

Workshop Manual Audi A3 1997 ➤

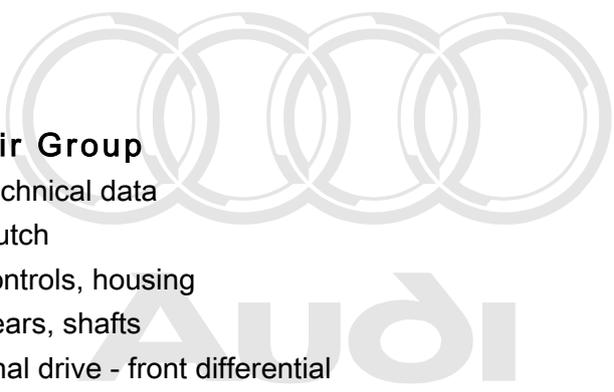
5/6-speed manual gearbox 02M/02Y, four-wheel drive

Edition 03.2005



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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 - front differential

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

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00 – Technical data

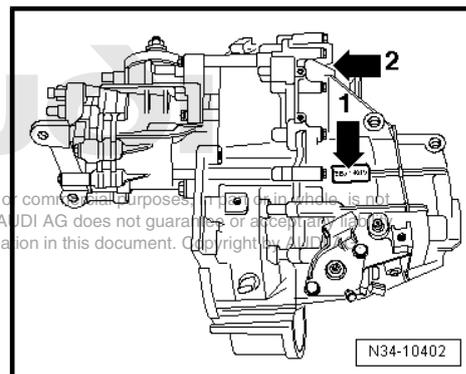
1 Gearbox identification

- ◆ The manual gearbox 02M/02Y, four-wheel drive is installed as a 5 and 6-speed gearbox in the Audi A3 1997 >. Allocation => [page 2](#).
- ◆ The components of manual gearbox 02M, four-wheel drive and 02Y, four-wheel drive are the same.

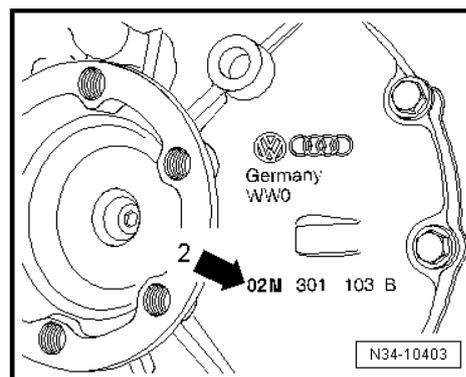
Location on gearbox

- ◆ Code letters and date of manufacture of gearbox -arrow 1-
- ◆ Manual gearbox 02M/02Y, four-wheel drive -arrow 2-

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Manual gearbox 02M, four-wheel drive -arrow 2-



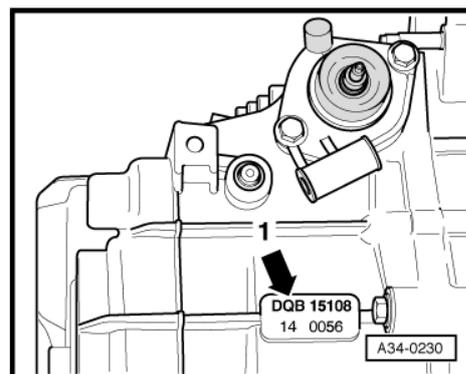
Code letters and date of manufacture of gearbox -arrow 1-

Example:	DQB	15	10	8
	Code letters	Day	Month	Year "1998" of manufacture

Additional data are production-related.

Note

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





2 Code letters, allocation, transmission ratios, capacities

Manual gearbox		5/6-speed 02M, four-wheel drive		
Gearbox	Code letters	DQB	DXW	DRV
	Manufactured from to	09.99 08.00	09.98 08.00	09.00 11.00
Allocation	Model	Audi A3 1997 ▶	Audi A3 1997 ▶	Audi A3 1997 ▶
	Engine	1.8 ltr. - 154 kW	1.8 ltr. - 110 kW 1.8 ltr. - 132 kW	1.9 ltr. - 96 kW turbo diesel
Ratios	Final drive I for 1st to 4th gear	63 : 15 = 4.200	63 : 15 = 4.200	62 : 16 = 3.875
Z ₂ : Z ₁	Final drive II for 5th/6th gear and reverse gear	63 : 19 = 3.316	63 : 19 = 3.316	62 : 20 = 3.100
	1st gear	41 : 12 = 3.417	42 : 11 = 3.818	42 : 11 = 3.818
	2nd gear	40 : 19 = 2.105	40 : 19 = 2.105	40 : 19 = 2.105
	3rd gear	40 : 28 = 1.429	39 : 29 = 1.345	38 : 29 = 1.310
	4th gear	37 : 34 = 1.088	35 : 36 = 0.972	34 : 37 = 0.919
	5th gear	34 : 31 = 1.097	32 : 33 = 0.970	31 : 34 = 0.912
	6th gear	31 : 34 = 0.912	–	28 : 37 = 0.757
	Reverse gear	23 : 14 x 30 : 12 = 4.107	23 : 14 x 31 : 11 = 4.630	23 : 14 x 31 : 11 = 4.630
Capacity	2.6 litres			
Specification	⇒ Parts catalogue			
Clutch actuation	Hydraulic			
Clutch plate Ø	240 mm	240 mm	240 mm	
Drive shaft flange Ø	108 mm	108 mm	108 mm	
Overall ratio i_{OV} , in top gear	3.023	3.215	2.346	
Allocation: rear final drive	Designation 02D ⇒ Parts catalogue			

Manual gearbox		6-speed 02M, four-wheel drive		6-speed 02Y, four-wheel drive
Gearbox	Code letters	EFY	FEK	FEL
	Manufactured from to	11.98 08.00	06.01 05.02	05.02 06.03
Allocation	Model	Audi A3 1997 ▶	Audi A3 1997 ▶	Audi A3 1997 ▶
	Engine	1.8 ltr. - 132 kW	1.9 ltr. - 96 kW turbo diesel	1.9 ltr. - 96 kW turbo diesel
Ratios	Final drive I for 1st to 4th gear	63 : 15 = 4.200	62 : 16 = 3.875	62 : 16 = 3.875
Z ₂ : Z ₁	Final drive II for 5th/6th gear and reverse gear	63 : 19 = 3.316	62 : 20 = 3.100	62 : 20 = 3.100
	1st gear	41 : 12 = 3.417	42 : 11 = 3.818	49 : 13 = 3.796
	2nd gear	40 : 19 = 2.105	40 : 19 = 2.105	48 : 23 = 2.087
	3rd gear	40 : 27 = 1.481	38 : 29 = 1.310	45 : 34 = 1.324
	4th gear	38 : 33 = 1.152	34 : 37 = 0.919	41 : 45 = 0.911
	5th gear	35 : 30 = 1.167	31 : 34 = 0.912	37 : 41 = 0.902
	6th gear	32 : 33 = 0.970	28 : 37 = 0.757	34 : 45 = 0.756

Manual gearbox	6-speed 02M, four-wheel drive		6-speed 02Y, four-wheel drive
Reverse gear	23 : 14 x 30 : 12 = 4.108	23 : 14 x 31 : 11 = 4.630	23 : 14 x 36 : 13 = 4.549
Capacity	2.6 litres		
Specification	⇒ Parts catalogue		
Clutch actuation	Hydraulic		
Clutch plate ∅	240 mm	240 mm	240 mm
Drive shaft flange ∅	108 mm	108 mm	108 mm
Overall ratio i_{ov} , in top gear	3.215	2.346	3.215
Allocation: rear final drive	Designation 02D ⇒ Parts catalogue		

Manual gearbox		5/6-speed 02M, four-wheel drive		
Gearbox	Code letters	FHA	FHB	FHC
	Manufactured from to	02.01 05.02	08.01 04.02	08.00 04.02
Allocation	Model	Audi A3 1997 ▶	Audi A3 1997 ▶	Audi A3 1997 ▶
	Engine	1.8 ltr. - 132 kW	1.8 ltr. - 154 kW	1.8 ltr. - 110 kW 1.8 ltr. - 132 kW
Ratios $Z_2 : Z_1$	Final drive I for 1st to 4th gear	63 : 15 = 4.200	63 : 15 = 4.200	63 : 15 = 4.200
	Final drive II for 5th/6th gear and reverse gear	63 : 19 = 3.316	63 : 19 = 3.316	63 : 19 = 3.316
	1st gear	41 : 12 = 3.417	41 : 12 = 3.417	42 : 11 = 3.818
	2nd gear	40 : 19 = 2.105	40 : 19 = 2.105	40 : 19 = 2.105
	3rd gear	40 : 27 = 1.481	40 : 28 = 1.429	39 : 29 = 1.345
	4th gear	38 : 33 = 1.152	37 : 34 = 1.088	35 : 36 = 0.972
	5th gear	35 : 30 = 1.167	34 : 31 = 1.097	32 : 33 = 0.970
	6th gear	32 : 33 = 0.970	31 : 34 = 0.912	–
	Reverse gear	23 : 14 x 30 : 12 = 4.108	23 : 14 x 30 : 12 = 4.108	23 : 14 x 31 : 11 = 4.630
Capacity	2.6 litres			
Specification	⇒ Parts catalogue			
Clutch actuation	Hydraulic			
Clutch plate ∅	240 mm	240 mm	240 mm	
Drive shaft flange ∅	108 mm	108 mm	108 mm	
Overall ratio i_{ov} , in top gear	3.215	3.023	3.215	
Allocation: rear final drive	Designation 02D ⇒ Parts catalogue			

Manual gearbox		6-speed 02Y, four-wheel drive		
Gearbox	Code letters	FMN	FMQ	FMT
	Manufactured from to	08.01 06.03	05.02 06.03	05.02 08.02
Allocation	Model	Audi A3 1997 ▶	Audi A3 1997 ▶	Audi A3 1997 ▶
	Engine	1.8 ltr. - 165 kW	1.9 ltr. - 96 kW turbo diesel	1.8 ltr. - 132 kW
Ratios	Final drive I for 1st to 4th gear	72 : 17 = 4.235	62 : 16 = 3.875	72 : 17 = 4.235



Manual gearbox		6-speed 02Y, four-wheel drive		
Z ₂ : Z ₁	Final drive II for 5th/6th gear and reverse gear	72 : 22 = 3.273	62 : 20 = 3.100	72 : 22 = 3.273
	1st gear	47 : 14 = 3.357	49 : 13 = 3.769	47 : 14 = 3.357
	2nd gear	48 : 23 = 2.087	48 : 23 = 2.087	48 : 23 = 2.087
	3rd gear	47 : 32 = 1.469	45 : 34 = 1.324	47 : 32 = 1.469
	4th gear	45 : 41 = 1.098	41 : 45 = 0.911	46 : 40 = 1.150
	5th gear	41 : 37 = 1.108	37 : 41 = 0.902	43 : 36 = 1.194
	6th gear	38 : 41 = 0.927	34 : 45 = 0.756	39 : 40 = 0.975
	Reverse gear	23 : 14 x 34 : 14 = 3.990	23 : 14 x 36 : 13 = 4.549	23 : 14 x 34 : 14 = 3.990
Capacity	2.6 litres			
Specification	⇒ Parts catalogue			
Clutch actuation	Hydraulic			
Clutch plate Ø	240 mm	240 mm	240 mm	
Drive shaft flange Ø	108 mm	108 mm	108 mm	
Overall ratio $i_{ov.}$ in top gear	3.033	2.342	3.191	
Allocation: rear final drive	Designation 02D ⇒ Parts catalogue			

Manual gearbox		6-speed 02Y, four-wheel drive		
Gearbox	Code letters	FZL	FZP	
	Manufactured from to	08.02 06.03	08.02 06.03	
Allocation	Model	Audi A3 1997 ▶	Audi A3 1997 ▶	
	Engine	1.8 ltr. - 165 kW	1.8 ltr. - 132 kW	
Ratios	Final drive I for 1st to 4th gear	72 : 17 = 4.235	72 : 17 = 4.235	
Z ₂ : Z ₁	Final drive II for 5th/6th gear and reverse gear	72 : 22 = 3.273	72 : 22 = 3.273	
	1st gear	47 : 14 = 3.357	47 : 14 = 3.357	
	2nd gear	48 : 23 = 2.087	48 : 23 = 2.087	
	3rd gear	47 : 32 = 1.469	47 : 32 = 1.469	
	4th gear	45 : 41 = 1.098	46 : 40 = 1.150	
	5th gear	41 : 37 = 1.108	43 : 36 = 1.194	
	6th gear	38 : 41 = 0.927	39 : 40 = 0.975	
	Reverse gear	23 : 14 x 34 : 14 = 3.990	23 : 14 x 34 : 14 = 3.990	
Capacity	2.6 litres			
Specification	⇒ Parts catalogue			
Clutch actuation	Hydraulic			
Clutch plate Ø	240 mm	240 mm		
Drive shaft flange Ø	108 mm	108 mm		
Overall ratio $i_{ov.}$ in top gear	3.033	3.191		
Allocation: rear final drive	Designation 02D ⇒ Parts catalogue			

2.1 Calculating ratio “i”

Example:

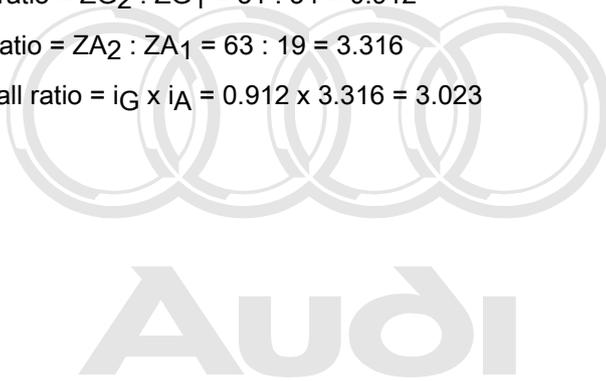
	6th gear	Final drive
Drive gear	$ZG_1 = 34$	$ZA_1 = 19$
Driven gear	$ZG_2 = 31$	$ZA_2 = 63$

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

$i_G = \text{gear ratio} = ZG_2 : ZG_1 = 31 : 34 = 0.912$

$i_A = \text{axle ratio} = ZA_2 : ZA_1 = 63 : 19 = 3.316$

$i_{ov} = \text{overall ratio} = i_G \times i_A = 0.912 \times 3.316 = 3.023$



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3 Rear final drive identification

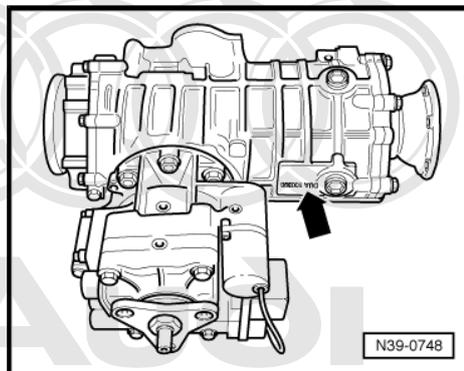
The rear final drive 02D is used in conjunction with the 5 and 6-speed manual gearbox 02M/02Y (four-wheel drive).



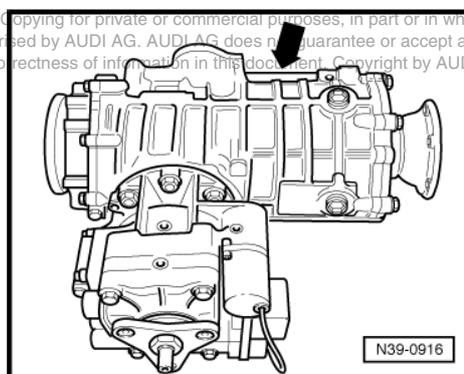
Note

- ◆ Refer to Workshop Manual => Rear final drive 02D; Rep. Gr. 39 for repairs on the propshaft or the final drive.
- ◆ Code letters, allocation, transmission ratios, capacities => Rear final drive 02D; Rep. Gr. 00

Identification is marked either near the oil filler plug -arrow-



or near the electrical connector for the Haldex coupling -arrow-

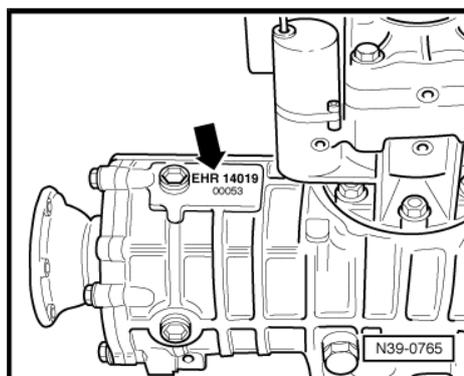


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Code letters and date of manufacture of gearbox

Example:	EHR	14	01	9
	Code letters	Day	Month	Year of manufacture (1999)

Additional data are production-related.



4 Transmission layout

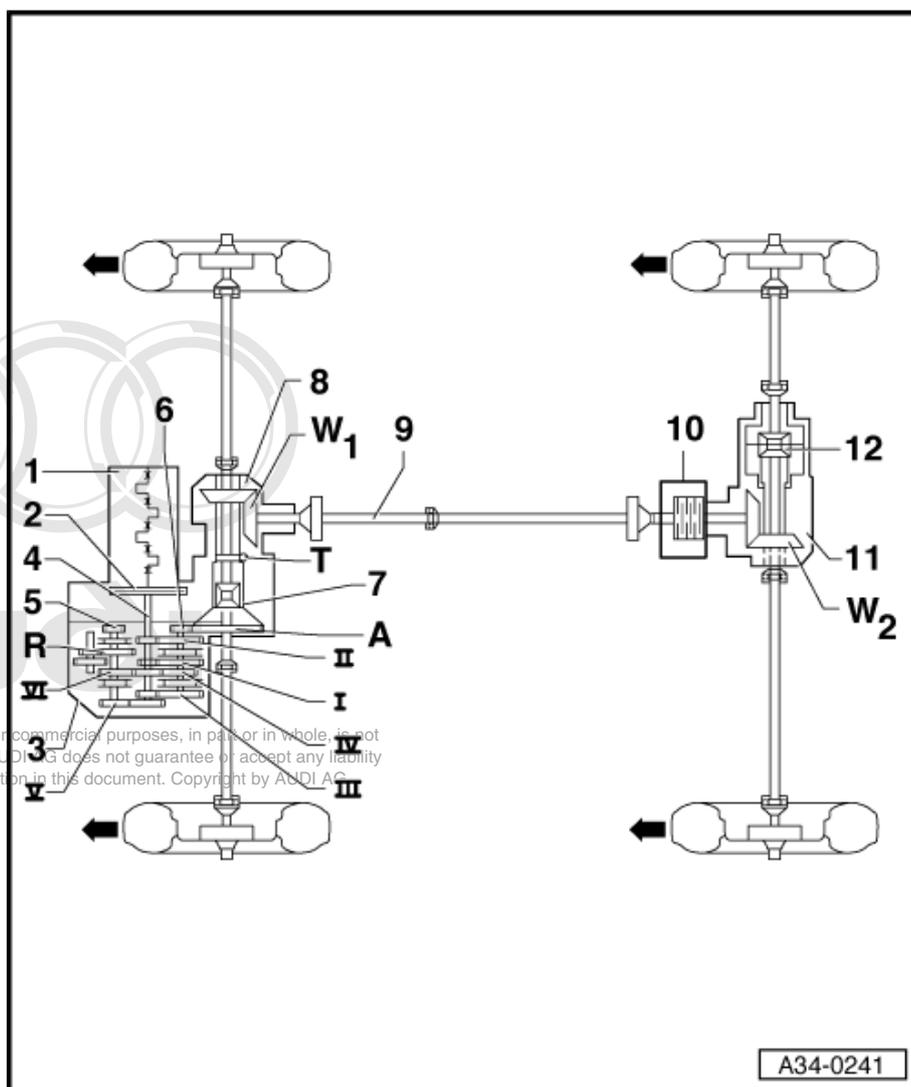
Identification



Note

Arrows point in direction of travel

- 1 - Engine
- 2 - Clutch
- 3 - Manual gearbox
- 4 - Input shaft
- 5 - Output shaft for 5th/6th/reverse gear (pinion shaft II)
- 6 - Output shaft for 1st-4th gear (pinion shaft I)
- 7 - Differential
- 8 - Bevel box
- 9 - Propshaft
 - Removing and installing ⇒ Rear final drive 02D; Rep. Gr. 39
- 10 - Haldex coupling
 - Dismantling and assembling ⇒ Rear final drive 02D; Rep. Gr. 39
- 11 - Rear final drive
 - Dismantling and assembling ⇒ Rear final drive 02D; Rep. Gr. 39
- 12 - Differential
 - Dismantling and assembling ⇒ Rear final drive 02D; Rep. Gr. 39



Ratio

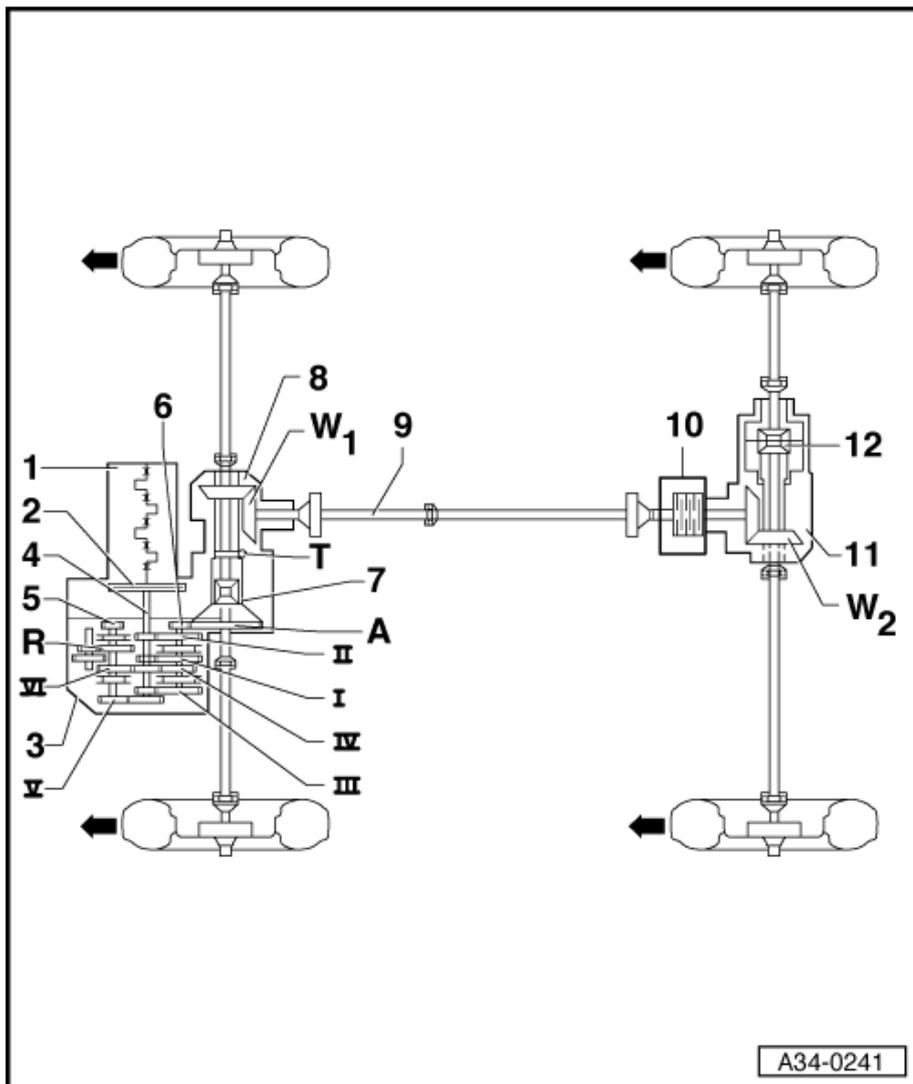


Note

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
- T - Speedometer drive
- W1 - Front bevel gears
- W2 - Rear bevel gears



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5 General repair instructions

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

A number of generally applicable instructions for the various repair procedures - which were previously repeated at numerous places in the Workshop Manual - are summarised here. They apply to the work described in this Manual.

5.1 Contact corrosion

- ◆ The housing of the manual gearbox in the Audi A3 is made of a magnesium alloy.
- ◆ Bolts and other components which are in direct contact with the gearbox casing are surface treated for compatibility with magnesium.
- ◆ If the incorrect components are used (bolts, nuts, washers etc.), this will cause contact corrosion. The gearbox housing will be damaged.
- ◆ If you are not sure whether used parts can be re-installed, always fit new parts.



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- ◆ ***Only use Genuine Audi parts.***
- ◆ ***Damage resulting from contact corrosion is not covered by the warranty.***

5.2 Special tools

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

5.3 Components

Gearbox

- ◆ When installing, ensure that the dowel sleeves between the engine and gearbox are correctly located.
- ◆ When assembling mounting brackets as well as other waxed components, the contact surfaces must be cleaned. The contact surfaces must be free of wax and grease.
- ◆ When installing a new gearbox or bevel box fill with gear oil.
- ◆ Capacities and specifications ⇒ [page 2](#) .

O-rings, oil seals, gaskets

- ◆ Always install new O-rings, oil seals and gaskets.
- ◆ After removing gaskets and seals, always inspect the contact surface on the housing or shaft for burrs resulting from removal or for other signs of damage.
- ◆ Clean joints thoroughly and apply sealant -AMV 188 200 03- .
- ◆ Apply sealant evenly and not too thickly.

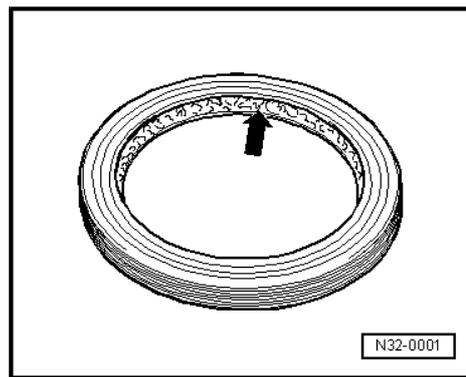
Before installing:



- ◆ Lightly oil the outer circumference of oil seals 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 sealing lip does not contact the shaft in the same place as the old seal (make use of insertion depth tolerances).

After installation:

- ◆ Check gear oil level in manual gearbox with bevel box
⇒ [page 82](#) .



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Locking elements

- ◆ Do not over-stretch circlips.
- ◆ 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

- ◆ Nuts and bolts for securing covers and housings must be slackened and tightened in diagonal sequence.
- ◆ Parts which are particularly sensitive (e.g. clutch pressure plates) must be kept straight. Slacken and tighten them in stages and in diagonal sequence.
- ◆ The tightening torques stated apply to non-oiled nuts and bolts.
- ◆ Always renew self-locking bolts and nuts.
- ◆ For all threaded connections, ensure that (where applicable) the contact surfaces and the nuts and bolts are not coated with wax until after assembly is completed.

Bearings

- ◆ Install new tapered roller bearings as supplied; do not lubricate additionally with oil.
- ◆ Lubricate all bearings (except tapered roller bearings) with gear oil before installing in gearbox.
- ◆ Always renew the tapered roller bearings on one shaft together as a set and use new bearings from a single manufacturer.
- ◆ Heat inner races of tapered roller bearings to approx. 100°C before installing. Press in 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).
- ◆ Install needle bearings so the lettering (side with thicker metal) faces towards the installing tool.

Shims

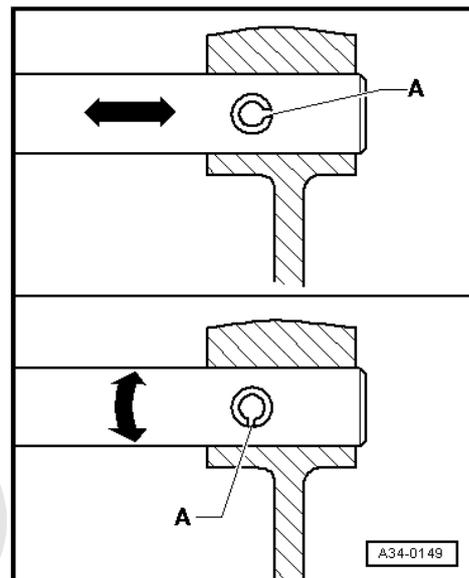
- ◆ Measure shims at several points with a micrometer. Tolerance variations make it possible to obtain the exact shim thickness required.
- ◆ Check for burrs and damage.
- ◆ Install only shims which are in perfect condition.

Synchroniser rings

- ◆ Do not interchange. When reusing synchroniser rings, always fit to the same gear wheel.
- ◆ Check for wear; renew if necessary.
- ◆ Lubricate with gear oil before installing.

Gear wheels

- ◆ Before installing, clean and heat on a hotplate to approx. 100° C.
- ◆ The temperature can be measured with temperature tester - V.A.G 1558- , ignition tester -V.A.G 1767- or diesel tester - V.A.G 1743- .



A34-0149



Selector gears

- ◆ After installing, check 1st to 6th speed selector gears for minimal axial play and freedom of movement.

Clutch actuation

- ◆ Ensure that the pressure plate is kept straight: loosen and tighten bolts in a diagonal sequence and in several gradual stages.
- ◆ If the clutch has burnt out, thoroughly clean the bell housing, flywheel and parts of the engine facing the gearbox in order to prevent odours.

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30 – Clutch

1 Servicing clutch mechanism

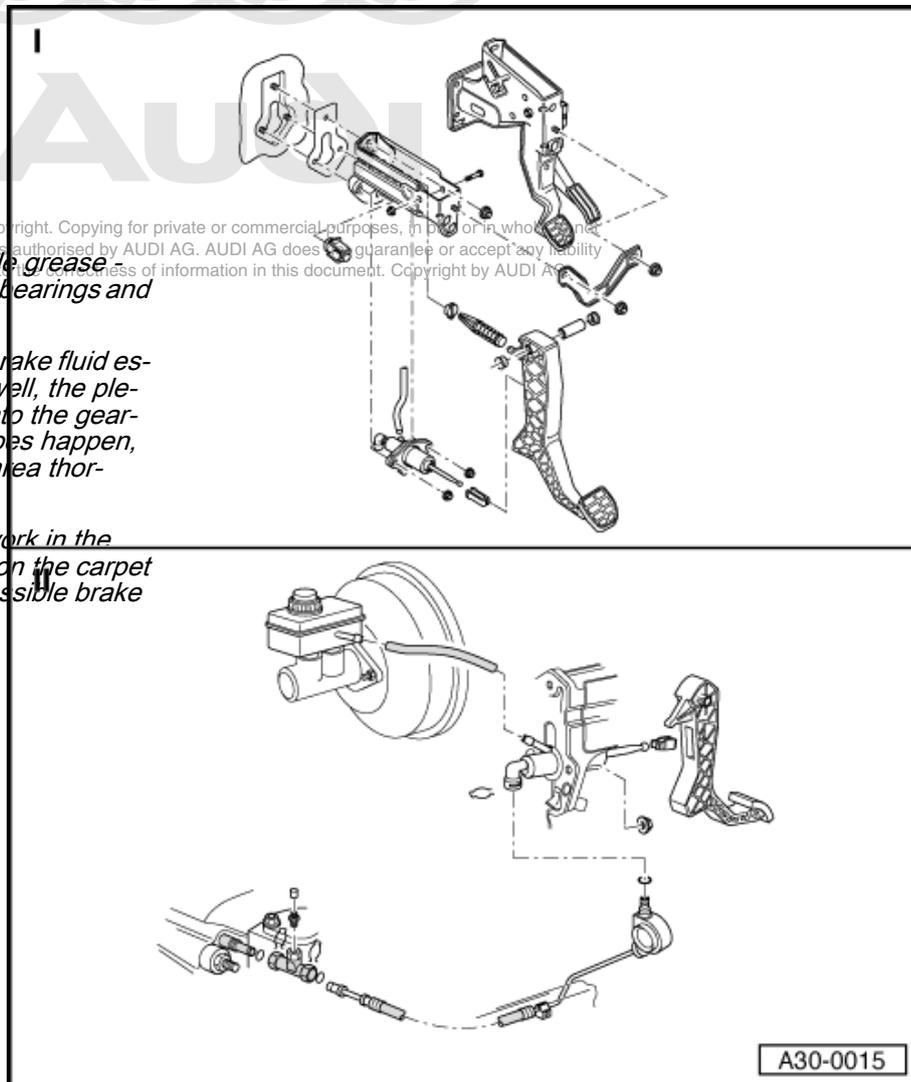
I - Pedal cluster - exploded view of components
⇒ [page 14](#)

II - Hydraulics - exploded view of components ⇒ [page 19](#)



Note

- ◆ *Apply polycarbamide grease G 052 142 A2- to all bearings and contact surfaces.*
- ◆ *Make sure that no brake fluid escapes into the footwell, the plenum chamber or onto the gearbox below. If this does happen, clean the affected area thoroughly.*
- ◆ *When performing work in the footwell, put cloths on the carpet to protect it from possible brake fluid spills.*



1.1 Pedal cluster - exploded view of components

1 - Cross panel

- With mounting for mounting bracket and master cylinder

2 - Gasket

- Always renew

3 - Mounting bracket

- For mounting clutch pedal

4 - Bolt

5 - Mounting bracket

- For mounting accelerator pedal and brake pedal

6 - Hexagon nut, 25 Nm

- Self-locking
- Renew

7 - Connecting plate

8 - Hexagon nut, 25 Nm

- Self-locking
- Renew

9 - Mounting bush

10 - Pivot pin

11 - Clutch pedal

- Removing and installing ⇒ [page 17](#)

12 - Retaining clip

- Removing and installing ⇒ [Item 4 \(page 19\)](#)

13 - Hexagon nut, 25 Nm

- Self-locking
- Renew

14 - Clutch master cylinder

- Removing and installing ⇒ [page 21](#)

15 - Supply hose

16 - Over-centre spring

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

17 - Mounting for over-centre spring

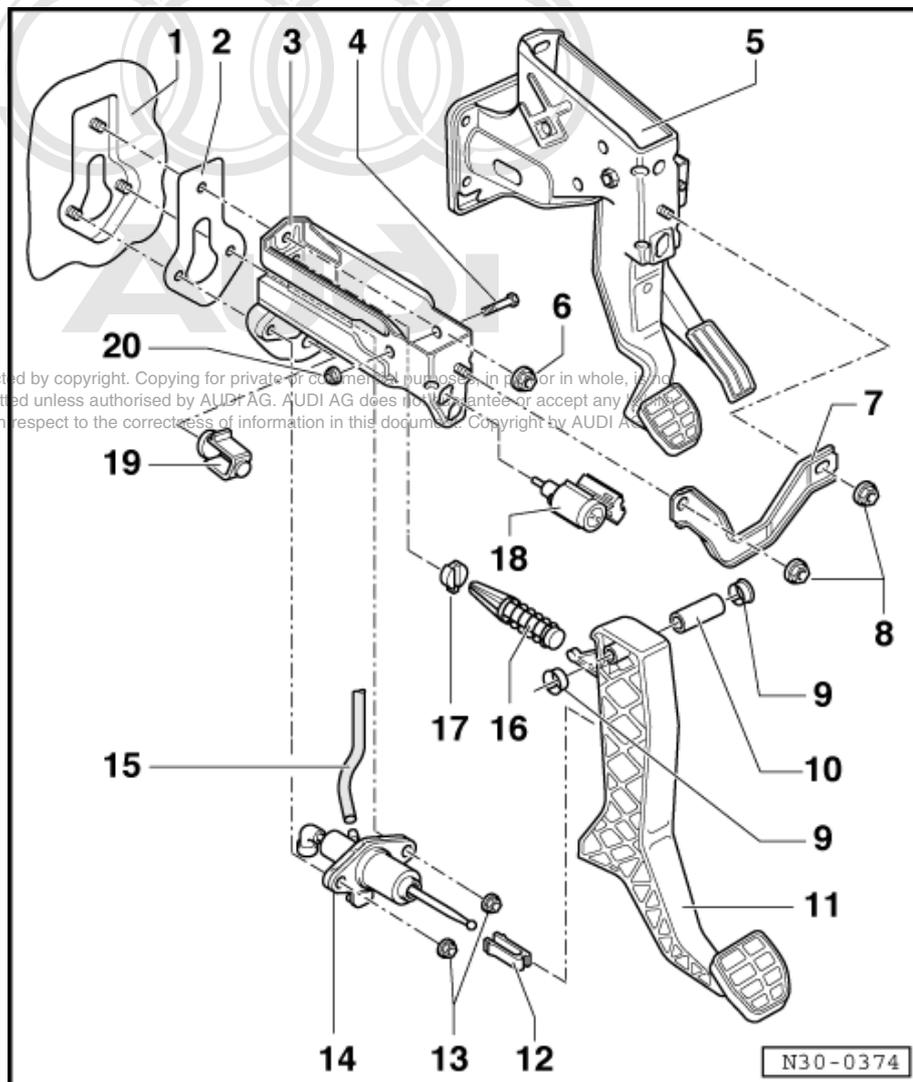
- Install in mounting bracket
- When renewing: remove and install clutch master cylinder ⇒ [page 21](#)

18 - Clutch pedal switch -F36-

- Removing and installing ⇒ ["1.2 Removing and installing clutch pedal switch F36 \(square housing\)", page 15](#) or ⇒ ["1.3 Removing and installing clutch pedal switch F36 \(round housing\)", page 15](#)

19 - Stop for clutch pedal

- Installation position ⇒ [page 23](#)



20 - Hexagon nut, 25 Nm

- Self-locking
- Renew

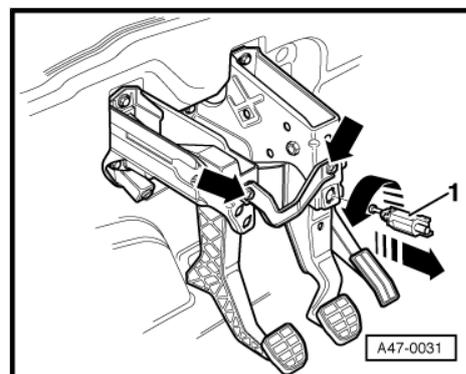
1.2 Removing and installing clutch pedal switch -F36- (square housing)

i Note

Switch may only be fitted once so as to ensure a firm fit.

Removing

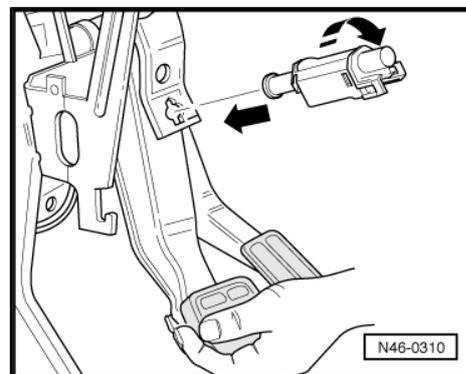
- Remove storage compartment on driver's side ⇒ General body repairs, interior; Rep. Gr. 68 .
- Unplug electrical connector from clutch pedal switch.
- Remove clutch pedal switch -1- by turning 90° anti-clockwise.



Installing

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

- Pull operating rod of clutch pedal switch out onto stop.
- Push clutch pedal down by hand.
- Insert switch in mounting hole and secure by turning clockwise through 90° -arrows-.
- Release clutch pedal
- Install storage compartment on driver's side ⇒ General body repairs, interior; Rep. Gr. 68 .



1.3 Removing and installing clutch pedal switch -F36- (round housing)

i Note

Clutch pedal switch may only be fitted once so as to ensure a firm fit.

Removing

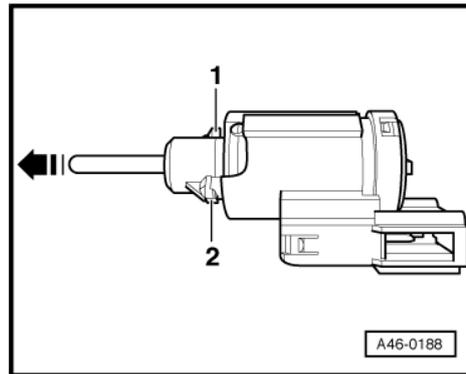
- Remove storage compartment on driver's side ⇒ General body repairs, interior; Rep. Gr. 68 .
- Unplug electrical connector from clutch pedal switch.
- Remove clutch pedal switch by turning in anti-clockwise direction through 45° .

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Installing

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

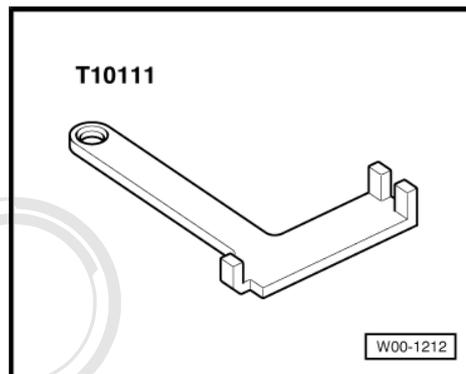
- Pull out operating rod -arrow- all the way before installing clutch pedal switch.
- The clutch pedal should be in the normal position (i.e. not pressed down).
- Guide clutch pedal switch through mounting hole, press operating rod against clutch pedal and attach switch by turning 45° clockwise.
- Install storage compartment on driver's side => General body repairs, interior; Rep. Gr. 68 .



1.4 Removing and installing over-centre spring

Special tools and workshop equipment required

- ◆ Assembly clip -T10111-

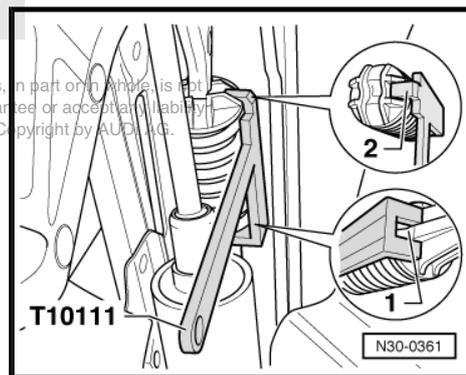


Removing

- Remove storage compartment on driver's side => General body repairs, interior; Rep. Gr. 68 .
- Fit assembly clip -T10111- from the right onto over-centre spring.
- Ensure that the assembly clip is correctly seated:

The rear part of assembly clip must be positioned on the over-centre spring so that the claws fit exactly over the rib -1-.

- Lightly depress clutch pedal towards bulkhead.
- Engage the lug -2- of the assembly clip into the cut-out on the over-centre spring.
- Now depress the clutch pedal towards the bulkhead until the over-centre spring can be removed from below from the mountings on the mounting bracket and clutch pedal.
- Return clutch pedal to normal position.



- Turn over-centre spring together with assembly clip -T10111- in direction of -arrow A- and take out downwards in direction of -arrow B-.

Installing

- Pull clutch pedal into the passenger compartment.

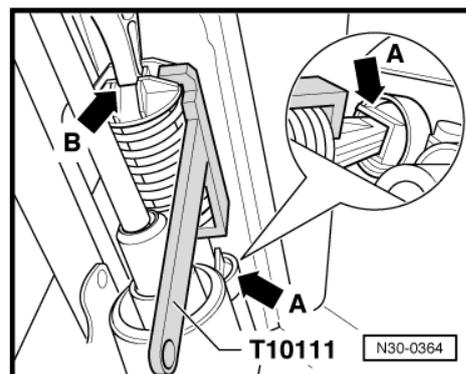
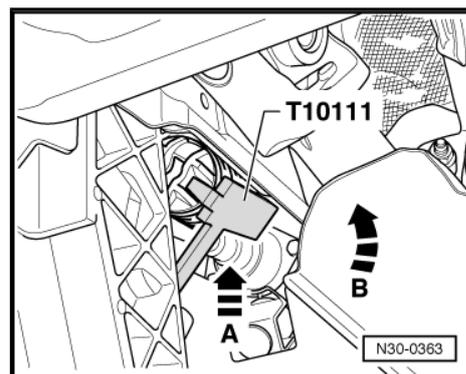
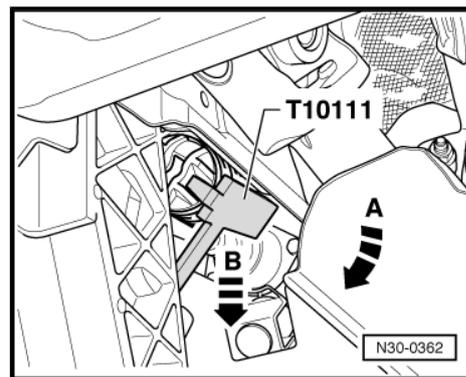


- Insert over-centre spring together with assembly clip -T10111- upwards (in direction of -arrow A-) into mounting bracket and then turn in direction of -arrow B-.



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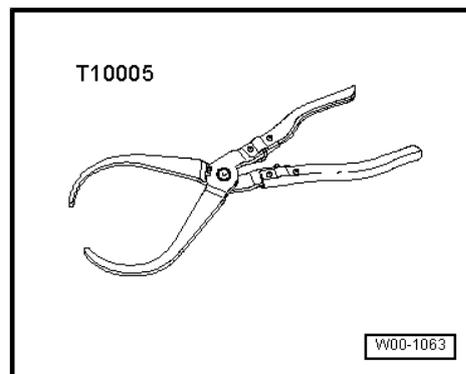
- Insert over-centre spring into rear mounting first -arrow A-.
- Operate clutch pedal until the over-centre spring seats on the mounting lug -arrow B- on the clutch pedal.
- Return clutch pedal to normal position and remove the assembly clip.
- Install storage compartment on driver's side => General body repairs, interior; Rep. Gr. 68 .



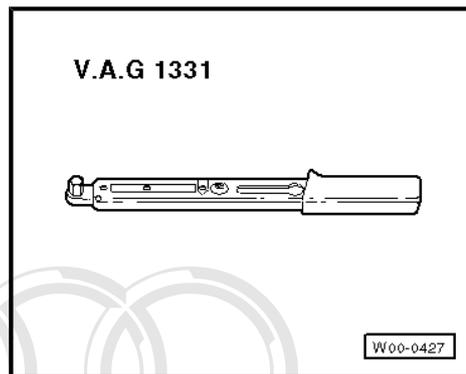
1.5 Removing and installing clutch pedal

Special tools and workshop equipment required

- ◆ Pliers -T10005-



- ◆ Torque wrench -V.A.G 1331-

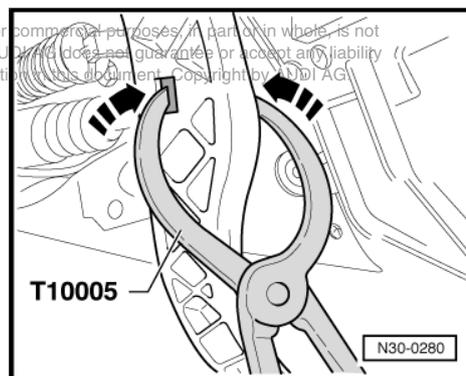


Removing

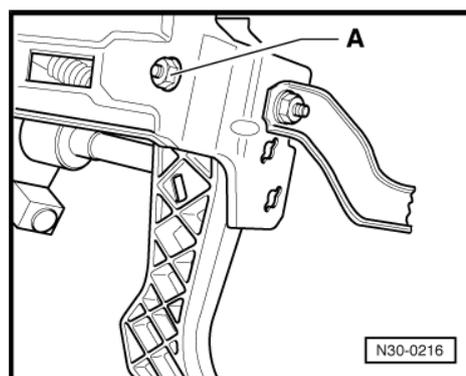
- Remove over-centre spring ⇒ [page 16](#) .
- Remove clutch pedal switch
⇒ ["1.2 Removing and installing clutch pedal switch F36 \(square housing\)", page 15](#) or
⇒ ["1.3 Removing and installing clutch pedal switch F36 \(round housing\)", page 15](#) .

Release master cylinder operating rod from clutch pedal as follows:

- Pull clutch pedal slightly towards the passenger compartment.
- Press both sides of mounting inwards using pliers -T10005-
-arrows-.



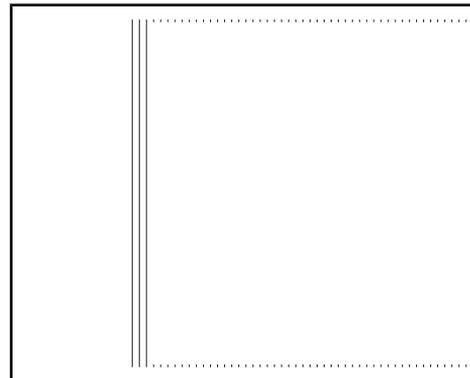
- Remove nut -A-.
- Pull bolt out until the clutch pedal can be removed.



Installing

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

- The retaining clip -A- must be fitted on the master cylinder operating rod -B-.
- Press clutch pedal in direction of -arrow- to engage. Ensure that pedal is correctly located.
- Install over-centre spring ⇒ [page 16](#) .
- Install clutch pedal switch
 ⇒ “1.2 Removing and installing clutch pedal switch F36 (square housing)”, [page 15](#) or
 ⇒ “1.3 Removing and installing clutch pedal switch F36 (round housing)”, [page 15](#) .



1.6 Hydraulics - exploded view of components

1 - Brake fluid reservoir

2 - Supply hose

3 - Clutch master cylinder

- Removing and installing ⇒ [page 21](#)

4 - Retaining clip

- Only renew when clutch master cylinder has been removed
- Lever off to remove ⇒ [page 20](#)
- Pressing on ⇒ [page 20](#)

5 - Clutch pedal

- Removing and installing ⇒ [page 17](#)

6 - Hexagon nut, 25 Nm

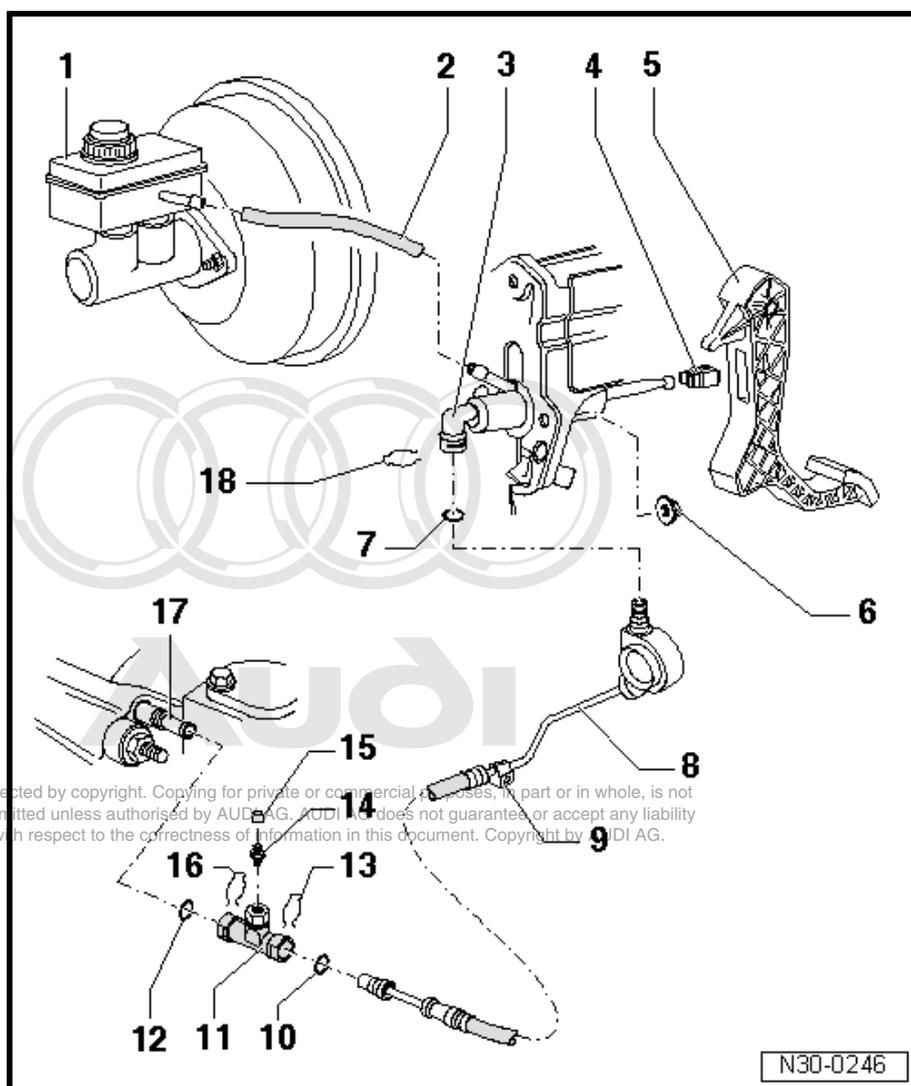
- 2 x
- Self-locking
- Renew

7 - Seal/O-ring

- Renew; for correct version refer to ⇒ [Parts catalogue](#)
- Whether a seal or an O-ring is used depends on the type of connection ⇒ [page 21](#) .
- Lubricate with brake fluid before installing
- Push onto pipe connection

8 - Pipe/hose assembly

- With frequency modulator
- Disconnecting from clutch master cylinder and installing ⇒ [page 22](#)
- Disconnecting from clutch slave cylinder ⇒ [page 57](#)
- For correct version refer to ⇒ [Parts catalogue](#)



9 - Retainer

- Attached to body

10 - Seal/O-ring

- Renew; for correct version refer to ⇒ Parts catalogue
- Whether a seal or an O-ring is used depends on the type of connection ⇒ [page 21](#) .
- Lubricate with brake fluid before installing
- Push onto pipe connection

11 - Bleeder connection

12 - Seal/O-ring

- Renew; for correct version refer to ⇒ Parts catalogue
- Whether a seal or an O-ring is used depends on the type of connection ⇒ [page 21](#) .
- Lubricate with brake fluid before installing
- Push onto pipe connection

13 - Clip

- To remove pipe, pull out clip as far as limit stop ⇒ [page 22](#)

14 - Bleeder valve

- Bleeding clutch system ⇒ [page 24](#)

15 - Dust cap

16 - Clip

- To remove pipe, pull out clip as far as limit stop ⇒ [page 22](#)

17 - Clutch slave cylinder (release bearing with hydraulic actuator)

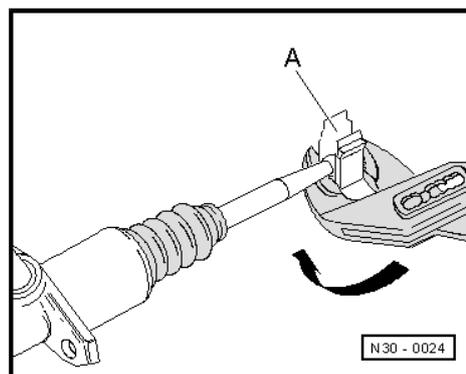
- Can only be removed after removing gearbox
- Removing and installing ⇒ [page 24](#)

18 - Clip

- To remove pipe, pull out clip as far as limit stop ⇒ [page 22](#)

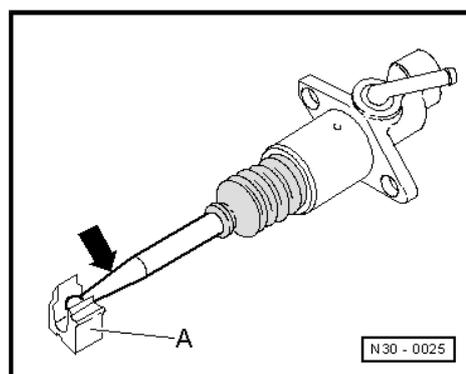
Levering off retaining clip

- Lever retaining clip -A- off in direction of -arrow- using pliers.



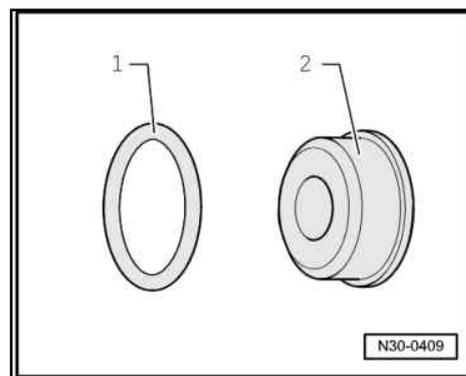
Pressing master cylinder operating rod into retaining clip

- Press master cylinder operating rod into retaining clip -A- -arrow-.



Seals/O-rings for pipe/hose assemblies

- 1 - For metal pipe/hose assemblies
- 2 - For synthetic pipe/hose assemblies



1.7 Removing and installing clutch master cylinder

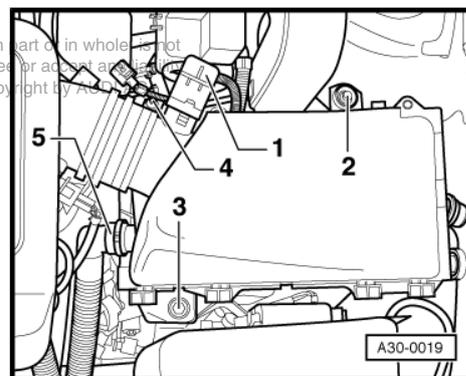
Special tools and workshop equipment required

- ◆ Pliers -T10005-

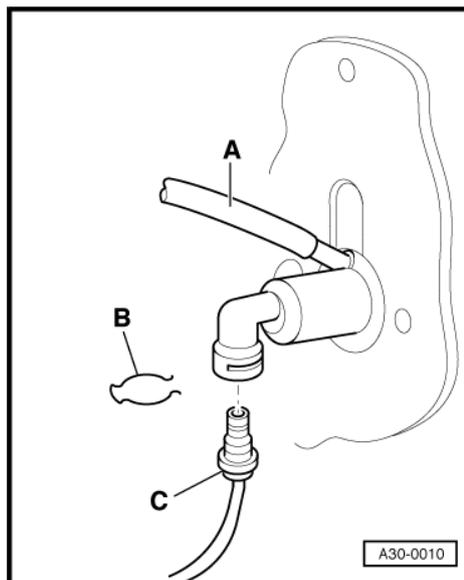


Removing

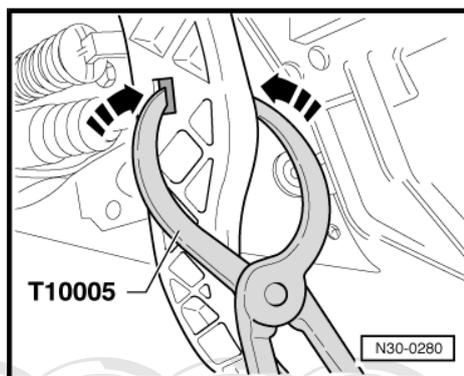
- Detach air intake hose at throttle valve module J338 (slacken hose clip -4-).
- Unplug electrical connector for air mass meter -G70- -1-.
- If fitted, detach hose -5- from air cleaner housing.
- Remove bolts -2- and -3-.
- Take out air cleaner housing.



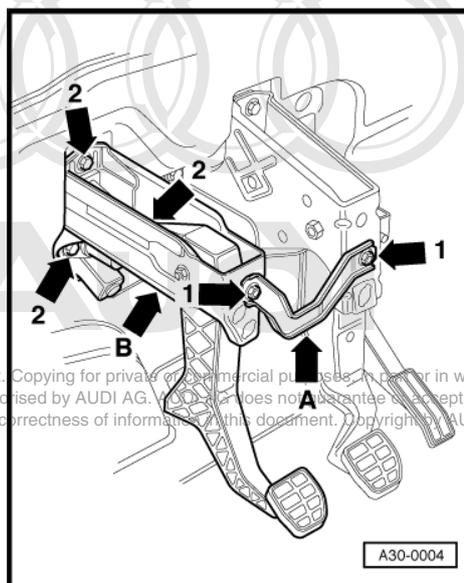
- Pull off supply hose -A- going to brake fluid reservoir and seal.
- Pull out clip -B- for pipe/hose assembly.
- Pull pipe/hose assembly -C- out from master cylinder and seal.
- Remove storage compartment on driver's side => General body repairs, interior; Rep. Gr. 68 .
- Remove clutch pedal switch
=> ["1.2 Removing and installing clutch pedal switch F36 \(square housing\)", page 15](#) or
=> ["1.3 Removing and installing clutch pedal switch F36 \(round housing\)", page 15](#) .



- Pull clutch pedal lightly towards the passenger compartment to separate master cylinder operating rod from clutch pedal and press both sides of retaining clip inwards -arrows- using pliers -T10005- .

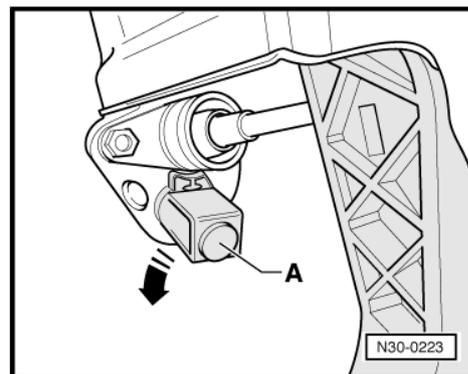


- Remove connecting plate -A- -arrows 1-.
- Remove nuts -arrows 2- and take off mounting bracket -B-.

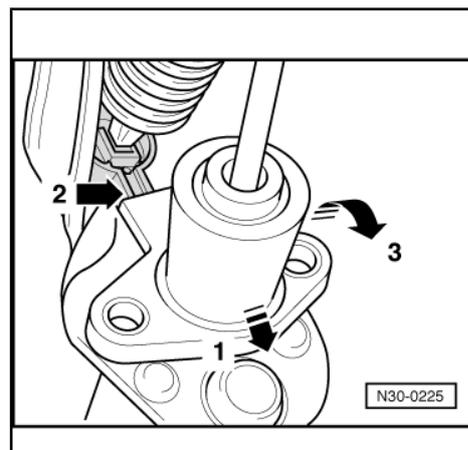


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- Turn stop -A- for clutch pedal in direction of -arrow- and remove.



- Then push master cylinder in the direction of -arrow 1- onto stop.
- It must not be covered in upper area by over-centre spring mounting -arrow 2-.
- Then swing master cylinder in direction of -arrow 3- out of mounting bracket.

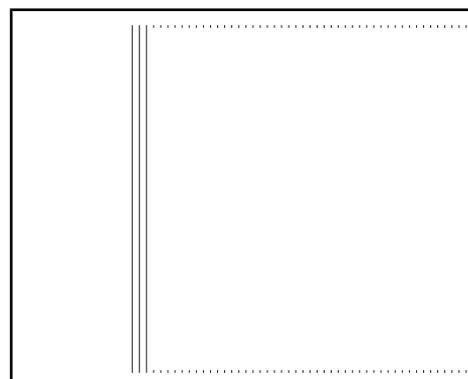


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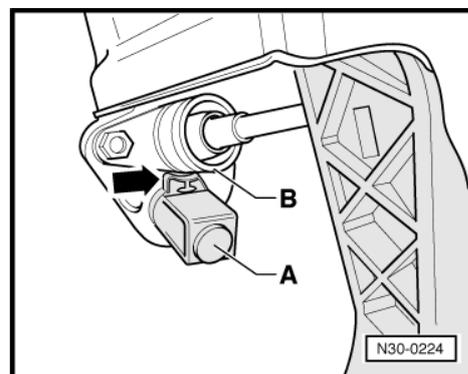
Installing

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

- The retaining clip -A- must be fitted on the master cylinder operating rod -B-.
- Press clutch pedal in direction of -arrow- to engage. Ensure that pedal is correctly located.



- Fit stop -A- for clutch pedal again.
- Installation position: the angled tabs -arrow- point towards the master cylinder -B-.
- Install clutch pedal switch
 ⇒ [“1.2 Removing and installing clutch pedal switch F36 \(square housing\)”, page 15](#) or
 ⇒ [“1.3 Removing and installing clutch pedal switch F36 \(round housing\)”, page 15](#) .
- Bleed clutch system ⇒ [page 24](#) .



1.8 Removing and installing clutch slave cylinder (release bearing with hydraulic actuator)

Note

Slave cylinder and release bearing are one unit and can only be renewed together.

Removing

- Remove gearbox ⇒ [page 52](#) .
- Remove bolts -arrows-.
- Pull out release bearing -A- together with clutch slave cylinder.

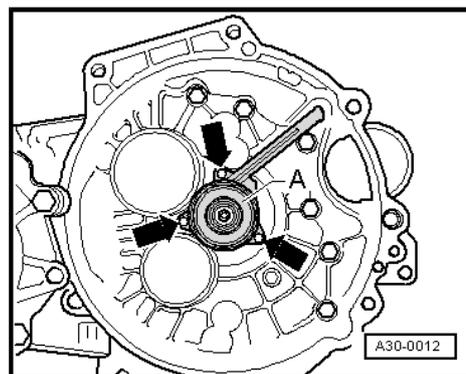
Installing

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

- Install gearbox ⇒ [“2.1 Installing gearbox”, page 62](#) .
- Bleed clutch system ⇒ [page 24](#) .

Tightening torque

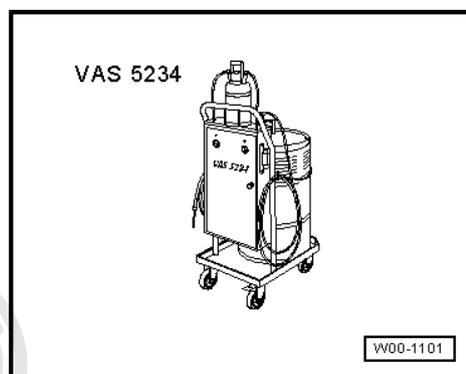
Component	Nm
Clutch slave cylinder to gearbox	12



1.9 Bleeding clutch system

Special tools and workshop equipment required

- ◆ Brake charge and bleed equipment -VAS 5234-



Brake fluid specification ⇒ Brake system; Rep. Gr. 47 .

Procedure

Note

- ◆ *The clutch system must be bled after performing work on the hydraulic clutch mechanism.*

- ◆ *It is not necessary to pre-fill the system.* Protected by copyright. Copying for private or commercial purposes, in part or in whole, is not permitted. G. AUDI AG does not guarantee or accept any liability with respect to the correctness of information in this document. Copyright by AUDI AG.

- ◆ *When performing the following steps, make sure that no brake fluid escapes onto the gearbox.*

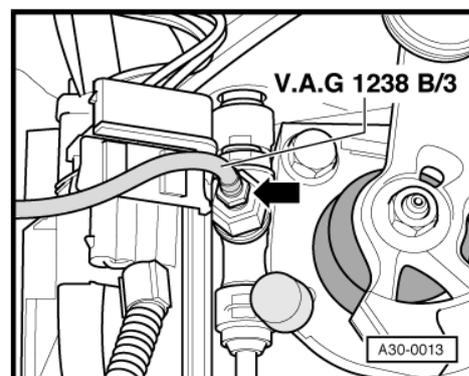
- Pull clutch pedal back to its normal rest position.

- Connect brake charge and bleed equipment -VAS 5234- to brake fluid reservoir (do not switch on at this stage).
- If necessary, use bleed hose -V.A.G 1238 B/3- (670 mm) to bleed system.
- Connect bleed hose to collector bottle of brake charge and bleed equipment -VAS 5234- .
- Connect bleed hose -V.A.G 1238 B/3- to bleeder valve -arrow-.

 **Note**

Ensure that bleed hose is correctly fitted during bleeding operation.

- Open bleeder valve -arrow-.
- Switch on bleeding equipment.
- Operating pressure 2.0 bar
- Bleed off about 100 cm³ of brake fluid.
- Close bleeder valve.
- Rapidly operate clutch pedal from stop to stop 15 times.
- Bleed off an additional 50 cm³ of brake fluid.
- Close bleeder valve. Tightening torque 4.5 Nm.
- Depress clutch pedal several times after bleeding process is completed.
- Bleed system once again if necessary.
- Remove bleed hose and fit protective cap.
- Remove brake charge and bleed equipment -VAS 5234- from brake fluid reservoir.



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2 Servicing clutch release mechanism

2.1 Clutch release mechanism - exploded view of components

1 - Gearbox

2 - Oil seal

- For input shaft
- Renewing ⇒ [page 26](#)

3 - Release bearing with hydraulic actuator

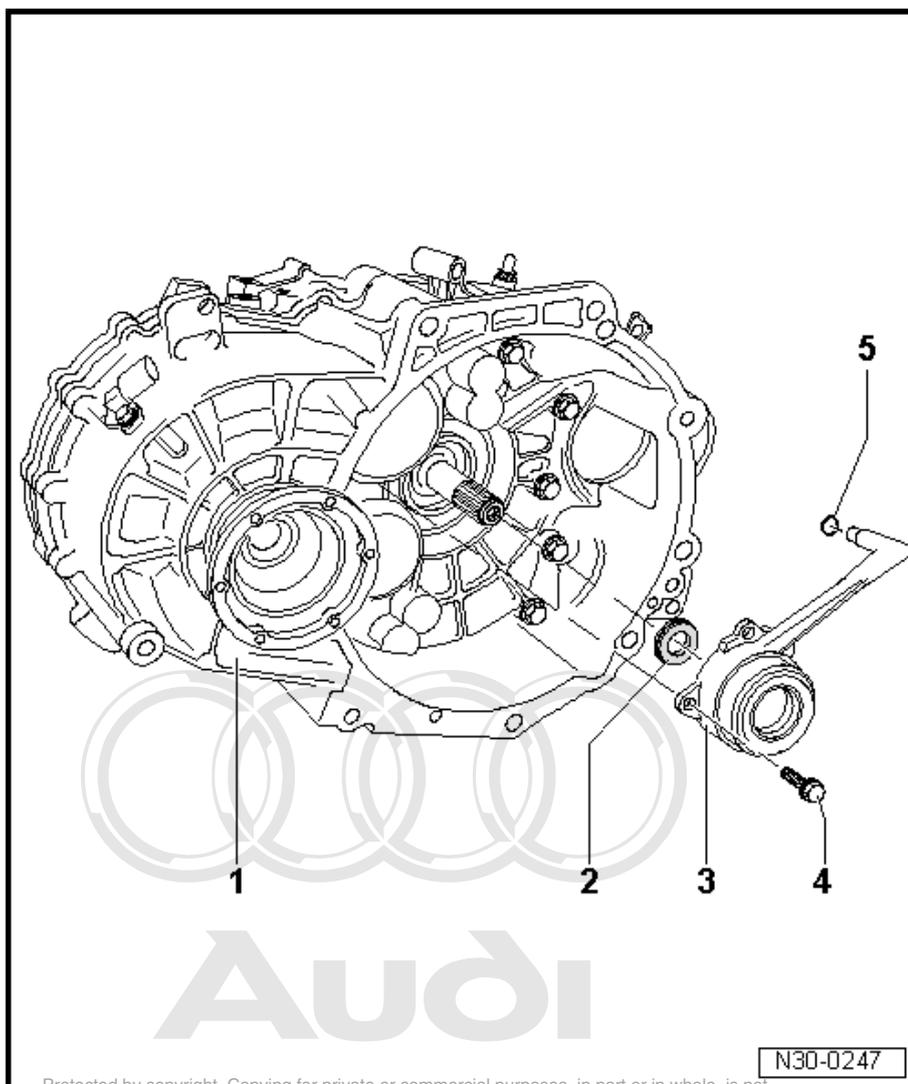
- One unit; can only be renewed together
- Do not wash out bearing; wipe clean only
- Renew complete release bearing with hydraulic actuator if noises occur.
- Removing and installing ⇒ [page 24](#)

4 - Bolt, 12 Nm

- 3 x
- For correct version check engine code and refer to ⇒ Parts catalogue

5 - Seal/O-ring

- Renew; for correct version refer to ⇒ Parts catalogue
- Whether a seal or an O-ring is used depends on the type of connection ⇒ [page 21](#).
- Lubricate with brake fluid before installing
- Push onto pipe connection

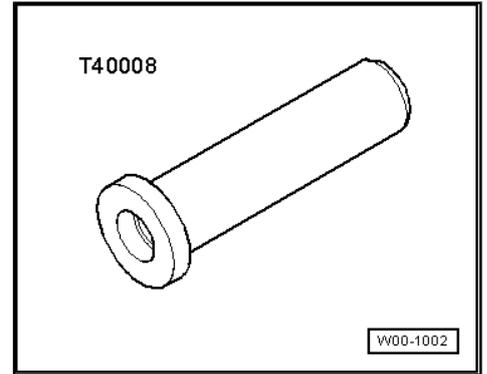


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2.2 Renewing input shaft oil seal

Special tools and workshop equipment required

◆ Thrust piece -T40008-

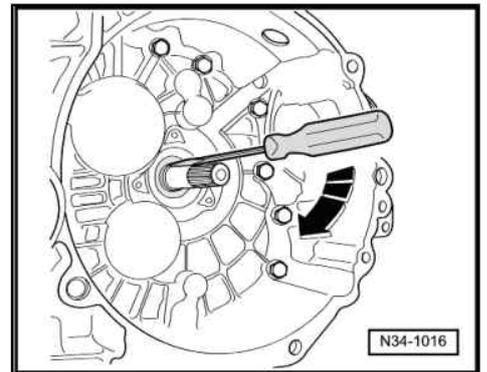


Procedure

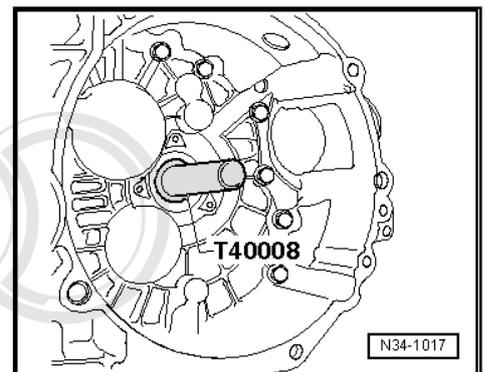
- Prise out input shaft oil seal carefully using a screwdriver.

 **Note**

Take care not to damage contact surface for oil seal on input shaft.



- Drive in new oil seal as far as the stop using thrust piece - T40008- .
- Pack space between sealing lip and dust lip half-full with sealing grease -G 052 128 A1- .



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3 Servicing conventional clutch

3.1 Conventional clutch - exploded view of components



Note

Select the correct pressure plate and clutch plate according to engine code => Parts catalogue .

1 - Dual-mass flywheel

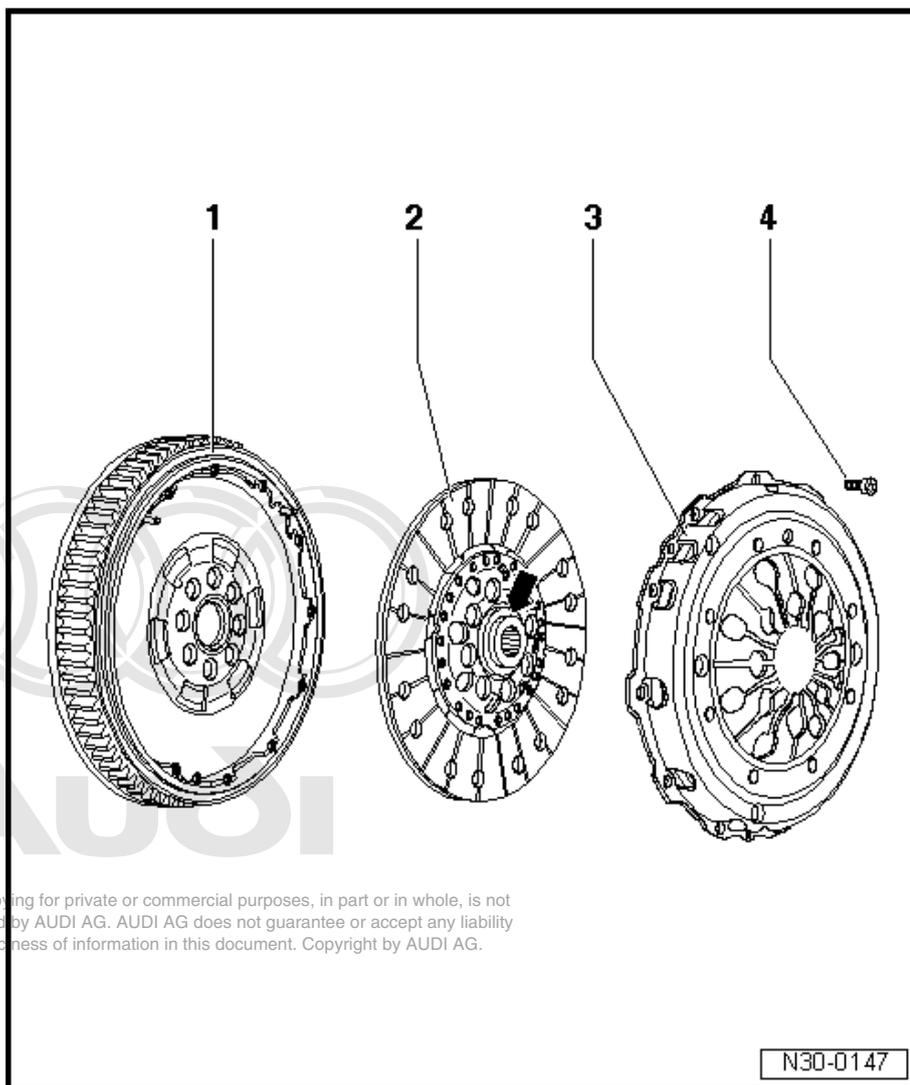
- Observe instructions for removal => [page 29](#)
- Removing and installing => Rep. Gr. 13
- Ensure that dowel pins fit tightly
- Contact surface for clutch lining must be free of grooves, oil and grease

2 - Clutch plate

- Removing and installing => [page 29](#)
- Installation position: Shorter end of hub -arrow- faces towards pressure plate
- Centralising clutch plate with small internal hub diameter => [page 31](#)
- Centralising clutch plate with larger internal hub diameter => [page 32](#)
- Clutch plate diameter => [page 2](#)

3 - Pressure plate

- Removing and installing => [page 29](#)
- Check ends of diaphragm spring => [page 29](#)
- Check spring connections and rivets => [page 29](#)



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4 - M6 = 13 Nm; M7 = 20 Nm; M8 = 22 Nm

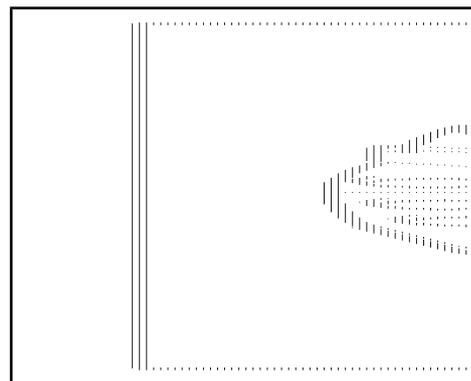
- Working clockwise, slacken all bolts one after the other in steps of 90° (1/4 turn) until the pressure plate is free
- Observe instructions for installation => [page 32](#)
- For correct version check engine code and refer to => Parts catalogue

Checking ends of diaphragm spring

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

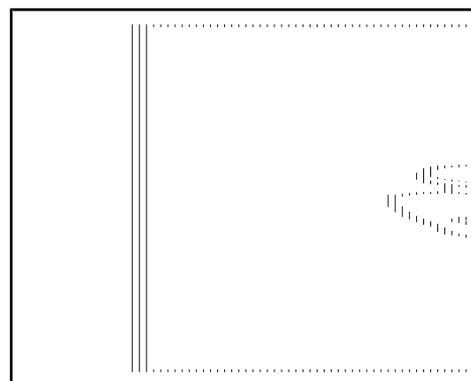
 **Note**

Select the correct pressure plate and clutch plate according to engine code ⇒ Parts catalogue .



Checking spring connections and rivets

- Check spring connections between pressure plate and cover for cracks and make sure rivets are seated tightly.
- Renew pressure plate if spring connections are damaged or rivets are loose -arrows-.

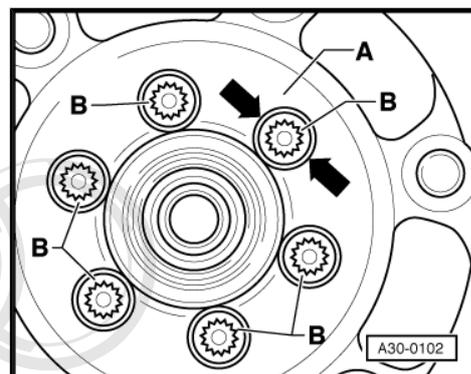


Instructions for removing dual-mass flywheel

 **Note**

Do not use an impact wrench or pneumatic wrench to remove bolts -B-: this would severely damage the dual-mass flywheel. The bolts must always be removed by hand.

- Rotate dual-mass flywheel -A- so that the bolts are aligned centrally behind the holes -arrows-.
- When removing the bolts, make sure that none of the bolt heads contacts the dual-mass flywheel, as this would damage the flywheel when the bolts are unscrewed further.

