

1993 Volkswagen Golf III GL

1993-99 TRANSMISSION 4 Spd. Automatic Transmission 01M - Cabrio, Golf, GTI & Jetta

1993-99 TRANSMISSION

4 Spd. Automatic Transmission 01M - Cabrio, Golf, GTI & Jetta

MODEL APPLICATION

CABRIO

Information in this article applies to 2000-2002 Cabrio models.

EARLY PRODUCTION 1999 GOLF, GTI, & JETTA

Information in this article applies up to early production 1999 Golf, GTI and Jetta vehicles. To identify early production vehicles, the 7th and 8th characters of the VIN are 1H.

GENERAL, TECHNICAL DATA

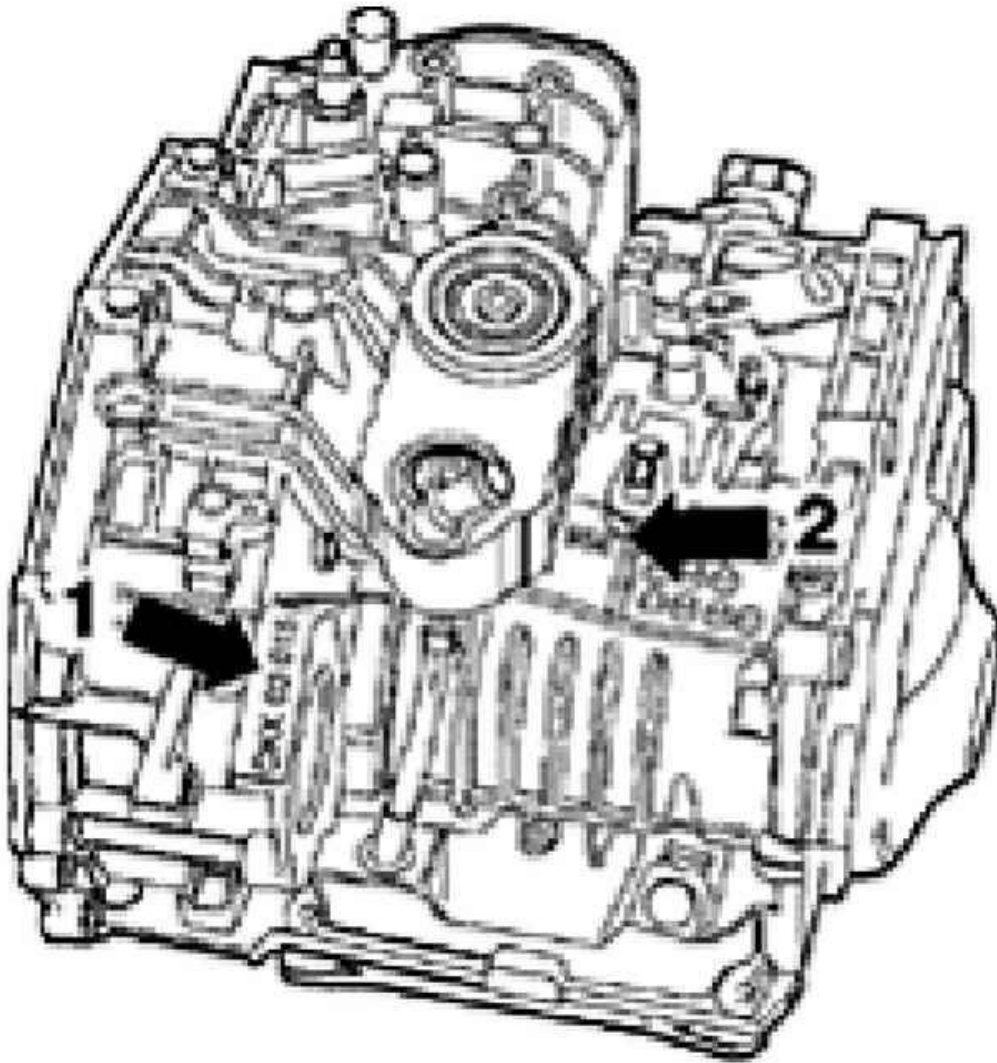
TRANSMISSION, IDENTIFICATION

The 4-speed automatic transmission 01M is installed in the Golf III from 1995, Jetta III from 1995, and Cabrio from 1995 in combination with a 4- or 6- cylinder engine. For Applications, see **CODE LETTERS, TRANSMISSION APPLICATION, RATIOS, EQUIPMENT**.

LOCATION ON TRANSMISSION

Code letters -arrow 1-

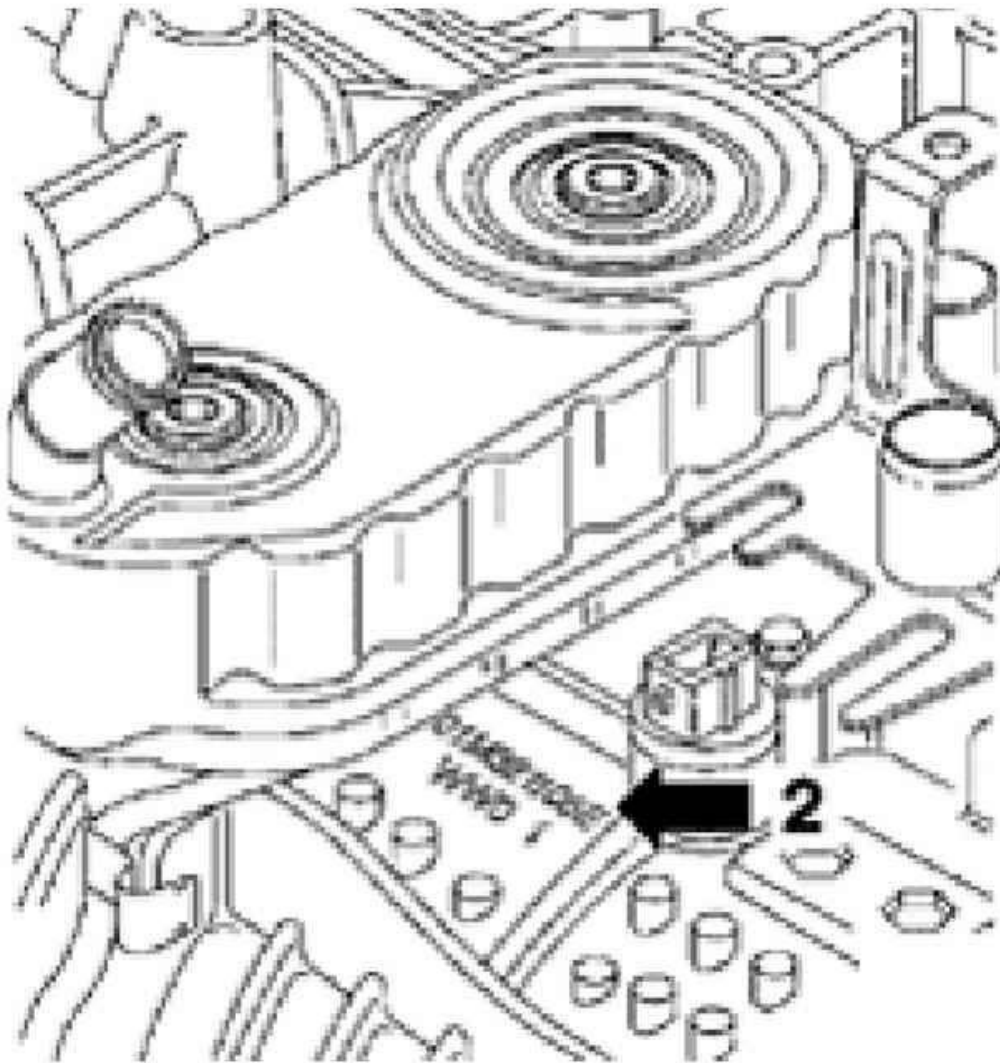
Automatic transmission 01M -arrow 2-



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Fig. 1: Locating Transmission Code Letters
Courtesy of VOLKSWAGEN OF AMERICA, INC.

AUTOMATIC TRANSMISSION 01M -ARROW 2-



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Fig. 2: Identifying Automatic Transmission 01M
Courtesy of VOLKSWAGEN OF AMERICA, INC.

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Example:	CKX	03	01	5
	I	I	I	I
	I	I	I	I
	Code letters	Day	Month	Year (1995) of manufacture

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Fig. 3: Sample Automatic Transmission 01M Code
Courtesy of VOLKSWAGEN OF AMERICA, INC.

The code letters of the transmission also appear on vehicle data plates.

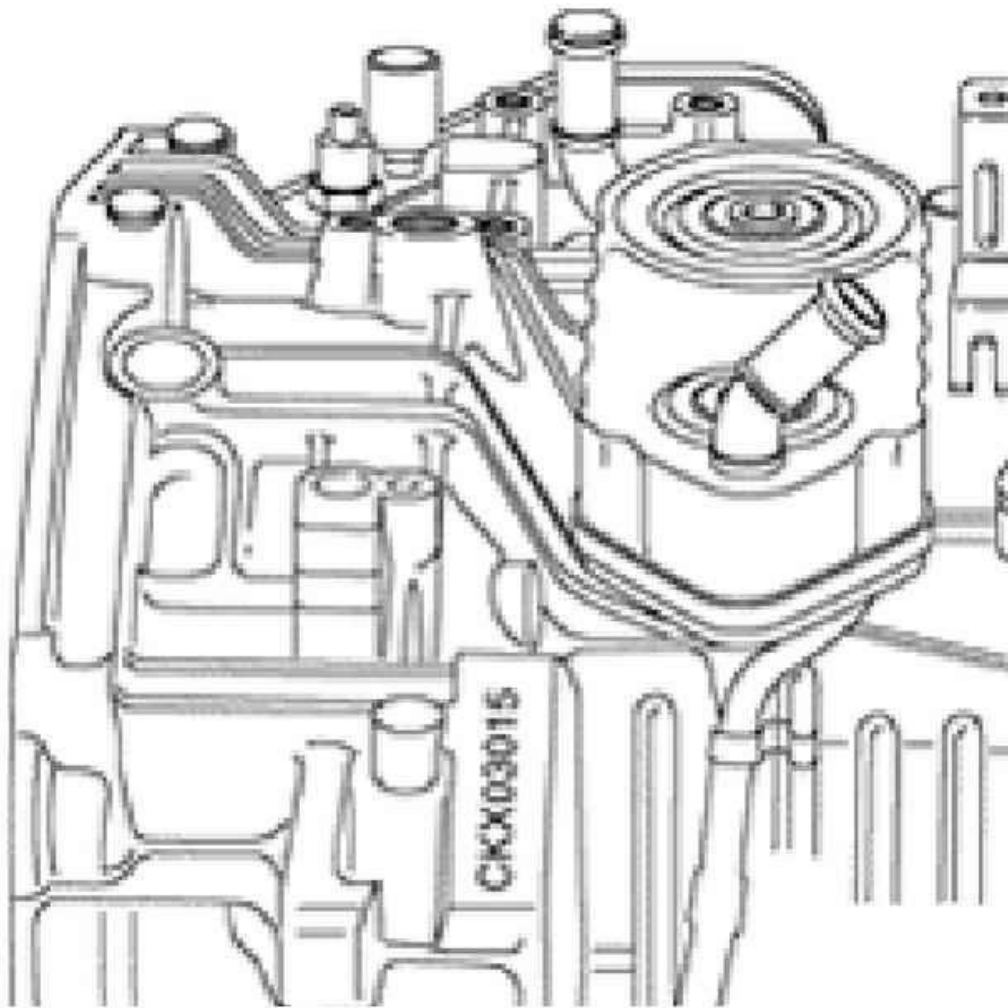
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Fig. 4: Identifying Code Letters Of Transmission On Vehicle Data Plates
Courtesy of VOLKSWAGEN OF AMERICA, INC.

AUTOMATIC TRANSMISSION 01M, GENERAL INFORMATION

There are several fundamental differences between the 4-speed automatic transmission 01M and the 096 automatic transmission. These changes are briefly mentioned below.

TRANSMISSION

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The 4-speed automatic transmission 01M is equipped with 4 hydraulically activated forward gears. When the lock-up clutch is closed these forward gears become mechanically-driven gears by cutting out the torque converter slip.

TORQUE CONVERTER

The torque converter for the 01M transmission is equipped with a lock-up clutch. The lock-up clutch is closed depending on load and speed and drives 1st, 2nd, 3rd and 4th gears mechanically independent of slip.

ON BOARD DIAGNOSTIC (OBD)

On Board Diagnostic is described in Repair Manual.

See 4 SPD. AUTOMATIC TRANSMISSION 01M ON BOARD DIAGNOSTIC (OBD) .

TRANSMISSION CONTROL MODULE (TCM) -J217 - WITH GEAR CHANGES BASED ON DRIVING SITUATION (FUZZY LOGIC)

Depending on driving situation and driving force resistance, gear change points are determined automatically.

Advantages:

- Gear changes fuel consumption orientated
- Maximum engine output always available
- Individual adaption of gear change points for all driving situations
- Gear change points are infinitely variable

GEAR CHANGE POINT VARIATIONS FOR GRADIENTS

An additional gear change map automatically selects gear changes for gradients dependent upon accelerator pedal position and driving speed.

- Gear change map for extreme uphill stretches is matched to engine output
- Gear change map for extreme downhill stretches is matched to braking effect of the engine

CODE LETTERS, TRANSMISSION APPLICATION, RATIOS, EQUIPMENT

CODE LETTERS, TRANSMISSION APPLICATION, RATIOS, EQUIPMENT SPECIFICATION (1 OF 8)

Automatic transmission		01M					
Transmission	Code letters	CLB	DLL	CLK	DKS	CKX	DKR
	Manufactured from	01.95	06.95	01.95	06.95	01.95	06.95
	to	01.97		01.97		01.97	
Torque converter	Code letters	QCDR		QADC		QADC	

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Valve body	Code letters	QCA		QCA		QCA	
	Manufactured from	01.95		01.95		01.95	
	to						
Number of plates		Inner	Outer	Inner	Outer	Inner	Outer
	Clutch -K1-	5	5	5	5	5	5
	Clutch -K2-	5	5	5	5	5	5
	Clutch -K3-	6	5	5	4	5	4
	Brake -B1-	5	5	5	5	5	5
	Brake -B2-	6	7	6	7	6	7
Allocation	Model	Golf III 1995 and up		Golf III 1995 and up		Golf III 1995 and up	
		Jetta III 1995 and up		Jetta III 1995 and up Cabrio 1995 and up		Jetta III 1995 and up	
	Engine	2.8 L - 128 kW (172 hp)		2.0 L - 85 kW (115 hp)		1.8 L - 55 kW (75 hp)	
				1.8 L - 66 kW (90 hp)			

CODE LETTERS, TRANSMISSION APPLICATION, RATIOS, EQUIPMENT SPECIFICATION (2 OF 8)

Transmission	Code letters		CLB	DLL	CLK	DKS	CKX	DKR
Ratios	1st gear		2.714		2.714		2.714	
	2nd gear		1.441		1.441		1.441	
	3rd gear		1.000		1.000		1.000	
	4th gear		0.742		0.742		0.742	
	Reverse gear		2.884		2.884		2.884	
Intermediate drive	No. of teeth	Input gear	45		45		45	
		Output gear	44		44		44	
	Ratio		0.978		0.978		0.978	
Final drive	No. of teeth	Drive pinion	20		18		17	
		Final drive gear	74		76		77	
	Ratio		3.700		4.222		4.529	
Drive shaft	Flange diameter mm		100		Tripodic		Tripodic	
ATF cooler	Equipment		Pressure-side 6-row		Pressure-side 6-row		Pressure-side 6 - row	

CODE LETTERS, TRANSMISSION APPLICATION, RATIOS, EQUIPMENT SPECIFICATION (3 OF 8)

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OF 8)

Automatic transmission		01M					
Transmission to	Code letters	CKZ		CKY		CLA	
	Manufactured from	01.95		01.95		01.95	
	01.97						
Torque converter	Code letters	QCDC		QCDC		QCDC	
Valve body to	Code letters	QCA		QCA		QCA	
	Manufactured from	01.95		01.95		01.95	
Number of plates		Inner	Outer	Inner	Outer	Inner	Outer
	Clutch -K1-	5	4	5	5	5	4
	Clutch -K2-	5	5	5	5	5	5
	Clutch -K3-	6	5	5	4	5	4
	Brake -B1-	5	5	5	5	5	5
	Brake -B2-	6	7	6	7	6	7
Allocation	Model	Golf III 1995 and up Jetta III 1995 and up		Golf III 1995 and up Jetta III 1995 and up		Golf III 1995 and up Jetta III 1995 and up	
	Engine	1.9 L - 66 kW (90 hp) Diesel - TDI		1.8 L - 66 kW (90 hp)		2.0 L - 85 kW (115 hp)	

CODE LETTERS, TRANSMISSION APPLICATION, RATIOS, EQUIPMENT SPECIFICATION (4 OF 8)

Transmission	Code letters		CKZ	CKY	CLA
Ratios	1st gear		2.714	2.714	2.714
	2nd gear		1.441	1.441	1.441
	3rd gear		1.000	1.000	1.000
	4th gear		0.742	0.742	0.742
	Reverse gear		2.884	2.884	2.884
Intermediate drive	No. of teeth	Input gear	45	45	45
		Output gear	44	44	44
	Ratio		0.978	0.978	0.978
Final drive	No. of teeth	Drive pinion	22	17	18
		Final drive gear	73	77	76
	Ratio		3.273	4.529	4.222
Drive shaft	Flange		Tripodic	100	100

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	diameter mm			
ATF cooler	Equipment	Pressure-side 6-row	Pressure-side 6-row	Pressure-side 6-row

CODE LETTERS, TRANSMISSION APPLICATION, RATIOS, EQUIPMENT SPECIFICATION (5 OF 8)

Automatic transmission		01M					
Transmission	Code letters	DLY		DNS		DLV	
	Manufactured from	01.97		01.97		01.97	
	to	-		-		-	
Torque converter	Code letters	QADC		QADC		QADC	
Valve body	Code letters	QEA		QEA		QEA	
	Manufactured from	01.97		01.97		01.97	
	to	-		-		-	
Number of plates	-	Inner	Outer	Inner	Outer	Inner	Outer
	Clutch -K1-	5	5	5	5	4	4
	Clutch -K2-	4	4	4	4	3	3
	Clutch -K3-	5	4	5	4	5	4
	Brake -B1-	5	5	5	5	4	4
	Brake -B2-	4	5	4	5	4	5
Allocation	Model	Golf III 1995 And Up		Golf III 1995 And Up		Golf III 1995 And Up	
		Jetta III 1995 And Up		Jetta III 1995 And Up		Jetta III 1995 And Up	
	Engine	2.0 L - 85 kW		2.0 L - 85 kW		1.8 L - 66 kW	
		(115 hp)		(115 hp)		(90 hp)	

CODE LETTERS, TRANSMISSION APPLICATION, RATIOS, EQUIPMENT SPECIFICATION (6 OF 8)

Transmission	Code letters		DLY	DNS	DLV
1st gear			2.714	2.714	2.714
2nd gear			1.441	1.441	1.441
3rd gear			1.000	1.000	1.000
4th gear			0.742	0.742	0.742
Reverse gear			2.884	2.884	2.884
Intermediate drive	No. of teeth	Input gear	45	45	45
		Output gear	44	44	44
	Ratio		0.978	0.978	0.978
Final drive	No. of teeth	Drive pinion	18	18	17
		Final drive gear	76	76	77
	Ratio		4.222	4.222	4.529

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Drive shaft	Flange diameter mm	100	Tripodic	Tripodic
ATF cooler	Equipment	Pressure-side 6-row	Pressure-side 6-row	Pressure-side 6-row

CODE LETTERS, TRANSMISSION APPLICATION, RATIOS, EQUIPMENT SPECIFICATION (7 OF 8)

Automatic transmission			01M					
Transmission	Code letters		DLR		DNW		DLX	
	Manufactured from		01.97		01.97		01.97	
	to							
Torque converter	Code letters		QADC		QADC		QCDC	
Valve body	Code letters		QEA		QEA		QEA	
	Manufactured from		01.97		01.97		01.97	
	to							
Number of plates			Inner	Outer	Inner	Outer	Inner	Outer
	Clutch -K1-		4	4	4	4	5	5
	Clutch -K2-		3	3	3	3	5	5
	Clutch -K3-		5	4	5	4	6	5
	Brake -B1-		4	4	4	4	5	5
	Brake -B2-		4	5	4	5	5	6
Allocation	Model		Golf III 1995 and up Jetta III 1995 and up		Golf III 1995 and up Jetta III 1995 and up		Golf III 1995 and up Jetta III 1995 and up	
	Engine		1.8 L - 66 kW (90 hp)		1.8 L - 66 kW (90 hp)		1.9 L - 66 kW (90 hp) Diesel - TDI	
Ratios	1st gear		2.714		2.714		2.714	
	2nd gear		1.441		1.441		1.441	
	3rd gear		1.000		1.000		1.000	
	4th gear		0.742		0.742		0.742	
	Reverse gear		2.884		2.884		2.884	
Intermediate drive	No. of teeth	Input gear	45		45		45	
		Output gear	44		44		44	
	Ratio		0.978		0.978		0.978	
Final drive	No. of teeth	Drive pinion	17		17		22	
		Final drive gear	77		77		72	
	Ratio		4.529		4.529		3.273	
Drive shaft	Flange diameter mm		Tripodic		100		Tripodic	
ATF cooler	Equipment		Pressure-side 6-row		Pressure-side 6-row		Pressure-side 6-row	

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CODE LETTERS, TRANSMISSION APPLICATION, RATIOS, EQUIPMENT SPECIFICATION (8 OF 8)

Automatic transmission			01M					
Transmission	Code letters		DMA		DNT		DLZ	
	Manufactured from		01.97		01.97		01.97	
	to							
Torque converter	Code letters		QCDR		QCDR		QADC	
Valve body	Code letters		QEA		QEA		QEA	
	Manufactured from		01.97		01.97		01.97	
	to							
Number of plates			Inner	Outer	Inner	Outer	Inner	Outer
	Clutch -K1-		5	5	5	5	5	5
	Clutch -K2-		5	5	5	5	4	4
	Clutch -K3-		6	5	6	5	5	4
	Brake -B1-		5	5	5	5	5	5
	Brake -B2-		5	6	5	6	4	5
Allocation	Model		Golf III 1995 And Up Jetta III 1995 And Up		Golf III 1995 And Up Jetta III 1995 And Up		Golf III 1995 And Up Jetta III 1995 And Up	
	Engine		2.8 L - 128 kW (172 hp)		2.8 L - 128 kW (172 hp)		2.0 L - 85 kW (115 hp)	
Transmission	Code Letters		DMA		DNT		DLZ	
Ratios	1st gear		2.714		2.714		2.714	
	2nd gear		1.441		1.441		1.441	
	3rd gear		1.000		1.000		1.000	
	4th gear		0.742		0.742		0.742	
	Reverse gear		2.884		2.884		2.884	
Intermediate drive	No. of teeth	Input gear	45		45		45	
		Output gear	44		44		44	
	Ratio		0.978		0.978		0.978	
Final drive	No. of teeth	Drive pinion	20		20		18	
		Final drive gear	74		74		76	
	Ratio		3.700		3.700		4.222	
Drive shaft	Flange diameter mm		100		100		Tripodic	
ATF cooler	Equipment		Pressure-side 6-row		Pressure-side 6-row		Pressure-side 6-row	

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CAPACITIES

PLANETARY GEAR

PLANETARY GEAR FLUID SPECIFICATIONS

Capacities	Planetary gear	Automatic trans
Initial filling	5.3 L (5.6 qt)	01M
Oil change	approx. 3.0 L (3.2 qt)	
Lubricant	VW ATF	

VW ATF is available as a replacement part.

Container size 0.5 L -Part No. G 052 162 A1

Container size 1.0 L -Part No. G 052 162 A2

FINAL DRIVE

FINAL DRIVE FLUID SPECIFICATIONS

Capacities	Final drive	Automatic trans
Initial filling	0.75 L (0.8 qt)	01M
Oil change	Filled for life No change	
Lubricant	Gear oil SAE 75W90 (synthetic oil)	

Gear oil SAE 75W90 (synthetic oil) is available as a replacement part.

Container size 0.5 L -Part No. G 052 145 A1

Container size 1.0 L -Part No. G 052 145 A2

REPAIR INSTRUCTIONS

Maximum possible care, cleanliness, and proper tools are essential to ensure successful transmission repairs.

A number of generally applicable instructions for individual repair operations, which are otherwise mentioned at various points in the Repair Manual, are summarized here.

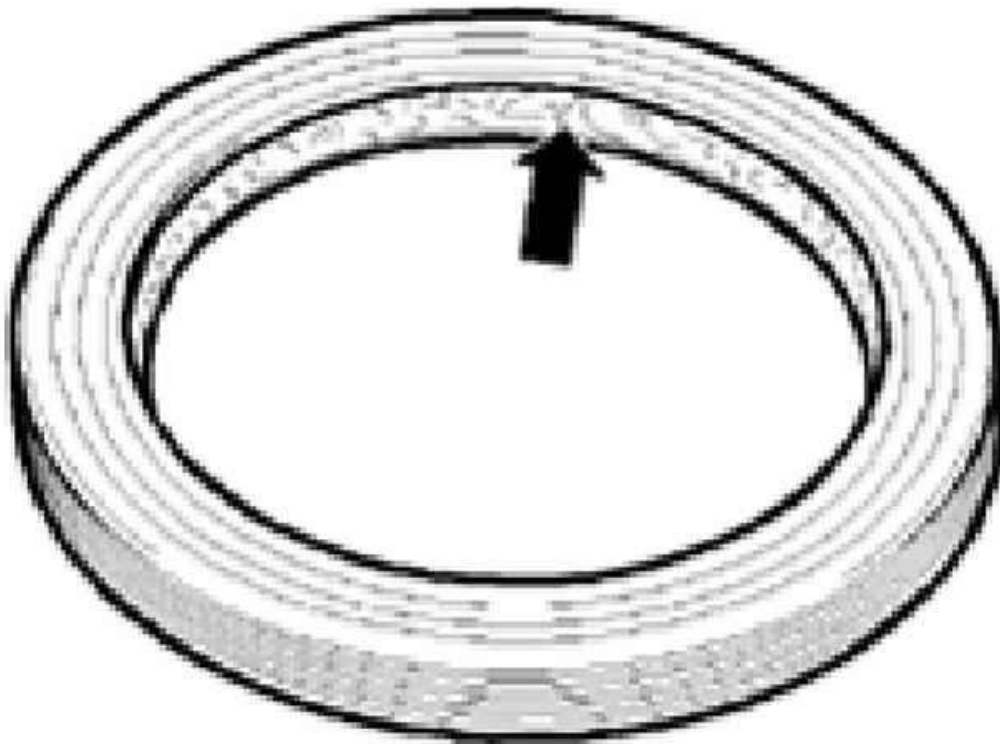
TRANSMISSION

When automatic transmission is replaced, check VW ATF in planetary transmission, (see **ATF LEVEL, CHECKING AND TOPPING UP**), and gear oil in final drive (see **FINAL DRIVE OIL LEVEL, CHECKING**) should be checked and topped up as necessary. Capacities and specifications can be found in **CAPACITIES**.

- When installing transmission ensure dowel pins are installed correctly.

Gaskets, oil seals

- Radial shaft seals: Pack space between sealing edges - arrow- with grease before installing.



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Fig. 5: Pack Space Between Sealing Edges With Grease Before Installing
Courtesy of VOLKSWAGEN OF AMERICA, INC.

- Always install new O-rings.
- After installation, check ATF level in transmission or gear oil in final drive, adjust to correct level if necessary.

Locking elements

- Do not overstretch circlips; replace if necessary.
- Circlips must be properly seated in the grooves.

Nuts, bolts

- Nuts and bolts for attaching covers and housings must be loosened and tightened diagonally.
- Tightening torques stated apply to unoled nuts and bolts.
- Clean threads of bolts that are secured by locking fluid with a wire brush. Then insert bolts with AMV 185 100 A1.
- Always replace self-locking nuts.

Bearings

- Install needle bearings with the inscribed side (thicker metal) facing the drift.
- Heat inner races of tapered roller bearings to approx. 100 °C (212 °F) before inserting.
- Do not interchange inner and outer races of same size bearings.
- Always replace tapered roller bearings which are mounted on a shaft together and use bearings from a single manufacturer.
- Lubricate all bearings in transmission with gear oil before installing. Oil with special care for measuring friction torque.

Shims

- Measure shims at several points with micrometer. Different tolerances make it possible to obtain exact shim thickness required.
- Check for burrs and damage. Install only shims which are in perfect condition.

Inner plates

- Place new inner plates in ATF fluid for 15 minutes before installing.

Valve body

- Replace valve body if any selector elements are burned.

Clutches

- Disassemble clutches K1, K2 and K3 only for cleaning. If parts are damaged, replace clutch. Determine clutches according to transmission code letters.

On Board Diagnosis (OBD)

- Before performing repairs, determine cause of malfunction with On Board Diagnosis.

See **ON BOARD DIAGNOSTIC (OBD), PERFORMING** .

TORQUE CONVERTER

The torque converter is equipped with a lock-up clutch. The lock-up clutch is closed depending on vehicle load and speed; it drives 1st, 2nd, 3rd and 4th gears mechanically independent of slip.

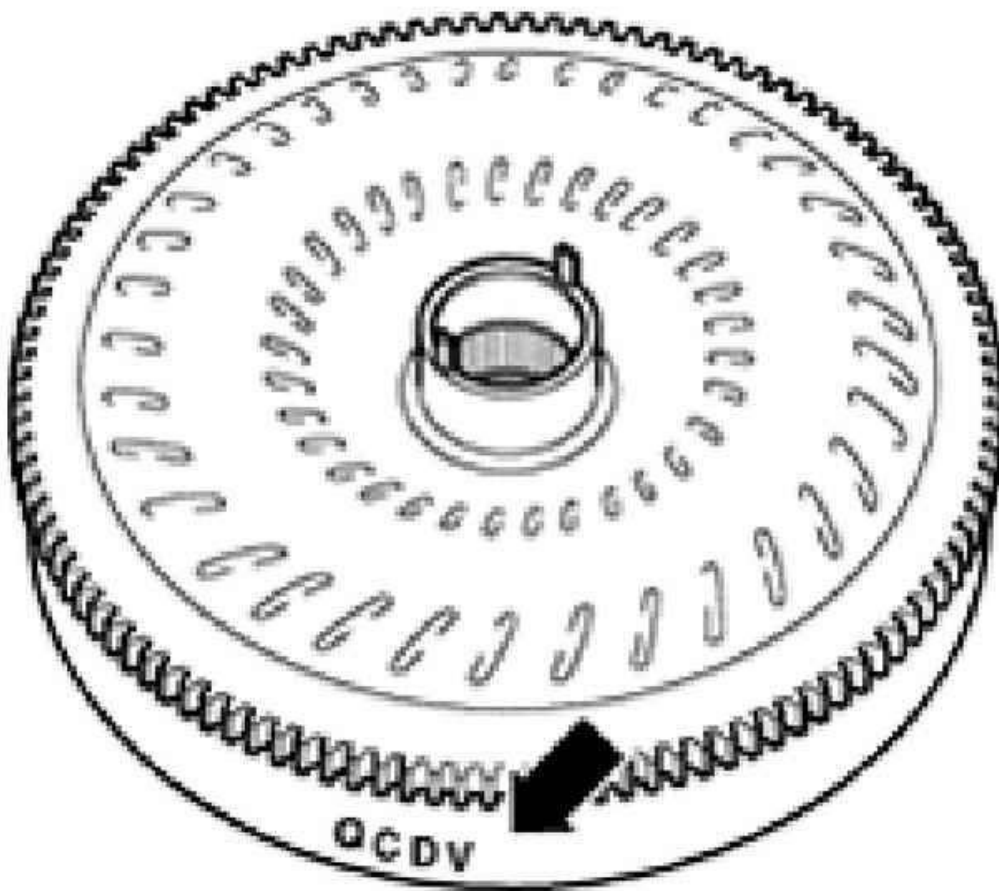
The lock-up clutch is integrated in the torque converter.

ATF pump is driven by the torque converter.

When installing torque converter, ensure both drive pins engage in ATF pump inner wheel recesses.

TORQUE CONVERTER, IDENTIFICATION

Torque converters are identified by code letters -arrow-



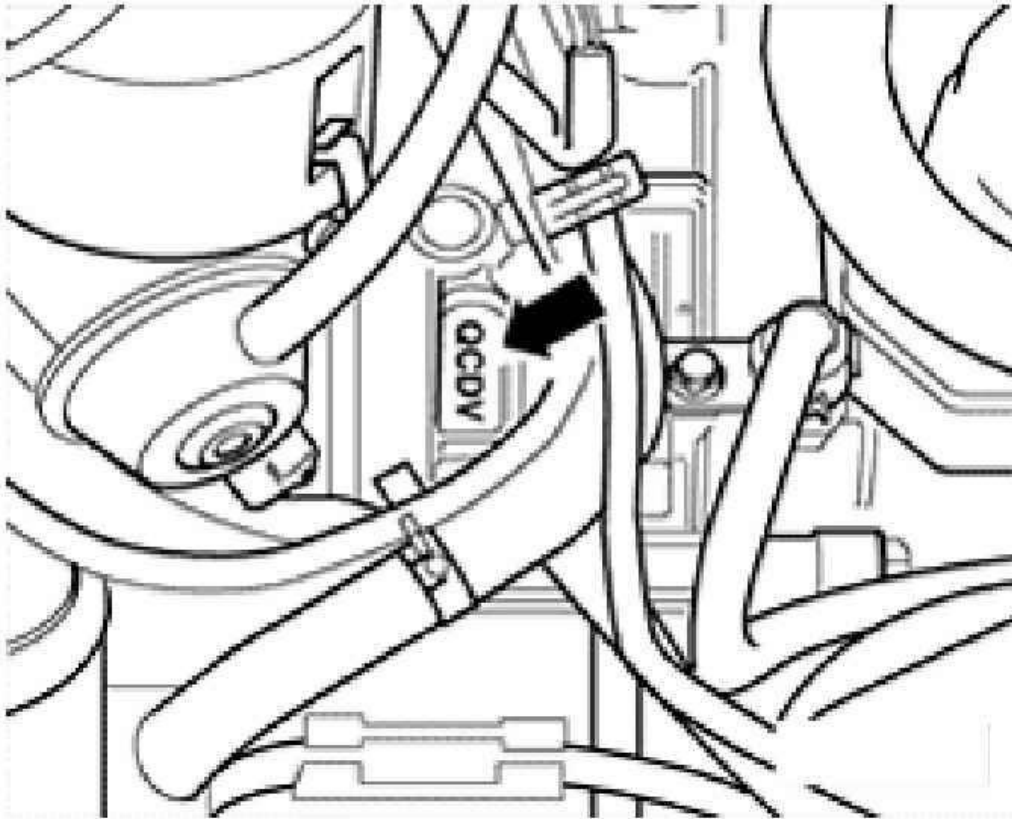
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Fig. 6: Locating Torque Converters Code Letters
Courtesy of VOLKSWAGEN OF AMERICA, INC.

For transmission/torque converter allocation, see TRANSMISSION LAYOUT.

Torque converter code letters

(Transmission installed)



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Fig. 7: Identifying Torque Converter Code Letters (Transmission Installed)
Courtesy of VOLKSWAGEN OF AMERICA, INC.

TORQUE CONVERTER, DRAINING

Special tools and equipment

- VAG 1358 A Oil extractor

V.A.G 1358 A



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Fig. 8: Identifying VAG 1358 A Oil Extractor
Courtesy of VOLKSWAGEN OF AMERICA, INC.

Torque converter, draining

If torque converter has become contaminated by wear or when completely overhauling transmission, drain torque converter as follows:

- Extract ATF from torque converter using VAG 1358 A and probe VAG 1358 A/1 or equivalent.

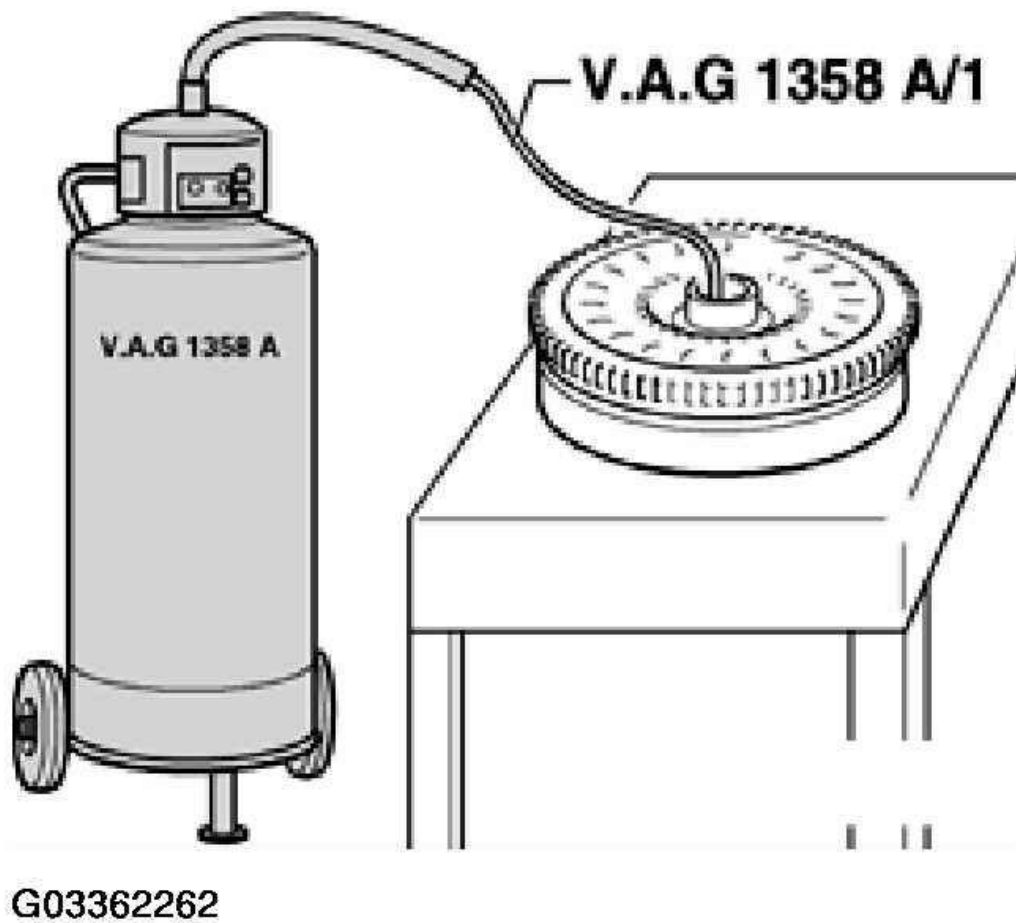


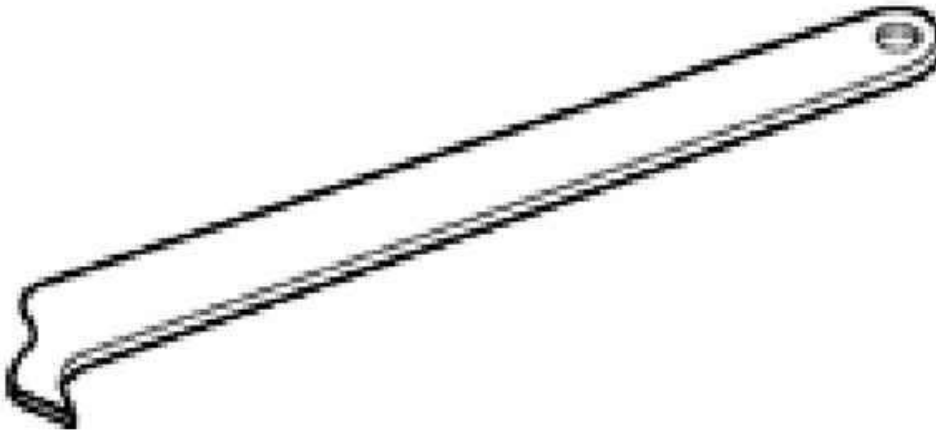
Fig. 9: Draining Extract ATF From Torque Converter
Courtesy of VOLKSWAGEN OF AMERICA, INC.

TORQUE CONVERTER OIL SEAL, REMOVING AND INSTALLING

Special tools and equipment

- VAG 681 Extractor lever

VW 681

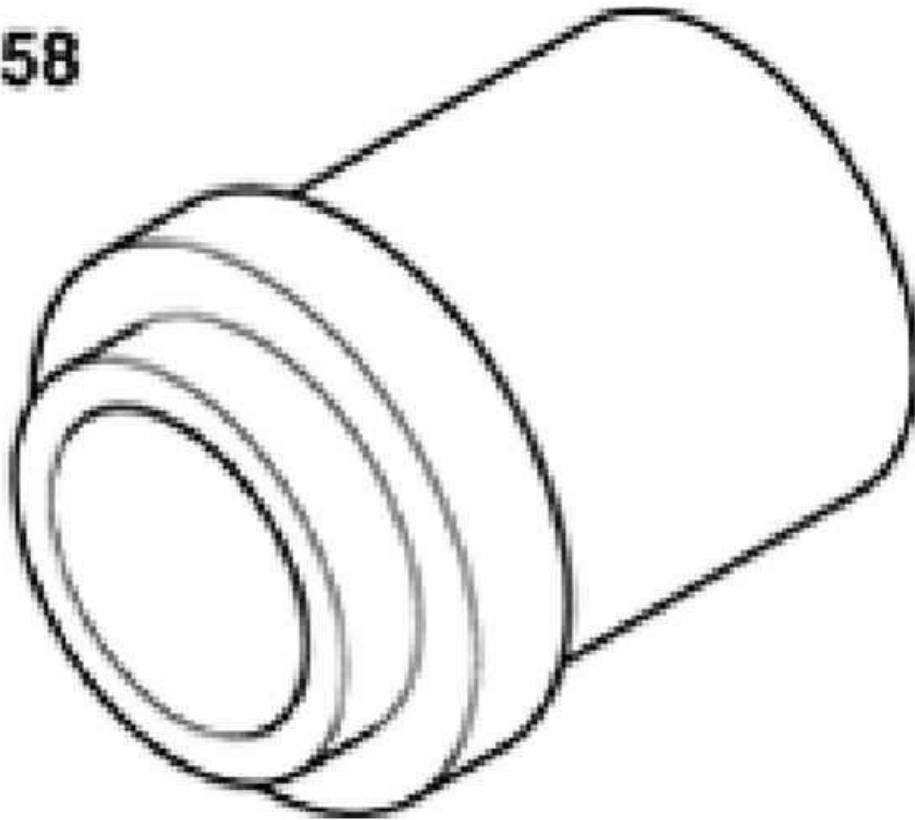


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Fig. 10: Identifying VAG 681 Extractor Lever
Courtesy of VOLKSWAGEN OF AMERICA, INC.

- 3158 Sleeve

3158



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Fig. 11: Identifying 3158 Sleeve

Courtesy of VOLKSWAGEN OF AMERICA, INC.

Torque converter oil seal, removing

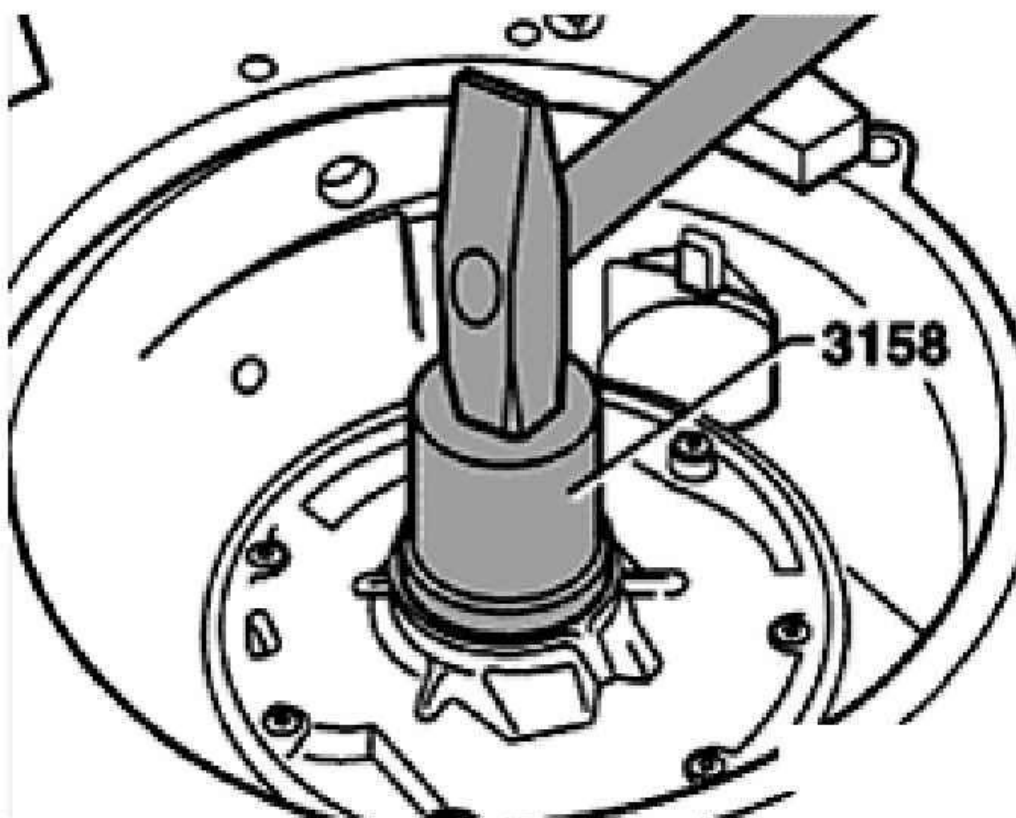


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Fig. 12: Removing Torque Converter Oil Seal
Courtesy of VOLKSWAGEN OF AMERICA, INC.

Torque converter oil seal, installing

- Drive in until flush



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Fig. 13: Installing Torque Converter Oil Seal
Courtesy of VOLKSWAGEN OF AMERICA, INC.

AUTOMATIC TRANSMISSION - CONTROLS, HOUSING

SHIFT MECHANISM, SERVICING

WARNING: Before working on running engine, move selector lever into the "P" and apply parking brake.

Checking operation

- Shift selector lever to "P" and switch ignition on:
 - Brake pedal not depressed:

Selector lever is locked and cannot be shifted out of "P". Shift lock solenoid -N110- blocks selector

lever.

- Brake pedal depressed:

Shift lock solenoid -N110- releases selector lever. It is possible to shift into a driving gear.

Selector lever in "N" position and ignition switched on:

- Ignition ON
- Brake pedal not depressed:

Selector lever is locked and cannot be shifted out of "N". Shift lock solenoid -N110- blocks selector lever.

- Brake pedal depressed:

Shift lock solenoid -N110- releases selector lever. It is possible to shift into a driving gear.

NOTE:

- **Starter must not operate in selector lever positions "1", "2", "3", "D" and "R".**
- **When travelling at speeds above 5 km/h (3 mph) and shifting to "N", shift lock solenoid -N110- must not engage and block selector lever. Selector lever can be shifted into a driving gear.**
- **When travelling at speeds below 5 km/h (3 mph) (almost stopped) and shifting into selector lever position "N", shift lock solenoid -N110- must not engage until after approx. 1 sec. Selector lever cannot be shifted out of "N" until brake pedal is depressed.**

Selector lever cable, checking and adjusting

Checking

- Remove selector lever cable bolt from selector shaft lever
- Move selector lever from "P" to "1".
 - Selector lever mechanism and selector lever cable must move freely. If necessary, replace selector lever cable or check selector lever mechanism.

Always replace selector lever locking washer at transmission lever after disassembling.

Adjusting

- Selector lever in "P" position.
 - Loosen selector lever cable bolt on selector shaft lever.
 - Shift selector lever/shaft to "P". Parking lock should and it should not be possible to turn front wheels in same direction.
 - In this position tighten bolt

- Tightening torque: 25 N.m (18 ft lb)

Ignition lock, checking

- Shift selector lever to "P" and
- Switch ignition OFF").

The ignition key can only be removed with selector lever in "P" .

- Remove ignition key. Selector lever cannot be shifted out of "P".

Shift mechanism, disassembling and assembling

The following list pertains to **Fig. 14**.

1. **Selector lever handle**
2. **Set screw**
 - 1.5 N.m (13 in. lb)
3. **Cover**
 - With selector indicator
4. **Cover strip**
 - Insert into cover -3-.
5. **Sleeve**
6. **Shift Lock Solenoid -N110-**
 - Adjusting, see **Shift lock solenoid -N110-, adjusting**
 - Checking, see **Shift lock solenoid -N110-, adjusting clearance between pressure rod and lever**
 - Securing harness to selector housing, see **Selector lever housing, installing wiring harness**
 - Can be checked via OBD function 08, read measuring value block

See **READ MEASURING VALUE BLOCK (FUNCTION 08)**

7. **Bolt**
 - 3 N.m (27 in. lb)
 - Qty. 2
 - Insert with AMV 185 101 A1
8. **Bolt**
 - Grease shank
9. **Bushing**
10. **Locking washer**
11. **Selector lever**
 - Removing: lower protective plate is removed and front protective plate is removed and pushed forward

- Assemble before installing, see **Selector lever, assemble before installing**
- 12. **Indicator lighting**
 - Securing connector, see **Indicator light connector, installing**
- 13. **Spring**
 - Insert with locking lever -14- into selector lever -11-
- 14. **Locking lever**
 - For locking selector lever -11- in "P" or "N"
- 15. **Bushing**
- 16. **Nut**
 - 10 N.m (7 ft lb)
 - Always replace
- 17. **Gasket**
- 18. **Selector lever housing**
 - Does not need to be removed to replace selector lever cable or individual shift mechanism parts
 - Removing, see **Selector lever housing, removing and installing**
- 19. **Bolt**
 - 25 N.m (18 ft lb), see **Boot, inserting in selector lever housing**
- 20. **Nut**
 - 15 N.m (11 ft lb)
 - Qty 3
 - Always replace
- 21. **Nut**
- 22. **Spacer**
- 23. **Nuts**
 - To secure center console
- 24. **Protective sleeve**
 - Insert into selector lever housing -18 - before attaching selector lever cable -25 -
- 25. **Selector lever cable**
 - Do not bend or kink
 - Lightly grease cable eyelet and cable ends before installing
 - To remove selector lever -11-, lower protective plate is removed, exhaust system is separated in front of catalyst (catalyst is removed on 6-cylinder engines and front protective plate is removed.
 - Remove clipped lever cable from transmission support bracket
 - Check guide tube for tight fit.
 - Check protective sleeve between console and lever/gearshift shaft for proper seating and secure selector lever cable with corrugated locking element, see item -28-
 - Attaching selector lever cable to selector lever -11-, see **Selector lever cable, installing to selector lever**

- Adjusting, see **SELECTOR LEVER CABLE, CHECKING AND ADJUSTING**

26. Console

- With cable anchorage for selector lever cable -25-

27. Lever

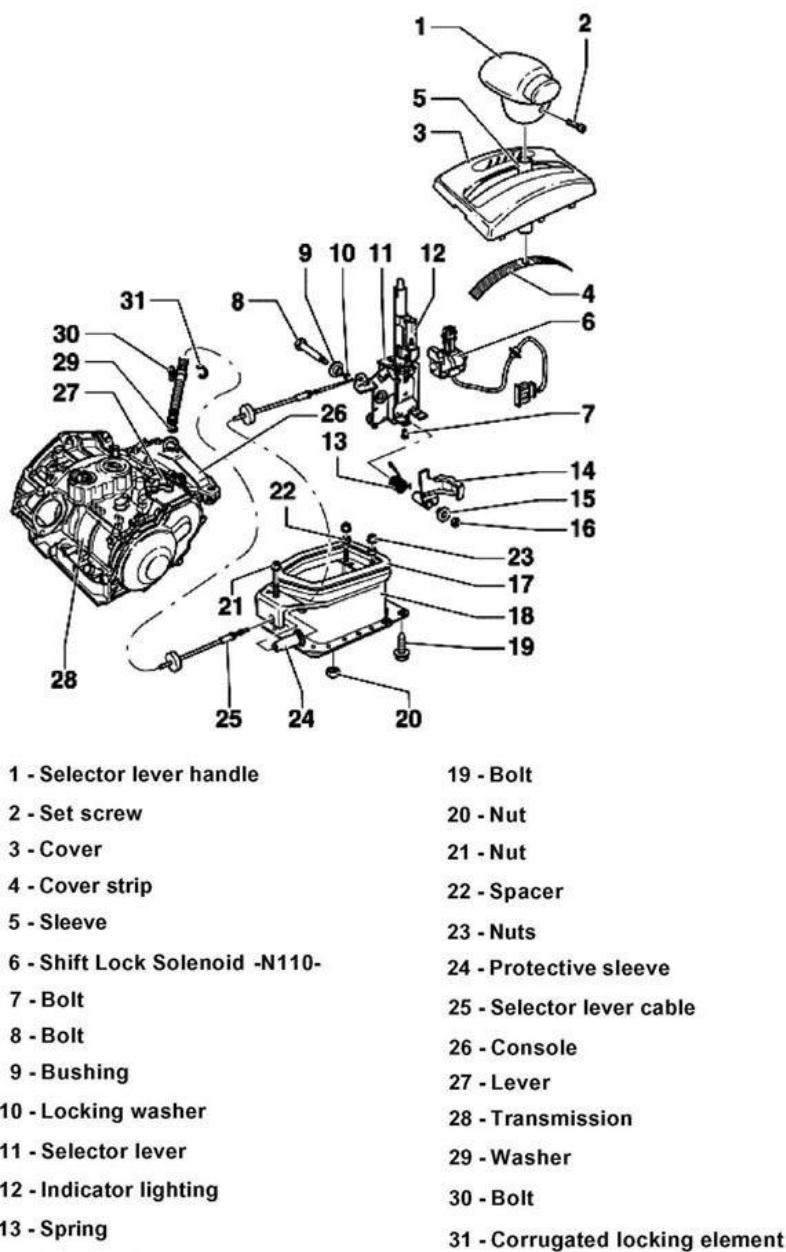
- For selector shaft

28. - Transmission**29. Washer****30. Bolt**

- 25 N.m (18 ft lb)

31. Corrugated locking element

- For selector lever cable -25-
- Always replace



G03362267

Fig. 14: Exploded View Of Shift Mechanism Components
 Courtesy of VOLKSWAGEN OF AMERICA, INC.

Selector lever housing, removing and installing

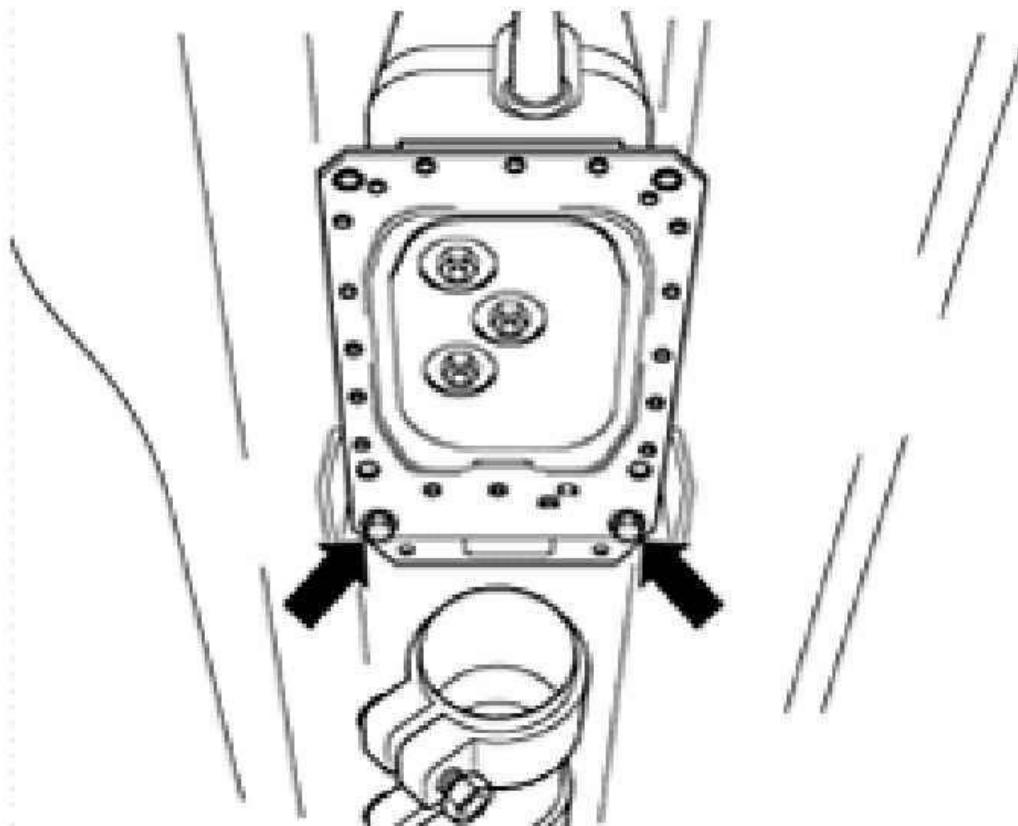
- Remove rear center console.
- Remove hex nut.
- Remove lower protective plate.
- Disconnect Heated Oxygen Sensor connector -G39-.
- Separate exhaust system in front of catalyst

See appropriate Exhaust System article.

- Remove catalyst (6-cylinder vehicles)

See **EXHAUST SYSTEM, GENERAL INFORMATION** .

- Remove front protective plate and rear bolts (arrows).



G03362268

Fig. 15: Removing Front Protective Plate And Rear Bolts

1993 Volkswagen Golf III GL

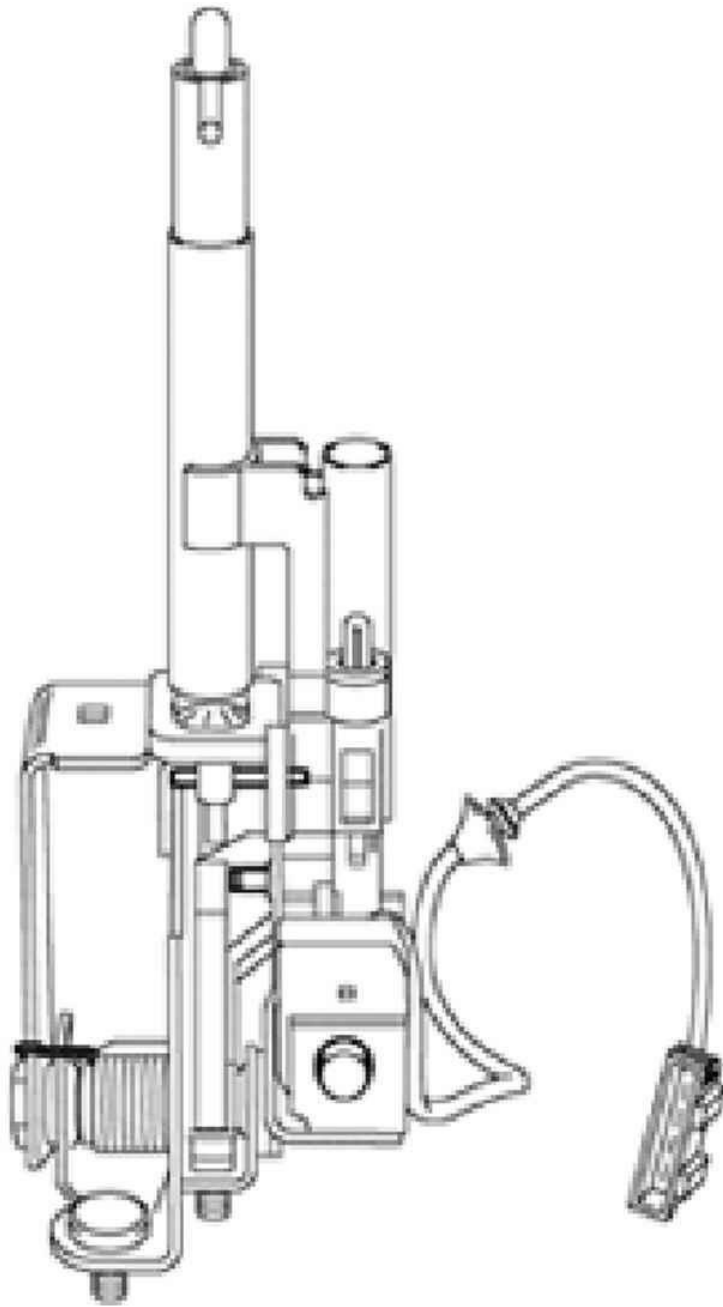
1993-99 TRANSMISSION 4 Spd. Automatic Transmission 01M - Cabrio, Golf, GTI & Jetta

Courtesy of VOLKSWAGEN OF AMERICA, INC.

Selector lever, assemble before installing

Before installing selector lever in selector lever housing, adjust shift lock solenoid -N110- and carry out functional check.

- Install set screw and shift lock solenoid -N110- screw with sealant AMV 185 101 A1

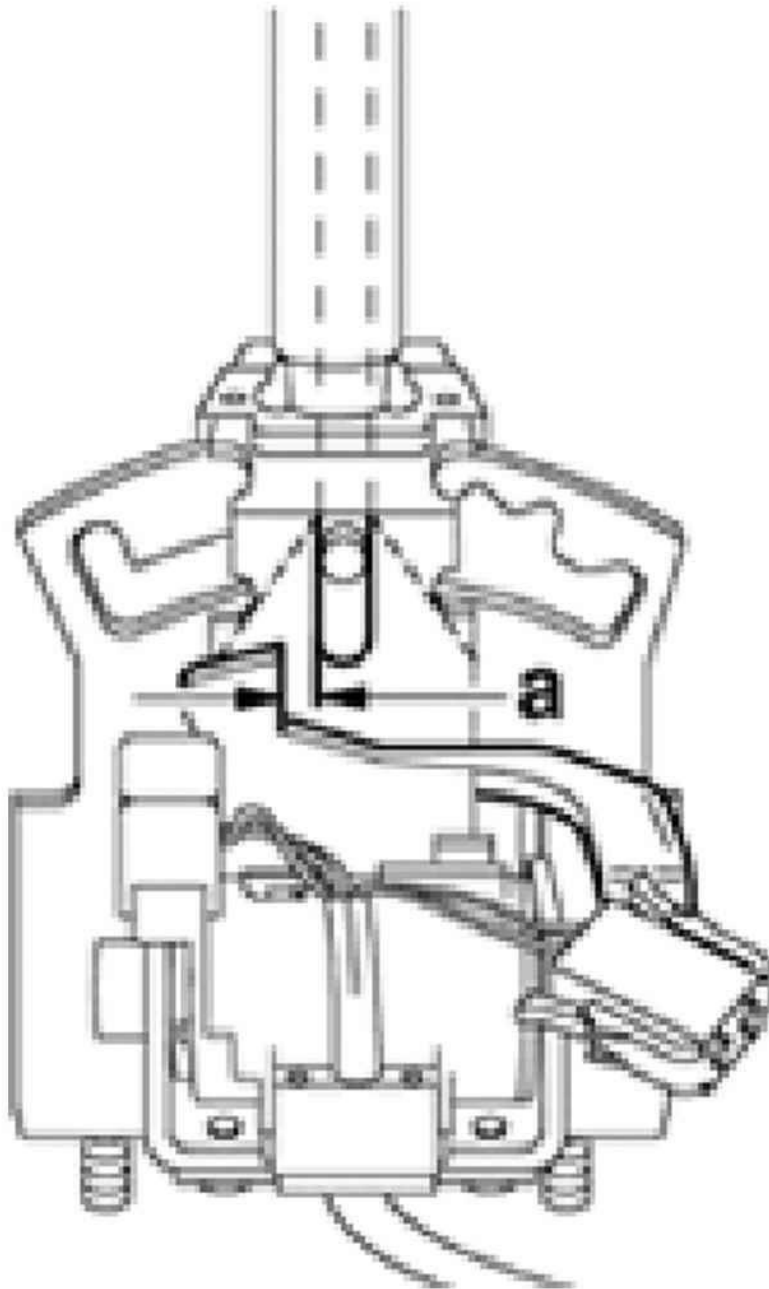


G03362269

Fig. 16: Installing Set Screw And Shift Lock Solenoid
Courtesy of VOLKSWAGEN OF AMERICA, INC.

Shift lock solenoid -N110-, adjusting

- Adjust solenoid by sliding in elongated holes so that a clearance of 0.3 mm exists between pressure rod and lever. See **Shift lock solenoid -N110-, adjusting clearance between pressure rod and lever.**



G03362270

Fig. 17: Adjusting Shift Lock Solenoid
Courtesy of VOLKSWAGEN OF AMERICA, INC.

Shift lock solenoid -N110-, adjusting clearance between pressure rod and lever

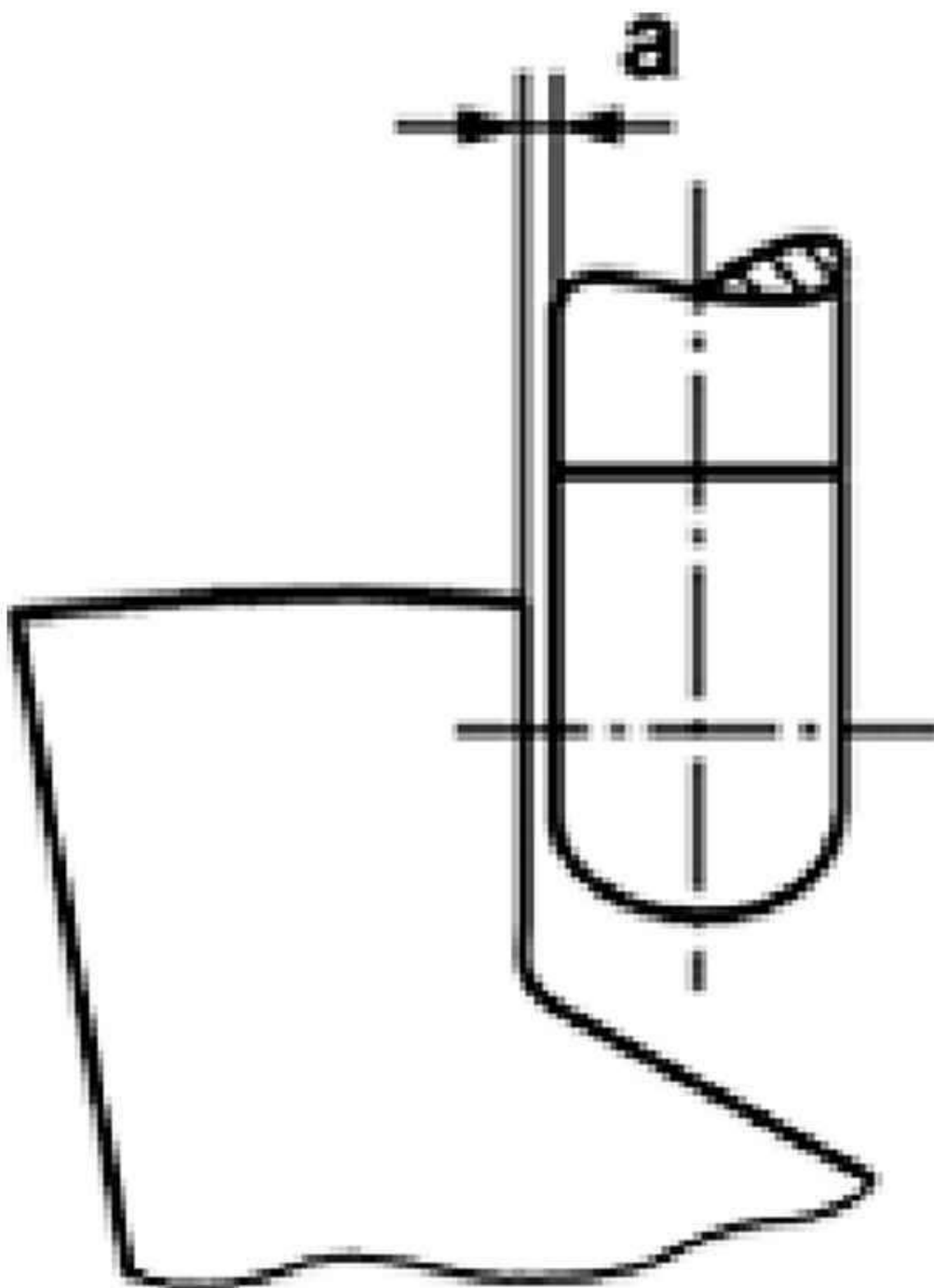
Dimension a = 0.3mm

Functional check

- Shift selector lever to "P" and supply solenoid with 12V. It must not be possible to shift lever into a driving gear.
- Interrupt solenoid operation. It must not be possible to shift into all driving gears. Pressure rod must not catch on lever.
- Shift selector lever into "N" and supply solenoid with 12V. It must not be possible to shift lever into a driving gear.
- After adjusting clearance, install assembled selector lever.

1993 Volkswagen Golf III GL

1993-99 TRANSMISSION 4 Spd. Automatic Transmission 01M - Cabrio, Golf, GTI & Jetta

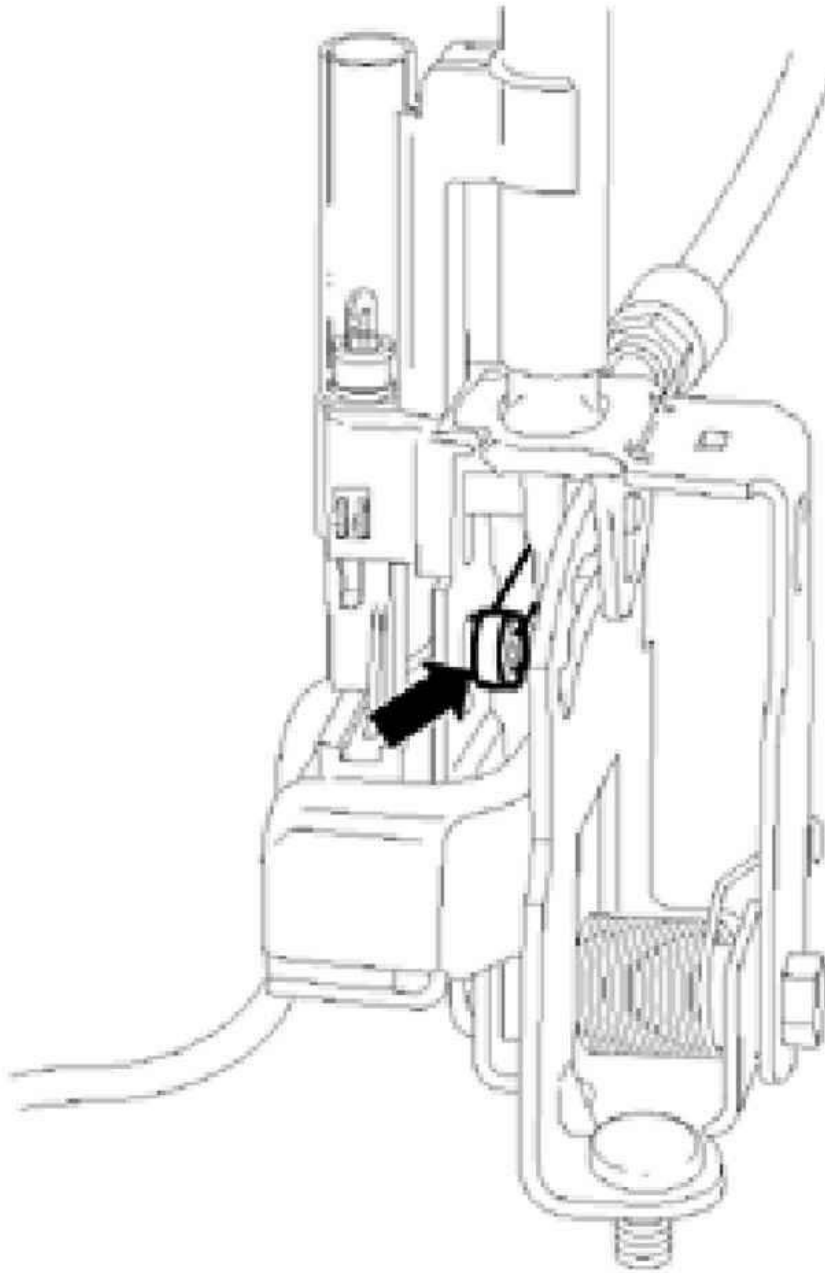


G03362271

Fig. 18: Adjusting Clearance Between Pressure Rod And Lever
Courtesy of VOLKSWAGEN OF AMERICA, INC.

Selector lever cable, installing to selector lever

- Install selector lever cable eye -arrow- on selector lever and secure with circlip.



G03362272

Fig. 19: Installing Selector Lever Cable
Courtesy of VOLKSWAGEN OF AMERICA, INC.

Selector lever housing, installing wiring harness

- Insert wiring harness into clips and into selector lever housing -arrows-.

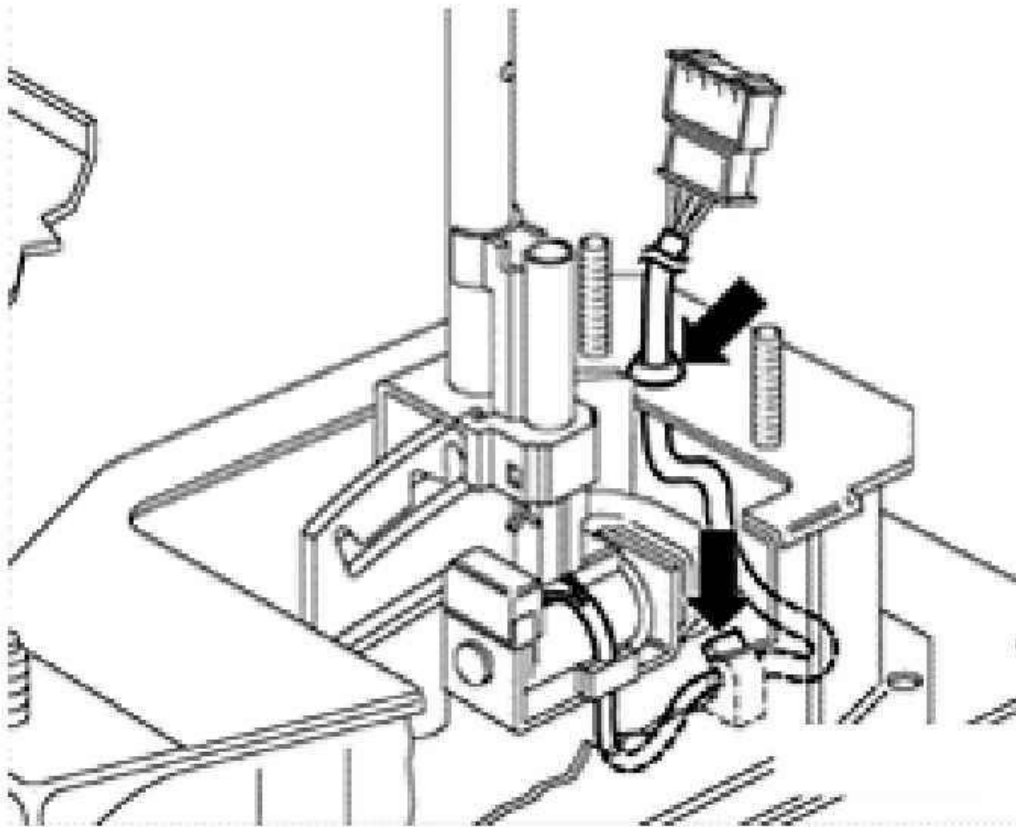
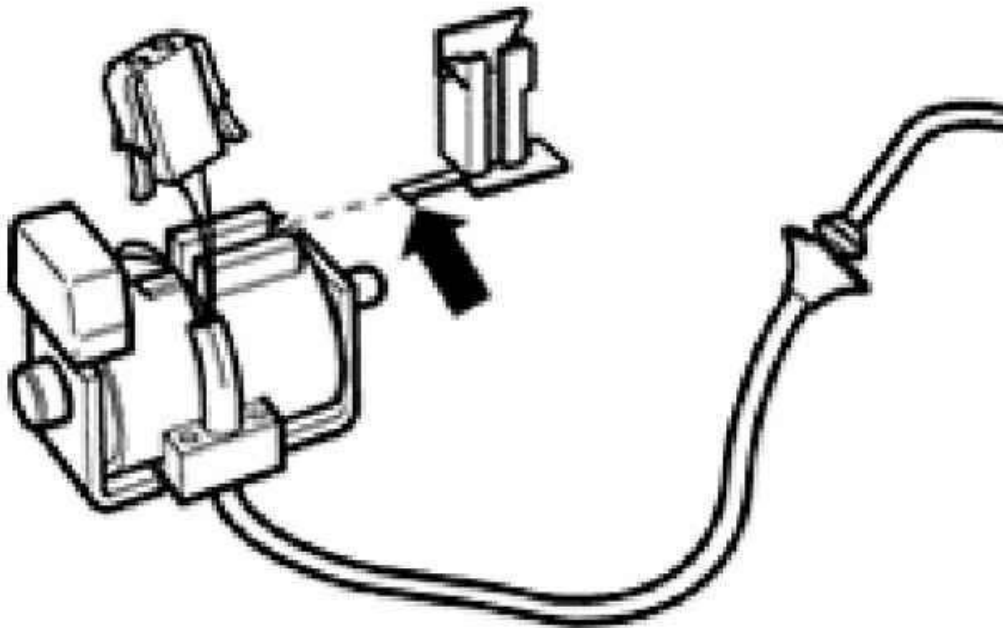
**G03362273**

Fig. 20: Installing Wiring Harness
Courtesy of VOLKSWAGEN OF AMERICA, INC.

Indicator light connector, installing

- Insert bracket with lug -arrow- until lug engages.
- Seat connector cable into bracket and slide connector onto bracket.

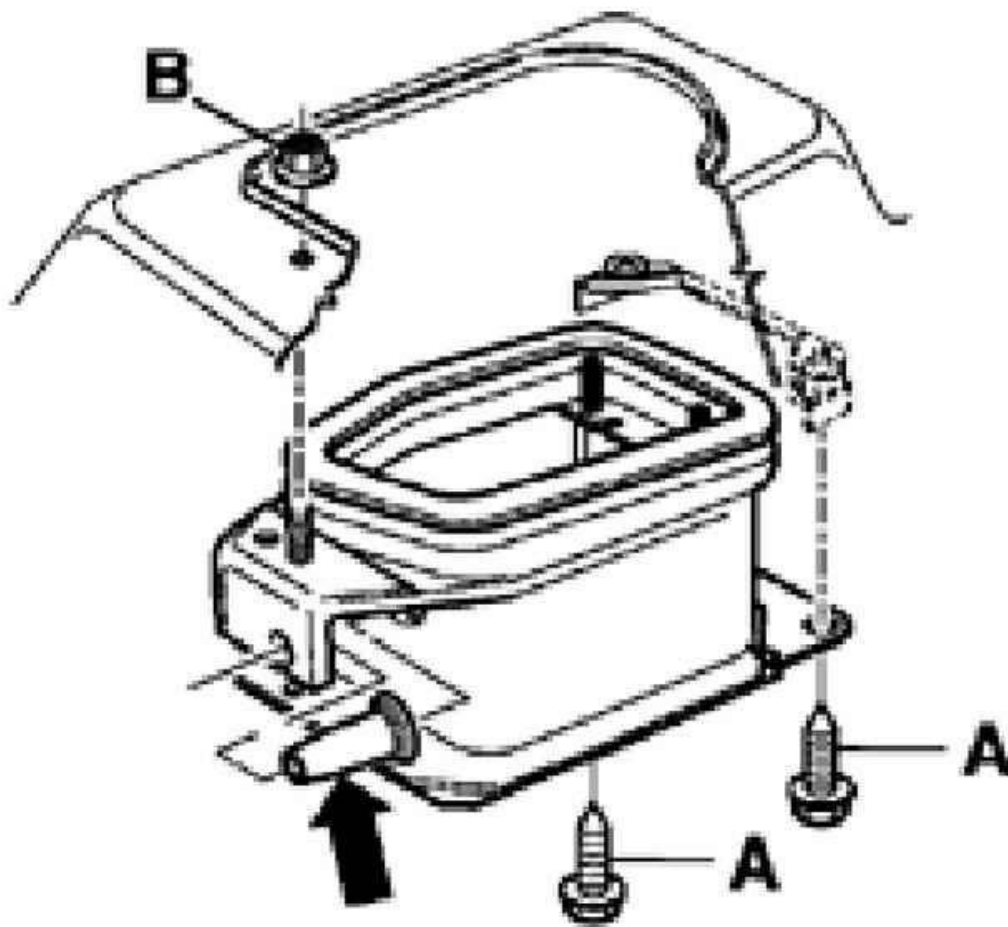


G03362274

Fig. 21: Installing Indicator Light Connector
Courtesy of VOLKSWAGEN OF AMERICA, INC.

Boot, inserting in selector lever housing

- Before installing selector lever cable, insert boot -arrow-.

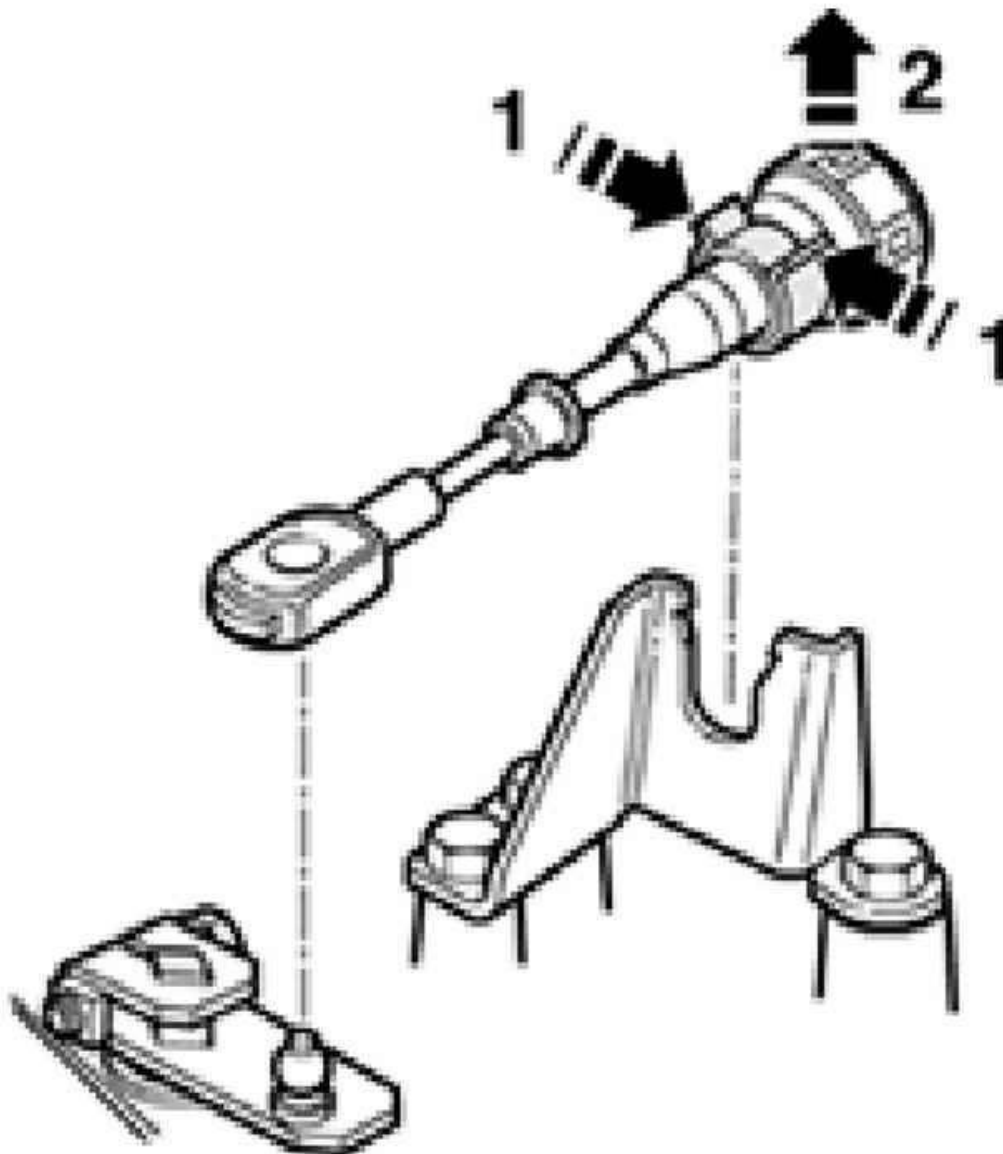


G03362275

Fig. 22: Installing Selector Lever Housing
Courtesy of VOLKSWAGEN OF AMERICA, INC.

Selector lever cable, removing from transmission support bracket

- Release selector lever cable -1-.
- Remove selector lever cable -1- from support bracket -2-.



G03362276

Fig. 23: Removing Selector Lever Cable From Transmission Support Bracket
Courtesy of VOLKSWAGEN OF AMERICA, INC.

Shift mechanism, disassembling and assembling (vehicles with ignition key removal lock)

The following list pertains to **Fig. 24**.

1. **Ignition/starter switch**
2. **Locking cable**
 - Must not be kinked
 - Adjusting, see **Locking cable, adjusting**
 - Removing and installing, see **Locking cable, removing and installing (vehicles with ignition key removal lock)**
3. **Clip**
4. **Selector lever handle**
 - For securing locking cable
 - Always replace
5. **Set screw**
 - 1.5 N.m (13 in. lb)
6. **Cover**
 - With selector indicator
7. **Sleeve**
8. **Cover strip**
 - Insert into cover -3-
9. **Selector lever**
 - Disassemble and assemble, see page
 - Removing: Lower protective plate is removed and front protective plate is removed and pushed forward
 - Installing: Insert locking cable anchorage in notch of selector lever housing
 - Securing harness to selector housing, see **Selector lever housing, installing wiring harness.**
10. **Nuts**
 - To secure central console
11. **Spacer**
12. **Gasket**
 - Always replace
13. **Selector lever housing**
 - Does not need to be removed to replace selector lever cable or individual shift mechanism parts
 - Removing and installing, see **Selector lever housing, removing and installing**
14. **Screw**
 - 25 N.m (18 ft lb)
15. **Nut**
 - 15 N.m (11 ft lb)
 - Always replace
 - Qty. 3
16. **Protective sleeve**

- Insert into selector lever housing -13- before attaching selector lever cable -18-

17. Nut

- 25 N.m (18 ft lb)

18. Selector lever cable

- Do not bend or kink
- Lightly grease cable eyelet and cable ends before installing
- To remove selector lever -9-, lower protective plate is removed, exhaust system is separated in front of catalyst (catalyst is removed on 6-cylinder engines and front protective plate is removed.
- Tighten cable on cable anchorage/selector lever housing to 20 N.m (15 ft lb)
- Remove clipped lever cable from transmission support bracket, see **Selector lever cable, removing from transmission support bracket**
- Check guide tube for tight fit.
- Check protective sleeve between console and lever/gearshift shaft for proper seating and secure selector lever cable with corrugated locking element
- Attaching selector lever cable to selector lever -9-, see **Selector lever cable, installing to selector lever**
- Adjusting, see **SELECTOR LEVER CABLE, CHECKING AND ADJUSTING**

19. Seal

- Bonded to cable anchorage
- Replace if damaged

20. Circlip**21. Washer****22. Bolt**

- 6 N.m (53 in lb)

23. Transmission**24. Lever**

- For selector shaft

25. Console

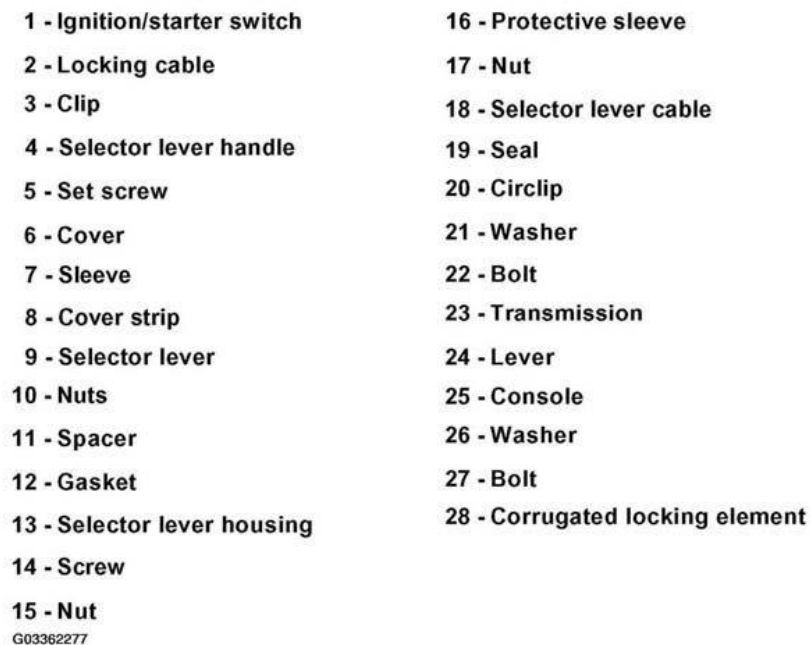
- With cable anchorage for selector lever cable -18-

26. Washer**27. Bolt**

- 25 N.m (18 ft lb)

28. Corrugated locking element

- For selector lever cable -25-
- Always replace

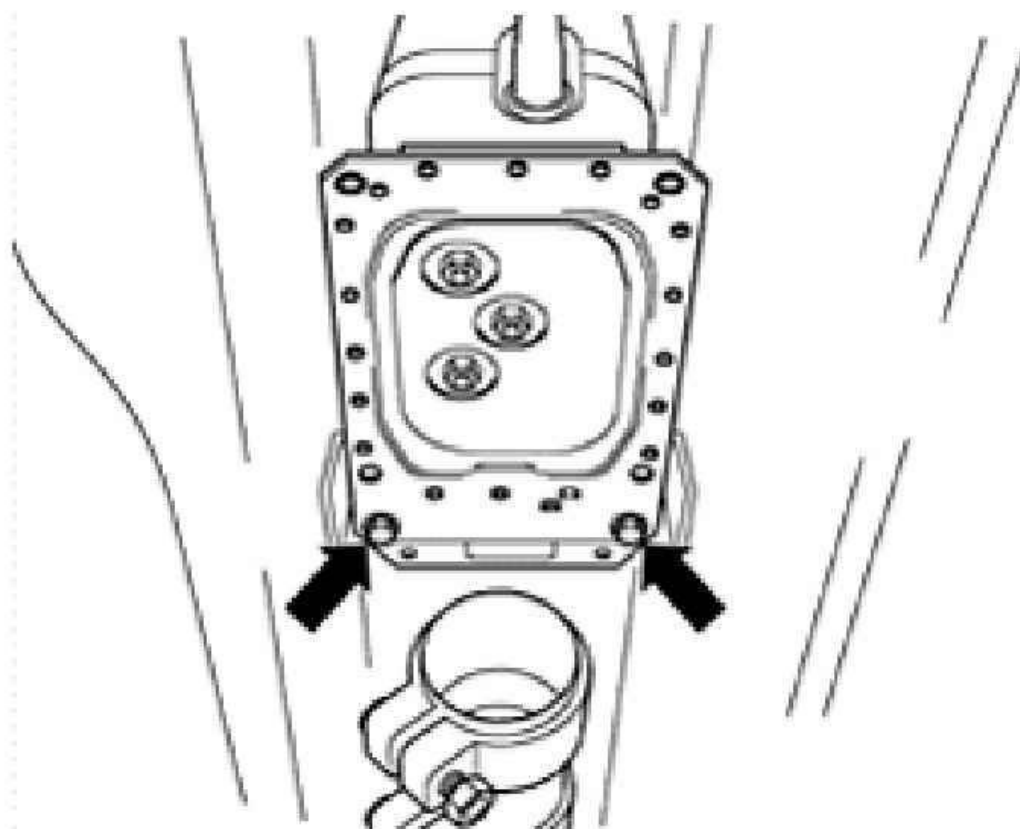


Courtesy of VOLKSWAGEN OF AMERICA, INC.

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- Remove rear center console.
- Remove hex nut.
- Remove lower protective plate.
- Disconnect Heated Oxygen Sensor connector -G39-.
- Separate exhaust system in front of catalyst

See appropriate Engine Exhaust article.

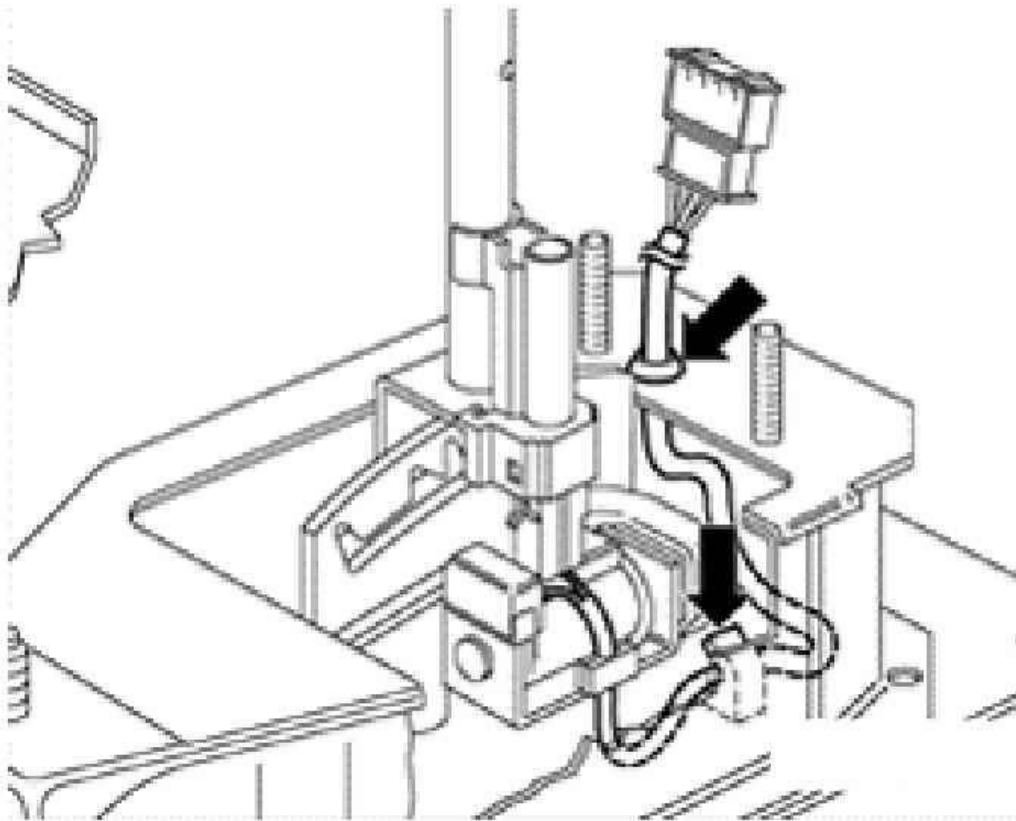


G03362278

Fig. 25: Removing Lower Protective Plate
Courtesy of VOLKSWAGEN OF AMERICA, INC.

Selector lever housing, installing wiring harness

- Insert wiring harness into clips and into selector lever housing -arrows-.

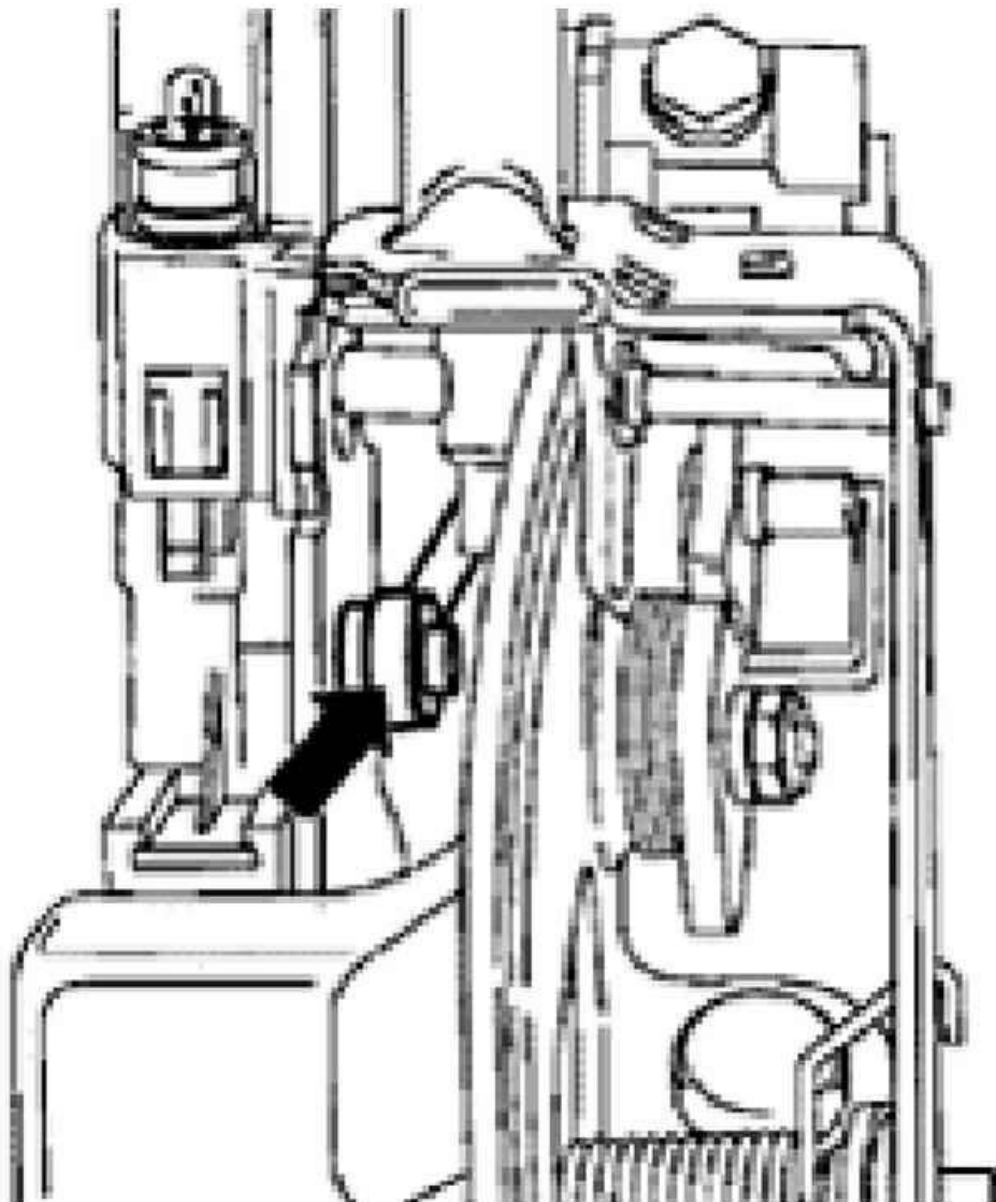


G03362279

Fig. 26: Installing Wiring Harness
Courtesy of VOLKSWAGEN OF AMERICA, INC.

Selector lever cable, installing to selector lever

- Install selector lever cable eye -arrow- on selector lever and secure with circlip.

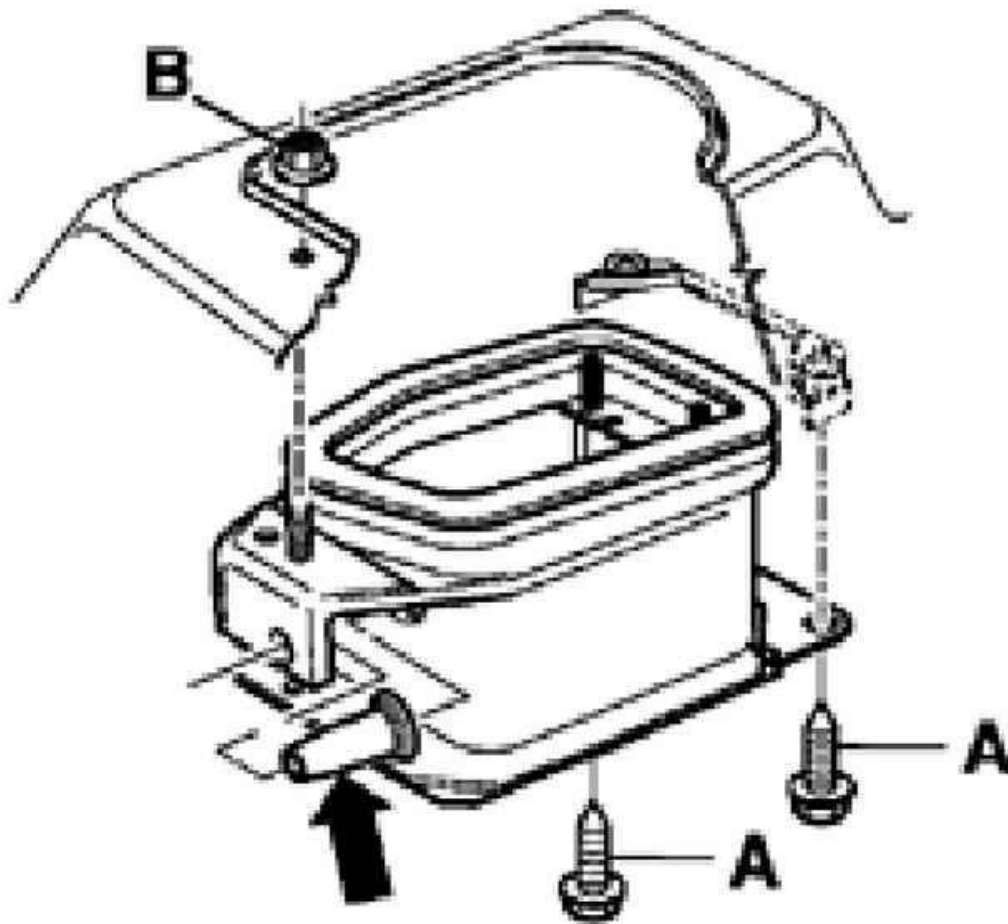


G03362280

Fig. 27: Installing Selector Lever Cable
Courtesy of VOLKSWAGEN OF AMERICA, INC.

Boot, inserting in selector lever housing

- Before installing selector lever cable, insert boot -arrow-.

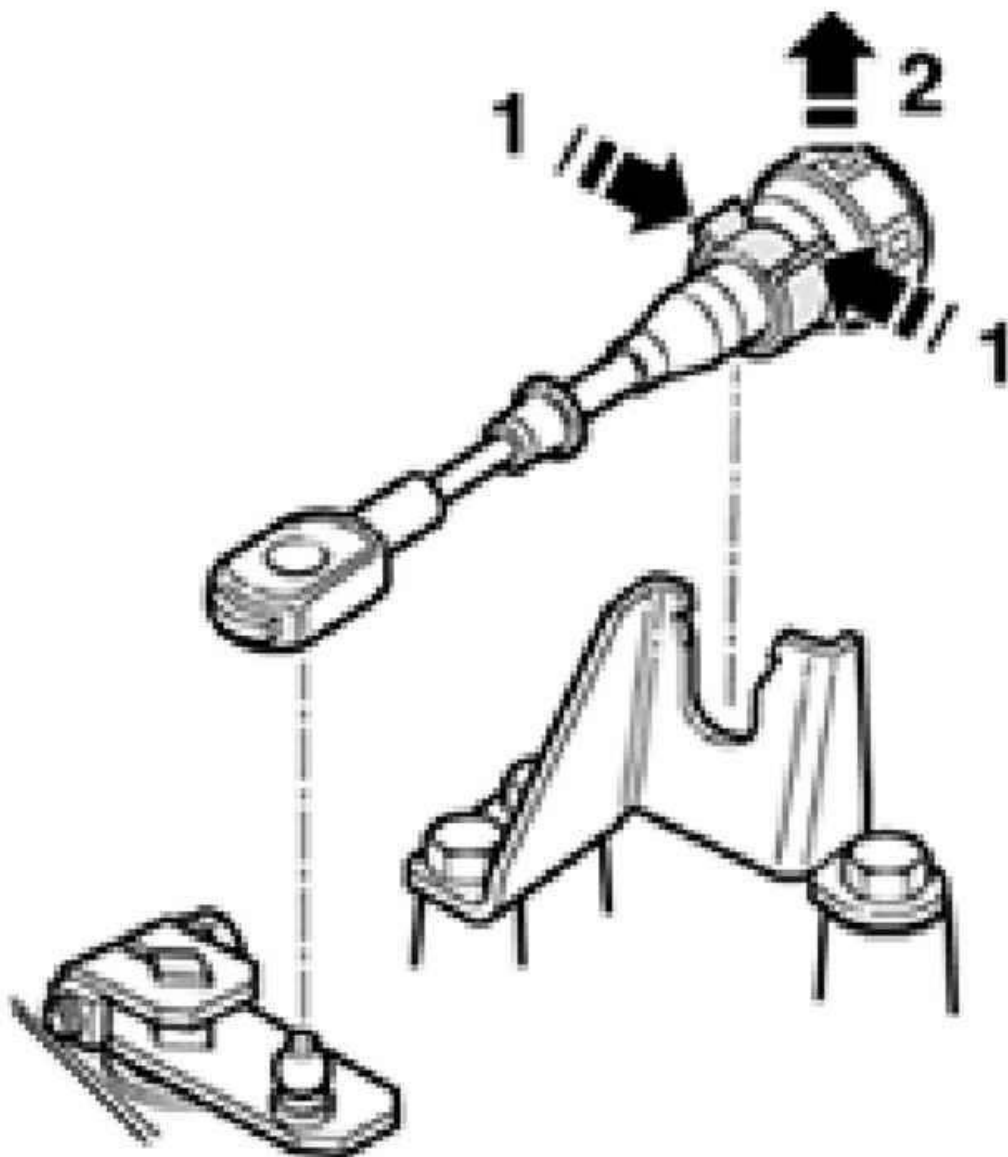


G03362281

Fig. 28: Installing Selector Lever Housing
Courtesy of VOLKSWAGEN OF AMERICA, INC.

Selector lever cable, removing from transmission support bracket

- Release selector lever cable -1-.
- Remove selector lever cable -1- from support bracket -2-.



G03362282

Fig. 29: Removing Selector Lever Cable From Transmission Support Bracket
Courtesy of VOLKSWAGEN OF AMERICA, INC.

