42: Refer to **Pinion and hollow shaft, disassembling and assembling** and rubber washer for length compensation -item 44: Refer to **Pinion and hollow shaft, disassembling and assembling**.

Pressing in outer race for tapered roller bearing

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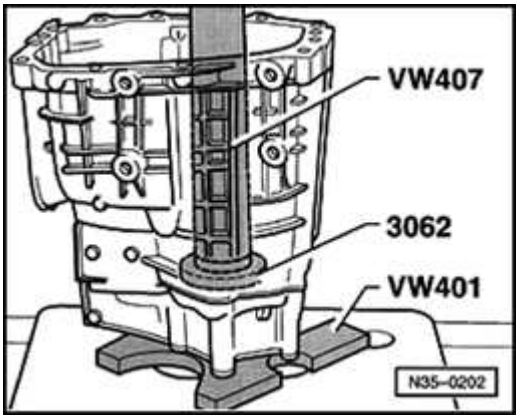


Fig. 277: Pressing In Tapered Roller Bearing Outer Race
Courtesy of VOLKSWAGEN UNITED STATES, INC.

Pressing off inner race for tapered roller bearing

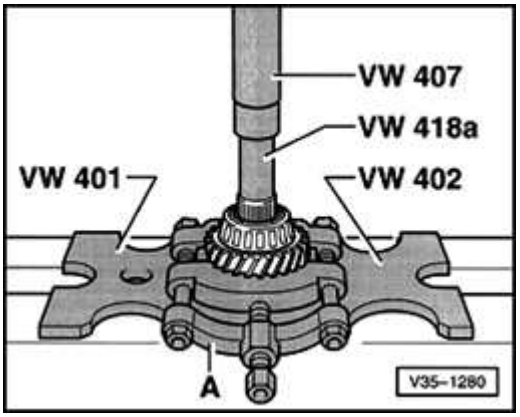


Fig. 278: Pressing Off Inner Race For Tapered Roller Bearing
Courtesy of VOLKSWAGEN UNITED STATES, INC.

- Press off inner race together with reverse gear sliding gear.

A - Separating tool 22 to 115 mm, e.g. Kukko 17/2

Pressing on inner race for tapered roller bearing

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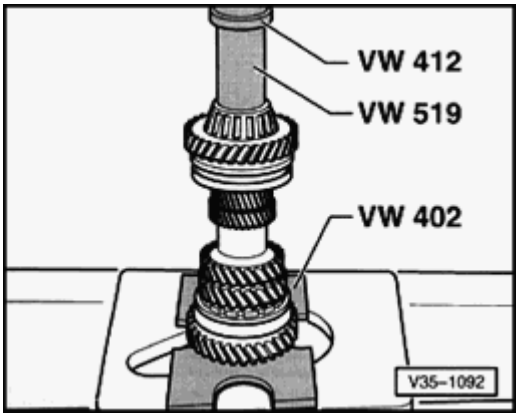


Fig. 279: Pressing On Tapered Roller Bearing Inner Race
Courtesy of VOLKSWAGEN UNITED STATES, INC.

- Install circlip before pressing on inner race.

Pressing off 5th gear and reverse gear synchro-hub

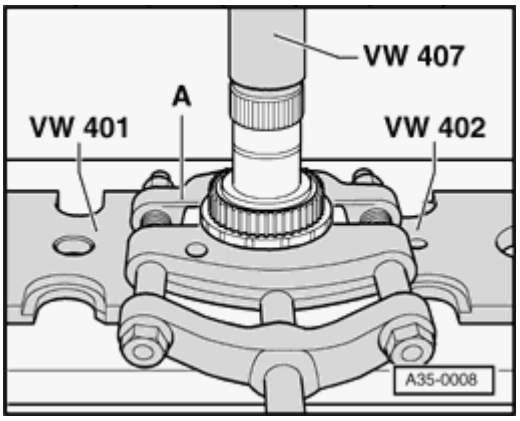


Fig. 280: Pressing Off Synchronizer Hub For 5th Gear And Reverse Gear
Courtesy of VOLKSWAGEN UNITED STATES, INC.

- Remove circlip before pressing off.
- Press off synchro-hub together with 5th gear sliding gear.

A - Separating tool 22 to 115 mm, e.g. Kukko 17/2

Pressing off 4th gear wheel

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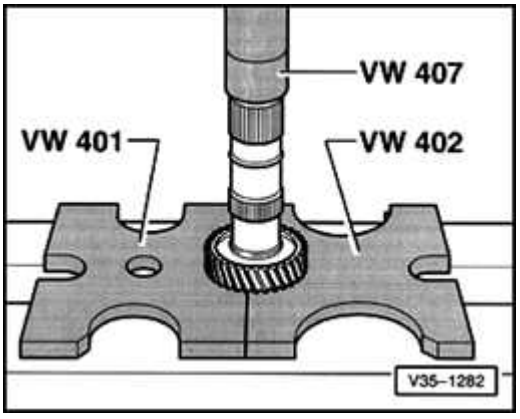


Fig. 281: Pressing Off 4th-Gear Gear Wheel
Courtesy of VOLKSWAGEN UNITED STATES, INC.

- Remove circlip before pressing off.

Pressing off 3rd gear wheel

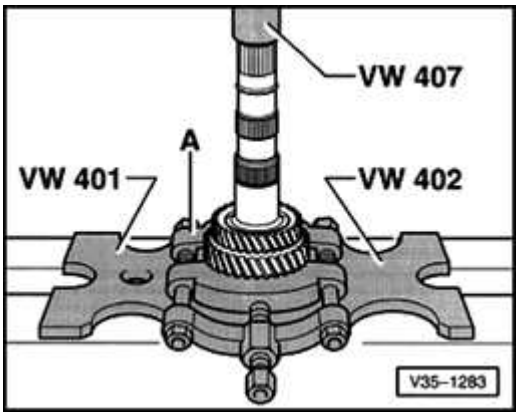


Fig. 282: Pressing Off 3Rd-Gear Gear Wheel
Courtesy of VOLKSWAGEN UNITED STATES, INC.

- Remove circlip before pressing off.
- Press off 3rd gear wheel together with 2nd gear sliding gear.

A - Separating tool 22 to 115 mm, e.g. Kukko 17/2

Pressing off 1st and 2nd gear synchro-hub

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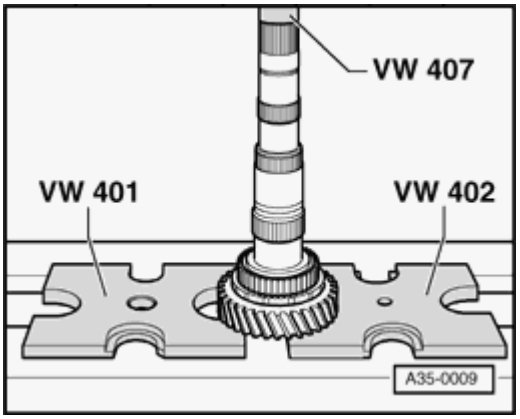


Fig. 283: Pressing Off 1st And 2nd Gear Synchro-Hub
Courtesy of VOLKSWAGEN UNITED STATES, INC.

- Remove circlip before pressing off.
- Press off synchro-hub together with 1st gear sliding gear.

Installation position of circlips

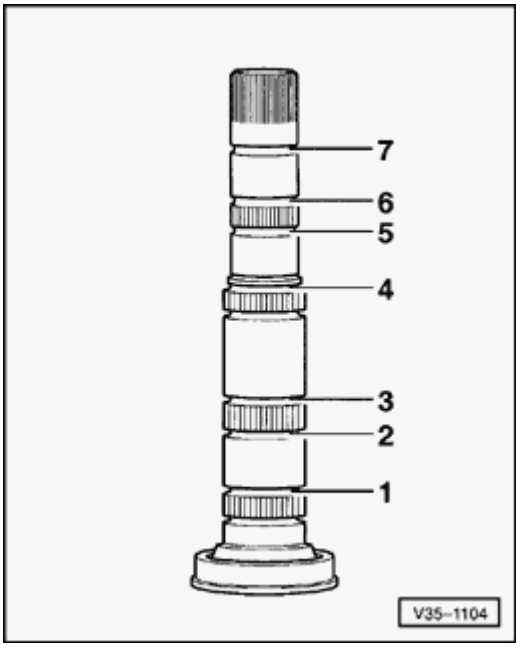


Fig. 284: Identifying Installed Position Of Circlips
Courtesy of VOLKSWAGEN UNITED STATES, INC.

- Determine circlips for synchro-hubs, needle bearings and gear wheels of individual gears as shown in. See **Determining circlip**.

- Circlip -1- secures synchro-hub for 1st and 2nd gear.

Identifiable by color: blue

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Circlip thickness (mm)		
1.90	1.96	2.02
1.93	1.99	

- Circlip -2- secures 2nd gear needle bearing/sliding gear.

Identifiable by color: blue

Circlip thickness (mm)
2.50

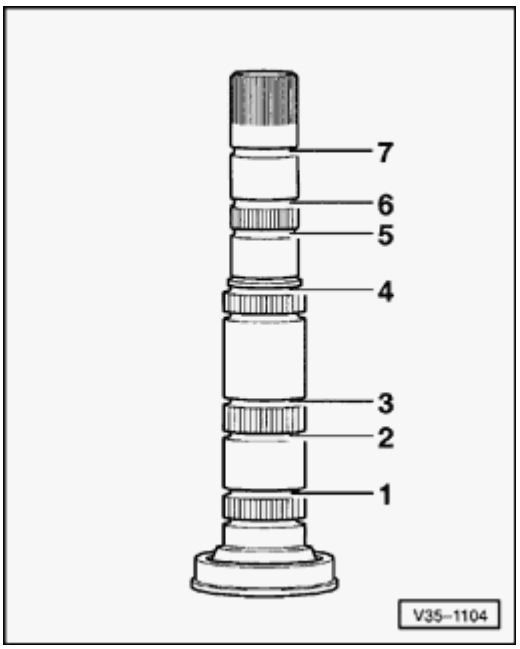


Fig. 285: Identifying Installed Position Of Circlips
Courtesy of VOLKSWAGEN UNITED STATES, INC.

- Circlip -3- secures 3rd gear wheel.

Circlip thickness (mm)		
1.90	1.98	2.06
1.94	2.02	

- Circlip -4- secures 4th gear wheel.

Circlip thickness (mm)		
1.86	1.94	
1.90	1.98	

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- Circlip -5- secures 5th gear needle bearing/sliding gear.

Identifiable by color: brown

Circlip thickness (mm)
2.00

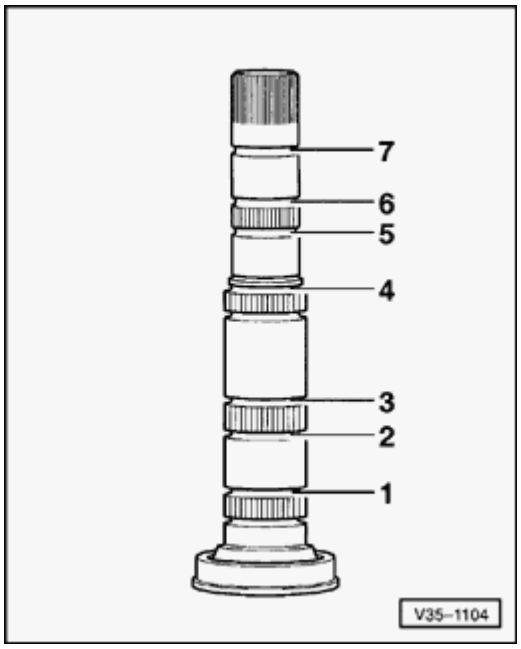


Fig. 286: Identifying Installed Position Of Circlips
Courtesy of VOLKSWAGEN UNITED STATES, INC.

- Circlip -6- secures synchro-hub for 5th gear and reverse gear.

Identifiable by color: blue

Circlip thickness (mm)		
1.90	1.96	2.02
1.93	1.99	2.05

- Circlip -7- secures needle bearing for reverse gear sliding gear.

Circlip thickness (mm)
2.50

- If necessary determine circlips using chart. Part numbers

Inserting spring into sliding gear

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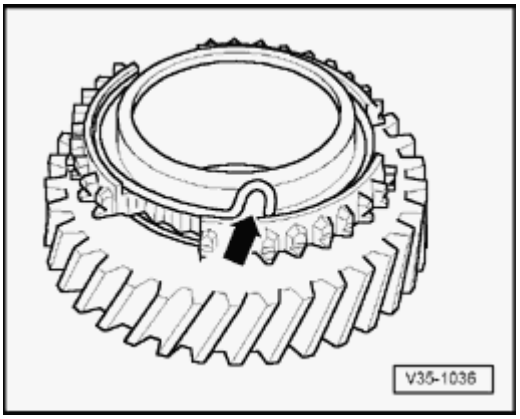


Fig. 287: Inserting Spring Into Gear
Courtesy of VOLKSWAGEN UNITED STATES, INC.

Bent end of spring (arrow) must be hooked into hole of sliding gear.

Checking synchro-ring for wear

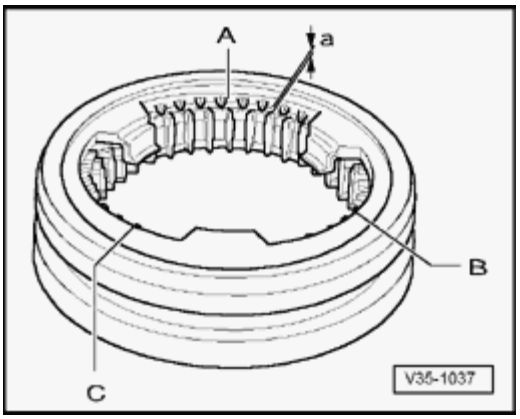


Fig. 288: Checking Synchronizer For Wear
Courtesy of VOLKSWAGEN UNITED STATES, INC.

- Push synchro-ring into locking collar and use feeler gauge to measure gap -a- at positions -A-, -B- and -C-.
- Add up measured values and divide by 3.

Obtained value must not be lower than 0.5 mm.

Pressing on synchro-hub for 1st and 2nd gear

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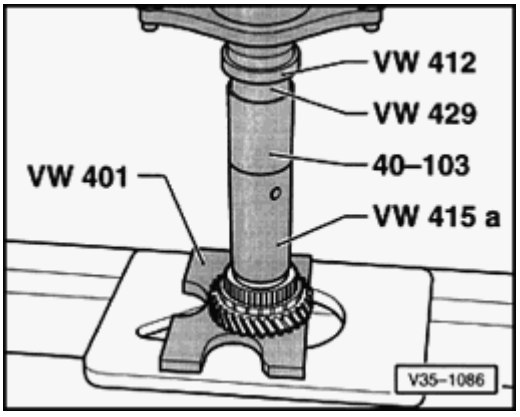


Fig. 289: Pressing On Synchronizer Hub For 1st And 2nd Gears
Courtesy of VOLKSWAGEN UNITED STATES, INC.

- Installation position:

High collar on inside faces 2nd gear

Installation position of locking collar for 1st and 2nd gear

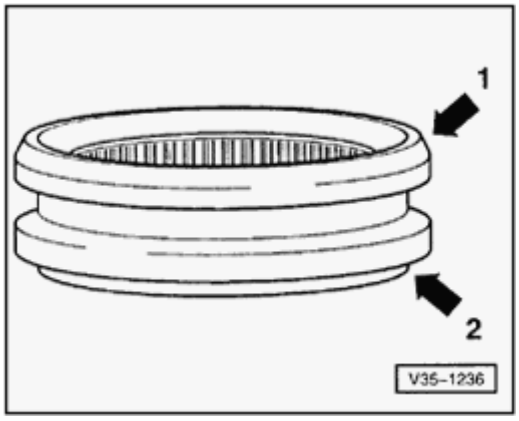


Fig. 290: Identifying Installed Position Of Operating Sleeve For 1st And 2nd Gear
Courtesy of VOLKSWAGEN UNITED STATES, INC.

- Installation position:

Chamfer (arrow -1-) faces 2nd gear

Shoulder (arrow -2-) faces 1st gear

Pressing on 3rd gear wheel

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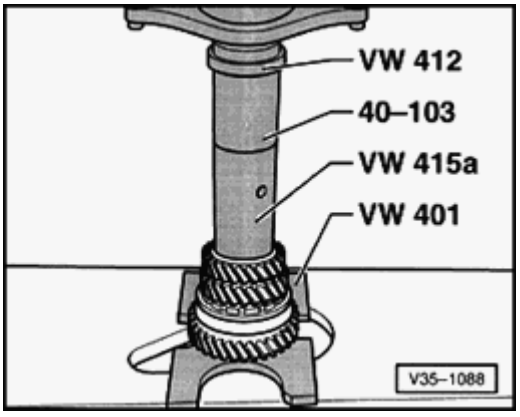


Fig. 291: Pressing On 3rd-Gear Gear Wheel
Courtesy of VOLKSWAGEN UNITED STATES, INC.

- Installation position:

Groove on gear wheel faces 4th gear

Pressing on 4th gear wheel

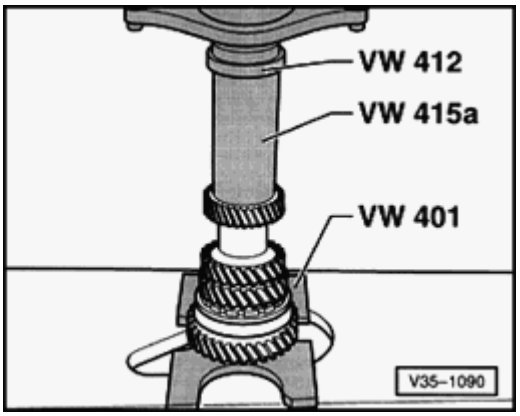


Fig. 292: Pressing On 4th-Gear Gear Wheel
Courtesy of VOLKSWAGEN UNITED STATES, INC.

- Installation position:

High collar on inside faces 3rd gear

Pressing on synchro-hub for 5th gear and reverse gear

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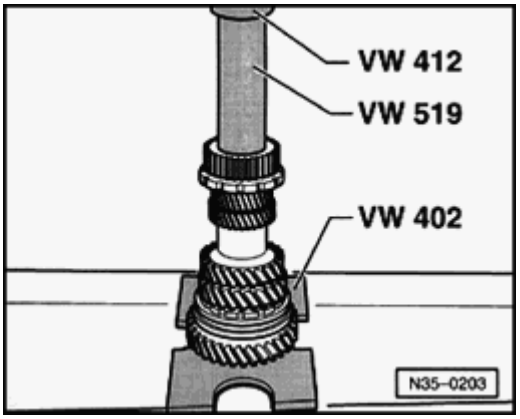


Fig. 293: Pressing On Synchronizer Hub For 5th Gear And Reverse Gear
Courtesy of VOLKSWAGEN UNITED STATES, INC.

- Installation position:

High collar on inside faces 5th gear

Installation position of locking collar for 5th gear and reverse gear

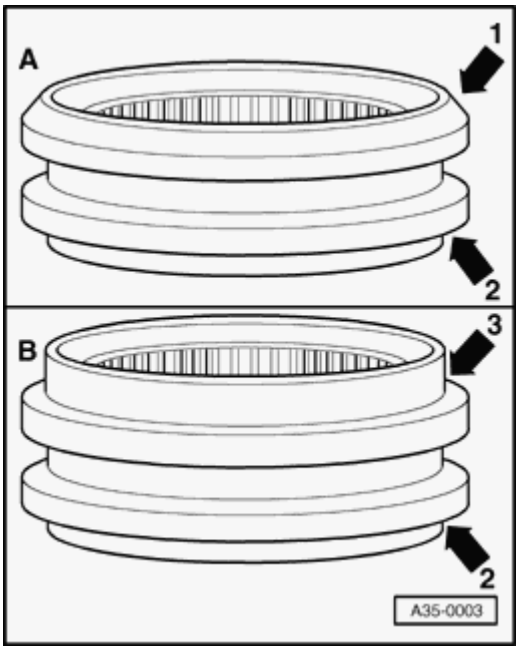


Fig. 294: Identifying Installed Position Of Operating Sleeve Up To Transmission Manufacture Date 22 06 3
Courtesy of VOLKSWAGEN UNITED STATES, INC.

Locking collars with chamfer -A- and locking collars with high shoulder -B- are used for assembly.

- Note locking collar assignment to reverse idler gear. See **Locking collar assignment to reverse idler gear**

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- Installation position:

Chamfer (arrow -1-) faces reverse gear

Low shoulder (arrow -2-) faces 5th gear

High shoulder (arrow -3-) faces reverse gear

Locking collar assignment to reverse idler gear

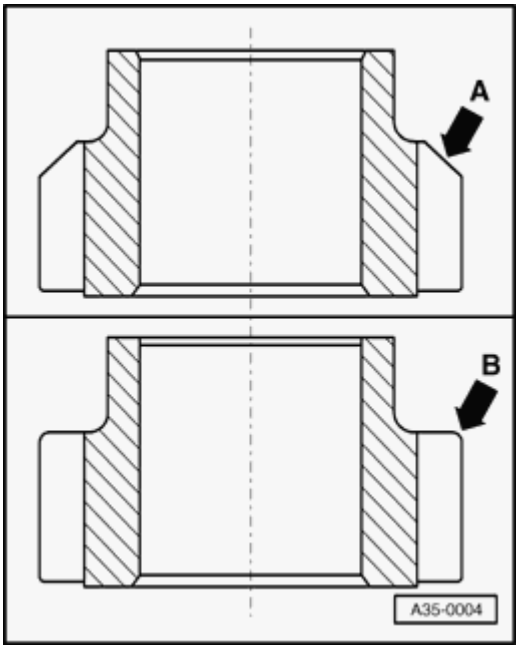


Fig. 295: Allocation Of Operating Sleeve To Reverse Idler Gear
Courtesy of VOLKSWAGEN UNITED STATES, INC.

A	Reverse idler gear with chamfer	Either locking collar type (with chamfer or high shoulder) can be used for assembly
B	Reverse idler gear without chamfer	Only locking collars with high shoulder can be used for assembly. Do not use locking collars with chamfer.

REVERSE IDLER GEAR, REMOVING AND INSTALLING

Reverse idler gear, removing and installing

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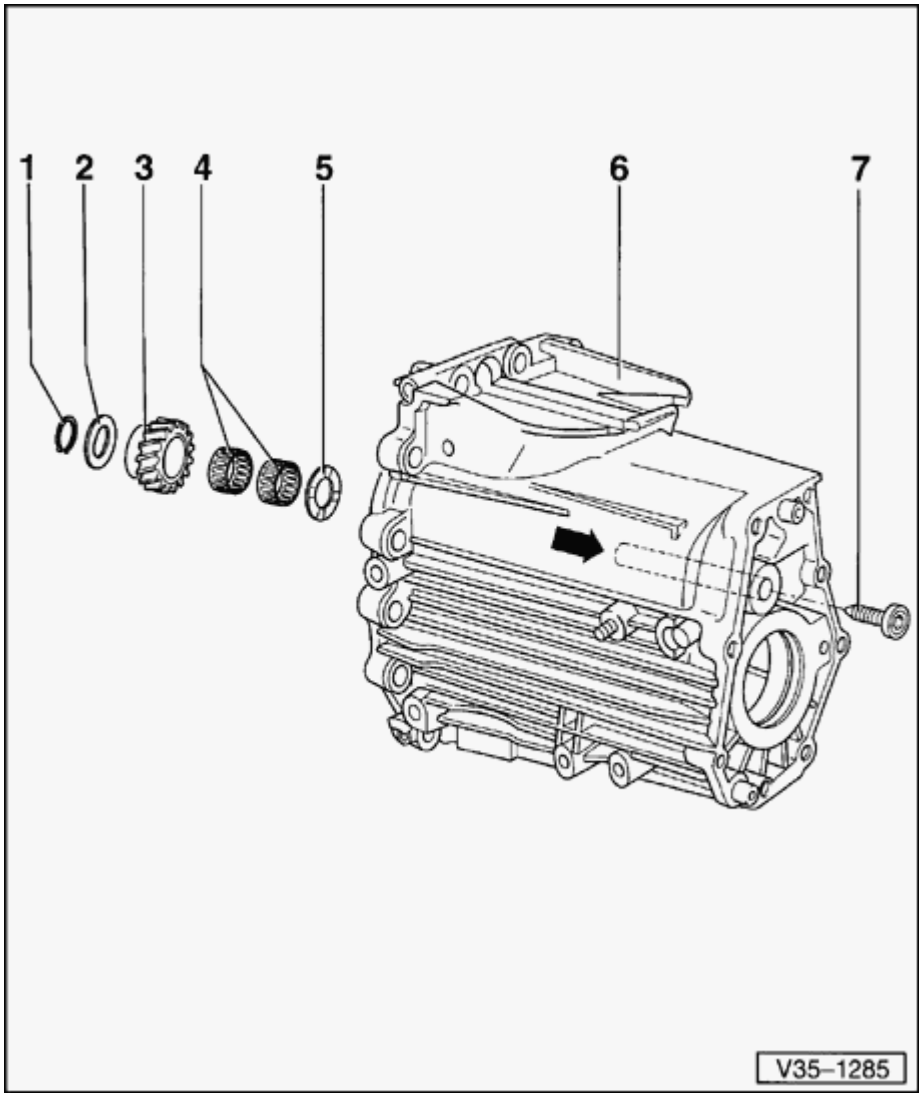


Fig. 296: Reverse Idler Gear, Overview
Courtesy of VOLKSWAGEN UNITED STATES, INC.

