

Workshop Manual

Audi A3 2013 ➤

Audi Q3 2012 ➤

Audi Q3 China 2013 ➤

Audi TT 2015 ➤

Servicing 6-speed manual gearbox 02Q, 0BB, 0FB

Edition 08.2014



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List of Workshop Manual Repair Groups

Repair Group

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

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00 – Technical data

1 Identification

(ARL003956; Edition 08.2014)

⇒ [“1.1 Gearbox identification”, page 1](#)

⇒ [“1.2 Bevel box identification”, page 3](#)

1.1 Gearbox identification

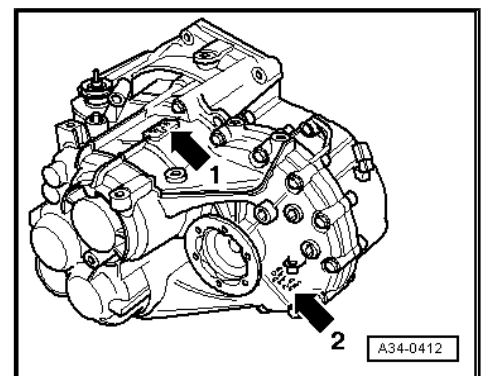
⇒ [“1.1.1 Gearbox identification, front-wheel drive”, page 1](#)

⇒ [“1.1.2 Gearbox identification, four-wheel drive”, page 2](#)

1.1.1 Gearbox identification, front-wheel drive

Location on gearbox

- ◆ Code letters and date of manufacture -arrow 1-
- ◆ Manual gearbox 02Q -arrow 2-

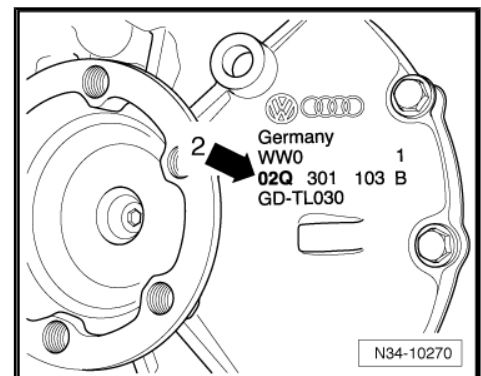


Manual gearbox 02Q, 0BB and 0FB front-wheel drive -arrow 2-



Note

- ◆ “02Q” is also written on the gearbox housing on manual gearboxes “0BB” and “0FB”.
- ◆ The gearbox housing on manual gearboxes “0BB”, “0FB” and “02Q” is identical.
- ◆ As a result, manual gearboxes “0BB” and “0FB” can only be identified using their code letters.



Code letters and production date of manual gearbox -arrow-

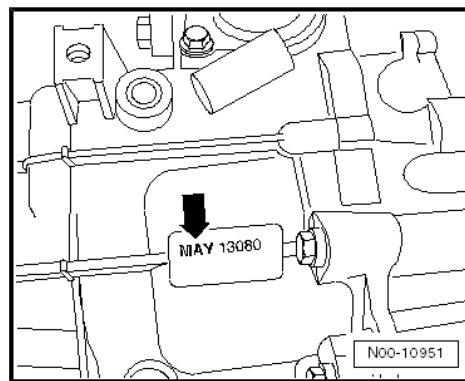
Example:	MAY	13	08	0
	Code letters	Day	Month	Year (2010) of manufacture

Additional data identify the factory where the unit was built.



Note

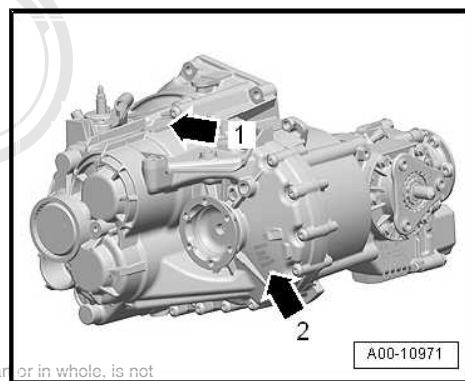
- ◆ The gearbox code letters can also be found on the vehicle data sticker.
- ◆ Manual gearbox 0FB has reinforcements in the area of the output shaft for 1st - 4th gear and is designed for a torque of up to 380 Nm.



1.1.2 Gearbox identification, four-wheel drive

Location on gearbox

- ◆ Code letters and date of manufacture -arrow 1-
- ◆ Manual gearbox 02Q four-wheel drive and manual gearbox 0FB four-wheel drive -arrow 2-

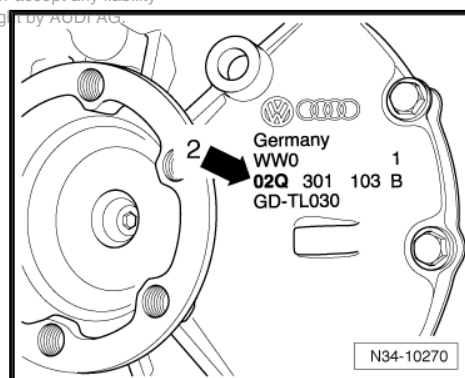


Manual gearbox 02Q four-wheel drive and manual gearbox 0FB four-wheel drive -arrow 2-



Note

- ◆ "02Q" is also written on the gearbox housing on the manual gearbox "0FB".
- ◆ The gearbox housing on manual gearboxes "0FB" and "02Q" is identical.
- ◆ As a result, manual gearbox "0FB" can only be identified using its code letters.



Code letters and production date of manual gearbox -arrow-

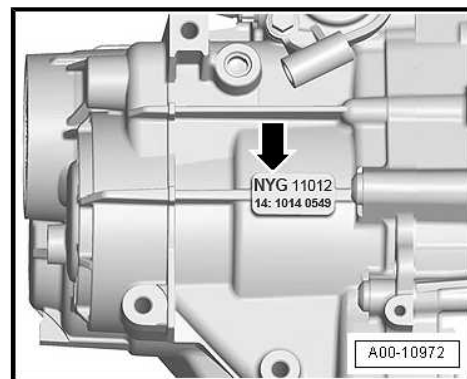
Example:	NYG	11	01	2
	Code letters	Day	Month	Year (2012) of manufacture

Additional data identify the factory where the unit was built.



Note

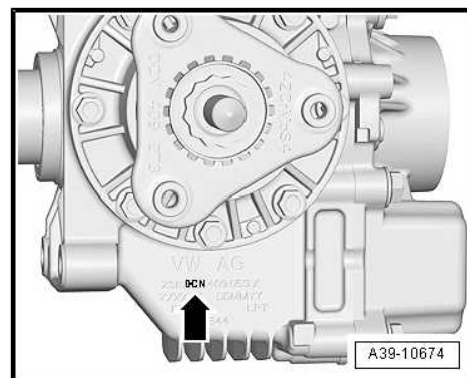
- ◆ The gearbox code letters can also be found on the vehicle data sticker.
- ◆ Manual gearbox 0FB has reinforcements in the area of the output shaft for 1st - 4th gear and is designed for a torque of up to 380 Nm.



1.2 Bevel box identification

Note different versions of bevel box:

- ◆ The bevel box "0CN" -arrow- is manufactured by "Linamar". The output flange is secured with a twelve-point nut.
- ◆ The bevel box "0AV" is manufactured by "Magna" ("0AV" would then be on the gearbox housing instead of "0CN" as in illustration). The output flange is secured with a hexagon nut.



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2 Technical data

⇒ ["2.1 Allocation of gearbox to engine", page 4](#)

⇒ ["2.2 Capacities", page 4](#)

⇒ ["2.3 Calculating gear ratios", page 4](#)

2.1 Allocation of gearbox to engine

Information on code letters, gearbox allocation ⇒ 6-speed manual gearbox; Rep. gr. 00 ; Technical data; Allocation of gearbox to engine

2.2 Capacities

⇒ ["2.2.1 Capacities - front-wheel drive", page 4](#)

⇒ ["2.2.2 Capacities - four-wheel drive", page 4](#)

⇒ ["2.2.3 Capacities - bevel box", page 4](#)

2.2.1 Capacities - front-wheel drive

Manual gearbox	6-speed 02Q/0BB/0FB, front-wheel drive
Gear oil capacity in manual gearbox	2.3 ltr.
♦ Gear oil specifications (manual gearbox) ⇒ Electronic parts catalogue	

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2.2.2 Capacities - four-wheel drive

Manual gearbox	6-speed 02Q/0FB, four-wheel drive
Gear oil capacity in manual gearbox	2.3 ltr.
♦ Gear oil specifications (manual gearbox) ⇒ Electronic parts catalogue	

2.2.3 Capacities - bevel box

Capacity of bevel box	0.9 ltr.
♦ Gear oil specifications (bevel box) ⇒ Electronic parts catalogue	

2.3 Calculating gear ratios

Example:

	6th gear	Final drive
Driving gear	$Z_{G1} = 33$	$Z_{A1} = 23$
Driven gear	$Z_{G2} = 46$	$Z_{A2} = 71$

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

i_G = gear ratio = $Z_{G2} : Z_{G1} = 33 : 46 = 0.717$

i_A = axle ratio = $Z_{A2} : Z_{A1} = 71 : 23 = 3.087$

$i_{ov.}$ = overall ratio = $i_G \times i_A = 0.717 \times 3.087 = 2.215$

3 Transmission layout

⇒ [“3.1 Transmission layout - front-wheel drive”, page 5](#)

⇒ [“3.2 Transmission layout - four-wheel drive”, page 7](#)

3.1 Transmission layout - front-wheel drive

Identification

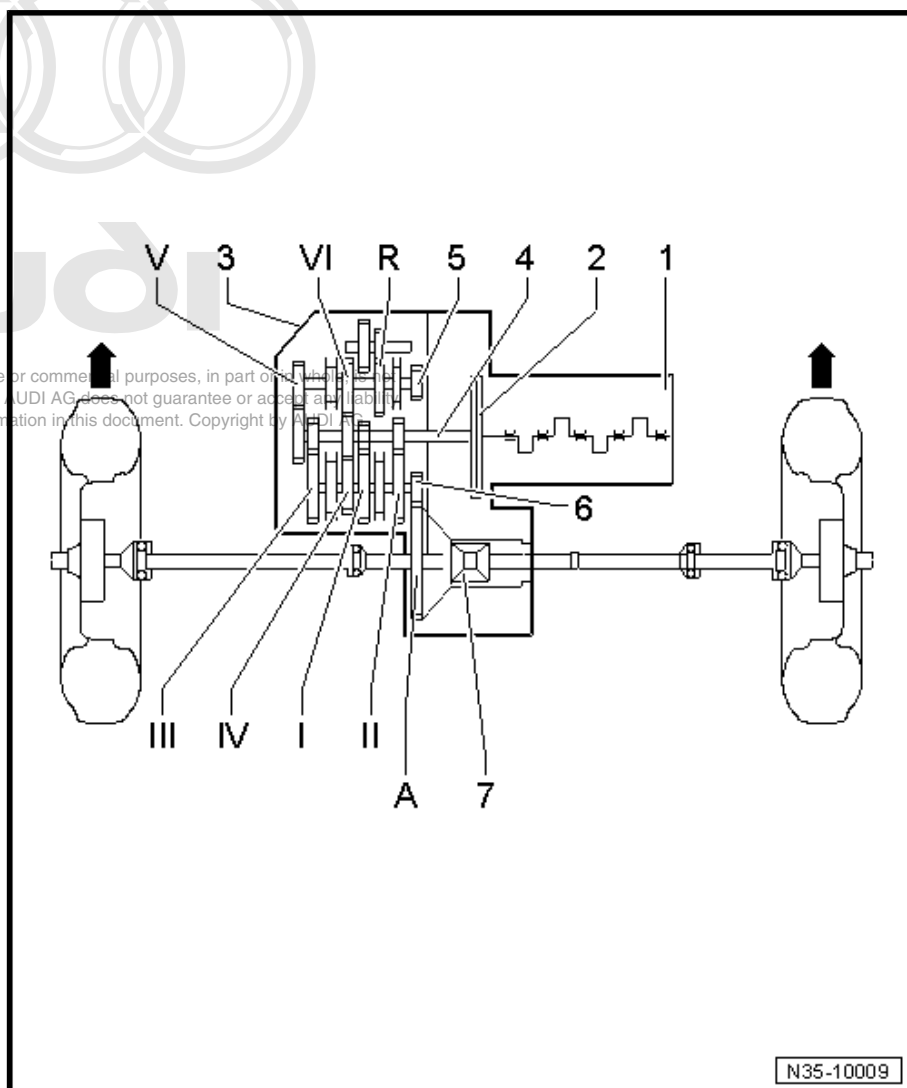


Note

-Arrows- point in direction of travel.

- 1 - Engine
- 2 - Clutch
- 3 - Manual gearbox
- 4 - Input shaft
- 5 - Output shaft II for 5th, 6th and reverse gear
- 6 - Output shaft I for 1st - 4th gear
- 7 - Differential

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Ratio

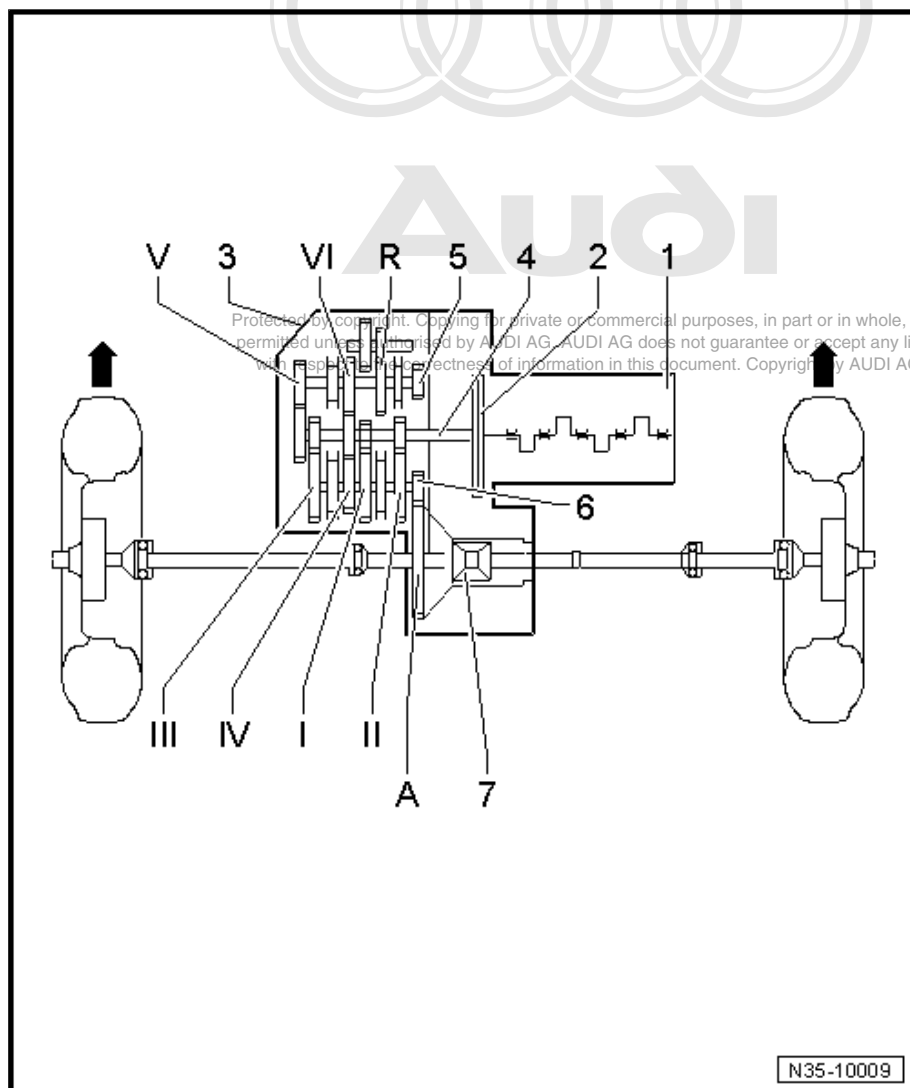


Note

-Arrows- point in direction of travel.



- I - 1st gear
- II - 2nd gear
- III - 3rd gear
- IV - 4th gear
- V - 5th gear
- VI - 6th gear
- R - Reverse gear
- A - Final drive

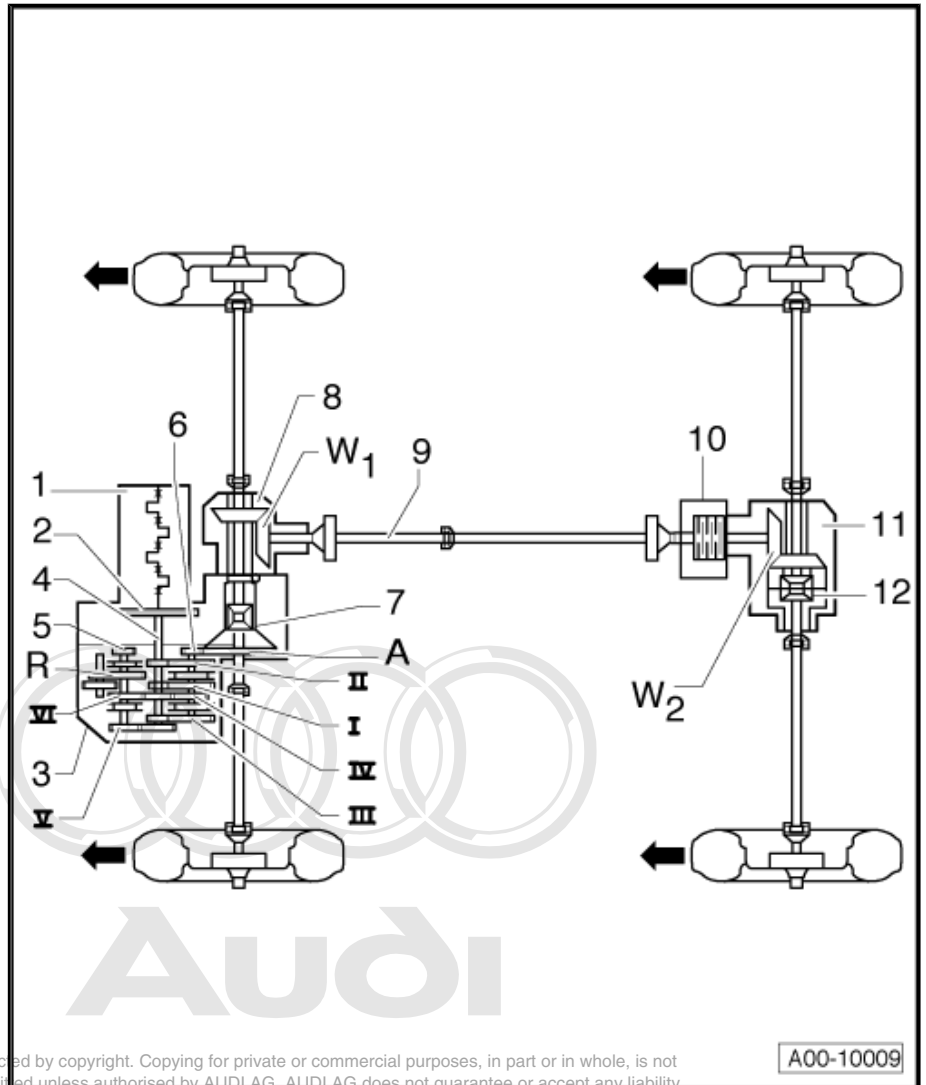


3.2 Transmission layout - four-wheel drive

Identification

-Arrows- point in direction of travel.

- 1 - Engine
- 2 - Clutch
- 3 - Manual gearbox
- 4 - Input shaft
- 5 - Output shaft II for 5th, 6th and reverse gear
- 6 - Output shaft I for 1st - 4th gear
- 7 - Differential
- 8 - Bevel box
- 9 - Propshaft
- 10 - Haldex coupling
- 11 - Rear final drive
- 12 - Differential



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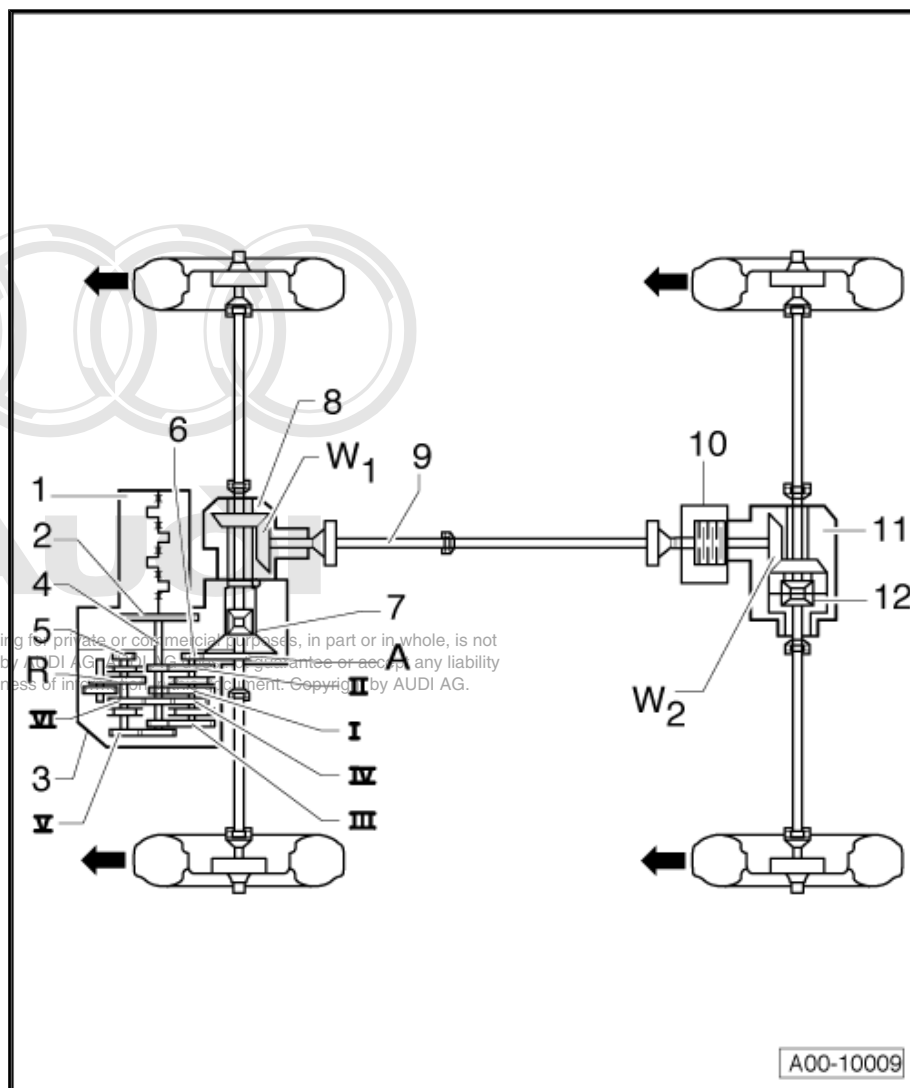
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Ratio

-Arrows- point in direction of travel.

- I - 1st gear
- II - 2nd gear
- III - 3rd gear
- IV - 4th gear
- V - 5th gear
- VI - 6th gear
- R - Reverse gear
- A - Final drive
- W1 - Front bevel gears
- W2 - Rear bevel gears

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4 Repair instructions

⇒ [“4.1 General repair instructions”, page 9](#)

⇒ [“4.2 Contact corrosion”, page 13](#)

4.1 General repair instructions

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

A number of generally applicable instructions for the various repair procedures are summarised here. They apply to the work described in this Manual.

Special tools

- ◆ For a complete list of special tools used in this Workshop Manual ⇒ Workshop equipment and special tools .

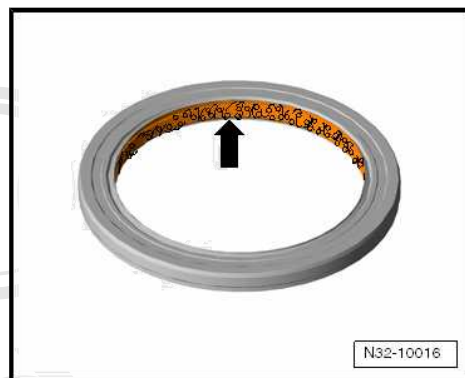
Gearbox

- ◆ Thoroughly clean all joints and connections and the surrounding areas before dismantling.
- ◆ When assembling gearbox, ensure dowel sleeves are correctly seated.
- ◆ Allocate bolts and other components according to ⇒ Electronic parts catalogue .
- ◆ For gear oil specification, refer to ⇒ Electronic parts catalogue .
- ◆ Capacities ⇒ [page 4](#) .

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Seals, oil seals, O-rings and gaskets

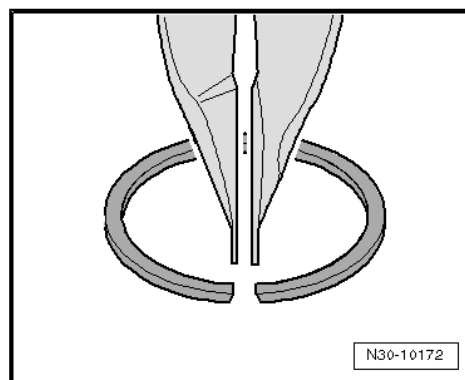
- ◆ Always renew seals, oil seals, O-rings and gaskets.
- ◆ After removing gaskets and oil seals, always inspect the contact surface on housings or shafts for burrs resulting from removal or for other signs of damage and rectify any damage found.
- ◆ Before installing oil seals, lightly oil the outer 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 with oil before installation to prevent them being trapped during assembly.
- ◆ After installing new gaskets, O-rings, seals and oil seals, check oil level ⇒ 6-speed manual gearbox; Rep. gr. 34 ; Gear oil; Checking gear oil level or ⇒ 6-speed manual gearbox; Rep. gr. 39 ; Gear oil; Checking gear oil level .



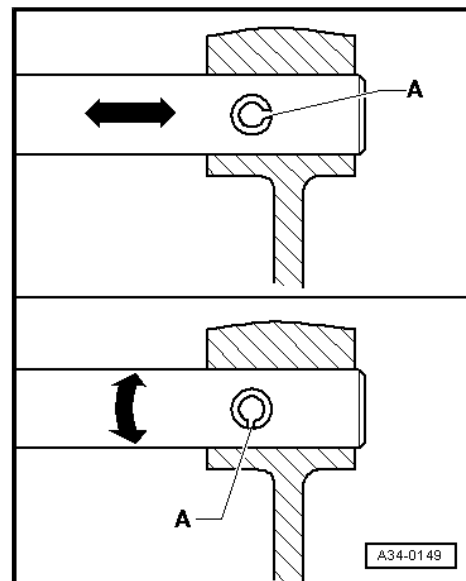
Sealants

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

Locking elements

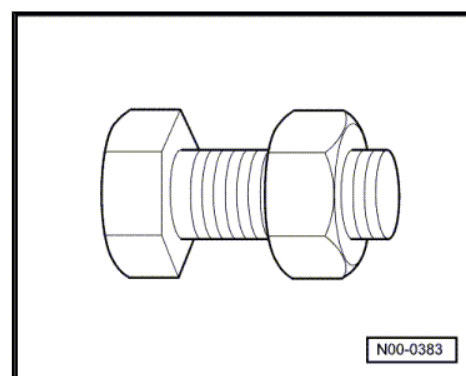


- ◆ Do not over-stretch circlips.
- ◆ Installation position for some circlips: the circlip is fitted so that the narrow part of the gap is at the top. This also gives the pliers a better grip when removing and installing.
- ◆ Always renew circlips which have been damaged or over-stretched.
- ◆ Circlips 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

- ◆ Loosen the securing nuts and bolts in reverse sequence to the specified tightening sequence.
- ◆ Securing bolts and securing nuts which secure covers and housings should be loosened and tightened diagonally in stages if no tightening sequence is specified.
- ◆ Renew self-locking nuts and bolts.
- ◆ The tightening torques stated apply to non-oiled nuts and bolts.
- ◆ Use a wire brush to clean the threads of bolts which are secured with locking fluid. Then apply locking fluid - AMV 185 101 A1- to bolt threads before installing.
- ◆ Threaded holes which take self-locking bolts or bolts coated with locking fluid must be cleaned (using a thread tap or similar). Otherwise there is a danger of the bolts shearing off the next time they are removed.
- ◆ 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

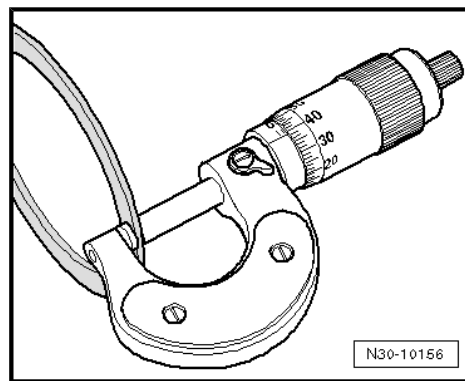
- ◆ Install new tapered roller bearings as supplied; do not lubricate additionally with oil.
- ◆ Lubricate all bearings (except new tapered roller bearings) with gear oil before installing in gearbox.
- ◆ Use inductive heater - VAS 6414- to heat inner races of tapered roller bearings to approx. 100°C before installing. Press home onto stop when installing so there is no axial clearance.
- ◆ Do not interchange the outer or inner races of bearings of the same size (the bearings are paired).
- ◆ If required, renew the tapered roller bearings on one shaft together and use new bearings from a single manufacturer.
- ◆ Install needle bearings, ball sleeves and roller bearings so the lettering (side with thicker metal) faces towards the installing tool.

Shims

- ◆ Use a micrometer to measure the shims at several points. 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 reusing synchro-rings, always fit to the same selector gear.
- ◆ Check for wear; renew if necessary.
- ◆ Lubricate with gear oil before installing.



Checking synchro-rings for 1st to 3rd gear

- ◆ Check contact surface -arrow 1- on synchro-ring -A- and contact surface -arrow 3- on inner ring -C- for grooves or scoring.
- ◆ Check coated contact surfaces -arrows 2- on outer ring -B- for damage (flattened sections, missing particles of friction lining).

Gear wheels, synchro-hubs

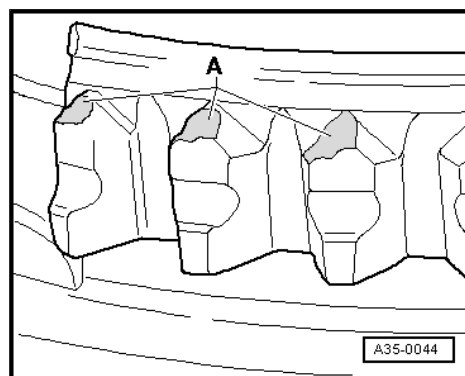
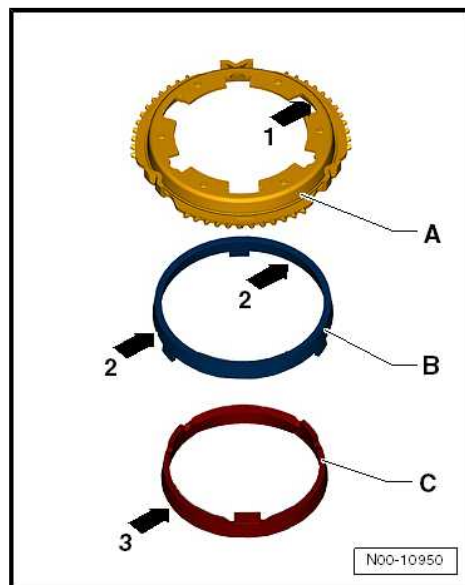
- ◆ Clean before pressing on.
- ◆ Use inductive heater - VAS 6414- to heat to approx. 100°C before installing. Press home onto stop when installing so there is no axial clearance.
- ◆ Note correct installation position.

Selector gears and locking collars

- ◆ Check cone on selector gear for scoring and visible traces of wear.
- ◆ After installing, check 1st to 6th speed selector gears for minimal axial play and freedom of movement.

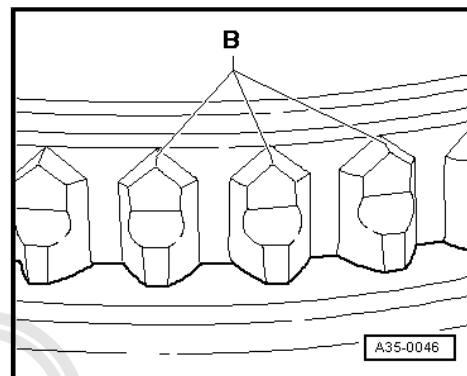
- ◆ Abnormal wear on synchro-ring or selector gear:

A - Worn chamfer on dog teeth of synchro-ring or selector gear.



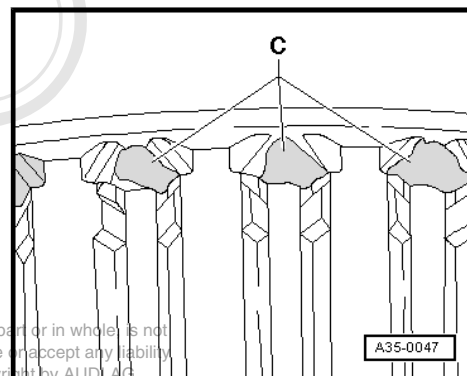
- ◆ In comparison: intact synchro-ring or selector gear:

B - Intact chamfer on dog teeth of synchro-ring or selector gear.



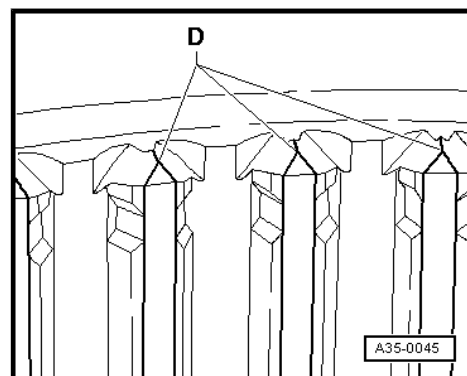
- ◆ Abnormal wear on locking collar:

C - Worn chamfer on internal splines of locking collar.



- ◆ In comparison: intact locking collar:

D - Intact chamfer on internal splines of locking collar.



4.2 Contact corrosion

The gearbox housing and clutch housing are made of a magnesium alloy.

Contact corrosion can occur if unsuitable 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 .

You should also note the following:

- ◆ Use only genuine spare parts: these have been fully tested and are compatible with aluminium.
- ◆ We recommend the use of accessories approved by Audi.



Caution

Damage caused by contact corrosion is not covered under warranty.



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30 – Clutch

1 Clutch mechanism

⇒ [“1.1 Exploded view - clutch release mechanism”, page 15](#)

⇒ [“1.2 Removing and installing clutch slave cylinder together with release bearing”, page 16](#)

1.1 Exploded view - clutch release mechanism

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- Gearbox removed ⇒ 6-speed manual gearbox; Rep. gr. 34 ;
 Removing and installing gearbox .

1 - Clutch slave cylinder with release bearing

- ☐ Are one unit; can only be renewed together
- ☐ Do not wash out bearing; wipe clean only
- ☐ If bearing is noisy, renew together with slave cylinder
- ☐ Depending on version, also clutch slave cylinder with permanently connected pipe -4-
- ☐ Removing and installing
 ⇒ [page 16](#)
- ☐ Release bearing with additional plastic disc
 ⇒ [page 16](#) , allocation of pressure plate
 ⇒ [page 16](#)
- ☐ For correct version, refer to ⇒ Electronic parts catalogue

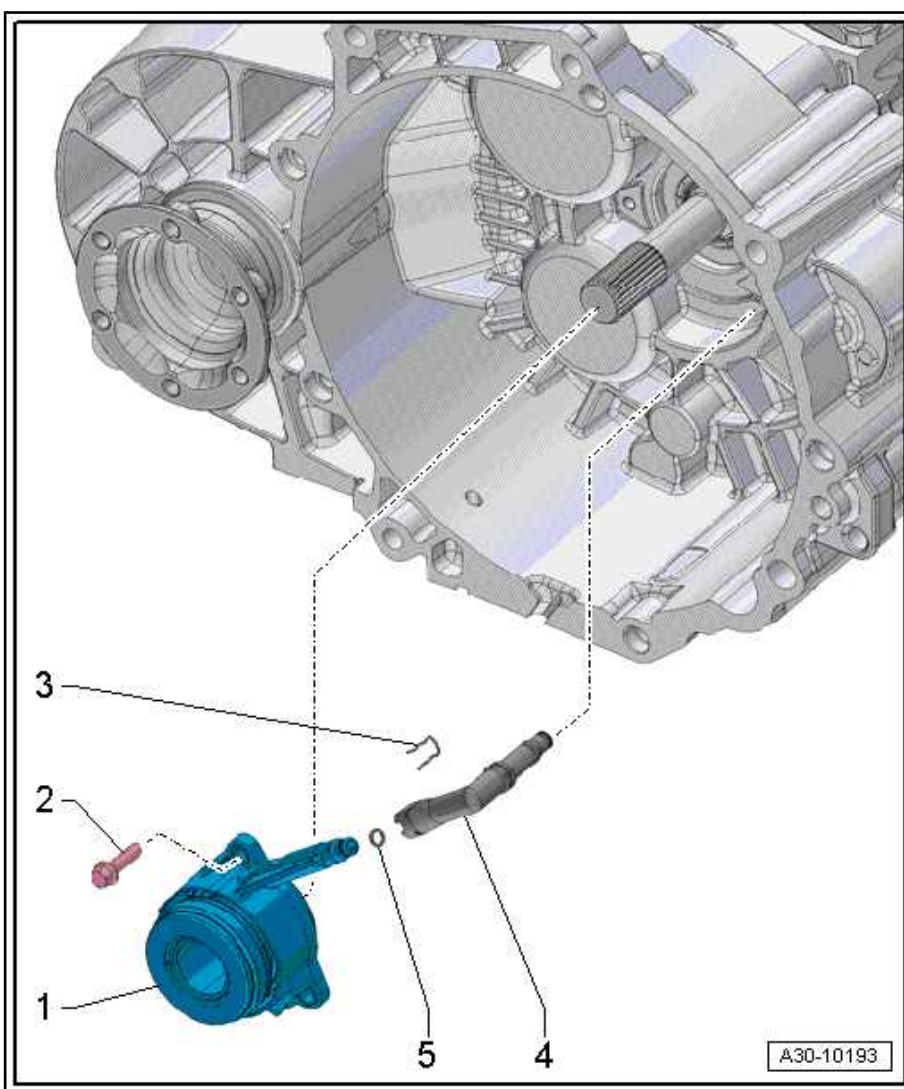
2 - Bolt

- ☐ 3x
- ☐ Always renew
- ☐ Tighten bolts carefully in several small steps and in diagonal sequence; make sure that mounting lugs on slave cylinder do not break off
- ☐ 12 Nm for metal clutch slave cylinder (with no locking fluid)
- ☐ 15 Nm for plastic clutch slave cylinder (with locking fluid)



Note

Select correct thread pitch of bolt when cleaning tapped holes for bolts in clutch housing.



3 - Retaining clip

- ☐ To remove and install pipe, pull out retaining clip as far as it will go
- ☐ Push on until retaining clip engages audibly

4 - Pipe

- ☐ To clutch master cylinder
- ☐ Depending on version, also clutch slave cylinder -1- with permanently connected pipe

5 - O-ring

- ☐ Renew if damaged
- ☐ Push onto pipe connection
- ☐ Lubricate with brake fluid before installing

Release bearing with additional plastic disc

- Identification: projections -arrow- on plastic disc.
- Pressure plate has been adapted ➔ [page 16](#) .
- If required, modified release bearing and modified pressure plate must always be fitted together

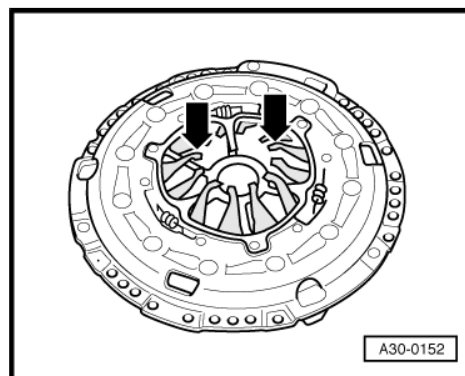
For correct version, refer to ➔ Electronic parts catalogue



For release bearing with additional plastic disc only: tips of diaphragm springs on pressure plate (-arrows-), slightly lower overall height

- Release bearing with additional plastic disc and pressure plate with tips of diaphragm springs of slightly lower overall height must only be installed together.

For correct version, refer to ➔ Electronic parts catalogue



1.2 Removing and installing clutch slave cylinder together with release bearing



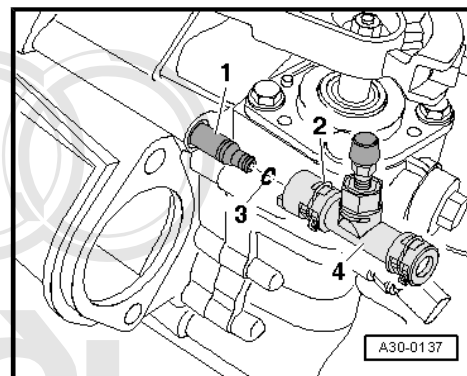
Note

- ◆ *Slave cylinder and release bearing are one unit and can only be renewed together.*
- ◆ *Note thread pitch of securing bolts for clutch slave cylinder when cleaning tapped holes for bolts in clutch housing.*

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Removing

- Gearbox is removed
- Release retaining clip -2- with a screwdriver and pull bleeder connection -4- off slave cylinder -1-.



- Remove bolts -arrows-.
- Take off slave cylinder together with release bearing -A-.

Installing

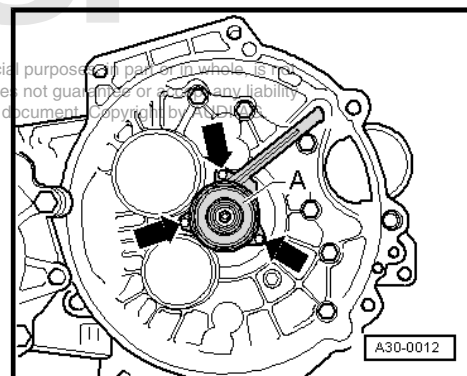
Installation is carried out in reverse sequence; note the following:



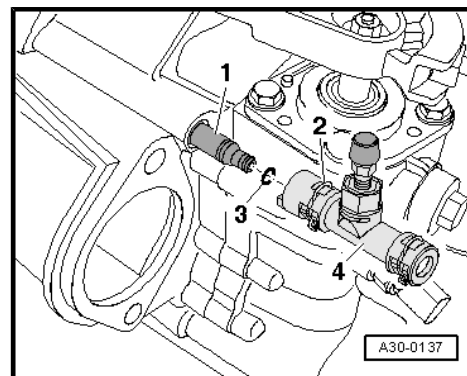
Caution

Risk of damage to clutch slave cylinder.

- ◆ **The bolts must only be tightened in small steps to avoid any risk of breaking off the mounting lugs -arrows- on the clutch slave cylinder.**



- Bolt on clutch slave cylinder with release bearing -arrows-; tightening torque: ➔ [Item 2 \(page 15\)](#) .
- Check O-ring -3- for damage and renew if necessary.
- Press bleeder connection -4- onto connection on clutch slave cylinder -1- so that retaining clip -2- snaps into place.
- Pull on bleeder connection to check it is secure.

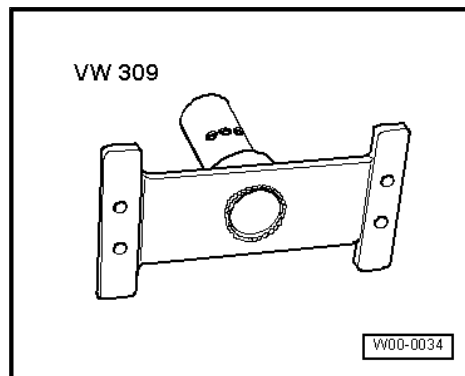


34 – Controls, housing

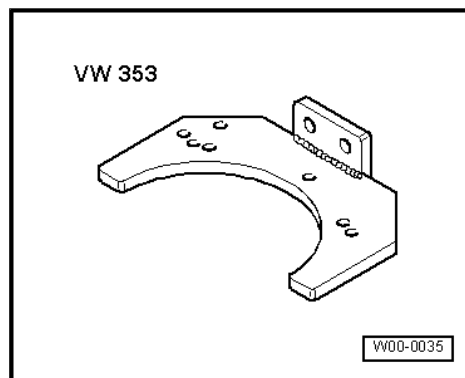
1 Securing to engine and gearbox support

Special tools and workshop equipment required

- ◆ Support plate - VW 309-



- ◆ Gearbox support - VW 353-



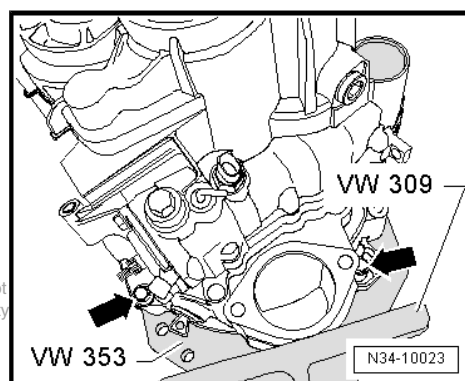
- Secure gearbox to assembly stand with bolts -arrows-.



Note

If one of the bolt holes is not flush with the gearbox support, then insert a washer (or washers) between the bolt hole and the gearbox support.

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2 Dismantling and assembling gearbox

⇒ [“2.1 Schematic overview - gearbox”, page 19](#)

⇒ [“2.2 Exploded view - gearbox”, page 21](#)

⇒ [“2.3 Exploded view - gearbox housing and selector mechanism”, page 23](#)

⇒ [“2.4 Exploded view - selector unit”, page 25](#)

⇒ [“2.5 Exploded view - input shaft, output shafts, differential and selector rods”, page 26](#)

⇒ [“2.6 Exploded view - selector forks”, page 30](#)

⇒ [“2.7 Dismantling and assembling gearbox”, page 30](#)

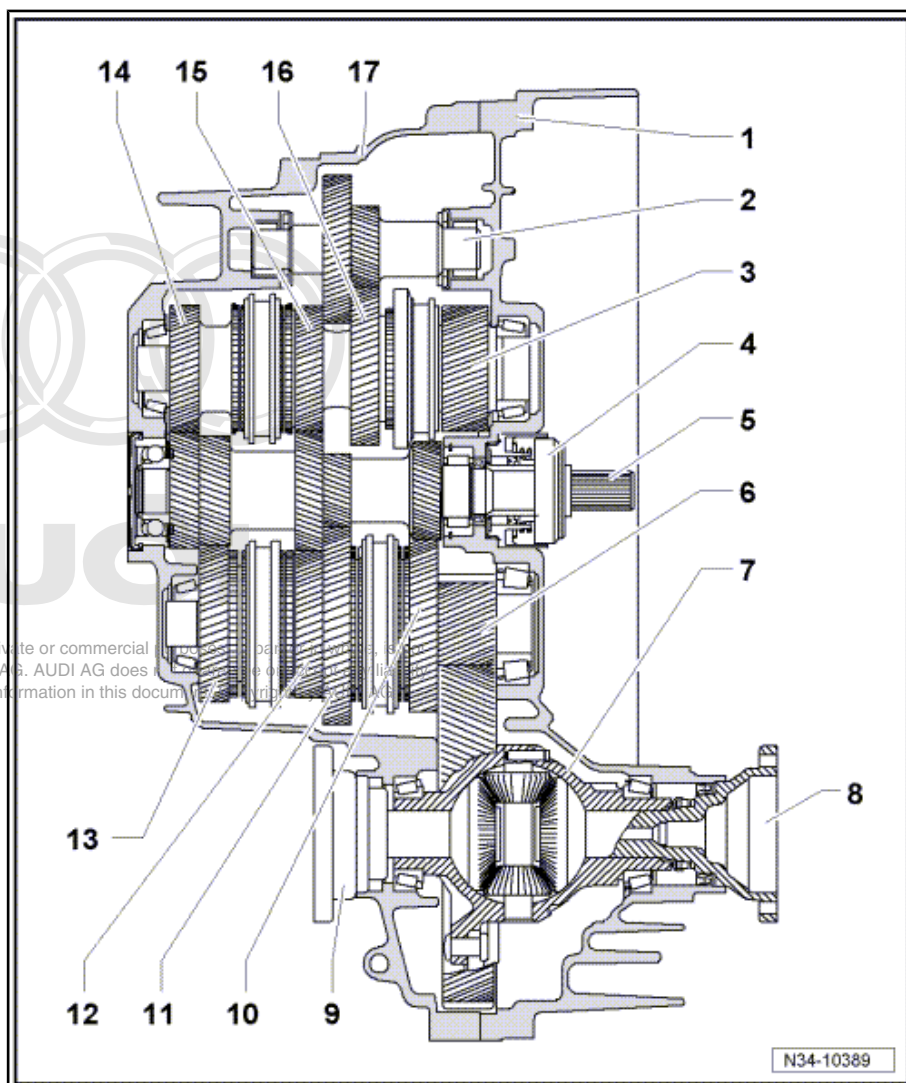
2.1 Schematic overview - gearbox

⇒ [“2.1.1 Schematic overview - gearbox, front-wheel drive”, page 19](#)

⇒ [“2.1.2 Schematic overview - gearbox, four-wheel drive”, page 20](#)

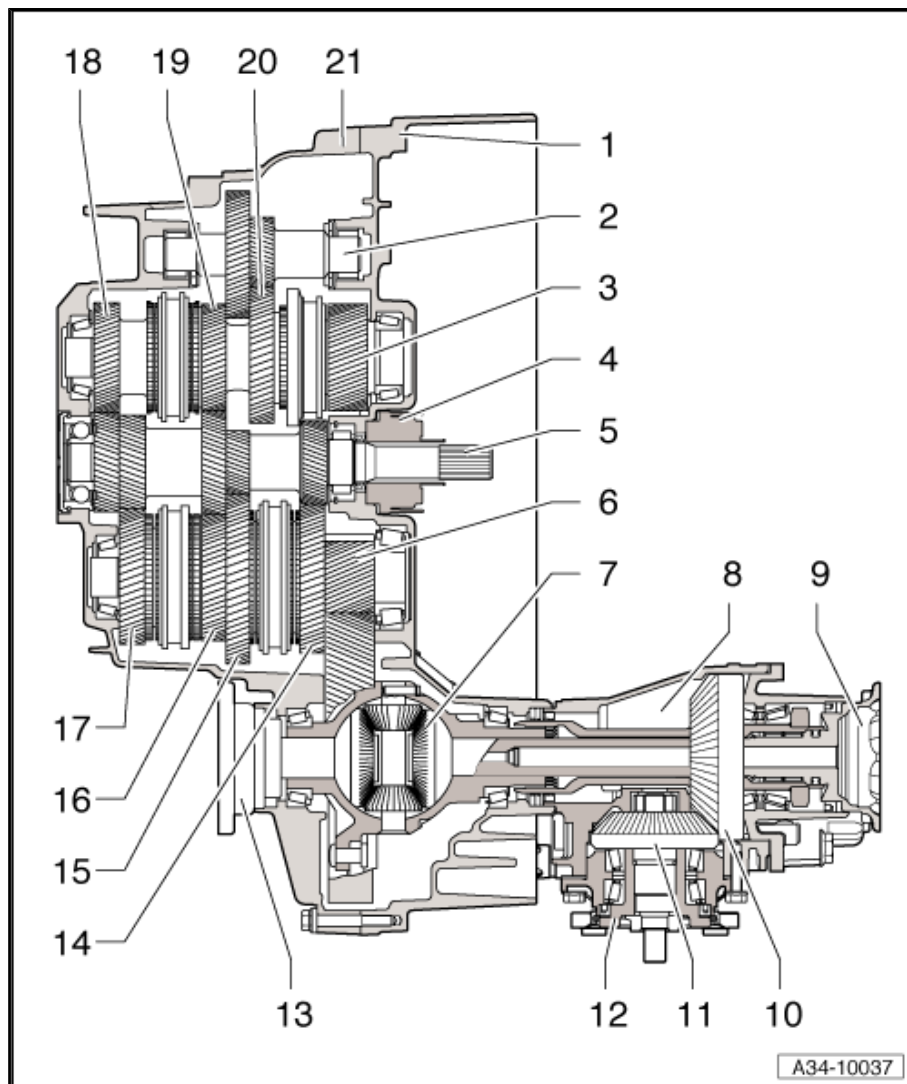
2.1.1 Schematic overview - gearbox, front-wheel drive

- 1 - Clutch housing
- 2 - Reverse shaft
- 3 - Output shaft for 5th, 6th and reverse gear
- 4 - Clutch slave cylinder with release bearing
- 5 - Input shaft
- 6 - Output shaft for 1st - 4th gear
- 7 - Differential
- 8 - Flange shaft (right-side)
- 9 - Flange shaft (left-side)
- 10 - 2nd speed selector gear
- 11 - 1st speed selector gear
- 12 - 4th speed selector gear
- 13 - 3rd speed selector gear
- 14 - 5th speed selector gear
- 15 - 6th speed selector gear
- 16 - Reverse selector gear
- 17 - Gearbox housing



2.1.2 Schematic overview - gearbox, four-wheel drive

- 1 - Clutch housing
- 2 - Reverse shaft
- 3 - Output shaft for 5th, 6th and reverse gear
- 4 - Clutch slave cylinder with release bearing
- 5 - Input shaft
- 6 - Output shaft for 1st - 4th gear
- 7 - Differential
- 8 - Bevel box
- 9 - Flange shaft (right-side)
- 10 - Bevel gear with input shaft
- 11 - Shaft bevel gear
- 12 - Output flange
- 13 - Flange shaft (left-side)
- 14 - 2nd speed selector gear
- 15 - 1st speed selector gear
- 16 - 4th speed selector gear
- 17 - 3rd speed selector gear
- 18 - 5th speed selector gear
- 19 - 6th speed selector gear
- 20 - Reverse selector gear
- 21 - Gearbox housing



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2.2 Exploded view - gearbox

⇒ [“2.2.1 Exploded view - gearbox \(front-wheel drive\)”, page 21](#)

⇒ [“2.2.2 Exploded view - gearbox \(four-wheel drive\)”, page 22](#)

2.2.1 Exploded view - gearbox (front-wheel drive)

I -

⇒ [“2.3 Exploded view - gear box housing and selector mechanism”, page 23](#)

I -

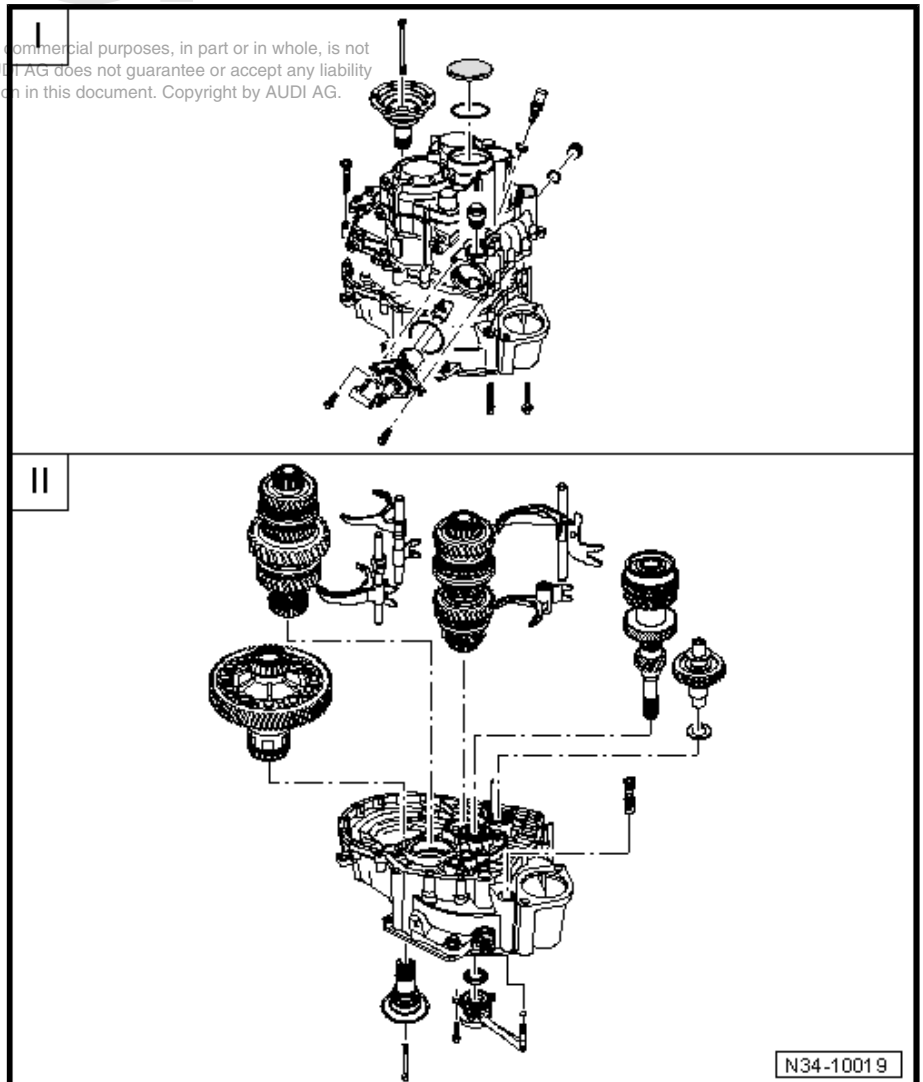
⇒ [“2.4 Exploded view - selector unit”, page 25](#)

II -

⇒ [“2.5.1 Exploded view - input shaft, output shafts, differential and selector rods \(front-wheel drive\)”, page 26](#)

II -

⇒ [“2.6 Exploded view - selector forks”, page 30](#)



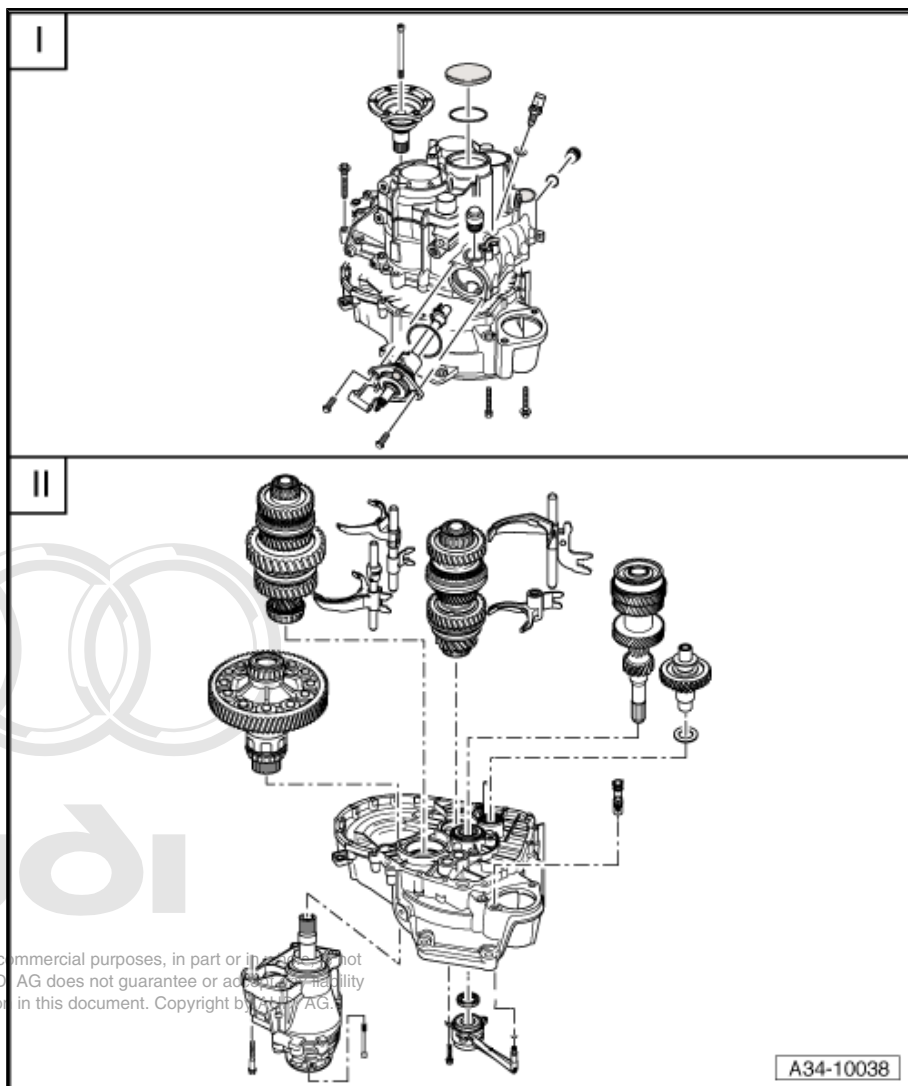
2.2.2 Exploded view - gearbox (four-wheel drive)

I -
⇒ [“2.3 Exploded view - gearbox housing and selector mechanism”, page 23](#)

I -
⇒ [“2.4 Exploded view - selector unit”, page 25](#)

II -
⇒ [“2.5.2 Exploded view - input shaft, output shafts, differential and selector rods \(four-wheel drive\)”, page 28](#)

II -
⇒ [“2.6 Exploded view - selector forks”, page 30](#)



