

Audi 100 1991 ➤

Automatic gearbox 018 Four-wheel drive

Gearbox ID	CST							
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Edition 10.1999

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List of Workshop Manual Repair GroupsList of Workshop Manual Repair Groups

Audi 100 1991 ➤

Automatic gearbox 018 Four-wheel drive

Repair Group

00 - Technical data

32 - Torque converter

37 - Controls, Housing

38 - Gears, Hydraulic controls

39 - Final drive, Differential rear



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Technical information should always be available to the foremen and mechanics, because their careful and constant adherence to the instructions is essential to ensure vehicle road-worthiness and safety. In addition, the normal basic safety precautions for working on motor vehicles must, as a matter of course, be observed.

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Audi Automatic gearbox 018 Four-wheel drive - Edition 10.1999



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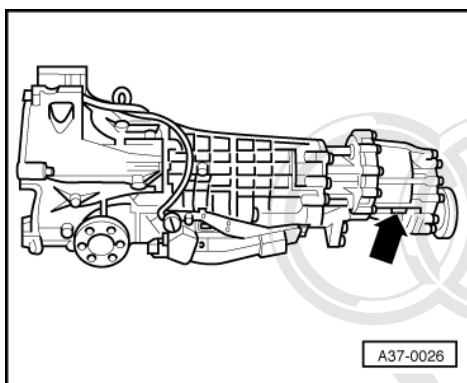
00 - Technical data

1 - Gearbox identification

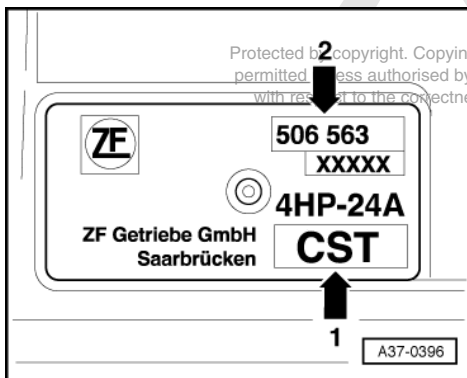
1.1 - Gearbox identification

The 4-speed automatic gearbox 018 (four-wheel drive) is installed in the Audi 100 1991 ä in combination with 8-cylinder engines.
Allocation=>Page **2**.

Location on gearbox



-> Gearbox serial number -arrow-



-> Gearbox code letters and gearbox serial number

Code letters -arrow 1-
Gearbox serial No. -arrow 2-

Note:

The gearbox code letters are also included on the vehicle data stickers.



1.2 - Code letters, gearbox allocation, ratios, capacities

Automatic gearbox		018		
Gearbox	Code letters		CST	
	Manufactured	from to	07.94	
Torque converter	Code letters		B21	
Allocation	Model		Audi 100 1991 ä	
	Engine		4.2 ltr. - 213 kW	
Ratios	1st gear		2.479	
	2nd gear		1.479	
	3rd gear		1.000	
	4th gear		0.728	
	Reverse gear		2.086	

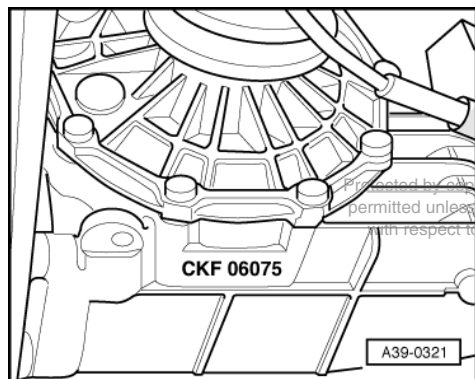
Gearbox	Code letters		CST		
Intermediate drive to front axle	No. of teeth	Input gear	27		
		Intermediate gear	59		
		Output gear	35		
	Ratio		1.30		
Intermediate drive to rear axle	No. of teeth	Input gear	39		
		Output gear	36		
	Ratio		0.923		
Front final drive	No. of teeth	Drive pinion	12		
		Crown wheel	35		
	Ratio		2.916		
Drive shaft flange dia.			108 mm		
Allocation: rear final drive	Code letters		CKF		

2 - Rear final drive identification

2.1 - Rear final drive identification

Final drive 017 is allocated to automatic gearbox 018 (four-wheel drive).

Allocation => Page 3



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-> Code letters and date of manufacture of rear final drive:

Example:	CKF	06	07	5
	Code letters		Day Month	Year (1995) of manufacture

Note:

The code letters of the rear final drive are also included on the vehicle data stickers.

2.2 - Code letters, allocation, ratios and capacities

Rear final drive		017	
Code letters		CKF	
Manufactured	from to	07.94	
Allocation	Model	Audi 100 1991 ä	
	Engine	4.2 ltr. - 213 kW	
Ratio	Final drive	37 : 9 = 4.111	
Drive shaft flange dia.		108 mm	
Allocation:		CST	
Automatic gearbox 018 (four-wheel drive)			
Code letters			

3 - Capacities

3.1 - Capacities

Planetary gearbox

Capacities	Planetary gearbox	Automatic gearbox
Initial filling	9.7 ltr.	018
Fluid change	approx. 3.0 ltr.1)	
Lubricant	ATF	

1) ATF replacement intervals for planetary gearbox

=> Maintenance booklet

ATF is obtainable as a replacement part (also sold as "VW ATF").

- ◆ 0.5 ltr. - Part No. G 052 162 A1
- ◆ 1.0 ltr. - Part No. G 052 162 A2
- ◆ 20 ltr. - Part No. G 052 162 A6

Note:

Only the ATF available as a replacement part can be used in automatic gearbox 018.



Front final drive

Capacities	Front final drive	Automatic gearbox
Initial filling	0.5 ltr.	018
Oil change	Filled for life No change	
Lubricant	Gear oil SAE75 W90 (synthetic oil)	

Gear oil SAE 75 W 90 (synthetic oil) is available as a replacement part in the following container sizes:

- ♦ 0.5 ltr. - Part No. G 052 145 A1
- ♦ 1.0 ltr. - Part No. G 052 145 S2

Checking oil level in front final drive=>page **70** .

Rear final drive

Capacities	Rear final drive	Rear axle
Initial filling	1.7 l	017
Change	Filled for life, no oil change	
Lubricant	Gear oil SAE75 W90 (synthetic oil)	

Gear oil SAE 75 W 90 (synthetic oil) is available as a replacement part in the following container sizes:

- ♦ 0.5 ltr. - Part No. G 052 145 A1
- ♦ 1.0 ltr. - Part No. G 052 145 S2

Checking oil level in rear final drive => Page **115** .

4 - Repair instructions

4.1 - Repair instructions

4.2 - General repair instructions

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

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

Special tools

For a complete list of special tools used in this Workshop Manual

=> Booklet; Special tools, Workshop equipment

Gearbox

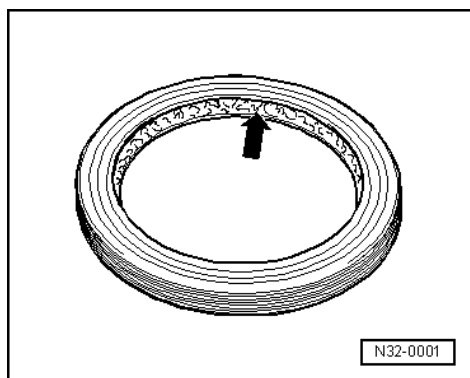
- ♦ Observe rules for cleanliness when working on automatic gearbox => Page **47** .

- ◆ Do not run the engine or tow the vehicle if the oil pan is removed or if the ATF has been drained from the gearbox.
- ◆ If the gearbox is removed from the vehicle, secure the torque converter to prevent it dropping out.
- ◆ Thoroughly clean all connections and the surrounding area before disconnecting.
- ◆ Before installing the gearbox, check the installed depth of the torque converter => Page 10 .
- ◆ When installing gearbox, ensure that the dowel sleeves are fitted correctly.
- ◆ Place removed parts on a clean surface and cover over. Use sheeting and paper. Do not use fluffing cloths!
- ◆ If repairs cannot be completed immediately and components are left open, cover the components carefully or fit plugs as required.
- ◆ Install only clean parts: do not remove replacement parts from their wrapping until you are ready to install them.
- ◆ When fitting a replacement automatic gearbox, check the following fluid levels and top up as necessary:
ATF in planetary gearbox => Page 3 .
- ◆ When fitting a new rear final drive, check the oil level in the rear final drive and top up if necessary => Page 4 .

O-rings, seals, gaskets

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- ◆ Always renew O-rings, seals and gaskets
- ◆ After removing gaskets and seals, always inspect the contact surface on the housing or shaft for burrs resulting from removal or for other signs of damage.



- ◆ Thoroughly clean housing joint surfaces before assembling.
- ◆ -> Before installing oil seals (radial shaft seals), pack space between sealing lips -arrow- with grease.
- ◆ The open side of the oil seals faces toward the side with fluid filling.
- ◆ Before installing, lightly lubricate outer circumference of seal and sealing lips with ATF or gear oil, depending on fitting location.
- ◆ Lightly lubricate O-rings with ATF before inserting to prevent them being trapped and damaged when assembling.
- ◆ Use only ATF in the parts of the gearbox where ATF is the specified lubricant; other lubricants will cause malfunctions in the gearbox hydraulics.
- ◆ When replacing oil seals, always vary the point at which the sealing lips make contact (use insertion depth tolerances).
- ◆ After installing, check the relevant fluid levels and top up if necessary:
ATF in planetary gearbox => Page 3 .

Nuts, bolts

- ◆ Slacken the bolts in reverse sequence to the specified tightening sequence.
- ◆ Nuts and bolts which secure covers and housings should be slackened and tightened crosswise in stages if no tightening sequence is specified.
- ◆ Parts which are particularly sensitive to distortion (e.g. valve body) must be kept straight when removing and installing; loosen or tighten diagonally in stages.
- ◆ The tightening torques stated apply to non-oiled nuts and bolts.
- ◆ Renew self-locking bolts and nuts.
- ◆ The threads of bolts which are secured by a locking fluid should be cleaned with a wire brush. Then apply AMV 185 101 A1 when inserting.



- ◆ Threaded holes into which self-locking bolts or bolts coated with locking fluid are screwed, must be cleaned (e.g. tap). Otherwise there is a danger of bolts shearing when subsequently being removed.

Locking elements

- ◆ Do not overstretch circlips.
- ◆ Always renew circlips which have been damaged or over-tensioned.
- ◆ Circlips must be properly seated in the base of the groove.

Bearings

- ◆ Install needle bearings with the lettering on the bearing (the side with thicker metal) facing towards the drift or other tool used for installing.
- ◆ Lubricate bearings with gear oil or ATF, depending on fitting location.
- ◆ The taper roller bearings for the drive pinion and the differential in the rear final drive are of the low-friction type. Do not additionally oil new taper roller bearings before performing friction torque measurements. These bearings have already been lubricated with a special oil for this purpose by the manufacturer.
- ◆ Do not interchange the outer or inner races of bearings of the same size.
- ◆ Always replace the taper roller bearings on one shaft together and use new bearings from a single manufacturer.
- ◆ Heat inner races of taper roller bearings to approx. 100 °C before installing. Press in onto stop when installing so there is no axial clearance.

Shims

- ◆ Use a micrometer to measure the shims at several points. Different tolerances make it possible to obtain the exact shim thickness required.
- ◆ Inspect for burrs and signs of damage. Install only shims which are in perfect condition.

Valve body

- ◆ Renew the valve body if any of the selector elements are scorched.

Self-diagnosis

- ◆ Before performing repairs to the automatic gearbox, determine the cause of the fault as precisely as possible using the Self-diagnosis.

=> Automatic gearbox 018, Self-diagnosis; Repair group 01; Performing self-diagnosis Performing self-diagnosis

32 - Torque converter

1 - Torque converter

1.1 - Torque converter

Important
Before installing the gearbox, check the installed depth of the torque converter => Page 10 .

Notes:

- ◆ Observe rules for cleanliness when working on automatic gearbox => Page 47 .
- ◆ General repair instructions => Page 4 .
- ◆ Lubricate seals lightly with ATF. Other lubricants cause malfunctions in the gearbox hydraulics.

1.2 - Checking torque converter

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- -> Check the hub of the torque converter for signs of wear -arrow-.

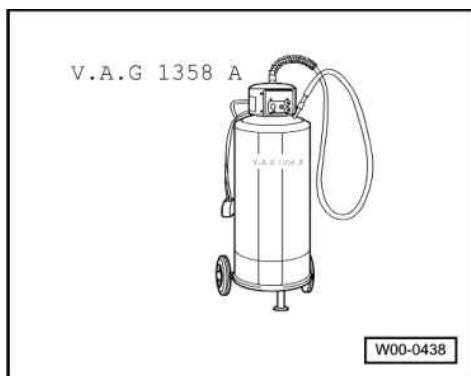
Note:

The torque converter is welded together and must be replaced as a complete unit if it is damaged or defective.



1.3 - Draining torque converter

Special tools and workshop equipment required



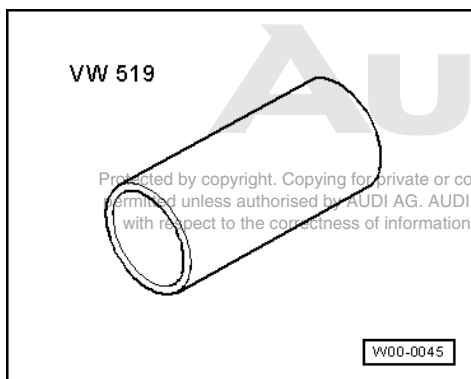
- ♦ Oil extractor V.A.G 1358 A
- ♦ Oil extractor probe V.A.G 1358 A/1

If there is dirt in the ATF resulting from internal wear, or if the gearbox is being overhauled, the torque converter must be drained.

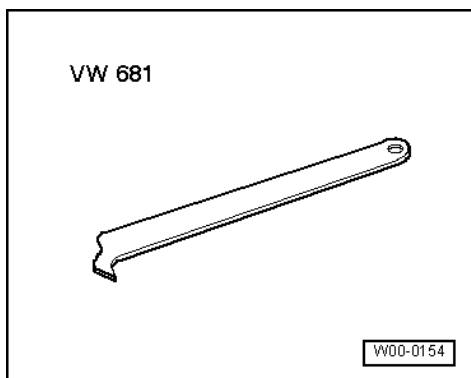
- Extract ATF from torque converter using V.A.G 1358 A and probe V.A.G 1358 A/1.

1.4 - Fitting a new torque converter oil seal

Special tools and workshop equipment required



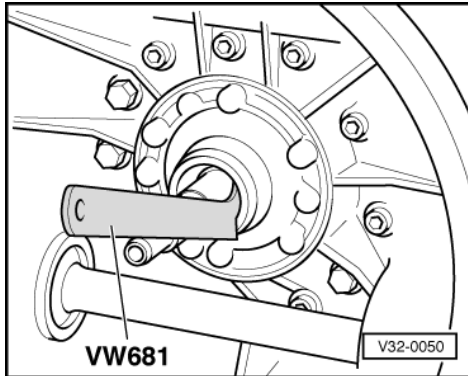
- ♦ Tube VW 519



- ◆ Extractor lever VW 681

Removing

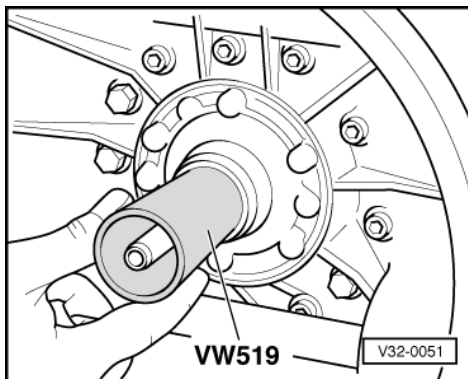
- Remove gearbox => Page 26 .



- Pull out torque converter.
- Secure gearbox to repair stand => Page 40 or place it on a level surface.
- -> Remove torque converter oil seal with oil seal extractor lever VW 681.

Installing

- Lubricate the outer circumference and the sealing lips of the oil seal with ATF.
- Installation position: open side of oil seal towards gearbox



- -> Drive in torque converter oil seal using tube VW 519.
- Install torque converter=>Page 9 .

1.5 - Installing torque converter

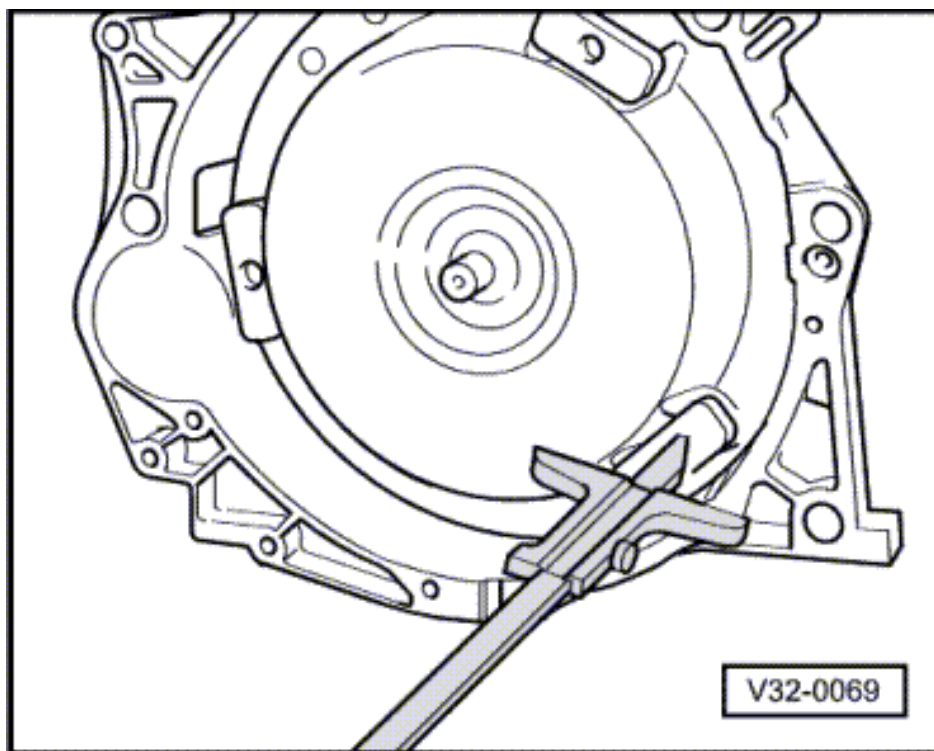
Special tools and workshop equipment required

- ◆ Depth gauge
- Press torque converter hub through oil seal as far as first stop.
- Lightly press torque converter inwards and turn until slots on torque converter hub engage in drive lugs on ATF pump gear and torque converter slides in a noticeable distance.

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Installed depth



-> The distance between the surface of the mounting lugs and the surface of the torque converter bellhousing should be at least 26 mm, if the torque converter has been installed properly.

If the torque converter has not been installed properly, the distance will be about 12 mm.

Important!

If the torque converter is incorrectly inserted, the driver of the torque converter or the ATF pump will be severely damaged when the gearbox is attached to the engine.



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37 - Controls, Housing

1 - Servicing shift mechanism

1.1 - Servicing shift mechanism

1.2 - Dismantling and assembling shift mechanism

Warning!

Before working on engine when it is running, move selector lever into position "P" and apply handbrake.

The following work is necessary before dismantling the shift mechanism:

- ♦ To work on selector housing, remove front section of centre console

=> General Body Repairs; Repair Group 70; Dash panel; Removing and installing front centre console. Dash panel Removing and installing front centre console.

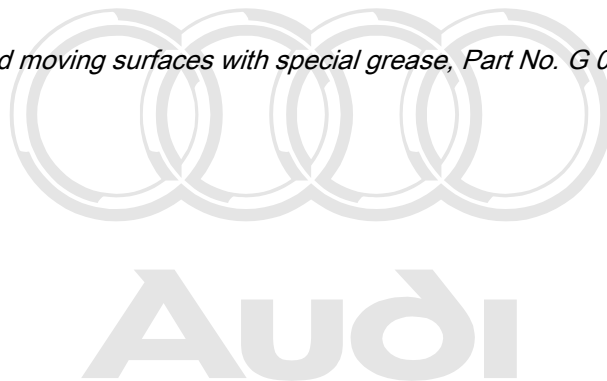
- ♦ When replacing locking cable, also remove steering wheel and dash panel insert

=> Electrical System; Repair Group 90; Dash panel insert; Removing and installing dash panel insert Dash panel insert Removing and installing dash panel insert

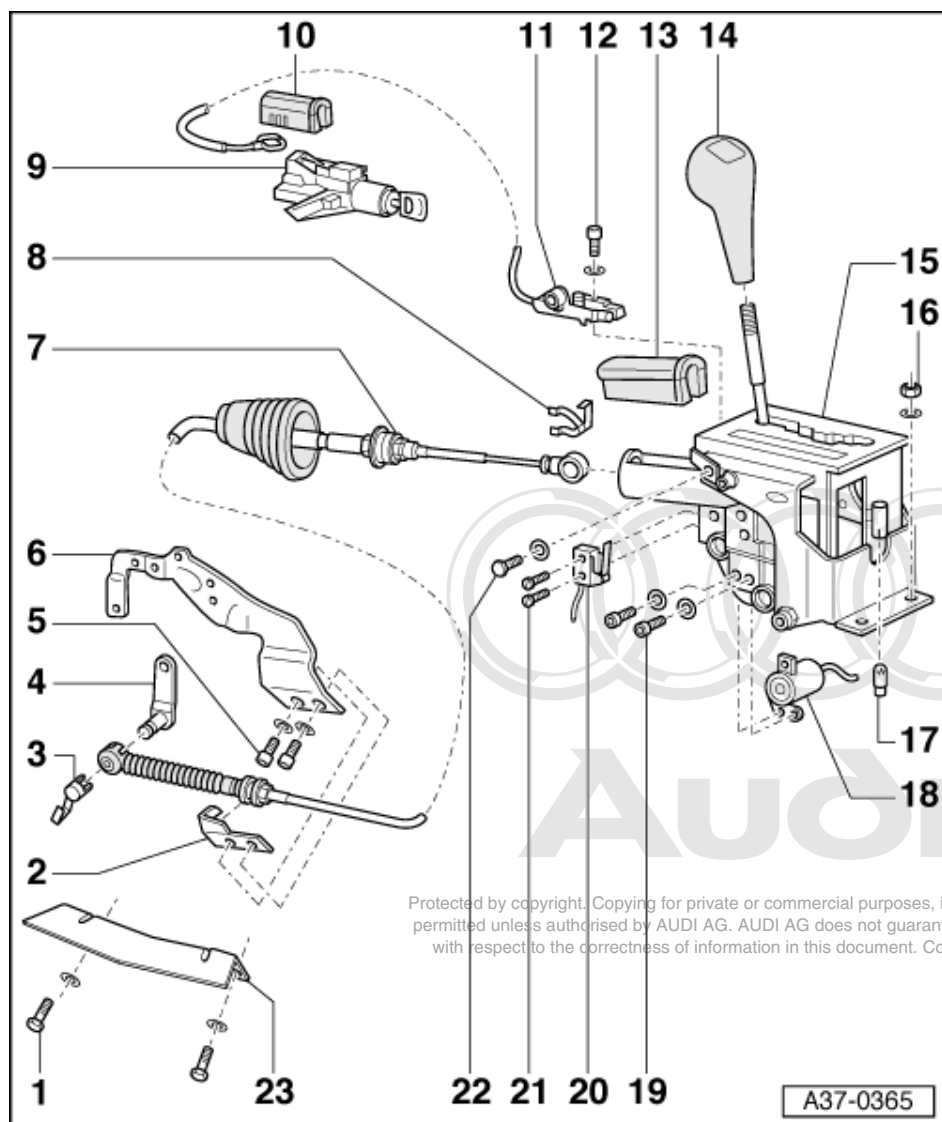
- ♦ The entire selector mechanism is removed upwards.

Note:

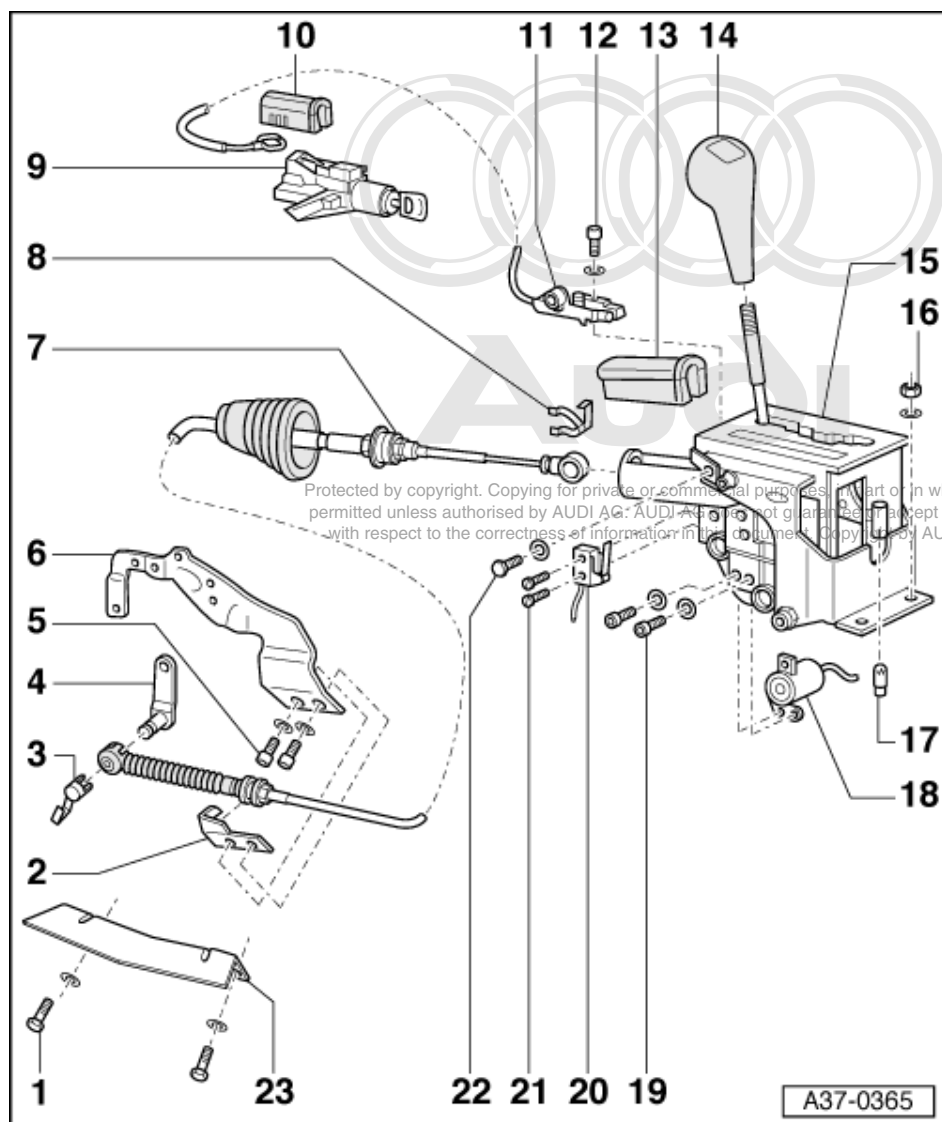
Lubricate bearings and moving surfaces with special grease, Part No. G 052 142 A2.



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- 1 Bolt - 9 Nm
2 Support bracket
 ♦ For selector lever cable
 ♦ On gearbox
3 Retaining clip
 ♦ For selector lever cable
4 Bolt - 9 Nm
5 Selector lever on gearbox
6 Bracket
7 Selector lever cable
 ♦ With guide and bush
 ♦ Removing and installing together with selector housing
 =>Page 16
 ♦ Ensure bellows and grommet are fitted correctly, otherwise moisture can enter cable



12 Bolt - 9 Nm

13 Insulating piece

14 Selector lever handle

15 Selector housing (shift gate)

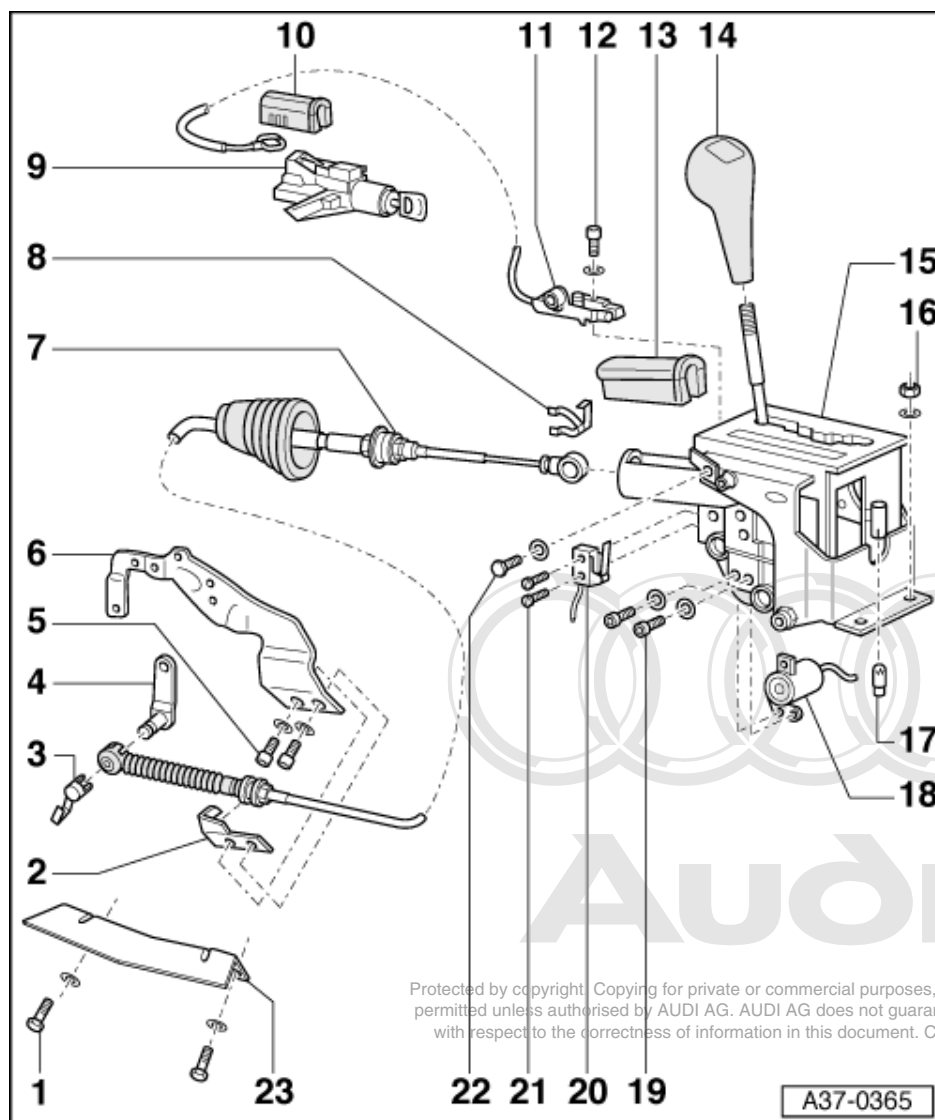
- ♦ Remove together with selector lever cable=> Page 16
- ♦ Do not route any wiring between selector housing and vehicle body

16 Nut - 9 Nm

17 Bulb for gear selection indicator

18 Selector lever lock solenoid -N110-

- ♦ To remove, remove selector housing -Item 15 -



- ♦ Installing:
- After installing shift mechanism switch on ignition. The solenoid blocks the selector lever in position "P" and position "N". The selector lever can be moved out of positions "P" and "N" when the brake pedal is pressed

19 Bolt - 9 Nm

- ♦ Secure with sealing paint

20 Selector lever lock switch -F142

21 Bolt - 0.5 Nm

- ♦ Secure with sealing paint

22 Bolt - 9 Nm

23 Heat shield

1.3 - Checking shift mechanism

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

- Brake pedal not depressed:

Selector lever is locked and cannot be shifted out of "P" position. Solenoid for selector lever lock blocks selector lever.

- Brake pedal depressed:

Solenoid for selector lever lock should release selector lever. With selector lever handle pressed down, it should be possible to shift into a driving gear. Selector lever should move freely.

Shift selector lever from "P" through "R, N, D, 3, 2, 1" slowly and check that selector lever display in dash panel corresponds to selector lever position.

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

- Brake pedal not depressed:

Selector lever is locked and cannot be shifted out of "N" position with selector lever handle pressed down. Solenoid for selector lever lock blocks selector lever.

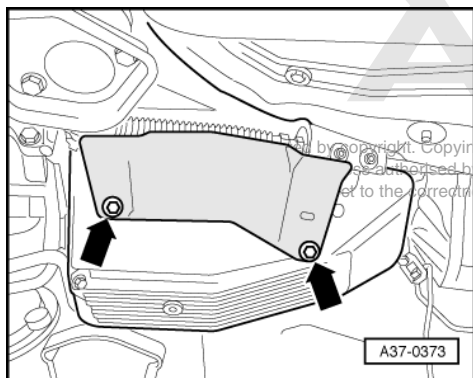
- Brake pedal depressed:

Solenoid for selector lever lock releases selector lever. With selector lever handle pressed down, it should be possible to shift into a driving gear. Selector lever should move freely.

Notes:

- ♦ The starter must not operate in the selector lever positions "1", "2", "3", "D" and "R".
- ♦ When travelling at speeds above 5 km/h and shifting into selector lever position "N", solenoid for selector lever lock must not engage and block selector lever. Selector lever can be shifted into a driving gear.
- ♦ When travelling at speeds below 2 km/h (almost stationary) and shifting into selector lever position "N", solenoid for selector lever lock should only engage after about 1 second. Selector lever cannot be shifted out of "N" position until brake pedal is depressed.

1.4 - Removing and installing selector housing with selector lever cable

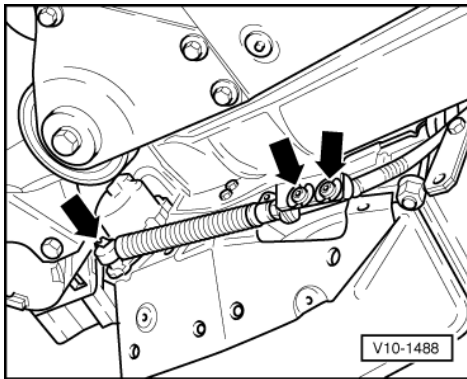


Removing

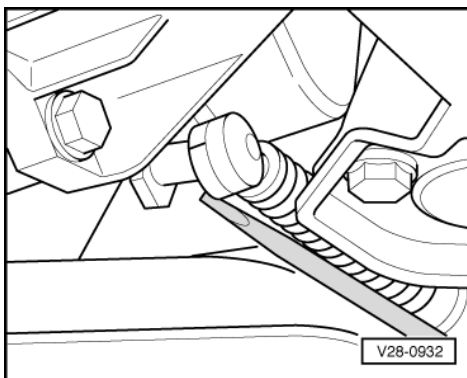
- Move selector lever into position "P".
- -> Unbolt heat shield for selector lever cable on gearbox.

Note:

Shown in illustration with exhaust system removed.



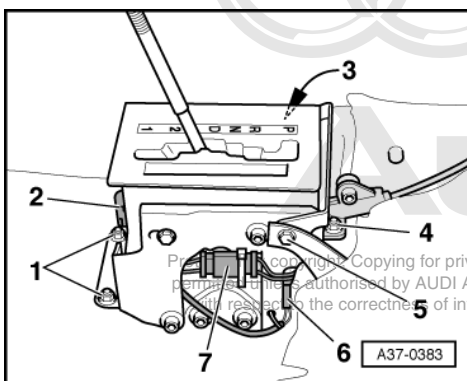
- -> Unscrew bolts -right arrow- on support bracket.
- Release securing clip -left arrow-.



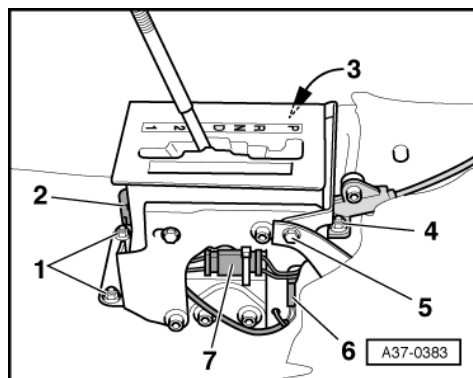
- -> Prise off ball socket of selector lever cable using a screwdriver.
- Remove front section of centre console

=> General Body Repairs; Repair Group 70; Dash panel; Removing and installing front centre console. Dash panel Removing and installing front centre console.

- Unscrew nut on heater duct.
- Pull heater duct off air conditioner unit towards the rear.



- -> Unscrew socket head bolt -4- on locking cable and disengage locking cable.
- Unscrew nuts -1- and bolts -3- and -5- for selector housing.
- Lift rear end of selector housing over the studs and pull slightly towards the rear.
- Pull bulb holder out of retainer -2-.



- -> Unplug connectors -6- and -7-.
- Move wiring harness clear.
- Carefully remove selector housing from vehicle together with selector lever cable.
- Detach selector lever cable from selector housing
=>Page 18 .

Installing

Install in reverse sequence; note the following points:

Note:

The selector lever cable must not be kinked.

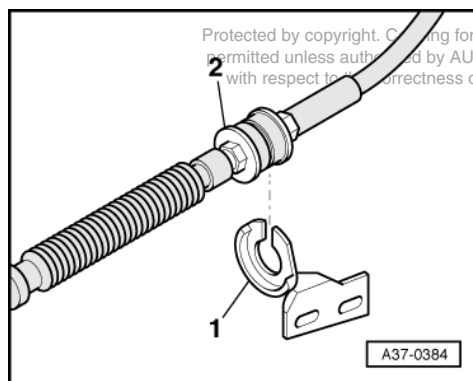
- Ensure bellows and grommet are fitted correctly, otherwise moisture can enter cable.
- If bellows or grommet are damaged, renew selector lever cable.
- Checking and adjusting selector lever cable
=>Page 20 .
- Installing locking cable=>Page 21 .

Tightening torques

Component	Nm
Selector housing to body	9
Support bracket for selector lever cable to gearbox	9
Heat shield for selector lever cable to gearbox	9

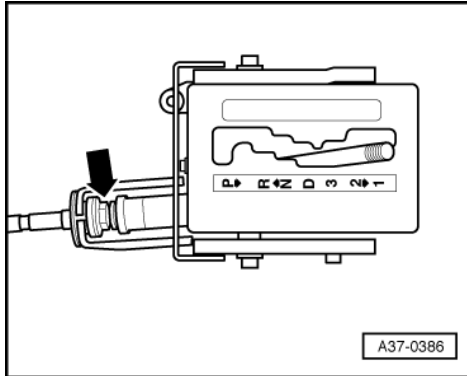
1.5 - Removing and installing selector lever cable

- Selector housing and selector lever cable removed
=>Page 16 .

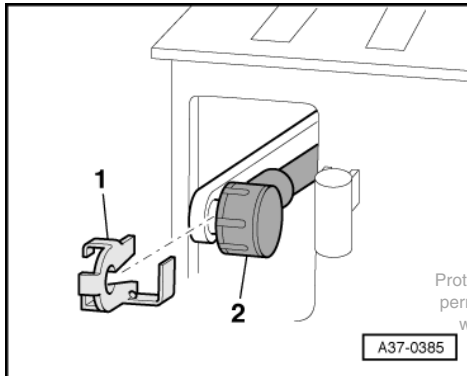


Removing

- -> Loosen lock nut and pull selector lever cable -2- off support bracket -1-.
- Pull off bellows from selector housing.
- Detach insulating piece -Item **14** from selector housing.



- -> Unscrew support bracket for selector lever cable from selector housing -arrow-.



- -> Release securing clip -1- and prise off ball socket -2- of selector lever cable using a screwdriver.
- Detach selector lever cable from selector housing.

Installing

Install in reverse sequence; note the following points:

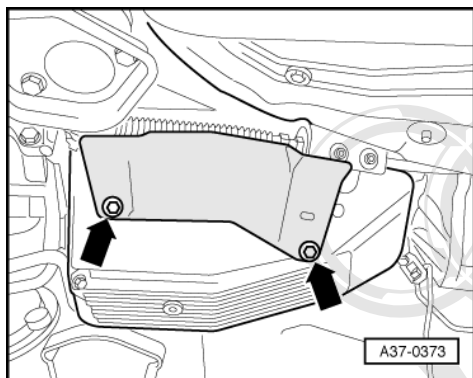
- Install selector housing=>Page **18** .

Tightening torques

Component	Nm
Selector lever cable to selector housing	12
Selector lever cable to support bracket on gear-box	12

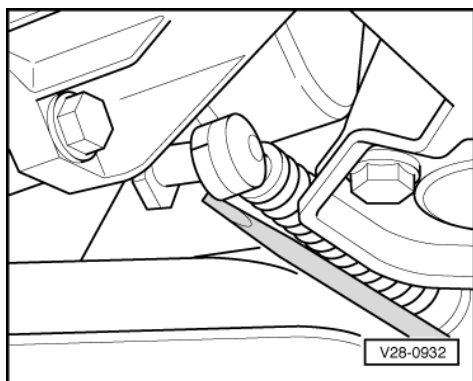


1.6 - Checking and adjusting selector lever cable

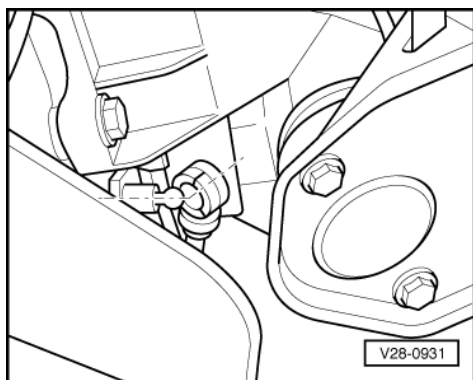


Checking

- Move selector lever into position "P".
 - -> Unbolt heat shield for selector lever cable on gearbox - arrows.
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- -> Release securing clip and lever off ball socket of selector lever cable using a screwdriver.
- Shift selector lever from "P" to "1".
 - The shift mechanism and selector lever cable should move smoothly and easily; if necessary, replace selector lever cable or service shift mechanism.
- Set ball joint on gearbox selector lever to position "N" as follows:
 - Press ball joint forwards to end stop (position "P").
 - Then allow ball joint to move through position "R" and engage in position "N".
- Move selector lever into position "N".

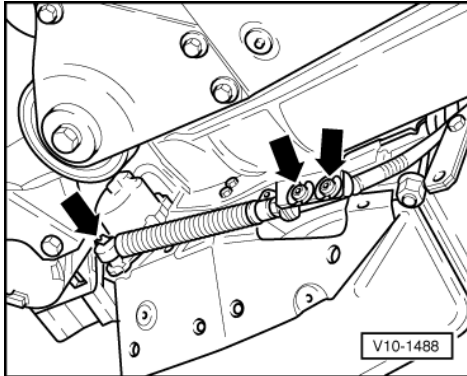


- -> Ball socket and ball joint should now be aligned accurately.
Attach selector lever cable to ball joint by hand; ball socket should engage.
Press on securing clip.

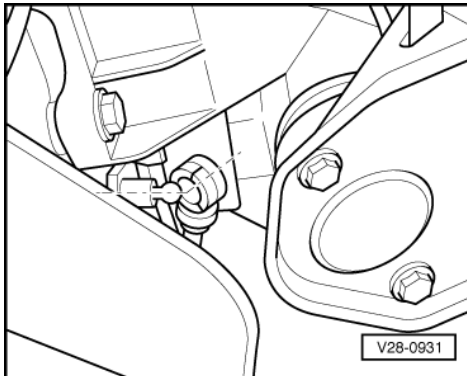
If ball socket and ball joint are not aligned accurately:

- Adjust selector lever cable.

Adjusting



- -> Slacken bolts -right arrows-.
- It should be possible to move support bracket for selector lever cable by hand.



- -> Move ball socket longitudinally until ball socket and ball joint are aligned accurately.
- Tighten support bracket bolts.
- Attach selector lever cable to ball joint by hand; ball socket should engage.
- Press on securing clip.
- Checking selector mechanism => page 15 .

Note:

If gear display -Y5 in dash panel insert does not correspond to selector lever position, repeat adjustment or adjust multi-function switch -F125=>Page 52 .

Tightening torques

Component	Nm
Support bracket for selector lever cable to gearbox	9
Heat shield for selector lever cable to gearbox	9

1.7 - Removing, installing and adjusting locking cable

Notes:

- ♦ Adjust locking cable=>Page 23 after attaching to ignition switch, and then attach cable to selector housing.

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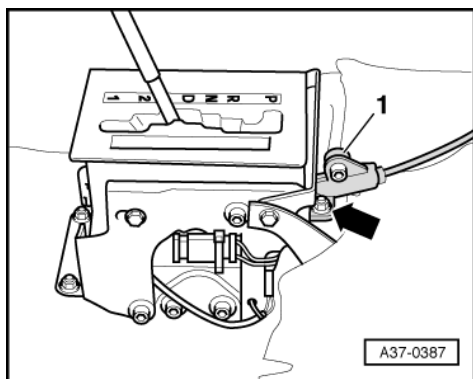
- ♦ The locking cable must not be kinked.

Removing

- Remove front centre console.

=> General Body Repairs; Repair Group 70; Dash panel; Removing and installing front centre console Dash panel Removing and installing front centre console

- Unscrew nut on heater duct.
- Pull heater duct off air conditioner unit towards the rear.

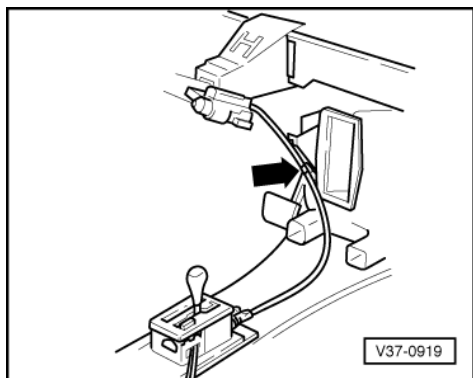


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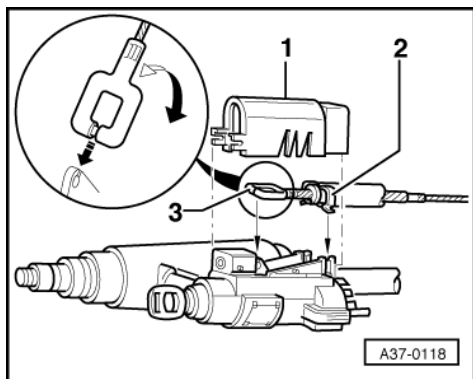
- Remove steering wheel and dash panel insert

=> Electrical System; Repair Group 90; Dash panel insert; Removing and installing dash panel insert Dash panel insert Removing and installing dash panel insert

- Move selector lever into position "N".
- -> Unscrew socket head bolt -arrow- on locking cable.
- Disengage locking cable -1- from selector housing.



- -> Release clip -arrow- under dash panel and disengage locking cable.



- -> Take off cap -1-.
- Release spring clip -2-.
- Turn end of locking cable -3- up through about 90° and pull up and out of retaining eye on ignition/starter switch.

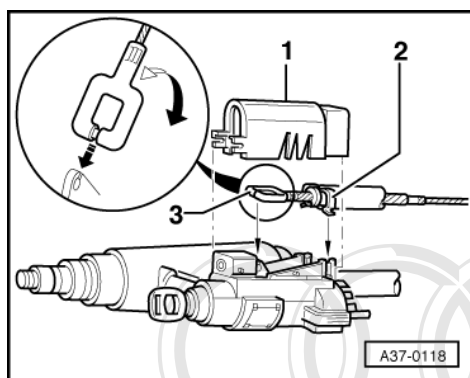
Note:

Do not kink the locking cable when turning it upwards.

- Detach locking cable.

Installing

Install in reverse sequence; note the following points:



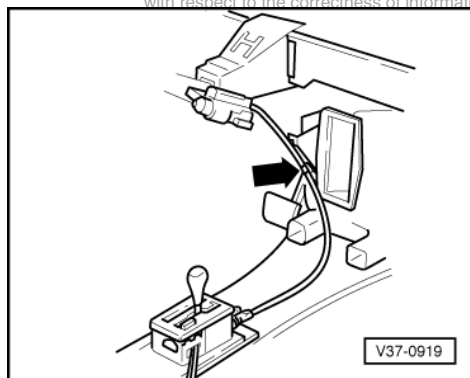
- -> Insert locking cable -3- into top of retaining eye on ignition/starter switch (flat parts of locking cable and retaining eye must be aligned) and turn locking cable down through about 90°.
- Insert spring clip -2-.

Note:

The spring clip must be engaged properly, otherwise the cap cannot be fitted.

- Fit cap -1- on ignition/starter switch.

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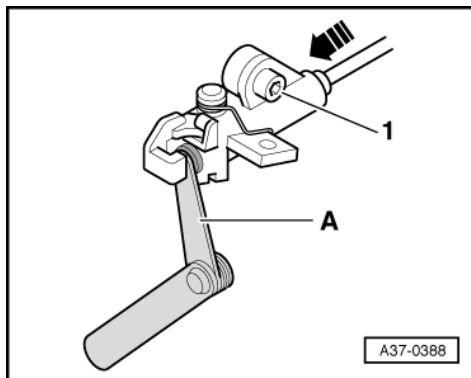


- -> Bring locking cable into correct position under dash panel and secure with clip -arrow-.

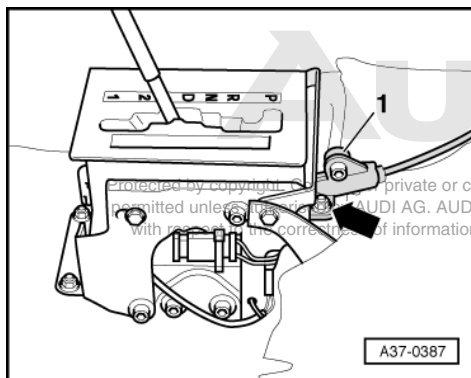
Adjusting

Note:

The adjustment of the locking cable is performed in the installed position.



- -> Unscrew bolt -1-.
- Turn key in ignition/starter switch to "ignition on" position.
- Locate locking cable support bracket on selector housing and secure in position for bolting on.
- Insert feeler gauge -A- (1.5 mm) between locking arm and locking pin.
- Adjust locking cable by moving in direction of arrow so that locking pin is pushed against feeler gauge.
- Tighten bolt -1- in this position to 9 Nm.
- Turn key in ignition/starter switch several times backwards and forwards between "ignition on" and "ignition off" positions.
- Check gap between locking pin and locking arm once again.
 - Specification: 1.2 ... 1.7 mm



- -> Engage locking cable -1- in selector housing and secure with bolt -arrow-.
- Check the ignition key removal lock after adjusting locking cable=>Page 24 .

Tightening torque

Component	Nm
Locking cable to selector housing	9

1.8 - Checking ignition key removal lock

- Turn ignition key to "ignition on" position.
- Press foot brake and hold.
- When selector lever handle is pressed down it should be possible to move selector lever smoothly out of position "P".
- It should not be possible to remove the ignition key when the selector lever is in any other position than "P".
- Move selector lever into position "P".
- It must be possible to move ignition key to removal position without "sticking".
- Pull out ignition key.

- It should only be possible to remove ignition key in selector lever position "P".
- Selector lever cannot be shifted out of "P" position with selector lever handle pressed down and foot brake depressed.

2 - Checking gearbox

2.1 - Checking gearbox

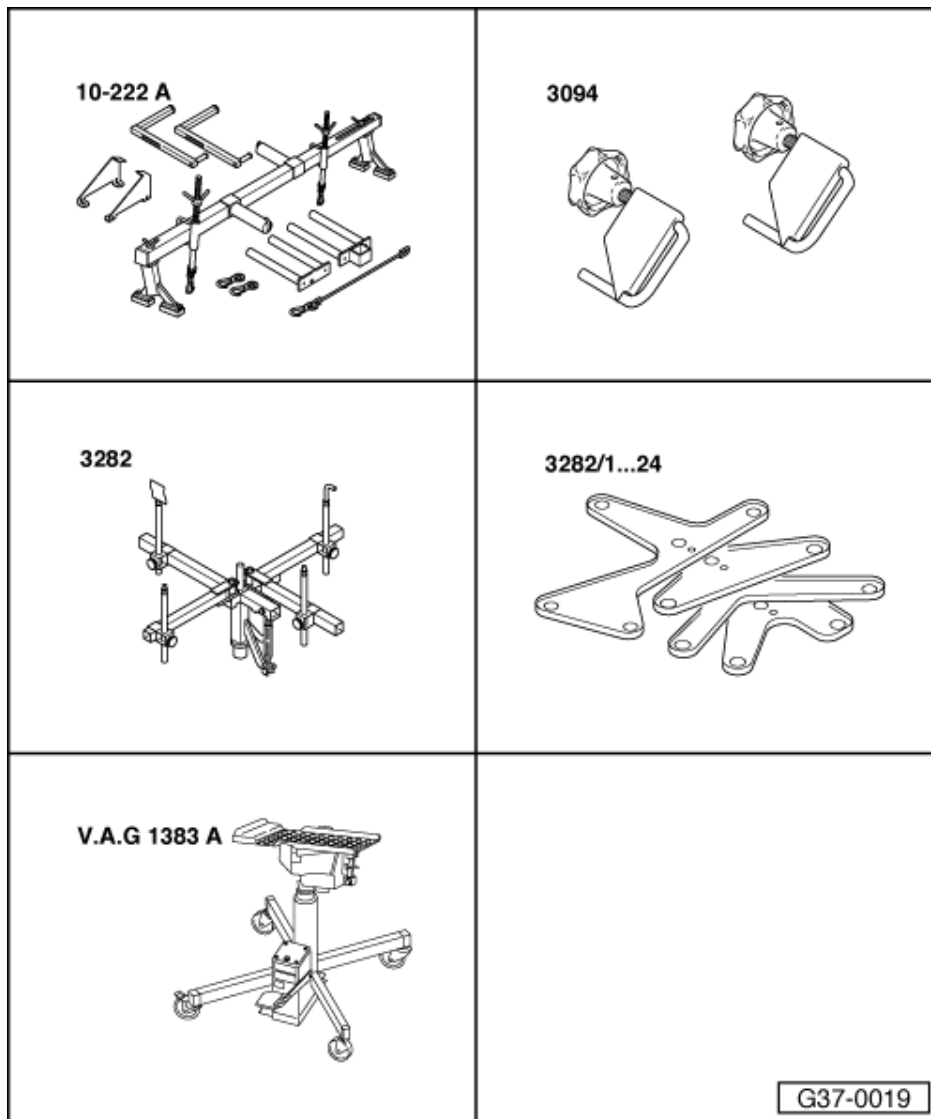
When tracing the cause of faults, always perform self-diagnosis as a first step.

=> Automatic gearbox 018, Self-diagnosis, Repair group 01, Performing self diagnosis Performing self diagnosis

Only check the automatic gearbox according to the procedure described in the "Fault-finding, Transmission" binder if the fault cannot be traced and corrected via self-diagnosis.

3 - Removing and installing gearbox

3.1 - Removing and installing gearbox



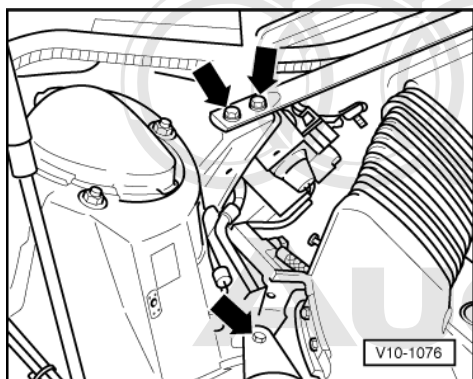


Special tools and workshop equipment required

- ♦ Support bar 10-222 A with 10-222 A 4 and 10-222 A 12
- ♦ Hose clamps 3094
- ♦ Gearbox support 3282
- ♦ Adjusting plate 3282/11
- ♦ Engine/gearbox jack
V.A.G 1383 A

Removing

- Obtain radio code on vehicles with coded radio.

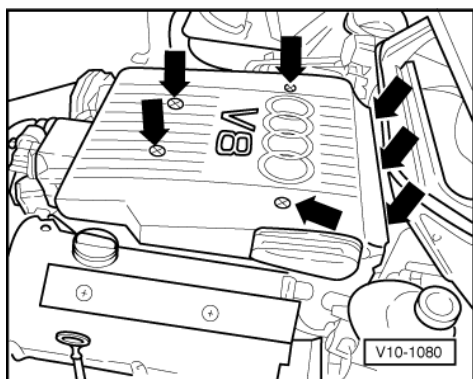


- Switch off ignition and disconnect battery earth strap (under rear seat).

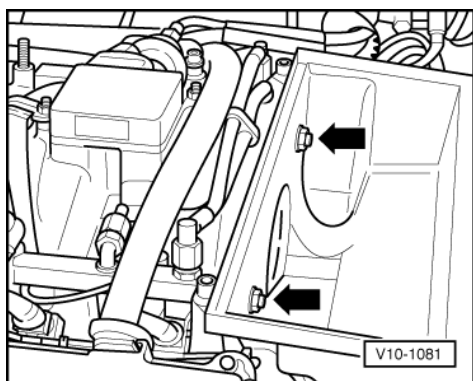
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=> General body repairs, Interior; Repair group 72; Rear seats; Removing and installing rear seat bench Rear seats Removing and installing rear seat bench

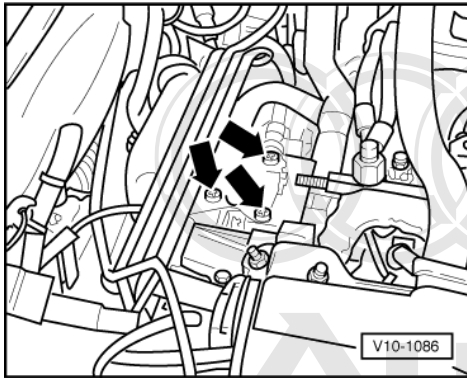
- -> Remove stabiliser bar -top arrows-.
- Unbolt air ducts on left and right sides -bottom arrow-.
- Detach right air duct from radiator.



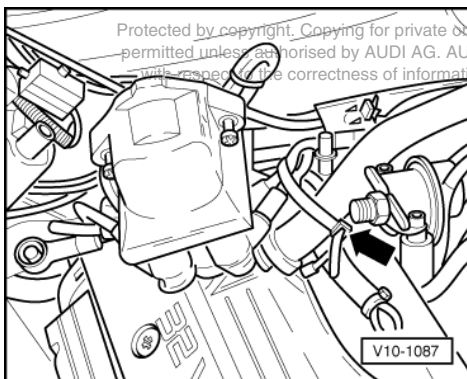
- -> Unbolt top section of air cleaner housing -arrows-.
- Take out air filter element.



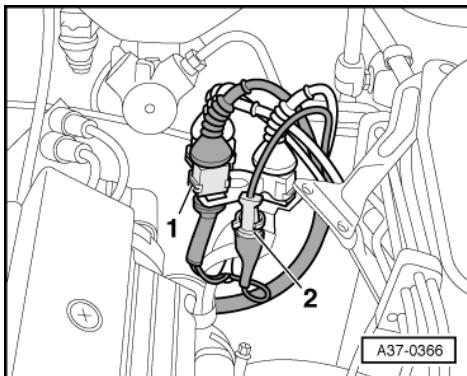
- -> Unbolt bottom section of air cleaner housing -arrows-, push towards rear of vehicle and lift out.



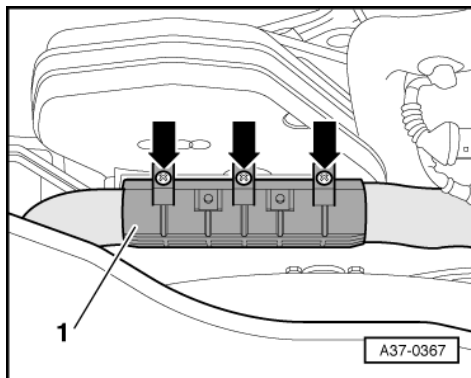
- -> Unbolt metal bracket for ignition cable retainer -arrows-.



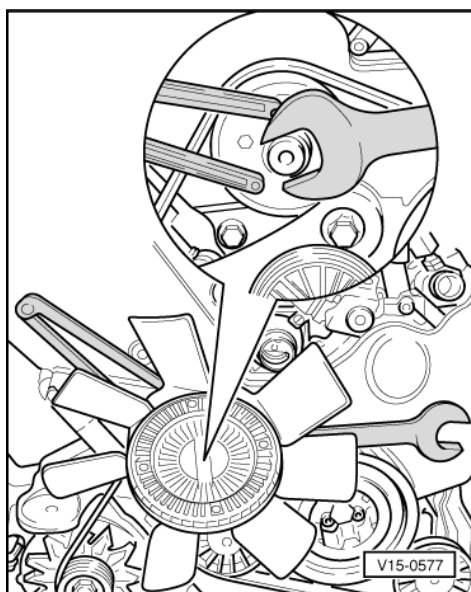
- Disconnect ignition cables from ignition coils (left and right sides).
- Detach distributor caps on left and right sides (leave ignition cables connected).
- -> Secure both distributor caps to crankcase breather hose using cable ties -arrow-.



- -> Unplug connectors -1- and -2- for lambda probe and lambda probe heating.
- Release wiring.
- Unbolt wiring retainer on torque converter bellhousing.
- Move wiring clear to the bottom.



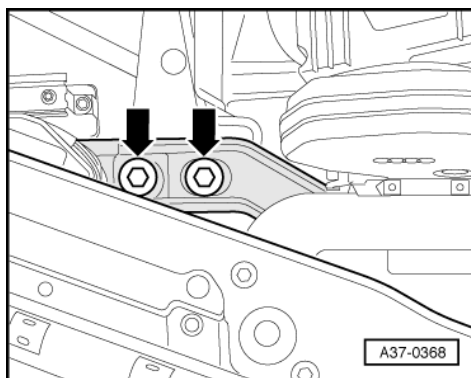
- -> Open support clamp for coolant hose -arrows- and detach top section -1-.



