

Audi A3 1997 ➤

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

Gearbox ID	DQB	DXW	EFY						
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Edition 12.1998



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List of Workshop Manual Repair Groups

Audi A3 1997 ➤

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

Repair Group

00 - Technical data

30 - Clutch

34 - Controls, Housing

35 - Gears, Shafts

39 - Final drive, Differential

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

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Contents

00 - Technical data	1
1 Gearbox identification	1
1.1 Gearbox identification	1
1.2 Code letters, assignment of mechanical units, transmission ratios, capacities	2
1.3 Code letters, assignment of mechanical units, transmission ratios, capacities - rear final drive	3
2 Transmission layout	4
2.1 Transmission layout	4
3 Calculating transmission ratio "i"	7
3.1 Calculating transmission ratio "i"	7
4 General repair instructions	7
4.1 General repair instructions	7
4.2 Contact corrosion	7
30 - Clutch	10
1 Servicing clutch mechanism	10
1.1 Servicing clutch mechanism	10
1.2 Exploded view of pedal cluster	11
1.3 Removing and installing over-centre spring (LHD vehicles)	13
1.4 Removing and installing over-centre spring (RHD vehicles)	14
1.5 Removing and installing clutch pedal	14
1.6 Exploded view of hydraulic system	17
1.7 Removing and installing master cylinder	20
1.8 Removing and installing slave cylinder (release bearing with hydraulic actuator)	25
1.9 Bleeding clutch system	25
2 Servicing clutch release mechanism	27
2.1 Servicing clutch release mechanism	27
2.2 Replacing input shaft oil seal	28
3 Servicing clutch	29
3.1 Servicing clutch	29
34 - Controls, Housing	33
1 Servicing shift mechanism	33
1.1 Servicing shift mechanism	33
1.2 Installation position of shift mechanism	33
1.3 Removing and installing gear stick knob and cover	35
1.4 Servicing gear stick and gear stick housing	37
1.5 Removing and installing selector cables - Exploded view	42
1.6 Removing and installing shift mechanism	45
1.7 Adjusting shift mechanism	49
2 Removing and installing gearbox	53
2.1 Removing and installing gearbox	53
2.2 Removing	54
2.3 Gearbox transportation	64
2.4 Installing	65
3 Removing and installing bevel box	74
3.1 Removing and installing bevel box	74
4 Checking oil in manual gearbox with bevel box	83
4.1 Checking oil in manual gearbox with bevel box	83
5 Dismantling and assembling gearbox	85
5.1 Dismantling and assembling gearbox	85
5.2 Exploded view of gearbox	85

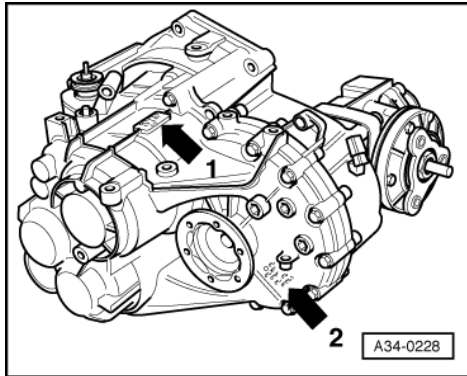


5.3	Exploded view	87
5.4	Dismantling and assembling gearbox housing and shift mechanism	88
5.5	Dismantling and assembling input shaft, output shafts (pinion shafts), differential, bevel box and selector rods	91
5.6	Assembly sequence	96
6	Servicing gearbox housing	104
6.1	Servicing gearbox housing	104
7	Servicing clutch housing	114
7.1	Servicing clutch housing	114
8	Dismantling and assembling gearbox shift mechanism	121
8.1	Dismantling and assembling gearbox shift mechanism	121
9	Dismantling and assembling selector forks	125
9.1	Dismantling and assembling selector forks	125
35 - Gears, Shafts		128
1	Dismantling and assembling input shaft	128
1.1	Dismantling and assembling input shaft	128
2	Adjusting input shaft	138
2.1	Adjusting input shaft	138
2.2	Shim table	141
2.3	Check measurement	142
3	Dismantling and assembling 1st - 4th gear output shaft	143
3.1	Dismantling and assembling 1st - 4th gear output shaft	143
4	Adjusting 1st - 4th gear output shaft	164
4.1	Adjusting 1st - 4th gear output shaft	164
5	Dismantling and assembling 5th/6th and reverse gear output shaft	169
5.1	Dismantling and assembling 5th/6th and reverse gear output shaft	169
6	Adjusting 5th/6th and reverse gear output shaft	187
6.1	Adjusting 5th/6th and reverse gear output shaft	187
39 - Final drive, Differential		192
1	Replacing oil seals for left flange shaft or right drive flange	192
1.1	Replacing oil seals for left flange shaft or right drive flange	192
1.2	Replacing oil seal for left flange shaft	192
1.3	Replacing oil seal for right drive flange	195
2	Replacing oil seal for bevel box output flange	198
2.1	Replacing oil seal for bevel box output flange	198
3	Dismantling and assembling differential	203
3.1	Dismantling and assembling differential	203
4	Adjustment table	218
4.1	Adjustment table	218
5	Adjusting differential	219
5.1	Adjusting differential	219

00 - Technical data

1 - Gearbox identification

1.1 - Gearbox identification



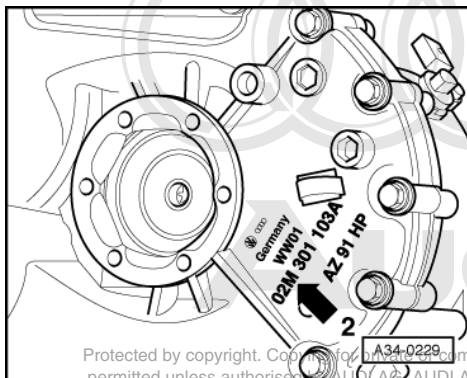
The manual gearbox 02M/four-wheel drive is installed as 5 or 6-speed unit in combination with the 4-cyl. turbo engine in the Audi A3 1997 ä.

Assignment =>Page **2**.

-> Location on gearbox

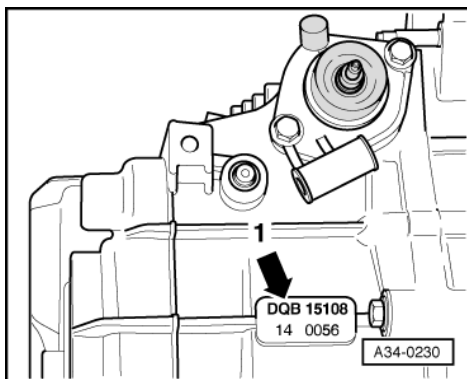
Code letters and date of manufacture of gearbox (arrow 1)

Manual gearbox 02M/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

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

Additional data depend on manufacture.

Note:

The gearbox code letters can also be found on the vehicle data stickers.

1.2 - Code letters, assignment of mechanical units, transmission ratios, capacities

Manual gearbox		5 and 6-speed 02M/four-wheel drive		
Code letters		DXW	EFY	DQB
Manufactured	from to	07.98	04.99	07.98
Assignment	Model	Audi A3 1997 ä 1.8 l - 110 kW 1.8 l - 132 kW	Audi A3 1997 ä 1.8 l - 132 kW	Audi A3 1997 ä 1.8 l - 154 kW (S3)
	Engine			
Transmission ratio: Z2 : Z1	Final drive I1)	63 : 15 = 4.200	63 : 15 = 4.200	63 : 15 = 4.200
	Final drive II2)	63 : 19 = 3.316	63 : 19 = 3.316	63 : 19 = 3.316
	1st gear	42 : 11 = 3.818	41 : 12 = 3.417	41 : 12 = 3.417
	2nd gear	40 : 19 = 2.105	40 : 19 = 2.105	40 : 19 = 2.105
	3rd gear	39 : 29 = 1.345	39 : 29 = 1.345	39 : 29 = 1.345
	4th gear	35 : 36 = 0.972	38 : 33 = 1.152	37 : 34 = 1.088
	5th gear	32 : 33 = 0.970	35 : 30 = 1.167	34 : 31 = 1.097
	6th gear	-	32 : 33 = 0.970	31 : 34 = 0.912
	Reverse gear	23 : 14 x 31 : 11 = 4.630	23 : 14 x 30 : 12 = 4.107	23 : 14 x 30 : 12 = 4.107
Speedometer		Electronic		

Code letters	DXW	EFY	DQB
Capacity	2.6 litres		
Specification	Gear oil G51 SAE 75W90 (synthetic oil)		
Clutch mechanism	Hydraulic	Hydraulic	Hydraulic
Clutch plate ø	240 mm3)	240 mm3)	240 mm3)
Drive shaft flange ø	108 mm	108 mm	108 mm
itot in top gear	3.215	3.215	3.023
Rear final drive assignment	EHR, EUK		
Code letters			

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Notes:

- 1) Final drive for 1st to 4th gears
- 2) Final drive for 5th/6th and reverse gears
- 3) Dual-mass flywheel

1.3 - Code letters, assignment of mechanical units, transmission ratios, capacities - rear final drive

Rear final drive		02D	
Code letters		EHR	EUK
Manufactured	from to	10.98 09.99	05.99
Assignment	Model Engine	Audi A3 1997 ä 1.8 l - 110 kW 1.8 l - 132 kW 1.8 l - 165 kW (S3)	Audi A3 1997 ä 1.8 l - 110 kW 1.8 l - 132 kW 1.8 l - 165 kW (S3)
Transmission ratio: Z2 : Z1	Bevel box front/rear	17 : 27 x 27 : 17 = 1.00	17 : 27 x 27 : 17 = 1.00
Final drive capacity		1.0 litre	
Specification		Gear oil G50 SAE 75W90 (synthetic oil)	
Haldex coupling capacity		0.42 litre	
Haldex coupling oil change quantity		0.25 litre	
Specification		Heavy-duty oil for Haldex coupling G 052 175 A1	
Drive shaft flange ø		100 mm	100 mm
Manual gearbox assignment Code letters		DQB DXW EFY	DQB DXW EFY

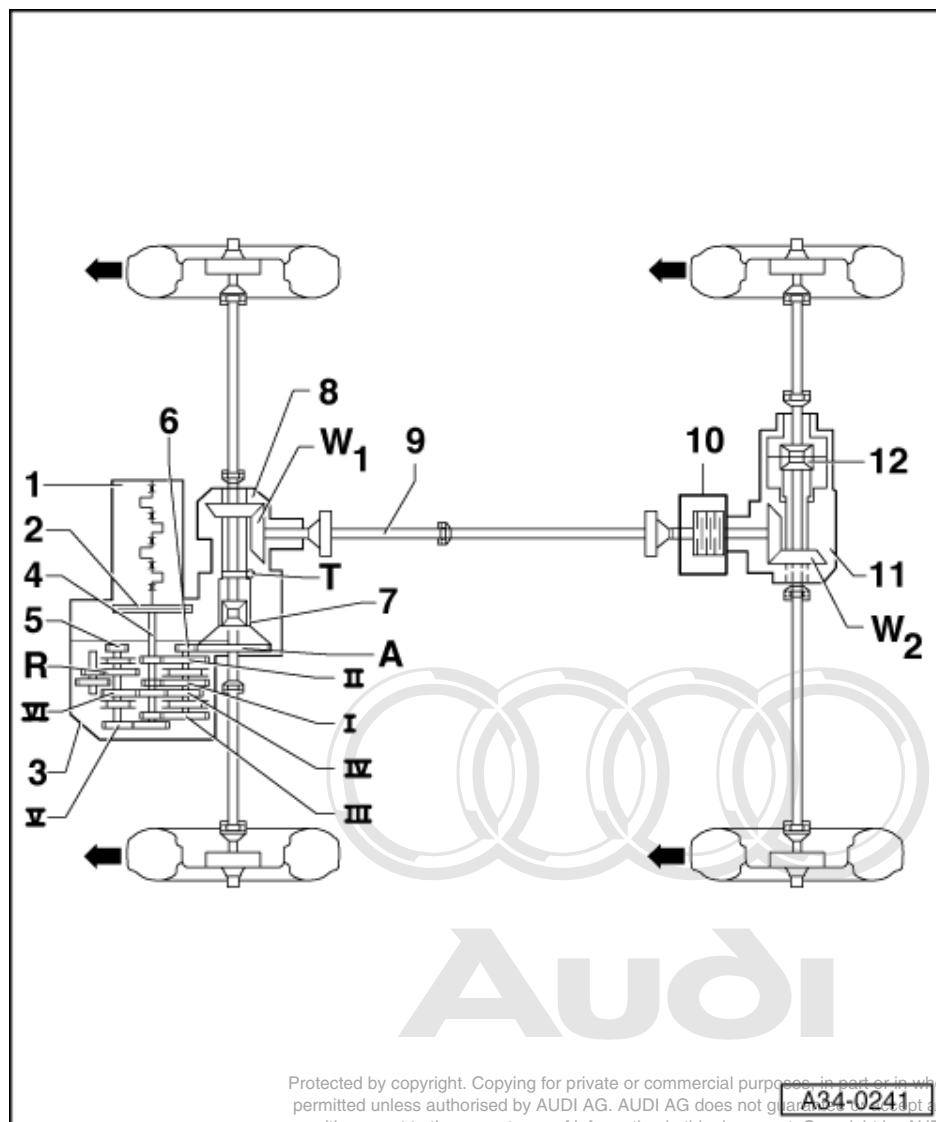
Modified Haldex coupling control unit for gearbox code EUK (gradual introduction)

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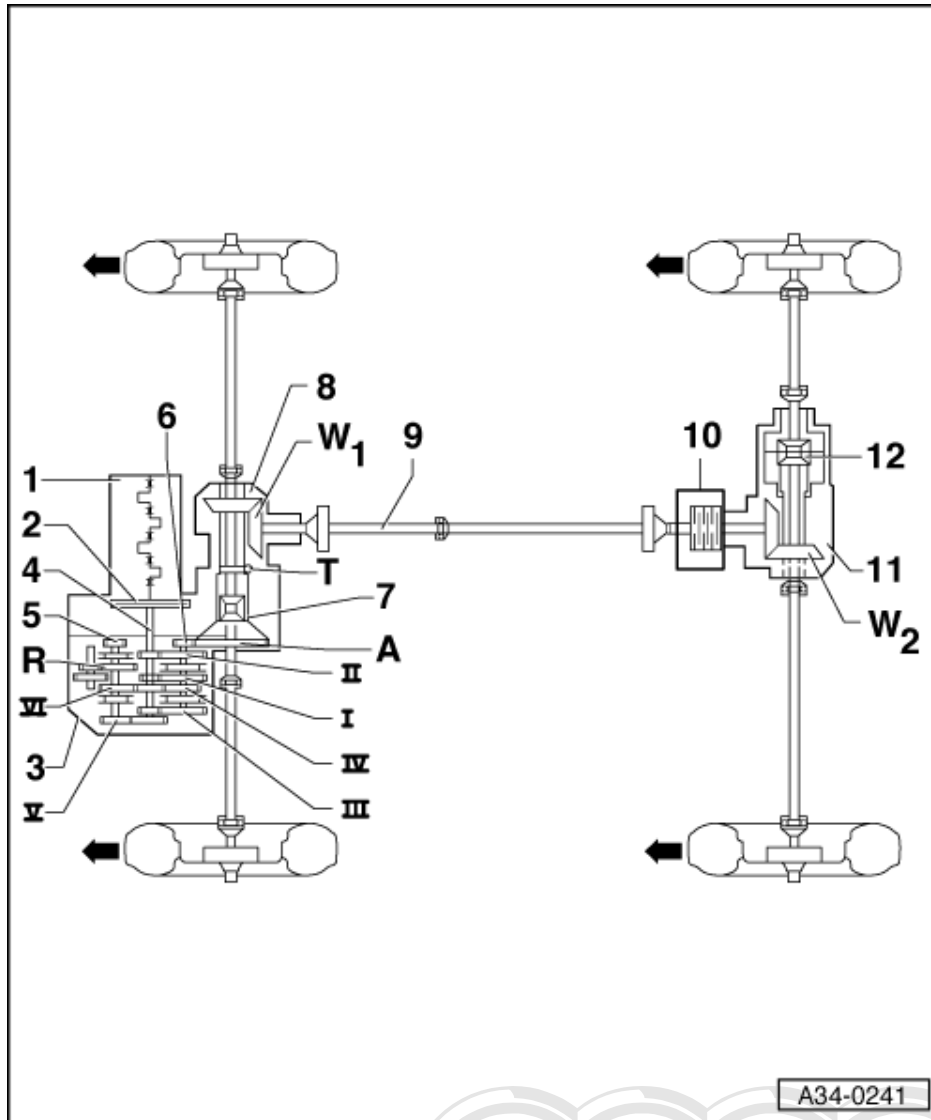
2 - Transmission layout

2.1 - Transmission layout



Designations

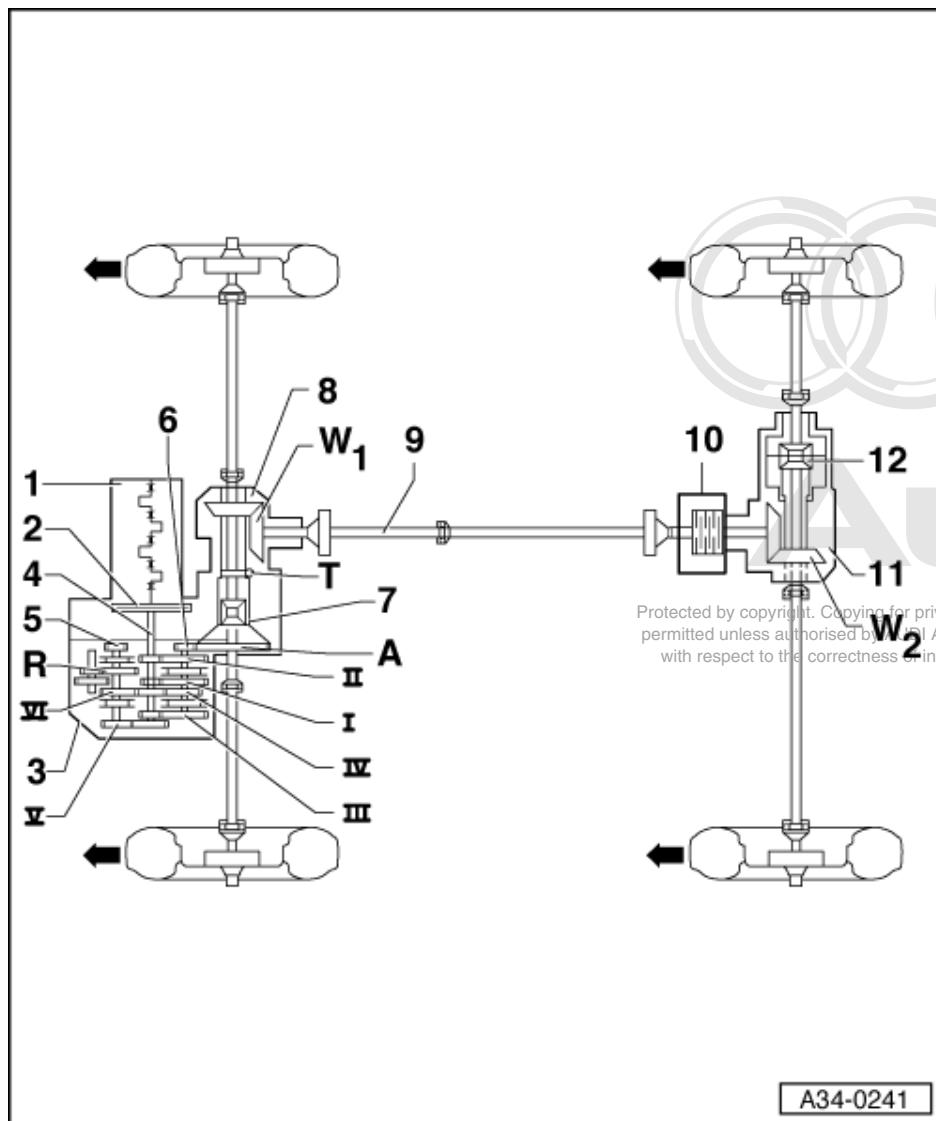
- 1 Engine
- 2 Clutch
- 3 Manual gearbox
- 4 Input shaft
- 5 5th/6th/reverse gear output shaft (pinion shaft II)
- 6 1st-4th gear output shaft (pinion shaft I)
- 7 Differential
- 8 Bevel box



- 9 Propshaft
- 10 Haldex coupling
- 11 Rear final drive
- 12 Differential

Arrows point in direction of travel

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Transmission ratios

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

Arrows point in direction of travel

3 - Calculating transmission ratio "i"

3.1 - Calculating transmission ratio "i"

Example:

	6th gear	Final drive
Drive gear	ZG1 = 34	ZA1 = 19
Driven gear	ZG2 = 31	ZA2 = 63

$i = Z2 : Z1$ 1)

$iG = \text{Gear ratio} = ZG2 : ZG1 = 31 : 34 = 0.912$

$iA = \text{Axle ratio} = ZA2 : ZA1 = 63 : 19 = 3.316$

$itot = \text{Overall ratio}$

$= iG \times iA = 0.912 \times 3.316 = 3.023$

1) Z1 = No. of drive gear teeth, Z2 = No. of driven gear teeth

4 - General repair instructions

4.1 - General repair instructions

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

A number of generally valid instructions governing the various repair procedures -which used to be repeated several times throughout the Workshop Manual are summarised here and apply to this Workshop Manual.

4.2 - Contact corrosion

- ◆ The housing of the 02M gearbox in the A3 is made of a magnesium alloy.
- ◆ Bolts and other components coming into direct contact with the gearbox are provided with a surface matched to the magnesium gearbox housing.
- ◆ The use of incorrect components (bolts, nuts, washers ...) will cause contact corrosion and damage the gearbox housing.
- ◆ Always fit new components in cases of doubt about re-use.

Attention:

- ◆ **Always use genuine Audi parts.**
- ◆ **Damage resulting from contact corrosion is not covered by warranty.**

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Special tools

For a list of special tools used in this Workshop Manual, refer to

=> binder "Special Tools, Workshop Equipment"

Gearbox

- ◆ When installing manual gearbox, make sure dowel sleeves between engine and gearbox are correctly located.

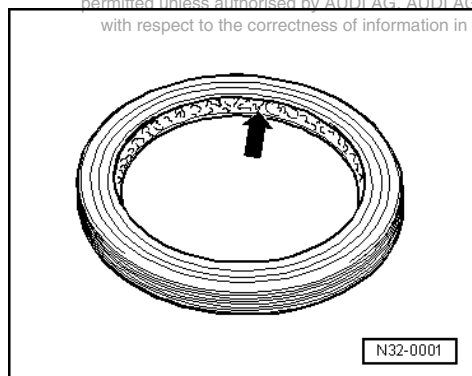


- ♦ When assembling mounting brackets and waxed components, contact surfaces must be cleaned to ensure that they are free of wax and grease.
- ♦ Top up gear oil on replacing manual gearbox/bevel box.
- ♦ Capacity and specification => Page 2.

O-rings, oil seals, gaskets

- ♦ Always replace O-rings, oil seals and gaskets.
- ♦ After removing gaskets, examine contact surface on housing/shaft for burr resulting from removal or for other signs of damage.
- ♦ Thoroughly clean joint surfaces and apply sealant AMV 188 200 03.
- ♦ Apply sealant evenly but not too thickly.

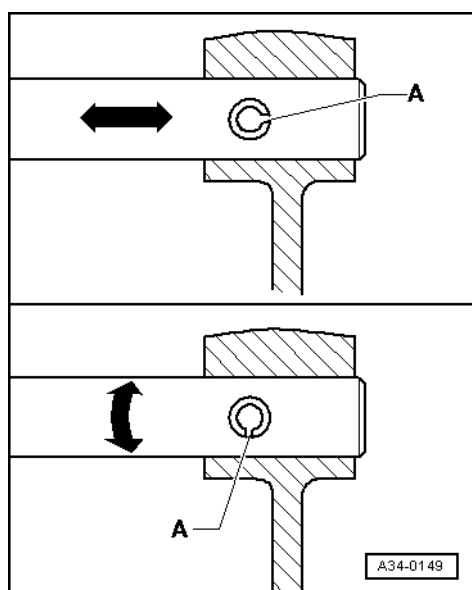
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Prior to installation:

- ♦ -> Before installing radial shaft oil seals, lubricate outer diameter slightly and half fill space between sealing lips -arrow- with sealing grease G 052 128 A1.
- ♦ Open sides of oil seals face fluid side.
- ♦ Press in new oil seal such that sealing lip is not at same location as sealing lip of old oil seal (make use of insertion depth tolerance).
- ♦ Check oil level in manual gearbox with bevel box
=> Page 83.

Locking elements



- ♦ Take care not to overstretch circlips.
- ♦ Always replace damaged or overstretched circlips.
- ♦ Circlips must be properly positioned in groove.

- ♦ -> Replace spring pins. Installation position: Slot -A- in line with direction of force -arrow-.

Bolts and nuts

- ♦ Slacken off and tighten bolts and nuts for securing covers and housings in diagonal sequence.
- ♦ Take care not to tilt particularly sensitive components, such as clutch pressure plates and slacken off/tighten nuts and bolts gradually in diagonal sequence.
- ♦ Tightening torques specified apply to non-lubricated bolts and nuts.
- ♦ Always replace self-locking bolts and nuts.
- ♦ For all bolted joints, ensure that - where necessary - contact surfaces as well as bolts and nuts are only waxed following assembly.

Bearings

- ♦ Install new taper roller bearings as supplied without additional lubrication.
- ♦ With the exception of taper roller bearings, lubricate all gearbox bearings with gear oil before installing.
- ♦ Taper roller bearings fitted on one shaft are to be replaced as a set using the same make of bearings.
- ♦ Heat inner races of taper roller bearings to approx. 100 °C before installing. Press home as far as stop on assembly so that there is no axial clearance.
- ♦ Take care not to interchange outer and inner races of bearings of the same size (bearings are matched in pairs).
- ♦ Install needle bearings with labelled side (thicker metal) facing fitting tool.

Shims

- ♦ Measure shims at several points with a micrometer. Different tolerances make it possible to find the exact shim thickness required.
- ♦ Check for burrs and damage.
- ♦ Only install shims which are in perfect condition.

Synchro-rings

- ♦ Take care not to interchange. Always fit to same gear if rings are re-used.
- ♦ Check for wear and replace if necessary.
- ♦ Coat with gear oil before installing.

Gear wheels

- ♦ Before installing, clean and heat on a hot plate to approx. 100 °C.
- ♦ Temperature can be checked using temperature tester V.A.G.1558.

Sliding gears

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

Clutch mechanism

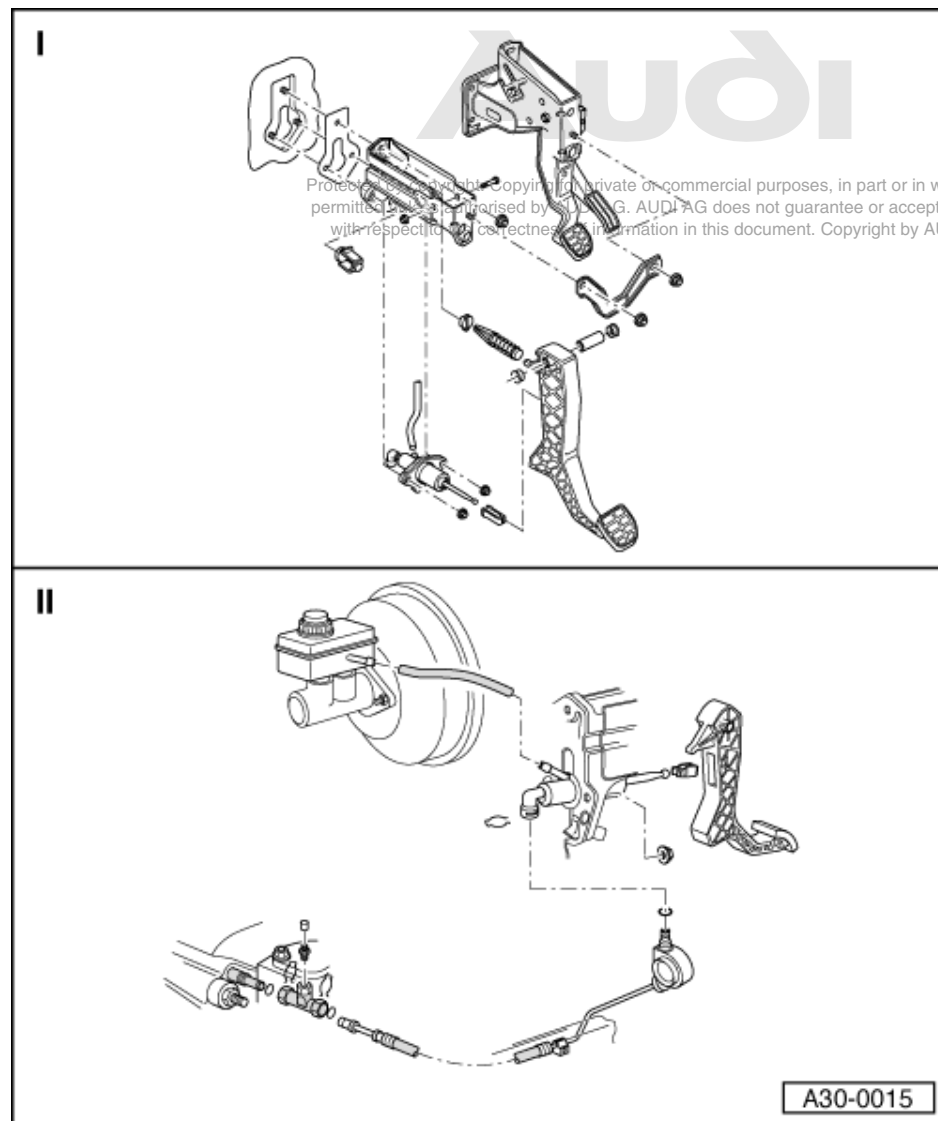
- ♦ Make sure clutch pressure plate is kept straight; slacken off and tighten bolts gradually in diagonal sequence.
- ♦ To reduce odour nuisance caused by a scorched clutch, thoroughly clean bell housing, flywheel and parts of engine facing gearbox.



30 - Clutch

1 - Servicing clutch mechanism

1.1 - Servicing clutch mechanism



I - Exploded view of pedal cluster

=>Page 11

II - Exploded view of hydraulic system

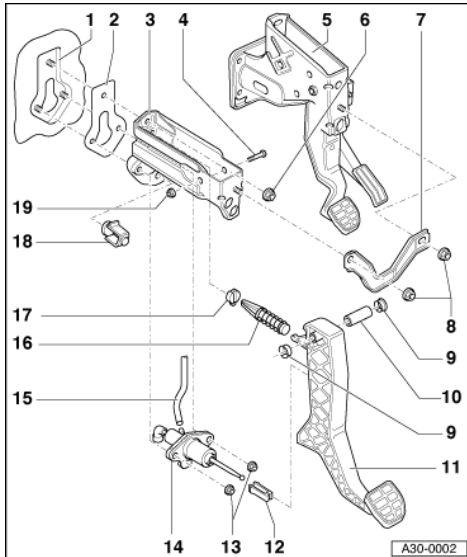
=>Page 17

Notes:

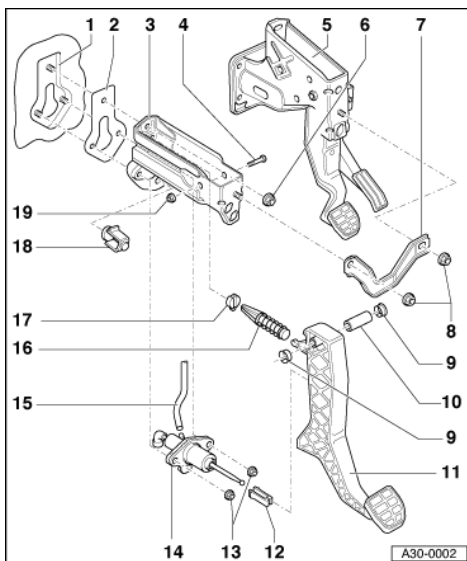
- ♦ Disconnect battery earth strap.
- ♦ Heed radio code on vehicles with encoded radio.
- ♦ Lubricate all bearing and contact surfaces with polycarbamide grease, part no. G 052 142 A2.
- ♦ Make sure brake fluid does not escape into footwell or plenum chamber or onto gearbox below. If it does, area affected must be thoroughly cleaned.

- ♦ When working in footwell, cover carpet with cloths to protect it against brake fluid spillage.

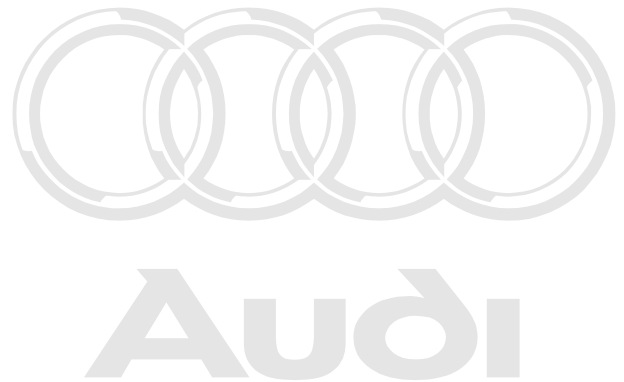
1.2 - Exploded view of pedal cluster



- 1 Bulkhead**
 - ♦ With mount for mounting bracket and master cylinder
- 2 Gasket**
 - ♦ Always replace
- 3 Mounting bracket**
 - ♦ For clutch pedal
- 4 Bolt**
- 5 Mounting bracket**
 - ♦ For accelerator pedal and brake pedal
- 6 Self-locking hexagon nut, 25 Nm**
 - ♦ Always replace
- 7 Connecting plate**



- 8 Self-locking hexagon nut, 25 Nm**
 - ♦ Always replace



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9 Mounting bush

10 Pivot pin

11 Clutch pedal

- ♦ Removing and installing
=> Page **14**

12 Retainer

- ♦ Removing and installing
=> Page **17**

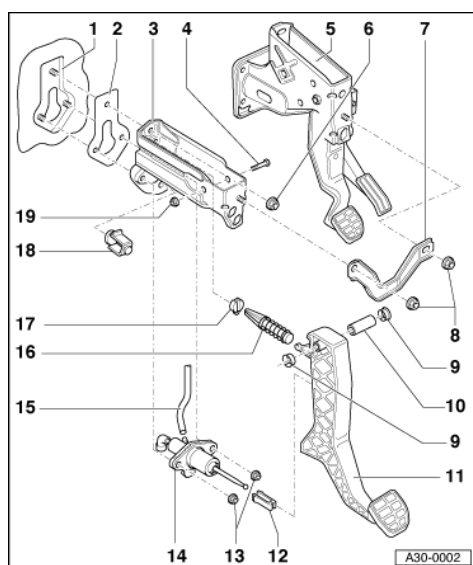
**13 Self-locking hexagon nut,
25 Nm**

- ♦ Always replace

14 Master cylinder

- ♦ Removing and installing
=> Page **20**

15 Supply hose



16 Over-centre spring

- ♦ Removing and installing
=>Page **13**

17 Over-centre spring mounting

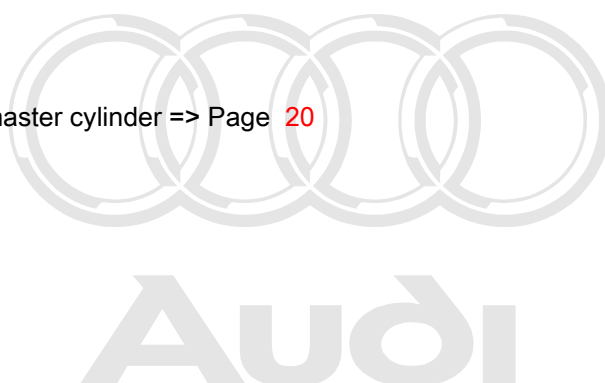
- ♦ Insert in mounting bracket
- ♦ Replacing involves removing and installing master cylinder => Page **20**

18 Stop

- ♦ For clutch pedal
- ♦ Installation position
=> Page **24**

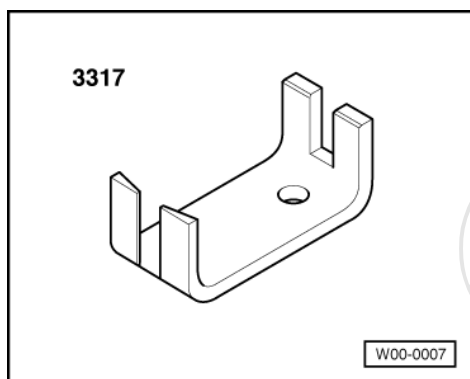
**19 Self-locking hexagon nut,
25 Nm**

- ♦ Always replace



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1.3 - Removing and installing over-centre spring (LHD vehicles)



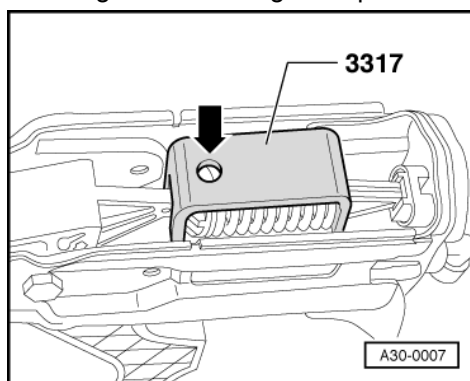
Special tools and workshop equipment required

- ♦ 3317 Installation clamp

Removing

- Remove driver's storage compartment.

=> General Body Repairs, Interior; Repair Group 68; Storage compartments, covers and trim panels; Removing and installing driver's storage compartment Storage compartments, covers and trim panels Removing and installing driver's storage compartment



- -> Tension over-centre spring with clutch pedal and press on installation clamp 3317 from above.

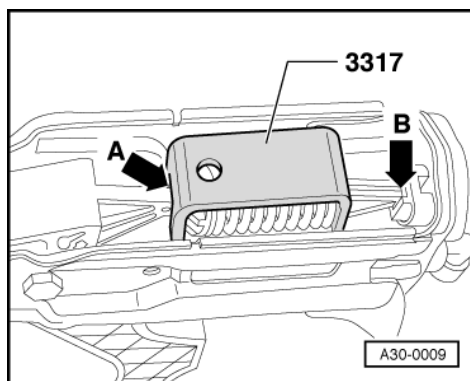
Note:

Hole (arrow) faces clutch pedal.

- Move clutch pedal to rest position and detach over-centre spring together with installation clamp 3317.

Installing

- Pull clutch pedal into passenger compartment.





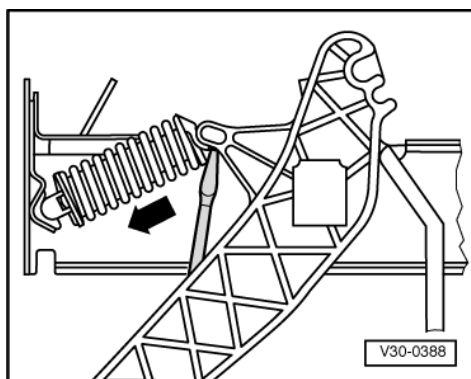
- -> Start by inserting over-centre spring in rear mounting (arrow B), then press clutch pedal until installation clamp makes contact with locating lug (arrow A) of clutch pedal.
- Move clutch pedal to rest position and detach installation clamp.

1.4 - Removing and installing over-centre spring (RHD vehicles)

Removing

- Remove driver's storage compartment.

=> General Body Repairs, Interior; Repair Group 68; Storage compartments, covers and trim panels; Removing and installing driver's storage compartment Storage compartments, covers and trim panels Removing and installing driver's storage compartment



- Apply screwdriver between clutch pedal and over-centre spring.
- -> Press clutch pedal and prise over-centre spring off pedal in direction of arrow.

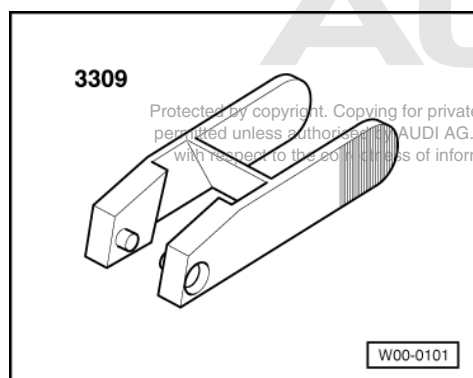
Installing

Install in reverse order, paying attention to the following:

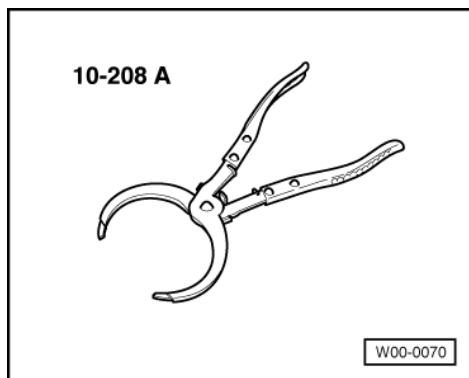
- Press clutch pedal.
- Insert over-centre spring in over-centre spring mounting and press onto locating lug of clutch pedal.

1.5 - Removing and installing clutch pedal

Special tools and workshop equipment required

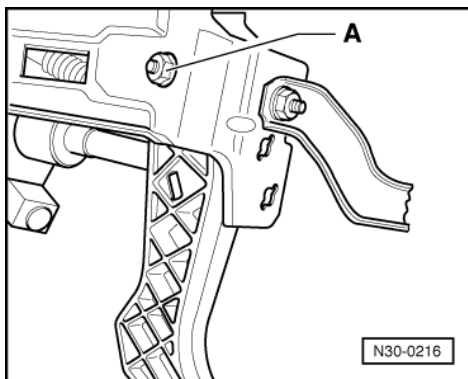


- ♦ 3309 Release tool



♦ 10-208 A Pliers

Removing

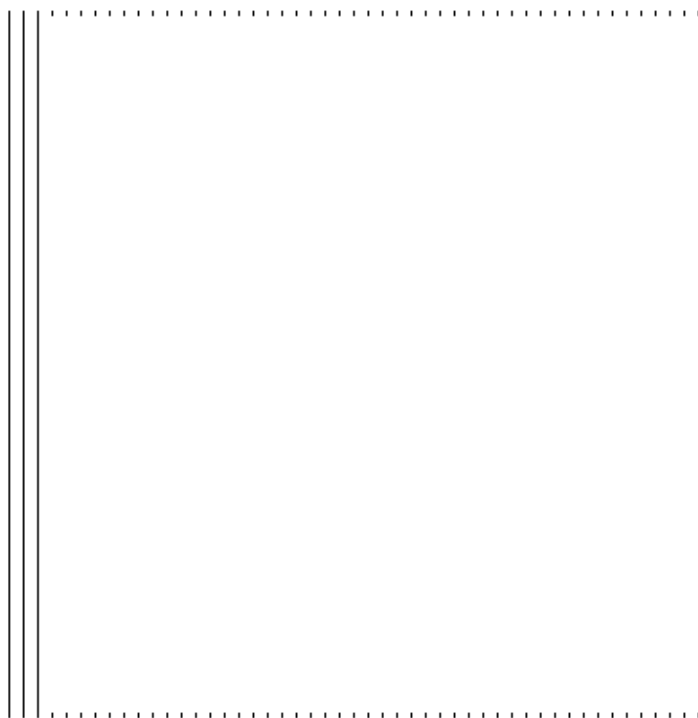


- Remove over-centre spring => Page 13 .
- Separate clutch pedal from master cylinder => Page 20 and press operating rod towards engine compartment as far as it will go.
- -> Unscrew nut -A-.
- Pull out bolt until clutch pedal can be removed.

Installing

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Install in reverse order, paying attention to the following:

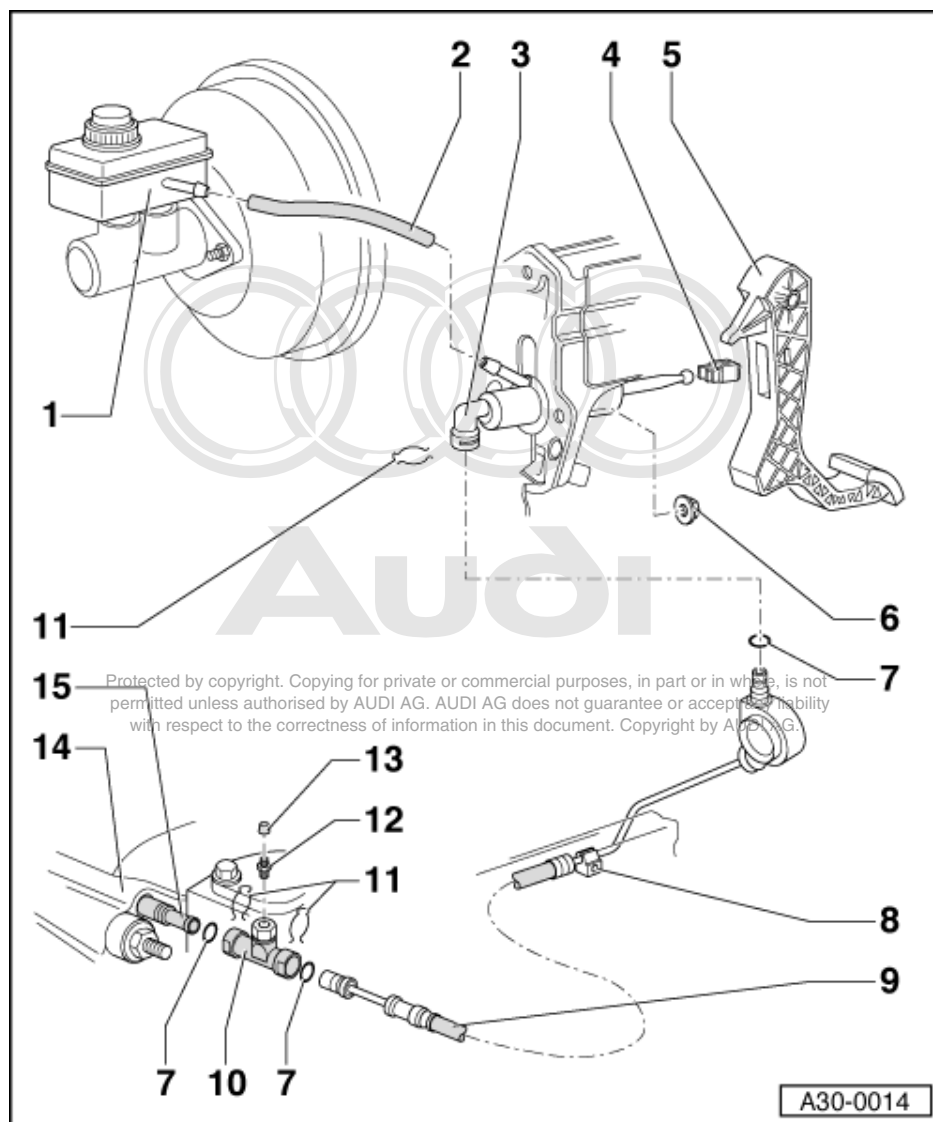


- Install over-centre spring => Page **13**.
- -> Retainer -A- must be located on operating rod -B- of master cylinder.
- Press clutch pedal in direction of arrow to engage (ensure proper locking).

