



Workshop Manual Audi A2 2001 ➤

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5-speed manual gearbox 085 DS

Edition 07.2010

List of Workshop Manual Repair Groups

Repair Group

- 00 - Technical data
- 30 - Clutch
- 34 - Controls, housing
- 35 - Gears, shafts
- 39 - Final drive - front differential



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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.

Contents

00 - Technical data	1
1 Gearbox identification	1
1.1 Code letters, allocation, ratios	1
2 Capacities	3
3 Transmission layout	4
3.1 Calculating ratio „i“	4
4 Safety precautions	6
5 Notes on tow-starting and towing	7
6 Repair instructions	8
7 Rules for cleanliness when working on 5-speed manual gearbox	12
8 Contact corrosion!	13
9 Pipe/wire routing and attachment	14
30 - Clutch	15
1 Exploded view - clutch mechanism	15
1.1 Removing and installing clutch slave cylinder	16
1.2 Adjusting clutch play	18
2 Exploded view - clutch release mechanism	19
2.1 Servicing clutch release mechanism	20
3 Exploded view - clutch unit	23
3.1 Removing and installing clutch plate and clutch pressure plate	25
34 - Controls, housing	27
1 Overview - selector mechanism	27
1.1 Checking selector mechanism	27
2 Exploded view of gear knob and cover	29
2.1 Removing and installing gear knob and boot	29
2.2 Removing and installing mount and symbol panel	30
3 Exploded view - selector mechanism	32
3.1 Removing and installing selector mechanism	33
3.2 Dismantling and assembling selector mechanism	33
3.3 Removing and installing selector lever pushrod	36
3.4 Removing and installing potentiometer for selector lever forward and backward	36
3.5 Removing and installing selector lever lock solenoid N110	36
4 Exploded view of gear actuator	39
4.1 Removing and installing gear actuator	42
4.2 Adjusting gear actuator	47
4.3 Renewing gasket for gear actuator	48
5 Exploded view of hydraulic control unit, pressure accumulator	55
5.1 Removing and installing hydraulic control unit	56
6 Exploded view of hose/pipe assemblies	61
6.1 Removing and installing hose/pipe assemblies	62
7 Fluid level for clutch mechanism and selector mechanism	67
8 Removing gearbox	68
9 Installing gearbox	77
10 Transporting gearbox	81
11 Securing gearbox to engine and gearbox support	82
12 Checking gear oil level and topping up	83



13	Exploded view of gearbox housing, selector mechanism, input shaft, output shaft (pinion shaft), differential, selector forks	84
13.1	Dismantling and assembling gearbox housing, selector mechanism, input shaft, output shaft (pinion shaft), differential and selector forks	87
14	Exploded view - clutch housing	101
14.1	Servicing clutch housing	103
14.2	Adjusting selector finger and selector sleeve	106
35 - Gears, shafts		110
1	Exploded view - input shaft	110
1.1	Dismantling and assembling input shaft	112
1.2	Adjusting input shaft	117
2	Exploded view - output shaft	121
2.1	Dismantling and assembling output shaft	124
2.2	Adjusting output shaft	130
39 - Final drive - front differential		134
1	Renewing oil seals for flange shafts	134
2	Exploded view - differential	136
2.1	Dismantling and assembling differential	138
2.2	Removing and installing final drive gear	141
2.3	Table of adjustments	142
2.4	Adjusting differential	143

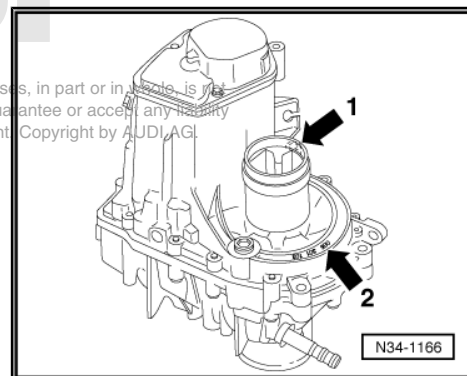
00 – Technical data

1 Gearbox identification

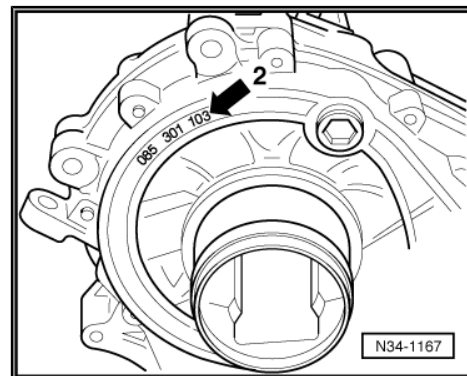
The „5-speed manual gearbox 085 DS“ is fitted in conjunction with the 3-cylinder 1.2 ltr. TDI engine in the Audi A2 2001 ►. Allocation ⇒ [page 1](#).

Location on gearbox

- ◆ -Arrow 1- Code letters and date of manufacture
- ◆ -Arrow 2- 5-speed manual gearbox 085 DS



Manual gearbox 085 DS -Arrow 2-



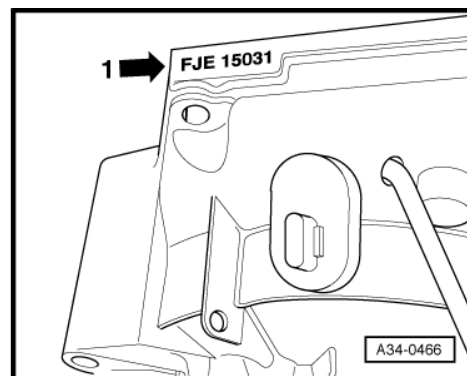
-Arrow 1- Code letters and date of manufacture of gearbox

Example:	FJE	15 03 1
	Code letters	Date of manufacture: 15.03.2001



Note

- ◆ Additional data are manufacture-related.
- ◆ The code letters for the gearbox are also given on the vehicle data stickers.



1.1 Code letters, allocation, ratios

Manual gearbox		085 DS	
Code letters		DSK	FLE 1)2)
Manufactured	from to	11.00 03.01	04.01 08.05
Allocation	Model	Audi A2 2001 >	Audi A2 2001 >
	Engine	1.2l TDI - 45 kW	1.2l TDI - 45 kW
Ratio: Z ₂ : Z ₁	Final drive	60 : 18 = 3.333	60 : 18 = 3.333
	1st gear	38 : 11 = 3.455	38 : 11 = 3.455



Manual gearbox	085 DS	
Code letters	DSK	FLE 1)2)
2nd gear	43 : 22 = 1.955	43 : 22 = 1.955
3rd gear	39 : 33 = 1.182	39 : 33 = 1.182
4th gear	39 : 48 = 0.813	39 : 48 = 0.813
5th gear	34 : 53 = 0.642	34 : 53 = 0.642
Reverse gear	44 : 13 = 3.385	44 : 13 = 3.385
Speedometer	12 : 20 = 0.600	12 : 20 = 0.600
Clutch actuation	Hydraulic	Hydraulic
Clutch plate Ø	200 mm	200 mm
Overall ratio ¹ ov. in top gear	2.139	2.139
• 1) Heavy-duty reverse gear wheel For correct version, refer to ⇒ Electronic parts catalogue . • 2) For vehicles with ESP; heavy-duty differential. For correct version, refer to ⇒ Electronic parts catalogue .		



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2 Capacities

Gearbox capacity

5-speed manual gearbox 085 DS	
Capacity	2.5 ltr.
Lubricant	Gear oil ⇒ Electronic parts catalogue

For manual gearbox 085 use only the gear oil available from the parts catalogue. Other types of oil cause malfunctions and/or failure of the gearbox.

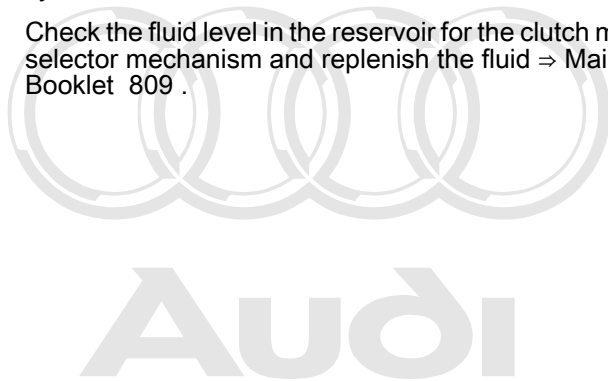
⇒ „12 Checking gear oil level and topping up“, page 83 .

Clutch mechanism and selector mechanism capacities

Hydraulic system for clutch and selector mechanism	
Capacity	0.41 ltr.
Lubricant	Hydraulic fluid ⇒ Electronic parts catalogue

For the hydraulic system, use only the hydraulic fluid available from the parts catalogue for the clutch and selector mechanism. Other fluids would cause malfunctioning or failure of the hydraulic system.

Check the fluid level in the reservoir for the clutch mechanism and selector mechanism and replenish the fluid ⇒ Maintenance ; Booklet 809 .



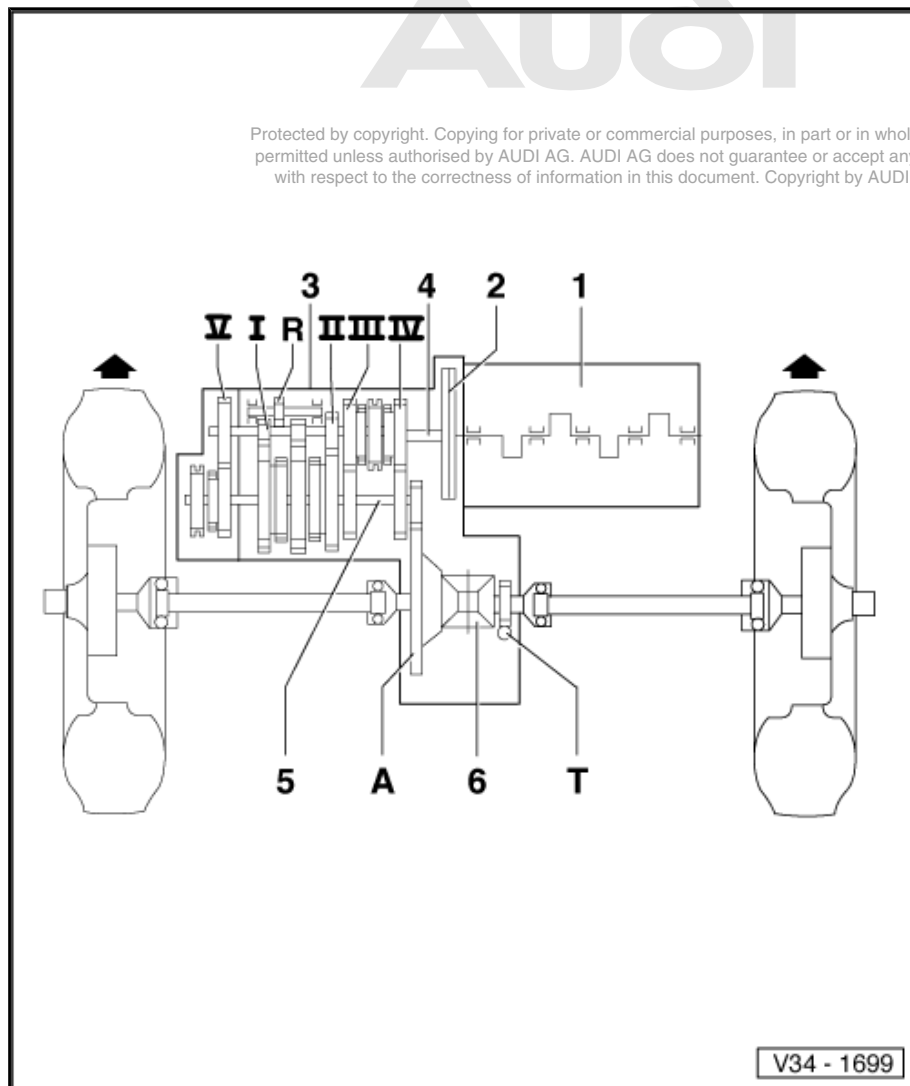
3 Transmission layout



Note

-Arrows- point in direction of travel.

- 1 - Engine
- 2 - Clutch
- 3 - Manual gearbox
- 4 - Input shaft (main shaft)
- 5 - Pinion shaft (output shaft)
- 6 - Differential
- I - 1st gear
- II - 2nd gear
- III - 3rd gear
- IV - 4th gear
- V - 5th gear
- R - Reverse gear
- A - Final drive
- T - Speedometer drive (electronic)



3.1 Calculating ratio „i“

Example:

	5th gear	Final drive
Drive gear	$ZG_1 = 34$	$ZA_1 = 18$
Driven gear	$ZG_2 = 53$	$ZA_2 = 60$

$i = Z_2 : Z_1$ (Z_1 = number of teeth on drive gear, Z_2 = number of teeth on driven gear)

i_G = gear ratio = $ZG_2 : ZG_1 = 34 : 53 = 0.642$

i_A = axle ratio = $ZA_2 : ZA_1 = 60 : 18 = 3.333$

i_{tot} = Total ratio = $i_G \times i_A \times i_S = 0.642 \times 3.333 = 2.139$



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4 Safety precautions

Observe the following precautions to avoid possible injury and/or damage to the vehicle:



WARNING

Accidents and injury can be caused if a gear is inadvertently engaged while the engine is running.

- ◆ *Before performing work with the engine running, move the selector lever to position „N“ and apply the parking brake.*

Observe the following precautions to avoid possible injury and/or irreparable damage to electrical and electronic components:

- ◆ Switch off ignition before disconnecting and connecting test equipment.



Caution

When disconnecting the battery there is a risk of serious damage to electronic components:

- ◆ *Observe the correct procedure for disconnecting the battery.*
- ◆ *Always switch off the ignition before disconnecting the battery.*

– Disconnect battery ⇒ Rep. gr. 27 .

Observe the following precautions if test equipment has to be used when road-testing the vehicle.



WARNING

Accidents can be caused if the driver is distracted by test equipment or if test equipment is not secured.

Injuries can also be caused if the passenger's airbag is triggered in a collision.

- *The use of test equipment while driving causes distraction.*
- *There is an increased risk of injury if test equipment is not secured.*
- ◆ *Always secure testing equipment to the rear seat with a strap and have them operated from there by a second person.*

5 Notes on tow-starting and towing



Caution

Risk of irreparable damage to gearbox.

- ◆ *When the vehicle is towed, the selector lever must be set to position „N“ and the vehicle must not be towed for a distance of more than 50 km or at a speed in excess of 50 km/h.*

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Note

It is not possible to start the engine by means of tow-starting, for instance in the case of insufficient battery charge or if the starter is not working.

6 Repair instructions

Proper tools and the maximum possible care and cleanliness are essential for satisfactory repairs. The usual basic safety precautions also naturally apply when carrying out repair work.

To avoid repetition, a number of generally applicable instructions for the various repair procedures are summarised here. They apply to the work described in this Manual.

Fault-finding, vehicle self-diagnosis and measurement

- ◆ Before performing gearbox repairs the cause of the trouble should be identified as accurately as possible ⇒ Rep. gr. 01



Note

Before performing servicing work on the selector mechanism and hydraulic system of the 5-speed manual gearbox 085 DS, the electrical components can be checked using the self-diagnosis routine ⇒ Rep. gr. 01.

Environmental and waste disposal regulations for oil

- ◆ ATF, gear oil and any other type of oil must be handled with care.
- ◆ Dispose of drained oil properly.
- ◆ Always adhere to statutory environmental and waste disposal regulations.
- ◆ Observe the information shown on the packaging of the oil.

Special tools

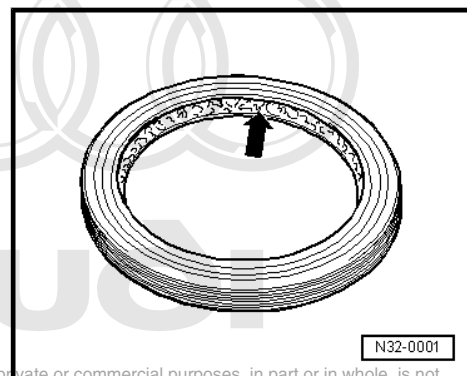
For a complete list of special tools used in this Workshop Manual ⇒ "Special tools, Workshop equipment"

Gearbox

- ◆ Rules for cleanliness when working on manual gearboxes ⇒ [page 12](#).
- ◆ Do not run the engine and do not tow the vehicle with the gearbox housing cover detached or without gear oil.
- ◆ For gearbox replacement, refer to ⇒ [„12 Checking gear oil level and topping up“, page 83](#). Capacities ⇒ [page 3](#), specifications ⇒ Electronic parts catalogue.
- ◆ When installing gearbox, ensure that dowel sleeves are fitted correctly.

O-rings, seals, gaskets and oil seals

- ◆ 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, lightly oil the outer circumference of the seal and fill the space between the sealing lips -arrow- about half full with grease -G 052 128 A1- .
- ◆ The open side of the oil seals faces toward the side with fluid filling.
- ◆ When installing a new oil seal, position the seal in the housing so that the sealing lip does not contact the shaft in the same place as the old seal (make use of installation depth tolerances).
- ◆ Lightly lubricate O-rings before installation to prevent them from being trapped and damaged during assembly.
- ◆ Check oil level in manual gearbox after installing new seals and gaskets ⇒ [page 83](#) .



Sealants

- ◆ Thoroughly clean housing contact surfaces before applying sealing paste.
- ◆ Apply sealing paste -AMV 188 200 03- evenly and not too thick.
- ◆ Breather holes must remain free of sealing paste.

Locking elements

- ◆ Do not over-stretch circlips.
- ◆ Renew circlips which have been damaged or over-tensioned.
- ◆ Circlips must be properly seated in the base of the groove.
- ◆ Renew spring pins. Position: the slit -A- should be in line with the line of force -arrow-.

Nuts, bolts

- ◆ The bolts and nuts securing covers and housings should be loosened and tightened diagonally.
- ◆ Take care to keep sensitive components - e.g. clutch pressure plates - straight. They should only be unfastened and tightened diagonally and in stages.
- ◆ The tightening torques stated apply to non-oiled nuts and bolts.
- ◆ Always renew self-locking bolts and nuts.
- ◆ For all threaded connections, ensure that (where applicable) the contact surfaces and the nuts and bolts are not coated with wax until after assembly is completed.

Bearings

- ◆ Install needle bearings so the lettering (side with thicker metal) faces towards the installing tool.
- ◆ Lubricate all bearings in gearbox housing with gear oil before installing.
- ◆ Heat inner races of taper roller bearings to approx. 100 °C before installing. On assembly press home with no axial clearance.
- ◆ Do not interchange inner or outer races of bearings of the same size.
- ◆ Always renew the tapered roller bearings on one shaft together and use new bearings from a single manufacturer.

Shims

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

Synchro-rings

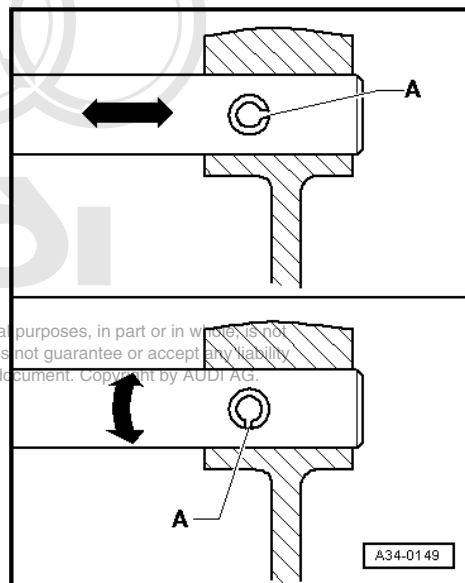
- ◆ Do not interchange. When re-using synchro-rings, always fit to the same gear.
- ◆ Check for wear and renew if necessary.
- ◆ Lubricate with gear oil before installing.

Gear wheels

- ◆ Before pressing on, clean and heat to approx. 100 °C on a hot plate.
- ◆ The temperature can be checked with temperature tester - V.A.G 1558-.

Selector gears

After installing, check that the 1st to 5th speed selector gears have a slight amount of axial clearance and move freely.



Clutch

- ◆ When removing gearbox, remove clutch slave cylinder without disconnecting pipes.
- ◆ Make sure the clutch pressure plate is kept straight; slacken off and tighten in small stages.
- ◆ If the clutch has burnt out, thoroughly clean the bell housing, flywheel and parts of the engine facing the gearbox in order to prevent odours.



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7 Rules for cleanliness when working on 5-speed manual gearbox

- ◆ Thoroughly clean all joints and connections and the surrounding areas before dismantling.
- ◆ Use cleaning fluid -D 009 401 04- to clean the gearbox and its components.
- ◆ Use lint-free cloths for cleaning; Audi recommends the „WY-PALL X70 / WORKHORSE“ cloth from Kimberly-Clark Professional.
- ◆ Seal off open lines and connections immediately with clean plugs or sealing caps from engine bung set -VAS 6122- immediately.
- ◆ Place removed parts on a clean surface and cover them over. Use sheeting or lint-free cloths.
- ◆ Carefully cover or seal open components if repairs cannot be carried out immediately.
- ◆ Only install clean components: do not remove replacement parts from packaging until just before installation.



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8 Contact corrosion!

Contact corrosion can occur if non-approved fasteners are used on the vehicle (bolts, nuts, washers etc.).

For this reason, only fasteners with a special surface coating are fitted.

Rubber or plastic parts and adhesives also consist of non-conductive materials.

If you are not sure whether used parts can be re-installed, always fit new parts ⇒ Electronic parts catalogue .

Please note:

- ◆ We recommend only genuine spare parts: these have been fully tested.
- ◆ We recommend the use of accessories approved by Audi.
- ◆ Damage resulting from contact corrosion is not covered by the warranty.

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9 Pipe/wire routing and attachment

To avoid interchange and to maintain the original installation position, mark hydraulic pipes, vacuum pipes and wires prior to removal. If necessary, make sketches or take photographs.



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30 – Clutch

1 Exploded view - clutch mechanism

1 - Clutch slave cylinder

- ☐ Removing and installing with hose/pipe assembly ➔ [page 16](#)
- ☐ With clutch travel sender -G162-; -G162- can be tested in the Electrical checks and in the measured values ➔ Rep. gr. 01

2 - Electrical connector

- ☐ For clutch travel sender -G162-

3 - Bracket

- ☐ For clutch slave cylinder

4 - Bolt

- ☐ Secures bracket to gearbox
- ☐ 10 Nm

5 - Lock nut

- ☐ For clutch cable
- ☐ 15 Nm

6 - Adjusting nut

- ☐ For clutch cable
- ☐ Adjusting clutch play ➔ [page 18](#)

- ☐ **lock after adjusting**

7 - O-ring

- ☐ Renew
- ☐ Take care not to interchange; for assignment refer to ➔ Electronic parts catalogue
- ☐ Distinguishing feature ➔ [page 16](#)

8 - Assembly plate

- ☐ Exploded view ➔ [page 61](#)

9 - Bracket

- ☐ Holds pipe/hose assemblies in position

10 - Pipe/hose assemblies

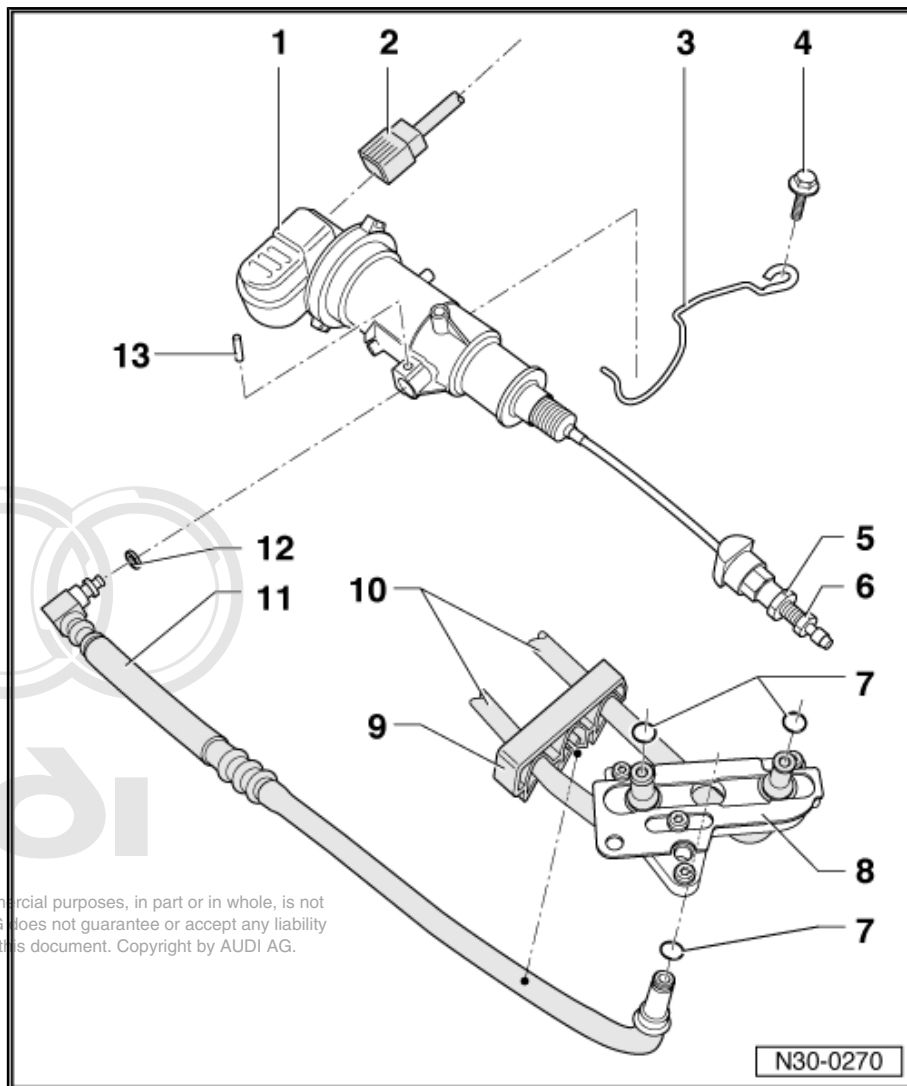
- ☐ Inserting in gear actuator ➔ [page 61](#)

11 - Pipe/hose assembly

- ☐ Colour of connection piece in mounting plate: „gold“
- ☐ Removing and installing with clutch slave cylinder ➔ [page 16](#)

12 - O-ring

- ☐ Renew
- ☐ Take care not to interchange; for assignment refer to ➔ Electronic parts catalogue



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❑ Distinguishing feature ⇒ [page 16](#)

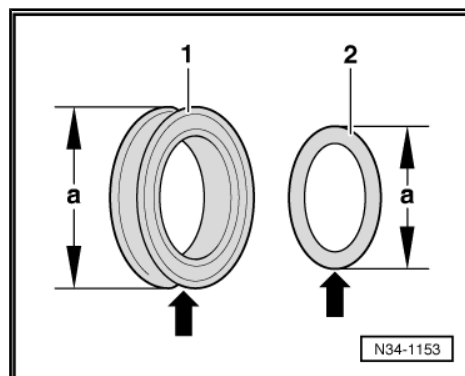
13 - Spring pin

❑ Renew

❑ Drive in and drive out with drift

Distinguishing features of O-rings for hose/pipe assemblies

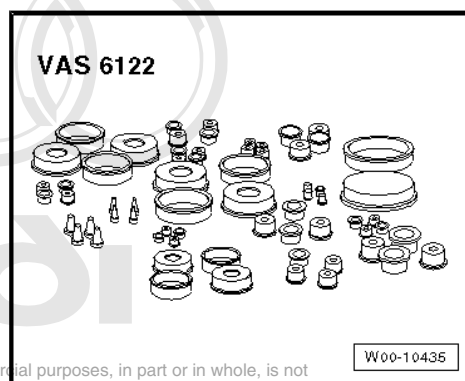
Item	Fitting location	Dimension -a- (mm)	Contour -Arrow-
-1-	Clutch slave cylinder	10	angular
-2-	Hydraulic control unit, gear actuator	8	round



1.1 Removing and installing clutch slave cylinder

Special tools and workshop equipment required

◆ Engine bung set -VAS 6122-



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Removing



Note

The clutch slave cylinder is removed together with the hose/pipe assembly.



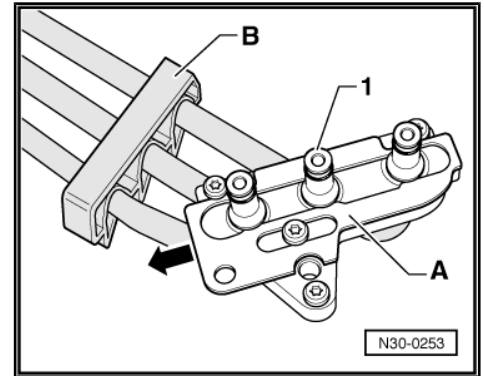
Caution

When disconnecting the battery there is a risk of serious damage to electronic components:

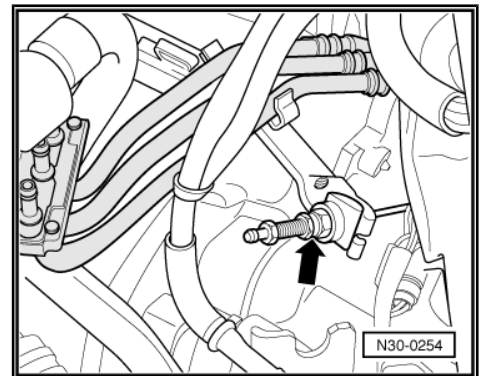
◆ **Observe the correct procedure for disconnecting the battery.**

- Disconnect the earth wire at the battery ⇒ Rep. gr. 27 .
- Remove hydraulic control unit ⇒ [page 56](#) .

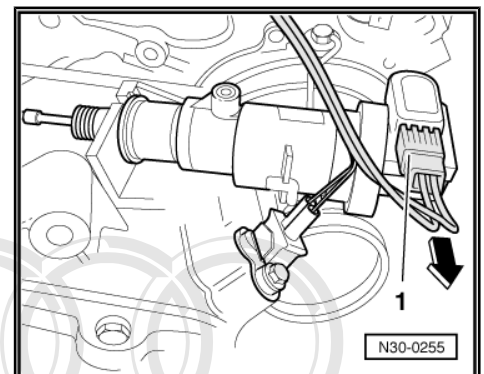
- Press slider -A- in -direction of arrow- on mounting plate.
- Take the hose/pipe assembly -1- out of the mounting plate.
- Press the hose/pipe assembly out of the holder -B-.
- Seal off open lines and connections with clean plugs from engine bung set -VAS 6122- .



- Unfasten the lock nut -arrow- and the adjusting nut at the clutch cable.
- Disengage the clutch cable at the operating lever.



- Release the connector -1- for the clutch travel sender -G162- and unplug -arrow-.



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- Disengage the wire clip at the location marked with an -arrow- and pull the clutch slave cylinder out of the support bracket -A-.



Note

-Item B- can be disregarded.

- Unscrew the hose/pipe assembly from the clutch slave cylinder ⇒ [page 15](#) .

Installing

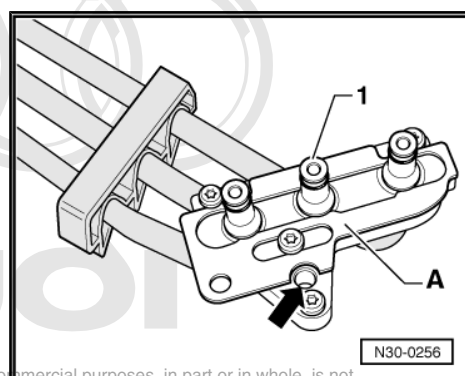
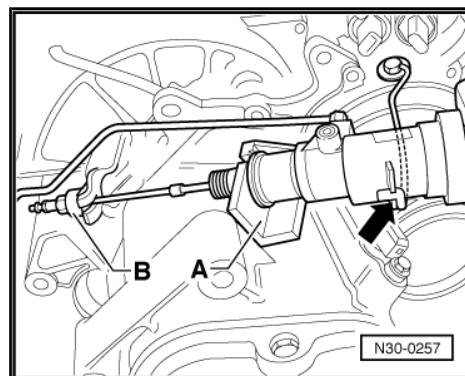
Installation is carried out in reverse sequence; note the following:



Note

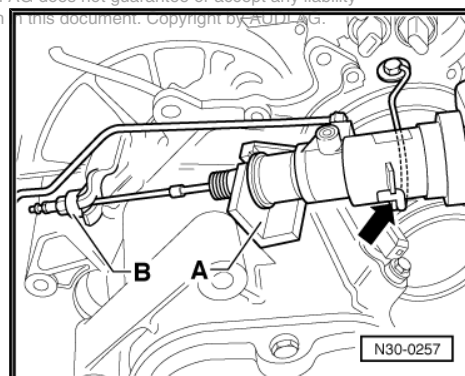
- ♦ Renew O-rings, paying attention to the different O-ring diameters; for assignment refer to ⇒ *Electronic parts catalogue* .
- ♦ The clutch slave cylinder is installed together with the hose/pipe assembly.

- Insert the hose/pipe assembly -1- in the centre hole in the mounting plate.
- To lock the hose/pipe assembly -1-, press the slider -A- into the centre position.
- The recess in the slider must coincide with the hole in the mounting plate -arrow-.



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- Press the clutch slave cylinder into the support bracket -A-.
- Fasten the clutch slave cylinder with the wire clip -arrow-.
- Engage the clutch cable -B- at the release lever (turn the lock nut to the end of the clutch cable if necessary).
- Install hydraulic control unit ⇒ [page 56](#) .
- Check the fluid level in the hydraulic system and top up the fluid ⇒ Maintenance ; Booklet 809 .
- Adjust the clutch play ⇒ [page 18](#) .



1.2 Adjusting clutch play

The clutch play is adjusted by setting the clutch travel sender - G162- to the specified value.

- Perform basic setting in the „vehicle self-diagnosis“ routine ⇒ Rep. gr. 01 .

2 Exploded view - clutch release mechanism



Note

- ◆ Remove the gearbox when working on the release shaft and release bearing ⇒ [page 68](#).
- ◆ Coat all bearing and contact surfaces with high-temperature grease -G 000 603-.

1 - Release shaft

- ☐ Check for ease of movement

2 - Oil seal

- ☐ Lever out with screwdriver
- ☐ Installing ⇒ [page 21](#)

3 - Bearing bush

- ☐ Removing ⇒ [page 20](#)
- ☐ Installing ⇒ [page 21](#)

4 - Clutch housing

- ☐ Servicing ⇒ [page 101](#)

5 - Bearing bush

- ☐ Removing ⇒ [page 21](#)
- ☐ Installing ⇒ [page 21](#)

6 - Retaining clip

- ☐ Prise out before removing release shaft

7 - Release lever

- ☐ Assembling with release shaft ⇒ [page 22](#)

8 - Release bearing

- ☐ Do not wash out bearing; wipe clean only
- ☐ Renew bearing if noisy

9 - Retaining clip

- ☐ Attach to release bearing

10 - Retaining spring

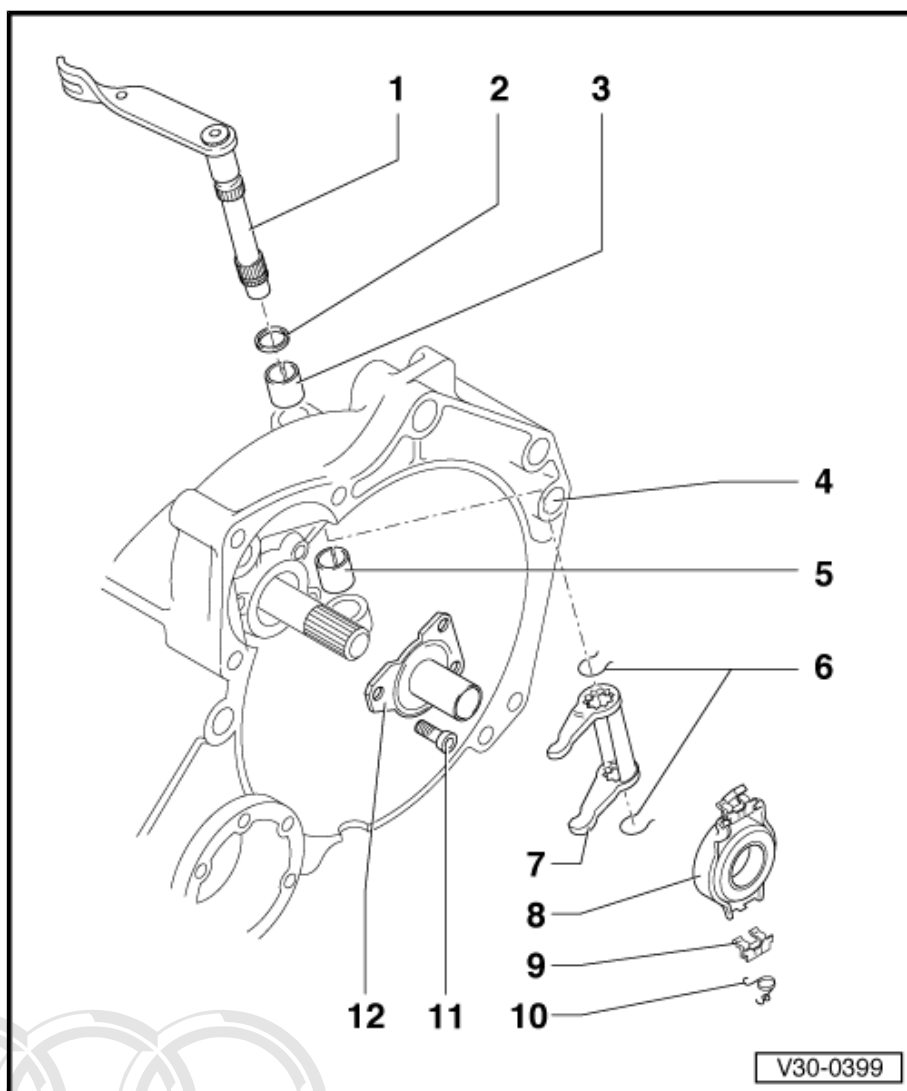
- ☐ Insert in retaining clip and then in release lever

11 - Bolt

- ☐ Self-locking
- ☐ Renew
- ☐ 18 Nm

12 - Guide sleeve

- ☐ Grease release bearing guide

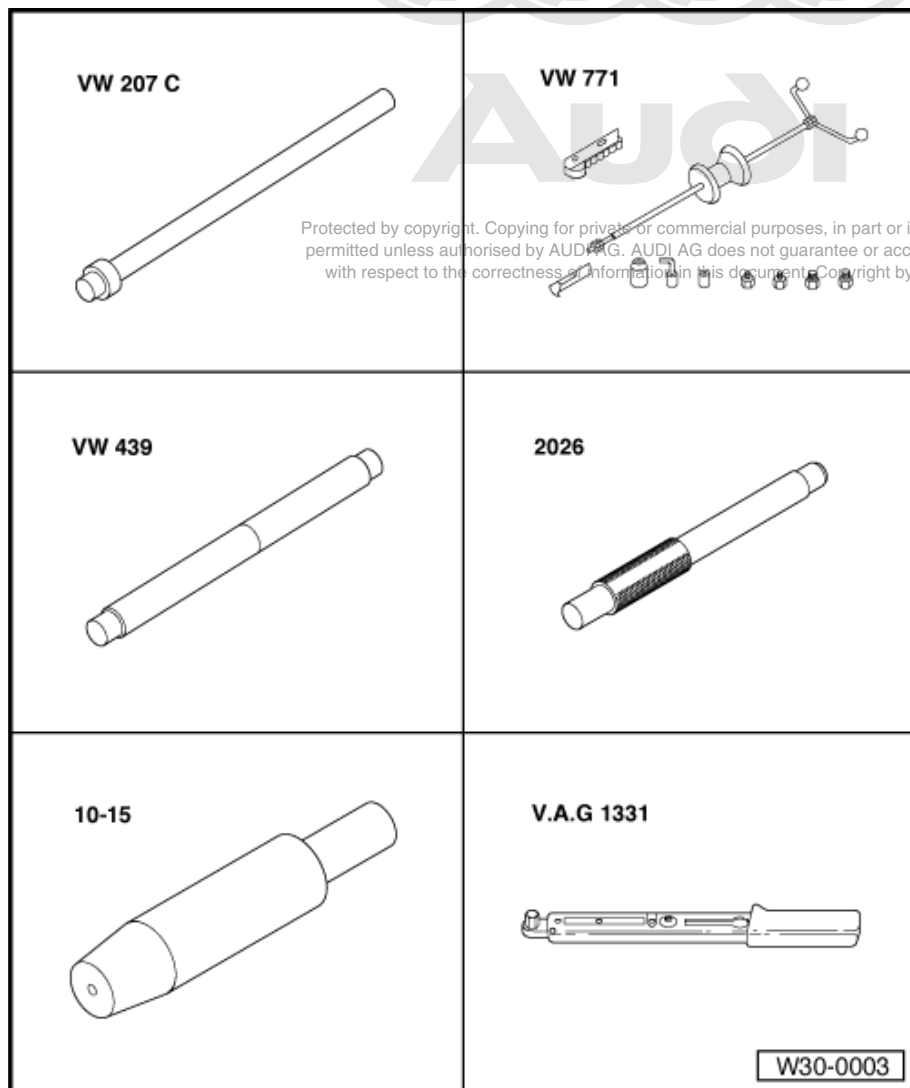


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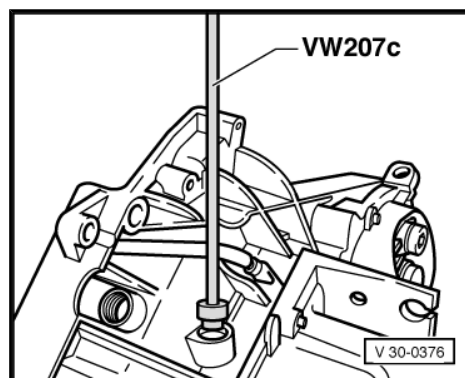
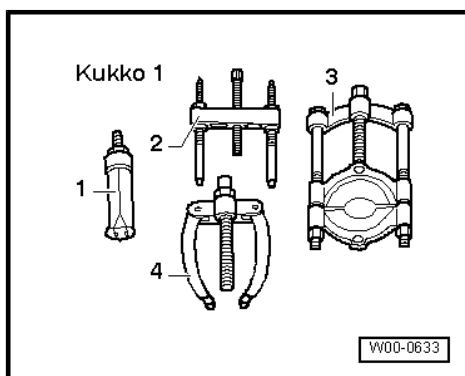
2.1 Servicing clutch release mechanism

Special tools and workshop equipment required

- ◆ Drift -VW 207 C-
- ◆ Multi-purpose tool -VW 771- with -VW 771/15-
- ◆ Guide pin -VW 439-
- ◆ Punch -2026-
- ◆ Guide pin -10 - 15-
- ◆ Torque wrench -V.A.G 1331-



- ◆ -1-internal puller - Kukko 21/2-

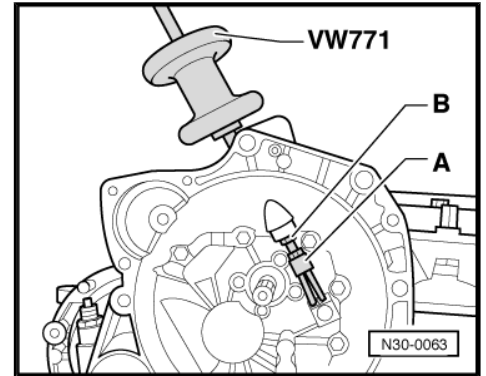


Driving out bearing bush

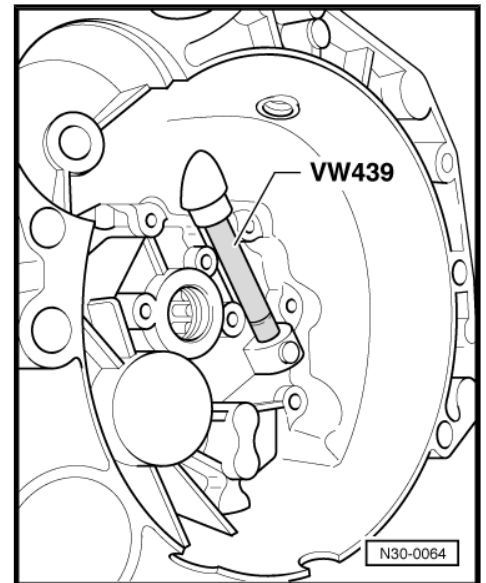
Pulling out bearing bush

A - Internal puller 14 ... 19 mm -Kukko 21/2-

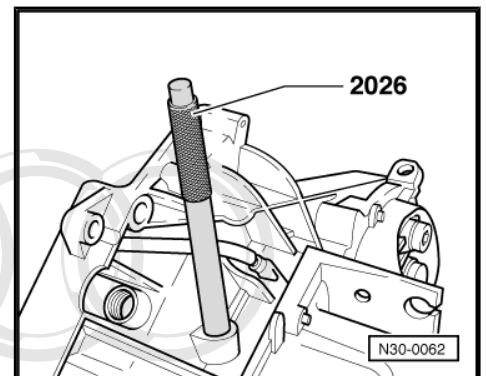
B - -VW 771/15- In conjunction with adapter of counter-support - Kukko 22/1-



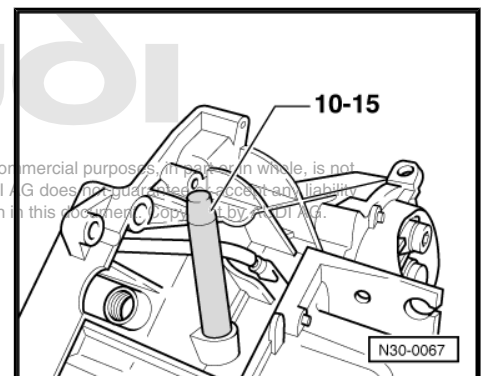
Driving in bearing bush as far as stop



Driving in bearing bush until flush



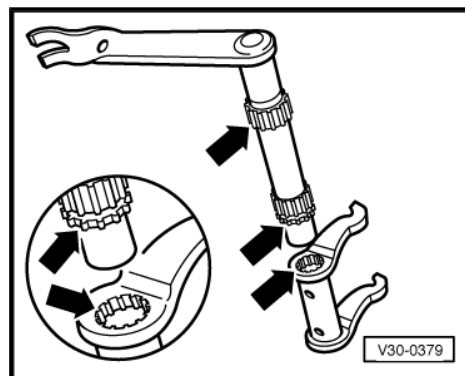
Driving in release shaft seal up to stop



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Assembling release lever with release shaft

- Insert the release lever such that the master spline is aligned with the release shaft -arrows-.



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3 Exploded view - clutch unit



Note

- ◆ *Refer to general repair instructions ⇒ [page 8](#).*
- ◆ *Renew the clutch plate and clutch pressure plate if riveted joints are damaged or loose.*
- ◆ *Select the correct clutch plate and pressure plate according to engine code ⇒ *Electronic parts catalogue*.*
- ◆ *Clean input shaft splines and hub splines on used clutch plates, remove corrosion and apply an extremely thin coat of clutch plate grease -G 000 100- to the splines. Then move the clutch plate back and forth on the input shaft until the hub moves freely on the input shaft. It is important to remove excess grease.*
- ◆ *Clutch pressure plates have an anti-corrosion coating and are greased. Only the contact surface may be cleaned, otherwise the service life of the clutch will be considerably reduced.*
- ◆ *If the clutch has burnt out, thoroughly clean the bell housing, flywheel and parts of the engine facing the gearbox in order to prevent odours.*



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1 - Flywheel

- ☐ Ensure that dowel pins fit tightly
- ☐ Contact surface for clutch lining must be free of scoring, oil and grease
- ☐ Removing and installing
⇒ Rep. gr. 13

2 - Clutch plate

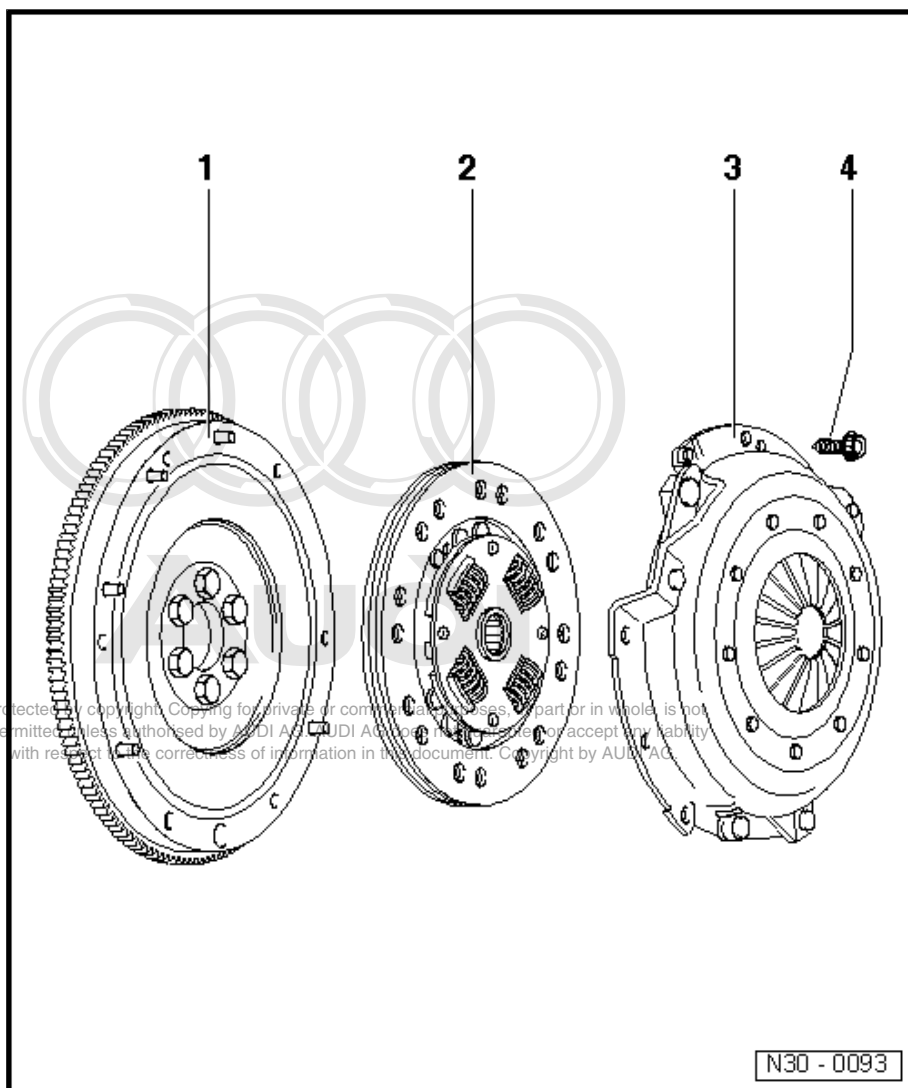
- ☐ Installation position:
Damper assembly (coil springs) or lettering „Getriebeseite“ (gear-box end) faces towards pressure plate or gear-box
- ☐ Centralising
⇒ [page 26](#)
- ☐ Clutch plate diameter
⇒ „1.1 Code letters, allocation, ratios“, [page 1](#)

3 - Clutch pressure plate

- ☐ Removing and installing
⇒ [page 25](#)
- ☐ Checking spring connections and rivets
⇒ [page 24](#)
- ☐ Checking ends of diaphragm spring
⇒ [page 25](#)

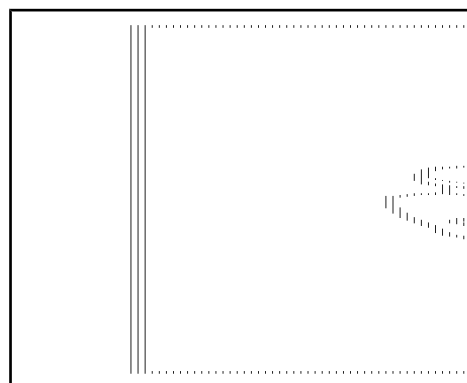
4 - Bolt

- ☐ Slacken off and tighten diagonally and in stages
- ☐ 20 Nm



Checking spring connections and rivets

- Check for cracks in the spring connections between the clutch pressure plate and cover -centre arrow- as well as for firm attachment of the riveted joints -right arrows-.
- The clutch pressure plate must be renewed if a spring connection is severely kinked or broken or if riveted joints are loose.