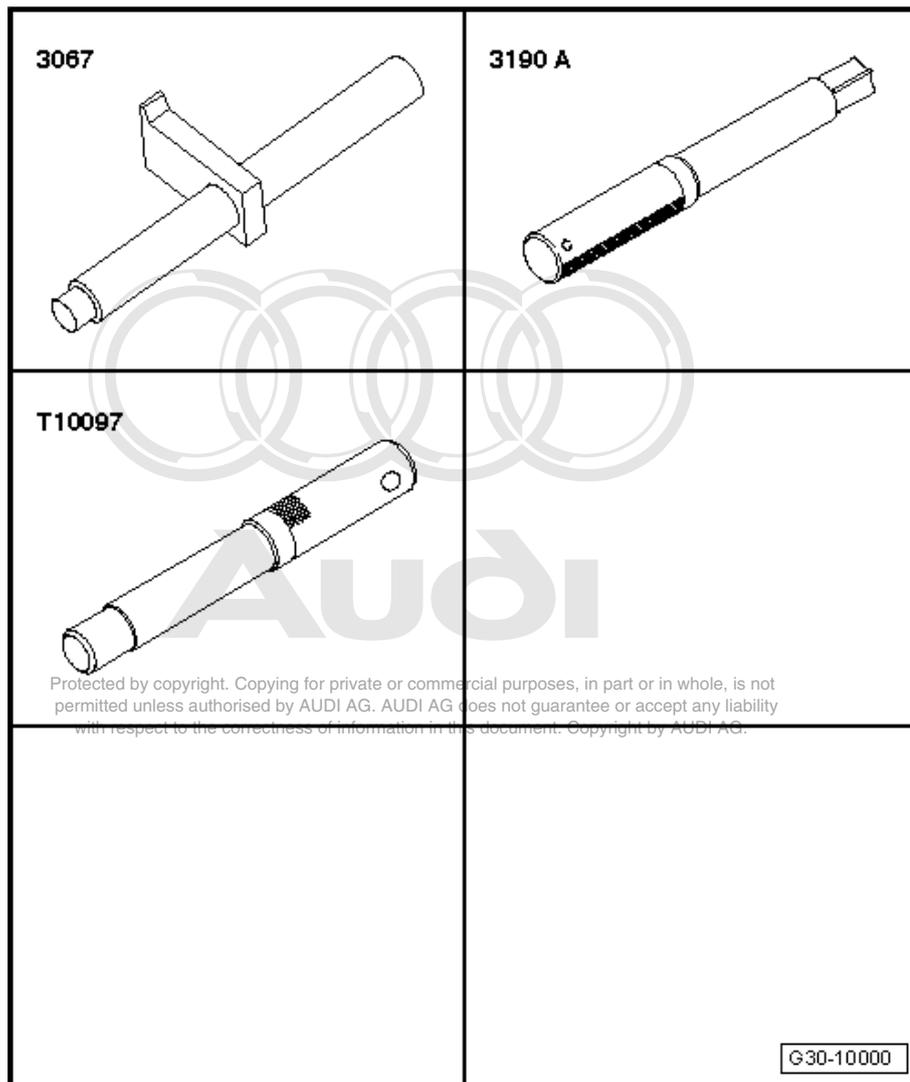


3.2 Removing and installing conventional clutch

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Special tools and workshop equipment required

- ◆ Counterhold tool -3067-
- ◆ Centring mandrel -3190 A-
- ◆ Centring mandrel -T10097- for clutch plate with larger hub diameter
- ◆ Grease for clutch plate splines -G 000 100-

**Removing**

- Remove gearbox ⇒ [page 52](#) .
- Apply counter-hold tool -3067- in order to loosen bolts.

To prevent the pressure plate from becoming distorted during removal (causes clutch grab when driving off), always adhere to the following procedure when unbolting the pressure plate:

- Working clockwise, loosen all six bolts consecutively in steps of 90° (1/4 turn) until the pressure plate is released.
- Take off pressure plate and clutch plate.

Installing

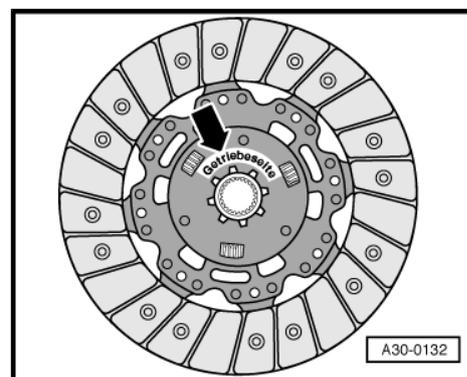
Installation is carried out in reverse sequence; note the following:

i Note

- ◆ *Select the correct clutch plate and pressure plate according to engine code: ⇒ Parts catalogue .*
- ◆ *If the clutch has burnt out, thoroughly clean the bell housing, flywheel and parts of the engine facing the gearbox in order to prevent odours.*
- ◆ *Clean input shaft splines and (in the case of a used clutch plate) the hub splines. Remove corrosion and apply only a very thin coating of grease for clutch plate splines -G 000 100- to the splines. Then move clutch plate backwards and forwards on input shaft until hub moves freely on shaft. It is important to remove excess grease.*
- ◆ *Pressure plates have an anti-corrosion coating and are greased. Only the contact surface may be cleaned, otherwise the service life of the clutch will be considerably reduced.*
- ◆ *Pressure plate contact surface and clutch plate lining must make full contact with flywheel. Only then insert bolts.*

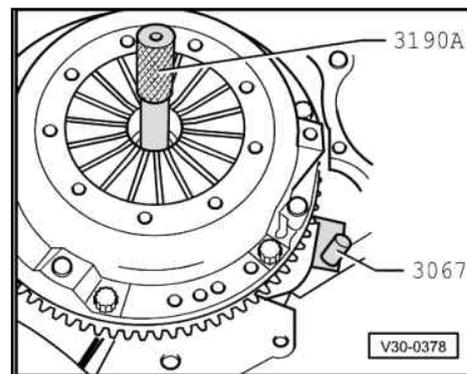
– Note correct installation position of clutch plate:

- The marking “Getriebeseite” or “Getr.-Seite” (gearbox side) -arrow- faces pressure plate and gearbox.



Centralising clutch plate with small internal hub diameter

- Use centring mandrel -3190 A- to centralise clutch plate.
- Reverse position of counter-hold tool -3067- when installing.

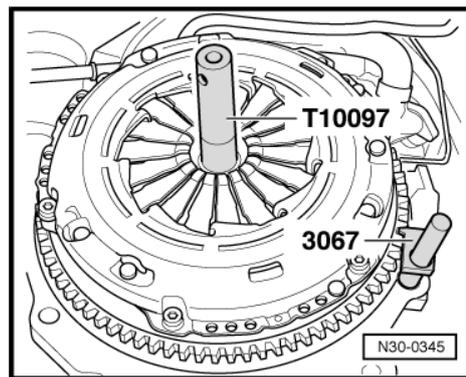


Centralising clutch plate with larger internal hub diameter

- Use centring mandrel -T10097- to centralise clutch plate with larger hub diameter.

To prevent the pressure plate from becoming distorted during installation (causes clutch grab when driving off), always adhere to the following procedure when installing the pressure plate:

- Fit pressure plate onto dowel pins.
- Screw in all 6 bolts evenly by hand until bolt heads make contact with pressure plate.
- Working clockwise, tighten all six bolts consecutively in steps of 90° (1/4 turn) until the housing makes contact with the flywheel.
- Working clockwise, tighten all 6 bolts to final torque consecutively.
- Install gearbox ⇒ ["2.1 Installing gearbox", page 62](#) .



Tightening torque

Component		Nm
Pressure plate to dual-mass flywheel	M6	13
	M7	20
	M8	22



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4 Servicing self-adjusting clutch “LuK version”

4.1 Exploded view of components

1 - Dual-mass flywheel

- Observe instructions for removal ⇒ [page 34](#)
- Removing and installing ⇒ Rep. Gr. 13
- Ensure that dowel pins fit tightly
- Contact surface for clutch lining must be free of grooves, oil and grease

2 - Clutch plate

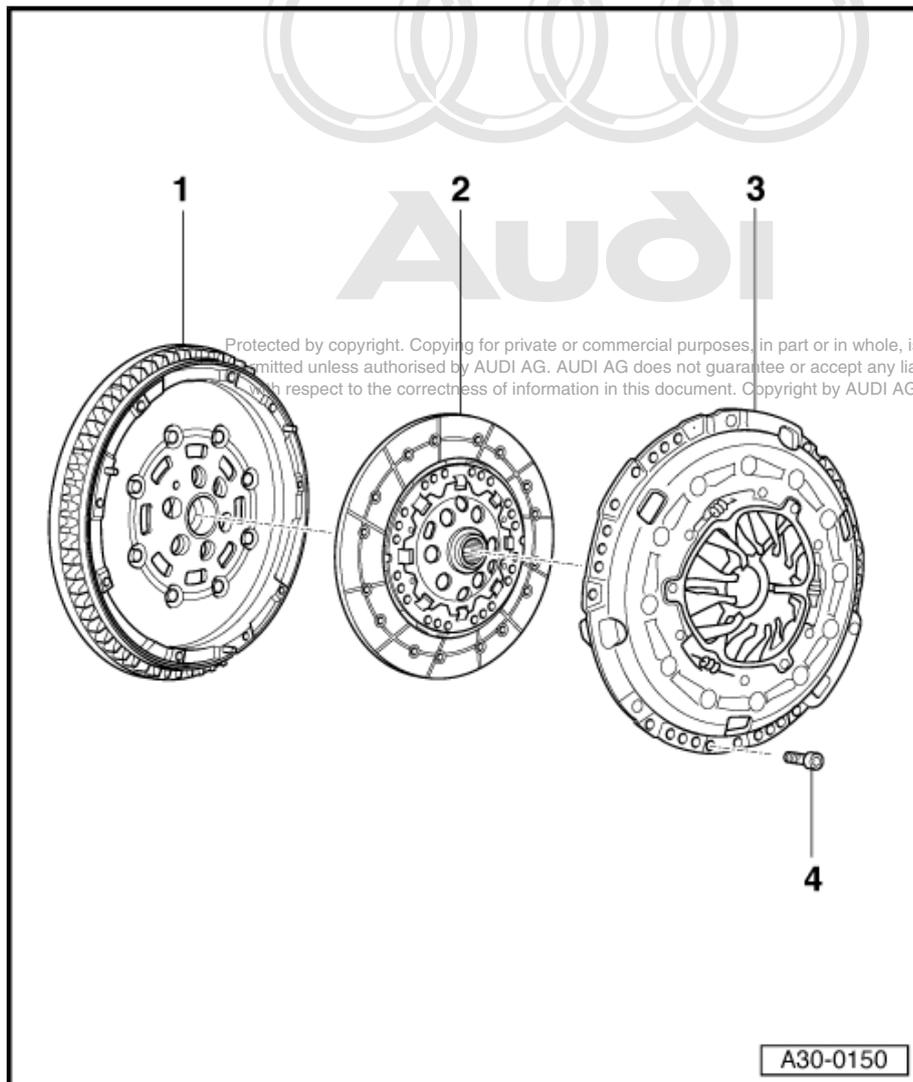
- Removing and installing ⇒ [page 34](#)
- Always renew SAC pressure plate as well
- Installation position: marking “Getriebeseite” (gear-box side) faces towards gearbox
- Clutch plate diameter ⇒ [page 2](#)

3 - SAC pressure plate

- “SAC” = self adjusting clutch
- Removing and installing ⇒ [page 34](#)
- Check ends of diaphragm spring ⇒ [page 34](#)
- Check spring connections and rivets ⇒ [page 34](#)
- Always renew clutch plate as well

4 - M6 = 13 Nm; M7 = 20 Nm; M8 = 22 Nm

- Working clockwise, slacken all bolts one after the other in steps of 90° (1/4 turn) until the pressure plate is free
- Observe instructions for installation ⇒ [page 36](#)
- For correct version check engine code and refer to ⇒ Parts catalogue



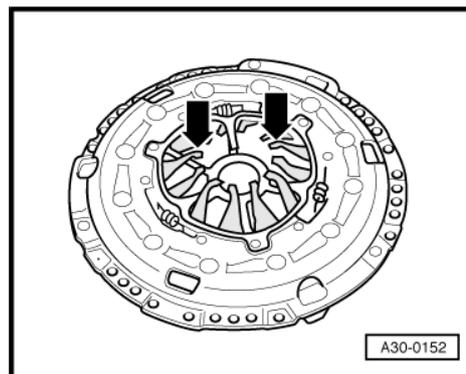
Checking ends of diaphragm spring

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



Note

If required, pressure plate and clutch plate must always be renewed together. Select the correct pressure plate and clutch plate according to engine code → Parts catalogue .



Checking spring connections and rivets

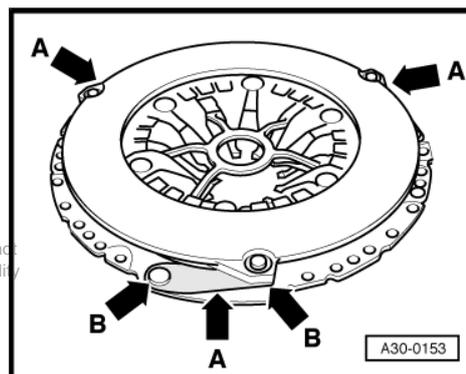
- Check spring connections -arrows A- for damage and make sure riveted joints -arrows B- are seated tightly.
- Renew pressure plate if spring connections are broken or badly bent, or if riveted joints are loose.



Note

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If required, pressure plate and clutch plate must always be renewed together. Select the correct pressure plate and clutch plate according to engine code → Parts catalogue .



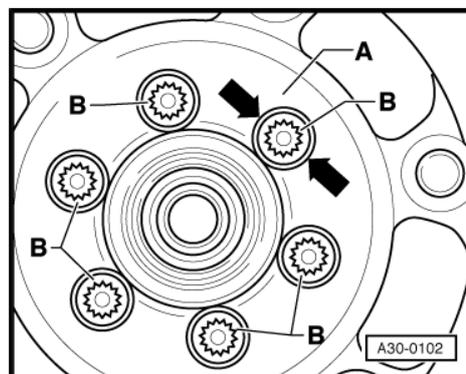
Instructions for removing dual-mass flywheel



Note

Do not use an impact wrench or pneumatic wrench to remove bolts -B-: this would severely damage the dual-mass flywheel. The bolts must always be removed by hand.

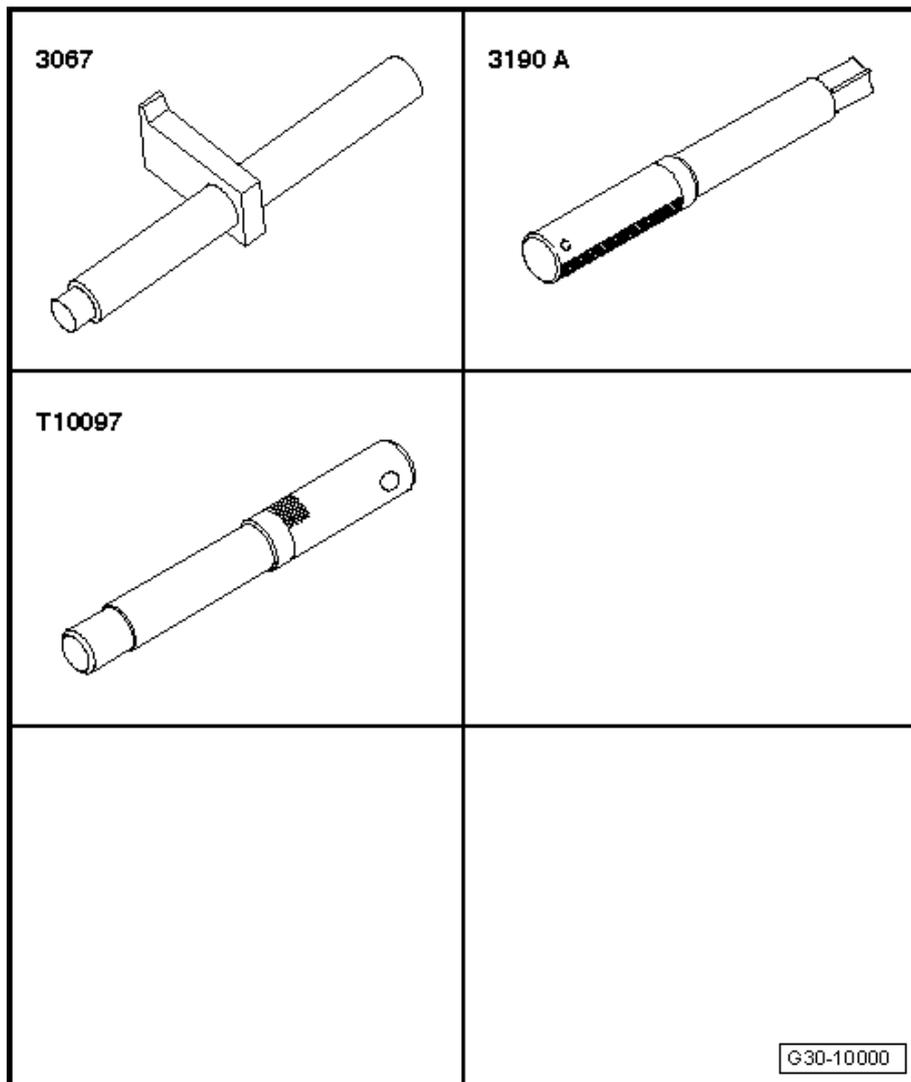
- Rotate dual-mass flywheel -A- so that the bolts are aligned centrally behind the holes -arrows-.
- When removing the bolts, make sure that none of the bolt heads contacts the dual-mass flywheel, as this would damage the flywheel when the bolts are unscrewed further.



4.2 Removing and installing self-adjusting clutch

Special tools and workshop equipment required

- ◆ Counterhold tool -3067-
- ◆ Centring mandrel -3190 A-
- ◆ Centring mandrel -T10097- for clutch plate with larger hub diameter
- ◆ Grease for clutch plate splines -G 000 100-



Removing

- Remove gearbox ⇒ [page 52](#) .
- Apply counter-hold tool -3067- in order to loosen bolts.

To prevent the pressure plate from becoming distorted during removal (causes clutch grab when driving off), always adhere to the following procedure when unbolting the pressure plate:

- Working clockwise, loosen all six bolts consecutively in steps of 90° ($\frac{1}{4}$ turn) until the pressure plate is released.
- Take off pressure plate and clutch plate.

Installing

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

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Note

- ◆ *Renew clutch plate and pressure plate if riveted joints are damaged or loose.*
- ◆ *If required, always renew clutch plate and pressure plate together.*
- ◆ *Select the correct clutch plate and pressure plate according to engine code: ⇒ Parts catalogue .*
- ◆ *If the clutch has burnt out, thoroughly clean the bell housing, flywheel and parts of the engine facing the gearbox in order to prevent odours.*
- ◆ *Clean input shaft splines and (in the case of a used clutch plate) the hub splines. Remove corrosion and apply only a very thin coating of grease for clutch plate splines -G 000 100- to the splines. Then move clutch plate backwards and forwards on input shaft until hub moves freely on shaft. It is important to remove excess grease.*
- ◆ *Pressure plates have an anti-corrosion coating and are greased. Only the contact surface may be cleaned, otherwise the service life of the clutch will be considerably reduced.*
- ◆ *Pressure plate contact surface and clutch plate lining must make full contact with flywheel. Only then insert bolts.*

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- **Note correct installation position of clutch plate.**
- The marking "Getriebeseite" (gearbox side) faces towards the gearbox
- Reverse position of counter-hold tool -3067- when installing.

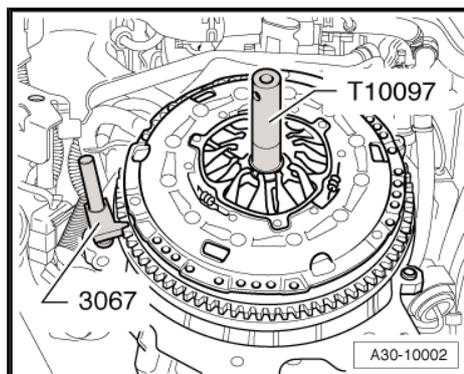


Note

Use centring mandrel -3190 A- to centralise clutch plate or centring mandrel -T10097- to centralise clutch plate with larger hub diameter.

To prevent the pressure plate from becoming distorted during installation (causes clutch grab when driving off), always adhere to the following procedure when installing the pressure plate:

- Fit pressure plate onto dowel pins.
- Screw in all 6 bolts evenly by hand until bolt heads make contact with pressure plate.
- Working clockwise, tighten all six bolts consecutively in steps of 90° (1/4 turn) until the housing makes contact with the flywheel.
- Working clockwise, tighten all 6 bolts to final torque consecutively.
- Install gearbox ⇒ ["2.1 Installing gearbox", page 62](#) .



Tightening torque

Component		Nm
Pressure plate to dual-mass flywheel	M6	13
	M7	20
	M8	22

34 – Controls, housing

1 Servicing selector mechanism

1.1 Installation position of selector mechanism

-Arrow A- gear selection movement

-Arrow B- gate selection movement

1 - Gear selector cable

- For gear selection movement -arrow A-

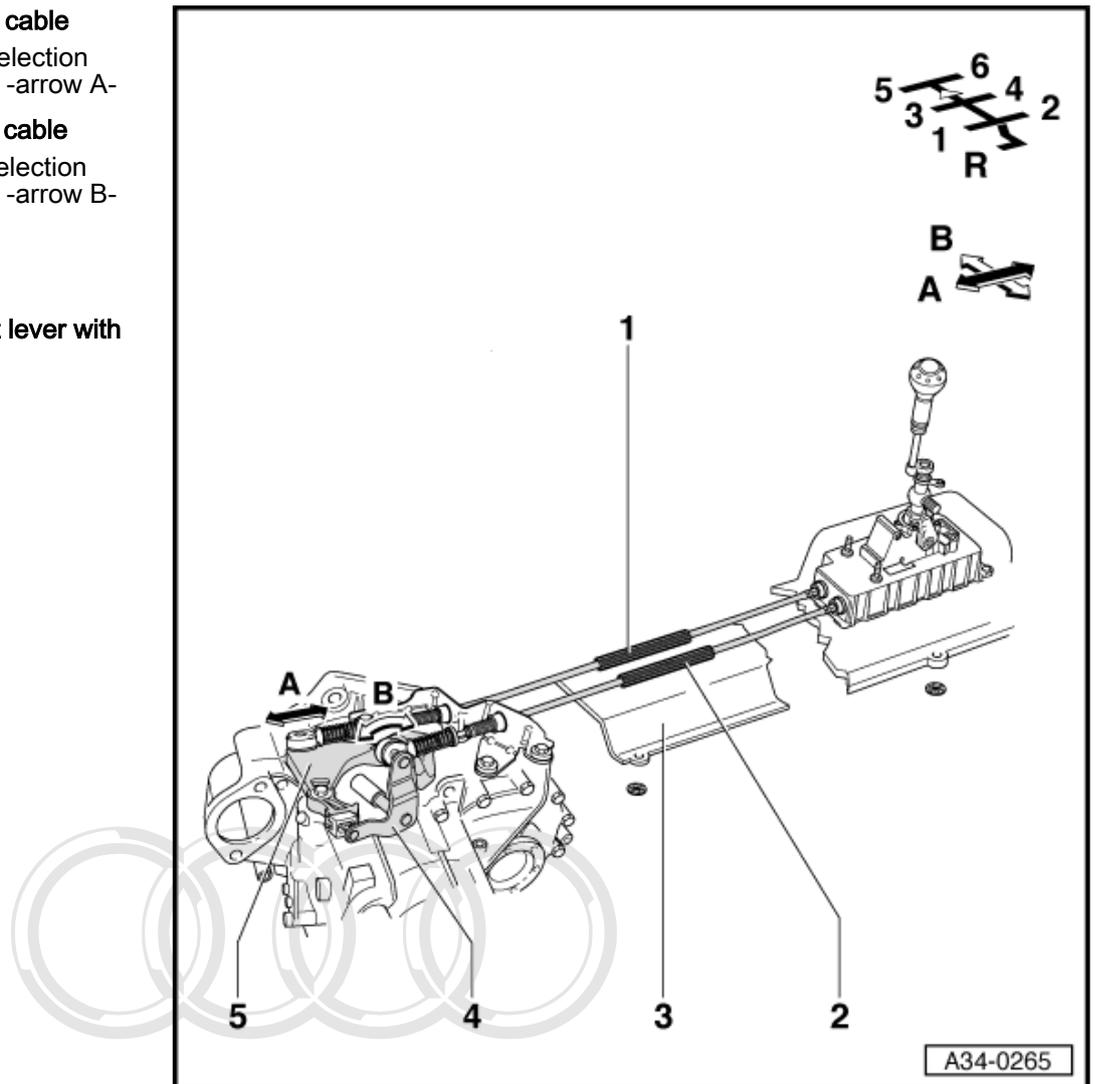
2 - Gate selector cable

- For gate selection movement -arrow B-

3 - Heat shield

4 - Relay lever

5 - Selector shaft lever with damper weight



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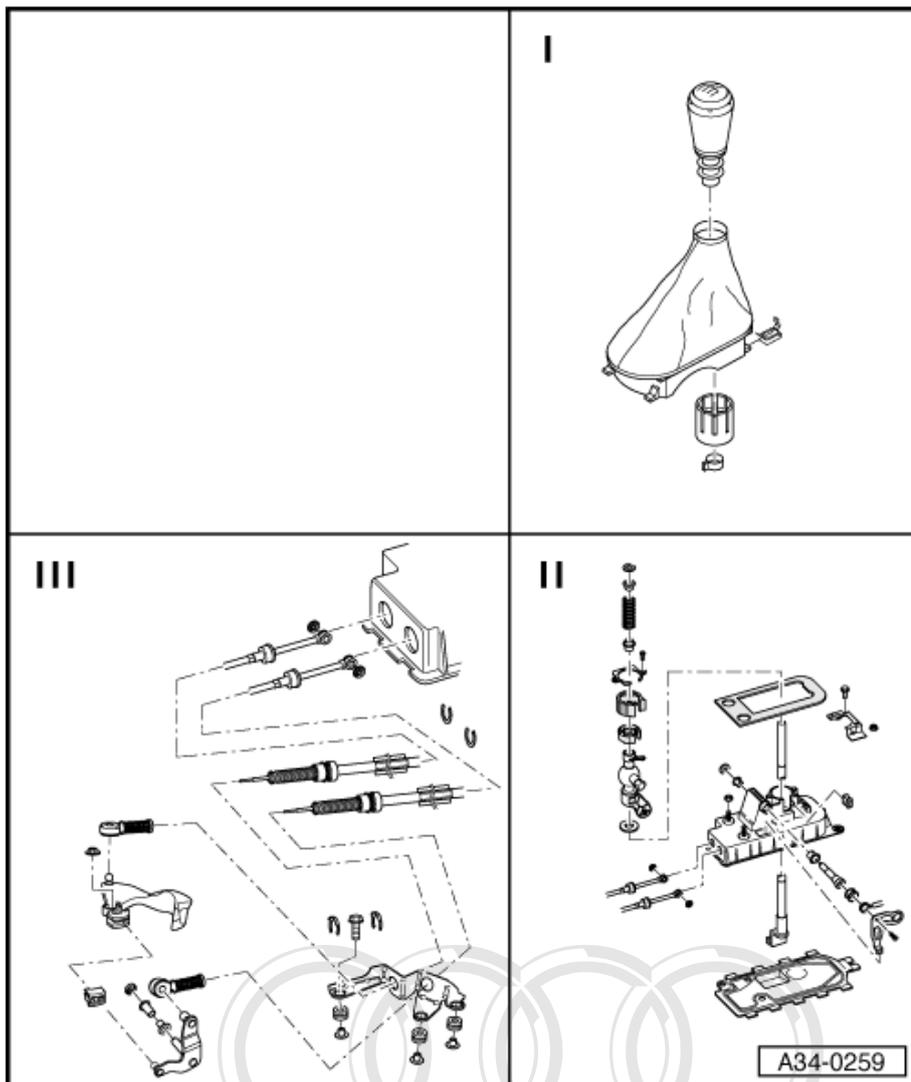
I - Gear lever knob and boot - exploded view of components
⇒ [page 39](#)

II - Gear lever and selector housing - exploded view of components
⇒ [page 40](#)

III - Selector cables
⇒ "1.4 Selector cables to 06.2001 - exploded view of components", [page 42](#) or
⇒ "1.5 Selector cables from 07.2001 - exploded view of components", [page 44](#)

Removing and installing selector mechanism ⇒ [page 45](#)

Adjusting selector mechanism ⇒ [page 48](#)



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1.2 Gear lever knob and boot - exploded view of components

1 - Gear lever knob

- Remove and install together with boot
- Removing

2 - Boot with mounting frame

- Remove and install together with gear lever knob
- Removing
- Separating from gear lever knob ⇒ [page 39](#)
- Connect to gear lever knob before installing ⇒ [page 39](#)

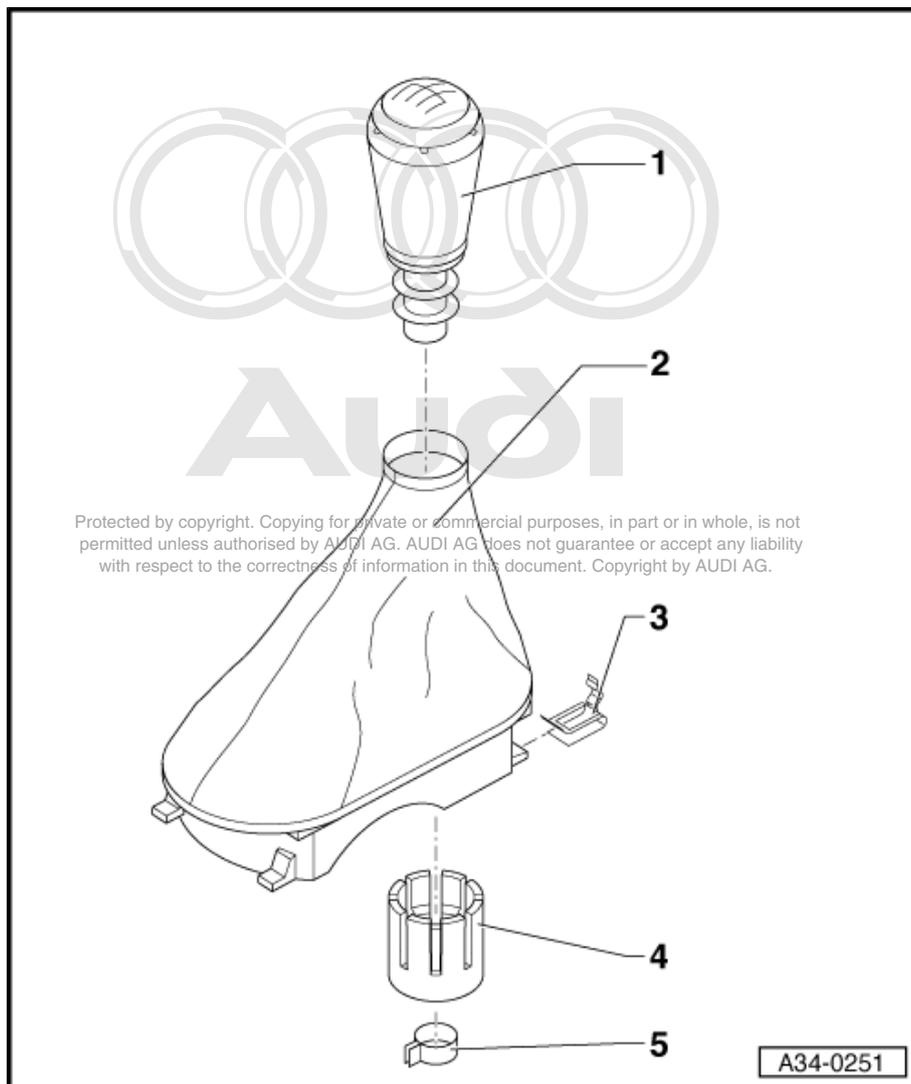
3 - Retaining clips

4 - Clamping sleeve

- Connects boot with gear lever knob
- Removing ⇒ [page 39](#)

5 - Clip

- Secures gear lever knob to gear lever
- Secure on gear lever knob using hose clip pliers -V.A.G 1275-

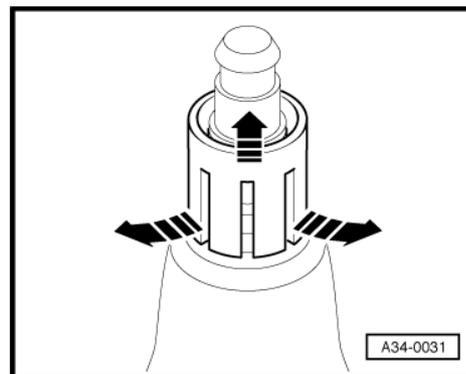


Detaching boot from gear lever knob and assembling

- Turn boot inside out.
- Carefully bend tabs on clamping sleeve open -arrows- using screwdriver. Detach clamping sleeve from gear lever knob while doing so.
- Detach gear lever knob from boot.

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

- Insert gear lever knob in boot.
- Push clamping sleeve onto gear lever knob and engage.
- Install gear lever knob and boot together.



1.3 Gear lever and selector housing - exploded view of components

i Note

Lubricate all bearings and moving surfaces with polycarbamide grease -G 000 450 02- .

1 - Circlip

- Removing and installing ⇒ [page 41](#)

2 - Bush

3 - Spring

4 - Bush

5 - Torx bolt, 5 Nm

6 - Cover

7 - Damper

8 - Bearing shell

9 - Gear lever guide

10 - Damping washer

11 - Gasket

- Between selector housing and floor
- Self-adhesive
- Bond to selector housing

12 - Bolt, 25 Nm

13 - Bracket

- Secured on body

14 - Hexagon nut, 25 Nm

- For bracket on body

15 - Gear lever

16 - Damper

17 - Selector housing

18 - Mounting bush

19 - Pivot pin

20 - Guide bush

21 - Spring

- Installing ⇒ [page 41](#)

22 - Gate selector bracket

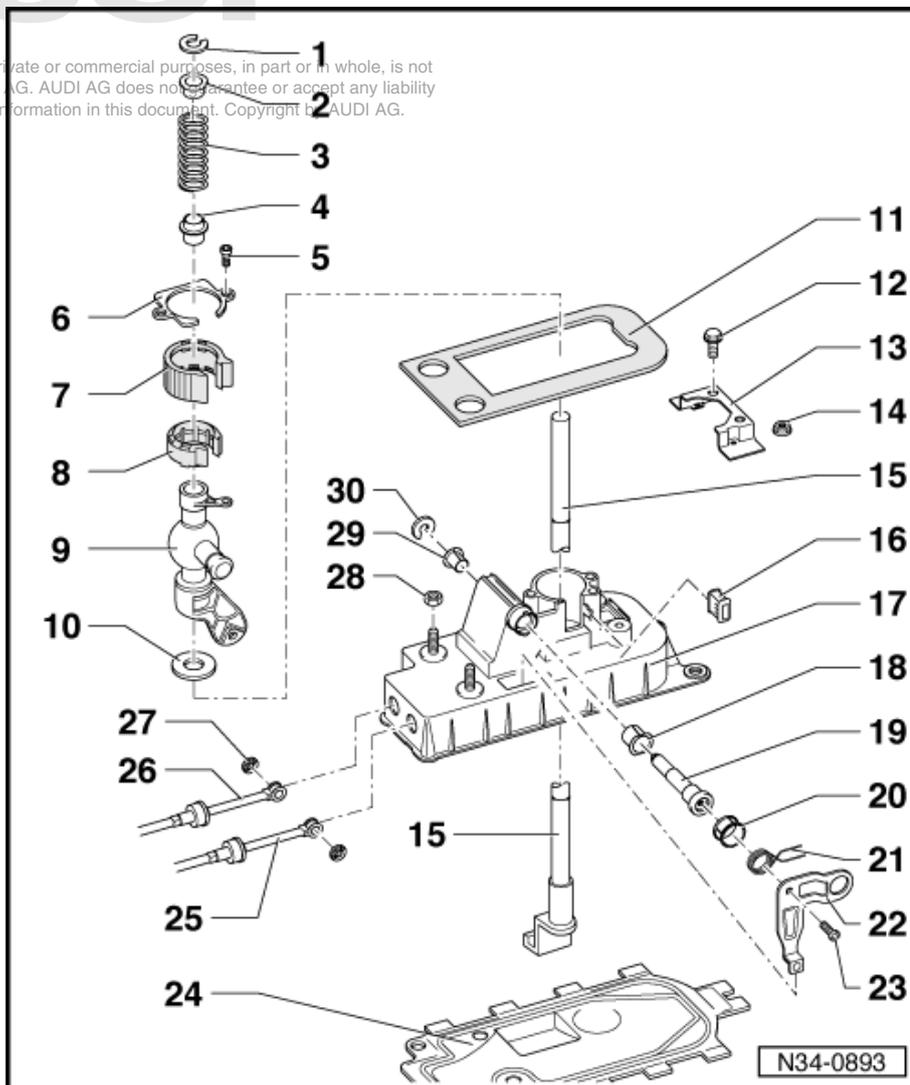
23 - Torx bolt, 5 Nm

24 - Floor plate

- Bend tabs open to remove
- Renew

25 - Gate selector cable

- On gate selector bracket
- Installation position ⇒ [page 37](#)



26 - Gear selector cable

- Press onto gear lever guide
- Installation position ⇒ [page 37](#)

27 - Securing clip

28 - Hexagon nut, 25 Nm

29 - Mounting bush

- Only fits in one position.

30 - Circlip

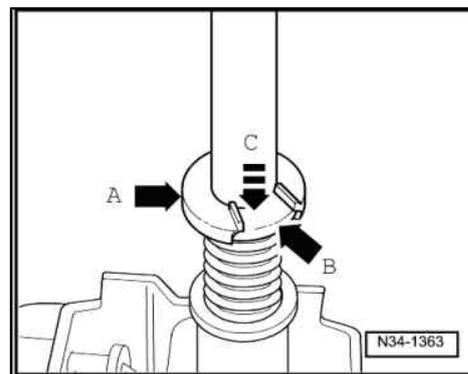
Removing and installing circlip

- To remove and install circlip -arrow A-, use screwdriver to press spacer bush -arrow B- in direction of -arrow C- as far as stop and detach circlip.



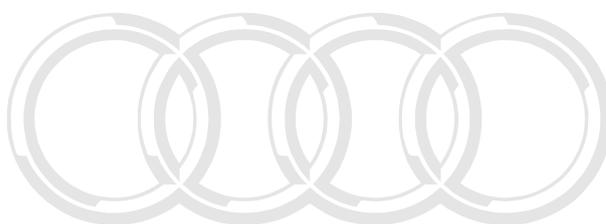
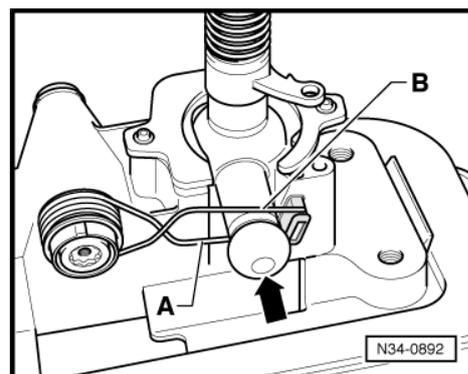
Note

- ◆ *Keep spacer bush straight while pushing down.*
- ◆ *Groove in gear lever for circlip must be visible.*
- ◆ *Release spring carefully.*



Installing spring

- Insert spring so that the spring extension -A- is under the pin -arrow-.
- Then pull spring extension -B- up towards gear lever until it lies on upper section of pin -arrow-.



Audi

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1.4 Selector cables to 06.2001 - exploded view of components



Note

Lubricate all bearings and moving surfaces with polycarbamide grease -G 052 142 A2-.

1 - Gear selector cable

- Press onto gear lever guide
- Installation position ⇒ [page 37](#)

2 - Gate selector cable

- On gate selector bracket
- Installation position ⇒ [page 37](#)

3 - Securing clip

- Always renew

4 - Circlip

- Take care not to damage selector cables when removing.
- Always renew

5 - Selector housing

6 - Hexagon bolt, 25 Nm

- For support bracket

7 - Support bracket

8 - Grommet

- For support bracket mounting on gearbox

9 - Distance piece

10 - Cable end-piece

- Secures gate selector cable to relay lever
- Renew if removed from relay lever ⇒ [page 43](#)
- Installing ⇒ [page 43](#)
- Release to install and adjust selector mechanism ⇒ [page 46](#)

11 - Relay lever

- Installation position ⇒ [page 43](#)
- After installing, adjust selector mechanism ⇒ [page 48](#)

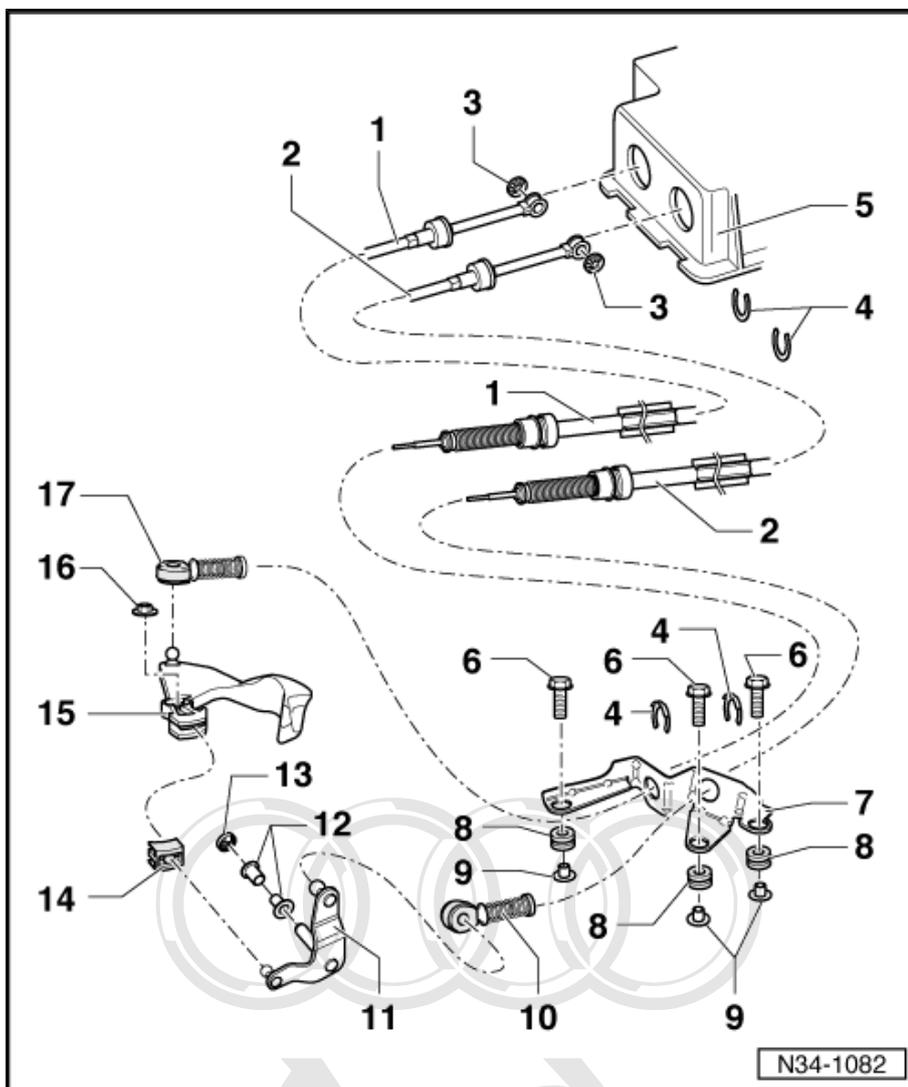
12 - Mounting bush

13 - Securing clip

14 - Slide block

15 - Selector shaft lever with damper weight

- Installation position ⇒ [page 43](#)
- Install so that gap in splines aligns with selector shaft
- After installing, adjust selector mechanism ⇒ [page 48](#)



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16 - Hexagon nut, 25 Nm

- Always renew

17 - Cable end-piece

- Secures gear selector cable to gearbox selector lever
- Renew if removed from gearbox selector lever ⇒ [page 43](#)
- Installing ⇒ [page 43](#)
- Release to install and adjust selector mechanism ⇒ [page 46](#)

Installation positions of selector shaft lever, relay lever and locking pin

- 1 - Locking mechanism for gear selector cable
- 2 - Locking mechanism for gate selector cable
- 3 - Selector shaft lever with damper weight
- 4 - Relay lever

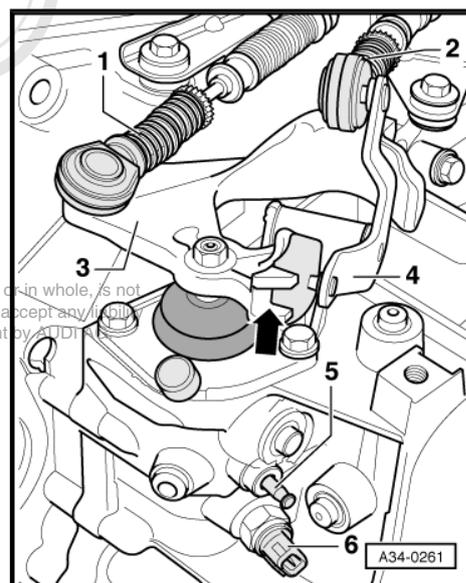
- Relay lever locates in guide rail of selector shaft lever via slide block -arrow-.

- Apply polycarbamide grease -G 052 142 A2-

- 5 - Locking pin

- To adjust selector mechanism, press locking pin into gearbox ⇒ [page 48](#)

- 6 - Reversing light switch -F4-



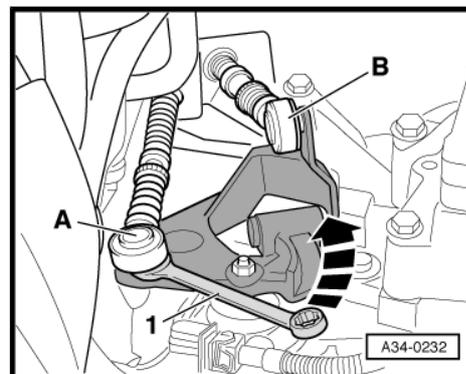
Renewing cable end-pieces



Note

Cable end-pieces must be renewed after being removed. Cable end-pieces are damaged upon removal.

- Lever off gear selector cable -A- and gate selector cable -B- using an open-ended spanner (13 mm) -1-.



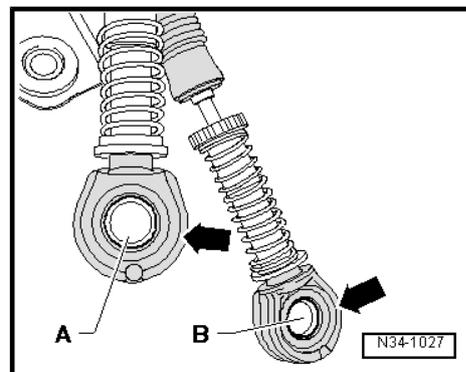
Installing new cable end-pieces

- Apply a small amount of polycarbamide grease -G 052 142 A2- in ball sockets of cable end-piece -A- and gate cable end-piece -B-.



Note

The seals -arrows- outside the ball socket must be grease-free.



1.5 Selector cables from 07.2001 - exploded view of components

Note

Lubricate all bearings and moving surfaces with polycarbamide grease -G 052 142 A2- .

1 - Gear selector cable

- Connect to cable end-piece
⇒ [Item 18 \(page 45\)](#)
- Installation position
⇒ [page 37](#)

2 - Gate selector cable

- Connect to cable end-piece
⇒ [Item 11 \(page 44\)](#)
- Installation position
⇒ [page 37](#)

3 - Securing clip

- Renew

4 - Circlip

- Take care not to damage selector cables when removing.
- Renew

5 - Selector housing

6 - Hexagon bolt, 20 Nm

- 2 x

7 - Support bracket

8 - Grommet

- For support bracket mounting on gearbox

9 - Distance piece

10 - Nut, 20 Nm

11 - Cable end-piece

- Secures gate selector cable to relay lever
- Do not interchange with ⇒ [Item 18 \(page 45\)](#) ; different version ⇒ [page 45](#)

12 - Relay lever

- Installation position ⇒ [page 45](#)
- After installing, adjust selector mechanism ⇒ [page 48](#)

13 - Mounting bush

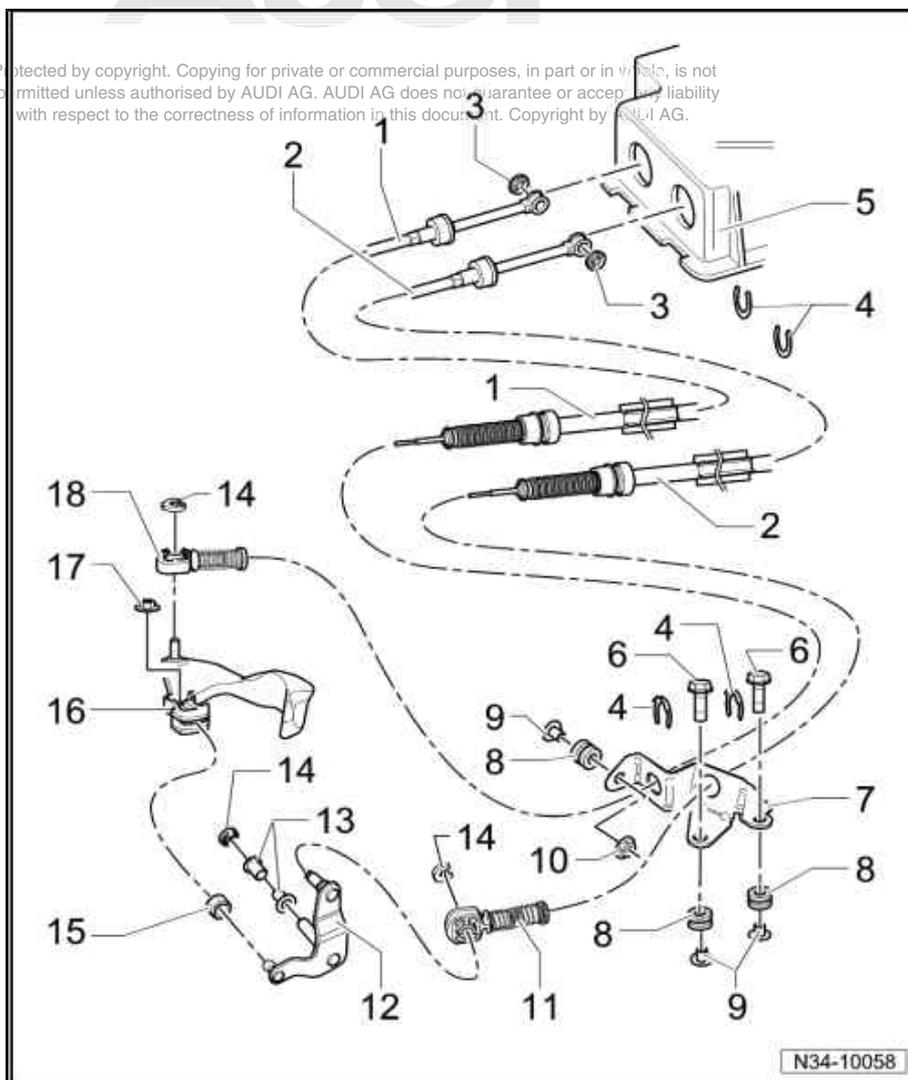
14 - Securing clip

- Renew after removing

15 - Slide block

16 - Selector shaft lever with damper weight

- Install so that gap in splines aligns with selector shaft
- Installation position ⇒ [page 45](#)
- After installing, adjust selector mechanism ⇒ [page 48](#)



17 - Hexagon nut, 23 Nm

- Self-locking
- Renew

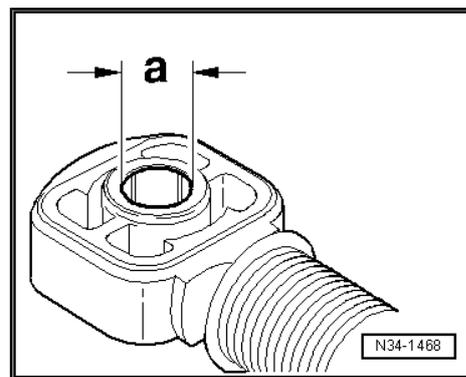
18 - Cable end-piece

- Secures gear selector cable to selector shaft lever
- Do not interchange with ⇒ [Item 11 \(page 44\)](#) ; different version ⇒ [page 45](#)

Allocation of cable-end pieces

The holes in the cable end-pieces have different diameters:

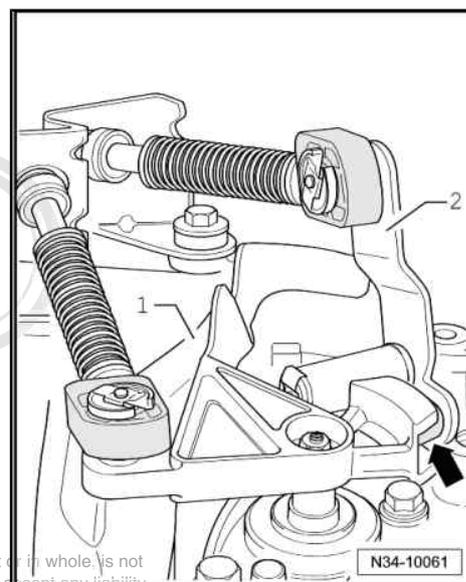
- ◆ Cable end-piece securing gear selector cable to selector shaft lever: diameter -a- = 10 mm.
- ◆ Cable end-piece for gate selector cable to relay lever: diameter -a- = 8 mm.



Installation position of selector shaft lever and relay lever

- 1 - Selector shaft lever with damper weight
- 2 - Relay lever

- Relay lever locates in guide rail of selector shaft lever via slide block -arrow-.

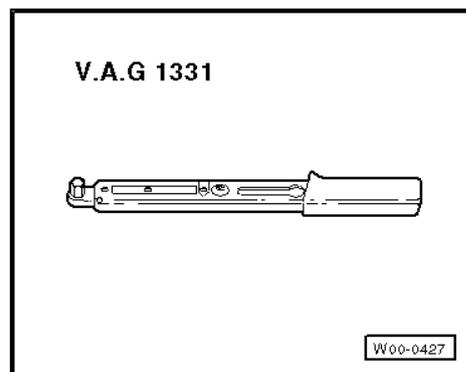


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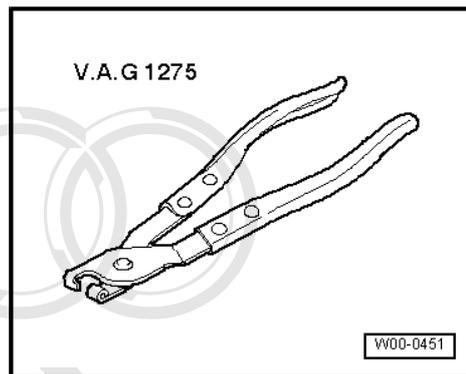
1.6 Removing and installing selector mechanism

Special tools and workshop equipment required

- ◆ Torque wrench -V.A.G 1331-



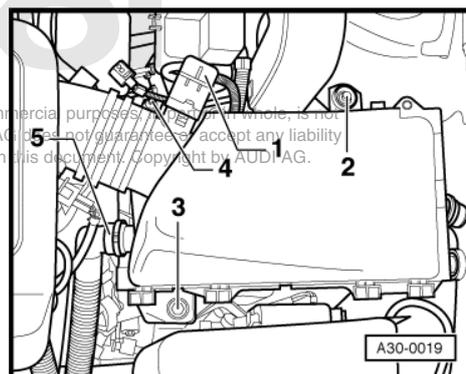
- ◆ Hose clip pliers -V.A.G 1275-



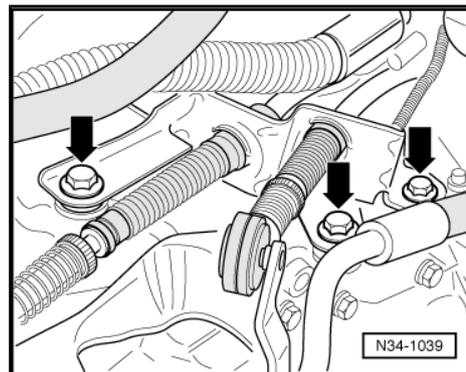
Removing

- Detach air intake hose at throttle valve module -J338- (slacken hose clip -4-).
- Unplug electrical connector for air mass meter G70 -1-.
- If fitted, detach hose -5- from air cleaner housing.
- Remove bolts -2- and -3-.
- Take out air cleaner housing.

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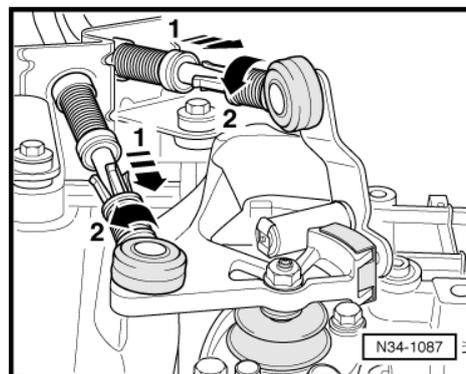


- Detach cable support bracket from gearbox -arrows-.



Vehicles to 06.2001:

- Release cable end-pieces for gate selector cable and gear selector cable; push back collar as far as it will go in direction of -arrow 1-, then turn anti-clockwise in direction of -arrow 2- so that it engages.
- Pull selector cables out of cable end-pieces

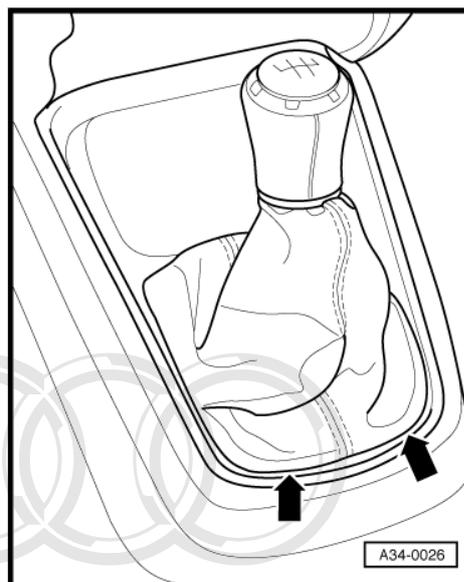
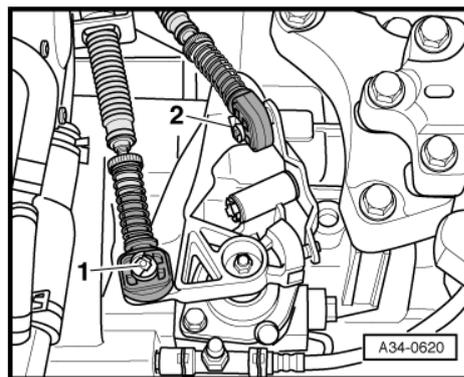


Vehicles from 07.2001:

- Unclip securing clip -1- from gear selector cable and securing clip -2- from gate selector cable.
- Detach cable end-pieces with selector cables from selector shaft lever and relay lever.

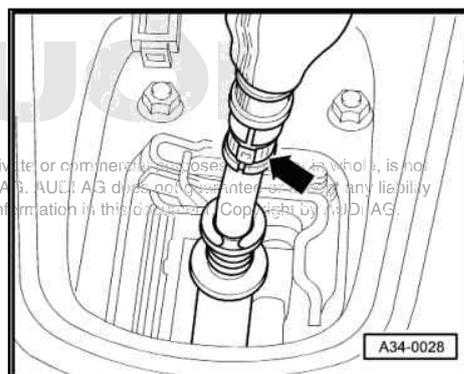
Continued for all vehicles:

- Carefully pry gear lever boot off centre console -arrows-.
- Pull gear lever boot off centre console towards rear.

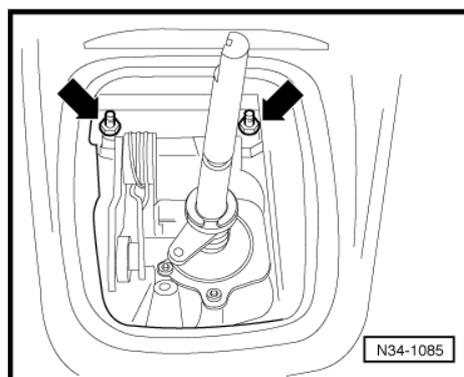


- Destroy clip -arrow- and pull off gear lever knob together with boot.
- Remove noise insulation, if fitted.

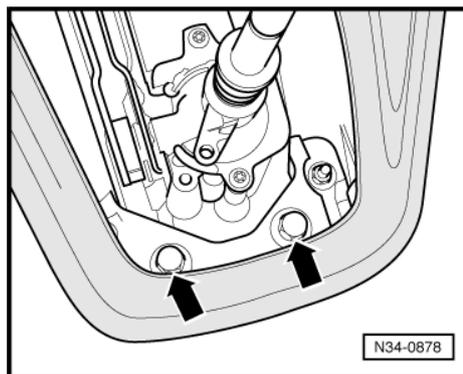
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- Now remove front securing nuts for selector housing -arrows-.



- Then remove rear securing nuts for selector housing -arrows-.
- Disconnect exhaust system behind front exhaust pipe and remove catalytic converter (2nd mechanic required) => Rep. Gr. 26 .
- Remove propshaft => Rear final drive 02D; Rep. Gr. 39 .
- Remove heat shield (front).
- Pivot selector housing downwards and remove together with selector cables.



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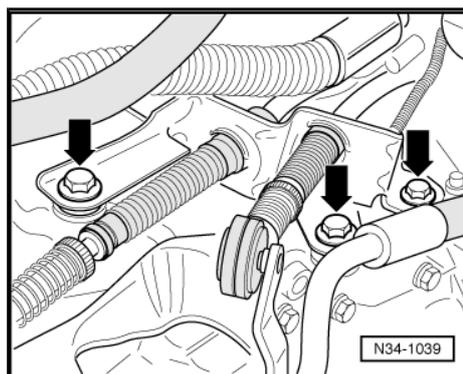
Installing

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

- Attach cable support bracket -arrows-.
- Align selector housing parallel to body.
- Distance to body must then be the same on both sides.

Vehicles to 06.2001:

- Insert Bowden cables in unlocked cable end-pieces.

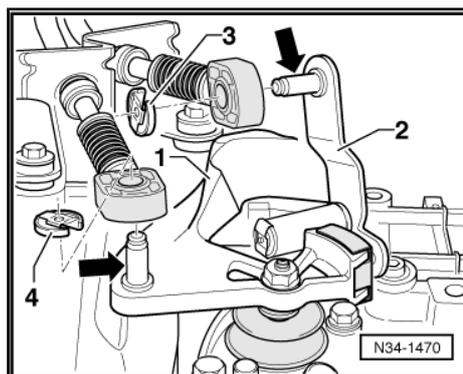


Vehicles from 07.2001:

- Spread small amount of grease -G 000 450 02- onto pins -arrows- of gearbox selector lever -1- and relay lever -2-.
- Always renew circlips -3- and -4- after removing.

All models:

- Install propshaft => Rear final drive 02D; Rep. Gr. 39 .
- Install exhaust system free of stress => Rep. Gr. 26 .
- Adjust selector mechanism => [page 48](#) .



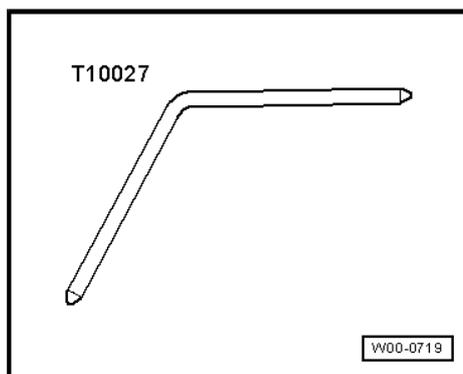
Tightening torques

Component	Nm
Selector housing to body	25
Selector cable support bracket to gearbox	25

1.7 Adjusting selector mechanism

Special tools and workshop equipment required

- ◆ Locking pin -T10027-

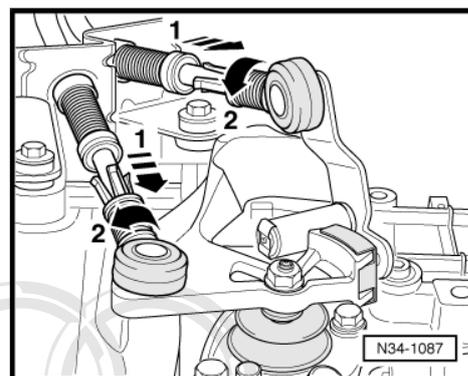


Requirements for adjustment

- Gear selector linkage must be in proper condition and undamaged.
- Selector mechanism must move freely.
- Gearbox, clutch and clutch mechanism must be in proper condition.
- Gearbox in neutral.

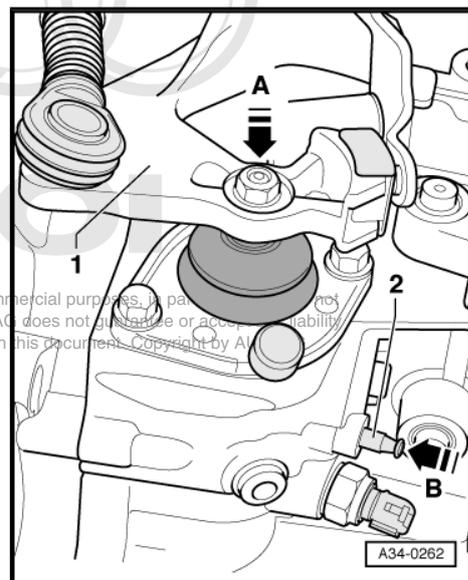
Procedure

- Release cable end-pieces for gate selector cable and gear selector cable; push back collar as far as it will go in direction of -arrow 1-, then turn anti-clockwise in direction of -arrow 2- so that it engages.



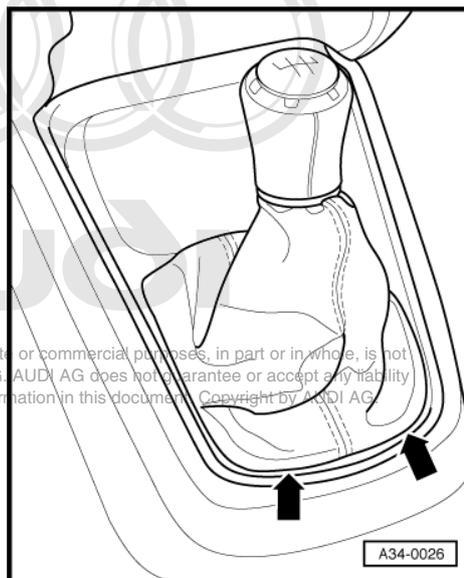
Now lock the selector shaft as follows:

- Press selector shaft lever -1- in direction of -arrow A- downwards into selector gate for 1st/2nd gear.
- At the same time press locking pin -2- in direction of -arrow B- into gearbox until it engages.
- The selector shaft is then locked and can no longer be moved.

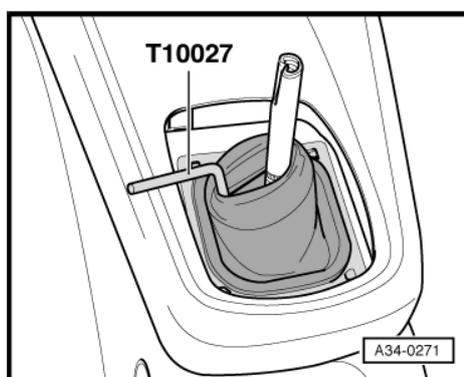


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- Carefully pry gear lever boot off centre console -arrows-.

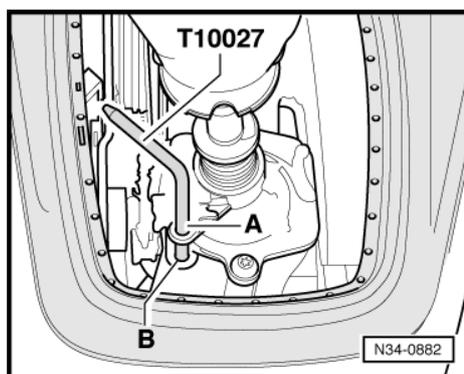


- Pull rubber boot away from gear lever so that locking pin -T10027- can be inserted (if rubber boot is fitted).

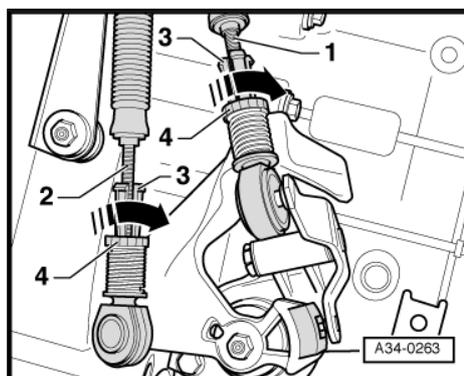


Now lock the gear lever as follows:

- With gearbox in neutral, guide gear lever to the left into 1st/2nd gear gate.
- Then guide locking pin -T10027- through hole -A- and into hole -B-.



- Make sure that gate selector cable -1- and gear selector cable -2- are located free of tension in the cable end-pieces -3-.
- Turn collars -4- as far as they will go in direction of -arrow- and release.
- The spring presses the locking mechanism into normal position.



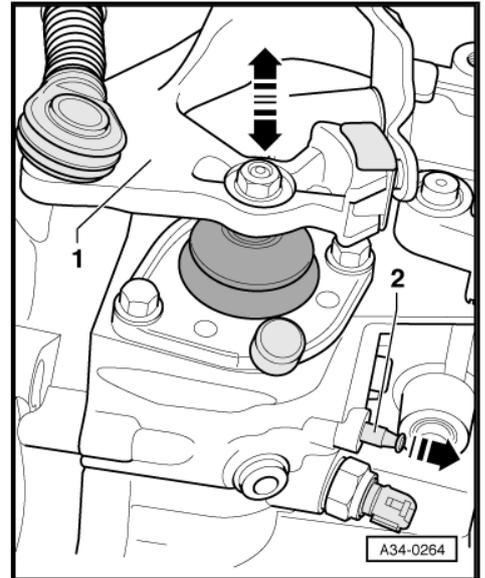
- Pull locking pin -2- back to normal position (direction of -arrow-).
- Pull locking pin -T10027- out of selector mechanism.
- It should be possible to move selector shaft lever -1- in direction of -arrow-.

Checking gear lever setting

- The gear lever should rest in the 3rd/4th gear gate when the gearbox is in neutral.
- Press clutch pedal.
- Select all gears several times.
- Check operation of reverse gear lock.
- The gear lever should return by itself from the reverse gear gate to the 3rd / 4th gear gate.

If the gear lever sticks or baulks repeatedly when engaging a gear, perform the adjustment procedure again.

- Install boot for gear lever.

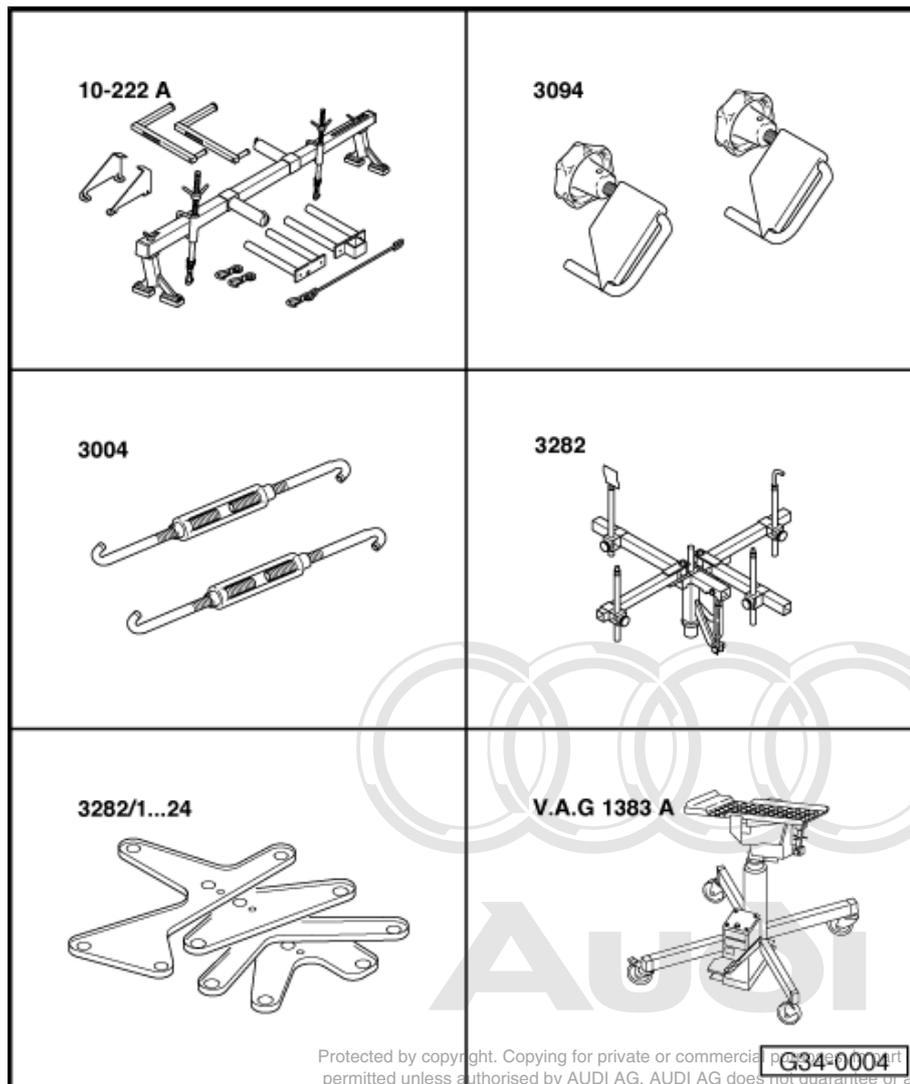


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2 Removing gearbox

Special tools and workshop equipment required

- ◆ Support bracket -10-222 A-
- ◆ Hose clamps, up to Ø 25 mm -3094- (3x)
- ◆ Hooks -3004- (3x)
- ◆ Gearbox support -3282-
- ◆ Adjustment plate -3282/27-
- ◆ Engine and gearbox jack - V.A.G 1383 A-
- ◆ Chain (2x)



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G34-0004

Procedure



Note

All cable ties which are released or cut open when removing the gearbox must be refitted in the same position when installing the gearbox.

- Move gear lever to neutral.

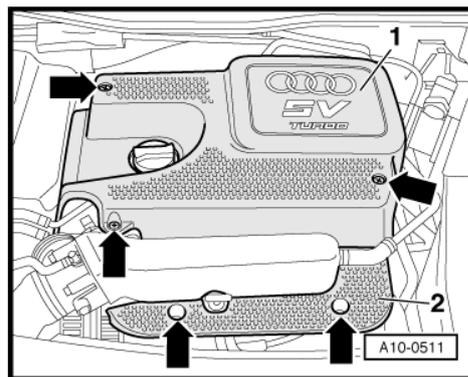


Caution

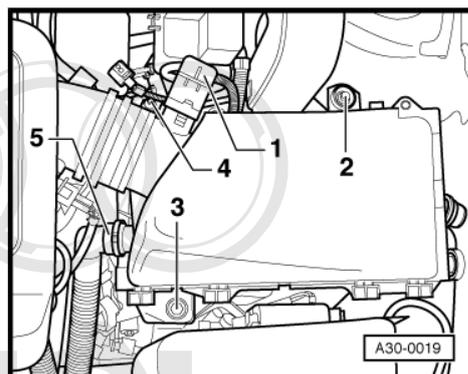
Follow steps required when disconnecting battery => Electrical system; Rep. Gr. 27.

- With ignition switched off, disconnect earth wire at battery.

- Remove engine cover panel -1- above cylinder head cover -arrows-.

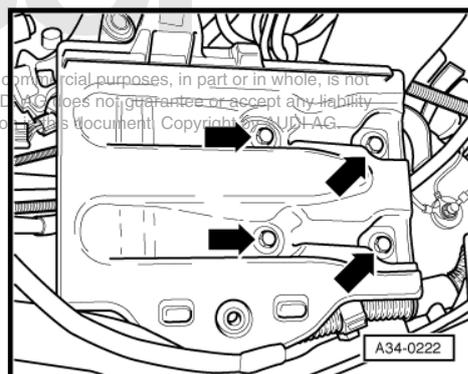


- Detach air intake hose at throttle valve module -J338- (slacken hose clip -4-).
- Unplug electrical connector for air mass meter -G70- -1-.
- If fitted, detach hose -5- from air cleaner housing.
- Remove bolts -2- and -3-.
- Take out air cleaner housing.

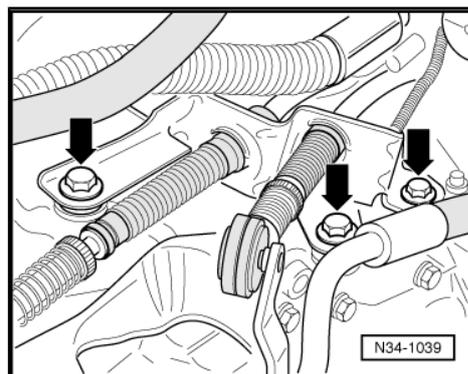


- Remove battery and battery tray -arrows-.

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- Detach cable support bracket from gearbox -arrows-.

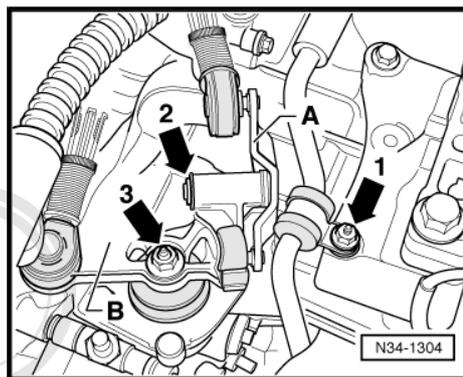


- Detach securing clip -arrow 2- and remove relay lever -A- with gate selector cable.



Caution

Do not remove cable end-pieces from selector shaft lever or relay lever. Cable end-pieces must be renewed after removal.



- Unscrew nut -arrow 1- for pressure pipe of power steering.
- Unscrew nut -arrow 3- and detach selector shaft lever -B- with gear selector cable.



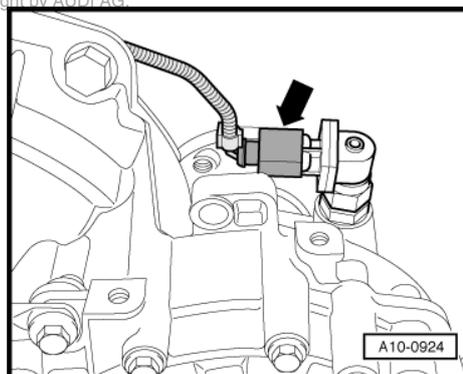
Note

If necessary, use puller -Kukko 20-10- to detach.

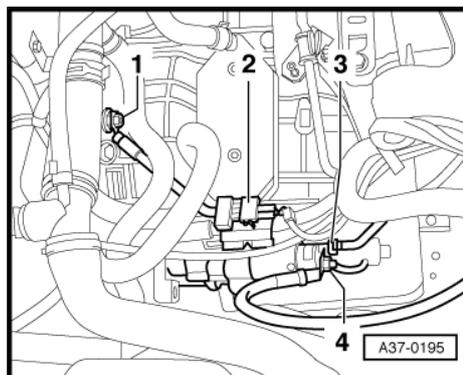
- Tie up gear selector cable with selector shaft lever and gate selector cable.

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- Unplug electrical connector at speedometer sender -G22- -arrow-.



- Unscrew earth wire -1-.
- Detach electrical connector -3- from starter. Pipe -4- remains connected.
- Unplug connector -2- and pull out of bracket.
- Disengage wiring from bracket on starter and move clear to one side.
- Remove bracket.
- Remove top bolt securing starter.
- Unscrew engine/gearbox securing bolts which are accessible from above.



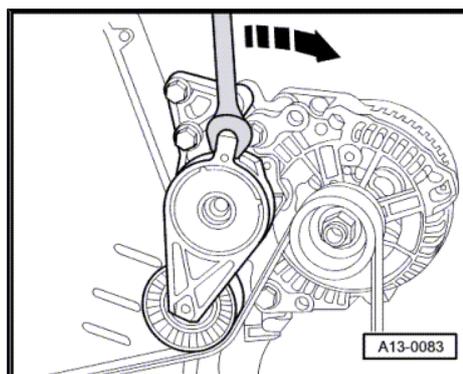
Vehicles with two charge air coolers:



Note

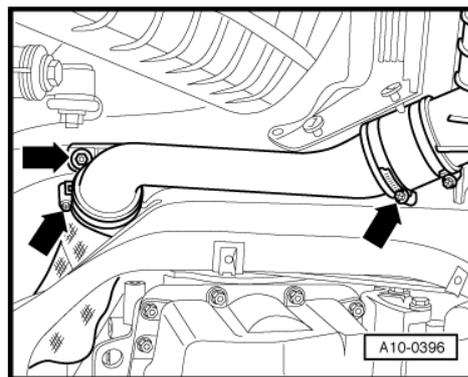
Before removing, mark direction of operation of poly V-belt with chalk or felt-tipped pen. Running a used belt in the opposite direction could destroy it.