1 - Circlip

2 - Support plate

3 - Reverse idler gear

- Different versions, Assignment. See **Locking collar assignment to reverse idler gear**

4 - Needle bearing

5 - Thrust washer

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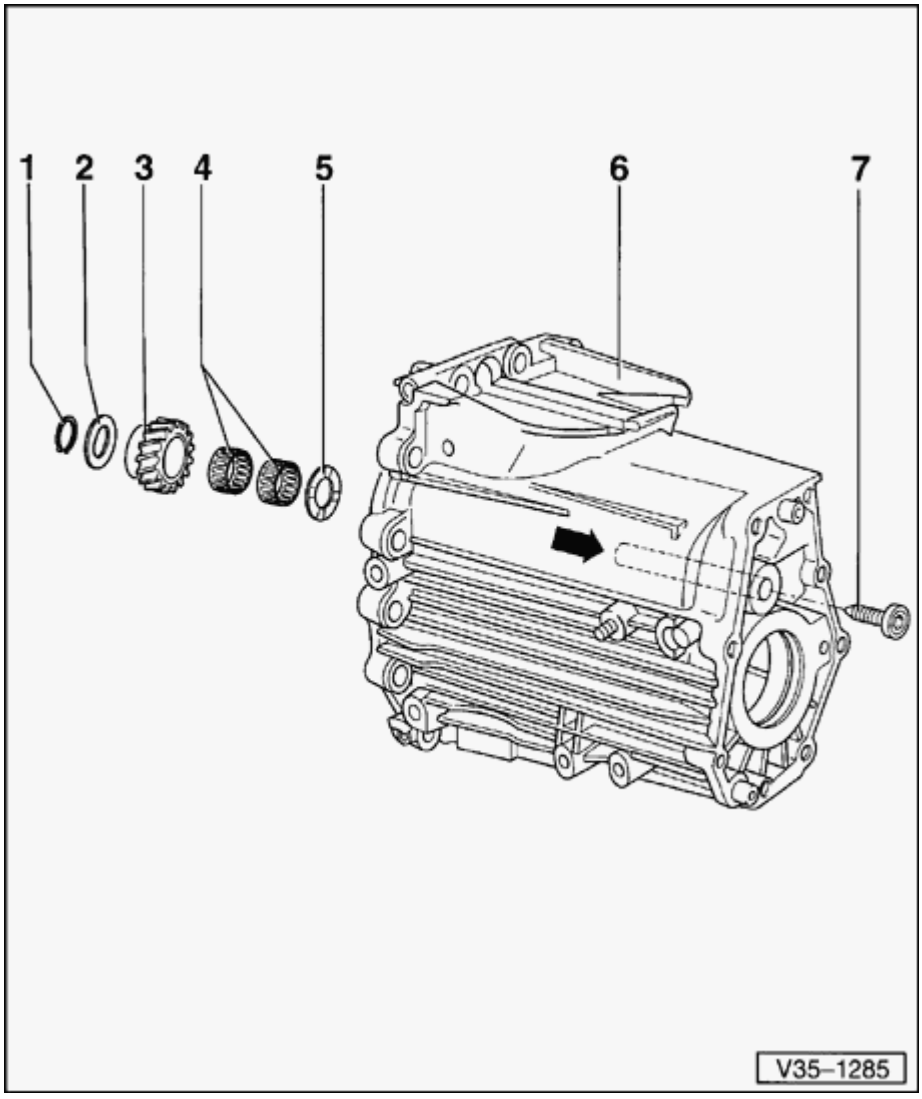


Fig. 297: Reverse Idler Gear, Overview
Courtesy of VOLKSWAGEN UNITED STATES, INC.

6 - Transmission cover

- With axle for reverse idler gear (arrow)
- Axle for reverse idler gear does not have to be removed in order to remove reverse idler gear
- Axle for reverse idler gear is not available as replacement part

7 - TORX bolt, 35 Nm

- For additional fastening of axle for reverse idler gear

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39 FINAL DRIVE, DIFFERENTIAL

OIL SEAL FOR DRIVE FLANGE, REPLACING

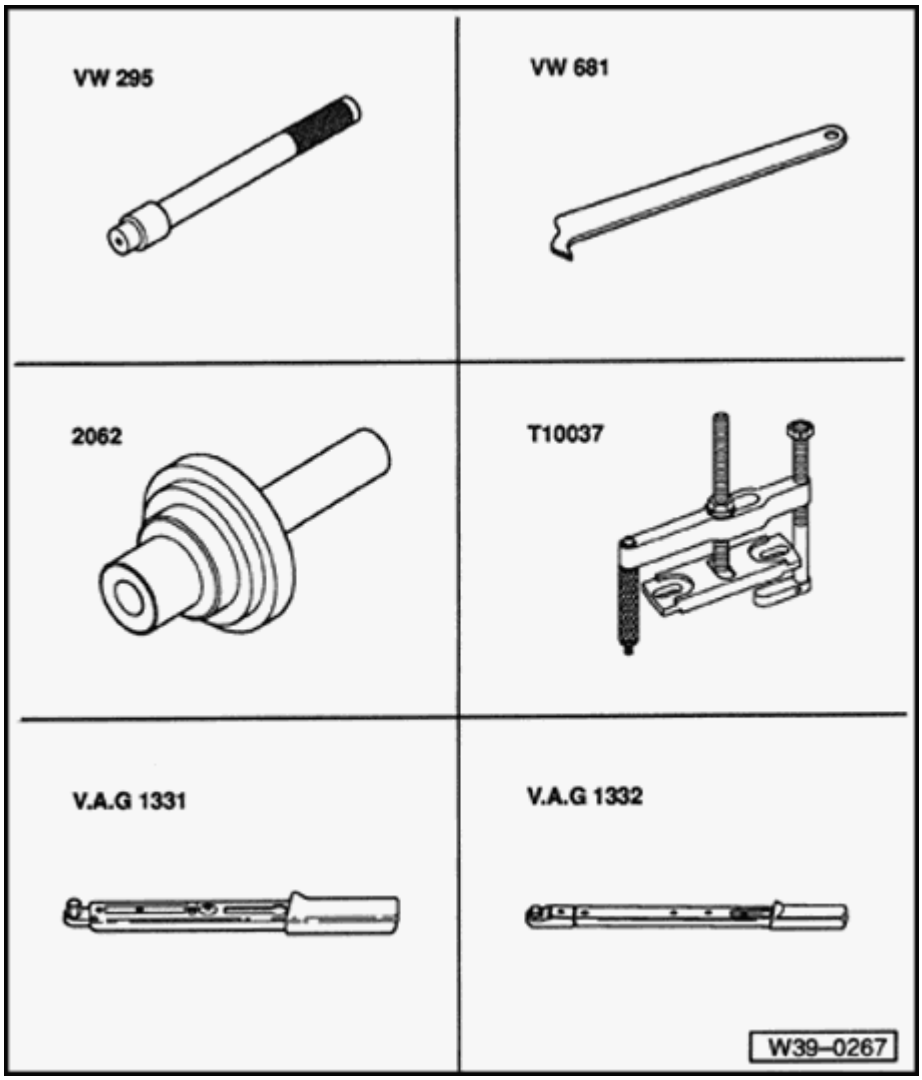


Fig. 298: Identifying Special Tools
Courtesy of VOLKSWAGEN UNITED STATES, INC.

(Transmission installed)

- Pay attention to general repair instructions. Refer to **General repair instructions**.

Special tools and equipment

- VW 295 Mandrel
- VW 681 Extractor lever
- 2062 Insertion mandrel

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- T10037 Puller
- VAG 1331 Torque wrench
- VAG 1332 Torque wrench

Special tools, testers and other items required

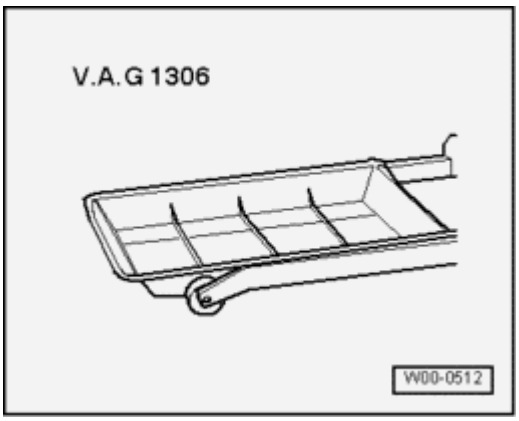


Fig. 299: Identifying Drip Tray V.A.G 1306
Courtesy of VOLKSWAGEN UNITED STATES, INC.

- VAG 1306 Drip tray

NOTE:

- **Use the same procedure for removing both left and right oil seals.**
- **It is not necessary to remove the exhaust system.**

Removing

- Turn steering wheel to left lock.

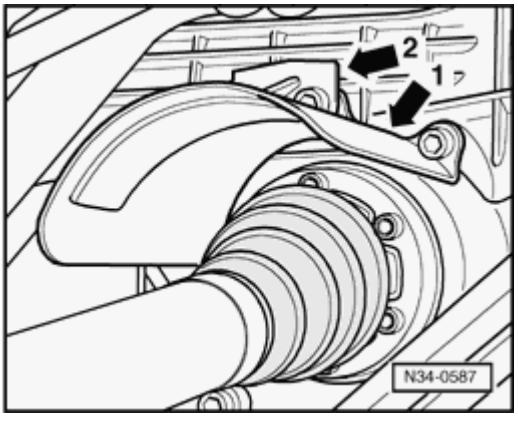


Fig. 300: Detaching Heat Shields And Right-Hand Axle Shaft
Courtesy of VOLKSWAGEN UNITED STATES, INC.

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- Remove cover plates above drive axle (arrows 1 + 2).
- Disconnect drive axle from transmission flange:
- Tie drive axle up as far out of the way as possible. Take care not to damage paintwork on drive axle.
- Place drip tray VAG 1306 under transmission.

Replacing left oil seal

Remove left drive flange

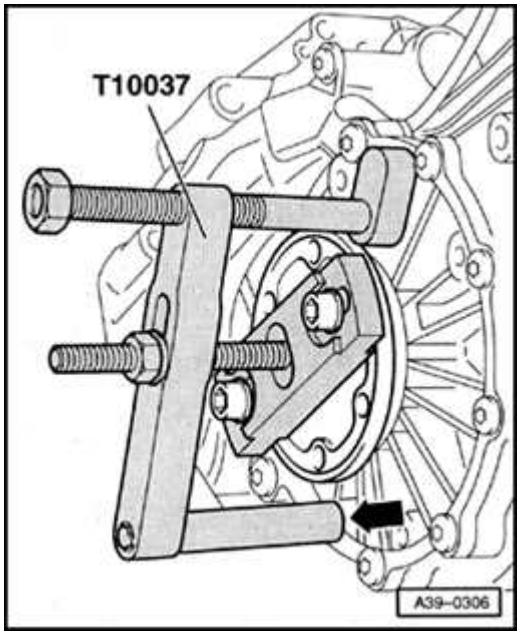


Fig. 301: Removing Drive Flange (Left Side)
Courtesy of VOLKSWAGEN UNITED STATES, INC.

- Remove drive flange by firmly screwing puller T10037 to cover of differential (arrow).

Replacing right oil seal

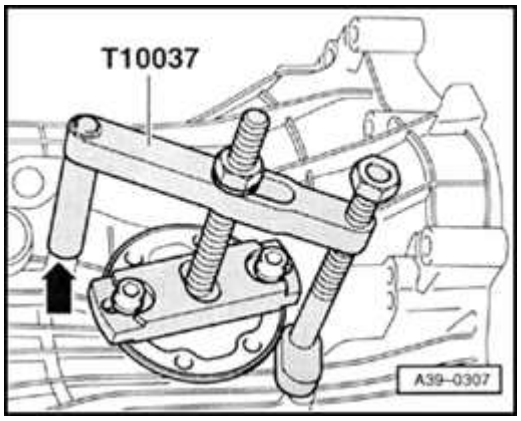


Fig. 302: Removing Drive Flange (Right Side)

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Courtesy of VOLKSWAGEN UNITED STATES, INC.

- Remove drive flange by firmly screwing puller T10037 to transmission housing (arrow).

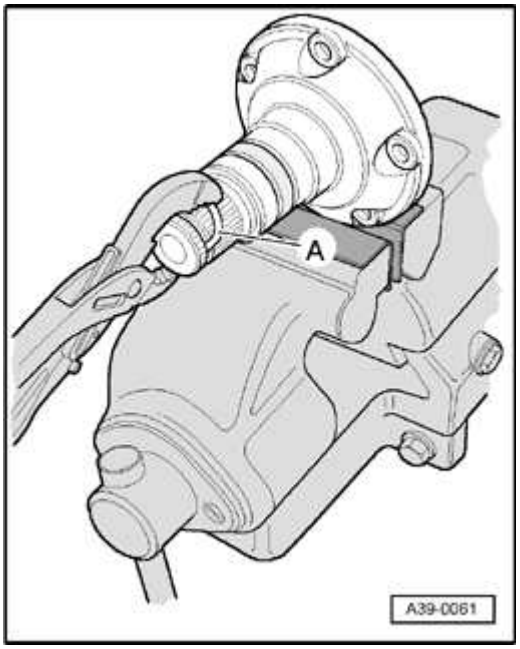


Fig. 303: Removing And Installing Securing Ring
Courtesy of VOLKSWAGEN UNITED STATES, INC.

- Always replace circlip of drive flange.

- Clamp drive flange with soft jaws in vice. Press circlip out of drive flange groove using new circlip -A-.
- Pull out oil seal of drive flange using VW 681.

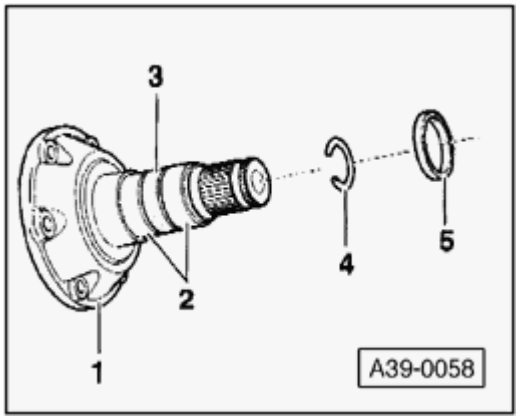


Fig. 304: Flange Shaft Design
Courtesy of VOLKSWAGEN UNITED STATES, INC.

Drive flange assembly with mounted polygonal bearing

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1 - Drive flange

2 - Needle bearing (polygonal bearing)

3 - Spacer ring

4 - Circlip

5 - Spacer ring - additionally installed if splined shaft diameter = 30 mm

NOTE:

- **Polygonal bearings run roughly when drive flange is not installed. This does not indicate faulty bearings. An acoustic test can only be conducted when drive flange is installed.**
- **Look out for damages to polygonal bearings (e.g. cracks in outer race of bearing)**
- **Polygonal bearings can only be replaced together with drive flange.**
- **Drive flanges with a splined shaft diameter of 30 mm have a spacer ring -5- installed between polygonal bearing and planet pinion.**

Installing

NOTE: Repair rim offset 6.5 mm if employing used drive flange.

- Slightly oil circumference of oil seal.

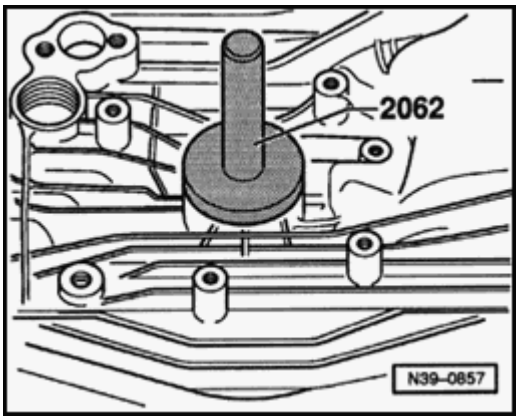


Fig. 305: Installing Right-Hand Drive Flange Seal
Courtesy of VOLKSWAGEN UNITED STATES, INC.

- Drive in new oil seal for right drive flange 5.5 mm below surface of housing, taking care not to tilt it.
- Fill space between sealing lip and dust lip with sealing grease G 052 128 A1.

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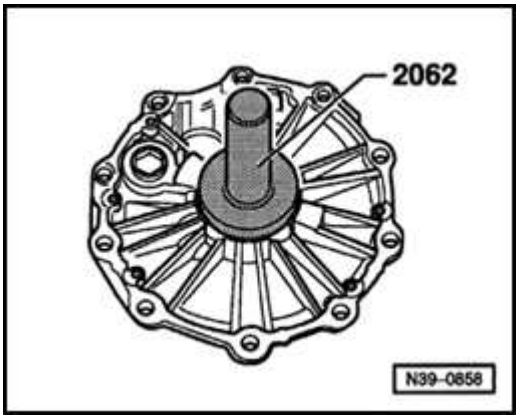


Fig. 306: Installing Left-Hand Drive Flange Seal
Courtesy of VOLKSWAGEN UNITED STATES, INC.

- Drive in new oil seal for left drive flange 5.5 mm below surface of cover, taking care not to tilt it.
- Drive in drive flange using mandrel VW 295.
- Screw drive axle to drive flange.
- Screw on cover plates for drive axle, if installed.

- Checking oil level in manual transmission. Refer to **Transmission oil level, checking**.

Tightening torques

Component		Nm
Drive axle to drive flange	M8	40
	M10	70
Heat shields for drive axles		23

SPEEDOMETER VEHICLE SPEED SENSOR AND DRIVE-WHEEL, REMOVING AND INSTALLING

Speedometer vehicle speed sensor and drive-wheel, removing and installing

- Transmission installed

- Pay attention to general repair instructions. Refer to **General repair instructions**.

Speedometer vehicle speed sensor -G22-, removing and installing

Removing

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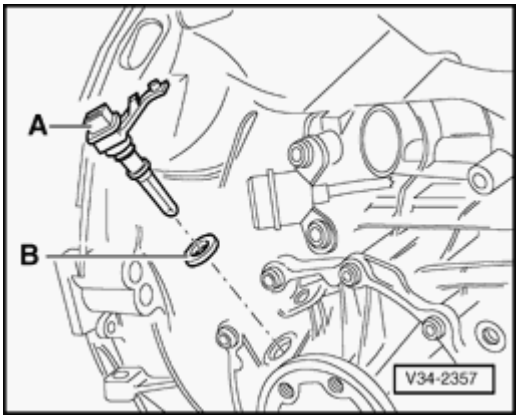


Fig. 307: Identifying Speedometer Vehicle Speed Sensor (VSS) and O-ring
Courtesy of VOLKSWAGEN UNITED STATES, INC.

- Unplug connector of sender -A-.
- Press down retainer, swivel sensor to one side and pull upward and out.

Installing

- Replace O-ring -B- during installation.
- Insert sensor and engage.

NOTE: Handle sender with care. If damaged, speed values can no longer be precise.

Speedometer drive wheel, removing and installing

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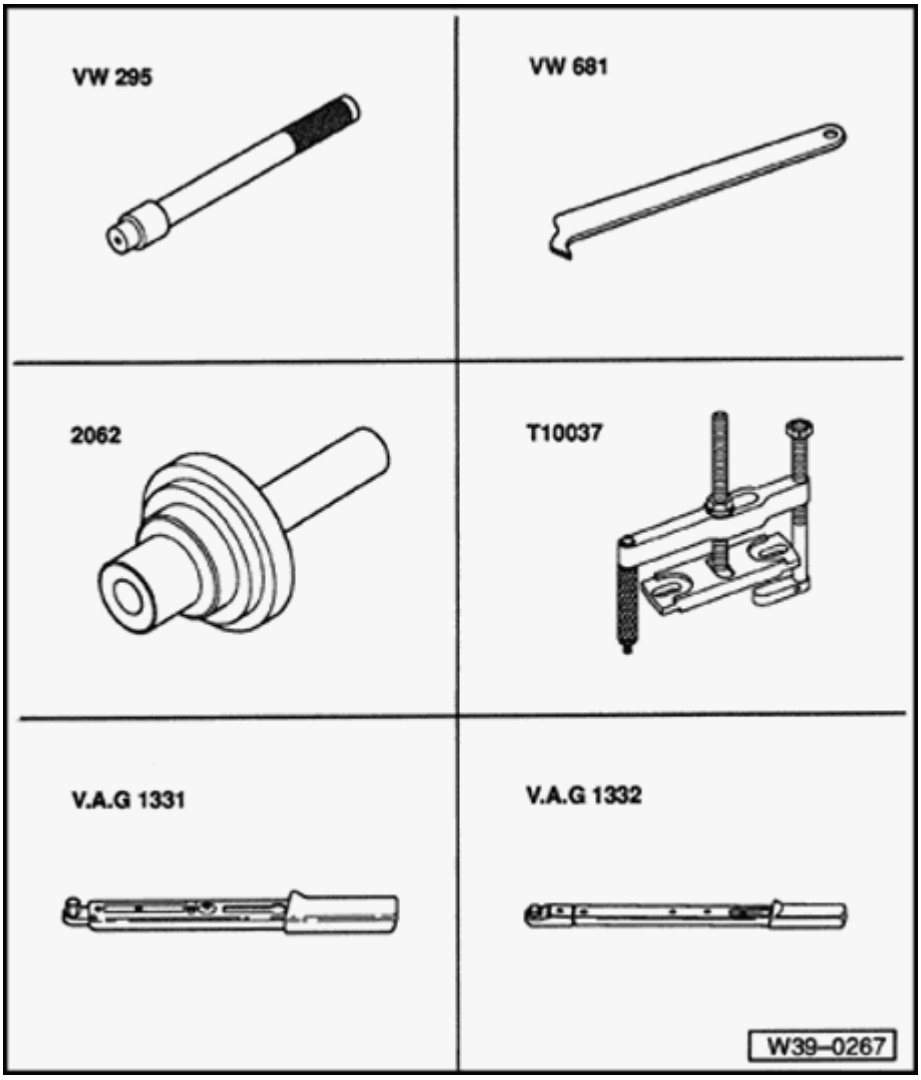


Fig. 308: Identifying Special Tools
Courtesy of VOLKSWAGEN UNITED STATES, INC.