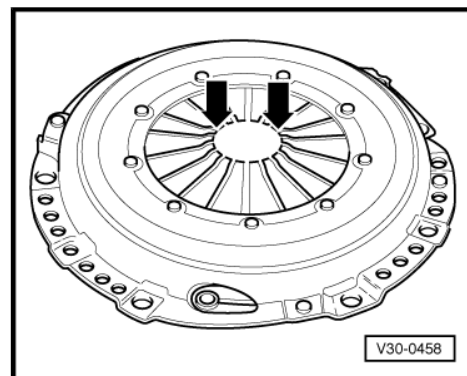
Checking ends of diaphragm spring

- Wear up to half the thickness of the diaphragm spring -arrows- is permissible.



Note

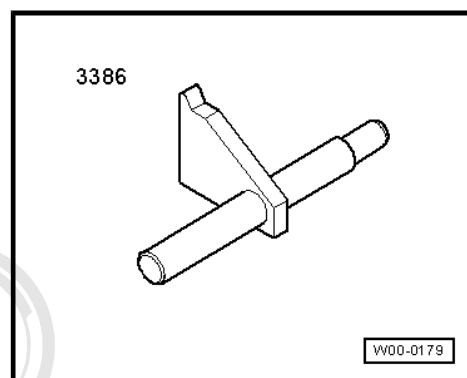
When performing repairs always match up clutch pressure plate and clutch plate by checking engine code ⇒ Electronic parts catalogue .



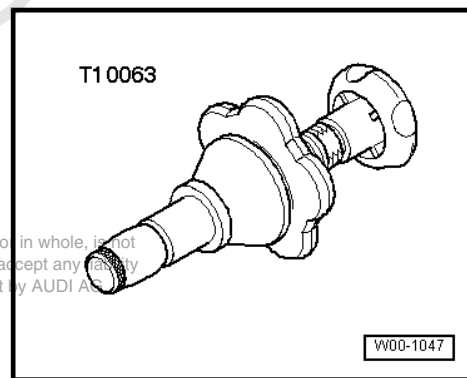
3.1 Removing and installing clutch plate and clutch pressure plate

Special tools and workshop equipment required

- ◆ Counterhold tool -3386-



- ◆ Centring tool -T10063-



- ◆ Grease for clutch plate splines -G 000 100-

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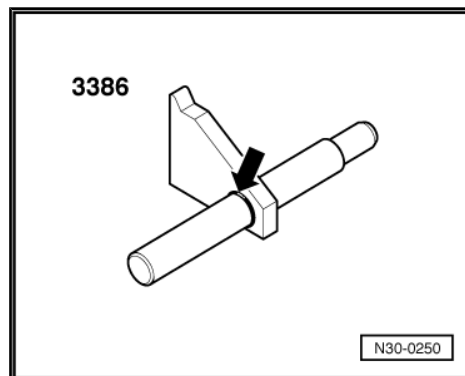

Note

The counterhold -3386- can only be used if it can be moved on the shaft. This involves detaching the circlip -arrow-.

- The shaft can then be moved in the counterhold -3386- .


Note

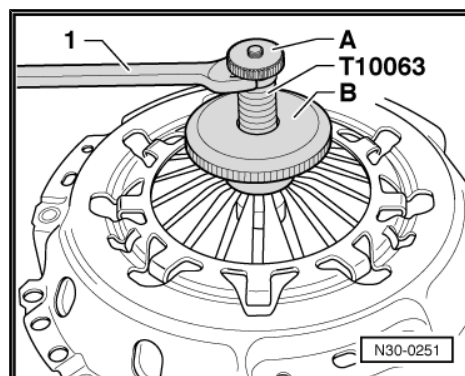
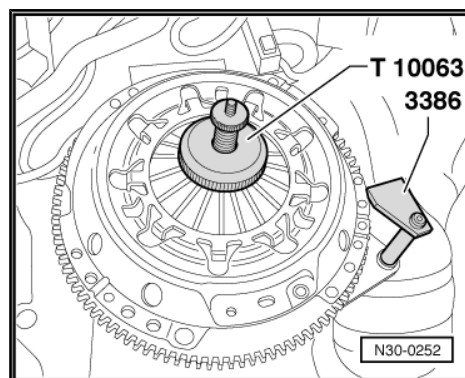
Re-install the circlip after use.


Removing

- Gearbox removed
- Attach counterhold tool -3386- before loosening bolts.
- Consecutively slacken off all bolts in clockwise direction in 90° stages until the clutch pressure plate is released.

Installing

- Tightening torque ⇒ [page 23](#)
- Re-position counterhold tool -3386- to tighten bolts.
- Position the clutch plate with the clutch pressure plate on the flywheel and centre the clutch plate with the centring tool - T10063- . This involves unfastening the nuts on the centring tool.
- Installation position of clutch plate: Damper assembly (coil springs) or lettering „Getriebeseite“ (gearbox end) faces towards clutch pressure plate or gearbox
- Tighten the nut -A- with a 13 mm open-ended wrench -Item 1- until the centring tool -T10063- is clamped together with the clutch plate.
- Then tighten the nut -B- until the clutch pressure plate and clutch plate are clamped together.
- Evenly screw in all bolts by hand until the bolt heads make contact with the clutch pressure plate.
- Consecutively tighten all bolts in clockwise direction in 90° stages until the housing makes contact with the flywheel.
- Consecutively tighten all bolts to final setting in clockwise direction.



34 – Controls, housing

1 Overview - selector mechanism

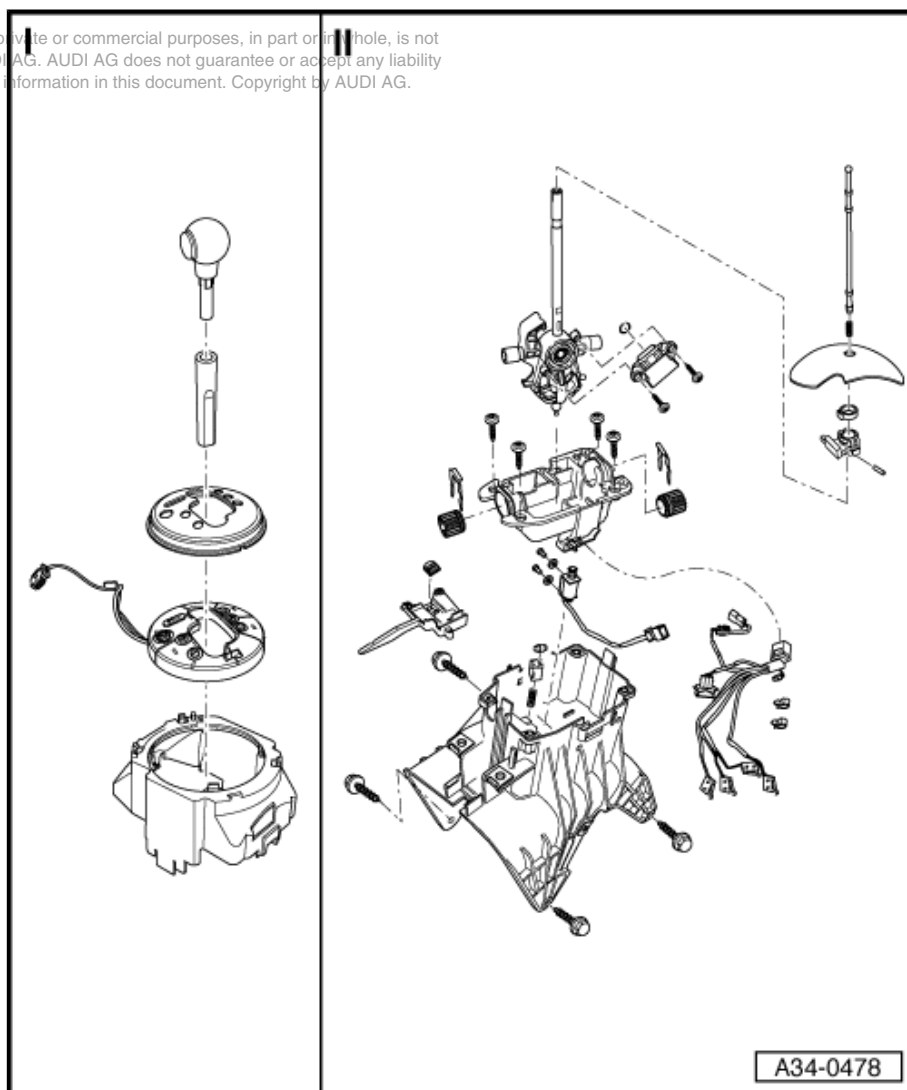


WARNING

Accidents and injury can be caused if a gear is inadvertently engaged while the engine is running.

I - Exploded view of gear knob and cover ⇒ [page 29](#)

II - Exploded view of selector mechanism ⇒ [page 32](#)



1.1 Checking selector mechanism

Overview:

1. Checking operation of selector mechanism ⇒ [page 28](#)
2. Checking ignition key removal lock ⇒ [page 28](#)

1. Checking operation of selector mechanism

- It must not be possible to operate the starter in the selector lever positions „+“ and „-“, „D“ and „R“ or „E“ (in Economy mode) and „R“.
- When travelling at speeds above 5 km/h and shifting into selector lever position „N“, the solenoid for the selector lever lock must not engage and block the selector lever. The selector lever can be shifted into a driving gear.
- When the lever is shifted to position „N“ with the vehicle moving at a speed of less than 5 km/h (virtual standstill), the selector lever lock solenoid should only engage after approx. 1 second. Selector lever cannot be shifted out of „N“ position until brake pedal is depressed.

Selector lever set to „STOP“ and ignition switched on:

- Do not depress brake pedal.
- The selector lever is locked and cannot be shifted out of the „STOP“ position with the lock button on the selector lever knob pressed. Selector lever lock solenoid -N110- blocks selector lever.
- Press and hold brake pedal.
- Selector lever lock solenoid -N110- releases selector lever. It is possible to shift into a driving gear.

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- Selector lever in position „N“ and ignition switched on:**
- Do not depress brake pedal.
 - The selector lever is locked and cannot be shifted out of position „N“. Selector lever lock solenoid -N110- blocks selector lever.
 - Depress brake pedal.
 - Selector lever lock solenoid -N110- releases selector lever. It is possible to shift into a driving gear.

2. Checking ignition key removal lock

- Switch on ignition.
- Press and hold brake pedal.
- With the lock button on the selector lever knob pressed, it must be possible to shift „smoothly“ out of the selector lever „STOP“ position.
- Switch off ignition.
- It must not be possible to remove the ignition key with the selector lever in a position other than „STOP“.
- Set the selector lever to the „STOP“ position.
- Pull out ignition key.
- It should only be possible to remove the ignition key with the selector lever in the „STOP“ position.
- With the lock button pressed and the foot brake applied, the selector lever cannot be shifted out of the „STOP“ position.

If the ignition key removal lock does not function as described, perform „vehicle self-diagnosis“ ⇒ Rep. gr. 01 .

2 Exploded view of gear knob and cover

1 - Gear knob

- ☐ Removing and installing
⇒ [page 29](#)

2 - Sleeve

- ☐ Removing and installing
⇒ „2.1 Removing and installing gear knob and boot“, [page 29](#)

3 - Cover

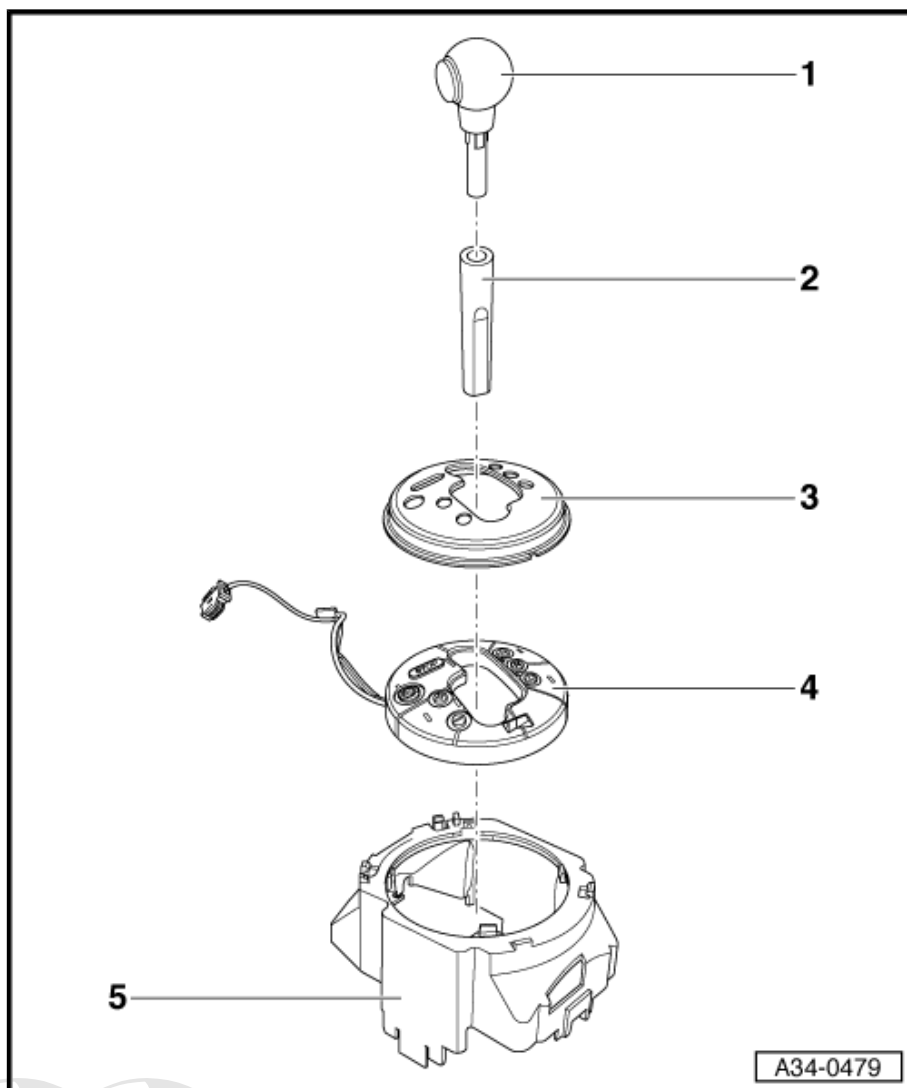
- ☐ Removing and installing
⇒ [page 29](#)

4 - Symbol insert

- ☐ With printed circuit
- ☐ Insert in cover -Item 3-
- ☐ Removing and installing
⇒ [page 30](#)

5 - Mount

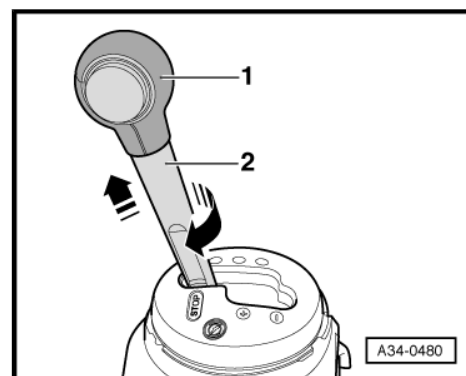
- ☐ Removing and installing
⇒ [page 30](#)



2.1 Removing and installing gear knob and boot

Removing

- Give the sleeve -2- a 90° turn in -direction of arrow- as far as it will go and then lift off the gear knob -1- together with the sleeve.
- The gear knob and sleeve can then be pulled apart.



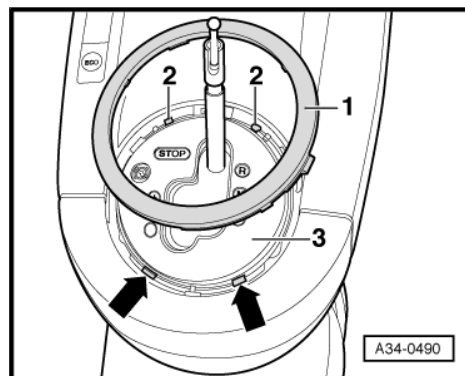
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- Lift the trim ring -1- off the centre console.
- Press the retainer tabs -2- outwards and lift out the cover -3-.

Installing

Installation is carried out in reverse sequence; note the following:

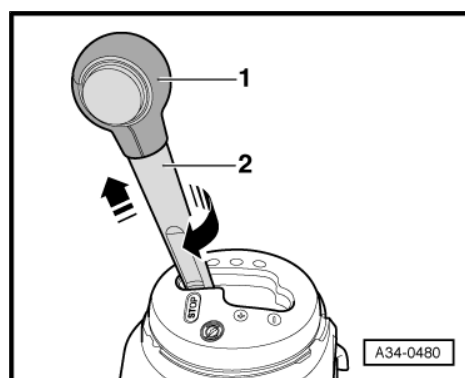
- Insert the cover -3- at the bottom -arrows- and then engage at the top -Item 2-.



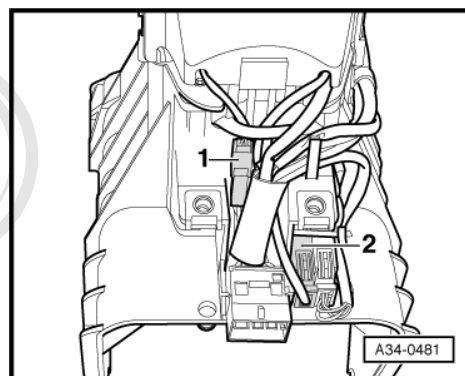
2.2 Removing and installing mount and symbol panel

Removing

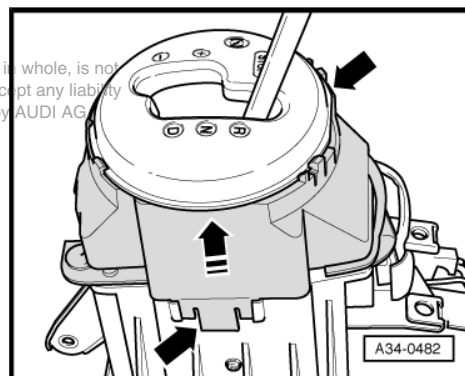
- Remove selector mechanism ⇒ [page 33](#) .
- Give the sleeve -2- a 90° turn in -direction of arrow- as far as it will go and then lift off the gear knob -1- together with the sleeve.



- Unplug connectors -1- and -2- and move wiring clear.



- Release the mount on both sides -arrows- and lift it off.



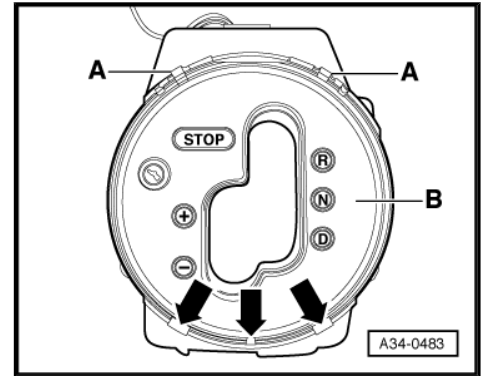
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- Press the retainer tabs -A- outwards and lift out the cover -B- with the symbol panel.

Installing

Installation is carried out in reverse sequence; note the following:

- Insert the cover -B- at the bottom -arrows- and then engage at the top -Item A-.



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3 Exploded view - selector mechanism

1 - O-ring

- ☐ Renew

2 - Potentiometer for selector lever forward and backward - G272-

- ☐ Can be tested in the Electrical checks and in the measured values ⇒ Rep. gr. 01
- ☐ Removing and installing ⇒ [page 36](#)

3 - Bolt

4 - Push rod

- ☐ Removing and installing ⇒ [page 36](#)

5 - Spring

- ☐ Removing and installing ⇒ „3.3 Removing and installing selector lever pushrod“, [page 36](#)

6 - Cover

7 - Clamp

8 - Detent

- ☐ Removing and installing ⇒ [page 36](#)

9 - Pin

10 - Bolt

- ☐ 5 Nm

11 - Securing clip

- ☐ Secures bearing bush -item 12- in position in mounting plate -item 13-

- ☐ Installation position: Angled end points towards selector lever

12 - Bearing bush

13 - Base plate

14 - Wiring harness

- ☐ With selector lever gate detector switch -F257- , selector lever detector switch for N -F258- , selector lever detector switch for stopped -F259- , selector lever detector switch for E -F271-
- ☐ Can be tested in the Electrical checks and in the measured values ⇒ Rep. gr. 01

15 - Cable clip

16 - Bolt

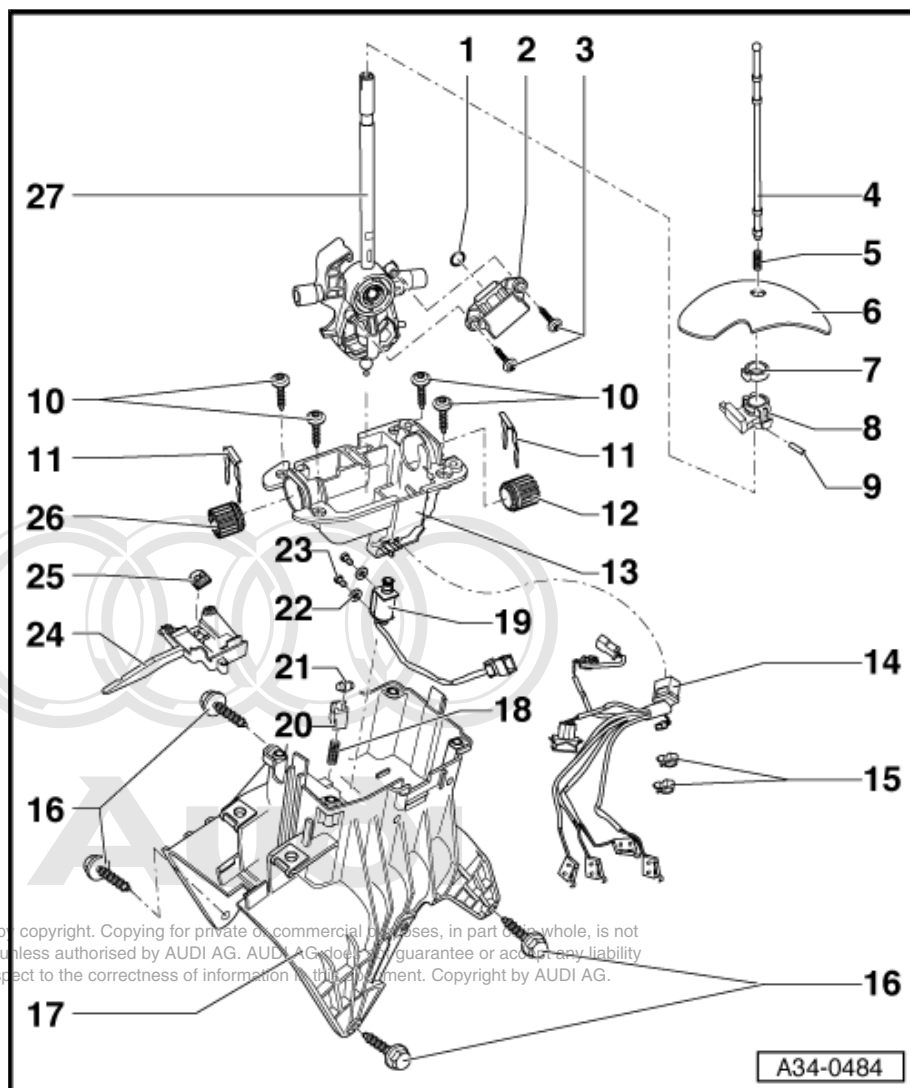
- ☐ 10 Nm

17 - Selector housing

18 - Spring

19 - Selector lever lock solenoid -N110-

- ☐ Can be tested in the Electrical checks and in the measured values ⇒ Rep. gr. 01
- ☐ Removing and installing ⇒ [page 36](#)



20 - Bracket

- ☐ For supporting roller -Item 21-
- ☐ Installation position: Roller mount faces along selector housing

21 - Roller

- ☐ Grease sliding surfaces

22 - Washer

23 - Bolt

24 - Locking lever

- ☐ Inserted in mounting plate and connected to selector lever lock solenoid -N110-

25 - Retaining clip

- ☐ Removing ⇒ [page 37](#)
- ☐ Installing ⇒ [page 38](#)

26 - Bearing bush

27 - Selector lever

- ☐ Removing and installing ⇒ [page 33](#)

3.1 Removing and installing selector mechanism

Removing



Caution

When disconnecting the battery there is a risk of serious damage to electronic components.

- ◆ **Observe the correct procedure for disconnecting the battery.**

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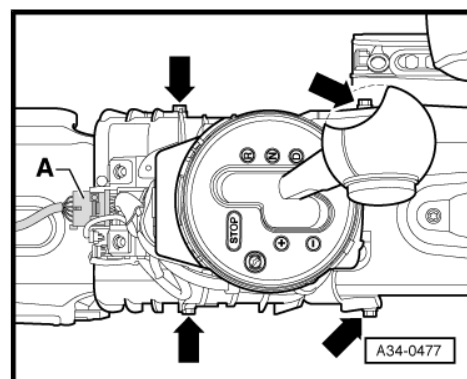
- Disconnect the earth wire at the battery ⇒ Rep. gr. 27 .
- Remove centre console ⇒ Rep. gr. 68 .
- Unplug electrical connector -A-.
- Remove bolts -arrows- and detach selector mechanism.

Installing

- Tightening torque ⇒ [page 32](#)

Installation is carried out in reverse sequence; note the following:

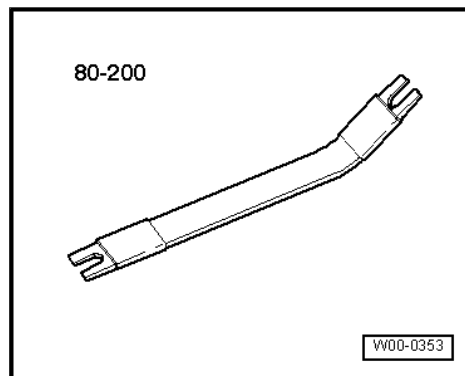
- Install centre console ⇒ Rep. gr. 68 .
- Observe correct procedure after connecting battery ⇒ Rep. gr. 27 .
- Check selector mechanism ⇒ [page 28](#) .
- Check operation of ignition key withdrawal lock ⇒ [page 28](#) .
- Perform basic setting in the „vehicle self-diagnosis“ routine ⇒ Rep. gr. 01 .



3.2 Dismantling and assembling selector mechanism

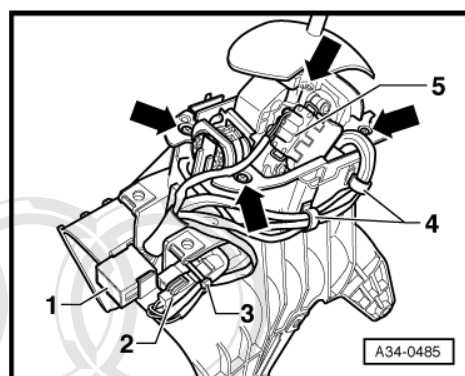
Special tools and workshop equipment required

◆ Removal lever -80 - 200-

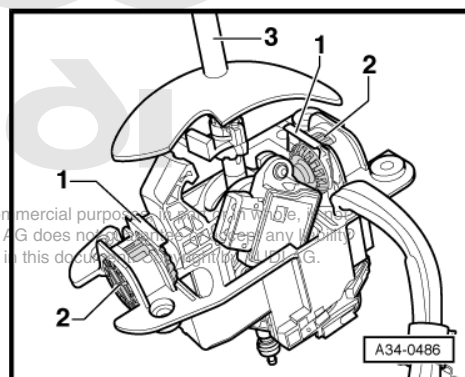


Dismantling

- Remove selector mechanism ⇒ [page 33](#) .
- Remove the mount ⇒ [page 30](#) .
- Unclip the connector -1-.
- Unplug electrical connectors -2- and -5-.
- Sever the cable tie -3- and pull out the cable clips -4-.
- Remove bolts -arrows- and take selector mechanism out of selector housing.



- Use a screwdriver to press off the lock washers -1-.
- Press the two selector lever bearing bushes -2- out of the mounting plate.
- Take out the selector lever -3-.

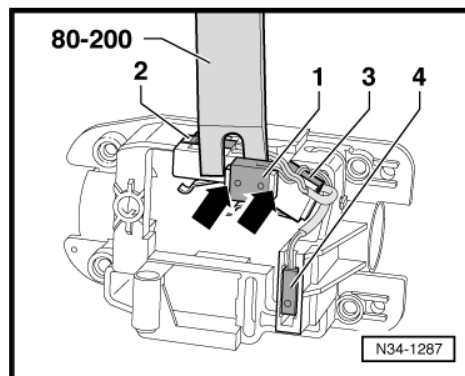


- Carefully and evenly press off the selector lever detector switch for N -F258- -Item 1- with the pressing-off lever -80 - 200- . Whilst doing so, press the retainer tabs -arrows- outwards.



Note

- ◆ *There are 2 pins in the mount which hold the switch in position.*
- ◆ *It is essential to make sure that these pins do not break off.*
- Press the switches -2, 3, 4- out of the mounting plate mounts.
- Take the wiring harness with the switches out of the mounting plate.

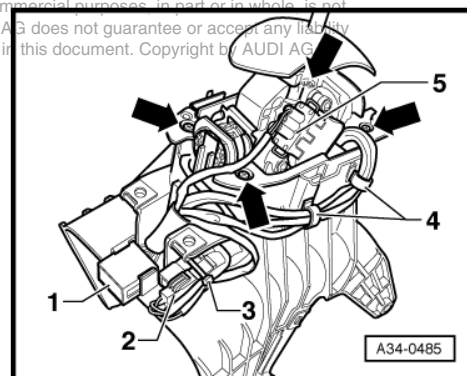
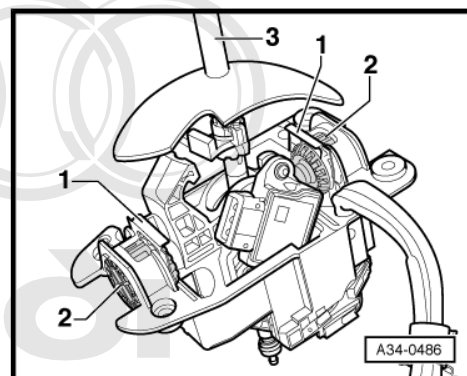
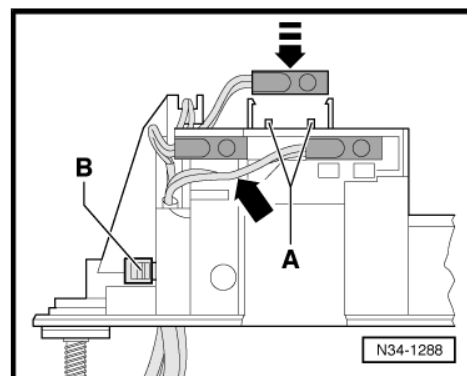
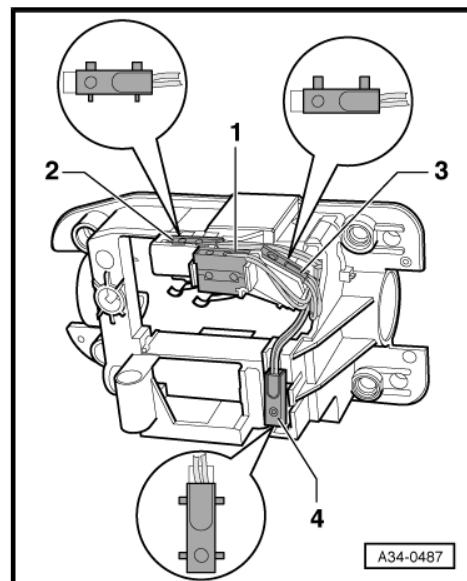


Assembling

- Tightening torque ⇒ [page 32](#)

Installation is carried out in reverse sequence; note the following:

- Fit the wiring harness with the switches:
 - 1 - Selector lever detector switch for N -F258-
 - 2 - Selector lever detector switch for E -F271-
 - 3 - Selector lever detector switch for stopped -F259-
 - 4 - Selector lever gate detector switch -F257-
- Press the selector lever detector switch for N -F258- vertically from above into the mount -top arrow-.
- Make sure the two lugs -A- do not break off whilst doing so.
- Press the wire -arrow- into the mounting plate recess and secure with cable ties -B-.
- Use the current flow diagram to check the wiring and connectors ⇒ Current flow diagrams, Electrical fault finding and Fitting locations.
- Insert the selector lever -3- in the mounting plate.
- Slide selector lever bearing bushes -2- from front/rear into mounting plate.
- Fit lock washers -1- for bearing bushes in mounting plate.
- The offset ends face inwards.
- Insert the selector mechanism in the selector housing and tighten the bolts -arrows-.
- Clip in the connector -1-, plug in the connector -2- and secure with a cable tie -3-.
- Plug in the connector -5-.



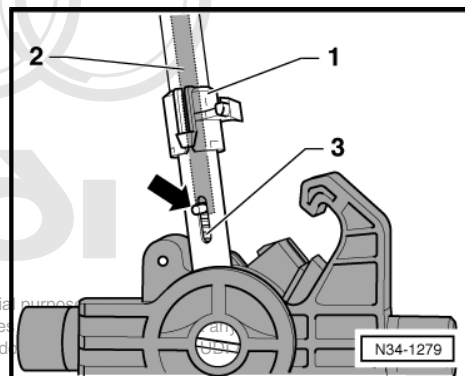
3.3 Removing and installing selector lever pushrod

Removing

- Lift the catch -1- off the pin -arrow-.
- Press the pushrod -2- towards the spring -3- and pull out the pin.

Installing

Perform installation in reverse sequence of removal.



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3.4 Removing and installing potentiometer for selector lever forward and backward -G272-

Removing

- Remove selector lever
⇒ „3.2 Dismantling and assembling selector mechanism“, page 33 .
- Remove the bolts -arrows- and detach the potentiometer for selector lever forward and backward -G272- from the selector lever.

Installing

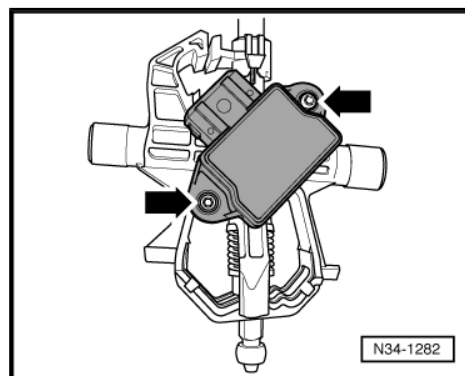
Installation is carried out in reverse sequence; note the following:



Note

Renew O-ring.

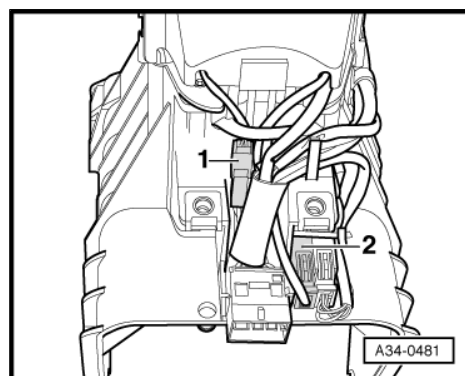
- Install selector lever ⇒ page 33 .



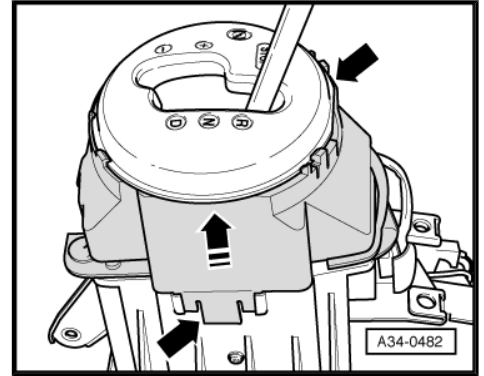
3.5 Removing and installing selector lever lock solenoid -N110-

Removing

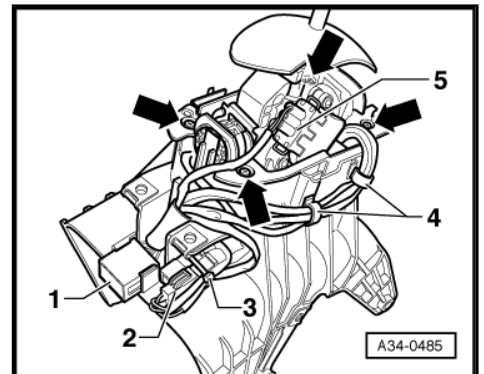
- Remove selector mechanism ⇒ page 33 .
- Unplug connectors -1- and -2- and move wiring clear.



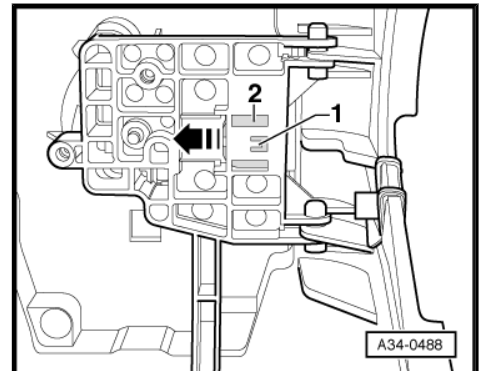
- Release the mount on both sides -arrows- and lift off.



- Unclip the connector -1-.
- Unplug electrical connectors -2- and -5-.
- Sever the cable tie -3- and pull out the cable clips -4-.
- Remove the bolts -arrows- and take the selector mechanism out of the selector housing.



- Lift the retainer tab -1- slightly at the locking lever and in doing so slide the retaining clip -2- in -direction of arrow- as far as it will go.

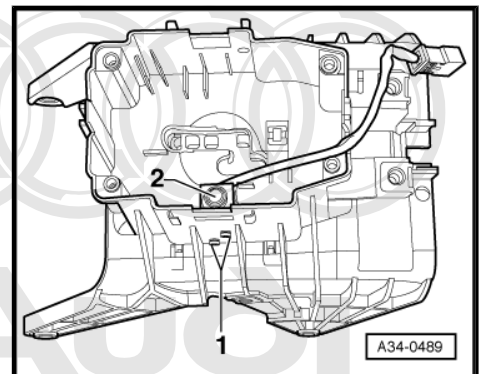


- Remove the bolts -1- and detach the selector lever lock solenoid -N110- -Item 2-.

Installing

Installation is carried out in reverse sequence; note the following:

- Insert the selector lever lock solenoid -N110- and screw on.



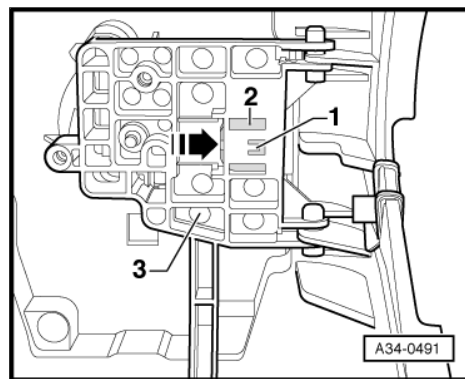
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- Press selector lever lock solenoid -N110- against locking lever -3- and at the same time slide retaining clip -2- in direction of -arrow- until retainer tab -1- engages.

**Note**

Check that the selector lever lock solenoid and locking lever are connected.

- Fit the mount and symbol panel ⇒ [page 30](#) .
- Install selector mechanism ⇒ [page 33](#) .
- Install centre console ⇒ Rep. gr. 68 .
- Observe correct procedure after connecting battery ⇒ Rep. gr. 27 .
- Check selector mechanism ⇒ [page 28](#) .
- Check operation of ignition key withdrawal lock ⇒ [page 28](#) .
- Perform basic setting in the „vehicle self-diagnosis“ routine ⇒ Rep. gr. 01 .



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4 Exploded view of gear actuator

1 - Gear actuator

- ☐ Removing and installing
⇒ [page 42](#)
- ☐ ⇒ „4.3 Renewing gasket
for gear actuator“,
[page 48](#)

2 - Clip

- ☐ Renew

3 - O-ring

- ☐ Renew

4 - Pipe/hose assembly

- ☐ Exploded view
⇒ [page 61](#)

5 - Pipe/hose assembly

- ☐ Exploded view
⇒ [page 61](#)

6 - Electrical connector

- ☐ For selector lever valve 4 -N287- for gate selection
- ☐ Valve can be checked via electrical checks and measured values ⇒ Rep. gr. 01

7 - Electrical connector

- ☐ For selector lever valve 3 -N286- for gate selection
- ☐ Valve can be checked via electrical checks and measured values ⇒ Rep. gr. 01

8 - Electrical connector

- ☐ For selector lever valve 1 -N284- for gear selection
- ☐ Valve can be checked via electrical checks and measured values ⇒ Rep. gr. 01

9 - Electrical connector

- ☐ For selector lever valve 2 -N285- for gear selection
- ☐ Valve can be checked via electrical checks and measured values ⇒ Rep. gr. 01

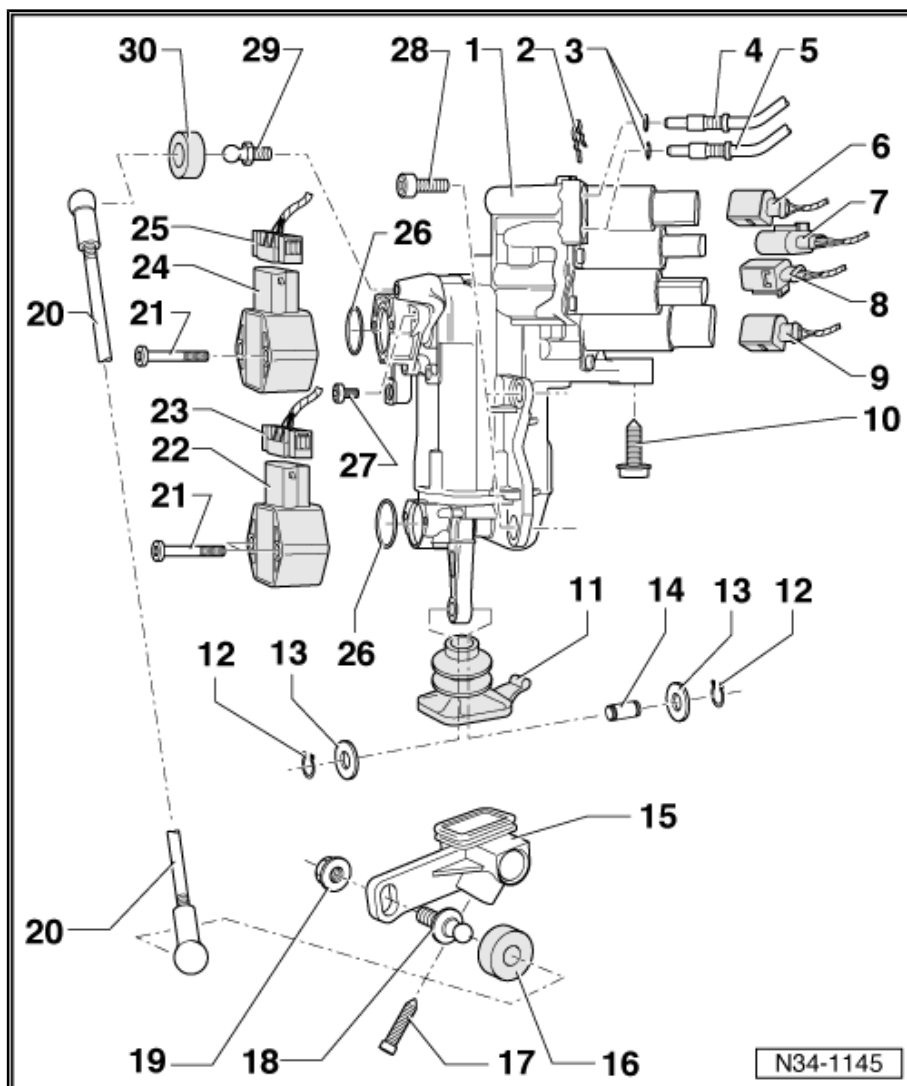
10 - Bolt

- ☐ Secures gear actuator to gearbox
- ☐ Tightening torque and sequence ⇒ [page 41](#)

11 - Bellows

12 - Circlip

- ☐ Renew





13 - Washer

14 - Pivot pin

15 - Selector finger

16 - Sealing washer

17 - Bolt

- ☐ Self-locking
- ☐ Renew
- ☐ Tightening torque and sequence ⇒ [page 41](#)

18 - Ball head

19 - Hexagon nut

- ☐ 20 Nm

20 - Selector rod

21 - Bolt

- ☐ 4x
- ☐ Self-locking
- ☐ Renew
- ☐ 5 Nm

22 - Gear detector potentiometer 1 -G239-

- ☐ Can be checked via electrical checks and measured values ⇒ Rep. gr. 01
- ☐ Installing ⇒ [page 41](#)

23 - Electrical connector

24 - Gear detector potentiometer 2 -G240-

- ☐ Can be checked via electrical checks and measured values ⇒ Rep. gr. 01
- ☐ Installing ⇒ [page 41](#)

25 - Electrical connector

26 - O-ring

- ☐ Renew

27 - Bolt

- ☐ Serves as transport lock
- ☐ Remove before installing gear actuator

28 - Bolt

- ☐ Secures gear actuator to gearbox
- ☐ Tightening torque and sequence ⇒ [page 41](#)

29 - Ball stud

- ☐ Self-locking
- ☐ Renew
- ☐ 4 Nm

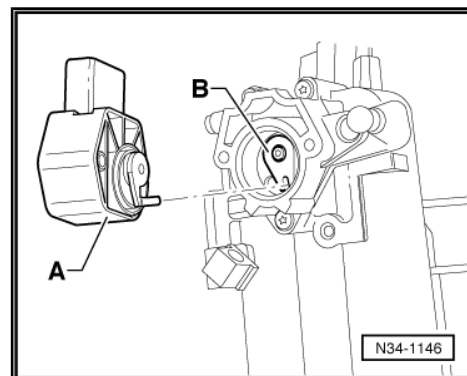
30 - Sealing washer



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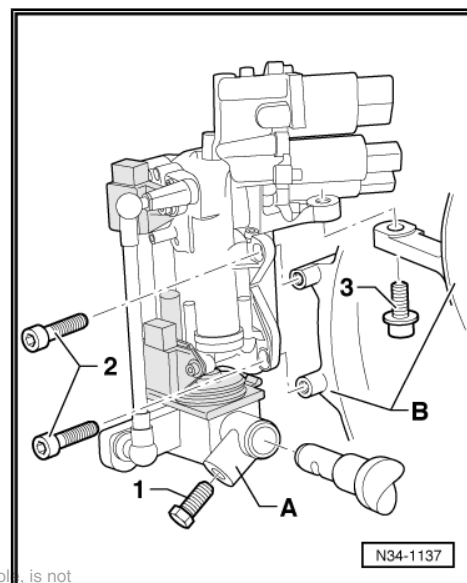
Installing gear detector potentiometer -G239- / -G240-

- Insert the gear detector potentiometer -A- in the gear actuator.
- The lug must engage in the lever -B-.



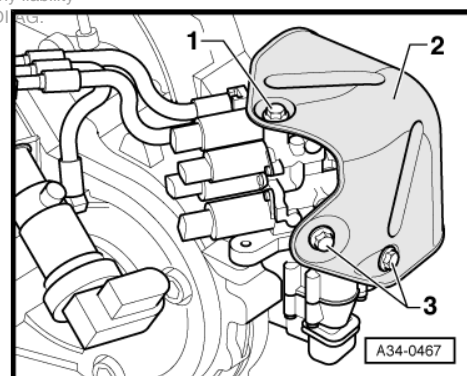
Gear actuator tightening torque and sequence

- Gearbox in neutral.
- Tighten the gear actuator bolts in 4 stages as follows:
 1. Screw in the bolts -2- and -3- by hand until they make contact.
 2. Tighten bolts -2- to 25 Nm.
 3. Tighten bolt -3- to 20 Nm.
 4. Tighten bolt -1- to 17 Nm.



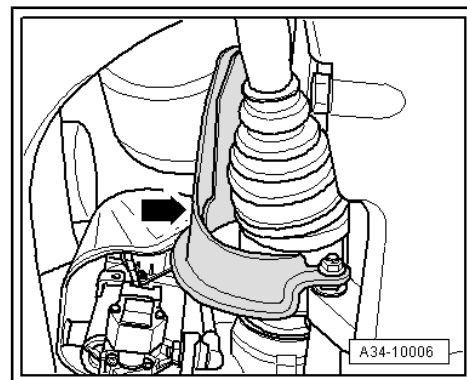
Tightening torque for gear actuator heat shield

- Tighten the bolts -1- and -3- for the gear actuator heat shield -2- to 8 Nm.



Heat shield for drive shaft (right-side) - tightening torque

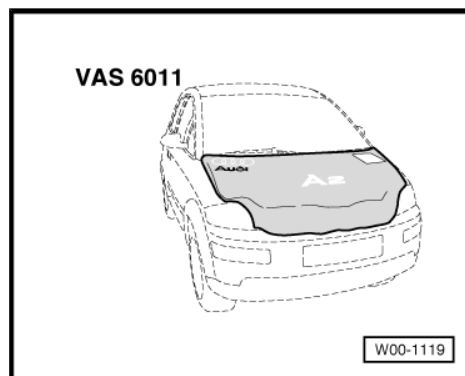
- Tighten the bolts for the drive shaft heat shield -arrow- to 23 Nm.



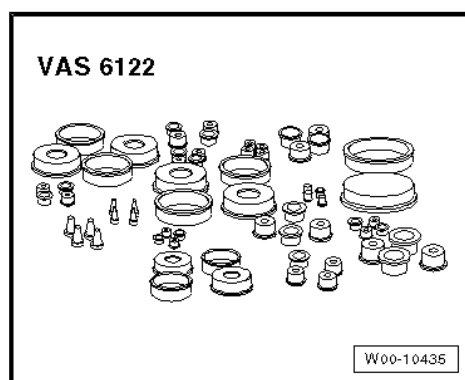
4.1 Removing and installing gear actuator

Special tools and workshop equipment required

- ◆ Protective cover for bonnet Audi A2 -VAS 6011-



- ◆ Engine bung set -VAS 6122-



Removing



Caution

There is a risk of contamination from escaping hydraulic fluid.