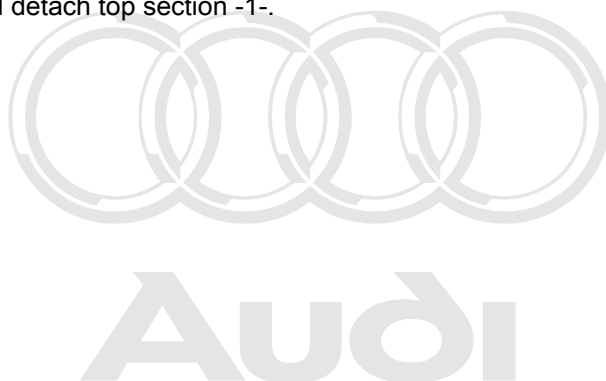
- -> Unscrew viscous fan and place fan in fan cowl.

Notes:

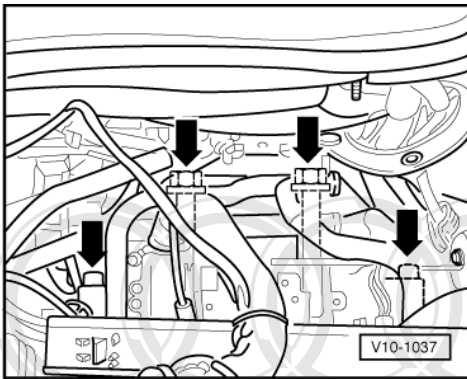
- ♦ The viscous fan has a left-hand thread; turn clockwise to loosen.
- ♦ Illustration shows viscous fan with engine removed to give a clear picture.



- -> Unbolt engine support -arrows- (watch spacers).



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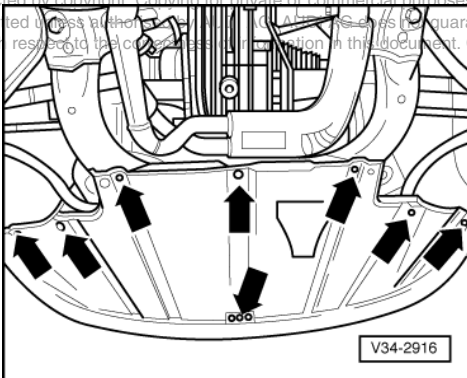
- -> Unscrew upper bolts -arrows- between gearbox and engine, except for the top bolt.

Note:

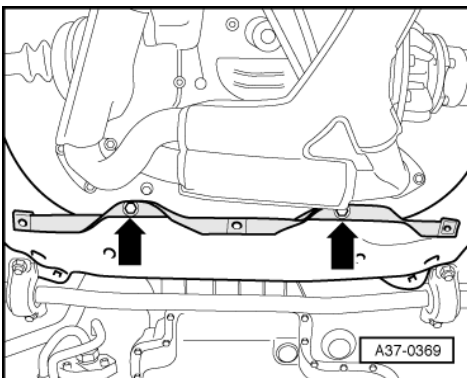
When removing the bolts, note their lengths and positions so that they can be re-fitted correctly.

- Remove front wheels.

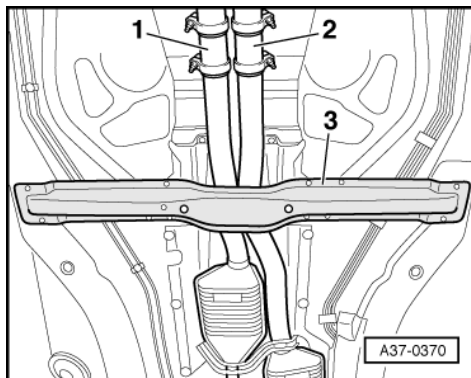
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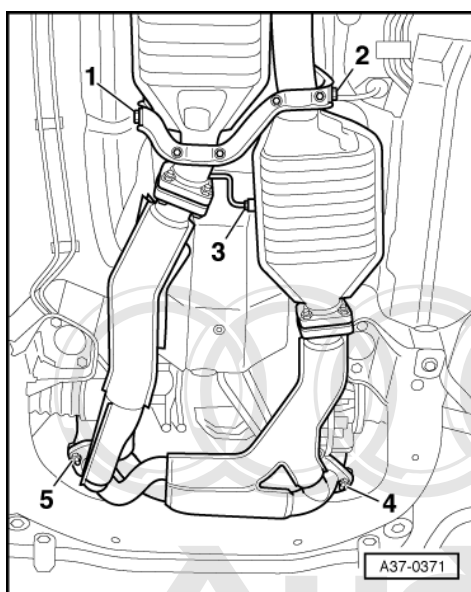
- -> Remove noise insulation -arrows-.



- -> Unbolt bracket for noise insulation -arrows-.



- -> Remove floor cross piece -3-.
- Slacken bolts on clamps -1- and -2-.

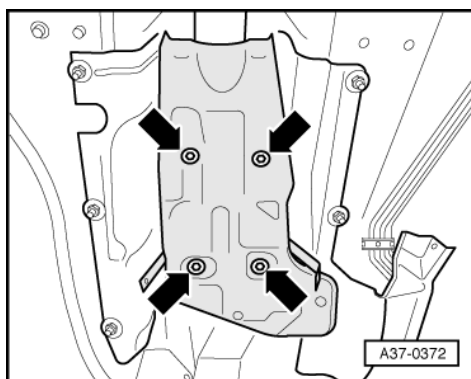


- -> Unscrew thermo-sensor -3-.
- Unbolt exhaust system from left and right manifolds -4- and -5- and at mountings on gearbox -1- and -2-.
- Remove front exhaust pipes together with catalytic converters.

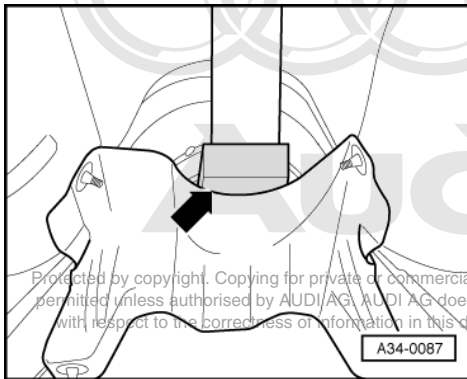
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Note:

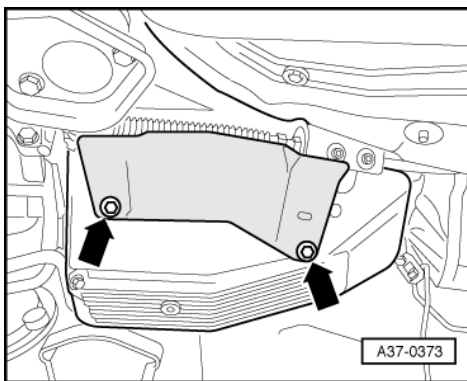
When removing the exhaust system, ensure that the sealing rings do not drop onto the ground - they can be damaged by impact.



- -> Unbolt front heat shield.

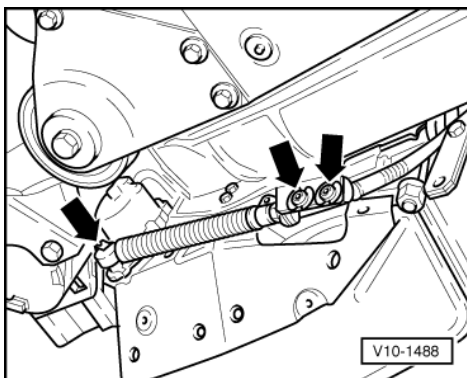


- -> Unbolt propshaft at gearbox and support against rear heat shield by inserting a wooden wedge -arrow-.
- Unbolt drive shafts from flanges on gearbox.

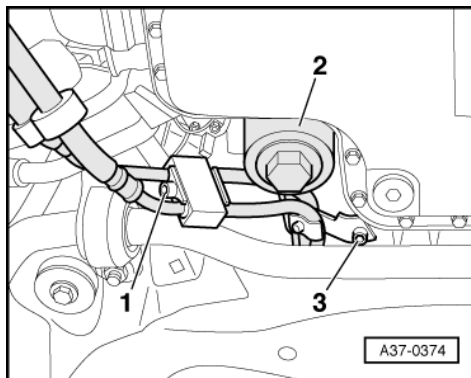


=> Running gear, Front-wheel drive and four-wheel drive; Repair group 40; Servicing drive shafts; Removing and installing drive shafts Servicing drive shafts Removing and installing drive shafts

- -> Unbolt heat shield for selector lever cable on gearbox -arrows-.



- -> Release securing clip and lever off ball socket of selector lever cable -left arrow- using a screwdriver.
- If necessary, mark position of selector lever cable support bracket on gearbox housing for later installation, and unbolt support bracket -right arrows-.
- Place container under the engine.

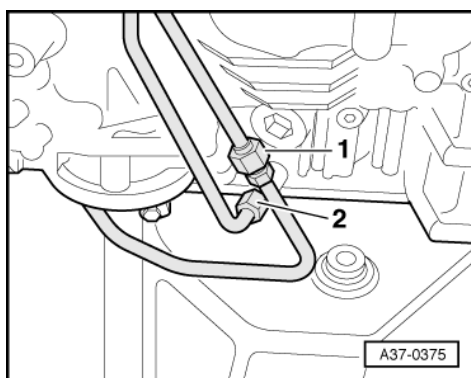


- -> Remove oil filter -2-.
- Clamp off ATF hoses going to ATF cooler using hose clamps 3094.

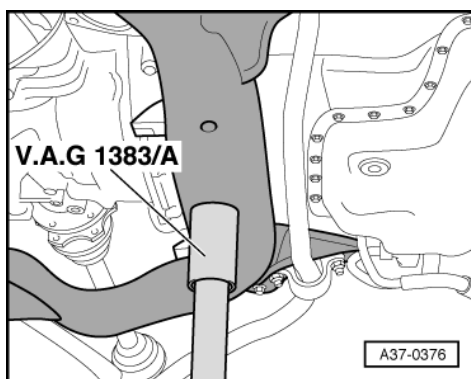
Note:

Observe rules for cleanliness when working on automatic gearbox => Page **47**.

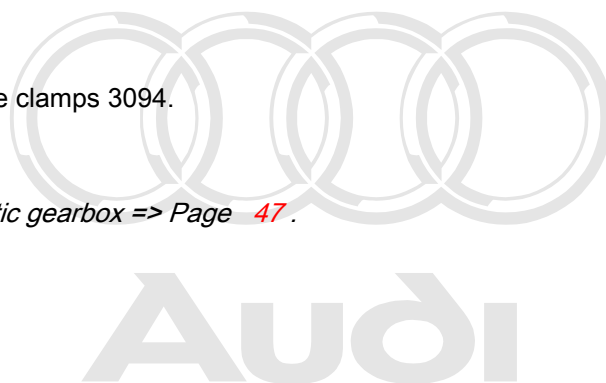
- Unscrew bolt -1- on connector block for ATF pipes.
- Unbolt bracket from engine -3-.



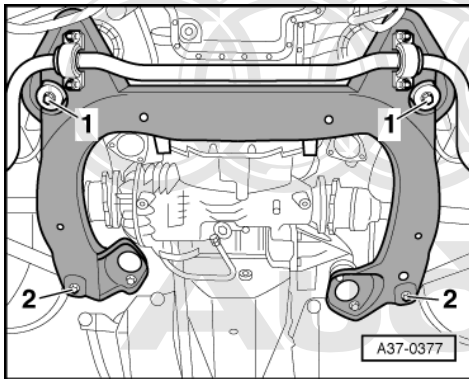
- -> Unscrew union nuts -1- and 2- and detach ATF pipes.



- -> Support subframe at the front with engine/gearbox jack V.A.G1383 A.



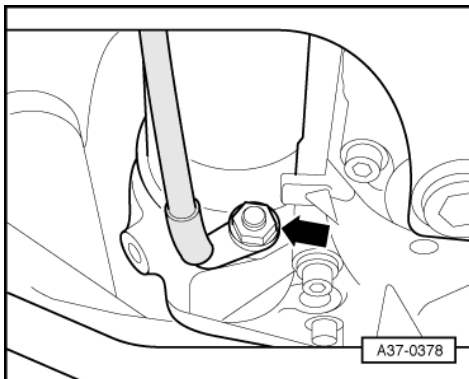
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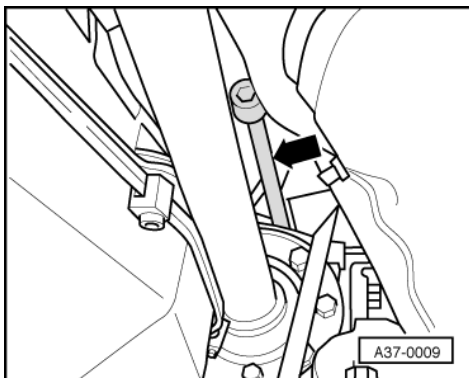
- > Unscrew front subframe bolts -1-.
 - Lower subframe at the front.
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Notes:

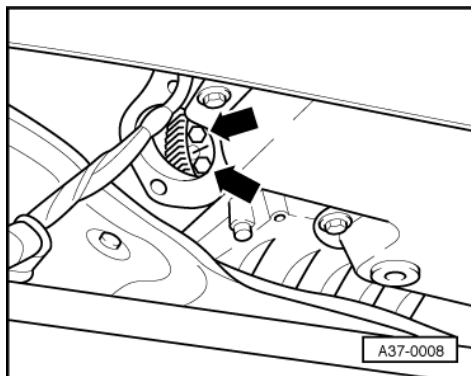
- ♦ Do not slacken more than two M12 bolts on the subframe at the same time, otherwise it will be necessary to check and adjust wheel alignment.
- ♦ Do not lower subframe too far; take care not to damage pipes or hoses.
- Disconnect wiring from starter.



- -> Unscrew lower nut -arrow- on starter, and detach earth cable.



- -> Unscrew top bolt on starter, using an extension with universal joint -arrow-.
- Detach starter.



- -> Unscrew 6 torque converter bolts through starter opening (turn crankshaft 1/3 turn each time).

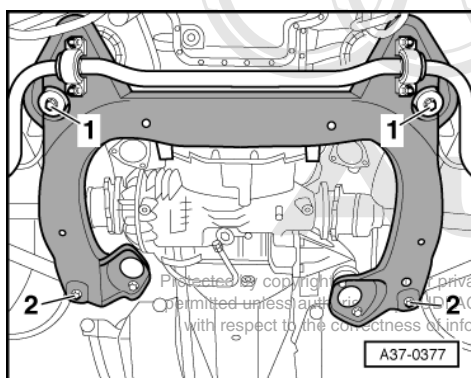
Note:

To remove the torque converter bolts, counter-hold the main bolt on the vibration damper.

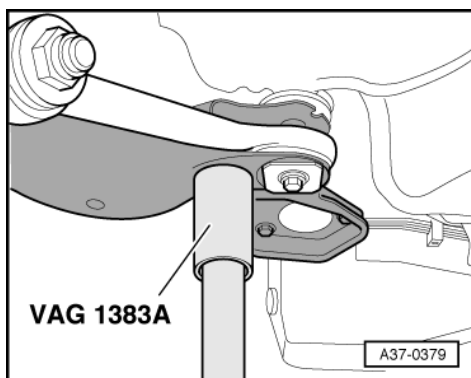
- Unscrew lower engine/gearbox connecting bolts.

Notes:

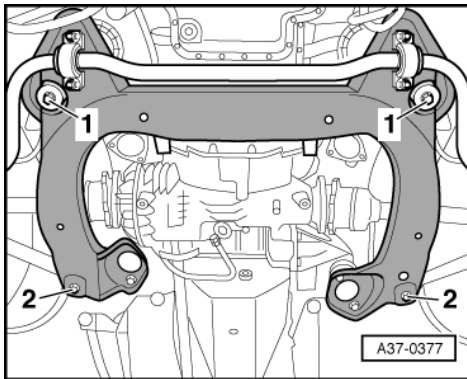
- ♦ When removing the bolts, note their lengths and positions so that they can be re-fitted correctly.
- ♦ The lower engine/gearbox connecting bolts on the left and right sides should be left in position, but only tightened lightly.



- -> Secure subframe with old bolts -1- to start with: tighten to 110 Nm.



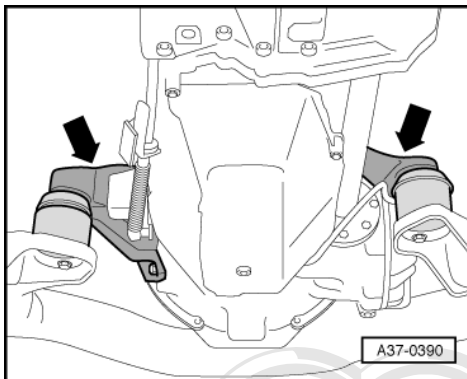
- -> Support rear end of subframe with engine/gearbox jack V.A.G 1383 A.



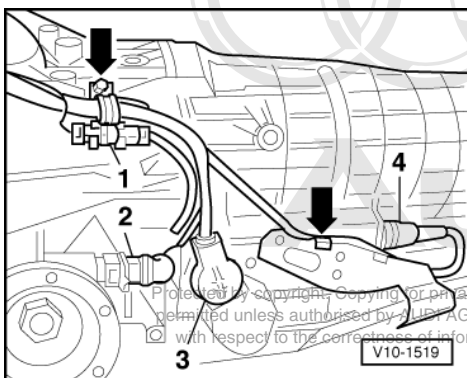
- -> Unscrew rear subframe bolts -2-.
- Lower subframe at the rear.

Notes:

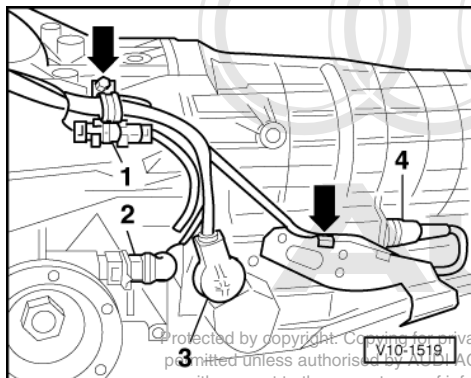
- ◆ Do not slacken more than two M12 bolts on the subframe at the same time, otherwise it will be necessary to check and adjust wheel alignment.
- ◆ When lowering subframe, ensure clearance between gearbox and propshaft.
- Support rear of gearbox.



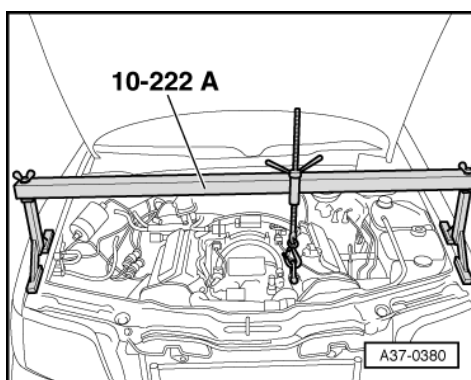
- -> Remove left and right gearbox supports together with gearbox mountings -arrows-.



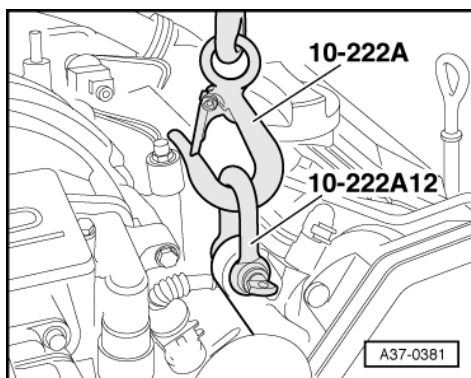
- -> Unbolt wiring retainer -left arrow-.
- Unplug connector -1- for reversing switch.
- Pull connector -2- off speedometer sender.
- Press release catch down and unplug connector -3- for multi-function switch.



- -> Release bayonet catch -4- on 8-pin connector by turning anti-clockwise and unplug connector from gearbox.
- Unclip wiring -right arrow-.



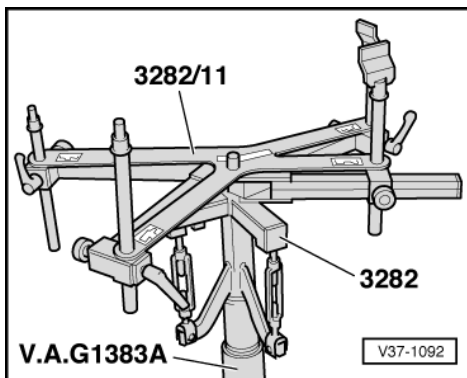
- -> Set up support bar 10-222 A on wing panel flanges.



- -> Attach 10-222 A 12 to front left engine lifting eye.
- Engage 10-222 A 12 on spindle of support bar 10-222 A.
- Raise engine as far as possible with spindle of support bar.

Note:

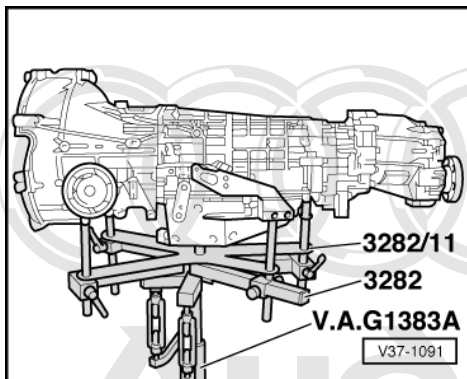
Do not lift engine so far that cruise control actuator contacts track rod.



- -> Set up gearbox support 3282 with adjusting plate 3282/11 for removing automatic gearbox 018, and mount onto jack V.A.G 1383 A.

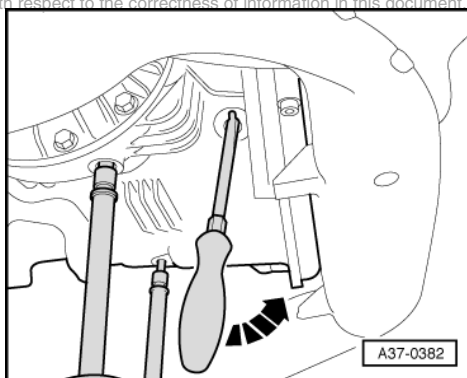
Note:

The symbols on the adjusting plate indicate the attachments required for automatic gearbox 018. The arrow points towards front of vehicle.



- -> Run gearbox jack V.A.G 1383 A with gearbox support 3282 in under the gearbox and take up the weight of the gearbox.
- Remove engine/gearbox connecting bolts on left and right sides.

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- -> Press gearbox off engine and at the same time press torque converter out of drive plate.
- Lower rear of engine/gearbox assembly slightly with jack V.A.G 1383 A.
- Move the gearbox away down to the rear.

Note:

Ensure that wiring and other connections are not damaged.

- Secure torque converter in gearbox to prevent it falling out.

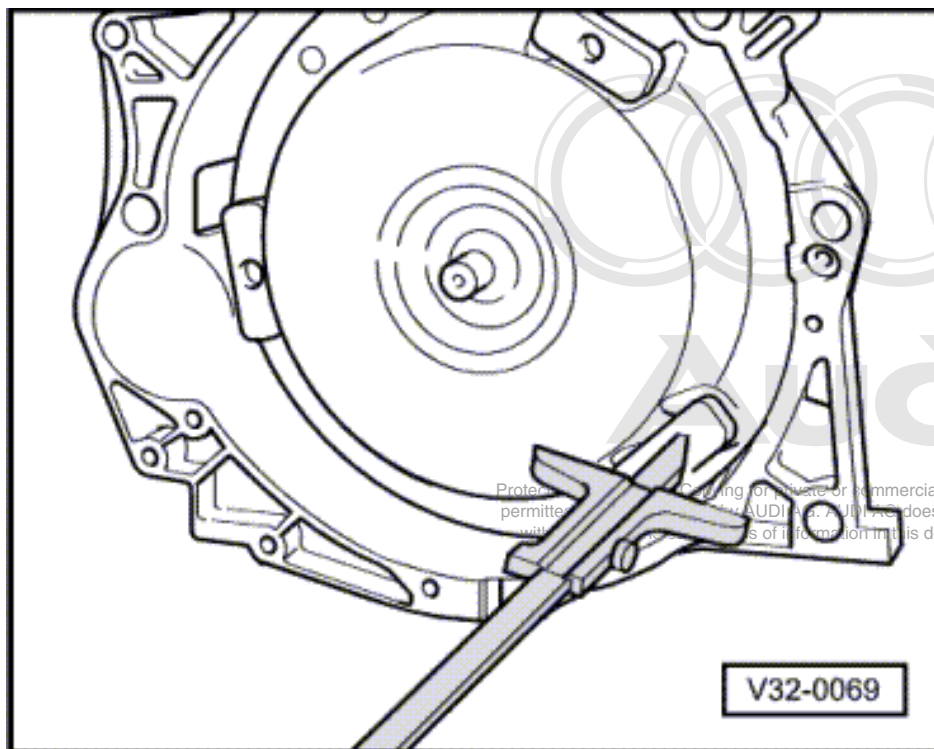


Installing

Install in reverse sequence; note the following points:

Notes:

- ♦ When performing repairs, renew seals, gaskets, self-locking nuts and bolts which have a specified tightening angle.
- ♦ Before installing a replacement gearbox, clean ATF pipes and ATF cooler.
=> Page 50 .
- Before installing the gearbox, ensure that the torque converter has been fitted correctly in the gearbox => Page 9 .



- -> If the torque converter has been fitted correctly, the distance between the surface of the mounting lugs and the surface of the torque converter bellhousing should be at least 26 mm.

Note:

The torque converter can only be secured to the drive plate in one position (due to unequal spacing between threaded holes). Turn torque converter as required.

- Before installing gearbox, make sure that dowel sleeves are correctly seated on cylinder block.
- Make sure that no wiring or pipes are trapped when bringing engine and gearbox together.
- Install engine/gearbox connecting bolts as marked on removal.
- First tighten all torque converter bolts by hand, and then tighten to specified torque.

Note:

When installing ATF pipes, replace O-rings and lubricate new O-rings with ATF.

- Renew all M12 subframe bolts which have been loosened, together with lock washers.

Note:

Do not slacken more than two M12 bolts on the subframe at the same time, otherwise it will be necessary to check and adjust wheel alignment.

- Install subframe, observing tightening sequence:

=> Running gear, front-wheel drive and four-wheel drive; Repair group 40; Removing and installing subframe
Removing and installing subframe

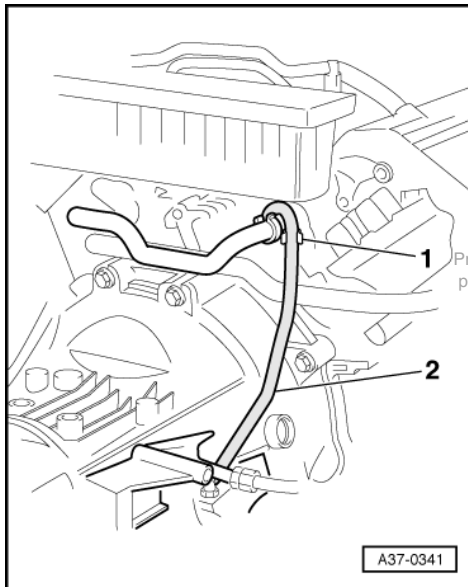
- Install propshaft => Page 111 .
- Bolt on drive shafts

=> Running gear, Front-wheel drive and four-wheel drive; Repair group 40; Servicing drive shafts; Removing and installing drive shafts
Servicing drive shafts Removing and installing drive shafts

- Align exhaust system free of stress

=> 8-cylinder engine, Mechanics; Repair Group 26; Aligning exhaust system free of stress
Aligning exhaust system free of stress

- The front engine support must be free of stress when installed; use spacers if necessary.



- Install viscous fan:

=> 8-cylinder engine, Mechanics; Repair group 15; Removing and installing toothed belt (engine code ABH, AEC); Removing and installing viscous fan
Removing and installing toothed belt (engine code ABH, AEC)
Removing and installing viscous fan

- Check selector lever cable setting => Page 20 .
- -> Secure differential breather hose -2- to engine with retaining clip -1-.
- Apply D 000 600 to bolts securing ignition cable retainer.
- Check oil level before starting engine.
- Check oil level in front final drive of automatic gearbox => Page 70 .
- Check ATF level => Page 41 .
- After connecting battery, enter anti-theft code for radio

=> Radio operating instructions

- Close windows fully using electric window switches.
- Then operate all electric window switches again for at least one second in the "close" direction to activate the automatic one-touch function.



- Set clock to correct time.

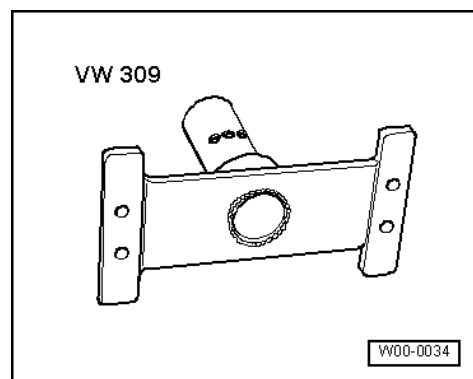
Tightening torques

Component		Nm
Bolts/nuts	M6	10
	M8	20
	M10	45
	M12	65

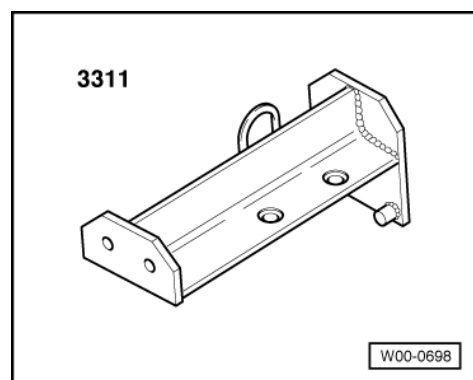
Component	Nm
Except for the following:	
Torque converter to drive plate	40
Front engine support to longitudinal member	45
Gearbox support to gearbox	42
Gearbox mountings to subframe	40
ATF pipes	25
Bracket for ATF pipe to engine	25
Support bracket for selector lever cable to gearbox	10
Heat shield for selector lever cable to gearbox	9
Cross-piece below exhaust system to body	25

3.2 - Securing gearbox to repair stand

Special tools and workshop equipment required

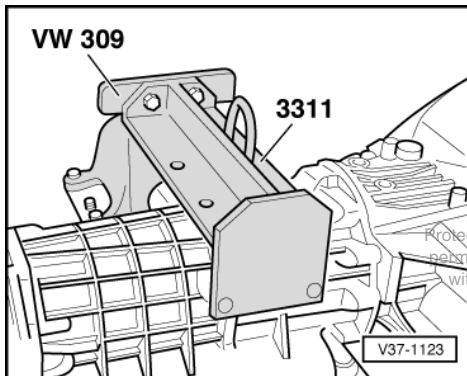


- ♦ Retaining plate VW 309



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- ♦ Attaching and holding appliance 3311
- Remove torque converter or secure it to prevent it dropping out.



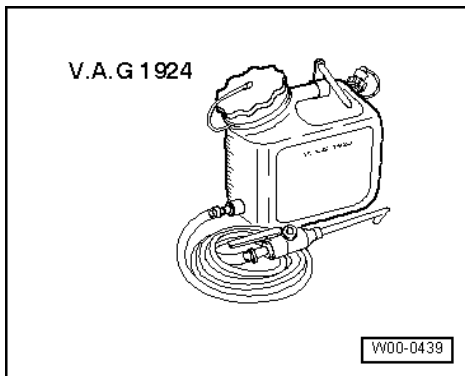
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- -> When performing repairs, secure gearbox to repair stand with attaching and holding appliance 3311 and holding plate VW 309.

4 - Checking ATF level; changing ATF

4.1 - Checking ATF level; changing ATF

Special tools and workshop equipment required



- ♦ ATF filling system V.A.G 1924
- ♦ Drip tray
- ♦ Protective goggles

4.2 - Checking ATF level

Requirements for test:

- Gearbox not in emergency running mode; ATF temperature not higher than 30 °C when starting the check.
- Vehicle must be level (horizontal)
- Selector lever in position P
- Air conditioner and heater switched off



Note:

Use only ATF G 052 162 A (transparent and slightly yellow) for topping up. Do not use any additives.

Container sizes:

- ♦ 0.5 ltr. - Part No. G 052 162 A1
- ♦ 1.0 ltr. - Part No. G 052 162 A2
- ♦ 20 ltr. - Part No. G 052 162 A6

Notes:

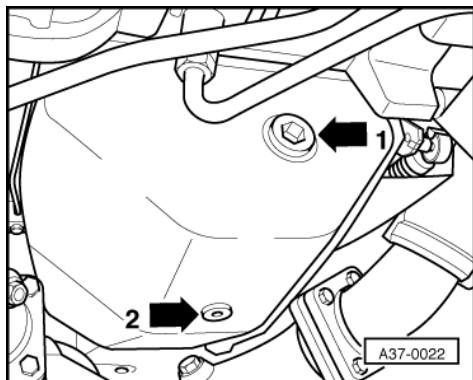
- ♦ The ATF level will vary according to the temperature of the ATF.
- ♦ If the ATF level is checked when the ATF temperature is too low, this will result in overfilling.
- ♦ If the ATF level is checked when the ATF temperature is too high, this will result in underfilling.
- ♦ Overfilling or underfilling will impair the function of the gearbox.

Test sequence

- Start engine and allow to run at idling speed.

Notes:

- ♦ The ATF temperature must not be above 30 °C when starting the check (gearbox oil pan just warm to the touch).
- ♦ Temperature tester V.A.G 1558 can be used for a more accurate measurement of the ATF temperature. Apply the tester probe to the outside of the oil pan.



- -> Unscrew ATF filler plug -arrow 1-.

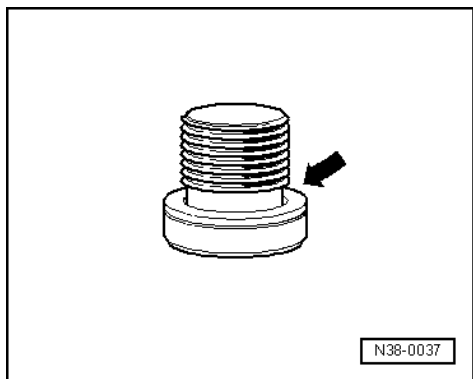
Warning!

Wear eye protection

- The ATF level is correct if a small quantity of fluid comes out at the hole when the ATF temperature is between 35 ° and 40 °C 1). (The fluid will come out because the ATF level rises as the temperature increases.)

1) 50°C for tropical countries

- If ATF flows out of the hole, the ATF level is okay.



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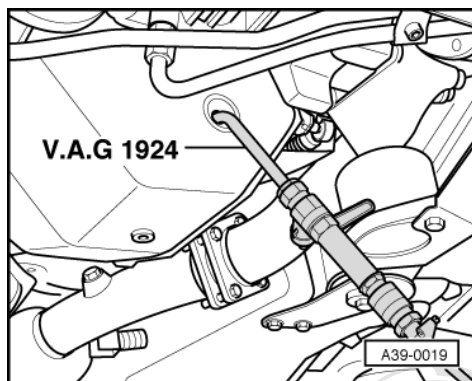
- -> Always renew seal -arrow- for ATF inspection plug.
- Tighten ATF filler plug. This completes the ATF check.

Tightening torque

Component	Nm
ATF filler plug	60

Topping up ATF

- If no ATF comes out at the hole, top up with ATF as follows:



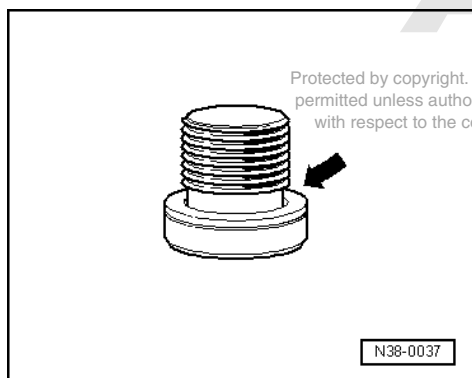
- -> Use V.A.G 1924 to add ATF until fluid level reaches lower edge of filler hole.

Note:

Use only ATF with Part No. G 052 162 A (colourless/yellow) for topping up. Do not use any additives.

Warning!

If the ATF level is too high or too low it will adversely affect the operation of the gearbox.



- -> Always renew seal -arrow- for ATF inspection plug.
- Tighten ATF filler plug -arrow 1-. This completes the ATF check.

Tightening torque

Component	Nm
ATF filler plug	60

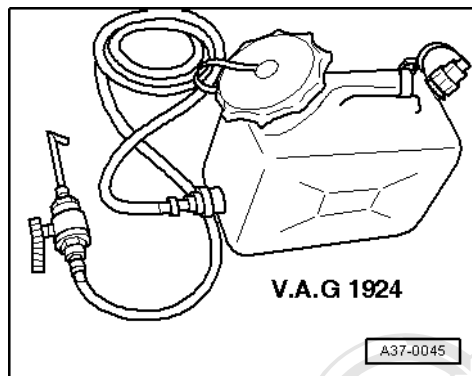


4.3 - Changing ATF or filling up after repairs

- Engine not running

Notes:

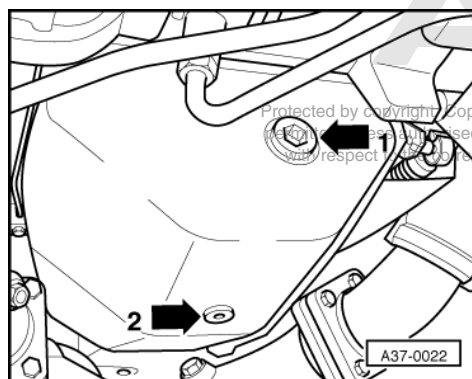
- ♦ Use only ATF G 052 162 A (yellowish colour). Do not use any additives.
- ♦ The engine must not be started without ATF and the vehicle must not be towed!
- ♦ The ATF temperature must not be above 30 °C when starting the check (gearbox oil pan just warm to the touch).
- ♦ Temperature tester V.A.G 1558 can be used for a more accurate measurement of the ATF temperature. Apply the tester probe to the outside of the oil pan.



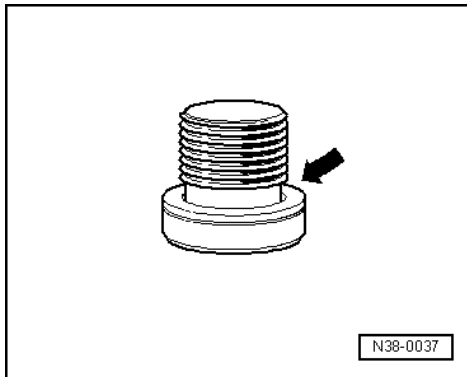
- ♦ Observe disposal regulations!

Work sequence

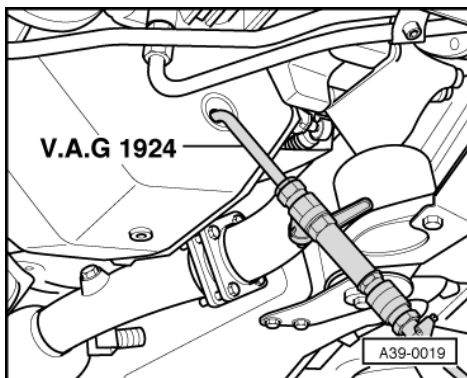
- -> Secure reservoir of ATF filling system V.A.G 1924 at the highest possible point on the vehicle.
- Raise vehicle.
- Place container under the gearbox.



- -> Unscrew ATF drain plug -arrow 2-.
- Drain ATF.
- Unscrew ATF filler plug -arrow 1-.



- -> Always renew seal -arrow- for ATF drain plug.
- Tighten ATF drain plug.



- -> Use V.A.G 1924 to add ATF until fluid level reaches lower edge of filler hole.
- Start engine and run at idling speed.

Warning!
Wear eye protection

- With the engine running, add more ATF until fluid level reaches lower edge of filler hole again.
- Fit ATF filler plug with new seal and screw in (hand-tight).
- With the brake pedal depressed and the engine running at idling speed, move the gear selector lever through all gear positions. The selector lever must be left in each position for 2 or 3 seconds.
- Check and top up ATF level =>from Page 41 .

Note:

Observe all notes and test requirements as for "Checking ATF level".

Tightening torque

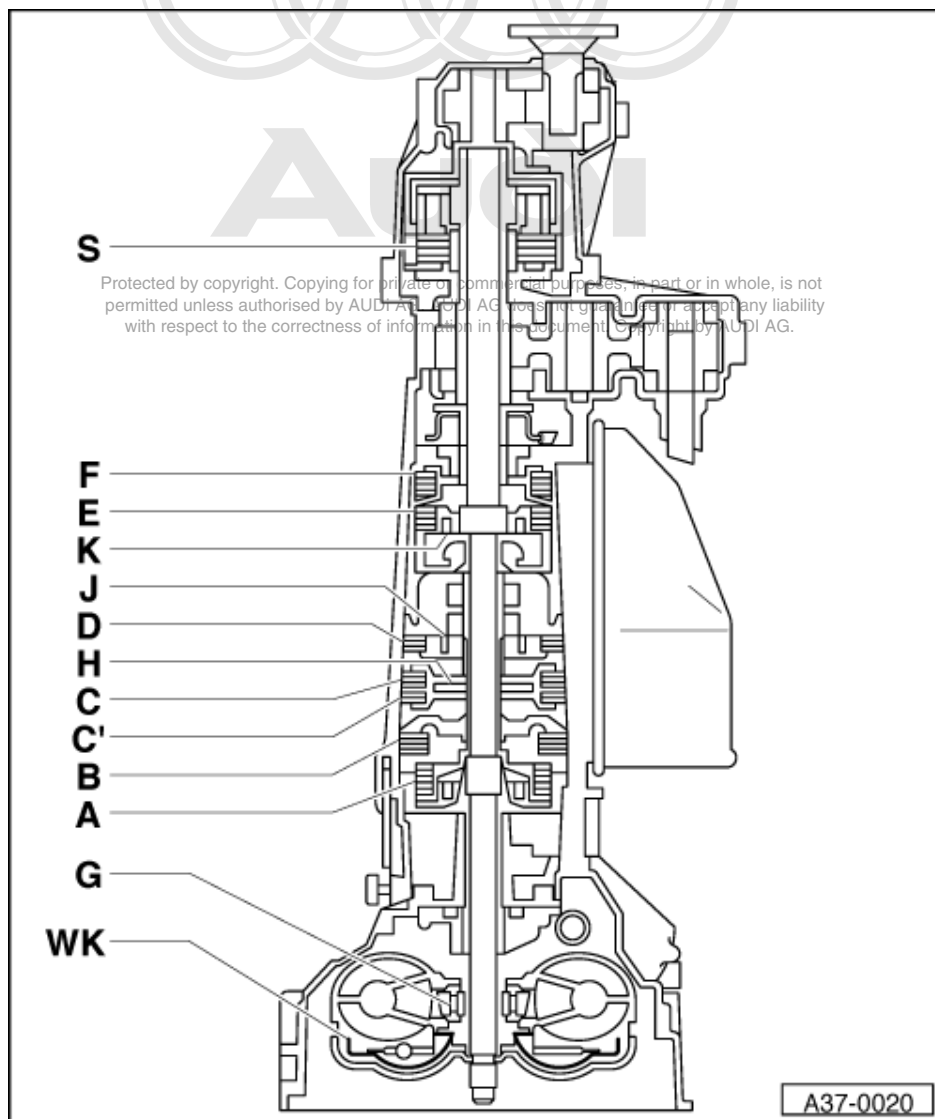
Component	Nm
ATF drain plug	35
ATF filler plug	60

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5 - Transmission layout

5.1 - Transmission layout



- A - Clutch A
- B - Clutch B
- E - Clutch E
- C' - Brake C'
- C - Brake C
- D - Brake D
- F - Brake F
- G - Freewheel G
- H - Freewheel H
- J - Freewheel J
- K - Freewheel K
- S - Clutch S

WK - Torque converter lock-up clutch

5.2 - Actuation of selector elements

- ◆ When dealing with problems relating to poor acceleration and performance or general malfunctions, the following chart indicates which selector elements are actuated in the various gears. This should help to identify the selector elements which are not working properly.

Position / gear	Solenoid valves			Clutches							
	Solenoid valves			Clutches				Brakes			
	-N88	-N89	-N90	A	B	E	S	C'	C	D	F
P = park											
R = reverse					x	x	(x)			x	
N = neutral		x				x					
D, 1st gear		x		x		x	(x)			(x)	
D, 2nd gear	x	x	(x)	x		x	(x)	x	x		
D, 3rd gear	x		(x)	x	x	x	(x)		x		
D, 4th gear			(x)	x	x		(x)		x		x
Emergency running (backup) mode				x	x				x		

6 - Dismantling and assembling gearbox

6.1 - Dismantling and assembling gearbox

- Observe general repair instructions=> Page 4 .

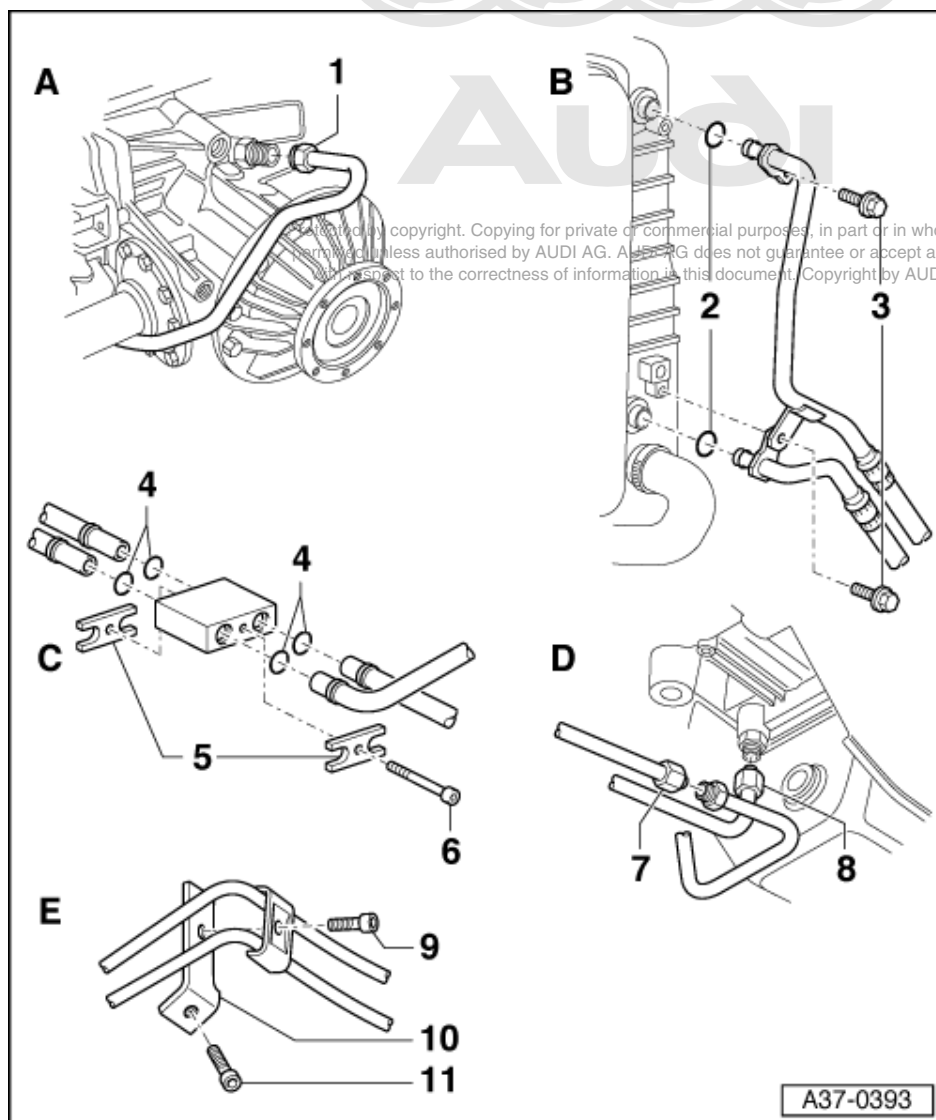
6.2 - Rules for cleanliness when working on automatic gearbox

- ◆ Thoroughly clean the connection points and the surrounding area before disconnecting.
- ◆ Place removed parts on a clean surface and cover over. Use sheeting or paper. Do not use fluffing cloths!
- ◆ Carefully cover over or plug opened components if repairs are not carried out immediately.
- ◆ Install only clean parts: do not remove replacement parts from their wrapping until just before installing.
- ◆ Always replace O-rings, seals and gaskets.
- ◆ Lightly lubricate O-rings with ATF before fitting to prevent the rings being trapped and damaged when components are installed.
- ◆ Do not use any other lubricants in or on components that are lubricated with ATF. Otherwise, problems may occur with the hydraulic actuation of the gearbox.
- ◆ After completing installation, check the following fluid levels and top up as necessary:
ATF in planetary gearbox => Page 3 .

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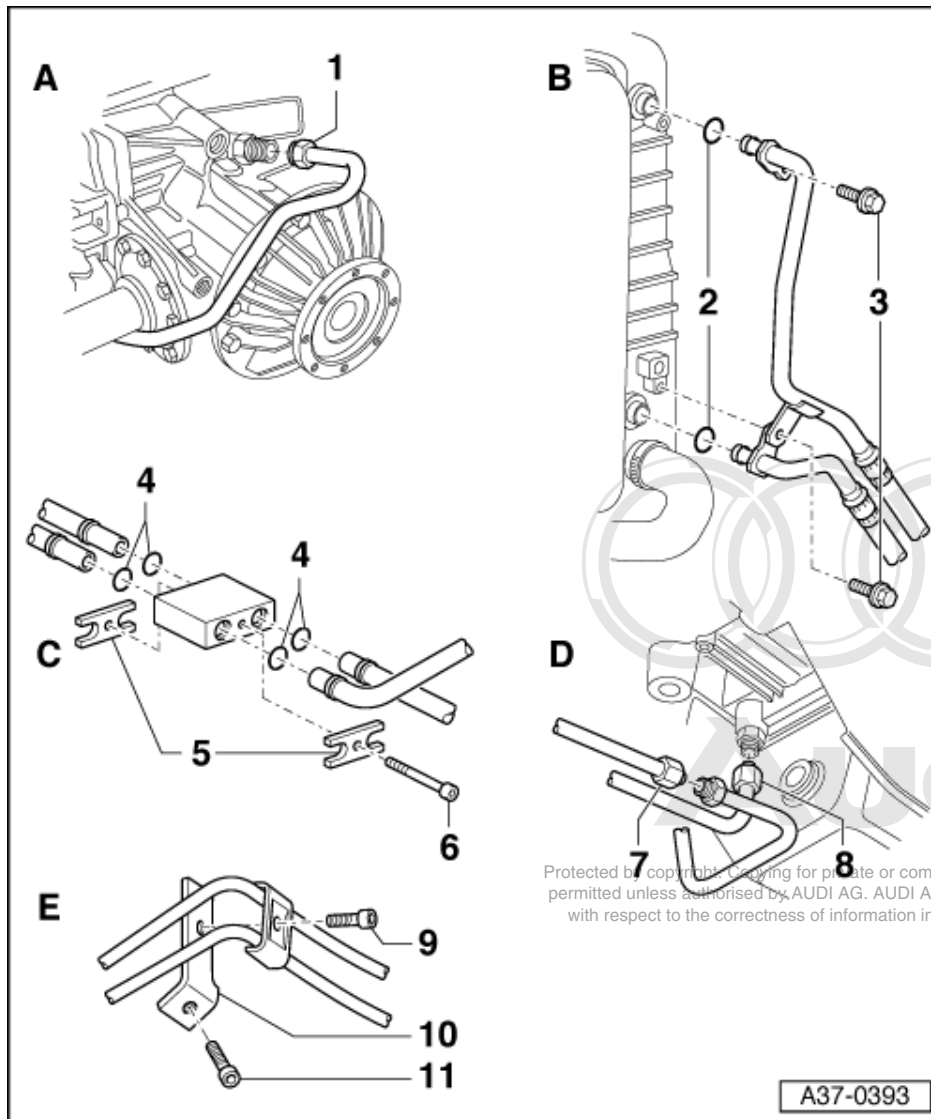


6.3 - Removing and installing ATF pipes



- A - Attachment of ATF pipe to gearbox (top)
- B - Attachment of ATF pipe to ATF cooler
- C - Connecting ATF pipe to ATF pipe
- D - Attachment of ATF pipe to gearbox (bottom)
- E - Attachment of ATF pipe to bracket

- 1 Union nut - 25 Nm
- 2 O-ring
 - ◆ Renew
 - ◆ Insert with ATF



- 3 Bolt - 5 Nm**
 - ♦ Do not tighten until pipe is completely inserted
- 4 O-ring**
 - ♦ Renew
 - ♦ Insert with ATF
- 5 Retainer**
- 6 Bolt - 24 Nm**
 - ♦ Do not tighten until pipe is completely inserted
- 7 Union nut, 25 Nm**
- 8 Union nut, 25 Nm**
- 9 Bolt - 5 Nm**
- 10 Bracket**
- 11 Bolt - 25 Nm**



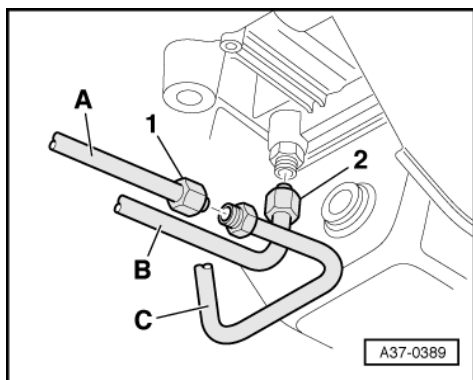
6.4 - Cleaning ATF pipes and ATF cooler

Note:

Always blow out ATF cooler and ATF pipes with compressed air (not more than 10 bar) before installing an exchange gearbox.

Special tools and workshop equipment required

- ♦ Hose, approx. 18 mm dia.
- ♦ Compressed air gun (commercially available)
- ♦ Drip tray
- ♦ Protective goggles

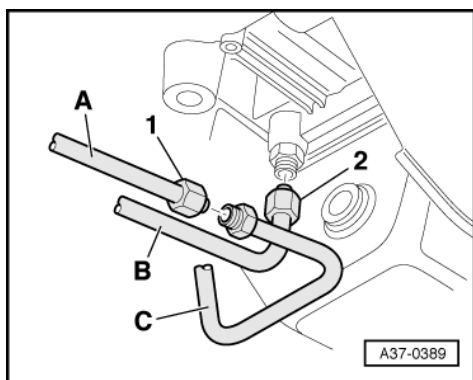


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Work sequence

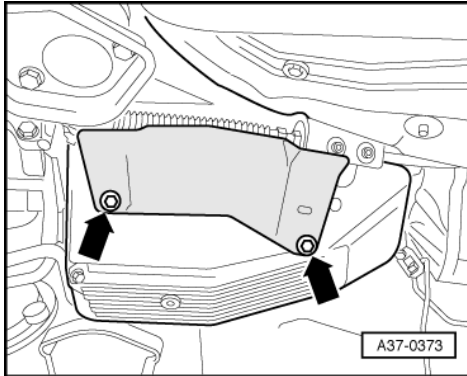
- Place container under the gearbox.
- -> Unscrew union nuts -1- and -2-.
- Pull ATF pipes off gearbox.
- Connect hose (approx. 18 mm dia.) to ATF pipe -A- and secure with a hose clamp. Hang other end of hose in a suitable container.

Warning!
Wear eye protection



- -> Blow through ATF pipe -B- with a compressed air gun.
- Change hose from ATF pipe -A- over to ATF pipe -B- and repeat sequence.
- If necessary, blow through ATF pipe -C- with gearbox removed.
- Secure ATF pipes again=>Page 48 .
- Then check and top up ATF level=>Page 41 .

6.5 - Removing and installing multi-function switch -F125

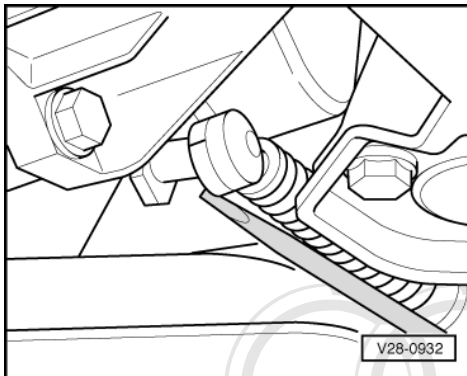


Removing

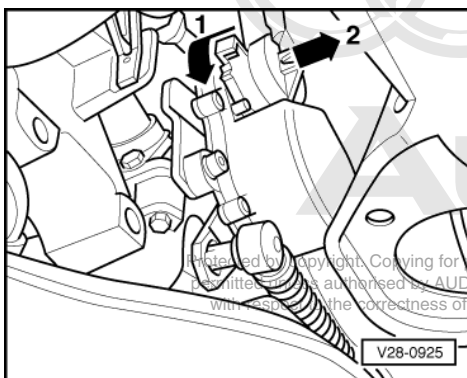
- -> Unbolt heat shield for selector lever cable on gearbox -arrows-.

Note:

Shown in illustration with exhaust system removed.



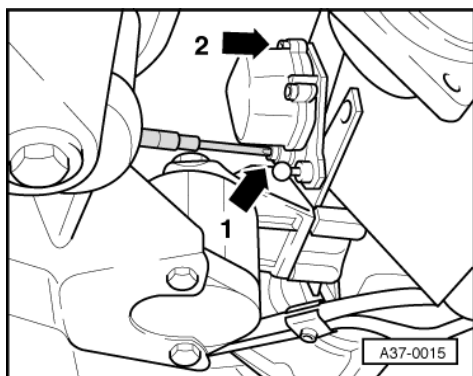
- -> Detach securing clip and press off ball socket of selector lever cable with a screwdriver.



- -> Using a screwdriver, press down retainer catch -arrow 1- of 8-pin connector on multi-function switch - F125.
- Unplug connector. There is a drilling inside the connector to help when disconnecting. Prise off with an Allen key if necessary.

Note:

Illustration shows gearbox without left gearbox support.



- -> Unscrew bolts -arrow 1- and -arrow 2-.

Note:

To slacken bolts, use a 5 mm socket with 1/4" drive.

- Take off multi-function switch.

Installing

Install in reverse sequence; note the following points:

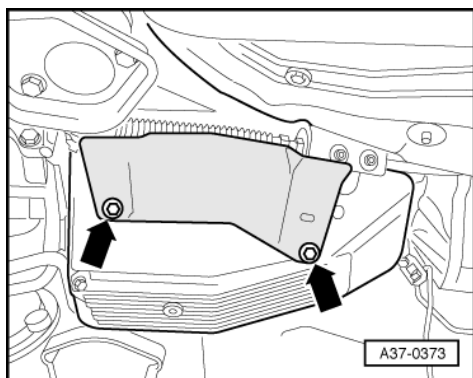
- Fit retainer catch on multi-function switch and pull off protective cap.
- Plug in connector and press retainer catch upwards as far as it will go.

Note:

When plugging in the connector, take care not to damage any of the retaining tabs on the connector.

- Only screw in securing bolts so far that multi-function switch can still be moved within elongated holes.
- Adjusting multi-function switch => page 52.

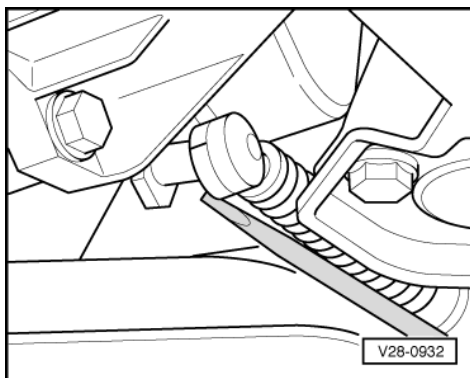
6.6 - Adjusting multi-function switch -F125



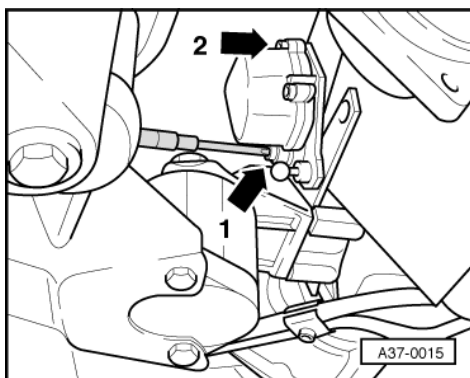
- Move selector lever into position "P".
- -> Unbolt heat shield for selector lever cable on gearbox -arrows-.

Note:

Shown in illustration with exhaust system removed.



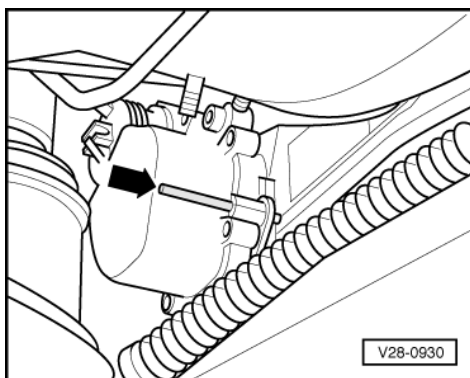
- -> Release securing clip and lever off ball socket of selector lever cable using a screwdriver.
- Set ball joint on gearbox selector lever to position "N" as follows:
 - Press ball joint forwards to end stop (position "P").
 - Then allow ball joint to move through position "R" and engage in position "N".



- Move selector lever into position "N".
- -> Slacken securing bolts -arrow 1- and -arrow 2- far enough to allow multi-function switch to move in elongated holes.

Notes:

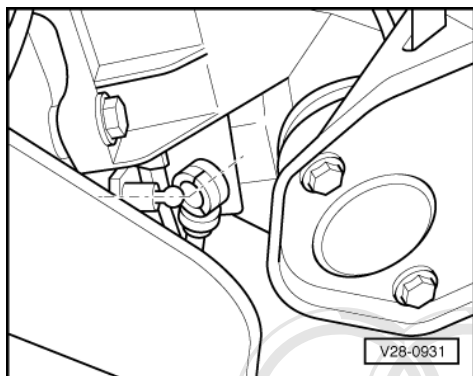
- ♦ To slacken bolts, use a 5 mm socket with 1/4" drive.
- ♦ The multi-function switch can be adjusted with an adjuster pin (which is only supplied together with the switch as a replacement part) or by using a 4 mm drill bit.



- -> Insert adjuster pin or drill bit through adjustment hole in multi-function switch.
- Turn multi-function switch until adjuster pin or 4 mm drill bit can be fixed in opposite adjustment hole.
- Tighten securing bolts for multi-function switch (10 Nm).
- Remove adjuster pin or drill bit



- Press ball joint forwards to end stop (position "P").
- Move selector lever into position "P".