(Transmission installed)

Special tools and equipment

- VW 295 Mandrel
- VW 681 Extractor lever
- 2062 Insertion mandrel
- T10037 Puller
- VAG 1331 Torque wrench
- VAG 1332 Torque wrench

Special tools, testers and other items required

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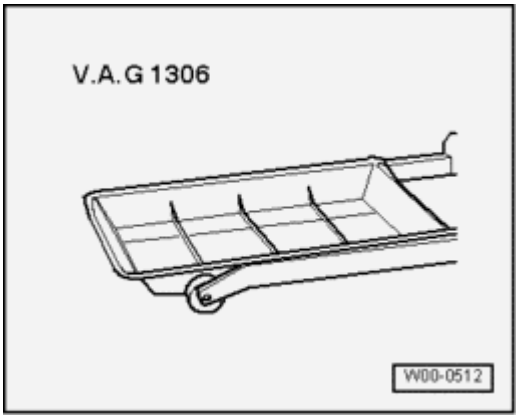


Fig. 309: Identifying Drip Tray V.A.G 1306
Courtesy of VOLKSWAGEN UNITED STATES, INC.

- VAG 1306 Drip tray

Removing

- Turn steering wheel to left lock.
- If installed, remove cover plate above left drive axle.
- Disconnect drive axle from drive flange.
- Place drip tray in position.

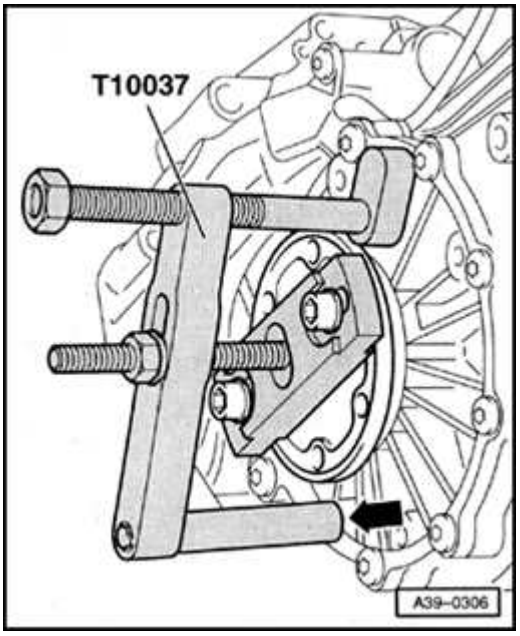


Fig. 310: Removing Drive Flange (Left Side)
Courtesy of VOLKSWAGEN UNITED STATES, INC.

- Remove drive flange by firmly screwing puller T10037 to cover of differential (arrow).
- Pull out oil seal of drive flange using VW 681.

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- Remove speedometer vehicle speed sensor. Refer to **Speedometer vehicle speed sensor -G22-, removing and installing**.

Removing speedometer driving gear:

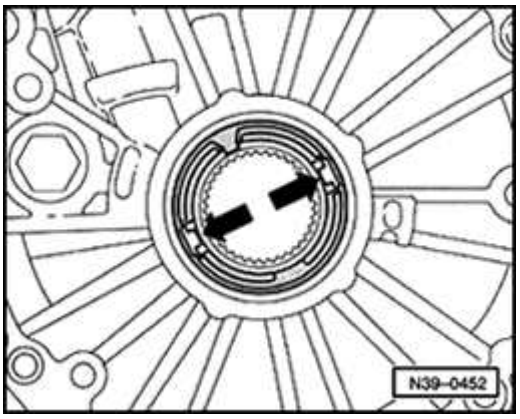


Fig. 311: Press Drive Gear Retaining Clips In Direction Of Arrows Using Screwdriver
Courtesy of VOLKSWAGEN UNITED STATES, INC.

- Press clips in direction of arrow using a screwdriver.
- Remove driving gear by prying out on all sides.

Installing

Install in reverse order, paying attention to the following:

NOTE: Install the driving gear carefully ensuring it is not crooked on the differential. Do not use force or the driving gear could break.

Installation position:

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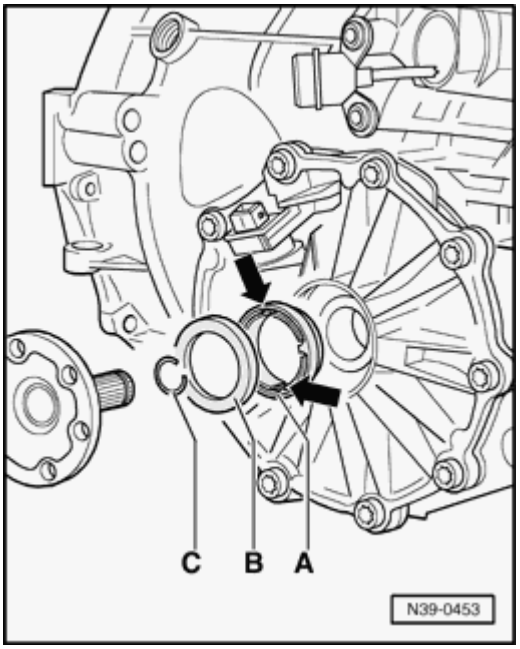


Fig. 312: Identifying Installed Position Of Drive Gear, Retaining Clip And Seal
Courtesy of VOLKSWAGEN UNITED STATES, INC.

Driving tab of driving gear -A- faces oil seal -B- and locks in place in groove of differential.

The clips (arrows) engage in circumferential groove of differential.

- Always replace oil seal -B- and circlip -C-.
- Drive in drive flange using mandrel VW 295.
- Top up manual transmission with oil and check oil level. Refer to **Transmission oil level, checking**.

Tightening torques

Component		Nm
Drive axle to drive flange	M8	40
	M10	70
Heat shields above drive axles to transmission		23

OIL SEAL FOR DRIVE FLANGE/DRIVE SHAFT, REPLACING

Oil seal for drive flange/drive shaft, replacing

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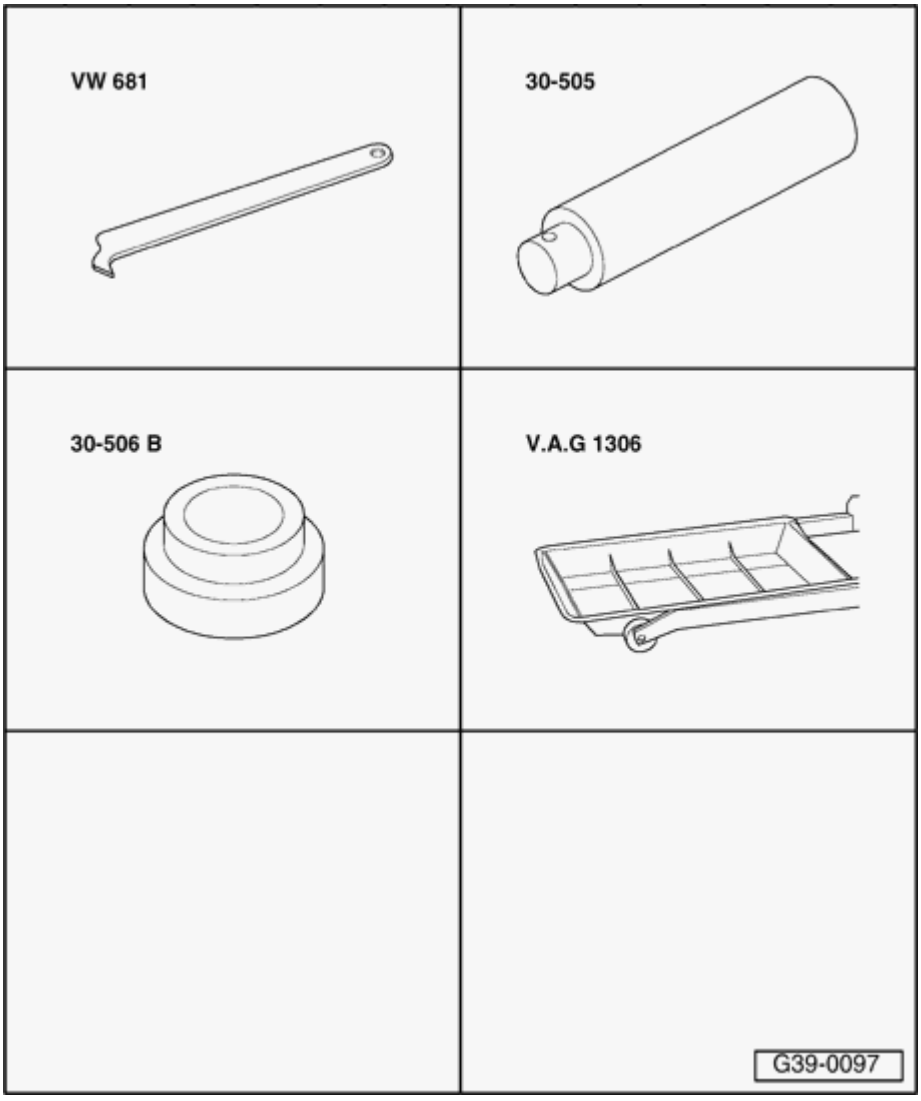


Fig. 313: Identifying Special Tools - Oil Seal For Drive Flange/Drive Shaft, Replacing
Courtesy of VOLKSWAGEN UNITED STATES, INC.

(Transmission installed)

Special tools and equipment

- VW 681 Extractor lever
- 30-505 Insertion mandrel
- 30-506 B Press tool
- VAG 1306 Drip tray

Removing

- Pay attention to general repair instructions. Refer to **General repair instructions**.

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- Place drip tray VAG 1306 underneath and drain gear oil.

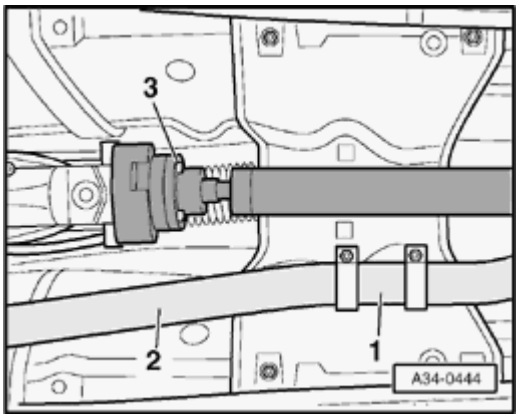


Fig. 314: Exhaust Pipe Clamp And Driveshaft At Transmission
Courtesy of VOLKSWAGEN UNITED STATES, INC.

- Separate exhaust system at clamp -1-.

Refer to **26 - EXHAUST SYSTEM, EMISSION CONTROLS**

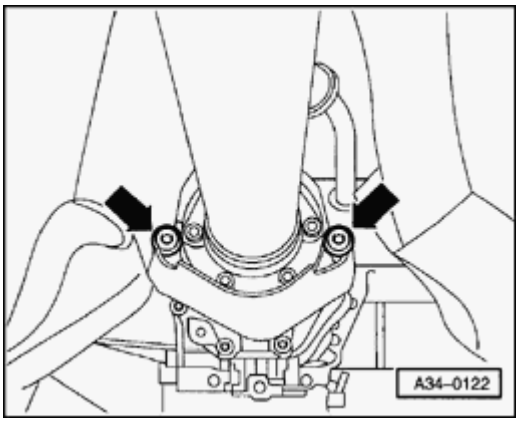


Fig. 315: Identifying Heat Shield Fasteners For Torsen Differential
Courtesy of VOLKSWAGEN UNITED STATES, INC.

- Unscrew heat shield for driveshaft from cover of Torsen differential (arrows).
- Disconnect driveshaft from transmission.

Refer to **39 FINAL DRIVE, DIFFERENTIAL**

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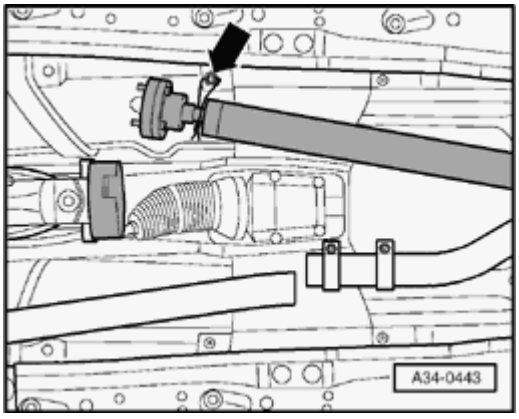


Fig. 316: Drive Shaft Secured With Wire And Locating Speed Nut
Courtesy of VOLKSWAGEN UNITED STATES, INC.

- Re-insert speed nut (arrow) slightly and secure driveshaft to stud with wire.
- Place drip tray VAG 1306 below cap.

NOTE:

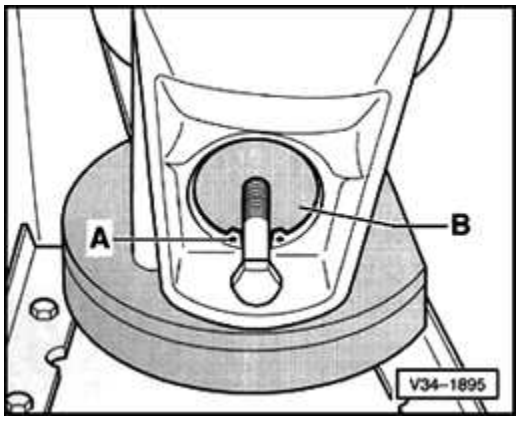


Fig. 317: Identifying Circlip And Sealing Cap
Courtesy of VOLKSWAGEN UNITED STATES, INC.

Oil escapes when cap -B- is taken off.

- Remove circlip -A-.
- Install an M8 bolt into threaded hole of cap.
- Remove cap by means of bolt.

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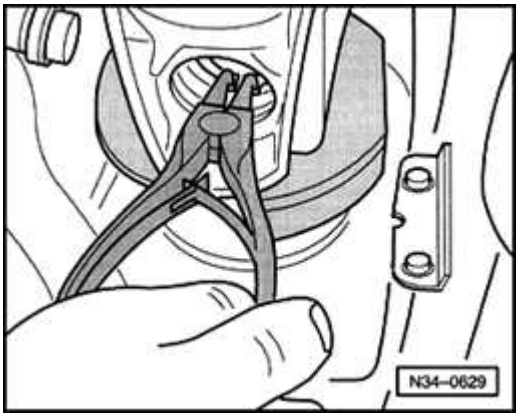


Fig. 318: Drive Flange, Removal And Installation
Courtesy of VOLKSWAGEN UNITED STATES, INC.

- Expand circlip and pull out drive flange.

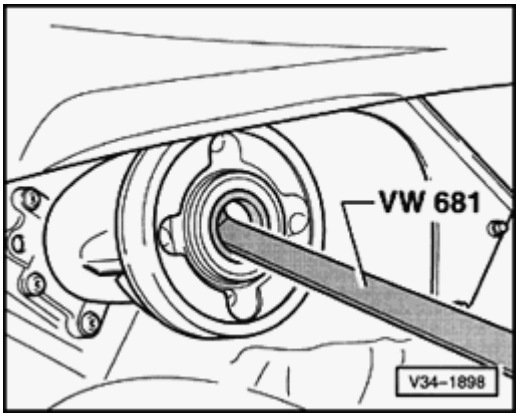


Fig. 319: Pulling Out Oil Seal For Drive Flange Using VW 681
Courtesy of VOLKSWAGEN UNITED STATES, INC.

- Pull out oil seal for drive flange using VW 681.

Installing

- Slightly oil circumference of oil seal.

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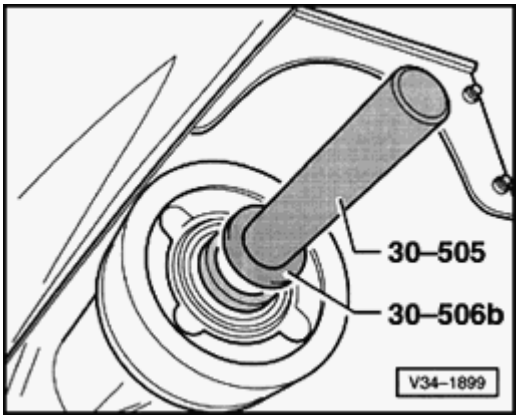


Fig. 320: Driving In New Flange Shaft Seal
Courtesy of VOLKSWAGEN UNITED STATES, INC.

- Drive in new oil seal for drive flange 2 mm below surface of housing, taking care not to tilt it.
- Fill space between sealing lip and dust lip with sealing grease G 052 128 A1.
- Insert drive flange.

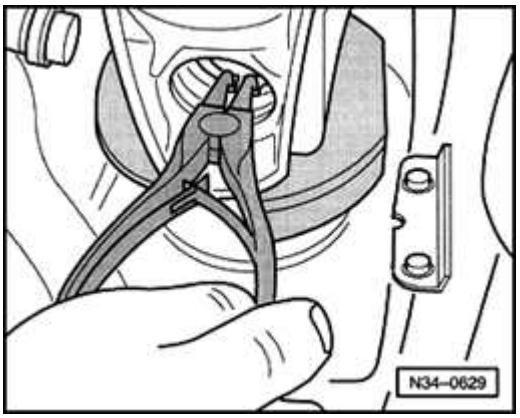


Fig. 321: Drive Flange, Removal And Installation
Courtesy of VOLKSWAGEN UNITED STATES, INC.

- Insert drive flange circlip at same time as shaft.

- Circlip must be properly positioned in groove.

- Insert cap with a new O-ring and secure.
- Bolt driveshaft to transmission.

Refer to **39 FINAL DRIVE, DIFFERENTIAL**

- Top up manual transmission with oil and check oil level. Refer to **Transmission oil level, checking**.
- Align exhaust system stress-free:

Refer to **26 - EXHAUST SYSTEM, EMISSION CONTROLS**

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Tightening torques

Component		Nm
Drive shaft to manual transmission 1)		55
Heat shield for driveshaft to cover plate for Torsen differential		25

1) Replace bolt

DIFFERENTIAL, REMOVING AND INSTALLING

Differential, removing and installing

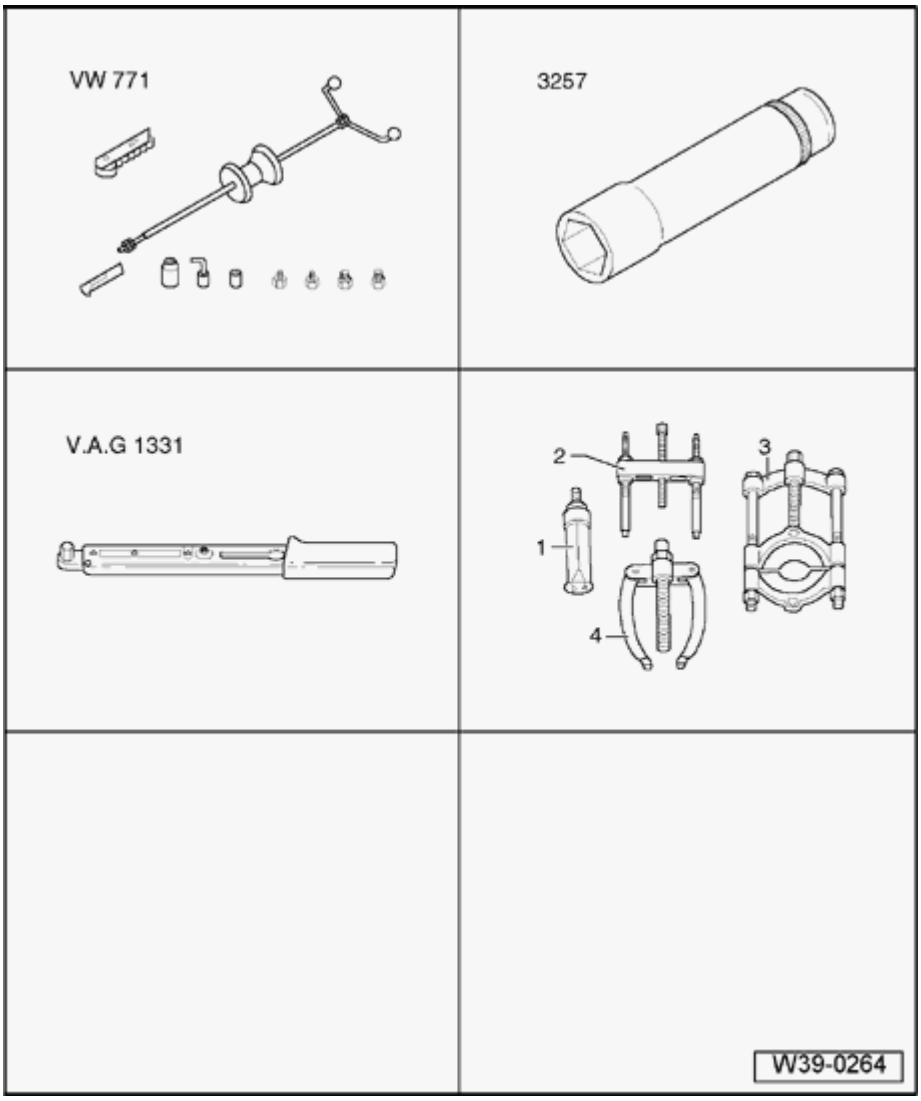


Fig. 322: Identifying Special Tools - Differential, Removing And Installing
Courtesy of VOLKSWAGEN UNITED STATES, INC.

Special tools and equipment

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- VW 771 Multi-purpose tool
- 3257 6 mm Allen key extension
- VAG 1331 Torque wrench
- 1 - Kukko 21/3 Internal puller

NOTE:

- **The differential can also be removed and installed with the transmission installed.**
- **The differential can be removed and installed without disassembling the transmission, input shaft, pinion or transmission housing. The above-mentioned parts must be disassembled if the differential is to be adjusted.**
- **Watch out for visible damages to the polygonal bearings.**
- **Polygonal bearings can only be replaced together with drive flange.**
- **Polygonal bearings run roughly when drive flange is not installed. This does not indicate faulty bearings. An acoustic test can only be conducted when drive flange is installed.**
- **Drive flanges with a splined shaft diameter of 30 mm have a spacer ring installed between polygonal bearing and bevel gear. See Drive flange assembly with polygonal bearings, -item 5-.**
- **When replacing parts marked 1) adjustments are required. Refer to Adjustment table.**

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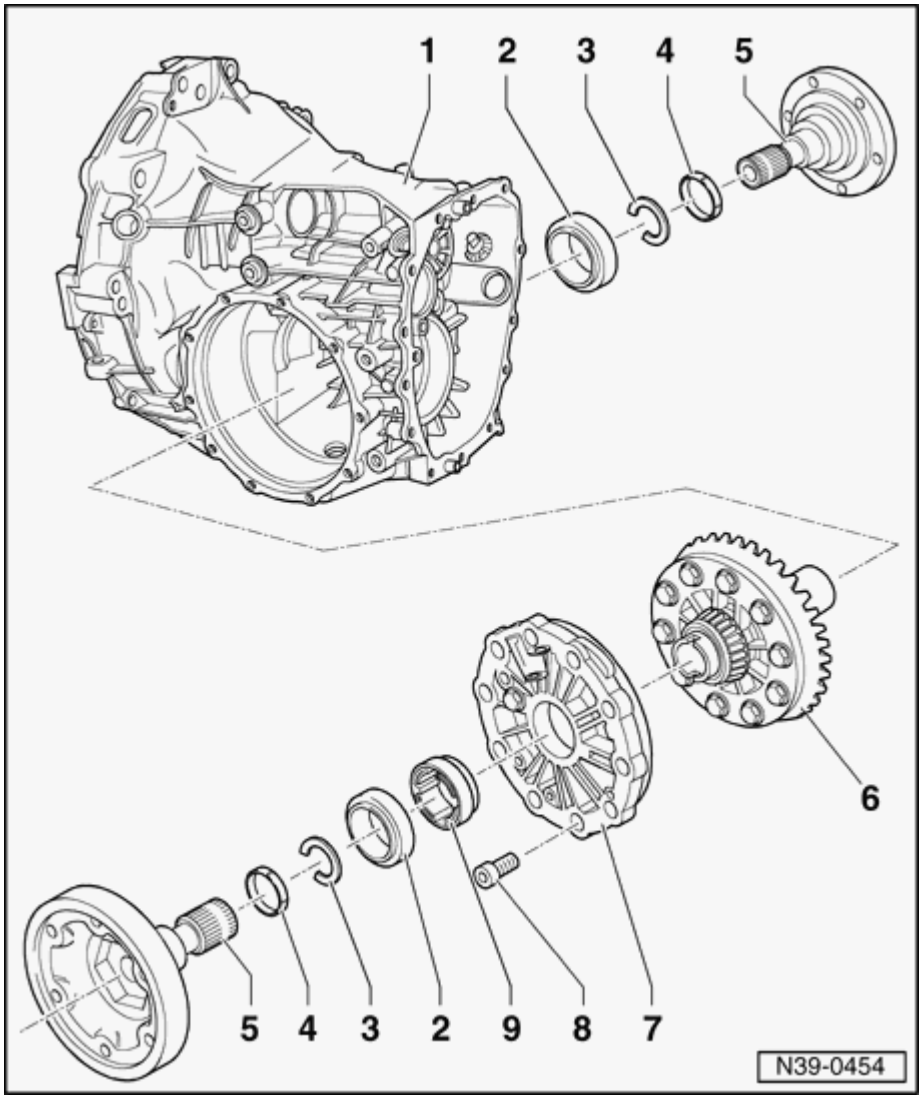


Fig. 323: Differential, Removal And Installation, Overview
Courtesy of VOLKSWAGEN UNITED STATES, INC.