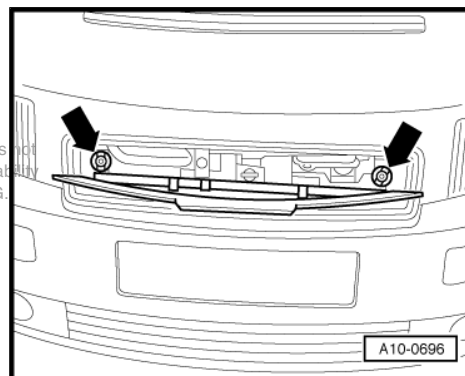
- ◆ *The battery must be disconnected as the hydraulic pump starts up even with the ignition switched off.*

When disconnecting the battery there is a risk of serious damage to electronic components:

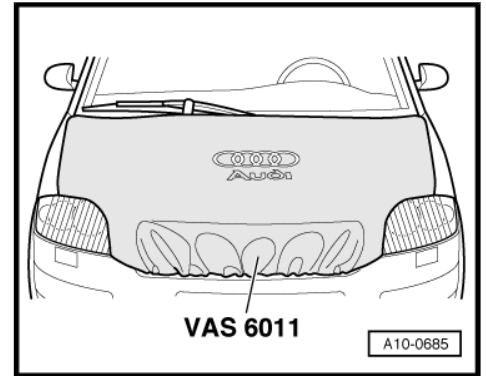
- ◆ *Observe the correct procedure for disconnecting the battery.*

- Disconnect the earth wire at the battery ⇒ Rep. gr. 27 .
- Wash outside of bonnet and dry with a chamois leather.
- Release service flap from inside.
- Release bonnet -arrows- and pull it forwards slightly.

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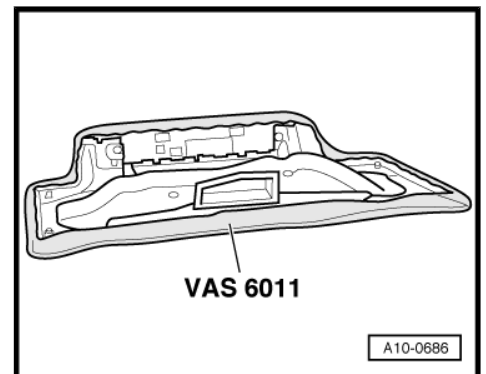
- Fit the protective cover -VAS 6011- over the bonnet.



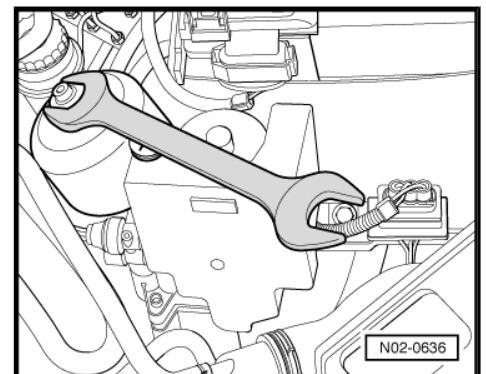
 Note

Do not store the bonnet in an upright position.

- Detach the bonnet and set it down on the protective cover -VAS 6011- .

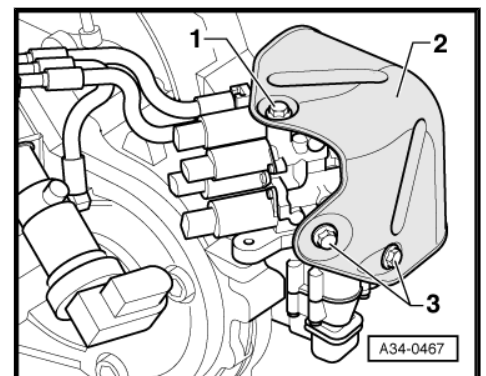


- Unfasten the pressure accumulator by roughly $\frac{1}{2}$ a turn.
- The hydraulic fluid level in the reservoir increases.

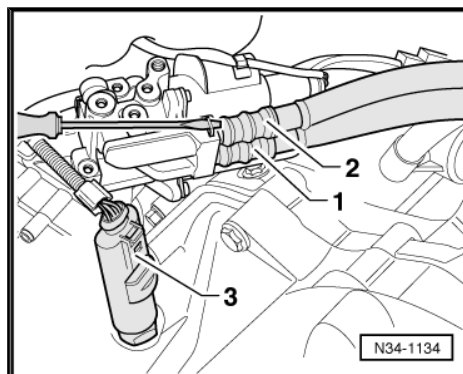


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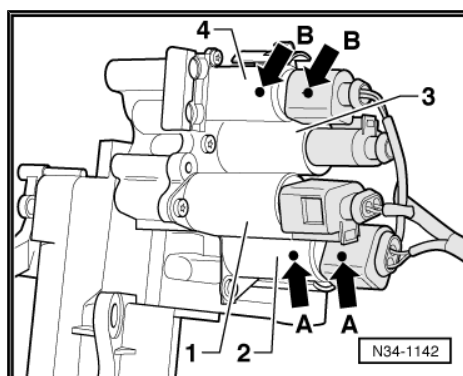
- Remove the bolt -1- at the top of the gear actuator heat shield -2-.



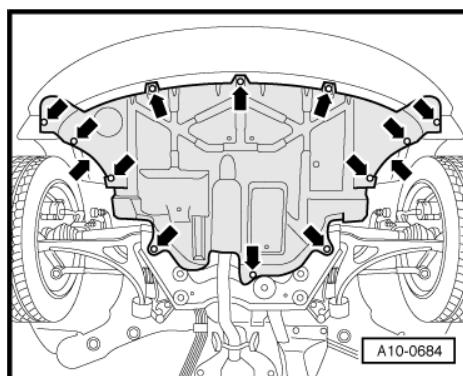
- Use a screwdriver to prise the hose/pipe assembly clip out of the gear actuator.
- Pull the hose/pipe assembly -1- and -2- out of the gear actuator.
- Seal off open lines and connections with clean plugs from engine bung set -VAS 6122- .
- Unplug the connector -3- at the vehicle speed sender -G68- .



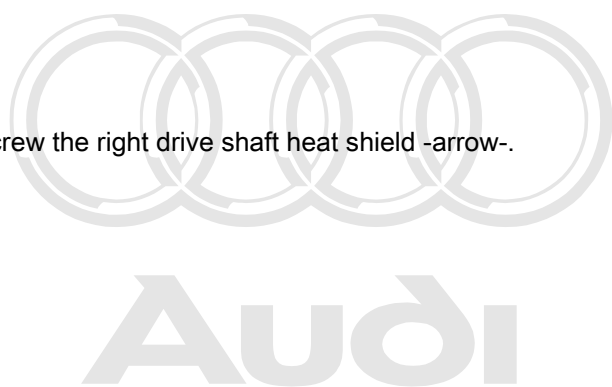
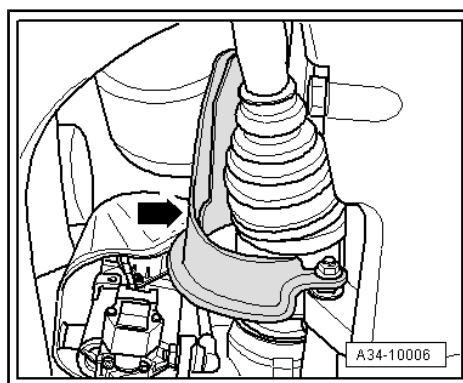
- For re-installation, mark -arrows A, B- the connectors for the valves -2- and -4-.
- Unplug electrical connectors at valves -1 ... 4-.



- Remove the noise insulation -arrows-.

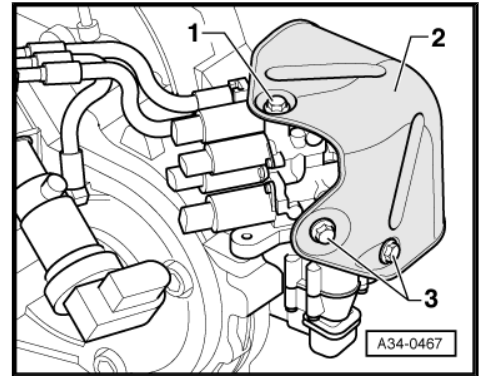


- Unscrew the right drive shaft heat shield -arrow-.

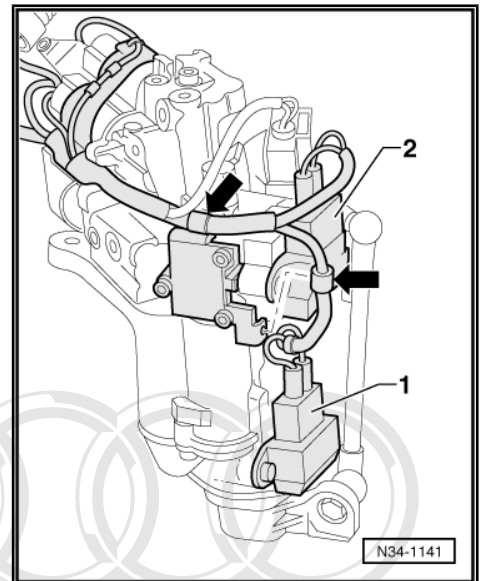


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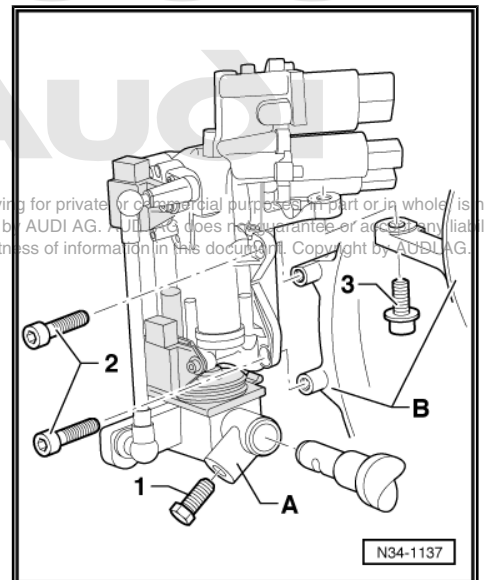
- Remove the bolts -3- and detach the gear actuator heat shield -2-.



- Unplug the connectors -1- and -2- at the gear detector potentiometers -G239- / -G240- .
- Disengage -arrows- wiring harness from fasteners at gear actuator and move clear.



- Slacken off the bolt -1- and detach the selector finger -A-.
- Remove bolts -2- and -3-.
- Detach the gear actuator from the gearbox -B- and carefully take out downwards.



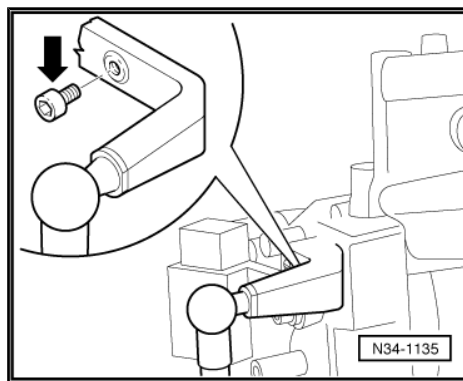
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Installing

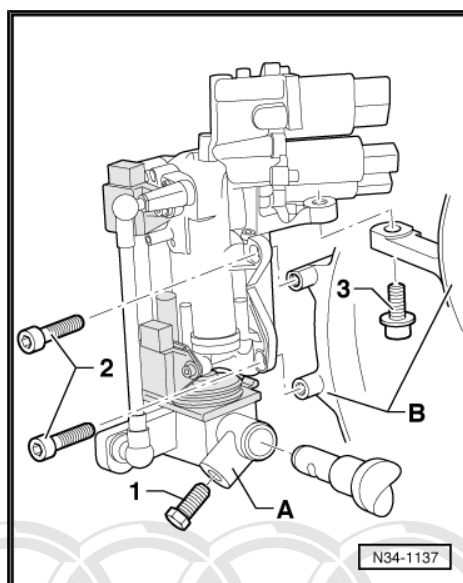
- Tightening torque ⇒ [page 41](#) , ⇒ [page 41](#) .

Installation is carried out in reverse sequence; note the following:

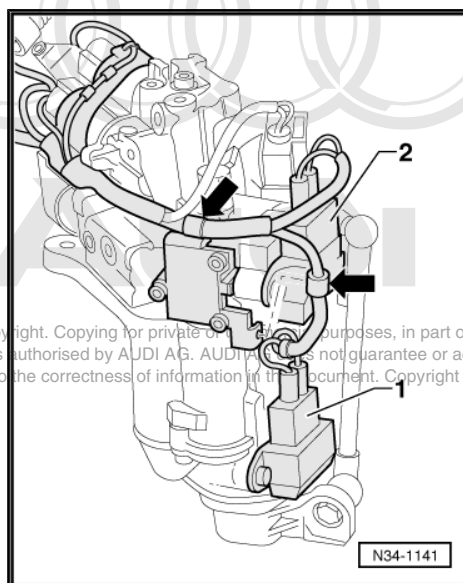
- Remove the transportation safeguard bolt -arrow-.



- Use a tap to remove remnants of locking compound from the tapped hole in the selector finger -A-.
- The gearbox must be in neutral.
- Tighten the gear actuator bolts ⇒ [page 41](#) .

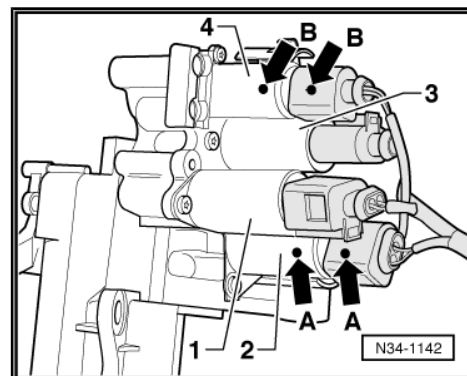


- Attach the wiring harness to the gear actuator -arrows-.
- Plug in the connectors -1- and -2- at the gear detector potentiometers -G239- / -G240- , paying attention to the different wire lengths.
- ◆ Long wire for gear detector potentiometer 1 -G239- .
- ◆ Short wire for gear detector potentiometer 2 -G240- .
- Use the current flow diagram to check wiring and connectors ⇒ Current flow diagrams, Electrical fault finding and Fitting locations.
- Install noise insulation ⇒ Rep. gr. 50 .



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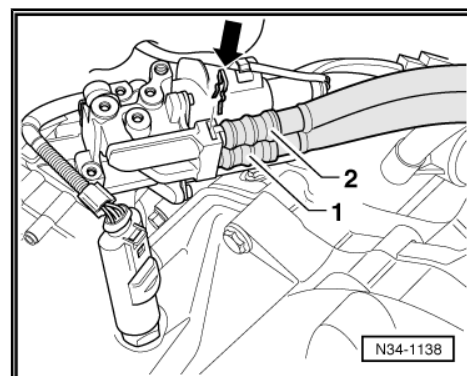
- Fit the connectors in line with the marks -arrows A, B- made on removal.
- 1 - Connector for selector lever valve 1 -N284-
- 2 - Connector for selector lever valve 2 -N285-
- 3 - Connector for selector lever valve 3 -N286-
- 4 - Connector for selector lever valve 4 -N287-
- Use the current flow diagram to check wiring and connectors
⇒ Current flow diagrams, Electrical fault finding and Fitting locations.



Caution

There is a risk of damage to the gear actuator.

- ◆ *Make sure the hose/pipe assemblies are fitted in accordance with the coloured marks ⇒ [page 62](#) .*
- ◆ *If the hose/pipe assemblies have been incorrectly inserted, there is a risk of irreparable damage to the gear actuator on connecting the battery.*

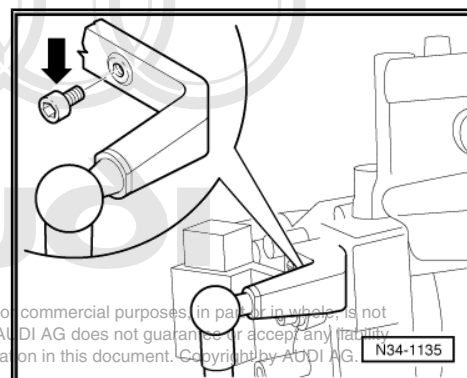


- Plug in the connector at the vehicle speed sender -G68- .
- Secure the pressure accumulator ⇒ [page 55](#) .
- Observe correct procedure after connecting battery ⇒ Rep. gr. 27 .
- Switch on ignition (hydraulic fluid level in reservoir falls).
- Perform a visual check for leaks in the hydraulic system.
- Check the fluid level in the reservoir for the clutch mechanism and selector mechanism and replenish the fluid ⇒ Maintenance ; Booklet 809 .
- Adjust the gear actuator ⇒ [page 47](#) .

4.2 Adjusting gear actuator

Procedure

- Gear actuator fitted
- Hose/pipe assemblies connected and all connectors plugged in
- Transportation safeguard bolt -arrow- removed from lever in top part of gear actuator

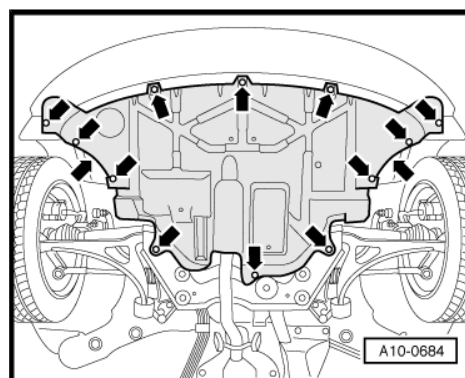
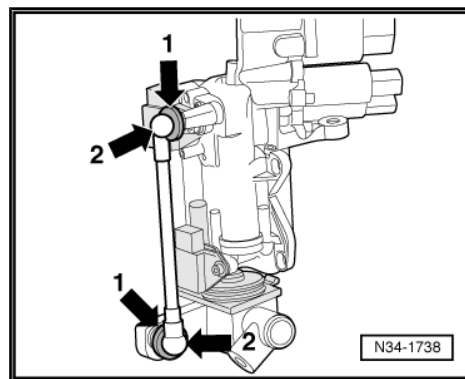


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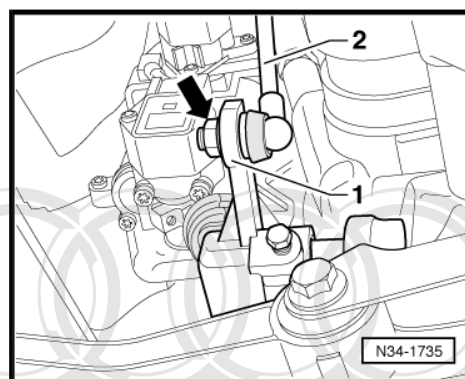
- Sealing washers -arrows 1- intact
- No play at ball heads -arrows 2- of selector rod


Note

- ◆ *The gearbox selector finger is not to be moved when checking the play.*
- ◆ *If play is found, renew selector rod with ball heads and sealing washers.*
- ◆ *Play at the selector rod may lead to termination of basic setting in the „vehicle self-diagnosis“ routine.*
- ◆ *Play at the selector rod could damage the gearbox.*
- Check the fluid level in the reservoir for the clutch mechanism and selector mechanism and replenish the fluid ⇒ Maintenance ; Booklet 809 .
- Remove the noise insulation -arrows-.



- Gearbox in neutral.
- Unfasten the nut -arrow- by roughly 2 turns until the ball head in the selector finger -1- moves freely.
- Switch on the ignition and shift the selector lever to position „N“.
- The ball head in the selector finger is then moved into position by the gear actuator.
- Tighten the nut -arrow- in this position, taking care not to alter the position of the selector rod -2- and the ball end.
- Check the fluid level in the hydraulic system again and top up the fluid ⇒ Maintenance ; Booklet 809 .
- Perform basic setting in the „vehicle self-diagnosis“ routine ⇒ Rep. gr. 01 .



4.3 Renewing gasket for gear actuator

Special tools and workshop equipment required

- ◆ Gearbox support -VW 353-
- ◆ Support plate -VW 309-
- ◆ Engine and gearbox support -VAS 6095- or support clamp -VW 313-
- ◆ Torque wrench -V.A.G 1410-
- ◆ Engine bung set -VAS 6122-

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- ◆ Strong rubber band
- ◆ Bolt M8 x 30
- ◆ Nut M5

Procedure

Observe rules for cleanliness:

- ◆ Only use lint-free cloths for cleaning, e.g. a „WYPALL X70 / WORKHORSE“ cloth from Kimberly-Clark Professional.
- ◆ Place removed parts on a clean surface and cover them over. Use sheeting or lint-free cloths.
- ◆ Carefully cover or seal dismantled components if repairs cannot be completed immediately.
- ◆ Only install clean components: do not remove replacement parts from packaging until just before installation.
- Remove gear actuator ⇒ [page 42](#) .
- Attach support plate -VW 309- to gearbox support -VW 353- and insert in engine and gearbox support -VAS 6095- .



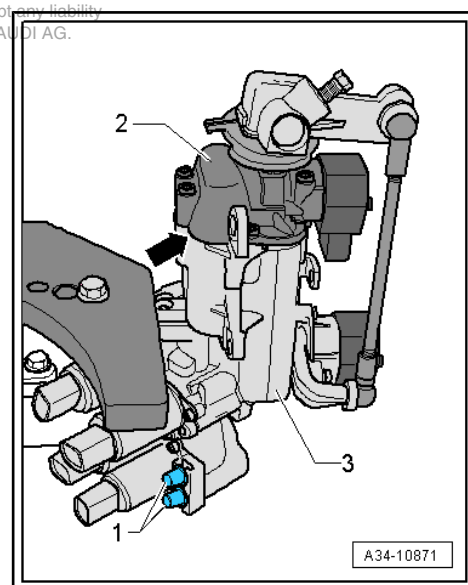
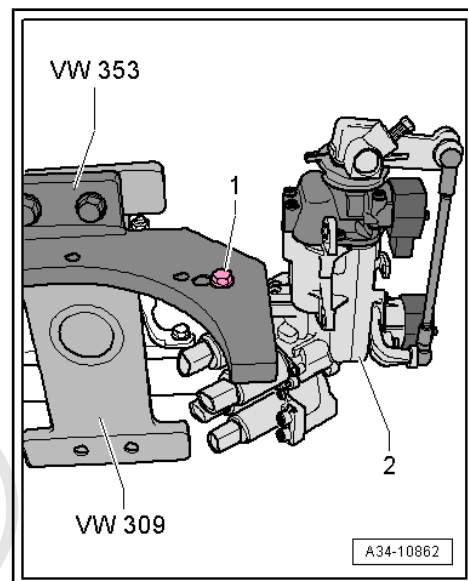
Caution

Risk of damage to selector lever valve 2 -N285-

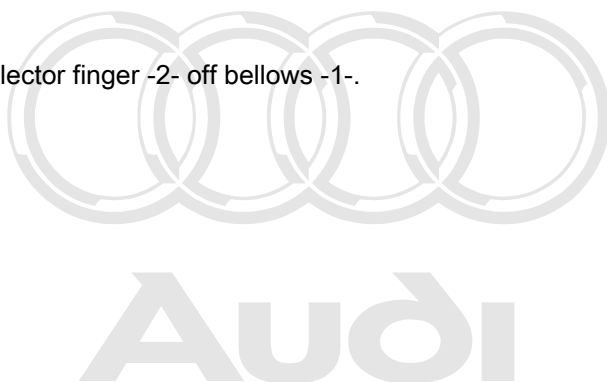
The selector lever valve 2 -N285- will be damaged if a bolt -1- longer than M8 x 30 is used.

- Secure gear actuator -2- to gearbox support -VW 353- with bolt -1- (M8 x 30) and tighten to 20 Nm.
- Seal off open connections -1- with clean plugs from engine bung set -VAS 6122- .
- Place drip tray in position.
- Clean gear actuator.
- Clean cover for gear actuator -2-, housing -3- and connection point -arrow- with brake cleaner.
- Blow off and dry gear actuator with compressed air.

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- Pull selector finger -2- off bellows -1-.



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Note

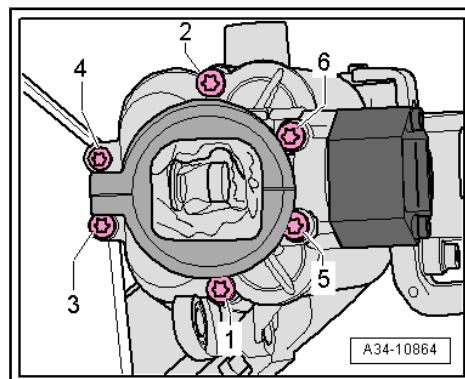
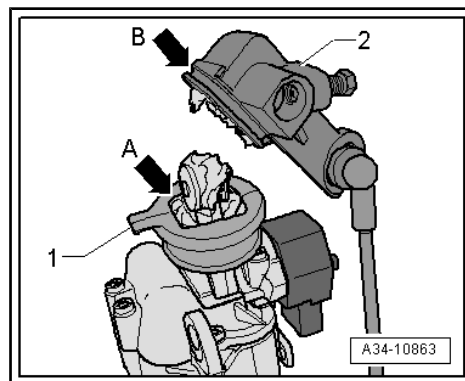
Do not remove bolts -5 and 6- at this stage.

- Remove bolts -1 to 4-.



Note

- ◆ *Renew bolts.*
- ◆ *The bolts are of different lengths; take care to install in correct positions.*

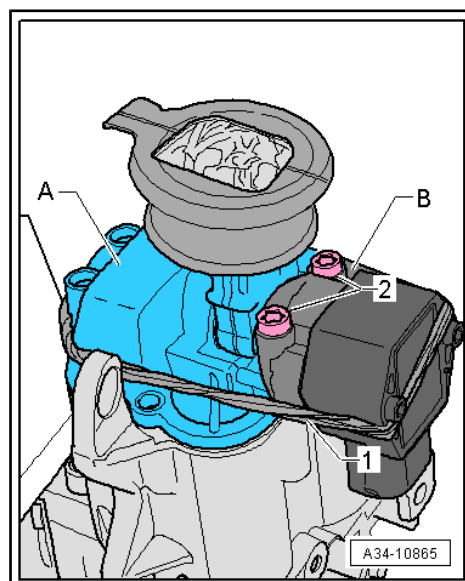


Caution

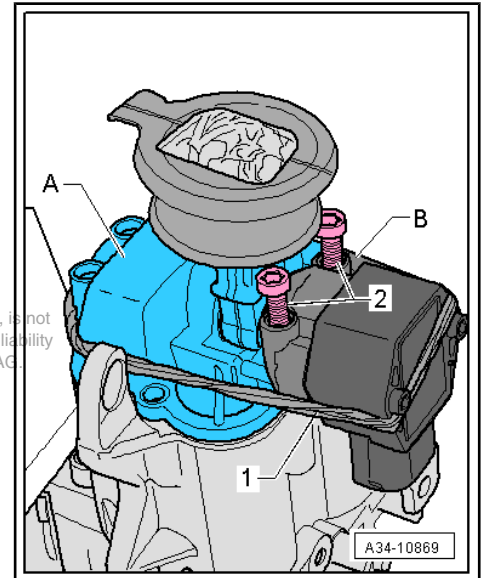
Risk of damage to gear actuator

- ◆ *The cover for the gear actuator must be secured as shown before removing the bolts -2-.*
- ◆ *The bolts -2- hold the cover for the gear actuator -A- and the potentiometer carrier -B- together.*
- ◆ *If the cover for the gear actuator -A- is separated from the potentiometer carrier -B- it is no longer possible to reproduce the basic setting of the gear actuator, and the complete gear actuator must be renewed.*
- ◆ *It is important to perform the following steps exactly as described.*

- Use a strong rubber band -1- to secure cover for gear actuator -A- firmly to potentiometer carrier -B-.



- Unscrew bolts -2- but leave them inserted in bolt holes.

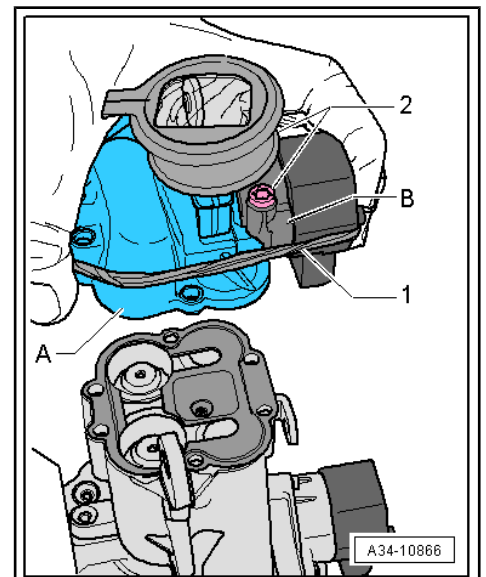


- Press cover for gear actuator -A- and potentiometer carrier -B- together by hand and detach.



Note

Do not remove the rubber band -1- and the two bolts -2-.

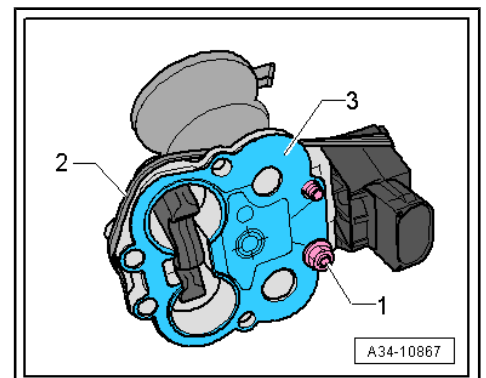


- Secure one of the two bolts with an M5 nut -1- to prevent it from falling out.



Note

- ◆ *Do not screw on nut -1- further than 3 threads*
- ◆ *Ensure that the sealing surface is not damaged.*



- Take off gasket -1-.
- Clean sealing surface -2- on gear actuator with a lint-free cloth.



Caution

Risk of damage to gear actuator

- ◆ *No dirt must be allowed to enter the gear actuator.*
- ◆ *Even the slightest amount of dirt can cause a failure of the gear actuator.*

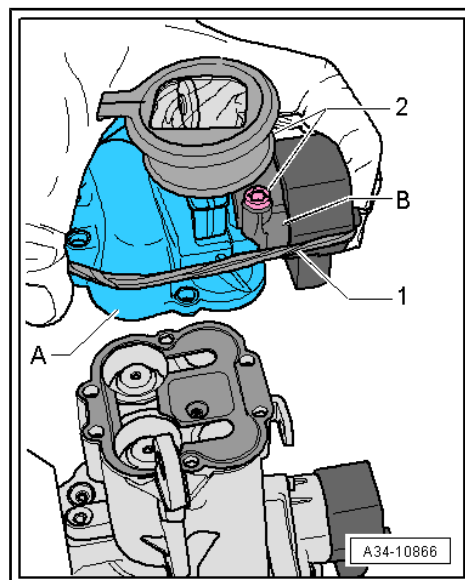
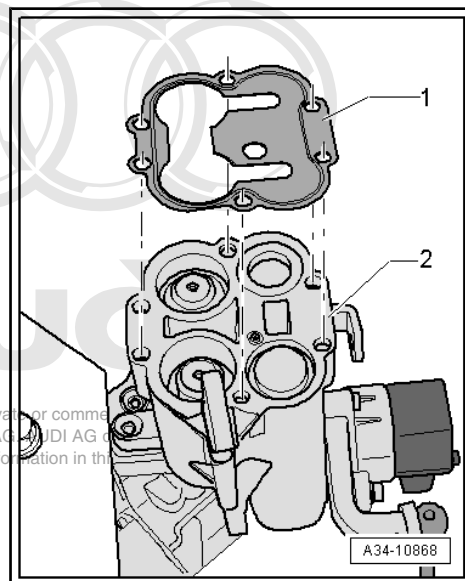
- Fit new gasket -1- (dry) onto gear actuator.



Note

When the gasket is fitted correctly, all the bolt holes in the gear actuator coincide with the holes in the gasket

- Take hold of cover for gear actuator -A- and potentiometer carrier -B-, keeping them pressed together by hand.

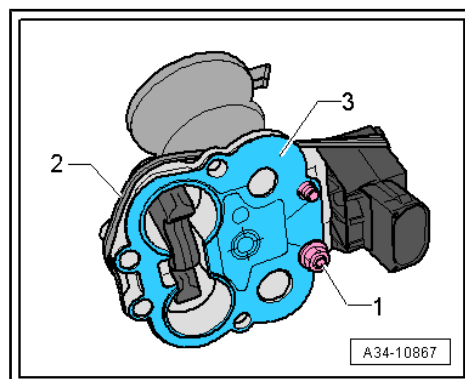


- Remove nut -1- and take out bolts.
- Clean sealing surface -3- on cover for gear actuator with a lint-free cloth.
- Fit two new bolts (M5 x 38).

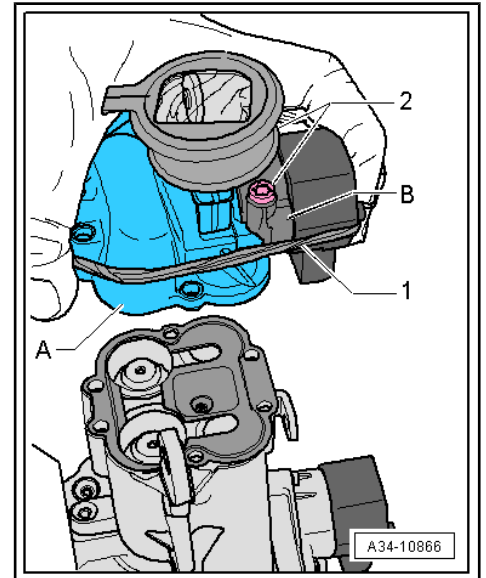


Note

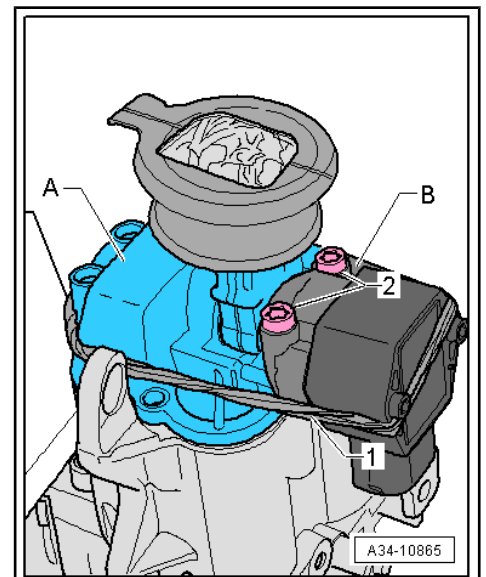
The bolts are of different lengths; take care to install in correct positions ⇒ [page 53](#).



- Fit cover for gear actuator with bolts -2- inserted.



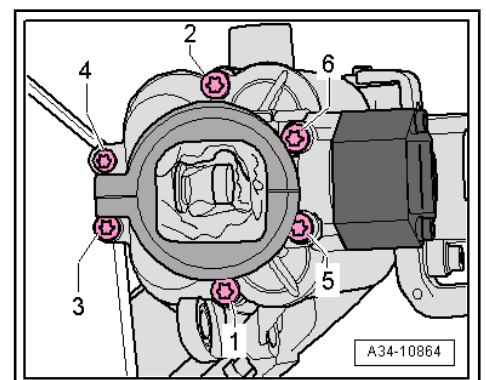
- Screw in bolts -2- (hand-tight).
- Take off rubber band -1-.



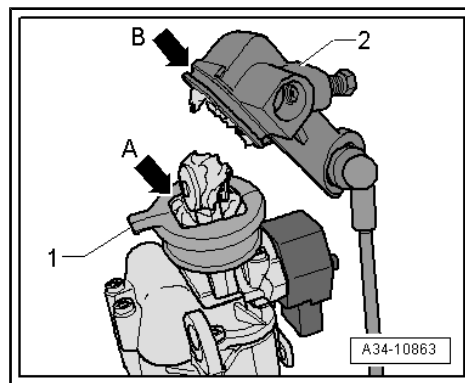
Positions of bolts:

- ◆ Bolts -1- and -2-: M5 x 16
- ◆ Bolts -3- and -4-: M5 x 30
- ◆ Bolts -5- and -6-: M5 x 38
- Screw in new bolts -1 to 4- (hand-tight).
- Using torque wrench -V.A.G 1410- , tighten bolts to 5 Nm in the sequence indicated: -1 to 6-.

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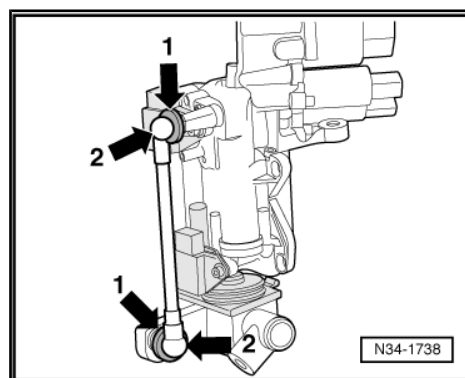
- Check bellows -1- for damage and renew if necessary.
- Pack fresh grease into bellows -1- and selector finger -2- if old grease is dirty or not sufficient ⇒ Electronic parts catalogue .
- Engage selector finger -2- in bellows -1-.
- The sealing surface -arrow A- of the bellows must engage all round in the groove -arrow B- on the selector finger.



- Check sealing washers -arrows 1- for damage and renew if necessary.
- Check ball joints -arrows 2- on selector rod; they must be free of play.
- Fit the gear actuator ⇒ [page 42](#) .


Note

- ◆ *Perform all work and tests required after installation of the gear actuator, including the following:*
- ◆ *Visual inspection of hydraulic system for leakage.*
- ◆ *Check the fluid level in the reservoir for the clutch mechanism and selector mechanism and replenish the fluid ⇒ Maintenance, Booklet 809*
- ◆ *Adjust the gear actuator ⇒ [page 47](#).*



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5 Exploded view of hydraulic control unit, pressure accumulator

1 - Accumulator

- ☐ 40 Nm

2 - O-ring

- ☐ Renew

3 - Hydraulic control unit

- ☐ Can be tested in the Electrical checks and in the measured values ⇒ Rep. gr. 01
- ☐ Removing and installing ⇒ [page 56](#)

4 - Bolt with washer

- ☐ 8 Nm

5 - Spacer sleeve

6 - Bracket

- ☐ For hydraulic control unit

7 - Bolt

- ☐ 25 Nm

8 - Bolt

- ☐ 10 Nm

9 - Rubber bush

10 - Pipe/hose assembly

- ☐ Exploded view ⇒ [page 61](#)

11 - Pipe/hose assembly

- ☐ Exploded view ⇒ [page 61](#)

12 - Pipe/hose assembly

- ☐ Exploded view ⇒ [page 61](#)

13 - O-rings

- ☐ Renew

14 - Seal

- ☐ Renew

15 - Seal

- ☐ Renew

16 - Bolt

- ☐ 8 Nm

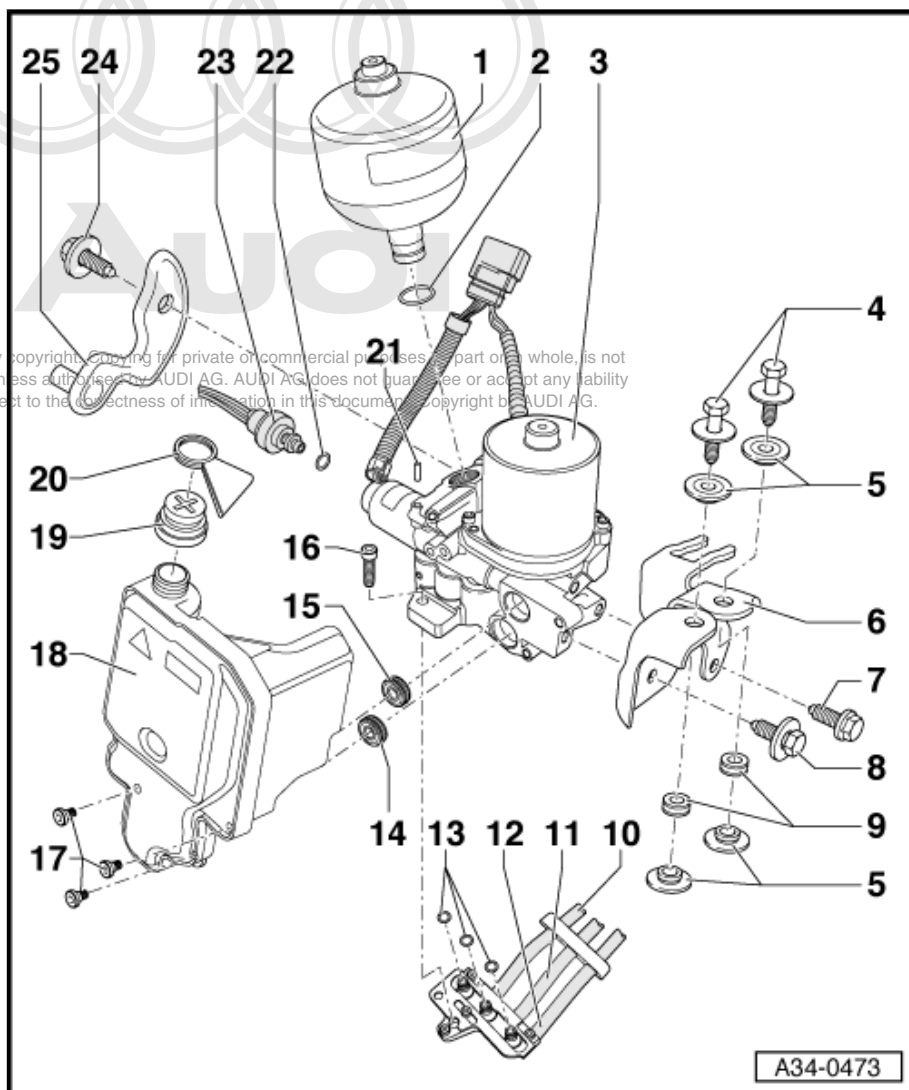
17 - Bolt

- ☐ For attaching reservoir to hydraulic control unit
- ☐ 5 Nm

18 - Reservoir

19 - Cover

- ☐ 2 Nm



20 - Seal

- ☐ prevents foreign bodies from entering breather hole in cap during transport
- ☐ Always to be removed following installation

21 - Spring pin

- ☐ Drive in and drive out with drift

22 - Seal

- ☐ Renew

23 - Gearbox hydraulic pressure sender -G270-

- ☐ Can be tested in the Electrical checks and in the measured values ⇒ Rep. gr. 01
- ☐ Removing wires from connector housing ⇒ Electrical system General information; Rep. gr. 97 ; Releasing and dismantling contact housings

24 - Bolt

- ☐ 25 Nm

25 - Bracket

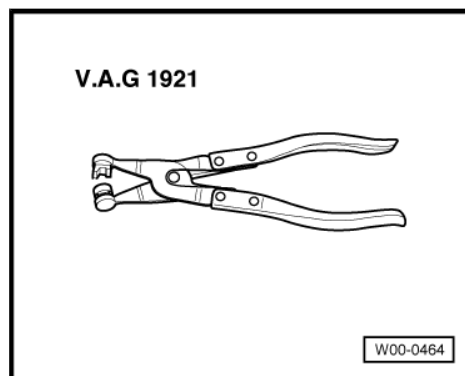
- ☐ For attaching hydraulic control unit to body

5.1 Removing and installing hydraulic control unit

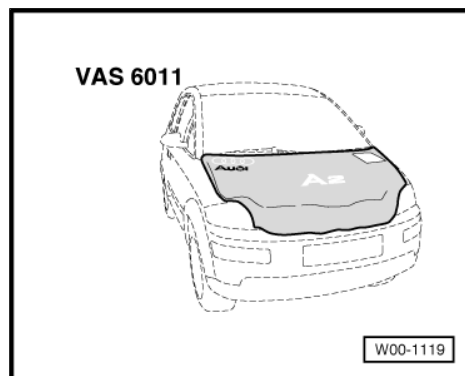
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Special tools and workshop equipment required

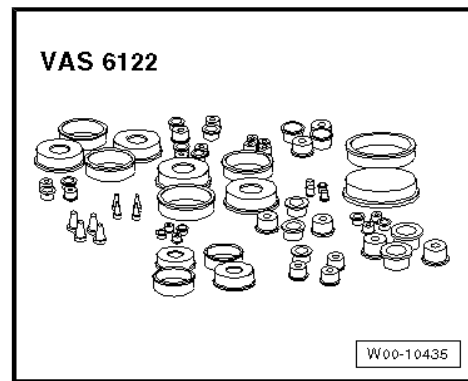
- ◆ Hose clip pliers -V.A.G 1921-



- ◆ Protective cover for bonnet Audi A2 -VAS 6011-



◆ Engine bung set -VAS 6122-



Removing



Note

It is essential that the battery is disconnected, as the hydraulic pump runs even with the ignition switched off, and hydraulic fluid can escape from the system.

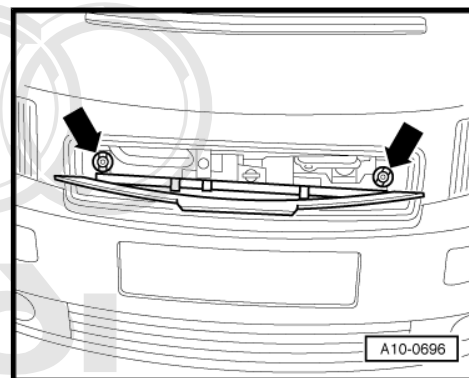


Caution

When disconnecting the battery there is a risk of serious damage to electronic components:

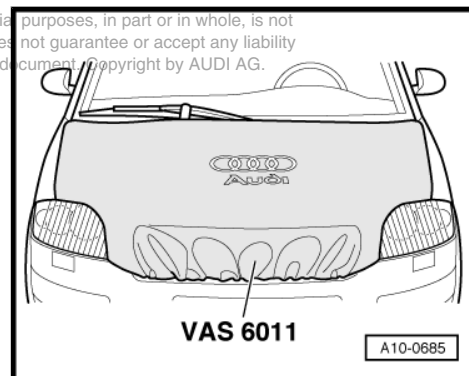
- ◆ ***Observe the correct procedure for disconnecting the battery.***

- Disconnect the earth wire at the battery ⇒ Rep. gr. 27 .
- Wash and polish outside of bonnet with a chamois leather.
- Release service flap from inside.
- Release bonnet -arrows- and pull it forwards slightly.



- Fit the protective cover -VAS 6011- over the bonnet.

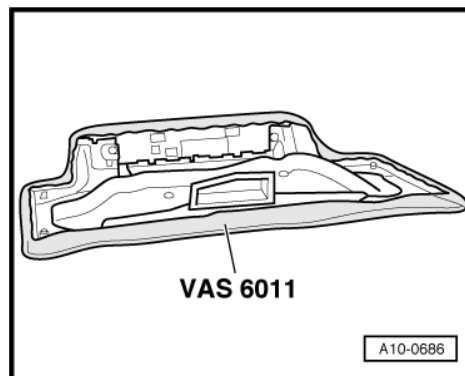
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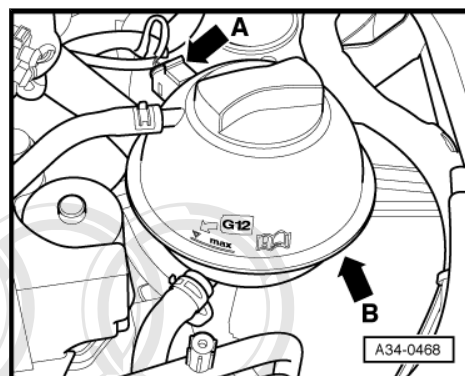
 Note

Do not store the bonnet in an upright position.

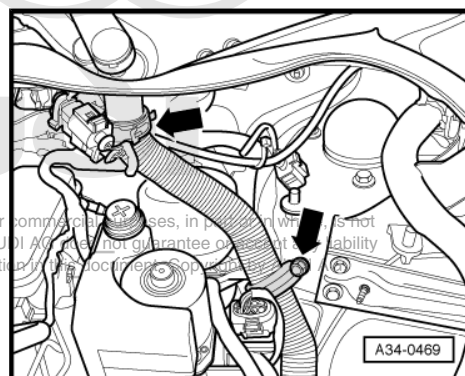
- Detach the bonnet and set it down on the protective cover - VAS 6011- .



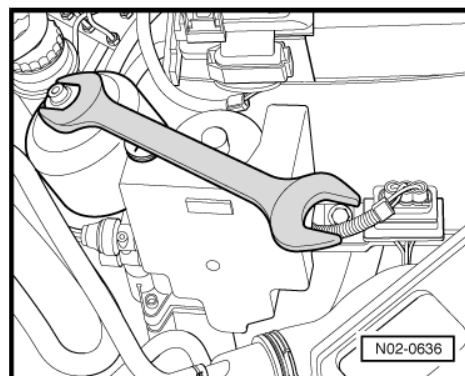
- Unplug the connector -arrow A-.
- Unscrew the coolant expansion tank -arrow B- and lay aside with the coolant hoses connected.



- Unfasten the hose clamp -top arrow- and detach the water drain hose from the cowl panel grille.
- Unscrew the nut -bottom arrow-.
- Detach and lay aside the water drain hose.

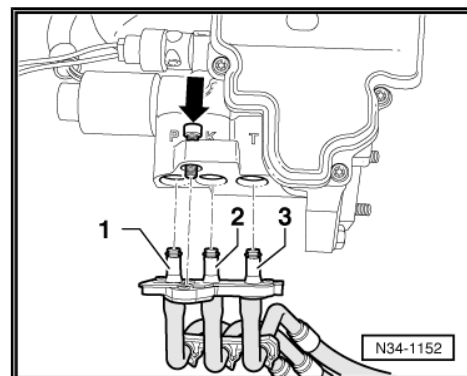


- Unfasten the pressure accumulator by roughly $\frac{1}{2}$ a turn.
- The hydraulic fluid level in the reservoir increases.

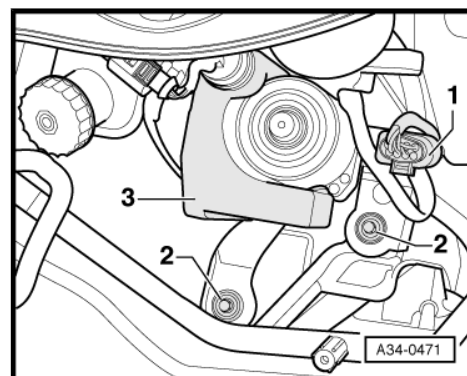


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- Remove bolt -arrow-.
- Pull pipe/hose assemblies -1 ... 3- together downwards out of hydraulic control unit.
- Seal off open lines and connections with clean plugs from engine bung set -VAS 6122- .



- Unplug electrical connector -1-.
- Remove bolts -2- and take out hydraulic control unit -3-.



Installing

- Tightening torque ⇒ [page 55](#)

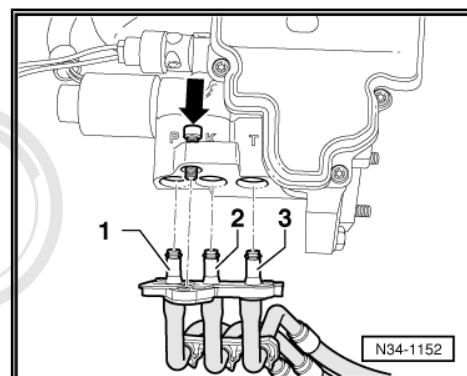
Installation is carried out in reverse sequence; note the following:



Caution

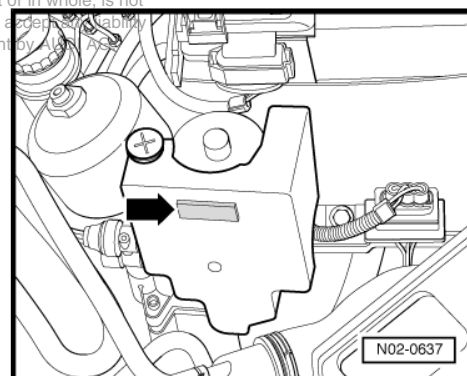
Incorrect insertion of the hose/pipe assemblies could cause irreparable damage to the gear actuator.