- -> Ball socket and ball joint should be aligned accurately.
Attach selector lever cable to ball joint by hand; ball socket should engage.
Press on securing clip.

If ball socket and ball joint are not aligned accurately:

- Check selector lever cable setting => Page 20 .

Note:

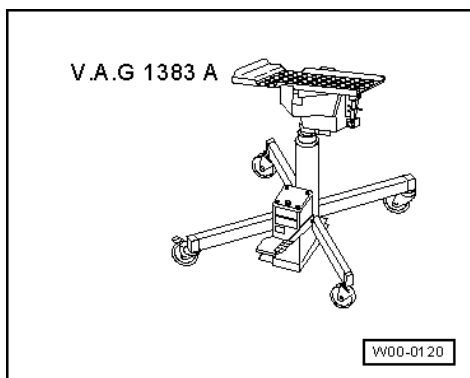
If the selector lever display in the dash panel insert does not agree with the selector lever position after repeated adjustment to the selector lever cable and the multi-function switch, renew the multi-function switch =>Page 51 .

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Tightening torque

Component	Nm
Multi-function switch to gearbox	10
Heat shield for selector lever cable to gearbox	9

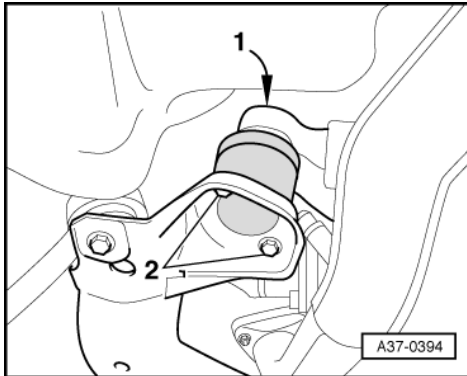
6.7 - Removing and installing reversing switch -F41



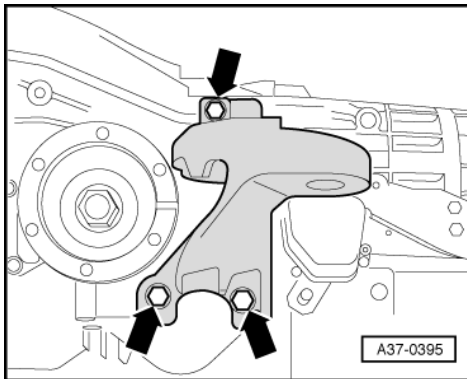
Special tools and workshop equipment required

- ♦ Engine/gearbox jack V.A.G 1383 A

Removing



- -> Unbolt bonded rubber mounting from left gearbox support -1-.
- Run engine/gearbox jack V.A.G 1383 A under the gearbox and take up the weight of the gearbox.
- Unbolt bonded rubber mounting from subframe -2-.
- Unclip lambda probe wiring from left gearbox support.

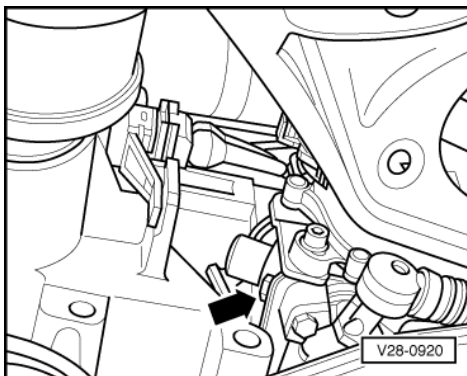


- -> Unbolt left gearbox support -arrows-.

Note:

Shown in illustration with gearbox removed.

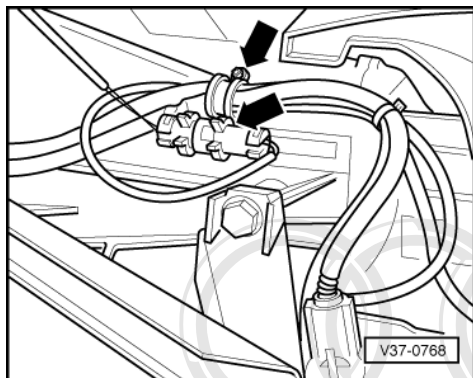
- Take out bonded rubber mounting.
- Move left gearbox support clear to the side.



- -> Unscrew bolt -arrow- for retainer bracket.
- Pull switch out of gearbox.



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- -> Detach electrical connector from retainer and unplug connector. Unscrew wiring clamp.

Installing

Install in reverse sequence; note the following points:

- Renew O-ring on switch.

Tightening torques

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Component	Nm
Retainer bracket for switch to gearbox	10
Left gearbox support to gearbox	40
Bonded rubber mounting to left gearbox support	40
Bonded rubber mounting to subframe	40

38 - Gears, Hydraulic controls

1 - Removing and installing oil pan, ATF screen and valve body

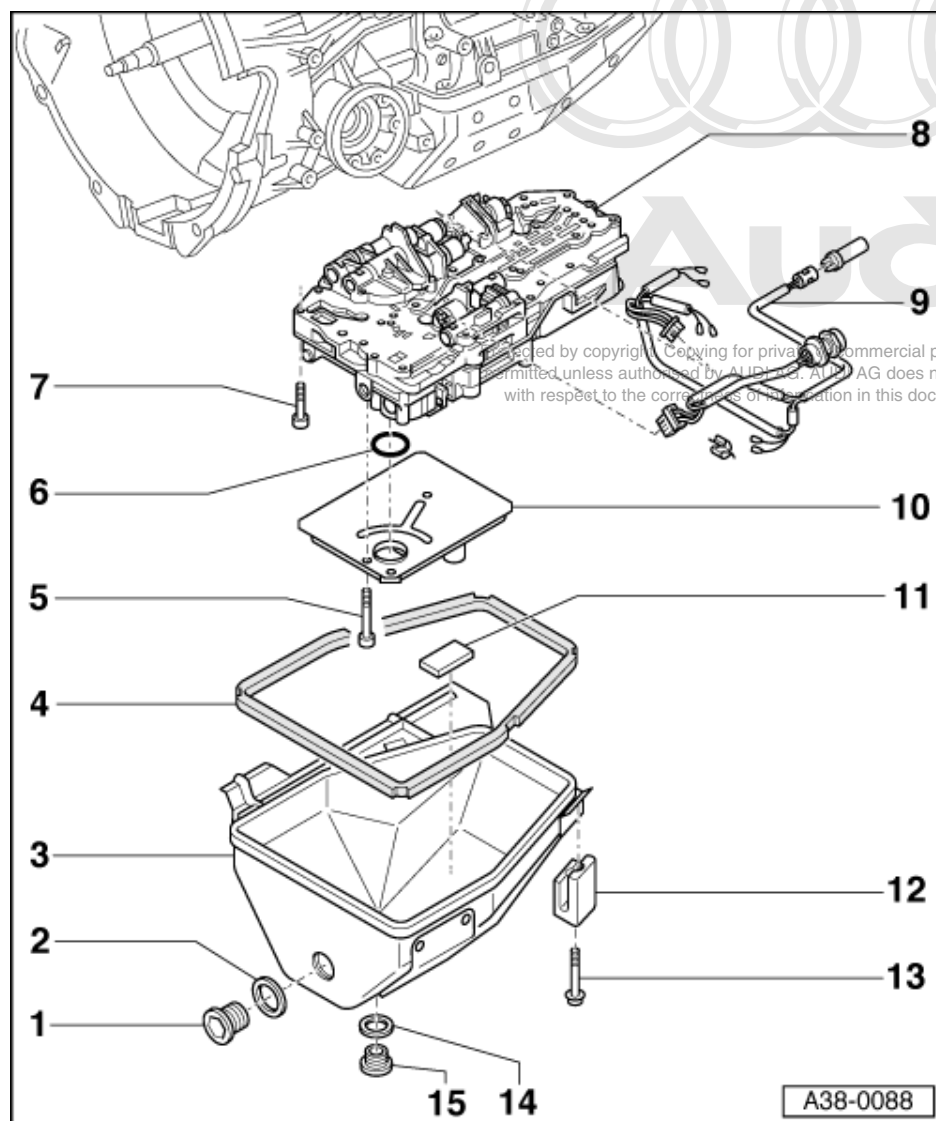
1.1 - Removing and installing oil pan, ATF screen and valve body

Warning

Do not run engine or tow vehicle with oil pan removed or when there is no ATF in the gearbox.

Notes:

- ◆ Always replace valve body if it has collected dirt or if it is defective.
- ◆ Observe rules for cleanliness when working on automatic gearbox => Page 47 .
- ◆ General repair instructions => Page 4 .
- ◆ Lubricate O-rings and oil seals lightly with ATF. Other types of lubricant can cause problems with the hydraulic actuation of the gearbox.



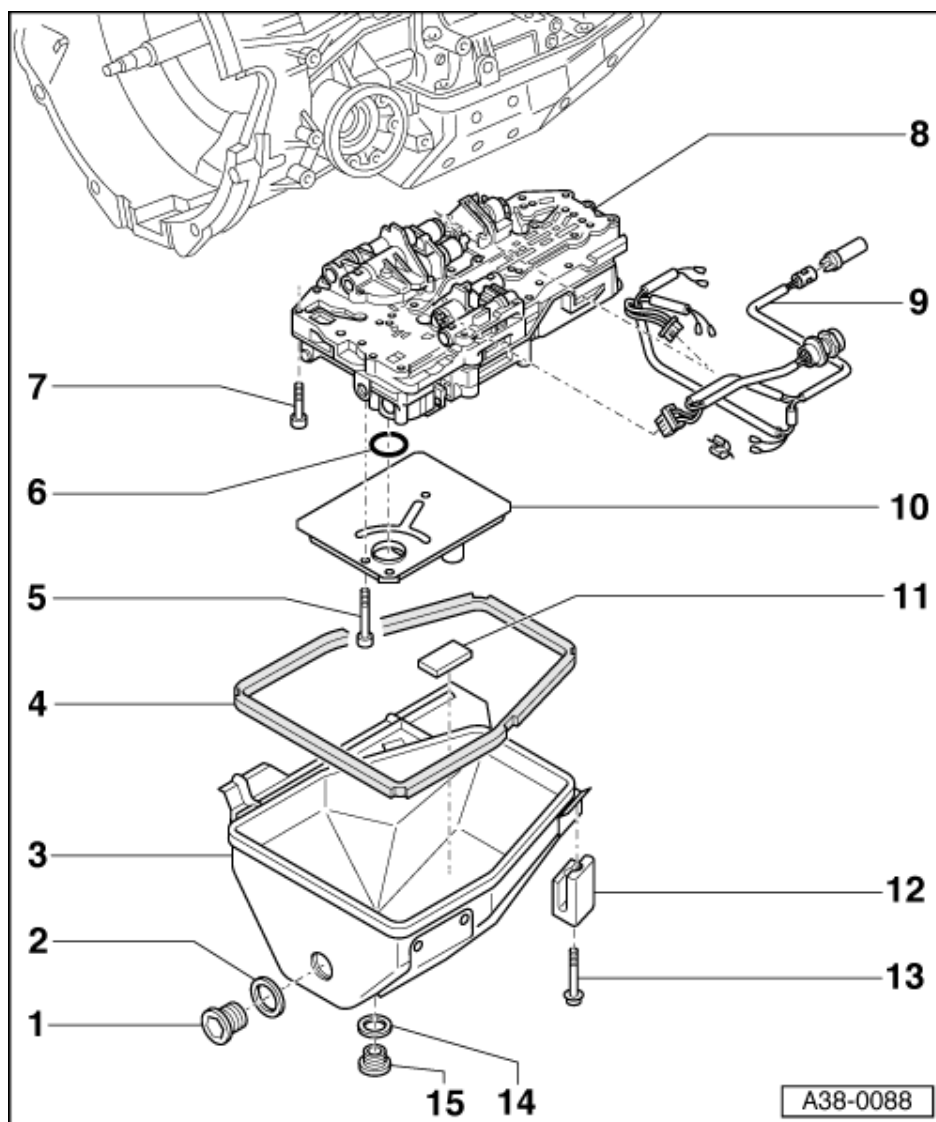


- 1 Plug - 60 Nm
- 2 Seal
 - ♦ Renew
- 3 Oil pan
 - ♦ Removing and installing
 - => Page 60
- 4 Gasket
 - ♦ Renew
- 5 Bolt - 8 Nm
- 6 O-ring
 - ♦ Renew
- 7 Bolt - 8 Nm
 - ♦ Bolts securing valve body:
 - 7 bolts M6 x 33;
 - 3 bolts M6 x 60,
 - 3 bolts M6 x 80
 - ♦ Note sequence when loosening
 - => Page 64
 - ♦ Note sequence when tightening
 - => Page 65



Audi

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- 8 Valve body
 - ♦ Removing and installing

=> Page 63

9 Wiring harness

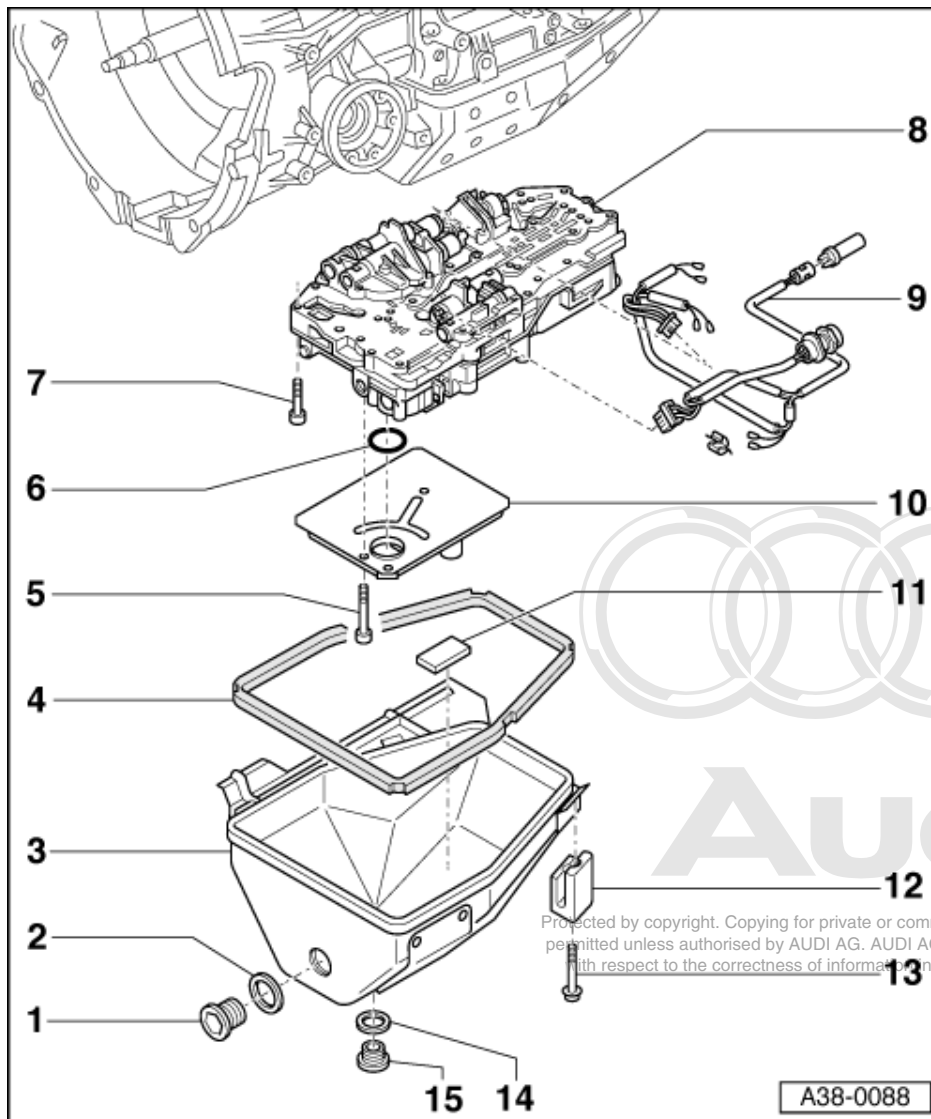
- ◆ Removing and installing
=>Page 65
- ◆ Remove and install valve body (=>Page 63) in order to renew wiring harness
- ◆ Renew O-ring on 8-pin connector
- ◆ Tighten coupling nut on 8-pin connector to 20 Nm

10 ATF screen

- ◆ Removing and installing
=> Page 62

11 Magnet

- ◆ Qty. 4
- ◆ Ensure correct positioning, otherwise noise can be caused



12 Retaining bracket

13 Bolt - 6 Nm

- ◆ Tighten oil pan bolts in several stages and in diagonal sequence

14 Seal

- ◆ Renew

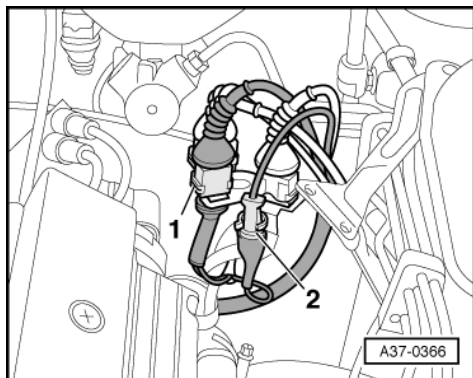
15 Drain plug - 35 Nm



1.2 - Removing and installing oil pan

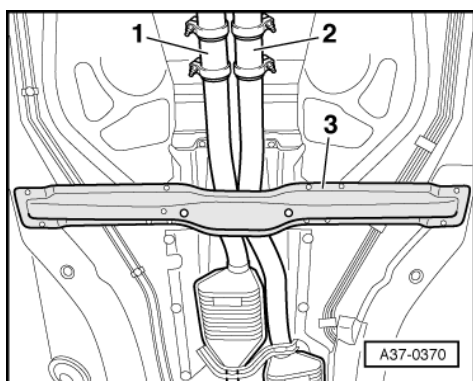
Special tools and workshop equipment required

- ♦ Drip tray



Removing

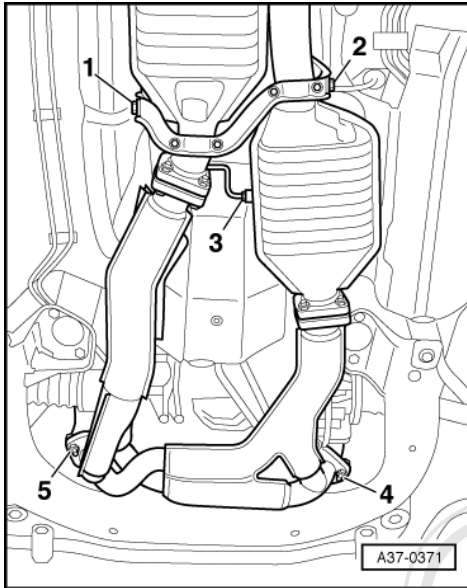
- Unbolt left air duct going to air cleaner housing.
- -> Unplug connectors -1- and -2- for lambda probe and lambda probe heater.
- Release wiring.
- Move wiring clear to the bottom.



- -> Remove floor cross piece -3-.
- Slacken bolts on clamps -1- and -2-.
- Unclip lambda probe wiring from left gearbox support.



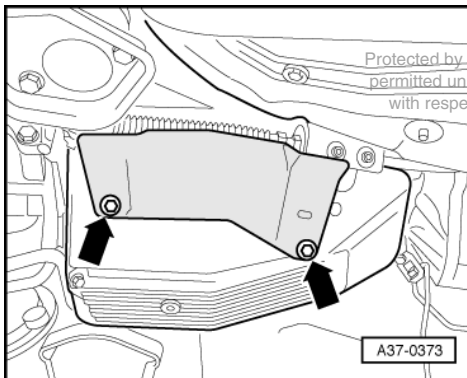
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- -> Unscrew thermo-sensor -3-.
- Unbolt exhaust system from left and right manifolds -4- and -5- and at mountings on gearbox -1- and -2-.
- Remove front exhaust pipes together with catalytic converters.

Note:

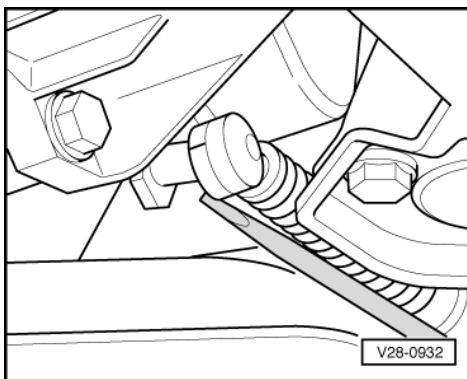
When removing the exhaust system, ensure that the sealing rings do not drop onto the ground - they can be damaged by impact.



- -> Unbolt heat shield for selector lever cable on gearbox.

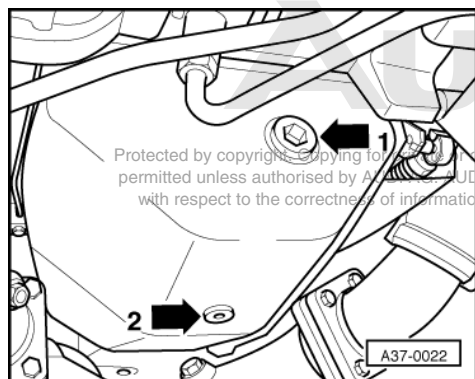
Note:

Shown in illustration with exhaust system removed.





- -> Release securing clip and lever off ball socket of selector lever cable using a screwdriver.
- Place container under the gearbox.



- -> Unscrew ATF drain plug -arrow 2- and drain off ATF.
- Slacken bolts on oil pan.
- Take off retaining bracket (which is now loose).

Installing

Install in reverse sequence; note the following points:

Note:

Replace gaskets and seals.

- Clean magnets in oil pan. Ensure that the magnets are in full contact with the oil pan.
- Always renew seal for ATF drain plug.
- Align exhaust system free of stress

=> 8-cylinder engine, Mechanics; Repair Group 26; Aligning exhaust system free of stress Aligning exhaust system free of stress

- Check selector lever cable setting => Page 20 .
- Top up ATF => Page 44 .

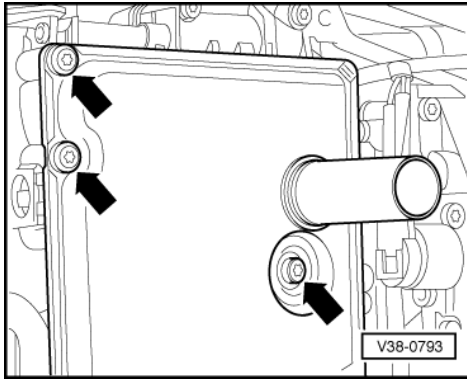
Tightening torques

Component	Nm
ATF drain plug	35
Oil pan to gearbox housing	6
Heat shield for selector lever cable to gearbox	9
Floor cross piece	10

1.3 - Removing and installing ATF screen

Removing

- Remove oil pan => Page 60 .



- -> Unscrew bolts on ATF screen -arrows-.
- Pull ATF screen off valve body.

Installing

Install in reverse sequence; note the following points:

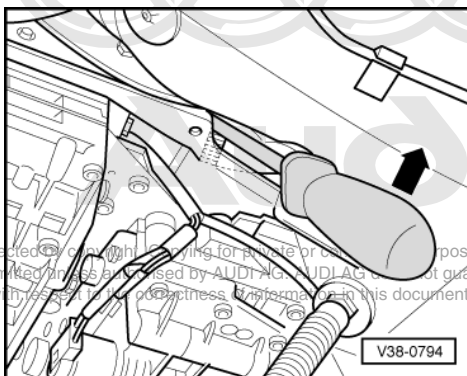
- Renew O-ring on ATF screen.
- Install oil pan => Page 62 .
- Fill up with ATF => Page 44 .

Tightening torque

Component	Nm
ATF screen to valve body	8

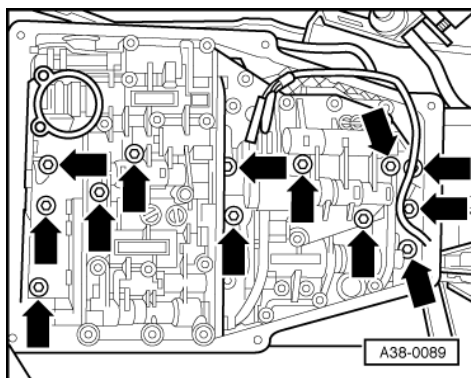
1.4 - Removing and installing valve body

Removing



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- Remove oil pan => Page 60 .
- Remove ATF screen => Page 62 .
- -> Release bayonet catch on 8-pin connector by turning anti-clockwise with a screwdriver and unplug connector from gearbox.
- Slacken coupling nut (32 mm A/F).



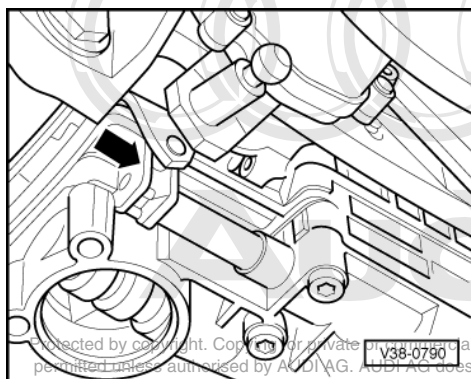
- ➔ Unscrew securing bolts -arrows- on valve body, working from outside to inside, and take out valve body together with wiring harness.

Notes:

- ♦ Only slacken the securing bolts indicated in the illustration -arrows-.
- ♦ If other bolts are slackened, this can affect the functioning of the valve body.
- ♦ The bolts have different lengths; check that they are fitted correctly.

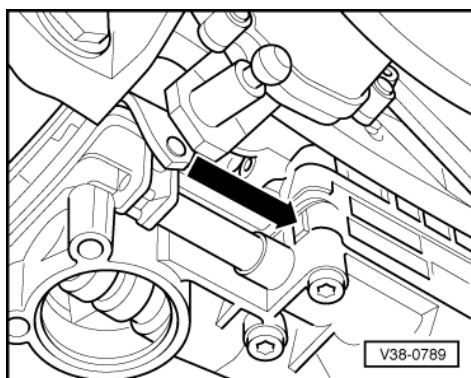
Installing

Install in reverse sequence; note the following points:



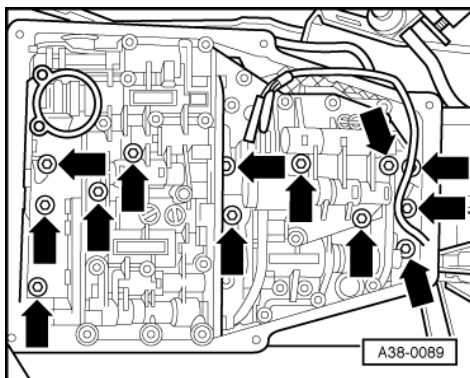
- ➔ Engage selector slide -arrow- in detent plate.

- First tighten bolts securing valve body hand-tight.



- ➔ Set selector lever of multi-function switch to position "1" -arrow-.

- Move valve body until cast lug makes contact with detent plate -tip of arrow-.



- -> Then tighten bolts for valve body to specified torque, working from the inside outwards.
- Renew O-ring on 8-pin connector.
- Install ATF screen => Page 62 .
- Install oil pan => Page 62 .
- Fill up with ATF => Page 44 .

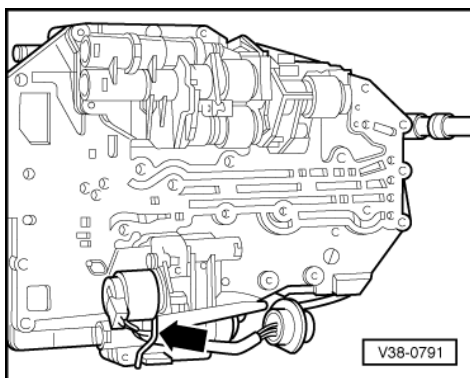
Tightening torques

Component	Nm
Coupling nut for 8-pin connector on wiring harness	20
Valve body to gearbox housing (working from the inside outwards)	8

1.5 - Removing and installing wiring harness in gearbox

Removing

- Remove valve body => Page 63
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- -> Unplug connectors at solenoid valves and pull wiring harness out of retainer -arrow-.

Installing

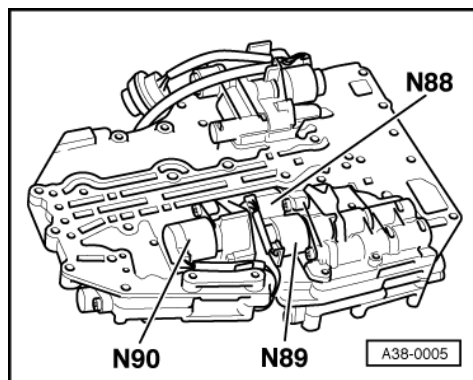
Install in reverse sequence; note the following points:

- When fitting the harness, plug the connectors onto the respective solenoid valves.
- Renew O-ring on 8-pin connector.
- Install valve body => page 63 .
- Install ATF screen => Page 62 .
- Install oil pan => Page 62 .

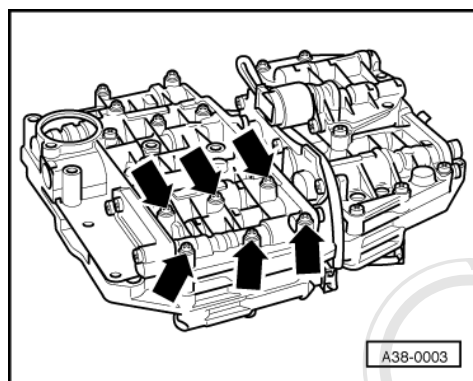
- Fill up with ATF => Page 44 .

1.6 - Removing and installing solenoid valves -N88 and -N89

Removing



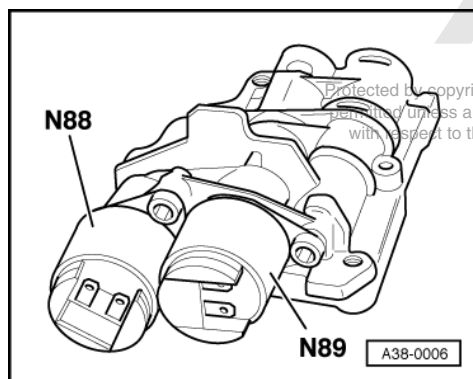
- Remove valve body => Page 63 .
- -> Unplug connector on solenoid valve.



- -> Unscrew bolts -arrows-.

Notes:

- ♦ Only slacken the securing bolts indicated in the illustration -arrows-.
- ♦ If other bolts are slackened, this can affect the functioning of the valve body.



- -> Unbolt retainer at defective solenoid valve.

Installing

Install in reverse sequence; note the following points:

- Install the solenoid valve so that the connector terminal points in the same direction as before.
- Install valve body => Page 63 .
- Install ATF screen => Page 62 .
- Install oil pan => Page 62 .
- Fill up with ATF => Page 44 .

Tightening torques

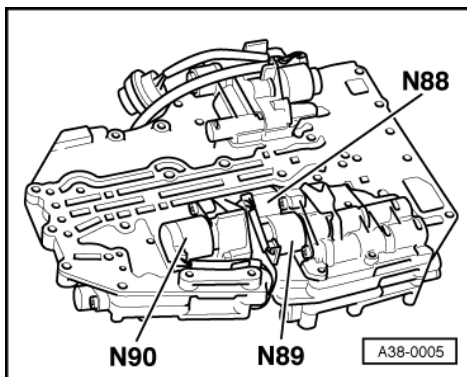
Component	Nm
Retainer for solenoid valve	5
Housing to valve body	5

1.7 - Removing and installing solenoid valve -N90

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Removing

- Remove valve body => Page 63 .



- -> Unplug connector on solenoid valve.
- Unbolt retainer.

Installing

Install in reverse sequence; note the following points:

- Install the solenoid valve so that the connector terminal points in the same direction as before.
- Install valve body => Page 63 .
- Install ATF screen => Page 62 .
- Install oil pan => Page 62 .
- Fill up with ATF => Page 44 .

Tightening torque

Component	Nm
Retainer for solenoid valve	5



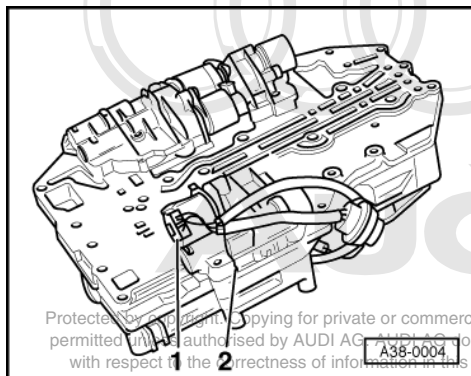
1.8 - Removing and installing solenoid valve -N91 (pressure regulator)

Note:

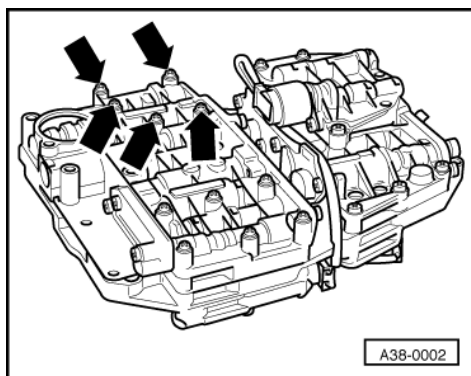
The pressure regulator -N91 can only be renewed together with the modulator housing.

Removing

- Remove valve body => Page 63 .



- -> Unplug connector -1-.
- Release retaining clip -2-.



- -> Unscrew bolts -arrows-.

Notes:

- ♦ Only slacken the securing bolts indicated in the illustration -arrows-.
- ♦ If other bolts are slackened, this can affect the functioning of the valve body.

Installing

Install in reverse sequence; note the following points:

- Install valve body => Page 63 .
- Install ATF screen => Page 62 .
- Install oil pan => Page 62 .
- Fill up with ATF => Page 44 .

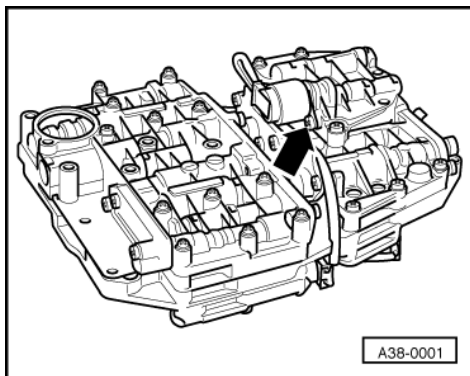
Tightening torque

Component	Nm
Modulator housing to valve body	5

1.9 - Removing and installing solenoid valve -N92 (for centre differential lock)

Removing

- Remove ATF screen => Page 62 .
- Unplug connector at solenoid valve.



- -> Unbolt retainer -arrow-.

Installing

Install in reverse sequence; note the following points:

- Install ATF screen => Page 62 .
- Install oil pan => Page 62 .
- Fill up with ATF => Page 44 .

Tightening torque

Component	Nm
Retainer for solenoid valve	5

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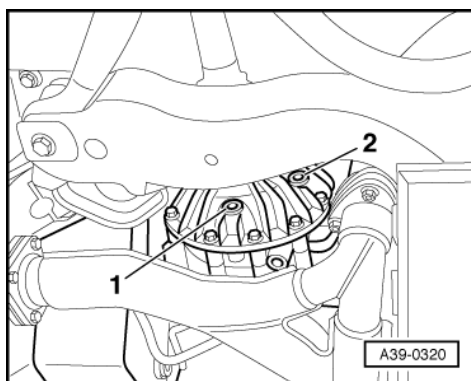


39 - Final drive, Differential rear

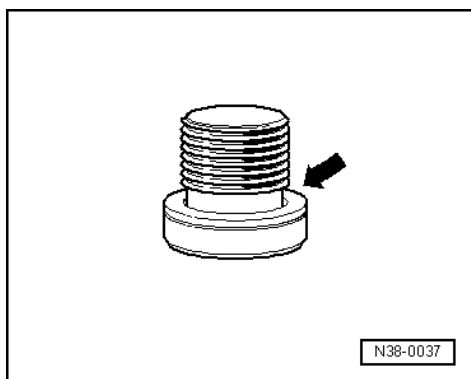
1 - Gear oil in front final drive

1.1 - Gear oil in front final drive

1.2 - Checking oil level in front final drive



- -> Unscrew oil filler plug -arrow-.
- Specification: oil level should be up to the bottom of the hole.
- Top up oil as necessary.
- Specification => Page 3



- -> Always renew seal -arrow- for filler plug.
- Screw in oil filler plug.

Tightening torque

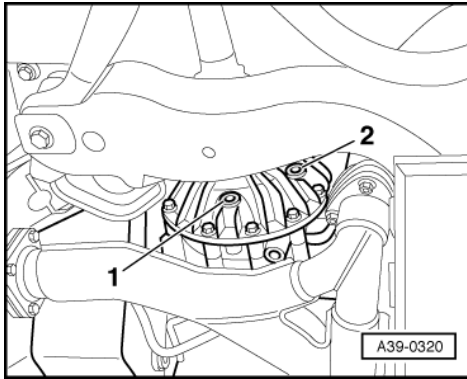
Component	Nm
Oil filler plug	45

1.3 - Changing gear oil in front final drive or filling after repairs

- Place drip tray underneath.



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- -> Remove oil drain plug -1- at bottom of differential cover and drain oil.
- Always renew seal for oil drain plug.
- Screw in oil drain plug.
- Remove oil filler plug -arrow 2-.
- Fill slowly with gear oil.
 - Specification: oil level should be up to the bottom of the hole
 - Specification => page 4
- Always renew seal for oil filler plug.
- Insert oil filler plug.

Tightening torques

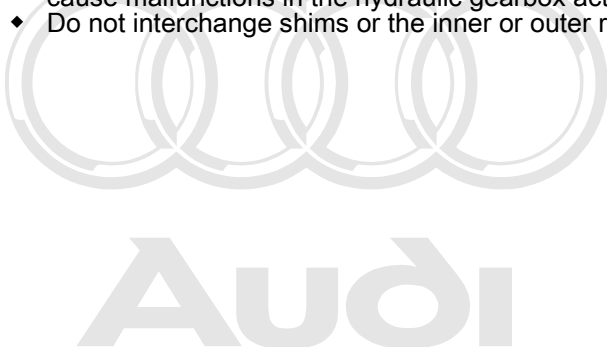
Component	Nm
Oil drain plug	45
Oil filler plug	45

2 - Servicing front final drive

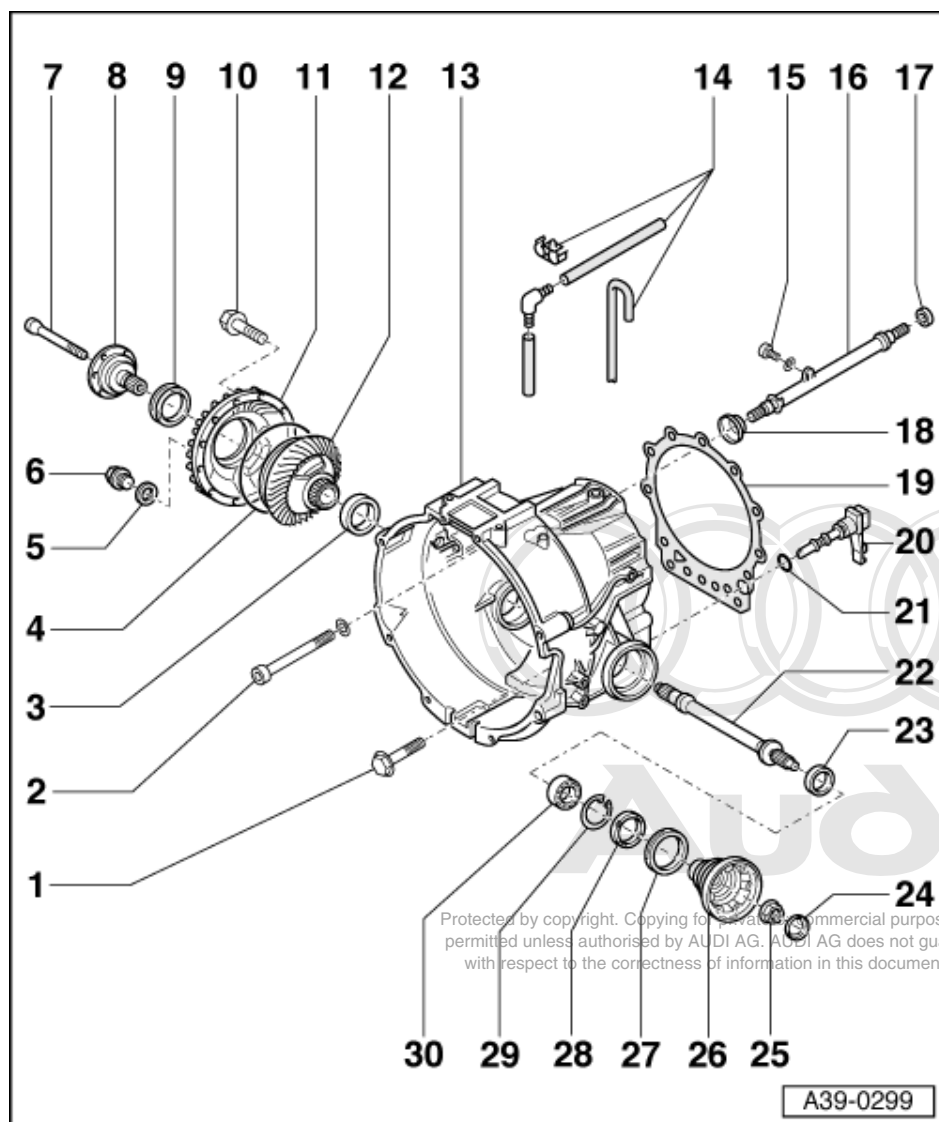
2.1 - Servicing front final drive

Notes:

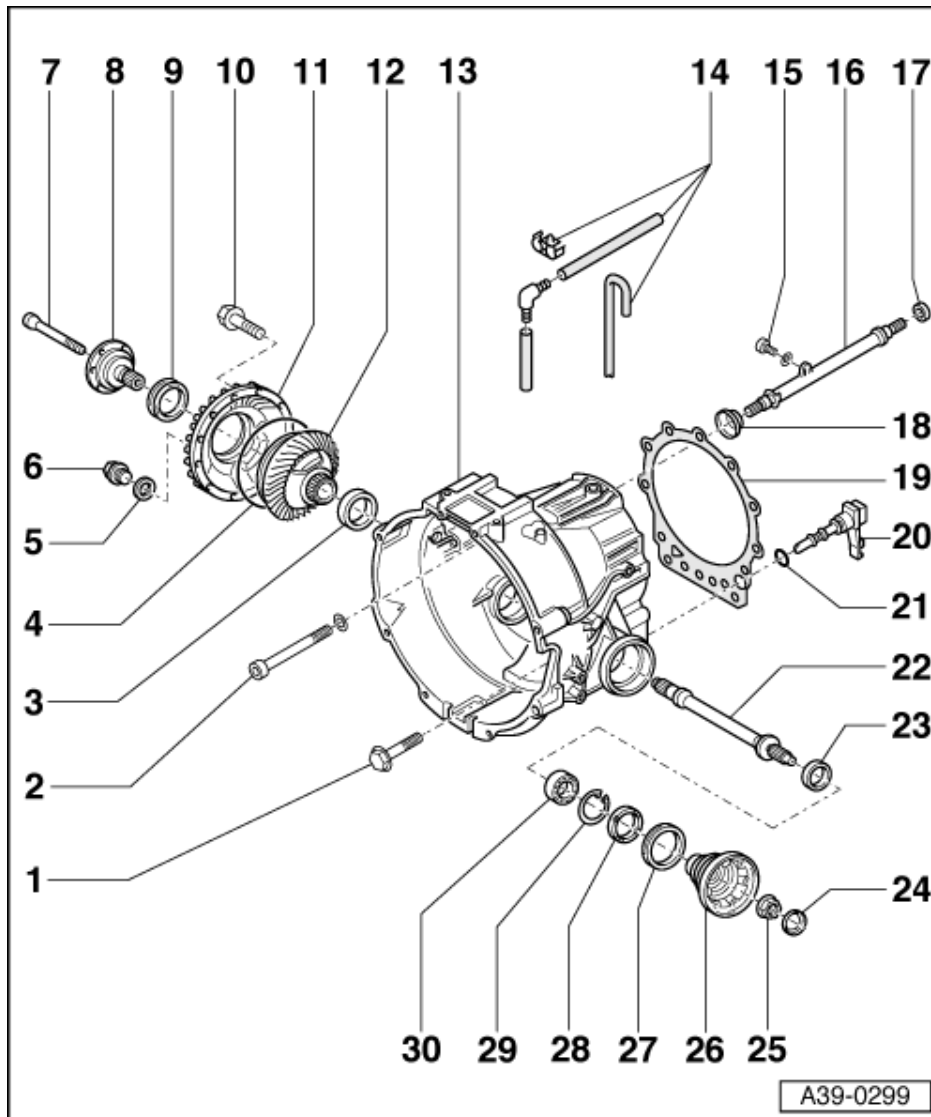
- ◆ Observe the rules for cleanliness when working on the automatic gearbox => page 47 .
- ◆ General repair instructions => Page 4 .
- ◆ Lubricate O-rings and oil seals with a small amount of ATF. Other lubricants or grease will cause malfunctions in the hydraulic gearbox actuators.
- ◆ If required, use only Vaseline to stick components in place when assembling. Other types of grease will cause malfunctions in the hydraulic gearbox actuators.
- ◆ Do not interchange shims or the inner or outer races of bearings of the same size.



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- 1 Hexagon bolt - 46 Nm
 - ♦ Loosen inaccessible bolts using Hazet tool 3432 (or other suitable commercial tool)
- 2 Torx socket head bolt - 46 Nm
- 3 Sealing ring
 - ♦ Between final drive and torque converter bellhousing
 - ♦ Renewing => Page 87
- 4 O-ring
 - ♦ Renew
- 5 Sealing ring
 - ♦ Renew
- 6 Screw plug, 45 Nm



7 Hexagon socket head bolt
- 23 Nm

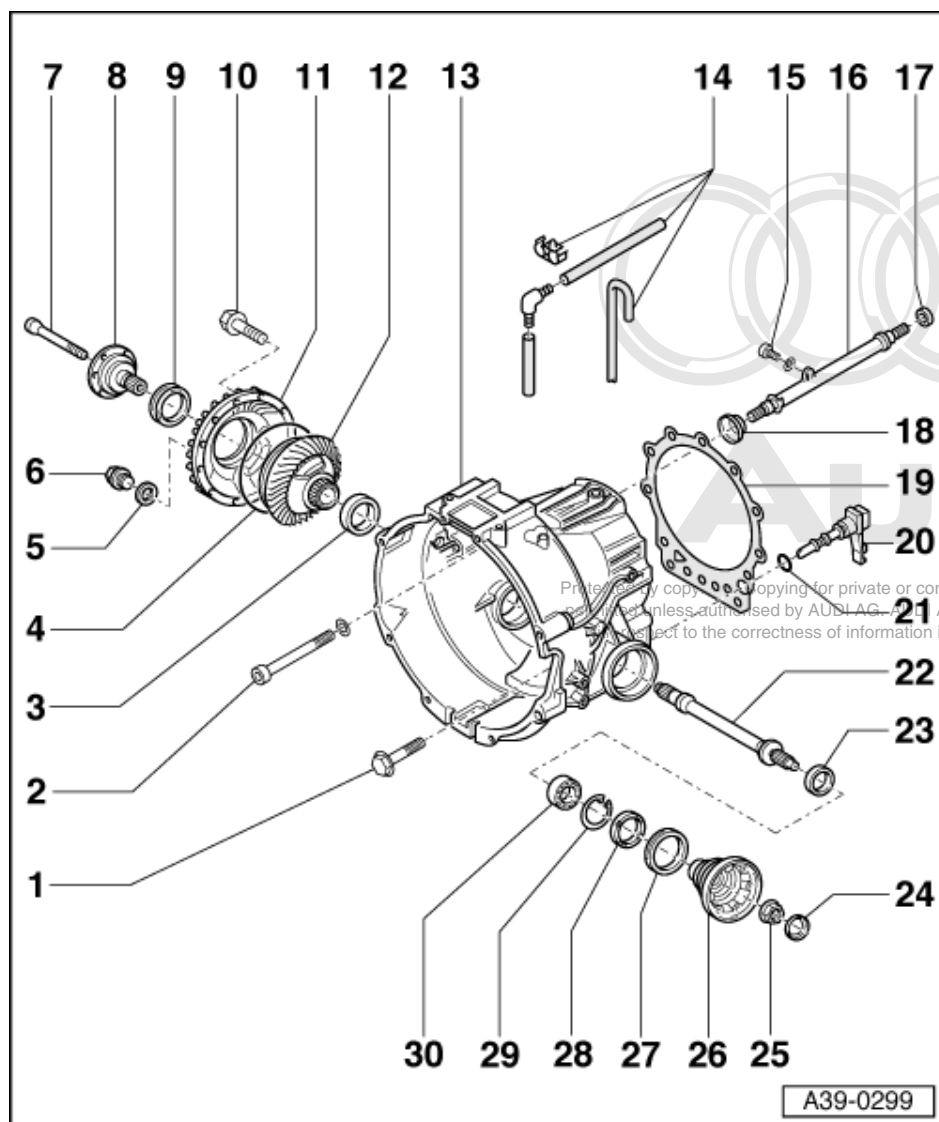
8 Right-hand flange shaft
♦ Removing and installing
=> Page 80

9 Oil seal
♦ Renewing => page 80

10 Hexagon bolt - 25 Nm
♦ Tighten bolts in several stages and in diagonal sequence

11 Differential cover
♦ When removing, ensure that taper roller bearing outer race and shim behind bearing race do not drop out
♦ The shim has a measured thickness, and must not be exchanged with a shim of different thickness

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12 Differential

13 Torque converter bellhousing

- ◆ Ensure that taper roller bearing outer race for differential and shim behind bearing race do not drop out
- ◆ The shim has a measured thickness, and must not be exchanged with a shim of different thickness

14 Vent pipe

- ◆ Installation position => Fig. 1

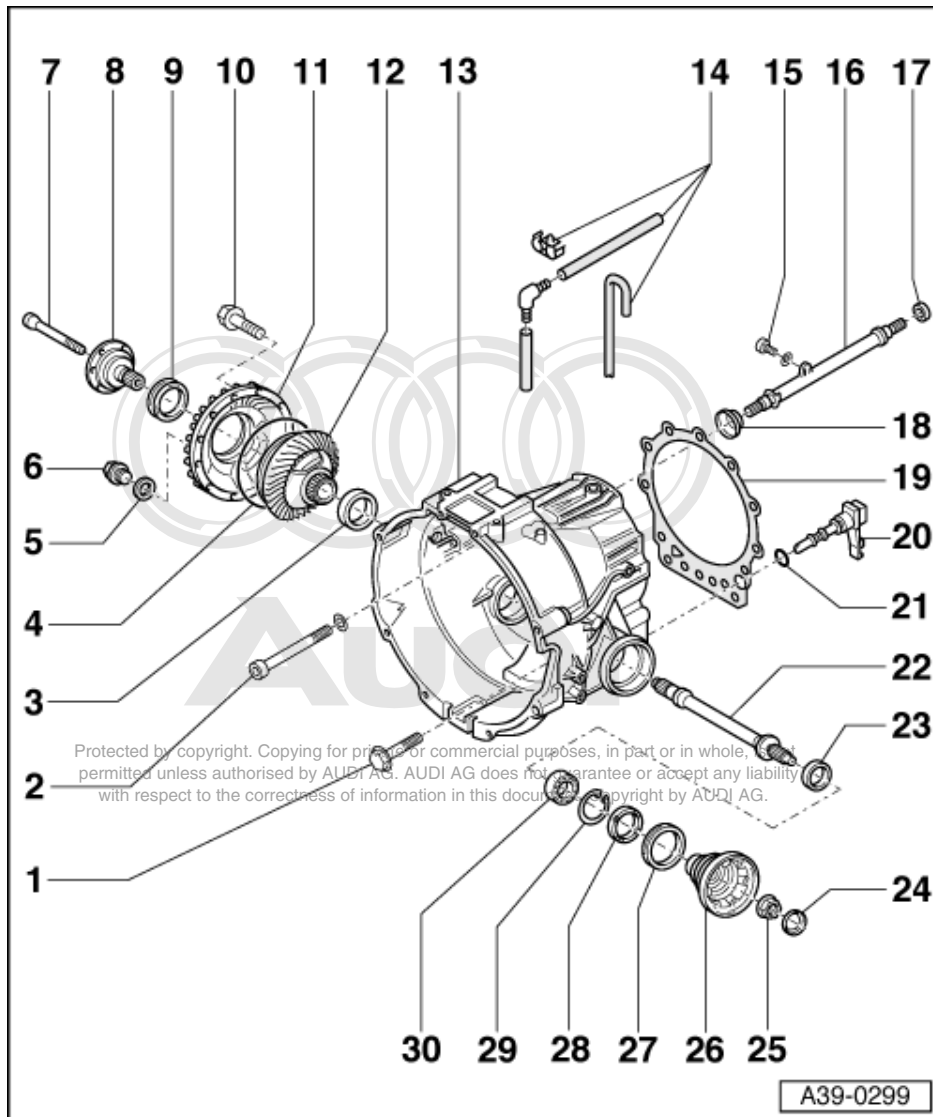
15 Torx socket head bolt,
- 8 Nm

16 Intermediate shaft

- ◆ With protective tube

17 Oil seal

- ◆ Renewing => Page 82



18 Oil seal

- ♦ Renewing => Page 82

19 Gasket

- ♦ Renew

20 Speedometer sender -G22

- ♦ Removing and installing
=> Page 91

21 O-ring

- ♦ Renew

22 Left-hand flange shaft

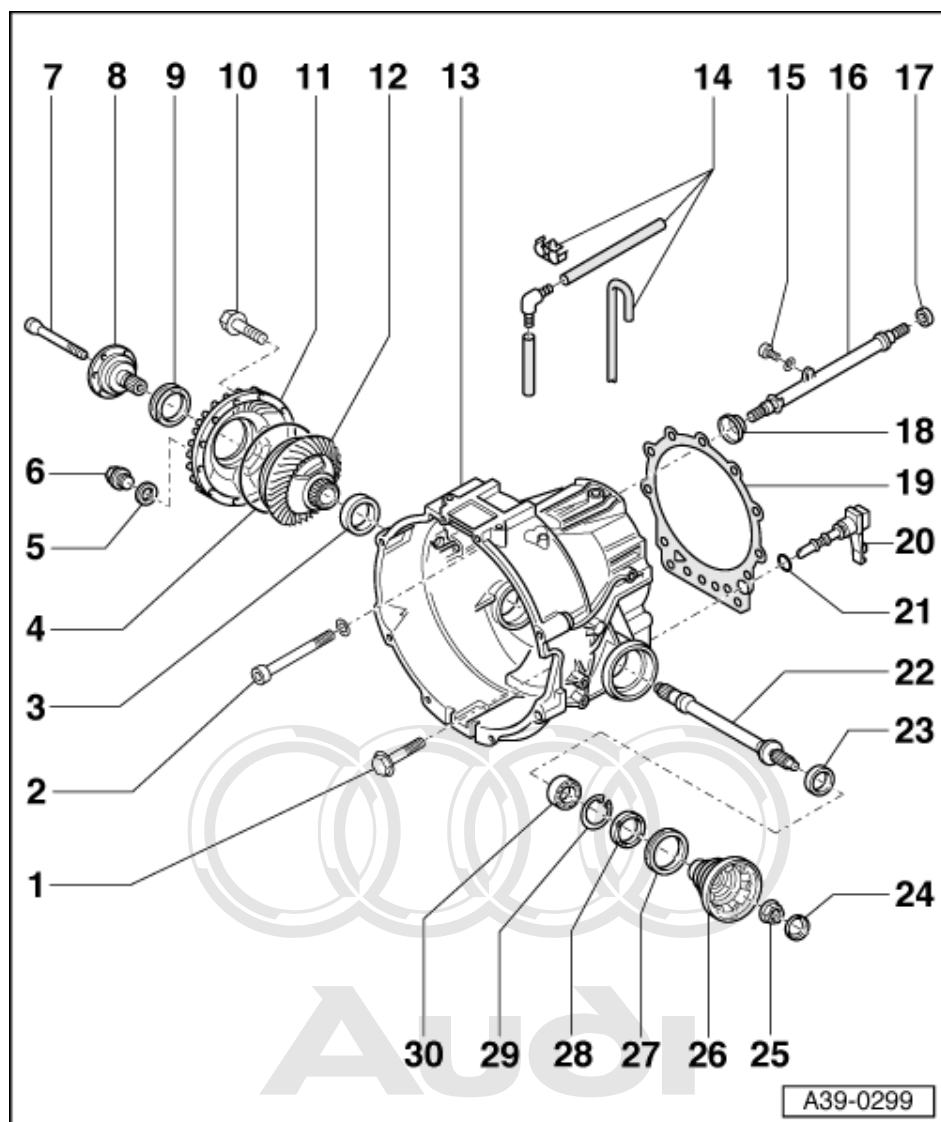
- ♦ Removing and installing
=> Page 77

23 Sealing ring

- ♦ Renew

24 Securing plate

- ♦ For -Item 25 -
- ♦ Renew => Page 79



A39-0299

25 Collared nut - 100 Nm

- ◆ Securing => Page 79

26 Drive flange

- ◆ Removing and installing
=> Page 77

27 Oil seal

- ◆ Renewing => Page 77

28 Drive gear

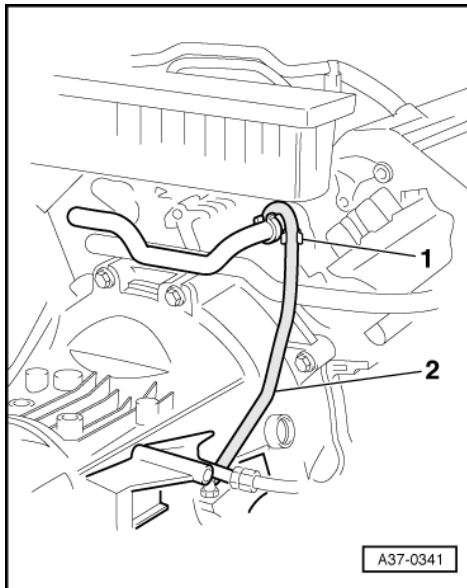
- ◆ For speedometer sender -G22
- ◆ Removing and installing
=> Page 92

29 Circlip

- ◆ For -Item 30 - in gearbox housing

30 Bearing

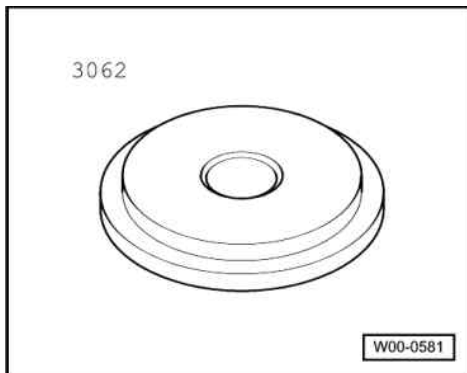
- ◆ Fit filled with multi-purpose grease



→ Fig.1 Installation position of breather pipe

- Secure breather hose -2- for differential to engine with retaining clip -1-.

2.2 - Renewing left-hand flange shaft oil seal



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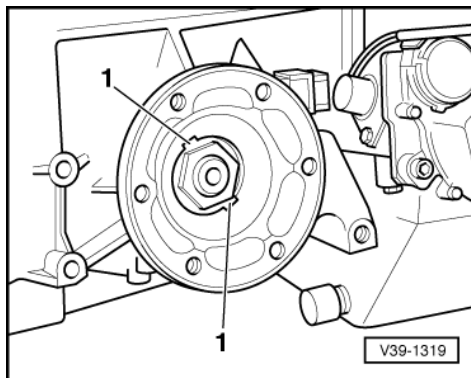
Special tools and workshop equipment required

- ◆ Thrust pad 3062
- ◆ Drip tray

Removing

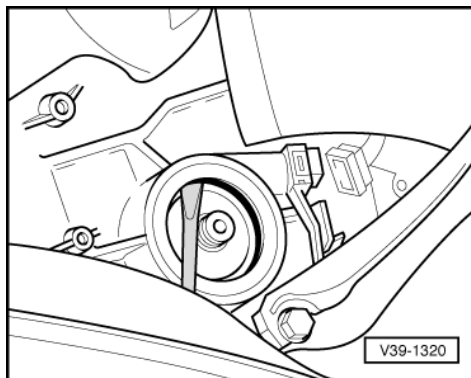
- Gearbox installed
- Unbolt left drive shaft from flange shaft.

=> Running gear, Front-wheel drive and four-wheel drive; Repair group 40; Servicing drive shafts; Removing and installing drive shafts Servicing drive shafts Removing and installing drive shafts



- Move drive shaft clear to the front and tie up.
- -> Bend open locking plate -1- of collared nut with a screwdriver.
- Unscrew nut on flange shaft. To do this, screw 2 bolts into flange shaft and brace with a suitable lever.
- Place container under the gearbox.
- Release flange shaft with 2 levers and pull out flange shaft by hand together with drive wheel for speedometer sender -G22.

Note:



Do not damage collar on gearbox housing when levering out flange shaft.

- -> Lever out oil seal for flange shaft with a screwdriver.

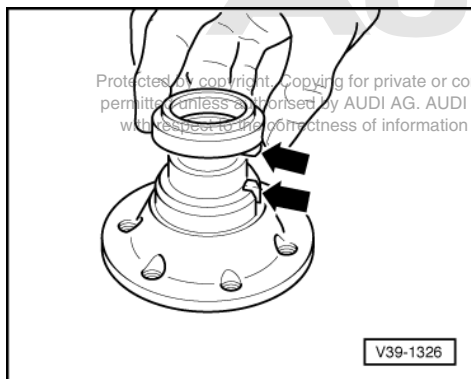
Note:

Do not damage seating surfaces for oil seal.

Installing

Install in reverse sequence; note the following points:

- Check seating surfaces for oil seal in gearbox housing for damage and rework if necessary.
- Drive oil seal in up to stop with thrust pad 3062.
- The open side of the oil seal faces the gearbox.