1 - Transmission housing 1)

2 - Oil seal

- Replacing. Refer to **Oil seal for drive flange, replacing**

3 - Circlip

- Replace
- Removing and installing. See **Removing and installing circlip**

4 - Spacer ring

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- Only installed on drive flanges with polygonal bearings and splined diameter 30 mm
- Removing. See **Removing spacer ring**
- Installing. See **Installing spacer ring**

5 - Drive flange

- Removing and installing. Refer to **Oil seal for drive flange, replacing**
- Drive flange assembly: See **Drive flange assembly with polygonal bearings**

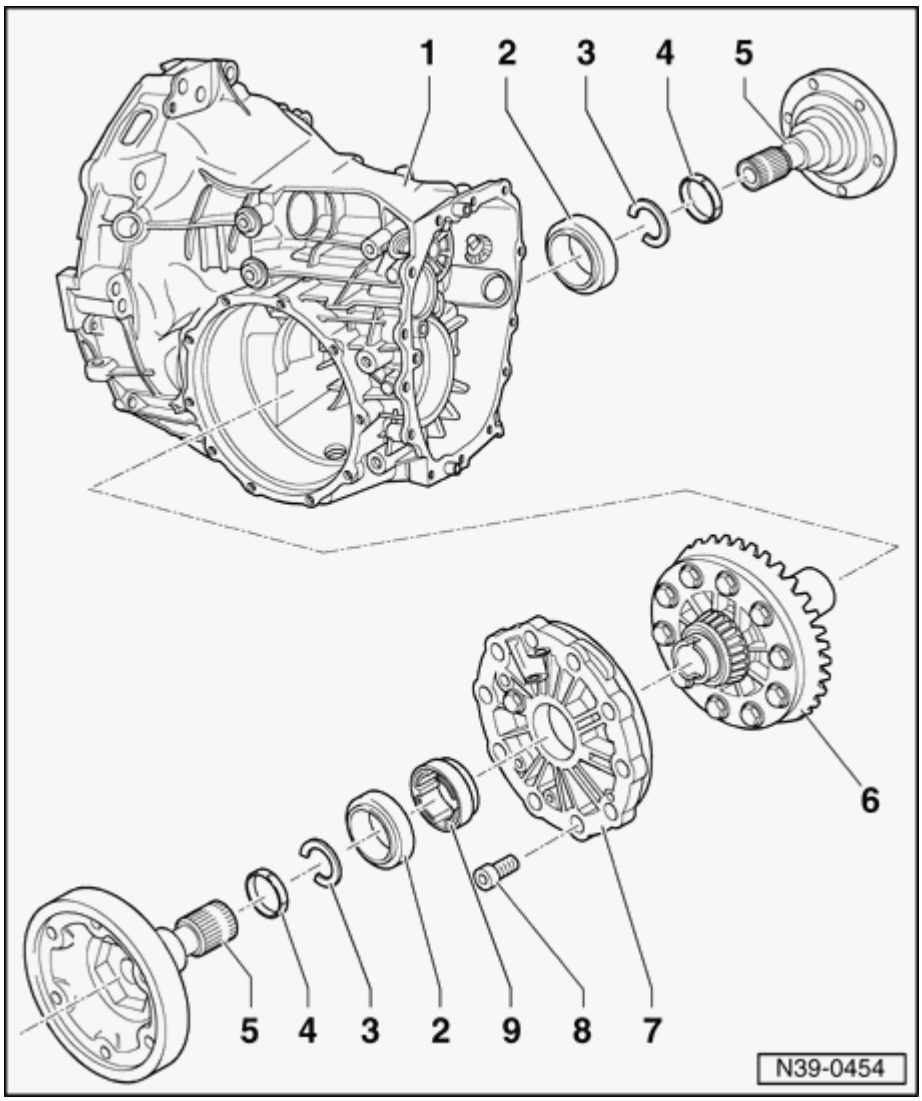


Fig. 324: Differential, Removal And Installation, Overview
Courtesy of VOLKSWAGEN UNITED STATES, INC.

6 - Differential with ring gear 1)

- Can also be removed without removing manual transmission

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- Disassembling and assembling. Refer to **Differential, disassembling and assembling**

7 - Final drive cover 1)

- Apply a thin coat of sealing paste AMV 188 001 02 to sealing surfaces

8 - TORX bolt, 25 Nm

9 - Speedometer driving gear

- Removing and installing. Refer to **Speedometer drive wheel, removing and installing**
- Mount on differential carefully and without tilting. Do not use force, the driving gear could break

Removing and installing circlip

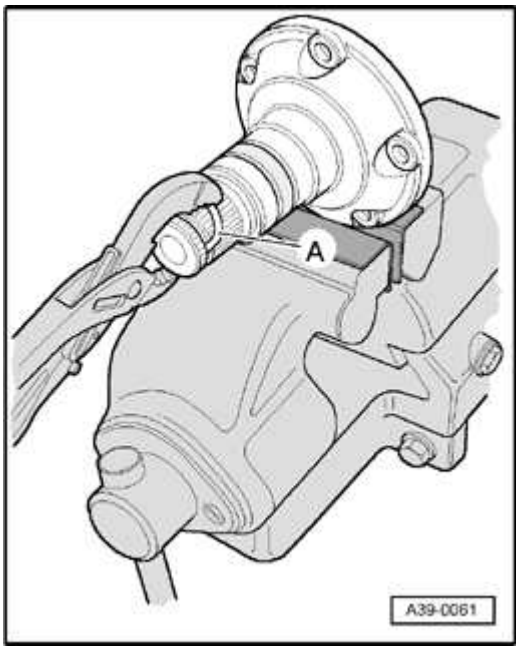


Fig. 325: Removing And Installing Securing Ring
Courtesy of VOLKSWAGEN UNITED STATES, INC.

- Clamp drive flange with soft jaws in vice. Press circlip out of drive flange groove using new circlip -A-.

Removing spacer ring

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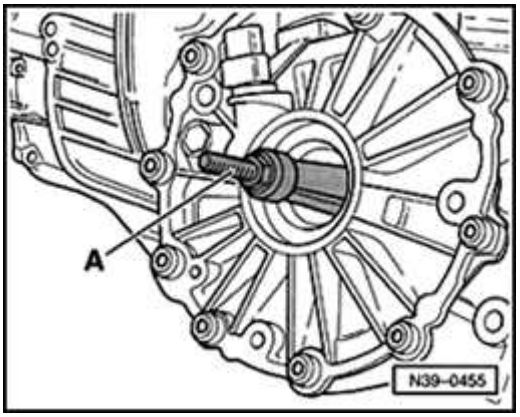


Fig. 326: Removing Spacer Ring
Courtesy of VOLKSWAGEN UNITED STATES, INC.

A - Internal puller 18.5 to 23.5 mm, e.g. Kukko 21/3

- If difficult to move, pull out spacer ring using multi-purpose tool VW 771.

Installing spacer ring

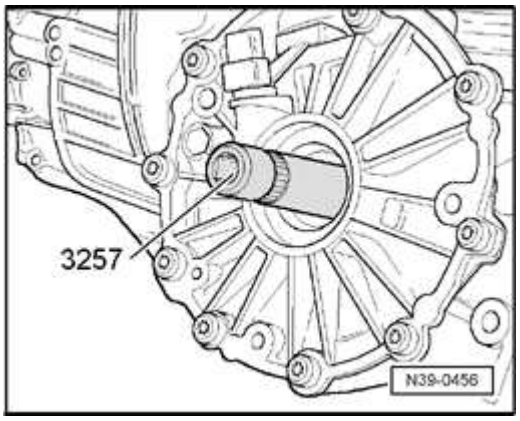


Fig. 327: Installing Spacer Ring
Courtesy of VOLKSWAGEN UNITED STATES, INC.

- Push spacer ring in as far as it will go, ensuring it is not crooked.

Drive flange assembly with polygonal bearings

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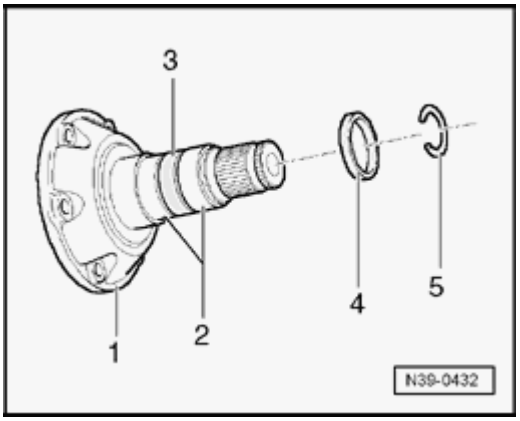


Fig. 328: Flange Shaft Assembly, Overview
Courtesy of VOLKSWAGEN UNITED STATES, INC.

1 - Drive flange

2 - Needle bearing (polygonal bearing)

3 - Spacer ring

4 - Spacer ring - additionally installed if splined shaft diameter = 30 mm

5 - Circlip

NOTE: Needle bearings (polygonal bearings) do not move freely when drive flange is removed. This does not indicate faulty bearings.

DIFFERENTIAL, DISASSEMBLING AND ASSEMBLING

Differential, disassembling and assembling

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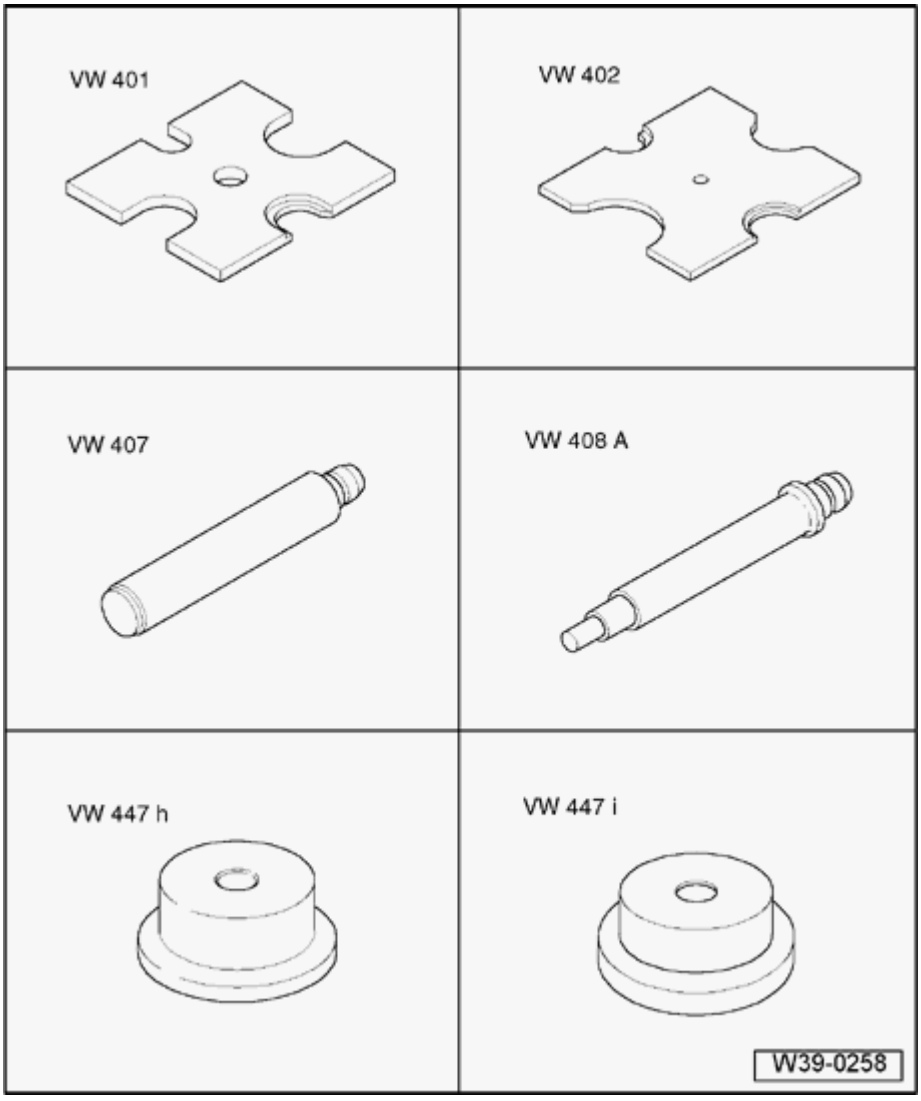


Fig. 329: Identifying Special Tools - Differential, Disassembling And Assembling
Courtesy of VOLKSWAGEN UNITED STATES, INC.

Special tools and workshop equipment required

- VW 401 Pressure plate
- VW 402 Pressure plate
- VW 407 Press tool
- VW 408 A Press tool

- VW 447 H Thrust pad
- VW 447i Thrust pad

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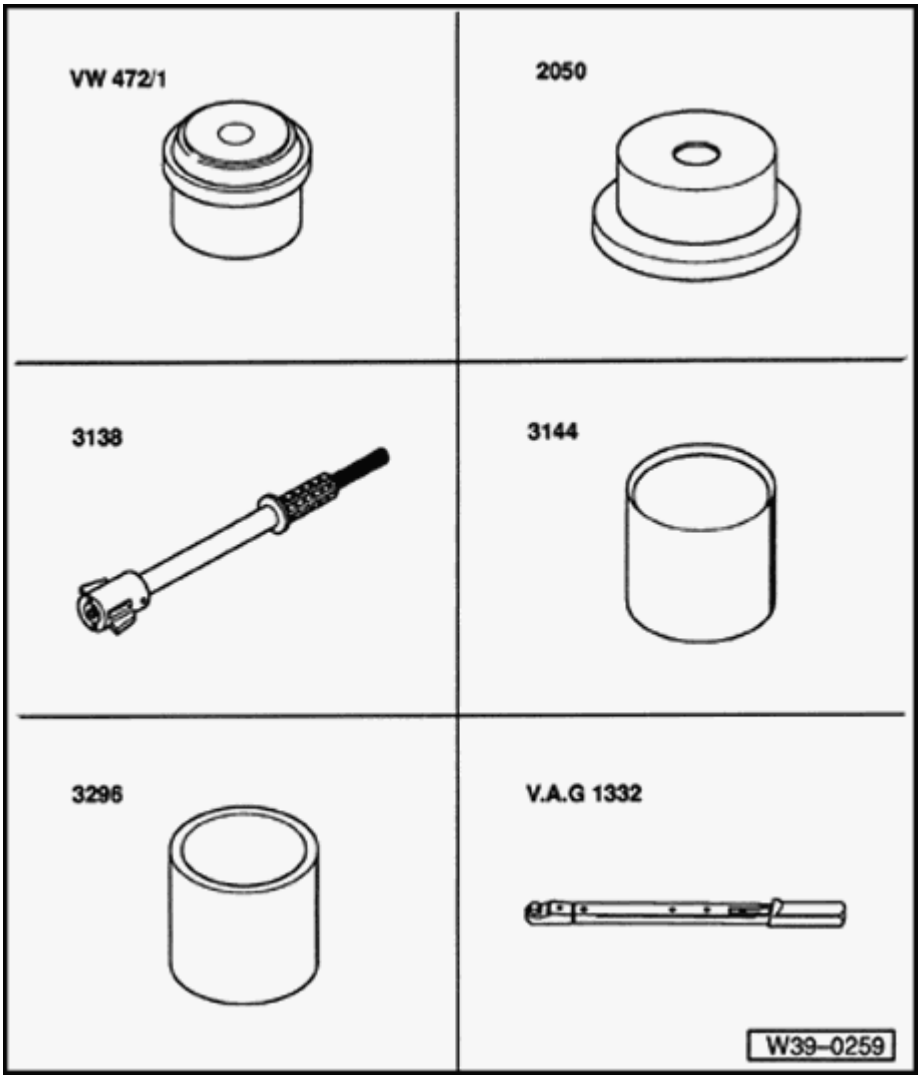


Fig. 330: Identifying Special Tools - Differential, Disassembling And Assembling
Courtesy of VOLKSWAGEN UNITED STATES, INC.

Special tools and equipment

- VW 472/1 Pressure piece
- 2050 Pressure piece
- 3138 Punch-out tool
- 3144 Sleeve
- 3296 Pipe
- VAG 1332 Torque wrench

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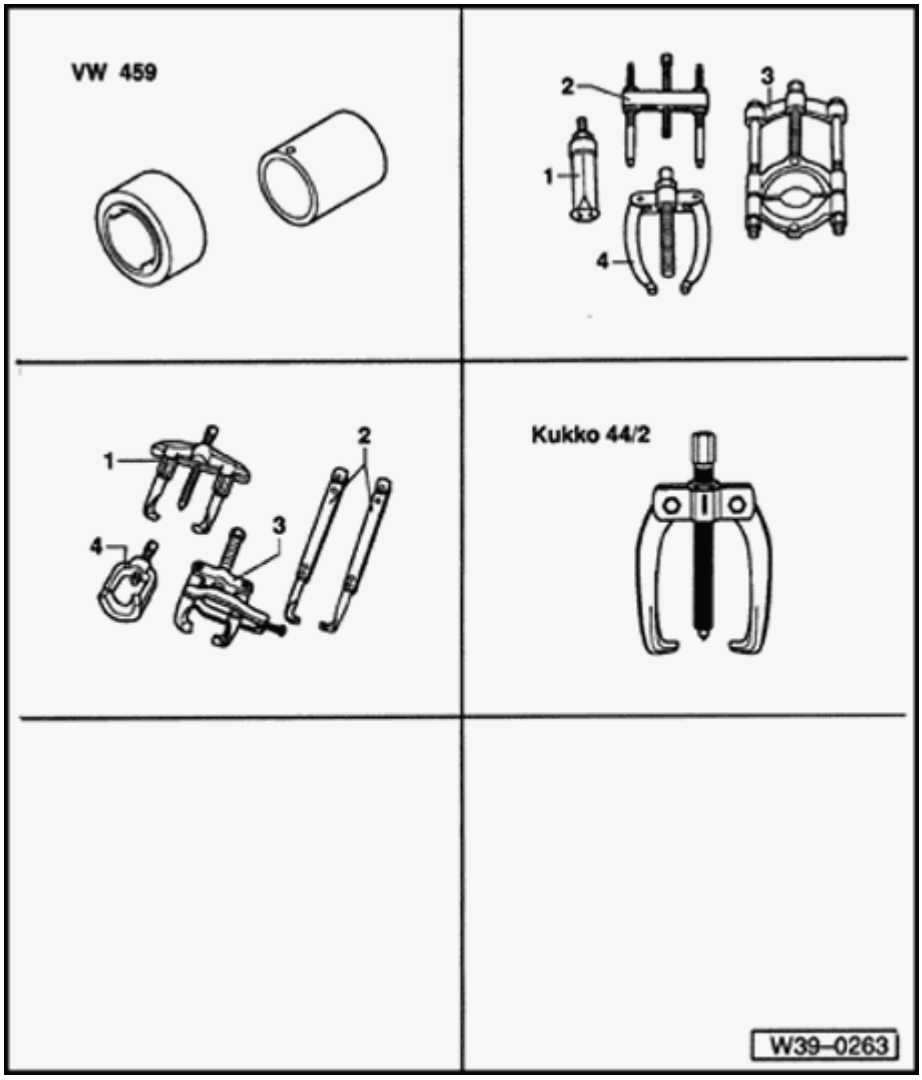


Fig. 331: Identifying Special Tools - Differential, Disassembling And Assembling
Courtesy of VOLKSWAGEN UNITED STATES, INC.

Special tools and equipment

- VW 459 Pressing-out and pressing in tool
- 1 - Kukko 21/7 Internal puller
- 3 - Kukko 204/2 Puller
- 4 - Kukko 22/2 Counter-support
- Kukko 44-2 Two-arm puller

NOTE:

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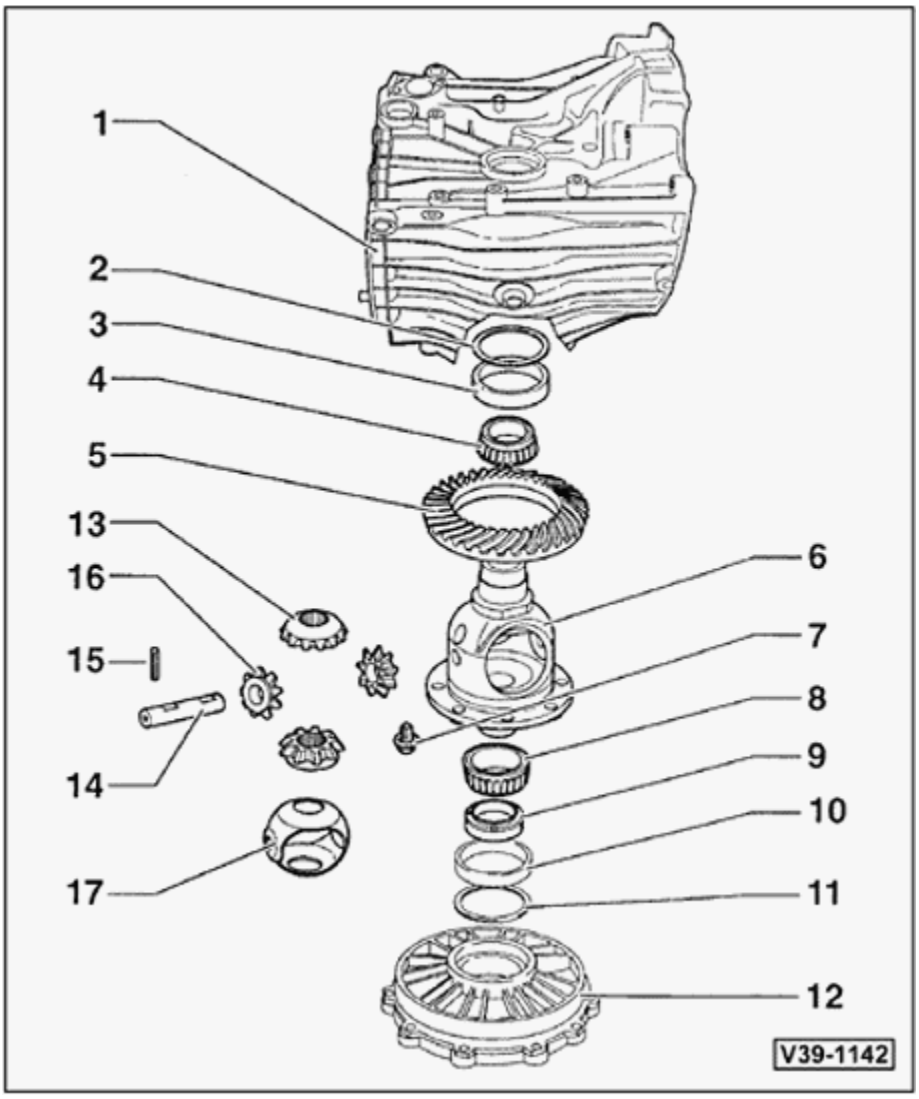


Fig. 332: Differential, Disassembling And Assembling, Overview
Courtesy of VOLKSWAGEN UNITED STATES, INC.