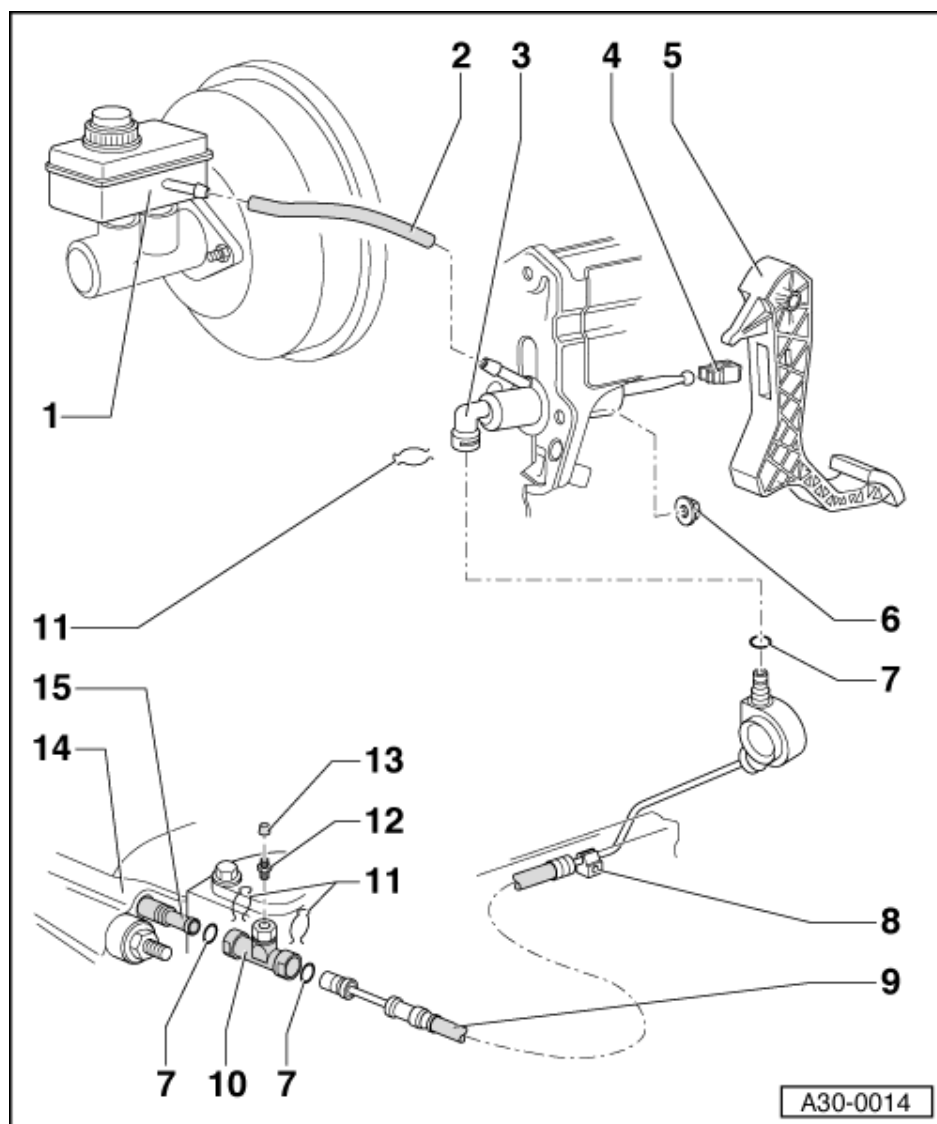


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1.6 - Exploded view of hydraulic system



- 1 Brake fluid reservoir
- 2 Supply hose
- 3 Master cylinder
 - ♦ Removing and installing
=> Page 20
- 4 Retainer
 - ♦ Remove master cylinder to replace
 - ♦ Detaching =>Fig. 1
 - ♦ Pressing on =>Fig. 2
- 5 Clutch pedal
 - ♦ Removing and installing
=> Page 14
- 6 Self-locking hexagon nut,
25 Nm
 - ♦ Always replace



7 O-ring

- ◆ Always replace
- ◆ Attach to pipe connection
- ◆ Apply brake fluid when fitting

8 Bracket

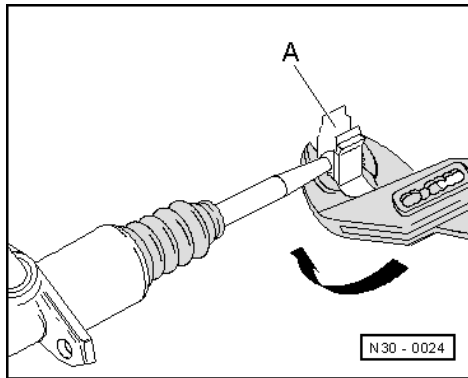
- ◆ Attached to body

9 Hose/pipe assembly

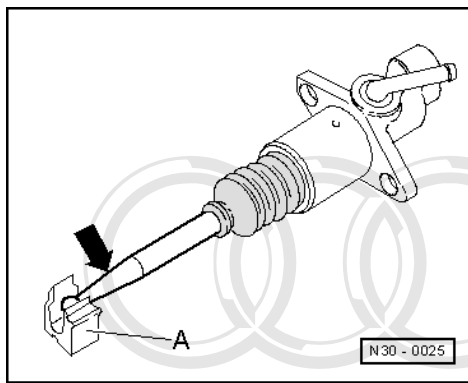
- ◆ With frequency modulator
- ◆ Separating from master cylinder and installing=>Page 21
- ◆ Separating from slave cylinder => Page 59
- ◆ Assign as per Parts List

10 Bleeder

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-> Fig.1 Prising off retainer -A- in direction of arrow

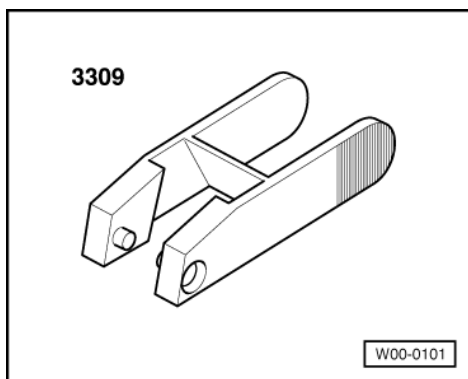


-> Fig.2 Pressing master cylinder operating rod into retainer -A- in direction of arrow

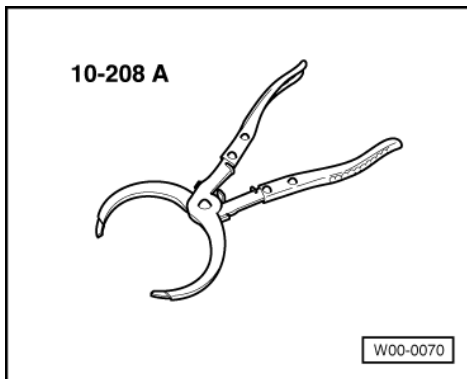
1.7 Removing and installing master cylinder

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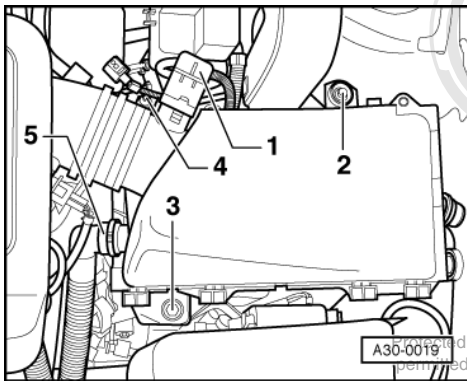
Special tools and workshop equipment required



- ♦ 3309 Release tool



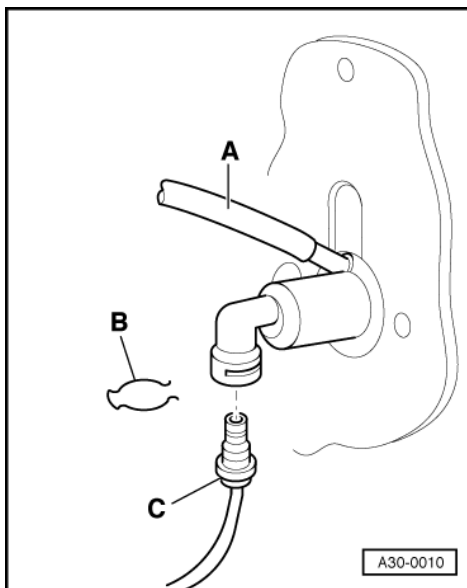
♦ 10-208 A Pliers



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Removing

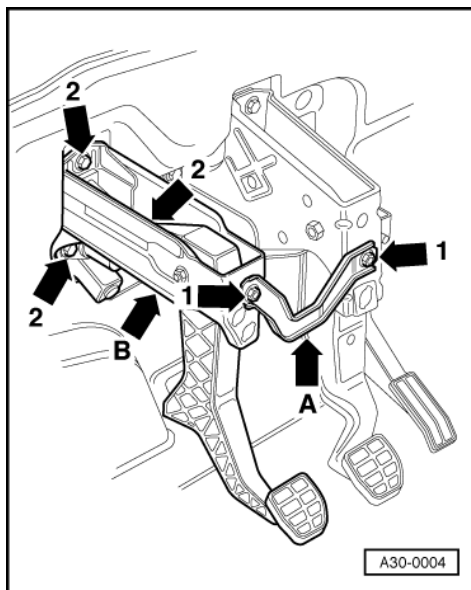
- -> Unfasten hose clamp -4- and pull intake hose and connector -1- off air-mass meter.
- If fitted, pull hose -5- off air cleaner housing.
- Then remove entire air cleaner housing by screwing out bolts -2- and -3-.



- -> Pull off and seal supply hose -A- to brake fluid reservoir.
- Pull clip -B- for hose/pipe assembly out of master cylinder.



- Pull hose/pipe assembly -C- out of master cylinder and seal.

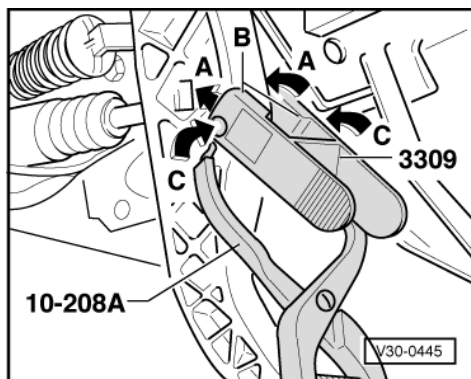


- Remove driver's storage compartment.

=> General Body Repairs, Interior; Repair Group 68; Storage compartments, covers and trim panels; Removing and installing driver's storage compartment Storage compartments, covers and trim panels Removing and installing driver's storage compartment

-> Then unscrew entire clutch pedal mounting bracket as follows:

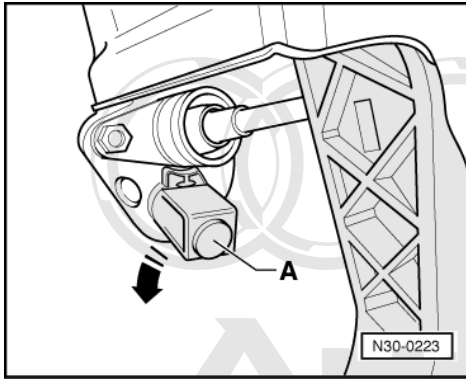
- Start by unscrewing connecting plate -A- (arrows 1).
- Disconnect cruise control switch if fitted.
- Then unscrew securing nuts (arrows 2) for mounting bracket -B-.
- Take out mounting bracket.



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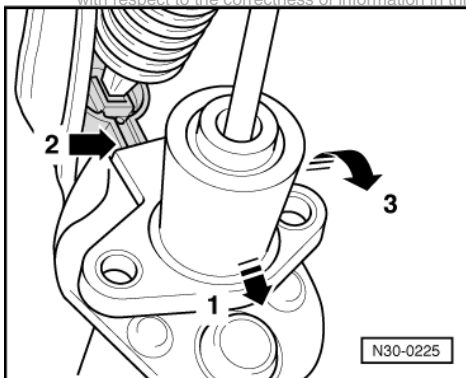
-> Release master cylinder operating rod from clutch pedal as follows:

- Insert release tool 3309 in clutch pedal recesses (arrows A) with "top/oben" labelling (B) facing away from clutch pedal.
- Use pliers 10-208A to press release tool together in recesses (arrows C).



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

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- -> Start by pressing master cylinder in direction of arrow 1 as far as stop.
It must not be covered in upper area by over-centre spring mounting (arrow 2).
- Then swivel out of mounting bracket in direction of arrow 3.



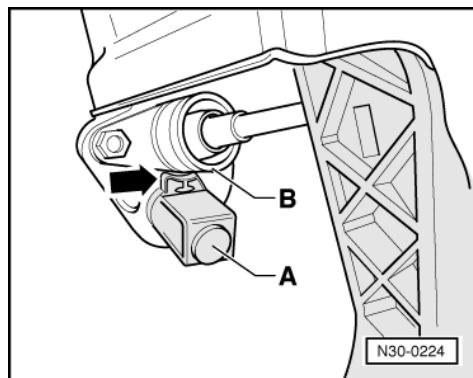
Installing



Install in reverse order, paying attention to the following:

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- -> Retainer -A- must be located on operating rod -B- of master cylinder.
- Press clutch pedal in direction of arrow to engage (ensure proper locking).



- -> Re-insert stop -A- for clutch pedal.

Installation position:

Arm (arrow) faces master cylinder -B-.

- After installing master cylinder, bleed clutch system=>Page 25 .

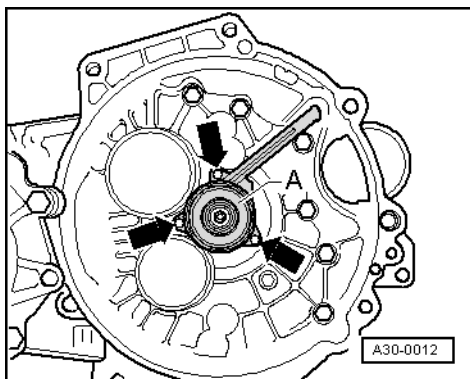
1.8 - Removing and installing slave cylinder (release bearing with hydraulic actuator)

Note:

Slave cylinder and release bearing form a unit and can only be jointly replaced.

Removing

- Gearbox must be removed => Page 53 before slave cylinder can be taken out



- -> Screw out bolts -arrows-.
- Pull out release bearing -A- together with slave cylinder.

Installing

Install in reverse order, paying attention to the following:

- Install gearbox => Page 65 .
- Bleed clutch system=>Page 25 .

Tightening torque

Slave cylinder to gearbox 12 Nm

1.9 - Bleeding clutch system



Special tools and workshop equipment required

- ♦ V.A.G. 1869 Brake filling and bleeding appliance



Notes:

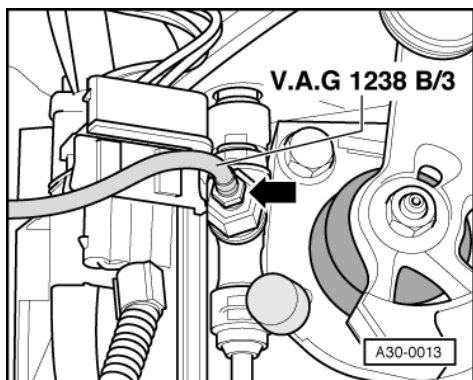
- ♦ Make sure no brake fluid escapes onto gearbox when performing the following work.
- ♦ Bleed system after working on hydraulic clutch mechanism.
- ♦ Before bleeding, top up reservoir with brake fluid as far as "max" mark.

- Brake fluid specification

=> Repair Group 47: Brake system booklet

Sequence of operations

- Pull back clutch pedal into rest position.
- Bleeding may involve use of 670 mm long bleed hose V.A.G 1238/B 3.
- Then connect bleed hose to collector bottle of brake bleeding appliance.

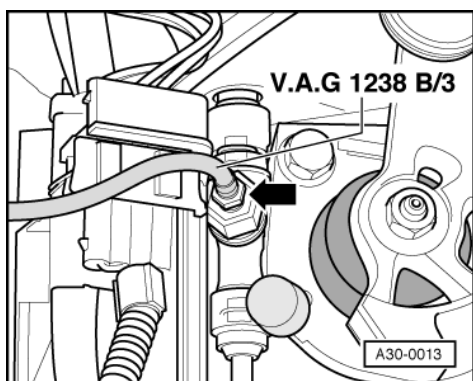


- -> Attach bleed hose V.A.G 1238/B3 to bleed valve
-arrow-.

Note:

Make sure bleed hose is correctly fitted when bleeding.

- Switch on bleeding appliance.
- Working pressure 2.0 bar



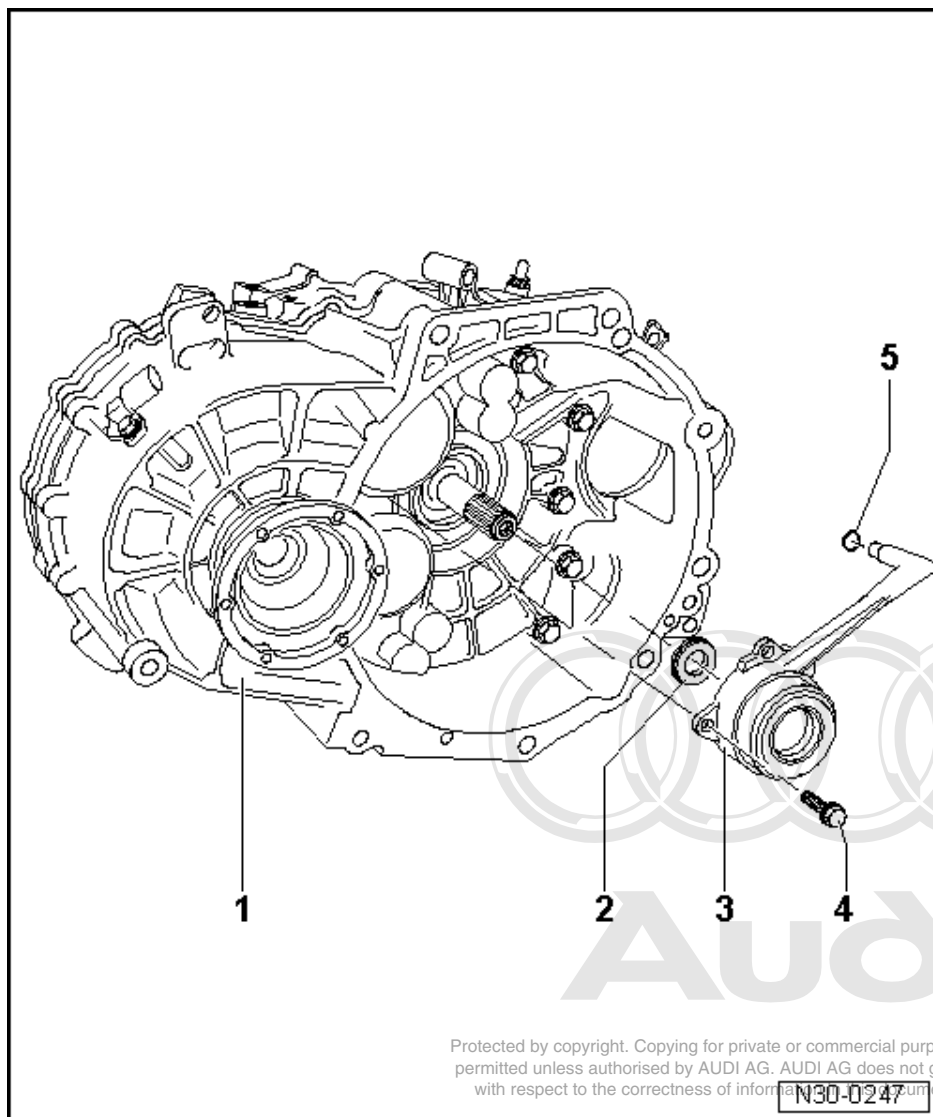
- -> Open bleed valve -arrow-.
- Bleed off approx. 100 cm3 of brake fluid.
- Close bleed valve.
- Rapidly operate pedal 15 times from stop to stop.
- Bleed off a further 50 cm3 of brake fluid.
- Close bleed screw (tightening torque 4.5 Nm).
- Detach filling appliance from brake fluid reservoir.
- Press clutch pedal several times following completion of bleeding process.

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- Bleed system again if necessary.

2 - Servicing clutch release mechanism

2.1 - Servicing clutch release mechanism



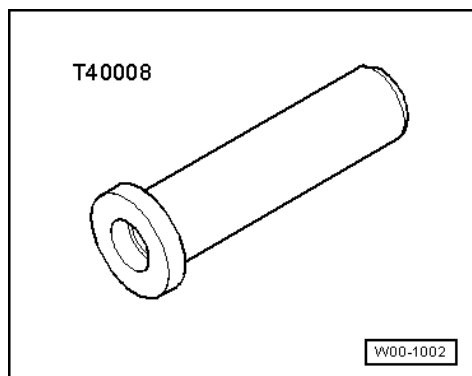
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- 1 Gearbox
- 2 Input shaft oil seal
 - ♦ Replacing => Page 28
- 3 Release bearing with hydraulic actuator
 - ♦ One unit; can only be replaced jointly
 - ♦ Never wash out bearing; only to be wiped over
 - ♦ Replace noisy bearings together with slave cylinder
 - ♦ Removing and installing
=>Page 25
- 4 Collared bolt, 12 Nm
 - ♦ 3x
- 5 O-ring
 - ♦ Always replace
 - ♦ Attach to pipe connection



- ♦ Apply brake fluid when inserting

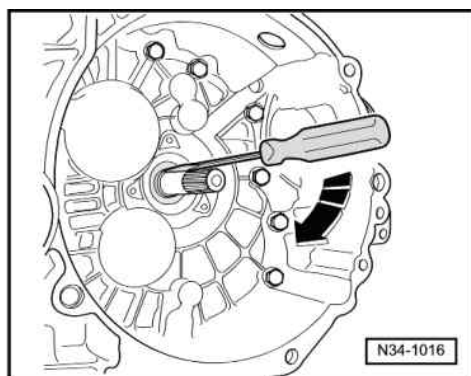
2.2 - Replacing input shaft oil seal



Special tools and workshop equipment required

- ♦ T40008 Thrust pad

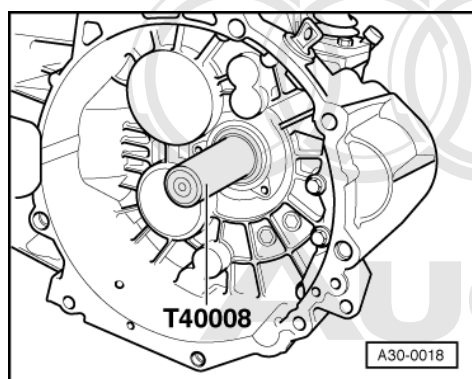
Sequence of operations



- -> Use screwdriver to carefully prise out input shaft oil seal.

Note:

Take care not to damage running surface for radial shaft seal on input shaft.



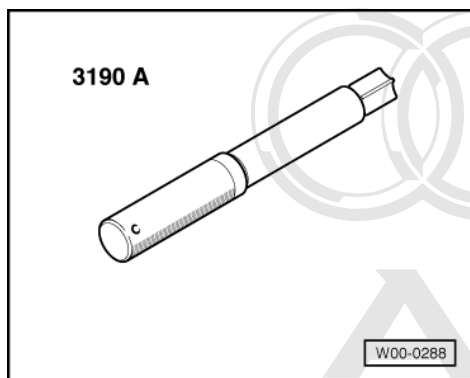
- -> Use thrust pad T40008 to drive home oil seal.
- Half-fill space between sealing lip and dust lip with sealing grease G 052 128 A1.

3 - Servicing clutch

3.1 - Servicing clutch

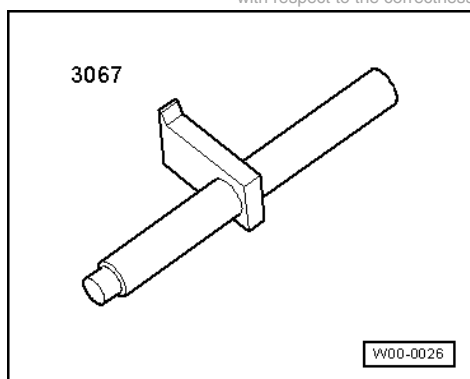
- Gearbox removed

Special tools and workshop equipment required



- ♦ 3190 A Centring mandrel

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- ♦ 3067 Counterhold
- ♦ Grease G 000 100

Notes:

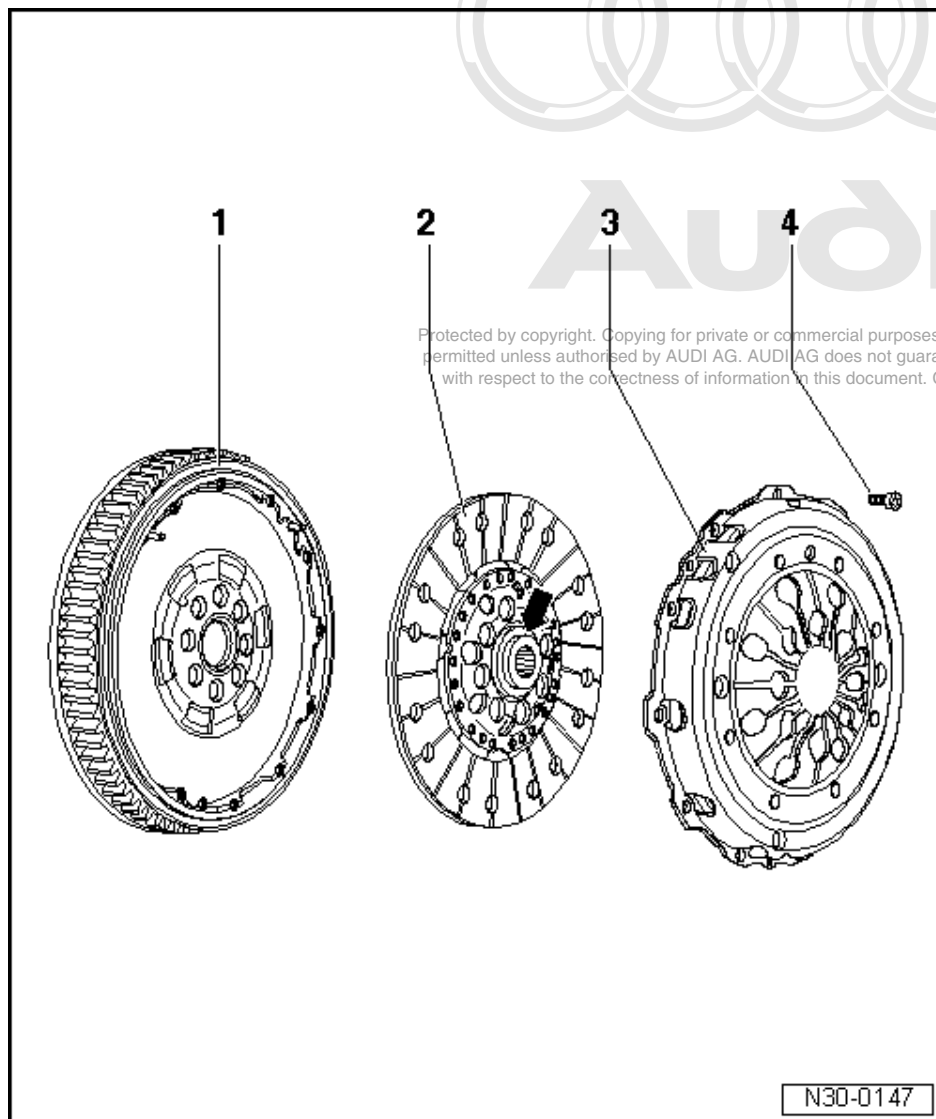
- ♦ Before replacing clutch plate and pressure plate, refer to

=> Fault-finding No. 9 - Complaints about clutch and clutch mechanism

- ♦ Replace clutch plates and pressure plates where riveted joint is damaged or loose.
- ♦ Clean input shaft splines and - in the case of used clutch plates - hub splines, remove corrosion and apply a very thin coat of grease (part no. G 000 100) to input shaft splines. Then move clutch plate back and forth on input shaft until hub moves freely on shaft. Excess grease must be removed.
- ♦ Assign clutch plate and pressure plate by way of engine code.

=> Parts List

- ♦ Pressure plates have an anti-corrosion coating and are greased. Only the contact surface may be cleaned, as otherwise the clutch service life will be considerably shortened.
- ♦ To reduce the odour nuisance of a scorched clutch, thoroughly clean bell housing, flywheel and parts of engine facing gearbox.



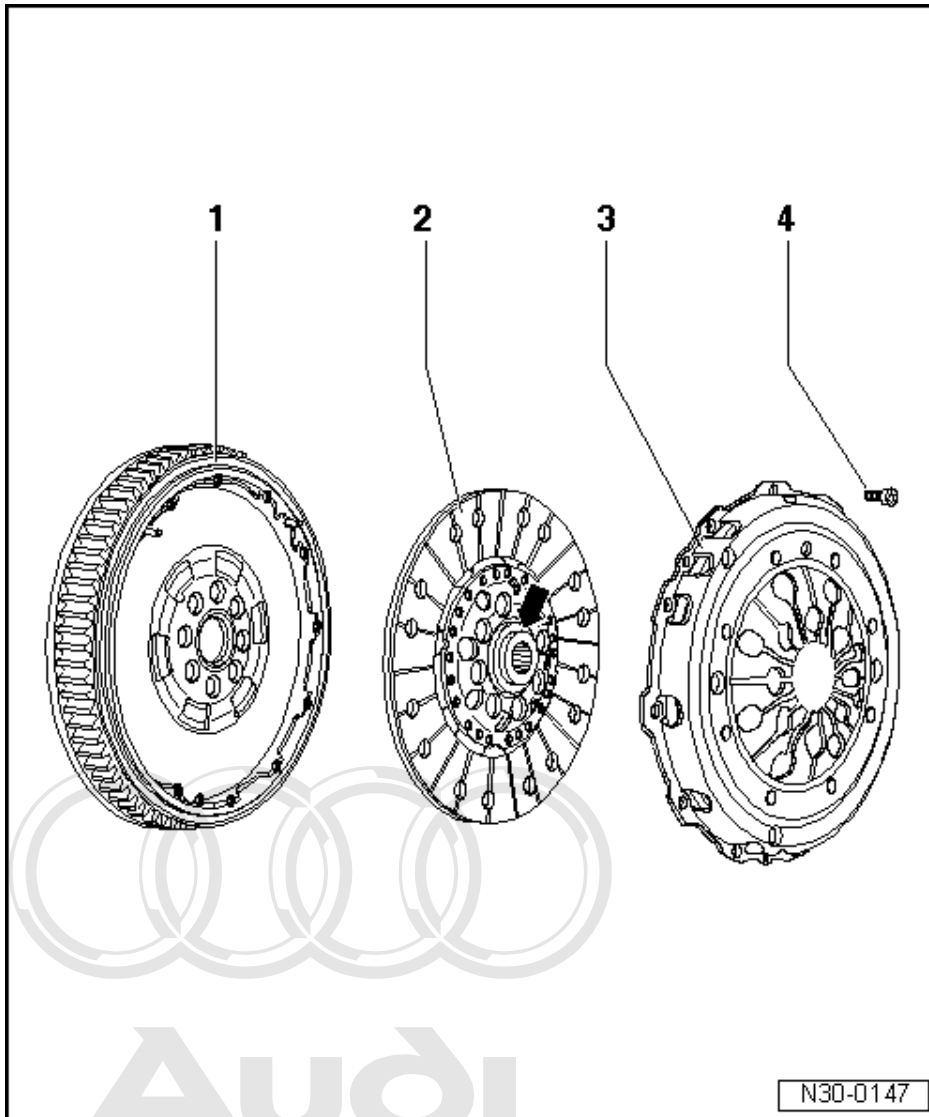
1 Dual-mass flywheel

- ◆ Make sure centring pins are a tight fit
- ◆ Contact surface for clutch lining must be free from grooves, oil and grease
- ◆ Removing and installing

=> 4-cyl. Engine (5-valve Turbo), Mechanics; Repair Group 13; Removing and installing dual-mass flywheel
Removing and installing dual-mass flywheel

2 Clutch plate

- ◆ Diameter => Page 2
- ◆ Installation position on dual-mass flywheel: Shorter hub end (arrow) facing pressure plate
- ◆ Installation position with one-piece flywheel: Spring cage facing pressure plate
- ◆ Centring => Fig. 1



3 Pressure plate

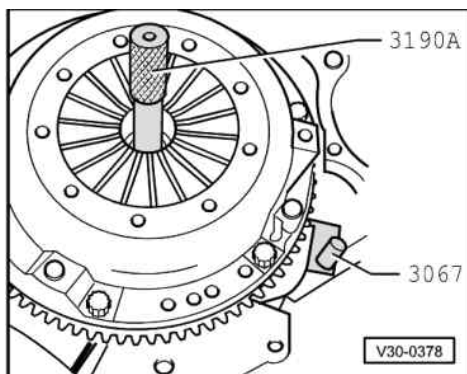
◆ Removing and installing

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◆ Checking ends of diaphragm spring => Fig. 2

4 Bolt M 8

- 22 Nm
- ◆ Slacken off/tighten gradually and in diagonal sequence
- ◆ Assign as per Parts List



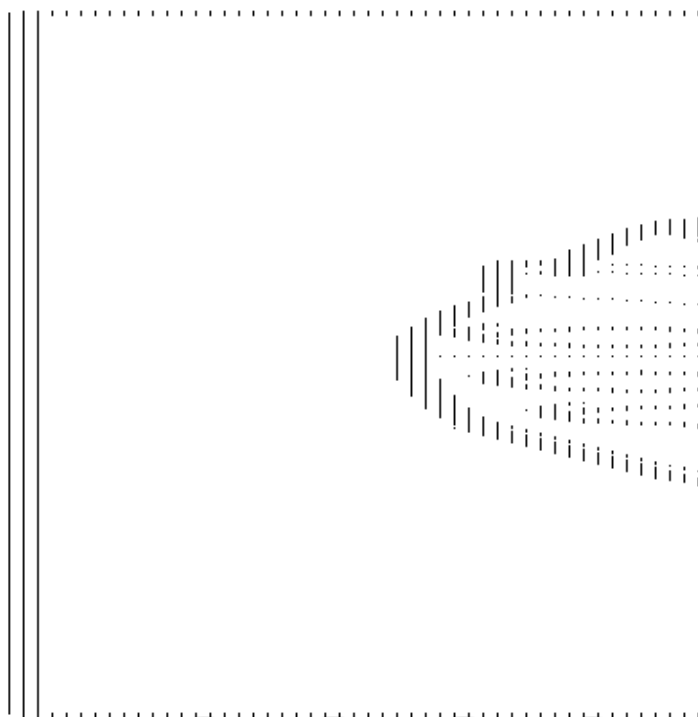


-> Fig.1 Centring clutch plate and removing/installing pressure plate

- Slacken off/tighten bolts gradually and in diagonal sequence.
- Reverse position of counterhold 3067 when removing.

Note:

Pressure plate contact surface and clutch plate lining must make full contact with flywheel. Tighten bolts evenly and diagonally so as not to damage centring holes in pressure plate and centring pins in flywheel.



-> Fig.2 Checking ends of diaphragm spring

- Wear down to half diaphragm spring thickness is permitted

Note:

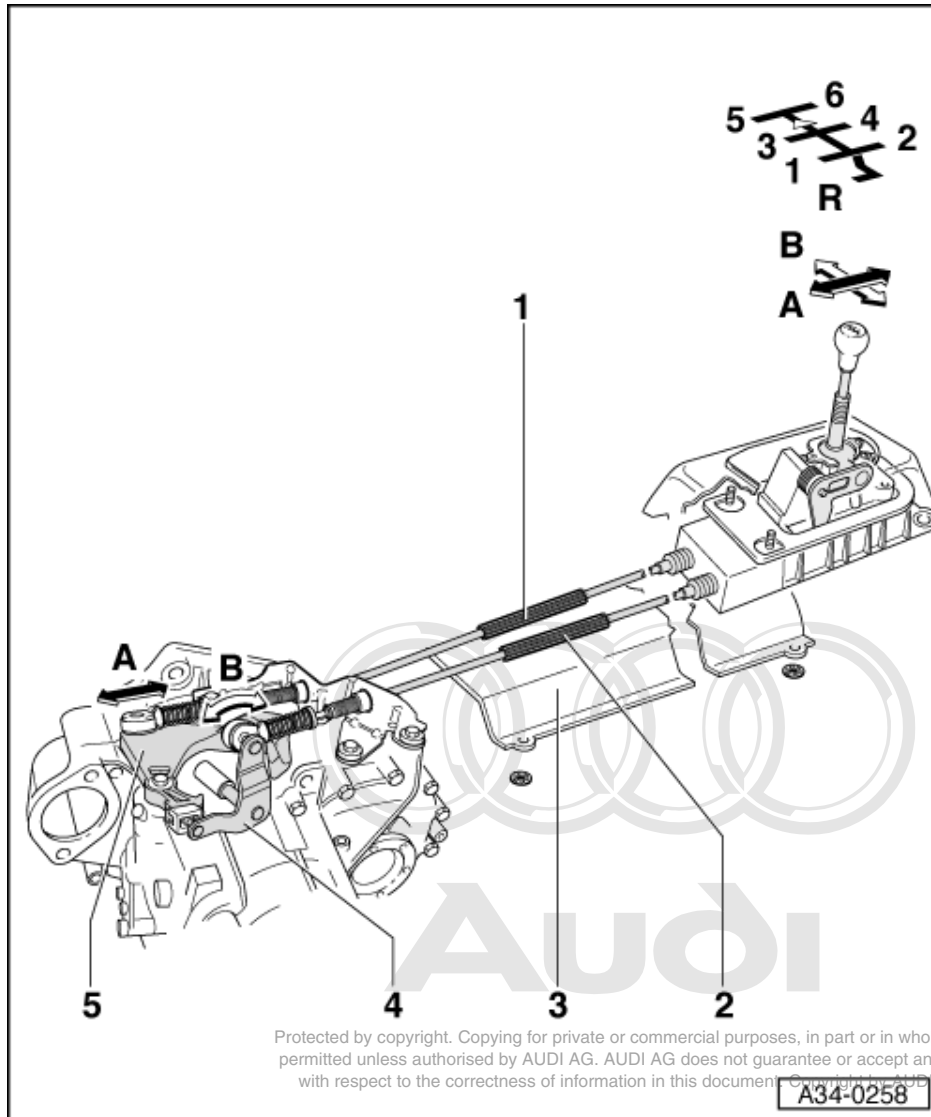
When performing repairs, always assign clutch pressure plate and clutch plate by way of engine code in line with Parts List.

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34 - Controls, Housing

1 - Servicing shift mechanism

1.1 - Servicing shift mechanism



1.2 - Installation position of shift mechanism

Arrow -A- gear selection movement

Arrow -B- gate selection movement

1 Gear selector cable

- ♦ For gear selection movement -A-

2 Gate selector cable

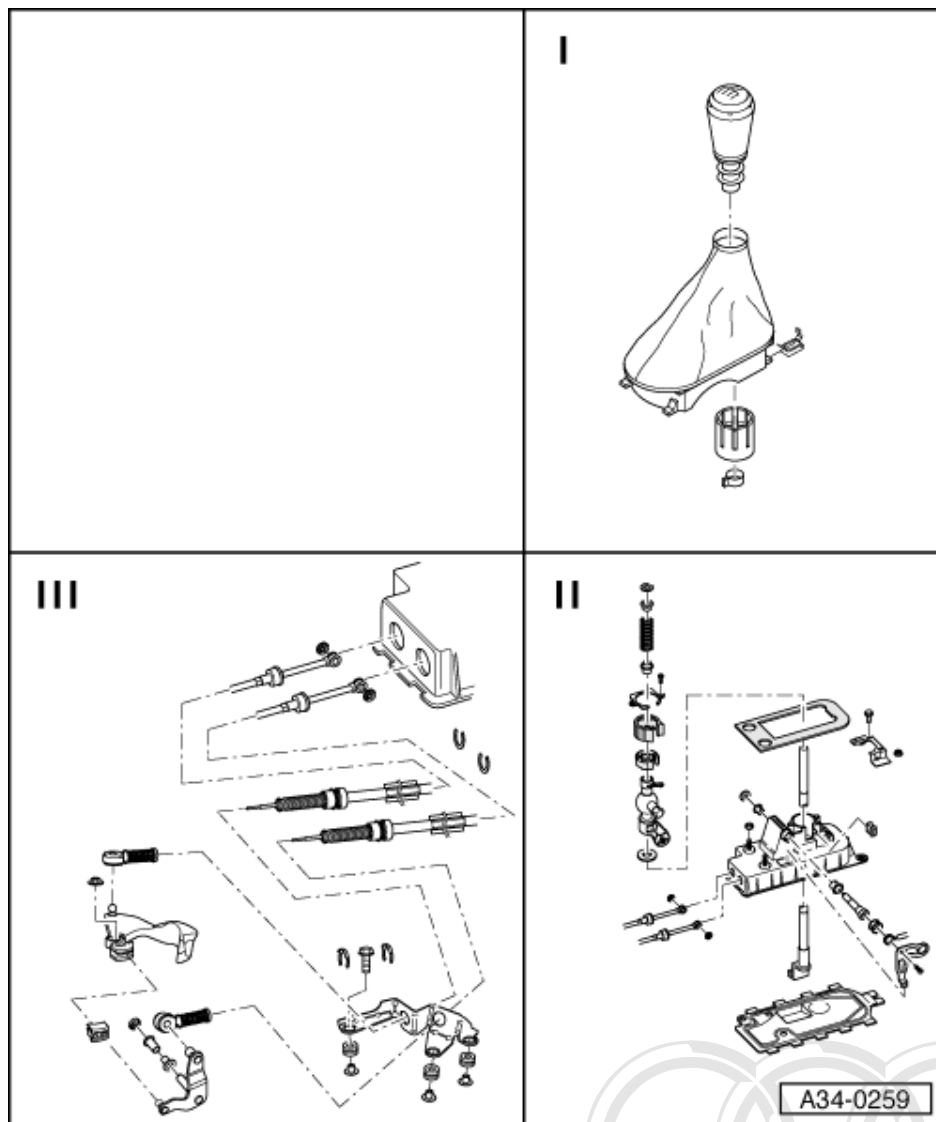
- ♦ For gate selection movement -B-

3 Heat shield

- ♦ Detach before removing shift mechanism

4 Actuating arm

5 Selector lever on gearbox with vibration damper



I - Removing and installing gear stick knob and cover => Page 35

II - Servicing gear stick and gear stick housing => Page 37

III - Removing and installing selector cables - Exploded view => Page 42

Removing and installing shift mechanism

=> Page 45

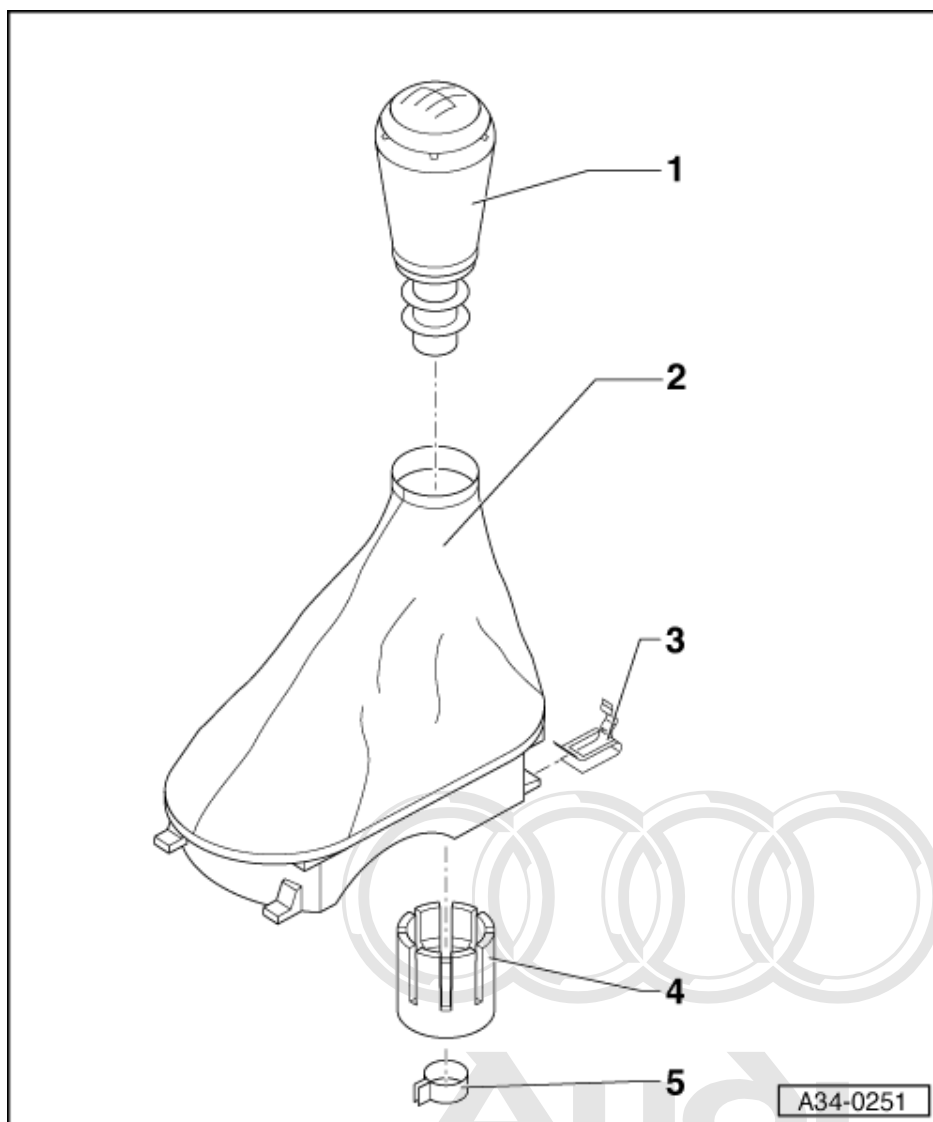
Adjusting shift mechanism => Page 49

Notes:

- ♦ Disconnect earth strap from battery in engine compartment before working on shift mechanism.
- ♦ Heed radio code on vehicles with encoded radio.