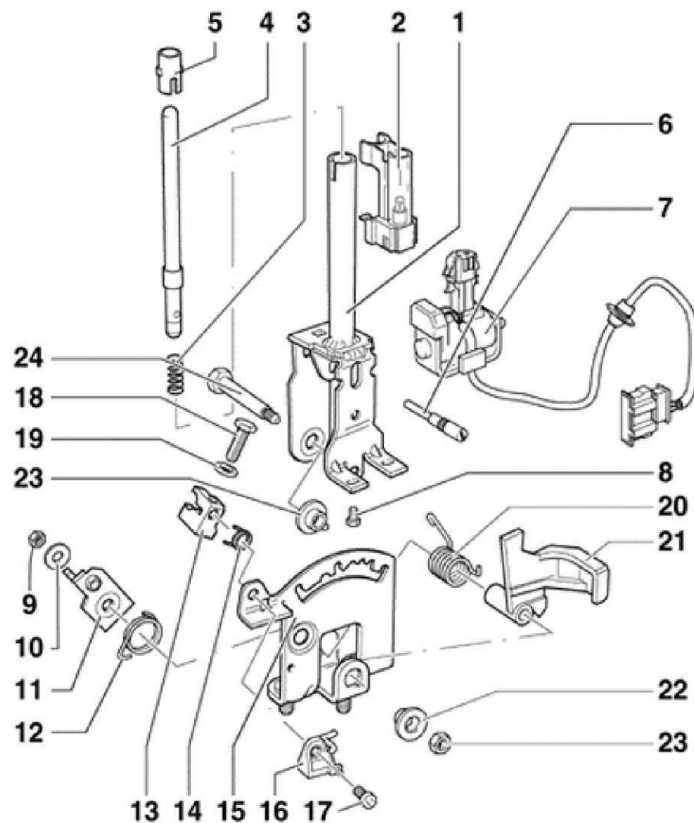
Selector lever, disassembling and assembling (vehicles with ignition key removal lock)

The following list pertains to **Fig. 30**.

1. **Selector lever**
 - Assembling, see **Selector lever, assembling before installing**
2. **Indicator lighting**
 - Securing indicator lighting connector, see **Indicator lighting connector, securing**
3. **Spring**
4. **Pressure rod**
 - Grease in area of sliding surfaces
5. **Guide sleeve**
 - Install after installing pressure rod
6. **Set screw**
 - Always replace
 - To remove set screw, remove shift lock solenoid -N110- and indicator lighting. Clamp set screw in vice and loosen by turning selector lever.
 - Install with sealant AMV185 101 A1
7. **Shift Lock Solenoid -N110-**
 - Adjusting, see **Shift Lock Solenoid -N110-, adjusting**
 - Functional check, see **Clearance between pressure rod and lever, adjusting**
 - Can be checked via OBD function 08, read measuring value block

See **READ MEASURING VALUE BLOCK (FUNCTION 08)**
8. **Screw**
 - 3 N.m (27 in lb)
 - Qty. 2
 - Install with sealant AMV185 101 A1
9. **Nut**
 - 5 N.m (44 in lb)
 - Always replace
10. **Washer**
11. **Locking lever**
 - For ignition key removal lock
 - Adjust together with locking cable, see **LOCKING CABLE, ADJUSTING**
12. **Spring**
 - Hook into hole of detent plate
13. **Retainer**
 - For locking cable
 - Removing and installing locking cable, see **LOCKING CABLE, REMOVING AND INSTALLING (VEHICLES WITH IGNITION KEY REMOVAL LOCK)**
 - Adjusting locking cable, see **LOCKING CABLE, ADJUSTING**

14. **Spring**
 - For locking pin
15. **Detent plate**
 - Assemble selector lever before installing in selector lever housing, see **Selector lever, assembling before installing**
16. **Locking pin**
 - With bracket
17. **Hex screw (socket head)**
 - 6 N.m (53 in lb)
18. **Screw**
 - 6 N.m (53 in lb)
19. **Washer**
20. **Spring**
 - Insert in selector lever together with lever -21-
21. **Lever**
 - For locking in selector lever position "N" or "P"
 - Adjusting, see **Shift Lock Solenoid -N110-, adjusting**
22. **Bushing**
23. **Nut, 10 N.m (7 ft lb)**
 - 10 N.m (7 ft lb)
 - Always replace
24. **Bolt**
 - Grease shank



- | | |
|--------------------------------|------------------------------|
| 1 - Selector lever | 14 - Spring |
| 2 - Indicator lighting | 15 - Detent plate |
| 3 - Spring | 16 - Locking pin |
| 4 - Pressure rod | 17 - Hex screw (socket head) |
| 5 - Guide sleeve | 18 - Screw |
| 6 - Set screw | 19 - Washer |
| 7 - Shift Lock Solenoid -N110- | 20 - Spring |
| 8 - Screw | 21 - Lever |
| 9 - Nut | 22 - Bushing |
| 10 - Washer | 23 - Nut, 10 Nm (7 ft lb) |
| 11 - Locking lever | 24 - Bolt |
| 12 - Spring | |
| 13 - Retainer | |

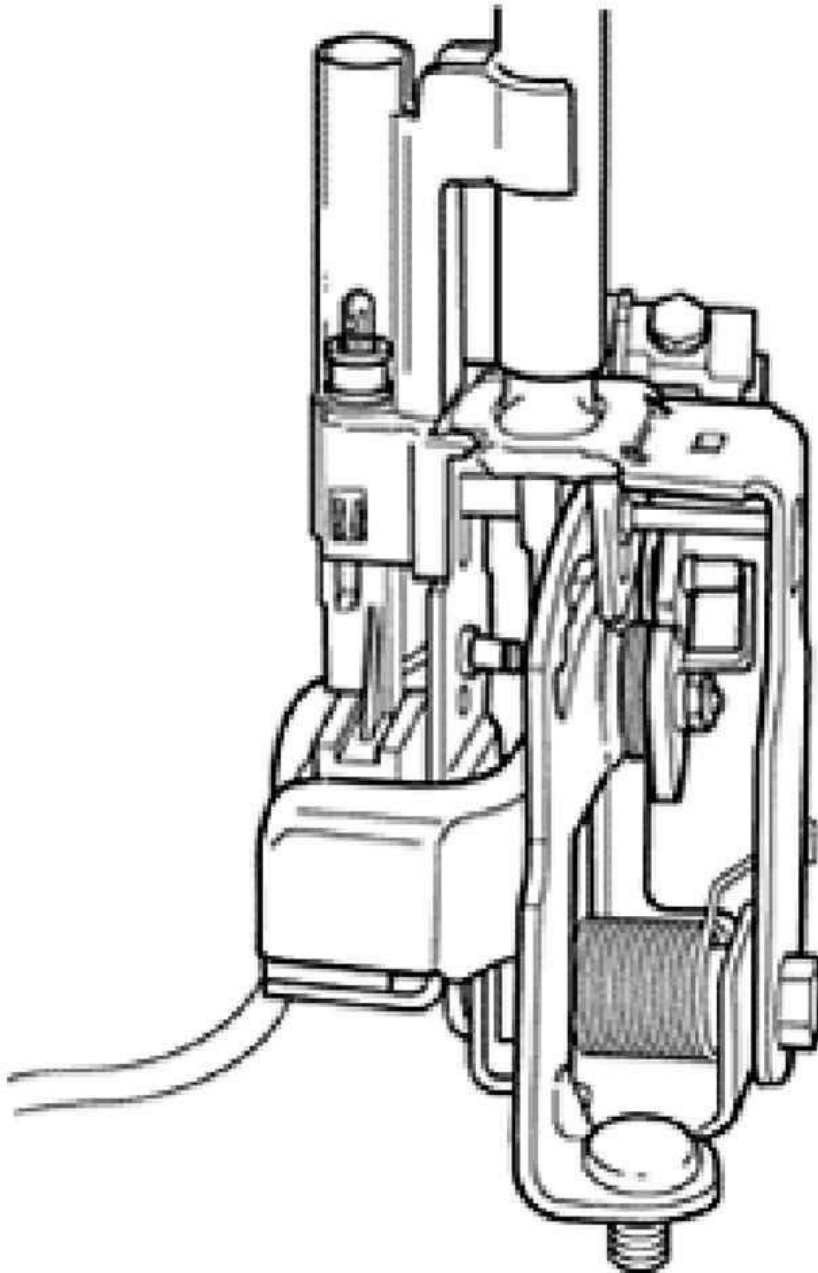
G03362283

Fig. 30: Exploded View Of Selector Lever Components (Vehicles With Ignition Key Removal Lock)
 Courtesy of VOLKSWAGEN OF AMERICA, INC.

Selector lever, assembling before installing

Adjust Shift Lock Solenoid -N110- and carry out functional check, see **Clearance between pressure rod and lever, adjusting** before installing selector lever in selector lever housing.

- Install set screw and Shift Lock Solenoid -N110- screws with locking fluid AMV 185 101 A1.



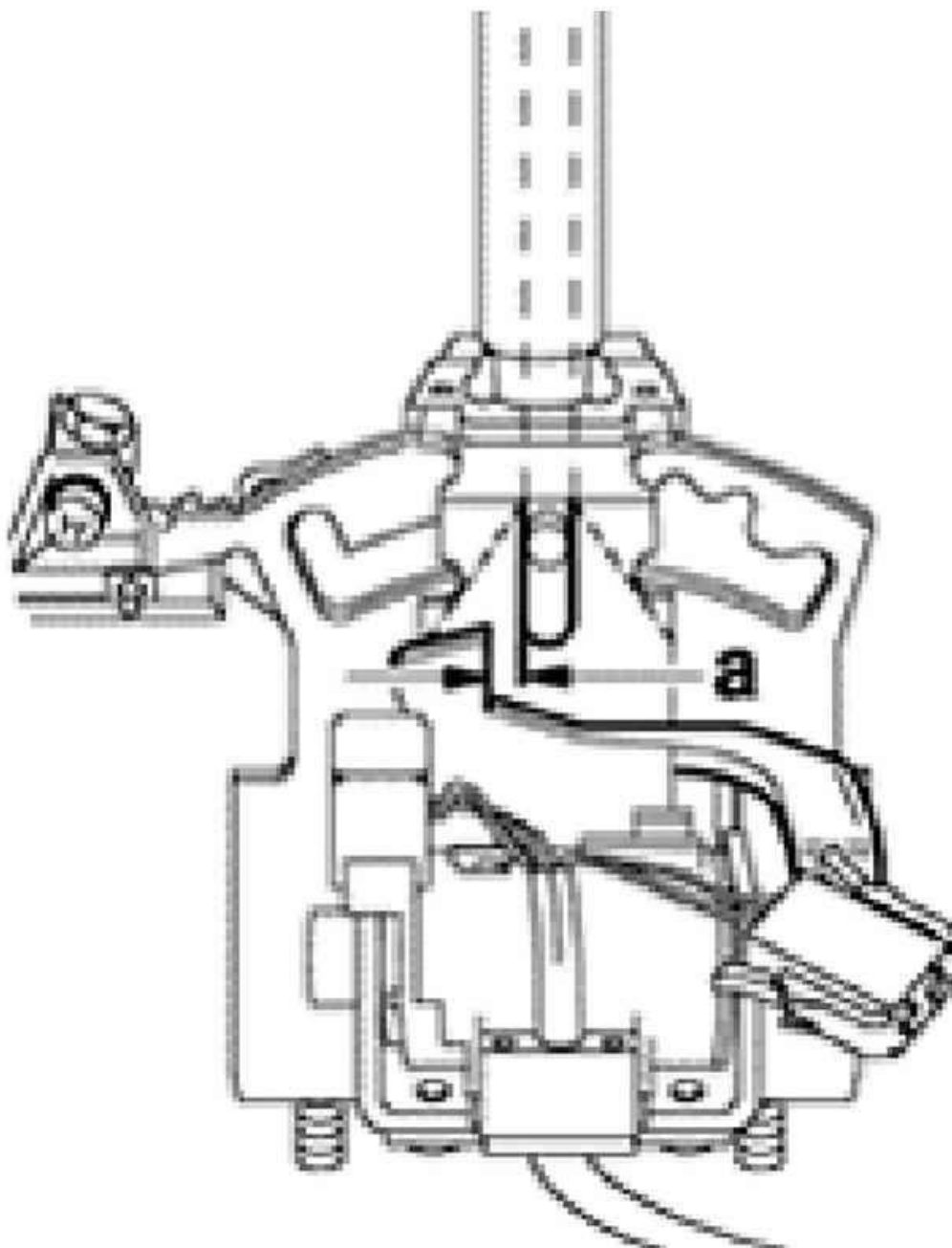
G03362284

Fig. 31: Installing Shift Lock

Courtesy of VOLKSWAGEN OF AMERICA, INC.

Shift Lock Solenoid -N110-, adjusting

- Adjust solenoid by sliding in elongated holes so that clearance -a- of 0.3 mm exists between pressure rod and lever, see **Clearance between pressure rod and lever, adjusting.**



G03362285

Fig. 32: Adjusting Shift Lock Solenoid
Courtesy of VOLKSWAGEN OF AMERICA, INC.

1993 Volkswagen Golf III GL

1993-99 TRANSMISSION 4 Spd. Automatic Transmission 01M - Cabrio, Golf, GTI & Jetta

Clearance between pressure rod and lever, adjusting

Dimension a 0.3 mm

Functional check

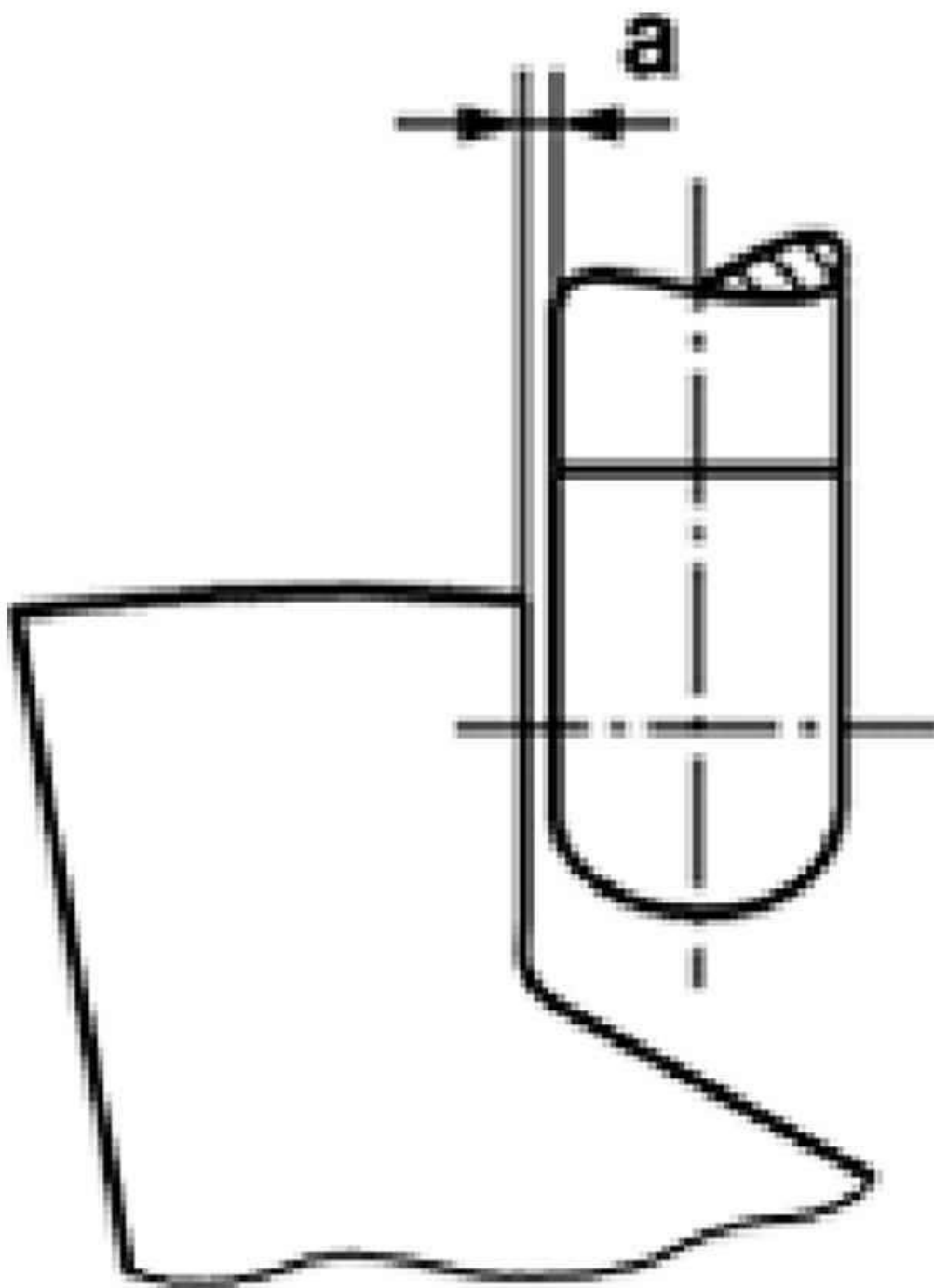
- Shift selector lever into "P" and supply solenoid with 12 V. It must not be possible to shift selector lever into a driving gear
 - Interrupt solenoid operation; it must be possible to shift into driving gears.

Pressure rod must not catch on lever.

- Shift selector lever into "N" and check as in "P".
- After adjusting clearance, install assembled selector lever.

1993 Volkswagen Golf III GL

1993-99 TRANSMISSION 4 Spd. Automatic Transmission 01M - Cabrio, Golf, GTI & Jetta

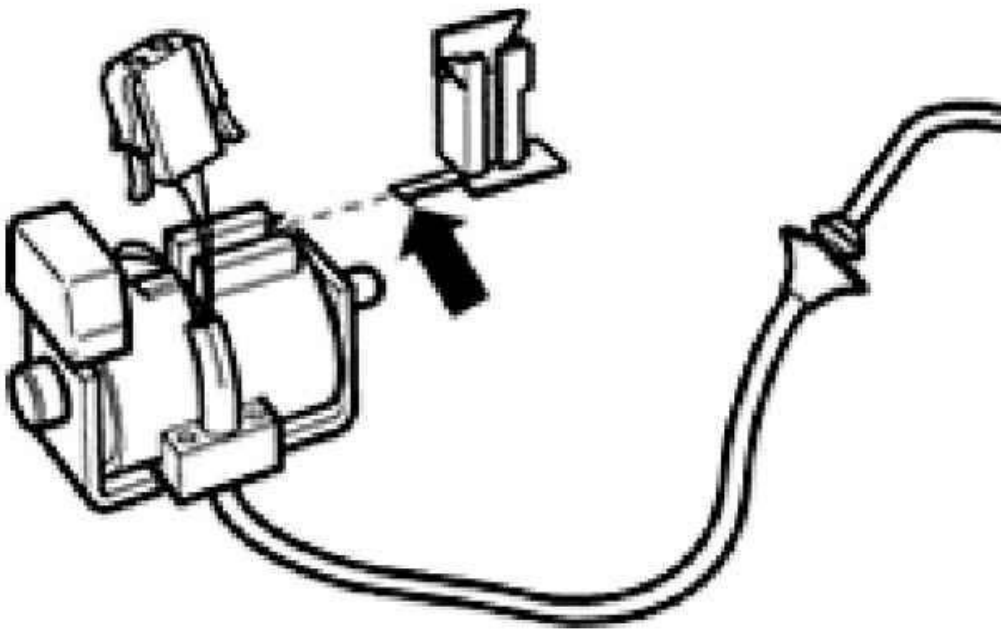


G03362286

Fig. 33: Adjusting Clearance Between Pressure Rod And Lever
Courtesy of VOLKSWAGEN OF AMERICA, INC.

Indicator lighting connector, securing

- Push bracket with lug -arrow- on until lug engages.
- Seat connector cable into bracket and slide connector onto bracket.



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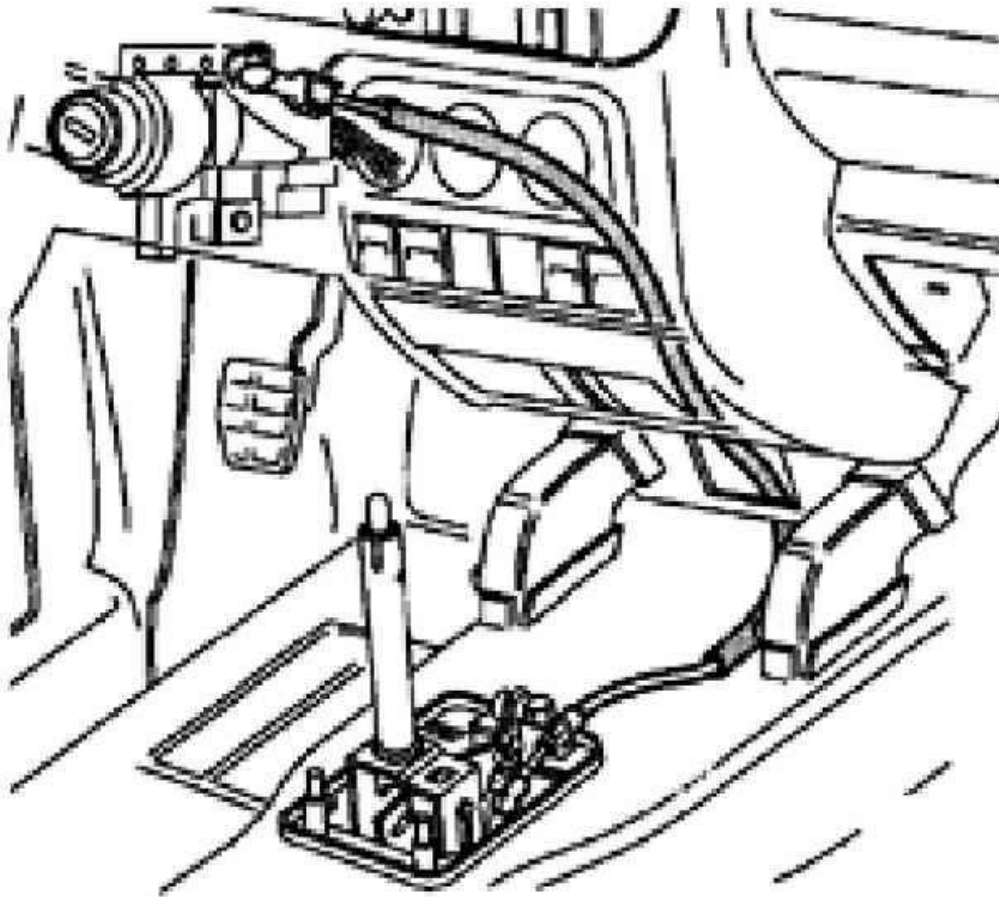
Fig. 34: Installing Indicator Lighting Connector
Courtesy of VOLKSWAGEN OF AMERICA, INC.

Locking cable, removing and installing (vehicles with ignition key removal lock)

NOTE:

- Locking cable must not be kinked.
- Adjust locking cable after installing, see LOCKING CABLE, ADJUSTING.

Installation position of locking cable



G03362288

Fig. 35: Installation Position Of Locking Cable
Courtesy of VOLKSWAGEN OF AMERICA, INC.

Removing

- Remove selector lever handle.
- Remove cover with cover strip.
- On vehicles with program switch pull connector off program switch.
- Remove central console.

See **INSTRUMENT PANEL, REMOVING** .

- Loosen cable anchorage screw -a-.

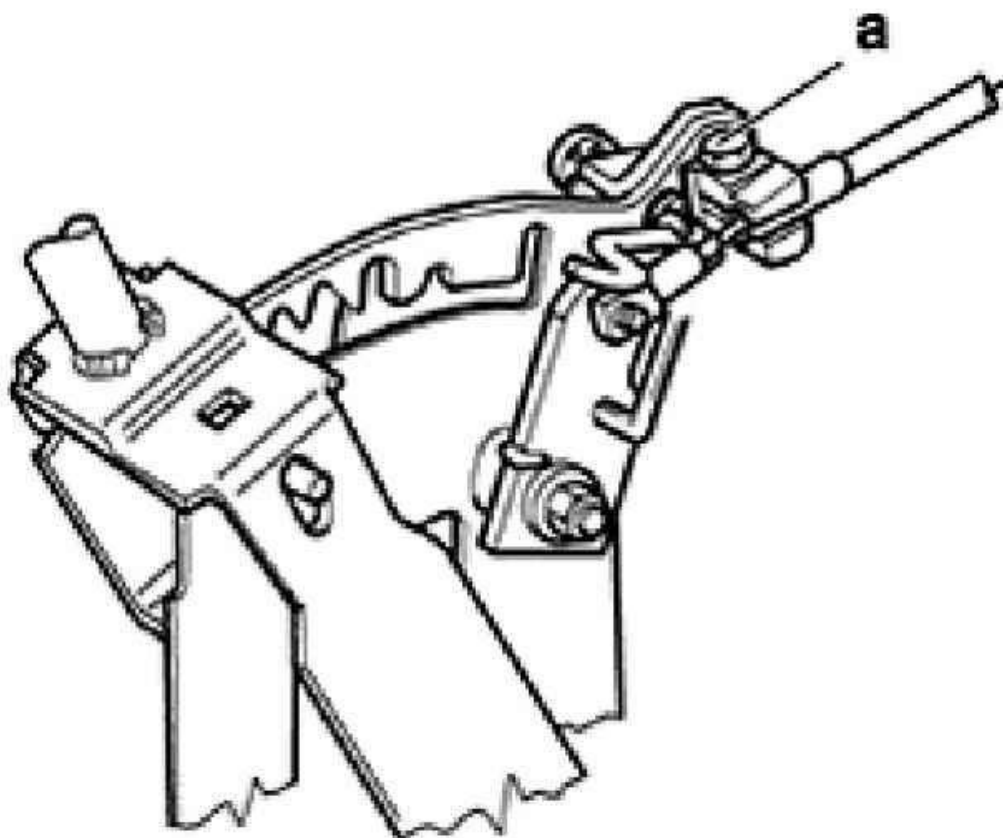
**G03362289**

Fig. 36: Loosening Cable Anchorage Screw
Courtesy of VOLKSWAGEN OF AMERICA, INC.

- Remove locking cable out of locking lever and pull out of cable anchorage.
- Remove steering wheel and ignition/starter switch trim.

See **STEERING COLUMN, STEERING COLUMN TUBE AND STEERING WHEEL, SERVICING** or **STEERING WHEEL WITH AIRBAG, SERVICING**

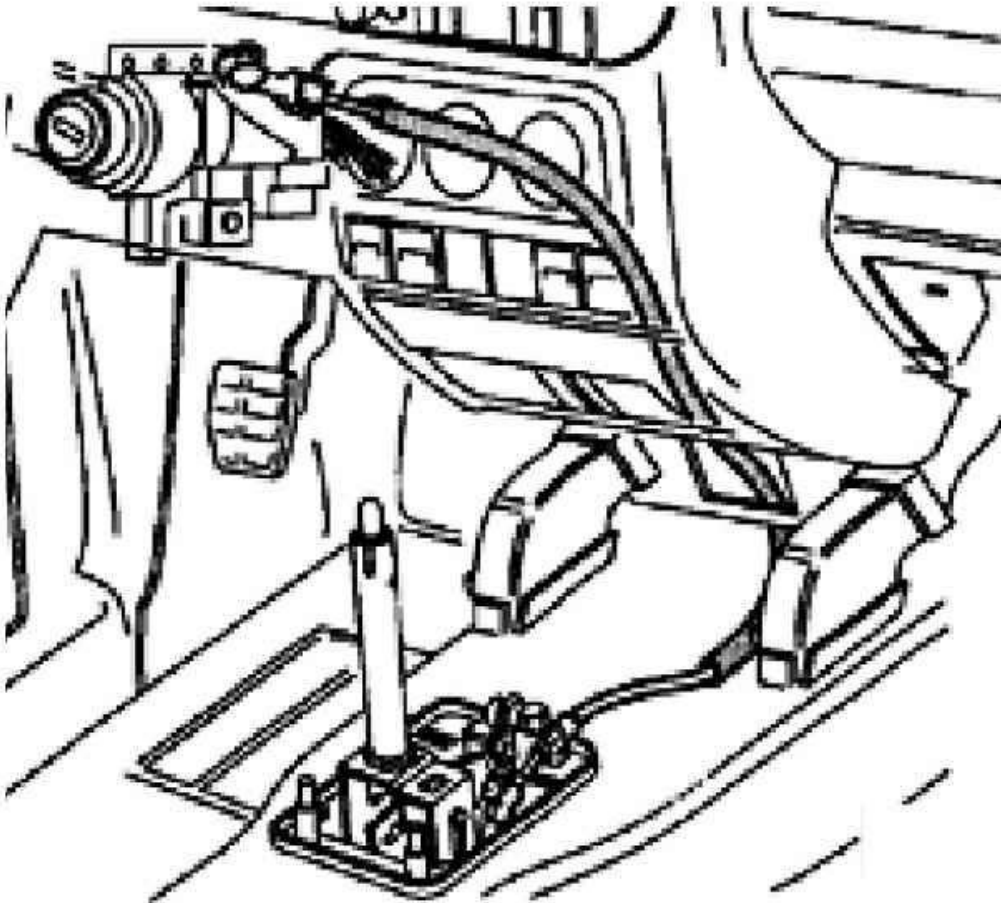
See **STEERING COLUMN SWITCHES, CONNECTOR WIRING**

- Press locking cable clip out of ignition/starter switch support bracket and remove locking cable from ball head.
- Remove locking cable.

Installing

NOTE: **Ensure proper routing of locking cable when installing.**

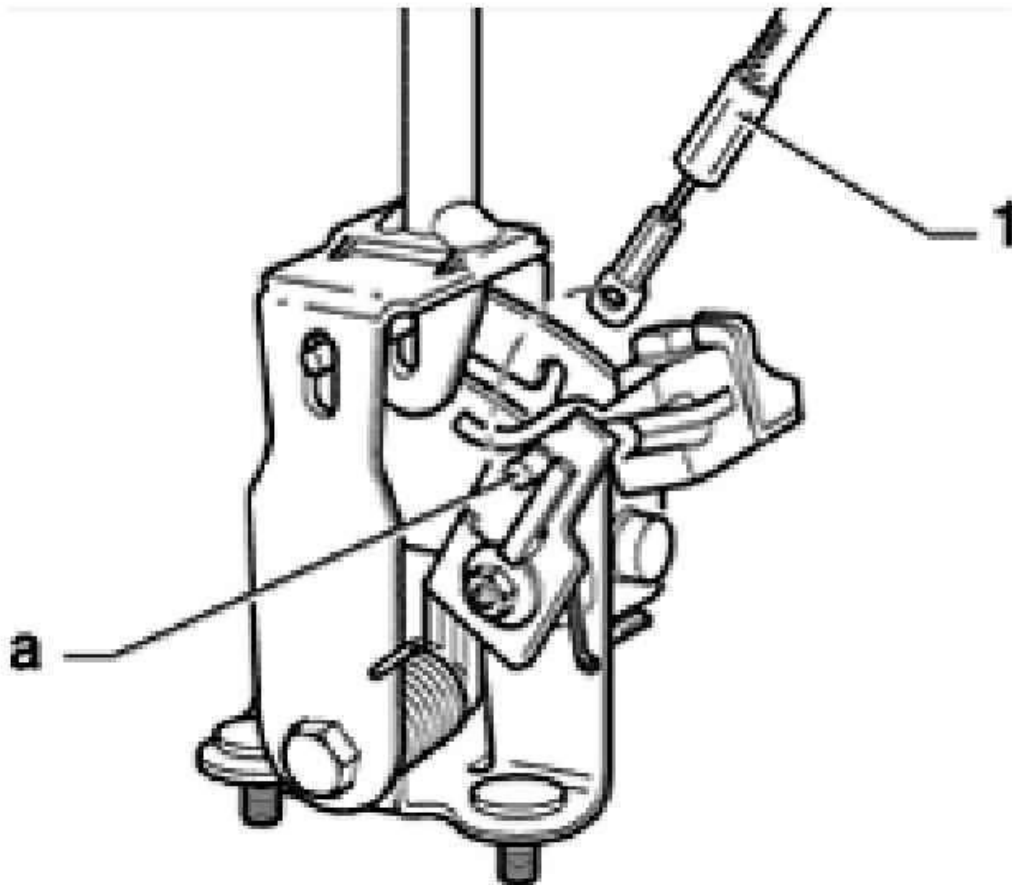
- Install locking cable in vehicle.



G03362290

Fig. 37: Installing Locking Cable In Vehicle
Courtesy of VOLKSWAGEN OF AMERICA, INC.

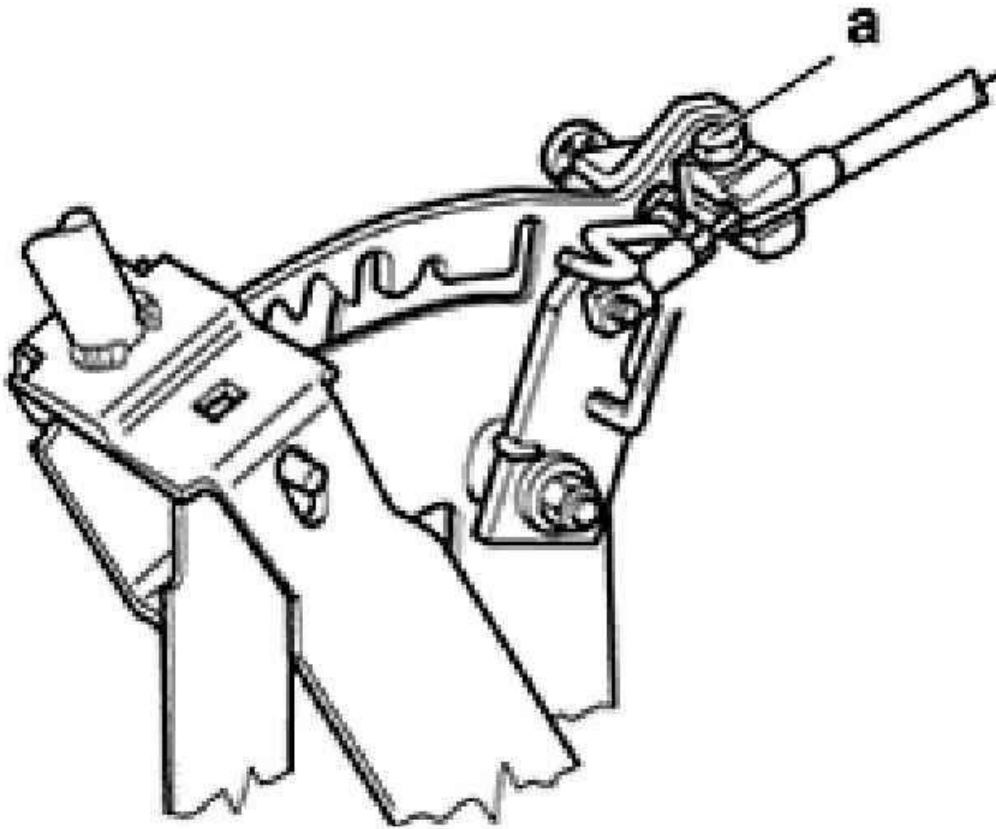
- Mount locking cable eye -1- on locking lever -a-.



G03362291

Fig. 38: Installing Mount Locking Cable Eye On Locking Lever
Courtesy of VOLKSWAGEN OF AMERICA, INC.

- Install locking cable in cable anchorage.
- Do not tighten screw -a- until after adjusting locking cable.



G03362292

Fig. 39: Installing Locking Cable In Cable Anchorage
Courtesy of VOLKSWAGEN OF AMERICA, INC.

- Mount locking cable clip on locking cable.
- Press locking cable onto ball head.
- Press locking cable with clip into ignition/starter switch support bracket.

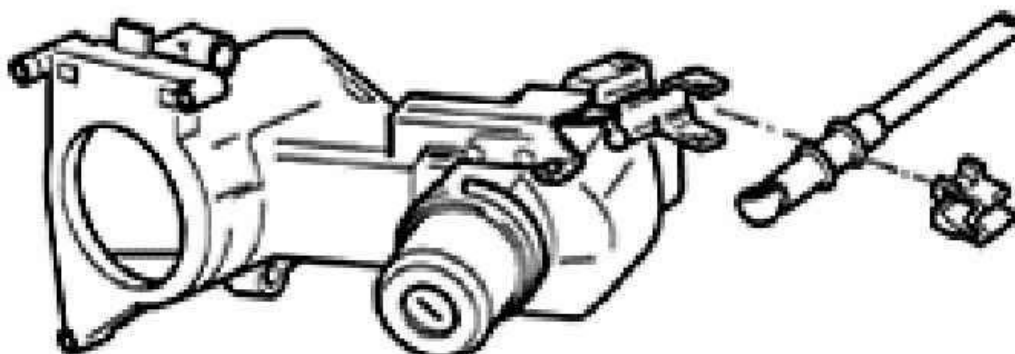
**G03362293**

Fig. 40: Installing Mount Locking Cable Clip On Locking Cable
Courtesy of VOLKSWAGEN OF AMERICA, INC.

- Route locking cable along steering column.
- Adjust locking cable on cable anchorage of selector lever, see **LOCKING CABLE, ADJUSTING.**
- - Install central console.

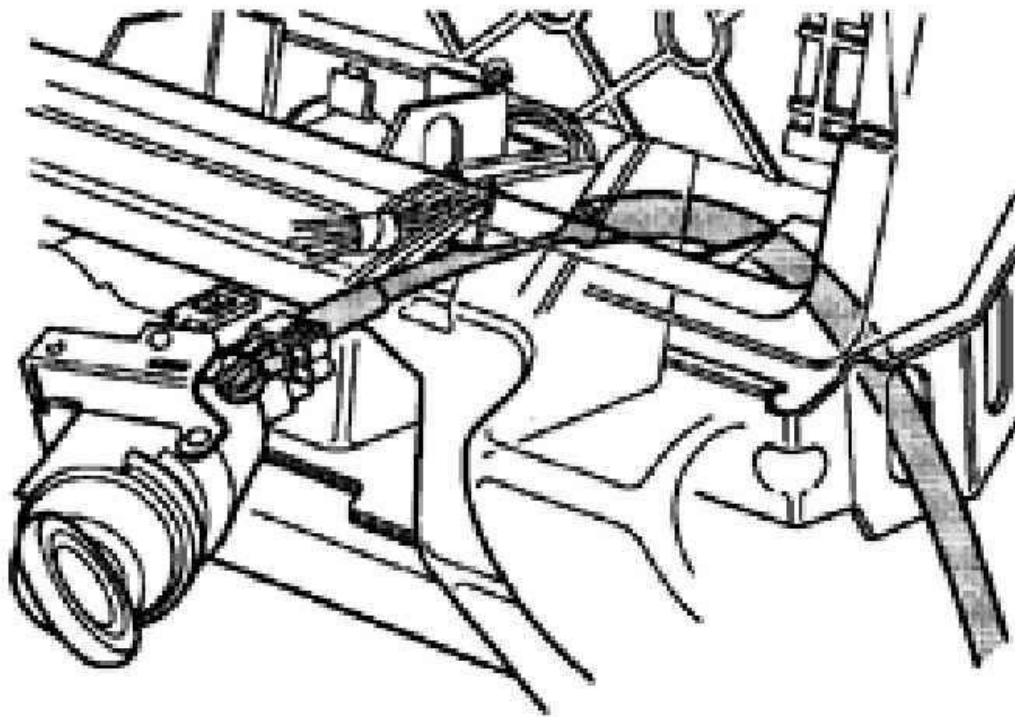
See **INSTRUMENT PANEL, REMOVING .**

- Install cover with indicator and selector lever handle.
- Attach trim pieces of ignition/starter switch.

See **STEERING COLUMN SWITCHES, CONNECTOR WIRING**

- Install steering wheel.

See **STEERING COLUMN, STEERING COLUMN TUBE AND STEERING WHEEL, SERVICING** or **STEERING WHEEL WITH AIRBAG, SERVICING**



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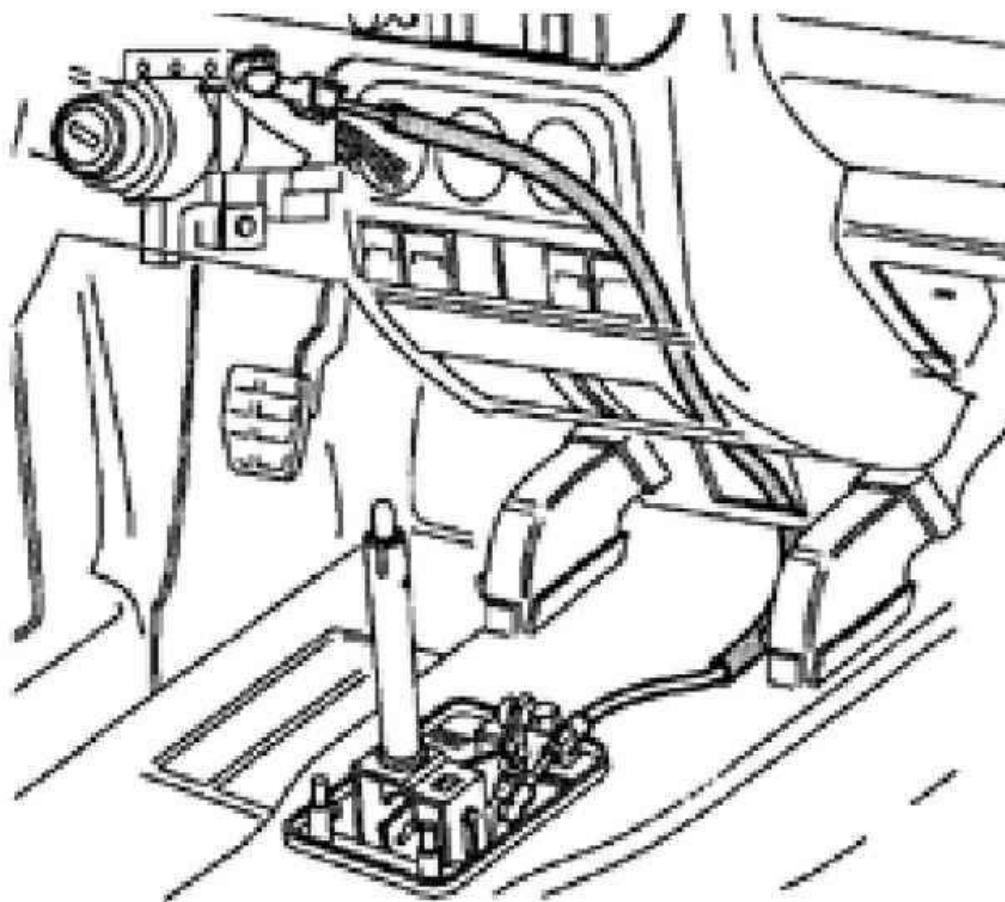
Fig. 41: Installing Locking Cable Along Steering Column
Courtesy of VOLKSWAGEN OF AMERICA, INC.

Locking cable, adjusting

NOTE: **Locking cable must always be adjusted in installation position.**

Installation position of locking cable

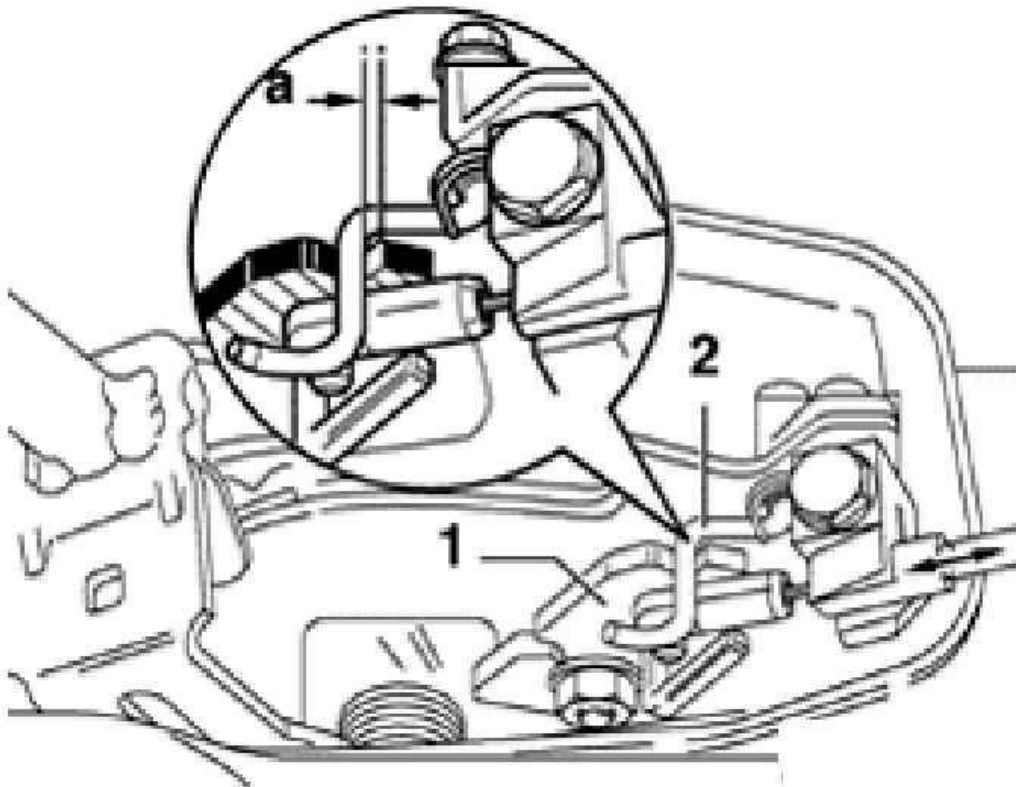
- Shift selector lever into "1" position.
- Turn ignition key to right (starting position) and release.



G03362295

Fig. 42: Adjusting Locking Cable
Courtesy of VOLKSWAGEN OF AMERICA, INC.

- Adjust clearance to 0.7 mm between lever -1- and locking pin -2- by sliding locking cable casing.
 - Dimension a 0.7 mm
- Tighten locking cable anchorage screw in this position to 6 N.m (53 in. lb).
- Shift selector lever into "P" position and turn ignition key to end position.
- Pull out ignition key.
 - It must only be possible to remove ignition key in this selector lever position.
 - Selector lever cannot be shifted out of "P" position.



G03362296

Fig. 43: Adjusting Clearance Between Lever And Locking Pin
Courtesy of VOLKSWAGEN OF AMERICA, INC.

TRANSMISSION, CHECKING

NOTE: Before attempting to repair the automatic transmission, first read Diagnostic Trouble Codes (DTC) using VAG 1551 Scan Tool. Then identify and locate the malfunction before starting to repair.

See **4 SPD. AUTOMATIC TRANSMISSION 01M ON BOARD DIAGNOSTIC (OBD)**

Shift points, checking

See **SHIFT POINTS, CHECKING**

Stall speed, checking

See STALL SPEED, CHECKING

Main pressure, measuring

See MAIN PRESSURE, MEASURING

SHIFT POINTS, CHECKING

Test Requirements

- Conduct On Board Diagnostic (OBD)
 - Activate Diagnostic Trouble Code (DTC) Memory
- Check engine adjustment

See appropriate Multiport Fuel Injection (MFI) article.

Transmission shifts too early or too late into the next gear

When checking the shift points note that the speedometer can deviate within the permissible tolerances from the specified value.

The tables list the shift points based on transmission code.

H = Hydraulic shifting

M = Mechanical shifting

To test the shift points, connect VAG 1551 Scan Tool

See READ MEASURING VALUE BLOCK (FUNCTION 08)

Shift points in km/h (mph)

NOTE: During the warm up period, with hot ATF, up-hill or down-hill drives the shift points depending on the drive situation, are automatically changed by the control module.

SHIFT POINTS IN KM/H (MPH) SPECIFICATIONS (1 OF 3)

Transmission Code Letter	Shift	Kickdown km/h (mph)
CLB	1 H - 1 M	60 - 66 (37 - 41)
	1 M - 2 H	60 - 66 (37 - 41)
	2 H - 2 M	122 - 128 (76 - 80)
	2 M - 3 H	122 - 128 (76 - 80)
	3 H - 3 M	179 - 185 (111 - 115)
	3 M - 4 H	179 - 185 (111 - 115)

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	4 H - 4 M	179 -185 (111 - 115)
	4 M - 4 H	180 -174 (112 -108)
	4 H - 3 M	180 -174 (112 -108)
	3 M - 3 H	121 -115 (75 - 71)
	3 H - 2 M	121 -115 (75 -71)
	2 M - 2 H	121 -115 (75 - 71)
	2 H - 1 M	51 - 45 (32 - 28)
	1 M - 1 H	51 - 45 (32 - 28)

SHIFT POINTS IN KM/H (MPH) SPECIFICATIONS (2 OF 3)

Transmission Code Letter	Shift	Kickdown km/h (mph)
CLK	1 H - 1 M	49 - 55 (30 - 34)
	1 M - 2 H	49 - 55 (30 - 34)
	2 H - 2 M	98 -104 (61 - 65)
	2 M - 3 H	98 -104 (61 - 65)
	3 H - 3 M	137-143 (85 - 89)
	3 M - 4 H	137-143 (85 - 89)
	4 H - 4 M	137-143 (85 - 89)
	4 M - 4 H	139 -133 (86 - 83)
	4 H - 3 M	139 -133 (86 - 83)
	3 M - 3 H	98 - 92 (61 - 57)
	3 H - 2 M	98 - 92 (61 - 57)
	2 M - 2 H	98 - 92 (61 - 57)
	2 H - 1 M	42 - 36 (26 - 22)
	1 M - 1 H	42 - 36 (26 - 22)
CKX	1 H - 1 M	46 - 52 (29 - 32)
	1 M - 2 H	46 - 52 (29 - 32)
	2 H - 2 M	90 - 96 (56 - 60)
	2 M - 3 H	90 - 96 (56 - 60)
	3 H - 3 M	105 -111 (65 - 69)
	3 M - 4 H	131 -137 (81 - 85)
	4 H - 4 M	131 -137 (81 - 85)
	4 M - 4 H	132 -126 (82 - 78)
	4 H - 3 M	132 -126 (82 - 78)
	3 M - 3 H	99 - 93 (61 - 58)
	3 H - 2 M	89 - 83 (55 - 51)
	2 M - 2 H	89 - 83 (55 - 51)
	2 H - 1 M	39 - 33 (24 - 20)
	1 M - 1 H	39 - 33 (24 - 20)

SHIFT POINTS IN KM/H (MPH) SPECIFICATIONS (3 OF 3)

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1993 Volkswagen Golf III GL

1993-99 TRANSMISSION 4 Spd. Automatic Transmission 01M - Cabrio, Golf, GTI & Jetta

Transmission Code Letter	Shift	Kickdown km/h
CKZ	1 H - 1 M	-
	1 M - 2 H	-
	2 H - 2 M	-
	2 M - 3 H	-
	3 H - 3 M	-
	3 M - 4 H	-
	4 H - 4 M	-
	4 M - 4 H	-
	4 H - 3 M	-
	3 M - 3 H	-
	3 H - 2 M	-
	2 M - 2 H	-
	2 H - 1 M	-
	1 M - 1 H	-

STALL SPEED, CHECKING

- Connect tachometer, e.g. VAG 200 VW1367 or equivalent to engine or with VAG 1551 Scan Tool read engine rpm in measuring value block.
- Lock wheels with parking brake and foot brake.
- Start engine and place selector lever in D position
- Briefly apply Wide Open Throttle (max. 5 seconds). If necessary repeat after 20 seconds. The stall speed listed in the chart must be attained.
- If end speed is not attained, check the items listed in **STALL SPEED, CHECKING** table.

STALL SPEED, CHECKING

Stall Speed	Possible Fault
Stall speed too high:	Forward clutch slips, One-way clutch slips
Stall speed up to 200 rpm too low:	Check engine adjustment
Stall speed over 200 rpm too low:	Torque converter faulty

If in doubt, always check the engine adjustment and correct if necessary.

The correct torque converter must always be installed with the correct transmission.

Stall speed chart**STALL SPEED SPECIFICATIONS**

Transmission Code Letter	Torque Converter Code Letter	Stall speed rpm
CLB	QCDV	2050 - 2350
CLK	QADB	2550 - 2850
CKX	QADB	2250 - 2550

CKZ

QCDB

...

MAIN PRESSURE, MEASURING

- Before measuring the main pressure activate the Diagnostic Trouble Code (DTC) Memory and eliminate possible electrical malfunctions.

See **ON BOARD DIAGNOSTIC (OBD), PERFORMING** .

See connector for pressure manometer (arrow).

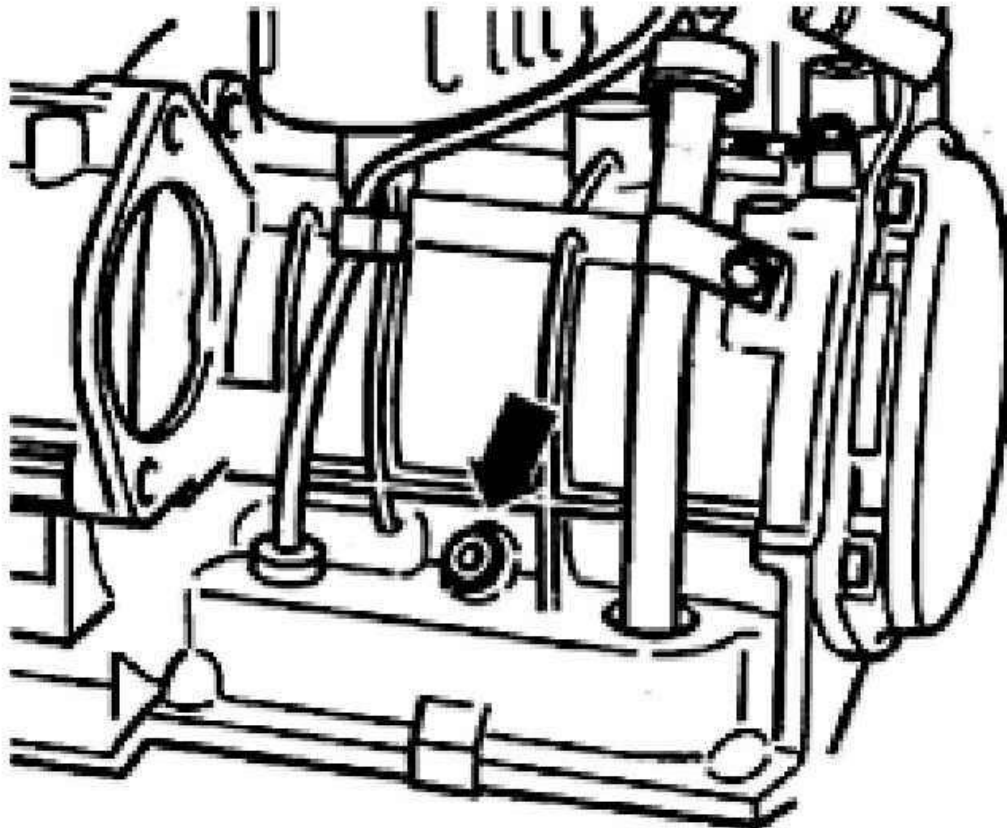
**G03362297**

Fig. 44: Removing Main Pressure Tap Bolt
Courtesy of VOLKSWAGEN OF AMERICA, INC.

- Remove bolt for main pressure tap

NOTE: Always replace bolt for main pressure tap.

- Connect pressure tool VAG 1702 or equivalent and tighten knurled screw.
- Vent pressure tool line VAG 1702 by loosening the knurled screw with engine running.

NOTE: Re-tighten knurled screw after ventilation.

- Bring ATF temperature to 60 C (140 F) by connecting VAG 1551 Scan Tool and reading measuring value block.

See **VAG 1551 SCAN TOOL (ST), CONNECTING AND SELECTING FUNCTIONS** .

Min. Pressure Specified value in bar (psi) gauge pressure:

MAIN PRESSURE SPECIFICATION VALUES

Automatic Transmission	Selector lever positions and test conditions			
01M	D Idle	R Idle	Connector for solenoid valves removed ⁽¹⁾	
			D Engine speed approx. 2000 rpm	R Engine speed approx. 2000 rpm
Main pressure in bar (psi)	3.4 - 3.8 (49 - 55)	6.5 - 7.5 (94 - 109)	10.1 - 11.3 (146 - 164)	23.0 - 24.0 (334 - 348)
(1) After connecting the connectors for solenoid valves, activate Diagnostic Trouble Code (DTC) Memory and erase. See <u>DIAGNOSTIC TROUBLE CODE (DTC) MEMORY, ERASING (FUNCTION 5)</u> .				

- If possible, conduct the main pressure check on a chassis dynamometer (rolling road).

If deviations to the specified values are observed the following may be the cause:

MAIN PRESSURE TROUBLESHOOTING

Possible Cause	Remedy
Idle rpm too high	Adjust engine
ATF-Pump faulty	Check ATF Pump and replace if necessary
Valve stuck in valve body	Replace valve body

TRANSMISSION, REMOVING AND INSTALLING

Special tools and equipment

- -222 A Support
- -222 A/1 Support
- -222 A/3 Adapter (6-cylinder engine)
- 3094 Hose clamps
- 3282 Transmission support
- 3282/2 Adjustment plate
- 3300 A Engine support
- VAG 1383 A Engine/transmission jack
- VAG 1331 Torque wrench
- VAG 1332 Torque wrench

Removing

- Obtain radio code.
- Disconnect battery ground strap.
- Remove battery on vehicles with 6-cylinder engines.

See **BATTERY, REMOVING AND INSTALLING** .

- Disconnect speedometer connector at transmission.
- Disconnect Vehicle Speed Sensor (VSS) -G68- connector.
- Remove electrical connections -arrows- at transmission.
- Remove wiring harness from retainer on transmission and move to the side.

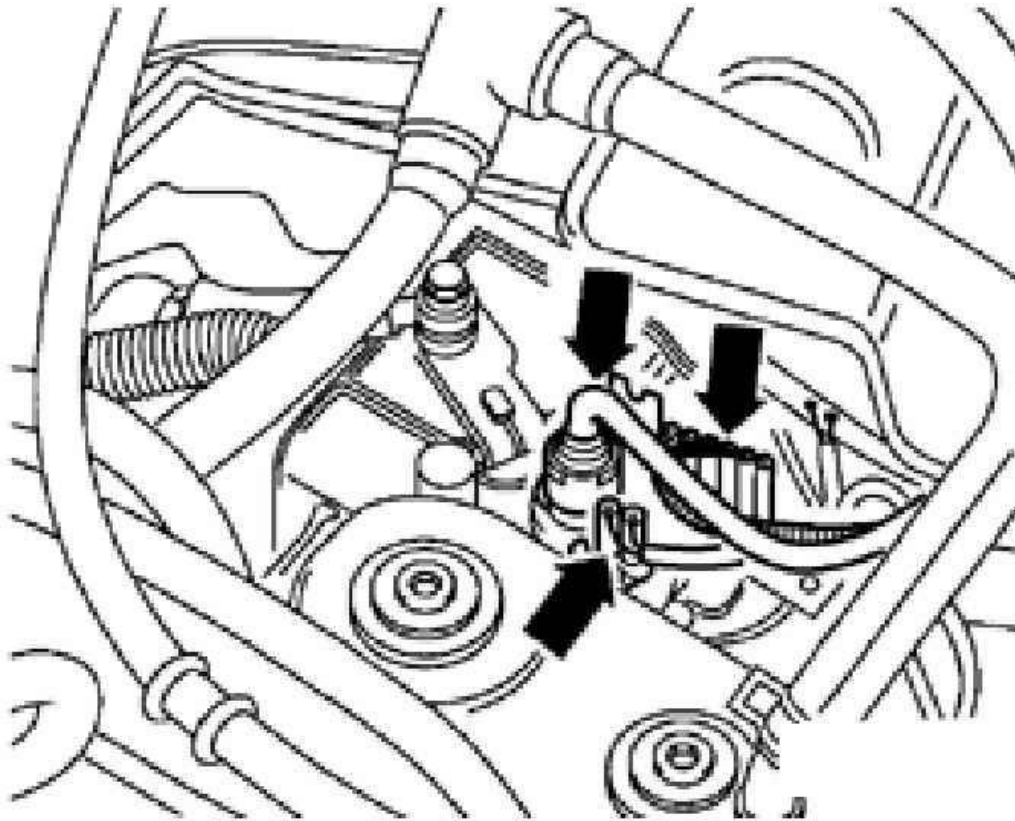
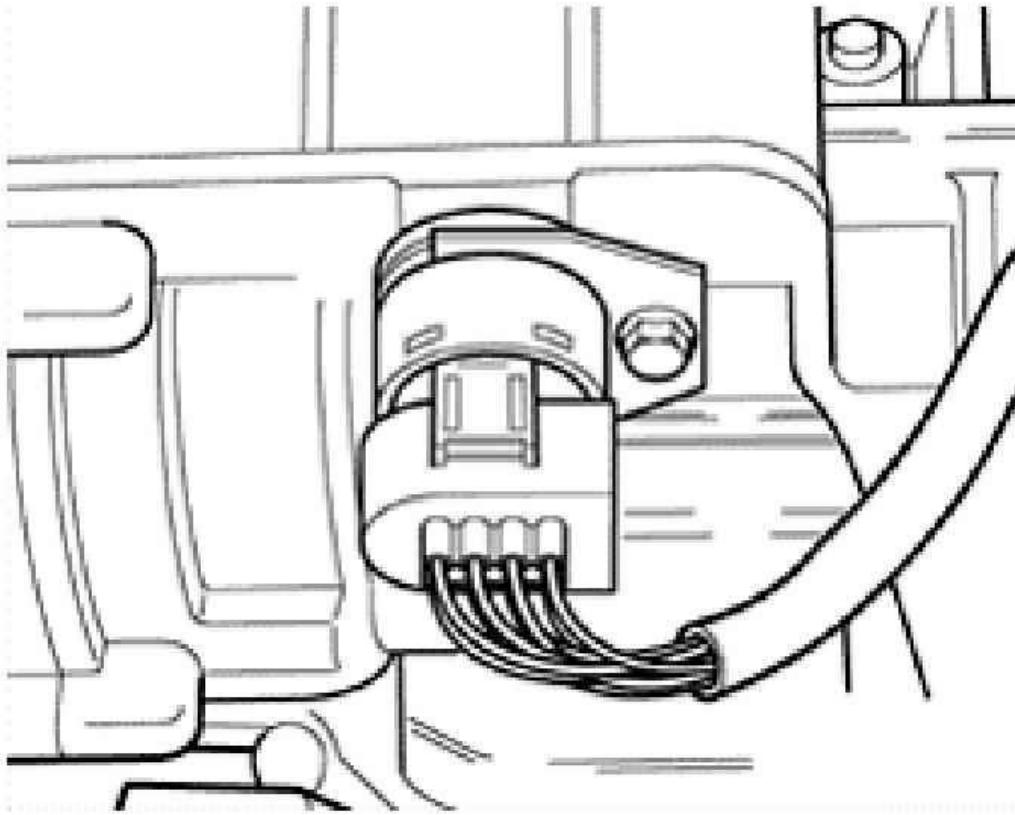
**G03362298**

Fig. 45: Removing Electrical Connections At Transmission
Courtesy of VOLKSWAGEN OF AMERICA, INC.

- Pull connector off Multi-function Transmission Range (TR) Switch.
- Remove Multi-function TR Switch on vehicles with 6- cylinder engine.
- Move selector lever to "P" and remove selector lever cable from lever/selector shaft.
- Remove selector lever cable anchorage circlip and remove selector lever cable.

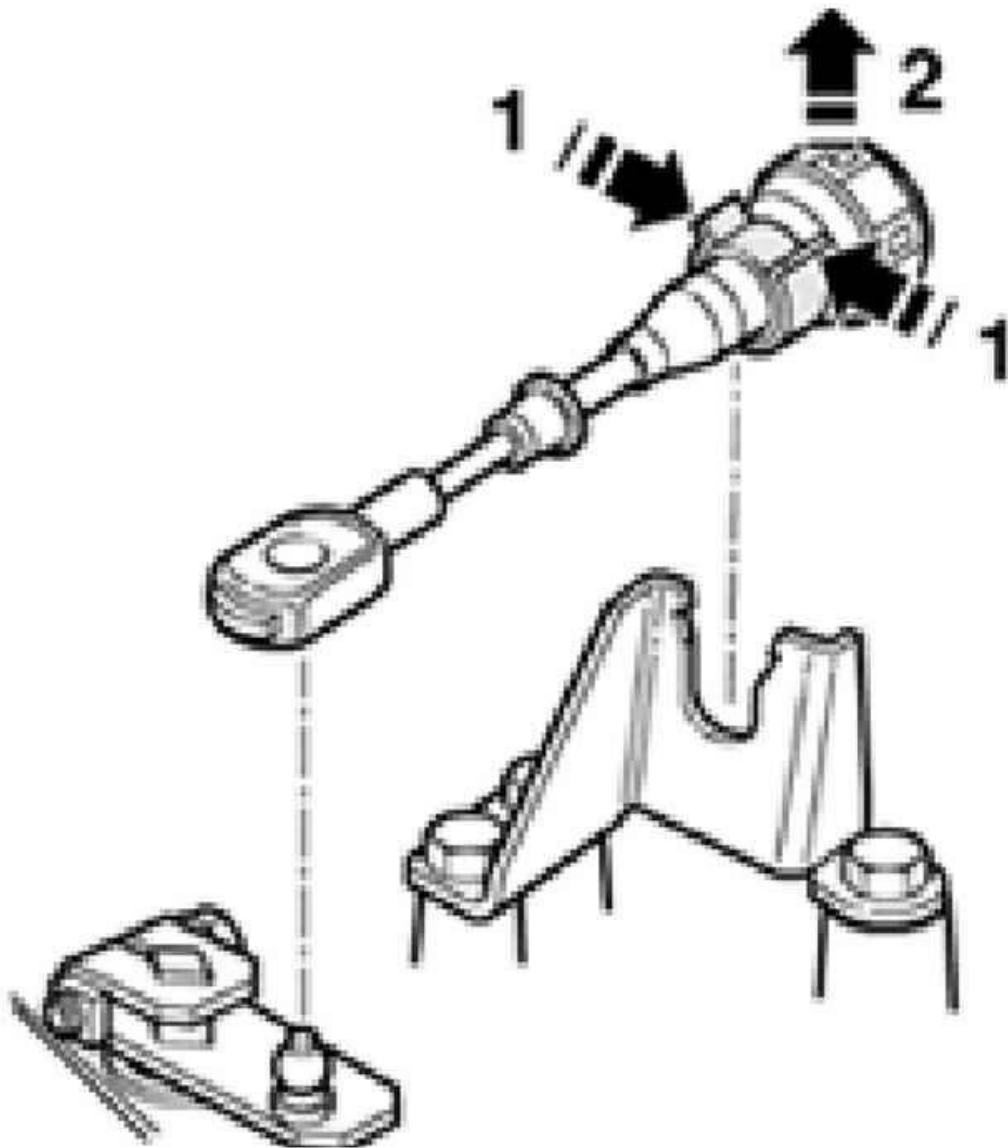


G03362299

Fig. 46: Removing Multi-Function TR Switch
Courtesy of VOLKSWAGEN OF AMERICA, INC.

Transmissions with clipped selector lever cable

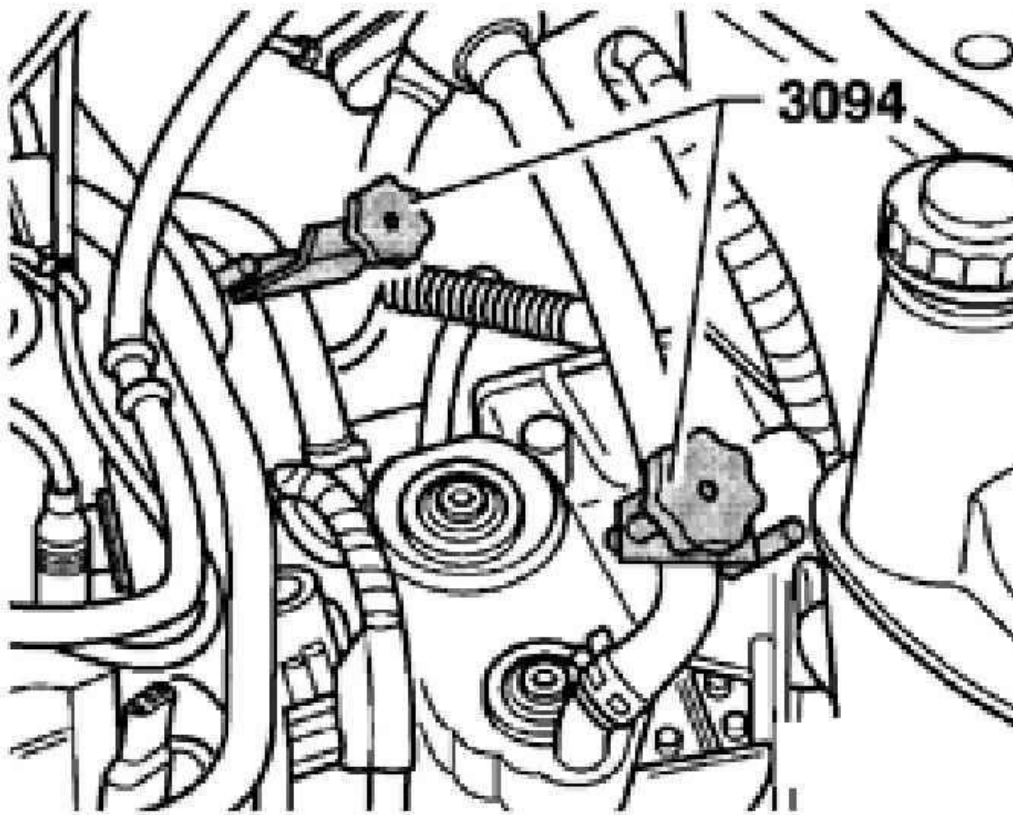
- Release selector lever cable -1-.
- Remove cable -1- from support bracket -2-.



G03362300

Fig. 47: Removing Cable From Support Bracket
Courtesy of VOLKSWAGEN OF AMERICA, INC.

- Clamp-off ATF cooler hoses with 3094 and remove at ATF cooler.

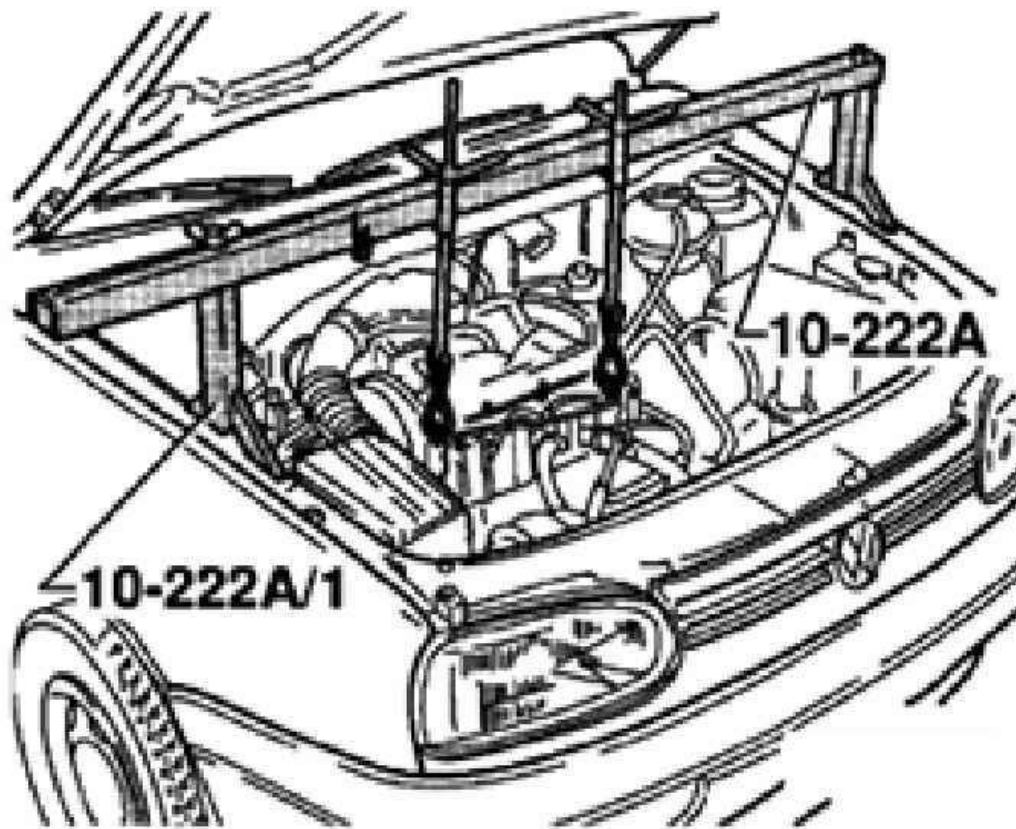


G03362301

Fig. 48: Clamping ATF Cooler Hoses

Courtesy of VOLKSWAGEN OF AMERICA, INC.

- Install support bar 10-222 A with legs 10-222 A/1 (6-cyl. engine adapter 10-222 A/3) and support engine/transmission in this position.



G03362302

Fig. 49: Installing Engine Support Bar

Courtesy of VOLKSWAGEN OF AMERICA, INC.

- Remove vacuum line -a- and connector -b- before inserting support bar into eye -arrow- on vehicles with 6- cylinder engines.

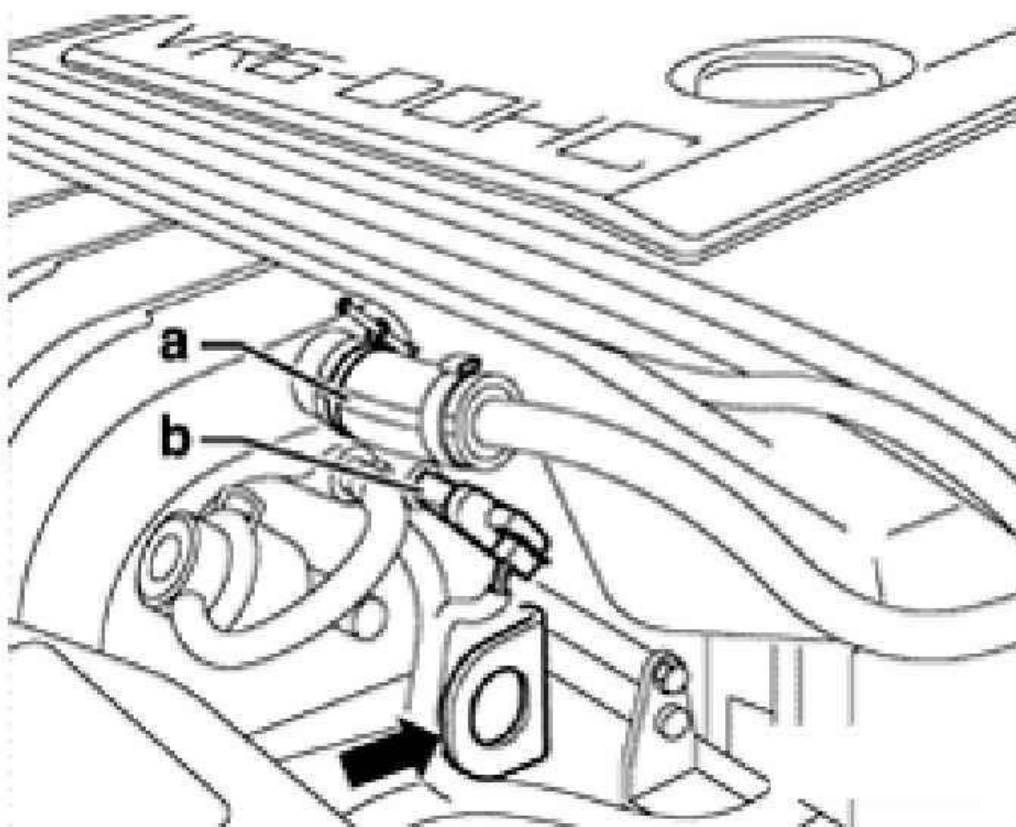
**G03362303**

Fig. 50: Removing Vacuum Line And Connector (2.8L VR6)

Courtesy of VOLKSWAGEN OF AMERICA, INC.

- Remove starter.

See **STARTER MOTOR, REMOVING AND INSTALLING** .

- Remove bracket for power steering pressure hose.

See **POWER STEERING PUMP, RESERVOIR AND HYDRAULIC LINES, SERVICING** .

- Pull connector off radiator fan motor on vehicles with 6-cylinder engine.
- Disconnect front mount from engine carrier.
- Remove mount.
- Remove coolant expansion tank and lay to one side.

- Remove left engine mount complete.
- Remove upper engine/transmission connecting bolts.
- Remove ATF oil pan protective plate.
 - Remove right-hand belt drive cover on vehicles with 6-cylinder engine.

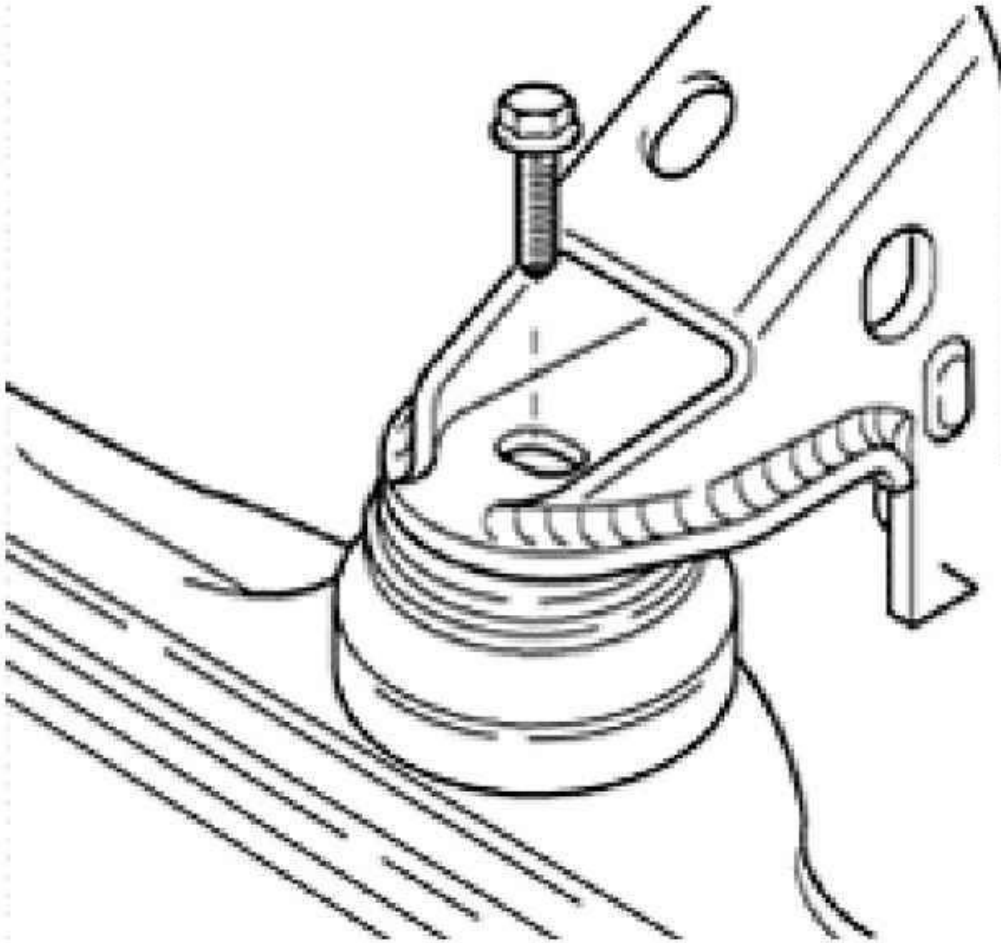
**G03362304**

Fig. 51: Disconnecting Front Mount From Engine Carrier
Courtesy of VOLKSWAGEN OF AMERICA, INC.

- Remove torque converter cover plate and nuts from torque converter.
 - Remove vibration damping weight on vehicles with 6-cylinder engine.
- Disconnect drive shafts at flanges.

- Raise right drive shaft and secure.
- Remove left wheel.
- Turn steering to right lock.
- Mark installation position of ball joint bolts on left-hand control arm and remove bolts.
 - Remove bolts -A- and loosen bolts -B- on vehicles with Plus running gear.

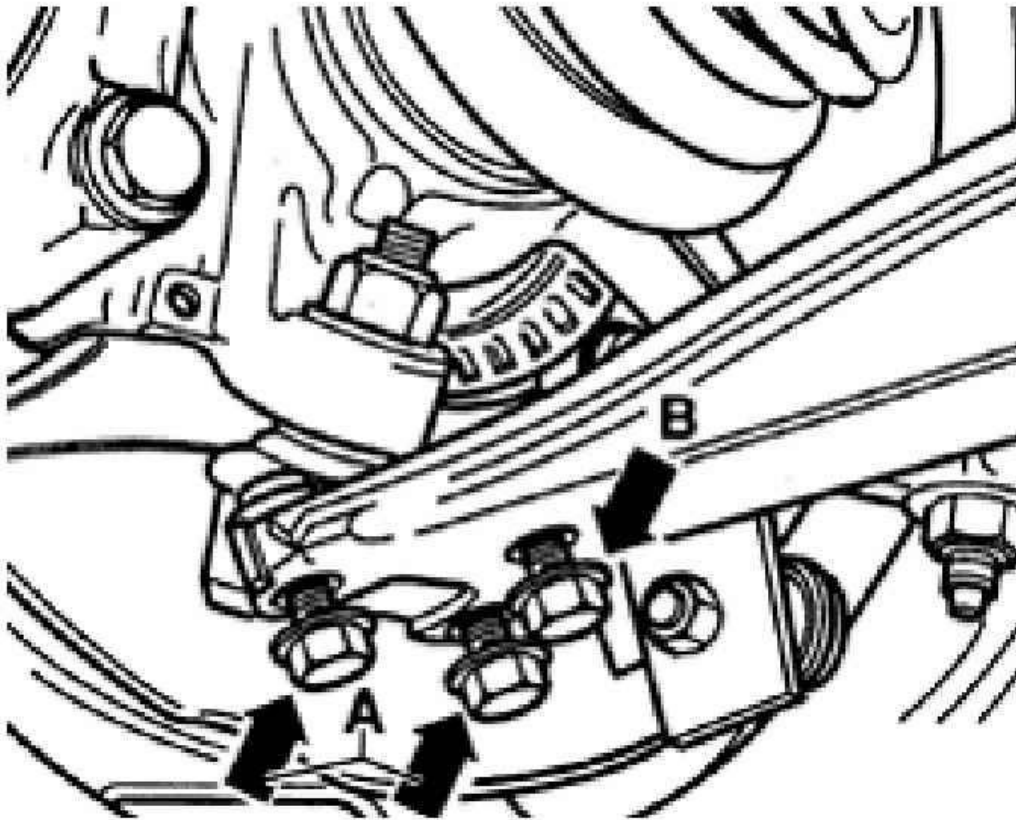
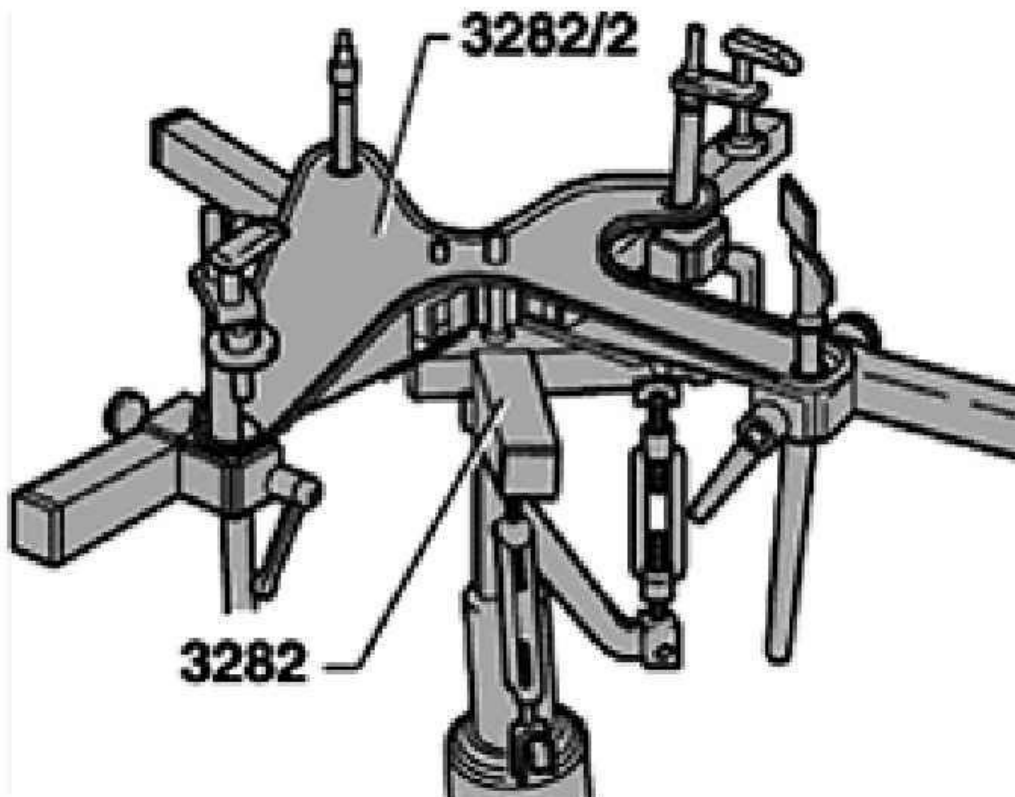
**G03362305**

Fig. 52: Removing Ball Joint Bolts With Plus Running Gear
Courtesy of VOLKSWAGEN OF AMERICA, INC.

- Swing ball joint outward and move left-hand drive shaft to one side. Remove drive shaft with a tripod (star shaped) joint.
- Set up transmission support 3282.

Transmission support 3282 is set up with adjusting plate 3282/2 for removing automatic transmission 01M.

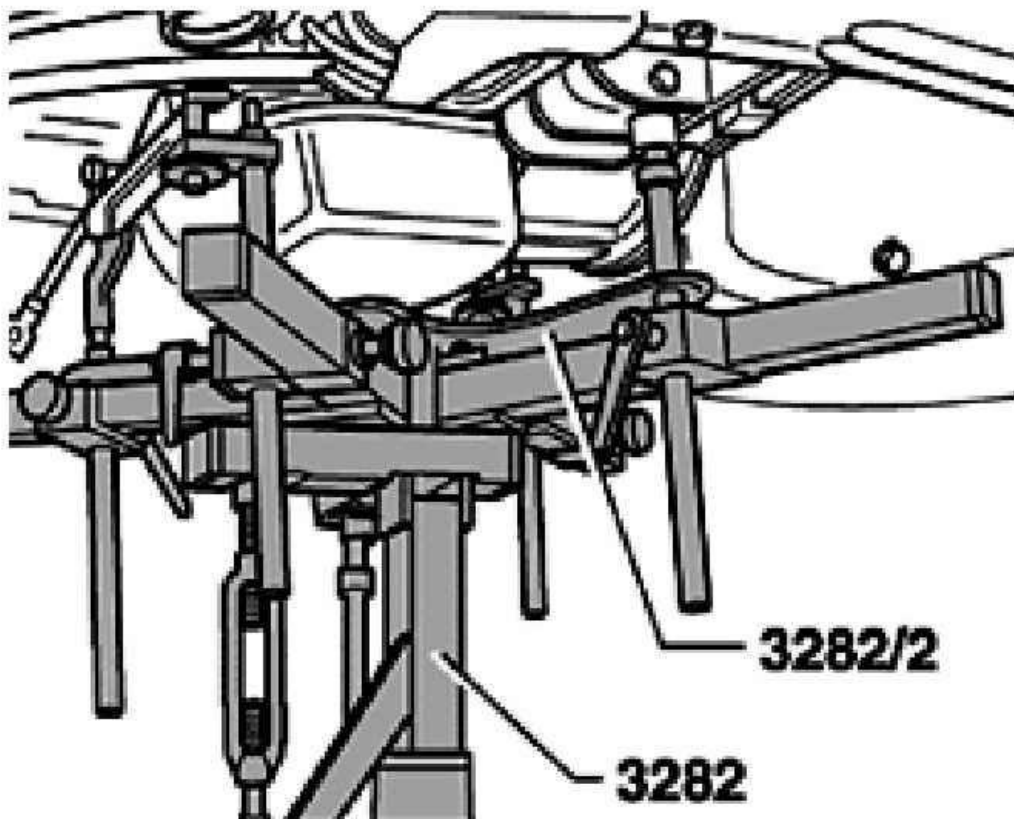
The symbols on the adjusting plate indicate the mounts required.



G03362306

Fig. 53: Identifying Set Up Transmission Support 3282
Courtesy of VOLKSWAGEN OF AMERICA, INC.

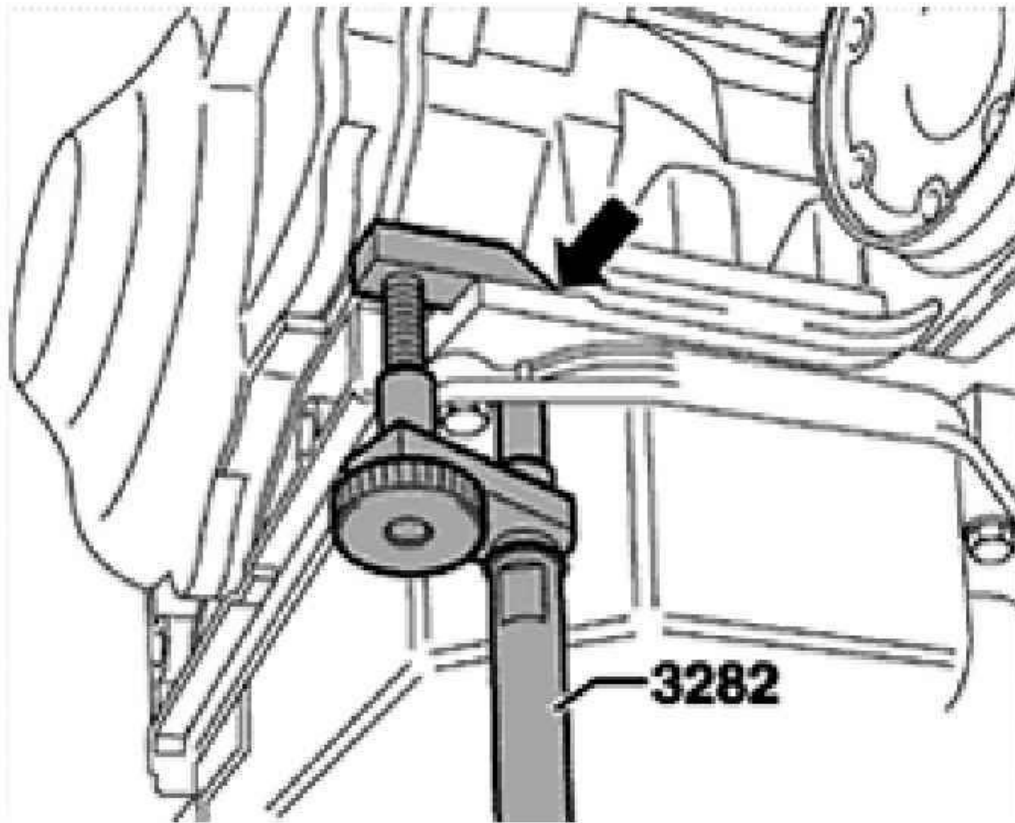
- Move jack VAG 1383 A with transmission support 3282 under transmission and support.



G03362307

Fig. 54: Moving Jack VAG 1383 A With Transmission Support 3282 Under Transmission
Courtesy of VOLKSWAGEN OF AMERICA, INC.

- Place securing mount pin on sump and secure to transmission housing -arrow-.
- Remove lower engine/transmission connecting bolts.



G03362308

Fig. 55: Placing Securing Mount Pin On Sump
Courtesy of VOLKSWAGEN OF AMERICA, INC.

- Tilt engine and transmission forward with supporting device 3300 A.

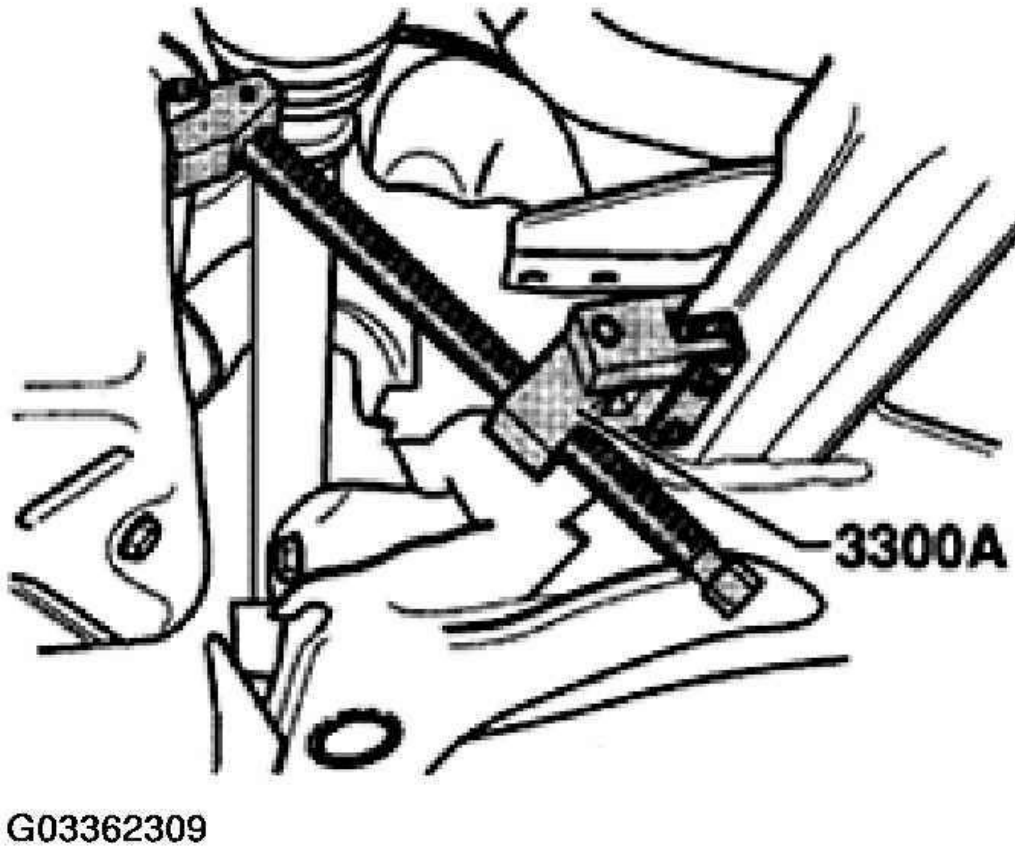


Fig. 56: Tilting Engine And Transmission With Supporting Device 3300 A
 Courtesy of VOLKSWAGEN OF AMERICA, INC.

- Press transmission off engine; when doing this, press torque converter out of drive plate.
- Press torque converter against ATF pump.
- Lower engine using support device spindle.
- Lower transmission slightly.
- Guide power steering pressure line past transmission.
- Tilt transmission using jack spindle and, while lowering, ensure cover (wheel housing side) is guided closely past wheel housing.
- Swivel transmission and carefully lower.

Ensure right joint flange does not contact supporting device 3300 A and Multi -function TR Switch does not contact subframe.

- Secure torque converter to prevent it falling out.

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Installing

Installation is performed in the reverse order.

When installing the torque converter, ensure that both drive pins engage in the ATF pump inner wheel recesses.

- Before installing, ensure the dowel sleeves are correctly located.
- When installing transmission, observe torque converter contact impression on drive plate.
- Replace selector cable anchorage locking washer.
- Check selector lever cable adjustment, adjust if necessary, see **SELECTOR LEVER CABLE, CHECKING AND ADJUSTING.**

Tightening torques

TIGHTENING TORQUES

Component	Torque
Drive shaft to flange	45 N.m (37 ft lb)
Torque converter to drive plate	60 N.m (44 ft lb)
Transmission to engine bolt (M12)	80 N.m (59 ft lb)
Transmission to engine bolt (M10)	60 N.m (44 ft lb)
Front mount to assembly	60 N.m (44 ft lb)
Left mount to assembly	60 N.m (44 ft lb)
Left mount to transmission	25 N.m (18 ft lb)
Cover plate to transmission	15 N.m (11 ft lb)
Ball joint to control arm	35 N.m (26 ft lb)
Starter to transmission	60 N.m (44 ft lb)

Automatic transmission, transporting

Special tool 3336 may be used to transport the automatic transmission and also when setting up transmission support 3282.

- Secure special tool 3336 to transmission housing flange.
- Position pins so that 8 holes are visible in chain direction.

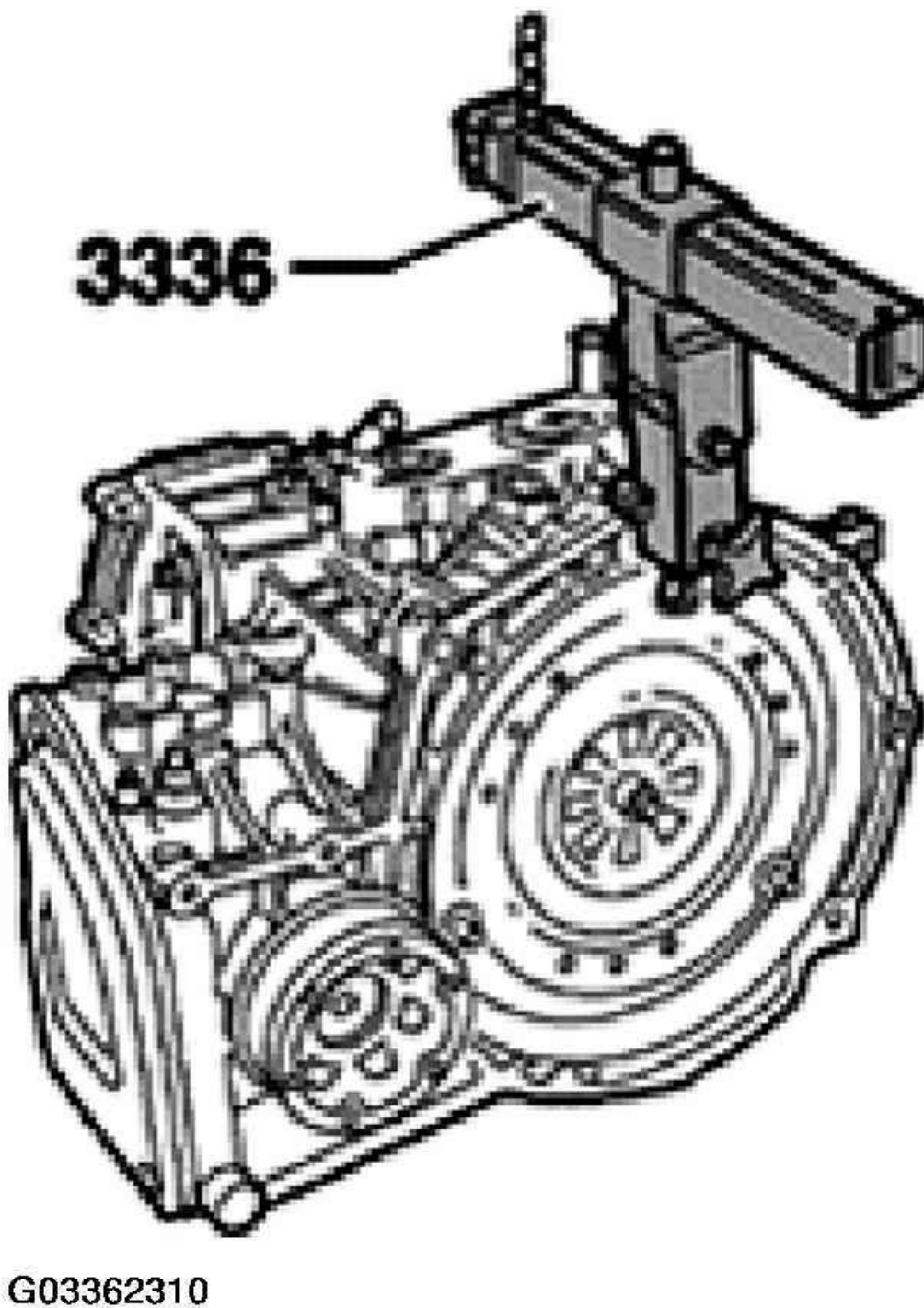


Fig. 57: Securing Special Tool 3336 To Transmission Housing Flange

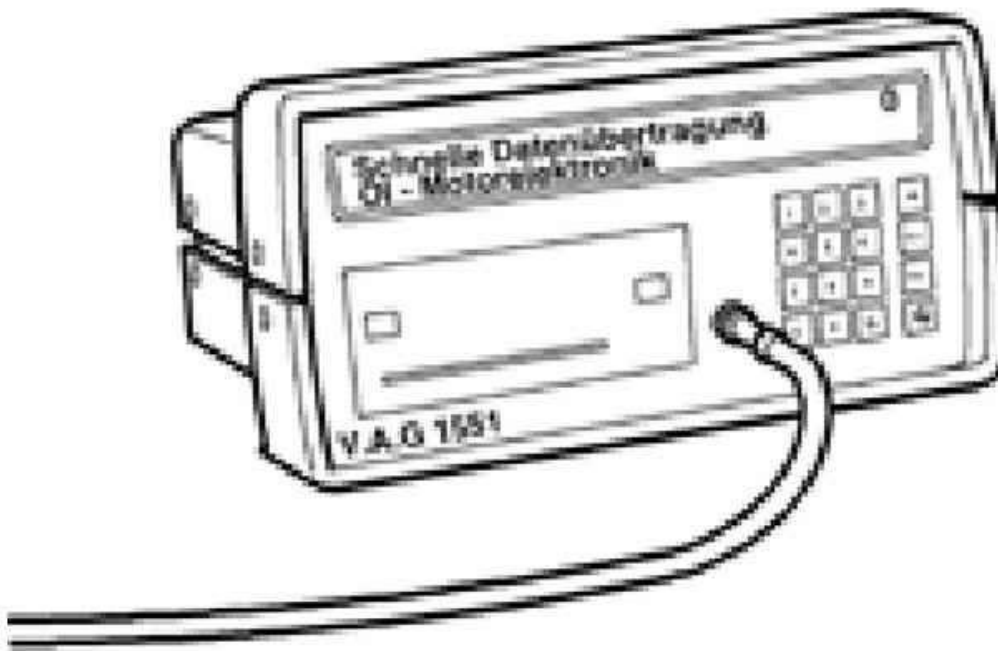
Courtesy of VOLKSWAGEN OF AMERICA, INC.

ATF LEVEL, CHECKING AND TOPPING UP

Special tools and equipment

- VAG 1551 Scan Tool

V.A.G 1551

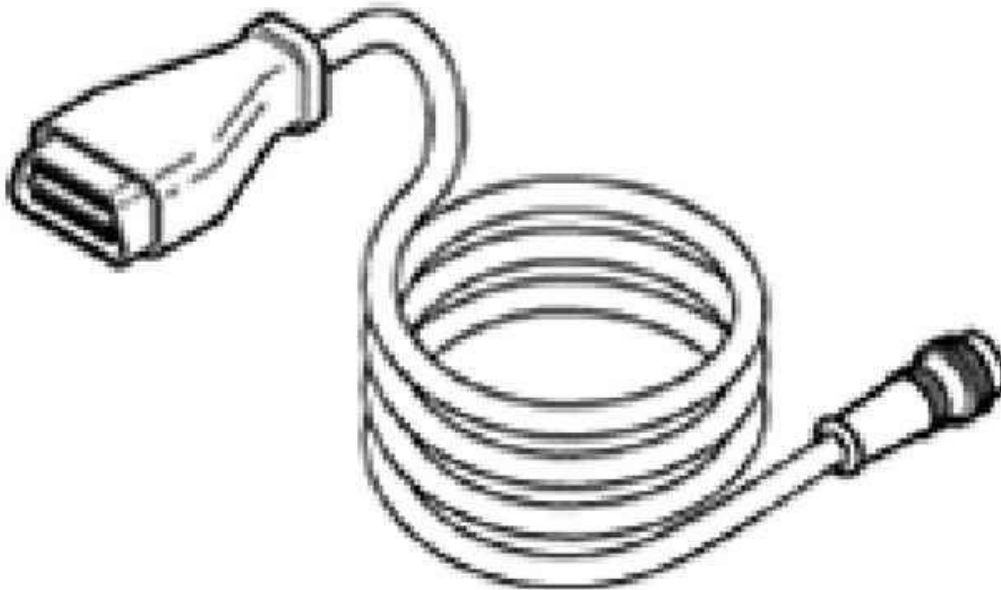


G03362311

Fig. 58: Identifying Special Tools - VAG 1551 Scan Tool
Courtesy of VOLKSWAGEN OF AMERICA, INC.

- VAG 1551/3B Cable

V.A.G 1551/3 A



G03362312

Fig. 59: Identifying Special Tools - VAG 1551/3B Cable
Courtesy of VOLKSWAGEN OF AMERICA, INC.

- VAG 1924 Reservoir

VW ATF is obtainable as a spare part.