- **Removing and installing differential. Refer to Differential, removing and installing.**
- **Replace both tapered roller bearings together.**
- **When replacing parts marked 1) adjustments are required. Refer to Adjustment table.**

1 - Transmission housing 1)

2 - Shim "S2"

- Make note of thickness
- Adjustment table. Refer to **Adjustment table**

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3 - Outer race for right tapered roller bearing 1)

- Extracting. See **Extracting tapered roller bearing outer race from transmission housing**
- Pressing in. See **Pressing tapered roller bearing outer race into transmission housing**

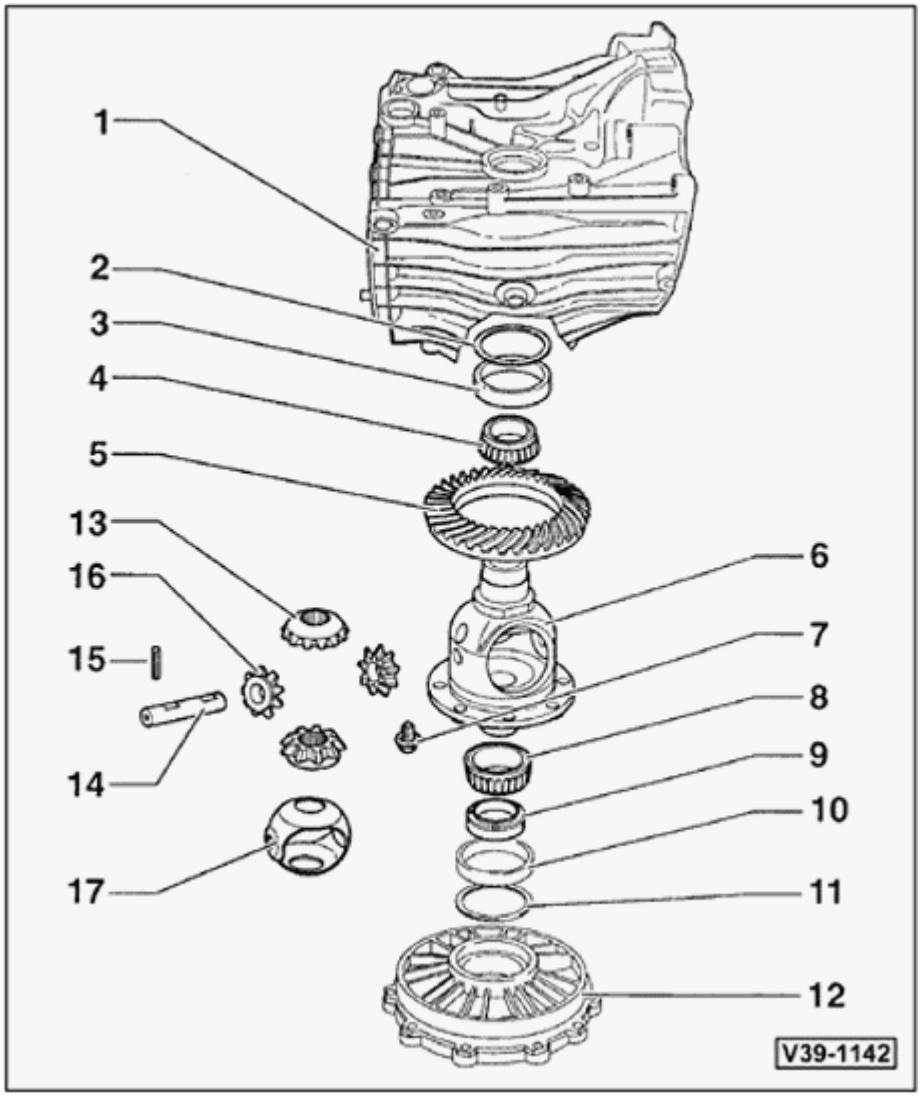


Fig. 333: Differential, Disassembling And Assembling, Overview
Courtesy of VOLKSWAGEN UNITED STATES, INC.

4 - Inner race for right tapered roller bearing 1)

- Pulling off. See **Extracting inner race for right tapered roller bearing**
- Pressing on. See **Pressing on inner race for right tapered roller bearing**

5 - Ring gear 1)

- Paired with pinion (drive unit)

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- Assigning by way of transmission code letters. Refer to **Code letters, assignment of mechanical units, transmission ratios and capacities**
- Driving out of housing using mandrel. See **Driving ring gear out of housing**
- Installing to differential housing **HEATING RING GEAR TO APPROX. 100 ° C and installing** 10

6 - Differential housing 1)

- Assigning by way of transmission code letters. Refer to **Code letters, assignment of mechanical units, transmission ratios and capacities**
- Assignment

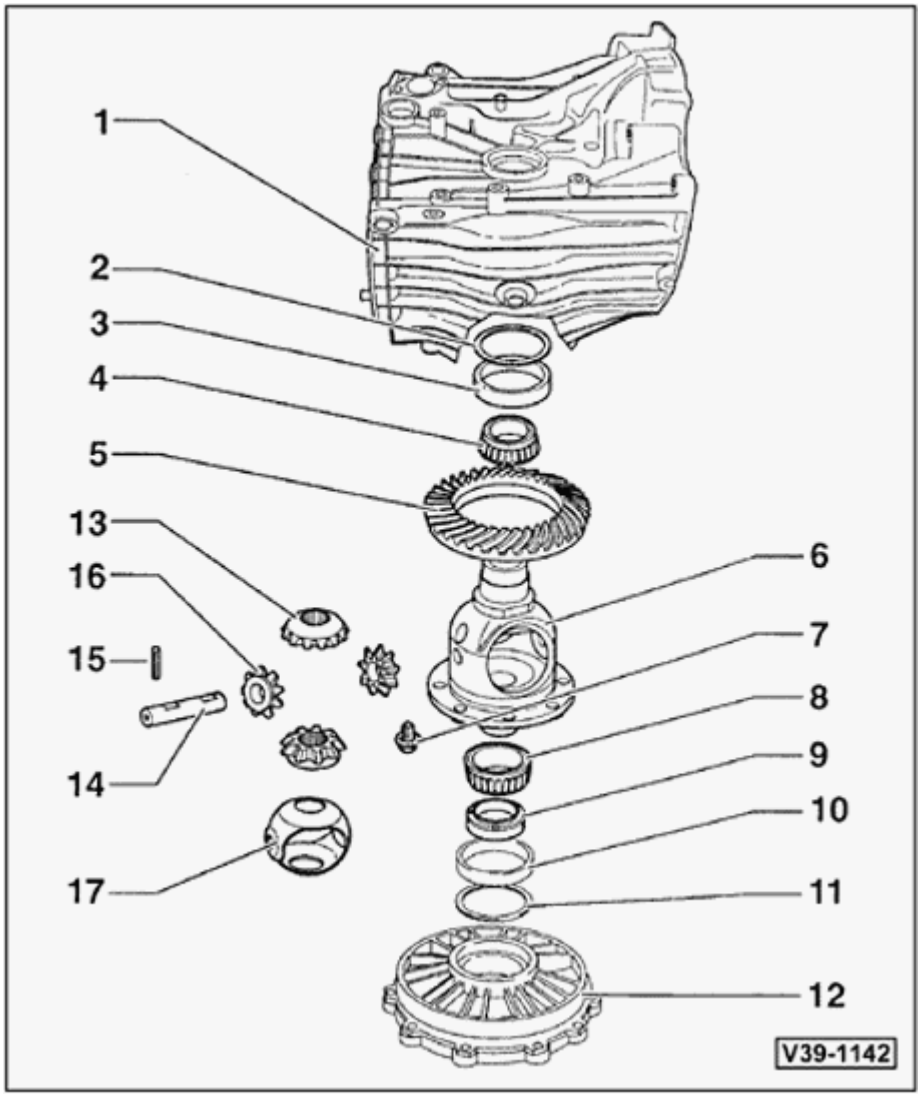


Fig. 334: Differential, Disassembling And Assembling, Overview
Courtesy of VOLKSWAGEN UNITED STATES, INC.

7 - Bolt, 60 Nm plus 1/8 turn (45)

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- Always replace
- Screw in bolts evenly and tighten to torque in diagonal sequence

8 - Inner race for left tapered roller bearing 1)

- Pulling off. See **Extracting inner race for left tapered roller bearing**
- Pressing on. See **Mounting inner race for left tapered roller bearing**
- Assignment

9 - Speedometer driving gear

- Removing and installing. Refer to **Speedometer drive wheel, removing and installing**
- Mount on differential carefully and without tilting. Do not use force, the driving gear could break

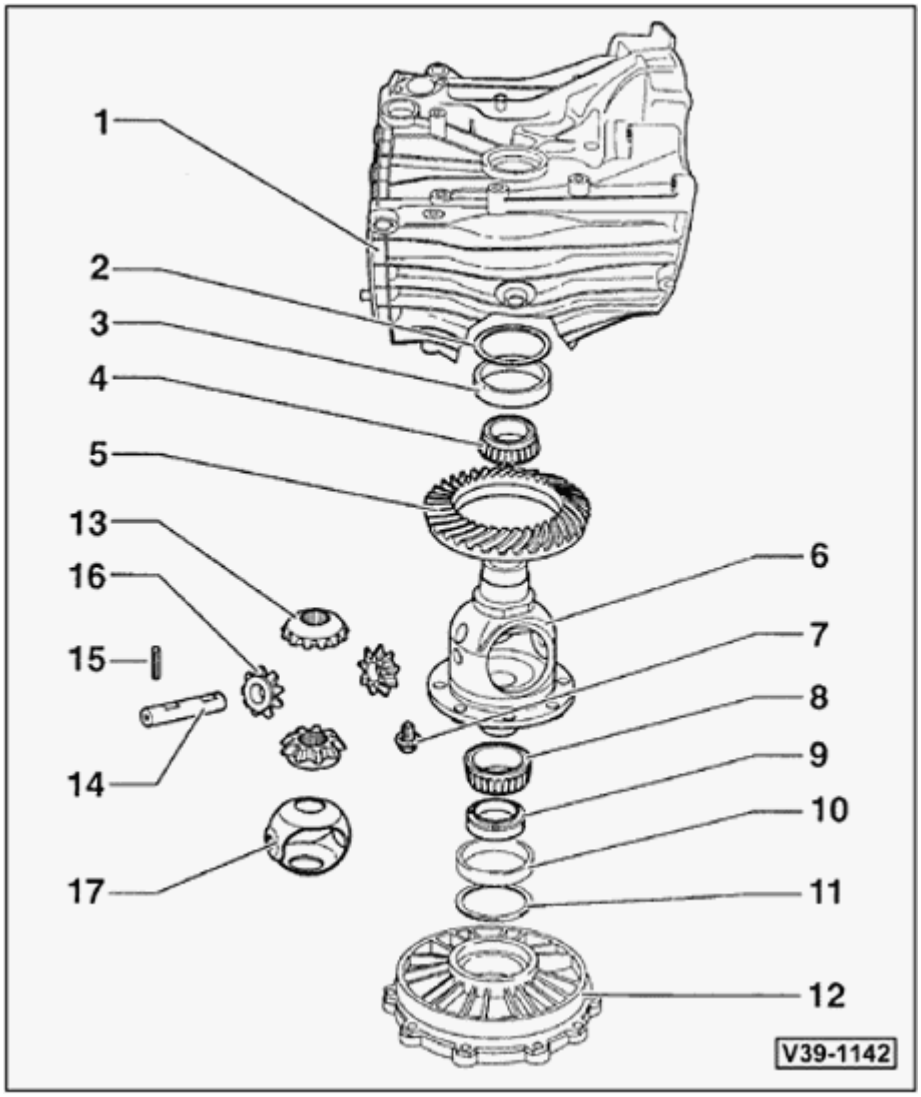


Fig. 335: Differential, Disassembling And Assembling, Overview

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Courtesy of VOLKSWAGEN UNITED STATES, INC.

10 - Outer race for left tapered roller bearing 1)

- Driving out. See **Driving outer race of left tapered roller bearing out of cover**
- Pressing in. See **Driving outer race of left tapered roller bearing into cover**
- Assignment

11 - Shim "S1"

- Make note of thickness
- Adjustment table. Refer to **Adjustment table**
- Assignment

12 - Final drive cover 1)

- Apply a thin coat of sealing paste AMV 188 001 02 to sealing surfaces
- Assignment

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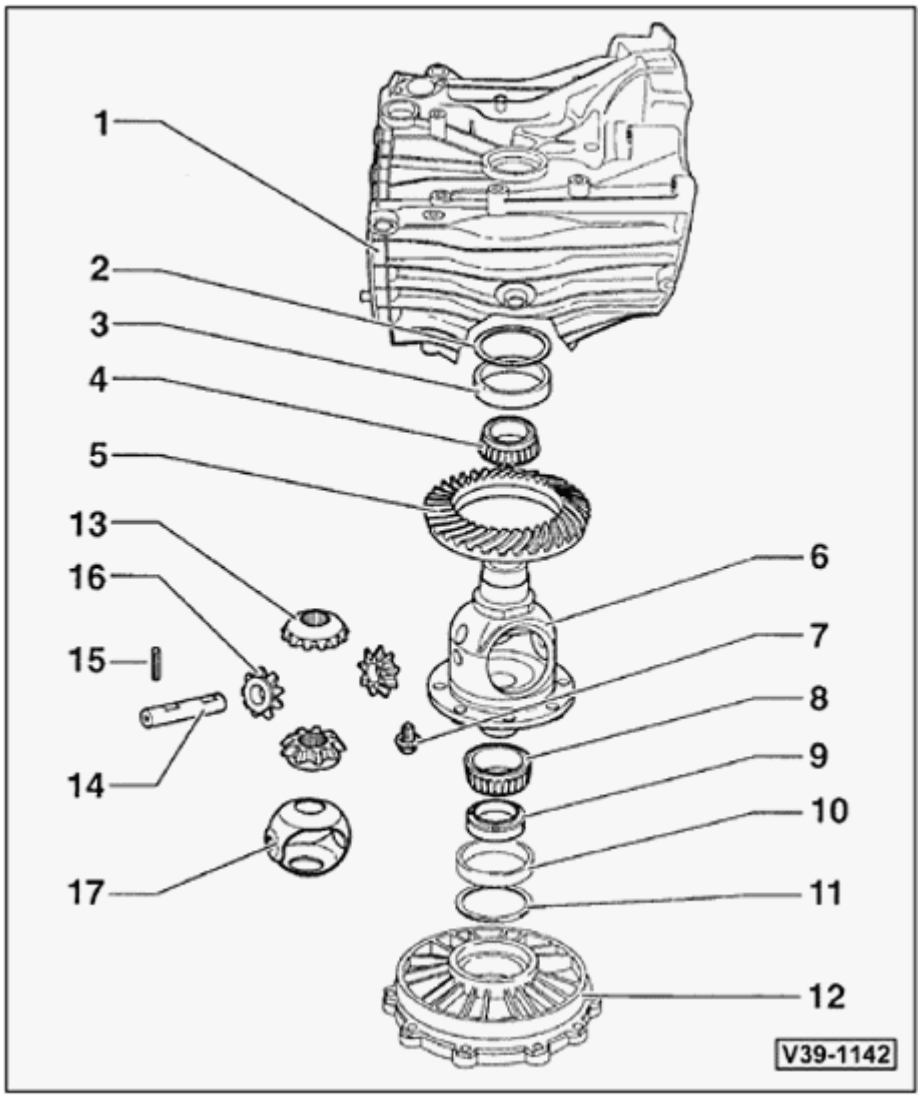


Fig. 336: Differential, Disassembling And Assembling, Overview
Courtesy of VOLKSWAGEN UNITED STATES, INC.

13 - Large bevel gear

- Installing. See **Installing bevel gears**

14 - Differential bevel gear shaft

- Drive out with mandrel after removing spring pin

15 - Spring pin

- For securing bevel gear shaft
- With circumferential groove: Removing and installing. See **Removing and installing spring pin**
- Without circumferential groove: Drive out with mandrel

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16 - Small bevel gear

- Installing. See **Installing bevel gears**

17 - One-piece thrust washer

- Apply gear oil on insertion

Extracting tapered roller bearing outer race from transmission housing

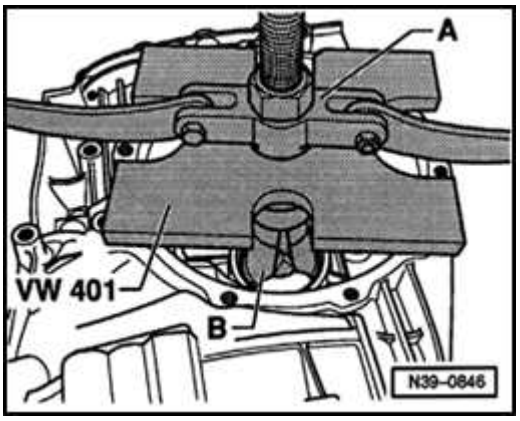


Fig. 337: Pulling Outer Race/Tapered Roller Bearing Out Of Transmission Housing
Courtesy of VOLKSWAGEN UNITED STATES, INC.

A - Counter-support, e.g. Kukko 22/2

B - Internal puller 46 to 58 mm, e.g. Kukko 21/7

- Check shims for damage after removal.

Pressing tapered roller bearing outer race into transmission housing

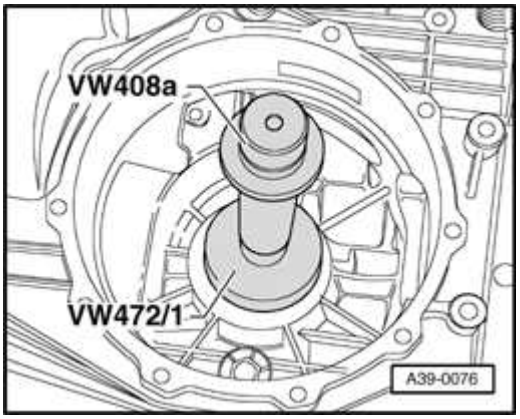


Fig. 338: Pressing Outer Race/Tapered Roller Bearing Into Transmission Housing
Courtesy of VOLKSWAGEN UNITED STATES, INC.

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- Insert tapered section of pressure piece VW 472/1 into outer race.

Extracting inner race for right tapered roller bearing

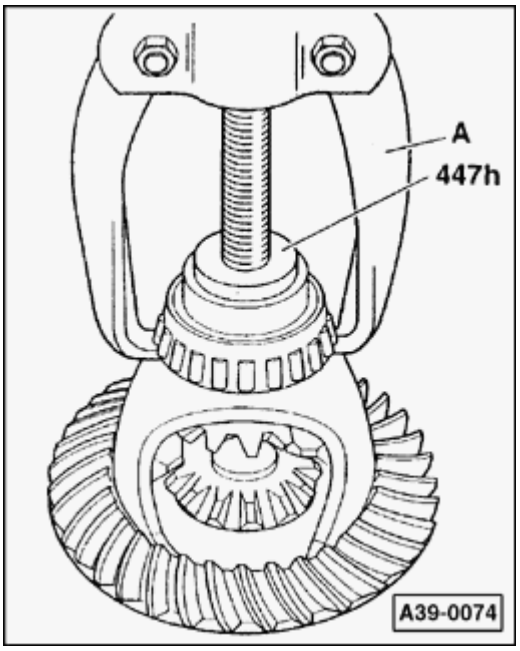


Fig. 339: Pulling Off Right Tapered Roller Bearing Inner Race
Courtesy of VOLKSWAGEN UNITED STATES, INC.

A - Two-arm puller, e.g. Kukko 20/10 or Kukko 44/2

NOTE: The differential features a recess under the bearing seat for applying the puller -A-.

Pressing on inner race for right tapered roller bearing

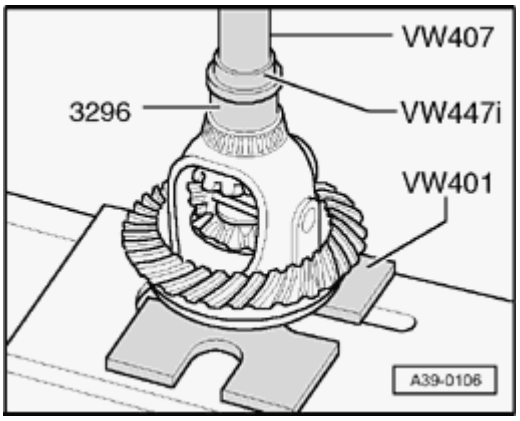


Fig. 340: Pressing On Right Tapered Roller Bearing Inner Race
Courtesy of VOLKSWAGEN UNITED STATES, INC.

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WARNING: Wear protective gloves.

- Heat inner race to approx. 100 ° C, mount and press into place.

Extracting inner race for left tapered roller bearing

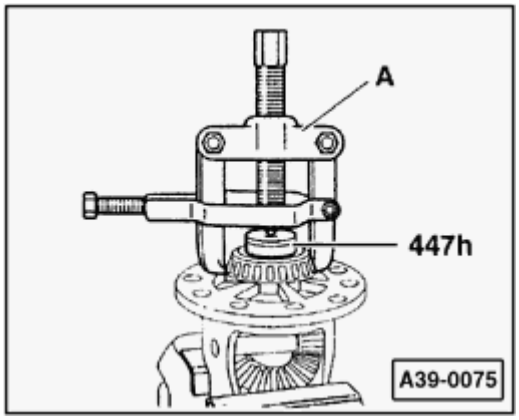


Fig. 341: Pulling Off Left Tapered Roller Bearing Inner Race
Courtesy of VOLKSWAGEN UNITED STATES, INC.

A - Two-arm puller, e.g. Kukko 204/2

NOTE: The differential features a recess under the bearing seat for applying the puller - A-.

Mounting inner race for left tapered roller bearing

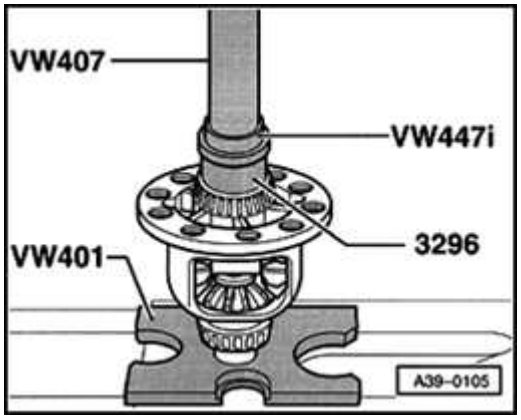


Fig. 342: Installing Left Tapered Roller Bearing Inner Race
Courtesy of VOLKSWAGEN UNITED STATES, INC.

WARNING: Wear protective gloves.

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- Heat inner race to approx. 100 ° C, mount and press into place.