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1.3 - Removing and installing gear stick knob and cover



1 Gear stick knob

- ◆ Detach and fit together with cover

- ◆ Removing => Page 46

2 Cover with frame

- ◆ Remove and install together with gear stick knob

- ◆ Removing => Page 46

- ◆ Separating from gear stick knob

=> Fig. 1

- ◆ Attaching to gear stick knob before installing => Fig. 1

3 Retaining clip

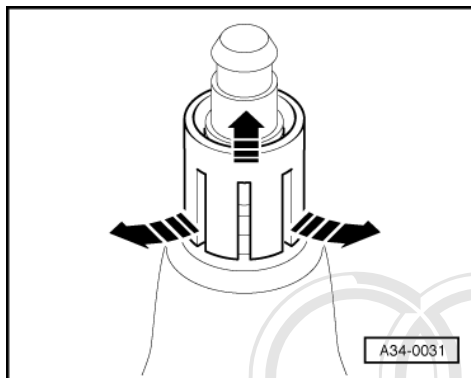
4 Connection piece

- ◆ Connects cover to gear stick knob

- ◆ Removing => Fig. 1

5 Clamp

- ◆ For securing gear stick knob on gear stick



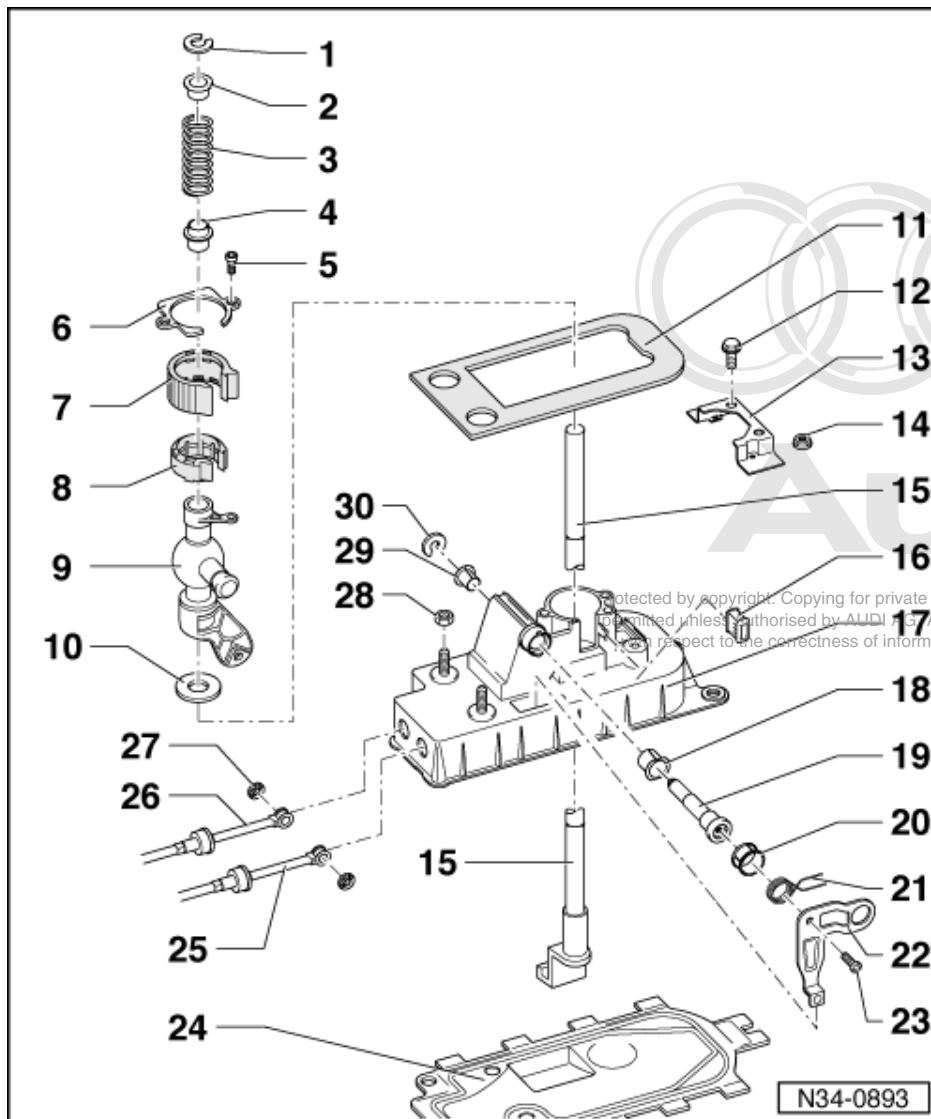
-> Fig.1 Separating cover from gear stick knob and attaching to gear stick knob

- Turn cover inside out.
- Use screwdriver to prise prongs on connection piece -arrows- outwards.
- Pull connection piece off gear stick.
- Turn gear stick knob outwards and pull off cover.

Assemble in reverse order, paying attention to the following:

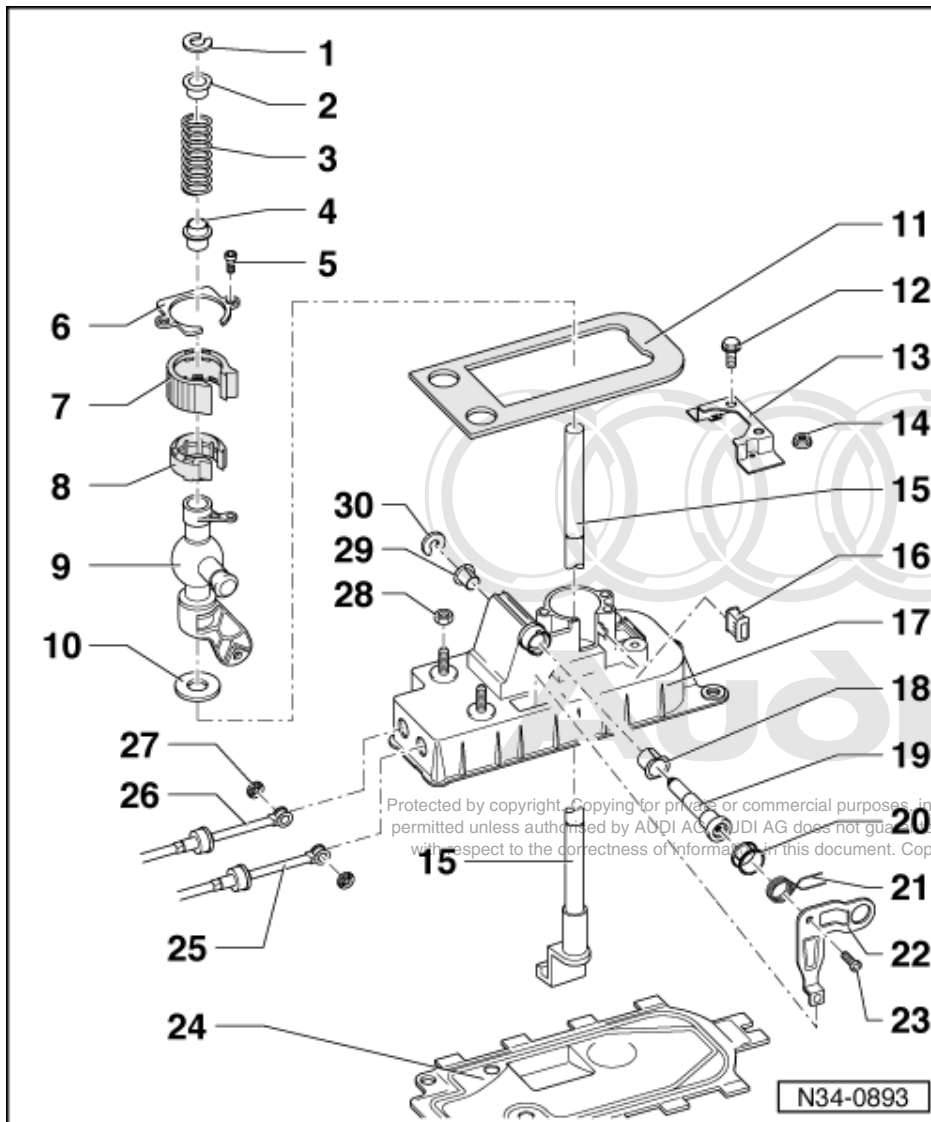
- Turn cover inside out.
- Insert gear stick knob in cover.
- Slip connection piece over gear stick knob and cover. Connection piece must engage on gear stick knob.

1.4 - Servicing gear stick and gear stick housing

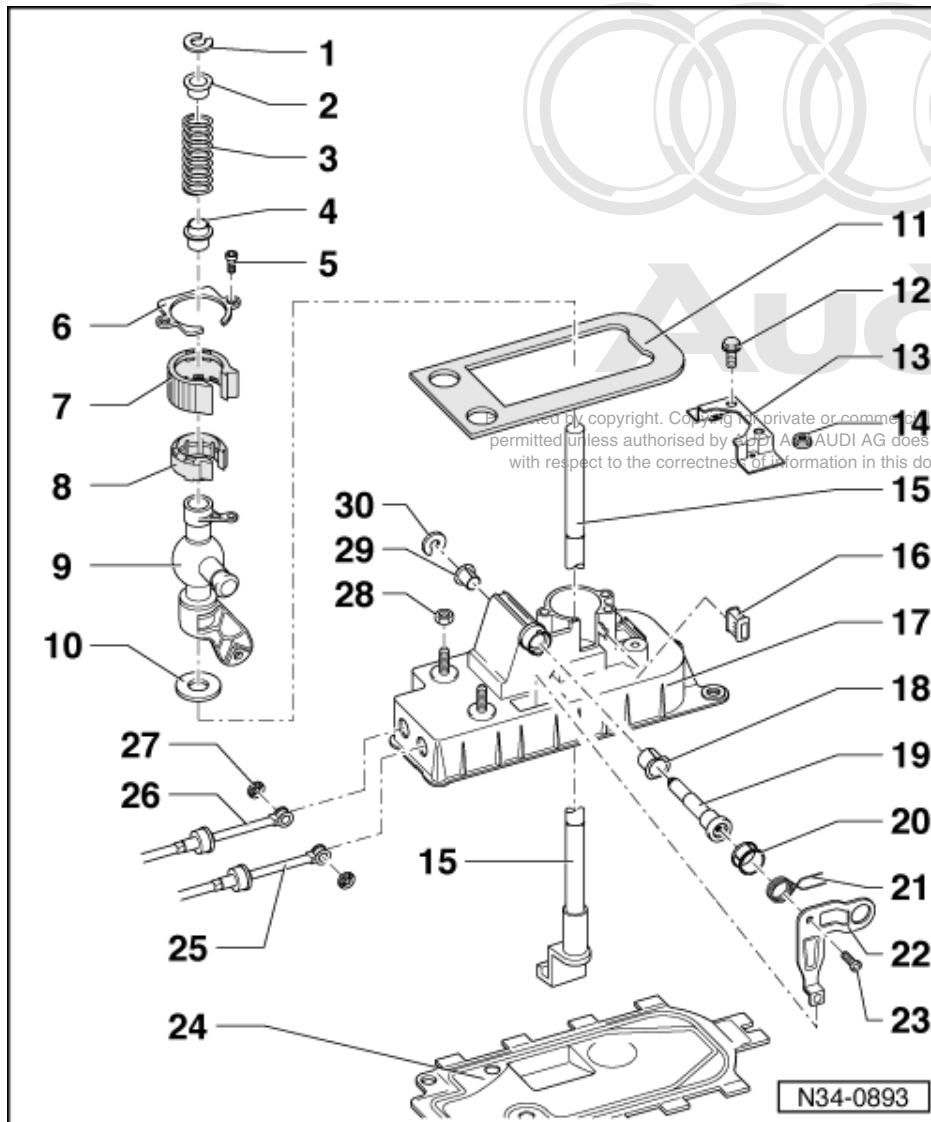
**Note:**

Lubricate all mountings and sliding surfaces with polycarbamide grease, part no. G 052 142 A2.

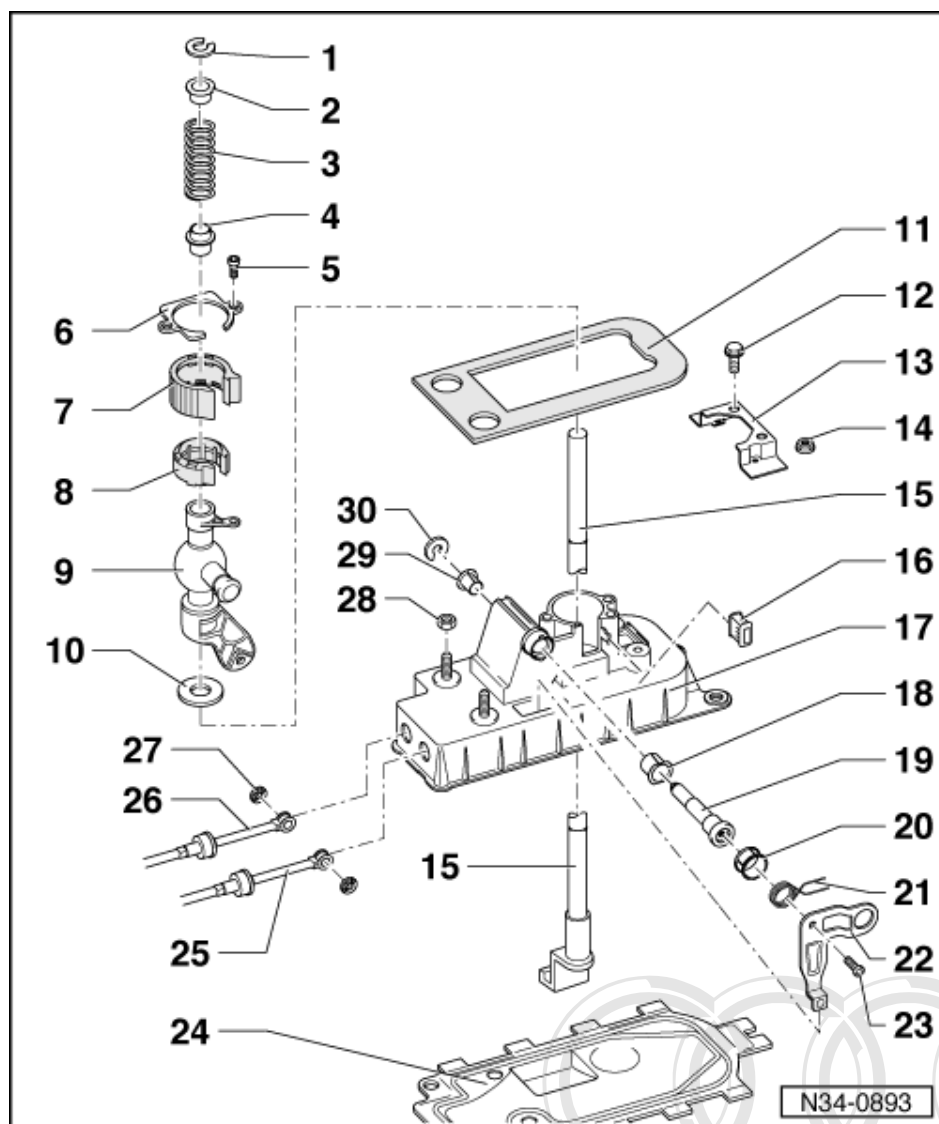
- 1 Circlip
 - ♦ Removing and installing => Fig. 1
- 2 Bush
- 3 Spring
- 4 Bush
- 5 Torx socket-head bolt, 6 Nm
- 6 Cover plate



- 7 Damper
- 8 Bearing shell
 - ♦ Insert in damper, item 7
- 9 Gear stick guide
- 10 Damping washer
- 11 Gasket
 - ♦ Between gear stick housing and floor
 - ♦ Self-adhesive
 - ♦ Bond to gear stick housing
- 12 Bolt, 25 Nm
- 13 Bracket
 - ♦ Attached to body
- 14 Hexagon nut, 25 Nm
 - ♦ For attaching bracket to body



- 15 Gear stick
 16 Damper
 ♦ Press onto gear stick housing
 17 Gear stick housing
 18 Mounting bush
 ♦ Only fits in one position
 19 Pivot pin
 20 Guide bush
 ♦ Press onto gear stick housing
 21 Spring
 ♦ Installing => Fig. 2
 22 Gate selector bracket
 23 Torx socket-head bolt, 6 Nm

**24 Base plate**

- ◆ Bend open tabs to detach
- ◆ Replace

25 Gate selector cable

- ◆ On gate selector bracket
- ◆ Installation position => Page 33

26 Gear selector cable

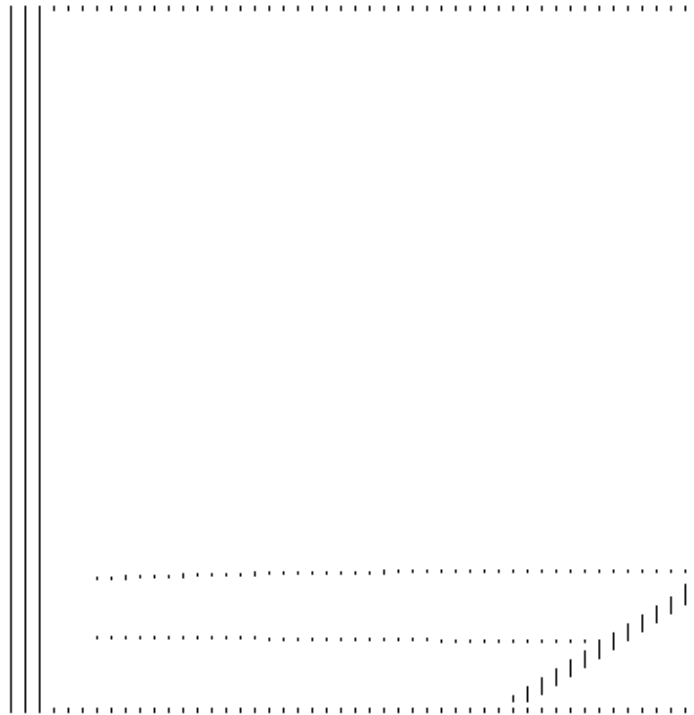
- ◆ Press onto gear stick guide
- ◆ Installation position => Page 33

27 Circlip**28 Hexagon nut, 25 Nm****29 Mounting bush**

- ◆ Only fits in one position

30 Circlip

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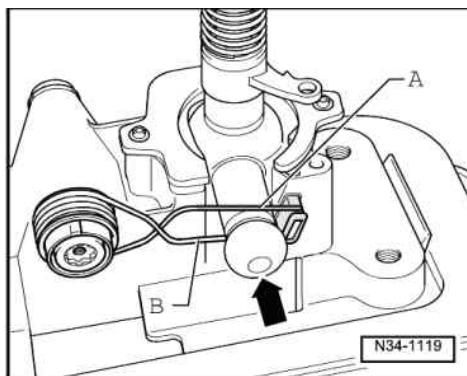


-> Fig.1 Removing and installing circlip

- To remove and install circlip, pull gear stick in direction of arrow -A- and at the same time use screwdriver to press down spacer bush as far as it will go in direction of arrow -B-.

Note:

Take care not to tilt spacer bush when pressing it down. Carefully relieve pressure at circlip groove in gear stick.

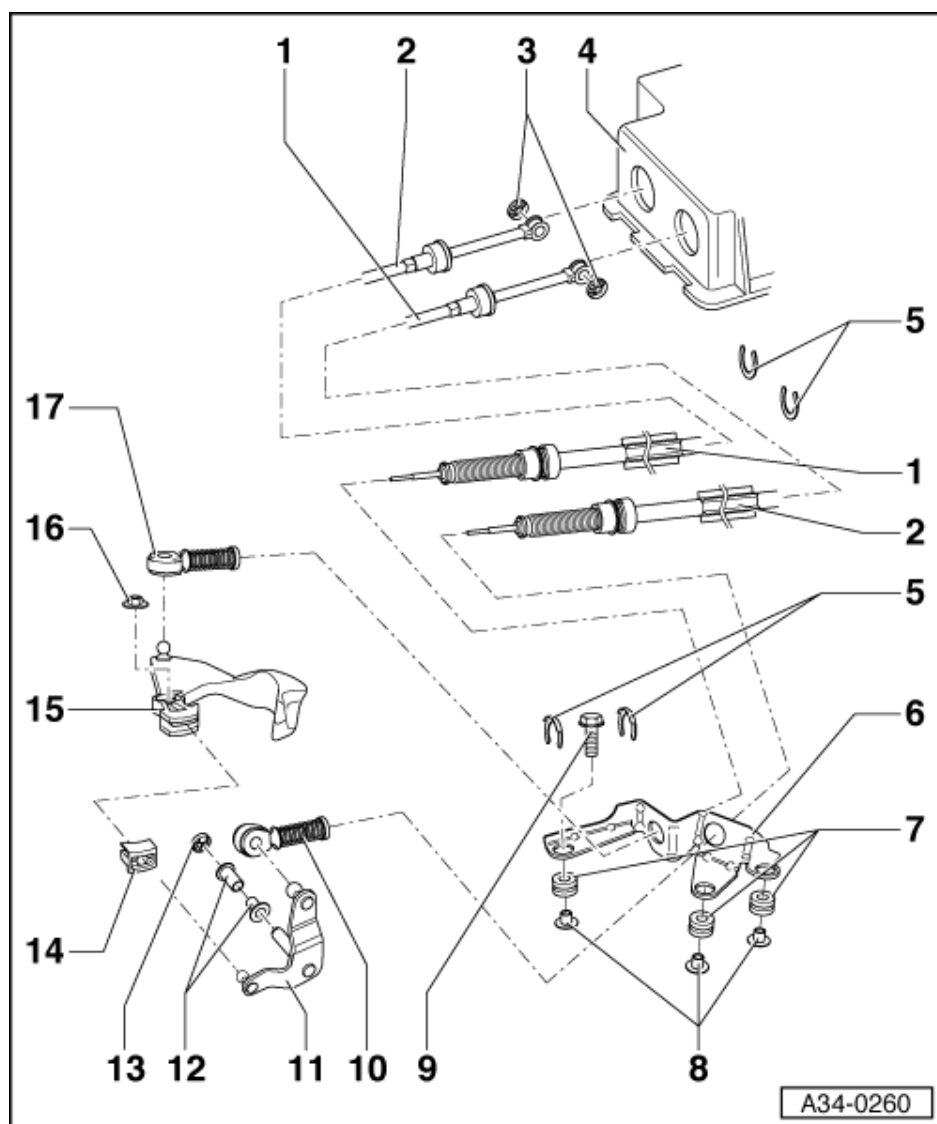


-> Fig.2 Installing spring

- Insert spring such that spring extension -A- makes contact above pin (arrow).
- Then pull down spring extension -B- such that it reaches below pin (arrow).



1.5 - Removing and installing selector cables - Exploded view

**Note:**

Lubricate mountings and sliding surfaces with polycarbamide grease, part no. G 052 142 A2.

1 Gate selector cable

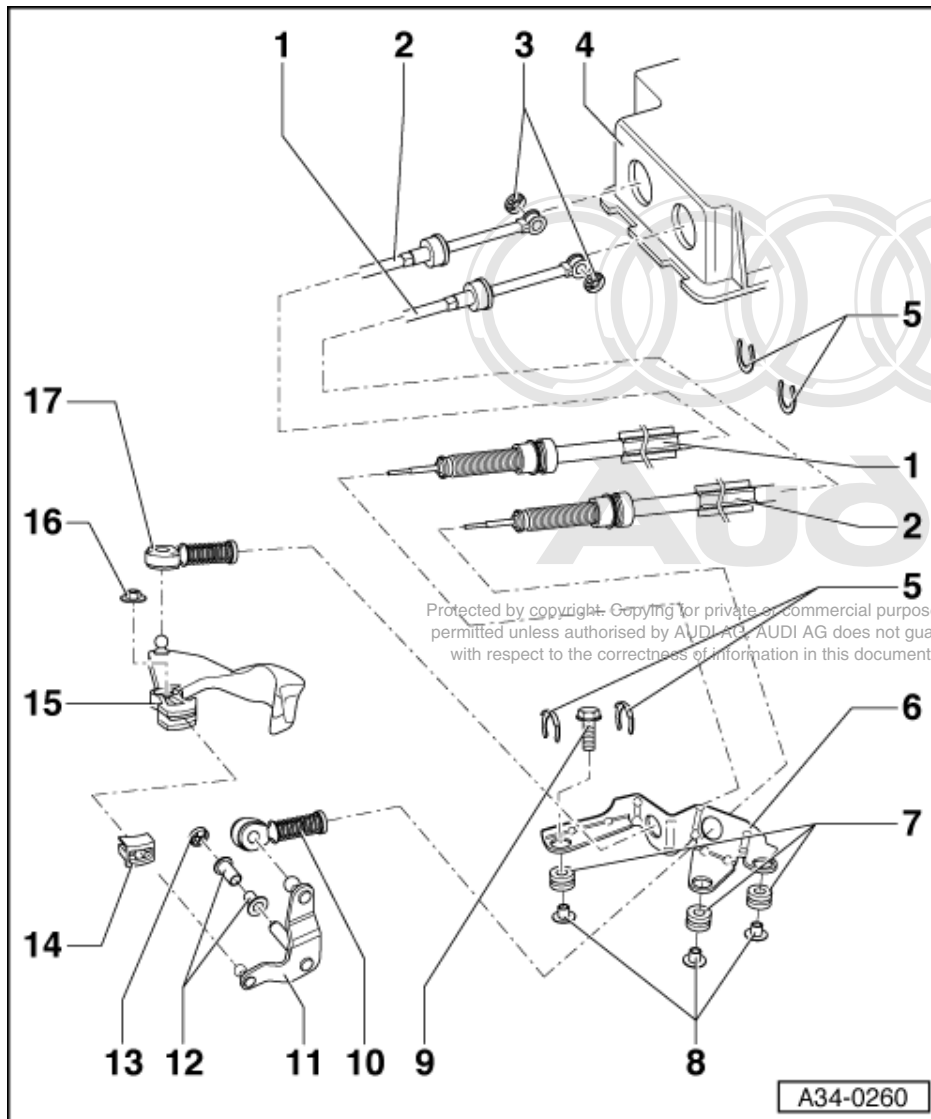
- ♦ On gate selector bracket
- ♦ Installation position => Page 33

2 Gear selector cable

- ♦ Press onto gear stick guide
- ♦ Installation position => Page 33

3 Circlip**4 Gear stick housing****5 Circlip**

- ♦ Take care not to damage cables when removing



6 Support bracket

7 Grommet

- ♦ Support bracket mounting on gearbox

8 Spacer

9 Hexagon bolt, 25 Nm

- ♦ For support bracket

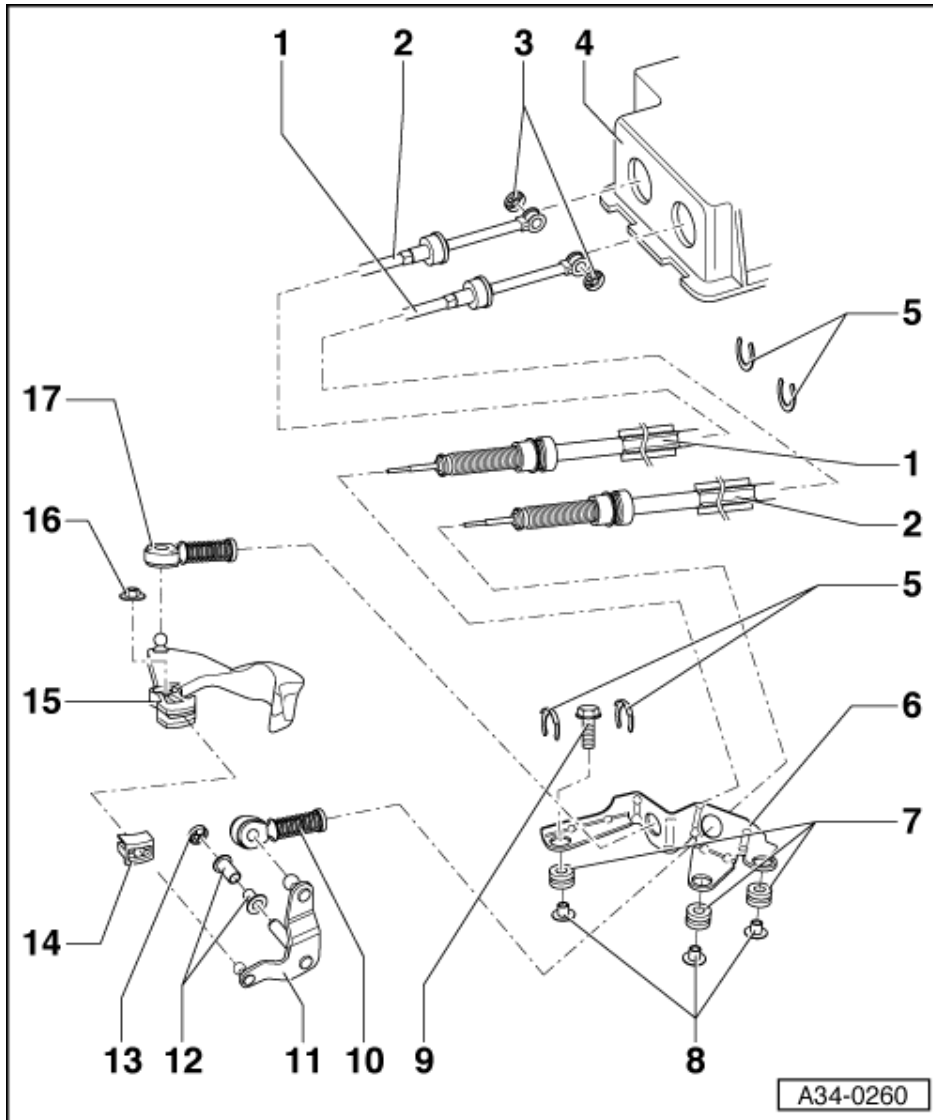
10 Cable locking mechanism

- ♦ For gate selector cable on actuating arm
- ♦ Releasing to adjust shift mechanism => Page 49
- ♦ Must be replaced after prising off actuating arm -item 11 -

11 Actuating arm

- ♦ Installation position => Page 45, Fig. 1

12 Mounting bush



13 Circlip

14 Shoe

15 Selector lever on gearbox

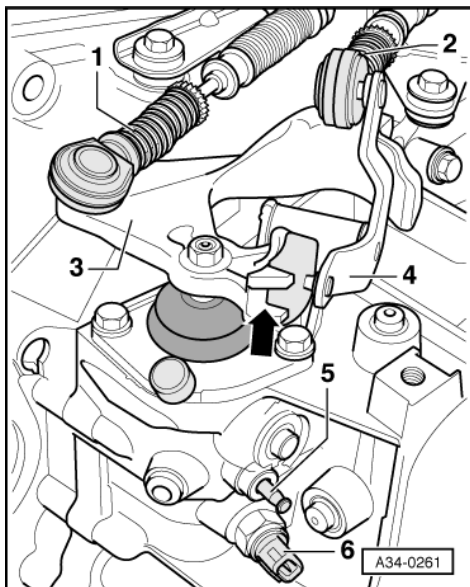
- ◆ With vibration damper
- ◆ Insert such that master spline is aligned with selector shaft
- ◆ Adjusting shift mechanism after installing => Page 49
- ◆ Installation position => Page 45 , Fig. 1

16 Hexagon nut, 25 Nm

17 Cable locking mechanism

- ◆ For gear selector cable on gear stick
- ◆ Must be replaced after being prised off selector lever on gearbox -item 15 -
- ◆ Releasing to adjust shift mechanism => Page 49

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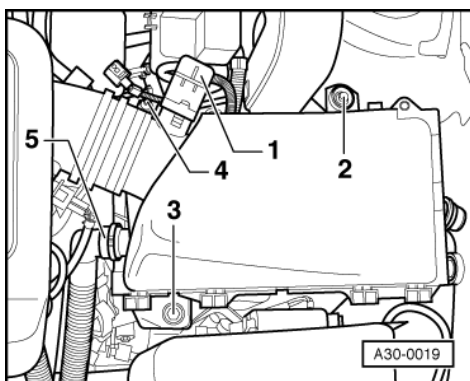


-> Fig.1 Installation position of selector lever on gearbox, actuating arm and setting pin

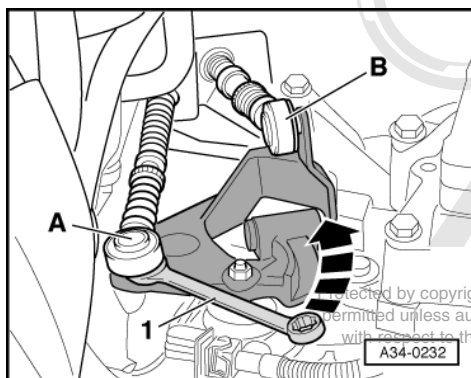
- 1 - Gear selector cable locking mechanism
 - 2 - Gate selector cable locking mechanism
 - 3 - Selector lever on gearbox with vibration damper
 - 4 - Actuating arm
- Engages by way of shoe in slide rail of selector lever on gearbox -arrow A-
Lubricate with MoS2 grease
- 5 - Setting pin
 - Press into gearbox to adjust shift mechanism => Page 49
 - 6 - Reversing light switch

1.6 - Removing and installing shift mechanism

Removing

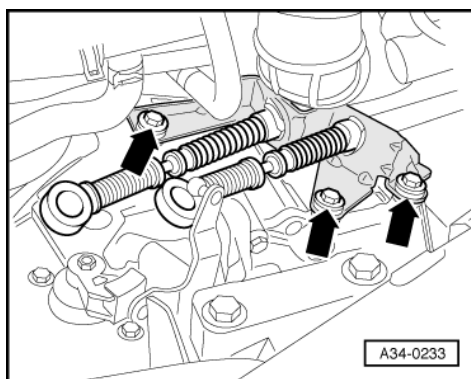


- -> Unfasten clamp -4- and pull both intake hose and connector -1- off air-mass meter.
- If fitted, pull hose -5- off air cleaner housing.
- Remove entire air cleaner housing by screwing out bolts -2- and -3-.



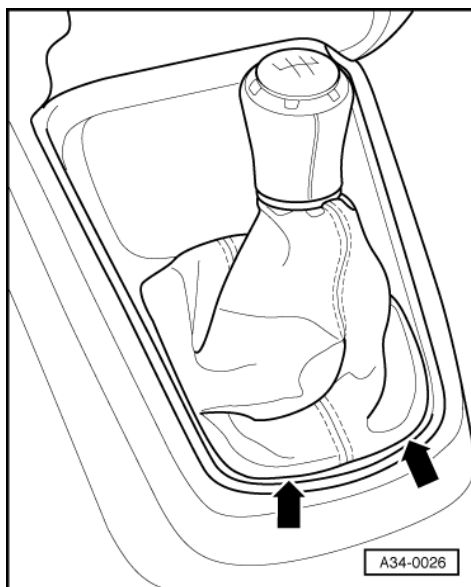
- -> Use open-ended wrench -1- to prise off gear selector cable -A- and gate selector cable -B-.

1 = Commercially available 13 mm open-ended wrench

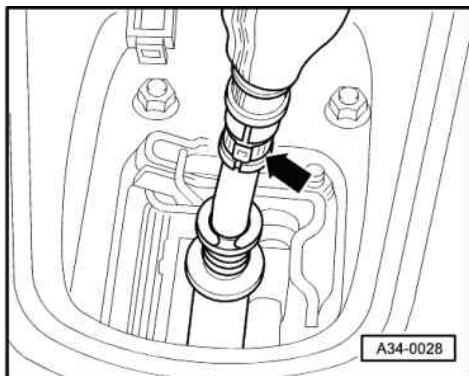


- -> Screw cable support bracket off gearbox -arrows-

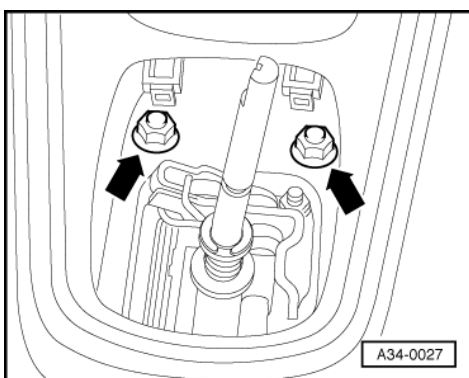
Removing gear stick knob and cover for gear stick



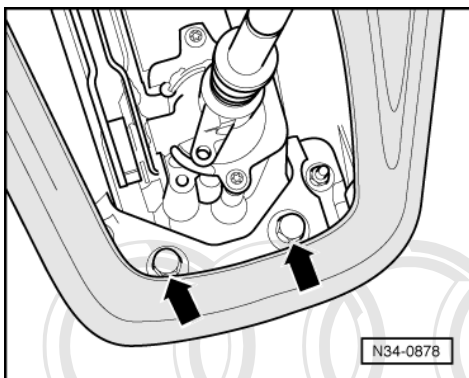
- -> Carefully prise cover off centre console (arrows).
- Pull cover to rear off centre console.
- Pull cover up and over gear stick knob.



- -> Unfasten clip -arrow- and pull off gear stick knob together with cover.
- Detach noise insulation if fitted.



- -> Unfasten front securing nuts for gear stick housing -arrows-.



- -> Then unscrew rear securing bolts for gear stick housing (arrows).
- Separate front part of exhaust system downstream of front exhaust pipe and remove catalytic converter with centre section (2nd mechanic required).

=> 4-cyl. Engine (5-valve Turbo), Mechanics; Repair Group 26; Removing and installing exhaust system components Removing and installing exhaust system components

- Remove propshaft.

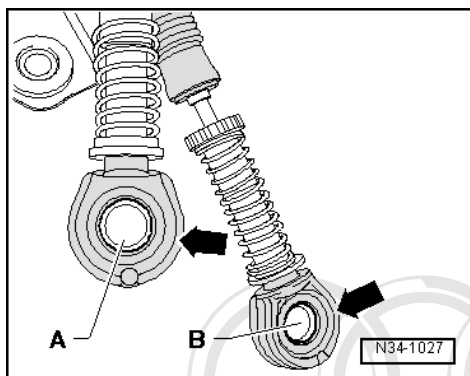
=> 5/6-speed Manual Gearbox 02M; Four-wheel Drive/Final Drive; Repair Group 39; Removing and installing propshaft Removing and installing propshaft

- Remove front heat shield.
- Swivel down gearstick housing and take out together with gear selector cables.



Installing

Install in reverse order, paying attention to the following:



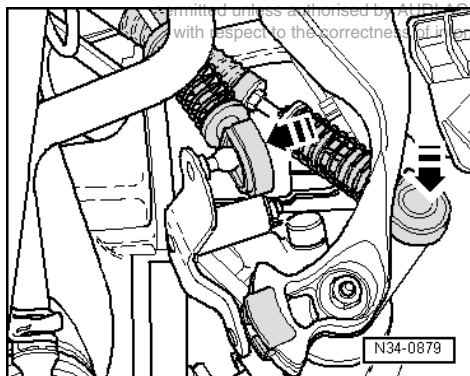
Cable locking mechanisms must be replaced if cables are to be re-used.

- -> Apply a small quantity of polycarbamide grease to ball socket of cable locking mechanism -A- and gate selector cable locking mechanism -B-.

Note:

Seals -arrows- outside ball socket must be free from grease.

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- Align gear stick housing in parallel with body.
- -> Press gear selector cable onto selector lever on gearbox and gate selector cable onto actuating arm - arrows-.
- Install propshaft.

=> 5/6-speed Manual Gearbox 02M, Four-wheel Drive/Final Drive; Repair Group 39; Removing and installing propshaft Removing and installing propshaft

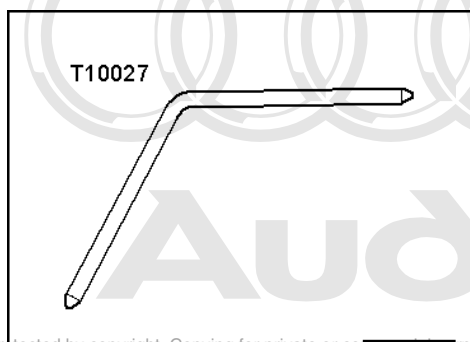
Adjust shift mechanism => Page 49 .

Tightening torques

Gear stick housing to body	25 Nm
Cable support bracket to gearbox	25 Nm
Clamp for exhaust pipe	40 Nm
Catalytic converter to front exhaust pipe	25 Nm

1.7 - Adjusting shift mechanism

Special tools and workshop equipment required



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- ♦ T10027 Setting pin

Notes:

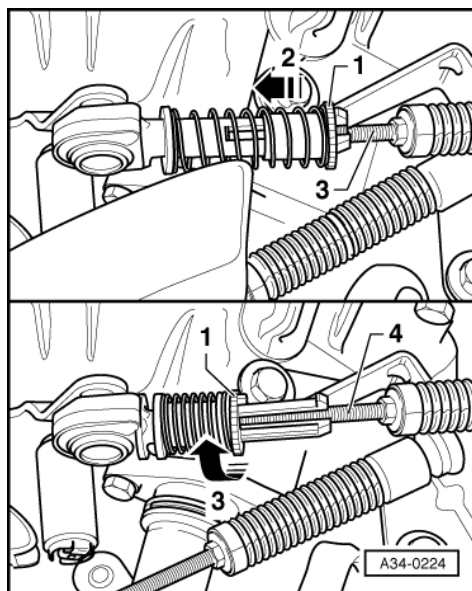
The following points are essential to ensure proper adjustment:

- ♦ Moving parts of shift mechanism and transmission elements must be in perfect condition
- ♦ Shift mechanism must move freely

Gearbox, clutch and clutch mechanism must also be in perfect condition.

- Gearbox in neutral

Release locking mechanism for gate selector cable and gear selector cable as follows:



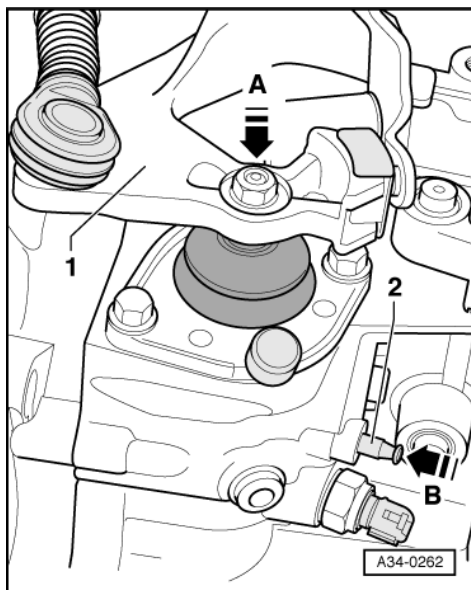
- -> Press collar -1- as far as it will go in direction of arrow -2-.
- Turn collar -1- as far as it will go in direction of arrow -3- and allow it to engage.

Notes:

- ♦ It must be possible to move cable -4- in locking mechanism.



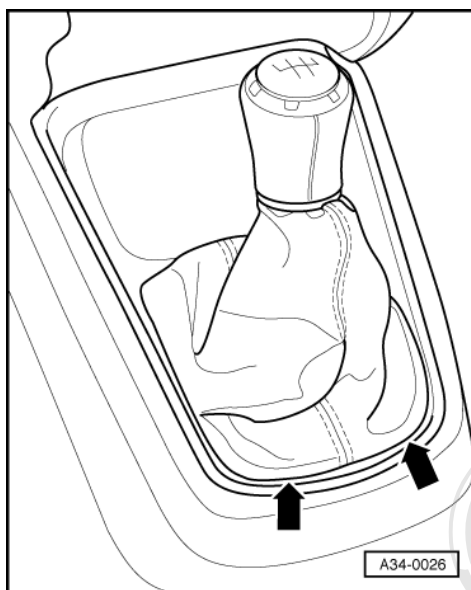
- ♦ Illustration shows gate selector cable; gear selector cable is released in the same manner.



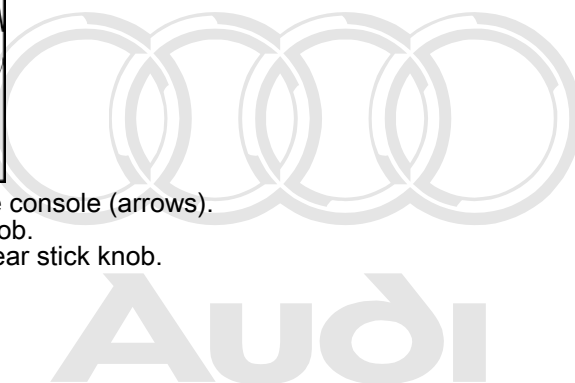
-> Secure selector shaft as follows:

- Press down selector lever on gearbox -1- in direction of arrow -A- into 1st/2nd gear selector gate and at the same time press setting pin -2- in direction of arrow -B- into gearbox until it engages.

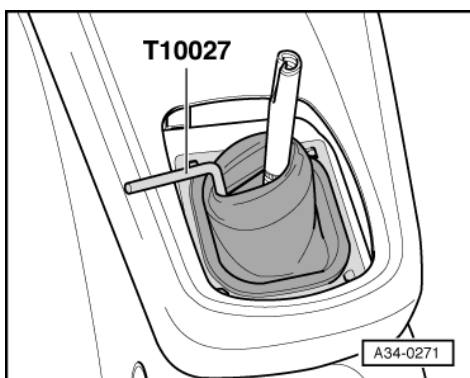
The selector shaft is now locked and can no longer be moved.



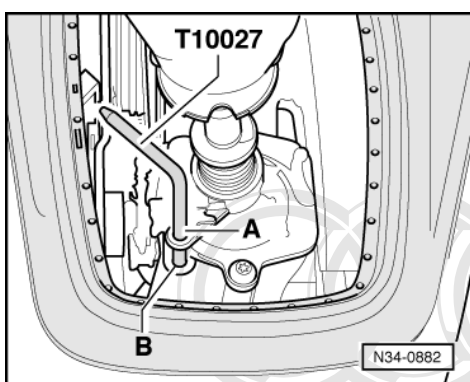
- -> Pull cover for gear stick off centre console (arrows).
- Pull cover up and over gear stick knob.
- If fitted, pull rubber cover towards gear stick knob.