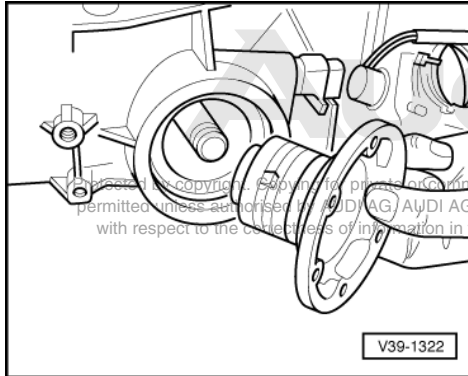


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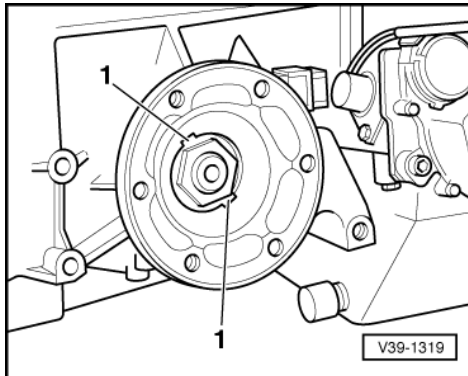
- The oil seal must be inserted at the same depth in the housing all round.
Apply multi-purpose grease to inner face of magnetic ring and fit onto flange shaft.

Note:

-> The lugs of the drive wheel must engage in the cut-outs of the flange shaft -arrows-.



- -> Insert flange shaft with drive wheel for speedometer sender.



- -> Secure flange shaft with collared nut and lock with new locking plate -1-.
- Bolt on drive shaft

=> Running gear, Front-wheel drive and four-wheel drive; Repair group 40; Servicing drive shafts; Removing and installing drive shafts Servicing drive shafts Removing and installing drive shafts

- Fill front final drive of automatic gearbox with gear oil and check oil level => page 70 .

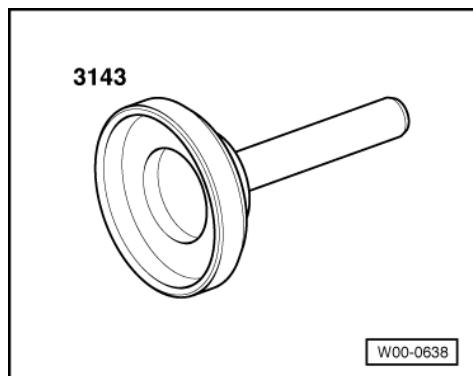
Tightening torque

Component		Nm
Left flange shaft to gearbox	M20	100

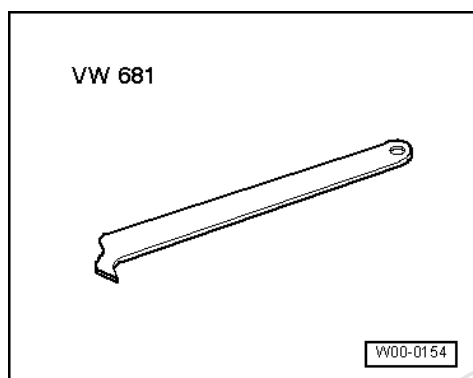


2.3 - Renewing oil seal for right flange shaft

Special tools and workshop equipment required



- ♦ Drift sleeve 3143



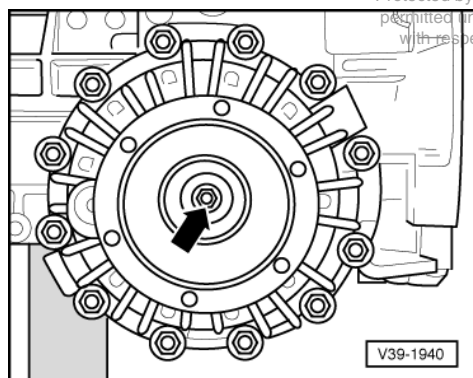
- ♦ Extractor lever VW 681
- ♦ Drip tray

Removing

- Gearbox installed
- Unbolt right-hand drive shaft from flange shaft

=> Running gear, Front-wheel drive and four-wheel drive; Repair group 40; Servicing drive shafts; Removing and installing drive shafts Servicing drive shafts Removing and installing drive shafts

- Move drive shaft clear to the side.

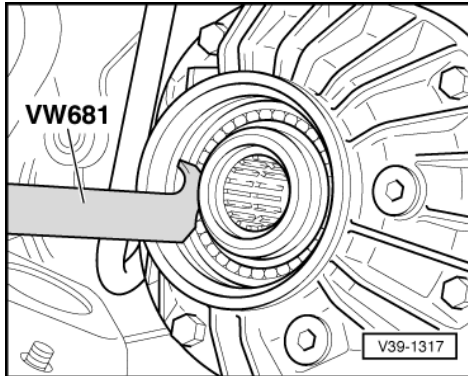


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- -> Remove centre bolt -arrow- for right flange shaft by screwing two bolts into flange shaft and bracing with a suitable lever.
- Place container under the gearbox.
- Pull out right flange shaft (release with 2 levers if necessary).

Note:

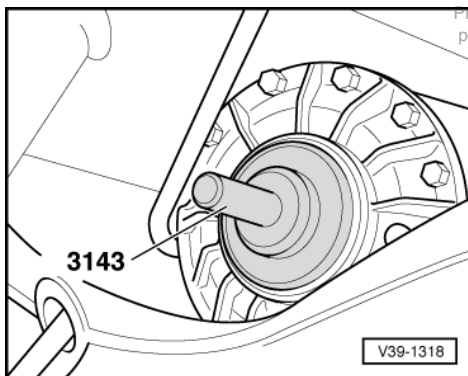
Do not damage collar on gearbox housing when levering out flange shaft.



- -> Pull out flange shaft oil seal with extractor lever VW 681.

Installing

Install in reverse sequence; note the following points:



- -> Using drift sleeve 3143, drive in oil seal for right flange shaft onto stop.
- Bolt on drive shaft

=> Running gear, Front-wheel drive and four-wheel drive; Repair group 40; Servicing drive shafts; Removing and installing drive shafts Servicing drive shafts Removing and installing drive shafts

- Fill front final drive of automatic gearbox with gear oil and check oil level => page 70 .

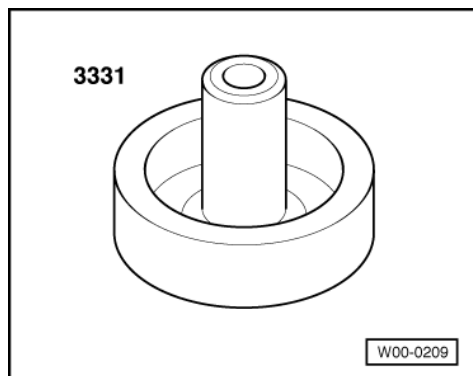
Tightening torque

Component		Nm
Right flange shaft to gearbox	M8	25

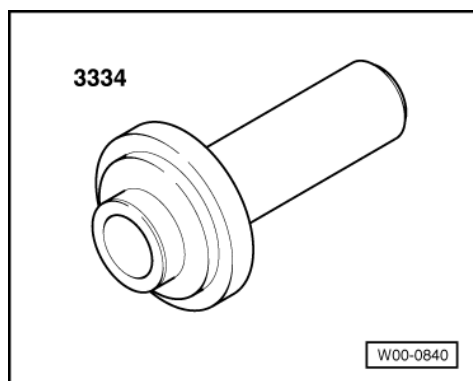


2.4 - Renewing front and rear oil seals for intermediate shaft

Special tools and workshop equipment required



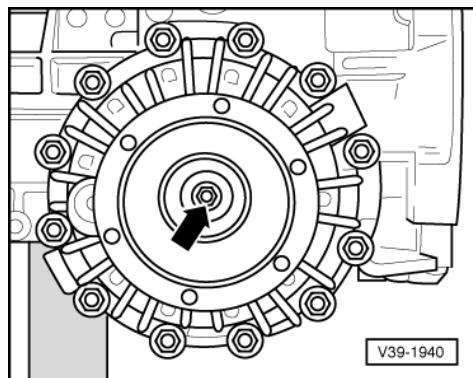
- ♦ Thrust piece 3331



- ♦ Thrust piece 3334

Removing

- Gearbox removed
- Remove torque converter.

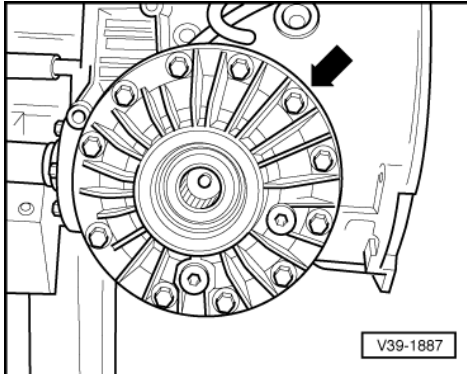


- Secure gearbox to repair stand
=> Page 40 .
- Drain ATF => Page 44 .
- Drain gear oil in front final drive => page 70 .
- -> Remove centre bolt -arrow- for right flange shaft by screwing two bolts into flange shaft and bracing with a suitable lever.



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- Pull out right flange shaft.



- -> Loosen securing bolts -arrow- for differential cover using diagonal sequence and remove bolts.
- Remove differential cover.

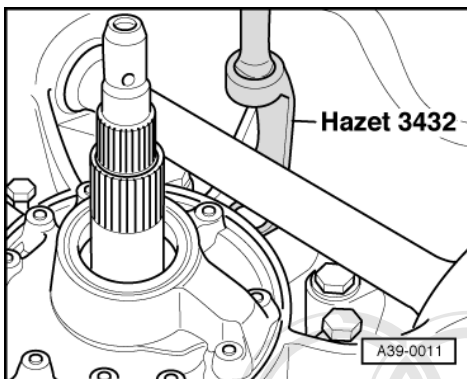
Note:

When removing differential cover, secure differential to prevent it from falling out.

- Take out differential with inner races for taper roller bearings. Leave the outer races in place.

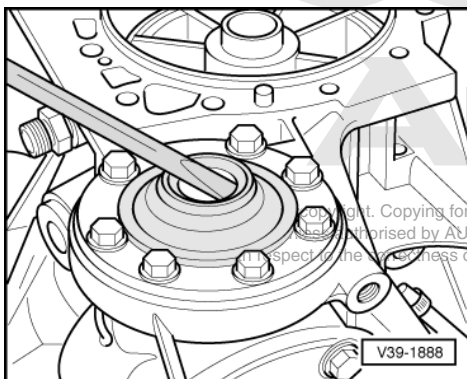
Notes:

- ◆ When removing, ensure that taper roller bearing outer race and shim behind bearing race do not drop out.
- ◆ The shim has a measured thickness, and must not be exchanged with a shim of different thickness.
- Remove torque converter oil seal => Page 8 .
- Bring gearbox into a vertical position with torque converter bellhousing facing up.
- Unscrew bolts for torque converter bellhousing.



Note:

- > Loosen inaccessible bolts using Hazet tool 3432 (or other suitable commercial tool).
- Lever off torque converter bellhousing over input shaft and put down on a clean surface.

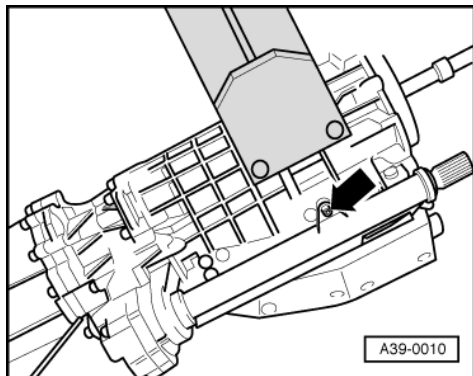




- -> Lever out oil seal for final drive with a screwdriver.

Note:

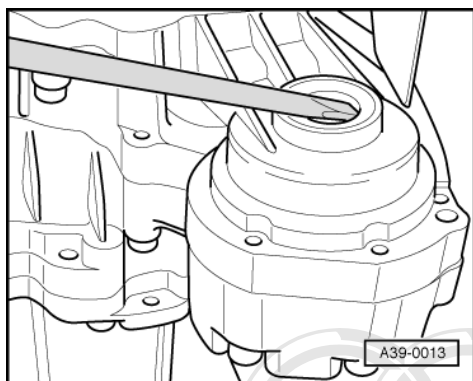
Take care not to damage the peened securing point for the slotted nut behind the seal.



- -> Unbolt protective tube -arrow-.
- Push out intermediate shaft.

Note:

If there is visible scoring on the intermediate shaft, renew the intermediate shaft together with oil seals.



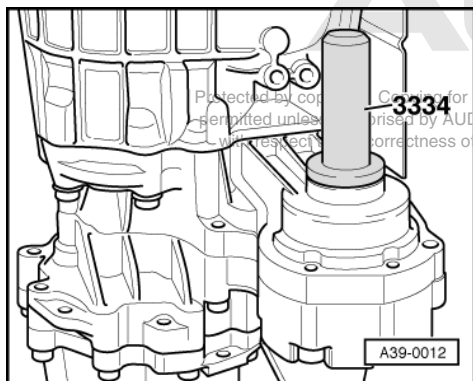
- -> Lever out oil seal for transfer gearing with a screwdriver.

Note:

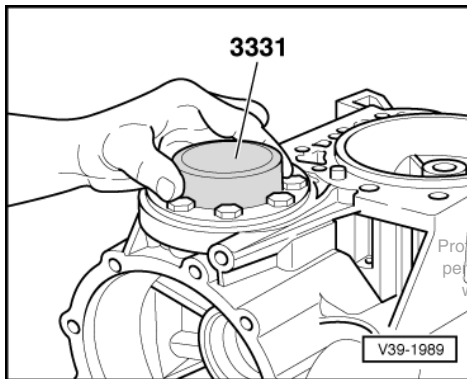
Do not damage seating surfaces for oil seal.

Installing

Install in reverse sequence; note the following points:

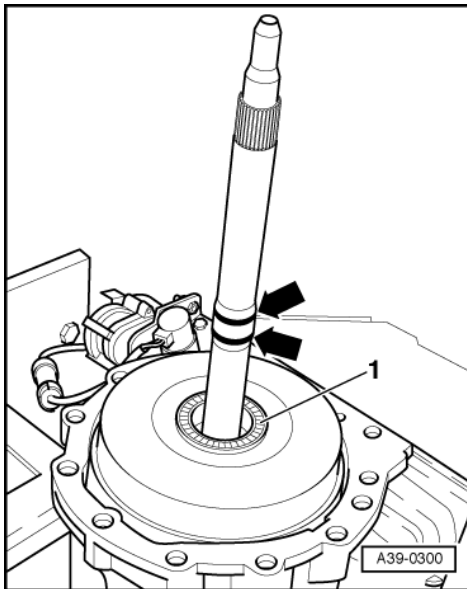


- -> Drive in oil seal onto stop with thrust piece 3334.



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- -> Drive in oil seal onto stop with thrust piece 3331.
- Renew gasket for torque converter bellhousing.



- -> Renew square-section rings on input shaft (apply Vaseline when fitting).

Note:

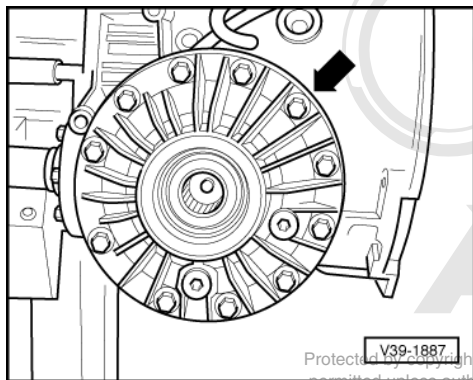
Use only Vaseline; other types of grease will cause malfunctions in the hydraulic gearbox actuators.

- Stick shim for axial bearing -1- on stator shaft (on inside of torque converter bellhousing) with Vaseline.
- Fit axial bearing -1- in flared washer.
 - Position of washer: flared side towards axial bearing.
- Guide torque converter bellhousing over input shaft (keep housing straight - 2nd mechanic required).

Caution

If the torque converter bellhousing is not kept straight when installing, this will shear off the square-section rings. If this happens, the gearbox will still transmit power in selector lever position "N".

- If necessary, turn the drive pinion shaft slightly in both directions until the torque converter bellhousing is fully seated.
- Insert differential into gearbox housing.



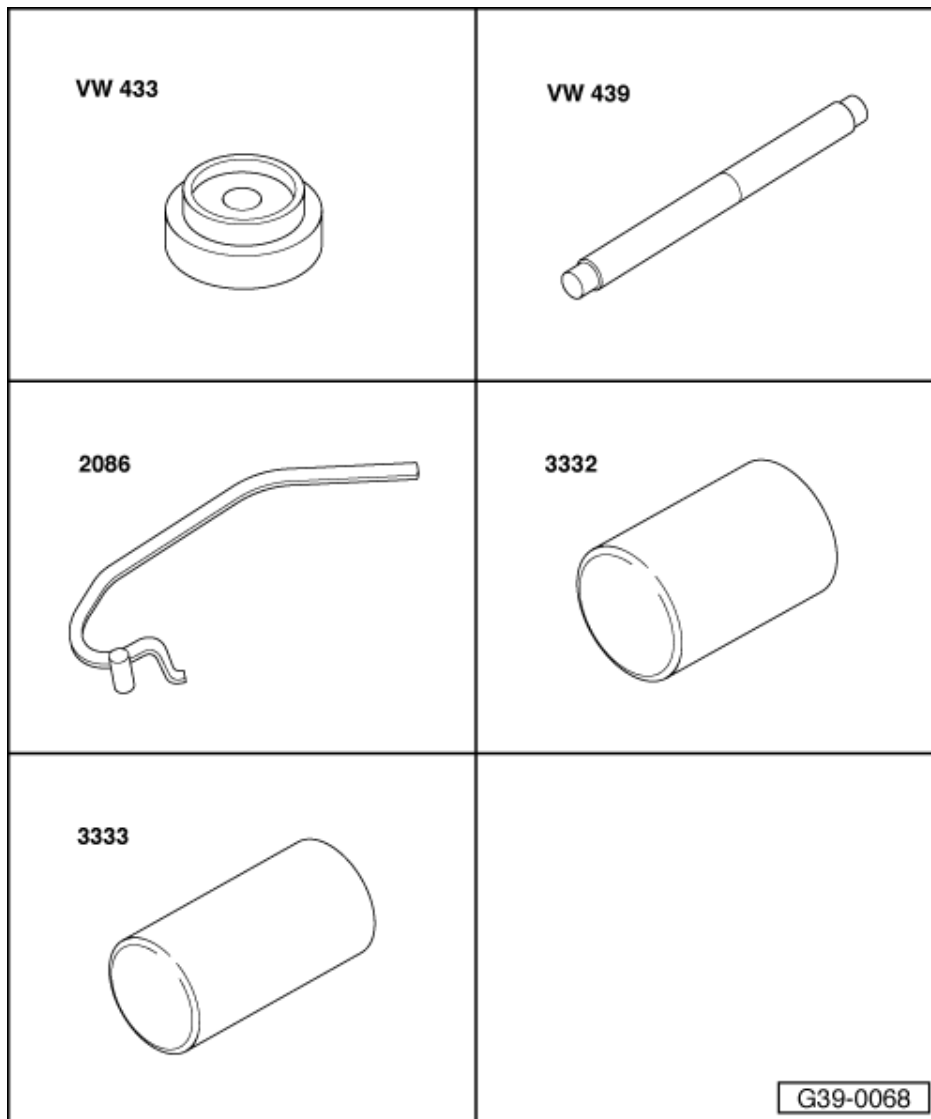
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- -> Install differential cover with new O-ring and tighten securing bolts arrow in diagonal sequence.
- Install torque converter oil seal
=> Page 9 .
- Install right-hand flange shaft with oil seal
=>Page 81 .
- Top up ATF => Page 44 .
- Fill front final drive of automatic gearbox with gear oil and check oil level => page 70 .

Tightening torque

Component	Nm
Protective tube to gearbox housing	8
Torque converter bellhousing to gearbox housing	45
Differential cover to gearbox housing M8	25

2.5 - Renewing oil seals for torque converter bellhousing

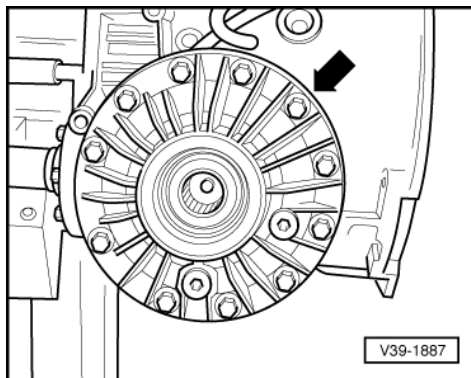


Special tools and workshop equipment required

- ◆ Press tool VW 433
- ◆ Guide pin VW 439
- ◆ Extractor hook 2086
- ◆ Thrust piece 3332
- ◆ Thrust piece 3333

Removing

- Gearbox removed
 - Remove torque converter
 - Secure gearbox to repair stand
=> Page 40
 - Drain ATF => Page 44 .
 - Drain gear oil in front final drive => page 70 .
 - Remove left-hand flange shaft with oil seal
=>Page 77 .
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- -> Loosen securing bolts -arrow- for differential cover using diagonal sequence and remove bolts.
- Remove differential cover.

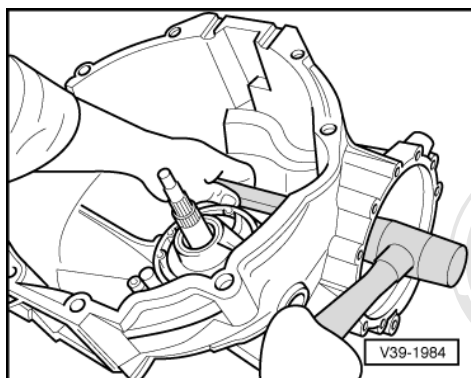
Note:

When removing differential cover, secure differential to prevent it from falling out.

- Take out differential with inner races for taper roller bearings. Leave the outer races in place.

Notes:

- ♦ When removing, ensure that taper roller bearing outer race and shim behind bearing race do not drop out.
- ♦ The shim has a measured thickness, and must not be exchanged with a shim of different thickness.
- Remove right-hand flange shaft with oil seal
=>Page 80.
- Remove circlip -Item 76 for transverse shaft bearing.

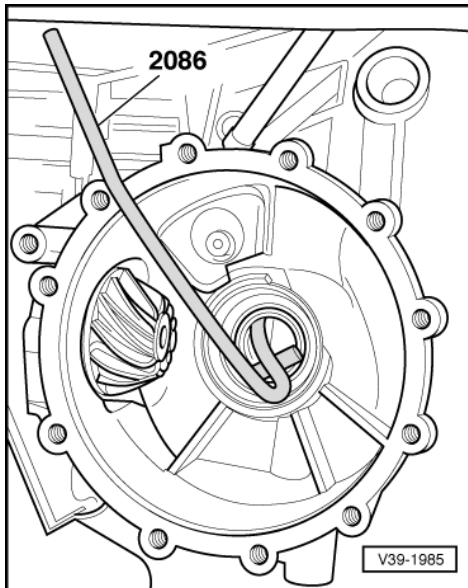


- -> Drive out transverse shaft bearing with light hammer blows on the transverse shaft using a plastic hammer.

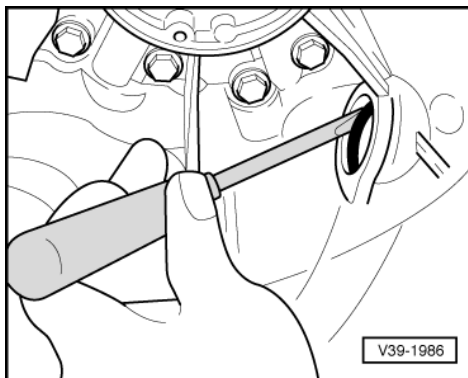
Note:

Prevent transverse shaft from dropping out when removing transverse shaft bearing.

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- -> Pull out left oil seal for transverse shaft using extractor hook 2086.



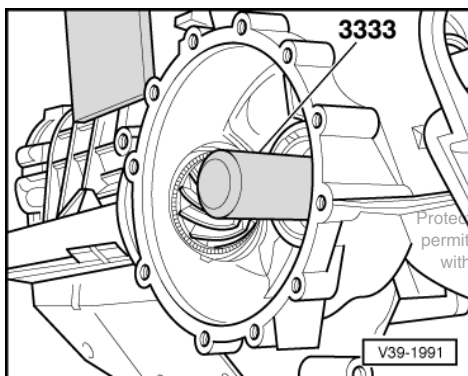
- -> Carefully lever out left oil seal for transverse shaft with a screwdriver.

Note:

Do not damage seating surfaces for oil seal.

Installing

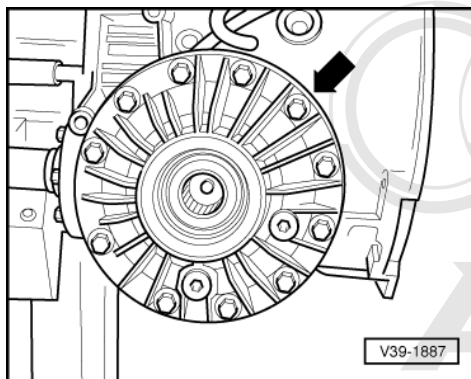
Install in reverse sequence; note the following points:



- -> Drive in right oil seal for transverse shaft onto stop using thrust piece 3333.

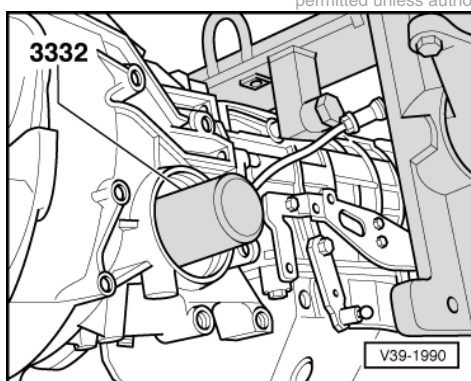


- Insert differential into gearbox housing.

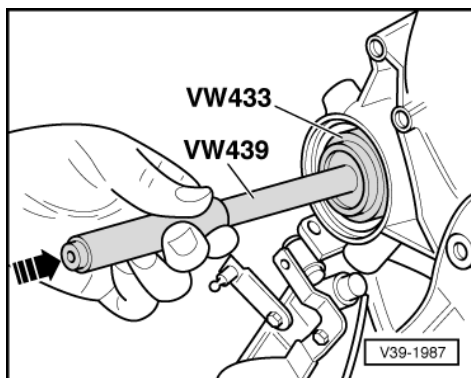


- -> Install differential cover with new O-ring and tighten securing bolts -arrow- in diagonal sequence.

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- -> Drive left oil seal for transverse shaft onto stop using thrust piece 3332.



- -> Carefully slide in transverse shaft.
- Drive in transverse shaft bearing onto stop using press tool VW 433 and guide pin VW 439.
- Install circlip.
- Pack transverse shaft bearing with 25 g of grease G 000 100.
- Install left-hand flange shaft with oil seal
=>Page 78 .
- Install right-hand flange shaft with oil seal
=>Page 81 .
- Top up ATF => Page 44 .

Tightening torque

Component	Nm
-----------	----

Differential cover to gearbox housing	M8	25
---------------------------------------	----	----

3 - Removing and installing speedometer sender -G22 and drive wheel for speedometer sender

3.1 - Removing and installing speedometer sender -G22 and drive wheel for speedometer sender

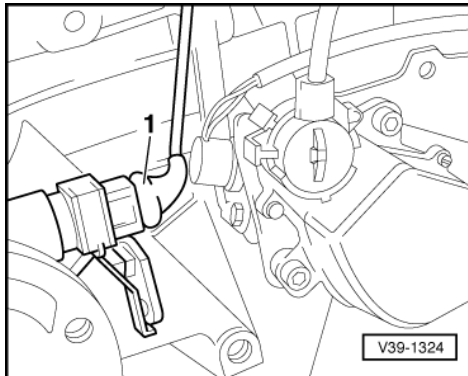
- Gearbox installed

Removing and installing speedometer sender -G22

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Fitting location => Item 75.

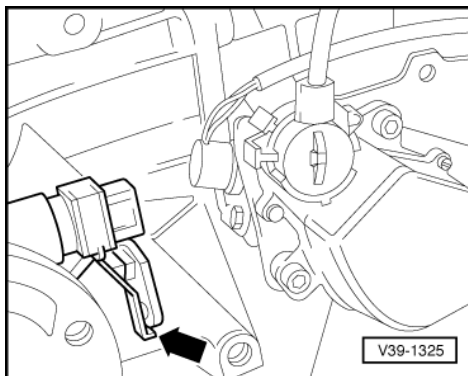
Removing



- -> Unplug connector -1- from speedometer sender -G22.

Note:

Illustration shows gearbox without left gearbox support.



- -> Press retainer -arrow- on sender towards the front, turn retainer and pull out sender.

Installing

Install in reverse sequence; note the following points:

- Renew O-ring on sender.



- Apply a small quantity of multi-purpose grease and install sender.

Removing and installing drive wheel for speedometer sender -G22

Note:

Fitting location => Item **76**.

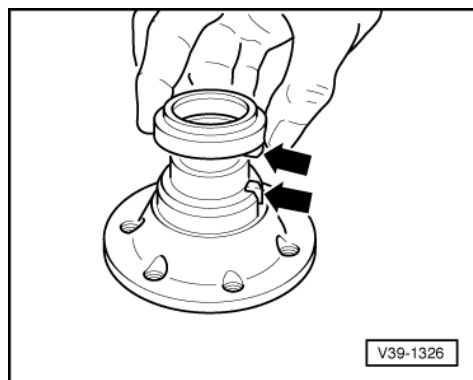
Removing

- Remove left flange shaft => Page **77**.
- Pull drive wheel off flange shaft.

Installing

Install in reverse sequence; note the following points:

- Apply multi-purpose grease to inner face of magnetic ring and fit onto flange shaft.



Note:

-> The lugs of the drive wheel must engage in the cut-outs of the flange shaft -arrows-.

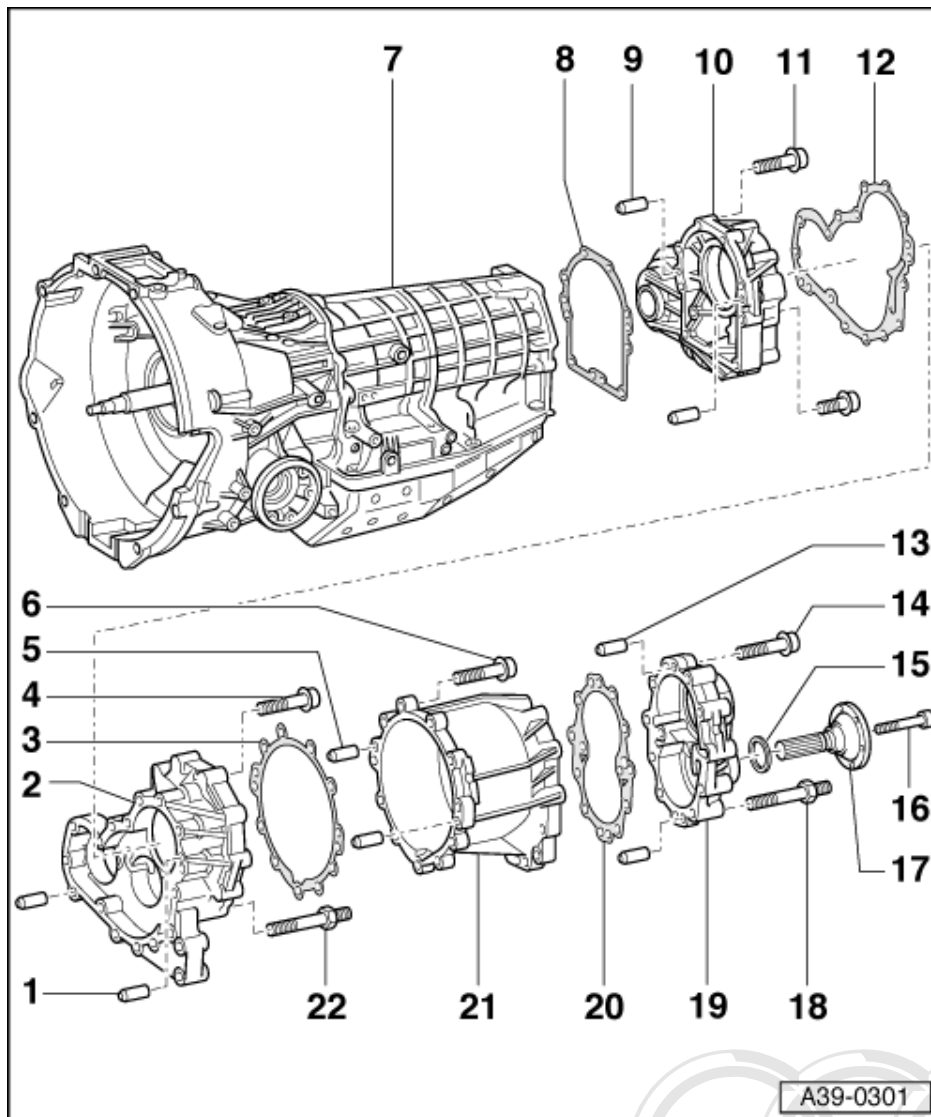
- Install left flange shaft => Page **78**.



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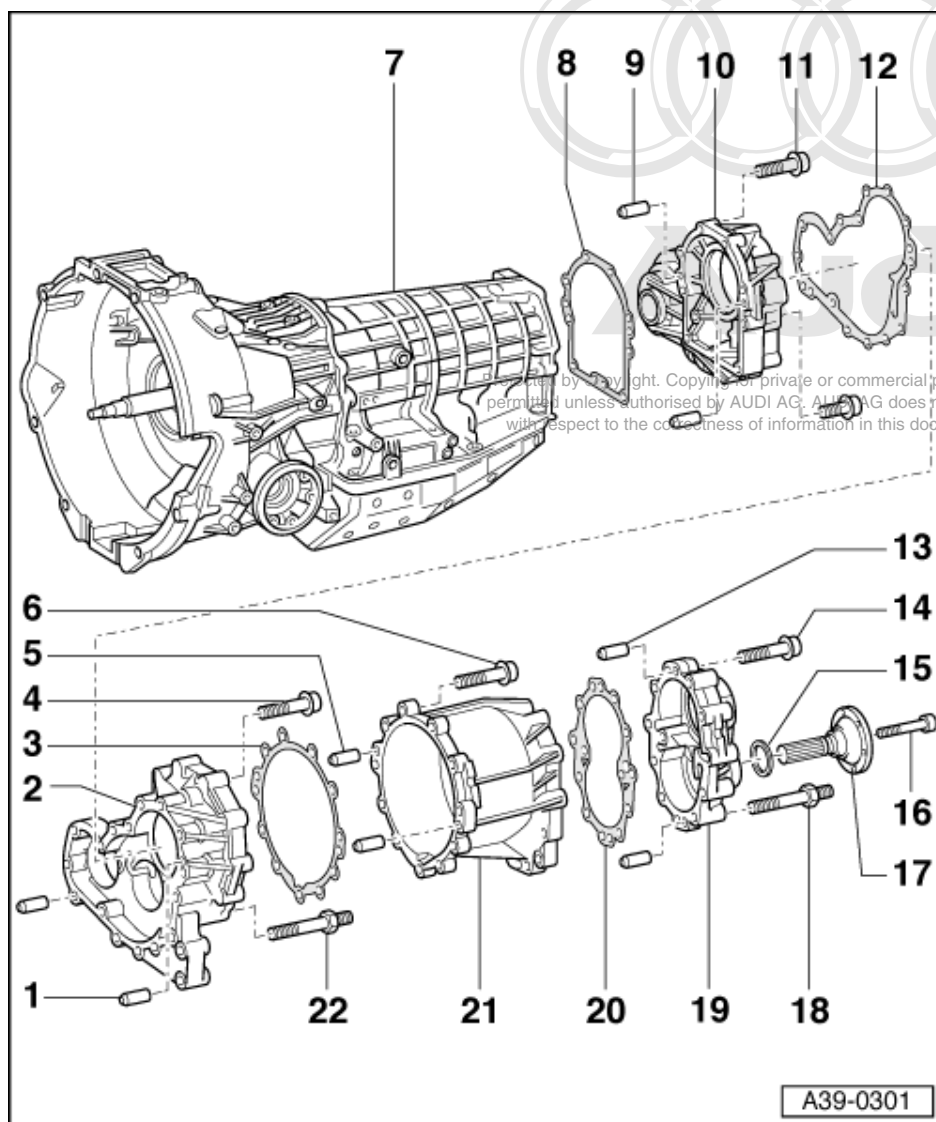
4 - Servicing transfer gearing

4.1 - Servicing transfer gearing



- 1 Dowel sleeve
- 2 Rear intermediate housing
- 3 Gasket
 - ◆ Renew
- 4 Bolt - 23 Nm
 - ◆ Tighten in several stages and in diagonal sequence
- 5 Dowel sleeve
- 6 Bolt - 23 Nm
 - ◆ Tighten in several stages and in diagonal sequence

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7 Gearbox housing

8 Gasket

- ♦ Renewing => Page 96

9 Dowel sleeve

10 Front intermediate housing

11 Bolt - 23 Nm

- ♦ Tighten in several stages and in diagonal sequence

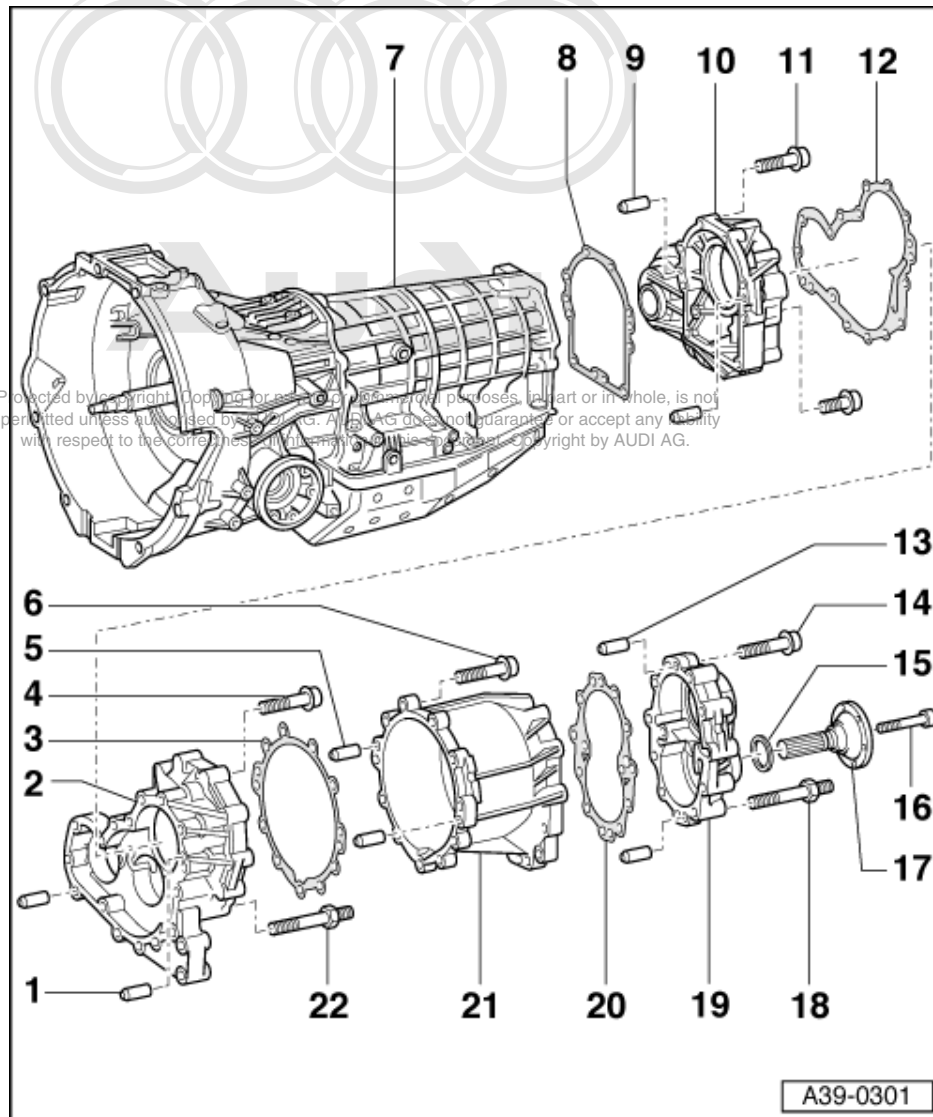
12 Gasket

- ♦ Renew

13 Dowel sleeve

14 Bolt - 23 Nm

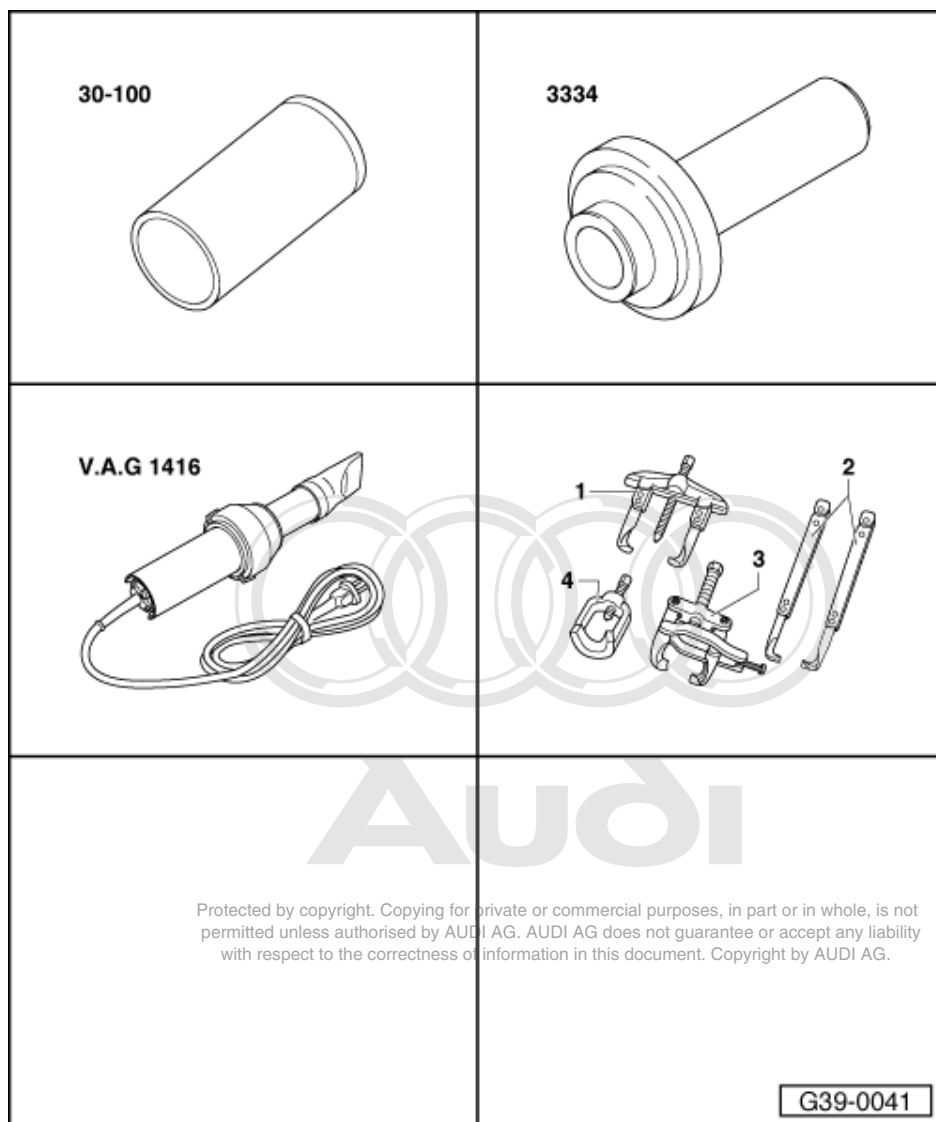
- ♦ Tighten in several stages and in diagonal sequence



- 15 Oil seal
 - ♦ Renewing => Page 102
- 16 Hexagon socket head bolt,
 - 23 Nm
- 17 Output flange
- 18 Stud - 23 Nm
- 19 Cover for transfer gear housing
- 20 Gasket
 - ♦ Renew
- 21 Transfer gear housing
- 22 Stud - 23 Nm



4.2 - Renewing gasket between front intermediate housing and gearbox housing

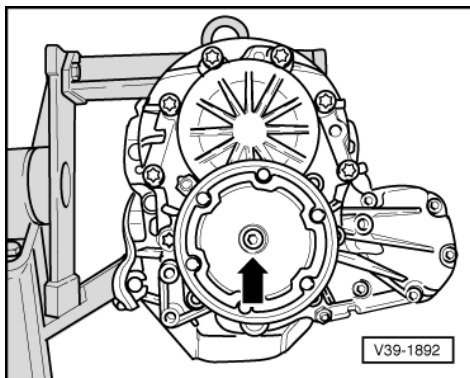


Special tools and workshop equipment required

- ♦ Drift sleeve 30-100
- ♦ Thrust piece 3334
- ♦ Hot air blower V.A.G 1416
- ♦ 1 - Puller Kukko 20-10
- ♦ 2 - Arms for puller Kukko 1-250

Removing

- Gearbox removed
- Remove torque converter.

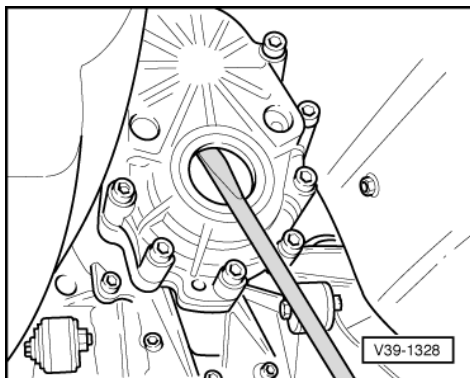


- Secure gearbox to repair stand
=> Page 40
- Drain ATF => Page 44 .
- -> Unscrew bolt securing drive flange -arrow- (screw 2 bolts into flange and brace with a suitable lever).
- Pull out drive flange (if necessary, release with 2 levers).

Note:

Do not damage collar on gearbox housing when levering off drive flange.

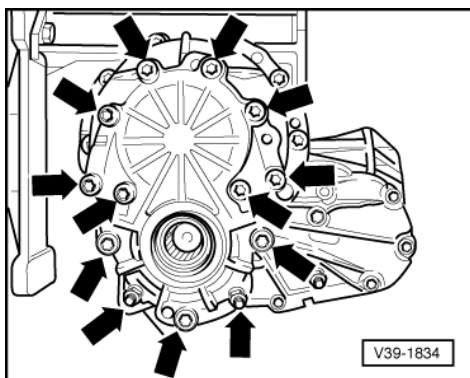
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- -> Lever out oil seal for propshaft drive flange with a screwdriver.

Notes:

- ◆ Do not damage seating surfaces for oil seal.
- ◆ Illustration shows gearbox in vehicle.

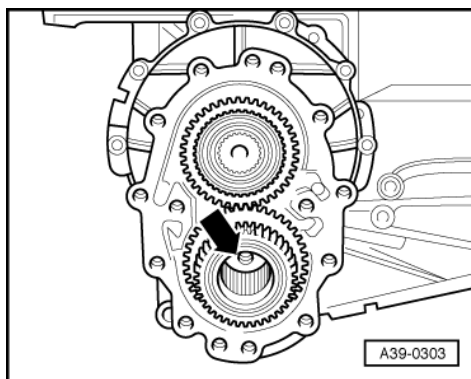


- -> Loosen securing bolts -arrows- on cover for transfer gear housing in diagonal sequence and remove bolts.
- Remove housing cover.

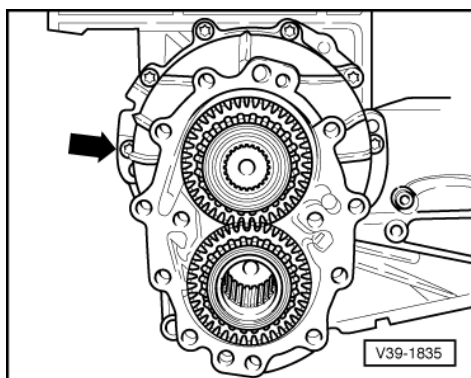


Note:

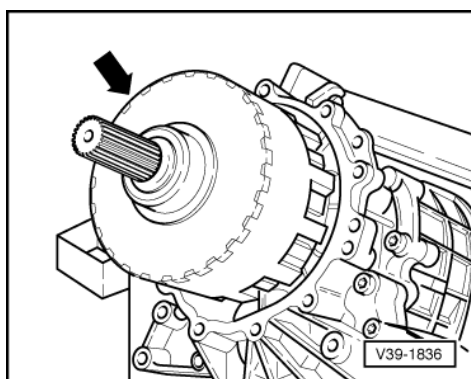
When removing housing cover, prevent spur gears from dropping out.



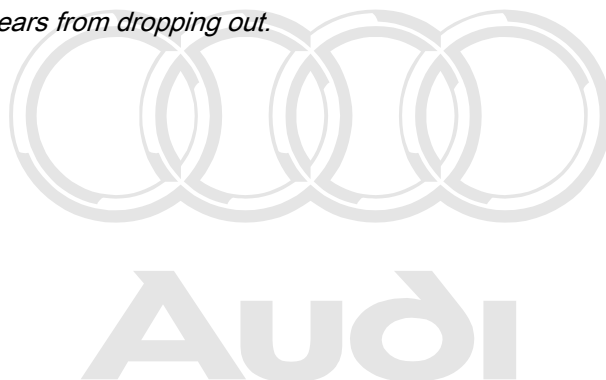
- -> Take out spur gears. When doing this, watch position of tensioning nut -arrow-.
- Put down spur gears in bearing shells in housing cover.



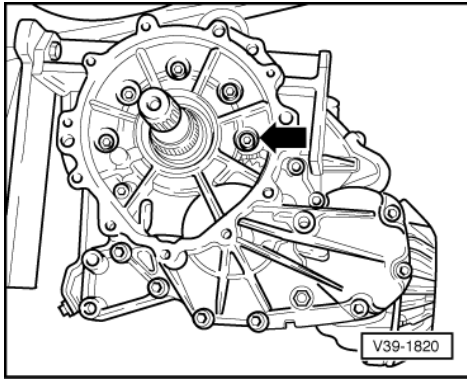
- -> Loosen securing bolts -arrow- for transfer gear housing in diagonal sequence and remove.
- Pull transfer gear housing off gearbox.



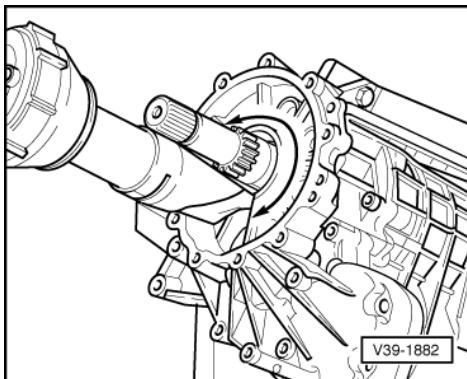
- -> Pull centre differential -arrow- off output shaft towards the rear.



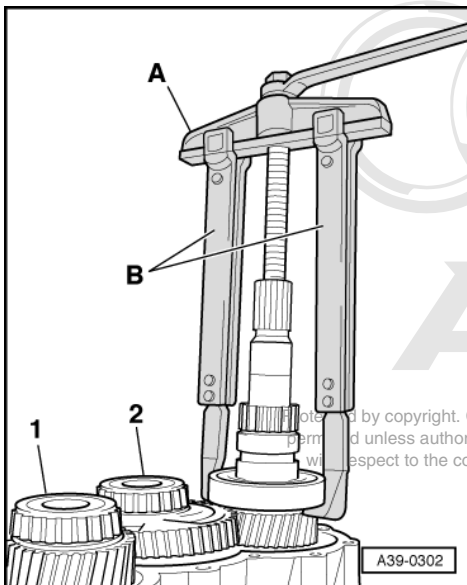
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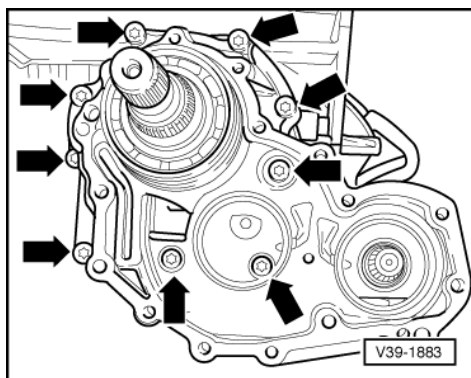
- -> Loosen securing bolts -arrow- for rear intermediate housing in diagonal sequence and remove bolts.



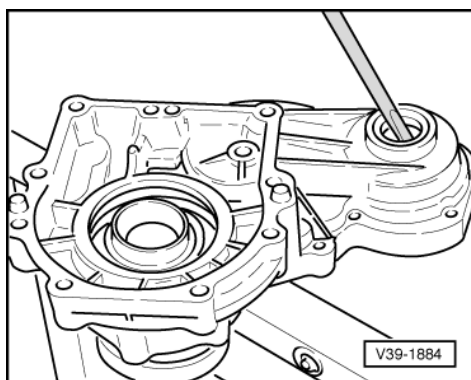
- -> Apply heat to rear intermediate housing -arrows- using hot air blower V.A.G 1416.
- Remove housing.



- Mark drive pinion -1- and intermediate pinion -2-, to ensure they are installed later in the correct positions and facing the right way.
- -> Lift output shaft bearing approx. 10 mm.
- A - Puller, e.g. Kukko 20-10
- B - Arms for puller, e.g. Kukko 1-250
- Take out drive pinion and intermediate pinion.



- -> Loosen securing bolts -arrows- for front intermediate housing in diagonal sequence and remove bolts.
- Pull front intermediate housing off gearbox.
- Put down front intermediate housing on a clean surface.

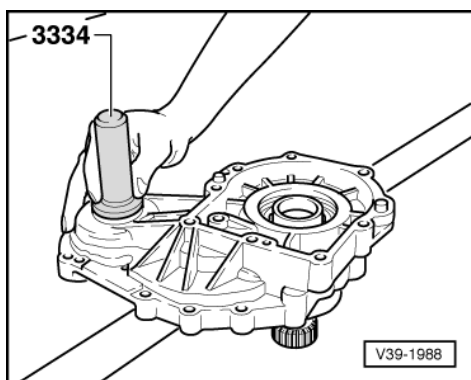


- -> Lever out oil seal for transfer gearing with a screwdriver.

Note:

If there is visible scoring on the intermediate shaft, renew intermediate shaft together with oil seals => Page 82.

Installing



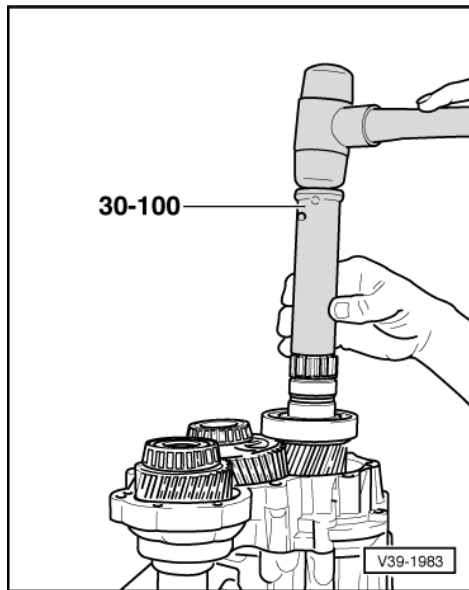
Install in reverse sequence; note the following points:

Note:

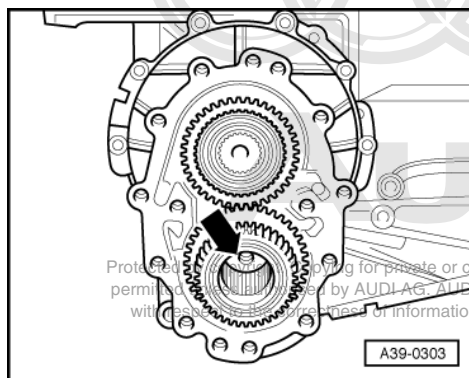
Replace gaskets and seals.

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- -> Drive oil seal in onto to stop using thrust piece 3334.



- Install drive pinion and intermediate pinion according to markings made earlier.
- -> Drive on output shaft bearing over output shaft.
- Apply heat to rear intermediate housing using hot air blower V.A.G 1416 and install housing.
- Install centre differential.
- Install bolts for transfer gear housing and tighten in diagonal sequence to specified torque in several stages.



- -> Stick tensioning nut for flange shaft -arrow- to front side of spur gear 2.

Note:

Only use Vaseline. Other types of grease will impair the function of the hydraulic gearbox actuators.

- Install spur gears 1 and 2.
- Install bolts securing cover for transfer gear housing and tighten in diagonal sequence to specified torque in several stages.
- Install oil seal for propshaft drive flange and install drive flange => Page 103 .
- Top up ATF => Page 44 .

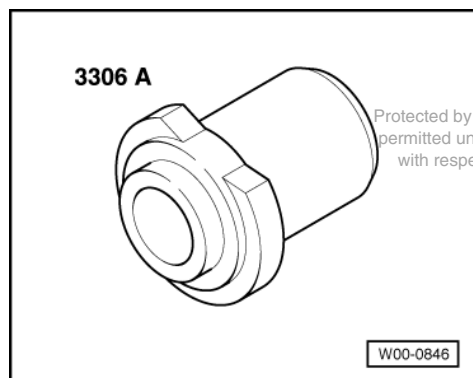
Tightening torques

Component	Nm
Front intermediate housing to gearbox housing	23
Rear intermediate housing to front intermediate housing	23



Component	Nm
Transfer gear housing to rear intermediate housing	23
Cover for transfer gear housing to transfer gear housing	23
Hexagon socket head bolt for rear flange shaft	23

4.3 - Renewing oil seal on drive flange for propshaft

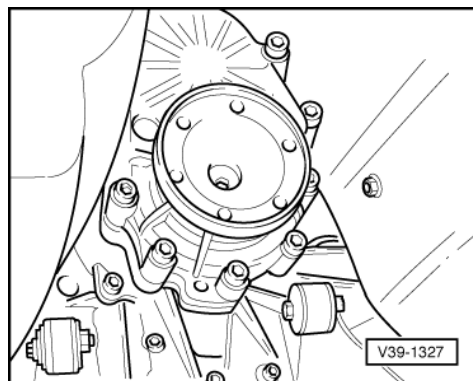


Special tools and workshop equipment required

- ♦ Thrust piece 3306 A
- ♦ Drip tray

Removing

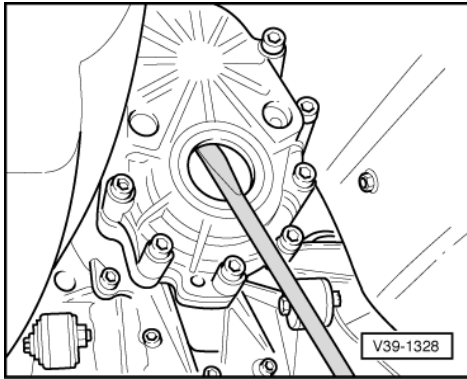
- Gearbox installed
- Mark position of propshaft at rear flange shaft before removing.
- Remove propshaft => Page 105 .



- -> Unscrew bolt securing drive flange (use pin to prevent drive flange from turning).
- Place container under the gearbox.
- Pull out drive flange (if necessary, release drive flange with two levers).

Note:

Do not damage collar on gearbox housing when levering off drive flange.



- -> Lever out oil seal for propshaft drive flange with a screwdriver.

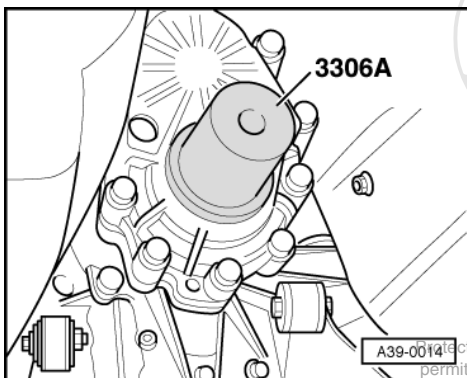
Note:

Do not damage seating surfaces for oil seal.

Installing

Install in reverse sequence; note the following points:

- Clean oil seal seat in gearbox housing.
- Lubricate the outer circumference and the sealing lips of the oil seal with ATF.
 - Installation position: open side of oil seal towards gearbox



- -> Drive in oil seal onto stop with thrust piece 3306 A.
- Secure drive flange with hexagon socket head bolt.
- Install propshaft => Page 111 .
- Top up ATF => Page 44 .

Tightening torque

Component	Nm
Hexagon socket head bolt for rear flange shaft	23

5 - Servicing propshaft

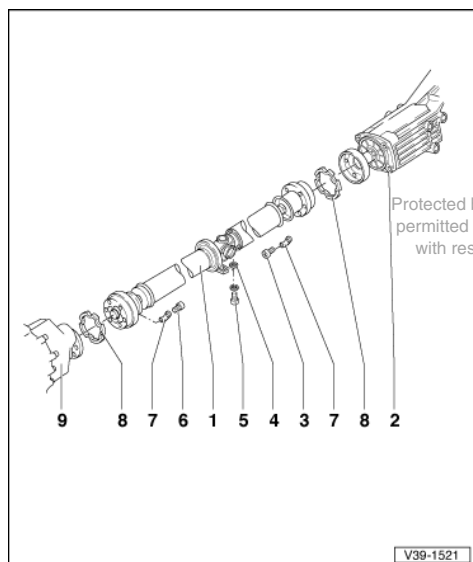
5.1 - Servicing propshaft

Notes:

- ◆ Observe general repair instructions => Page 4 .
- ◆ Do not bend the propshaft more than 25 ° at the central joint, otherwise the universal joint will be damaged.
- ◆ Only store and transport propshaft extended.



- ♦ No repair work can be carried out on the propshaft with the exception of removing, installing and adjusting.
- ♦ If the propshaft is only detached at the gearbox or from rear final drive then the propshaft is to be tied-up or supported at the constant velocity joint.
- ♦ Before removing, mark the position of the propshaft joint in relation to the flange on the rear final drive. Re-install in the same position, otherwise this can cause excessive imbalance, bearing damage and droning noise.
- ♦ If complaints are received (noises, vibrations), it is essential to check whether correct adjustment of the propshaft rectifies the fault before replacing the propshaft.
- ♦ After removing the propshaft from the rear final drive, the additional balance disc (thick washer) that may be located between the packing plate and the bolt head must not be re-installed.