Driving outer race of left tapered roller bearing out of cover

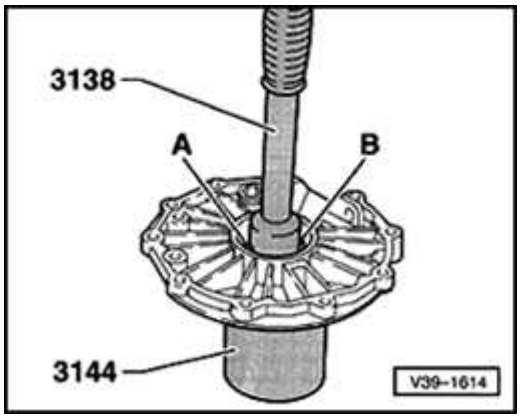


Fig. 343: Driving Out Outer Race Of Left Tapered Roller Bearing From Cover
Courtesy of VOLKSWAGEN UNITED STATES, INC.

- Screw out webs -A- and -B- until they are positioned on outer race inside recess in housing.
- Check shims for damage after removal.

Driving outer race of left tapered roller bearing into cover

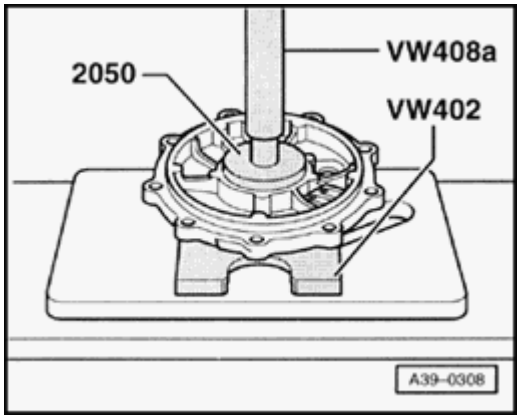


Fig. 344: Driving In Outer Race Of Tapered Roller Bearing Into Cover
Courtesy of VOLKSWAGEN UNITED STATES, INC.

- Press outer race of left tapered roller bearing into cover using pressure piece 2050.
- Insert tapered section of pressure piece 2050 into outer race.

Driving ring gear out of housing

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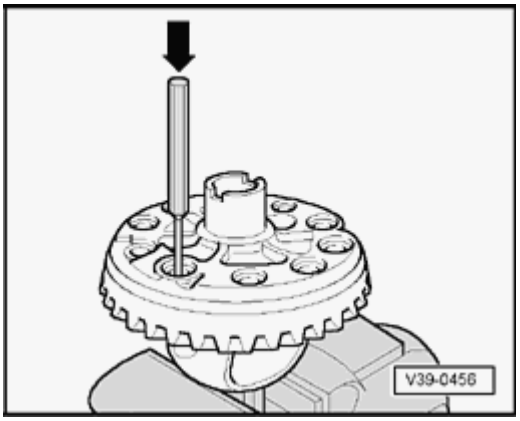


Fig. 345: Driving Out Ring Gear From Housing
Courtesy of VOLKSWAGEN UNITED STATES, INC.

Heating ring gear to approx. 100 ° C and installing

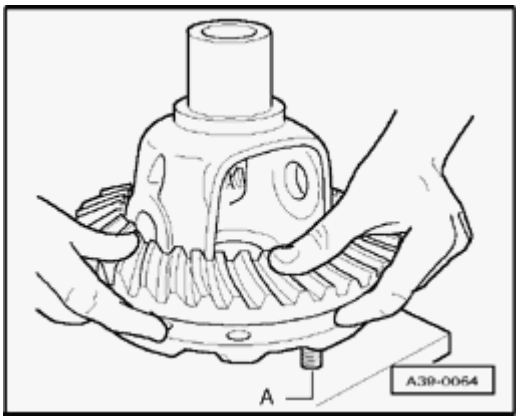


Fig. 346: Installing Ring Gear
Courtesy of VOLKSWAGEN UNITED STATES, INC.

WARNING: Wear protective gloves.

- Use locating pins -A- (self-made) to guide ring gear when installing.
- Allow to cool somewhat before screwing in bolts. Then tighten to torque.

Installing bevel gears

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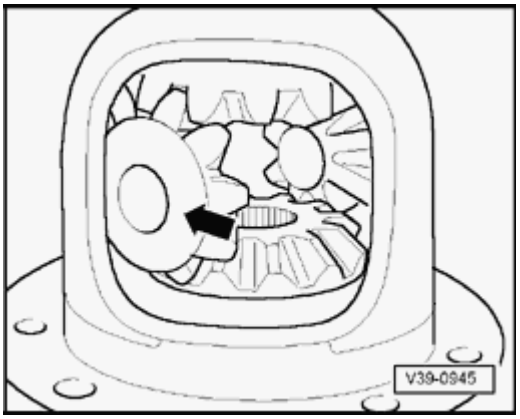


Fig. 347: Installing Small Differential Bevel Gears
Courtesy of VOLKSWAGEN UNITED STATES, INC.

- Lubricate one-piece thrust washer with gear oil and insert.
- Insert large bevel gears.
- Insert small bevel gears offset by 180 ° and swivel into place (arrow).
- Drive bevel gear shaft into final position and secure.

Removing and installing spring pin

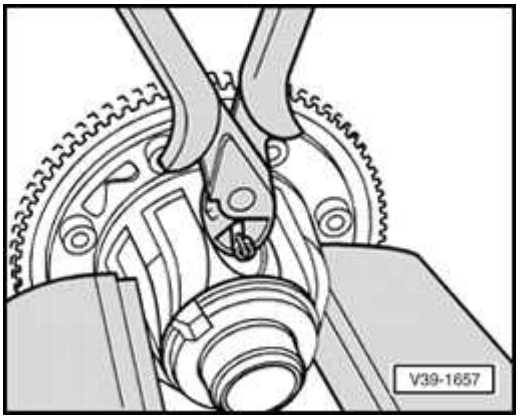


Fig. 348: Pulling Out Spring Pin With Side Cutting Pliers
Courtesy of VOLKSWAGEN UNITED STATES, INC.

Removing

- Extract spring pin with circumferential groove using side-cutting pliers.
- Knock out spring pin without circumferential groove from behind with mandrel.

Installing

- Drive in spring pin as far as it will go.

PINION AND RING GEAR, ADJUSTING

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General

- Careful adjustment of the pinion and ring gear is a decisive factor as regards the service life and smooth running of the final drive. Even during production, the pinion and ring gear are checked together to ensure a good seating position and low noise in both directions of rotation. The position which achieves the smoothest running is determined by moving the pinion axially, so that the ring gear is never absolutely tight against the pinion but remains within the specified tolerance for torsional side clearance.
- The objective of adjustment is to once more achieve the position for smoothest running, which was originally ascertained on the testing machine during production.
- The dimension "r" referenced to controller "Ro" is written on the circumference of the ring gear. Only replace drive unit components (pinion and ring gear) together.

Drive units, adjusting and marking

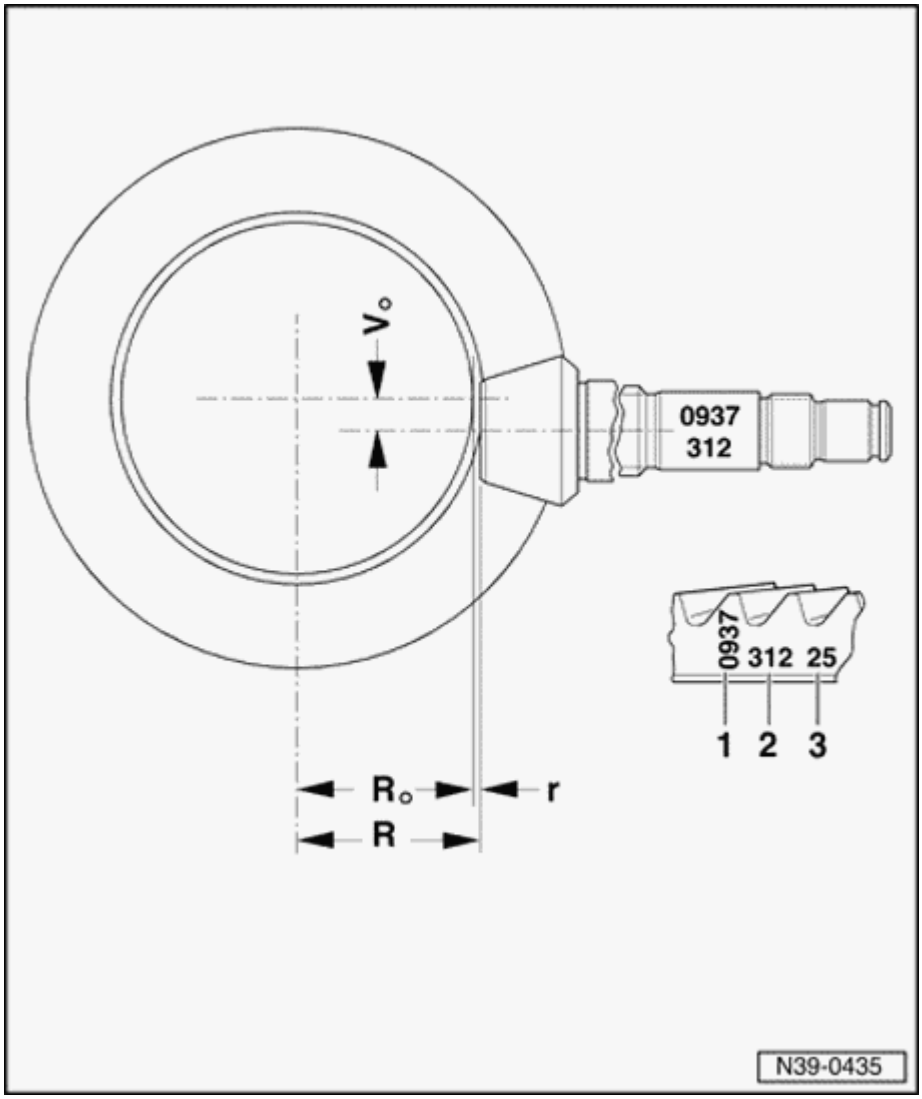


Fig. 349: Identifying Gear Set Markings And Adjustment Dimensions
Courtesy of VOLKSWAGEN UNITED STATES, INC.

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1 - Code "0937" stands for Oerlikon drive unit with transmission ratio 37 : 9.

2 - Pair number (312) of drive set

3 - Dimension "r" referenced to controller of testing machine used in production. Dimension "r" is always stated in 1/100 mm. Example: "25" stands for r = 0.25 mm

Ro - Length of testing machine controller used.

Ro - Ring gear diameter 170 mm = 54.95 mm

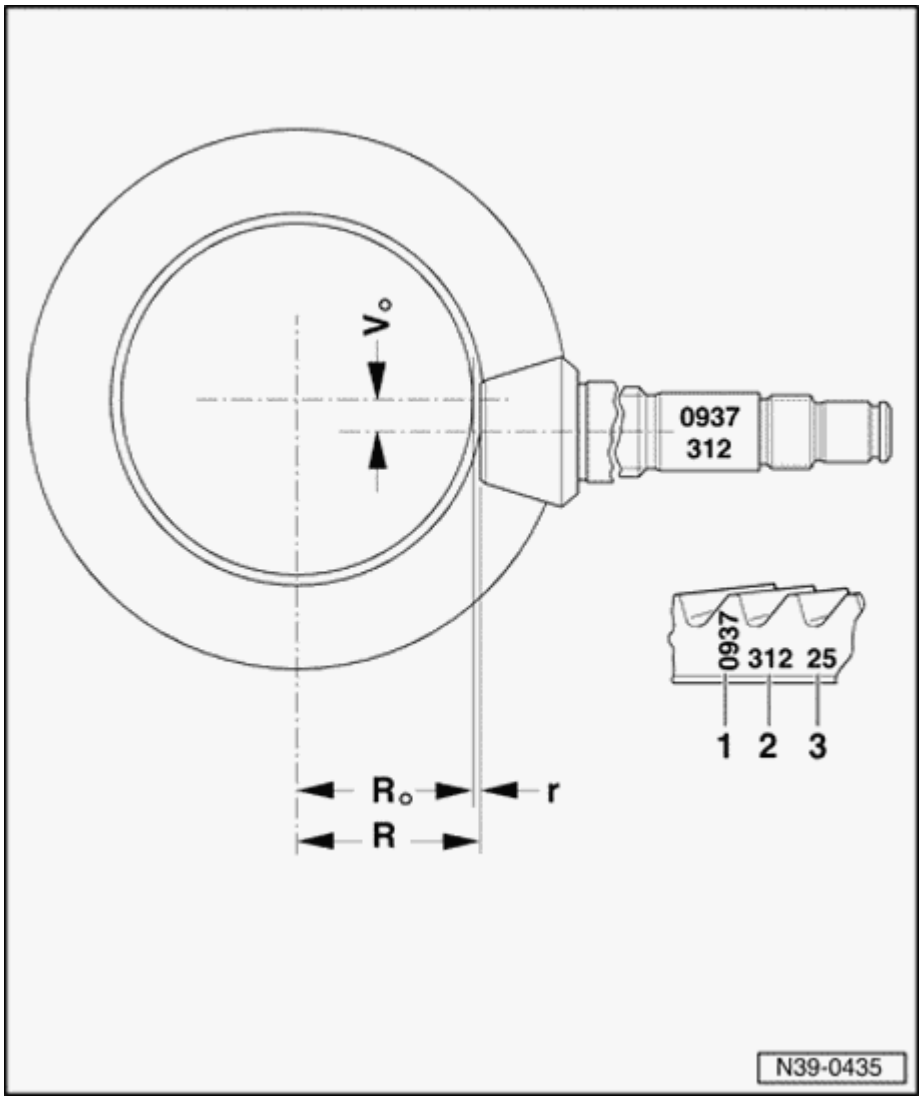


Fig. 350: Identifying Gear Set Markings And Adjustment Dimensions
Courtesy of VOLKSWAGEN UNITED STATES, INC.

R - Actual dimension between ring gear axis and end face of pinion at the point of smoothest running for this one drive set

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Vo - Hypoid offset

Position of shims

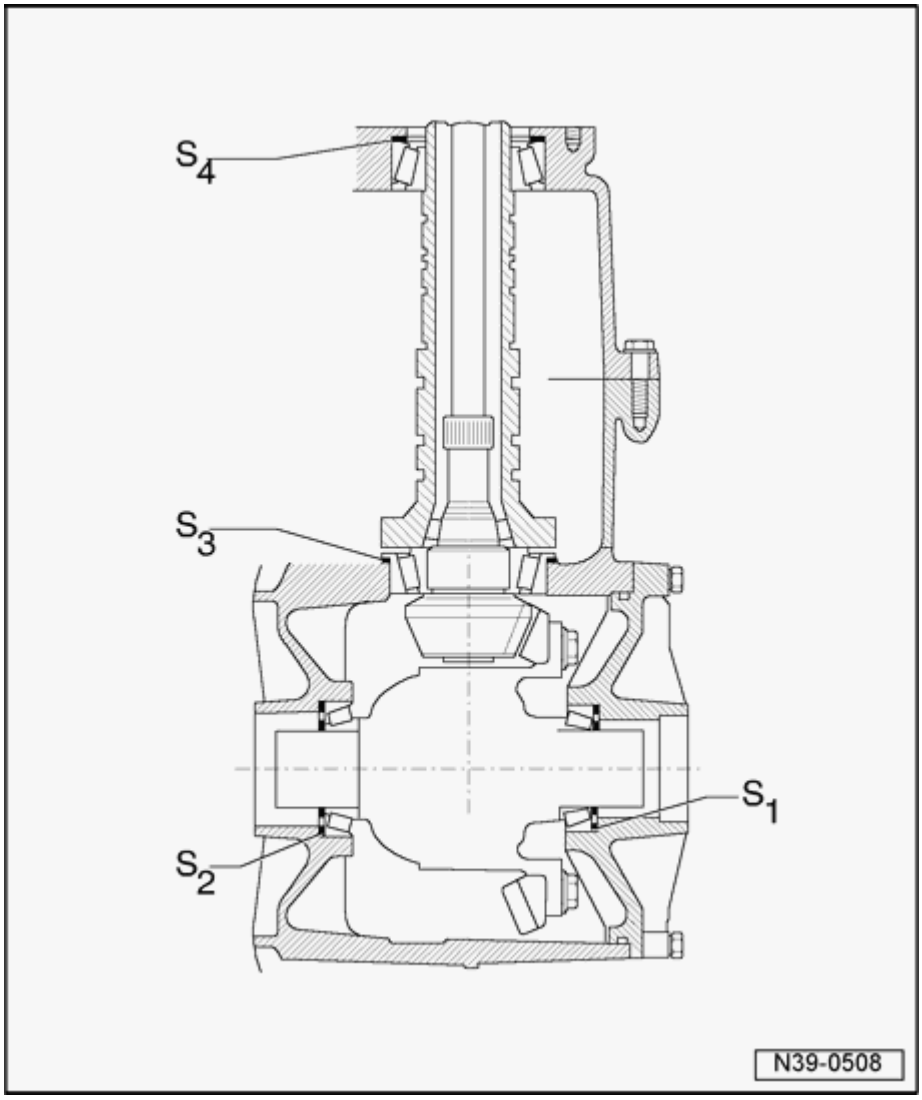


Fig. 351: Identifying Shim Locations
Courtesy of VOLKSWAGEN UNITED STATES, INC.

NOTE: Adjustment table for replacing individual transmission components. Refer to Adjustment table.

S1 - Shim for ring gear in final drive cover

S2 - Shim for ring gear in transmission housing

S3 - Shim for pinion in transmission housing

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S4 - Shim for pinion in transmission cover

Adjustment table

NOTE: When performing transmission repair work, the pinion, ring gear or drive unit must only be re-adjusted if you are replacing components which directly influence the setting of the final drive. Refer to the following table so as to avoid unnecessary adjustment.

	To be adjusted:			
Replaced component:	Ring gear "S1"+"S2" 1) Refer to **Ring gear, adjusting**	Pinion "S3"+"S4" 1) over dimension "r" Refer to **Pinion, adjusting**	Pinion "S4" 1) Refer to **Shim "S4", re-determining when replacing transmission cover**	Torsional side clearance Checking Refer to **Measuring torsional side clearance**
Transmission housing 3)	X	X		X
Transmission cover			X	
Differential housing	X			X
Double tapered roller bearing for pinion and hollow shaft		X		X
Differential tapered roller bearing	X			X
Drive unit 2)	**X**	X		X
Final drive cover	X			X

1) Shims, installation position. Refer to **Position of shims**

2) Pinion and ring gear, only replace together

3) If transmission housing is replaced, input shaft must also be adjusted. Refer to **Input shaft, adjusting**.

Drive unit, re-adjustment sequence

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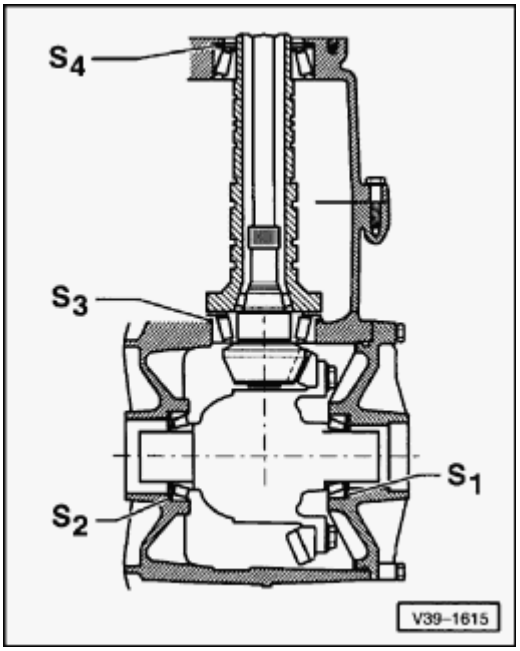


Fig. 352: Adjusting Gear Set, Sequence
Courtesy of VOLKSWAGEN UNITED STATES, INC.

If the pinion and ring gear require re-adjustment, please follow the sequence described below in the interest of rationalized work procedure:

1.)	Define total shim thickness "Stotal" of "S1" + "S2" (adjusting pre-load of tapered roller bearing for differential). Refer to **Defining total shim thickness "Stotal" of shims "S1" + "S2"** onward.
2.)	Define total shim thickness "Stotal" of "S3" + "S4" (adjusting pre-load of tapered roller bearing for differential). Refer to **Defining total shim thickness "Stotal" of shims "S3" + "S4"** onward.
3.)	Distribute total shim thickness "Stotal" of "S3" + "S4" in such a way that dimension from center of ring gear to end face of pinion corresponds to mounting dimension "R" as defined during production. Refer to **Defining thickness of shim "S3"** onward.
4.)	Distribute total shim thickness "Stotal" of "S1" + "S2" in such a way that the specified torsional side clearance is present between ring gear and pinion. Refer to **Defining thickness of shim "S2"** onward.

NOTE: List of components and shims. Refer to Position of shims.

Pinion, adjusting

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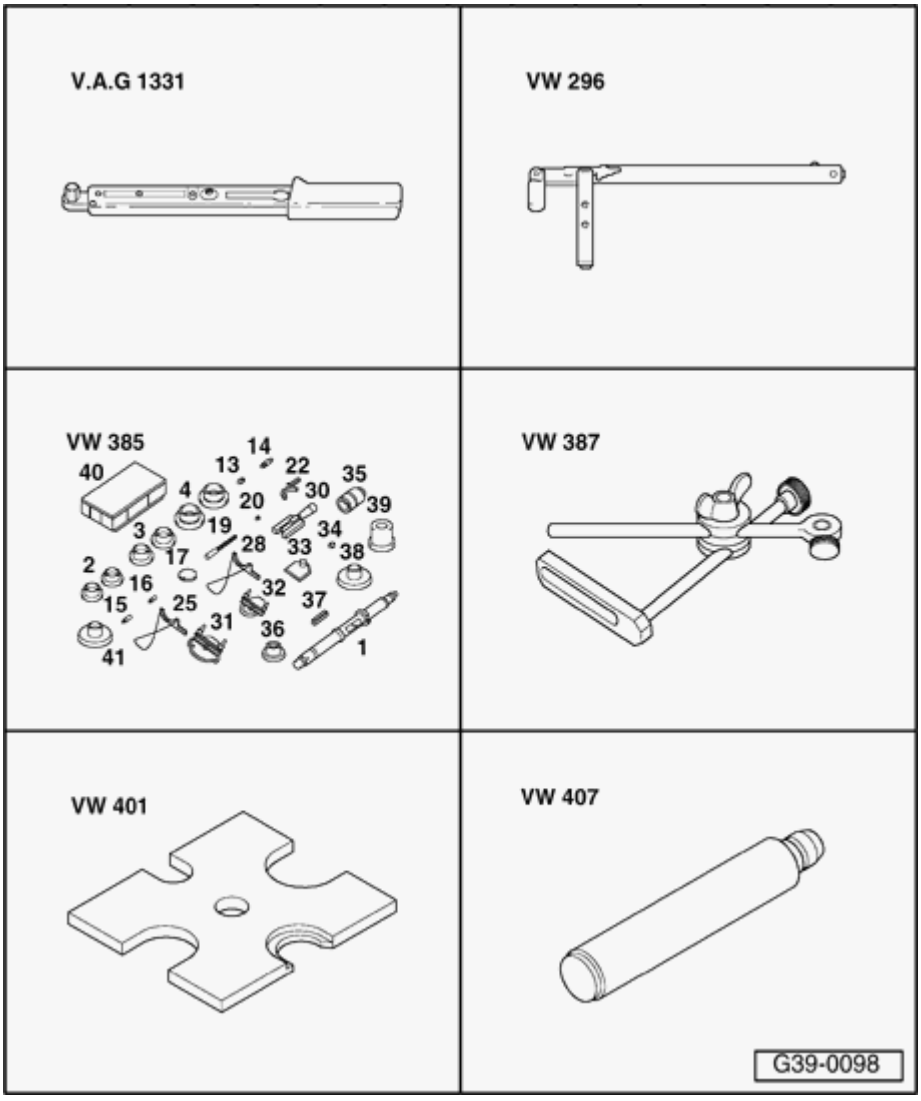


Fig. 353: Identifying Special Tools - Pinion Shaft, Adjusting
Courtesy of VOLKSWAGEN UNITED STATES, INC.