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2.3 Exploded view - gearbox housing and selector mechanism

1 - Countersunk bolt

- ☐ Removing and installing
 ⇒ [Item 11 \(page 117\)](#) or
 ⇒ [Item 13 \(page 120\)](#)

2 - Flange shaft (left-side)

- ☐ With spring and tapered ring
- ☐ Removing and installing
 ⇒ [page 107](#)
- ☐ Assembling, front-wheel drive ⇒ [page 116](#)
- ☐ Assembling, four-wheel drive ⇒ [page 119](#)

3 - Circlip

- ☐ For sheet-metal sealing cap
 ⇒ [Item 4 \(page 23\)](#)
- ☐ Not fitted on version with plastic sealing cap

4 - Sealing cap

- ☐ Sheet metal or plastic
 ⇒ [page 31](#)
- ☐ Sheet metal version: secured with circlip
 ⇒ [Item 3 \(page 23\)](#)
- ☐ Plastic version: without circlip
- ☐ Select correct components from ⇒ Electronic parts catalogue

5 - Circlip

- ☐ For grooved ball bearing on input shaft
 ⇒ [Item 4 \(page 60\)](#)
- ☐ Thickness must be redetermined on gearboxes with reinforcements (manual gearbox 0FB)
 ⇒ [page 42](#)

6 - Reversing light switch - F4-

- ☐ 20 Nm

7 - Oil drain plug

- ☐ Note the different versions ⇒ [page 24](#)
- ☐ Hexagon socket head bolt, 30 Nm
- ☐ Multi-point socket head bolt, 45 Nm

8 - Bolt

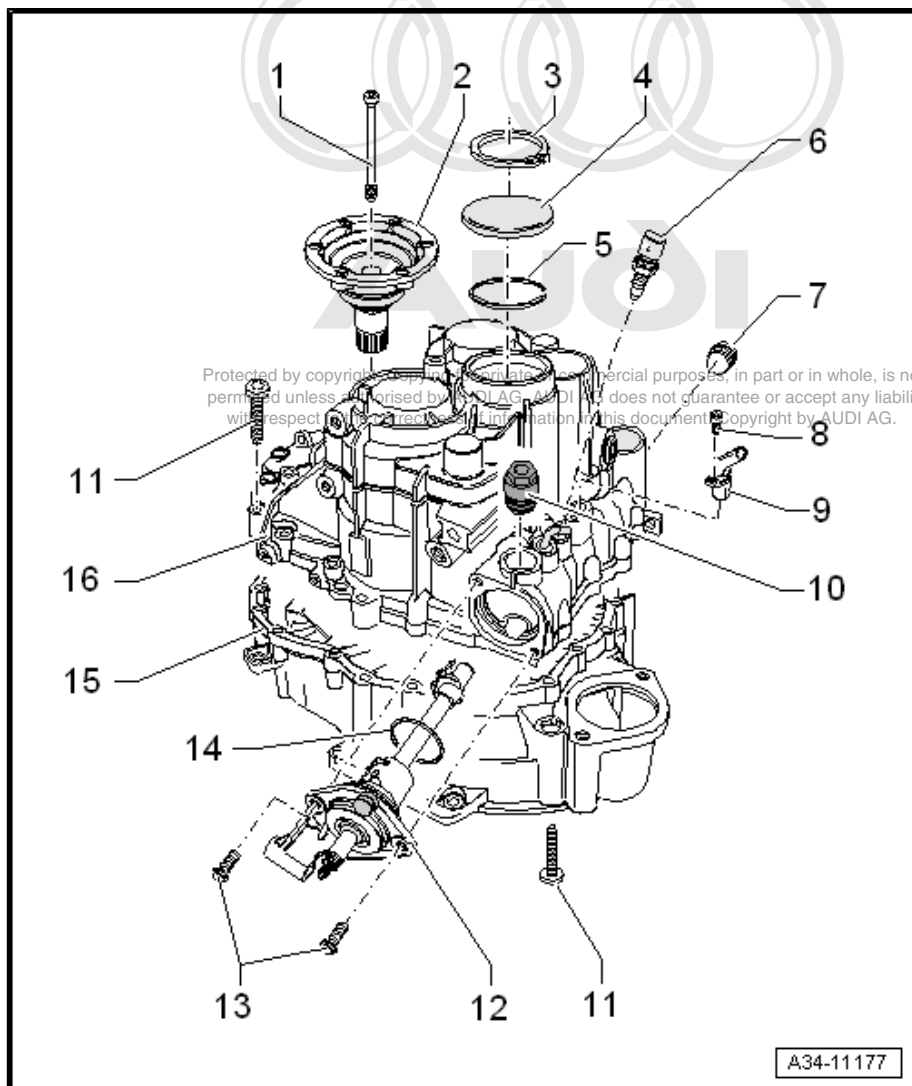
- ☐ 6 Nm

9 - Gearbox neutral position sender - G701-

- ☐ For vehicles with start/stop system

10 - Locking bolt

- ☐ For selector shaft
- ☐ Made of plastic: 30 Nm
- ☐ Renew



11 - Bolt

- ☐ 15 Nm and turn 180° further
- ☐ Aluminium bolt M 9
- ☐ Always renew

12 - Selector unit

- ☐ (Selector shaft with selector mechanism cover)
- ☐ Servicing ⇒ [page 25](#)

13 - Bolt

- ☐ 20 Nm
- ☐ Renew

14 - O-ring

- ☐ Renew

15 - Clutch housing

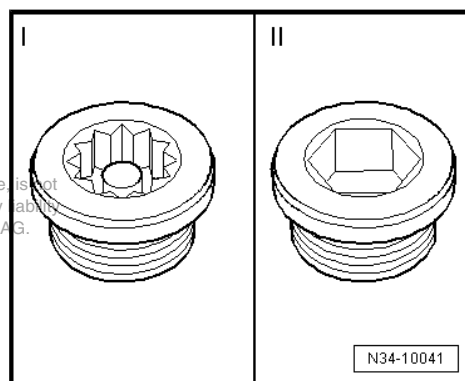
- ☐ Servicing ⇒ [page 49](#)

16 - Gearbox housing

- ☐ Servicing ⇒ [page 47](#)

Different versions of oil filler/oil drain plug

Component	Nm
Oil filler plug / drain plug with multi-point socket head -I-	45
Oil filler plug / drain plug with hexagon socket head -II-	30



2.4 Exploded view - selector unit

1 - Bearing bush

- ☐ For selector shaft
- ☐ Removing and installing
 ⇒ [Item 15 \(page 48\)](#)

2 - Selector unit

- ☐ Consists of selector shaft and selector mechanism cover
- ☐ Components cannot be separated from each other

3 - O-ring

- ☐ Fit in circular slot on selector mechanism cover
- ☐ Lubricate with gear oil before installing
- ☐ Always renew

4 - Cap

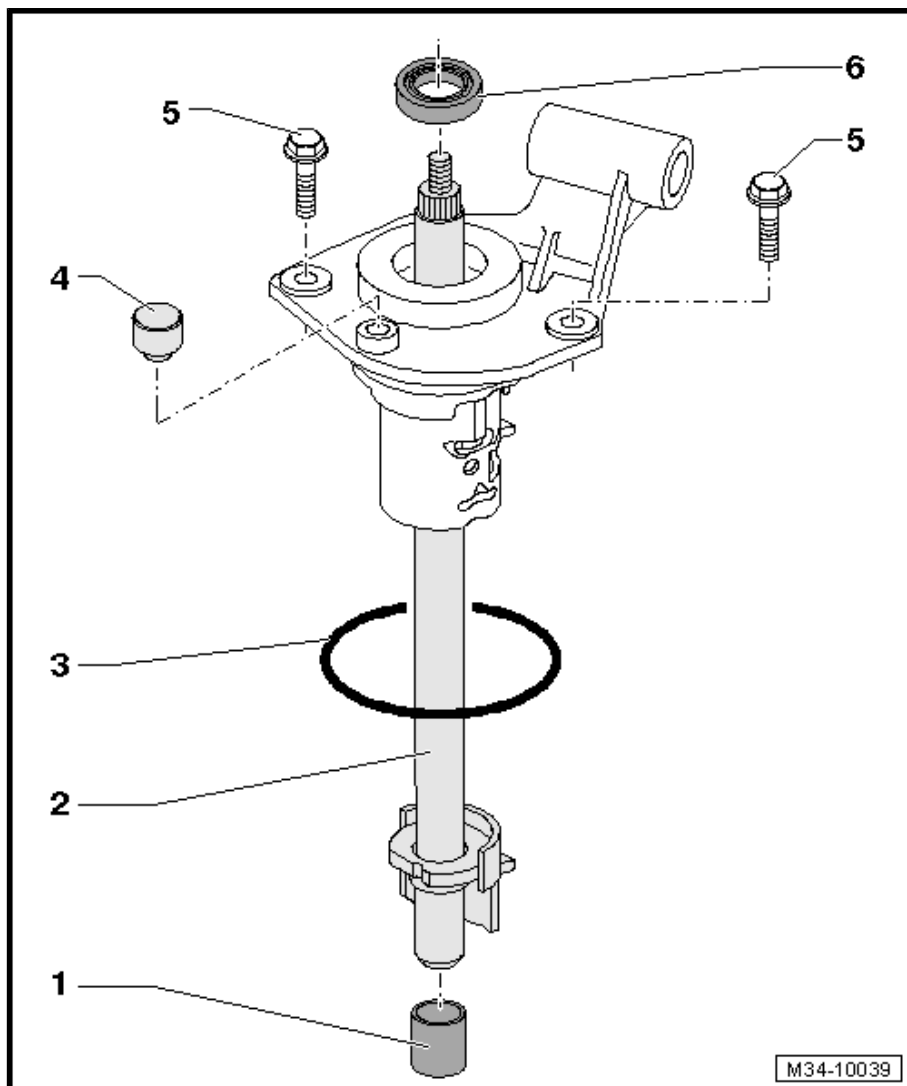
- ☐ For gearbox breather

5 - Bolt

- ☐ For selector unit on gearbox housing
- ☐ Tightening torque
 ⇒ [Item 13 \(page 24\)](#)
- ☐ Always renew

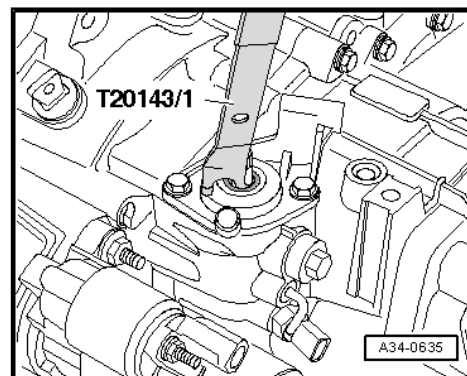
6 - Oil seal for selector shaft

- ☐ Removing ⇒ [page 25](#)
- ☐ Installing ⇒ [page 26](#)



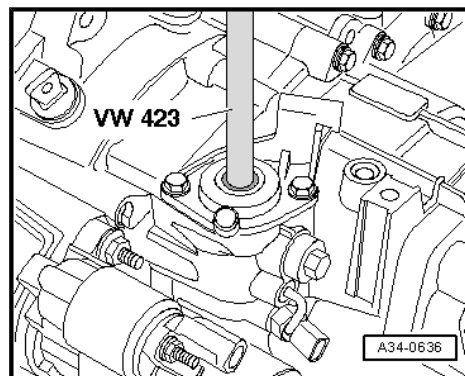
Removing selector shaft oil seal

- Pull out oil seal using extractor tool - T20143/1- .



Installing oil seal for selector shaft

- Lightly oil outer circumference of new oil seal.
- Pack space between sealing lip and dust lip half-full with sealing grease - G 052 128 A1- .
- Drive in oil seal with tube - VW 423- .



2.5 Exploded view - input shaft, output shafts, differential and selector rods

⇒ "2.5.1 Exploded view - input shaft, output shafts, differential and selector rods (front-wheel drive)", page 26

⇒ "2.5.2 Exploded view - input shaft, output shafts, differential and selector rods (four-wheel drive)", page 28

2.5.1 Exploded view - input shaft, output shafts, differential and selector rods (front-wheel drive)

1 - Output shaft for 1st - 4th gear

- ❑ Dismantling and assembling ⇒ [page 67](#)
- ❑ Installation position ⇒ [page 27](#)

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

- ❑ Installation position ⇒ [page 27](#)

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

- ❑ Installation position ⇒ [page 27](#)

4 - Output shaft for 5th, 6th and reverse gear

- ❑ Dismantling and assembling ⇒ [page 71](#)
- ❑ Installation position ⇒ [page 27](#)

5 - Selector rod with selector fork for 5th and 6th gear

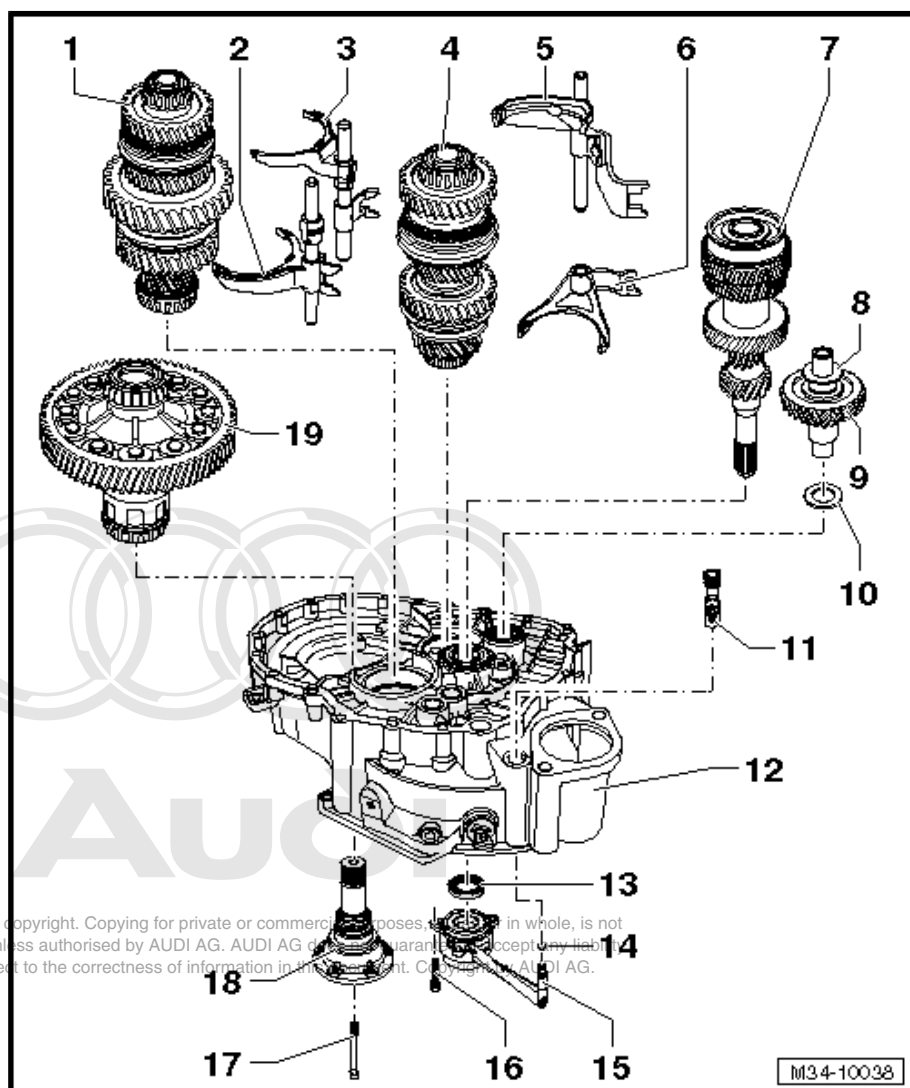
- ❑ Installation position ⇒ [page 27](#)

6 - Reverse gear selector fork

- ❑ Installation position ⇒ [page 27](#)

7 - Input shaft

- ❑ Installation position ⇒ [page 27](#)
- ❑ Dismantling and assembling ⇒ [page 60](#)



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- ☐ Always renew grooved ball bearing on input shaft ➔ [Item 4 \(page 60\)](#)

8 - Thrust washer

9 - Reverse shaft

- ☐ Fit before installing thrust washer ➔ [Item 8 \(page 27\)](#)

10 - Thrust washer

11 - Bleeder connection

- ☐ Connect to clutch slave cylinder ➔ [Item 15 \(page 27\)](#)

12 - Clutch housing

- ☐ Servicing ➔ [page 49](#)

13 - Input shaft oil seal

- ☐ Renewing ➔ [page 65](#)

14 - O-ring

- ☐ Renew damaged O-rings
- ☐ Push onto pipe connection
- ☐ Lubricate with brake fluid before installing
- ☐ For correct version, refer to ➔ Electronic parts catalogue

15 - Clutch slave cylinder with release bearing

- ☐ Removing and installing ➔ [Item 1 \(page 15\)](#)

16 - Bolt

- ☐ Removing and installing ➔ [Item 2 \(page 15\)](#)

17 - Countersunk bolt

- ☐ Removing and installing ➔ [Item 11 \(page 117\)](#) or ➔ [Item 13 \(page 120\)](#)

18 - Flange shaft (right-side)

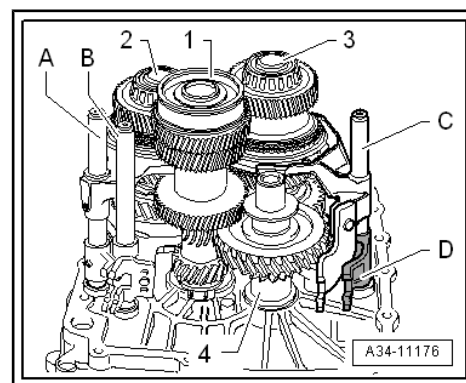
- ☐ With spring and tapered ring
- ☐ Removing and installing ➔ [page 109](#)
- ☐ Assembling ➔ [page 116](#)

19 - Differential

- ☐ Dismantling and assembling ➔ [page 116](#)

Installation position of shafts and selector rods in gearbox

- 1 - Input shaft
- 2 - Output shaft for 1st - 4th gear
- 3 - Output shaft for 5th, 6th and reverse gear
- 4 - Reverse shaft
- A - Selector rod for 3rd and 4th gear
- B - Selector rod for 1st and 2nd gear
- C - Selector rod for 5th and 6th gear
- D - Reverse gear selector fork



Note

Reverse gear selector fork -item D- is fitted on selector rod for 5th/6th gear -item C-.

2.5.2 Exploded view - input shaft, output shafts, differential and selector rods (four-wheel drive)

1 - Output shaft for 1st - 4th gear

- ☐ Dismantling and assembling ⇒ [page 67](#)
- ☐ Installation position ⇒ [page 27](#)

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

- ☐ Installation position ⇒ [page 27](#)

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

- ☐ Installation position ⇒ [page 27](#)

4 - Output shaft for 5th, 6th and reverse gear

- ☐ Dismantling and assembling ⇒ [page 71](#)
- ☐ Always renew grooved ball bearing on input shaft ⇒ [Item 4 \(page 60\)](#)
- ☐ Installation position ⇒ [page 27](#)

5 - Selector rod with selector fork for 5th and 6th gear

- ☐ Installation position ⇒ [page 27](#)

6 - Reverse gear selector fork

- ☐ Installation position ⇒ [page 27](#)

7 - Input shaft

- ☐ Installation position ⇒ [page 27](#)
- ☐ Dismantling and assembling ⇒ [page 60](#)
- ☐ Always renew grooved ball bearing on input shaft ⇒ [Item 4 \(page 60\)](#)

8 - Thrust washer

9 - Reverse shaft

- ☐ Fit before installing thrust washer ⇒ [Item 8 \(page 28\)](#)

10 - Thrust washer

11 - Bleeder connection

- ☐ Connect to clutch slave cylinder ⇒ [Item 15 \(page 29\)](#)

12 - Clutch housing

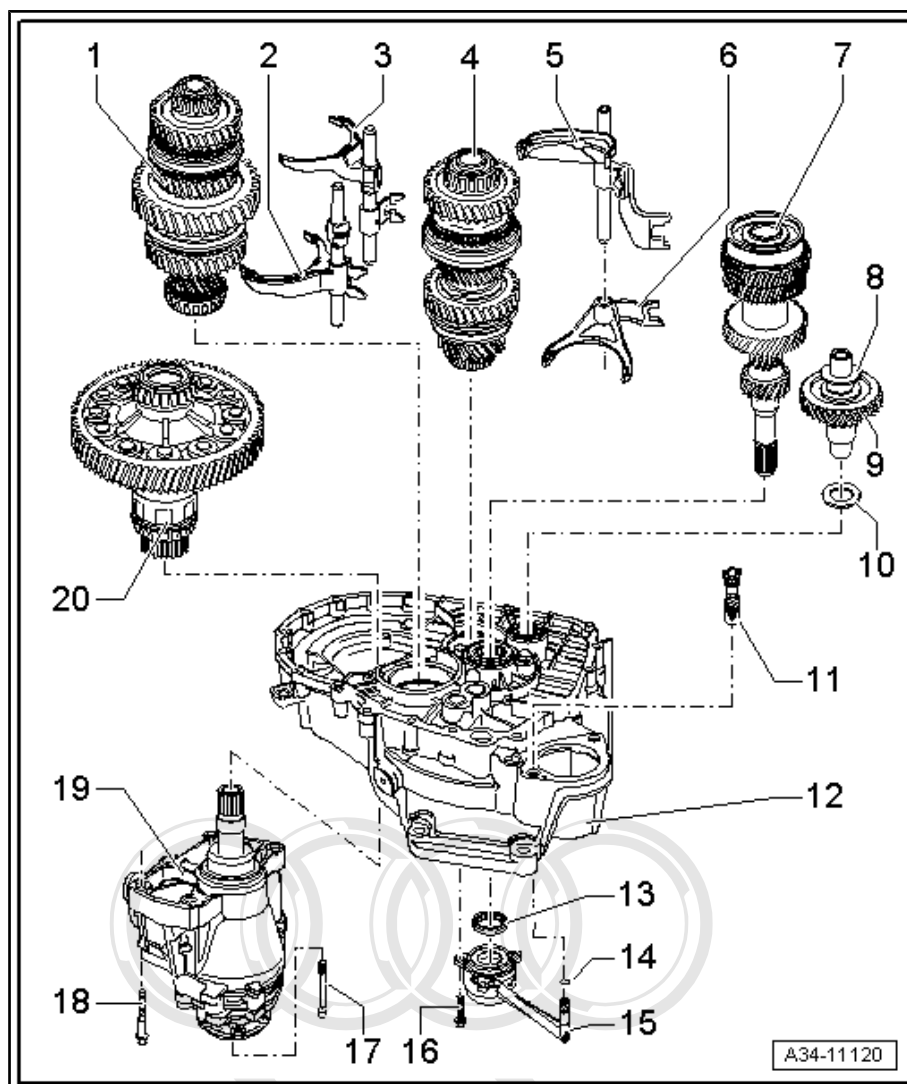
- ☐ Servicing ⇒ [page 49](#)

13 - Input shaft oil seal

- ☐ Renewing ⇒ [page 65](#)

14 - O-ring

- ☐ Renew damaged O-rings



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- ☐ Push onto pipe connection
- ☐ Lubricate with brake fluid before installing
- ☐ For correct version, refer to ⇒ Electronic parts catalogue

15 - Clutch slave cylinder with release bearing

- ☐ Removing and installing ⇒ [Item 1 \(page 15\)](#)

16 - Bolt

- ☐ Removing and installing ⇒ [Item 2 \(page 15\)](#)

17 - Bolt

- ☐ Removing and installing ⇒ [Item 13 \(page 120\)](#)

18 - Bolt

- ☐ Tightening torque ⇒ [Item 12 \(page 120\)](#)
- ☐ 4x
- ☐ Renew

19 - Bevel box

- ☐ Detaching with gearbox removed ⇒ [page 34](#)
- ☐ Fitting with gearbox removed ⇒ [page 46](#)
- ☐ Exploded view - bevel box ⇒ [page 137](#)

20 - Differential

- ☐ Dismantling and assembling ⇒ [page 119](#)



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2.6 Exploded view - selector forks

1 - Damper rubber

- ❑ Pull out of selector rod and install by hand

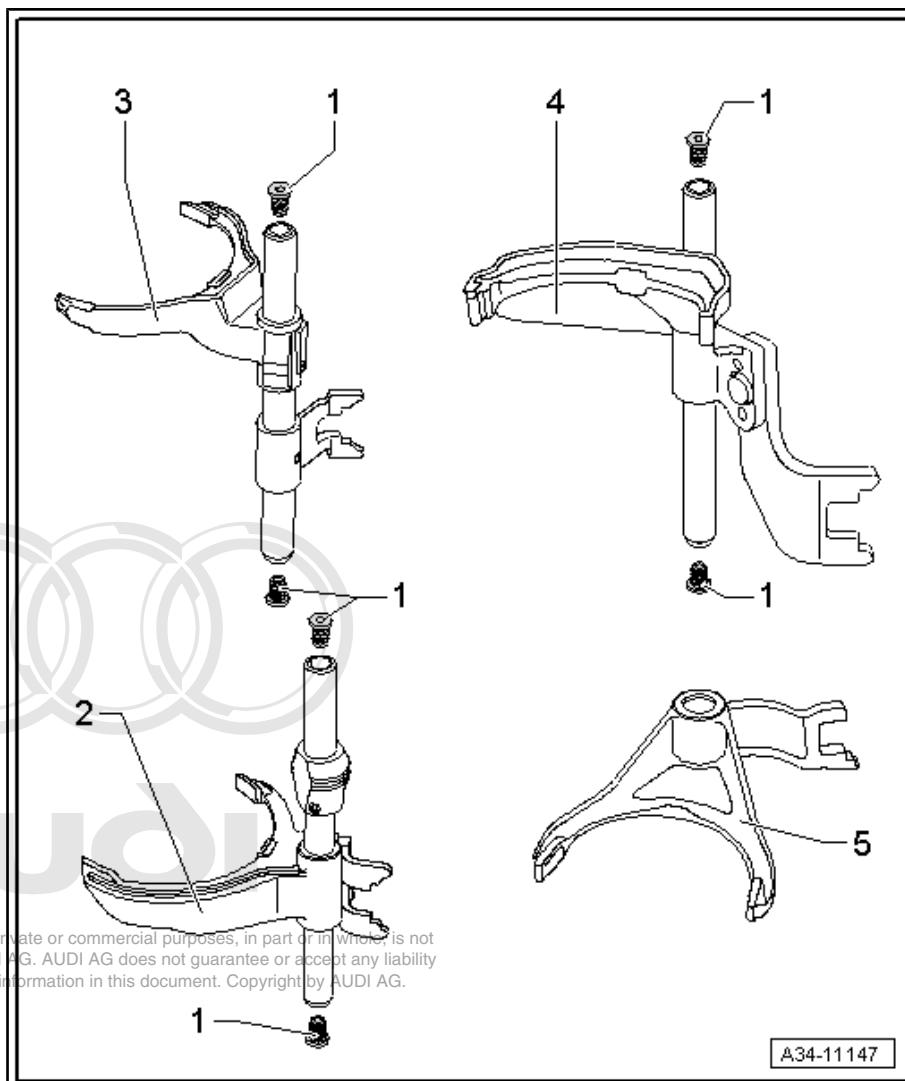
2 - Selector rod with selector fork for 1st and 2nd gear

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

4 - Selector rod with selector fork for 5th and 6th gear

5 - Reverse gear selector fork

- ❑ Mounted on selector rod with selector fork for 5th and 6th gear ➔ [page 27](#)



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2.7 Dismantling and assembling gearbox

Removing and installing gearbox housing, selector mechanism, input shaft, output shafts, differential, selector rods and bevel box (if fitted)

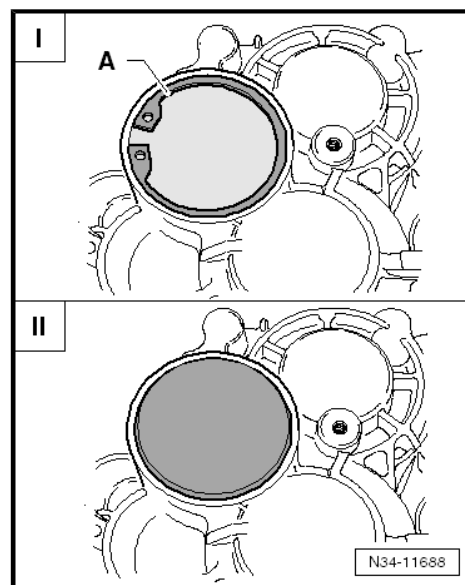


Note

Depending on version, a sheet-metal sealing cap or a plastic sealing cap may be fitted for the input shaft.

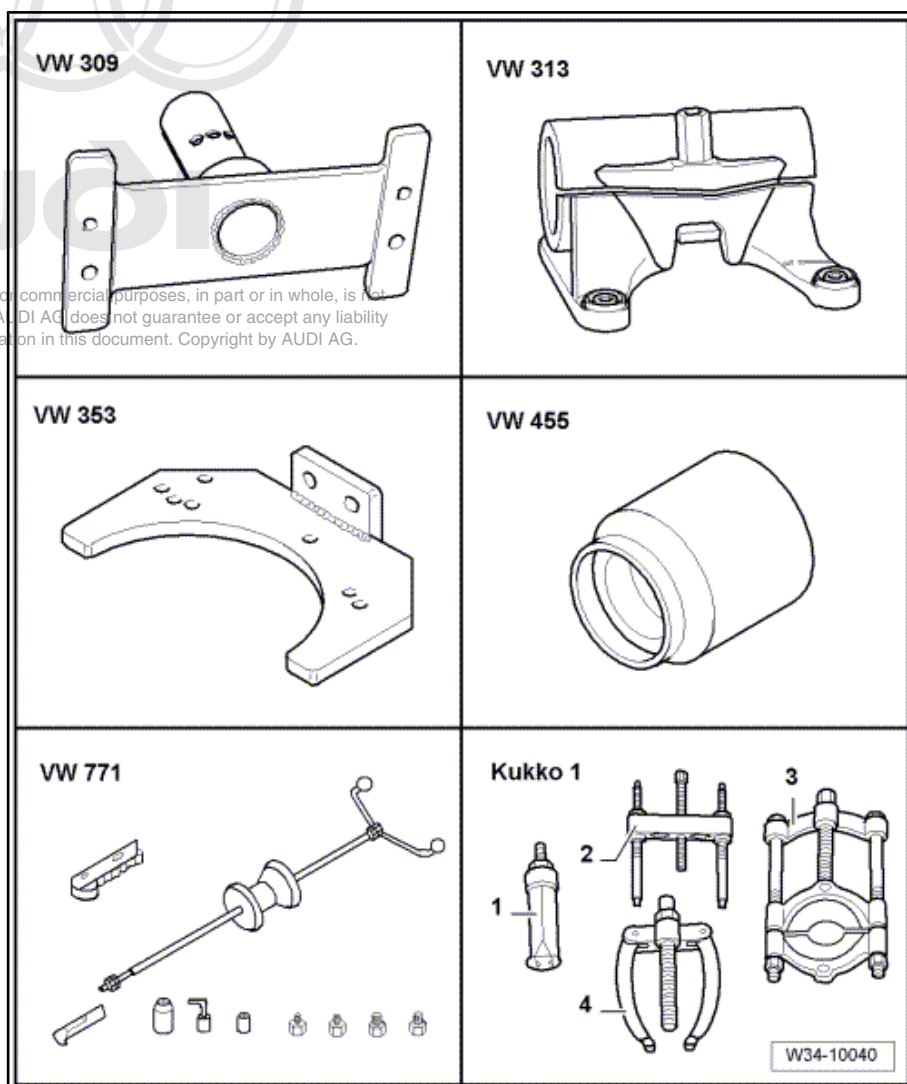
Circlip -A- is no longer fitted with plastic sealing cap for input shaft.

- ◆ -I- = Sheet metal sealing cap for input shaft with circlip -A-
- ◆ -II- = Plastic sealing cap for input shaft without circlip

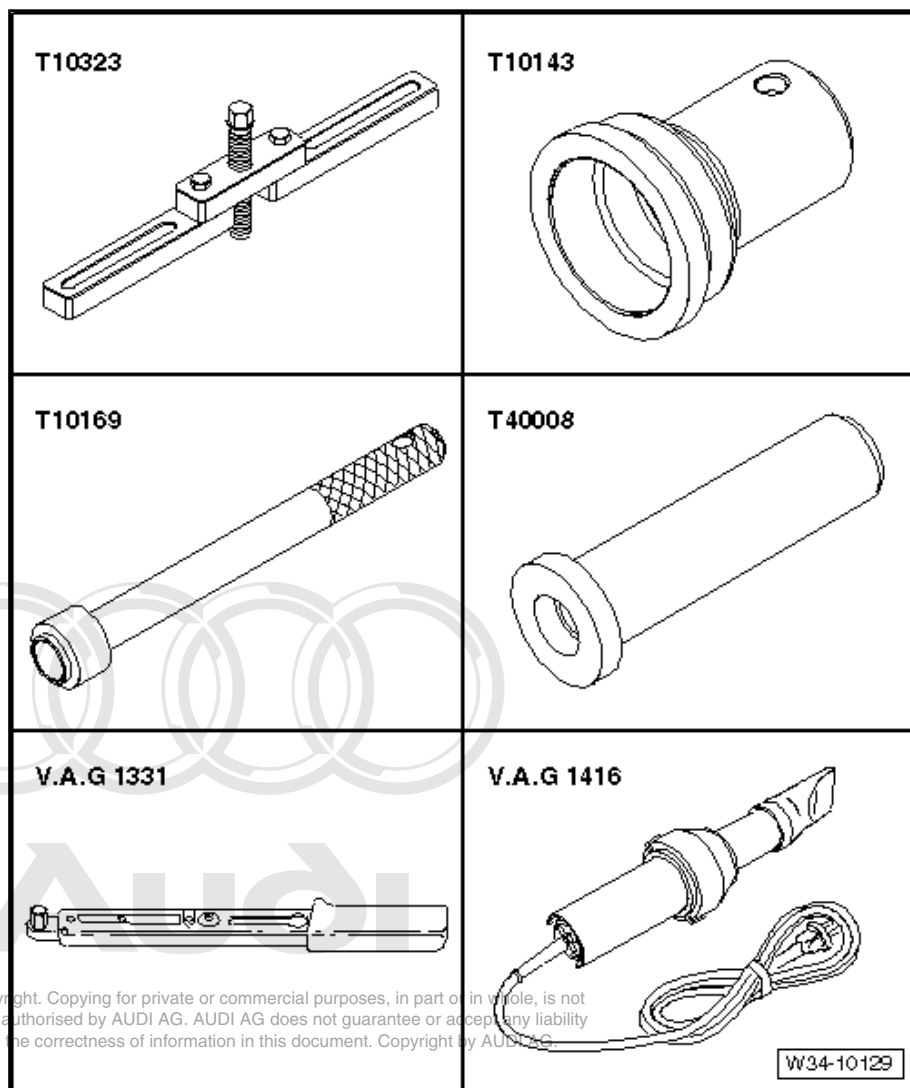


Special tools and workshop equipment required

- ◆ Support plate - VW 309-
- ◆ Support clamp - VW 313-
- ◆ Gearbox support - VW 353-
- ◆ Installing sleeve - VW 455-
or sleeve - 3160-
- ◆ Multi-purpose tool - VW 771-
- ◆ -1- Internal puller - Kukko 21/01-
- ◆ -3- Splitter - Kukko 17/0-
- ◆ -4- Counter-support - Kukko 22/1-

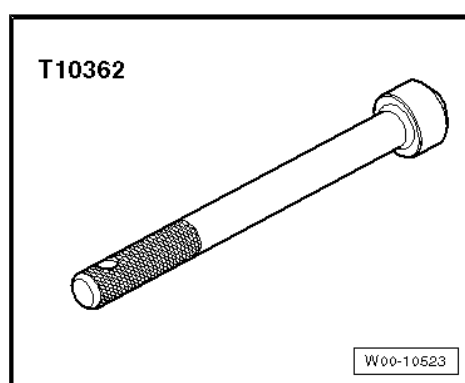


- ◆ Support bridge - 30-211A-
- ◆ For sheet-metal sealing cap: thrust piece - T10143-
 ⇒ [page 45](#)
- ◆ Thrust piece - T40008-
- ◆ Torque wrench - V.A.G 1331-
- ◆ Hot air blower - V.A.G 1416-
- ◆ Drift - T10169-

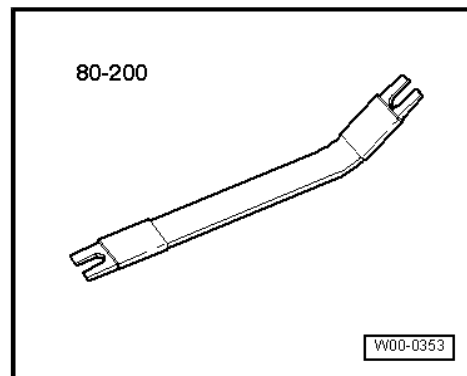


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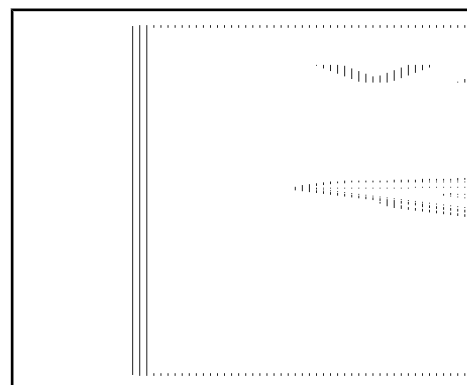
- ◆ Or drift - T10362- ⇒ [page 55](#)



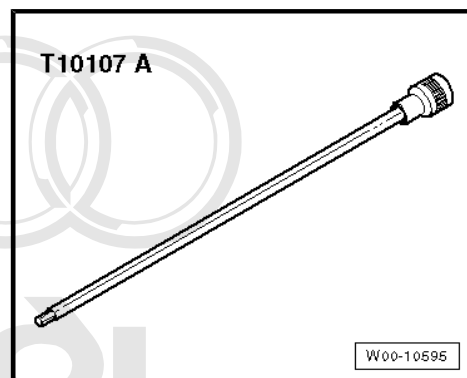
- ◆ Removal lever - 80 - 200-



- ◆ Drip tray for workshop hoist - VAS 6208-

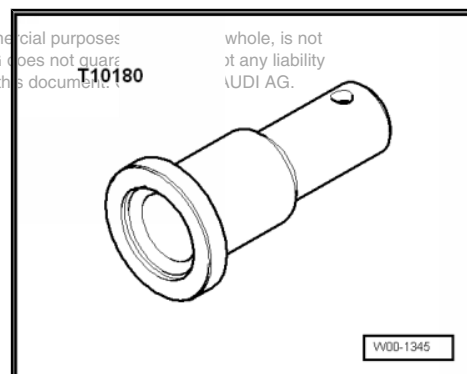


- ◆ Socket and extended bit - T10107 A-



- ◆ For plastic sealing cap: thrust piece - T10180- ➔ [page 45](#)

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- ◆ Sealing paste - AMV 188 200 03-

Dismantling gearbox

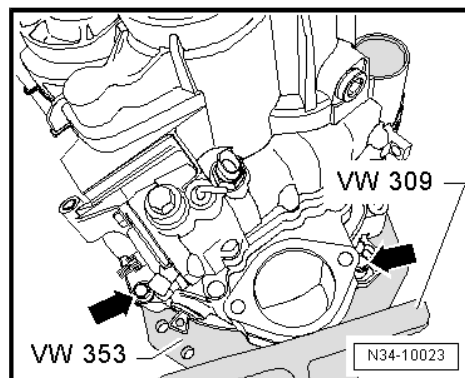
- Secure gearbox to assembly stand with bolts -arrows-.



Note

If one of the bolt holes is not flush with the gearbox support, then insert a washer (or washers) between the bolt hole and the gearbox support.

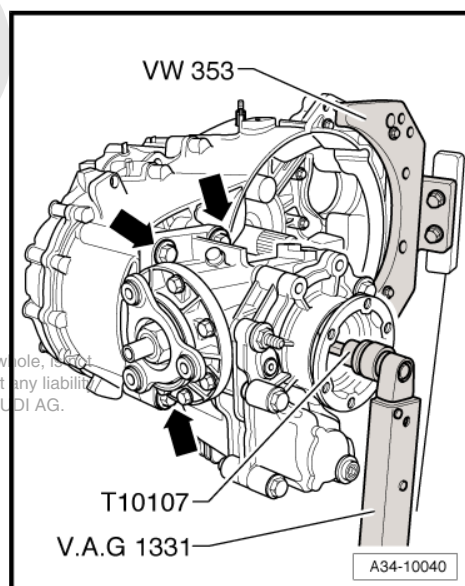
- Turn the gearbox in the assembly stand so that the oil drain plug faces downwards.
- Place drip tray underneath.
- Drain gear oil out of gearbox.



Gearbox for four-wheel drive

- Remove countersunk bolt for flange shaft (right-side) with socket and extended bit - T10107- or -T10107 A-.
- Remove 4 bolts -arrows- securing bevel box to gearbox (illustration only shows 3 bolts).
- Carefully push bevel box away from gearbox, making sure it does not fall down.

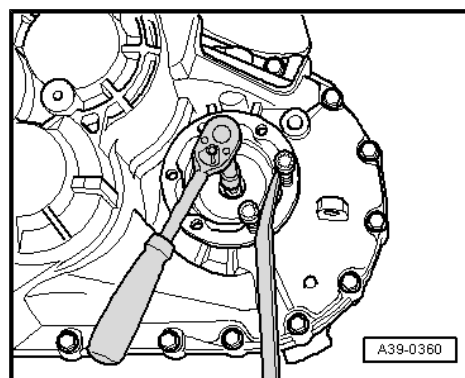
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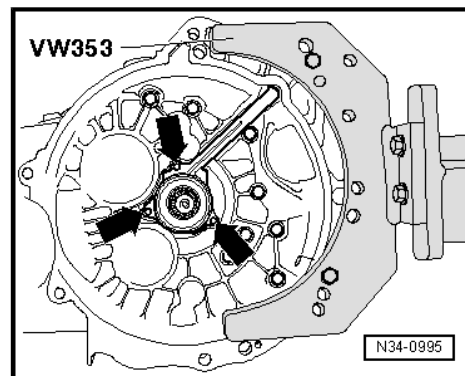
Gearbox for front-wheel drive

- Remove bolt securing flange shaft (right-side). To do this, screw two bolts into flange and counterhold flange shaft with tyre iron or other suitable lever (illustration shows flange shaft on left side).
- Pull out flange shaft and spring.

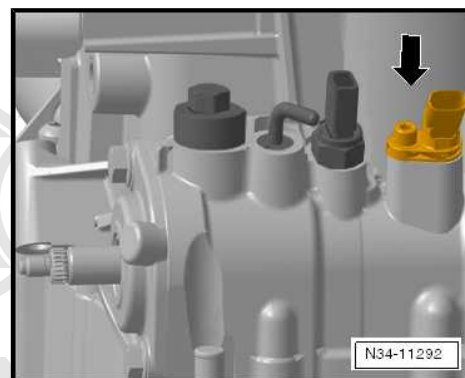
Continued for all vehicles:



- Remove clutch slave cylinder with release bearing -arrows-.

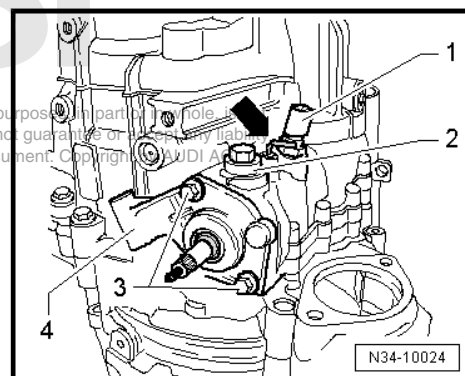


- Gearbox for vehicles with start/stop system: remove gearbox neutral position sender - G701- -arrow-.



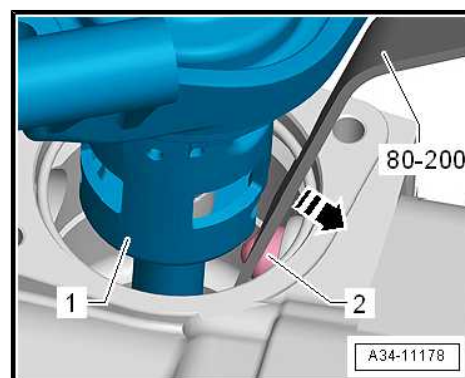
Make sure that the selector shaft is not locked in position by the angled rod -arrow- while carrying out the following steps.

- Put selector shaft in neutral position.
- Remove reversing light switch -F4- -1-.
- Remove locking bolt -2-.
- Then remove bolts -3-.
- Pull selector shaft with selector mechanism cover -4- out of gearbox housing.

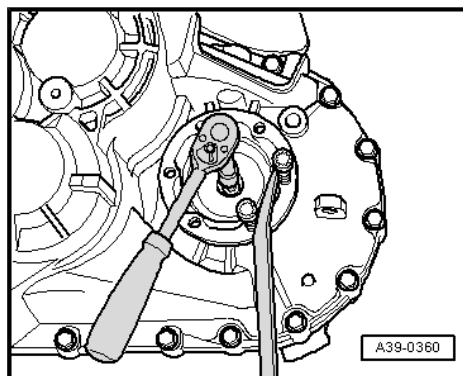


Note

Press against spring pressure of locking bush -2- in direction of -arrow- using removal lever - 80 - 200- so that selector shaft -1- does not make contact with locking bush while being removed.



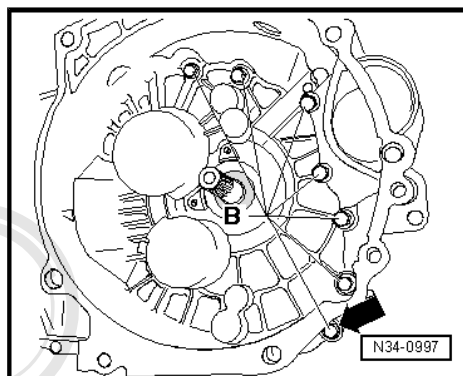
- Remove bolt securing flange shaft (left-side). To do this, screw two bolts into flange and counterhold flange shaft with tyre iron or other suitable lever.
- Pull out flange shaft and spring.



- Remove bolts -B- securing gearbox housing from inside clutch housing.


Note

One of the bolts -arrow- is outside the joint flange.

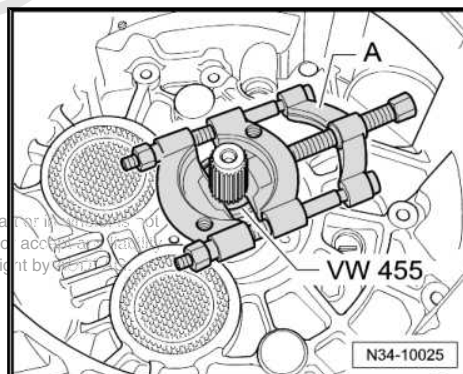


- Secure input shaft as follows:

The input shaft splines are of different length, depending on the gearbox version.

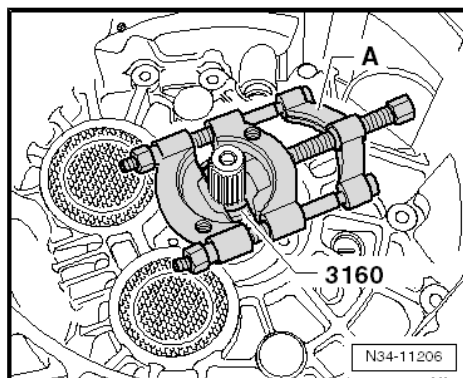
- Either fit installing sleeve - VW 455- over input shaft and against clutch housing.

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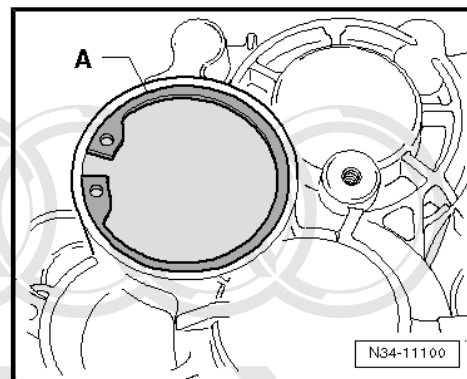
- Or fit sleeve - 3160- over input shaft and against clutch housing.
- Then tighten splitter -A-, e.g. -Kukko 17/0- behind splines on input shaft.

The rear side of the splitter must be in contact with installing sleeve - VW 455- or sleeve - 3160- (zero play).



Metal sealing cap

- Remove circlip -A- for input shaft sealing cap.

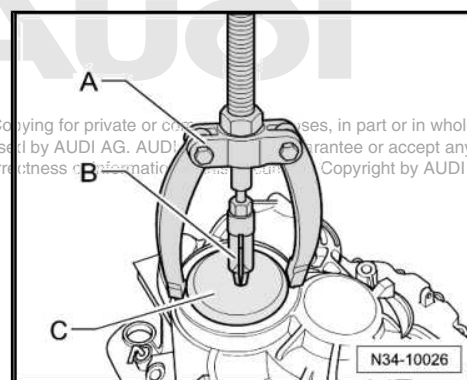


- Pierce rubber in centre of sealing cap -C- with a screwdriver.
- Pull sealing cap out of gearbox housing.

A - Counter-support , e.g. -Kukko 22/1-

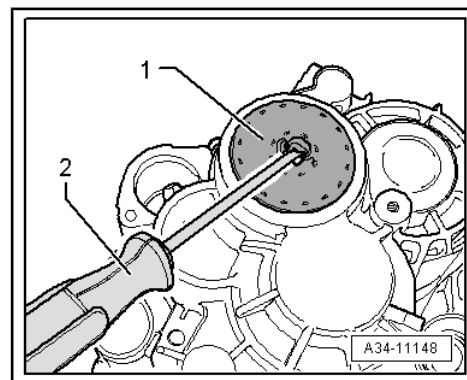
B - Internal puller 8 ... 12 mm , e.g. -Kukko 21/01-

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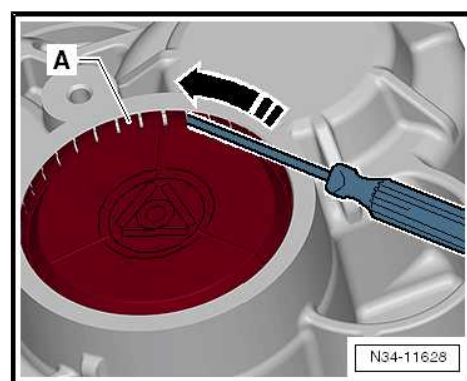
Note

- ◆ To remove sealing cap -1-, rubber in centre of sealing cap may also be pierced with a screwdriver.
- ◆ Carefully lever sealing cap off gearbox housing with a screwdriver -2-.



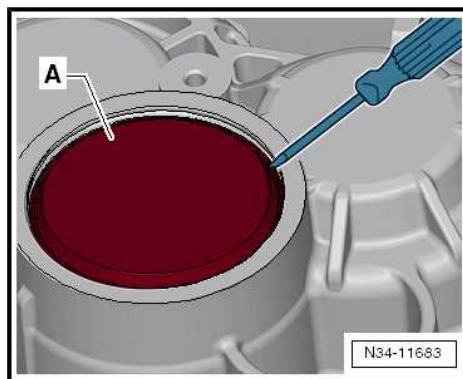
Plastic sealing cap

Carefully remove all tabs -A-. Take care not to damage gearbox housing.



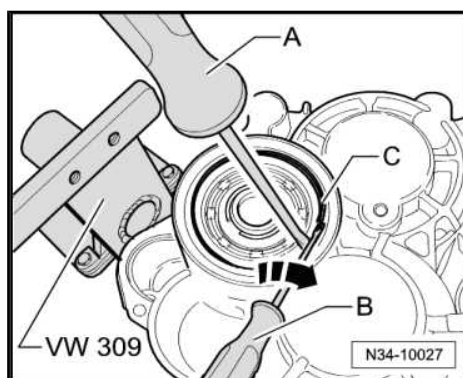
- Lever out sealing cap -A-.
- Make sure that all parts of the sealing cap are completely removed.

Continued for all vehicles:

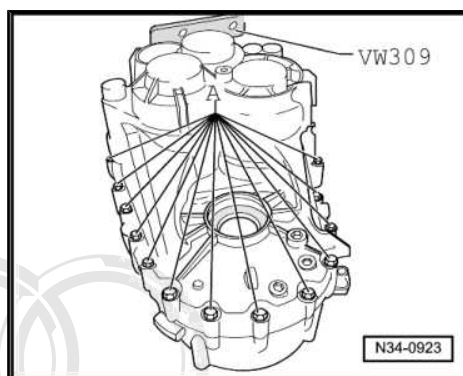


Detach circlip -C- from grooved ball bearing on input shaft/gearbox housing as follows:

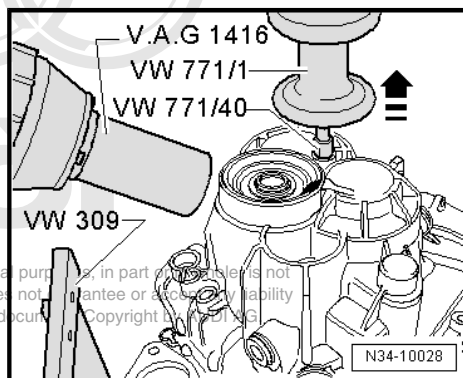
- Hold one end of circlip with screwdriver -A-.
- Lever other end of circlip out of slot in grooved ball bearing in direction of -arrow- with 2nd screwdriver -B-.
- Lever circlip out further by repositioning screwdriver -B-.



- Remove gearbox housing/clutch housing securing bolts -A-.



- Screw adapter VW 771/40 into threaded hole in gearbox housing.
- Using hot air blower - V.A.G 1416- , heat area around seat of input shaft ball bearing in gearbox housing for approx. 10 minutes to approx. 100°C.
- Using multi-purpose tool VW 771/1 , pull gearbox housing off clutch housing in direction of -arrow-.



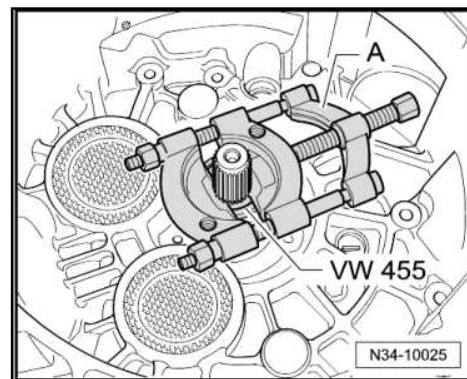
Note

If necessary, carefully apply a lever to the protruding flanges on alternate sides of the gearbox housing, taking care not to damage the sealing surfaces.

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- Remove splitter -A- and installing sleeve VW 455 or sleeve -3160- from input shaft.

A second mechanic is required for removing the shafts from the clutch housing.

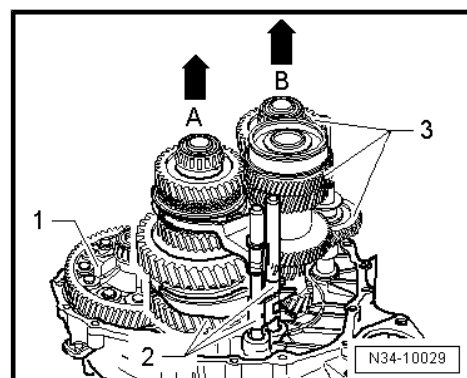


- Lift up differential -1- with your left hand. With your right hand, lift 1st - 4th gear output shaft together with selector rods -2- -arrow A-.
- At the same time, the second mechanic must lift the input shaft, reverse shaft and 5th/6th gear output shaft -3- out of the clutch housing together with the selector rods -arrow B-.



Note

If required, put the differential back in the clutch housing after lifting the shafts.



- Removing input shaft oil seal

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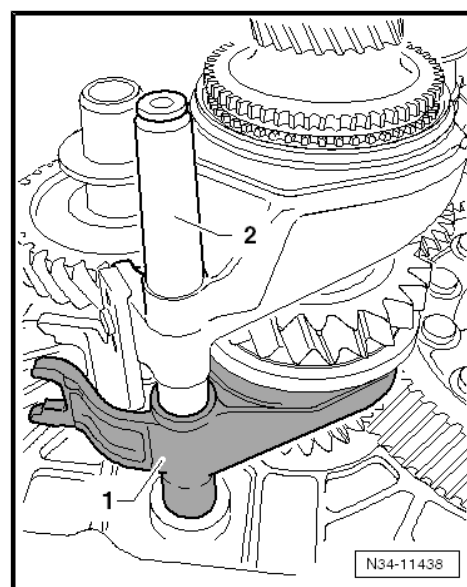


Note

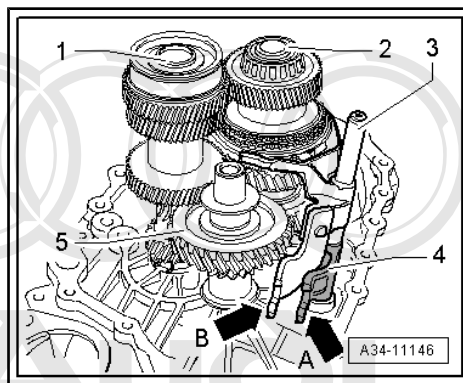
*Always renew grooved ball bearing on input shaft
 ⇒ [Item 4 \(page 60\)](#) .*

Assembling gearbox

- A new grooved ball bearing has been pressed onto the input shaft ⇒ [Item 4 \(page 60\)](#) .
- Reverse gear selector fork -1- is fitted on selector rod for 5th and 6th gear -2- ⇒ [page 40](#) .



- Insert input shaft -1-, output shaft for 5th and 6th gear -2- together with selector rod for 5th and 6th gear -3-, reverse gear selector fork -4- and reverse shaft -5-.
- Selector jaw -arrow A- of reverse gear selector fork faces outside of gearbox. Selector jaw -arrow B- of selector rod for 5th and 6th gear must face inside of gearbox.



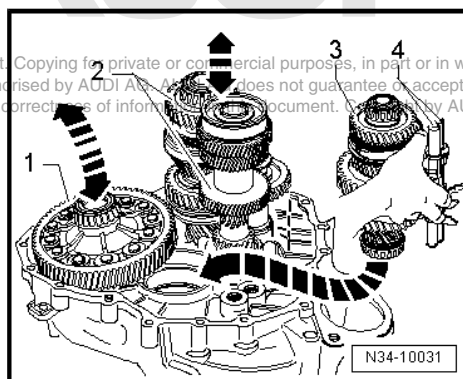
- Then install differential -1-.



Note

A second mechanic is required for installing the shafts in the clutch housing.

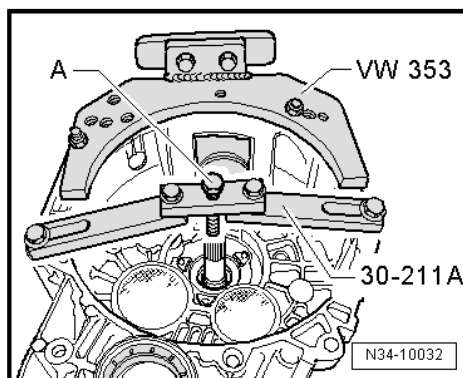
- Take 1st - 4th gear output shaft -3- with selector rods -4- in your right hand as illustrated.
- Lift up differential slightly with your left hand.
- At the same time, have the second mechanic lift the input shaft and output shaft for 5th and 6th gear -2- slightly, together with the reverse shaft.
- Install output shaft for 1st - 4th gear in direction of -arrow-.
- The teeth of the input shaft, output shafts and final drive gear/differential must mesh.
- Now, together with second mechanic, locate shafts and differential in their bearing seats.
- Secure support bridge - 30-211A- for input shaft to clutch housing.



Note

Illustration shows clutch housing turned through 180° for clarity.

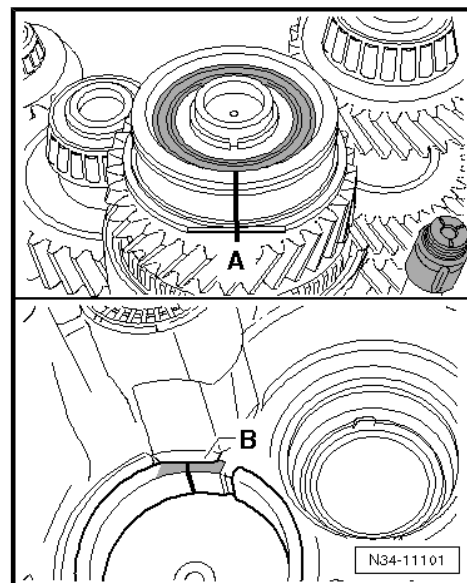
- Screw in bolt -A- until input shaft lifts slightly.



Grooved ball bearing for input shaft will fit into gearbox housing in one position only.