- Move tensioner in direction of -arrow- to slacken poly V-belt.
- Detach poly V-belt.



Vehicles with one charge air cooler:

- Remove both front wheels.
- Detach air pipe leading to charge air cooler at longitudinal member (bottom right) -arrows-.

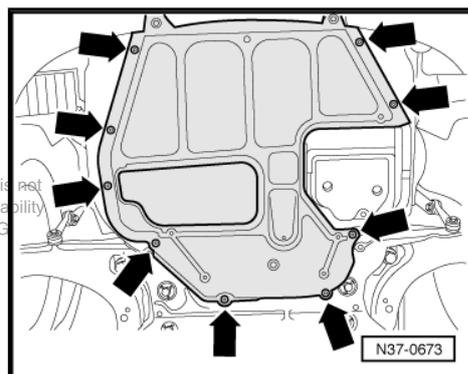


Continued for all vehicles:

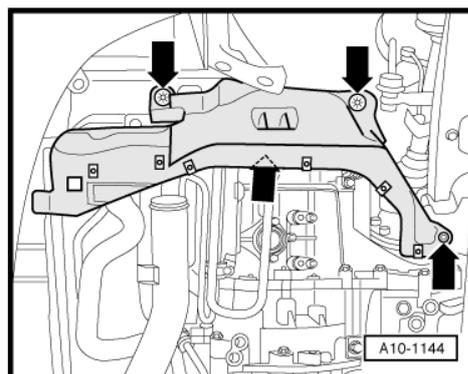
- Remove centre noise insulation -arrows-.



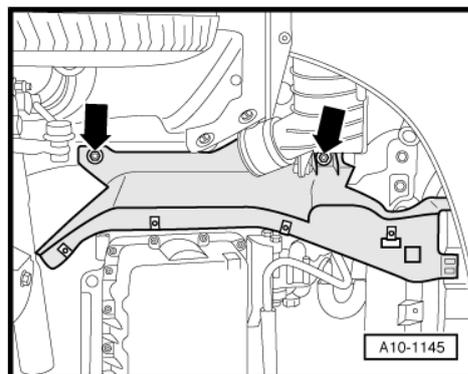
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- Remove noise insulation (left-side) -arrows-.

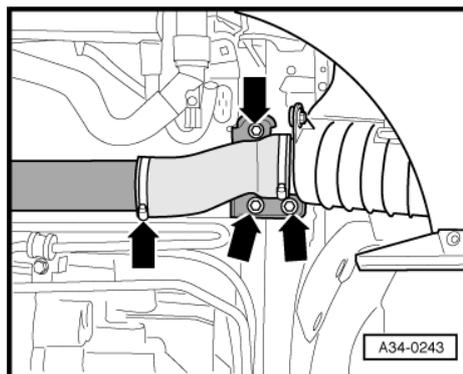


- Remove noise insulation (right-side) -arrows-.

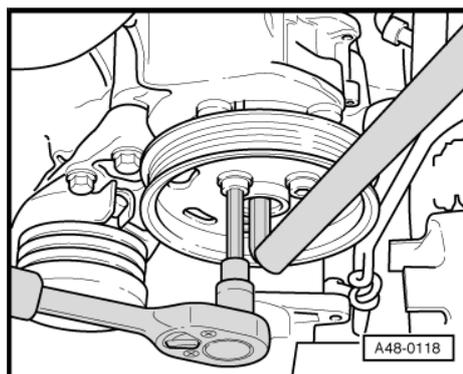


Vehicles with two charge air coolers:

- Remove tubular cross member -arrows-.

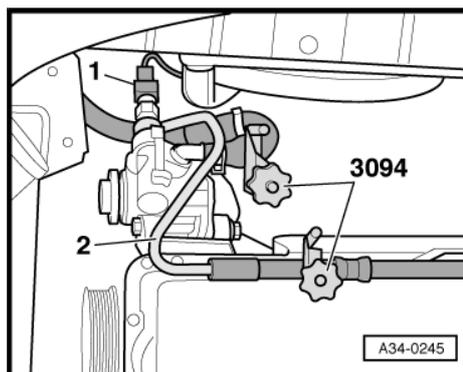


- Remove power steering pump pulley (counterhold with Allen key).



Continued for all vehicles:

- Clamp off supply hose and pressure hose at power steering pump using hose clamps -3094- .
- Unplug electrical connector -1- on power steering pressure switch.
- Unscrew pressure pipe -2- on power steering pump.

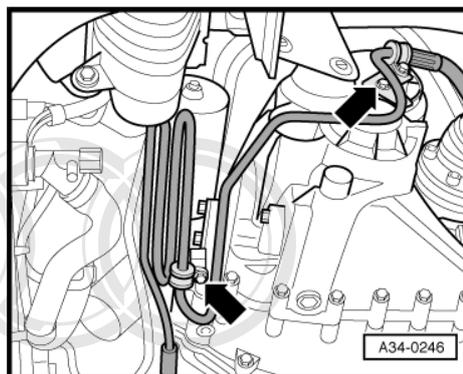


- Detach power steering pipe from gearbox -arrows- and remove speed nut from gearbox.

i Note

If fitted, detach additional pipe retainer.

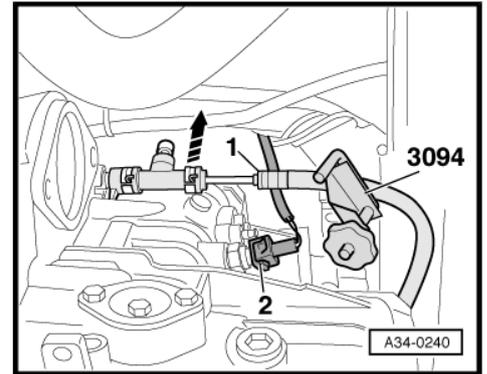
- Remove bottom bolt securing starter and take out starter.



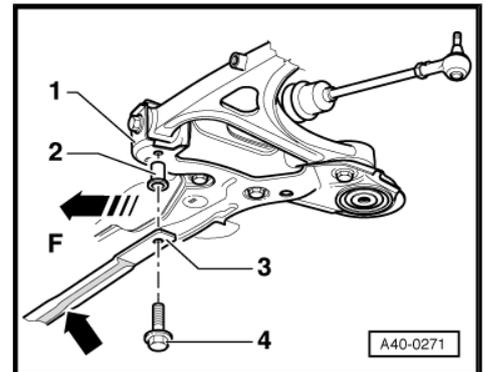
- Using hose clamp -3094- , clamp off pressure line to clutch slave cylinder.
- Pull up retaining clip -arrow- and pull pressure line -1- out of hose connection.

**Caution**

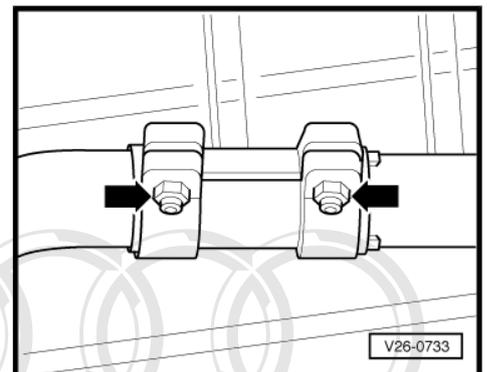
Do not operate clutch pedal after disconnecting pressure line from slave cylinder.



- If fitted, detach cross piece -3- from subframe -1-.
- Unplug electrical connector for reversing light switch -F4- -2-.



- Disconnect exhaust system at clamp -arrows-.
- Push clamp towards the rear.

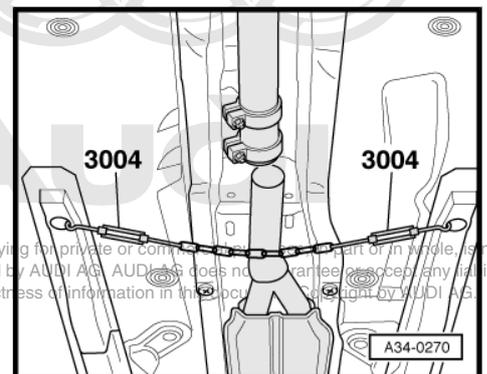


- Tie up exhaust system with a chain. To do so, engage hooks -3004- in openings on underbody (if necessary remove plugs).

**Note**

The flexible joint (de-coupling element) in the exhaust system must not be bent more than 10° – otherwise it can be damaged.

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- Mark position of propshaft relative to flexible coupling on bevel box.
- Unscrew propshaft from flexible coupling at bevel box -arrows-.



Note

Counterhold with a lever on triangle flange when loosening the bolts.

- Press propshaft horizontally to rear as far as possible.

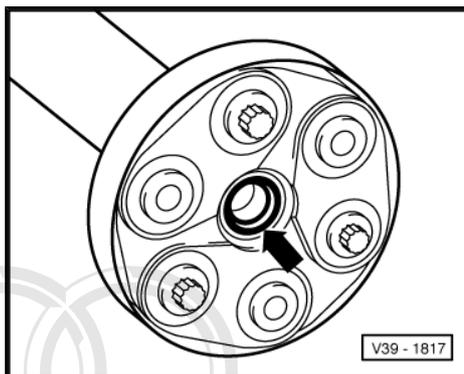
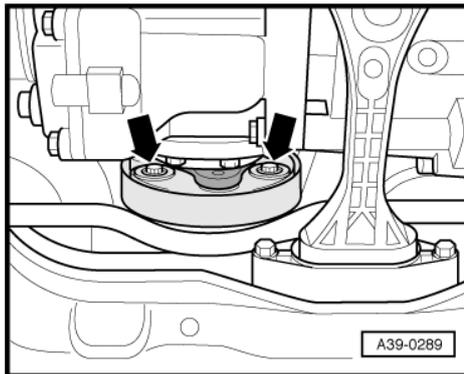


Note

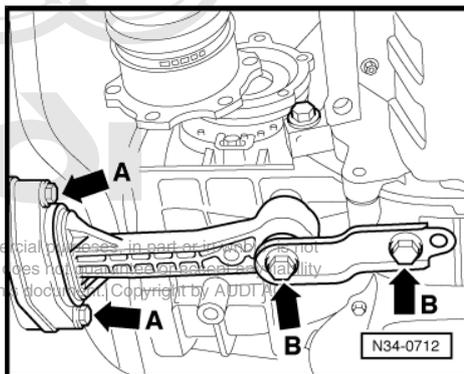
After loosening bolts -A- (=> following illustration N34-0712) the engine/gearbox assembly will swing slightly to the front.

Caution

Make sure that the seal -arrow- in the flange of the propshaft is not damaged when removing and installing. If seals are damaged, the propshaft must be renewed.

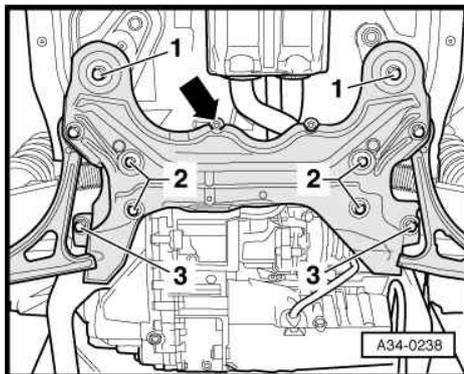


- First unscrew bolts -A- and then bolts -B- and remove pendulum support.
- Carefully press engine/gearbox assembly forwards.

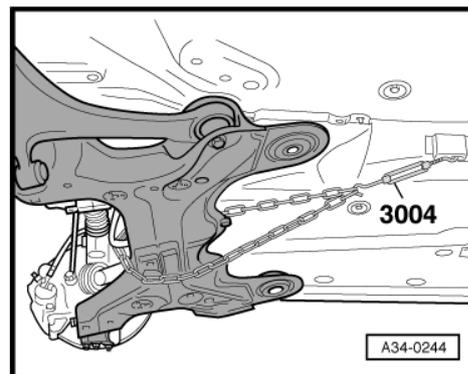
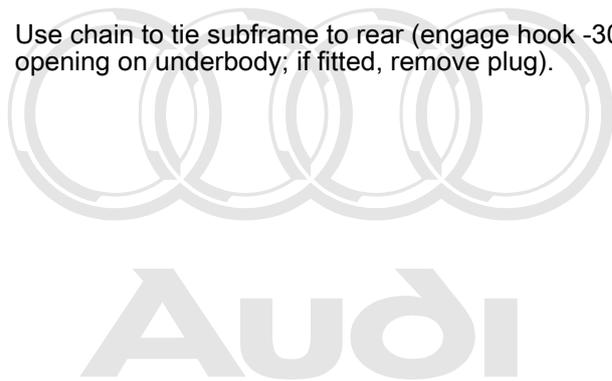


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- If fitted, unbolt front bracket for exhaust system -arrow- from subframe.
- Remove bolts -2- for steering box.
- Lever off steering box from subframe (dowel sleeve).
- Position engine and gearbox jack -V.A.G 1383 A- with engine and universal support -V.A.G 1359/2- below subframe.
- Remove subframe bolts -1- and -3-.
- Carefully lower subframe and press steering box upwards at the same time (do not detach subframe from swivel joints and coupling rods).
- Tie up steering box.
- Remove drive shafts from gearbox flange shafts and place to rear onto subframe (take care not to damage surface protection).

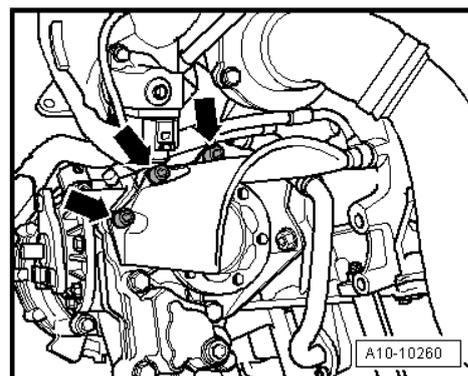


- Use chain to tie subframe to rear (engage hook -3004- into opening on underbody; if fitted, remove plug).



- Unscrew heat shield for drive shaft on right of bevel box **arrows**.

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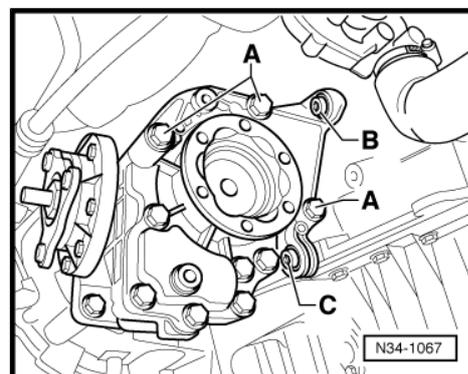


Vehicles with bevel box bracket (metal casting):

- Unscrew bolts -A ... C- at bevel box bracket.

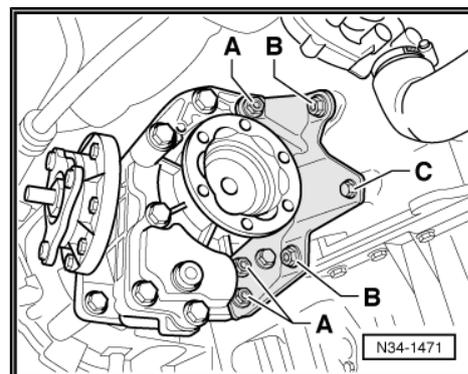


It is not possible to remove bracket at this stage. Bracket remains in installation position.



Vehicles with bevel box bracket (sheet metal version):

- Remove bolts -A ... C- and take off bevel box bracket.





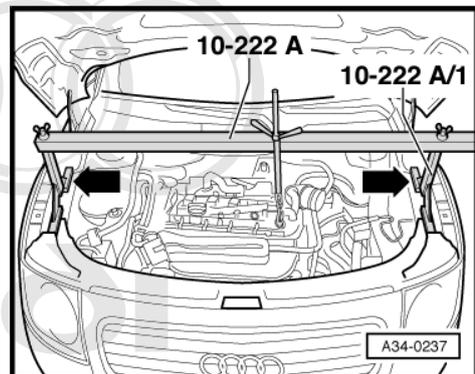
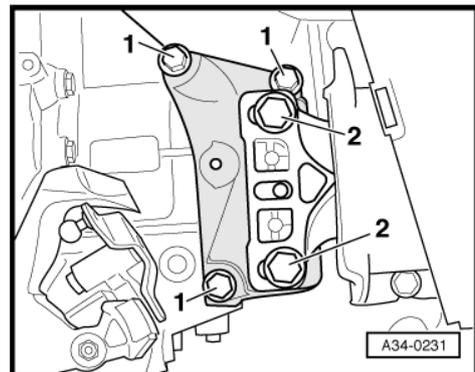
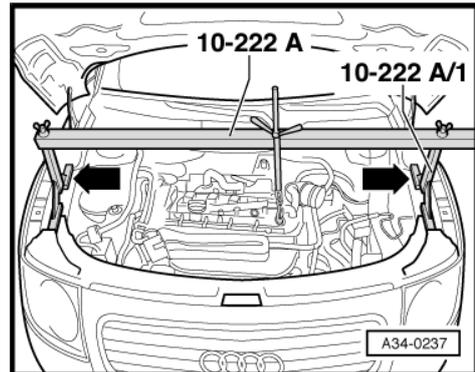
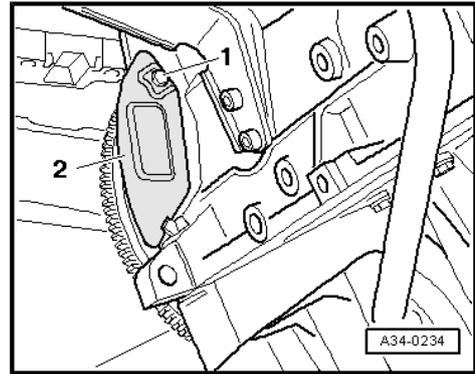
Continued for all vehicles:



Note

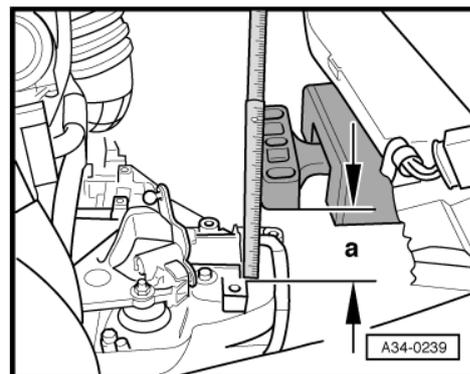
The small cover plate -2- is fitted behind the bevel box and is not visible with bevel box installed. Shown in illustration with gearbox removed.

- Remove bolt -1- (using 10 mm spanner) and remove flywheel cover plate behind bevel box.
- Set up support bracket -10-222 A- with rack -10-222 A/1- on wing mounting flanges -arrows-.
- Take up weight of engine/gearbox assembly via the spindle.
- Remove gearbox support (left-side), to do so unscrew bolts -1- and -2-.
- Lower the engine/gearbox assembly slightly using the spindle.



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- The distance -a- between gearbox housing and gearbox mounting should be 100 ... 110 mm.

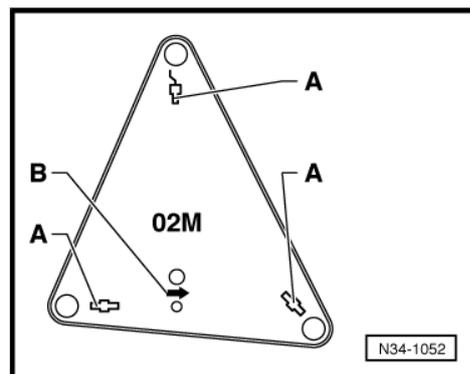


To remove manual gearbox 02M set up gearbox support -3282- with adjustment plate -3282/27- .

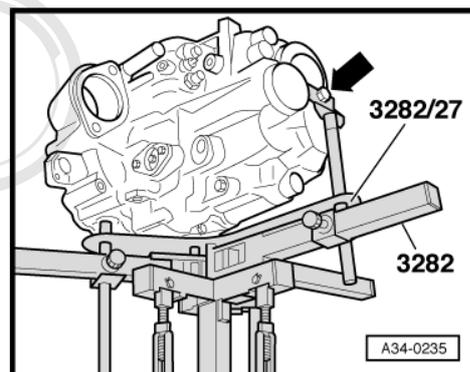
A - Support elements

B - Arrow points in direction of travel

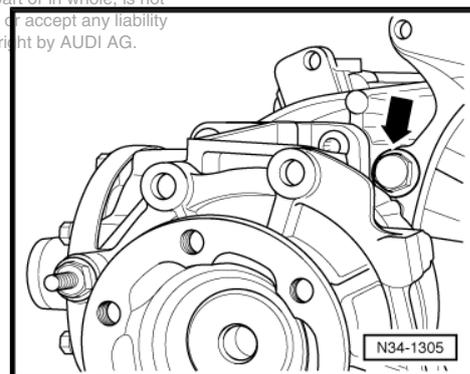
- Assemble engine and gearbox jack -V.A.G 1383 A- as follows:
- Place adjustment plate -3282/27- on gearbox support -3282- (adjustment plate only fits in one position).
- Attach support elements as illustrated on adjustment plate.



- Align arms of gearbox support according to holes in adjustment plate -3282/27- .
- Position engine and gearbox jack -V.A.G 1383 A- under vehicle; arrow symbol on the adjustment plate faces forward.
- Align the adjustment plate parallel to the gearbox.
- Secure support element to gearbox with bolt M8x25 -arrow-.

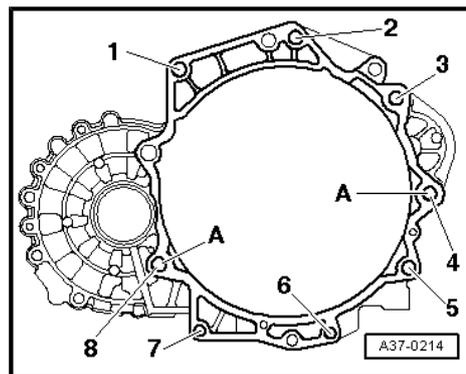


- Unscrew bolt -arrow- above bevel box.



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- Unscrew engine/gearbox securing bolts which are accessible from below.
- Pull gearbox off dowel sleeves.
- Remove bevel box bracket.
- Pull the gearbox off engine first from the bevel box side and then from the front side.
- Lower gearbox carefully.



2.1 Installing gearbox

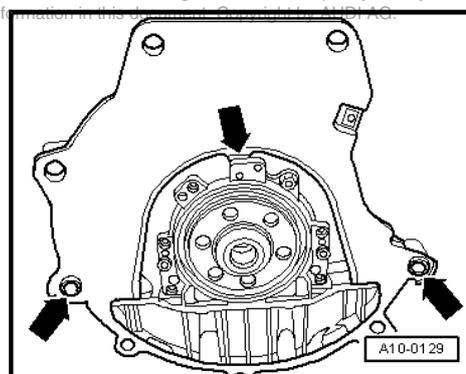
Installation is carried out in reverse sequence; note the following:



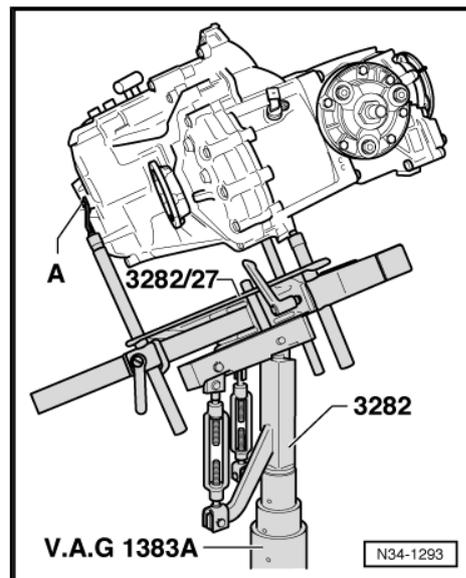
Note

- ◆ *Renew self-locking nuts and bolts when performing assembly work.*
- ◆ *Renew oil seals and gaskets, and bolts which are tightened by turning through a specified angle.*
- ◆ *Secure all hose connections with the correct hose clips (as original equipment); refer to ⇒ Parts catalogue .*
- ◆ *All cable ties which are released or cut open during removal must be fitted in the same position when installing.*
- Clean input shaft splines and (in the case of used clutch plates) the hub splines. Remove corrosion and apply only a very thin coating of grease for clutch plate splines -G 000 100- to the splines. It is important to remove excess grease.
- It should be possible to push the clutch plate back and forth slightly on the input shaft.
- Check that dowel sleeves for centralising engine/gearbox are in the cylinder block; install if necessary.
- Check clutch release bearing with hydraulic actuator for wear and renew if necessary.
- Engage intermediate plate at sealing flange and push onto dowel sleeves -arrows-.

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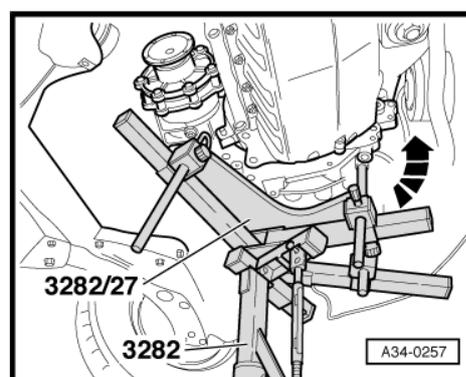
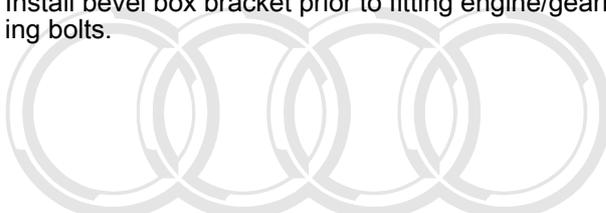
- Tilt gearbox to the left by turning spindles of gearbox support -3282- .
- Raise gearbox carefully and move to installation position using gearbox support.



- Push the gearbox over the engine flywheel at the front first -arrow- and then at the bevel box side.
- Install gearbox.

Vehicles with bevel box bracket (metal casting):

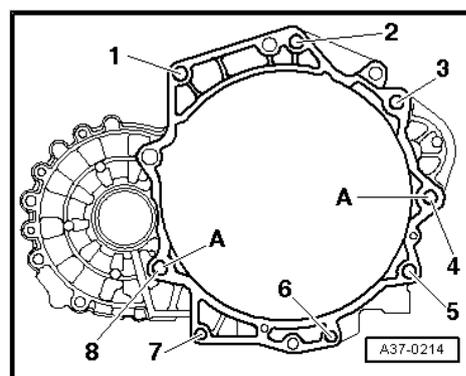
- Install bevel box bracket prior to fitting engine/gearbox securing bolts.



Continued for all vehicles:

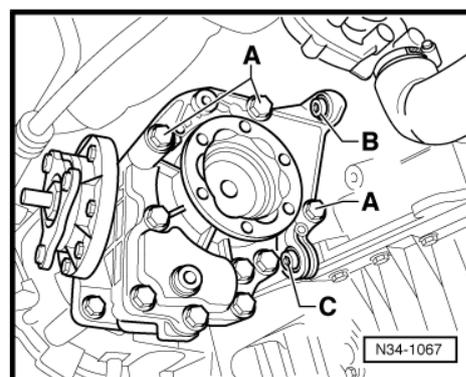
- Fit new engine/gearbox securing bolts which are accessible from below. Tightening torques => [page 64](#)

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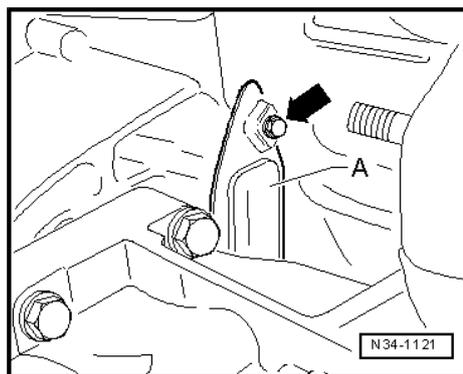
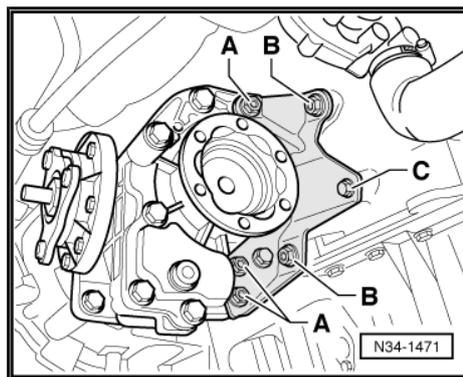
Vehicles with bevel box bracket (metal casting):

- Screw in bevel box bracket bolts -A ... C- only a few turns at this stage.
- Observe the further tightening sequence:
 1. First tighten bolts -A- to 3 Nm.
 2. Tighten bolts -B- and -C- to 35 Nm.
 3. Tighten bolts -A- to 45 Nm.



Vehicles with bevel box bracket (sheet metal version):

- Screw in bevel box bracket bolts -A ... C- only a few turns at this stage.
- Observe the further tightening sequence:
 1. First tighten bolts -A- to 3 Nm.
 2. Tighten bolts -B- to 35 Nm.
 3. Tighten bolt -C- to 22 Nm.
 4. Tighten bolts -A- to 45 Nm.
- Detach gearbox support -3282- from gearbox.
- If fitted, install small flywheel cover plate -A- at rear of bevel box and secure bolt -arrow-.
- Fit new engine/gearbox securing bolts which are accessible from above.

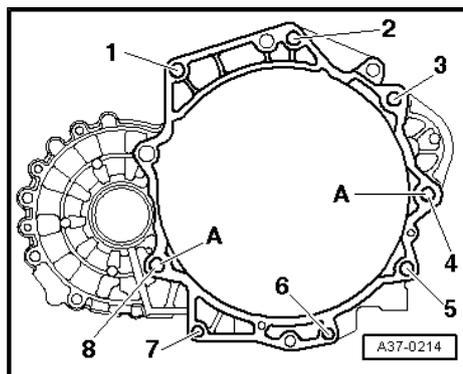


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Engine/gearbox securing bolts

Item	Bolt	Nm
1, 2 ¹⁾	M12x55	80 ²⁾
3 ¹⁾ , 4 ¹⁾	M12x165	80 ²⁾
5	M10x105	40 ²⁾
6, 7	M10x50	40 ²⁾
8	M12x70	80 ²⁾
A	Dowel sleeves for centralising	

- 1) Bolt with stud M8
- 2) Renew bolts

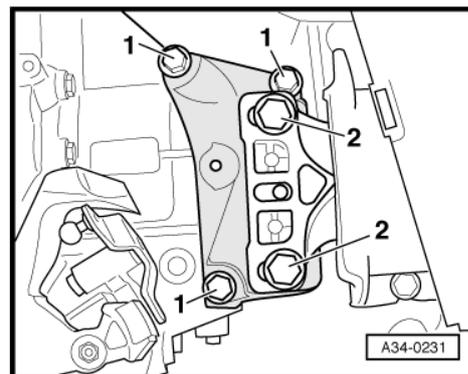


- Use new bolts -1- to secure gearbox support to gearbox.
- Pull gearbox up to gearbox support with spindle on support bracket.



Caution

Before screwing in the bolts, the support arm of the gearbox mounting and the gearbox support must be aligned absolutely parallel, otherwise the threads will be damaged. If necessary, push gearbox up at the rear with trolley jack.



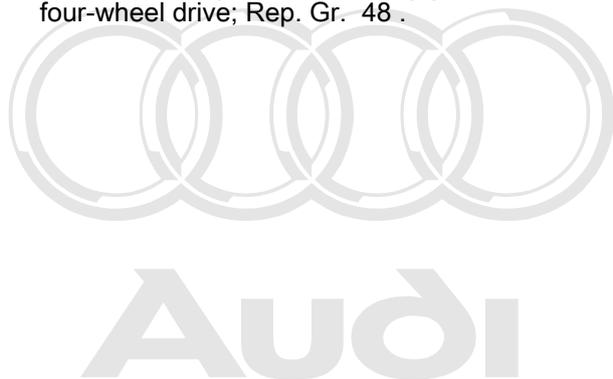
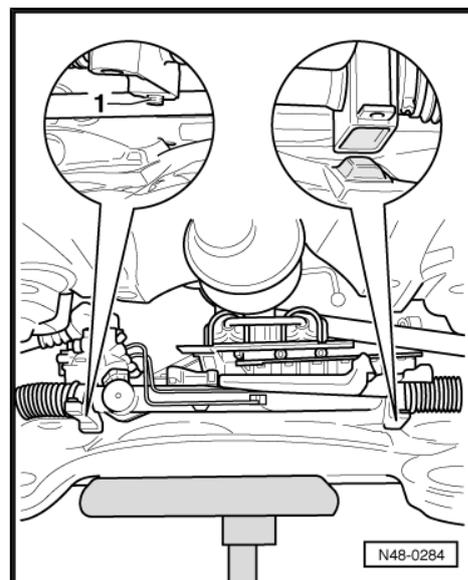
- Use new bolts -2- to secure support arm of gearbox mounting to gearbox support.



WARNING

Support bracket -10-222 A- must not be removed until all bolts on left and right assembly mountings have been tightened to specified torque.

- Remove support bracket.
- Install subframe as follows:
- Move drive shafts into installation position and tighten hand-tight.
- Move subframe into installation position.
- Fit subframe bolts.
- Place steering box onto subframe and fit steering box bolts.
- Threaded sleeve -1- must be positioned in hole in subframe
- Rubber buffer on opposite side must be positioned on corresponding projection on subframe.
- Secure steering box ⇒ Running gear, front-wheel drive and four-wheel drive; Rep. Gr. 48 .

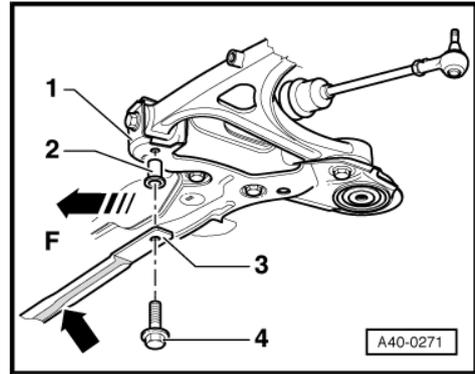


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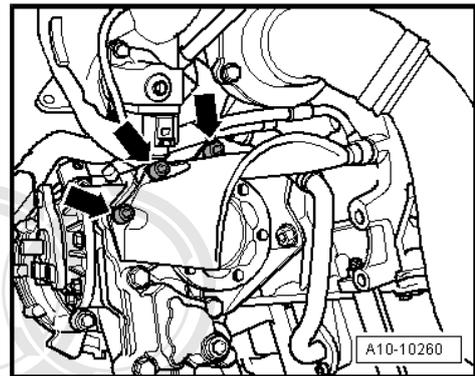
- Use new bolts to secure subframe -1- ⇒ Running gear, front-wheel drive and four-wheel drive; Rep. Gr. 48 .
- Where fitted, secure cross piece -3- using new bolts and locking fluid -D 000 600 A2- to subframe -1-.

Installation position: Marking "L" or "links" (left-side) must be positioned on the left as seen in direction of travel. Foam strip faces downwards -arrow-.

- Bolt drive shafts to gearbox flange shafts ⇒ Running gear, front-wheel drive and four-wheel drive; Rep. Gr. 40 .

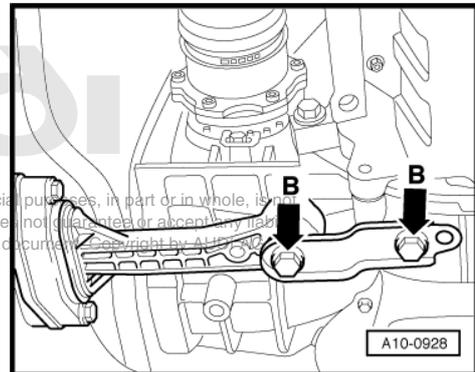


- Install heat shield for drive shaft (right-side) -arrows-.



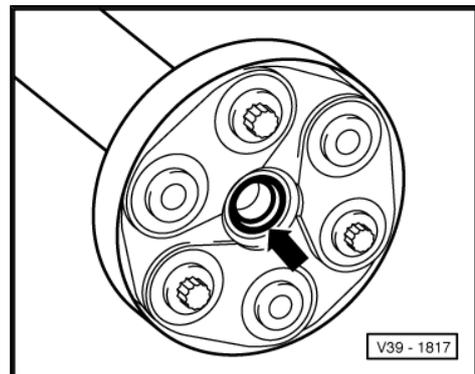
- Secure pendulum support to gearbox with new bolts -arrows B-.
- Press engine/gearbox assembly towards bulkhead; the bevel box pin must be guided carefully into the propshaft flange when doing this.

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- Slide propshaft onto guide pin without tilting.

Caution
Make sure that the seal -arrow- in the flange of the propshaft is not damaged when removing and installing. If seals are damaged, the propshaft must be renewed.



- Secure pendulum support to subframe with new bolts -arrows A-.

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- Bolt propshaft to flexible coupling on bevel box flange -arrows-: ⇒ Rear final drive 02D; Rep. Gr. 39 .
- Install exhaust system free of stress ⇒ Rep. Gr. 26 .

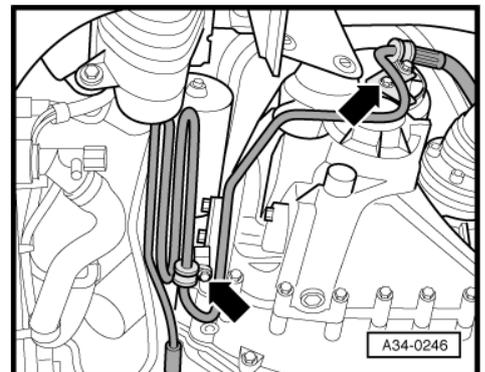
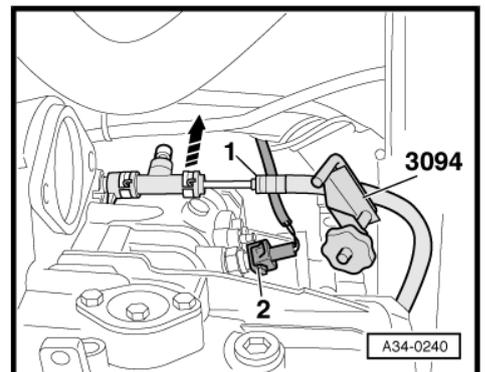
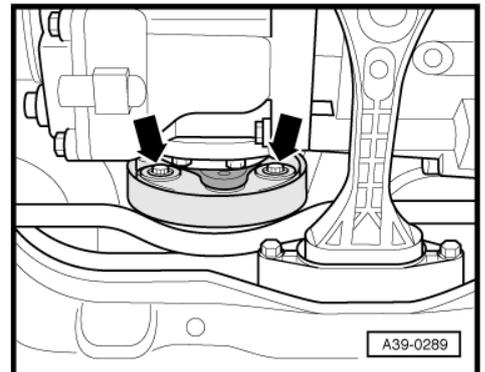
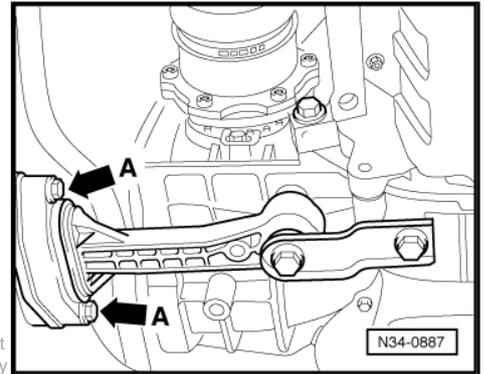
- Press pressure pipe -1- into hose connector and lock in position with retaining clip.



Caution

Do not press clutch pedal before clutch system has been bled.

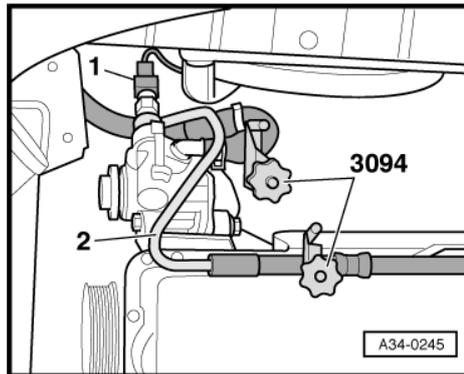
- Remove hose clamp -3094- .
- Attach electrical connector for reversing light switch -F4- -2-.
- Install starter and fit bottom bolt. Tightening torques ⇒ [page 64](#)
- Fit power steering pipe to gearbox -arrows-.



- Fit pressure pipe -2- to power steering pump with new seals
⇒ Running gear, front-wheel drive and four-wheel drive; Rep. Gr. 48 .
- Remove hose clamps -3094- .
- Attach electrical connector -1- for power steering pressure switch.

Vehicles with two charge air coolers:

- Fit power steering pump pulley and poly V-belt pulley ⇒ Running gear, front-wheel drive and four-wheel drive; Rep. Gr. 48 .
- Install tubular cross member ⇒ **General body repairs, exterior;** Rep. Gr. 50 .



Continued for all vehicles:

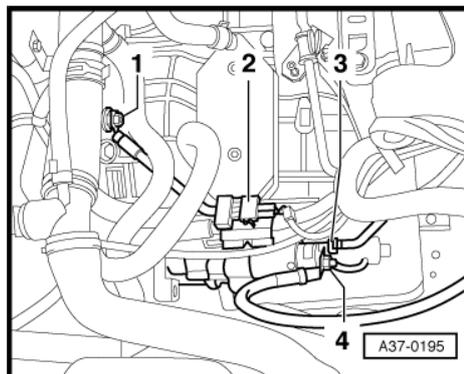
- Check gear oil in manual gearbox with bevel box
⇒ [page 82](#) .
- Install noise insulation panels ⇒ General body repairs, exterior; Rep. Gr. 50 .

Vehicles with one charge air cooler:

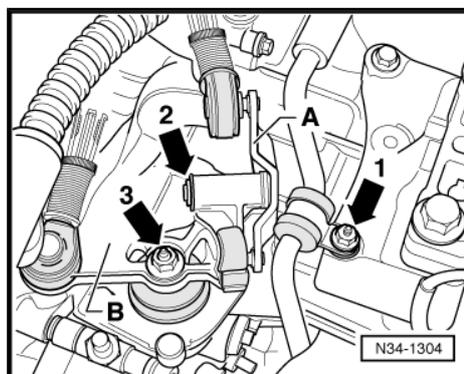
- Attach air pipe leading to charge air cooler at longitudinal member (bottom right).

Continued for all vehicles:

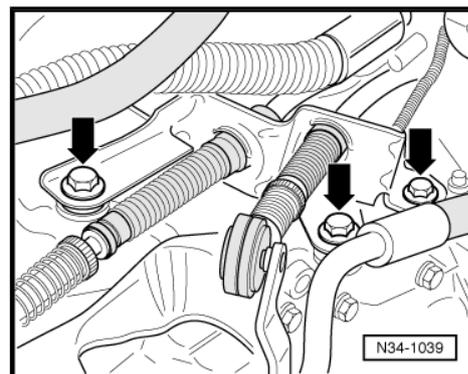
- Install top bolt securing starter. Tightening torque ⇒ [page 64](#) .
- Attach electrical connector -3-.
- Fit bracket -2-, attach wiring and engage connector in bracket.
- Fit earth wire -1-.



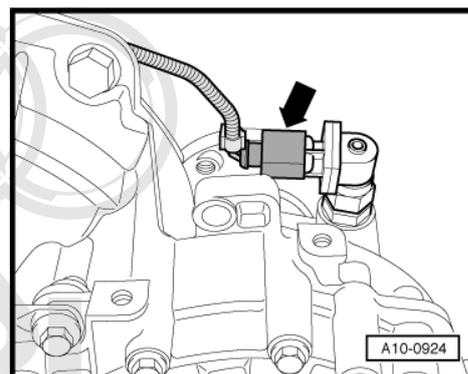
- Fit selector shaft lever -B- with gear selector cable on selector shaft (tighten nut -arrow 3-).
- Install relay lever -A- with gate selector cable (insert securing clip -arrow 2-).
- Tighten nut -arrow 1-.



- Attach cable support bracket to gearbox -arrows-.



- Plug in electrical connector at speedometer sender -G22- -arrow-.
- Make sure that mountings of engine/gearbox assembly are free of tension when installing => Rep. Gr. 10 .
- Bleed clutch system => [page 24](#) .
- Adjust selector mechanism => [page 48](#) .
- Install battery tray.
- Install air cleaner housing.
- Install battery; follow steps required after connecting battery => Electrical system; Rep. Gr. 27 .
- Attach engine cover panel:



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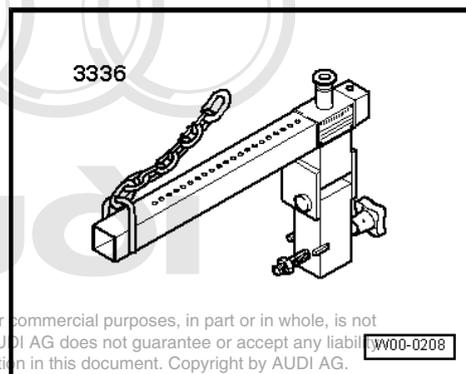
Tightening torques

Component	Nm
Flywheel cover plate to gearbox	10
Gearbox support to gearbox	40 + 90° 1) 2)
Gearbox console to gearbox mounting	60 + 90° 1) 2)
Pendulum support gearbox to	40 + 90° 1) 2)
subframe	20 + 90° 1) 2)
Cross piece to subframe (if fitted)	30 + 90° 1) 2) 4)
Heat shield to gearbox	25
Heat shield to gearbox	25
Flywheel cover plate to gearbox	10
Pressure pipe of power steering to gearbox support	22
Selector cable support bracket to gearbox	23
Selector shaft lever to selector shaft	20 3)
Air cleaner housing to body	10
Air pipe to longitudinal member	10
<ul style="list-style-type: none"> • 1) Renew bolts • 2) 90° = one quarter turn • 3) Renew nut • 4) Apply locking fluid -D 000 600 A2- when fitting 	

2.2 Transporting gearbox

Special tools and workshop equipment required

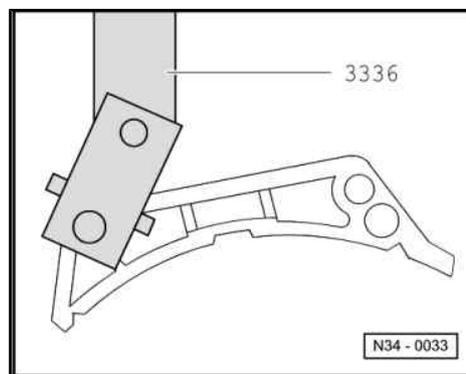
- ◆ Gearbox lifting tackle -3336-



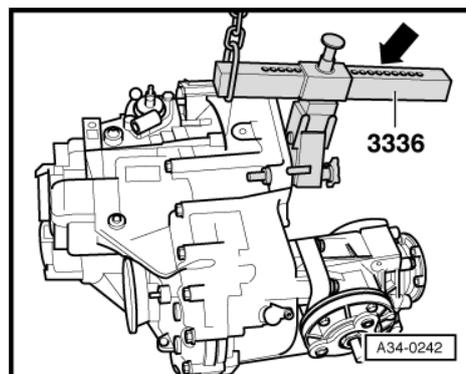
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Procedure

- Bolt gearbox lifting tackle -3336- onto clutch housing.



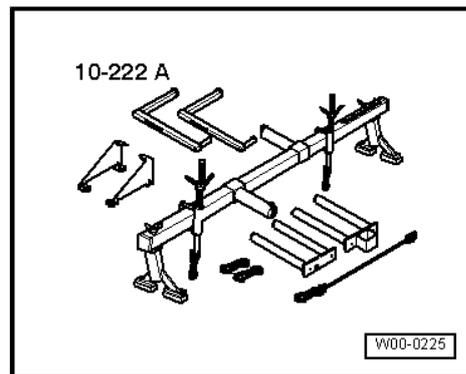
- Set support arm on sliding bracket by means of locking pin -arrow-.
- Number of holes visible = 10
- Lift gearbox with workshop crane -VAS 6100- and gearbox lifting tackle -3336- .



2.3 Removing and installing gearbox mounting

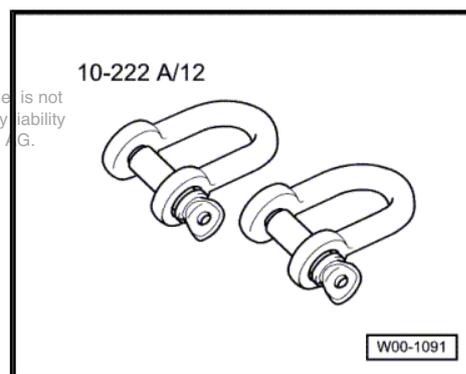
Special tools and workshop equipment required

◆ Support bracket -10-222 A-



◆ Shackle -10-222 A /12-

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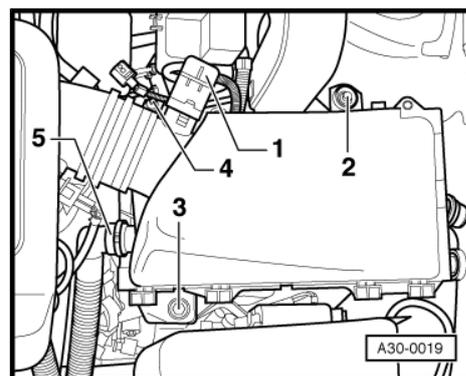
Removing



Caution

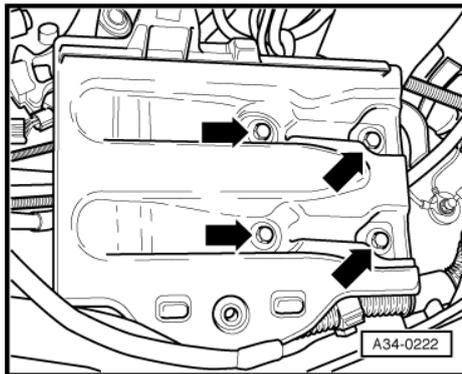
Follow steps required when disconnecting battery → Electrical system; Rep. Gr. 27 .

- With ignition switched off, disconnect earth wire at battery.
- Detach air intake hose at throttle valve module -J338- (slacken hose clip -4-).
- Unplug electrical connector for air mass meter -G70- -1-.
- If fitted, detach hose -5- from air cleaner housing.
- Remove bolts -2- and -3-.
- Take out air cleaner housing.

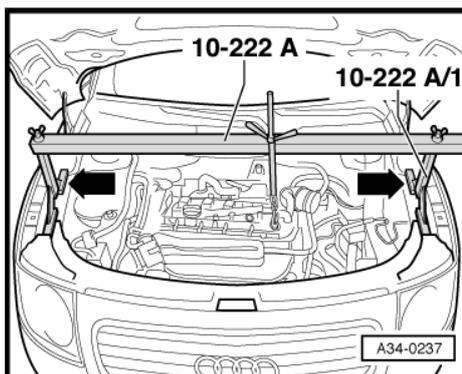




- Remove battery and battery tray -arrows-.



- Set up support bracket -10-222 A- with rack -10-222 A/1- on wing mounting flanges -arrows-.
- Take up weight of engine/gearbox assembly via the spindle.

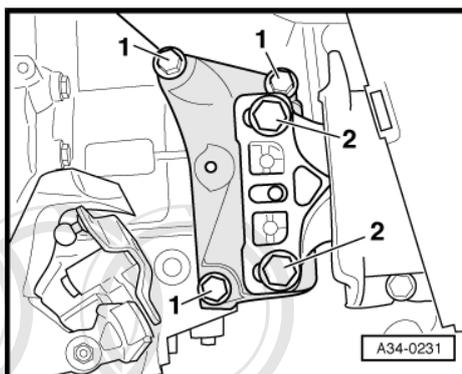


- Remove bolts -2-.



Note

-Item 1- can be disregarded.

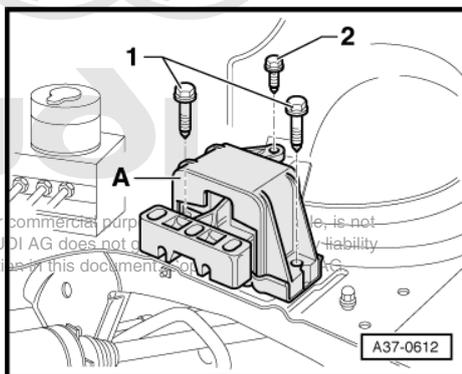


- Remove all components to obtain access to bolts -1- and -2-.
- Remove bolts -1- and -2-.
- Take off gearbox mounting -A-.

Installing

Perform installation in reverse sequence of removal. Note the following when installing:

- Install gearbox mounting -A- with new bolts.

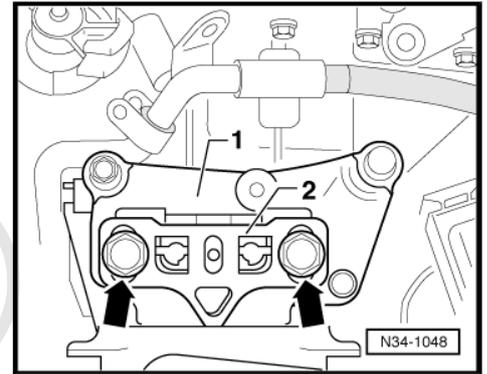


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- Pull gearbox up to gearbox mounting with spindle on support bracket.

**Caution**

Before screwing in the bolts -arrows-, the gearbox support -1- and the support arm -2- of the gearbox mounting must be aligned absolutely parallel, otherwise the threads will be damaged. If necessary, push gearbox up at the rear with trolley jack.



- Use new bolts -arrows- to secure support arm of gearbox mounting -2- to gearbox support -1-.

**WARNING**

Support bracket -10-222 A- must not be removed until all bolts on left and right assembly mountings have been tightened to specified torque.

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- Install battery tray.
- Install air cleaner housing.
- Install battery; follow steps required after connecting battery
⇒ Electrical system; Rep. Gr. 27 .

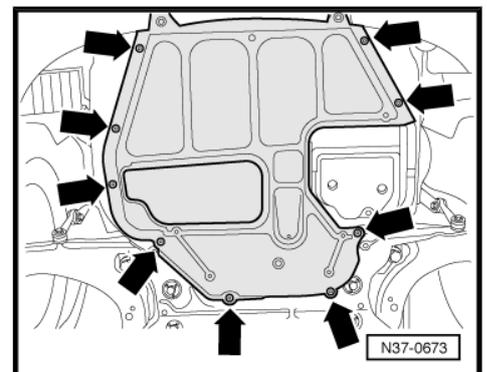
Tightening torques

Component		Nm
Gearbox mounting to body	M8	25
	M10	40 + 90° 1) 2)
Gearbox mounting to gearbox support		60 + 90° 1) 2)
Air cleaner housing to body		10
<ul style="list-style-type: none"> • 1) Renew bolts • 2) 90° = one quarter turn 		

2.4 Removing and installing pendulum support

Removing

- Remove centre noise insulation -arrows-.



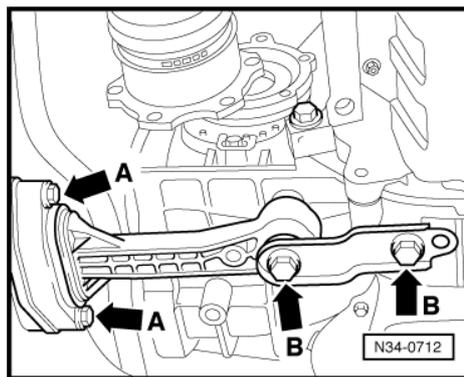


- First unscrew bolts -arrows A- and then bolts -arrows B- on pendulum support.
- Remove pendulum support.

Installing

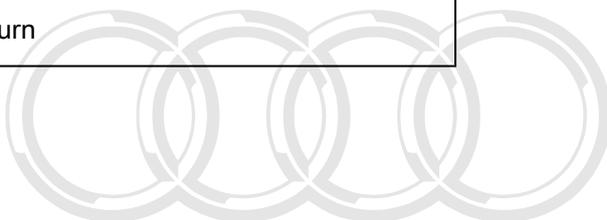
Installation is carried out in reverse sequence; note the following:

- First secure pendulum support to gearbox -arrows B-, then on subframe -arrows A-.
- Use new bolts.
- Install noise insulation => General body repairs, exterior; Rep. Gr. 50 .



Tightening torques

Component	Nm
Pendulum support to gearbox	40 + 90° 1) 2)
subframe	20 + 90° 1) 2)
<ul style="list-style-type: none"> • 1) Renew bolts • 2) 90° = one quarter turn 	



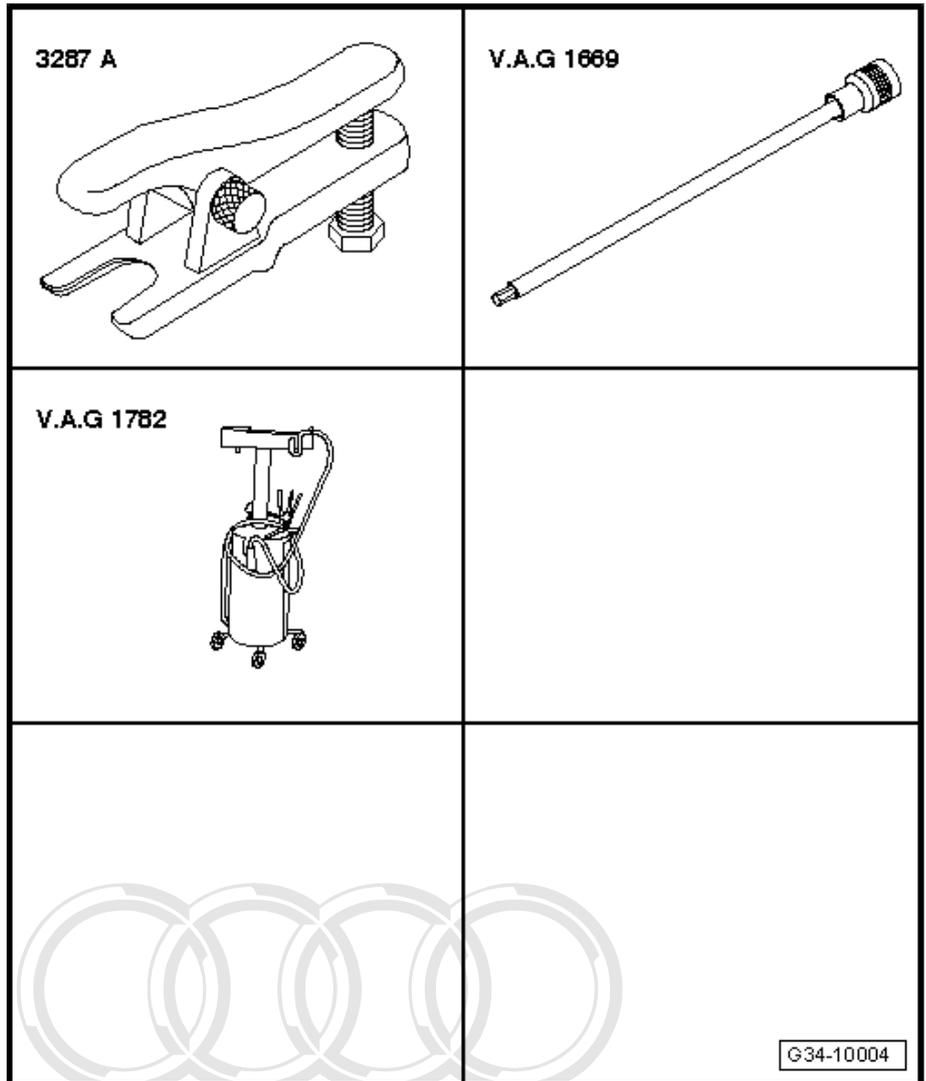
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3 Removing and installing bevel box with gearbox installed

Special tools and workshop equipment required

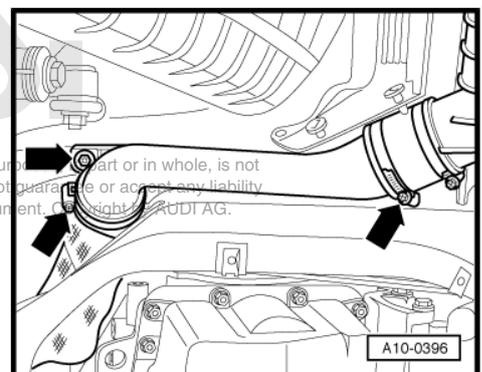
- ◆ Ball joint puller -3287 A-
- ◆ Hexagon key -V.A.G 1669-
- ◆ Used oil collection and extraction unit -V.A.G 1782-



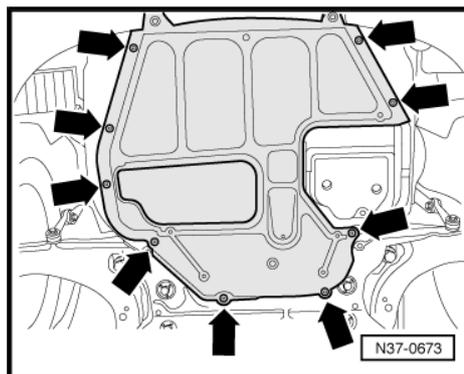
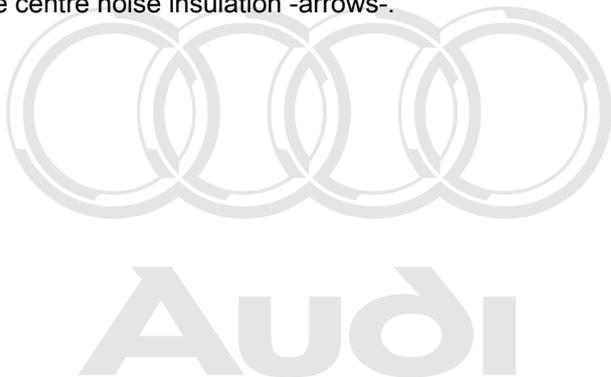
Removing

- On vehicles with one charge air cooler: remove air pipe leading to charge air cooler at longitudinal member (bottom right).

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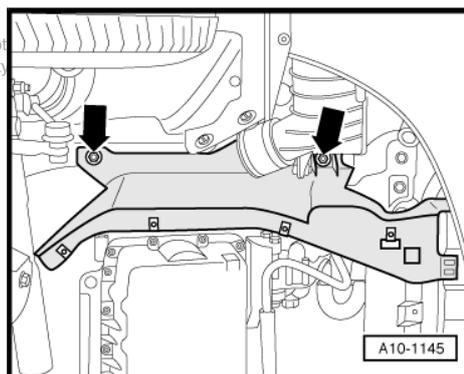


- Remove centre noise insulation -arrows-

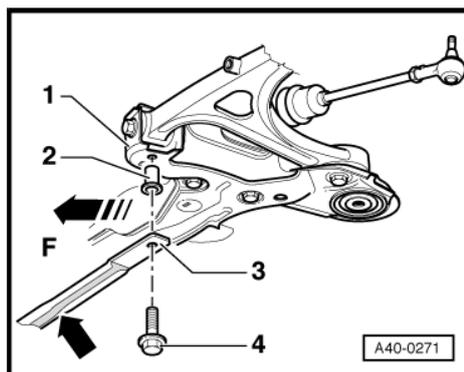


- Remove noise insulation (right-side) -arrows-

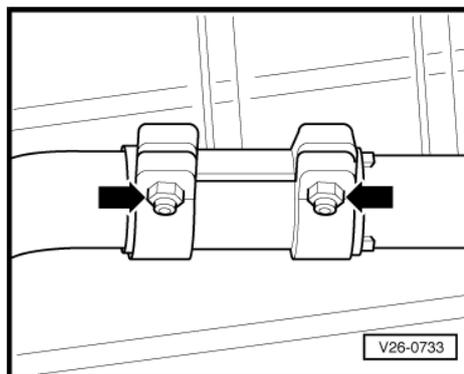
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- If fitted, detach cross piece -3- from subframe -1-.



- If fitted, unbolt mounting for exhaust system from subframe.
- Disconnect exhaust system at clamp -arrows-
- Push clamp towards the rear.



- Mark position of flexible coupling on bevel box flange.
- Unscrew propshaft with flexible coupling from bevel box flange -arrows-.

 Note

Counterhold with a lever on triangle flange when loosening the bolts.

- Press propshaft horizontally to rear as far as possible.

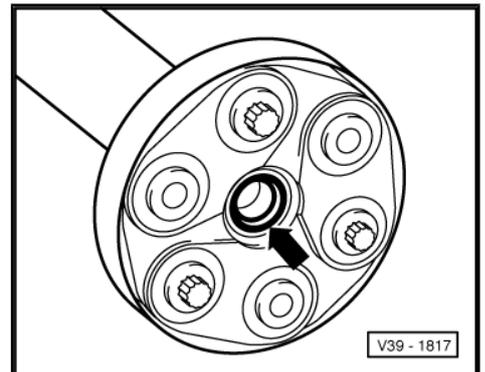
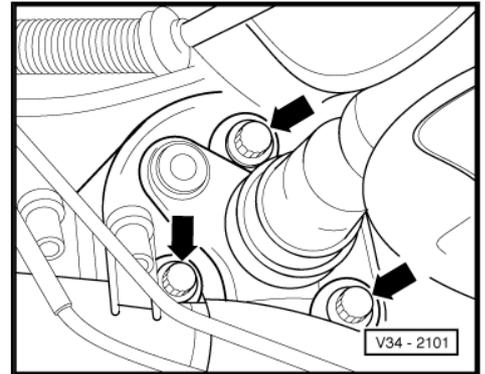
 Note

After loosening bolts -A- (=> following illustration N34-887) the engine/gearbox assembly will swing slightly to the front.

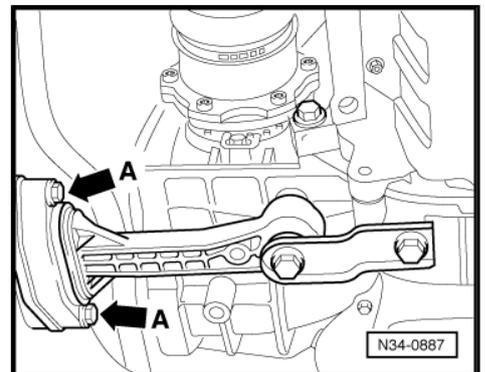


Caution

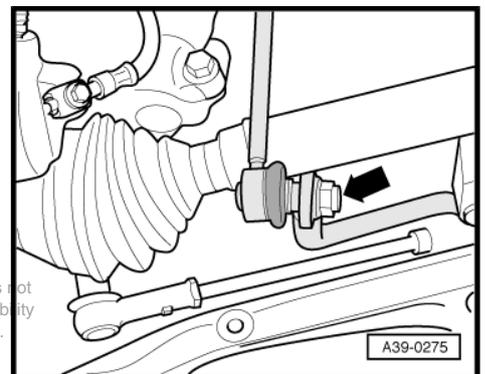
Make sure that the seal -arrow- in the flange of the propshaft is not damaged when removing and installing. If seals are damaged, the propshaft must be renewed.



- Unbolt pendulum support at subframe -arrows A-.
- Carefully press engine/gearbox assembly forwards.



- Unscrew nut -arrow- for coupling rod on anti-roll bar (right-side).



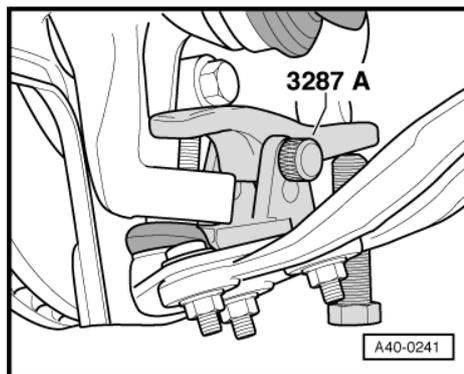
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- Unscrew nut (top) from swivel joint (right-side).
- Position ball joint puller -3287 A- as shown in illustration and pull off swivel joint.

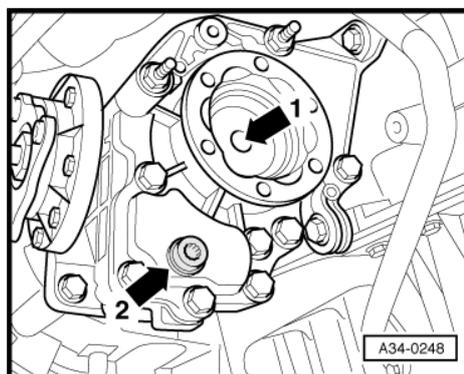
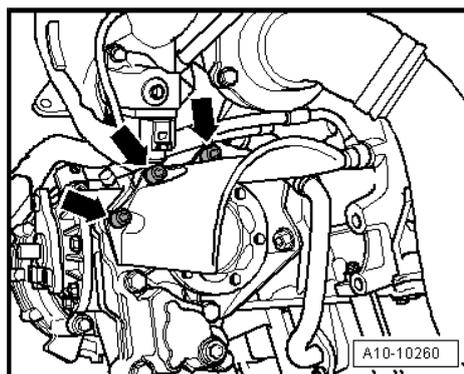
**Note**

To protect thread, leave nut screwed several turns onto ball joint.

- Turn steering wheel to the left.
- Unscrew heat shield for drive shaft on right of bevel box -arrows-.
- Unbolt drive shaft (right side) from gearbox flange shaft.
- Lift drive shaft (right-side) up and secure with wire.



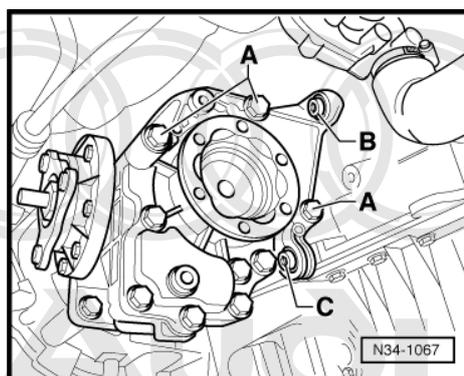
- Place used oil collection and extraction unit -V.A.G 1782- below gearbox.
- Remove drain plug -arrow 2- and allow gear oil to drain off.
- Unscrew bolt for flange shaft (right-side) -arrow 1- using hexagon key -V.A.G 1669- .

**Vehicles with bevel box bracket (metal casting):**

- Unscrew bolts -A ... C- at bevel box bracket.

**Note**

It is not possible to remove bracket at this stage. Bracket remains in installation position.



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Vehicles with bevel box bracket (sheet metal version):

- Remove bolts -A ... C- and take off bevel box bracket.

Continued for all vehicles:

- Remove bolts securing bevel box to gearbox.
- Detach bevel box from gearbox.
- Remove bevel box.

Installing

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

- Always renew O-ring between bevel box and gearbox -arrow A- and seals on oil supply drillings -arrow B, C-.
- Lightly lubricate O-ring and seals prior to installing.
- Push bevel box completely onto gearbox, at the same time ensuring that the splines on the bevel box input shaft are guided centrally onto the differential connecting piece.
- If the splines 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.

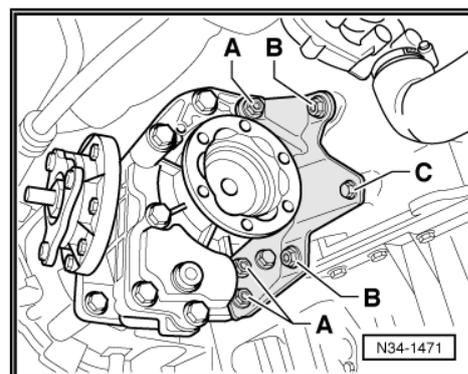
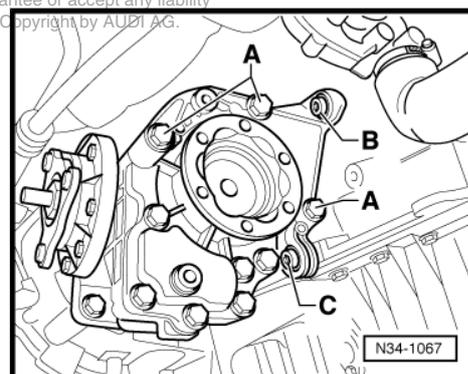
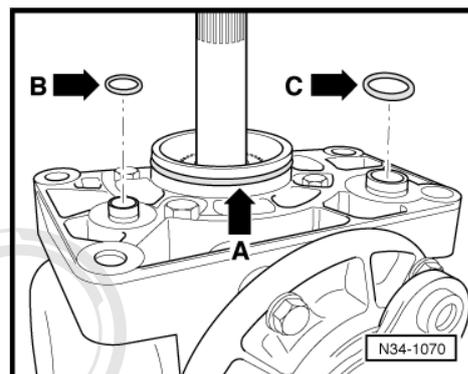
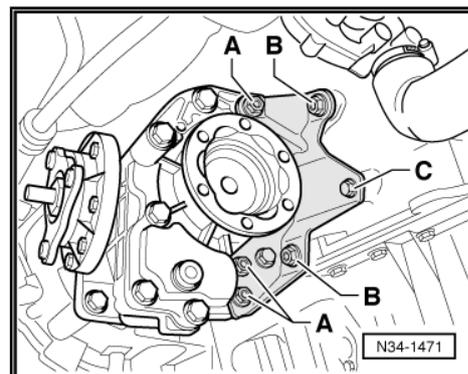
- Install bevel box bracket prior to fitting bevel box/gearbox securing bolts.
- Tighten new securing bolts between bevel box and gearbox.

Vehicles with bevel box bracket (metal casting):

- Screw in bevel box bracket bolts -A ... C- only a few turns at this stage.
- Observe the further tightening sequence:
 1. First tighten bolts -A- to 3 Nm.
 2. Tighten bolts -B- and -C- to 35 Nm.
 3. Tighten bolts -A- to 45 Nm.

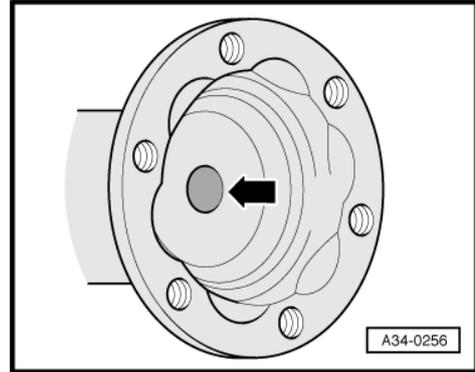
Vehicles with bevel box bracket (sheet metal version):

- Screw in bevel box bracket bolts -A ... C- only a few turns at this stage.
- Observe the further tightening sequence:
 1. First tighten bolts -A- to 3 Nm.
 2. Tighten bolts -B- to 35 Nm.
 3. Tighten bolt -C- to 22 Nm.
 4. Tighten bolts -A- to 45 Nm.

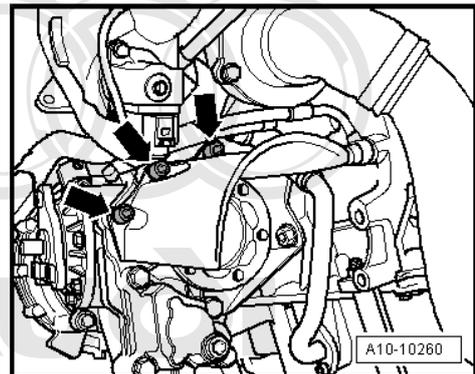


Continued for all vehicles:

- Tighten bolt for flange shaft (right-side) -1- using hexagon key -V.A.G 1669- .
- Bolt drive shaft (right-side) to gearbox flange shaft => Running gear, front-wheel drive and four-wheel drive; Rep. Gr. 40 .



- Install heat shield for drive shaft (right-side) -arrows-.
- Press engine/gearbox assembly towards bulkhead; the bevel box pin must be guided carefully into the propshaft flange when doing this.

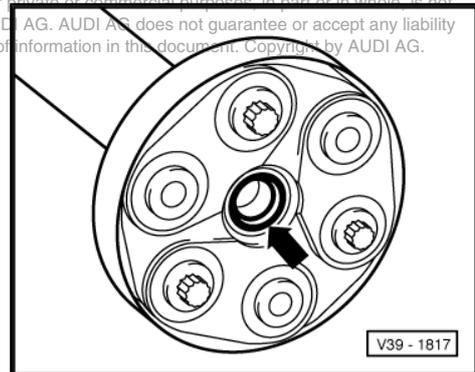


- Slide propshaft onto guide pin without tilting

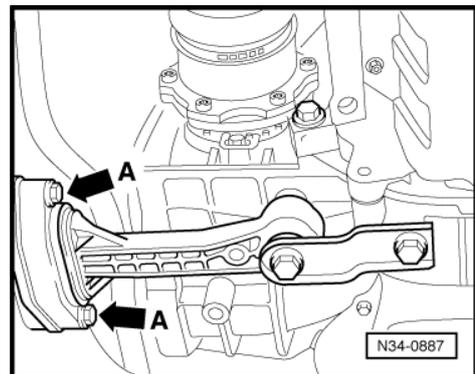
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Caution

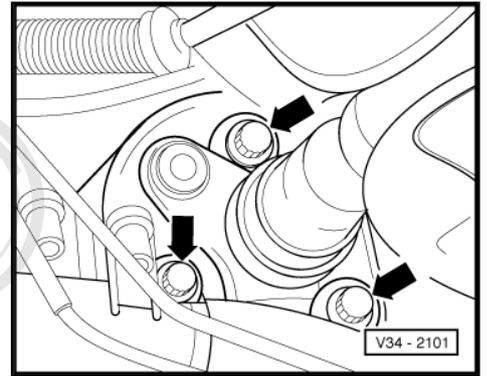
The seal -arrow- in the propshaft flange must not be damaged when removing and installing. If seals are damaged, the propshaft must be renewed.



- Bolt on pendulum support at subframe -arrows A-.
- Use new bolts.



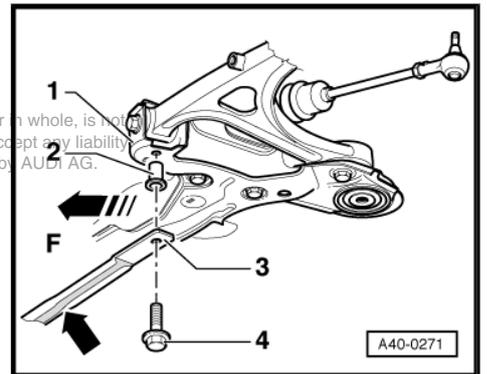
- Bolt propshaft to flexible coupling on bevel box flange -arrows-: ⇒ Rear final drive 02D; Rep. Gr. 39 .
- Install exhaust system free of stress ⇒ Rep. Gr. 26 .
- Install swivel joint and coupling rod ⇒ Running gear, front-wheel drive and four-wheel drive; Rep. Gr. 40 .



- Where fitted, secure cross piece -3- to subframe -1- using new bolts and locking fluid -D 000 600 A2- .

Installation position: Marking "L" or "links" (left-side) must be positioned on the left as seen in direction of travel. Foam strip faces downwards -arrow-

- Fill up gear oil in manual gearbox with bevel box ⇒ [page 82](#) .



Component	Nm
Bevel box to gearbox	40 + 45° 1) 2)
Flange shaft to gearbox	25
Heat shield for drive shaft to bevel box	25
Pendulum support to subframe	20 + 90° 1) 3)
Cross piece to subframe (if fitted)	30 + 90° 1) 3) 4)
<ul style="list-style-type: none"> • 1) Renew bolts • 2) 45° is equivalent to an eighth turn • 3) 90° is equivalent to a quarter turn • 4) Apply locking fluid -D 000 600 A2- when fitting 	

4 Checking gear oil level in manual gearbox with bevel box and filling up.



Note

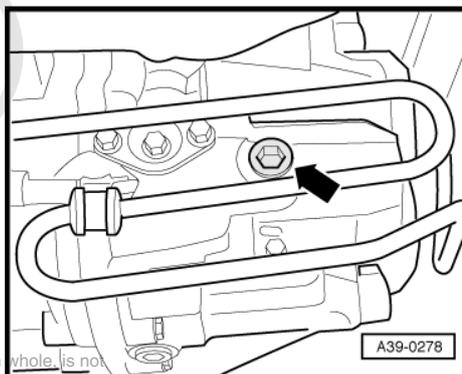
Gearbox and bevel box are filled together through the oil filler hole in the gearbox.

Procedure

- Remove screw plug -arrow-.
- Specification: oil level up to lower edge of filler hole
- Top up gearbox oil if necessary. Specification ⇒ [page 2](#) .
- Fit a new screw plug.

Adhere to the following procedure when filling new bevel box with gear oil or when re-filling bevel box after removing and installing.