1 Propshaft

- ♦ Adjusting => Page **111**

2 Rear final drive

3 Bolt - 55 Nm

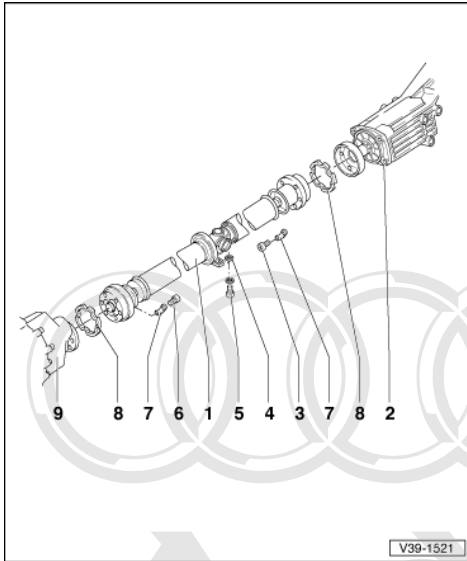
- ♦ Qty. 6
- ♦ Self-locking
- ♦ Renew
- ♦ Threads for bolts in flange shafts must always be cleaned (e.g. with a thread tap)

4 Shims

- ♦ Adjusting propshaft
=> Page **111**

5 Bolt - 23 Nm

- ♦ Qty. 2



6 Bolt - 55 Nm

- ◆ Qty. 6
- ◆ Self-locking
- ◆ Renew
- ◆ Threads for bolts in flange shafts must always be cleaned (e.g. with a thread tap)

7 Packing plate

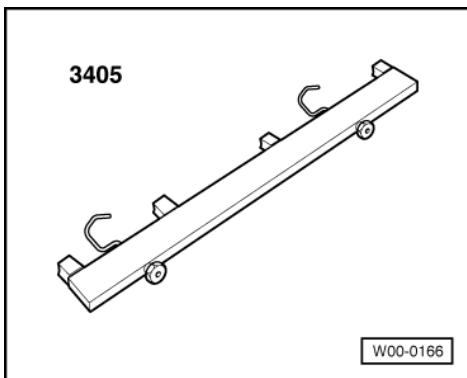
8 Gasket

- ◆ Always renew
- ◆ Pull off backing foil, and stick self-adhesive side of gasket to flange shaft.
- ◆ Remove grease from flange shaft

9 Gearbox

5.2 - Removing and installing propshaft

Special tools and workshop equipment required



- ◆ Assembly appliance 3405

or

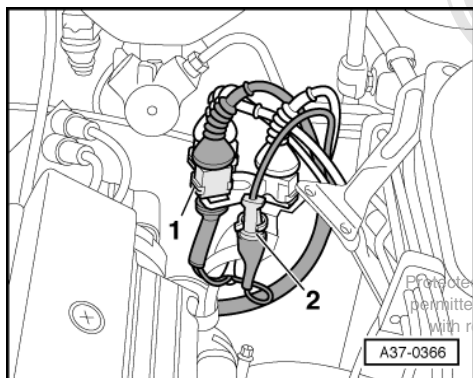
- ◆ Assembly appliance 3213

Removing

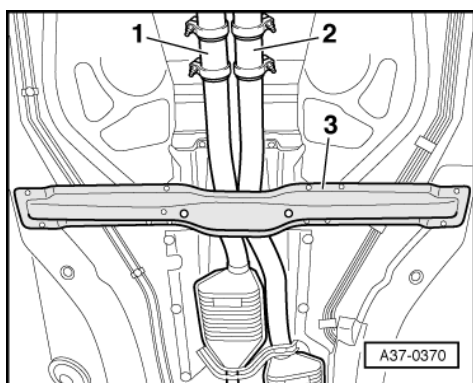
- Observe notes => Page 103 .



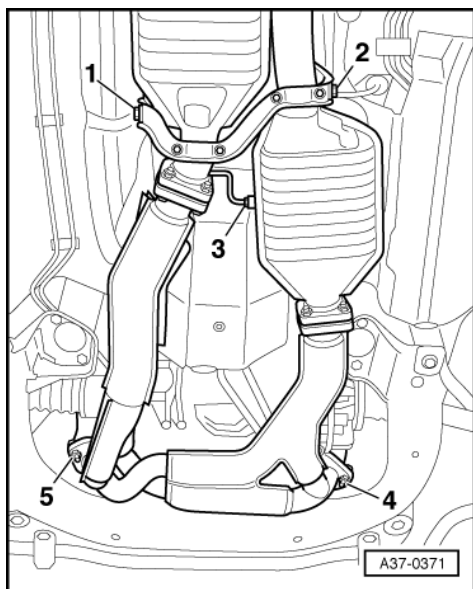
- Detach left air duct going to air cleaner housing.



- -> Unplug connectors -1- and -2- for lambda probe and lambda probe heating.
- Release wiring.
- Move wiring clear to the bottom.



- -> Remove floor cross piece -3-.
- Slacken bolts on clamps -1- and -2-.

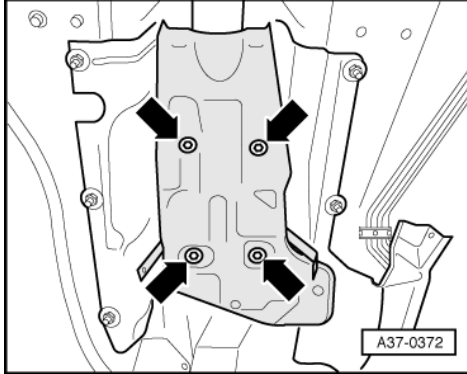


- -> Unscrew thermo-sensor -3-.
- Detach exhaust system at left and right manifolds -4- and -5- and at mountings on gearbox -1- and -2-.
- Remove front exhaust pipes together with catalytic converters.

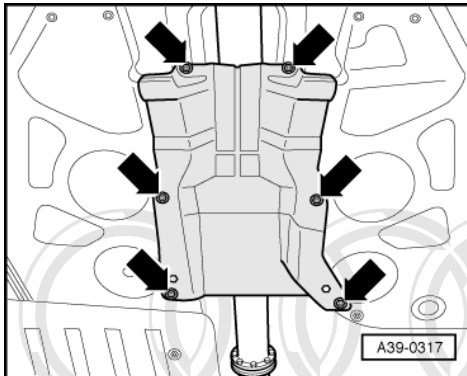
Note:

When removing the exhaust system, take care not to drop the sealing rings; they are liable to be damaged by impact.

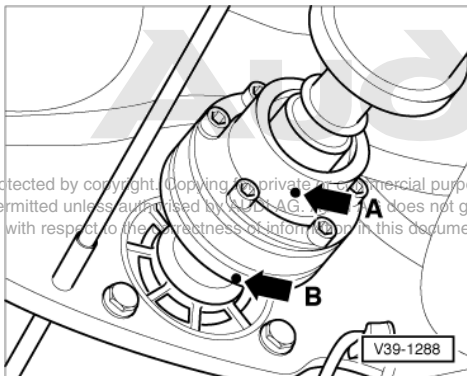
- Detach main silencer and rear silencer from mounting straps and remove.



- -> Unbolt front heat shield.



- -> Unbolt heat shield for propshaft -arrows-.



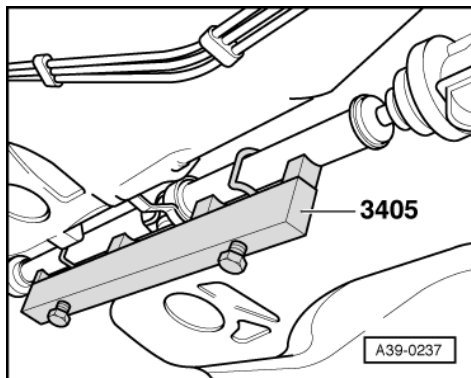
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- -> Check whether there is a factory marking (paint) on the propshaft and propshaft/rear final drive flange. If not, mark position of propshaft flange -arrow A- in relation to rear final drive -arrow B- with paint.

Note:

This is only necessary if the same propshaft is going to be re-installed.

- Slacken securing bolts on both propshaft flanges.
- Unscrew the three upper securing bolts on each propshaft constant velocity joint.



- Loosen securing bolts of centre propshaft mounting slightly.
- -> Attach assembly appliance 3405 and tighten the plastic nuts.

Note:

Never fit assembly appliance onto balance plates.

- Remove remaining bolts securing propshaft flanges to gearbox and rear final drive as well as securing bolts of centre propshaft mounting.
- Slide propshaft together towards rear final drive. The constant velocity joints move along their axes.
- Guide out propshaft with assembly appliance past gearbox flange.

Note:

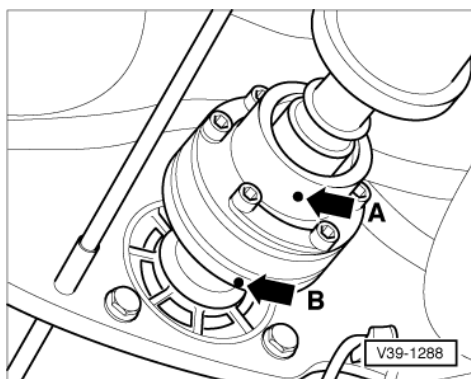
Only transport and store propshaft when extended.

Installing

Install in reverse sequence; note the following points:

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- ♦ It is essential that the locking fluid remaining in the threads in the flange shafts on the gearbox and rear final drive is cleaned out after removing the propshaft. Otherwise there is a danger that the new bolts will seize when they are screwed in and then shear if they have to be removed later.
- ♦ The threaded holes can be cleaned with a thread tap.
- ♦ Renew the gaskets on the flange shafts (remove backing foil and stick gaskets onto flange shaft; make sure that the surfaces are free of grease).



- ♦ -> To prevent imbalance, the flanges on the propshaft -arrow A- and on the rear final drive -arrow B- must be installed so that the factory markings (or the markings made on removal) are in alignment.
- ♦ If a new propshaft is being installed and the factory paint marking on the rear final drive flange is no longer visible, the radial run-out at the flange for the propshaft must be measured => Page 109 , and the paint marking on the propshaft must be aligned with the marking on the flange.
- ♦ After removing the propshaft from the rear final drive, the additional balance disk (thick washer) that may be located between the packing plate and the bolt head must not be re-installed.

- ◆ Renew propshaft bolts (self-locking).
- Adjust propshaft after installing => Page 111 .
- Install heat shields above propshaft.
- Align exhaust system free of stress

=> 8-cylinder engine, Mechanics; Repair Group 26; Aligning exhaust system free of stress Aligning exhaust system free of stress

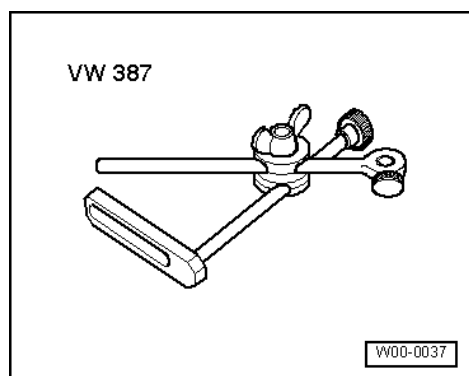
Tightening torques

Component	Nm
Propshaft to gearbox (output flange)	55 1)
Propshaft to final drive (input flange)	55 1)
Centre propshaft mounting to body	23
Floor cross piece	10

- 1) Renew bolts

5.3 - Measuring radial run-out at propshaft flange and marking

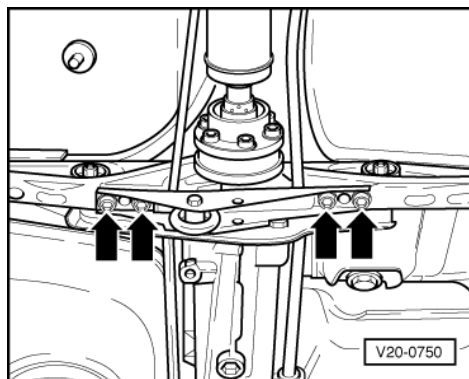
Special tools and workshop equipment required



- ◆ Universal dial gauge bracket VW 387
- ◆ Dial gauge

Notes:

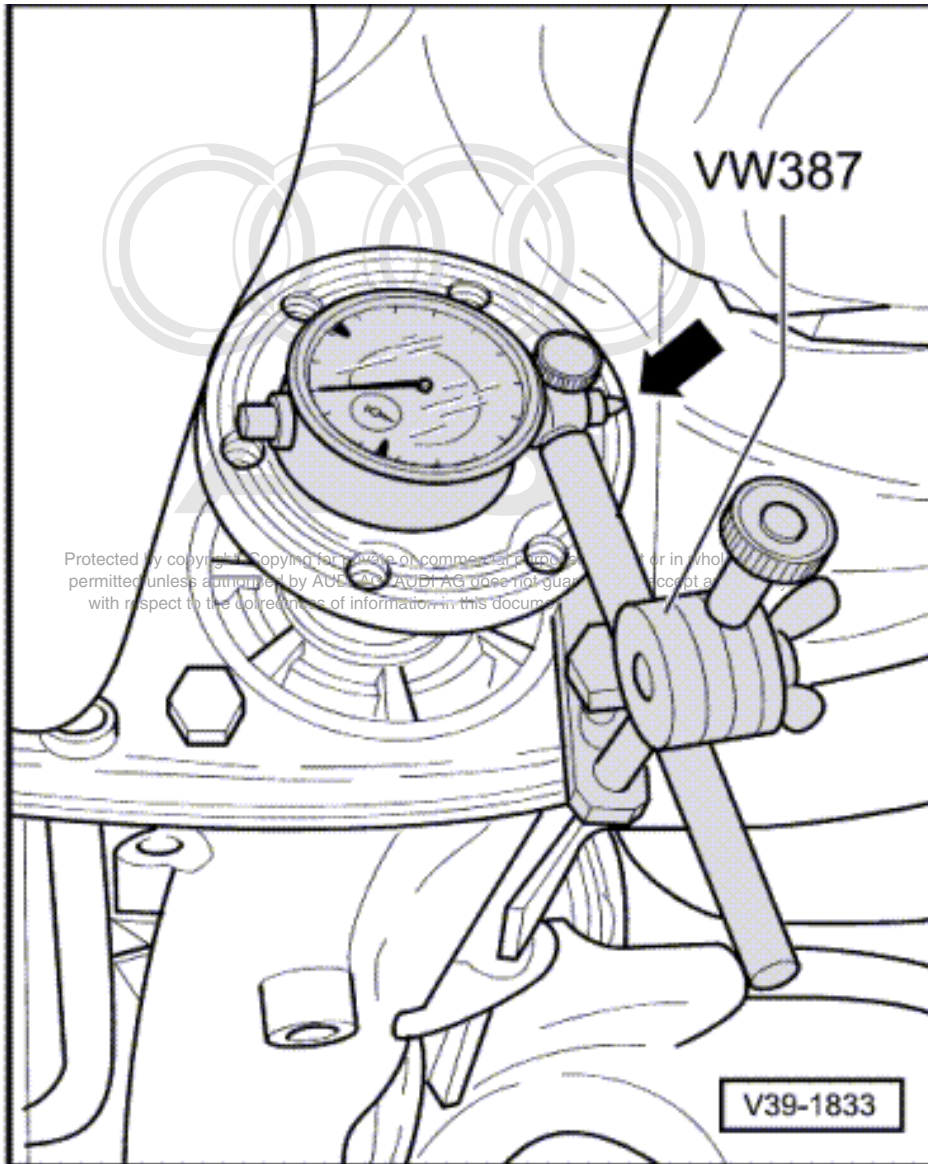
- ◆ The radial run-out must always be measured when drive pinion or propshaft flange are removed.
- ◆ If a new propshaft is being installed and the marking on the flange shaft of the rear final drive is no longer visible, the point of maximum radial run-out must be measured with a dial gauge and marked with paint.



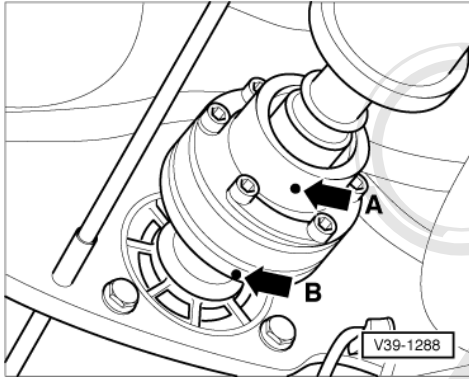
- ♦ The paint marking on the propshaft is then brought into alignment with this paint marking => Page 108 .
- ♦ The radial run-out can be measured when rear final drive is installed but the propshaft must be disconnected at rear final drive. Observe notes =>Page 103 .

Work sequence

- -> Unbolt brace -arrows-.



- -> Secure universal dial gauge retainer VW 387 with dial gauge to cross member/final drive bolted joint.
- Position dial gauge on ground circumference in propshaft flange -arrow- and set to zero with a preload of 1 mm.
- Turn differential via both rear wheels (left and right flange shaft) at same time in one direction until the propshaft flange has turned once completely.
- Make a paint marking at the point of greatest radial run-out on the outside of the flange (= greatest distance from axis of rotation).
- Remove old marks on propshaft flange.

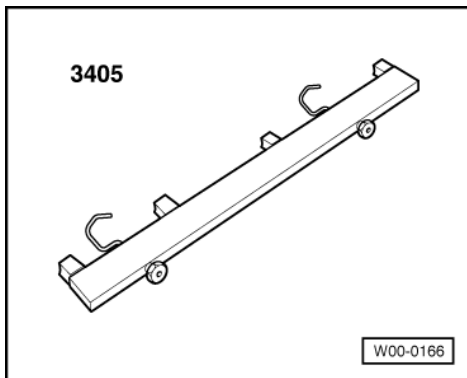


- -> When installing the propshaft, the marking on the propshaft (arrow -A-) must be aligned with the marking on the rear final drive (arrow -B-).
- Install propshaft => Page 108.

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5.4 - Adjusting propshaft

Adjustments should be carried out with care, because a badly adjusted propshaft is often the cause of vibration and droning.



Special tools and workshop equipment required

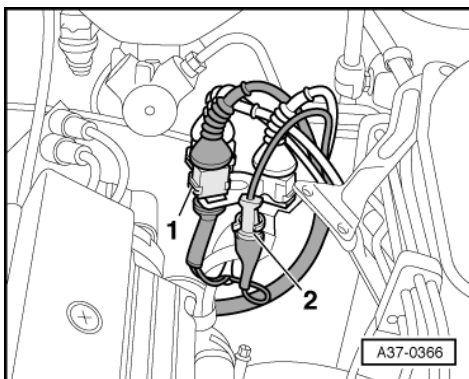
- ♦ Assembly appliance 3405

or

- ♦ Assembly appliance 3213

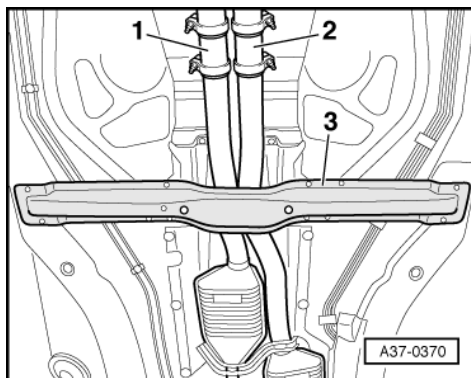
Work sequence

- Observe notes => Page 103.
- Detach left air duct going to air cleaner housing.

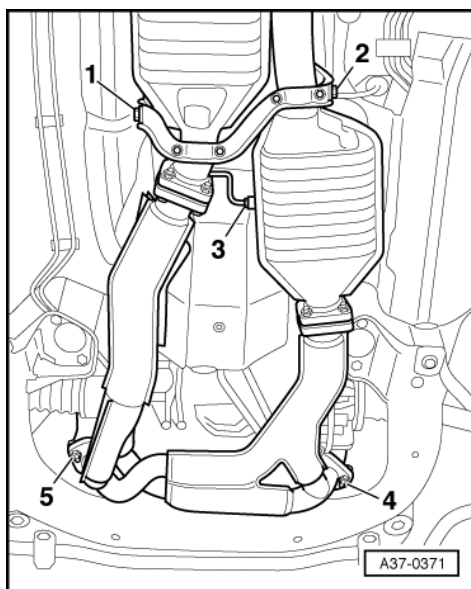




- -> Unplug connectors -1- and -2- for lambda probe and lambda probe heating.
- Release wiring.
- Move wiring clear to the bottom.



- -> Remove floor cross piece -3-.
- Slacken bolts on clamps -1- and -2-.



- -> Unscrew thermo-sensor -3-.
- Detach exhaust system at left and right manifolds -4- and -5- and at mountings on gearbox -1- and -2-.
- Remove front exhaust pipes together with catalytic converters.

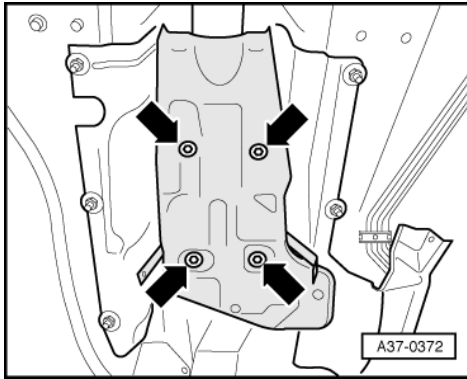
Note:

When removing the exhaust system, take care not to drop the sealing rings; they are liable to be damaged by impact.

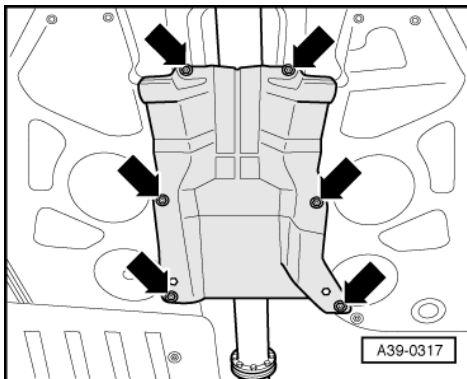
- Detach and remove rear section of exhaust system.



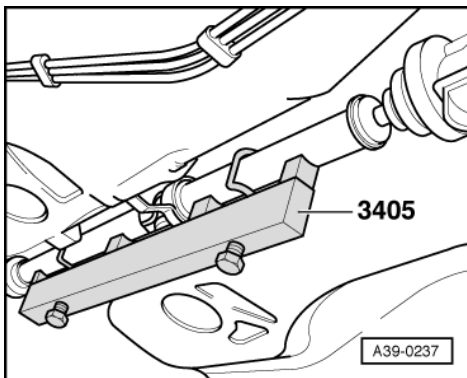
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- -> Unbolt front heat shield.



- -> Unbolt heat shield for propshaft -arrows-.
- Loosen securing bolts of centre propshaft mounting slightly.

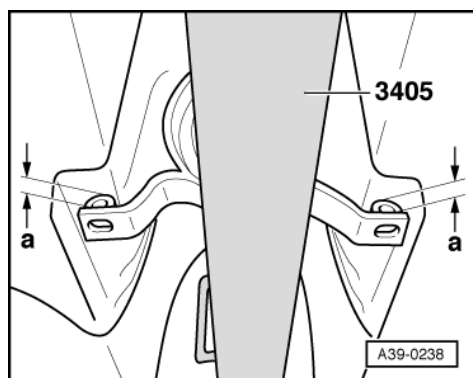


- -> Attach assembly appliance 3405 and tighten the plastic nuts.

Note:

Never fit assembly appliance onto balance plates.

- Remove securing bolts and shims from centre mounting.



- ➔ Align centre propshaft mounting so that distance -a- is the same on left and right.
- Measure -a- on both sides.
- Select shims from table.

Part numbers

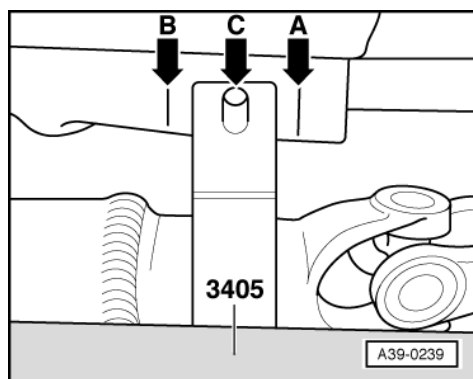
➔ Parts catalogue

The following shims are available

Dimension -a- (mm)	Shim thickness (mm)
0 ... 3.0	-
3.1 ... 5.0	2
5.1 ... 7.0	4
7.1 ... 9.0	6
9.1 ... 11.0	8
11.1 ... 13.0	10

- Install the correct shims on both sides.

Aligning propshaft longitudinally



- ➔ Using assembly appliance, push propshaft towards the rear as far as it will go.
- Mark position of centre mounting on body -arrow A-.
- Using assembly appliance, push propshaft towards the front as far as it will go.
- Mark position of centre mounting on body -arrow B-.
- Align propshaft -arrow C-.
- The centre mounting must be positioned centrally between the markings -A- and -B-.
- Install securing bolts of propshaft centre mounting and previously determined shims and tighten.
- Remove assembly appliance.
- Install heat shields above propshaft.
- Align exhaust system free of stress



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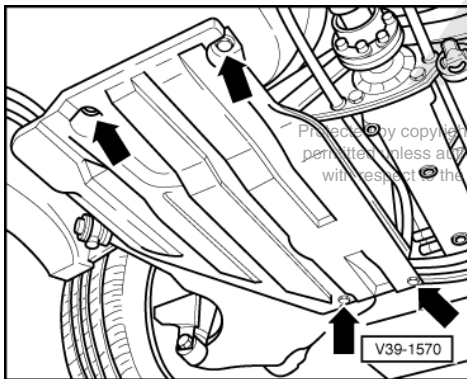
=> 8-cylinder engine, Mechanics; Repair Group 26; Aligning exhaust system free of stress Aligning exhaust system free of stress

Tightening torques

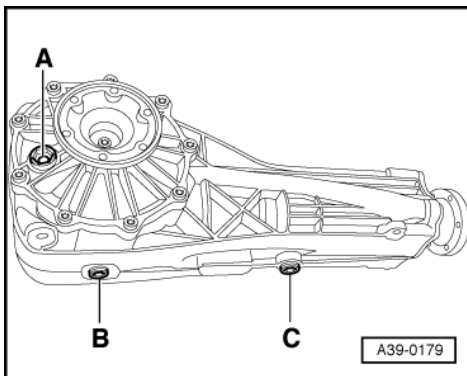
Component	Nm
Propshaft centre mounting to body	23
Floor cross piece	10

6 - Checking oil level in rear final drive

6.1 - Checking oil level in rear final drive



- -> Unbolt fuel tank cover panel -arrows-.



- -> Unscrew oil filler plug -arrow A-.
- Specification: oil level up to bottom lip of filler hole.
- Top up oil if necessary. Specification => Page 3.
- Screw in oil filler plug.

Tightening torque

Component	Nm
Oil filler plug	25

7 - Renewing flange shaft oil seals

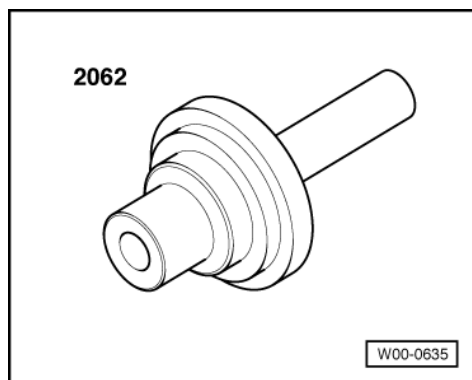
7.1 - Renewing flange shaft oil seals

- Observe general repair instructions



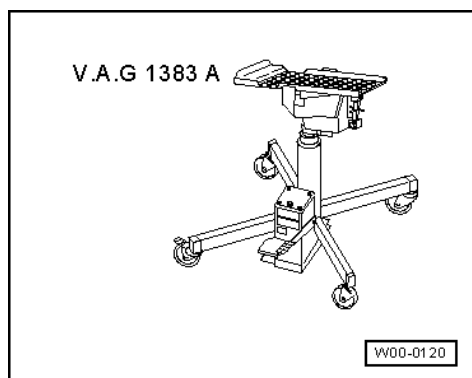
=> Page 4 .

7.2 - Renewing right flange shaft oil seal



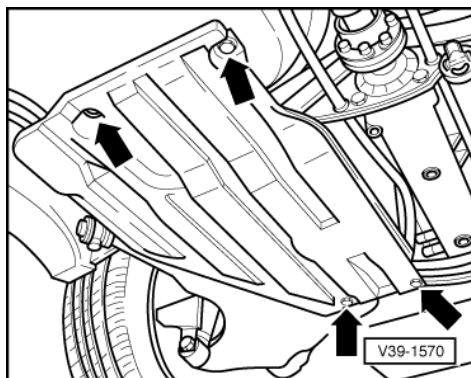
Special tools and workshop equipment required

- ♦ Drift 2062



- ♦ Engine/gearbox jack V.A.G 1383 A
- Rear final drive installed

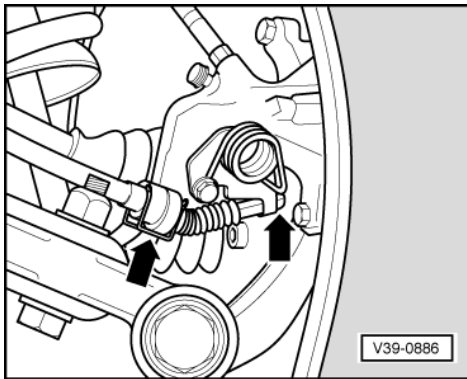
Removing



- -> Unbolt fuel tank cover panel -arrows-.



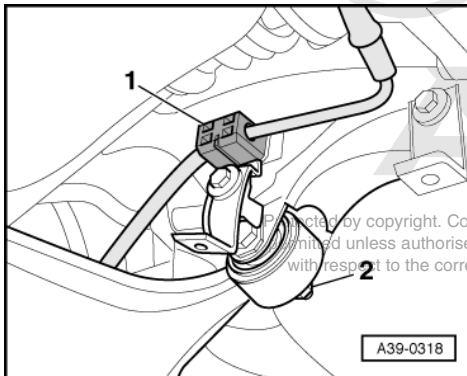
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- -> Disengage handbrake cable at right brake caliper -arrows-.

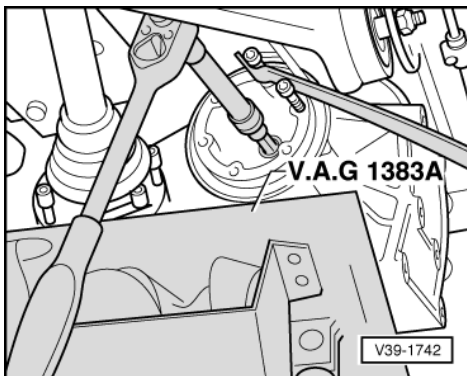
Note:

When detaching the handbrake cable, make sure the plastic sleeve on the cable is not damaged.

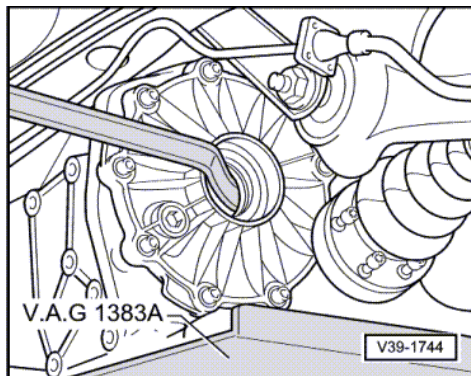


- -> Press handbrake cable out of retainer on right side -1-.
- Support trapezium link using engine/gearbox jack V.A.G 1383 A.
- Unbolt trapezium link from cross member -2- and lower carefully using engine/gearbox jack V.A.G 1383 A.
- Unbolt right drive shaft from flange shaft and move drive shaft down and clear

=> Running gear, Front-wheel drive and four-wheel drive; Repair group 42; Removing and installing drive shaft; Servicing drive shaft Removing and installing drive shaft Servicing drive shaft



- -> Remove flange shaft. To loosen securing bolt, screw two bolts into flange shaft and hold with bar to prevent it from turning.
- Pull out flange shaft using the bolts already screwed in.
- Place container underneath and catch escaping oil.

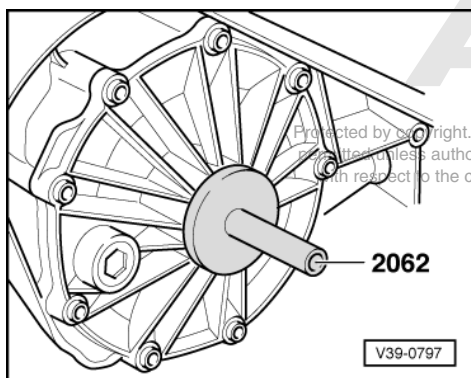


- -> Lever out oil seal for right flange shaft using a suitable lever.

Installing

Install in reverse sequence; note the following points:

- Clean seat for oil seal.
- Moisten outer circumference of seal with gear oil.
- Fill space between sealing lip and dust lip with multi-purpose grease.



- -> Drive in oil seal for right flange shaft onto stop with mandrel 2062, ensuring that seal is kept straight.
- Insert flange shaft.
- Screw in cone-head bolt to secure flange shaft.

- Bolt on drive shaft

=> Running gear, Front-wheel drive and four-wheel drive; Repair group 42; Removing and installing drive shaft; Servicing drive shaft Removing and installing drive shaft Servicing drive shaft

- Bolt trapezium link onto cross member

=> Running gear, Front-wheel drive and four-wheel drive; Repair group 42; Assembly overview of rear axle (vehicles with four-wheel drive); Removing and installing trapezium link Assembly overview of rear axle (vehicles with four-wheel drive) Removing and installing trapezium link

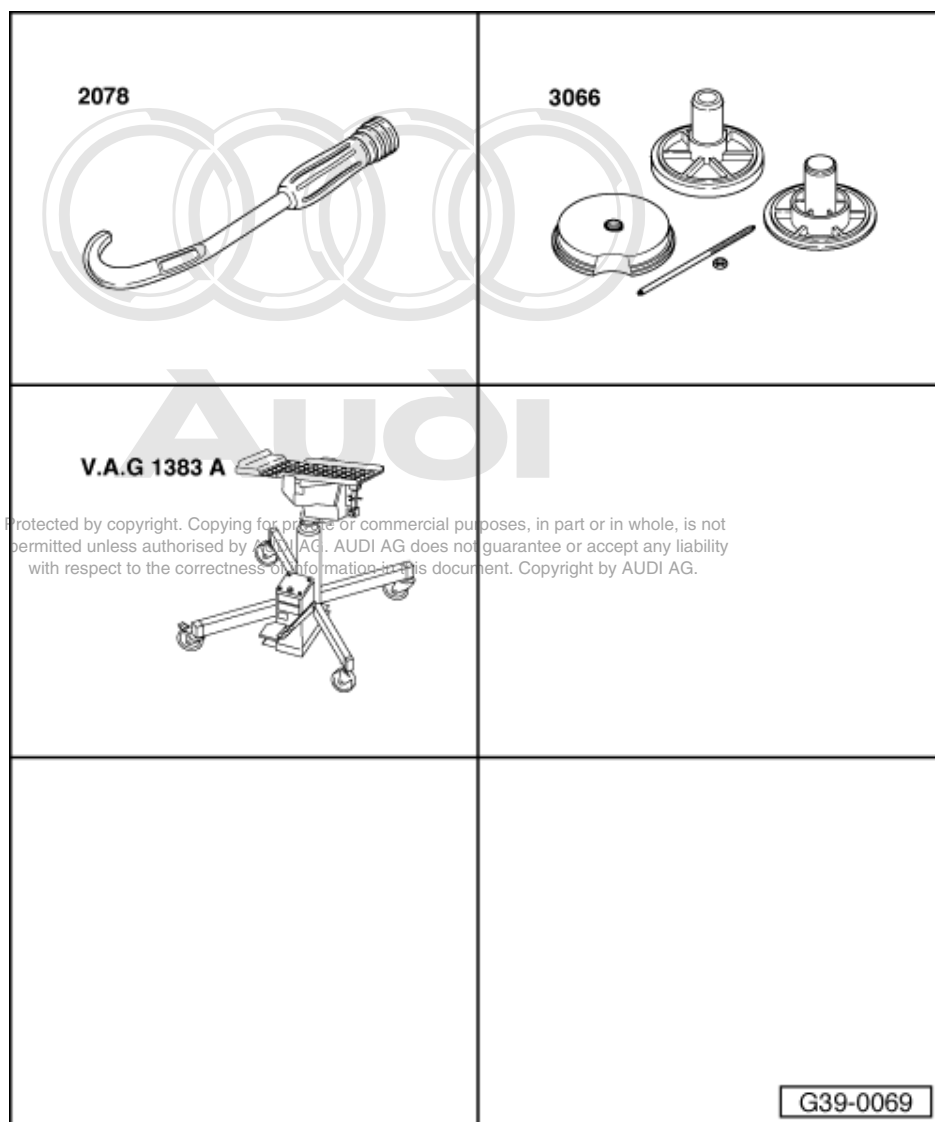
- Top-up gear oil in rear final drive and check oil level => Page 115 .

Tightening torques

Component	Nm
Flange shaft to final drive	10 + 90° 1)
Fuel tank cover panel to body	20

- 1) 90° is a quarter turn

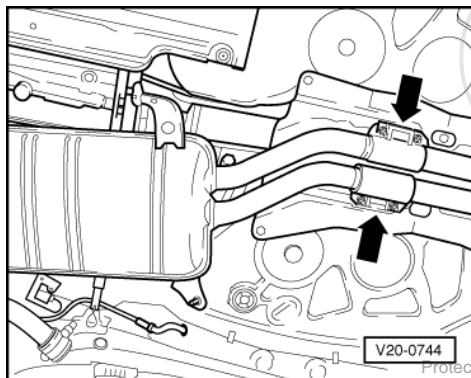
7.3 - Renewing left flange shaft oil seal



- ◆ Bucket tappet compressor 2078
- ◆ Assembly tool 3066
- ◆ Engine/gearbox jack
V.A.G 1383 A

Removing

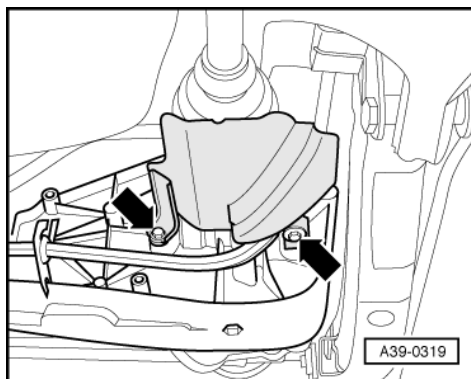
- Rear final drive installed



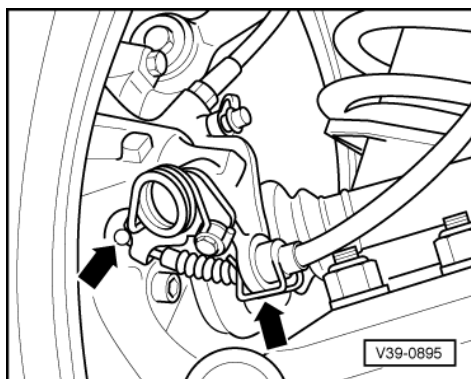
- -> Loosen the clamps -arrows- and detach exhaust system

=> 8-cylinder engine, Mechanics; Repair Group 26; Removing and installing exhaust system Removing and installing exhaust system

- Detach main silencer and rear silencer from mounting straps and remove.



- -> Unbolt cover plate for drive shaft -arrows-.

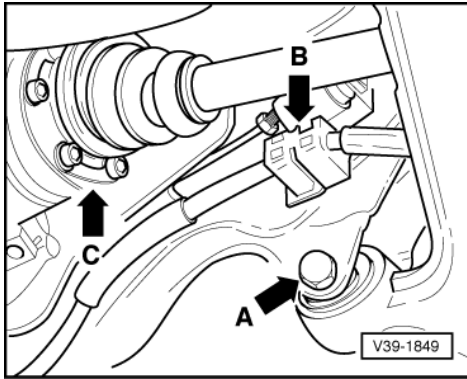


- -> Disengage handbrake cable at left brake caliper -arrows-.

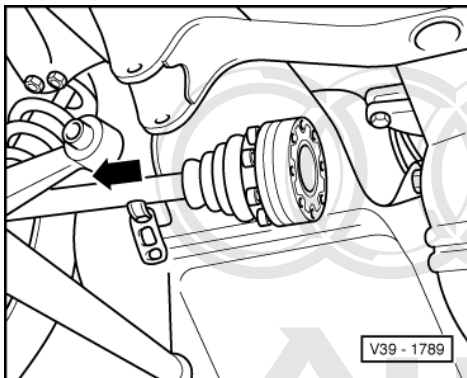
Note:

When detaching the handbrake cable, make sure the plastic sleeve on the cable is not damaged.

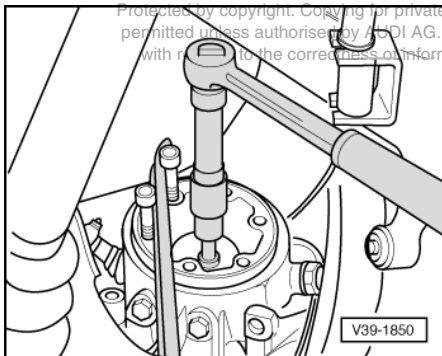
- Support trapezium link using engine/gearbox jack V.A.G 1383 A.



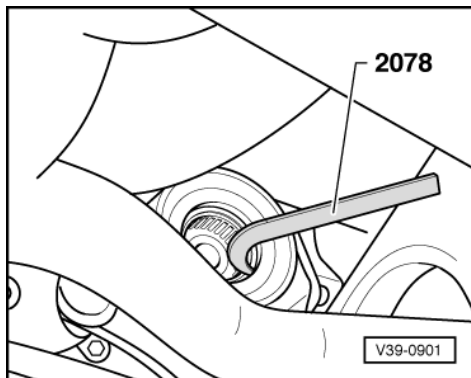
- -> Unbolt trapezium link from cross member -arrow A- and lower carefully using engine/gearbox jack V.A.G 1383 A.
- Push left handbrake cable out of retainer -arrow B-.
- Unbolt drive shaft from flange shaft -arrow C-.



- -> Press trapezium link outwards -arrow- and move drive shaft down and clear.



- -> Remove flange shaft. To loosen securing bolt, screw two bolts into flange shaft and hold with bar to prevent it from turning.
- Place drip tray underneath and catch escaping oil.
- Pull out flange shaft using the bolts already screwed in.

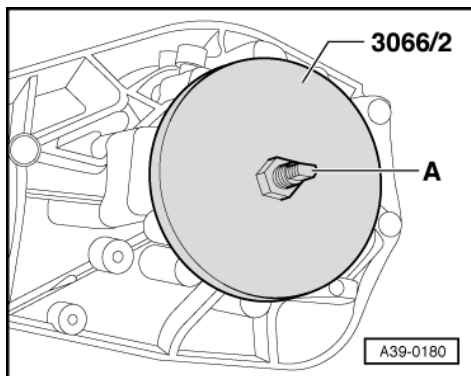


- -> Prise out flange shaft oil seal using bucket tappet compressor 2078

Installing

Install in reverse sequence; note the following points:

- Clean seat for oil seal.
- Lubricate outer circumference of seal with gear oil.
- Fill space between sealing lip and dust lip with multi-purpose grease.



- -> Screw stud -A- of assembly tool 3066 into differential.
- Install seal as far as stop using stud and thrust plate 3066/2.
- Insert flange shaft.
- Screw in cone-head bolt to secure flange shaft.

- Bolt on drive shaft

=> Running gear, Front-wheel drive and four-wheel drive; Repair group 42; Removing and installing drive shaft; Servicing drive shaft Removing and installing drive shaft Servicing drive shaft

- Bolt trapezium link onto cross member

=> Running gear, Front-wheel drive and four-wheel drive; Repair group 42; Assembly overview of rear axle (vehicles with four-wheel drive); Removing and installing trapezium link Assembly overview of rear axle (vehicles with four-wheel drive) Removing and installing trapezium link

- Top-up gear oil in rear final drive and check oil level => Page 115 .
- Align exhaust system free of stress

=> 8-cylinder engine, Mechanics; Repair Group 26; Aligning exhaust system free of stress Aligning exhaust system free of stress

Tightening torques

Component	Nm
Flange shaft to final drive	10 + 90° 1)

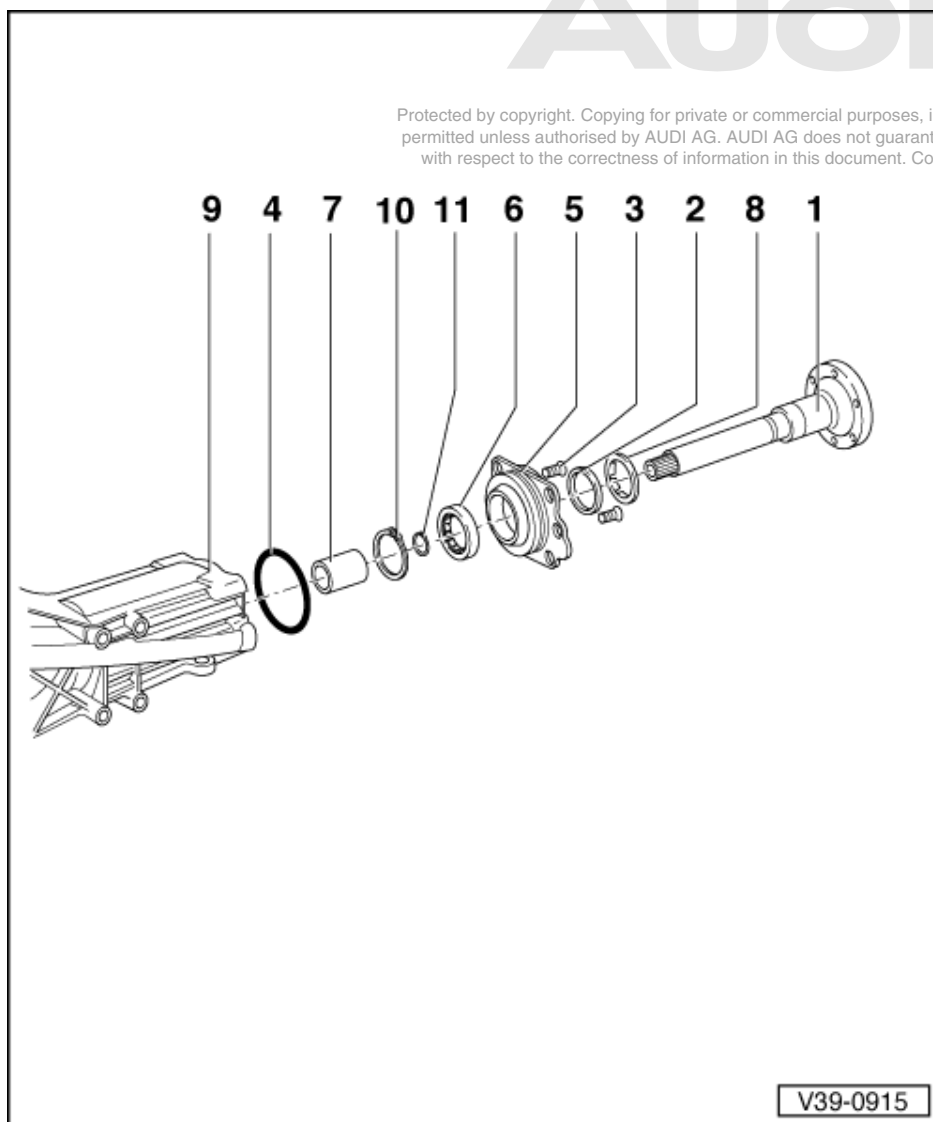
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Component	Nm
Cover plate for drive shaft	25

- 1) 90° is a quarter turn

8 - Replacing oil seal and grooved ball bearing for propshaft flange

8.1 - Replacing oil seal and grooved ball bearing for propshaft flange



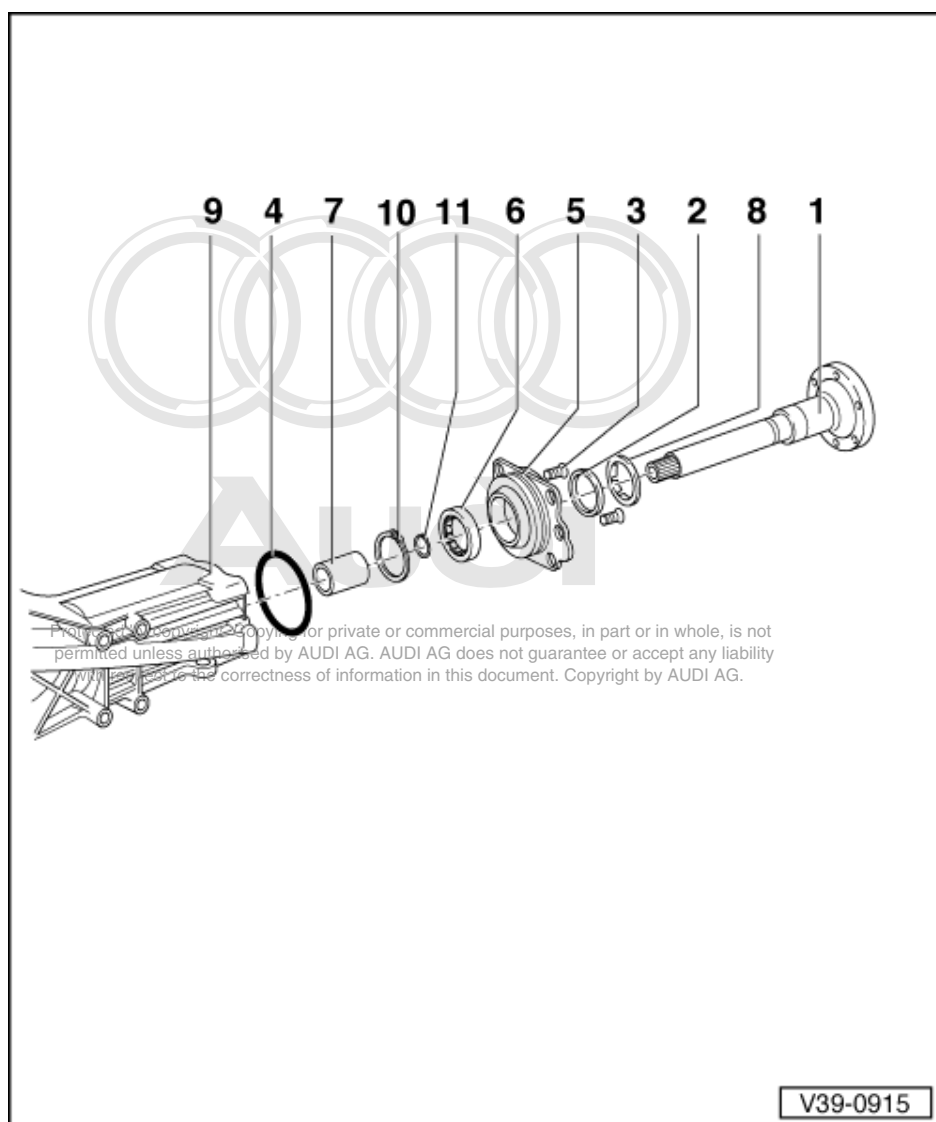
Note:

The oil seal and grooved ball bearing can be replaced with the rear final drive installed; just lower the final drive.

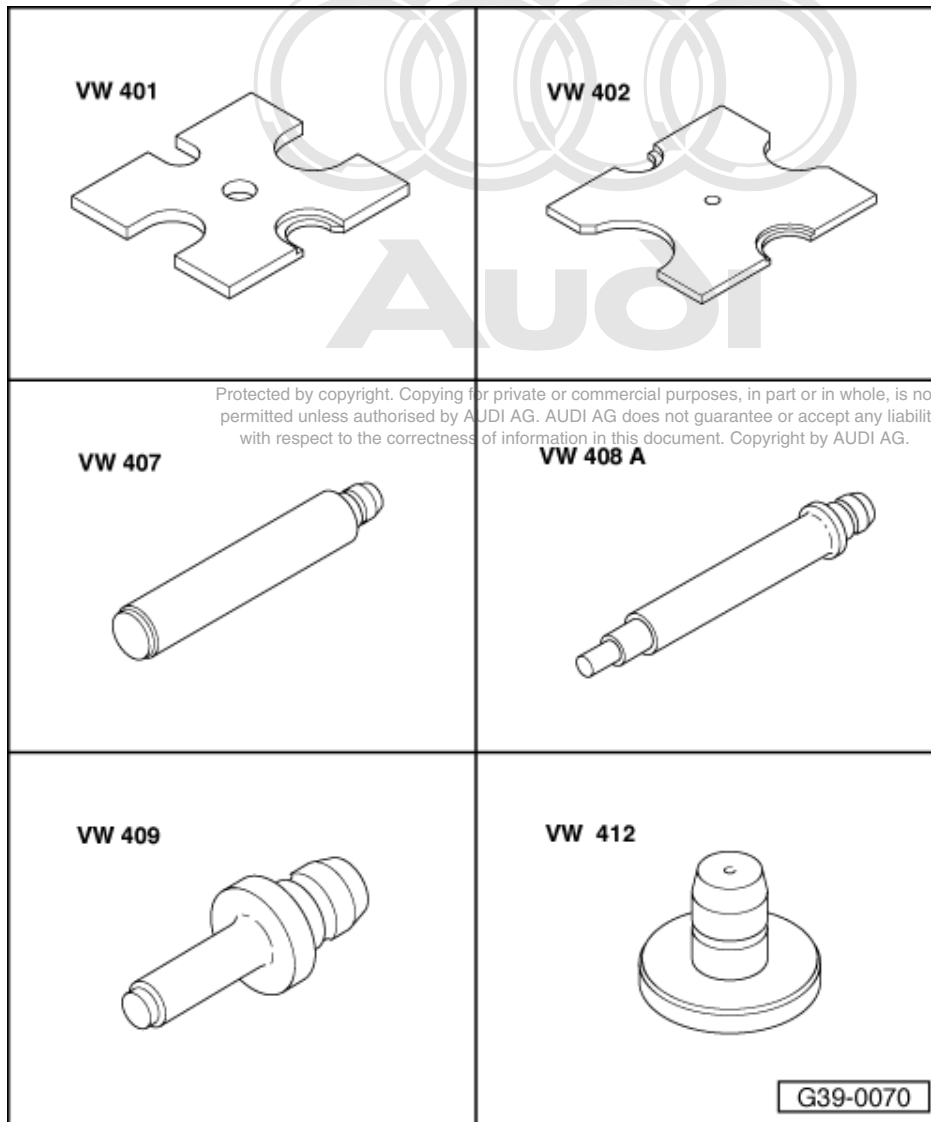
- 1 Flange shaft
 - ♦ Note position in relation to propshaft, mark if necessary
 - ♦ Measure radial run-out if flange shaft is removed
- 2 Oil seal
- 3 Countersunk bolt - 25 Nm
- 4 O ring



♦ Renew

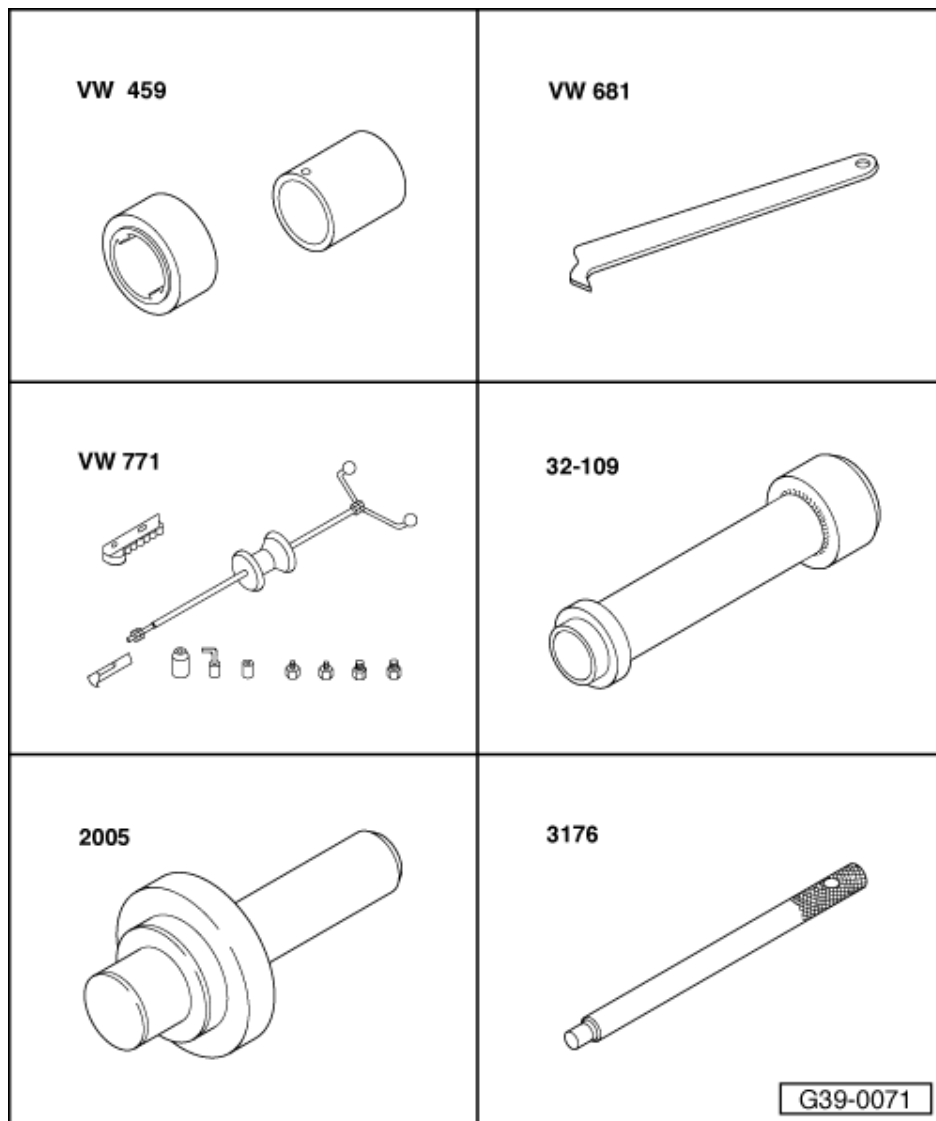


- 5 Cover
- 6 Grooved ball bearing
- 7 Collar
- 8 Plastic ring
- 9 Rear final drive housing
- 10 Large circlip
- 11 Small circlip

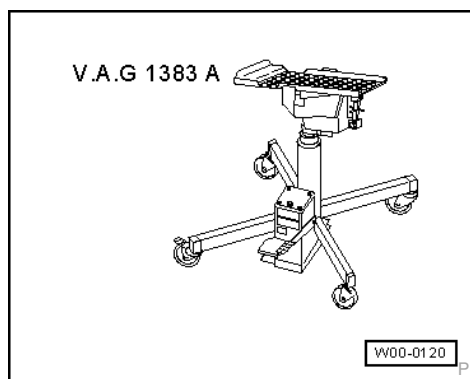


Special tools and workshop equipment required

- ◆ Thrust plate VW 401
- ◆ Thrust plate VW 402
- ◆ Press tool VW 407
- ◆ Press tool VW 408 A
- ◆ Press tool VW 409
- ◆ Press tool VW 412



- ♦ Removing tool VW 459/1
- ♦ Oil seal extractor lever VW 681
- ♦ Multi-purpose tool VW 771
- ♦ Tube 32-109
- ♦ Punch 2005
- ♦ Centring mandrel 3176

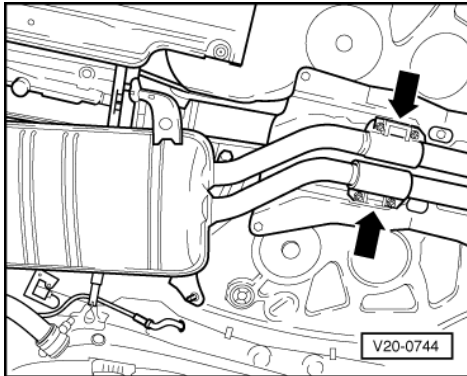


- ♦ Engine/gearbox jack V.A.G 1383 A



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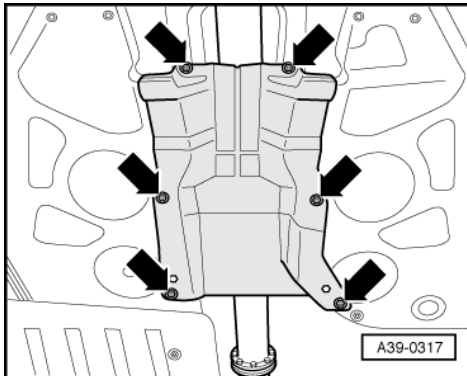
Removing



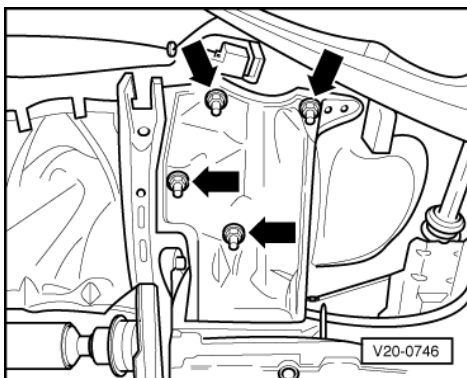
- -> Loosen the clamps -arrows- and detach exhaust system

=> 8-cylinder engine, Mechanics; Repair Group 26; Removing and installing exhaust system Removing and installing exhaust system

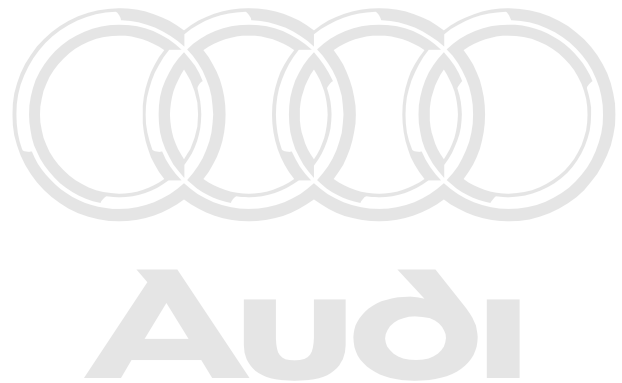
- Detach main silencer and rear silencer from mounting straps and remove.