- ◆ ***Fit pipe/hose assemblies -1 ... 3- according to coloured markings ⇒ [page 62](#) .***

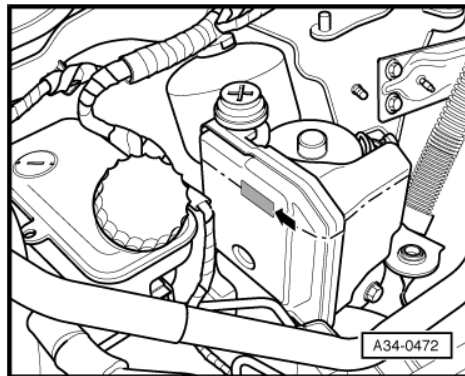


- Tighten bolt -arrow-.
- Secure the pressure accumulator.

- Pour in hydraulic fluid and check the hydraulic fluid level
⇒ Maintenance ; Booklet 809 .



- Observe correct procedure after connecting battery ⇒ Rep. gr. 27 .
- Switch on ignition (hydraulic fluid level in reservoir drops).
- Press the foot brake and perform a few gearshift operations (including in Tiptronic gate).
- The entire hydraulic system is now bled.
- Switch off ignition.
- Perform a visual check for leaks in the hydraulic system.
- Check the hydraulic fluid level and top up the fluid ⇒ Maintenance ; Booklet 809 .
- Perform basic setting in the „vehicle self-diagnosis“ routine ⇒ Rep. gr. 01 .



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6 Exploded view of hose/pipe assemblies

1 - Pipe/hose assembly

- ☐ Colour of connection pieces: „blue“
- ☐ Make a coloured mark on the hose/pipe assembly if necessary
- ☐ Removing and installing ⇒ [page 62](#)
- ☐ Inserting in gear actuator ⇒ [page 62](#)
- ☐ Inserting with mounting plate in hydraulic control unit ⇒ [page 62](#)

2 - Pipe/hose assembly

- ☐ Colour of connection piece in mounting plate: „gold“
- ☐ Removing and installing with clutch slave cylinder
- ☐ Removing and installing ⇒ [page 62](#)
- ☐ Inserting with mounting plate in hydraulic control unit ⇒ [page 62](#)

3 - Pipe/hose assembly

- ☐ Colour of connection pieces: „silver“
- ☐ Removing and installing ⇒ [page 62](#)
- ☐ Inserting in gear actuator ⇒ [page 62](#)
- ☐ Inserting with mounting plate in hydraulic control unit ⇒ [page 62](#)

4 - O-ring

- ☐ Renew
- ☐ Take care not to interchange; for assignment refer to ⇒ Electronic parts catalogue
- ☐ Distinguishing feature ⇒ [page 62](#)

5 - Spring pin

- ☐ Renew
- ☐ Drive in and drive out with drift

6 - Clutch slave cylinder

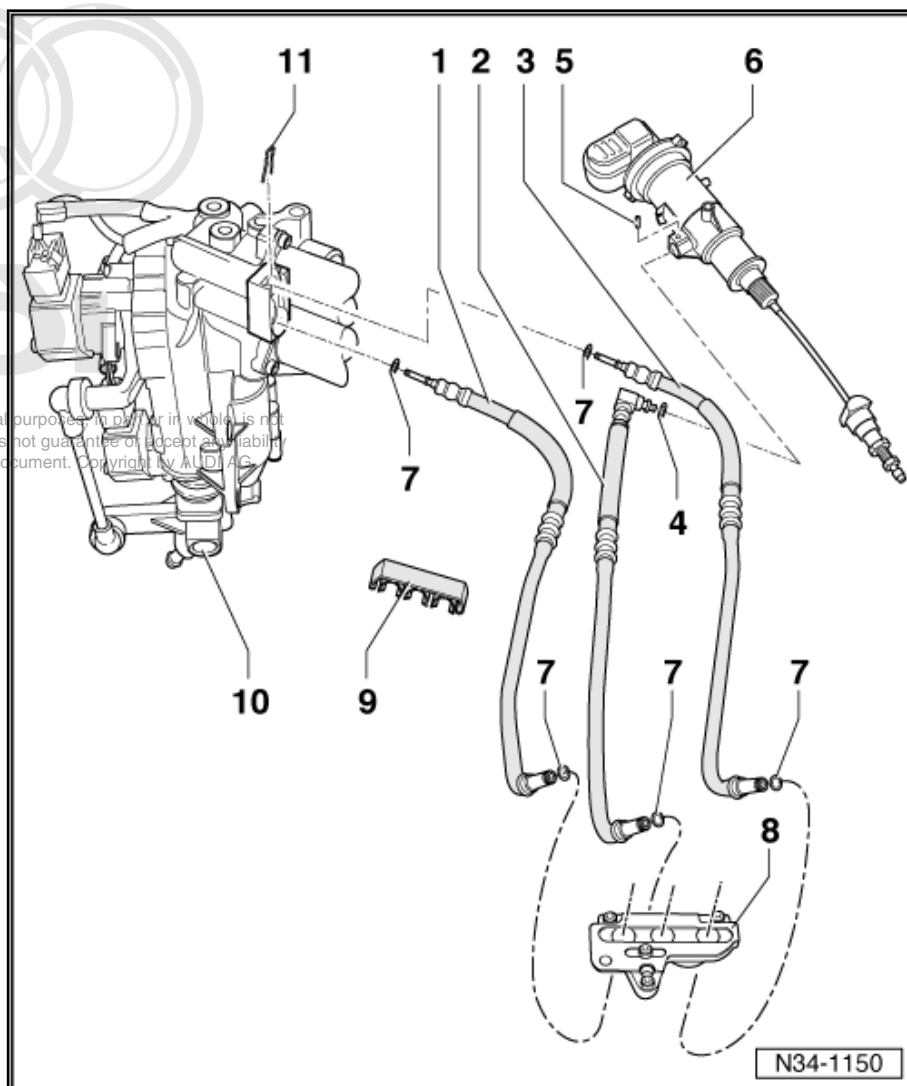
- ☐ Removing and installing ⇒ [page 16](#)

7 - O-ring

- ☐ Renew
- ☐ Different versions ⇒ [page 62](#) ; for correct version refer to ⇒ Electronic parts catalogue

8 - Assembly plate

- ☐ Attachment with pipe/hose assemblies to hydraulic control unit ⇒ [page 62](#)



9 - Bracket

- ☐ holds hose/pipe assemblies in position

10 - Gear actuator

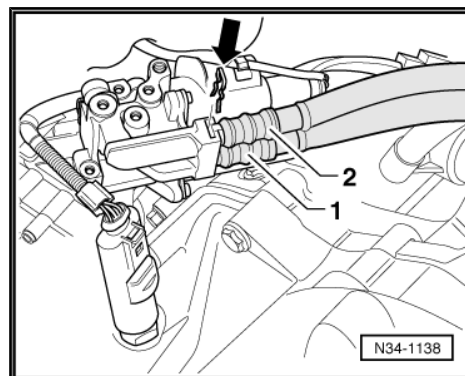
- ☐ Removing and installing ⇒ [page 39](#)

11 - Clip

- ☐ Renew

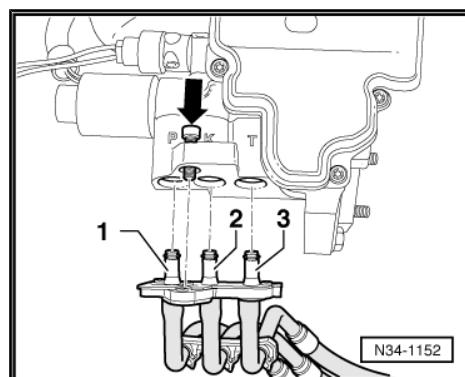
Installing hose/pipe assemblies at gear actuator

- Press the hose/pipe assembly -1- „blue“ with a new O-ring into the lower gear actuator hole.
- Press the hose/pipe assembly -2- „silver“ with a new O-ring into the upper gear actuator hole.
- Secure the hose/pipe assemblies in position in the gear actuator with the clip -arrow-.



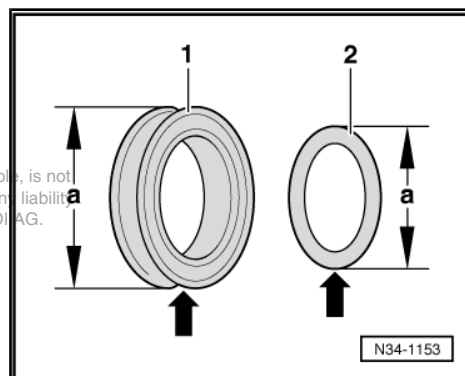
Installing pipe/hose assemblies with mounting plate at hydraulic control unit

- Press home pipe/hose assemblies with mounting plate and new O-rings in hydraulic control unit.
- Hose/pipe assembly -1- „blue“ at „P“ = Pressure container
- Hose/pipe assembly -2- „gold“ at „K“ = Clutch slave cylinder
- Hose/pipe assembly -3- „silver“ at „T“ = Reservoir



Distinguishing features of O-rings for hose/pipe assemblies

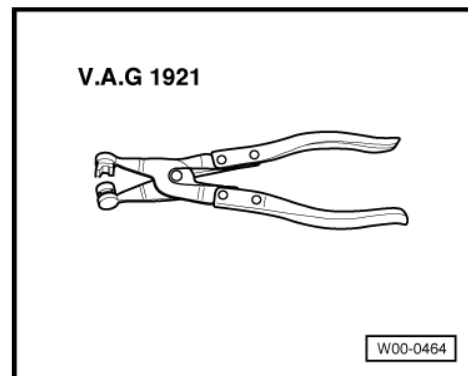
Item	Fitting location	Dimension -a- (mm)	Contour -Arrow-
-1-	Clutch slave cylinder	10	angular
-2-	Hydraulic control unit, gear actuator	8	round



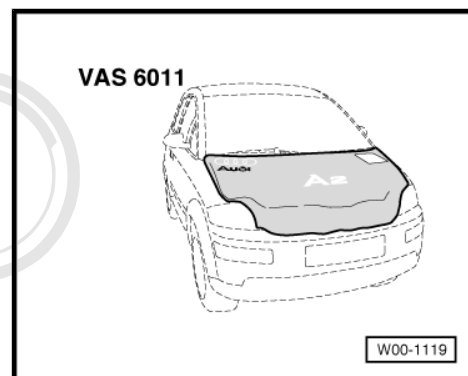
6.1 Removing and installing hose/pipe assemblies

Special tools and workshop equipment required

◆ Hose clip pliers -V.A.G 1921-

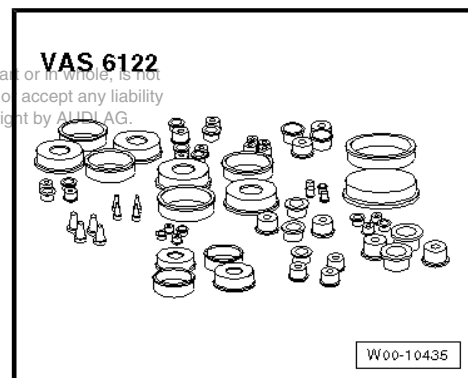


◆ Protective cover for bonnet Audi A2 -VAS 6011-



◆ Engine bung set -VAS 6122-

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Removing



Caution

There is a risk of contamination from escaping hydraulic fluid.

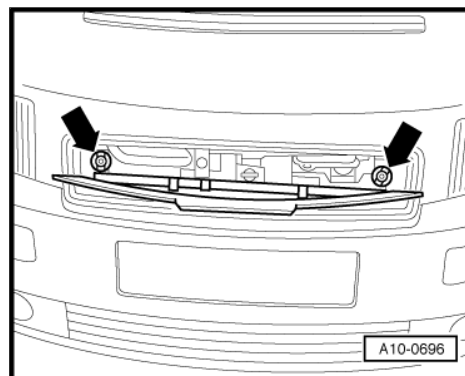
- ◆ *The battery must be disconnected as the hydraulic pump starts up even with the ignition switched off.*

When disconnecting the battery there is a risk of serious damage to electronic components:

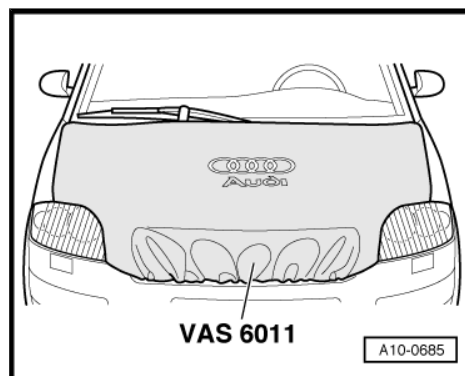
- ◆ *Observe the correct procedure for disconnecting the battery.*

- Disconnect the earth wire at the battery ⇒ Rep. gr. 27 .

- Wash and polish outside of bonnet with a chamois leather.
- Release service flap from inside.
- Release bonnet -arrows- and pull it forwards slightly.



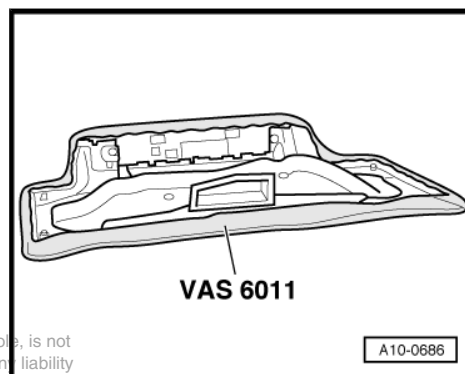
- Fit the protective cover -VAS 6011- over the bonnet.



Note

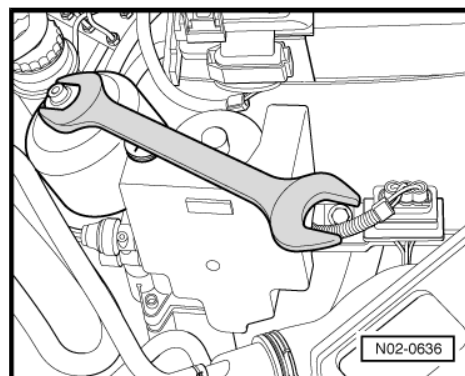
Do not store the bonnet in an upright position.

- Detach the bonnet and set it down on the protective cover -VAS 6011- .



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- Unfasten the pressure accumulator by roughly $\frac{1}{2}$ a turn.
- The hydraulic fluid level in the reservoir increases.

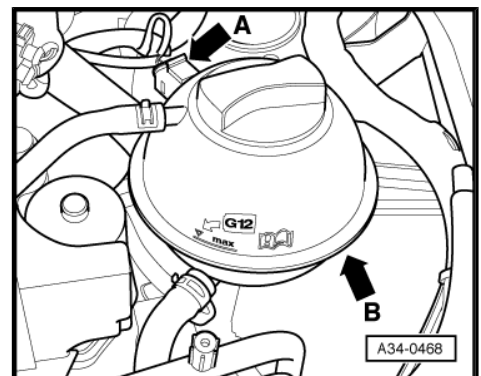
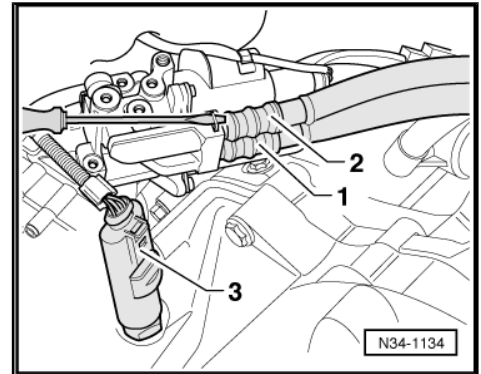


- Use a screwdriver to prise the hose/pipe assembly clip out of the gear actuator.
- Pull the hose/pipe assembly -1- and -2- out of the gear actuator.

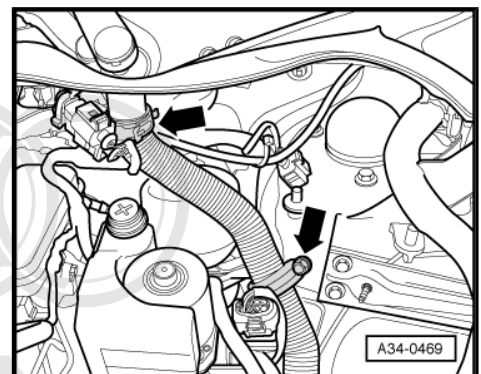
 Note

-Item 3- can be disregarded.

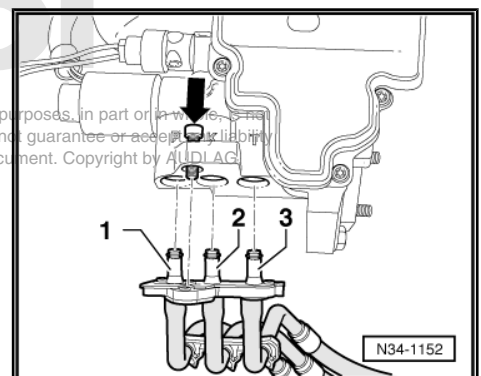
- Seal off open lines and connections with clean plugs from engine bung set -VAS 6122- .
- Unplug the connector -arrow A-.
- Unscrew the coolant expansion tank -arrow B- and lay aside with the coolant hoses connected.



- Unfasten the hose clamp -top arrow- and detach the water drain hose from the cowl panel grille.
- Unscrew the nut -bottom arrow-.
- Detach and lay aside the water drain hose.



- Remove bolt -arrow-.
- Pull pipe/hose assemblies -1 ... 3- together downwards out of hydraulic control unit.

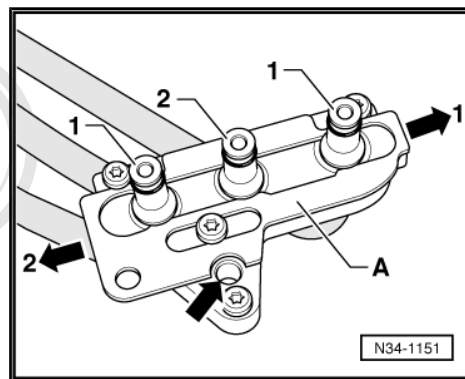


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- Seal off open lines and connections with clean plugs from engine bung set -VAS 6122- .
- Mark the hose/pipe assemblies for renewed installation.
- Move the slider -A- in -direction of arrow 1- and take the hose/pipe assemblies -1- and -2- out of the mounting plate.

Installing

- Tightening torque ⇒ [page 55](#)
- Insert the hose/pipe assemblies in the mounting plate in line with the marks made on removal.
- To lock the hose/pipe assemblies, press the slider -A- into the centre position -arrow 2-.
- The recess in the slider must coincide with the hole in the mounting plate -arrow-.
- Insert pipe/hose assemblies in hydraulic control unit ⇒ [page 62](#) and gear actuator ⇒ [page 62](#) .



7 **Fluid level for clutch mechanism and selector mechanism**

Checking fluid level in reservoir for clutch mechanism and selector mechanism ⇒ Maintenance ; Booklet 809

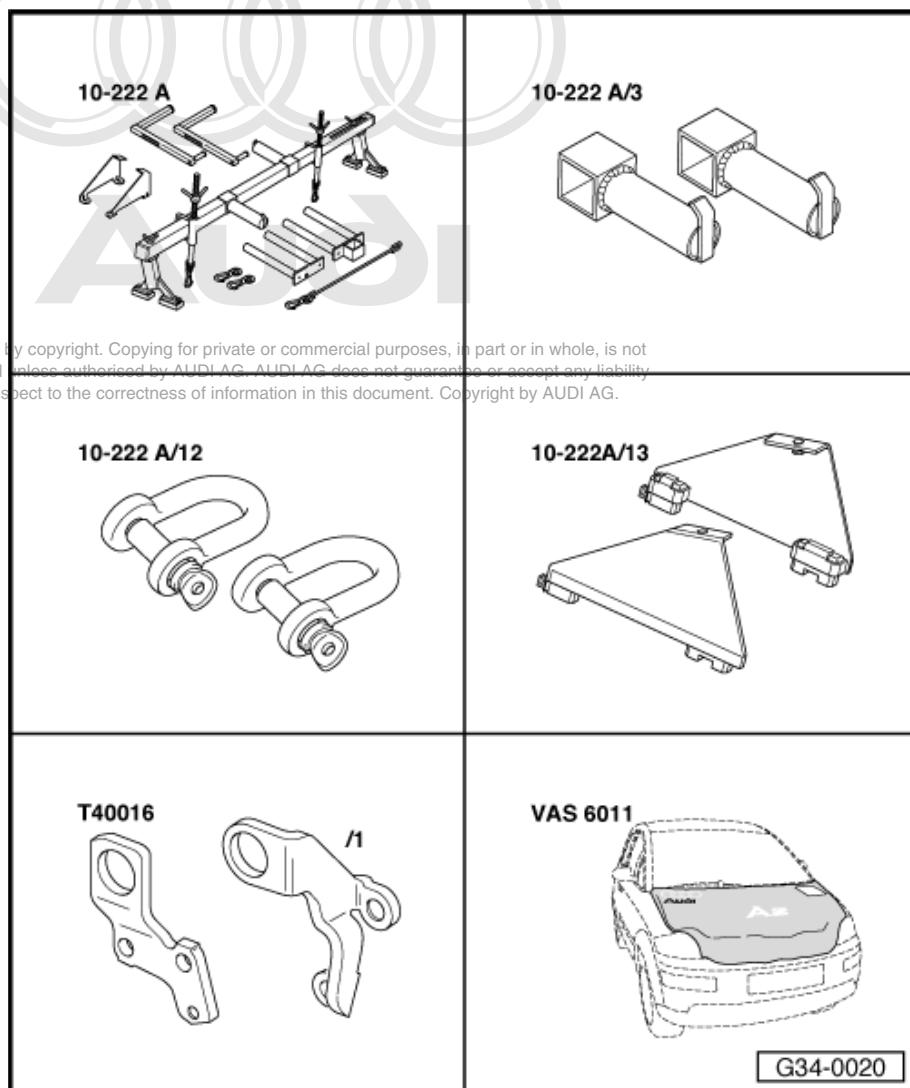


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8 Removing gearbox

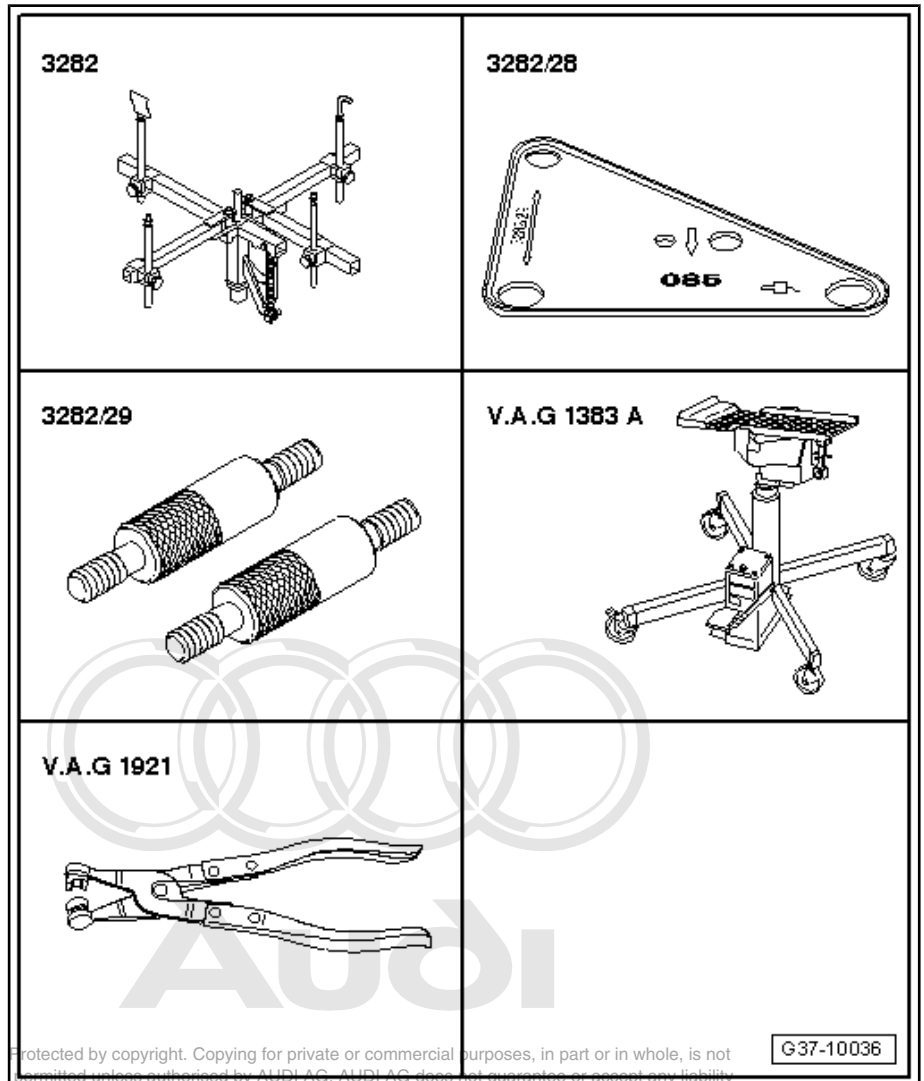
Special tools and workshop equipment required

- ◆ Support bracket -10 - 222 A-
- ◆ Adapter -10 - 222 A /3-
- ◆ Shackle -10 - 222 A /12-
- ◆ Adapter -10 - 222 A /13-
- ◆ Transportation shackle - T40016-
- ◆ Protective cover for bonnet - Audi A2 -VAS 6011-



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- ◆ Gearbox support -3282-
- ◆ Adjustment plate -3282/28-
- ◆ Pin -3282/29-
- ◆ Engine and gearbox jack - V.A.G 1383 A-
- ◆ Hose clip pliers - V.A.G 1921-



Procedure



Note

Pay attention to the repair instructions, particularly with regard to contact corrosion ⇒ [page 13](#).



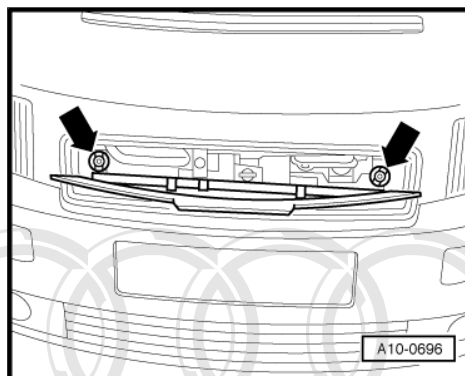
Caution

When disconnecting the battery there is a risk of serious damage to electronic components:

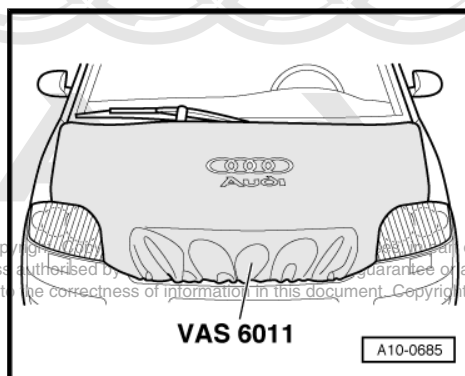
- ◆ Observe the correct procedure for disconnecting the battery.

- Disconnect the earth wire at the battery ⇒ Rep. gr. 27.

- Wash and polish outside of bonnet with a chamois leather.
- Release service flap from inside.
- Release the bonnet -arrows- and pull it forwards slightly.



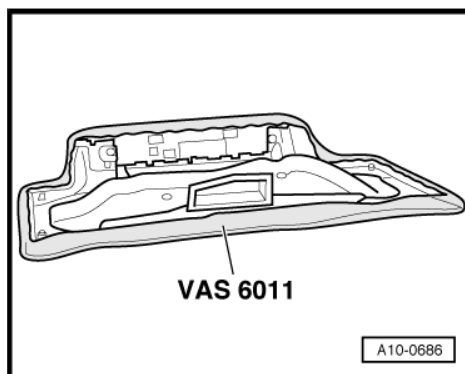
- Fit the protective cover -VAS 6011- over the bonnet.



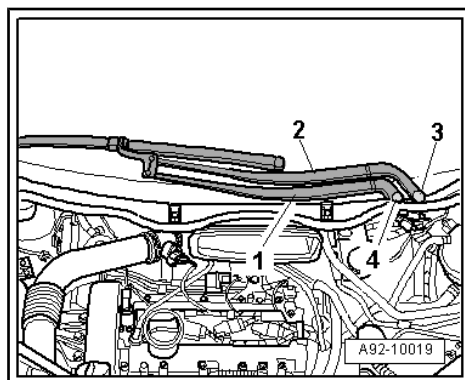
Note

Do not store the bonnet in an upright position.

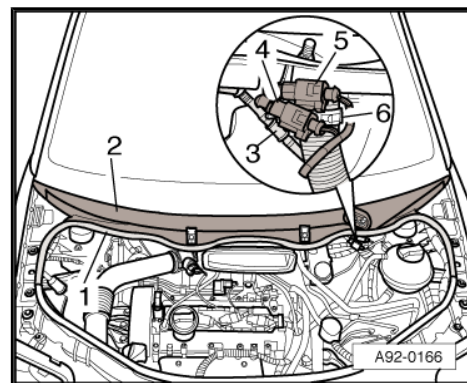
- Detach the bonnet and set it down on the protective cover -VAS 6011- .



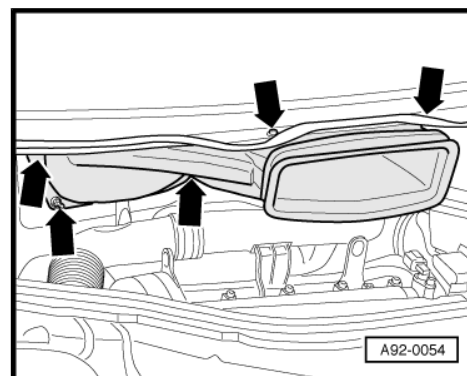
- Use a screwdriver to prise the caps -3- and -4- off the wiper arms.
- Unfasten the nuts of both wiper arms by several turns.
- By tilting slightly, consecutively detach the wiper arms -1- and -2- from the wiper shaft.
- Completely unfasten the nuts and detach the wiper arms.



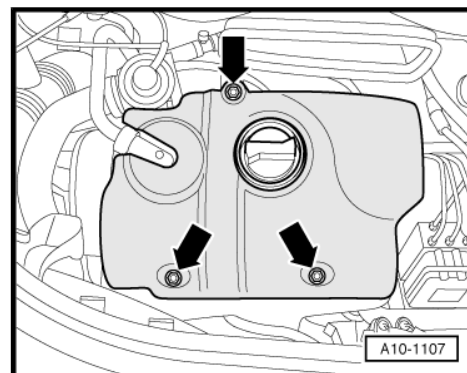
- Disconnect the washer fluid pipe -3-.
- If fitted, unplug the connectors -4- and -5- for the heated washer jets.
- Unfasten the hose clamp -6- with the hose clamp fitting tool - V.A.G 1921- and detach the water drain hose from the cowl panel grille.
- Detach the rubber seal -1- for the cowl panel grille.
- Detach the cowl panel grille -2-.
- Move washer fluid pipe clear.



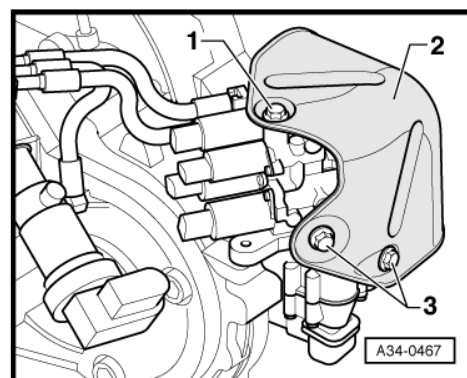
- Remove nuts and bolts -arrows-.
- Pull the fresh air duct forwards and swivel it out to the right side of the vehicle.



- Remove engine cover panel -arrows-.
- Remove the noise insulation underneath. This involves detaching the crankcase breather hose.
- Remove hydraulic control unit ⇒ [page 56](#) .

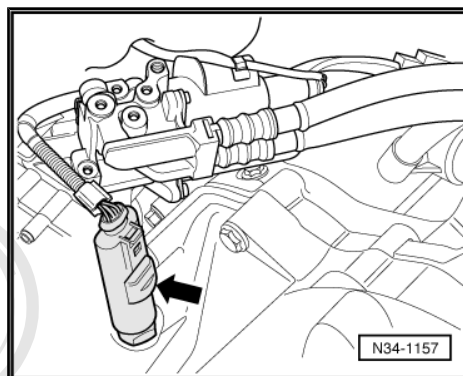


- Remove the bolt -1- at the top of the gear actuator heat shield -2-.

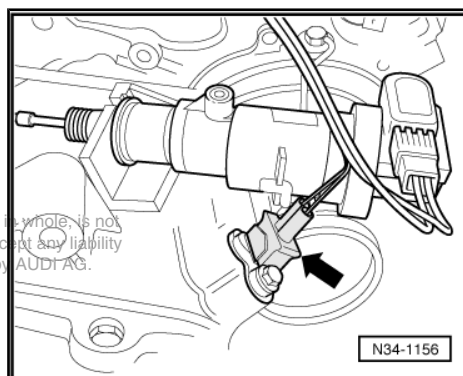


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- Unplug the connector -arrow- at the vehicle speed sender - G68- .



- Unplug the connector -arrow- for the gearbox speed sender - G38- .



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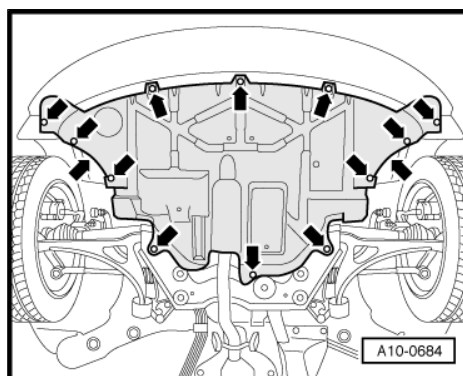
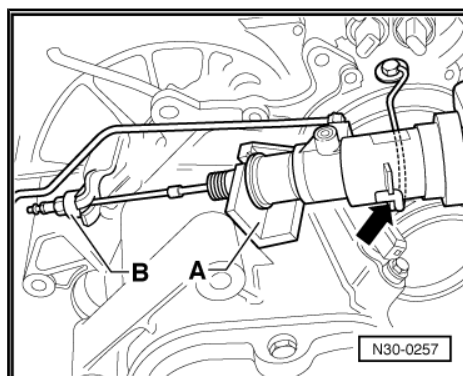
- Unfasten the lock nut -B- and the adjusting nut at the clutch cable.
- Disengage the clutch cable at the operating lever.



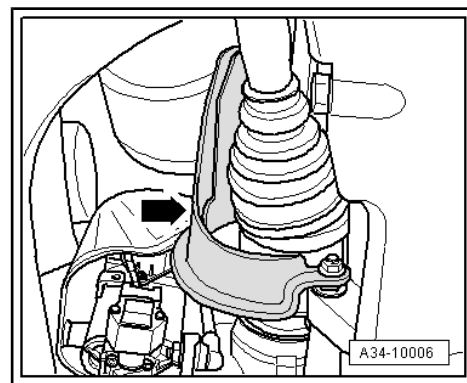
Note

Do not unfasten the hydraulic pipe at the clutch slave cylinder.

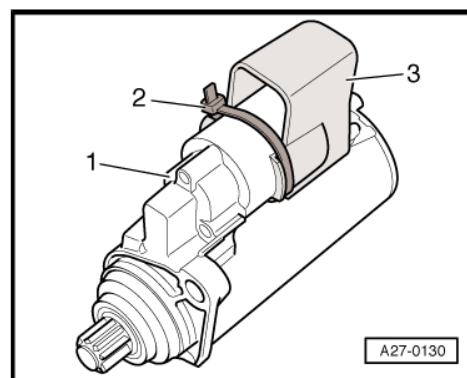
- Disengage the wire clip at the location marked with an -arrow- and pull the clutch slave cylinder out of the support bracket -A-.
- Lay aside the clutch slave cylinder (do not open up the piping system).
- Unscrew the wire clip from the gearbox.
- Detach all other brackets and wiring from gearbox.
- Remove front wheels.
- Remove the noise insulation -arrows-.



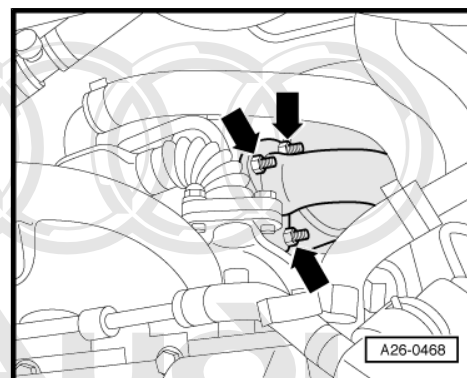
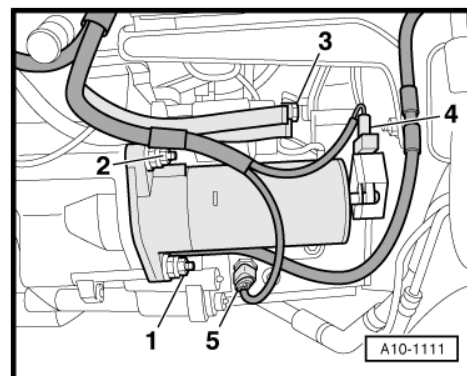
- Unscrew the right drive shaft heat shield -arrow-.
- Remove drive shafts on both sides ⇒ Rep. gr. 40 .



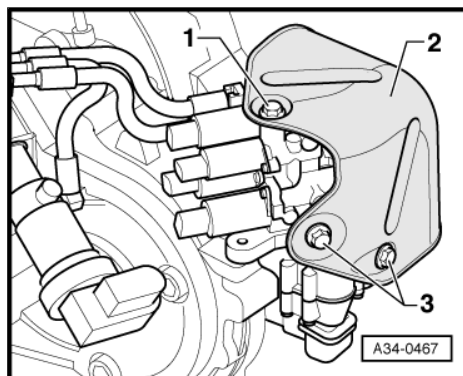
- Sever the cable tie -2- and lift the cover -3- off the solenoid switch -1-.



- Unscrew the nut -2-.
- Detach the wire -3- from the starter solenoid switch.
- Disengage the wire holder.
- Remove the bolt for the starter at the top.
- Unscrew the nut -1- and detach the earth wire from the starter at the bottom.
- Unplug the connector/terminal 50 -Item 4- at the solenoid switch.
- Remove the centre hex stud at the bottom and take out the starter downwards.
- Unplug connector -5- at reversing light switch -F4- and move wiring clear.
- Unscrew the starter catalytic converter at the turbocharger -arrows- and secure at the bulkhead ⇒ Rep. gr. 26 .



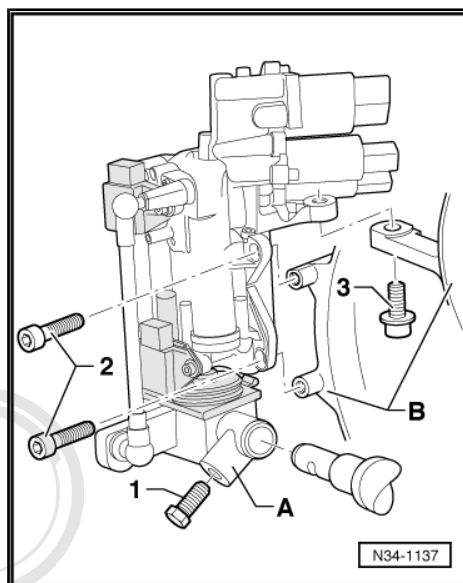
- Remove the bolts -3- and detach the gear actuator heat shield -2-.



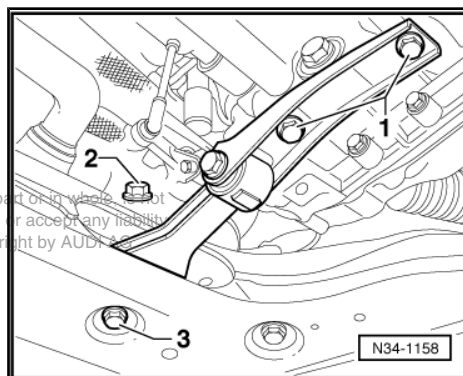
Note

Do not unfasten the hydraulic pipes at the gear actuator.

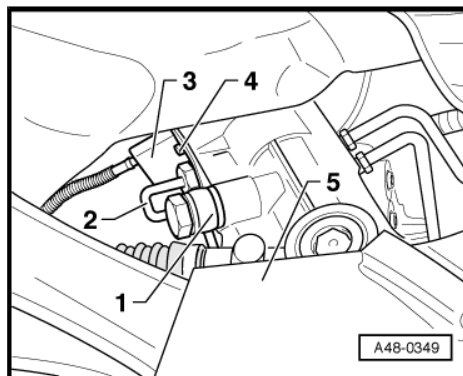
- Slacken off the bolt -1- by a few turns.
- Detach the selector finger -A- from the gearbox selector rod.
- Remove bolts -2- and -3-.
- Tie the gear actuator in place at the body as far as possible.



- Remove the bolts -1, 3-, unscrew the nut -2- and detach the pendulum support.

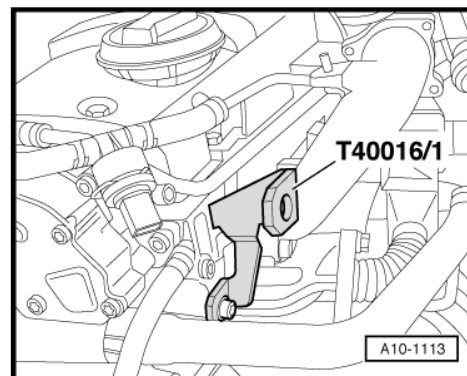


- Vehicles with power steering: disconnect hydraulic lines -1- and -2- from steering box ⇒ Rep. gr. 48 .



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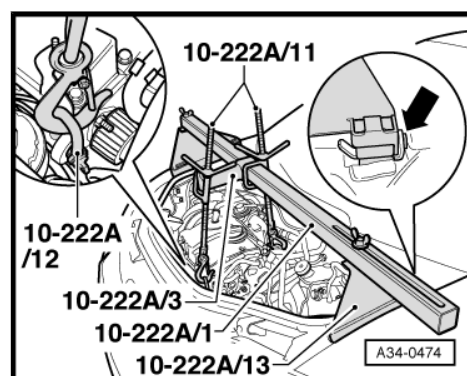
- Remove both bolts connecting the engine to the gearbox at the top.
- Screw on the transportation strap -T40016/1- at the rear left of the cylinder head.



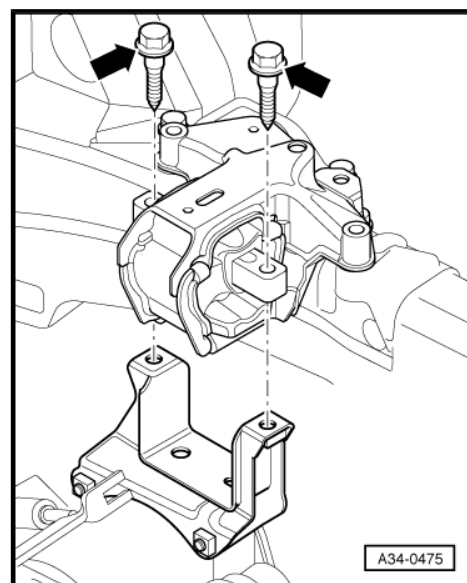
- Fit the adapter -10 - 222 A /3- at the support bar -10 - 222 A- .
- Set up support bracket -10 - 222 A- with adapter -10 - 222 A/ 13- on wing mounting flanges.



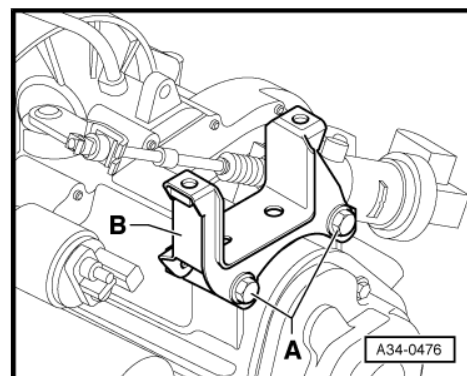
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Engage the adapters -10 - 222 A/ 13- at the rear in the mounting hooks for the bonnet -arrow-.



- Slightly pre-tension the engine/gearbox assembly by way of the spindles.
- Remove the left gearbox mounting bolts -arrows-.
- Carefully tilt the engine/gearbox assembly. To do so, screw down the left spindle at the support bar -10 - 222 A- .

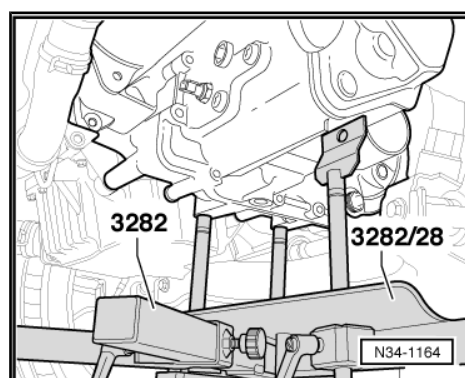
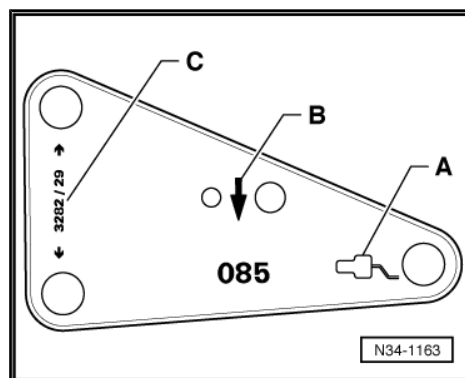


- Remove bolts -A- and detach gearbox bracket -B-.

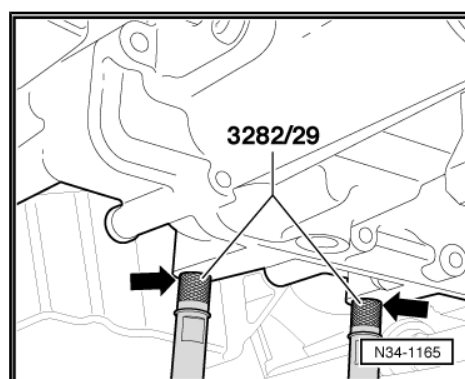


The gearbox support -3282- is set up for removal of the gearbox „085 DS“ using the adjustment plate -3282/28- .

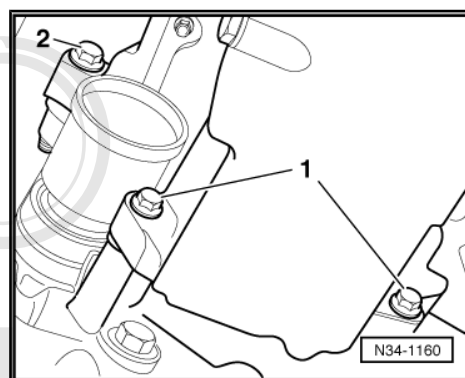
- Insert gearbox support -3282- in engine and gearbox jack - V.A.G 1383 A- .
- Align arms of gearbox support according to holes in adjustment plate.
- Screw in the support element -A- as shown on the adjustment plate.
- In place of the support element -C-, screw in the pins -3282/29- .
- Position the engine and gearbox lifter under the vehicle.
- The arrow symbol -B- on the adjustment plate points in the direction of travel.
- Align adjustment plate -3282/28- parallel with gearbox.



- Screw the pins -3282/29- -arrows- into the holes for the pendulum support bolts at the gearbox.



- Remove the bolts -1- and -2- connecting the engine to the gearbox at the bottom.
- Press the gearbox off the dowel sleeves and tilt on the left by way of the spindles of the gearbox support -3282- .
- Carefully lower gearbox using engine and gearbox jack -V.A.G 1383 A- .
- Alter the position of the gearbox in the area of the subframe and the body on the left when lowering by way of the spindles of the gearbox support.



9 Installing gearbox

Procedure

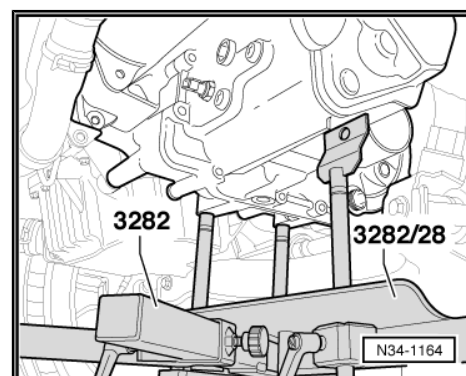
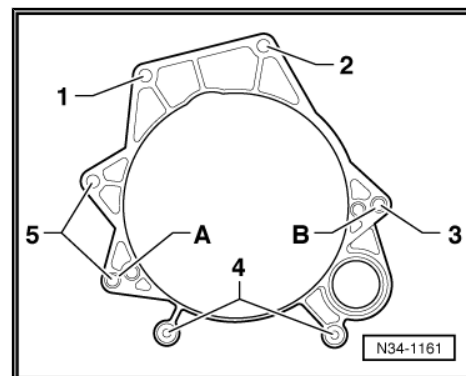


Note

- ◆ *Renew bolts which are tightened by turning through a specified angle.*
- ◆ *Renew self-locking nuts and bolts, and seals, O-rings and gaskets.*
- ◆ *Secure all hose connections with the correct hose clips (as original equipment); refer to ⇒ *Electronic parts catalogue* .*
- ◆ *Re-attach all cable ties at the same locations when re-installing.*

Tightening torques for installing gearbox ⇒ [page 79](#)

- Check whether there are dowel sleeves -A- and -B- for centring the engine and gearbox in the cylinder block; fit any missing dowel sleeves.
- If fitted, ensure that the intermediate plate is correctly positioned on engine.
- Clean the input shaft splines and hub splines on used clutch plates, remove corrosion and apply an extremely thin layer of clutch plate grease -G 000 100- to the splines. Then move the clutch plate back and forth on the input shaft until the hub moves freely on the input shaft. It is important to remove excess grease.
- Raise gearbox carefully using gearbox support -3282- .
- Align gearbox with engine and install.



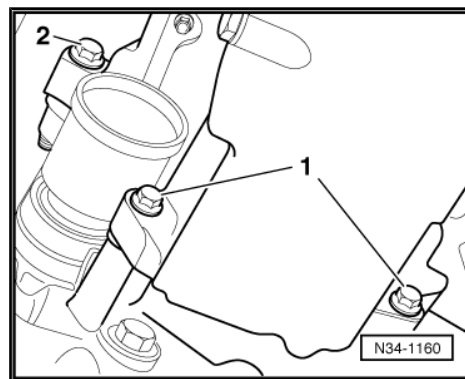
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- Screw in the bolts -1- and -2- connecting the engine to the gearbox at the bottom and tighten; then screw in and tighten the bolts at the top ⇒ [page 79](#) .
- Install gearbox bracket ⇒ [page 80](#) .
- Align the engine/gearbox assembly in installation position. To do so, tighten both spindles at the support bar -10 - 222 A- .
- Install gearbox mounting ⇒ [page 80](#) .