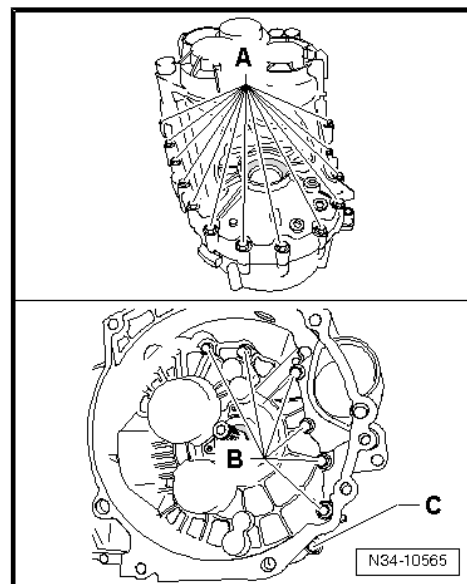
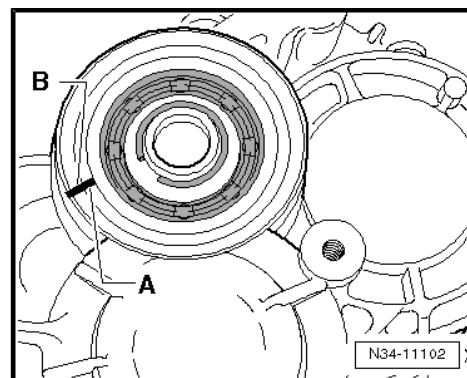
The grooved ball bearing and the bearing mounting are flattened on one side.

- Flattened sides -A- on grooved ball bearing and bearing mounting -B- in gearbox housing must be aligned.
- Mark flattened sides with paint.
- Transfer markings onto top area of grooved ball bearing and top area of bearing mounting on gearbox housing (⇒ next illustration).
- Using hot air blower, e.g. -V.A.G 1416-, heat area around seat of grooved ball bearing for input shaft in gearbox housing for approx. 10 minutes to approx. 100 °C.



Note

- ◆ *Heating is necessary to ensure that grooved ball bearing is not damaged when installing gearbox housing.*
 - ◆ *Apply sealing paste - AMV 188 200 03- evenly to sealing surface of clutch housing.*
 - ◆ *Align marking -A- on grooved ball bearing with marking -B- on gearbox housing and fit gearbox housing.*
- Fit gearbox housing and tighten new bolts -A-, -B- and -C- to specified torque.

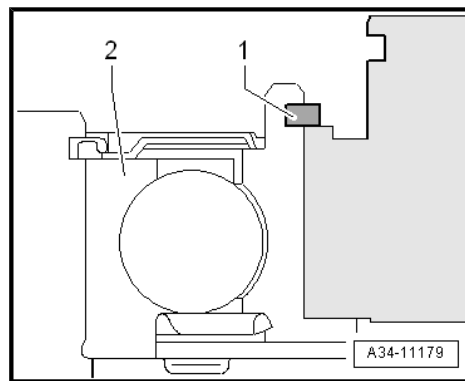


Thickness of circlip -1- for grooved ball bearing/input shaft -2- must be redetermined on gearboxes with reinforcements (manual gearbox 0FB):

- Check that input shaft is pressed against gearbox housing with support bridge - 30-211A- .
- Determine the thickest circlip for the grooved ball bearing/input shaft that will just fit and install it. Start with the thickest one.

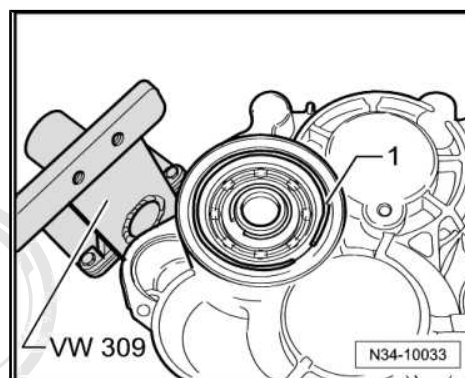
The following circlips are available; for part numbers refer to ➔ Electronic parts catalogue .

Circlip thickness (mm)		
2.03	2.09	2.15
2.21	2.27	



Continued for all vehicles:

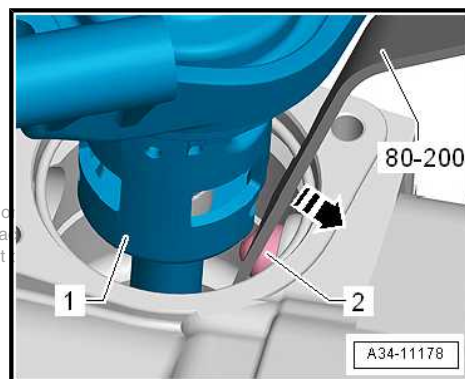
- Install circlip -1- for input shaft grooved ball bearing.
- Remove support bridge - 30 - 211 A- for input shaft.
- If stop sleeve for selector shaft has been removed, drive it in now ➔ [page 55](#) (drive in until tool reaches stop).
- Turn gearbox on assembly stand so that opening for selector shaft faces up.



Note

Press against spring pressure of locking bush -2- in direction of -arrow- using removal lever - 80 - 200- so that selector shaft -1- does not make contact with locking bush while being fitted.

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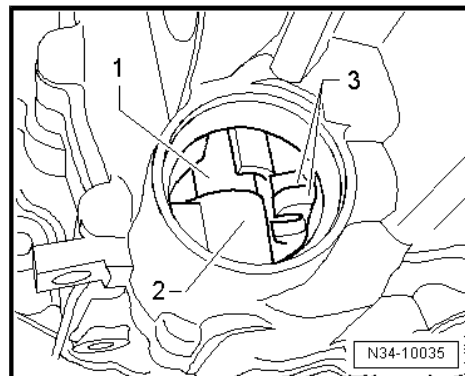


- Insert selector shaft -1- into bottom mounting -2- and into selector forks -3-.



Note

The sealing cap ➔ [Item 2 \(page 47\)](#) is removed to give a better illustration.

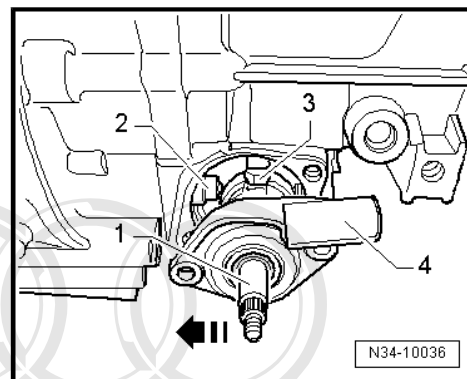


- Now push selector shaft -1- against stop sleeve -2- in direction of -arrow- and run selector finger -3- down through selector forks and onto stop.
- Selector mechanism cover -4- should be parallel to joint surface on gearbox housing.
- Selector shaft should move up and down easily (gate selector movement).



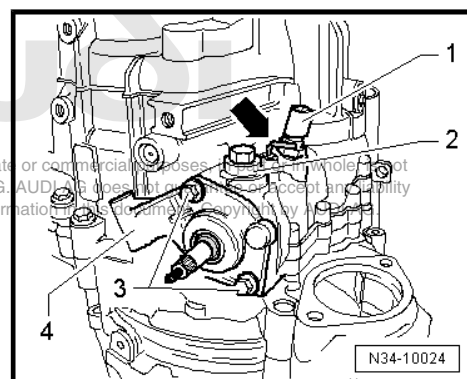
Note

If the selector mechanism cover is not parallel with the joint surface, the selector shaft is not seated in its bottom mounting.

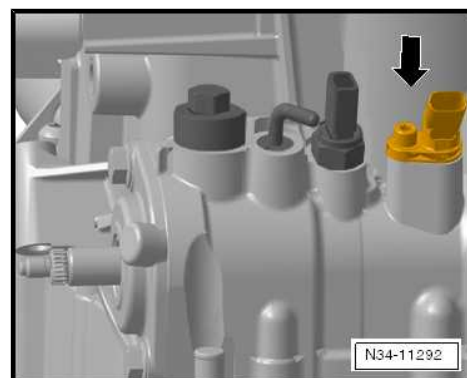


- Tighten bolts -3- for selector mechanism cover -4-.
- Screw in locking bolt -2-; angled rod -arrow- must be released.
- Install reversing light switch - F4- -1-.

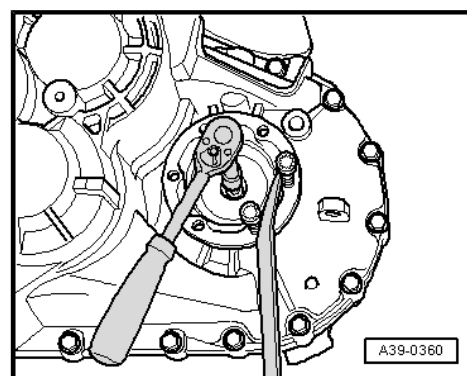
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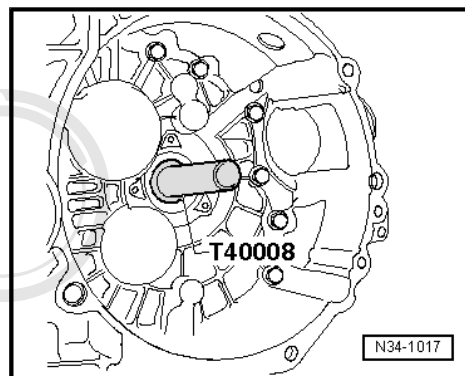
- Gearbox for vehicles with start/stop system: fit gearbox neutral position sender - G701- -arrow- and tighten securing bolt to specified torque ➔ [Item 8 \(page 23\)](#) .



- Install flange shaft (left-side) together with spring, thrust washer and tapered ring.

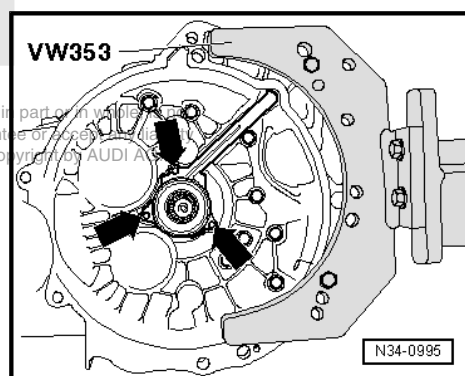


- Drive in new oil seal for input shaft so it is flush.



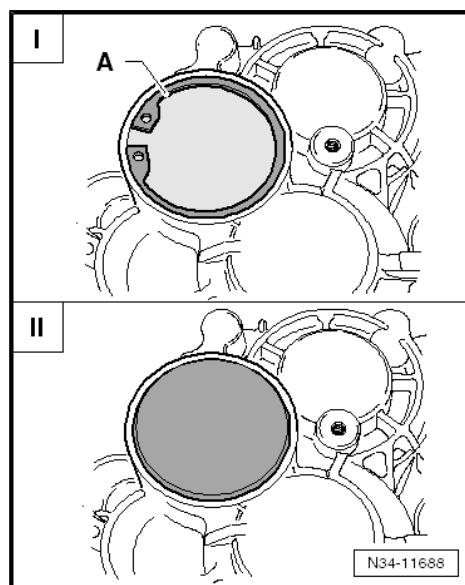
- Install clutch slave cylinder with release bearing and tighten bolts -arrows- to specified torque.
- Select all gears.
- Install sealing cap for input shaft as follows.

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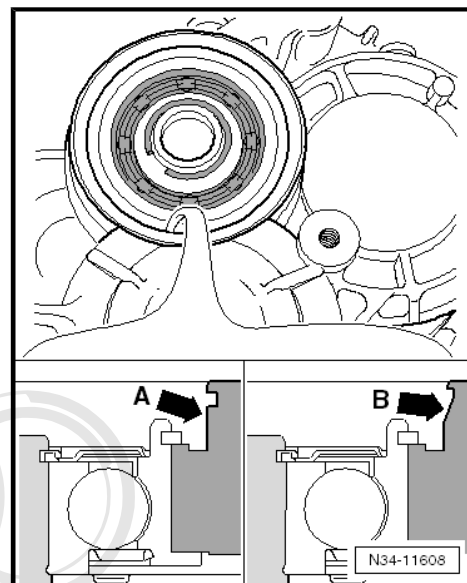
Identification of sealing caps

- I- = Sheet metal sealing cap: secured with circlip -A-
- II- = Plastic sealing cap: without circlip



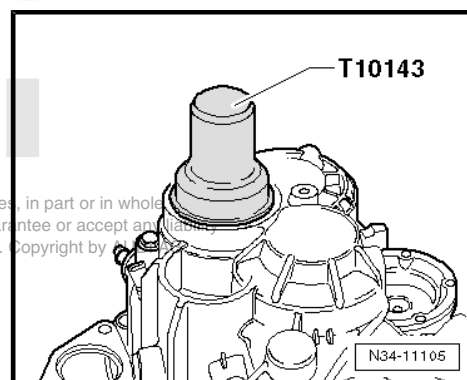
Allocation

Seat for sealing cap	Sealing cap	Installing
-Arrow A- = vertical	Made of metal	⇒ page 45
-Arrow B- = tapered	Made of plastic	⇒ page 45

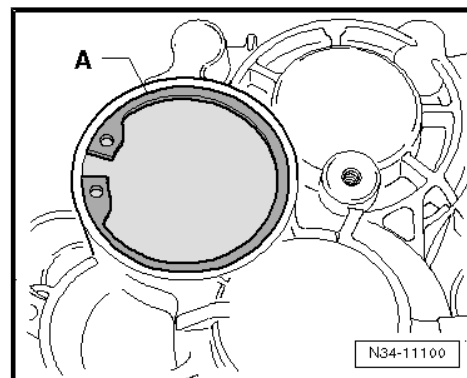


Metal sealing cap

- Drive sealing cap into gearbox housing onto stop.



- Secure sealing cap with circlip -A-.

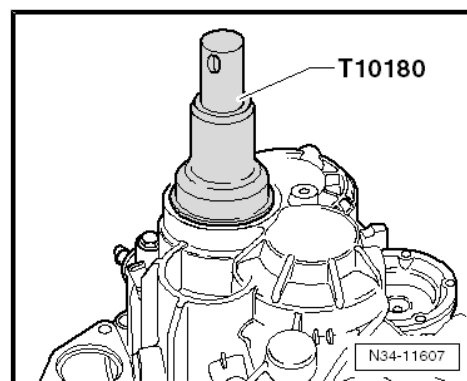


Plastic sealing cap

- Drive sealing cap into gearbox housing onto stop.

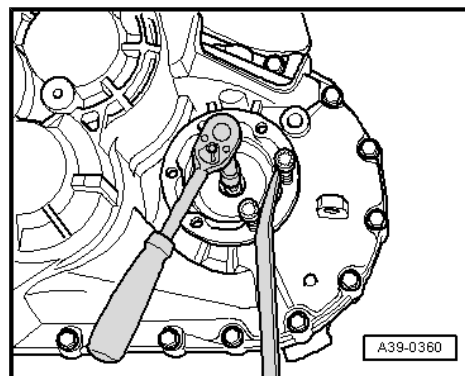
Continued for all vehicles:

- It is important to use the correct type of sealing cap
 ⇒ [page 45](#) .
- Incorrect installation can cause leakage.
- Select correct sealing cap from ⇒ Electronic parts catalogue .



Gearbox for front-wheel drive

- Install flange shaft (right-side) together with spring, thrust washer and tapered ring (illustration shows flange shaft on left side).



Gearbox for four-wheel drive

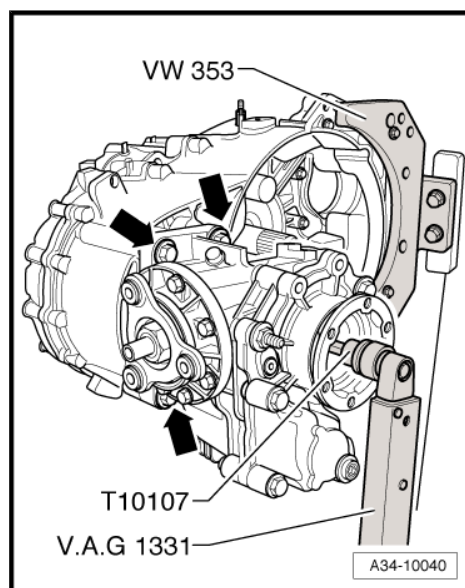
Attach bevel box to gearbox as follows:

- Grease splines on differential in gearbox with grease for clutch plate splines - G 000 100- .
- Push bevel box fully onto gearbox, ensuring that splines of bevel box input shaft and differential are centred when brought together.
- Also align the teeth of the flange shaft (right-side) and the differential pinion; if necessary turn the flange shaft.
- If the teeth are correctly positioned and the components are located centrally, the bevel box will slide against the gearbox onto the stop.



Note

Do not use the securing bolts to pull the bevel box onto the gearbox. This could cause the bevel box to tilt and the securing eyes may break off.



- Fit 4 bolts -arrows- securing bevel box to gearbox (illustration only shows 3 bolts) and tighten bolts.
- Tighten countersunk bolt for flange shaft (right-side) with socket and extended bit - T10107- or -T10107 A- .

Tightening torques

- ◆ ⇒ [“2.3 Exploded view - gearbox housing and selector mechanism”, page 23](#)
- ◆ ⇒ [“1.1 Exploded view - clutch release mechanism”, page 15](#)
- ◆ ⇒ [“3.1.1 Exploded view - differential, front-wheel drive”, page 116](#) .
- ◆ Gearbox for four-wheel drive
 ⇒ [“3.1.2 Exploded view - differential, four-wheel drive”, page 119](#)

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3 Gearbox housing, clutch housing

⇒ [“3.1 Exploded view - gearbox housing”, page 47](#)

⇒ [“3.2 Exploded view - clutch housing”, page 49](#)

⇒ [“3.3 Servicing gearbox housing”, page 50](#)

⇒ [“3.4 Servicing clutch housing”, page 58](#)

3.1 Exploded view - gearbox housing

1 - Gearbox housing

- ☐ If renewed: Adjust output shafts and differential ⇒ [page 115](#)
- ☐ Note shape of housing in area of mounting for sealing cap ⇒ [page 45](#)
- ☐ Select correct components from ⇒ Electronic parts catalogue

2 - Sealing cap

- ☐ Removing ⇒ [page 53](#)
- ☐ Driving in ⇒ [page 53](#)

3 - Oil drain plug

- ☐ Tightening torque ⇒ [page 24](#)

4 - Oil filler plug

- ☐ Tightening torque ⇒ [page 24](#)

5 - Angled rod

- ☐ For adjusting selector mechanism
- ☐ Can be renewed without dismantling gearbox
- ☐ Removing ⇒ [page 54](#)
- ☐ Installation position ⇒ [page 54](#)
- ☐ Driving in ⇒ [page 54](#)

6 - Bearing bush

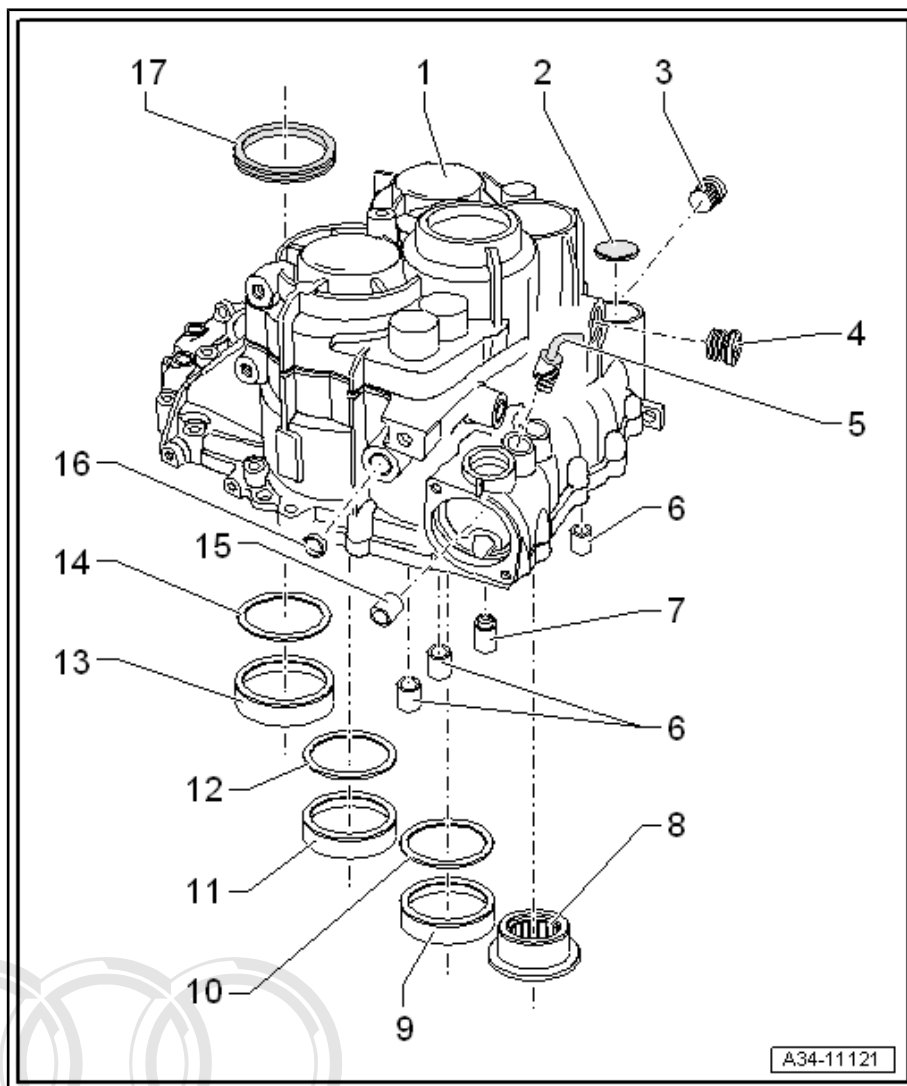
- ☐ For selector rods
- ☐ Pulling out ⇒ [page 54](#)
- ☐ Driving in ⇒ [page 55](#)

7 - Stop sleeve

- ☐ Pressing out (gearbox dismantled) ⇒ [page 55](#)
- ☐ Driving out (gearbox not dismantled) ⇒ [page 55](#)
- ☐ Identification of different types of stop sleeve ⇒ [page 55](#)
- ☐ Driving in stop sleeve with shoulder ⇒ [page 56](#)
- ☐ Driving in stop sleeve without shoulder ⇒ [page 56](#)

8 - Needle bearing

- ☐ For reverse shaft
- ☐ Always renew after removing
- ☐ Pulling out ⇒ [page 56](#)





- ☐ Pressing in ⇒ [page 56](#)

9 - Tapered roller bearing outer race

- ☐ For 5th/6th and reverse gear output shaft
- ☐ Removing and installing ⇒ [Item 23 \(page 73\)](#)
- ☐ If renewed: Adjust 5th/6th and reverse gear output shaft ⇒ [page 100](#)

10 - Shim

- ☐ For 5th/6th and reverse gear output shaft
- ☐ Table of adjustments ⇒ [page 115](#)

11 - Tapered roller bearing outer race

- ☐ For 1st - 4th gear output shaft
- ☐ Removing and installing ⇒ [Item 34 \(page 70\)](#)
- ☐ If renewed: Adjust 1st - 4th gear output shaft ⇒ [page 95](#)

12 - Shim

- ☐ For 1st - 4th gear output shaft
- ☐ Table of adjustments ⇒ [page 115](#)

13 - Tapered roller bearing outer race

- ☐ For differential
- ☐ Removing and installing - front-wheel drive ⇒ [Item 3 \(page 117\)](#)
- ☐ Removing and installing - four-wheel drive ⇒ [Item 3 \(page 119\)](#)
- ☐ If renewed: adjust differential ⇒ [page 133](#)

14 - Shim

- ☐ For differential
- ☐ Table of adjustments ⇒ [page 115](#)

15 - Bearing bush

- ☐ For selector shaft
- ☐ Pulling out ⇒ [page 57](#)
- ☐ Driving in ⇒ [page 57](#)

16 - Sealing plug

- ☐ Driving out ⇒ [page 57](#)
- ☐ Driving in ⇒ [page 58](#)

17 - Oil seal

- ☐ For flange shaft (left-side)
- ☐ Renewing ⇒ [page 107](#)

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3.2 Exploded view - clutch housing

1 - Bearing bush

- ☐ For selector rods
- ☐ Always renew after re-
moving
- ☐ Pulling out ➤ [page 59](#)
- ☐ Driving in ➤ [page 59](#)

2 - Needle bearing

- ☐ For reverse shaft
- ☐ Always renew after re-
moving
- ☐ Pulling out ➤ [page 59](#)
- ☐ Pressing in
➤ [page 59](#)

3 - Dowel sleeve

- ☐ 2x

4 - Clutch housing

- ☐ If renewed: Adjust out-
put shafts and differen-
tial ➤ [page 115](#)

5 - Cap

- ☐ Not fitted on all clutch
housings

6 - Oil seal

- ☐ For input shaft
- ☐ Renewing ➤ [page 65](#)

7 - Oil seal

- ☐ Front-wheel drive - for
flange shaft (right-side)
- ☐ Front-wheel drive
➤ ["1.3.1 Front-wheel
drive - renewing flange
shaft oil seal \(right-side\) with gearbox removed", page 109](#)
- ☐ Four-wheel drive - between gearbox and bevel box
- ☐ Four-wheel drive
➤ ["1.3.3 Renewing oil seal between gearbox and bevel box at gearbox, four-wheel drive", page 113](#)

8 - Shim

- ☐ For differential
- ☐ 0.65 mm thick
- ☐ Installation position: Shoulder on inside diameter faces towards oil seal ➤ [Item 7 \(page 49\)](#)

9 - Tapered roller bearing outer race

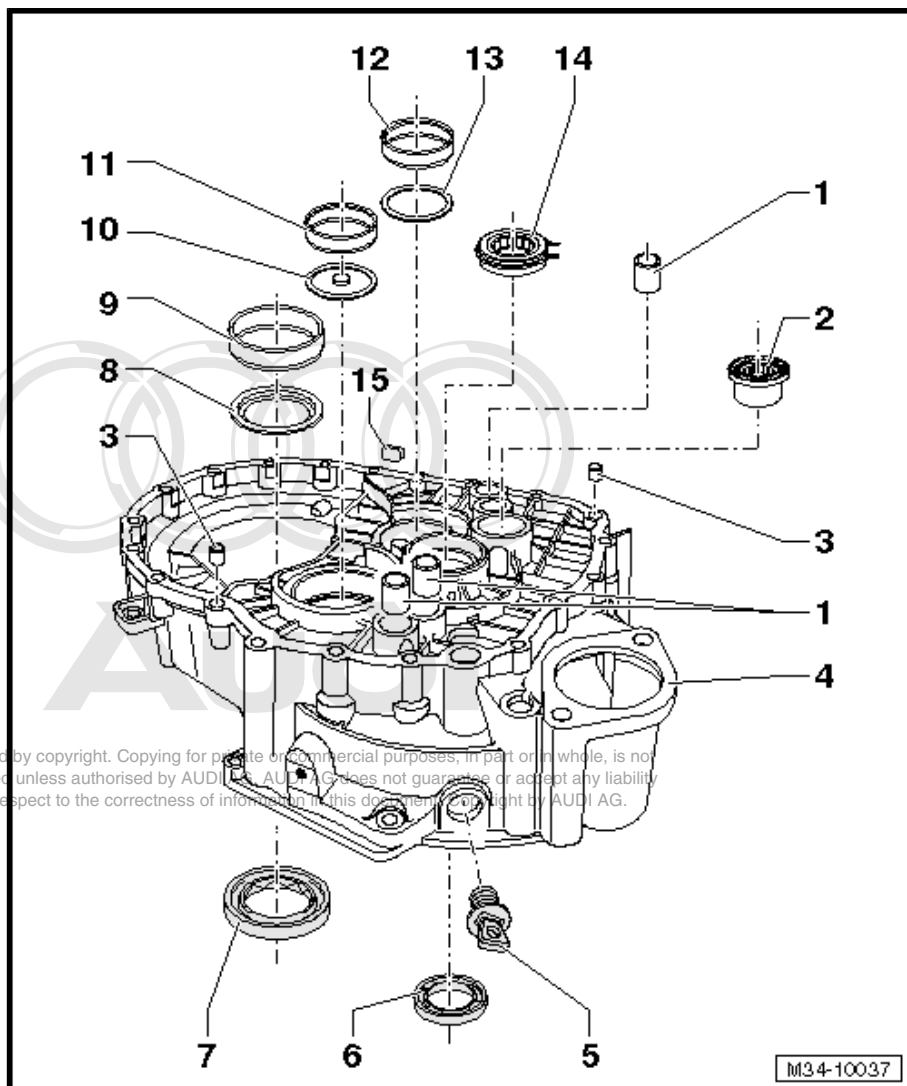
- ☐ For differential
- ☐ Removing and installing - front-wheel drive ➤ [Item 7 \(page 117\)](#)
- ☐ Removing and installing - four-wheel drive ➤ [Item 7 \(page 119\)](#)
- ☐ If renewed: adjust differential ➤ [page 133](#)

10 - Oil deflector plate

- ☐ Installation position: Shoulder on drilling faces towards output shaft

11 - Tapered roller bearing outer race

- ☐ For 1st - 4th gear output shaft



- ☐ Removing and installing ➤ [Item 4 \(page 68\)](#)
- ☐ If renewed: Adjust 1st - 4th gear output shaft ➤ [page 95](#)

12 - Tapered roller bearing outer race

- ☐ For 5th/6th and reverse gear output shaft
- ☐ Removing and installing ➤ [Item 3 \(page 72\)](#)
- ☐ If renewed: Adjust 5th/6th and reverse gear output shaft ➤ [page 100](#)

13 - Shim

- ☐ For 5th/6th and reverse gear output shaft
- ☐ 0.65 mm thick

14 - Roller bearing

- ☐ For input shaft
- ☐ Removing and installing ➤ [page 60](#)

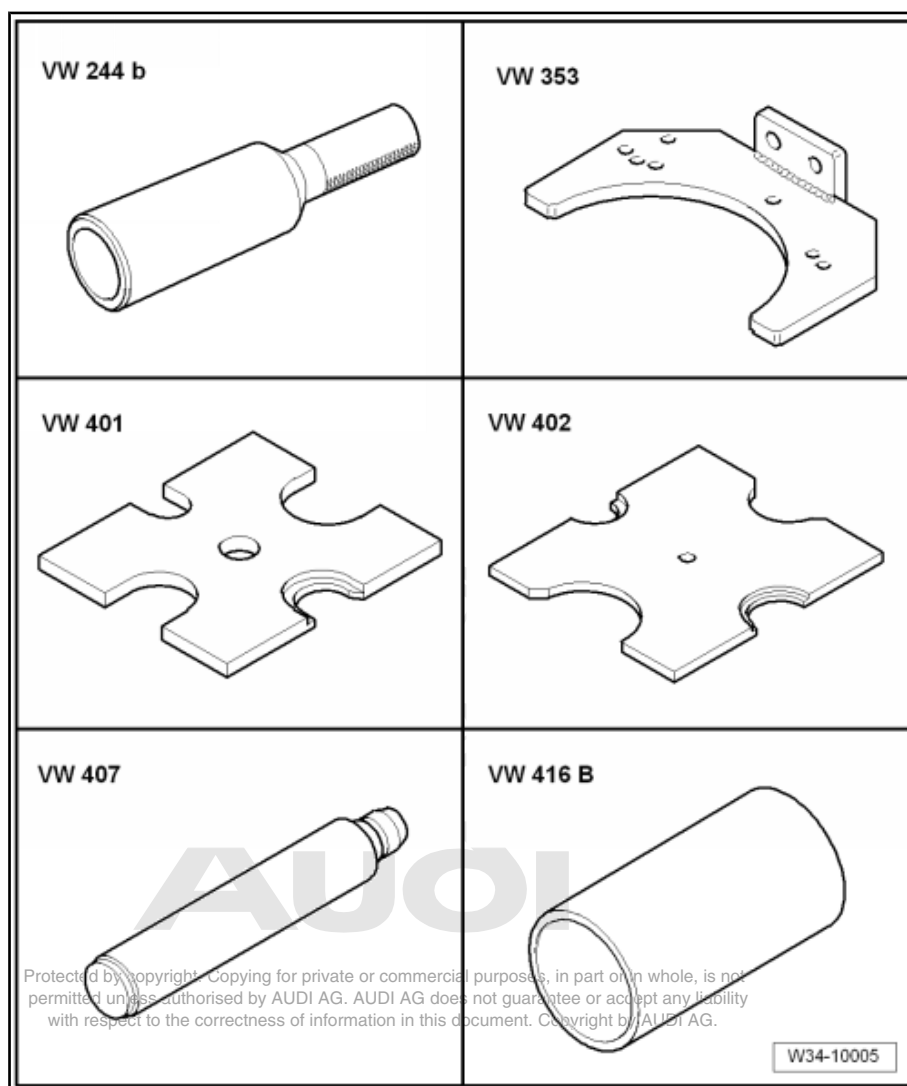
15 - Magnet

- ☐ Held in place by joint surface of housing

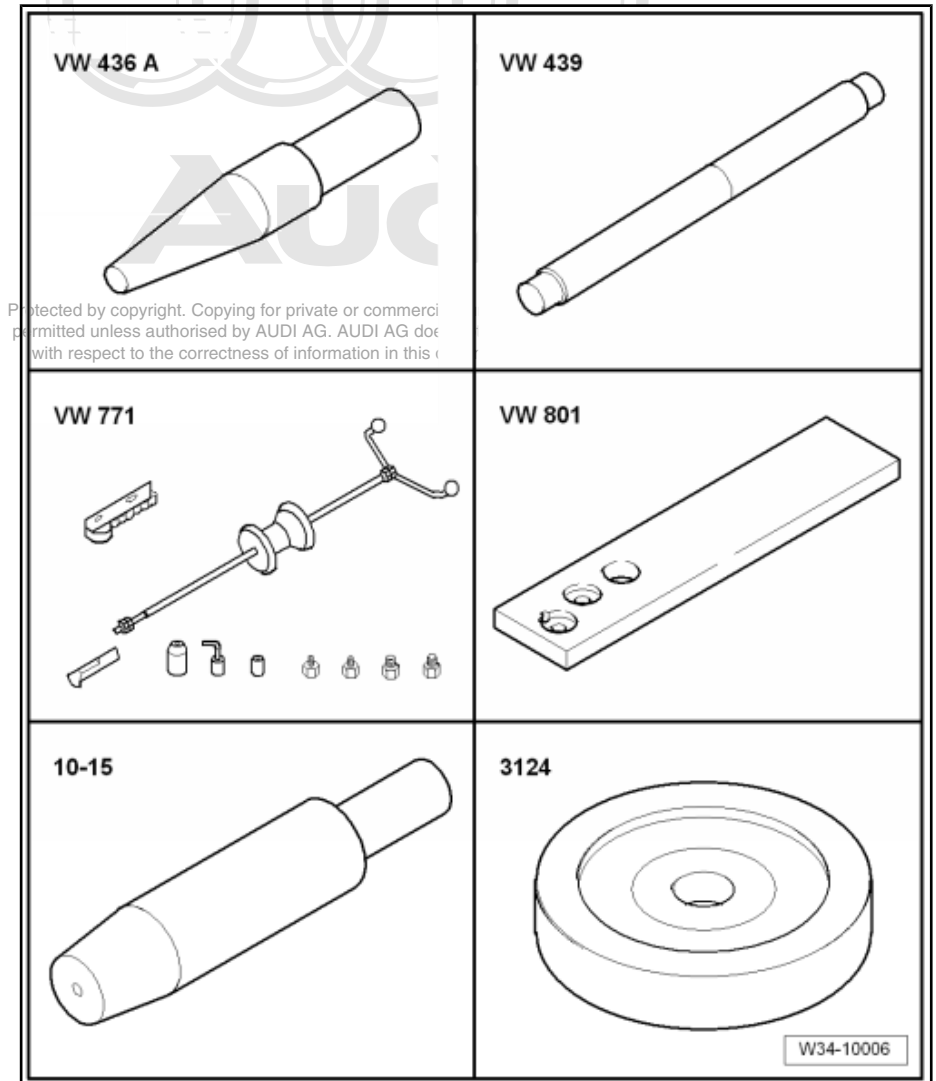
3.3 Servicing gearbox housing

Special tools and workshop equipment required

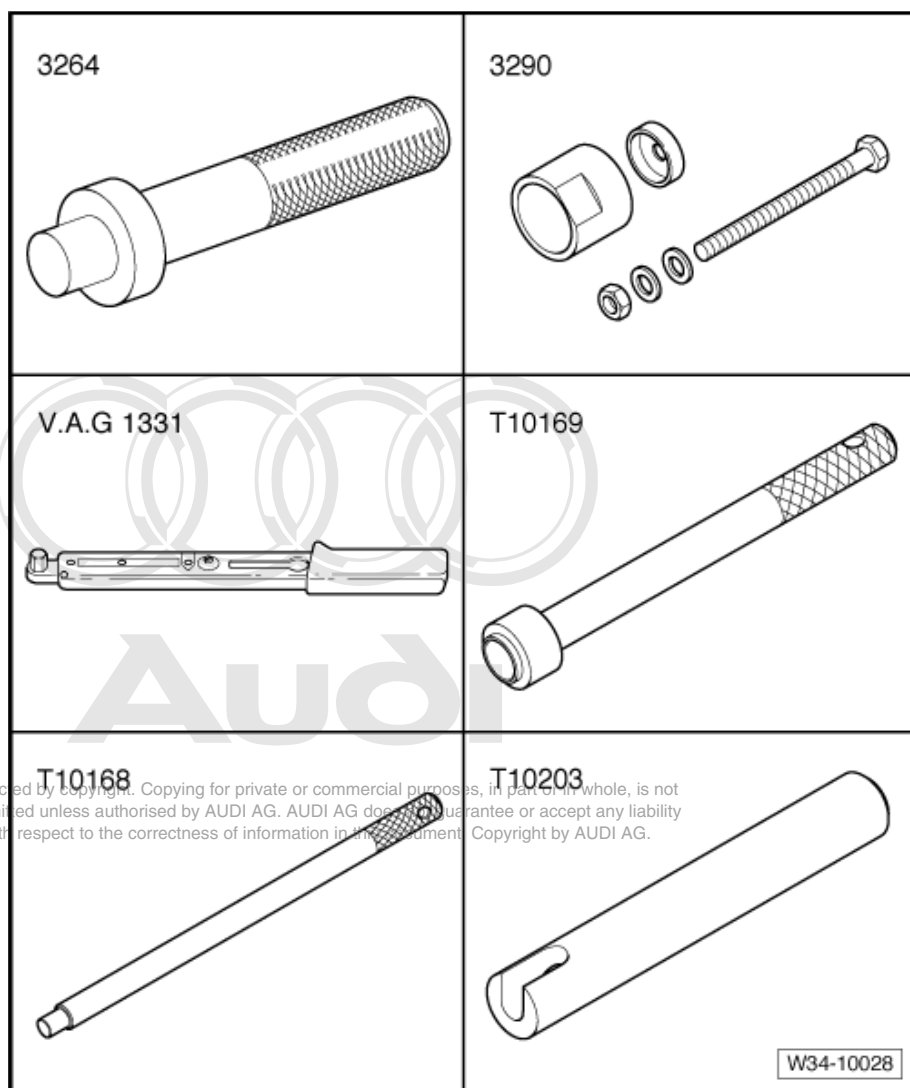
- ◆ Drift sleeve - VW 244B-
- ◆ Gearbox support - VW 353-
- ◆ Thrust plate - VW 401-
- ◆ Thrust plate - VW 402-
- ◆ Press tool - VW 407-
- ◆ Tube - VW 416 B-



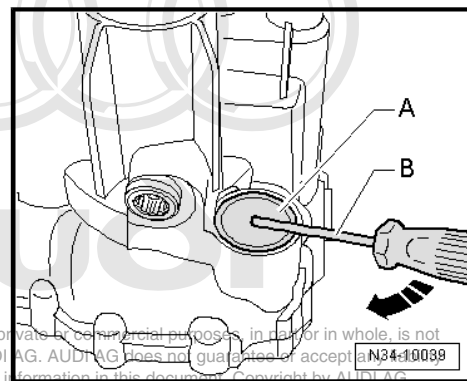
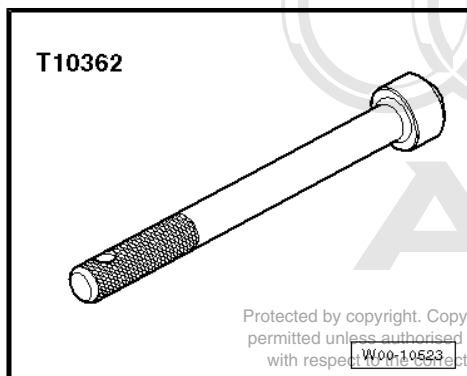
- ◆ Guide pin - VW 436 A-
- ◆ Guide pin - VW 439-
- ◆ Multi-purpose tool - VW 771-
- ◆ Support plate - VW 801-
- ◆ Guide pin - 10-15-
- ◆ Thrust piece - 3124-



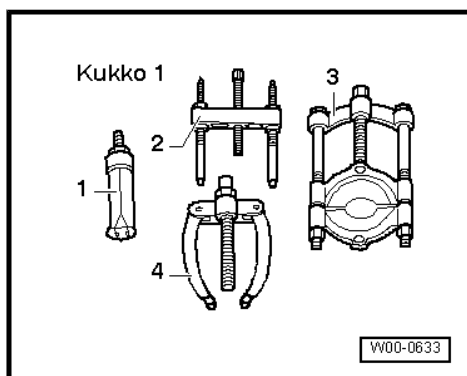
- ◆ Punch - 3264-
- ◆ Assembly tool - 3290-
- ◆ Torque wrench - V.A.G 1331-
- ◆ Drift - T10169-
- ◆ Drift - T10168-
- ◆ Thrust piece - T10203-



- ◆ Drift - T10362-
 ⇒ [page 55](#)



- ◆ -1- Internal puller -
 Kukko 21/2-



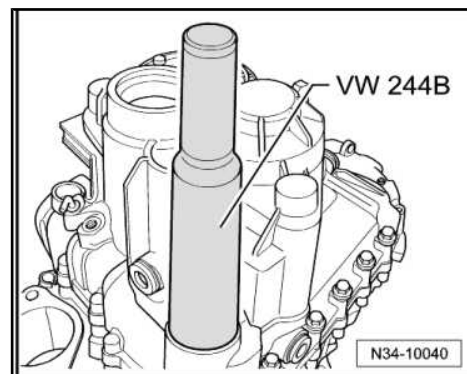
- ◆ -1- Internal puller -
 Kukko 21/4-
- ◆ -4- Counter-support -
 Kukko 22/2-
- ◆ Thread adapter of
 counter-support -
 Kukko 22/1-

Removing sealing cap

-A-

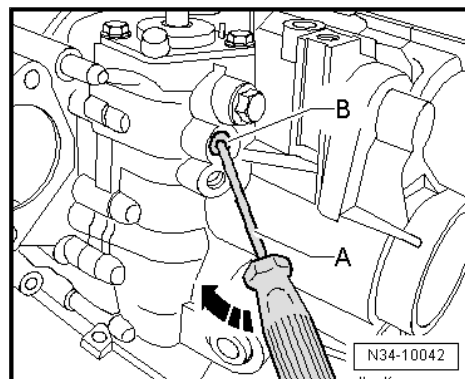
- Pierce rubber in cen-
 tre of sealing cap with
 a screwdriver -B- and
 pry off sealing cap
 -in direction of arrow-

Driving in sealing cap onto stop



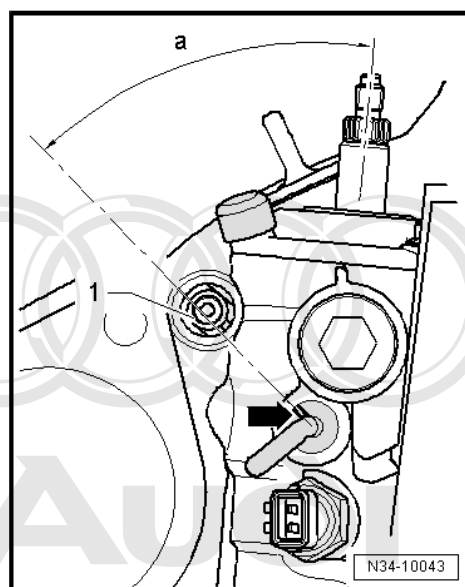
Removing angled rod for selector shaft

- Shear off rod in released position.
- Insert screwdriver -A- in bore for angled rod -B-.
- Lever out angled rod in direction of -arrow-.



Installation position of angled rod

- Marking on angled rod -arrow- must face towards connection on clutch slave cylinder -1-.
- Dimension -a- must be approx. 45°.

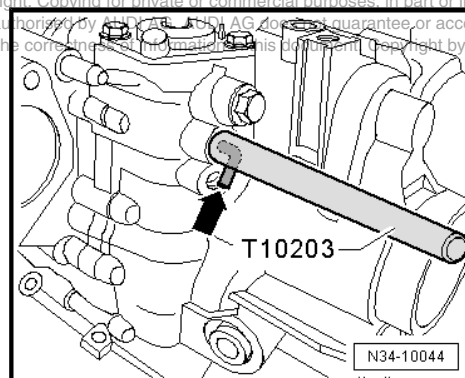


Driving in angled rod -arrow- for selector shaft as far as tool stop



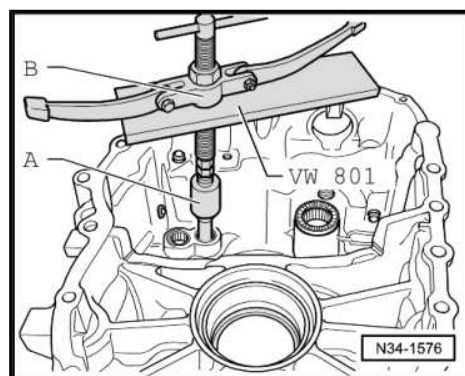
Note

Angled rod must be in released position when driving in.

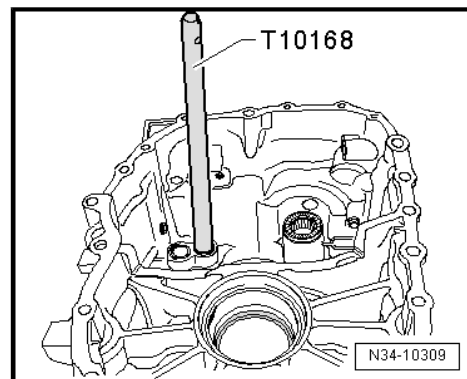


Pulling out bearing bush for selector rod

- A - Internal puller 14.5 ... 18.5 mm , e.g. -Kukko 21/2-
- B - Counter-support , e.g. -Kukko 22/2-

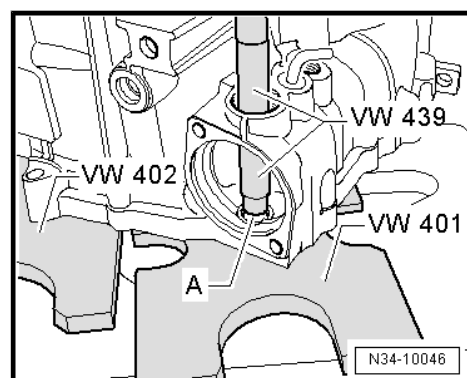


Driving in bearing bush for selector rod (drive in until tool contacts stop)



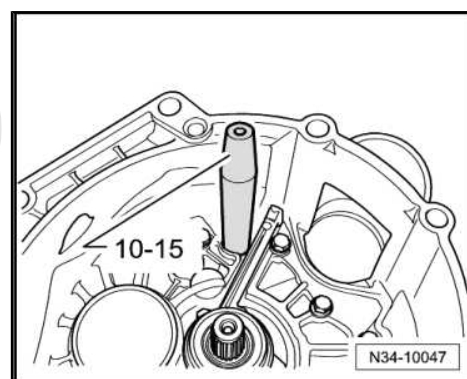
Pressing stop sleeve -A- out of gearbox housing

- Place gearbox housing on thrust plates - VW 401- and -VW 402- so that the dowel sleeves in the gearbox housing do not become damaged.



Driving out stop sleeve (gearbox not dismantled) using guide pin - 10-15-

- Locking bolt and selector shaft removed
- Turn gearbox so that stop sleeve does not drop into gearbox.



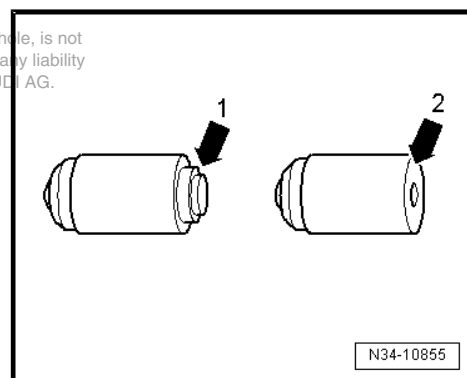
Identification of different types of stop sleeve

The following stop sleeves can be installed.

Installing stop sleeve with shoulder -arrow 1- ➔ [page 56](#) .

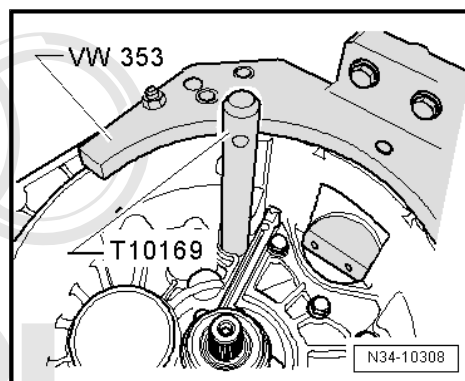
Installing stop sleeve without shoulder -arrow 2- ➔ [page 56](#) .

Select correct components from ➔ Electronic parts catalogue .



Driving in stop sleeve with shoulder as far as tool stop

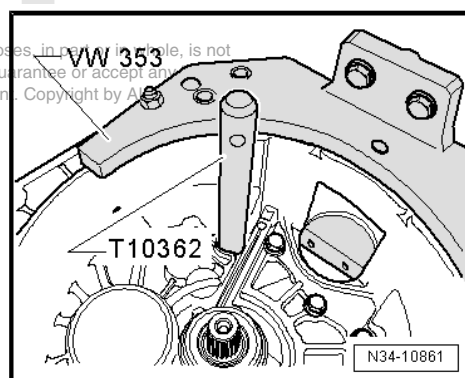
- Gearbox housing bolted to clutch housing



Driving in stop sleeve without shoulder as far as tool stop

- Gearbox housing bolted to clutch housing

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Pulling needle bearing for reverse shaft out of gearbox housing

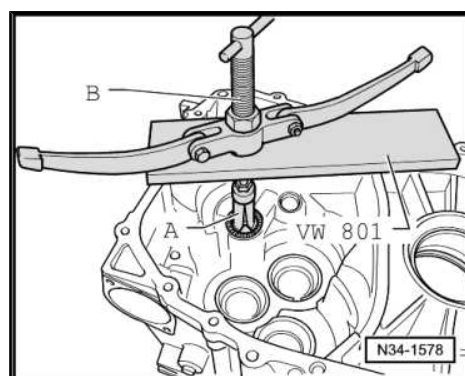
A - Internal puller 23.5 ... 30 mm , e.g. -Kukko 21/4-

B - Counter-support , e.g. -Kukko 22/2-



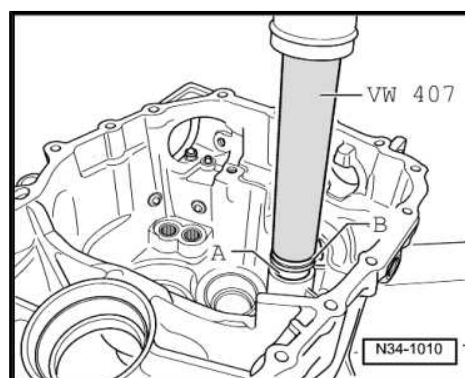
Note

The needle bearing is destroyed during removal and must be renewed.



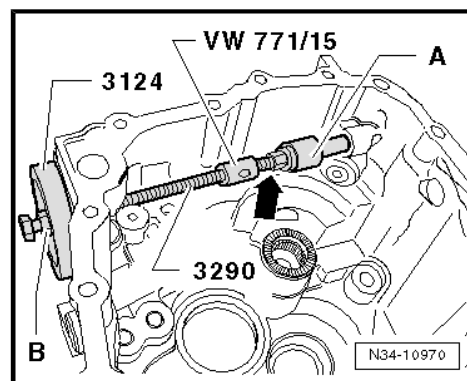
Pressing needle bearing -A- into gearbox housing

- Before pressing in, place reverse shaft thrust washer -B- onto needle bearing.
- Support gearbox housing with tube - VW 416 B- directly below bearing mounting.

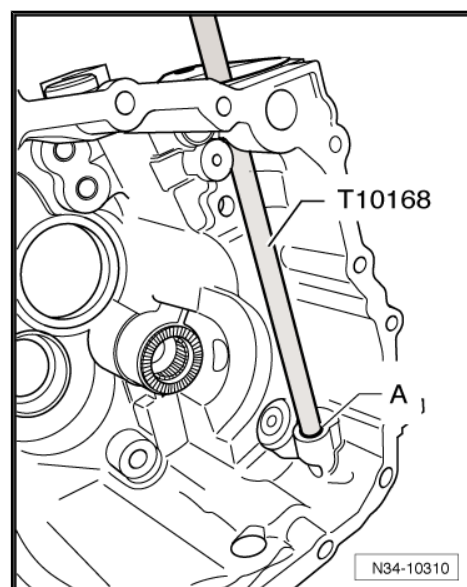


Pulling out selector shaft bearing bush

- Use thread adapter of counter-support - Kukko 22/1- -arrow-.
- Hold spindle of assembly tool - 3290- tight and turn nut -B-.
- A - Internal puller 14.5 ... 18.5 mm , e.g. -Kukko 21/2-

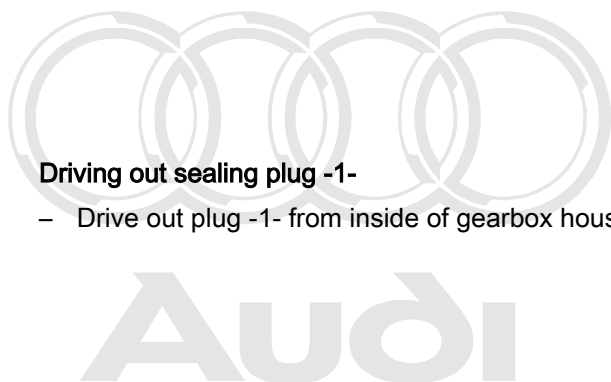
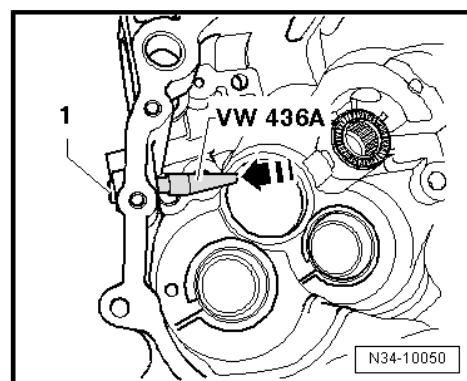


Driving in bearing bush -A- for selector shaft as far as tool stop



Driving out sealing plug -1-

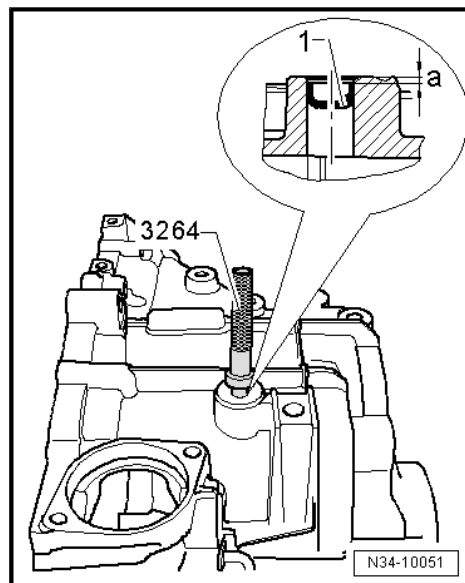
- Drive out plug -1- from inside of gearbox housing -arrow-.



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Driving in sealing plug -1-

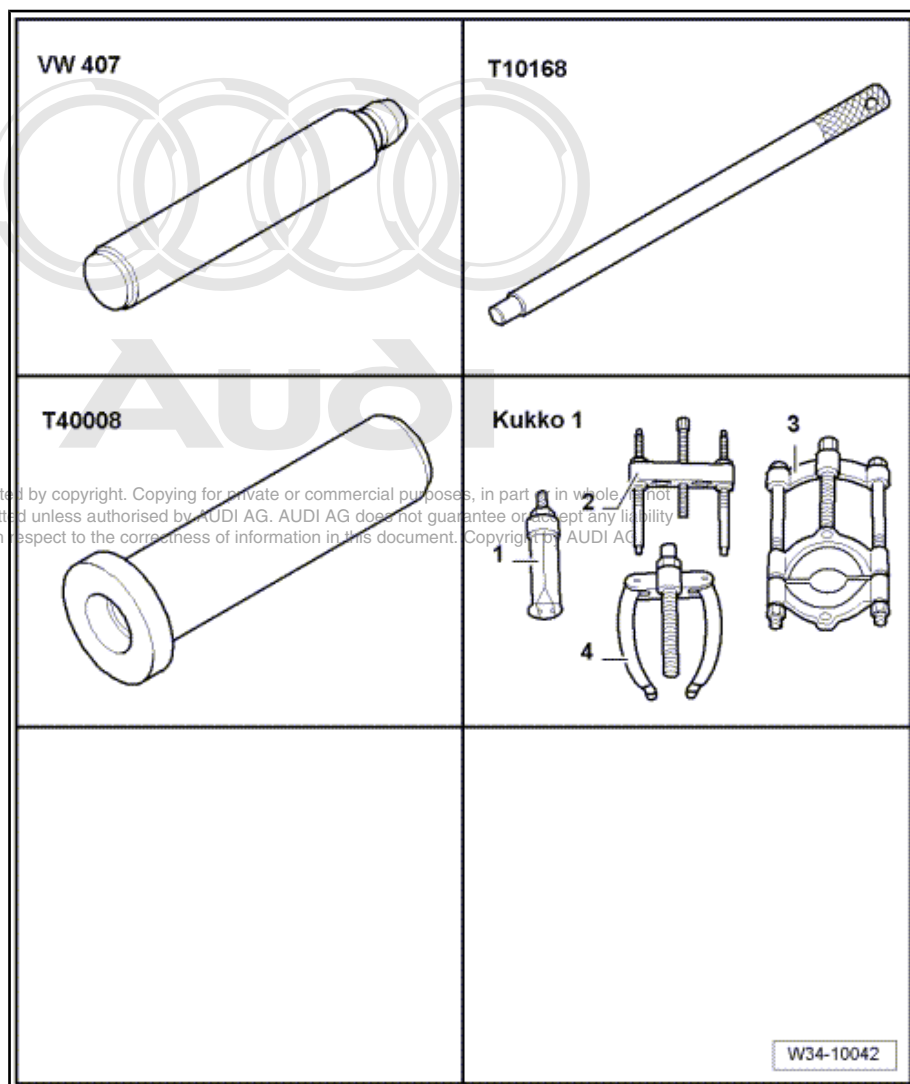
- Use punch - 3264- to drive in sealing plug to dimension -a- = approx. 3 mm below top edge of housing.



3.4 Servicing clutch housing

Special tools and workshop equipment required

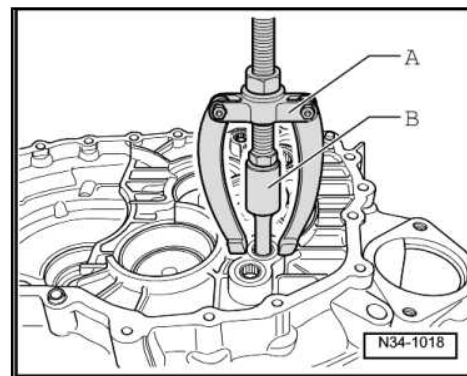
- ◆ Press tool - VW 407-
- ◆ Drift - T10168-
- ◆ Press tool - T40008-
- ◆ -1- Internal puller - Kukko 21/2-
- ◆ -1- Internal puller - Kukko 21/4-
- ◆ -4- Counter-support - Kukko 22/1-
- ◆ -4- Counter-support - Kukko 22/2-



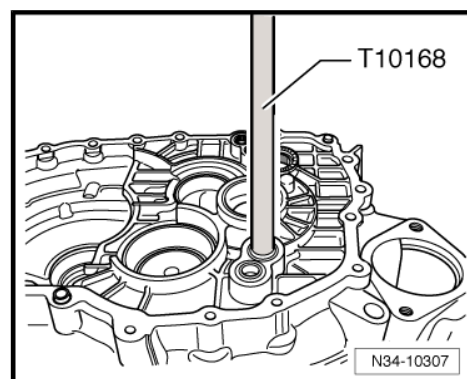
Pulling out bearing bush for selector rod

A - Counter-support - Kukko 22/1-

B - Internal puller 14.5...18.5 mm - Kukko 21/2-



Driving in bearing bush for selector rod (drive in until tool contacts stop)



Pulling needle bearing out of clutch housing

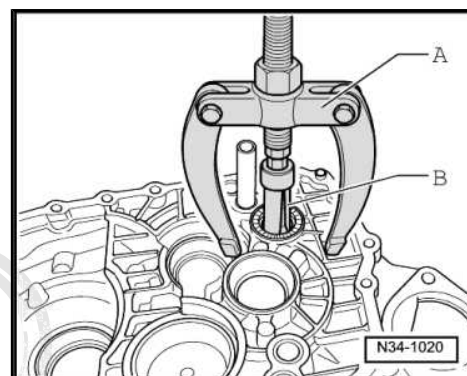
A - Counter-support - Kukko 22/2-

B - Internal puller 23.5 ... 30 mm - Kukko 21/4-



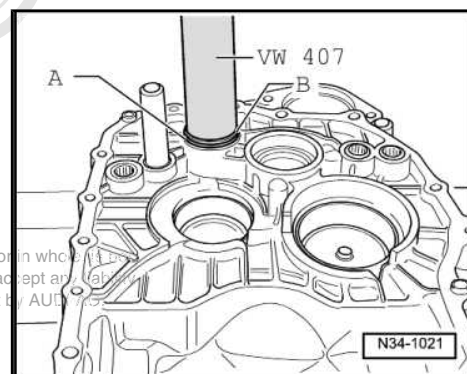
Note

The needle bearing is destroyed during removal and must be renewed.