- Remove screw plug -arrow-.
- Fill gear oil up to lower edge of filler hole.
- Install screw plug.
- Start engine, engage a gear and allow gearbox to turn for approx. 2 minutes.
- Turn off engine and remove screw plug.
- Fill gear oil up to lower edge of filler hole once again.
- Fit a new screw plug.



Tightening torque

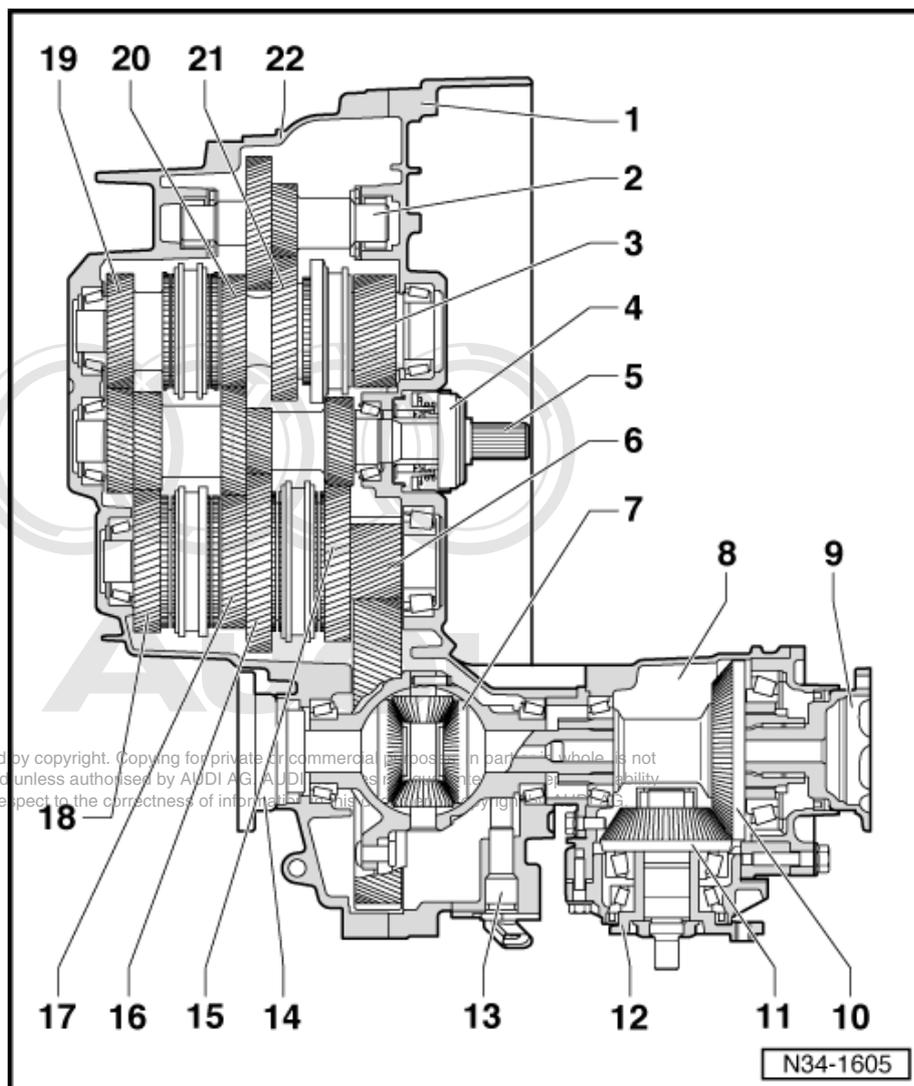
Component		Nm
Screw plug for oil filler hole ¹⁾	Screw plug with hexagon socket	30
	Screw plug with multi-point socket	45

¹⁾ Renew plug

5 Dismantling and assembling gearbox

5.1 Gearbox - exploded view of components

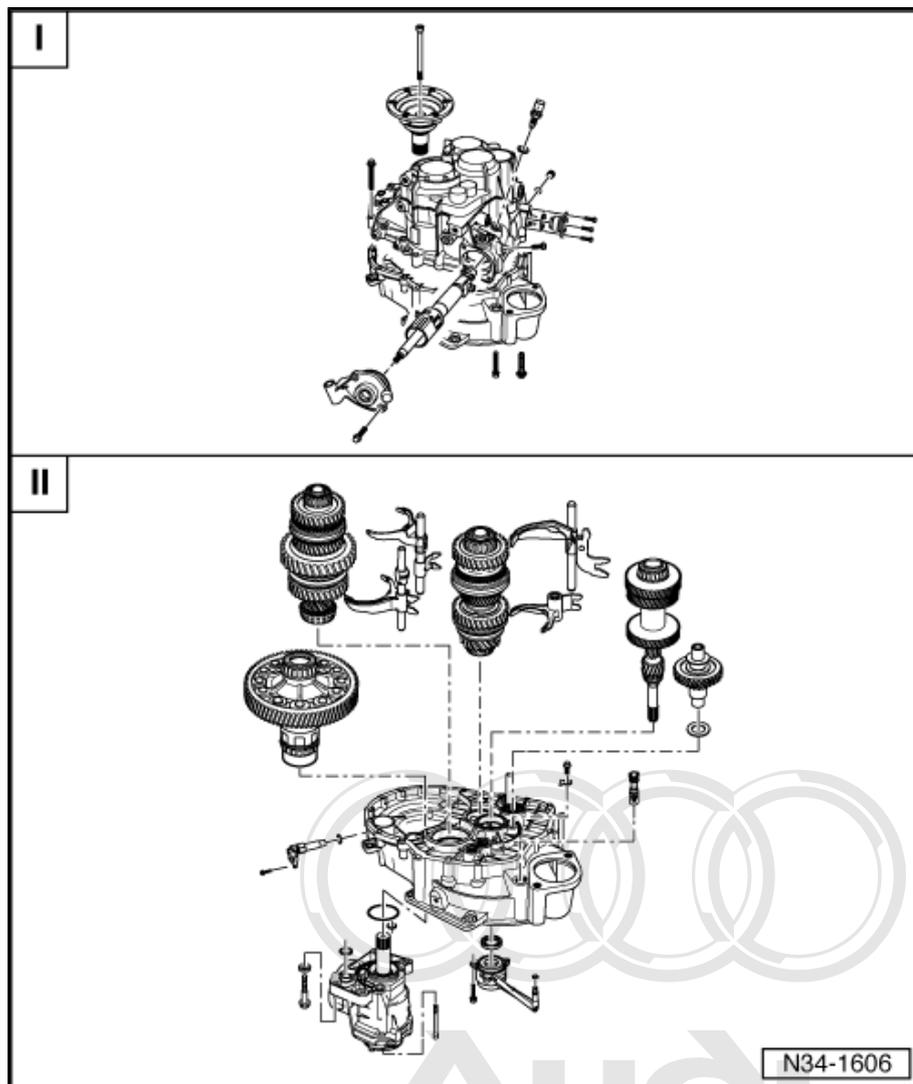
- 1 - Clutch housing
- 2 - Reverse shaft
- 3 - Output shaft for 5th, 6th and reverse gears
- 4 - Clutch slave cylinder with release bearing
- 5 - Input shaft
- 6 - Output shaft for 1st - 4th gear
- 7 - Differential
- 8 - Bevel box
- 9 - Flange shaft (right-side)
- 10 - Bevel gear with input shaft
- 11 - Shaft bevel gear
- 12 - Output flange
- 13 - Speedometer sender - G22-
- 14 - Flange shaft (left-side)
- 15 - 2nd speed selector gear
- 16 - 1st speed selector gear
- 17 - 4th speed selector gear
- 18 - 3rd speed selector gear
- 19 - 5th speed selector gear
- 20 - 6th speed selector gear
- Spacer sleeve fitted in 5-speed gearbox
- 21 - Reverse selector gear
- 22 - Gearbox housing



5.2 Gearbox - exploded view

I - Dismantling and assembling gearbox housing and selector mechanism => [page 85](#)

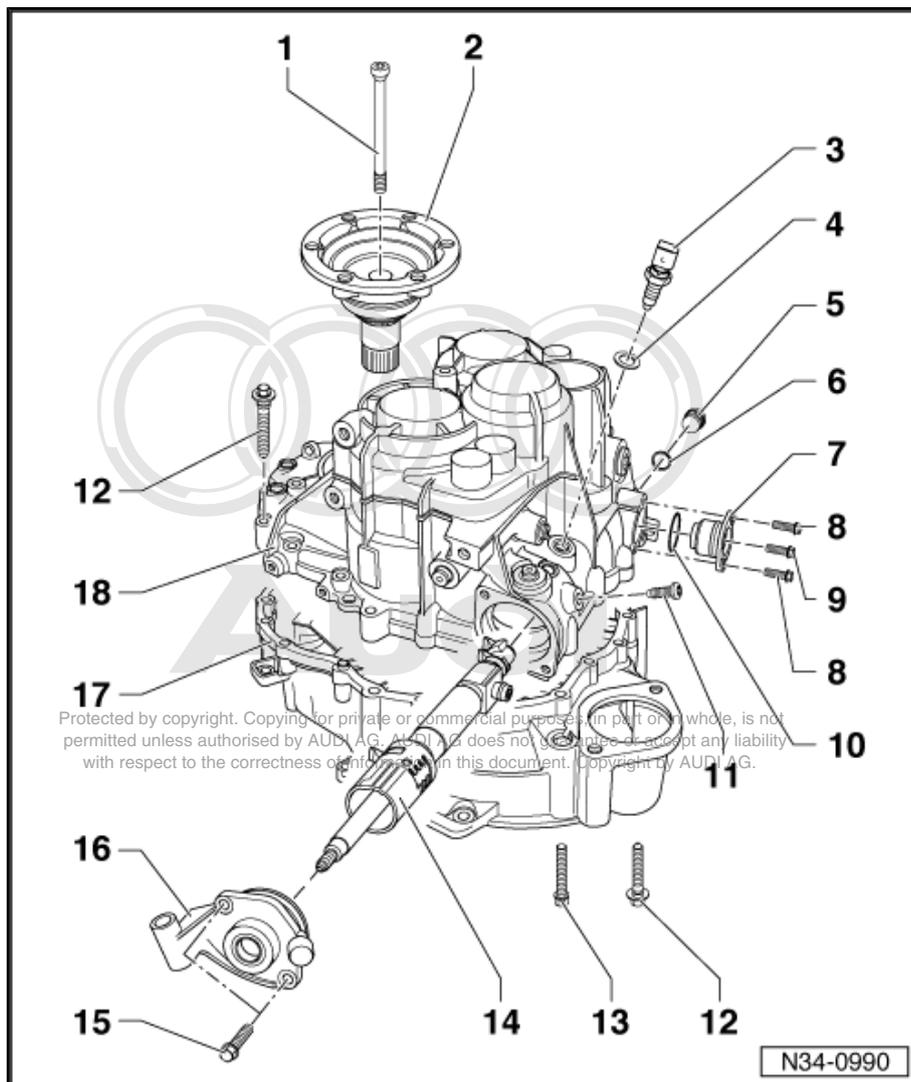
II - Dismantling and assembling input shaft, output shafts (pinion shafts), differential, bevel box and selector rods => [page 86](#)



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5.3 Dismantling and assembling gearbox housing and selector mechanism

- 1 - Countersunk bolt, 25 Nm**
- 2 - Flange shaft with spring**
 - Removing and installing ⇒ [page 157](#)
 - Assembling ⇒ [page 167](#)
- 3 - Reversing light switch -F4-**
 - Tighten to 20 Nm
- 4 - Seal**
 - Renew
- 5 - Oil drain plug, 30 Nm**
 - Renew
- 6 - Seal**
 - Renew
- 7 - Cover plate**
- 8 - Hexagon bolt, 20 Nm**
 - Renew
- 9 - Hexagon bolt, 20 Nm**
 - For securing selector shaft ⇒ [Item 14 \(page 85\)](#) to cover plate
 - Renew
- 10 - O-ring**
 - Renew
 - Fit in groove on cover plate
- 11 - Locking bolt, 15 Nm**
 - For selector shaft gate
 - Renew
 - Insert with locking fluid; locking fluid ⇒ Parts catalogue
- 12 - Bolt, 25 Nm + tighten 45° (1/8 turn) further**
 - With captive washer
 - Renew
- 13 - Bolt, 25 Nm + tighten 45° (1/8 turn) further**
 - Without washer
 - Renew
- 14 - Selector shaft**
 - Dismantling and assembling ⇒ [page 105](#)
- 15 - Hexagon bolt, 20 Nm**
 - Renew
- 16 - Selector mechanism cover**
 - Dismantling and assembling ⇒ [page 105](#)
- 17 - Clutch housing**
 - Servicing ⇒ [page 100](#)



18 - Gearbox housing

- Servicing ⇒ [page 95](#)

5.4 Dismantling and assembling input shaft, output shafts (pinion shafts), differential, bevel box and selector rods

1 - Output shaft for 1st - 4th gear

- Dismantling and assembling ⇒ [page 122](#)
- Installation position ⇒ [page 88](#)

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

- Installation position ⇒ [page 88](#)

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

- Installation position ⇒ [page 88](#)

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

- Dismantling and assembling ⇒ [page 139](#)
- Installation position ⇒ [page 88](#)

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

- Installation position ⇒ [page 88](#)

6 - Reverse gear selector fork

- Installation position ⇒ [page 88](#)

7 - Input shaft

- Dismantling and assembling ⇒ [page 111](#)

8 - Reverse shaft

- Removing and installing ⇒ [page 88](#)

9 - Thrust washer

10 - Bleeder connection

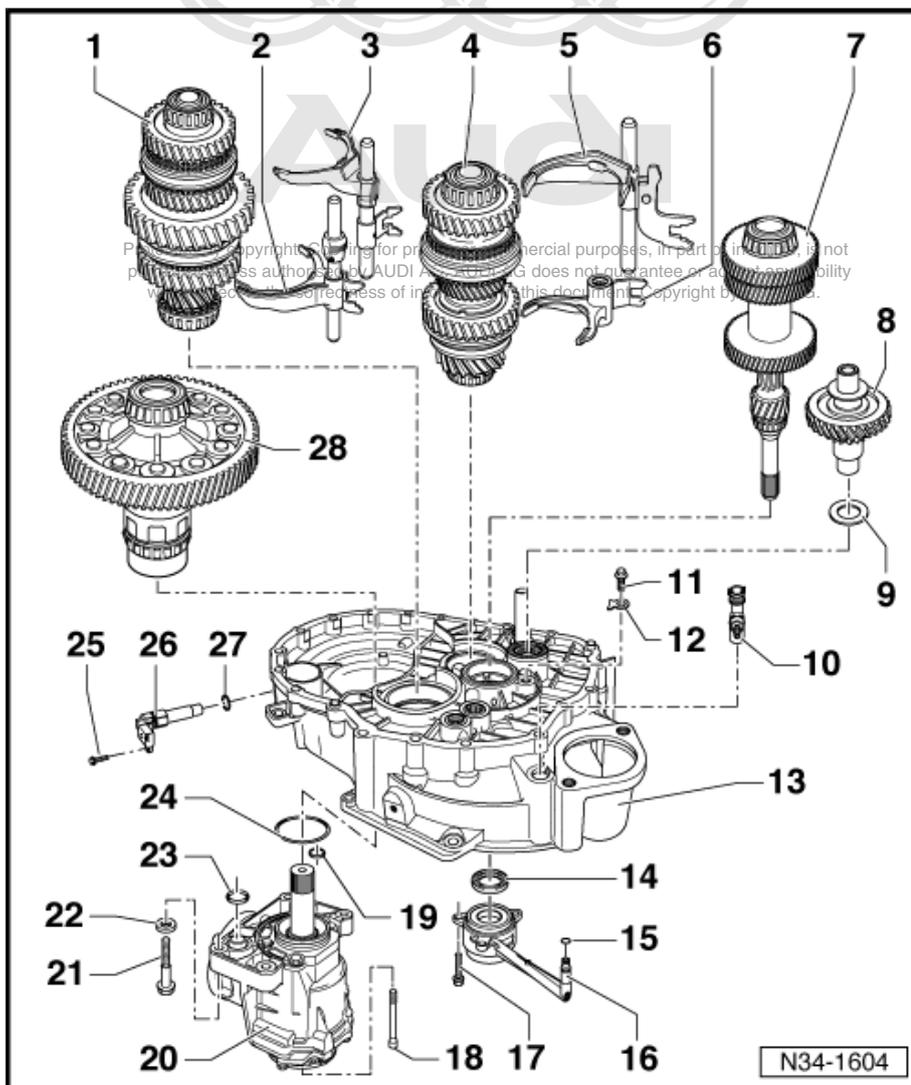
- Connect to clutch slave cylinder ⇒ [Item 16 \(page 87\)](#)

11 - Bolt, 12 Nm

- Self-locking
- Renew
- Fitted on gearboxes from manufacture date 06 04 0

12 - Locking plate

- Secures tapered roller bearing outer race for input shaft
- Fitted on gearboxes from manufacture date 06 04 0



13 - Clutch housing

14 - Oil seal

- For input shaft

15 - O-ring

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

16 - Clutch slave cylinder with release bearing

17 - Hexagon bolt, 12 Nm

- 3 x
- Renew

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18 - Countersunk bolt, 25 Nm

19 - O-ring

- Renew

20 - Bevel box

- Removing and installing (with gearbox installed) ⇒ [page 75](#)
- Removing and installing (with gearbox removed) ⇒ [page 90](#)
- Dismantling and assembling ⇒ [page 180](#)

21 - Bolt, 40 Nm + tighten 45° (1/8 turn) further

- Renew

22 - Washer

23 - O-ring

- Renew

24 - O-ring

- Renew

25 - Hexagon bolt, 12 Nm

- Renew

26 - Speedometer sender -G22-



Note

- ◆ *Not fitted on gearboxes from manufacture date 04 11 2.*
- ◆ *Bore is covered by cover plate (cover plate secured with bolt ⇒ [Item 25 \(page 87\)](#)).*

27 - O-ring

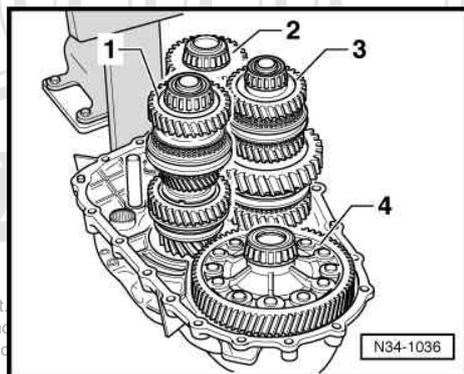
- Renew

28 - Differential

- Dismantling and assembling ⇒ [page 167](#)

Installation position of output shafts (pinion shafts) in gearbox:

- 1 - Output shaft for 5th, 6th and reverse gears
- 2 - Input shaft
- 3 - Output shaft for 1st - 4th gear
- 4 - Differential



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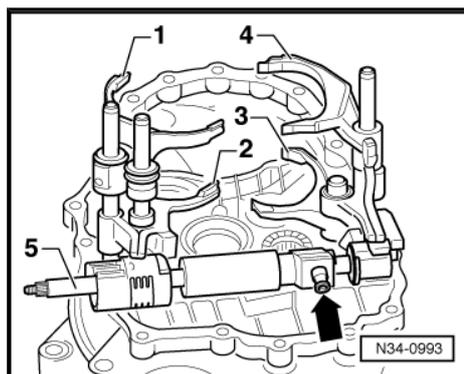
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Installation position of complete selector mechanism in gearbox:

- 1 - Selector fork for 3rd gear and 4th gear
- 2 - Selector fork for 1st gear and 2nd gear
- 3 - Reverse gear selector fork
- 4 - Selector fork for 5th gear and 6th gear
- 5 - Selector shaft

**Note**

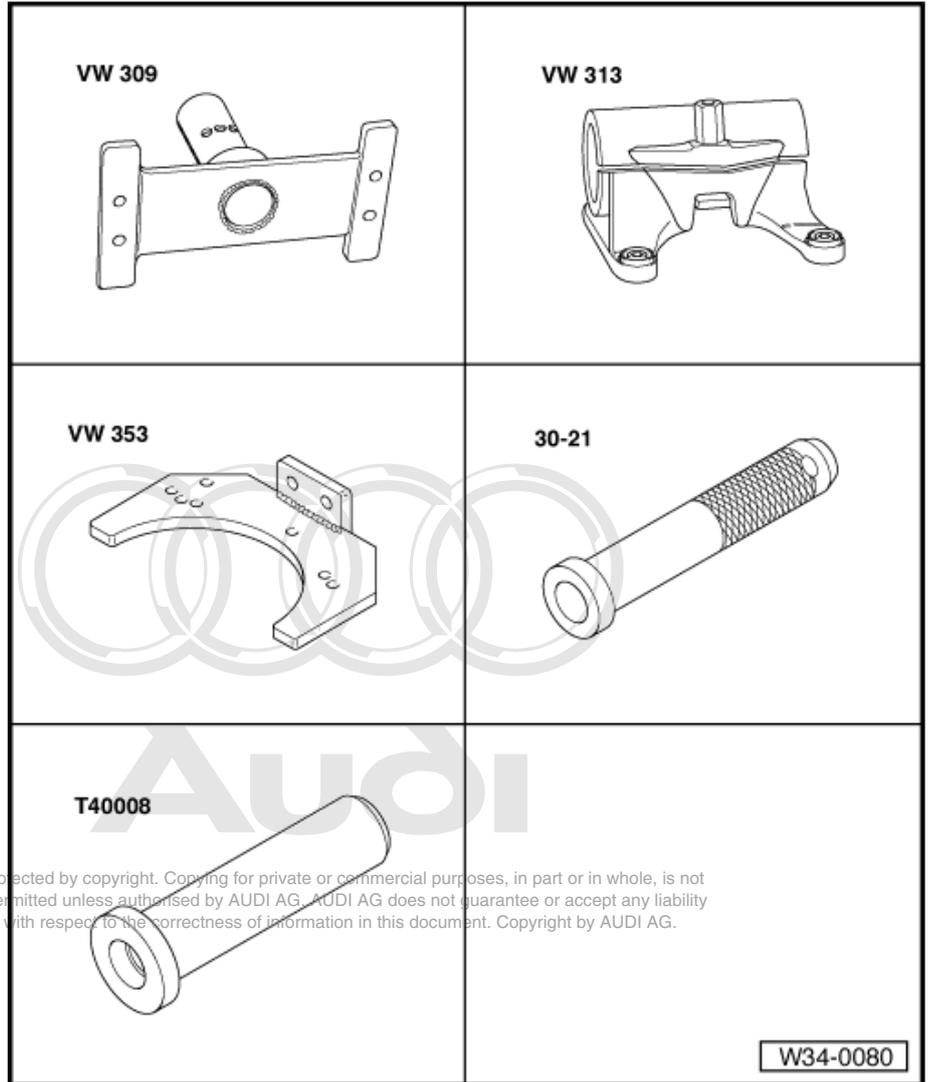
The lower selector shaft mounting -arrow- is bolted to the gearbox housing with the cover plate.



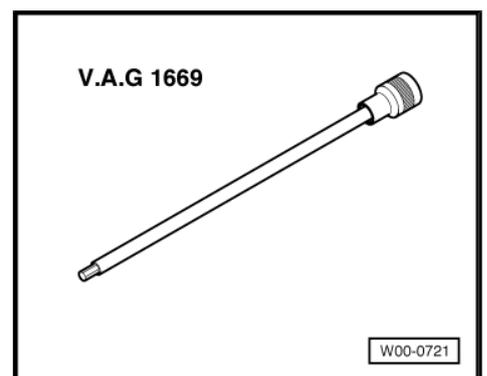
5.5 Dismantling and assembling gearbox housing, selector mechanism, input shaft, output shafts (pinion shafts), differential, bevel box and selector rods

Special tools and workshop equipment required

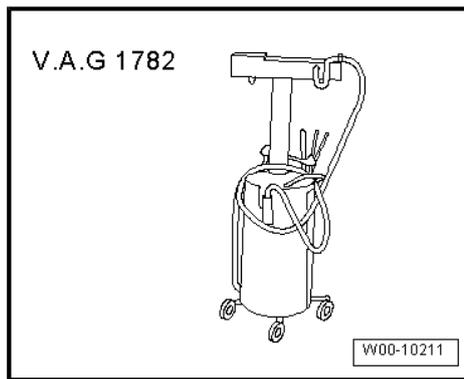
- ◆ Support plate -VW 309-
- ◆ Support clamp -VW 313-
- ◆ Gearbox support -VW 353-
- ◆ Sleeve -30-21-
- ◆ Thrust piece -T40008-



- ◆ Hexagon key -V.A.G 1669-

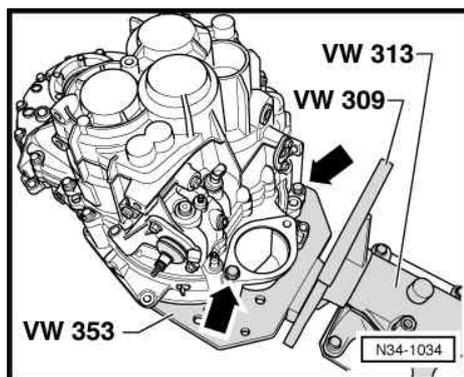


◆ Used oil collection and extraction unit -V.A.G 1782-



Dismantling

- Secure gearbox to assembly stand with bolts -arrows-.
- Turn gearbox on assembly stand with oil drain plug downwards.
- Place used oil collection and extraction unit -V.A.G 1782- below gearbox.
- Remove oil drain plug and allow gear oil to drain off.

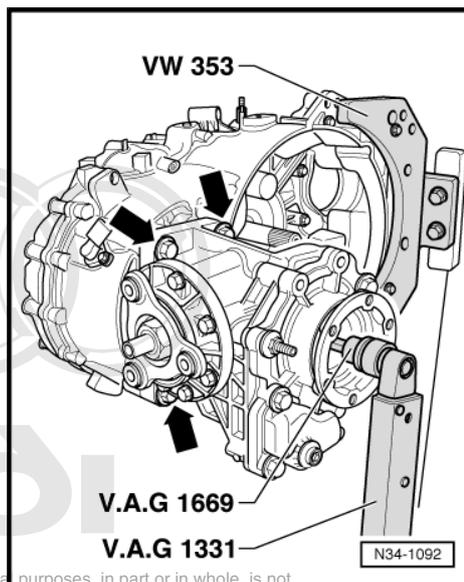


- Unscrew bolt for flange shaft (right-side) using hexagon key - V.A.G 1669- .

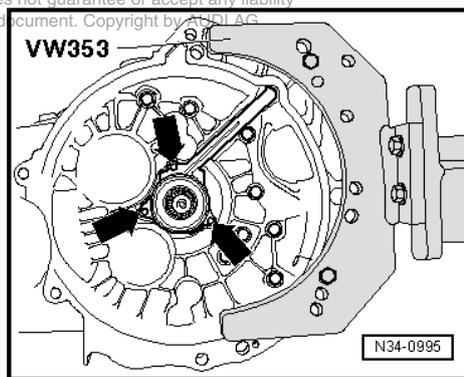
i Note

The flange shaft (right-side) remains in the bevel box.

- Unscrew all four bolts securing bevel box to gearbox (illustration only shows three bolts) -arrows-.
- Detach bevel box from gearbox.

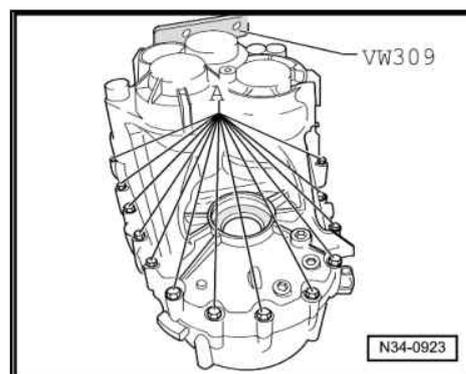
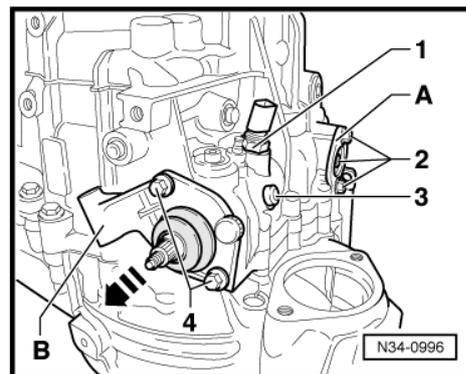


- Remove slave cylinder with release bearing -arrows-.



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- Move selector shaft to neutral.
- Remove reversing light switch -F4- -1-.
- Remove hexagon bolts -2- for selector shaft cover plate -A-.
- Carefully pull out cover plate.
- Unscrew locking bolt -3- for selector shaft gate.
- Remove bolts -4- and take off selector mechanism cover -B- from gearbox housing.
- Pull selector shaft out of gearbox housing.
- Remove flange shaft (left-side).
- Remove bolts -A- connecting gearbox housing to clutch housing.



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

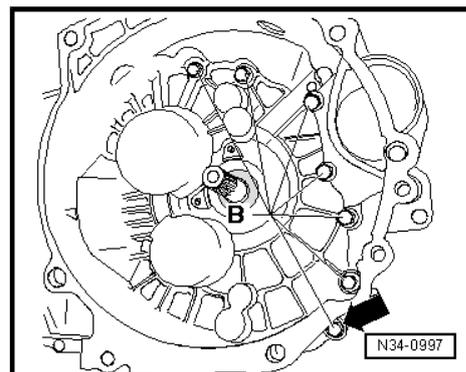
 **Note**

The hexagon bolt -arrow- is located outside the joint flange. It is fitted with a washer.

- Take off gearbox housing.

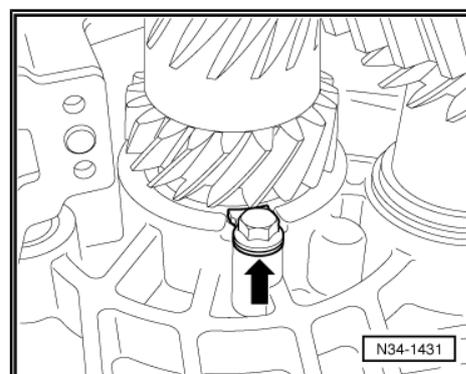
 **Note**

If necessary, use a lever to carefully lift the gearbox housing all round and alternating between sides at the protruding flange, taking care not to damage sealing surfaces.



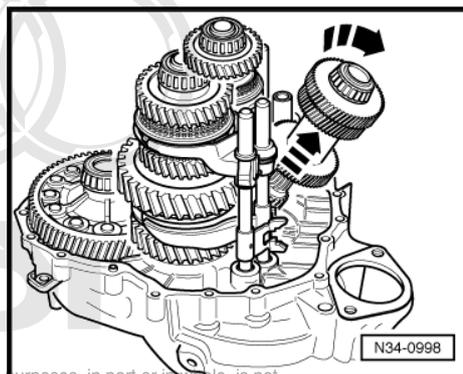
Gearboxes from manufacture date 06 04 0:

- Remove bolt -arrow- and detach locking plate securing tapered roller bearing outer race for input shaft.

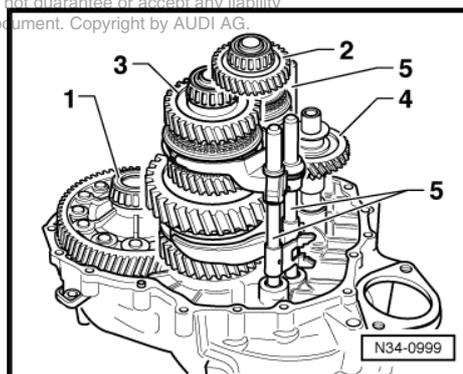


All models:

- Swing input shaft in direction of -arrow- and take off.
- If fitted, remove speedometer sender -G22- .

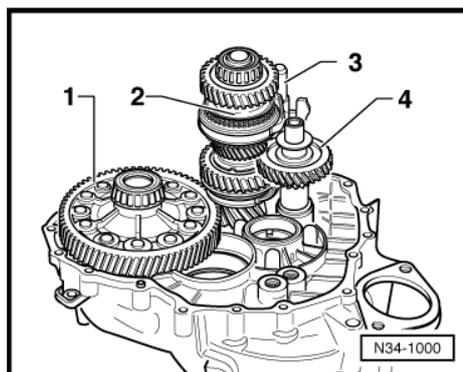


- With the help of a second mechanic, carefully remove differential -1-, output shafts -2- and -3-, reverse shaft -4- and selector rods -5- together from clutch housing (second mechanic required).
- Drive out input shaft oil seal using sleeve -30-21- .

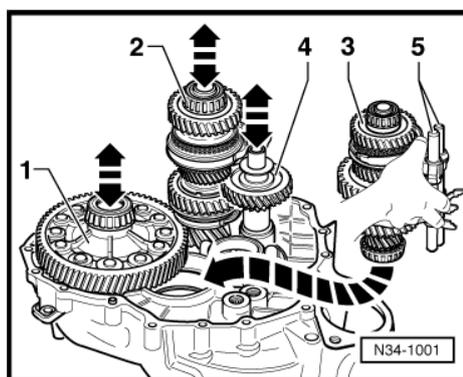


Assembling

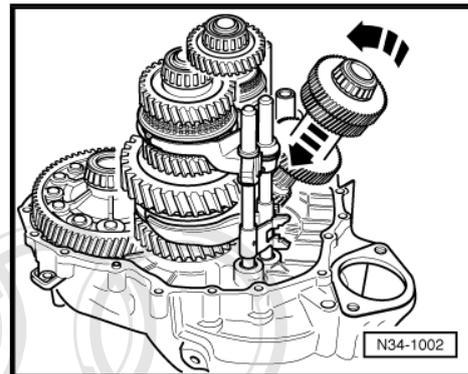
- Install differential -1-.
- Install 5th, 6th and reverse gear output shaft -2- together with reverse gear selector fork, 5th, 6th gear selector rod -3- and reverse shaft -4-.



- Take 1st - 4th gear output shaft -3- with selector rods -5- in your right hand as illustrated.
- Lift up differential slightly with your left hand.
- At the same time the second mechanic must lift output shaft for 5th, 6th and reverse gear -2- slightly, together with the reverse shaft -4-.
- Now insert 1st - 4th gear output shaft in direction of -arrow-.
- The teeth of the output shafts and final drive gear/differential must mesh.
- Together with second mechanic, place shafts in their bearing seats.



- Insert input shaft in clutch housing and pivot into position -arrow-.



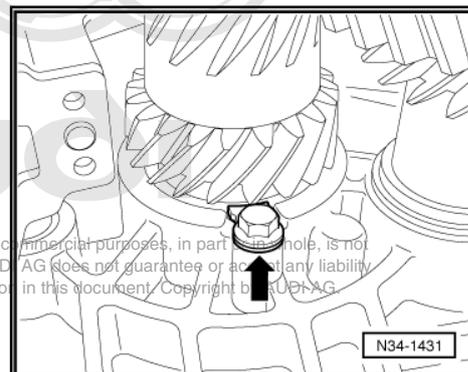
Gearboxes from manufacture date 06 04 0:

- Insert locking plate -arrow- in recess of tapered roller bearing outer race for input shaft
- Tighten new bolt to tightening torque.

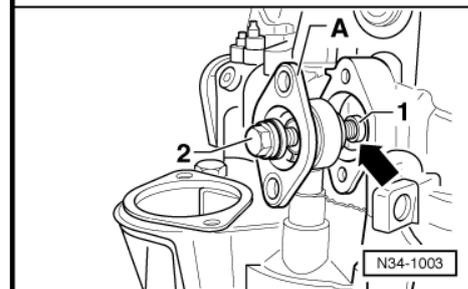
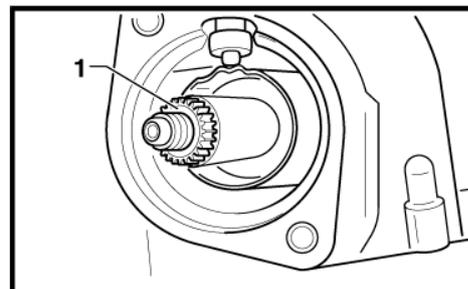
All models:

- Fit gearbox housing.

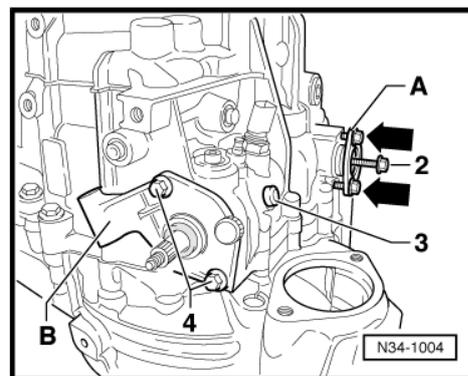
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- Move selector rods to neutral.
- Insert selector shaft -1-.
- Position selector shaft so that the selector fingers are inserted in the selector rods => [page 88](#) .
- When doing this, align the lower selector shaft bearing -arrow- through the drilling for cover plate.
- Bolt the cover plate -A- to lower selector shaft bearing -1- with bolt M8x60 mm -2-.

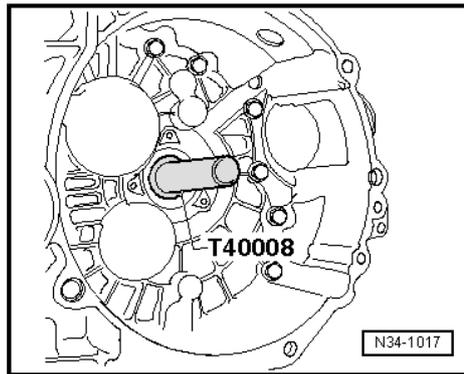


- Hand-tighten cover plate -A- by alternately tightening ($1/2$ turn) bolts -arrows-.
- Remove bolt -2- and hand-tighten original bolt in its place.
- Install selector shaft cover -B- and tighten hexagon bolts -4- to specified torque.
- Tighten hexagon bolts securing cover plate.
- Insert locking bolt -3- for selector shaft gate with locking fluid; locking fluid => Parts catalogue .
- Install reversing light switch -F4- .
- Install complete flange shaft (left-side) => [Item 2 \(page 85\)](#) .
- Install speedometer sender -G22- .



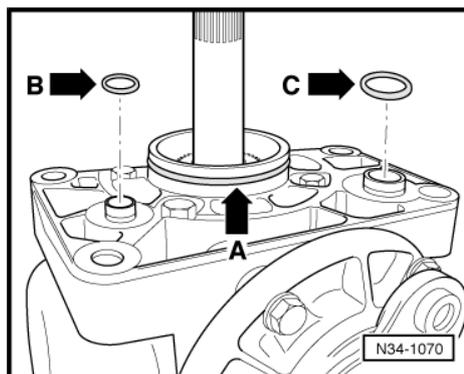
Install input shaft oil seal as follows:

- Pack space between sealing lip and dust lip half-full with sealing grease -G 052 128 A1- .
- Lightly lubricate outer circumference of oil seal with gear oil.
- Drive in input shaft oil seal.
- Install slave cylinder with release bearing.



Install bevel box as follows:

- Renew O-ring between bevel box and gearbox -arrow A- and O-rings on oil supply sleeves -arrow B, C-.
- Lightly lubricate O-rings prior to installing.
- Push bevel box completely onto gearbox, at the same time ensuring that the bevel box input shaft splines are guided centrally onto the differential connecting piece.
- Also align the splines of the flange shaft (right-side) and the differential pinion, if necessary turn the flange shaft.
- If the splines are correctly positioned and the components are located centrally, the bevel box will slide against the gearbox onto the stop.

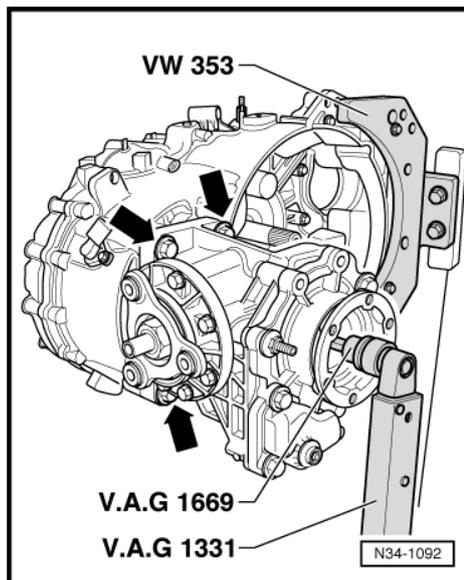


Caution

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.

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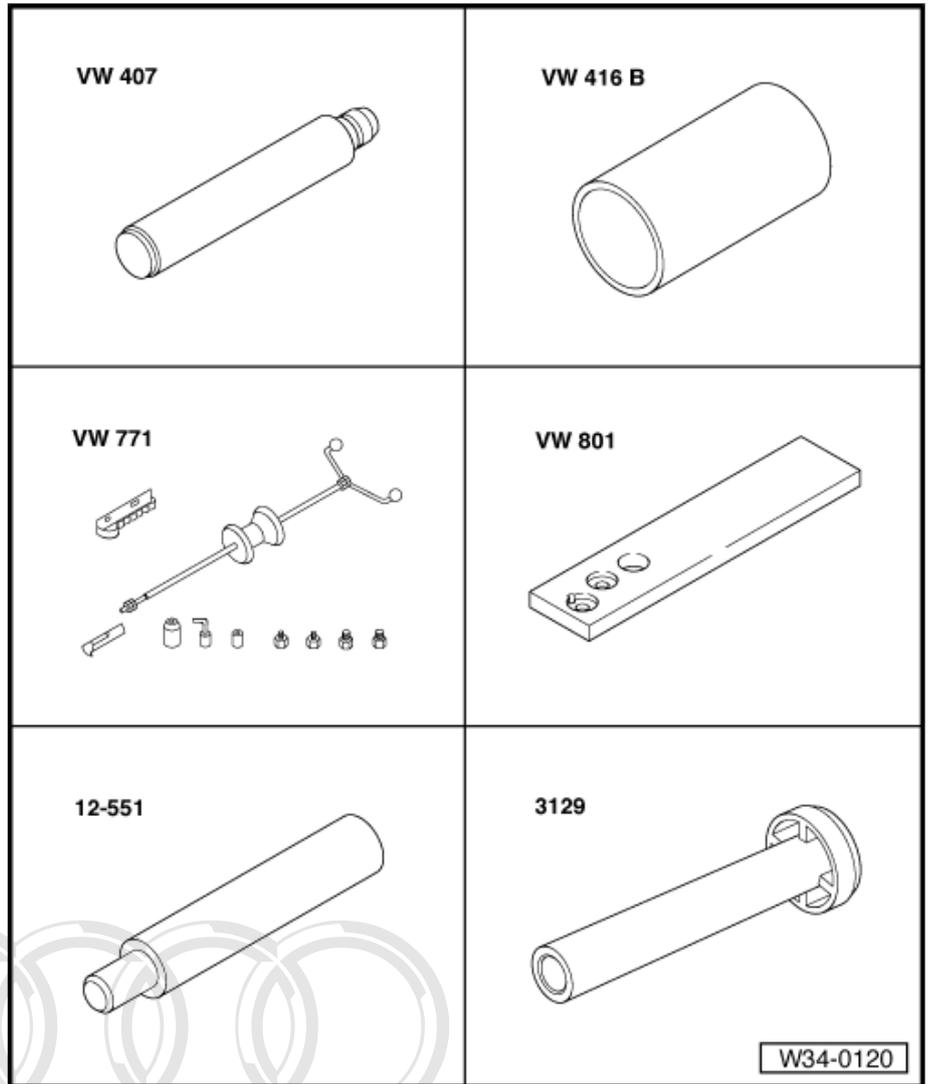
- Tighten all 4 bolts securing bevel box to gearbox (illustration only shows 3 bolts) -arrows-.
- Tighten countersunk bolt for flange shaft (right-side) using hexagon key -V.A.G 1669- (counterhold flange shaft with drift to prevent it from turning).



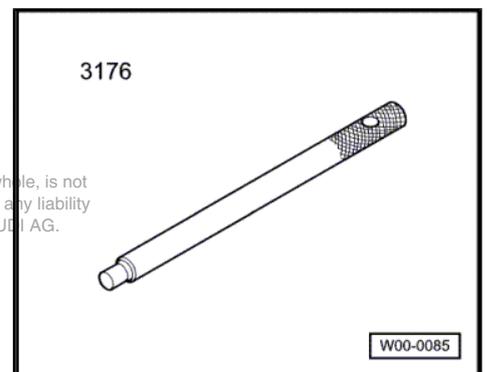
6 Servicing gearbox housing

Special tools and workshop equipment required

- ◆ Press tool -VW 407-
- ◆ Tube -VW 416 B-
- ◆ Multi-purpose tool -VW 771-
- ◆ Support plate -VW 801-
- ◆ Centring mandrel -12-551-
- ◆ Thrust piece -3129-

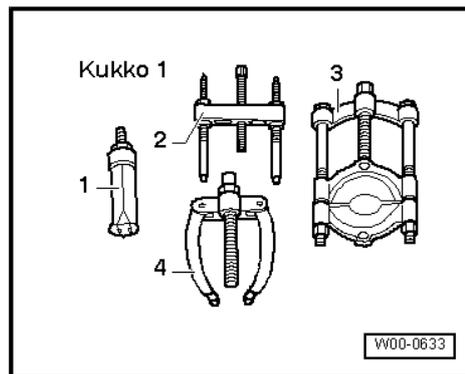


- ◆ Centring mandrel -3176-



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◆ -1- Internal puller -Kukko 21/2- and -Kukko 21/4-



◆ -4- Counter-support -Kukko 22/2-

Gearbox housing - exploded view of components

1 - Gearbox housing

- If renewed: Adjust input shaft, output shafts and differential ⇒ [page 175](#)

2 - Seal

- Renew

3 - Oil drain plug, 30 Nm

- Renew

4 - Stop sleeves

- Driving out ⇒ [page 97](#)
- Driving in ⇒ [page 97](#)

5 - Oil filler plug, 30 Nm

- Renew

6 - Locking pin

- For adjusting selector mechanism ⇒ [page 49](#)
- Driving out ⇒ [page 98](#)
- Driving in ⇒ [page 98](#)

7 - Mounting bush

- For selector shafts
- Always renew after removing
- Pulling out ⇒ [page 98](#)
- Driving in ⇒ [page 98](#)

8 - Needle bearing

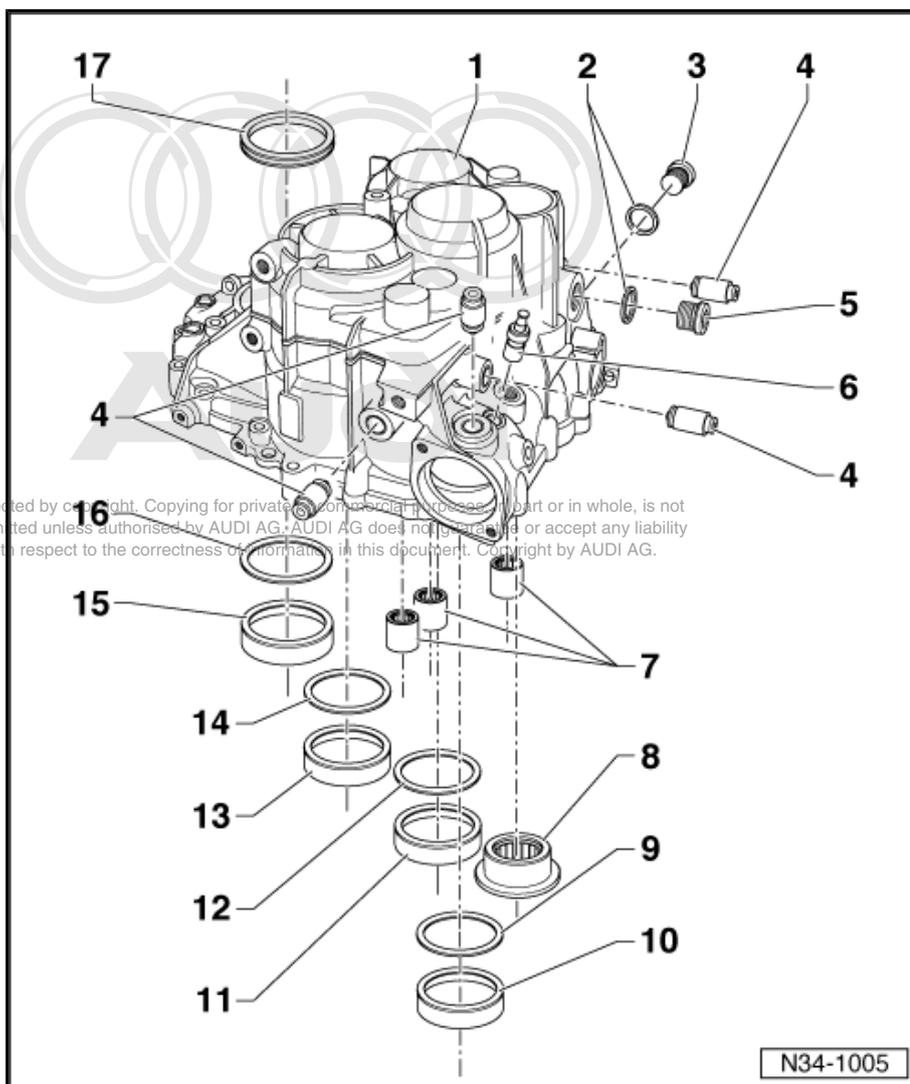
- Always renew after removing
- Pulling out ⇒ [page 99](#)
- Pressing in ⇒ [page 99](#)

9 - Shim

- For input shaft
- Table of adjustments ⇒ [page 175](#)

10 - Tapered roller bearing outer race

- For input shaft



- Removing and installing ⇒ [page 111](#)
- If renewed: Adjust input shaft ⇒ [page 118](#)

11 - Tapered roller bearing outer race

- For 5th/6th and reverse gear output shaft
- Removing and installing ⇒ [page 139](#)
- If renewed: Adjust 5th/6th and reverse gear output shaft ⇒ [page 151](#)

12 - Shim

- For 5th/6th and reverse gear output shaft
- Table of adjustments ⇒ [page 175](#)

13 - Tapered roller bearing outer race

- For 1st - 4th gear output shaft
- Removing and installing ⇒ [page 134](#)
- If renewed: Adjust 1st - 4th gear output shaft ⇒ [page 134](#)

14 - Shim

- For 1st - 4th gear output shaft
- Table of adjustments ⇒ [page 175](#)

15 - Tapered roller bearing outer race

- For differential
- Removing and installing ⇒ [page 167](#)
- If renewed: Adjust differential ⇒ [page 176](#)

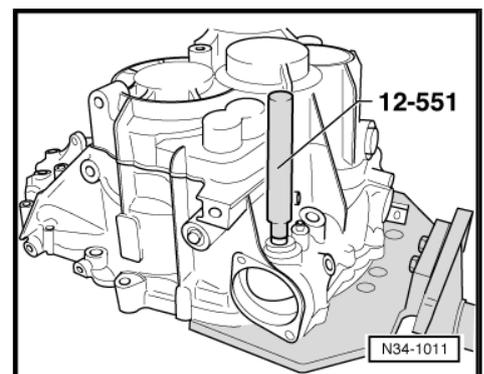
16 - Shim

- For differential
- Table of adjustments ⇒ [page 175](#)

17 - Oil seal

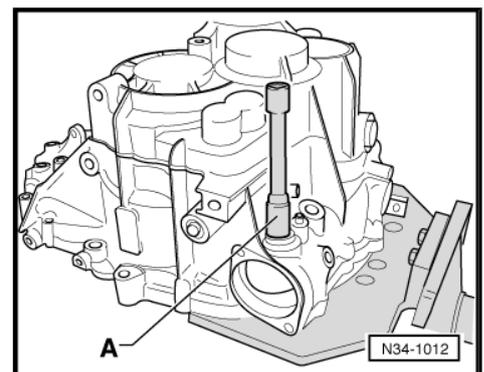
- For flange shaft (left-side)
- Renewing ⇒ [page 157](#)

Driving out stop sleeve

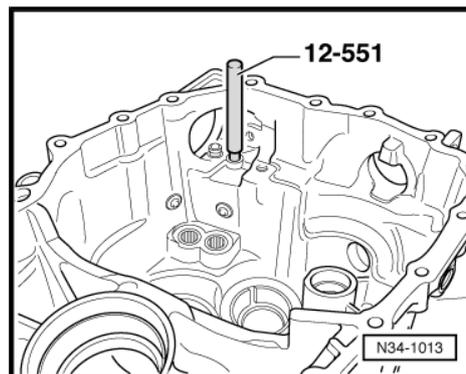


Driving in stop sleeve

- Drive stop sleeve in onto stop using 13 mm socket -A- and plastic-headed hammer.

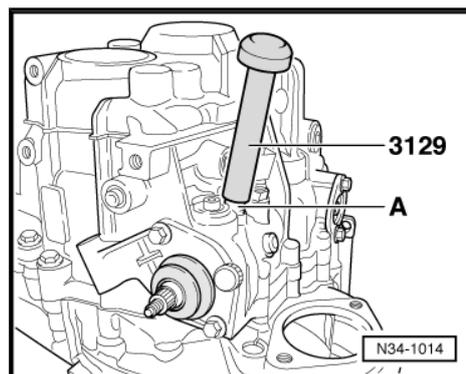


Driving out locking pin



Driving in locking pin

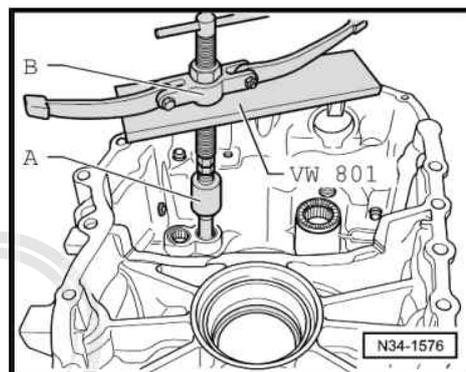
- Drive in locking pin -A- onto stop.



Pulling out bearing bush for selector rod

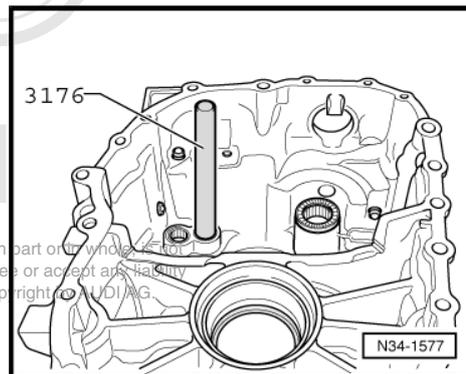
A - Internal puller 14.5 ... 18.5 mm -Kukko 21/2-

B - Counter-support -Kukko 22/2-



Driving in selector rod bush

- Drive in bearing bush for selector rod until flush.



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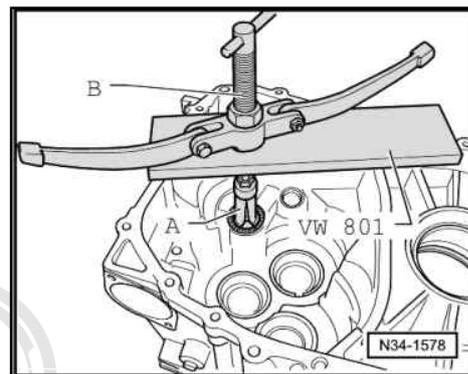
Pulling needle bearing for reverse shaft out of gearbox housing

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

B - Counter-support -Kukko 22/2-

Note

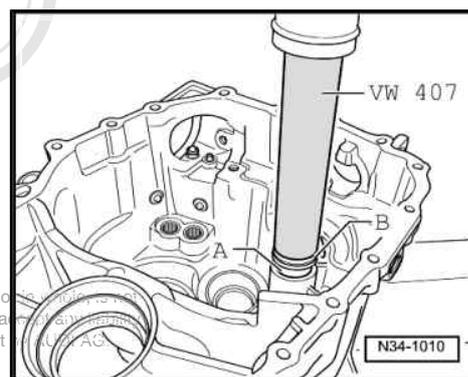
The needle bearing is destroyed during removal and must be renewed.



Pressing needle bearing for reverse shaft into gearbox housing

– Before pressing in, place reverse shaft thrust washer -B- on needle bearing -A-.

– Place tube -VW 416 B- directly under bearing mounting to support gearbox housing.

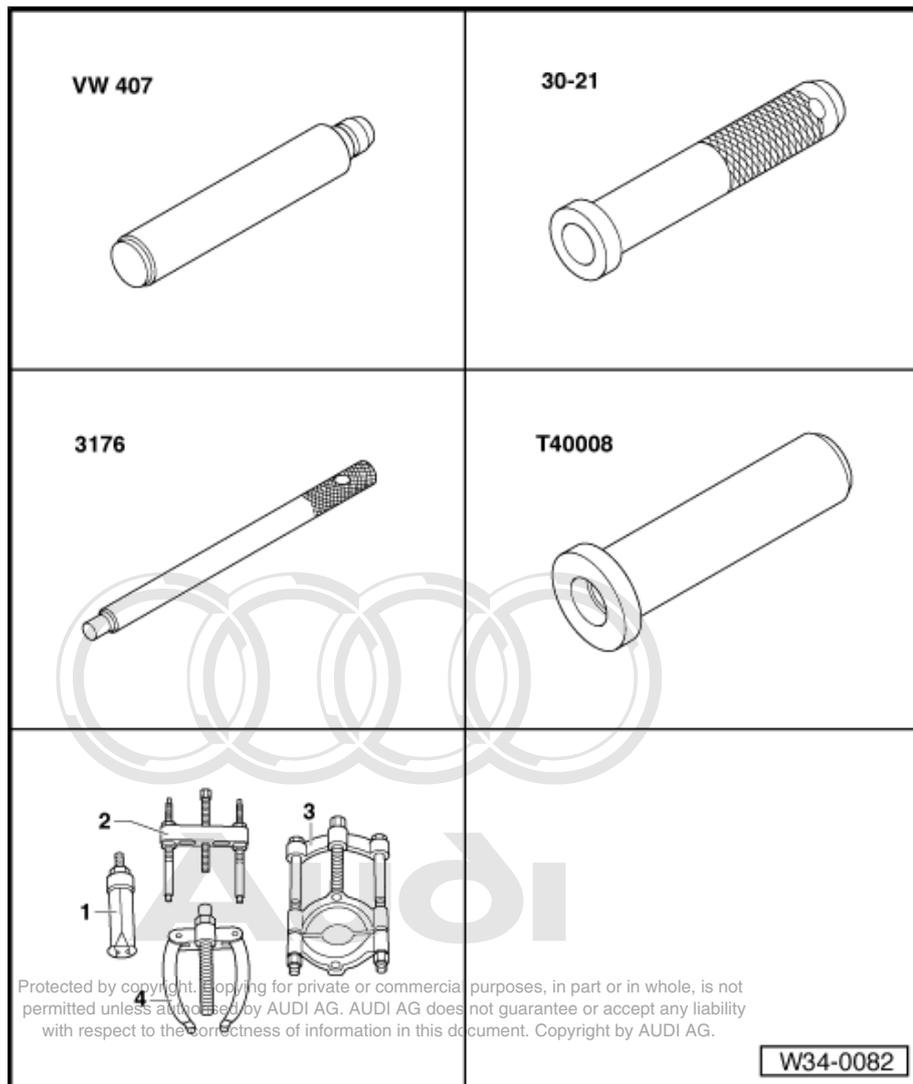


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7 Servicing clutch housing

Special tools and workshop equipment required

- ◆ Press tool -VW 407-
- ◆ Sleeve -30-21-
- ◆ Centring mandrel -3176-
- ◆ Thrust piece -T40008-
- ◆ -1- Internal puller -Kukko 21/2- and -Kukko 21/4-
- ◆ -4- Counter-support -Kukko 22/1- and -Kukko 22/2-



Clutch housing - exploded view of components

1 - Mounting bush

- For selector shafts
- Always renew after removing
- Pulling out ⇒ [page 102](#)
- Driving in ⇒ [page 102](#)

2 - Reverse gear selector fork shaft

- Cannot be removed with workshop tools
- Pressing into clutch housing ⇒ [page 104](#)

3 - Needle bearing

- Always renew after removing
- Pulling out ⇒ [page 103](#)
- Pressing in ⇒ [page 103](#)

4 - Dowel sleeve

- 2 x

5 - Clutch housing

- On gearboxes from manufacture date 06 04 0: with additional drilling and recess for locking plate securing tapered roller bearing outer race for input shaft ⇒ [Item 14 \(page 102\)](#)
- If renewed: table of adjustments ⇒ [page 175](#)

6 - Input shaft oil seal

- Removing ⇒ [page 103](#)
- Installing ⇒ [page 103](#)

7 - Oil guide

- Lever out with screwdriver
- Only fits in one position.

8 - Washer

- For differential
- 0.65 mm thick

9 - Tapered roller bearing outer race

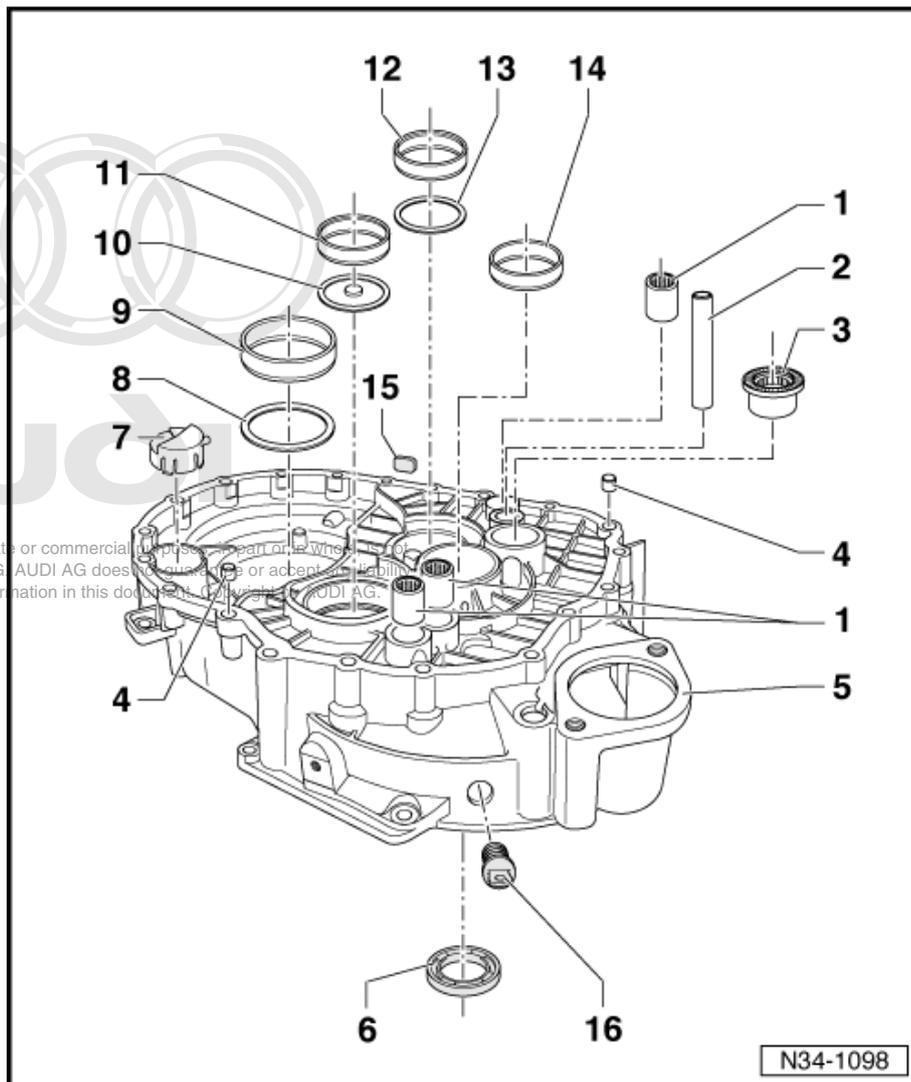
- For differential
- Removing and installing ⇒ [page 167](#)
- If renewed: Adjust differential ⇒ [page 176](#)

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 ⇒ [page 128](#)
- If renewed: Adjust 1st - 4th gear output shaft ⇒ [page 134](#)



12 - Tapered roller bearing outer race

- For 5th/6th and reverse gear output shaft
- Removing and installing ⇒ [page 139](#)
- If renewed: Adjust 5th/6th and reverse gear output shaft ⇒ [page 151](#)

13 - Washer

- For output shaft
- 0.65 mm thick

14 - Tapered roller bearing outer race

- For input shaft
- Removing and installing ⇒ [page 111](#)
- On gearboxes from manufacture date 06 04 0: secured with locking plate ⇒ [Item 12 \(page 86\)](#) and bolt ⇒ [Item 11 \(page 86\)](#)
- Renew bolt for locking plate and tighten to 12 Nm.
- If renewed: Adjust input shaft ⇒ [page 118](#)

15 - Magnet

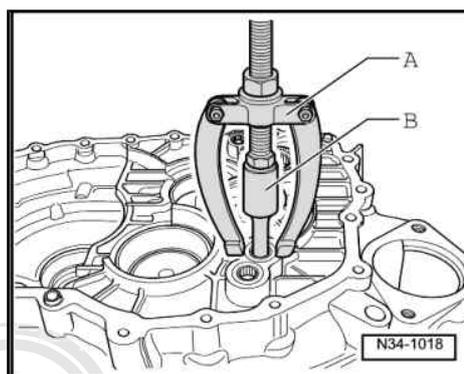
- Held in place by joint surface of housing

16 - Cap

Pulling out bearing bush for selector rod

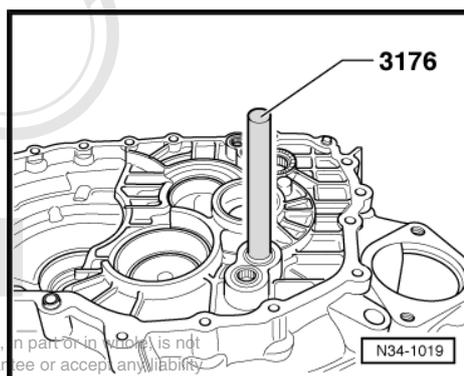
A - Counter-support -Kukko 22/1-

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



Driving in selector rod bush

- Drive in bearing bush for selector rod until flush.



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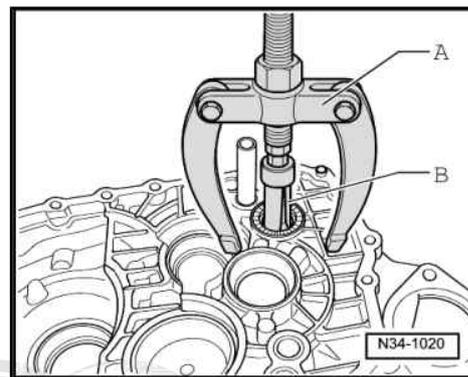
Pulling needle bearing out of clutch housing

A - Counter-support -Kukko 22/2-

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

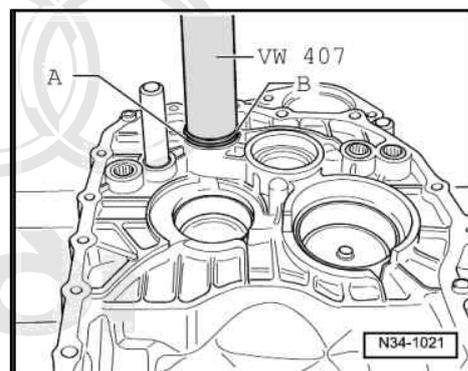
 **Note**

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



Pressing needle bearing into clutch housing

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

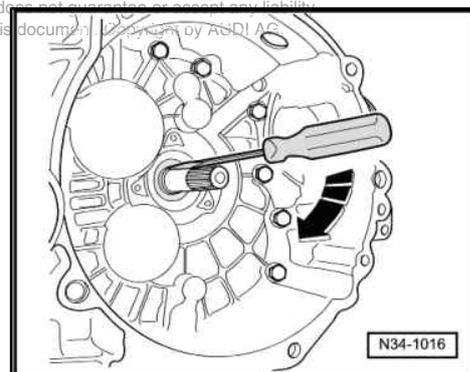


Removing input shaft oil seal

- Lever out oil seal carefully using a screwdriver.

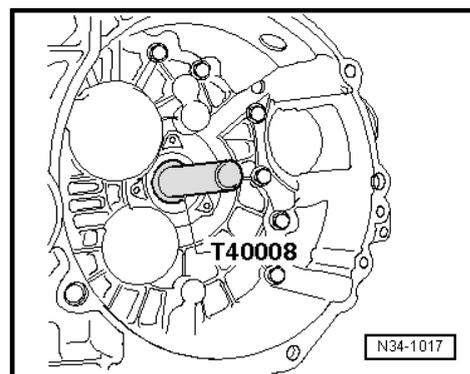
 **Note**

When gearbox is dismantled, oil seal can be removed with sleeve -30-21-.



Driving in oil seal for input shaft

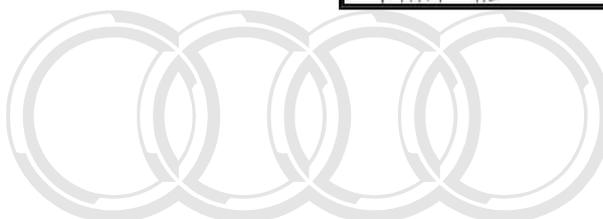
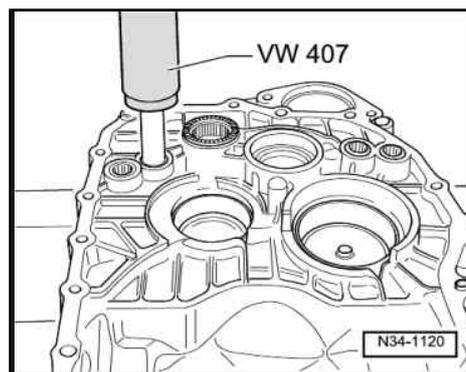
- Pack space between sealing lip and dust lip half-full with sealing grease -G 052 128 A1-.
- Lightly lubricate outer circumference of oil seal with gear oil.
- Drive in input shaft oil seal until flush.



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Pressing reverse gear selector fork shaft into clutch housing



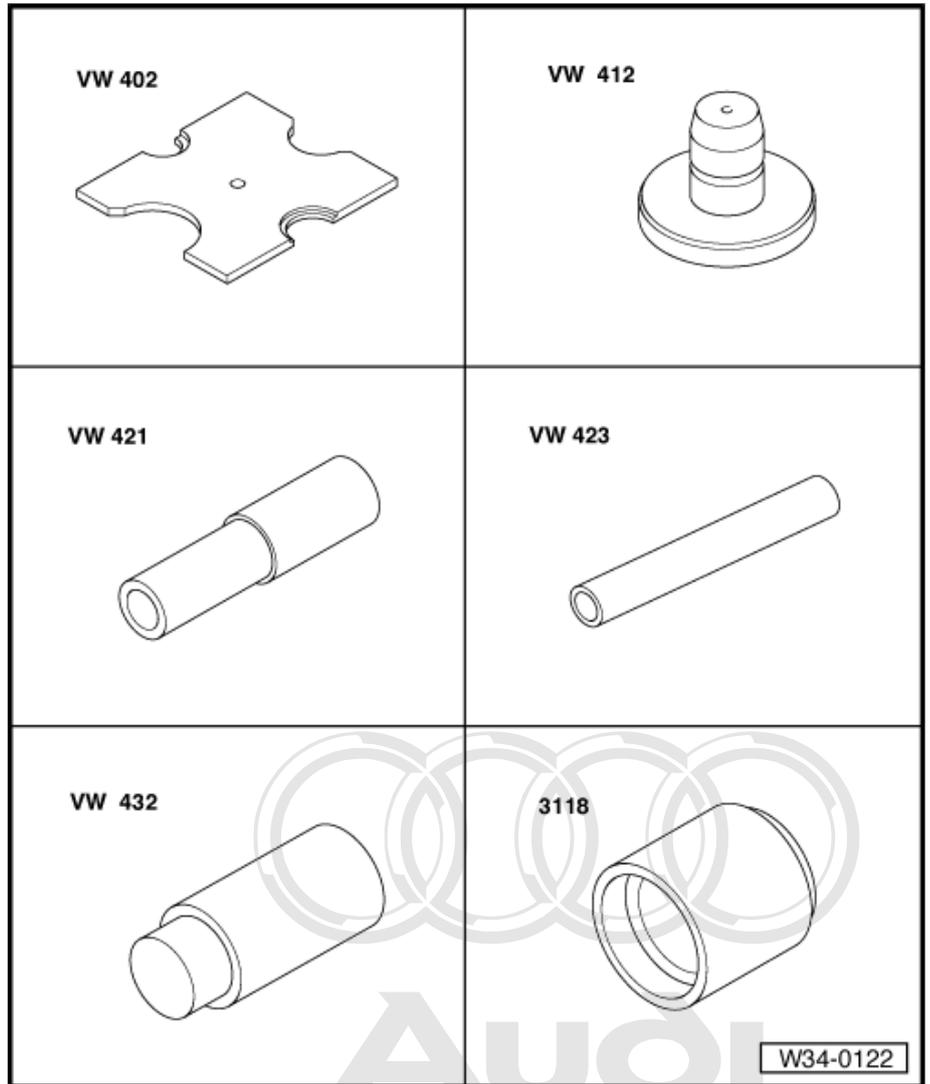
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8 Servicing selector mechanism in gearbox

Special tools and workshop equipment required

- ◆ Thrust plate -VW 402-
- ◆ Press tool -VW 412-
- ◆ Tube -VW 421-
- ◆ Tube -VW 423-
- ◆ Press tool -VW 432-
- ◆ Press tool -3118-



Selector mechanism in gearbox - exploded view of components

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1 - Hexagon nut, 20 Nm

- Self-locking
- Renew

2 - Selector shaft lever

- Install so that gap in splines aligns with selector shaft
- Can be renewed with selector mechanism installed
- Installation position
⇒ [page 43](#)

3 - Slide block

- Clip into relay lever
⇒ [Item 6 \(page 106\)](#)

4 - Circlip

- Removing ⇒ [page 107](#)

5 - Mounting bush

6 - Relay lever

- Installation position
⇒ [page 43](#)

7 - Selector mechanism cover

8 - Ball sleeve

- For selector shaft
- Removing ⇒ [page 107](#)
- Pressing in
⇒ [page 107](#)

9 - Selector shaft

10 - O-ring

- Renew

11 - O-ring

- Renew

12 - Cover plate

13 - Oil seal

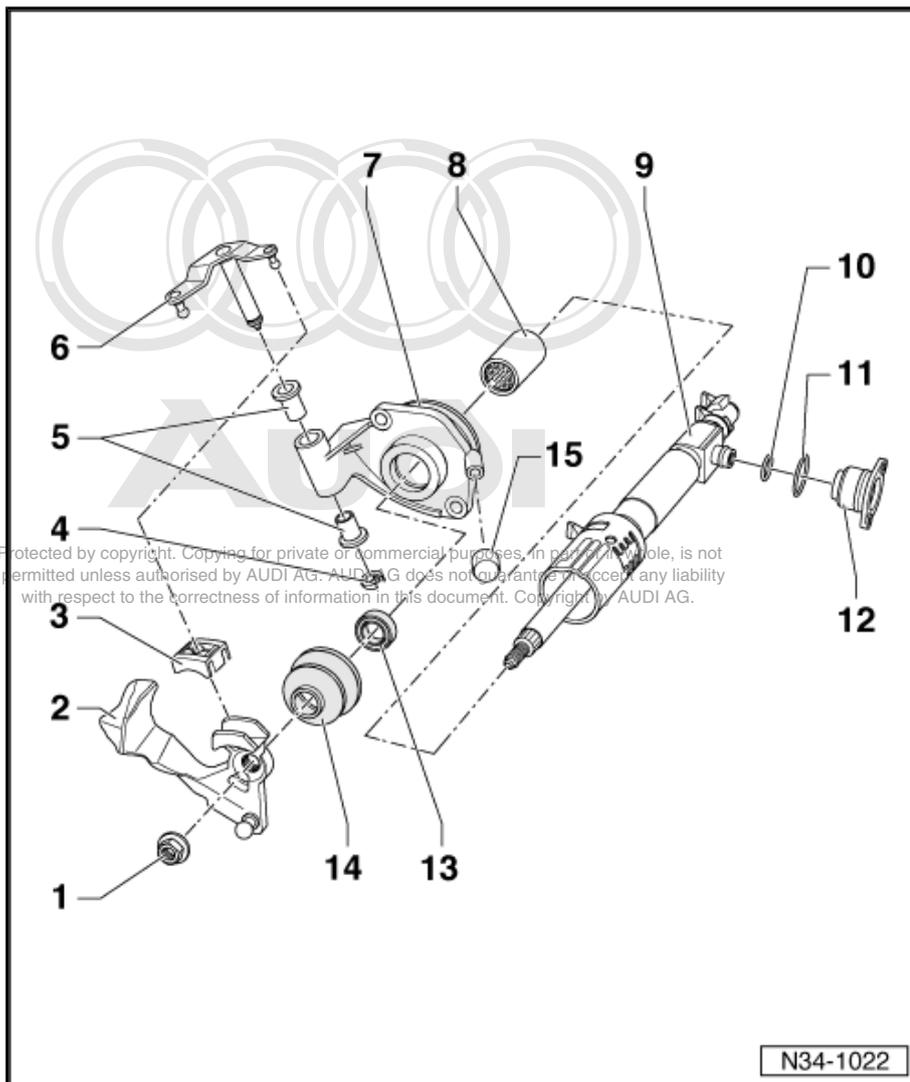
- Lever out with screwdriver
- Installing ⇒ [page 107](#)

14 - Cap

- For selector shaft

15 - Cap

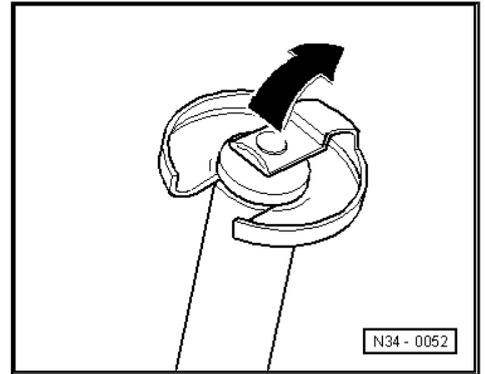
- For gearbox breather



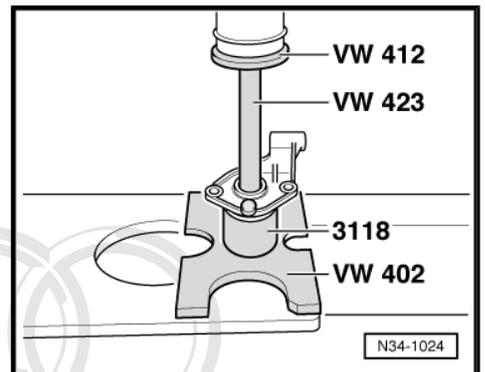
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Removing securing clip for relay lever

- Lift tab in direction of -arrow-.

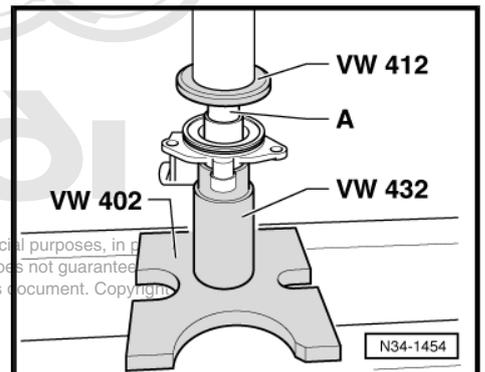


Pressing ball sleeve out of selector mechanism cover



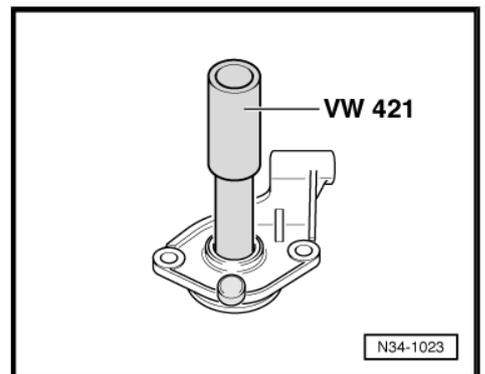
Pressing ball sleeve into selector mechanism cover

- A - Ball sleeve



Installing oil seal

- Drive in oil seal onto stop.
- Pack space between sealing lip and dust lip half-full with sealing grease -G 052 128 A1- .