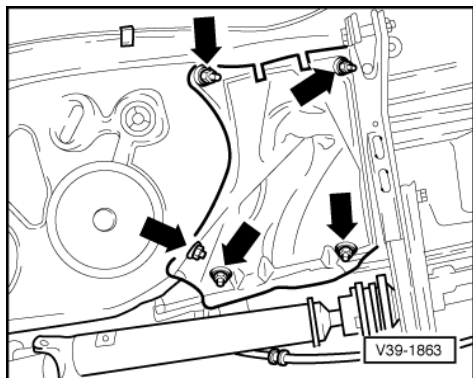
- -> Remove heat shield for propshaft -arrows-.



- -> Unbolt heat shield behind cross piece I -arrows-.

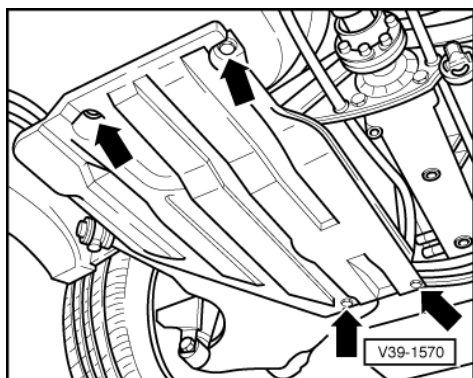


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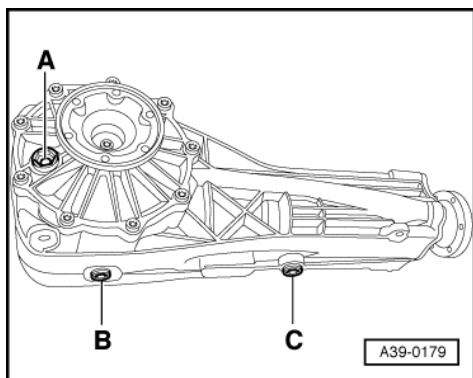


- -> Unbolt heat shield in front of cross-piece I -arrows.

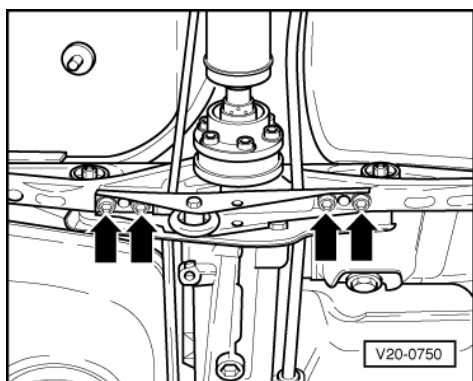
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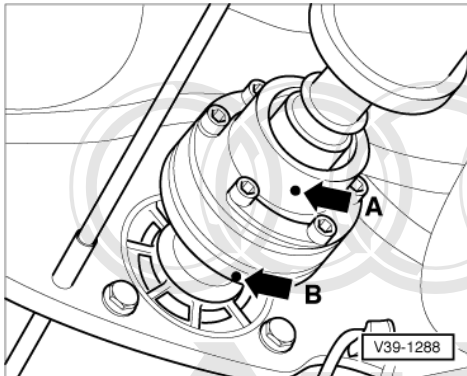
- -> Unbolt fuel tank cover panel -arrows-.
- Place drip tray under final drive.



- -> Unscrew oil drain plugs -B- and -C- and drain off gear oil.

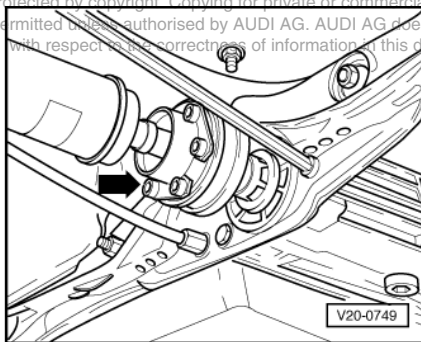


- -> Unbolt brace -arrows-.



- -> Check whether there is a factory marking (paint) on the propshaft and propshaft/rear final drive flange. If not, mark position of propshaft flange -arrow A- in relation to rear final drive -arrow B- with paint.

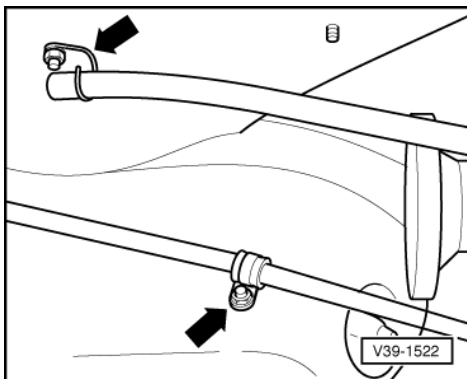
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- -> Unscrew bolts securing propshaft to rear final drive.
- Lift propshaft clear and tie in place.

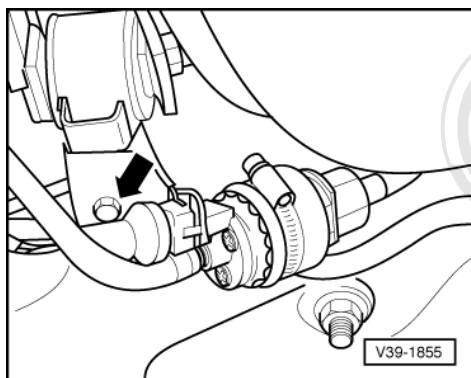
Note:

Do not bend the propshaft more than 25 °, otherwise the universal joint could be damaged.



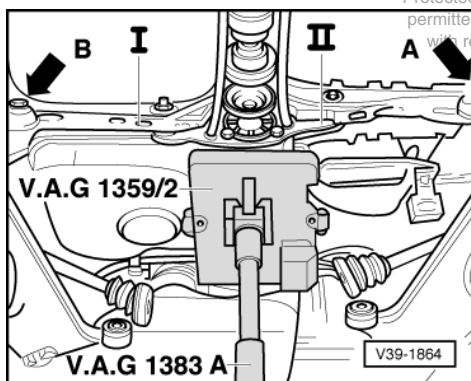
- -> Unbolt retainers for handbrake cables -arrows-.
- Slacken adjuster nut for handbrake cables and disengage cables at compensating bar

=> Brake system; Repair group 46; Handbrake lever - assembly overview Handbrake lever - assembly overview



- -> Vehicles with auxiliary heater: unbolt retainer for metering pump -arrow-.

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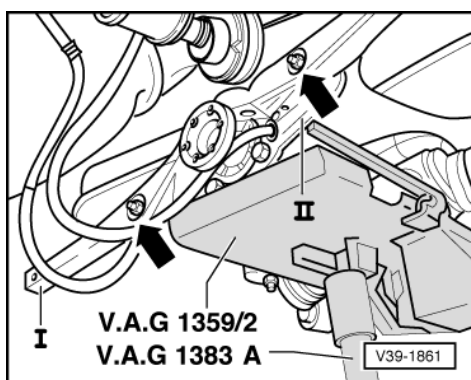


- -> Support final drive with gearbox jack V.A.G 1383 A and V.A.G 1359/2.
- Secure final drive with a strap.
- Carefully pull handbrake cables through eyes of cross-piece II to rear.
- Loosen bolt -arrow A- for cross-piece I.

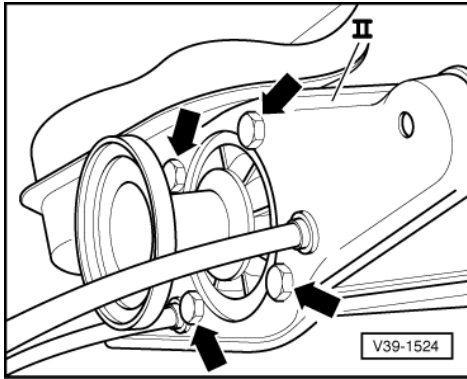
Note:

Do not slacken the bolts securing the rear final drive.

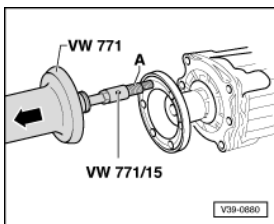
- Remove bolt -arrow B- for cross-piece I and lower final drive carefully using gearbox jack.



- -> Unbolt cross-piece II from cross-piece I -arrows-.
- Lift cross-piece I clear and tie in place.

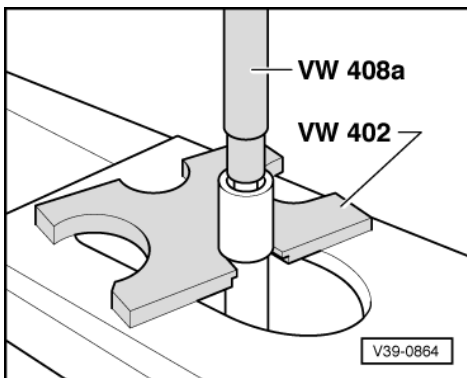


- -> Unbolt cross-piece II from final drive -arrows- and lift out over flange shaft of final drive.

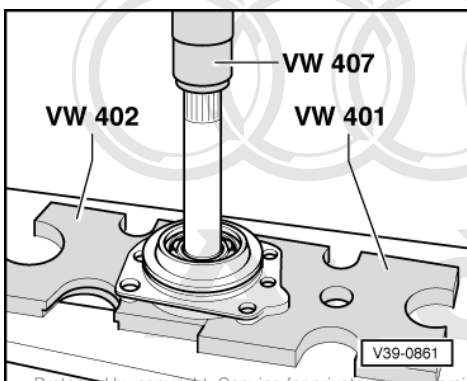


- -> Unbolt cover for final drive and pull out together with flange shaft.

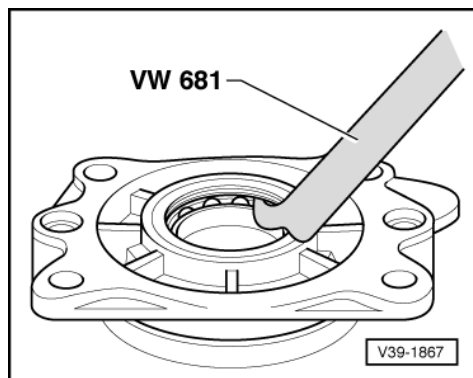
A - M8/M10 stud



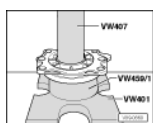
- -> Press off collar.
- Take off small circlip (in front of grooved ball bearing).



- > Press out flange shaft.



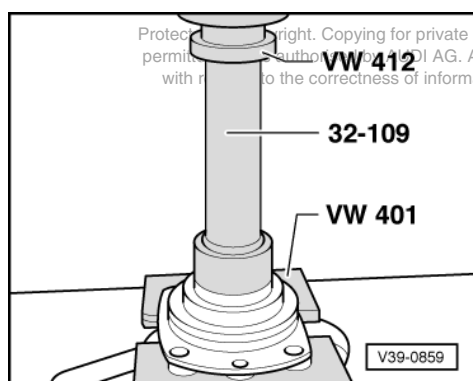
- -> Prise out oil seal.
- Remove large circlip from cover.



- -> Press out grooved ball bearing.

Installing

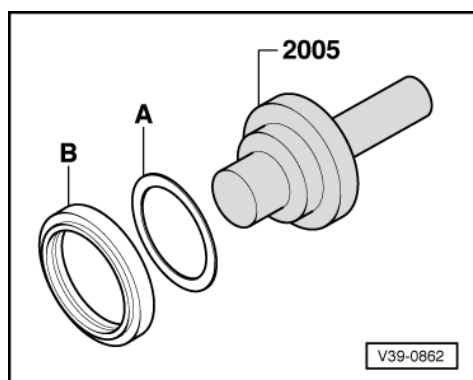
Install in reverse sequence; note the following points:



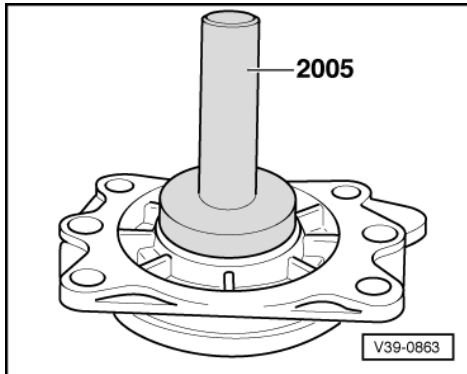
Note:

Always replace self-locking nuts and bolts.

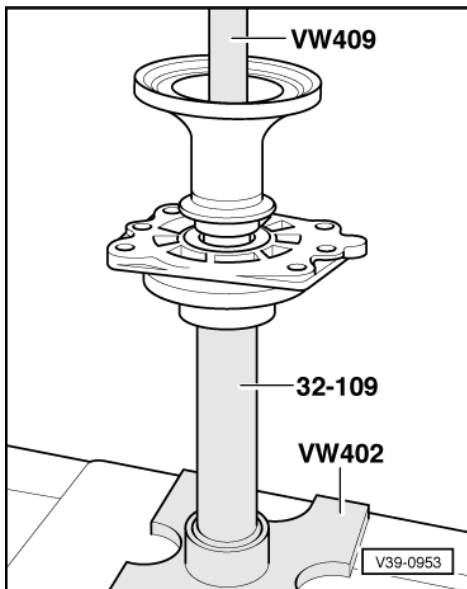
- Clean seat for oil seal.
- -> Press in grooved ball bearing.
- Insert large circlip into cover.



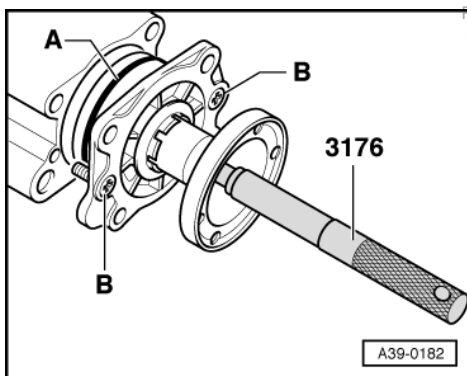
- -> Fit new seal -B- and shim -A- Part No. 016 311 391 P (1.05 mm thick) onto punch 2005.
- Thoroughly clean seat for oil seal in cover.
- Lubricate outer circumference of seal with gear oil.



- -> Drive in flange shaft seal and shim onto stop using punch 2005.
- Fill space between sealing lip and dust lip with multi-purpose grease.
- Fit plastic ring onto flange shaft => Page 124 , -Item 8 -.



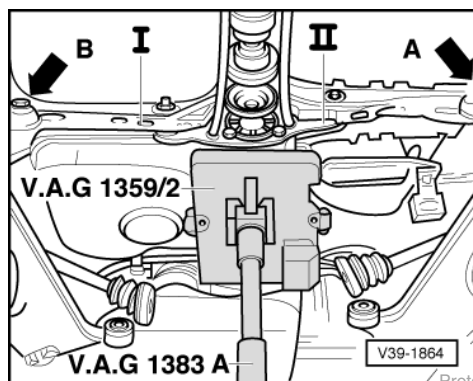
- -> Press in flange shaft.
- Fit small circlip.
- Fit collar and drive into place using plastic-headed hammer.



- -> Always fit new O-ring -A- and lubricate lightly before inserting.
- Drive in the flange shaft and the cover using centring mandrel 3176.



- Tighten countersunk bolts -B- to 25 Nm.



- -> Bolt cross-piece II onto final drive.
- Bolt cross-piece I onto cross-piece II and body.
- Engage handbrake cables in compensating bar and adjust handbrake

=> Brake system; Repair group 46; Handbrake lever - assembly overview Handbrake lever - assembly overview

- Top up gear oil in rear final drive and check oil level
=> Page 115 .
- Measure radial run-out at flange shaft and mark position
=> Page 109 .
- Fit new gasket on flange shaft and tighten bolts on propshaft.
See notes on installation => Page 108 .
- Align exhaust system free of stress

=> 8-cylinder engine, Mechanics; Repair Group 26; Aligning exhaust system free of stress Aligning exhaust system free of stress

Tightening torques

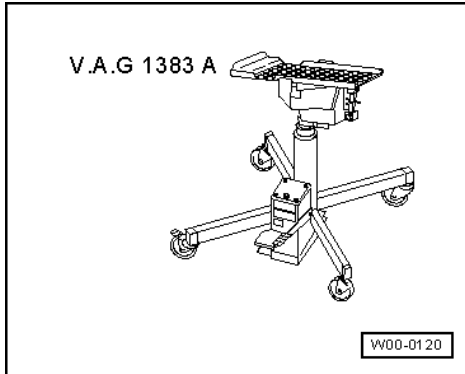
Component	Nm
Cover to rear final drive	25
Cross-piece II to rear final drive	45
Cross-piece I to cross-piece II	45
Cross-piece I to body	45
Brace to cross-piece I	55
Metering pump retainer to body 1)	25
Propshaft to flange shaft M8	55 2)
Fuel tank cover panel to body	20

- 1) Vehicles with auxiliary heater
- 2) Renew bolts

9 - Removing and installing rear final drive

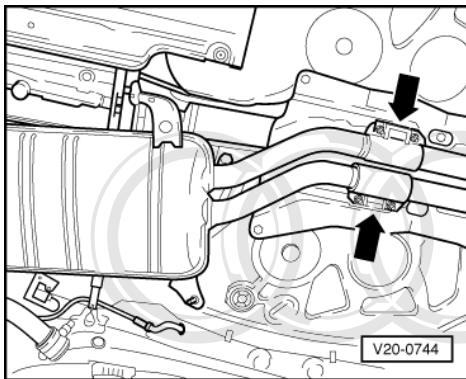
9.1 - Removing and installing rear final drive

Special tools and workshop equipment required



- ♦ Engine/gearbox jack V.A.G 1383 A

Removing

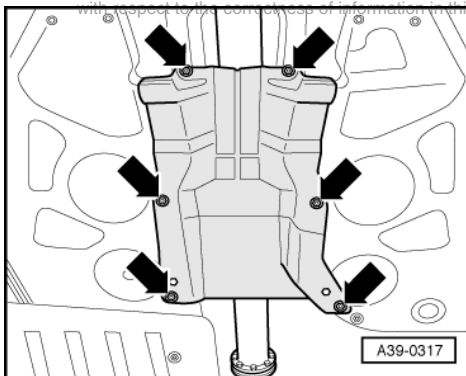


- -> Loosen the clamps -arrows- and detach exhaust system

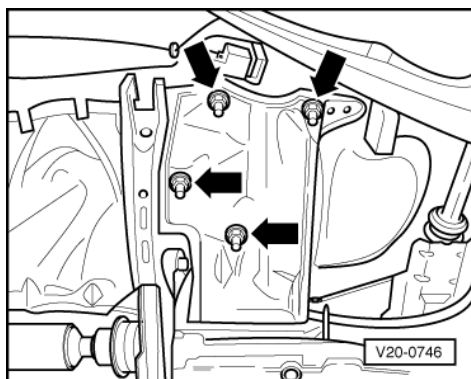
=> 8-cylinder engine, Mechanics; Repair Group 26; Removing and installing exhaust system Removing and installing exhaust system

- Detach main silencer and rear silencer from mounting straps and remove.

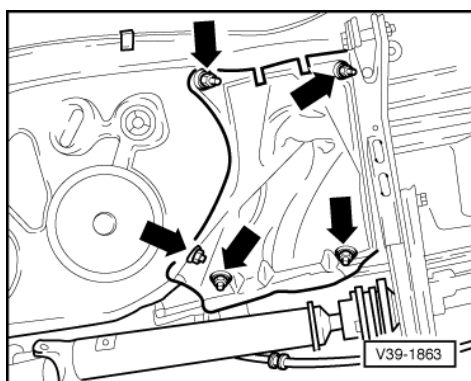
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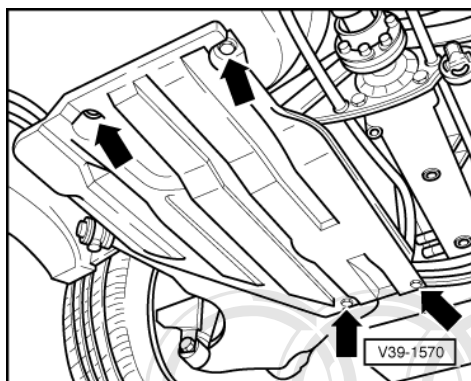
- -> Unbolt heat shield for propshaft -arrows-.



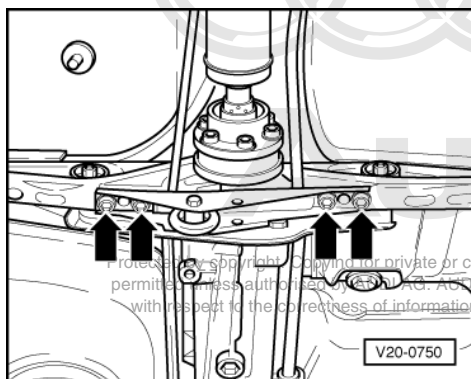
- -> Unbolt heat shield behind cross piece I -arrows-.



- -> Unbolt heat shield in front of cross-piece I -arrows.

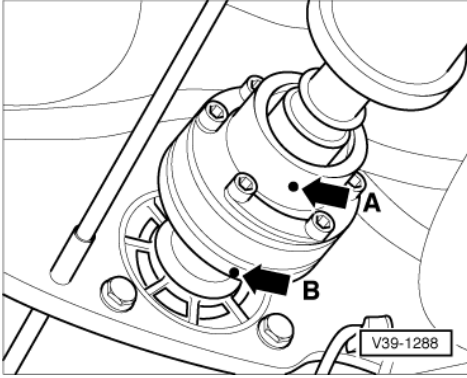


- -> Unbolt fuel tank cover panel -arrows-.

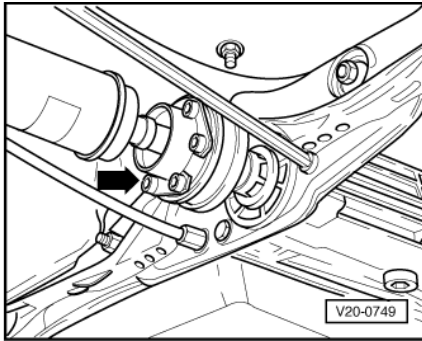


- -> Unbolt brace -arrows-.

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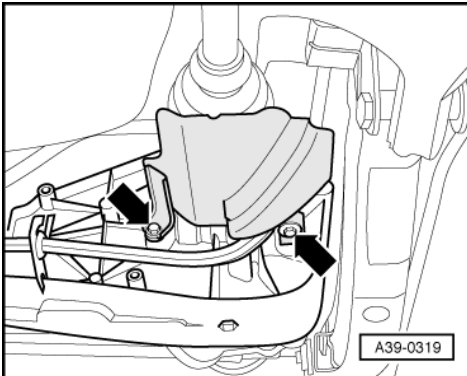
- -> Check whether there is a factory marking (paint) on the propshaft and propshaft/rear final drive flange. If not, mark position of propshaft flange -arrow A- in relation to rear final drive -arrow B- with paint.



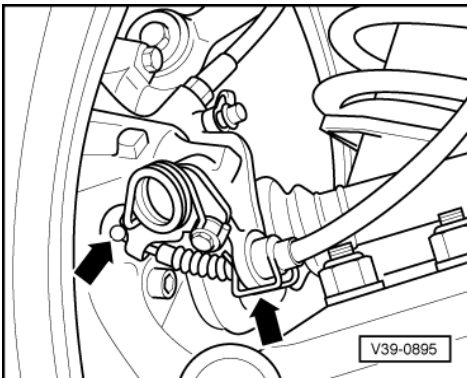
- -> Remove bolts securing propshaft to rear final drive.
- Lift propshaft clear and tie in place.

Note:

Do not bend propshaft more than 25°, otherwise the universal joint could be damaged.



- -> Unbolt cover plate for left drive shaft -arrows-.

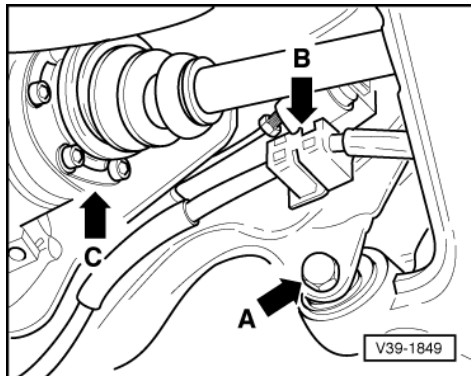


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- -> Disengage handbrake cable at left brake caliper -arrows-.

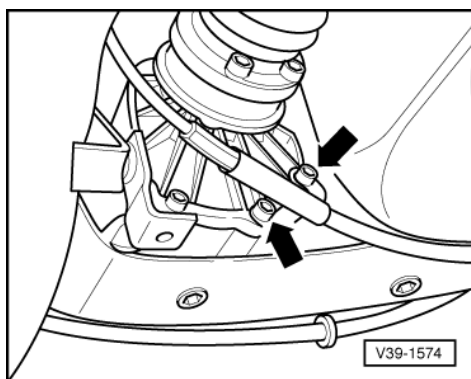
Note:

When detaching the handbrake cable, make sure the plastic sleeve on the cable is not damaged.



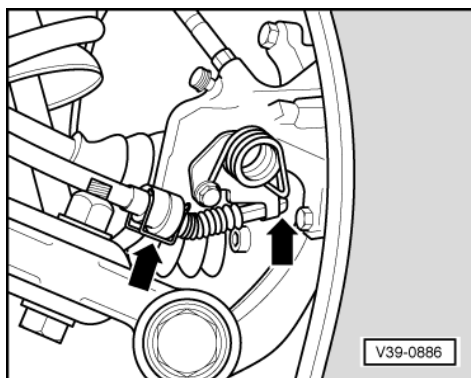
- -> Push left handbrake cable out of retainer -arrow B-.
- Unbolt drive shaft from flange shaft -arrow C-, lift clear and tie in place.

=> Running gear, Front-wheel drive and four-wheel drive; Repair group 42; Removing and installing drive shaft; Servicing drive shaft Removing and installing drive shaft Servicing drive shaft



- -> Unbolt right-hand retainer for handbrake cable -arrows- from rear final drive

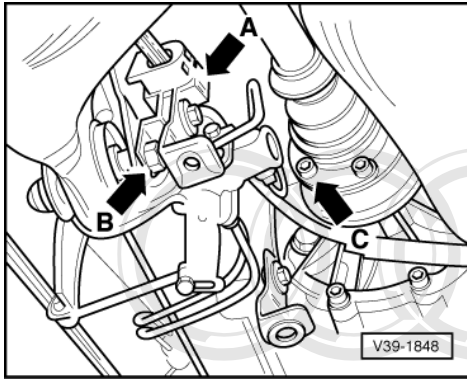
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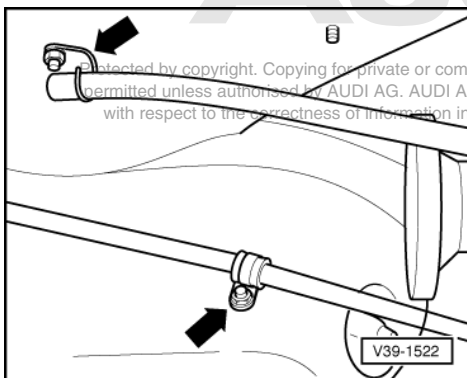
- -> Disengage handbrake cable at right brake caliper -arrows-.

Note:

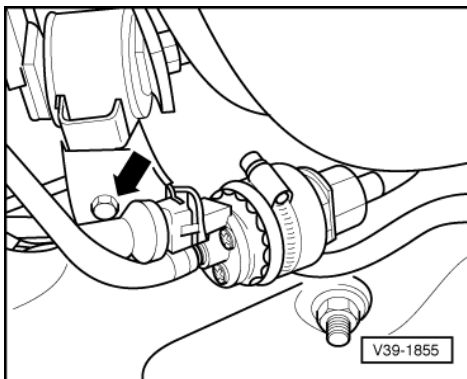
When detaching the handbrake cable, make sure the plastic sleeve on the cable is not damaged.



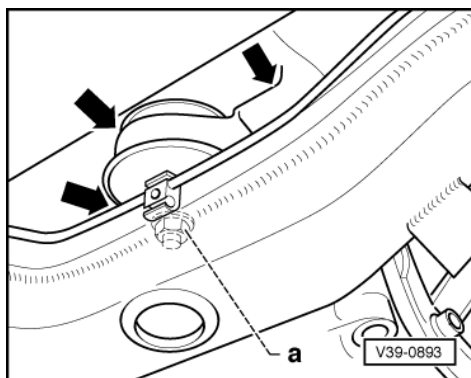
- -> Push handbrake cable out of right-hand retainer -arrow A-.
- Unbolt right drive shaft -arrow C- from flange shaft and put down.



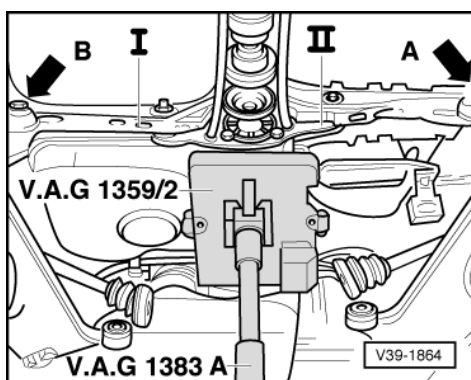
- -> Unbolt retainers for handbrake cables -arrows-.



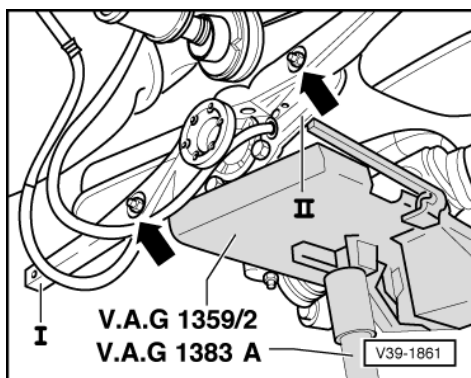
- -> Vehicles with auxiliary heater: unbolt retainer for metering pump -arrow-.
- Support final drive using engine/gearbox jack V.A.G 1383 A and universal support V.A.G 1359/2.
- Secure final drive with a strap.



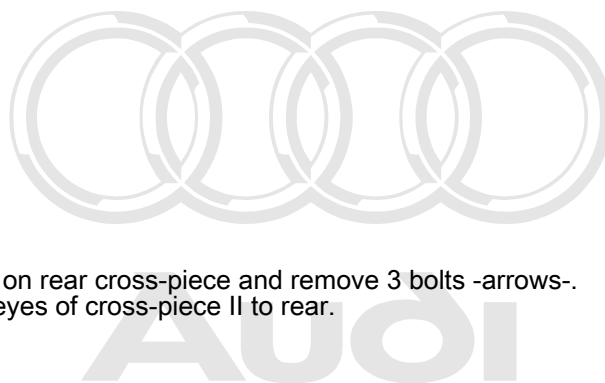
- -> Loosen nut for final drive mounting -a- on rear cross-piece and remove 3 bolts -arrows-.
- Carefully pull handbrake cables through eyes of cross-piece II to rear.



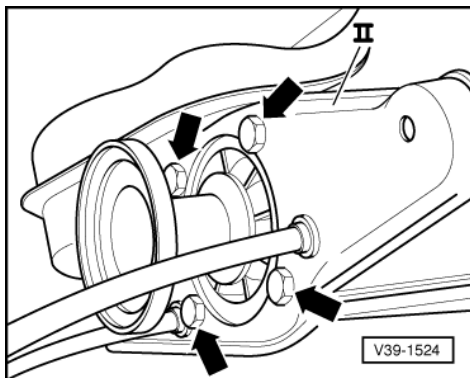
- -> Remove bolts (arrows -A- and -B-) for cross-piece I.
- Lower final drive slightly with engine/gearbox jack V.A.G 1383 A.



- -> Unbolt cross-piece I from cross-piece II -arrows-.
- Tie cross-piece I clear.



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- -> Unbolt cross-piece II from final drive -arrows- and lift out over flange shaft of final drive.
- Pull final drive towards the front and lower slowly together with rear final drive mounting.

Note:

When lowering the final drive, pull it towards the left to clear the fuel tank.

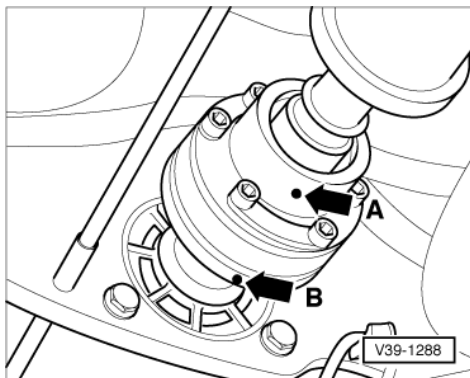
Installing

Install in reverse sequence; note the following points:

Notes:

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- ◆ It is essential to clean out the locking fluid remaining in the threads in the flange shaft on the rear final drive after removing the propshaft. Otherwise there is a danger that the new bolts will seize when they are screwed in and then shear if they have to be removed later.
- ◆ The threaded holes can be cleaned with a thread tap.
- ◆ Renew the gaskets on the flange shafts (remove backing foil and stick gaskets onto flange shaft; make sure that the surfaces are free of grease).



- ◆ -> To prevent imbalance, the flanges on the propshaft -arrow A- and on the rear final drive -arrow B- must be installed so that the factory markings (or the markings made on removal) are in alignment.
- ◆ After removing the propshaft from the rear final drive, the additional balance disk (thick washer) that may be located between the packing plate and the bolt head must not be re-installed.
- ◆ Renew propshaft bolts (self-locking).

- Bolt on propshaft => Page 108 .
- Bolt on drive shaft

=> Running gear, Front-wheel drive and four-wheel drive; Repair group 42; Removing and installing drive shaft; Servicing drive shaft Removing and installing drive shaft Servicing drive shaft

- Bolt trapezium link onto cross member



=> Running gear, Front-wheel drive and four-wheel drive; Repair group 42; Assembly overview, rear axle (vehicles with four-wheel drive); Removing and installing trapezium link Assembly overview, rear axle (vehicles with four-wheel drive) Removing and installing trapezium link

- Top up gear oil in rear final drive and check oil level => Page 115 .
- Align exhaust system free of stress

=> 8-cylinder engine, Mechanics; Repair Group 26; Aligning exhaust system free of stress Aligning exhaust system free of stress

Tightening torques

Component	Nm
Cross-piece II to rear final drive	45
Cross-piece I to cross-piece II	45
Cross-piece I to body	45
Final drive support/final drive mounting to rear final drive	45

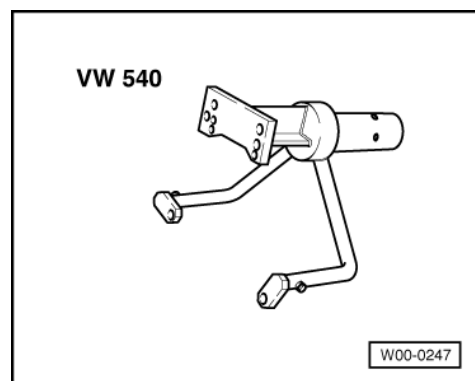
Component	Nm
Final drive mounting to rear final drive	45
Brace to cross-piece I	55
Flange shaft to final drive	10 + 90° 1)
Drive shaft cover plate to rear final drive	25
Vacuum unit bracket to rear final drive	25
Retainer for handbrake cable	25
Metering pump retainer to body 2)	25
Propshaft to rear final drive	55
Fuel tank cover panel to body	20
Oil drain plug/ oil filler plug	25

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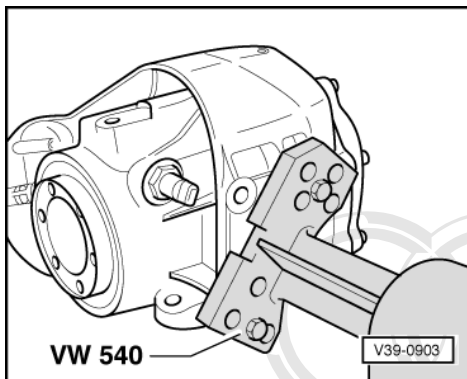
- 1) 90° is a quarter turn
- 2) Vehicles with auxiliary heater

9.2 - Securing rear final drive to repair stand

Special tools and workshop equipment required



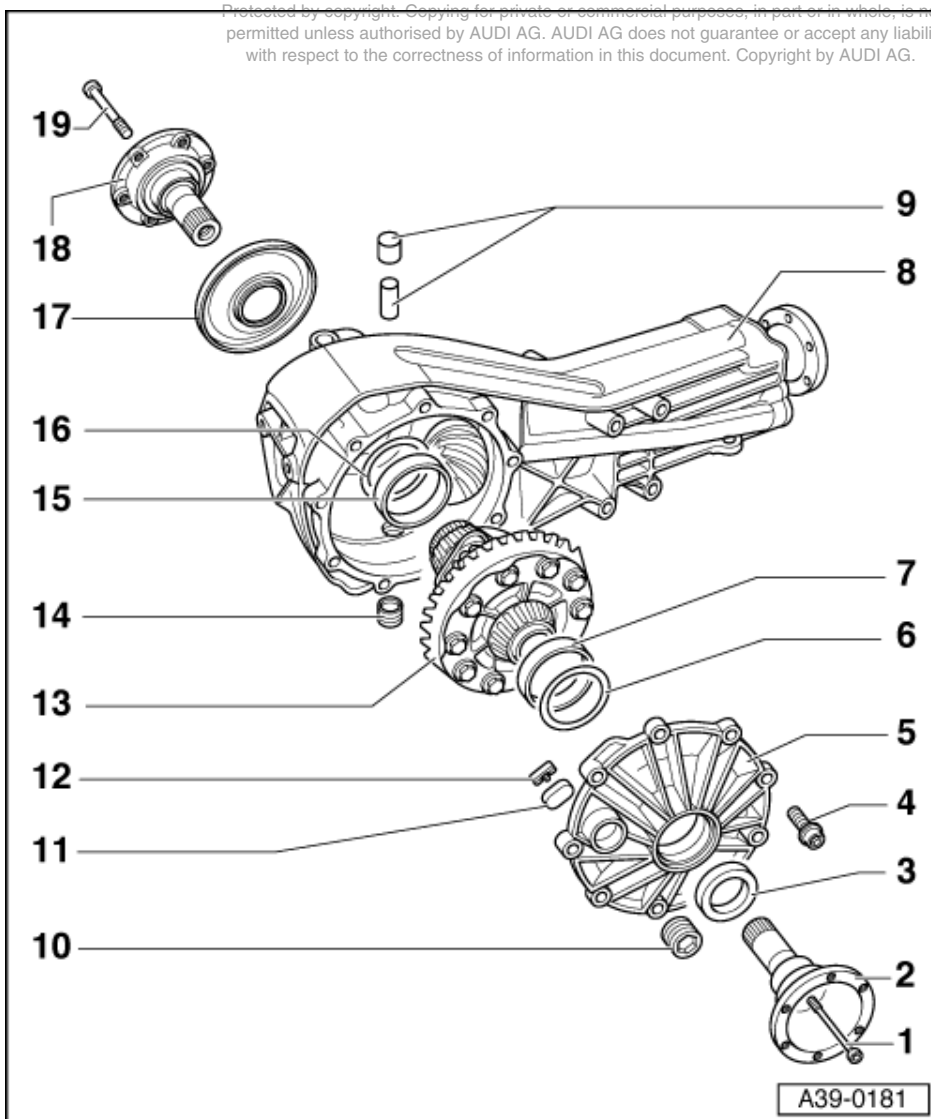
- ♦ Engine/gearbox support VW 540



- -> Secure complete rear final drive to a repair stand with engine and gearbox support VW 540.

10 - Dismantling and assembling rear final drive

10.1 - Dismantling and assembling rear final drive

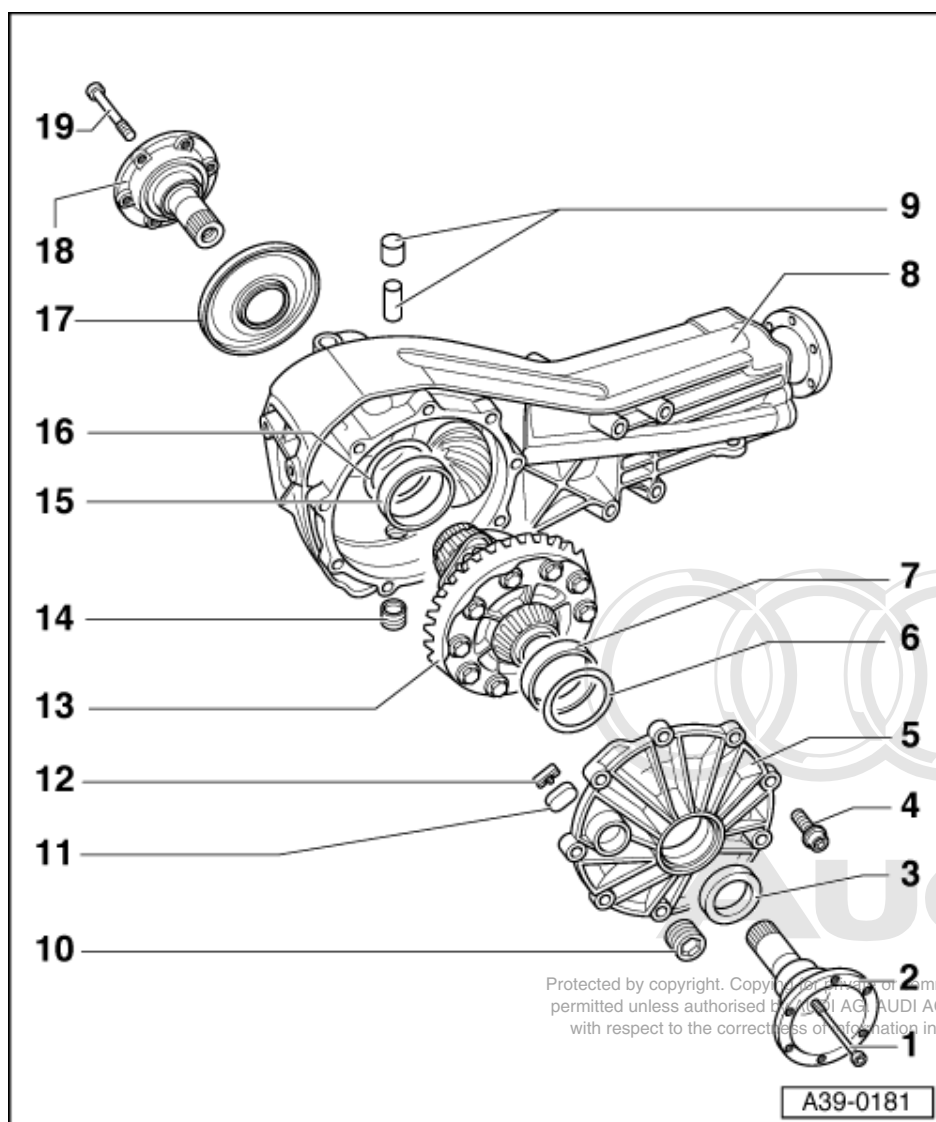


10.2 - Removing and installing differential

Notes:

- ♦ General repair instructions =>Page 4 .
- ♦ Secure final drive on a repair stand => Page 39-113.
- ♦ Adjustments are required when replacing components marked 1)
=> Adjustment overview Page 177 .

- 1 Taper head bolt M8
10 Nm + 1/4 turn (90°) further



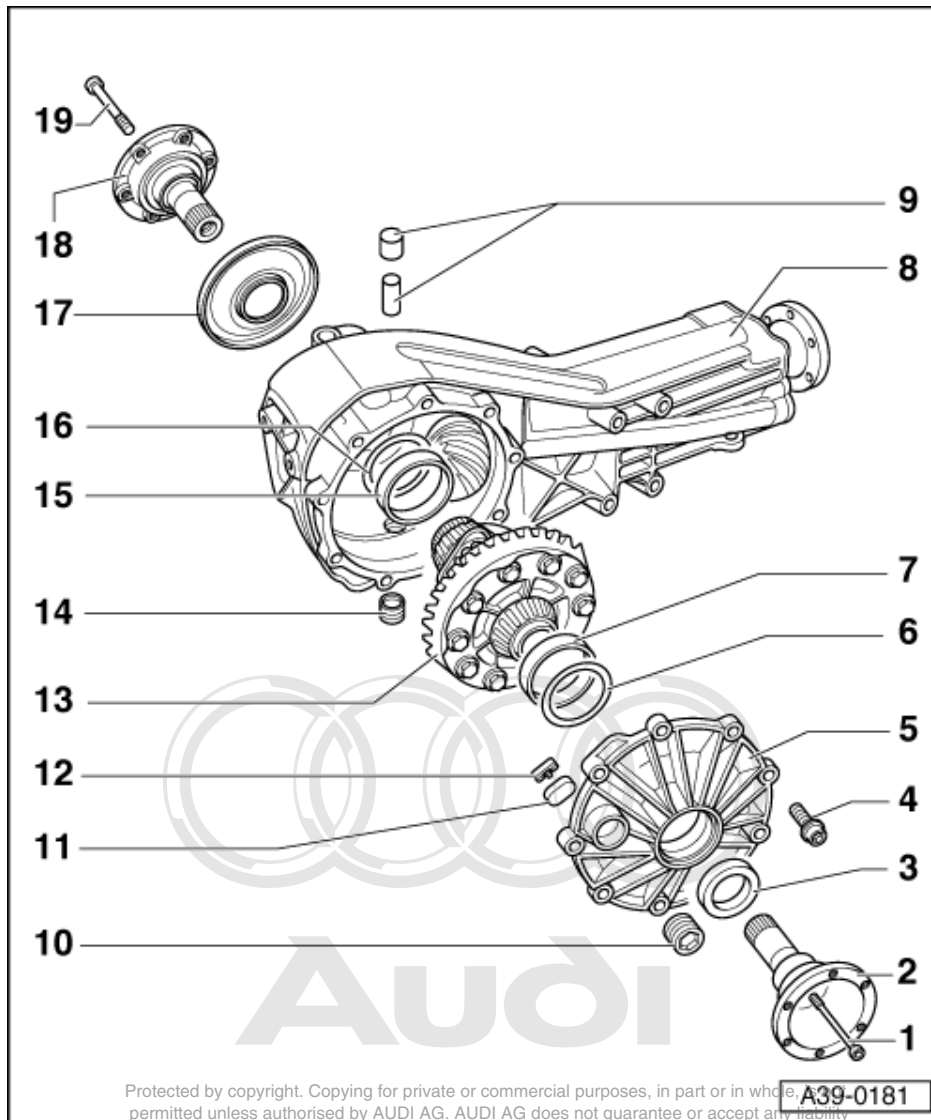
- 2 Flange shaft, right
 - ♦ Removing => Page 147
 - ♦ Installing => Page 148
- 3 Oil seal, right
 - ♦ Prise out=>Page 118
 - ♦ Drive in with 2062 as far as stop
=>Page 118
- 4 Bolt - 25 Nm
- 5 Cover for final drive 1)
 - ♦ Seal with AMV 188 000 02
 - ♦ Installation position: magnet towards the bottom

6 Shim "S1"

- ♦ Note thickness
- ♦ Adjustment overview
=> Page 177

7 Outer race for small taper roller bearing 1)

- ♦ Driving out
=> Fig. 158
- ♦ Driving in
=> Fig. 159



8 Final drive housing 1)

- ♦ With drive pinion
- ♦ Removing and installing drive pinion
=> Page 162

9 Breather

- ♦ Insertion depth=>Fig. 1

10 Oil filler plug - 25 Nm

11 Magnet

- ♦ Installation position => Fig. 2

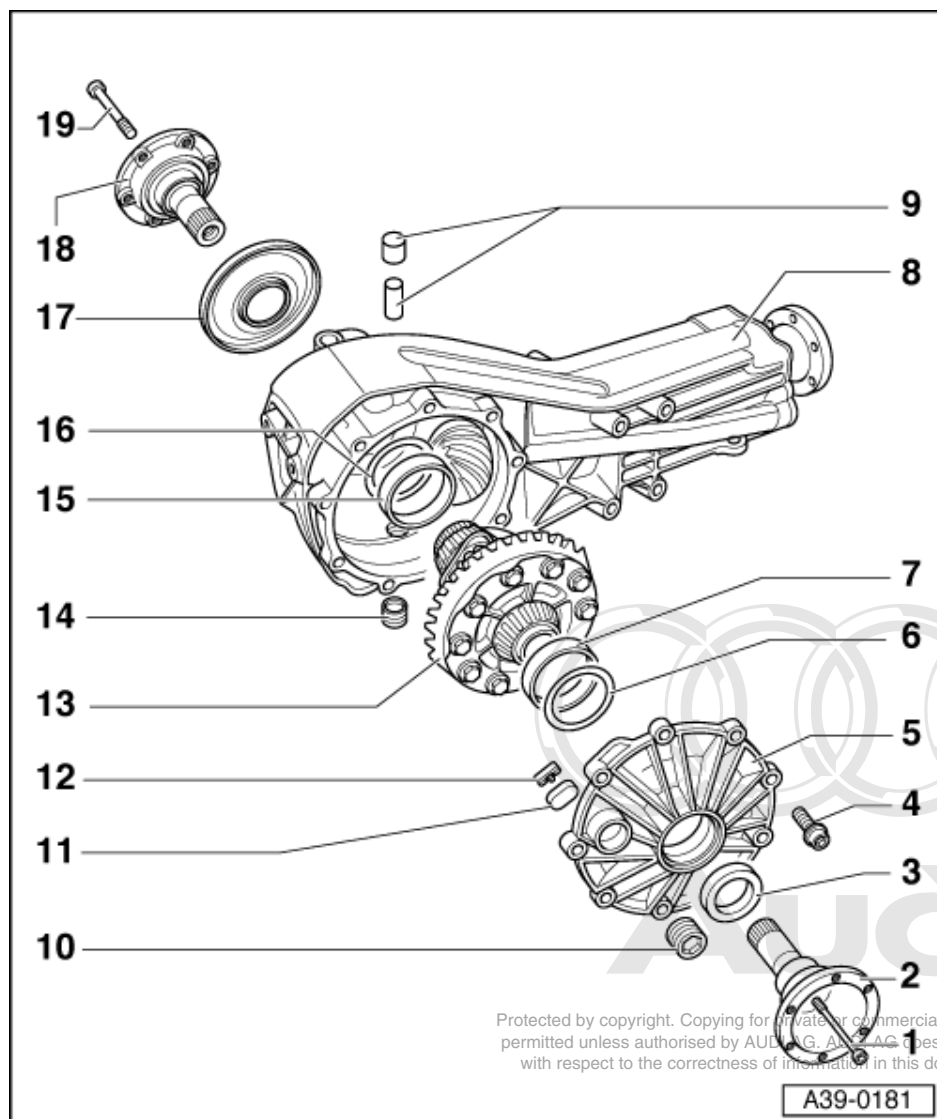
12 Clip for magnet

- ♦ Installation position => Fig. 2
- ♦ Renew

13 Differential with crown wheel 1)

- ♦ Removing => Page 147
- ♦ Dismantling and assembling
=> Page 149

14 Oil drain plug - 25 Nm



15 Outer race for large taper roller bearing 1)

- ♦ Driving out and driving in
=> Fig. 156

16 Shim "S2"

- ♦ Note thickness
- ♦ Adjustment overview
=> Page 177

17 Oil seal, left

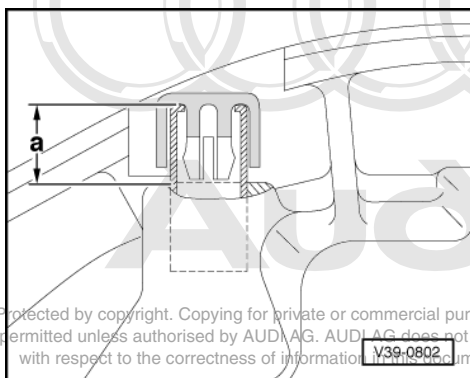
- ♦ Prise out=>Page 147
- ♦ Drive in with 3066/2 as far as stop
=> Page 122

18 Flange shaft, left

- ♦ No adjustment necessary
- ♦ Removing => Page 147
- ♦ Installing => Page 148

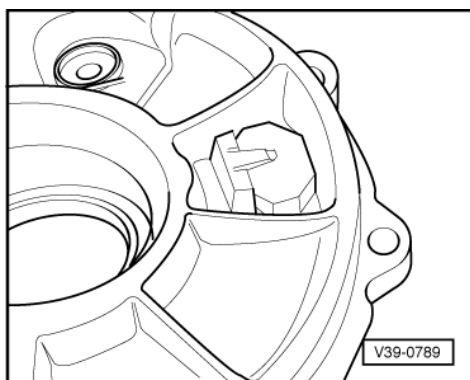
19 Taper-head bolt M8

- 10 Nm + 1/4 turn (90°) further



→ Fig.1 Insertion depth for breather sleeve

- ◆ Dimension a = 13 mm



→ Fig.2 Installation position of magnet

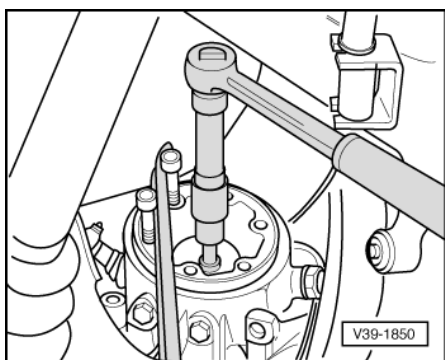
- Always fit new clip when performing repairs.

Removing and installing differential

- Rear final drive removed

Removing

- Secure complete rear final drive on a repair stand =>Page 142 .
- Place drip tray under final drive.
- Drain off oil.



- → Remove left and right-hand flange shafts.
- To loosen the securing bolt, screw two bolts into the flange shaft and counter-hold with a lever.
- Mark flange shafts (for left and right sides).



- Pull out flange shaft using the bolts already screwed in.
- Unscrew securing bolts from cover for final drive.
- Take cover for final drive off axle housing and remove differential.

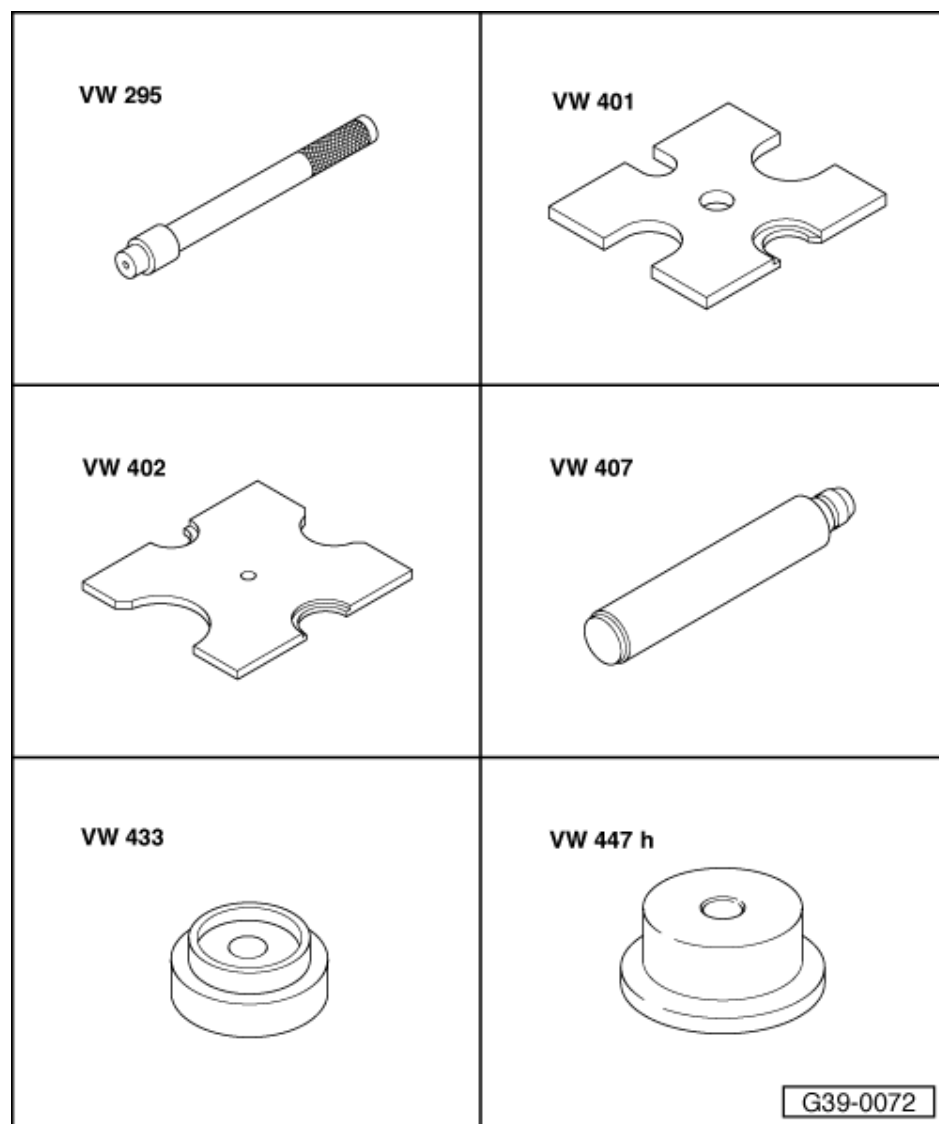
Installing

Install in reverse sequence; note the following points:

- Insert differential.
- Clean sealing surface and coat with sealing paste AMV 188 000 02.
- Fit cover for final drive on final drive housing and tighten in diagonal sequence to 25 Nm.
- Fill space between sealing and dust lips with multipurpose grease.
- Install flange shafts and tighten to 10 Nm + 90°.
- Top up gear oil in rear final drive and check oil level => Page 115.