Pressing needle bearing -A- into clutch housing

- Before pressing in, place reverse shaft thrust washer -B- onto needle bearing.



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35 – Gears, shafts

1 Input shaft

⇒ "1.1 Exploded view - input shaft", page 60

⇒ "1.2 Dismantling and assembling input shaft", page 61

⇒ "1.3 Renewing input shaft oil seal", page 65

1.1 Exploded view - input shaft



Note

- ◆ Secure gearbox to assembly stand ⇒ [page 18](#) .
- ◆ Before installing, heat gear wheels to approx. 100 °C using inductive heater - VAS 6414- (wear protective gloves).
- ◆ Lubricate all bearings on input shaft with gear oil before installing.
- ◆ Always renew grooved ball bearing ⇒ [Item 4 \(page 60\)](#) .

1 - Circlip

- ☐ For grooved ball bearing on input shaft
⇒ [Item 4 \(page 60\)](#)
- ☐ Removing and installing
⇒ [page 30](#)
- ☐ Thickness must be re-determined on gearboxes with reinforcements (manual gearbox 0FB)
⇒ [page 42](#)

2 - Gearbox housing

3 - Circlip

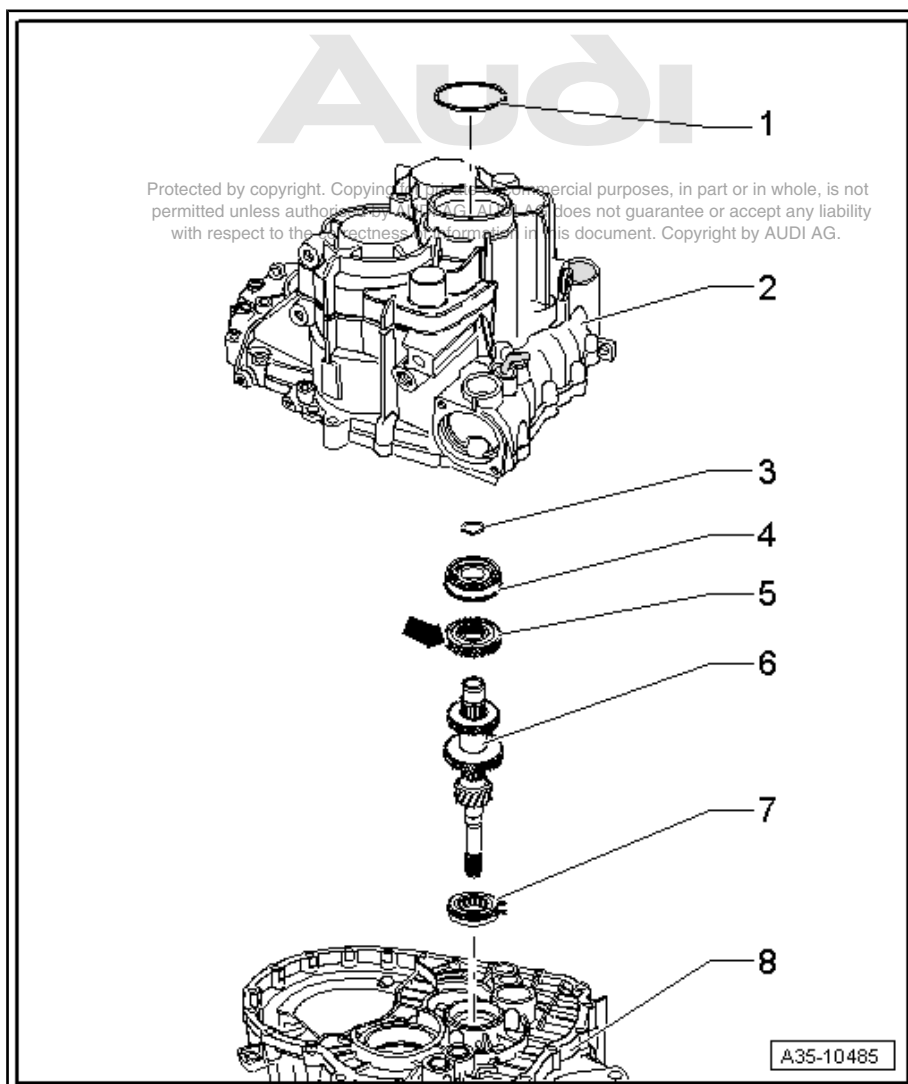
- ☐ When grooved ball bearing
⇒ [Item 4 \(page 60\)](#) or input shaft
⇒ [Item 6 \(page 61\)](#) are renewed: determine thickness of required circlip ⇒ [page 64](#)

4 - Grooved ball bearing

- ☐ Always renew
- ☐ Pulling off ⇒ [page 63](#)
- ☐ Installation position
⇒ [page 64](#)
- ☐ Pressing on
⇒ [page 64](#)

5 - 5th gear wheel

- ☐ Supplied together with input shaft as replacement part
- ☐ Pressing off
⇒ [page 63](#)
- ☐ Installation position: annular groove -arrow- faces towards grooved ball bearing ⇒ [Item 4 \(page 60\)](#)



- ☐ Pressing on ➔ [page 63](#)

6 - Input shaft

- ☐ With 3rd/4th and 6th gear wheels

7 - Roller bearing

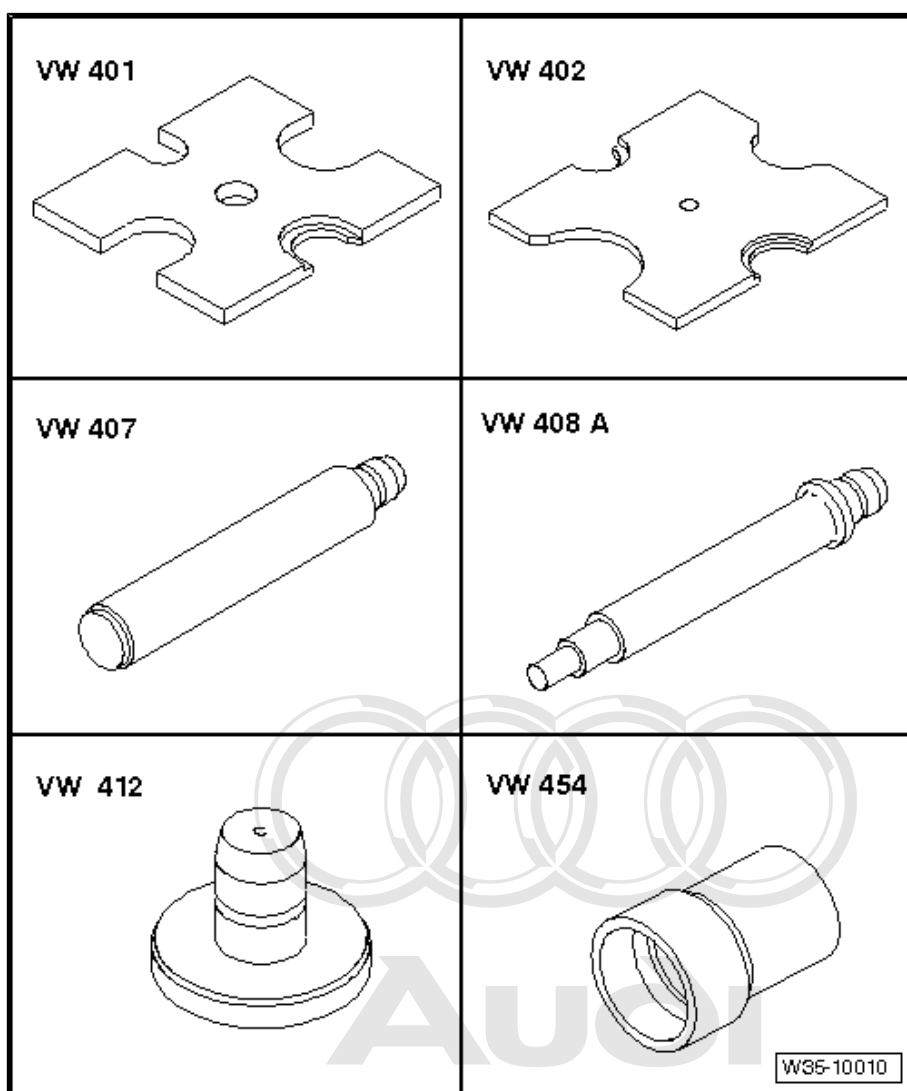
- ☐ With circlip
- ☐ Pulling out ➔ [page 64](#)
- ☐ Pressing in ➔ [page 65](#)
- ☐ Installation position: Circlip in bearing faces towards input shaft

8 - Clutch housing

1.2 Dismantling and assembling input shaft

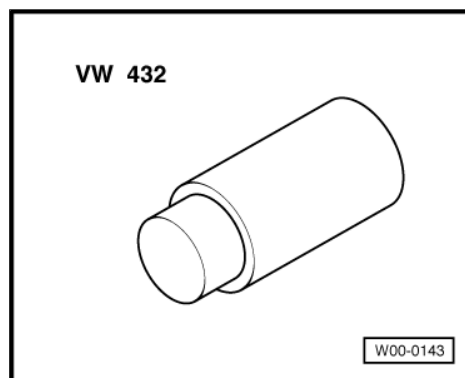
Special tools and workshop equipment required

- ◆ Thrust plate - VW 401-
- ◆ Thrust plate - VW 402-
- ◆ Press tool - VW 407-
- ◆ Press tool - VW 408 A-
- ◆ Press tool - VW 412-
- ◆ Press tool - VW 454-



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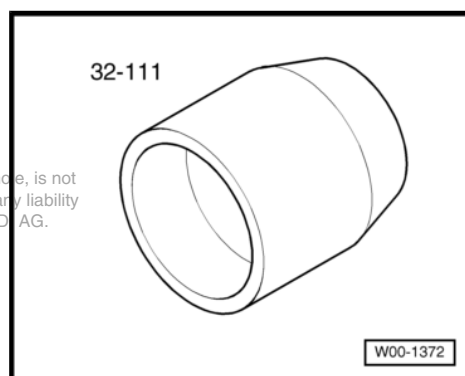
◆ Press tool - VW 432-



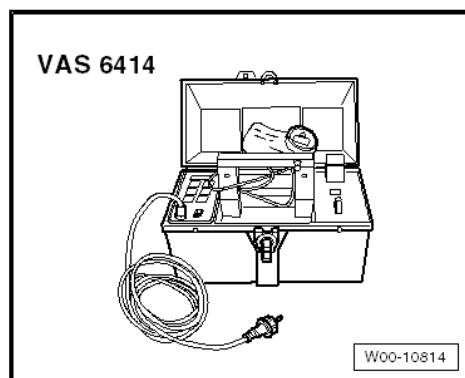
◆ Thrust piece - 32 - 111-



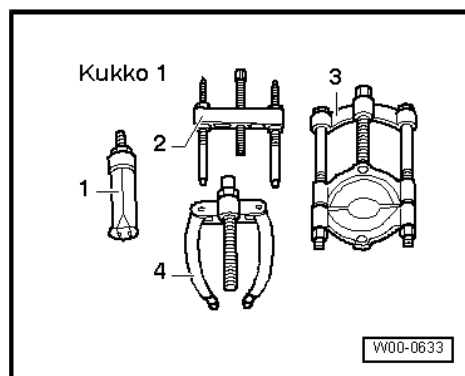
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◆ Inductive heater - VAS 6414-



◆ -1- Internal puller - Kukko 21/5-



◆ -3- Splitter 22 ... 115 mm - Kukko 17/2-

◆ -4- Counter-support - Kukko 22/2-

◆ Feeler gauge

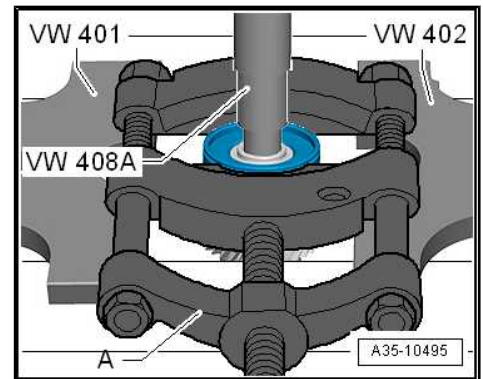
Dismantling input shaft

- Remove circlip for grooved ball bearing.

Pressing off grooved ball bearing

- Apply splitter -A- at annular groove for circlip in grooved ball bearing.

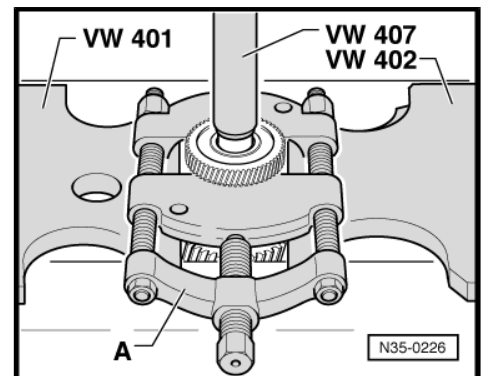
A - Splitter 22...115 mm , e.g. -Kukko 17/2-



Pressing off 5th gear wheel

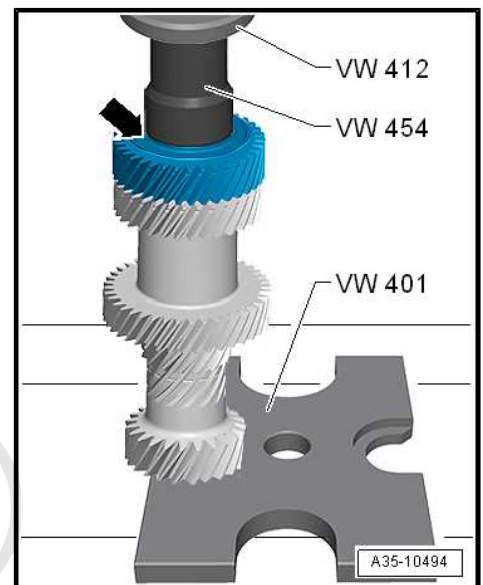
A - Splitter 22...115 mm , e.g. -Kukko 17/2-

Assembling input shaft



Heating 5th gear wheel and pressing on

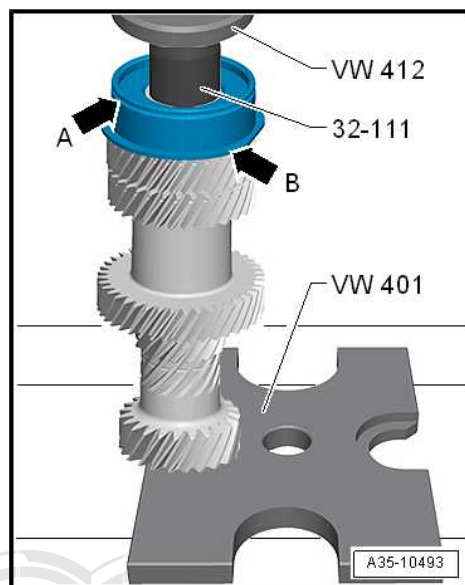
- Groove -arrow- on gear wheel must face upwards.



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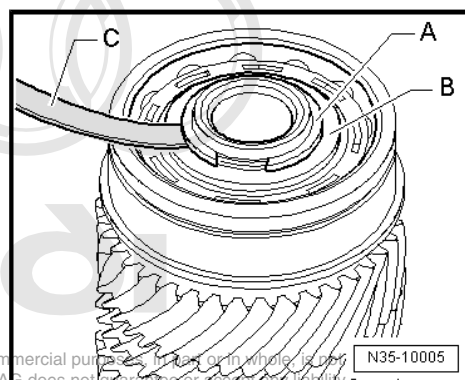
Pressing on grooved ball bearing

- Installation position of grooved ball bearing: groove for circlip faces upwards -arrow A-. Shoulder -arrow B- must face towards 5th gear wheel.
- Then determine thickness of circlip for grooved ball bearing on input shaft ➔ [page 64](#) and fit circlip.



Determining thickness of circlip

- Install a 1.86 mm thick circlip -A- in slot on input shaft and press circlip upwards.
- Measure gap between grooved ball bearing -B- and fitted circlip -A- using feeler gauge -C-.
- Remove circlip fitted for measurement.
- Select circlip from table; refer to ➔ Electronic parts catalogue for part number.



The following circlips are available:

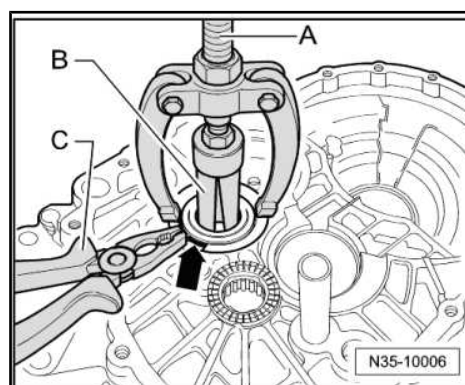
Measured value (mm)	Circlip thickness (mm)	Axial clearance (mm)
0.01 ... 0.05	1.86	0.01 ... 0.05
0.05 ... 0.07	1.89	0.01 ... 0.05
0.07 ... 0.10	1.92	0.01 ... 0.05
0.10 ... 0.13	1.95	0.01 ... 0.05
0.13 ... 0.16	1.98	0.01 ... 0.05

Pulling roller bearing out of clutch housing

- When pulling out, compress circlip -arrow- for roller bearing using pliers -C-.

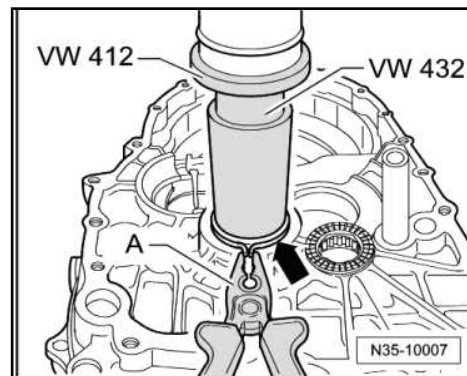
A - Counter-support , e.g. -Kukko 22/2-

B - Internal puller 30 ... 37 mm , e.g. -Kukko 21/5-



Pressing roller bearing into clutch housing

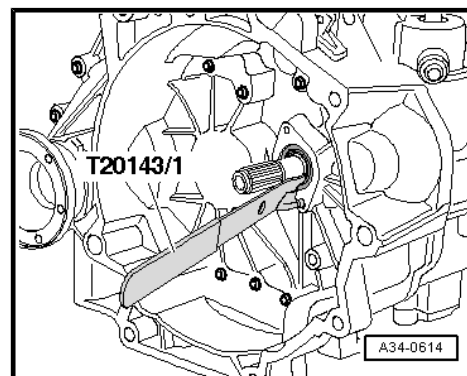
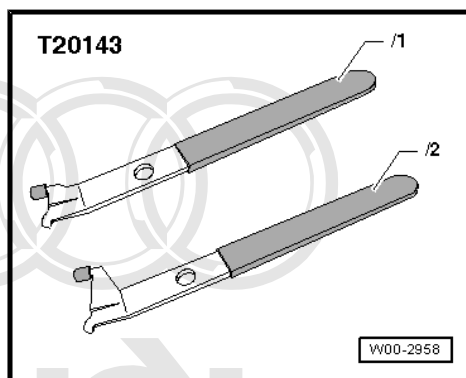
- When pressing in, compress circlip -arrow- for roller bearing using pliers -A-.
- Remove the pliers before the roller bearing is in its final position.
- The circlip must engage in the groove in the clutch housing.



1.3 Renewing input shaft oil seal

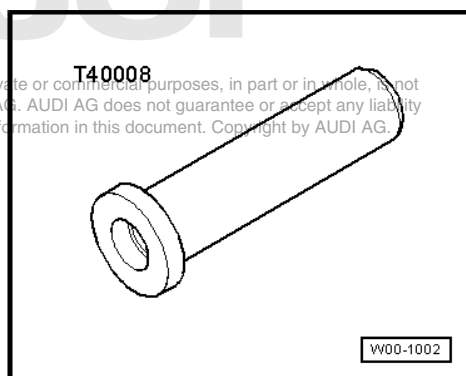
Special tools and workshop equipment required

- ◆ Extractor tool - T20143/1-



- ◆ Thrust piece - T40008-

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- ◆ Sealing grease - G 052 128 A1-

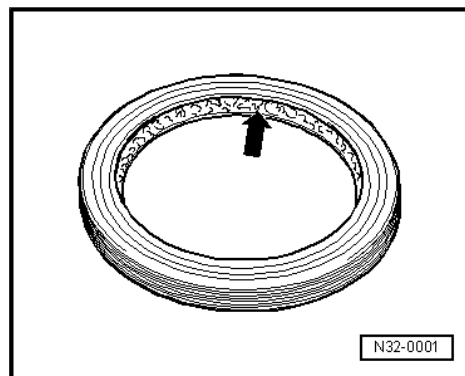
Removing input shaft oil seal



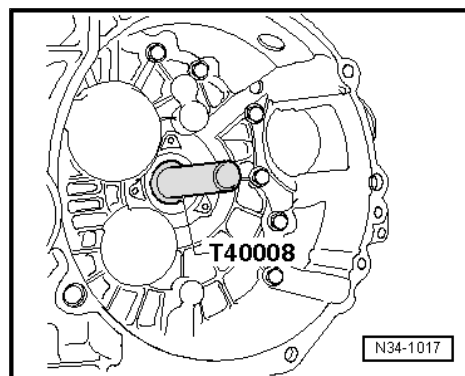
Note

When clutch housing is removed, oil seal can be removed with a drift.

- Lightly oil outer circumference of new oil seal.
- Pack space between sealing lip and dust lip -arrow- half full with sealing grease - G 052 128 A1- .



Driving in input shaft oil seal so it is flush



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2 Output shaft

⇒ [“2.1 Exploded view - output shaft”, page 67](#)

⇒ [“2.2 Dismantling and assembling output shaft”, page 74](#)

⇒ [“2.3 Adjusting output shaft”, page 95](#)

2.1 Exploded view - output shaft

⇒ [“2.1.1 Exploded view - output shaft for 1st - 4th gear”, page 67](#)

⇒ [“2.1.2 Exploded view - output shaft for 5th, 6th and reverse gear”, page 71](#)

2.1.1 Exploded view - output shaft for 1st - 4th gear



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- ◆ *Secure gearbox to assembly stand ⇒ [page 18](#)*
- ◆ *Before installing, heat tapered roller bearing inner races and synchro-hubs to approx. 100 °C using inductive heater - VAS 6414- (wear protective gloves).*
- ◆ *On gearboxes with reinforcements (manual gearbox 0FB), a collared sleeve is fitted instead of the retaining ring ⇒ [Item 19 \(page 69\)](#) and the thrust washers ⇒ [Item 20 \(page 69\)](#) . The following components have been modified accordingly: output shaft for 1st - 4th gear, 4th speed selector gear and needle bearing for 4th speed selector gear ⇒ [page 70](#) . Select correct components from ⇒ *Electronic parts catalogue* .*
- ◆ *Carry out output shaft adjustment ⇒ [page 95](#) if the output shaft or tapered roller bearings have been renewed.*
- ◆ *Always renew both tapered roller bearings together.*

1 - Clutch housing
2 - Oil deflector plate
3 - Dished washer

- ☐ Pulling out ➔ [page 78](#)
- ☐ Pressing in ➔ [page 78](#)

4 - Tapered roller bearing outer race

- ☐ Pulling out ➔ [page 79](#)
- ☐ Pressing in ➔ [page 79](#)

5 - Tapered roller bearing inner race

- ☐ Pressing off ➔ [page 79](#)
- ☐ Pressing on ➔ [page 79](#)

6 - Output shaft

- ☐ For 1st to 4th gear
- ☐ Note the different versions ➔ [page 71](#)
- ☐ Select correct version according to gearbox code letters ➔ Electronic parts catalogue
- ☐ Adjusting ➔ [page 95](#)

7 - Needle bearing

- ☐ For 2nd gear

8 - 2nd speed selector gear
9 - Inner ring for 2nd gear

- ☐ Renew if scored
- ☐ Installation position ➔ [page 82](#)

10 - Outer ring for 2nd gear

- ☐ Check inner contact surface for wear ➔ [page 82](#)
- ☐ Check outer contact surface for wear ➔ [page 82](#)
- ☐ Installation position ➔ [page 82](#)

11 - 2nd gear synchro-ring

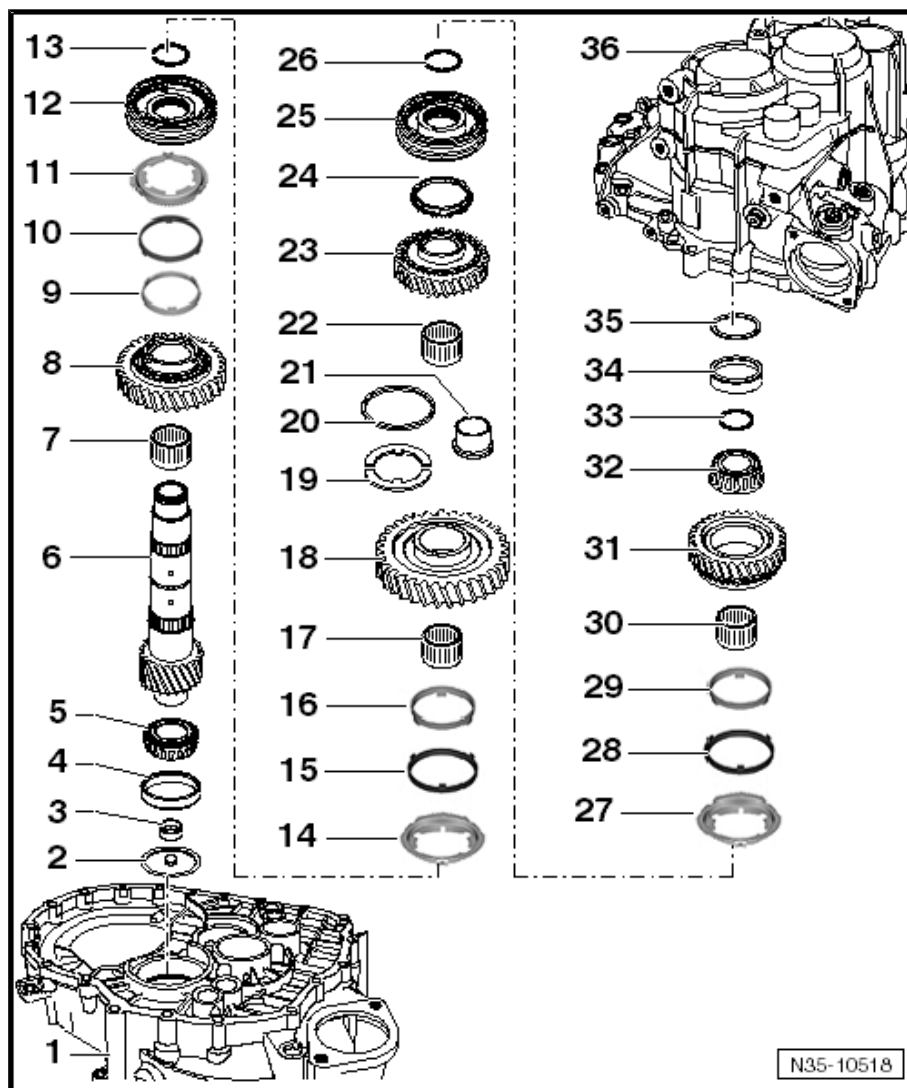
- ☐ Check inner friction surface for grooves or radial scoring
- ☐ Installation position ➔ [page 82](#)

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

- ☐ Press off together with 2nd speed selector gear after removing circlip ➔ [Item 13 \(page 68\)](#) ➔ [page 81](#)
- ☐ Dismantling ➔ [page 83](#)
- ☐ Assembling locking collar/synchro-hub ➔ [page 83](#) and ➔ [page 83](#)
- ☐ Installation position ➔ [page 83](#)
- ☐ Pressing on ➔ [page 83](#)

13 - Circlip
14 - 1st gear synchro-ring

- ☐ Check inner friction surface for grooves or radial scoring
- ☐ Installation position ➔ [page 84](#)



15 - Outer ring for 1st gear

- ☐ Check inner contact surface for wear ⇒ [page 82](#)
- ☐ Check outer contact surface for wear ⇒ [page 82](#)
- ☐ Installation position ⇒ [page 84](#)

16 - Inner ring for 1st gear

- ☐ Renew if scored
- ☐ Installation position ⇒ [page 84](#)

17 - Needle bearing

- ☐ For 1st gear

18 - 1st speed selector gear

- ☐ Fit onto output shaft ⇒ [page 84](#)

19 - Thrust washer

- ☐ For 1st and 4th gear
- ☐ 2x
- ☐ Insert lug on thrust washer in hole on output shaft
- ☐ Not installed on gearboxes with reinforcements

20 - Retaining ring

- ☐ Holds thrust washers ⇒ [Item 19 \(page 69\)](#) in position on output shaft
- ☐ Not installed on gearboxes with reinforcements

21 - Collared sleeve

- ☐ For 4th gear needle bearing
- ☐ Only installed on gearboxes with reinforcements ⇒ [page 70](#)

22 - Needle bearing

- ☐ For 4th gear
- ☐ Note the different versions ⇒ [page 71](#)
- ☐ Select correct version according to gearbox code letters ⇒ Electronic parts catalogue

23 - 4th speed selector gear

- ☐ Note the different versions ⇒ [page 71](#)
- ☐ Select correct version according to gearbox code letters ⇒ Electronic parts catalogue

24 - 4th gear synchro-ring

- ☐ Checking for wear ⇒ [page 85](#)

25 - Locking collar with synchro-hub for 3rd and 4th gear

- ☐ Pull off together with 4th speed selector gear after removing circlip ⇒ [Item 26 \(page 69\)](#) ⇒ [page 81](#)
- ☐ Dismantling ⇒ [page 83](#)
- ☐ Assembling locking collar/synchro-hub ⇒ [page 83](#) and ⇒ [page 83](#)
- ☐ Installation position: Locking collar/synchro-hub ⇒ [page 85](#)
- ☐ Pressing on ⇒ [page 85](#)

26 - Circlip

27 - 3rd gear synchro-ring

- ☐ Check inner friction surface for grooves or radial scoring
- ☐ Installation position ⇒ [page 85](#)

28 - Outer ring for 3rd gear

- ☐ Check inner contact surface for wear ⇒ [page 82](#)
- ☐ Check outer contact surface for wear ⇒ [page 82](#)
- ☐ Installation position ⇒ [page 85](#)

29 - Inner ring for 3rd gear

- ☐ Renew if scored

- ☐ Installation position ➔ [page 85](#)

30 - Needle bearing

- ☐ For 3rd gear

31 - 3rd speed selector gear

- ☐ Fit onto output shaft ➔ [page 86](#)

32 - Tapered roller bearing inner race

- ☐ Pulling off ➔ [page 80](#)
- ☐ Pressing on ➔ [page 80](#)

33 - Circlip

- ☐ When tapered roller bearing ➔ [Item 32 \(page 70\)](#) or output shaft ➔ [Item 6 \(page 68\)](#) are renewed: determine thickness of required circlip ➔ [page 80](#)

34 - Tapered roller bearing outer race

- ☐ Pulling out ➔ [page 80](#)
- ☐ Pressing in ➔ [page 81](#)

35 - Shim

- ☐ Determining thickness ➔ [page 95](#)

36 - Gearbox housing

Reinforcements on gearbox 0FB in area of 4th speed selector gear

The following components are affected:

1 - Output shaft

Distinguishing features ➔ [page 71](#)

2 - Collared sleeve

Distinguishing features ➔ [page 71](#)

3 - Needle bearing for 4th gear

Distinguishing features ➔ [page 71](#)

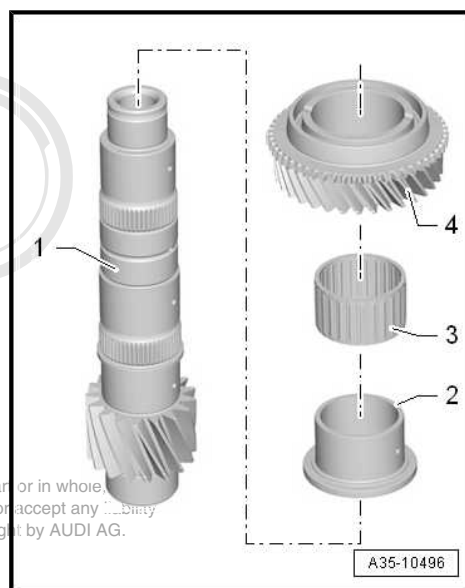
4 - 4th speed selector gear

Distinguishing features ➔ [page 71](#)



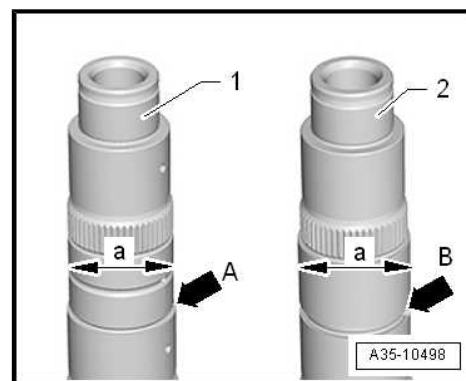
Note

- ◆ *Never install components designed for gearboxes with reinforced 4th gear on gearboxes without reinforced 4th gear, and vice versa. Select correct components from ➔ [Electronic parts catalogue](#).*
- ◆ *Removal and installation of changed components should be performed as described in the Workshop Manual ➔ [page 74](#).*



Identification of output shafts

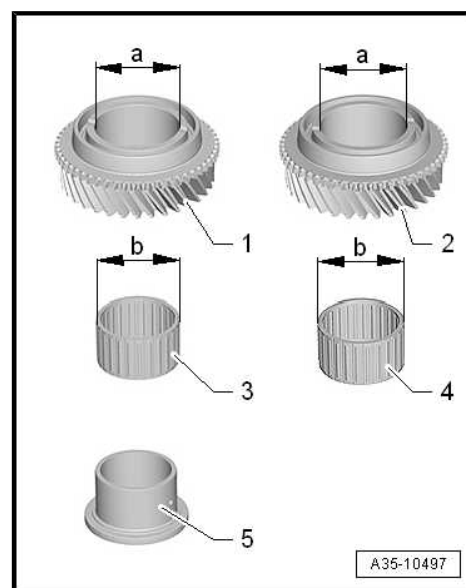
Output shaft	-1- with reinforcements	-2- without reinforcements
Dimension -a-	40.1 mm	42.0 mm
-Arrow A-	Shoulder for seating of collared sleeve ⇒ Item 21 (page 69)	-
-Arrow B-	-	2 holes opposite each other and annular groove for mounting for thrust washers ⇒ Item 19 (page 69)



Distinguishing features of needle bearings and 4th speed selector gears

4th speed selector gear	-1- with reinforcements	-2- without reinforcements
Dimension -a-	52.0 mm	48.0 mm
Needle bearing for 4th speed selector gear	-3- with reinforcements	-4- without reinforcements
Dimension -b-	52.0 mm	48.0 mm

- Needle bearing -3- is fitted on collared sleeve -5- on gearboxes with reinforcements



2.1.2 Exploded view - output shaft for 5th, 6th and reverse gear



Note

- ◆ Secure gearbox to assembly stand ⇒ [page 18](#).
- ◆ Before installing, heat tapered roller bearing inner races and synchro-hubs to approx. 100 °C using inductive heater - VAS 6414- (wear protective gloves).
- ◆ Carry out output shaft adjustment ⇒ [page 100](#) if the output shaft or tapered roller bearings have been renewed.
- ◆ Always renew both tapered roller bearings together.

1 - Clutch housing
2 - Shim

- ☐ 0.65 mm thick

3 - Tapered roller bearing outer race

- ☐ Pulling out ➤ [page 90](#)
- ☐ Pressing in ➤ [page 91](#)

4 - Tapered roller bearing inner race

- ☐ Pulling off ➤ [page 92](#)
- ☐ Pressing on ➤ [page 95](#)

5 - Output shaft for 5th, 6th and reverse gear

- ☐ Adjusting ➤ [page 100](#)

6 - Reverse gear synchro-hub

- ☐ Pressing off ➤ [page 92](#)
- ☐ Installation position ➤ [page 93](#)
- ☐ Pressing on ➤ [page 93](#)

7 - Circlip
8 - Reverse gear locking collar

- ☐ With synchro-ring

9 - Needle bearing

- ☐ For reverse selector gear

10 - Reverse selector gear
11 - Sleeve

- ☐ Press off with reverse selector gear ➤ [page 92](#)
- ☐ Installation position: Wide shoulder of sleeve faces towards reverse selector gear
- ☐ Pressing on ➤ [page 93](#)

12 - Circlip
13 - Needle bearing

- ☐ For 6th gear

14 - 6th speed selector gear
15 - 6th gear synchro-ring

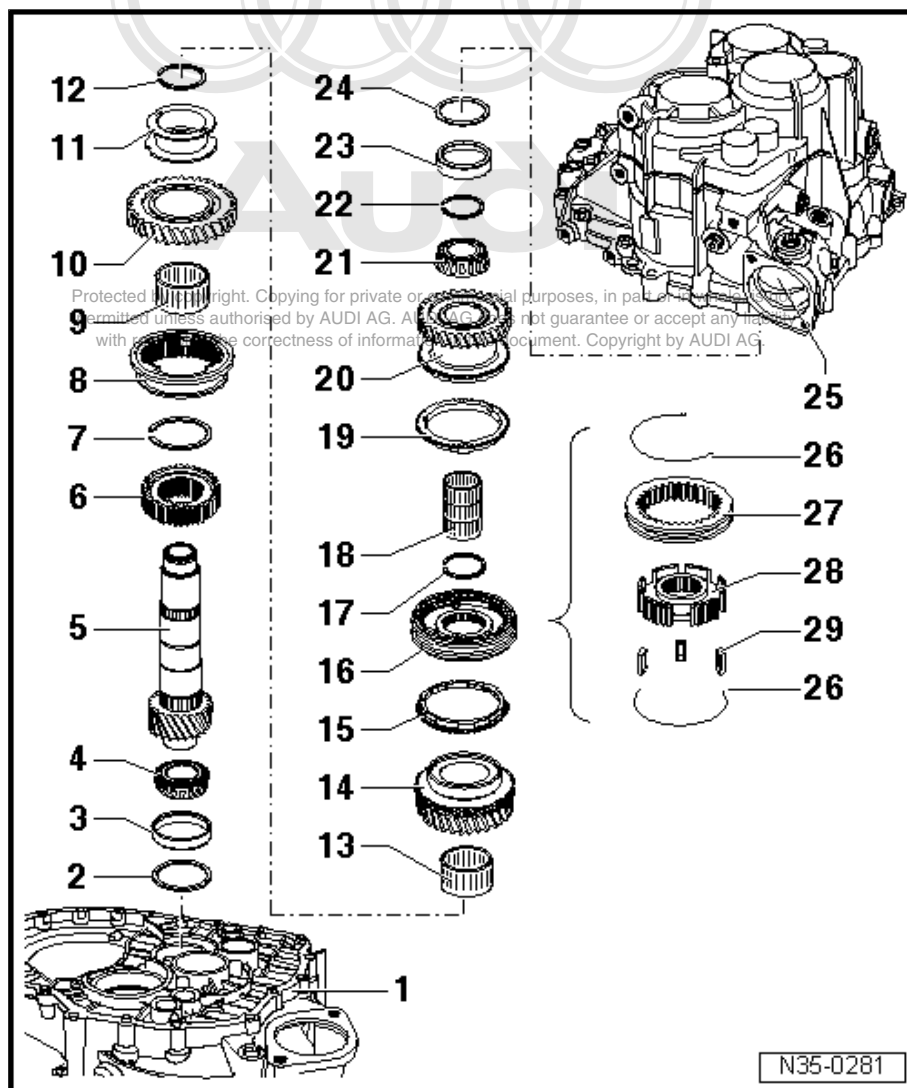
- ☐ Checking for wear ➤ [page 93](#)

16 - Locking collar/synchro-hub for 5th and 6th gear

- ☐ Press off together with 6th speed selector gear after removing circlip ➤ [Item 17 \(page 72\)](#) ➤ [page 92](#)
- ☐ Dismantling ➤ [page 94](#)
- ☐ Assembling locking collar/synchro-hub ➤ [page 94](#) and ➤ [page 94](#)
- ☐ Pressing on ➤ [page 94](#)

17 - Circlip
18 - Needle bearing

- ☐ For 5th gear



19 - 5th gear synchro-ring

- ☐ Checking for wear ➔ [page 93](#)

20 - 5th speed selector gear

21 - Tapered roller bearing inner race

- ☐ Pulling off ➔ [page 91](#)
- ☐ Pressing on ➔ [page 94](#)

22 - Circlip

- ☐ When tapered roller bearing ➔ [Item 21 \(page 73\)](#) or output shaft ➔ [Item 5 \(page 72\)](#) are renewed: determine thickness of required circlip ➔ [page 95](#)

23 - Tapered roller bearing outer race

- ☐ Pulling out ➔ [page 91](#)
- ☐ Pressing in ➔ [page 91](#)

24 - Shim

- ☐ Determining thickness ➔ [page 100](#)

25 - Gearbox housing

26 - Spring

- ☐ Installation position ➔ [page 94](#)

27 - Locking collar

28 - Synchro-hub

29 - Locking piece

- ☐ 3x
- ☐ Installation position ➔ [page 94](#)



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2.2 Dismantling and assembling output shaft

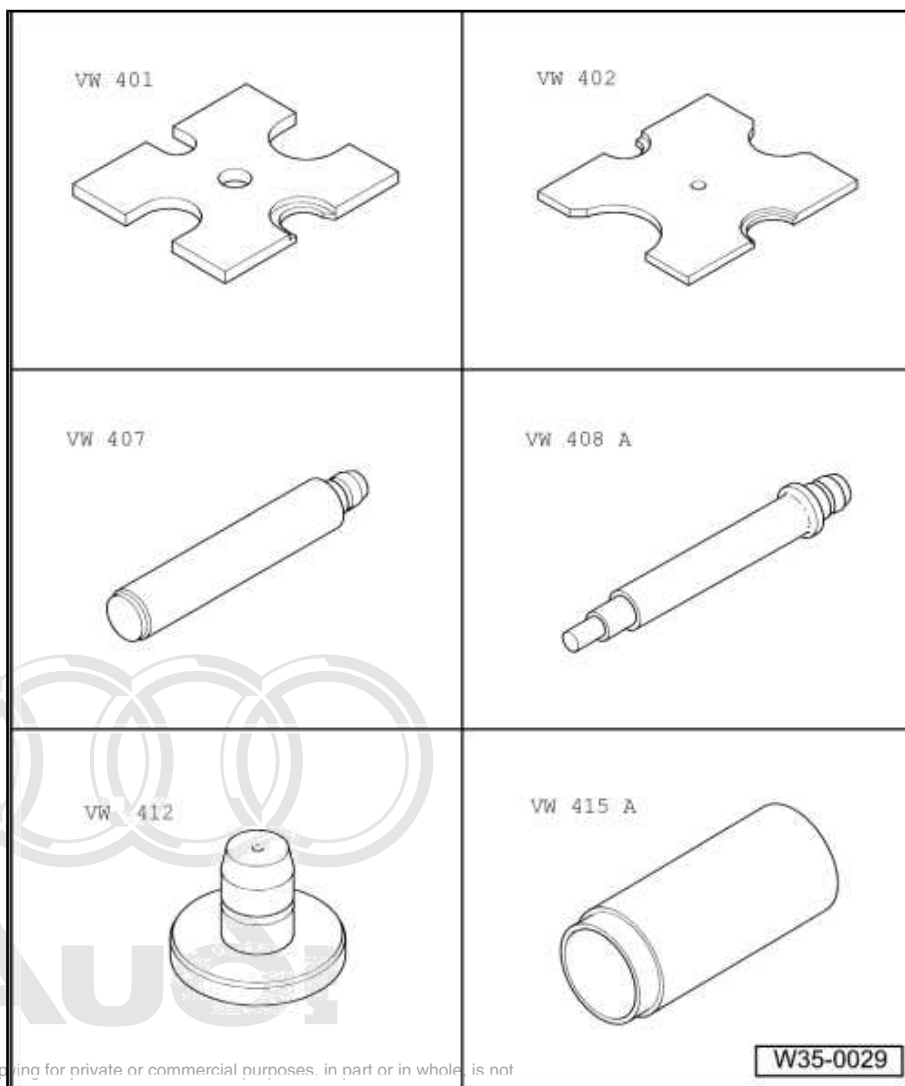
⇒ [“2.2.1 Dismantling and assembling output shaft for 1st - 4th gear”, page 74](#)

⇒ [“2.2.2 Dismantling and assembling output shaft for 5th, 6th and reverse gear”, page 86](#)

2.2.1 Dismantling and assembling output shaft for 1st - 4th gear

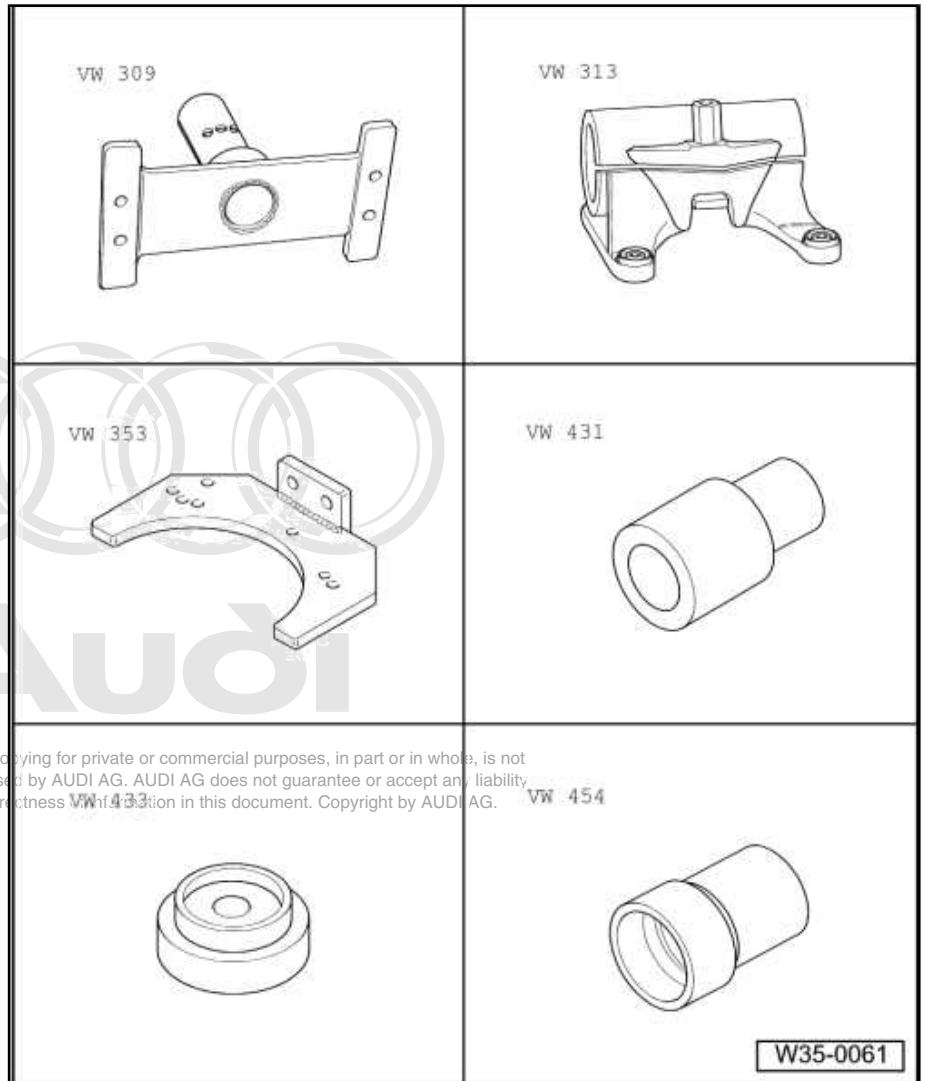
Special tools and workshop equipment required

- ◆ Thrust plate - VW 401-
- ◆ Thrust plate - VW 402-
- ◆ Press tool - VW 407-
- ◆ Press tool - VW 408 A-
- ◆ Press tool - VW 412-
- ◆ Tube - VW 415 A-



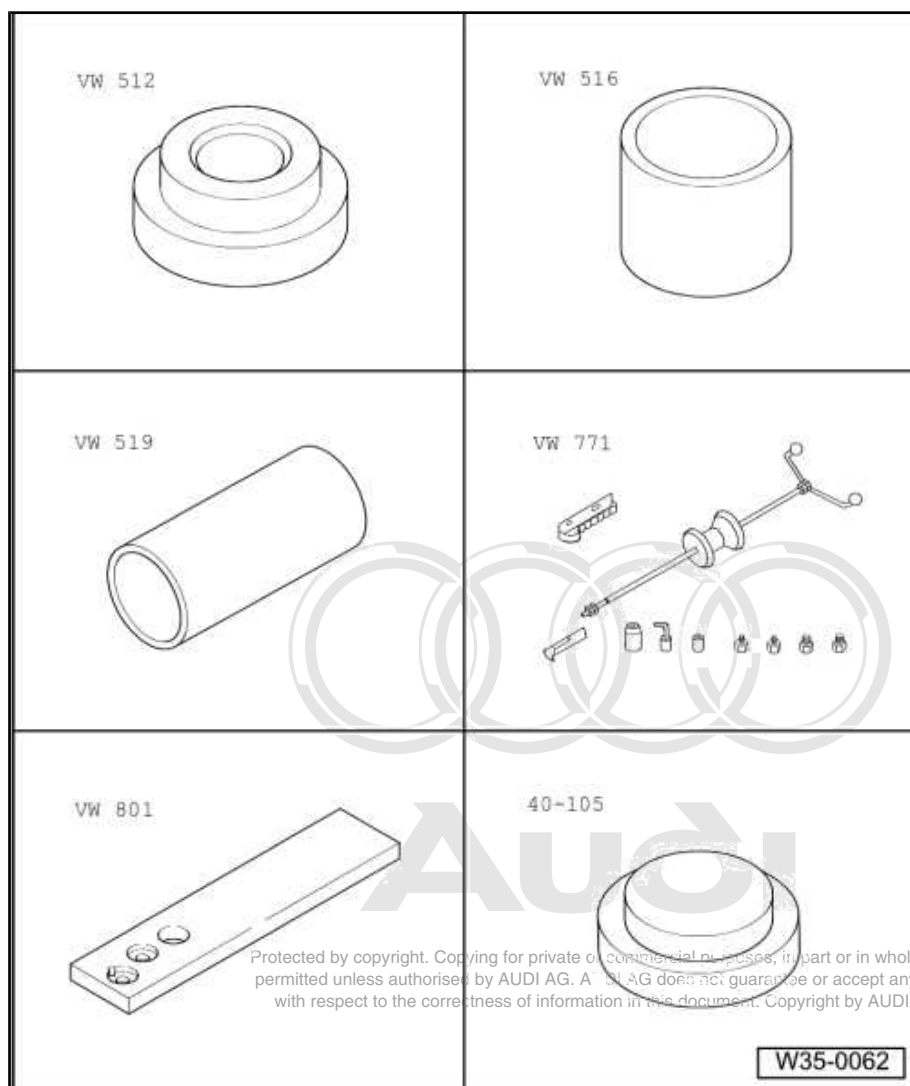
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- ◆ Support plate - VW 309-
- ◆ Support clamp - VW 313-
- ◆ Gearbox support - VW 353-
- ◆ Press tool - VW 431-
- ◆ Press tool - VW 433-
- ◆ Press tool - VW 454-

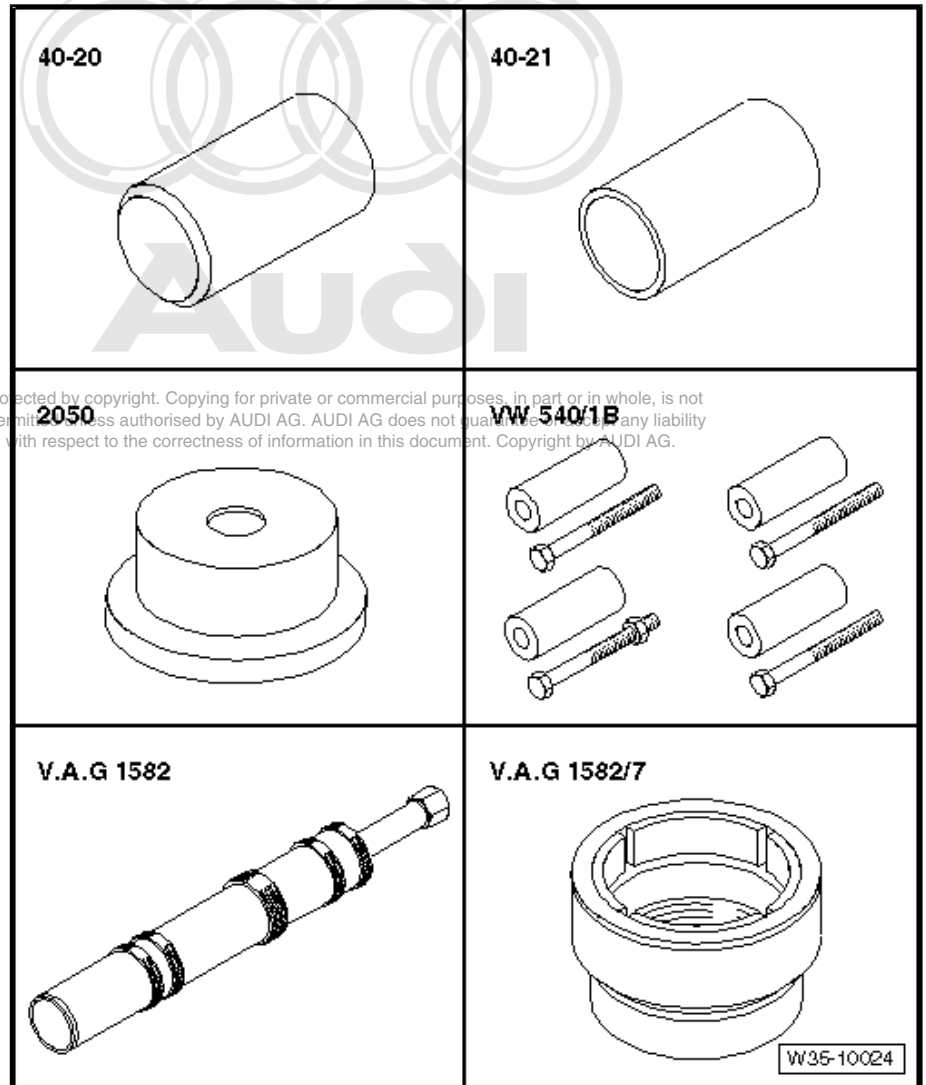


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- ◆ Thrust pad - VW 512-
- ◆ Tube - VW 516-
- ◆ Tube - VW 519-
- ◆ Multi-purpose tool - VW 771-
- ◆ Support plate - VW 801-
- ◆ Thrust plate - 40 - 105-

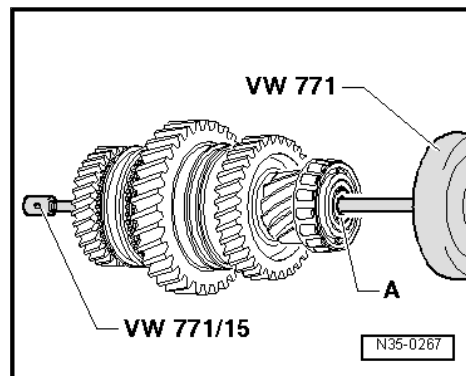
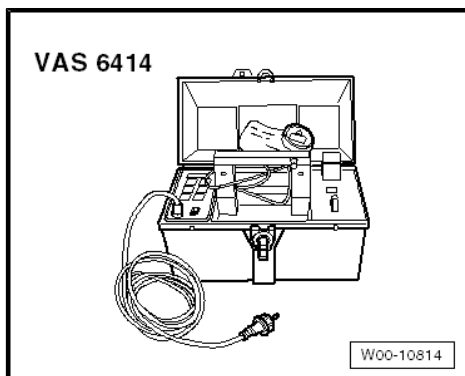


- ◆ Drift sleeve - 40 - 20-
- ◆ Drift sleeve - 40 - 21-
- ◆ Thrust piece - 2050-
- ◆ Engine and gearbox support supplement - VW 540/1 B-
- ◆ Tapered roller bearing puller - V.A.G 1582-
- ◆ Adapter - V.A.G 1582/7-

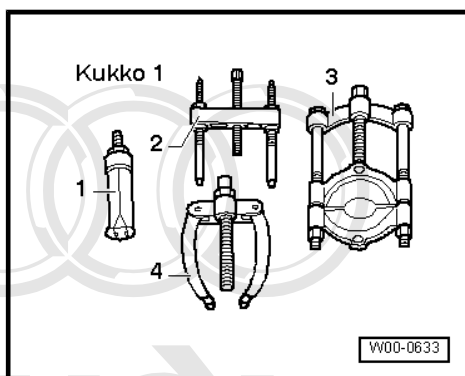


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- ◆ Inductive heater - VAS 6414-



- ◆ -1- Internal puller - Kukko 21/7-



- ◆ -1- Internal puller - Kukko 21/8-

- ◆ -2- Puller - Kukko 18/2-
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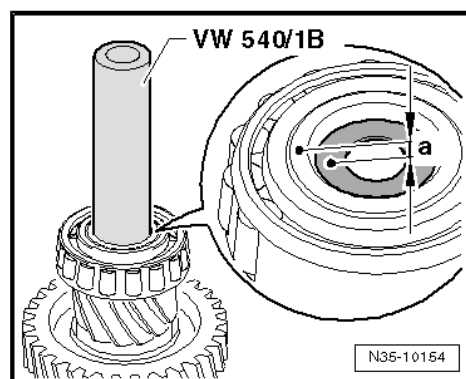
- ◆ -3- Splitter - Kukko 17/2-

- ◆ -4- Counter-support - Kukko 22/2-

**Pulling dished washer
 -A- out of output shaft**

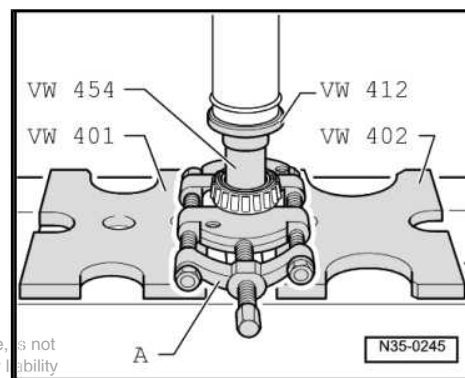
Pressing dished washer into output shaft

Dimension "a" = 2 mm



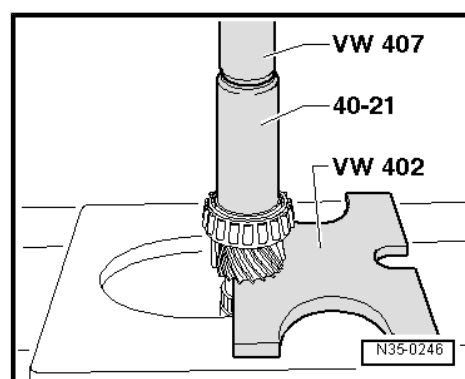
Pressing off tapered roller bearing inner race on clutch housing end

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



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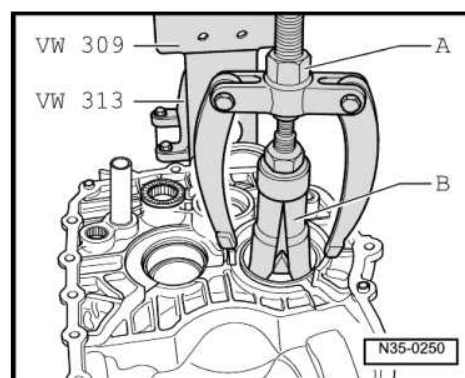
Pressing on tapered roller bearing inner race on clutch housing end



Pulling tapered roller bearing outer race out of clutch housing

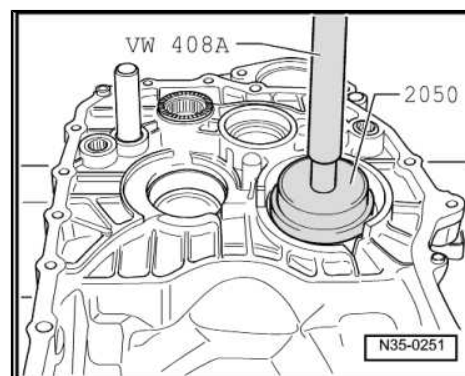
A - Counter-support , e.g. -Kukko 22/2-

B - Internal puller 56 ... 70 mm , e.g. -Kukko 21/8-



Pressing tapered roller bearing outer race into clutch housing

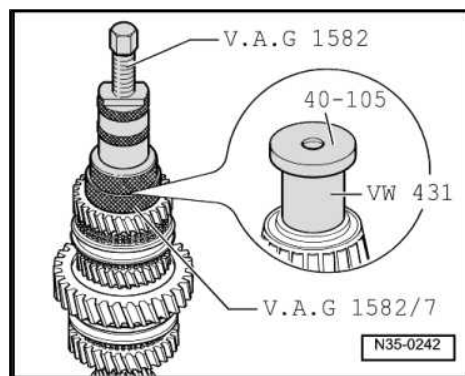
- Support clutch housing with drift sleeve - 40 - 20- directly below bearing mounting.