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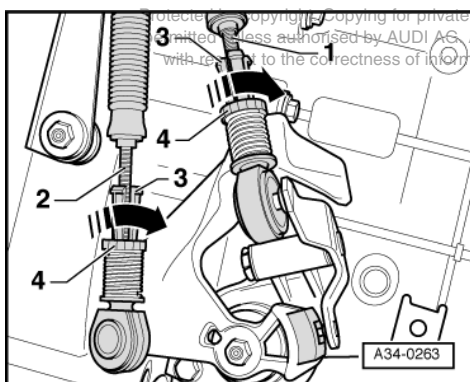


- -> If fitted, pull rubber cover away from gear stick until setting pin T10027 can be inserted in hole -A- (=> Fig. N34-0882, Page 51).



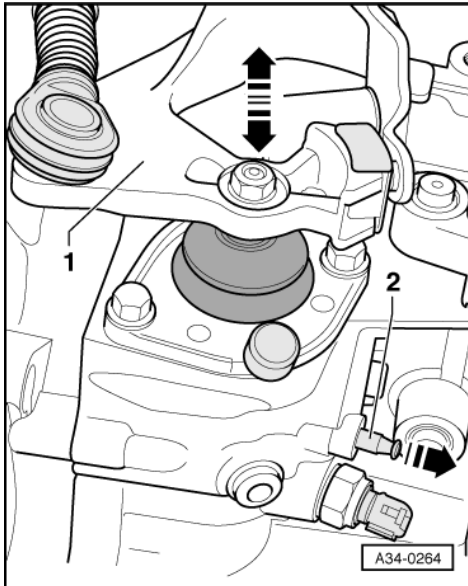
-> Then secure gear stick as follows:

- Guide gear stick in neutral to left into 1st/2nd gear gate.
- Fix gear stick in position in vehicle using special tool T 10027.



- -> Ensure stress-free positioning of gate selector cable -1- and gear selector cable -2- in locking mechanism -3-.
- Turn collars -4- as far as they will go in direction of arrow and release.

Spring presses locking mechanism into initial position.



- -> Pull back locking pin -2- into initial position -arrow direction-.
- Pull special tool T 10027 out of shift mechanism.
- Fit cover for gear stick.

Functional test

- Gear stick must be in 3rd/4th gear gate with gearbox in neutral
- Press clutch.
- Select all gears several times, paying particular attention to function of reverse gear lock.

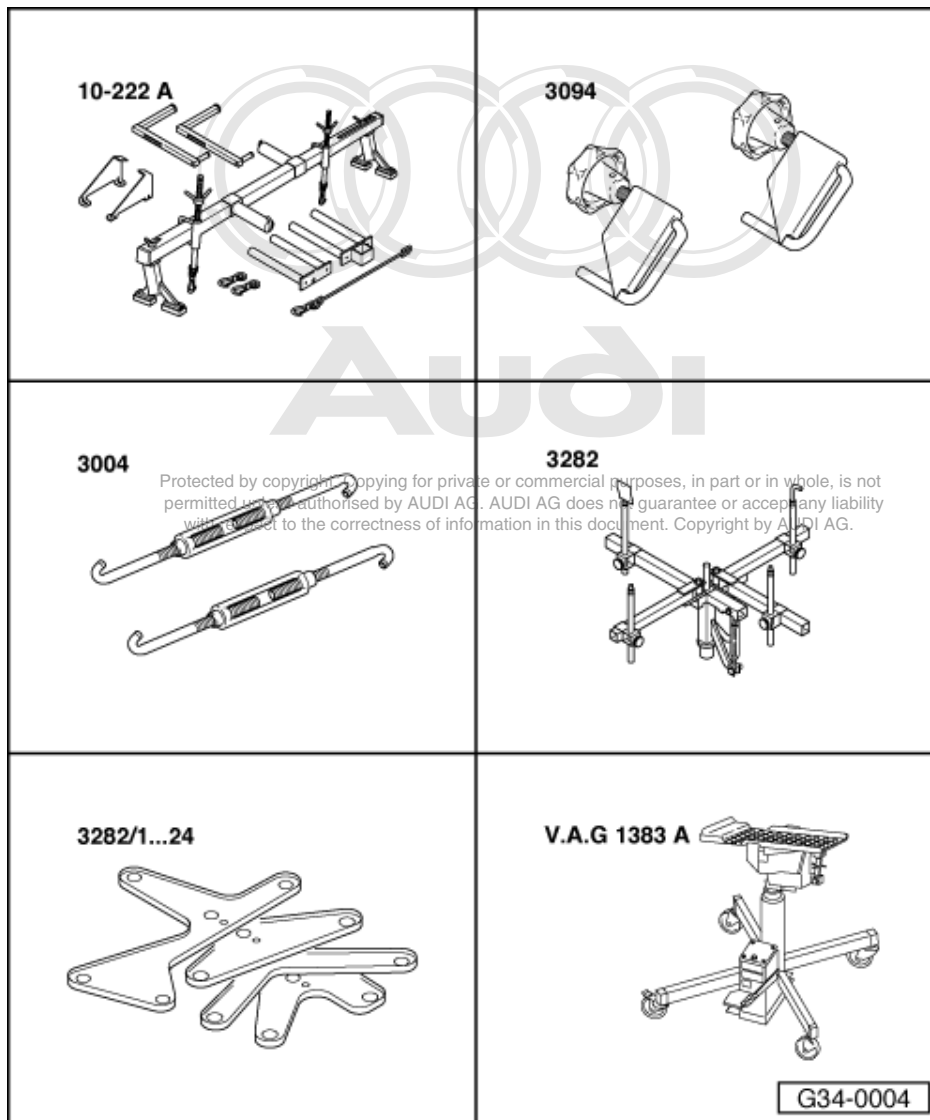
Repeat shift mechanism adjustment process if a gear fails to engage smoothly after repeated selection =>
Page 49 .



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2 - Removing and installing gearbox

2.1 - Removing and installing gearbox



Special tools and workshop equipment required

- ◆ 10-222 A Support bar
- ◆ 3094 Hose clamp (3x)
- ◆ 3004 Hook (3x)
- ◆ 3282 Gearbox support with 3282/48 pin (2x) and 3282/52 support
- ◆ 3282/27 Adjustment plate
- ◆ V.A.G 1383 A Gearbox jack
- ◆ Chain (2x)

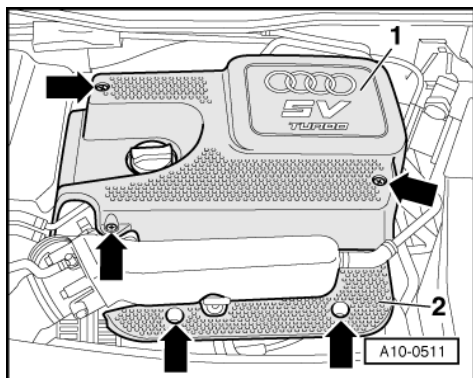


2.2 - Removing

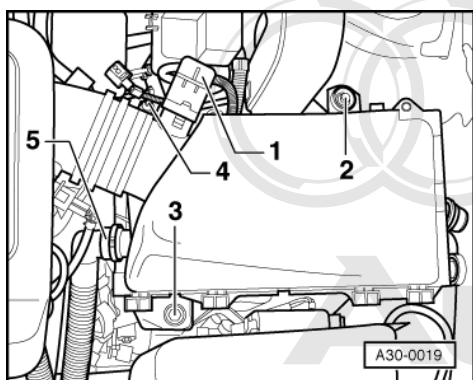
Note:

All cable ties unfastened or cut open on gearbox removal must be replaced with cable ties fitted in the same position on installation.

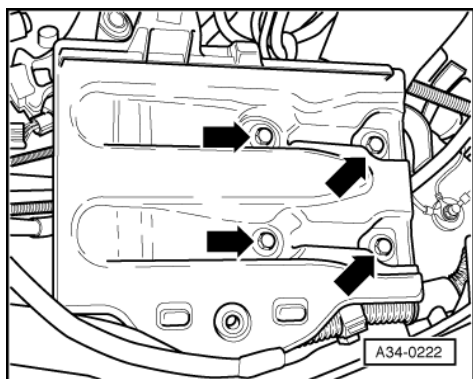
- Move gear stick to neutral position.
- Heed (if necessary obtain) radio code for vehicles with encoded radio.
- Disconnect battery earth strap with ignition switched off.



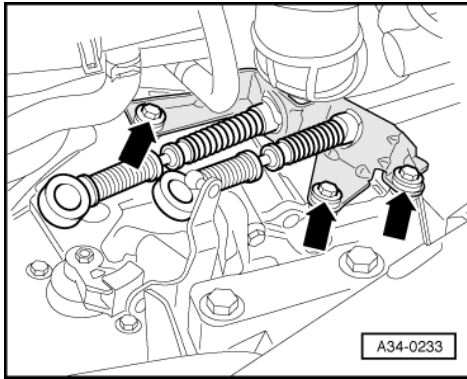
- -> Remove engine cover -1- over cylinder head cover -top arrows-.



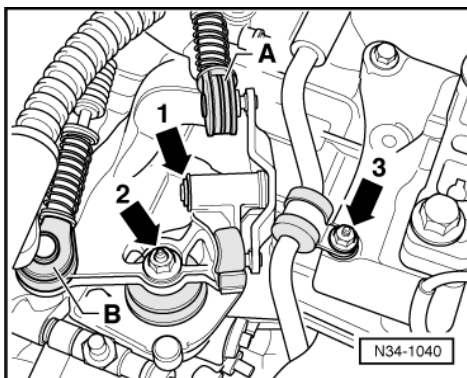
- -> Unfasten hose clamp -4- and pull both intake hose and connector 1 off air-mass meter.
- If fitted, pull hose -5- off air cleaner housing.
- Then remove entire air cleaner housing by screwing out bolts -2- and -3-.



- -> Remove battery and battery carrier -arrows-.

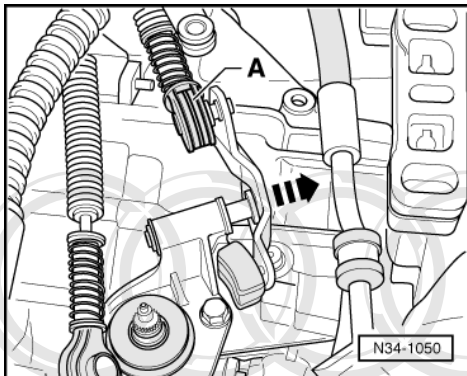


- -> Unscrew cable support bracket from gearbox -arrows-.

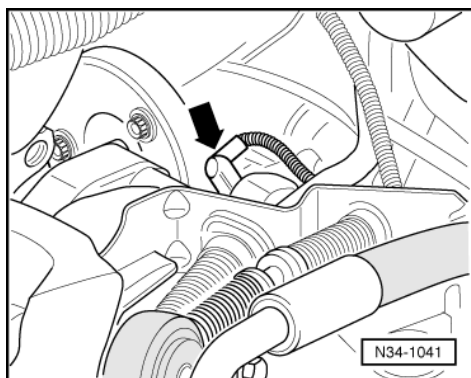


- -> Pull circlip (arrow 1) off actuating arm of gate selector cable -A-.
- Detach gear selector cable -B- together with selector lever on gearbox by unscrewing nut (arrow 2).

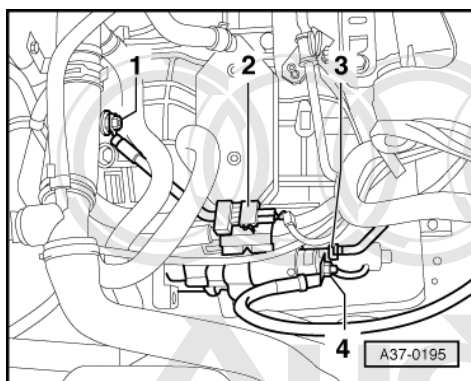
If necessary, make use of puller, e.g. Kukko 20-10.



- -> Pull off gate selector cable -A- together with actuating arm.
- Then tie gear selector cable with selector lever on gearbox and gate selector cable with actuating arm in place.

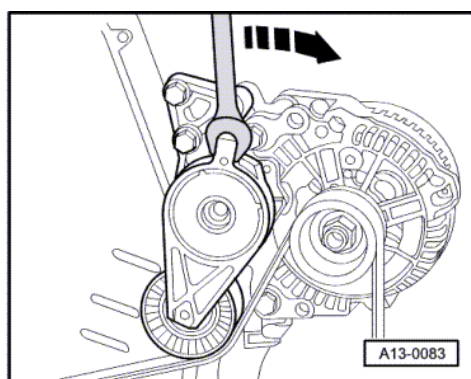


- -> Unplug connector of speedometer sender (arrow).



- -> Unscrew earth wire -1-.
- Unplug connector -3- at starter (leave wire -4- connected).
- Unplug connector -2- and pull out of retainer.
- Disengage wires from retainer at starter and lay aside; unscrew bracket.
- Then remove upper securing bolt at starter.
- Screw out engine/gearbox connecting bolts accessible from above.

Vehicles with 2 charge-air coolers:

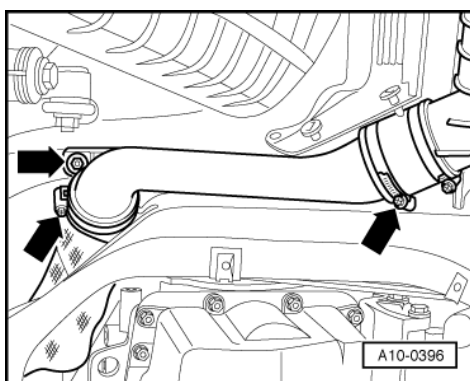


- -> Swivel tensioner in direction of arrow to slacken off ribbed belt.

Note:

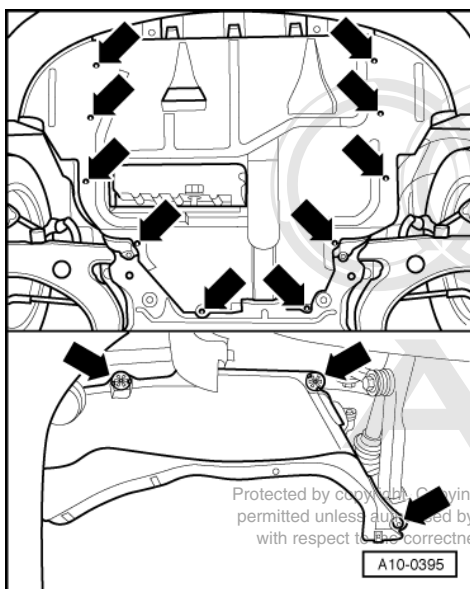
Mark direction of ribbed belt with chalk or felt-tip pen prior to removal. Running a used belt in the opposite direction could destroy it. When installing belt, make sure it is properly seated in pulleys.

- Detach ribbed belt.



Vehicles with 1 charge-air cooler:

- -> Detach air pipe to charge-air cooler at bottom of right longitudinal member -arrows-.

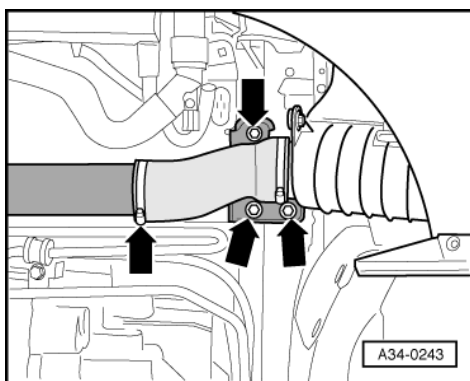


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All vehicles:

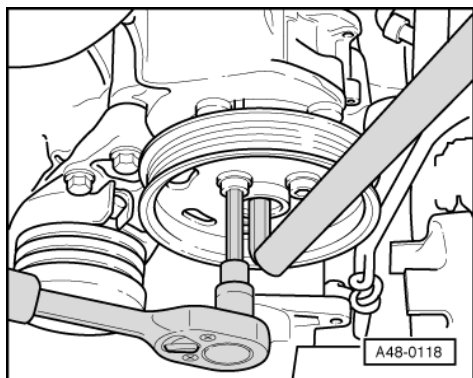
- Unscrew both front wheels.
- -> Remove centre, left and right noise insulation -arrows-.

Vehicles with 2 charge-air coolers:



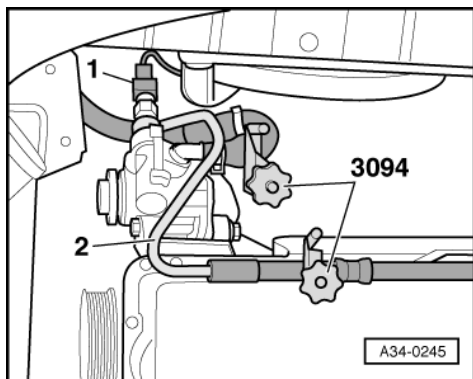


- -> Remove connecting pipe between charge-air coolers -arrows-.

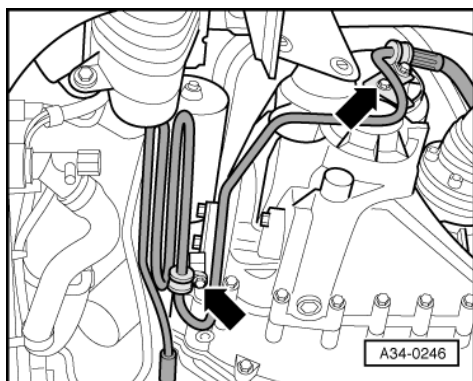


- -> Unscrew pulley of power steering vane pump whilst providing support with Allen key.

All vehicles:



- -> Use hose clamps 3094 to pinch off feed and return pipe at power steering vane pump.
- Unplug connector -1- at power steering pressure switch.
- Unscrew pressure pipe -2- at power steering vane pump.

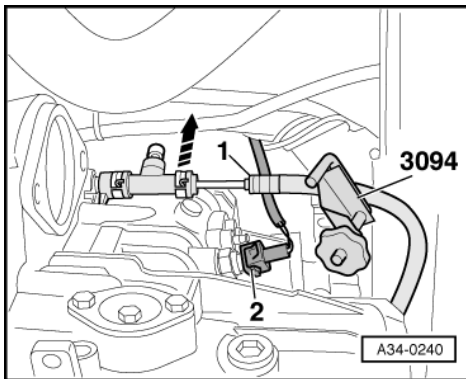


- -> Detach power steering pipe from gearbox -arrows- and pull speed nut off gearbox.

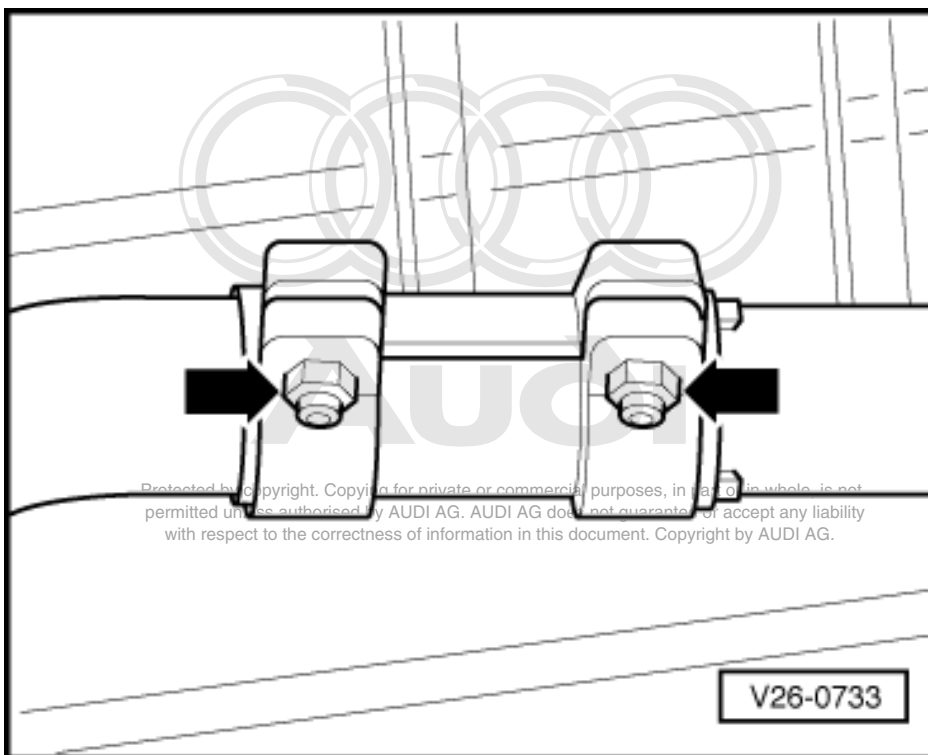
Note:

If fitted, unfasten additional pipe retainer.

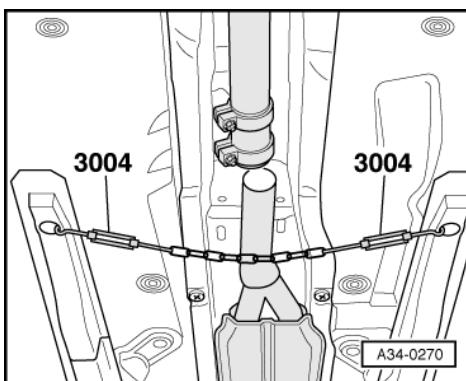
- Screw out lower starter securing bolt and detach starter.



- -> Use hose clamp 3094 to pinch off pressure pipe to clutch slave cylinder.
- Lift fastener -arrow- and pull pressure pipe -1- out of hose connector.
- Unplug connector at reversing light switch -2-.



- -> Disconnect exhaust system at clamp -arrows-.
- Push clamp to rear.



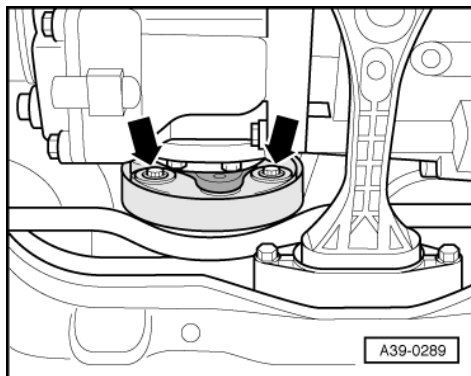


- -> Use chain to tie exhaust system in position. To do so, engage hook 3004 in openings on underside of vehicle (remove plugs if necessary).

Note:

To avoid damage, decoupling element of exhaust system is never to be kinked by more than 10 °.

- Mark position of propshaft with respect to flexible coupling at bevel box.



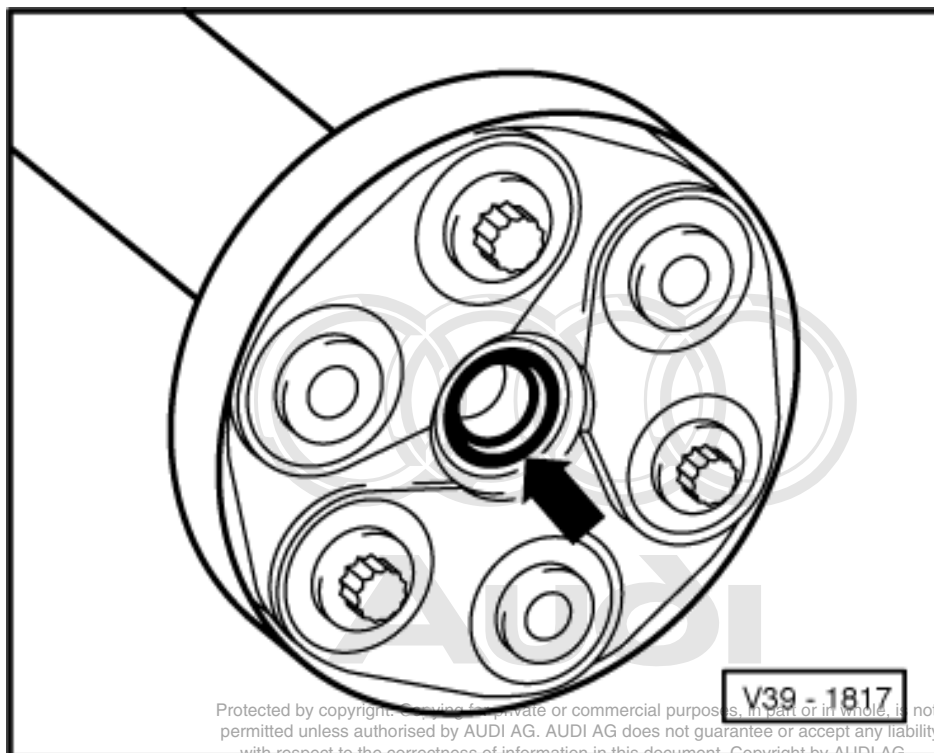
- -> Unscrew propshaft from flexible coupling at bevel box -arrows-.

Note:

When slackening off bolts, provide support at triangular flange with a suitable lever.

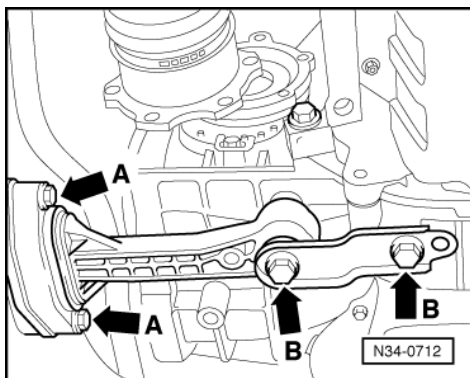
- Press front tube of propshaft to rear as far as it will go.

Note:

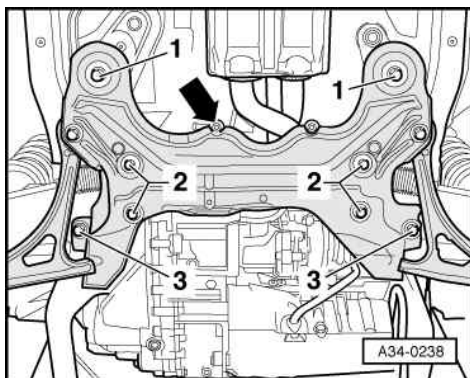


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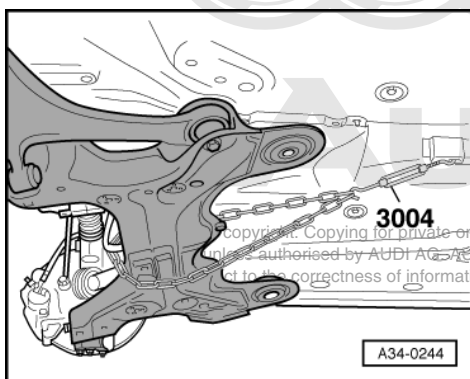
-> Engine/gearbox assembly moves slightly forwards after slackening off bolts -A- (=>Fig. N34-0712, Page 61). Take care not to damage oil seal -arrow- in propshaft flange on removal and installation.



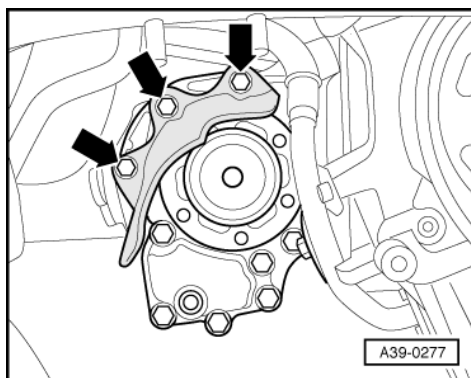
- -> First screw out bolts -A-, then bolts -B- of pendulum support.
- Detach pendulum support.
- Press engine/gearbox carefully forwards.



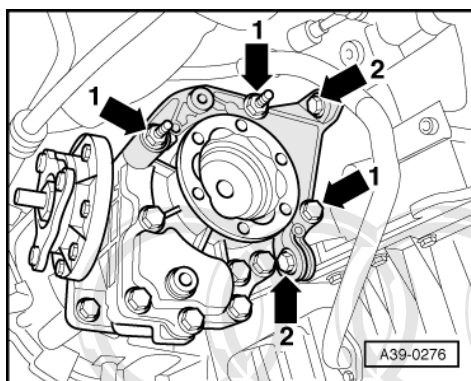
- -> If fitted, unscrew front bracket for exhaust system -arrow- from subframe.
- Screw out bolts -2- for steering box.
- Prise steering box off subframe (dowel sleeve).
- Position gearbox jack V.A.G 1383 A with universal support 1359/2 under subframe.
- Screw out bolts -1- and -3- for subframe.
- Carefully lower subframe, leaving it suspended from ball joints and connecting links. Press steering box upwards at the same time.
- Tie steering box in place.



- Detach drive shafts from flange shafts, move to rear and set down on subframe (take care not to damage surface protection).
- -> Use chain to tie subframe in place towards rear of vehicle. To do so, insert hook 3004 in opening on underside of vehicle (remove plug if fitted).



- -> Unscrew heat shield for right drive shaft from bevel box.



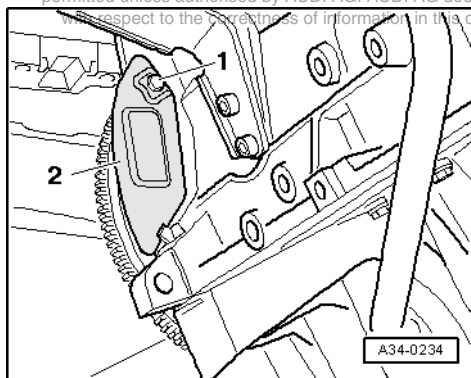
- -> Screw out bolts -1- and -2- at bracket for bevel box.

Note:

Bracket cannot be detached at this stage and should be left in installation position.

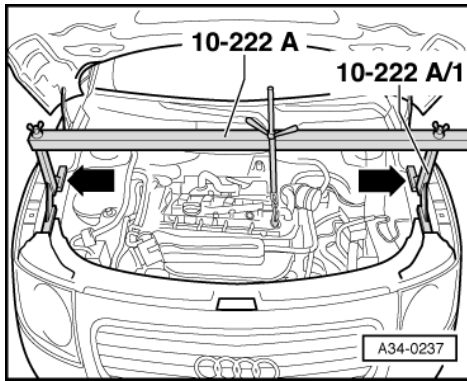
Note:

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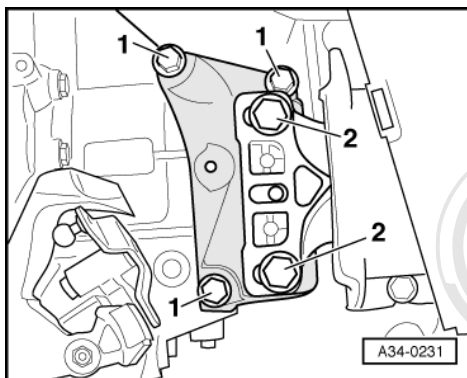


-> Small cover plate -2- is located behind bevel box and is not visible with bevel box in position. Illustration shows gearbox removed.

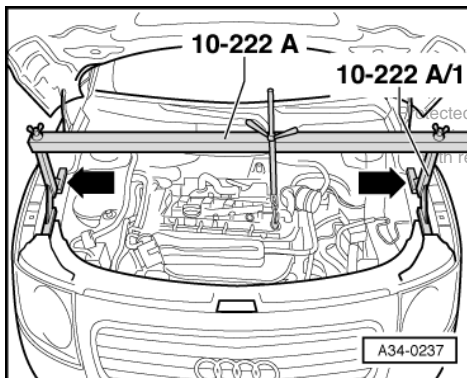
- Screw out 10 mm bolt -1- and remove cover plate for flywheel behind bevel box.
- Fit support bar 10-222A together with legs 10-222 A/1.



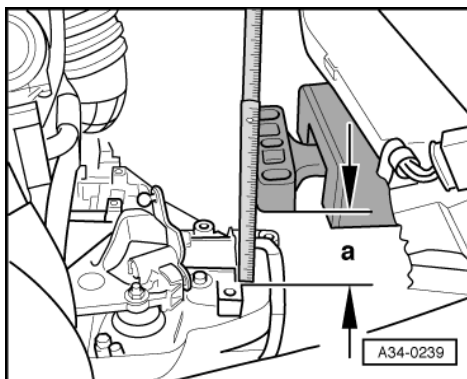
- -> Set up support bar on wheel housing panels
- arrows-
- Use spindle to slightly pretension engine/gearbox assembly.



- -> Remove left gearbox support (bolts -1- and -2-).

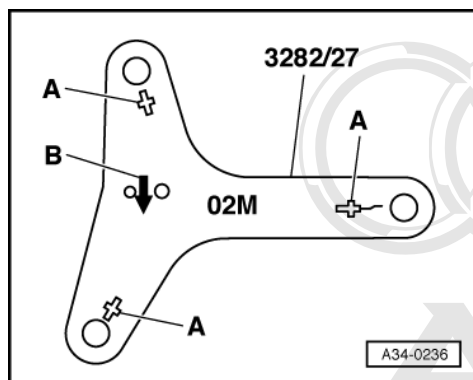


- -> Lower engine/gearbox assembly with spindle

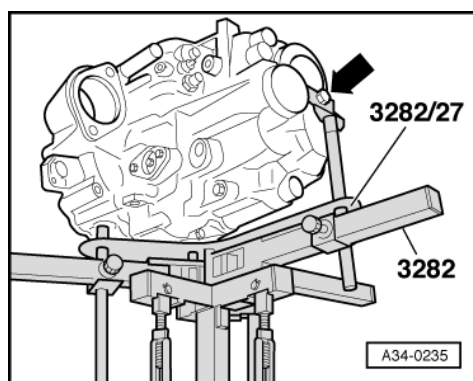




- -> ... until distance between gearbox housing and gearbox mounting is -a- = 100 ... 110 mm.



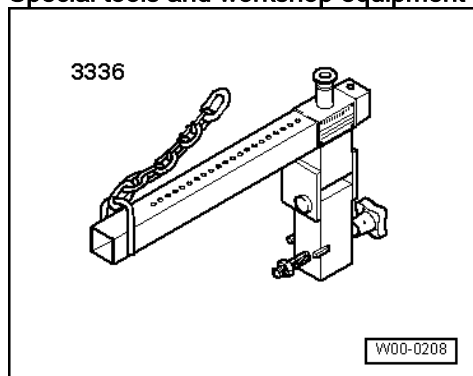
- Assemble gearbox jack with gearbox support 3282, adjustment plate 3282/27 for "02M" gearbox and support elements as follows:
- Place adjustment plate 3282/27 on gearbox support 3282 (only fits in one position).
- Align arms of gearbox support to coincide with holes in adjustment plate
- -> Screw in support elements -A- as shown on adjustment plate.



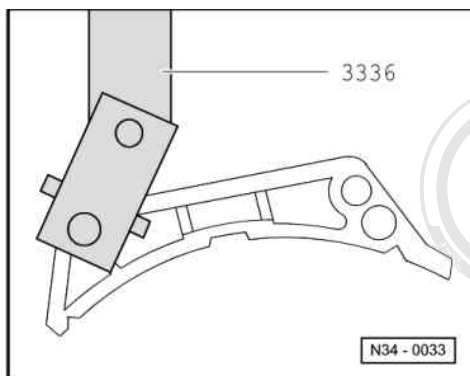
- -> Position gearbox jack under vehicle with arrow symbol -B- (=> Fig. V34-2670) on adjustment plate pointing in direction of travel.
- Align adjustment plate in parallel with gearbox and use M8 x 25 bolt to screw support to gearbox -arrow-.
- Screw out engine/gearbox connecting bolts accessible from underneath.
- Press gearbox off dowel sleeves.
- Detach bracket for bevel box.
- Pull gearbox off engine (on bevel box side first, then at front).
- Then carefully lower gearbox.

2.3 - Gearbox transportation

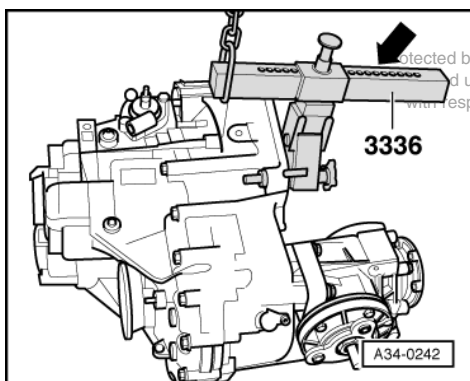
Special tools and workshop equipment required



♦ Gearbox attachment device 3336



- -> Screw gearbox attachment device 3336 to clutch housing.



- -> Set support arm at sliding piece with locking pin (arrow).

Number of visible holes = 10

- Support gearbox with workshop crane and gearbox attachment device 3336.
- Set down gearbox.

2.4 - Installing

Notes:

- ♦ Secure all hose connections with standard hose clamps.

=> Parts List

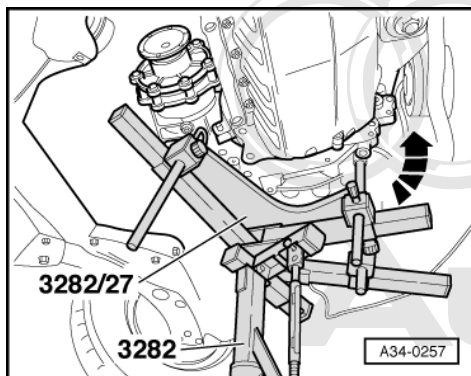
- ♦ Replace gaskets and oil seals.
- Clean input shaft splines and - in the case of used clutch plates - hub splines, remove corrosion and apply extremely thin layer of grease G 000 100 to splines.

It must be possible to slide clutch plate easily back and forth on input shaft.

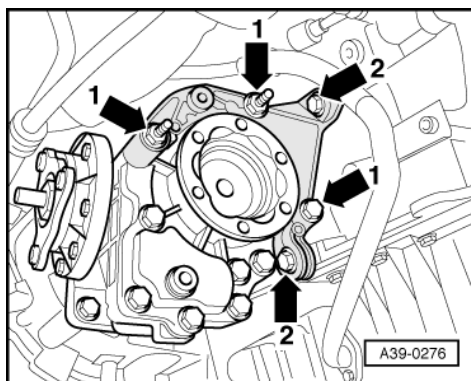
- Check whether dowel sleeves for centring engine/gearbox in cylinder block have been fitted and install if necessary.
- Check clutch release bearing with hydraulic actuator for wear and replace if necessary.
- Make sure intermediate plate is correctly positioned at engine.



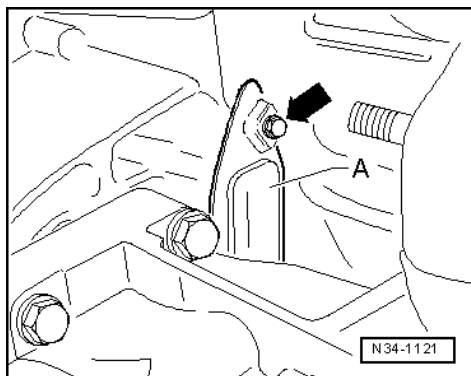
- Incline gearbox to left via spindles of gearbox support 3282.
- Lift gearbox carefully and move into installation position with gearbox support 3282.



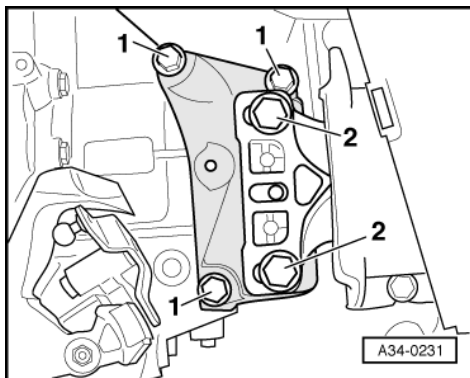
- -> Push gearbox over engine flywheel (front side -arrow- first, then on bevel box side).
- Insert gearbox.
- Install bracket for bevel box before screwing in engine/gearbox connecting bolts.



- -> Loosely screw in bolts -arrow 1- and -arrow 2-.
- Screw in engine/gearbox connecting bolts accessible from underneath. Tightening torques => Page 73
- Tighten bracket for bevel box, paying attention to the following assembly sequence:
 - Tighten bolts -arrow 1- to 3 Nm first.
 - Tighten bolts -arrow 2- to 40 Nm.
 - Tighten bolts -arrow 1- to 45 Nm.



- -> If applicable, insert small cover plate -A- for flywheel behind bevel box and tighten bolt -arrow- to 10 Nm.
- Screw in upper engine/gearbox securing bolts.
Tightening torques => Page 73

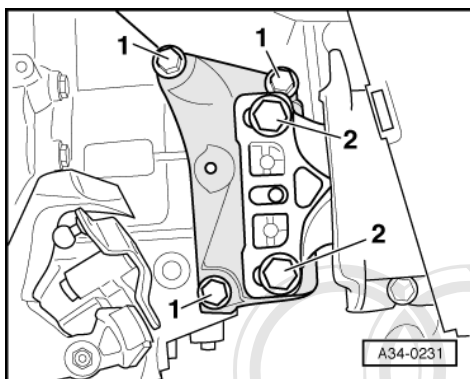
**Note:**

Use ladder V.A.S 5085 for installing securing bolts.

- Install engine/gearbox mountings as follows:
 - -> Replace bolts -1-.
 - Without fitting pendulum support, screw gearbox console to gearbox (40 Nm + 90°).
- Use spindle of support bar to lift gearbox as far as gearbox support.

Attention:

Before screwing in gearbox support/gearbox console bolts, support and console must be absolutely parallel as otherwise thread will be damaged. If necessary, use trolley jack to lift up rear of gearbox.



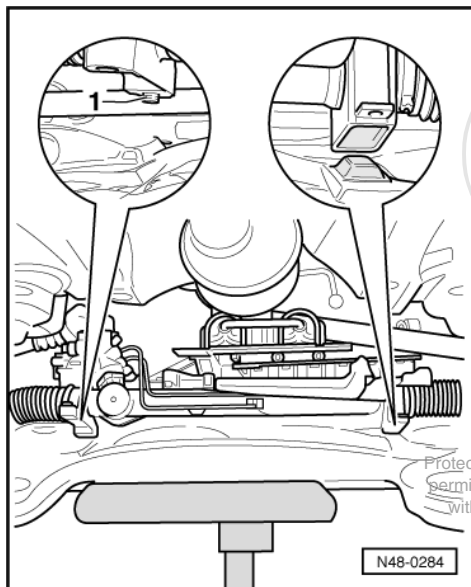
- -> Replace bolts -2-.
- Screw gearbox console to gearbox support (60 Nm + 90°).

Attention:

Do not detach support bar 10-222A until all engine/gearbox mounting bolts on left and right have been tightened to torque.

- Detach support bar.
- Install subframe as follows:

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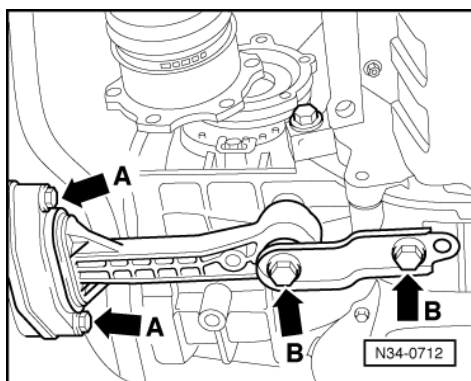
- Move drive shafts to installation position and hand-tighten bolts.
- Move subframe to installation position.
- Fit subframe bolts.
- Position steering box on subframe and fit steering box bolts.
- -> Threaded sleeve -1- must be positioned in hole in subframe
- Rubber buffer on opposite side must be positioned on corresponding projection on subframe.
- Screw on steering box.

=> Running Gear, Front-wheel Drive and Four-wheel Drive; Repair Group 48; Exploded View: Power-assisted steering box; Four-wheel drive vehicles Exploded View: Power-assisted steering box Four-wheel drive vehicles

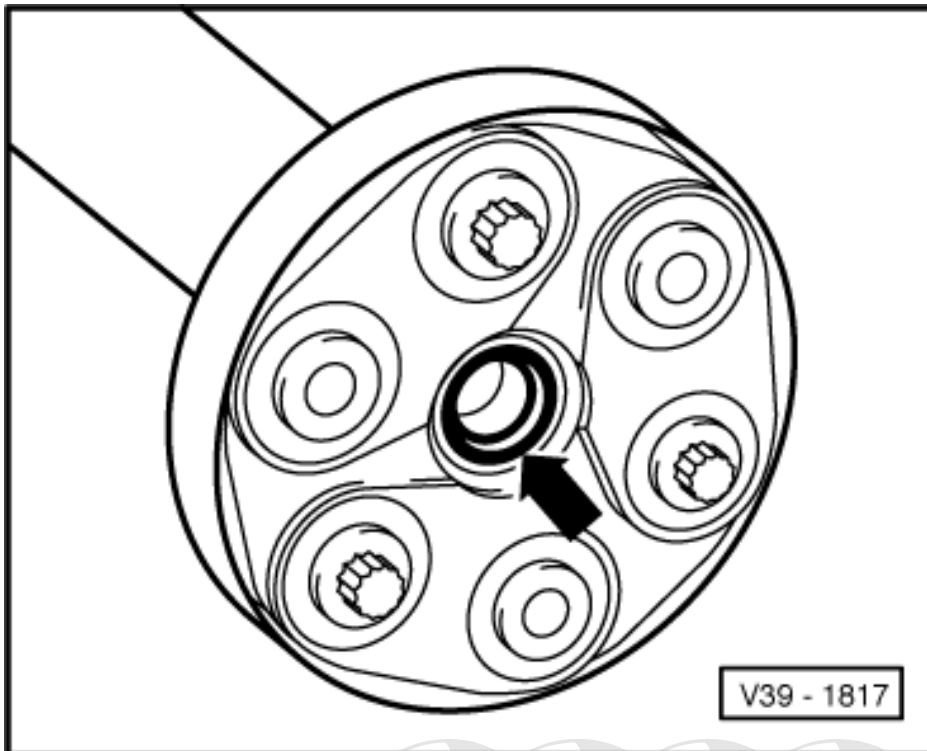
- Screw on subframe using new bolts.

=> Running Gear, Front-wheel Drive and Four-wheel Drive; Repair Group 40; Exploded View: Subframe, anti-roll bar, wishbones; Removing and installing subframe Exploded View: Subframe, anti-roll bar, wishbones
Removing and installing subframe

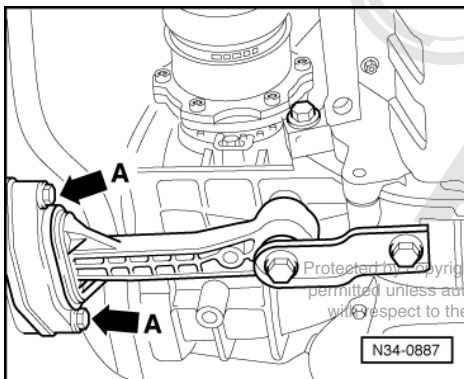
- Screw drive shafts to gearbox (M10 bolts: 77 Nm).
- Attach right drive shaft guard (25 Nm).