Container size 0.5 L (0.53 qt) - Part No. G 052 162 A1

Container size 1.0 L (1.0567 qt) - Part No. G 052 162 A2

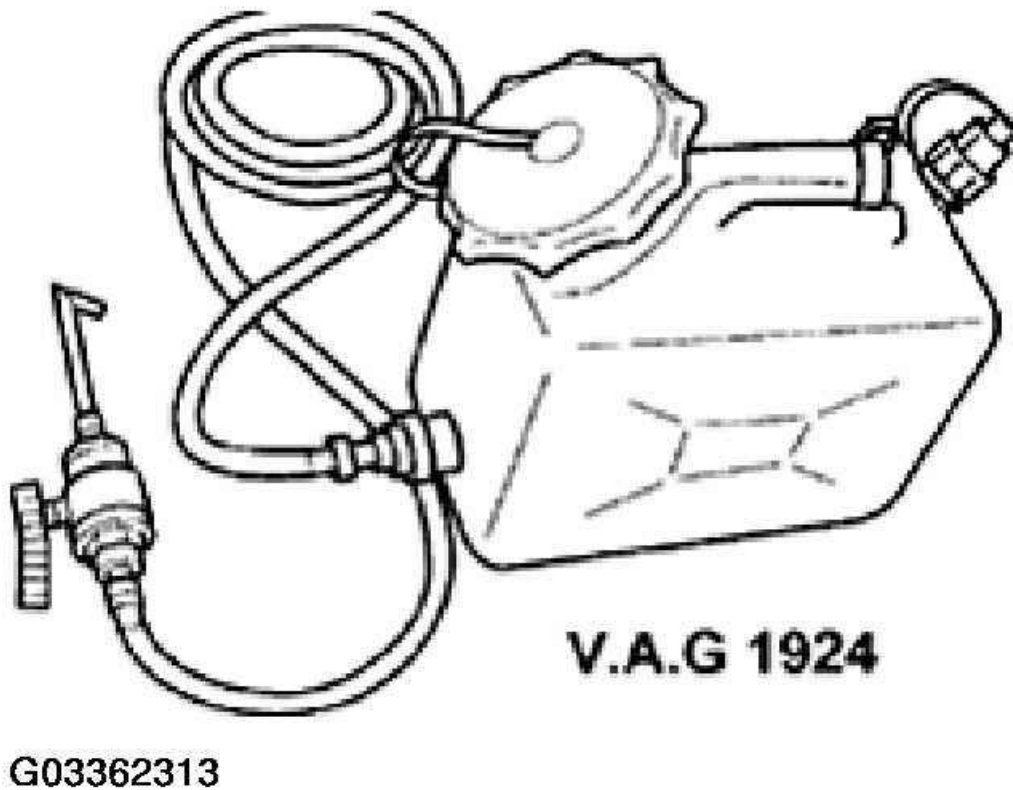
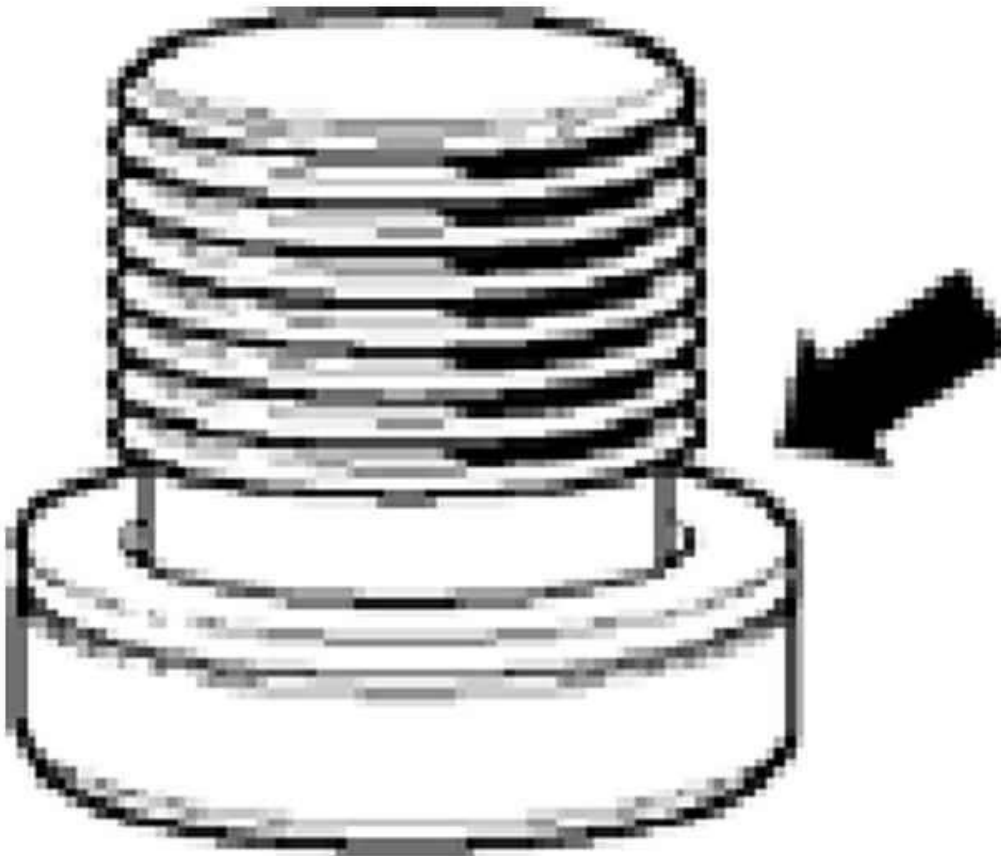


Fig. 60: Identifying Special Tools - VAG 1924 Reservoir
Courtesy of VOLKSWAGEN OF AMERICA, INC.

- Always replace seal -arrow- when checking ATF level.



G03362314

Fig. 61: Replacing ATF Plug Seal

Courtesy of VOLKSWAGEN OF AMERICA, INC.

Additional information

See **4 SPD. AUTOMATIC TRANSMISSION 01M ON BOARD DIAGNOSTIC (OBD)** .

ATF level, checking

Checking conditions

- Transmission not in emergency run mode, ATF temperature not above approx. 30°C (86 °F)
- Vehicle level
- Selector lever in "P"

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- Attach VAG 1924 ATF filling system reservoir to vehicle.
- Connect VAG 1551 Scan Tool and enter address word "02 Transmission electronics." Advance until "Select function XX" indicated on display.

See **VAG 1551 SCAN TOOL (ST), CONNECTING AND SELECTING FUNCTIONS** .

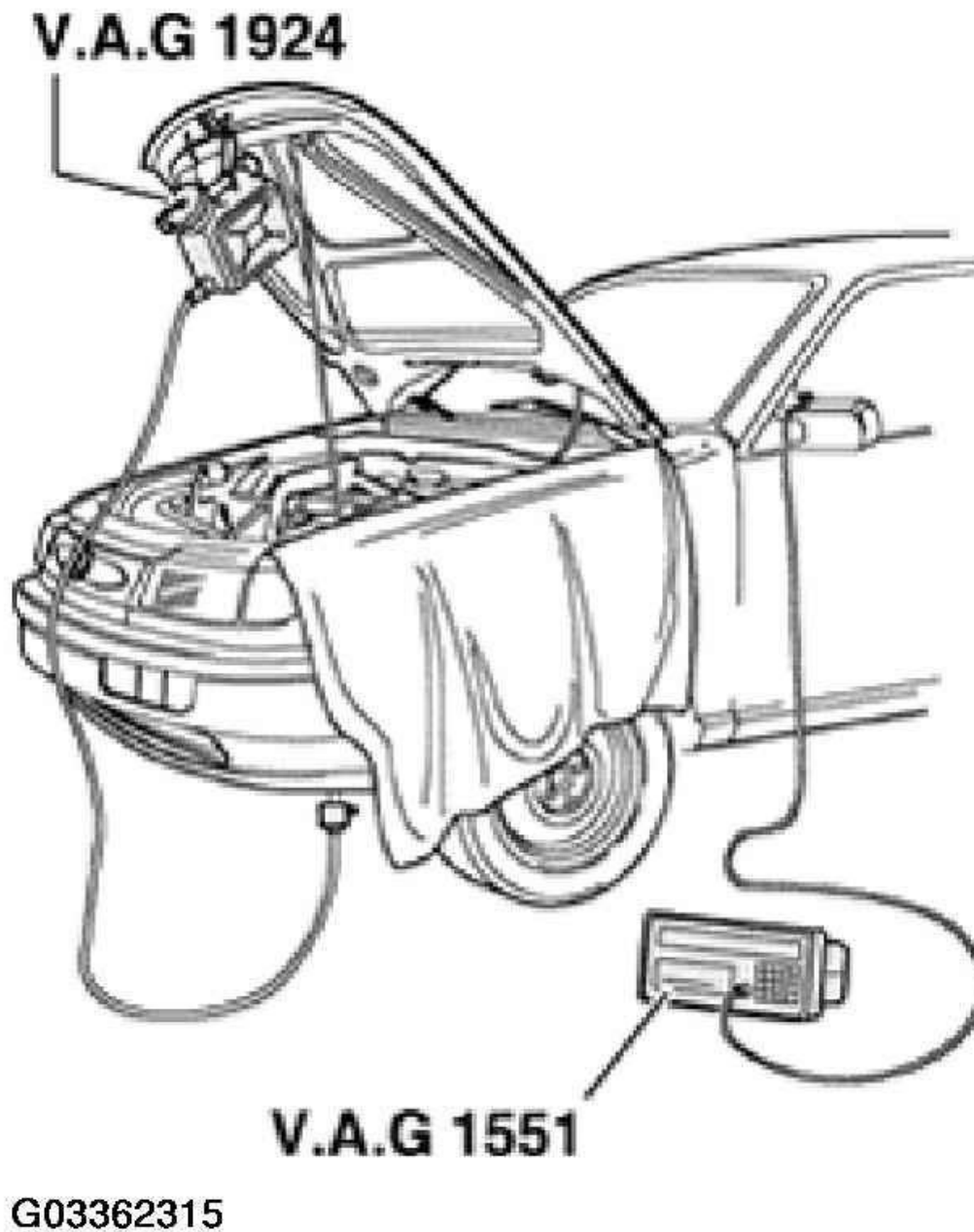


Fig. 62: Attaching VAG 1924 ATF Filling System Reservoir To Vehicle
Courtesy of VOLKSWAGEN OF AMERICA, INC.

- Start engine.
- Raise vehicle.

- Place container under transmission.

Indicated on display:



Fig. 63: Identifying Scan Tool Display (1 Of 4)
Courtesy of VOLKSWAGEN OF AMERICA, INC.

- Press buttons -0- and -8- to select function 08, Read measuring value block.

Indicated on display:

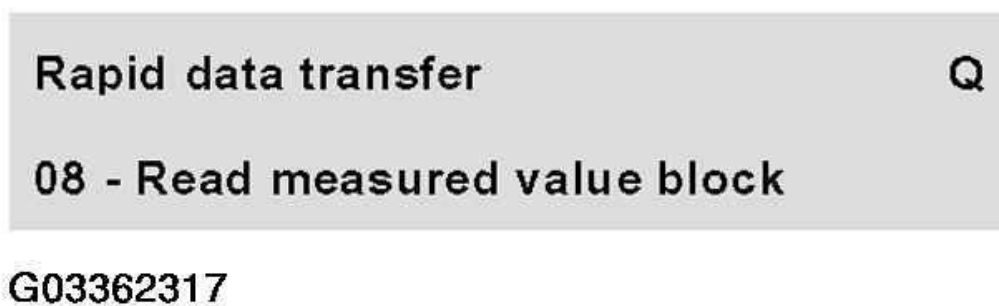


Fig. 64: Identifying Scan Tool Display (2 Of 4)
Courtesy of VOLKSWAGEN OF AMERICA, INC.

- Press -Q- button to confirm entry.

Indicated on display:

- Press buttons -0- and -5- to select function 05, Display group number.
- Press -Q- button to confirm entry.

Indicated on display:

Reading measured value block

Enter display group number XX

G03362318

Fig. 65: Identifying Scan Tool Display (3 Of 4)
Courtesy of VOLKSWAGEN OF AMERICA, INC.

First display field shows ATF temperature.

Reading measured value block 5



30 0 C 0011011 0 900 rpm

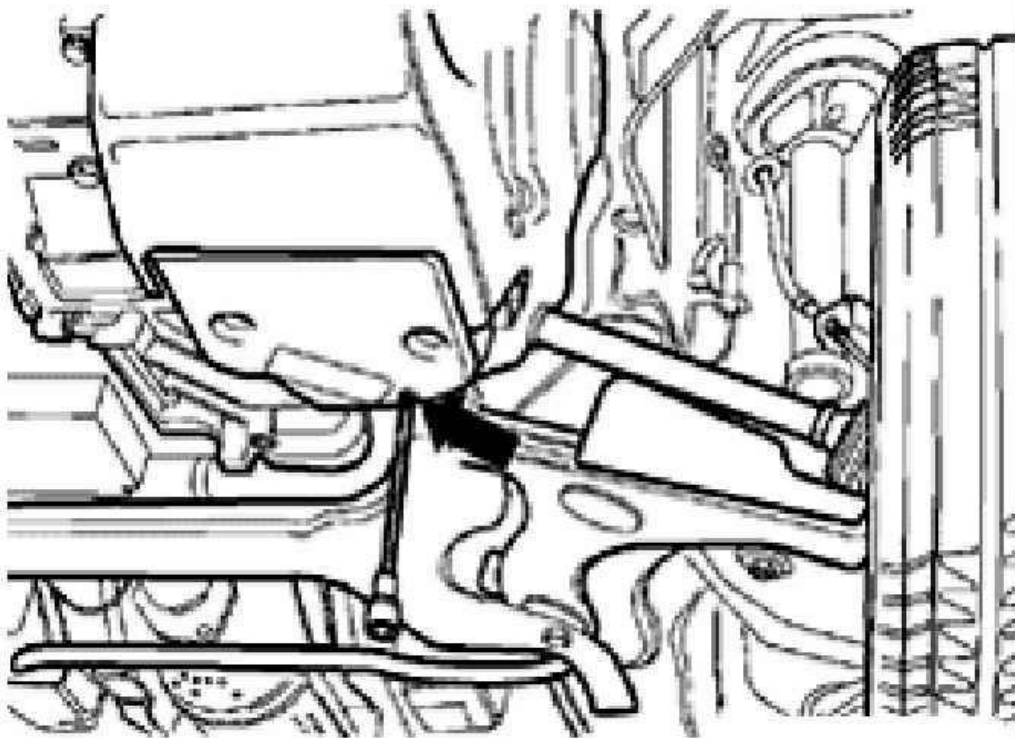
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Fig. 66: Identifying Scan Tool Display (4 Of 4)
Courtesy of VOLKSWAGEN OF AMERICA, INC.

- Bring ATF to test temperature.

Test temperature: 35 °C to 45 °C (95 °F to 113 °F)

- Remove ATF level plug from the oil pan -arrow-.



G03362320

Fig. 67: Removing ATF Level Plug From Oil Pan
Courtesy of VOLKSWAGEN OF AMERICA, INC.

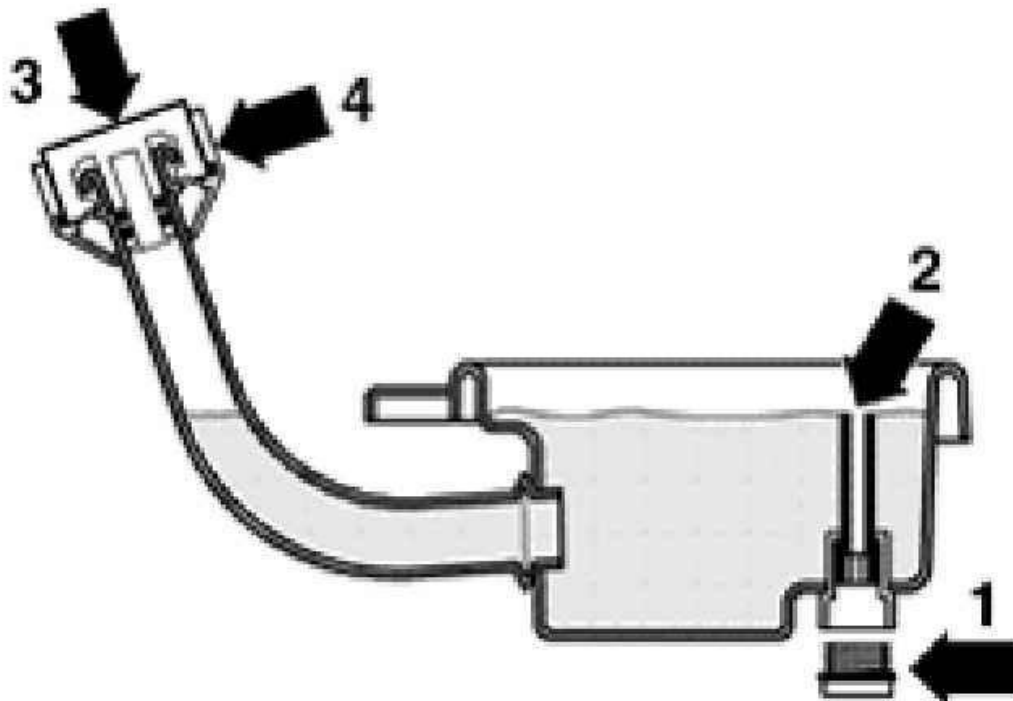
ATF in overflow line -arrow 2 - runs out.

If ATF drips out of hole:

ATF level need not be topped up.

- Install new seal -arrow 1 - on plug and tighten to 15 N.m (11 ft lb). ATF check is completed.

Plug -arrow 3- and cap -arrow 4- remain closed.



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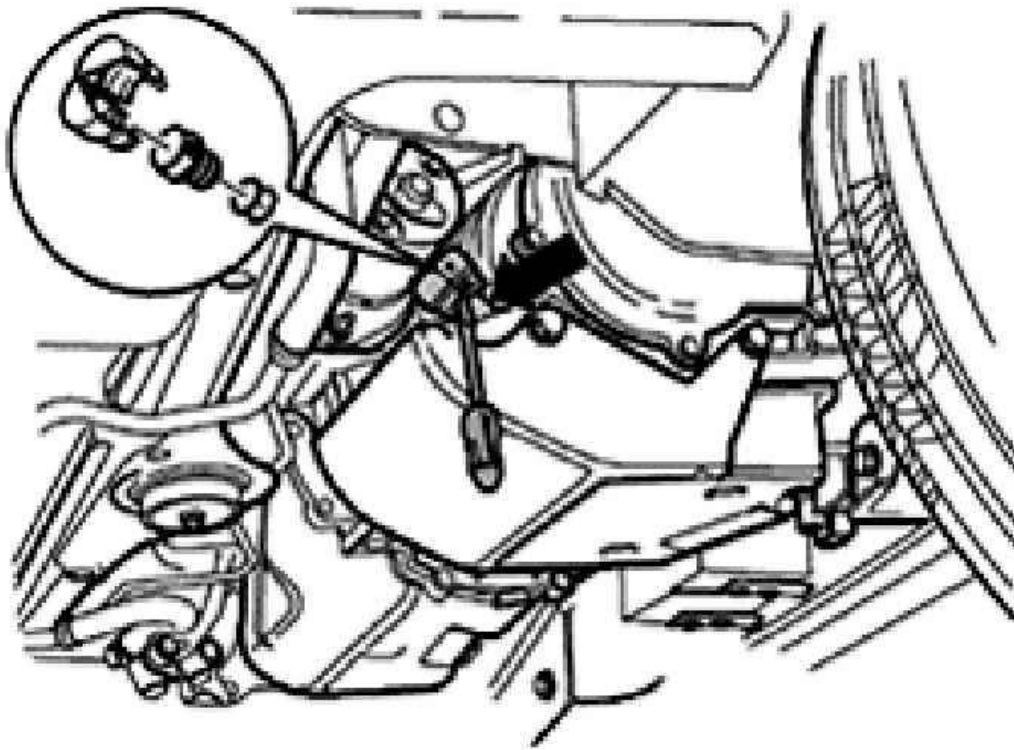
Fig. 68: Identifying ATF In Overflow Line Runs Out
Courtesy of VOLKSWAGEN OF AMERICA, INC.

ATF, topping up

Only if ATF in overflow line runs out of hole

- Remove plug protective cap -arrow- with a screwdriver. As cap will be damaged, always replace cap.
- Remove plug from filler line.

NOTE: Some transmissions have a cap with a spring retainer. A cap with a spring retainer can be used again.

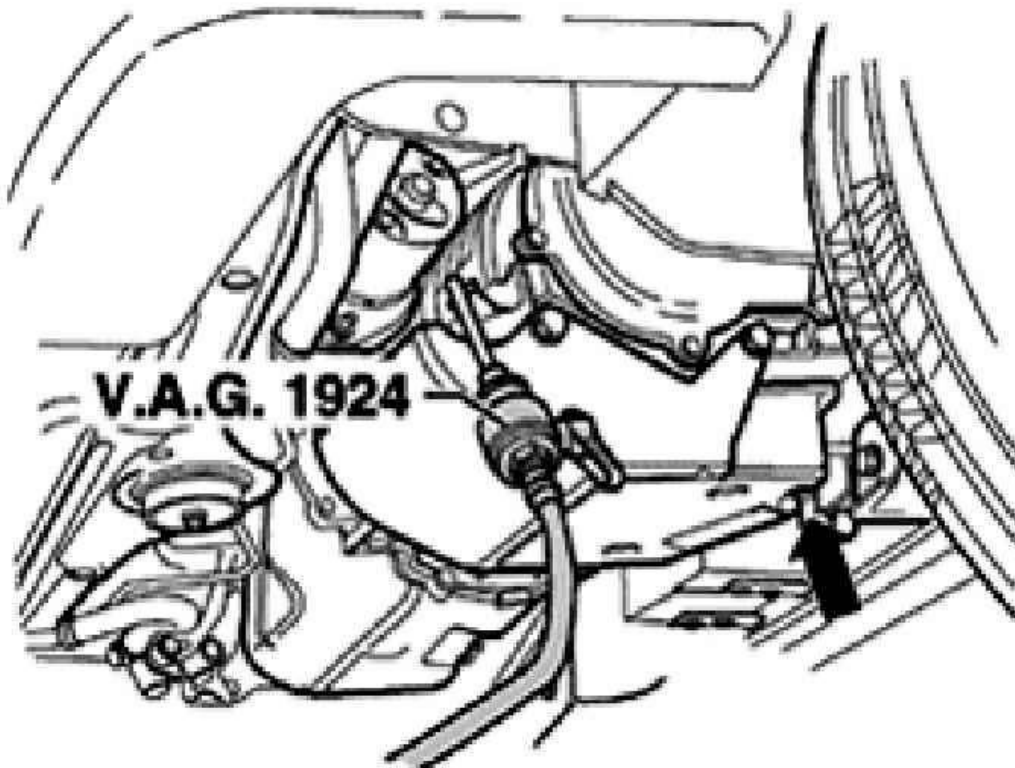


G03362322

Fig. 69: Removing Plug From Filler Line
Courtesy of VOLKSWAGEN OF AMERICA, INC.

- Fill with ATF using VAG 1924 until ATF runs out of level plug hole -arrow-.

CAUTION: Too little or too much ATF will adversely affect transmission function.

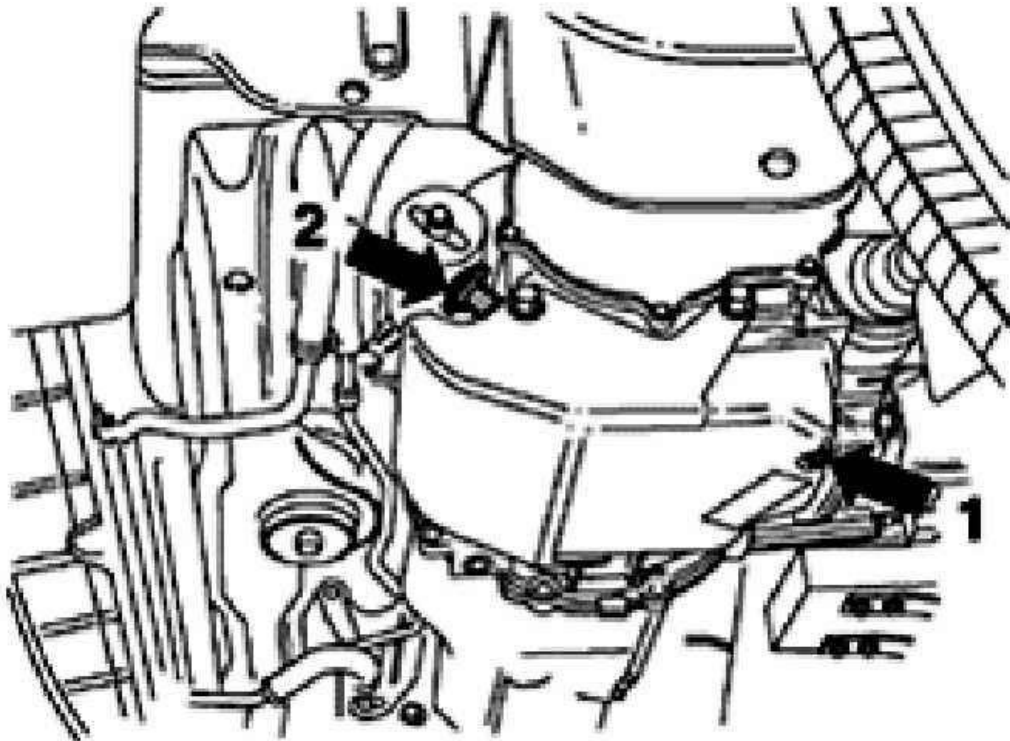


G03362323

Fig. 70: Filling ATF Using VAG 1924

Courtesy of VOLKSWAGEN OF AMERICA, INC.

- Install new seal to level plug -arrow 1 - and tighten to 15 N.m (11 ft lb).
- Install plug on filler pipe until spring retainer lock locates, or
- Install plug on filler pipe and secure with new cap -arrow 2-.



G03362324

Fig. 71: Installing Seal To Level Plug And Filler Pipe
Courtesy of VOLKSWAGEN OF AMERICA, INC.

- Lock cap.

NOTE: Always replace protective caps without spring retainers. The cap secures the plug.

ATF, replacing

- Place container under transmission.
- Remove ATF level plug from oil pan -arrow-.

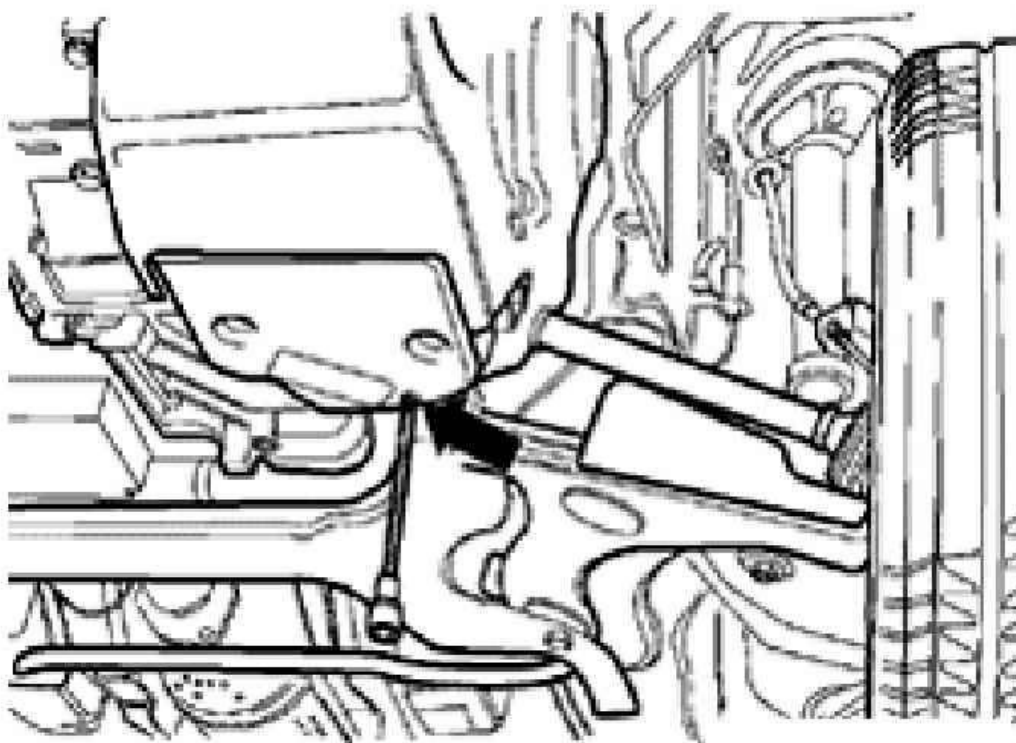
**G03362325**

Fig. 72: Removing ATF Level Plug From Oil Pan
Courtesy of VOLKSWAGEN OF AMERICA, INC.

- Remove overflow line through level hole.
- Drain ATF.
- Install overflow line.
- Install level plug and hand-tighten.
- Fill with 3 ltr (3.2 qt) of ATF through filler line using VAG 1924.
- Start engine and shift through all selector lever positions with vehicle stationary.
- Check and top up ATF level, see **ATF LEVEL, CHECKING AND TOPPING UP.**

TRANSMISSION WITH SELECTOR ELEMENTS

Position of selector elements

The following list pertains to **Fig. 73.**

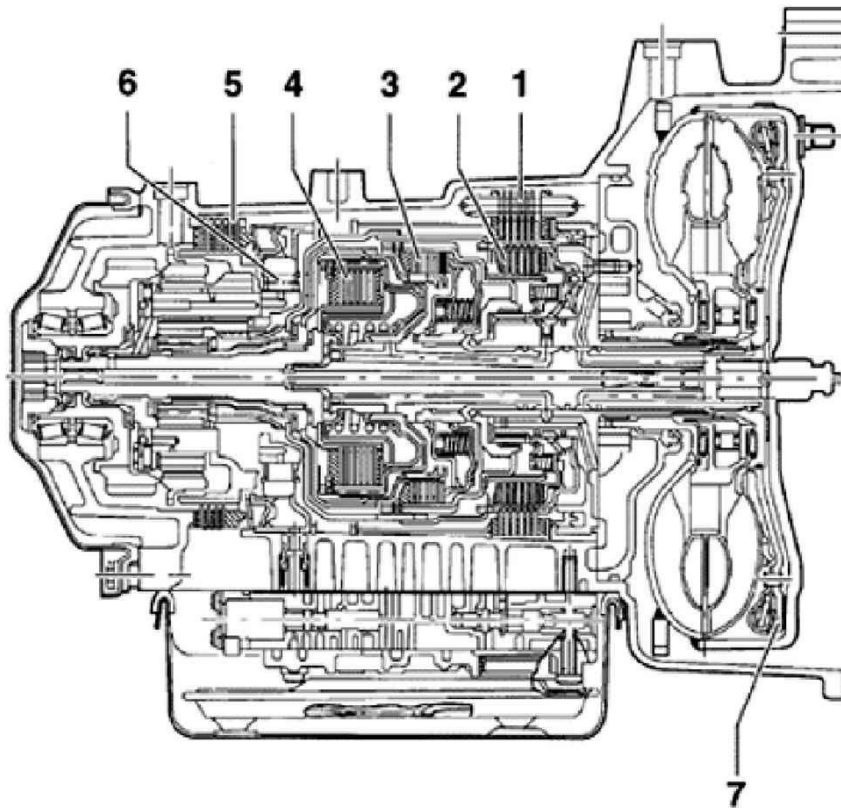
1993 Volkswagen Golf III GL

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1. = 2nd and 4th gear brake -B2-
2. = Reverse gear clutch -K2-
3. = 1st to 3rd gear clutch -K1-
4. = 3rd and 4th gear clutch -K3-
5. = Reverse gear brake -B1-
6. = Free wheel clutch
7. = Lock-up clutch integrated in torque converter -LC-

Before starting transmission repairs, first check for Diagnostic Trouble Codes (DTC) using On Board Diagnostic (OBD).

See **ON BOARD DIAGNOSTIC (OBD), PERFORMING** .



1 = 2nd and 4th gear brake -B2-

2 = Reverse gear clutch -K2-

3 = 1st to 3rd gear clutch -K1-

4 = 3rd and 4th gear clutch -K3-

5 = Reverse gear brake -B1-

6 = Free wheel clutch

7 = Lock-up clutch integrated in torque converter -LC-

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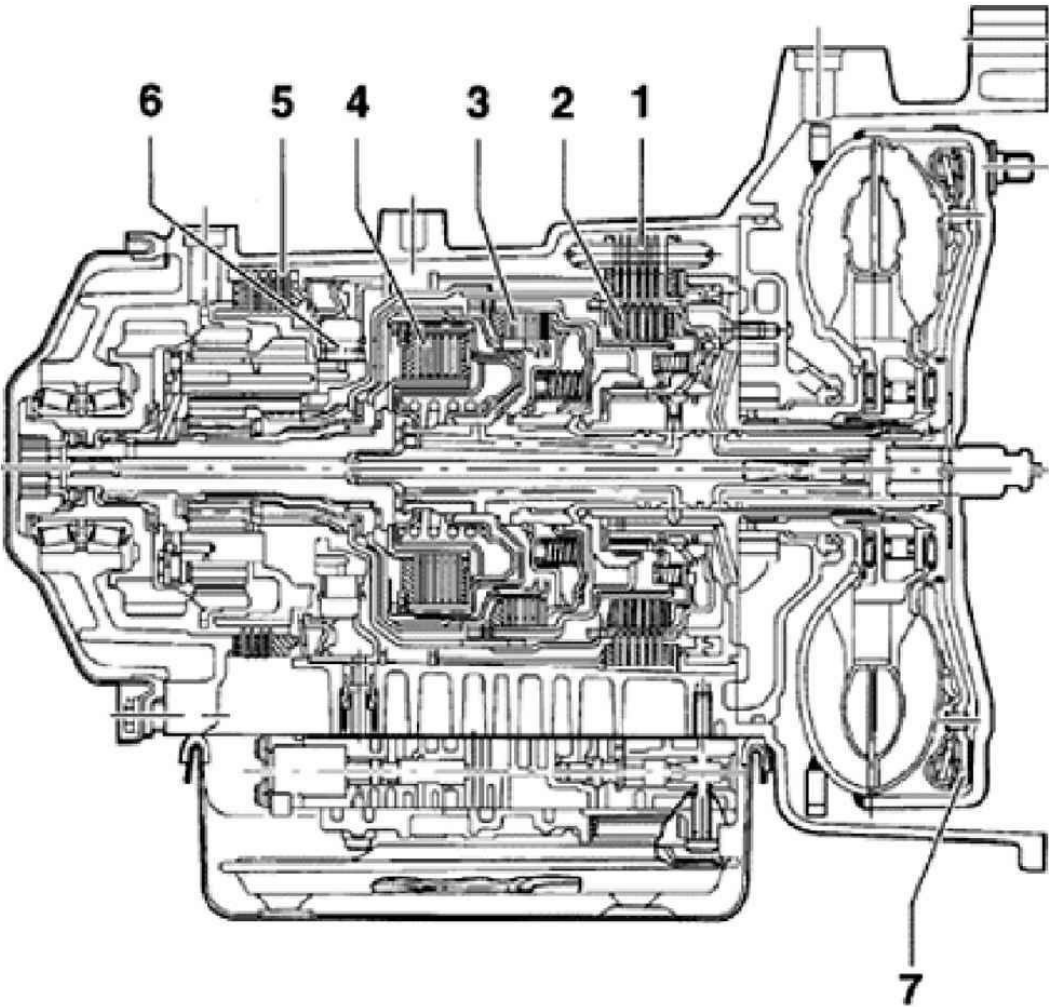
Fig. 73: Sectional View Of Transmission With Selector Elements (1 Of 3)
Courtesy of VOLKSWAGEN OF AMERICA, INC.

Position of selector elements

The **POSITION OF SELECTOR ELEMENTS** table shows which selector elements are operated in individual ranges to help you troubleshoot poor acceleration and speed performance or with drive train malfunctions in general. The table should help you determine which selector elements are not operating properly.

All gears are shifted hydraulically.

All forward gears are driven mechanically at a predetermined load and speed via torque converter lockup clutch.



G03362327

Fig. 74: Sectional View Of Transmission With Selector Elements (2 Of 3)
Courtesy of VOLKSWAGEN OF AMERICA, INC.

POSITION OF SELECTOR ELEMENTS

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1993 Volkswagen Golf III GL

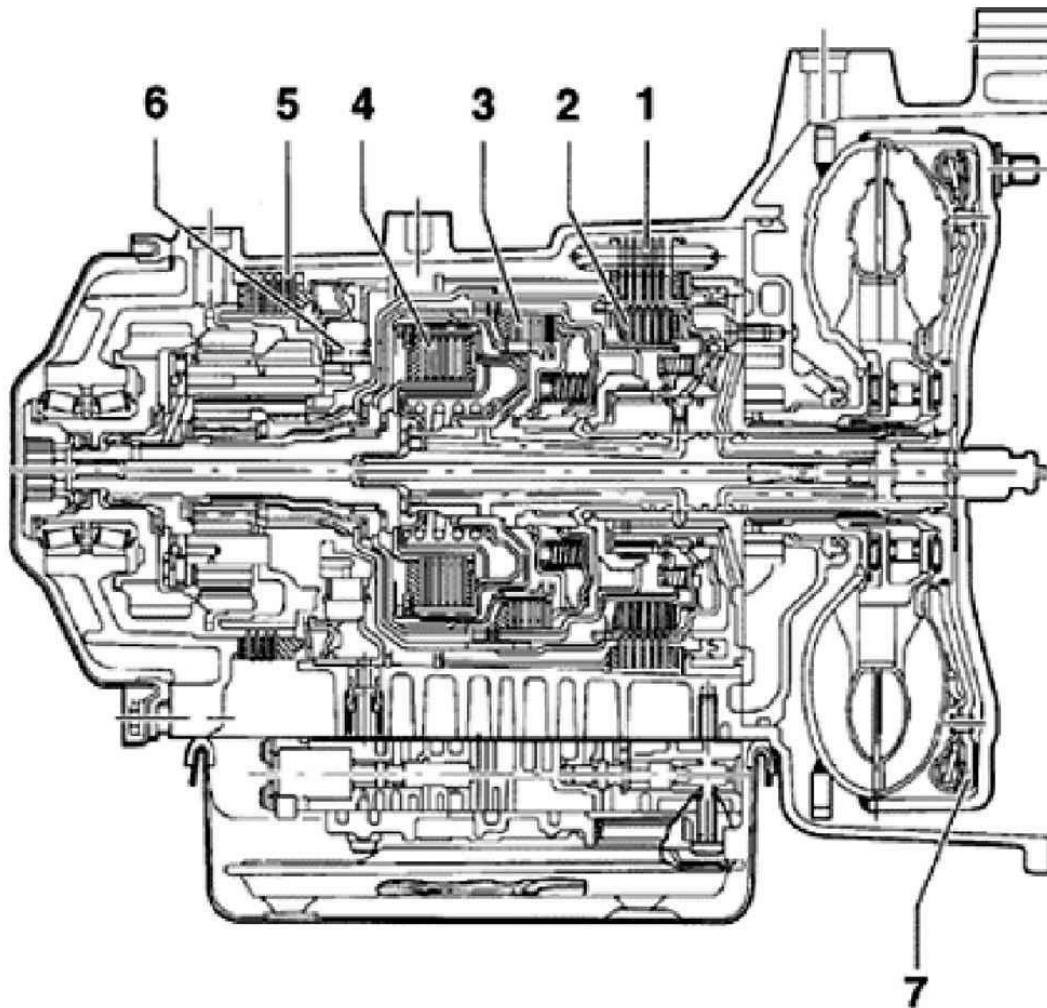
1993-99 TRANSMISSION 4 Spd. Automatic Transmission 01M - Cabrio, Golf, GTI & Jetta

Gear	B1	B2	K1	K2	K3	F	LC
R	X			X			
1H			X			X	
1M			X			X	X
2H		X	X				
2M		X	X				X
3H			X		X		
3M			X		X		X
4H		X			X		
4M		X			X		X

X = clutches, brakes or free wheel engaged

H = hydraulic

M = mechanical



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Fig. 75: Sectional View Of Transmission With Selector Elements (3 Of 3)

Courtesy of VOLKSWAGEN OF AMERICA, INC.

TRANSMISSION, DISASSEMBLING AND ASSEMBLING

ATF cooler and ATF filler tube, removing and installing, see **ATF cooler and ATF filler tube, removing and installing.**

Transmission, disassembling and assembling, overview, see **TRANSMISSION, DISASSEMBLING AND ASSEMBLING, OVERVIEW.**

Transmission, disassembling and assembling, see **TRANSMISSION, DISASSEMBLING AND ASSEMBLING.**

- Disassembling, see **TRANSMISSION, DISASSEMBLING.**
- Assembling, see **TRANSMISSION, ASSEMBLING.**

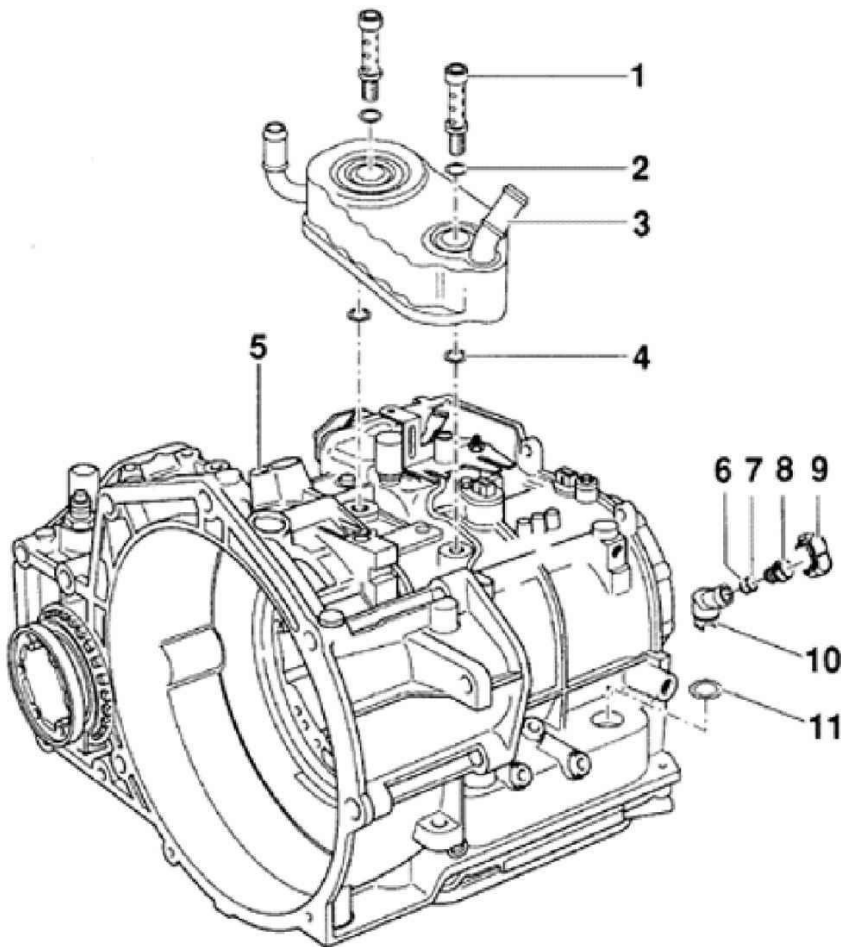
Overview of all transmission adjustments, see **TRANSMISSION ADJUSTMENTS, OVERVIEW.**

Valve body, removing and installing, see **VALVE BODY, REMOVING AND INSTALLING.**

ATF cooler and ATF filler tube, removing and installing

The following list pertains to **Fig. 76.**

1. **Banjo bolt**
 - 35 N.m (26 ft lb)
2. **O-ring**
 - Always replace
3. **ATF cooler**
4. **O-ring**
 - Always replace
5. **Transmission housing**
6. **Seal**
 - Always replace
7. **Seal**
 - Always replace
8. **Plug**
9. **Cap**
 - To secure ATF level plug after checking ATF level: see **ATF LEVEL, CHECKING AND TOPPING UP**
 - Always replace
10. **ATF filler tube**
11. **O-ring**
 - Always replace



- | | |
|--------------------------|----------------------|
| 1 - Banjo bolt | 8 - Plug |
| 2 - O-ring | 9 - Cap |
| 3 - ATF cooler | 10 - ATF filler tube |
| 4 - O-ring | 11 - O-ring |
| 5 - Transmission housing | |
| 6 - Seal | |
| 7 - Seal | |

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Fig. 76: Exploded View Of ATF Cooler And ATF Filler Tube Components
 Courtesy of VOLKSWAGEN OF AMERICA, INC.

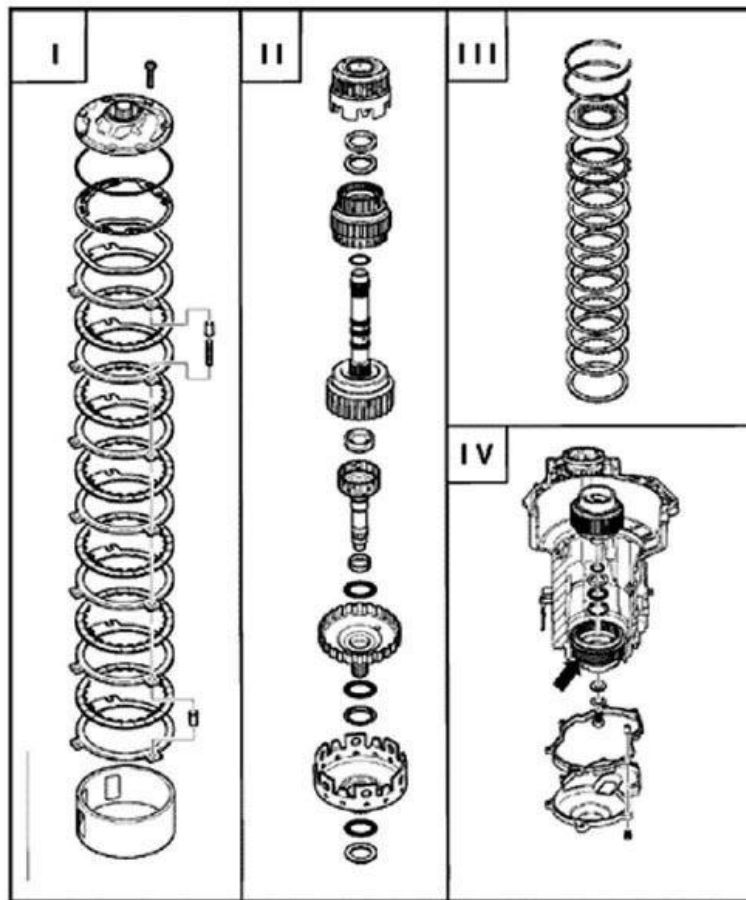
Transmission, disassembling and assembling, overview

NOTE: **Transmission, disassembling, see TRANSMISSION, DISASSEMBLING**

Transmission, assembling, see TRANSMISSION, ASSEMBLING.

- I. Removing and installing: ATF pump to supporting tube, see **I - ATF pump to support tube, removing and installing**
- II. Removing and installing: Reverse gear clutch -K2- to large sun gear, see **II - Reverse gear clutch -K2- to large sun gear, removing and installing**
- III. Removing and installing: Free wheel and reverse gear brake -B1-, see **III - Free wheel and reverse gear brake -B1-, removing and installing**
- IV. Planet carrier, removing and installing, see **IV - Planet carrier and transmission housing with input gear and cover, assembling**

- NOTE:**
- It is not necessary to remove input gear -arrow-.
 - Input gear, removing and installing, see **INPUT GEAR, REMOVING AND INSTALLING**



I - Removing and installing:
ATF pump to supporting
tube

II - Removing and installing:
Reverse gear clutch -K2-
to large sun gear

III - Removing and installing:
Free wheel and reverse
gear brake -B1-

IV - Planet carrier, removing
and installing

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Fig. 77: Exploded View Of Transmission Components
Courtesy of VOLKSWAGEN OF AMERICA, INC.

I - ATF pump to support tube, removing and installing

For an Overview, see **TRANSMISSION, DISASSEMBLING AND ASSEMBLING, OVERVIEW**

NOTE: **Transmission, disassembling, see** **TRANSMISSION, DISASSEMBLING**

Transmission, assembling, see **TRANSMISSION, ASSEMBLING**

The following list pertains to **Fig. 78**.

1. **Bolt**
 - Qty. 7
 - Tighten to 8 N.m (71 in. lb) plus additional 90° turn.
 - Additional 90° turn may be done in several stages
2. **ATF pump with -B2- piston**
 - Spare part must agree with transmission code letters
 - Disassembling and assembling, see **ATF PUMP, DISASSEMBLING AND ASSEMBLING**
3. **O-ring**
 - Always replace
 - Place on ATF pump
4. **Gasket**
 - Always replace
5. **Spring cap**
 - Qty. 6
 - Install 3 spring caps after installing first outer plate
 - Install 3 spring caps before installing last outer plate
6. **Spring**
 - Qty. 3
7. **Retaining ring**
 - Not installed on transmissions: CLB, DLL, CLK, DKS, CKX, DKR, CKZ, DAB, CKY, CLA
8. **Shim**
 - Not installed on transmissions: CLB, DLL, CLK, DKS, CKX, DKR, CKZ, DAB, CKY, CLA
9. **Corrugated spring washer**
 - Only installed on transmissions: CLB, DLL, CLK, DKS, CKX, DKR, CKZ, DAB, CKY, CLA
10. **Outer plate -B2-**
 - Quantity from, see **TRANSMISSION LAYOUT**
 - For transmissions with installed corrugated spring washer -9-, determine thickness of outer plate, see **2nd and 4th gear brake -B2-, adjusting (with shim and retaining ring)**
11. **Inner plate -B2-**
 - Quantity, see **TRANSMISSION LAYOUT**
 - Before installation, place new inner plates in ATF for 15 minutes

12. Outer plate -B2-

- Always install 2 mm thick outer plates
- Quantity, see **TRANSMISSION LAYOUT**

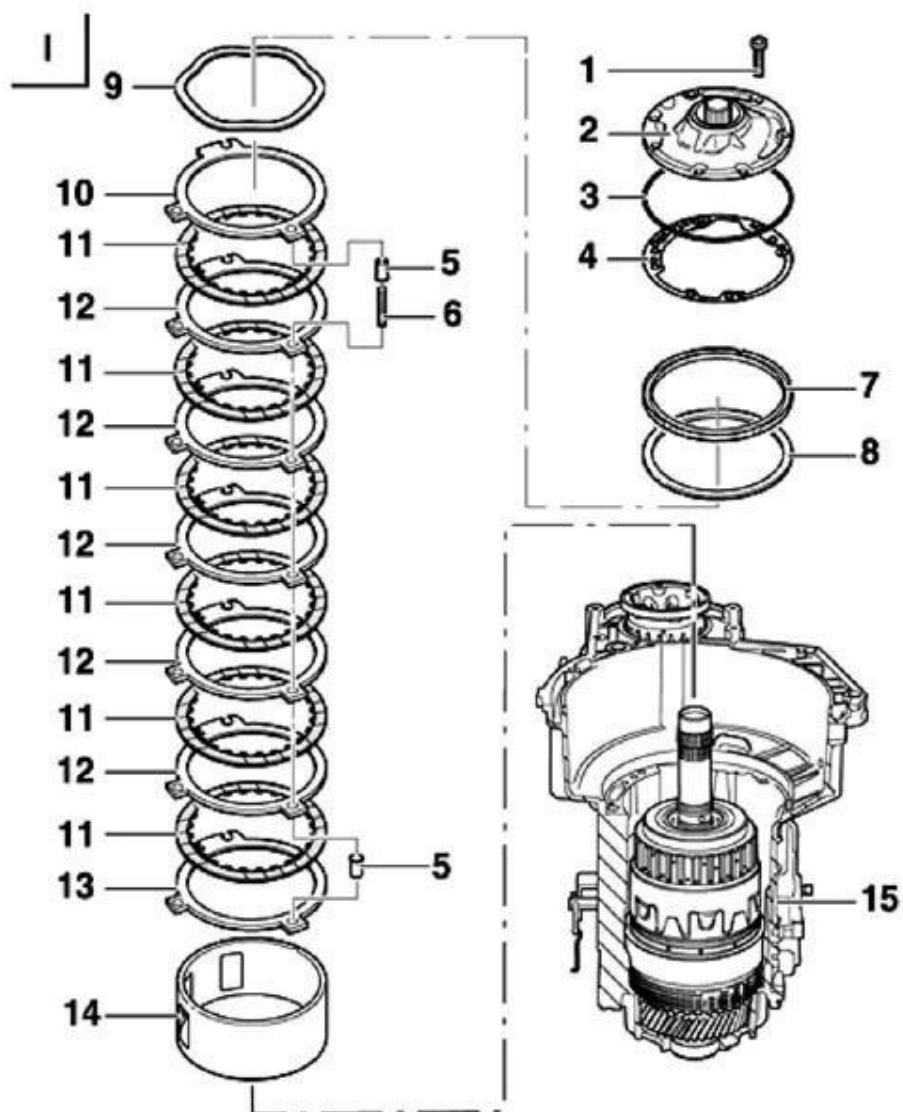
13. Outer plate -B2-

- Install 3 mm thick outer plate to supporting tube

14. Supporting tube -B2-

- For -B2- plate package
- Spare part must comply with transmission code letters
- Insert with groove engaging in wedge of free wheel

15. Transmission housing with clutches installed



1 - Bolt

2 - ATF pump with -B2- piston

3 - O-ring

4 - Gasket

5 - Spring cap

6 - Spring

7 - Retaining ring

8 - Shim

9 - Corrugated spring washer

10 - Outer plate -B2-

11 - Inner plate -B2-

12 - Outer plate -B2-

13 - Outer plate -B2-

14 - Supporting tube -B2-

15 - Transmission housing with
clutches installed

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Fig. 78: Exploded View Of ATF Pump To Support Tube Components
Courtesy of VOLKSWAGEN OF AMERICA, INC.

II - Reverse gear clutch -K2- to large sun gear, removing and installing

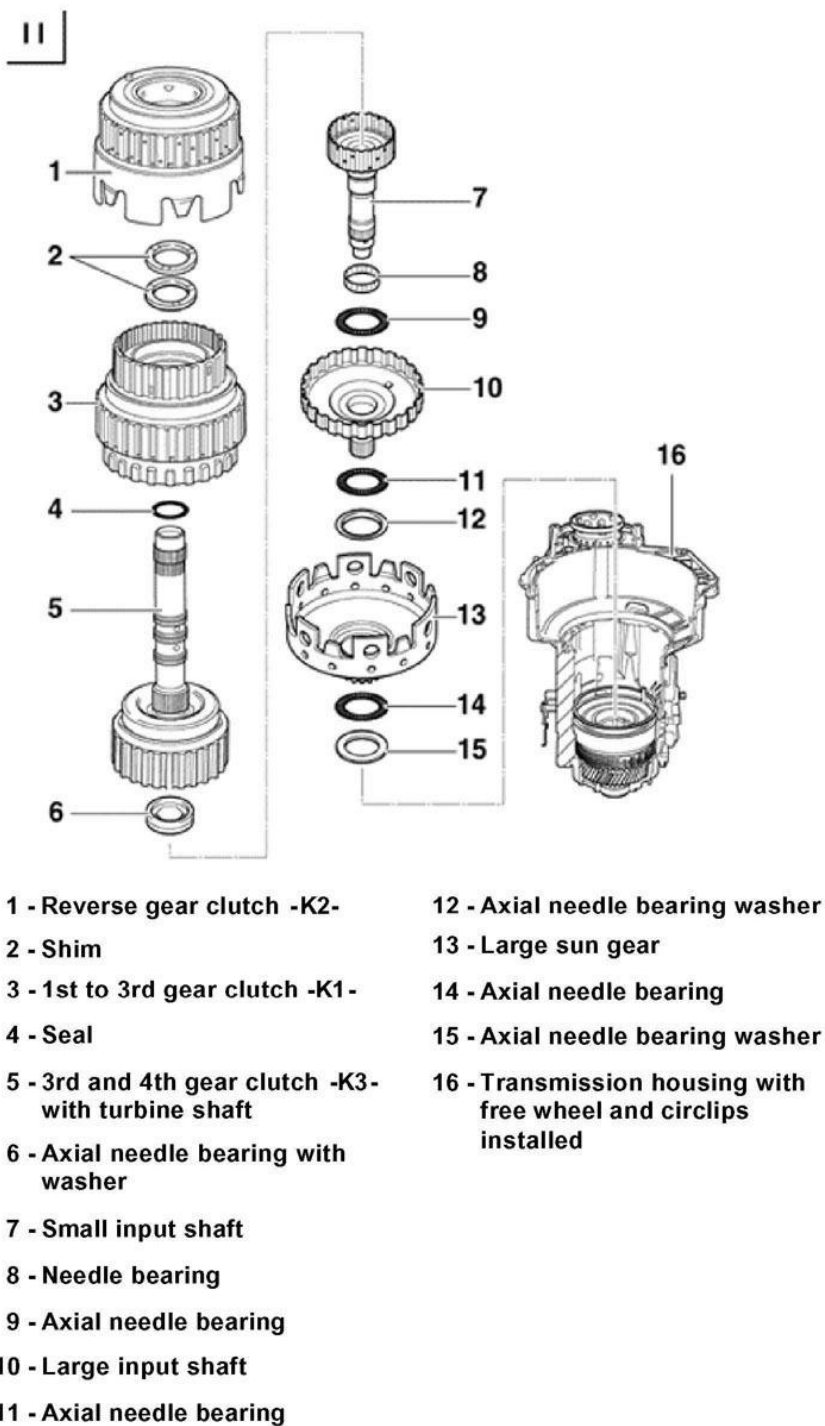
For an overview, see **TRANSMISSION, DISASSEMBLING AND ASSEMBLING, OVERVIEW**

NOTE:

- Transmission, disassembling, see **TRANSMISSION, DISASSEMBLING**
- Transmission, assembling, see **TRANSMISSION, ASSEMBLING**

The following list pertains to **Fig. 79**.

1. **Reverse gear clutch -K2-**
 - Disassembling and assembling, see **TRANSMISSION, DISASSEMBLING AND ASSEMBLING**
2. **Shim**
 - Determining thickness, see **CLUTCH PLAY BETWEEN -K1- AND -K2-, ADJUSTING**
 - 1 or 2 shims can be installed
3. **1st to 3rd gear clutch -K1-**
 - Disassembling and assembling, see **TRANSMISSION, DISASSEMBLING AND ASSEMBLING**
4. **Seal**
 - Always replace
5. **3rd and 4th gear clutch -K3- with turbine shaft**
 - Disassembling and assembling, see **TRANSMISSION, DISASSEMBLING AND ASSEMBLING**
6. **Axial needle bearing with washer**
 - Axial needle bearing faces toward small input shaft
7. **Small input shaft**
8. **Needle bearing**
9. **Axial needle bearing**
10. **Large input shaft**
11. **Axial needle bearing**
12. **Axial needle bearing washer**
 - With shoulder
13. **Large sun gear**
14. **Axial needle bearing**
15. **Axial needle bearing washer**
16. **Transmission housing with free wheel and circlips installed**



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Fig. 79: II - Exploded View Of Reverse Gear Clutch K2 To Large Sun Gear
Courtesy of VOLKSWAGEN OF AMERICA, INC.

III - Free wheel and reverse gear brake -B1-, removing and installing

For an overview, **TRANSMISSION, DISASSEMBLING AND ASSEMBLING, OVERVIEW**

NOTE:

- **Transmission, disassembling, see TRANSMISSION, DISASSEMBLING**
- **Transmission, assembling, see TRANSMISSION, ASSEMBLING.**

The following list pertains to **Fig. 80**.

1. Circlip

- For supporting tube -B2-
- Installation position: Circlip open ends must face free wheel retaining wedge

2. Circlip

- For free wheel
- Installation position: Circlip open ends must face free wheel retaining wedge

3. Free wheel with -B1- piston

- Before removing free wheel, remove valve body and sealing plugs, see **VALVE BODY, REMOVING AND INSTALLING**
- Disassembling and assembling, see **FREE WHEEL WITH -B1- PISTON, DISASSEMBLING AND ASSEMBLING**

4. Dished spring

- Install with convex side facing free wheel

5. Pressure plate -B1-

- Install with flat side facing plates
- Spare part must comply with transmission code letters

6. Inner plate, -B1-

- Quantity of inner plates -B1-, see **TRANSMISSION LAYOUT**
- Soak plates in ATF for 15 minutes before installing

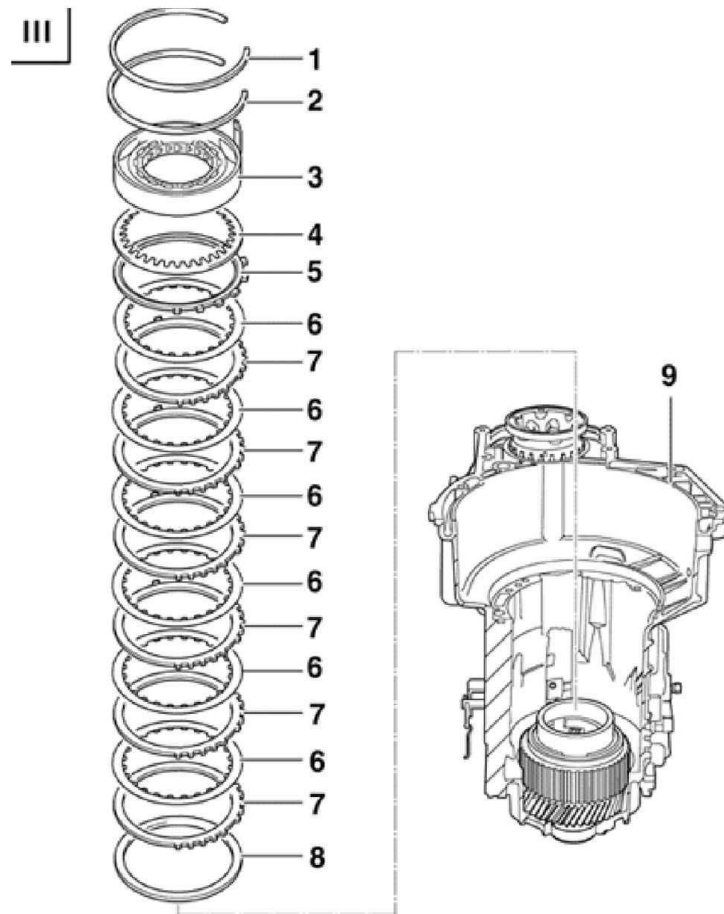
7. Outer plate, -B1-

- Quantity of outer plates -B1-, see **TRANSMISSION LAYOUT**

8. Shim

- Determining thickness, see **REVERSE GEAR BRAKE -B1-, ADJUSTING**, adjusting reverse gear brake -B1-

9. Transmission housing with planet carrier installed



- 1 - Circlip
- 2 - Circlip
- 3 - Free wheel with -B1- piston
- 4 - Dished spring
- 5 - Pressure plate -B1-
- 6 - Inner plate, -B1-
- 7 - Outer plate, -B1-
- 8 - Shim
- 9 - Transmission housing with planet carrier installed

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Fig. 80: III - Exploded View Of Free Wheel And Reverse Gear Brake -B1
 Courtesy of VOLKSWAGEN OF AMERICA, INC.

IV - Planet carrier and transmission housing with input gear and cover, assembling

For an overview, see TRANSMISSION, DISASSEMBLING AND ASSEMBLING, OVERVIEW.

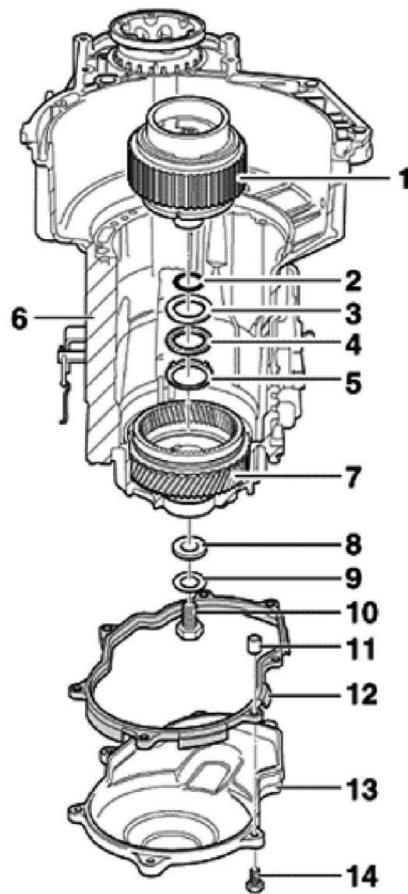
NOTE:

- **Transmission, disassembling**, see TRANSMISSION, DISASSEMBLING
- **Transmission, assembling**, see TRANSMISSION, ASSEMBLING

The following list pertains to Fig. 81.

1. **Planet carrier**
 - Adjusting, see PLANET CARRIER, ADJUSTING
2. **O-ring**
 - Always replace
 - Insert in planet carrier
3. **Axial needle bearing washer**
4. **Axial needle bearing**
5. **Axial needle bearing washer**
 - Install smooth side in input gear
6. **Transmission housing with input gear installed**
7. **Input gear**
 - Do not remove to disassemble transmission
 - Removing and installing input gear or axial needle bearing for planet carrier, see INPUT GEAR, REMOVING AND INSTALLING
8. **Planet carrier shim**
 - Determining thickness, see PLANET CARRIER, ADJUSTING
9. **Washer**
10. **Bolt**
 - 30 N.m (22 ft lb)
 - For small input shaft
11. **Spacer bushing**
 - Install in gasket (Qty 7)
12. **Gasket**
 - Always replace
13. **Cover**
14. **Bolt, 8 N.m (70 in. lb)**
 - 8 N.m (70 in lb)

IV



- | | |
|--|-----------------------------|
| 1 - Planet carrier | 11 - Spacer bushing |
| 2 - O-ring | 12 - Gasket |
| 3 - Axial needle bearing washer | 13 - Cover |
| 4 - Axial needle bearing | 14 - Bolt, 8 Nm (70 in. lb) |
| 5 - Axial needle bearing washer | |
| 6 - Transmission housing with input gear installed | |
| 7 - Input gear | |
| 8 - Planet carrier shim | |
| 9 - Washer | |
| 10 - Bolt | |

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Fig. 81: IV - Exploded View Of Planet Carrier And Transmission Housing With Input Gear And Cover, Assembling
 Courtesy of VOLKSWAGEN OF AMERICA, INC.

Transmission, disassembling and assembling

Special tools and equipment

- VW 309 Support fixture
- VW 313 Support clamp
- VW 353 Transmission support
- 2 M8 bolts
- 2 M10 bolts with nuts
- Drip tray

Transmission, disassembling

- Place drain pan under transmission
- Remove sealing plug -1- and ATF overflow line -2-.

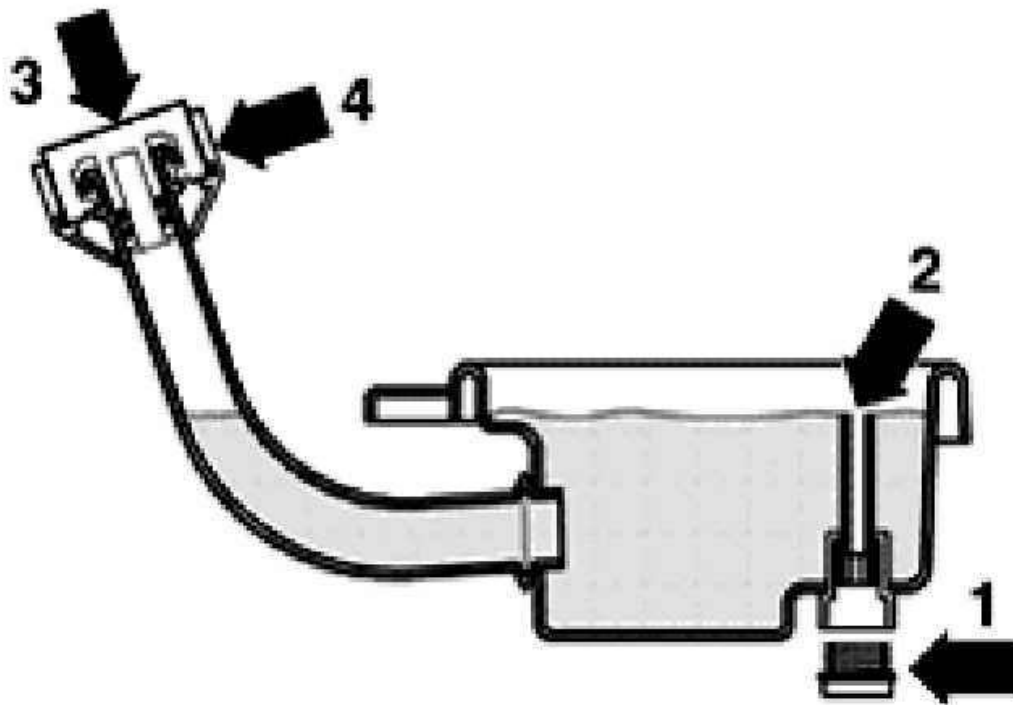
**G03362335**

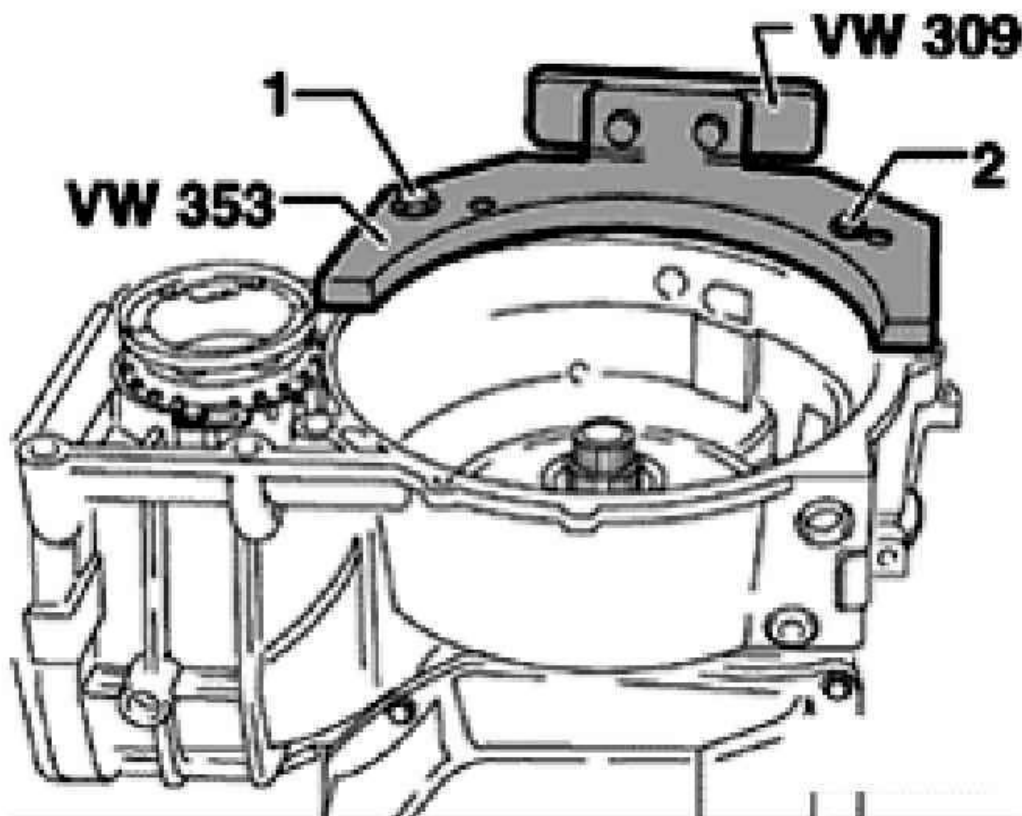
Fig. 82: Removing Sealing Plug And ATF Overflow Line
Courtesy of VOLKSWAGEN OF AMERICA, INC.

- Drain ATF

3 - Sealing plug

4 - Cap

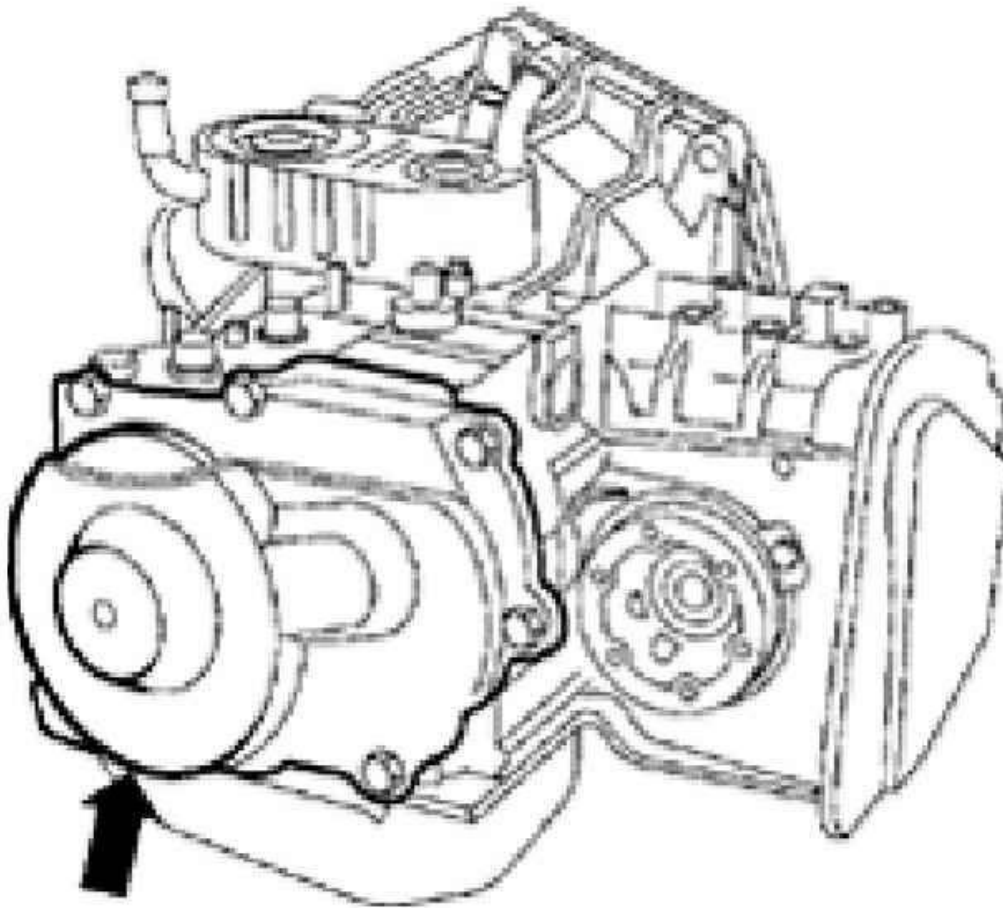
- Seal ATF cooler connections.
- Remove torque converter
- Secure transmission to assembly support with bolts -1- and -2- (M10).



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Fig. 83: Securing Transmission To Assembly Support With Bolts
Courtesy of VOLKSWAGEN OF AMERICA, INC.

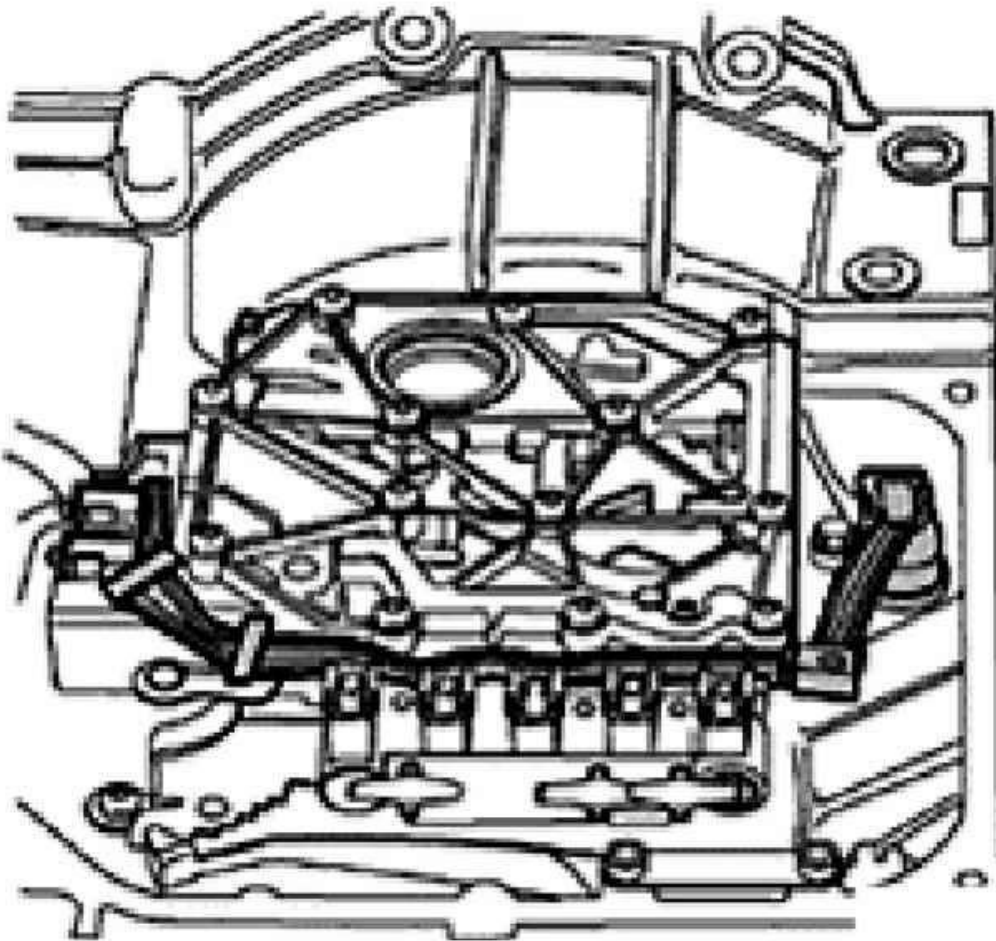
- Remove transmission housing cover with gasket -arrow-



G03362337

Fig. 84: Removing Transmission Housing Cover With Gasket
Courtesy of VOLKSWAGEN OF AMERICA, INC.

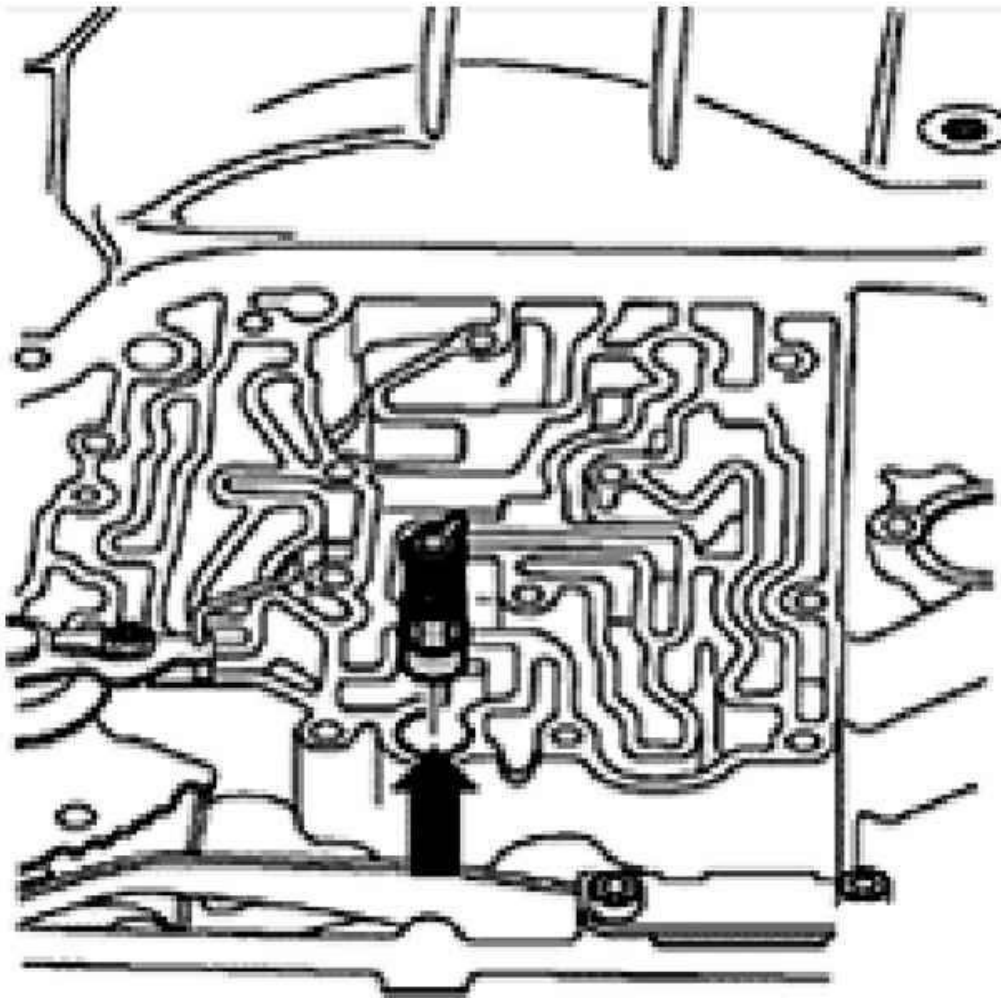
- Remove oil pan.
- Remove ATF screen.
- Remove valve body with conductor strip, see **VALVE BODY, REMOVING AND INSTALLING**



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Fig. 85: Removing Valve Body With Conductor Strip
Courtesy of VOLKSWAGEN OF AMERICA, INC.

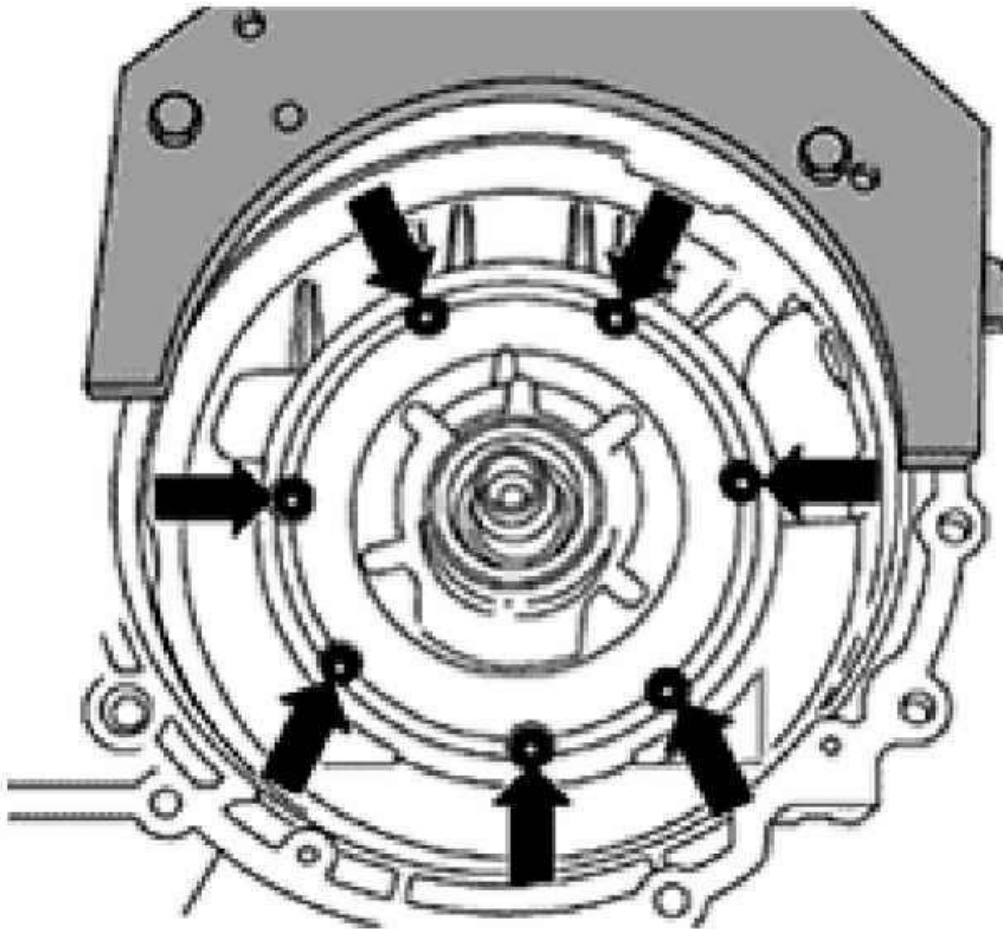
- Remove sealing plugs for -B1- -arrow-.



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Fig. 86: Removing Sealing Plugs
Courtesy of VOLKSWAGEN OF AMERICA, INC.

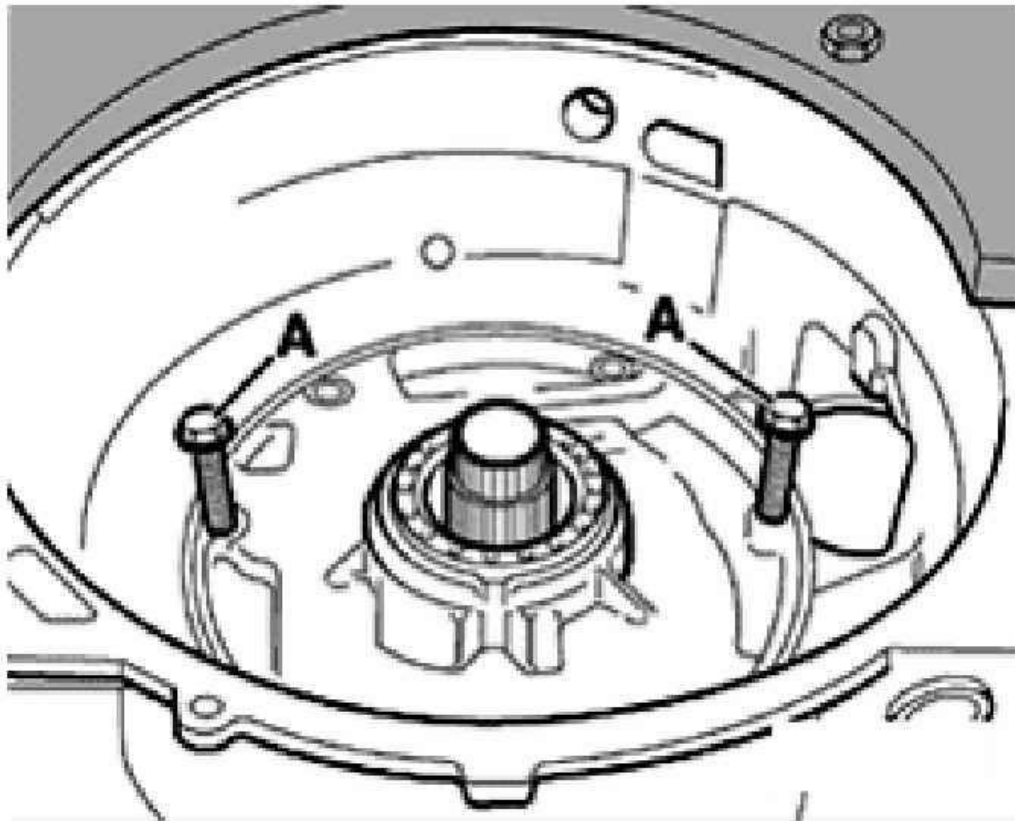
- Remove ATF pump bolts -arrows-.



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Fig. 87: Removing ATF Pump Bolts
Courtesy of VOLKSWAGEN OF AMERICA, INC.

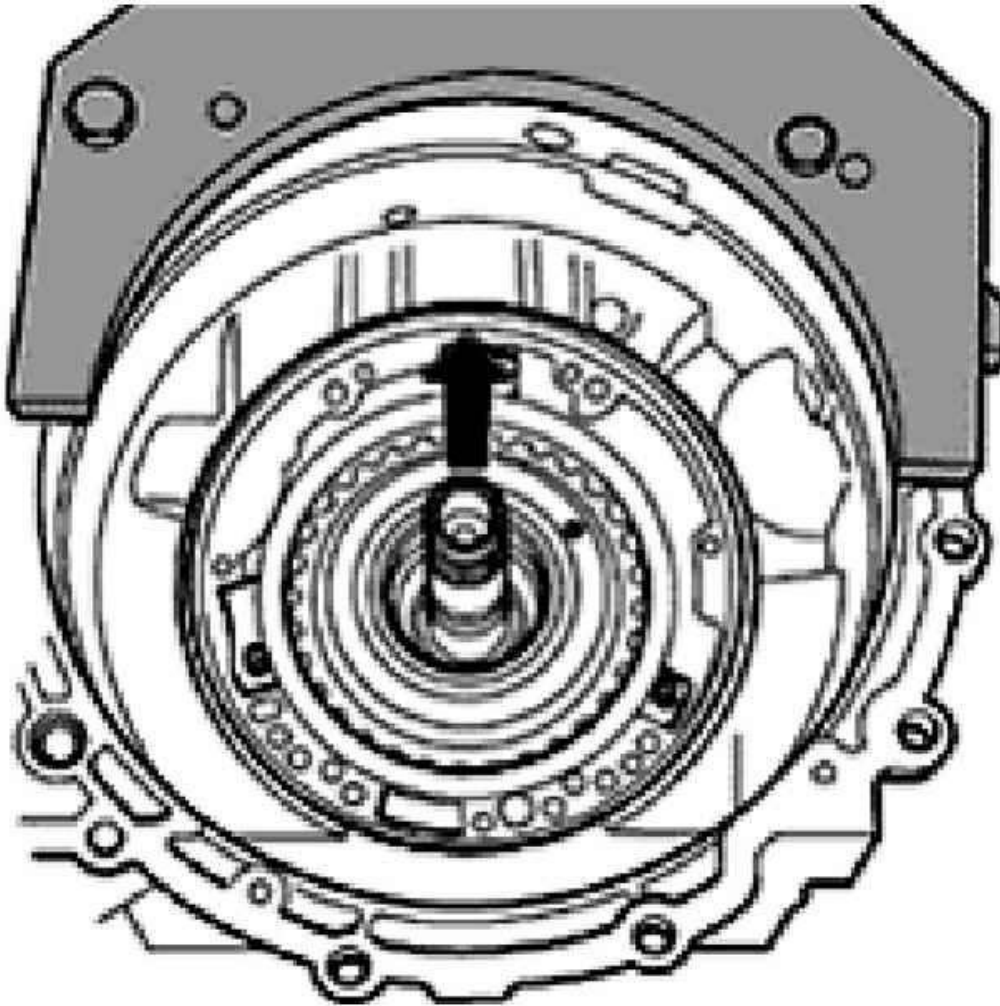
- Install bolts -A- (M8) in threaded holes of ATF pump.
- Press ATF pump off transmission by turning bolts -A-evenly.



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Fig. 88: Installing Bolts In Threaded Holes Of ATF Pump
Courtesy of VOLKSWAGEN OF AMERICA, INC.

- Remove all clutches with support sleeve, -B2- plates, springs and spring caps together.



G03362342

Fig. 89: Removing Clutches With Support Sleeve, -B2- Plates, Springs And Spring Caps
Courtesy of VOLKSWAGEN OF AMERICA, INC.

- Insert screwdriver through hole of large sun gear to loosen and tighten bolt for small input shaft.

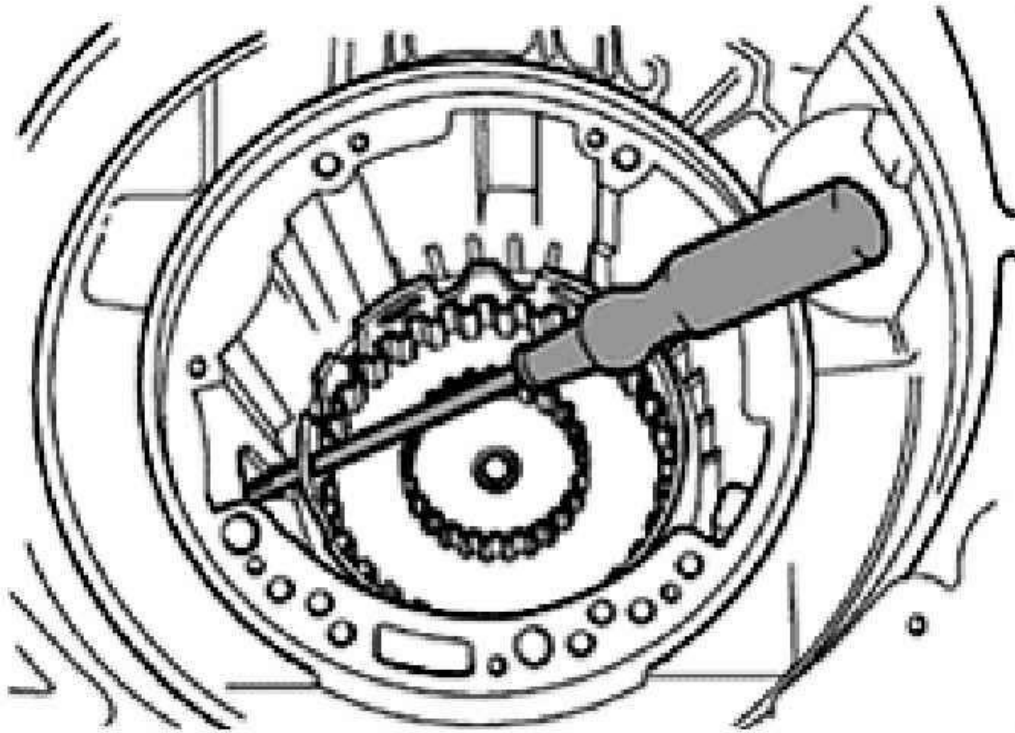
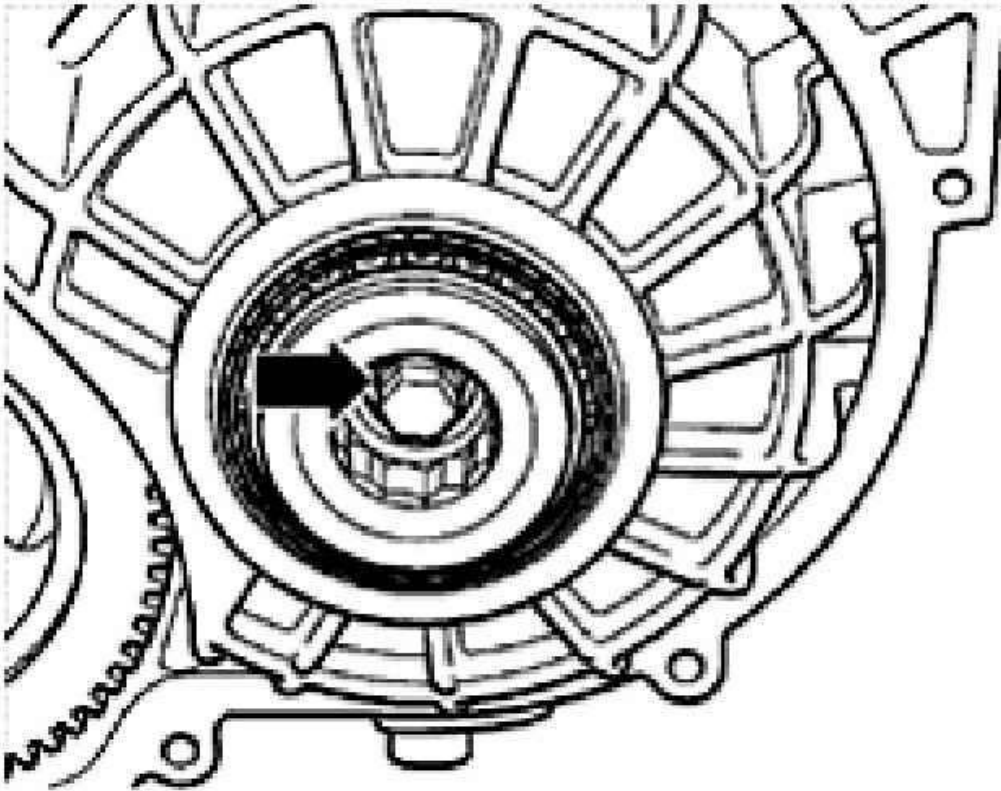
**G03362343**

Fig. 90: Inserting Screwdriver Through Hole Of Large Sun Gear
Courtesy of VOLKSWAGEN OF AMERICA, INC.

- Loosen small input shaft bolt -arrow-.
- Remove small input shaft bolt, washer and shim.

Planet carrier axial needle bearing remains in transmission/input gear.

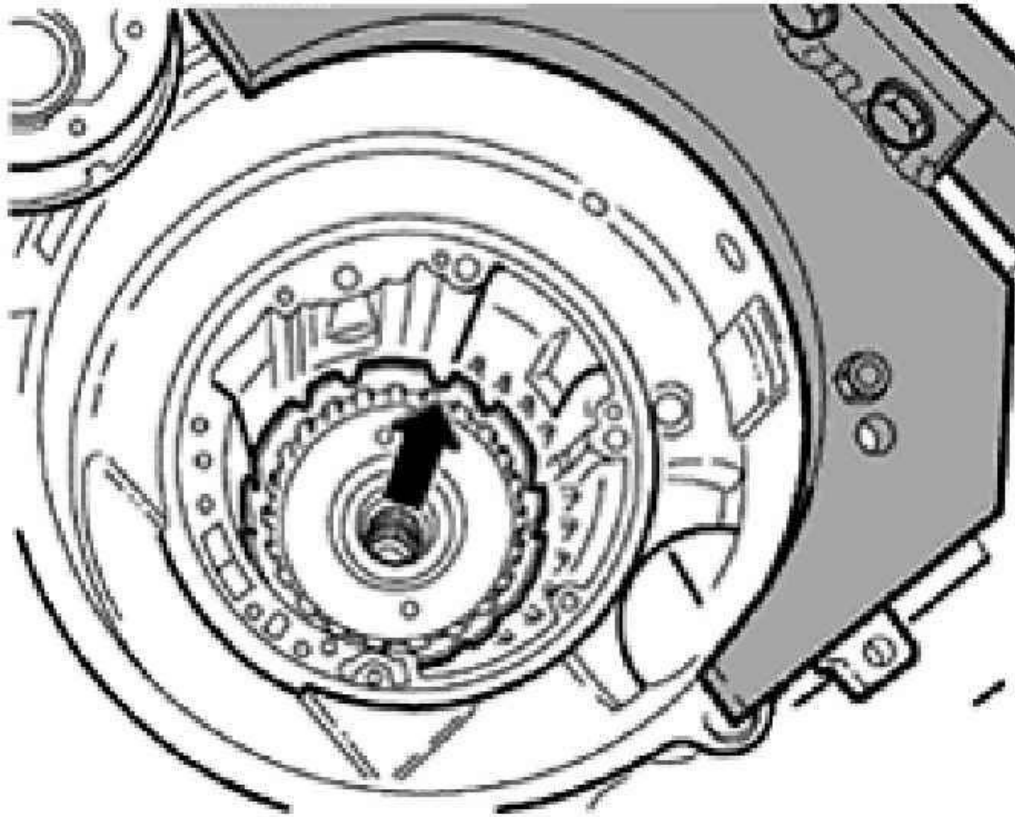
- Remove small input shaft.



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Fig. 91: Loosening Small Input Shaft Bolt
Courtesy of VOLKSWAGEN OF AMERICA, INC.

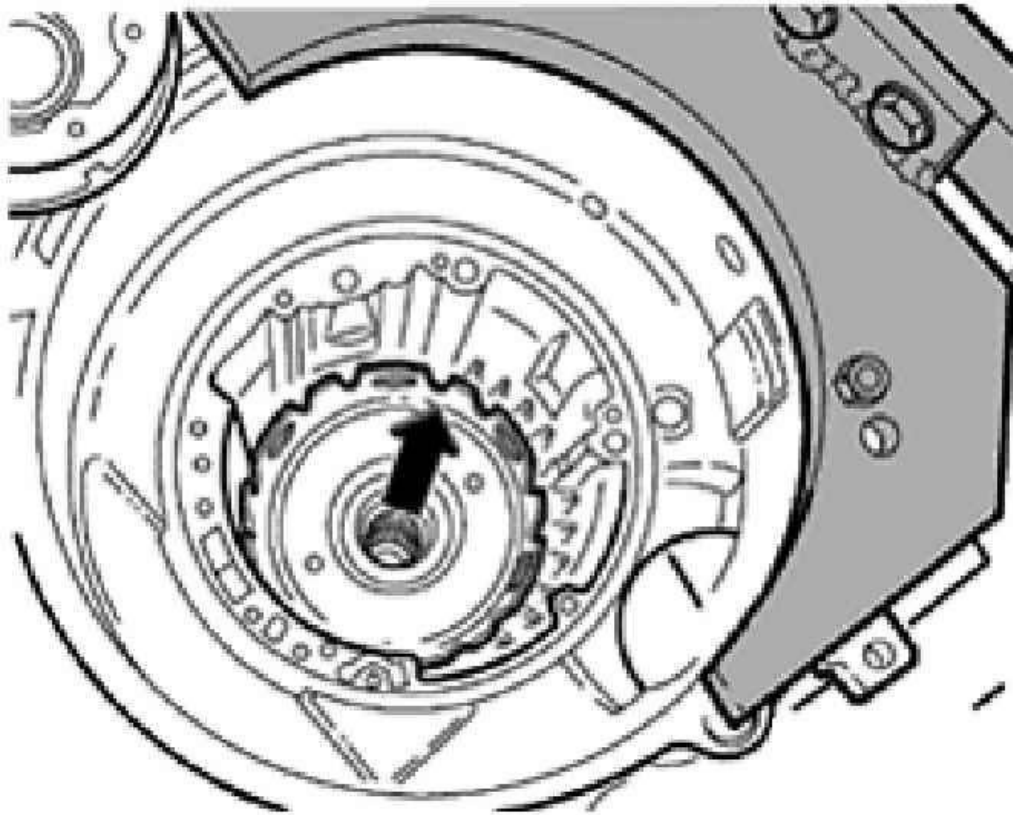
- Pull out large input shaft -arrow-.



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Fig. 92: Pulling Out Large Input Shaft
Courtesy of VOLKSWAGEN OF AMERICA, INC.

- Pull out large sun gear -arrow-.



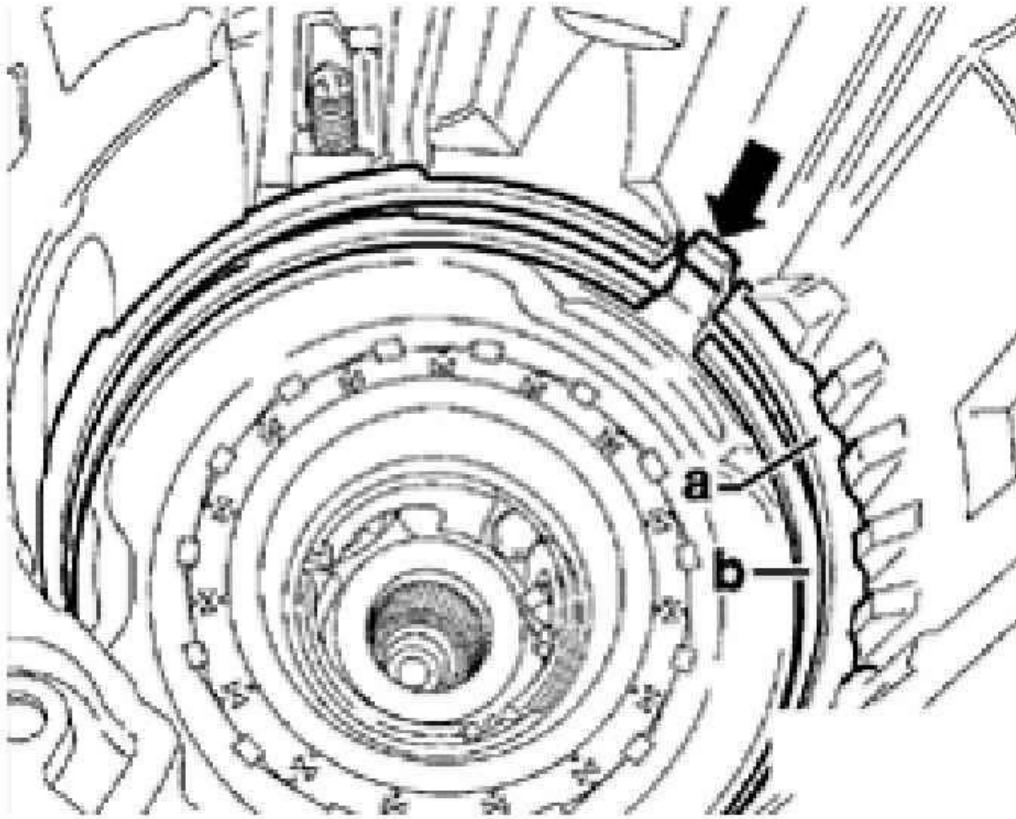
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Fig. 93: Pulling Out Large Sun Gear
Courtesy of VOLKSWAGEN OF AMERICA, INC.

- Remove Transmission Vehicle Speed Sensor (VSS) -G38-

See **VEHICLE SPEED SENSOR (VSS) -G68-, REMOVING AND INSTALLING**

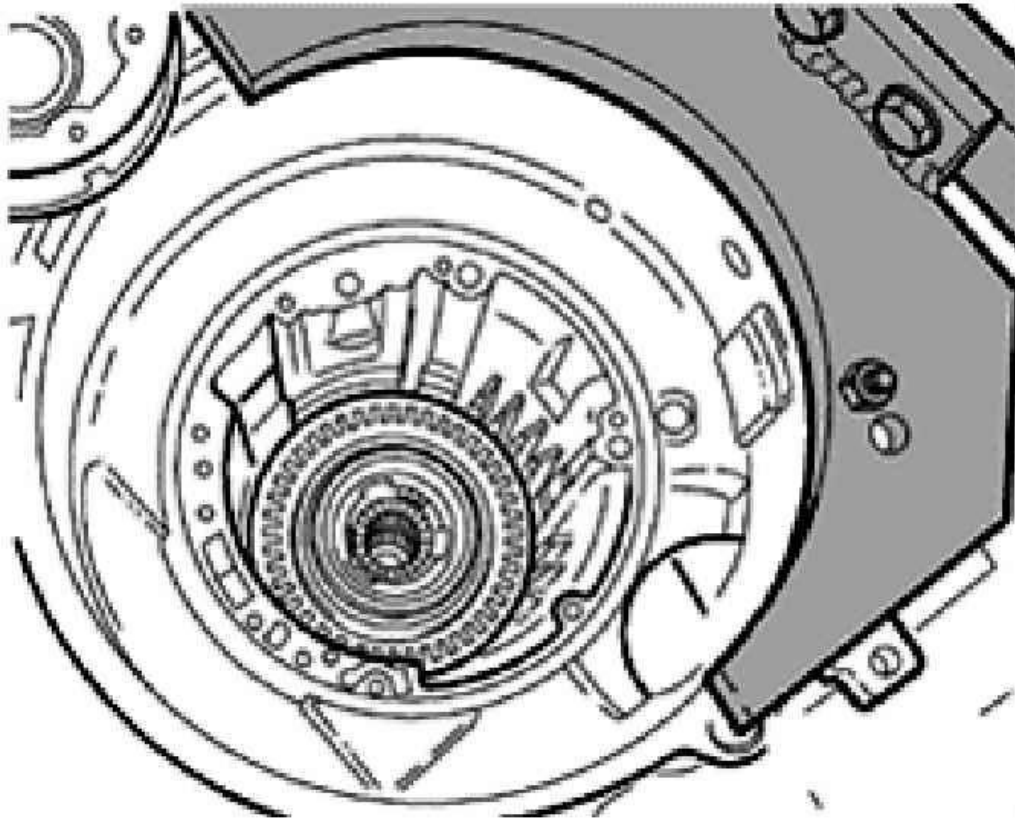
- Remove supporting tube circlip -a- and free wheel circlip -b-.
- Remove free wheel out of transmission housing by pulling on free wheel retaining wedge -arrow- with pliers.