Note

Ensure stress-free installation of the engine/gearbox assembly.



WARNING

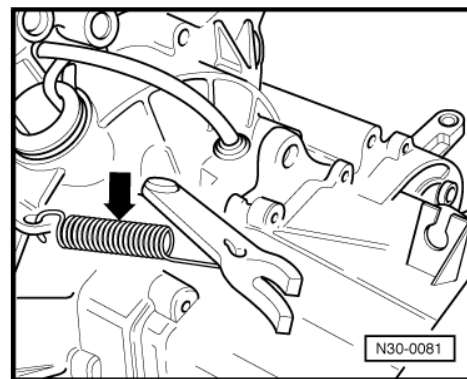
Risk of accident.

- ◆ **Do not detach the support bar -10 - 222 A- until the gearbox bracket bolts have been tightened to torque.**

- Detach the support bar.
- Install starter ⇒ Rep. gr. 27 .
- Install the reversing light switch -F4- ⇒ [page 84](#) .
- Vehicles with power-assisted steering: install hydraulic lines ⇒ Rep. gr. 48 .
- Install drive shafts ⇒ Rep. gr. 40 .
- Install heat shield for drive shaft (right-side) ⇒ [page 80](#) .
- Install pendulum support ⇒ Rep. gr. 10 .
- Install the starter catalytic converter ⇒ Rep. gr. 26 .
- Fit the gear actuator ⇒ [page 42](#) .

 Note

- ◆ *With a new gearbox, always take out the spring -arrow- between the release lever and gearbox as otherwise proper operation of the clutch slave cylinder is not guaranteed.*
- ◆ *The spring acts as transportation safeguard for the release bearing.*
- Fit the holder for the clutch slave cylinder ➔ [page 15](#) .
- Install clutch slave cylinder ➔ [page 16](#) .
- Check gear oil level and top up as required ➔ [page 83](#) .
- Install noise insulation ➔ Rep. gr. 50 .
- Install hydraulic control unit ➔ [page 56](#) .
- Observe correct procedure after connecting battery ➔ Rep. gr. 27 .



Caution

Overvoltage can cause irreparable damage to control units.

- ◆ ***Do not use charger for boost starting,***

- Check the fluid level in the reservoir for the clutch mechanism and selector mechanism and replenish the fluid ➔ Maintenance ; Booklet 809 .
- Adjust the clutch ➔ [page 18](#) .
- Perform basic setting in the „vehicle self-diagnosis“ routine ➔ Rep. gr. 01 .

Tightening torques

 Note

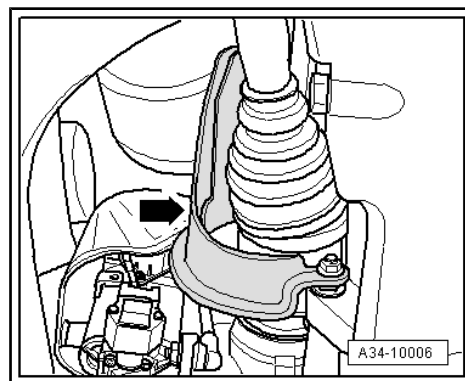
- ◆ *Tightening torques apply only to lightly greased, oiled, phosphated or black-finished nuts and bolts.*
- ◆ *Additional lubricant such as engine or gear oil may be used, but do not use graphite lubricant.*
- ◆ ***Do not use parts which have been degreased***
- ◆ *Tolerance for tightening torques is $\pm 15\%$.*

Component		Nm
Bolts and nuts	M6	9
	M7	15
	M8	20
	M10	40
	M12	65

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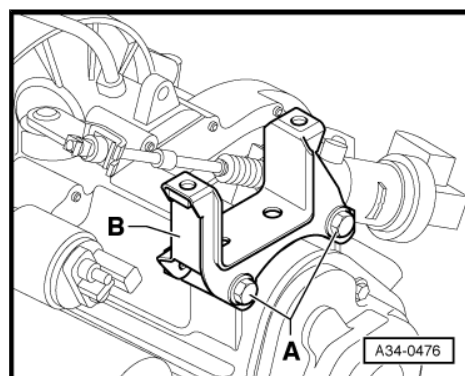
Heat shield for drive shaft (right-side) - tightening torque

- Tighten the bolts for the drive shaft heat shield -arrow- to 23 Nm.



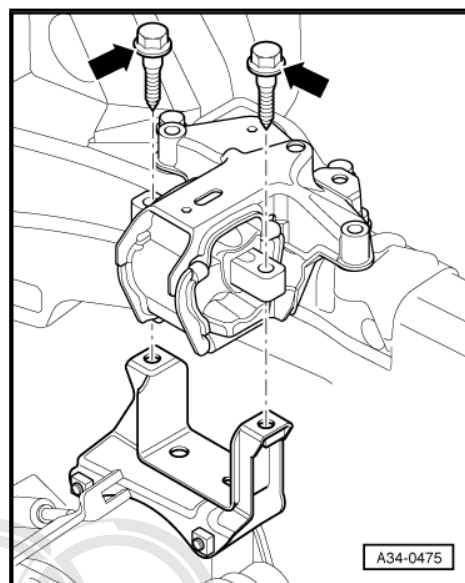
Tightening torque for gearbox bracket

- Tighten bolts -A- for gearbox bracket -B- to 50 Nm and turn a further 90°.



Tightening torque for gearbox mounting

- Tighten the gearbox mounting bolts -arrows- to 40 Nm and give a further 90° turn.

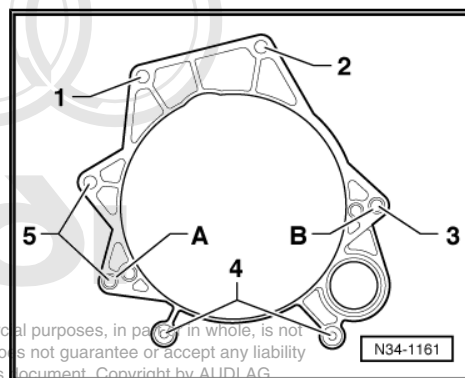


Gearbox to engine

Item	Bolt	Nm
1, 2	M12x60	80
3	M12x80	80
4 1)	M10x50	45
5 2)	M12x180	80
A, B	Dowel sleeves for centralising	

- 1) Tighten from engine end.
- 2) Also secures starter.

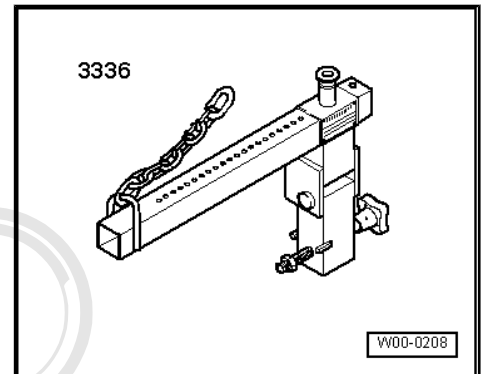
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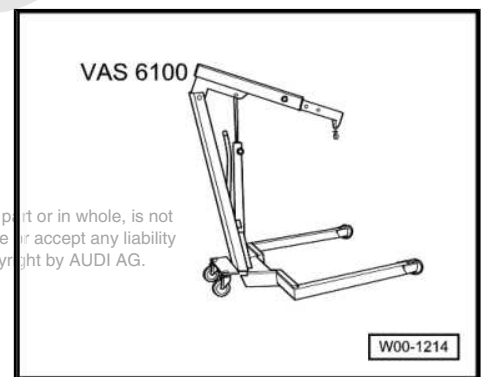
10 Transporting gearbox

Special tools and workshop equipment required

- ◆ Gearbox lifting tackle -3336-



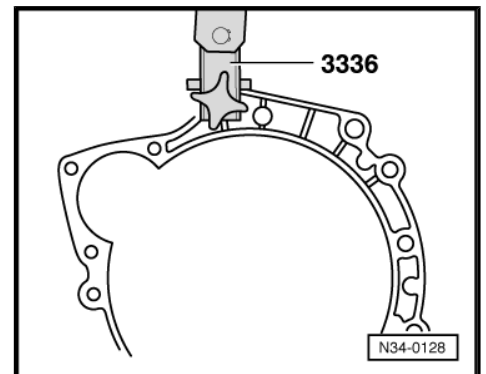
- ◆ Workshop hoist -VAS 6100-



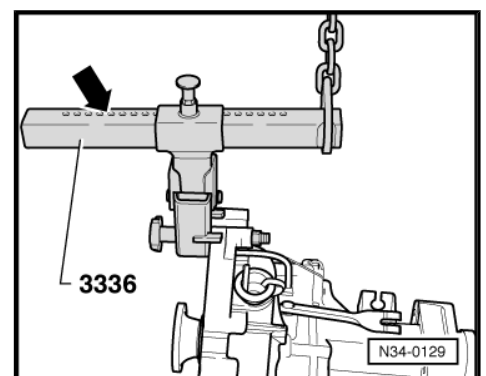
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Procedure

- Bolt the gearbox lifting tackle -3336- to the clutch housing as shown.



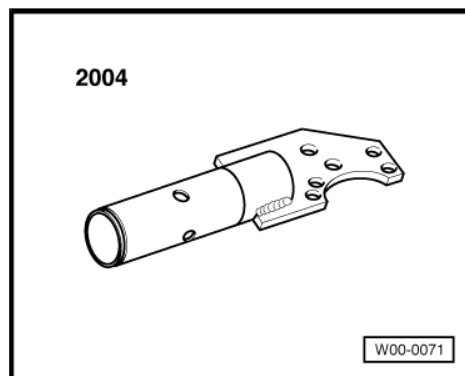
- Set support arm on sliding bracket by means of locking pin -arrow-.
- Number of holes visible = 9
- Lift gearbox with workshop hoist -VAS 6100- and gearbox lifting tackle -3336-.



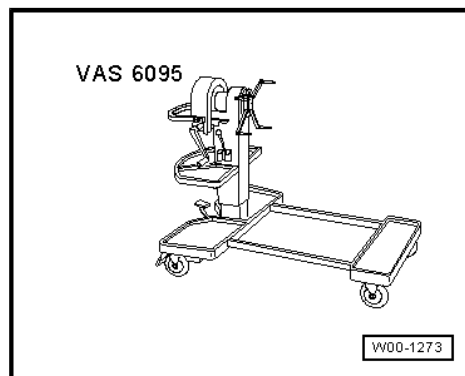
11 Securing gearbox to engine and gearbox support

Special tools and workshop equipment required

- ◆ Gearbox bracket -2004-

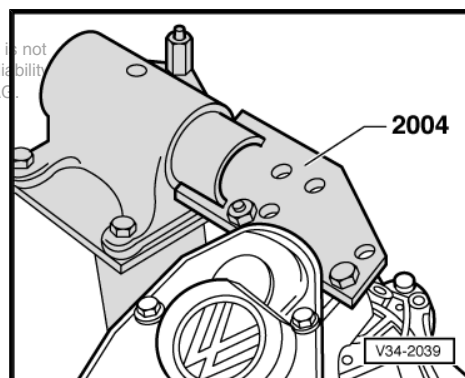


- ◆ Engine and gearbox support -VAS 6095-



Procedure

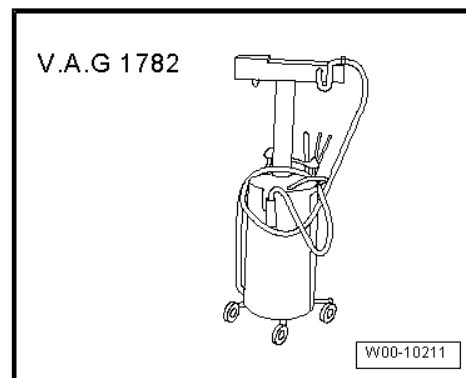
- Gearbox is on workshop hoist -VAS 6100- => [page 81](#)
- Screw the gearbox holder -2004- to the gearbox.
- Using workshop hoist -VAS 6100- , insert gearbox into engine and gearbox support -VAS 6095- .



12 Checking gear oil level and topping up

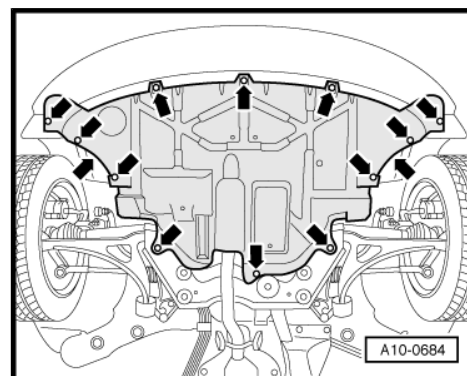
Special tools and workshop equipment required

- ◆ Used oil collection and extraction unit -V.A.G 1782-

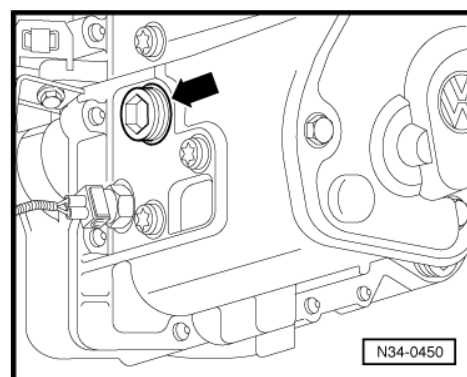


Procedure

- Tightening torque ⇒ [page 84](#)
- Vehicle must be absolutely horizontal (drive it onto a four-pillar lifting platform or over an inspection pit).
- Remove the noise insulation -arrows-.
- Place used oil collection and extraction unit -V.A.G 1782- below gearbox.



- Unscrew plug -arrow- at side of gearbox housing.
- Gear oil level must be up to bottom lip of filler and inspection hole.
- If gear oil is below filler and inspection hole, top up until gear oil emerges at filler and inspection hole.
- Gear oil specifications ⇒ Electronic parts catalogue
- Fit a new seal and tighten the screw plug for the inspection and filler hole.
- Install noise insulation ⇒ Rep. gr. 50 .



13 Exploded view of gearbox housing, selector mechanism, input shaft, output shaft (pinion shaft), differential, selector forks

1 - Clutch housing

- ☐ Exploded view
⇒ [page 101](#)

2 - Bolt

- ☐ 25 Nm

3 - Output shaft

- ☐ Exploded view
⇒ [page 121](#)

4 - Input shaft

- ☐ Exploded view
⇒ [page 112](#)

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

6 - Selector rod with selector fork for 1st and 2nd gear

7 - Reverse gear shaft

8 - Selector rod for reverse gear

9 - Reverse gear wheel

- ☐ Insert with shaft

10 - Reverse lever

- ☐ Insert with selector rod for reverse gear

11 - Selector rod

- ☐ For 5th gear

12 - Bolt

- ☐ For reverse gear shaft
- ☐ 35 Nm

13 - Reversing light switch -F4-

- ☐ 20 Nm

14 - Screw plug

- ☐ For inspection and filler hole
- ☐ 25 Nm

15 - Bolt

- ☐ For 5th gear and reverse gear selector rods
- ☐ 35 Nm

16 - Bolt

- ☐ For reverse gear reverse lever
- ☐ 35 Nm

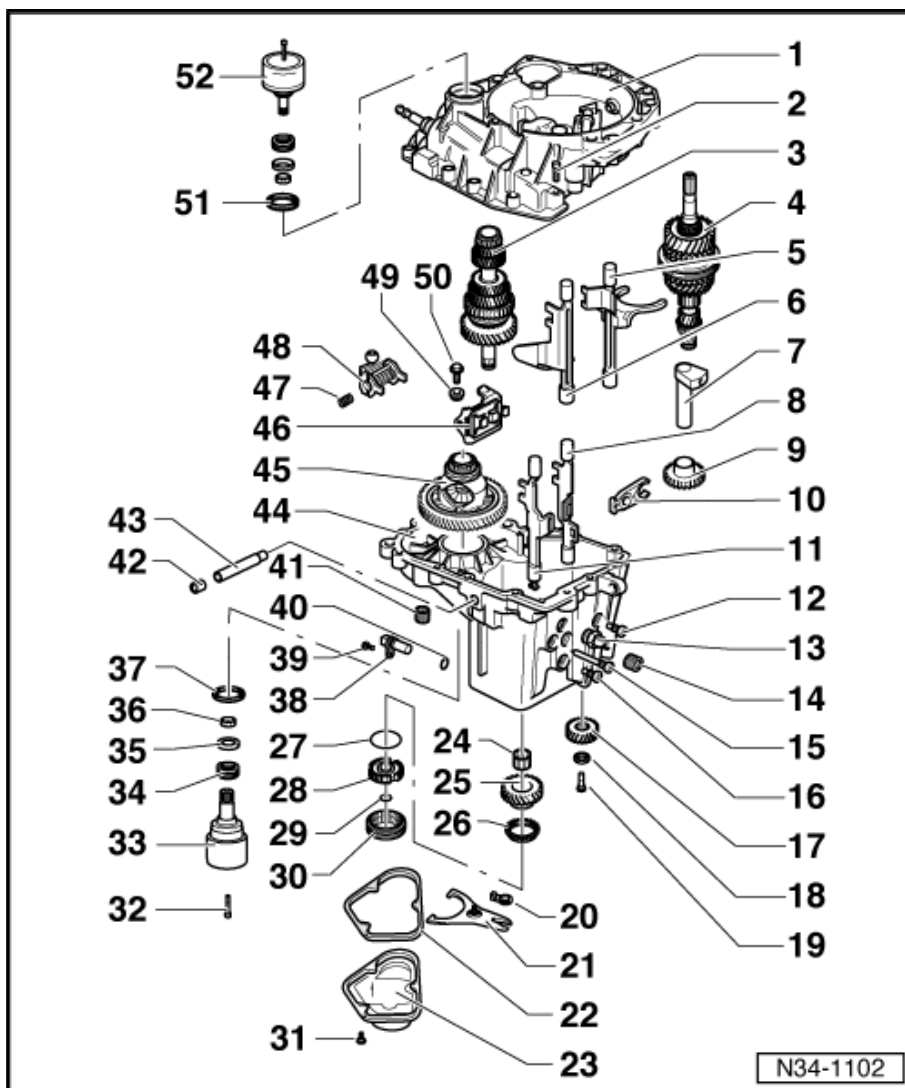
17 - 5th gear wheel

18 - Dished spring

- ☐ Outside edge (concave side) points towards 5th gear

19 - Bolt

- ☐ Renew



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- ☐ 40 Nm
- 20 - Clip**
- 21 - 5th gear selector fork**
 - ☐ With ball stud
- 22 - Gasket**
- 23 - Gearbox housing cover**
- 24 - Needle bearing**
 - ☐ For 5th gear
- 25 - 5th speed selector gear**
- 26 - 5th gear synchro-ring**
 - ☐ Locking pieces are on synchro-ring
- 27 - Spring**
- 28 - 5th gear synchronising hub**
- 29 - Circlip**
 - ☐ Renew
- 30 - 5th gear locking collar**
- 31 - Bolt**
 - ☐ 10 Nm
- 32 - Bolt**
 - ☐ 25 Nm
- 33 - Flange shaft (left-side)**
 - ☐ Different on left and right ➔ [page 87](#)
- 34 - Spring for flange shaft**
- 35 - Thrust washer**
- 36 - Tapered ring**
- 37 - Oil seal**
 - ☐ For flange shaft (left-side)
 - ☐ Different on left and right ➔ Electronic parts catalogue
 - ☐ Renewing with gearbox installed ➔ [page 134](#)
- 38 - Gearbox speed sender -G38-**
 - ☐ Fitting location ➔ [page 86](#)
 - ☐ Can be checked in „Guided fault finding“ using -VAS 5051- .
- 39 - Bolt**
 - ☐ Tightening torque ➔ [page 86](#)
- 40 - O-ring**
 - ☐ Renew
- 41 - Oil drain plug**
 - ☐ 25 Nm
- 42 - Sealing plug**
- 43 - Shift shaft**
- 44 - Gearbox housing**
 - ☐ If renewed: Refer to table of adjustments ➔ [page 142](#)
 - ☐ Insert magnet in gearbox housing, held in position by contact surface of gearbox housing
 - ☐ Installing oil collector in gearbox housing ➔ [page 86](#)



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45 - Differential

- ☐ Exploded view ⇒ [page 136](#)

46 - Selector console

47 - Spring

48 - Selector finger

49 - Bush

- ☐ for selector console

50 - Bolt

- ☐ 15 Nm

51 - Oil seal

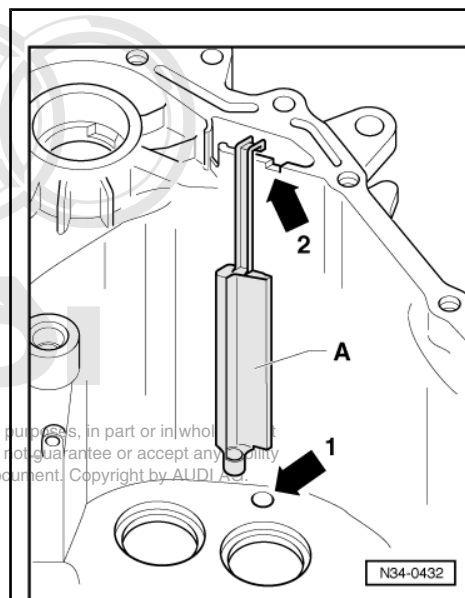
- ☐ For flange shaft (right-side)
- ☐ Different on left and right ⇒ Electronic parts catalogue
- ☐ Renewing with gearbox installed ⇒ [page 134](#)

52 - Flange shaft (right-side)

- ☐ Different on left and right ⇒ [page 87](#)

Installing oil collector in gearbox housing

- Simultaneously insert the oil collector -A- in the hole -arrow 1- and the groove -arrow 2-.



Fitting location and tightening torque of gearbox speed sender - G38-

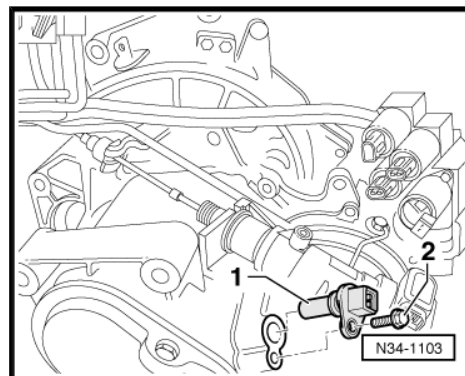
- ◆ Fitting location: Gearbox speed sender -1- is installed in gearbox housing behind threaded eyes for gearbox bracket (left-side)



Note

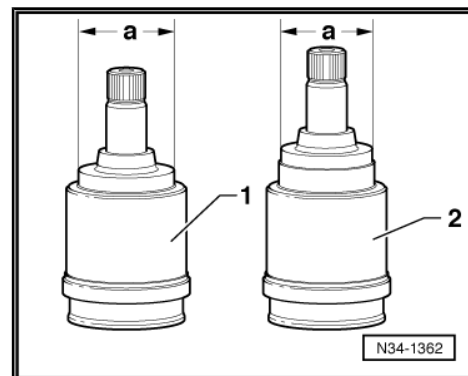
Renew O-ring.

- Tighten bolt -2- to 10 Nm.



Distinguishing feature of flange shafts

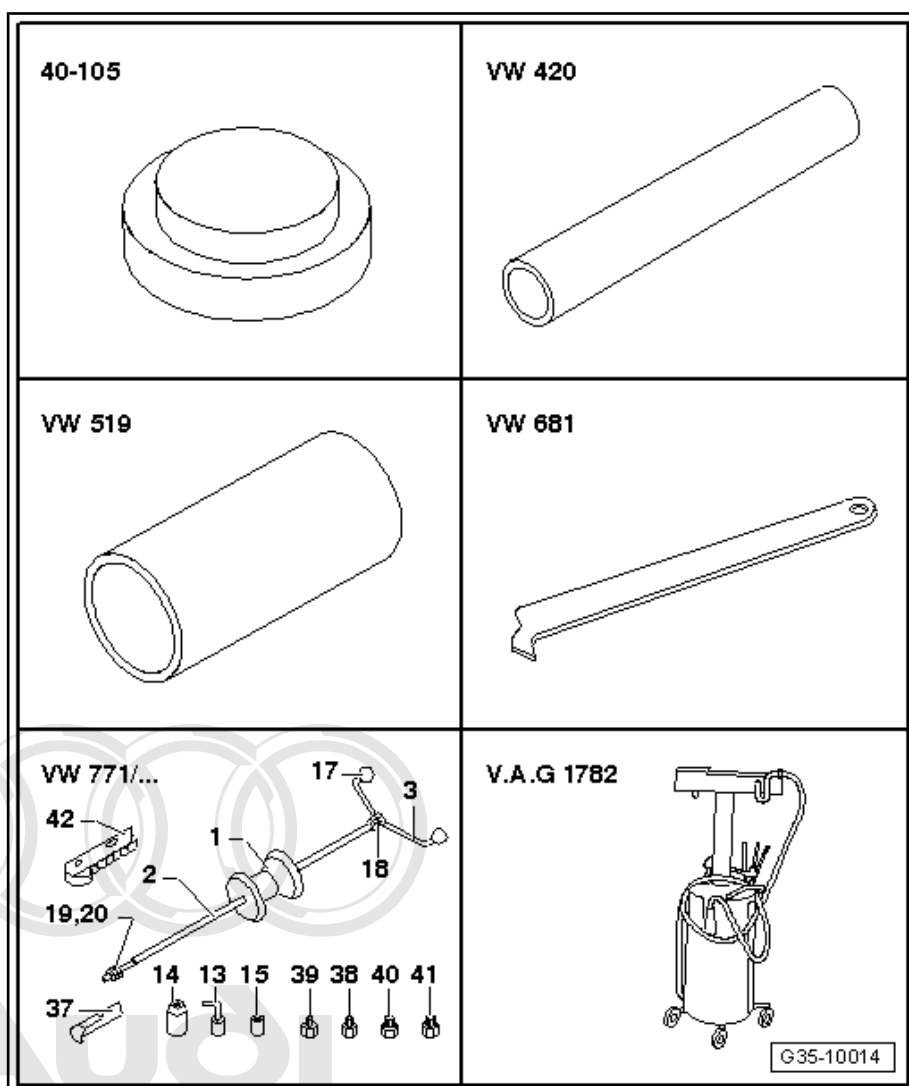
Item	Flange shaft	Dimension -a- (mm)
-1-	Left = Gearbox housing end	57
-2-	Right = Clutch housing end	48



13.1 Dismantling and assembling gearbox housing, selector mechanism, input shaft, output shaft (pinion shaft), differential and selector forks

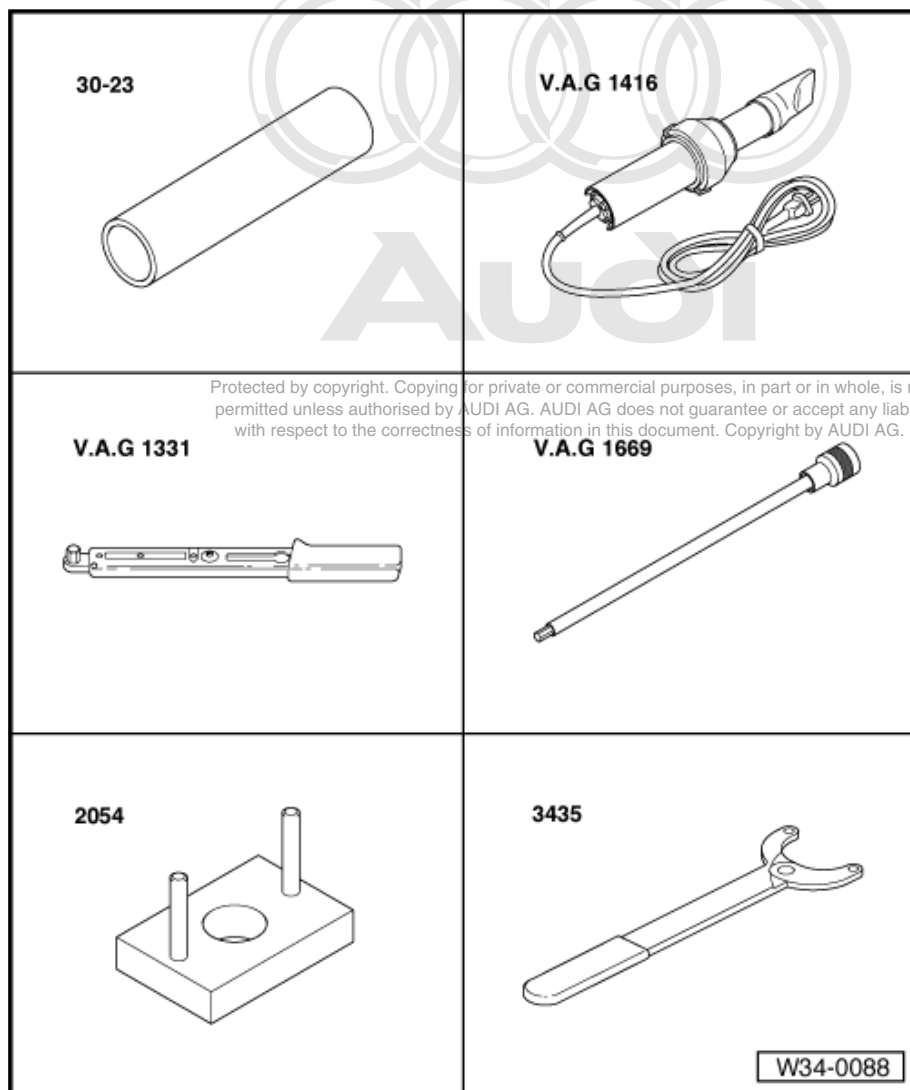
Special tools and workshop equipment required

- ◆ Thrust plate -40 - 105-
- ◆ Tube -VW 420-
- ◆ Tube -VW 519-
- ◆ Oil seal extractor lever -VW 681-
- ◆ Multi-purpose tool -VW 771- with -VW 771/38- and -VW 771/40-
- ◆ Used oil collection and extraction unit -V.A.G 1782-

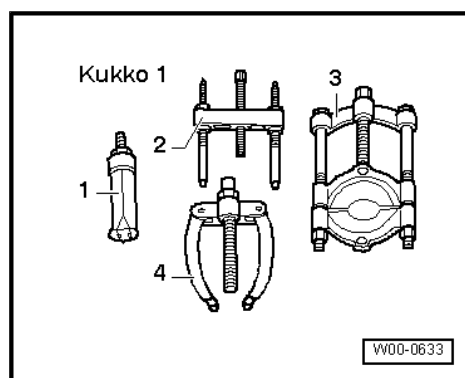


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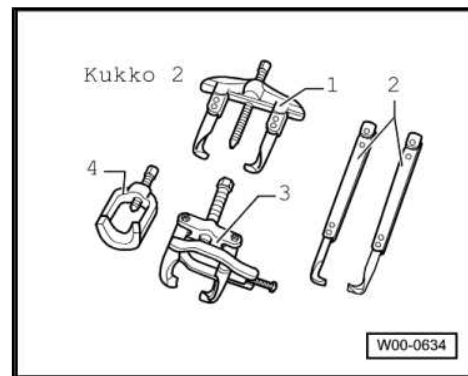
- ◆ Extension -30 - 23-
- ◆ Hot air blower -V.A.G 1416-
- ◆ Torque wrench -V.A.G 1331-
- ◆ Hexagon key -V.A.G 1669-
- ◆ Pressing-out tool -2054-
- ◆ Counterhold tool -3435-



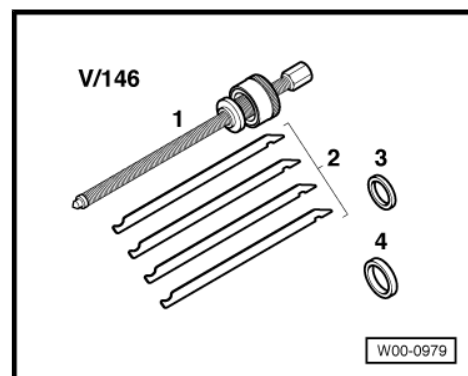
- ◆ -2-Puller -Kukko 18/1-



◆ -1- Two-arm puller -Kukko 20/10-



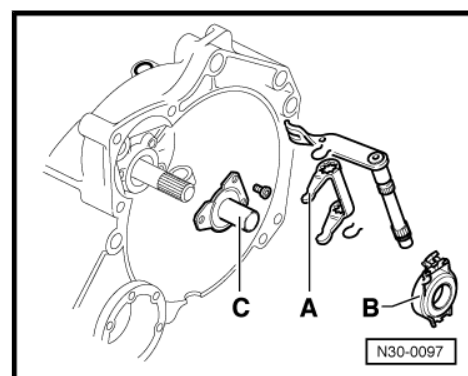
◆ -1- Ball bearing extractor -Matra V/146.6-



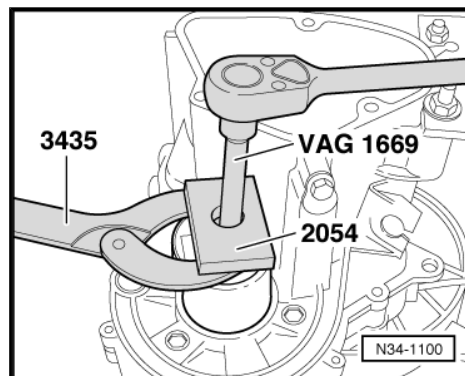
- ◆ -2- Hook -Matra V/146.7-
- ◆ -3- Support ring -Matra 6305-
- ◆ Puller arm -Matra V/170-
- ◆ Protective gloves

Dismantling

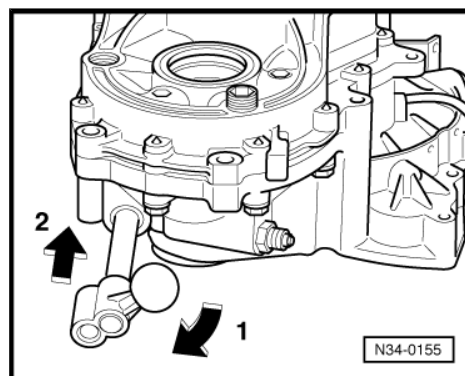
- Gearbox secured to engine and gearbox support ➔ [page 82](#) .
- Place used oil collection and extraction unit -V.A.G 1782- below gearbox.
- Turn the gearbox in the engine and gearbox support so that the oil drain plug is facing downwards.
- Drain off gear oil.
- Detach the clutch release lever -A- with release bearing -B-.
- Unscrew the guide sleeve -C-.



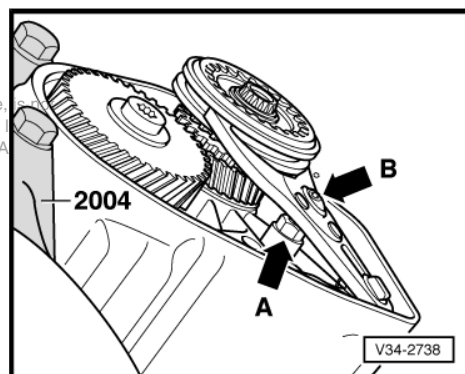
- Remove both flange shafts.
- Take out flange shafts together with springs, thrust washers and tapered rings.



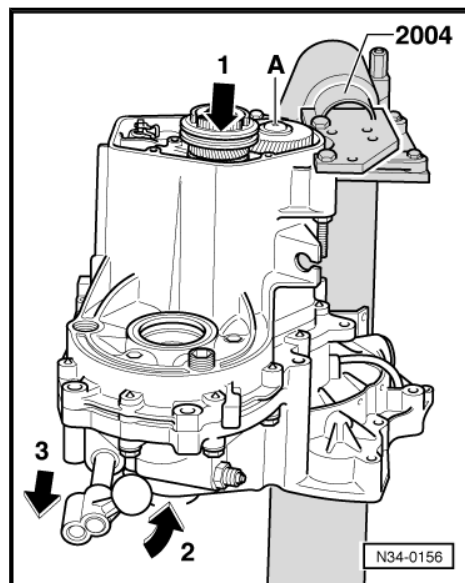
- Unbolt gearbox housing cover and detach together with gasket.
- Screw the selector finger to the selector shaft.
- Engage 5th gear -arrows 1 and 2-.



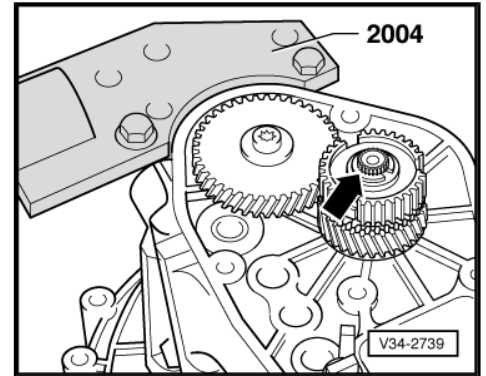
- Unfasten the lock nut -arrow A- beneath the 5th gear selector fork.
- Unscrew ball stud -arrow B- and remove selector fork together with 5th gear locking collar.



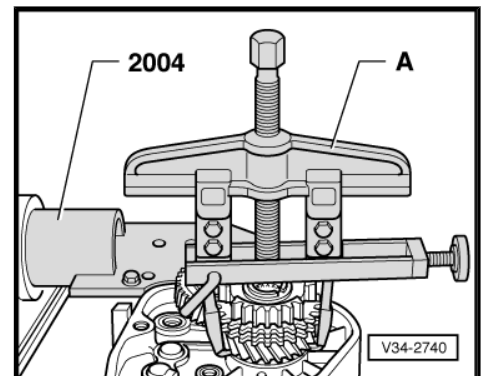
- Push 5th gear locking collar over synchronising hub again.
- Unscrew the bolt -A- for the 5th gear wheel. To do so, engage 5th gear -arrow 1- and 2nd gear -arrow 2, 3-.
- After engaging both gears the input shaft and output shaft are locked; the synchronising hub and gear wheel cannot turn. The bolt can now be loosened.
- Detach the 5th gear locking collar and disengage 2nd gear.



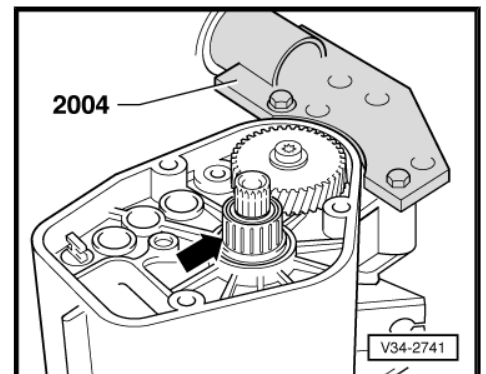
- Detach circlip -arrow- for synchronising hub.



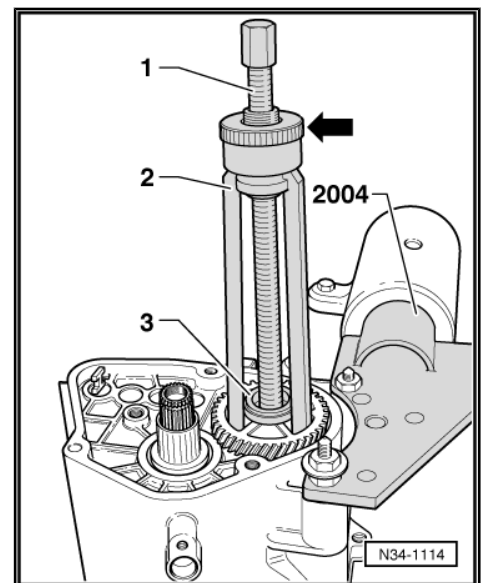
- Detach synchronising hub with 5th speed selector gear.
A - Two-arm puller -Kukko 20/10- with puller arm -Matra V/170-



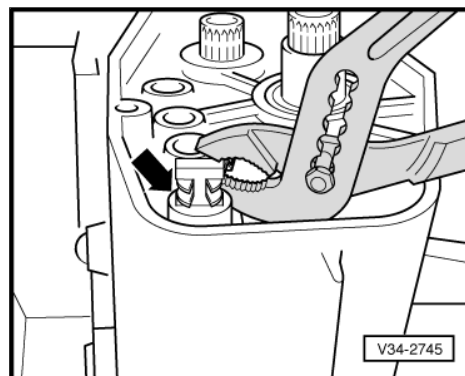
- Detach the needle bearing -arrow-.



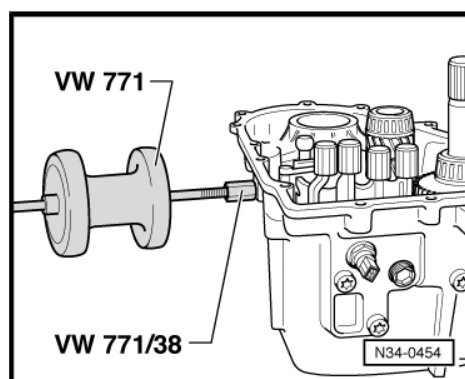
- Detach the 5th gear wheel. To do so, position the support ring -Matra 6305- -Item 3- on the gear wheel such that the chamfer is facing upwards.
- Insert the ball bearing extractor -Matra V/146.6- -Item 1- with 3 hooks -Matra V/146.7- -Item 2- in the gear wheel recesses.
- Press down the support ring -Matra 6305- and tension the hooks -Matra V/146.7- with the nut -arrow-.



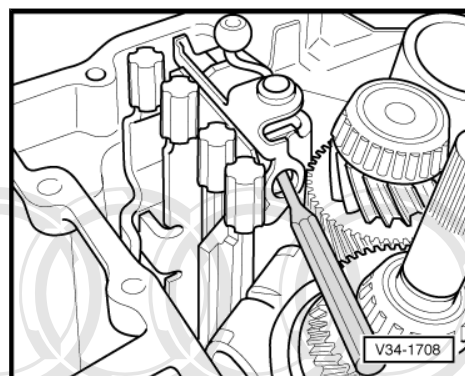
- Squeeze and detach the clip -arrow-.
- Remove the clutch housing bolts and detach the clutch housing.
- Detach the differential from the gearbox housing.



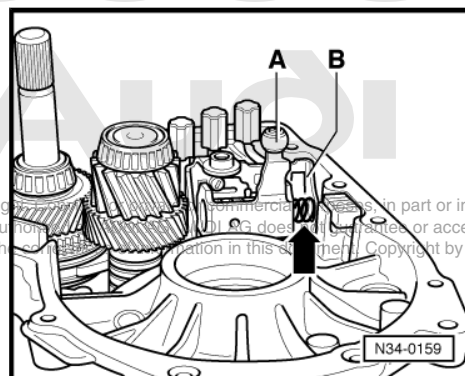
- Use the multi-purpose tool -VW 771- and -VW 771/38- to pull out the sealing plug.



- Pull out the shift shaft (drive out with a mandrel if necessary).

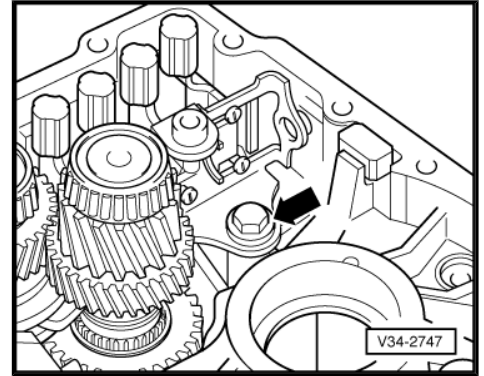


- Remove the spring -arrow- between the selector finger -A- and shift console -B-.
- Take out the selector finger.

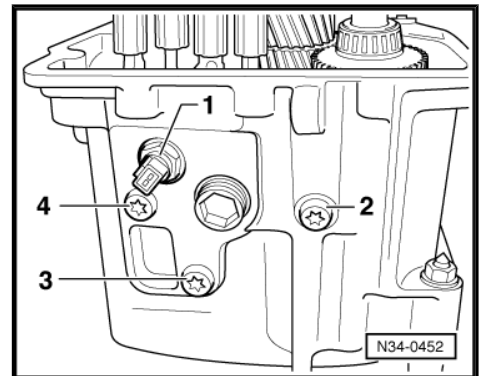


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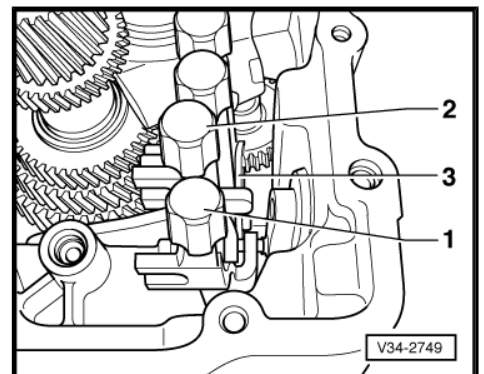
- Remove the bolt -arrow- and take out the shift console with bushing.



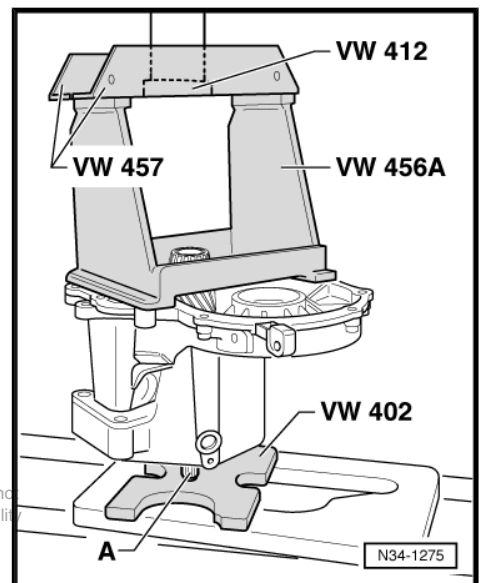
- Unscrew reversing light switch -F4- -item 1- and bolts -2, 3, 4- for reverse gear.



- Remove the 5th gear selector rod -1- and the selector rod -2- for reverse gear with reverse lever -3-.

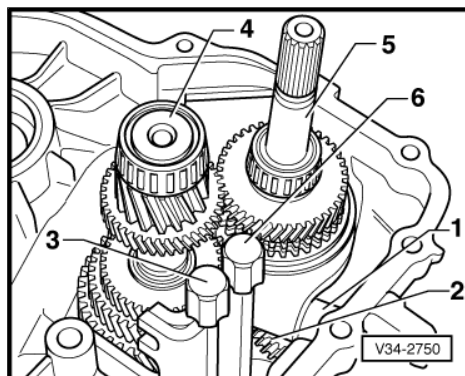


- Detach the gearbox from the engine and gearbox support to press out the output shaft.
- Press the output shaft -A- out of the mount in the gearbox housing.
- Re-attach the gearbox to the engine and gearbox support.



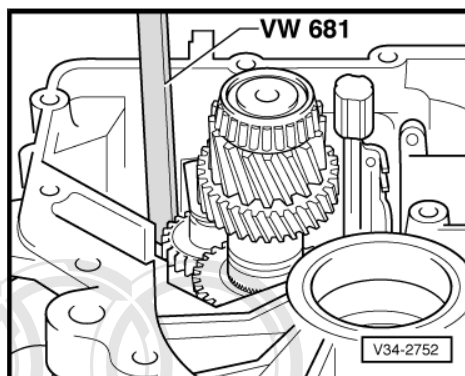
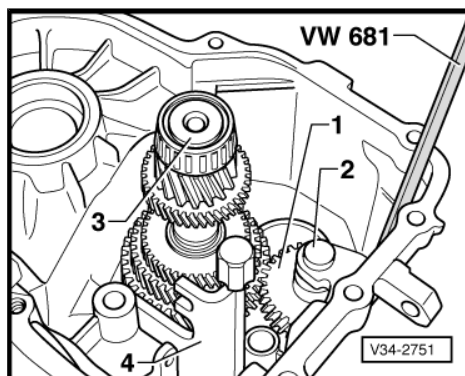
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- Drive out reverse gear shaft -1-.
- Take the input shaft -5-, output shaft -4-, 1st and 2nd gear selector rod -Item 3-, 3rd and 4th gear selector rod -Item 6-, reverse gear wheel -2- and shaft -1- out of the gearbox housing.



Assembling

- Tightening torques ⇒ [page 84](#)
- Press the taper roller bearing outer race for the output shaft into the gearbox housing ⇒ [page 121](#).
- Insert the output shaft -3- with 1st and 2nd gear selector rod -Item 4-.
- Slide the reverse gear wheel -1- over the shaft -2- and insert the shaft.
- Lift the reverse gear wheel with the pressing-out lever -VW 681- to permit subsequent insertion of the reverse lever for the reverse gear.

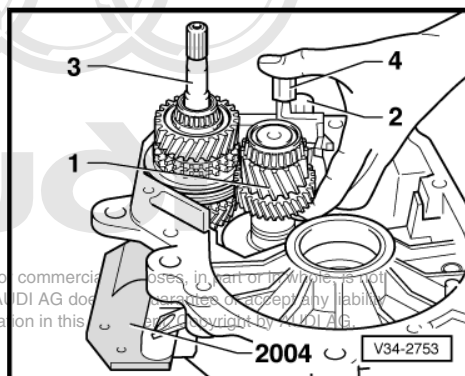


- Lift the output shaft -1- with 1st and 2nd gear selector rod -Item 2- slightly and re-insert together with the drive shaft -3- and the 3rd and 4th gear selector rod -Item 4-.



Note

- ◆ Reverse gear wheel still raised with pressing-off lever -VW 681-.
- ◆ On insertion with 3rd and 4th gear, guide the input shaft past the 4th gear wheel of the output shaft.



- Secure reverse gear shaft -arrow-.

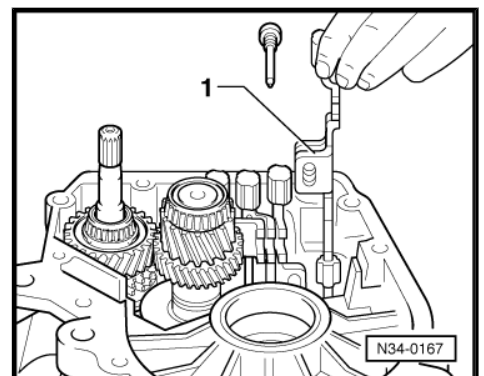
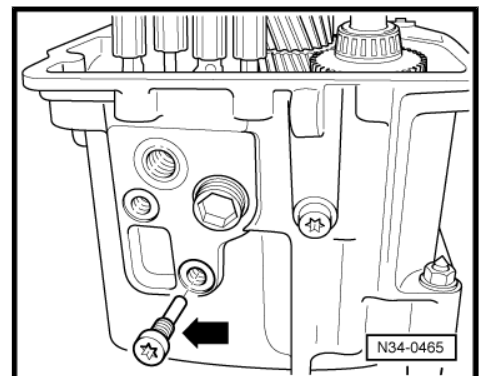
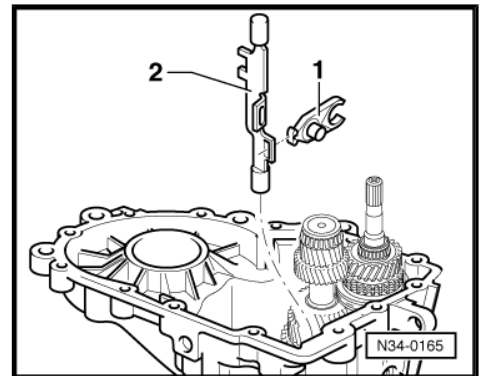
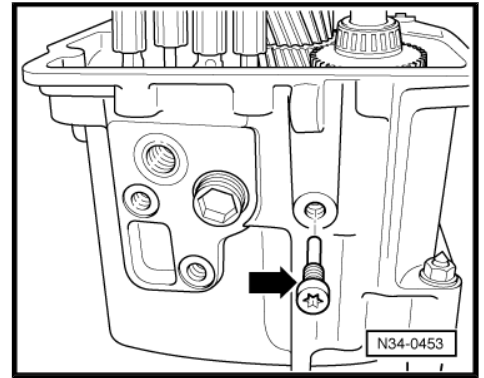
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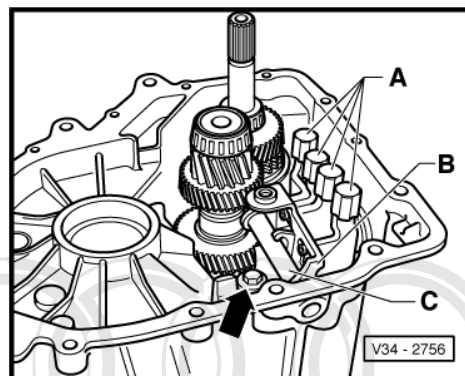
- Insert the reverse lever -1- in the selector rod -2- for reverse gear.
- Install components; for this purpose, first insert reverse lever into reverse gear wheel.