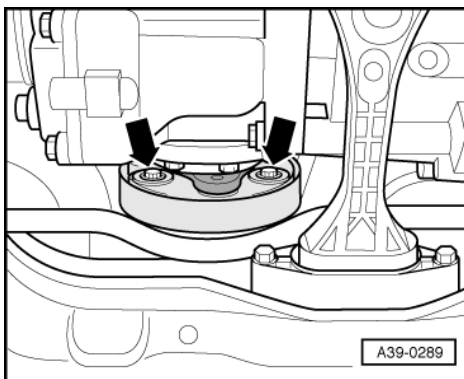
- -> Screw pendulum support to gearbox -arrows B- (40 Nm + 90°).
- Use new bolts for attachment.
- Press engine/gearbox assembly towards bulkhead; in doing so, carefully insert bevel box pin into propshaft flange.

Notes:

- ♦ -> Take care not to damage oil seals in propshaft flanges on removal and installation. Propshaft must be replaced if oil seals are damaged.
- ♦ Slip propshaft horizontally onto guide pin.



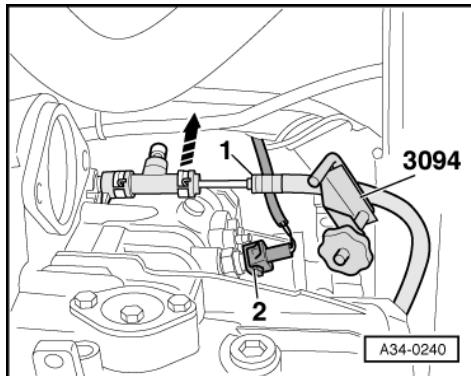
- -> Screw on pendulum support at subframe -arrows A- (20 Nm +1/4turn = 90°).
- Use new bolts for attachment.





- -> Screw propshaft to flexible coupling of bevel box -arrows- (60 Nm).
- Assemble exhaust system.

=> 4-cyl. Engine (5-valve Turbo), Mechanics; Repair Group 26; Removing and installing exhaust system components Removing and installing exhaust system components

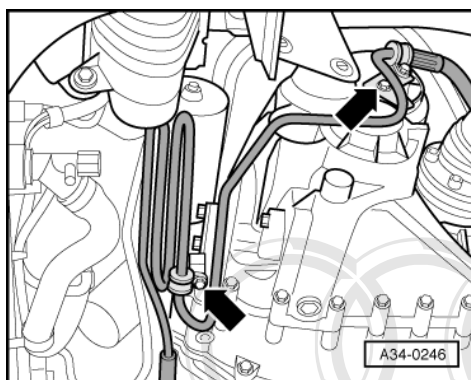


- -> Press pressure pipe -1- into hose connector and secure with fastener -arrow-.

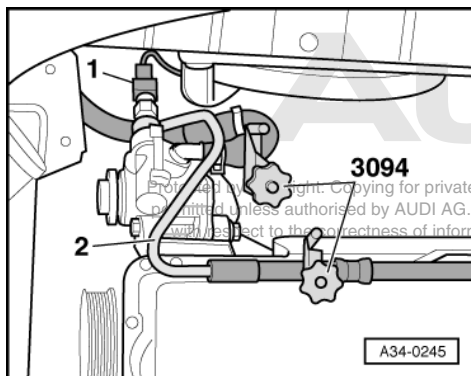
Note:

Do not press clutch pedal before bleeding clutch system.

- Detach 3094.
 - Plug connector to reversing light switch -2-.
 - Fit starter and screw in lower bolt.
- Tightening torques => Page **73**



- -> Fit power steering pipe at gearbox -arrows-.

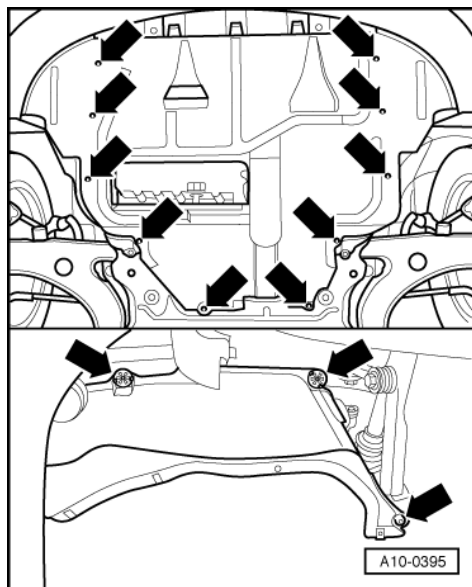


- -> Screw on pressure pipe -2- at power steering vane pump using new gaskets (38 Nm).
- Detach 3094.

- Plug connector -1- to power steering pressure switch.

Vehicles with 2 charge-air coolers:

- Fit pulley of power steering vane pump and ribbed belt.
- Install connecting pipe between charge-air coolers.



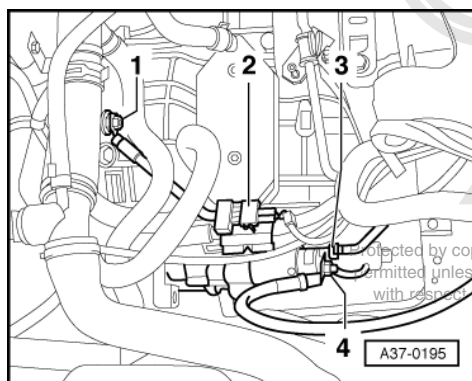
All vehicles:

- Check oil in manual gearbox with bevel box
=> Page 83 .
- -> Fit centre, left and right noise insulation -arrows-.

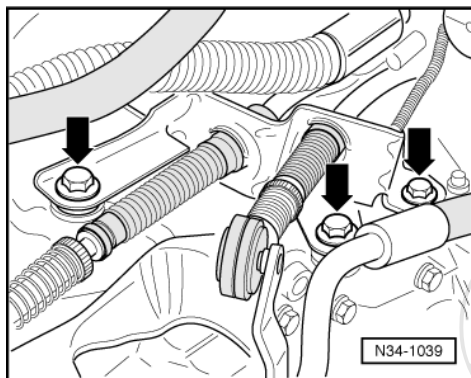
Vehicles with 1 charge-air cooler:

- Fit air pipe to charge-air cooler at bottom of right longitudinal member (10 Nm).

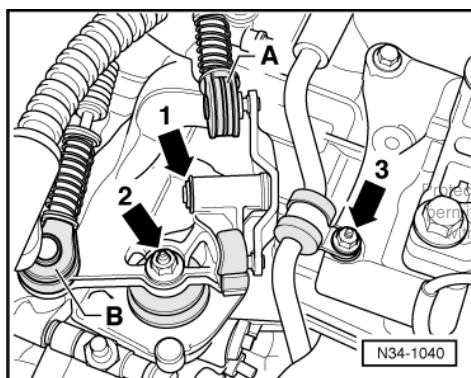
All vehicles:



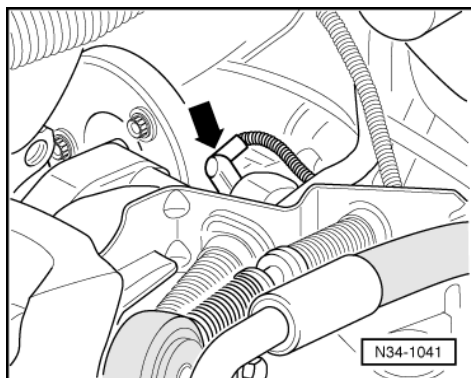
- Screw in upper securing bolt at starter.
Tightening torque => Page 73 .
- -> Attach connector -3-.
- Screw on retainer -2-, insert wire and engage connector in retainer.
- Screw on earth wire -1-.



- -> Screw on cable support bracket at gearbox -arrows- (23 Nm).



- -> Fit gear selector cable -B- with selector lever on gearbox -arrow 2- (25 Nm).
- Secure gate selector cable -A- with actuating arm using circlip (arrow 1).



- -> Plug connector to speedometer sender (arrow).
- Check stress-free installation of engine and gearbox mountings.

=> 4-cyl. Engine (5-valve Turbo), Mechanics; Repair Group 10; Removing and installing engine; Installing Removing and installing engine Installing

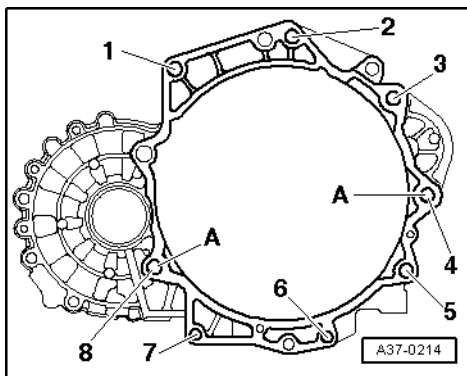
- Bleed clutch system=>Page 25 .
- Adjust shift mechanism => Page 49 .
- Install battery carrier and battery.
- Fit entire air cleaner housing.
- Fit engine cover.
- After connecting battery, enter radio anti-theft code.

=> Operating instructions

- Use electric window lifters to completely close windows.
- Then actuate all window lifter switches again for at least 1 second in "close" direction to activate automatic one-touch function.

- Set clock to correct time.

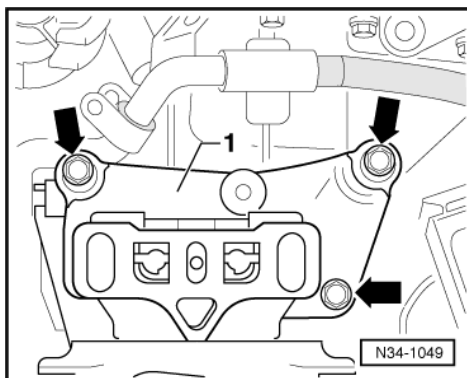
Tightening torques



-> Gearbox to engine

Item	Bolt	Qty.	Nm
1	M 12 x 55	1	802)
21)	M 12 x 55	1	802)
31)	M 12 x 165	1	802)
41)	M 12 x 165	1	802)
5	M 10 x 105	1	402)
6	M 10 x 50	1	402)
7	M 10 x 50	1	402)
8	M 12 x 70	1	802)

1) Bolt with M8 stud



2) Always replace bolts

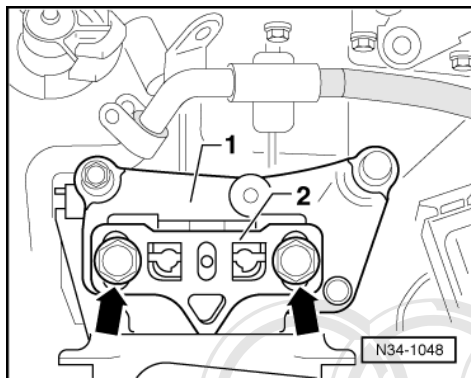
A: Dowel sleeves for centring

-> Gearbox console -1- to gearbox

Bolts -arrows-	40 Nm + 90°
----------------	-------------

- Replace bolts.

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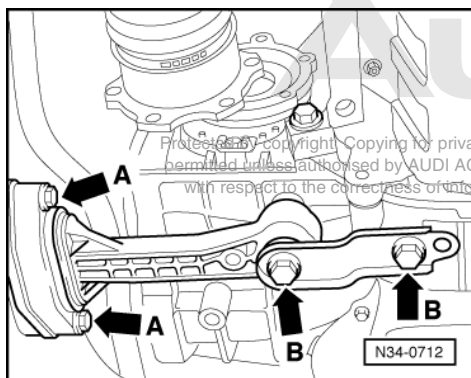


-> Gearbox console -1- to gearbox support -2-

Bolts -arrows-

60 Nm + 90°

- Replace bolts.



-> Pendulum support

Bolts -A-

20 Nm + 90°

Bolts -B-

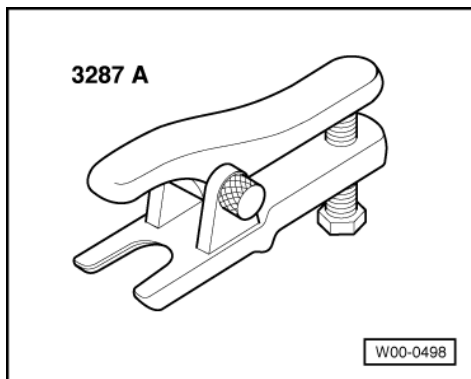
40 Nm + 90°

- Replace bolts.

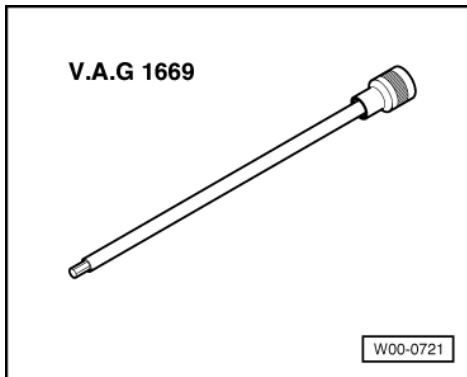
3 - Removing and installing bevel box

3.1 - Removing and installing bevel box

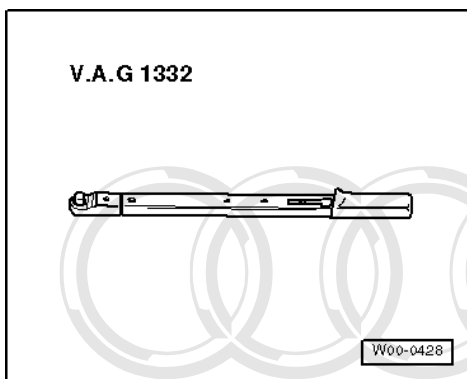
Special tools and workshop equipment required



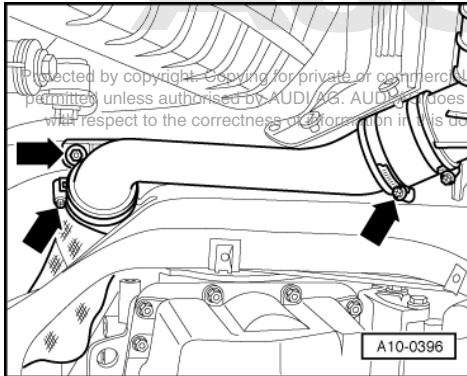
- ♦ 3287 A Ball joint puller



- ♦ V.A.G 1669 or min. 190 mm long, 6 mm socket attachment (commercially available)



- ♦ V.A.G 1332 Torque wrench
- ♦ Drip tray



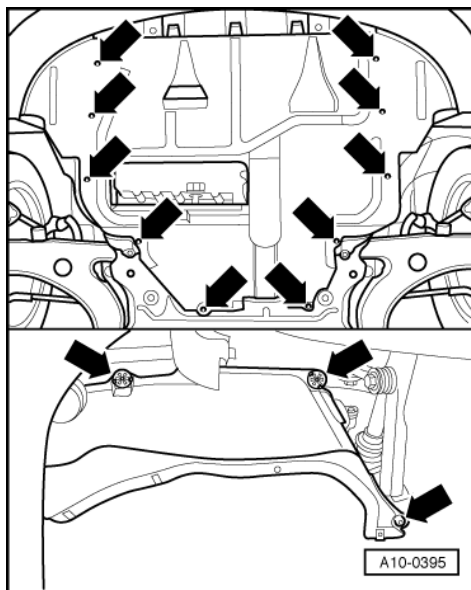
Removing

Vehicles with 1 charge-air cooler:

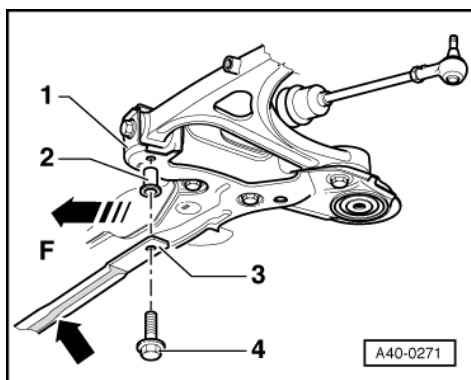
- -> Detach air pipe to charge-air cooler at bottom of right longitudinal member.



All vehicles:



- -> Remove centre and right noise insulation -arrows-.

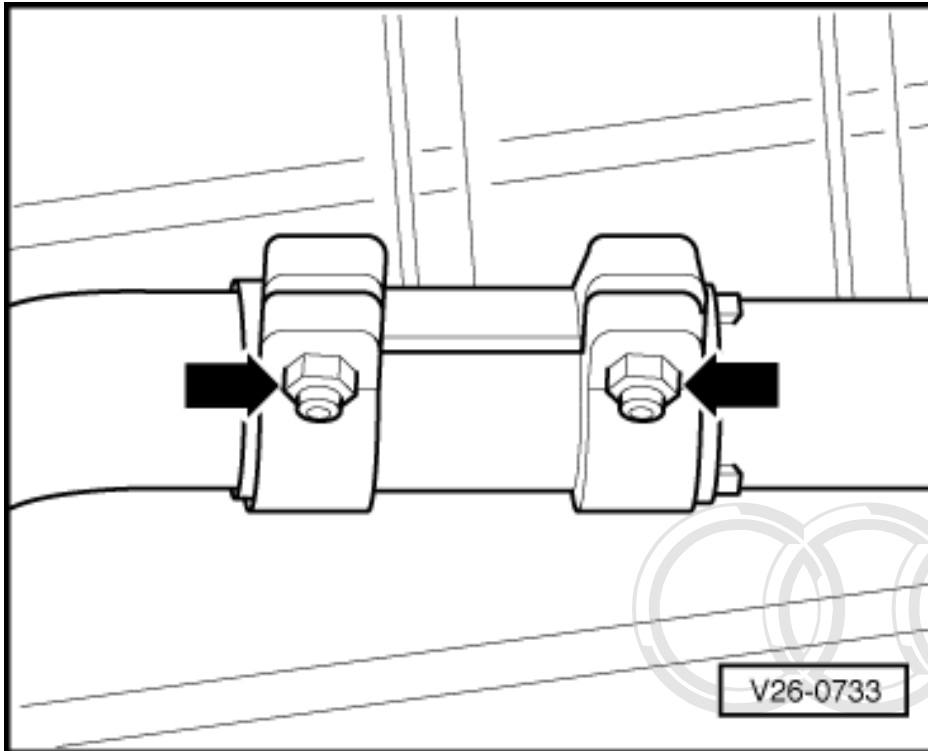


-> If fitted, unscrew cross brace -3- from subframe -1-.

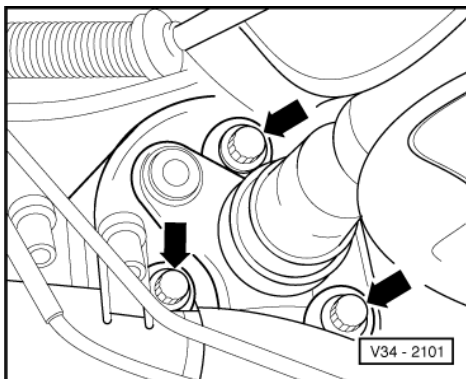
- If fitted, unscrew exhaust system mounting from subframe.



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- -> Separate exhaust system at clamp -arrows-.
- Push clamp to rear.



- Mark position of propshaft with flexible coupling relative to flange of bevel box.
- -> Unscrew propshaft with flexible coupling from flange of bevel box -arrows-.

Notes:

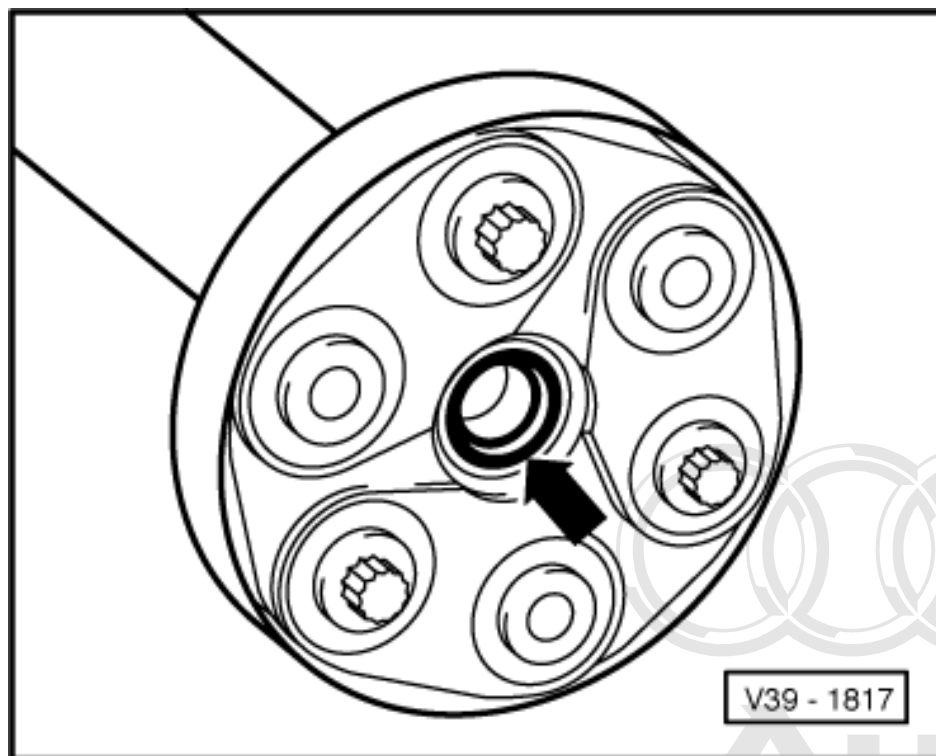
When slackening off bolts, use suitable lever to provide support at triangular flange.

- Press front propshaft tube to rear as far as it will go.

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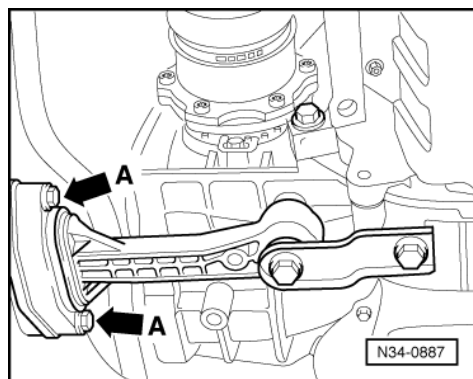


Note:

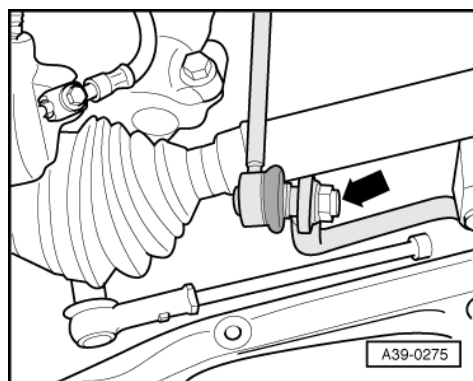


-> Engine/gearbox assembly moves forwards slightly after slackening off bolts -A- (=>Fig. N34-0887 below). Take care not to damage oil seal -arrow- in propshaft flange when removing and installing.

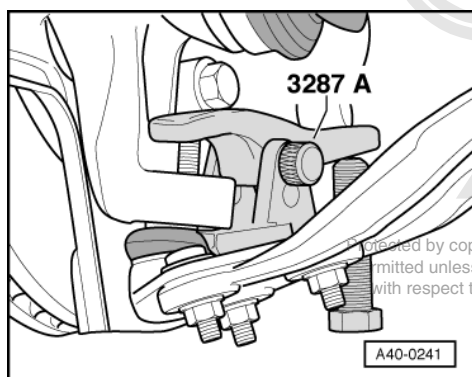
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- -> Unscrew pendulum support at subframe -arrows A-.
- Carefully press engine/gearbox forwards.



- -> Unscrew nut for connecting link from anti-roll bar on right.
- Unscrew upper nut from ball joint on right.

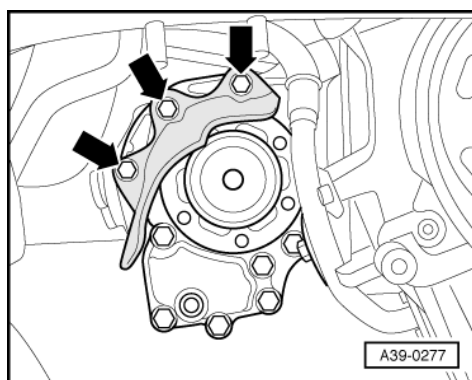


- -> Apply tool as shown and press out ball joint.

Note:

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

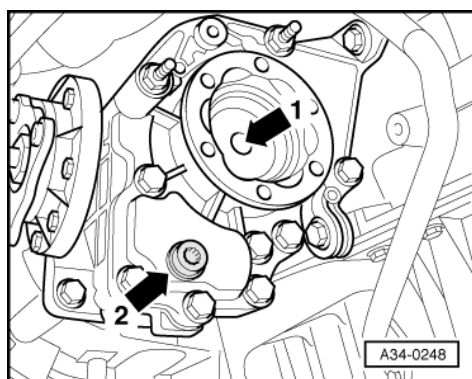
- Turn steering wheel onto left lock.



- -> Unscrew heat shield for right drive shaft from bevel box.
- Unscrew right drive shaft at gearbox and tie in place.

=> Running Gear, Front-wheel Drive and Four-wheel Drive; Repair Group 40; Drive Shafts; Removing and installing drive shaft Drive Shafts Removing and installing drive shaft

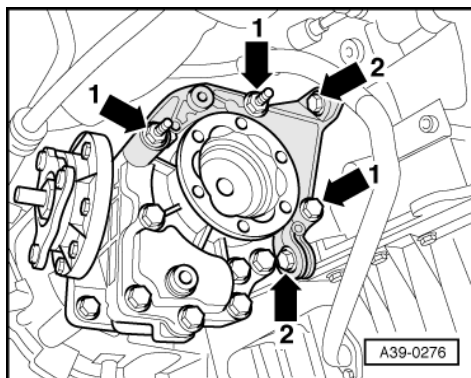
- Place drip tray under gearbox.



- -> Drain off gear oil -arrow 2-.



- Use V.A.G 1669 to remove bolt for right flange shaft -arrow 1-.



- -> Screw out bolts -1- and -2- at bracket for bevel box.

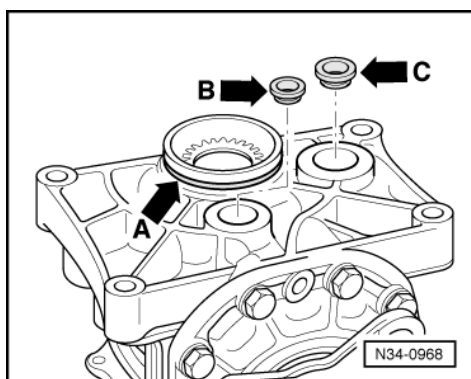
Note:

Bracket cannot be detached at this stage and should be left in its installation position.

- Remove bevel box/manual gearbox connecting bolts.
- Press bevel box off manual gearbox.
- Take out bevel box.

Installing

Install in reverse order, paying attention to the following:



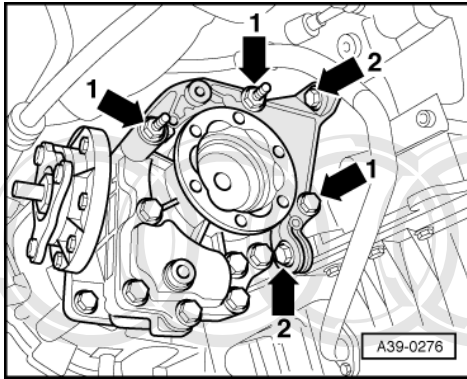
- -> Always replace O-ring between bevel box and manual gearbox -arrow A- as well as seals for oil supply passages -arrows B and C-.
- Lubricate O-ring and oil seals slightly before fitting.
- Push bevel box up against manual gearbox. In doing so, guide splines of bevel box input shaft centrally into connecting sleeve on differential.
 - If splines are positioned correctly and located centrally, bevel box will slide right up against manual gearbox

Note:

Do not pull bevel box onto gearbox with securing bolts, as otherwise bevel box will tilt and securing lugs could break off.

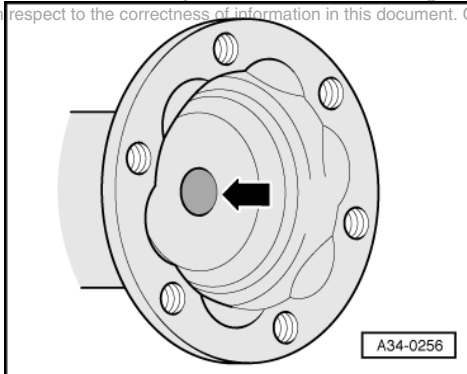
- Insert bracket for bevel box before screwing in bevel box/gearbox connecting bolts.
- Tighten bevel box/gearbox connecting bolts (40 Nm + 45°). Use new bolts.

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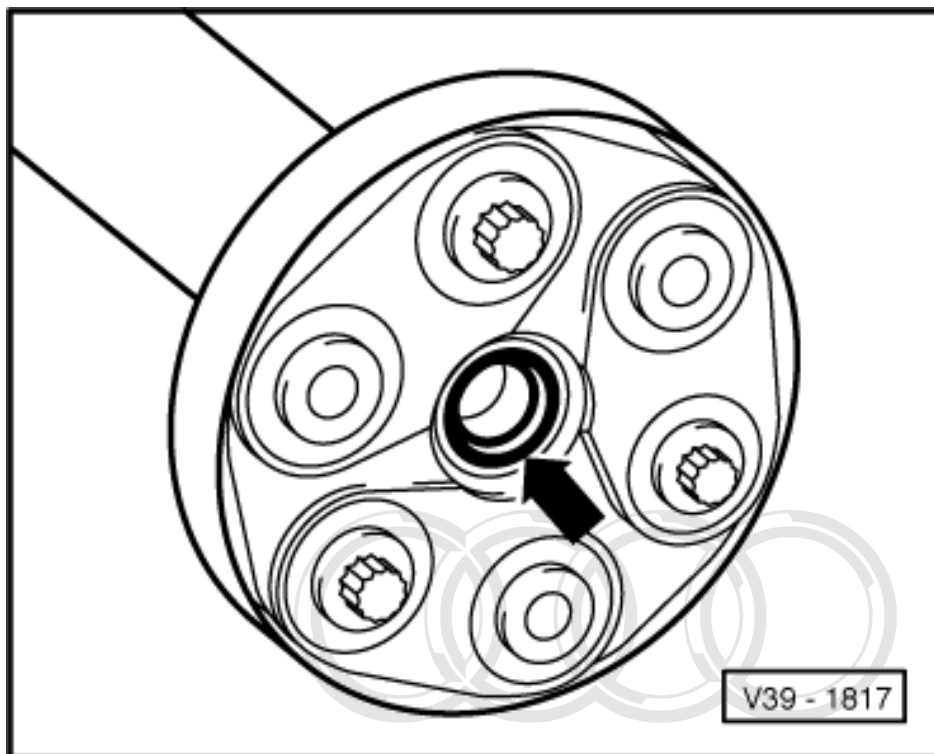
- -> Hand-tighten bolts -arrow 1- and -arrow 2- .
- Install bevel box bracket, paying attention to the following assembly sequence:
 - Tighten bolts -arrow 1- to 3 Nm first.
 - Tighten bolts -arrow 2- to 40 Nm.
 - Tighten bolts -arrow 1- to 45 Nm.

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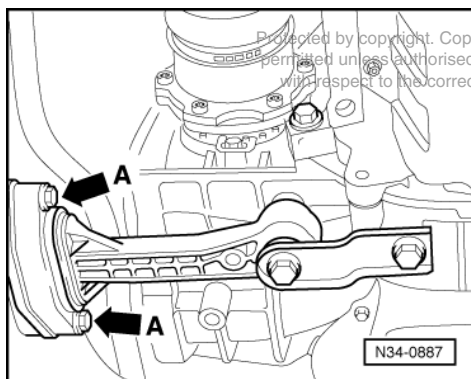


- -> Use V.A.G 1669 to tighten bolt for right flange shaft -arrow 1- (25 Nm).
- Screw drive shafts to gearbox (M10 bolts: 77 Nm).
- Attach right drive shaft guard (25 Nm).
- Press engine/gearbox assembly towards bulkhead; in doing so, carefully guide bevel box pin into propshaft flange.

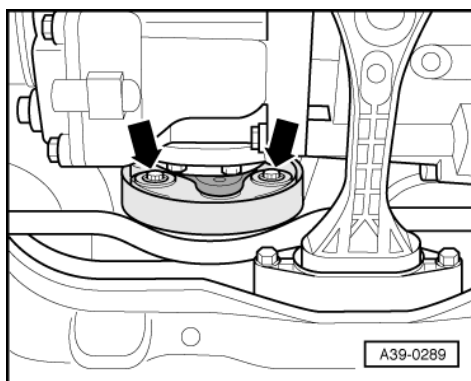
Notes:



- -> Take care not to damage oil seals in propshaft flanges on removal and installation. Propshaft must be replaced if oil seals are damaged.
- Slip propshaft horizontally onto guide pin.



- -> Screw on pendulum support at subframe -arrows A- (20 Nm + 90°).
- Use new bolts for attachment.



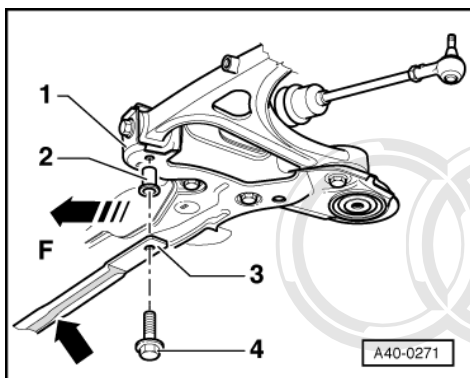
- -> Screw propshaft to flexible coupling of bevel box -arrows- (60 Nm).
- Assemble exhaust system.

=> 4-cyl. Engine (5-valve Turbo), Mechanics; Repair Group 26; Removing and installing exhaust system components Removing and installing exhaust system components

- Install ball joint and connecting link.

=> Running Gear, Front-wheel Drive and Four-wheel Drive; Repair Group 40; Exploded View: Subframe, anti-roll bar, wishbones Exploded View: Subframe, anti-roll bar, wishbones

- Top up oil in manual gearbox with bevel box => Page 83 .



- -> If applicable, install cross brace -1- using new bolts -4- and locking fluid D 000 600 A2. Installation position: Fit with "L" or "left" on left in direction of travel; foam strip -arrow- faces downwards. Tightening torque: 30 Nm + 90°
- Top up oil in manual gearbox with bevel box => Page 83 .

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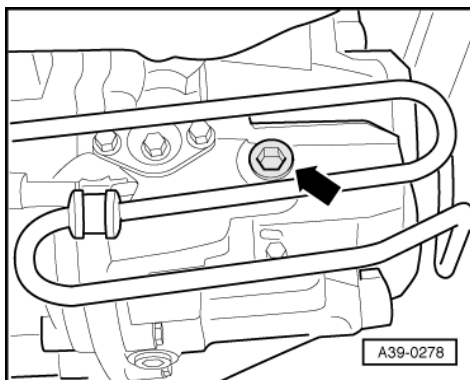
4 - Checking oil in manual gearbox with bevel box

4.1 - Checking oil in manual gearbox with bevel box

Note:

Manual gearbox and bevel box are jointly filled by way of manual gearbox oil filler hole.

Sequence of operations



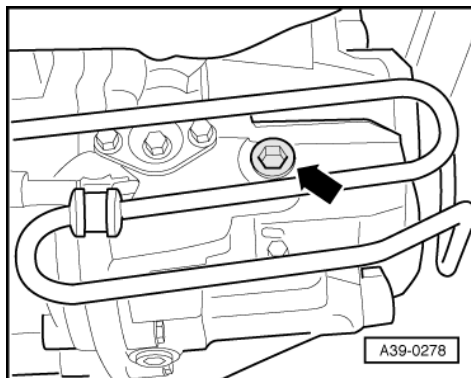
- -> Screw out oil filler plug to check gear oil level (arrow).
- Specification: Oil level up to lower edge of filler hole
- Top up gear oil if necessary. Specification => Page 2 onwards.



- Screw in oil filler plug.

Pay attention to the following in the event of fresh fill or bevel box removal/installation:

- Screw out plug (arrow).
- Pour in gear oil as far as lower edge of filler hole.
- Screw in oil filler plug.
- Start engine, engage gear and allow gearbox to turn for approx. 2 minutes.

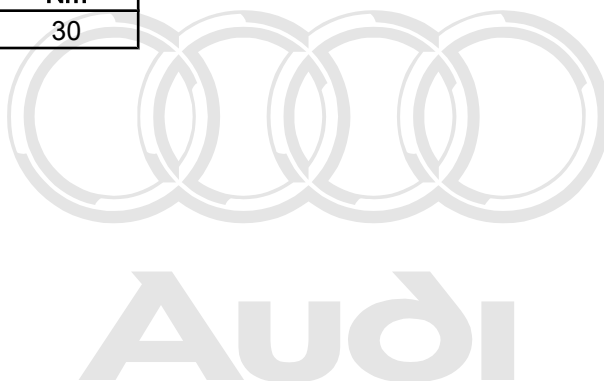


- Top up gear oil again as far as lower edge of filler hole.
- Screw in oil filler plug.

Tightening torque

Component	Nm
Oil filler plug ¹⁾	30

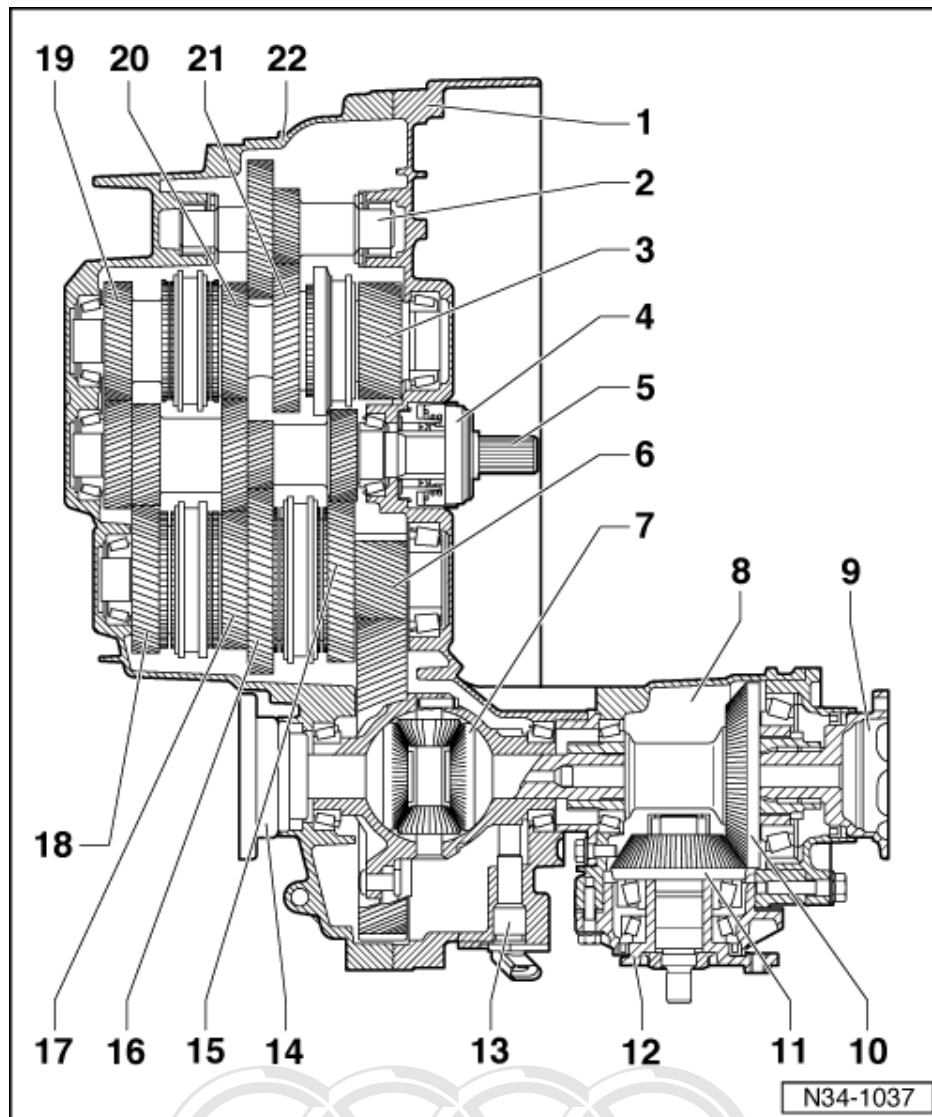
- 1) Always replace



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5 - Dismantling and assembling gearbox

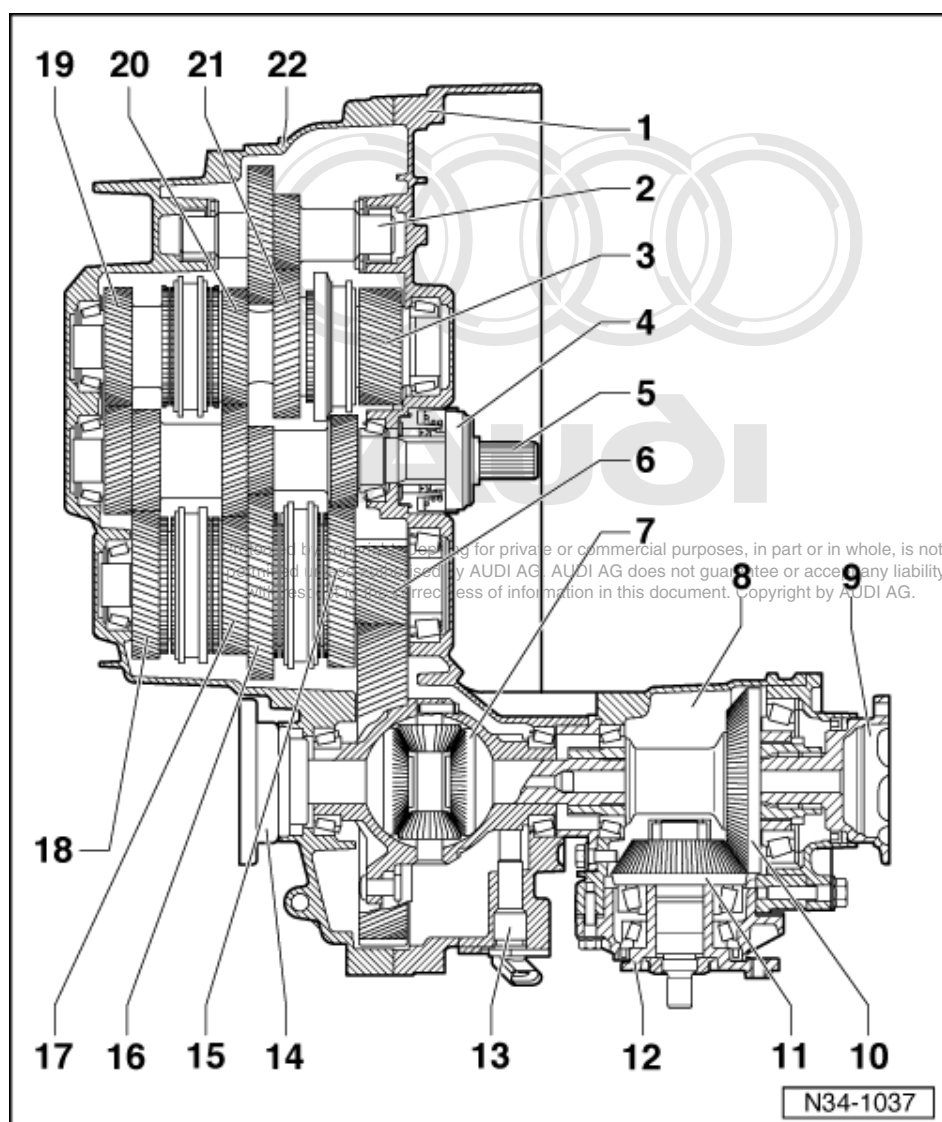
5.1 - Dismantling and assembling gearbox



Assembly sequence => Page **96**

5.2 - Exploded view of gearbox

- 1 Clutch housing
- 2 Reverse shaft
- 3 5th/6th and reverse gear output shaft
- 4 Slave cylinder with release bearing
- 5 Input shaft
- 6 1st to 4th gear output shaft
- 7 Differential
- 8 Bevel box
- 9 Right flange shaft