Pulling off tapered roller bearing inner race on gearbox housing end

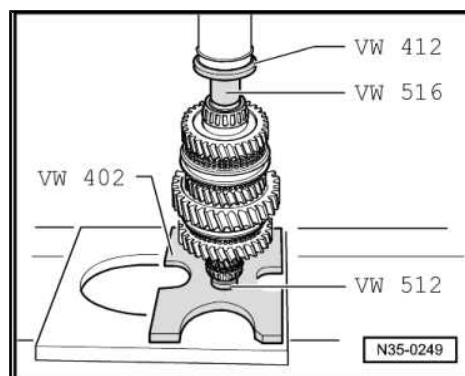
Before applying bearing puller , note the following:

- Remove circlip for tapered roller bearing inner race on gearbox housing end.
- Insert thrust piece - VW 431- in output shaft and place thrust plate - 40 - 105- on it.



Pressing on tapered roller bearing inner race on gearbox housing end

- Determine thickness of required circlip ➔ [page 80](#) and install circlip.



Determining thickness of circlip

- Determine the thickest circlip that will just fit and install it.

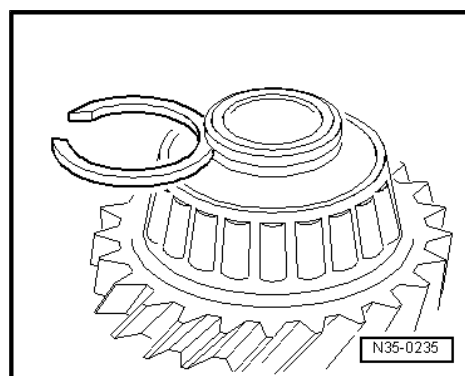


Note

Select circlips from ➔ *Electronic parts catalogue* .

The following circlips are available:

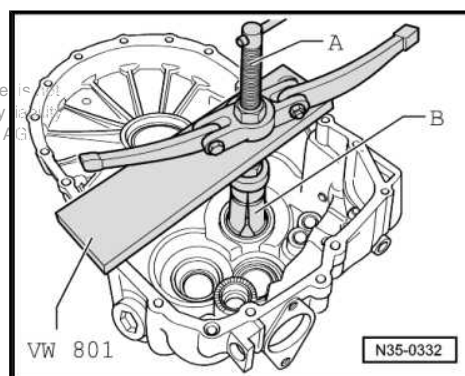
Thickness (mm)			
1.79	1.83	1.86	1.89
1.92	1.95	1.98	



Pulling tapered roller bearing outer race out of gearbox housing

A - Counter-support , e.g. -Kukko 22/2-

B - Internal puller 46 ... 58 mm , e.g. -Kukko 21/7-



Pressing tapered roller bearing outer race into gearbox housing

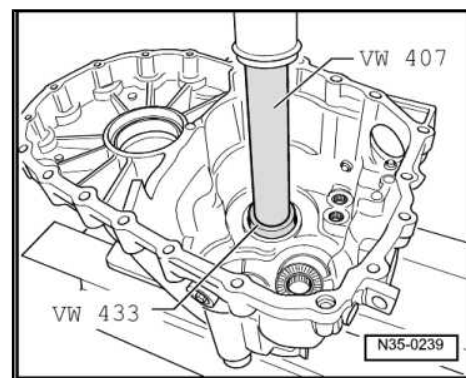
- Fit shim below outer race.
- Support gearbox housing with thrust piece - 2050- directly below bearing mounting.

Dismantling output shaft



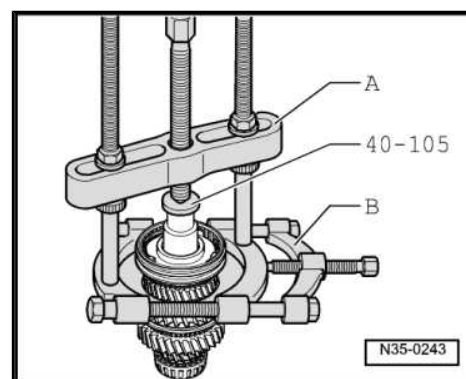
Note

Pulling off tapered roller bearing inner race on gearbox housing end ➔ [page 80](#)



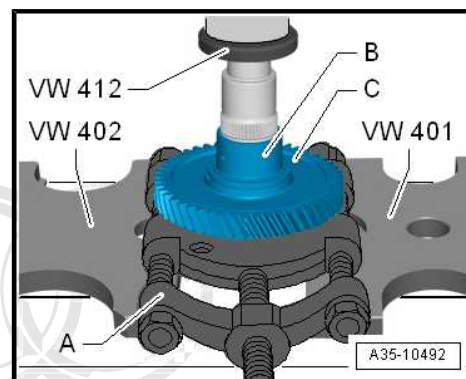
Pulling off 3rd and 4th gear synchro-hub/locking collar with 4th speed selector gear

- First remove circlip.
- A - Puller , e.g. -Kukko 18/2-
- B - Splitter 22...115 mm , e.g. -Kukko 17/2-
- Then remove retaining ring ➔ [Item 20 \(page 69\)](#) and thrust washers ➔ [Item 19 \(page 69\)](#) .
- After doing so, detach 1st speed selector gear with synchro-rings.



Pressing off collared sleeve -B- together with 4th speed selector gear -C- on gearboxes with reinforcements

- A - Splitter 22...115 mm , e.g. -Kukko 17/2-
- Clamp splitter -A- underneath driving teeth on 1st speed selector gear.



Pressing off 1st and 2nd gear locking collar and synchro-hub

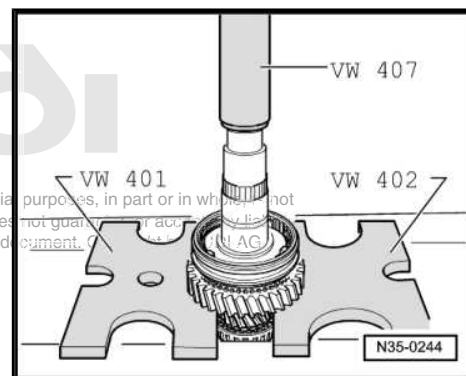
After removing the circlip, press off 2nd speed selector gear and locking collar/synchro-hub together.

Assembling output shaft



Note

Use inductive heater - VAS 6414- to heat tapered roller bearing inner races and synchro-hub to approx. 100°C before installing. Press home onto stop when installing so there is no axial clearance.

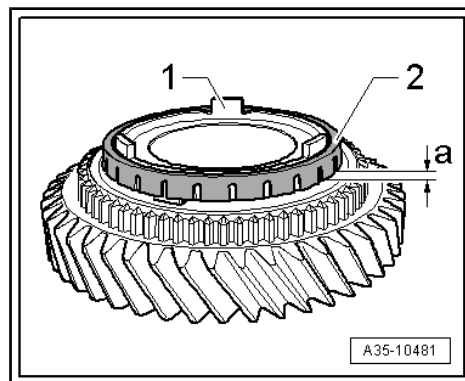


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Checking wear on inner friction surface of 1st, 2nd and 3rd gear outer ring

- Place inner ring -1- onto cone of selector gear.
- Press outer ring -2- against cone of inner ring. Measure gap -a- with feeler gauge at 3 points spaced 120° apart.
- Note down mean value.

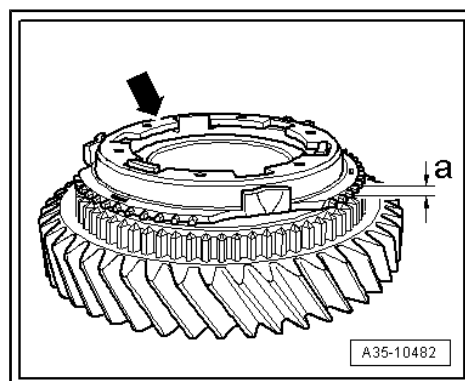
Wear limit: dimension -a-	
1st, 2nd and 3rd gear	0.4 mm



Checking wear on outer friction surface of 1st, 2nd and 3rd gear outer ring

- Check inner friction surface of synchro-ring -arrow- for grooves or radial scoring and renew if necessary.
- Place inner ring, outer ring and synchro-ring onto cone of inner ring.
- Press down and simultaneously rotate synchro-ring with outer ring to achieve proper seating.
- Measure gap -a- with feeler gauge at 3 points spaced 120° apart.
- Note down mean value.

Wear limit: dimension -a-	
1st, 2nd and 3rd gear	0.8 mm



- Install 2nd speed selector gear with needle bearing.

Installing outer ring, inner ring and synchro-ring of 2nd gear

- Place inner ring -A- on 2nd speed selector gear.

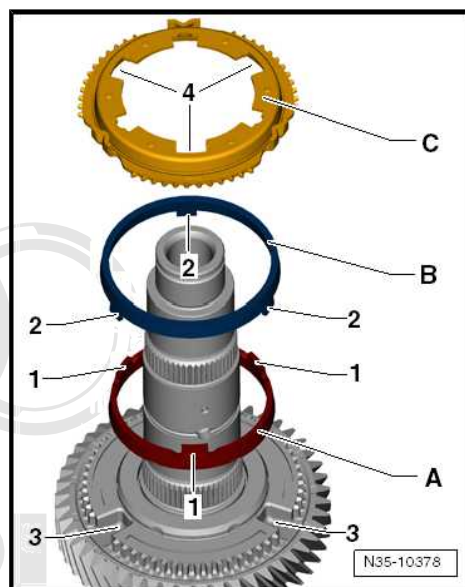
Lugs -1- face away from selector gear.

- Fit outer ring -B-.

Lugs -2- engage in slots -3- in selector gear.

- Fit synchro-ring -C-.

Larger recesses -4- engage on lugs -1- on inner ring -A-.



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Dismantling and assembling 1st/2nd gear and 3rd/4th gear locking collar/synchro-hub

- 1 - Spring
 - 2 - Locking piece
 - 3 - Locking collar
 - 4 - Synchro-hub
- Slide locking collar over synchro-hub.

On 3rd and 4th gear the wider collar of the synchro-hub and the shoulder on the locking collar face in the same direction.

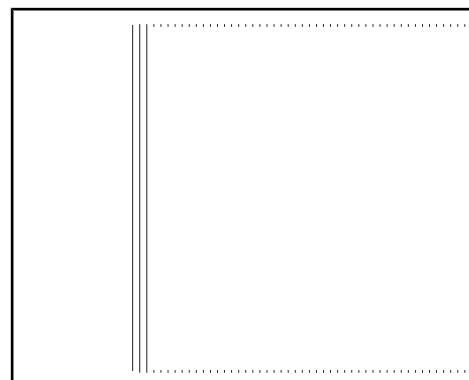
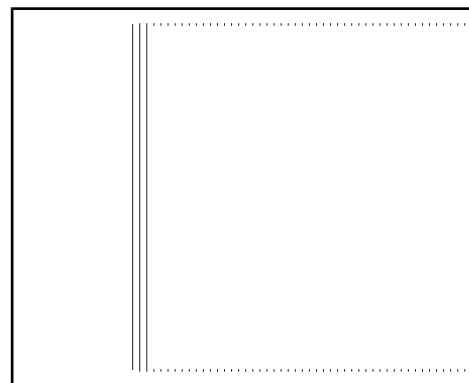
Recesses for locking pieces in synchro-hub and locking collar **must align**.

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Assembling 1st/2nd gear and 3rd/4th gear locking collar/synchro-hub

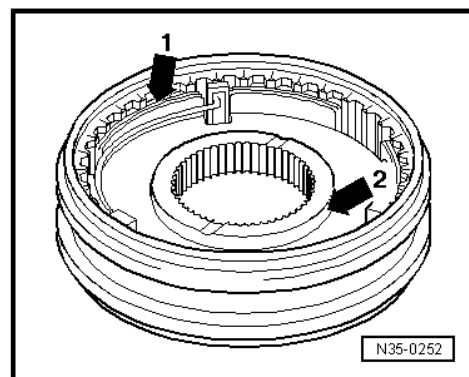
Locking collar is pushed over synchro-hub.

- Insert locking pieces and install springs offset at 120°. Angled end of spring must locate in hollow locking piece.



Installation position of 1st and 2nd gear locking collar/synchro-hub

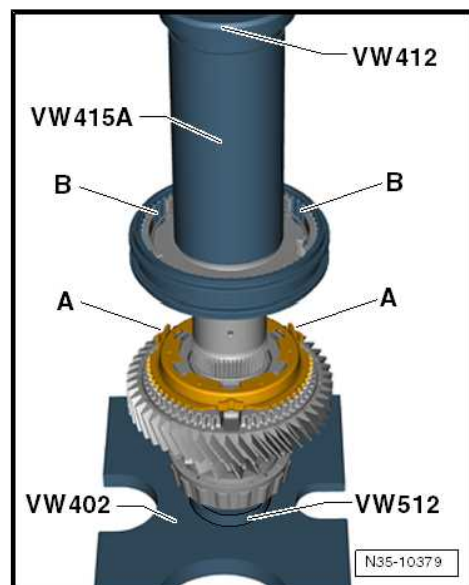
Identification groove -arrow 1- and narrow shoulder -arrow 2- on synchro-hub point towards 1st gear.



Heat 1st and 2nd gear locking collar/synchro-hub and press on

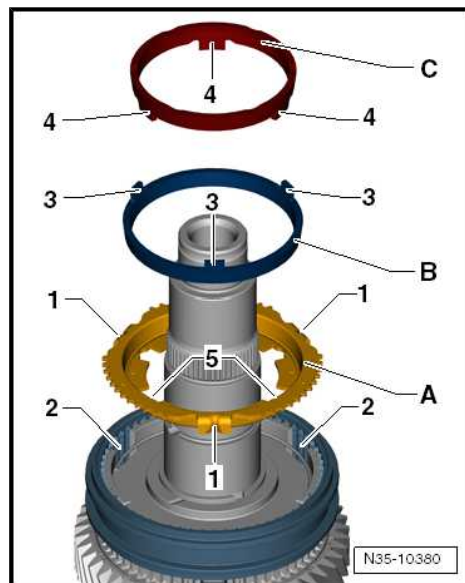
Lugs -A- on synchro-ring engage in recesses -B- in synchro-hub.

- Fit circlip.



Installing synchro-ring, outer ring and inner ring for 1st gear

- Fit synchro-ring -A- in 1st and 2nd gear synchro-hub.
- Lugs -1- engage in slots -2- in synchro-hub.
- Fit outer ring -B- in synchro-ring.
- Lugs -3- face away from synchro-ring.
- Fit inner ring -C- in outer ring.
- Lugs -4- engage in larger recesses -5- on synchro-ring -A-.



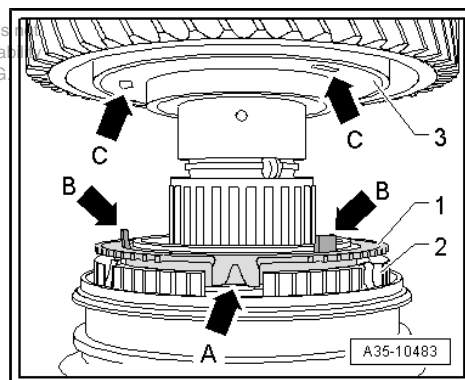
Installing 1st speed selector gear with needle bearing

- Lugs -arrow A- on synchro-ring -1- are located in recesses in synchro-hub -2-.

Lugs -arrows B- on outer ring engage in recesses -arrows C- in selector gear -3-.

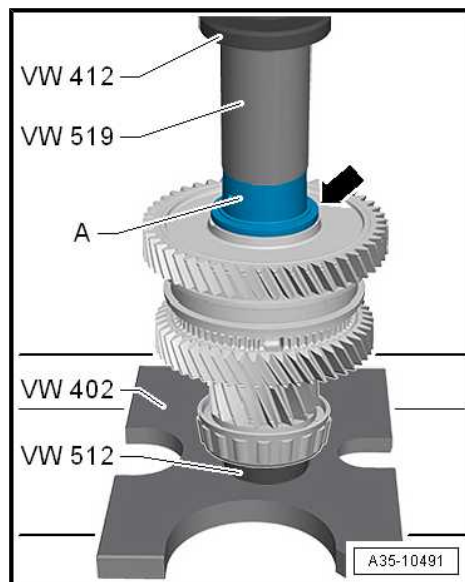
Gearboxes without reinforcements

- Fit thrust washers for 1st and 4th gear ➔ [Item 19 \(page 69\)](#) and retaining ring ➔ [Item 20 \(page 69\)](#) in output shaft.
- Install 4th speed selector gear with needle bearing.



Pressing on collared sleeve -A- as far as stop on gearboxes with reinforcements

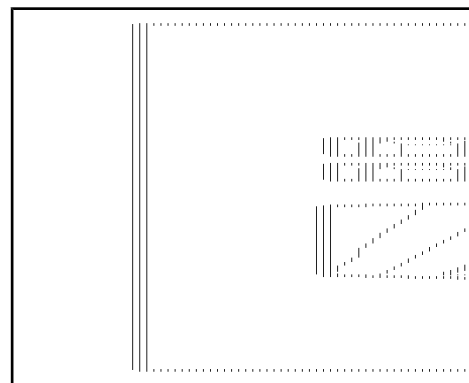
- Installation position of collared sleeve -A-: Collar -arrow- faces 1st speed selector gear.
- Then install 4th speed selector gear with needle bearing.



Checking 4th gear synchro-ring for wear

- Press synchro-ring onto cone of selector gear and measure gap dimension -a- with feeler gauge.

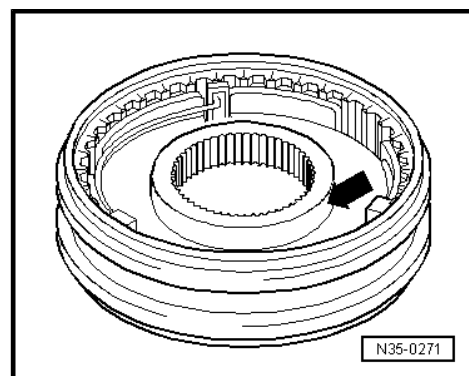
Gap -a-	Installation depth	Wear limit
4th gear	1.3...2.4 mm	0.8 mm



Installation position of 3rd and 4th gear locking collar/synchro-hub

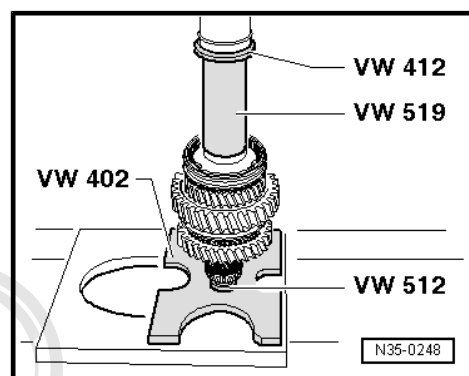
The wider shoulder on the synchro-hub -arrow- faces towards 3rd gear.

- Fit 4th gear synchro-ring on 4th speed selector gear.



Heat and press on 3rd and 4th gear synchro-hub with locking collar

- Turn 4th gear synchro-ring so that grooves align with locking pieces.
- Fit circlip.



Installing synchro-ring, outer ring and inner ring for 3rd gear

- Fit synchro-ring -A- in 3rd and 4th gear synchro-hub.

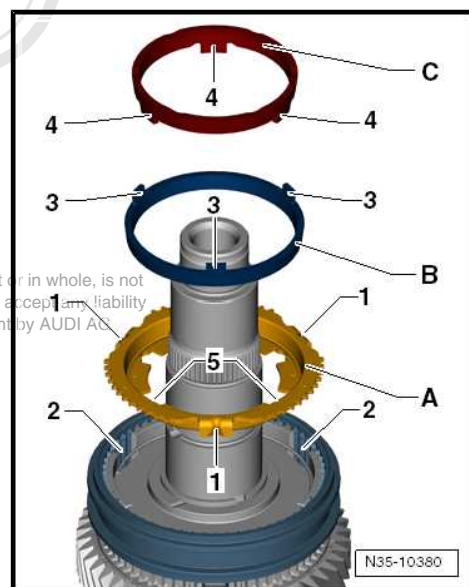
Lugs -1- engage in slots -2- in synchro-hub.

- Fit outer ring -B- in synchro-ring.

Lugs -3- face away from synchro-ring.

- Fit inner ring -C- in outer ring.

Lugs -4- engage in larger recesses -5- on synchro-ring -A-.



Installing 3rd speed selector gear with needle bearing

- Lugs -arrow A- on synchro-ring -1- are located in recesses in synchro-hub -2-.

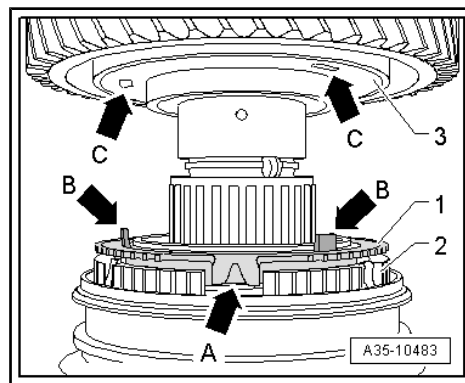
Lugs -arrows B- on outer ring engage in recesses -arrows C- in selector gear -3-.

- Install 3rd speed selector gear with needle bearing.



Note

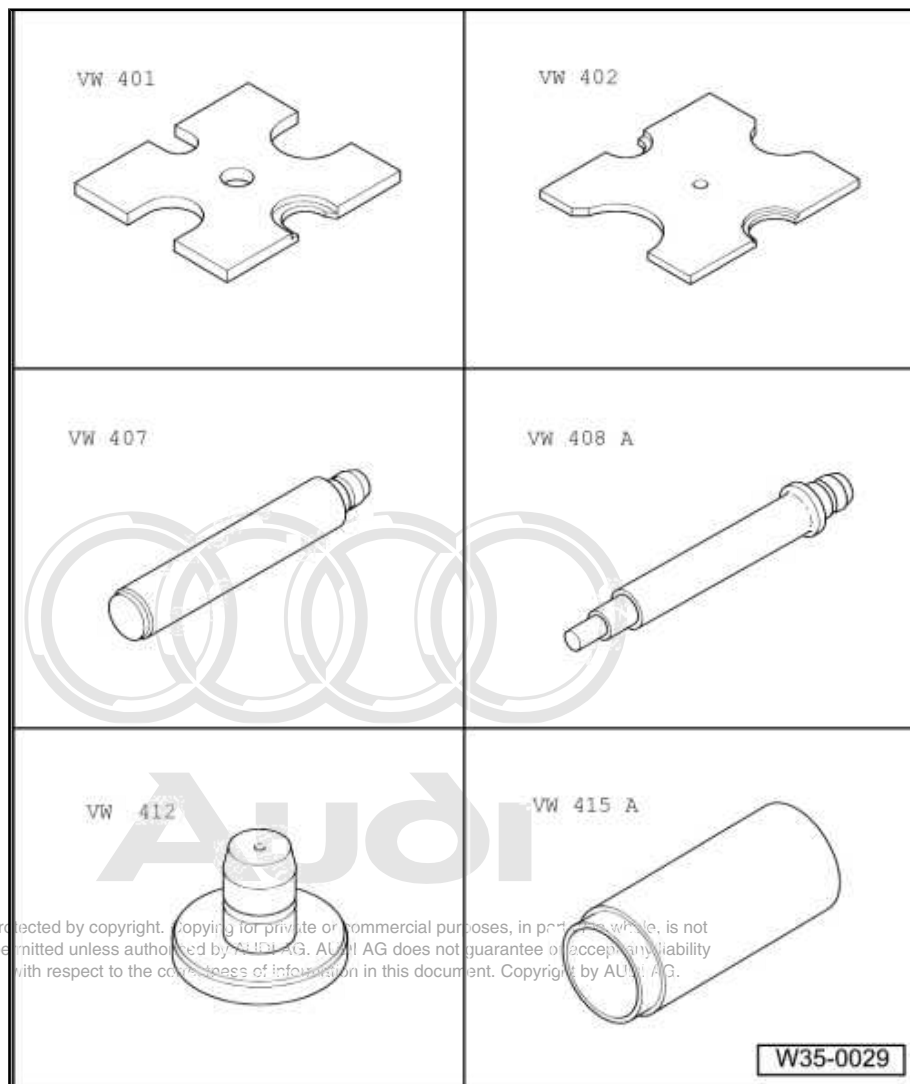
- ◆ Pressing on tapered roller bearing inner race ➔ [page 80](#)
- ◆ Determining thickness of circlip for tapered roller bearing inner race ➔ [page 80](#)



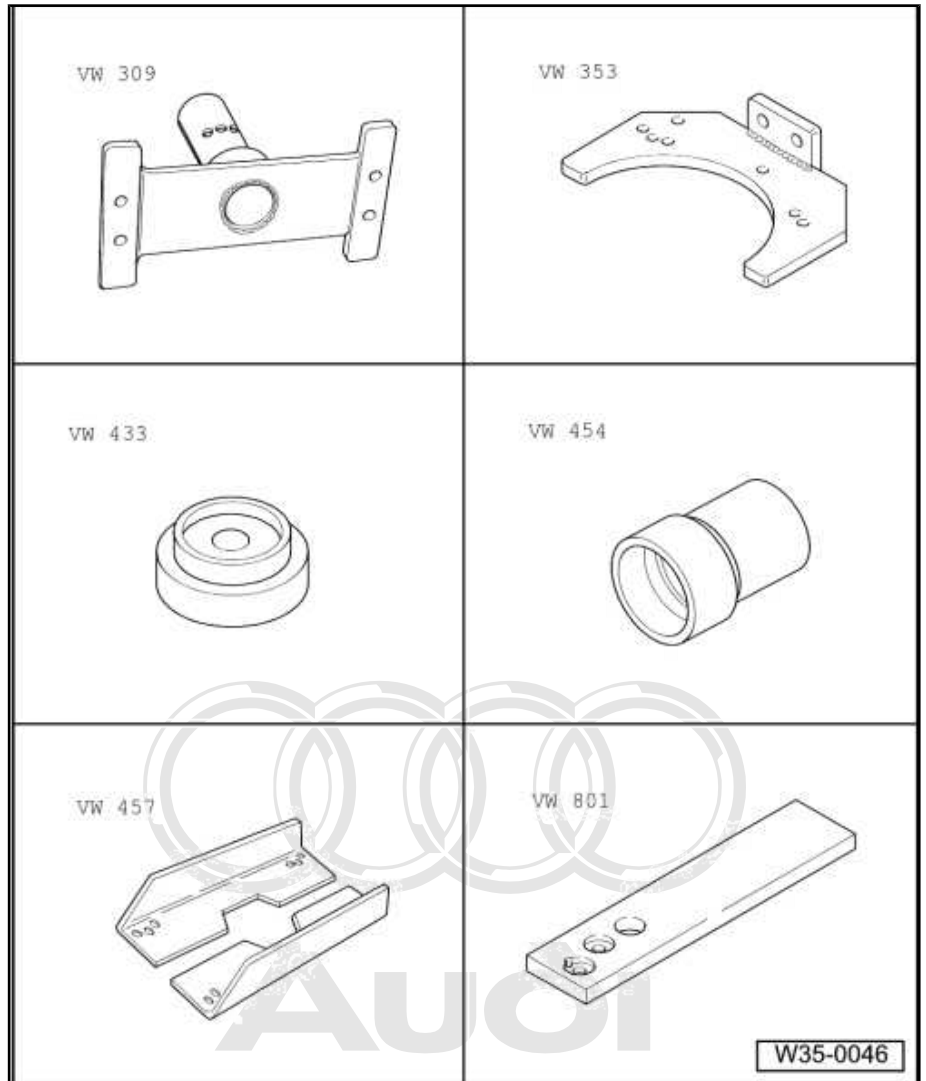
2.2.2 Dismantling and assembling output shaft for 5th, 6th and reverse gear

Special tools and workshop equipment required

- ◆ Thrust plate - VW 401-
- ◆ Thrust plate - VW 402-
- ◆ Press tool - VW 407-
- ◆ Press tool - VW 408 A-
- ◆ Press tool - VW 412-
- ◆ Tube - VW 415 A-

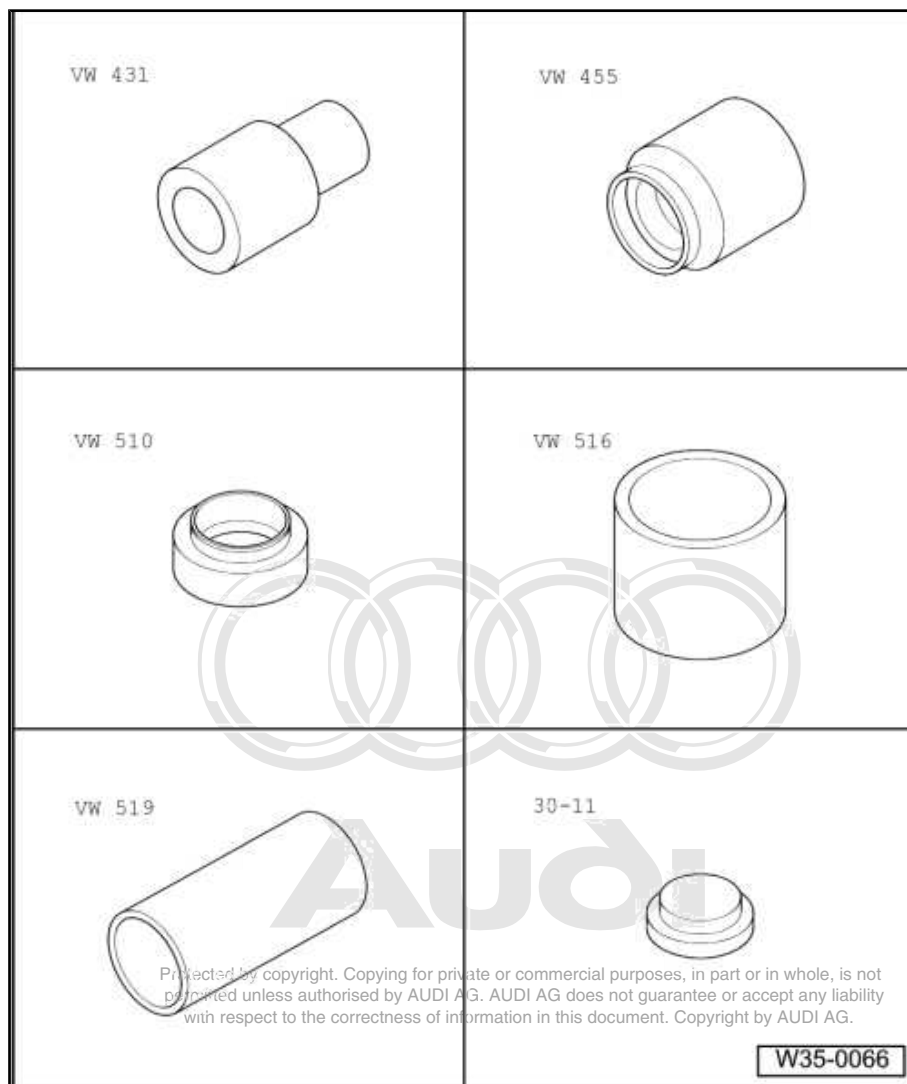


- ◆ Support plate - VW 309-
- ◆ Gearbox support - VW 353-
- ◆ Press tool - VW 433-
- ◆ Press tool - VW 454-
- ◆ Support rails - VW 457-
- ◆ Support plate - VW 801-

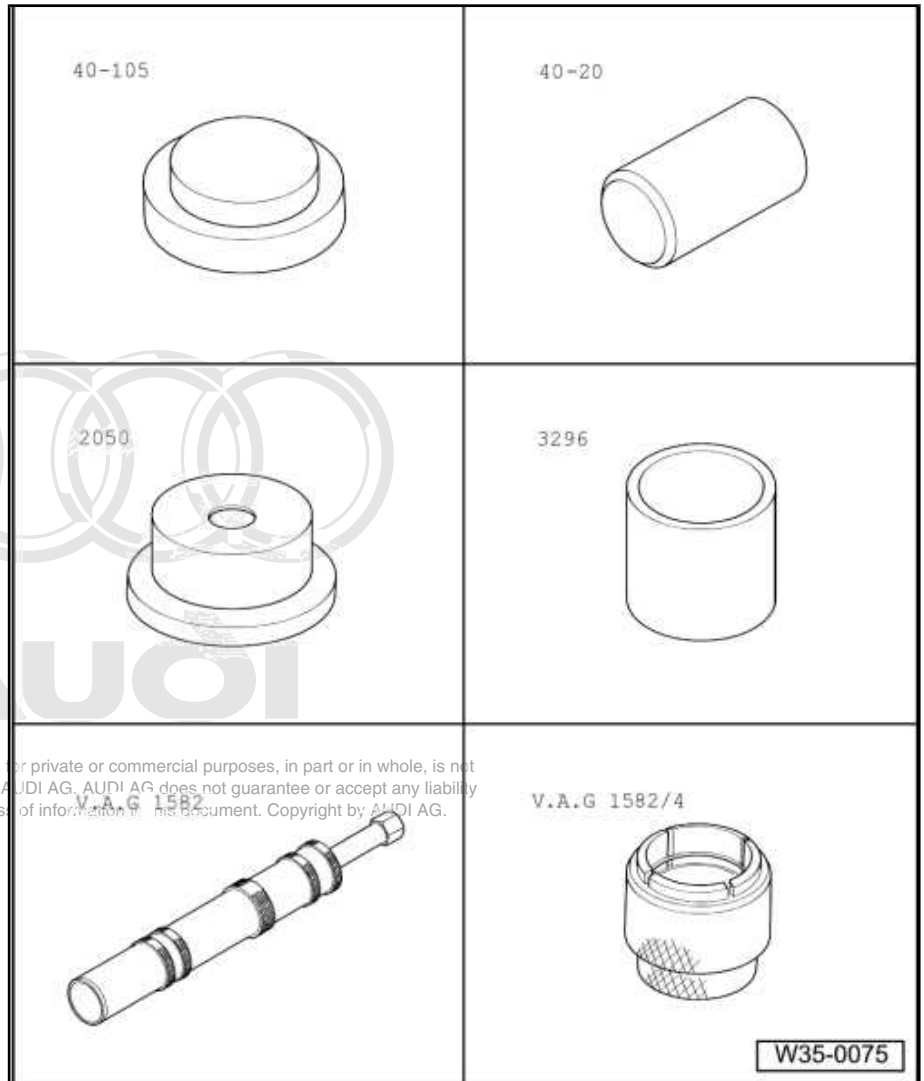


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- ◆ Thrust piece - VW 431-
- ◆ Installing sleeve - VW 455-
- ◆ Thrust pad - VW 510-
- ◆ Tube - VW 516-
- ◆ Tube - VW 519-
- ◆ Thrust plate - 30 - 11-

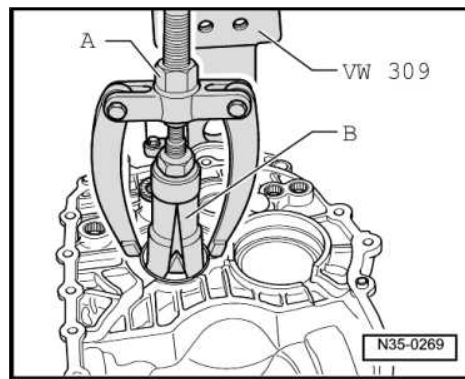
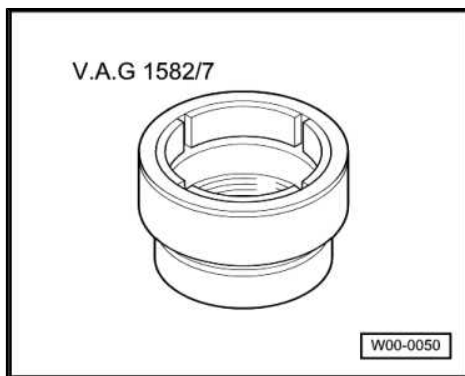


- ◆ Thrust plate - 40 - 105-
- ◆ Drift sleeve - 40 - 20-
- ◆ Thrust piece - 2050-
- ◆ Tube - 3296-
- ◆ Tapered roller bearing puller - V.A.G 1582-
- ◆ Adapter - V.A.G 1582/4-

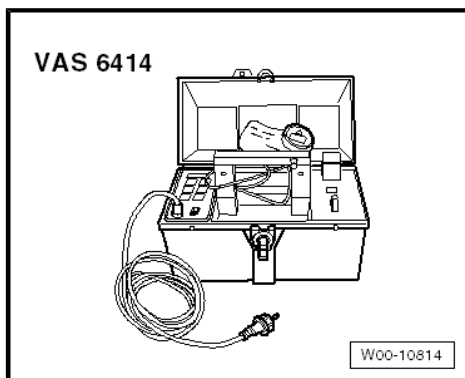


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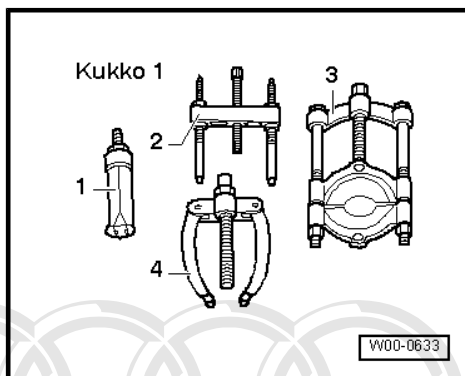
- ◆ Adapter - V.A.G 1582/7-



- ◆ Inductive heater - VAS 6414-



- ◆ -1- Internal puller - Kukko 21/7-



- ◆ -3- Splitter - Kukko 17/2-

- ◆ -4- Counter-support - Kukko 22/2-

Pulling tapered roller bearing outer race out of gearbox housing

A - Counter-support , e.g. -Kukko 22/2-

B - Internal puller 46 58 mm , e.g. -Kukko 21/7-

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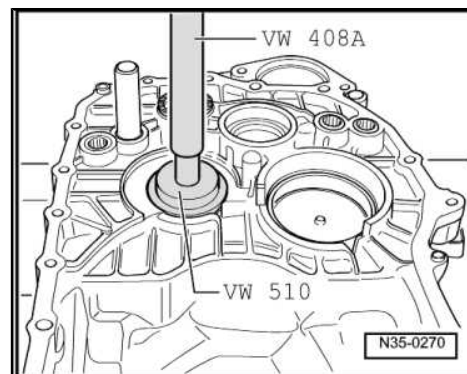


Note

After pulling out, check shim ➔ [Item 2 \(page 72\)](#) for damage and renew if necessary.

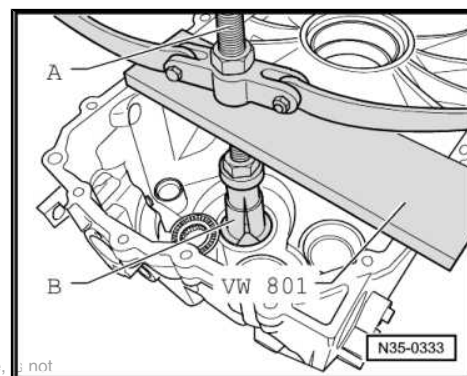
Pressing tapered roller bearing outer race into clutch housing

- Fit shim ➔ [Item 2 \(page 72\)](#) below outer race.
- Support clutch housing with drift sleeve - 40 - 20- directly below bearing mounting.



Pulling tapered roller bearing outer race out of gearbox housing

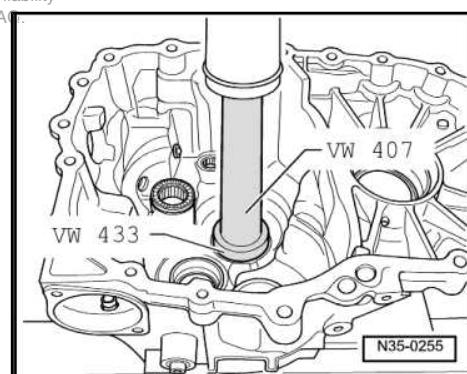
- A - Counter-support , e.g. -Kukko 22/2-
- B - Internal puller 46 ... 58 mm , e.g. -Kukko 21/7-



Pressing tapered roller bearing outer race into gearbox housing

- Support gearbox housing with thrust piece - 2050- directly below bearing mounting.

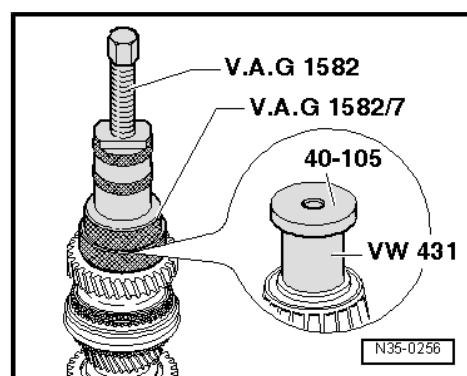
Dismantling output shaft



Pulling off tapered roller bearing inner race on gearbox housing end

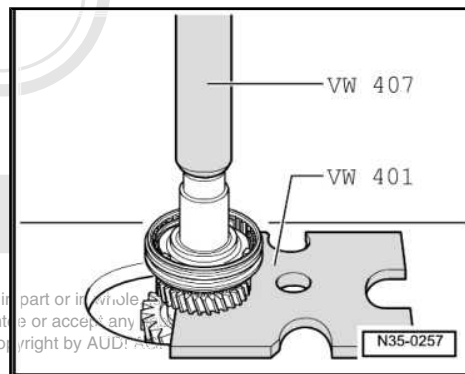
Before applying bearing puller , note the following:

- Remove circlip for tapered roller bearing inner race on gearbox housing end.
- Place thrust piece - VW 431- and thrust plate - 40 - 105- on output shaft.



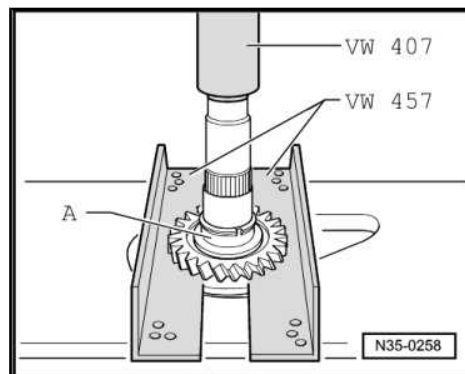
Pressing off 5th and 6th gear synchro-hub/locking collar with 6th speed selector gear

- First remove circlip.



Pressing off sleeve -A- together with reverse selector gear

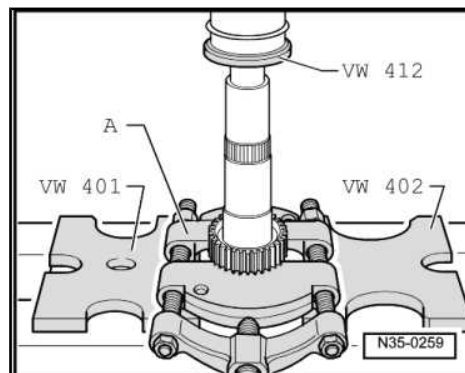
- First remove circlip.



Pressing off reverse gear synchro-hub

- First remove circlip.

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



Pulling off tapered roller bearing inner race on clutch housing end

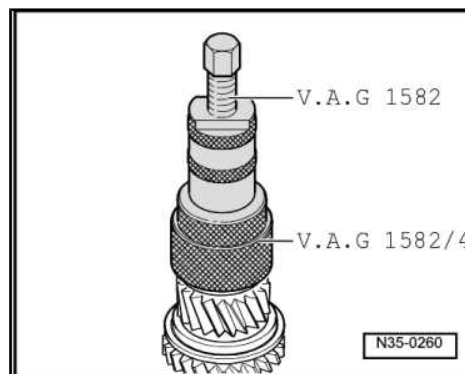
- Before applying puller, place thrust plate - 30 - 11- on output shaft.

Assembling output shaft



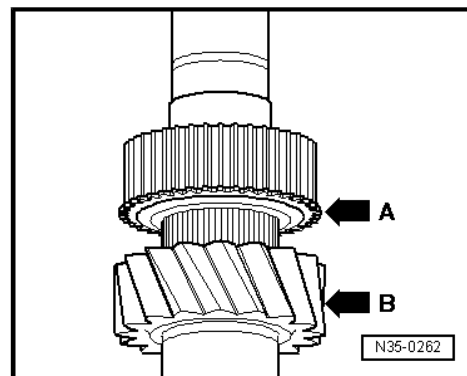
Note

Use inductive heater - VAS 6414- to heat tapered roller bearing inner races and synchro-hub to approx. 100°C before installing. Press home onto stop when installing so there is no axial clearance.



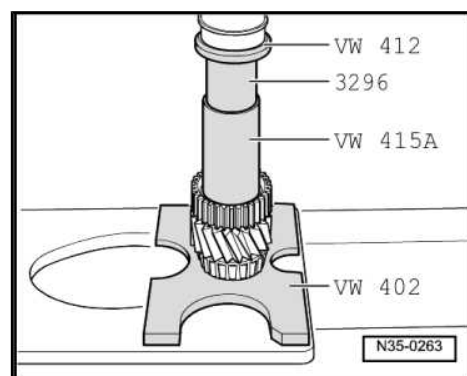
Installation position of reverse gear synchro-hub

Stop -arrow A- for reverse gear locking collar faces towards gear teeth on output shaft -arrow B-.



Heating and pressing on reverse gear synchro-hub

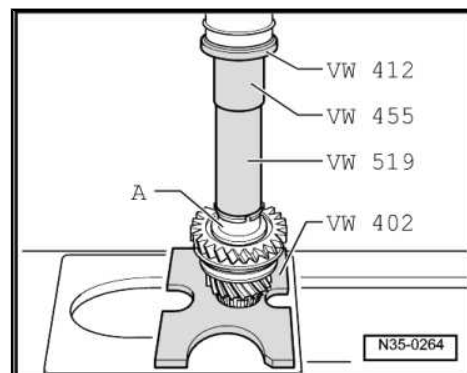
- Fit circlip.
- Fit reverse gear locking collar on reverse gear synchro-hub.
- Install reverse selector gear with needle bearing.



Pressing on sleeve -A-

Installation position: Wide shoulder faces towards reverse selector gear

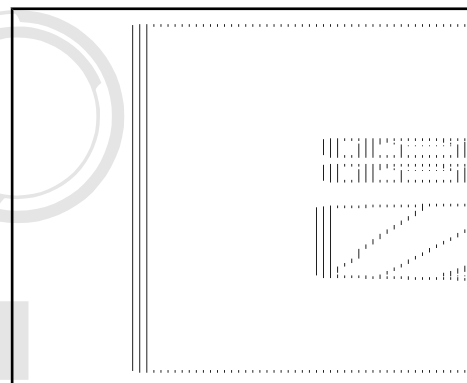
- Fit circlip.



Checking 5th and 6th gear synchro-ring for wear

- Press synchro-ring onto cone of selector gear and measure gap dimension -a- with feeler gauge.

Gap -a-	Installation depth	Wear limit
5th and 6th gear	1.0...1.7 mm	0.5 mm



Dismantling and assembling 5th and 6th gear locking collar and synchro-hub

- 1 - Spring
 - 2 - Locking piece
 - 3 - Locking collar
 - 4 - Synchro-hub
- Slide locking collar over synchro-hub.

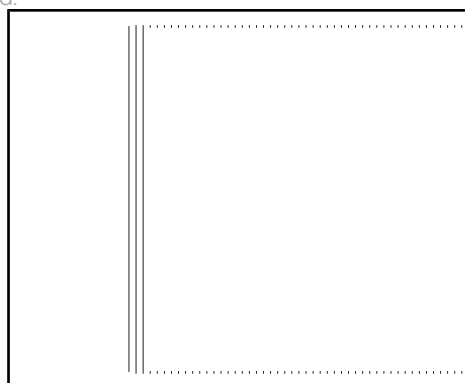
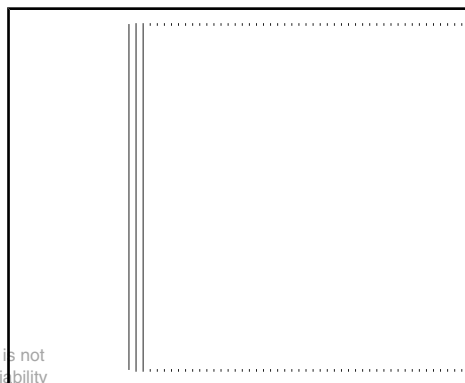
Recesses for locking pieces in synchro-hub and locking collar must align.

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Assembling 5th and 6th gear locking collar/synchro-hub

Locking collar is pushed over synchro-hub.

- Insert locking pieces and install springs offset at 120°. Angled end of spring must locate in hollow locking piece.
- Install 6th speed selector gear with needle bearing.
- Fit 6th gear synchro-ring.

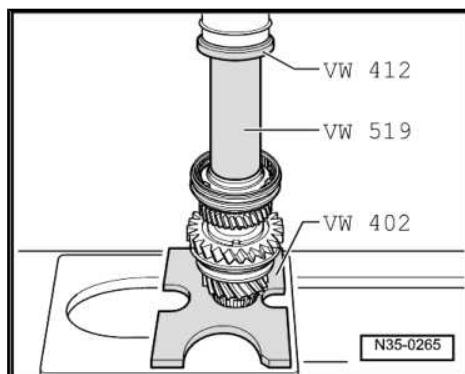


Pressing on 5th and 6th gear locking collar/synchro-hub

On some versions the outer diameter of the locking collar is chamfered.

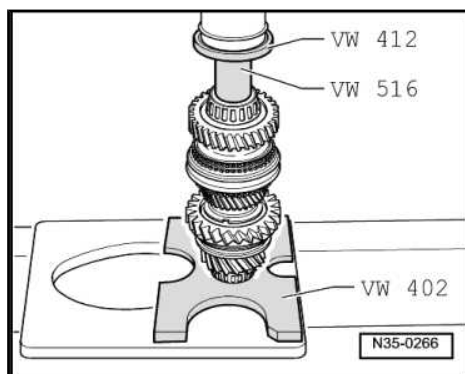
Installation position: Chamfer on outer diameter of locking collar faces towards 5th speed selector gear.

- Turn synchro-ring so that grooves align with locking pieces.
- Fit circlip.
- Fit 5th gear synchro-ring.
- Install 5th speed selector gear with needle bearing.



Pressing on tapered roller bearing inner race on gearbox housing end

- Determine thickness of required circlip ➔ [page 95](#) and install circlip.

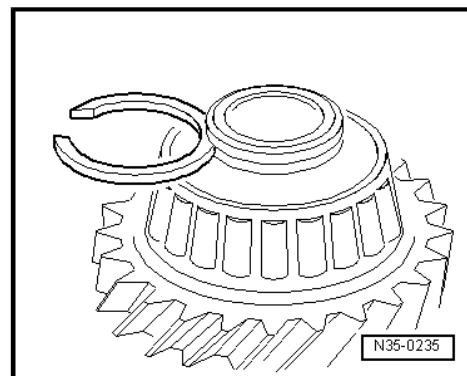


Determining thickness of circlip

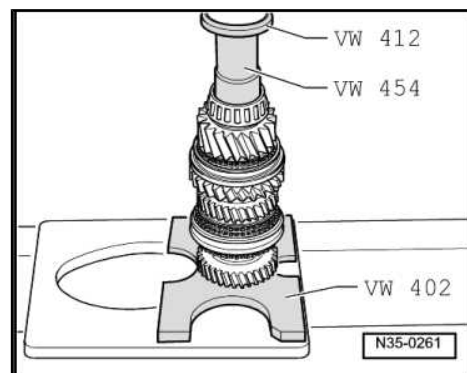
- Determine the thickest circlip that will just fit and install it.
- Select circlip from table. For part number, refer to ⇒ Electronic parts catalogue .

Circlips available

Thickness (mm)		
1.79	1.89	1.98
1.83	1.92	
1.86	1.95	



Pressing on tapered roller bearing inner race on clutch housing end



2.3 Adjusting output shaft

⇒ [“2.3.1 Adjusting output shaft for 1st - 4th gear”, page 95](#)

⇒ [“2.3.2 Adjusting output shaft for 5th, 6th and reverse gear”, page 100](#)

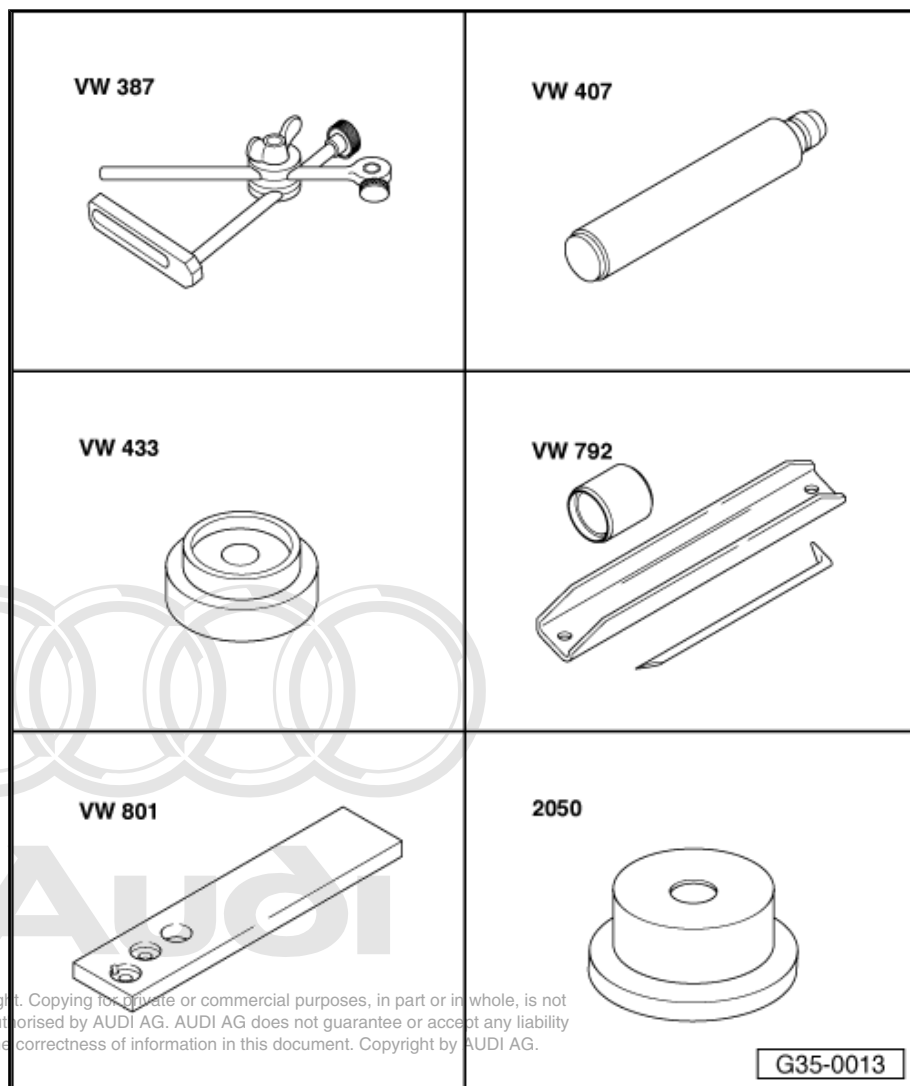
2.3.1 Adjusting output shaft for 1st - 4th gear

(Determining thickness of output shaft shim)

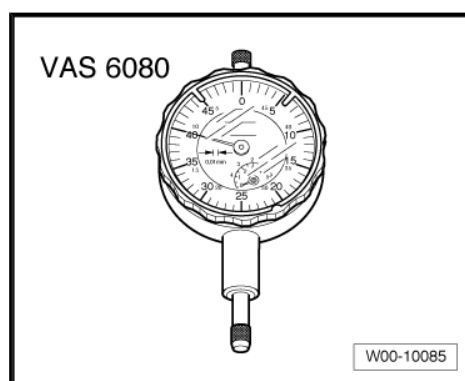
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Special tools and workshop equipment required

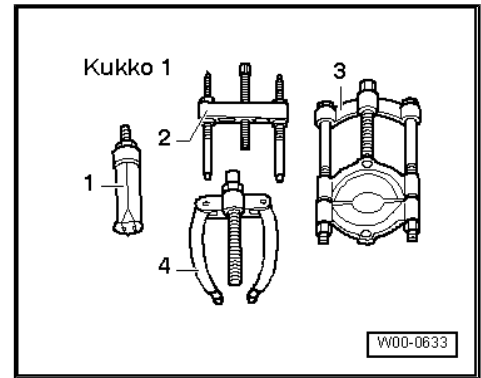
- ◆ Universal dial gauge bracket - VW 387-
- ◆ Press tool - VW 407-
- ◆ Press tool - VW 433-
- ◆ Assembly device - VW 792-
- ◆ Support plate - VW 801-
- ◆ Thrust piece - 2050-



- ◆ Dial gauge - VAS 6080-



◆ -1- Internal puller - Kukko 21/7-



◆ -4- Counter-support - Kukko 22/2-

Re-adjustment of the output shaft is required if the following components have been renewed:

- ◆ Gearbox housing
- ◆ Clutch housing
- ◆ Output shaft for 1st - 4th gear, or
- ◆ Tapered roller bearings for output shaft

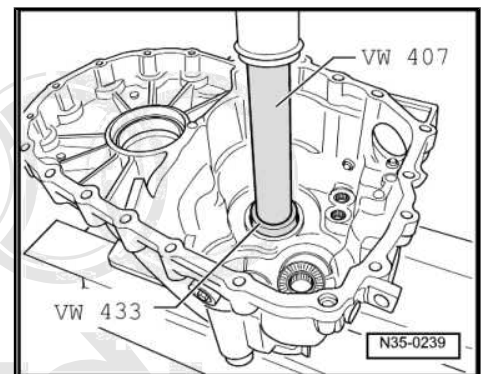
Table of adjustments ➔ [page 115](#)

Requirements:

- Gearbox secured to assembly stand ➔ [page 18](#) .
- Sealing surfaces of clutch and gearbox housings must be free of sealant.
- When taking measurements, install only the shaft to be measured.

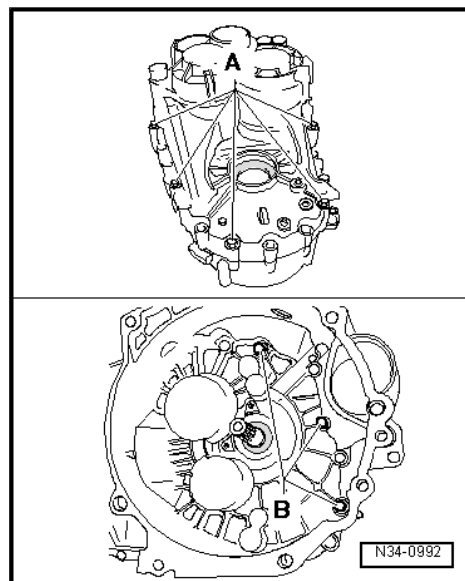
Procedure:

- Press tapered roller bearing outer race with shim (thickness 1.70 mm) into gearbox housing. Support gearbox housing with thrust piece - 2050- directly below bearing mounting.
- Fit complete 1st to 4th gear output shaft into clutch housing.



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- Fit gearbox housing and tighten bolts -A- and -B- diagonally to correct torque ⇒ [Item 11 \(page 24\)](#) .



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- Attach measuring tools and secure with bolt -arrow- to clutch housing.
- Set dial gauge e.g. -VAS 6080- (3 mm measuring range) to “0” with 1 mm preload.
- Loosen clutch housing/gearbox housing securing bolts diagonally until output shaft is free to move in gearbox housing.
- Read off play on gauge and note reading (example: 0.14 mm).

 Note

- ◆ *If no reading is shown when clutch housing/gearbox housing securing bolts are loosened:*
- ◆ *Install 1.95 mm shim or, if necessary, 2.20 mm shim in place of 1.70 mm shim for measurement.*
- ◆ *Select correct shims from ⇒ Electronic parts catalogue .*

Determining thickness of required shim:

The specified bearing preload is obtained as follows:

The measured value (0.14 mm) is subtracted from the thickness of the shim previously installed (1.70 mm).

A constant preload value (0.20 mm) is added to the result.