G03362347

Fig. 94: Removing Supporting Tube Circlip And Free Wheel Circlip
Courtesy of VOLKSWAGEN OF AMERICA, INC.

- Remove planet carrier with dished spring.



G03362348

Fig. 95: Removing Planet Carrier With Dished Spring
Courtesy of VOLKSWAGEN OF AMERICA, INC.

- Remove reverse gear brake -B1- plates.

NOTE:

- It is not necessary to remove input gear to disassemble transmission. Input gear, removing and installing, see INPUT GEAR, REMOVING AND INSTALLING.
- Transmission, assembling, see TRANSMISSION, ASSEMBLING.

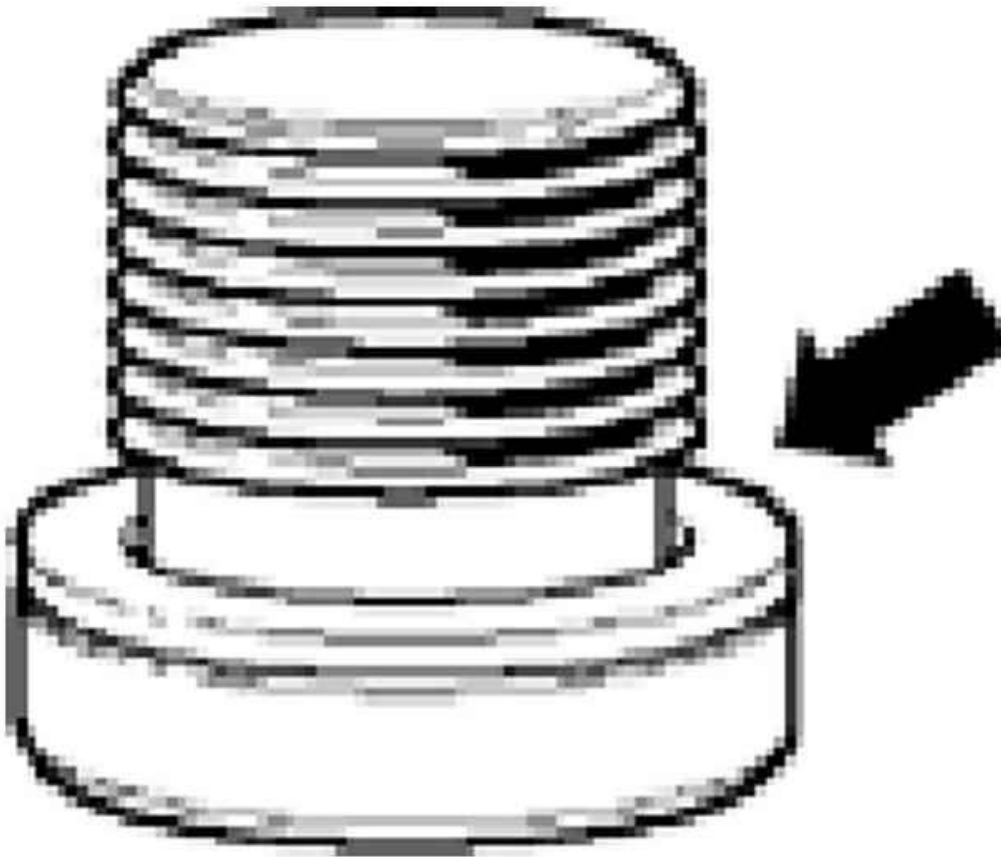
Transmission, assembling

Special tools and equipment

- Approx. 3 ltr VW ATF

Transmission, assembling

- Plug seal -arrow-.



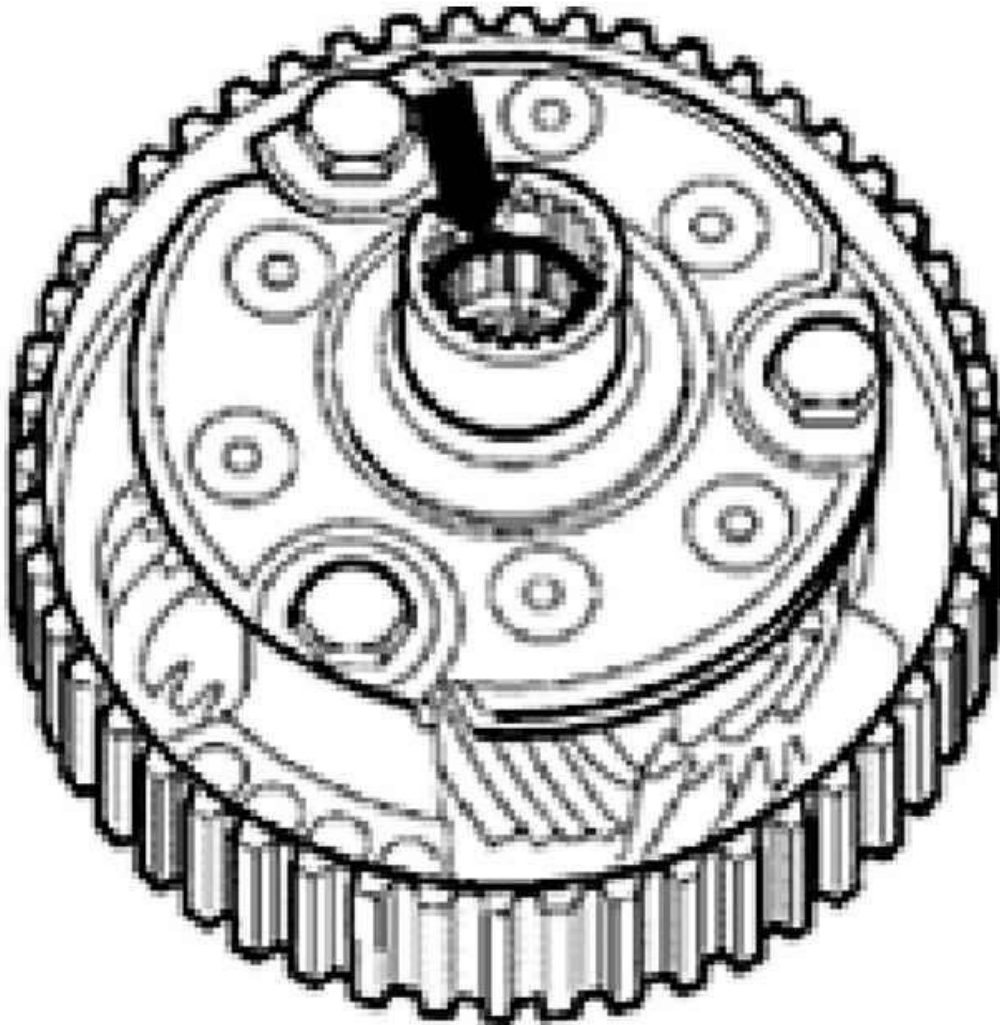
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Fig. 96: Installing Plug Seal

Courtesy of VOLKSWAGEN OF AMERICA, INC.

- Install O-ring in planet carrier.

NOTE: After replacing planet carrier, adjust, see PLANET CARRIER, ADJUSTING.



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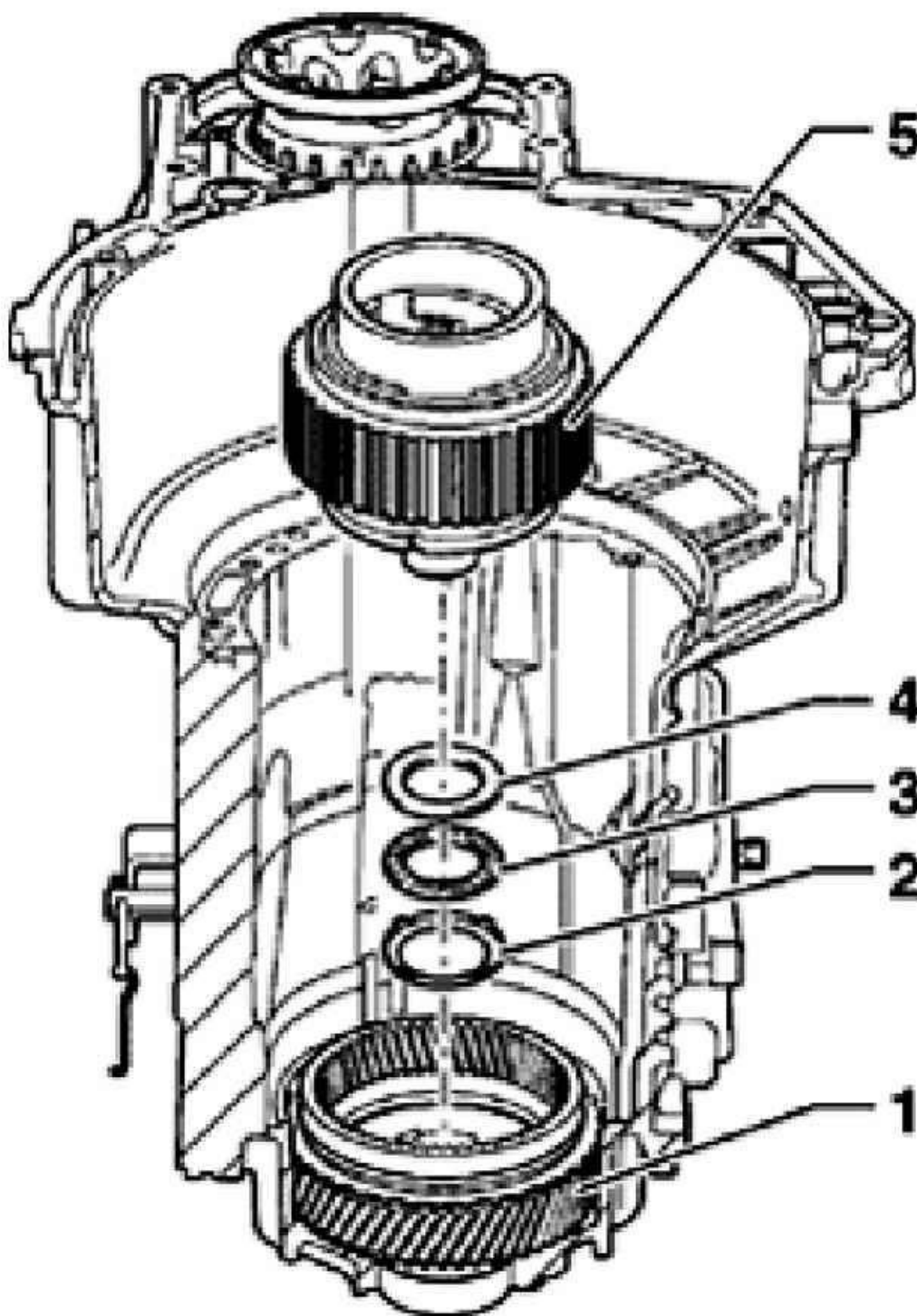
Fig. 97: Installing O Ring In Planet Carrier
Courtesy of VOLKSWAGEN OF AMERICA, INC.

- Insert axial needle bearing with washers and planet carrier in input gear.
 - 1. - Input gear is installed in transmission housing, see **TRANSMISSION, DISASSEMBLING AND ASSEMBLING, OVERVIEW**.
 - 2. - Axial needle bearing washer. Insert smooth side into input gear.
 - 3. - Axial needle bearing
 - 4. - Axial needle bearing washer

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5. - Install planet carrier with O -ring installed

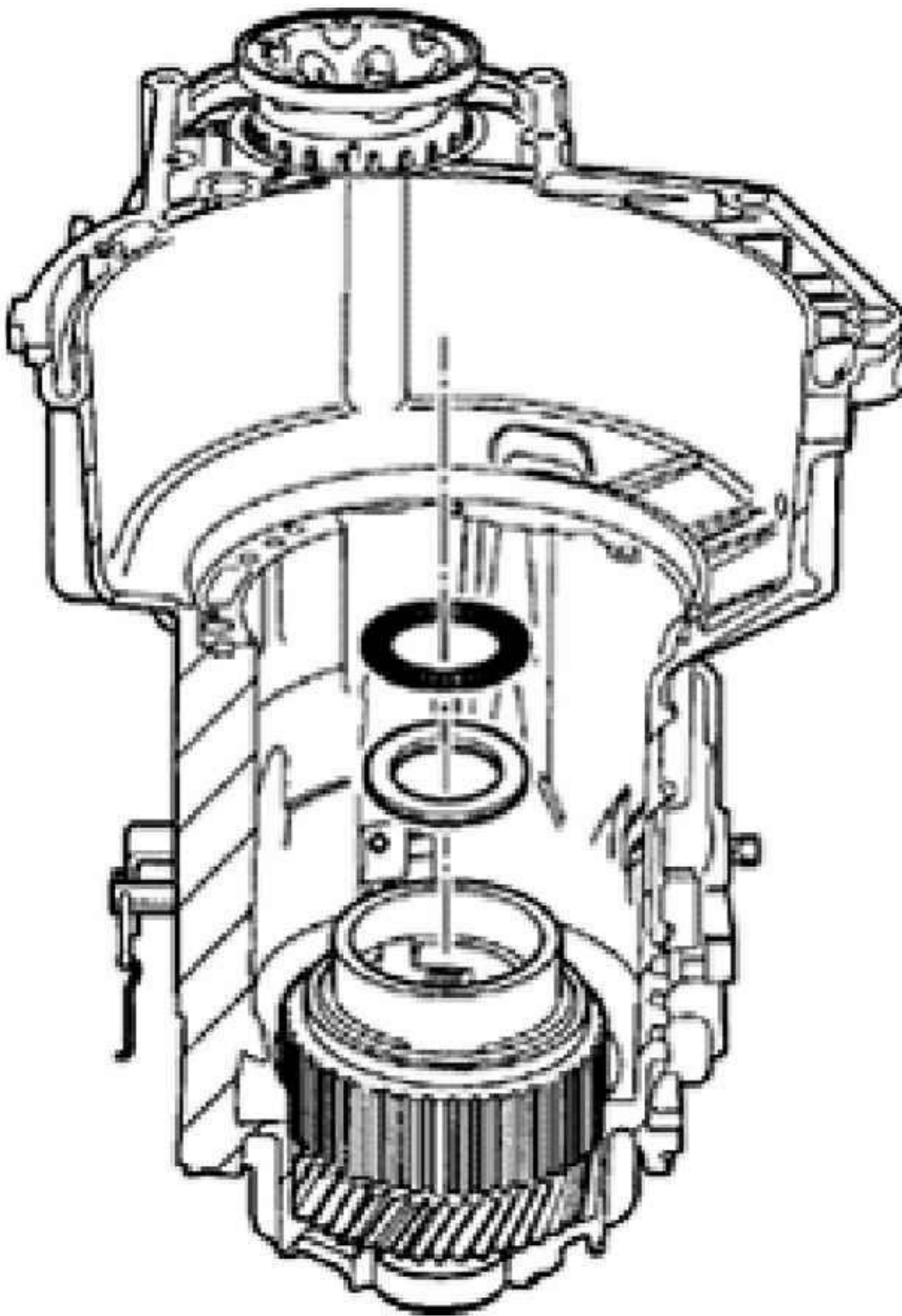


G03362351

Fig. 98: Installing Axial Needle Bearing With Washers And Planet Carrier In Input Gear
Courtesy of VOLKSWAGEN OF AMERICA, INC.

- Place washer and axial needle bearing on small sun gear in planet carrier.
- Center washer and axial needle bearing in small sun gear.
- Insert inner and outer -B1- plates.
- Insert pressure plate with flat side facing plates.

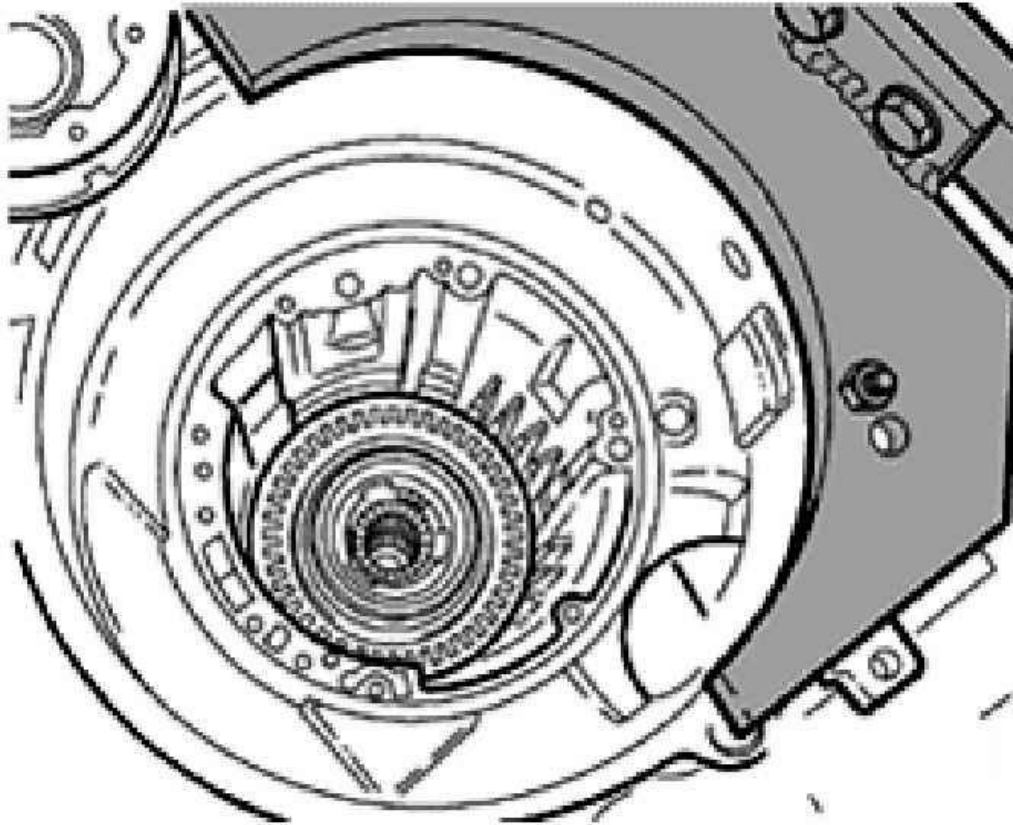
Thickness of pressure plate varies according to number of plates. Replacement parts must comply with transmission code letters.



G03362352

Fig. 99: Placing Washer And Axial Needle Bearing On Small Sun Gear In Planet Carrier
Courtesy of VOLKSWAGEN OF AMERICA, INC.

- Insert dished washer with convex facing toward free wheel.



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Fig. 100: Inserting Dished Washer With Convex Facing
Courtesy of VOLKSWAGEN OF AMERICA, INC.

NOTE: When replacing

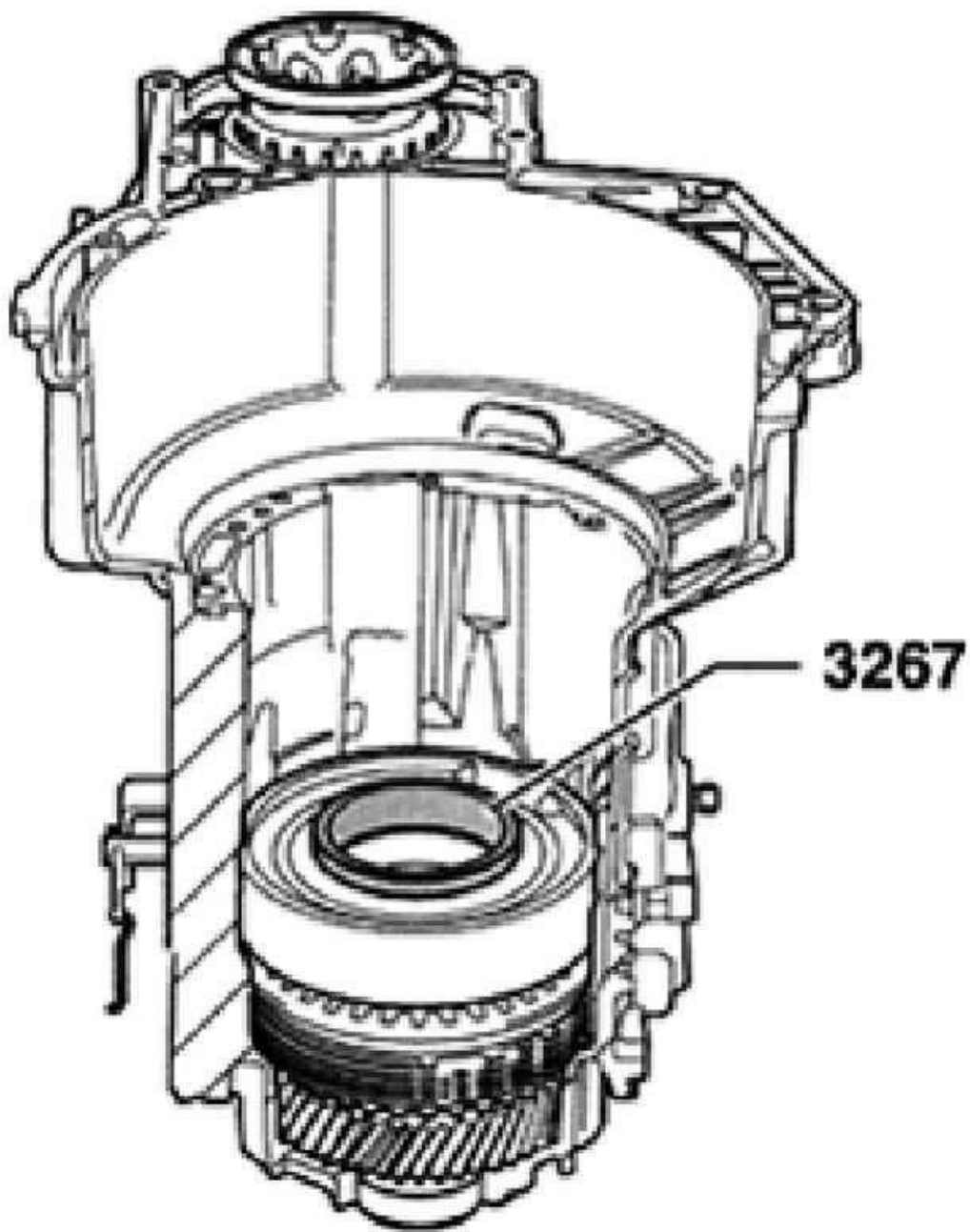
- Transmission housing
- Free wheel
- Piston for reverse gear brake -B1-
- or plates

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then adjust -B1-, see REVERSE GEAR BRAKE - B1-, ADJUSTING.

- Preload free wheel rollers with assembly ring 3267 and insert free wheel.



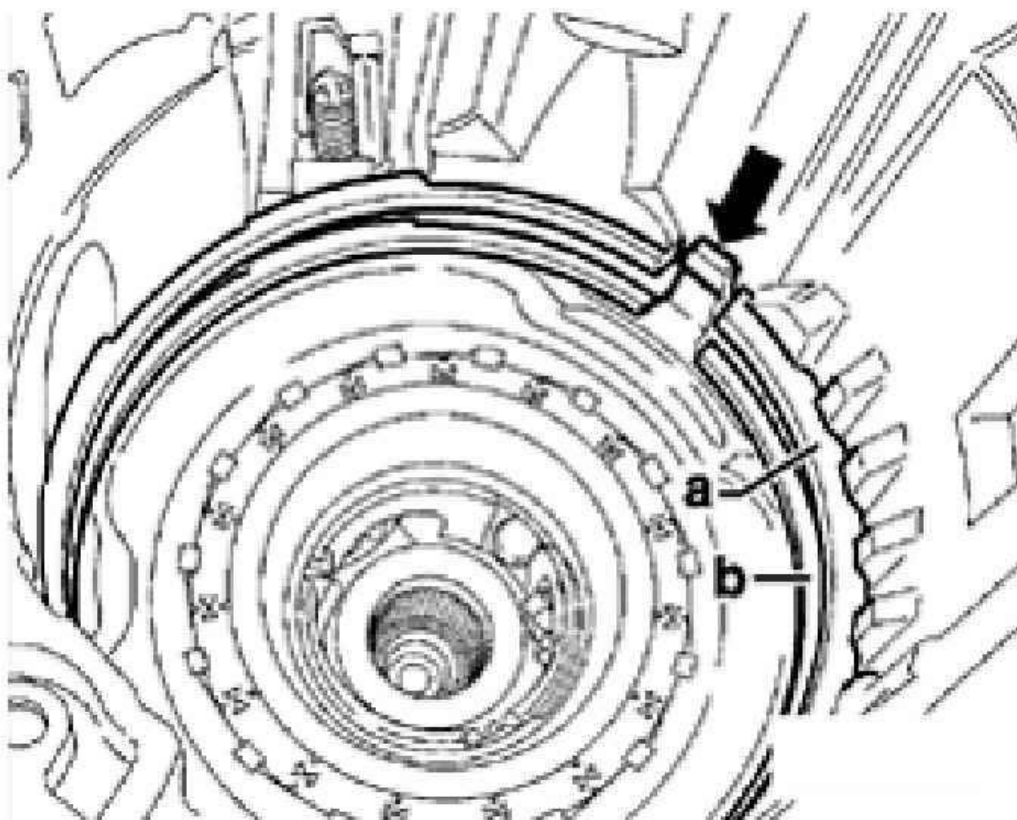
G03362354

Fig. 101: Installing Free Wheel Rollers With Assembly Ring 3267
Courtesy of VOLKSWAGEN OF AMERICA, INC.

- Install circlip for free wheel -b- and circlip for support tube -a-.
- Insert circlip gaps over free wheel retaining wedge -arrow-.
- Install Transmission Vehicle Speed Sensor -G38-

See **TRANSMISSION VEHICLE SPEED SENSOR (VSS) -G38-, REMOVING AND INSTALLING**.

- Check -B1- measurement, see **CLUTCH PLAY BETWEEN -K1- AND - K2-, ADJUSTING**



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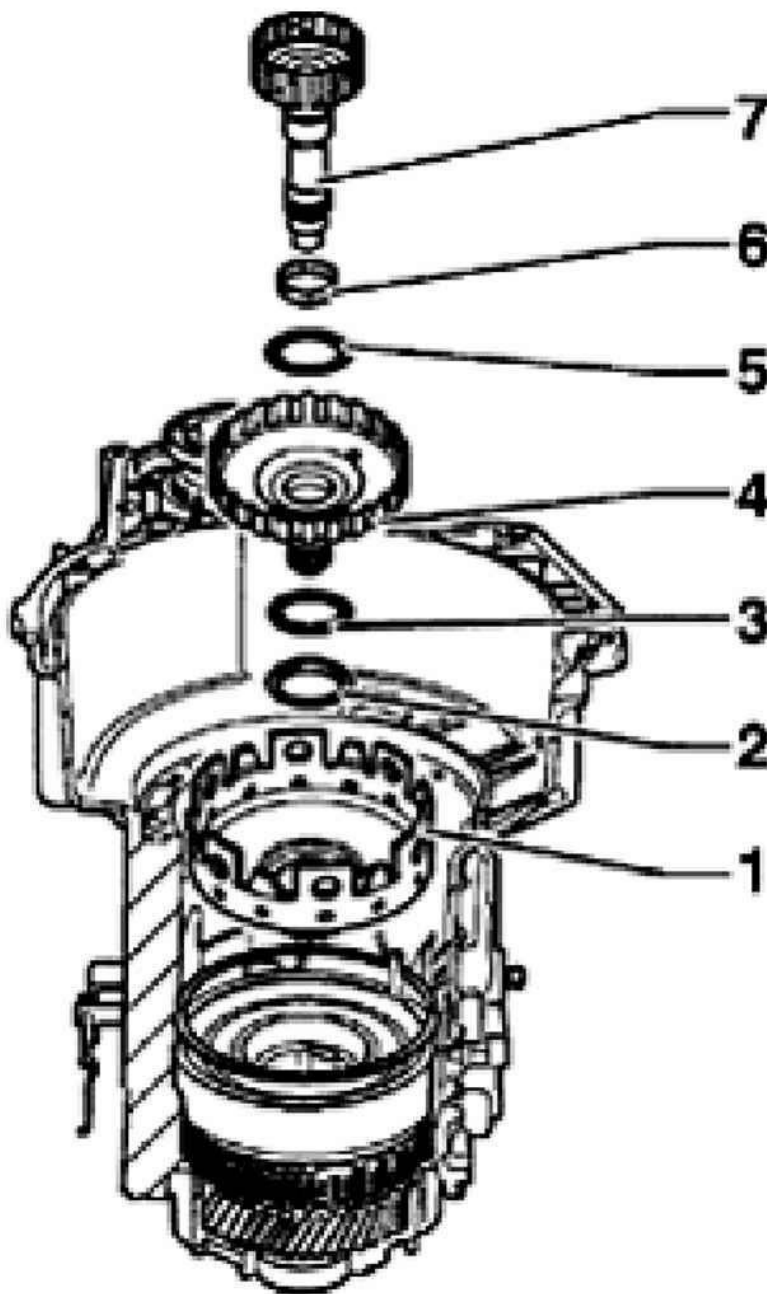
Fig. 102: Installing Circlip For Free Wheel And Support Tube
Courtesy of VOLKSWAGEN OF AMERICA, INC.

- Insert components in transmission housing, starting with large sun gear down to small input shaft.
 1. - Large sun gear
 2. - Needle bearing washer (collar faces to large sun gear)

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3. - Axial needle bearing
4. - Large input shaft
5. - Axial needle bearing
6. - Needle bearing
7. - Small input shaft

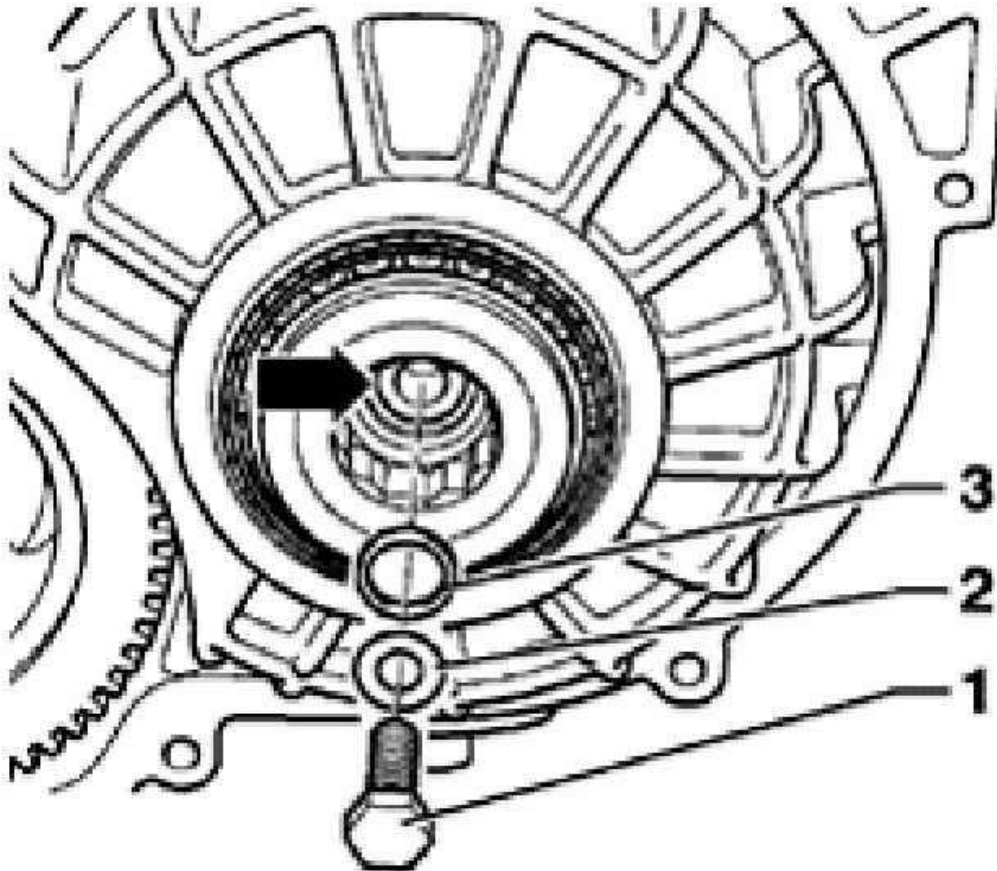


G03362356

Fig. 103: Inserting Components In Transmission Housing
Courtesy of VOLKSWAGEN OF AMERICA, INC.

- Install small drive shaft bolt -1- with washer -2- and shim -3-. See **Fig. 104**.
- Tightening torque: 30 N.m (22 ft lb)

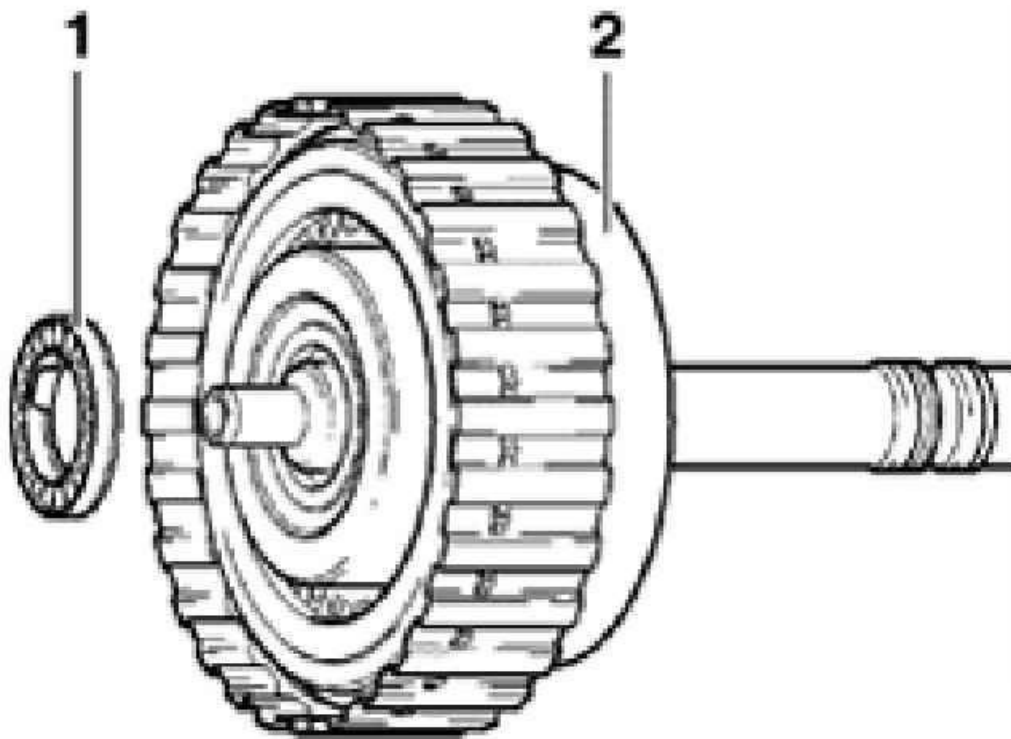
- Install shim -3- onto small input shaft shoulder -arrow-.
- Determine shim thickness, see **PLANET CARRIER, ADJUSTING.**
- Check planet carrier measurement, see **PLANET CARRIER, CHECKING MEASUREMENT.**



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Fig. 104: Installing Small Drive Shaft Bolt With Washer And Shim
 Courtesy of VOLKSWAGEN OF AMERICA, INC.

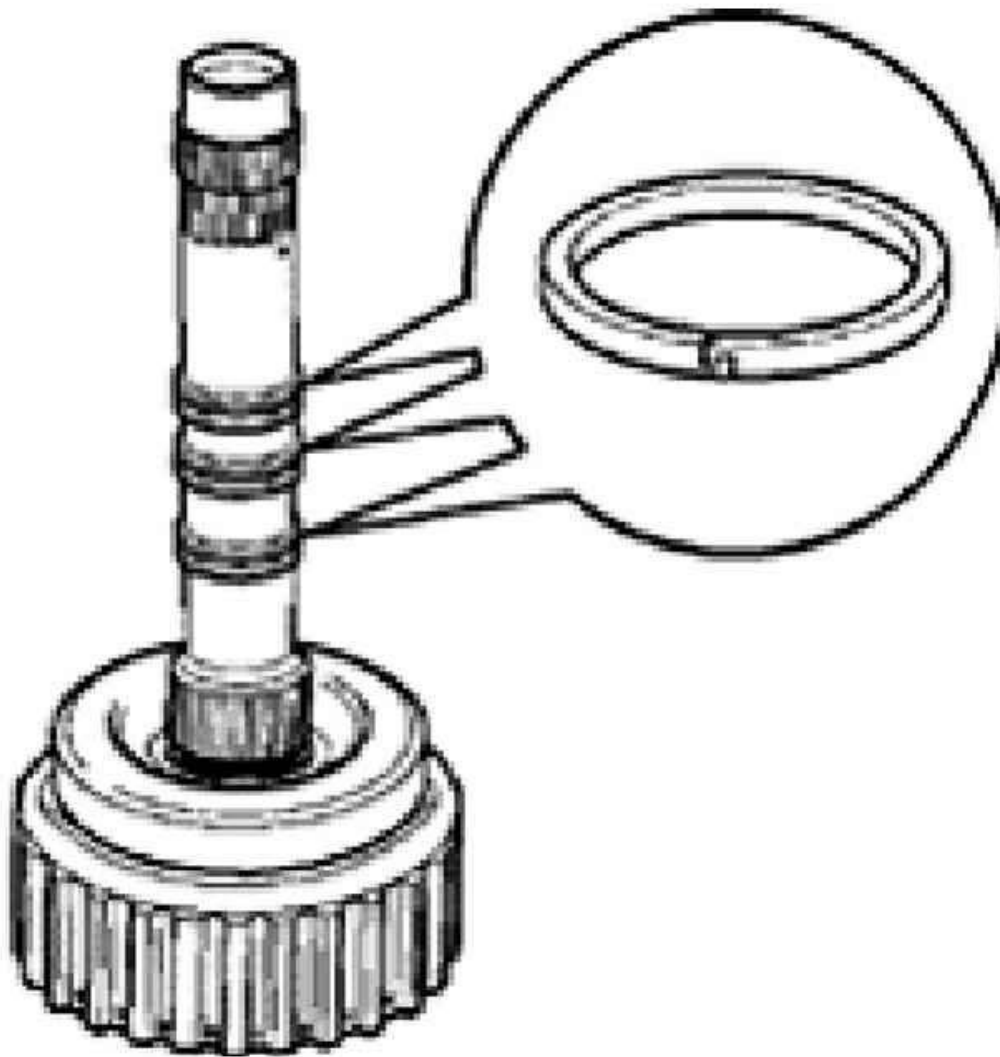
- Snap in axial needle bearing with thrust washer to 3rd and 4th gear clutch -K3-.
 1. - Axial needle bearing with thrust washer
 - Moisten axial needle bearing washer with ATF so bearing sticks to -K3-. Install bearing washer on -K3-.
 2. - 3rd and 4th gear clutch -K3-



G03362358

Fig. 105: Installing Axial Needle Bearing With Thrust Washer To 3rd And 4th Gear Clutch -K3
Courtesy of VOLKSWAGEN OF AMERICA, INC.

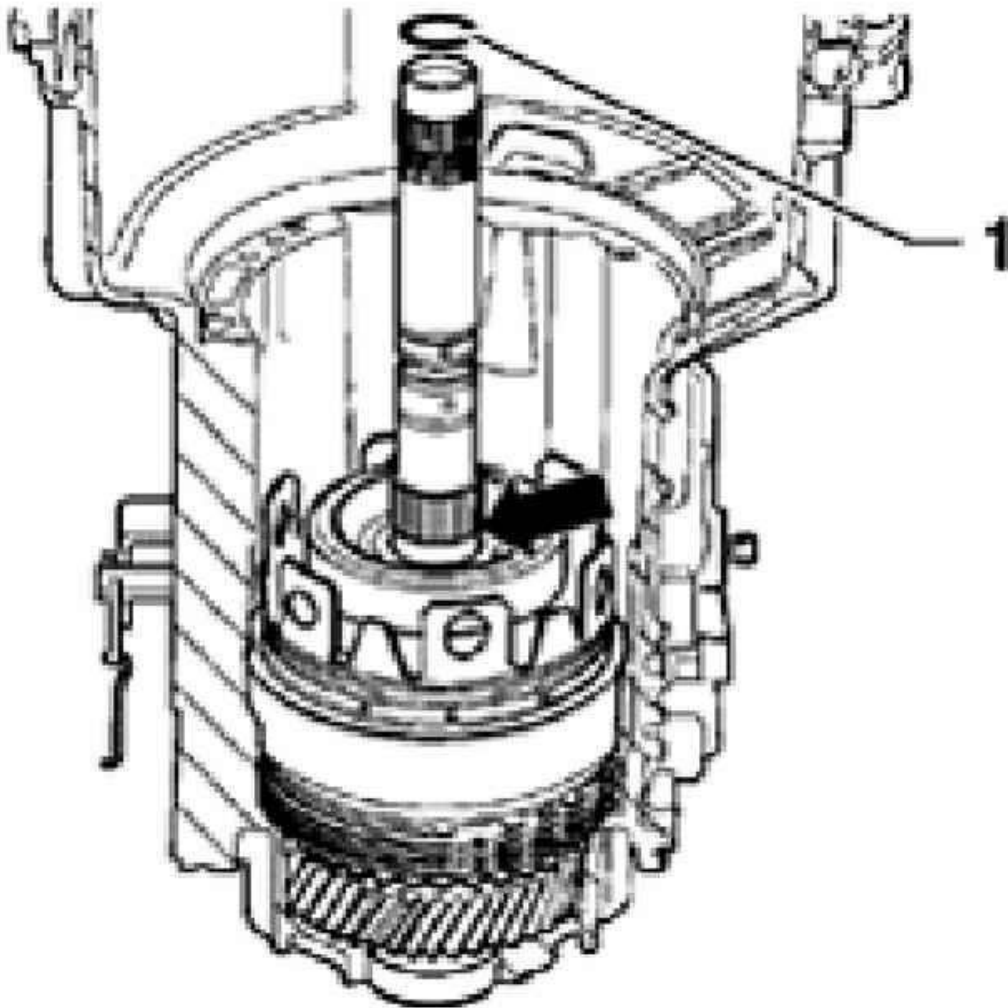
- Ensure piston rings seat correctly on -K3-.
- Ensure ends of piston rings are hooked together.



G03362359

Fig. 106: Ensuring Piston Rings Seat Correctly On -K3
Courtesy of VOLKSWAGEN OF AMERICA, INC.

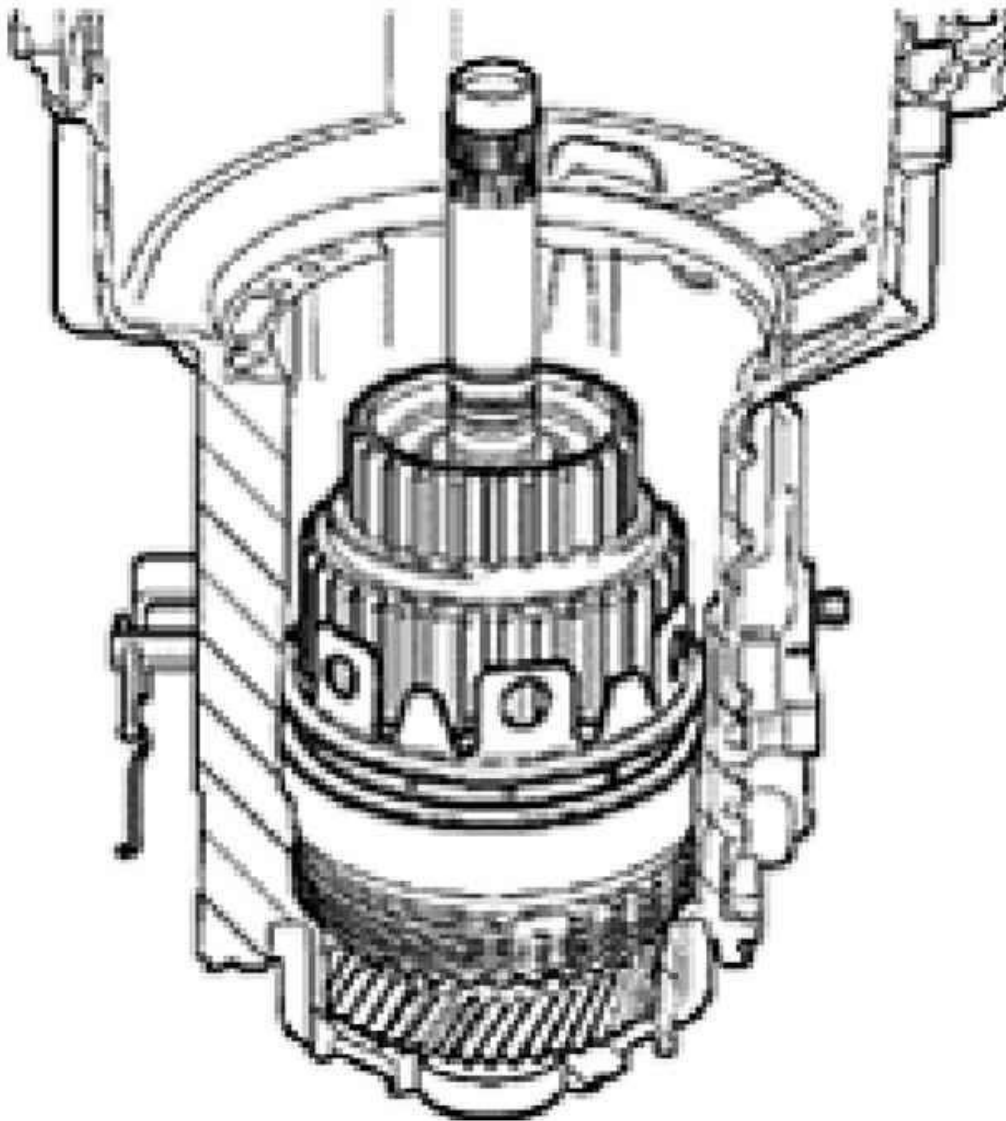
- Install 3rd and 4th gear clutch -K3-.
- Fit seal -1- in the groove -arrow-.



G03362360

Fig. 107: Installing Seal In Groove
Courtesy of VOLKSWAGEN OF AMERICA, INC.

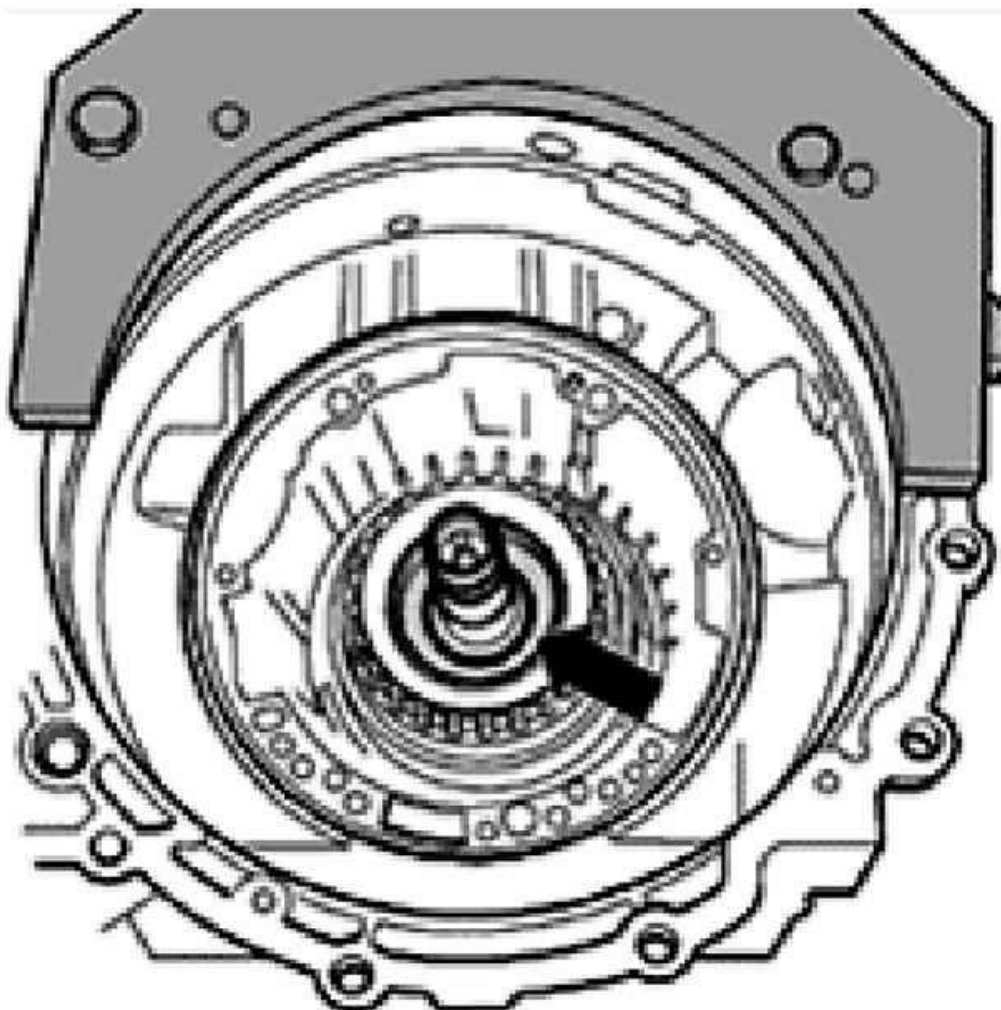
- Install 1st to 3rd gear clutch -K1- with 3rd and 4th gear clutch -K3-.



G03362361

Fig. 108: Installing 1st To 3rd Gear Clutch -K1- With 3rd And 4th Gear Clutch -K3
Courtesy of VOLKSWAGEN OF AMERICA, INC.

- Install shims -arrow- in -K1-.



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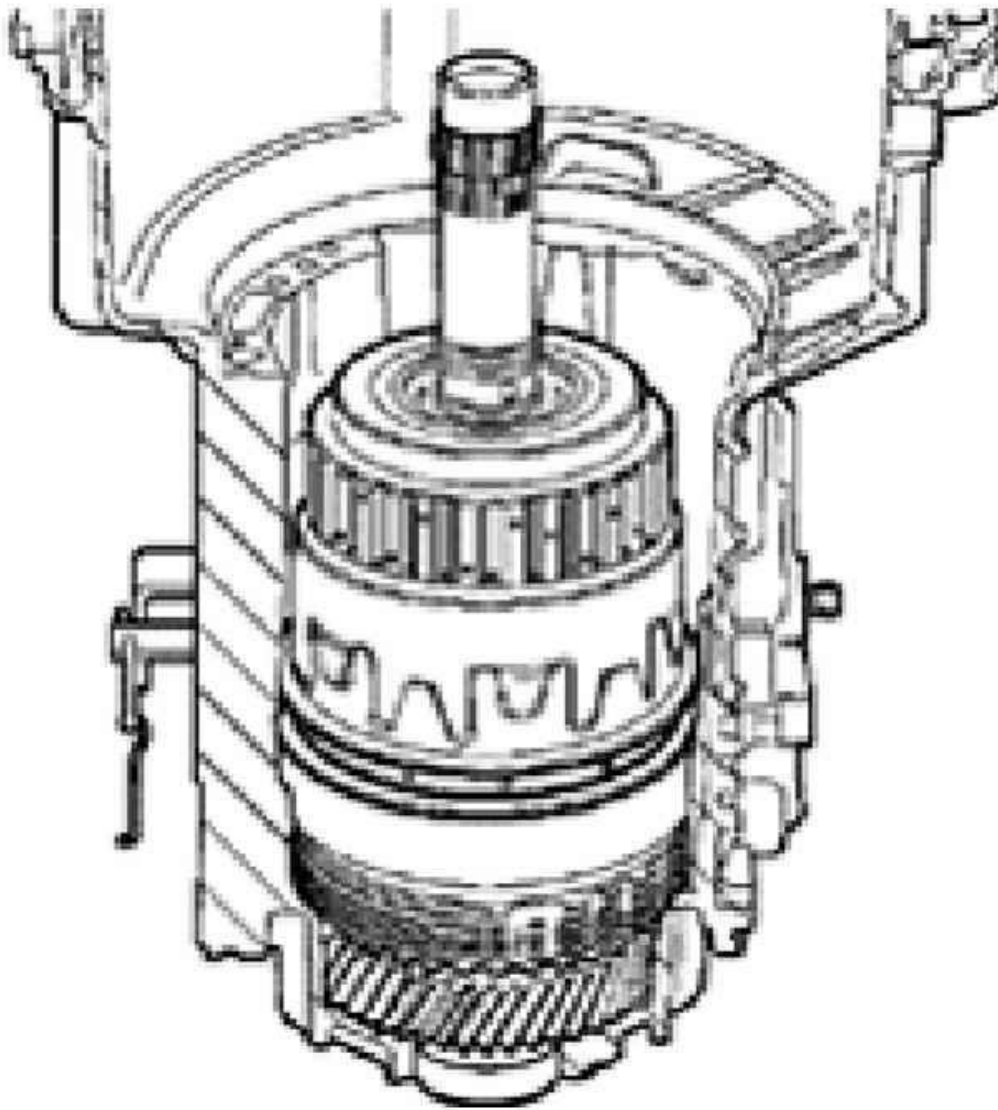
Fig. 109: Installing Shims In -K1

Courtesy of VOLKSWAGEN OF AMERICA, INC.

NOTE:

- Remeasure shim when replacing -K1-, -K2- or ATF pump, see CLUTCH PLAY BETWEEN -K1- AND - K2-, ADJUSTING.
- 1 or 2 shims can be installed.

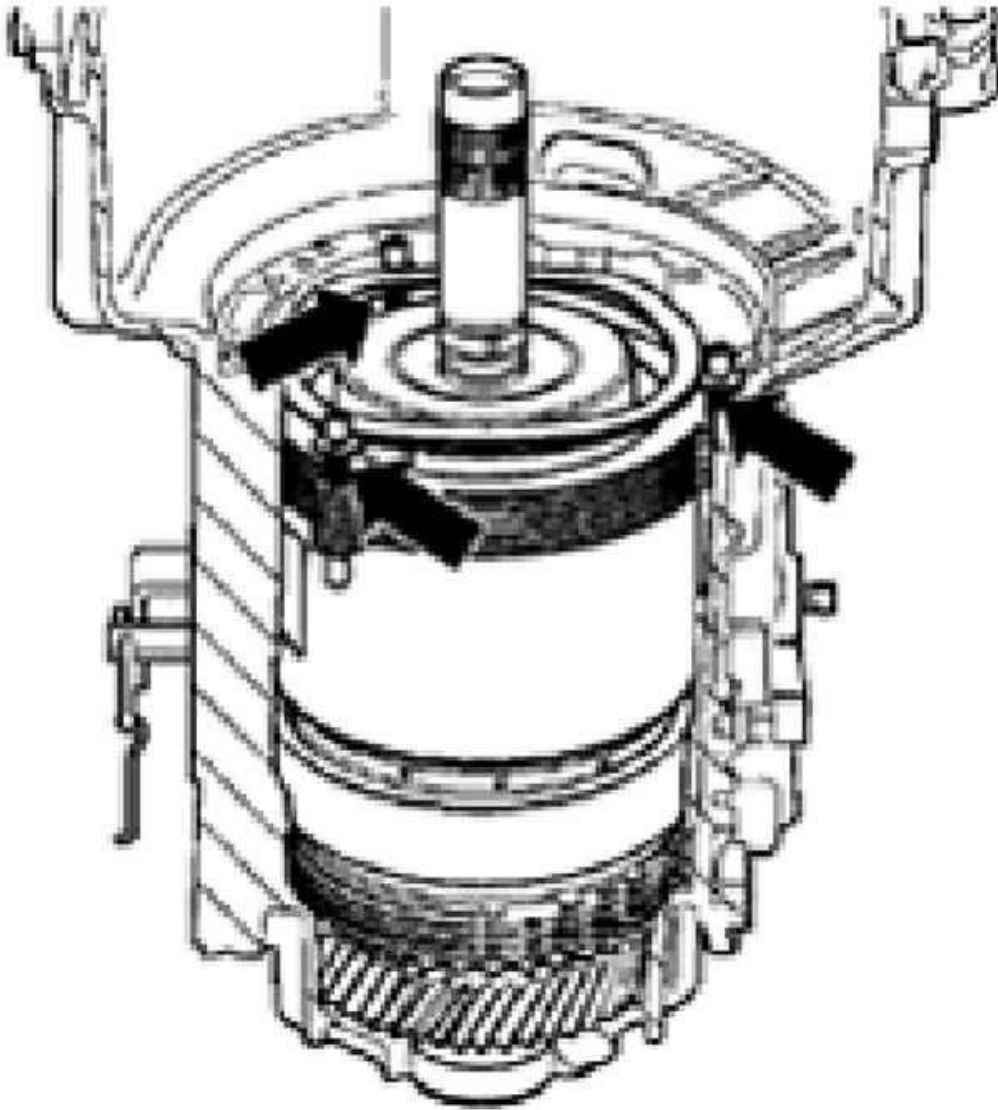
- Insert reverse gear clutch -K2-.
- Insert support tube for -B2- plate set -arrow- so support tube groove engages in free wheel wedge.



G03362363

Fig. 110: Installing Support Tube For B2 Plate Set
Courtesy of VOLKSWAGEN OF AMERICA, INC.

- Install -B2- plates as follows:
- First insert a 3 mm thick outer plate
- Insert three spring caps in outer plate
- Insert compression springs (arrows)

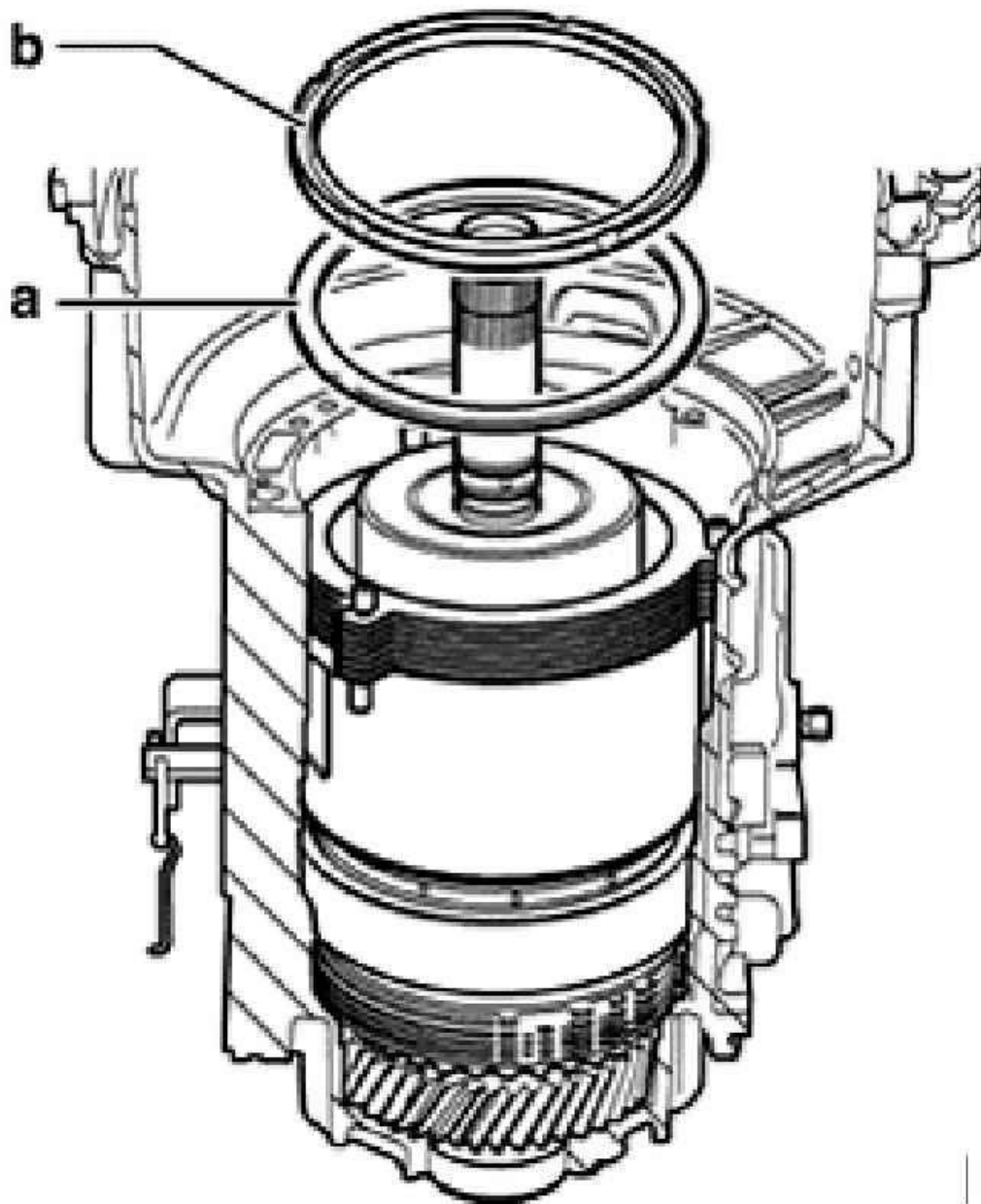


G03362364

Fig. 111: Inserting Compression Springs
Courtesy of VOLKSWAGEN OF AMERICA, INC.

- Insert all but the last outer plate
- Insert three spring caps onto compression springs.
- Adjust 2nd and 4th gear brakes on vehicles with a corrugated spring washer: see **2nd and 4th gear brake -B2-, adjusting (with shim and retaining ring).**

- Insert last measured outer plate.
- Install corrugated washer.
- On vehicles without a corrugated spring washer (with retaining ring -b-), the last outer plate is always 3 mm thick. Brake -B2- clearance is determined by a shim -a- on which the retaining ring -b- sits. See **Fig. 112**. There is no corrugated spring washer.
- Determine shim, see **2nd and 4th gear brake -B2-, adjusting (with shim and retaining ring)**
- Install shim -a-.
- Install retaining ring -b- onto shim. Smooth side must face shim.



G03362365

Fig. 112: Installing Retaining Ring Onto Shim
Courtesy of VOLKSWAGEN OF AMERICA, INC.

NOTE: When replacing

- **Transmission housing**
- **Support tube**
- **ATF pump**
- **Retaining ring**
- **or plates**

Adjust 2nd and 4th gear brakes -B2-: see 2nd and 4th gear brake -B2-, adjusting (with shim and retaining ring).

Replacement parts for components must comply with transmission code letters.

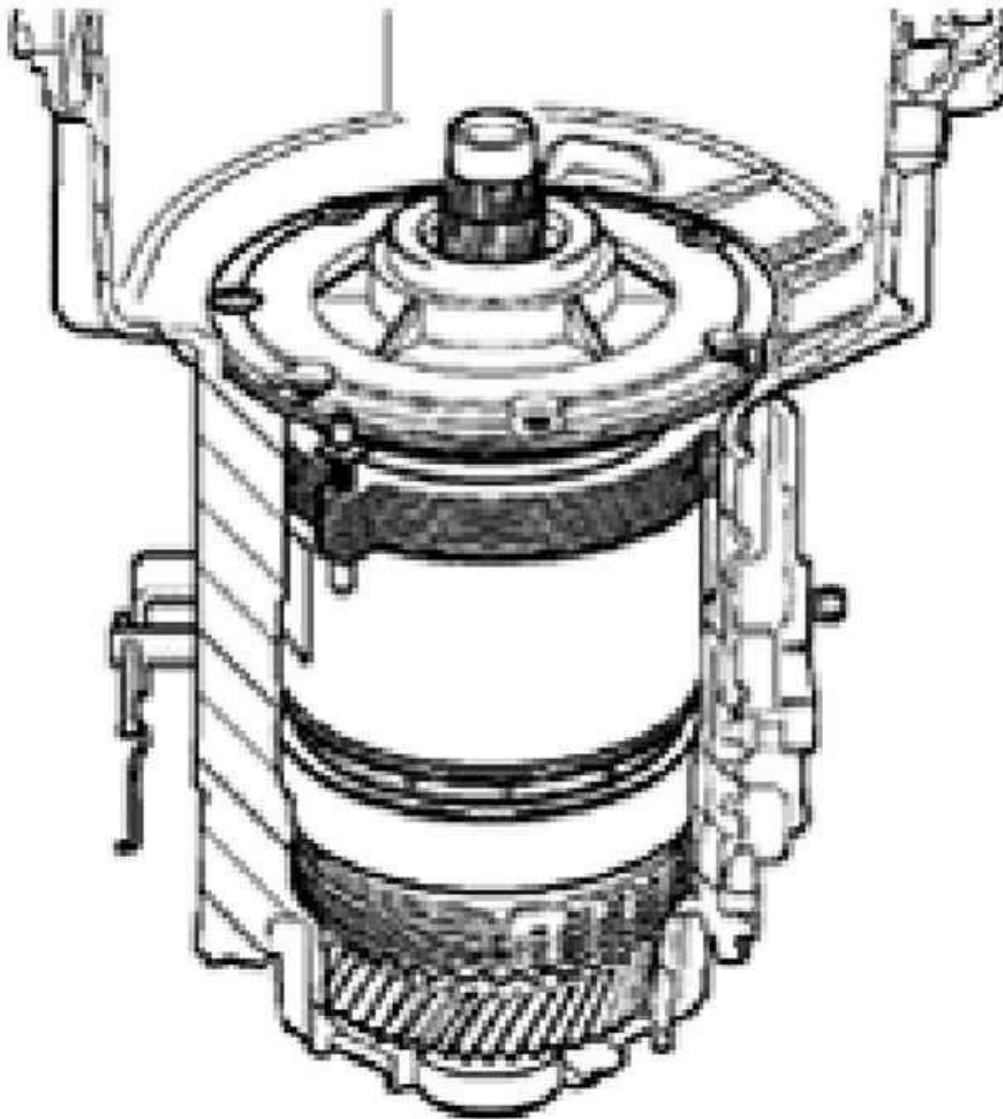
- Install ATF pump seal.
- Install O -ring on ATF pump.
- Install ATF pump.
- Tighten bolts evenly, crosswise.

NOTE:

- **Ensure O-ring is not damaged.**

Tightening torque: 8 N.m (71 in lb) then turn additional 90.

Additional turns can be done in stages.

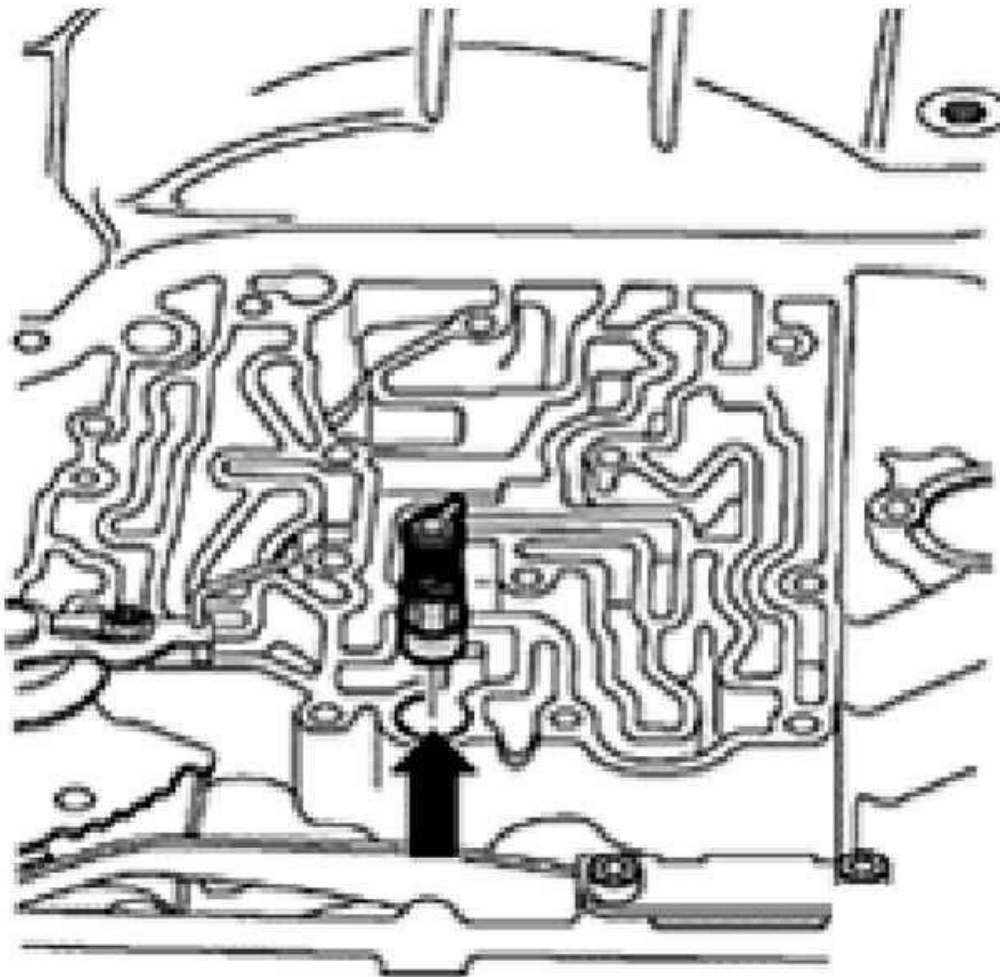


G03362366

Fig. 113: Installing ATF Pump
Courtesy of VOLKSWAGEN OF AMERICA, INC.

- Check clutch play measurement, see **CLUTCH PLAY MEASUREMENT, CHECKING.**
- Insert sealing plugs with O-rings -arrow-.

Installation position: Lug engages in oil channel.



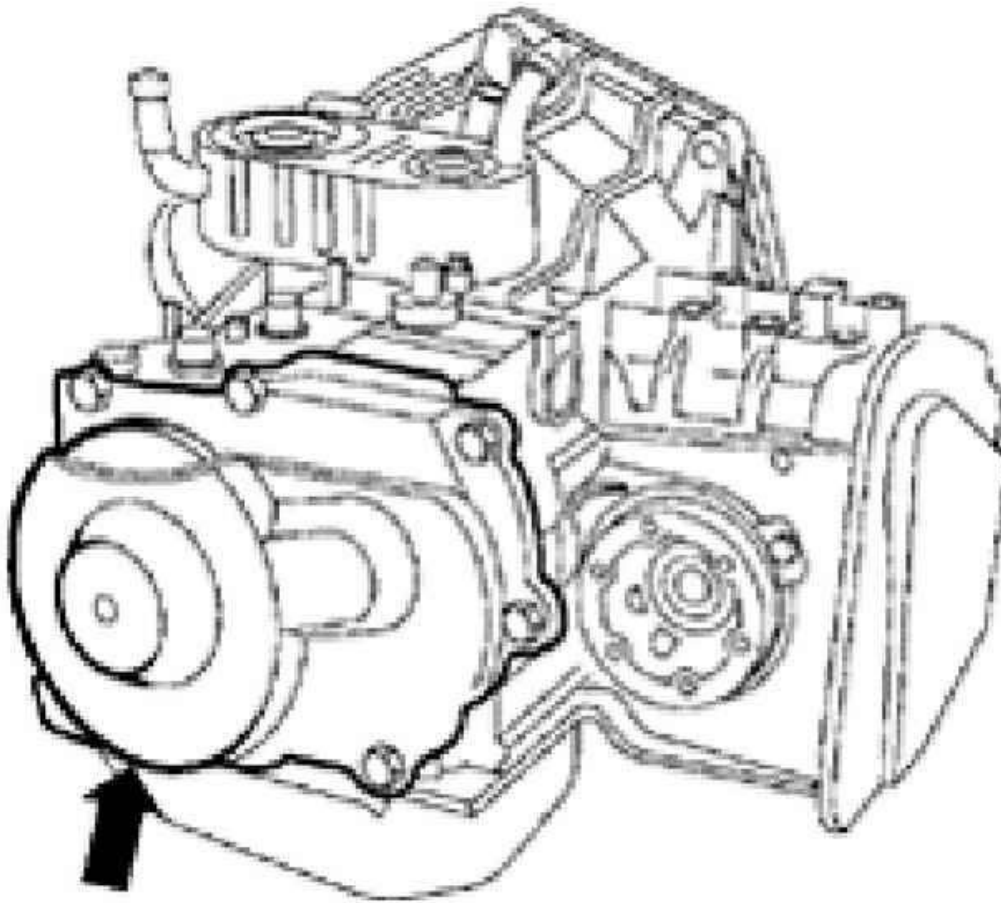
G03362367

Fig. 114: Inserting Sealing Plugs With O Rings

Courtesy of VOLKSWAGEN OF AMERICA, INC.

- Install valve body with conductor strip, see **VALVE BODY, REMOVING AND INSTALLING**.
- Insert oil pan.
- Install cover -arrow- with gasket and spacer bushings.

Tightening torque: 8 N.m (71 in lb)

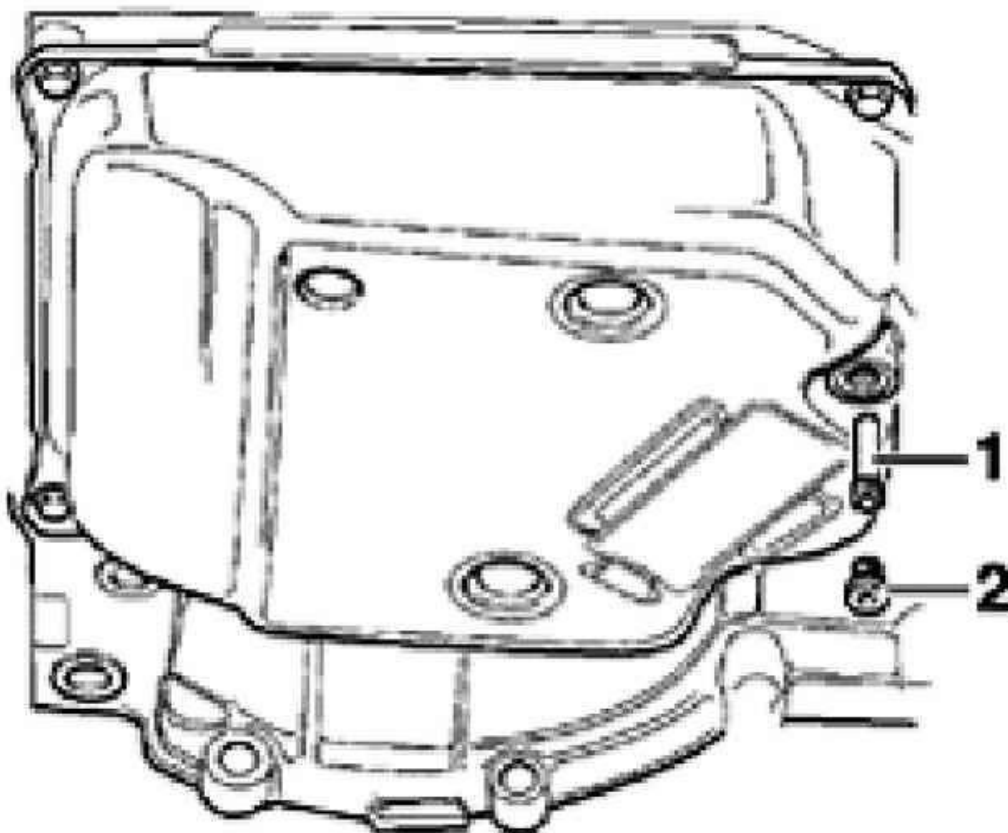


G03362368

Fig. 115: Installing Cover

Courtesy of VOLKSWAGEN OF AMERICA, INC.

- Install ATF overflow line -1- and sealing plug -2- with new seal and hand-tighten.



G03362369

Fig. 116: Installing ATF Overflow Line And Sealing Plug
 Courtesy of VOLKSWAGEN OF AMERICA, INC.

- Install torque converter.
- Install transmission, see **TRANSMISSION, REMOVING AND INSTALLING.**
- Fill with 3 liters (3.16 qt) of ATF: see **ATF, replacing.**
- Check ATF level and top-up: see **ATF LEVEL, CHECKING AND TOPPING UP.**

Transmission adjustments, overview

I. I = Reverse gear brake -B1-

- A - Shim
- Determining thickness adjusting reverse gear brake -B1-: see **REVERSE GEAR BRAKE - B1-, ADJUSTING**

II. II = 2nd and 4th gear brake -B2-

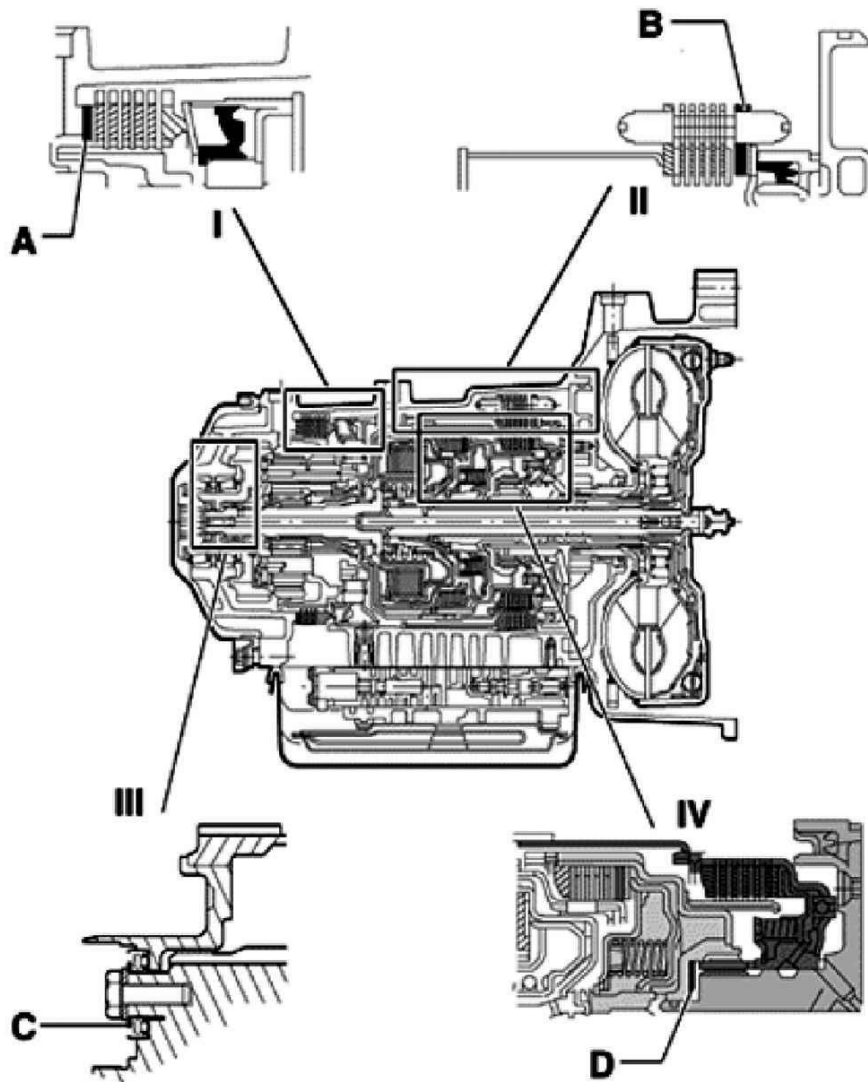
- B - Outer plate or shim
- Determining thickness adjusting 2nd and 4th gear brake -B2-: see **2nd and 4th gear brake -B2-, adjusting (with shim and retaining ring)**

III. III = Planet carrier

- C - Shim
- Determining thickness: see **PLANET CARRIER, ADJUSTING**

IV. IV = Clutch play

- D - Shim
- Determining thickness: see **CLUTCH PLAY BETWEEN -K1- AND - K2-, ADJUSTING**



I = Reverse gear brake -B1-

II = 2nd and 4th gear brake -B2-

III = Planet carrier

IV = Clutch play

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Fig. 117: Overview Of Transmission Adjustments
Courtesy of VOLKSWAGEN OF AMERICA, INC.

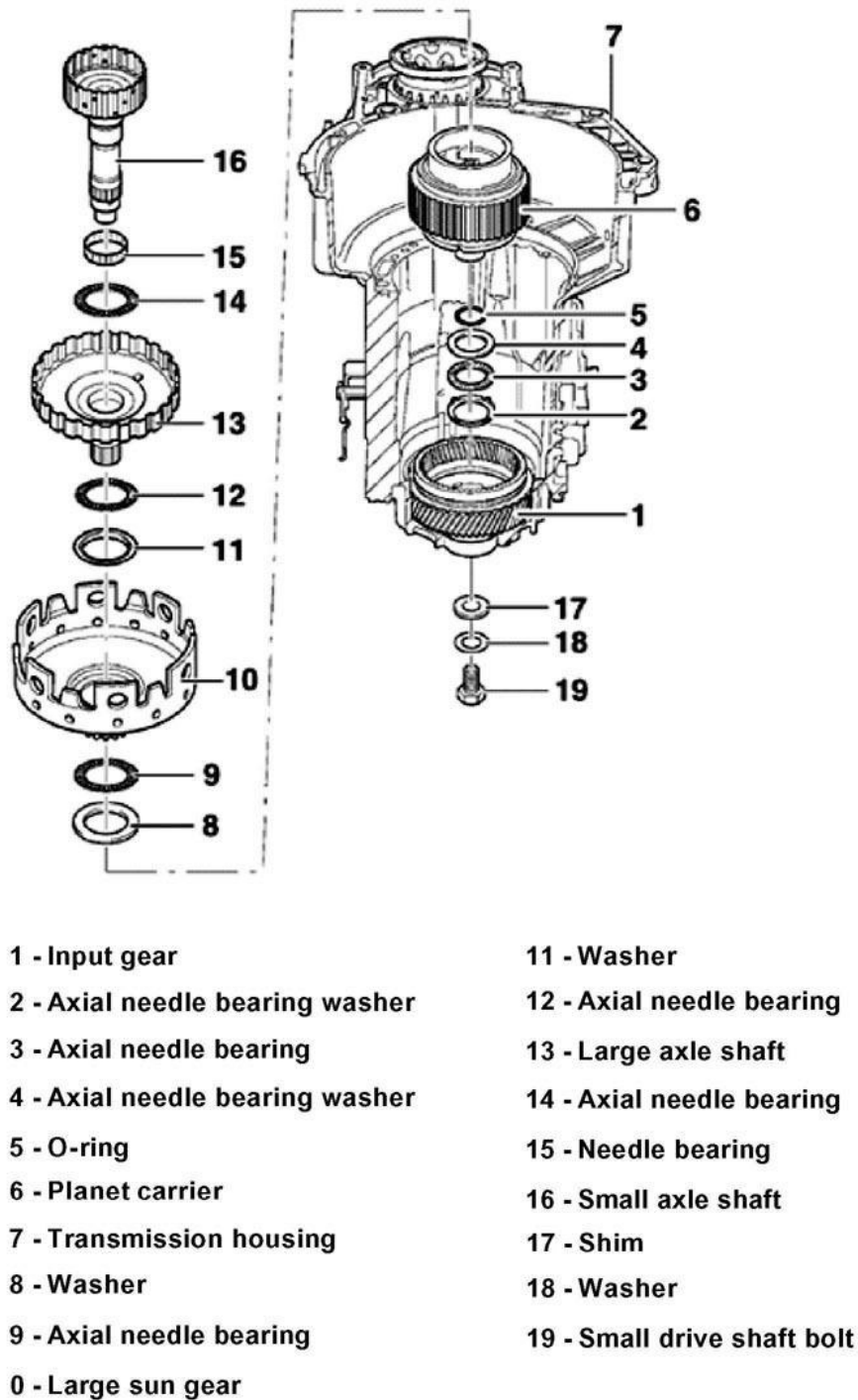
Planet carrier, adjusting

Overview of components to adjust planet carrier

NOTE: When adjusting planet carrier, install components in housing without shim -17-.

The following list pertains to **Fig. 118**.

1. **Input gear**
 - Do not remove to adjust planet carrier
 - Input gear or axial needle bearing for planet carrier, removing and installing, see **INPUT GEAR, REMOVING AND INSTALLING**
2. **- Axial needle bearing washer**
 - Install smooth side in input gear
3. **Axial needle bearing**
4. **Axial needle bearing washer**
5. **O-ring**
 - Insert into planet carrier, see **TRANSMISSION, ASSEMBLING**.
6. **Planet carrier**
7. **Transmission housing**
 - With input gear and axial needle bearing
 - Axial needle bearing remains in input gear
 - If axial needle bearing is damaged, see **INPUT GEAR, REMOVING AND INSTALLING**
8. **Washer**
9. **Axial needle bearing**
10. **Large sun gear**
11. **Washer**
 - Insert into large sun gear, see **TRANSMISSION, ASSEMBLING**
12. **Axial needle bearing**
13. **Large axle shaft**
14. **Axial needle bearing**
15. **Needle bearing**
16. **- Small axle shaft**
17. **Shim**
 - Do not install in planet carrier when adjusting
18. **Washer**
19. **Small drive shaft bolt**
 - 30 N.m (22 ft lb)



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Fig. 118: Exploded View Of Planet Carrier Adjusting Components
 Courtesy of VOLKSWAGEN OF AMERICA, INC.

Shim -A-, determining

- Install all components (items -2- through -16-) into transmission housing to adjust planet carrier, see **PLANET CARRIER, ADJUSTING.**

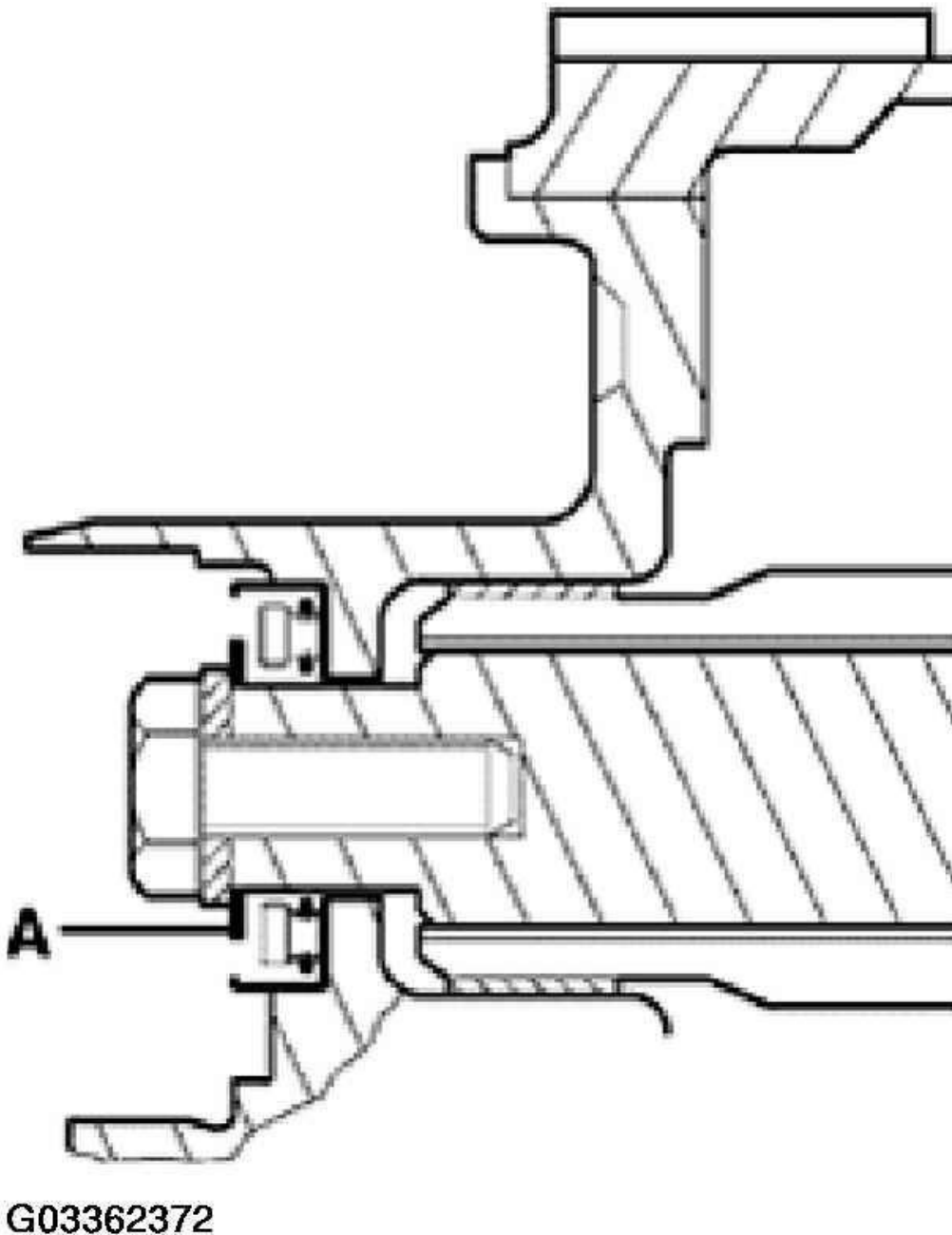
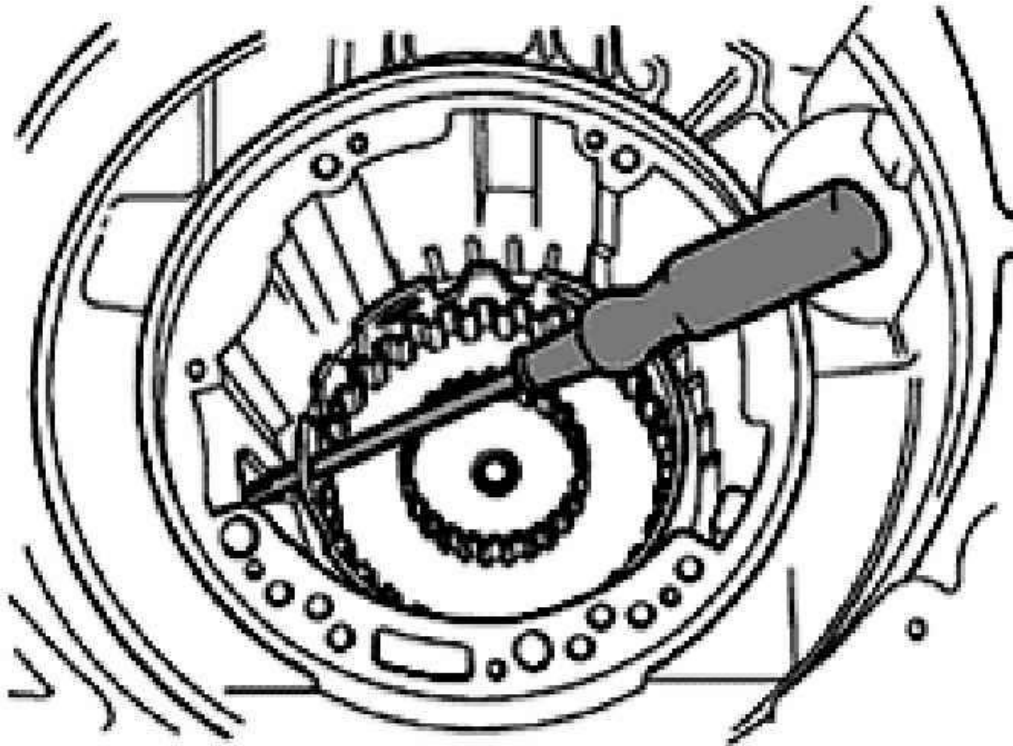


Fig. 119: Measuring Planet Carrier Shim Thickness

Courtesy of VOLKSWAGEN OF AMERICA, INC.

- Insert screwdriver through hole of large sun gear to loosen and tighten bolt for small input shaft.

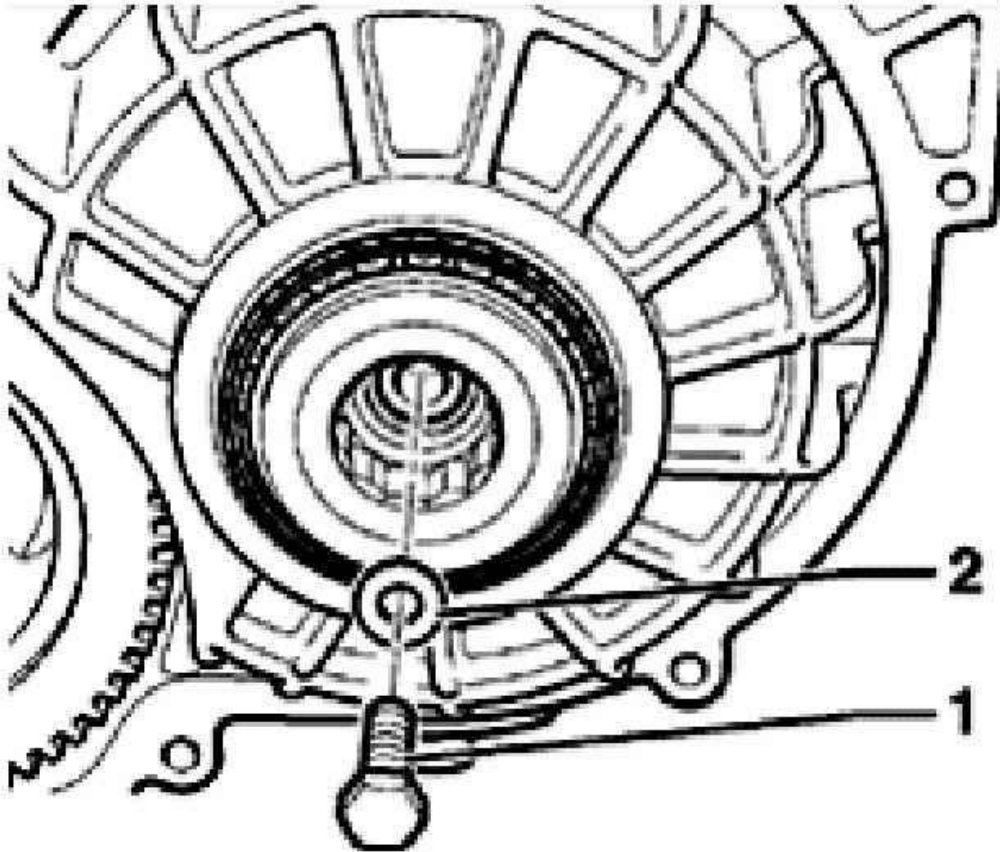


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Fig. 120: Inserting Screwdriver Through Hole Of Large Sun Gear

Courtesy of VOLKSWAGEN OF AMERICA, INC.

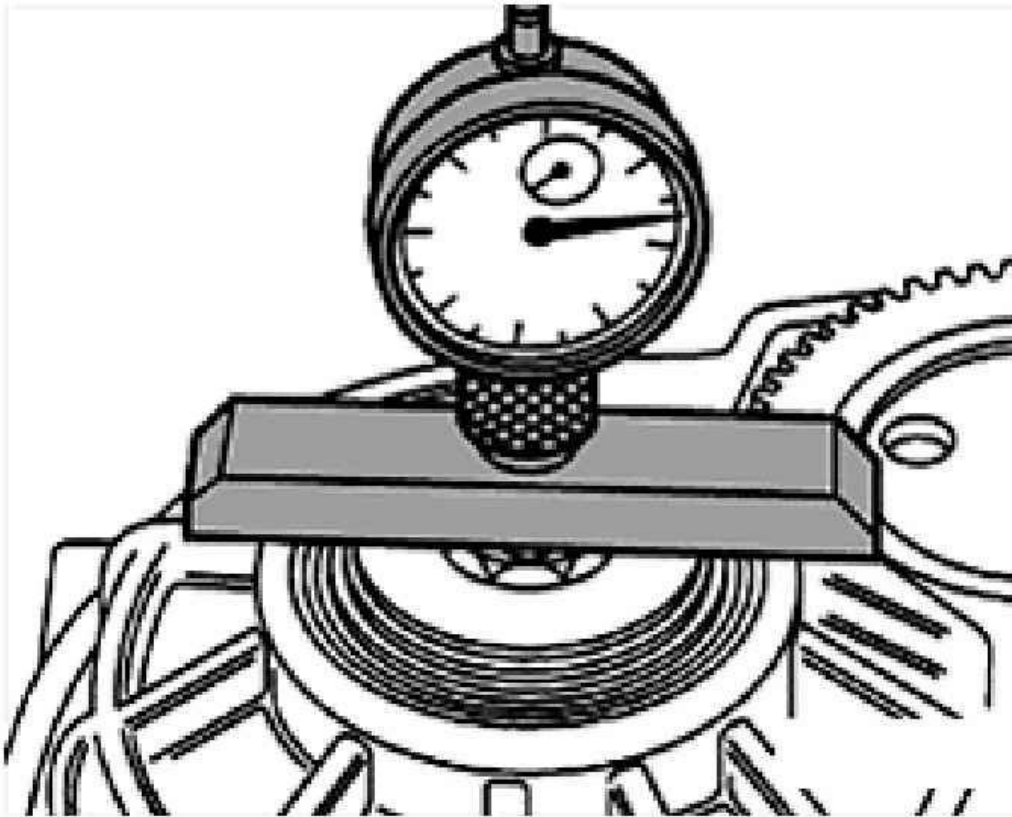
- Install small input shaft bolt -1- with washer -2- but without shim. Tightening torque: 30 N.m (22 ft lb).
- Install dial gauge in VW 382/7



G03362374

Fig. 121: Installing Small Input Shaft Bolt With Washer
Courtesy of VOLKSWAGEN OF AMERICA, INC.

- Adjust dial gauge with top of gauge positioned on bolt head center with 1 mm preload.



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Fig. 122: Adjusting Dial Gauge With Top Of Gauge Positioned On Bolt Head Center
 Courtesy of VOLKSWAGEN OF AMERICA, INC.

- Zero dial gauge.
- Move small input shaft up and take reading.

Example: Reading 2.00 mm

- Specify thickness of shim according to table and determine Part No.

Table of shims

SHIMS THICKNESS (PLANET CARRRIER)

Gauge reading (mm)	Shims (mm)
1.26... 1.35	1.0
1.36... 1.45	1.1

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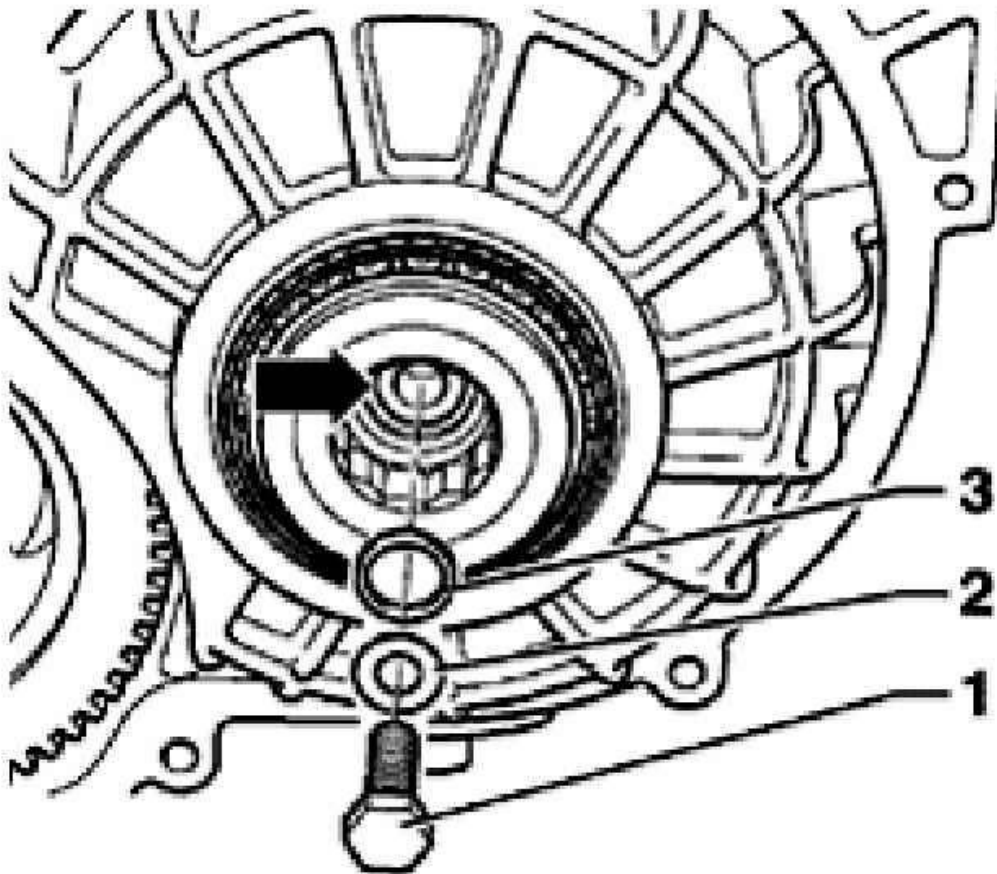
1.46... 1.55	1.2
1.56... 1.65	1.3
1.66... 1.75	1.4
1.76... 1.85	1.5
1.86... 1.95	1.6
1.96... 2.05	1.7
2.06... 2.15	1.8
2.16... 2.25	1.9
2.26... 2.35	2.0
2.36... 2.45	2.1
2.46... 2.55	2.2
2.56... 2.65	2.3
2.66... 2.75	2.4
2.76... 2.85	2.5
2.86... 2.95	2.6
2.96... 3.05	2.7
3.06... 3.15	2.8
3.16... 3.25	2.9

Example:

Measured value 2.00 mm

Insert 1.7 mm thick shim.

- Remove small input shaft bolt.
- Insert correct shim -3- on small input shaft -arrow-.



G03362376

Fig. 123: Inserting Correct Shim On Small Input Shaft**Courtesy of VOLKSWAGEN OF AMERICA, INC.**

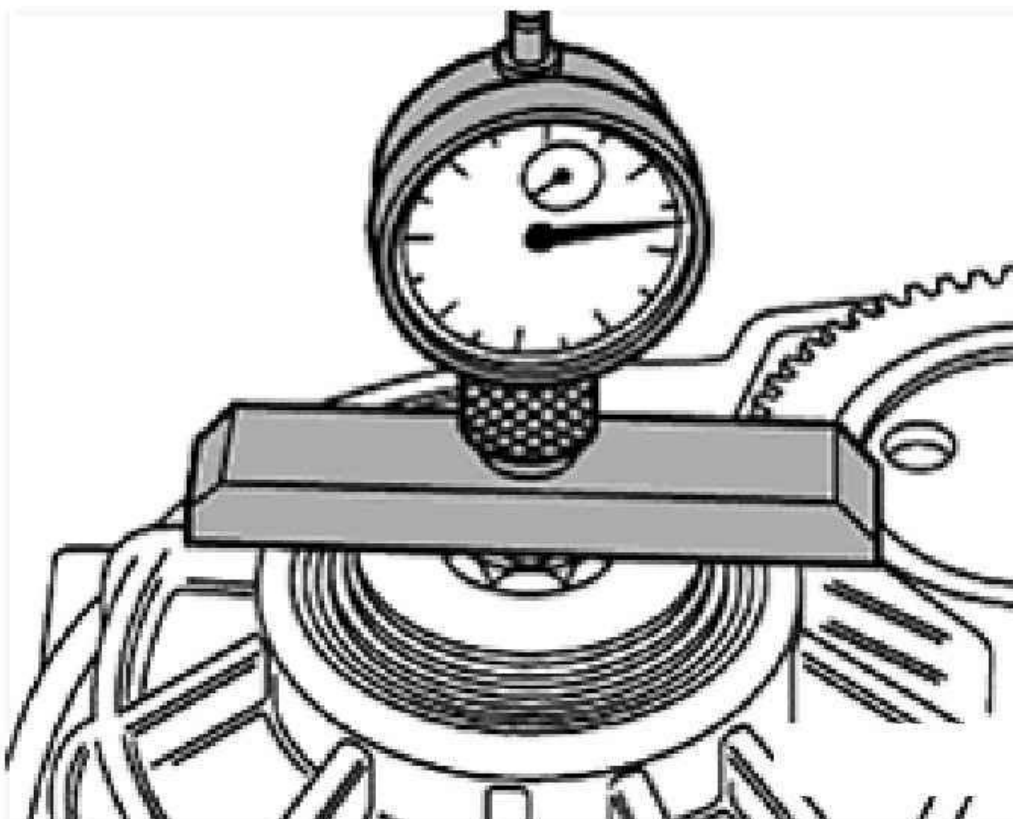
- Tighten small input shaft bolt -1- with washer -2-.

Tightening torque 30 N.m (22 ft lb).

- Perform planet carrier measurement.

Planet carrier, checking measurement

- Insert dial gauge in VW 382/7 and place tip on bolt of small input shaft.



G03362377

Fig. 124: Checking Planet Carrier End Play
Courtesy of VOLKSWAGEN OF AMERICA, INC.

- Move small input shaft up and down and take reading of play on dial gauge.

Play:

min. = 0.23 mm

max. = 0.37 mm

NOTE: If you adjusted the planet carrier without reverse gear brake -B1- and free wheel, install reverse gear brake -B1- before installing planet carrier install, see TRANSMISSION, ASSEMBLING.