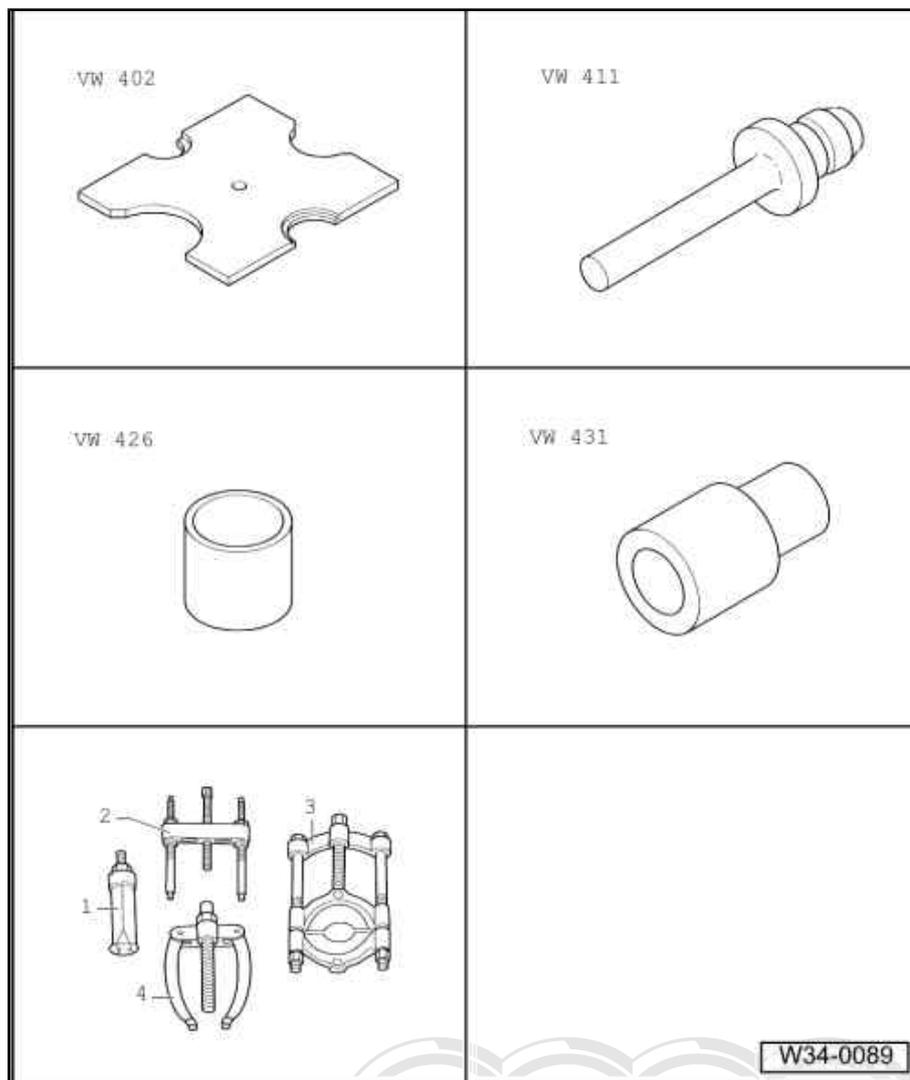


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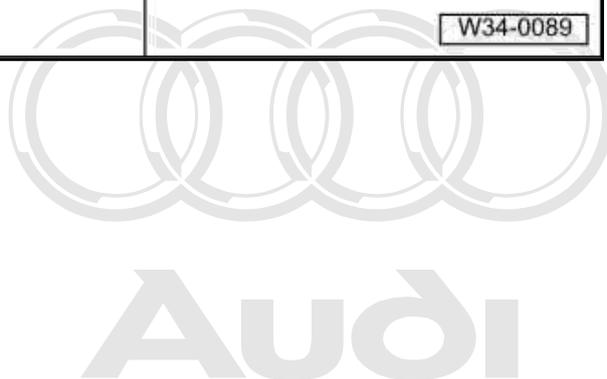
9 Dismantling and assembling selector forks

Special tools and workshop equipment required

- ◆ Thrust plate -VW 402-
- ◆ Press tool -VW 411-
- ◆ Tube -VW 426-
- ◆ Press tool -VW 431-
- ◆ -1- Internal puller -Kukko 21/3-
- ◆ -4- Counter-support -Kukko 22/1-

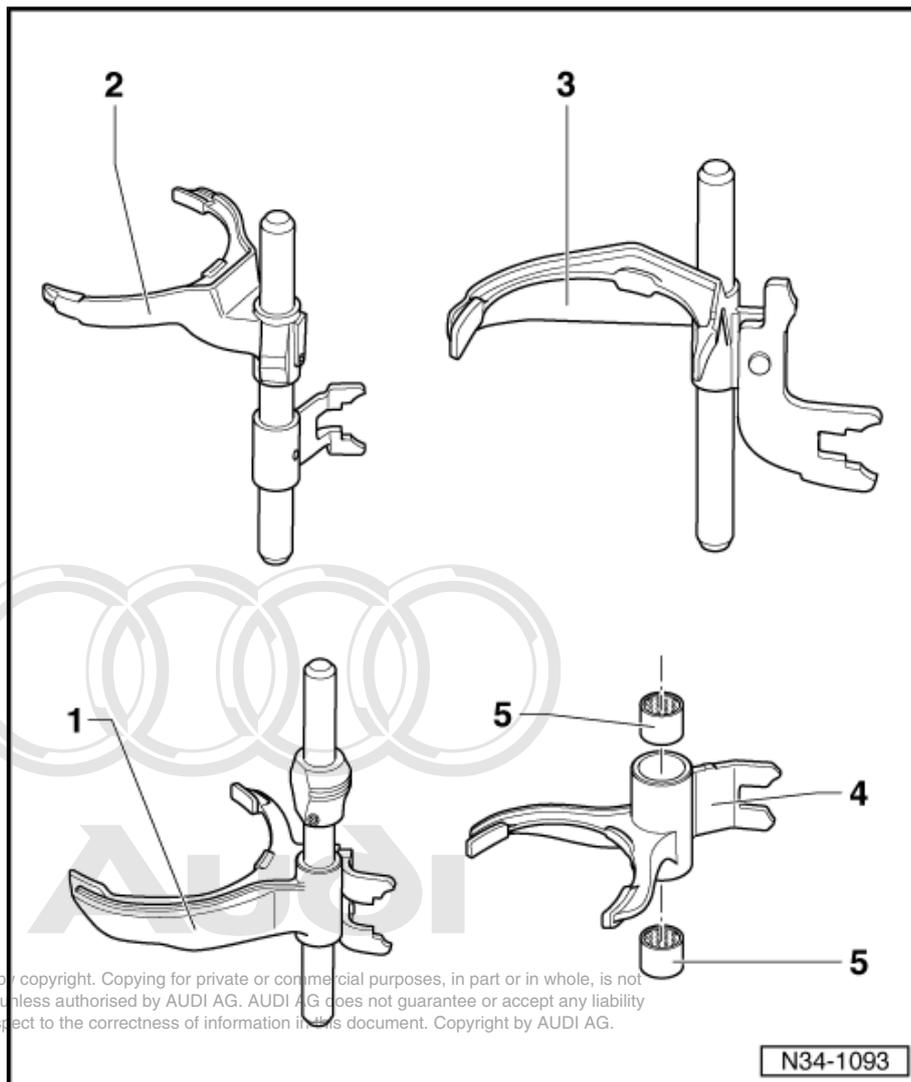


Selector forks - exploded view of components



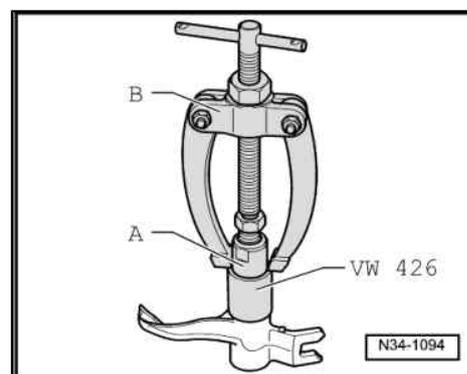
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- 1 - Selector rod with selector fork for 1st and 2nd gear
- 2 - Selector rod with selector fork for 3rd and 4th gear
- 3 - Selector rod with selector fork for 5th and 6th gear
- 4 - Reverse gear selector fork
- 5 - Ball sleeve
 - Pulling out => [page 109](#)
 - Pressing in => [page 110](#)



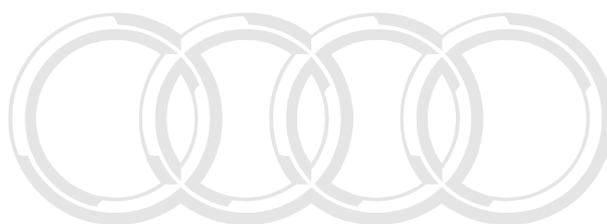
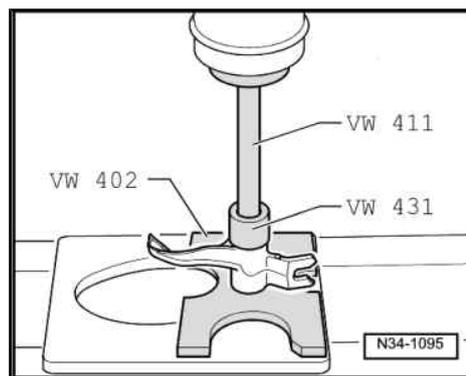
Pulling out ball sleeve for reverse gear selector fork

- A - Internal puller 18 ... 23 mm -Kukko 21/3-
- B - Counter-support -Kukko 22/1-





Pressing in ball sleeve for reverse gear selector fork



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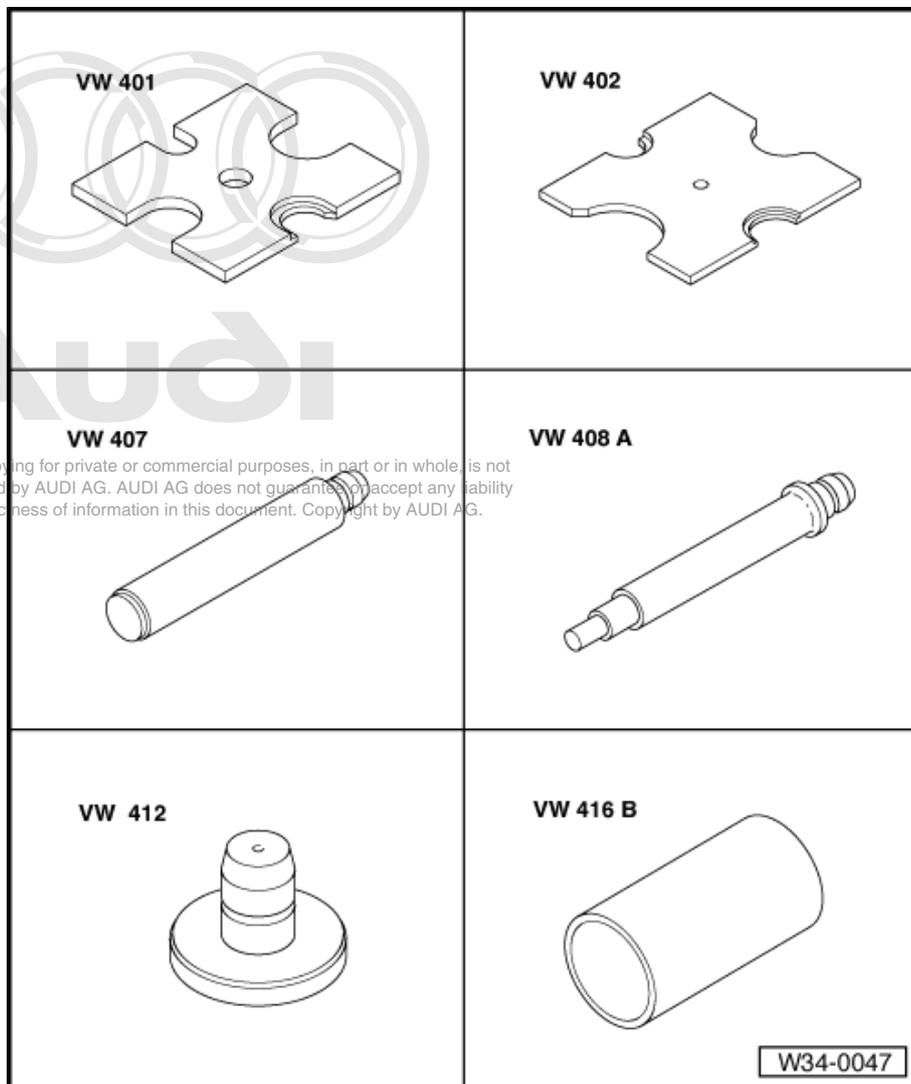
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35 – Gears, shafts

1 Dismantling and assembling input shaft

Special tools and workshop equipment required

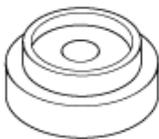
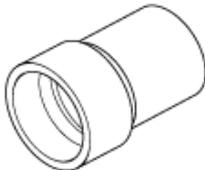
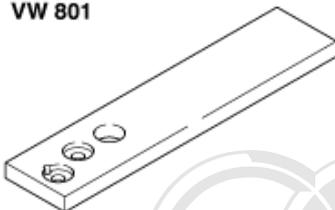
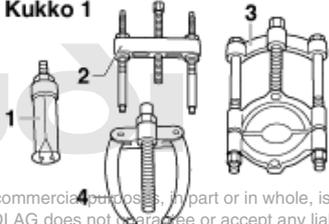
- ◆ Thrust plate -VW 401-
- ◆ Thrust plate -VW 402-
- ◆ Press tool -VW 407-
- ◆ Press tool -VW 408 A-
- ◆ Press tool -VW 412-
- ◆ Tube -VW 416 B-



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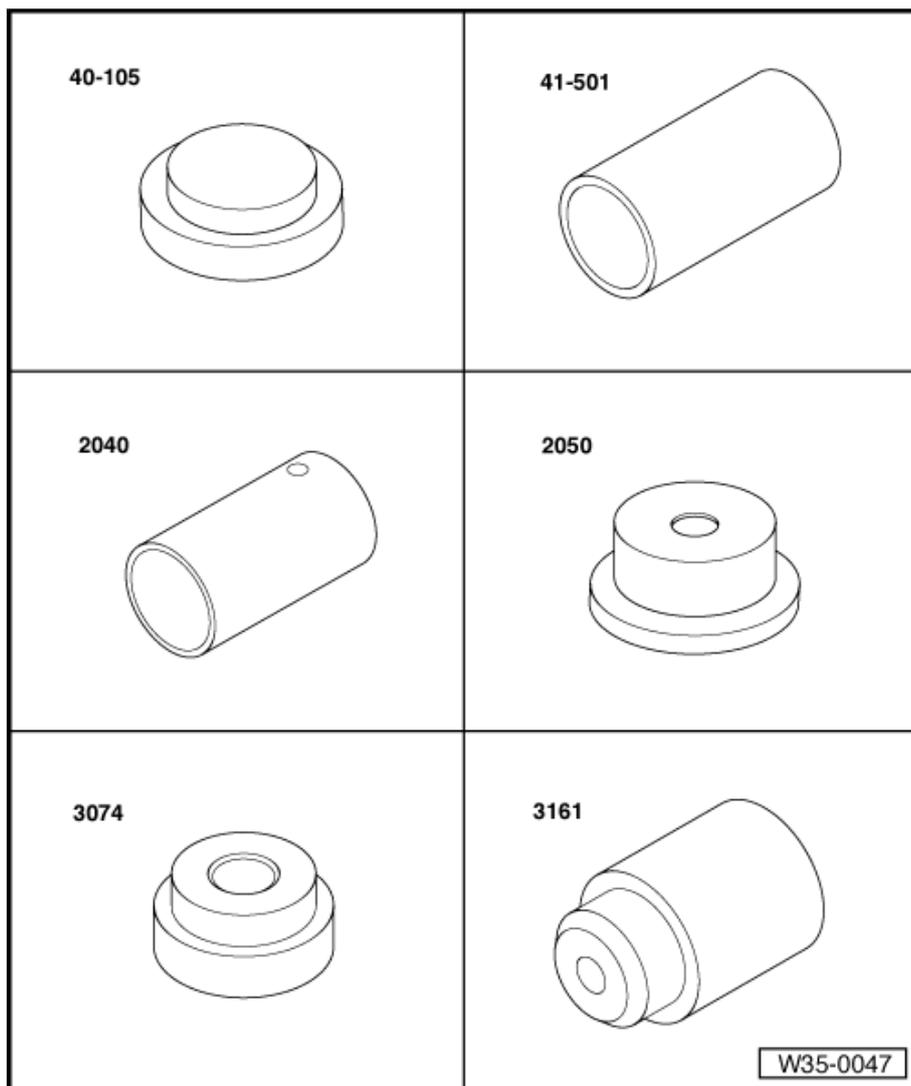
- ◆ Press tool -VW 433-
- ◆ Press tool -VW 454-
- ◆ Support plate -VW 801-
- ◆ Tapered roller bearing puller -V.A.G 1582-
- ◆ Adapter -V.A.G 1582/7-
- ◆ -1- Internal puller -Kukko 21/7-
- ◆ -3- Splitter -Kukko 17/2-
- ◆ -4- Counter-support -Kukko 22/2-

<p>VW 433</p> 	<p>VW 454</p> 
<p>VW 801</p> 	<p>V.A.G 1582</p> 
<p>V.A.G 1582/7</p> 	<p>Kukko 1</p> 

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W35-0071

- ◆ Thrust plate -40-105-
- ◆ Drift sleeve -41-501-
- ◆ Tube -2040-
- ◆ Thrust piece -2050-
- ◆ Thrust plate -3074-
- ◆ Extension -3161-



Input shaft - exploded view of components

Note

- ◆ Refer to technical data when installing new gears ⇒ [page 2](#) .
- ◆ The input shaft must be re-adjusted if the position of tapered roller bearings is affected when renewing parts. Table of adjustments ⇒ [page 175](#) .


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1 - Gearbox housing

2 - Shim

- Determining thickness
⇒ [page 118](#)

3 - Tapered roller bearing outer race

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

4 - Circlip

- When tapered roller bearing
⇒ [Item 5 \(page 114\)](#) or
input shaft
⇒ [Item 8 \(page 114\)](#) are
renewed: determine
thickness of required
circlip ⇒ [page 117](#)

5 - Tapered roller bearing inner race

- Pulling off ⇒ [page 115](#)
- Pressing on
⇒ [page 117](#)

6 - 5th gear wheel

- Pressing off
⇒ [page 115](#)
- Pressing on
⇒ [page 117](#)

7 - 3rd/4th and 6th gear wheels

- Pressing off
⇒ [page 116](#)
- Pressing on
⇒ [page 116](#)

8 - Input shaft

- Adjusting ⇒ [page 118](#)

9 - Tapered roller bearing inner race

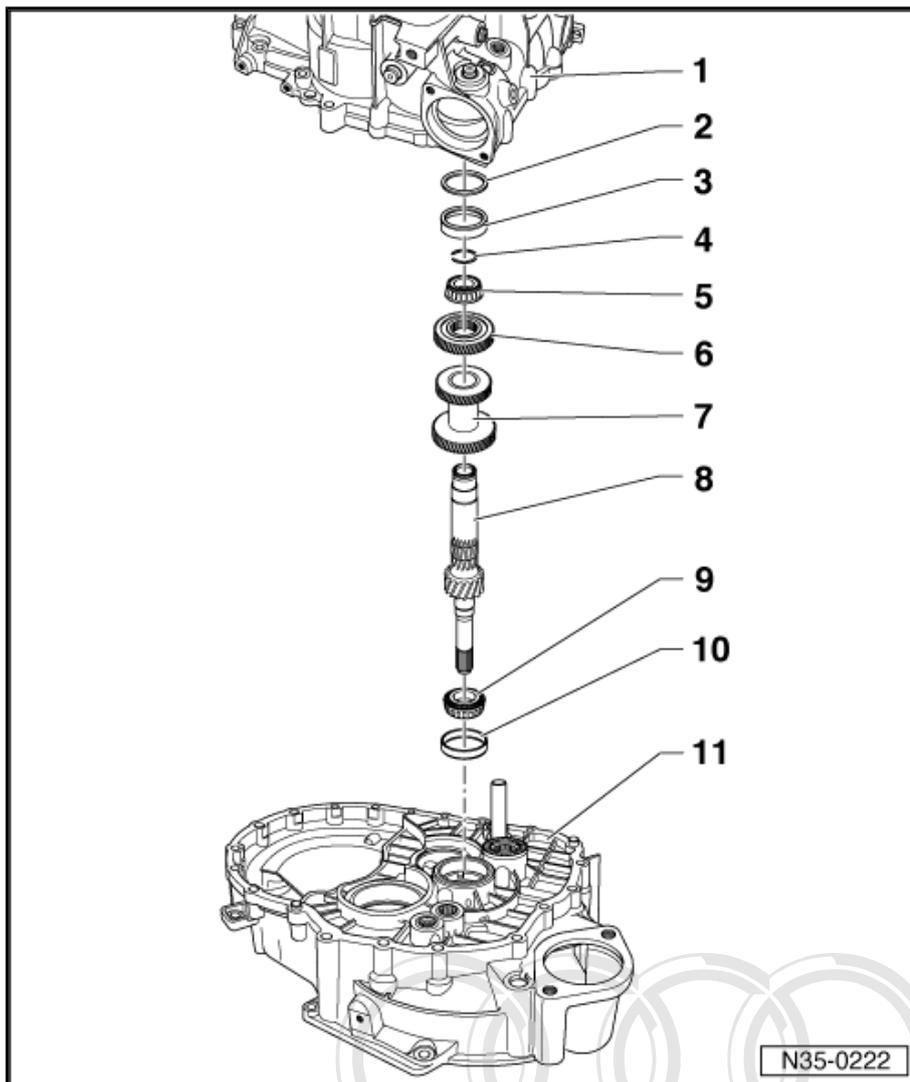
- Pressing off ⇒ [page 116](#)
- Pressing on ⇒ [page 116](#)

10 - Tapered roller bearing outer race

- Pulling out ⇒ [page 117](#)
- On gearboxes from manufacture date 06 04 0: secured with locking plate ⇒ [Item 12 \(page 86\)](#) and bolt
⇒ [Item 11 \(page 86\)](#)
- Installation position on gearboxes from manufacture date 06 04 0 ⇒ [page 118](#)
- Pressing in ⇒ [page 118](#)
- Renew bolt for locking plate and tighten to 12 Nm.

11 - Clutch housing

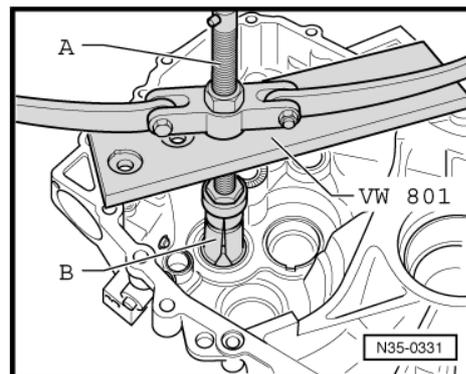
- On gearboxes from manufacture date 06 04 0: with additional threaded hole and recess for locking plate
to secure tapered roller bearing outer race ⇒ [Item 10 \(page 114\)](#)



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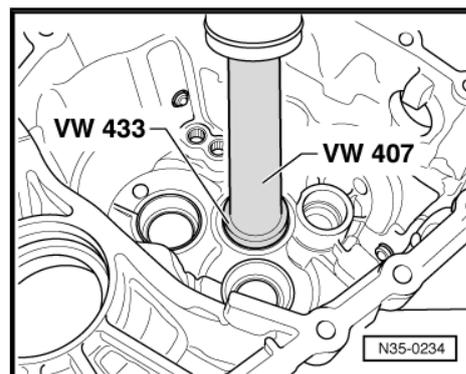
Pulling tapered roller bearing outer race out of gearbox housing

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



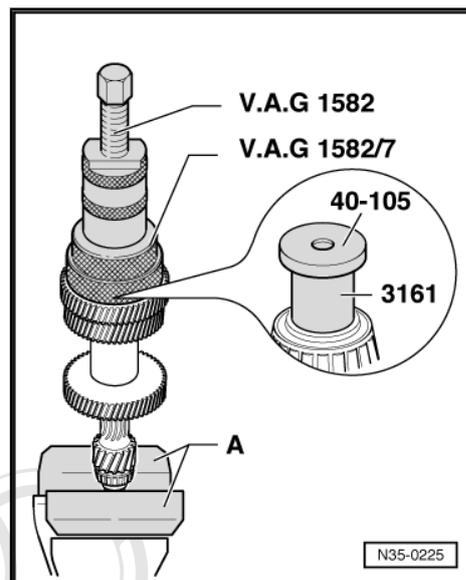
Pressing tapered roller bearing outer race into gearbox housing

- Place thrust piece -2050- directly under bearing mounting to support gearbox housing.



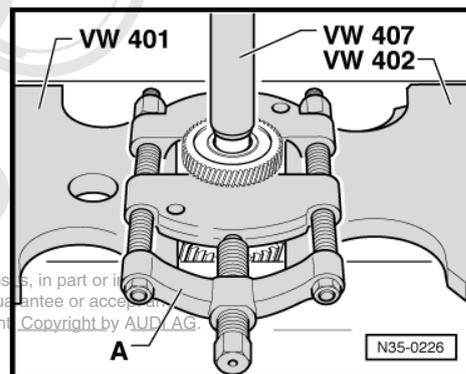
Pulling off tapered roller bearing inner race

- A - Soft jaws/vice
- First remove circlip.
- Before applying puller, place extension -3161- and thrust plate -40-105- on input shaft.



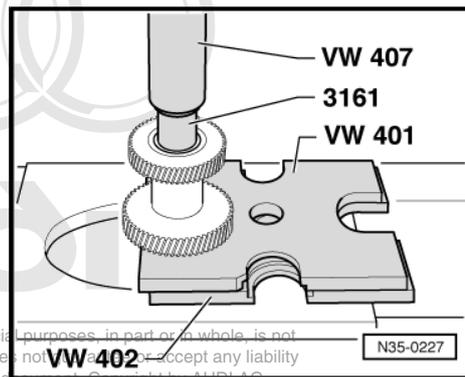
Pressing off 5th gear wheel

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



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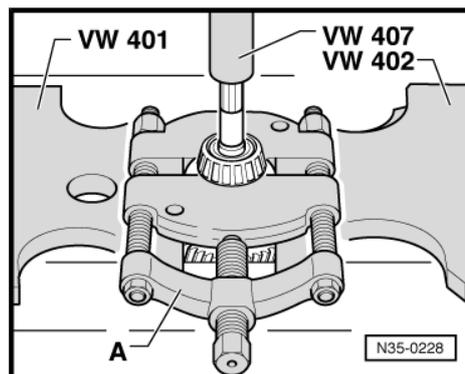
Pressing off 3rd/4th and 6th gear wheels



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Pressing off tapered roller bearing inner race

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



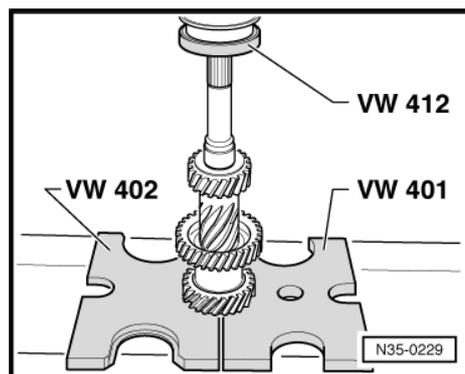
Pressing on 3rd/4th and 6th gear wheels

- Heat gear wheel to approx. 100 °C.

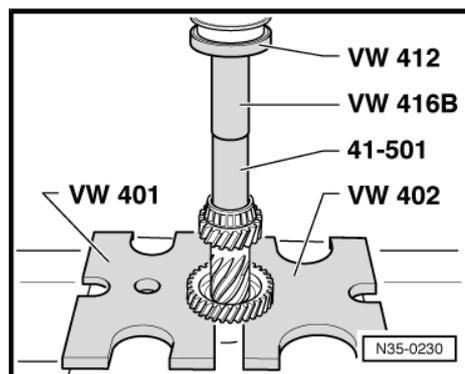
WARNING

Wear protective gloves.

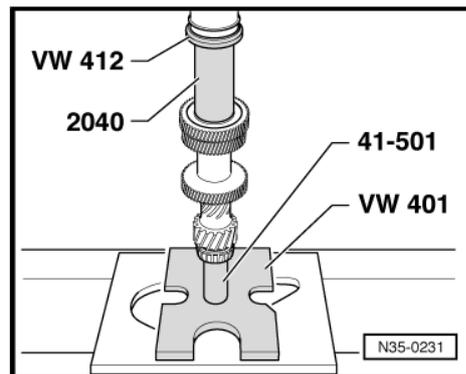
- Press on gear wheel quickly so that the heat is not immediately transferred to the input shaft.



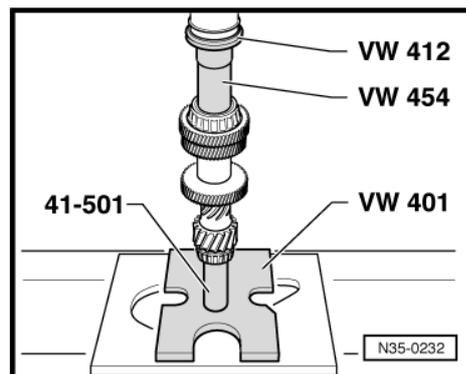
Pressing on tapered roller bearing inner race



Pressing on 5th gear wheel



Pressing on tapered roller bearing inner race

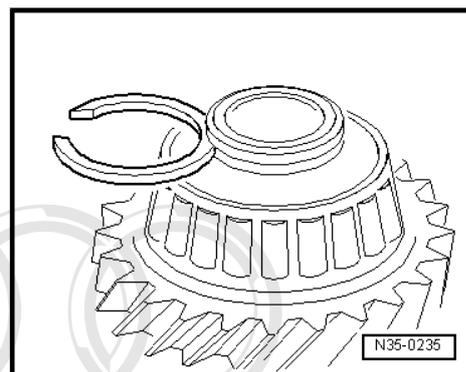


Determining thickness of circlip

– Determine the thickest circlip which will just fit and install it.

Circlips available (in mm) ¹⁾		
1.79	1.89	1.98
1.83	1.92	
1.86	1.95	

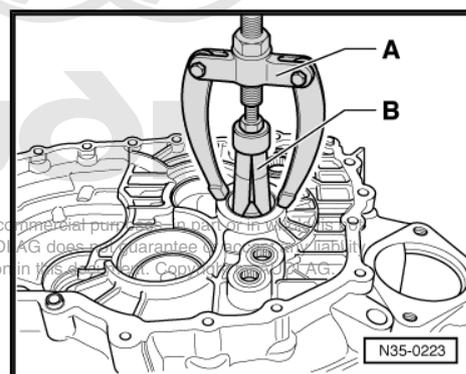
1) Part No.; for allocation refer to ⇒ Parts catalogue



Pulling tapered roller bearing outer race out of clutch housing

A - Counter-support -Kukko 22/2-

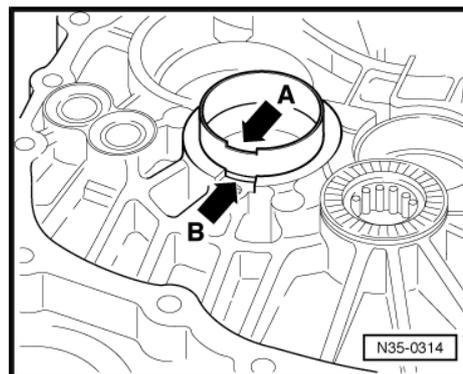
B - Internal puller 46 ... 58 mm -Kukko 21/7-



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Installation position of tapered bearing outer race in clutch housing - gearboxes from manufacture date 06 04 0

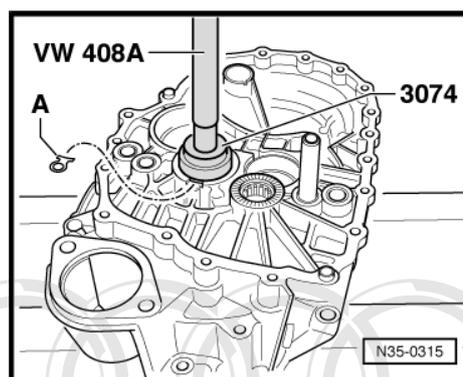
- The recesses for locking plate (⇒ [page 118](#)) on tapered roller bearing outer race -arrow A- and clutch housing -arrow B- must align.



Pressing in tapered roller bearing outer race

Gearboxes from manufacture date 06 04 0:

- After pressing in, check that the locking plate -A- can be inserted in the recess.
- The input shaft must be inserted before installing and securing the locking plate.



1.1 Adjusting input shaft

(Determining thickness of shim for input shaft)

The input shaft must be re-adjusted when the following components are renewed:

- ◆ Gearbox housing
- ◆ Clutch housing
- ◆ Input shaft
- ◆ Tapered roller bearings

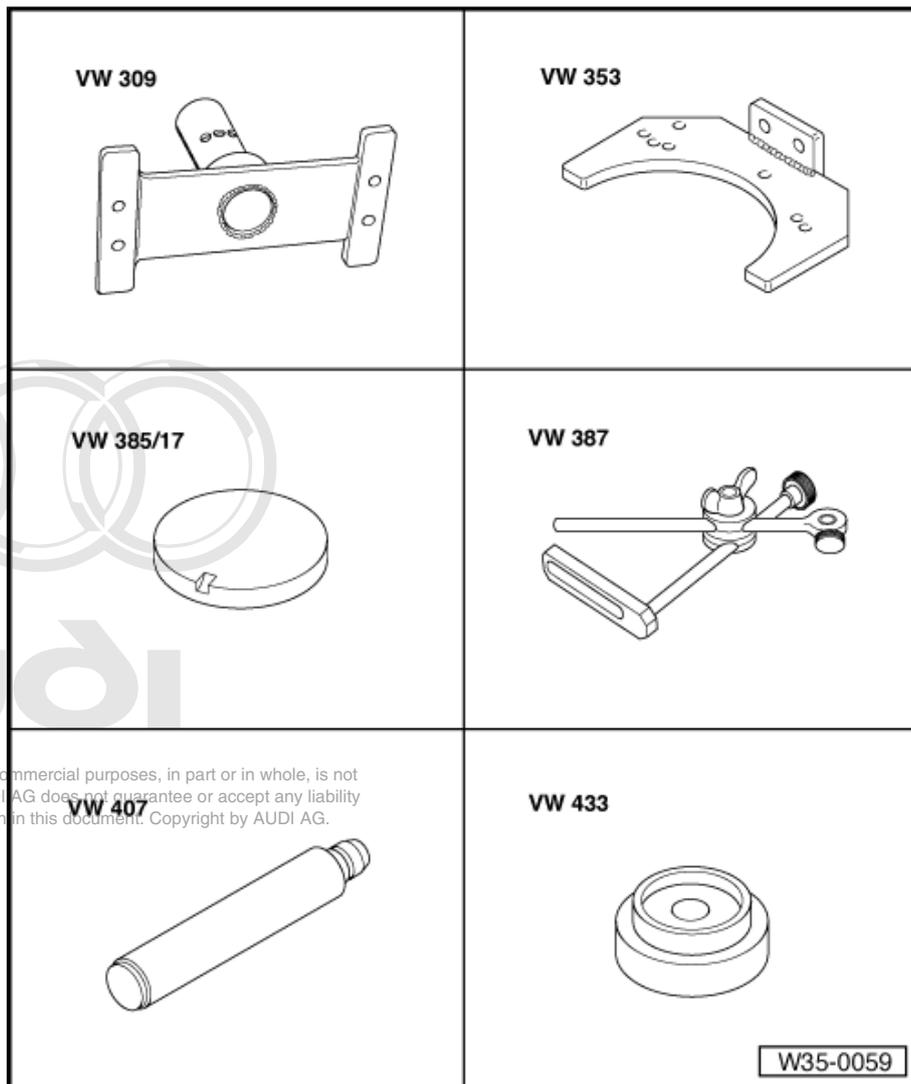
Table of adjustments ⇒ [page 175](#)



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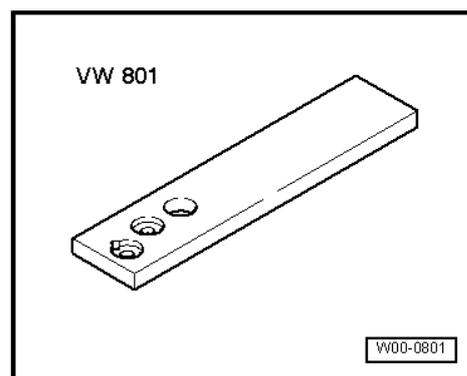
Special tools and workshop equipment required

- ◆ Support plate -VW 309-
- ◆ Gearbox support -VW 353-
- ◆ End measuring plate -VW 385/17-
- ◆ Universal dial gauge bracket -VW 387-
- ◆ Press tool -VW 407-
- ◆ Press tool -VW 433-

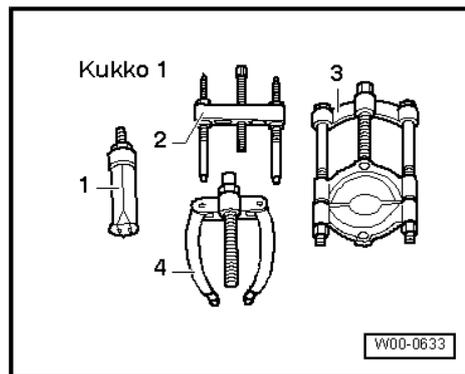


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- ◆ Support plate -VW 801-



◆ -1- Internal puller -Kukko 21/7-

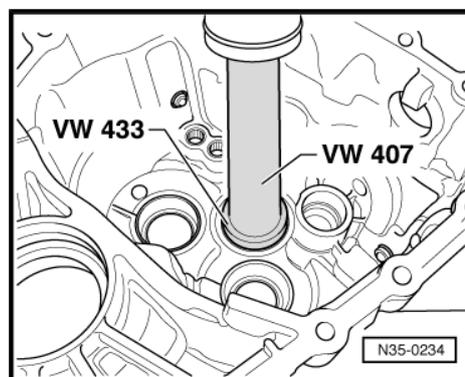


◆ -4- Counter-support -Kukko 22/1-

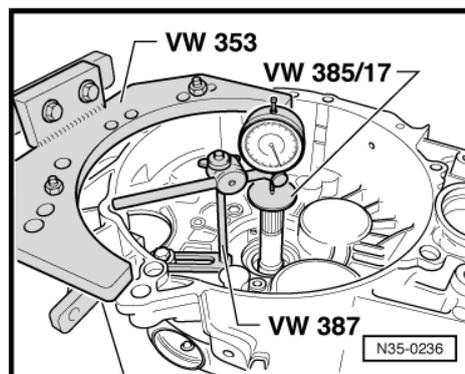
Adjusting

- Shims of determined thickness are installed for both output shafts.
- Press tapered roller bearing outer race (without shim) into gearbox housing onto stop.
- Install both output shafts and input shaft in clutch housing and fit gearbox housing. Tighten hexagon bolts to 25 Nm + tighten 45° (1/8 turn) further

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- Fit measuring appliance and dial gauge in clutch housing.
- Before measurement, rotate input shaft to allow tapered roller bearings to settle.
- Set dial gauge to "0" with a preload of 1 mm.



i Note

This procedure must be repeated for each subsequent measurement, as otherwise the dial gauge will not return to its original setting.

- Move input shaft towards dial gauge.
- Read off and note play indicated on dial gauge (in this example: 1.63 mm).
- Determine thickness of shim according to following table (in this example: 1.60).

Bearing clearance Measured value (mm)	Shim (mm) ²⁾	Bearing clearance Measured value (mm)	Shim (mm) ²⁾
1.480 ... 1.524	1.45	1.925 ... 1.974	1.90
1.525 ... 1.574	1.50	1.975 ... 2.024	1.95
1.575 ... 1.624	1.55	2.025 ... 2.074	2.00
1.625 ... 1.674	1.60	2.075 ... 2.124	2.05
1.675 ... 1.724	1.65	2.125 ... 2.174	2.10
1.725 ... 1.774	1.70	2.175 ... 2.224	2.15

Bearing clearance Measured value (mm)	Shim (mm) ²⁾	Bearing clearance Measured value (mm)	Shim (mm) ²⁾
1.775 ... 1.824	1.75	2.225 ... 2.274	2.20
1.825 ... 1.874	1.80	2.275 ... 2.324	2.25
1.875 ... 1.924	1.85	2.325 ... 2.374	2.30

2) Part No.; for allocation refer to ⇒ Parts catalogue

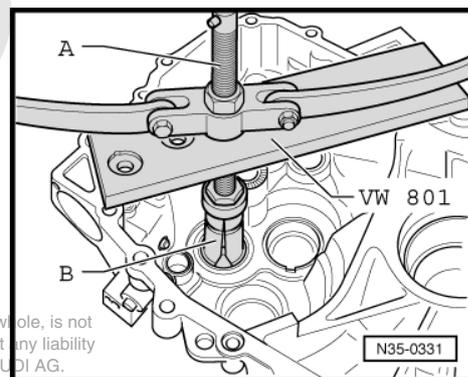
- Remove gearbox housing and pull tapered roller bearing outer race out of gearbox housing.

A - Counter-support -Kukko 22/2-

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

- Press tapered roller bearing outer race (with shim) into gearbox housing (shim in this example: 1.60 mm).
- Fit gearbox housing and tighten hexagon bolts to 25 Nm + tighten 45° (1/8 turn) further.

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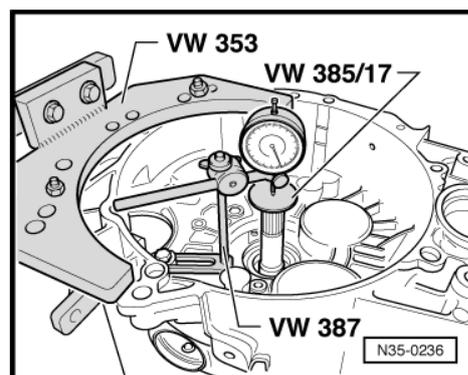
Checking adjustment

- Fit measuring appliance and dial gauge.
- Rotate input shaft to allow tapered roller bearings to settle.
- Move input shaft towards dial gauge.
 - Bearing clearance min. 0.065 mm.
 - Bearing clearance max. 0.150 mm.



Note

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

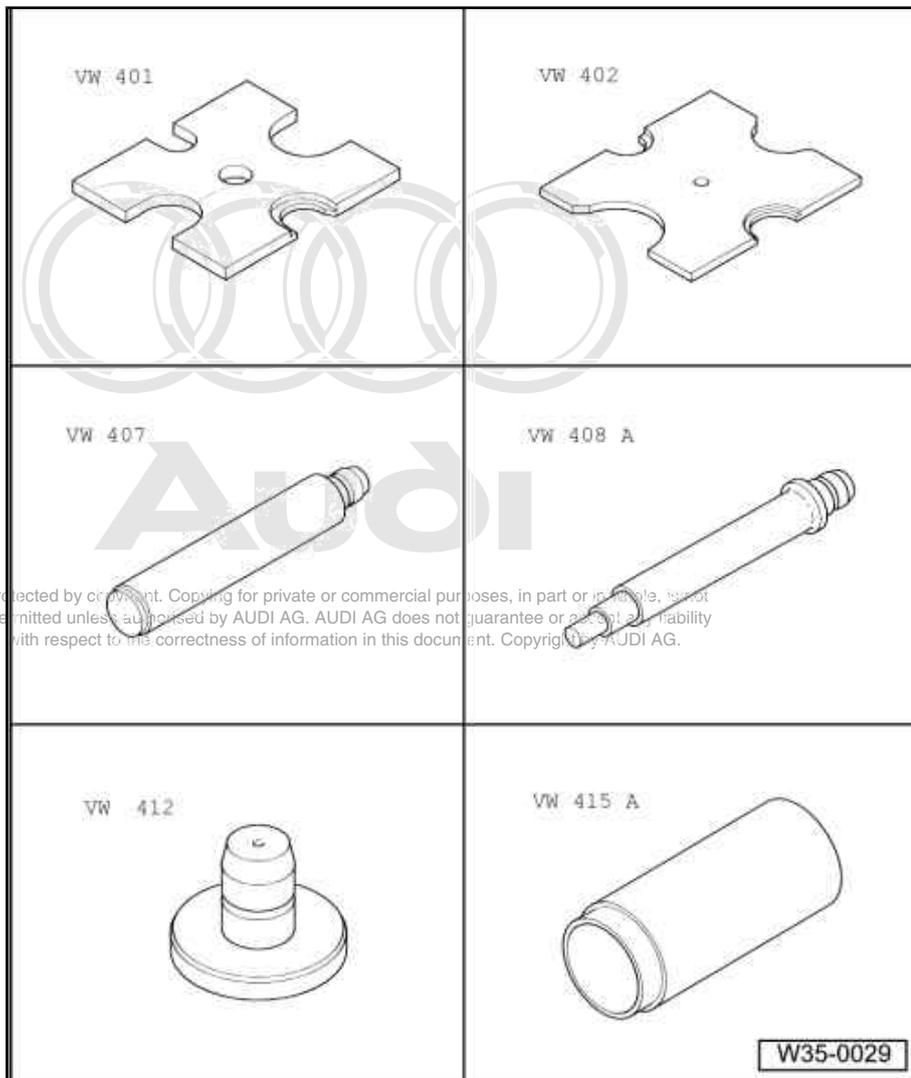




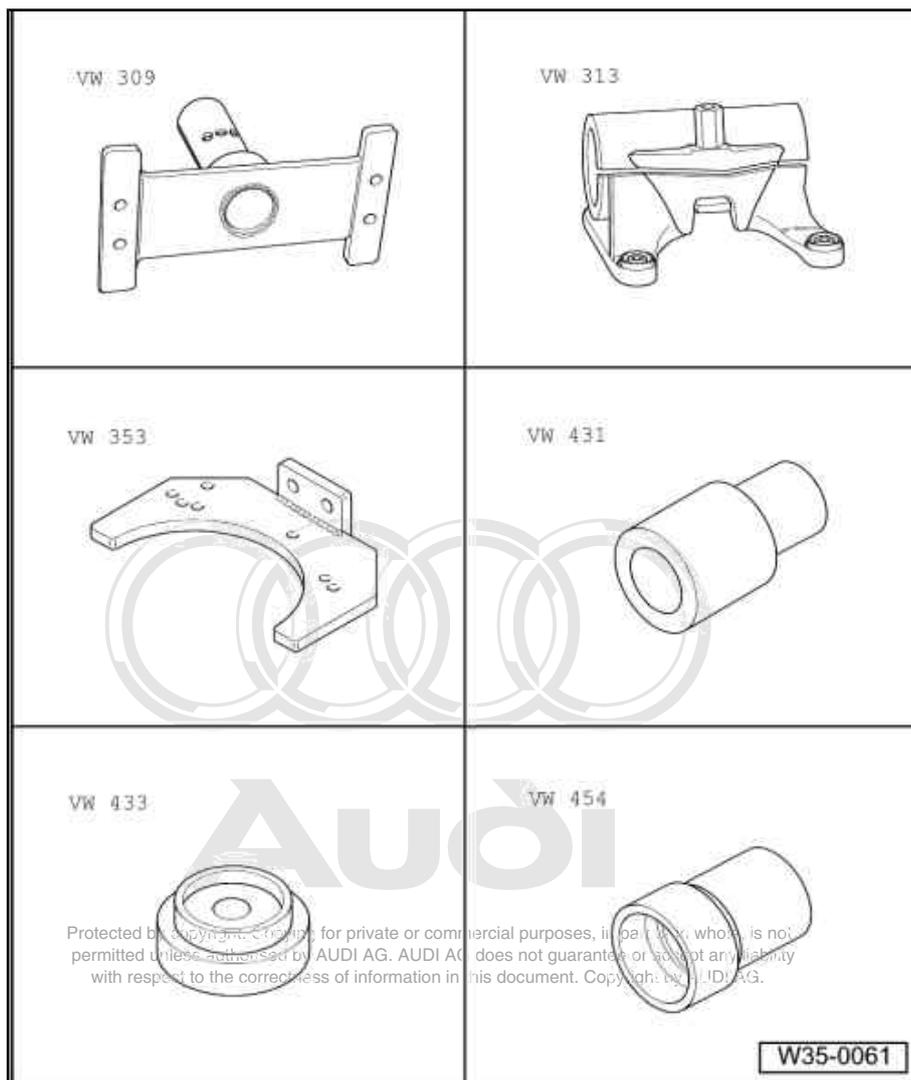
2 Dismantling and assembling output shaft for 1st - 4th gear

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-

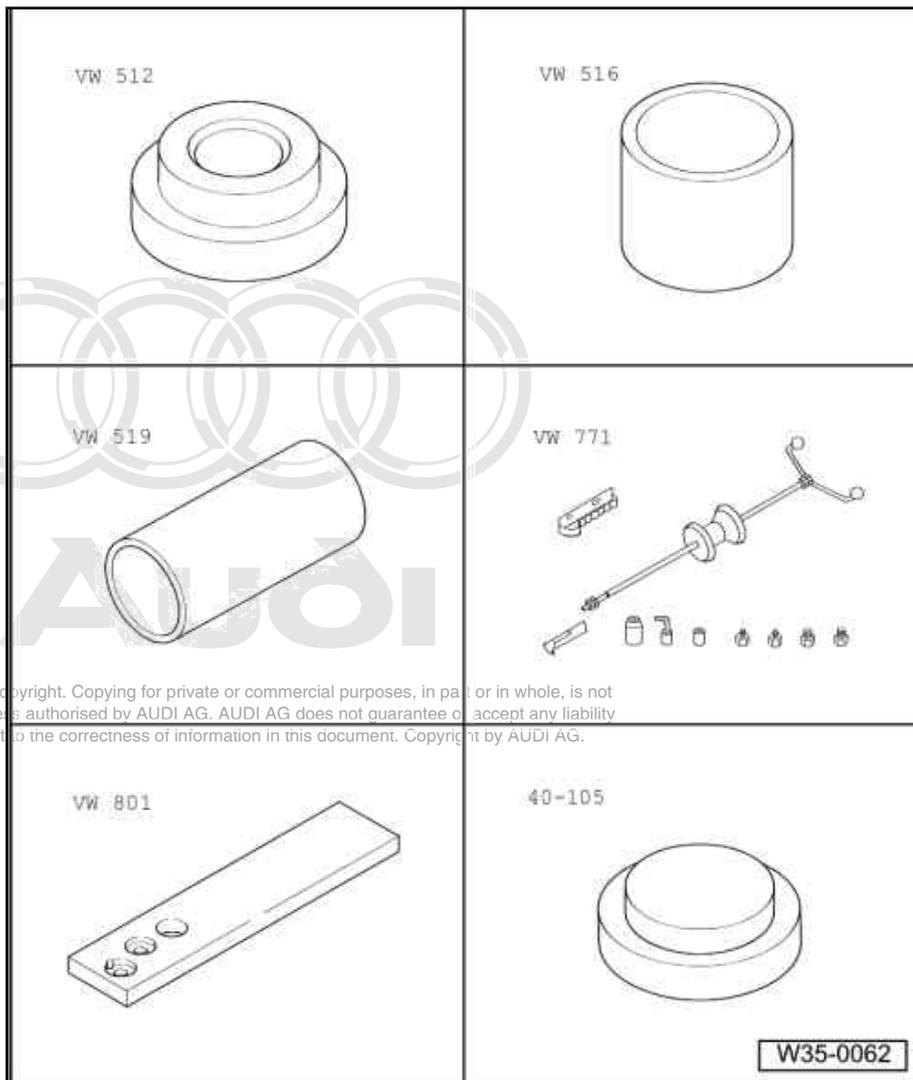


- ◆ Support plate -VW 309-
- ◆ Support clamp -VW 313-
- ◆ Gearbox support -VW 353-
- ◆ Press tool -VW 431-
- ◆ Press tool -VW 433-
- ◆ Press tool -VW 454-



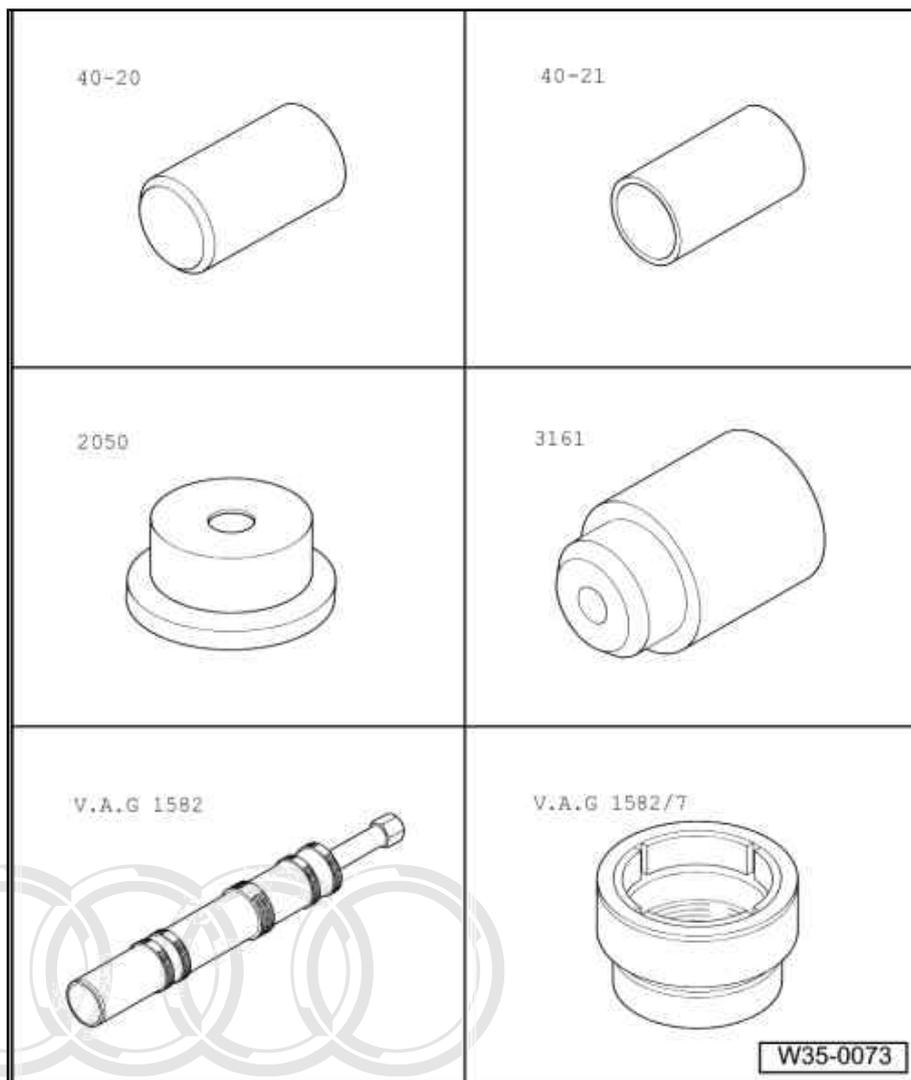


- ◆ Thrust plate -VW 512-
- ◆ Tube -VW 516-
- ◆ Tube -VW 519-
- ◆ Multi-purpose tool -VW 771-
- ◆ Support plate -VW 801-
- ◆ Thrust plate -40-105-



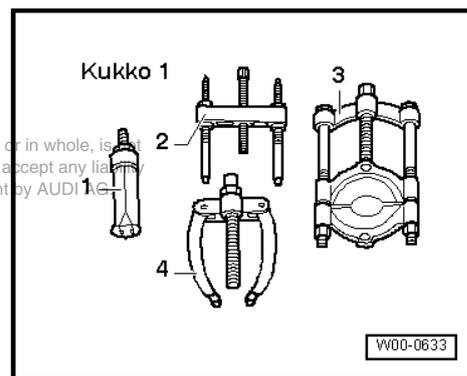
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- ◆ Drift sleeve -40-20-
- ◆ Drift sleeve -40-21-
- ◆ Thrust piece -2050-
- ◆ Extension -3161-
- ◆ Tapered roller bearing puller -V.A.G 1582-
- ◆ Adapter -V.A.G 1582/7-



- ◆ -1- Internal puller -Kukko 21/7- and -Kukko 21/8-
- ◆ -2- Puller -Kukko 18/2-
- ◆ -3- Splitter -Kukko 17/2-
- ◆ -4- Counter-support -Kukko 22/2-

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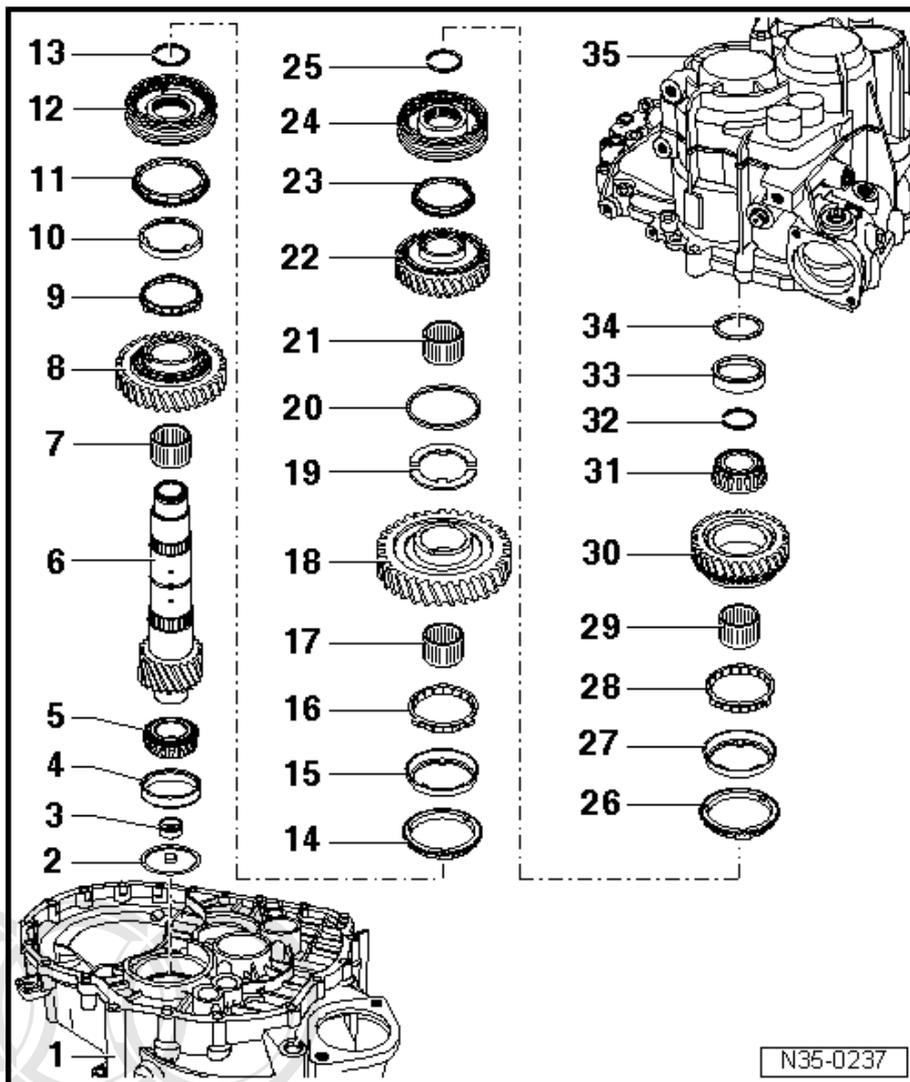


Output shaft for 1st - 4th gear - exploded view of components

Note

- ◆ Refer to technical data ⇒ [page 2](#) when installing new gears or a new output shaft.
- ◆ Adjust output shaft after renewing output shaft or tapered roller bearings ⇒ [page 134](#).

- 1 - Clutch housing
- 2 - Oil deflector plate
- 3 - Dished washer
 - Pulling out ⇒ [page 128](#)
 - Pressing in ⇒ [page 128](#)
- 4 - Tapered roller bearing outer race
 - Pulling out ⇒ [page 128](#)
 - Pressing in ⇒ [page 129](#)
- 5 - Tapered roller bearing inner race
 - Pressing off ⇒ [page 130](#)
 - Pressing on ⇒ [page 130](#)
- 6 - Output shaft
 - For 1st to 4th gear
 - Adjusting ⇒ [page 134](#)
- 7 - Needle bearing
 - For 2nd gear
- 8 - 2nd speed selector gear
- 9 - Synchro-ring
 - Inner ring for 2nd gear
 - Checking for wear ⇒ [page 130](#)
 - Check lugs for scoring
 - Installation position ⇒ [page 131](#)



- 10 - Outer ring for 2nd gear
 - Fit on synchro-ring ⇒ [Item 9 \(page 126\)](#)
 - Renew if scored or if there are visible traces of wear
 - Installation position ⇒ [page 131](#)
- 11 - 2nd gear synchro-ring
 - Checking for wear ⇒ [page 130](#)
 - Installation position ⇒ [page 131](#)

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

- Press off together with bearing mounting ⇒ [page 129](#) after removing circlip ⇒ [Item 13 \(page 126\)](#)
- Dismantling ⇒ [page 131](#)
- Assembling locking collar/synchronising hub ⇒ [page 131](#) and ⇒ [page 131](#)
- Installation position ⇒ [page 131](#)
- Pressing on ⇒ [page 132](#)

13 - Circlip

14 - 1st gear synchro-ring

- Checking for wear ⇒ [page 130](#)
- Assemble so that the recesses engage on the locking pieces on the locking collar ⇒ [Item 12 \(page 126\)](#)

15 - Outer ring for 1st gear

- Insert in synchro-ring ⇒ [Item 14 \(page 126\)](#) ; installation position ⇒ [page 132](#)
- Renew if scored or if there are visible traces of wear

16 - Synchro-ring

- Inner ring for 1st gear
- Checking for wear ⇒ [page 130](#)
- Check lugs for scoring
- Installation position ⇒ [page 132](#)

17 - Needle bearing

- For 1st gear

18 - 1st speed selector gear

- Installation position ⇒ [page 132](#)

19 - Thrust washers

- For 1st and 4th gear
- Insert lugs on thrust washer in hole on output shaft

20 - Washer

- Holds thrust washers ⇒ [Item 19 \(page 127\)](#) in position on output shaft

21 - Needle bearing

- For 4th gear

22 - 4th speed selector gear

23 - 4th gear synchro-ring

- Checking for wear ⇒ [page 133](#)

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

- Pull off together with 4th speed selector gear after removing circlip ⇒ [Item 25 \(page 127\)](#) ⇒ [page 129](#)
- Dismantling ⇒ [page 131](#)
- Installation position: Locking collar/synchronising hub ⇒ [page 133](#)
- Assembling locking collar/synchronising hub ⇒ [page 131](#) and ⇒ [page 131](#)
- Pressing on ⇒ [page 133](#)

25 - Circlip

26 - 3rd gear synchro-ring

- Checking for wear ⇒ [page 130](#)

27 - Outer ring for 3rd gear

- Insert in synchro-ring ⇒ [Item 26 \(page 127\)](#) ; installation position ⇒ [page 132](#)
- Renew if scored or if there are visible traces of wear

28 - Synchro-ring

- Inner ring for 3rd gear
- Checking for wear ⇒ [page 130](#)
- Check lugs for scoring
- Installation position ⇒ [page 132](#)

29 - Needle bearing

- For 3rd gear

30 - 3rd speed selector gear

- Installation position ⇒ [page 132](#)

31 - Tapered roller bearing inner race

- Pulling off ⇒ [page 129](#)
- Pressing on ⇒ [page 133](#)

32 - Circlip

- When tapered roller bearing ⇒ [Item 31 \(page 127\)](#) or output shaft ⇒ [Item 6 \(page 126\)](#) are renewed: determine thickness of required circlip ⇒ [page 134](#)

33 - Tapered roller bearing outer race

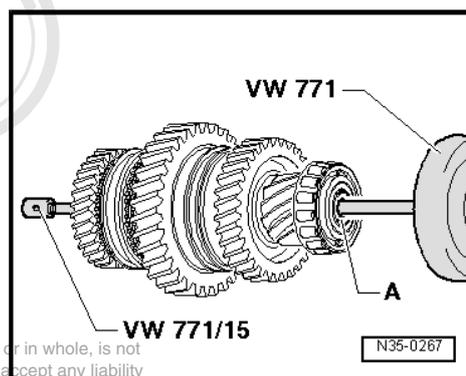
- Pulling out ⇒ [page 134](#)
- Pressing in ⇒ [page 134](#)

34 - Shim

- Determining thickness ⇒ [page 134](#)

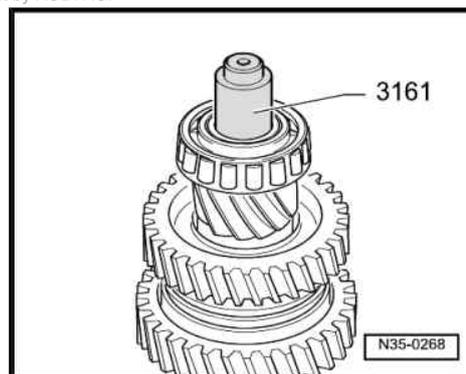
35 - Gearbox housing

Pulling dished washer -A- out of output shaft



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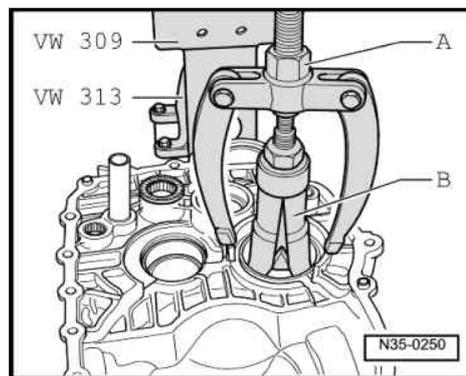
Pressing dished washer into output shaft onto stop



Pulling out tapered roller bearing outer race

A - Counter-support -Kukko 22/2-

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

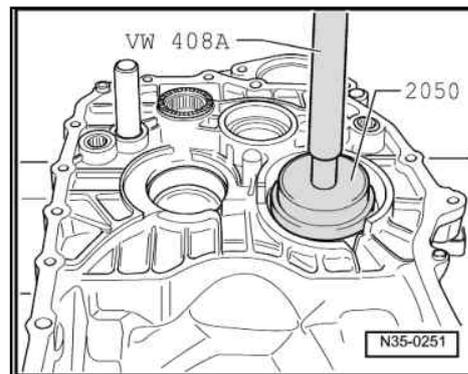


Pressing tapered roller bearing outer race into clutch housing

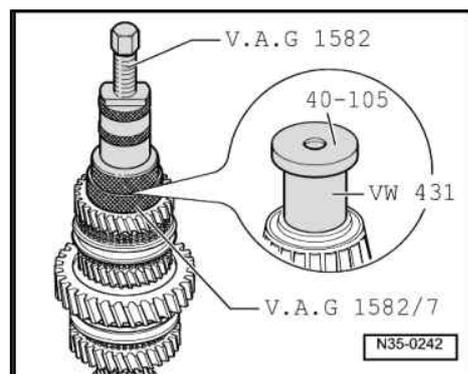
- Place drift sleeve -40-20- directly under bearing mounting to support clutch housing.

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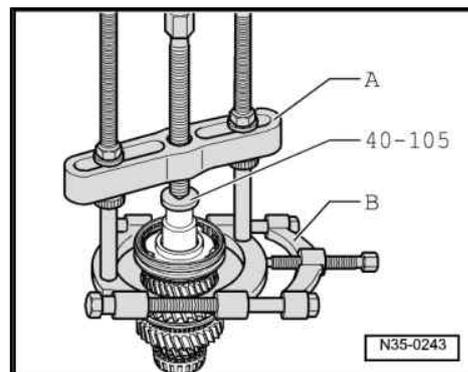
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**Pulling off tapered roller bearing inner race**

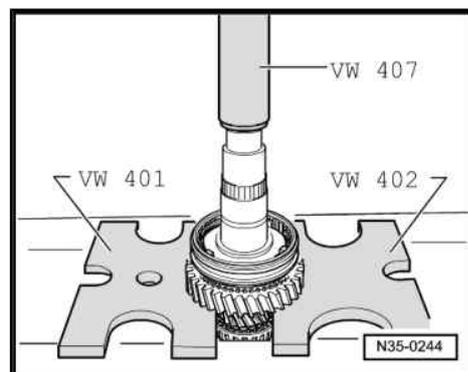
- Before fitting puller, position press tool -VW 431- in output shaft and set thrust plate -40-105- on it.

**Pulling off 3rd and 4th gear synchronising hub/locking collar with 4th speed selector gear**

- First remove circlip.
- A - Puller -Kukko 18/2-
- B - Splitter 22 ... 115 mm -Kukko 17/2-

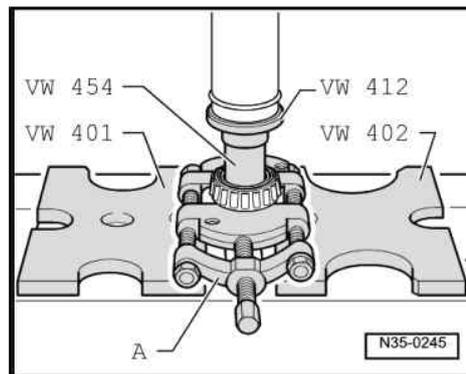
**Pressing off 1st and 2nd gear locking collar and synchronising hub**

- First remove circlip.
- Press off 2nd speed selector gear and locking collar/synchronising hub together.

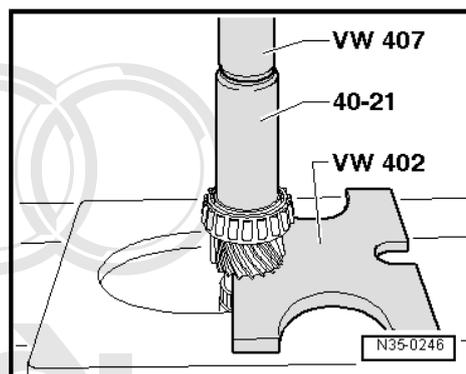


Pressing off tapered roller bearing inner race

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

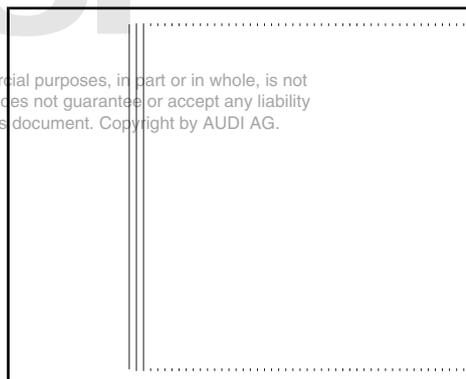


Pressing on tapered roller bearing inner race



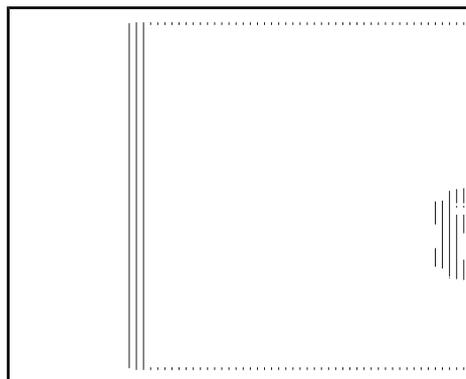
Checking inner ring for 1st, 2nd and 3rd gear for wear

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



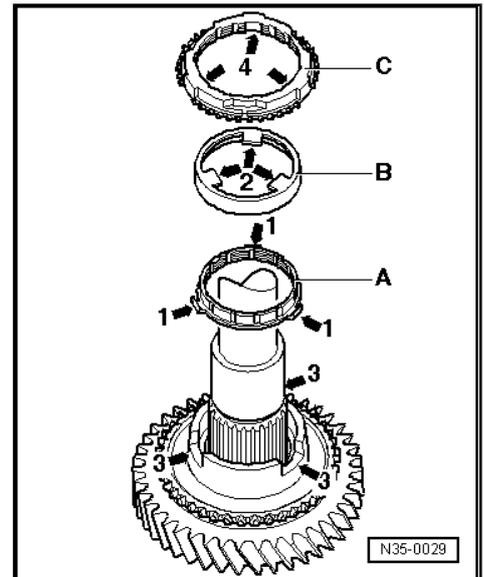
Checking 1st, 2nd and 3rd gear synchro-rings for wear

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

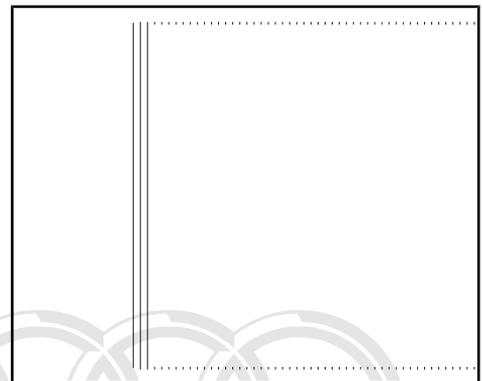


Installation position of outer ring, inner ring and synchro-ring of 2nd gear

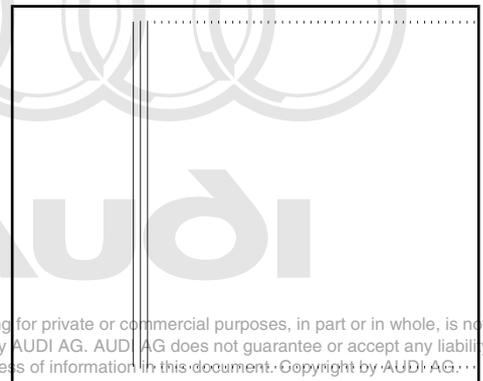
- Place inner ring -A- on 2nd speed selector gear.
- The angled tabs -arrows 1- point towards the outer ring -B-.
- Position outer ring -B- on gear.
- The tabs -arrows 2- lock in the recesses -arrows 3- of the selector gear.
- Position synchro-ring -C- on gear.
- The recesses -arrows 4- locate on the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

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

- 1 - Spring
 - 2 - Locking piece
 - 3 - Locking collar
 - 4 - Synchronising hub
- Slide locking collar onto synchro-hub.
 - Recesses for locking pieces on synchronising hub and locking collar must align.

**Assembling 1st/2nd gear and 3rd/4th gear locking collar/synchronising hub**

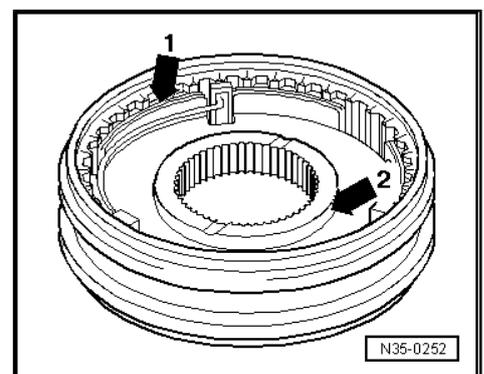
- Locking collar is pushed over synchronising hub.
- Insert locking pieces and install springs 120° off-set.
- Angled end of spring must locate in hollow locking piece.



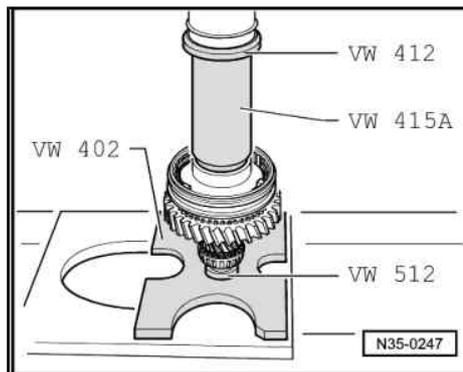
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Installation position of 1st and 2nd gear locking collar/synchronising hub

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

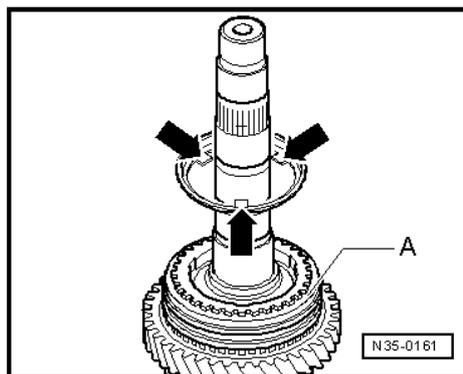


Pressing on 1st and 2nd gear locking collar/synchronising hub



Installation position of 1st or 3rd gear outer ring

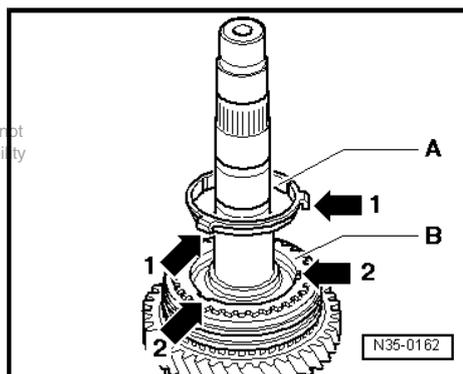
- Lugs -arrows- face towards synchronising hub/locking collar -A-.



Installation position of synchro-ring -A- (inner ring for 1st or 3rd gear)

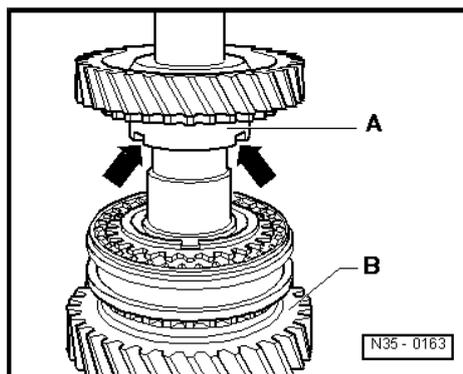
- Lugs -arrows 1- locate in the recesses -arrows 2- in the synchro-ring -B-

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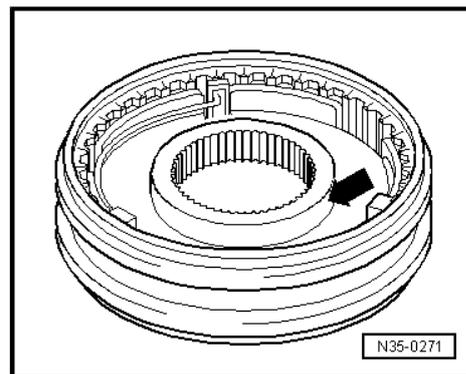
Installation position of 1st and 3rd speed selector gear

- The higher shoulder -A- faces towards 2nd or 4th gear -B-.
- The recesses in the shoulder -arrows- engage on the lugs on the outer ring => [page 132](#) .

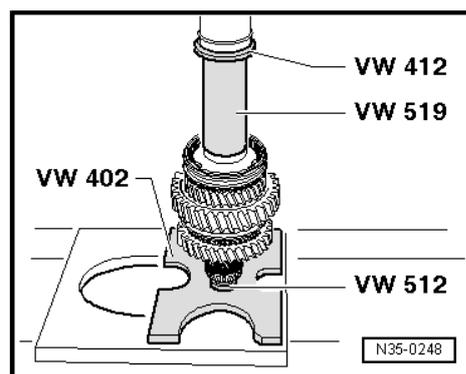


Installation position of 3rd and 4th gear locking collar/synchronising hub

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

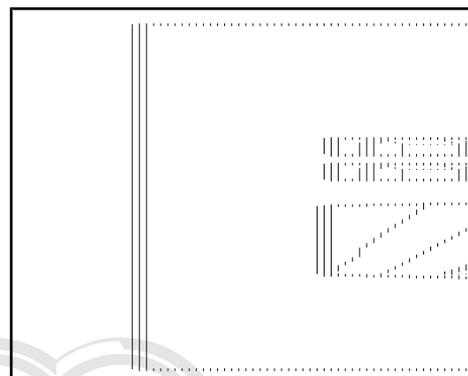


Pressing on 3rd and 4th gear synchronising hub with locking collar



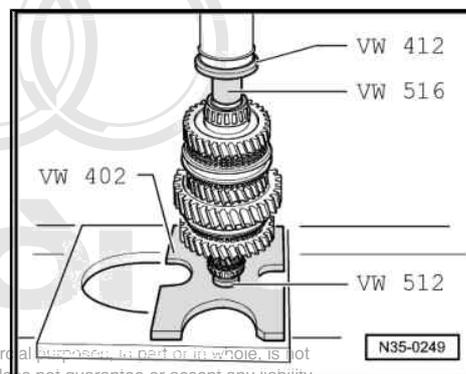
Checking synchro-ring for 4th gear for wear

- Press synchro-ring against tapered seat on selector gear and measure gap -a- using a feeler gauge.
- Specified gap: 1.0 ... 1.7 mm.
- Wear limit 0.5 mm.



Pressing on tapered roller bearing inner race

- Determine required thickness and fit circlip => [page 134](#) .