Example:

Inserted shim	1.70 mm
– Measured value	0.14 mm
+ Preload (constant value)	0.20 mm
Thickness of shim	1.76 mm

- Select shim of required thickness from table; for part number, refer to ⇒ Electronic parts catalogue .

The following shims are available:

Thickness of shims in mm ¹⁾			
1.45	1.70	1.95	2.20
1.50	1.75	2.00	2.25
1.55	1.80	2.05	
1.60	1.85	2.10	
1.65	1.90	2.15	

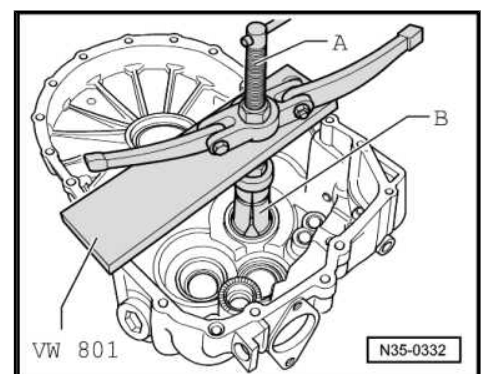
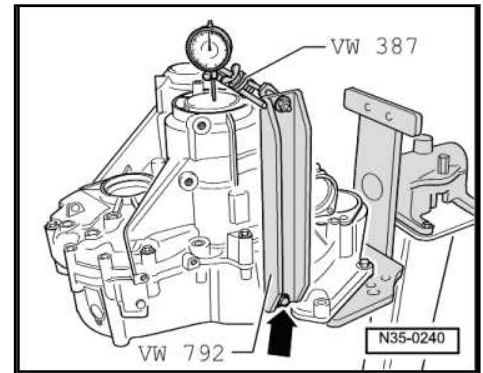
1) Tolerance variations make it possible to obtain the exact shim thickness required.

- Detach gearbox housing and pull tapered roller bearing outer race out of gearbox housing.

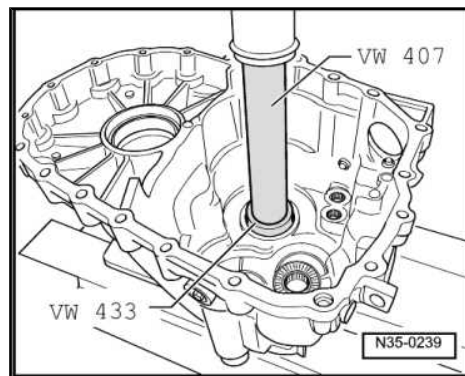
A - Counter-support , e.g. -Kukko 22/2-

B - Internal puller 46 ... 58 mm , e.g. -Kukko 21/7-

- Remove inserted shim (1.70 mm thick) from gearbox housing.

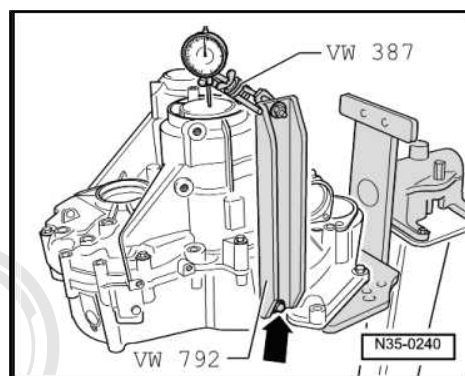


- Press in tapered roller bearing outer race together with the correct shim (in example 1.75 mm). Support gearbox housing with thrust piece - 2050- directly below bearing mounting.



Check adjustment.

- Required shim installed (thickness as determined above)
- Attach measuring tools and secure with bolt -arrow- to clutch housing.
- Set dial gauge e.g. -VAS 6080- (3 mm measuring range) to "0" with 1 mm preload.
- Loosen clutch housing/gearbox housing securing bolts diagonally until output shaft is free to move in gearbox housing.
- If the correct shim has been selected, the dial gauge should now indicate a value of 0.15 ... 0.25 mm.



2.3.2 Adjusting output shaft for 5th, 6th and reverse gear

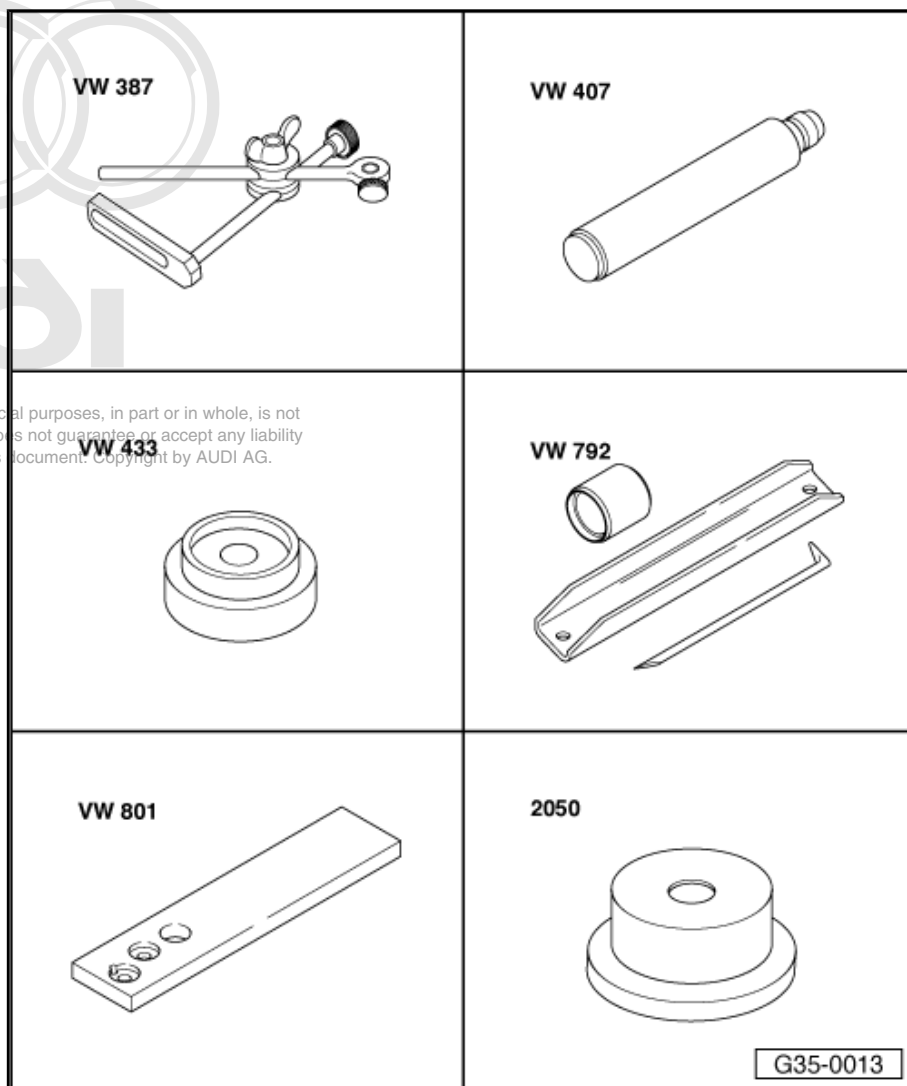
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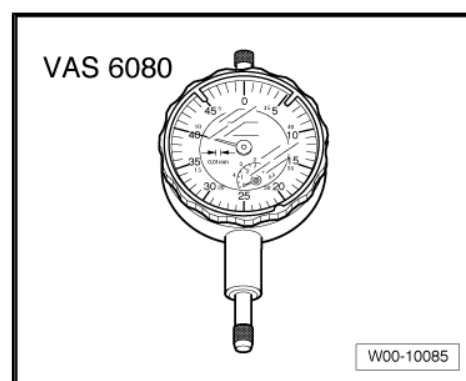
Special tools and workshop equipment required

- ◆ Universal dial gauge bracket - VW 387-
- ◆ Press tool - VW 407-
- ◆ Press tool - VW 433-
- ◆ Assembly device - VW 792-
- ◆ Support plate - VW 801-
- ◆ Thrust piece - 2050-

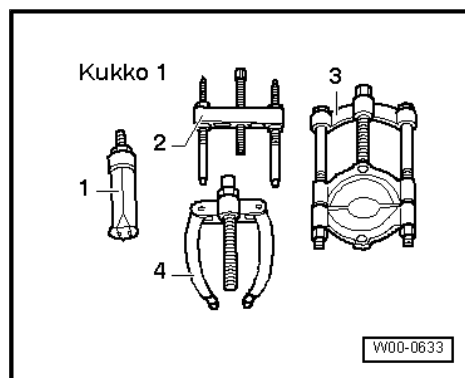
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- ◆ Dial gauge - VAS 6080-



◆ -1- Internal puller - Kukko 21/7-



◆ -4- Counter-support - Kukko 22/2-

Re-adjustment of the output shaft is required if the following components have been renewed:

- ◆ Gearbox housing
- ◆ Clutch housing
- ◆ Output shaft for 5th, 6th and reverse gear or
- ◆ Tapered roller bearings for output shaft

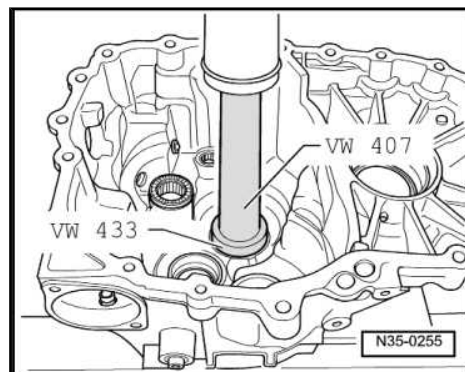
Table of adjustments ➤ [page 115](#)

Requirements:

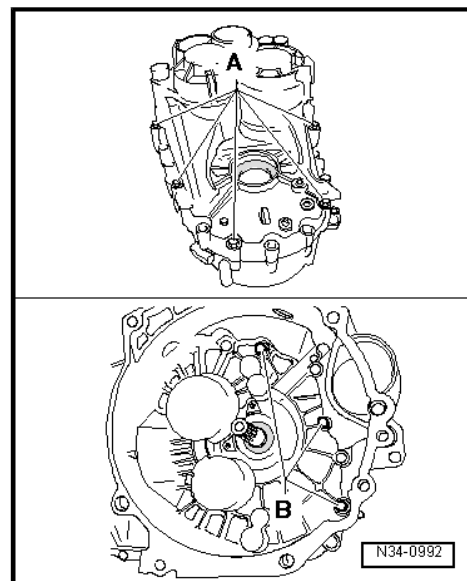
- Gearbox secured to assembly stand ➤ [page 18](#) .
- Sealing surfaces of clutch and gearbox housings must be free of sealant.
- When taking measurements, install only the shaft to be measured.

Procedure:

- Press tapered roller bearing outer race with shim (thickness 1.70 mm) into gearbox housing. Support gearbox housing with thrust piece - 2050- directly below bearing mounting.
- Insert complete 5th, 6th and reverse gear output shaft in clutch housing.



- Fit gearbox housing and tighten bolts -A- and -B- diagonally to correct torque ⇒ [Item 11 \(page 24\)](#) .



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- Set up measuring tools.
- Put washers of a total thickness of 8 mm on bolt -arrow- securing assembly device - VW 792- to clutch housing.
- Set dial gauge (3 mm measuring range) to "0" with 1 mm preload.
- Loosen clutch housing/gearbox housing securing bolts diagonally until output shaft is free to move in gearbox housing.
- Read off play on gauge and note reading (example: 0.25 mm).



Note

- ♦ If no reading is shown when clutch housing/gearbox housing securing bolts are loosened:
- ♦ Install 1.95 mm shim or, if necessary, 2.20 mm shim in place of 1.70 mm shim for measurement.
- ♦ Select correct shims from ⇒ Electronic parts catalogue .

Determining thickness of required shim:

The specified bearing preload is obtained as follows:

The measured value (0.25 mm) is subtracted from the thickness of the shim previously installed (1.70 mm).

A constant preload value (0.20 mm) is added to the result.

Example:

Inserted shim	1.70 mm
– Measured value	0.25 mm
+ Preload (constant value)	0.20 mm
Thickness of shim	1.65 mm

- Select shim of required thickness from table; for part number, refer to ⇒ Electronic parts catalogue .

The following shims are available:

Thickness of shims in mm ²⁾			
1.50	1.70	1.90	2.10
1.55	1.75	1.95	2.15
1.60	1.80	2.00	2.20
1.65	1.85	2.05	2.25

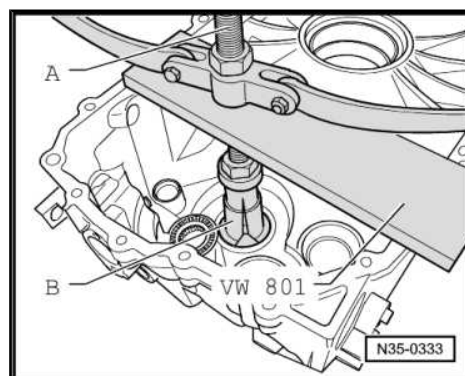
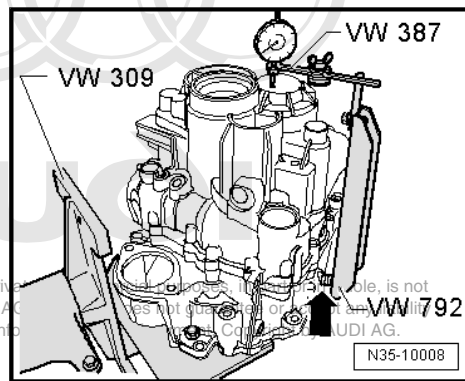
2) Tolerance variations make it possible to obtain the exact shim thickness required.

- Detach gearbox housing and pull tapered roller bearing outer race out of gearbox housing.

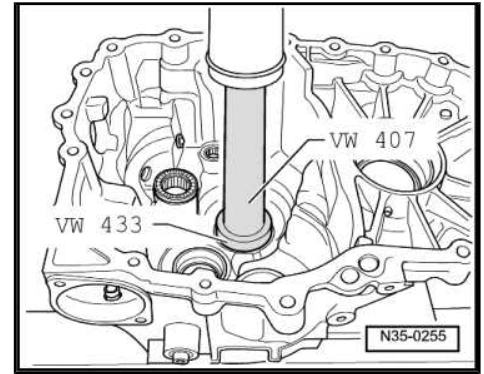
A - Counter-support , e.g. -Kukko 22/2-

B - Internal puller 46 ... 58 mm , e.g. -Kukko 21/7-

- Remove inserted shim (1.70 mm thick) from gearbox housing.

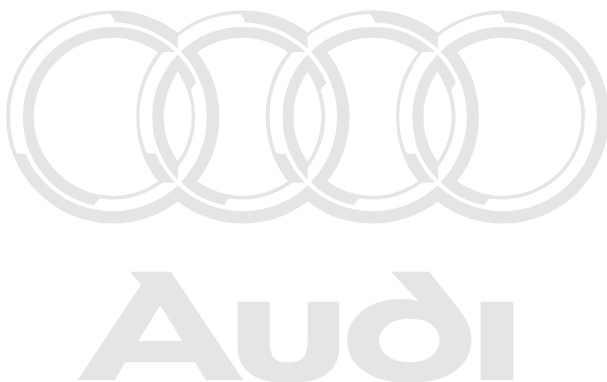
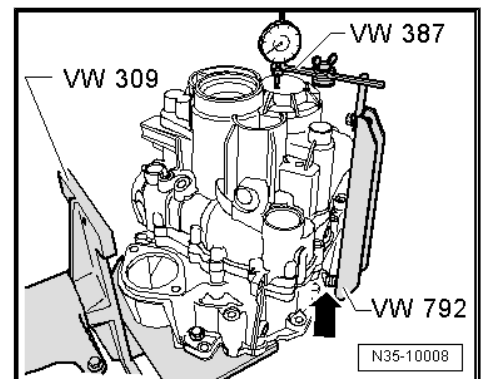


- Press in tapered roller bearing outer race together with the correct shim (in example 1.65 mm). Support gearbox housing with thrust piece - 2050- directly below bearing mounting.



Check adjustment.

- Required shim installed (thickness as determined above)
- Set up measuring tools.
- Put washers of a total thickness of 8 mm on bolt -arrow- securing assembly device - VW 792- to clutch housing.
- Set dial gauge e.g. -VAS 6080- (3 mm measuring range) to »0« with 1 mm preload.
- Loosen clutch housing/gearbox housing securing bolts diagonally until output shaft is free to move in gearbox housing.
- If the correct shim has been selected, the dial gauge should now indicate a value of 0.15 ... 0.25 mm.



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39 – Final drive - differential

1 Oil seals

⇒ "1.1 Overview of fitting locations - oil seals", page 106

⇒ "1.2 Renewing oil seal (left-side)", page 107

⇒ "1.3 Renewing oil seal (right-side)", page 109

1.1 Overview of fitting locations - oil seals

1 - Input shaft oil seal

- ☐ Renewing ⇒ [page 65](#)

2 - Oil seal

Front-wheel drive - for flange shaft (right-side)

- ☐ Renewing ⇒ [page 109](#)

Four-wheel drive - in gearbox, fitted between gearbox and bevel box

- ☐ Renewing ⇒ [page 113](#)
- ☐ Renewing flange shaft oil seal (right-side) with gearbox installed ⇒ 6-speed manual gearbox; Rep. gr. 39 ; Oil seals; Renewing oil seal (right-side)

3 - Bevel box

- ☐ Detaching with gearbox removed ⇒ [page 34](#)
- ☐ Fitting with gearbox removed ⇒ [page 46](#)
- ☐ Exploded view - bevel box ⇒ [page 137](#)

4 - Flange shaft oil seal (right-side)

Four-wheel drive - installed in bevel box (right-side)

- ☐ Renewing ⇒ [page 111](#)

5 - Flange shaft (right-side)

Four-wheel drive

- ☐ Removing and installing ⇒ [page 111](#)

6 - Seal

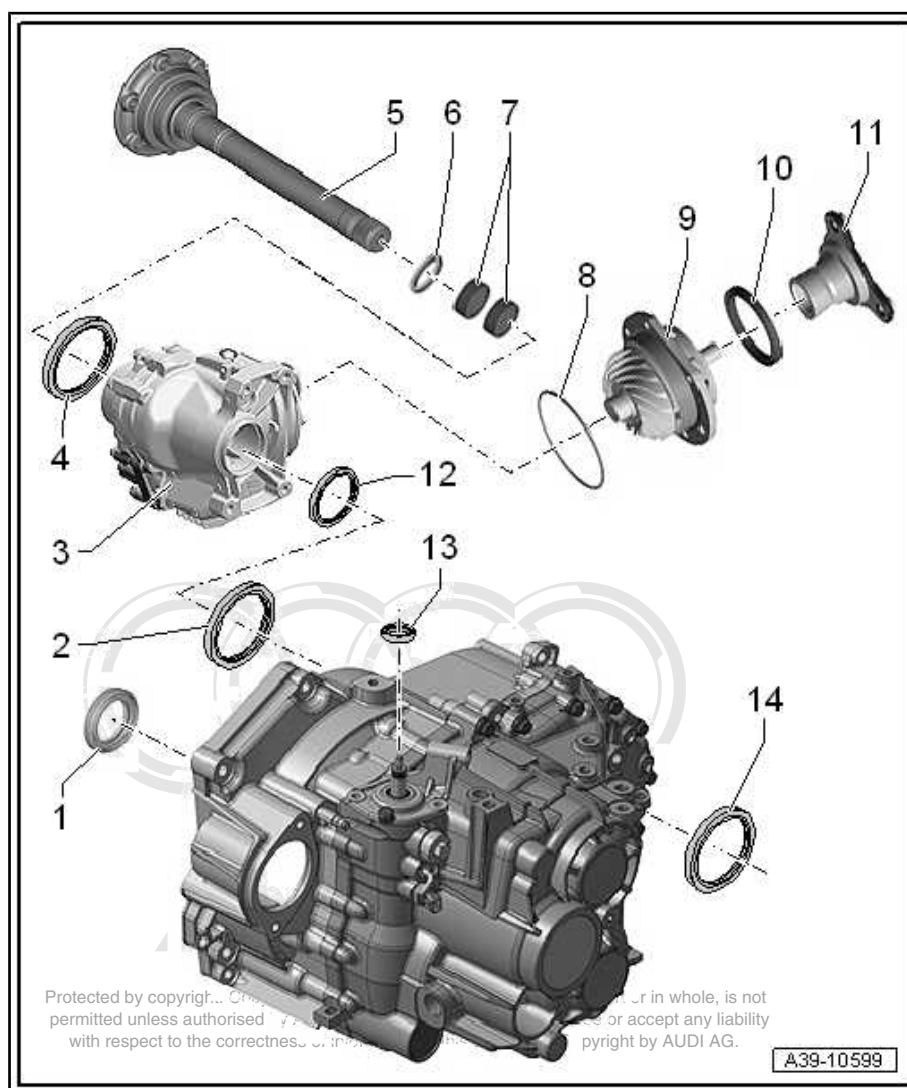
- ☐ Insert in annular groove in flange shaft (right-side)
- ☐ Remove needle bearings (polygon bearings) in order to renew

7 - Needle bearing (polygon bearing)

- ☐ Renewing ⇒ [page 158](#)

8 - O-ring

- ☐ To renew, unscrew securing bolts for pinion housing and carefully lever off pinion housing



9 - Pinion housing

10 - Oil seal for output flange

Bevel box "0CN"

- ☐ Renewing ➔ ["4.2.2 Renewing output flange oil seal on bevel box 0CN", page 143](#)

Bevel box "0AV"

- ☐ ➔ ["4.2.3 Renewing output flange oil seal on bevel box 0AV", page 151](#)

11 - Output flange on bevel box

12 - Oil seal

- ☐ Installed in bevel box between bevel box and gearbox
- ☐ Renewing (with bevel box removed) ➔ [page 141](#)

13 - Oil seal for selector shaft

- ☐ Renewing ➔ [Item 6 \(page 25\)](#)

14 - Flange shaft oil seal (left-side)

- ☐ Renewing ➔ [page 107](#)

1.2 Renewing oil seal (left-side)

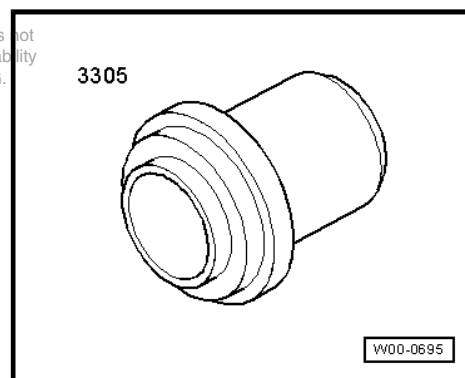
Renewing flange shaft oil seal (left-side) with gearbox installed ➔ 6-speed manual gearbox; Rep. gr. 39 ; Oil seals; Renewing oil seal (left-side)

The procedure for renewing the flange shaft oil seal (left-side) is identical for vehicles with four-wheel drive and vehicles with front-wheel drive.

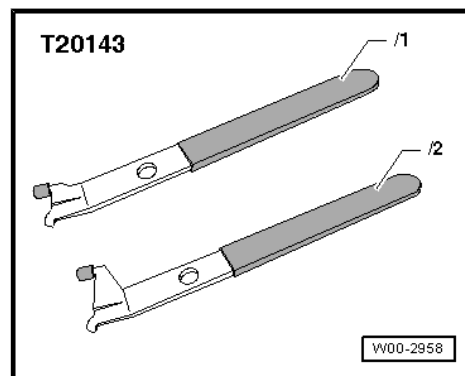
Special tools and workshop equipment required

- ◆ Thrust piece - 3305-

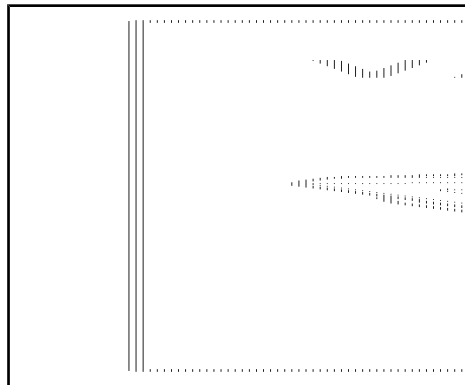
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- ◆ Extractor tool - T20143/2-



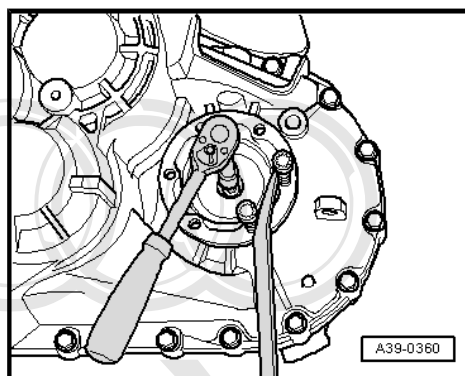
- ◆ Drip tray for workshop hoist - VAS 6208-



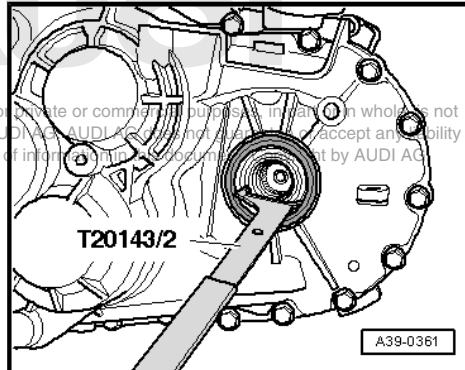
- ◆ Sealing grease - G 052 128 A1-

Removing

- Place drip tray under the gearbox.
- Remove bolt securing flange shaft (left-side). To do this, screw two bolts into flange and counterhold flange shaft with tyre iron or other suitable lever.
- Pull out flange shaft.



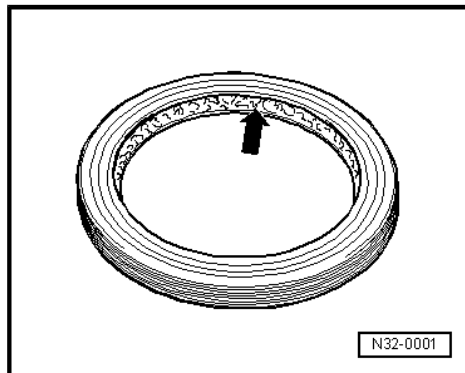
- Pull out flange shaft oil seal using extractor tool - T20143/2- .



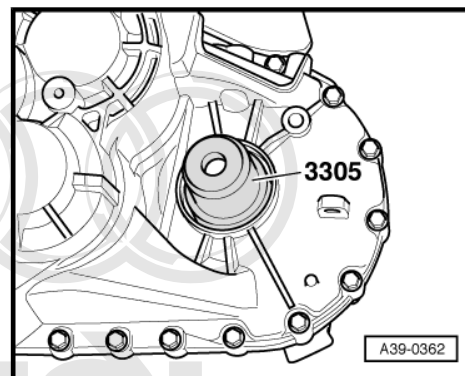
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Installing

- Lightly oil outer circumference of new oil seal.
- Pack space between sealing lip and dust lip -arrow- half full with sealing grease - G 052 128 A1- .



- Drive in new oil seal as far as stop using thrust piece - 3305- . Make sure seal remains straight.
- Push flange shaft in towards gearbox housing and tighten securing bolt. Tightening torque ➔ [Item 11 \(page 117\)](#) / ➔ [Item 13 \(page 120\)](#) .
- Check gear oil level in gearbox ➔ 6-speed manual gearbox; Rep. gr. 34 ; Gear oil; Checking gear oil level .



1.3 Renewing oil seal (right-side)

➔ ["1.3.1 Front-wheel drive - renewing flange shaft oil seal \(right-side\) with gearbox removed", page 109](#)

➔ ["1.3.2 Four-wheel drive - renewing flange shaft oil seal \(right-side\) with gearbox removed", page 111](#)

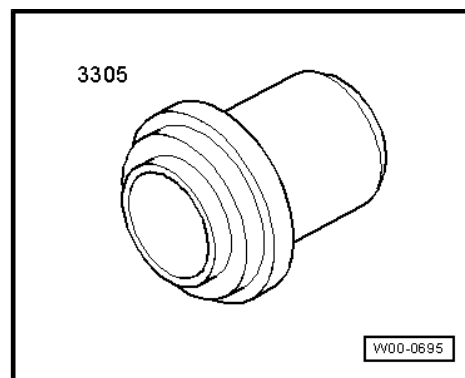
➔ ["1.3.3 Renewing oil seal between gearbox and bevel box at gearbox, four-wheel drive", page 113](#)

1.3.1 Front-wheel drive - renewing flange shaft oil seal (right-side) with gearbox removed

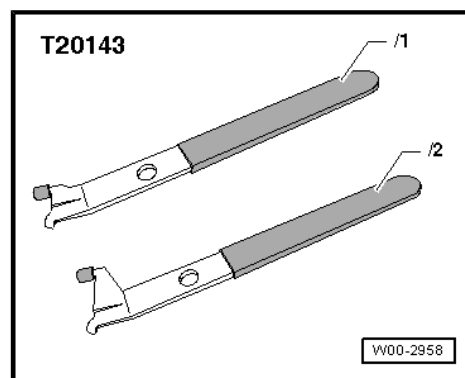
Renewing flange shaft oil seal (right-side) with gearbox installed
➔ 6-speed manual gearbox; Rep. gr. 39 ; Oil seals; Renewing oil seal (right-side)

Special tools and workshop equipment required

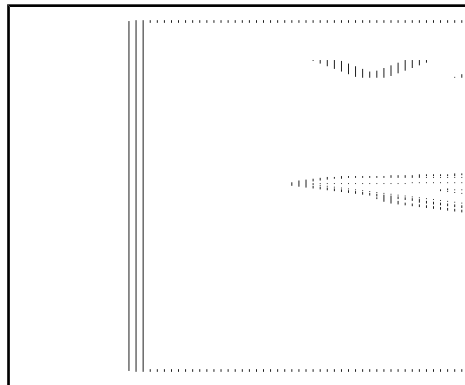
- ◆ Thrust piece - 3305-



- ◆ Extractor tool - T20143/2-



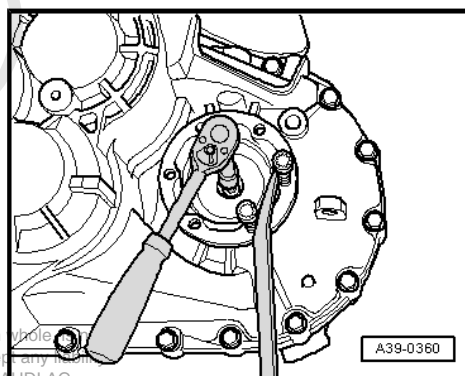
◆ Drip tray for workshop hoist - VAS 6208-



◆ Sealing grease - G 052 128 A1-

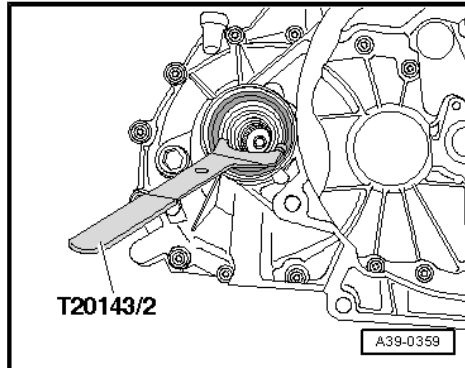
Removing

- Place drip tray under the gearbox.
- Remove bolt securing flange shaft (right-side). To do this, screw two bolts into flange and counterhold flange shaft with tyre iron or other suitable lever (illustration shows flange shaft on left side).
- Pull out flange shaft.



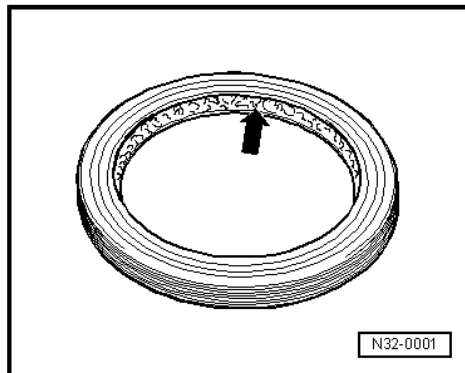
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- Pull out flange shaft oil seal using extractor tool - T20143/2- .

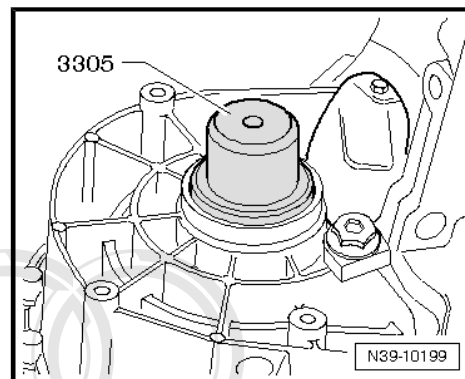


Installing

- Lightly oil outer circumference of new oil seal.
- Pack space between sealing lip and dust lip -arrow- half full with sealing grease - G 052 128 A1- .



- Drive in new oil seal as far as stop using thrust piece - 3305- . Make sure seal remains straight.
- Push flange shaft in towards gearbox housing and tighten securing bolt. Tightening torque ➔ [Item 11 \(page 117\)](#)
- Check gear oil level in gearbox ➔ 6-speed manual gearbox; Rep. gr. 34 ; Gear oil; Checking gear oil level .



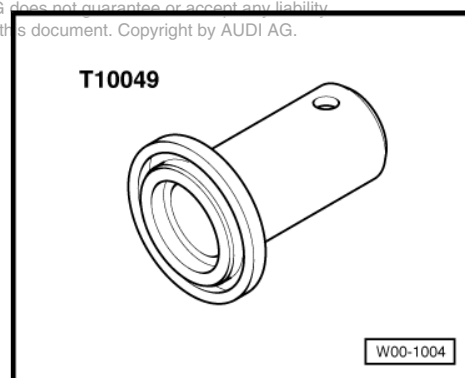
1.3.2 Four-wheel drive - renewing flange shaft oil seal (right-side) with gearbox removed

Renewing flange shaft oil seal (right-side) with gearbox installed
➔ 6-speed manual gearbox; Rep. gr. 39 ; Oil seals; Renewing oil seal (right-side)

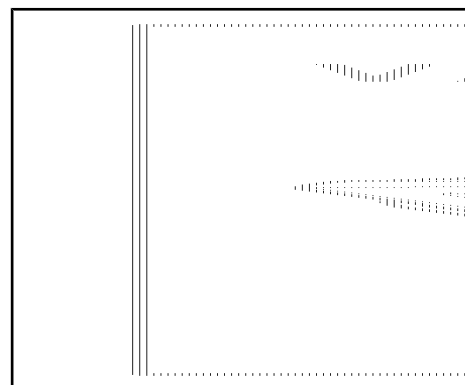
Special tools and workshop equipment required

- ◆ Thrust piece - T10049-

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- ◆ Drip tray for workshop hoist - VAS 6208-

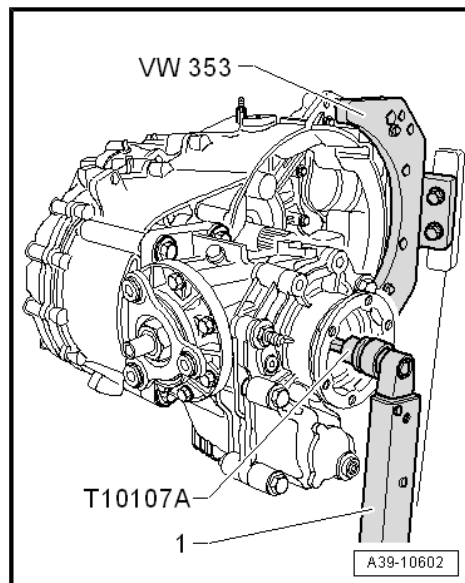


- ◆ Sealing grease - G 052 128 A1-

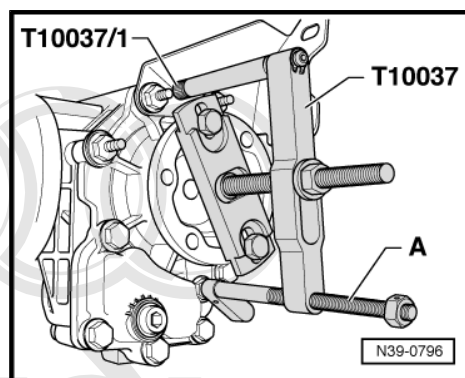
Removing

- Place drip tray underneath.

- Using socket and extended bit - T10107 A- and torque wrench -1-, remove bolt securing flange shaft (right-side). To do so, screw two bolts into flange and counterhold flange shaft with tyre iron or other suitable lever.

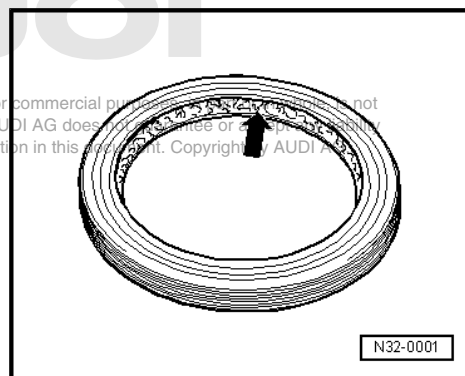


- Attach puller - T10037- to flange shaft (right-side).
- Use knurled nut - T10037/1- and spindle to align puller -A- parallel with flange.
- Pull out flange shaft (right-side).
- Pry out flange shaft oil seal using a suitable lever.

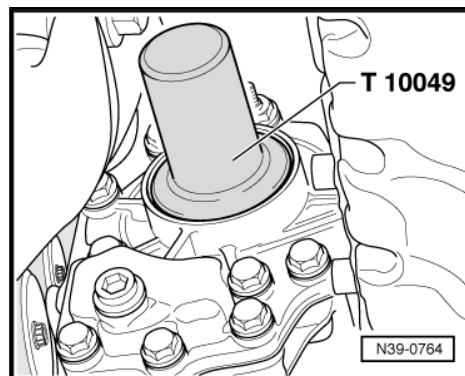


Installing

- Lightly oil outer circumference of new oil seal.
- Pack space between sealing lip and dust lip -arrow- half full with sealing grease - G 052 128 A1- .



- Drive seal in onto stop using thrust piece - T10049- .
- Carefully drive in flange shaft (while turning).
- Secure flange shaft with countersunk bolt; tightening torque ➔ [Item 13 \(page 120\)](#) .
- Check gear oil level in bevel box ➔ 6-speed manual gearbox; Rep. gr. 39 ; Gear oil; Checking gear oil level .

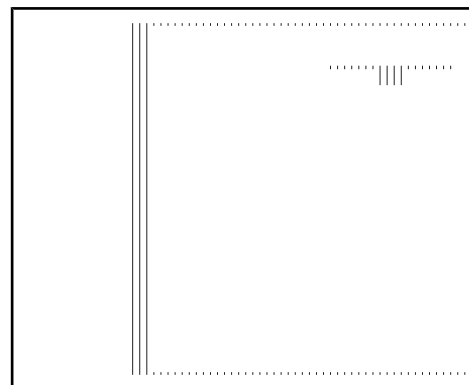


1.3.3 Renewing oil seal between gearbox and bevel box at gearbox, four-wheel drive

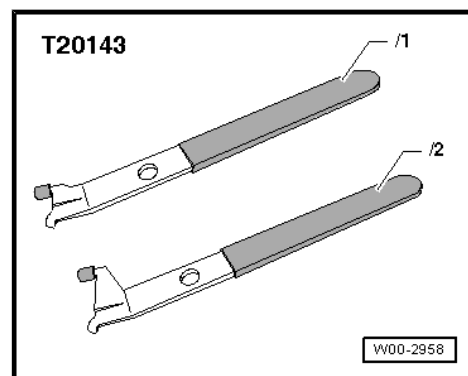
Renewing oil seal between gearbox and bevel box with gearbox installed ⇒ 6-speed manual gearbox; Rep. gr. 39 ; Oil seals;
Renewing oil seal (right-side)

Special tools and workshop equipment required

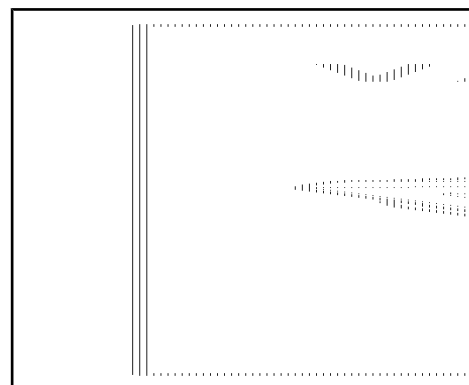
- ◆ Thrust piece - T10243-



- ◆ Extractor tool - T20143/2-



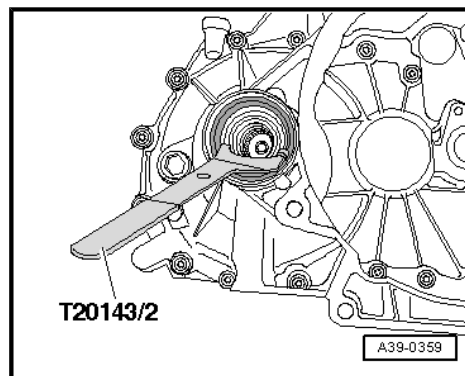
- ◆ Drip tray for workshop hoist - VAS 6208-



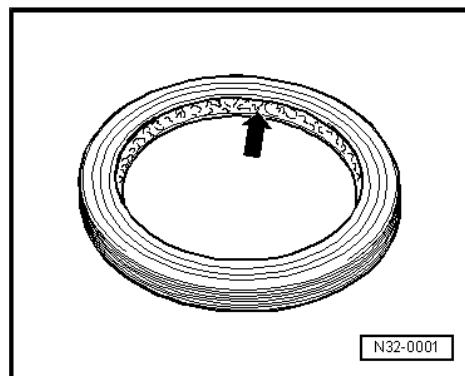
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- ◆ Sealing grease - G 052 128 A1-
 - Place drip tray underneath.
 - Detach bevel box from gearbox ⇒ [page 34](#) .

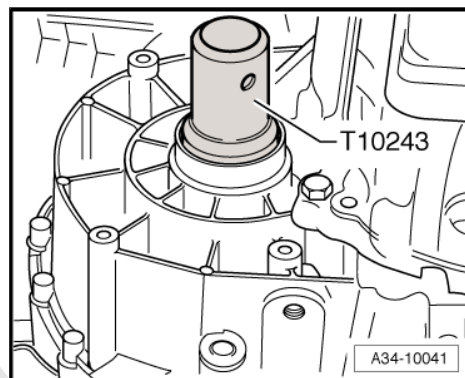
- Pull out oil seal for bevel box using extractor tool - T20143/2- .



- Pack space between sealing lip and dust lip -arrow- half full with sealing grease - G 052 128 A1- .
- Lightly oil outer circumference of new oil seal.



- Drive in new oil seal onto stop using thrust piece - T10243- . Take care to keep seal straight when installing.
- Attach bevel box to gearbox ➤ [page 46](#) .
- Check gear oil level in gearbox ➤ 6-speed manual gearbox; Rep. gr. 34 ; Gear oil; Checking gear oil level .



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2 Table of adjustments



Note

If repairs have been carried out on the gearbox, it is only necessary to adjust the output shaft for 1st - 4th gear, the output shaft for 5th, 6th and reverse gear or the 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:		
	Output shaft for 1st - 4th gear ⇒ page 95	Output shaft for 5th, 6th and reverse gear ⇒ page 100	Differential ⇒ page 133
Gearbox housing	x	x	x
Clutch housing	x	x	x
Output shaft for 1st - 4th gear	x		
Output shaft for 5th, 6th and reverse gear		x	
Differential cage			x
Tapered roller bearing for 1st - 4th gear output shaft	x		
Tapered roller bearing for 5th/6th and reverse gear output shaft		x	
Tapered roller bearings for differential			x

3 Differential

⇒ ["3.1 Exploded view - differential", page 116](#)

⇒ ["3.2 Dismantling and assembling differential", page 122](#)

⇒ ["3.3 Adjusting differential", page 133](#)

3.1 Exploded view - differential

⇒ ["3.1.1 Exploded view - differential, front-wheel drive", page 116](#)

⇒ ["3.1.2 Exploded view - differential, four-wheel drive", page 119](#)

3.1.1 Exploded view - differential, front-wheel drive



Note

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- ◆ *Secure gearbox to assembly stand ⇒ [page 18](#) .*
- ◆ *Always renew both tapered roller bearings together.*
- ◆ *Use inductive heater - VAS 6414- to heat tapered roller bearing inner race to 100°C before installing.*
- ◆ *Adjust differential if tapered roller bearings, differential cage, gearbox housing or clutch housing are renewed ⇒ [page 133](#) .*

1 - Gearbox housing

2 - Shim

- ☐ For differential
- ☐ Determining thickness
 ⇒ [page 133](#)

3 - Tapered roller bearing outer race

- ☐ Pulling out ⇒ [page 126](#)
- ☐ Pressing in
 ⇒ [page 126](#)

4 - Tapered roller bearing inner race

- ☐ Pulling off ⇒ [page 125](#)
- ☐ Pressing on
 ⇒ [page 125](#)

5 - Differential cage

- ☐ With final drive gear

6 - Tapered roller bearing inner race

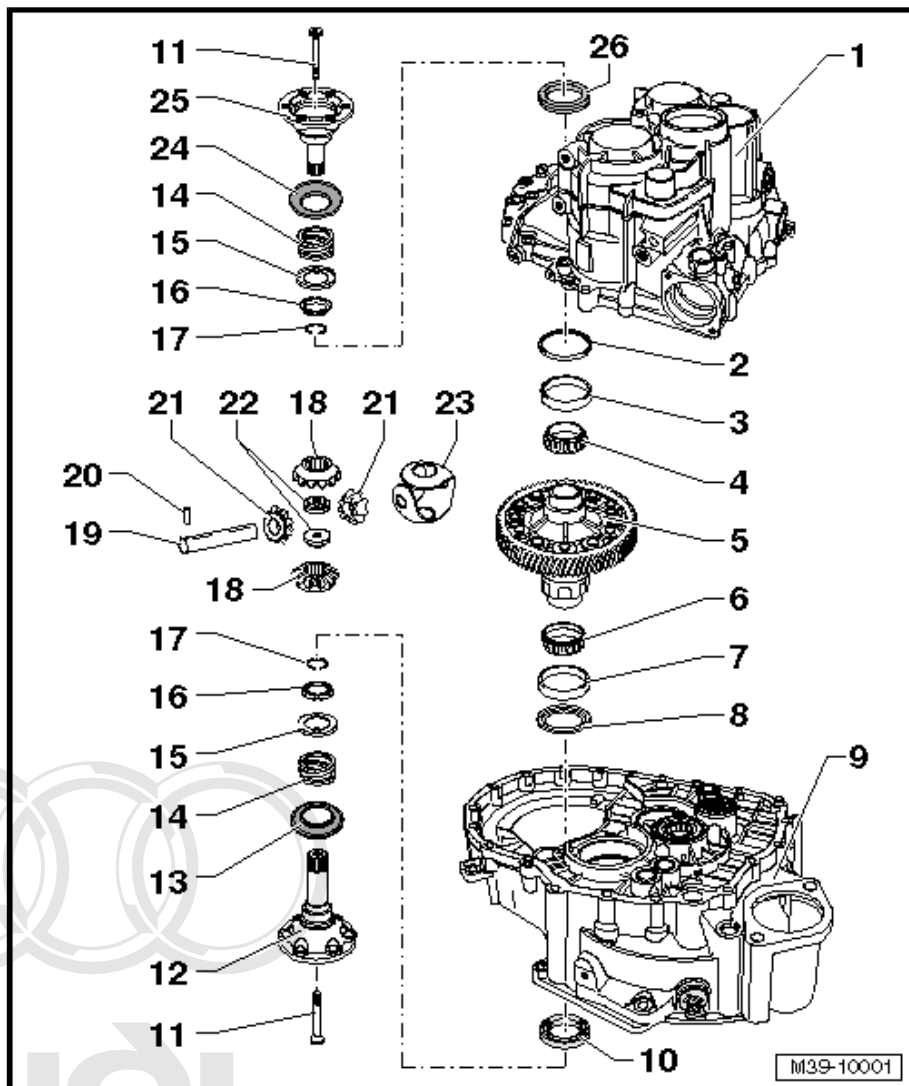
- ☐ Pulling off ⇒ [page 125](#)
- ☐ Pressing on
 ⇒ [page 125](#)

7 - Tapered roller bearing outer race

- ☐ Pulling out ⇒ [page 124](#)
- ☐ Pressing in
 ⇒ [page 124](#)

8 - Shim

- ☐ 0.65 mm thick
- ☐ Installation position:
 Shoulder on inside diameter faces towards oil seal ⇒ [Item 10 \(page 117\)](#)



9 - Clutch housing

10 - Oil seal

- ☐ For flange shaft (right-side) ⇒ [Item 12 \(page 117\)](#)
- ☐ Renewing with gearbox removed ⇒ [page 109](#)
- ☐ Renewing with gearbox installed ⇒ 6-speed manual gearbox; Rep. gr. 39 ; Oil seals; Renewing oil seal (right-side)

11 - Countersunk bolt

- ☐ 33 Nm
- ☐ Screws into threaded piece ⇒ [Item 22 \(page 118\)](#)

12 - Flange shaft (right-side)

13 - Protective ring

- ☐ Lever protective ring off flange shaft by applying a screwdriver on alternate sides
 ⇒ [Item 12 \(page 117\)](#) .
- ☐ Installation position: Recess faces away from tapped holes in flange shaft
- ☐ Press on protective ring by hand as far as stop
- ☐ Protective ring must engage in flange shaft

14 - Spring for flange shaft

- ☐ Installed behind flange shaft

15 - Thrust washer

- ☐ Installation position: Shoulder towards spring, lugs (if included) towards tapered ring

16 - Tapered ring

- ☐ Installation position: Taper towards differential cage

17 - Circlip

- ☐ Holds tapered ring, thrust washer and spring in position when flange shaft is removed

18 - Sun wheel

- ☐ Installing ⇒ [page 127](#)

19 - Differential pinion pin

- ☐ Drive out with drift
- ☐ Installing ⇒ [page 127](#)

20 - Spring pin

- ☐ Secures differential pinion pin
- ☐ Removing ⇒ [page 126](#)
- ☐ Installing ⇒ [page 127](#)

21 - Planet pinion

- ☐ Installing ⇒ [page 127](#)

22 - Threaded piece

- ☐ Installing ⇒ [page 127](#)

23 - One-piece thrust washer

- ☐ Lubricate with gear oil before installing

24 - Protective ring

- ☐ Lever protective ring off flange shaft ⇒ [Item 25 \(page 118\)](#) by applying a screwdriver on alternate sides
- ☐ Installation position: Recess faces away from tapped holes in flange shaft
- ☐ Press on protective ring by hand as far as stop
- ☐ Protective ring must engage in flange shaft

25 - Flange shaft (left-side)

26 - Oil seal

- ☐ For flange shaft (left-side)
- ☐ Renewing with gearbox removed ⇒ [page 107](#)
- ☐ Renewing with gearbox installed ⇒ 6-speed manual gearbox; Rep. gr. 39 ; Oil seals; Renewing oil seal (left-side)

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3.1.2 Exploded view - differential, four-wheel drive



Note

- ◆ Secure gearbox to assembly stand ⇒ [page 18](#).
- ◆ Use inductive heater - VAS 6414- to heat tapered roller bearing inner race to 100°C before installing.
- ◆ Always renew both tapered roller bearings together.
- ◆ Adjust differential if tapered roller bearings, differential cage, gearbox housing or clutch housing are renewed ⇒ [page 133](#).

1 - Gearbox housing

2 - Shim

- ☐ For differential
- ☐ Determining thickness
⇒ [page 133](#)

3 - Tapered roller bearing outer race

- ☐ Pulling out ⇒ [page 132](#)
- ☐ Pressing in
⇒ [page 132](#)

4 - Tapered roller bearing inner race

- ☐ Pulling off ⇒ [page 131](#)
- ☐ Pressing on
⇒ [page 131](#)

5 - Differential cage

- ☐ With riveted final drive gear

6 - Tapered roller bearing inner race

- ☐ Pulling off ⇒ [page 131](#)
- ☐ Pressing on
⇒ [page 132](#)

7 - Tapered roller bearing outer race

- ☐ Pulling out ⇒ [page 130](#)
- ☐ Pressing in
⇒ [page 131](#)

8 - Shim

- ☐ 0.65 mm thick
- ☐ Installation position:
Shoulder on inside diameter faces oil seal in clutch housing

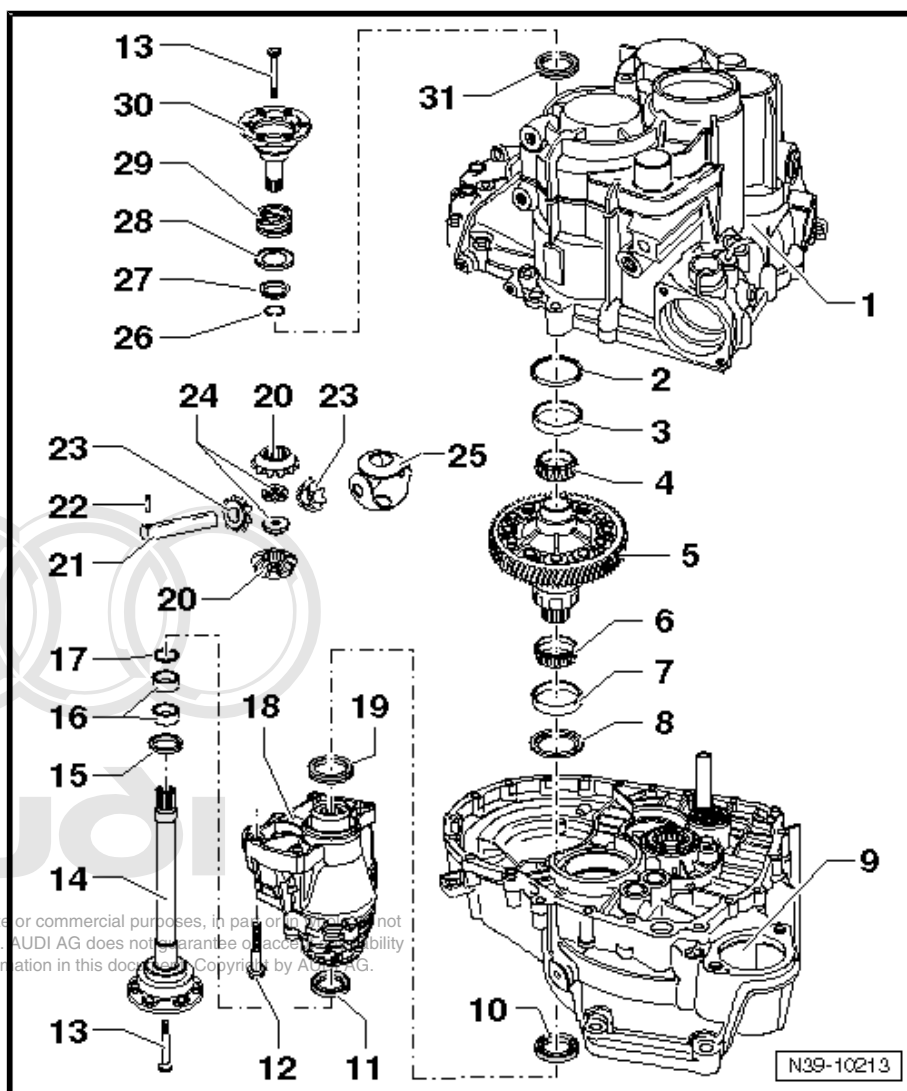
9 - Clutch housing

10 - Oil seal

- ☐ In gearbox, fitted between gearbox and bevel box
- ☐ Renewing with gearbox removed ⇒ [page 113](#)
- ☐ Renewing with gearbox installed ⇒ 6-speed manual gearbox; Rep. gr. 39 ; Oil seals; Renewing oil seal (right-side)

11 - Oil seal

- ☐ For flange shaft (right-side)





- ☐ Different diameters for left and right
- ☐ Renewing (gearbox with bevel box removed) ⇒ [page 111](#)
- ☐ Renewing (gearbox with bevel box installed) ⇒ 6-speed manual gearbox; Rep. gr. 39 ; Oil seals; Renewing oil seal (right-side)

12 - Bolt

- ☐ 40 Nm and turn 90° further
- ☐ 4x
- ☐ Renew

13 - Countersunk bolt

- ☐ 33 Nm
- ☐ Screws into threaded piece ⇒ [Item 24 \(page 120\)](#)

14 - Flange shaft (right-side)

- ☐ Removing and installing ⇒ [page 111](#)

15 - Seal

- ☐ Insert in annular groove in flange shaft (right-side)
- ☐ Remove needle bearings (polygon bearings ⇒ [Item 16 \(page 120\)](#)) in order to renew

16 - Needle bearing (polygon bearing)

- ☐ Renewing ⇒ [page 158](#)

17 - Circlip

- ☐ Always renew
- ☐ For needle bearings (polygon bearings)
- ☐ Fit in annular groove of flange shaft

18 - Bevel box

- ☐ Exploded view - bevel box ⇒ [page 137](#)

19 - Oil seal

- ☐ In bevel box, fitted between bevel box and gearbox
- ☐ Renewing (with bevel box removed) ⇒ [page 141](#)

20 - Sun wheel

- ☐ Installing ⇒ [page 133](#)
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21 - Differential pinion pin

- ☐ Removing ⇒ [page 132](#)
- ☐ Installing ⇒ [page 133](#)

22 - Spring pin

- ☐ Secures differential pinion pin
- ☐ Removing ⇒ [page 132](#)
- ☐ Installing ⇒ [page 133](#)

23 - Planet pinion

- ☐ Removing and installing ⇒ [page 133](#)

24 - Threaded piece

- ☐ Installing ⇒ [page 133](#)

25 - One-piece thrust washer

- ☐ Lubricate with gear oil before installing

26 - Circlip

- ☐ Holds tapered ring, thrust washer and spring in position when flange shaft is removed

27 - Tapered ring

- ☐ With grooves to engage on thrust washer
- ☐ Installation position: Taper towards differential cage

28 - Thrust washer

- ☐ Installation position: Shoulder towards spring, lugs towards tapered ring

29 - Spring

- ☐ For flange shaft (left-side)
- ☐ Installed behind flange shaft (left-side)

30 - Flange shaft (left-side)

31 - Oil seal

- ☐ For flange shaft (left-side)
- ☐ Different diameters for left and right
- ☐ Renewing with gearbox removed ➔ [page 107](#)
- ☐ Renewing with gearbox installed ➔ 6-speed manual gearbox; Rep. gr. 39 ; Oil seals; Renewing oil seal (left-side)

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3.2 Dismantling and assembling differential

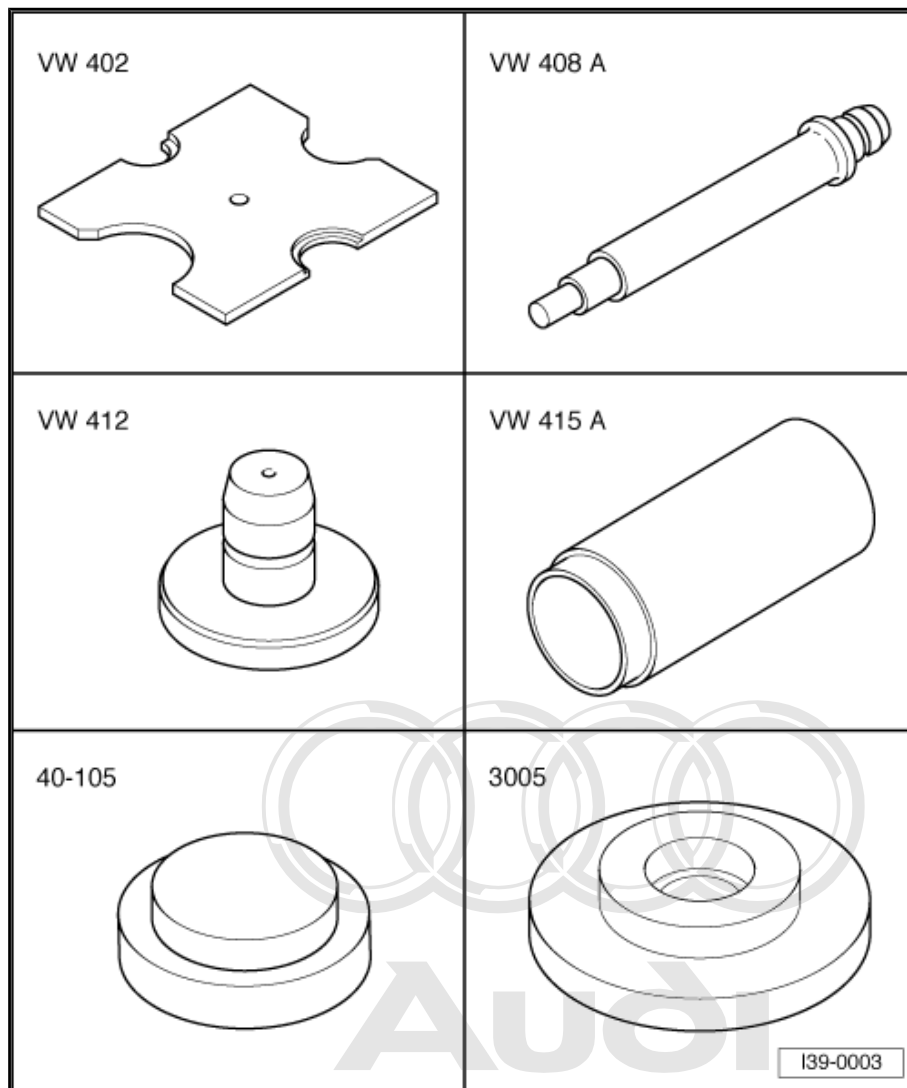
⇒ [“3.2.1 Dismantling and assembling differential, front-wheel drive”, page 122](#)

⇒ [“3.2.2 Dismantling and assembling differential - four-wheel drive”, page 127](#)

3.2.1 Dismantling and assembling differential, front-wheel drive

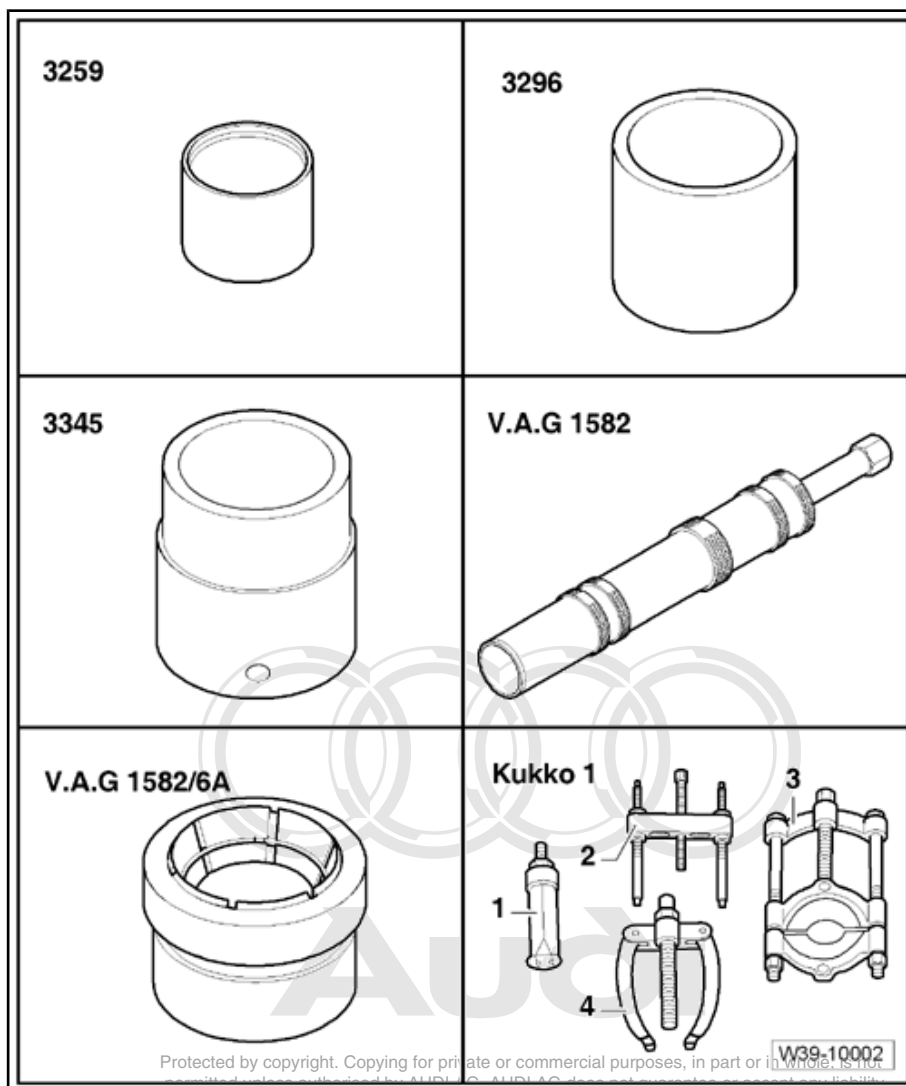
Special tools and workshop equipment required

- ◆ Thrust plate - VW 402-
- ◆ Press tool - VW 408 A-
- ◆ Press tool - VW 412-
- ◆ Tube - VW 415 A-
- ◆ Thrust plate - 40 - 105-
- ◆ Thrust plate - 3005-



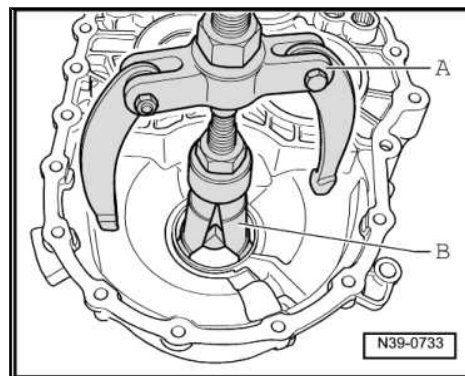
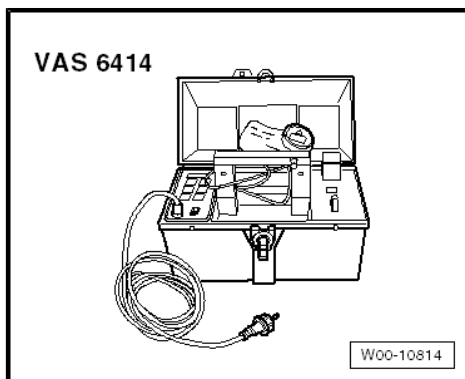
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- ◆ Tube - 3259-
- ◆ Tube - 3296-
- ◆ Wheel bearing tube - 3345-
- ◆ Tapered roller bearing puller - V.A.G 1582-
- ◆ Adapter - V.A.G 1582/6A-
- ◆ -1- Internal puller 46 ... 58 mm - Kukko 21/7- or internal puller 56 ... 70 mm - Kukko 21/8-
- ◆ -2- Puller - Kukko 18/1-
- ◆ -3- Splitter 12 ... 75 mm - Kukko 17/1-
- ◆ -4- Counter-support - Kukko 22/2-



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- ◆ Inductive heater - VAS 6414-



Pulling tapered roller bearing outer race out of clutch housing

A - Counter-support - Kukko 22/2-

B - Internal puller 46...58 mm - Kukko 21/7-



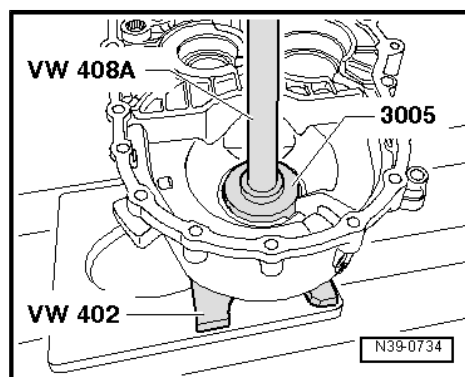
Note

- ◆ *Clamp internal puller -B- firmly between tapered roller bearing outer race and shim ⇒ [Item 8 \(page 117\)](#) .*
- ◆ *After pulling out, check shim for damage and renew if necessary.*
- ◆ *Internal puller 56 ... 70 mm - Kukko 21/8- can be used instead of internal puller 46...58 mm - Kukko 21/7- .*

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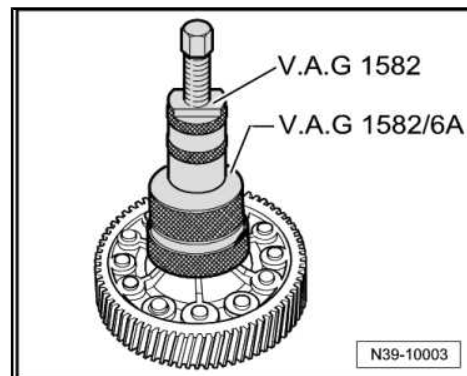
Pressing tapered roller bearing outer race into clutch housing

- First install shim ⇒ [Item 8 \(page 117\)](#) .
- Installation position of shim: Shoulder on inside diameter faces towards oil seal in clutch housing.