10 Bevel gear with input shaft

11 Shaft bevel gear

12 Output flange

13 Speedometer sender

14 Left flange shaft

15 2nd gear sliding gear

16 1st gear sliding gear

17 4th gear sliding gear

18 3rd gear sliding gear

19 5th gear sliding gear

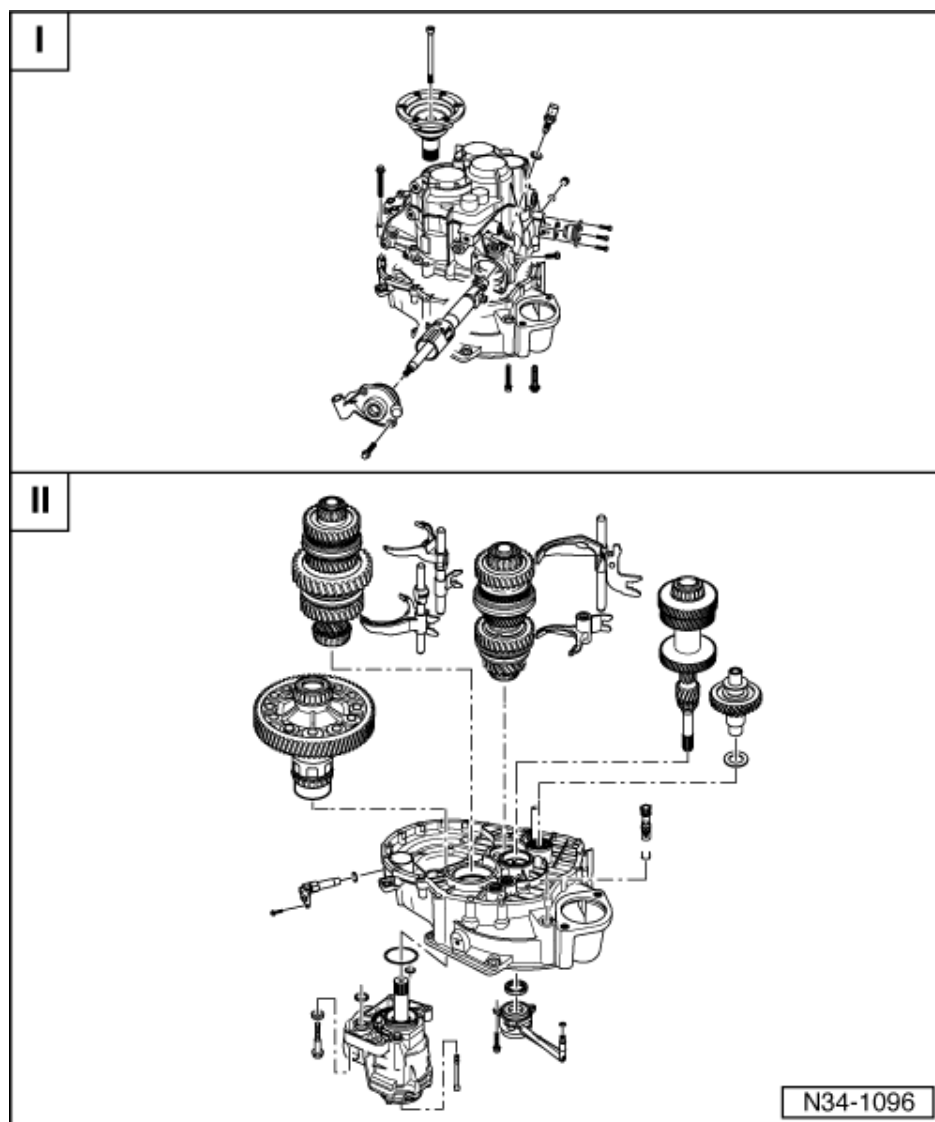
20 6th gear sliding gear

♦ Spacer sleeve fitted in 5-speed manual -gearbox

21 Reverse sliding gear

22 Gearbox housing

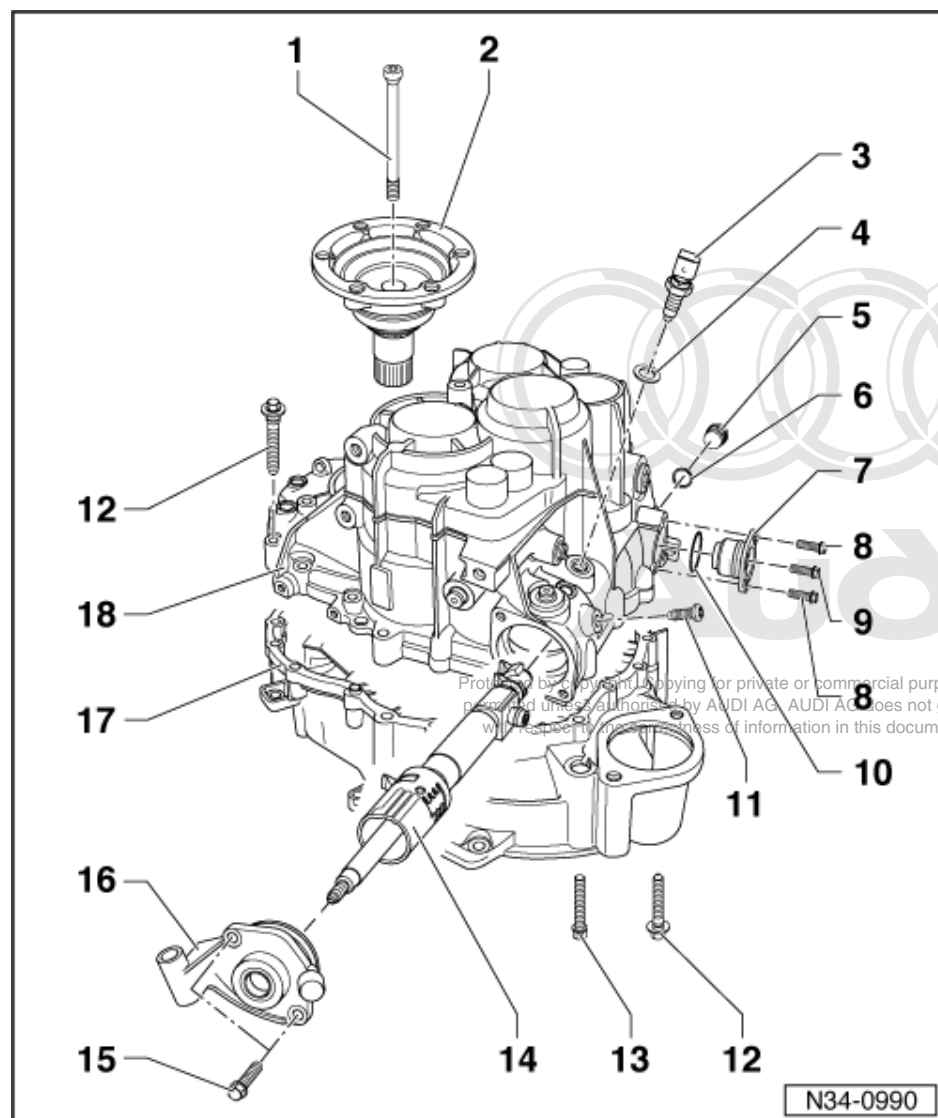
5.3 - Exploded view



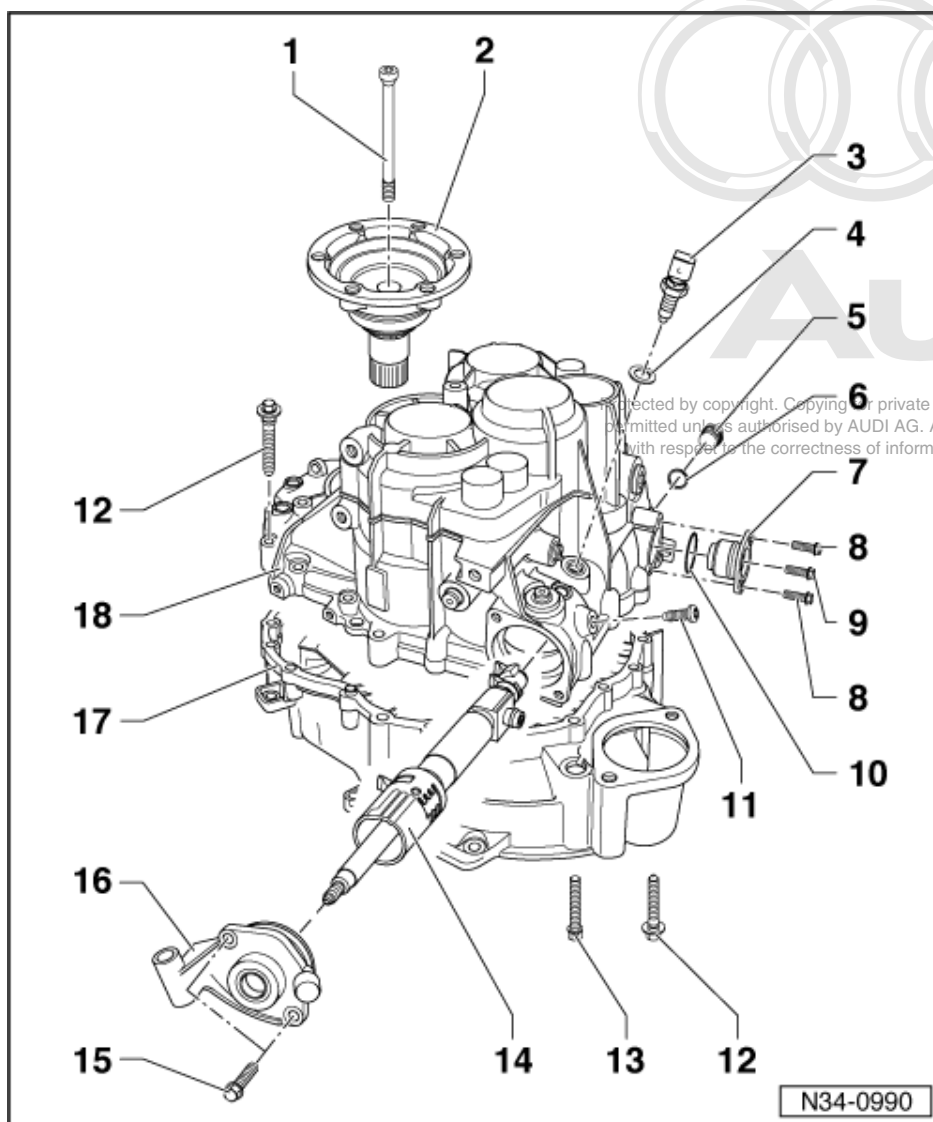
I - Dismantling and assembling gearbox housing and shift mechanism => Page 88

II - Dismantling and assembling input shaft, output shafts (pinion shafts), differential, bevel box and selector rods => Page 91

5.4 - Dismantling and assembling gearbox housing and shift mechanism



- 1 Taper-head bolt, 25 Nm
- 2 Flange shaft with spring
 - ♦ Removing -and installing=> Page 192
 - ♦ Assembling=> Page 203 onwards
- 3 Reversing light switch, 20 Nm
- 4 Oil seal
 - ♦ Always replace
- 5 Oil drain plug, 30 Nm
 - ♦ Always replace
- 6 Oil seal
 - ♦ Always replace
- 7 Sealing cap

**8 Hexagon bolt, 20 Nm**

- ♦ Always replace

9 Hexagon bolt, 20 Nm

- ♦ For attaching selector shaft -item 14 - to sealing cap
- ♦ Always replace

10 O-ring

- ♦ Always replace
- ♦ Insert in sealing cap groove

11 Locking bolt, 15 Nm

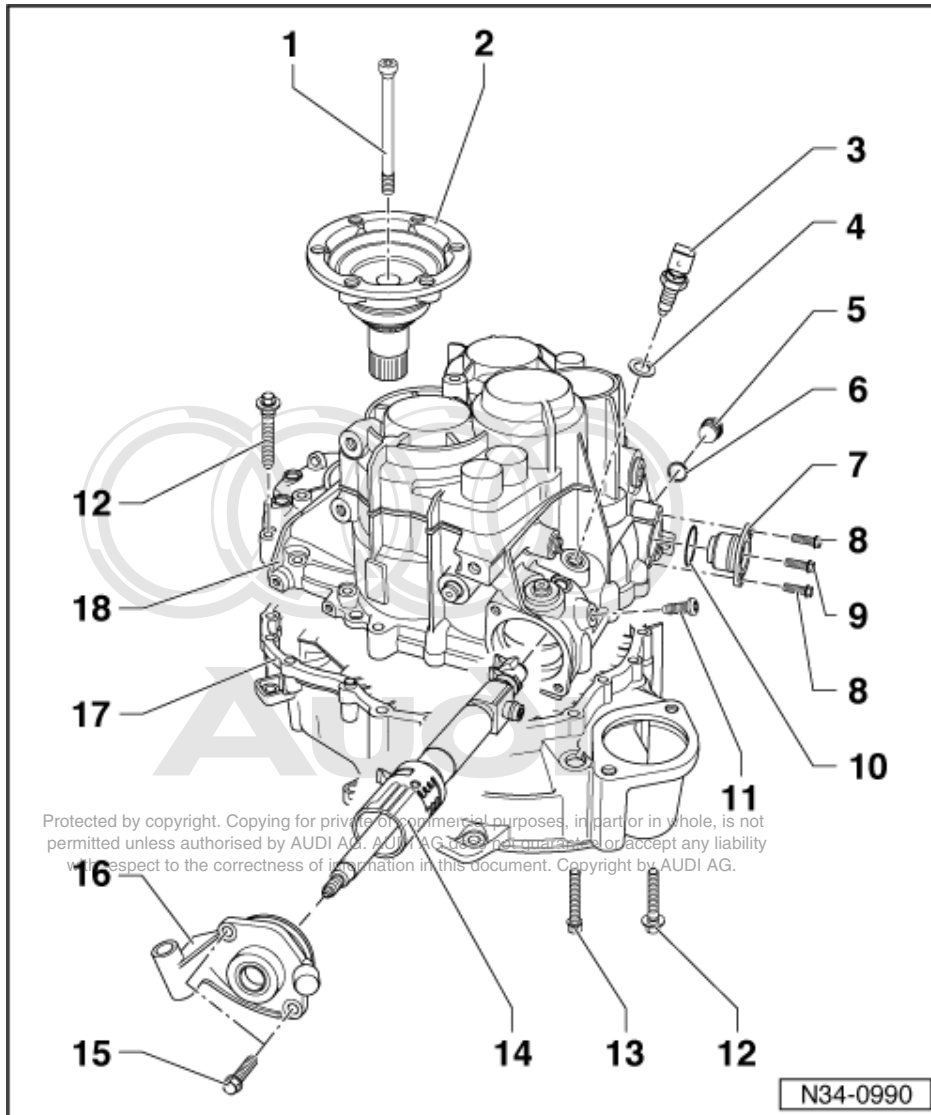
- ♦ For selector shaft gate
- ♦ Always replace
- ♦ Apply locking fluid D 000 600 A2 when fitting

12 Hexagon bolt, 25 Nm + further 45°turn

- ♦ With captive washer
- ♦ Always replace

13 Hexagon bolt, 25 Nm + further 45°turn

- ♦ No washer
- ♦ Always replace



14 Selector shaft

- ♦ Dismantling and assembling => Page 122 , dismantling and assembling gearbox shift mechanism

15 Hexagon bolt, 20 Nm

- ♦ Always replace

16 Selector mechanism cover

- ♦ Dismantling and assembling => Page 122 , dismantling and assembling gearbox shift mechanism

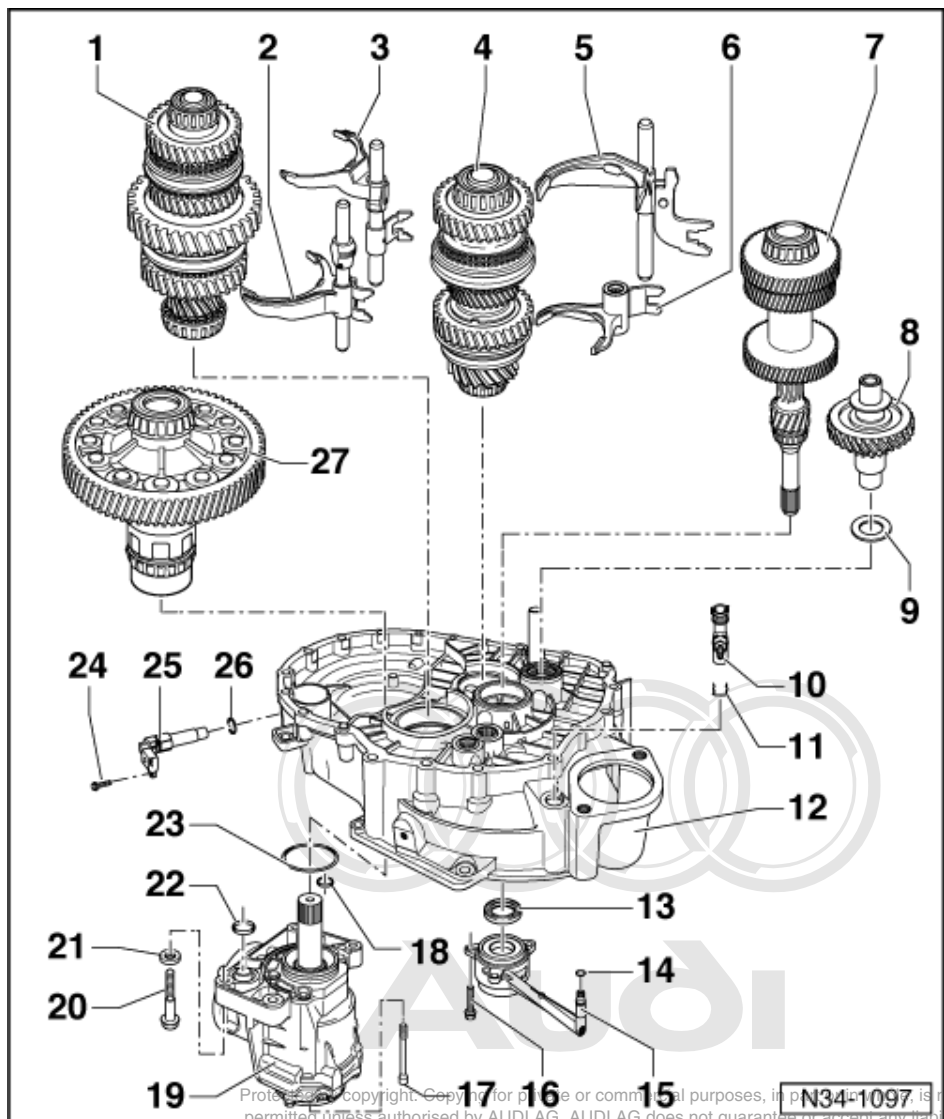
17 Clutch housing

- ♦ Servicing => Page 114

18 Gearbox housing

- ♦ Servicing => Page 104

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



1 1st to 4th gear output shaft

- ◆ Dismantling and assembling
=> Page 143
- ◆ Installation position => Fig. 1

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

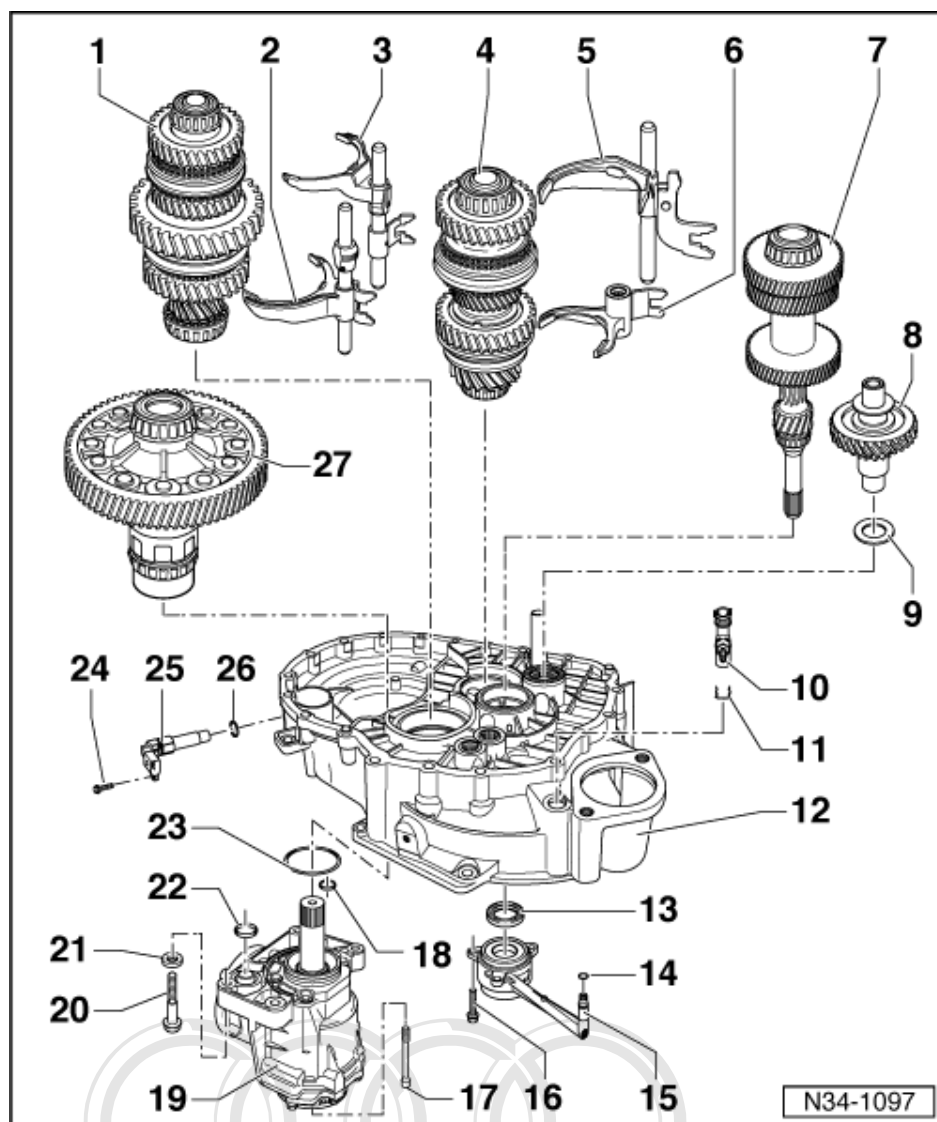
- ◆ Installation position => Fig. 2

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

- ◆ Installation position => Fig. 2

4 5th/6th and reverse gear output shaft

- ◆ Dismantling and assembling
=> Page 169
- ◆ Installation position => Fig. 1

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

- ♦ Installation position => Fig. 2

6 Reverse gear selector fork

- ♦ Installation position => Fig. 2

7 Input shaft

- ♦ Dismantling and assembling
=> Page 128

8 Reverse shaft

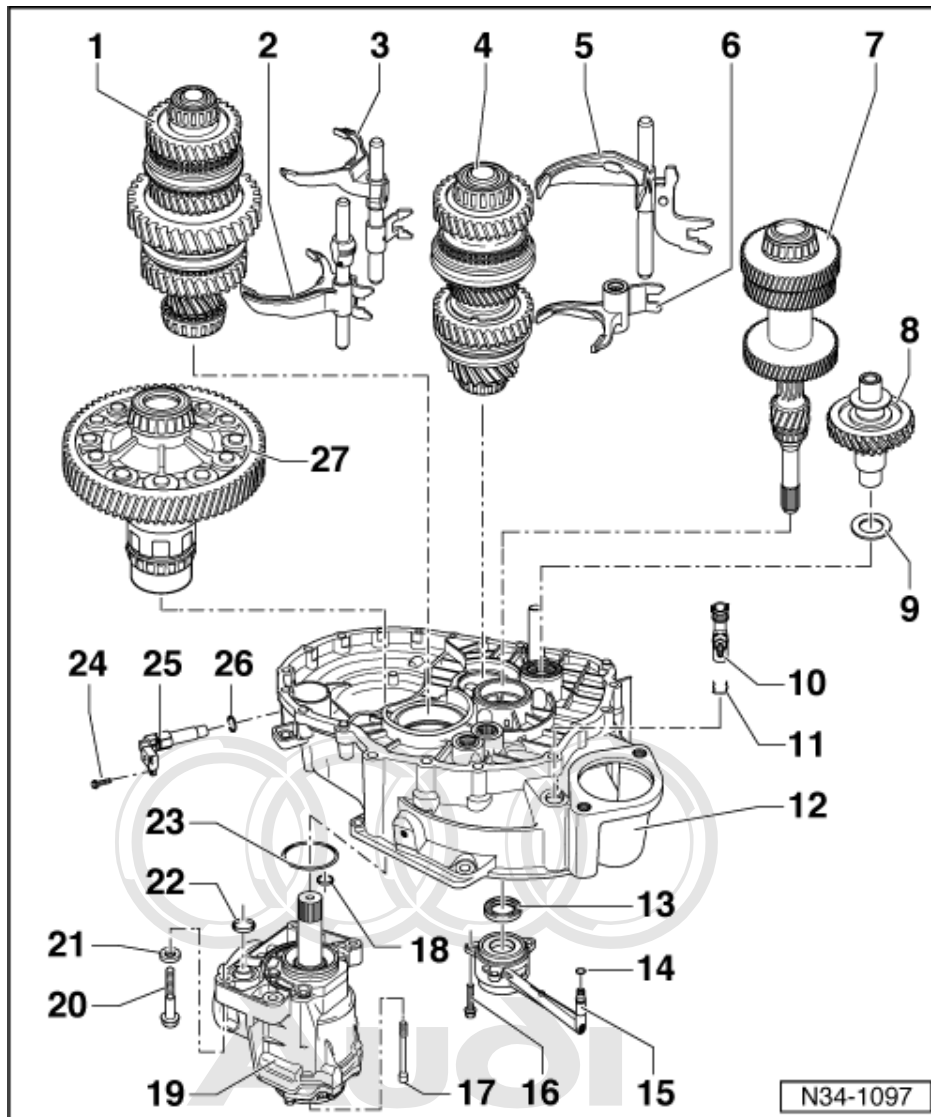
- ♦ Removing- and installing

=> Page 96 onwards

9 Thrust washer**10 Bleeder**

- ♦ Connect to slave cylinder -item 15 -

11 Clip**12 Clutch housing**



13 Input shaft oil seal
 14 O-ring
 ♦ Replace

15 Slave cylinder with release bearing

16 Hexagon bolt, 12 Nm

♦ 3x

17 Taper-head bolt, 25 Nm

18 O-ring

♦ Always replace

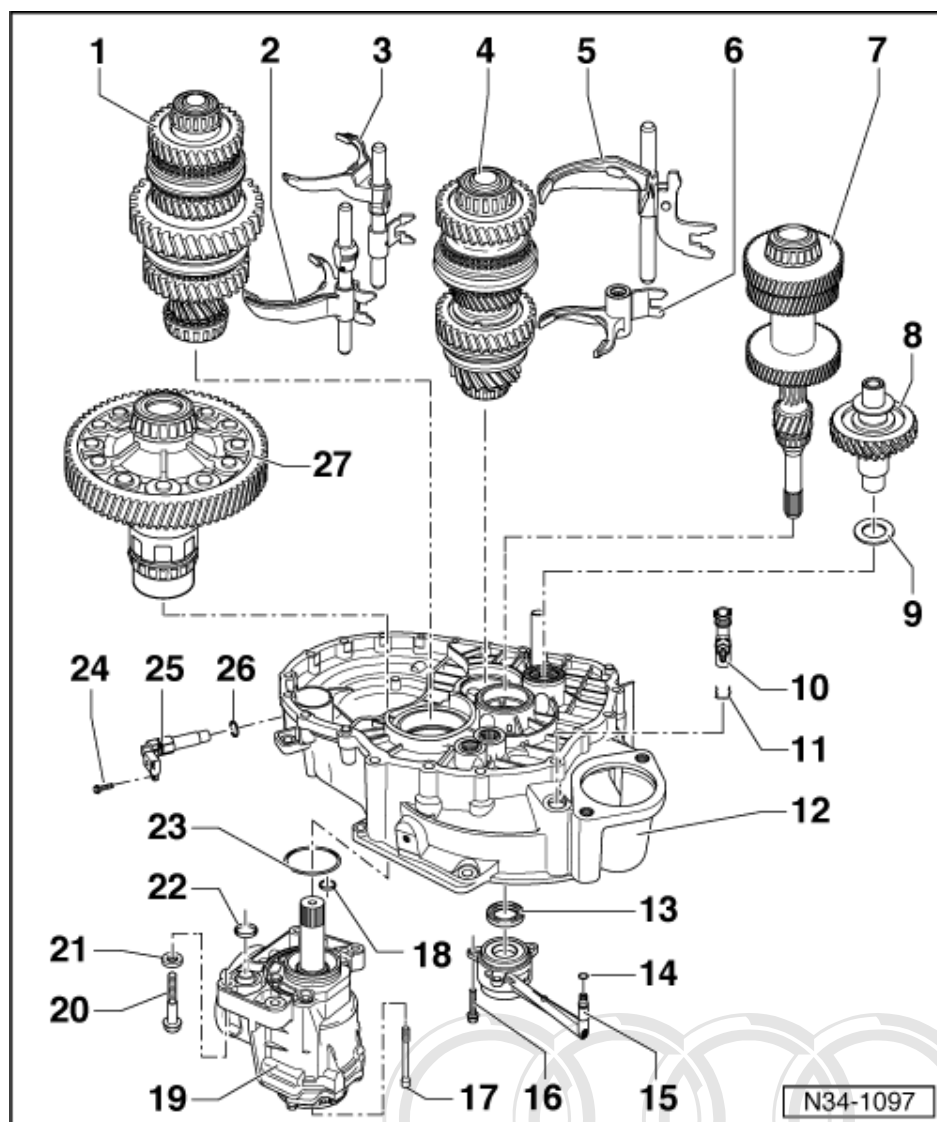
19 Bevel box

♦ Dismantling and assembling

=> 5- and 6-speed- Manual Gearbox 02M, Four-wheel Drive/Final Drive; Repair group 39; Dismantling and assembling bevel box Dismantling and assembling bevel box

20 Bolt, 40 Nm + further 45° turn

♦ Always replace



21 Washer

22 O-ring

- ♦ Always replace

23 O-ring

- ♦ Always replace

24 Hexagon bolt ,12 Nm

25 Speedometer sender

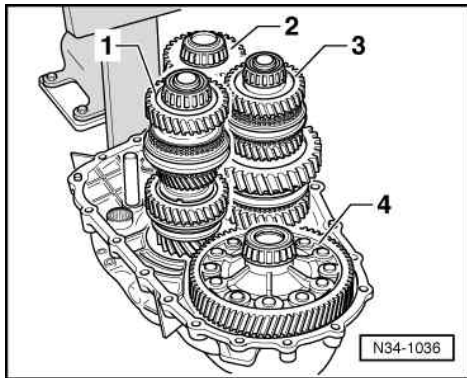
26 O-ring

- ♦ Always replace

27 Differential

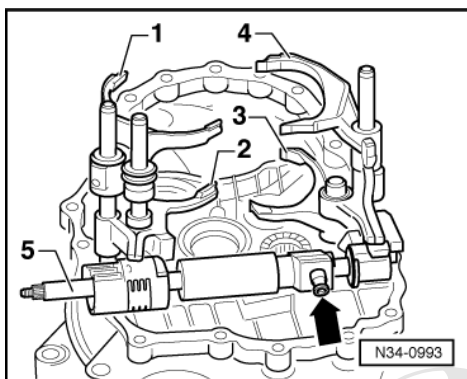
- ♦ Dismantling and assembling
=> Page 203

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-> Fig.1 Installation position of output shafts (pinion shafts) in gearbox:

- 1 - 5th/6th and reverse gear output shaft
- 2 - Input shaft
- 3 - 1st to 4th gear output shaft
- 4 - Differential



-> Fig.2 Installation position of shift mechanism assembly in gearbox:

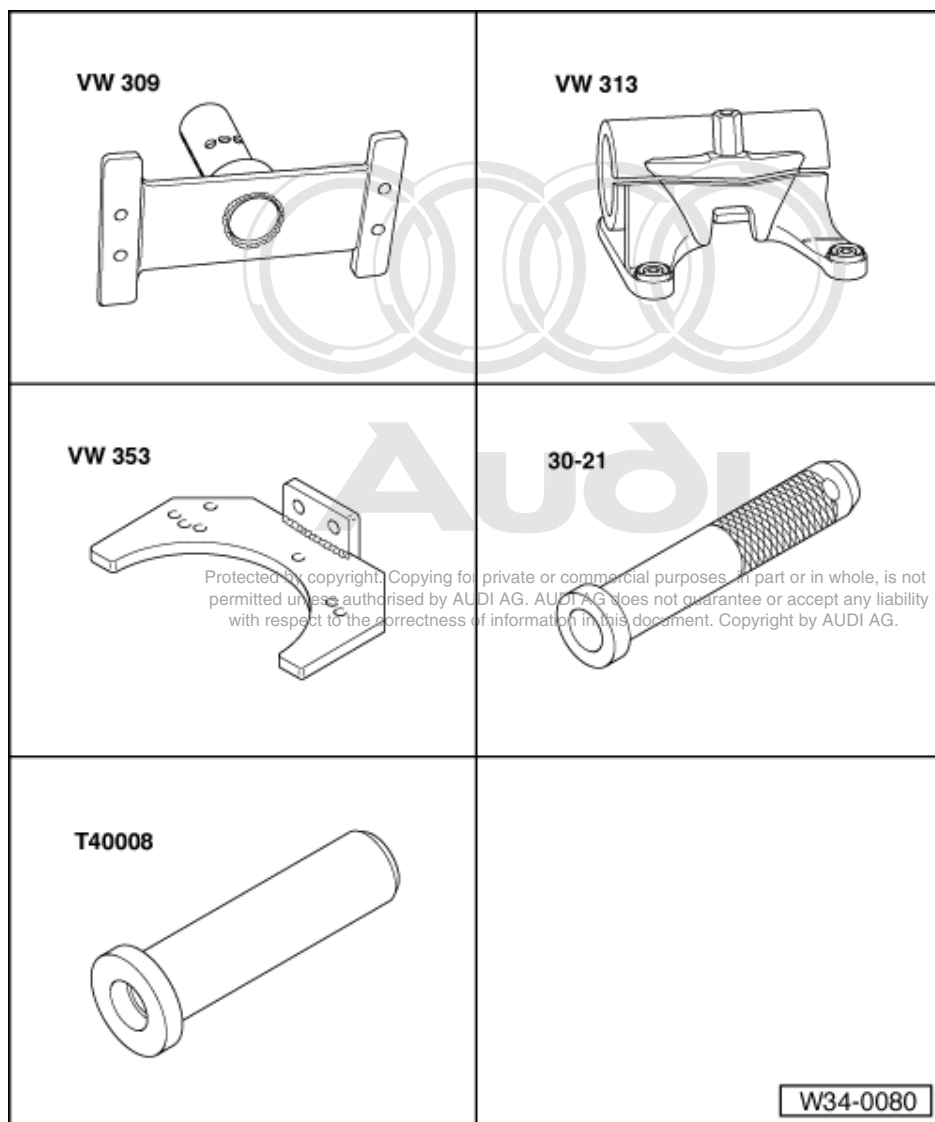
- 1 - 3rd and 4th gear selector fork
- 2 - 1st and 2nd gear selector fork
- 3 - Reverse gear selector fork
- 4 - 5th and 6th gear selector fork
- 5 - Selector shaft

The lower selector shaft mounting - arrow - is bolted to the sealing cap on the gearbox housing.

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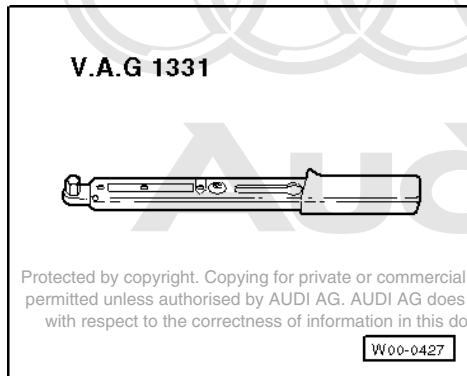
5.6 - Assembly sequence



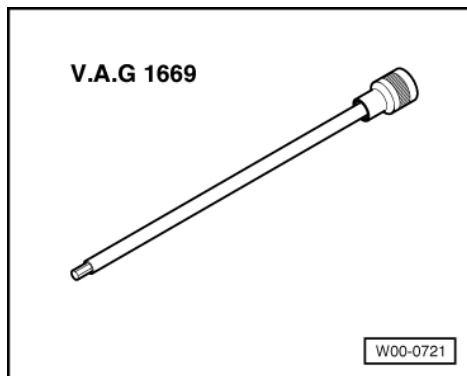
Dismantling and assembling gearbox housing, shift mechanism, input shaft, output shafts (pinion shafts), differential, bevel box and selector rods

Special tools and workshop equipment required

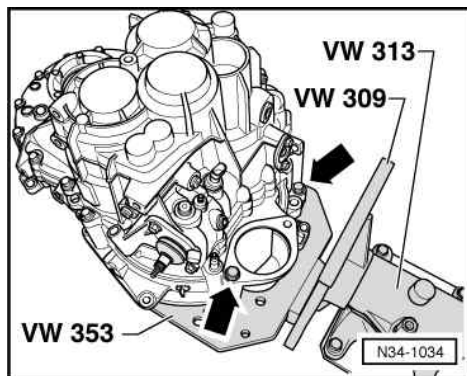
- ♦ VW 309 Holding plate
- ♦ VW 313 Support clamp
- ♦ VW 353 Gearbox support
- ♦ 30-21 Sleeve
- ♦ T40008 Thrust pad

Special tools and workshop equipment required

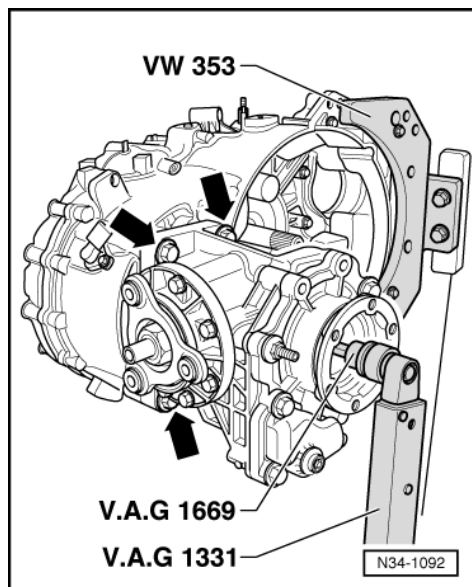
- ♦ V.A.G 1331 Torque wrench
- ♦ V.A.G 1332 Torque wrench



- ♦ V.A.G 1669 6 mm Allen key extension

**Dismantling**

- -> Use bolts -arrows- to attach gearbox to repair stand.
- Turn gearbox on repair stand such that oil drain plug is facing downwards.



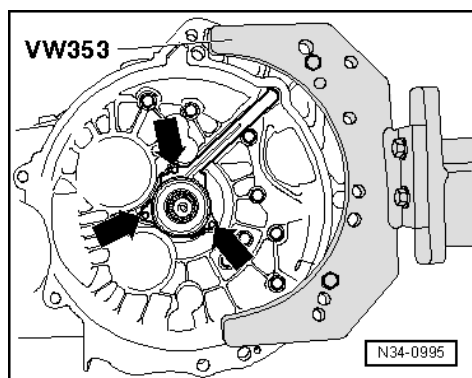
- Place drip tray in position.
- Drain oil out of manual gearbox- and bevel box.
- -> Remove bolt for right flange shaft using V.A.G 1669 or 6 mm socket attachment (commercially available).

Note:

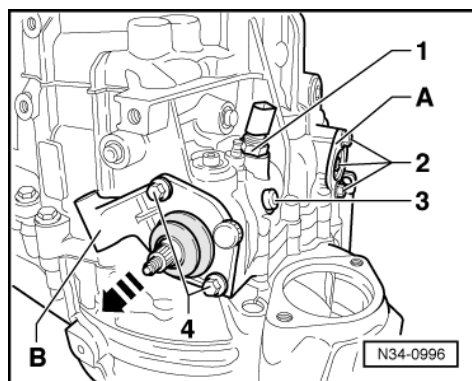
Right flange shaft remains in bevel box.

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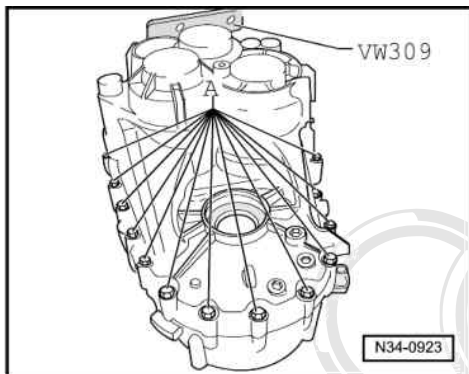
- Remove the four bevel box/manual gearbox connecting bolts
-arrows- (only three bolts are shown in Fig.).
- Press bevel box off manual gearbox.



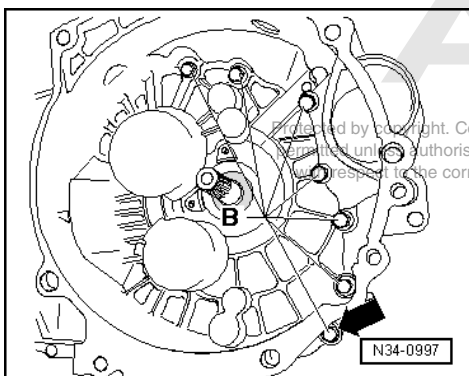
- -> Detach slave cylinder with release bearing -arrows-.
- Move selector shaft to neutral position.



- -> Remove reversing light switch -1-.
- Screw out hexagon bolts -2- for cover plate of selector shaft -A-.
- Carefully pull out cover plate.
- Remove locking bolt -3- for selector shaft gate.
- Then screw out bolts -4- and press selector mechanism cover -B- off gearbox housing.
- Pull selector shaft out of gearbox housing.



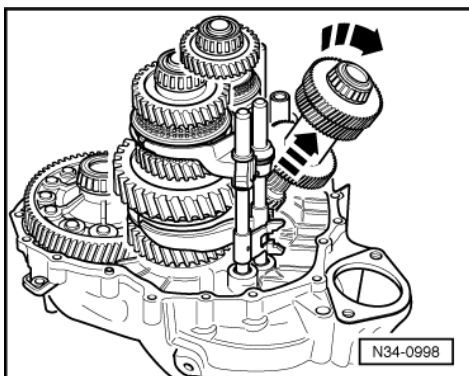
- Remove left flange shaft.
- -> Remove bolts -A- securing gearbox housing to clutch housing in area of differential.



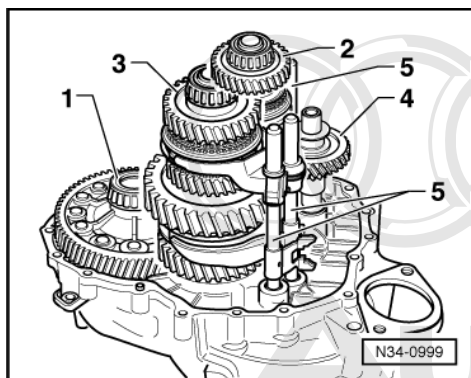
- -> Unscrew bolts -B- for securing gearbox housing from clutch housing.

Note:

Hexagon bolt -arrow- is located outside bolting flange and is fitted with a washer.

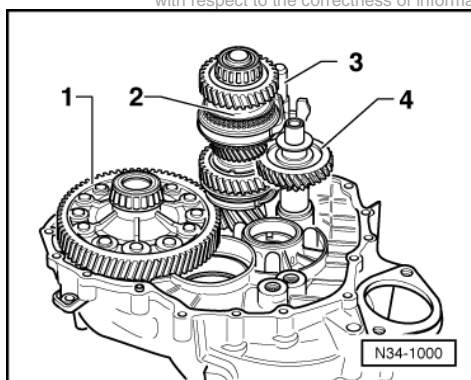


- Detach gearbox housing. If necessary, carefully lever off all round at projecting webs, alternating between sides and taking care not to damage sealing surfaces.
- -> Swivel input shaft in direction of arrow and detach.
- Remove speedometer sender.



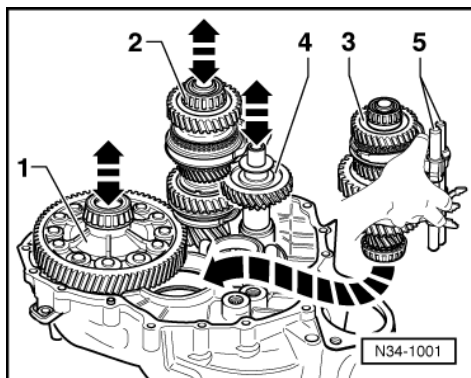
- -> With the help of a second mechanic, carefully detach differential -1-, output shafts -2- and -3-, reverse shaft -4- and selector rods -5- together from clutch housing.
- Use sleeve 30-21 to drive out input shaft oil seal.

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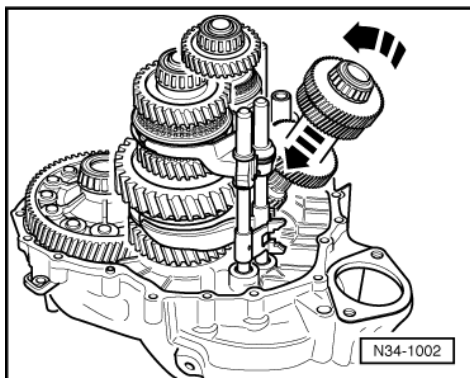
Assembling

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



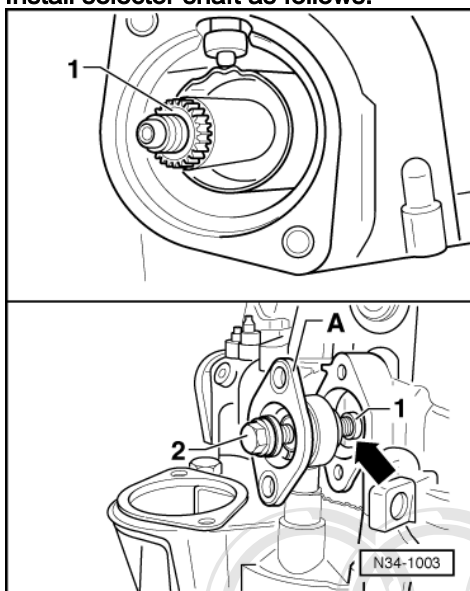
- -> As shown in illustration, take hold of 1st to 4th gear output shaft -3- with selector rods -5- in right hand.
- Use left hand to lift differential slightly.
- At the same time, have second mechanic slightly lift 5th/6th and reverse gear output shaft -2- together with reverse shaft -4-.
- Then insert 1st to 4th gear output shaft in direction of arrow.

Splines of output shafts and final drive gear wheel/differential must mesh.

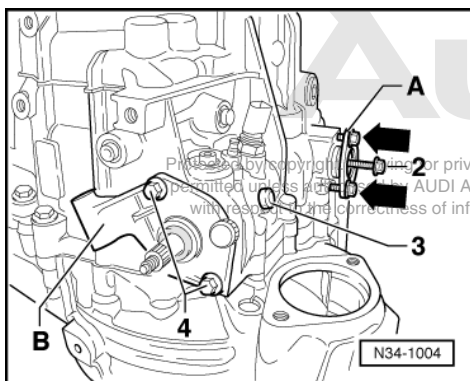


- With the help of second mechanic, then place shafts in their bearing seats.
- -> Insert input shaft in clutch housing and swivel in -arrow-.
- Fit gearbox housing.

Install selector shaft as follows:



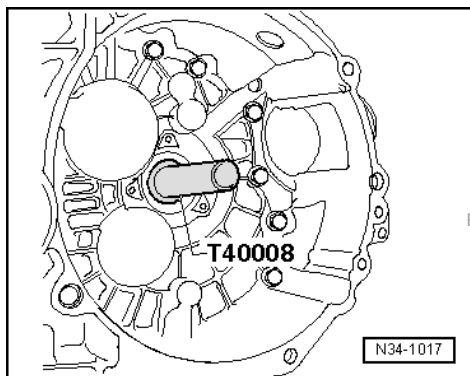
- Move selector rods to neutral position.
- -> Insert selector shaft -1-.
- Position selector shaft such that selector fingers are inserted in selector rods => Page 95 , Fig. 2 .
- When doing so, align lower selector shaft mounting -arrow- through hole for sealing cap.
- Screw sealing cap -A- to lower selector shaft mounting -1- using M8 x 60 mm bolt -2-.



- -> Hand-tighten sealing cap -A- by alternately tightening (1/2 turn) bolts -arrows-.
- Screw out bolt -2- and hand-tighten original bolt in its place.
- Fit selector mechanism cover -B- for selector shaft and tighten hexagon bolts -4- to torque.
- Then tighten hexagon bolts for sealing cap.