Reverse gear brake - B1-, adjusting

Components to adjust reverse gear brake -B1-, Overview

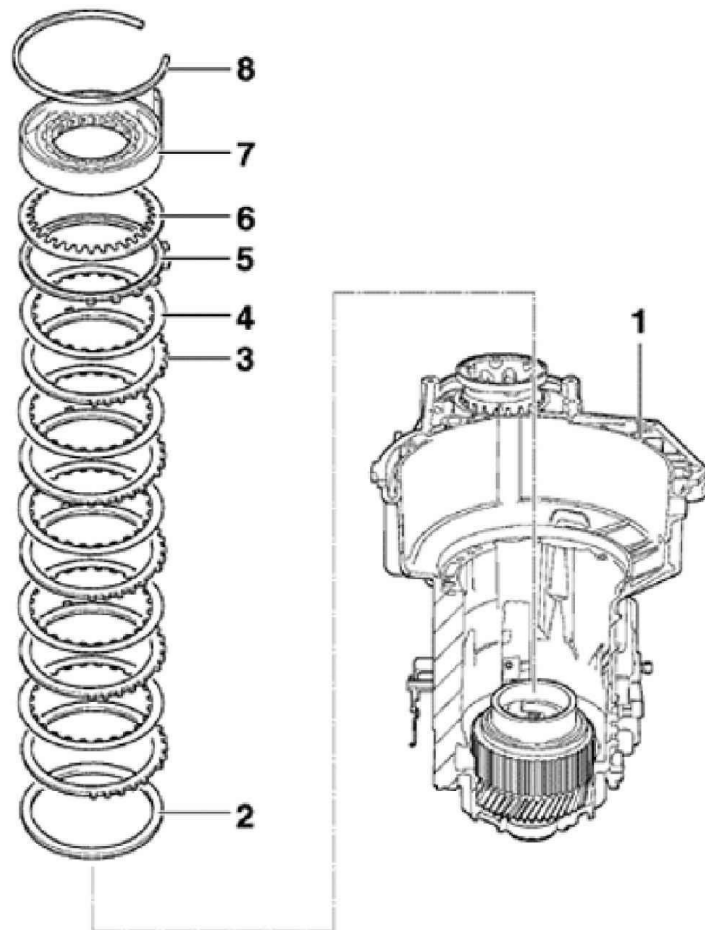
The following list pertains to **Fig. 125**.

1. **Transmission housing**
 - With input gear and planet carrier installed
2. **Shim**
3. **Outer plate -B1-**
 - Quantity, see **TRANSMISSION LAYOUT**
4. **Inner plate -B1-**
 - Quantity, see **TRANSMISSION LAYOUT**
5. **Pressure plate**
 - Install with flat side facing plates
 - Spare part must comply with transmission code letters
6. **Dished washer**
 - Convex side faces towards free wheel
7. **Free wheel with -B1- piston**

NOTE: Before removing or installing free wheel, remove valve body and take out sealing plugs and remove Transmission Vehicle Speed Sensor (VSS) -G38-. See **VALVE BODY, REMOVING AND INSTALLING**.

See **TRANSMISSION VEHICLE SPEED SENSOR (VSS) -G38-, REMOVING AND INSTALLING**.

8. **Circlip**



- 1 - Transmission housing
- 2 - Shim
- 3 - Outer plate -B1-
- 4 - Inner plate -B1-
- 5 - Pressure plate
- 6 - Dished washer
- 7 - Free wheel with -B1- piston
- 8 - Circlip

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Fig. 125: Exploded View Of Reverse Gear Brake - B1 Components
Courtesy of VOLKSWAGEN OF AMERICA, INC.

Shim -A-, determining thickness

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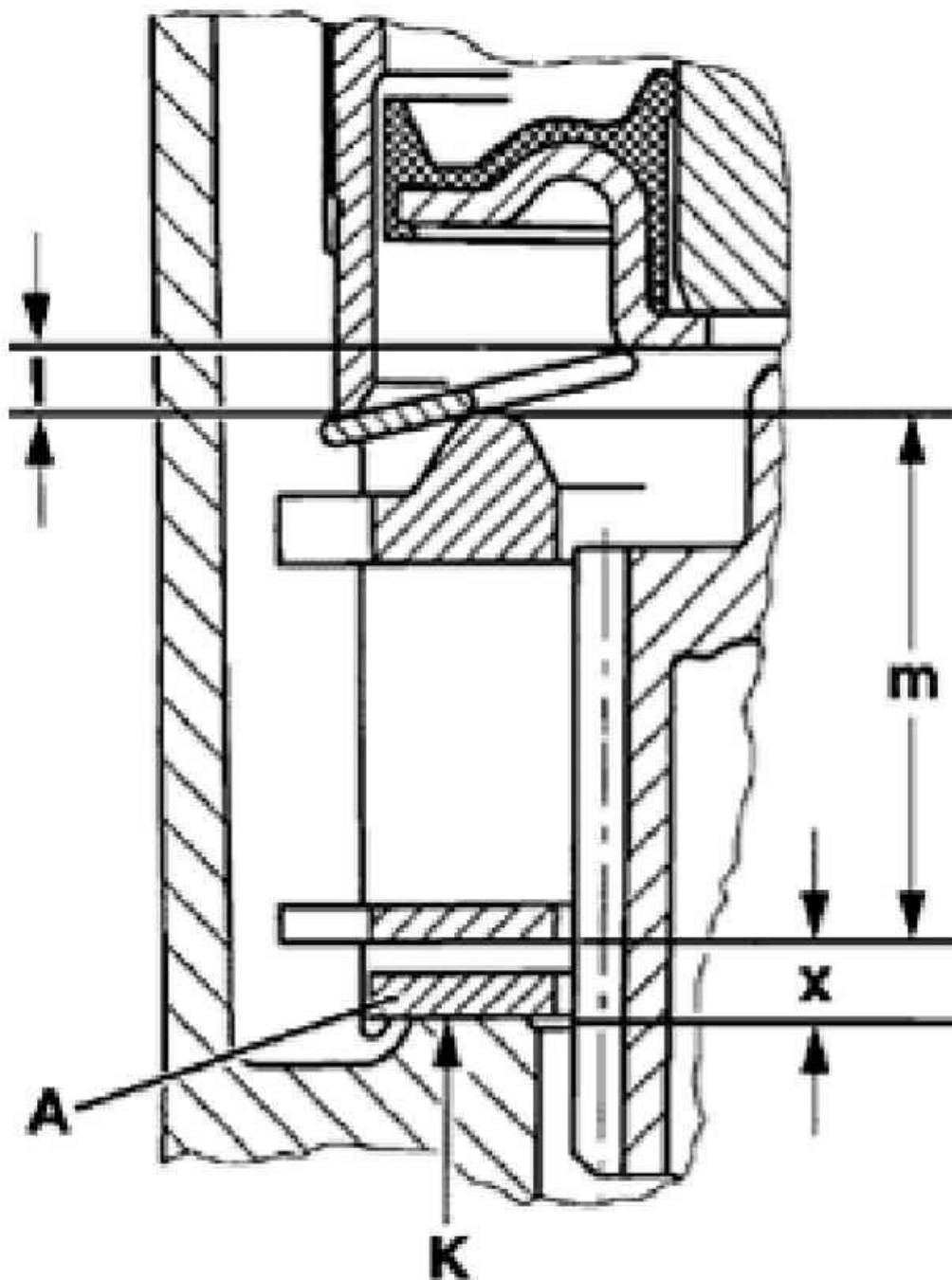
To measure shim thickness, transmission housing must be clamped into assembly stand so input gear is facing down.

Shim thickness is determined by gap "x" and selected from table, see **TABLE OF "SHIMS":**.

$$x = k + 1/2 - m$$

- A = Shim
- x = Gap
- I = Position of piston in free wheel
- m = Height of plate set including pressure plate
- K = Constant = 26.9 mm

"K" is determined by installation height in transmission housing and is not adjustable.



G03362379

Fig. 126: Measuring Shim Thickness (Reverse Gear Brake - B1-)

Courtesy of VOLKSWAGEN OF AMERICA, INC.

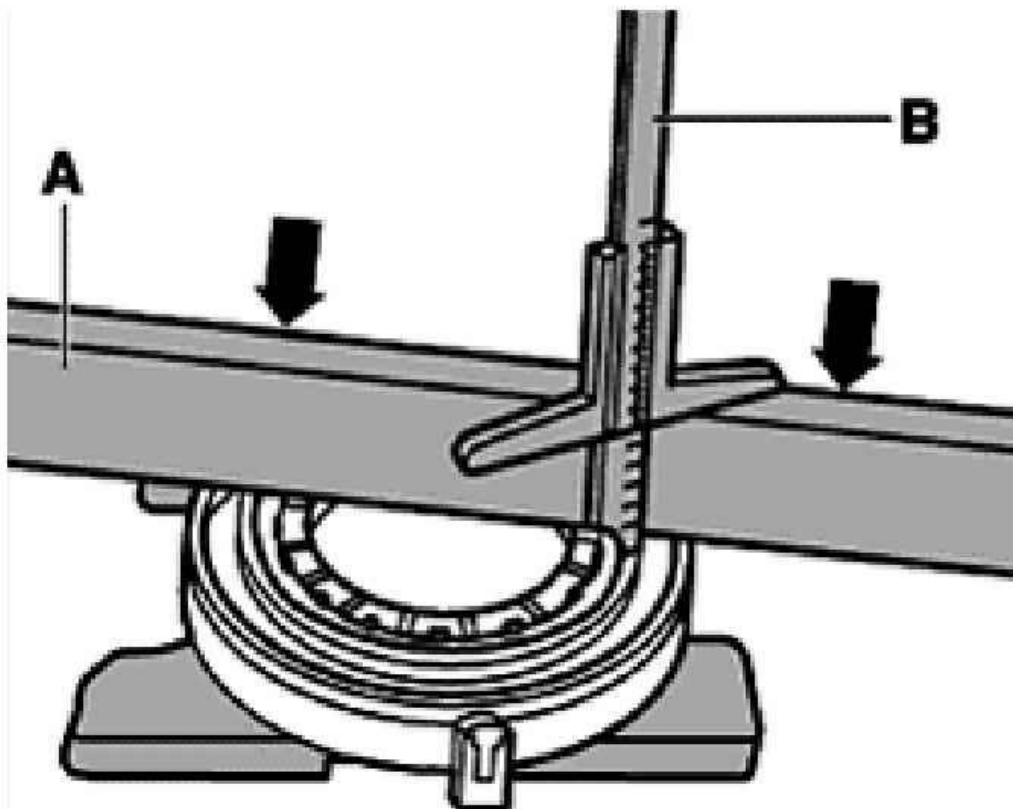
Calculating "I":

- Press piston in direction of arrow to stop.
- Place straightedge "A" onto outer race of free wheel.
- Measure to inner edge of piston with depth gauge "B".

Example:

CALCULATING I (REVERSE GEAR BRAKE - B1-)

Reading	=	51.8 mm
- Straightedge	=	- 48.2 mm
Calculated size I	=	3.6 mm



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Fig. 127: Measuring To Inner Edge Of Piston With Depth Gauge B

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Calculating "m":

- Place straightedge "A" on thrust plate.
- Compress set of plates including pressure plate in direction of arrow and measure thickness of plate set with depth gauge "B".

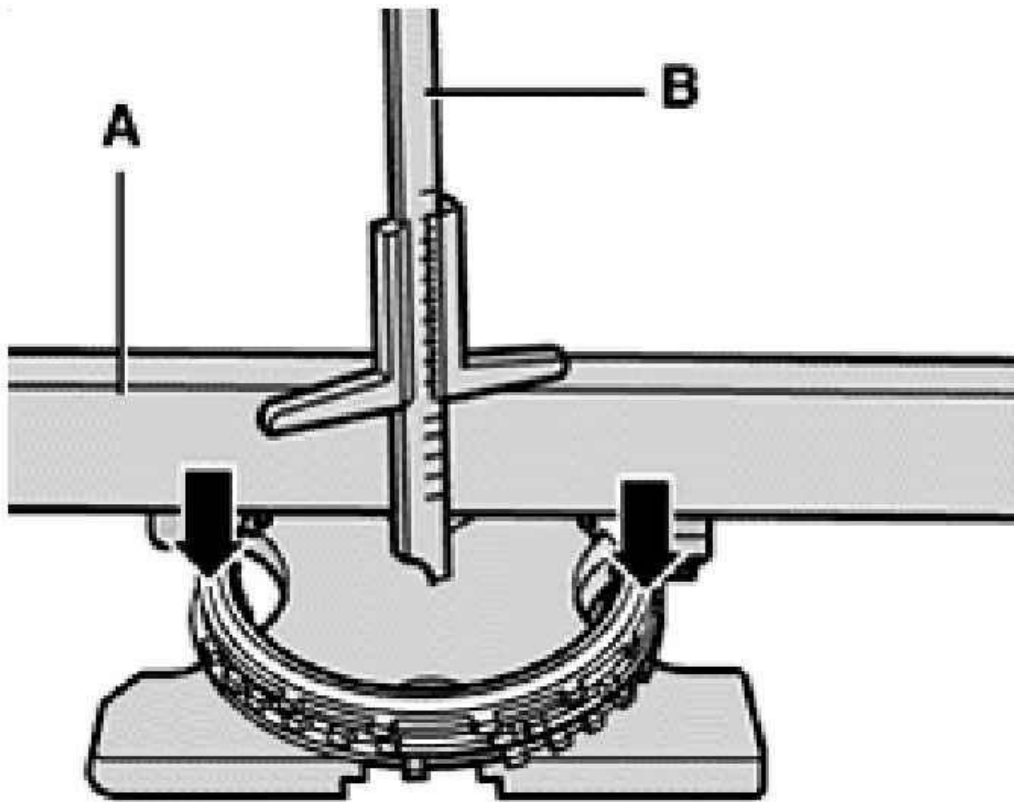
Example:

CALCULATING M (REVERSE GEAR BRAKE - B1-)

Reading	=	73.5 mm
- Straightedge	=	- 48.2 mm
Calculated size l	=	25.3 mm

$$x = k + 1/2 - m$$

- Determine size of shims according to table: see **TABLE OF "SHIMS":**.



G03362381

Fig. 128: Measure Thickness Of Plate Set With Depth Gauge B
 Courtesy of VOLKSWAGEN OF AMERICA, INC.

Table of "shims":

SHIMS THICKNESS (REVERSE GEAR BRAKE - B1-)

Gap "x" (mm)	Shims (mm)
2.36... 2.45	1.0
2.46... 2.55	1.1
2.56... 2.65	1.2
2.66... 2.75	1.3
2.76... 2.85	1.4
2.86... 2.95	1.5
2.96... 3.05	1.6
3.06... 3.15	1.7
3.16... 3.25	1.8
3.26... 3.35	1.9

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3.36... 3.45	1.0 + 1.0
3.46... 3.55	1.0 + 1.1
3.56... 3.65	1.1 + 1.1
3.66... 3.75	1.1 + 1.2
3.76... 3.85	1.2 + 1.2
3.86... 3.95	1.2 + 1.3
3.96... 4.05	1.3 + 1.3
4.06... 4.15	1.3 + 1.4
4.16... 4.25	1.4 + 1.4

- Select shims according to table and determine Part No. from parts catalog.
- After determining shim for -B1-, check measurement.

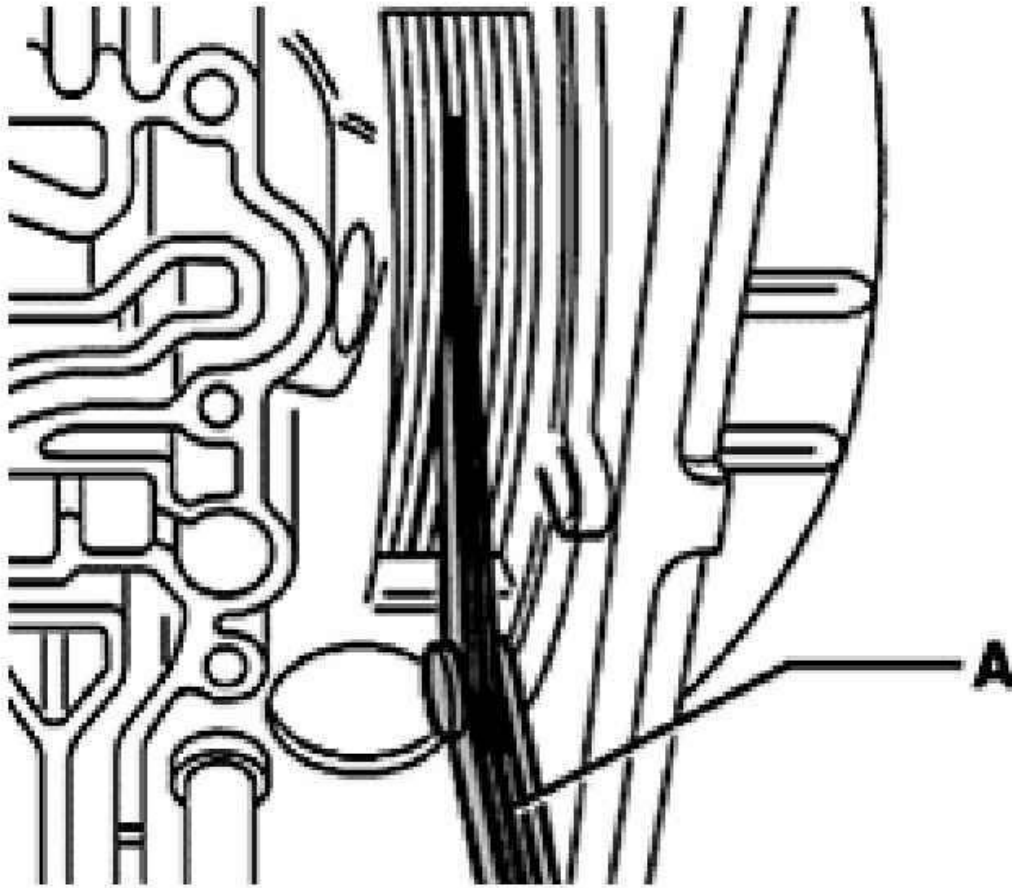
Reverse gear brake -B1-, checking measurement

- Install parts up to free wheel and secure with circlip: see **TRANSMISSION, ASSEMBLING.**
- Measure play between plates with feeler gauge "A".

Play:

min. = 1.25 mm

max. = 1.55 mm



G03362382

Fig. 129: Measuring Play Between Plates With Feeler Gauge A
 Courtesy of VOLKSWAGEN OF AMERICA, INC.

Clutch play between -K1- and - K2-, adjusting

NOTE: To adjust clutch play, install components without shim -6-: see TRANSMISSION, ASSEMBLING.

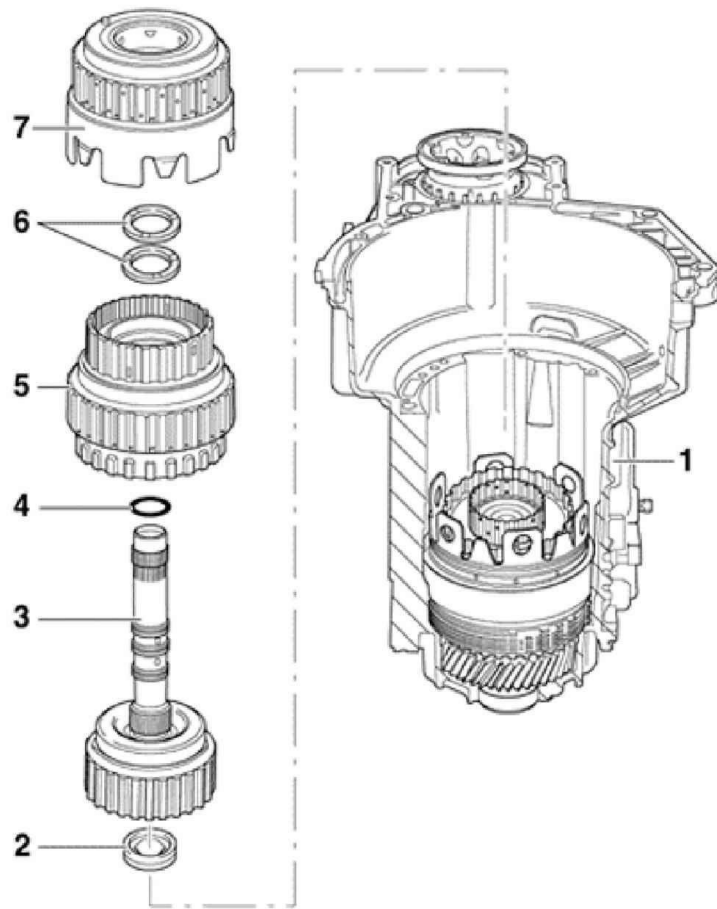
The following list pertains to Fig. 130.

1. Transmission housing
 - Transmission installed up to small input shaft: see TRANSMISSION, ASSEMBLING.
2. Axial needle bearing with washer

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- Axial needle bearing faces toward small input shaft
 - Washer faces toward -K3-
3. **3rd and 4th gear clutch -K3- with pump shaft**
 4. **O-ring**
 5. **1st to 3rd gear clutch -K1- with pump shaft**
 6. **Shim**
 - Do not install when adjusting clutch play
 - 1 or 2 shims can be installed
 7. **Reverse gear clutch -K2-**



- 1 - Transmission housing
- 2 - Axial needle bearing with washer
- 3 - 3rd and 4th gear clutch -K3- with pump shaft
- 4 - O-ring
- 5 - 1st to 3rd gear clutch -K1- with pump shaft
- 6 - Shim
- 7 - Reverse gear clutch -K2-

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Fig. 130: Exploded View Of Clutch Play Between K1 And K2 Adjusting Components
 Courtesy of VOLKSWAGEN OF AMERICA, INC.

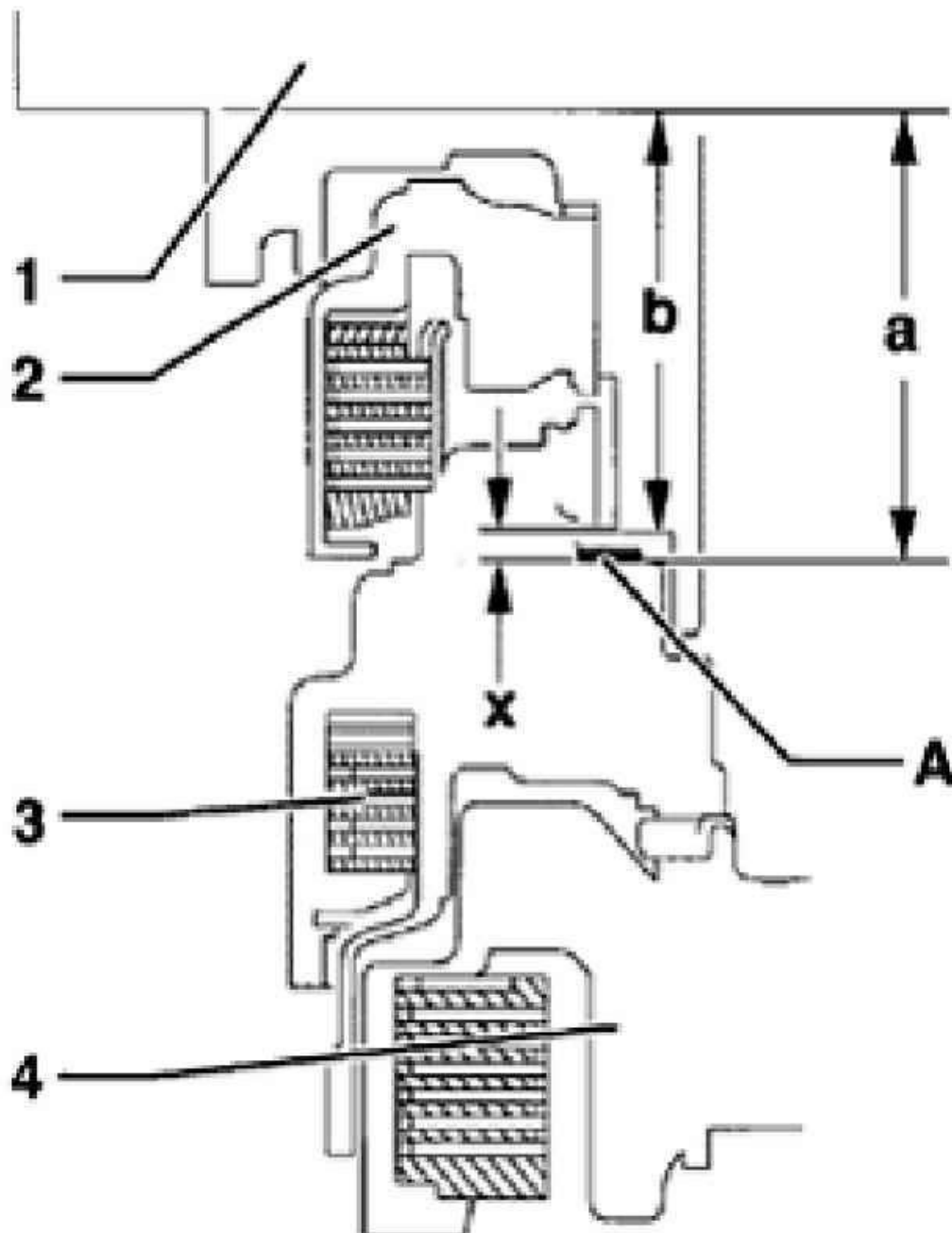
Conditions

- Planet carrier installed and adjusted, Transmission, assembling, see **TRANSMISSION, ASSEMBLING**
- For the measuring sequence, the transmission housing must be clamped into assembly stand so input gear is facing downward.

Determining shim -A-**A - Shim**

1. - ATF pump
 2. - Reverse gear clutch -K2-
 3. - 1st to 3rd gear clutch -K1-
 4. - 4th gear clutch -K3-
- Calculate thickness of shim, determine gap "x" and calculate shim thickness.

$$\text{Gap } x = a - b$$



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Fig. 131: Measuring Shim Thickness (Clutch Play Between -K1- and - K2-)
 Courtesy of VOLKSWAGEN OF AMERICA, INC.

Calculating "a":

- For the measuring sequence, the transmission housing must be clamped into assembly stand so input gear is facing downward.
- Place straightedge "A" onto transmission housing.

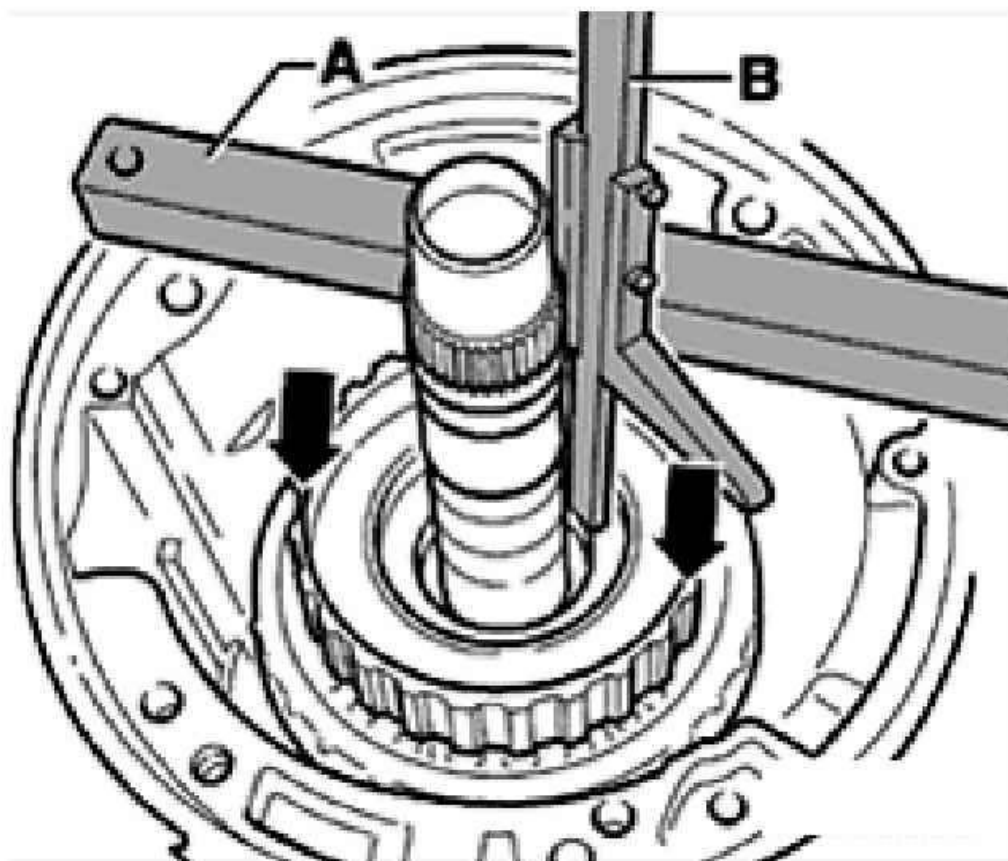
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Fig. 132: Placing Straightedge A Onto Transmission Housing (Clutch Play Between -K1- and -K2-)
Courtesy of VOLKSWAGEN OF AMERICA, INC.

- Press -K1- down in direction of arrow and measure distance into -K1- with depth gauge "B".

Example:

Reading 1 = 88.5 mm

- Measure with depth gauge "B" to pump flange on transmission housing.

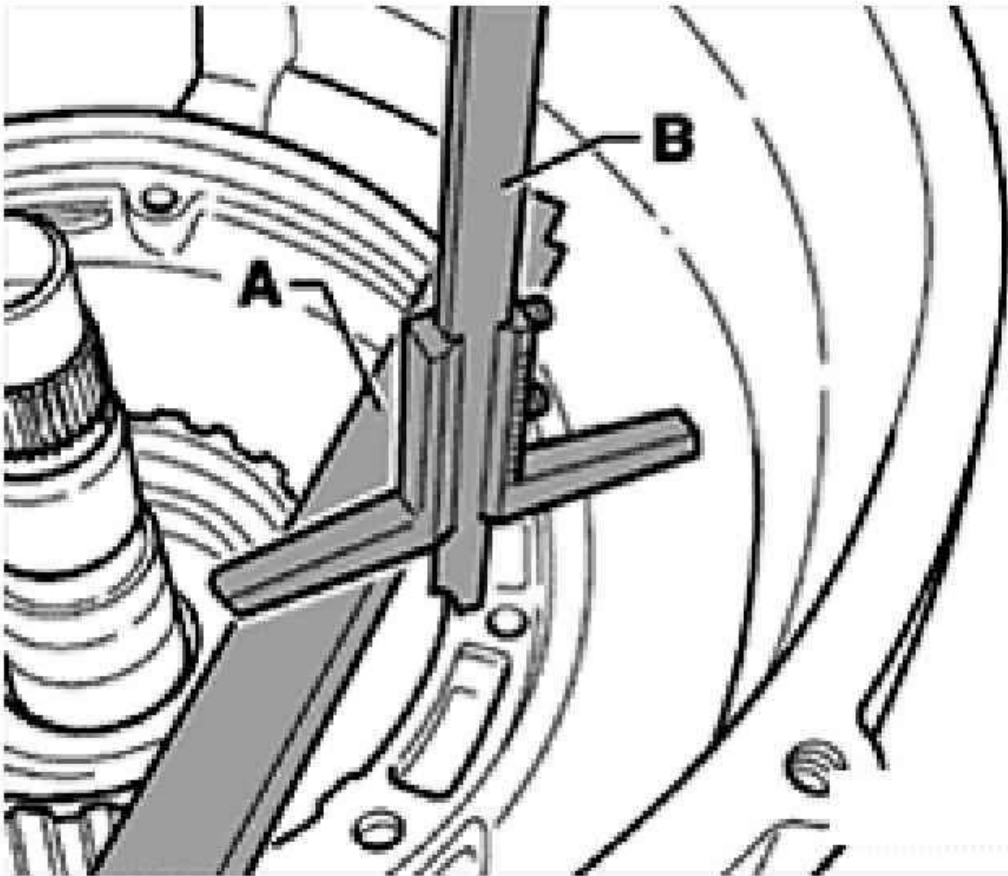
Example:

Reading 2 = 34.3 mm

CALCULATING A (CLUTCH PLAY BETWEEN -K1- AND -K2-)

Reading 1	=	88.5 mm
- Reading 2	=	- 34.3 mm
Calculated size a	=	54.2 mm

= Size measured from pump flange/transmission housing into -K1-.



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Fig. 133: Measuring With Depth Gauge B To Pump Flange On Transmission Housing (Clutch Play

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Between -K1- and -K2-

Courtesy of VOLKSWAGEN OF AMERICA, INC.

Calculating "b":

- Place new paper gasket onto ATF pump.
- Place straightedge -B- onto stator support -arrow- and measure with depth gauge -A- to gasket of pump flange.

Example:

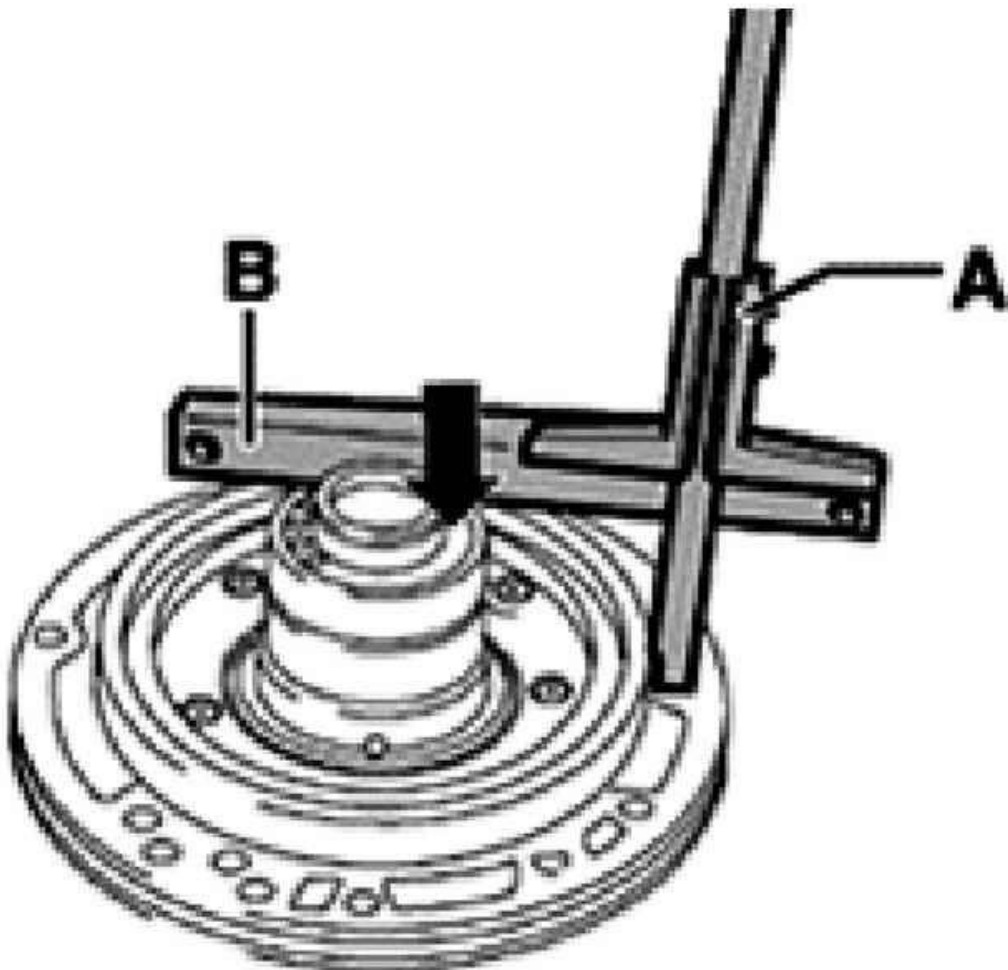
CALCULATING B (CLUTCH PLAY BETWEEN -K1- AND -K2-)

Reading	=	70.5 mm
- Straightedge	=	- 19.5 mm
Calculated size b	=	51.0 mm

Gap x = a - b

= 54.2 mm - 51.0 mm = 3.2 mm

- Determine size of shim according to table:



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Fig. 134: Measuring With Depth Gauge A To Gasket Of Pump Flange (Clutch Play Between -K1- and - K2-)
Courtesy of VOLKSWAGEN OF AMERICA, INC.

Table of "shims":

SHIM THICKNESS (CLUTCH PLAY BETWEEN -K1- AND - K2-)

Gap "x" (mm)	Shims (mm)
... 2.54	1.4
2.55... 3.09	1 + 1
3.10... 3.49	1.2 + 1.2

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3.50... 3.89	1.4 + 1.4
3.90... 4.29	1.6 + 1.6
4.30... 4.69	1.8 + 1.8
4.70... 5.04	1.2 + 1.2 + 1.6
5.05... 5.25	1.2 + 1.2 + 1.8

- Determine thickness of shims according to table and determine Part No. from parts catalog.
- Check clutch play check measurement after installing ATF pump.

Clutch play measurement, checking

- The clutch play cannot be measured until the ATF pump has been installed.
- Attach dial gauge holder to transmission housing and place dial gauge on turbine shaft with a preload of 1 mm.
- Move turbine shaft up and down and read play on dial gauge.

Play:

min. = 0.5 mm

max. = 1.2 mm

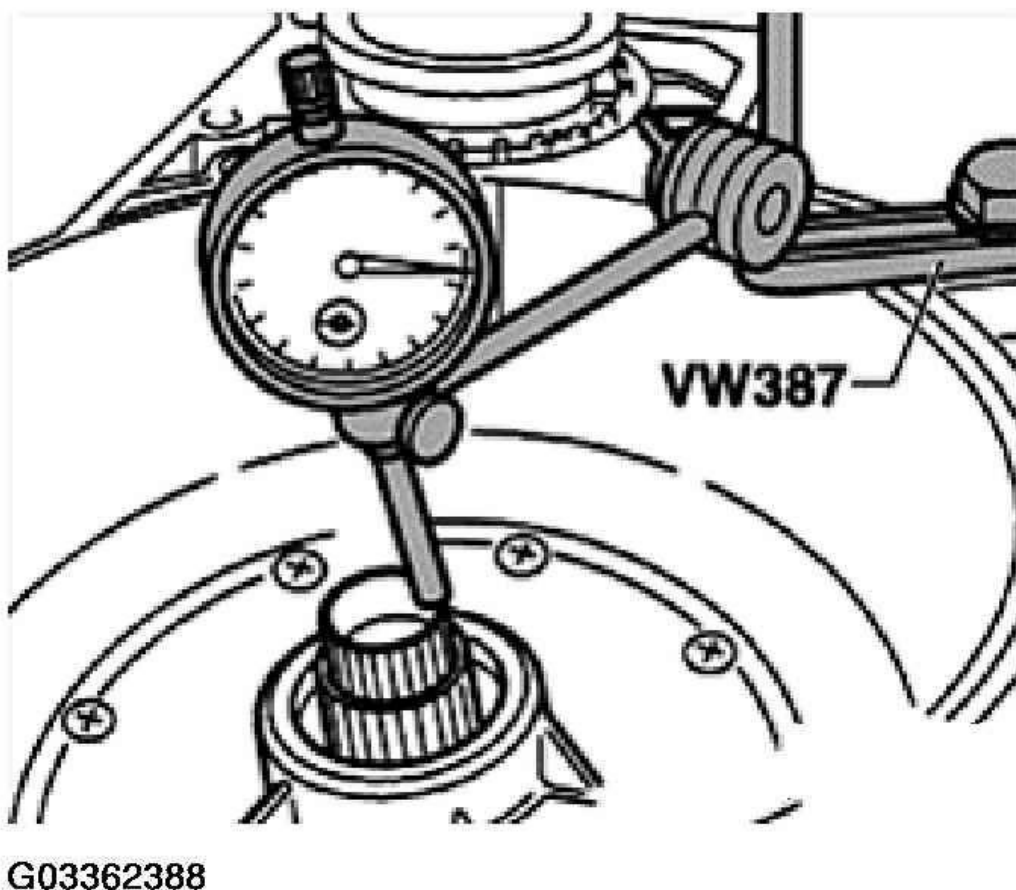


Fig. 135: Measuring Clutch Play (Clutch Play Between -K1- and -K2-)
 Courtesy of VOLKSWAGEN OF AMERICA, INC.

2nd and 4th gear brake -B2-, adjusting (with shim and retaining ring)

Special tools and equipment

- 3459 Adjustment tool

2nd and 4th gear brake -B2-, adjusting

NOTE: This adjustment procedure is for transmissions with a shim -11- and retaining ring -12- installed in brake -B2-.

On transmissions with a shim -11- and retaining ring -12-, brake -B2- is determined by shim thickness.

On some transmissions, a corrugated spring washer is installed on the last outer plate instead of the shim -11-

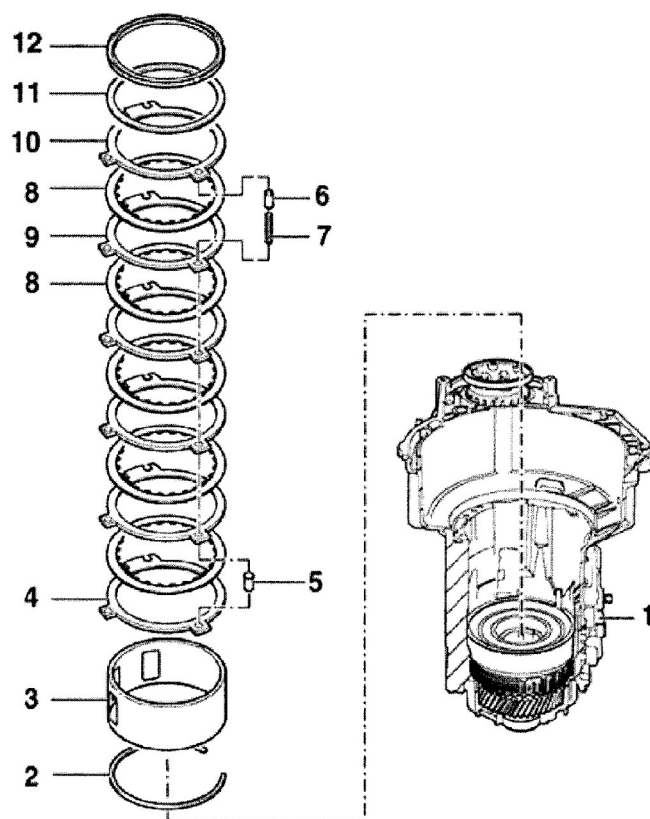
and retaining ring -12-.

On these transmissions, brake play is determined by the thickness of the last outer plate: see **2ND AND 4TH GEAR BRAKE -B2-, ADJUSTING (WITH SHIM AND RETAINING RING)**.

NOTE: To adjust, install components without shim -11-, without last outer plate -10- and without spring caps -6-.

The following list pertains to **Fig. 136**.

1. **Transmission housing**
2. **Circlip**
 - For supporting tube
3. **Supporting tube -B2-**
 - Spare part must match transmission code letters.
 - Insert with notch engaging on free wheel wedge
4. **Outer plate -B2-**
 - 3 mm thick
5. **Spring cap**
 - Install first outer plate -4-, then install spring cap
6. **Spring cap**
 - Do not install when adjusting -B2-
 - Install before installing last outer plate
7. **Spring**
 - Spare part must match transmission code letters.
8. **Inner plate -B2-**
 - Quantity, see **TRANSMISSION LAYOUT**
 - Always install 2 mm thick outer plates
9. **Outer plate -B2-**
 - Quantity, see **TRANSMISSION LAYOUT**
 - Always install 2 mm thick outer plates
10. **Outer plate -B2-**
 - 3 mm thick
 - Do not install when adjusting -B2-
11. **Shim**
 - Do not install when adjusting -B2-
12. **Retaining ring**
 - When adjusting -B2-, insert with smooth side facing last inner plate -8-



1 - Transmission housing

2 - Circlip

- ◆ For supporting tube

3 - Supporting tube -B2-

- ◆ Spare part is determined according to transmission code letters
- ◆ Insert so that notch locates on freewheel wedge

4 - Outer plate -B2-

- ◆ 3 mm thick

5 - Spring cap

- ◆ Install after installing first outer plate (item - 4 -)

6 - Spring cap

- ◆ Do not install when adjusting -B2-
- ◆ Install before installing last outer plate

7 - Spring

- ◆ Spare part is determined according to transmission code letters

8 - Inner plate -B2-

- ◆ Spare part is determined according to transmission code letters

9 - Outer plate -B2-

- ◆ Always install 2 mm thick outer plates

10 - Outer plate -B2-

- ◆ 3 mm thick
- ◆ Do not install when adjusting -B2-

11 - Shim

- ◆ Do not install when adjusting -B2-

12 - Retaining ring

- ◆ Inserted with smooth side facing last inner plate (item - 8 -) when adjusting -B2-.

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Fig. 136: Identifying 2nd And 4th Gear Brake B2 Components (With Shim And Retaining Ring)
Courtesy of VOLKSWAGEN OF AMERICA, INC.

Shim thickness, determining

The thickness of the shim(s) is determined by gap "x". See **Fig. 137**. Use the following formula:

$$\text{Gap } x = a - b - 3.2 \text{ mm}$$

Measuring points are shown in illustration to help understand formula. Special tool 3459, which exerts a force - F- onto plate packet via retaining ring, is not illustrated.

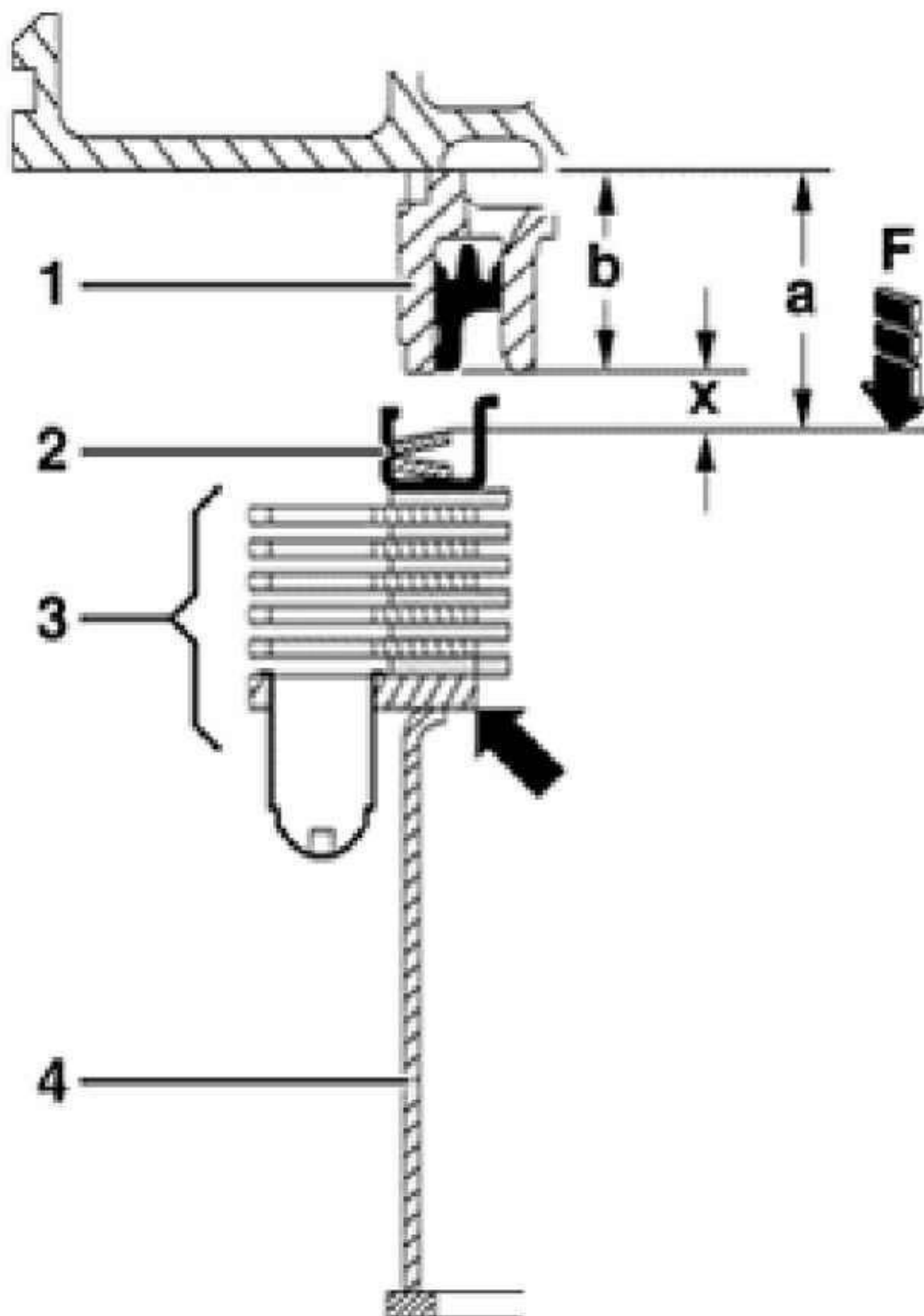
Dimension a, determining: see **CALCULATING DIMENSION "A":**.

Dimension b, determining: see **DIMENSION "B", CALCULATING :**.

2.65 mm - Amount for settling is taken into account by force F.

1. - ATF pump
2. - Retaining ring
3. - Plates for -B2- without last outer plate
4. - Support tube

NOTE: **First outer plate -arrow- and last outer plate are always 3 mm thick. Do not install to measure!**



G03362390

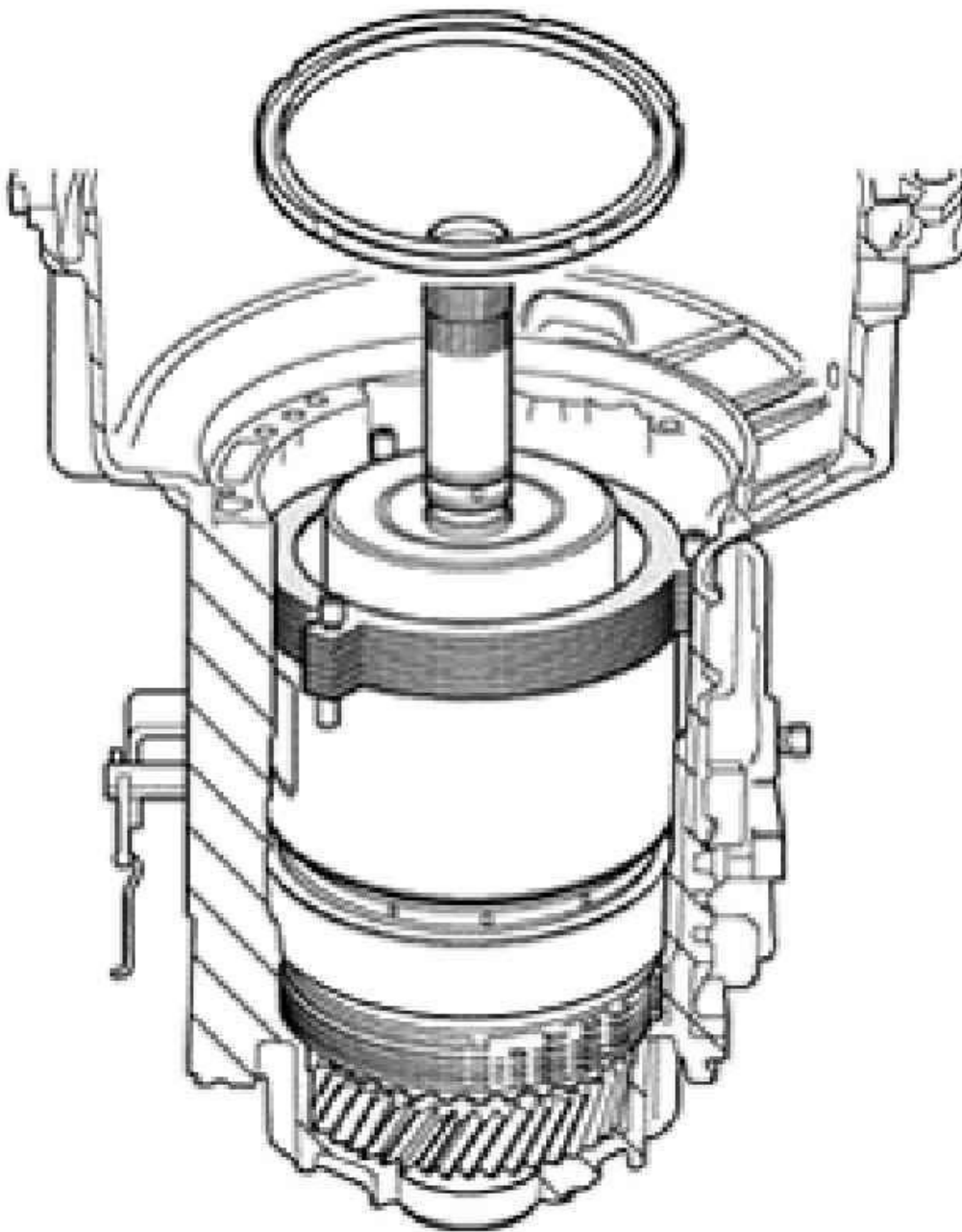
Fig. 137: Measuring 2nd And 4th Gear Brake B2 Adjusting Shim Thickness (With Shim And Retaining Ring)
Courtesy of VOLKSWAGEN OF AMERICA, INC.

Calculating dimension "a":

Assemble transmission up to the last -B2- inner plate, see **TRANSMISSION, ASSEMBLING**. The last outer plate and shim are not installed.

- Place retaining ring with smooth side onto last inner plate.
- Place adjustment tool 3459 on retaining ring and turn so 3 clips align with 3 holes for ATF pump.
- Bolt adjustment tool 3459 to flange for ATF pump to 5 N.m (44 in lb)

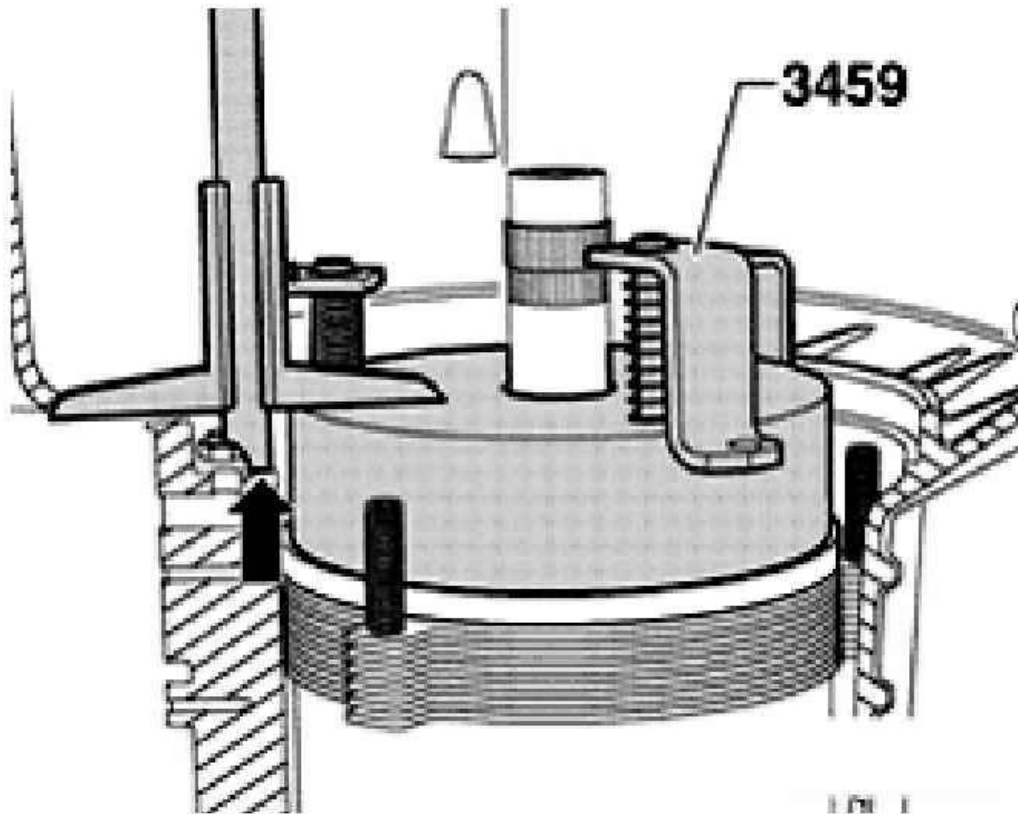
Plate stack for -B2- is now pressed together for the measurements



G03362391

Fig. 138: Installing Retaining Ring With Smooth Side Onto Last Inner Plate
Courtesy of VOLKSWAGEN OF AMERICA, INC.

- Measure from pump flange/transmission housing -arrow- to 3459 with depth gauge.



G03362392

Fig. 139: Measuring From Pump Flange/Transmission Housing To 3459 With Depth Gauge
 Courtesy of VOLKSWAGEN OF AMERICA, INC.

Dimension a = Height of 3459 in mm minus (-) measured value

Example:

CALCULATING DIMENSION A (2ND AND 4TH GEAR BRAKE B2 - WITH SHIM AND RETAINING RING)

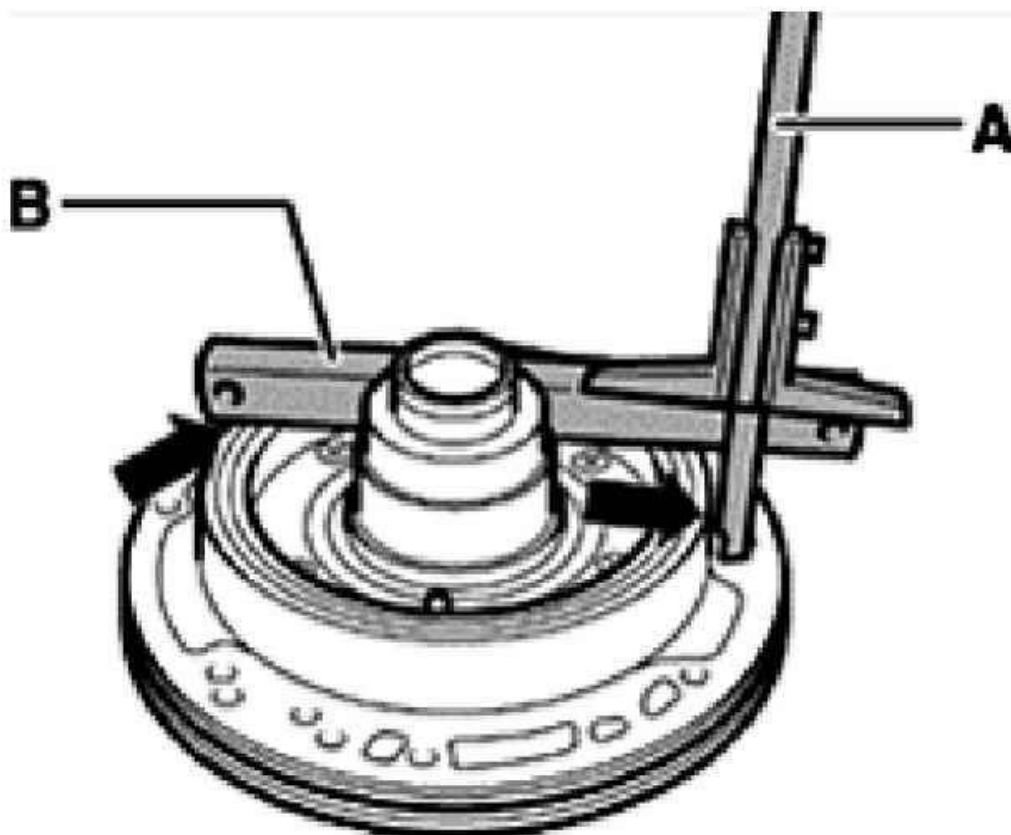
Height of 3459	=	60.0 mm
- Measured value	=	- 32.3 mm
Calculated value a	=	27.3 mm

- Note calculated value a.

- Remove 3459.
- Remove retaining ring.

Dimension "b", calculating :

- Push piston into ATF pump to stop.
- Place new paper gasket on ATF pump.
- Place straightedge "B" onto stator support -arrow- and measure with depth gauge "A" to gasket of pump flange.



G03362393

Fig. 140: Measuring With Depth Gauge A To Gasket Of Pump Flange
Courtesy of VOLKSWAGEN OF AMERICA, INC.

Example:

1993 Volkswagen Golf III GL

1993-99 TRANSMISSION 4 Spd. Automatic Transmission 01M - Cabrio, Golf, GTI & Jetta

CALCULATING DIMENSION B (2ND AND 4TH GEAR BRAKE B2 - WITH SHIM AND RETAINING RING)

Reading	=	39.8 mm
- Straightedge	=	- 19.5 mm
Calculated size b	=	20.3 mm

$$\text{Gap } x = a - b - 2.5 \text{ mm}$$

$$\text{Gap } x = 27.3 - 20.3 - 2.65 = 4.35 \text{ mm}$$

- Determine size of shim(s) according to table:

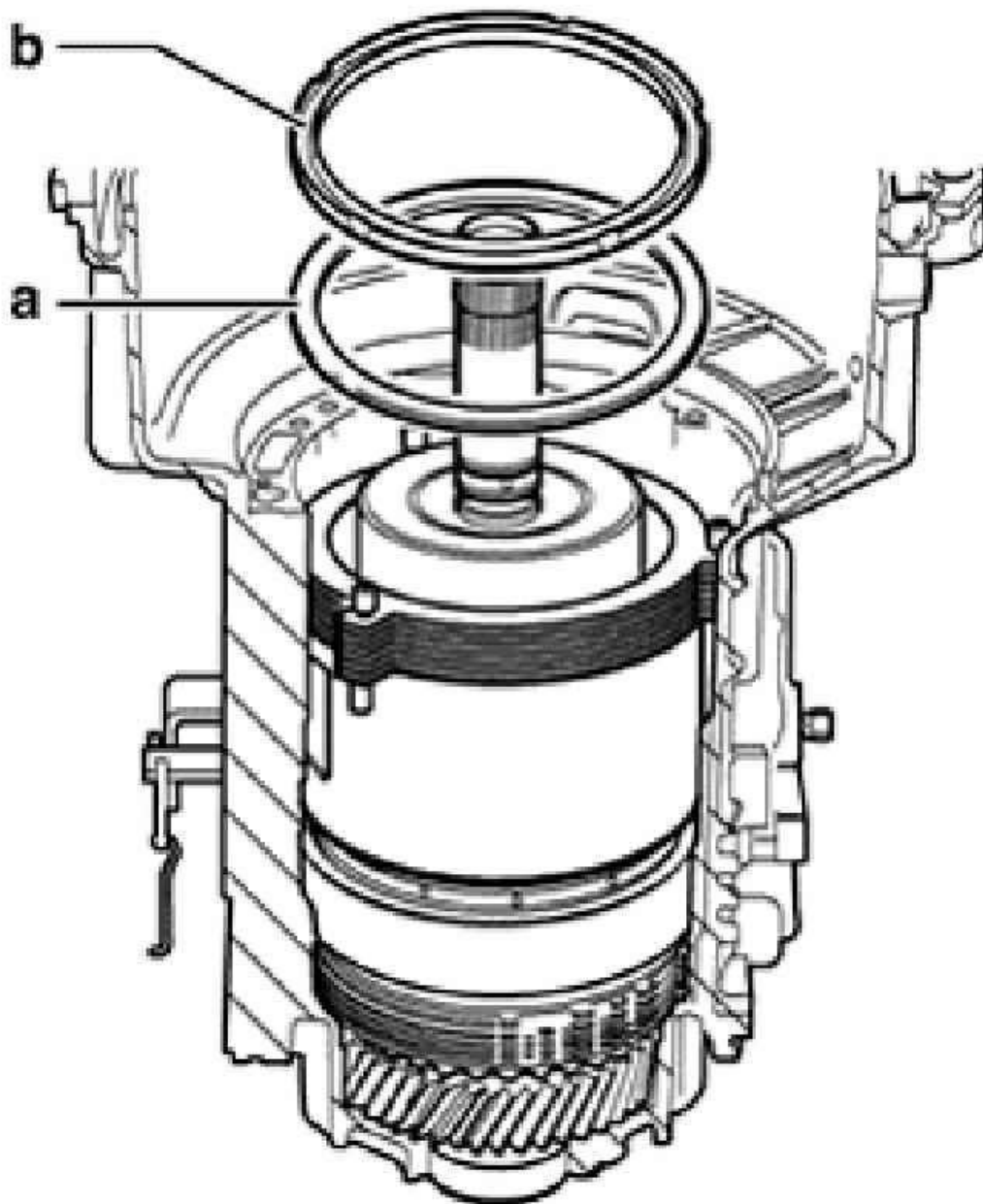
Table of "Shims":**SHIM THICKNESS (2ND AND 4TH GEAR BRAKE B2- WITH SHIM AND RETAINING RING)**

Gap "x" (mm)	Shims (mm)
3.25 ... 3.50	1.00
3.51 ... 3.75	1.25
3.76 ... 4.00	1.50
4.01 ... 4.25	1.75
4.26 ... 4.50	1.00 + 1.00
4.51 ... 4.75	1.00 + 1.25
4.76 ... 5.00	1.25 + 1.25
5.01 ... 5.25	1.25 + 1.50
5.26 ... 5.50	1.50 + 1.50
5.51 ... 5.75	1.50 + 1.75
5.76 ... 6.00	1.75 + 1.75

- Select shim(s) according to table and determine Part No. from parts catalogue.

In this example two shims must be installed (each 1.00mm thick).

- Insert three spring caps on compression springs.
- Insert last outer plate -3 mm thick-.
- Install correct shim(s) -a-.



G03362394

Fig. 141: Installing Correct Shim And Retaining Ring
Courtesy of VOLKSWAGEN OF AMERICA, INC.

- Place retaining ring -b- on shim(s). Smooth side facing shim.

- Continue installation as described: see **TRANSMISSION ADJUSTMENTS, OVERVIEW**.

2nd and 4th gear brake -B2-, adjusting (with corrugated washer)

Special tools and equipment

- 3459 Adjustment tool

2nd and 4th gear brake -B2-, adjusting (with corrugated washer)

NOTE: **This adjustment procedure is for transmissions with a corrugated washer -11- in brake -B2- on the last outer plate -10-**

These transmissions have the following code letters:

CLB, DLL, CLK, DKS, CKX, DKR, CKZ, DAB, CKY, CLA

On these transmissions, brake clearance is determined by outer plate(s) thickness of the last outer plate

NOTE: **To adjust, install components without corrugated washer -11-, without last outer plate -10- and without spring caps -6-.**

The following list pertains to **Fig. 142**.

1. **Transmission housing**
2. **Circlip**
 - For supporting tube
3. **Supporting tube -B2-**
 - Spare part must match transmission code letters.
 - Insert with notch engaging on free wheel wedge
4. **Outer plate -B2-**
 - 3 mm thick
5. **Spring cap**
 - Install first outer plate -4-, then install spring cap
6. **Spring cap**
 - Do not install when adjusting -B2-
 - Install before installing last outer plate
7. **Spring**
 - Spare part must match transmission code letters.
8. **Inner plate -B2-**
 - Quantity, see **TRANSMISSION LAYOUT**
 - Spare part must match transmission code letters.

9. Outer plate -B2-

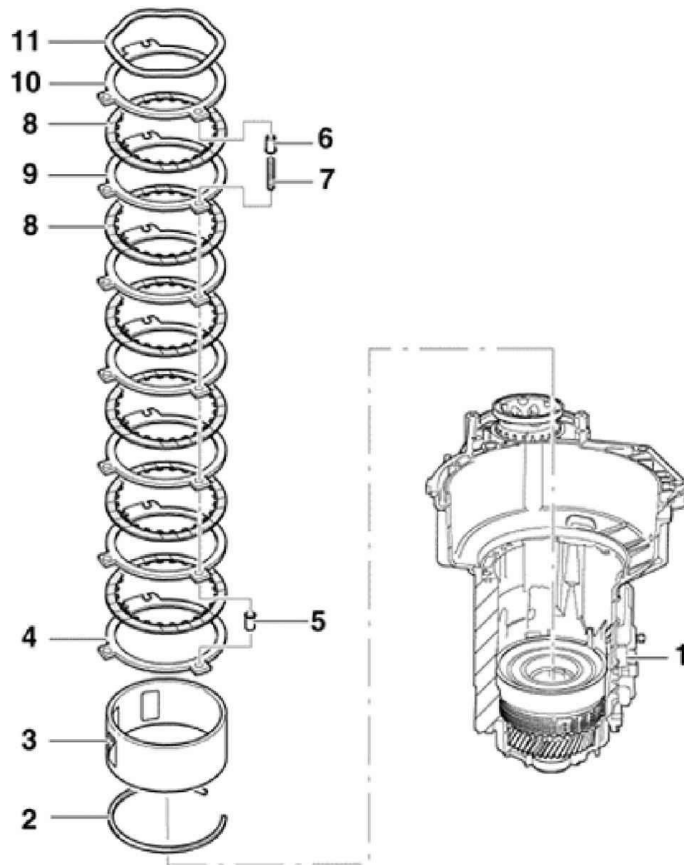
- Quantity, see **TRANSMISSION LAYOUT**
- Always install 2 mm thick outer plates

10. Outer plate -B2-

- Quantity, see **TRANSMISSION LAYOUT**
- Do not install when adjusting -B2-

11. Corrugated washer

- Do not install when adjusting -B2-



1 - Transmission housing

2 - Circlip

3 - Supporting tube -B2-

4 - Outer plate -B2-

5 - Spring cap

6 - Spring cap

7 - Spring

8 - Inner plate -B2-

9 - Outer plate -B2-

10 - Outer plate -B2-

11 - Corrugated washer

G03362395

Fig. 142: Exploded View Of 2nd And 4th Gear Brake B2 Adjusting Components (With Corrugated Washer)

Courtesy of VOLKSWAGEN OF AMERICA, INC.

Last outer plate "A", determining thickness

1993 Volkswagen Golf III GL

1993-99 TRANSMISSION 4 Spd. Automatic Transmission 01M - Cabrio, Golf, GTI & Jetta

The thickness of the last outer plate(s) is determined by gap "x". Use the following formula:

$$\text{Gap } x = a - b - 3.6 \text{ mm}$$

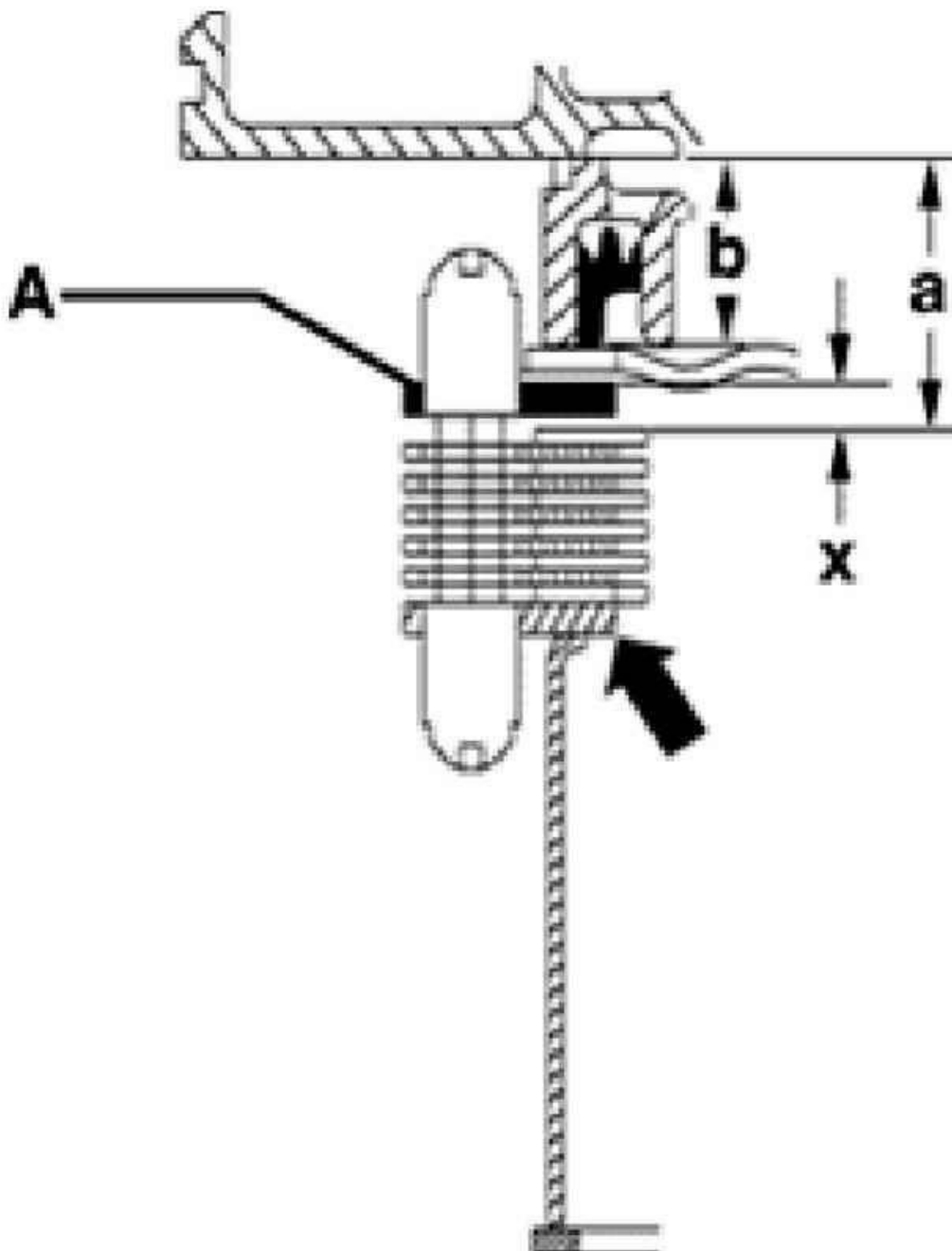
Measuring points are shown in illustration to help understand formula. Special tool 3459, which exerts a force onto plate packet is not illustrated

Dimension a, determining, see CALCULATING DIMENSION "A":.

Dimension b, determining, see DIMENSION "B", CALCULATING :.

3.6 mm - Amount for settling is taken into account by force exerted by special tool 3459.

NOTE: **First outer plate -arrow- is always 3 mm thick.**



G03362396

Fig. 143: Measuring Thickness Of Last Outer Plate (2nd And 4th Gear Brake B2 With Corrugated Washer)

1993 Volkswagen Golf III GL

1993-99 TRANSMISSION 4 Spd. Automatic Transmission 01M - Cabrio, Golf, GTI & Jetta

Courtesy of VOLKSWAGEN OF AMERICA, INC.

Calculating dimension "a":

Assemble transmission up to the last -B2- inner plate, see **TRANSMISSION, ASSEMBLING**. The last outer plate, the last 3 spring caps and the corrugated washer are not installed.

- Place adjustment tool 3459 onto last inner plate and turn so 3 clips align with 3 holes for ATF pump.
- Bolt adjustment tool 3459 to flange for ATF pump to 5 N.m (44 in lb)

Plate stack for -B2- is now pressed together for the measurements

- Measure from pump flange/transmission housing -arrow-to 3459 with depth gauge.

Dimension a = Height of 3459 in mm minus (-) measured value

Example:

CALCULATING DIMENSION A (2ND AND 4TH GEAR BRAKE B2 WITH CORRUGATED WASHER)

Height of 3459	=	60.0 mm
- Measured value	=	- 29.8 mm
Calculated value a	=	30.2 mm

- Note calculated value a.
- Remove 3459.

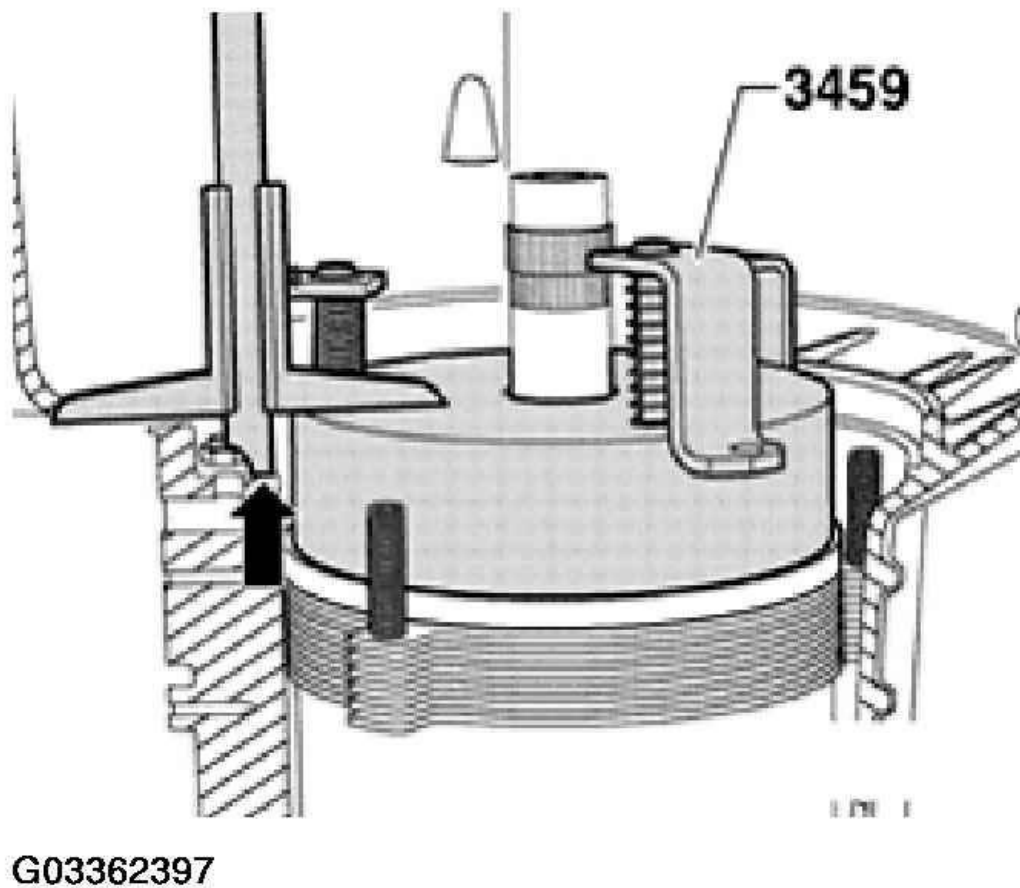


Fig. 144: Measuring From Pump Flange/Transmission Housing To 3459 With Depth Gauge
 Courtesy of VOLKSWAGEN OF AMERICA, INC.

Dimension "b", calculating :

- Push piston into ATF pump to stop.
- Place new paper gasket on ATF pump.
- Place straightedge "B" onto stator support -arrow- and measure with depth gauge "A" to gasket of pump flange.

Example:

CALCULATING DIMENSION B (2ND AND 4TH GEAR BRAKE B2 WITH CORRUGATED WASHER)

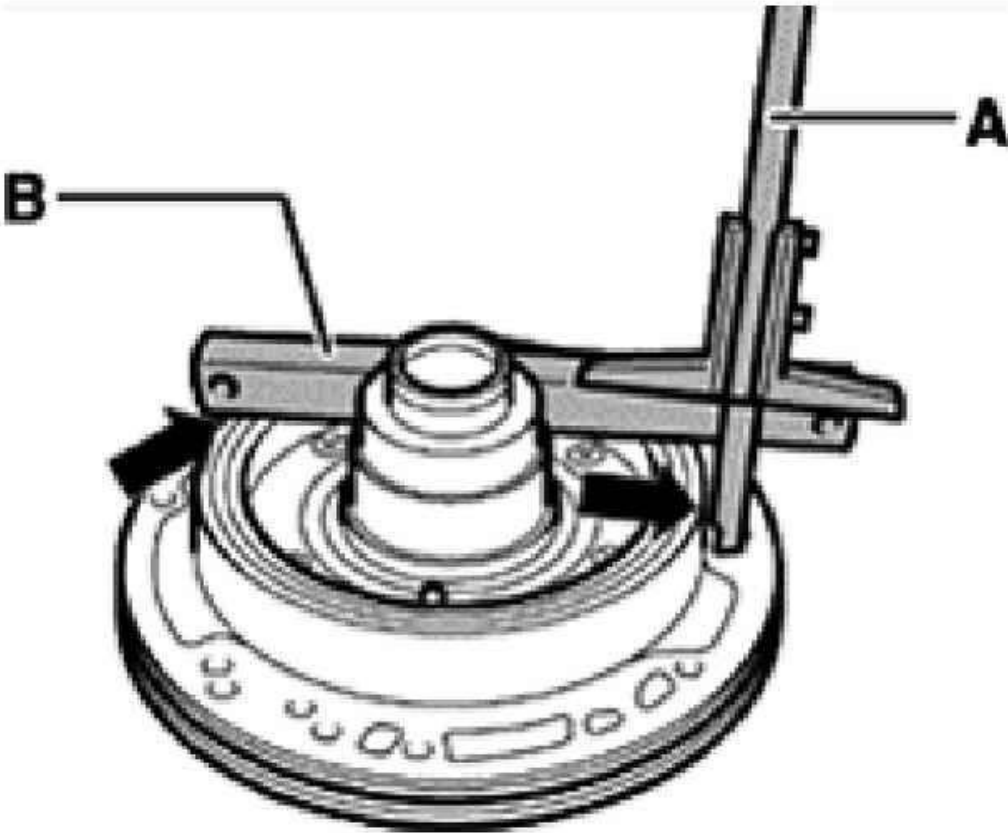
Reading	=	40.1 mm
- Straightedge	=	- 19.5 mm

Calculated size b	=	20.6 mm
-------------------	---	---------

Gap x = a - b - 3.6 mm

Gap x = 30.2 - 20.6 - 3.6 = 6.0 mm

- Determine size of shim(s) according to table: see **SHIM THICKNESS (2ND AND 4TH GEAR BRAKE B2 WITH CORRUGATED WASHER).**



G03362398

Fig. 145: Placing Straightedge B Onto Stator Support And Measuring With Depth Gauge A To Gasket Of Pump Flange
Courtesy of VOLKSWAGEN OF AMERICA, INC.

Table of "Shims":

SHIM THICKNESS (2ND AND 4TH GEAR BRAKE B2 WITH CORRUGATED WASHER)

Gap "x" (mm)	Shims (mm)
4.25... 4.49	2.75
4.50 ... 4.74	3.00
4.75 ... 4.99	3.25
5.00 ... 5.24	3.50
5.25 ... 5.49	3.75
5.50 ... 5.74	2.00 + 2.00
5.75 ... 5.99	2.00 + 2.25
6.00 ... 6.24	2.25 + 2.25
6.25 ... 6.49	2.25 + 2.50
6.50 ... 6.74	2.50 + 2.50
6.75 ... 7.00	2.50 + 2.75

- Select shim(s) according to table and determine Part No. from parts catalogue.

In this example two shims must be installed (each 2.25mm thick).

- Insert three spring caps on compression springs.
- Insert last outer plate(s).
- Insert corrugated washer.
- Continue installation as described, see **TRANSMISSION ADJUSTMENTS, OVERVIEW.**

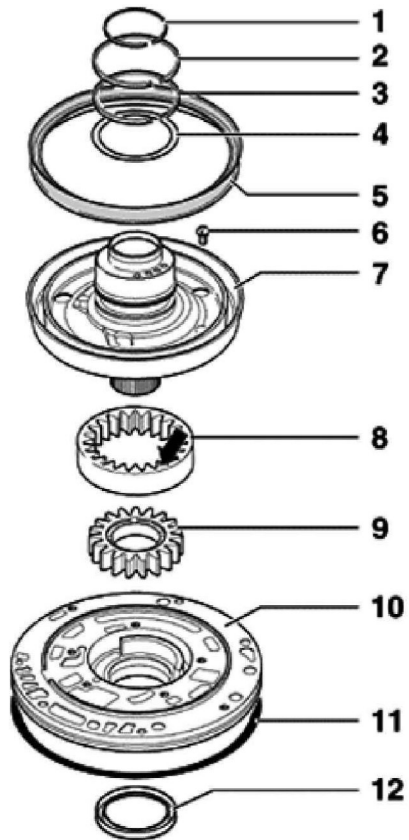
AUTOMATIC TRANSMISSION - GEARS, HYDRAULIC CONTROLS**ATF PUMP, DISASSEMBLING AND ASSEMBLING**

Replacement ATF pump parts and the ATF pump must comply with transmission code.

The following list pertains to **Fig. 146.**

- Piston ring**
 - Check for correct location
 - Installing, see **Piston ring, installing/hooking ends together**
- Piston ring**
 - Check for correct location
 - Installing, see **Piston ring, installing/hooking ends together**
- Piston ring**
 - Check for correct location
 - Installing, see **Piston ring, installing/hooking ends together**
- Thrust washer**
- Piston**
 - Sealing lips are vulcanized to the piston

- Moisten sealing lips with ATF before installing
 - Turn piston slightly when installing
6. **Bolt**
 - Tightening torque: 10 N.m (7 ft lb) plus and additional 1/8 turn (45 °)
 7. **Stator support**
 8. **Outer gear**
 - Manufacturer's marking (arrow) faces stator support
 - If outer gear is incorrectly installed, ATF pump may not operate freely in installed position
 9. **Inner gear**
 - Larger groove faces stator support
 10. **Housing for ATF pump**
 11. **O-ring**
 - Always replace
 12. **Torque converter oil seal**
 - Removing and installing, see **TORQUE CONVERTER OIL SEAL, REMOVING AND INSTALLING**



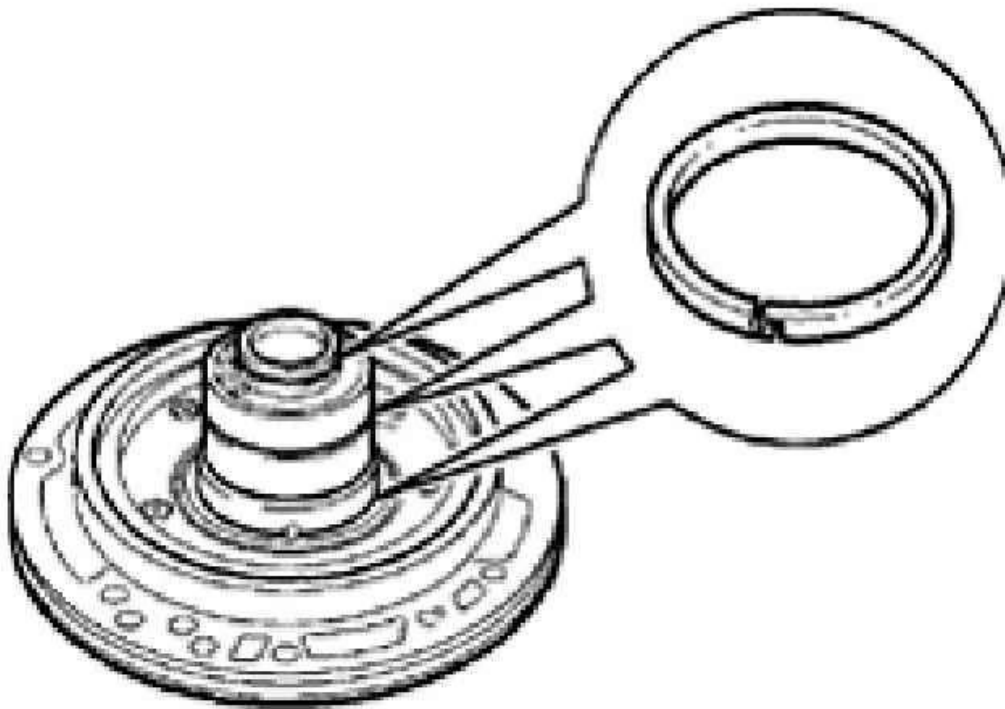
- 1 - Piston ring
- 2 - Piston ring
- 3 - Piston ring
- 4 - Thrust washer
- 5 - Piston
- 6 - Bolt
- 7 - Stator support
- 8 - Outer gear
- 9 - Inner gear
- 10 - Housing for ATF pump
- 11 - O-ring
- 12 - Torque converter oil seal

G03362399

Fig. 146: Identifying ATF Pump Components
 Courtesy of VOLKSWAGEN OF AMERICA, INC.

Piston rings, checking correct location

- Ensure ends of piston rings are hooked together.



G03362400

Fig. 147: Checking Correct Location Of Piston Rings
Courtesy of VOLKSWAGEN OF AMERICA, INC.

Piston ring, installing/hooks ends together

- Place piston ring in groove.
- To hook ends together, press sides of ring in and guide ends over one another.

NOTE: **Do not twist piston ring out of groove on one side.**

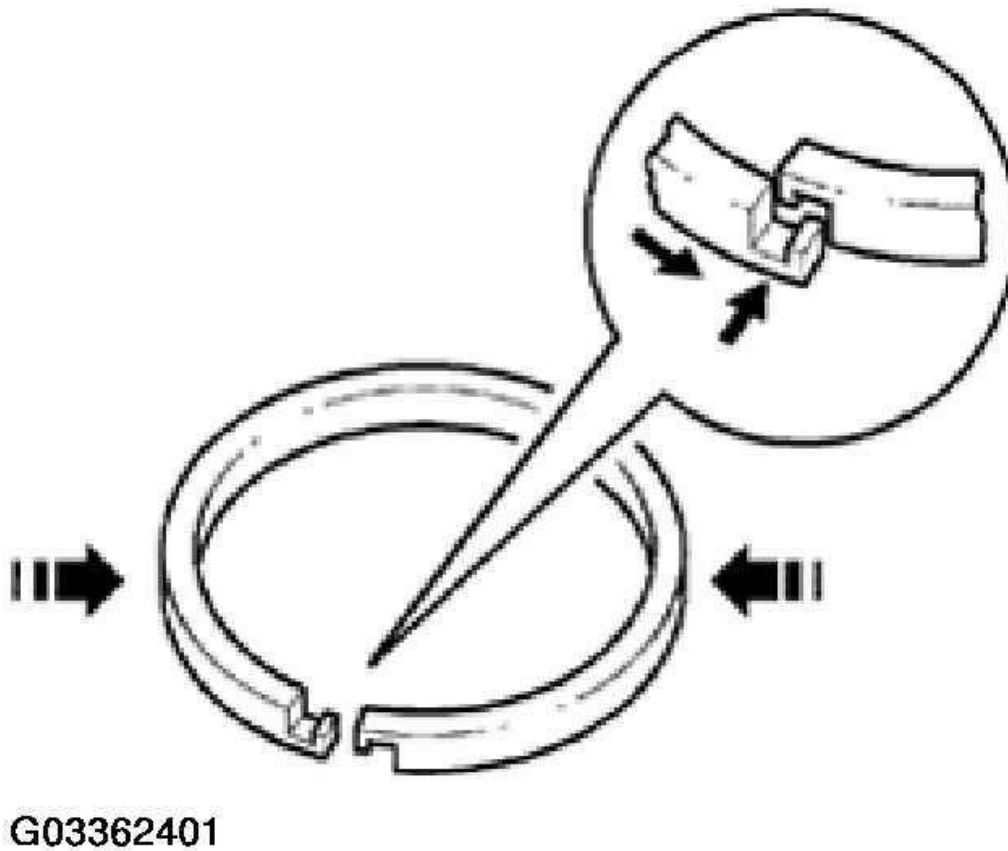


Fig. 148: Placing Piston Ring In Groove
Courtesy of VOLKSWAGEN OF AMERICA, INC.

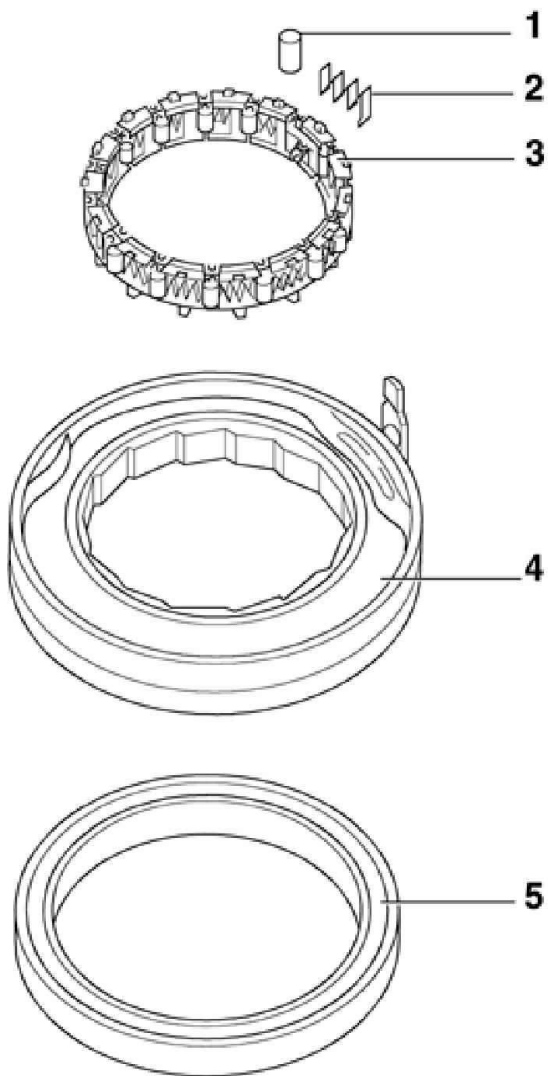
FREE WHEEL WITH -B1- PISTON, DISASSEMBLING AND ASSEMBLING

The following list pertains to **Fig. 149**.

1. **Rollers**
 - Installing, see **Rollers and springs, installing**
2. **Springs**
 - Installing, see **Rollers and springs, installing**
3. **Cage**
 - Installing, see **Cage with springs and rollers, installing**
 - Securing, see **Cage, securing**
4. **Outer ring**

5. Piston

- Sealing lips are vulcanized to piston
- Moisten sealing lips with ATF before installing
- Turn piston slightly when installing
- Installed position, see **Piston, installed position**



1 - Rollers

2 - Springs

3 - Cage

4 - Outer ring

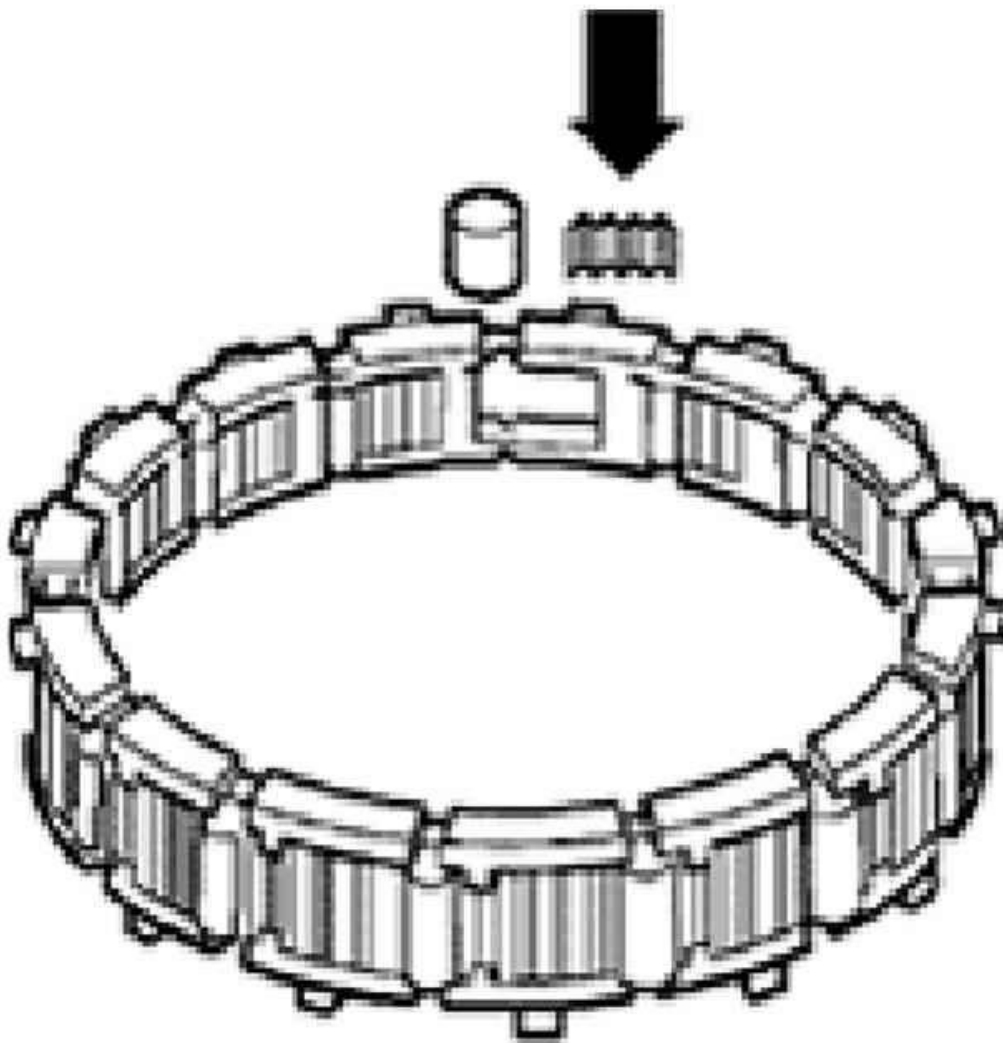
5 - Piston

G03362402

Fig. 149: Exploded View Of Free Wheel With -B1- Piston
Courtesy of VOLKSWAGEN OF AMERICA, INC.

Rollers and springs, installing

- Insert springs so that spring -arrow- engages in cage.

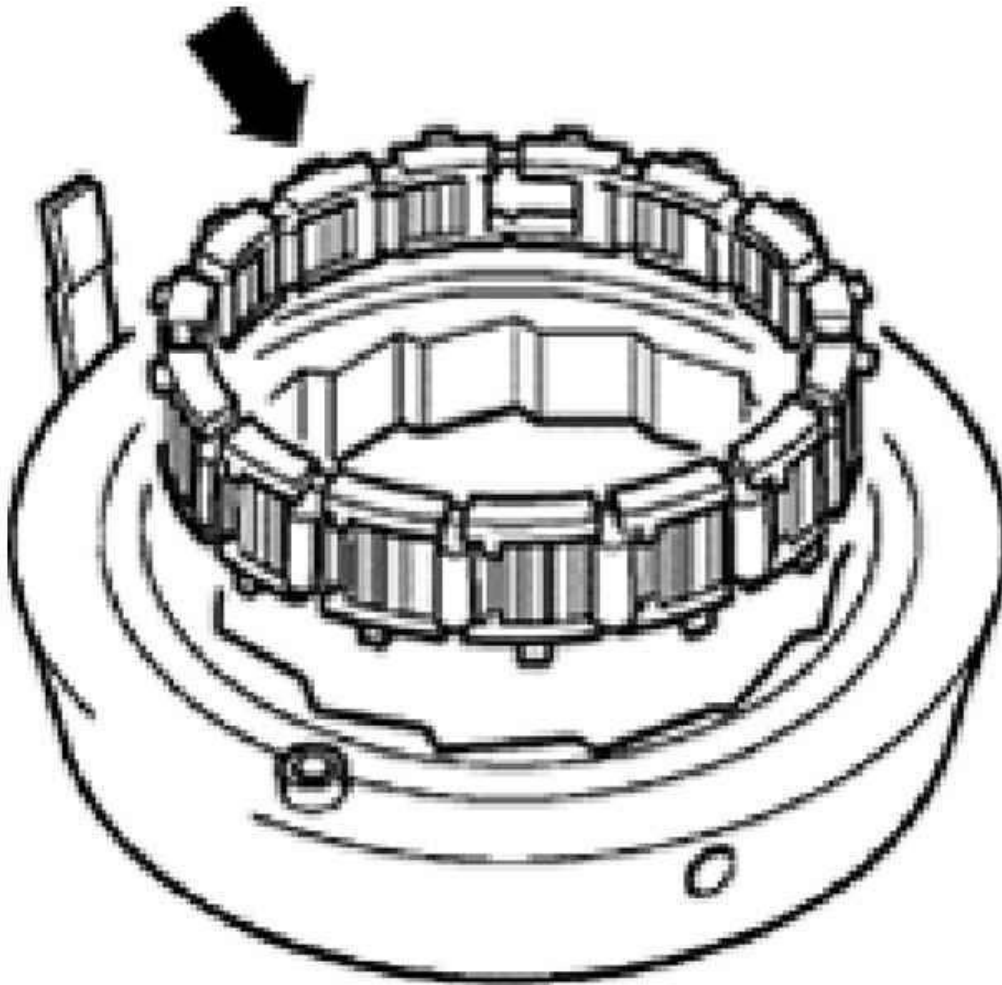


G03362403

Fig. 150: Installing Rollers And Springs
Courtesy of VOLKSWAGEN OF AMERICA, INC.

Cage with springs and rollers, installing

- Install with large lugs -arrow- facing up.

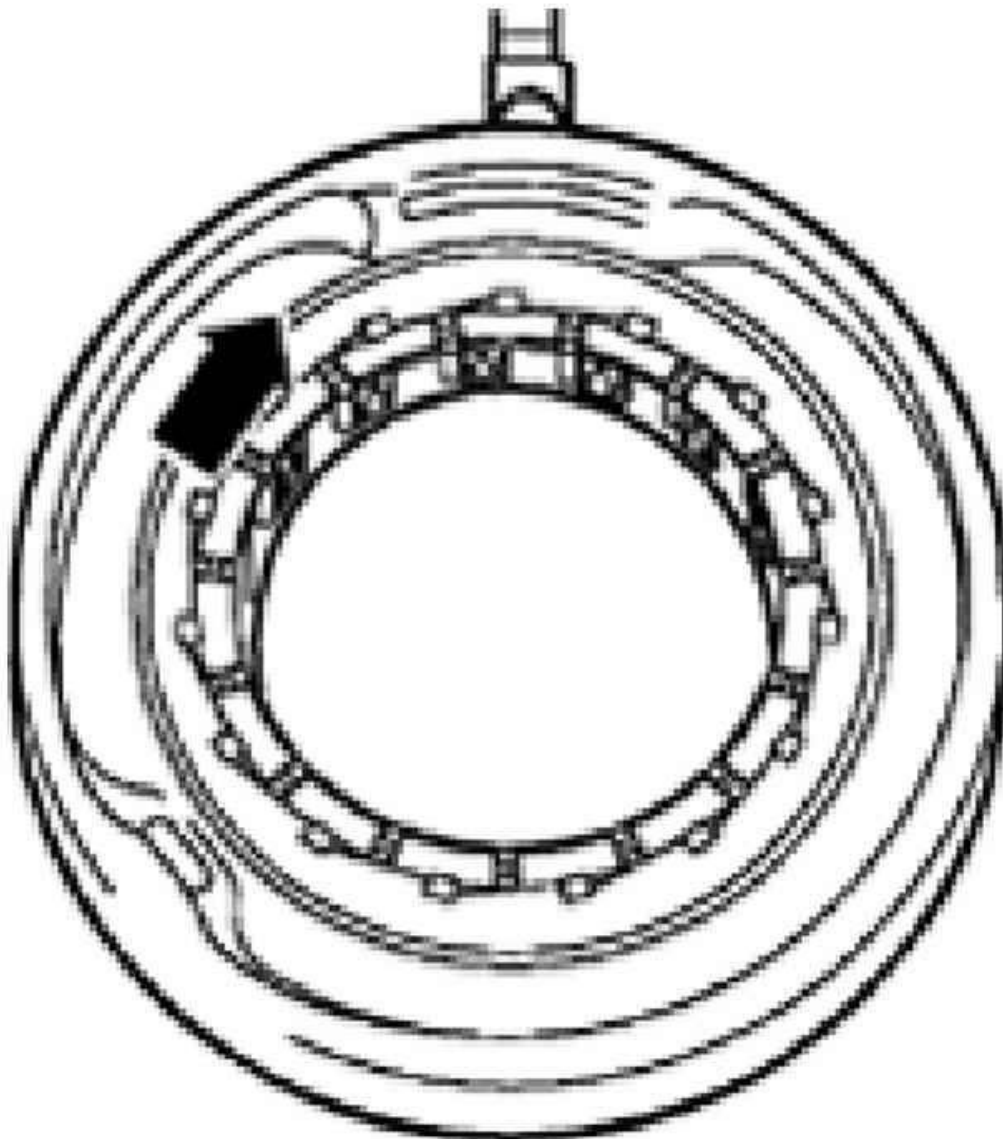


G03362404

Fig. 151: Installing Cage With Springs And Rollers
Courtesy of VOLKSWAGEN OF AMERICA, INC.

Cage, securing

- Secure cage by turning in direction of arrow to stop.



G03362405

Fig. 152: Securing Cage
Courtesy of VOLKSWAGEN OF AMERICA, INC.

Piston, installed position

- Install piston -A- as shown.