Pulling off tapered roller bearing inner race

- Before applying puller, place thrust plate - 40 - 105- on differential cage.

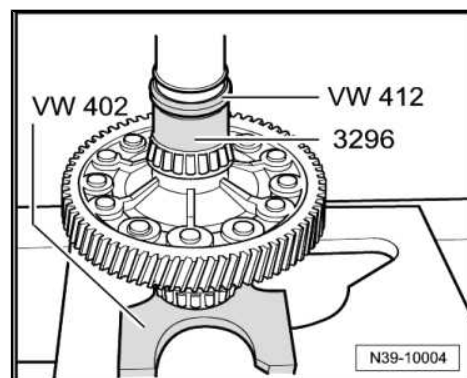


Heating and pressing on tapered roller bearing inner race



WARNING

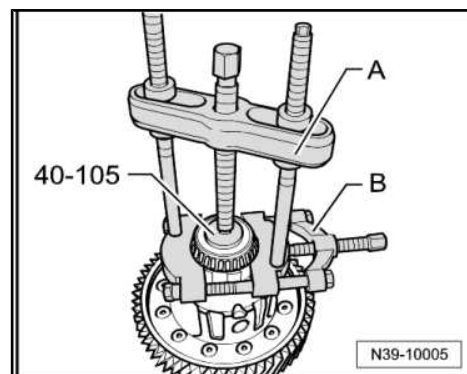
Wear protective gloves.



Pulling off tapered roller bearing inner race

A - Puller - Kukko 18/1-

B - Splitter 12 ... 75 mm - Kukko 17/1-
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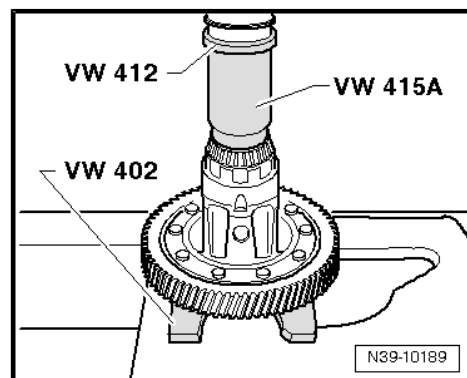
Heating and pressing on tapered roller bearing inner race

- Cage with bearing rollers must rotate freely when pressing on.
- If available, support tapered roller bearing inner race on opposite side using tube - 3296- .



WARNING

Wear protective gloves.



Pulling tapered roller bearing outer race out of gearbox housing

A - Counter-support - Kukko 22/2-

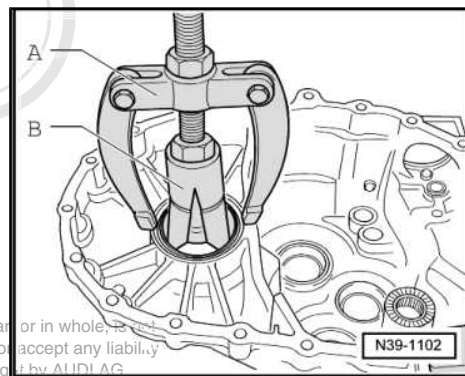
B - Internal puller 46...58 mm - Kukko 21/7-



Note

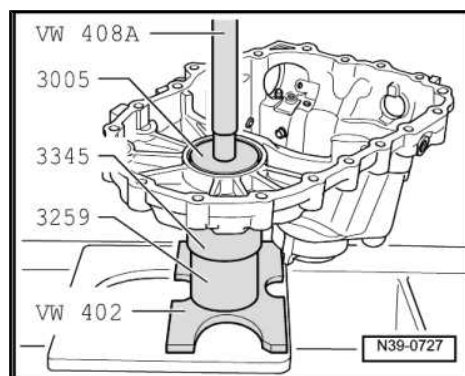
Internal puller 56 ... 70 mm - Kukko 21/8- can be used instead of internal puller 46...58 mm - Kukko 21/7- .

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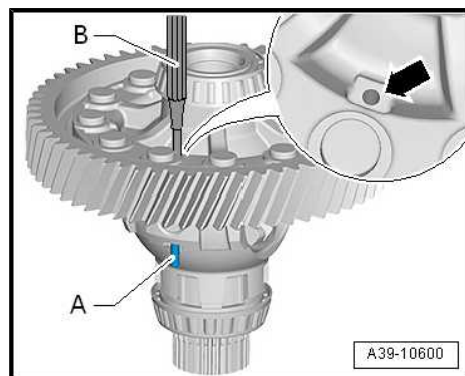
Pressing tapered roller bearing outer race into gearbox housing

- Support gearbox housing with tube - 3345- directly below bearing mounting.



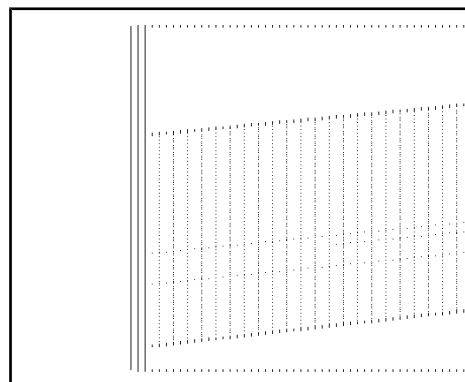
Removing spring pin for differential pinion pin

- Drive out spring pin -A- with a suitable punch -B- Ø 5 mm out of drilling -arrow- in differential cage.



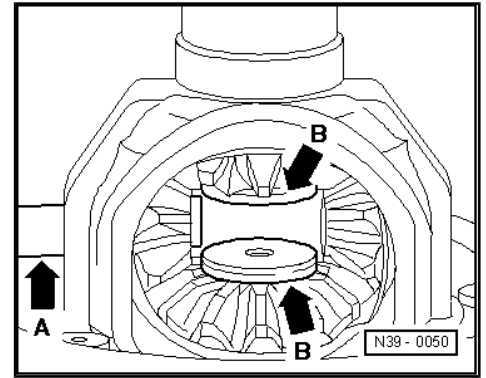
Note

- ◆ If the drilling -arrow- in the differential cage is not present, drive out the spring pin as follows:
- ◆ Cover tapered roller bearing inner race to avoid possible damage and ingress of metal particles.
- ◆ Drive out spring pin with chisel, inserting chisel into annular groove.



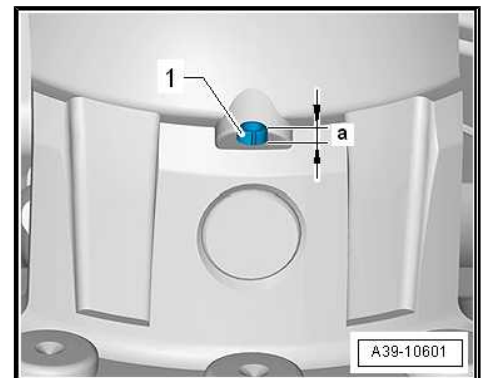
Installing differential bevel gears

- Lubricate one-piece thrust washer with gear oil and install.
- Install both sun wheels and secure (e.g. with flange shaft).
- Fit planet pinions (180° apart) and pivot into position.
- Push differential pinion pin -arrow A- in as far as first planet pinion.
- Fit threaded pieces -arrows B- in sun wheels.
- Installation position: Stepped shoulder towards sun wheel
- Drive differential pinion pin into final position and secure with spring pin ⇒ [page 127](#) .



Installing spring pin for differential pinion pin

- Align drilling in differential pinion pin with drilling in differential cage.
- Use a punch to drive in spring pin -1- to dimension -a- = 2.5 ± 0.5 mm.



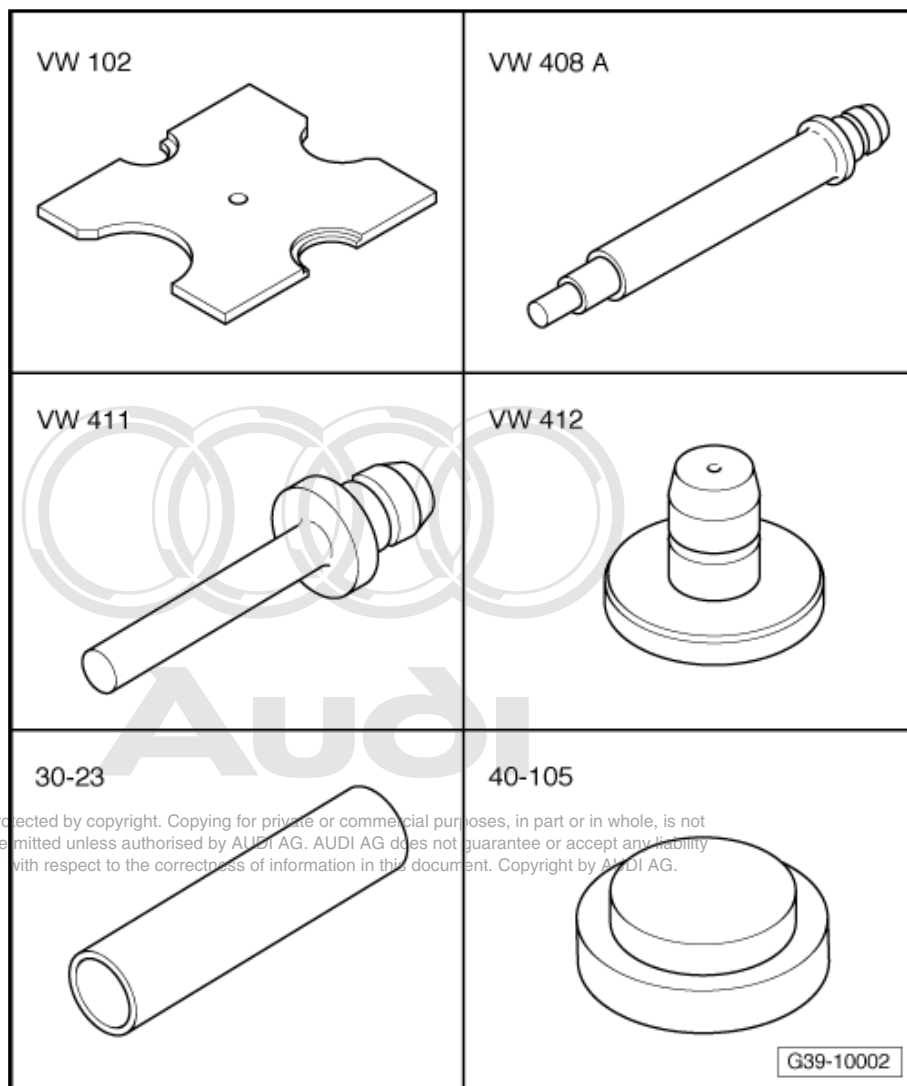
3.2.2 Dismantling and assembling differential - four-wheel drive



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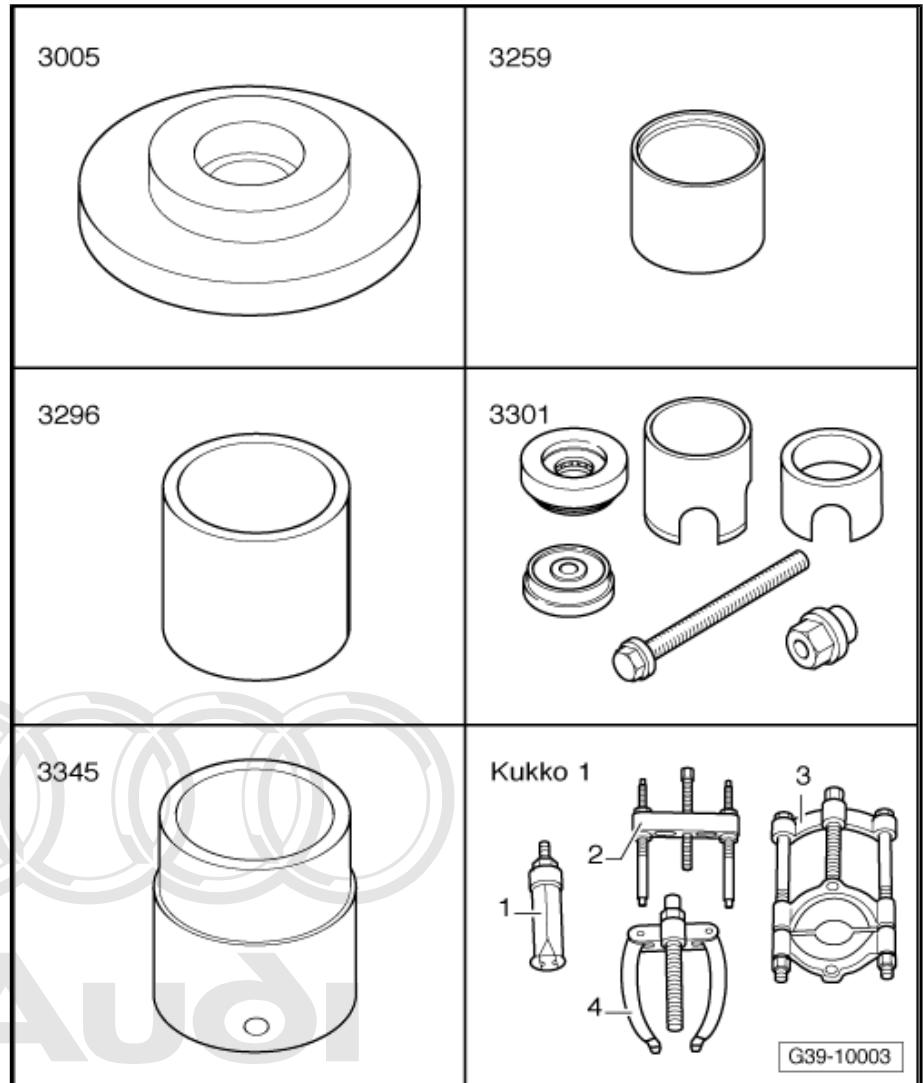
Special tools and workshop equipment required

- ◆ Thrust plate - VW 402-
- ◆ Press tool - VW 408 A-
- ◆ Press tool - VW 411-
- ◆ Press tool - VW 412-
- ◆ Extension - 30 - 23-
- ◆ Thrust plate - 40 - 105-



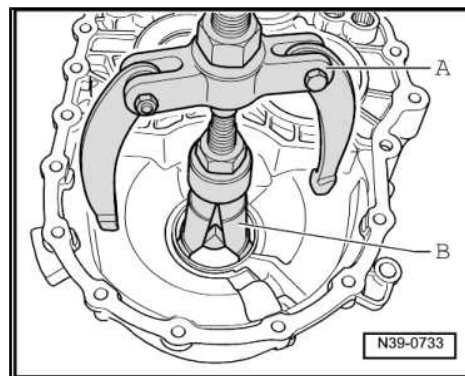
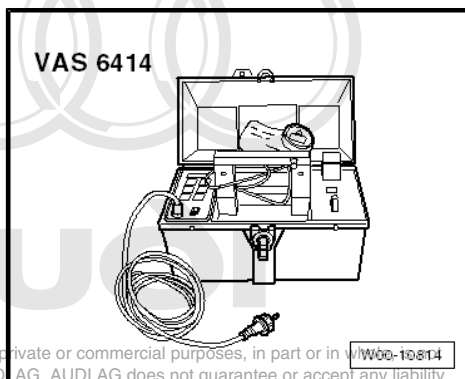
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- ◆ Thrust plate - 3005-
- ◆ Tube - 3259-
- ◆ Tube - 3296-
- ◆ Assembly tool - 3301-
- ◆ Tube - 3345-
- ◆ -1- Internal puller - Kukko 21/7- or internal puller 56 ...
70 mm - Kukko 21/8-
- ◆ -2- Puller - Kukko 18/1-
- ◆ -3- Splitter - Kukko 17/1-
- ◆ -4- Counter-support - Kuk-
ko 22/2-



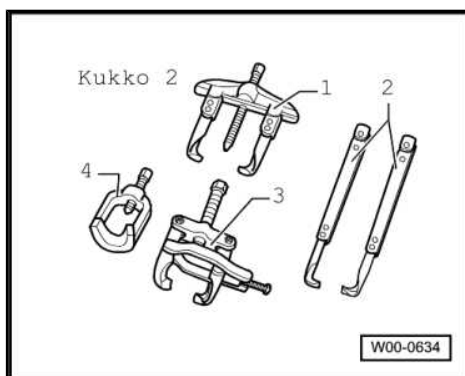
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- ◆ Inductive heater - VAS 6414-



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- ◆ -3- Puller - Kukko 204/2-



Pulling tapered roller bearing outer race out of clutch housing

A - Counter-support ,
e.g. -Kukko 22/2-

B - Internal puller 46 ...
58 mm , e.g. -Kukko
21/7-

- Clamp internal puller -B- firmly between tapered roller bearing outer race and shim.

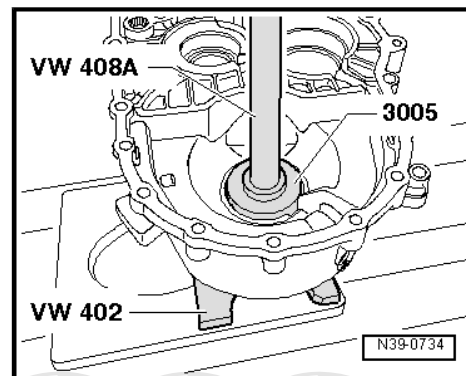


Note

- ◆ *Clamp internal puller -B- firmly between tapered roller bearing outer race and shim
⇒ **Item 8 (page 119)** .*
- ◆ *After pulling out, check shim for damage and renew if necessary.*
- ◆ *Internal puller 56 ... 70 mm - Kukko 21/8- can be used instead of internal puller 46...58 mm - Kukko 21/7- .*

Pressing tapered roller bearing outer race with shim into clutch housing

- First install shim ➔ [Item 8 \(page 119\)](#) .
- Installation position of shim: Shoulder on inside diameter faces towards oil seal in clutch housing.



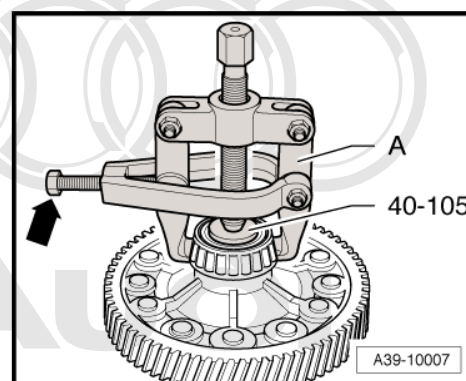
Pulling off tapered roller bearing inner race

- Fit thrust plate - 40 - 105- onto differential cage.
- Clamp jaws of puller (e.g. -Kukko 204/2-) under tapered roller bearing inner race on flat surfaces of differential cage.



Note

When pulling off the inner race ensure that the hooks do not bend outwards, if necessary tighten bolt -arrow-.

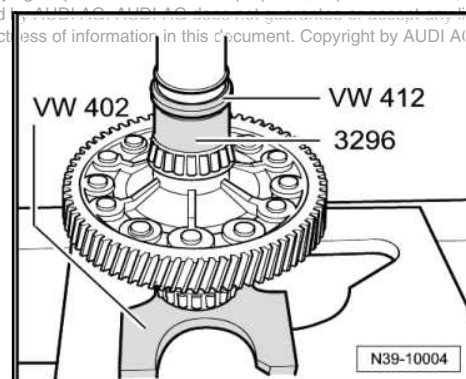


Heating and pressing on tapered roller bearing inner race



WARNING

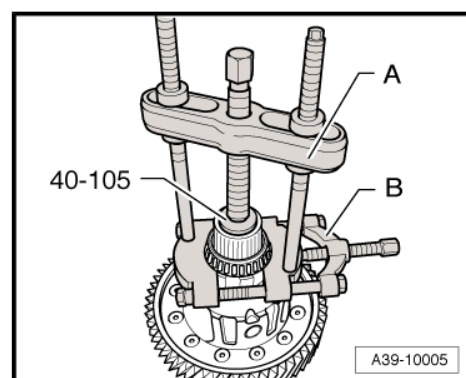
Wear protective gloves.



Pulling off tapered roller bearing inner race

A - Puller , e.g. -Kukko 18/1-

B - Splitter 12...75 mm , e.g. -Kukko 17/1-



Heating and pressing on tapered roller bearing inner race



WARNING

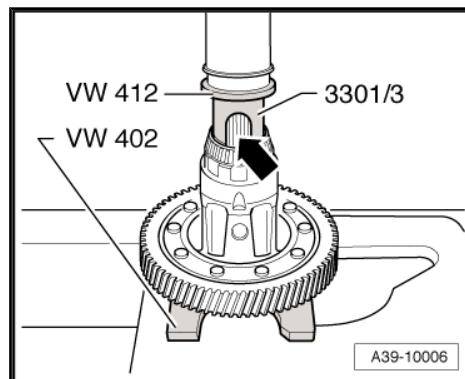
Wear protective gloves.



Note

If available, support tapered roller bearing inner race on opposite side using tube - 3296- .

- Fit sleeve -3301/3- of assembly device - 3301- onto tapered roller bearing inner race with recess -arrow- (larger inner diameter) facing downwards.



Pulling tapered roller bearing outer race out of gearbox housing

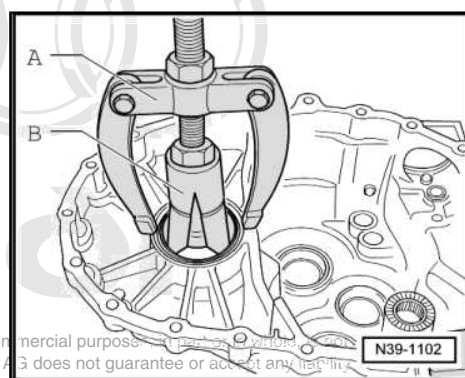
A - Counter-support , e.g. -Kukko 22/2-

B - Internal puller 46 ... 58 mm , e.g. -Kukko 21/7-



Note

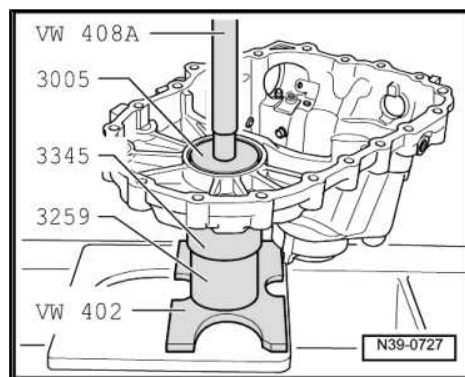
Internal puller 56 ... 70 mm - Kukko 21/8- can be used instead of internal puller 46...58 mm - Kukko 21/7- .



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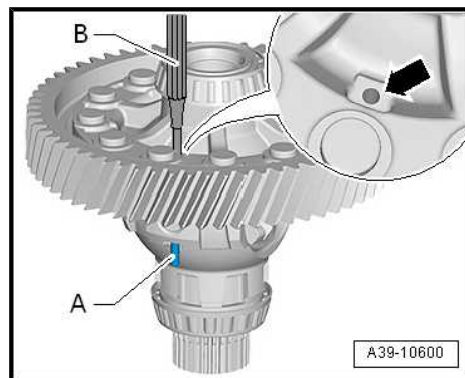
Pressing tapered roller bearing outer race into gearbox housing

- Support gearbox housing with tube - 3345- directly below bearing mounting.



Removing spring pin for differential pinion pin

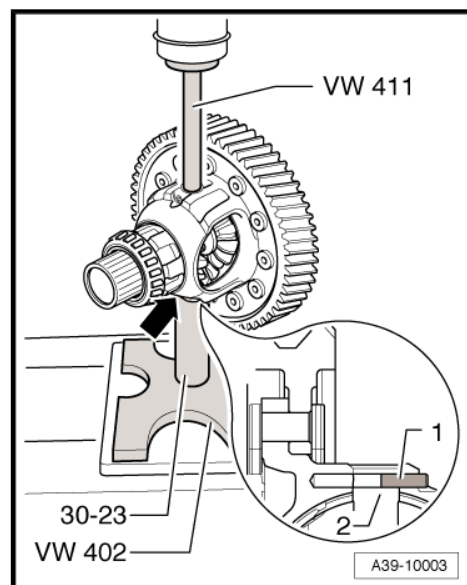
- Drive out spring pin -A- with a suitable punch -B- Ø 5 mm out of drilling -arrow- in differential cage.





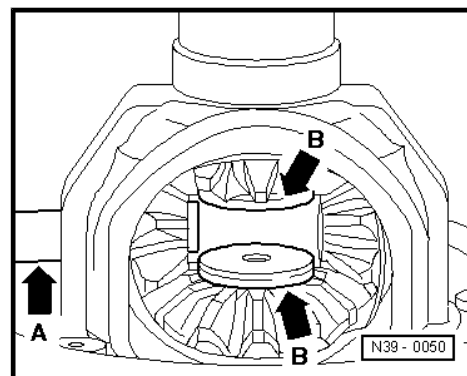
Note

- ◆ If the drilling -arrow- in the differential cage is not present, remove the spring pin as follows:
- ◆ First drive spring pin -1- into differential pinion pin -2- so it is flush.
- ◆ Place differential under press, with spring pin -arrow- facing towards extension - 30 - 23- .
- ◆ Then press out differential pinion pin.
- ◆ Remove any sheared off parts of the spring pin from the differential cage and differential pinion pin.



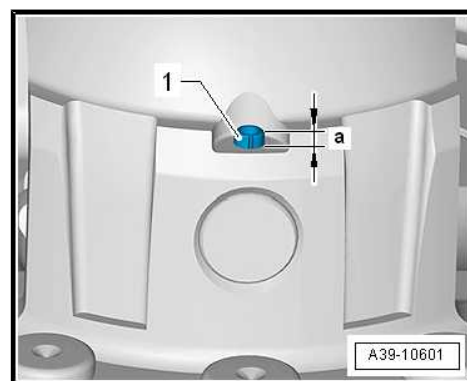
Installing differential bevel gears

- Lubricate one-piece thrust washer with gear oil and install.
- Install both sun wheels and secure (e.g. with flange shaft).
- Fit planet pinions (180° apart) and pivot into position.
- Push differential pinion pin -arrow A- in as far as first planet pinion.
- Fit threaded pieces -arrows B- in sun wheels.
- Installation position: Stepped shoulder towards sun wheel
- Drive differential pinion pin into final position and secure with spring pin ➔ [page 133](#) .



Installing spring pin for differential pinion pin

- Align drilling in differential pinion pin with drilling in differential cage.
- Use a punch to drive in spring pin -1- to dimension -a- = 2.5 ± 0.5 mm.



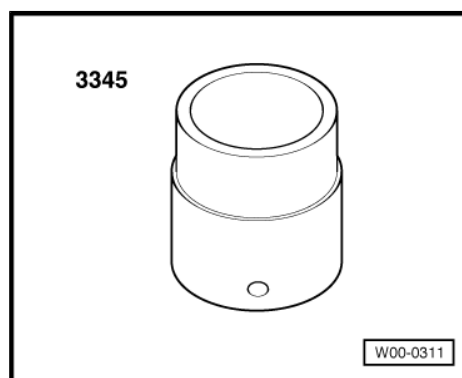
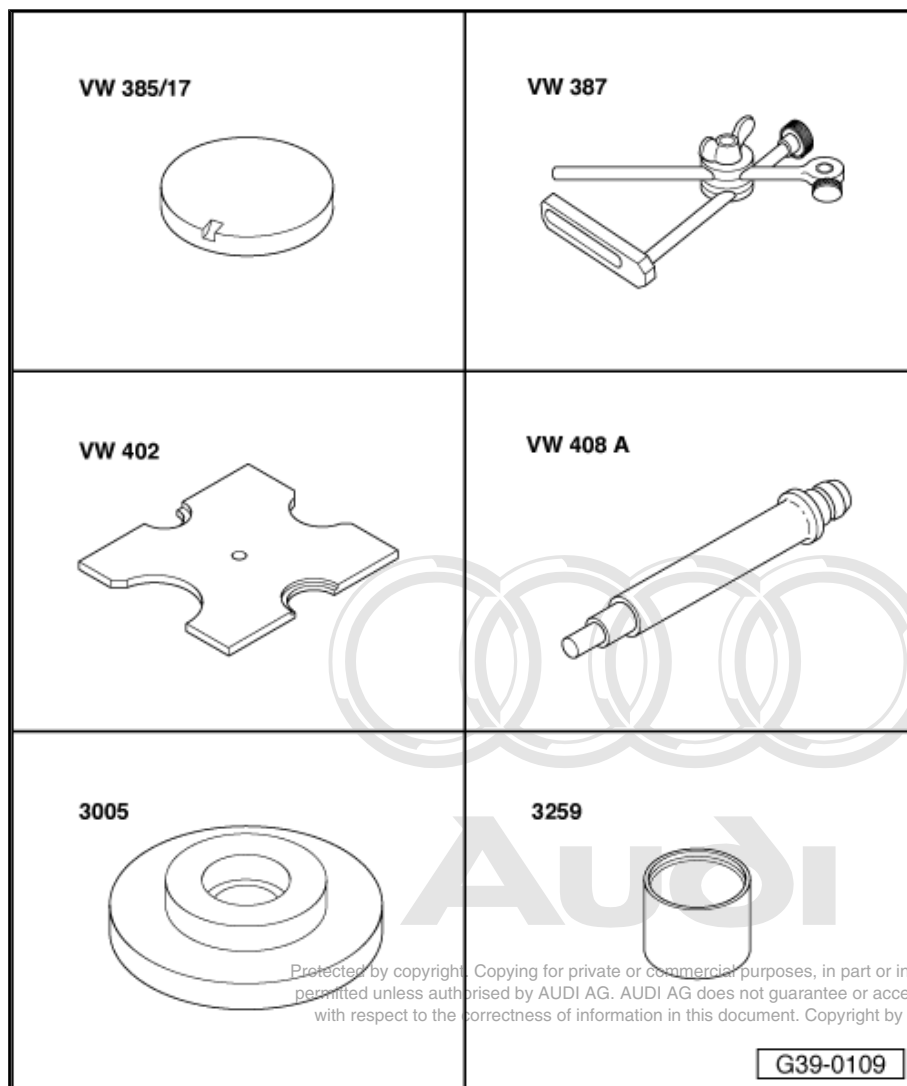
3.3

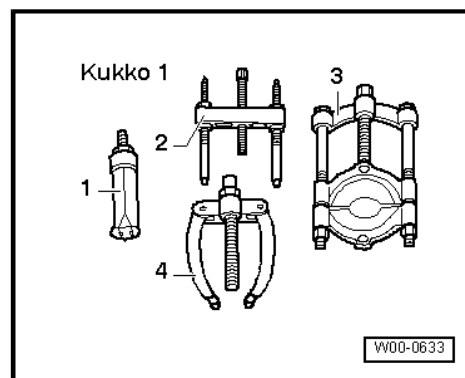
Adjusting differential

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Special tools and workshop equipment required

- ◆ End measuring plate - VW 385/17-
- ◆ Universal dial gauge bracket - VW 387-
- ◆ Thrust plate - VW 402-
- ◆ Press tool - VW 408 A-
- ◆ Thrust plate - 3005-
- ◆ Tube - 3259-





- ◆ Wheel bearing tube - 3345-
- ◆ -1- Internal puller 46 ... 58 mm - Kukko 21/7- or internal puller 56 ... 70 mm - Kukko 21/8-
- ◆ -4- Counter-support - Kukko 22/2-
- ◆ Dial gauge - VAS 6080-
- ◆ Dial gauge extension, 30 mm

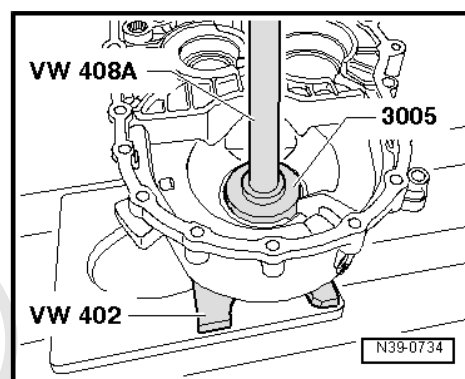
The differential must be re-adjusted when the following components have been renewed:

- ◆ Gearbox housing
- ◆ Clutch housing
- ◆ Differential cage, or
- ◆ Tapered roller bearings for differential

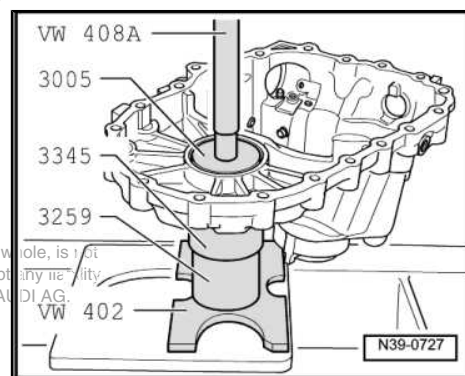
Table of adjustments ➔ [page 115](#)

Adjusting:

- Press tapered roller bearing outer race with shim
➔ [Item 8 \(page 117\)](#) / ➔ [Item 8 \(page 119\)](#) into clutch housing.
- Installation position of shim: Shoulder on inside diameter faces towards oil seal



- Press tapered roller bearing outer race without shim into the gearbox housing
- Install differential in clutch housing.
- Fit gearbox housing and tighten 5 bolts to specified torque
➔ [Item 11 \(page 24\)](#) .
- Press differential towards clutch housing; hold in this position and turn eight times.
- Press differential towards gearbox housing; hold in this position and turn eight times.



- Attach dial gauge e.g. -VAS 6080- to gearbox housing and set to "0" with 1 mm preload.

A - Dial gauge extension, 30 mm

- Move differential up and down and note play indicated on dial gauge (in this example: 0.70 mm).

Determining thickness of required shim:

The specified bearing preload is obtained by adding a constant figure (0.25 mm) to the reading indicated.

Example:

Measured value	0.70 mm
+ Preload (constant value)	0.25 mm
Thickness of shim =	0.95 mm

- Select shim of required thickness from table; for part numbers, refer to ⇒ Electronic parts catalogue .

The following shims are available:

Thickness of shims in mm			
0.65	0.85	1.05	1.25
0.70	0.90	1.10	
0.75	0.95	1.15	
0.80	1.00	1.20	

If the size of the shim required is larger than those listed in the table, install two shims amounting to the correct value. Install the thicker of the two shims first.

Tolerance variations make it possible to obtain the exact shim thickness required.

- Take off gearbox housing.
- Pull tapered roller bearing outer race out of gearbox housing.

A - Counter-support - Kukko 22/2-

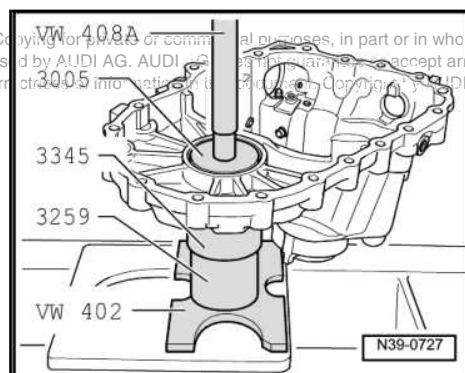
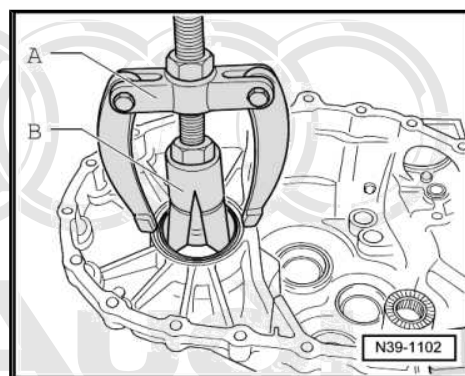
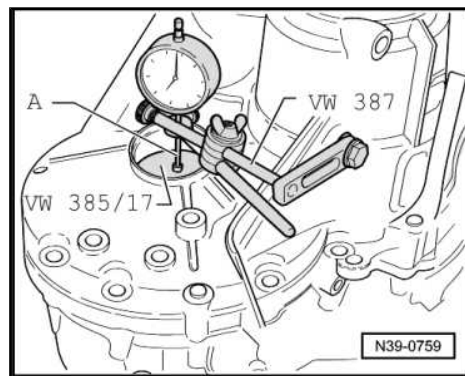
B - Internal puller 46...58 mm - Kukko 21/7-



Note

Internal puller 56 ... 70 mm - Kukko 21/8- can be used instead of internal puller 46...58 mm - Kukko 21/7- .

- Insert shim(s) of correct thickness.
- Press tapered roller bearing outer race in again and tighten gearbox housing bolts to specified torque.



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1 - Oil seal

- ☐ Between bevel box and gearbox
- ☐ Renewing (with bevel box removed)
⇒ [page 141](#)

2 - Bevel box

- ☐ Detaching with gearbox removed ⇒ [page 34](#)
- ☐ Fitting with gearbox removed ⇒ [page 46](#)

3 - Oil drain plug

- ☐ 11 Nm; if thread is lubricated
- ☐ 20 Nm; if thread is dry
- ☐ Always renew
- ☐ With captive seal

4 - Oil filler plug

- ☐ 11 Nm; if thread is lubricated
- ☐ 20 Nm; if thread is dry
- ☐ Always renew
- ☐ With captive seal

5 - Oil seal

- ☐ For flange shaft (right-side)
- ☐ Renewing (gearbox with bevel box removed)
⇒ [page 111](#)

6 - Breather pipe

- ☐ For bevel box breather
- ☐ Press in onto stop

7 - Cap

- ☐ For bevel box breather

8 - Flange shaft (right-side)

- ☐ Removing and installing ⇒ [page 111](#)

9 - Seal

- ☐ Insert in annular groove in flange shaft (right-side)
- ☐ Remove needle bearings (polygon bearings ⇒ [Item 10 \(page 138\)](#)) in order to renew

10 - Needle bearing (polygon bearing)

- ☐ Renewing ⇒ [page 158](#)

11 - Circlip

- ☐ Renew

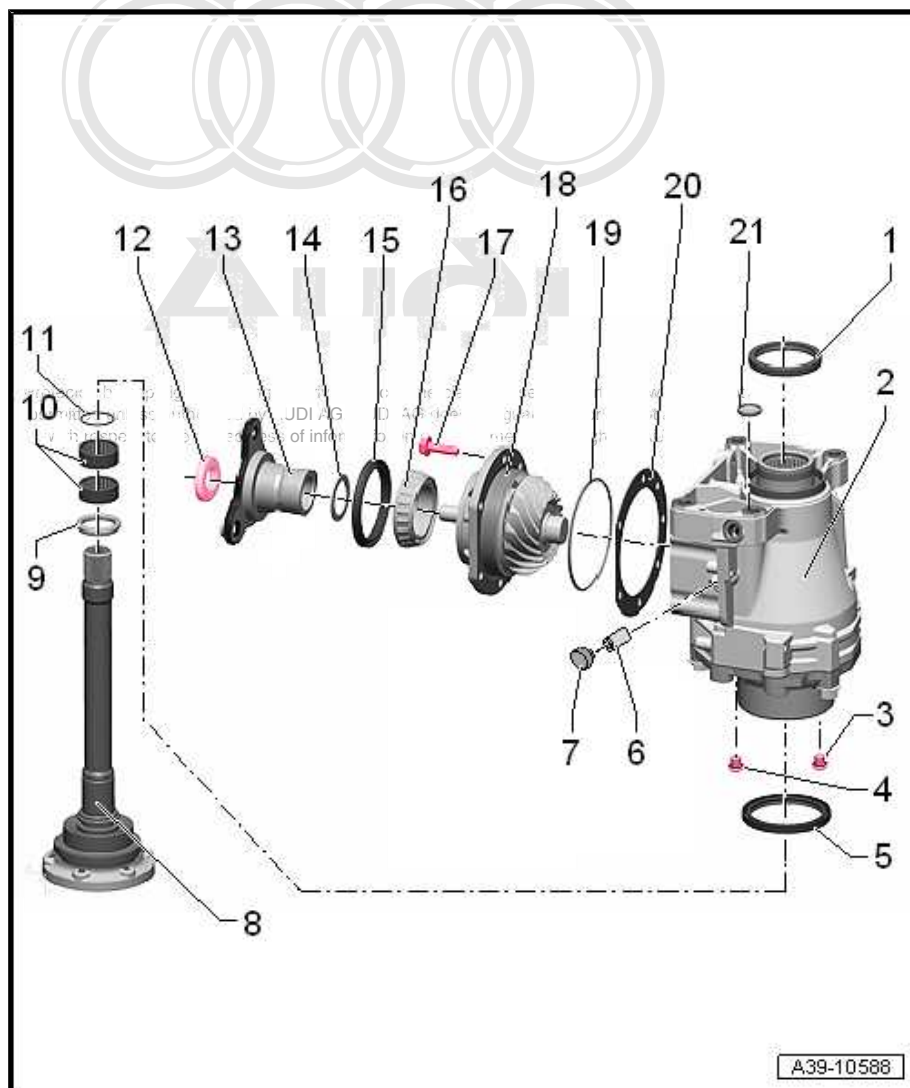
12 - Twelve-point nut

- ☐ 340 ± 15 Nm
- ☐ Renew
- ☐ Peen new nut to secure ⇒ [page 151](#)

13 - Output flange on bevel box

14 - Shim

- ☐ Component is not available as a replacement part



15 - Output flange oil seal on bevel box

- ☐ Renewing (with bevel box removed) ⇒ [page 143](#)

16 - Tapered roller bearing inner race

- ☐ Component is not available as a replacement part

17 - Bolt

- ☐ 38 Nm

18 - Pinion housing

- ☐ With shaft bevel gear and taper roller bearing outer race
- ☐ Components are not available as replacement parts
- ☐ Pry off carefully on alternate sides
- ☐ Observe bolt holes; pinion housing fits only in one position

19 - O-ring

- ☐ To renew, unscrew bolts ⇒ [Item 17 \(page 139\)](#) and carefully lever off pinion housing at notches in pinion housing
- ☐ Do not remove twelve-point nut ⇒ [Item 12 \(page 138\)](#) and output flange ⇒ [Item 13 \(page 138\)](#)

20 - Shim

- ☐ Component is not available as a replacement part
- ☐ Observe bolt holes on bevel box; shim can only be fitted in one position

21 - Sealing cap

- ☐ Component is not available as a replacement part

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4.1.2 Exploded view - bevel box "0AV"

Oil seals, bearing for flange shaft (right-side) and bearing for output flange in bevel box

1 - Oil seal between bevel box and gearbox

- ☐ Installed in bevel box
- ☐ Renewing (with bevel box removed)
⇒ [page 141](#)

2 - Bevel box

- ☐ Detaching with gearbox removed ⇒ [page 34](#)
- ☐ Fitting with gearbox removed ⇒ [page 46](#)
- ☐ Removing and installing with gearbox installed ⇒ 6-speed manual gearbox; Rep. gr. 34 ; Bevel box

3 - Oil drain plug

- ☐ 15 Nm
- ☐ Always renew
- ☐ With captive seal

4 - Flange shaft oil seal (right-side)

- ☐ Installed at bevel box (outer seal)
- ☐ Renewing ⇒ [page 111](#)

5 - Oil filler plug

- ☐ 15 Nm
- ☐ Always renew
- ☐ With captive seal

6 - Breather pipe

- ☐ For bevel box breather
- ☐ Component is not available as a replacement part

7 - Cap

- ☐ For bevel box breather

8 - Flange shaft (right-side)

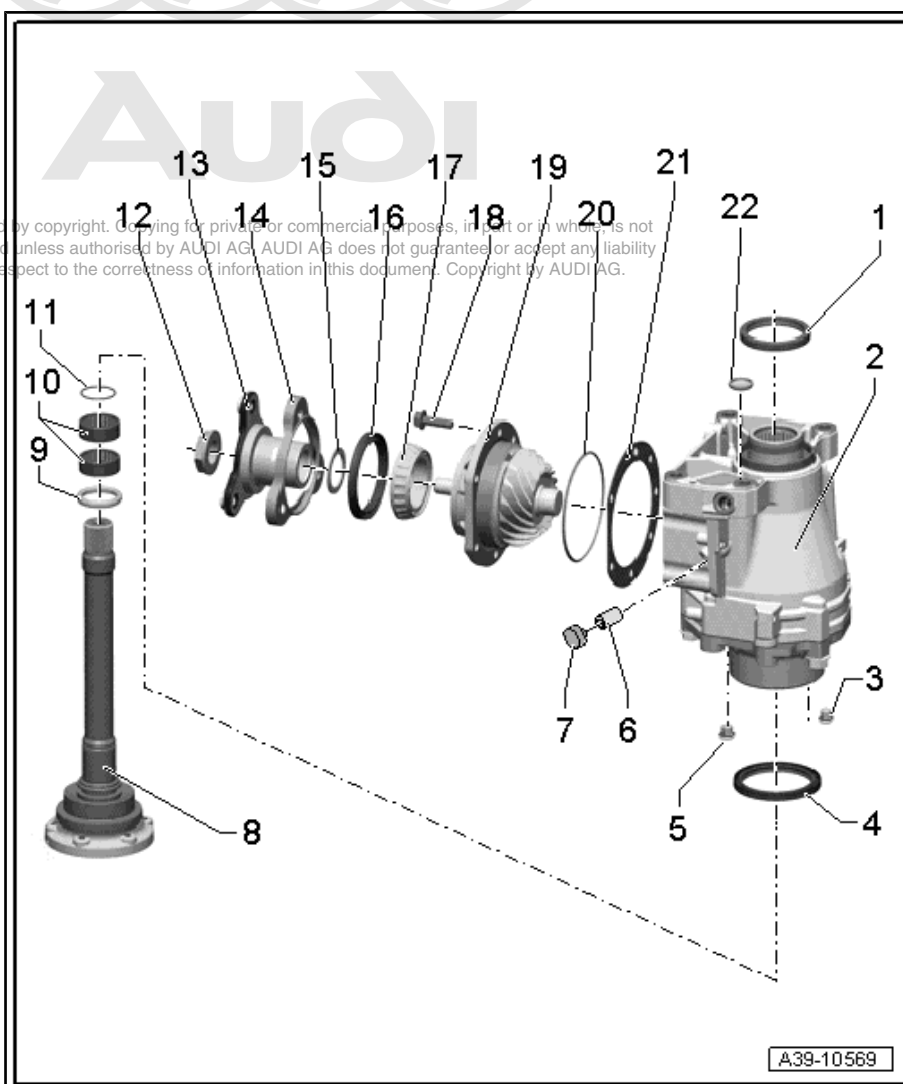
- ☐ Removing and installing ⇒ [page 111](#)

9 - Seal

- ☐ Renew
- ☐ Insert in annular groove in flange shaft (right-side)
- ☐ Remove needle bearings (polygon bearings ⇒ [Item 10 \(page 140\)](#)) in order to renew

10 - Needle bearing (polygon bearing)

- ☐ Does not turn easily when flange shaft is removed; this does not indicate a fault
- ☐ Acoustic check can only be performed when installed
- ☐ Check for damage such as cracking in outer race
- ☐ Renewing ⇒ [page 158](#)



11 - Circlip

- ☐ Renew

12 - Nut

- ☐ 480 Nm
- ☐ Apply locking fluid - D 000 600- when fitting
- ☐ Renew

13 - Output flange on bevel box

14 - Output flange cap

- ☐ Must engage with output flange
- ☐ Renew if damaged

15 - Shim

- ☐ Component is not available as a replacement part

16 - Output flange oil seal on bevel box

- ☐ Renewing ⇒ [page 151](#)

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17 - Tapered roller bearing inner race

- ☐ Component is not available as a replacement part

18 - Bolt

- ☐ 25 Nm
- ☐ Centre hex studs for securing heat shield for drive shaft (right-side) are fitted in place of some bolts

19 - Pinion housing

- ☐ With shaft bevel gear and taper roller bearing outer race
- ☐ Components are not available as replacement parts
- ☐ Carefully prise off and drive in on alternate sides
- ☐ Observe bolt holes; pinion housing fits only in one position

20 - O-ring

- ☐ To renew, unscrew bolts ⇒ [Item 18 \(page 141\)](#) and carefully lever off pinion housing at projecting webs on outside edge

21 - Shim

- ☐ Component is not available as a replacement part
- ☐ Observe bolt holes on bevel box; shim can only be fitted in one position

22 - Sealing cap

- ☐ Drive in as far as stop using spacer tube - VW 540/1 B- .

4.2 Renewing oil seals for bevel box

⇒ [“4.2.1 Renewing oil seal between gearbox and bevel box \(on bevel box\)”, page 141](#)

⇒ [“4.2.2 Renewing output flange oil seal on bevel box 0CN”, page 143](#)

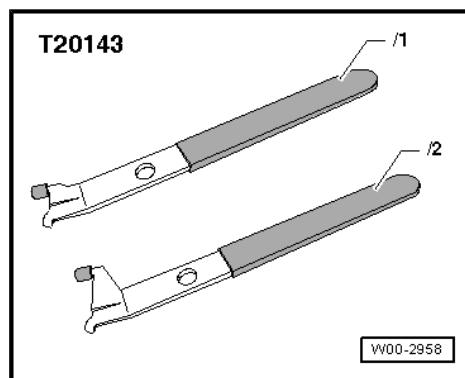
⇒ [“4.2.3 Renewing output flange oil seal on bevel box 0AV”, page 151](#)

⇒ [“4.4 Renewing needle bearings \(polygon bearings\) and seal for needle bearing on flange shaft \(right-side\)”, page 158](#)

4.2.1 Renewing oil seal between gearbox and bevel box (on bevel box)

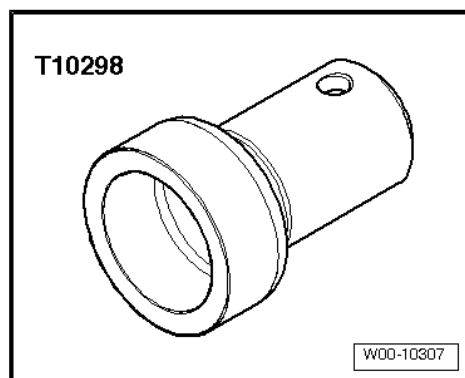
Special tools and workshop equipment required

◆ Extractor tool - T20143-



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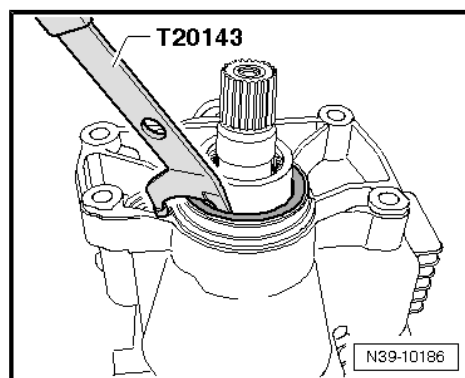
◆ Thrust piece - T10298-



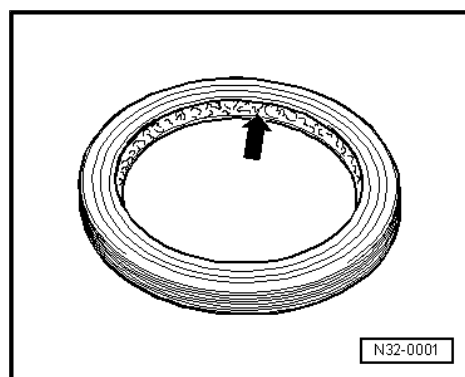
- Detach bevel box from gearbox ➔ [page 34](#) .
- Carefully remove oil seal using extractor tool - T20143/1- or extractor tool - T20143/2- .

i Note

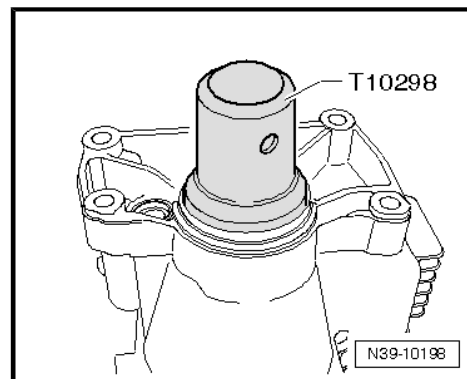
Take care not to damage running surface for oil seal on shaft when doing so.



- Pack space between sealing lip and dust lip -arrow- half full with sealing grease - G 052 128 A1- .
- Lightly oil outer circumference of new oil seal.



- Drive in new oil seal onto stop using thrust piece - T10298- . Take care to keep seal straight when installing.
- Attach bevel box to gearbox ➔ [page 46](#) .
- Check gear oil level in bevel box ➔ 6-speed manual gearbox; Rep. gr. 39 ; Gear oil; Checking gear oil level .