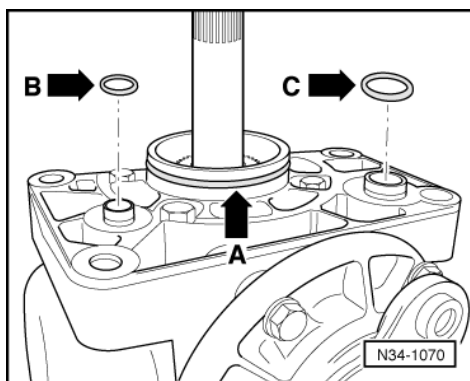


- Insert locking bolt -3- for selector shaft gate after applying locking fluid D 000 600 A2.
- Fit reversing light switch.



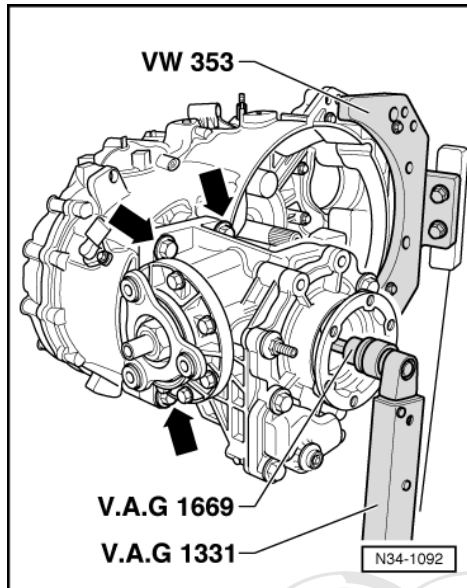
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- Install left flange shaft assembly=> Page 88 .
- Install speedometer sender.
- -> Drive in input shaft oil seal.
- Fit slave cylinder with release bearing.



Attach bevel box as follows:

- -> Always replace O-ring seal for bevel box/manual gearbox (arrow A) and O-ring seals for oil supply sleeves (arrows B and C) and lubricate slightly.
- Push bevel box right up against manual gearbox, taking care to ensure that bevel box input shaft splines are guided centrally onto differential connecting sleeve.
- Also align splines of right flange shaft and bevel gear, turning flange shaft if necessary.
- If spline position and central guide are correctly set, bevel box will slide onto stop against manual gearbox.
- Do not pull bevel box onto manual gearbox by way of securing bolts, as otherwise bevel box will tilt and securing lugs may break off.



- -> Tighten the four bevel box/manual gearbox connecting bolts -arrows- (only three bolts are shown in Fig.).
- Tighten taper-head bolt for right flange shaft using V.A.G 1669 or commercially available 6 mm socket attachment (secure with mandrel to prevent turning).

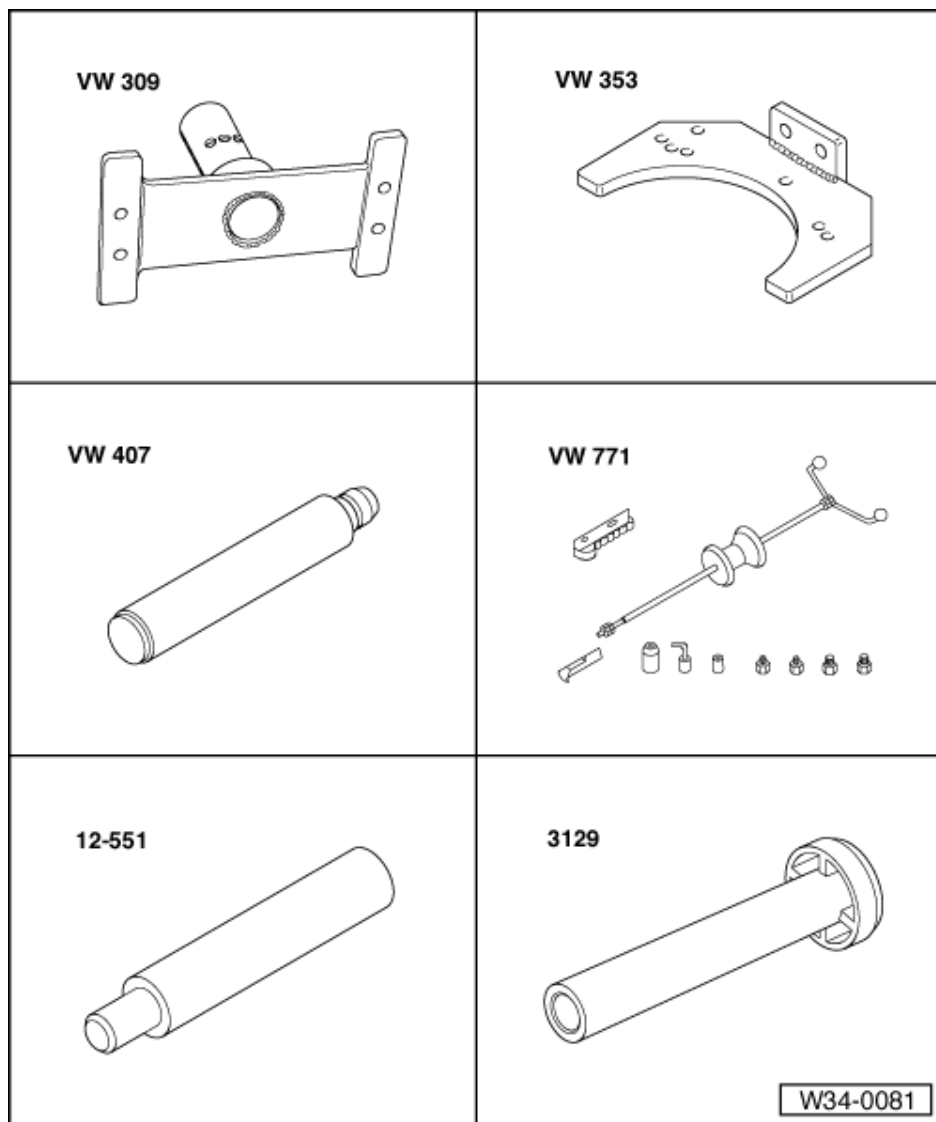
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6 - Servicing gearbox housing

6.1 - Servicing gearbox housing

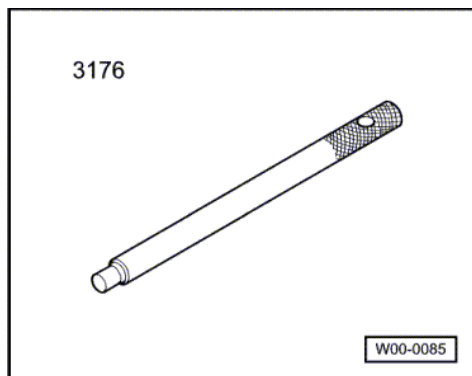


Special tools and workshop equipment required

- ♦ VW 309 Holding plate
- ♦ VW 353 Gearbox support
- ♦ VW 407 Press tool
- ♦ VW 771 Multi-purpose tool
- ♦ 12-551 Centring mandrel
- ♦ 3129 Fitting tool



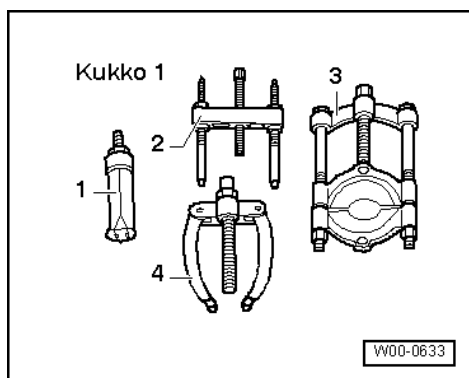
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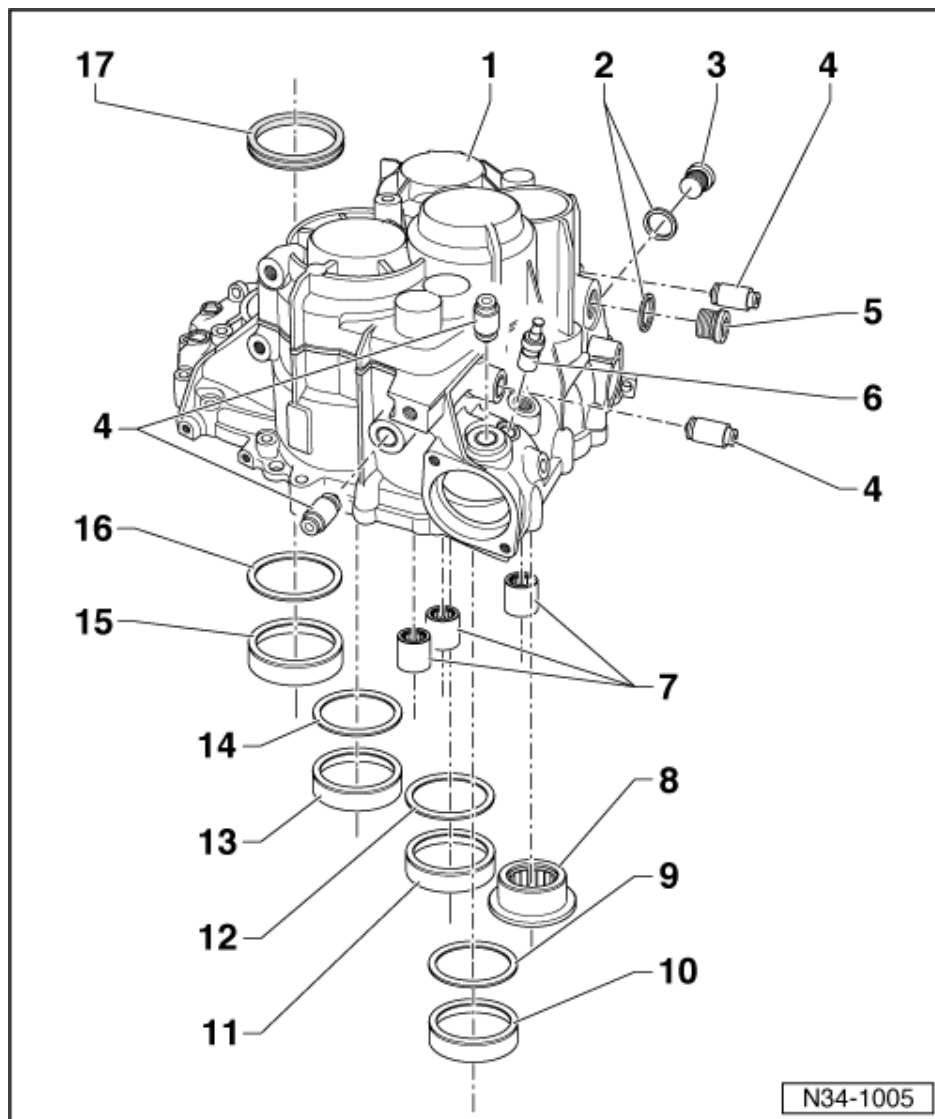
Special tools and workshop equipment required

- ◆ 3176 Centring mandrel

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



1 Gearbox housing

- ♦ Clamping to repair stand => Fig. 1
- ♦ Adjusting input shaft, output shafts and differential if housing replaced => Page 218

2 Oil seal

- ♦ Always replace

3 Oil drain plug, 30 Nm

- ♦ Always replace

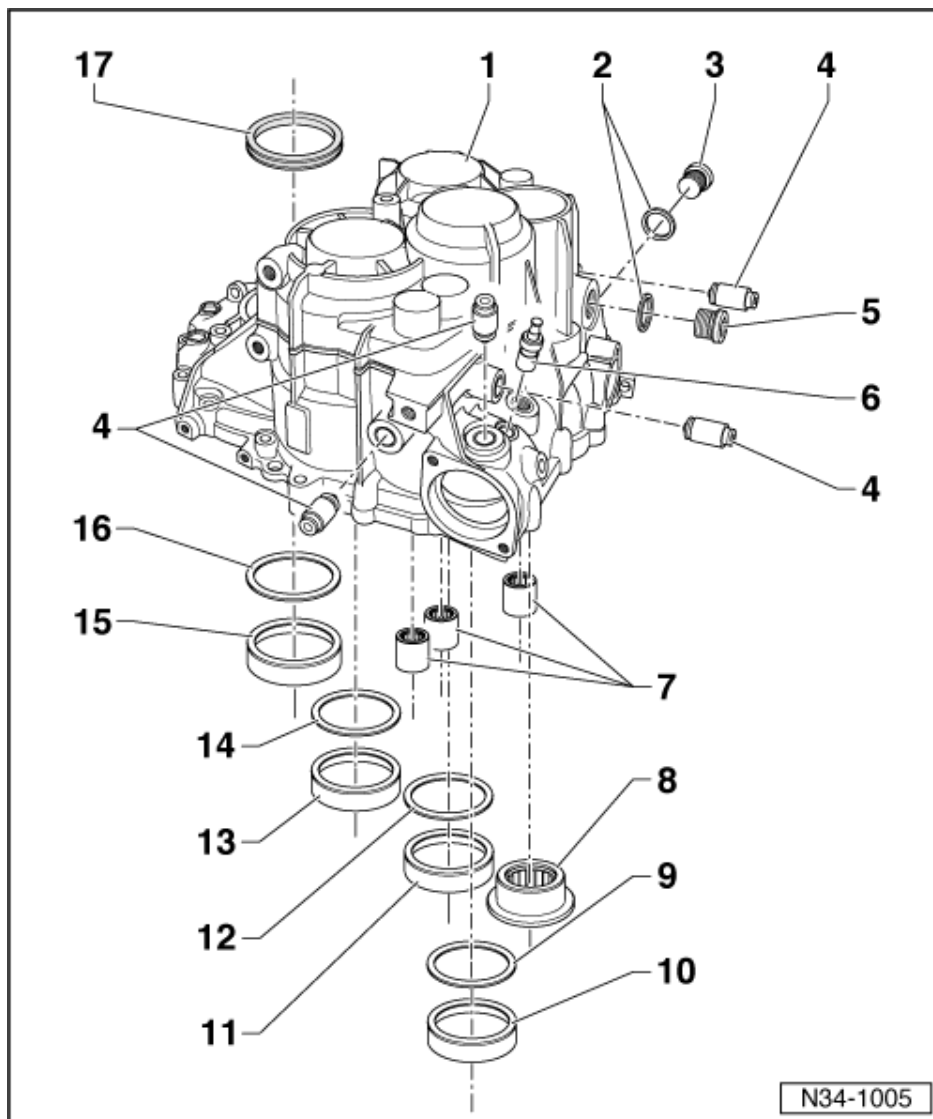
4 Locking sleeve

- ♦ Driving out => Fig. 2
- ♦ Driving in => Fig. 3

5 Oil filler plug, 30 Nm

- ♦ Always replace

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**6 Locking pin**

- ◆ Pressed into selector shaft gate to adjust outer shift mechanism => Page 49
- ◆ Driving out => Fig. 4
- ◆ Driving in => Fig. 5

7 Mounting bush

- ◆ For selector rods
- ◆ Always replace after removing
- ◆ Extracting => Fig. 6
- ◆ Installing => Fig. 7

8 Needle bush

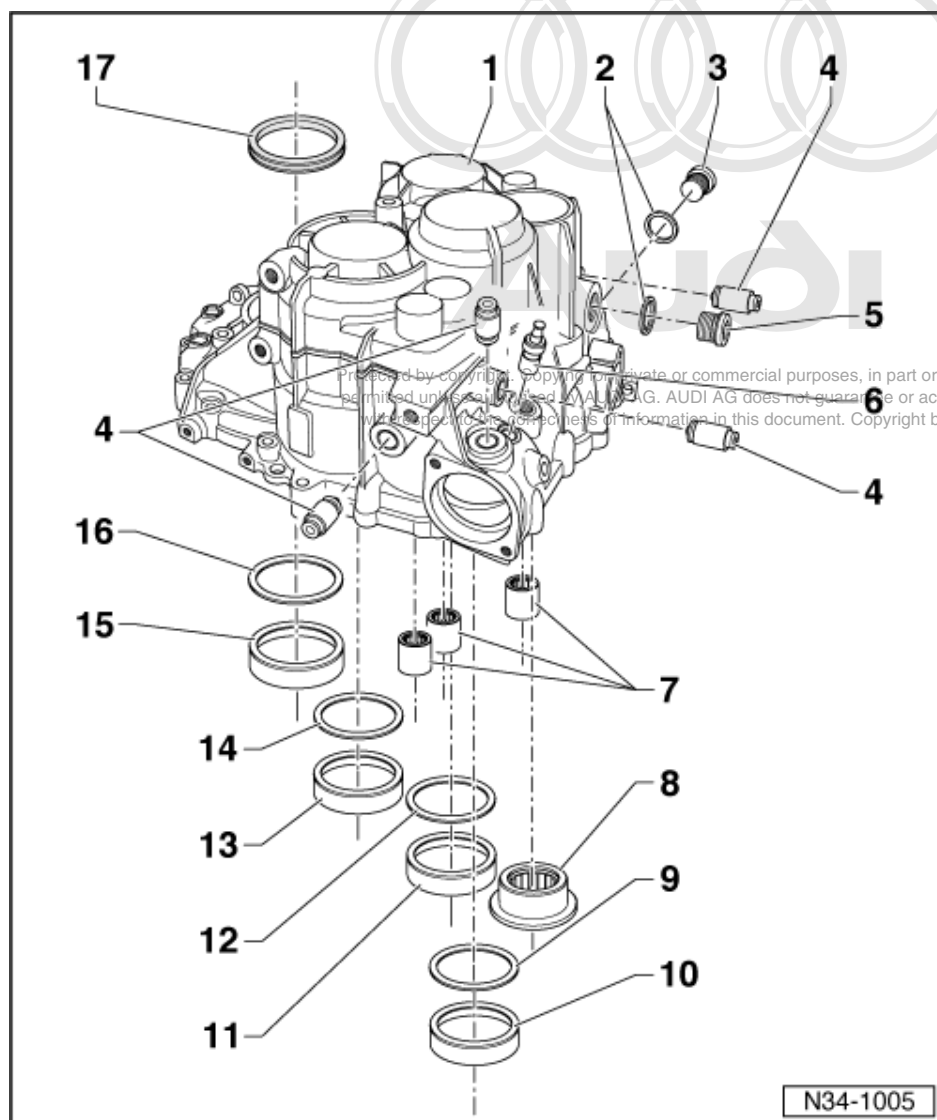
- ◆ Always replace after removing
- ◆ Extracting => Fig. 8
- ◆ Pressing in => Fig. 9

9 Shim

- ◆ For input shaft
- ◆ Adjustment table => Page 218



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10 Outer race/taper roller bearing

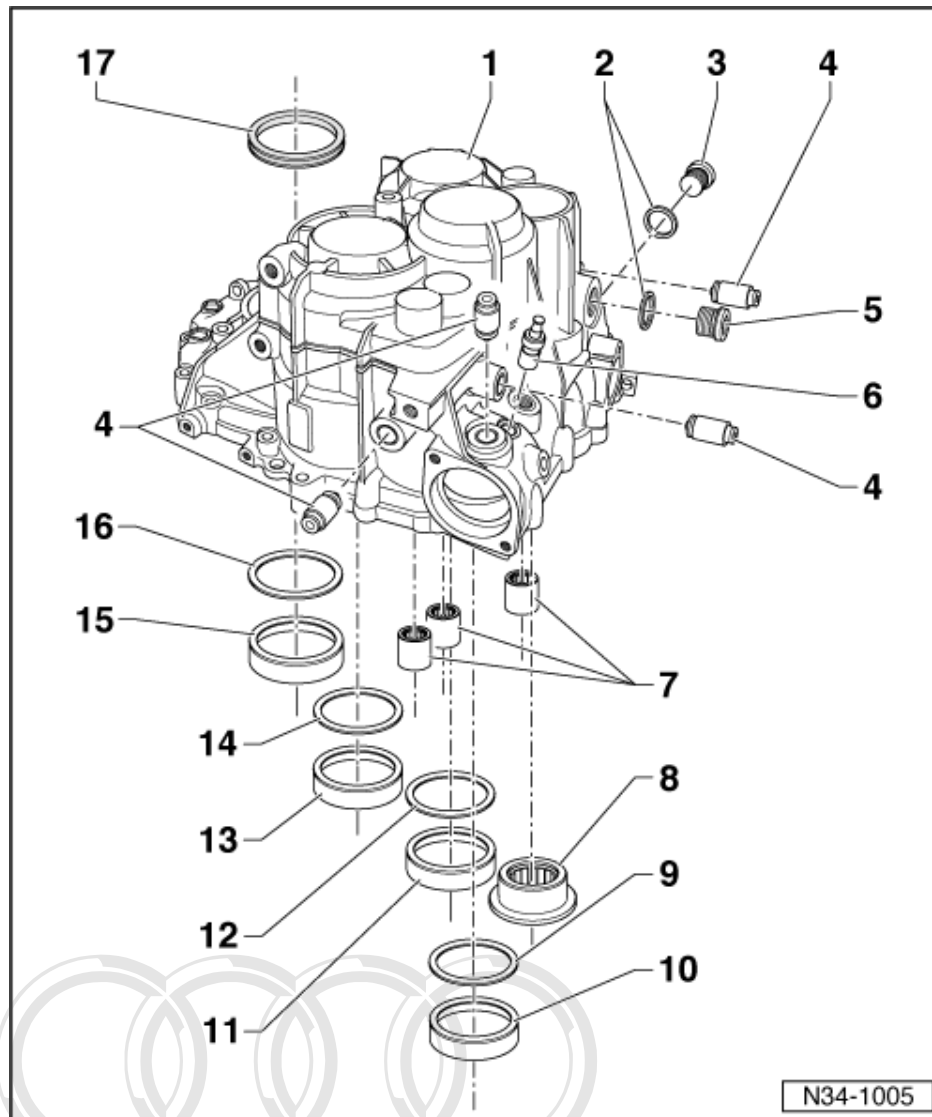
- ◆ For input shaft
- ◆ Removing and installing
=> Page 128 onwards
- ◆ If replaced, adjust input shaft => Page 138

11 Outer race/taper roller bearing

- ◆ For 5th/6th and reverse gear output shaft
- ◆ Removing and installing
=> Page 169 onwards
- ◆ If replaced, adjust 5th/6th and reverse gear output shaft
=> Page 187

12 Shim

- ◆ For 5th/6th and reverse gear output shaft
- ◆ Adjustment table=>Page 218



13 Outer race/taper roller bearing

- ◆ For 1st to 4th gear output shaft
- ◆ Removing and installing
=> Page 163
- ◆ If replaced, adjust 1st to 4th gear output shaft=>Page 164

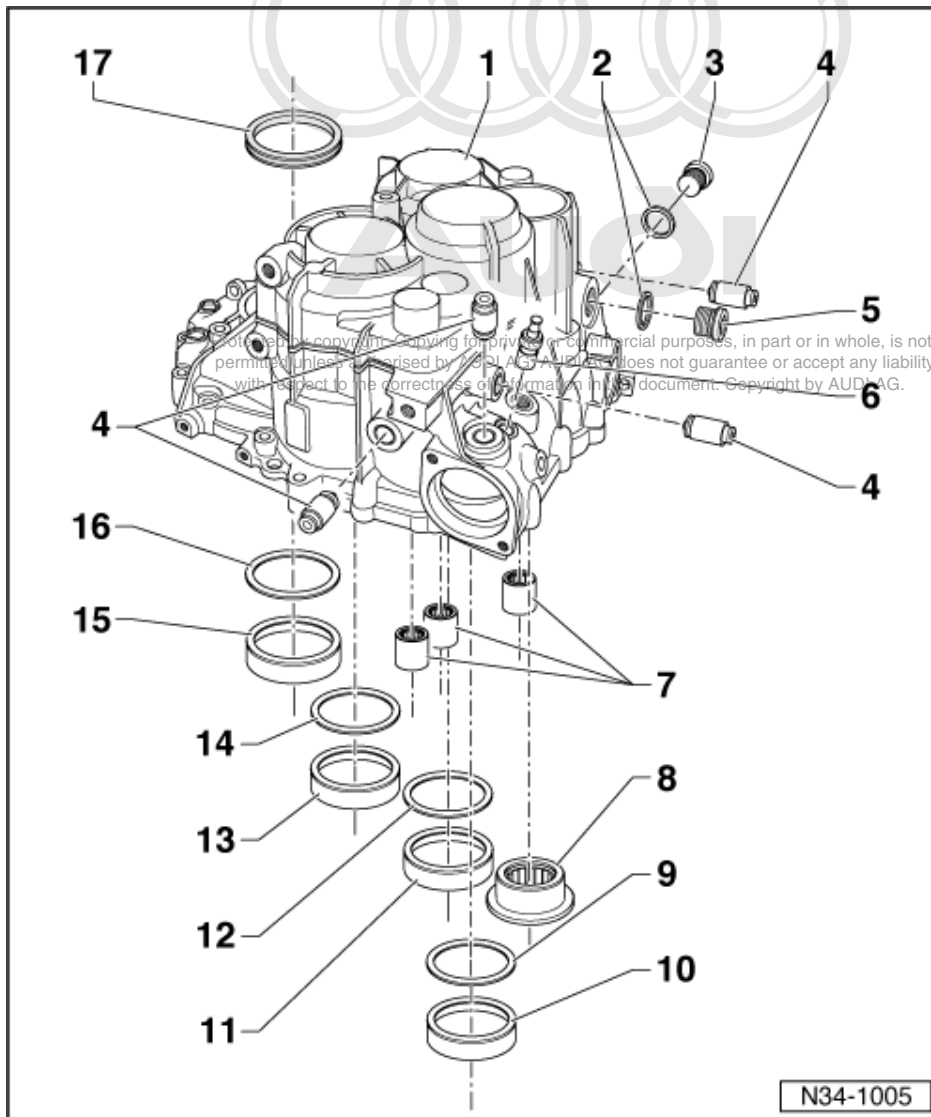
14 Shim

- ◆ For 1st to 4th gear output shaft
- ◆ Adjustment table=>Page 218

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15 Outer race/taper roller bearing

- ◆ For differential
- ◆ Removing and installing
=> Page 203 onwards
- ◆ If replaced, adjust differential => Page 219

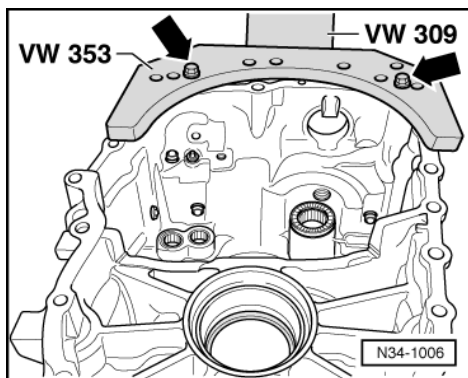


16 Shim

- ♦ For differential
- ♦ Adjustment table=>Page **218**

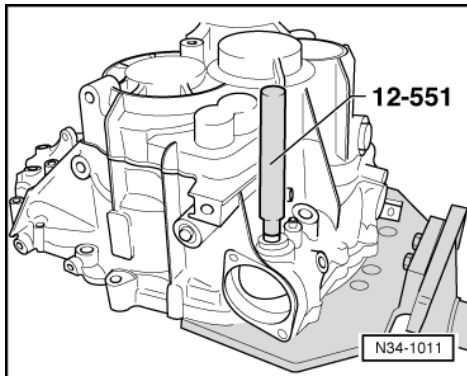
17 Oil seal

- ♦ Replacing => Page **192**

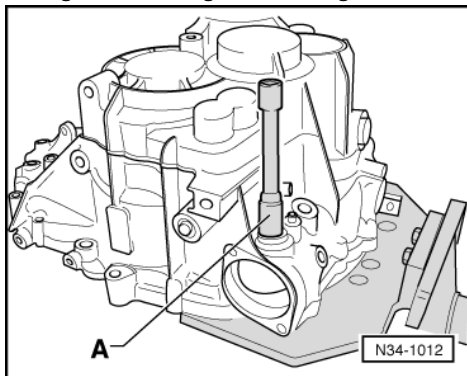


-> Fig.1 Attaching gearbox housing to repair stand with bolts

-arrows-

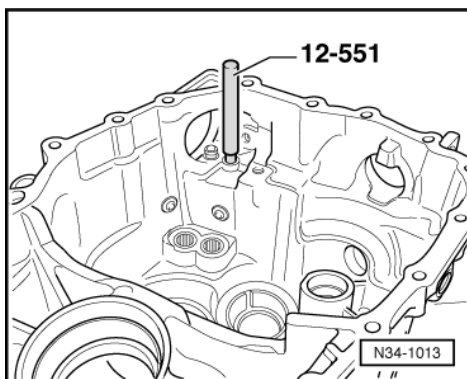


-> Fig.2 Driving out locking sleeve

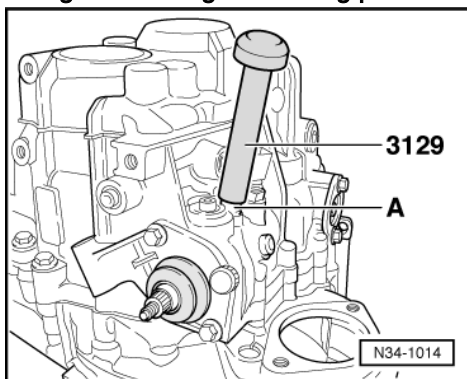


-> Fig.3 Driving home locking sleeve

- Use 13 mm socket attachment -A- and plastic-headed hammer to drive home locking sleeve.

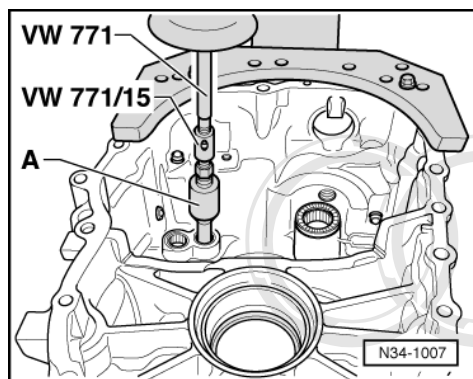


-> Fig.4 Driving out locking pin



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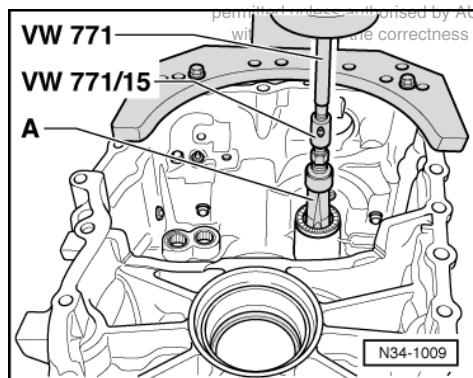
-> Fig.5 Driving home locking pin -A-



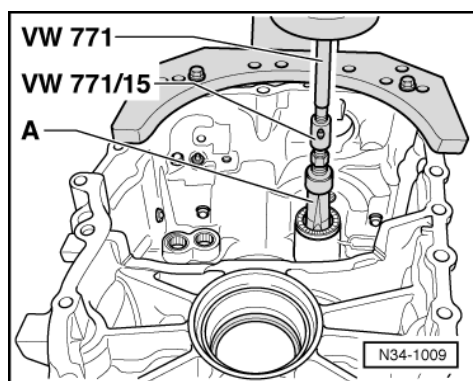
-> Fig.6 Extracting mounting bush for selector rod

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

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-> Fig.7 Driving mounting bush for selector rod in flush

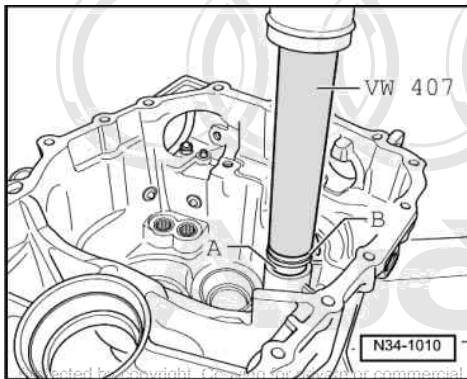


-> Fig.8 Pulling needle bush for reverse shaft out of gearbox housing

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

Note:

Needle bush is destroyed on removal and has to be replaced.



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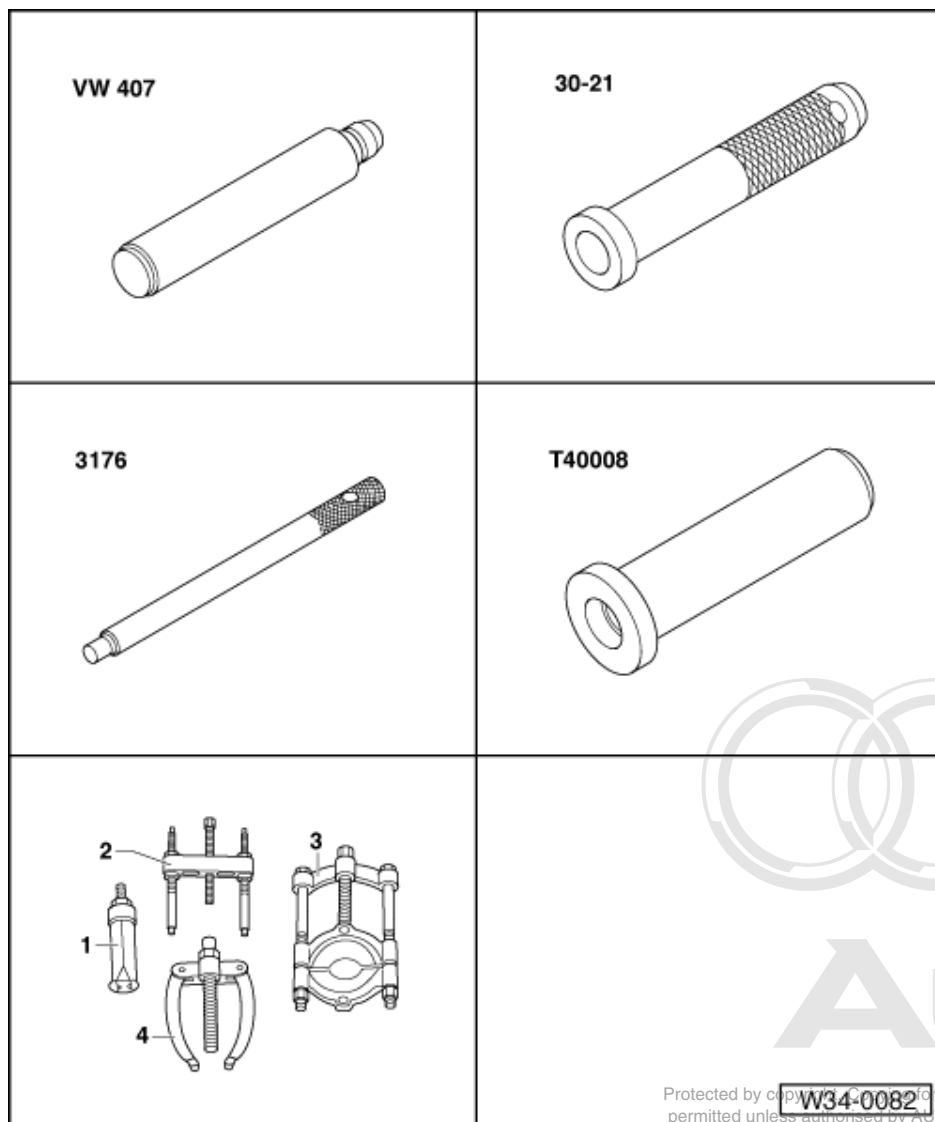
-> Fig.9 Pressing needle bush -A- into gearbox housing

- When pressing in, place thrust washer -B- of reverse shaft on needle bush.



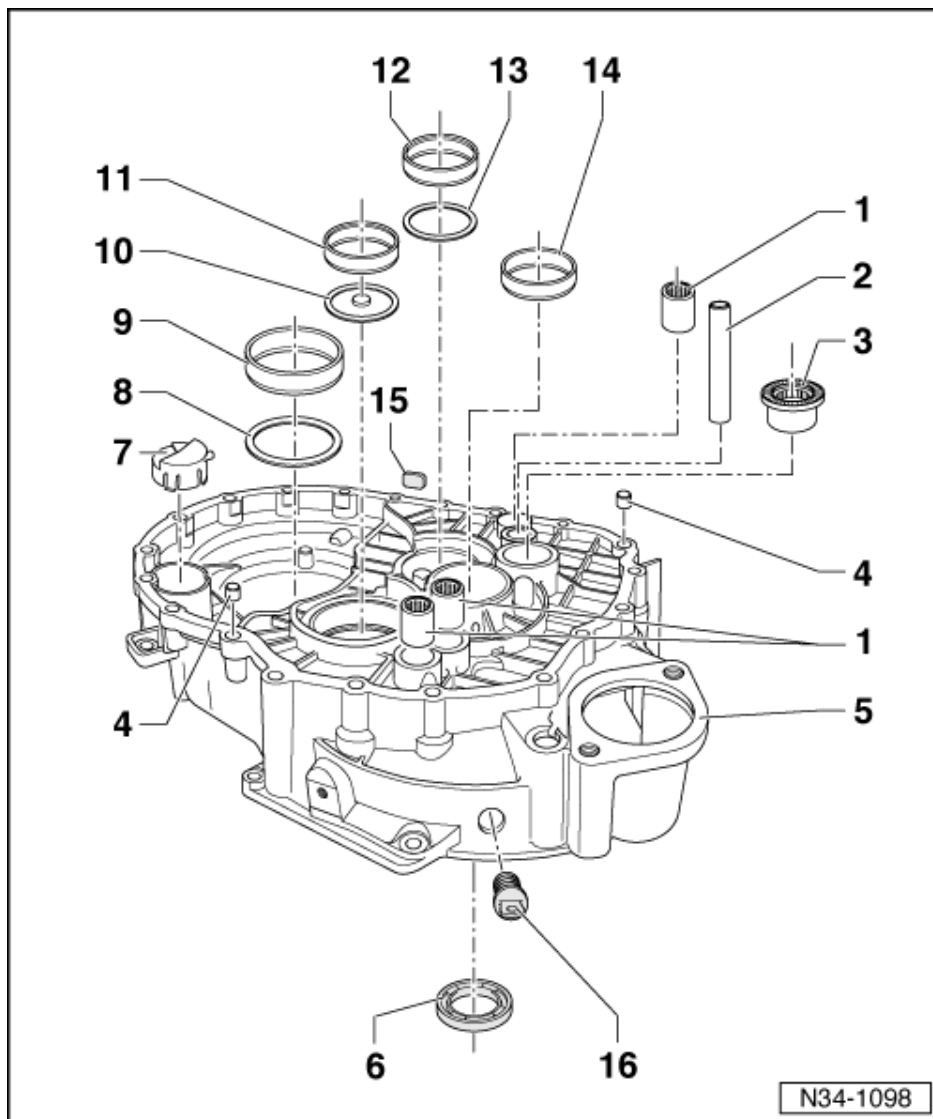
7 - Servicing clutch housing

7.1 - Servicing clutch housing



Special tools and workshop equipment required

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



1 Mounting bush

- ◆ For selector rods
- ◆ Always replace after removing
- ◆ Extracting => Fig. 1
- ◆ Driving in => Fig. 2

2 Reverse gear selector fork shaft

- ◆ Shaft cannot be removed using workshop tools
- ◆ Pressing shaft into clutch housing
=> Fig. 7

3 Needle bush

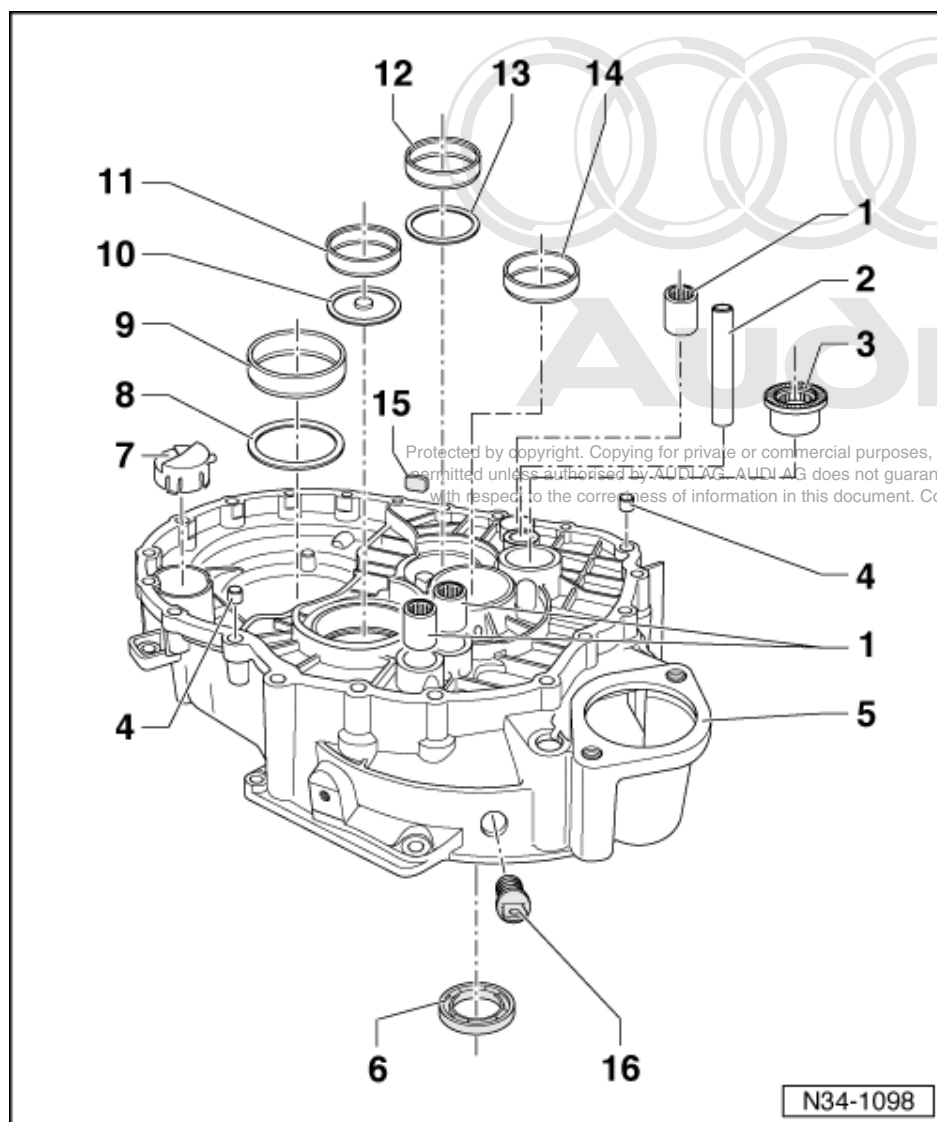
- ◆ Always replace after removing
- ◆ Extracting => Fig. 3
- ◆ Pressing in => Fig. 4

4 Dowel sleeve

- ◆ 2x

5 Clutch housing

- ◆ If replaced => Adjustment table, Page 218
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6 Input shaft oil seal

- ◆ Removing => Fig. 5
- ◆ Installing => Fig. 6

7 Oil guide

- ◆ Prise out with screwdriver
- ◆ Only fits in one position

8 Washer

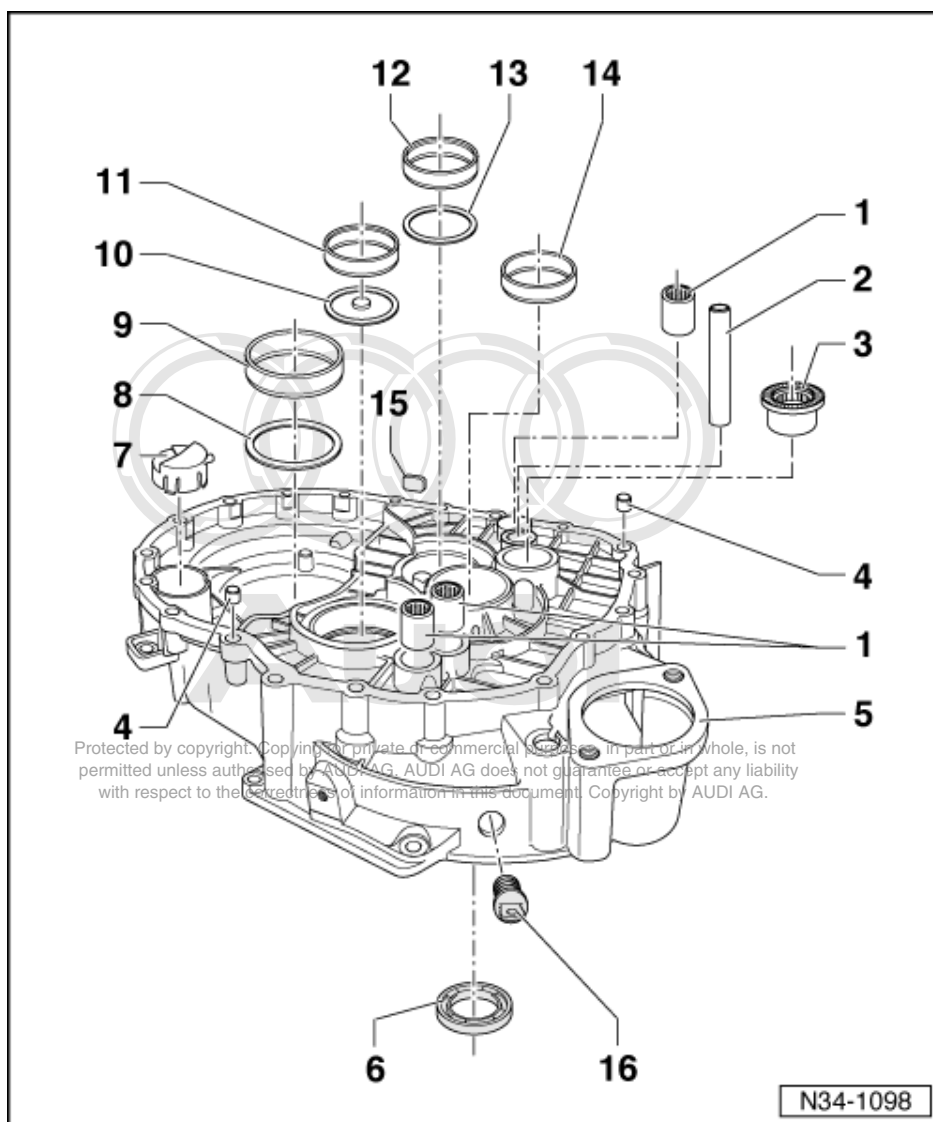
- ◆ For differential
- ◆ Always 0.65 mm thick

9 Outer race/taper roller bearing

- ◆ For differential
- ◆ Removing and installing
=> Page 203 onwards
- ◆ If replaced: Adjust differential
=> Page 219