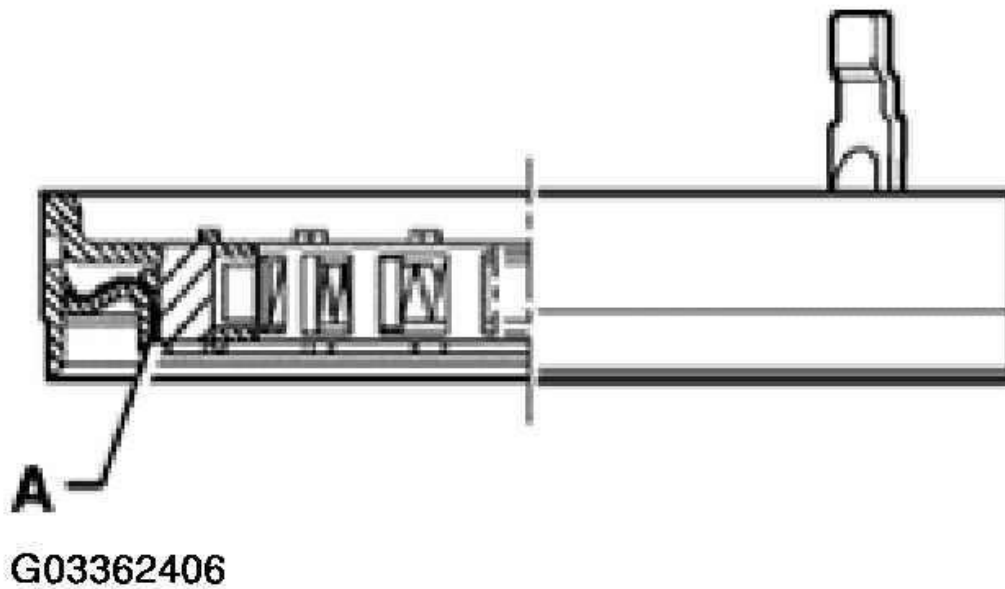


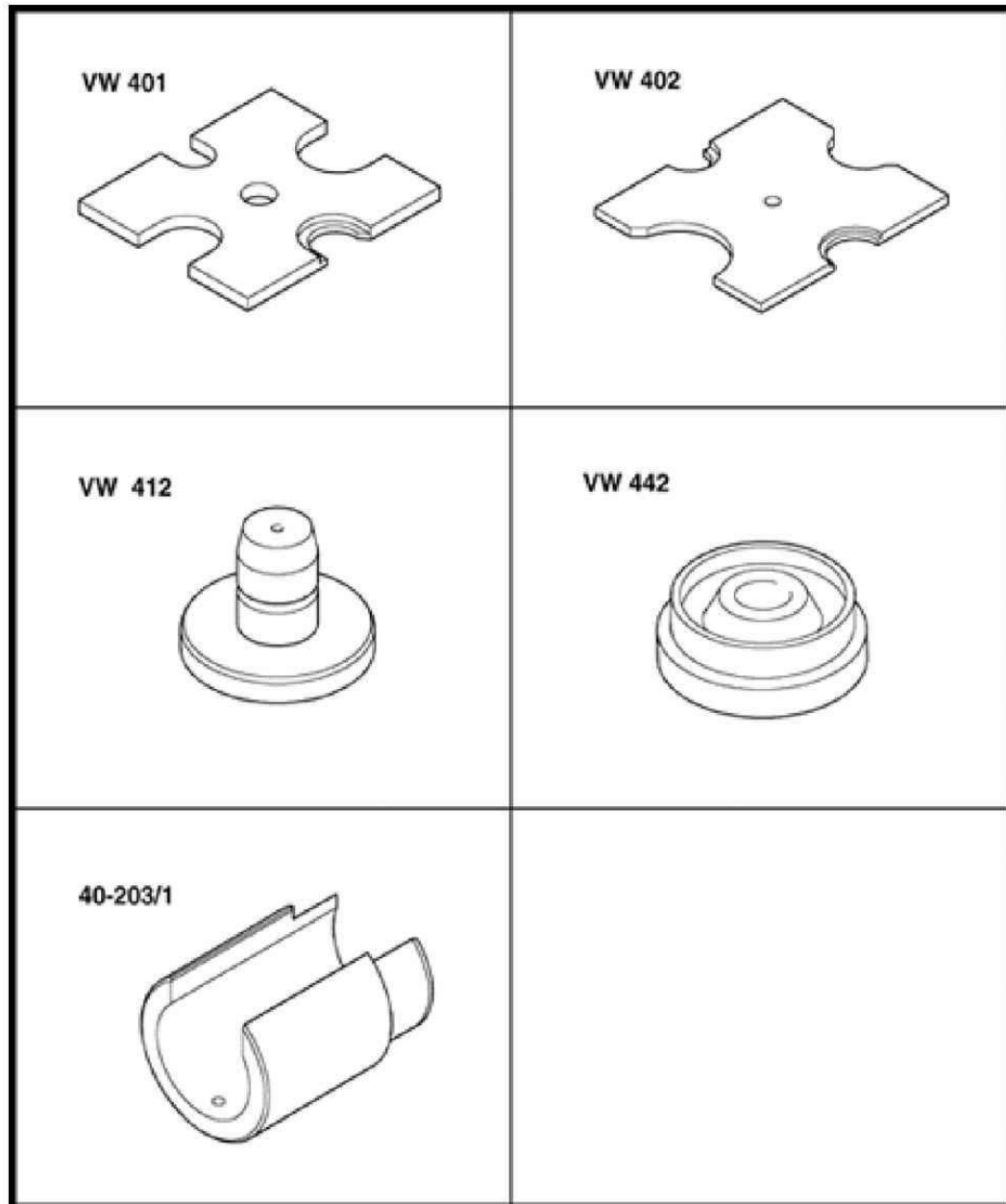
Fig. 153: Installing Piston A

Courtesy of VOLKSWAGEN OF AMERICA, INC.

1ST TO 3RD GEAR CLUTCH - K1-, DISASSEMBLING AND ASSEMBLING

Special tools and equipment

- VW 401 Press plate
- VW 402 Press plate
- VW 412 Press tool
- VW 442 Thrust pad
- 40-203/1 Tube, split



G03362407

Fig. 154: Identifying Special Tools - 1st To 3rd Gear Clutch - K1
 Courtesy of VOLKSWAGEN OF AMERICA, INC.

1st to 3rd gear clutch - K1-

NOTE:

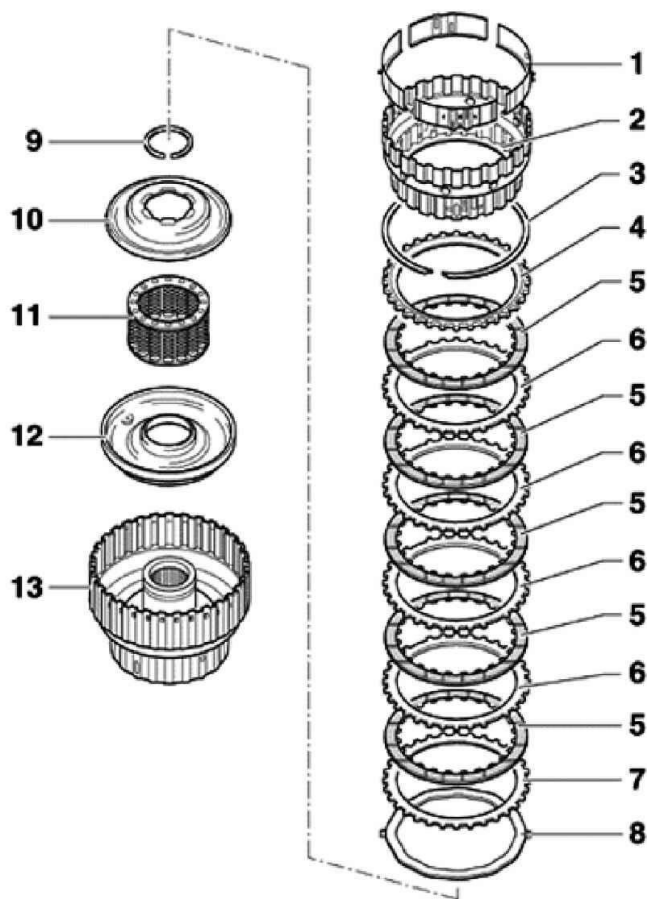
- Only disassemble clutch when cleaning or visually checking components.

The following list pertains to **Fig. 155**.

1. **Supporting ring**
 - 4-piece, unclip from inner plate carrier
 - Installing, see **Thrust plate and plates, installing on inner plate carrier**
2. **Inner plate carrier**
 - Installing, see **Inner plate carrier and circlip -arrow-, installing**
 - Assembling, see **Thrust plate and plates, installing on inner plate carrier**
3. **Circlip**
 - Different thickness
 - Mark after removing and install in same position
4. **Thrust plate**
 - Smooth side faces inner plate
 - Install together with inner plate carrier, see **Thrust plate and plates, installing on inner plate carrier**
5. **Inner plate**
 - Quantity, see **TRANSMISSION LAYOUT**
 - Installing, see **Thrust plate and plates, installing on inner plate carrier**
6. **Outer plate**
 - Quantity, see **TRANSMISSION LAYOUT**
 - Installing, see **Thrust plate and plates, installing on inner plate carrier**
 - Always 1.5 mm thick
7. **Outer plate**
 - Always 2 mm thick
 - Installing, see **Thrust plate and plates, installing on inner plate carrier**
8. **Corrugated washer**
9. **Circlip**
 - Removing and installing, see **Circlip, removing and installing**
10. **Piston cap**
 - Sealing lips are vulcanized to cap
 - Moisten sealing lips with ATF before installing
 - Turn cap slightly when installing
11. **Intermediate spring ring**
 - With spring supporting shell and compression springs
12. **Piston**
 - Sealing lips are vulcanized to piston
 - Moisten sealing lips with ATF before installing
 - Turn piston slightly when installing

13. Clutch housing

- Before installing inner plate carrier corrugated washer -8-, install inner and outer plates in clutch, see **Corrugated washer, inner and outer plates, installing in clutch housing**



1 - Supporting ring

2 - Inner plate carrier

3 - Circlip

4 - Thrust plate

5 - Inner plate

6 - Outer plate

7 - Outer plate

8 - Corrugated washer

9 - Circlip

10 - Piston cap

11 - Intermediate spring ring

12 - Piston

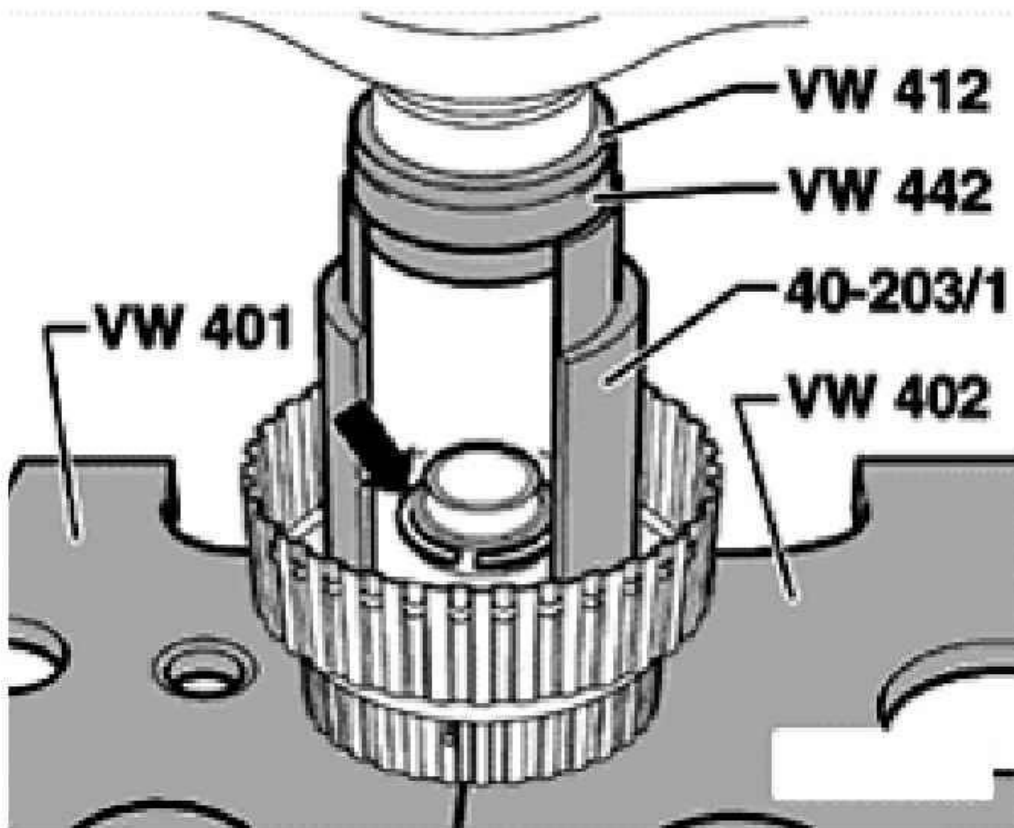
13 - Clutch housing

G03362408

Fig. 155: Disassembled View Of 1st to 3rd gear clutch K1
 Courtesy of VOLKSWAGEN OF AMERICA, INC.

Circlip, removing and installing

- Press piston cap with intermediate spring ring down far enough for circlip -arrow- to be inserted in groove.

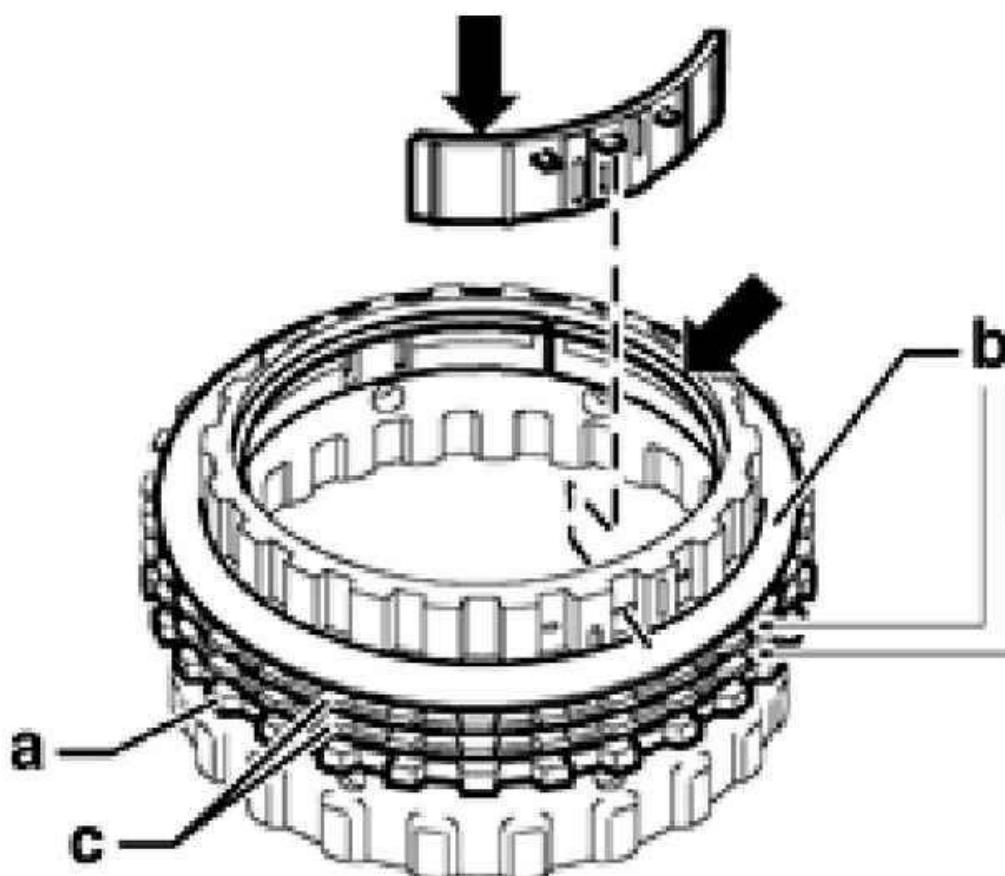


G03362409

Fig. 156: Circlip, Removing And Installing
 Courtesy of VOLKSWAGEN OF AMERICA, INC.

Thrust plate and plates, installing on inner plate carrier

- Install thrust plate -a- with smooth side facing inner plate and stepped side toward inner plate carrier.
- Install 3 inner plates -b- and 2 outer plates -c-.
- Clip in supporting ring with step -arrow-.



G03362410

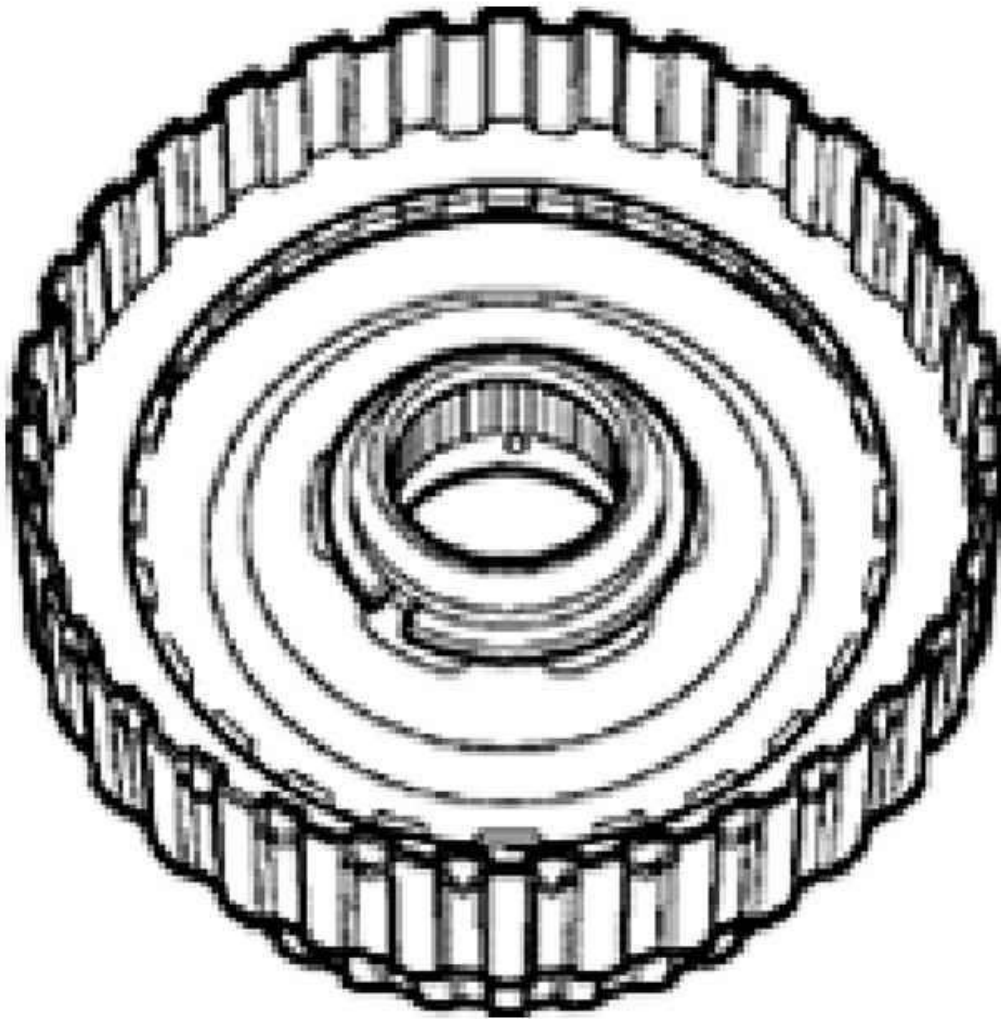
Fig. 157: Thrust Plate And Plates, Installing On Inner Plate Carrier
Courtesy of VOLKSWAGEN OF AMERICA, INC.

NOTE:

- Position locating lugs correctly.
- Corrugated washer, inner and outer plates, installing in clutch housing: see Corrugated washer, inner and outer plates, installing in clutch housing.

Corrugated washer, inner and outer plates, installing in clutch housing

- Install corrugated washer.
- Install 2 mm thick outer plate.
- Install remaining inner and outer plates.

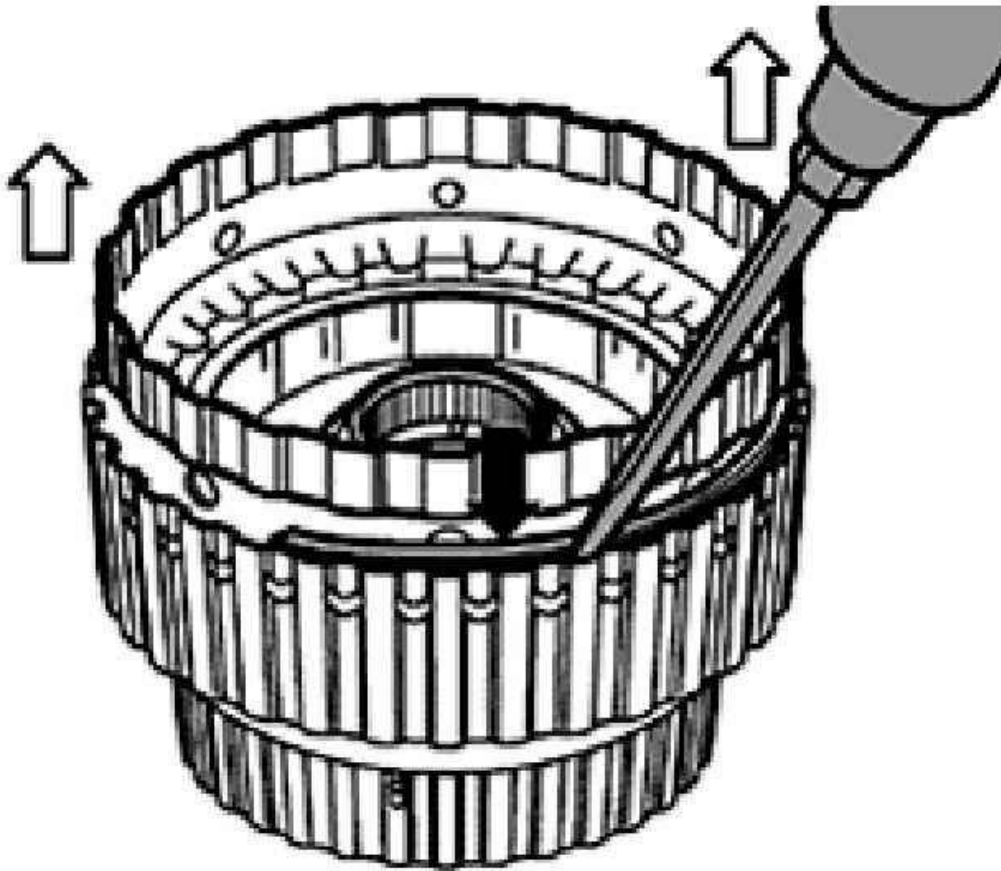


G03362411

Fig. 158: Installing Corrugated Washer, Inner And Outer Plates In Clutch Housing
Courtesy of VOLKSWAGEN OF AMERICA, INC.

Inner plate carrier and circlip -arrow-, installing

- Lift inner plate carrier slightly to install circlip -arrow-.



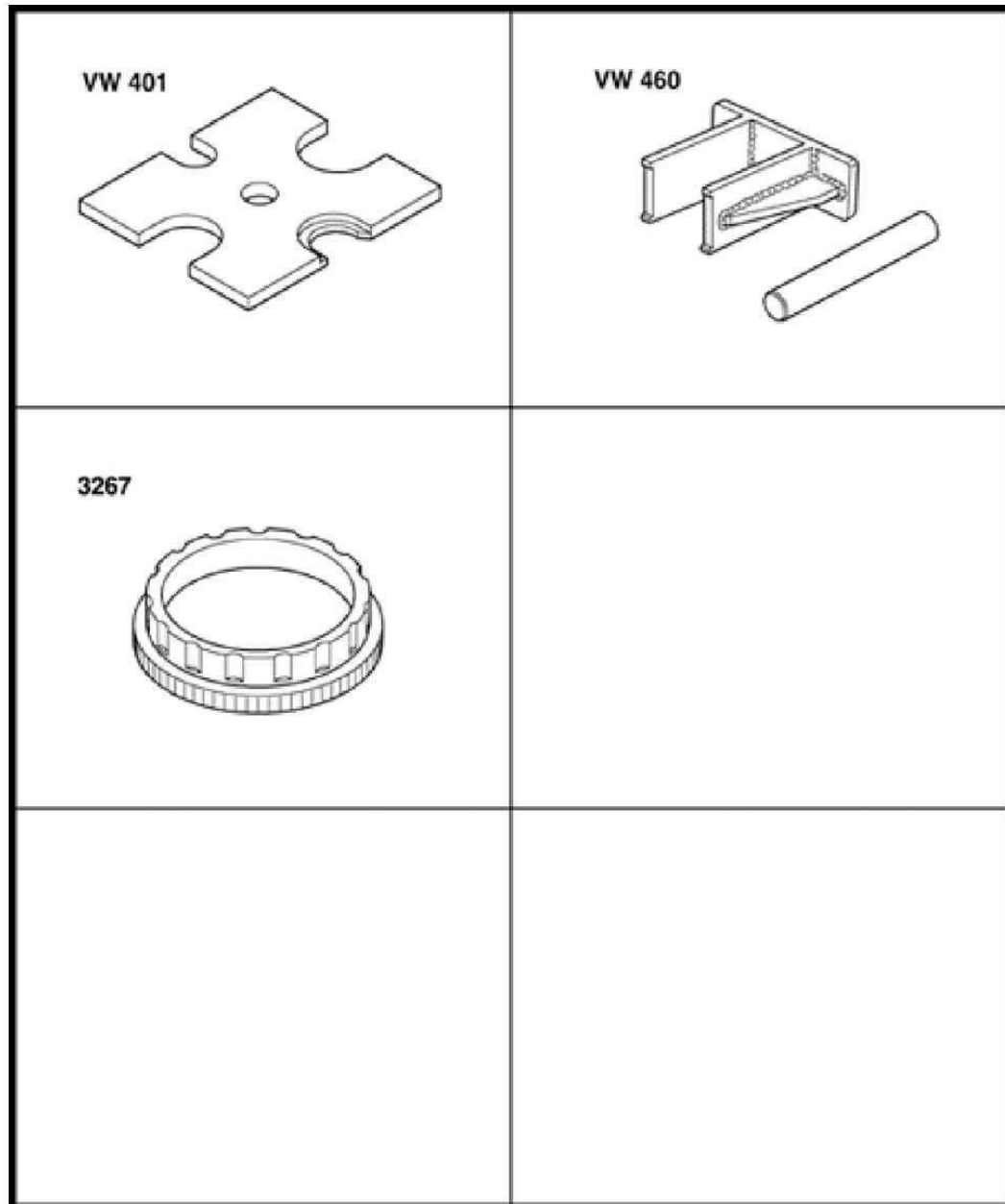
G03362412

Fig. 159: Installing Inner Plate Carrier And Circlip - Arrow -
Courtesy of VOLKSWAGEN OF AMERICA, INC.

REVERSE GEAR CLUTCH - K2-, DISASSEMBLING AND ASSEMBLING

Special tools and equipment

- VW 401 Press plate
- VW 460 Removal device
- 3267 Assembly ring



G03362413

Fig. 160: Identifying Special Tools - Disassembling 1st To 3rd Gear Clutch K2
 Courtesy of VOLKSWAGEN OF AMERICA, INC.

Reverse gear clutch - K2-

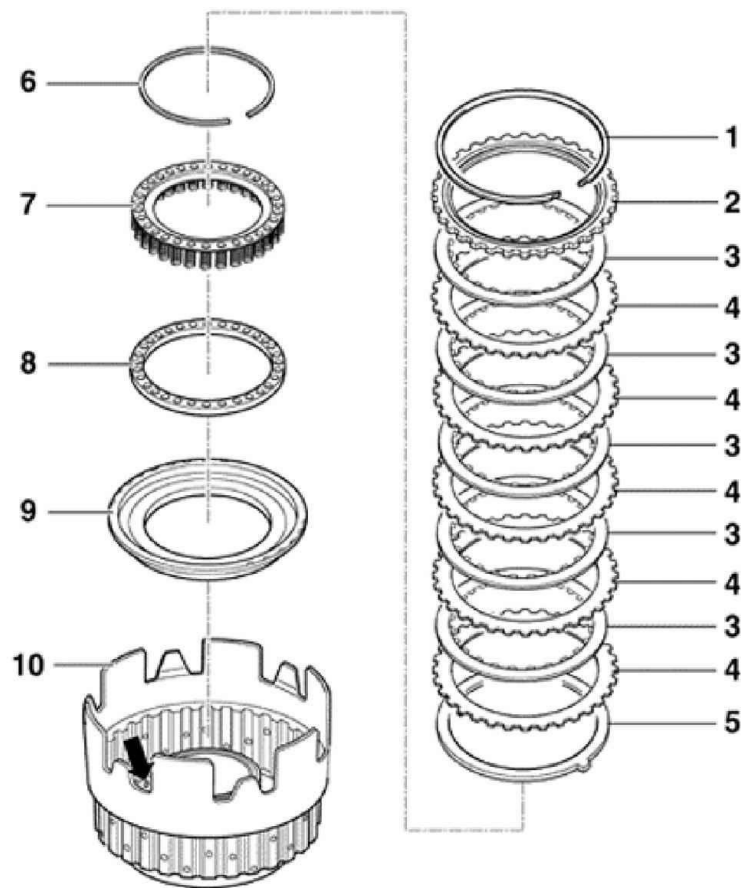
NOTE:

- Only disassemble if you clean or visually check components.

- **When checking, ensure ball valve -arrow- is not damaged.**

The following list pertains to **Fig. 161**.

1. **Circlip**
 - Mark after removing and install in same position
2. **Thrust plate**
 - Smooth side facing inner plates
3. **Inner plate**
 - Quantity, see **TRANSMISSION LAYOUT**
4. **Outer plate**
 - Quantity, see **TRANSMISSION LAYOUT**
5. **Corrugated washer**
6. **Circlip**
 - Removing and installing, see **Circlip -arrow-, removing and installing**
 - Installation position, see **Installation position of spring support plate, checking circlip**
7. **Spring support plate**
 - With springs
 - Installation position, see **Installation position of spring support plate, checking circlip**
8. **Spring support ring**
9. **Piston**
 - Seals are vulcanized to piston
 - Moisten seals with ATF before installing
 - Turn piston slightly when installing
10. **Clutch housing**



- 1 - Circlip
- 2 - Thrust plate
- 3 - Inner plate
- 4 - Outer plate
- 5 - Corrugated washer
- 6 - Circlip
- 7 - Spring support plate
- 8 - Spring support ring
- 9 - Piston
- 10 - Clutch housing

G03362414

Fig. 161: Disassembled View Of 1st To 3rd Gear Clutch K2
 Courtesy of VOLKSWAGEN OF AMERICA, INC.

Circlip -arrow-, removing and installing

- Press spring support plate down with 3267 just enough to remove and install circlip.

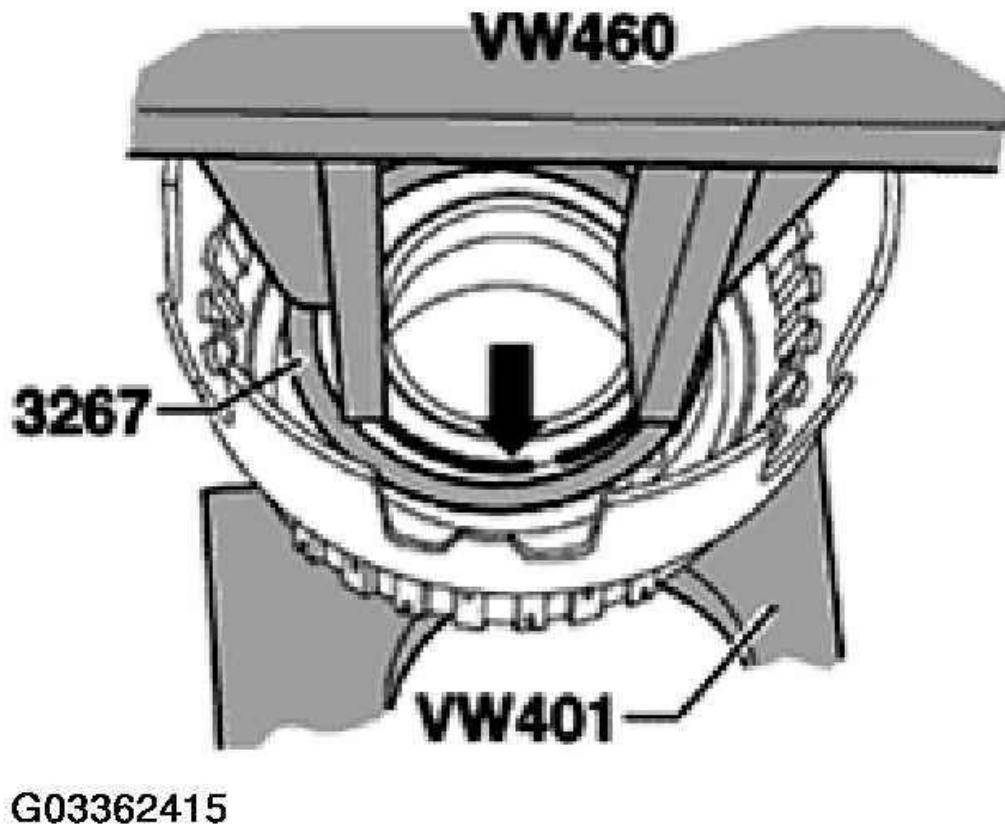


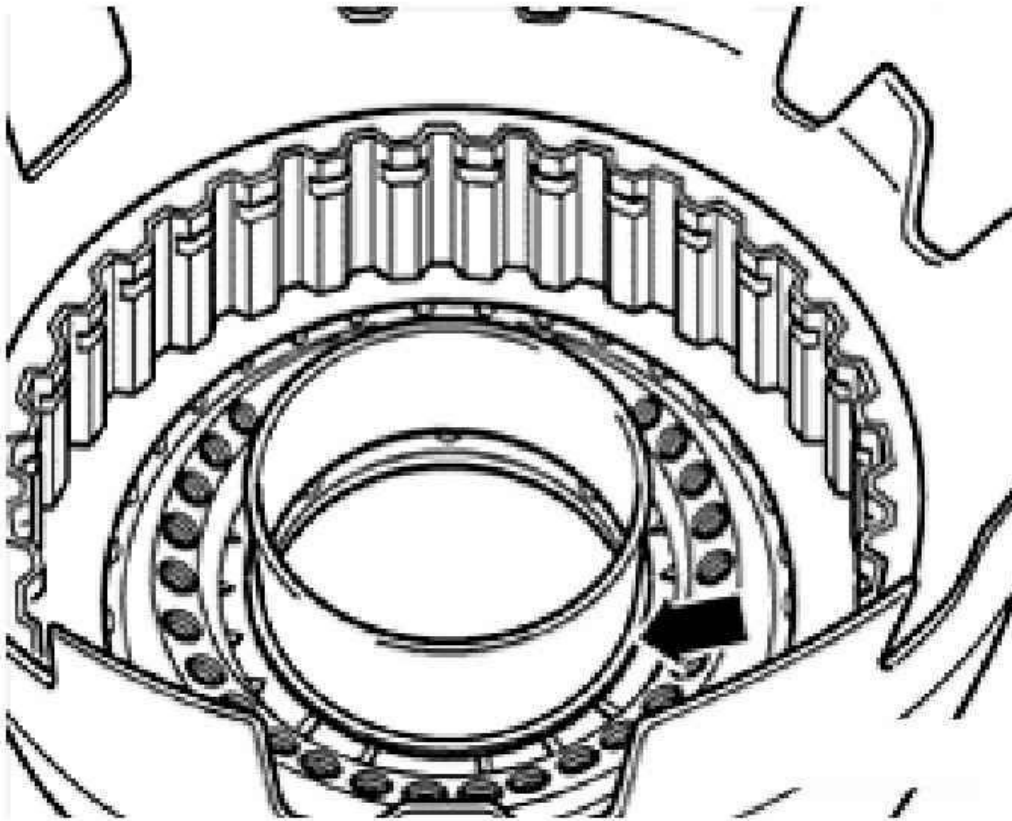
Fig. 162: Circlip Removing And Installing (1st To 3rd Gear Clutch K2)
Courtesy of VOLKSWAGEN OF AMERICA, INC.

NOTE: Be careful not to damage clutch housing ball valve.

Installation position of spring support plate, checking circlip

Circlip -arrow- must be seated in groove of clutch housing.

Spring support plate must be centered relative to hub.



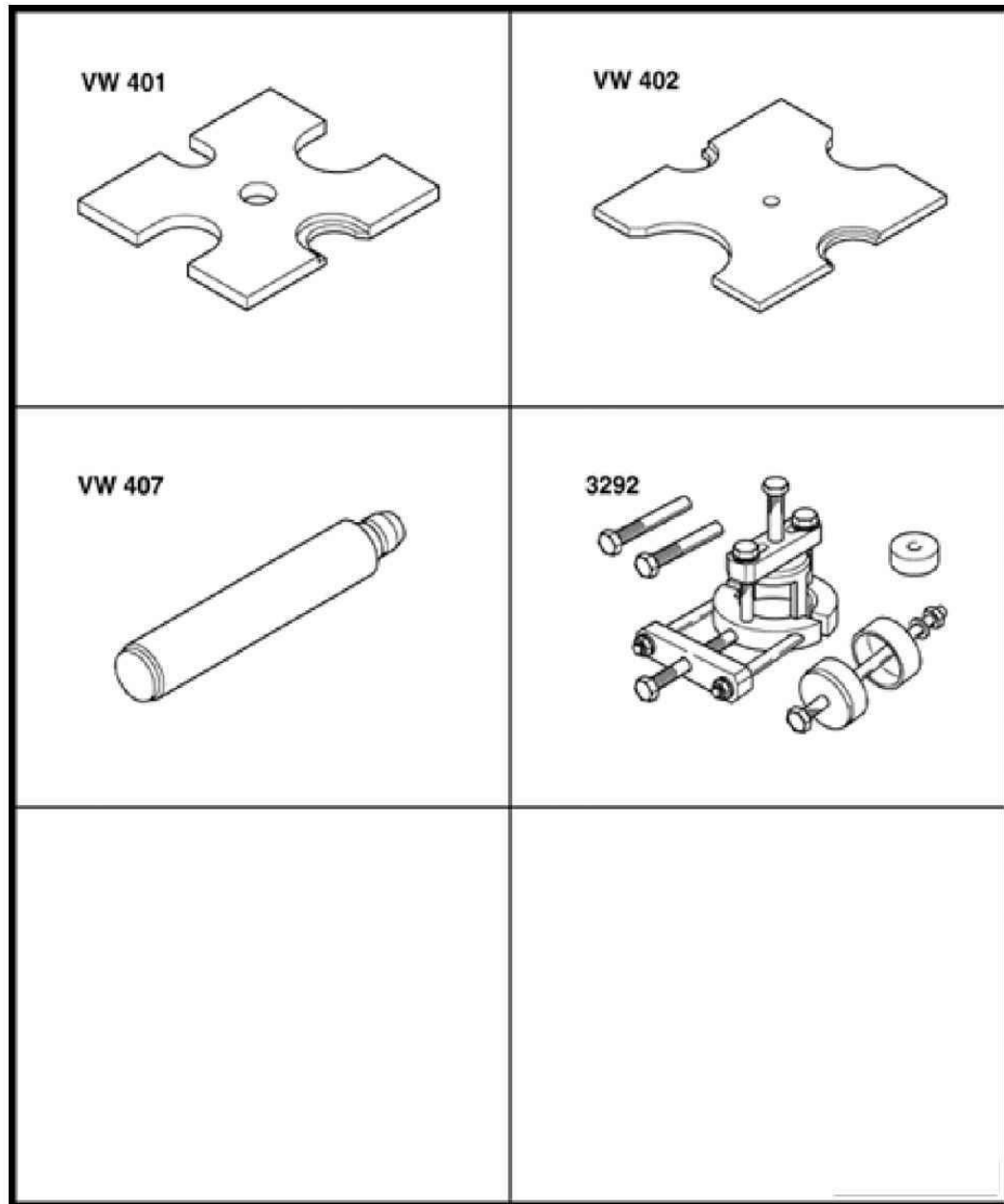
G03362416

Fig. 163: Installation Position Of Spring Support Plate, Checking Circlip
Courtesy of VOLKSWAGEN OF AMERICA, INC.

3RD AND 4TH GEAR CLUTCH -K3- WITH TURBINE SHAFT, DISASSEMBLING AND ASSEMBLING

Special tools and equipment

- VW 401 Press plate
- VW 402 Press plate
- VW 407 Press tool
- 3292/1 From assembly tool 3292



G03362417

Fig. 164: Identifying Special Tools - Disassembling 3rd To 4th Gear Clutch K3
 Courtesy of VOLKSWAGEN OF AMERICA, INC.

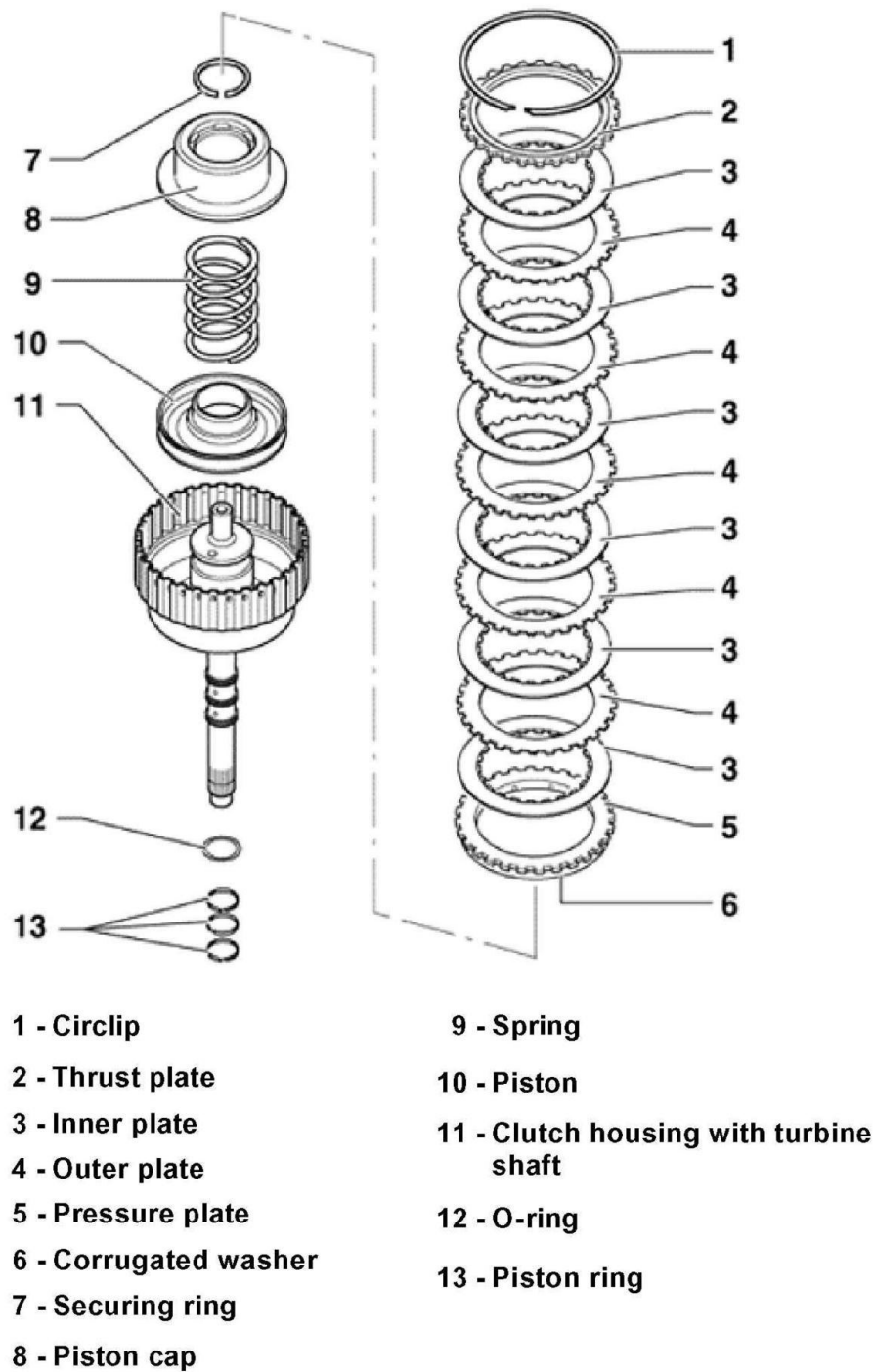
3rd and 4th gear clutch -K3-

NOTE:

- Only disassemble if you clean or visually check components.

The following list pertains to **Fig. 165**.

1. **Circlip**
 - Different thickness
 - Mark after removing and install at same point
2. **Thrust plate**
 - Install with stepped side facing circlip
3. **Inner plate**
 - Quantity, see **TRANSMISSION LAYOUT**
4. **Outer plate**
 - Quantity, see **TRANSMISSION LAYOUT**
5. **Pressure plate**
 - Install with peened corrugated washer facing piston
6. **Corrugated washer**
 - Peened to pressure plate - 5 -
7. **Securing ring**
 - Removing and installing, see **Circlip -arrow-, removing and installing**
8. **Piston cap**
 - Seals are vulcanized to piston cap
 - Moisten with ATF before installing
 - Turn piston cap slightly when installing
 - When removing and installing press down and install securing ring -7-
9. **Spring**
 - Seat between piston and piston cap
10. **Piston**
 - Seals are vulcanized to piston
 - Moisten seals with ATF before installing
 - Turn piston slightly when installing
11. **Clutch housing with turbine shaft**
 - Height varies according to number of inner and outer plates
12. **O-ring**
 - Always replace
 - Installing, see **O-ring, installing**
13. **Piston ring**
 - Be sure piston ring is correctly located, see **Piston rings, checking seating**
 - Installing, see **Piston rings, installing/hooking ends together**



G03362418

Fig. 165: Disassembled View Of 3rd And 4th Gear Clutch K3 With Turbine Shaft
 Courtesy of VOLKSWAGEN OF AMERICA, INC.

Circlip -arrow-, removing and installing

- Press down carefully on piston cap until circlip can be installed.

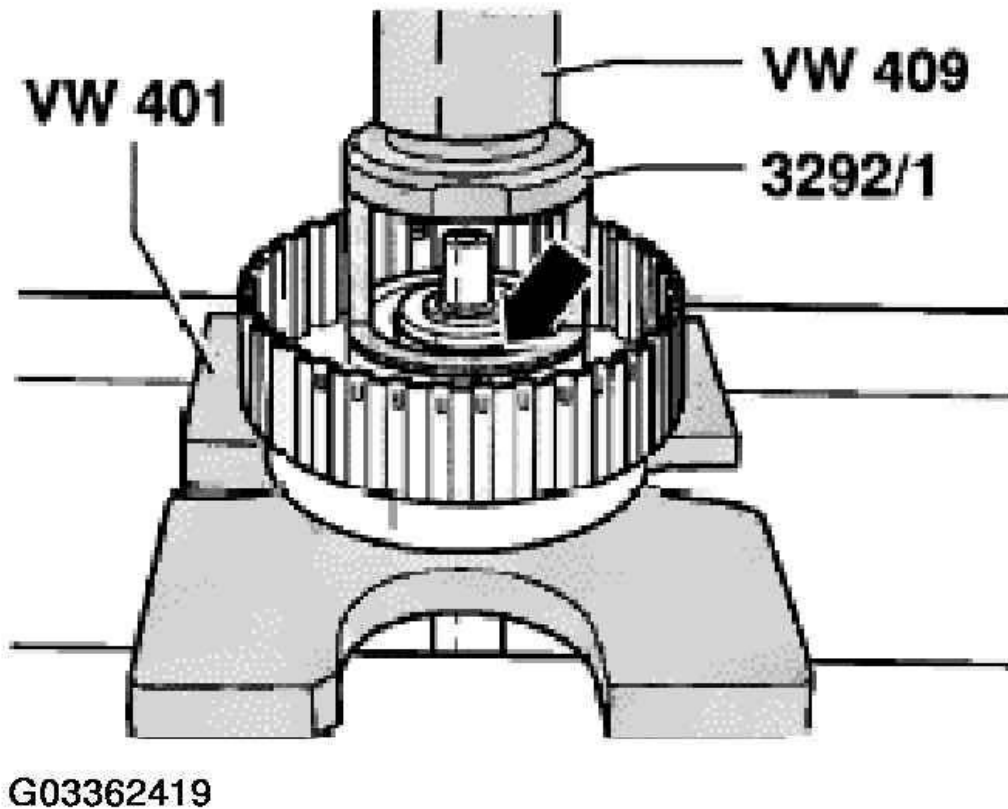
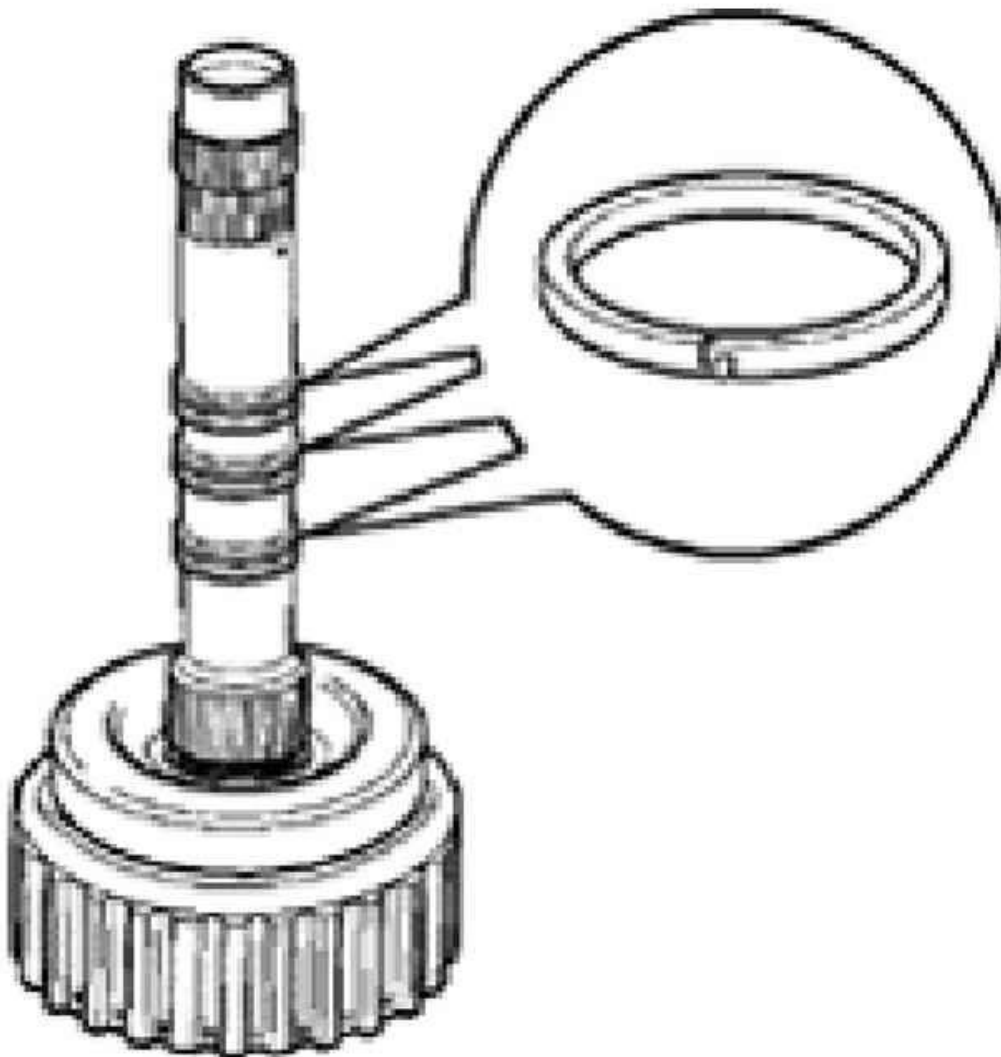


Fig. 166: Removing And Installing Circlip (3rd And 4th Gear Clutch K3)
 Courtesy of VOLKSWAGEN OF AMERICA, INC.

Piston rings, checking seating

One piston ring is installed on pump shaft inside clutch housing -arrow-.

- Hook ends of piston rings together.

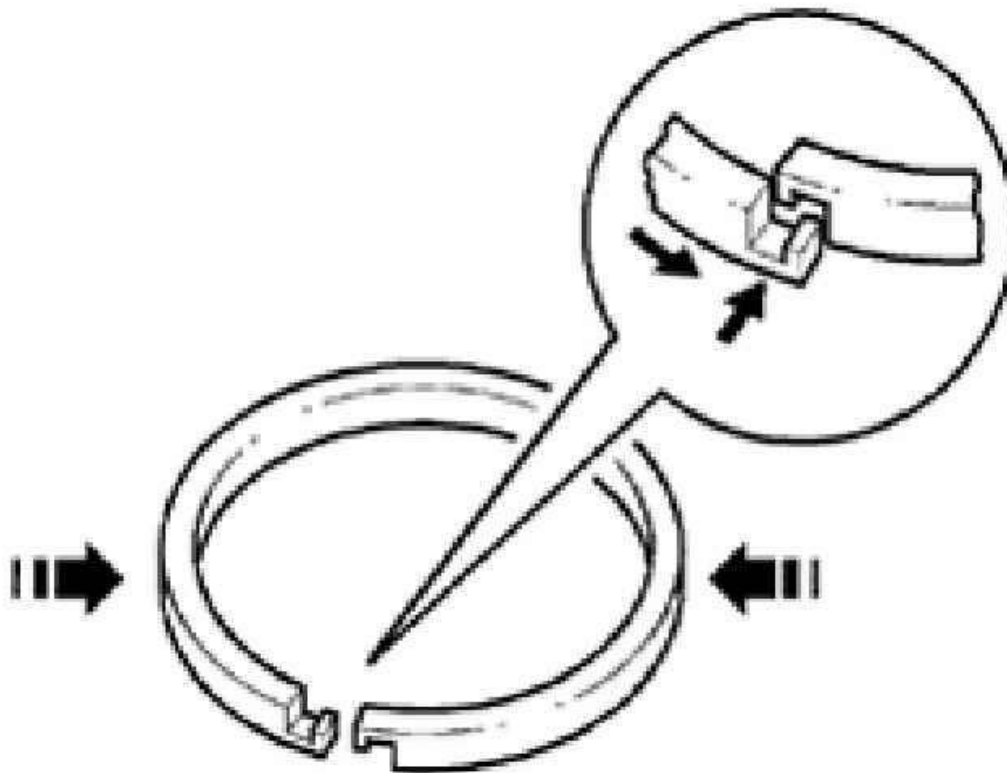


G03362420

Fig. 167: Piston Rings, Checking Seating
Courtesy of VOLKSWAGEN OF AMERICA, INC.

Piston rings, installing/hooking ends together

- Place piston ring in groove.
- Hook ends together by pressing sides of ring in and guide ends over one another.



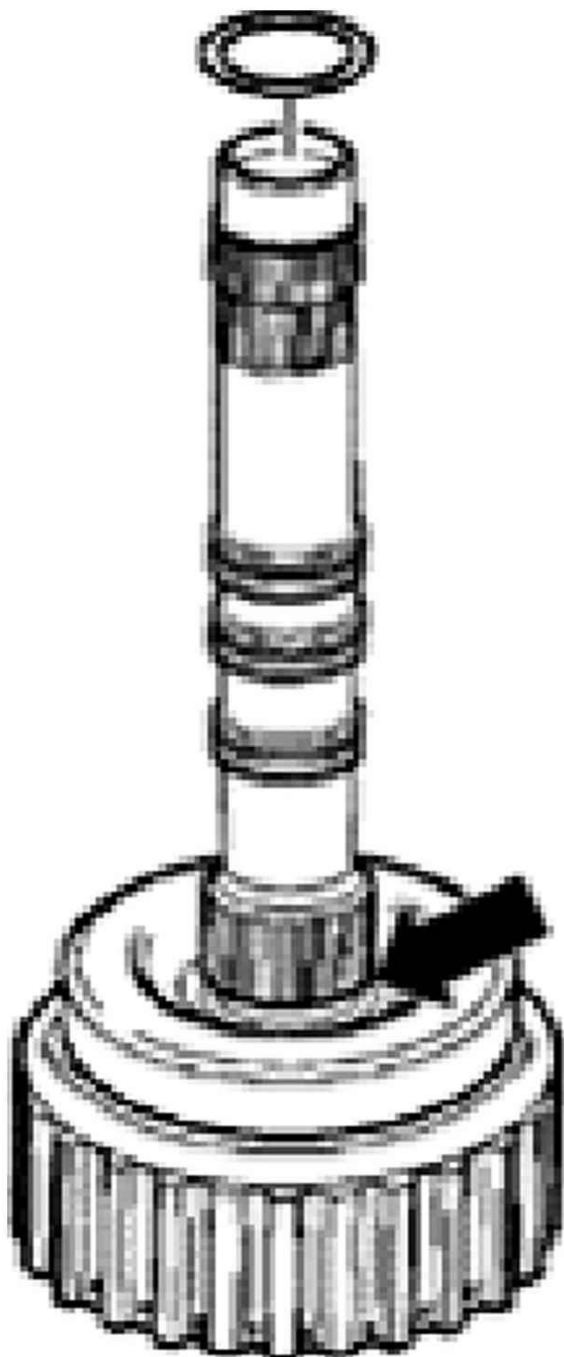
G03362421

Fig. 168: Piston Rings, Installing/Hooking Ends Together
Courtesy of VOLKSWAGEN OF AMERICA, INC.

NOTE: Do not twist piston ring out of groove on one side.

O-ring, installing

- Install O -ring in recess in turbine shaft -arrow-.



G03362422

Fig. 169: O-Ring, Installing
Courtesy of VOLKSWAGEN OF AMERICA, INC.

VALVE BODY, REMOVING AND INSTALLING

Special tools and equipment

- 3373 Lever for conductor strip

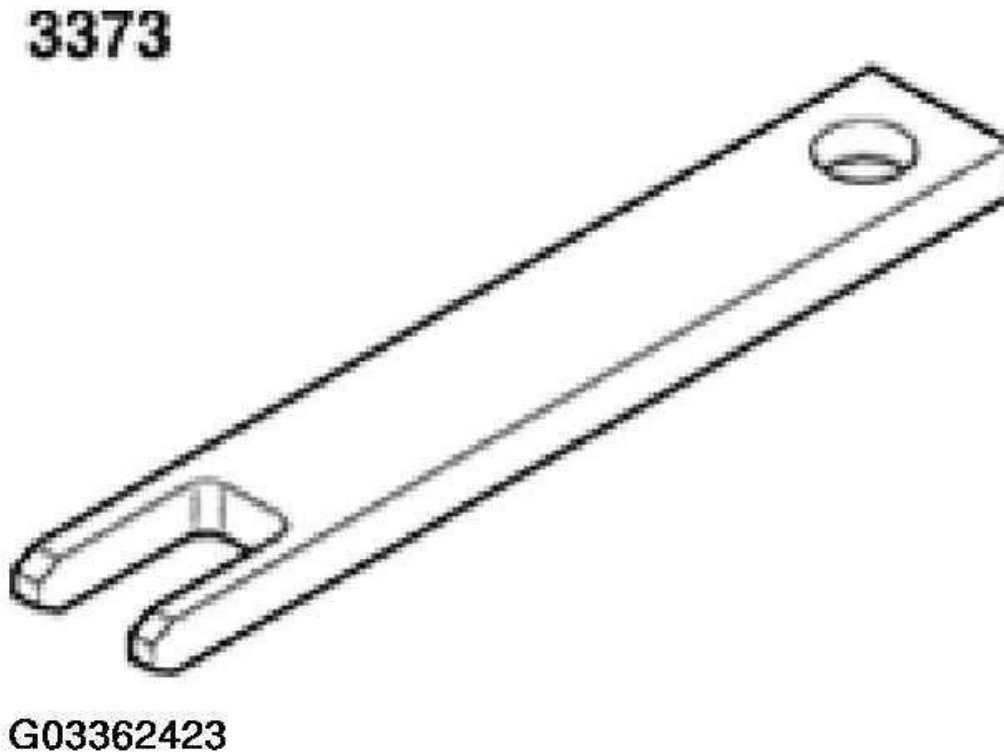
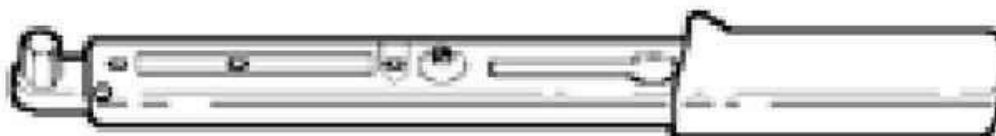


Fig. 170: Identifying Special Tool - 3373 Lever For Conductor Strip
Courtesy of VOLKSWAGEN OF AMERICA, INC.

- VAG 1331 Torque wrench or equivalent

V.A.G 1331



G03362424

Fig. 171: Identifying Special Tool - VAG 1331 Torque Wrench Or Equivalent
Courtesy of VOLKSWAGEN OF AMERICA, INC.

Valve body

CAUTION: Do not run engine or tow vehicle with oil pan removed or when there is no ATF in transmission.

NOTE:

- The valve body or conductor strip can also be removed with transmission installed.
- The conductor strip can be removed individually. On vehicles with 6-cyl. engine, first remove starter motor to remove conductor strip.
- After re-installing oil pan, fill with ATF: see ATF LEVEL, CHECKING AND TOPPING UP.
- Always replace a valve body which is fouled or inoperative.

The following list pertains to Fig. 172.

1. Plug

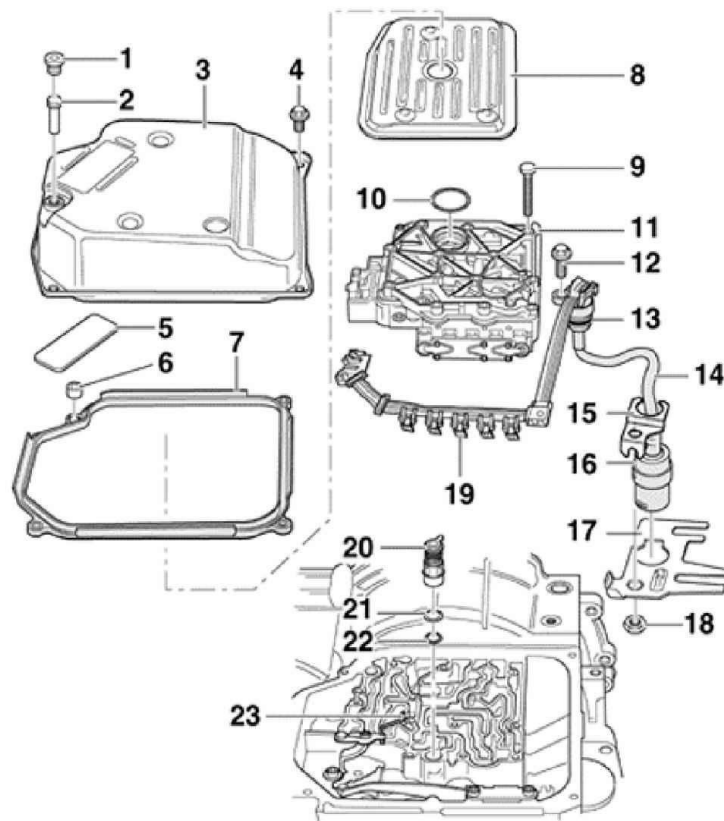
- Always replace seal, see Plug seal, replacing
- Checking ATF level and topping-up, see ATF LEVEL, CHECKING AND TOPPING UP

2. Overflow pipe

- Remove to drain ATF, see ATF, draining

- Thread in to stop
 - Checking ATF level and topping-up, see **ATF LEVEL, CHECKING AND TOPPING UP**
3. **Oil pan**
 4. **Bolt**
 - 12 N.m (9 ft lb)
 5. **Magnet**
 - Install in oil pan recess
 6. **Spacer bushing**
 - Press into gasket
 7. **Gasket**
 - Always replace
 - Press spacer bushings into gasket
 8. **ATF screen**
 - Installing, see **ATF screen, installing**
 9. **Bolt, 5 N.m (44 in. lb)**
 - 5 N.m (44 in lb)
 10. **Gasket**
 - Always replace
 - Install in valve body
 11. **Valve body**
 - Removing, see **Valve body/unhooking operating rod, removing**
 - Installing, see **Valve body, installing**
 - Marking, see **Valve body, identification**
 - Installing gasket -10-
 12. **Bolt**
 - 10 N.m (7 ft lb)
 13. **O-ring**
 - For wiring guide
 - Always replace
 14. **Conductor strip**
 - With wiring guide and connector
 - Can be removed and installed with transmission installed
 15. **Retaining bracket**
 - For conductor strip connector, installing, see **Securing clip with bolt for conductor strip connector, installing**
 16. **Wiring connector**
 - Attach to transmission housing
 17. **Clip**

- Insert lug of wiring connector in clip recess
 - Securing clip with bolt, see **Securing clip with bolt for conductor strip connector, installing**
18. **Nut**
- 10 N.m (7 ft lb)
 - Securing clip with bolt, see **Securing clip with bolt for conductor strip connector, installing**
19. **Plug for solenoid valves**
- Remove solenoid valves with 3373, see **Conductor strip, removing**
20. **Sealing plug**
- Remove before removing and installing free wheel
 - Install plug so lug is located in groove on housing, see **Sealing plug, installing**
 - Place O-rings on sealing plug
21. **O-ring**
- Always replace
22. **O-ring**
- Always replace
23. **Operating rod for manual selector valve**
- Unhooking, see **Valve body/unhooking operating rod, removing**
 - Install with stepped side facing manual selector valve, see **Operating rod, installing (unhooking onto) manual selector valve**
 - Adjusting, see **Operating rod, manual selector valve, adjusting**



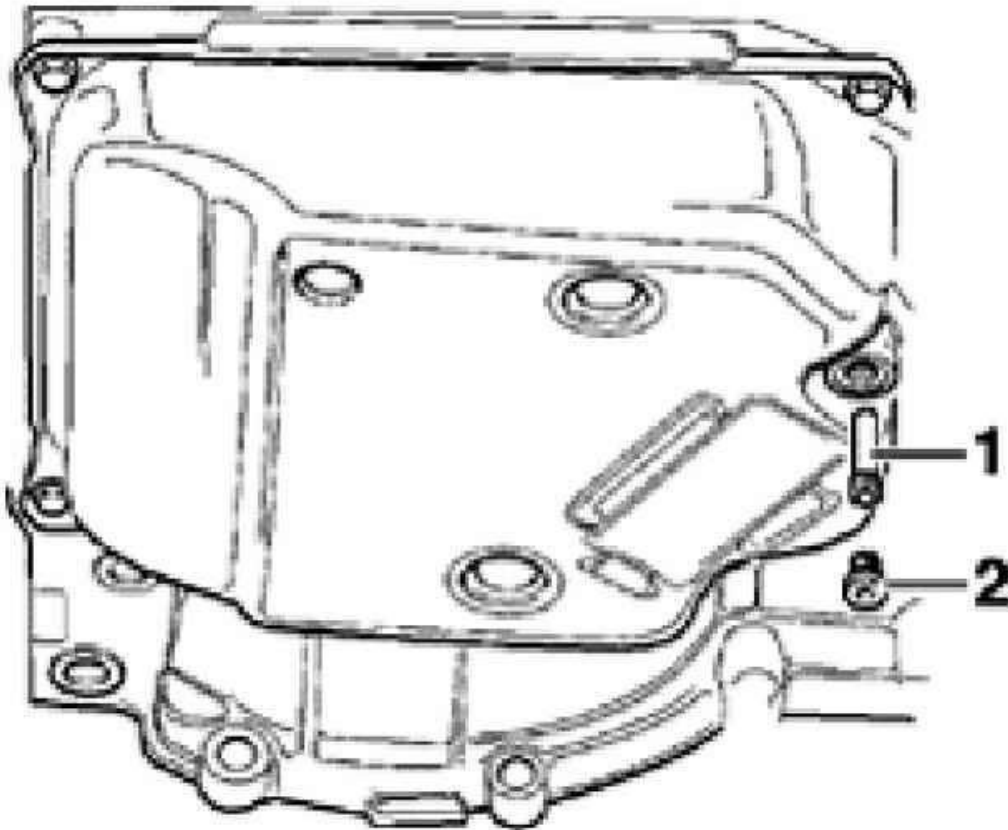
- | | |
|----------------------------|--|
| 1 - Plug | 14 - Conductor strip |
| 2 - Overflow pipe | 15 - Retaining bracket |
| 3 - Oil pan | 16 - Wiring connector |
| 4 - Bolt | 17 - Clip |
| 5 - Magnet | 18 - Nut |
| 6 - Spacer bushing | 19 - Plug for solenoid valves |
| 7 - Gasket | 20 - Sealing plug |
| 8 - ATF screen | 21 - O-ring |
| 9 - Bolt, 5 Nm (44 in. lb) | 22 - O-ring |
| 10 - Gasket | 23 - Operating rod for manual selector valve |
| 11 - Valve body | |
| 12 - Bolt | |
| 13 - O-ring | |

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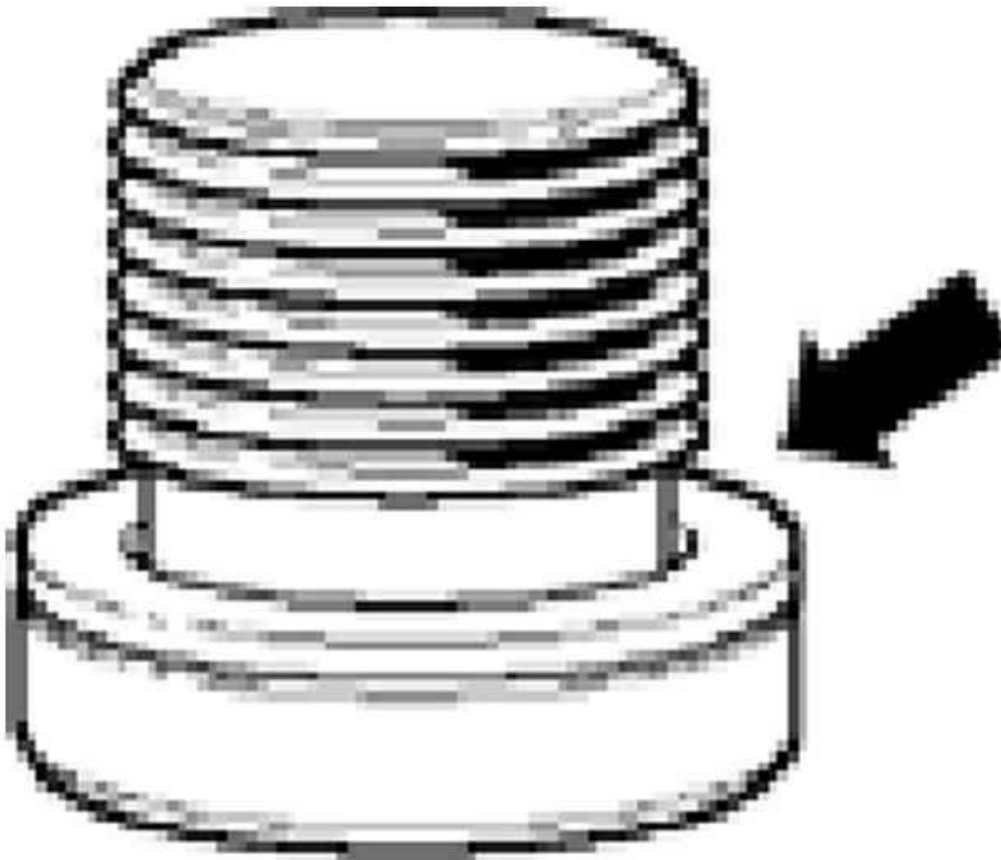
Fig. 172: Identifying Valve Body Components
Courtesy of VOLKSWAGEN OF AMERICA, INC.

ATF, draining

- Place drain pan under transmission.
- Remove plug -2-.
- Remove overflow pipe -1- and allow ATF to drain.
- Install -screw- overflow pipe in to stop.

**G03362426****Fig. 173: ATF, Draining****Courtesy of VOLKSWAGEN OF AMERICA, INC.****Plug seal, replacing**

- Cut open seal -arrow- with side cutters.

**G03362427****Fig. 174: Plug Seal, Replacing****Courtesy of VOLKSWAGEN OF AMERICA, INC.**

- After repairs, install new seal on plug and screw in hand - tight when filling with ATF.
- Fill with 3 liters (3.16 qt) ATF, then check ATF level and top-up, see **ATF LEVEL, CHECKING AND TOPPING UP.**

Conductor strip, removing

- Place 3373 on stop under solenoid valve plug.
- Remove plug with 3373 in direction of arrow.
- Remove bolt -1-.

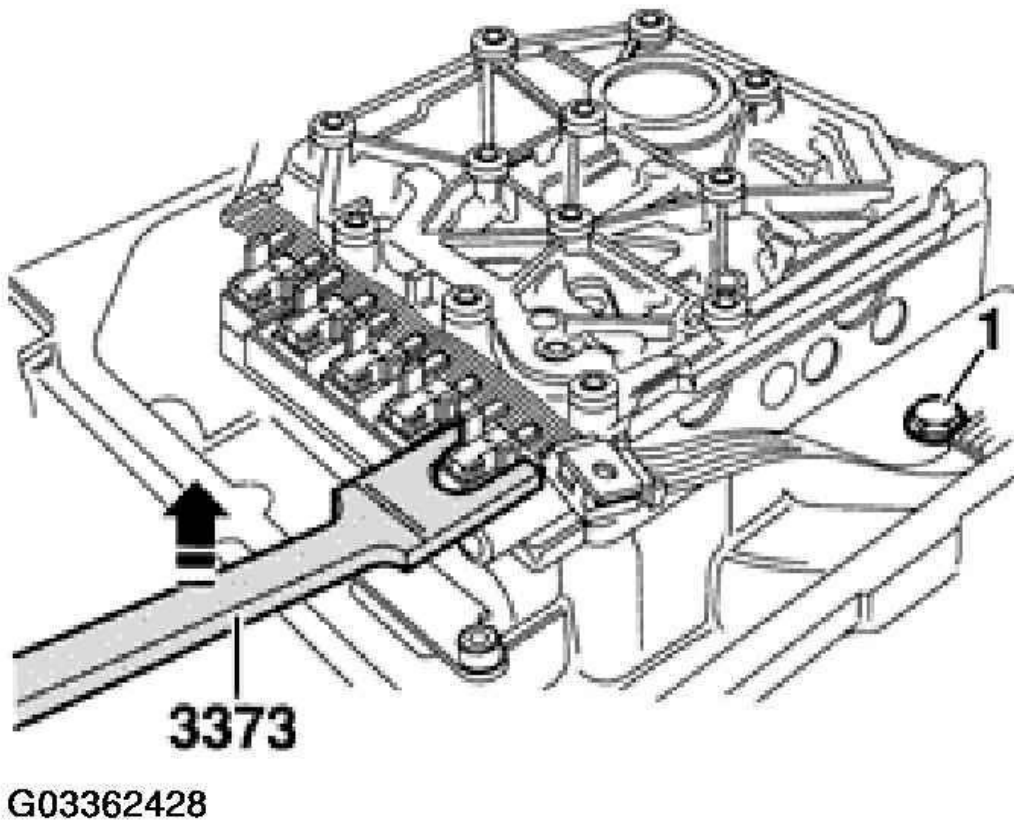


Fig. 175: Conductor Strip, Removing
 Courtesy of VOLKSWAGEN OF AMERICA, INC.

Valve body/unhooking operating rod, removing

When removing valve body, manual selector valve -1- remains in valve body.

- Shift selector lever/shaft into "1".
- Pull manual selector valve out until it is just possible to unhook operating rod -2-.
- Secure manual selector valve so it cannot fall out.

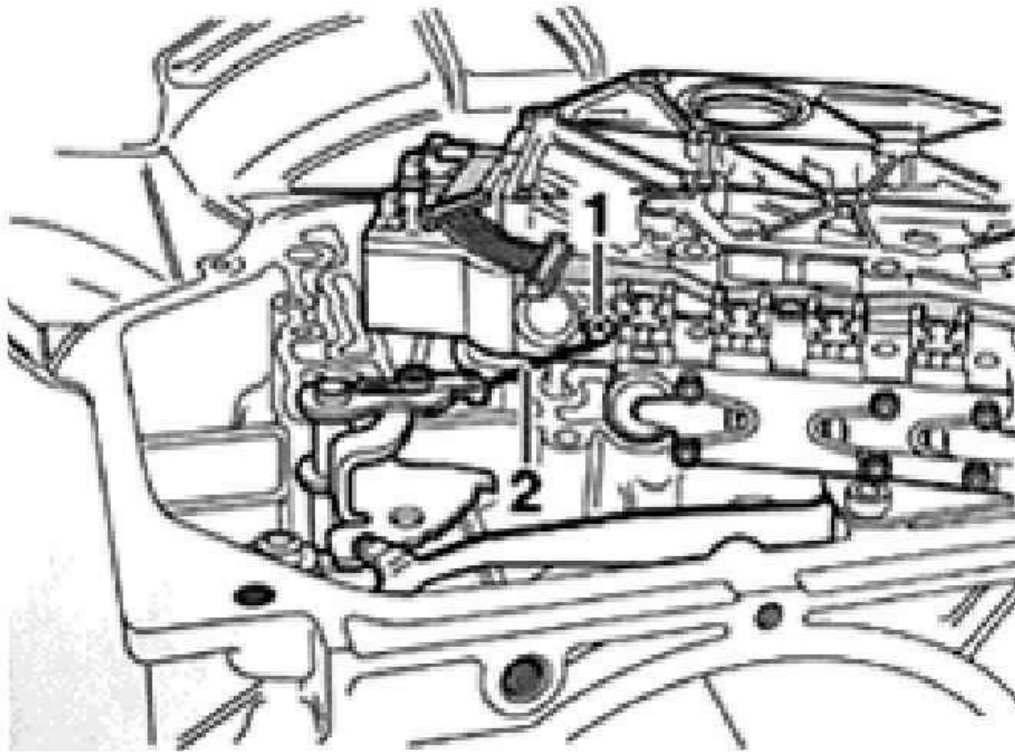
**G03362429**

Fig. 176: Valve Body/Unhooking Operating Rod, Removing
Courtesy of VOLKSWAGEN OF AMERICA, INC.

Sealing plug, installing

Remove sealing plug from housing before removing and installing free wheel, otherwise sealing plug and O - ring will be damaged.

- Install O -rings on sealing plug.
- Install sealing plug in hole in transmission housing - arrow-.

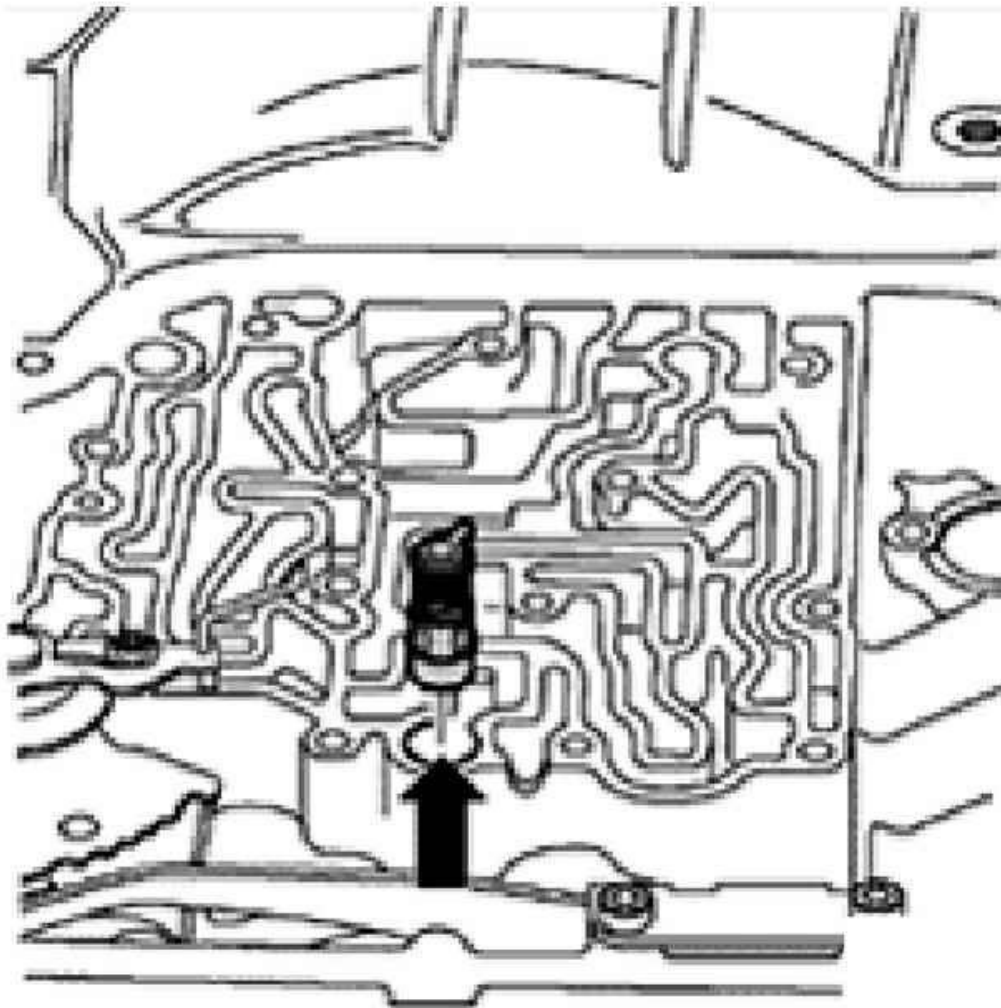
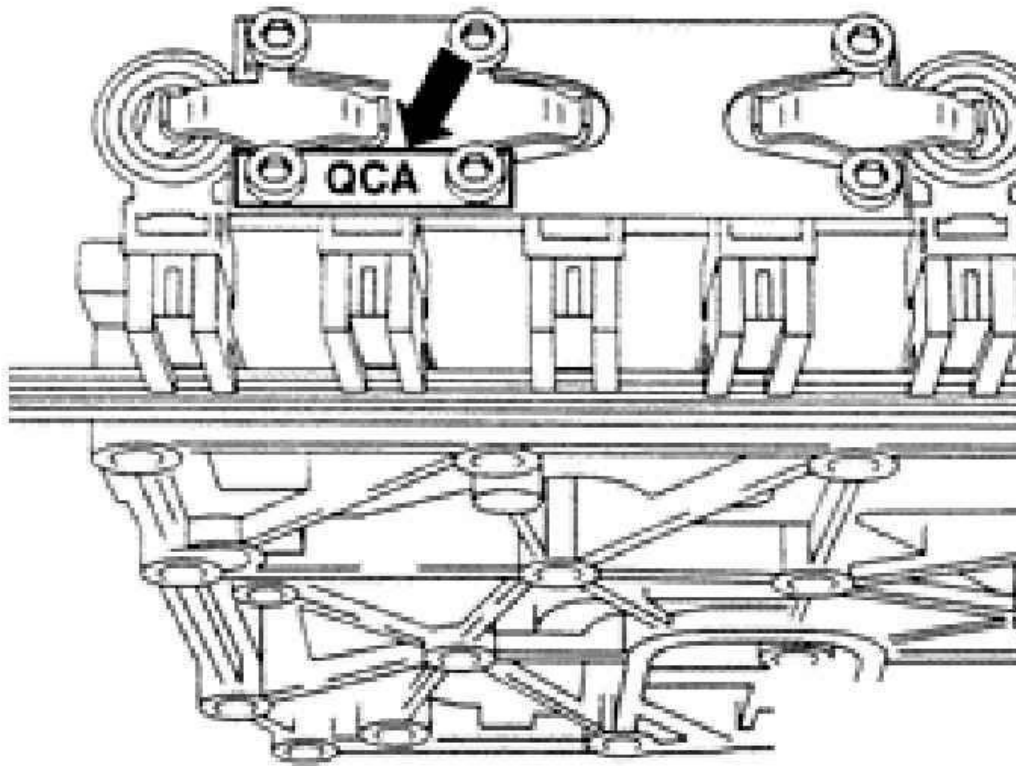
**G03362430**

Fig. 177: Sealing Plug, Installing
Courtesy of VOLKSWAGEN OF AMERICA, INC.

Valve body, identification

Code letters are stamped on a metal tab. Metal tab must remain on valve body.

Application, valve body/transmissions: see **TRANSMISSION LAYOUT**



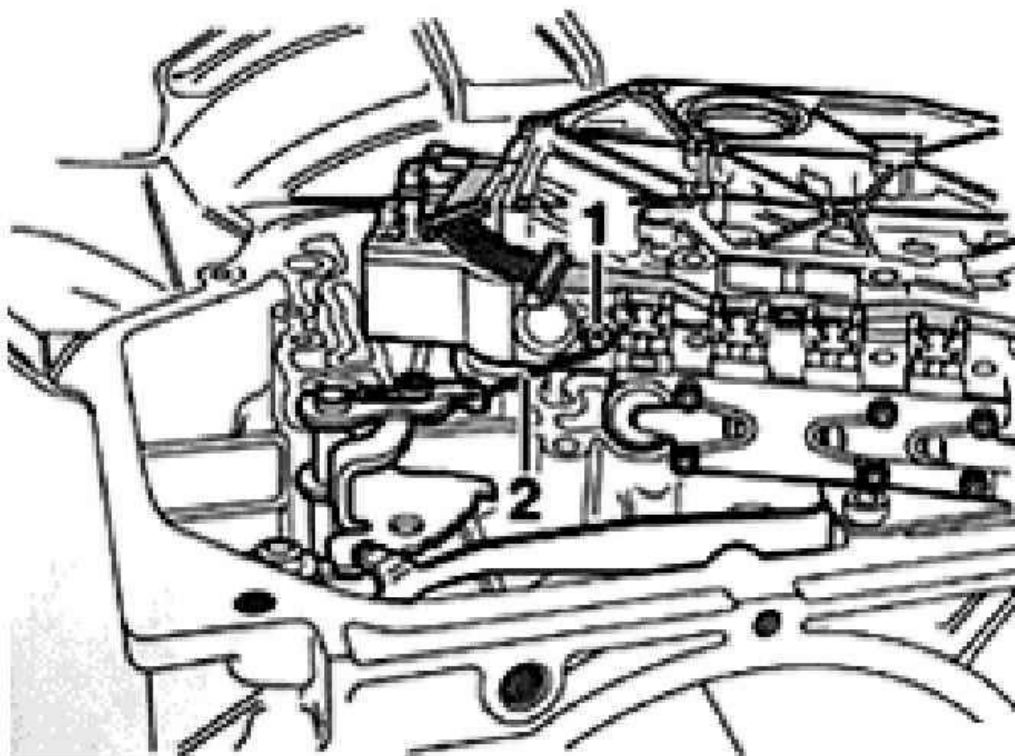
G03362431

Fig. 178: Valve Body, Identification

Courtesy of VOLKSWAGEN OF AMERICA, INC.

Operating rod, installing (unhooking onto) manual selector valve

- Turn manual selector valve -1- so shoulder faces operating rod.
- Guide operating rod -2- with manual selector valve in valve body.



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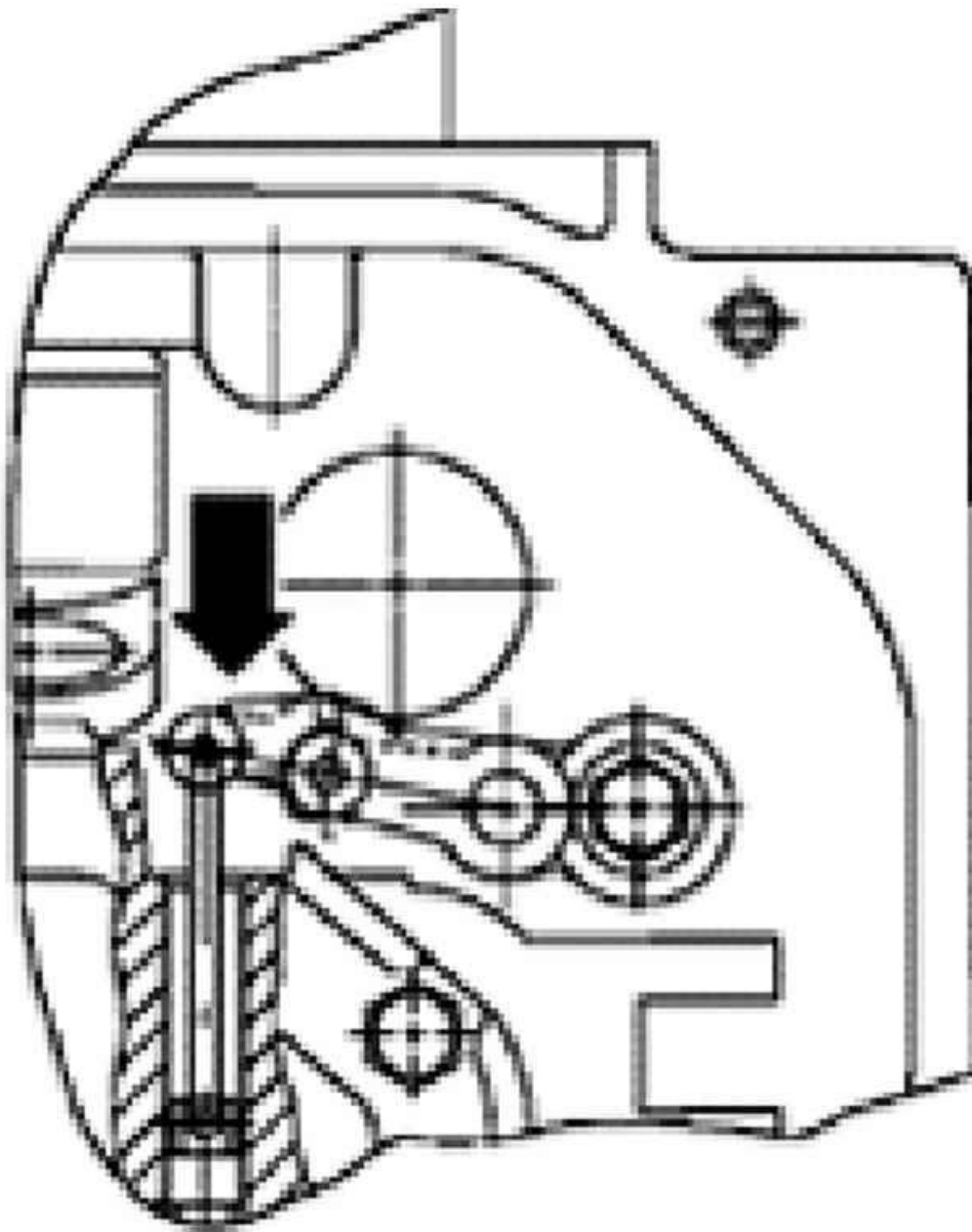
Fig. 179: Operating Rod, Installing (Unhooking Onto) Manual Selector Valve
Courtesy of VOLKSWAGEN OF AMERICA, INC.

Operating rod, manual selector valve, adjusting

- Move selector shaft to "P".
- Push operating rod with manual selector valve in valve body to stop (direction of arrow) and tighten bolt to 4 N.m (35 in. lb).

NOTE:

- **Manual selector valve must always be resting against stop. Counterhold in direction of arrow when tightening bolt.**
- **Always replace bolt and manual selector valve retaining clip.**



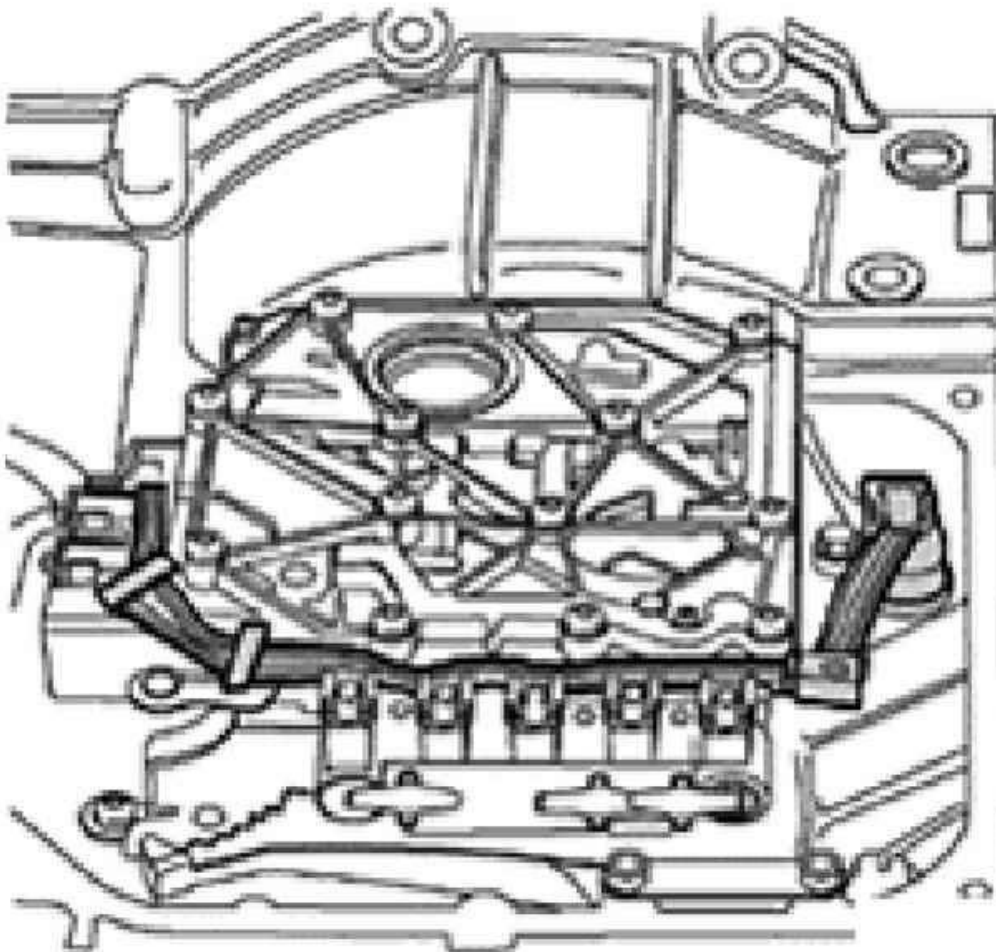
G03362433

Fig. 180: Operating Rod, Manual Selector Valve, Adjusting
Courtesy of VOLKSWAGEN OF AMERICA, INC.

Valve body, installing

- Route conductor strip, as illustrated.

NOTE: Do not kink or twist conductor strip when installing.

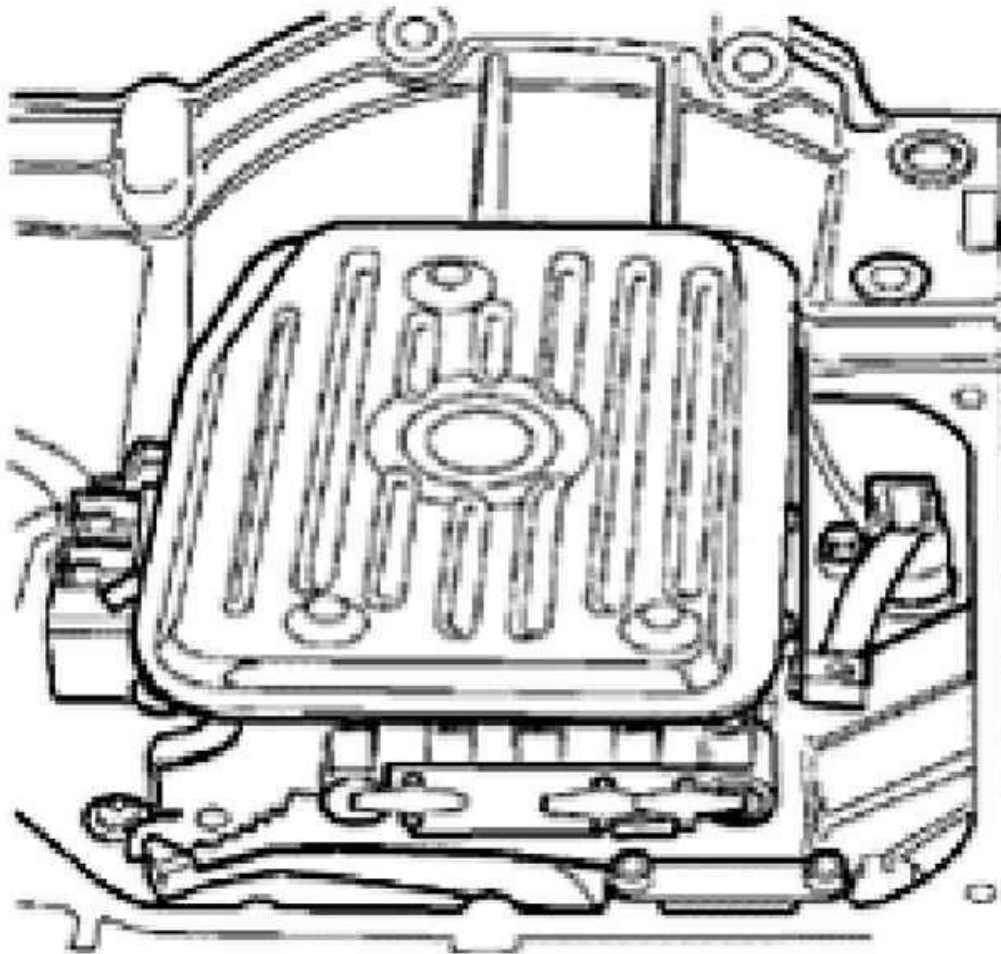


G03362434

Fig. 181: Valve body, Installing
Courtesy of VOLKSWAGEN OF AMERICA, INC.

ATF screen, installing

- Before installing ATF screen, install seal in valve body.
- Firmly press ATF screen on valve body.

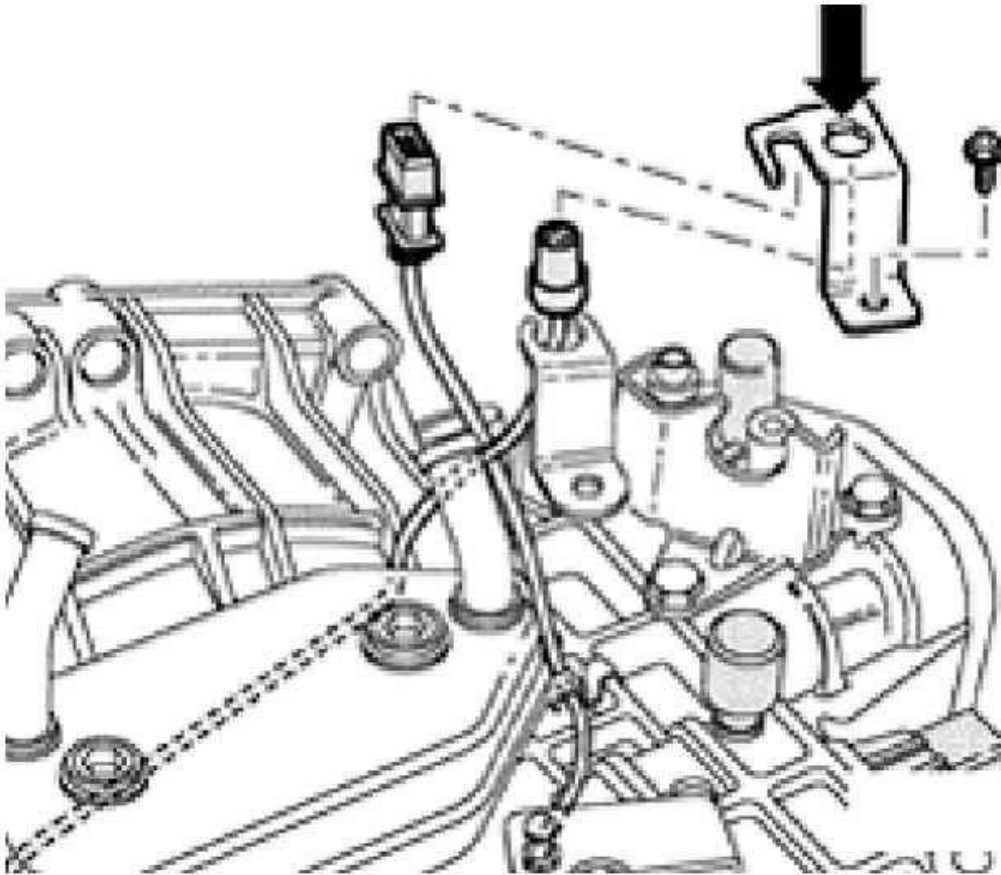


G03362435

Fig. 182: ATF Screen, Installing
Courtesy of VOLKSWAGEN OF AMERICA, INC.

Securing clip with bolt for conductor strip connector, installing

- Connect conductor strip connector to lower retainer.
- Install upper retainer with recess -arrow- onto connector tab.
- Tighten bolt to 20 N.m (15 ft lb).



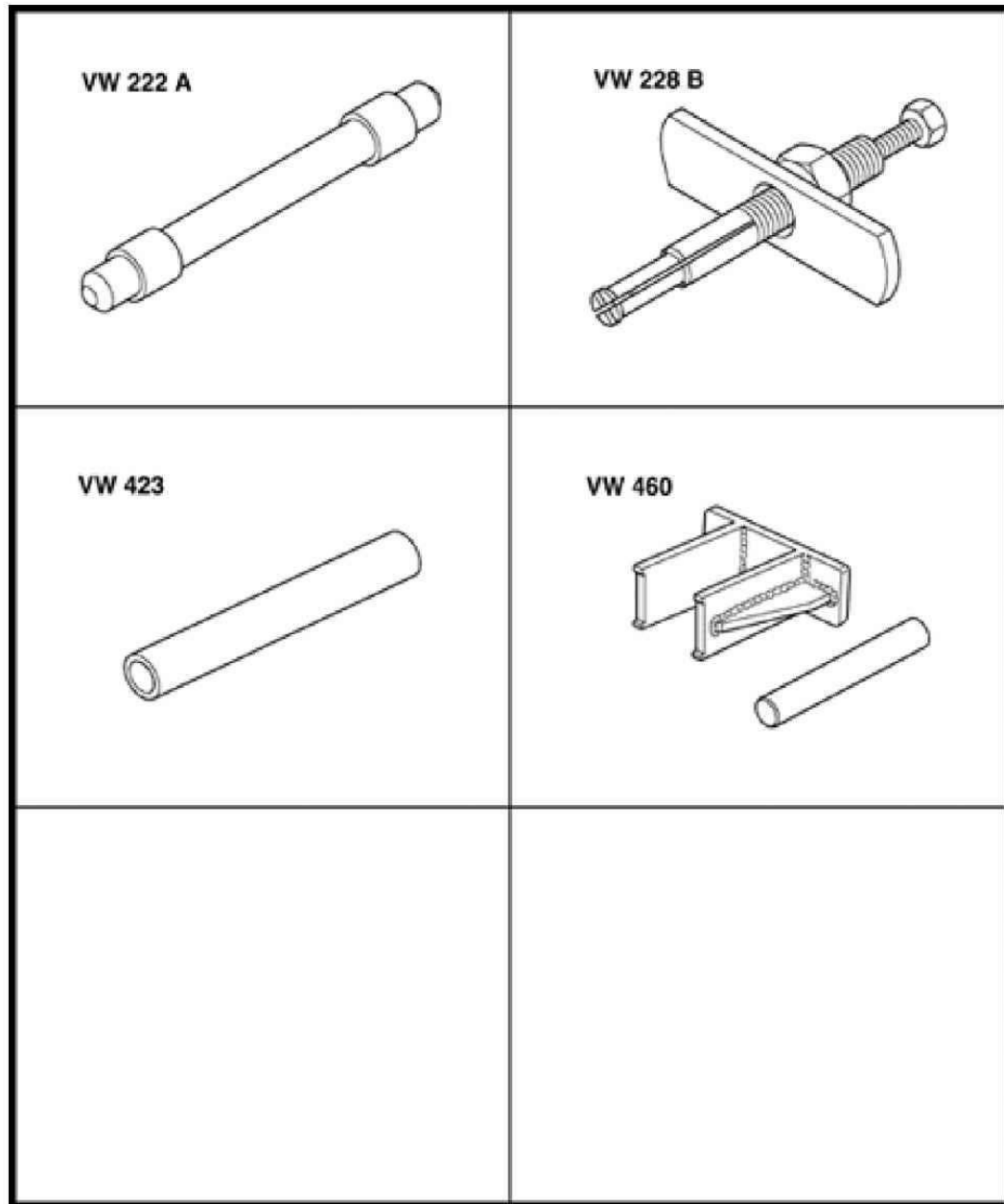
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Fig. 183: Securing Clip With Bolt For Conductor Strip Connector, Installing
Courtesy of VOLKSWAGEN OF AMERICA, INC.

PARKING LOCK, DISASSEMBLING AND ASSEMBLING

Special tools and equipment

- VW 222 A Drift
- VW 228 B Puller
- VW 423 Tube
- VW 460/2 Mandrel



G03362437

Fig. 184: Identifying Special Tools Disassembling And Assembling Parking Lock
 Courtesy of VOLKSWAGEN OF AMERICA, INC.

Parking lock

NOTE: See READ MEASURING VALUE BLOCK (FUNCTION 08) .

- Output gear must be removed to disassemble and assemble parking lock, see **DRIVE PINION, REMOVING AND INSTALLING**.

The following list pertains to **Fig. 185**.

1. **Bolt**
 - 4 N.m (35 in lb)
2. **Manual selector valve control**
 - Adjusting, see **VALVE BODY, REMOVING AND INSTALLING**
3. **Selector shaft with selector segment**
 - Removing and installing, see **Selector shaft with selector segments, removing and installing**
4. **Spring pin**
 - Driving out and in, see **Spring pin -arrows-, removing and installing**
5. **Engaging lever**
 - Install together with selector shaft and detent segment
6. **Detent segment**
 - Install together with selector shaft and engaging lever
7. **Lock washer**
8. **Bolt**
 - 10 N.m (7 ft lb)
9. **Spring for selector segment**
10. **Bolt**
 - 10 N.m (7 ft lb)
11. **O-ring**
 - Always replace
 - Only install on shafts with groove for circlip
12. **Washer**
13. **Shaft for detent lever**
 - Secured by circlip and bearing cap of drive pinion
14. **Return spring**
 - Inserting, see **Pawl with return spring, installing**
15. **Detent lever**
 - Installing with return spring, see **Pawl with return spring, installing**
16. **Parking lock gear**
 - Rounded side faces teeth of drive pinion
17. **Bolt**
 - 14 N.m (10 ft lb)
18. **Supporting plate**
 - Installing, see **Guide plate and supporting plate, installing**

19. Guide plate

- Install before supporting plate, see **Guide plate and supporting plate, installing**

20. O-ring

- Always replace

21. Multi-function Transmission Range (TR) Switch -F125-

- Install so that 1 pin each is resting on a slope of detent segment
- Test in vehicle with On Board Diagnosis (OBD)

See **READ MEASURING VALUE BLOCK (FUNCTION 08)** .

22. Retainer

- For multi-function switch

23. Bolt

- 10 N.m (7 ft lb)

24. Transmission housing

- It is not necessary to remove drive gear to disassemble parking lock

25. O-ring

- Always replace

26. Vehicle Speed Sensor (VSS) -G68-

- Test in vehicle with On Board Diagnosis (OBD)

See **READ MEASURING VALUE BLOCK (FUNCTION 08)** .

27. Bolt

- 10 N.m (7 ft lb)

28. Bolt

- 10 N.m (7 ft lb)

29. Transmission Vehicle Speed Sensor (VSS) -G38-

- Test in vehicle with On Board Diagnosis (OBD)

See **READ MEASURING VALUE BLOCK (FUNCTION 08)** .