(Adjusting pinion and hollow shaft)

Work after which pinion must be adjusted see Table. Refer to **Adjustment table**.

Special tools and equipment

- VAG 1331 Torque wrench
- VW 296 Extractor lever
- VW 385 Universal measuring device
- VW 387 Universal dial indicator holder
- VW 401 Pressure plate

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- VW 407 Press tool

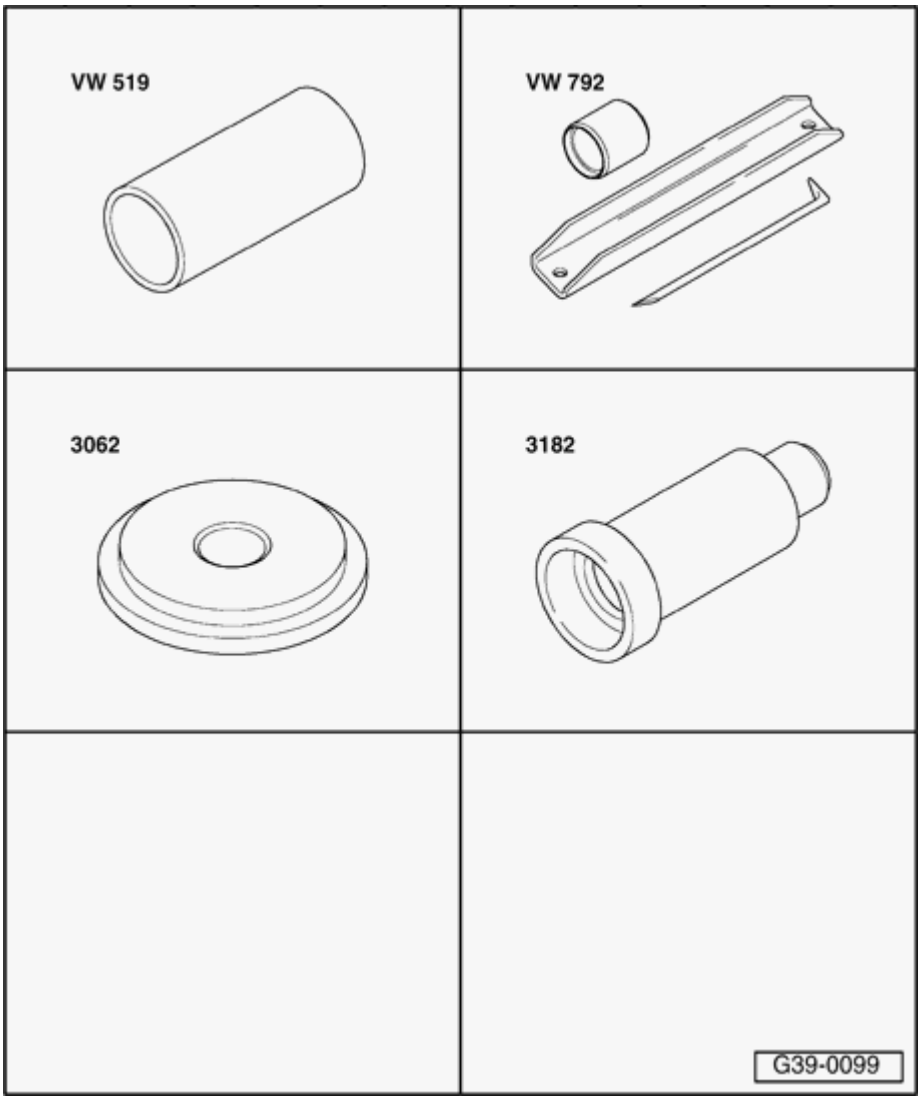


Fig. 354: Identifying Special Tools - Pinion Shaft, Adjusting
Courtesy of VOLKSWAGEN UNITED STATES, INC.

- VW 519 Tubular section
- VW 792 Assembly device
- 3062 Thrust pad
- 3182 Insertion sleeve

Defining total shim thickness "Stotal" of shims "S3" + "S4"

(Adjusting pre-load of tapered roller bearing for pinion and hollow shaft)

- Differential removed

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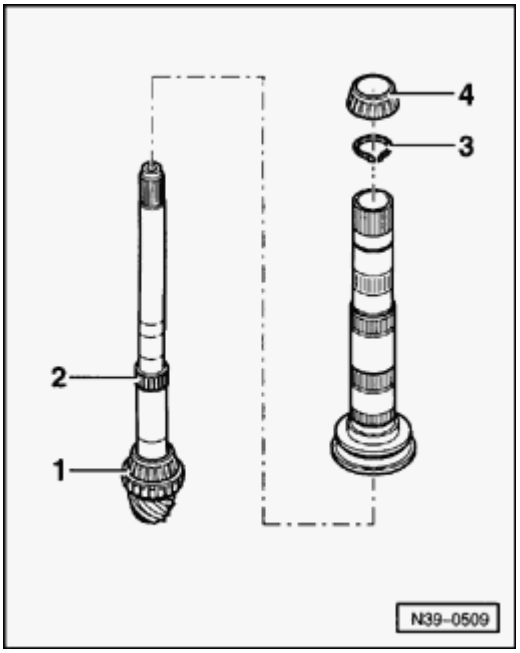


Fig. 355: Pinion Shaft Component, Overview
Courtesy of VOLKSWAGEN UNITED STATES, INC.

- Press inner race -1- of double tapered roller bearing onto pinion and secure. Refer to **Pinion and hollow shaft, disassembling and assembling** onward.

- Install needle bearing -2-.
- Position circlip -3- on hollow shaft and press on inner race of tapered roller bearing -4-. Refer to **Pinion and hollow shaft, disassembling and assembling** onward.
- Insert pinion shaft in hollow shaft.

NOTE: In the illustration the hollow wheel is shown without gears. The pinion can be set either with or without gears.

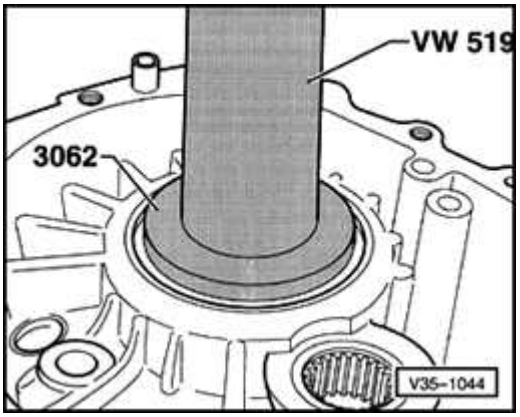


Fig. 356: Pressing In Outer Race For Double Tapered Roller Bearing
Courtesy of VOLKSWAGEN UNITED STATES, INC.

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- Insert outer race of double tapered roller bearing for pinion in transmission housing without shims.

Smaller diameter of pressure plate 3062 faces outer race.

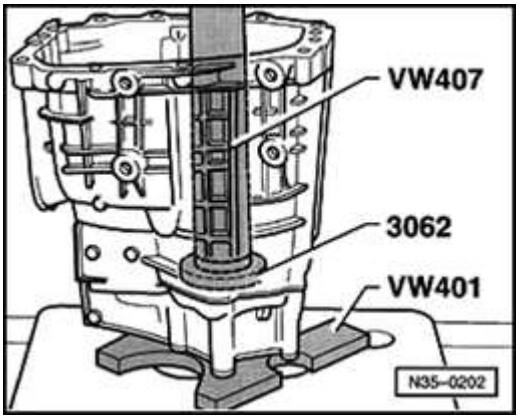


Fig. 357: Pressing In Tapered Roller Bearing Outer Race
Courtesy of VOLKSWAGEN UNITED STATES, INC.

- Insert outer race of pinion tapered roller bearing together with shim "S4*" (1.0 mm thick) in transmission cover.

NOTE:

- **A shim "S4" 1.0 mm thick is used provisionally as a reference value. It is referred to below as "S4*". Once measured value "e" has been determined, "S4*" will be replaced by actual shim "S4".**
- **For measurement, always insert rubber washer together with ring for rubber washer. Refer to item 44 Pinion and hollow shaft, disassembling and assembling.**

- Insert fully assembled pinion and hollow shaft in transmission housing.
- Install transmission cover and tighten bolts to 22 Nm.
- Turn transmission so that transmission cover faces downward.

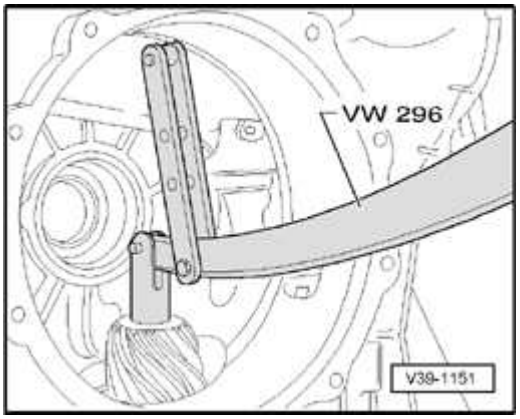


Fig. 358: Pressing Down On Drive Pinion Head Using Removal Tool VW 296

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Courtesy of VOLKSWAGEN UNITED STATES, INC.

- Press head of pinion with lever VW 296 until outer race of tapered roller bearing makes contact with transmission housing.
- Maintaining same pressure, rotate pinion in opposite direction to hollow shaft 5 turns in both directions, so that double tapered roller bearing slips into place.
- Next, rotate pinion and hollow shaft together 5 turns in both directions, so that tapered roller bearing slips into place.

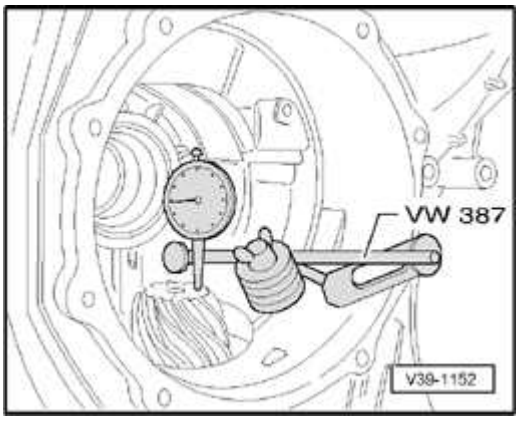


Fig. 359: Installing Dial Gauge (3 Mm Range) And Set To "0" With 2 Mm Pre-Load
Courtesy of VOLKSWAGEN UNITED STATES, INC.

- Install dial indicator and set to "0" with 1 mm pre-load.

NOTE: Dial indicator extension must be situated on ground surface of pinion head.

- Turn transmission 180 ° so that transmission cover faces upward.
- Rotate pinion and hollow shaft together 5 turns in both directions, so that tapered roller bearing slips into place. Otherwise, measurement results will be incorrect.

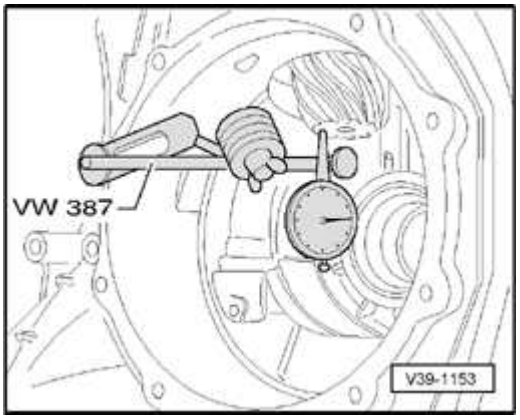


Fig. 360: Turn Transmission 180 Degrees, Settle Tapered Roller Bearing And Read Play On Dial Gauge
Courtesy of VOLKSWAGEN UNITED STATES, INC.

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- Read off and note down clearance indicated on dial indicator.

- Example measured value: 0.45 mm

NOTE: If the measurement is repeated, first rotate the pinion and hollow shaft once more 5 turns in each direction. Set dial indicator to "0" with 1 mm pre-load once again.

Formula:		
"Stotal"	**=**	**"S4*" + measured value + bearing pre-load**

Example:		
	Inserted shim "S4*"	1.00 mm
+	measured value (example)	0.45 mm
+	bearing pre-load (constant value)	0.15 mm
=	Total shim thickness "Stotal" of "S3" + "S4"	1.60 mm

Defining thickness of shim "S3*"

Formula:		
"S3*"	**=**	**"Stotal" - "S4*"**

Example:		
	Total shim thickness "Stotal" of "S3" + "S4"	1.60 mm
-	inserted shim "S4*"	1.00 mm
=	Thickness of shim "S3*"	0.60 mm

- Remove outer race of tapered roller bearing, insert shim "S3*" in transmission housing and re-install outer race. See **Pressing in outer race for double tapered roller bearing**
- Re-insert fully assembled pinion in transmission housing.
- Install transmission cover and tighten bolts to 22 Nm.
- Rotate pinion in same direction and in opposite direction to hollow shaft 5 turns in both directions, so that tapered roller bearings slip into place.

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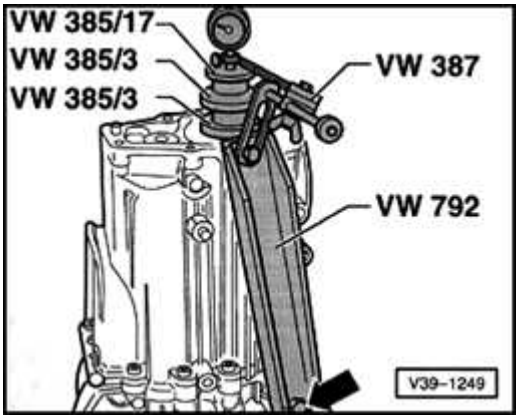


Fig. 361: Installing Measuring Tools And Secure To Transmission Housing
Courtesy of VOLKSWAGEN UNITED STATES, INC.

- Install measuring tools and secure with bolt (arrow) to transmission housing.
- Set dial indicator (3 mm measuring range) to "0" with 2 mm pre-load.
- Loosen bolts of transmission cover and turn pinion freely.

If correct shims were selected, the dial indicator should show the following value:

- 0.05 to 0.15 mm

- Tighten bolts of transmission cover to 22 Nm.
- Remove measuring tools.
- Rotate pinion in same direction and in opposite direction to hollow shaft 5 turns in both directions, so that tapered roller bearings slip into place.

Defining dimension "e"

NOTE: Dimension "e" is required to determine the definitive shim thickness of "S3" and "S4".

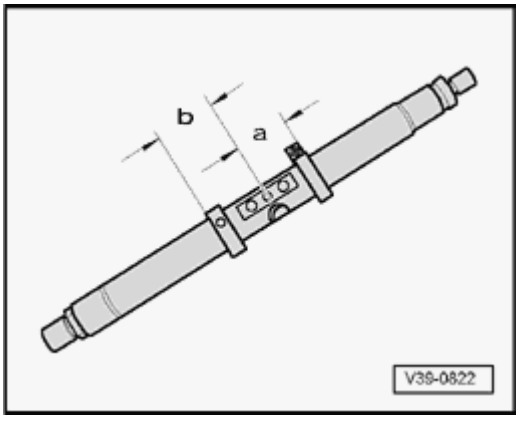


Fig. 362: Setting Adjusting Rings Of Measuring Bar VW 385/1

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Courtesy of VOLKSWAGEN UNITED STATES, INC.

- Adjust set rings of multi-purpose measuring mandrel VW 385/1 to following values:

- Dimension a = 35 mm
- Dimension b = 75 mm

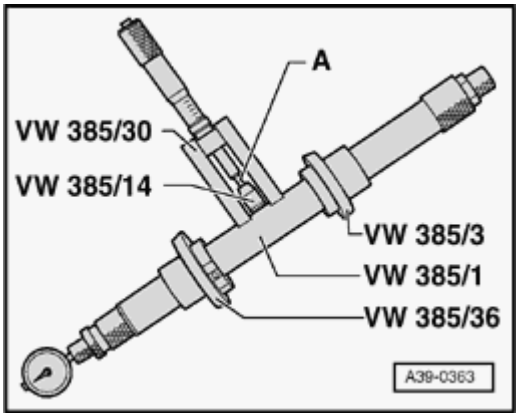


Fig. 363: Assembling Measuring Bar VW 385/1
Courtesy of VOLKSWAGEN UNITED STATES, INC.

- Assemble multi-purpose measuring mandrel VW 385/1 as shown in illustration:

- Dial indicator extension -A-, 6.5 mm long

- Adjust controller VW 385/30 to Ro in line with ring gear diameter and place on measuring mandrel.

Ring gear diameter 170 mm = 54.95 mm

- Set dial indicator (3 mm measuring range) to "0" with 2 mm pre-load.

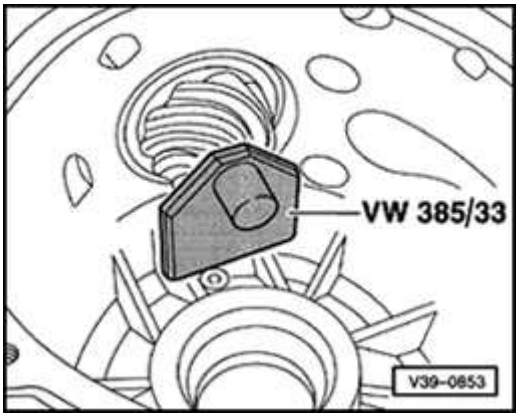


Fig. 364: Placing End Gauge On Drive Pinion Face
Courtesy of VOLKSWAGEN UNITED STATES, INC.

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- Place gauge block plate on pinion head.

NOTE: Make sure plate fits exactly and contact area is oil free.

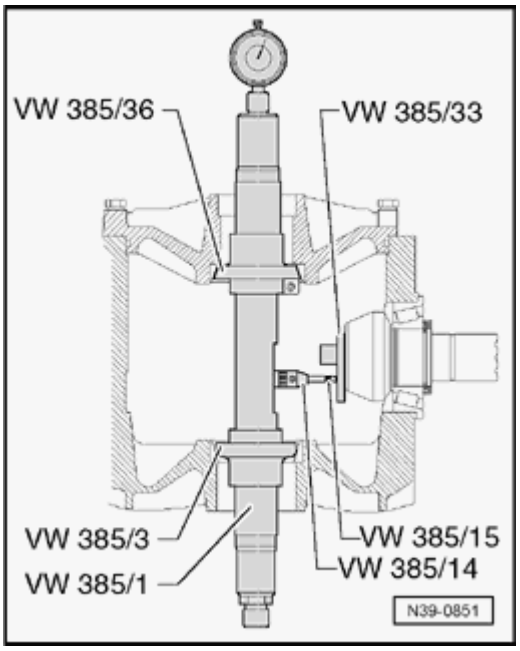
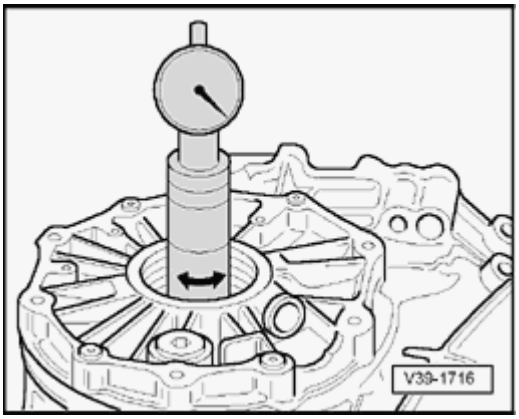


Fig. 365: Inserting Measuring Mandrel VW 385/1 Into Housing
Courtesy of VOLKSWAGEN UNITED STATES, INC.

- Remove controller and insert measuring mandrel in housing.

- Dial indicator extension -A- = 6.5 mm long must be screwed in
- Dial indicator faces cover of final drive

- Position cover of final drive and tighten 4 bolts to 22 Nm.
- Pull 2nd centering disc outward using moveable set ring until measuring mandrel can only just be turned by hand.



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Fig. 366: Turning Measuring Mandrel Until Dial Gauge Plunger Tip Touches End Gauge On Pinion Shaft Head And Measure Maximum Runout
Courtesy of VOLKSWAGEN UNITED STATES, INC.

- Turn measuring mandrel until tip of dial indicator runs into gauge block plate on pinion head and gauge displays maximum deflection (point of return).

- Measured value in following example: "e" = 0.26 mm (red zone)

NOTE: After removing multi-purpose measuring mandrel, check again whether dial indicator with controller VW 385/30 in position is still set to "0" with 2 mm pre-load.

Defining thickness of shim "S3"

- The dimension "r" referenced to controller "Ro" is measured for the drive units which are delivered as replacement parts and written on the circumference of the ring gear.
- If measurement is performed in red zone measured value "e" must be deducted.
- If measurement is performed in black zone measured value "e" must be added on.

Formula:		
"S3"	**=**	**"S3*" + "r" + "e"**
("e" in black zone)		
"S3"	**=**	**"S3*" + "r" - "e"**
("e" in red zone)		

Example:		
	Inserted shim "S3*"	0.60 mm
+	dimension "r"	0.38 mm
-	obtained value "e" (red zone)	0.26 mm
=	Thickness of shim "S3"	0.72 mm

- Define shim(s) as accurately as possible using chart. Part numbers

Available shims for "S3"

Shim thickness (mm) 1)		
0.40	0.55	0.70
0.45	0.60	0.75
0.50	0.65	

1) Due to shim tolerances any shim thickness can be obtained. Insert 2 shims if required.

Defining thickness of shim "S4"

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Formula:		
"S4"	**=**	**"Stotal" - "S3"**

Example:		
	Total shim thickness "Stotal" of "S3" + "S4"	1.60 mm
-	thickness of shim "S3"	0.72 mm
=	Thickness of shim "S4"	0.88 mm

- Define shim(s) as accurately as possible using chart. Part numbers

Available shims for "S4"

Shim thickness (mm) 1)		
0.45	0.65	0.85
0.50	0.70	0.90
0.55	0.75	
0.60	0.80	

1) Due to shim tolerances any shim thickness can be obtained. Insert 2 shims if required.

Checking measurement

Checking dimension "r"

- Install pinion/hollow shaft with defined shims "S3" and "S4".
- Rotate hollow shaft against pinion 5 turns in both directions, so that tapered roller bearing slips into place.
- Rotate pinion and hollow shaft together 5 turns in both directions, so that tapered roller bearing slips into place.

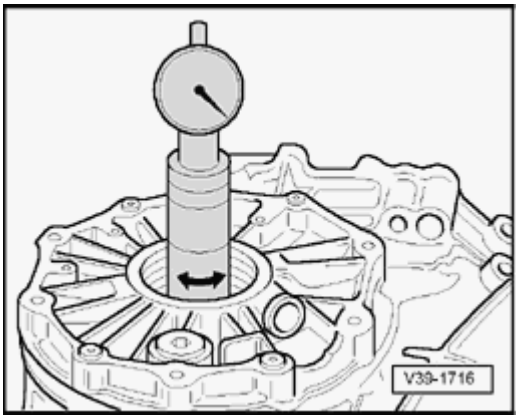


Fig. 367: Turning Measuring Mandrel Until Dial Gauge Plunger Tip Touches End Gauge On Pinion Shaft Head And Measure Maximum Runout
Courtesy of VOLKSWAGEN UNITED STATES, INC.

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- Insert multi-purpose measuring mandrel. Refer to **Defining dimension "e"**, and check measurement.
- Read off dial indicator counter-clockwise (red zone).

- If correct shims were selected, dimension "r" (written on circumference of ring gear) must be displayed showing a tolerance of ± 0.04 mm

Shim "S4", re-determining when replacing transmission cover

Special tools, testers and other items required

- 2 x centering disc VW 385/3
- Measuring plate VW 385/17
- Universal dial indicator holder VW 387
- Assembly device VW 792

- Dial indicator
- Dial indicator extension
- Depth caliper gauge with minimum measuring accuracy of 5/100 mm

- Clean joint surfaces of cover.