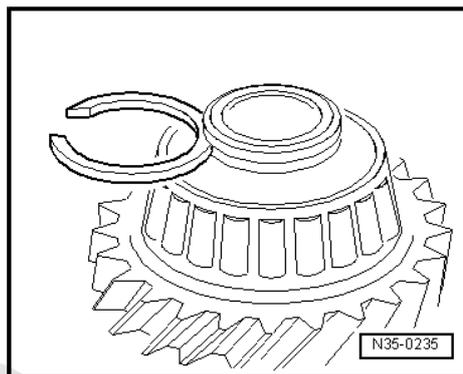
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Determining thickness of circlip

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

Circlips available (in mm) ³⁾		
1.79	1.89	1.98
1.83	1.92	
1.86	1.95	

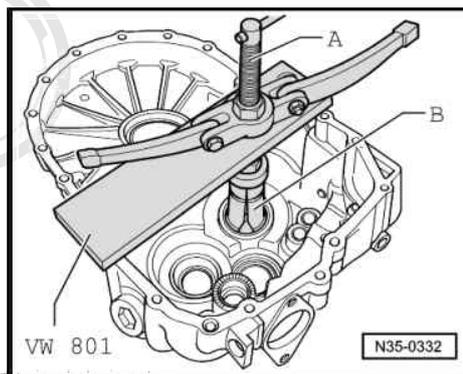
3) Part No.; for allocation refer to => Parts catalogue



Pulling tapered roller bearing outer race out of gearbox housing

A - Counter-support -Kukko 22/2-

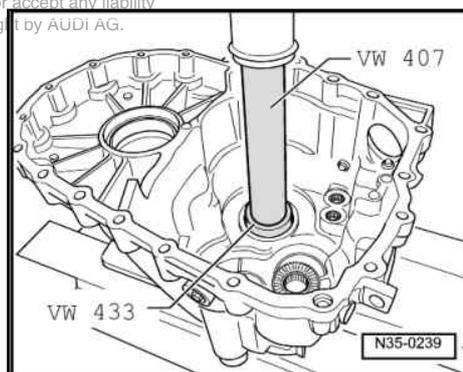
B - Internal puller 46 ... 58 mm -Kukko 21/7-



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Pressing tapered roller bearing outer race into gearbox housing

- First fit shim under outer race.
- Place thrust piece -2050- directly under bearing mounting to support gearbox housing.



2.1 Adjusting output shaft for 1st - 4th gear

(Determining thickness of output shaft shim)

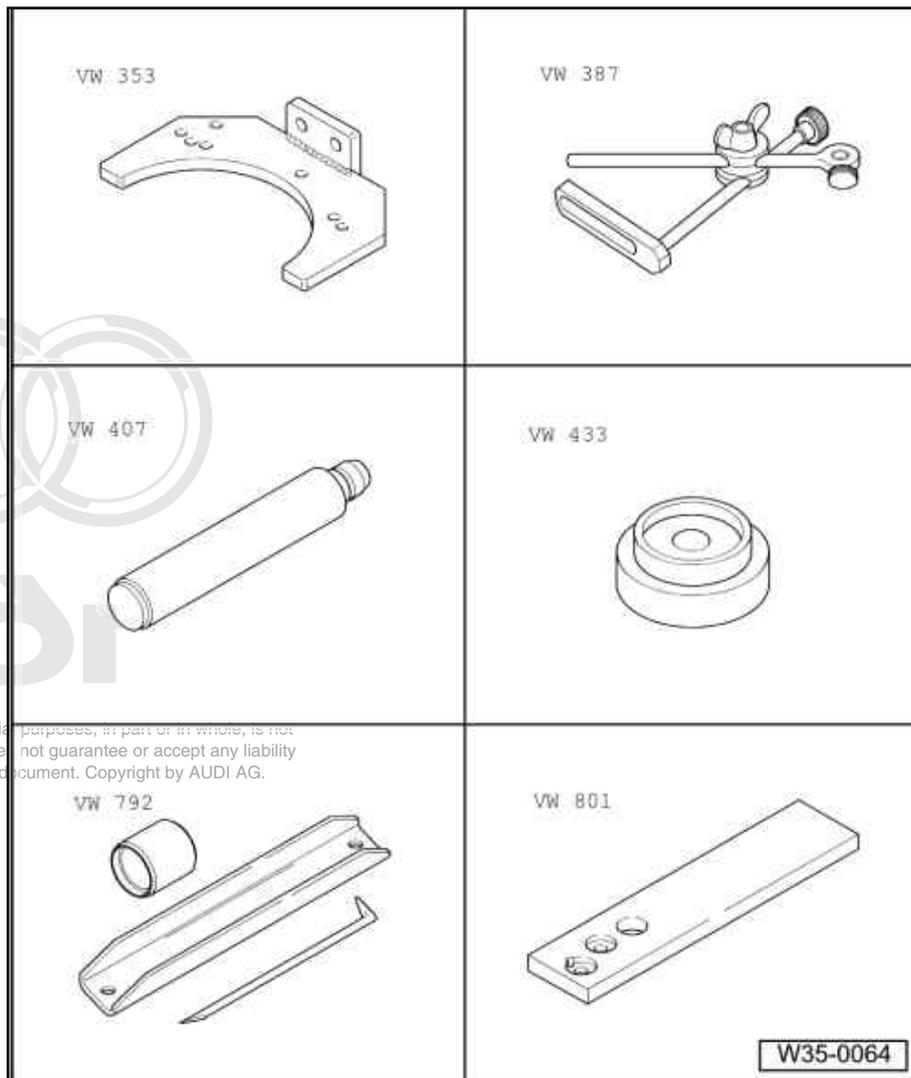
The output shaft must be re-adjusted when the following components are renewed:

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

Table of adjustments => [page 175](#)

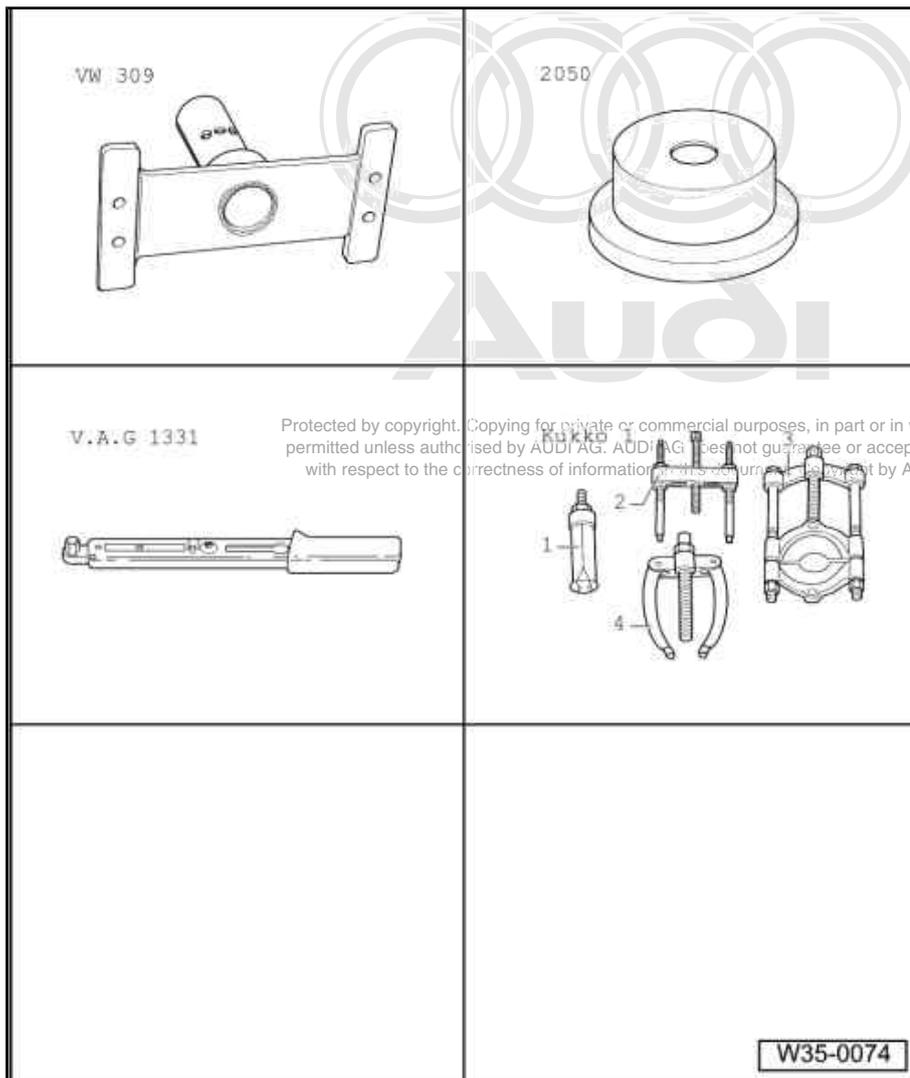
Special tools and workshop equipment required

- ◆ Gearbox support -VW 353-
- ◆ Universal dial gauge bracket -VW 387-
- ◆ Press tool -VW 407-
- ◆ Press tool -VW 433-
- ◆ Assembly tool -VW 792-
- ◆ Support plate -VW 801-



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- ◆ Support plate -VW 309-
- ◆ Thrust piece -2050-
- ◆ Torque wrench -V.A.G 1331-
- ◆ -1- Internal puller -Kukko 21/7-
- ◆ -4- Counter-support -Kukko 22/2-

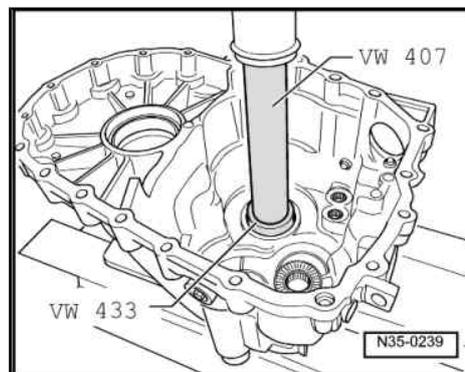


Requirements for adjustment

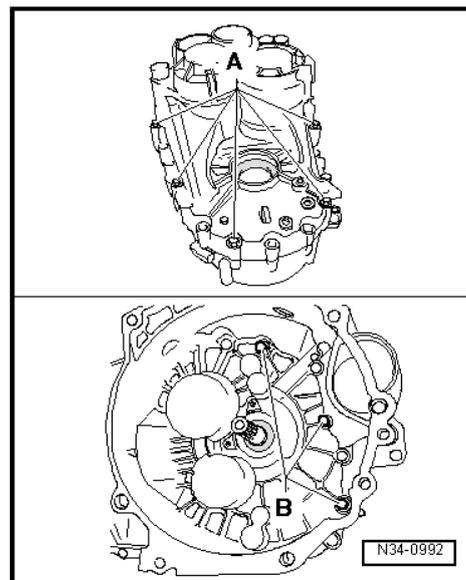
- Sealing surfaces of clutch and gearbox housings must be free of sealant.
- When taking measurements, install only the shaft to be measured.

Procedure

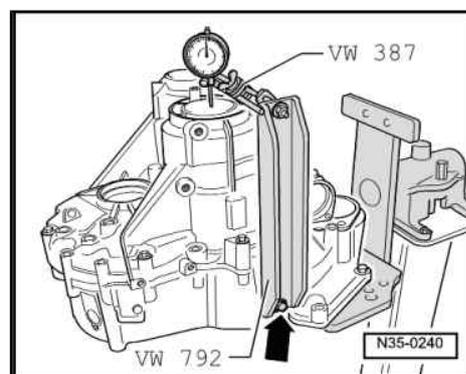
- Press tapered roller bearing outer race with shim (1.70 mm thickness) into gearbox housing. Place thrust piece -2050- directly under bearing mounting to support gearbox housing.
- Now insert complete 1st - 4th gear output shaft in clutch housing.



- Fit gearbox housing and tighten bolts -A- and -B- diagonally to correct torque.



- Fit measuring tools and secure with bolt -arrow- to clutch housing.
- Set dial gauge (3 mm measuring range) to "0" with a preload of 1 mm.
- 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).



i Note

If no play is indicated on dial gauge when clutch housing/gearbox housing securing bolts are loosened, fit a 1.95 mm shim (or if necessary a 2.20 mm shim) for performing the measurement.

Determining thickness of shim

The specified bearing preload is attained by subtracting the measured value (0.14 mm) from the inserted shim (1.70 mm) and adding a constant value for preload (0.20 mm). Example:

Shim installed	1.70 mm
- Measured value	0.14 mm
+ Preload (constant value)	0.20 mm
Thickness of shim	1.76 mm

- Select required shim thickness from following table:

Shims available (in mm) ^{4) 5)}		
1.40	1.70	2.00
1.45	1.75	2.05
1.50	1.80	2.10
1.55	1.85	2.15
1.60	1.90	2.20
1.65	1.95	

4) Part No.; for allocation refer to ⇒ Parts catalogue

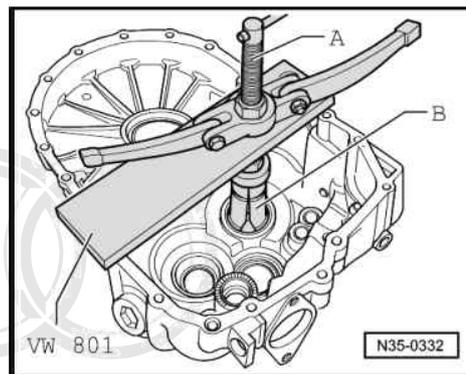
5) Tolerance variations make it possible to obtain the exact shim thickness required.

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

A - Counter-support -Kukko 22/2-

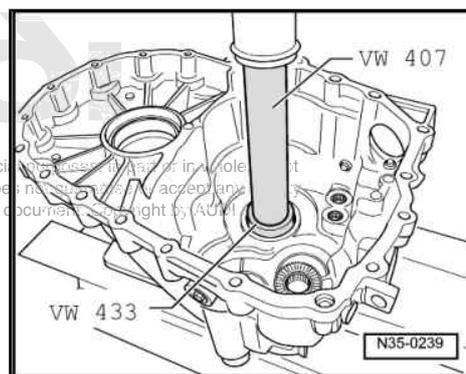
B - Internal puller 46 ... 58 mm -Kukko 21/7-

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



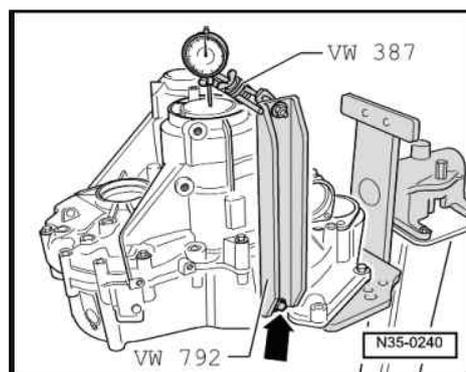
- Press in tapered roller bearing outer race with determined shim (shim in this example: 1.75 mm). Place thrust piece -2050- directly under bearing mounting to support gearbox housing.

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Checking adjustment

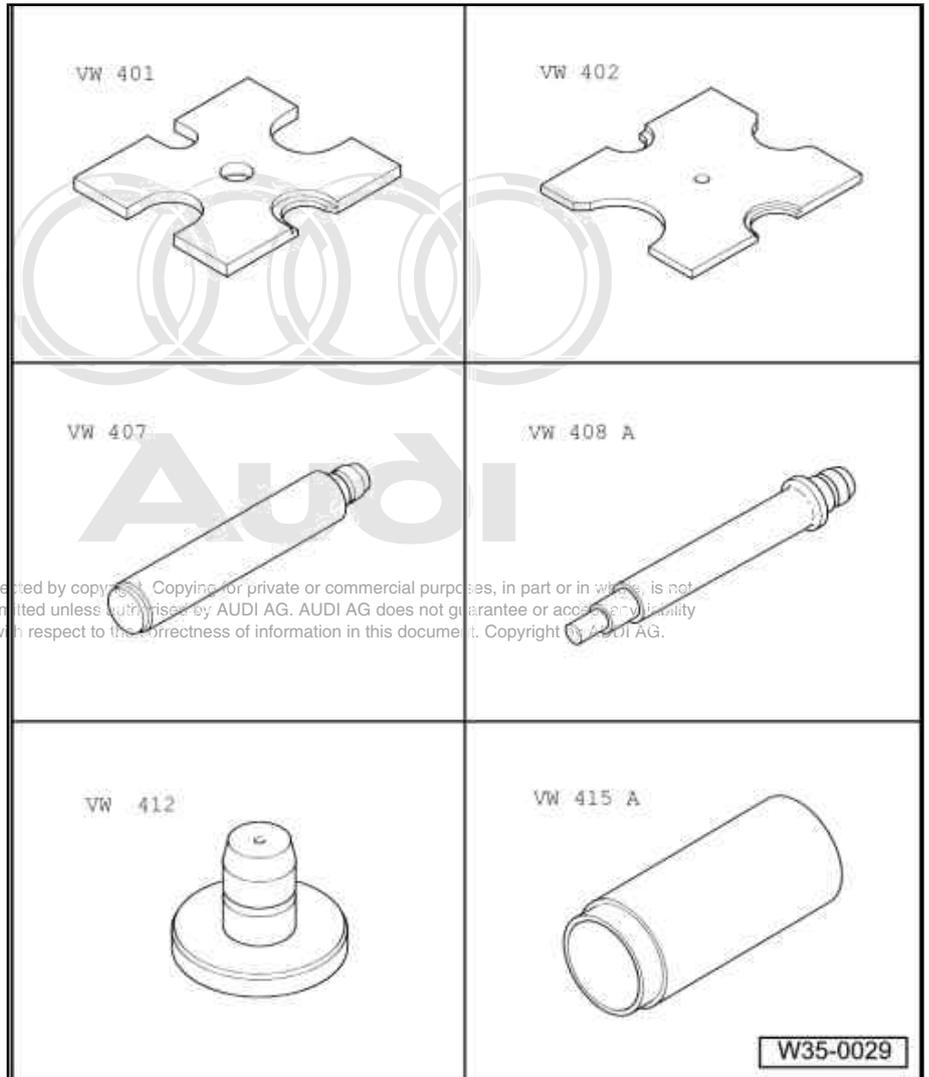
- Required shim installed (thickness as determined above)
- Fit measuring tools and secure with bolt -arrow- to gearbox housing.
- Set dial gauge (3 mm measuring range) to "0" with a preload of 1 mm.
- Loosen clutch housing/gearbox housing securing bolts diagonally until output shaft is free to move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



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

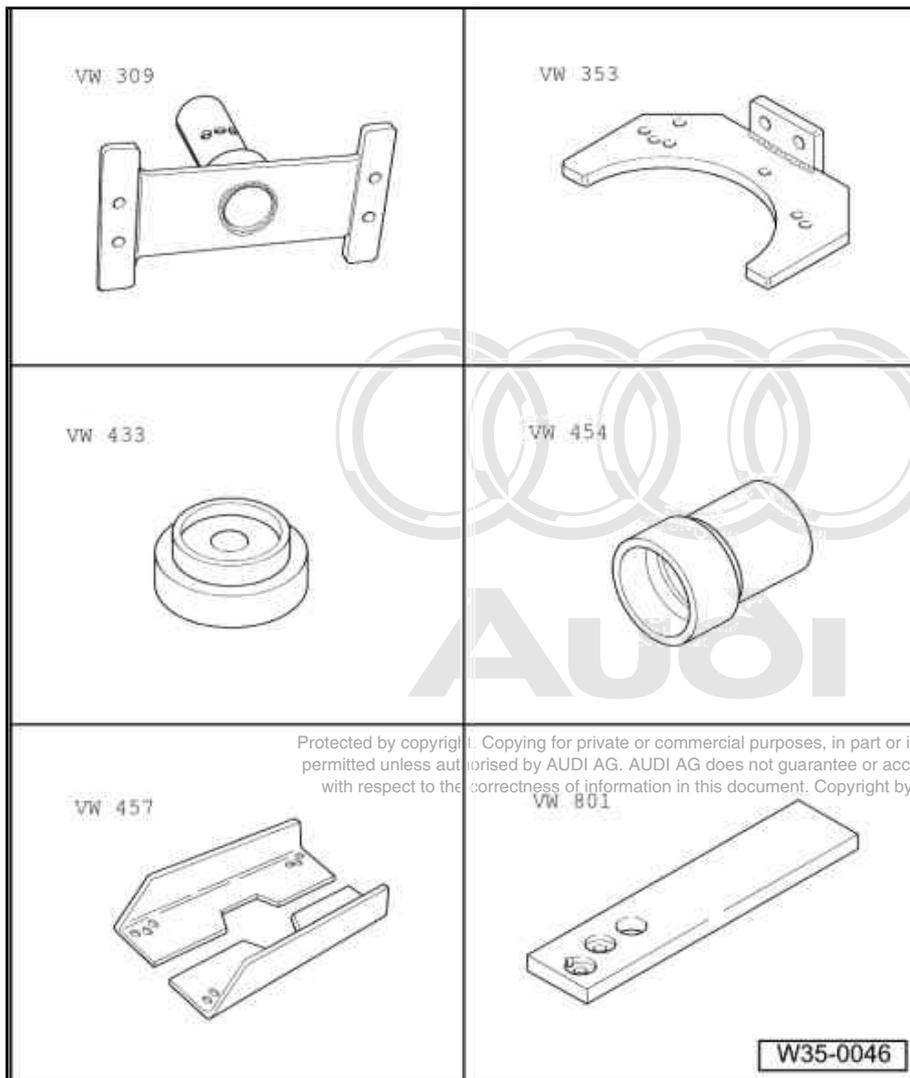
Special tools and workshop equipment required

- ◆ 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-



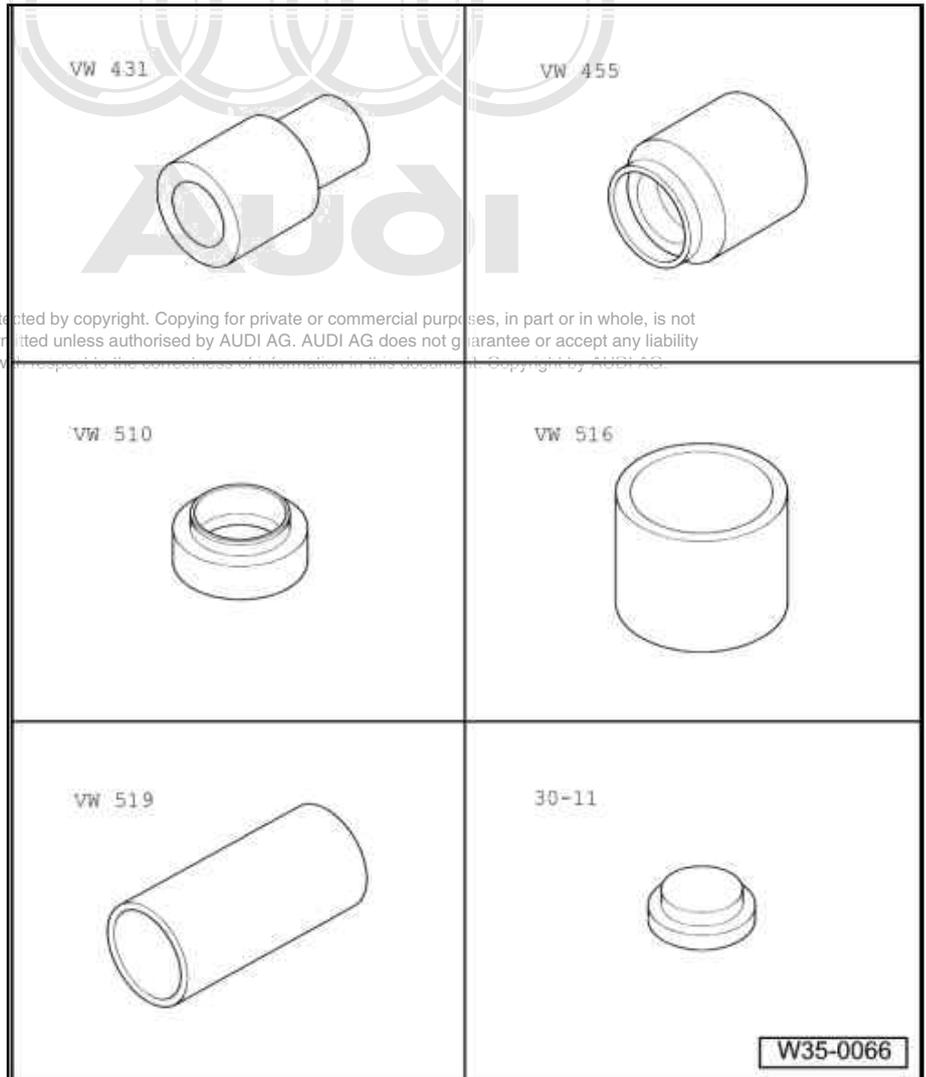


- ◆ Support plate -VW 309-
- ◆ Gearbox support -VW 353-
- ◆ Press tool -VW 433-
- ◆ Press tool -VW 454-
- ◆ Support rails -VW 457-
- ◆ Support plate -VW 801-



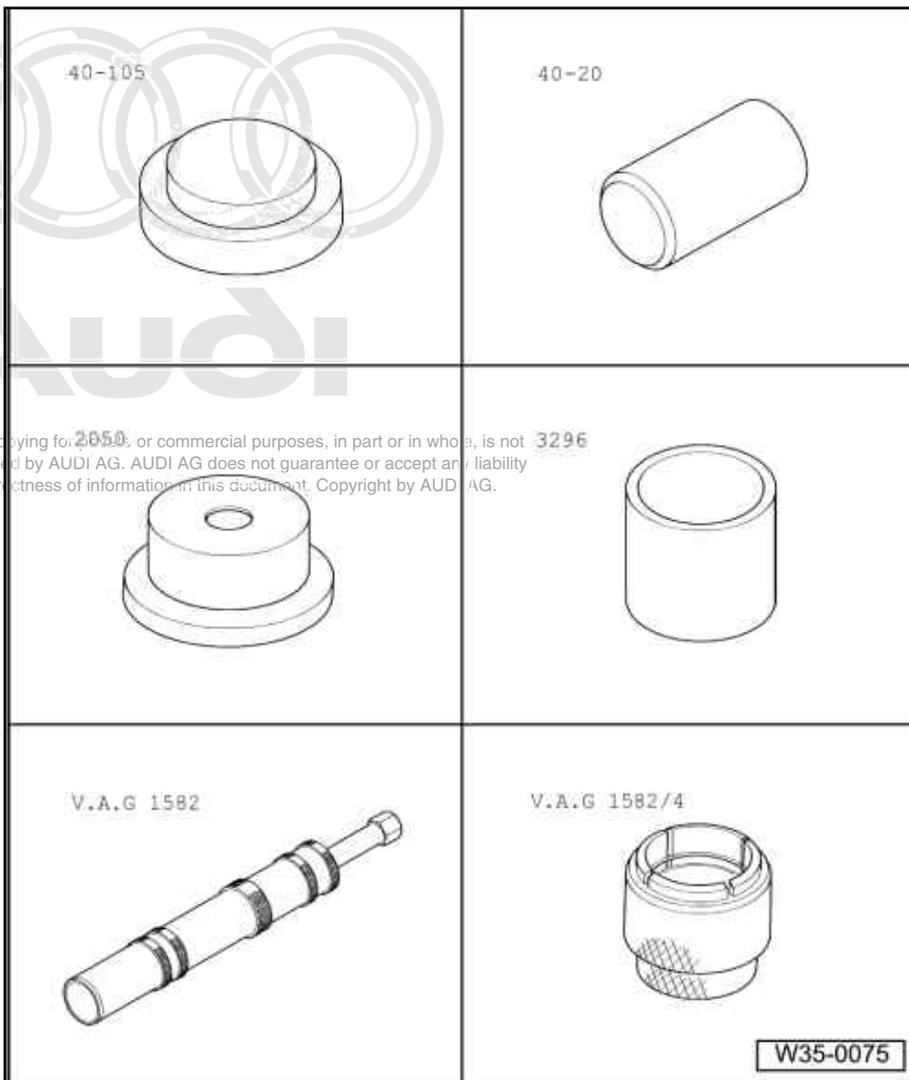
- ◆ Press tool -VW 431-
- ◆ Installing sleeve -VW 455-
- ◆ Thrust plate -VW 510-
- ◆ Tube -VW 516-
- ◆ Tube -VW 519-
- ◆ Thrust plate -30-11-

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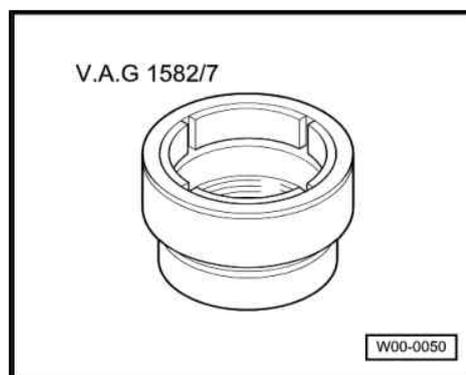


- ◆ Thrust plate -40-105-
- ◆ Drift sleeve -40-20-
- ◆ Thrust piece -2050-
- ◆ Fitting tool -3235-
- ◆ Tube -3296-
- ◆ Tapered roller bearing puller -V.A.G 1582-
- ◆ Adapter -V.A.G 1582/4-

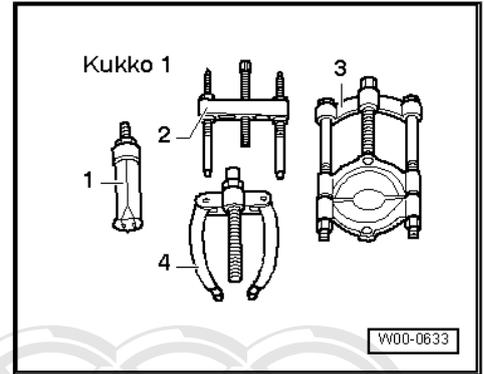
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- ◆ Adapter -V.A.G 1582/7-



- ◆ -1- Internal puller -Kukko 21/7-



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

Output shaft for 5th, 6th and reverse gears - exploded view of components

 **Note**

- ◆ Refer to technical data [⇒ page 2](#) when installing new gears or a new output shaft.
- ◆ Adjust output shaft after renewing output shaft or tapered roller bearings [⇒ page 134](#).

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1 - Clutch housing

2 - Washer

- 0.65 mm thick

3 - Tapered roller bearing outer race

- Pulling out ⇒ [page 145](#)
- Pressing in ⇒ [page 146](#)

4 - Tapered roller bearing inner race

- Pulling off ⇒ [page 147](#)
- Pressing on ⇒ [page 150](#)

5 - Output shaft

- For 5th, 6th and reverse gears
- Adjusting ⇒ [page 151](#)

6 - Reverse gear synchronising hub

- Pressing off ⇒ [page 147](#)
- Installation position ⇒ [page 147](#)
- Pressing on ⇒ [page 148](#)

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 147](#)
- Installation position: Wide shoulder of sleeve faces towards reverse selector gear
- Pressing on ⇒ [page 148](#)

12 - Circlip

13 - Needle bearing

- For 6th gear
- Not in 5-speed gearboxes

14 - 6th speed selector gear

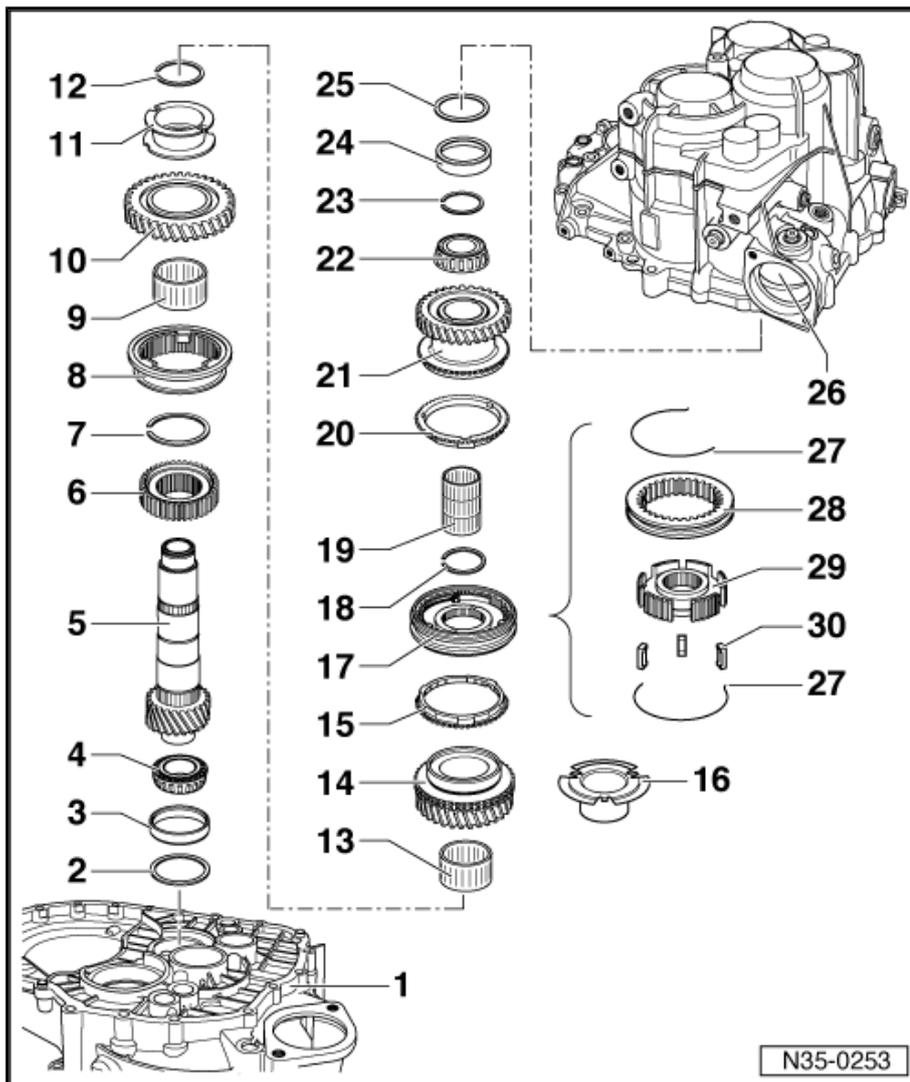
- Not in 5-speed gearboxes

15 - 6th gear synchro-ring

- Not in 5-speed gearboxes
- Checking for wear ⇒ [page 148](#)

16 - Spacer sleeve

- For 5-speed manual gearbox
- After removing circlip, press off together with 5th locking collar/synchronising hub ⇒ [Item 18 \(page 145\)](#) ⇒ [page 146](#)
- Position towards 5th gear locking collar/synchronising hub ⇒ [page 149](#)



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- Press on together with 5th gear locking collar/synchronising hub ⇒ [page 149](#)

17 - Locking collar with synchronising hub for 5th and 6th gear

- After removing circlip ⇒ [Item 18 \(page 145\)](#) , press off together with 6th speed selector gear ⇒ [page 146](#) or for 5-speed manual gearbox, with spacer sleeve ⇒ [page 146](#)
- Dismantling ⇒ [page 148](#)
- Assembling locking collar/synchronising hub ⇒ [page 148](#) and ⇒ [page 149](#)
- Pressing on (6-speed gearbox) ⇒ [page 149](#)
- Pressing on (5-speed gearbox) ⇒ [page 149](#)

18 - Circlip

19 - Needle bearing

- For 5th gear

20 - 5th gear synchro-ring

- Checking for wear ⇒ [page 148](#)

21 - 5th speed selector gear

22 - Tapered roller bearing inner race

- Pulling off ⇒ [page 146](#)
- Pressing on ⇒ [page 150](#)

23 - Circlip

- When tapered roller bearing ⇒ [Item 22 \(page 145\)](#) or output shaft ⇒ [Item 5 \(page 144\)](#) are renewed: determine thickness of required circlip ⇒ [page 150](#)

24 - Tapered roller bearing outer race

- Pulling out ⇒ [page 150](#)
- Pressing in ⇒ [page 151](#)

25 - Shim

- Determining thickness ⇒ [page 151](#)

26 - Gearbox housing

27 - Spring

- Installation position ⇒ [page 149](#)

28 - Locking collar

29 - Synchronising hub

30 - Locking pieces

- 3 x
- Installation position ⇒ [page 148](#)

Pulling out tapered roller bearing outer race

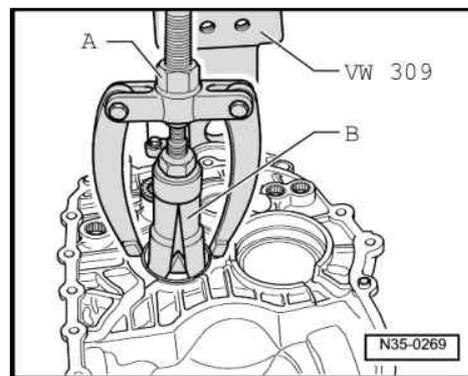
A - Counter-support -Kukko 22/2-

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



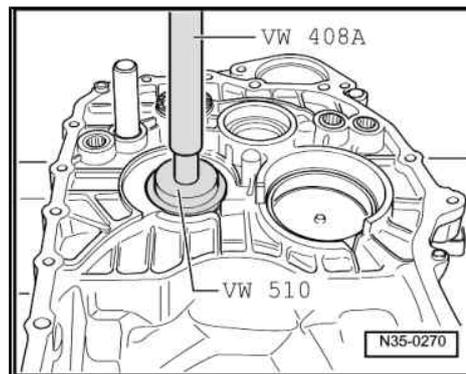
Note

After pulling out, check washer for damage and renew if necessary.



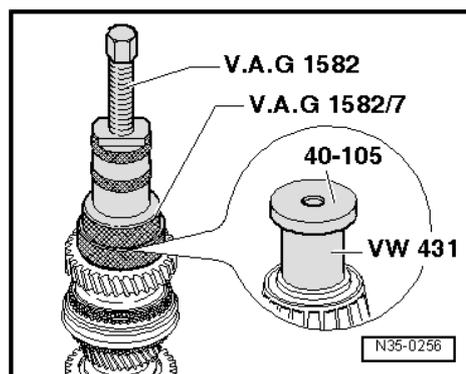
Pressing tapered roller bearing outer race into clutch housing

- First fit washer under outer race.
- Place drift sleeve -40-20- directly under bearing mounting to support clutch housing.



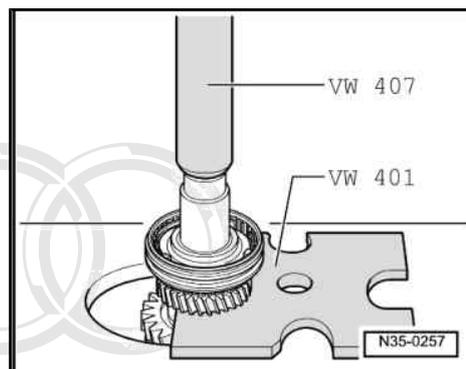
Pulling off tapered roller bearing inner race

- First remove circlip.
- Before applying puller, place press tool -VW 431- and thrust plate -40-105- on output shaft.



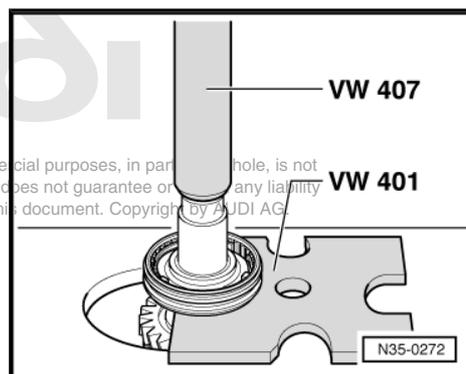
Pressing off 5th and 6th gear synchronising hub/locking collar with 6th speed selector gear

- First remove circlip.



Pressing off 5th gear synchronising hub/locking collar with spacer sleeve

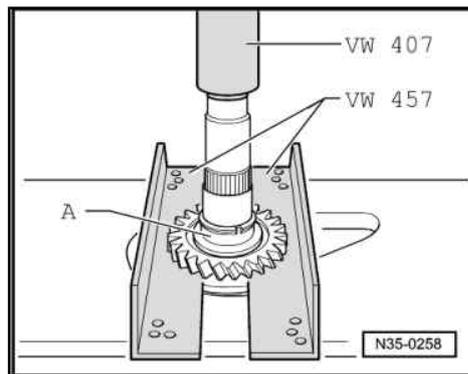
- First remove circlip.



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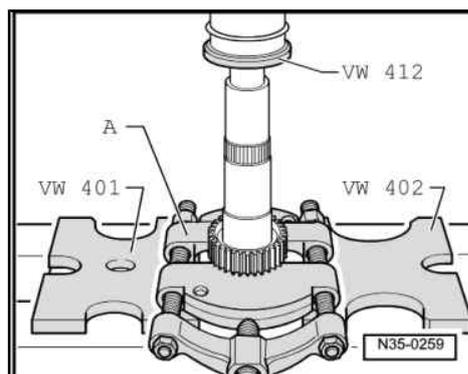
Pressing off sleeve with reverse selector gear

- First remove circlip before pressing off sleeve -A-



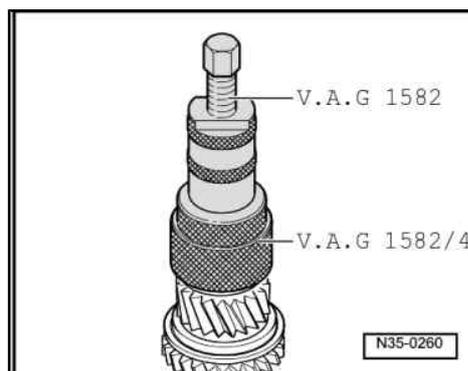
Pressing off reverse gear synchronising hub

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



Pulling off tapered roller bearing inner race

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

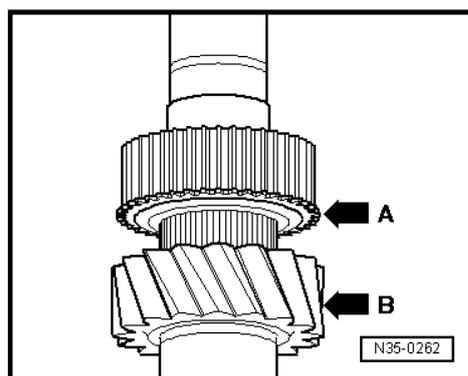


Installation position of reverse gear synchronising hub

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



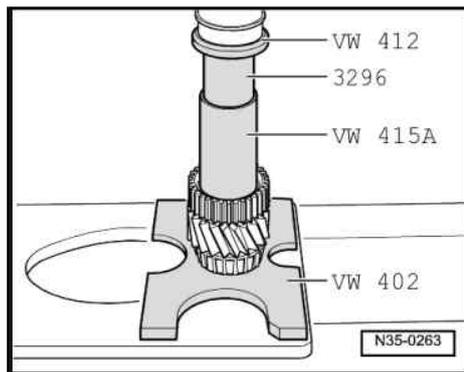
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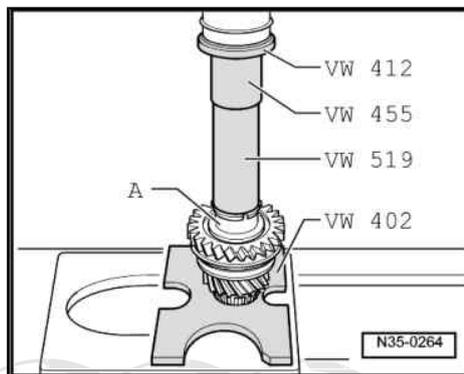
Pressing on reverse gear synchronising hub

- Fit circlip after pressing on.



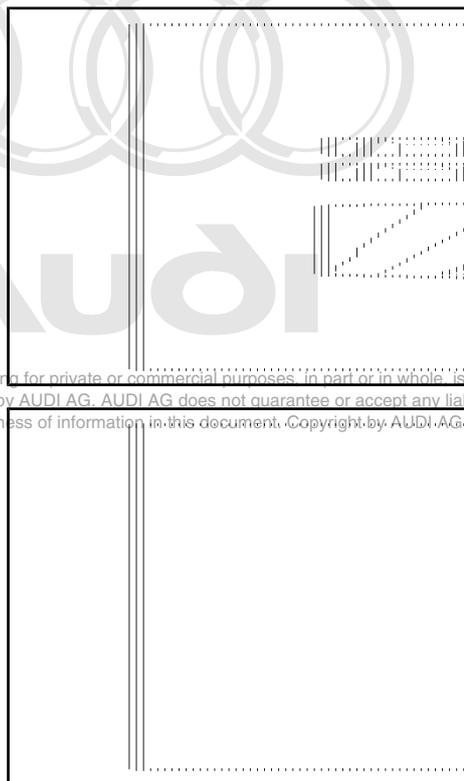
Pressing on sleeve

- Installation position: Wide shoulder faces towards reverse selector gear
- Install circlip after pressing on sleeve -A-.



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

- Press synchro-ring against tapered seat on selector gear and measure gap -a- using a feeler gauge.
- Specified gap: 1.0 ... 1.7 mm.
- Wear limit 0.5 mm.



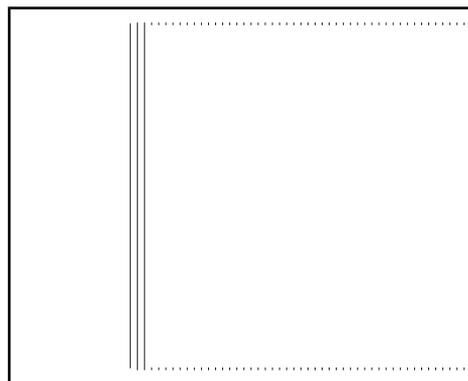
Dismantling and assembling 5th and 6th gear locking collar and synchronising hub

- 1 - Spring
 - 2 - Locking piece
 - 3 - Locking collar
 - 4 - Synchronising hub
- Slide locking collar onto synchro-hub.
 - Recesses for locking pieces on synchronising hub and locking collar must align.

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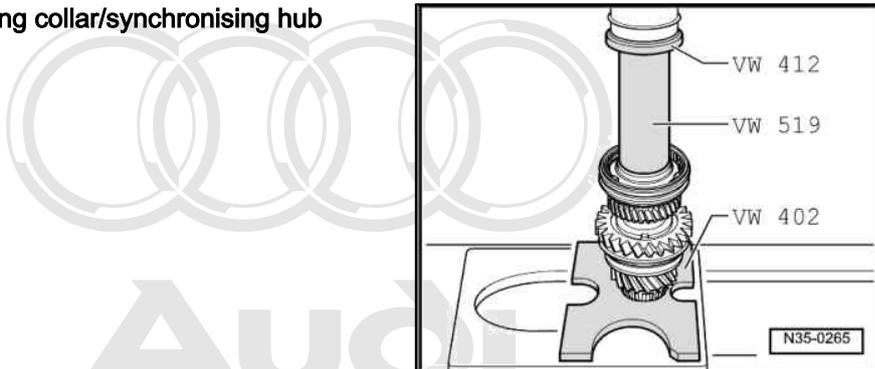
Assembling 5th and 6th gear locking collar/synchronising hub

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



Pressing on 5th and 6th gear locking collar/synchronising hub

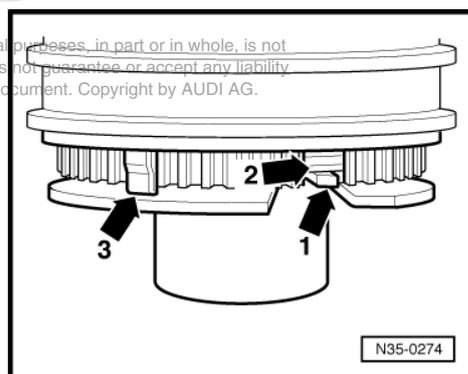
- Fit circlip after pressing on.



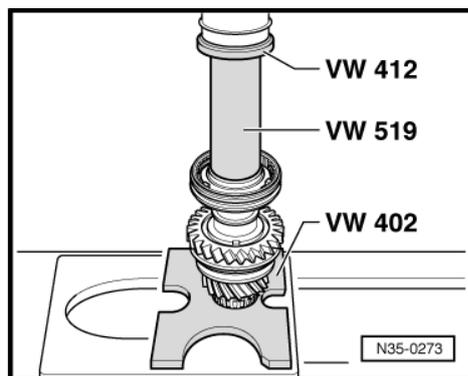
Positioning spacer sleeve towards 5th gear locking collar/synchronising hub

- Lugs -arrow 1- of spacer sleeve must line up with recesses in synchronising hub -arrow 2-.
- Locking pieces -arrow 3- must rest on collar of spacer sleeve.

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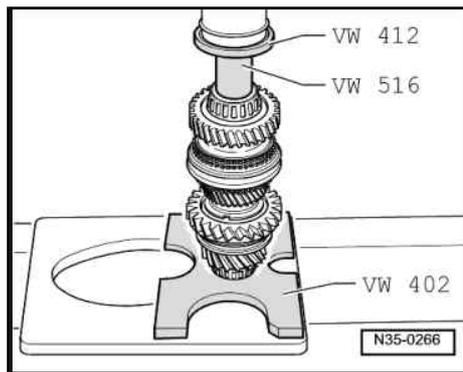


Pressing on 5th gear locking collar/synchronising hub together with spacer sleeve



Pressing on tapered roller bearing inner race

- Determine required thickness and fit circlip => [page 150](#) .

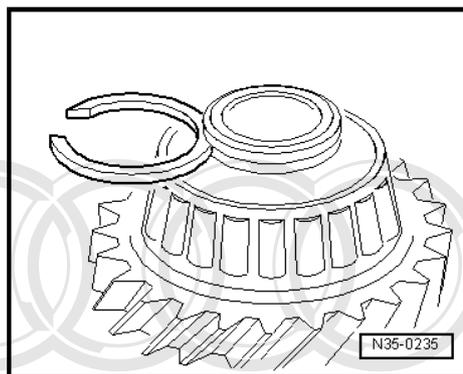


Determining thickness of circlip

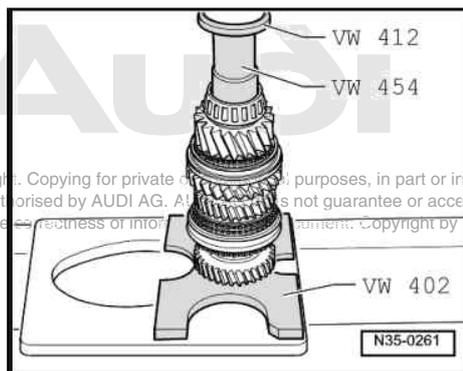
- Determine the thickest circlip which will just fit and install it.

Circlips available (in mm) ⁶⁾		
1.79	1.89	1.98
1.83	1.92	
1.86	1.95	

6) Part No.; for allocation refer to => Parts catalogue



Pressing on tapered roller bearing inner race

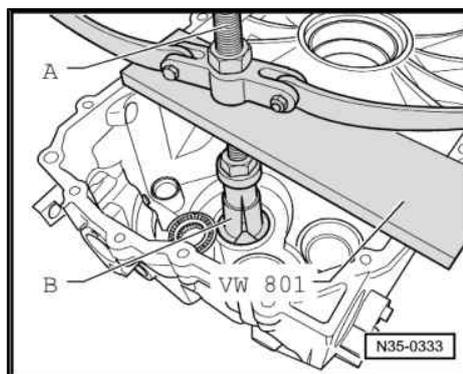


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Pulling tapered roller bearing outer race out of gearbox housing

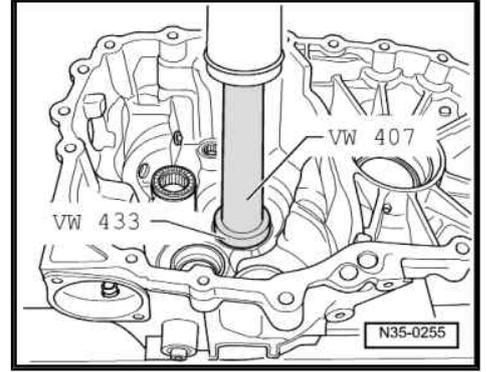
A - Counter-support -Kukko 22/2-

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



Pressing tapered roller bearing outer race into gearbox housing

- Place thrust piece -2050- directly under bearing mounting to support gearbox housing.



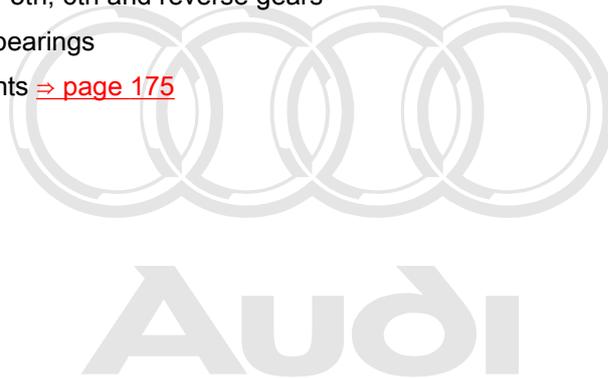
3.1 Adjusting output shaft for 5th, 6th and reverse gear

(Determining thickness of output shaft shim)

The output shaft must be re-adjusted when the following components are renewed:

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

Table of adjustments => [page 175](#)



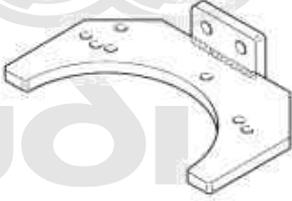
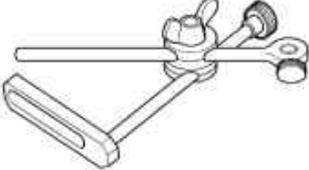
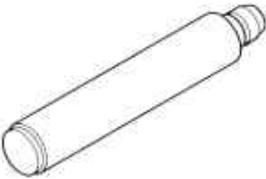
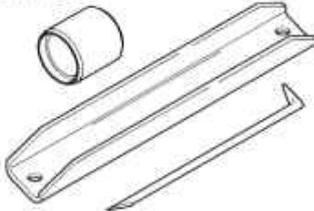
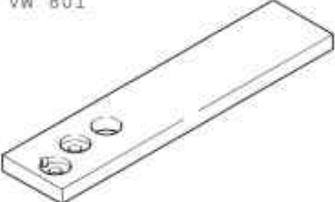
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Special tools and workshop equipment required

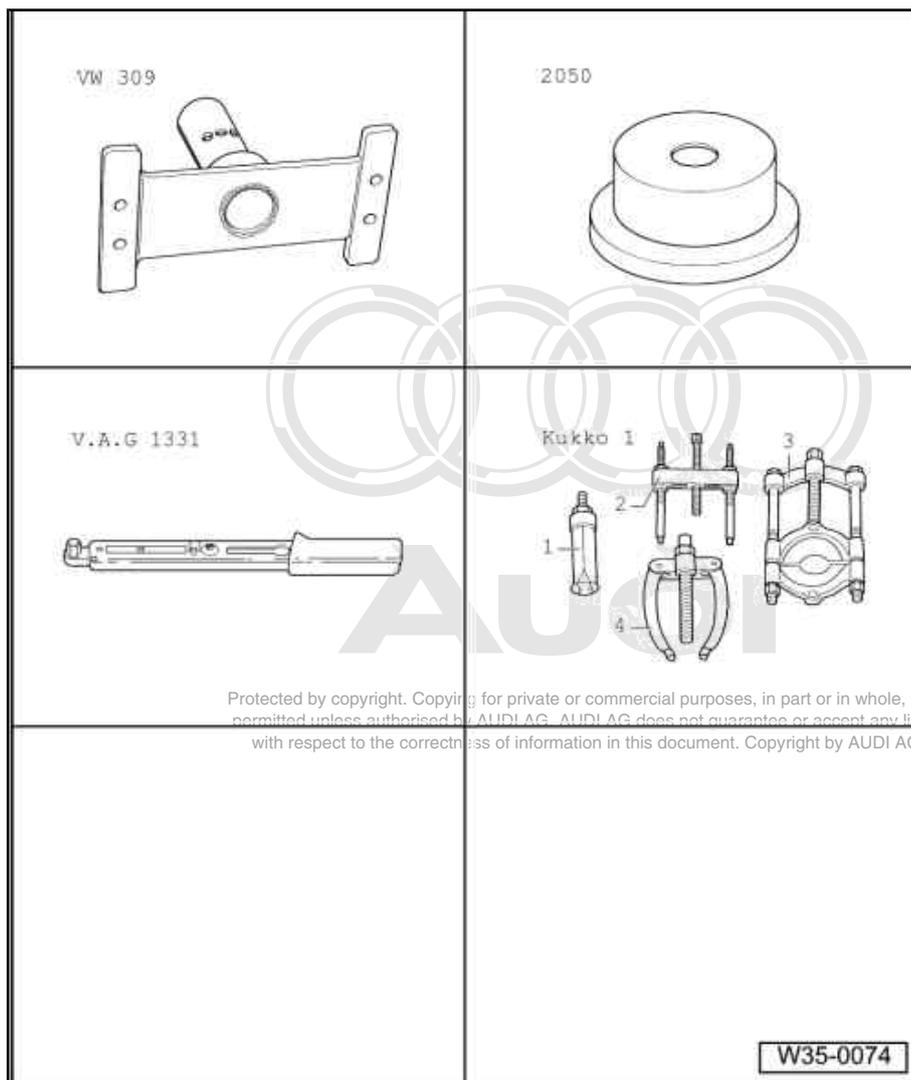
- ◆ Gearbox support -VW 353-
- ◆ Universal dial gauge bracket -VW 387-
- ◆ Press tool -VW 407-
- ◆ Press tool -VW 433-
- ◆ Assembly tool -VW 792-
- ◆ Support plate -VW 801-

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<p>VW 353</p> 	<p>VW 387</p> 
<p>VW 407</p> 	<p>VW 433</p> 
<p>VW 792</p> 	<p>VW 801</p> 

W35-0064

- ◆ Support plate -VW 309-
- ◆ Thrust piece -2050-
- ◆ Torque wrench -V.A.G 1331-
- ◆ -1- Internal puller -Kukko 21/7-
- ◆ -4- Counter-support -Kukko 22/2-

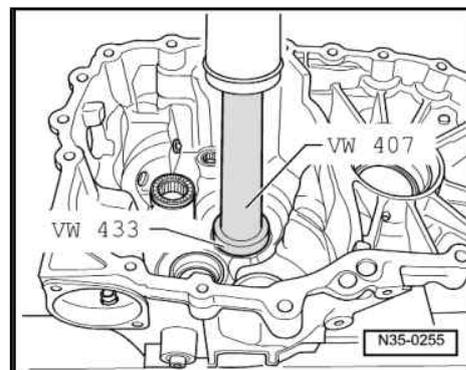


Requirements for adjustment

- Sealing surfaces of clutch and gearbox housings must be free of sealant.
- When taking measurements, install only the shaft to be measured.

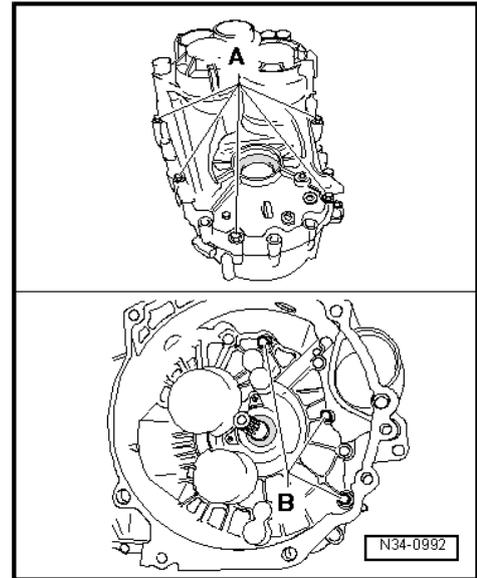
Procedure

- Press tapered roller bearing outer race with shim (1.70 mm thickness) into gearbox housing. Place thrust piece -2050- directly under bearing mounting to support gearbox housing.
- Now insert complete 5th/6th/reverse gear output shaft in clutch housing.





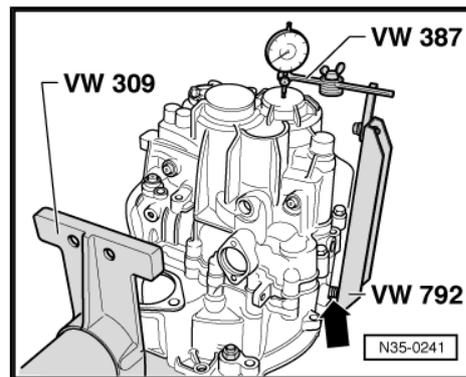
- Fit gearbox housing and tighten bolts -A- and -B- diagonally to correct torque.



Audi

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- Fit measuring tools. Put washers of a total thickness of 8 mm on bolt -arrow- securing assembly tool -VW 792- to clutch housing.
- Set dial gauge (3 mm measuring range) to "0" with a preload of 1 mm.
- 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: 0.27 mm).



i Note

If no play is indicated on dial gauge when clutch housing/gearbox housing securing bolts are loosened, fit a 1.95 mm shim (or if necessary a 2.20 mm shim) for performing the measurement.

Determining thickness of shim

The specified bearing preload is attained by subtracting the measured value (0.27 mm) from the inserted shim (1.70 mm) and adding a constant value for preload (0.20 mm). Example:

Shim installed	1.70 mm
- Measured value	0.27 mm
+ Preload (constant value)	0.20 mm
Thickness of shim	1.63 mm

- Select required shim thickness from following table.

Shims available (in mm) ^{7) 8)}		
1.40	1.70	2.00
1.45	1.75	2.05
1.50	1.80	2.10
1.55	1.85	2.15
1.60	1.90	
1.65	1.95	

7) Part No.; for allocation refer to ⇒ Parts catalogue

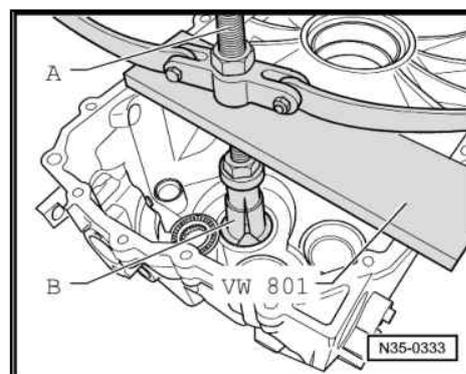
8) Tolerance variations make it possible to obtain the exact shim thickness required.

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

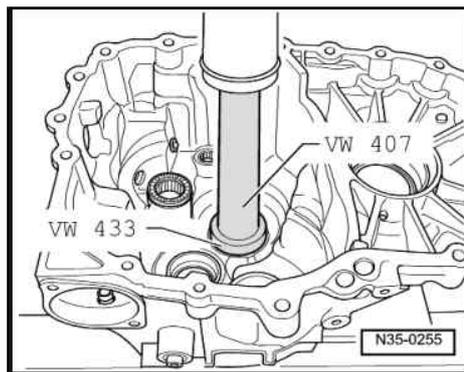
A - Counter-support -Kukko 22/2-

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

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

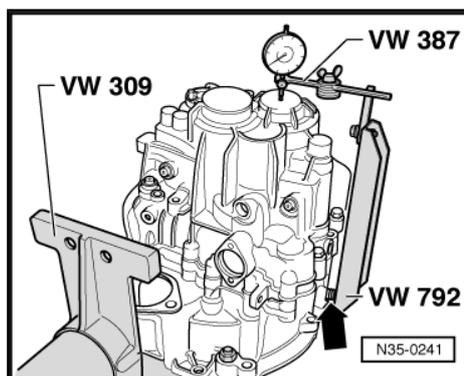


- Press in tapered roller bearing outer race with determined shim (shim in this example: 1.65 mm). Place thrust piece -2050- directly under bearing mounting to support gearbox housing.



Checking adjustment

- Required shim installed (thickness as determined above)
- Fit measuring tools. Put washers of a total thickness of 8 mm on bolt -arrow- securing assembly tool -VW 792- to clutch housing.
- Set dial gauge (3 mm measuring range) to “0” with a preload of 1 mm.
- 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 between 0.15 and 0.25 mm.



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39 – Final drive - front differential

1 Renewing oil seals

Renewing flange shaft oil seal (left-side) ⇒ [page 157](#)

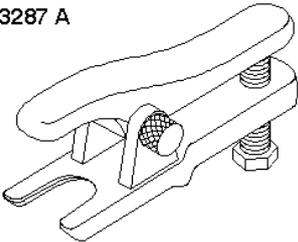
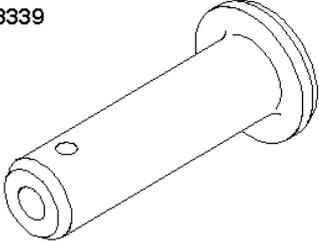
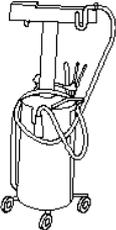
Renewing flange shaft oil seal (right-side) ⇒ [page 159](#)

Renewing oil seal for bevel box output flange ⇒ [page 163](#)

1.1 Renewing flange shaft oil seal (left-side)

Special tools and workshop equipment required

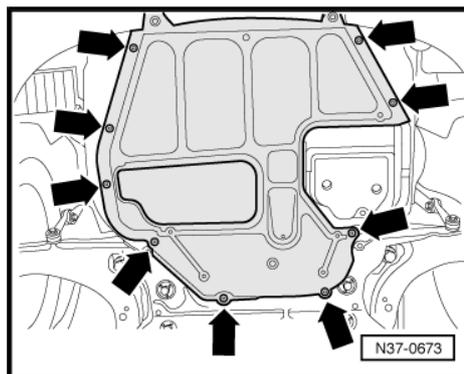
- ◆ Ball joint puller -3287 A-
- ◆ Thrust piece -3339-
- ◆ Used oil collection and extraction unit -V.A.G 1782-

<p>3287 A</p> 	<p>3339</p> 
<p>V.A.G 1782</p> 	
	<p>G39-0116</p>

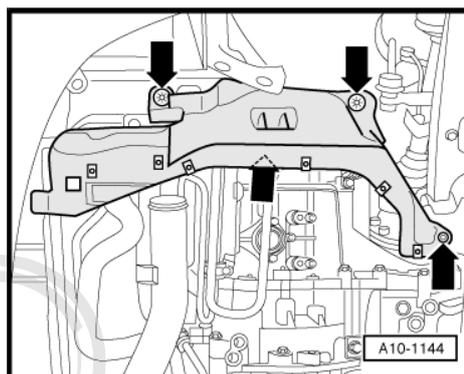
Procedure

- Gearbox installed

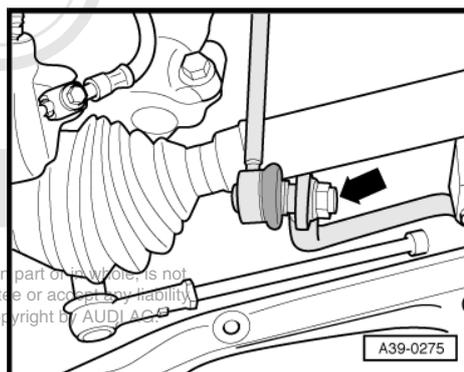
- Remove centre noise insulation -arrows-.



- Remove noise insulation (left-side) -arrows-.



- Unscrew nut -arrow- for coupling rod on anti-roll bar (left-side).

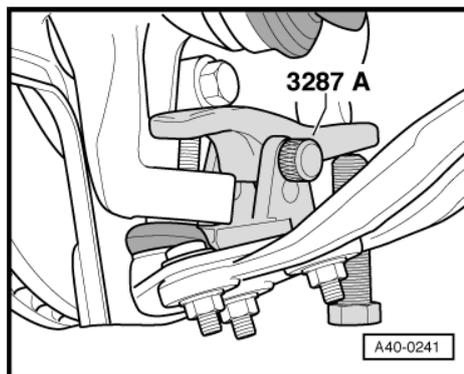


- Unscrew nut (top) from swivel joint (left-side).
- Position ball joint puller -3287 A- as shown in illustration and pull off swivel joint.

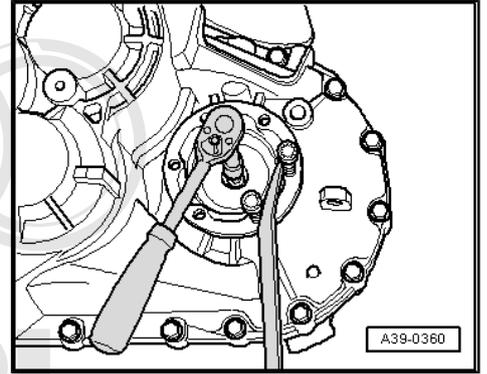
**Note**

To protect thread, leave nut screwed several turns onto ball joint.

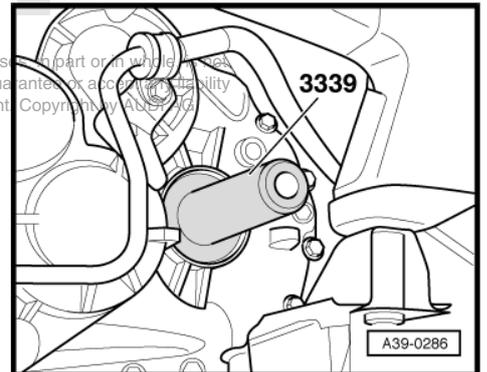
- Turn steering wheel to the right.
- Unbolt drive shaft (left-side) from gearbox flange shaft.
- Lift drive shaft (left-side) and secure with wire.



- Place used oil collection and extraction unit -V.A.G 1782- below gearbox.
- Remove countersunk bolt for left flange shaft; to do so, screw two bolts into flange and counterhold flange shaft with tyre iron or other suitable lever.
- Pull out flange shaft with spring.
- Pry out oil seal using lever.



- Drive in new oil seal as far as stop using thrust piece -3339- (keep oil seal straight while installing).
- Pack space between sealing lip and dust lip half-full with sealing grease -G 052 128 A1-.
- Push flange shaft against spring pressure and secure using countersunk bolt.
- Bolt drive shaft (left-side) to gearbox flange shaft ⇒ Running gear, front-wheel drive and four-wheel drive; Rep. Gr. 40 .
- Install swivel joint and coupling rod ⇒ Running gear, front-wheel drive and four-wheel drive; Rep. Gr. 40 .
- Fill up gear oil in manual gearbox with bevel box ⇒ [page 82](#) .
- Install noise insulation panels ⇒ General body repairs, exterior; Rep. Gr. 50 .



Tightening torque

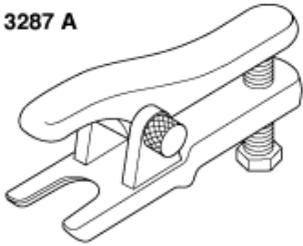
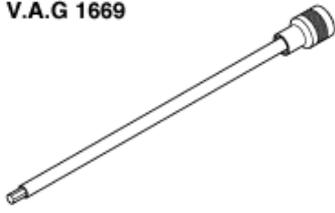
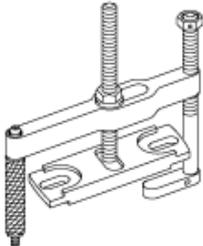
Component	Nm
Flange shaft to gearbox (countersunk bolt)	25

1.2 Renewing flange shaft oil seal (right-side)



Special tools and workshop equipment required

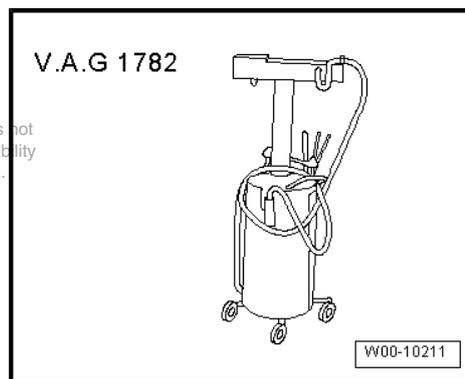
- ◆ Ball joint puller -3287 A-
- ◆ Hexagon key -V.A.G 1669-
- ◆ Puller -T10037-
- ◆ Thrust piece -T10049-

<p>3287 A</p> 	<p>V.A.G 1669</p> 
<p>T10037</p> 	<p>T10049</p> 
	<p>G39-0037</p>

Special tools and workshop equipment required

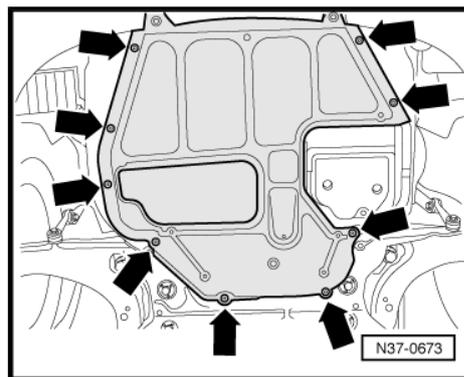
- ◆ Used oil collection and extraction unit -V.A.G 1782-

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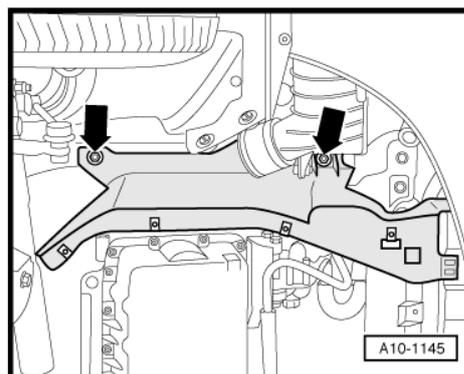


Procedure

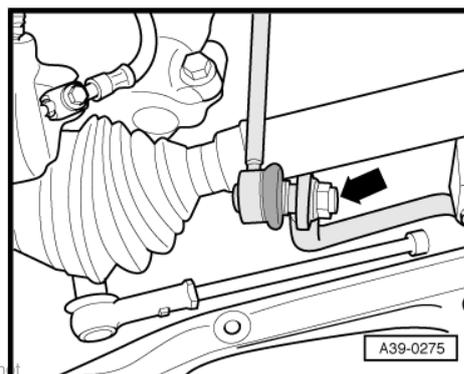
- Remove centre noise insulation -arrows-.



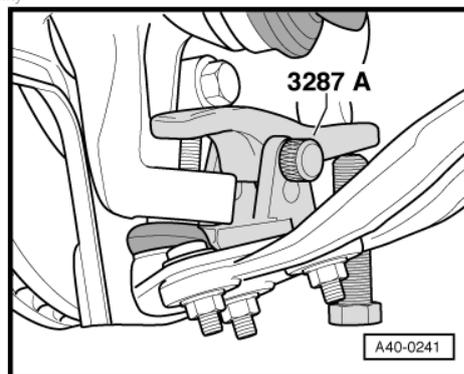
- Remove noise insulation (right-side) -arrows-.



- Unscrew nut -arrow- for coupling rod on anti-roll bar (right-side).



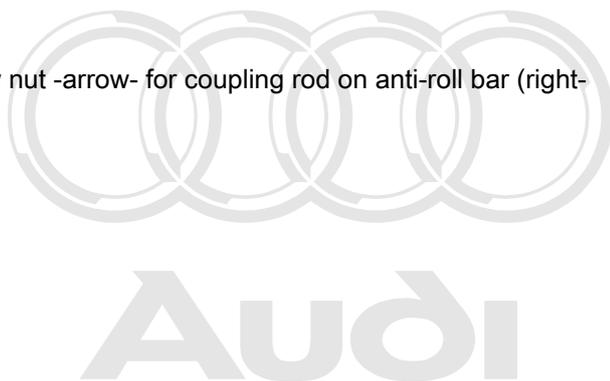
- Unscrew nut (top) from swivel joint (right-side).
- Position ball joint puller -3287 A- as shown in illustration and pull off swivel joint.



i Note

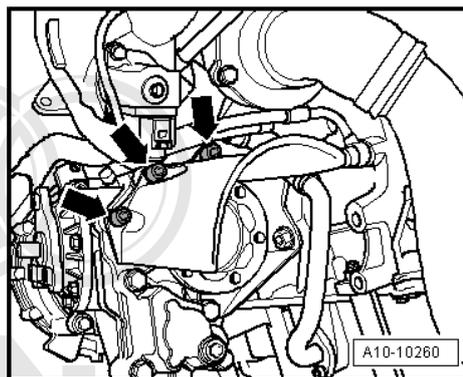
To protect thread, leave nut screwed several turns onto ball joint.

- Turn steering wheel to the left.

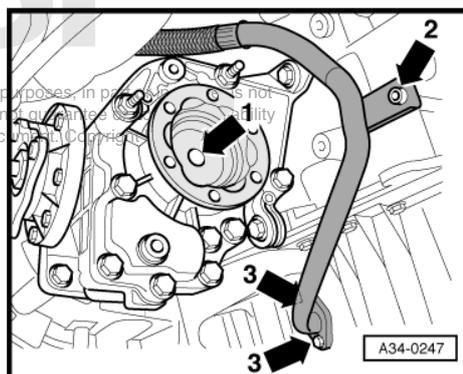


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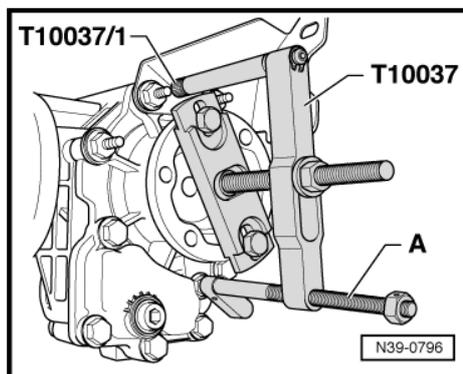
- Unscrew heat shield for drive shaft on right of bevel box -arrows-.
- Unbolt drive shaft (right side) from gearbox flange shaft.
- Lift drive shaft (right-side) up and secure with wire.



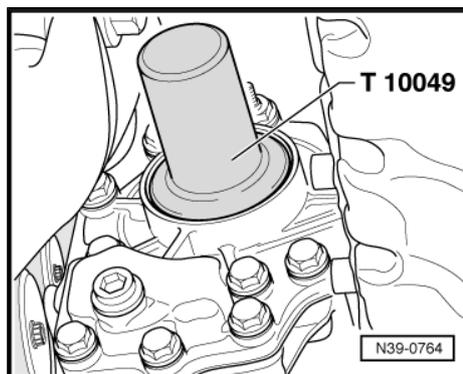
- Place used oil collection and extraction unit -V.A.G 1782- below gearbox.
- Unscrew oil return line for turbocharger from engine oil sump and cylinder block -arrows 1 and 2-.
- Unscrew countersunk bolt for flange shaft (right-side) -arrow 1- using hexagon key -V.A.G 1669- .



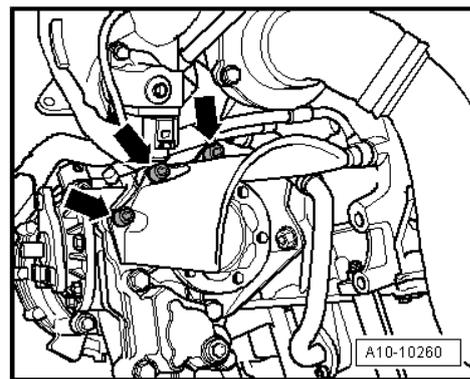
- Bolt puller -T10037- to flange shaft (right-side).
- Use knurled nut -T10037/1- and lower support -A- to align puller parallel with flange.
- Pull out flange shaft.
- Lever out flange shaft oil seal using an assembly lever.



- Drive in new oil seal with thrust piece -T10049- as far as the stop.
- Pack space between sealing lip and dust lip half-full with sealing grease -G 052 128 A1- .
- Carefully drive in flange shaft (turn flange shaft when doing so).
- Secure flange shaft with countersunk bolt.
- Install oil return line from turbocharger with new seal => Rep. Gr. 21 .
- Bolt drive shaft (right-side) to gearbox flange shaft => Running gear, front-wheel drive and four-wheel drive; Rep. Gr. 40 .



- Install heat shield for drive shaft (right-side) -arrows-.
- Install swivel joint and coupling rod ⇒ Running gear, front-wheel drive and four-wheel drive; Rep. Gr. 40 .
- Check gear oil in manual gearbox with bevel box ⇒ [page 82](#) .
- Install noise insulation panels ⇒ General body repairs, exterior; Rep. Gr. 50 .
- Fill up with engine oil ⇒ Rep. Gr. 17 .