- Secure the reverse lever -arrow-.
- Take the pressing-out lever -VW 681- out of the gearbox housing.

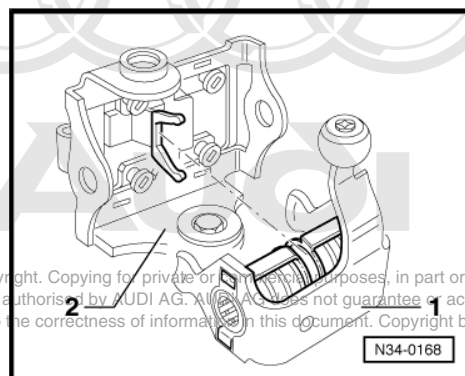
- Fit and secure the 5th gear selector rod -Item 1-.



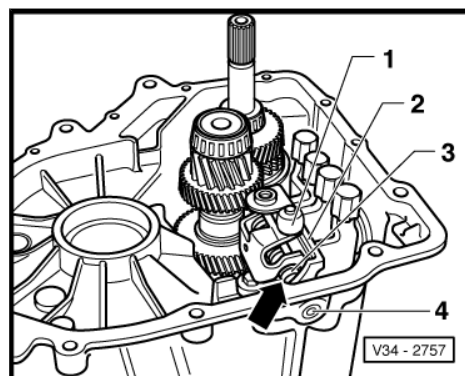
- Move the selector rods -A- into neutral position.
- Fit the shift console -B- with bushing and bolt.
- Align the shift console. To do so, insert the shift shaft -C- and tighten the bolt -arrow-.
- Take the shift shaft out again.



- Insert the selector finger -1- in the shift console -2-.

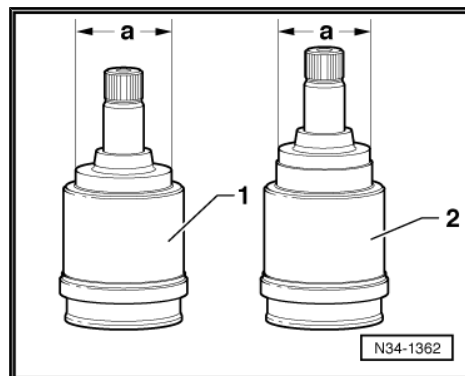


- Insert the spring -arrow- between the selector finger -1- and shift console -2-.
- Press the shift shaft -3- into the selector finger and shift console.

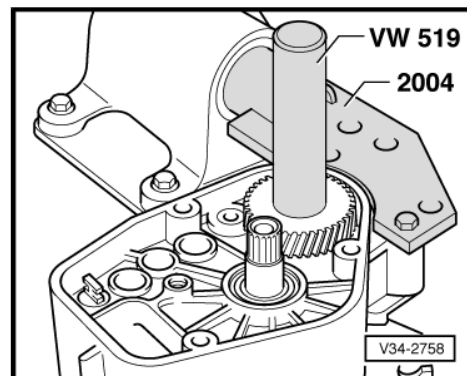


- Installation position: shoulder facing into gearbox housing
- Drive in the sealing plug -4- such that it is flush.
- Adjust the selector finger and selector sleeve if necessary
⇒ [page 106](#) .
- Insert differential.
- Install clutch housing.
- Screw in the reversing light switch -F4- .
- Fit the springs, thrust washers, tapered rings and flange shafts.

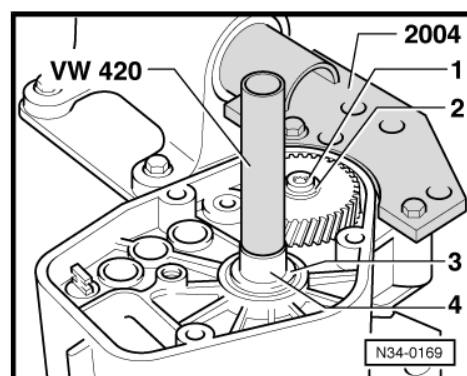
- Pay attention to the distinguishing features of the flange shafts
⇒ [page 87](#) .



- Drive on 5th gear wheel.
- Installation position: shoulder on inside diameter faces gear-box housing



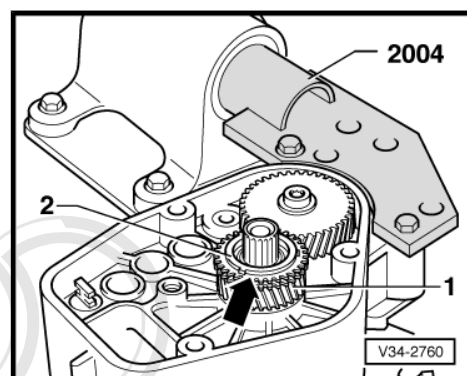
- Screw in a new bolt -1- with dished washer -2- for the 5th gear wheel.
- Installation position of dished spring: outer diameter (concave side) faces 5th gear.
- Fit thrust washer -3- for 5th speed selector gear.
- Installation position of thrust washer: Shoulder on inside diameter faces towards tapered roller bearing.



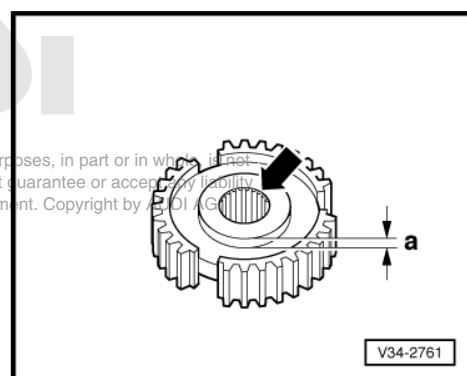
WARNING

Wear protective gloves.

- Heat the sleeve for the 5th gear needle bearing to approx. 100 °C on a hot plate and drive on.
- Fit 5th speed selector gear -item 1- with needle bearing.
- Position 5th gear synchro-ring -item 2- on selector gear.
- The drivers -arrow- of the 5th gear synchro-ring face the synchro-hub.
- Fit the 5th gear synchro-hub.
- Installation position: Tall collar -a- of synchronising hub facing gearbox housing.



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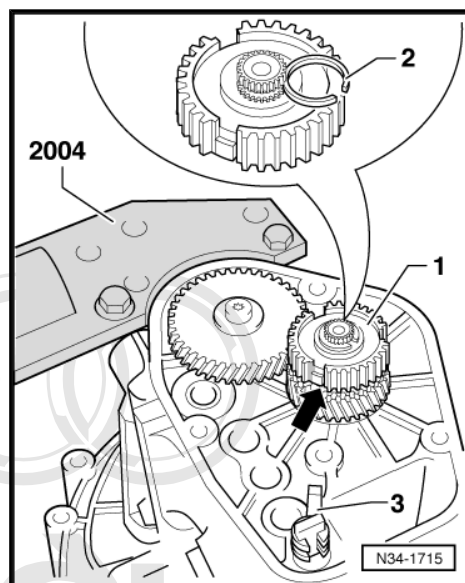
- Drive on the 5th gear synchro-hub -Item 1- with the attachment -30 - 23- .


Note

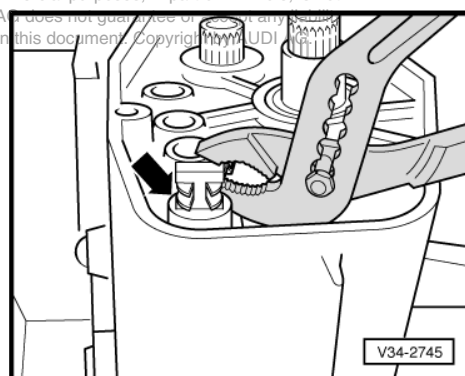
- ♦ *Pay attention to freedom of movement of the synchro-ring when driving on the synchro-hub.*
- ♦ *The locking pieces -arrow- must be positioned in the recesses of the synchro-ring.*
- Determine new circlip -2-.
- Determine and fit the thickest circlip which can still just be inserted; part no. ⇒ Electronic parts catalogue .

Available circlips - Thickness of circlips in mm		
2.0	2.3	2.6
2.1	2.4	
2.2	2.5	

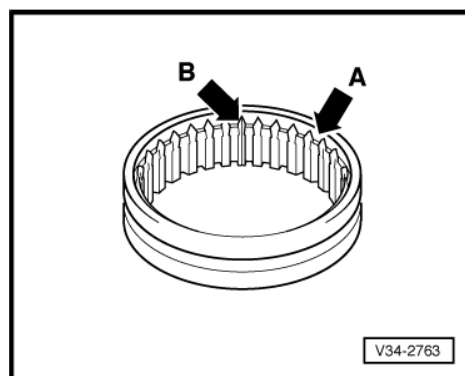
- Then fit the clip -3-.
- To do so, squeeze the clip -arrow- and position it on the 5th gear selector rod.



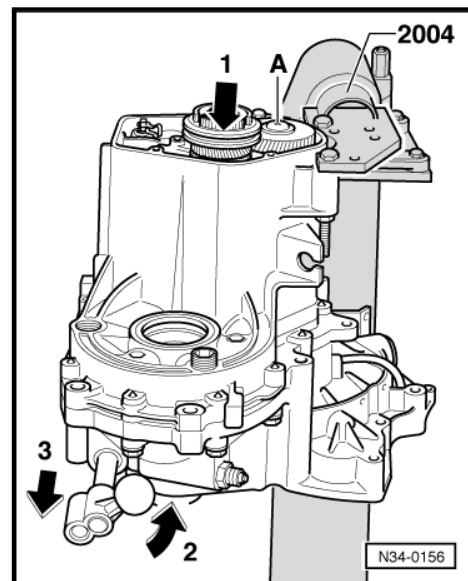
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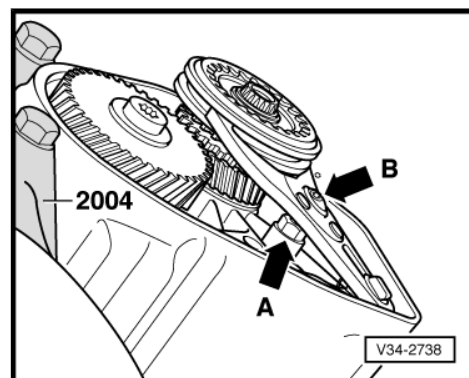
- Insert the 5th gear locking collar.
- Installation position: teeth with pointed end -arrow A- facing 5th speed selector gear
- Insert the markers on the splines -arrow B- in the recesses at the synchro-hub.



- Tighten the bolt -A- for the 5th gear wheel. To do so, engage 5th gear -arrow 1- and 2nd gear -arrow 2, 3-.
- Detach the locking collar again.

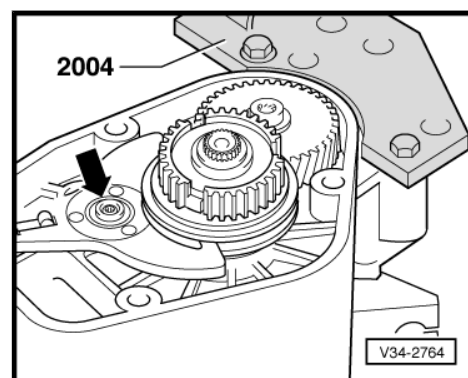


- If necessary, use a tap M8x1 to clean the tapped hole for the ball stud in the housing.
- Install locking collar together with 5th gear selector fork.
- Screw back the lock nut -arrow A- beneath the 5th gear selector fork.
- Screw in the ball stud -arrow B-.



Setting 5th gear - basic adjustment:

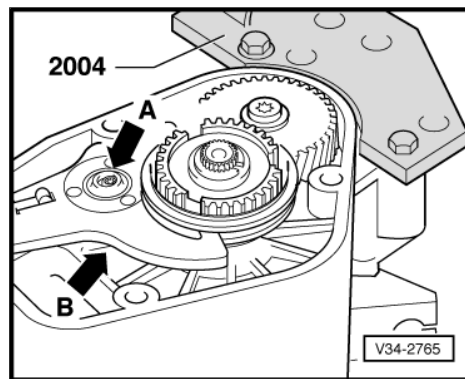
- Coat the thread of the ball stud with locking compound -D 000 600- .
- Turn gearbox to installation position.
- All selector rods must be in neutral position.
- Loosen lock nut on ball stud.
- By turning the ball stud -arrow-, set the locking collar flush with the synchro-hub.



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Fine adjustment:

- Select 5th gear.
- Screw in the ball stud -arrow A- until there is no longer any axial clearance at the 5th gear selector fork in the groove of the locking collar.
- Then screw back the ball stud until there is still just clearance between the locking collar and selector fork (roughly $\frac{1}{8}$ of a turn).
- Lock the ball stud with the lock nut -arrow B- under the 5th gear selector fork against the gearbox housing (the stud must not be turned).
- Disengage 5th gear.
- Locking collar should now be in the neutral position.
- The synchro-ring must move freely.
- Fit gasket.
- Install gearbox housing cover.



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14 Exploded view - clutch housing

1 - Locking bolt for selector shaft

- ☐ 40 Nm

2 - Dowel sleeve

- ☐ 2x

3 - Tapered roller bearing outer race

- ☐ For input shaft
- ☐ Removing and installing
⇒ [Item 21 \(page 111\)](#)

4 - Shim

- ☐ For input shaft
- ☐ Table of adjustments
⇒ [page 142](#)

5 - Release shaft

- ☐ Removing and installing
⇒ [page 20](#)

6 - Screw plug with sealing plug

7 - Breather pipe

8 - Clutch housing

- ☐ Servicing ⇒ [page 103](#)
- ☐ If renewed: Refer to table of adjustments
⇒ [page 142](#)

9 - Input shaft oil seal

- ☐ Removing ⇒ [page 104](#)
- ☐ Installing ⇒ [page 105](#)

10 - Guide sleeve

11 - Bolt

- ☐ 20 Nm

12 - Release bearing

- ☐ Removing and installing ⇒ [Item 8 \(page 19\)](#)

13 - Guide bush

14 - Input shaft with pinion

- ☐ For speedometer

15 - Oil seal for flange shaft

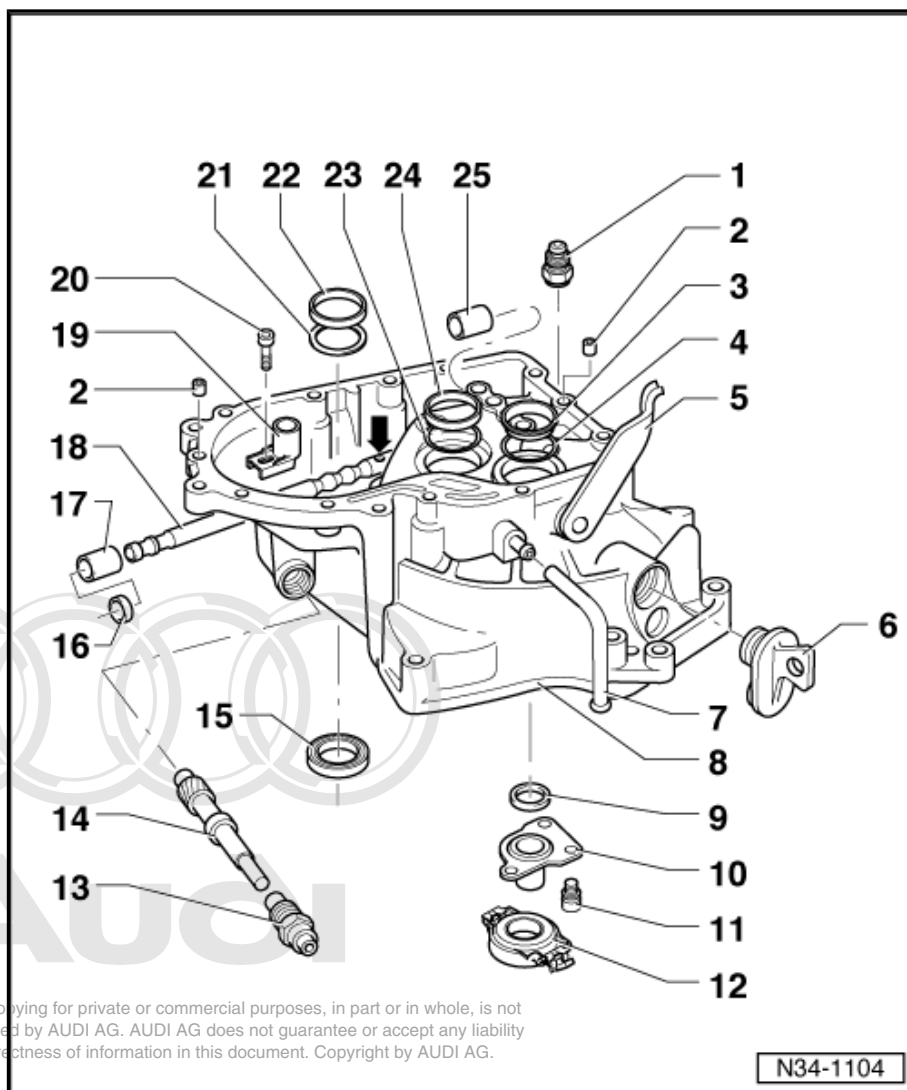
- ☐ Removing ⇒ [page 105](#)
- ☐ Installing ⇒ [page 105](#)
- ☐ Renewing (with gearbox installed) ⇒ [page 134](#)

16 - Oil seal for selector shaft

- ☐ Removing ⇒ [page 105](#)
- ☐ Installing ⇒ [page 106](#)
- ☐ Can be renewed with gearbox in vehicle

17 - Front ball sleeve for selector shaft

- ☐ Removing and installing ⇒ [page 106](#)





18 - Selector shaft

- ☐ Installation position: chamfer -arrow- facing selector sleeve -item 19-
- ☐ Lubricate sliding surfaces with MoS₂ grease
- ☐ Adjusting ⇒ [page 106](#)

19 - Selector sleeve

- ☐ Adjusting ⇒ [page 106](#)

20 - Bolt

- ☐ 25 Nm

21 - Shim

- ☐ For differential
- ☐ Table of adjustments ⇒ [page 142](#)

22 - Tapered roller bearing outer race

- ☐ For differential
- ☐ Removing and installing ⇒ [Item 3 \(page 136\)](#)
- ☐ If renewed: adjust differential ⇒ [page 143](#)

23 - Shim

- ☐ For output shaft
- ☐ Table of adjustments ⇒ [page 142](#)

24 - Tapered roller bearing outer race

- ☐ For output shaft
- ☐ Removing and installing ⇒ [page 121](#)

25 - Rear ball sleeve for selector shaft

- ☐ Removing and installing ⇒ [page 106](#)

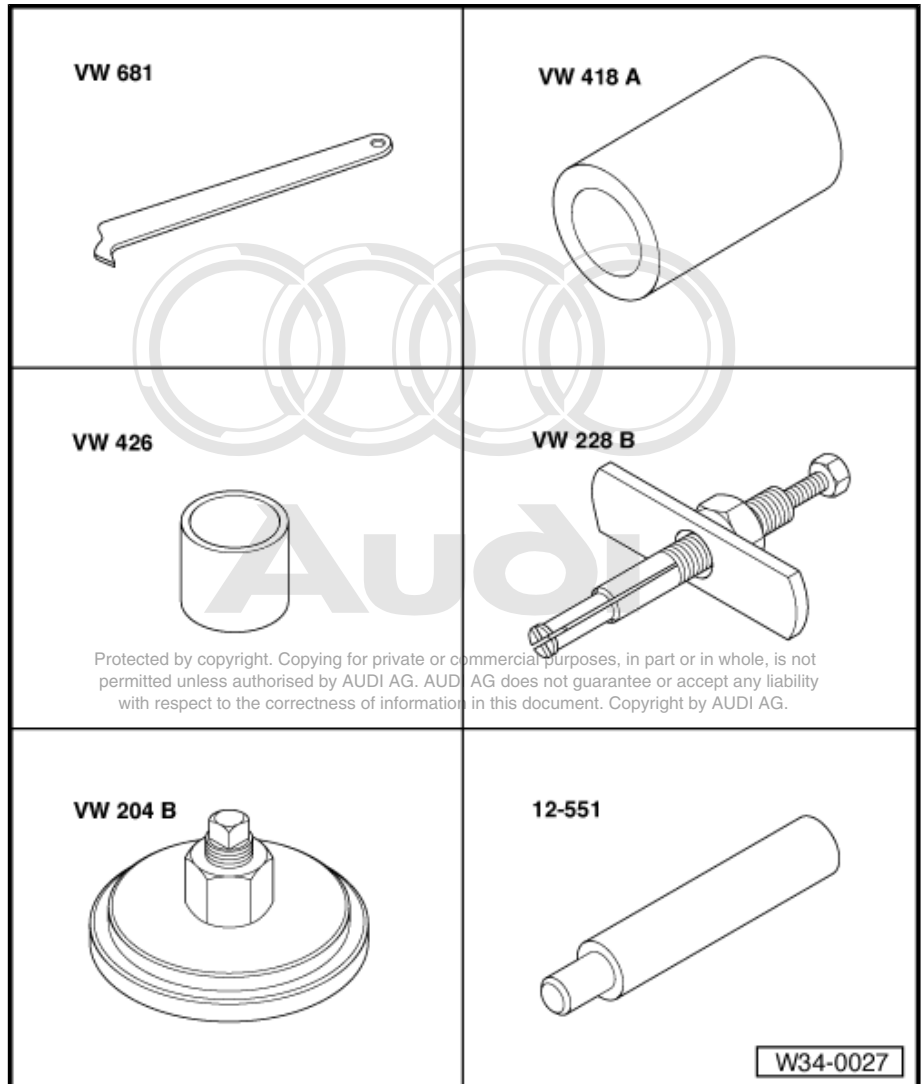


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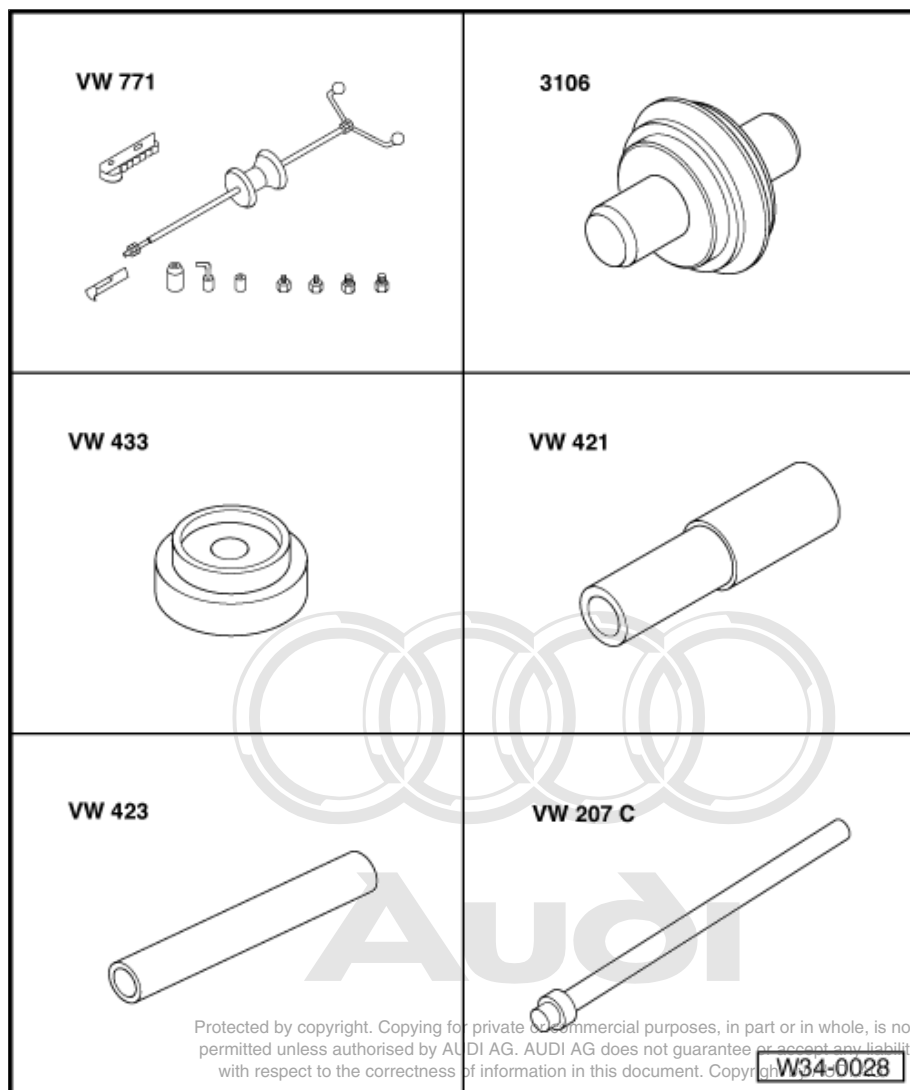
14.1 Servicing clutch housing

Special tools and workshop equipment required

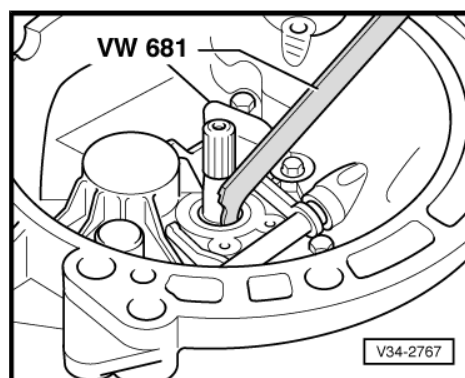
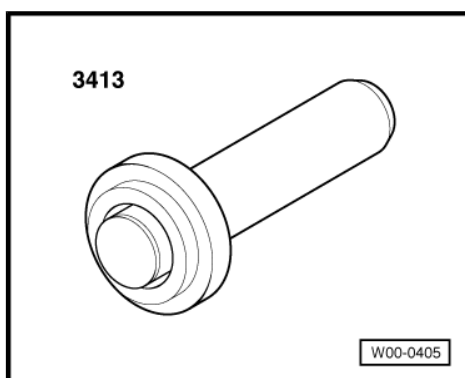
- ◆ Oil seal extractor lever -VW 681-
- ◆ Tube -VW 418 A-
- ◆ Tube -VW 426-
- ◆ Extractor -VW 228 B-
- ◆ Crankshaft seal installing tool -VW 204 B-
- ◆ Centring mandrel -12 - 551-



- ◆ Multi-purpose tool -VW 771- with -VW 771/37-
- ◆ Drift -3106-
- ◆ Press tool -VW 433-
- ◆ Tube -VW 421-
- ◆ Tube -VW 423-
- ◆ Drift -VW 207 C-



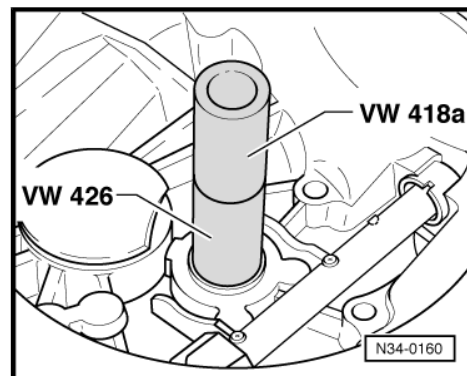
- ◆ Thrust piece -3413-



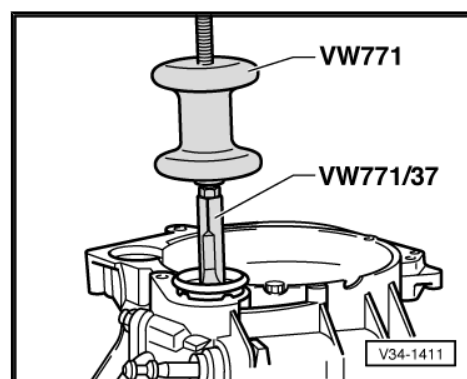
Extracting input shaft oil seal

Driving in input shaft oil seal

- Installation position: 2.5 mm beneath surface of housing
- Pack space between sealing lip and dust lip with sealing grease -G 052 128 A1- .

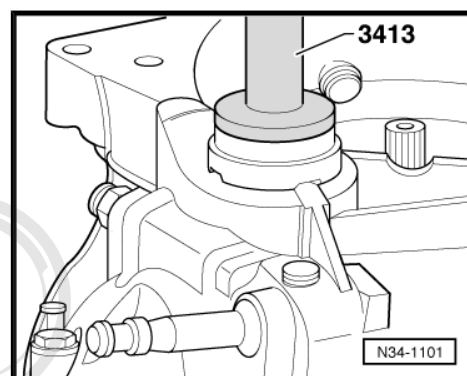


Extracting flange shaft oil seal



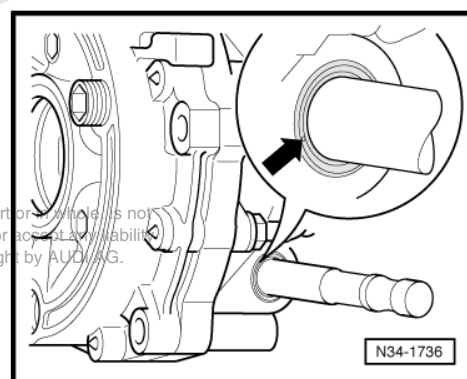
Driving in flange shaft oil seal (drive in onto stop)

- Pack space between sealing lip and dust lip with sealing grease -G 052 128 A1- .



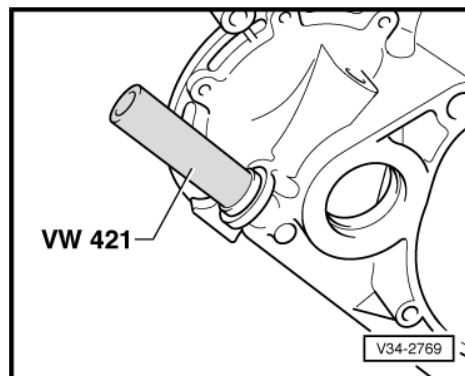
Prising out selector shaft oil seal

- Pull out selector shaft.
- Wind thin insulating tape around the selector shaft to avoid damaging it.
- Slide home the selector shaft again.
- Use a small screwdriver to carefully make a hole in the centre of the oil seal -arrow-.
- Use a slightly larger screwdriver to prise out the oil seal.
- Remove the insulating tape and check the selector shaft for damage.



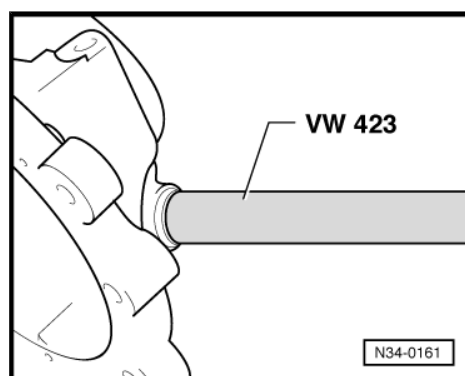
Pressing in selector shaft oil seal (press onto stop)

- Slide oil seal carefully over chamfer of selector shaft, turning oil seal at the same time



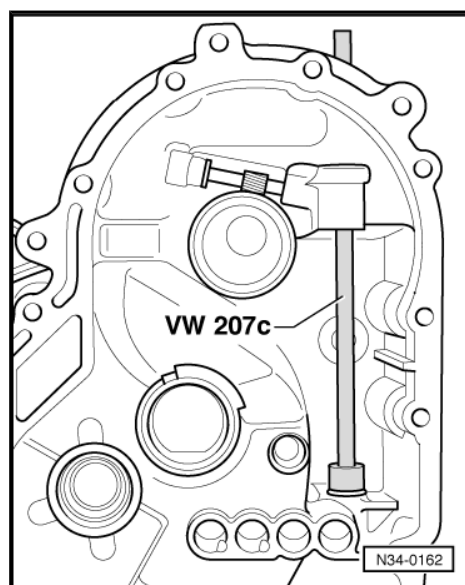
Removing and installing front ball sleeve

- Installation position: 10 mm beneath surface of housing



Removing and installing rear ball sleeve

- Installation position: ball sleeve must be flush with rear part of lug



14.2

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Adjusting selector finger and selector sleeve

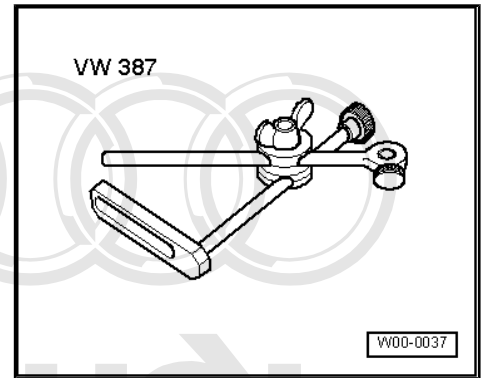


Note

- ◆ Adjustment is required if the following components have been renewed:
- ◆ Selector finger, selector sleeve, clutch housing, gearbox housing, selector shaft or locking element for selector shaft.

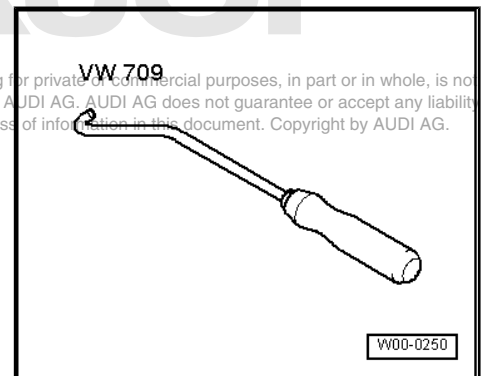
Special tools and workshop equipment required

◆ Universal dial gauge bracket -VW 387-

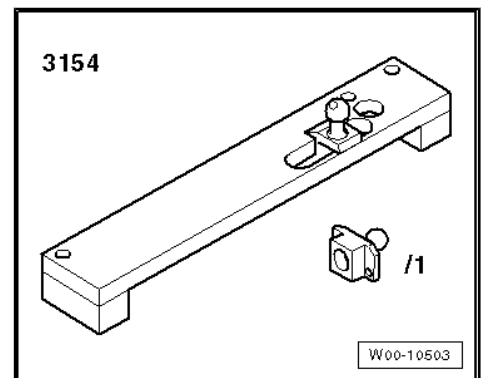


◆ Clamping tool -VW 709-

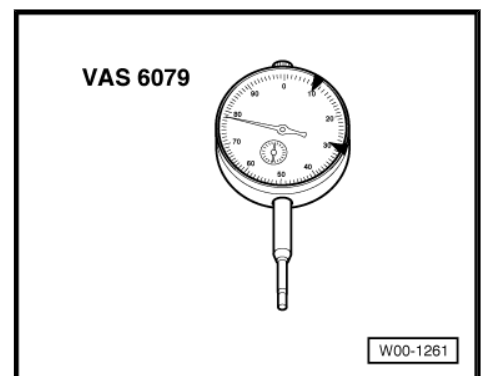
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◆ Adjusting tool -3154-

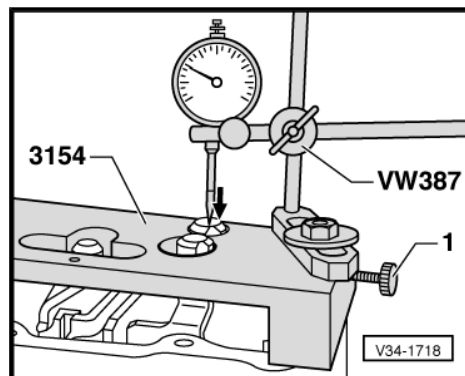


◆ Dial gauge -VAS 6079-

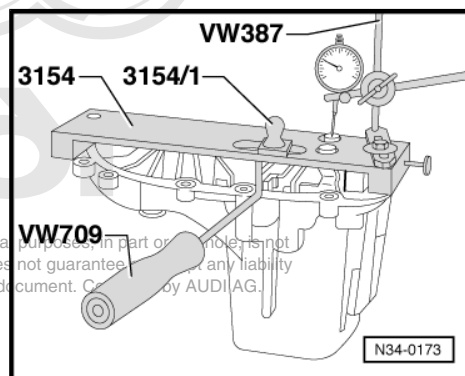


Procedure

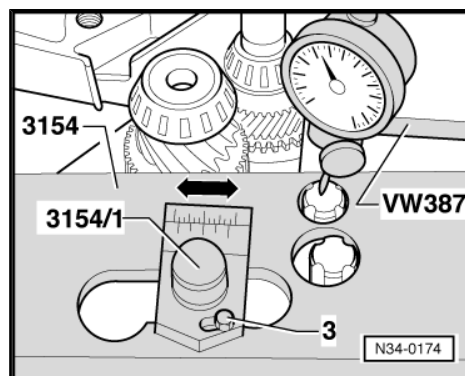
- Tightening torque ⇒ [page 101](#)
- Position the adjustment device -3154- with dowel sleeves on the gearbox housing.
- Attach the universal dial gauge holder -VW 387- with dial gauge -VAS 6079- and dial gauge extension.
- Position the dial gauge with 1 mm preload on the selector rod for reverse gear.
- Press the selector rod from above -arrow- and set the dial gauge to „0“.
- Press the selector rod from underneath against the dial gauge and read off the measured value.
- Measurement in following example: 0.70 mm.
- Lock the selector rod in the centre position. To do so, press the selector rod from underneath until a value of 0.35 mm is attained and then secure the selector rod with the bolt -1-.
- Pull the selector finger with the clamping tool -VW 709- into the reverse gear gate and fit the measurement attachment -3154/1-.



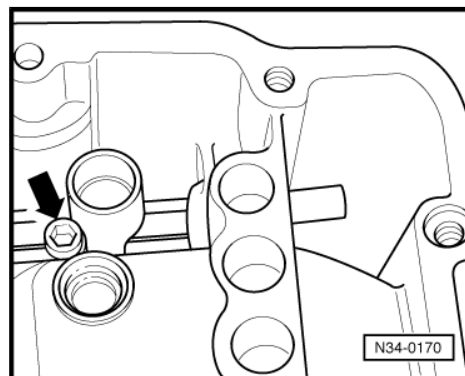
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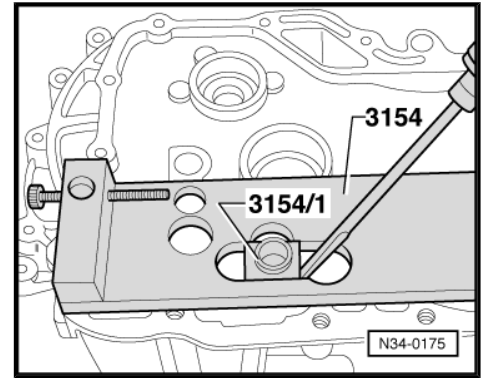
- Move the measurement attachment from stop to stop and read the value off the scale.
- Measurement in following example: 0.60 mm.
- Halve the measured value and tighten the bolt -3-.
- Measurement in following example: $0.60 \text{ mm} : 2 = 0.30 \text{ mm}$
- Detach the universal dial gauge holder -VW 387-.



- Slacken off the clamping bolt -arrow- until the selector sleeve can be moved freely on the selector shaft.
- Set the selector shaft to the centre detent.



- Insert the dowel sleeves in the clutch housing, turn the adjustment device -3154- through 180° and position it on the clutch housing such that the selector finger and selector sleeve are aligned.
- Tighten clamping bolt for selector sleeve.



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35 – Gears, shafts

1 Exploded view - input shaft



Note

- ◆ Refer to technical data when installing new gears ⇒ [page 1](#).
- ◆ The input shaft must be re-adjusted if component replacement affects the position of the taper roller bearings ⇒ [page 117](#).
- ◆ Table of adjustments ⇒ [page 142](#)

1 - Bolt

- ☐ Fitted piece on bolt head holds dished spring in position
- ☐ 40 Nm

2 - Dished spring

3 - 5th gear wheel

- ☐ Removing and installing ⇒ [Item 17 \(page 84\)](#)

4 - Washer

- ☐ 1 mm thick

5 - Tapered roller bearing outer race

- ☐ Pressing out ⇒ [page 113](#)
- ☐ Pressing in ⇒ [page 114](#)

6 - Tapered roller bearing inner race

- ☐ Pulling off ⇒ [page 114](#)
- ☐ Pressing on ⇒ [page 114](#)

7 - Gearbox housing

8 - Input shaft

- ☐ Adjusting ⇒ [page 117](#)

9 - Needle bearing

- ☐ Oil before installing

10 - 3rd speed selector gear

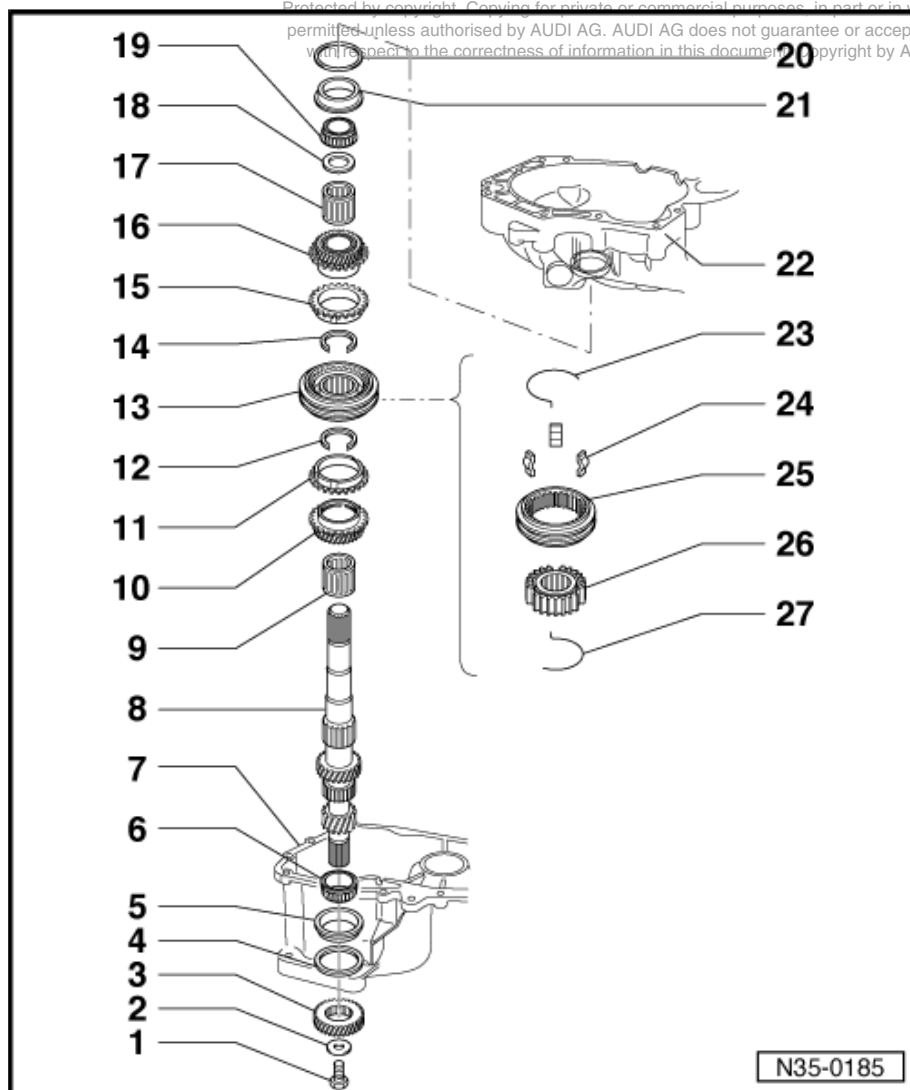
- ☐ Pressed off ⇒ [page 115](#) and pressed on ⇒ [page 116](#) together with locking collar/synchro-hub for 3rd and 4th gear

11 - 3rd gear synchro-ring

- ☐ Checking for wear ⇒ [page 116](#)

12 - Circlip

- ☐ Pressing out ⇒ [page 115](#)
- ☐ Fitting ⇒ [page 115](#)



13 - Locking collar with synchronising hub for 3rd and 4th gear

- ☐ Parts are paired
- ☐ Pressing off ⇒ [page 115](#)
- ☐ Assembly ⇒ [page 116](#) and ⇒ [page 116](#)
- ☐ Pressing on ⇒ [page 116](#)

14 - Circlip

- ☐ Pressing out ⇒ [page 115](#)
- ☐ Fitting ⇒ [page 115](#)

15 - 4th gear synchro-ring

- ☐ Checking for wear ⇒ [page 116](#)

16 - 4th speed selector gear

17 - Needle bearing

- ☐ Oil before installing

18 - Thrust washer

19 - Tapered roller bearing inner race

- ☐ Can be removed without tools

20 - Shim

- ☐ Determining thickness ⇒ „1.2 Adjusting input shaft“, [page 117](#)

21 - Tapered roller bearing outer race

- ☐ Pulling out ⇒ [page 114](#)
- ☐ Pressing in ⇒ [page 115](#)

22 - Clutch housing

23 - Spring

- ☐ Installation position ⇒ [page 116](#)

24 - Locking piece

- ☐ 3x

25 - Locking collar

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26 - Synchronising hub

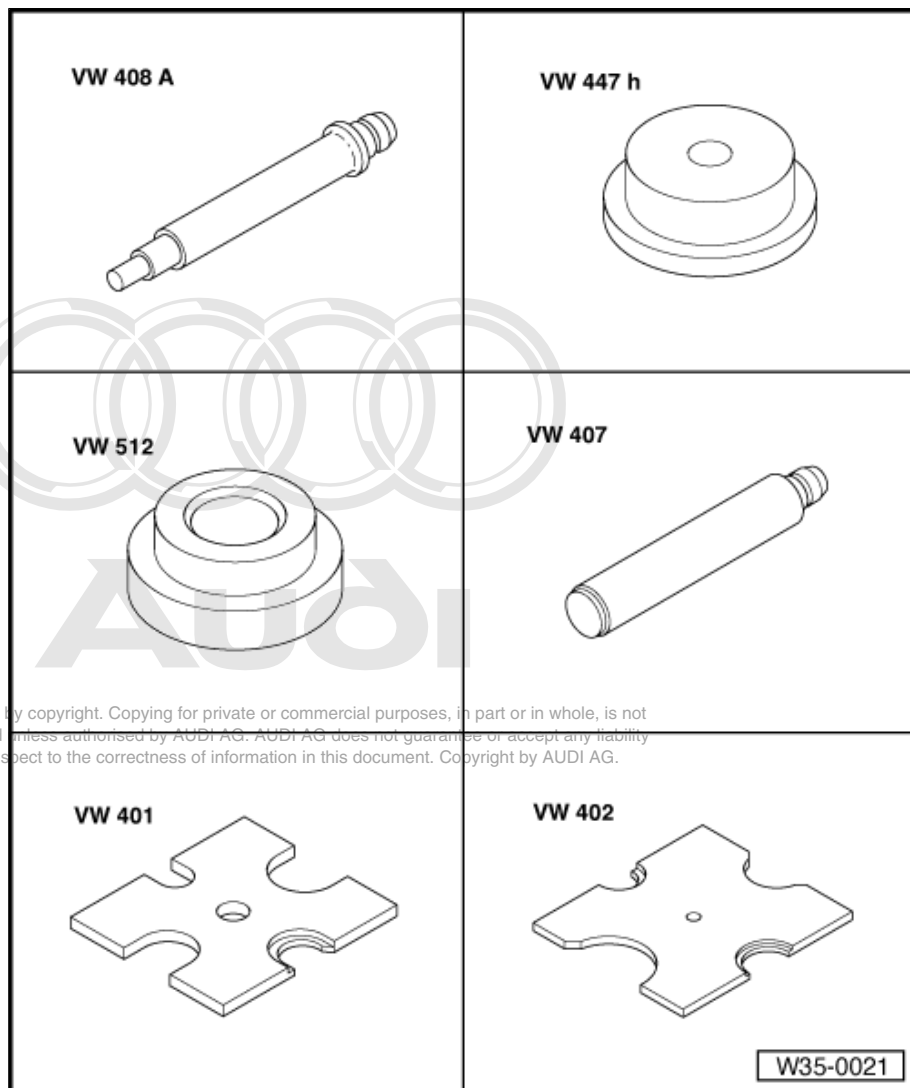
27 - Spring

- ☐ Installation position ⇒ [page 116](#)

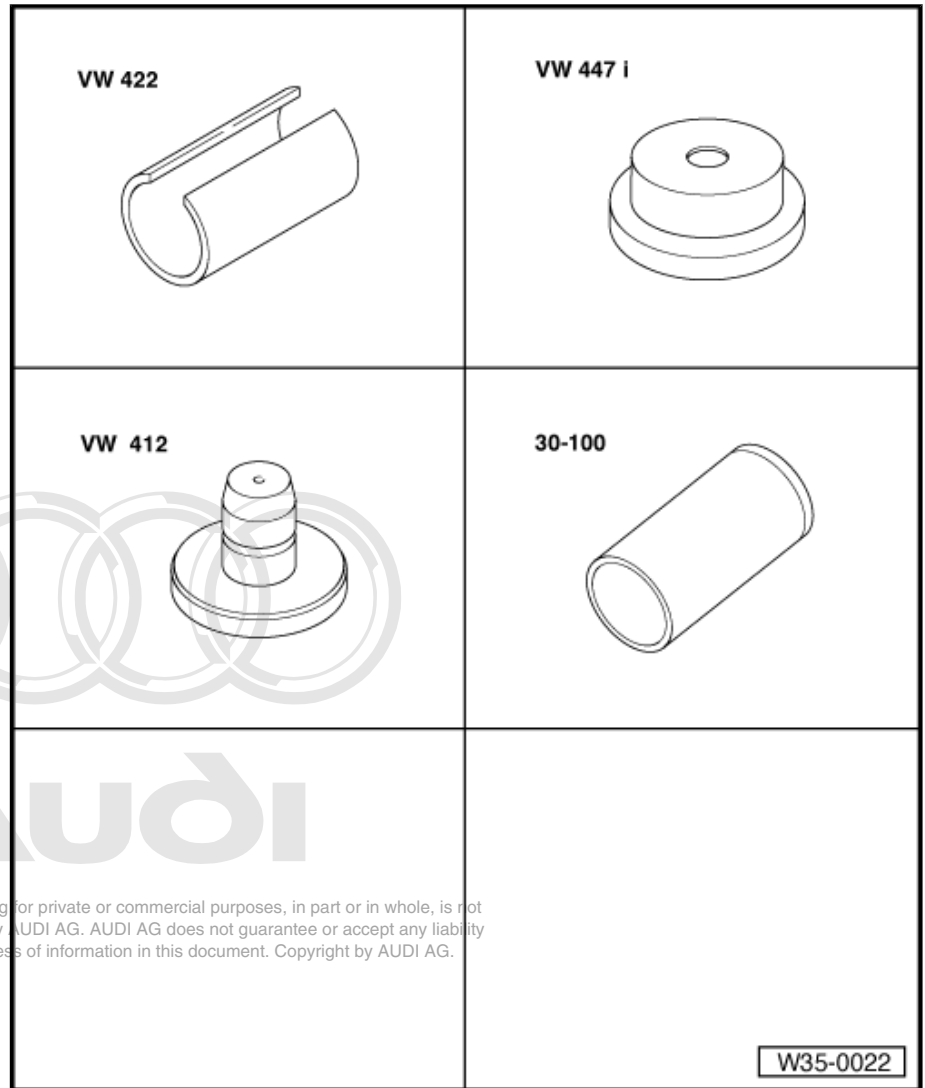
1.1 Dismantling and assembling input shaft