30. O-ring

- Always replace

31. O-ring

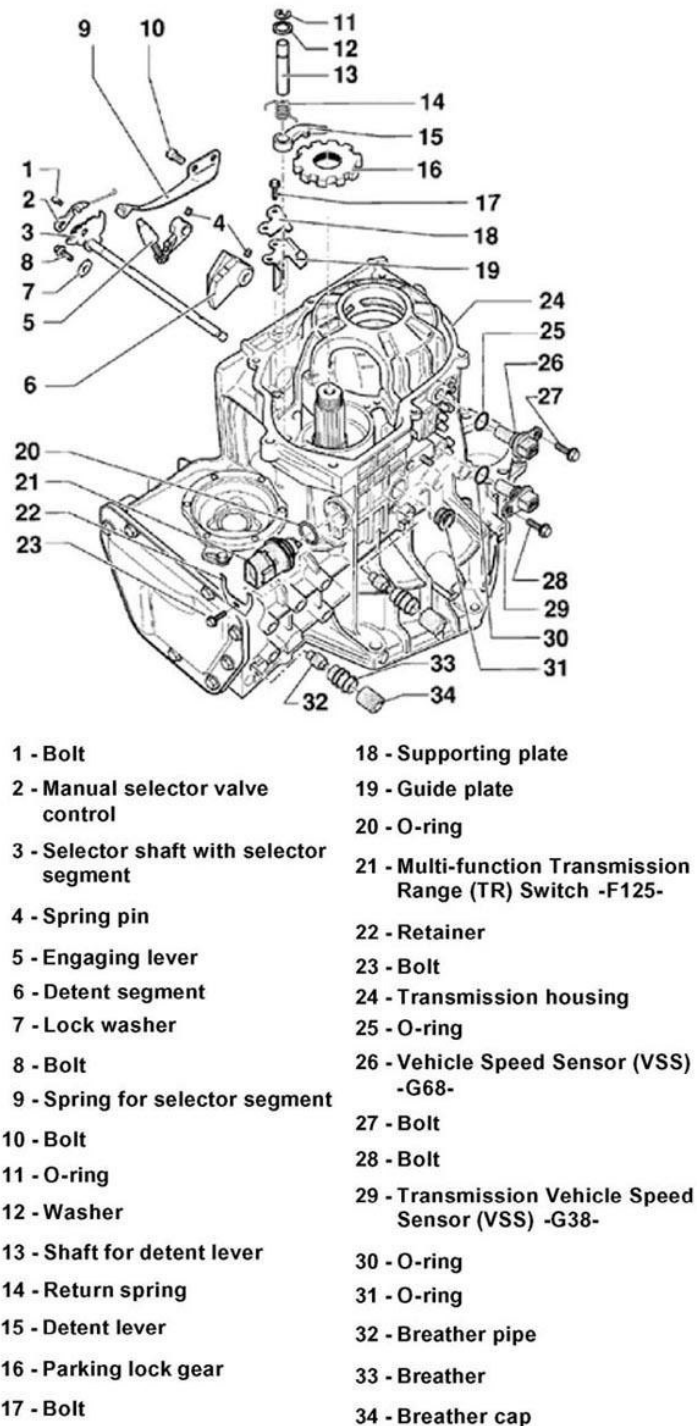
- Pry out with screwdriver
- Drive in flush with VW 423

32. Breather pipe

- Remove using pliers
- Drive onto stop with drift VW 460/2

33. Breather

34. Breather cap



G03362438

Fig. 185: Parking Lock, Exploded View

Courtesy of VOLKSWAGEN OF AMERICA, INC.

Spring pin -arrows-, removing and installing

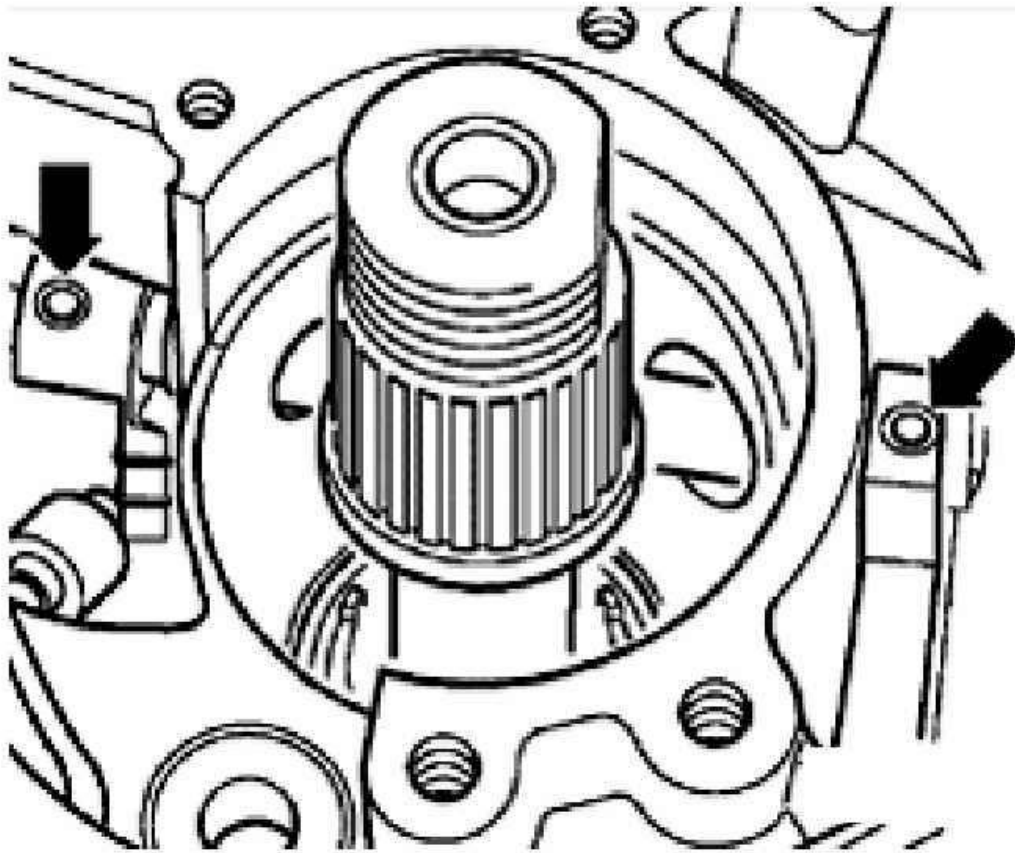
Driving out

- Only drive spring pin for engaging lever and spring pin for detent segment out far enough to remove selector shaft.

CAUTION: Driving out pin from engaging lever may cause it to drop in planetary gears.

Driving in

- Drive in spring pins until flush after inserting selector shaft, engaging lever and detent segment.



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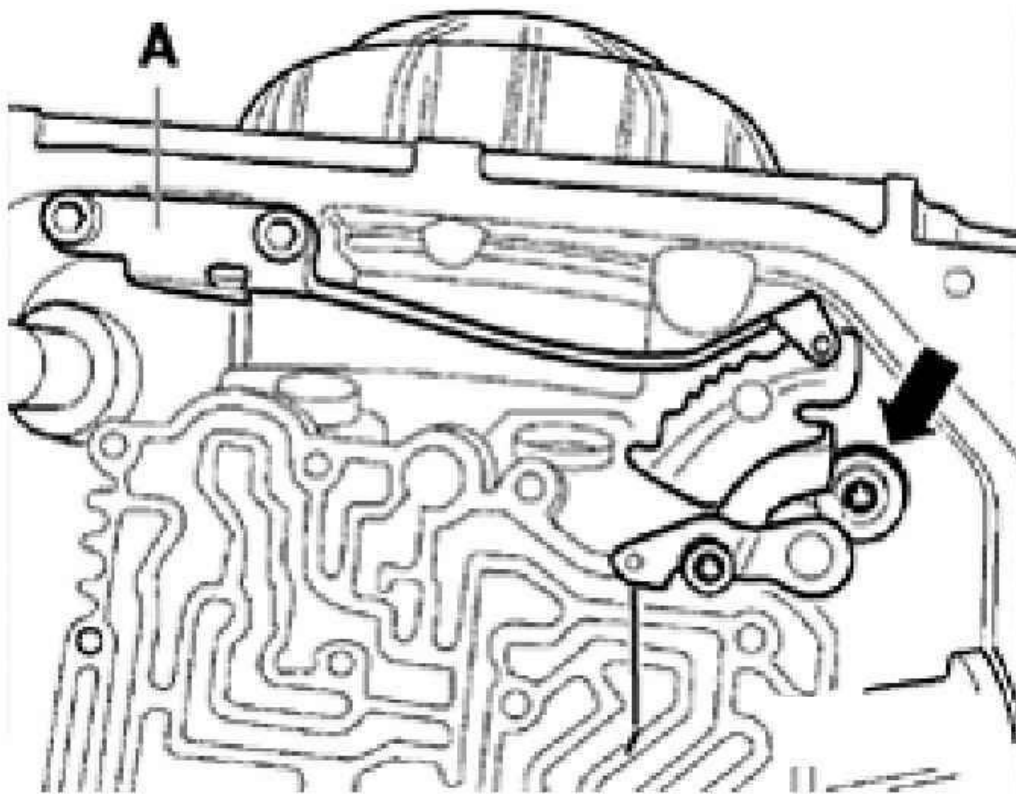
Fig. 186: Spring Pin -Arrows-, Removing & Installing
Courtesy of VOLKSWAGEN OF AMERICA, INC.

Selector shaft with selector segments, removing and installing

NOTE: With valve body installed be careful not to damage conductor strip.

- Remove selector segment spring -A-.
- Remove screw with washer -arrow-.

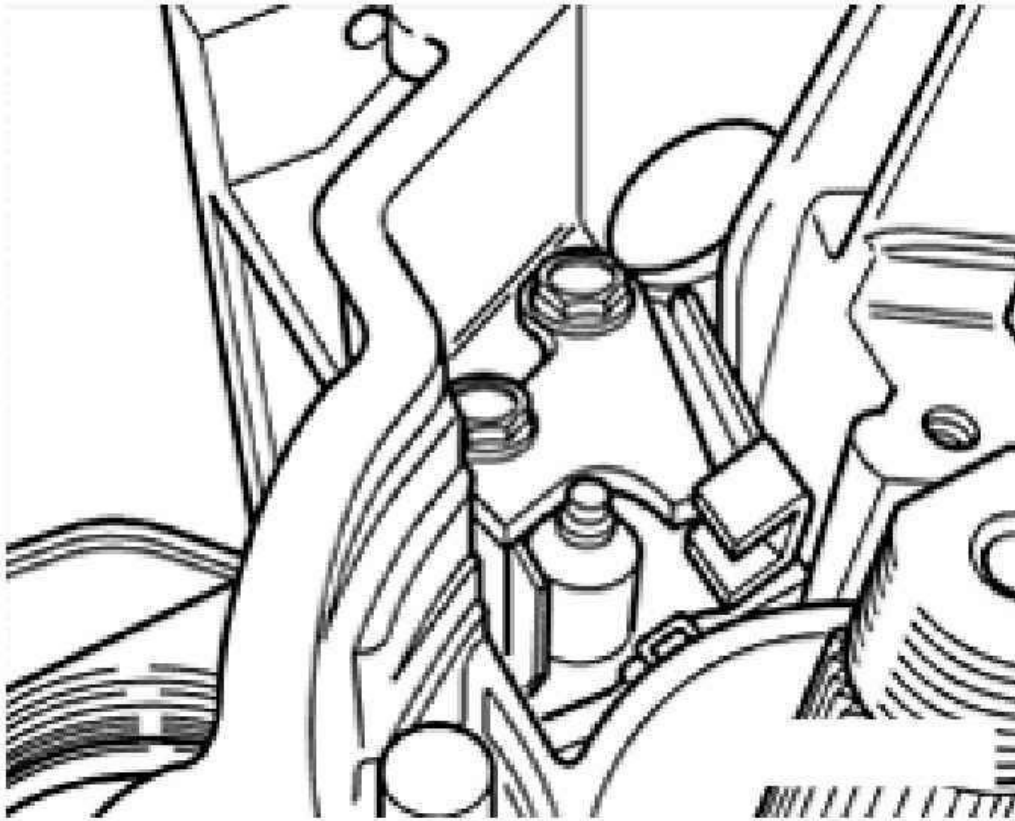
Washer prevents selector shaft movement.



G03362440

Fig. 187: Removing/Installing Selector Shaft With Selector Segments
Courtesy of VOLKSWAGEN OF AMERICA, INC.

Guide plate and supporting plate, installing



G03362441

Fig. 188: Installing Guide Plate And Supporting Plate
Courtesy of VOLKSWAGEN OF AMERICA, INC.

Pawl with return spring, installing

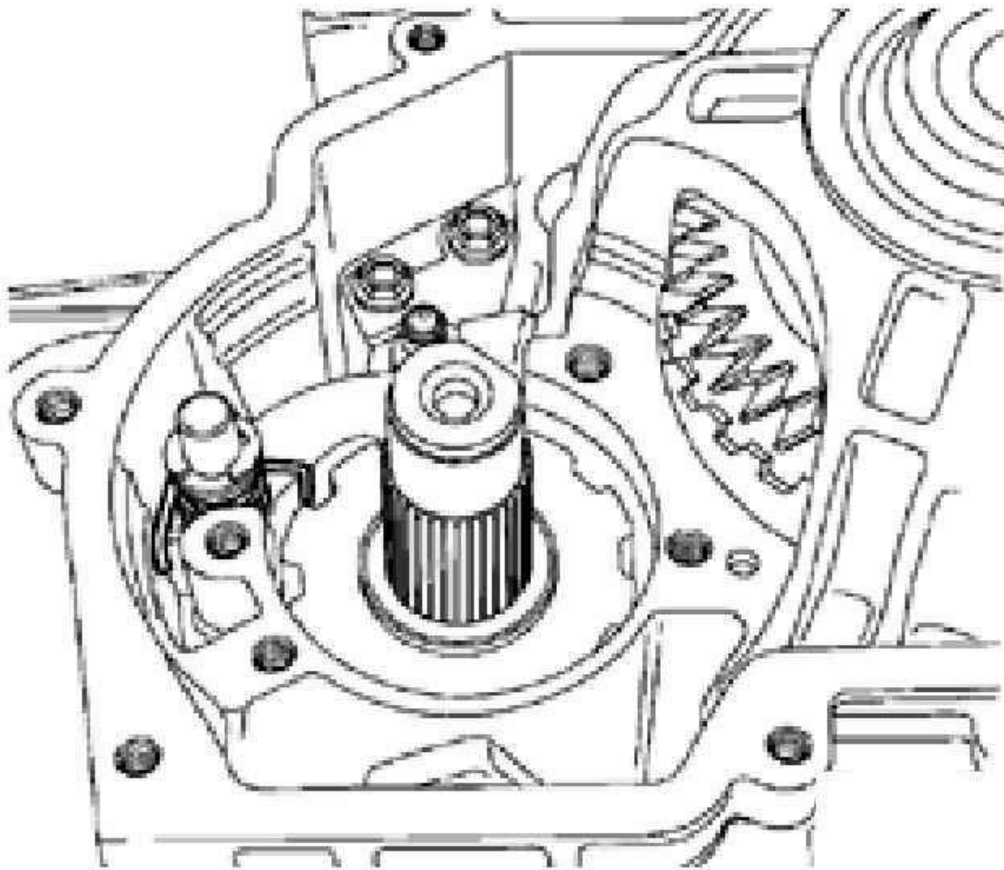
**G03362442**

Fig. 189: Installing Pawl With Return Spring
Courtesy of VOLKSWAGEN OF AMERICA, INC.

FINAL DRIVE, DIFFERENTIAL

FINAL DRIVE OIL LEVEL, CHECKING

Oil level is checked with transmission installed

Difference between Min./Max. is 0.1 L (0.105 qt). Excess oil can be drawn off using extraction system VAG 1358A.

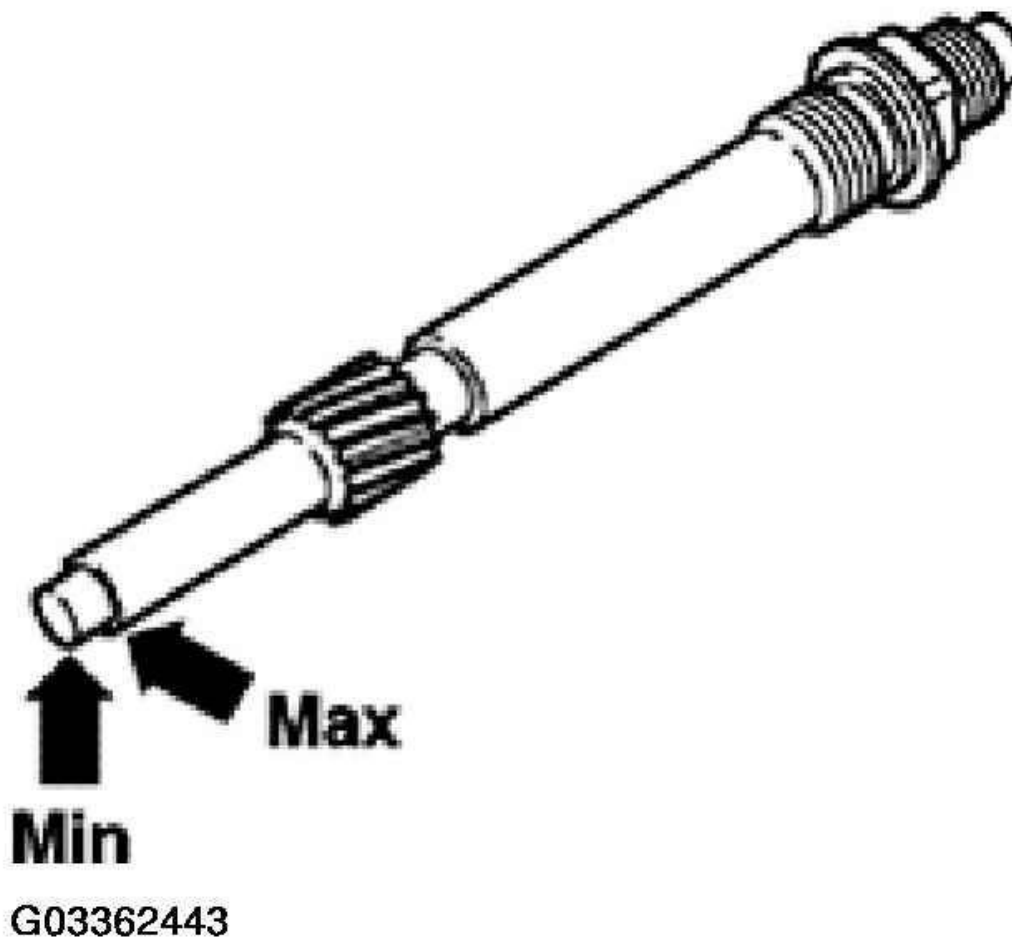


Fig. 190: Identifying Difference Between Min./Max
Courtesy of VOLKSWAGEN OF AMERICA, INC.

Checking:

- Remove speedometer shaft and clean.
- Install and remove speedometer shaft and, if necessary, correct oil level.
- Final drive oil level must be between Min./Max.

Specification and capacity of final drive : see FINAL DRIVE.

DRIVE FLANGE SEAL, REMOVING AND INSTALLING

Transmission installed

Special tools and equipment

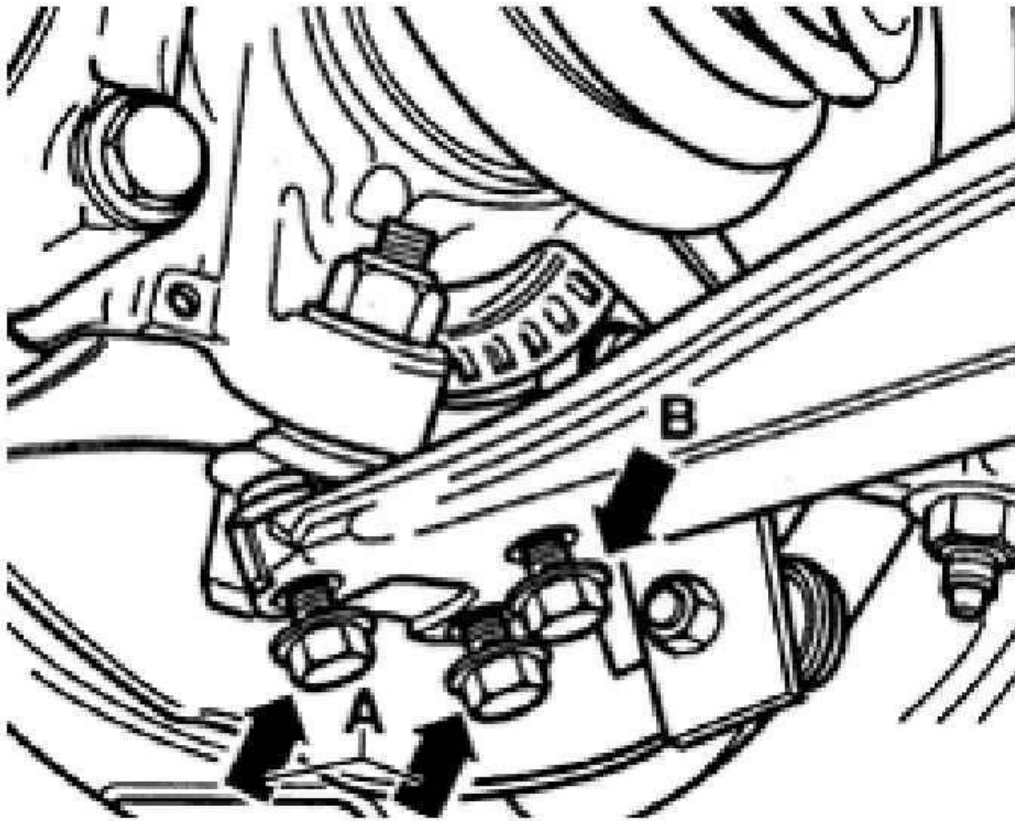
- VW 391 Axle shaft installation appliance
- VW 681 Oil seal extractor
- 3109 Puller
- 3319 Thrust piece
- VAG 1331 Torque wrench
- Kukko 18/0 puller
- 2 M8 x 35 bolts
- 8 mm washer
- Threaded rod M10 x 80 mm

Oil seal, replacing (right)

- Disconnect drive shaft from drive flange.
- Remove balance weight.
- Lay drive shaft to one side and secure.

Oil seal, replacing (left)

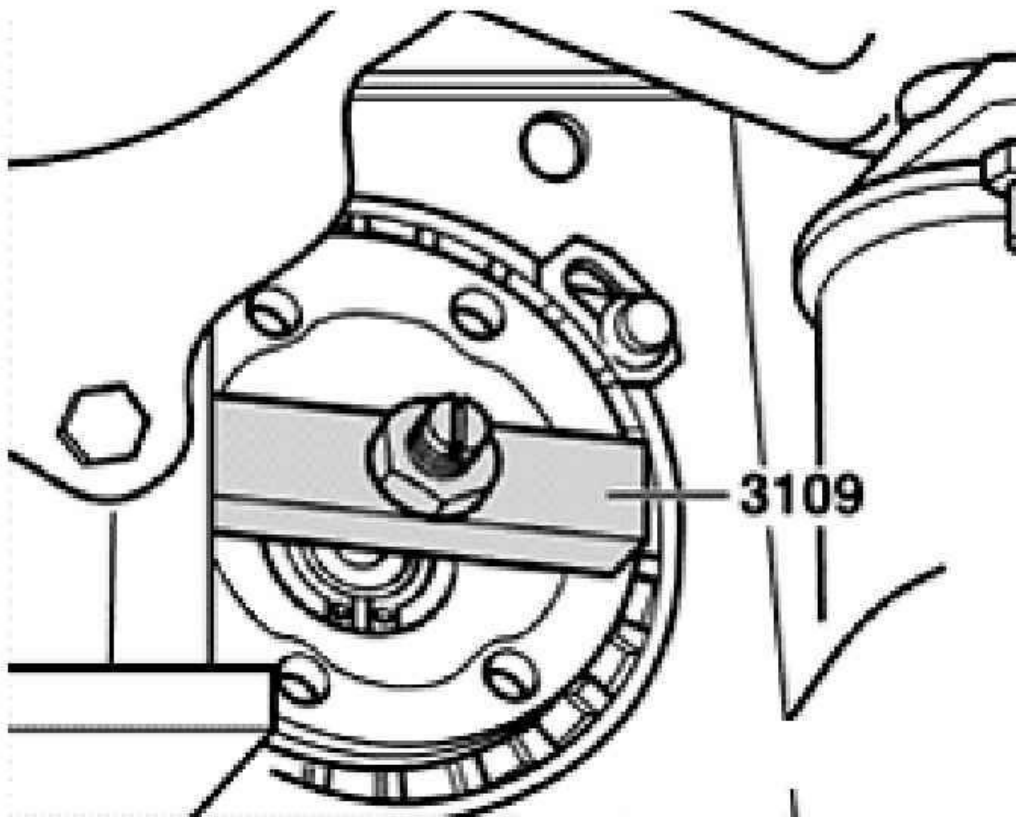
- Unbolt axle shaft from drive flange
- Mark installation position of ball joint bolts on left control arm and remove bolts.
- Remove outer bolts -arrow A-.



G03362444

Fig. 191: Removing Outer And Inner Ball Joint Bolts
Courtesy of VOLKSWAGEN OF AMERICA, INC.

- Loosen inner bolt -arrow B-.
- Turn steering to right, full lock.
- Swing ball joint out and place left -hand axle shaft to one side and secure.
- Pierce sealing cap in drive flange with screwdriver and pry out.
- Mount installation tool 3109 and remove circlip.



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Fig. 192: Removing Drive Flange Circlip
Courtesy of VOLKSWAGEN OF AMERICA, INC.

- Pull off drive flange with VW 391.

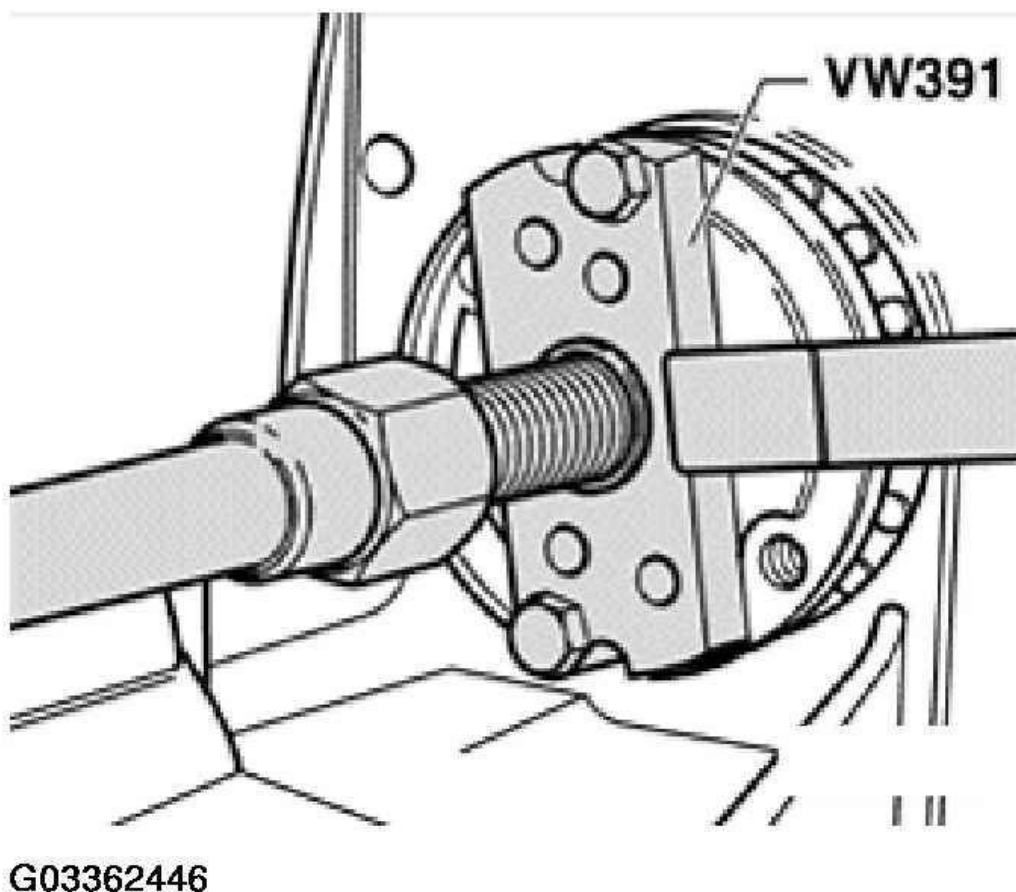


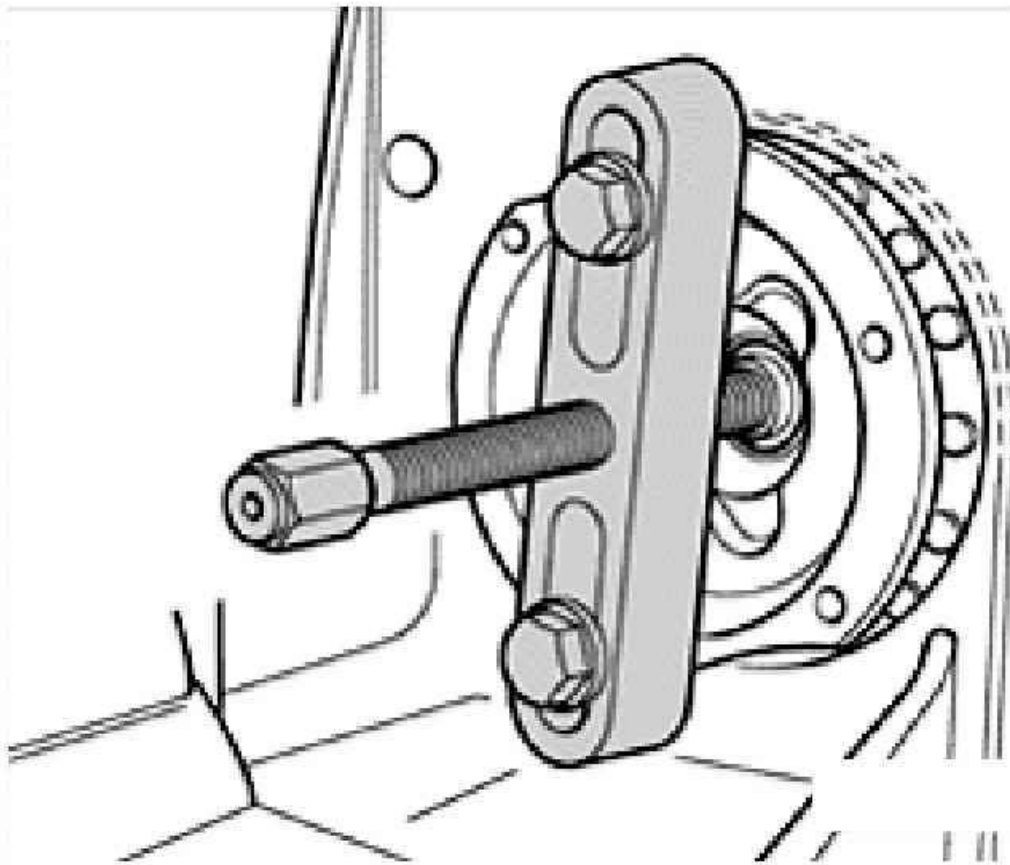
Fig. 193: Pulling Off Drive Flange

Courtesy of VOLKSWAGEN OF AMERICA, INC.

- Pull out drive flange oil seal with VW 681.

NOTE: On vehicles with flange for Tripodic drive shaft the joint flange is removed with Kukko 18-0 puller and two 8x35 mm bolts with 8 mm diameter washers.

- Bolt Kukko 18-0 puller to axle shaft flange with two 8x35mm bolts and 8mm washers.
- Remove circlip for drive flange.
- Remove drive flange.
- Remove drive flange oil seal with VW 681.

**G03362447****Fig. 194: Removing Drive Flange Oil Seal****Courtesy of VOLKSWAGEN OF AMERICA, INC.**

- Install (pull into stop) new oil seal with press piece 3319, M10 threaded rod approx. 80 mm (3.15 in. long) and nut with washer.
- Fill space between seal and dust lip with multi-purpose grease.
- Install drive flange, dished washer and circlip.

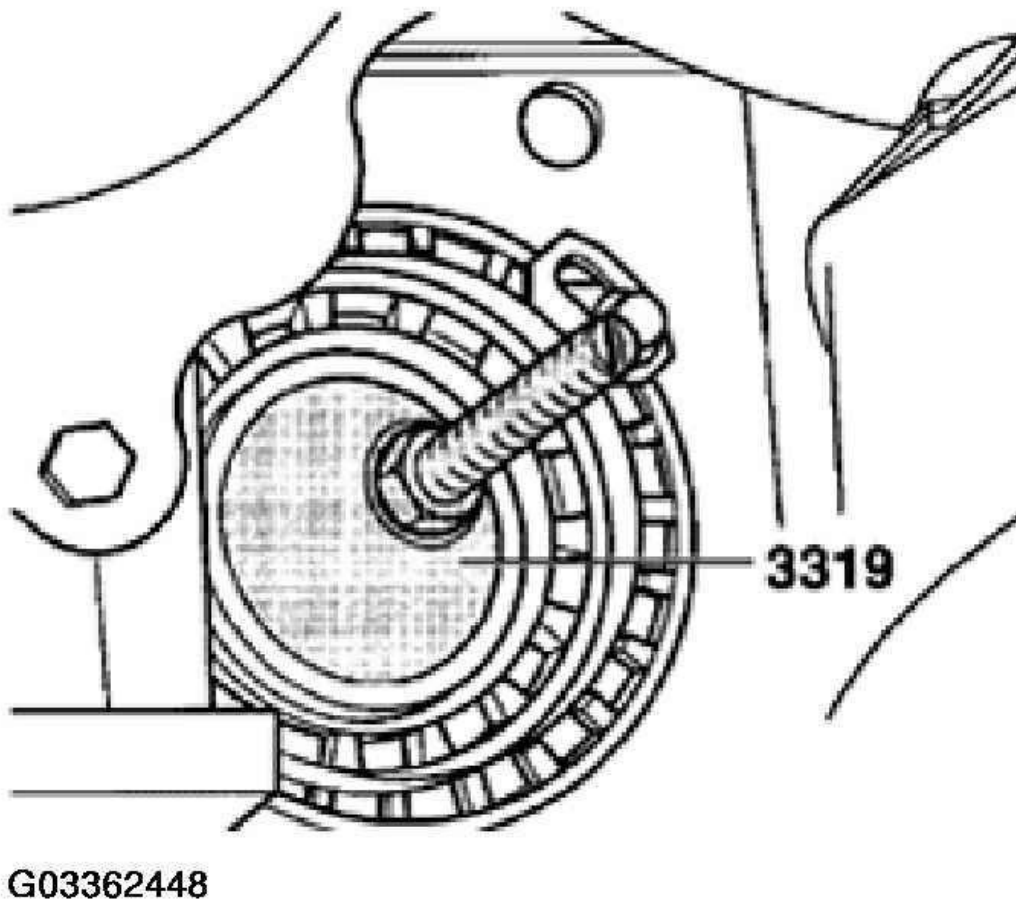


Fig. 195: Installing Drive Flange, Dished Washer And Circlip
Courtesy of VOLKSWAGEN OF AMERICA, INC.

- Pull drive flange in.

NOTE: Drive flange can also be pulled in with VW 391.

- Install circlip and seal drive flange with cover.

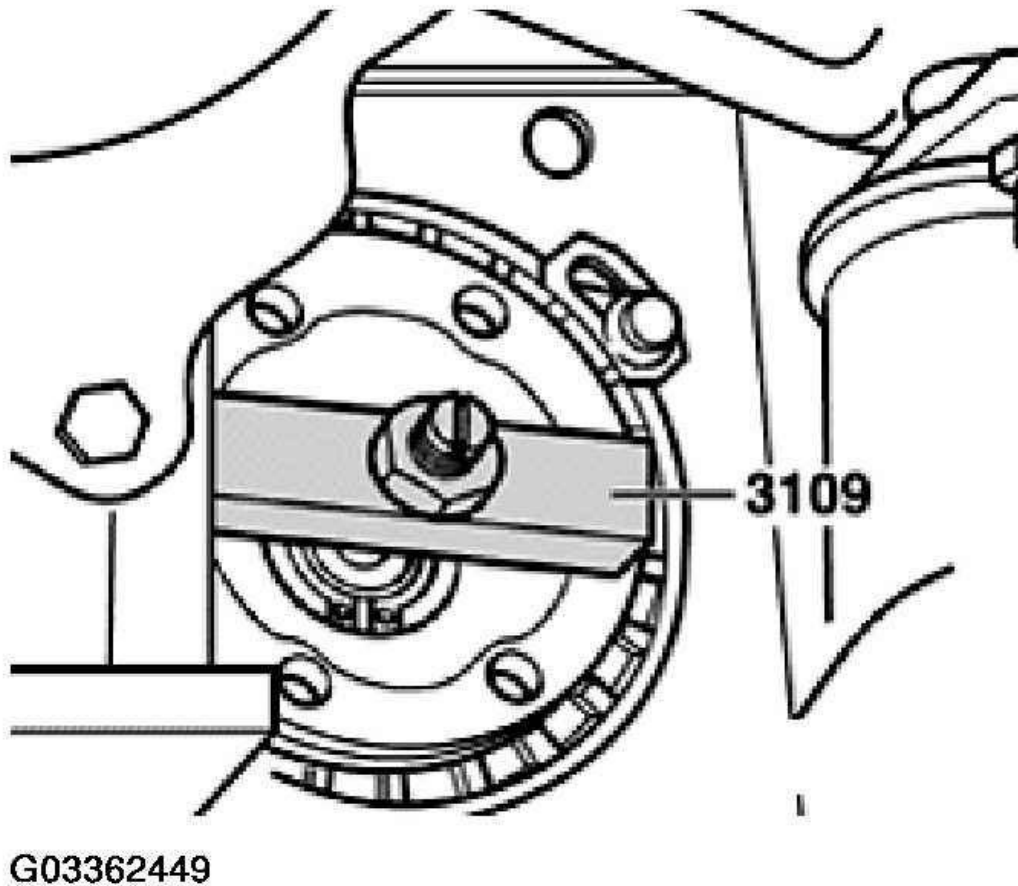


Fig. 196: Installing Circlip And Seal Drive Flange
Courtesy of VOLKSWAGEN OF AMERICA, INC.

- Install axle shaft.
- Reconnect ball joint to control arm.
- Check final drive oil level: see **FINAL DRIVE OIL LEVEL, CHECKING.**

Tightening torque:

Axle shaft to drive flange: 45 N.m (33 ft lb)

Ball joint to control arm: 35 N.m (26 ft lb)

FINAL DRIVE, DISASSEMBLING AND ASSEMBLING

Final drive, overview

The following list pertains to **Fig. 197**.

1. Planetary gear

- Disassembling and assembling, see **TRANSMISSION, DISASSEMBLING AND ASSEMBLING, OVERVIEW**

2. Input gear

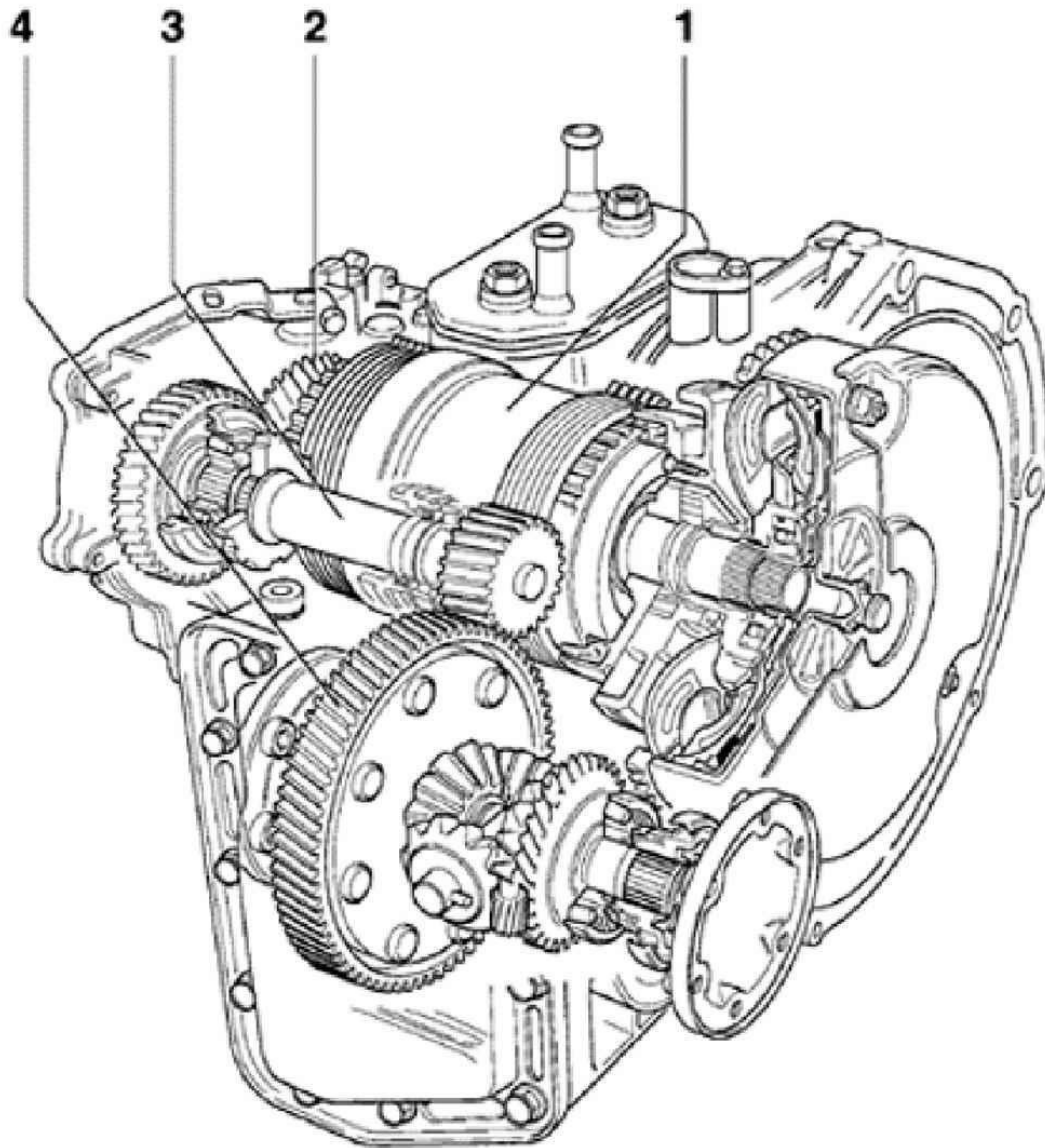
- Removing and installing, see **INPUT GEAR, REMOVING AND INSTALLING**
- Adjusting: see **INPUT GEAR, ADJUSTING**
- Final drive: adjusting (overview), see **FINAL DRIVE, ADJUSTING**
- Repairs on input gear can only be performed after individual components of transmission have been removed.

3. Drive pinion

- Removing and installing, see **DRIVE PINION, REMOVING AND INSTALLING**
- Adjusting, see **DRIVE PINION, ADJUSTING**
- Final drive, adjusting (overview), see **FINAL DRIVE, ADJUSTING**

4. Differential

- Removing and installing, see **DIFFERENTIAL, REMOVING AND INSTALLING**
- Disassembling and assembling, see **DIFFERENTIAL, DISASSEMBLING AND ASSEMBLING**
- Adjusting, see **DIFFERENTIAL, ADJUSTING**
- Final drive, adjusting (overview), see **FINAL DRIVE, ADJUSTING**



1 - Planetary gear

2 - Input gear

3 - Drive pinion

4 - Differential

G03362450

Fig. 197: Identifying Final Drive Components

Courtesy of VOLKSWAGEN OF AMERICA, INC.

INPUT GEAR, OVERVIEW

Special tools and equipment

- VW 402 Press plate
- VW 407 Press tool
- VW 771 Multi -purpose tool
- - 205 Thrust plate
- - 21 Press tool
- VAG 1582 Taper roller bearing puller
- VAG 1582-3 Attachment to VAG 1582

Input gear, removing and installing

NOTE:

- **Drive pinion and differential do not need to be removed.**
- **Before installing final drive measure friction torque at axle shaft, see FRICTION TORQUE, CHECKING**

The following list pertains to **Fig. 198**.

1. Socket-head fastener

- 250 N.m (184 ft lb)
- Engage parking lock to remove and install
- Use 22 mm socket
- Before installing socket -head fastener insert axial needle bearing -7-

2. Dished washer

- Curved side faces socket-head fastener

3. Shim

- Determining thickness, see **INPUT GEAR, ADJUSTING**

4. Tapered roller bearing inner race

- After measuring thickness of shim, install on input gear with locking fluid AMV 185 101 A1, see **Tapered roller bearing inner race, inserting**

5. Tapered roller bearing outer race

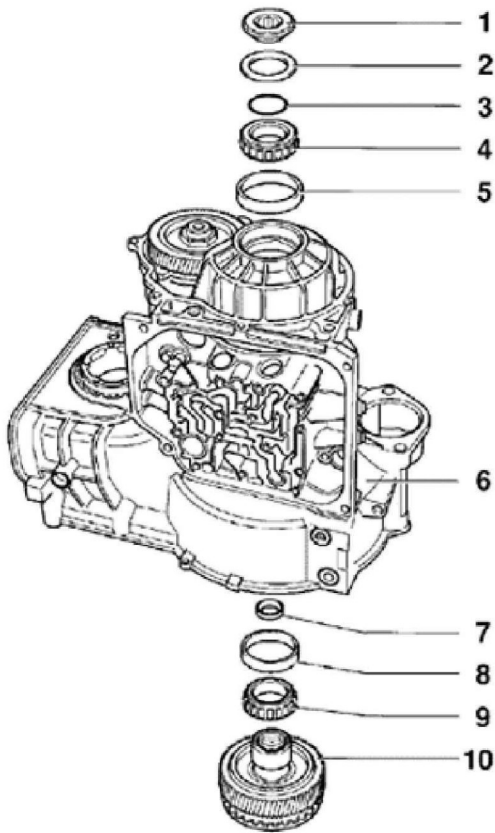
- Drive out with drift
- Drive in with 30-205
- Insert with locking fluid AMV 185 101 A1

6. Transmission housing

7. Axial needle bearing

- Install with flat side facing input gear

- Insert into input gear before installing socket -head fastener -1-
8. **Tapered roller bearing outer race**
 - Drive out with drift
 - Drive in with 30-205 and long drift
 - Install with locking fluid AMV 185 101 A1
 9. **Tapered roller bearing inner race**
 - Pulling off, see **Tapered roller bearing inner race, removing**
 - Pressing on, see **Tapered roller bearing inner race, installing**
 - Insert with locking fluid AMV 185 101 A1, see **Tapered roller bearing inner race, inserting**
 10. **Input gear**
 - With impulse wheel for Vehicle Speed Sensor (VSS) -G68-
 - Number of teeth, see **TRANSMISSION LAYOUT**
 - Adjusting, see **INPUT GEAR, ADJUSTING**
 - If signs of damage exist, always replace input gear and output gear together
 - Removing, see **Input gear, removing**
 - If input gear is replaced, adjust planet carrier, see **PLANET CARRIER, ADJUSTING.**



- 1 - Socket-head fastener
- 2 - Dished washer
- 3 - Shim
- 4 - Tapered roller bearing inner race
- 5 - Tapered roller bearing outer race
- 6 - Transmission housing
- 7 - Axial needle bearing
- 8 - Tapered roller bearing outer race
- 9 - Tapered roller bearing inner race
- 10 - Input gear

G03362451

Fig. 198: Exploded View Of Input Gear Components
 Courtesy of VOLKSWAGEN OF AMERICA, INC.

Tapered roller bearing inner race, removing

- Place press piece on input gear.

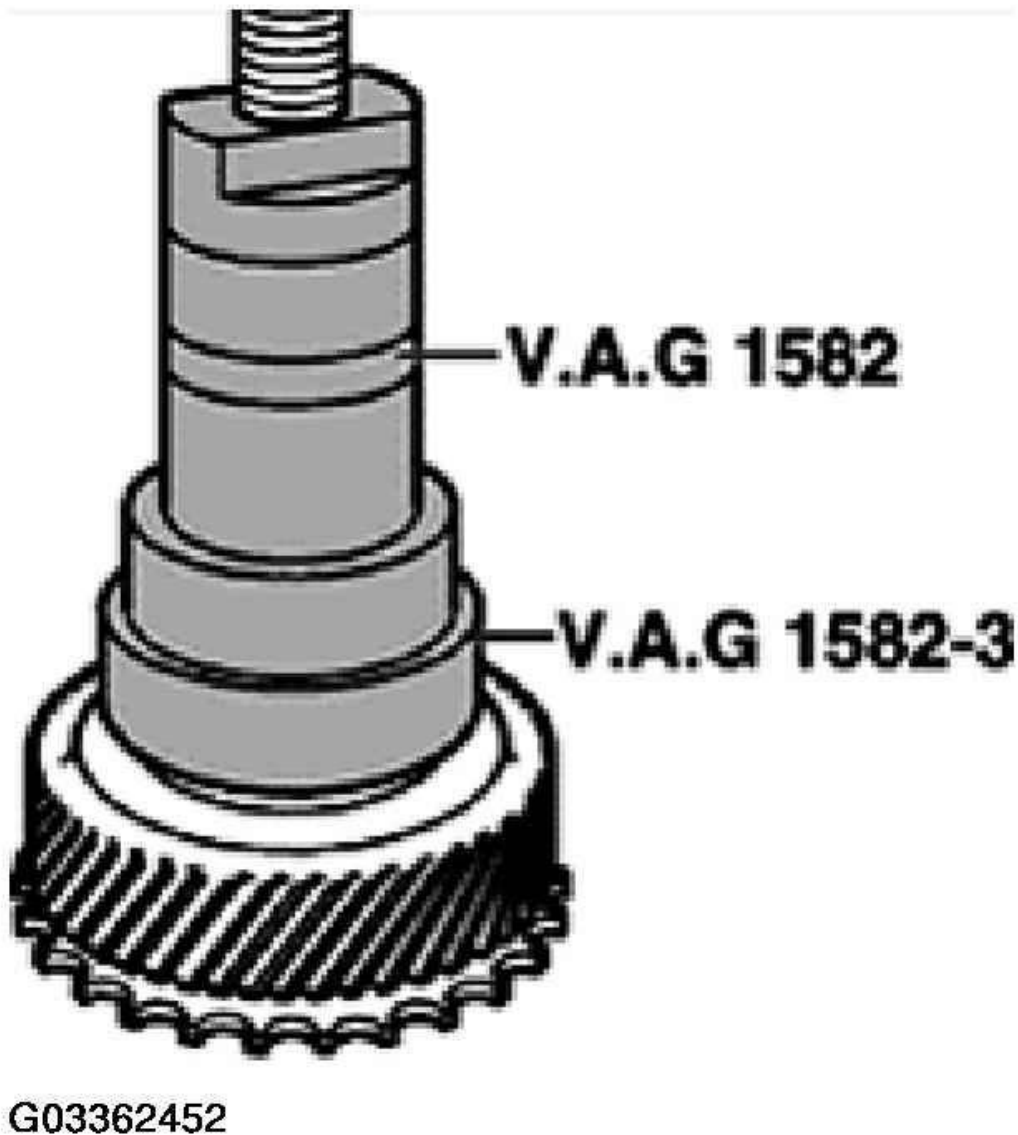
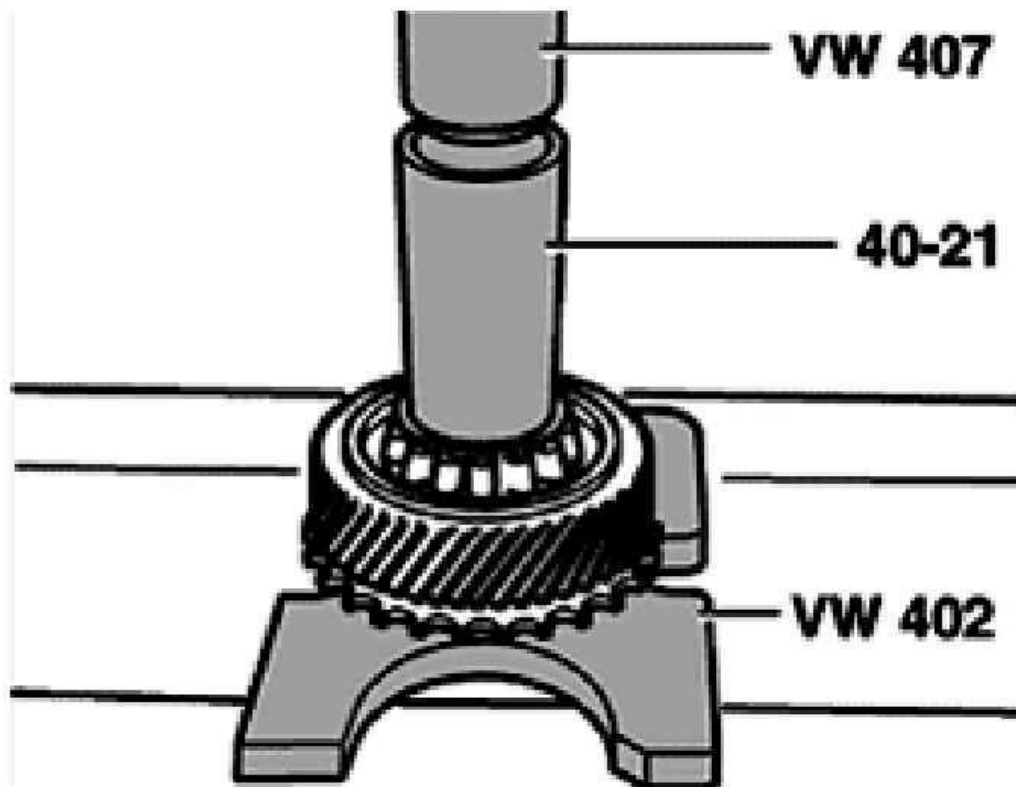


Fig. 199: Removing Tapered Roller Bearing Inner Race
Courtesy of VOLKSWAGEN OF AMERICA, INC.

Tapered roller bearing inner race, installing

- Place press plate VW 402 below hub of input gear to avoid damaging input gear.



G03362453

Fig. 200: Installing Tapered Roller Bearing Inner Race
Courtesy of VOLKSWAGEN OF AMERICA, INC.

Tapered roller bearing inner race, inserting

- Install tapered roller bearing inner race with AMV 185 101 A1 -arrow-.

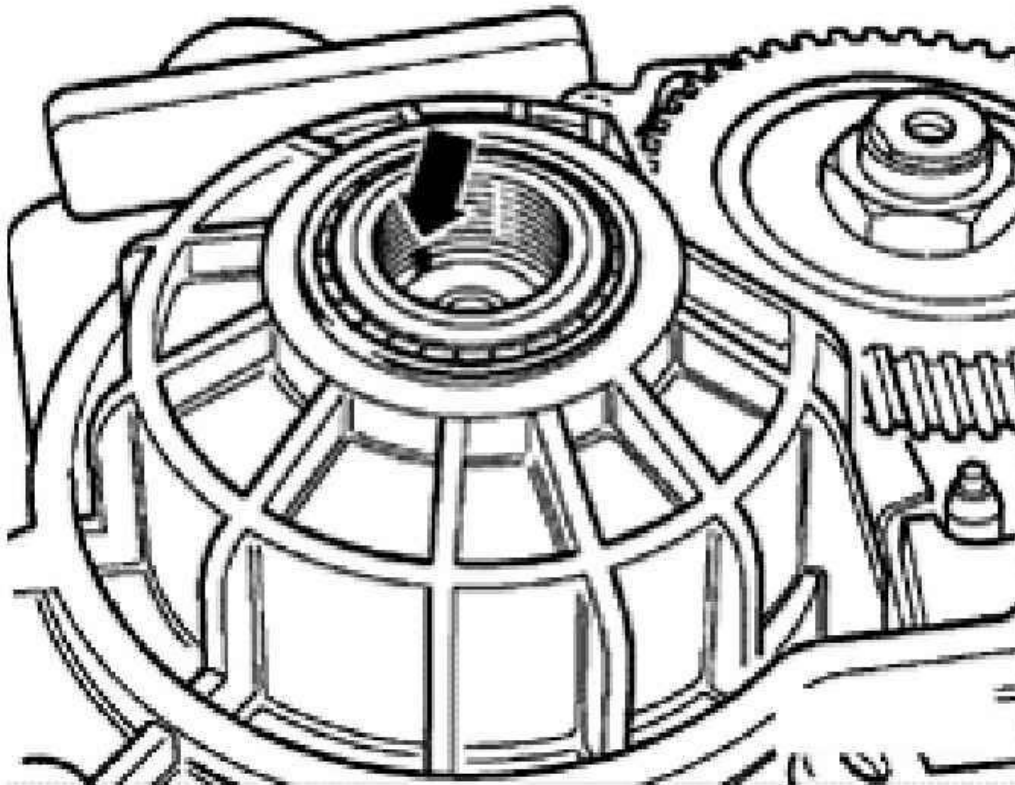
**G03362454**

Fig. 201: Inserting Tapered Roller Bearing Inner Race
Courtesy of VOLKSWAGEN OF AMERICA, INC.

Input gear, removing

- Install socket-head fastener without dished washer, shim and axial needle bearing far enough for a gap, size a = 3 mm, to exist between socket -head fastener and tapered roller bearing inner race.
- Drive out input gear with VW 771 to stop of tapered roller bearing inner race.
- Remove VW 771 and take out input gear.

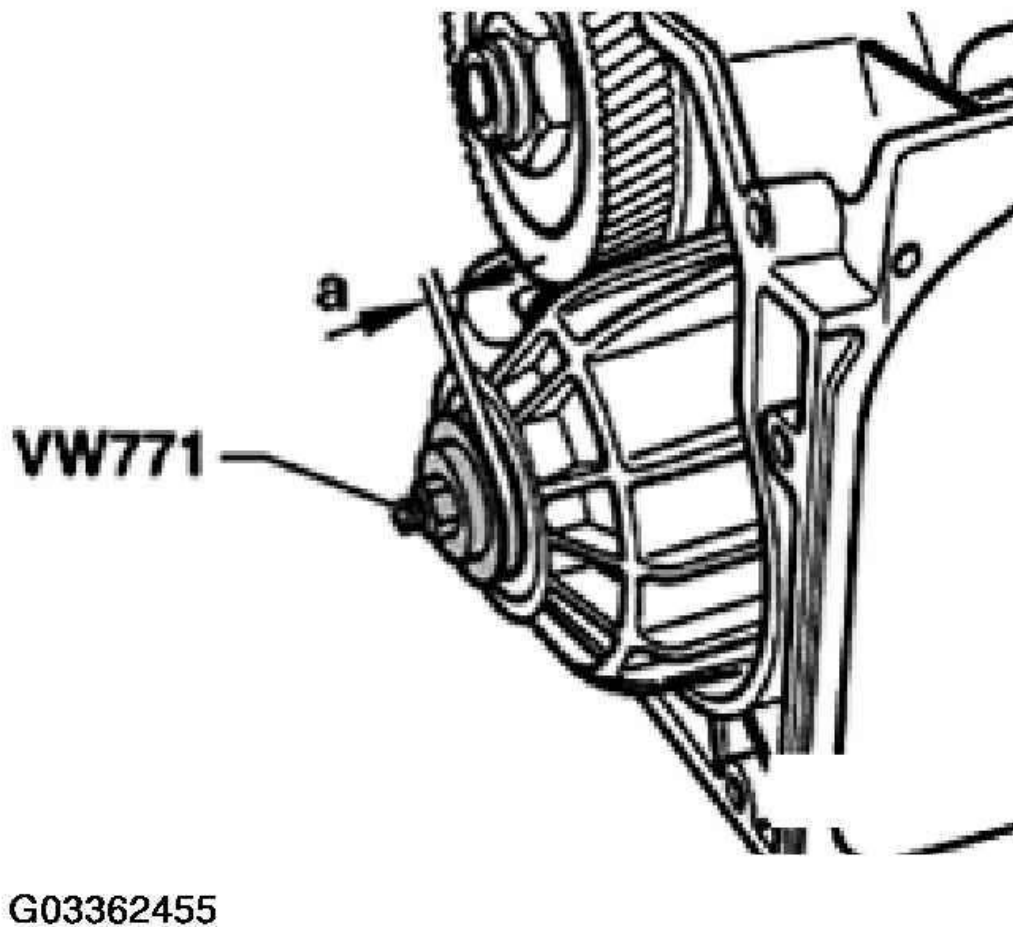
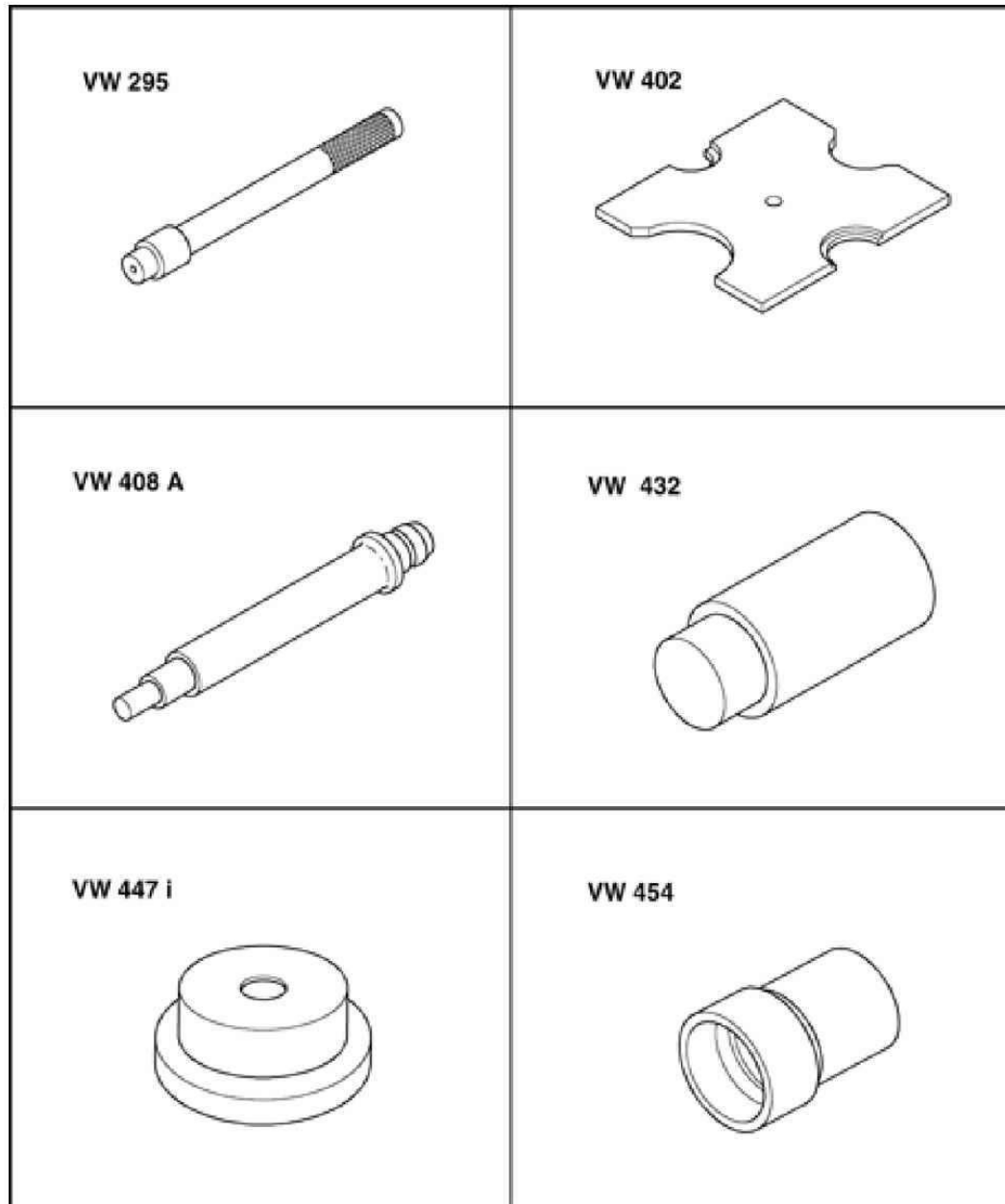


Fig. 202: Removing Input Gear
Courtesy of VOLKSWAGEN OF AMERICA, INC.

DRIVE PINION, REMOVING AND INSTALLING

Special tools and equipment

- VW 295 Drift
- VW 402 Press plate
- VW 408 A Press tool
- VW 432 Press piece
- VW 447 i Thrust plate
- VW 454 Press piece

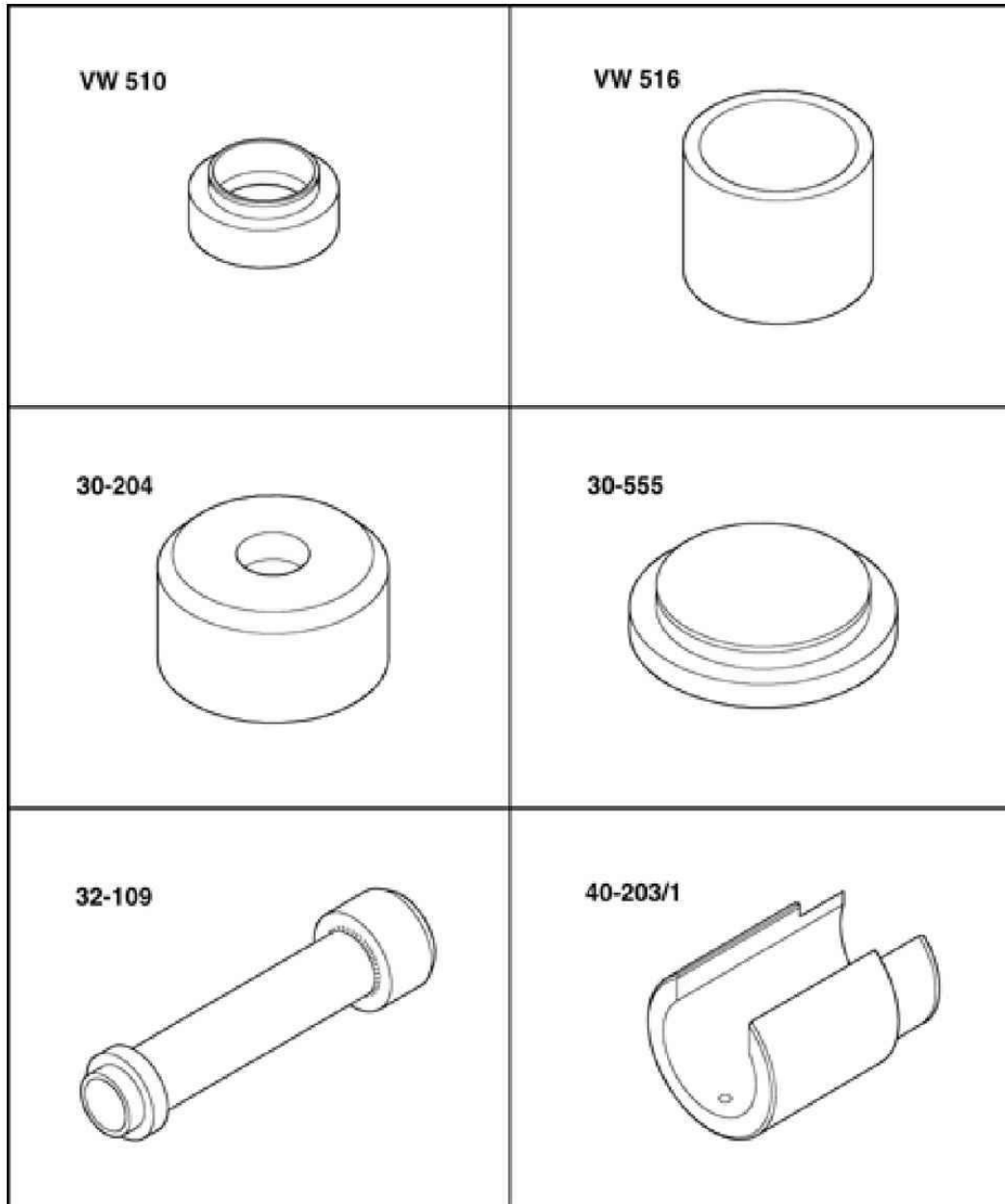


G03362456

Fig. 203: Identifying Special Tools (1 Of 3)
Courtesy of VOLKSWAGEN OF AMERICA, INC.

- VW 510 Press piece
- VW 516 Tube
- 30-204 Installing ring

- 30-555 Thrust piece
- 32-109 Tube
- 40-203/ 1 Tube, split



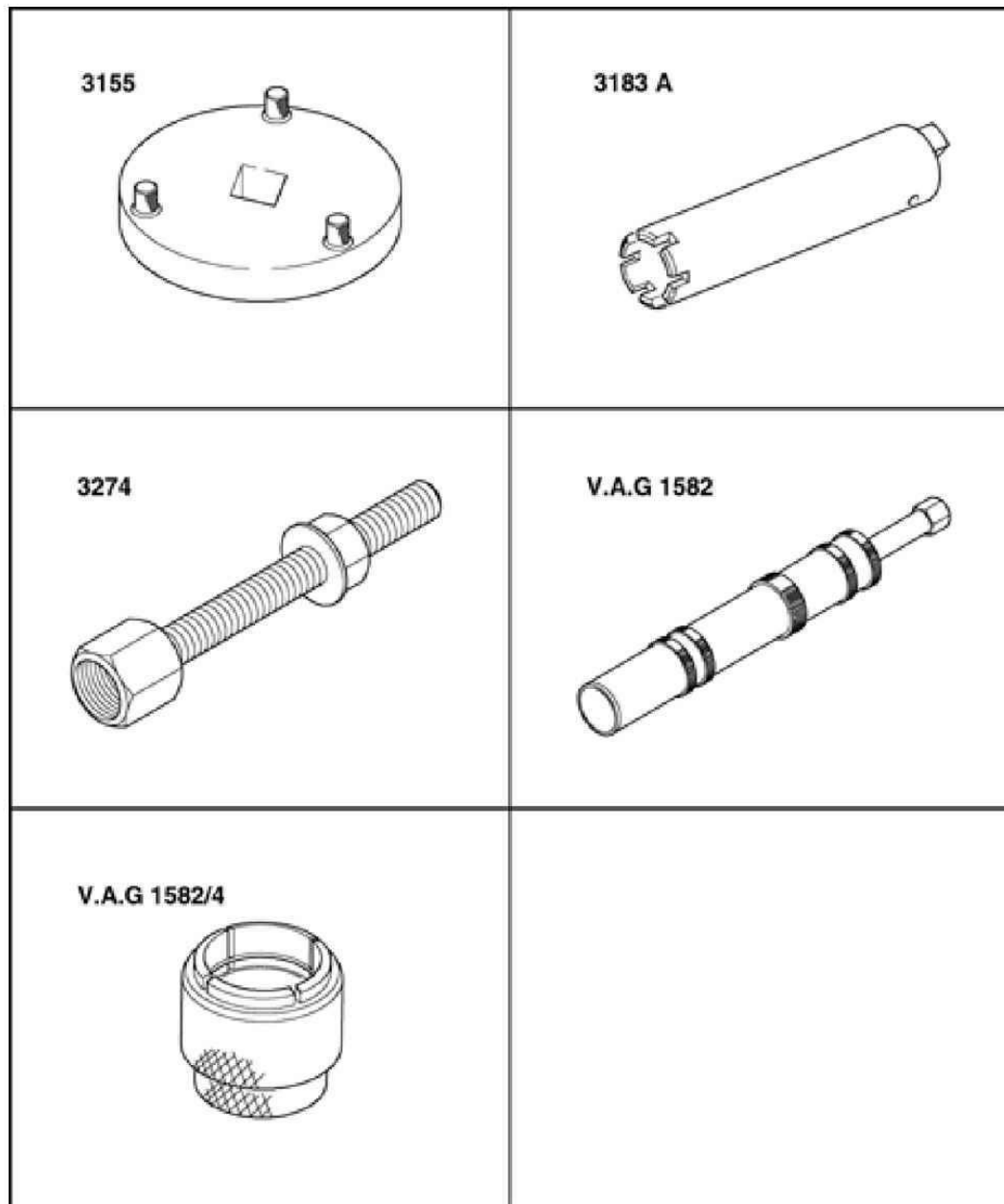
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Fig. 204: Identifying Special Tools (2 Of 3)
Courtesy of VOLKSWAGEN OF AMERICA, INC.

1993 Volkswagen Golf III GL

1993-99 TRANSMISSION 4 Spd. Automatic Transmission 01M - Cabrio, Golf, GTI & Jetta

- 3155 Ring nut wrench
- 3183 A Castellated box wrench
- 3274 Adapter
- VAG 1582 Tapered roller bearing puller
- VAG 1582/4 Clamping ring
- Kukko 20-10 Puller
- V/172 Removal hook



G03362458

Fig. 205: Identifying Special Tools (3 Of 3)
 Courtesy of VOLKSWAGEN OF AMERICA, INC.

Drive pinion

NOTE: To remove drive pinion, remove selector shaft and parking lock, see PARKING

LOCK, DISASSEMBLING AND ASSEMBLING, parking lock, disassembling and assembling.

The following list pertains to **Fig. 206**.

1. **Drive pinion**
 - Number of teeth, see **TRANSMISSION LAYOUT**
 - Adjusting, see **DRIVE PINION, ADJUSTING**
 - Removing, see **Drive pinion, removing**
2. **Transmission housing**
3. **Screw**
 - 12 N.m (9 ft lb)
 - Remove screw before removing or installing bearing support ring -13-.
 - Install with sealing compound AKD45600001
4. **Hex nut**
 - 250 N.m (184 ft lb)
 - Engage parking lock to remove or install
 - Secure with drift
5. **Output gear**
 - Number of teeth, see **TRANSMISSION LAYOUT**
 - Pulling off, see **Output gear, removing (pulling off)**
 - If signs of damage exist, always replace input gear and output gear together
6. **Tapered roller bearing inner race**
 - Pulling off, see **Tapered roller bearing inner race, removing (pulling off)**
 - Pressing on, see **Tapered roller bearing inner race, installing (pressing on)**
7. **Tapered roller bearing outer race**
 - Drive out with drift
 - Pressing in, see **Tapered roller bearing outer race, installing (pressing in)**
8. **ATF oil deflector**
 - Install together with bearing cap -10-.
9. **Bolt**
 - 25 N.m (18 ft lb)
10. **Bearing cap**
11. **Shim**
 - Determining thickness, see **DRIVE PINION, ADJUSTING**
12. **Parking lock gear**
 - Rounded side faces teeth of drive pinion
13. **Bearing support ring**
 - 200 N.m (148 ft lb)

- Remove screw - 3 - before removing or installing bearing support ring.
- Removing or installing, see **Bearing support ring, removing and installing**
- Bearing support ring cannot be removed until selector shaft has been removed, see **PARKING LOCK, DISASSEMBLING AND ASSEMBLING**
- Install bearing support ring carefully. Sealing lip and spring must not be damaged.
- Support ring with seal, see **Bearing support ring with seal for drive pinion**

14. O-ring

- Always replace
- Place onto bearing support ring -13-

15. Oil seal for drive pinion

- Remove with screwdriver
- Installation position, see **Bearing support ring with seal for drive pinion**
- Driving in, see **Drive pinion oil seal, installing (driving in)**

16. Tapered roller bearing outer race

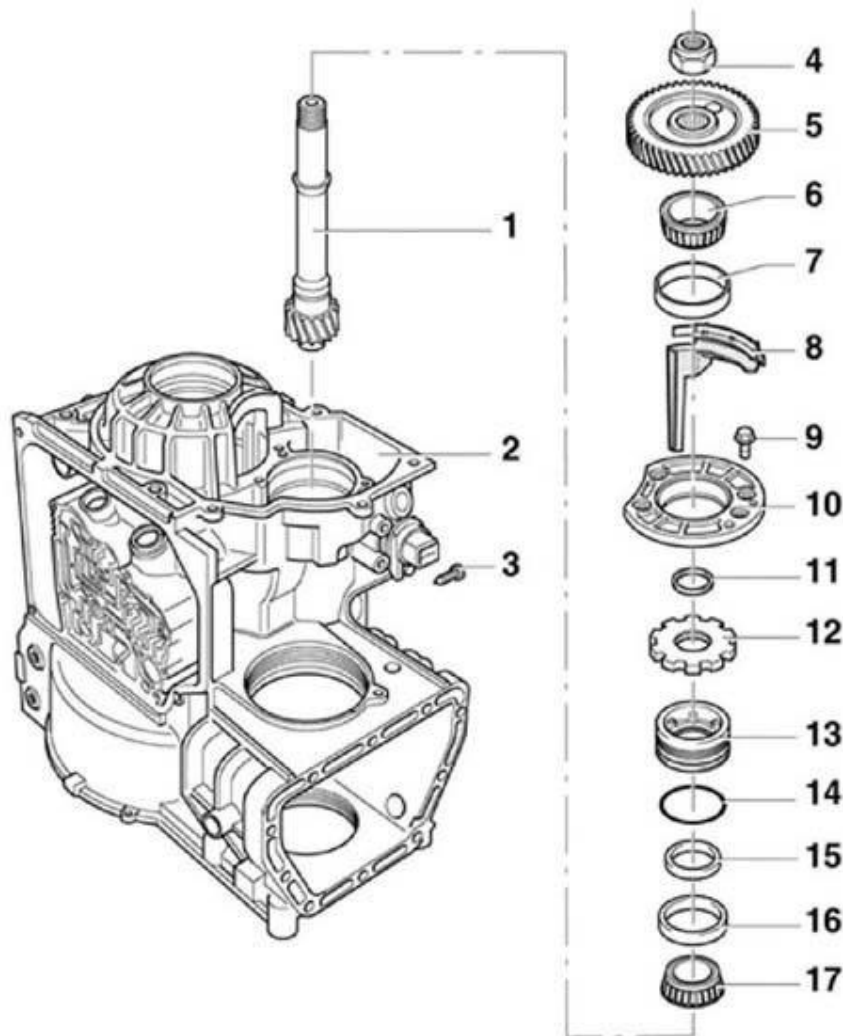
- Driving in, see **Tapered roller bearing outer race, installing (driving in)**

17. Tapered roller bearing inner race

- Drive off with drift
- Pressing on, see **Tapered roller bearing inner race, installing (pressing on)**

1993 Volkswagen Golf III GL

1993-99 TRANSMISSION 4 Spd. Automatic Transmission 01M - Cabrio, Golf, GTI & Jetta



1 - Drive pinion

2 - Transmission housing

3 - Screw

4 - Hex nut

5 - Output gear

6 - Tapered roller bearing inner race

7 - Tapered roller bearing outer race

8 - ATF oil deflector

9 - Bolt

10 - Bearing cap

11 - Shim

12 - Parking lock gear

13 - Bearing support ring

14 - O-ring

15 - Oil seal for drive pinion

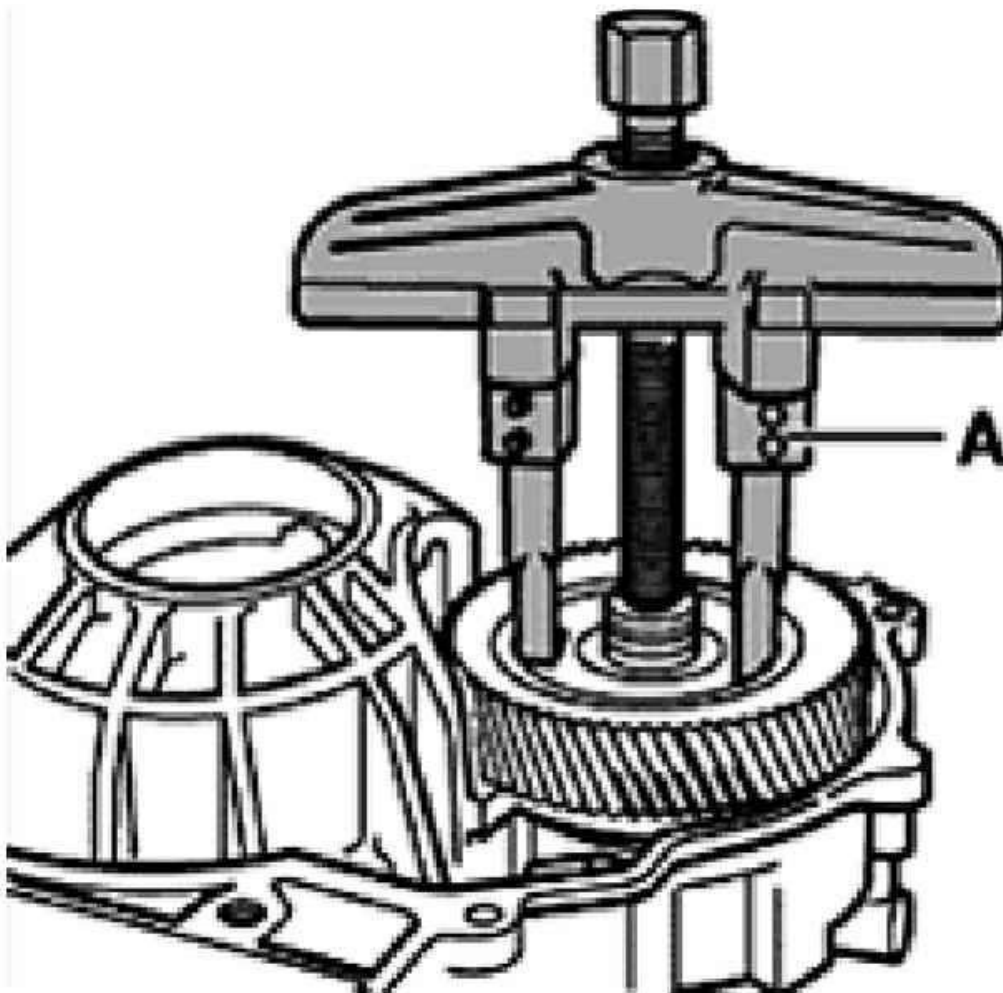
16 - Tapered roller bearing outer race

17 - Tapered roller bearing inner race

Fig. 206: Exploded View Of Drive Pinion
Courtesy of VOLKSWAGEN OF AMERICA, INC.

Output gear, removing (pulling off)

A - Kukko 20-10 and Matra V 172 pulling hooks.



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Fig. 207: Removing Output Gear
Courtesy of VOLKSWAGEN OF AMERICA, INC.

Tapered roller bearing inner race, removing (pulling off)

- Place press piece on output gear collar.

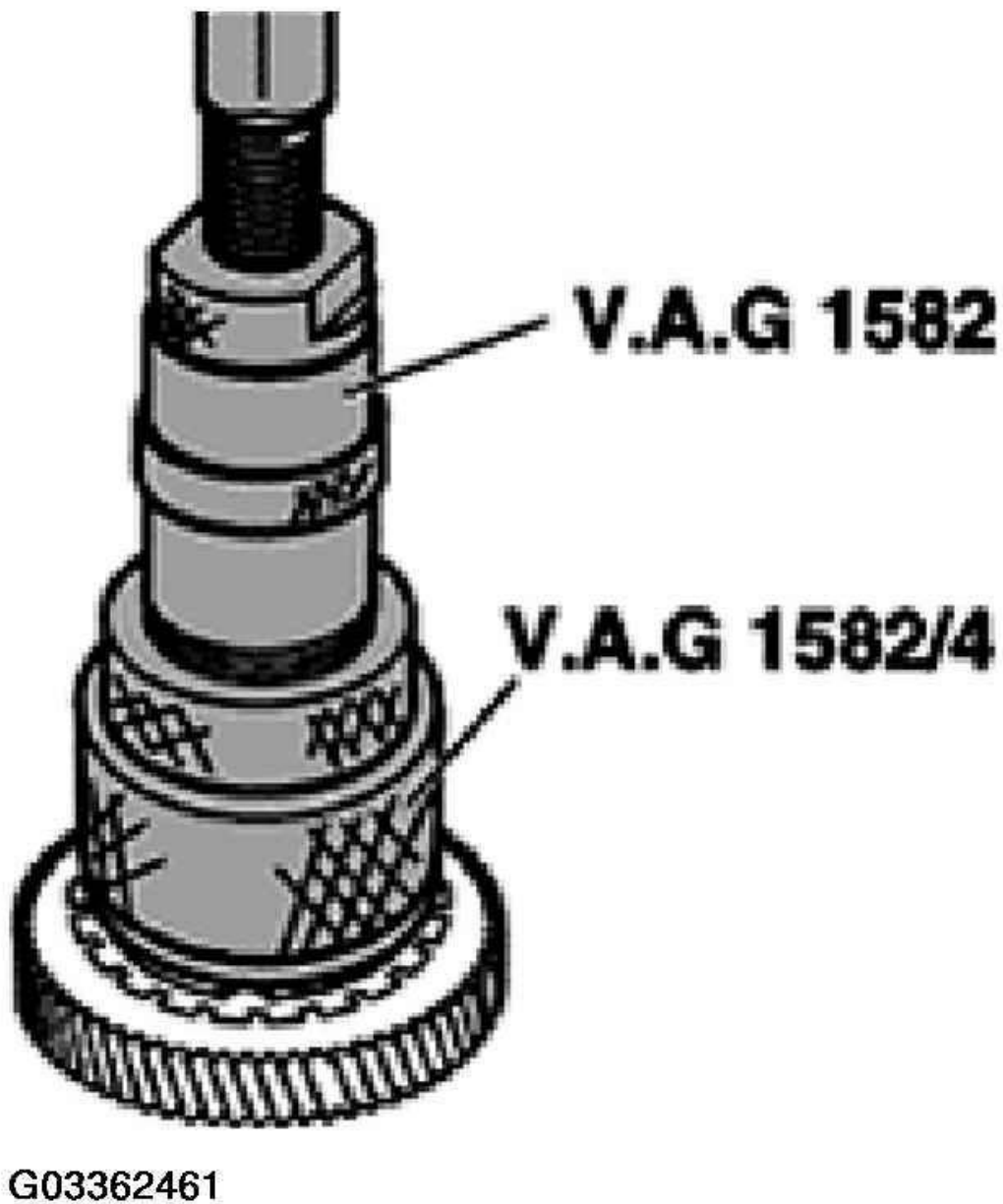


Fig. 208: Removing Tapered Roller Bearing Inner Race
Courtesy of VOLKSWAGEN OF AMERICA, INC.

Tapered roller bearing inner race, installing (pressing on)

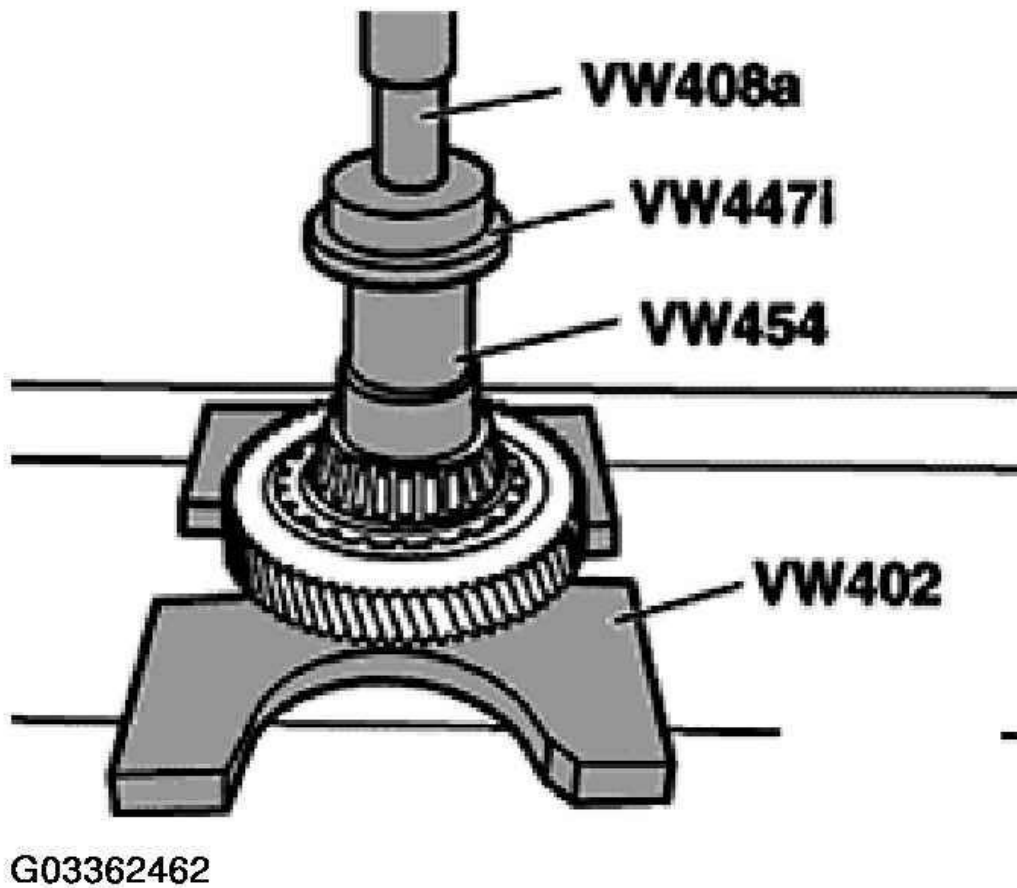
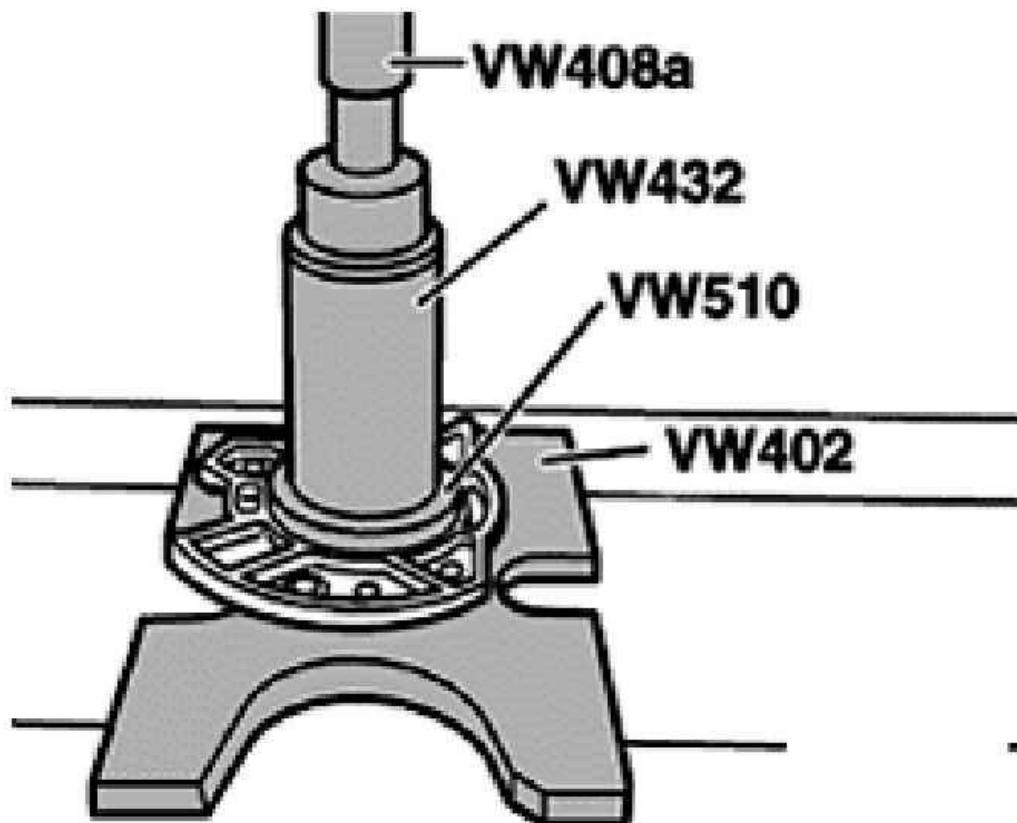


Fig. 209: Installing Tapered Roller Bearing Inner Race
Courtesy of VOLKSWAGEN OF AMERICA, INC.

Tapered roller bearing outer race, installing (pressing in)



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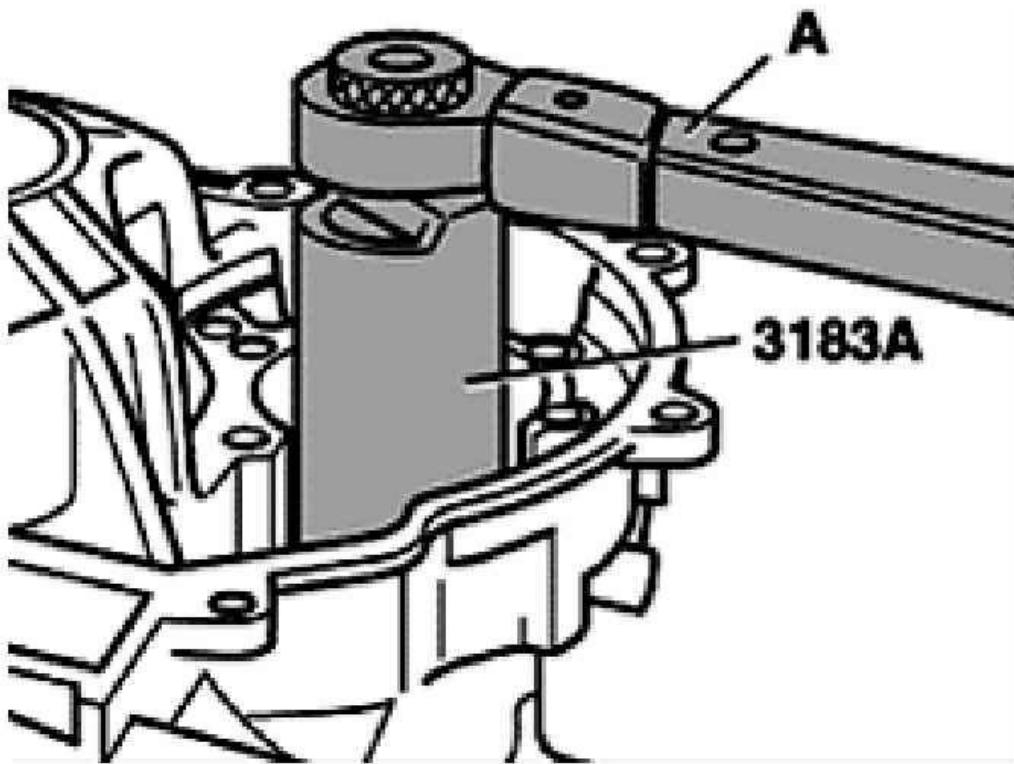
Fig. 210: Installing Tapered Roller Bearing Outer Race
Courtesy of VOLKSWAGEN OF AMERICA, INC.

Bearing support ring, removing and installing

- Remove locking bolt.

A - Torque wrench

- Tighten bearing support ring to 200 N.m (148 ft lb) and secure with locking screw. Install screw with AKD45600001.



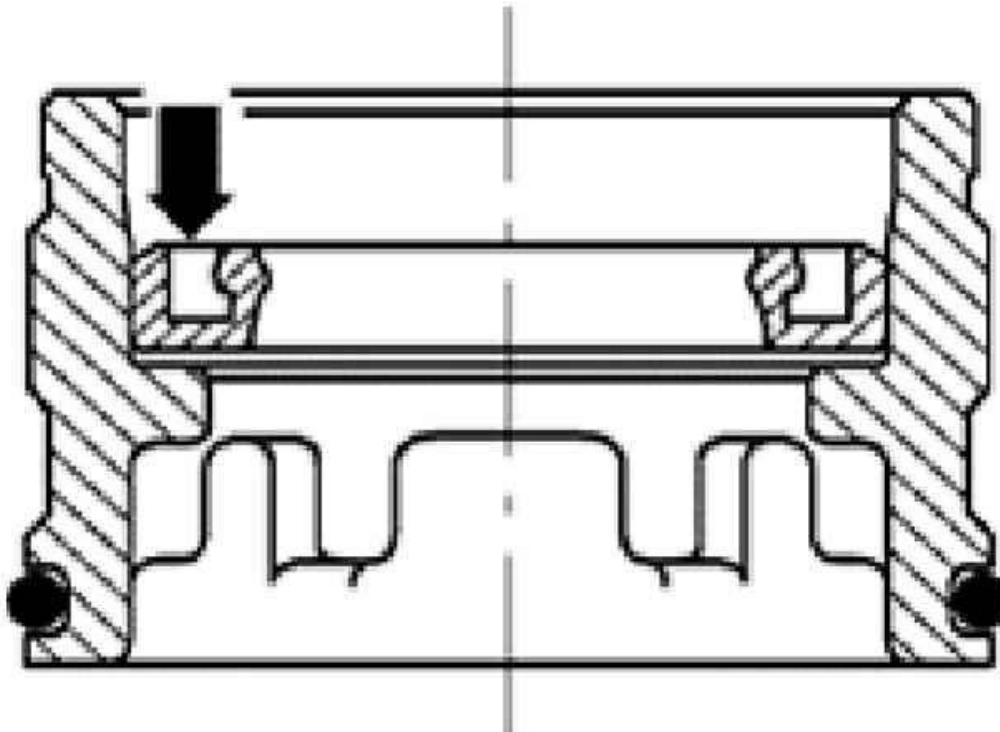
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Fig. 211: Removing/Installing Bearing Support Ring
Courtesy of VOLKSWAGEN OF AMERICA, INC.

Bearing support ring with seal for drive pinion

Installation position of seal:

Open side -arrow- faces towards tapered roller bearing outer race.

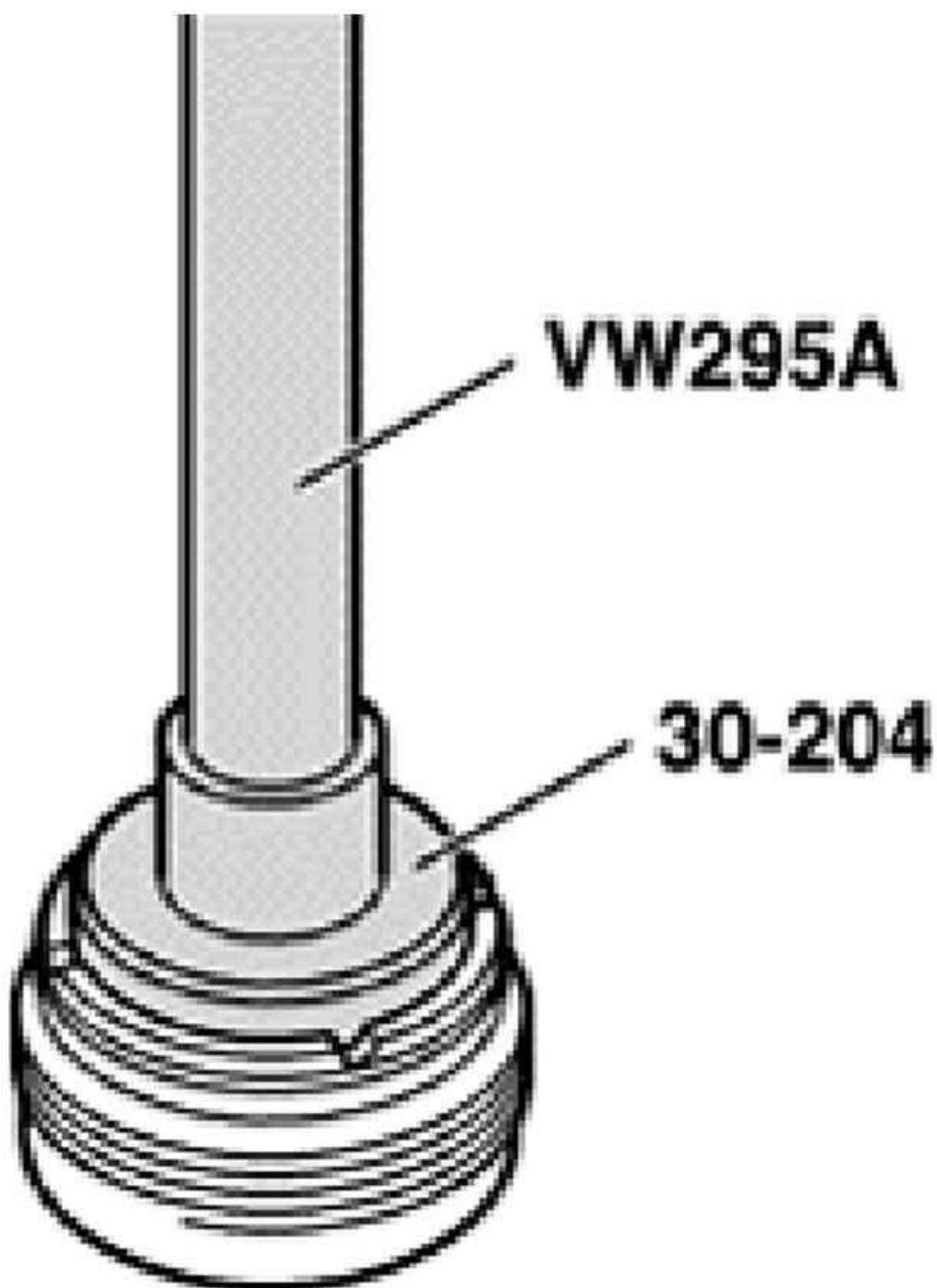


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Fig. 212: Installing Bearing Support Ring With Seal For Drive Pinion
Courtesy of VOLKSWAGEN OF AMERICA, INC.

Drive pinion oil seal, installing (driving in)

- Install oil seal so sealing lip faces out to special tool 30 - 204.



G03362466

Fig. 213: Drive Pinion Oil Seal, Installing (Driving In)
Courtesy of VOLKSWAGEN OF AMERICA, INC.

Drive pinion, removing

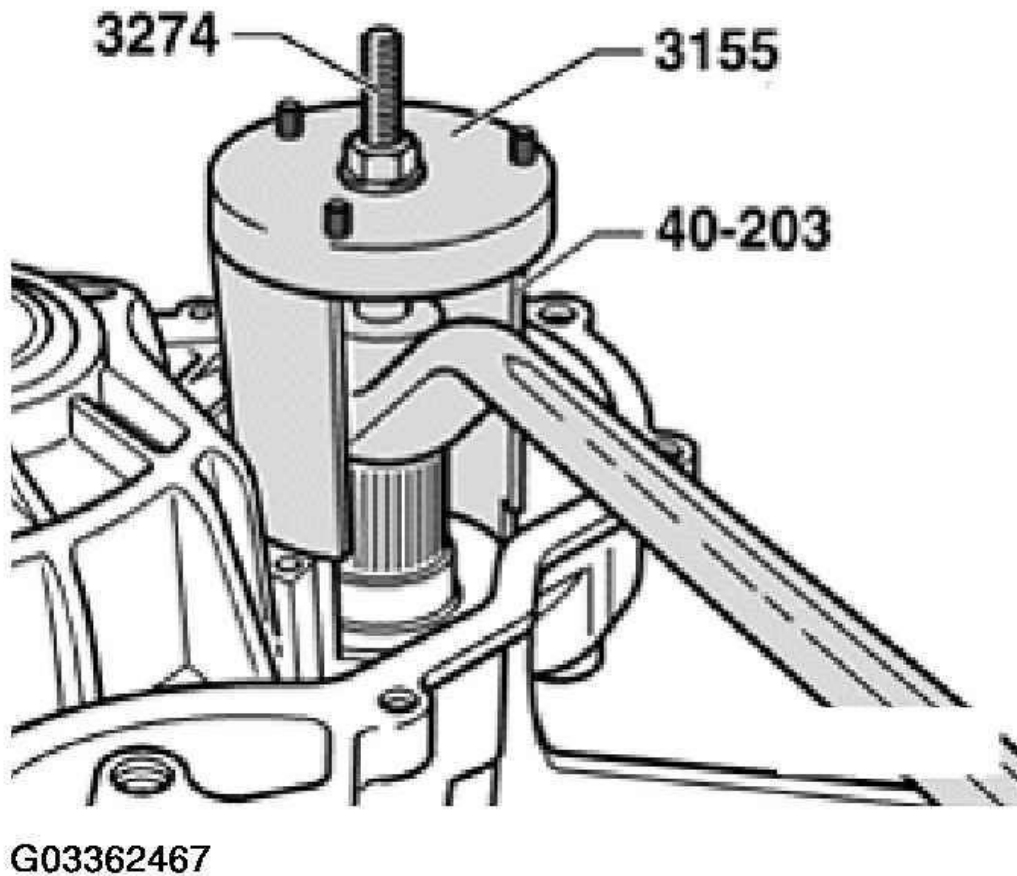
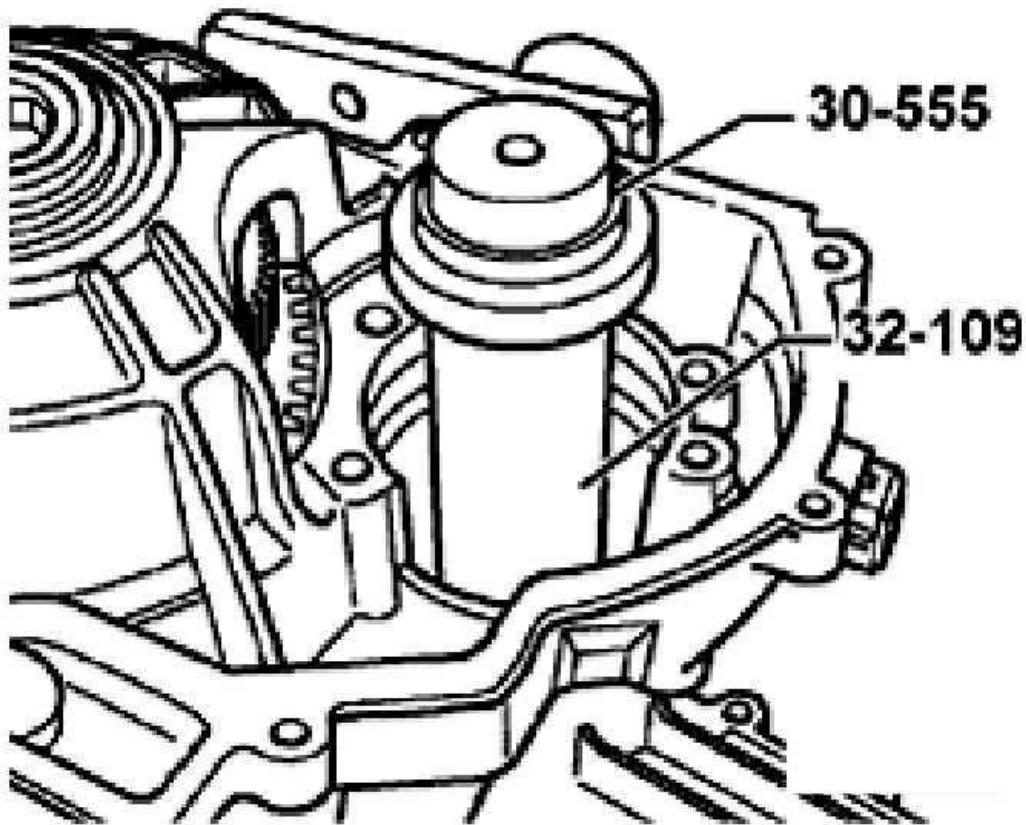


Fig. 214: Drive Pinion, Removing
Courtesy of VOLKSWAGEN OF AMERICA, INC.