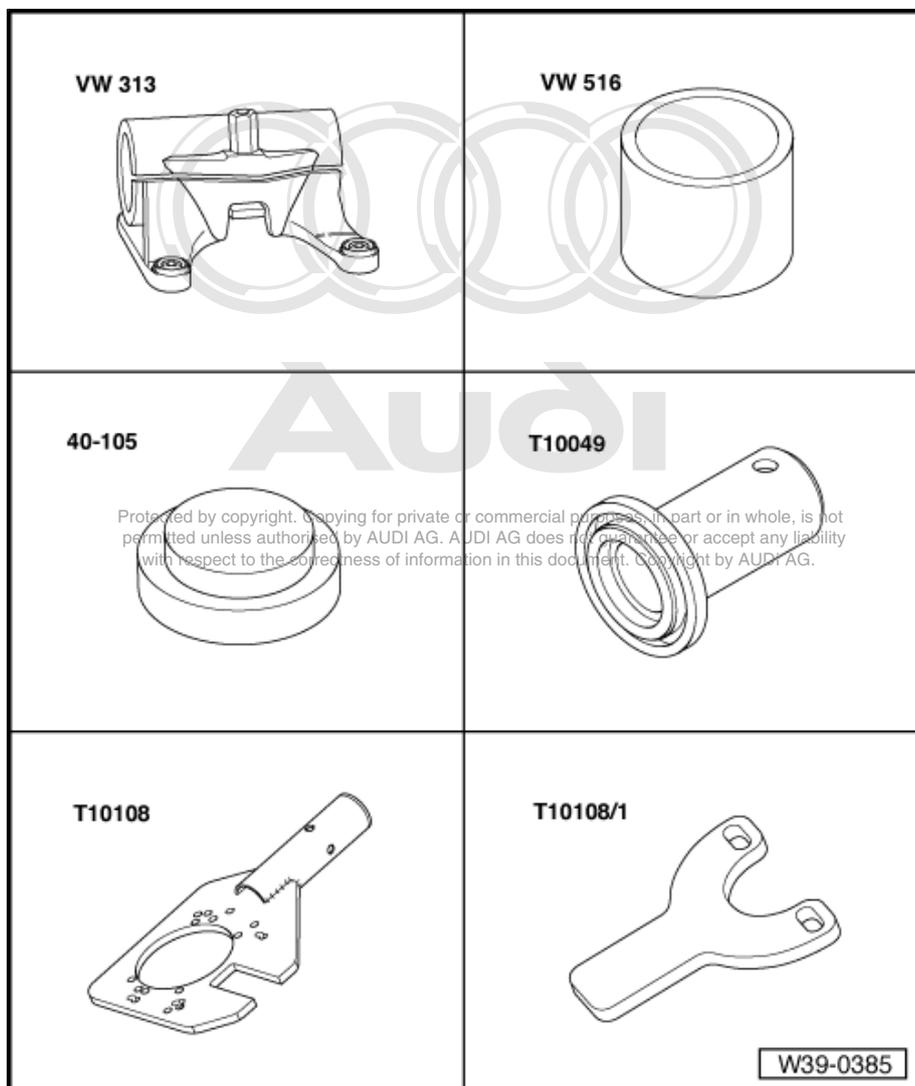
Tightening torques

Component	Nm
Flange shaft to gearbox (countersunk bolt)	25
Heat shield for drive shaft to bevel box	25

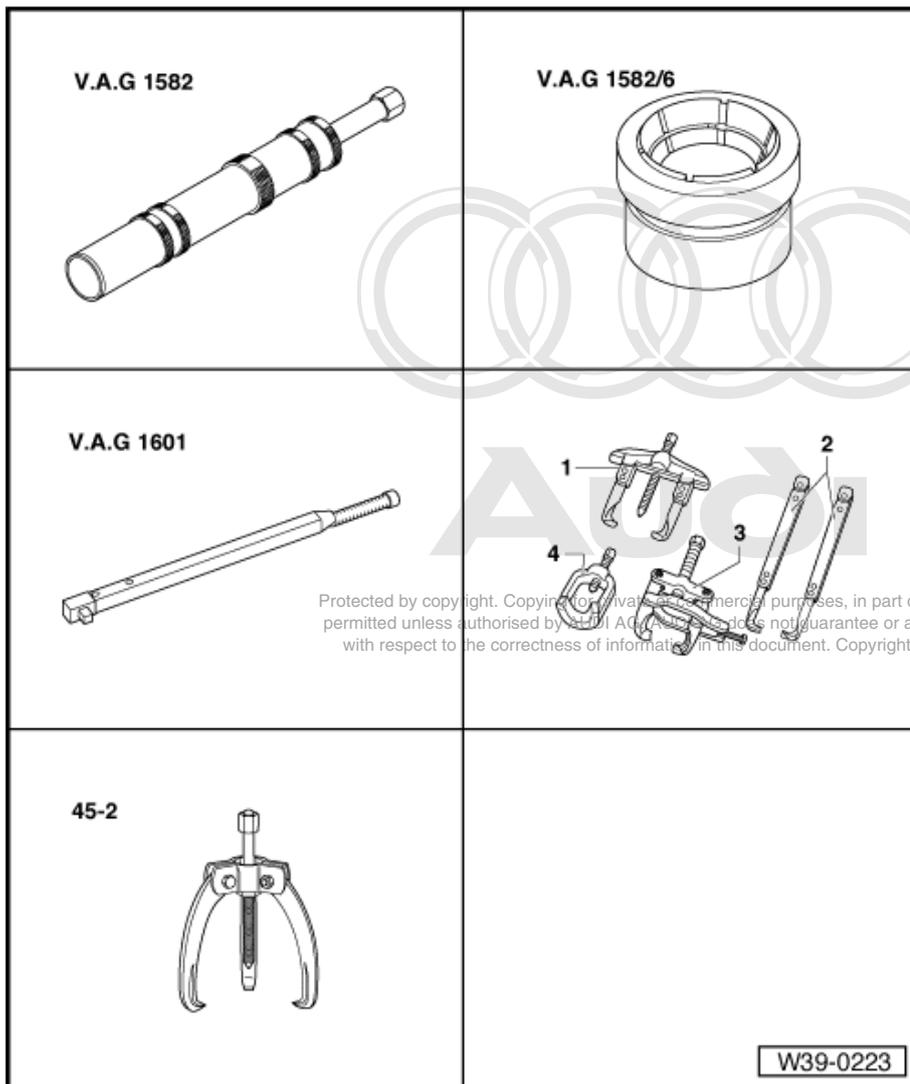
1.3 Renewing oil seal for bevel box output flange

Special tools and workshop equipment required

- ◆ Support clamp -VW 313-
- ◆ Tube -VW 516-
- ◆ Thrust plate -V.A.G 40-105-
- ◆ Thrust piece -T10049-
- ◆ Gearbox support -T10108-
- ◆ Support plate -T10108/1-



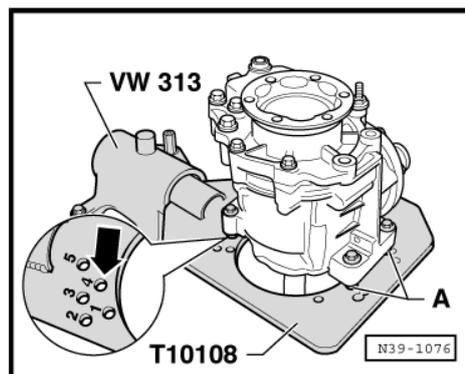
- ◆ Tapered roller bearing puller -V.A.G 1582-
- ◆ Adapter -V.A.G 1582/6A-
- ◆ Torque wrench -V.A.G 1601-
- ◆ -1- Two-arm puller -Kukko 20/10-
- ◆ Three-arm puller -Kukko 45-2-
- ◆ Locking fluid => Parts catalogue



Procedure

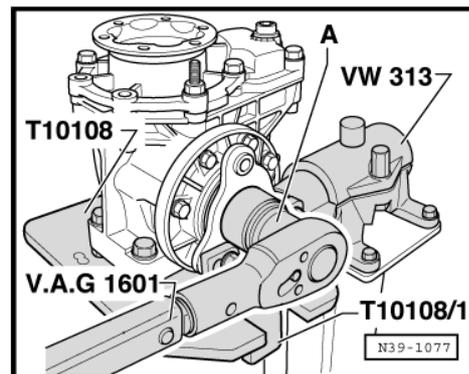
- Remove bevel box => [page 75](#) .
- Place bevel box on hole marked "4" -arrow- in gearbox support.
- Then align the bevel box with the three remaining holes and secure.

A - Nut M12x10 (4x)



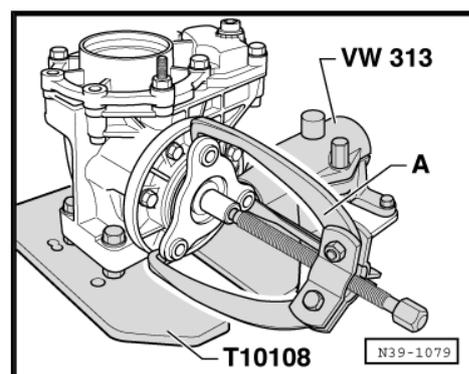
- Lock bevel box output flange with support plate -T10108/1- .
- Remove hexagon nut for output flange.

A - Socket attachment with $\frac{3}{4}$ " drive

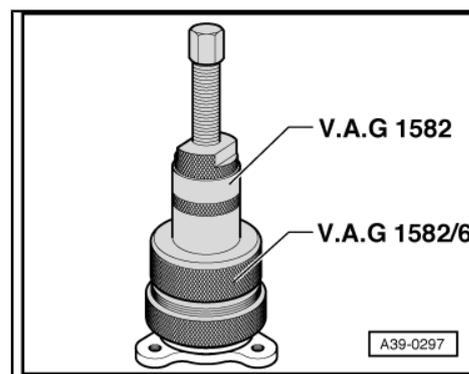


- Pull out output flange with oil seal and inner bearing race.

A - Three-arm puller -Kukko 45-2 -

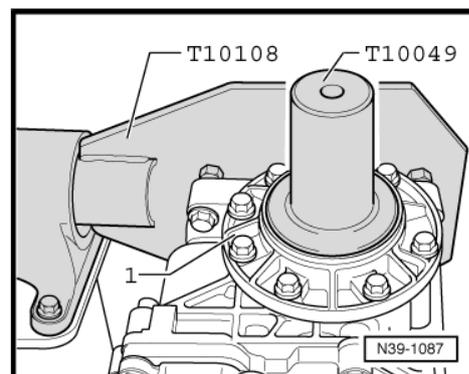


- Place thrust plate -V.A.G 40-105- on output flange.
- Pull off inner bearing race from output flange using tapered roller bearing puller -V.A.G 1582- .
- Detach oil seal from output flange.
- Clean any residue of locking fluid from thread of shaft bevel gear.

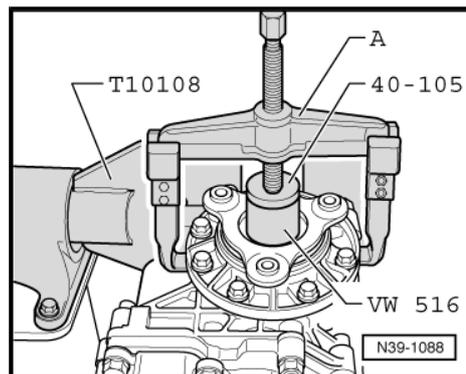


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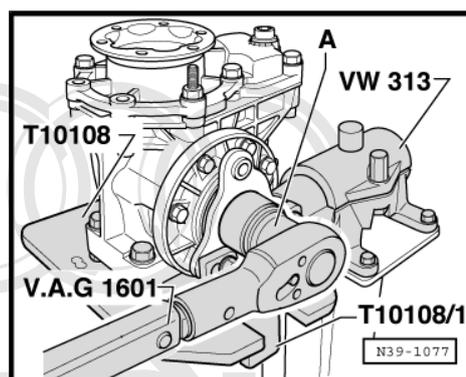
- Turn bevel box so that pinion housing -1- faces upwards.
- Insert small tapered roller bearing inner race for shaft bevel gear.
- Drive in new oil seal for output flange with thrust piece - T10049- as far as the stop.
- Pack space between sealing lip and dust lip half-full with sealing grease -G 052 128 A1- .
- Apply multi-purpose grease evenly to splines of output flange and shaft bevel gear.



- Press in output flange.
- A - Two-arm puller -Kukko 20/10-
- Place puller hooks at bottom of pinion housing.



- Apply locking fluid to threads of new hexagon nut and shaft bevel gear.
- Install new hexagon nut for output flange and tighten to specified torque ⇒ [Item 32 \(page 182\)](#) .
- A - Socket attachment with $\frac{3}{4}$ " drive
- Install bevel box
⇒ ["3 Removing and installing bevel box with gearbox installed", page 75](#) .
- Check gear oil in manual gearbox with bevel box ⇒ [page 82](#) .



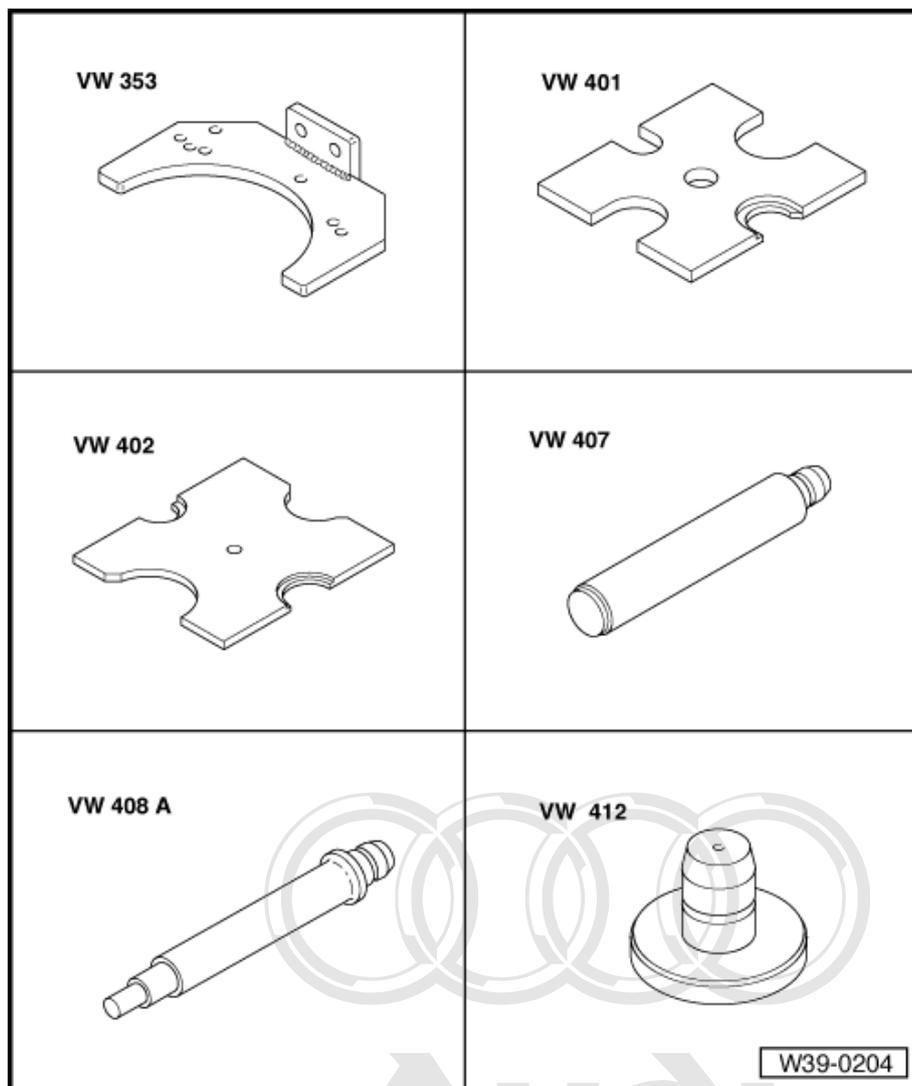
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2 Servicing differential

2.1 Dismantling and assembling differential

Special tools and workshop equipment required

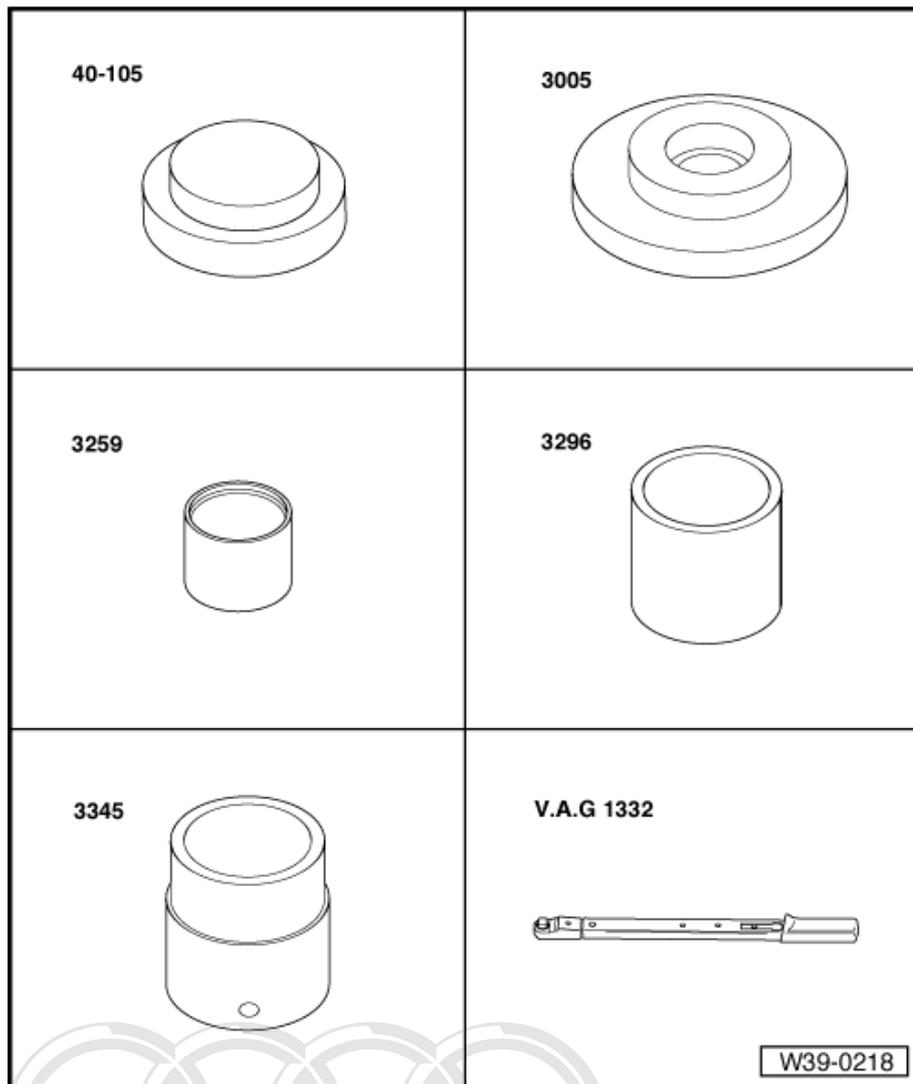
- ◆ Gearbox support -VW 353-
- ◆ Thrust plate -VW 401-
- ◆ Thrust plate -VW 402-
- ◆ Press tool -VW 407-
- ◆ Press tool -VW 408 A-
- ◆ Press tool -VW 412-



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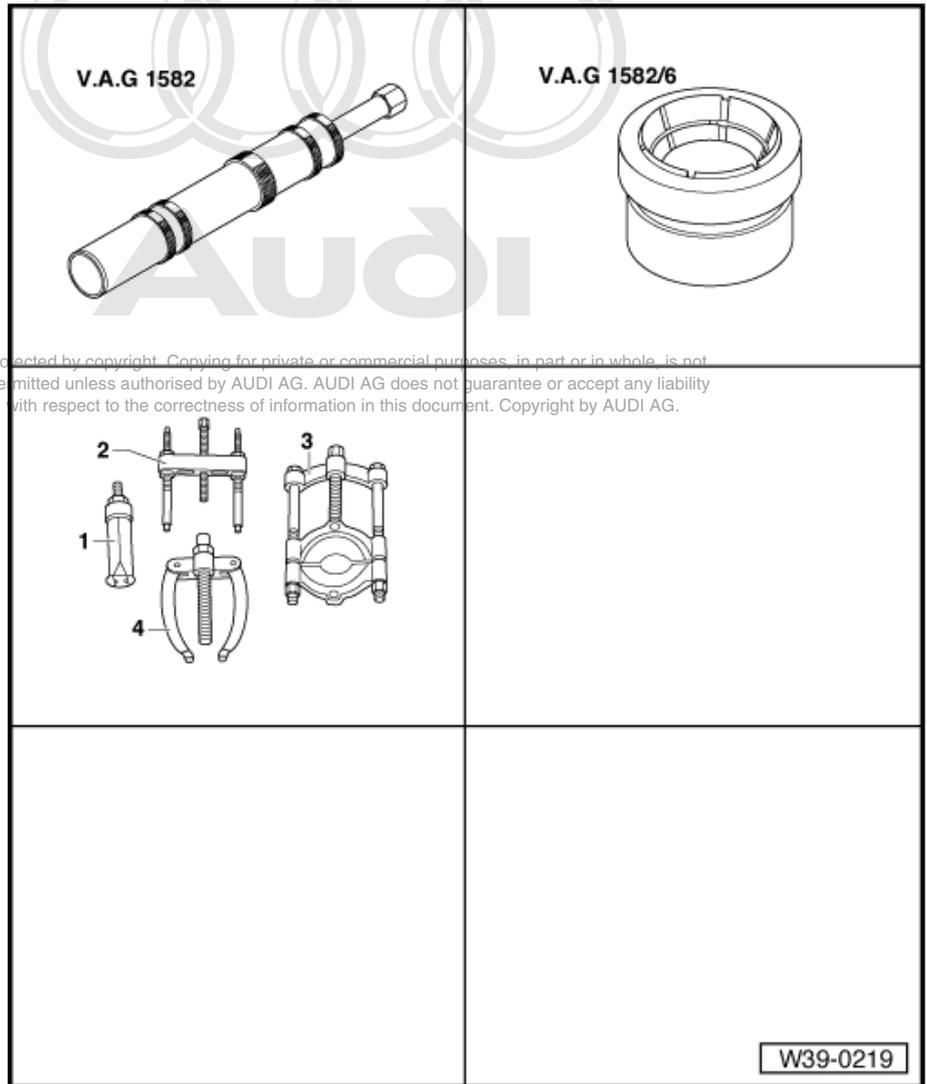


- ◆ Thrust plate -40-105-
- ◆ Thrust plate -3005-
- ◆ Tube -3259-
- ◆ Tube -3296-
- ◆ Tube for wheel bearing -3345-
- ◆ Torque wrench -V.A.G 1332-



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- ◆ Tapered roller bearing puller -V.A.G 1582-
- ◆ Adapter -V.A.G 1582/6 A-
- ◆ -1- Internal puller -Kukko 21/7-
- ◆ -2- Puller -Kukko 18/0-
- ◆ -3- Splitter -Kukko 17/1-
- ◆ -4- Counter-support -Kukko 22/2-



Differential - exploded view of components

 **Note**

- ◆ Heat tapered roller bearing inner race to 100°C before installing.
- ◆ Always renew both tapered roller bearings together.
- ◆ Adjust differential ⇒ [page 176](#) if tapered roller bearings, differential cage, gearbox housing or clutch housing are renewed.

1 - Gearbox housing
2 - Bolt

- Renew

3 - Differential cage

- Bolt to final drive gear
- For correct version refer to ⇒ Parts catalogue

4 - Final drive gear

- Riveted in production
- Pressing off ⇒ [page 174](#)
- Installation position: machined side faces towards bolting surface of differential cage.
- Heat to 100° C before installing.
- Fit to differential cage ⇒ [page 174](#)
- Bolted ⇒ [page 174](#)

5 - Locking plate
6 - Nut, 40 Nm + tighten 45° (1/8 turn) further
7 - Clutch housing
8 - Shim

- For differential
- Determining thickness ⇒ [page 176](#)

9 - Tapered roller bearing outer race

- Pulling out ⇒ [page 173](#)
- Pressing in ⇒ [page 173](#)

10 - Tapered roller bearing inner race

- Pulling off ⇒ [page 172](#)
- Pressing on ⇒ [page 173](#)

11 - Differential cage

- With riveted final drive gear
- Drill out rivet heads when renewing final drive gear ⇒ [page 173](#)
- Attaching final drive gear with bolts ⇒ [page 174](#)

12 - Tapered roller bearing inner race

- Pulling off ⇒ [page 172](#)
- Pressing on ⇒ [page 173](#)

13 - Tapered roller bearing outer race

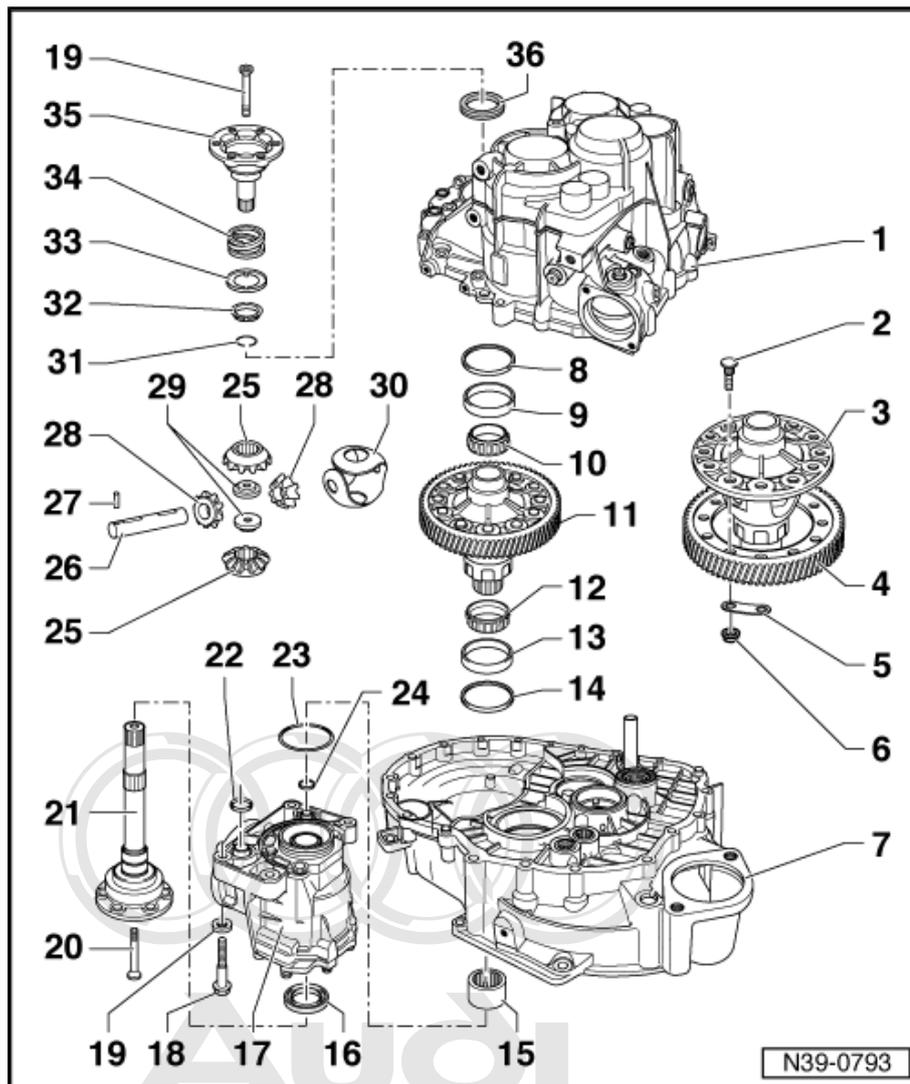
- Pulling out ⇒ [page 172](#)
- Pressing in ⇒ [page 172](#)

14 - Washer

- 0.65 mm thick

15 - Bevel box connecting piece

- Pressed onto differential cage



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- Only press on and off when differential cage has been removed
 - Pulling off ⇒ [page 175](#)
 - Pressing on ⇒ [page 175](#)
- 16 - Oil seal**
- For flange shaft (right-side)
 - Different diameters for left and right
 - Renewing ⇒ [page 159](#)
- 17 - Bevel box**
- Removing and installing (with gearbox installed) ⇒ [page 75](#)
 - Removing and installing (with gearbox removed) ⇒ [page 90](#)
 - Dismantling and assembling ⇒ [page 180](#)
- 18 - Bolt, 40 Nm + tighten 45° (1/8 turn) further**
- Renew
- 19 - Washer**
- 20 - Countersunk bolt, 25 Nm**
- Screws into threaded piece ⇒ [Item 29 \(page 171\)](#)
- 21 - Flange shaft (right-side)**
- Removing and installing ⇒ [page 195](#)
 - Renewing needle bearings (polygon bearings) for flange shaft ⇒ [page 195](#)
- 22 - O-ring**
- Renew
- 23 - O-ring**
- Renew
- 24 - O-ring**
- Renew
- 25 - Sun wheel**
- Installing ⇒ [page 175](#)
 - For correct version refer to ⇒ Parts catalogue
- 26 - Differential pinion pin**
- Drive out with drift
 - Installing ⇒ [page 175](#)
 - For correct version refer to ⇒ Parts catalogue
- 27 - Spring pin**
- For securing differential pinion pin
 - Removing and installing ⇒ [page 174](#)
 - For correct version refer to ⇒ Parts catalogue
- 28 - Planet pinion**
- Installing ⇒ [page 175](#)
 - For correct version refer to ⇒ Parts catalogue
- 29 - Threaded piece**
- Installing ⇒ [page 175](#)
 - For correct version refer to ⇒ Parts catalogue
- 30 - One-piece thrust washer**
- Lubricate with gear oil before installing
 - For correct version refer to ⇒ Parts catalogue

31 - Circlip

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

32 - Taper ring

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

33 - Thrust washer

- Installation position: Shoulder towards spring, lugs towards taper ring

34 - Spring for flange shaft

- Installed behind flange shaft

35 - Flange shaft (left-side)

36 - Oil seal

- For flange shaft (left-side)
- Different diameters for left and right
- Renewing with gearbox installed => [page 157](#)

Pulling tapered roller bearing outer race out of clutch housing

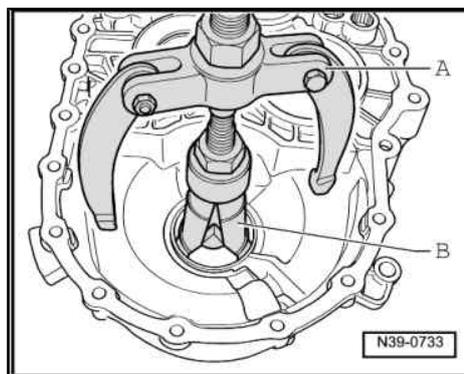
A - Counter-support -Kukko 22/2-

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



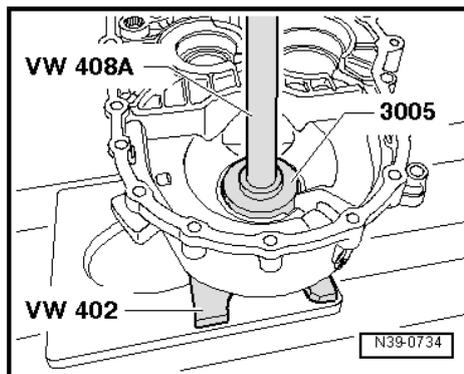
Note

After pulling out, check washer for damage and renew if necessary.



Pressing tapered roller bearing outer race into clutch housing

- First fit shim.



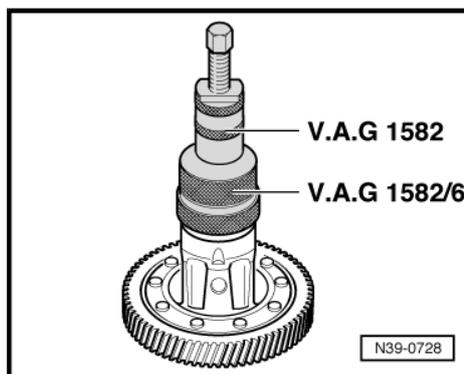
Pulling off tapered roller bearing inner races

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



Note

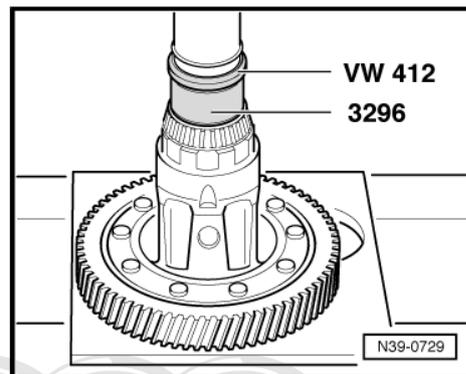
The procedure for pulling tapered roller bearing inner races off differential cage is the same for both bearings.



Pressing on tapered roller bearing inner races

 Note

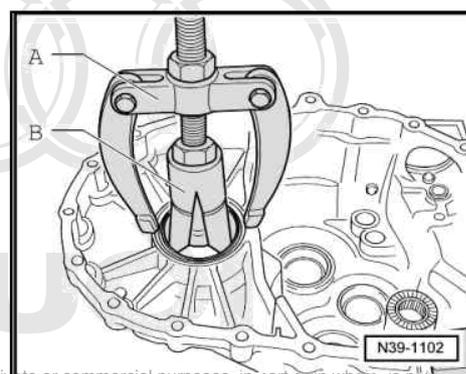
Use the same tools for pressing on tapered roller bearing inner race for gearbox housing and clutch housing.



Pulling tapered roller bearing outer race out of gearbox housing

A - Counter-support -Kukko 22/2-

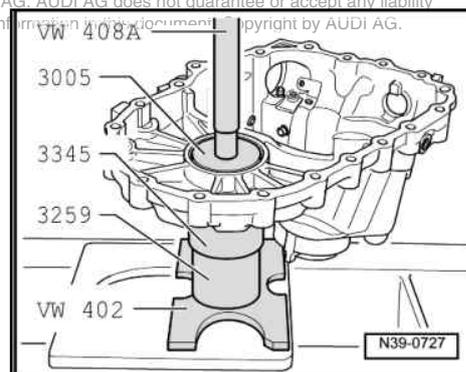
B - Internal puller 46 ... 58 mm -Kukko 21/7-



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Pressing tapered roller bearing outer race into gearbox housing

- Place tube for wheel bearing -3345- directly under bearing mounting to support gearbox housing.

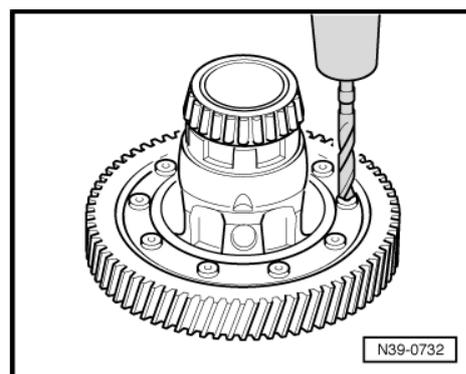


Drilling out rivet heads

- Drill out rivet heads from countersunk side with 12 mm drill and drive out rivets with a drift.

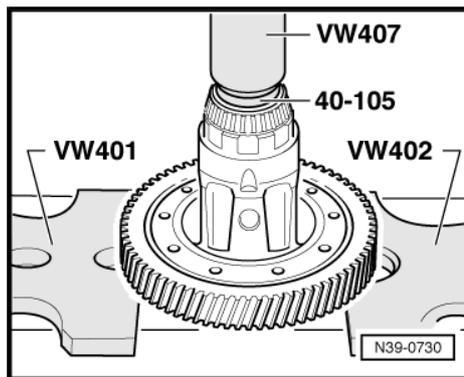
 Note

Clean differential before and after drilling and keep metal particles out of tapered roller bearings.



Pressing off final drive gear

- Place thrust plate -40-105- on differential cage.



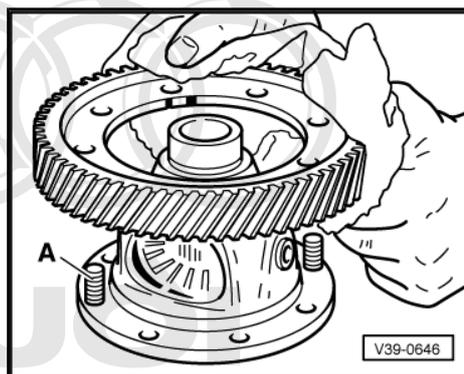
Heating final drive gear wheel to approx. 100 °C and installing



WARNING

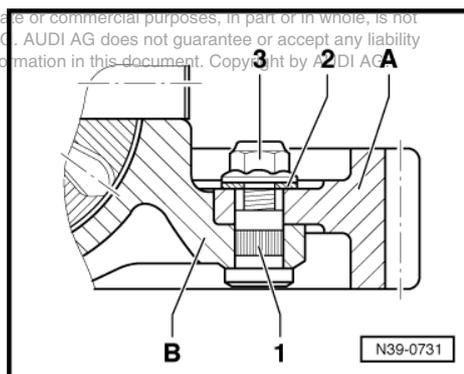
Wear protective gloves.

- Position final drive gear via bolts -A- from repair kit when installing.



Bolting final drive gear -A- and differential cage -B- together

Use special bolts -1- with locking plates -2- and nuts -3- → Parts catalogue .



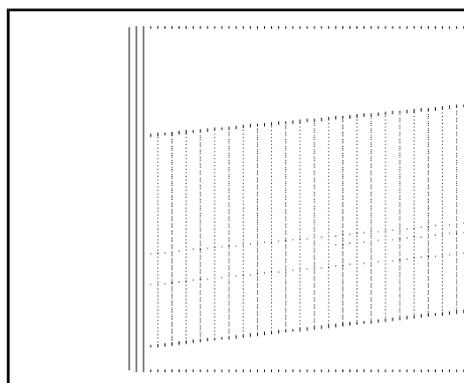
Removing and installing spring pin for differential pinion pin

Removing:

- Cover tapered roller bearing inner race to avoid damage and keep metal particles out of the bearing.
- Drive out spring pin using chisel (apply chisel in circular groove).

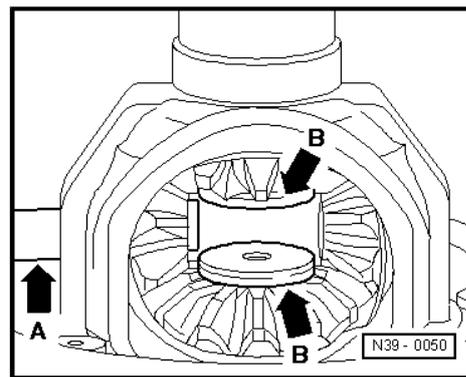
Installing:

- Drive spring pin onto stop in differential cage.



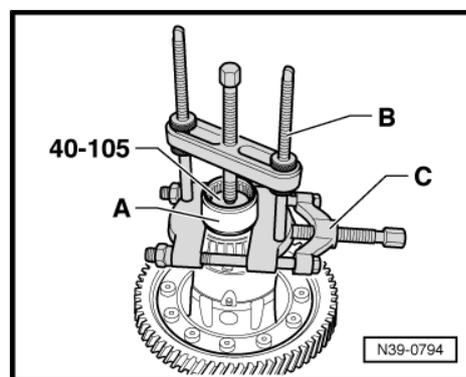
Installing differential bevel gears

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

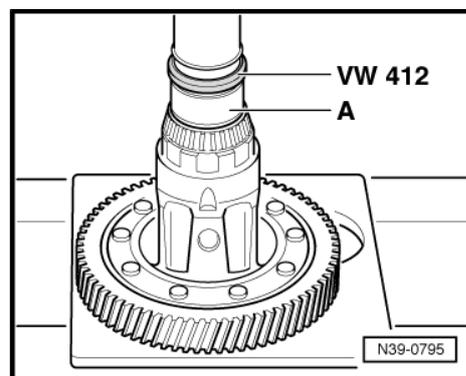
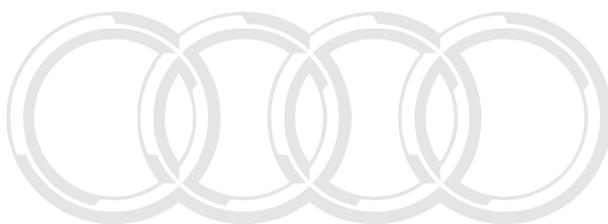


Pulling connecting piece off

- A - Connecting piece
- B - Puller -Kukko 18/1-
- C - Splitter 12 ... 75 mm -Kukko 17/1-



Pressing on connecting piece -A- for bevel box



2.2 Table of adjustments

If repairs have been carried out on the gearbox, it is only necessary to adjust the input shaft, 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:			
	Input shaft ⇒ page 118	Output shaft ⇒ page 134	Output shaft for 5th, 6th and reverse gears ⇒ page 151	Differential ⇒ page 176
Gearbox housing	x	x	x	x
Clutch housing	x	x	x	x
Input shaft	x			
Output shaft for 1st - 4th gear		x		
Output shaft for 5th, 6th and reverse gears			x	

Components renewed:	Components requiring adjustment:			
Differential cage				x
Tapered roller bearing for input shaft	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

2.3 Adjusting differential

It is necessary to readjust the differential when the following components have been renewed:

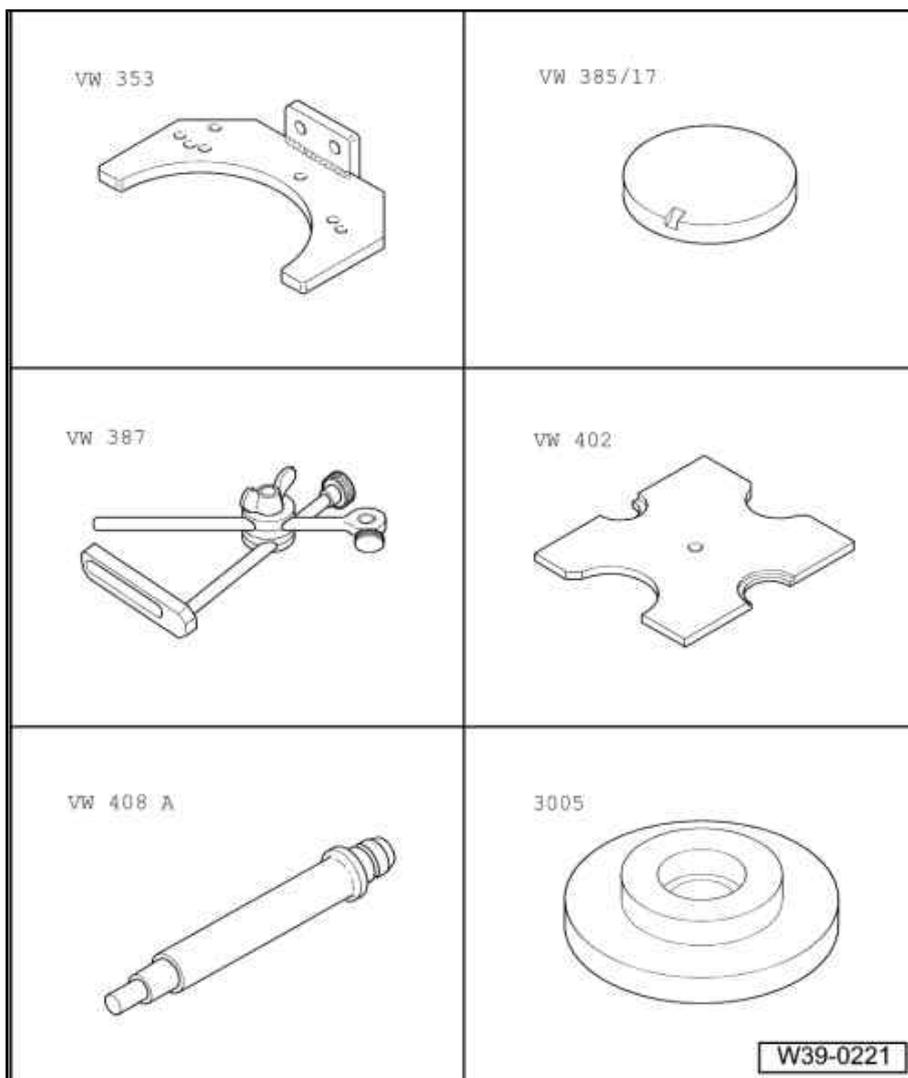
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- ◆ Gearbox housing
- ◆ Clutch housing
- ◆ Differential cage
- ◆ Differential tapered roller bearings

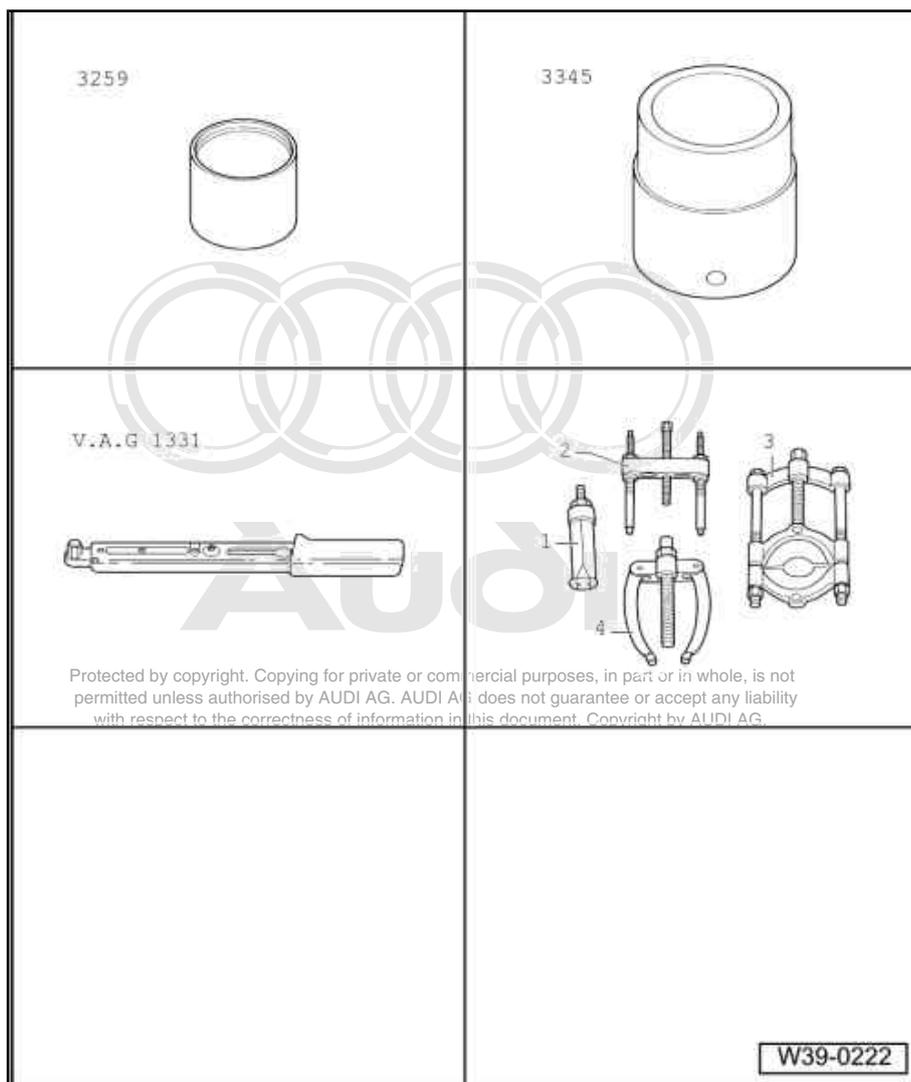
Table of adjustments => [page 175](#) .

Special tools and workshop equipment required

- ◆ Gearbox support -VW 353-
- ◆ 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-
- ◆ Tube for wheel bearing -3345-
- ◆ Torque wrench -V.A.G 1331-
- ◆ -1- Internal puller -Kukko 21/7-
- ◆ -4- Counter-support -Kukko 22/2-

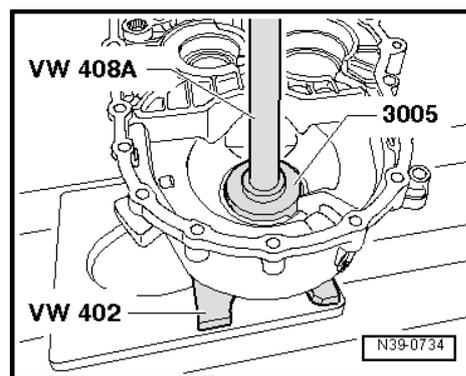


Procedure

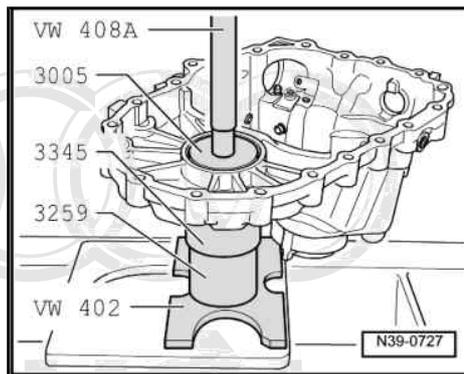
- Press tapered roller bearing outer race with shim (thickness: 0.65 mm) into clutch housing.

i Note

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



- Press tapered roller bearing outer race (without shim) into gearbox housing.
- Install differential in clutch housing.
- Fit gearbox housing and tighten 5 bolts to specified torque.
- 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.

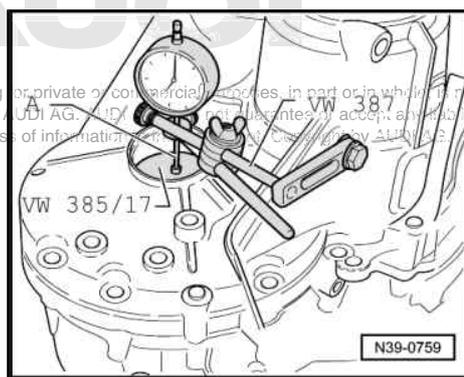


- Attach dial gauge and set to "0" with a preload of 1 mm.

A - Dial gauge extension, 30 mm

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

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Determining thickness of shim

The specified bearing preload is obtained by adding a constant figure (0.30 mm) to the reading indicated. Example:

Measured value	0.70 mm
+ Preload (constant value)	0.30 mm
Thickness of shim =	1.00 mm

- Select required shim thickness from following table.

Shim thickness (mm) ⁹⁾		
0.65	1.00	1.35
0.70	1.05	1.40
0.75	1.10	0.70 + 0.75 = 1.45
0.80	1.15	0.75 + 0.75 = 1.50
0.85	1.20	0.75 + 0.80 = 1.55
0.90	1.25	0.80 + 0.80 = 1.60
0.95	1.30	0.80 + 0.85 = 1.65

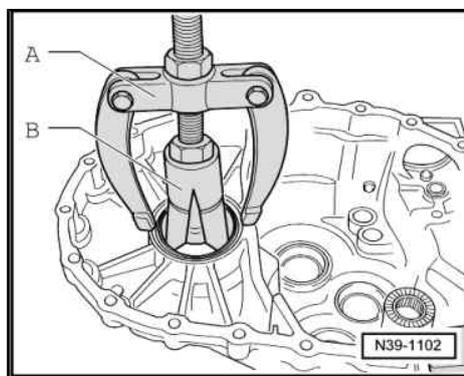
9) Part No.; for allocation refer to ⇒ Parts catalogue

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

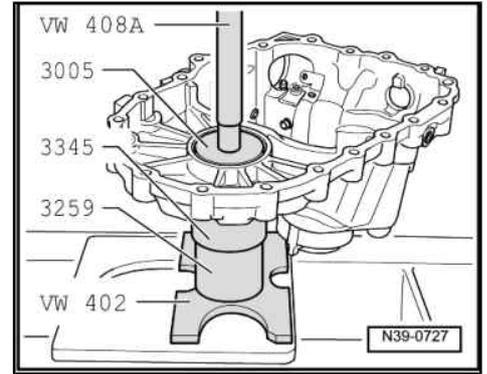
A - Counter-support -Kukko 22/2-

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

- Install shim(s) of the required thickness (thicker shim first).



- Press outer race in again and tighten gearbox housing bolts to specified torque.



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3 Bevel box

3.1 Dismantling and assembling bevel box

3.1.1 Exploded view

Sequence for dismantling and assembling ⇒ [page 184](#)

10) Adjustment work is required if these components are renewed
⇒ [page 202](#)

1 - Countersunk bolt, 25 Nm

- Flange shaft (right-side) to threaded piece on differential
- Length of countersunk bolt is matched to bevel box
- Check Part No. of bevel box
- Allocate countersunk bolt according to ⇒ Electronic parts catalogue (ETKA) when renewing bevel box.

2 - Flange shaft (right-side)

- Removing ⇒ [page 189](#)
- Pressing in ⇒ [page 192](#)
- Removing and installing with gearbox installed ⇒ [page 159](#)

3 - Needle bearing (polygon bearing)

- 2 x
- Renewing ⇒ [page 195](#)

4 - Circlip

- Always renew

5 - Oil seal

- Pry out oil seal using lever
- Drive in onto stop using thrust piece -T10049- ⇒ [page 195](#).

- Renewing (with gearbox installed) ⇒ [page 159](#)

6 - Centre hex stud, 45 Nm

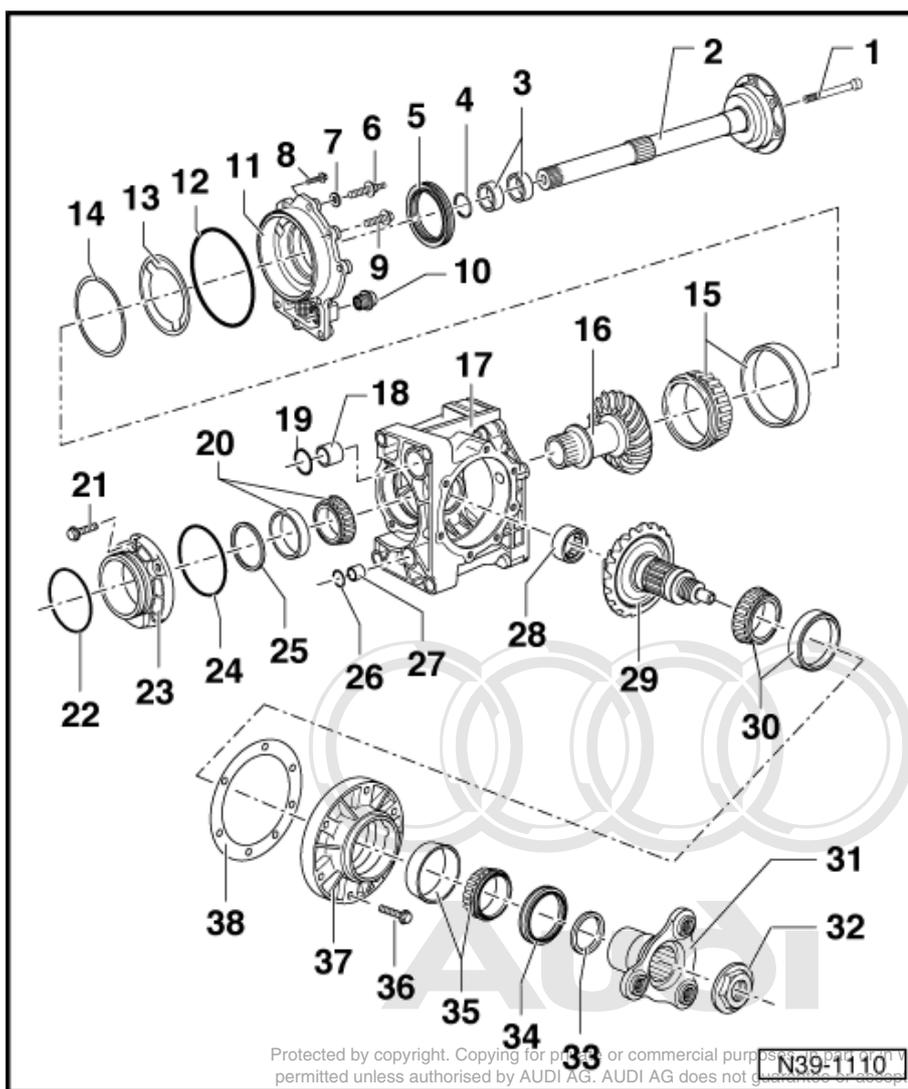
- M 10/ M 8

7 - Washer

- For centre hex stud ⇒ [Item 6 \(page 180\)](#)

8 - Bolt, 25 Nm

- M 8



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N39-1110

9 - Bolt, 45 Nm

- M 10

10 - Oil drain plug, 60 Nm

- With magnet and seal

11 - Cover, large ¹⁰⁾

- Removing ⇒ [page 191](#)
- Keep straight when installing, tighten securing bolts diagonally and in stages

12 - O-ring

- If fitted, always renew

13 - Oil deflector plate

- Note installation position ⇒ [page 193](#)
- Fitted on some gearboxes between shim S₁ ⇒ [Item 14 \(page 181\)](#) and large tapered roller bearing for bevel gear ⇒ [Item 15 \(page 181\)](#)

14 - Shim S₁

- Note thickness
- Fitted on some gearboxes between oil deflector plate ⇒ [Item 13 \(page 181\)](#) and cover, large ⇒ [Item 11 \(page 181\)](#)
- Table of adjustments ⇒ [page 202](#)

15 - Large tapered roller bearing for bevel gear¹⁰⁾

Inner race:

- Pressing off ⇒ [page 191](#)
- Pressing on ⇒ [page 192](#)

Outer race:

- Pulling out ⇒ [page 191](#)
- Pressing in ⇒ [page 194](#)

16 - Bevel gear with input shaft¹⁰⁾

- Is paired with shaft bevel gear ⇒ [Item 29 \(page 182\)](#)
- Cannot be pressed off input shaft
- Adjusting ⇒ [page 210](#)

17 - Final drive housing¹⁰⁾

- Drain oil then secure bevel box on assembly stand using gearbox support -T10108- ⇒ from Page ⇒ [page 184](#)

18 - Oil supply sleeve

- Pulling out ⇒ [page 192](#)
- Pressing in ⇒ [page 192](#)

19 - O-ring

- Always renew

20 - Small tapered roller bearing for bevel gear¹⁰⁾

Inner race:

- Fitted on input shaft without securing
- Removing ⇒ [page 191](#)
- Installing ⇒ [page 193](#)

Outer race:

- Fitted in final drive gear without securing
- Removing ⇒ [page 191](#)
- Installing ⇒ [page 193](#)

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21 - Bolt, 25 Nm

22 - O-ring

- Always renew
- Must rest in circumferential groove

23 - Cover, small¹⁰⁾

- Removing ⇒ [page 191](#)
- Keep straight when installing, tighten securing bolts diagonally and in stages

24 - O-ring

- Always renew

25 - Shim S₂

- Note thickness
- Table of adjustments ⇒ [page 202](#)

26 - O-ring

- Always renew

27 - Oil supply sleeve

- Pulling out ⇒ [page 192](#)
- Pressing in ⇒ [page 192](#)

28 - Roller bearing

- Pulling out ⇒ [page 191](#)
- Pressing in ⇒ [page 192](#)

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29 - Shaft bevel gear¹⁰⁾

- Is paired with bevel gear
- Clean thread
- Apply multi-purpose grease to splines for output flange
- Adjusting ⇒ [page 204](#)

30 - Large tapered roller bearing for shaft bevel gear¹⁰⁾

Inner race:

- Fit onto shaft bevel gear ⇒ [Item 29 \(page 182\)](#)

Outer race:

- Pressing out ⇒ [page 190](#)
- Pressing in ⇒ [page 194](#)

31 - Output flange¹⁰⁾

- Pulling out ⇒ [page 189](#)
- Drawing in ⇒ [page 194](#)
- Apply multi-purpose grease to splines

32 - Hexagon nut, 475 Nm

- Removing ⇒ [page 189](#)
- Installing ⇒ [page 194](#)
- Always renew
- Apply locking fluid -D 000 600- when fitting

33 - Shim S₄

- Note thickness
- Table of adjustments ⇒ [page 202](#)
- Fit shim onto shaft bevel gear ⇒ [Item 29 \(page 182\)](#) before inserting inner race for small tapered roller bearing ⇒ [Item 20 \(page 181\)](#)

34 - Oil seal

- Renew only with bevel box removed ⇒ [page 163](#)

35 - Small tapered roller bearing for shaft bevel gear¹⁰⁾

Outer race:

- Pressing out ⇒ [page 190](#)
- Pressing in ⇒ [page 194](#)

Inner race:

- Pulling off from output flange ⇒ [page 189](#)
- Insert in outer race

36 - Bolt, 25 Nm

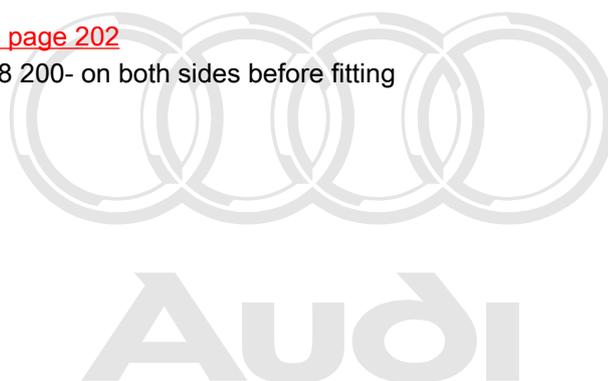
- Apply sealant -AMV 188 200- when installing

37 - Pinion housing¹⁰⁾

- Removing ⇒ [page 190](#)
- Installing ⇒ [page 194](#)
- Keep straight when installing, tighten securing bolts diagonally and in stages.

38 - Shim S₃

- Note thickness
- Table of adjustments ⇒ [page 202](#)
- Apply sealant -AMV 188 200- on both sides before fitting

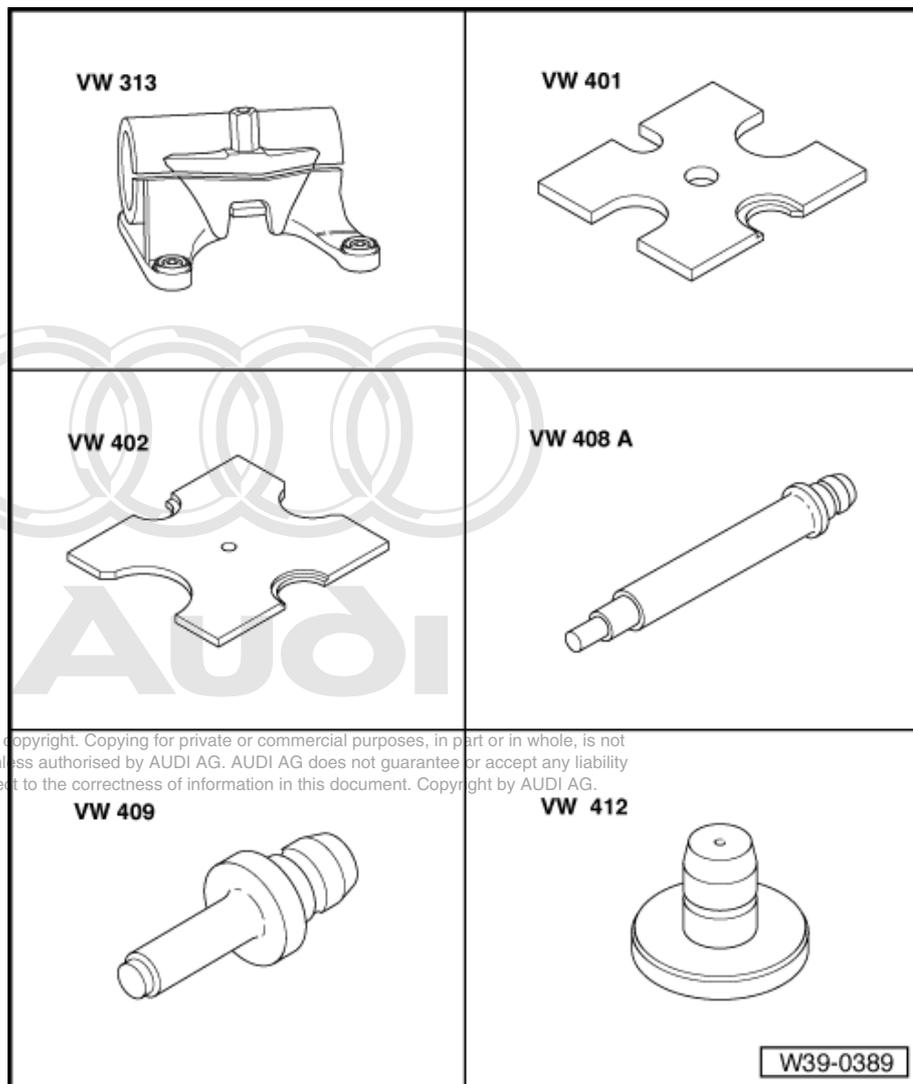


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3.1.2 Dismantling and assembling sequence

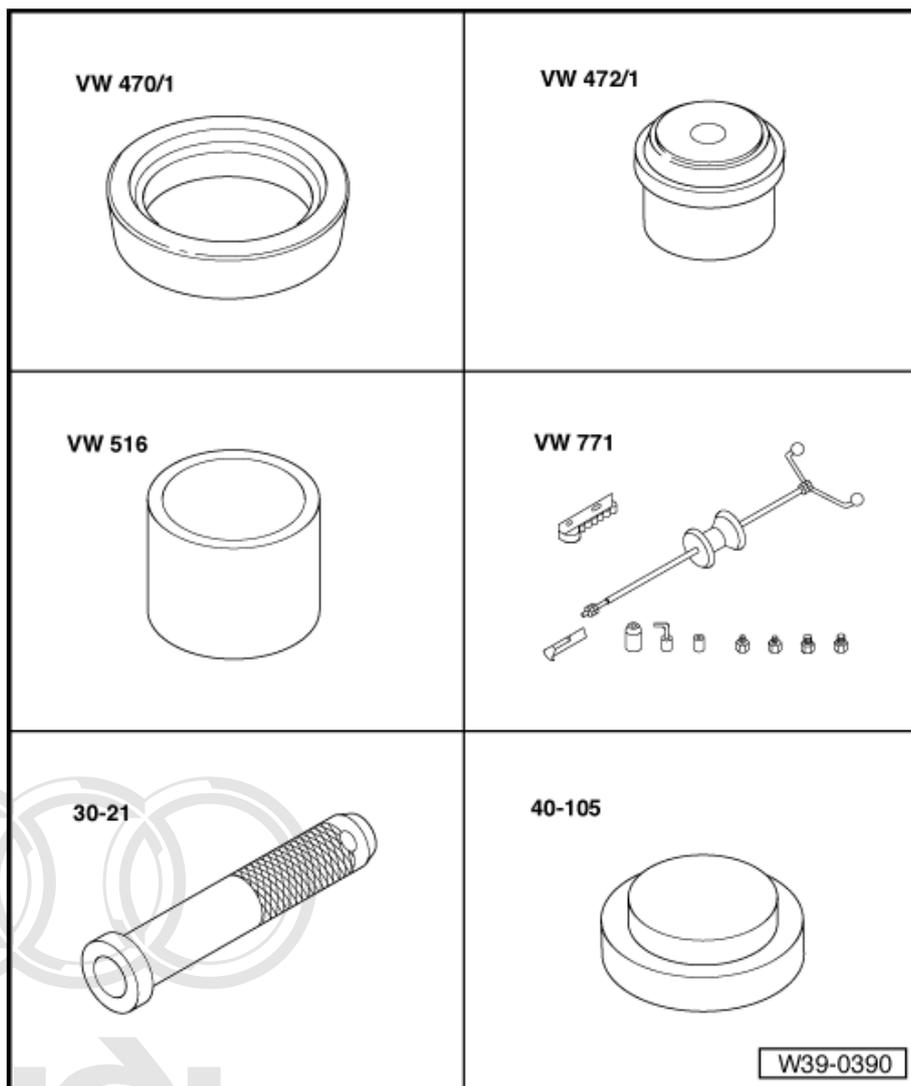
Special tools and workshop equipment required

- ◆ Support clamp -VW 313-
- ◆ Thrust plate -VW 401-
- ◆ Thrust plate -VW 402-
- ◆ Press tool -VW 408A-
- ◆ Press tool -VW 409-
- ◆ Press tool -VW 412-



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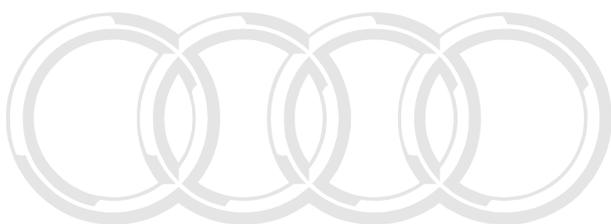
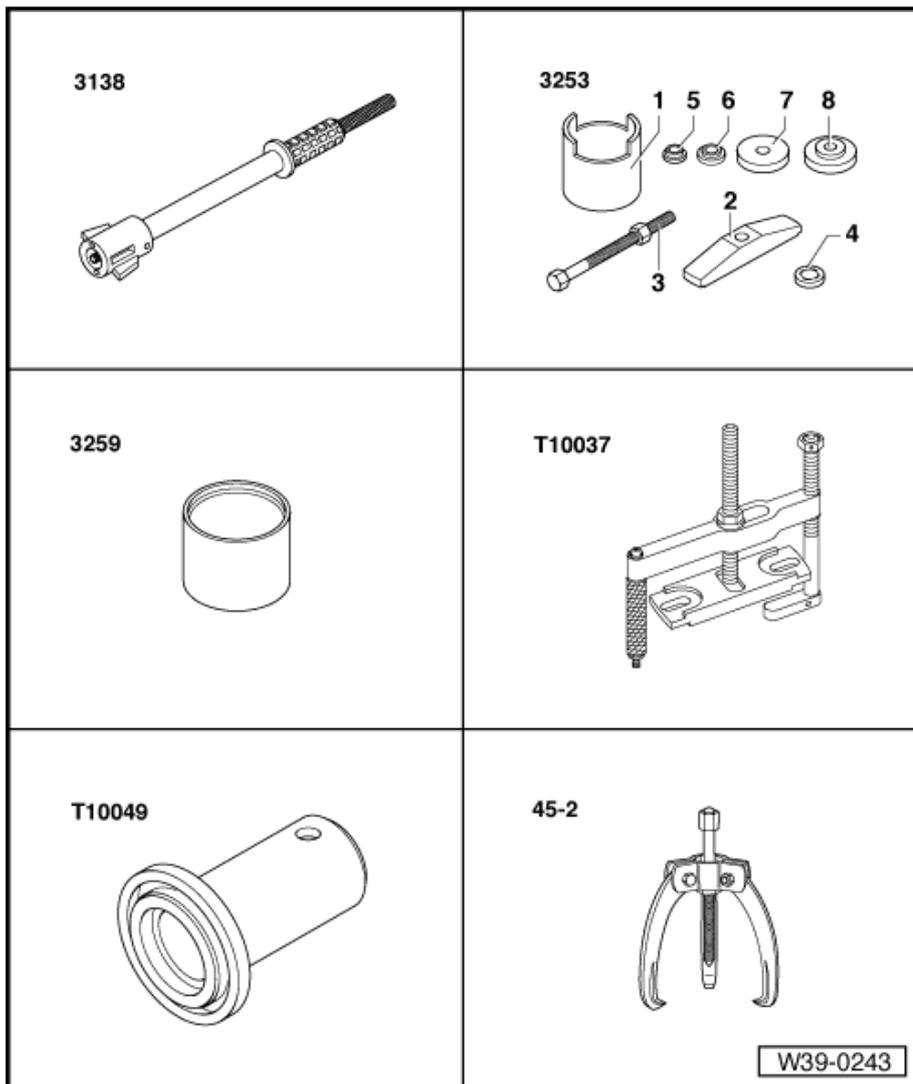
- ◆ Thrust pieces for pinion shaft bearing -VW 470/1-
- ◆ Thrust piece with spacer sleeve -VW 472/1-
- ◆ Tube -VW 516-
- ◆ Multi-purpose tool -VW 771-
- ◆ Sleeve -V.A.G 30-21-
- ◆ Thrust plate -V.A.G 40-105-



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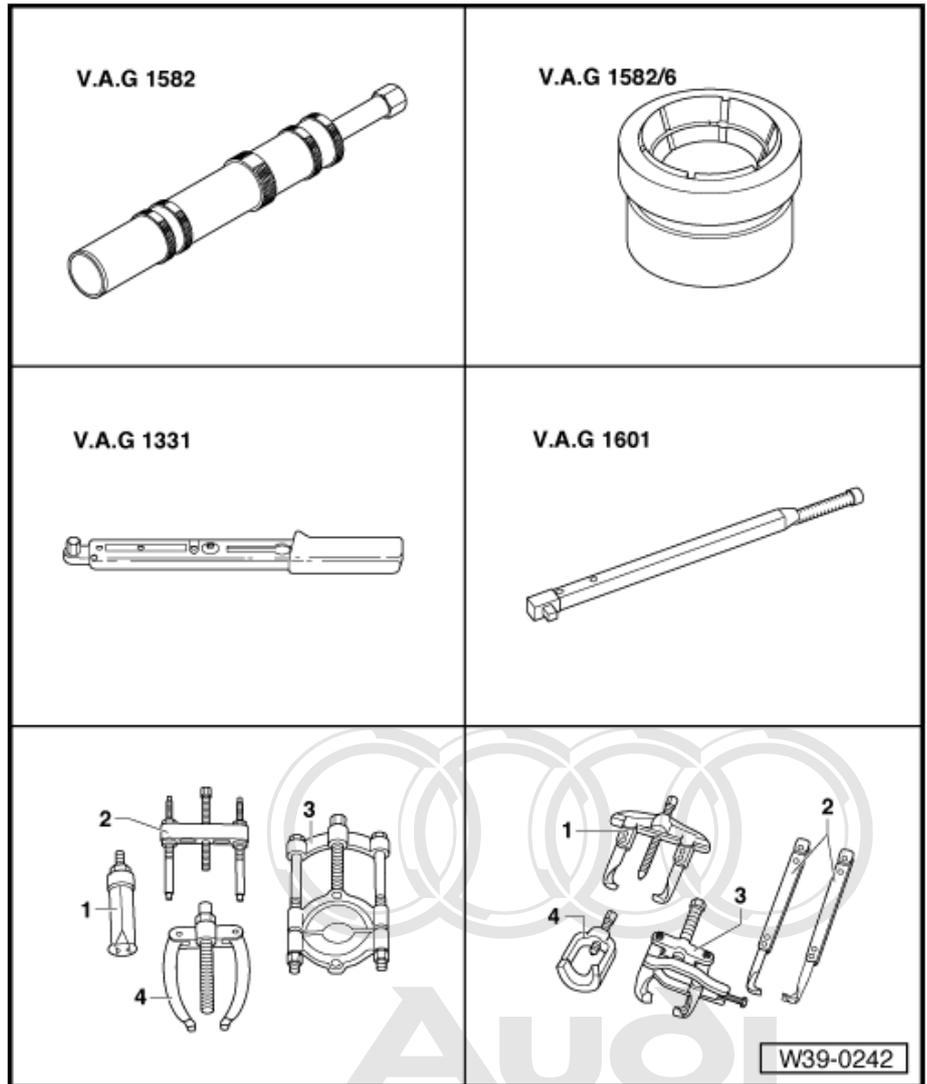
- ◆ Drift -VAS 3138-
- ◆ Assembly tool -VAS 3253-
- ◆ Tube -VAS 3259-
- ◆ Puller -T10037-
- ◆ Thrust piece -T10049-
- ◆ Three-arm puller -Kukko 45-2-



Audi

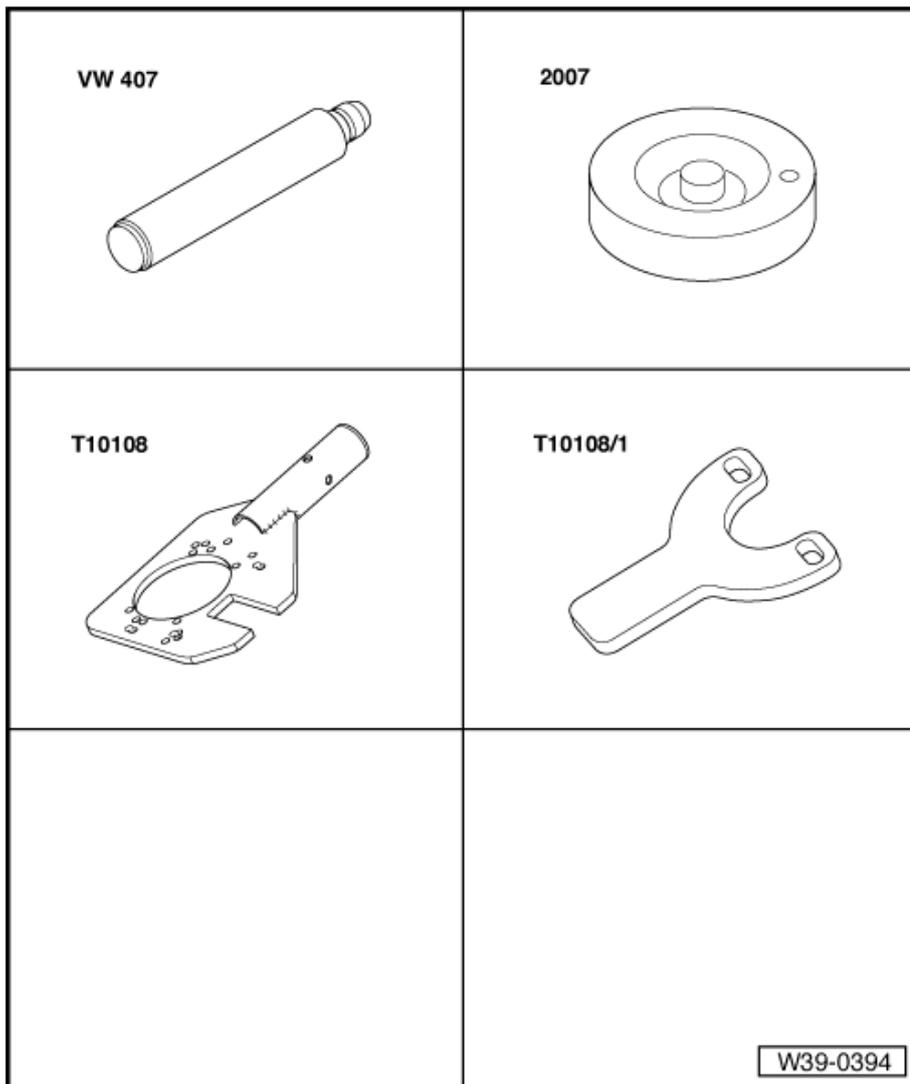
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- ◆ Tapered roller bearing puller -V.A.G 1582/-
- ◆ Adapter -V.A.G 1582/6-
- ◆ Torque wrench -V.A.G 1331/-
- ◆ Torque wrench -V.A.G 1601/-
- ◆ Internal puller -1- Kukko 21/02-
- ◆ Internal puller -1- Kukko 21/2-
- ◆ Internal puller -1- Kukko 21/4-
- ◆ Internal puller -1- Kukko 21/89-
- ◆ Splitter -3 - Kukko 17/2-
- ◆ Counter-support -4 - Kukko 22/1-
- ◆ Counter-support -4 - Kukko 22/4-
- ◆ Two-arm puller -1 - Kukko 20/10- with
- ◆ Hooks - Haken Matra V/ 170-



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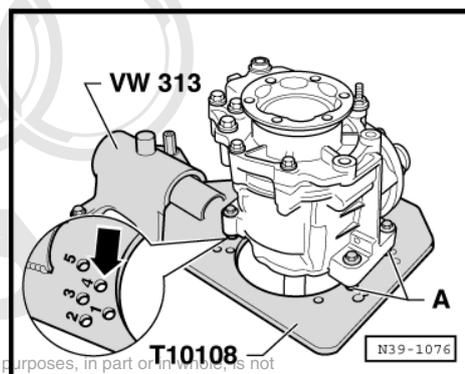
- ◆ Press tool -VW 407-
- ◆ Press tool -V.A.G 2007-
- ◆ Gearbox support -T10108-
- ◆ Support plate -T10108/1-



3.1.3 Dismantling bevel box

- Drain off gear oil.
- Place bevel box on hole marked -4- -arrow- in gearbox support.
- Then align the bevel box with the three remaining holes and secure.

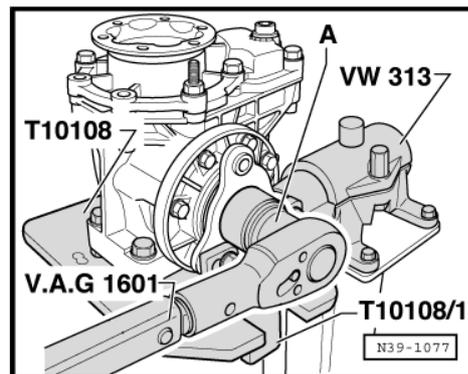
Nut -A- - M 12 x 10 (4x)



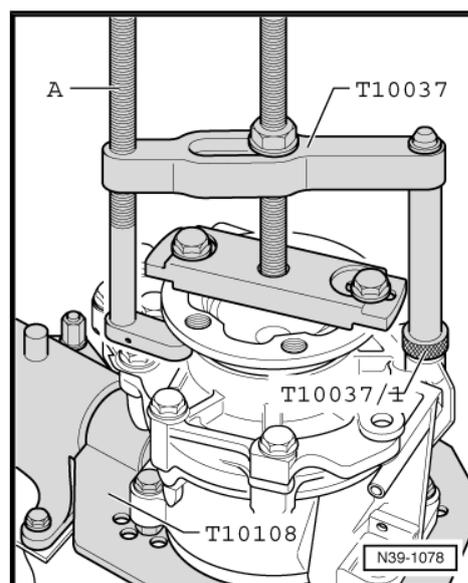
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- Lock bevel box output flange with support plate -T10108/1- .
- Unscrew hexagon nut for output flange.