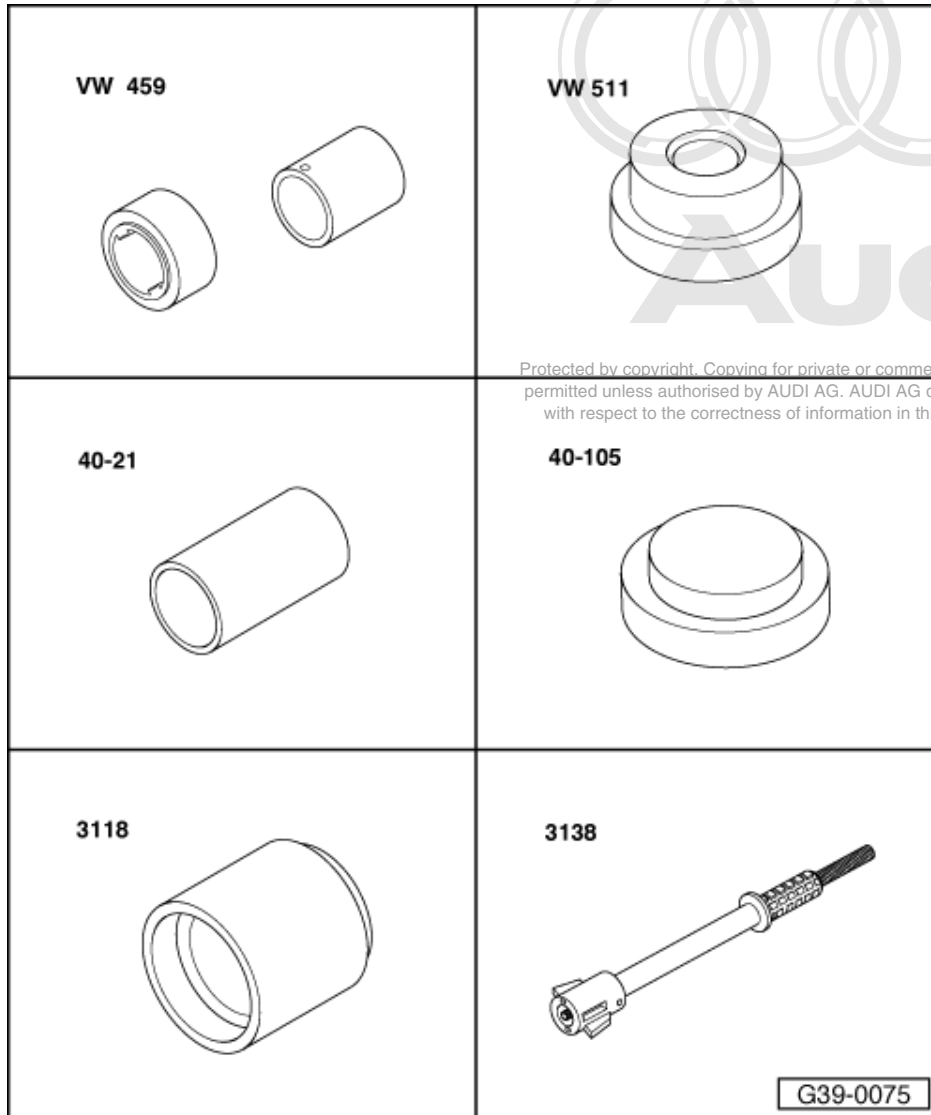
11 - Dismantling and assembling differential

11.1 - Dismantling and assembling differential



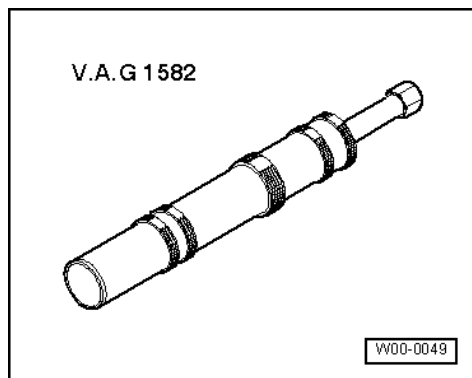
Special tools and workshop equipment required

- ◆ Drift VW 295
- ◆ Thrust plate VW 401
- ◆ Thrust plate VW 402
- ◆ Press tool VW 407
- ◆ Press tool VW 433
- ◆ Thrust plate VW 447 H

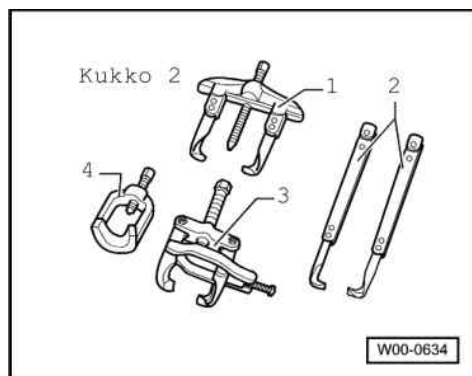


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- ◆ Installing and removing tool VW 459
- ◆ Thrust pad VW 511
- ◆ Press tool 40-21
- ◆ Thrust plate 40-105
- ◆ Thrust piece 3118
- ◆ Drift 3138



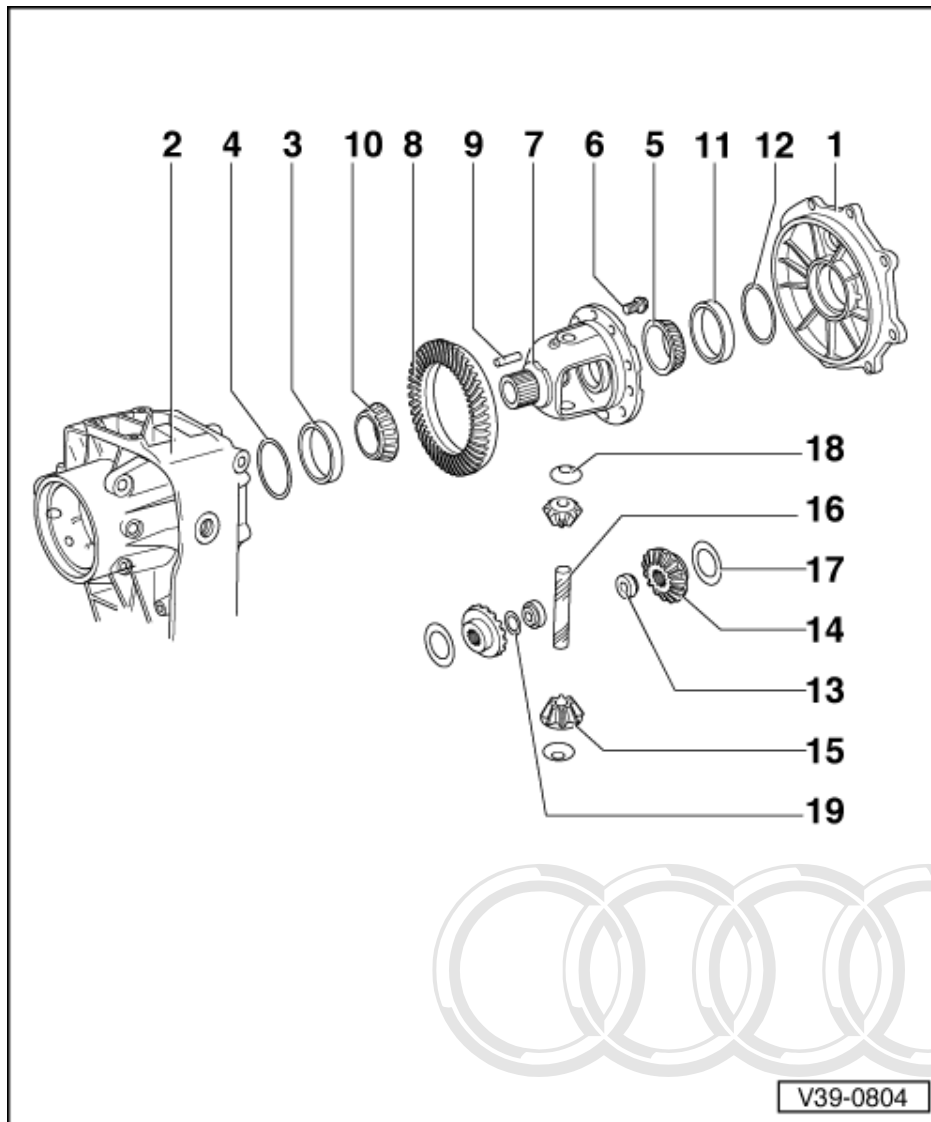
- ♦ Tapered roller bearing puller V.A.G 1582 and V.A.G 1582/6



- ♦ Two-arm puller Kukko 20/10



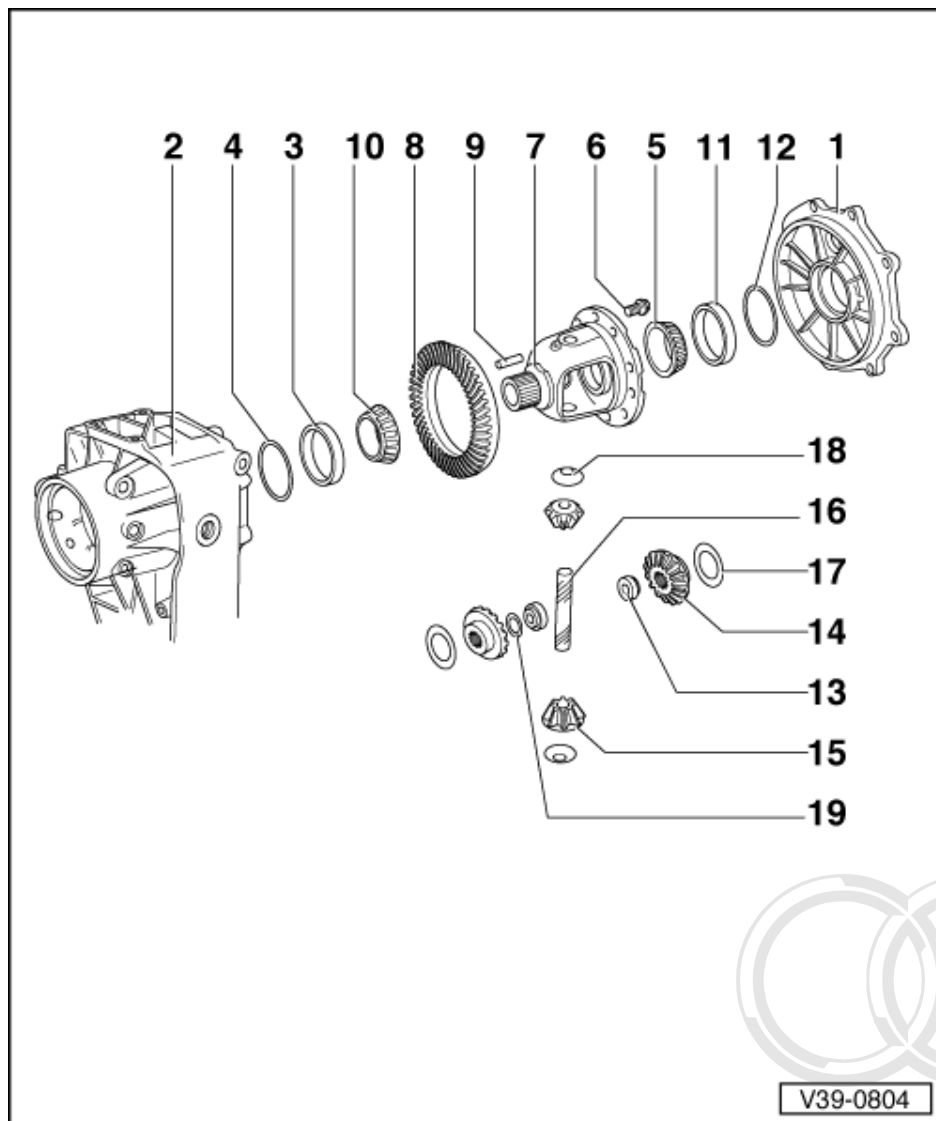
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Notes:

- ◆ General repair instructions =>Page 4 .
- ◆ Replace both taper roller bearings of the differential together. Use same make if possible.
- ◆ Adjustments are required when replacing components marked 1)
=> Adjustment overview Page 177

- 1 Cover for final drive 1)
- 2 Final drive housing 1)
- 3 Outer race for large taper roller bearing 1)
 - ◆ Driving out => Fig. 1
 - ◆ Driving in => Fig. 2



4 Shim "S2"

- ◆ Note thickness
- ◆ Adjustment overview
=> Page 177

5 Inner race for small taper roller bearing 1)

- ◆ Pulling out => Fig. 5
- ◆ Pressing in => Fig. 6

6 Bolt - 60 Nm + turn 45°further

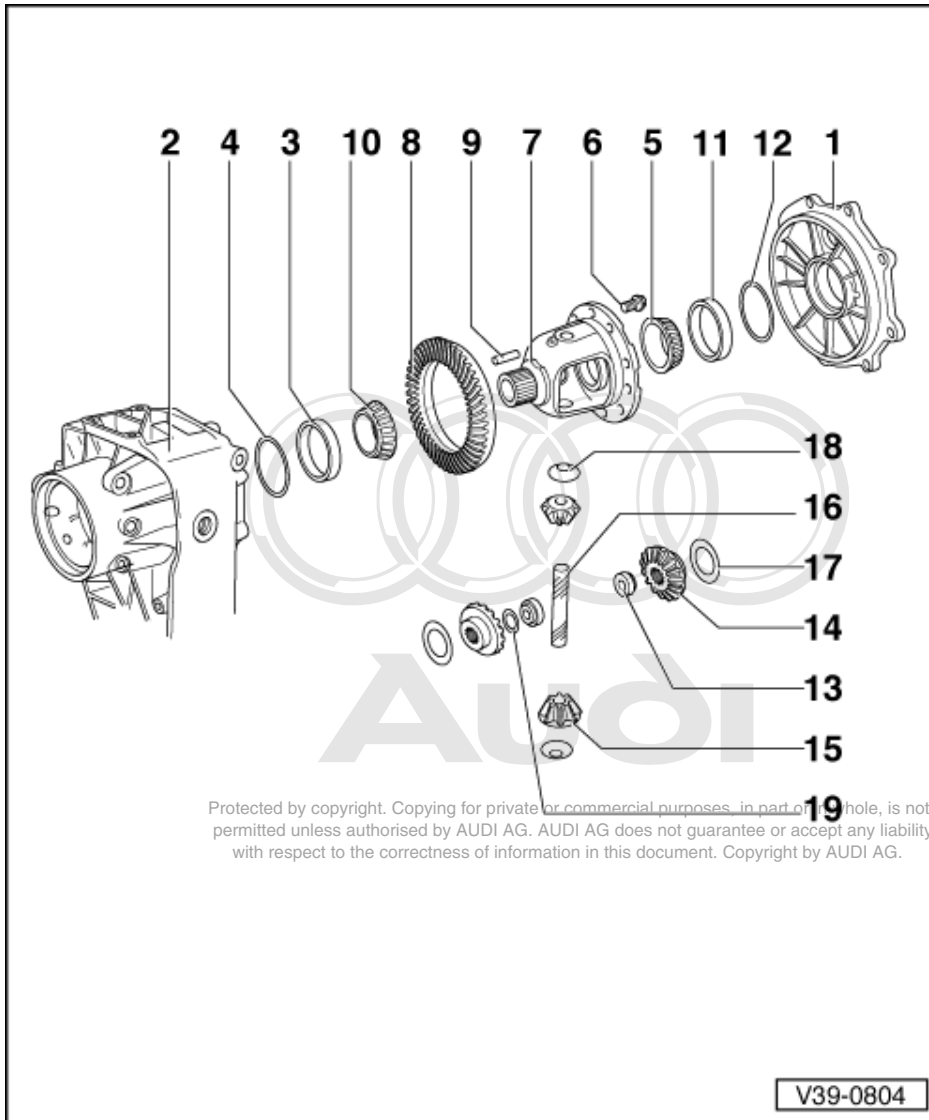
- ◆ Renew
- ◆ Allocation

=> Parts catalogue

- ◆ Lightly tighten bolts then tighten diagonally to correct torque

7 Differential housing 1)

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8 Crown wheel 1)

- ◆ Paired with drive pinion (final drive set)
- ◆ Select correct version according to code letters

=> Parts catalogue

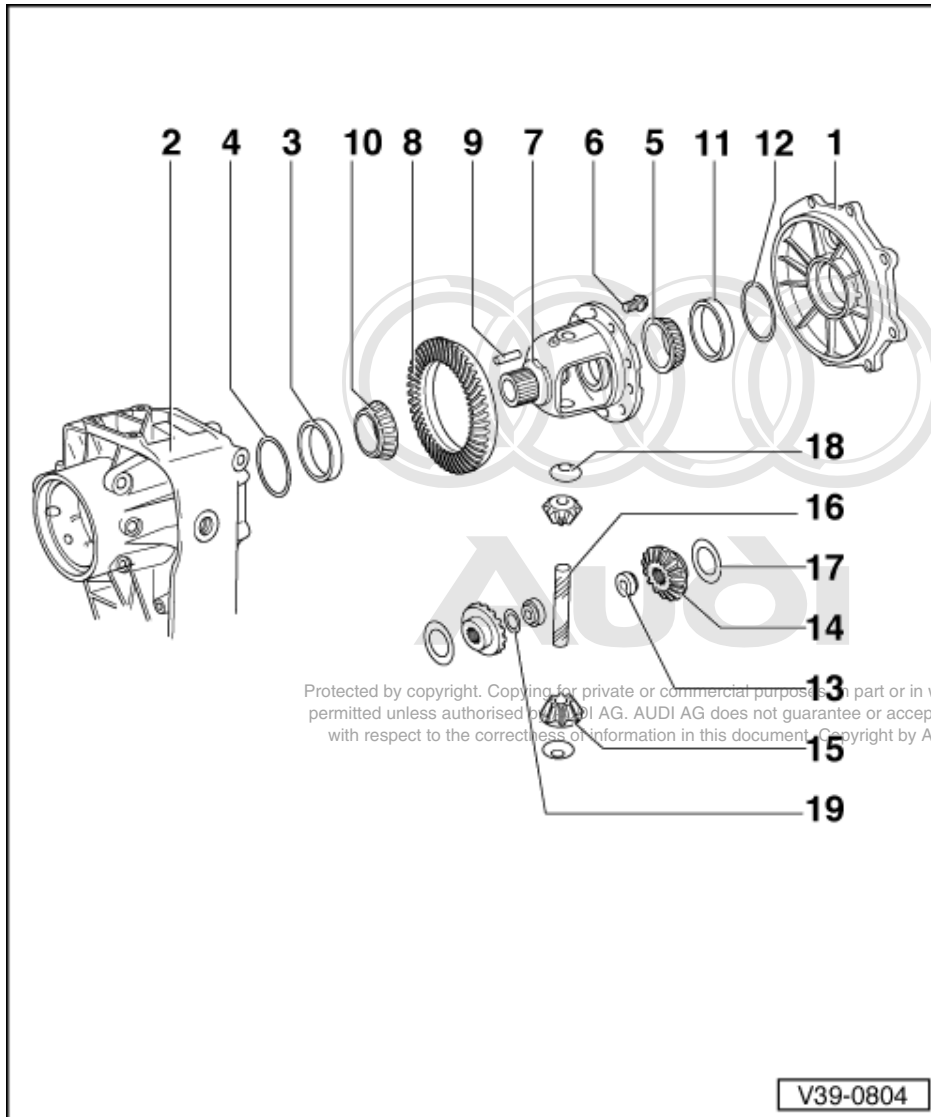
- ◆ Drive off differential housing with a drift => Fig. 9
- ◆ Installing on differential housing
=> Fig. 10

9 Spring pin

- ◆ For securing planet pinion axis shaft
- ◆ Drive in flush

10 Inner race for large taper roller bearing 1)

- ◆ Pulling off => Fig. 3
- ◆ Pressing on => Fig. 4



11 Outer race for small taper roller bearing 1)

- ♦ Driving out => Fig. 7
- ♦ Pressing in => Fig. 8

12 Shim "S1"

- ♦ Note thickness
- ♦ Adjustment overview
=> Page 177

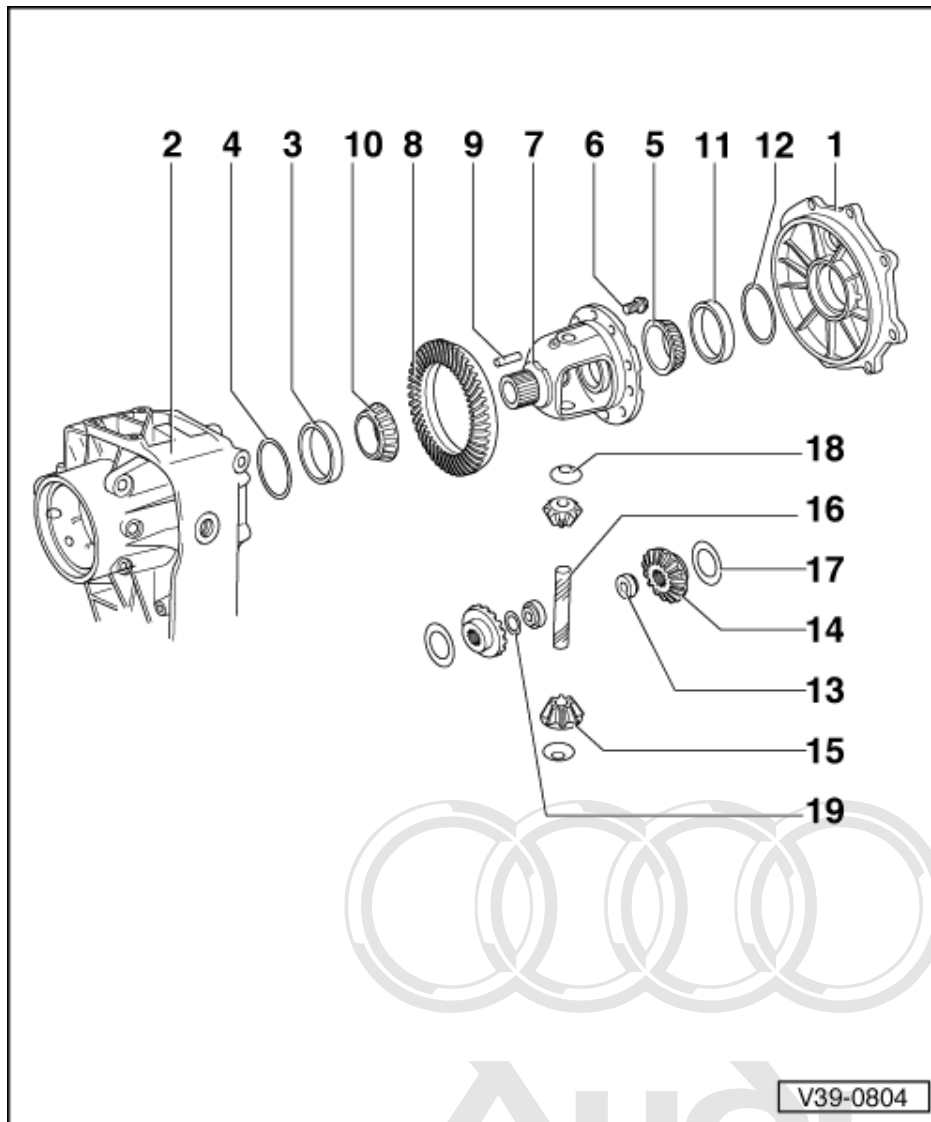
13 Threaded piece

14 Sun wheels

- ♦ Installing => Fig. 11
- ♦ Adjusting => Fig. 12

15 Planet wheels

- ♦ Installing => Fig. 11



16 Shaft for planet wheels

- ◆ Drive out with a drift
- ◆ Drive in carefully so that the thrust washers are not damaged
- ◆ Secure with spring pin

17 Shim

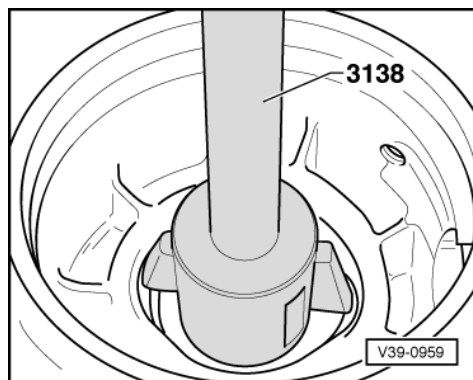
- ◆ Re-determining thickness
=> Fig. 12

18 Thrust washer

- ◆ Check for cracks and chipping

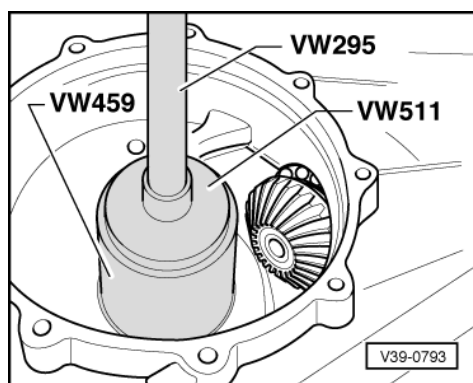
19 Not installed

V39-0804



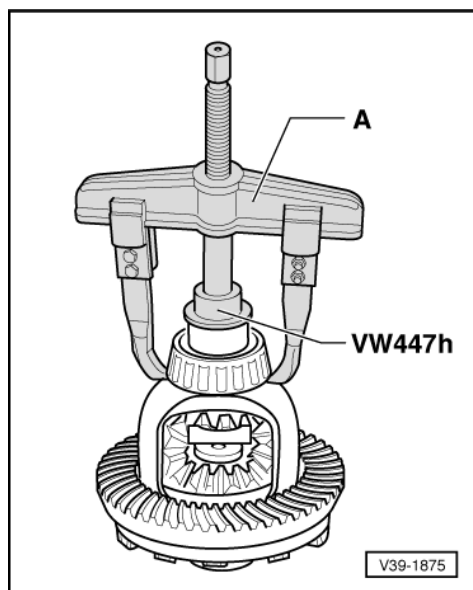
-> Fig.1 Driving outer race for large taper roller bearing out of final drive housing

- After removing check shims for damage.



-> Fig.2 Driving outer race for large taper roller bearing into final drive housing

- Position outer race using VW 295 and light even blows with a hammer.
- Then drive in onto stop as shown in illustration.

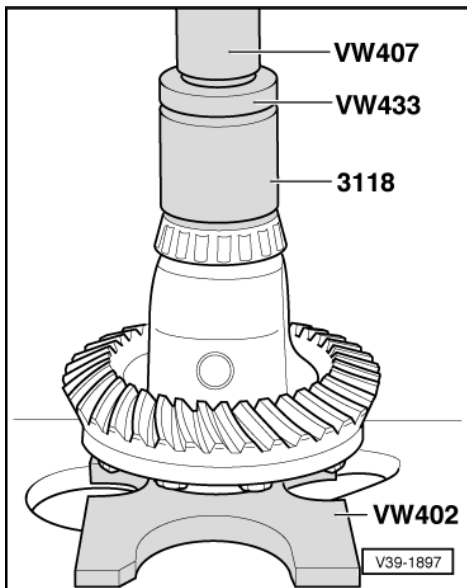


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-> **Fig.3 Pulling off inner race for large taper roller bearing**

- Before applying puller, fit thrust plate VW 447 h on differential housing.

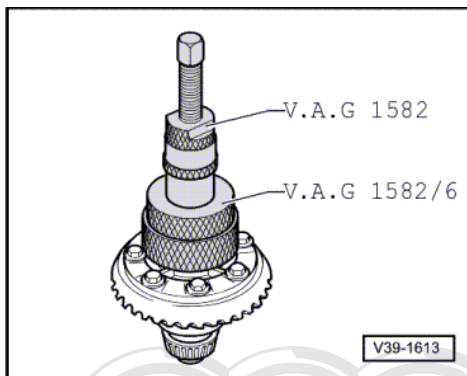
A - Two-arm puller, e.g. Kukko 20/10



-> **Fig.4 Pressing on inner race for large taper roller bearing**

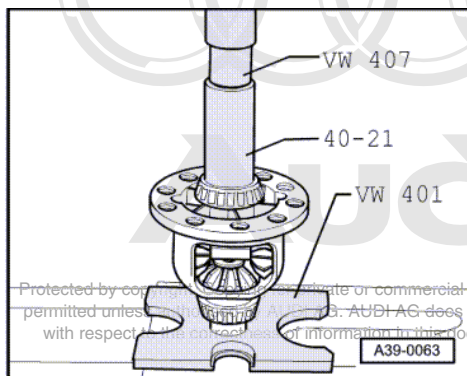
Caution
Wear protective gloves.

- Heat bearing to approx. 100 °C and press home.



-> **Fig.5 Pulling off inner race for small taper roller bearing**

- Fit thrust plate 40-105 onto differential housing before fitting puller.



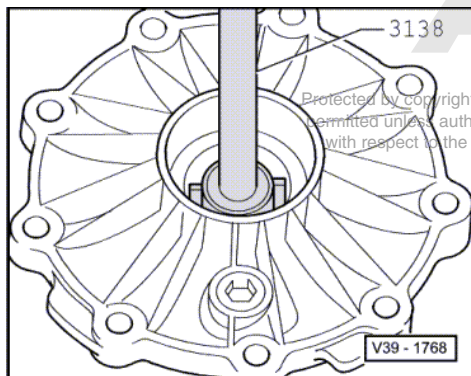
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-> Fig.6 Pressing on inner race for small taper roller bearing

Caution
Wear protective gloves.

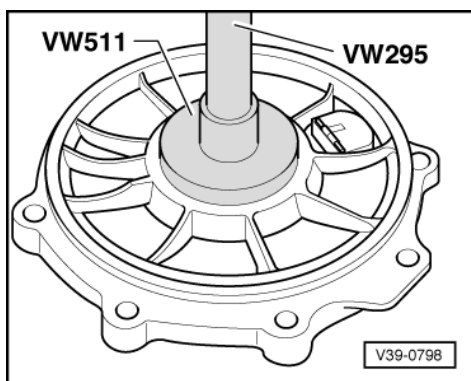
- Heat bearing to approx. 100 °C place on and press home.



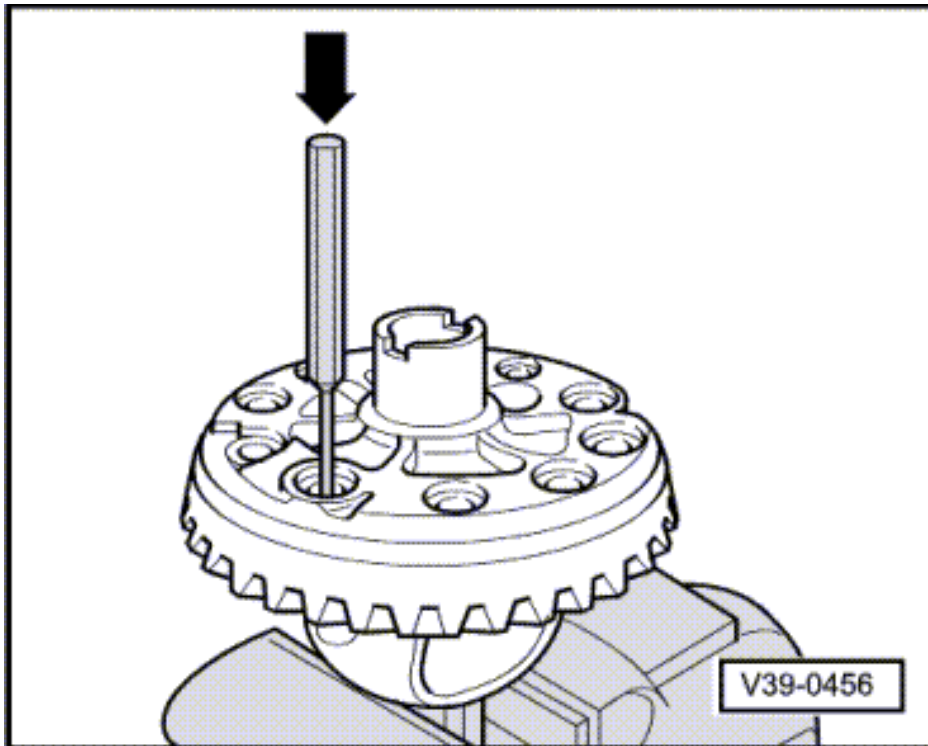
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-> Fig.7 Driving outer race for small taper roller bearing out of cover

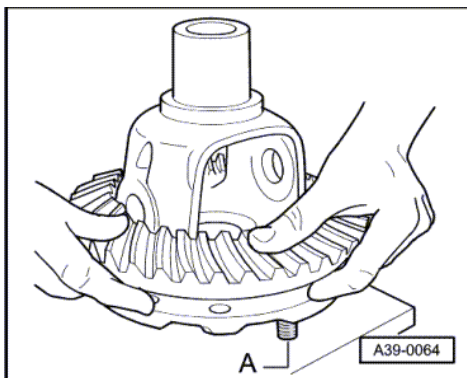
- After removing check shims for damage.



-> Fig8 Pressing outer race for small taper roller bearing into cover



-> Fig.9 Driving crown wheel off housing



-> Fig.10 Installing crown wheel

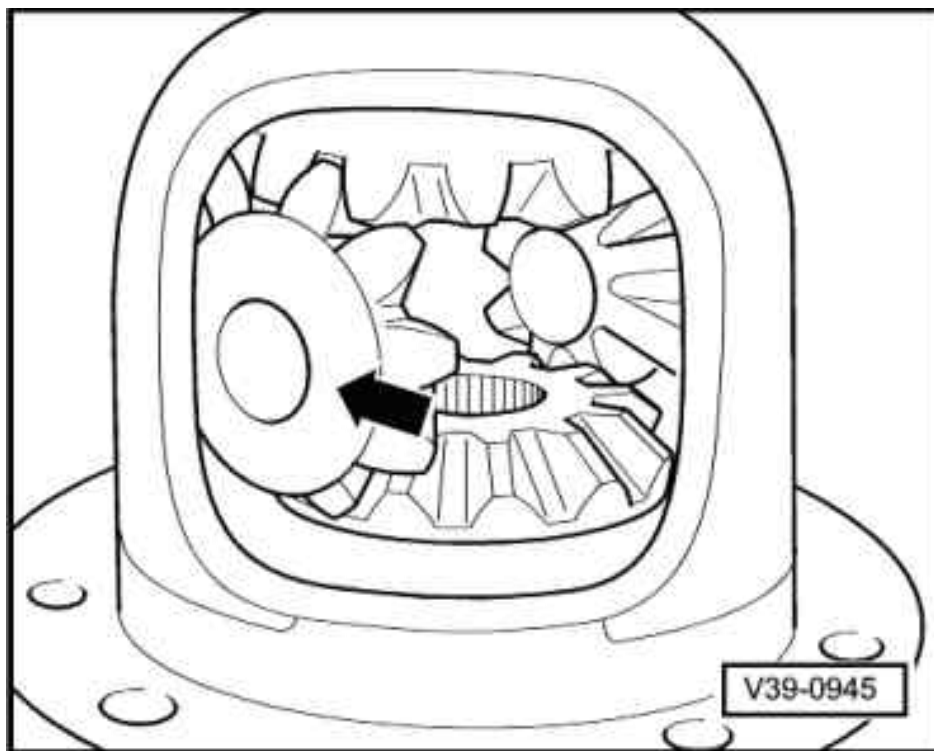
- Use 2 centring pins -A- (local manufacture) as a guide

Caution
Wear protective gloves.

- Heat crown wheel to approx. 100 °C and install.

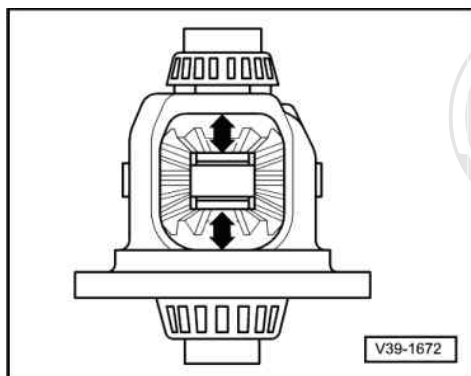
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-> Fig.11 Installing differential bevel gears

- If the sun wheels have been renewed, measure and select new shims => Fig. 12 .
- Insert sun wheels with the measured shims.
- Install planet pinions spaced 180° apart, and rotate into position -arrow-.
- Fit and align thrust washers.
- Insert threaded pieces.
- Drive planet pinion shaft into final position and secure.



-> Fig.12 Adjusting differential bevel gears

- Insert sun wheels with thinnest shims (0.5 mm).
- Insert planet pinions with thrust washers spaced 180° apart.

Note:

Do not now interchange bevel gears and thrust washers.

- Drive in planet pinion axis shaft.
- Press planet pinions outwards.
- Press sun wheels in direction indicated (arrows), and check the amount of play.
- Determine the thickest shims for the sun wheels (on each side) which can still just be inserted.

- The same thickness of shim should be used on both sides.
- Identify shims according to the table.
Part numbers.

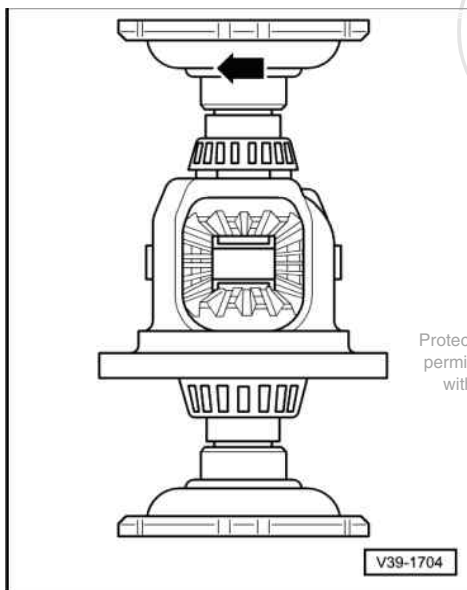
=> Parts catalogue

- Adjust play by inserting an appropriate shim.
- Specification: max. 0.10 mm

Available shims

Shim thickness (mm)		
0.50	0.70	0.90
0.60	0.80	1.00

Note:

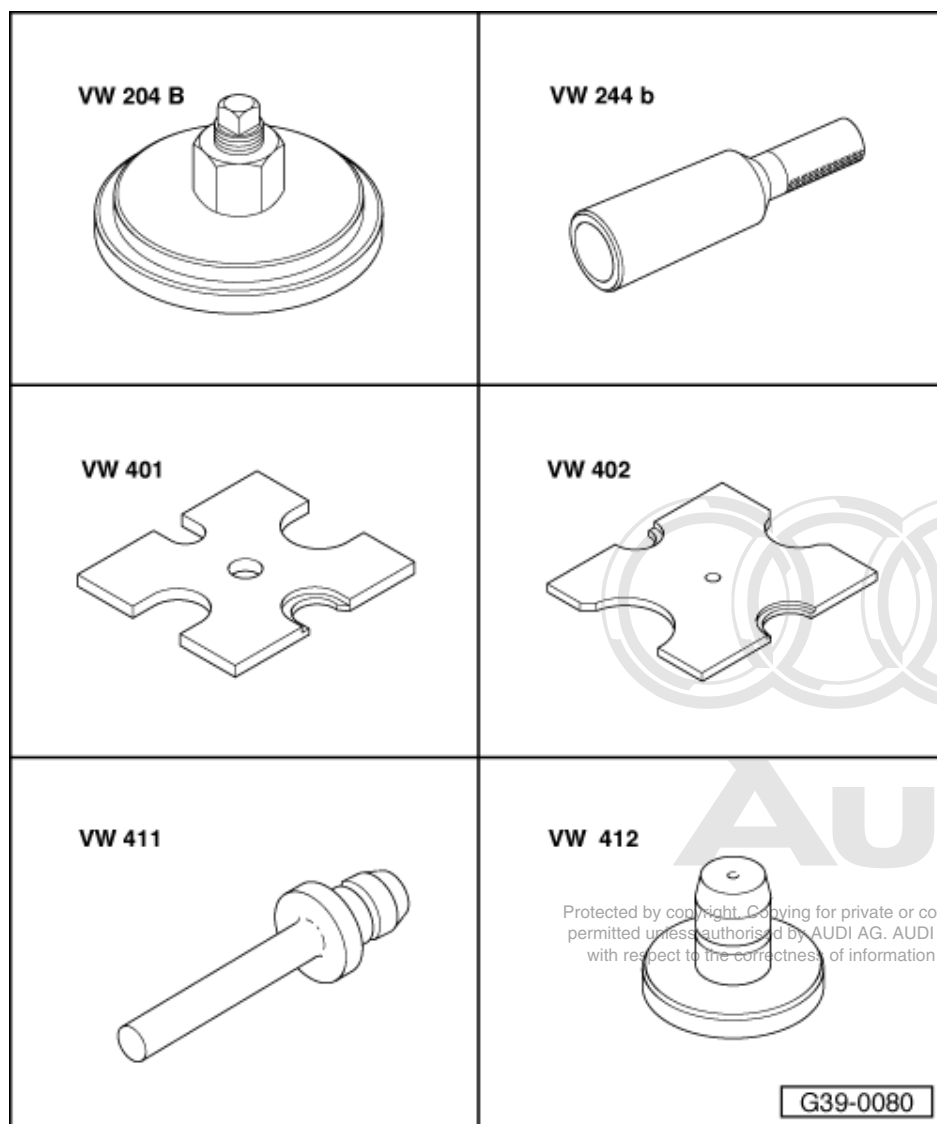


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-> The adjustment is also correct if no further play is perceptible, although it is still possible to rotate the differential bevel gears -arrow-.

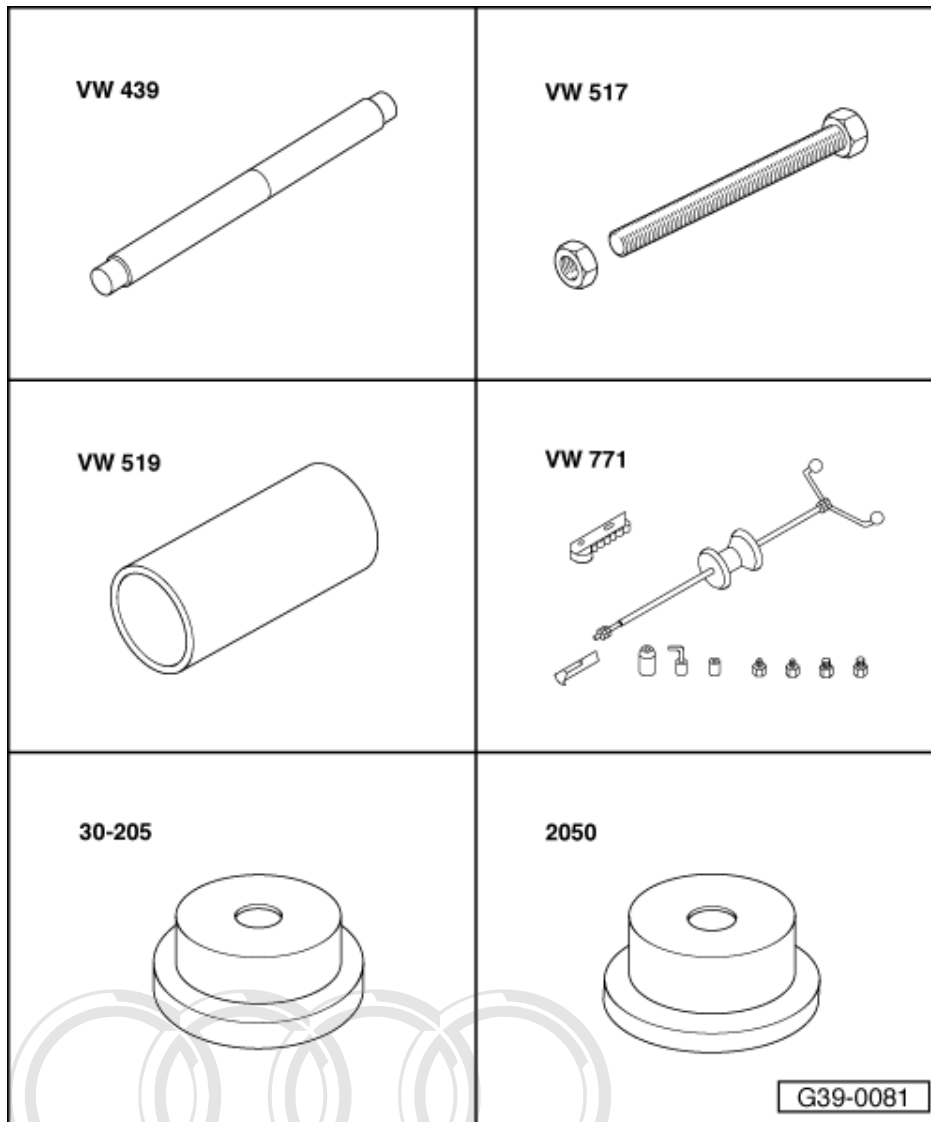
12 - Removing, installing, dismantling and assembling drive pinion

12.1 - Removing, installing, dismantling and assembling drive pinion



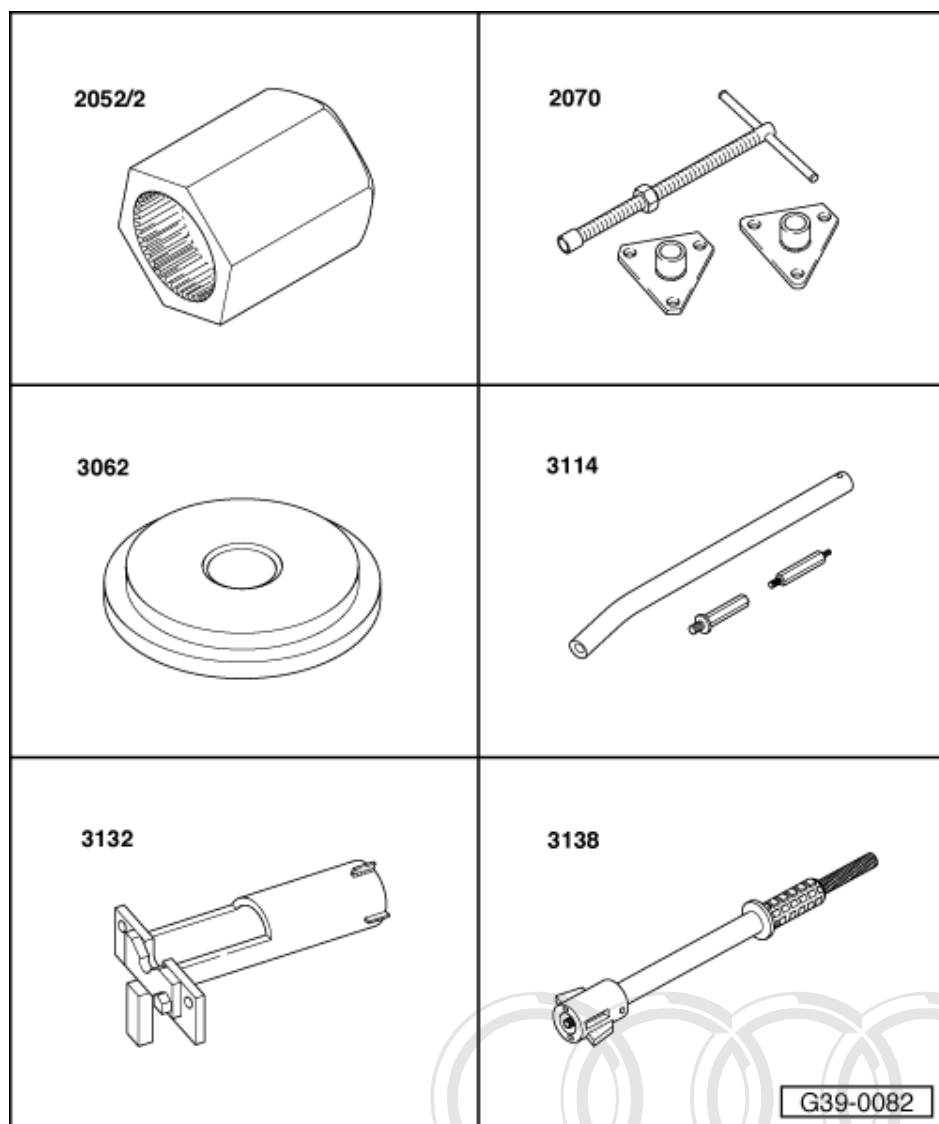
Special tools and workshop equipment required

- ♦ Crankshaft seal installing tool VW 204 B
- ♦ Fitting sleeve VW 244 B
- ♦ Thrust plate VW 401
- ♦ Thrust plate VW 402
- ♦ Press tool VW 411
- ♦ Press tool VW 412



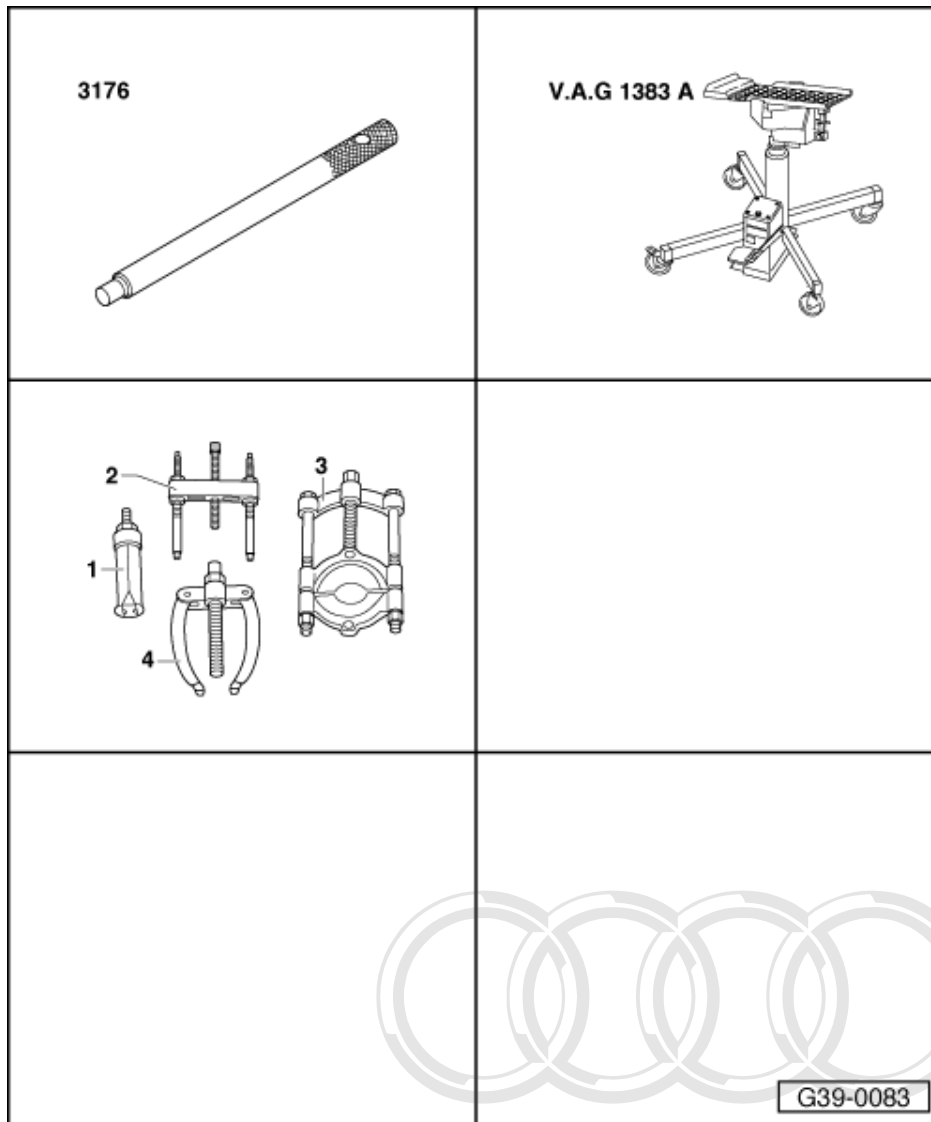
- ◆ Guide pin VW 439
- ◆ Threaded spindle VW 517
- ◆ Tube VW 519
- ◆ Multi-purpose tool VW 771
- ◆ Thrust plate 30-205
- ◆ Thrust pad 2050

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- ♦ Pinion assembly appliance 2052/2
- ♦ Tensioner 2070
- ♦ Thrust pad 3062
- ♦ Rod 3114
- ♦ Retainer 3132
- ♦ Drift 3138

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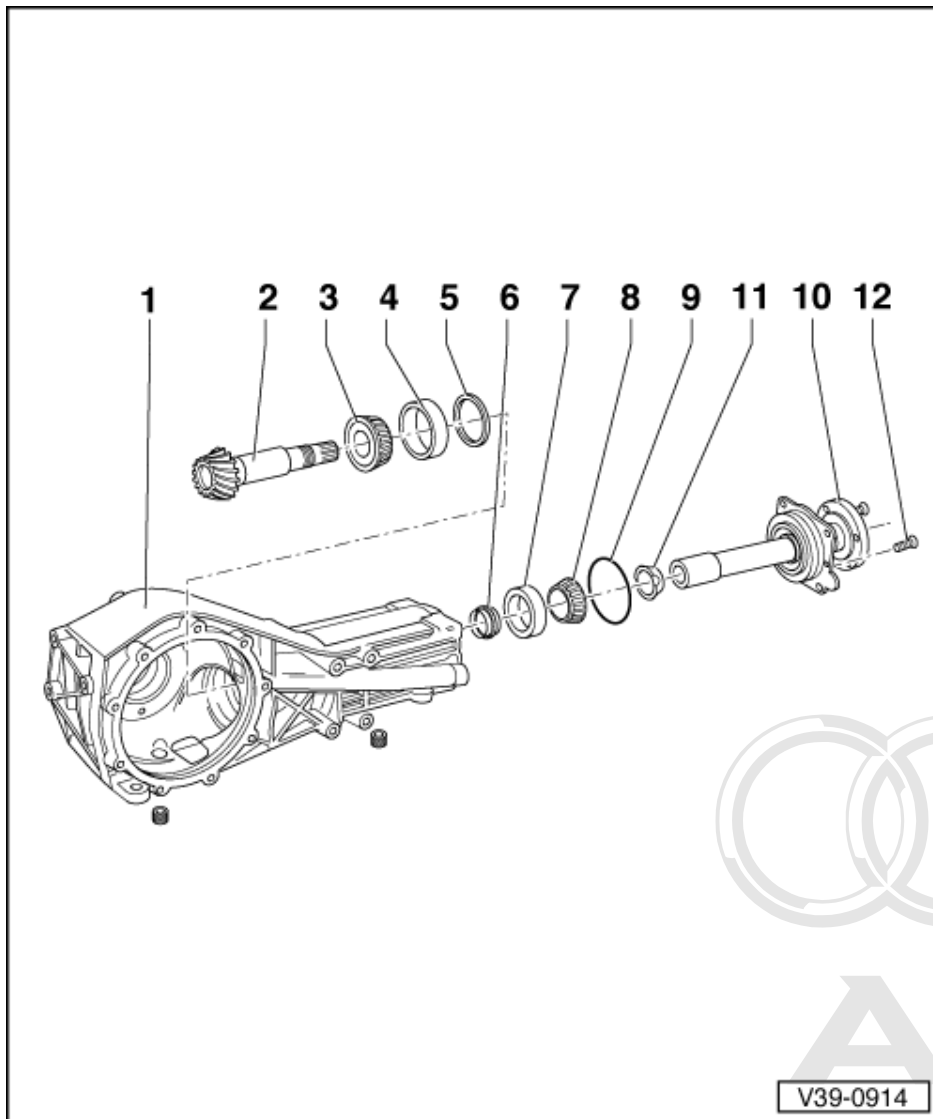


- ◆ Centring mandrel 3176
- ◆ Engine/gearbox jack
V.A.G 1383 A
- ◆ Separating device Kukko 17/2
- ◆ Internal puller Kukko 21/7
- ◆ Counter-hold tool Kukko 22/1
- ◆ Torque gauge 0 ... 600 Ncm
- ◆ Socket attachment (long), 32 mm A/F

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Notes:

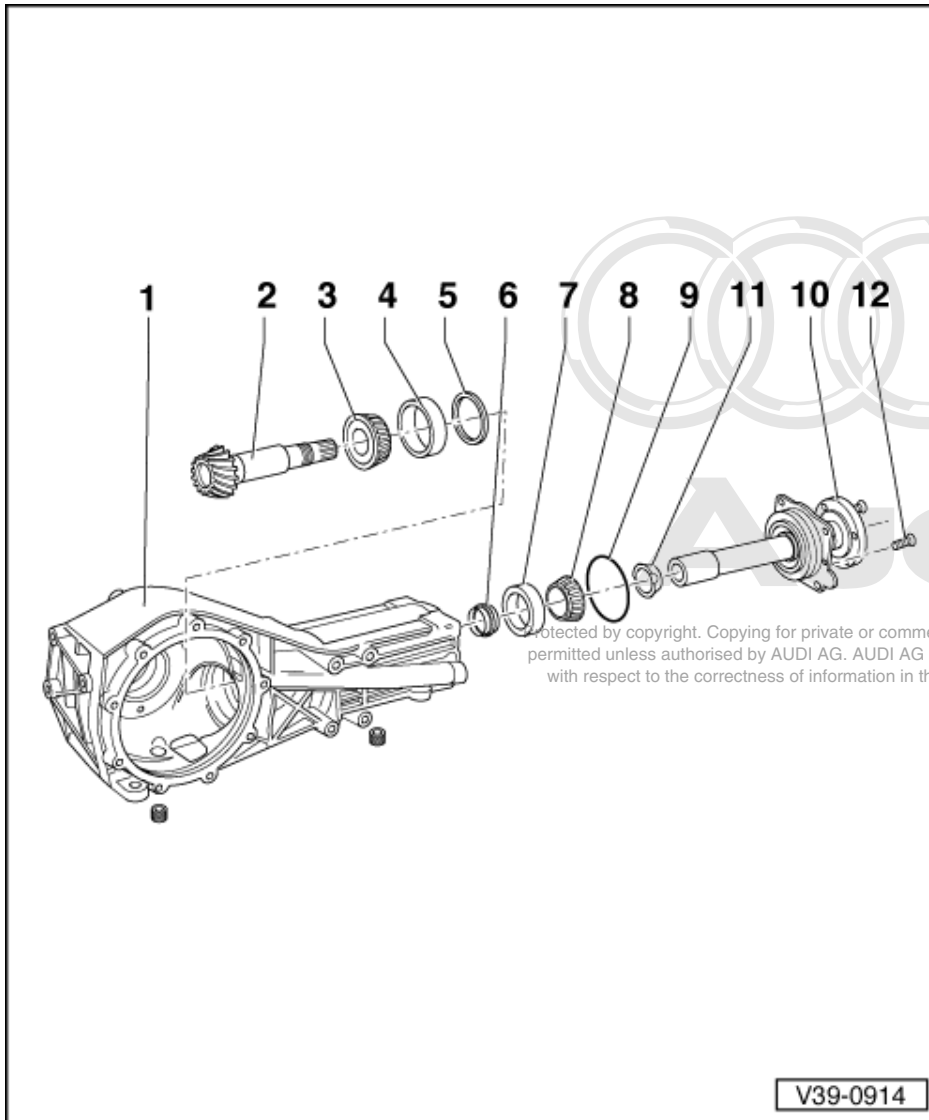
- ◆ General repair instructions => Page 4 .
- ◆ Securing final drive to repair stand => Page 39-113.
- ◆ Replace both taper roller bearings together. Use same make if possible.
- ◆ Do not additionally oil new taper roller bearings for friction torque measurement. The bearings have already been treated with a special oil by the manufacturer.
- ◆ Removing differential => Page 147 .
- ◆ Adjustments are required when replacing components marked 1)
=> Adjustment overview Page 177 .



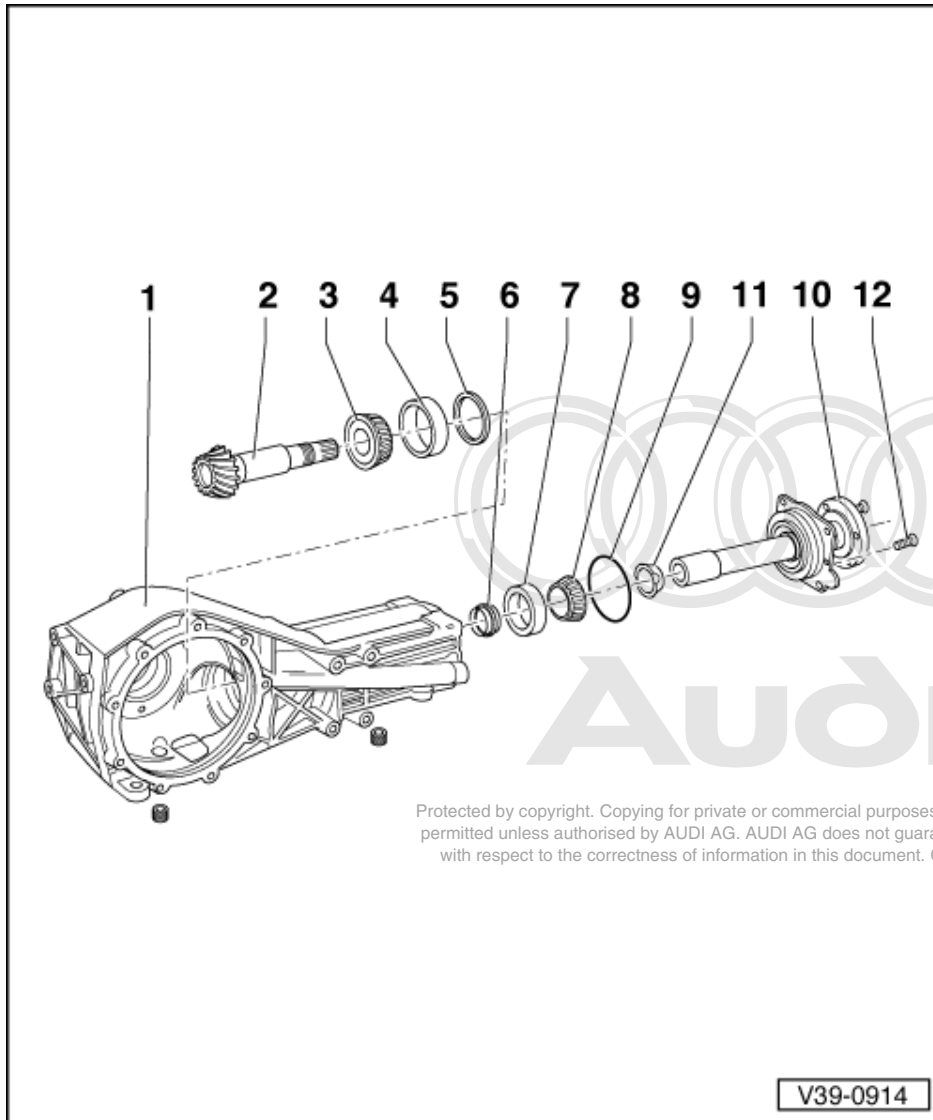
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- 1 Cover for final drive 1)
- 2 Drive pinion 1)
 - ♦ Is mated with crown wheel, always renew together as a set
- 3 Inner race for large taper roller bearing 1)
 - ♦ Pulling off => Fig. 7
 - ♦ Pressing on => Fig. 8
- 4 Outer race for large taper roller bearing 1)
 - ♦ Driving out => Fig. 6
 - ♦ Pulling in => Fig. 9
- 5 Shim "S3"
 - ♦ Note thickness
 - ♦ Adjustment overview
=> Page 177



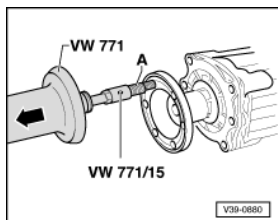
- 6 Spacer sleeve 1)**
 - ♦ Always renew
- 7 Outer race for small taper roller bearing 1)**
 - ♦ Pulling out => Fig. 5
 - ♦ Pressing in => Fig. 10
- 8 Inner race for small taper roller bearing 1)**
 - ♦ Pressing out drive pinion => Fig. 4
 - ♦ Installing => Fig. 11
- 9 O-ring**
 - ♦ Renew
- 10 Flange for propshaft and cover for final drive**
 - ♦ Removing and installing
=> Fig. 1
 - ♦ Installing => Fig. 16
 - ♦ Measuring radial run-out
=> Page 109



11 Nut

- ◆ Renew
- ◆ Removing
=> Fig. 2 and Fig. 3
- ◆ Installing => Fig. 13
- ◆ Measuring friction torque => Fig. 14
- ◆ Locking => Fig. 15

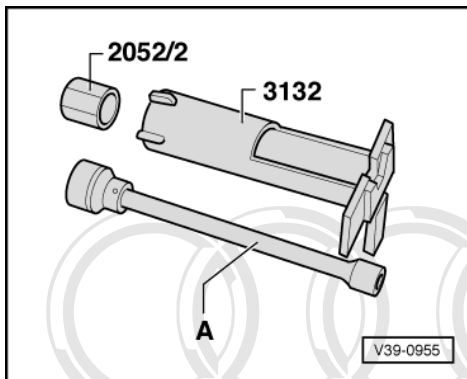
12 Countersunk bolt - 25 Nm



-> Fig1 Pulling off cover for final drive together with flange for propshaft

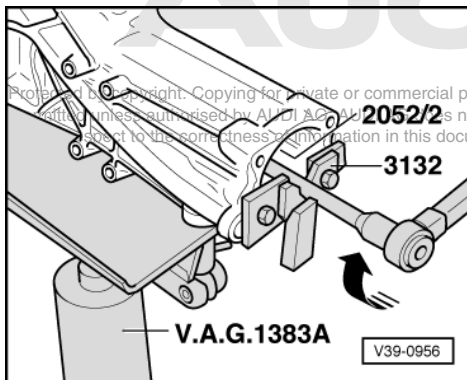
A - Bolt M8/M10

- Unscrew 2 countersunk bolts in cover.