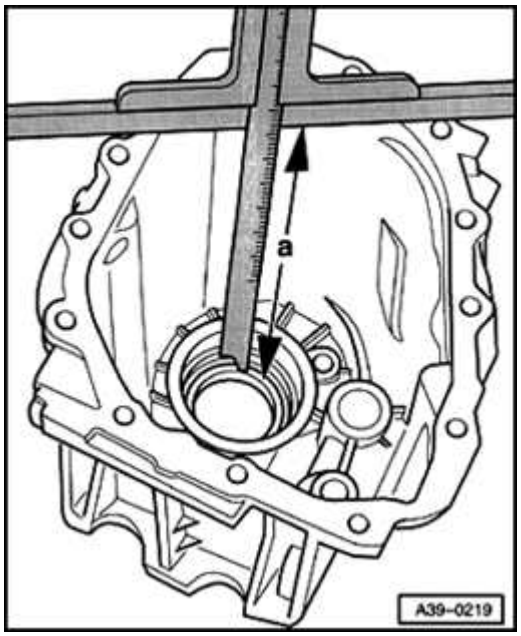


Fig. 368: Measuring Difference In Depth On Old And New Transmission Cover
Courtesy of VOLKSWAGEN UNITED STATES, INC.

- Measure difference in depth "a" on old and new transmission covers.

Example:

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	Depth "a" of old transmission cover	257.40 mm
	Depth "a" of new transmission cover	257.55 mm
=	Difference	0.15 mm

- Install thicker shim "S4" if new transmission cover is deeper.
- Install thinner shim "S4" if old transmission cover is deeper.

Example:

	Old shim "S4"	0.95 mm
+	Difference	0.15 mm
=	New shim "S4"	1.10 mm

Available shims. Refer to **Available shims for "S4"**.

- Insert outer race for tapered roller bearing together with shim "S4" in transmission cover. See **Pressing in outer race for tapered roller bearing**
- Re-insert fully assembled pinion in transmission housing.
- Install transmission cover and tighten bolts to 22 Nm.
- Rotate pinion in same direction and in opposite direction to hollow shaft 5 turns in both directions, so that tapered roller bearings slip into place.

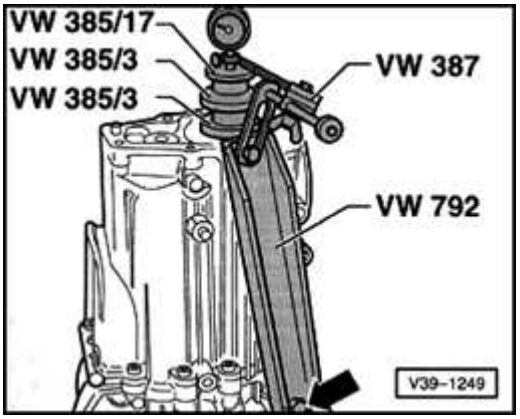


Fig. 369: Installing Measuring Tools And Secure To Transmission Housing
Courtesy of VOLKSWAGEN UNITED STATES, INC.

- Install measuring tools and secure with bolt (arrow) to transmission cover.
- Set dial indicator (3 mm measuring range) to "0" with 2 mm pre-load.
- Loosen bolts of transmission cover and turn pinion freely.

If correct shims were selected, the dial indicator should show the following value:

- 0.05 to 0.15 mm

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If this value is not obtained, the setting must be corrected.

Ring gear, adjusting

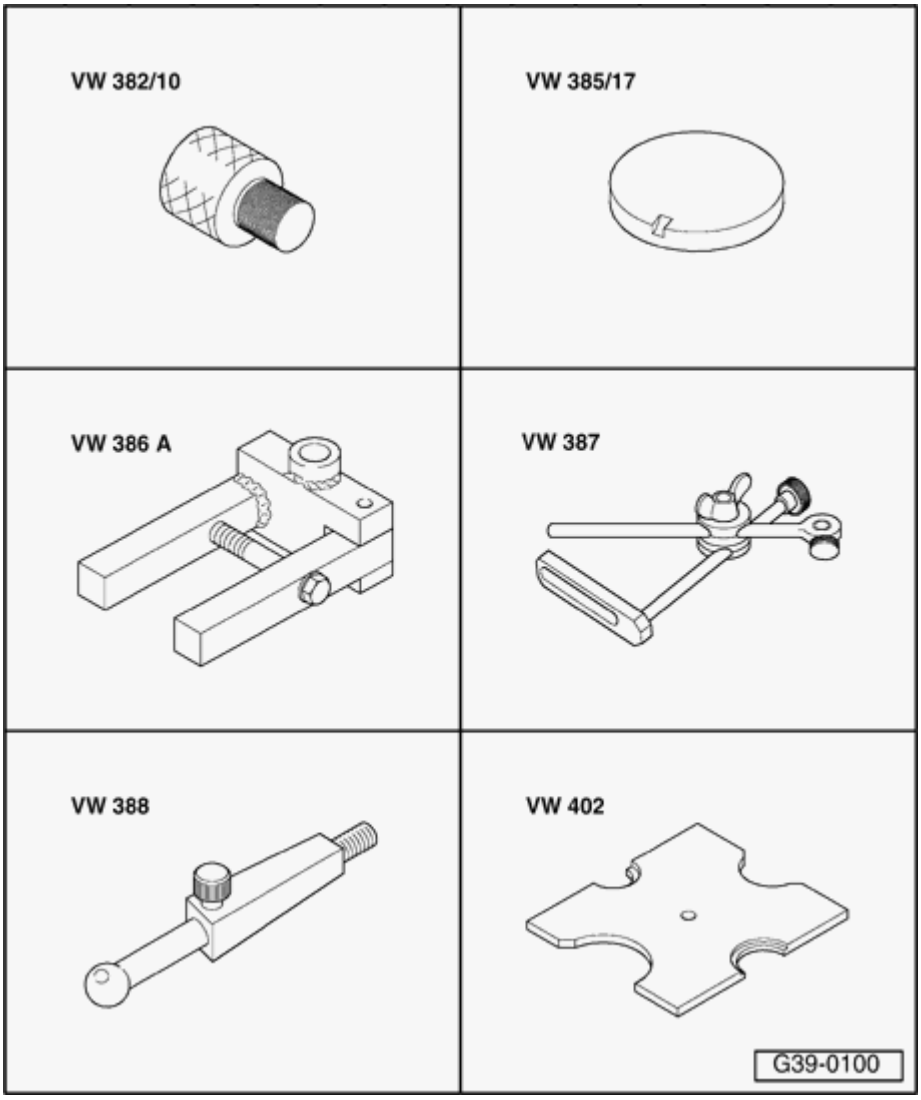


Fig. 370: Identifying Special Tools - Ring Gear, Adjusting
Courtesy of VOLKSWAGEN UNITED STATES, INC.

(Adjusting differential)

Special tools and equipment

- VW 382/10 Dial indicator extension
- VW 385/17 Gauge block plate
- VW 386 A Clamp for pinion
- VW 387 Universal dial indicator holder

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- VW 388 Measuring lever
- VW 402 Pressure plate

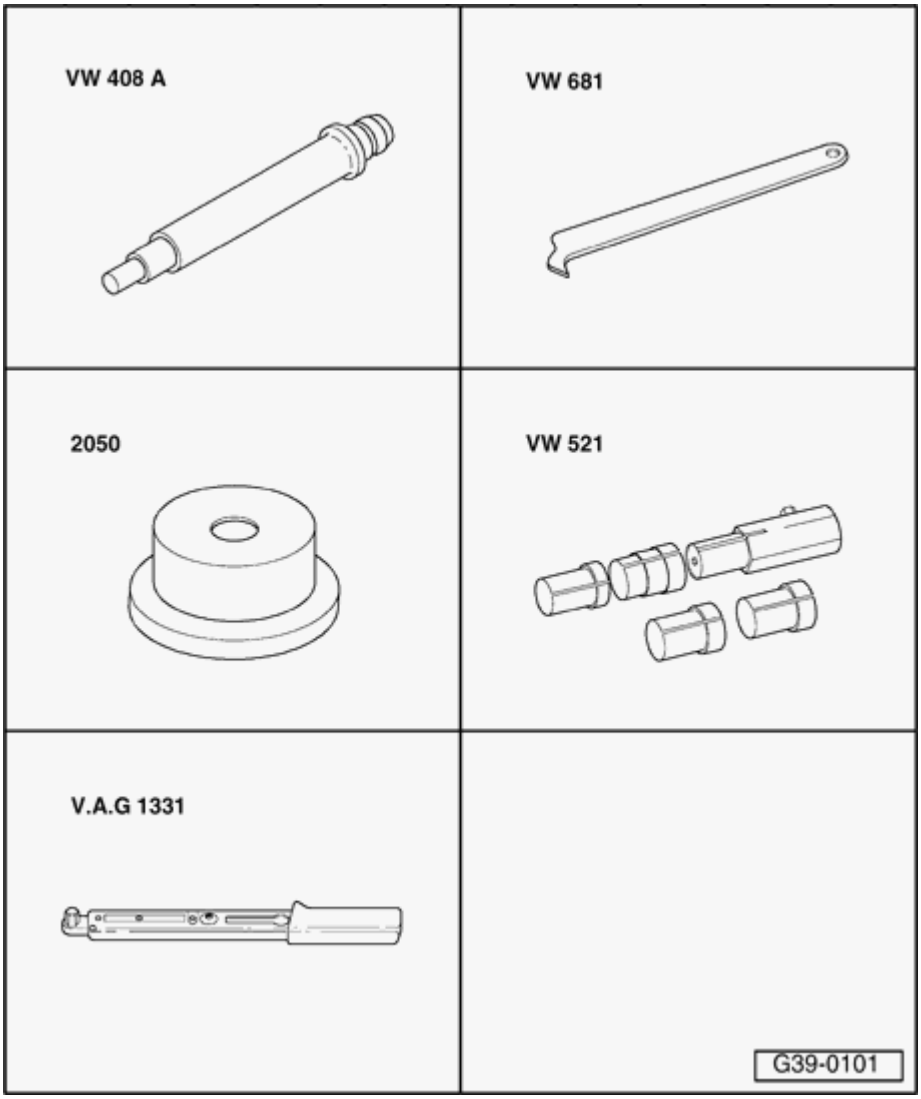


Fig. 371: Identifying Special Tools - Ring Gear, Adjusting
Courtesy of VOLKSWAGEN UNITED STATES, INC.

- VW 408 A Press tool
- VW 681 Extractor lever
- 2050 Pressure piece
- VW 521 Adjusting device for ring gear
- VAG 1331 Torque wrench
- Dial indicator

The ring gear must be re-adjusted if:

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transmission housing, final drive cover, differential tapered roller bearing, differential housing or drive unit are replaced.

Adjustment table. Refer to **Adjustment table**

Defining total shim thickness "Stotal" of shims "S1" + "S2"

(Adjusting pre-load of differential tapered roller bearing)

- Pinion removed
- If only differential tapered roller bearings are replaced, the ring gear can be removed from the differential housing. In this case, the pinion does not have to be removed.

- Pull out oil seals for drive flanges using extractor lever VW 681.
- Remove outer races of differential tapered roller bearings and take out shims. Refer to **Differential, disassembling and assembling**.

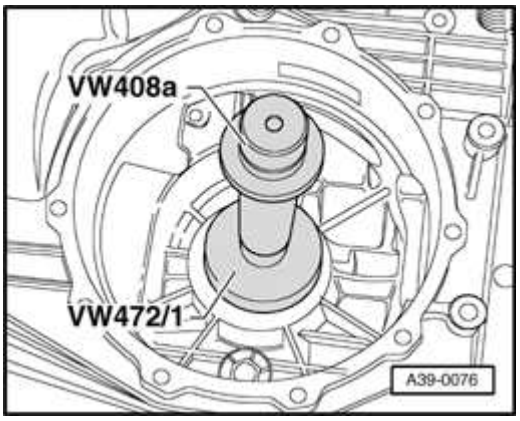


Fig. 372: Pressing Outer Race/Tapered Roller Bearing Into Transmission Housing
Courtesy of VOLKSWAGEN UNITED STATES, INC.

- Drive outer race of small tapered roller bearing and shim "S2" into transmission housing. For measurement purposes, a shim "S2*" 1.20 mm thick is used (2 shims of 0.60 mm).

NOTE: A shim "S2" 1.20 mm thick is used provisionally as a reference value. It is referred to below as "S2*". Once torsional side clearance is determined, "S2*" is replaced by the definitive "S2".

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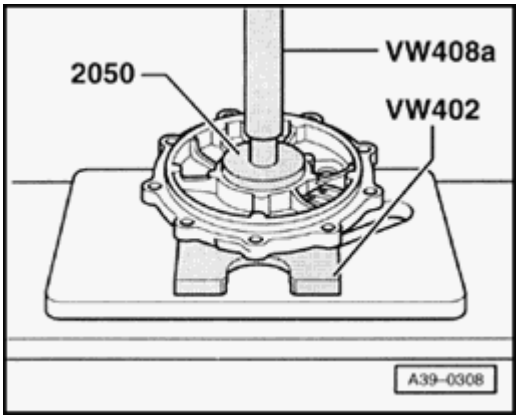


Fig. 373: Driving In Outer Race Of Tapered Roller Bearing Into Cover
Courtesy of VOLKSWAGEN UNITED STATES, INC.

- Press outer race of tapered roller bearing into cover of differential without shim "S1".
- Insert differential without driving gear for sender of speedometer -G22 in transmission housing.
- Install cover of differential using 4 bolts (25 Nm).
- Position transmission so that cover of differential faces upward.

- Rotate differential 5 turns in both directions, so that tapered roller bearing slips into place.
- Lay measuring plate VW 385/17 on differential.

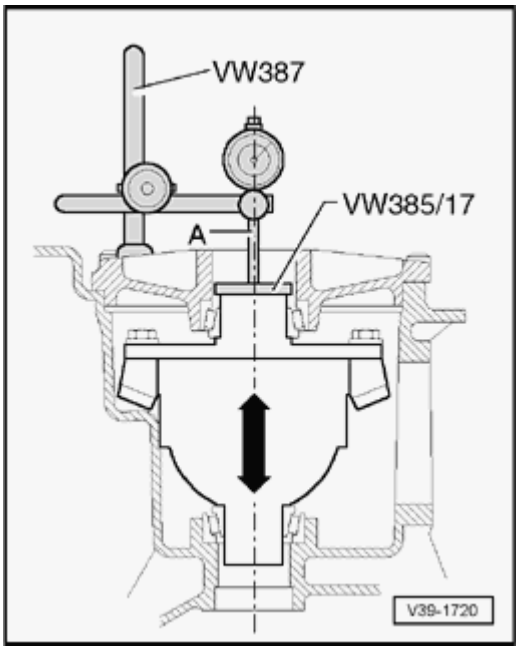


Fig. 374: Installing Magnetic Plate 50Mm Dia. VW 385/17 And Dial Gauge
Courtesy of VOLKSWAGEN UNITED STATES, INC.

- Set up measuring tools using a 30 mm dial indicator extension.
- Set dial indicator (3 mm measuring range) -A- to "0" with 2 mm pre-load.

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NOTE: Measuring tip of dial indicator must be positioned on center of differential.

- Lift differential without turning; read and note clearance indicated on dial indicator.
- Measured value in following example: 0.62 mm

NOTE:

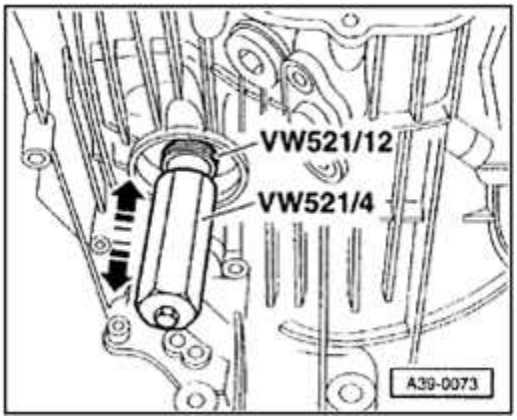


Fig. 375: Securing Special Tools VW 521/4 And VW 521/12 At Right On Differential (Housing Side)
Courtesy of VOLKSWAGEN UNITED STATES, INC.

- **To raise differential, fasten special tools VW 521/4 and VW 521/12 to right of differential (housing side).**
- **If the measurement is repeated, first rotate the pinion and hollow shaft once more 5 turns in each direction, so that the tapered roller bearing slips into place.**

Formula:		
"Stotal"	=	**"S2*" + measured value + bearing pre-load**

Example:		
	Inserted shim(s) "S2*"	1.20 mm
+	measured value	0.62 mm
+	bearing pre-load (constant value)	0.30 mm
=	Total shim thickness "Stotal" for "S1" + "S2"	2.12 mm

Defining thickness of shim "S1*"

NOTE:

- **Provisional shim "S1*" is replaced by definitive "S1" after torsional side clearance has been determined.**
- **Total shim thickness "Stotal" remains unchanged.**

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Formula:		
"S1*"	**=**	**"Stotal" - "S2*"**

Example:		
	Total shim thickness "Stotal" for "S1" + "S2"	2.12 mm
-	inserted shim(s) "S2*"	1.20 mm
=	Thickness of shim "S1*"	0.92 mm

Assigning shims

Measuring torsional side clearance

- Pinion installed with shims "S3*" and "S4*"

- Install differential with ring gear: S1* is installed on cover side, S2* in transmission housing.
- Mount final drive cover and tighten bolts to 25 Nm.
- Insert adjustment tool for ring gear VW 521/4 and VW 521/12.
- Rotate differential 5 turns in both directions, so that tapered roller bearings slip into place.

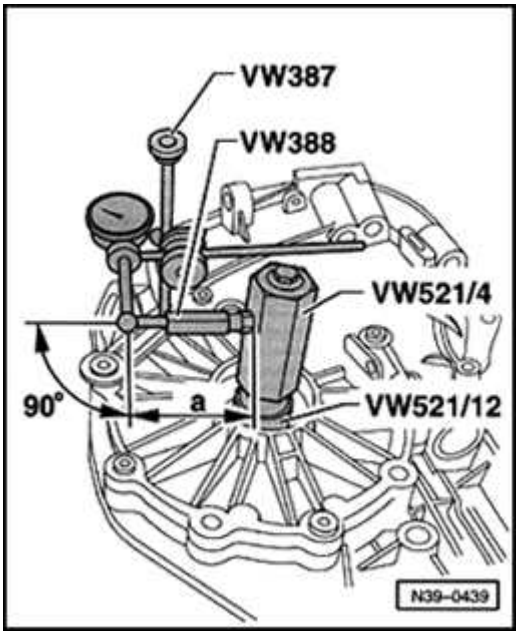


Fig. 376: Measuring Backlash
Courtesy of VOLKSWAGEN UNITED STATES, INC.

- Secure dial indicator holder VW 387 to housing.
- Insert dial indicator together with dial indicator extension VW 382/10 (6 mm plane).
- Set measuring lever VW 388 to dimension "a" = 67 mm (for ring gear diameter 170 mm).
- Determine clearance between flanks of teeth as follows:

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- Rotate ring gear until it makes contact with one tooth flank (end of clearance).
- Set dial indicator to "0" with 2 mm pre-load.
- Turn ring gear back until it makes contact with opposite tooth flank (torsional side clearance).
- Read off torsional side clearance and note down measured value.

- Turn ring gear additional 90 ° turn in each direction and repeat measurement 3 times.

NOTE:

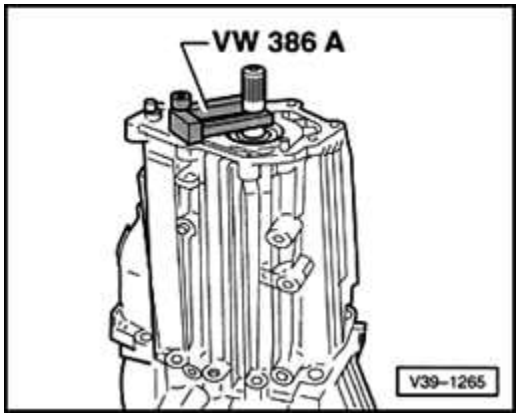


Fig. 377: Installing Clamping Piece VW 386 A
Courtesy of VOLKSWAGEN UNITED STATES, INC.

- **If pinion turns when differential is rotated, install VW 386 A to ensure that exact torsional side clearance can be measured.**
- **Release clamp for turning ring gear.**

Determining mean torsional side clearance

- Add up 4 measured values and divide total by 4.

Example:		
	1st measured value	0.28 mm
+	2nd measured value	0.30 mm
+	3rd measured value	0.30 mm
+	4th measured value	0.28 mm
=	Sum total of measured values	1.16 mm

- Result: The mean torsional side clearance equals 1.16 mm : 4 = 0.29 mm

NOTE: **If during measurement the individual values differ from one another by more than 0.06 mm, the ring gear or drive unit itself have not been correctly installed. Check repair work and replace drive unit if necessary.**

Defining thickness of shim "S2"

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Formula:		
"S2"	**=**	**"S2*" - torsional side clearance + lift**

Example:		
	Inserted shim "S2*"	1.20 mm
-	mean torsional side clearance	0.29 mm
+	lift (constant value)	0.15 mm
=	Thickness of shim "S2"	1.06 mm

- Define shim(s) as accurately as possible using chart. Part numbers

Available shims for "S2"

Shim thickness (mm) 1)		
0.45	0.65	0.85
0.50	0.70	0.90
0.55	0.75	
0.60	0.80	

1) Due to shim tolerances any shim thickness can be obtained. Insert 2 shims if required.

Defining thickness of shim "S1"

Formula:		
"S1"	**=**	**"Stotal" - "S2"**

Example:		
	Total shim thickness "Stotal" for "S1" + "S2"	2.12 mm
-	thickness of shim "S2"	1.06 mm
=	Thickness of shim "S1"	1.06 mm

- Define shim(s) as accurately as possible using chart. Part numbers

Available shims for "S1"

Shim thickness (mm) 1)		
0.45	0.65	0.85
0.50	0.70	0.90
0.55	0.75	
0.60	0.80	

1) Due to shim tolerances any shim thickness can be obtained. Insert 2 shims if required.

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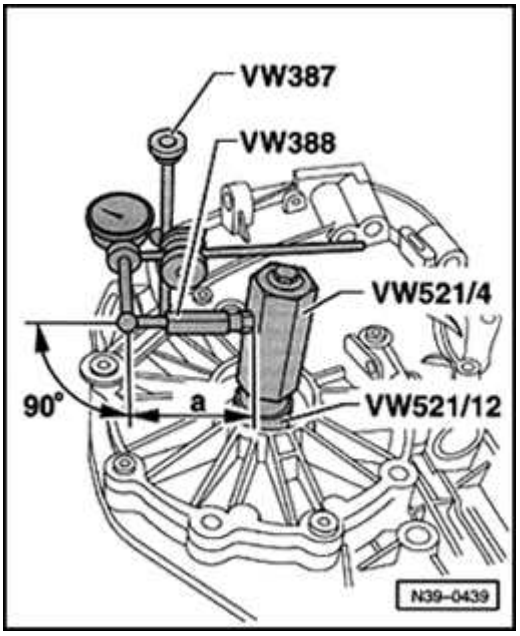


Fig. 378: Measuring Backlash
Courtesy of VOLKSWAGEN UNITED STATES, INC.

Checking measurement

- After shims "S1" and "S2" have been installed, rotate differential 5 turns in each direction so that tapered roller bearings slip into place.
- Measure torsional side clearance 4 times at circumference.

- Specification: 0.12 to 0.22 mm

NOTE:

- **If torsional side clearance is outside tolerance, repeat adjustments. But do not change total shim thickness "Stotal".**
- **Individual measured values may only differ from one another by max. 0.06 mm.**

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