Special tools and workshop equipment required

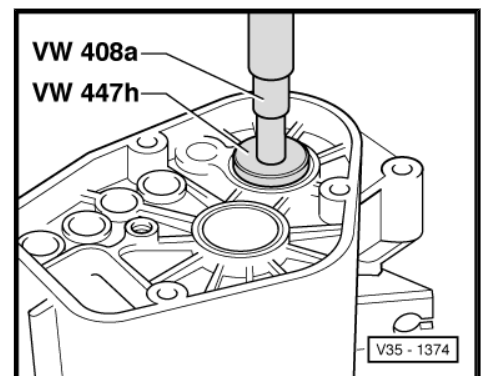
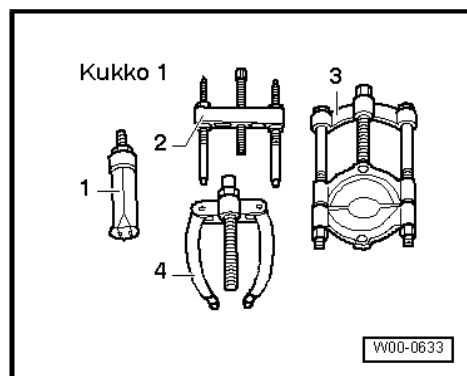
- ◆ Press tool -VW 408 A-
- ◆ Thrust plate -VW 447 H-
- ◆ Thrust pad -VW 512-
- ◆ Press tool -VW 407-
- ◆ Thrust plate -VW 401-
- ◆ Thrust plate -VW 402-



- ◆ Tube -VW 422-
- ◆ Thrust plate -VW 447 i-
- ◆ Press tool -VW 412-
- ◆ Drift sleeve -30 - 100-



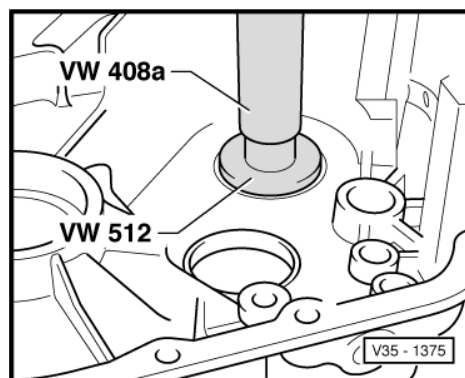
- ◆ -1-internal puller - Kukko 21/6-



- ◆ -3- Splitter -Kukko 17/2-
- ◆ -4- Counter-support - Kukko 22/2-

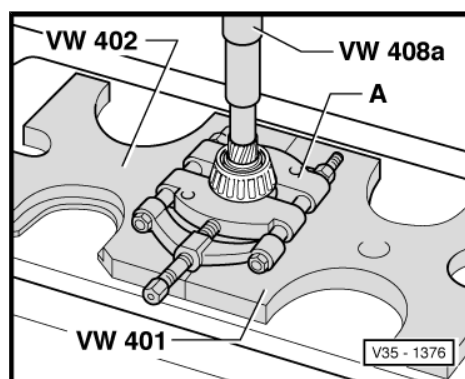
Pressing out tapered roller bearing outer race

Pressing in tapered roller bearing outer race

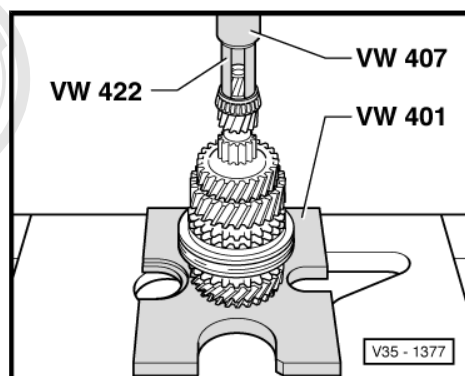


Pulling off inner race for small tapered roller bearing

A - Splitter 22 ... 115 mm -Kukko 17/2-



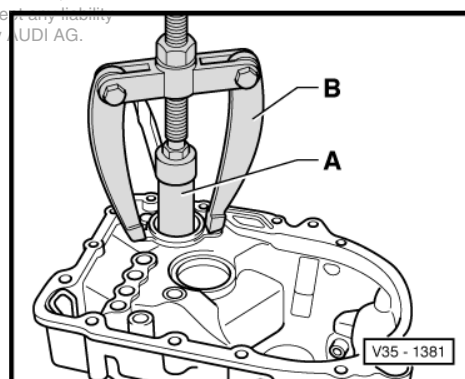
Pressing on inner race for small tapered roller bearing



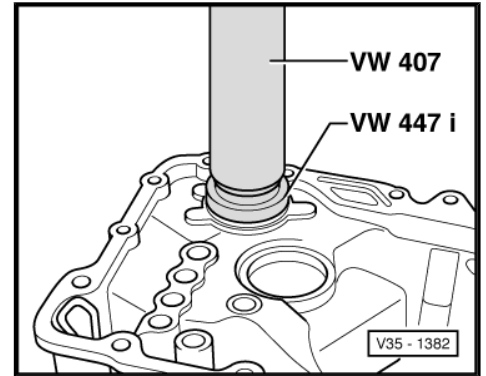
Pulling out tapered roller bearing outer race

A - Internal puller 37 ... 46 mm -Kukko 21/6-

B - Counter-support -Kukko 22/2-



Pressing in tapered roller bearing outer race



Removing circlip -1- from groove

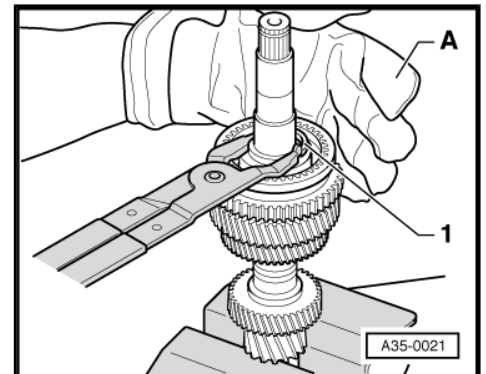
A - Protective glove



WARNING

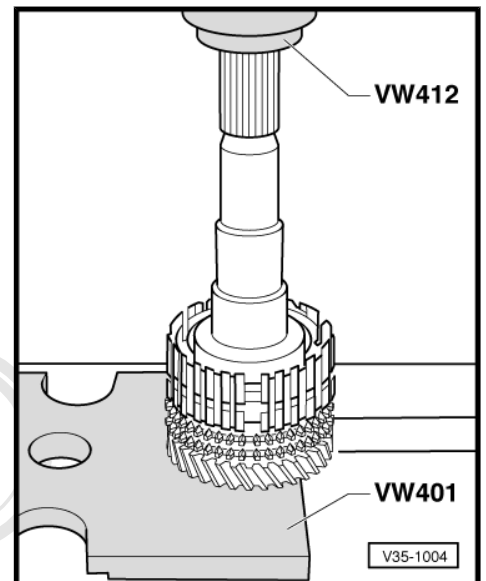
Risk of accident.

◆ *Make sure the circlip does not spring off.*

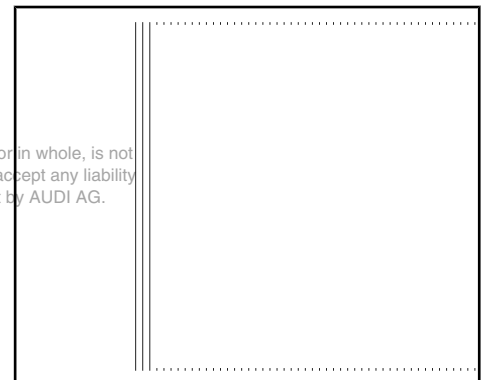


Pressing off synchronising hub

- After removing circlip, press off synchronising hub and 3rd speed selector gear.



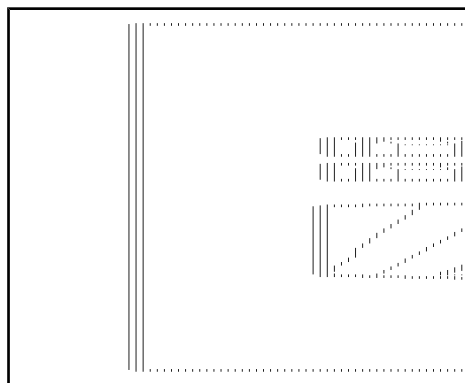
Inserting circlip



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Checking 3rd and 4th gear synchro-ring for wear

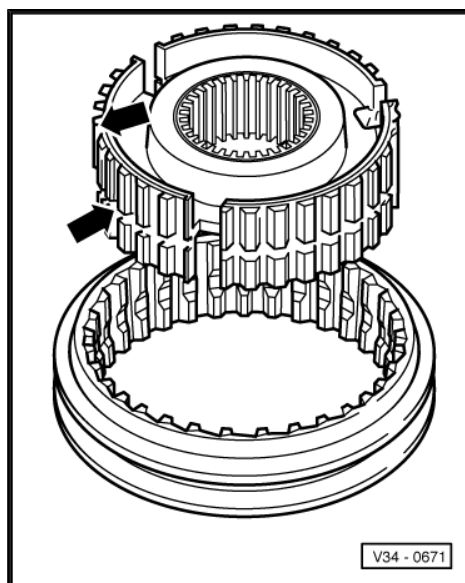
- Press synchro-ring onto taper of selector gear and measure gap dimension -a- with feeler gauge.
- Specified gap: 1.1 ... 1.7 mm.
- Wear limit 0.5 mm.



Assembling locking collar and synchro-hub for 3rd and 4th gear

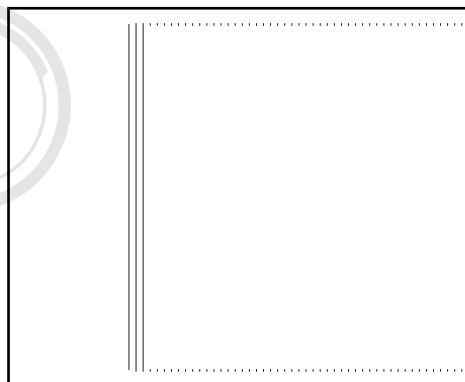
Installation position:

- Shorter splines beneath all-round groove -bottom arrow- facing 3rd gear.
- Groove at end face -top arrow- facing 4th gear.



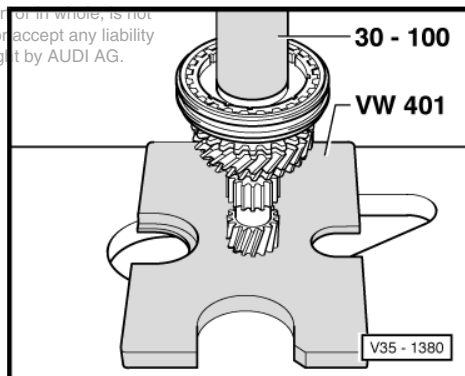
Assembling locking collar and synchro-hub

- Locking collar is pushed over synchronising hub.
- Insert locking pieces and install springs offset at 120°.
- Angled end of spring must locate in hollow locking piece.



Pressing on 3rd and 4th gear synchronising hub with locking collar

- Insert the circlip ⇒ [page 115](#).
- Check axial clearance of 3rd speed selector gear; if necessary press back synchronising hub until it makes contact with circlip ⇒ [page 115](#).



1.2 Adjusting input shaft

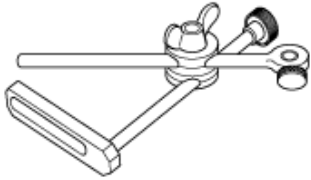
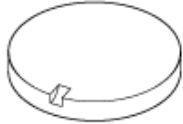
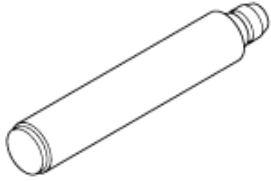
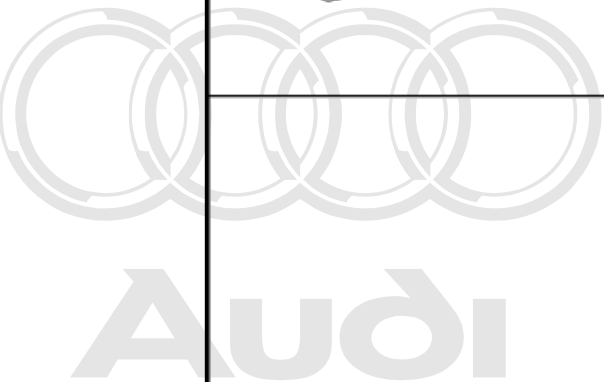
(Determining thickness of shim for input shaft)

Note

- ◆ *Re-adjustment of the input shaft is required if the following components have been renewed:*
- ◆ *Gearbox housing, clutch housing, input shaft or taper roller bearing.*
- ◆ *Table of adjustments ⇒ [page 142](#)*

Special tools and workshop equipment required

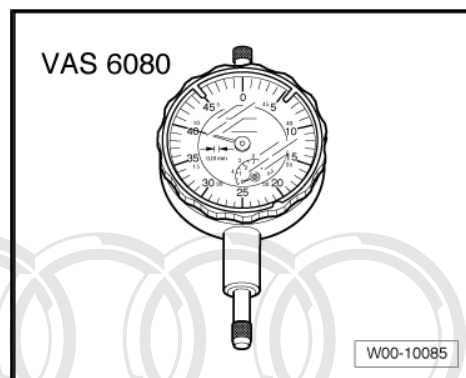
- ◆ Universal dial gauge bracket -VW 387-
- ◆ Measuring device d = 50 mm -VW 385/17- from universal measuring device -VW 385-
- ◆ Press tool -VW 407-
- ◆ Thrust plate -VW 447 i-

VW 387 	VW 385/17 
VW 407 	VW 447 i 
	

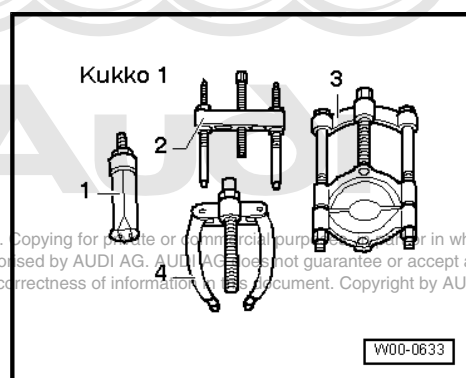
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W35-0023

◆ Dial gauge -VAS 6080-



◆ -1-internal puller -Kukko 21/6-

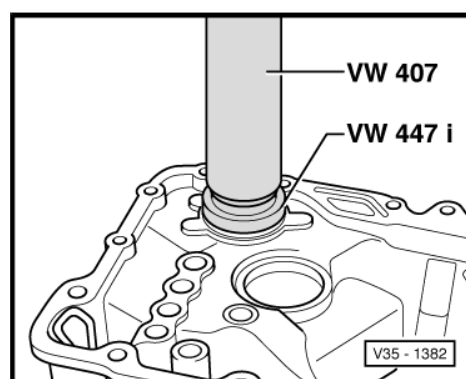


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◆ -4- Counter-support -Kukko 22/2-

Procedure

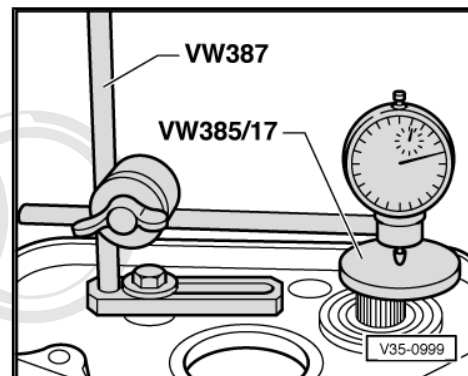
- Press home the taper roller bearing outer race in the clutch housing without a shim.
- Insert input shaft in gearbox housing and install clutch housing. Tighten bolts to 25 Nm.



- Set up the universal dial gauge holder -VW 387- with measuring device d = 50 mm -VW 385/17- and dial gauge -VAS 6080- (3 mm measuring range).
- Before measurement, rotate input shaft to allow tapered roller bearings to settle.
- Preload dial gauge to 1 mm and set to „0“.

 Note

This procedure is to be repeated for all further measurements, as the dial gauge does not otherwise return to the initial position.



- Press the input shaft towards the dial gauge.
- Read off play on dial gauge and note reading.
- Measurement in following example: 1.21 mm.

Determining thickness of shim

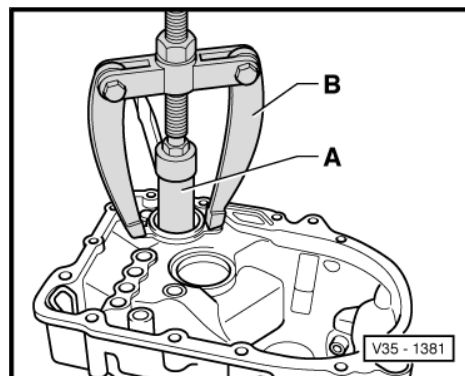
- Determine the thickness of the shim on the basis of the following table; for part numbers refer to ⇒ Electronic parts catalogue .

Bearing clearance Measured value (mm)	Available shims Thickness in mm	Bearing clearance Measured value (mm)	Available shims Thickness in mm
... 0.66	0.650	1.19 ... 1.20	1.200
0.67 ... 0.68	0.675	1.21 ... 1.23	1.225
0.69 ... 0.70	0.700	1.24 ... 1.26	1.250
0.71 ... 0.73	0.725	1.27 ... 1.28	1.275
0.74 ... 0.75	0.750	1.29 ... 1.30	1.300
0.76 ... 0.78	0.775	1.31 ... 1.33	1.325
0.79 ... 0.80	0.800	1.34 ... 1.36	1.350
0.81 ... 0.82	0.825	1.37 ... 1.38	1.375
0.83 ... 0.85	0.850	1.39 ... 1.40	1.400
0.86 ... 0.88	0.875	1.41 ... 1.43	0.700 + 0.725
0.89 ... 0.90	0.900	1.44 ... 1.46	0.700 + 0.750
0.91 ... 0.93	0.925	1.47 ... 1.48	0.700 + 0.775
0.94 ... 0.95	0.950	1.49 ... 1.50	0.700 + 0.800
0.96 ... 0.98	0.975	1.51 ... 1.53	0.700 + 0.825
0.99 ... 1.00	1.000	1.54 ... 1.56	0.700 + 0.850
1.01 ... 1.03	1.025	1.57 ... 1.58	0.700 + 0.875
1.04 ... 1.05	1.050	1.59 ... 1.61	0.700 + 0.900
1.06 ... 1.08	1.075	1.62 ... 1.63	0.700 + 0.925
1.09 ... 1.10	1.100	1.64 ... 1.66	0.700 + 0.950
1.11 ... 1.13	1.125	1.67 ... 1.68	0.700 + 0.975
1.14 ... 1.16	1.150	1.69 ... 1.70	0.700 + 1.000
1.17 ... 1.18	1.175		

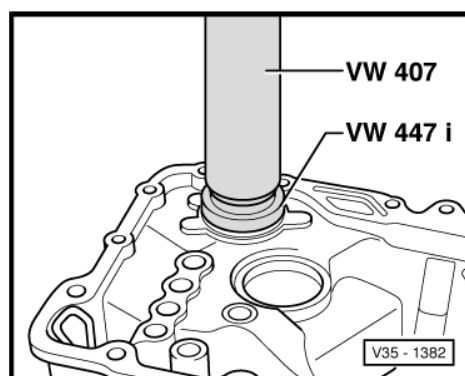
- Remove the input shaft and extract the taper roller bearing outer race from the clutch housing.

A - Internal puller 37 ... 46 mm -Kukko 21/6-

B - Counter-support -Kukko 22/2-

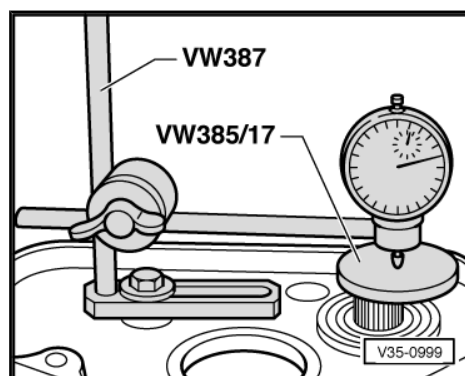


- Press the taper roller bearing outer race with the shim determined (1.225 mm in the example) into the clutch housing.
- Insert the input shaft in the gearbox housing, mount the clutch housing and tighten the bolts to 25 Nm.



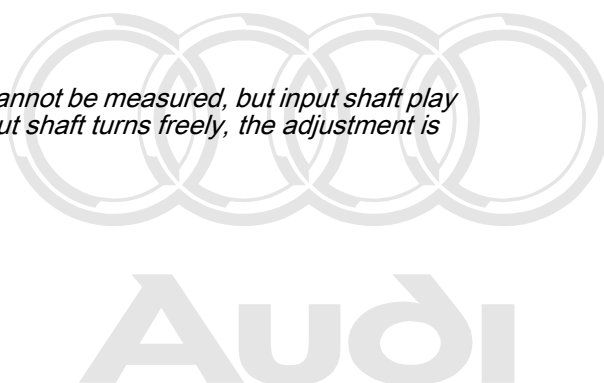
Checking adjustment

- Set up the universal dial gauge holder -VW 387- with measuring device d = 50 mm -VW 385/17- and dial gauge -VAS 6080- .
- Before measurement, rotate input shaft to allow tapered roller bearings to settle.
- Preload dial gauge to 1 mm and set to „0“.
- Press the input shaft towards the dial gauge.
- Read the bearing clearance off the dial gauge.
- Bearing clearance 0.01 ... 0.10 mm.



Note

If the bearing clearance cannot be measured, but input shaft play is perceptible and the input shaft turns freely, the adjustment is acceptable.



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2 Exploded view - output shaft



Note

- ◆ Refer to technical data ➔ [page 1](#) when installing new gears or a new output shaft.
- ◆ Following output shaft or taper roller bearing replacement, the output shaft must be re-adjusted ➔ [page 130](#).
- ◆ Table of adjustments ➔ [page 142](#)

1 - Gearbox housing

2 - Washer

- 1 mm thick

3 - Tapered roller bearing outer race

- Press out of gearbox housing with output shaft
- Pressing in ➔ [page 125](#)

4 - Tapered roller bearing inner race

- Press off with 1st speed selector gear ➔ [page 126](#)
- Pressing on ➔ [page 130](#)

5 - Thrust washer

6 - 1st speed selector gear

- Installation position ➔ [page 130](#)

7 - Needle bearing

- For 1st gear

8 - Synchro-ring (inner ring for 1st gear)

- Checking for wear ➔ [page 128](#)
- Check lugs for scoring
- Installation position ➔ [page 129](#)

9 - Outer ring for 1st gear

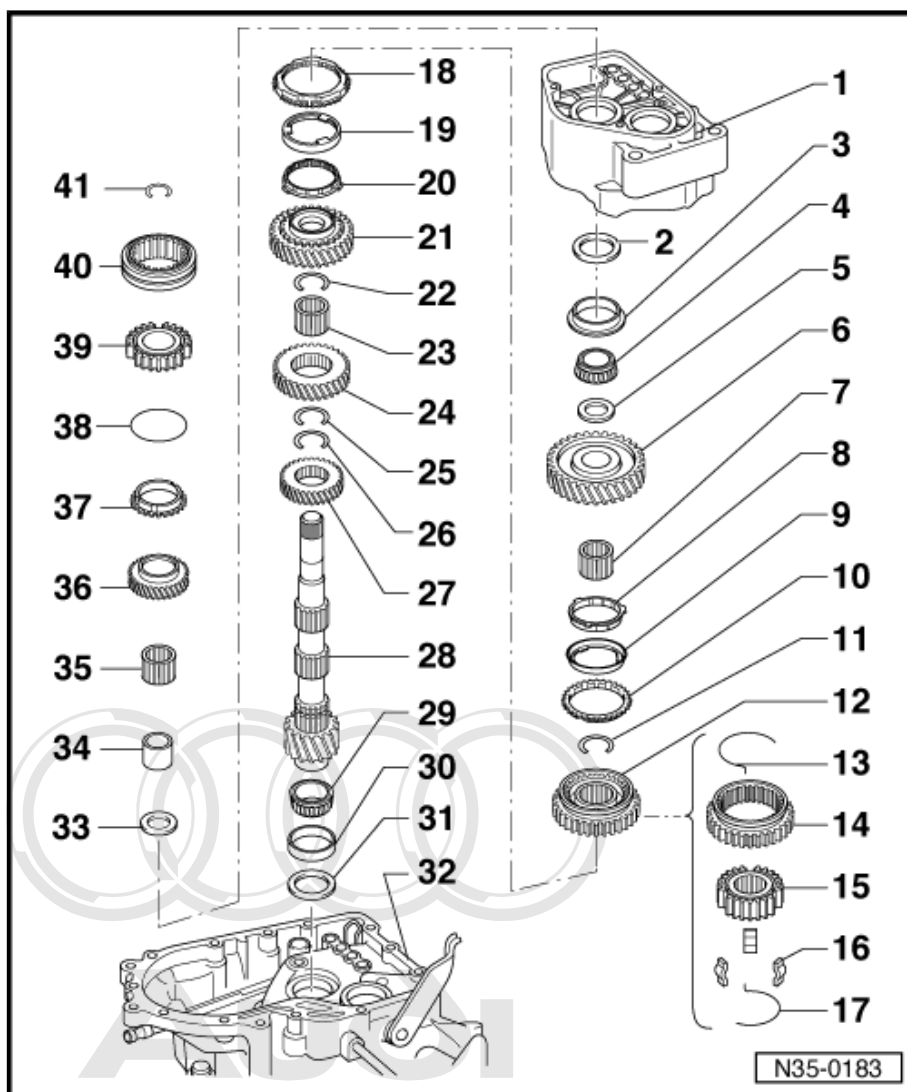
- Insert in synchro-ring -Item 10-
- Installation position ➔ [page 129](#)
- Renew if scored

10 - 1st gear synchro-ring

- Checking for wear ➔ [page 128](#)
- Insert such that recesses engage in locking pieces of locking collar -Item 12-

11 - Circlip

- Pressing out ➔ [page 126](#)
- Fitting ➔ [page 127](#)



12 - Locking collar with synchronising hub for 1st and 2nd gear

- ☐ Parts are paired
- ☐ Pressing off ⇒ [page 126](#)
- ☐ Assembling locking collar and synchro-hub ⇒ [page 128](#) and ⇒ [page 129](#)
- ☐ Pressing on ⇒ [page 129](#)

13 - Spring**14 - Locking collar****15 - Synchronising hub****16 - Locking piece**

- ☐ 3x

17 - Spring**18 - 2nd gear synchro-ring**

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- ☐ Checking for wear ⇒ [page 128](#)
- ☐ Installation position ⇒ [page 128](#)

19 - Outer ring for 2nd gear

- ☐ Position on synchro-ring -Item 20-
- ☐ Installation position ⇒ [page 128](#)
- ☐ Renew if scored

20 - Synchro-ring (inner ring for 2nd gear)

- ☐ Checking for wear ⇒ [page 128](#)
- ☐ Check lugs for scoring
- ☐ Installation position ⇒ [page 128](#)

21 - 2nd speed selector gear**22 - Circlip**

- ☐ Pressing out ⇒ [page 126](#)
- ☐ Fitting ⇒ [page 127](#)

23 - Needle bearing

- ☐ For 2nd gear

24 - 3rd gear wheel**25 - Circlip**

- ☐ Pressing out ⇒ [page 126](#)
- ☐ Fitting ⇒ [page 127](#)

26 - Circlip

- ☐ Pressing out ⇒ [page 126](#)
- ☐ Fitting ⇒ [page 127](#)

27 - 4th gear wheel

- ☐ Identification groove points towards final drive splines

28 - Output shaft

- ☐ Dismantling and assembling ⇒ [page 124](#)
- ☐ Pay attention to correct ratio (number of teeth) ⇒ [page 1](#)
- ☐ Adjusting ⇒ [page 130](#)

29 - Tapered roller bearing inner race

- ☐ Pulling off ⇒ [page 126](#)
- ☐ Pressing on ⇒ [page 127](#)

30 - Tapered roller bearing outer race

- ☐ Removing ⇒ [page 127](#)

- ☐ Pressing in [⇒ page 127](#)

31 - Shim

- ☐ For output shaft
- ☐ Table of adjustments [⇒ page 142](#)

32 - Clutch housing

33 - Thrust washer

- ☐ Shoulder on thrust washer faces towards tapered roller bearing

34 - Sleeve for needle bearing

- ☐ Press off with 1st speed selector gear [⇒ page 126](#)
- ☐ Driving on [⇒ page 97](#)

35 - Needle bearing

- ☐ For 5th speed selector gear

36 - 5th speed selector gear

37 - 5th gear synchro-ring

38 - Spring

- ☐ Position on 5th gear synchro-ring
- ☐ Renew if worn

39 - 5th gear synchronising hub

- ☐ Removing [⇒ page 87](#)

40 - 5th gear locking collar

- ☐ Removing [⇒ page 87](#)

41 - Circlip

- ☐ Renew
- ☐ Determining thickness

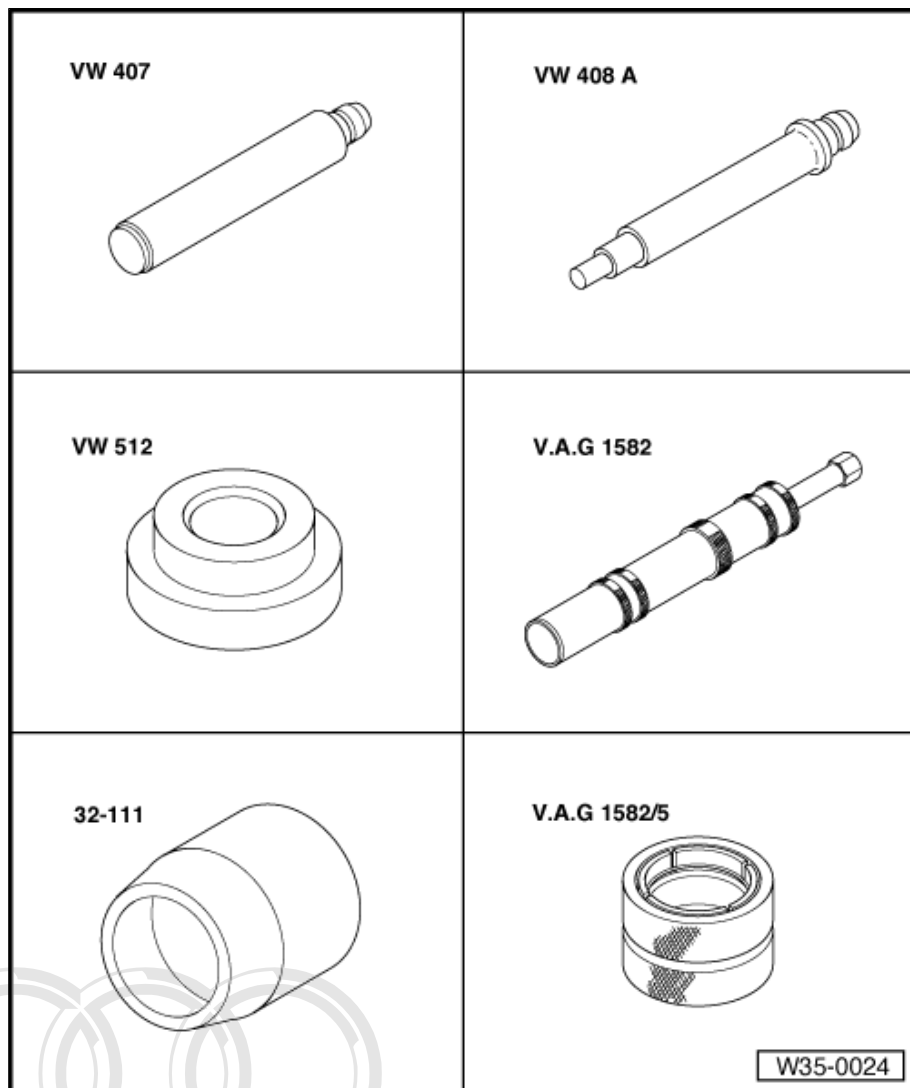


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2.1 Dismantling and assembling output shaft

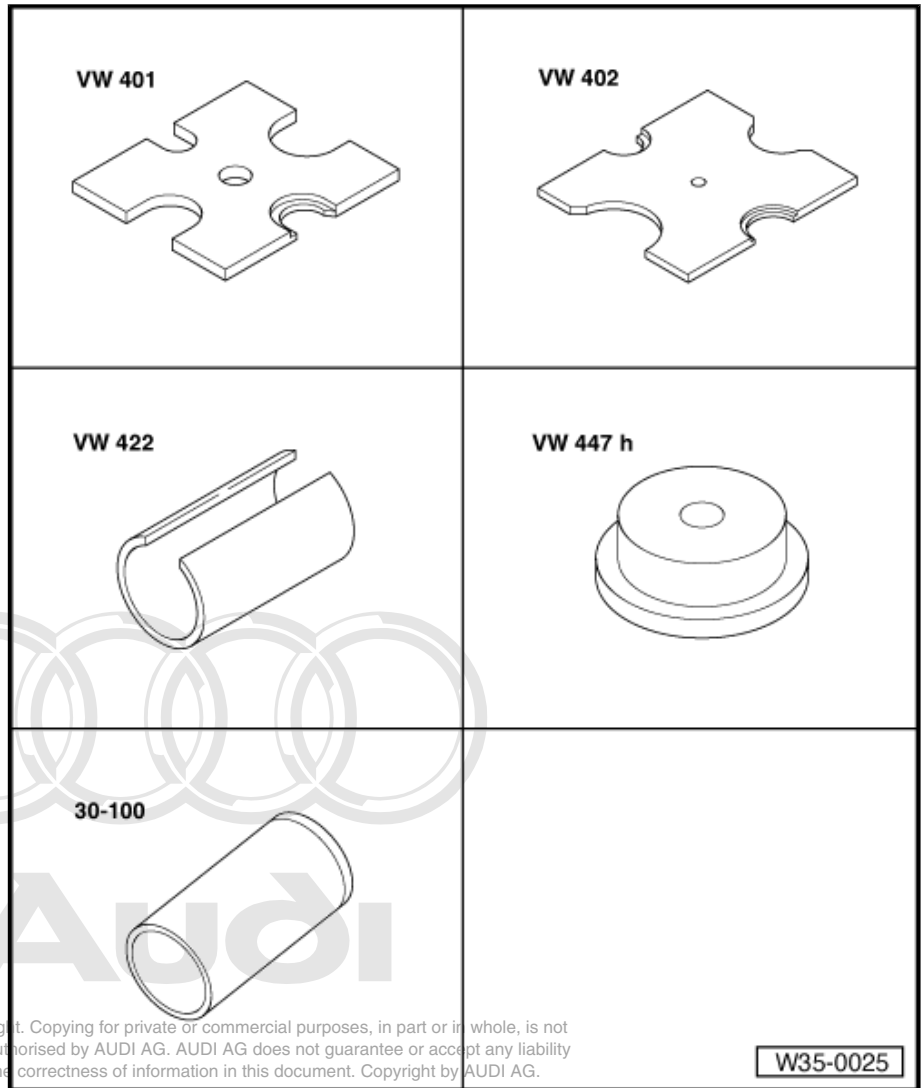
Special tools and workshop equipment required

- ◆ Press tool -VW 407-
- ◆ Press tool -VW 408 A-
- ◆ Thrust pad -VW 512-
- ◆ Tapered roller bearing puller -V.A.G 1582-
- ◆ Thrust piece -32 - 111-
- ◆ Adapter -V.A.G 1582/5-

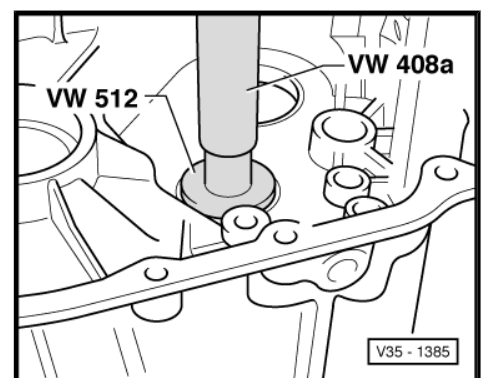
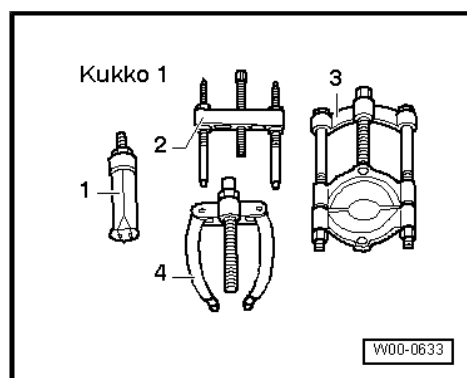


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- ◆ Thrust plate -VW 401-
- ◆ Thrust plate -VW 402-
- ◆ Tube -VW 422-
- ◆ Thrust plate -VW 447 H-
- ◆ Drift sleeve -30 - 100-



- ◆ -1-internal puller - Kukko 21/6-

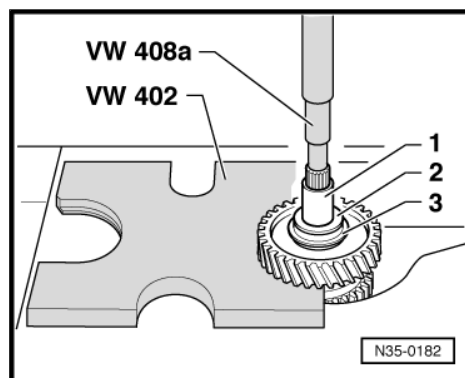


- ◆ -4- Counter-support
- ◆ -4 - Kukko 22/2-

Pressing in tapered roller bearing outer race

Pressing off 1st speed selector gear with sleeve, thrust washer and tapered roller bearing inner and outer races

- 1 - Sleeve
- 2 - Thrust washer
- 3 - Taper roller bearing inner and outer race



Pressing circlip out of groove

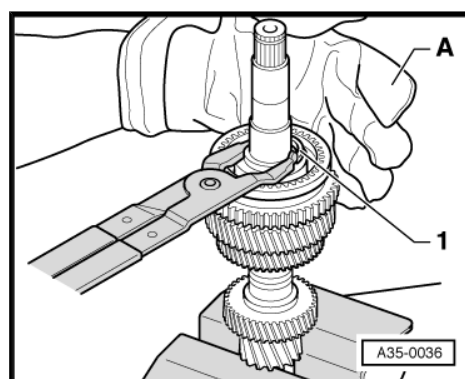
- 1 - Circlip
- A - Protective glove



WARNING

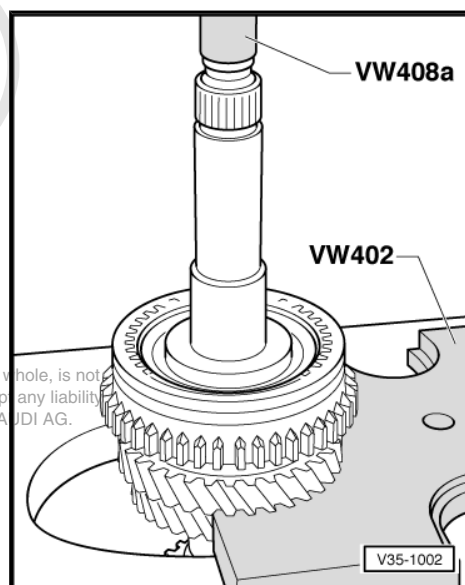
Risk of accident.

- ◆ *Make sure the circlip does not spring off.*



Pressing off 1st and 2nd gear locking collar and synchronising hub

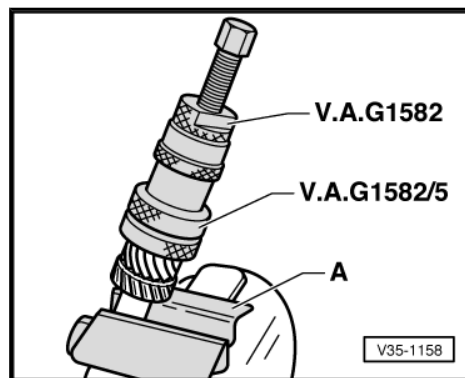
- After removing circlip, press off 2nd speed selector gear together with locking collar and synchronising hub.



Pulling off tapered roller bearing inner race

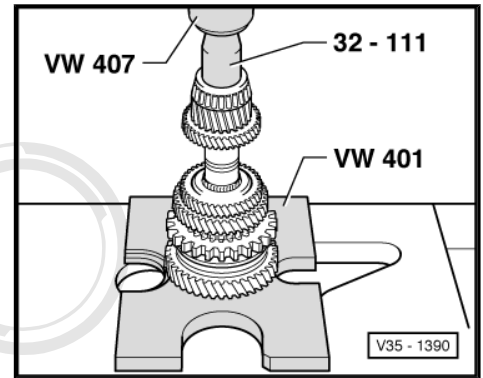
- A - Soft jaws/vice

- Fit adapter and apply tension to it behind the bearing rollers, then turn bearing and re-tension adapter.



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Pressing on tapered roller bearing inner race

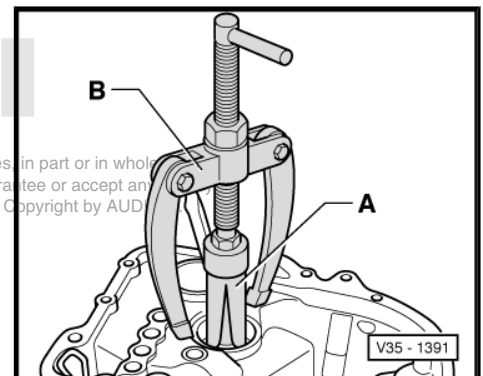


Pulling tapered roller bearing outer race out of clutch housing

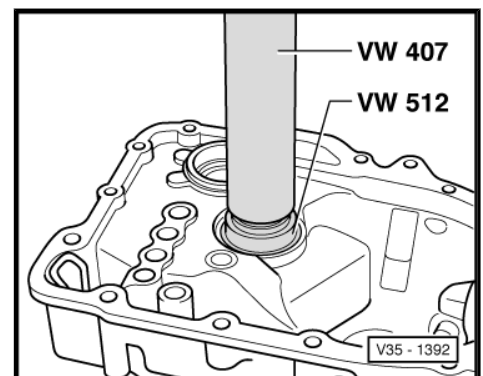
A - Internal puller 37 ... 46 mm -Kukko 21/6-

B - Counter-support -Kukko 22/2-

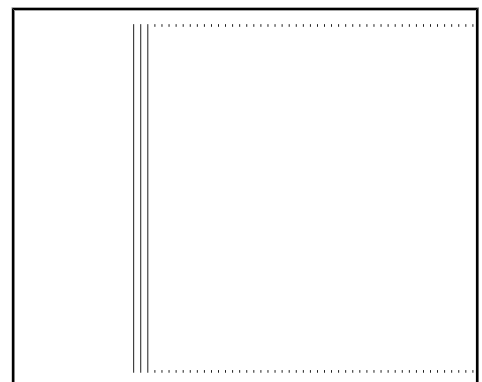
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Pressing in tapered roller bearing outer race

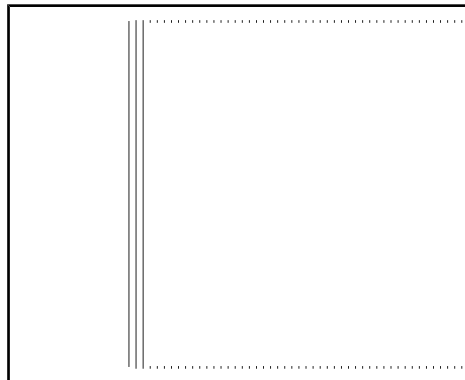


Inserting circlip



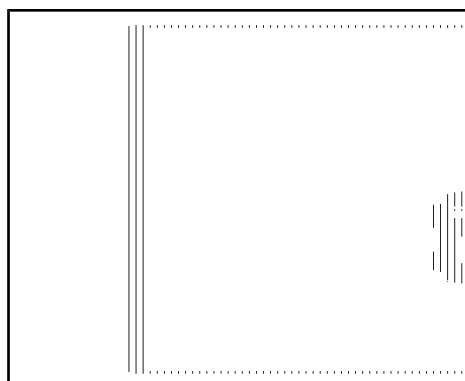
Checking 1st and 2nd gear inner ring for wear

- Press inner ring onto tapered seat on selector gear and measure gap -a- using a feeler gauge.
- Specified gap: 0.75 ... 1.25 mm.
- Wear limit 0.3 mm.



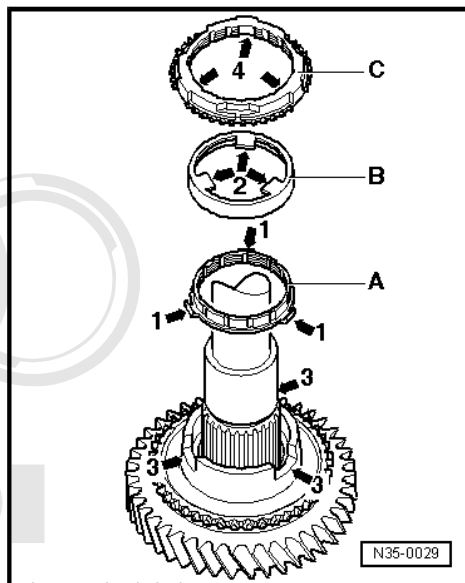
Checking 1st and 2nd gear synchro-ring for wear

- Press synchro-ring, outer ring and inner ring against tapered seat on selector gear and measure gap -a- using a feeler gauge.
- Specified gap: 1.2 ... 1.8 mm.
- Wear limit 0.5 mm.



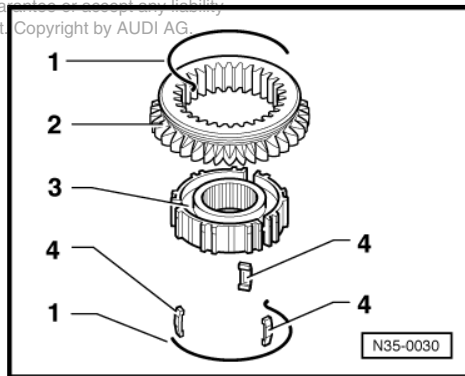
Installation position of outer ring, inner ring and synchro-ring of 2nd gear

- Place inner ring -A- on 2nd speed selector gear.
- The angled tabs -arrow 1- point towards the outer ring -B-.
- Fit outer ring -B-.
- The webs -arrow 2- lock in the recesses -arrow 3- of the selector gear.
- Fit synchro-ring -C-.
- The recesses -arrow 4- lock in the offset webs -arrow 1- of the inner ring -A-.



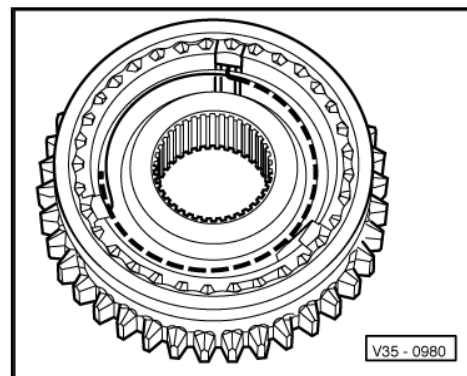
Dismantling and assembling 1st and 2nd gear locking collar and synchronising hub

- 1 - Spring
 - 2 - Locking collar
 - 3 - Synchronising hub
 - 4 - Locking piece
- Slide locking collar over synchronising hub.
 - Smaller recesses for locking pieces in synchronising hub and recesses in locking collar must align.



Assembling locking collar and synchro-hub for 1st and 2nd gear

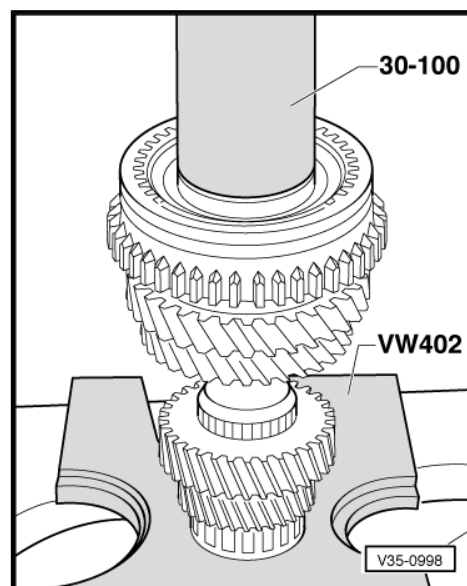
- Locking collar is pushed over synchronising hub.
- Insert locking pieces in smaller recesses and install springs 120° offset.
- Angled end of spring must locate in hollow locking piece.



Pressing on locking collar with synchro-hub

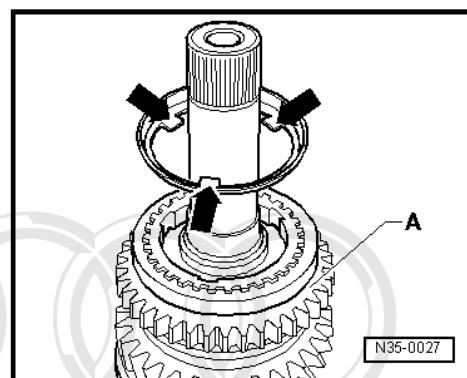
Installation position:

- Groove for selector fork in locking collar points towards 1st gear; reverse gear splines point towards 2nd gear.
- Turn synchro-ring so that grooves align with locking pieces.



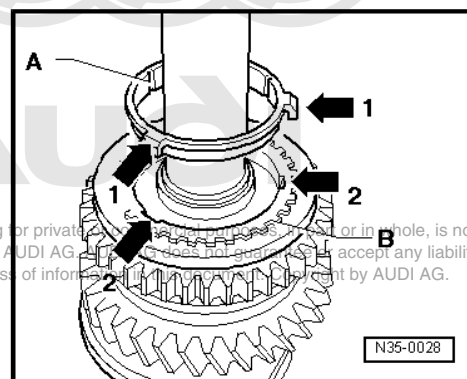
Installation position of outer ring for 1st gear

- The lugs -arrows- face the gear teeth of the reverse gear -A-.