Socket -A- for 3/4" drive



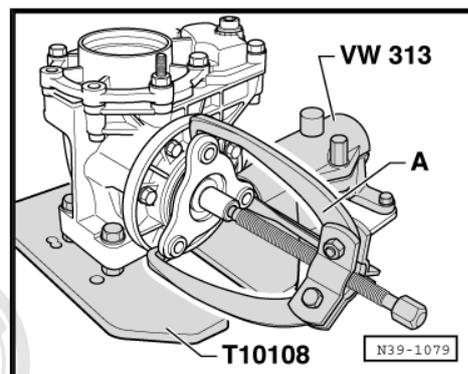
- Bolt puller -T10037- to flange shaft (right-side).
- Use knurled nut -T10037/1- and lower support -A- to align puller parallel with flange.
- Pull out flange shaft.
- If the seal has to be replaced, it must be removed now.



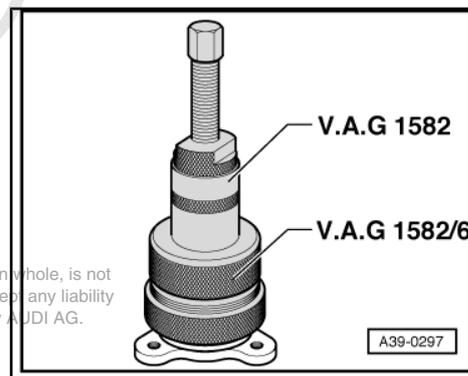
- Pull out output flange with oil seal and inner bearing race.

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

- Place thrust plate -V.A.G 40-105- on output flange.



- Pull off bearing inner race from output flange using tapered roller bearing extractor.
- Detach oil seal from output flange.

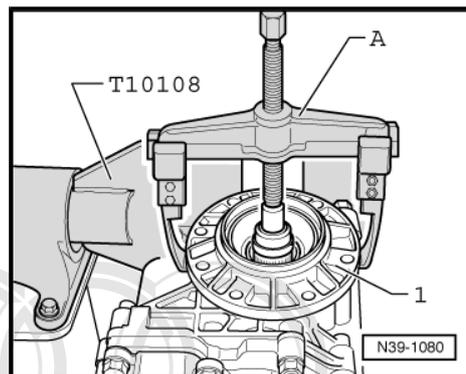


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- Turn bevel box so that pinion housing -1- faces upwards.
- Remove hexagon bolts securing pinion housing to final drive housing.
- Pull off pinion housing.

A - Two-arm puller , e.g. -Kukko 20/10- with hook -Matra V/170-

- Take off shim S₃.
- Remove shaft bevel gear with shim S₄ and inner race for large tapered roller bearing from final drive housing.
- Clean any residue of locking fluid from thread of shaft bevel gear.

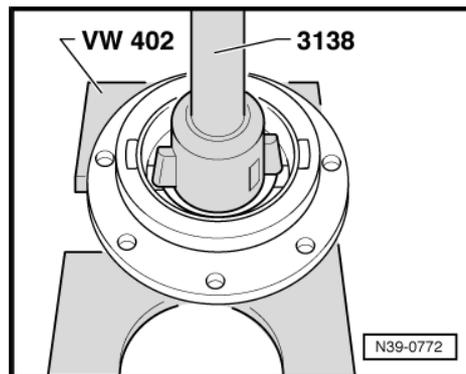


Note

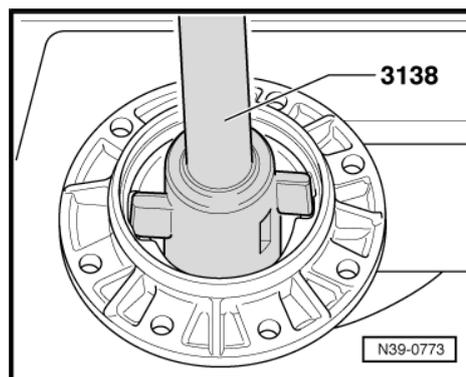
- ◆ *The pinion housing can also be removed and installed with the output flange fitted.*
- ◆ *Sealing surfaces between pinion housing and final drive housing and shim S₃ must be free of sealant.*
- ◆ *Also clean tapped holes in final drive housing and hexagon bolts securing pinion housing.*

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- Press small tapered roller bearing outer race out of pinion housing.



- Press large tapered roller bearing outer race out of pinion housing.

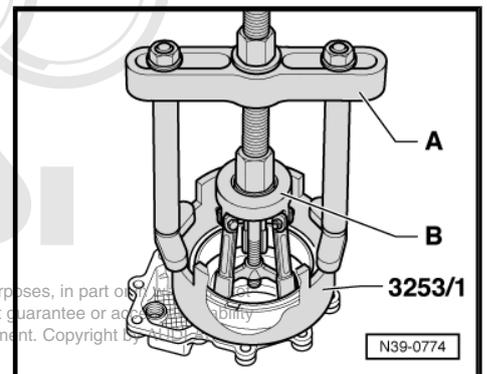
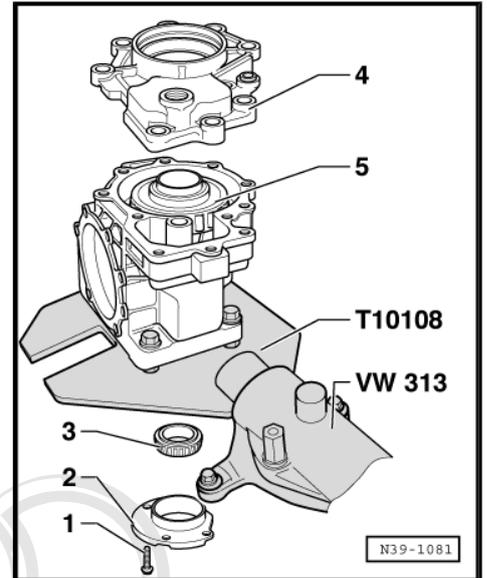


- Remove the four bolts -1- for small cover -2-.
- Detach small cover with tapered roller bearing outer race and shim S₂.
- Pull off tapered roller bearing inner race -3- from bevel gear with input shaft -5-.

 **Note**

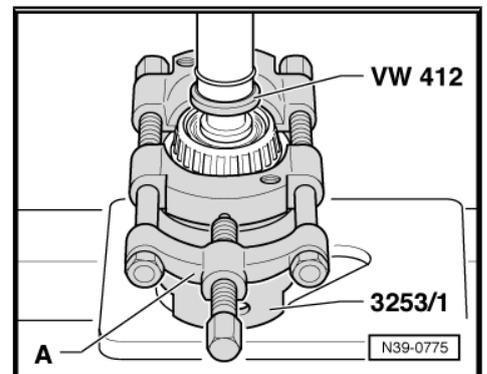
The inner race can be pulled off by hand. If necessary, carefully lift bevel gear with input shaft after removing large cover and detach inner race.

- Remove large cover -4-.
- Remove bevel gear with input shaft -5-.
- Pull large tapered roller bearing outer race out of large cover.
- A - Counter-support , e.g. -Kukko 22/4-
- B - Internal puller 56 ...110 mm , e.g. -Kukko 21/89-

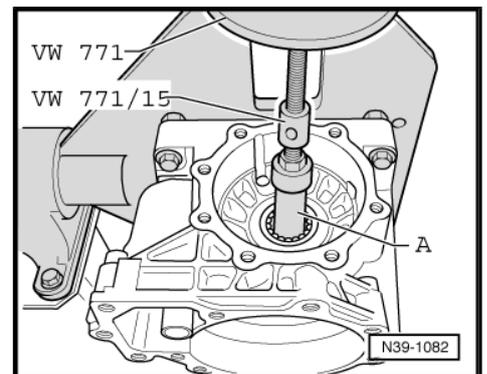


- Press off large tapered roller bearing inner race from bevel gear.

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



- Pull roller bearing out of final drive housing.
- A - Internal puller 22 ...28 mm , e.g. -Kukko 21/4-

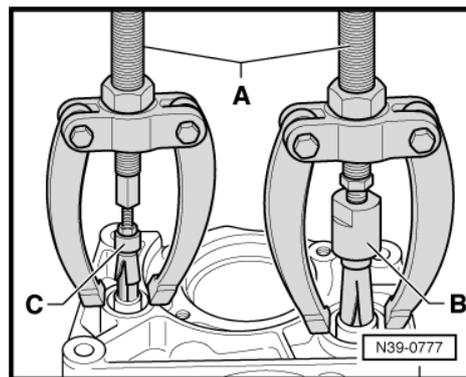


- Pull out oil supply sleeves.
- A - Counter-support , e.g. -Kukko 22/1-
- B - Internal puller 14.5 ...18.5 mm , e.g. -Kukko 21/2-
(To pull out large sleeve)
- C - Internal puller 8 ...12 mm , e.g. -Kukko 21/02-
(To pull out small sleeve)



Note

Sleeves can also be pulled out with bevel box remaining assembled.



3.1.4 Assembling bevel box



Note

Table of adjustments => page 202 .

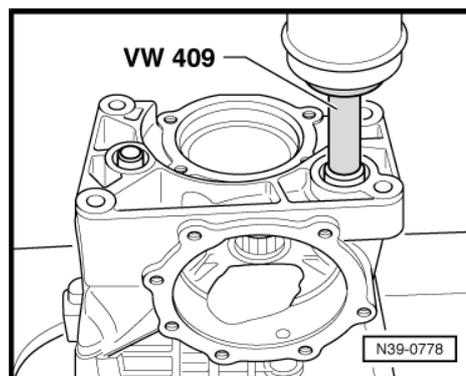
Pressing in oil supply sleeves

- Carefully press in until stop.



Note

- ◆ *Installation position: end with marking faces press tool*
- ◆ *Sleeves can also be driven in with press tool -VW 409- with the bevel box remaining assembled.*



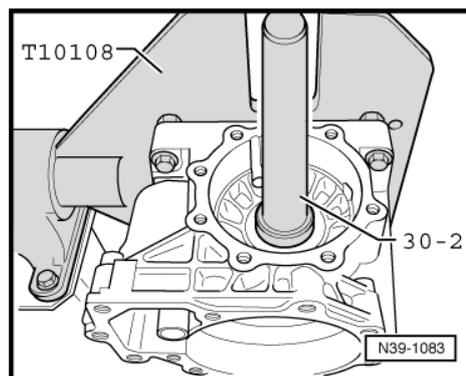
Pressing roller bearing into final drive housing

- Carefully press roller bearing into final drive housing onto stop using sleeve -V.A.G 30-21-

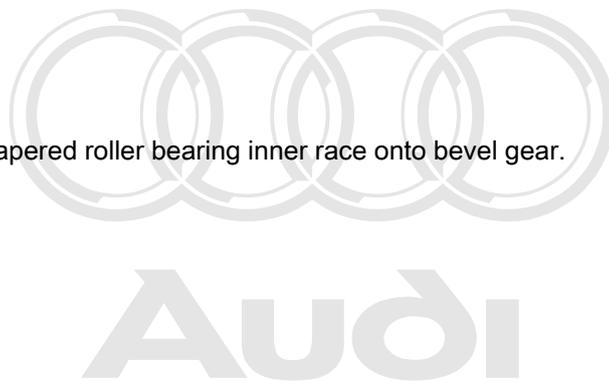
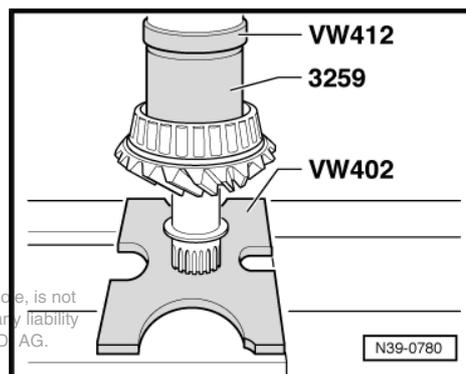


Note

The marking faces towards press tool.



- Press large tapered roller bearing inner race onto bevel gear.

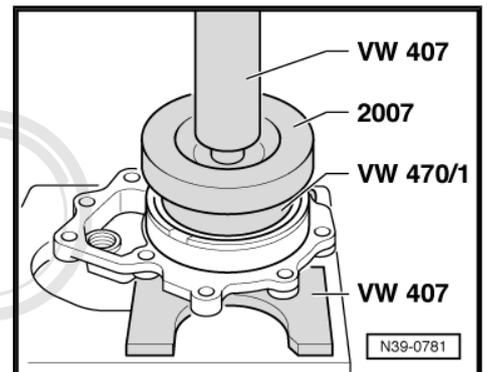
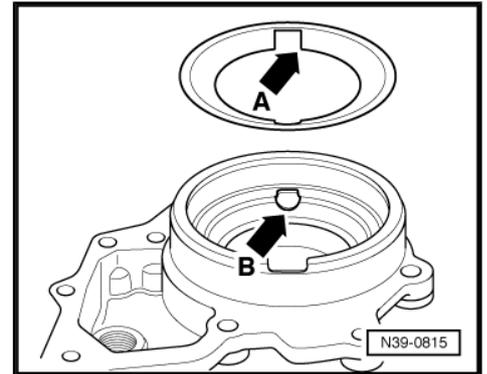


- Fit oil deflector plate with recess -arrow A- onto lug -arrow B- in large cover.

 **Note**

On some gearboxes shim S₁ is fitted between oil deflector plate and large cover. If fitted, place shim at the same position when installing.

- Insert shim S₁ into large cover and press in large tapered roller bearing outer race.



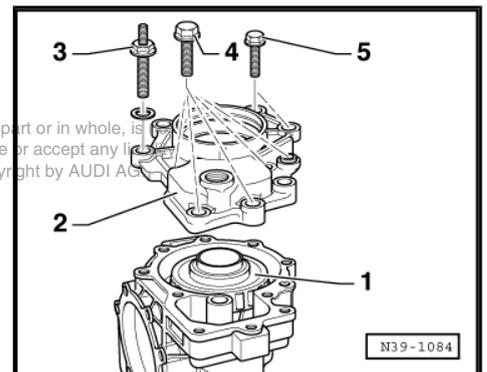
- Insert bevel gear with input shaft -1- into final drive housing.
- Lubricate new O-ring with oil and fit onto large cover -2-.

 **Note**

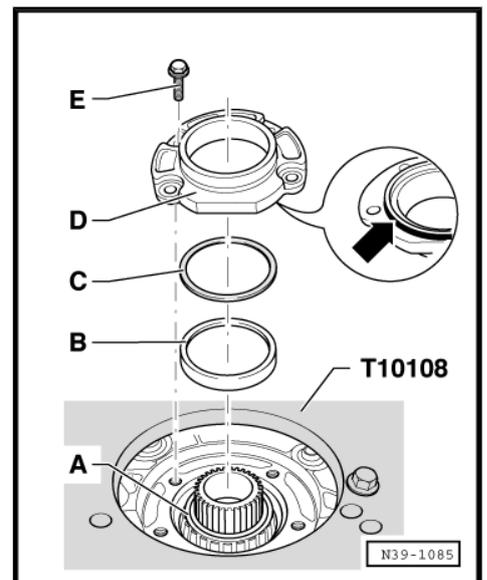
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The O-ring is not fitted on all gearboxes. On gearboxes without O-ring, apply sealant -AMV 188 200- evenly to sealing surface.

- Fit cover and tighten bolts -3-, -4- and -5- diagonally and in stages to correct torque => [Item 9 \(page 181\)](#) .

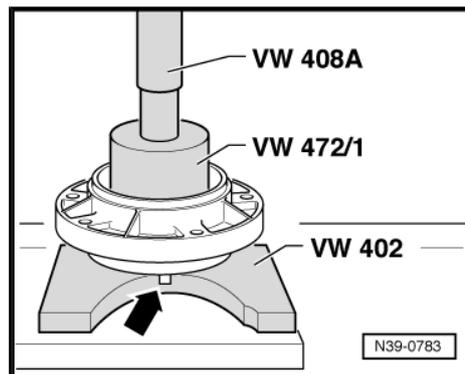


- Turn bevel box in assembly stand by 180°.
- Fit tapered roller bearing inner race -A- onto bevel gear with input shaft as far as stop.
- Then place tapered roller bearing outer race -B- and shim S₂ -C- on top.
- Fit a new O-ring -arrow- onto sealing surface of small cover -D-.
- Insert small cover and tighten bolts -E- to torque => [Item 21 \(page 182\)](#) .

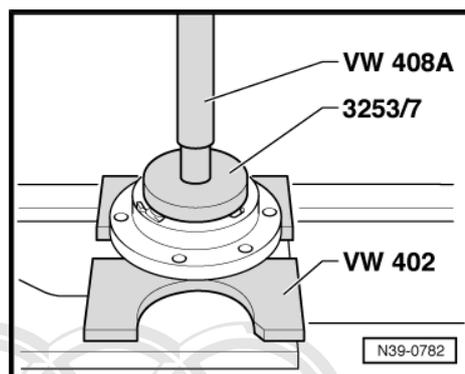


- Press in outer race for small tapered roller bearing into pinion housing.

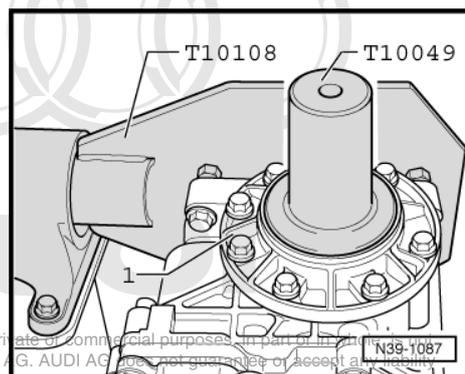
Make sure that the lug -arrow- on pinion housing does not make contact with thrust plate -VW 402- when pressing in.



- Press large tapered roller bearing outer race into pinion housing.
- Insert shaft bevel gear with shim S₄ and inner race for large tapered roller bearing in final drive housing.
- Apply sealant to both sides of shim S₃ and to final drive housing.



- Install pinion housing -1- (apply sealant to bolts when fitting).
- Insert small tapered roller bearing inner race for shaft bevel gear.
- Drive in new oil seal for output flange as far as stop using thrust piece -T10049- .
- Pack space between sealing lip and dust lip half-full with sealing grease -G 052 128 A1- .
- Apply multi-purpose grease evenly to splines of output flange and shaft bevel gear.

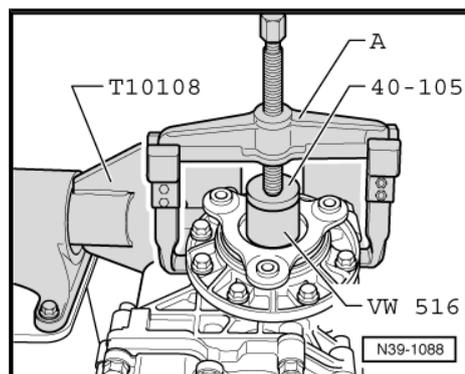


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Drawing in output flange

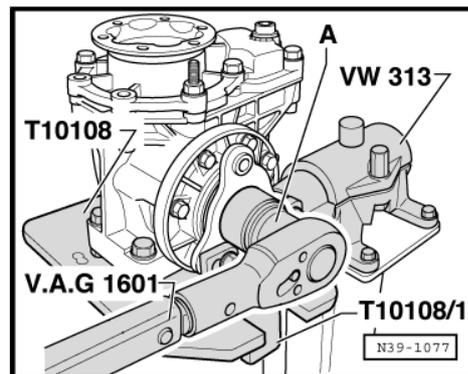
A - Two-arm puller , e.g. -Kukko 20/10-

- Attach hooks to underside of pinion housing.
- Coat threads of new hexagon nut and shaft bevel gear with locking fluid -D 000 600- .
- Install new hexagon nut for output flange and tighten to specified torque => [Item 32 \(page 182\)](#) .

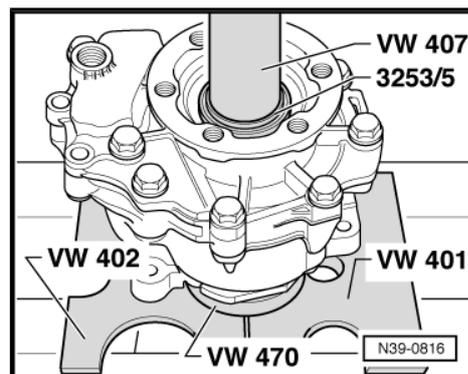
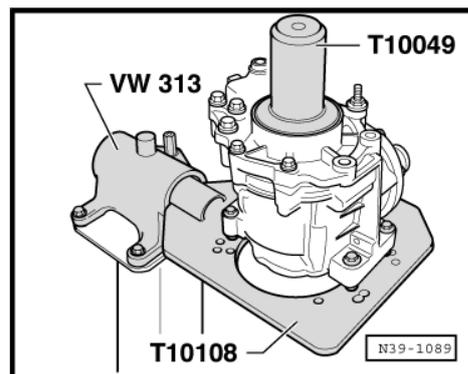


Socket -A- for 3/4" drive

- Drive in new oil seal for flange shaft (right-side) as far as stop.
- Pack space between sealing lip and dust lip half-full with sealing grease -G 052 128 A1- .



- Carefully press in flange shaft (right-side) while turning.
- Check whether it is still possible to turn flange shaft after pressing in.
- If necessary, apply a blow with a plastic-headed hammer onto other end of flange shaft.



3.2 Renewing needle bearings (polygon bearings) for flange shaft (right-side) with bevel box installed

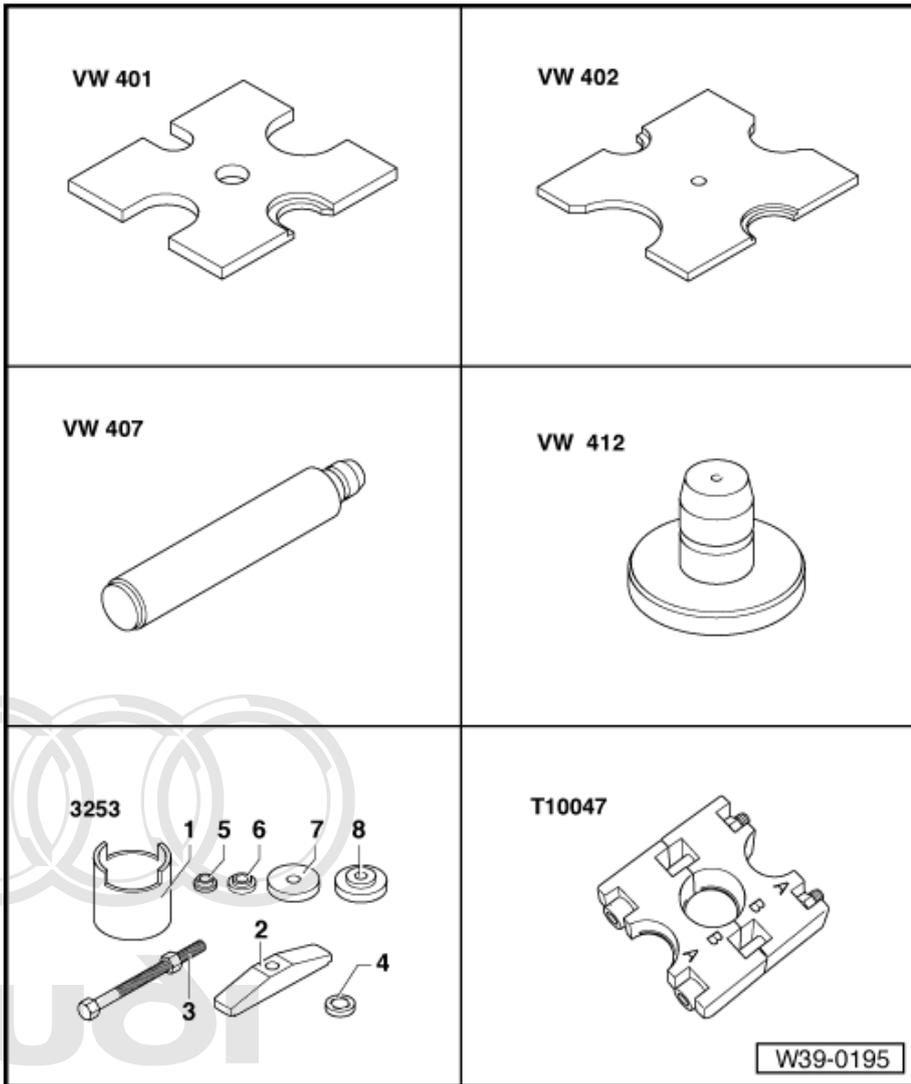


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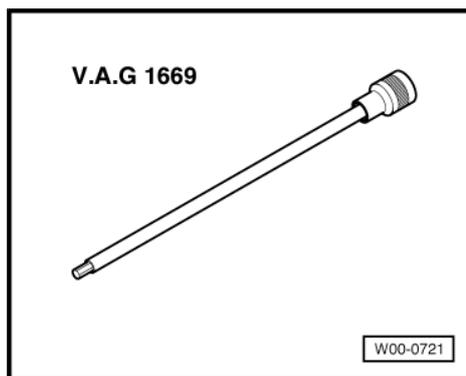
Special tools and workshop equipment required

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

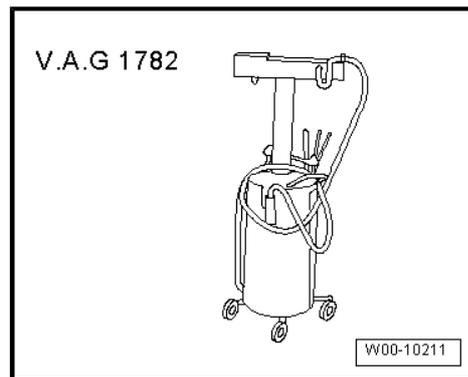


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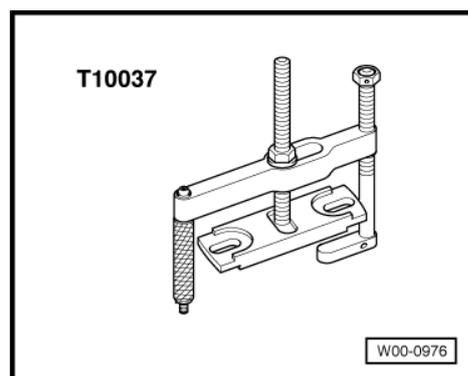
- ◆ Hexagon key -V.A.G 1669-



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

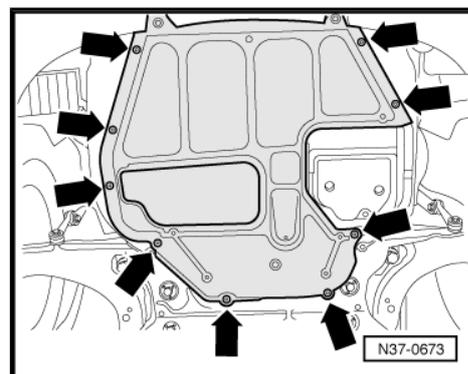


- ◆ Puller -T10037-

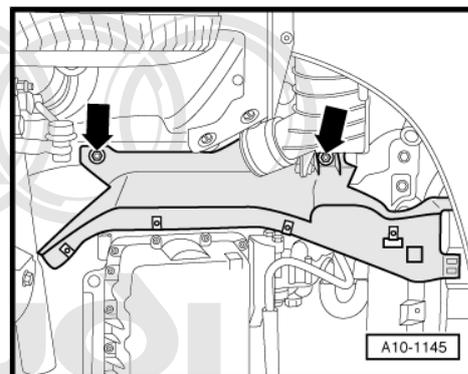


Procedure

- Remove centre noise insulation -arrows-

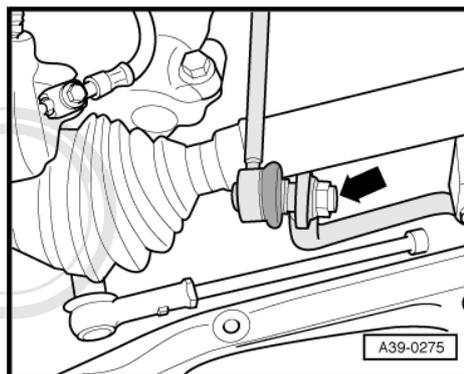


- Remove noise insulation (right-side) -arrows-



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- Unscrew nut -arrow- for coupling rod on anti-roll bar (right-side).



- Unscrew nut (top) from swivel joint (right-side).
- Position ball joint puller -3287 A- as shown in illustration and pull off swivel joint.

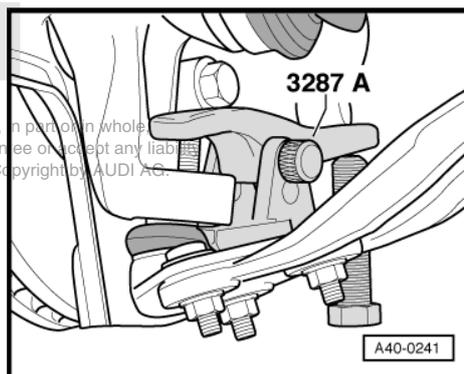
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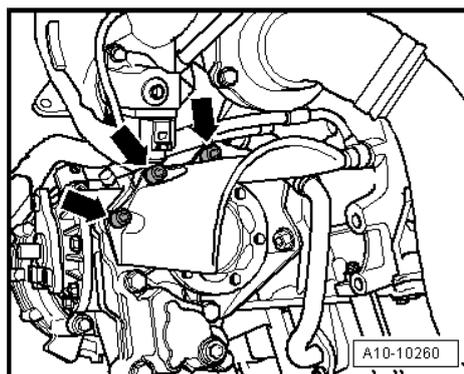
Note

To protect thread, leave nut screwed several turns onto ball joint.

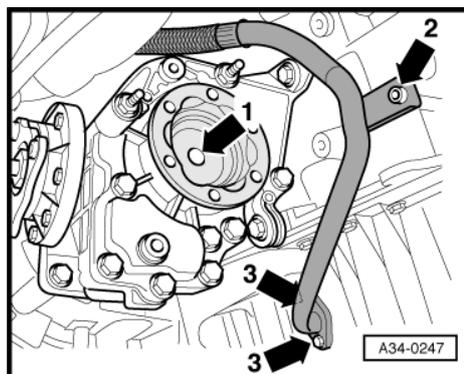
- Turn steering wheel to the left.



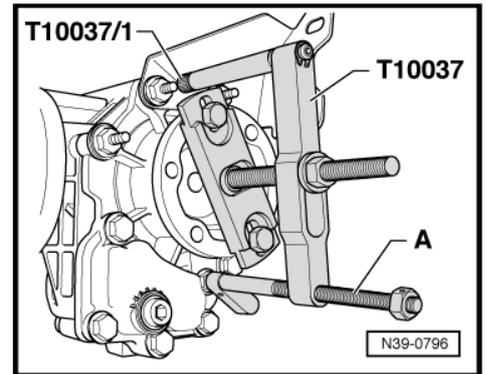
- Unscrew heat shield for drive shaft on right of bevel box -arrows-.
- Unbolt drive shaft (right side) from gearbox flange shaft.
- Lift drive shaft (right-side) up and secure with wire.



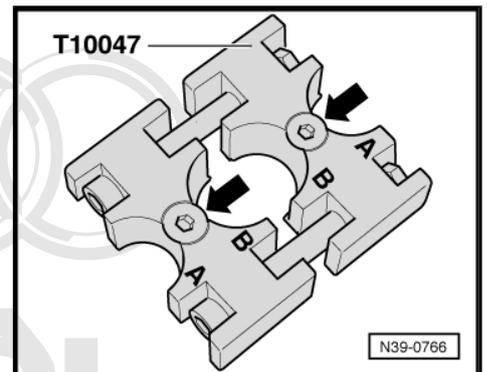
- Place used oil collection and extraction unit -V.A.G 1782- below gearbox.
- Unscrew oil return line for turbocharger from engine oil sump and cylinder block -arrows 1 and 2-.
- Unscrew countersunk bolt for flange shaft (right-side) -arrow 1- using hexagon key -V.A.G 1669- .



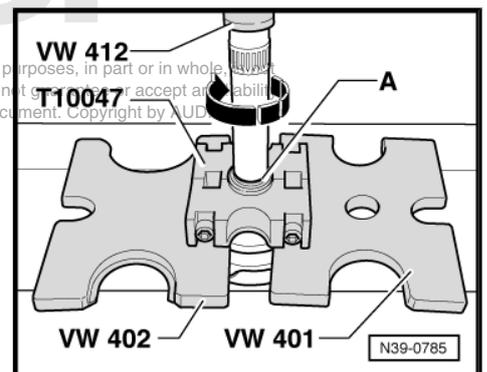
- Bolt puller -T10037- to flange shaft (right-side).
- Use knurled nut -T10037/1- and lower support -A- to align puller parallel with flange.
- Pull out flange shaft.



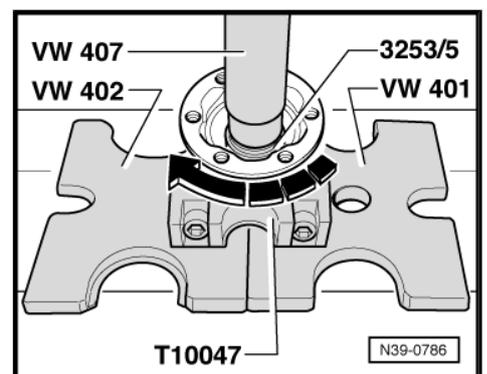
- Fit tensioning tool -T10047- so that markings "B" on both sections of tensioning tool point towards each other.
- The stepped shoulders -arrows- must then be below the bearing.
- Screw both sections together as far as stop.



- Remove circlip -A- securing bearings.
- Rotate shaft when pressing off arrow to prevent contact surface of bearings on shaft from being damaged.



- Rotate shaft when pressing on -arrow- to prevent contact surface of bearings on shaft from being damaged.
- Secure bearings with a new circlip.
- Carefully drive in flange shaft (turn flange shaft when doing so).
- Secure flange shaft with countersunk bolt.
- Install oil return line from turbocharger with new seal => Rep. Gr. 21 .
- Bolt drive shaft (right-side) to gearbox flange shaft => Running gear, front-wheel drive and four-wheel drive; Rep. Gr. 40 .

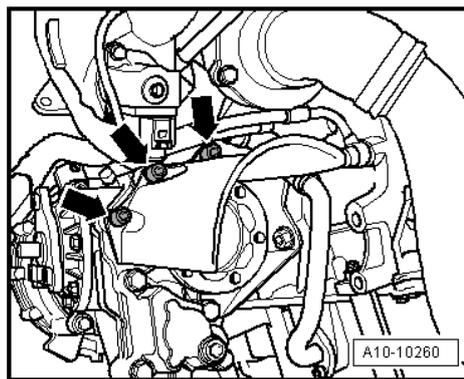




- Install heat shield for drive shaft (right-side) -arrows-.
- Install swivel joint and coupling rod ⇒ Running gear, front-wheel drive and four-wheel drive; Rep. Gr. 40 .
- Check gear oil in manual gearbox with bevel box ⇒ [page 82](#) .
- Install noise insulation panels ⇒ General body repairs, exterior; Rep. Gr. 50 .
- Fill up with engine oil ⇒ Rep. Gr. 17 .

Tightening torques

Component	Nm
Flange shaft to gearbox (countersunk bolt)	25
Heat shield for drive shaft to bevel box	25



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4 Adjusting shaft bevel gear and bevel gear (final drive gear set)

4.1 General notes

Careful adjustment of the shaft bevel gear and bevel gear is essential to ensure that the final drive gear set gives long service and runs silently. During manufacture the bevel gear and shaft bevel gear are therefore matched and checked on testing machines to ensure correct mesh pattern and silent running. The position for quietest running is obtained by moving the shaft bevel gear axially and, at the same time, maintaining the backlash within the specified tolerance. If required, the shaft bevel gear and bevel gear (final drive gear set) must always be renewed together.

4.2 Adjustment and marking of final drive gear set

A - Bevel gear

B - Shaft bevel gear

C - Actual distance between bevel gear axis and reverse side of shaft bevel gear (contact point of large tapered roller bearing inner race) at point of smoothest running for this particular final drive gear set. Distance = 65.50 mm.

1 - Gear set pairing number -561-.

2 - Tolerance of shaft bevel gear ($D = +10$)

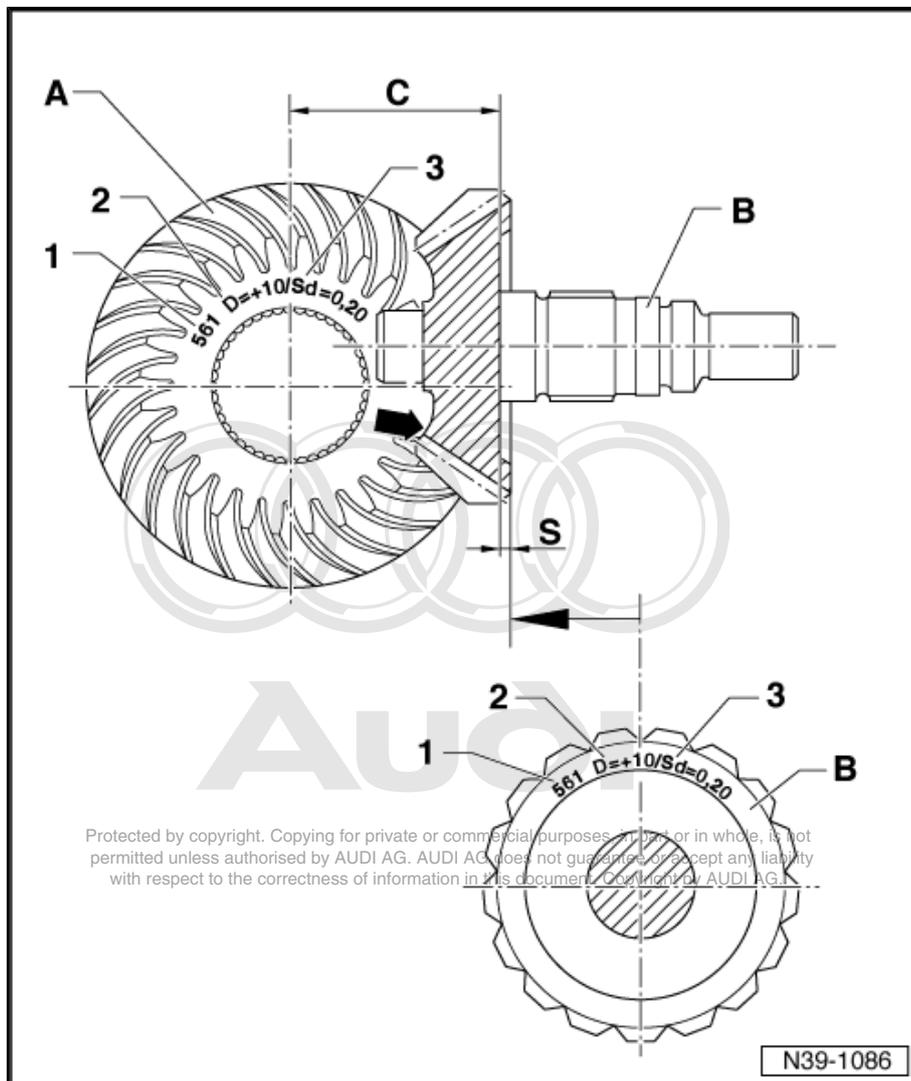
- Distance can be between 0 and +0.35 mm (+0.10 mm in example)
- Add to distance -C- when measuring

3 - Backlash ($S_d = 0.20$)

- Specification when checking adjustment

S - Offset dimension

- Distance between machined surface on reverse side of gear teeth and contact surface of tapered roller bearing inner race or shim S_4 on shaft bevel gear.
- This value is marked on the face -arrow- of the shaft bevel gear (3.95 in example).



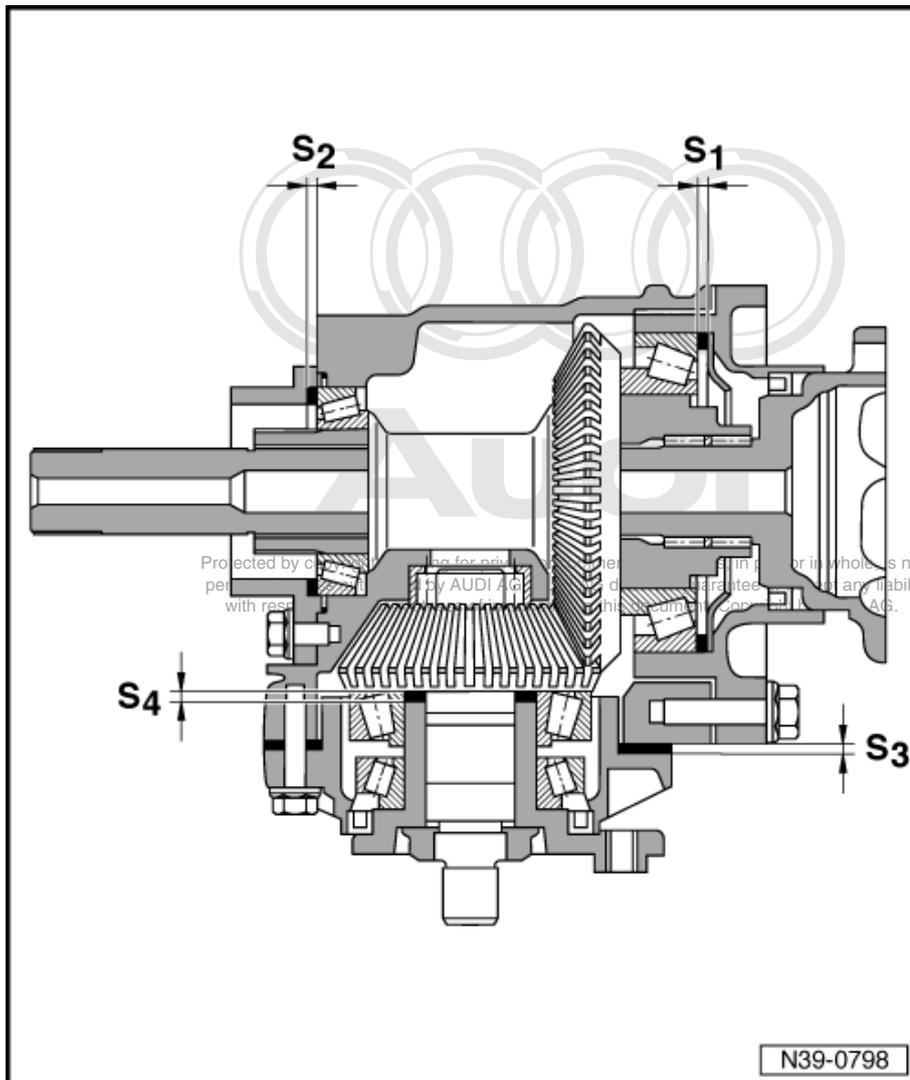
4.3 Position of shims

S1 - Shim for friction torque of bevel gear tapered roller bearing

S2 - Shim for friction torque and positioning of bevel gear

S3 - Shim for shaft bevel gear

S4 - Shim for friction torque of shaft bevel gear tapered roller bearing



4.4 Adjustment overview (bevel box)



Note

If repairs have been carried out on the gearbox it is only necessary to adjust the shaft bevel gear, bevel gear or the complete final drive gear set when parts are renewed which directly influence the adjustment of the final drive. Refer to the following table to avoid unnecessary adjustment work:

		Components requiring adjustment:	
		Shaft bevel gear (S3 and S4) ⇒ page 204	Bevel gear (S1 and S2) ⇒ page 210
Components renewed:	Final drive housing	x ¹¹⁾	x
	Cover, large		x
	Cover, small		x

Final drive gear set (shaft bevel gear and bevel gear with input shaft)	x	x
Tapered roller bearings for shaft bevel gear	x	
Tapered roller bearings for bevel gear		x
Pinion housing	x	
Output flange	x ¹²⁾	

11) S₃ only. The shaft bevel gear is removed together with the pinion housing. Therefore the shim S₄ remains in place and is unchanged.

12) S₄ only. Calculated from difference between measurements

⇒ [page 203](#).

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4.5 Recommended sequence for adjusting gear set

To avoid unnecessary work, keep to the following sequence when adjusting the shaft bevel gear and bevel gear.

Step 1: Adjusting shaft bevel gear (S₃ and S₄)

- Determine required thickness of shim "S₄" and install shim. This sets the preload of the tapered roller bearings for the shaft bevel gear.
- Determine required thickness of shim "S₃" and install shim. This sets the axial position of the shaft bevel gear so that the distance from the centre of the bevel gear to the rear surface of the shaft bevel gear corresponds to the distance "C" measured in production.

Step 2: Adjusting bevel gear (S₁ and S₂)

- Adjust preload of tapered roller bearings for bevel gear via S_{total}.
- Adjust backlash. Select shims "S₁" and "S₂" so that the required backlash between shaft bevel gear and bevel gear is obtained.
- Check backlash

The object of the adjustment is to reproduce the setting for quietest possible running, as obtained on the test machine in production. For good results, maximum care and cleanliness are very important when performing repairs and taking measurements.

4.6 Determining thickness of shim "S₄" when renewing output flange

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

- Measure length of shaft on removed output flange and new output flange and calculate the difference.

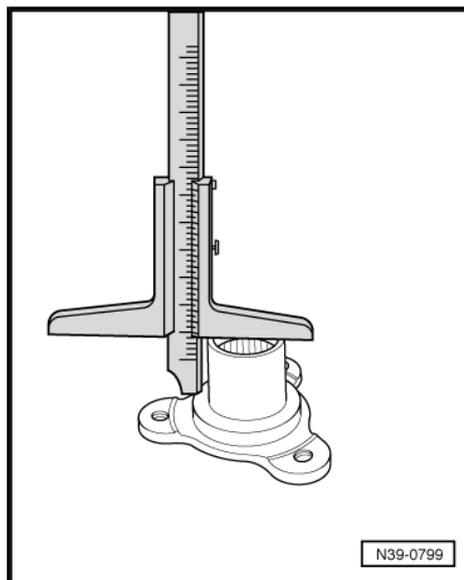
Example:

Removed output flange	43.50 mm
New output flange	43.30 mm
Difference	0.20 mm

If the new output flange is longer: Install a thinner shim for S₄ (thickness reduced by the difference calculated above).

If the removed output flange is longer: Install a thicker shim for S₄ (thickness increased by the difference calculated above).

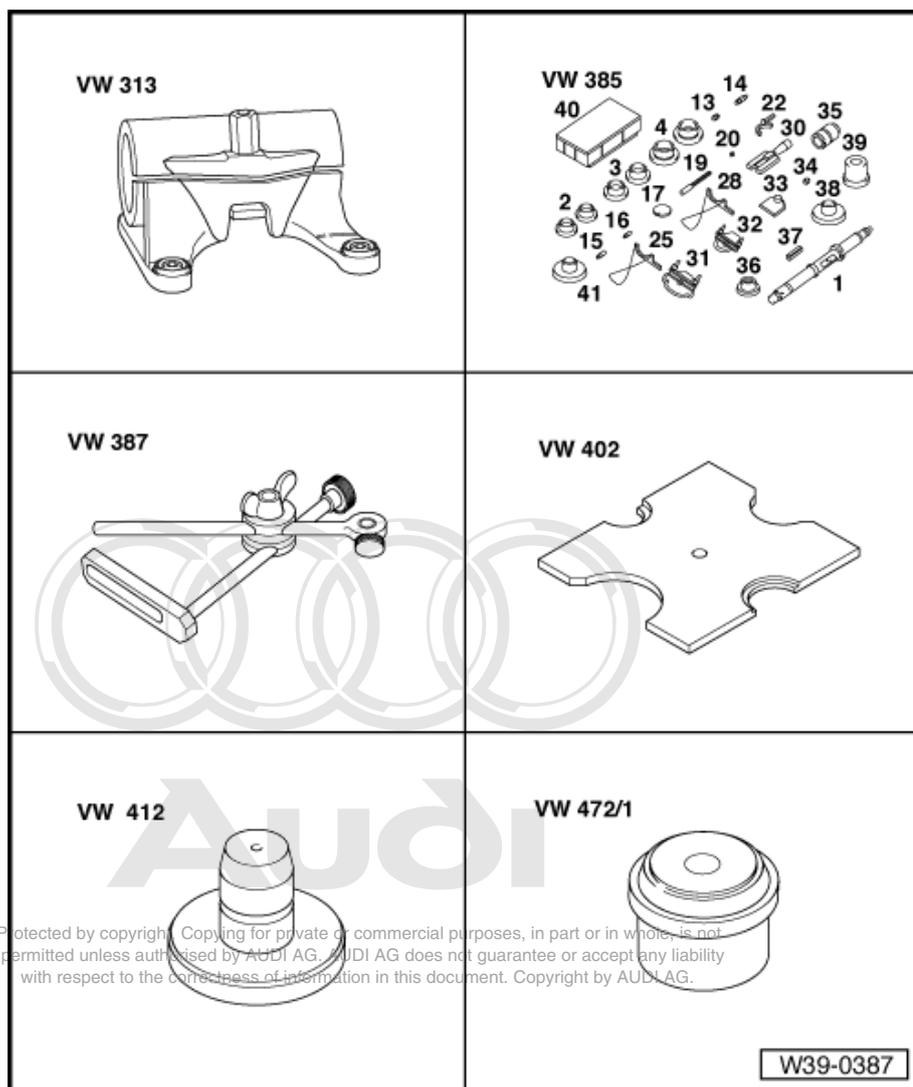
- Refer to Parts catalogue for correct shim(s).



4.7 Adjusting shaft bevel gear

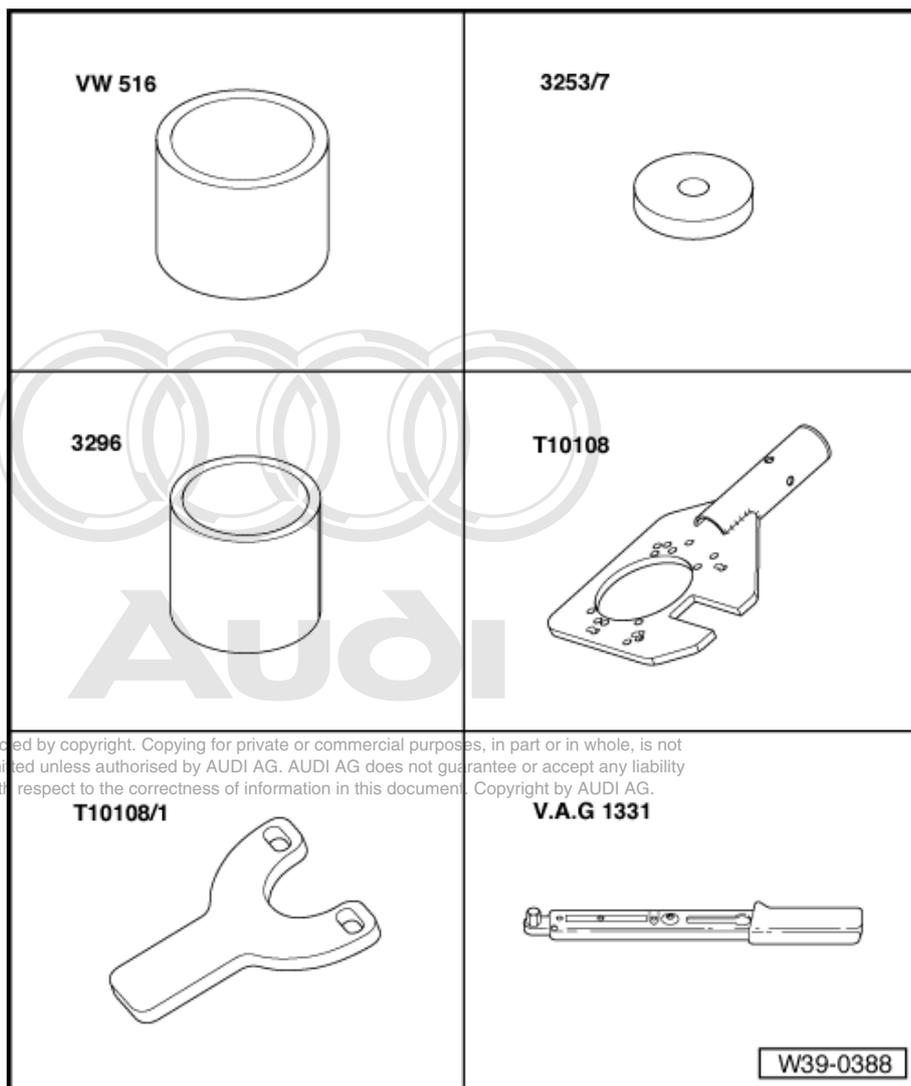
Special tools and workshop equipment required

- ◆ Support clamp -VW 313-
- ◆ Universal measuring tool - VW 385-
- ◆ Universal dial gauge bracket -VW 387-
- ◆ Thrust plate -VW 402-
- ◆ Press tool -VW 412-
- ◆ Press tool -VW 472/1-



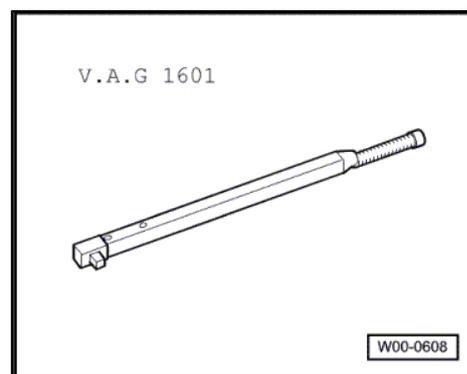
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- ◆ Tube -VW 516-
- ◆ Press piece -3253/7-
- ◆ Tube -VAS 3296-
- ◆ Gearbox support -T10108-
- ◆ Support plate -T10108/1-
- ◆ Torque wrench -V.A.G 1331/-
- ◆ Digital depth gauge -VAS 6087-
- ◆ Feeler gauge (with 0.03 mm scale)
- ◆ Dial gauge
- ◆ Torque gauge, commercially available, 0 ... 600 Ncm



Special tools and workshop equipment required

- ◆ Torque wrench -V.A.G 1601-



Readjustment of the shaft bevel gear is required if

- ◆ Final drive housing
- ◆ Tapered roller bearings for shaft bevel gear
- ◆ Final drive gear set

or the

- ◆ Pinion housing

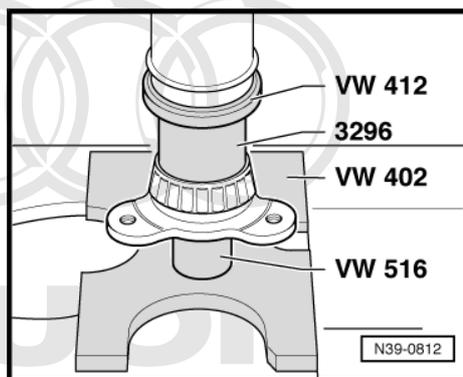
are renewed.

Table of adjustments => [page 202](#)

4.7.1 Determining thickness of shim "S4"

- Oil seal for output flange removed
- Press large tapered roller bearing outer race for shaft bevel gear into pinion housing with press piece -3253/7- => [page 194](#) .
- Press small tapered roller bearing outer race for shaft bevel gear into pinion housing with press tool -VW 472/1- => [page 194](#) .
- Fit large tapered roller bearing inner race onto shaft bevel gear.
- Press small tapered roller bearing inner race onto output flange.
- Insert shaft bevel gear.
- Fit the thickest shim "S4" = 2.5 mm (refer to => Electronic parts catalogue, ETKA) onto shaft bevel gear.
- Install output flange with inner race and fit hexagon nut.
- Screw in hexagon bolt -A- M10 to hold flange.

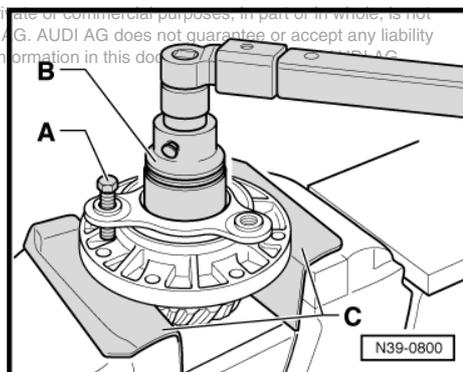
Socket attachment -B-



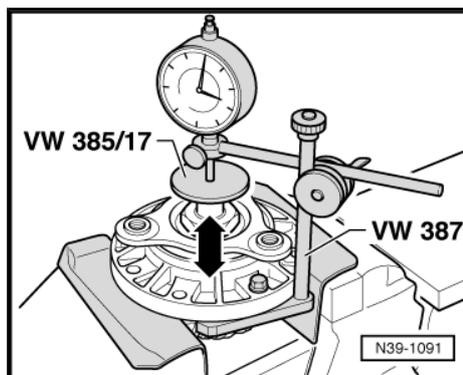
Jaw protectors -C-

- Tighten hexagon nut to 50 Nm, loosen or completely remove hexagon bolt -A-.
- Press shaft bevel gear towards large tapered roller bearing outer race and turn eight times.

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- Attach dial gauge and set to "0" with a preload of 1 mm.
- Move shaft bevel gear up and down (direction of -arrow-).
- Read off play from dial gauge and determine S4



4.7.2 Example:

Shim	2.50 mm
- Preload (constant value)	0.20 mm
- Clearance (read off dial gauge)	0.35 mm

Shim S4 = 1.95 mm

i Note

Select correct shims from => *Electronic parts catalogue (ETKA)*.

4.7.3 Shims available for S4

Shim thickness (mm)			
1.30	1.65	2.00	2.35
1.35	1.70	2.05	2.40
1.40	1.75	2.10	2.45
1.45	1.80	2.15	2.50
1.50	1.85	2.20	
1.55	1.90	2.25	
1.60	1.95	2.30	

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- Install determined shim S4 instead of shim of thickness 2.50 mm.
- Fit pinion housing with shim S3 onto final drive housing.

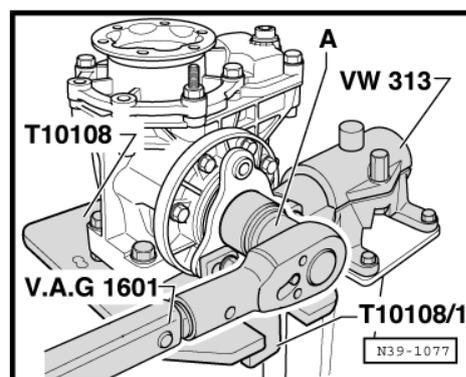
i Note

Fit shim S3 (e.g. 1.2 mm) when securing pinion housing to prevent the shaft bevel gear from making contact with the final drive housing.

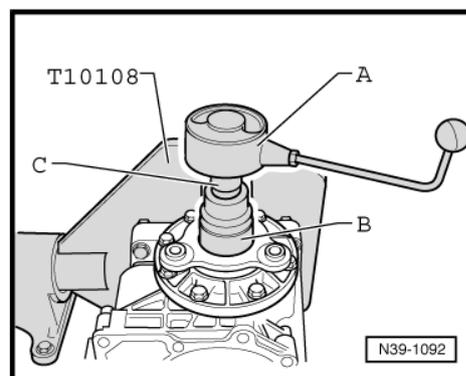
- Lock bevel box output flange with support plate -T10108/1- .
- Install hexagon nut for output flange and tighten to specified torque => [Item 32 \(page 182\)](#) .

Socket -A- for 3/4" drive

- Input shaft with bevel gear is removed



- Measure friction torque.
- A- Torque gauge, commercially available, 0 ...600 Ncm
- B- Socket attachment
- C- Adapter between 1/2 " and 3/4 "



4.7.4 Set friction torque as follows:

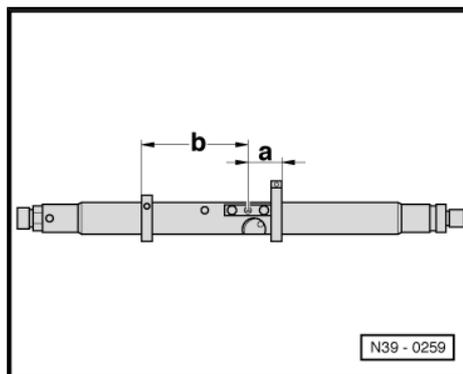
New bearings	Used bearings ¹³⁾
100 ... 240 Ncm	30 ... 50 Ncm

13) run at least 50 km (30 miles)

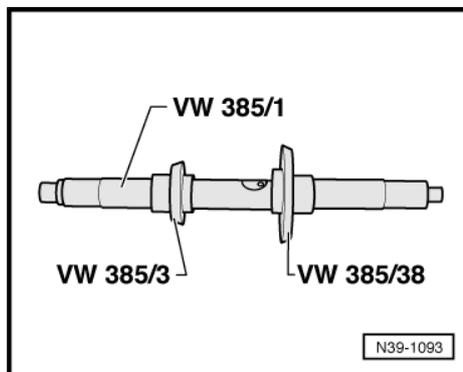
Correct if necessary by fitting a thinner (more friction torque) or thicker (less friction torque) S4 shim.

4.7.5 Determining thickness of shim "S3"

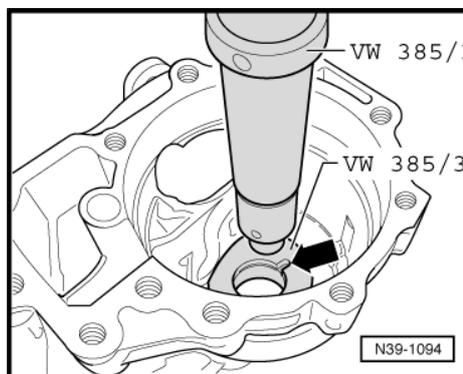
- Input shaft with bevel gear is removed.
- Outer races of taper roller bearings for bevel gear with input shaft are installed.
- Adjust setting ring of universal measuring tool -VW 385/1- to dimension "a" = 32 mm.
- Set the adjustable ring to dimension "b" = 70 mm.



- Assemble universal measuring tool -VW 385/1- as illustrated.



- Place centralising disc -VW 385/3- into small tapered roller bearing outer race.
- Insert universal measuring tool -VW 385/1- (make sure that the lugs of the adjustable ring lock into the slot -arrow- on the centralising disc).
- Attach large cover and tighten hexagon bolts.
- Using the adjustable ring, move the centralising disc outwards until it is no longer possible to turn universal measuring tool by hand.



4.7.6 Determining dimension -A-:

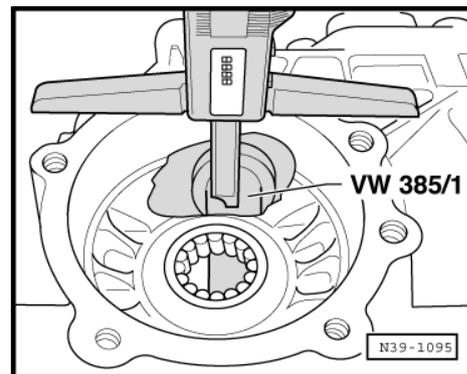
- Measure the distance between the joint surface for the pinion housing and the highest point of the universal measuring tool using a digital depth gauge (e.g. depth gauge -VAS 6087-).

In example: measurement = 72.50 mm.

- Add half the diameter of universal measuring tool -VW 385/1- to this measurement. This value is 16.00 mm.

Example:

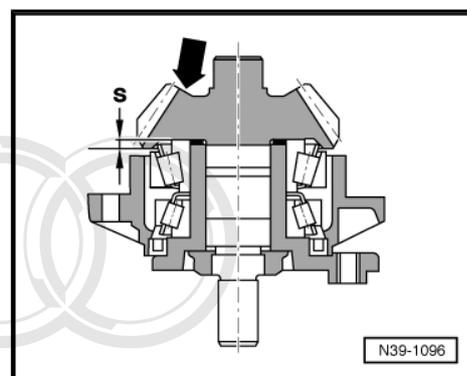
Depth as measured with depth gauge	72.50 mm
Half the Ø of universal measuring tool	+ 16.00 mm
Dimension -A-	= 88.50 mm



4.7.7 Determining dimension -B-:

The 1st value is the offset dimension -s- (3.95 mm in example). This value is marked on the face of the shaft bevel gear -arrow-.

- Hexagon nut for output flange is tightened to torque => [Item 32 \(page 182\)](#) .



The 2nd value is determined by measuring the distance between the large tapered roller bearing outer race (installed in pinion housing) and the machined rear surface of the shaft bevel gear.

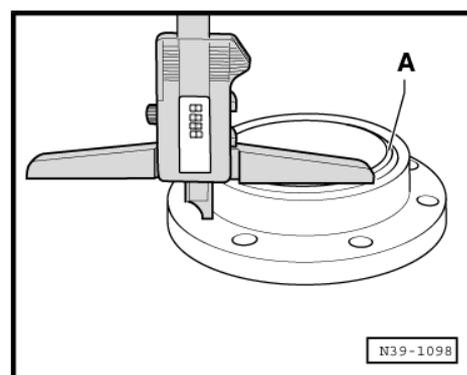
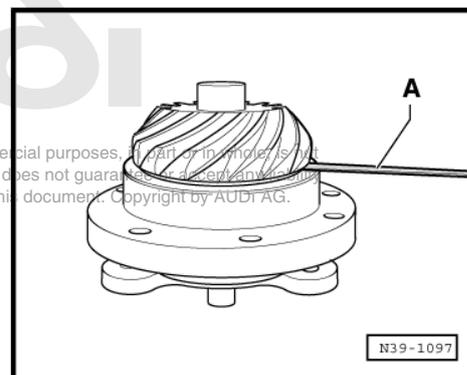
- Measure this gap "f" using a feeler gauge -A-.

Note

Use feeler gauges graduated in steps of 0.03 mm.

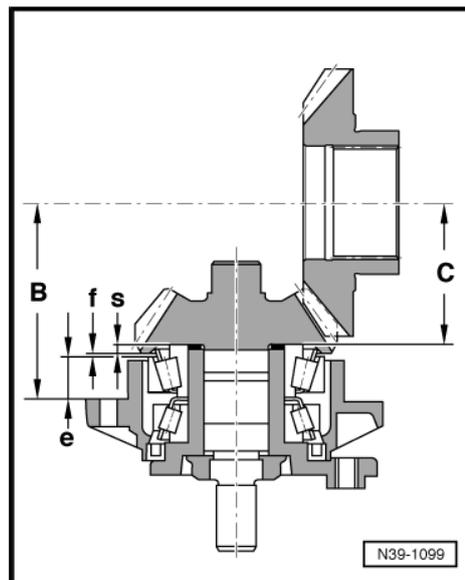
In example: measurement = 0.95 mm.

- To attain the 3rd value, the shaft bevel gear must be removed from the pinion housing.
- Measure distance between large tapered roller bearing outer race -A- and joint surface of pinion housing using a digital depth gauge (e.g. depth gauge -VAS 6087-).
- Write down value -e- (20.10 mm in example)



Example:

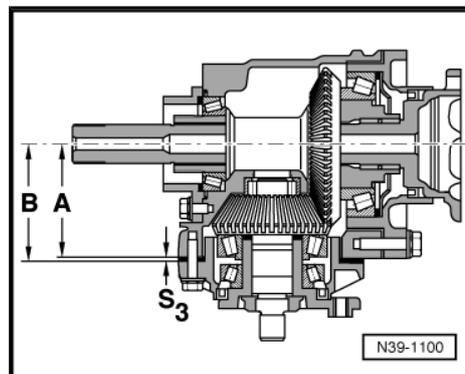
Noted offset dimension -s-	3.95 mm
Gap -f- as determined with feeler gauge	+ 0.95 mm
Dimension -e- as determined with depth gauge	+ 20.10 mm
Meshing dimension "C" with shaft bevel gear tolerance dimension "D" (C + D)	+ 65.60 mm
Dimension -B-	= 90.60 mm



4.7.8 Determining thickness of shim "S3"

$S_3 = \text{Dimension "B"} - \text{Dimension "A"}$

Dimension -B-	90.60 mm
Dimension -A-	- 88.50 mm
Thickness of shim S₃	= 2.10 mm



Note

Select correct shims from → *Electronic parts catalogue (ETKA)*.

4.7.9 Shims available for S₃

Shim thickness (mm)			
1.20	1.50	1.80	2.10
1.25	1.55	1.85	2.15
1.30	1.60	1.90	2.20
1.35	1.65	1.95	
1.40	1.70	2.00	
1.45	1.75	2.05	

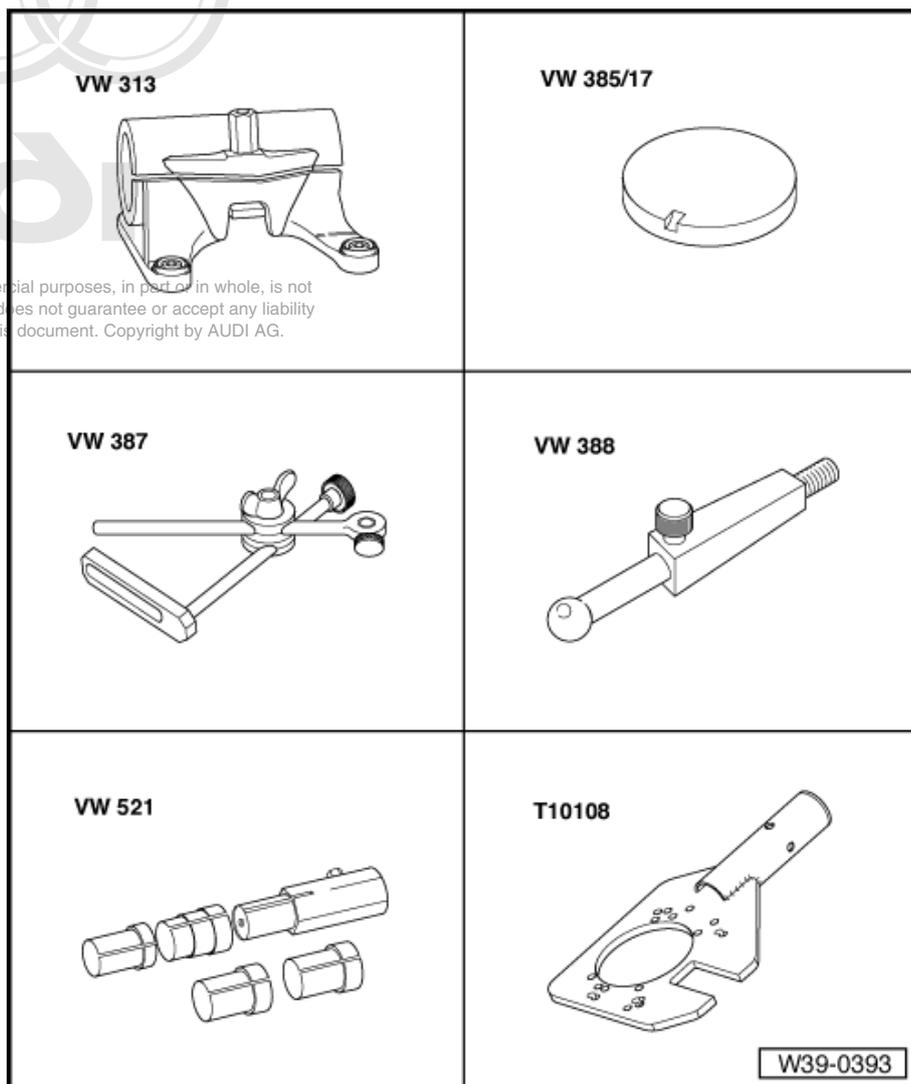
– Tolerance variations make it possible to obtain the exact shim thickness required.

4.8 Adjusting bevel gear

Special tools and workshop equipment required

- ◆ Support clamp -VW 313-
- ◆ End measuring plate -385/17-
- ◆ Universal dial gauge bracket -VW 387-
- ◆ Adjustable measuring lever -VW 388-
- ◆ Crown wheel adjusting tool -VW 521-
- ◆ Gearbox support -T10108-
- ◆ Dial gauge

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Readjustment of the bevel gear is required if

- ◆ Final drive housing
 - ◆ Cover
 - ◆ Tapered roller bearings for bevel gear with input shaft
- or
- ◆ Final drive gear set
- are renewed.

Table of adjustments ⇒ [page 202](#)

4.8.1 Adjusting preload of tapered roller bearings for bevel gear (friction torque)

Shaft bevel gear is removed.

- Insert bevel gear with input shaft -5- into final drive housing.
- Fit tapered roller bearing inner race -3- onto bevel gear with input shaft as far as stop.
- Fit 1.75 mm shim in seat of small tapered roller bearing outer race (S₂ side) in small cover -2-.

For measurement purposes a shim S₂ with a thickness of 1.75 mm is fitted provisionally. This is referred to in the following as S₂^{*}. S₂^{*} is replaced with the final shim S₂ after determining backlash.

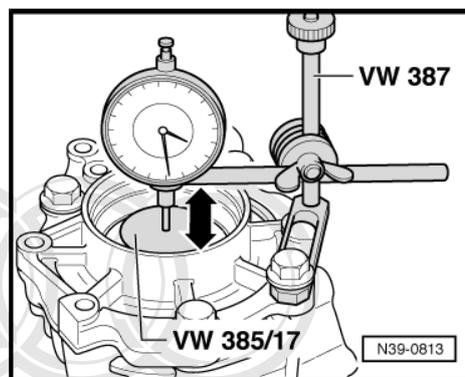
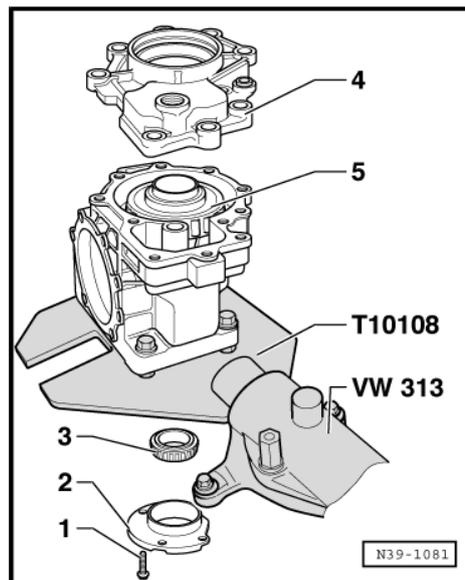
- Insert small cover and tighten bolts to torque => [Item 21 \(page 182\)](#) .



Note

On some gearboxes shim S₁ is fitted between oil deflector plate and large cover. On these gearboxes the oil deflector plate must be removed and a provisional shim S₁ fitted, which corresponds to the thickness of the oil deflector plate (e.g. 0.75 mm); Part No. => *Electronic parts catalogue, ETKA* .

- Install large cover with large tapered roller bearing outer race but without O-ring, flange shaft oil seal and without shim S₁.
- Press bevel gear with input shaft towards large cover and turn eight times.
- Press bevel gear with input shaft towards outer race for small tapered roller bearing and turn eight times.
- Attach dial gauge and set to "0" with a preload of 2 mm.
- Move bevel gear with input shaft up and down (direction of -arrow-)
- Read off play from dial gauge and determine S_{total}.



4.8.2 Example:

"S_{total}" = S₂^{*} + Measurement result + preload

Fitted shim(s) S ₂ [*]	1.75 mm
Measurement result (example)	+ 0.75 mm
Preload (constant value)	+ 0.20 mm
S _{tot}	= 2.70 mm

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4.8.3 Determining thickness of shim S_1^*



Note

- ◆ Provisional shim S_1^* is replaced with final shim S_1 after determining backlash.
- ◆ Total shim thickness " S_{total} " remains unchanged.

$$S_1^* = S_{tot} - S_2^*$$

4.8.4 Example:

Total shim thickness " S_{total} "	2.70 mm
Shim(s) S_2 fitted	- 1.75 mm
Thickness of shim S_1	= 0.95 mm



Note

Select correct shims from \Rightarrow *Electronic parts catalogue (ETKA)*.

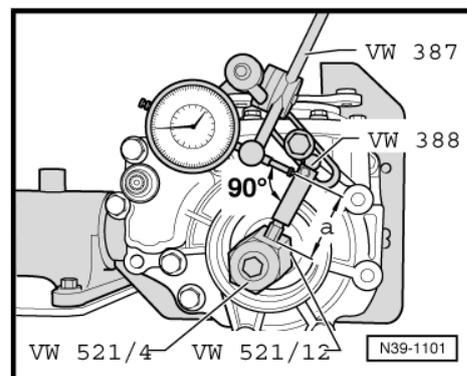
Shims available for $S_1 \Rightarrow$: see table \Rightarrow [page 215](#) and \Rightarrow [page 215](#).

4.8.5 Measuring backlash

Pinion housing with shaft bevel gear and S_3 installed

Install bevel gear with input shaft: S_1^* is fitted on large cover side, S_2^* on small cover side.

- Fit measuring tools.
- ◆ Dimension "a" = 43.5 mm
- ◆ Screw in adjustable measuring lever -VW 388- so that the dial gauge extension is at right angles to the measuring face.
- Rotate bevel gear with input shaft until stop. The shaft bevel gear must be held in one position. Position dial gauge, turn bevel gear with input shaft back and read off backlash. Note this value.
- Loosen clamping sleeve locking screw and after turning bevel gear with input shaft through a further 90°, repeat complete measuring process a further 3 times. Add up the four measured values and calculate the average backlash.



Calculating average backlash

4.8.6 Example:

1st measure- ment	0.30 mm
+ 2nd measure- ment	0.31 mm
+ 3rd measure- ment	0.30 mm
+ 4th measure- ment	0.29 mm
Total	1.20 mm



Average backlash = 1.20 mm : 4 = 0.30 mm.

4.8.7 Determining shim thickness S_2

$$S_2^* = \begin{array}{l} \text{Shim installed} \\ - \text{Average backlash} \\ + \text{Lift (constant value)} \end{array}$$

Lift = 0.20 mm

4.8.8 Example:

S_2^*	Shim installed	1.75 mm
-	Average backlash	0.30 mm
		1.45 mm
+	Lift (constant value)	0.20 mm
S_2	=	1.65 mm



Note

Select correct shims from \Rightarrow Electronic parts catalogue (ETKA).

4.8.9 Shims available for S_2

Shim thickness (mm)			
1.45	1.75	2.05	2.35
1.50	1.80	2.10	2.40
1.55	1.85	2.15	2.45
1.60	1.90	2.20	2.50
1.65	1.95	2.25	
1.70	2.00	2.30	

- Install determined shim S_2 instead of provisional S_2 .

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

- Tolerance variations make it possible to obtain the exact shim thickness required.
- Press outer race in again and install bevel gear with input shaft.

4.8.10 Determining shim thickness S_1

$$S_1 = S_{\text{total}} - S_2$$

Example:

$$S_1 = 2.70 \text{ mm} - 1.65 \text{ mm}$$

$$S_1 = 1.05 \text{ mm}$$



Note

Select correct shims from \Rightarrow Electronic parts catalogue (ETKA).

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4.8.11 Shims available for S₁

Shim thickness (mm)			
0.65	0.85	1.05	1.25
0.70	0.90	1.10	1.30
0.75	0.95	1.15	1.35
0.80	1.00	1.20	1.40

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

- Insert determined S₁ shim.



Note

On some gearboxes shim S₁ is fitted between oil deflector plate and large cover. On those gearboxes the shim fitted as a substitute must be exchanged for the originally fitted oil deflector plate in the same position.

- Press outer race in again.
- Install large cover.

4.8.12 Checking adjustment - measuring backlash

- It should be 0.15...0.20 mm.



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5 Propshaft

Refer to Workshop Manual ⇒ Rear final drive 02D; Rep. Gr. 39
for repairs on the propshaft.

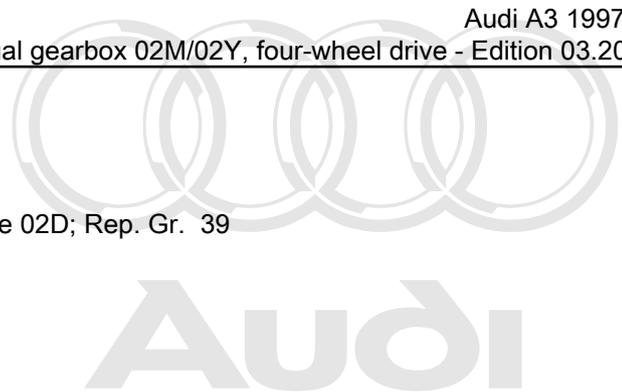


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6 Rear final drive

Refer to Workshop Manual ⇒ Rear final drive 02D; Rep. Gr. 39
for repairs on the rear final drive.



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