Tapered roller bearing outer race, installing (driving in)

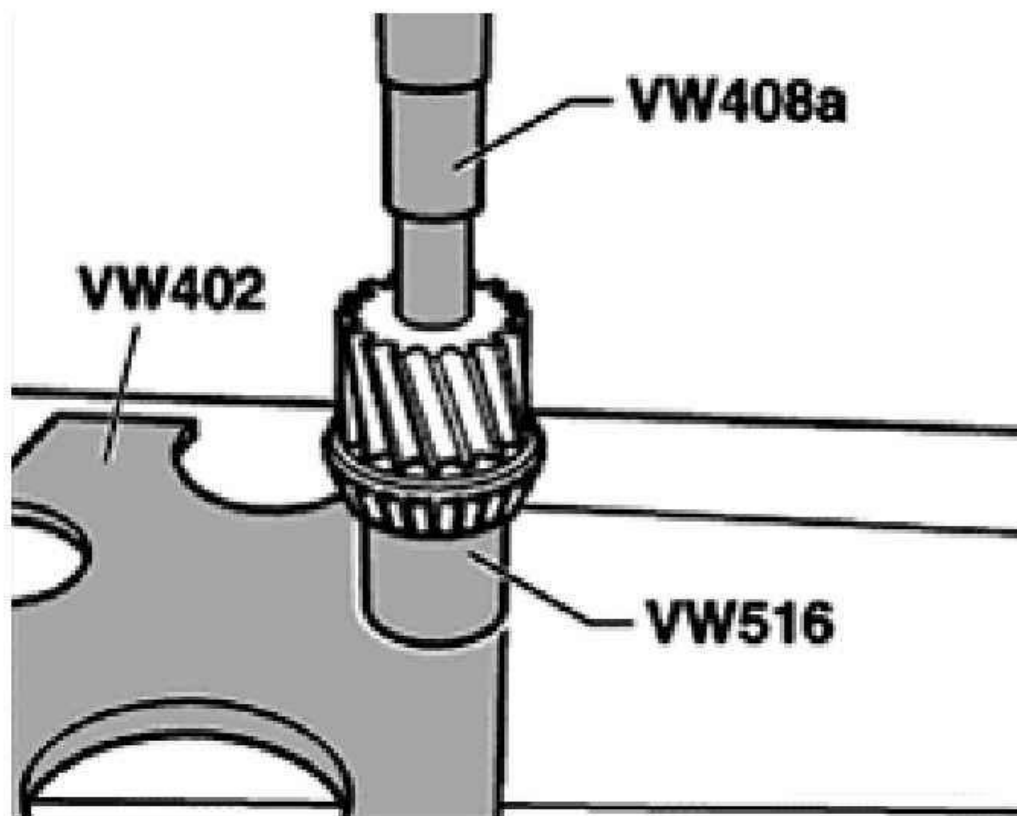
- Insert drive pinion with tapered roller bearing inner race, then drive in outer race.



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Fig. 215: Tapered Roller Bearing Outer Race, Installing (Driving In)
Courtesy of VOLKSWAGEN OF AMERICA, INC.

Tapered roller bearing inner race, installing (pressing on)



G03362469

Fig. 216: Tapered Roller Bearing Inner Race, Installing (Pressing On)
 Courtesy of VOLKSWAGEN OF AMERICA, INC.

DIFFERENTIAL, REMOVING AND INSTALLING

Special tools and equipment

- VW 391 Puller
- VW 681 Oil seal extractor
- 3109 Puller
- 3155 Ring nut wrench

Differential

NOTE:

- If tapered roller bearings are to be re-used, mark adjusting ring, see

Adjusting ring, marking

- **Drive pinion does not need to be removed for removing and installing the differential.**

The following list pertains to **Fig. 217**.

1. **Transmission housing**
2. **Speedometer drive**
 - With mark for oil level indication, see **Speedometer drive**
3. **Output shaft/drive flange**
 - Install thread facing drive flange
 - Remove before differential removal
 - Adjust differential before installing
4. **O-ring**
 - Always replace
5. **Adjusting ring**
 - Removing, see **Adjusting ring, removing**
 - If original bearings are re - installed, mark for reinstallation, see **Adjusting ring, marking**
 - If new bearings are installed, closely follow adjusting instructions, see **DIFFERENTIAL, ADJUSTING**
6. **Oil seal for drive flange**
 - Before installing, pack space between sealing surfaces with multi-purpose grease
 - Can be replaced with transmission installed, see **DRIVE FLANGE SEAL, REMOVING AND INSTALLING**
 - Remove with VW 681
 - Installing (driving in), see **Drive flange oil seal, installing (driving in to stop)**
7. **Tapered ring**
 - Shoulder faces thrust washer
8. **Thrust washer**
 - Place over compression spring
9. **Compression spring**
10. **Drive flange**
 - Install with tapered ring, thrust washer and compression spring
 - Remove before removing inner circlip at differential tapered bearing
 - Removing and installing, see **Drive flange, removing and installing**
11. **Dished washer**
12. **Circlip**
13. **Cover**
14. **Locking element**

15. **Bolt**
 - 12 N.m (9 ft lb)
16. **Cover**
17. **Circlip**
18. **Dished washer**
19. **Drive flange**
 - Install with tapered ring, thrust washer and compression spring
 - Remove before removing inner circlip at differential tapered gear
 - Removing and installing, see **Drive flange, removing and installing**
20. **Compression spring**
21. **Thrust washer**
 - Place over compression spring
22. **Tapered ring**
 - Shoulder faces thrust washer
23. **Oil seal for drive flange**
 - Before installing, pack space between sealing surfaces with multi -purpose grease
 - Can be replaced with transmission installed, see **DRIVE FLANGE SEAL, REMOVING AND INSTALLING**
 - Remove with VW 681
 - Installing (driving in), see **Drive flange oil seal, installing (driving in to stop)**
24. **Bearing body**
 - 150 N.m (111 ft lb)
 - When installing new bearing, closely follow adjusting instructions, see **DIFFERENTIAL, ADJUSTING**
 - Remove with 3155
 - Installing, see **Differential, installing**
25. **O-ring**
 - Always replace
26. **Output shaft/drive flange**
 - Install thread facing drive flange
 - Before removing flange, remove differential
 - Adjust differential before installing
27. **Differential**
 - Disassembling and assembling, see **DIFFERENTIAL, DISASSEMBLING AND ASSEMBLING**
 - Before removing differential, remove bearing body, adjusting ring and output shafts
28. **Screw**
 - 12 N.m (9 ft lb)

29. Locking element

- After adjusting tapered roller bearings, secure bearing body and adjusting ring

30. Circlip

- Remove drive flange before removing circlip
- Removing and installing, see **Circlip -arrows-, installing**

31. Circlip

- Remove drive flange before removing circlip
- Removing and installing, see **Circlip -arrows-, installing**

32. Seal

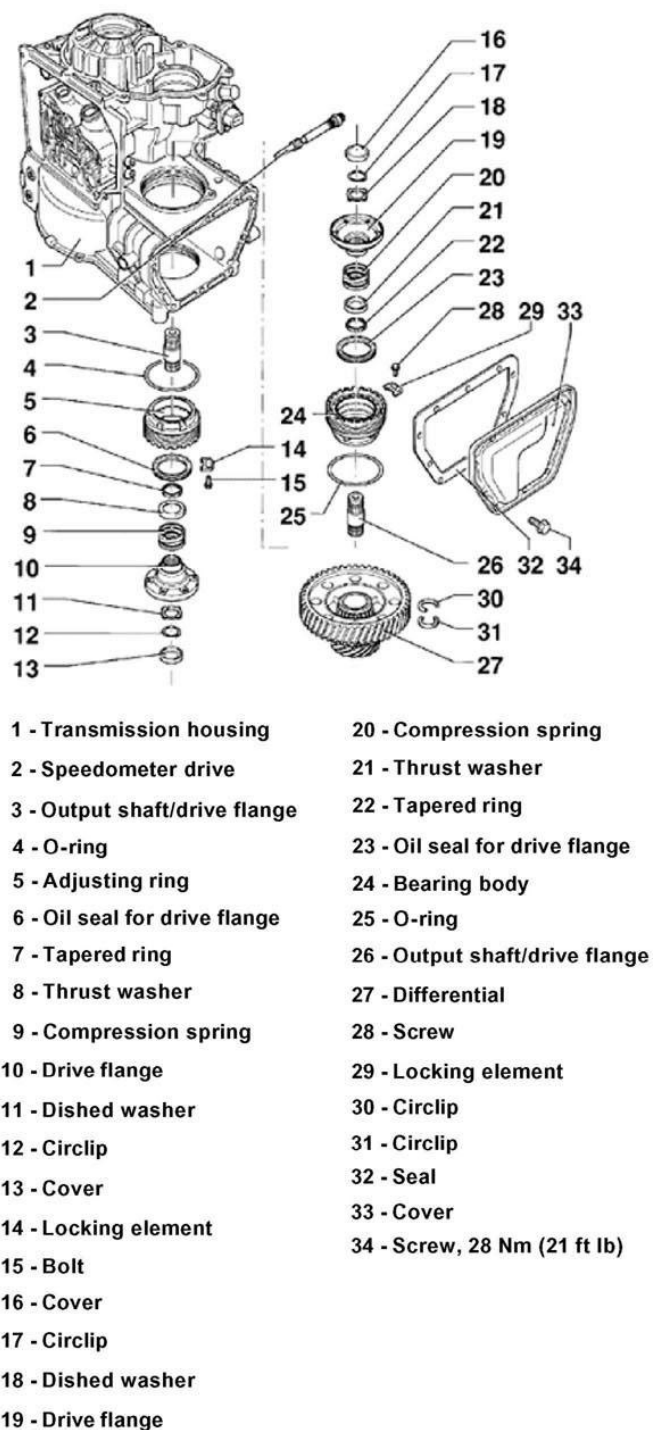
- Always replace

33. Cover

- For differential

34. Screw, 28 N.m (21 ft lb)

- 28 N.m (21 ft lb)
- Install with thread locking fluid AMV 185 101 A1



G03362470

Fig. 217: Exploded View Of Differential Components
Courtesy of VOLKSWAGEN OF AMERICA, INC.

Drive flange oil seal, installing (driving in to stop)

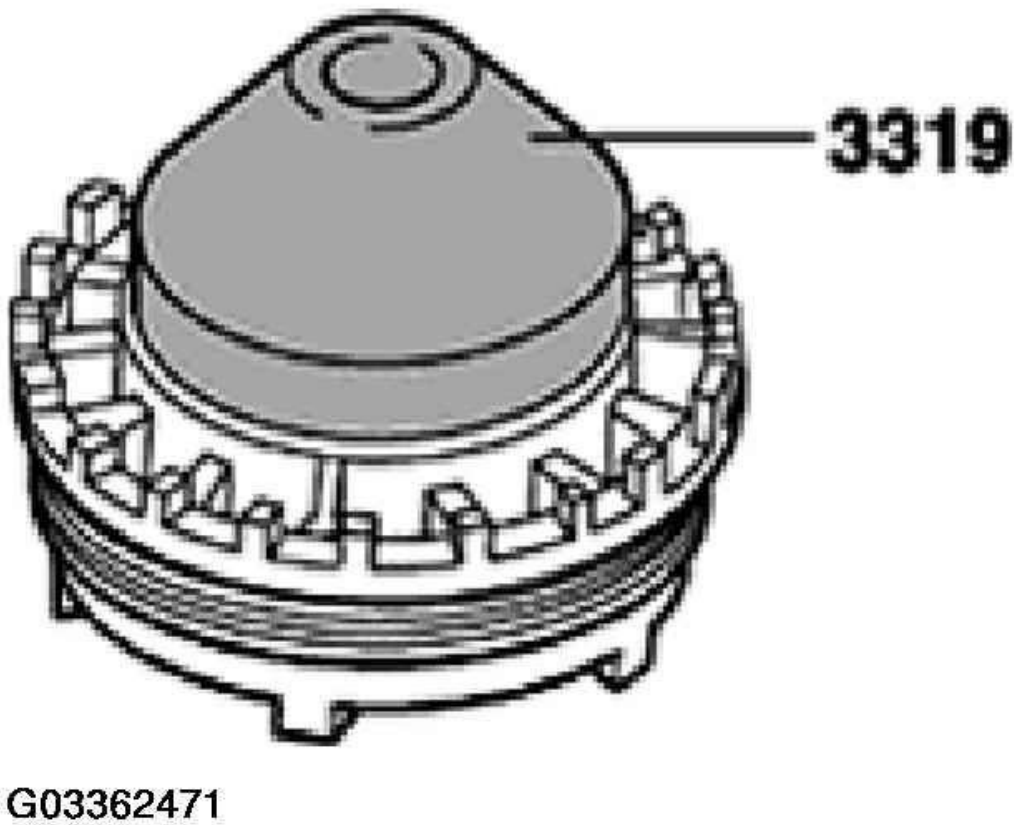
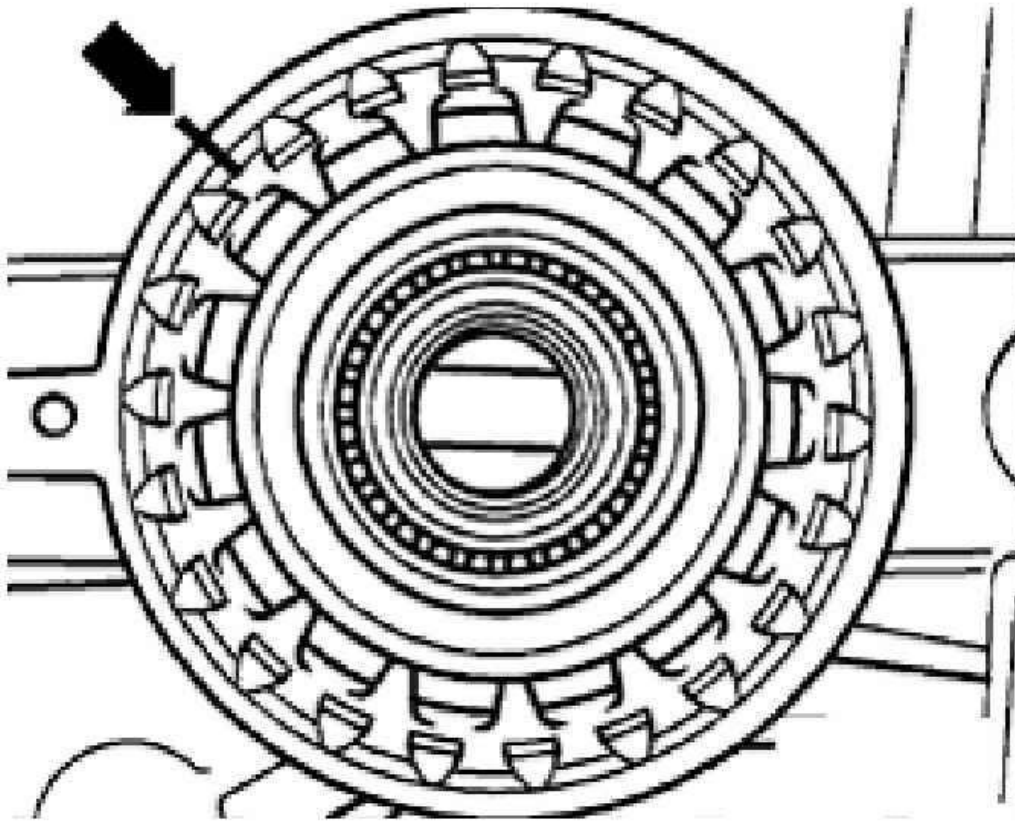


Fig. 218: Drive Flange Oil Seal, Installing (Driving In To Stop)
Courtesy of VOLKSWAGEN OF AMERICA, INC.

Adjusting ring, marking

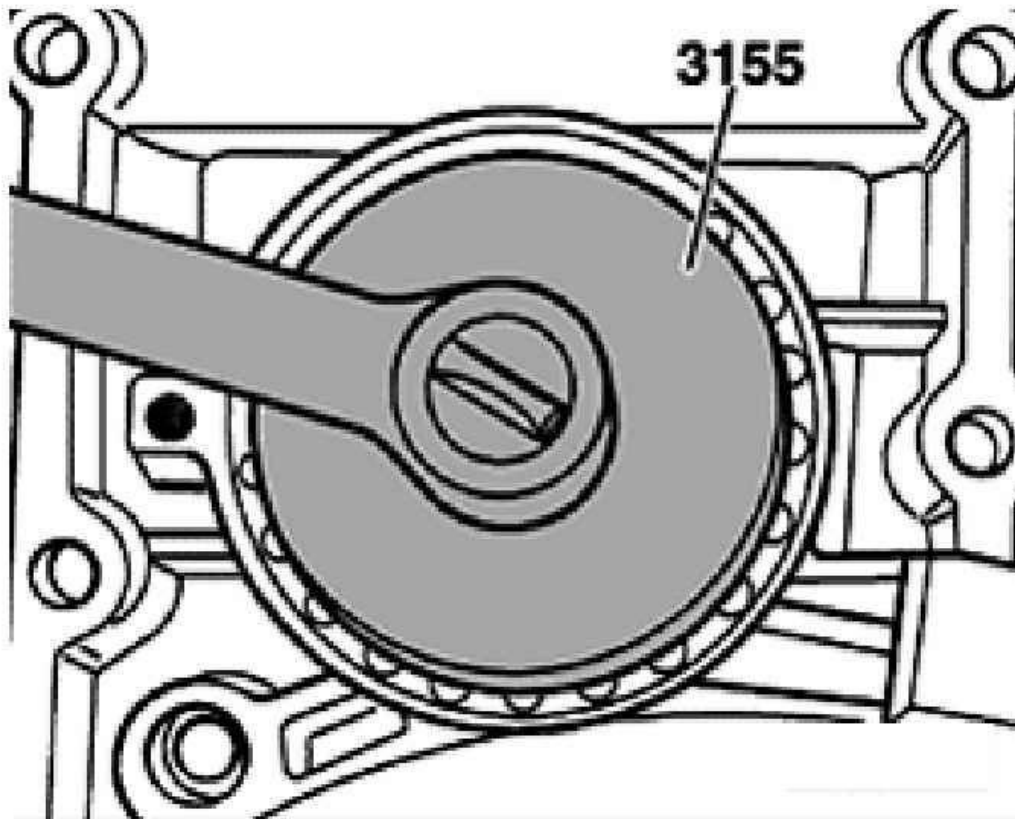
- Mark installation position -arrow- and align with marks if you plan If to reinstall bearings.



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Fig. 219: Adjusting Ring, Marking
Courtesy of VOLKSWAGEN OF AMERICA, INC.

Adjusting ring, removing

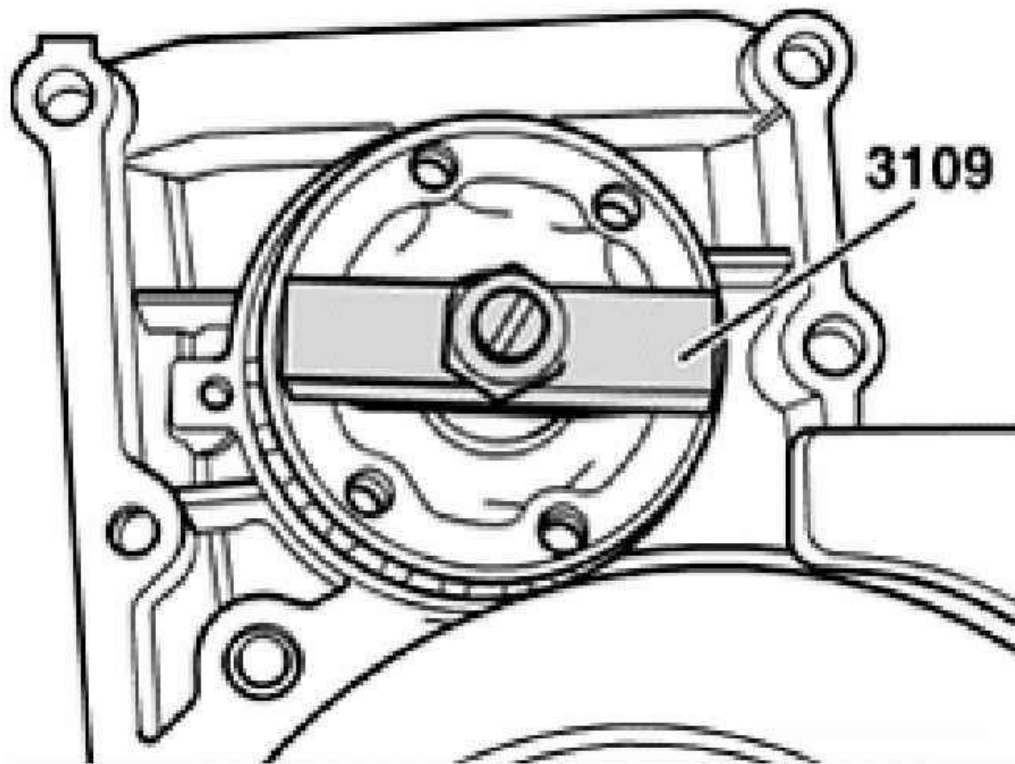


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Fig. 220: Adjusting Ring, Removing
Courtesy of VOLKSWAGEN OF AMERICA, INC.

Drive flange, removing and installing

NOTE: Drive flange can also be removed with VW 391.

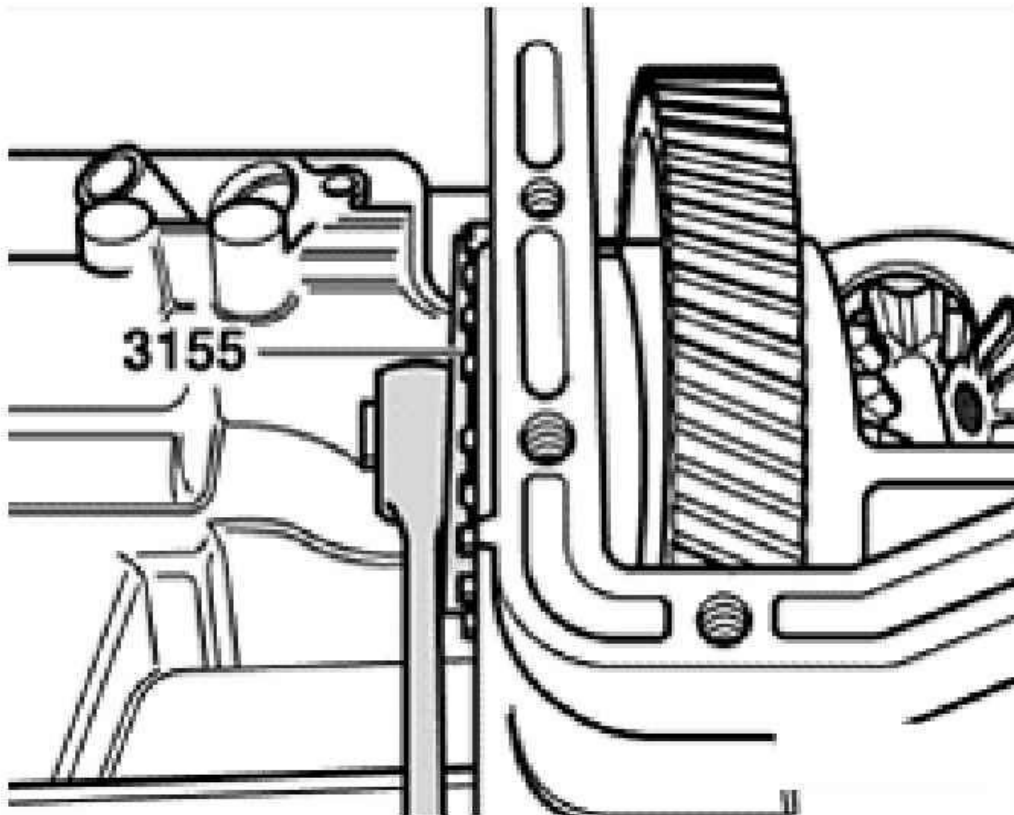


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Fig. 221: Drive Flange, Removing And Installing
Courtesy of VOLKSWAGEN OF AMERICA, INC.

Differential, installing

- Insert differential and screw in bearing body to stop and tighten to 150 N.m (111 ft lb)



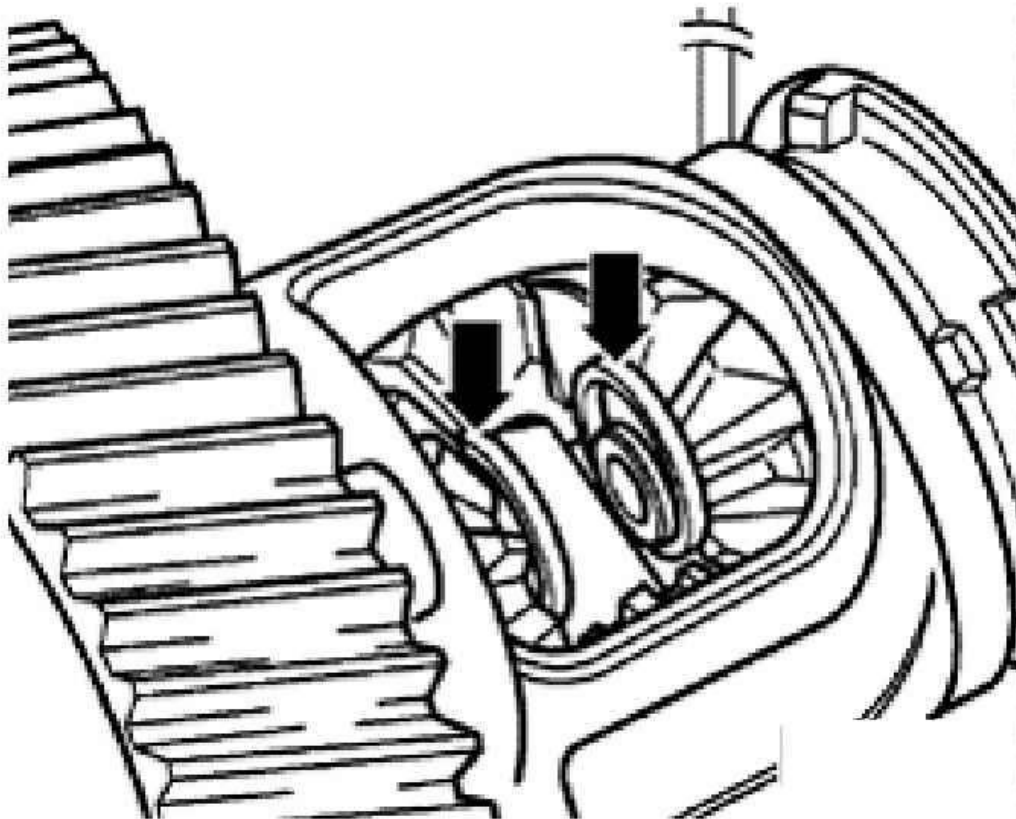
G03362475

Fig. 222: Differential, Installing

Courtesy of VOLKSWAGEN OF AMERICA, INC.

Circlip -arrows-, installing

- Remove circlip -arrows- with two screwdrivers.



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Fig. 223: Circlip -arrows-, Installing
Courtesy of VOLKSWAGEN OF AMERICA, INC.

Speedometer drive

- With transmission installed, check gear oil in final drive, see **FINAL DRIVE OIL LEVEL, CHECKING.**

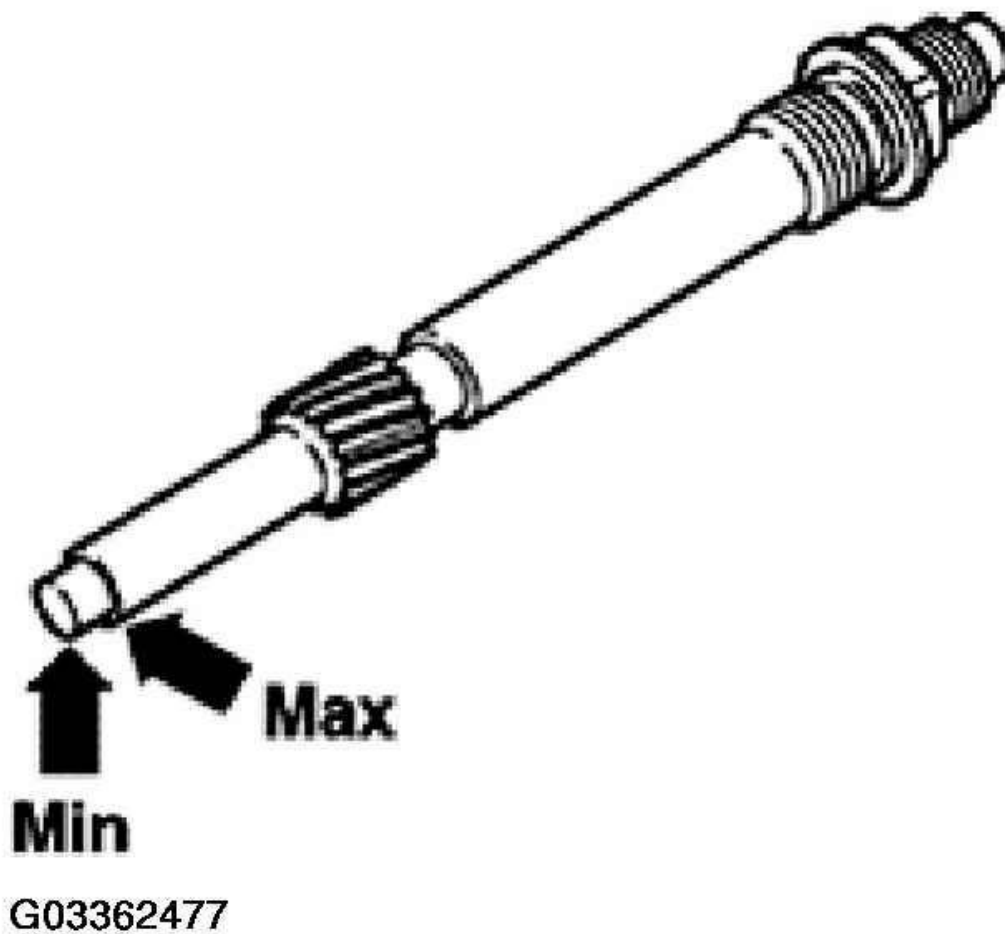


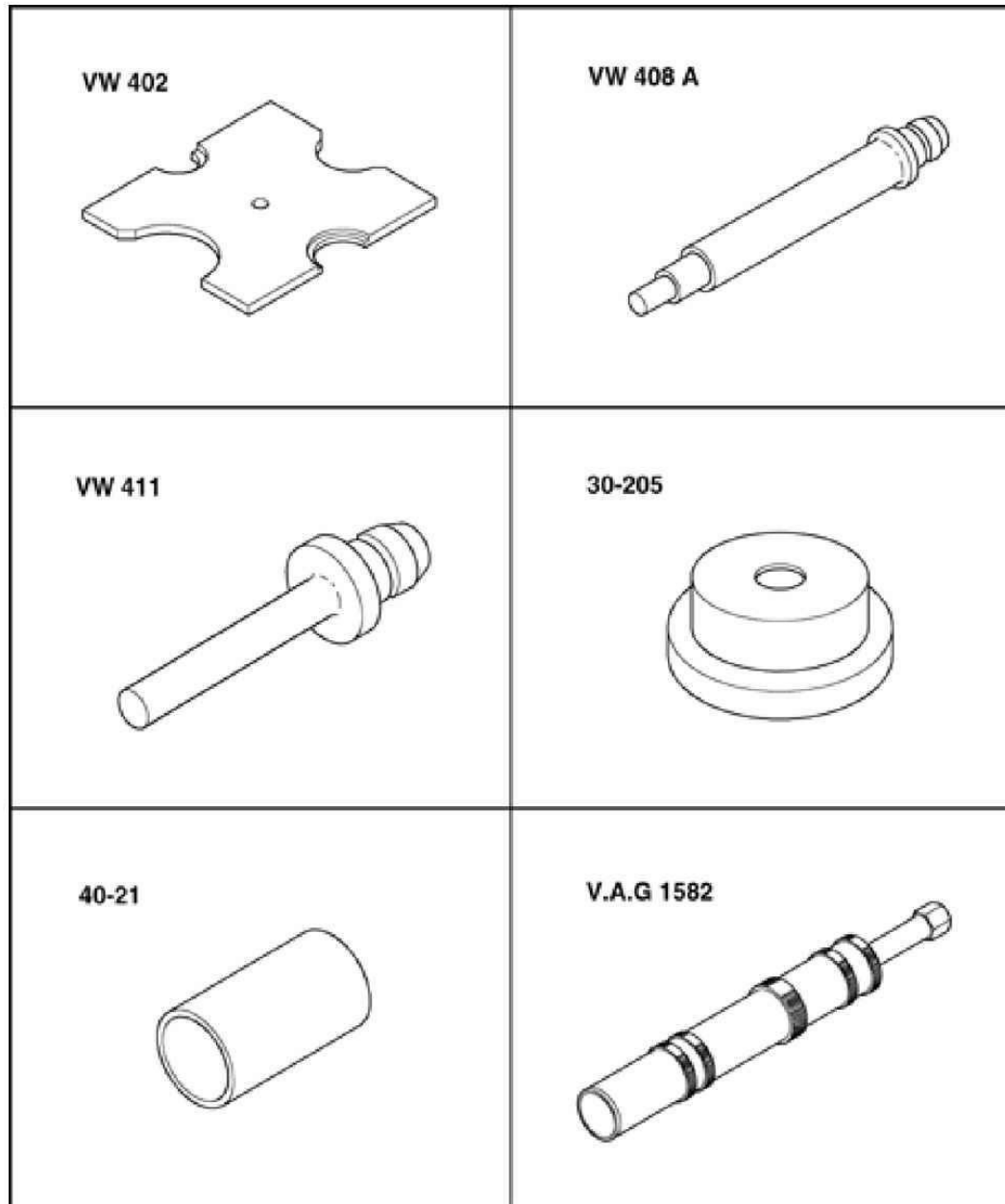
Fig. 224: Speedometer Drive

Courtesy of VOLKSWAGEN OF AMERICA, INC.

DIFFERENTIAL, DISASSEMBLING AND ASSEMBLING

Special tools and equipment

- VW 402 Press plate
- VW 408 A Press tool
- VW 411 Press tool
- 30-205 Thrust plate
- 40-21 Press tool
- VAG 1582 Tapered roller bearing puller

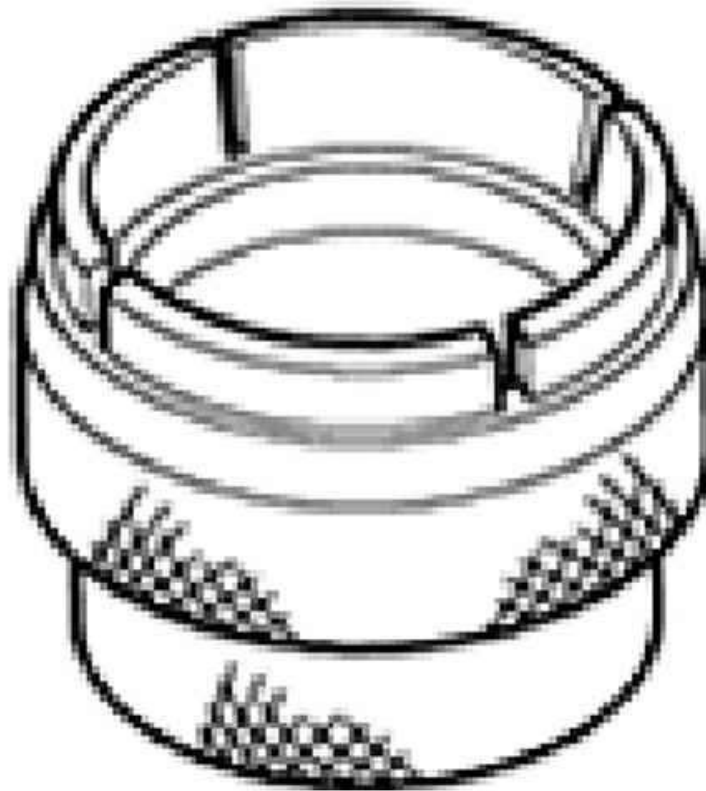


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Fig. 225: Identifying Special Tools - Differential
 Courtesy of VOLKSWAGEN OF AMERICA, INC.

- VAG 1582/3 Attachment

V.A.G 1582/3

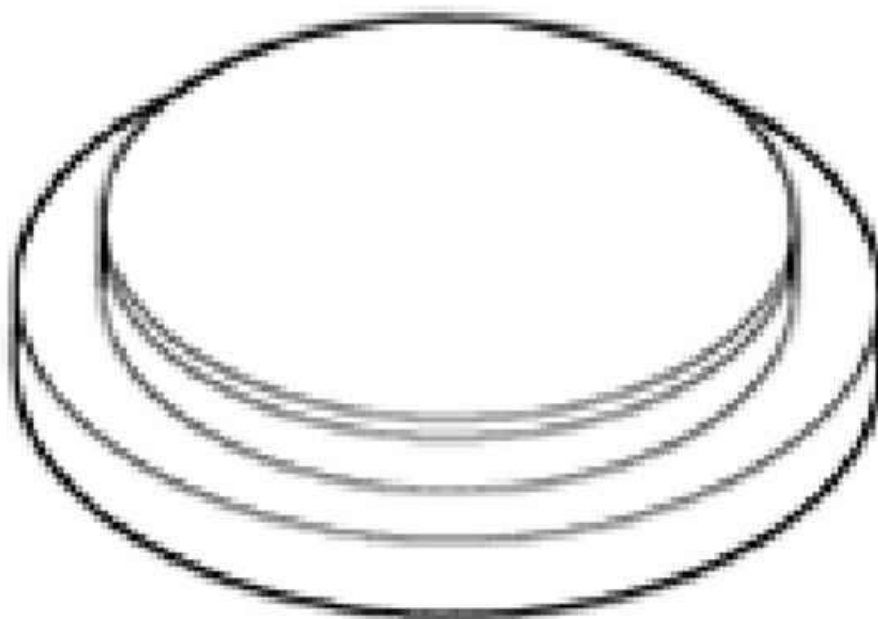


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Fig. 226: Identifying Special Tools Vag 1582/3 Attachment
Courtesy of VOLKSWAGEN OF AMERICA, INC.

- 30-555 Thrust piece

30-555



G03362480

Fig. 227: Identifying Special Tools 30-555 Thrust Piece
Courtesy of VOLKSWAGEN OF AMERICA, INC.

Differential, disassembling and assembling

NOTE:

- Heat tapered roller bearing inner race to 100°C (212°F) before pressing on.
- Heat adjusting ring for tapered roller bearing to 100°C (212°F) before pressing in tapered roller bearing outer race.

The following list pertains to **Fig. 228**.

1. Differential housing with riveted gear for final drive

- Final drive gear is riveted onto differential housing and then machined
- If differential or final drive gear is damaged, replace differential housing together with riveted final drive gear
- Number of teeth on final drive gear, see **TRANSMISSION LAYOUT**

2. **Output shaft/drive flange**
 - Removing and installing, see **DIFFERENTIAL, REMOVING AND INSTALLING**
3. **Tapered roller bearing inner race**
 - Pulling off, see **Tapered roller bearing inner race, removing (pulling off)**
 - Pressing on, see **Tapered roller bearing inner race, installing (pressing on)**
4. **Tapered roller bearing outer race**
 - Remove and install only when adjusting ring is heated
 - Drive out with drift
 - Pressing in, see **Tapered roller bearing outer race, installing (pressing in)**
5. **Bearing body for tapered roller bearing**
 - Removing and installing, see **DIFFERENTIAL, REMOVING AND INSTALLING**
6. **O-ring**
 - Always replace
7. **O-ring**
 - Always replace
8. **Adjusting ring for tapered roller bearing**
 - Removing and installing, see **DIFFERENTIAL, REMOVING AND INSTALLING**
9. **Output shaft/drive flange**
 - Removing and installing, see **DIFFERENTIAL, REMOVING AND INSTALLING**
10. **Tapered roller bearing outer race**
 - Remove and install only when adjusting ring is heated
 - Drive out with drift
 - Pressing in, see **Tapered roller bearing outer race, installing (pressing in)**
11. **Tapered roller bearing inner race**
 - Pulling off, see **Tapered roller bearing inner race, removing (pulling off)**
 - Pressing on, see **Tapered roller bearing inner race, installing (pressing on)**
 - Installing, see **Differential bevel gears, installing**
12. **Driver bushing**
 - Drive off together with speedometer drive gear -13-
 - Drive out with drift
13. **Speedometer drive gear**
 - Drive out with drift
 - Install together with driver bushing -12-
14. **One-piece thrust washer**
 - Place into differential housing before installing bevel gears
15. **Small bevel gears**
 - Installing, see **Differential bevel gears, installing**
16. **Large bevel gears**

- Installing, see **Differential bevel gears, installing**

17. Circlip

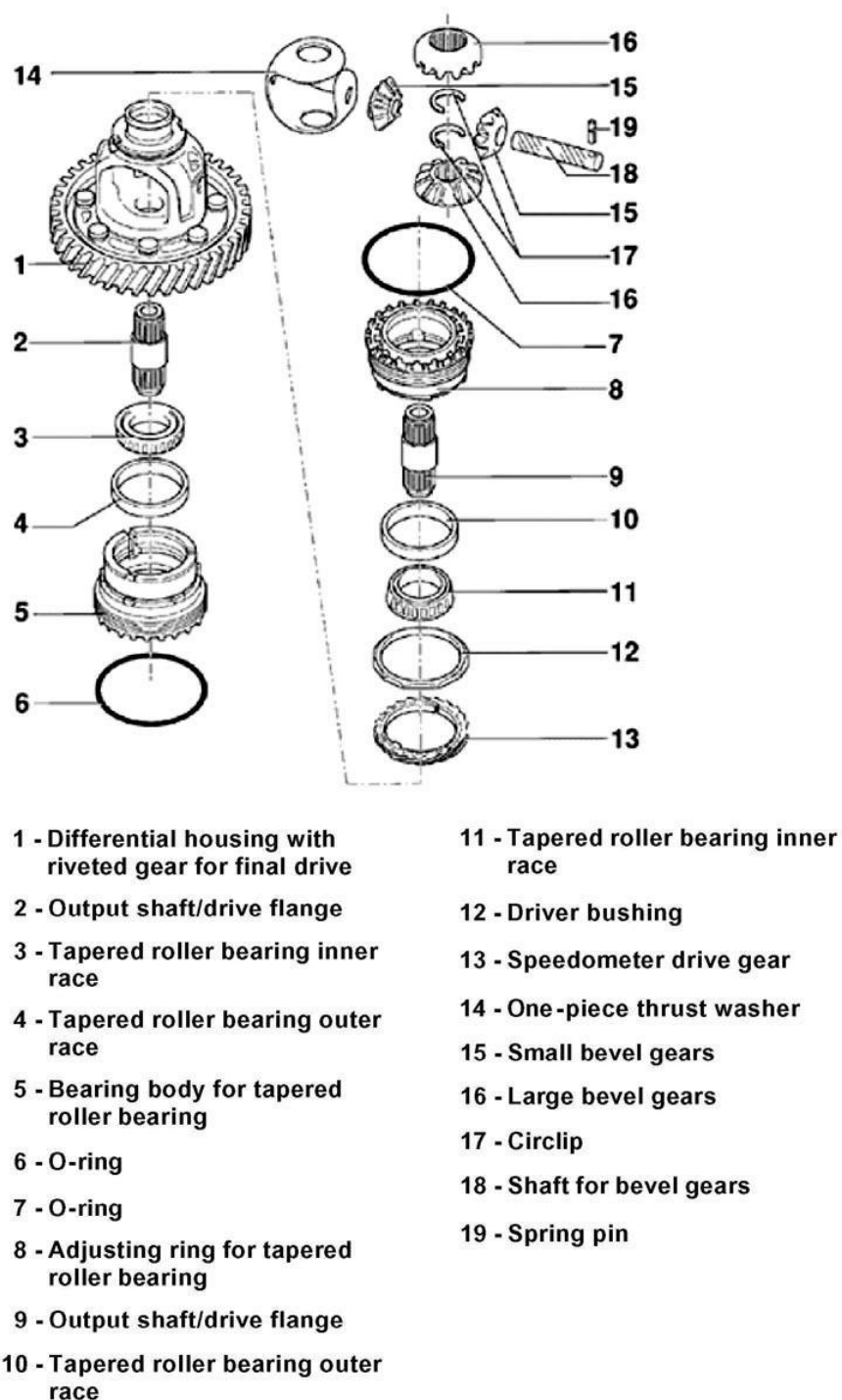
CAUTION: Do not remove circlip before pulling off drive flange, as compression spring is pre-loaded.

18. Shaft for bevel gears

- Drive out with drift
- When driving in, take care not to damage one-piece thrust washer

19. Spring pin

- For securing bevel gear shaft
- Removing and installing, see **Planet wheel axis shaft spring pin, removing and installing**



G03362481

Fig. 228: Exploded View Of Differential Components
 Courtesy of VOLKSWAGEN OF AMERICA, INC.

Tapered roller bearing inner race, removing (pulling off)

- Place press piece 30-555 on differential housing.

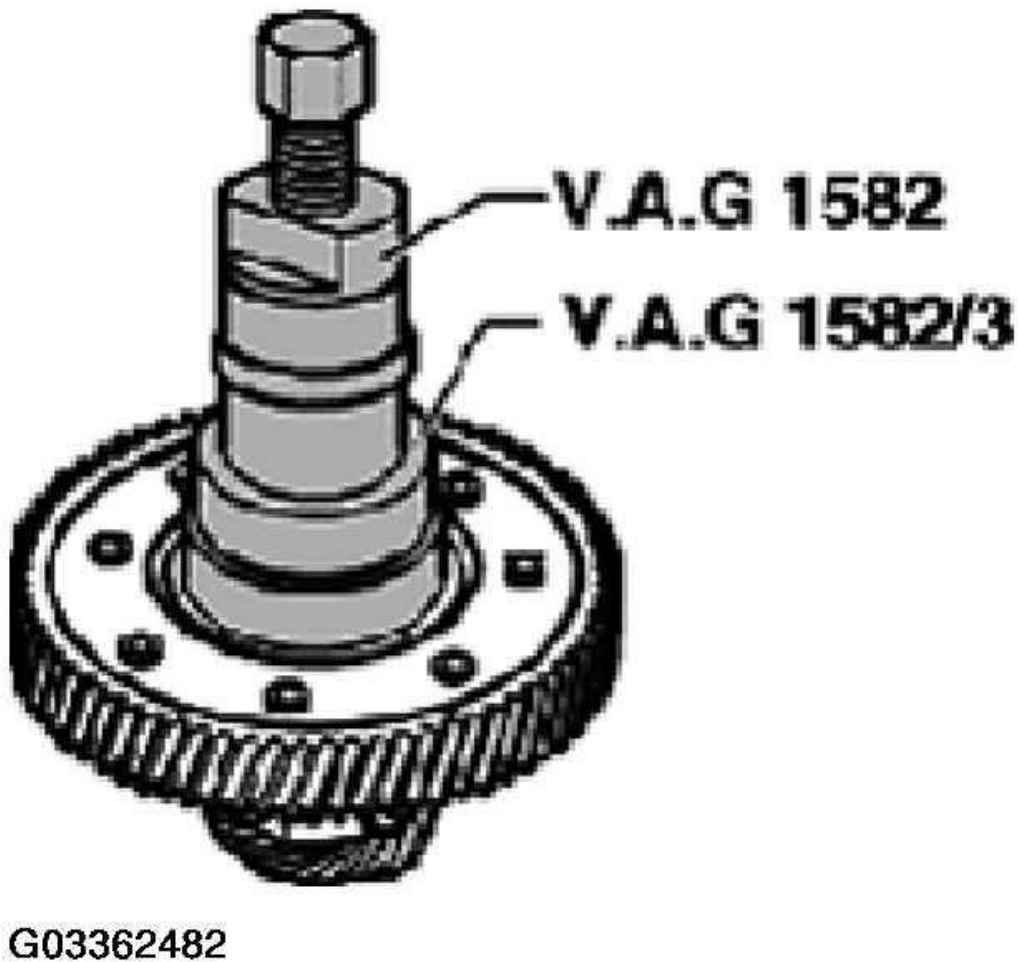
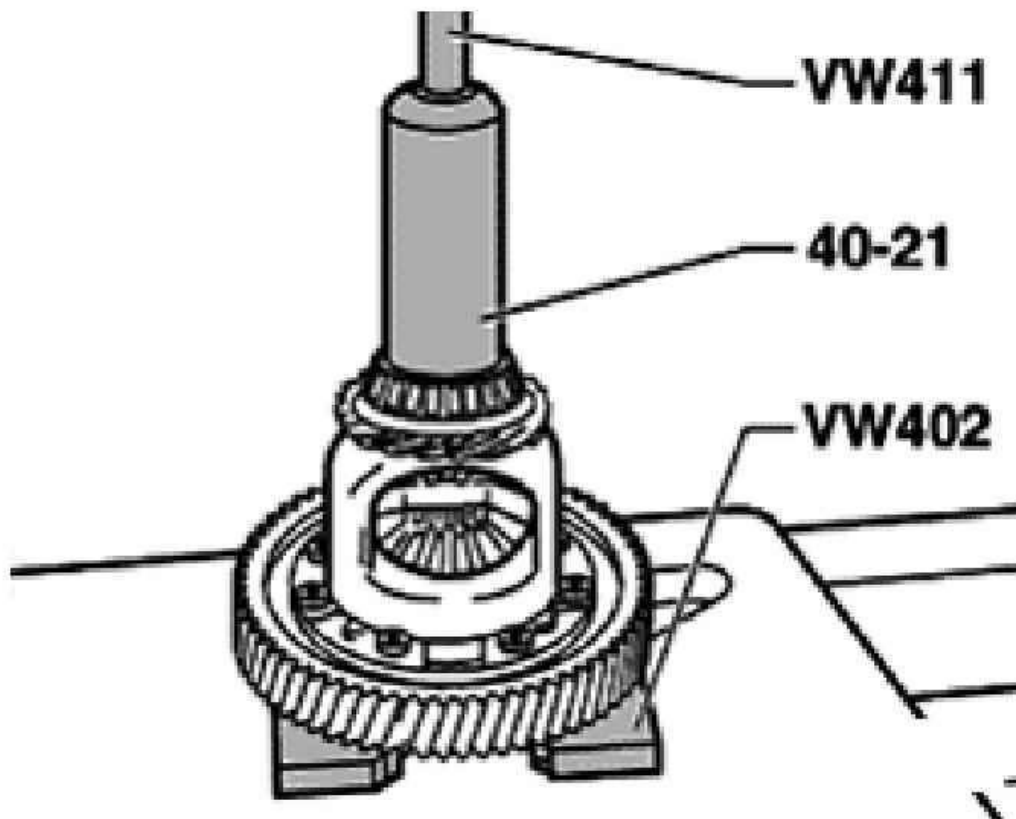


Fig. 229: Removing Tapered Roller Bearing Inner Race
Courtesy of VOLKSWAGEN OF AMERICA, INC.

Tapered roller bearing inner race, installing (pressing on)

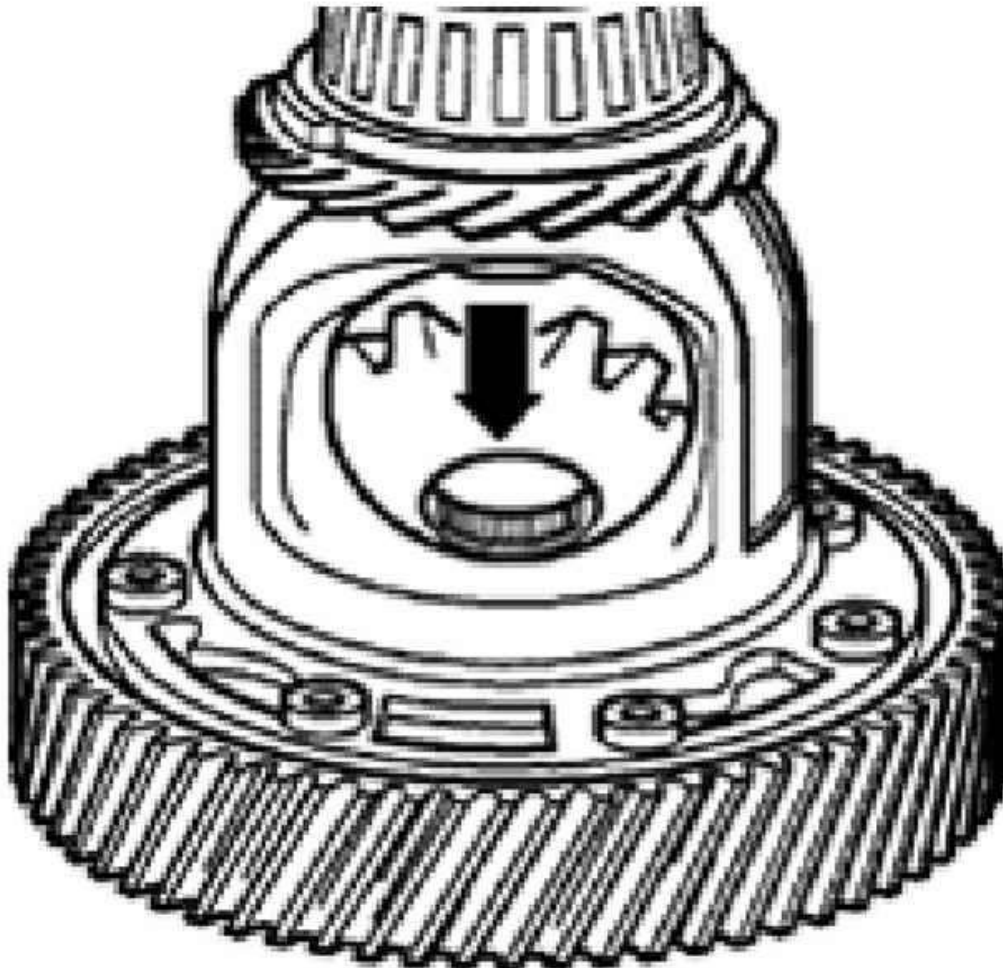


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Fig. 230: Installing Tapered Roller Bearing Inner Race
Courtesy of VOLKSWAGEN OF AMERICA, INC.

Differential bevel gears, installing

- Install one -piece thrust washer with gear oil.
- Install small bevel gears, drive in shaft and secure with spring pin.
- Install large bevel gears offset 180 and swivel in direction of arrow.

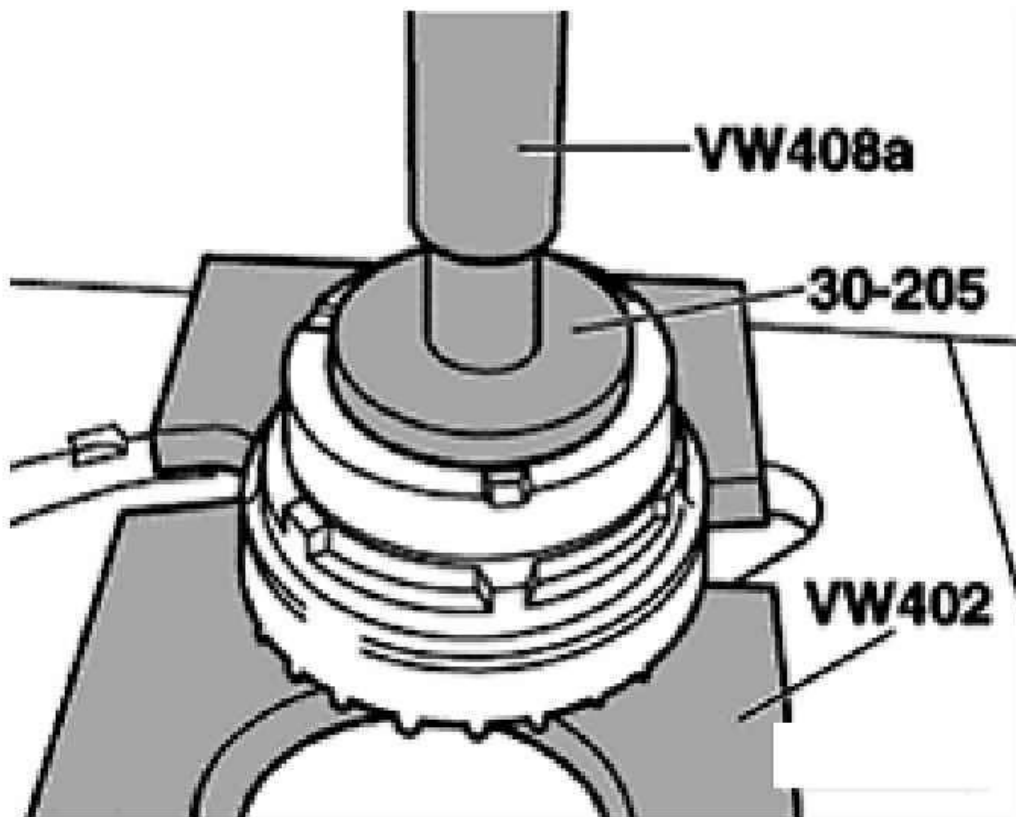


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Fig. 231: Differential Bevel Gears, Installing
Courtesy of VOLKSWAGEN OF AMERICA, INC.

Tapered roller bearing outer race, installing (pressing in)

- With adjusting ring or bearing body heated, install outer race and press home to stop.



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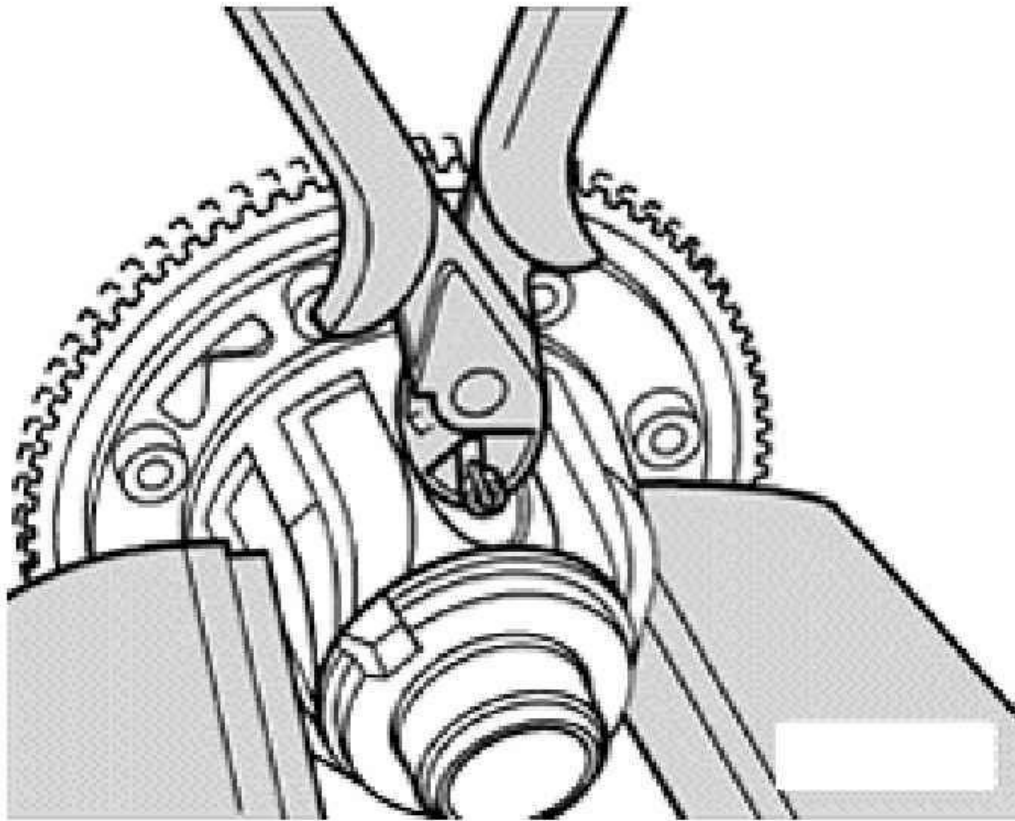
Fig. 232: Tapered Roller Bearing Outer Race, Installing (Pressing In)
Courtesy of VOLKSWAGEN OF AMERICA, INC.

Planet wheel axis shaft spring pin, removing and installing

- Length of spring pin 28.5 mm (1.122 in.)

Removing

- Remove spring pin with side cutters.



G03362486

Fig. 233: Removing Spring Pin

Courtesy of VOLKSWAGEN OF AMERICA, INC.

Installing

- Drive in spring pin to stop.

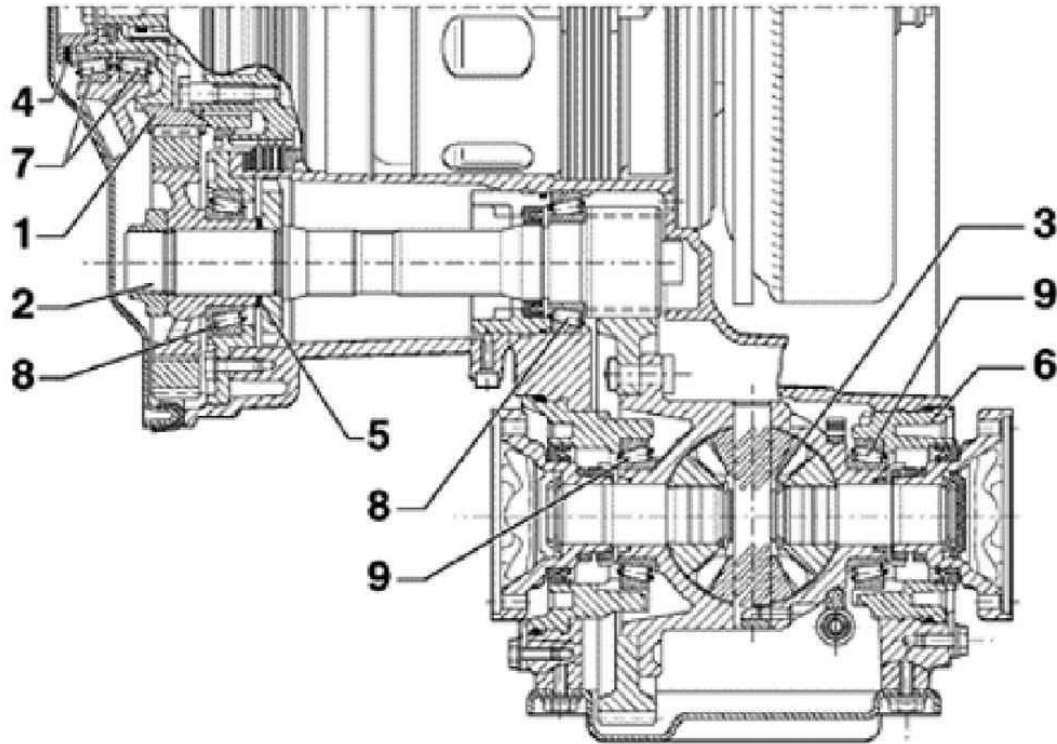
FINAL DRIVE, ADJUSTING

Adjustments, overview

The following list pertains to **Fig. 234**.

1. **Input gear**
 - Adjusting, see **INPUT GEAR, ADJUSTING**
2. **Drive pinion**

- Adjusting, see **DRIVE PINION, ADJUSTING**
- 3. **Differential**
 - Adjusting, see **DRIVE PINION, ADJUSTING**
- 4. **Shim for input gear**
 - Determine thickness from table, see **ADJUSTMENTS, AFTER COMPONENT REPLACEMENT**
 - Determine part number from parts catalog
- 5. **Shim for drive pinion**
 - Determine thickness from table, see **ADJUSTMENTS, AFTER COMPONENT REPLACEMENT**
 - Determine part number from parts catalog
- 6. **Shim for differential**
- 7. **Tapered roller bearings for input gear**
 - Always replace together
 - Measure friction torque via pinion shaft. Friction torque of new tapered roller bearings must be 180 - 220 Ncm (16 - 20 in. lb) greater than friction torque of pinion shaft
- 8. **Tapered roller bearings for drive pinion**
 - Always replace together
 - Determine shim thickness when replacing tapered roller bearings
- 9. **Tapered roller bearings for differential**
 - Always replace together
 - Measure friction torque via drive pinion. Friction torque of new tapered roller bearings must be 60 - 80 Ncm (5 - 7 in. lb) greater than friction torque of drive pinion



- 1 - Input gear**
- 2 - Drive pinion**
- 3 - Differential**
- 4 - Shim for input gear**
- 5 - Shim for drive pinion**
- 6 - Shim for differential**
- 7 - Tapered roller bearings for input gear**
- 8 - Tapered roller bearings for drive pinion**
- 9 - Tapered roller bearings for differential**

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Fig. 234: Adjusting Overview Of Final Drive
 Courtesy of VOLKSWAGEN OF AMERICA, INC.

Adjustments, after component replacement

When working on the transmission the following components only require adjustment if individual components have been replaced that directly affect the final drive adjustment. To eliminate unnecessary adjustments observe the COMPONENTS ADJUSTMENTS OVERVIEW table:

COMPONENTS ADJUSTMENTS OVERVIEW

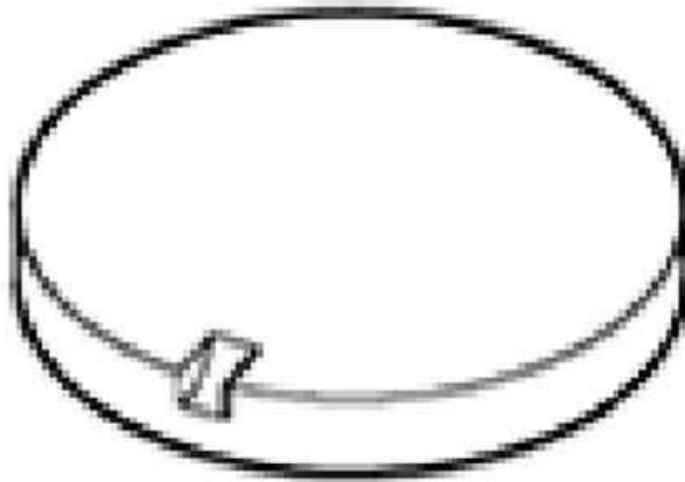
Components being replaced:	To adjust:		
	Differential housing with riveted gear wheel. See <u>DIFFERENTIAL, ADJUSTING</u>	Adjusting input gear ⁽¹⁾ See <u>INPUT GEAR, ADJUSTING</u>	Adjusting drive pinion with output gear ⁽¹⁾ See <u>DRIVE PINION, ADJUSTING</u>
Transmission housing	X	X	X
Input gear ⁽¹⁾		X	X
Input gear tapered roller bearing		X	
Output gear ⁽¹⁾		X	X
Drive pinion			X
Drive pinion tapered roller bearing			X
Differential housing with gear wheel	X		
Tapered roller bearing for differential, bearing body or shim	X		
Support ring, park lock gear or bearing cover			X
(1) Always replace input gear and output gear together.			

Drive pinion, adjusting

Special tools and equipment

- VW 385/17 End dimension plate

VW 385/17

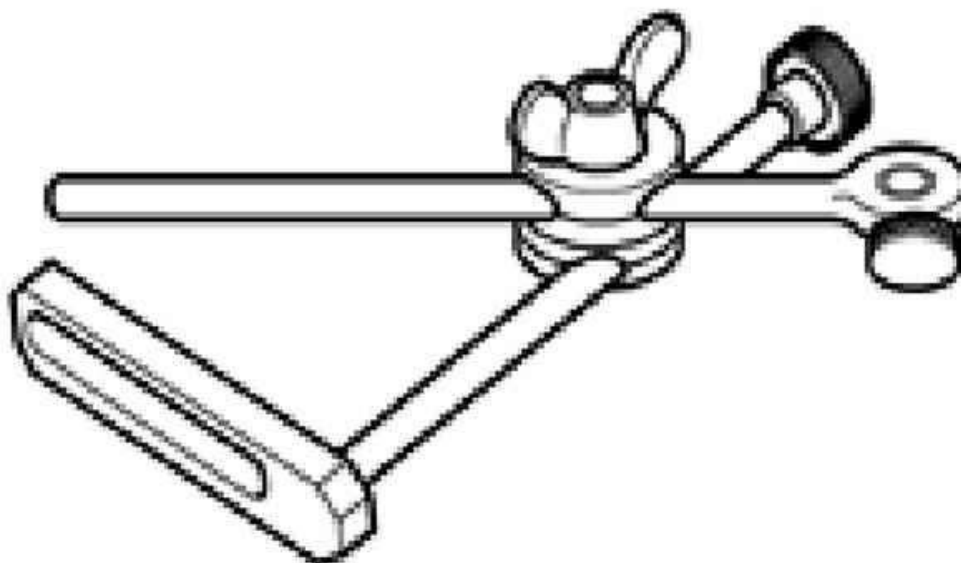


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Fig. 235: Identifying Special Tool VW 385/17 End Dimension Plate
Courtesy of VOLKSWAGEN OF AMERICA, INC.

- VW 387 Universal dial gauge bracket
- Dial gauge
- Torque gauge (commercially available) 0 ... 600 Ncm (0-53 in. lb)

VW 387



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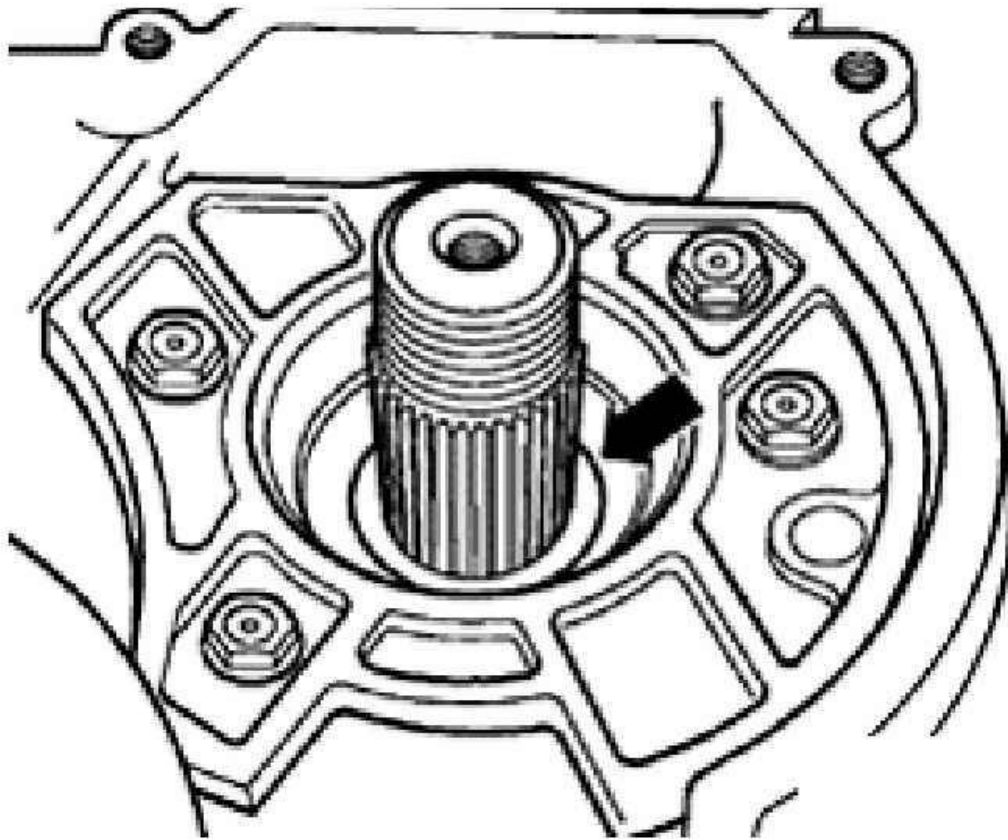
Fig. 236: Identifying Special Tool VW 387 Universal Dial Gauge Bracket
Courtesy of VOLKSWAGEN OF AMERICA, INC.

Conditions:

- Support ring for drive pinion bearing is installed and secured.
- Parking lock mechanism and parking lock gear are installed.

Adjusting:

- Place two shims (each 1.5 mm thick) -arrow- on drive pinion.
- - Place output gear with tapered roller bearing on drive pinion and tighten nut (41 mm) to 250 N.m (184 ft lb); engage parking lock when performing this step.

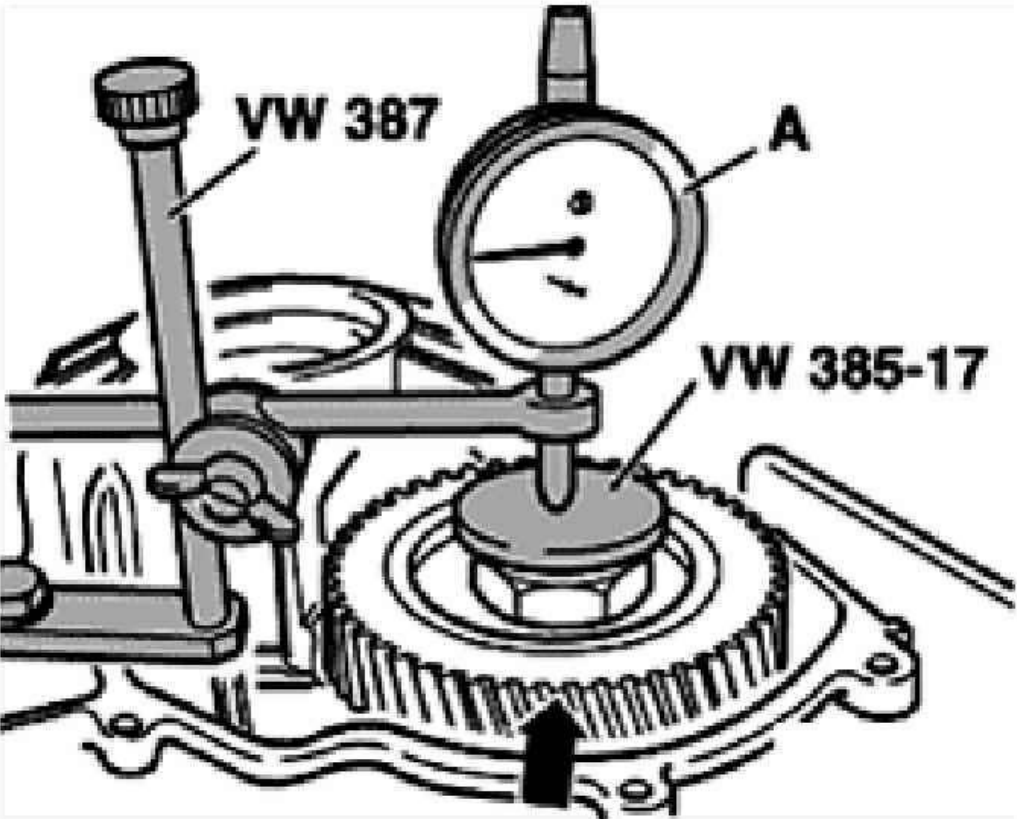


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Fig. 237: Placing Two Shims On Drive Pinion
Courtesy of VOLKSWAGEN OF AMERICA, INC.

- Insert dial gauge -A- and zero with a preload of 1 mm. Move drive pinion up and down. Read play at gauge and note (example 0.93 mm).

NOTE: When measuring, do not turn drive pinion as bearings will otherwise settle and falsify measurement result.



G03362491

Fig. 238: Inserting Dial Gauge -A- And Zero With A Preload Of 1 MM
Courtesy of VOLKSWAGEN OF AMERICA, INC.

Shims, determining

Specified bearing preload is achieved if reading (0.93 mm), bearing preload (0.12 mm) and compression amount (0.10mm) are deducted from (2 x 1.5 mm thick) shims.

Example:

SHIM THICKNESS EXAMPLE (DRIVE PINION)

Shims installed	3.00 mm (0.12 in.)
- Reading	0.93 mm (0.04 in.)
-Preload -	0.12 mm (0.004 in.)
Amount for compression	0.10 mm (0.0039 in.)
= Thickness of shim	1.85 mm (0.07 in.)

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- Remove output gear. Determine size of shim on basis of table and place on drive pinion: see **ADJUSTMENTS, AFTER COMPONENT REPLACEMENT.**
- Re-install output gear and tighten nut to 250 N.m (184 ft lb). Secure with drift.

Table of shims for drive pinion and input gear**SHIM THICKNESS (DRIVE PINION AND INPUT)**

Gauged thickness (mm)	Shim to be fitted (mm)
0.975 ... 0.999	1.000
1.000 ... 1.024	1.025
1.025 ... 1.049	1.050
1.050 ... 1.074	1.075
1.075 ... 1.099	1.100
1.100 ... 1.124	1.125
1.125 ... 1.149	1.150
1.150 ... 1.174	1.175
1.175 ... 1.199	1.200
1.200 ... 1.224	1.225
1.225 ... 1.249	1.250
1.250 ... 1.274	1.275
1.275 ... 1.299	1.300
1.300 ... 1.324	1.325
1.325 ... 1.349	1.350
1.350 ... 1.374	1.375
1.375 ... 1.399	1.400
1.400 ... 1.424	1.425
1.425 ... 1.449	1.450
1.450 ... 1.474	1.475
1.475 ... 1.499	1.500
1.500 ... 1.524	1.525
1.525 ... 1.549	1.550
1.550 ... 1.574	1.575
1.575 ... 1.599	1.600
1.600 ... 1.624	1.625
1.625 ... 1.649	1.650
1.650 ... 1.674	1.675
1.675 ... 1.699	1.700
1.700 ... 1.724	1.725
1.725 ... 1.749	1.750
1.750 ... 1.774	1.775
1.775 ... 1.799	1.800
1.800 ... 1.824	1.825

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1.825 ... 1.849	1.850
1.850 ... 1.874	1.875
1.875 ... 1.899	1.900
1.900 ... 1.924	1.925
1.925 ... 1.949	1.950
1.950 ... 1.974	1.975
1.975 ... 1.999	2.000
2.000 ... 2.024	2.025
2.025 ... 2.049	2.050
2.050 ... 2.074	2.075
2.075 ... 2.099	2.100
2.100 ... 2.124	2.125
2.125 ... 2.149	2.150
2.150 ... 1.274	2.175
2.175 ... 2.199	2.200
2.200 ... 2.224	2.225
2.225 ... 2.249	2.250
2.250 ... 2.274	2.275
2.275 ... 2.299	2.300
2.230 ... 2.324	2.325
2.325 ... 2.349	2.350
2.350 ... 2.374	2.375
2.375 ... 2.399	2.400
2.400 ... 2.424	2.425
2.425 ... 2.449	2.450
2.450 ... 2.474	2.475
2.475 ... 2.499	2.500
2.500 ... 2.524	2.525
2.525 ... 2.549	2.550
2.550 ... 2.574	2.575
2.575 ... 2.599	2.600
2.600 ... 2.624	2.625
2.625 ... 2.649	2.650
2.650 ... 2.674	2.675
2.675 ... 2.700	2.700

Because of close tolerances it is necessary to measure shim thickness precisely.

Part number: see parts catalog.

Friction torque, checking

Friction torque can only be checked if tapered roller bearings have been replaced.

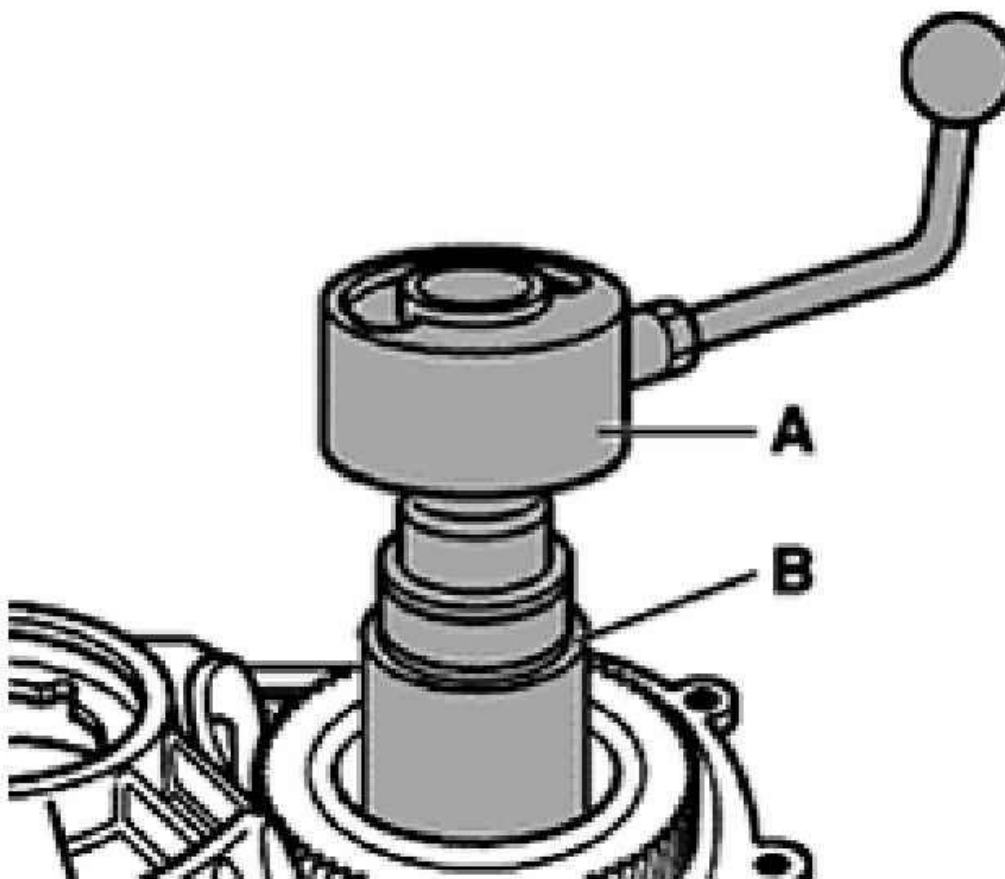
If tapered roller bearings have not been replaced, friction torque must not be checked. Then, adjust drive pinion as described from, see **DRIVE PINION, ADJUSTING**.

- Lubricate bearing beforehand with gear oil.

A - Torque gauge, commercially available, 0 - 600 Ncm (0 - 50 in. lb)

B - Wrench socket (41 mm)

- Friction torque of new tapered roller bearings must be 80-120 Ncm (7 - 11 in lb).



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Fig. 239: Checking Drive Pinion Friction Torque

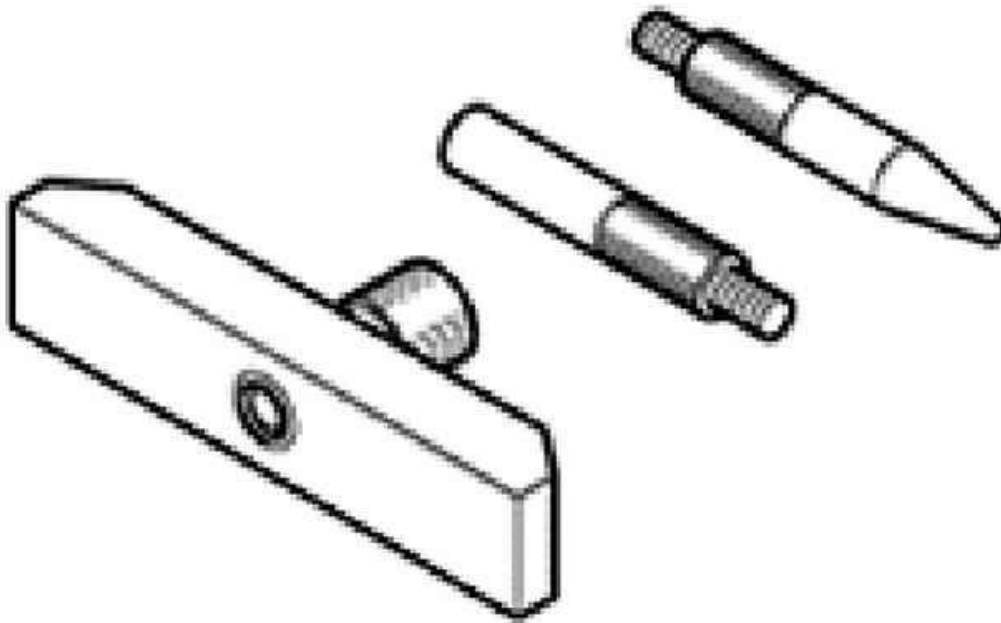
Courtesy of VOLKSWAGEN OF AMERICA, INC.

Input gear, adjusting

Special tools and equipment

- VW 382 Measuring appliance

VW 382

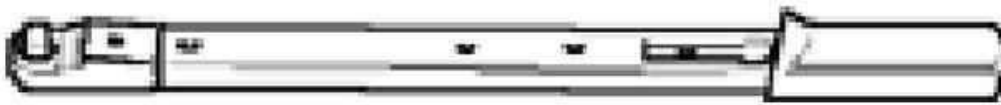


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Fig. 240: Identifying Special Tools VW 382 Measuring Appliance
Courtesy of VOLKSWAGEN OF AMERICA, INC.

- VAG 1332 Torque wrench
- Dial gauge
- Torque wrench (commercially available) 0 ... 600 Ncm (0-53 in. lb)

V.A.G 1332



G03362494

Fig. 241: Identifying Special Tools VAG 1332 Torque Wrench
Courtesy of VOLKSWAGEN OF AMERICA, INC.

Requirements:

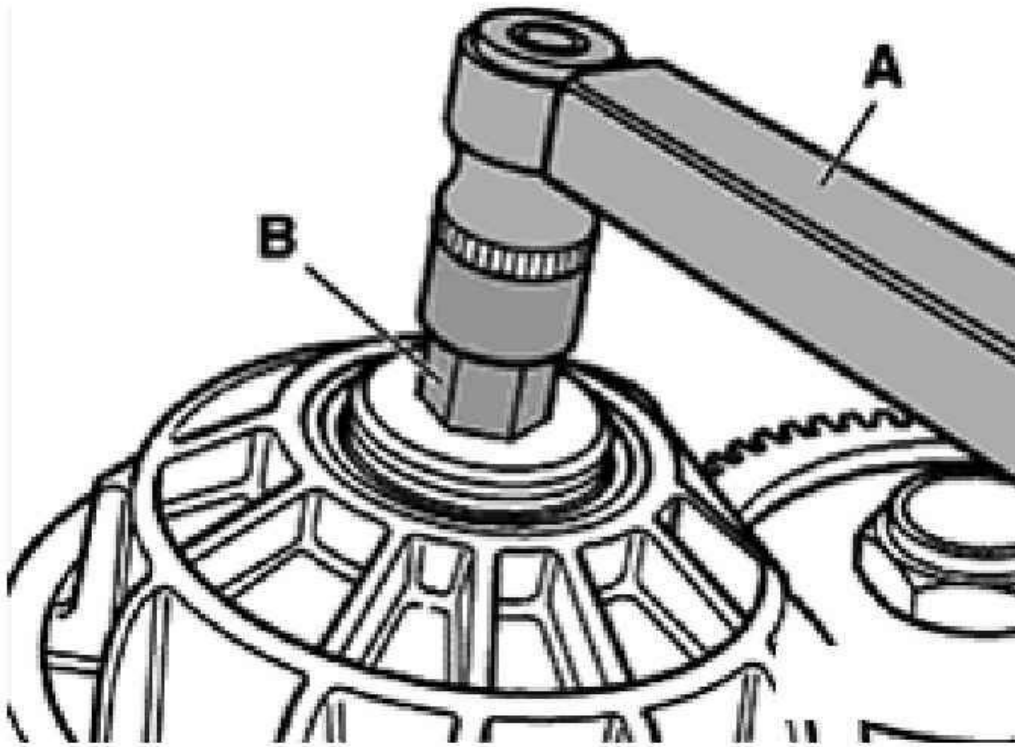
- Tighten socket-head fastener to 100 N.m (74 ft lb) without dished washer and without shim.

A - Torque wrench

B - 22 mm socket

The parking lock must be engaged.

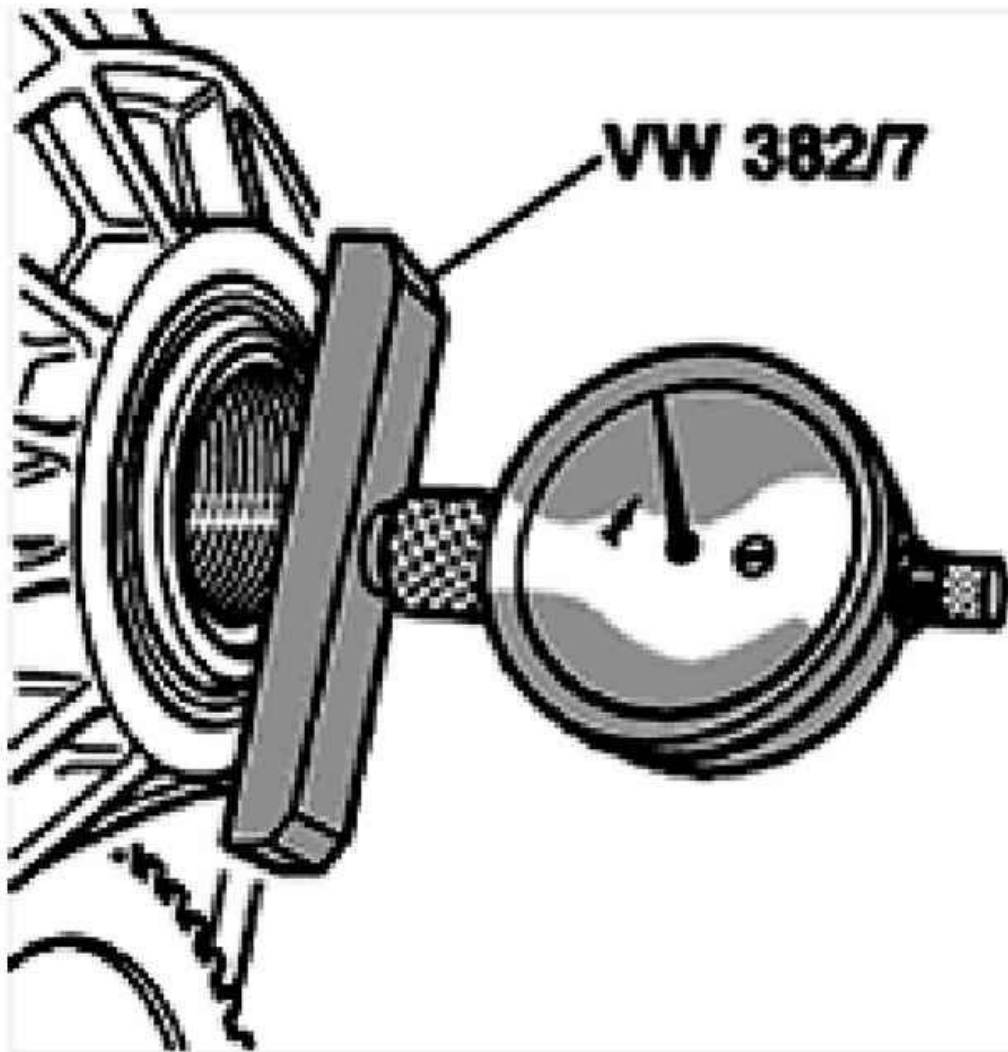
- Remove socket-head fastener.



G03362495

Fig. 242: Tightening Socket-Head Fastener
Courtesy of VOLKSWAGEN OF AMERICA, INC.

- Measure distance between input gear and tapered roller bearing inner race.



G03362496

Fig. 243: Measuring Distance Between Input Gear And Tapered Roller Bearing Inner Race
Courtesy of VOLKSWAGEN OF AMERICA, INC.

- Insert dial gauge and zero with a preload of 3 mm. Note reading (example 1.00 mm).

Thickness of dished washer (1.50 mm) must be added to the reading of = 2.50 mm.

Shim, determining

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Specified bearing preload is achieved if bearing preload of 0.18 mm is deducted from figure obtained from the measurement (dished washer + reading) of 2.50 mm.

Example:

SHIM THICKNESS (DRIVE PINION PRELOAD)

Dished washer + reading	2.50 mm (0.098 in.)
- Bearing preload	0.18 mm (0.0007 in.)
= Thickness of shim	2.32 mm (0.091 in.)

- Determine shim from table and install on drive shaft. Table of shims, see **ADJUSTMENTS, AFTER COMPONENT REPLACEMENT**.
- Insert axial needle bearing and tighten fastener including dished washer to 250 N.m (184 ft lb).

NOTE: Insert axial needle bearing for input shaft before tightening fastener. Installation position, see **INPUT GEAR, REMOVING AND INSTALLING**.

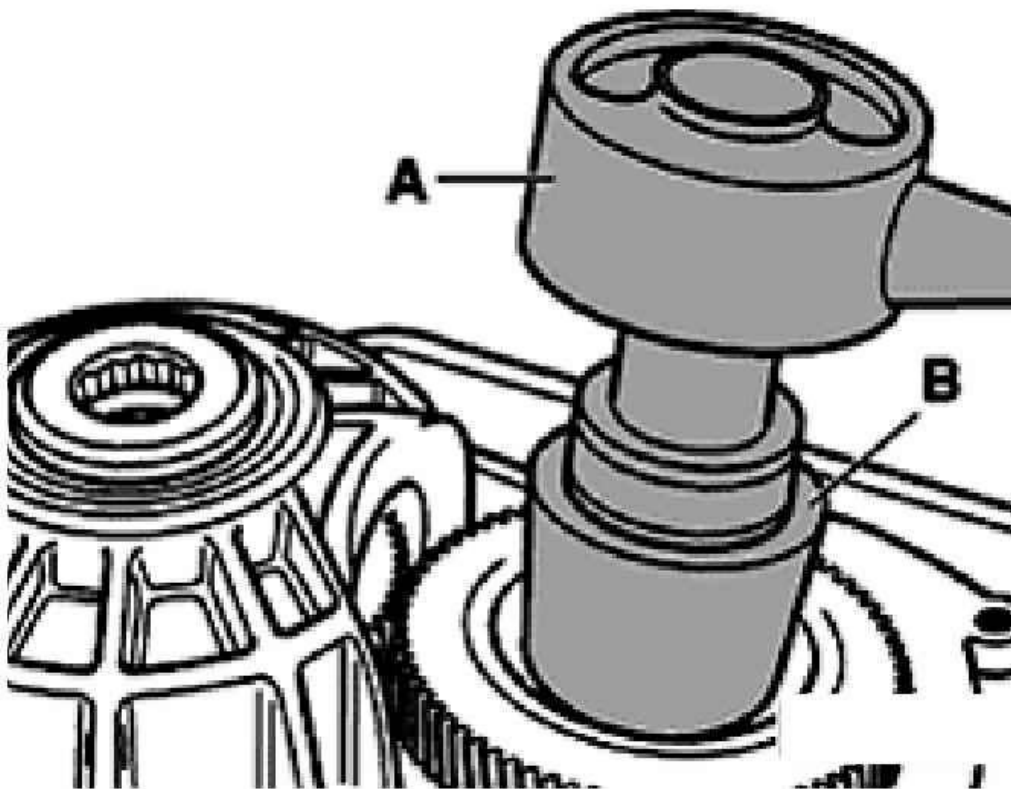
Friction torque, checking

A - Torque gauge, commercially available 0 - 600 Ncm (0 - 53 in. lb)

B - Socket (41 mm)

- Coat bearings beforehand with AT before installation.

Friction torque for these bearings must be 180 - 220 Ncm (16 - 20 in lb) greater than friction torque at drive pinion.



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Fig. 244: Checking Drive Pinion Friction Torque
 Courtesy of VOLKSWAGEN OF AMERICA, INC.

Example:

DRIVE PINION FRICTION TORQUE SPECIFICATION

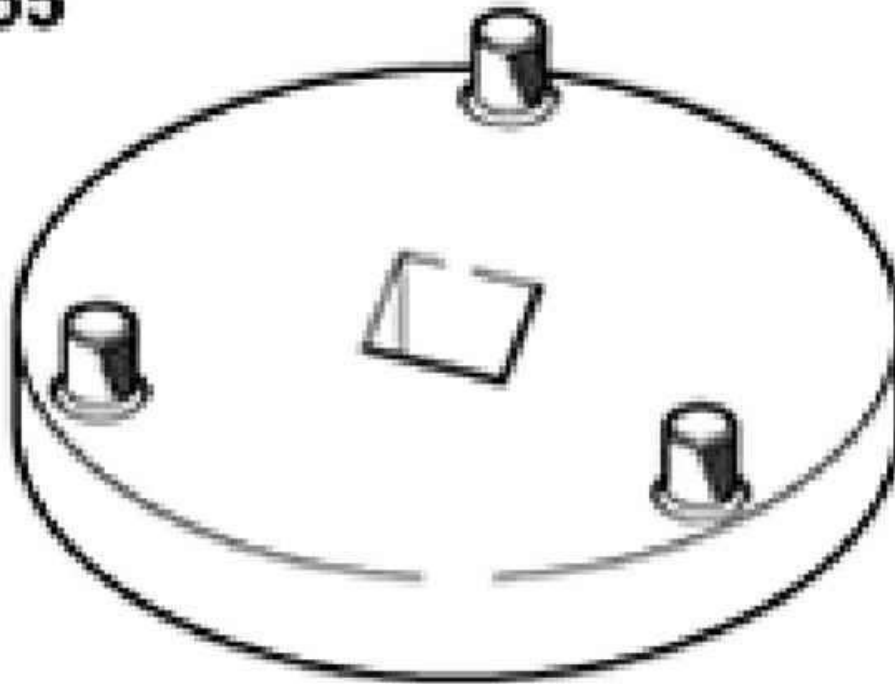
	Friction torque
Drive pinion (from measurement)	= 100 Ncm (9 in lb) ⁽¹⁾
Input gear (average)	= 200 Ncm (18 in lb)
Friction torque of input gear + drive pinion	= 300 Ncm (27 in lb)
(1) In the case of used bearings, substitute friction measured for the drive pinion.	

Differential, adjusting

Special tools and equipment

- 3155 Ring nut wrench

3155

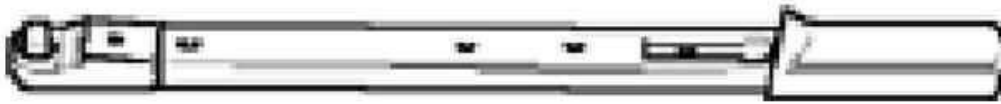


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Fig. 245: Identifying Special Tools 3155 Ring Nut Wrench
Courtesy of VOLKSWAGEN OF AMERICA, INC.

- VAG 1332 Torque wrench
- Torque gauge (commercially available) 0 ... 600 Ncm (0-53 in. lb)

V.A.G 1332



G03362499

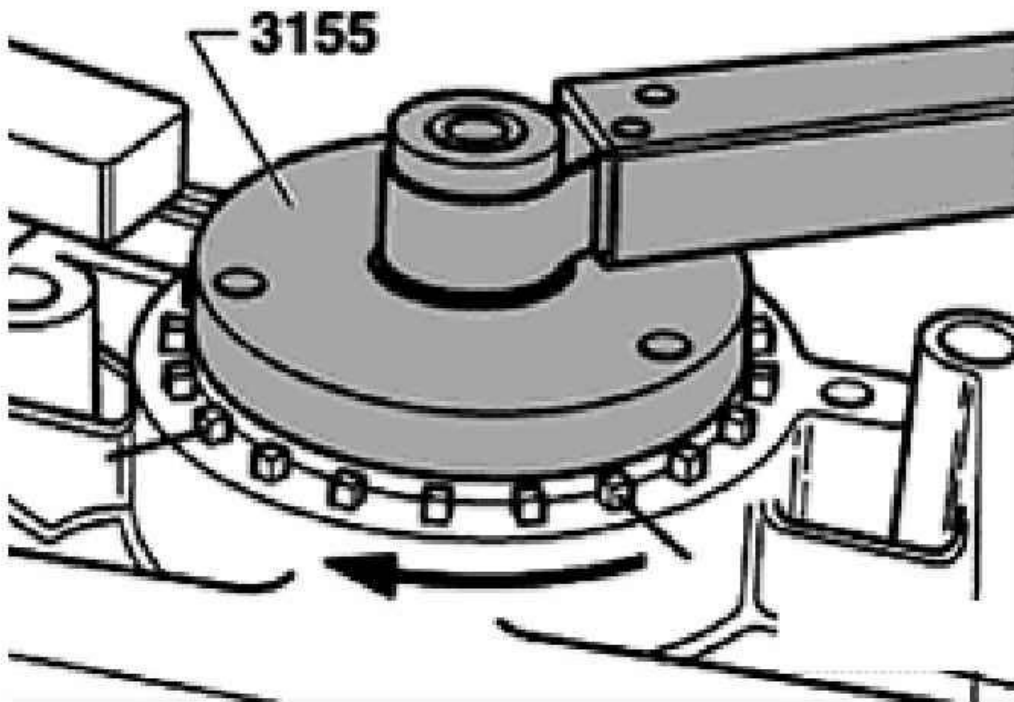
Fig. 246: Identifying Special Tools VAG 1332 Torque Wrench
Courtesy of VOLKSWAGEN OF AMERICA, INC.

Differential, adjusting

- Tighten bearing body with 3155 to 150 N.m (111 ft lb) up to stop and secure.
- Tighten adjusting ring to 50 N.m (37 ft lb) and mark.

NOTE: **When measuring, do not turn differential, otherwise bearings will settle and measurement will be incorrect.**

- Turn adjusting ring by five locking tabs -arrow- and secure to achieve tapered roller bearing preload.



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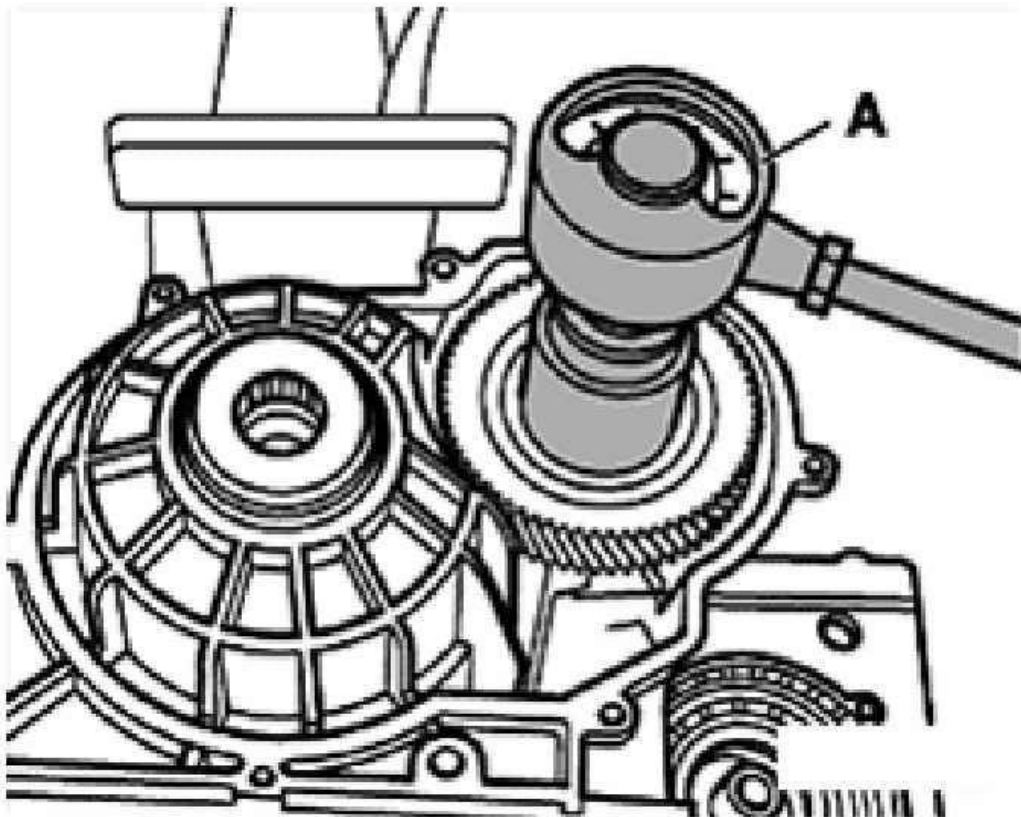
Fig. 247: Tightening Bearing Body
Courtesy of VOLKSWAGEN OF AMERICA, INC.

Friction torque, checking

A - Torque gauge, commercially available 0 - 600 Ncm (0 - 50 in. lb)

- Lubricate bearing beforehand with gear oil.

Friction torque of new tapered roller bearings must be 60 - 80 Ncm (5 - 7 in. lb) greater than at drive pinion.



G03362501

Fig. 248: Checking Drive Pinion Friction Torque
Courtesy of VOLKSWAGEN OF AMERICA, INC.

Example:

DRIVE PINION FRICTION TORQUE SPECIFICATION CHART

	Friction torque
Pinion shaft (measurement)	= 300 Ncm ⁽¹⁾
Differential (average)	= 70 Ncm
Friction torque of differential + pinion shaft	= 370 Ncm
(1) Insert the friction torque measured for the drive pinion if the bearings are used.	