Installation position of synchro-ring -A- (inner ring for 1st gear)

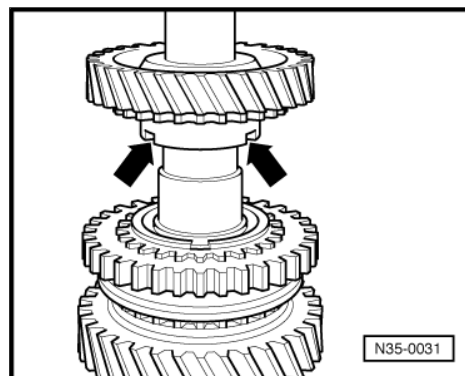
- The lugs -arrow 1- locate in the recesses -arrow 2- in the synchro-ring -B-.



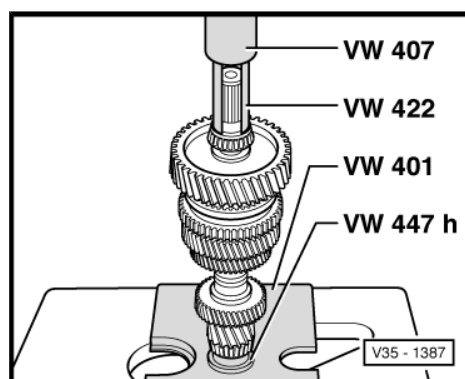
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Installation position of 1st speed selector gear

- The recesses in the collar -arrows- engage in the lugs of the outer ring for 1st gear ⇒ [page 129](#).



Pressing on tapered roller bearing inner race



2.2 Adjusting output shaft

(Determining shim for output shaft)



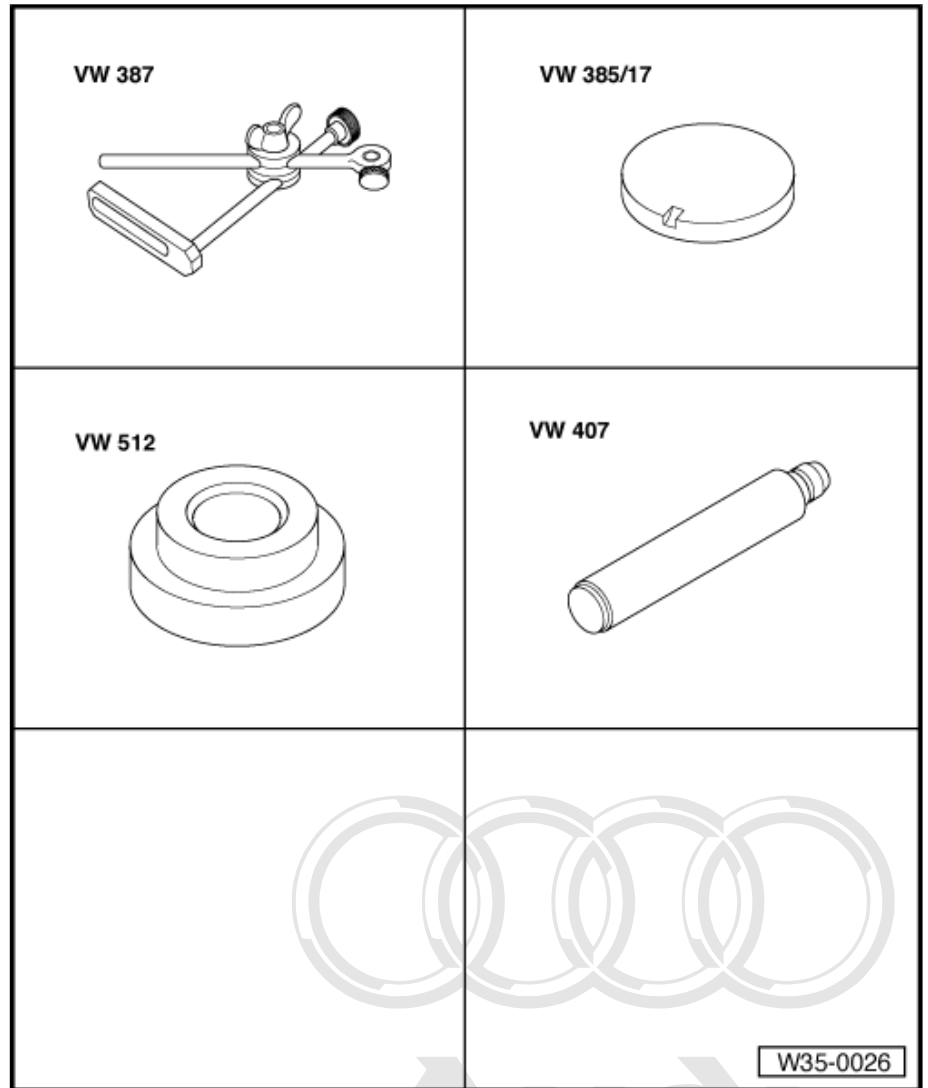
Note

- ◆ *Re-adjustment of the output shaft is required if the following components have been renewed:*
- ◆ *Gearbox housing, clutch housing, output shaft or taper roller bearing.*
- ◆ *Table of adjustments ⇒ [page 142](#)*

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Special tools and workshop equipment required

- ◆ Universal dial gauge bracket -VW 387-
- ◆ Measuring device $d = 50$ mm -VW 385/17- from universal measuring device -VW 385-
- ◆ Thrust pad -VW 512-
- ◆ Press tool -VW 407-

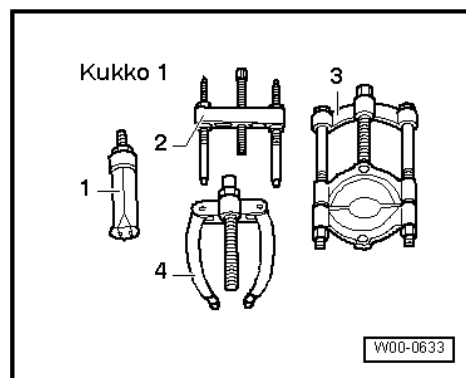


- ◆ Dial gauge -VAS 6080-

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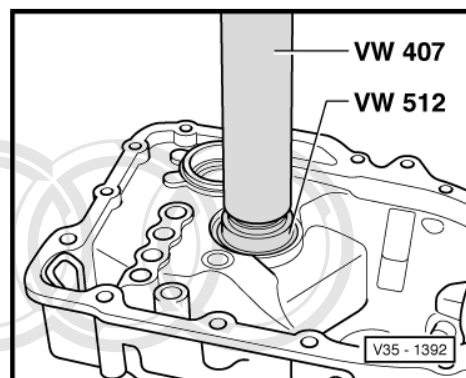
◆ -1-internal puller -Kukko 21/6-



◆ -4- Counter-support -4 - Kukko 22/2-

Procedure

- Press home the taper roller bearing outer race with a 0.75 mm thick shim in the clutch housing.
- Insert output shaft in clutch housing and install gearbox housing. Tighten bolts to 25 Nm.

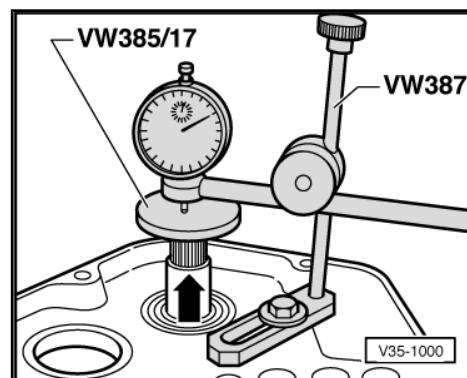


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- Set up the universal dial gauge holder -VW 387- with dial gauge -VAS 6080- (3 mm measuring range).
- Turn the output shaft prior to measurement so that the taper roller bearings settle.
- Preload dial gauge to 1 mm and set to „0“.

 Note

This procedure is to be repeated for all further measurements, as the dial gauge does not otherwise return to the initial position.



- Pull the output shaft in -direction of arrow-.
- Read off play on dial gauge and note reading.
- Measurement in following example: 0.30 mm.

Determining thickness of shim

Specified bearing preload = fitted shim + measured value + preload (constant value).

Example:

Inserted shim	0.75 mm
Dial gauge reading (example)	+ 0.30 mm
Preload (constant value)	+ 0.20 mm
Thickness of shim	= 1.25 mm

- Determine the thickness of the shim on the basis of the following table; for part numbers refer to ➔ Electronic parts catalogue .

Available shims - Thickness of shims in mm ¹⁾		
0.70	1.00	1.30
0.75	1.05	1.35
0.80	1.10	1.40
0.85	1.15	
0.90	1.20	
0.95	1.25	

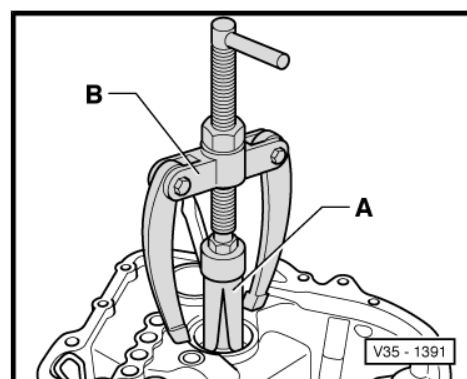
• ¹⁾ Different shim thicknesses permit precise setting of the required shim thickness. Fit 2 shims if necessary.

- Remove output shaft and pull taper roller bearing outer race out of clutch housing.

A - Internal puller 37 ... 46 mm -Kukko 21/6-

B - Counter-support -Kukko 22/2-

- Take the shim fitted (0.75 mm thick) out of the clutch housing.
- Press in the taper roller bearing outer race with the shim determined (1.25 mm in the example) and fit the output shaft.
- Mount the gearbox housing and tighten the bolts to 25 Nm.

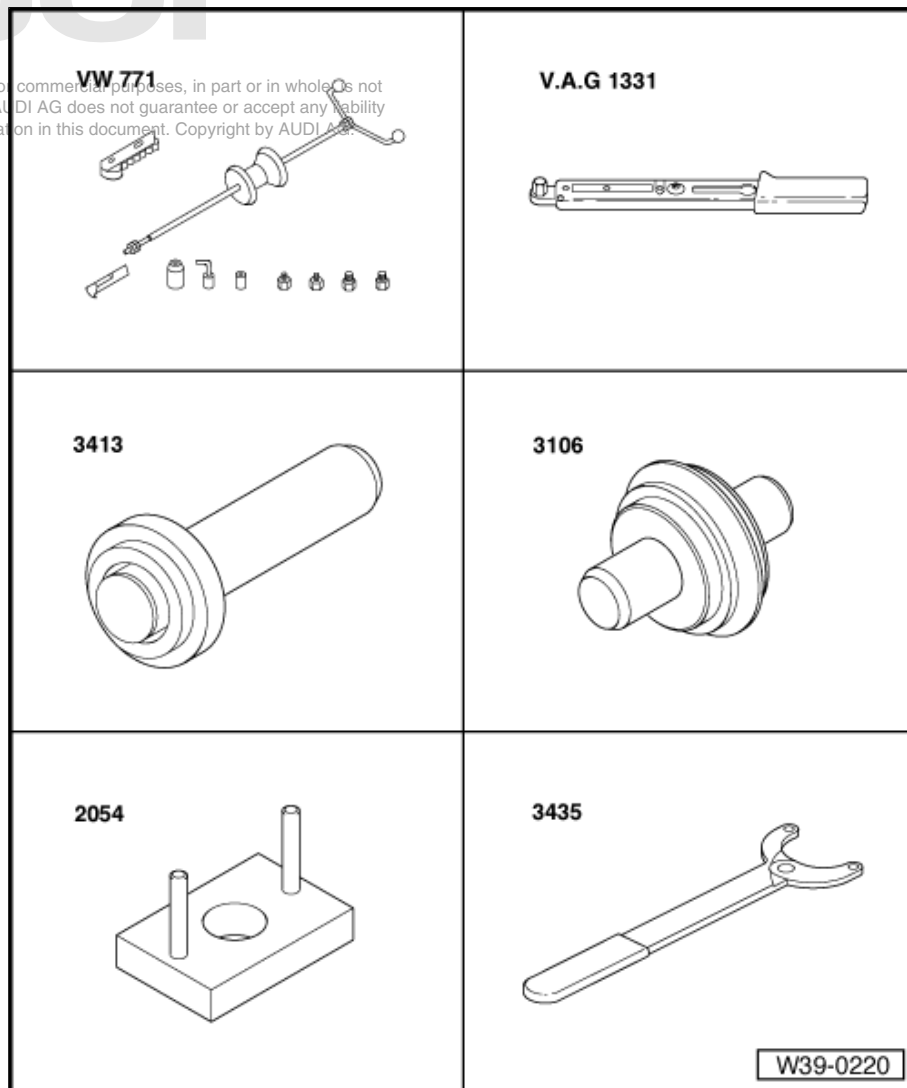


39 – Final drive - front differential

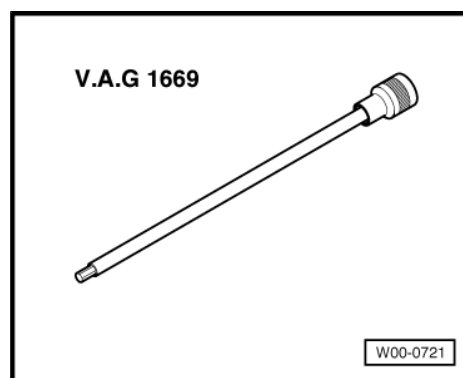
1 Renewing oil seals for flange shafts

Special tools and workshop equipment required

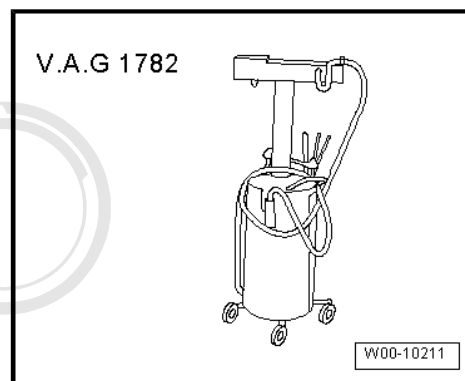
- ◆ Multi-purpose tool -VW 771- with -VW 771/37-
- ◆ Torque wrench -V.A.G 1331-
- ◆ Thrust piece -3413- for oil seal (right-side)
- ◆ Drift -3106- for oil seal (left-side)
- ◆ Removal tool -2054- for oil seal (left-side)
- ◆ Counterhold tool -3435- for oil seal (left-side)



- ◆ Hexagon key -V.A.G 1669- for oil seal (left-side)

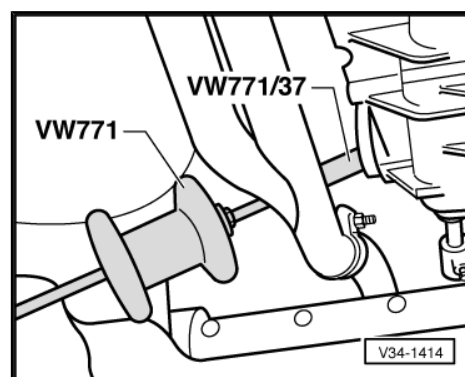
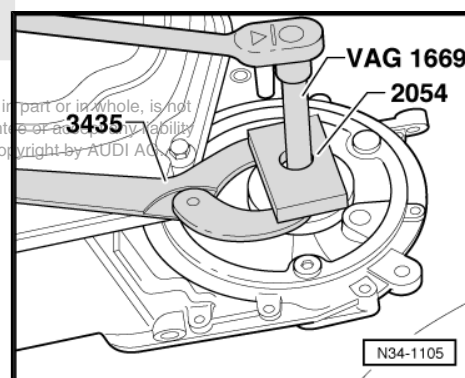


◆ Used oil collection and extraction unit -V.A.G 1782-



Procedure

- Gearbox in vehicle
- Tightening torques [⇒ page 84](#)
- Remove the drive shafts [⇒ Rep. gr. 40](#).
- Place used oil collection and extraction unit -V.A.G 1782- below gearbox.
- Remove flange shaft.
- Remove flange shaft together with springs, thrust washers and tapered rings
- Pull out oil seal.



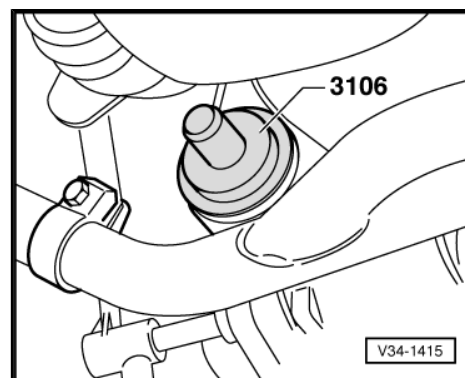
- Using drift -3106-, drive in new oil seal as far as stop, taking care to keep seal straight.



Note

The illustration shows the oil seal on the left side.

- Pack space between sealing lip and dust lip with sealing grease -G 052 128 A1-.
- Fit the springs, thrust washers, tapered rings and flange shafts. Pay attention to the distinguishing features of the flange shafts [⇒ page 87](#).
- Install drive shafts [⇒ Rep. gr. 40](#).
- Check gear oil level and top up as required [⇒ page 83](#).



2 Exploded view - differential



Note

- ◆ Always renew both tapered roller bearings together.
- ◆ The differential must be re-adjusted when the following components have been renewed:
- ◆ Taper roller bearing, differential cage, gearbox housing, clutch housing, differential ⇒ [page 143](#).
- ◆ Table of adjustments ⇒ [page 142](#)

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1 - Gearbox housing

2 - Shim „S1“

- ☐ For differential
- ☐ 1 mm thick

3 - Tapered roller bearing outer race

- ☐ Pressing out ⇒ [page 139](#)
- ☐ Pressing in ⇒ [page 140](#)

4 - Tapered roller bearing inner race

- ☐ Pulling off ⇒ [page 140](#)
- ☐ Pressing on ⇒ [page 140](#)

5 - Differential cage

- ☐ With riveted final drive gear

6 - One-piece thrust washer

- ☐ Lubricate with gear oil before installing

7 - Sun wheel

- ☐ Installing ⇒ [page 140](#)

8 - Threaded piece

9 - Planet pinion

- ☐ Installing ⇒ [page 140](#)

10 - Differential pinion pin

- ☐ Drive out with drift

11 - Speedometer drive wheel

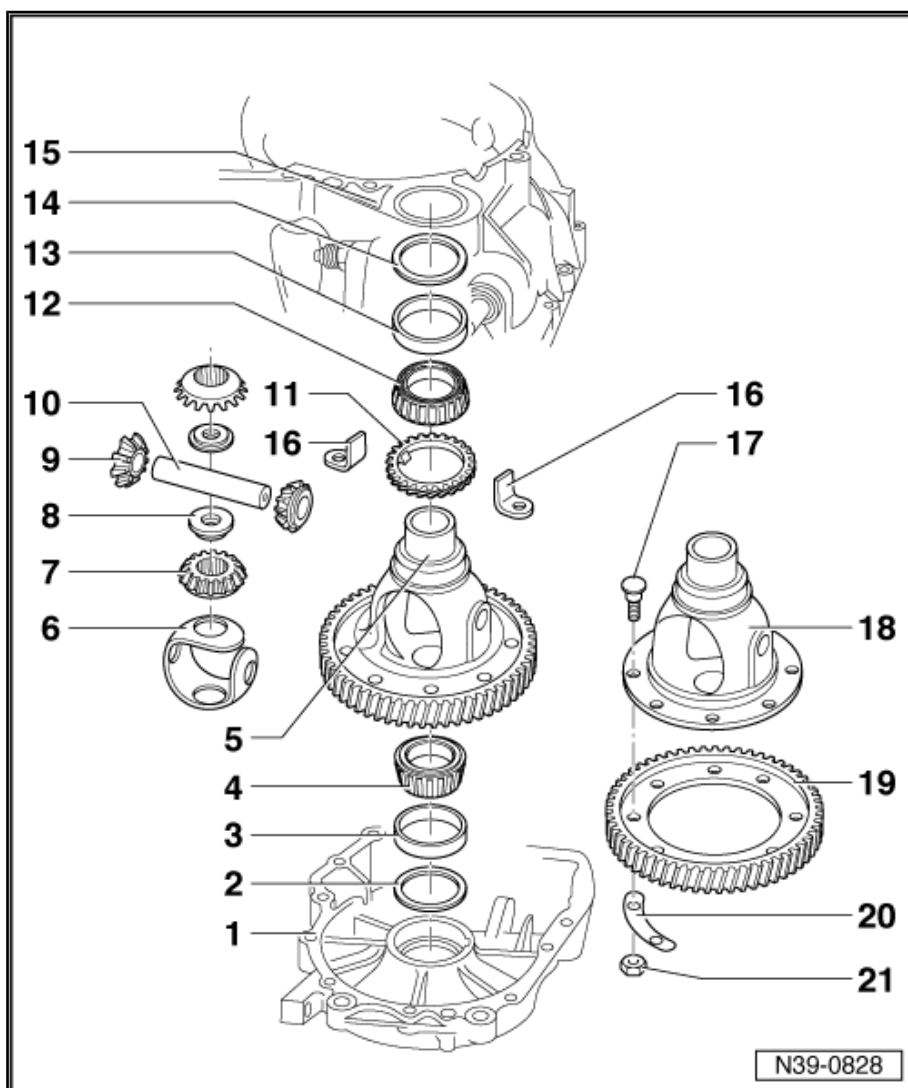
- ☐ Prise off using a screwdriver

12 - Tapered roller bearing inner race

- ☐ Pulling off ⇒ [page 140](#)
- ☐ Pressing on ⇒ [page 141](#)

13 - Tapered roller bearing outer race

- ☐ Pressing out ⇒ [page 141](#)
- ☐ Pressing in ⇒ [page 141](#)



14 - Shim „S2“

- ☐ For differential
- ☐ Determining thickness ⇒ [page 143](#)

15 - Clutch housing

16 - Bracket

- ☐ For securing differential pinion pin
- ☐ Always detach both brackets when removing and installing differential pinion pin
- ☐ For assignment of bolts, packing plates and nuts for attachment, refer to ⇒ Electronic parts catalogue

17 - Bolt

- ☐ For correct version, refer to ⇒ Electronic parts catalogue

18 - Differential cage

- ☐ If renewed: Refer to table of adjustments ⇒ [page 142](#)

19 - Final drive gear

- ☐ Riveted as original equipment
- ☐ On replacement, final drive gear is bolted on
- ☐ Removing and installing ⇒ [page 141](#)
- ☐ Pay attention to correct ratio (number of teeth) ⇒ [page 1](#)

20 - Locking plate

21 - Nut

- ☐ 70 Nm

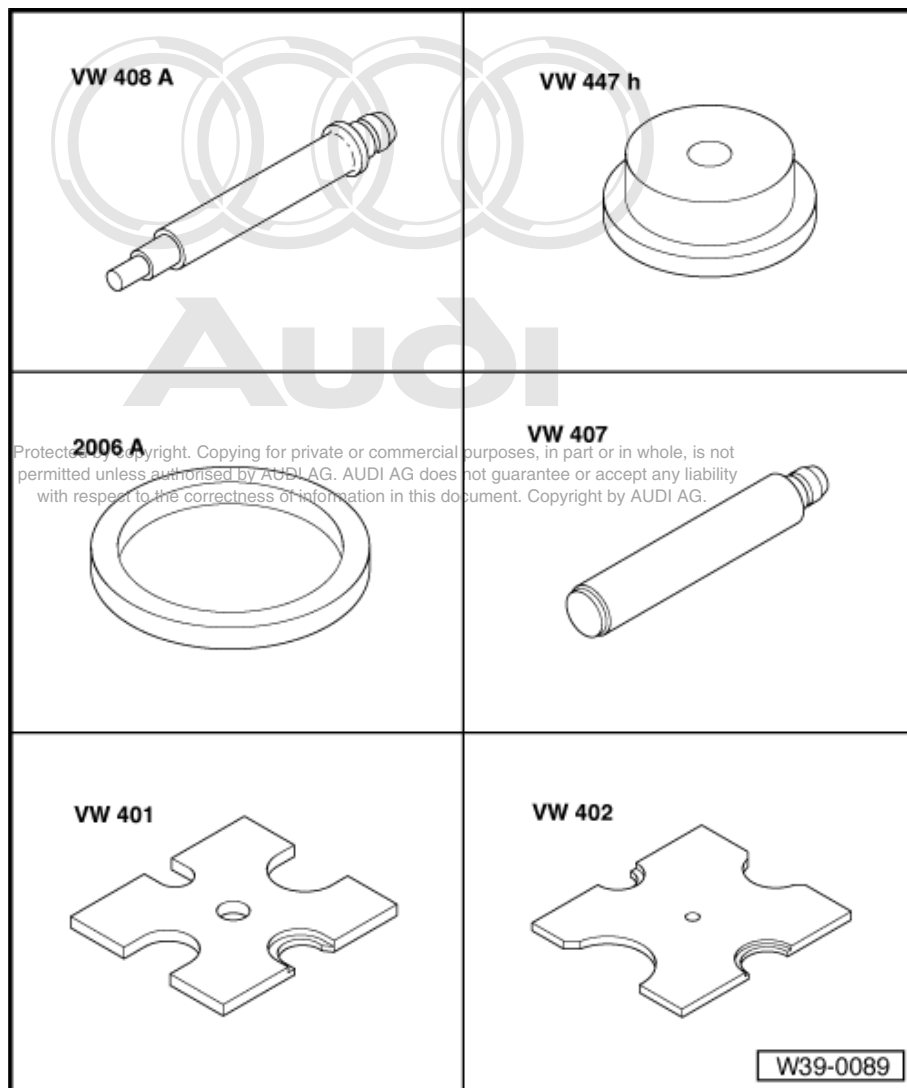


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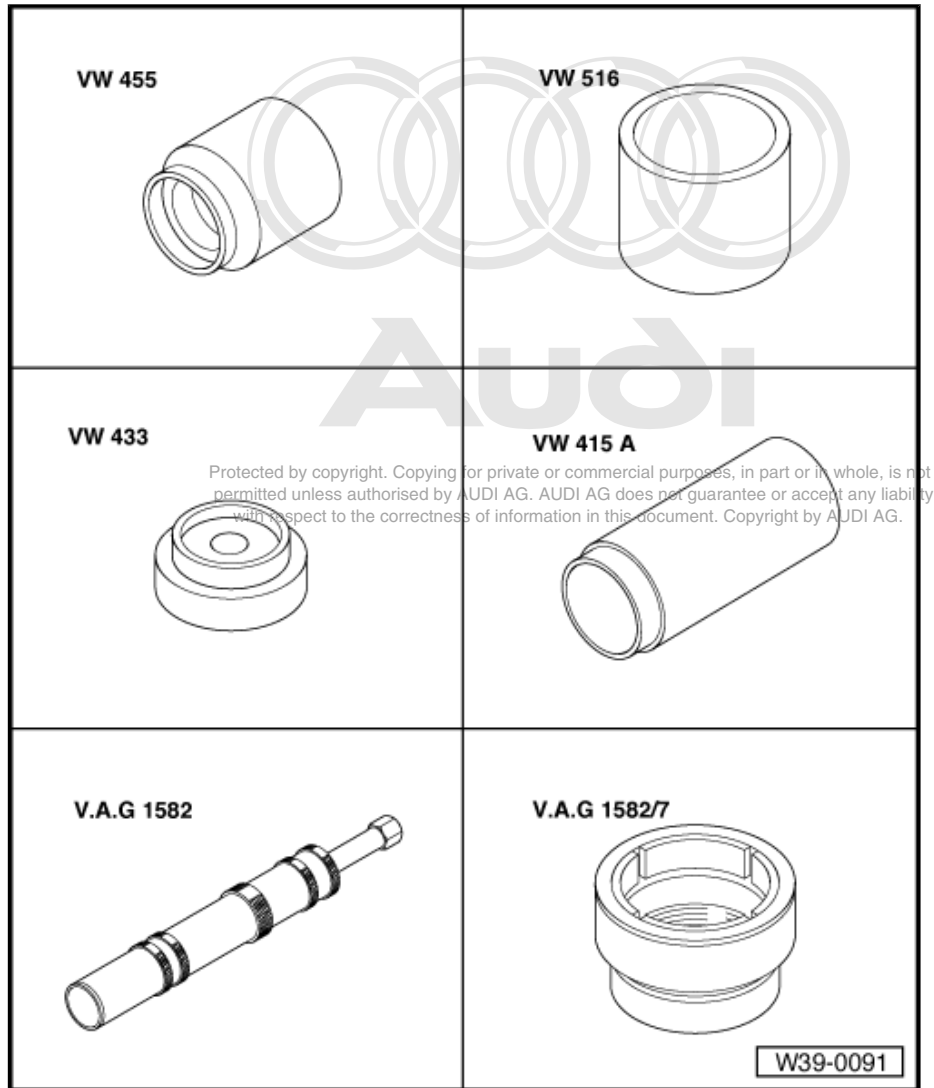
2.1 Dismantling and assembling differential

Special tools and workshop equipment required

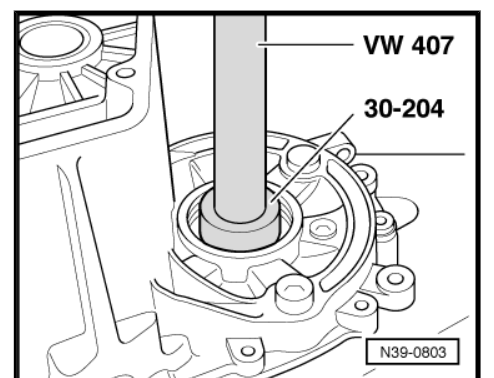
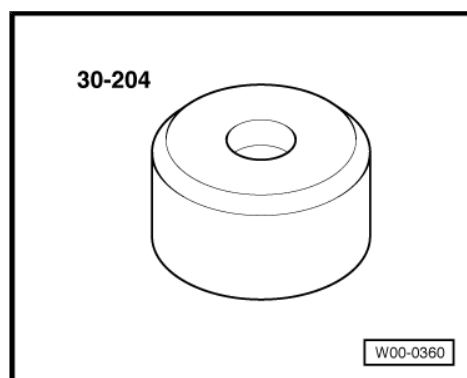
- ◆ Press tool -VW 408 A-
- ◆ Thrust plate -VW 447 H-
- ◆ Thrust ring -2006 A-
- ◆ Press tool -VW 407-
- ◆ Thrust plate -VW 401-
- ◆ Thrust plate -VW 402-



- ◆ Installing sleeve -VW 455-
- ◆ Tube -VW 516-
- ◆ Press tool -VW 433-
- ◆ Tube -VW 415 A-
- ◆ Tapered roller bearing puller -V.A.G 1582-
- ◆ Adapter -V.A.G 1582/7-



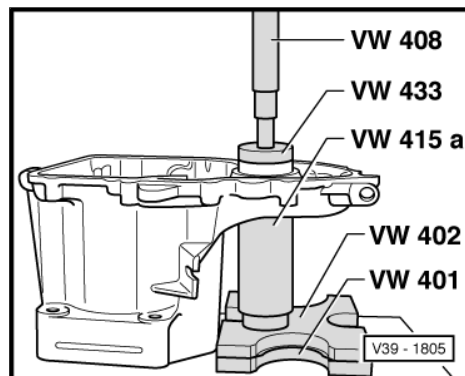
- ◆ Thrust plate -30 - 205-



- ◆ Protective gloves

Pressing out tapered roller bearing outer race

Pressing in tapered roller bearing outer race



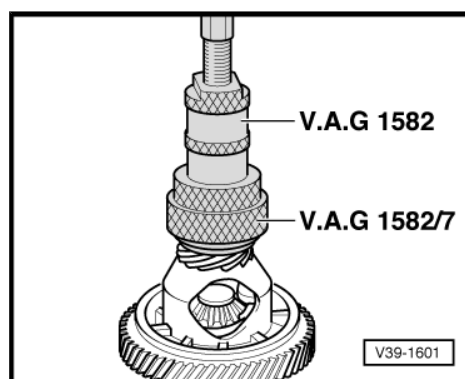
Pulling off tapered roller bearing inner races

- Before setting up the puller, place thrust plate -30 - 11- on differential cage.



Note

The procedure for pulling tapered roller bearing inner races off differential cage is the same for both bearings.



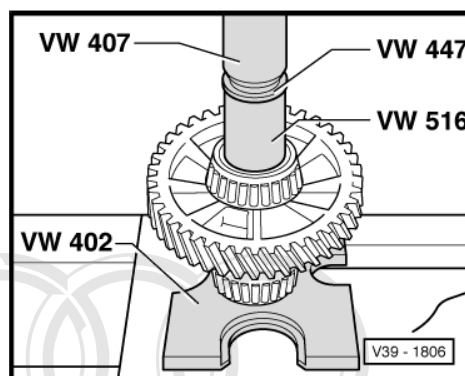
Pressing on tapered roller bearing inner race



WARNING

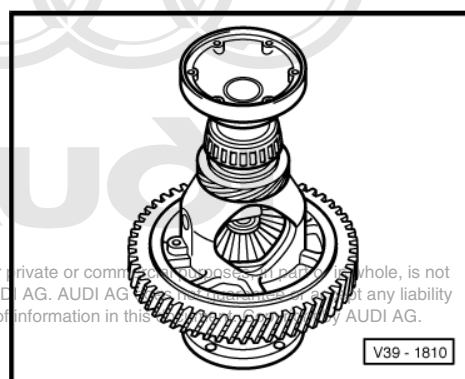
Wear protective gloves.

- Heat the inner race to approx. 100 °C on a hot plate before pressing on.



Installing differential bevel gears

- Lubricate one-piece thrust washer with gear oil and install.
- Install both sun wheels and secure (e.g. with flange shaft).
- Insert one planet pinion and turn through 180°.
- Insert the second planet pinion exactly opposite. Swivel in the planet pinions. Press in differential pinion pin as far as first pinion.
- Insert threaded pieces, ensuring they are seated correctly.
- Drive differential pinion pin into final position and secure.



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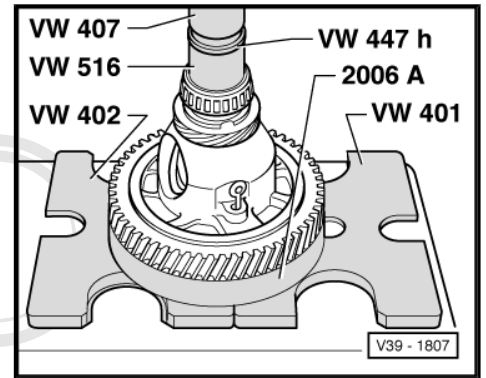
Pressing on tapered roller bearing inner race



WARNING

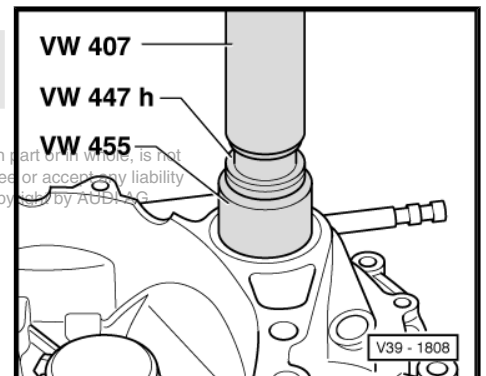
Wear protective gloves.

- Heat the inner race to approx. 100 °C on a hot plate before pressing on.

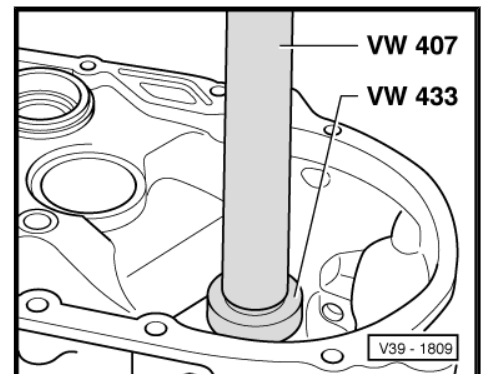


Pressing out tapered roller bearing outer race

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Pressing in tapered roller bearing outer race



2.2 Removing and installing final drive gear

Special tools and workshop equipment required

- ◆ Drill
- ◆ Drill Ø 12 mm
- ◆ Safety goggles

Removing

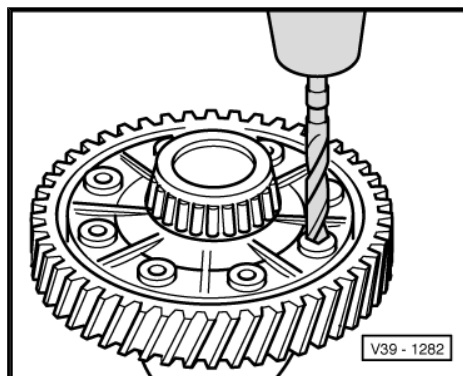


WARNING

Risk of eye injury.

- ◆ *Wear safety goggles.*

- Use a $\varnothing$ 12 mm bit to drill off the rivet heads on the countersunk side.
- Use a mandrel to drive out the rivets.



Note

Clean differential before and after drilling; protect tapered roller bearings from swarf.

Installing

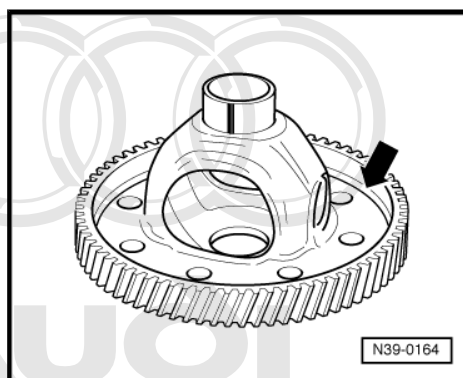
- Tightening torque $\Rightarrow$ [page 136](#)



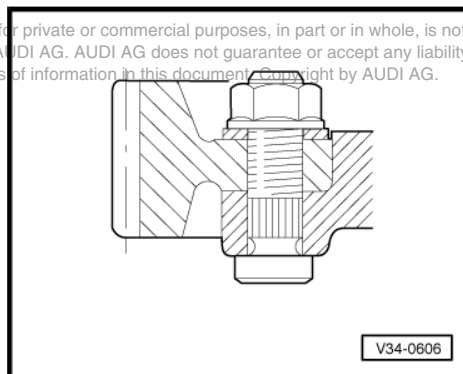
Note

When renewing the final drive gear, pay attention to the correct ratio (number of teeth) $\Rightarrow$ [page 1](#).

- Installation position: annular groove -arrow- faces towards mounting for differential bevel gears



- Bolt final drive gear to differential cage; for assignment of bolts, packing plates and nuts, refer to $\Rightarrow$ [Electronic parts catalogue](#).



2.3 Table of adjustments



Note

When performing repairs on the gearbox it is only necessary to re-adjust the input shaft, output shaft or differential if components have been renewed which have a direct effect on the adjustment of the gearbox. Refer to the following table to avoid unnecessary adjustment work:

Components renewed:	Components requiring adjustment:		
	Input shaft $\Rightarrow$ page 117	Output shaft $\Rightarrow$ page 130	Differential $\Rightarrow$ page 143
Gearbox housing	x	x	x

Components renewed:	Components requiring adjustment:		
Clutch housing	x	x	x
Input shaft	x		
Output shaft (final drive gear set)		x	
Differential cage			x
Tapered roller bearings for input shaft	x		
Tapered roller bearings for output shaft		x	
Tapered roller bearings for differential			x

2.4 Adjusting differential

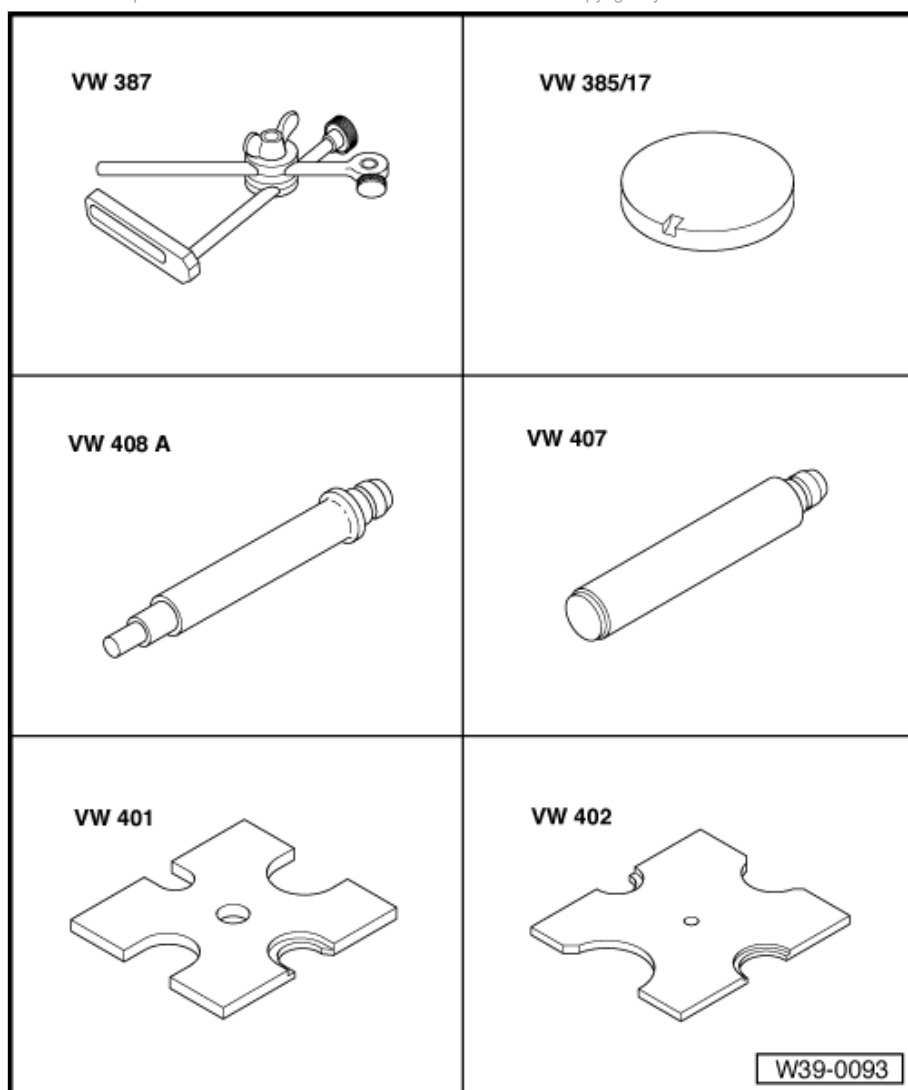
Note

- ◆ The differential must be re-adjusted when the following components have been renewed:
- ◆ Gearbox housing, clutch housing, differential cage and taper roller bearing for differential.
- ◆ Table of adjustments ➔ [page 142](#)

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Special tools and workshop equipment required

- ◆ Universal dial gauge bracket -VW 387-
- ◆ Measuring device d = 50 mm -VW 385/17- from universal measuring device -VW 385-
- ◆ Press tool -VW 408 A-
- ◆ Press tool -VW 407-
- ◆ Thrust plate -VW 401-



◆ Thrust plate -VW 402-

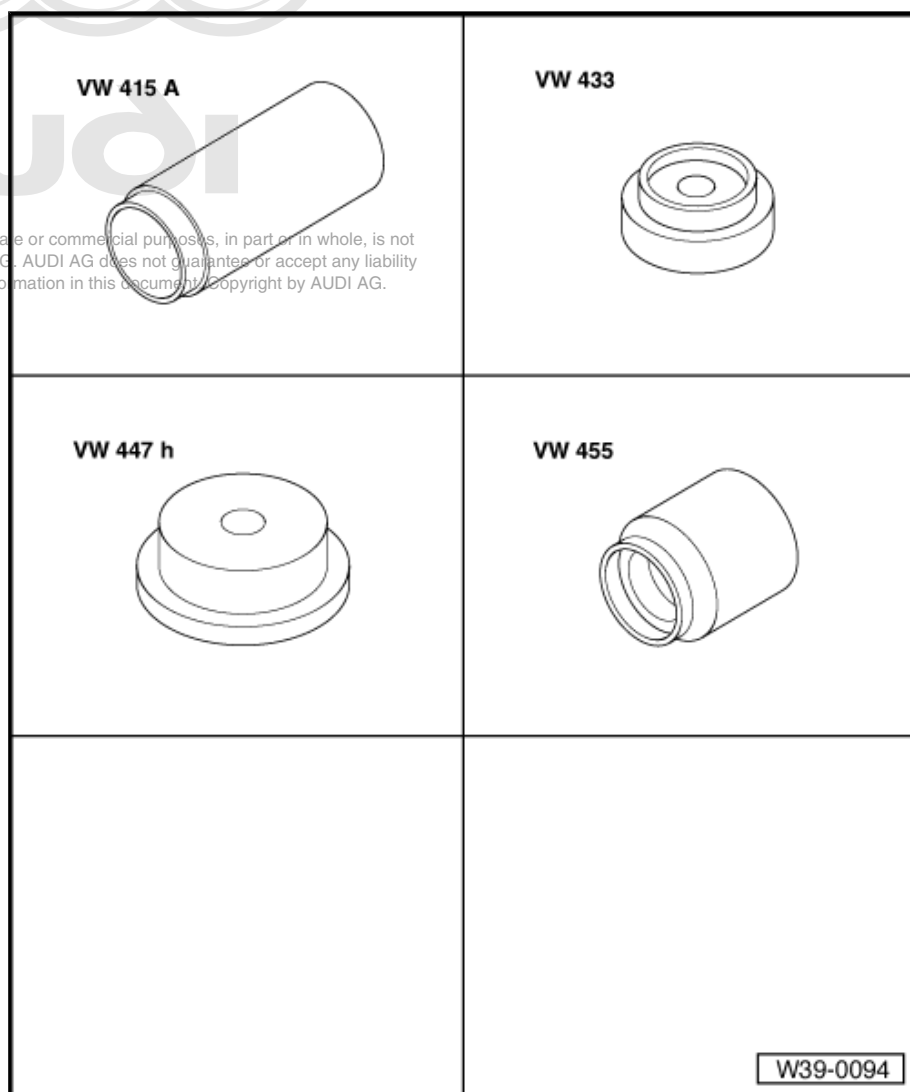
◆ Tube -VW 415 A-

◆ Press tool -VW 433-

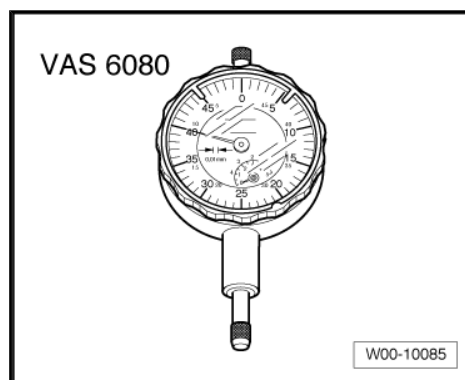
◆ Thrust plate -VW 447 H-

◆ Installing sleeve -VW 455-

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◆ Dial gauge -VAS 6080-



◆ Dial gauge extension approx. 30 mm

Procedure

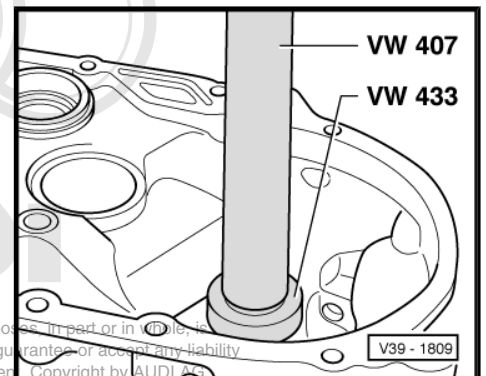
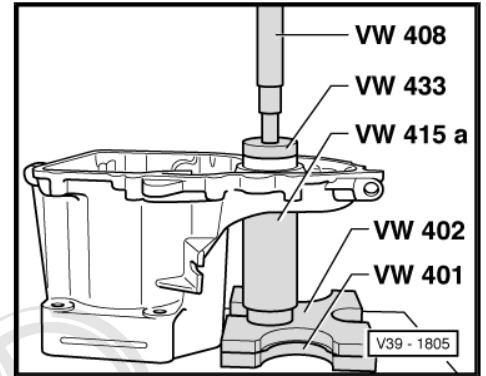
- Press taper roller bearing outer race (on side adjacent to final drive gear) with shim „S1“ (1 mm thick) into gearbox housing.



Note

The tapered roller bearing inner and outer races are paired. Do not interchange.

- Press tapered roller bearing outer race (on side opposite final drive gear) without shim into clutch housing.
- Install differential in gearbox housing.
- Mount the clutch housing and tighten the 5 bolts to 25 Nm.



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- Set up the universal dial gauge holder -VW 387- and dial gauge -VAS 6080- (3 mm measuring range) with dial gauge extension approx. 30 mm.

A - Shim „S1“ = 1 mm thick

- Preload dial gauge to 1 mm and set to „0“.
- Move differential up and down and read off and note play indicated on dial gauge.
- Measurement in following example: 1.50 mm.



Note

Do not turn the differential during measurement as otherwise the bearings will settle and the measurement result will be biased.

Determining shim „S2“

Formula: Thickness of shim = measured value + preload

Example:

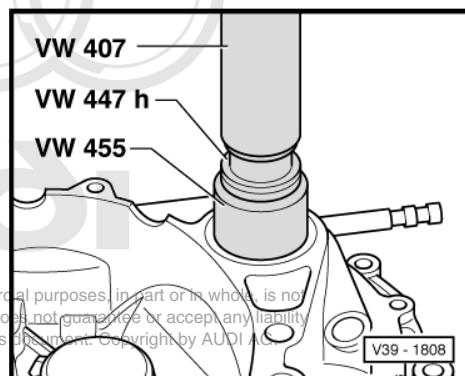
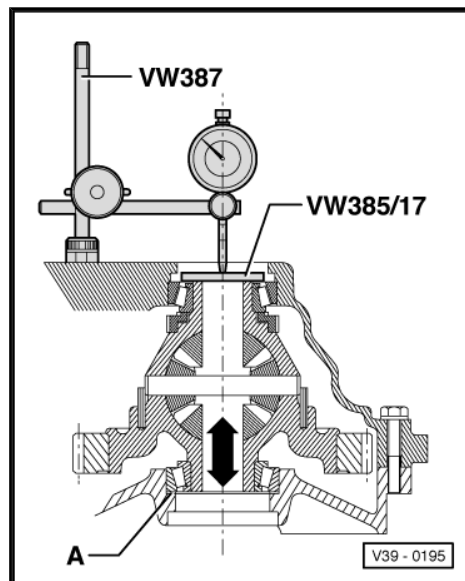
Dial gauge reading (example)	1.50 mm
Preload (constant value)	+ 0.30 mm
Thickness of shim „S2“	= 1.80 mm

- Determine the thickness of the shim on the basis of the following table; for part numbers refer to ⇒ Electronic parts catalogue .

Available shims - Thickness of shims in mm ¹⁾		
1.00	1.75	2.15
1.40	1.80	2.20
1.45	1.85	2.25
1.50	1.90	2.30
1.55	1.95	2.35
1.60	2.00	2.40
1.65	2.05	
1.70	2.10	

• ¹⁾ Different shim thicknesses permit precise setting of the required shim thickness. Fit 2 shims if necessary.

- Detach the clutch housing and press out the taper roller bearing outer race.
- Fit a shim „S2“ of the thickness determined (1.80 mm in the example) and press the taper roller bearing outer race back into the clutch housing.
- Fit clutch housing and tighten bolts to 25 Nm.



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