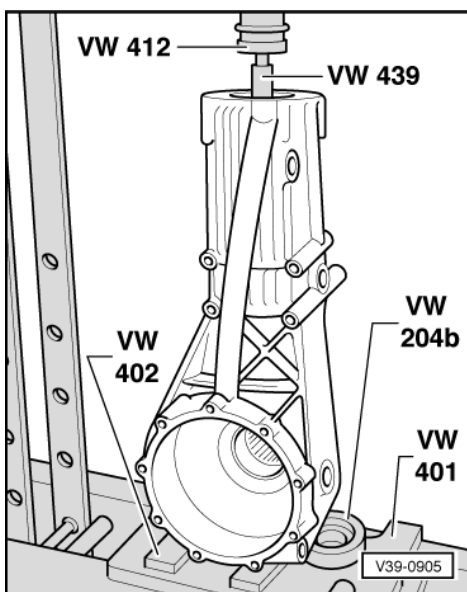
→ Fig.2 Tools for tightening and loosening drive pinion nuts

A - Extension piece and socket attachment (32 mm A/F)

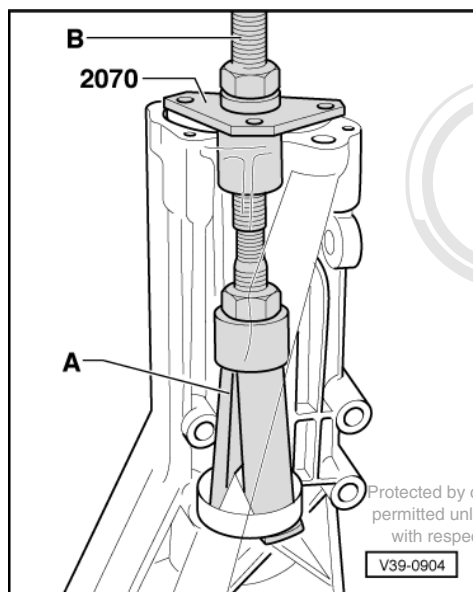


→ Fig.3 Removing nut for drive pinion

- Bolt on retainer 3132 with two M8 x 30 hexagon bolts.
- The final drive must be supported when loosening the nut (e.g. using universal support V.A.G 1359/2 in combination with gearbox jack V.A.G 1383 A).

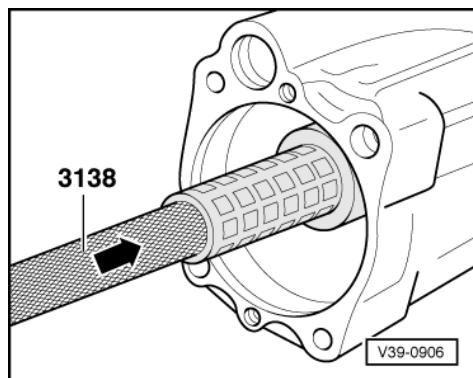


-> Fig.4 Pressing drive pinion out of inner race for small taper roller bearing



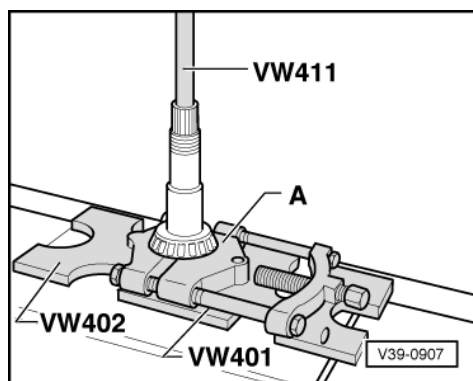
-> Fig.5 Pulling out outer race for small taper roller bearing

- A - Internal puller 46 ... 58 mm, e.g. Kukko 21/7
- B - Spindle from counter-hold tool Kukko 22/1



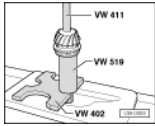
-> Fig.6 Driving out outer race for large taper roller bearing

- After removing check shims for damage.



-> **Fig.7 Pressing inner race for large taper roller bearing off drive pinion**

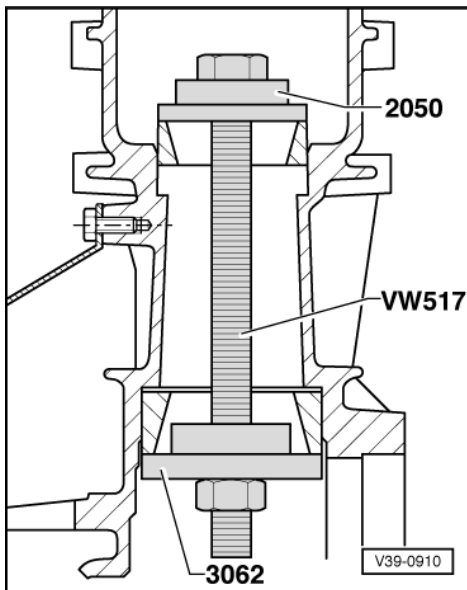
A - Separating device 22 ... 115 mm, e.g. Kukko 17/2



-> **Fig.8 Pressing inner race for large taper roller bearing onto drive pinion**

Caution
Wear protective gloves.

- Heat bearing to approx. 100 °C place on and press home.

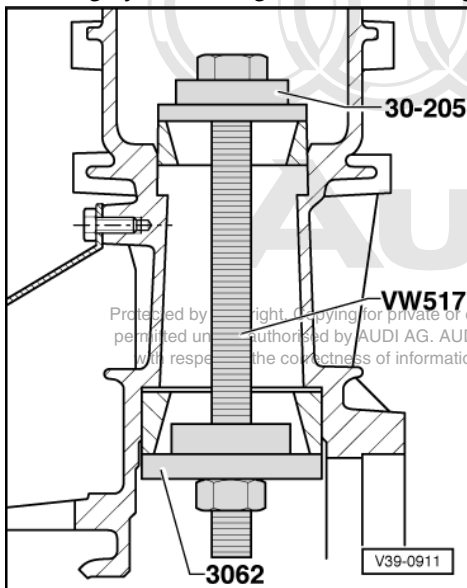


-> **Fig.9 Pulling in outer race for large taper roller bearing**

- Insert predetermined shim "S3" for drive pinion
=> Page 181.

Note:

Thoroughly oil bearing race and bearing seat in housing.



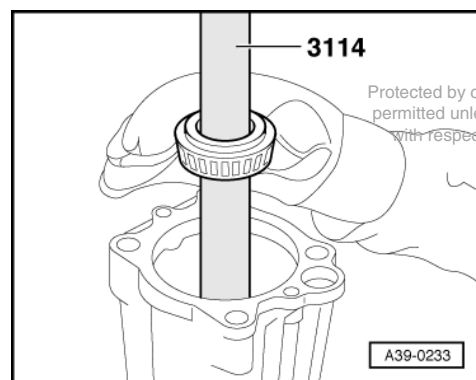
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-> Fig.10 Pressing in outer race for small taper roller bearing

- Ensure that outer bearing race is level all round before pressing in.

Note:

Thoroughly oil bearing race and bearing seat in housing.

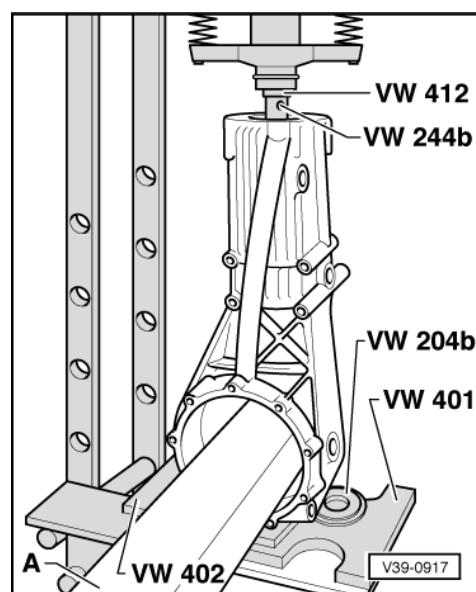


-> Fig.11 Fitting inner race for small taper roller bearing onto drive pinion

- Insert drive pinion with new spacer sleeve.
- Heat inner race for small taper roller bearing to approx. 100 °C.

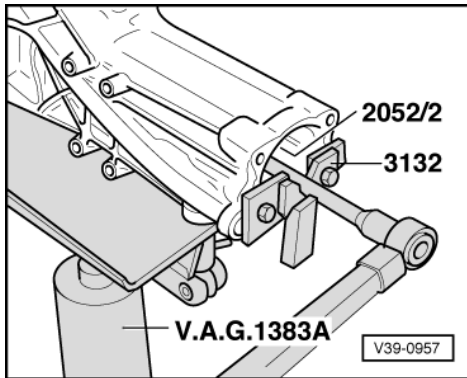
Caution
Wear protective gloves.

- Push drive pinion upwards, position special tool 3114 centrally on drive pinion and insert inner race for taper roller bearing.



-> Fig.12 Pressing home taper roller bearing

- A - Wooden block to support drive pinion.

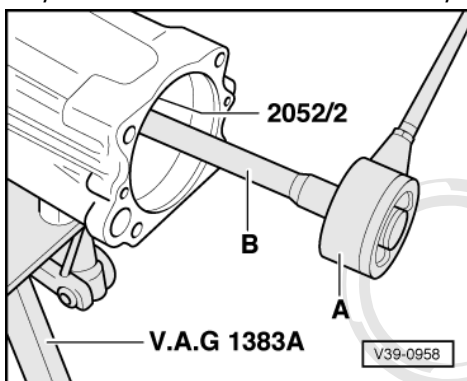


➔ Fig.13 Tightening nut for drive pinion and measuring friction torque

- The final drive must be supported when tightening the nut (e.g. using universal support V.A.G 1359/2 in conjunction with gearbox jack V.A.G 1383 A).
- Fit a new drive pinion nut.
- Tighten drive pinion nut just far enough so that no play can be felt at drive pinion.
- Gradually increase tightening torque, checking friction torque at regular intervals, until the specified friction torque is obtained => Fig. 14 .

Note:

If the specified friction torque is exceeded, the spacer sleeve must be renewed and the adjustment repeated. A spacer sleeve which has been compressed too much cannot be reused.



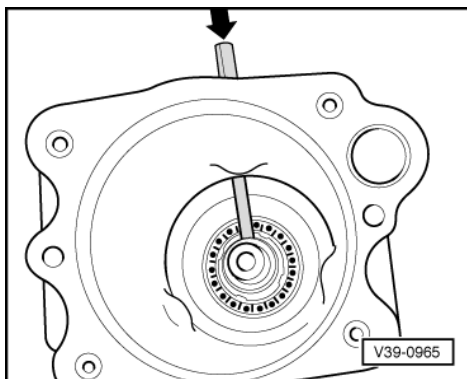
➔ Fig.14 Measuring friction torque

- A - Torque gauge, commercially available, 0 ... 600 Ncm
- B - Extension with 32 mm socket

- The following friction torques should be set:

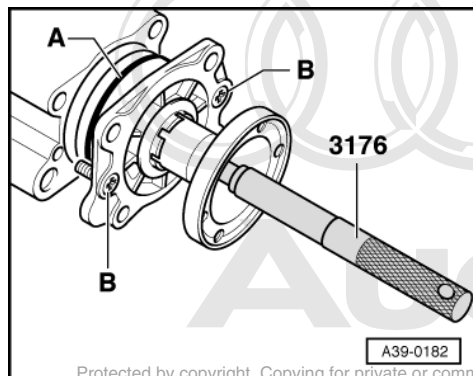
New bearings	Used bearings ¹⁾
250 ... 300 Ncm	30 ... 60 Ncm

1) run at least 50 km (30 miles)



-> Fig.15 Locking drive pinion nut

- Insert punch through oil drain hole and peen drive pinion nut.



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-> Fig.16 Installing flange for propshaft with cover for final drive

- Fit new O-ring -A- in cover and lubricate lightly.
- Drive in flange shaft and the cover using centring mandrel 3176.
- Tighten countersunk bolts -B- to 25 Nm.

Note:

The radial run-out at flange for propshaft must always be measured and marked =>Page 109.

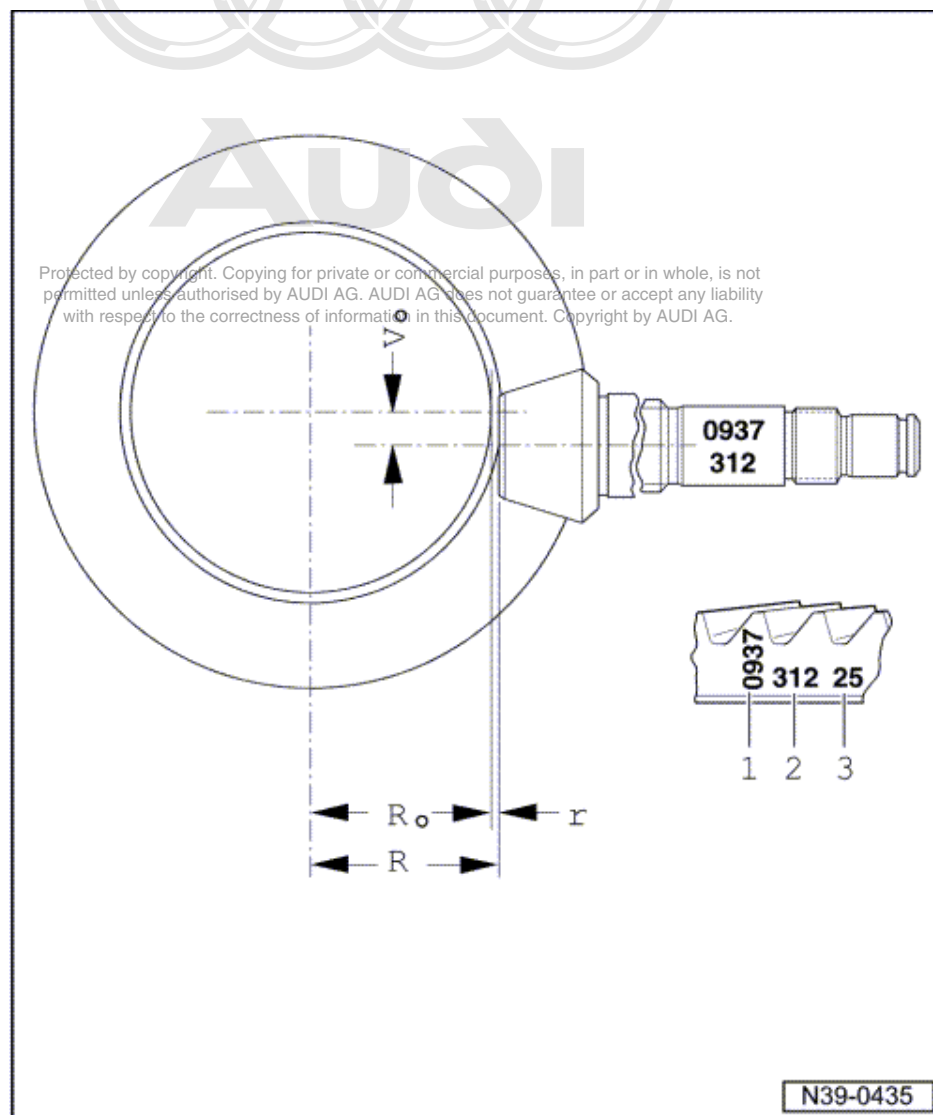
13 - Adjusting drive pinion and crown wheel

13.1 - Adjusting drive pinion and crown wheel

General notes:

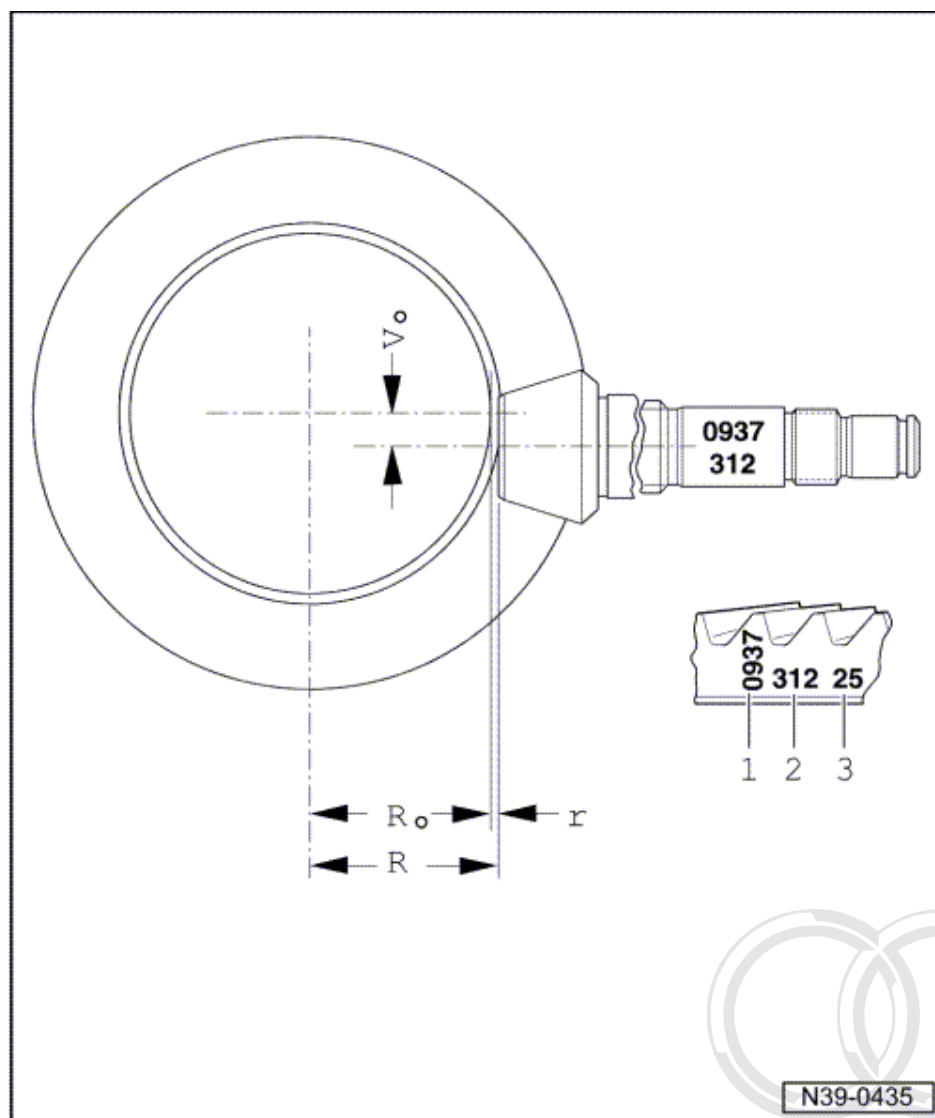
- ♦ Careful adjustment of the drive pinion and crown wheel is important for the service life and smooth running of the final drive. For this reason, the drive pinion and crown wheel are matched together during manufacture, and checked to ensure a good mesh pattern and quiet running in both directions of rotation. The position of quietest running is found by moving the drive pinion in an axial direction and at the same time lifting the crown wheel out of the zero-play mesh position by the amount necessary to maintain the backlash within the specified tolerance.
- ♦ The object of the adjustment is to reproduce the setting for quietest possible running, as obtained on the test machine in production.
- ♦ The deviation "r", which is related to the master gauge "Ro" is measured for the final drive sets supplied as replacement parts and marked on the outer circumference of the crown wheel. The final drive set (drive pinion and crown wheel) may only be replaced together as a matched pair.
- ♦ Observe the general repair instructions for taper roller bearings and shims.
- ♦ Maximum care and cleanliness are essential for achieving good results when performing repairs and taking measurements.

13.2 - Adjusting and marking of gear sets



- 1 Identification "0937" signifies Oerlikon gear set with a ratio of 37:9.
- 2 Gear set pairing number (312).
- 3 Deviation (tolerance) "r" is based on the test machine master gauge used in the production. The deviation "r" is always given in 1/100 mm. Example: "25" signifies
r = 0.25 mm

Ro - Length of master gauge used for test machine "Ro".
Ro -Crown wheel = 53.15 mm



R - Actual distance between centre axis of crown wheel and face of drive pinion at point with quietest running for this gear set.
 $R = R_o + r$

Vo - Hypoid offset

13.3 - Recommended sequence for readjusting final drive set

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The following work sequence is recommended to save time when the drive pinion and crown wheel have to be adjusted:

- 1.) Determine total shim thickness "Stotal" for "S1" + "S2" for the specified preload for taper roller bearings for differential.
- 2.) Determine total shim thickness "S3" to reproduce the installation position for the drive pinion determined on the test machine in production.
- 3.) Distribute total shim thickness "Stotal" for "S1" + "S2" so that the specified backlash exists between crown wheel and drive pinion.

Note:

Overview of components and shims =>Page **178**.

13.4 - Adjustment overview

Note:

If repairs have been carried out on the final drive it is only necessary to adjust the drive pinion or final drive set if components have been renewed which have a direct effect on the adjustments of the final drive. Refer to the following table to avoid unnecessary adjustments:

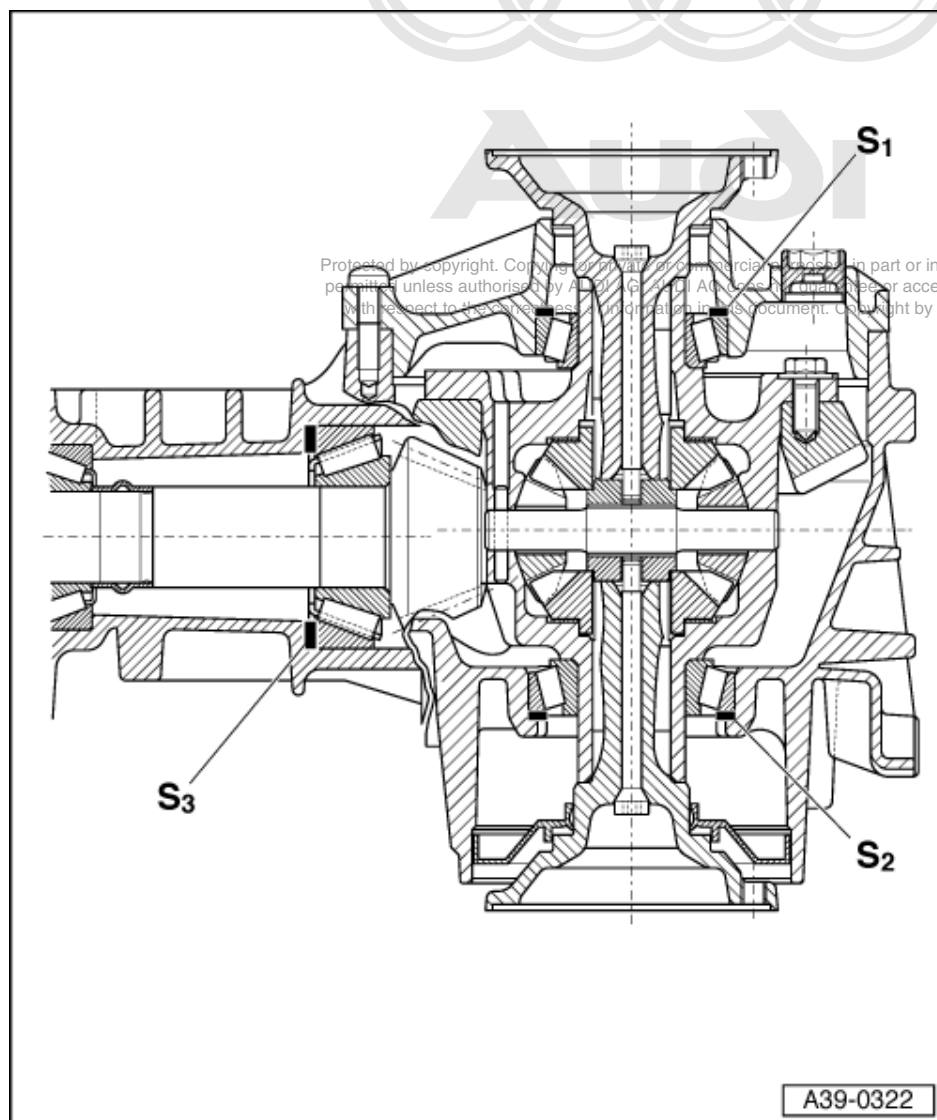
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Part renewed: ▼	to be adjusted:		
	Crown wheel "S1"+"S2" 1) => Page 188	Drive pinion "S3" 1) via deviation "r" => Page 181	Check backlash => Page 191
Final drive housing	X	X	X
Differential housing	X		X
Taper roller bearing for drive pinion		X	X
Taper roller bearing for differential	X		X
Final drive set 2)	X	X	X
Cover for final drive	X		X

- 1) Shims; installation position => Page **178**.
- 2) Drive pinion and crown wheel; only renew together.



13.5 - Position of shims

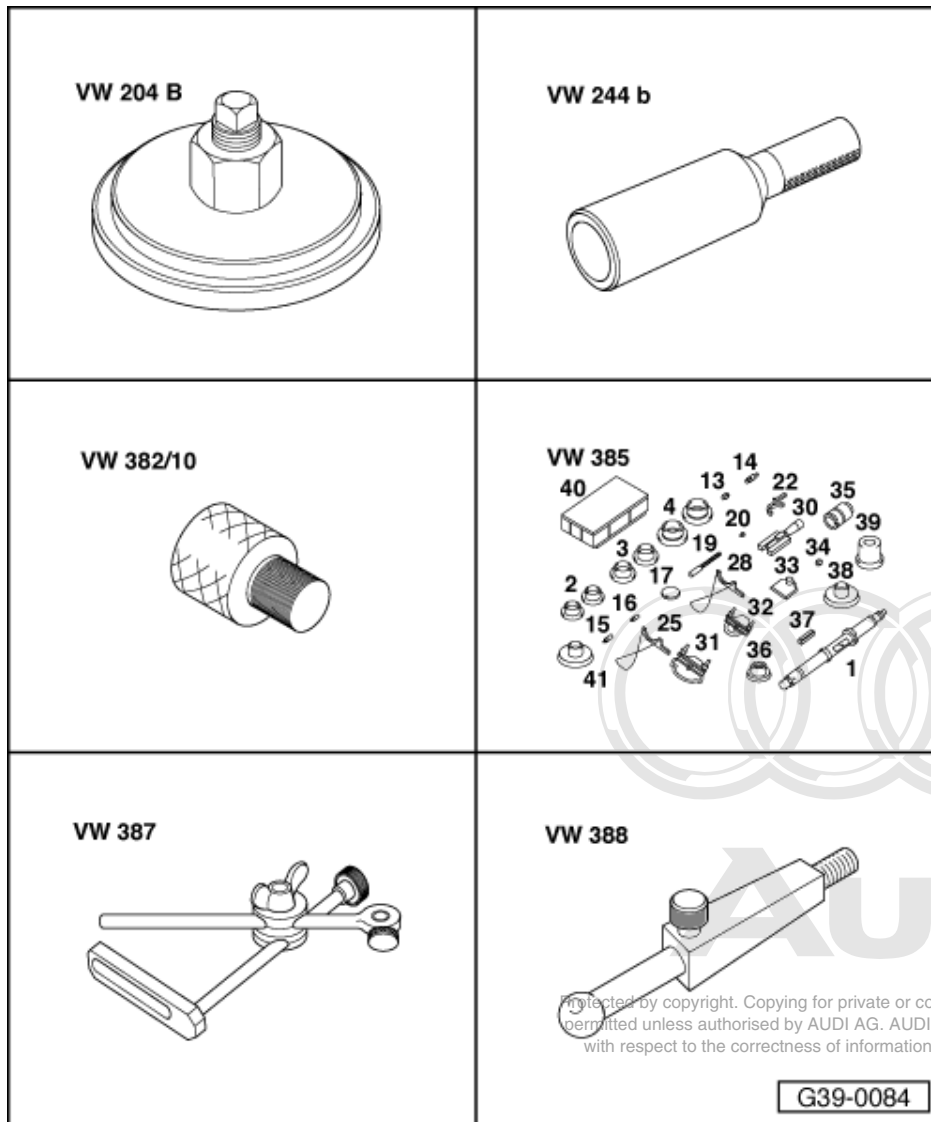


Note:

Adjustment overview when renewing individual components of final drive

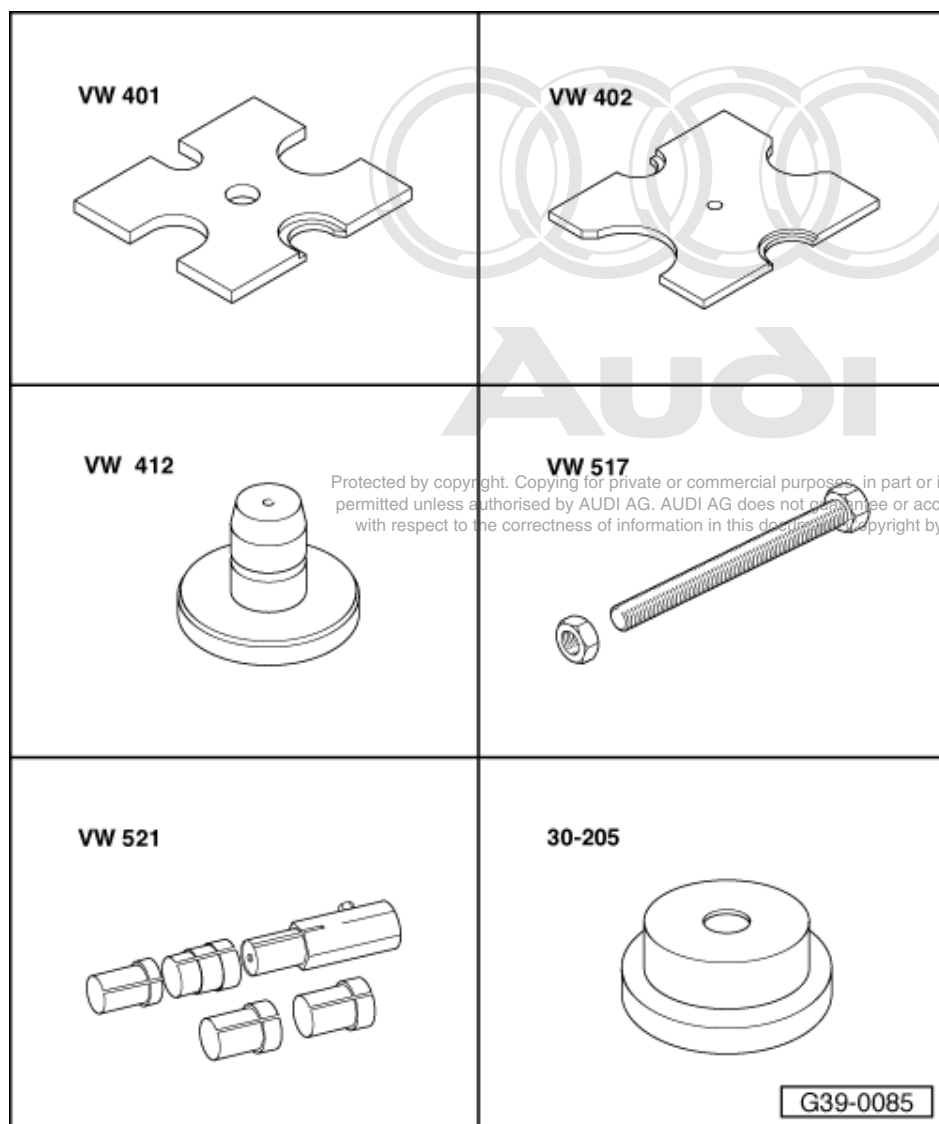
=>Page **177**.

- S1 -** Adjustment shim for crown wheel in cover for final drive
- S2 -** Adjustment shim for crown wheel in final drive housing
- S3 -** Adjustment shim for drive pinion in final drive housing

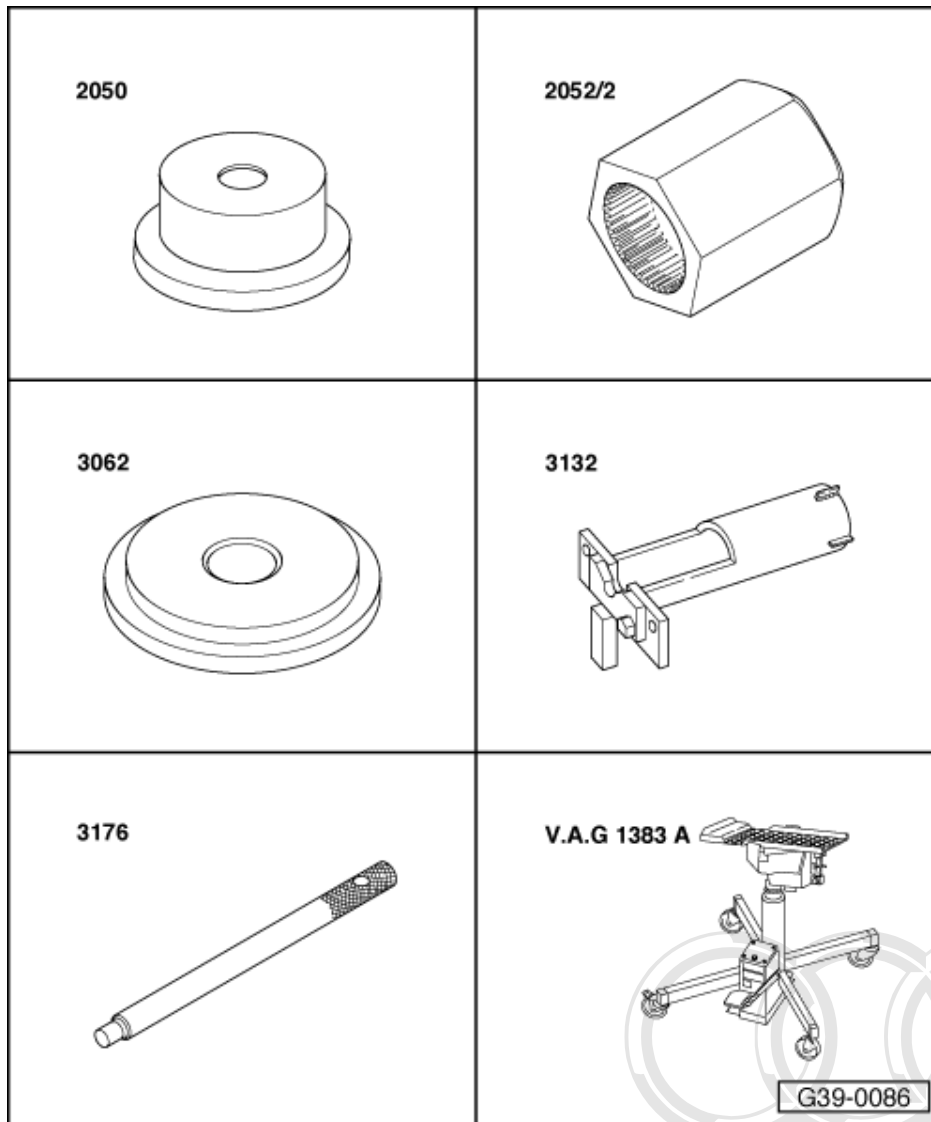


Special tools and workshop equipment required

- ◆ Crankshaft seal installing tool VW 204 B
- ◆ Fitting sleeve VW 244 B
- ◆ Dial gauge extension VW 382/10
- ◆ Universal mandrel VW 385
- ◆ Universal dial gauge bracket VW 387
- ◆ Measuring lever VW 388



- ◆ Thrust plate VW 401
- ◆ Thrust plate VW 402
- ◆ Press tool VW 412
- ◆ Threaded spindle VW 517
- ◆ Crown wheel adjusting device VW 521
- ◆ Thrust plate 30-205



- ◆ Thrust pad 2050
- ◆ Pinion assembly appliance 2052/2
- ◆ Thrust pad 3062
- ◆ Retainer 3132
- ◆ Centring mandrel 3176
- ◆ Engine/gearbox jack
V.A.G 1383 A
- ◆ Dial gauge extension 30 mm
- ◆ Dial gauge
- ◆ Torque gauge 0 ... 600 Ncm
- ◆ Extension with 32 mm socket

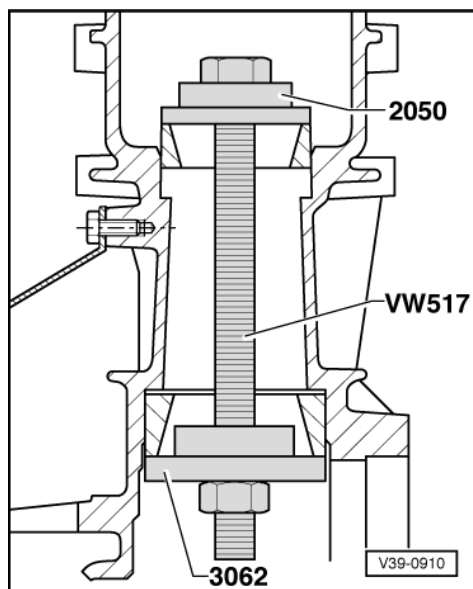
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13.6 - Adjusting drive pinion

Notes:

- ◆ Before adjusting drive pinion, adjust crown wheel (determine total shim thickness "Stotal" for shims "S1" + "S2") => Page **188**.
- ◆ The drive pinion only has to be readjusted if the final drive set (crown wheel and drive pinion), the taper roller bearings for the drive pinion or the final drive housing are renewed. Adjustment overview => Page **177**.

Determine thickness of shim "S3"

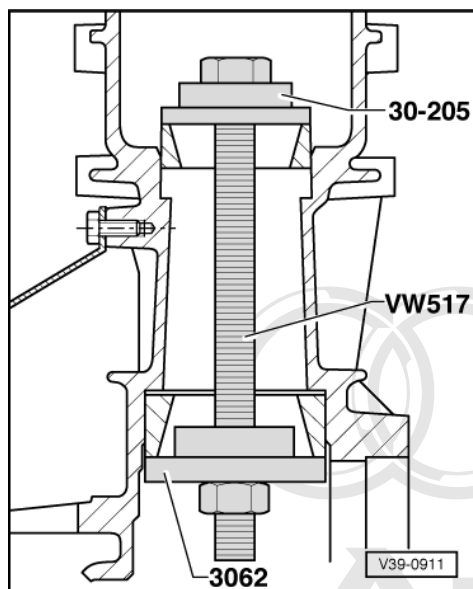


(Setting preload of taper roller bearing for drive pinion)

- Secure rear final drive to repair stand
=>Page 142 .
- -> Pull outer race of large taper roller bearing into housing (without shim).

Note:

Thoroughly oil bearing race and bearing seat in housing.



- -> Pull outer race for small taper roller bearing into housing.

Note:

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Thoroughly oil bearing race and bearing seat in housing.

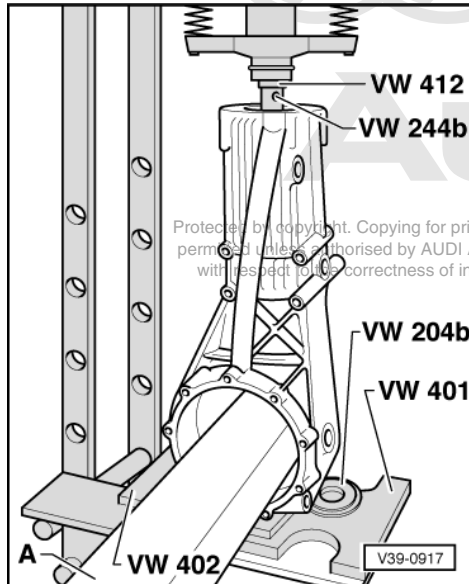
- Insert drive pinion without spacer sleeve.

Caution
Wear protective gloves.

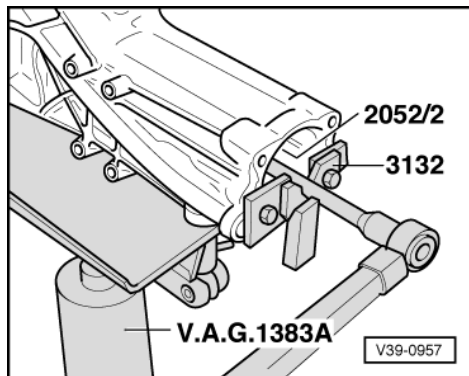
- Heat inner race for taper roller bearing to approx. 100 °C and fit onto drive pinion.

Note:

Only install spacer sleeve for final friction torque measurement (after determining shim "S3").



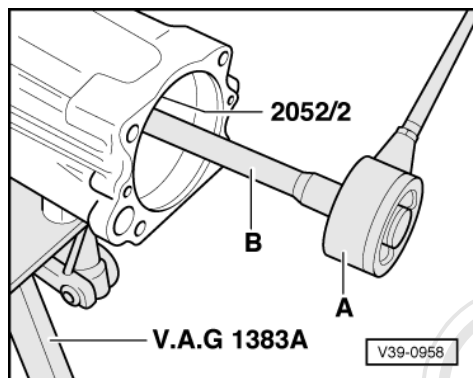
- -> Press taper roller bearing fully home.
- A - Wooden block used to support drive pinion



- -> Tighten drive pinion nut just far enough so that no play can be felt at drive pinion.

Note:

The final drive must be suitably supported when tightening the nut (for instance using universal support V.A.G 1359/2 and engine/gearbox jack V.A.G 1383 A).



- -> Tighten drive pinion nut until the following friction torque is obtained.

New bearings	Used bearings ¹⁾
250 ... 300 Ncm	30 ... 60 Ncm

- 1) run at least 50 km (30 miles)

Note:

Increase tightening torque slowly and measure friction torque at regular intervals until the specified friction torque is obtained.

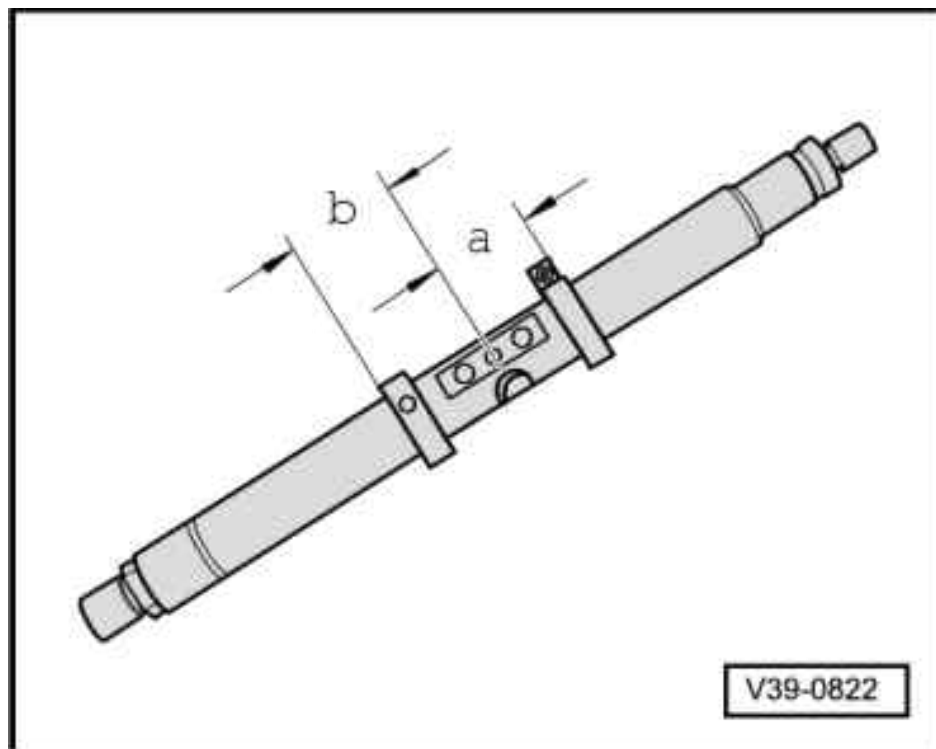
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- A - Torque gauge, commercially available, 0 ... 600 Ncm
- B - Extension with 32 mm socket

Note:

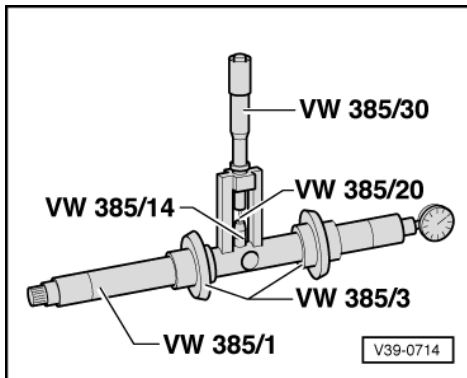
Use adapter (3/4 " to 1/2 ") if necessary.

- Fit a new drive pinion nut.

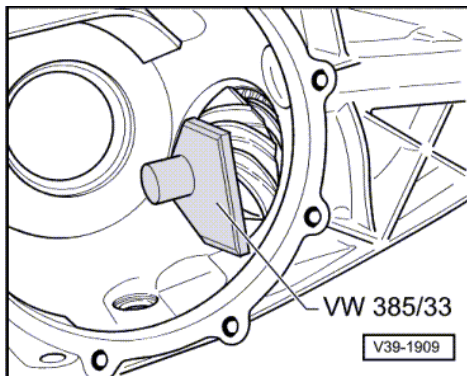


- -> Set adjustment ring of universal mandrel VW 385/1.
- Distance "a" = 75 mm
- Set sliding adjustment ring.

- Distance "b" = 35 mm



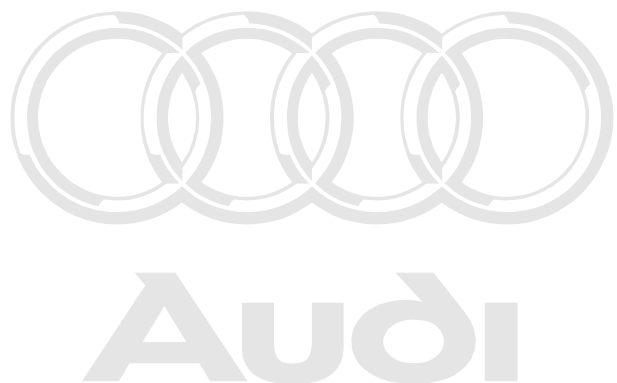
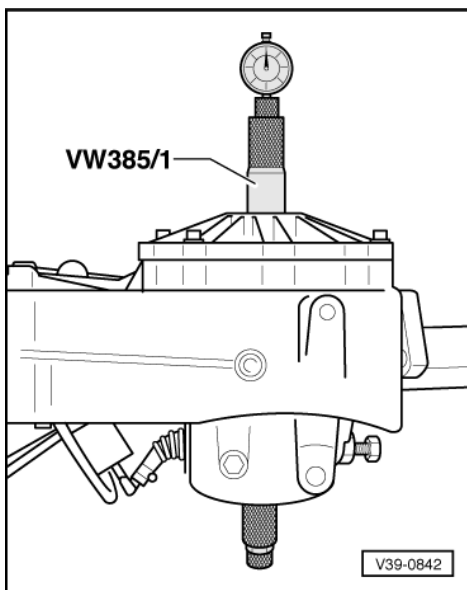
- -> Assemble universal mandrel as illustrated:
 - Dial gauge extension VW 385/20 = 3 mm long
 - Set universal master gauge VW 385/30.
 - $R_o = 53.15 \text{ mm}$
 - Set dial gauge (3 mm measuring range) to "0" with 2 mm preload.



Note:

Before performing following measurements turn drive pinion at least five turns in both directions, so that the taper roller bearings settle. Otherwise a false reading will be obtained.

- -> Place end measuring plate VW 385/33 onto drive pinion head.

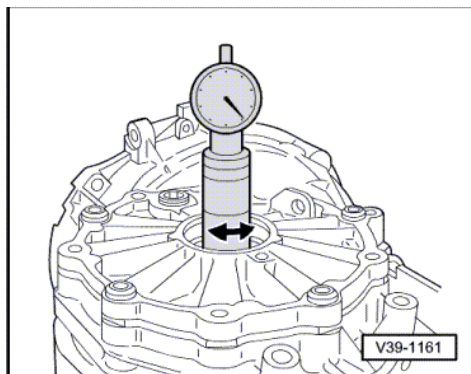


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- -> Remove master gauge and insert measuring mandrel in the housing.
 - The centring disc VW 385/3 faces towards cover for final drive
- Fit cover for final drive and tighten 4 bolts.
- Using the adjustable ring, move 2nd centring disc out as far as possible so that the mandrel can still just be turned by hand.

Determining measurement "e"



- -> Turn mandrel until the dial gauge point touches the end measuring plate on drive pinion head, then measure maximum deflection (return point). The measured value is dimension "e" (in red scale).
 - Measurement in following example: "e" = 1.60 mm

Note:

Dimension "e" is required to determine thickness of shim "S3".

- After removing universal mandrel, check once again whether the dial gauge reads "0" with 2 mm preload when master gauge VW 385/30 is in place - otherwise repeat the measurement.

Determining shim thickness "S3"

Formula:

$$\text{"S3"} = \text{"e"} - \text{"r"}$$

e = Measured value

r = Deviation (tolerance): marked on crown wheel in 1/100 mm

Example:

Determined value "e"	1.60 mm
- Deviation "r"	0.42 mm
= Thickness of shim "S3"	1.18 mm

- Determine shim(s) as accurately as possible from table. Part numbers

=> Parts catalogue

The following shims are available for "S3"

Shim thickness (mm) 1)		
0.95	1.20	1.45
1.00	1.25	1.50
1.05	1.30	1.55
1.10	1.35	
1.15	1.40	

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- 1) Using the shim tolerance variations it is possible to find the exact shim thickness required, insert two shims if necessary.
- Remove universal mandrel.
- Remove drive pinion and outer race of large taper roller bearing and install together with measured shims "S3" and new spacer sleeve
=>from Page 162 .
- Install inner race of small taper roller bearing and tighten nut for drive pinion until specified friction torque is obtained => Page 184 .

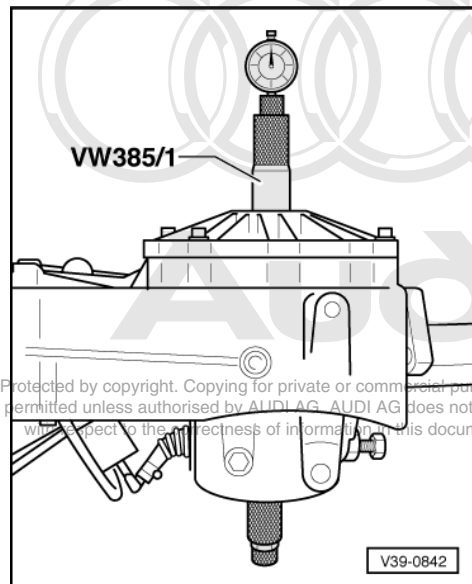
Note:

Increase tightening torque slowly and check friction torque at regular intervals, if the specified friction torque is exceeded, the spacer sleeve must be renewed and the adjustment repeated. A spacer sleeve which has been compressed too much cannot be reused.

- Set to following friction torques:

New bearings	Used bearings ¹⁾
250 ... 300 Ncm	30 ... 60 Ncm

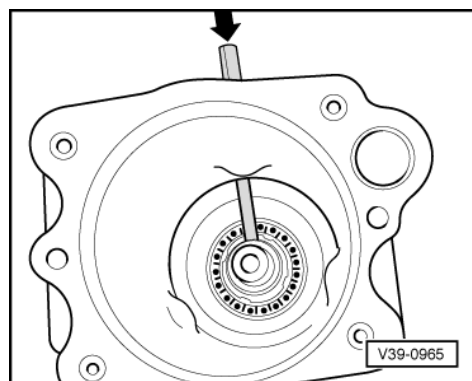
- 1) run at least 50 km (30 miles)



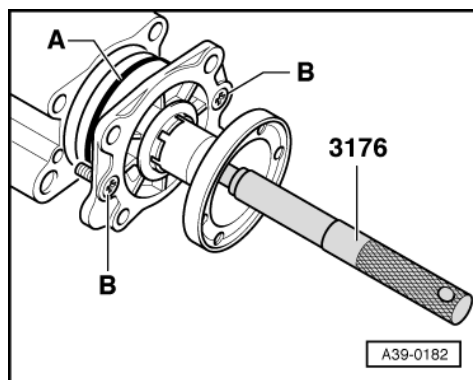
Performing check measurement

Checking dimension "r"

- Turn drive pinion at least 5 turns in both directions.
- -> Insert universal mandrel and perform check measurement.
 - If the shims have been correctly selected, the dial gauge should now show the value of "r" as marked on the crown wheel, reading anti-clockwise in the red scale, within a tolerance of ± 0.04 mm.



- -> Peen drive pinion nut by applying a punch through the oil drain hole.



- -> Renew O-ring -A- in cover.
- Install flange for propshaft and cover for final drive.
- Drive in flange shaft with drift 3176.
- Tighten 2 countersunk bolts -B- for cover to 25 Nm.

Note:

The radial run-out at flange for propshaft must be measured and marked =>Page 109 .

13.7 - Adjusting crown wheel

(Adjusting differential)

Repairs after which the crown wheel has to be adjusted

=>Adjustment overview Page 177 .

Determining total shim thickness "Stotal" for shims "S1" + "S2"

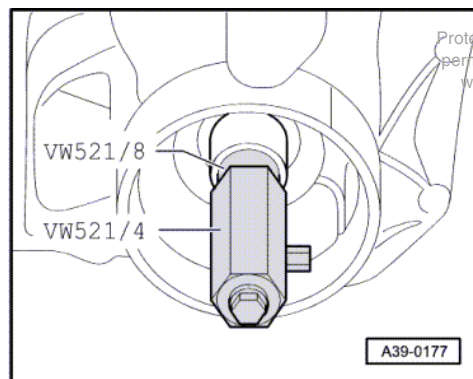
(Setting preload of taper roller bearing for differential)

- Drive pinion removed or crown wheel dismantled from differential housing
- Pull out flange shaft oil seal with lever.
- Remove differential taper roller bearing outer races and take out shims => from Page 149 .
- Press left-hand taper roller bearing outer race for differential (housing side) with shim "S2" into housing =>from Page 149 . To perform the measurement use a shim "S2*" with a thickness of 1.00 mm (one 0.80 mm shim and one 0.20 mm shim).

Note:

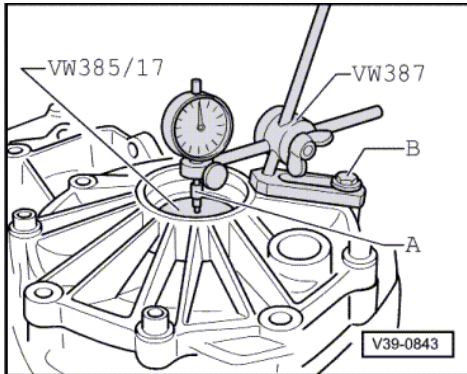
For measurement purposes a shim "S2" of 1.0 mm is initially inserted which will be designated "S2*" in the following. After determining the backlash "S2*" will be replaced by the correct "S2".

- Press in right-hand taper roller bearing outer race for differential (final drive cover side) without shims onto stop:
=>Fig. 159
- Insert differential into housing. The crown wheel is positioned on the right side (cover side).



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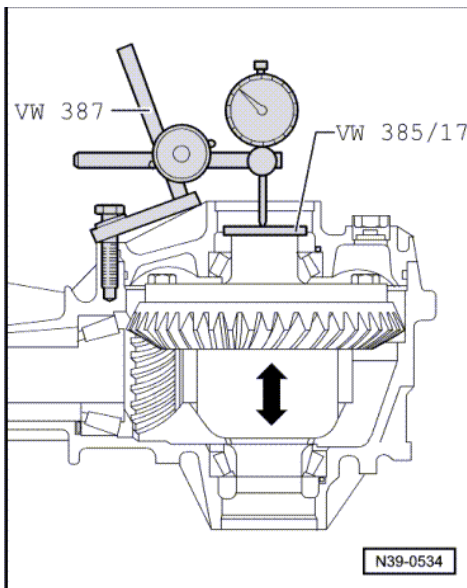
- Fit cover and tighten bolts to 25 Nm.
- ➔ Install special tools VW 521/4 and 521/8 onto housing side in differential housing.
- Turn cover side of differential housing upwards.



- Turn differential 5 turns in both directions to settle the taper roller bearing.
- Place measuring plate VW 385/17 onto differential.
- ➔ Fit measuring tools.

A - Dial gauge extension approx. 30 mm long
B - Hexagon bolt M8 x 45

- Place dial gauge extension on the centre of the measuring plate VW 385/17.



- Set dial gauge (3 mm measuring range) to "0" with 2 mm preload.
- ➔ Lift differential without turning; read off play on dial gauge and note.
- Measurement in following example: 0.50 mm

Note:

If the measurement has to be repeated, the differential must again be turned 5 turns in each direction to settle the taper roller bearing.

Formula:	
"Stotal" = "S2*" + measurement + bearing preload	
Example:	
Inserted shim(s) "S2*"	1.00 mm
+ Measured value	0.50 mm



Example:	
+ Bearing preload (constant)	0.30 mm
= Total shim thickness "Stotal" for shims "S1" + "S2"	1.80 mm

Determining thickness of shim "S1"**Notes:**

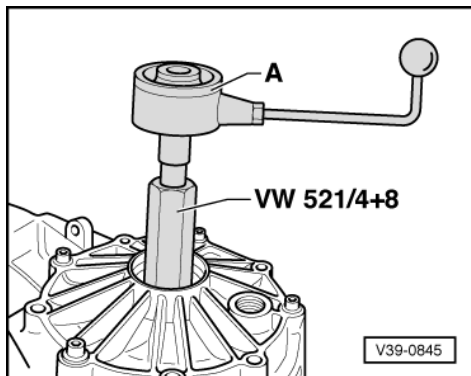
- ♦ The preliminary adjustment shim "S1*" will be replaced with the final shim "S1" after determining the backlash.
- ♦ The total shim thickness "Stotal" remains unchanged.

Formula:	
"S1*" = "Stotal" - "S2"	

Example:

Total shim thickness "Stotal" for shims "S1" + "S2"	1.80 mm
- Inserted shim(s) "S2"	1.00 mm
= Thickness of shim "S1"	0.80 mm

- Determine shim(s) as accurately as possible from table
=> Page 192 .

**Measuring friction torque (check)**

- Drive pinion removed
- Differential fitted with shims "S1*" and "S2"
- -> Fit torque gauge 0 ... 600 Ncm -A- onto differential.
- Read off friction torque.

Friction torque specifications:

New bearings	Used bearings ¹⁾
250 ... 300 Ncm	30 ... 60 Ncm

- 1) run at least 50 km (30 miles)

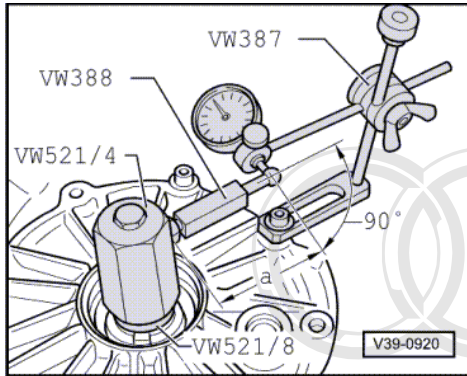
Note:

After readjusting the final drive set, adjust and check the drive pinion =>Page 181 .

Adjusting backlash

(Positioning crown wheel in final drive housing)

- Drive pinion with shim "S3" installed
- Differential with shims "S1*" + "S2*" installed
- Insert differential in final drive housing, install cover and tighten all bolts to 25 Nm.



- Turn differential 5 turns in both directions to settle the taper roller bearings.
- -> Assemble measuring equipment.
- Use dial gauge extension VW 382/10 (6 mm flat).
- Set measuring lever VW 388 to dimension "a" = 60 mm.
- Determine play between the teeth flanks as follows:
 - Turn crown wheel until it makes contact with a tooth flank (end of backlash travel).
 - Set dial gauge to "0" with 1 mm preload.
 - Turn crown wheel back until lying against an opposite tooth flank (backlash).
 - Read off backlash and note value.
 - Turn crown wheel through 90° and repeat measurements a further 3 times.

Note:

If the individual measurements differ by more than 0.06 mm from each other, the installation of the crown wheel or the final drive set itself is not correct. Check installation, replace final drive set if necessary.

Determining average backlash

Example:	
1st measurement	0.28 mm
+ 2nd measurement	0.30 mm
+ 3rd measurement	0.30 mm
+ 4th measurement	0.28 mm
= Sum of measured values	1.16 mm

- Result: The average backlash is $1.16 / 4 = 0.29$ mm

Determining thickness of shim "S2"

Formula:	
"S2"	= "S2*" - backlash + lift

Example:	
Inserted shim "S2"	1.00 mm
- Average backlash	0.29 mm
+ Lift (constant)	0.15 mm

**Example:**

= Thickness of shim "S2" 0.86 mm

- Determine shim(s) as accurately as possible from table. Part numbers

=> Parts catalogue

The following shims are available for "S2"

Shim thickness (mm) 1)		
0.15	0.60	1.50
0.20	0.65	1.65
0.25	0.80	
0.55	1.35	

1) Using the shim tolerance variations it is possible to find the exact shim thickness required, insert two shims if necessary.

Determining thickness of shim "S1"

Formula:

"S1" = "Stotal" - "S2"

Example:

Total shim thickness "Stotal"
for "S1" + "S2" 1.80 mm

- Thickness of shim "S2" 0.86 mm

= Thickness of shim "S1" 0.94 mm

- Determine shim(s) as accurately as possible from table. Part numbers

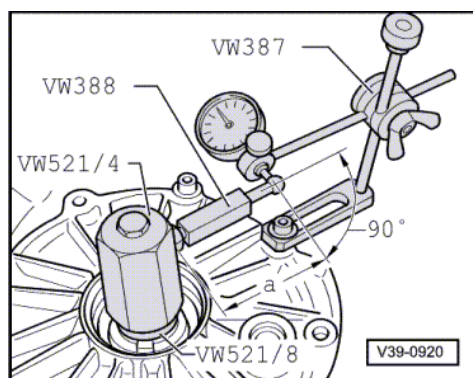
=> Parts catalogue

The following shims are available for "S1"

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Shim thickness (mm) 1)		
0.15	0.50	1.50
0.20	0.80	
0.25	1.00	

1) Using the shim tolerance variations it is possible to find the exact shim thickness required, insert two shims if necessary.



-> Performing check measurement

- Drive pinion with shim "S3" installed
- Differential with shims "S1" + "S2" installed
- Turn differential 5 turns in both directions so that the taper roller bearings settle.
- Measure backlash four times on circumference.
 - Specifications: 0.12 ... 0.22 mm

Notes:

- ♦ If the backlash lies outside the tolerances, the adjustments must be repeated, but the total shim thickness "Stotal" must remain unchanged.
- ♦ The individual measurements must not differ by more than 0.06 mm from each other.



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