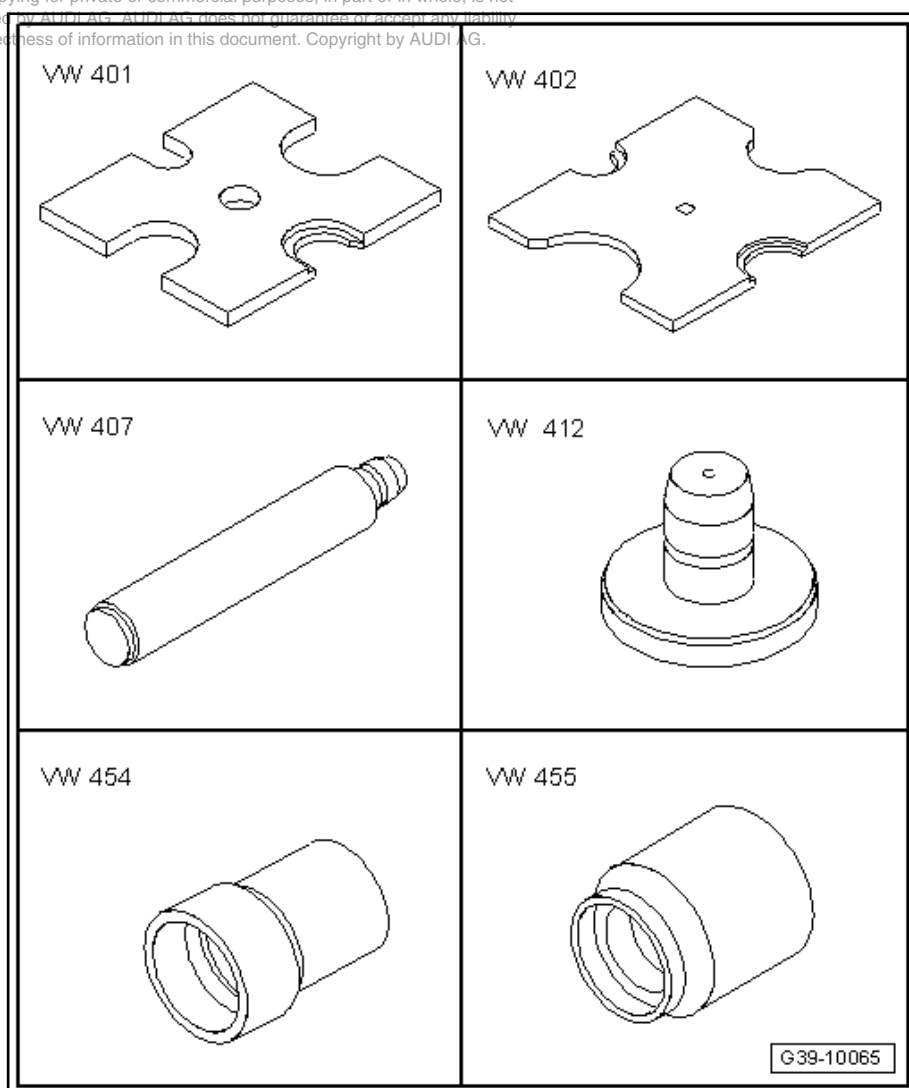


4.2.2 Renewing output flange oil seal on bevel box “0CN”

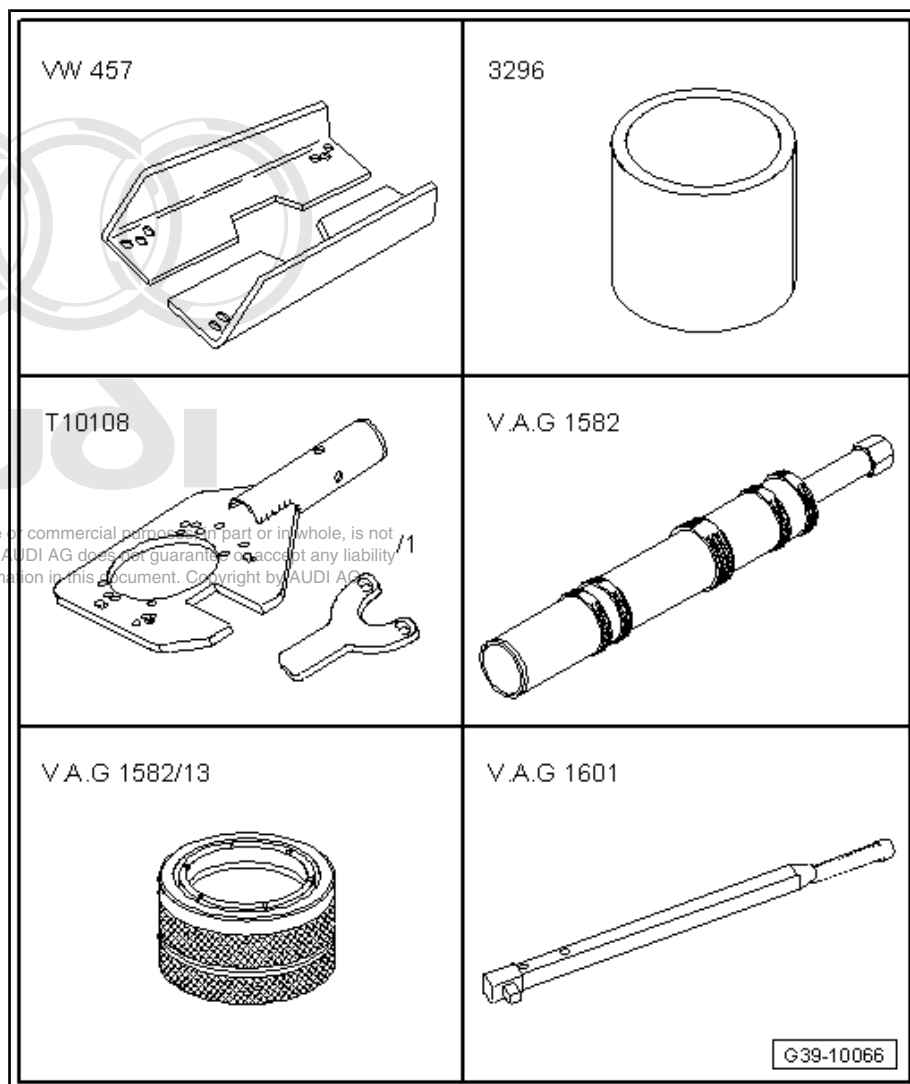
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Special tools and workshop equipment required

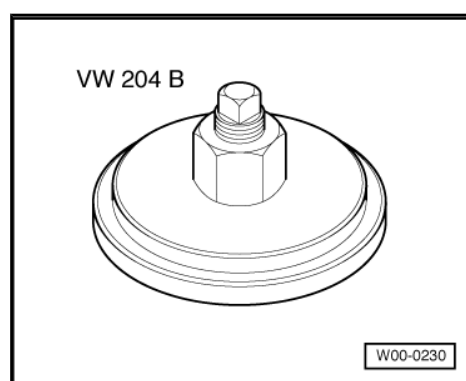
- ◆ Thrust plate - VW 401-
- ◆ Thrust plate - VW 402-
- ◆ Press tool - VW 407-
- ◆ Press tool - VW 412-
- ◆ Press tool - VW 454-
- ◆ Installing sleeve - VW 455-



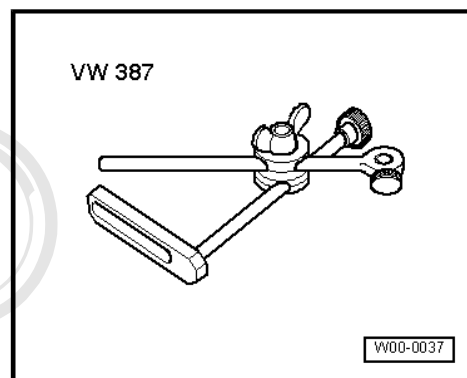
- ◆ Support rails - VW 457-
- ◆ Tube - 3296-
- ◆ Gearbox support - T10108-
with support plate -
T10108/1-
- ◆ Tapered roller bearing pull-
er - V.A.G 1582-
- ◆ Adapter - V.A.G 1582/13-
- ◆ Torque wrench - V.A.G
1601-



- ◆ Crankshaft seal installing tool - VW 204 B-

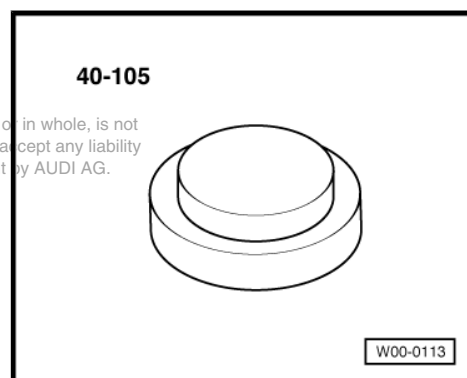


- ◆ Universal dial gauge bracket - VW 387-

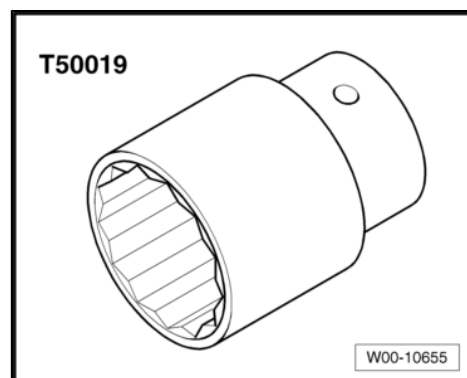


- ◆ Thrust plate - 40 - 105-

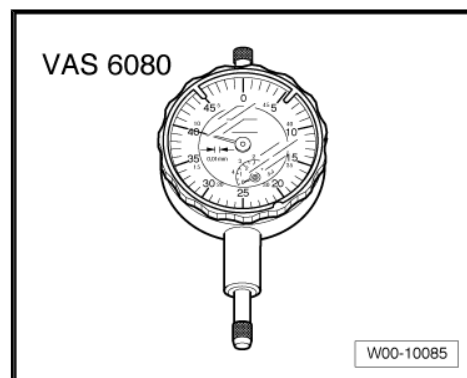
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- ◆ Socket (34 mm) e.g. -T50019-



- ◆ Dial gauge , e.g. -VAS 6080-



- ◆ Sealing grease - G 052 128 A1-
- ◆ 2x bolts (M10 x 30)
- ◆ 4x nuts (M12 x 10)

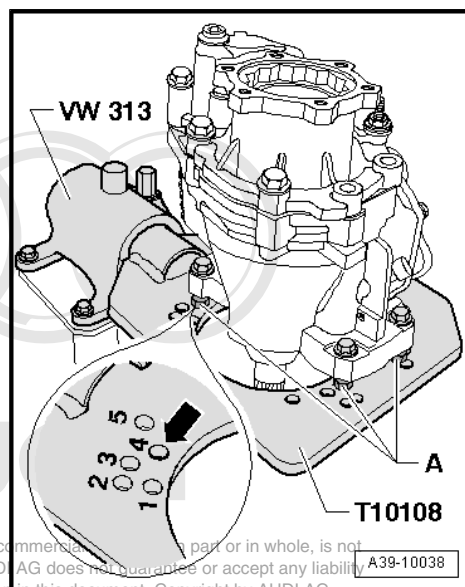


Note

- ◆ Note different versions of bevel box ➔ [page 137](#).
- ◆ A tapered bearing roller inner race is pressed onto the bevel box output flange.
- ◆ It is removed at a later stage.
- The tapered roller bearings for the bevel box output flange and the shims are not renewed.
- Tightening torques ➔ [page 137](#)

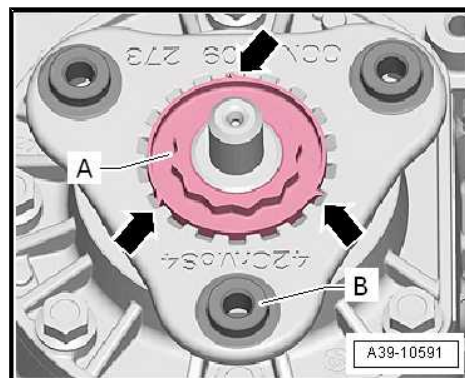
Removing oil seal for output flange

- Detach bevel box from gearbox ➔ [page 34](#).
- Locate bevel box on hole marked "4" -arrow- in gearbox support - T10108-. To do so, place nuts M12x10 -item A- between bevel box and gearbox support.
- Then align the bevel box with the three remaining holes and secure (place nuts -A- in between).
- Position drip tray, e.g. drip tray for workshop hoist - VAS 6208- below.
- Drain gear oil out of bevel box.



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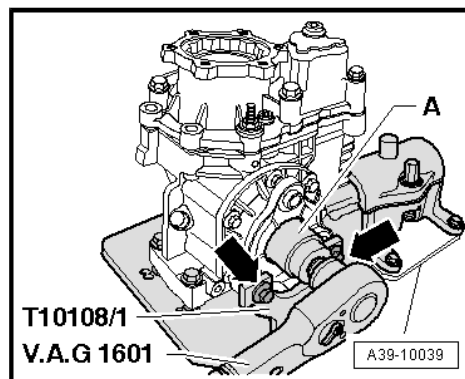
- Drive back peening points -arrows- of twelve-point nut -A- in recesses of output flange -B-.



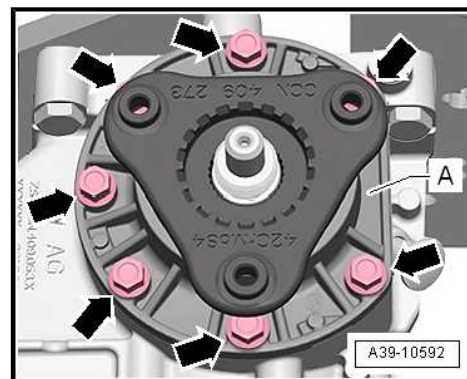
- Lock bevel box output flange with support plate - T10108/1- by screwing in two M10x30 bolts -arrows-.

A - 34 mm socket, e.g. socket 34 mm - T50019-

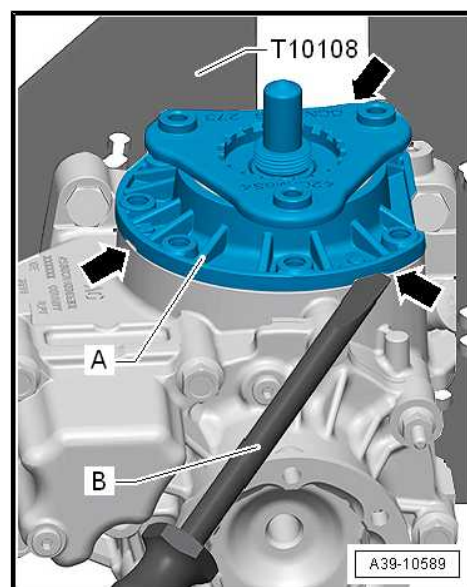
- Remove output flange nut.



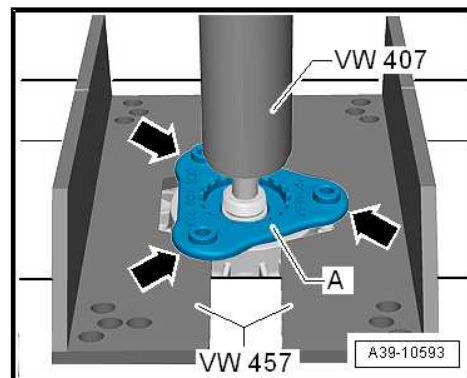
- Swing bevel box so that output flange points upwards.
- Remove securing bolts -arrows- for pinion housing -A-.



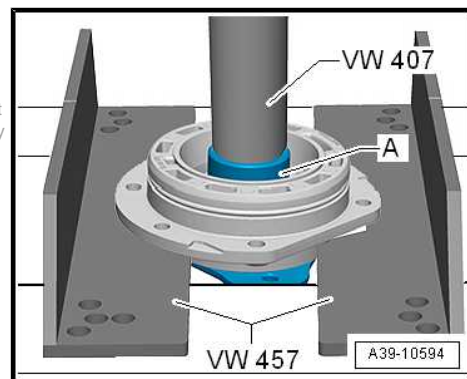
- Apply a suitable plain slot screwdriver -B- to 3 recesses -arrows- on pinion housing -A- and carefully lever off pinion housing together with shaft bevel gear.



- Fit output flange -A- onto support rails - VW 457- -arrows- so that it positioned centrally.
- Press shaft bevel gear off output flange -A-.
- When doing so, ensure that shaft bevel gear and tapered roller bearing inner race are not dropped.



- Press output flange -A- out of pinion housing.

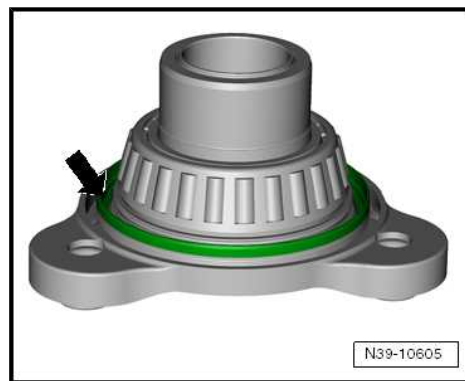


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Note

Oil seal -arrow- is located on output flange.



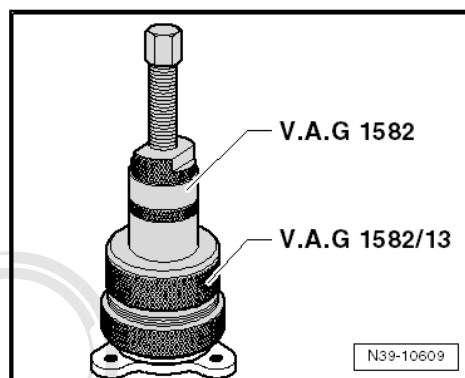
- In order to remove oil seal, tapered roller bearing inner race must be pulled off output flange.



Caution

Take care not to damage tapered roller bearing inner race.

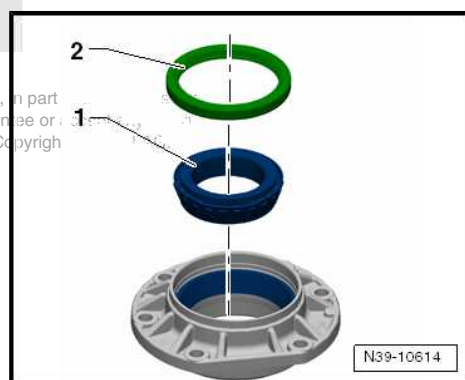
- Pull off tapered roller bearing inner race using adapter for tapered roller bearing puller - V.A.G 1582/13- .
- Bevel box must be renewed if tapered roller bearing inner race is damaged.



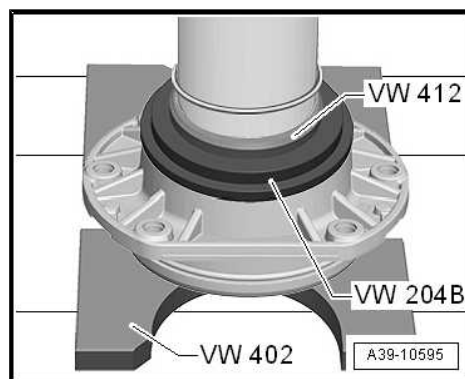
- Place thrust plate - 40 - 105- on output flange.
- Pull off tapered roller bearing inner race from output flange using tapered roller bearing puller .
- Remove oil seal for output flange.

Installing oil seal for output flange

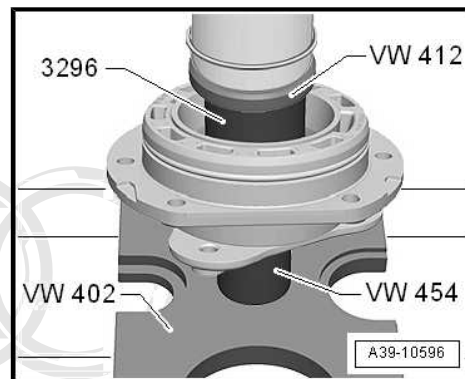
- Insert old tapered bearing roller inner race -1- into pinion housing.
- Lightly lubricate outer circumference of new oil seal -2- for output flange.



- Press in new oil seal so that it is flush.
- Large Ø of -VW 204 B- faces oil seal.
- Pack space between sealing lip and dust lip of oil seal half-full with sealing grease - G 052 128 A1- .

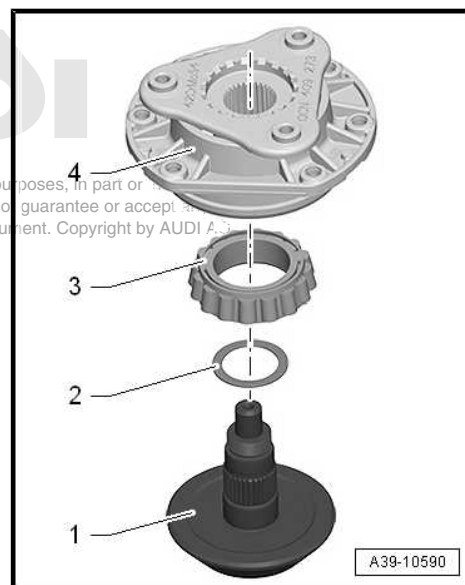


- Press tapered roller bearing inner race ➔ [page 148](#) onto output flange as far as stop.
- Large Ø of press tool - VW 454- faces output flange.
- Only press tapered roller bearing inner race on as far as stop. Do not exert excessive pressure on tapered roller bearing.

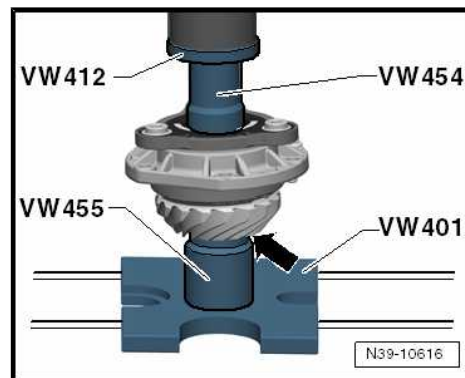


- Fit shim -2-, tapered roller bearing inner race -3- and pinion housing -4- onto shaft bevel gear -1-.
- Always re-install old shim -2-. This ensures the bearing preload of shaft bevel gear in pinion housing.

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- Carefully press pinion housing with output flange onto shaft bevel gear as far as stop.
- The shoulder -arrow- on installing sleeve - VW 455- faces towards shaft bevel gear.
- Turn pinion housing before pressing on.

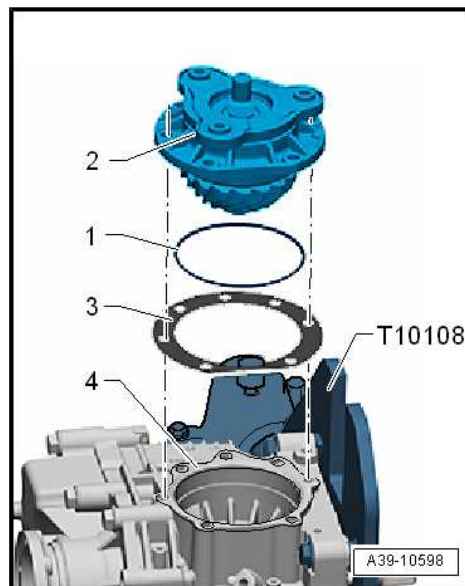


- Align old shim -3- with pinion housing -2-.
- Pinion housing -2- and shim -3- can only be fitted in one position.
- Lightly lubricate new O-ring -1- with gear oil and fit onto pinion housing -2-.
 - Place pinion housing -2- in final drive housing -4-.

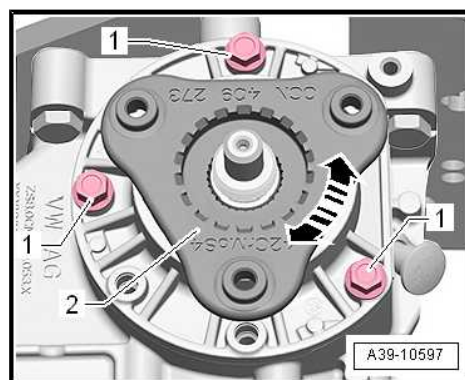


Note

- ◆ *Teeth of shaft bevel gear and bevel gear must mesh.*
- ◆ *Align holes for securing bolts on pinion housing with final drive housing.*

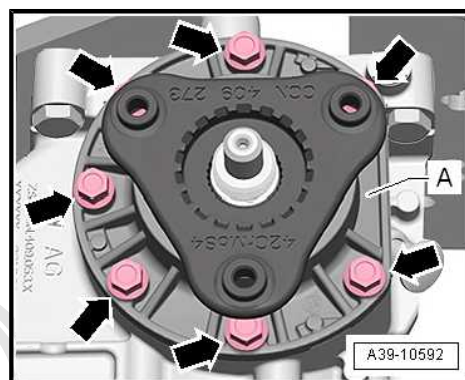


- Tighten bolts -1- in small steps and alternating between sides; at the same time turn output flange -2- slightly back and forth in direction of -arrows-.



- Tighten securing bolts -arrows- for pinion housing -A- to final setting in a diagonal sequence.

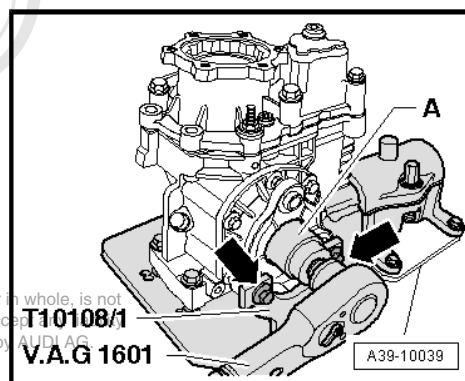
Tightening torque ➔ [Item 17 \(page 139\)](#)



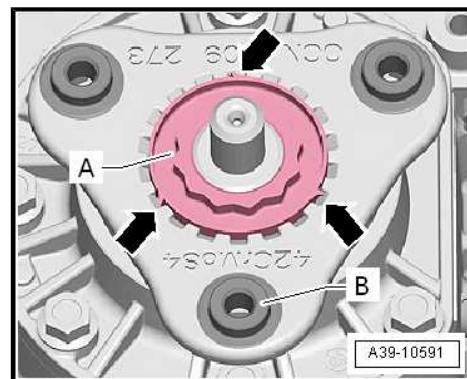
- Tighten new twelve-point nut for output flange.

Tightening torque ➔ [Item 12 \(page 138\)](#)

A - 34 mm socket, e.g. socket 34 mm - T50019-



- Secure twelve-point nut -A-.
- Peen nut into recesses of output flange -B- (120° offset) -arrows-.



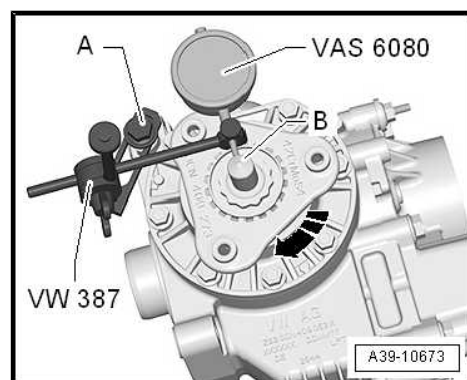
Measuring radial run-out at output flange/shaft bevel gear



Note

After tightening nut for output flange, check radial run-out at centring pin of shaft bevel gear.

- Secure measuring equipment to bevel box with bolt -A- (M8 x 25 mm).
- Apply dial gauge , e.g. -VAS 6080- to centring pin of shaft bevel gear -B- and set to "0" with 1 mm preload.
- Turn output flange one complete rotation in direction of -arrow-.
- Check reading on dial gauge .
- Maximum radial run-out: 0.05 mm
- Attach bevel box to gearbox ⇒ [page 46](#) .
- Check gear oil level in bevel box ⇒ 6-speed manual gearbox; Rep. gr. 39 ; Gear oil; Checking gear oil level .

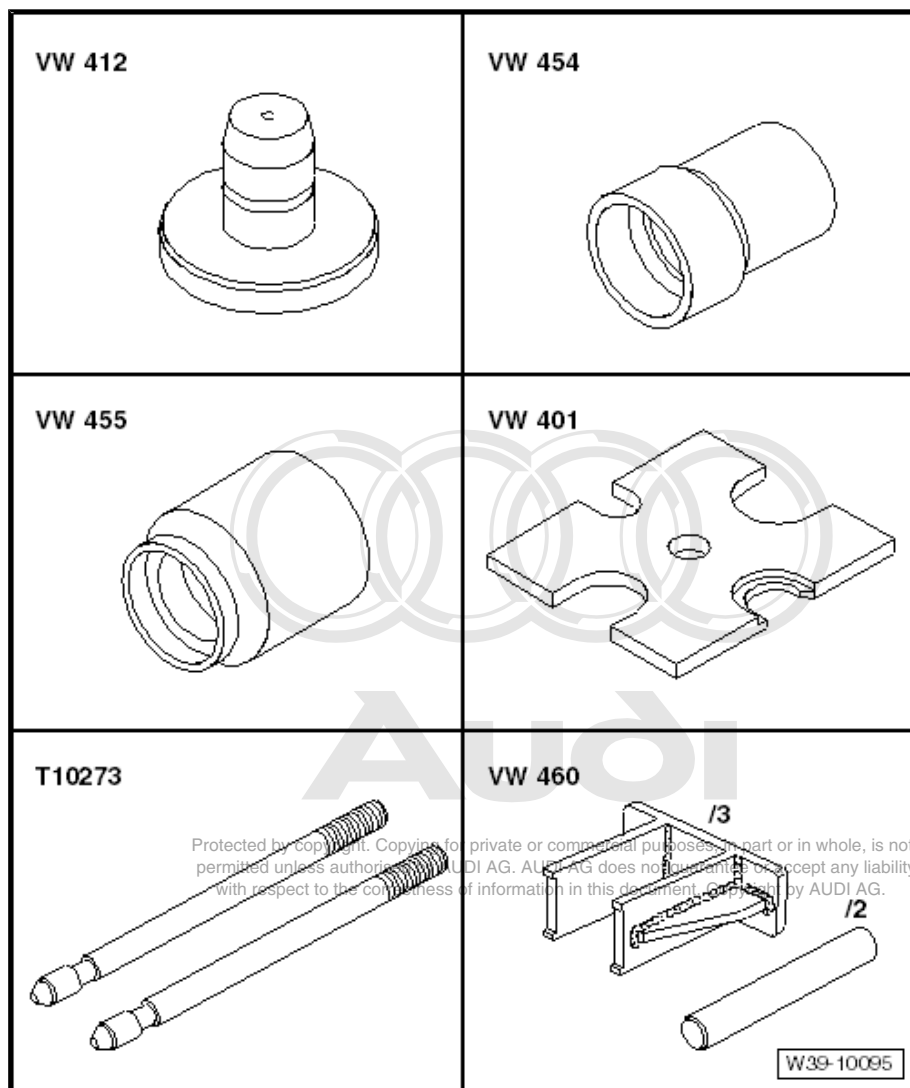


4.2.3 Renewing output flange oil seal on bevel box "0AV"

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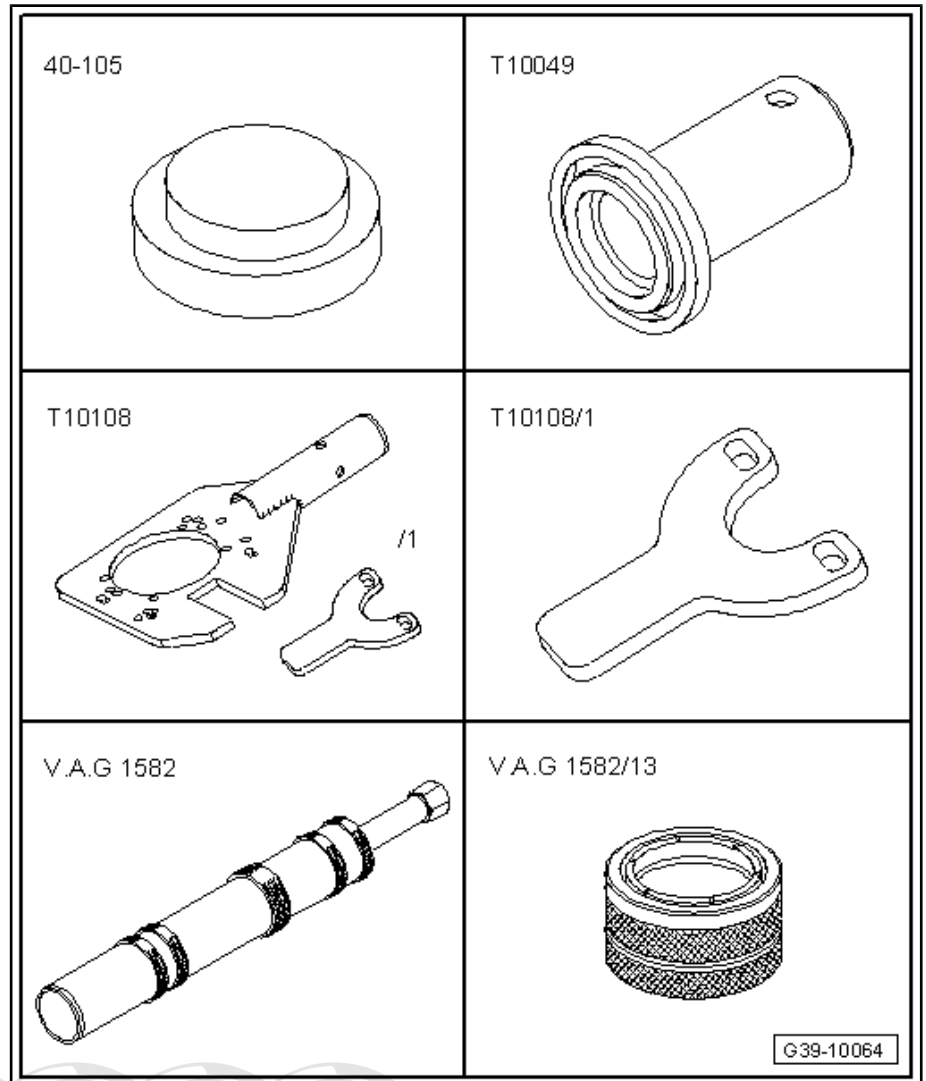
Special tools and workshop equipment required

- ◆ Press tool - VW 412-
- ◆ Press tool - VW 454-
- ◆ Installing sleeve - VW 455-
- ◆ Thrust plate - VW 401-
- ◆ 2 studs M8 x 30 mm or guide pins M8 - T10273-
- ◆ Pin - VW 460/2-

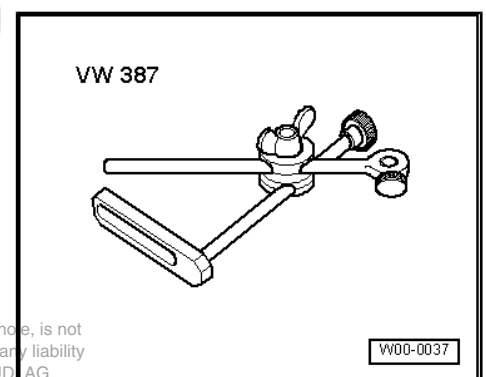


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- ◆ Thrust plate - 40 - 105-
- ◆ Thrust piece - T10049-
- ◆ Gearbox support - T10108-
- ◆ Support plate - T10108/1-
- ◆ Tapered roller bearing puller - V.A.G 1582-
- ◆ Adapter - V.A.G 1582/13-

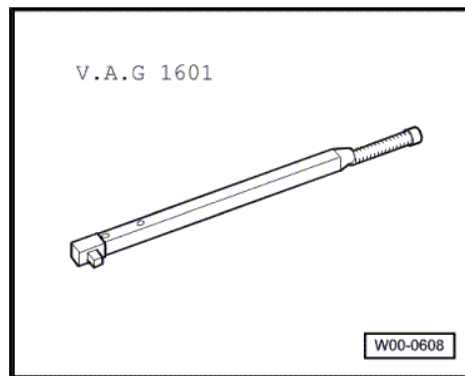


- ◆ Universal dial gauge bracket - VW 387-

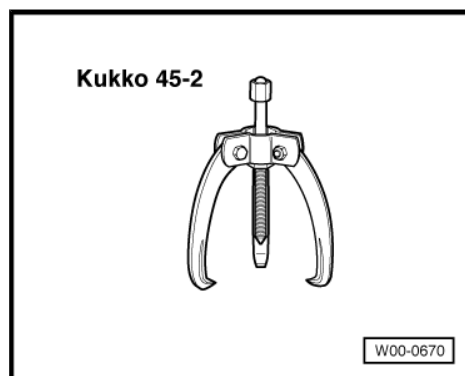


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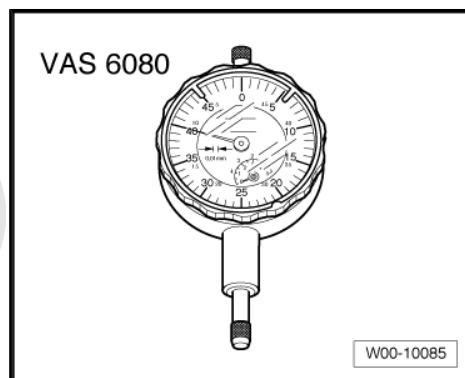
◆ Torque wrench - V.A.G 1601-



◆ Three-arm puller - Kukko 45-2-



◆ Dial gauge , e.g. -VAS 6080-



◆ Sealing grease - G 052 128 A1-

◆ 2x bolts (M10 x 30)

◆ 4x nuts (M12 x 10)

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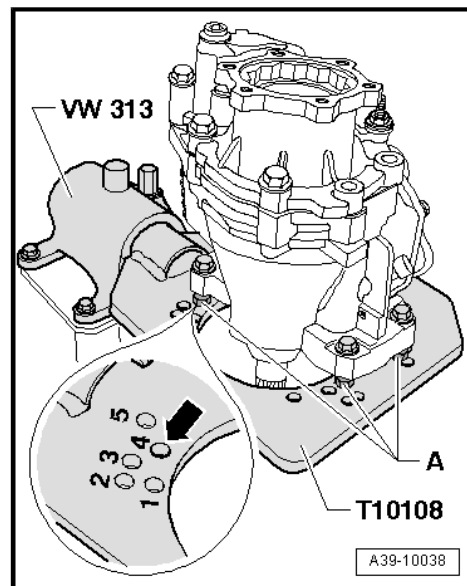


Note

- ◆ *Note different versions of bevel box ➔ [page 137](#) .*
- ◆ *A tapered bearing roller inner race is pressed onto the bevel box output flange.*
- ◆ *It is removed at a later stage.*
- The tapered roller bearings for the bevel box output flange and the shims are not renewed.
- Tightening torques ➔ [page 140](#)

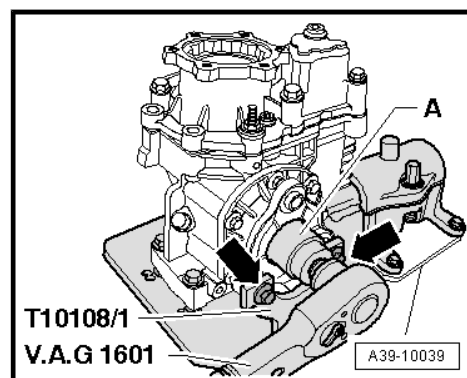
Removing oil seal for output flange

- Detach bevel box from gearbox ⇒ [page 34](#) .
- Place nut M12 x 10 -item A- between bevel box and gearbox support - T10108- and fit bevel box on hole marked "4" -arrow- in gearbox support.
- Then align the bevel box with the three remaining holes and secure (place nuts -A- in between).
- Position drip tray, e.g. drip tray for workshop hoist - VAS 6208- below.
- Drain gear oil out of bevel box.



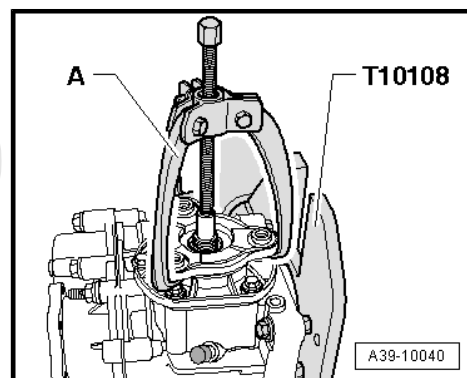
- Lock bevel box output flange with support plate -T10108/1- by screwing in two M10 x 30 bolts -arrows-.
- Remove output flange nut.

A - 36 mm socket for $\frac{3}{4}$ " drive



- Swing bevel box so that output flange points upwards.
- Pull output flange off shaft bevel gear of bevel box.

A - Three-arm puller , e.g. -Kukko 45-2-

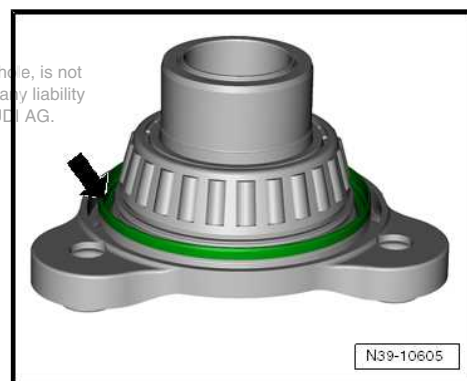


Note

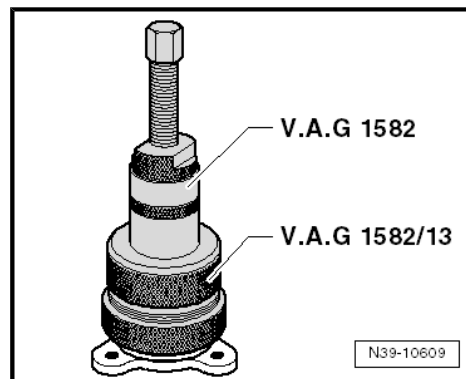
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When pulling off the output flange, the tapered roller bearing inner race and oil seal -arrow- remain fitted on the output flange.

Remove oil seal as follows:

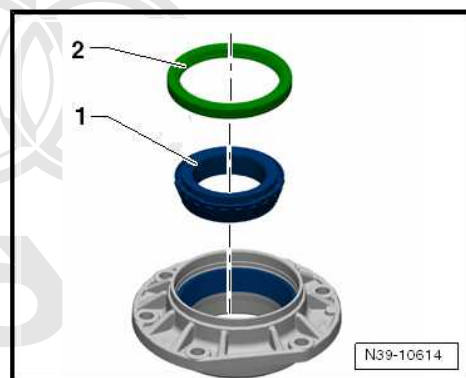
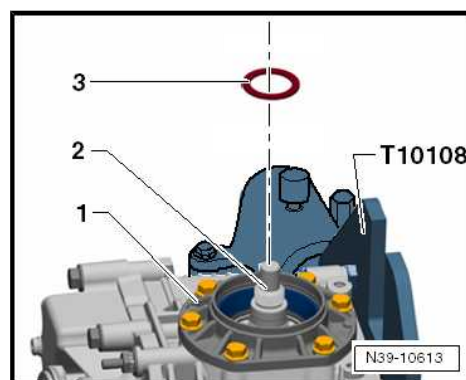


- In order to remove oil seal, tapered roller bearing inner race must be pulled off output flange.
- Place thrust plate - 40 - 105- on output flange.
- Pull off inner race for tapered roller bearing from output flange using tapered roller bearing puller - V.A.G 1582- and adapter - V.A.G 1582/13- .
- Remove oil seal for output flange.

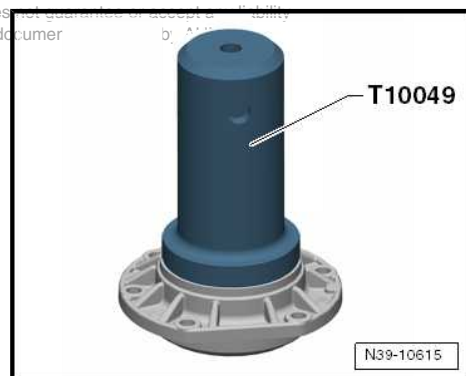


Installing oil seal for output flange

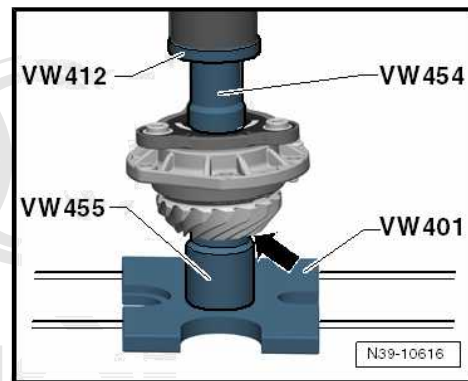
- In order to install oil seal, pinion housing -1- and shaft bevel gear -2- must first be removed.
- Remove bolts for pinion housing -1- and carefully lever off pinion housing in a diagonal sequence at projecting edges.
- Remove pinion housing with shaft bevel gear -2-.
- Clean thread on shaft bevel gear.
- If shim -3- was removed with output flange, it must be re-installed in pinion housing.
- This ensures the bearing preload of shaft bevel gear in pinion housing.
- Insert old tapered bearing roller inner race -1- into pinion housing.
- Lightly lubricate outer circumference of new oil seal -2- for output flange.



- Drive in new oil seal using thrust piece - T10049-
- Oil seal must be flush with top edge of housing.
- Pack space between sealing lip and dust lip of oil seal half-full with sealing grease - G 052 128 A1- .



- Press together output flange and pinion housing with shaft bevel gear as far as stop.
- The shoulder -arrow- on installing sleeve - VW 455- faces towards shaft bevel gear.



- Screw studs M8 x 30 mm = -A- or guide pins M8 - T10273- into final drive housing.

- Slide new O-ring -1- onto pinion housing -2-.

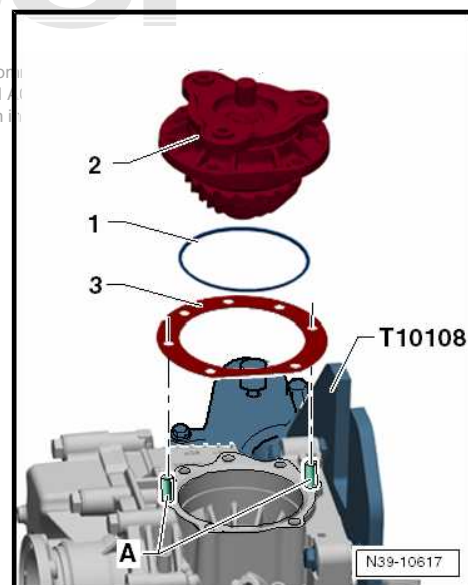
Pinion housing -2- and shim -3- can only be fitted in one position.

- Insert old shim -3-.
- Carefully drive in pinion housing in a diagonal sequence as far as stop using pin - VW 460/2- .

A small gap remains between pinion housing and housing for bevel box.

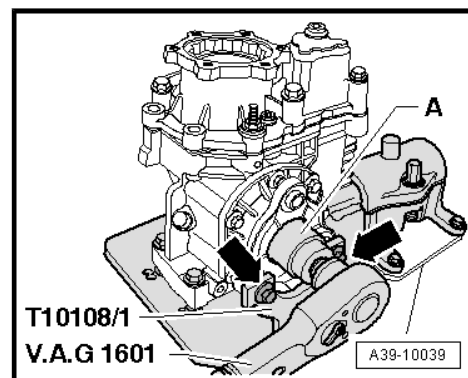
The gap closes when bolts for pinion housing are tightened.

- Tighten bolts securing pinion housing -2- in a diagonal sequence to specified torque ➔ [Item 17 \(page 139\)](#) .



- Coat thread of new nut for output flange with locking fluid - D 000 600- and tighten to specified torque ➔ [Item 12 \(page 141\)](#) .

A - 36 mm socket for $\frac{3}{4}$ " drive

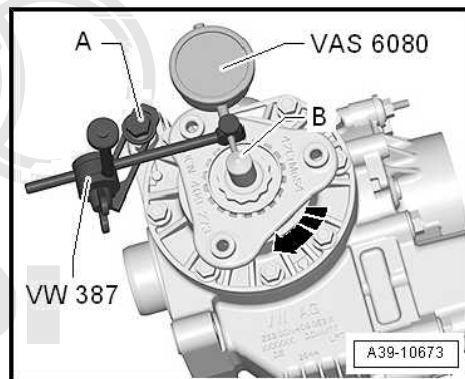


Measuring radial run-out at output flange/shaft bevel gear



Note

- ◆ After tightening nut for output flange, check radial run-out at centring pin of shaft bevel gear.
- ◆ The measuring process is illustrated for bevel box "0CN". The process is identical for bevel box "0AV".
- Secure measuring equipment to bevel box with bolt -A- (M8 x 25 mm).
- Apply dial gauge , e.g. -VAS 6080- to centring pin of shaft bevel gear -B- and set to "0" with 1 mm preload.
- Turn output flange one complete rotation in direction of -arrow-.
- Check reading on dial gauge .
- Maximum radial run-out: 0.05 mm
- Attach bevel box to gearbox ➔ [page 46](#) .
- Check gear oil level in bevel box ➔ 6-speed manual gearbox; Rep. gr. 39 ; Gear oil; Checking gear oil level .



4.3 Renewing output flange and re-determining shim for output flange

Adjustment is only necessary when renewing output flange. It serves to re-set the required preload of the tapered roller bearings for the shaft bevel gear.

- Remove output flange and pull tapered roller bearing inner race off output flange ➔ [page 143](#) / ➔ [page 151](#) .
- Measure length of shaft on removed output flange and new output flange and calculate the difference.

Example:

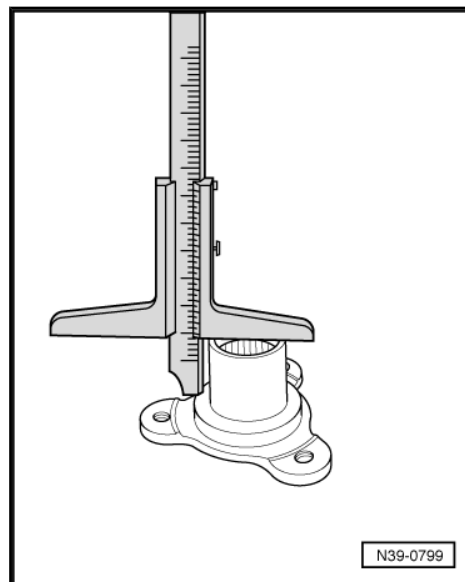
Removed output flange	45.00 mm
New output flange	45.10 mm
Difference	0.10 mm

If the new drive flange is longer, install a thinner shim (thickness reduced by the difference calculated above).

If the old drive flange is longer, install a thicker shim (thickness increased by the difference calculated above).

For correct version, refer to ➔ Electronic parts catalogue

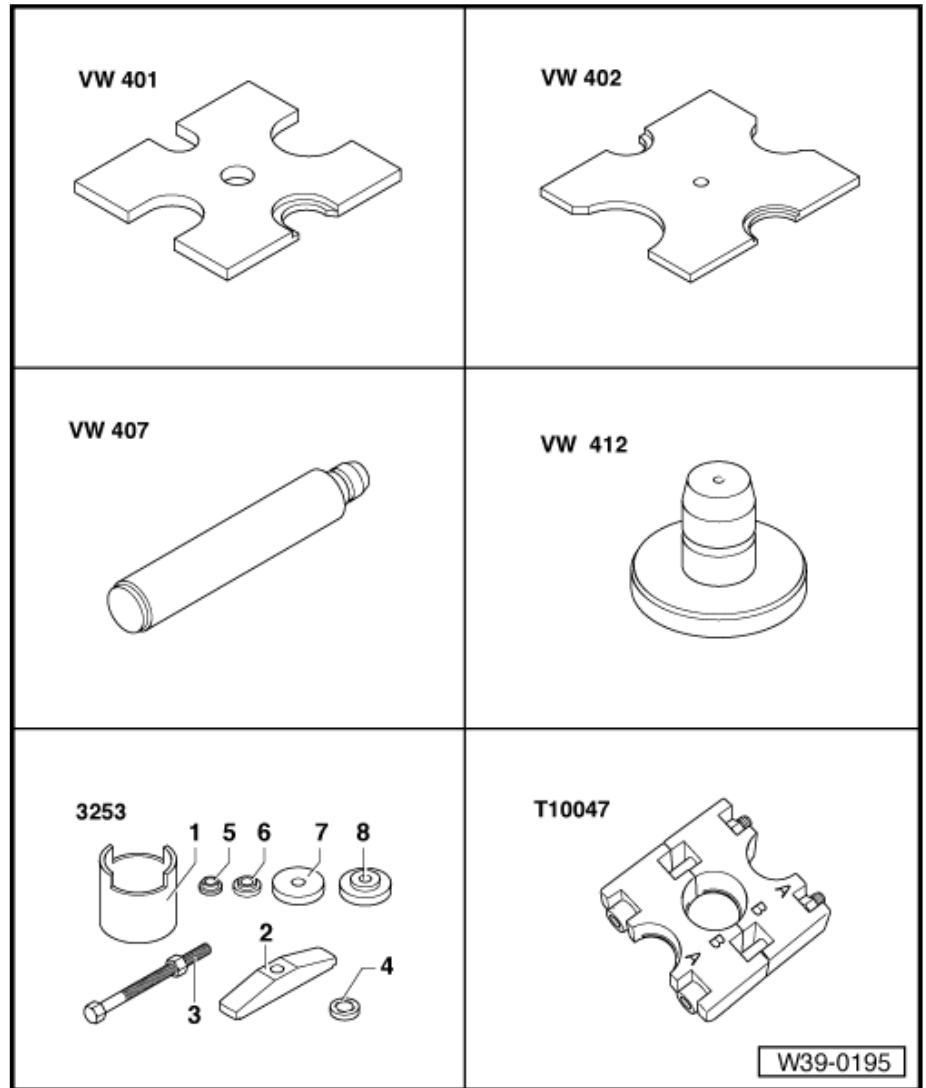
- Install output flange ➔ [page 143](#) / ➔ [page 151](#) .



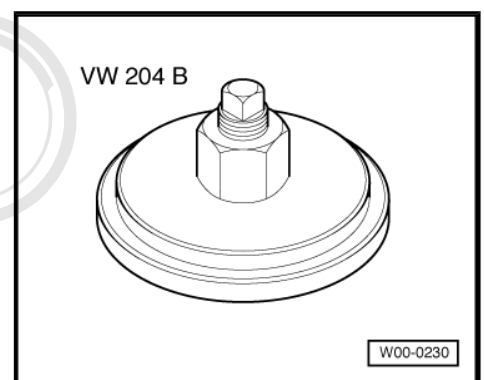
4.4 Renewing needle bearings (polygon bearings) and seal for needle bearing on flange shaft (right-side)

Special tools and workshop equipment required

- ◆ Thrust plate - VW 401-
- ◆ Thrust plate - VW 402-
- ◆ Press tool - VW 407-
- ◆ Press tool - VW 412-
- ◆ Assembly tool - 3253-
- ◆ Clamp - T10047-



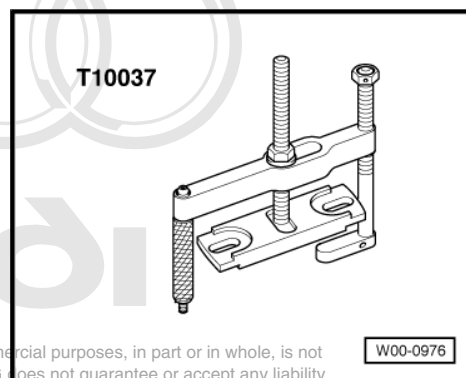
- ◆ Crankshaft seal installing tool - VW 204 B-



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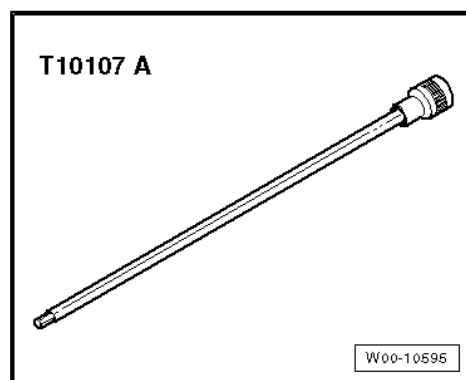


◆ Puller - T10037-

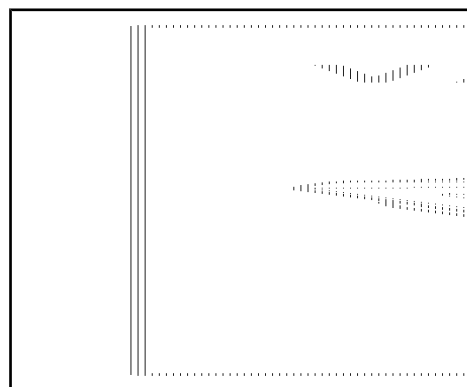


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◆ Socket and extended bit - T10107 A-



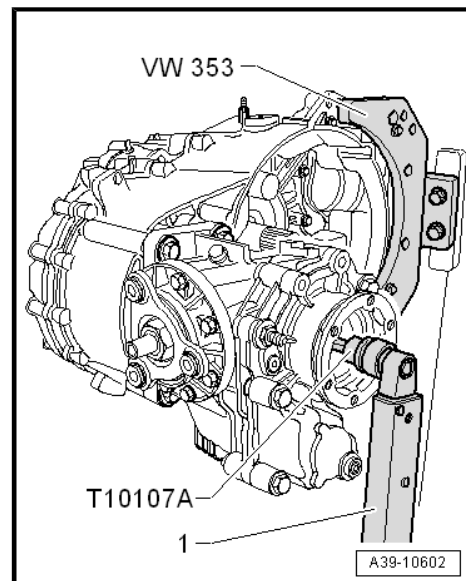
◆ Drip tray for workshop hoist - VAS 6208-



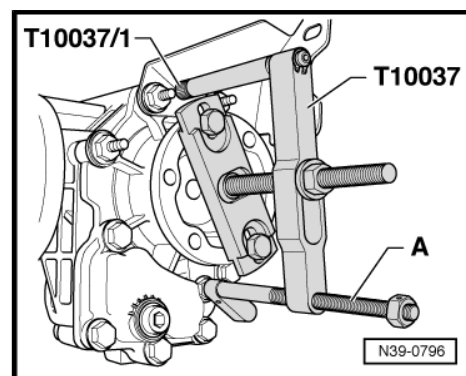
Removing

- Position drip tray , e.g. -VAS 6208- below.

- Using socket and extended bit - T10107 A- and torque wrench -1-, remove bolt securing flange shaft (right-side). To do so, screw two bolts into flange and counterhold flange shaft with tyre iron or other suitable lever.

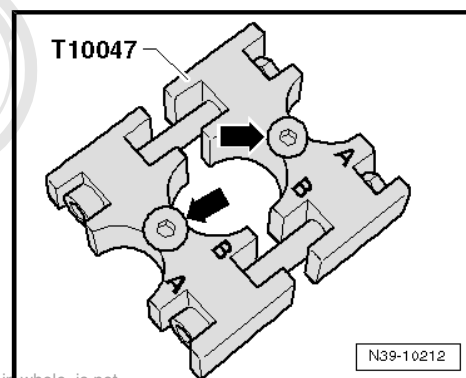


- Attach puller - T10037- to flange shaft (right-side).
- Use knurled nut - T10037/1- and spindle to align puller -A- parallel with flange.
- Pull out flange shaft (right-side).

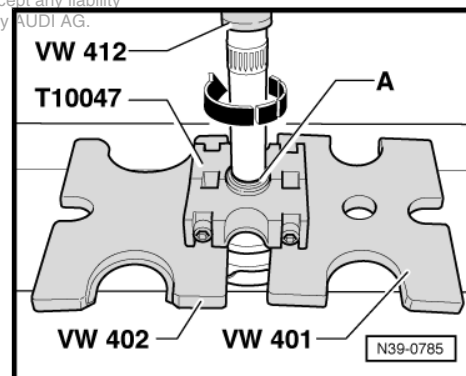


Attach clamp - T10047- to flange shaft as follows:

- Align both parts of clamp so that marks "B" are facing together.
- The stepped shoulders -arrows- must then be below needle bearing.
- Screw both halves together as far as stop.

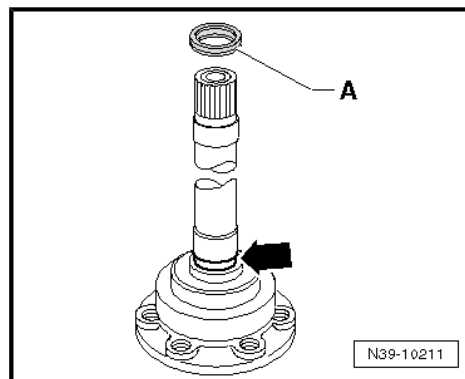


- Remove circlip -A- for needle bearings.



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- To prevent contact surface for needle bearings on flange shaft from being damaged, rotate flange shaft when pressing off -arrow-.
- Remove old oil seal -A- from groove -arrow-.

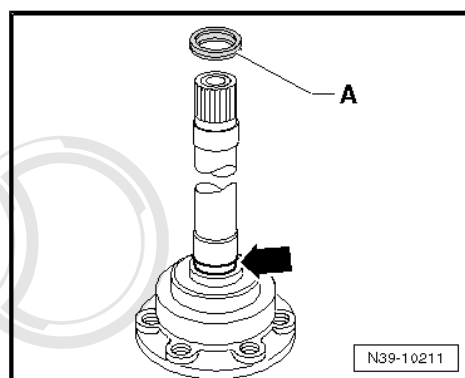


Installing

- Lightly lubricate new seal -A- with gear oil.
- Fit seal -A- in groove -arrow- on flange shaft.

Make sure that seal is not twisted.

- Attach clamp - T10047- to flange shaft ➔ illustration N39-10212 ➔ [page 161](#) .



- To prevent contact surface for needle bearings on flange shaft from being damaged, rotate flange shaft when pressing off -arrow-.
- Secure needle bearings on flange shaft with a new circlip.
- Carefully drive in flange shaft (while turning).
- Secure flange shaft with countersunk bolt; tightening torque ➔ [Item 13 \(page 120\)](#) .
- Check gear oil level in bevel box ➔ 6-speed manual gearbox; Rep. gr. 39 ; Gear oil; Checking gear oil level .