10 Oil deflector ring

- ◆ Installation position: Shoulder at hole faces output shaft

**11 Outer race/taper roller bearing**

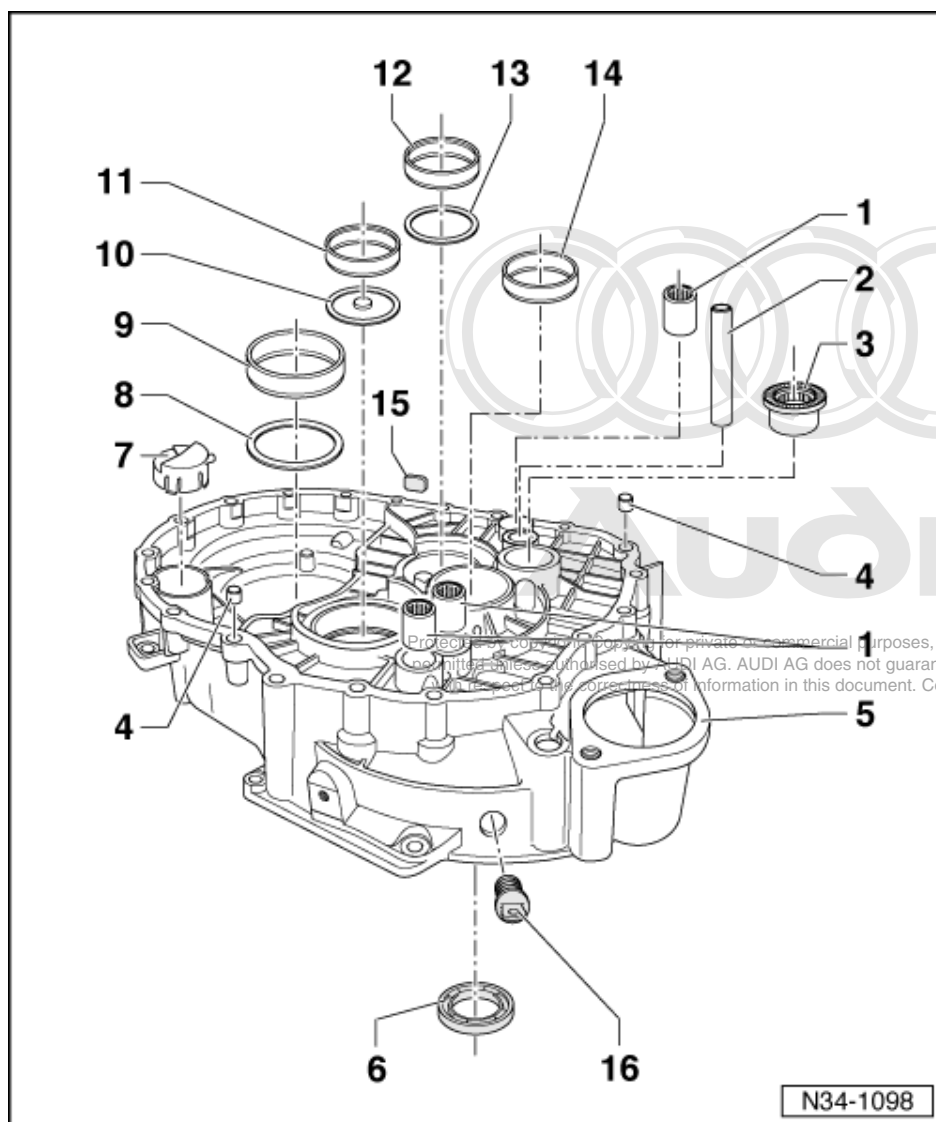
- ♦ For 1st to 4th gear output shaft
- ♦ Removing and installing
=> Page 154
- ♦ If replaced, adjust 1st to 4th gear output shaft=>Page 164

12 Outer race/taper roller bearing

- ♦ For 5th/6th and reverse gear output shaft
- ♦ Removing and installing
=> Page 169 onwards
- ♦ If replaced, adjust 5th/6th and reverse gear output shaft => Page 187

13 Washer

- ♦ For output shaft
- ♦ Always 0.65 mm thick



14 Outer race/taper roller bearing

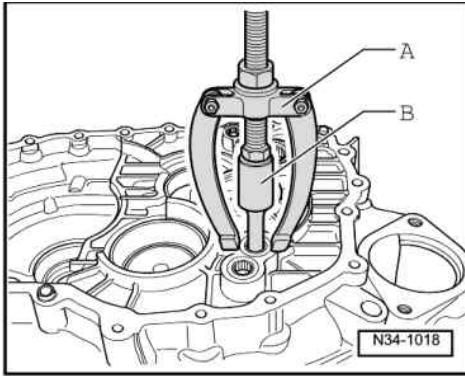
- ◆ For input shaft
- ◆ Removing and installing
=> Page 128 onwards
- ◆ If replaced, adjust input shaft
=> Page 138

15 Magnet

- ◆ Held in position by joint surface of housing

16 Cap

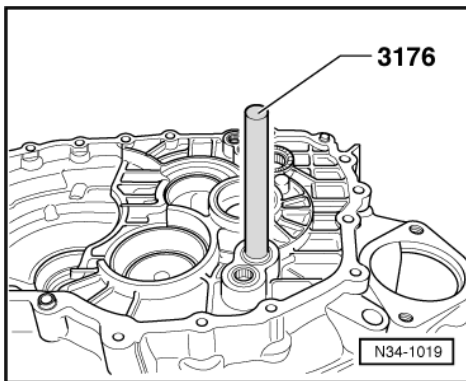
- ◆ Only fitted on clutch housing for 4-cyl. engine



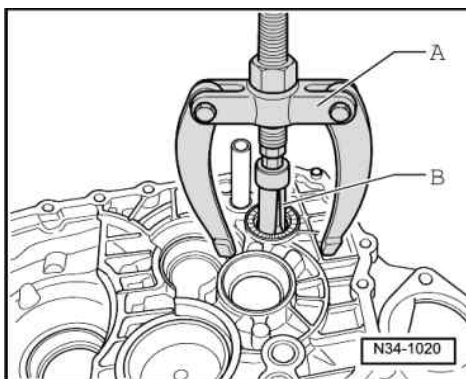
-> Fig.1 Extracting mounting bush for selector rod

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

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



-> Fig.2 Driving mounting bush for selector rod in flush



-> Fig.3 Pulling needle bush out of clutch housing

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

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

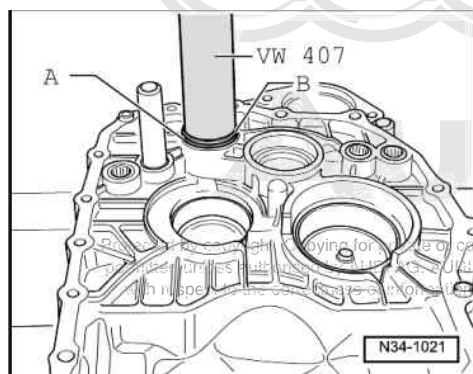


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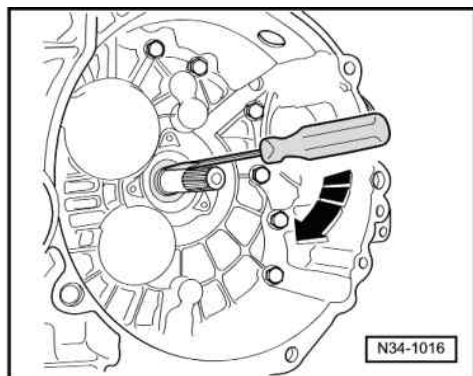
Note:

Needle bush is destroyed on removal and has to be replaced.



-> Fig.4 Pressing needle bush -A- into clutch housing

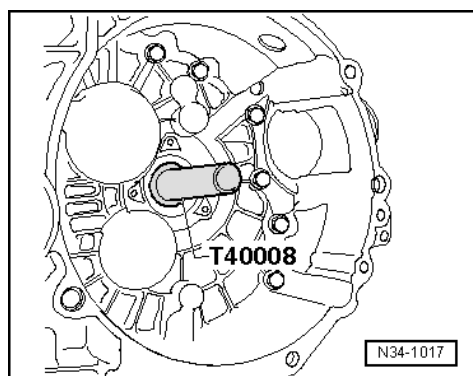
- When pressing in, position thrust washer -B- of reverse shaft on needle bush.



-> Fig.5 Removing input shaft oil seal

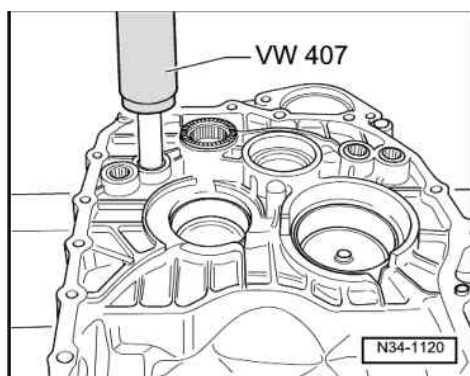
- Use screwdriver to carefully prise out oil seal.

With gearbox dismantled, sleeve 30-21 can be used to remove oil seal.



-> Fig.6 Driving input shaft oil seal in flush

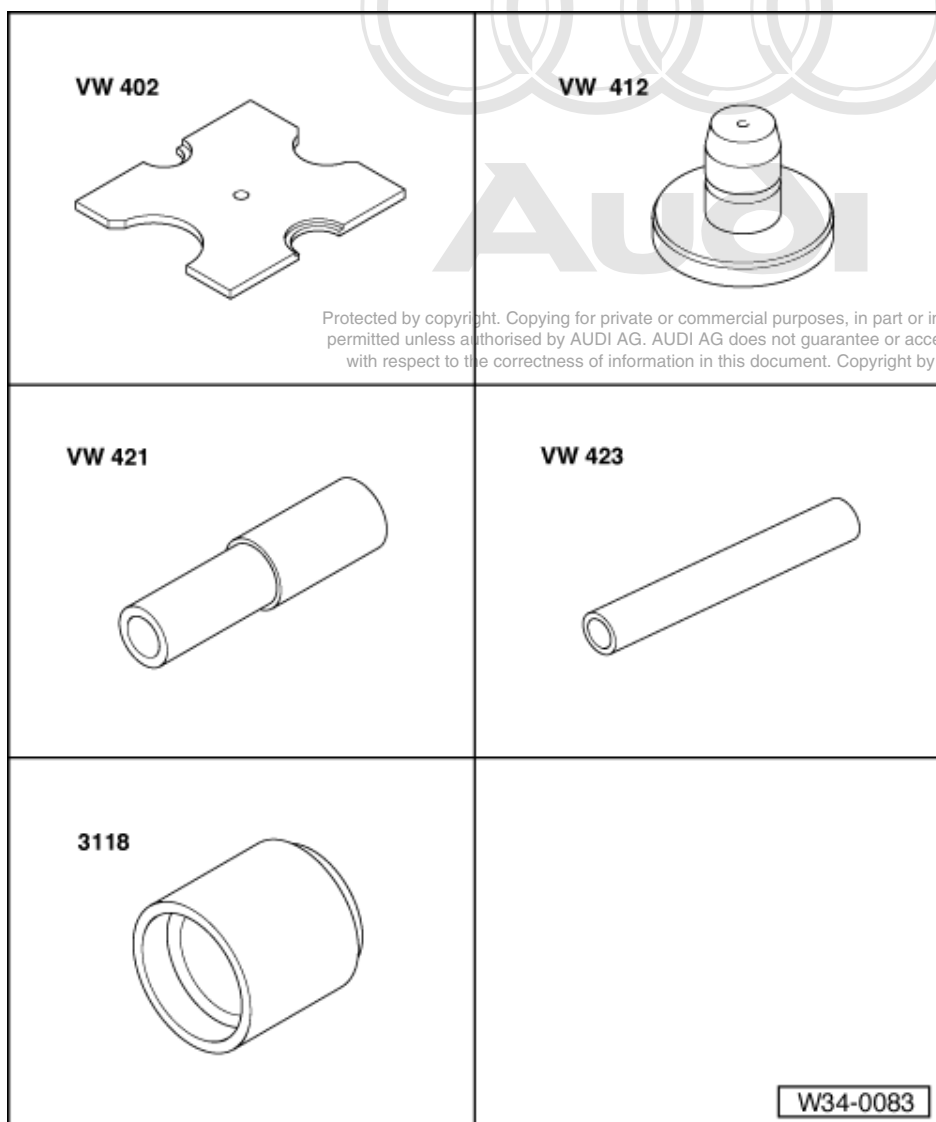
- Half-fill space between sealing lip and dust lip with sealing grease G 052 128 A1.



-> Fig.7 Pressing reverse gear selector fork shaft into clutch housing

8 - Dismantling and assembling gearbox shift mechanism

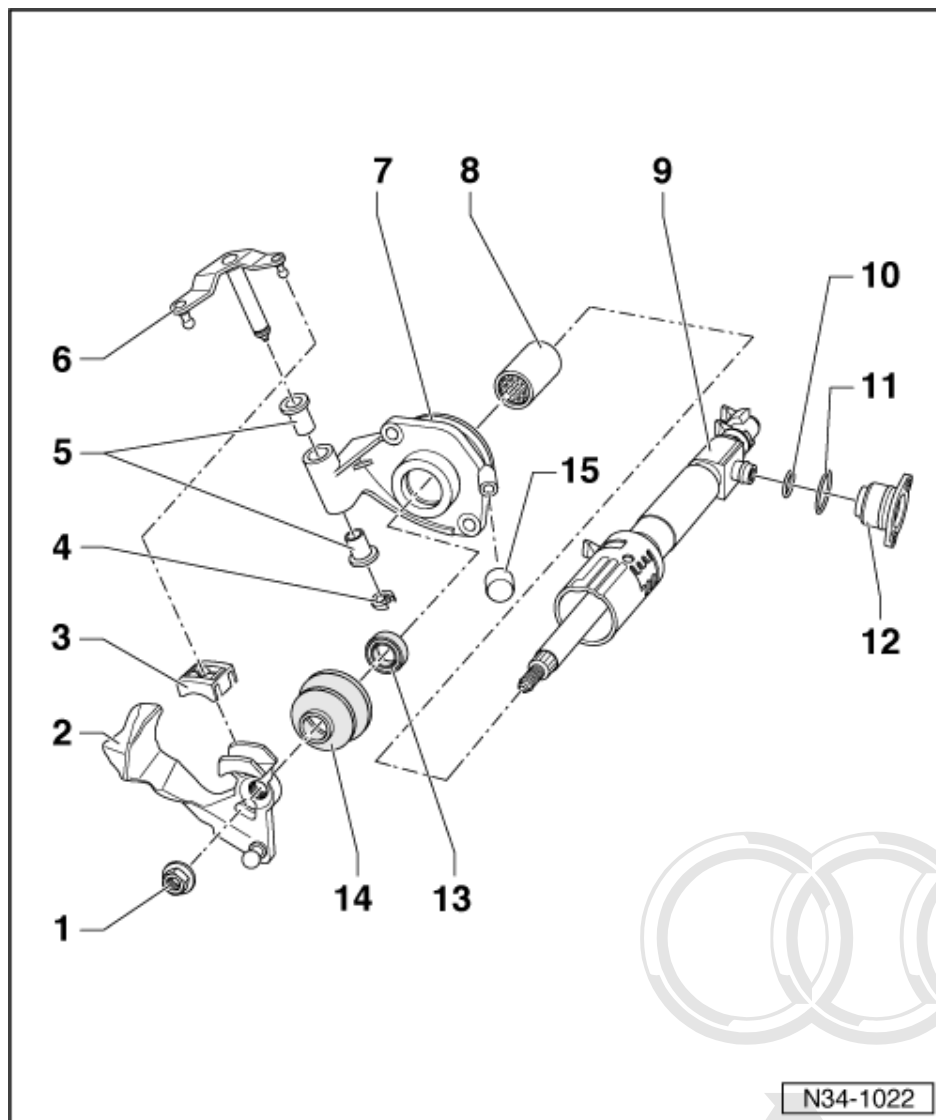
8.1 - Dismantling and assembling gearbox shift mechanism





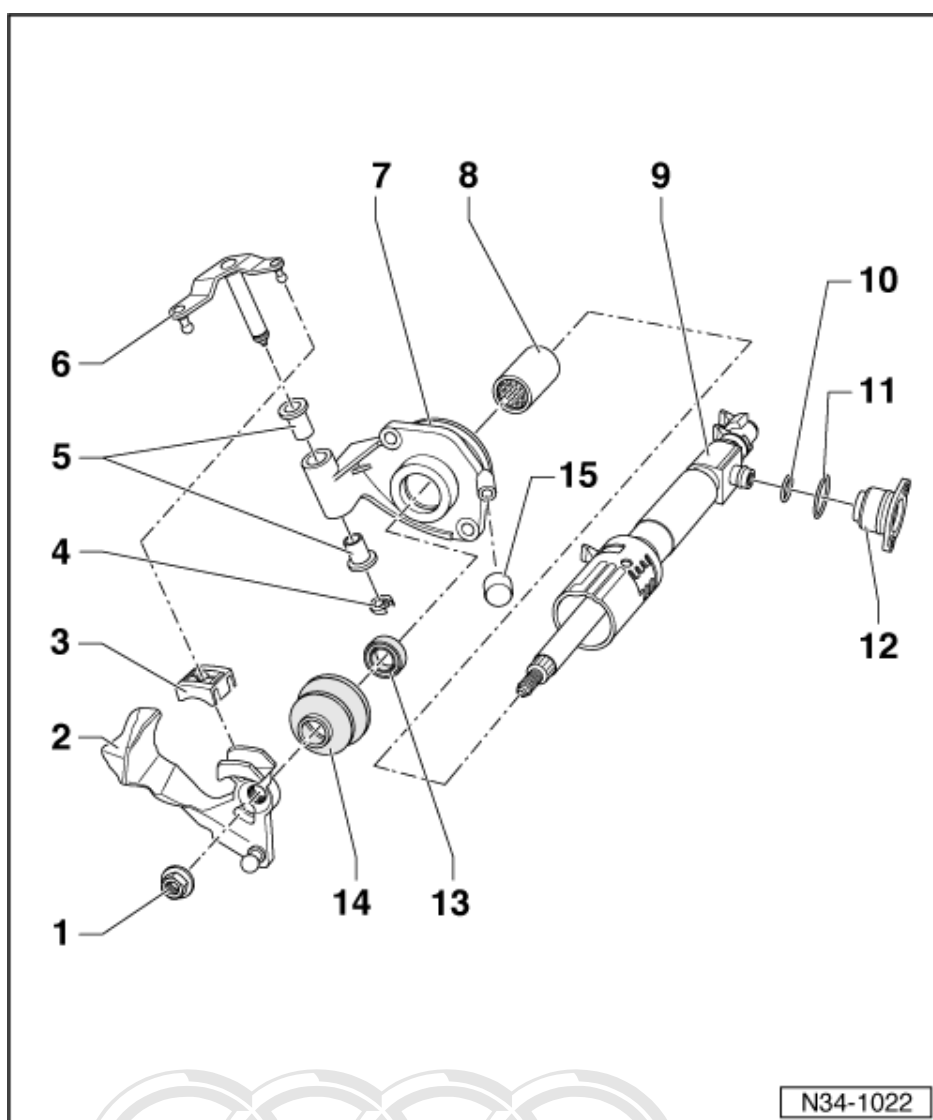
Special tools and workshop equipment required

- ♦ VW 402 Thrust plate
- ♦ VW 412 Press tool
- ♦ VW 421 Tubular section
- ♦ VW 423 Tubular section
- ♦ 3118 Tube



- 1 Hexagon nut, 25 Nm
- 2 Selector lever on gearbox
 - ♦ Insert such that master spline is aligned with selector shaft
 - ♦ Can be replaced with shift mechanism installed
 - ♦ Installation position => Page 45
- 3 Shoe
 - ♦ Clip into actuating arm -item 6 -
- 4 Circlip
 - ♦ Removing => Fig. 1
- 5 Mounting bush
- 6 Actuating arm
 - ♦ Installation position => Page 45
- 7 Selector mechanism cover

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**8 Ball sleeve**

- ♦ For selector shaft
- ♦ Removing => Fig. 2
- ♦ Pressing in => Fig. 3

9 Selector shaft**10 O-ring**

- ♦ Always replace

11 O-ring

- ♦ Always replace

12 Sealing cap**13 Oil seal**

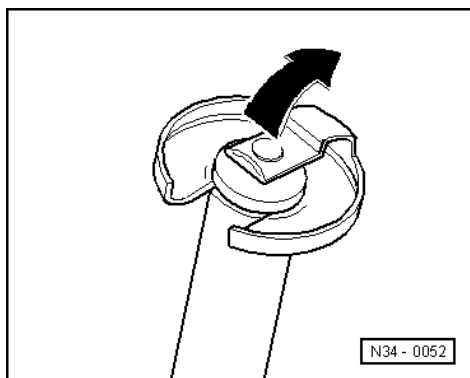
- ♦ **Prise out with screwdriver**
- ♦ Installing => Fig. 4

14 Protective cap

- ♦ For selector shaft

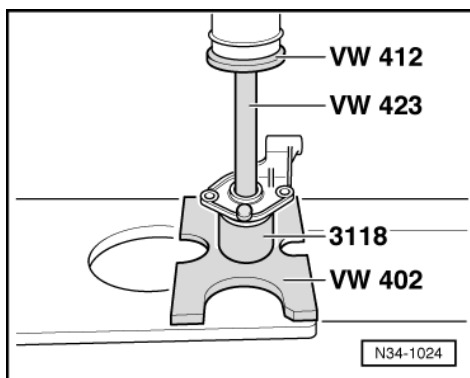
15 Cap

- ♦ For gearbox breather

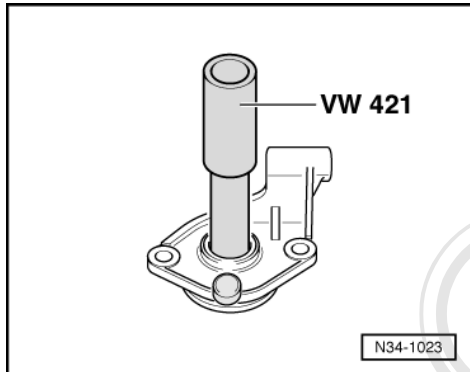


-> Fig.1 Removing circlip for actuating arm

- Lift clip in direction of arrow.

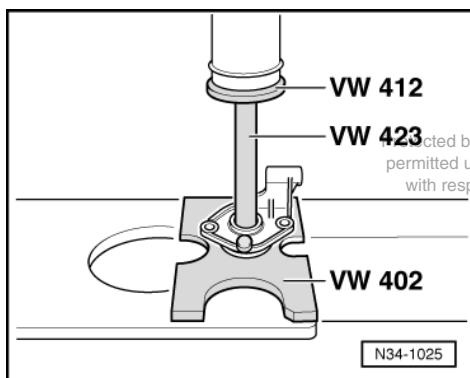


-> Fig.2 Pressing ball sleeve out of selector mechanism cover



-> Fig.3 Pressing ball sleeve into selector mechanism cover

- Press in ball sleeve until it makes contact with thrust plate VW 402.



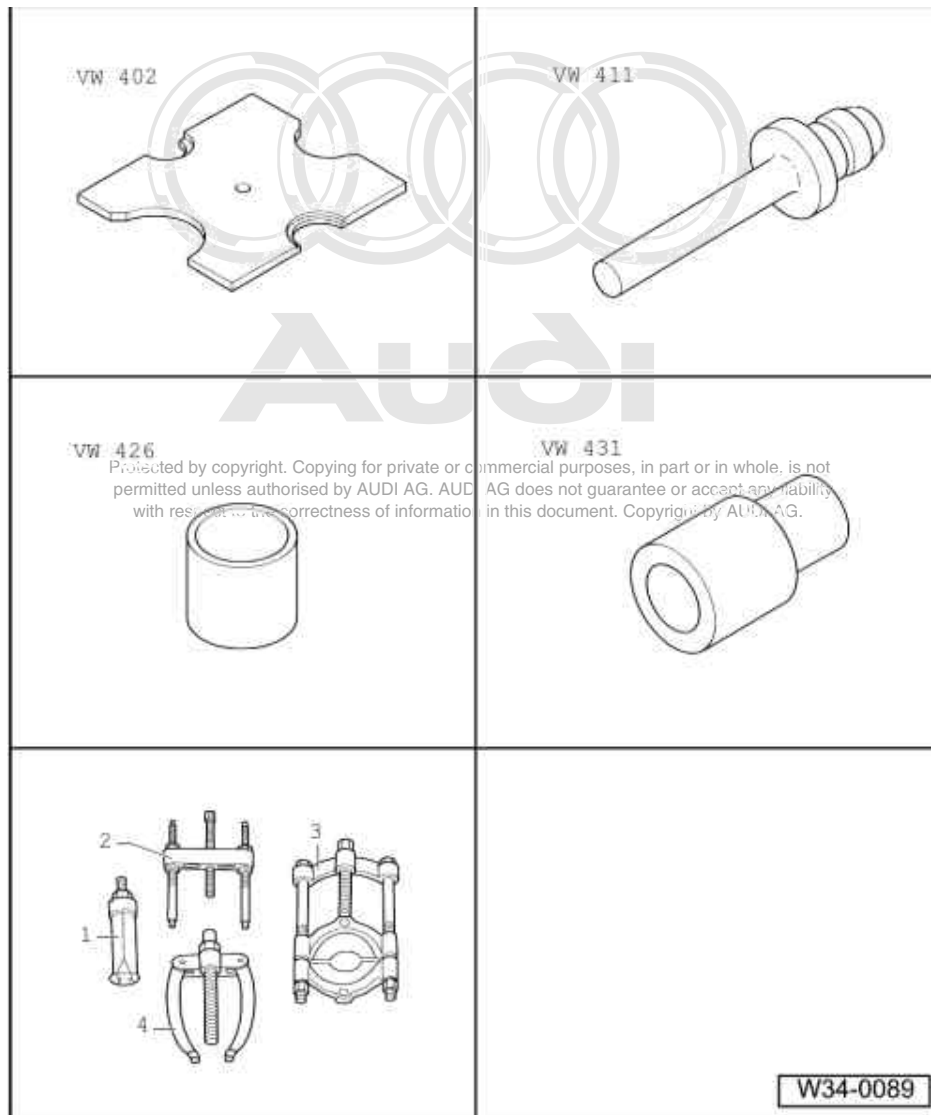
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-> Fig.4 Pressing home oil seal

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

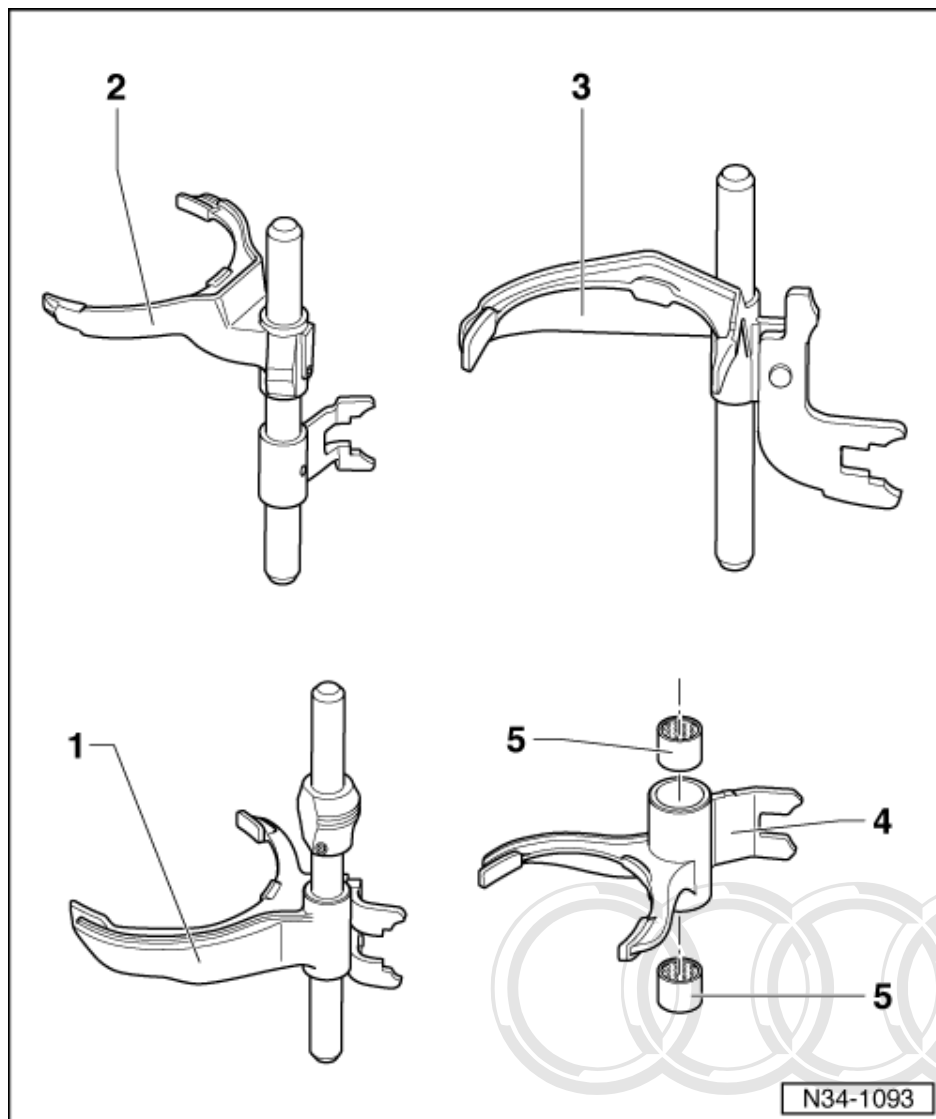
9 - Dismantling and assembling selector forks

9.1 - Dismantling and assembling selector forks



Special tools and workshop equipment required

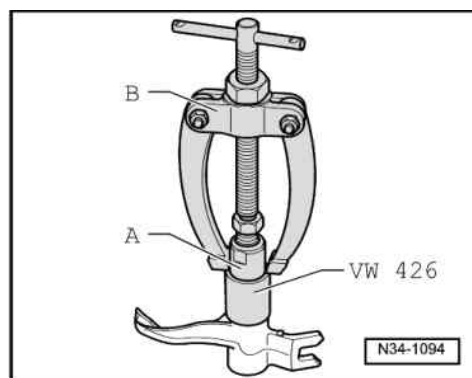
- ◆ VW 402 Thrust plate
- ◆ VW 411 Press tool
- ◆ VW 426 Tube
- ◆ VW 431 Thrust pad
- ◆ 1 - Kukko 21/3 Internal puller
- ◆ 4 - Kukko 22/1 Counter-support



- 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

- ◆ Extracting => Fig. 1
- ◆ Pressing in => Fig.2

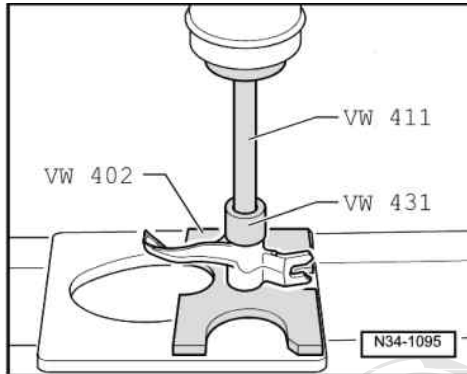
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-> Fig.1 Extracting ball sleeve for reverse gear selector fork

A - Internal puller 18 ... 23 mm, e.g. Kukko 21/3

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



-> Fig.2 Pressing in ball sleeve for reverse gear selector fork

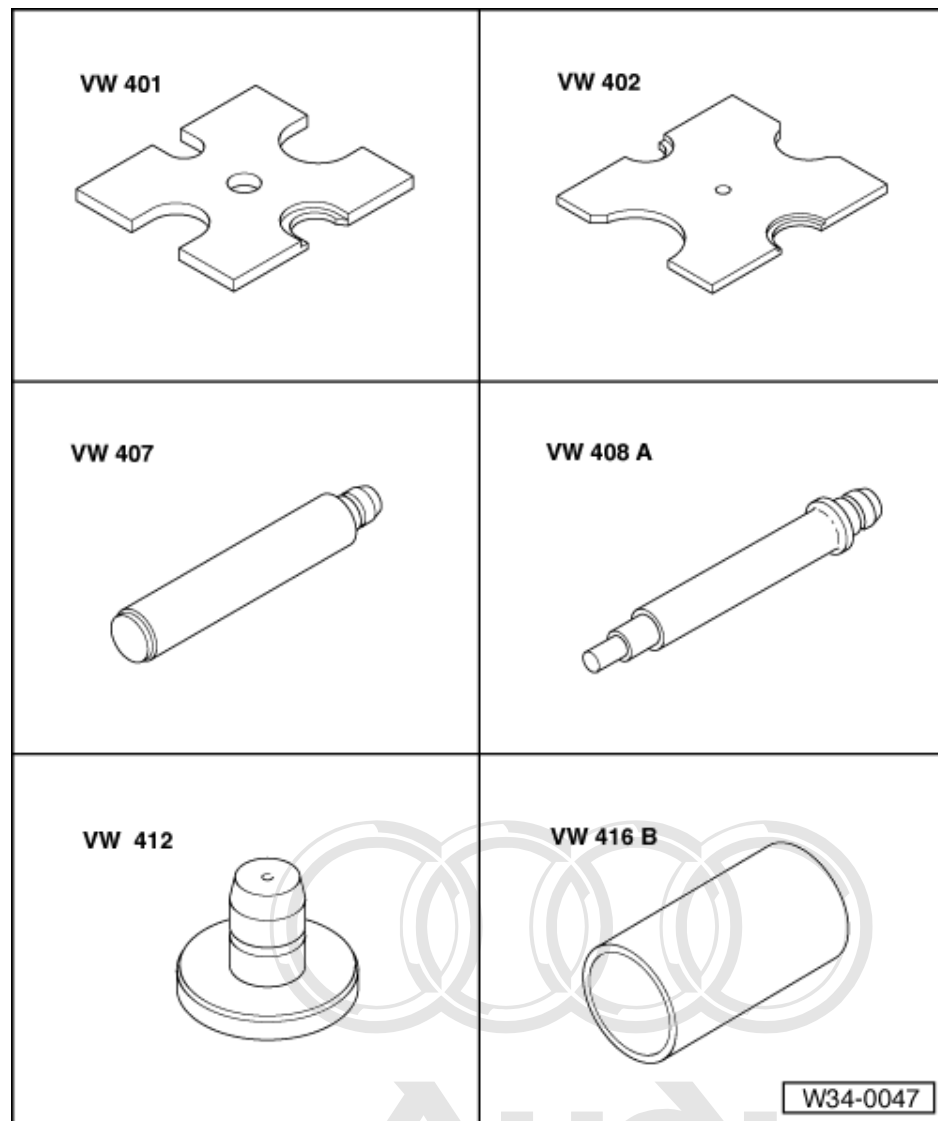
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35 - Gears, Shafts

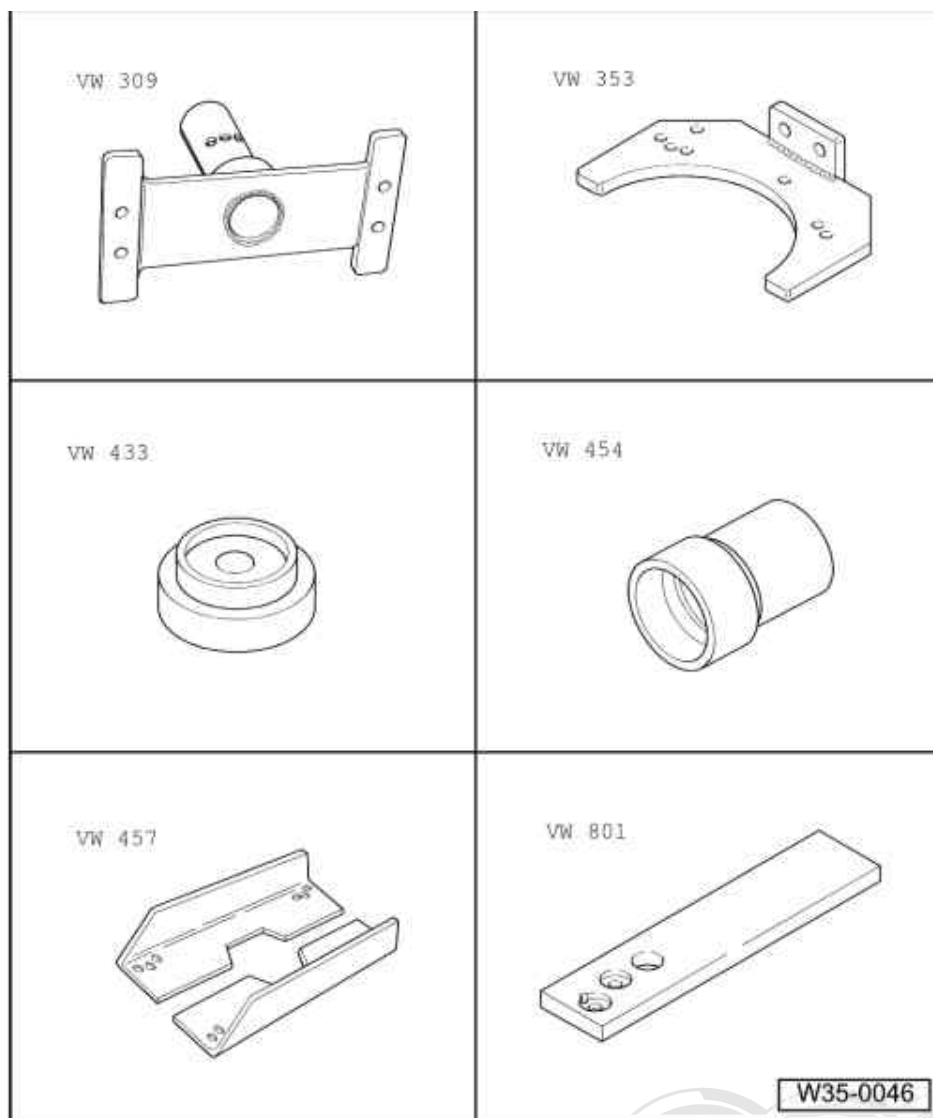
1 - Dismantling and assembling input shaft

1.1 - Dismantling and assembling input shaft



Special tools and workshop equipment required

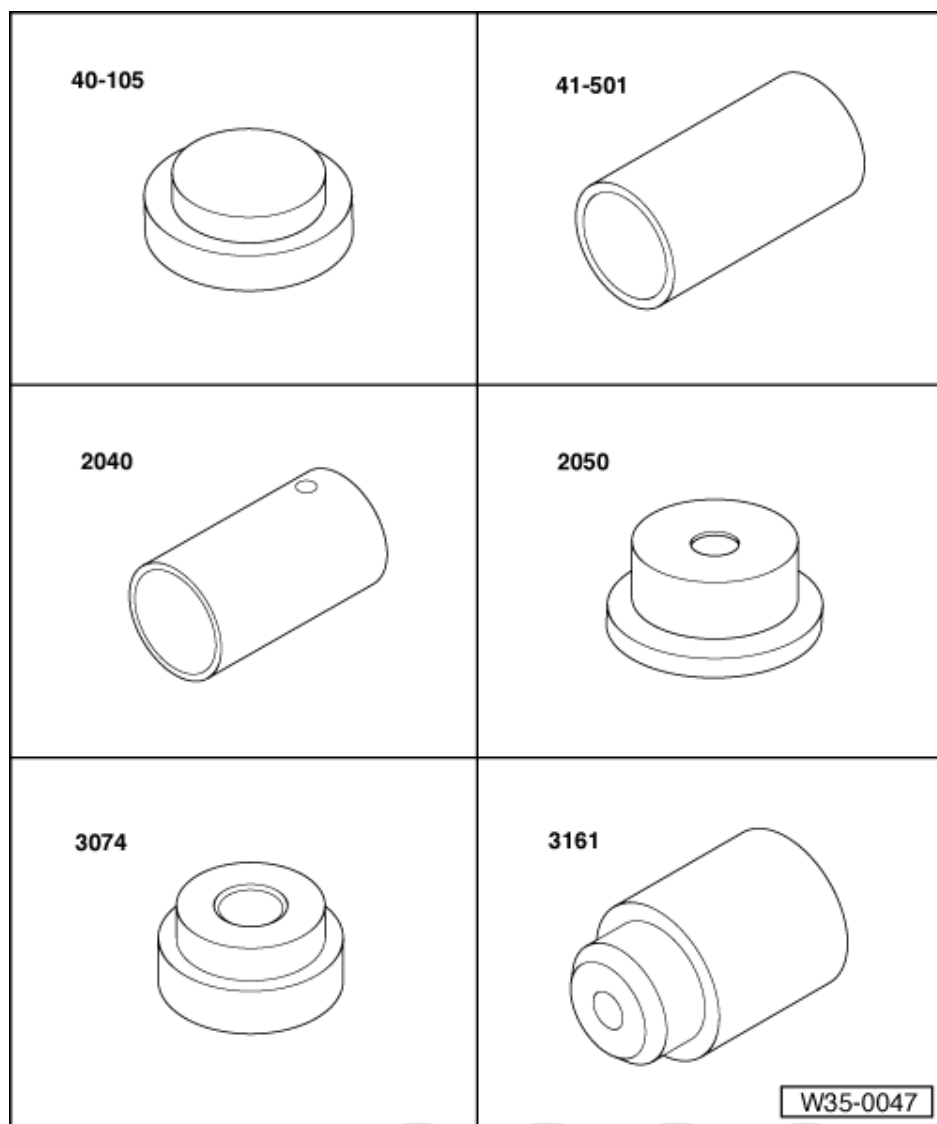
- ♦ VW 401 Pressure plate
- ♦ VW 402 Pressure plate
- ♦ VW 407 Press tool
- ♦ VW 408 A Press tool
- ♦ VW 412 Press tool
- ♦ VW 416 B Tubular section



Special tools and workshop equipment required

- ◆ VW 309 Holding plate
- ◆ VW 353 Gearbox support
- ◆ VW 433 Thrust pad
- ◆ VW 454 Thrust pad
- ◆ VW 457 Support rails
- ◆ VW 801 Holding plate

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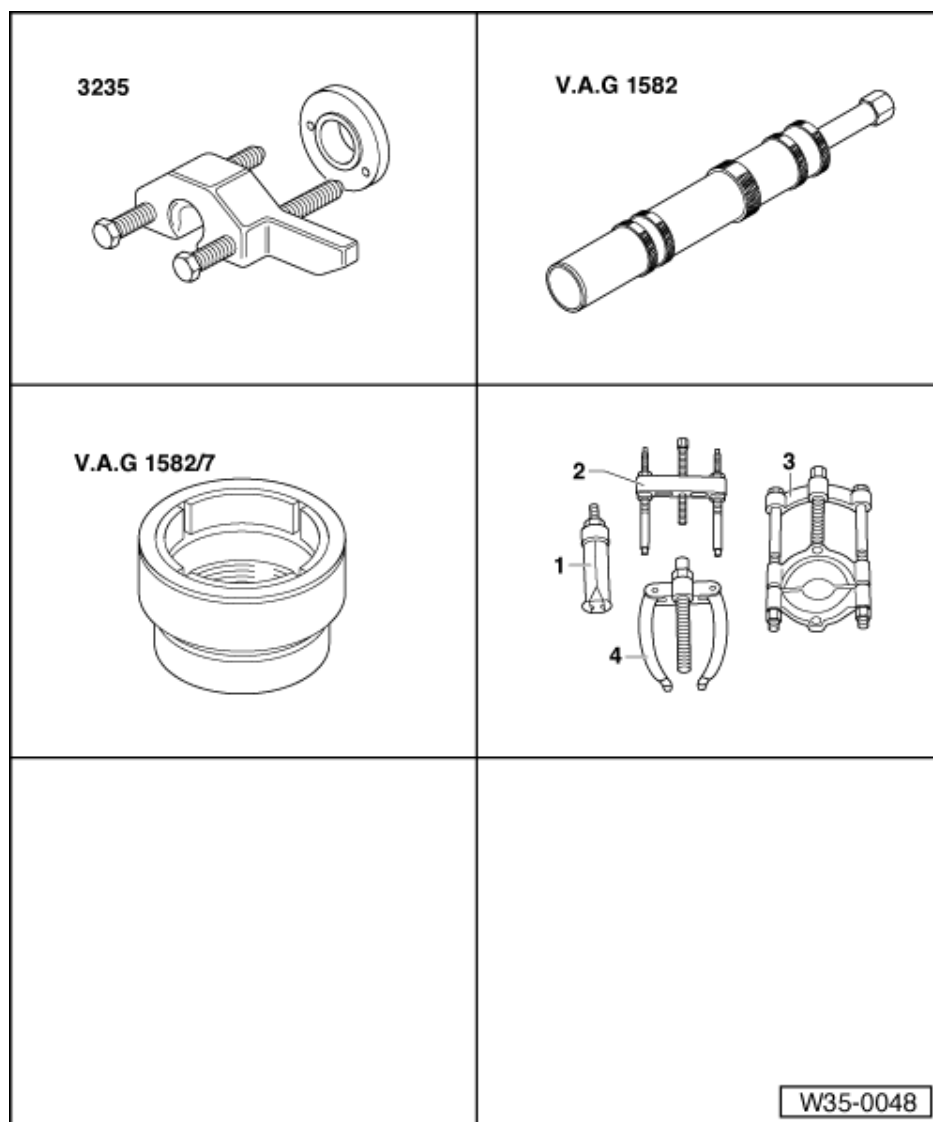


Special tools and workshop equipment required

- ♦ 40-105 Thrust plate
- ♦ 41-501 Drift sleeve
- ♦ 2040 Tubular section
- ♦ 2050 Thrust pad
- ♦ 3074 Thrust piece
- ♦ 3161 Extension piece

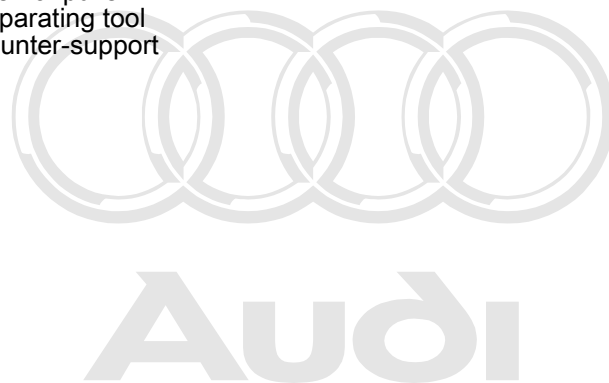


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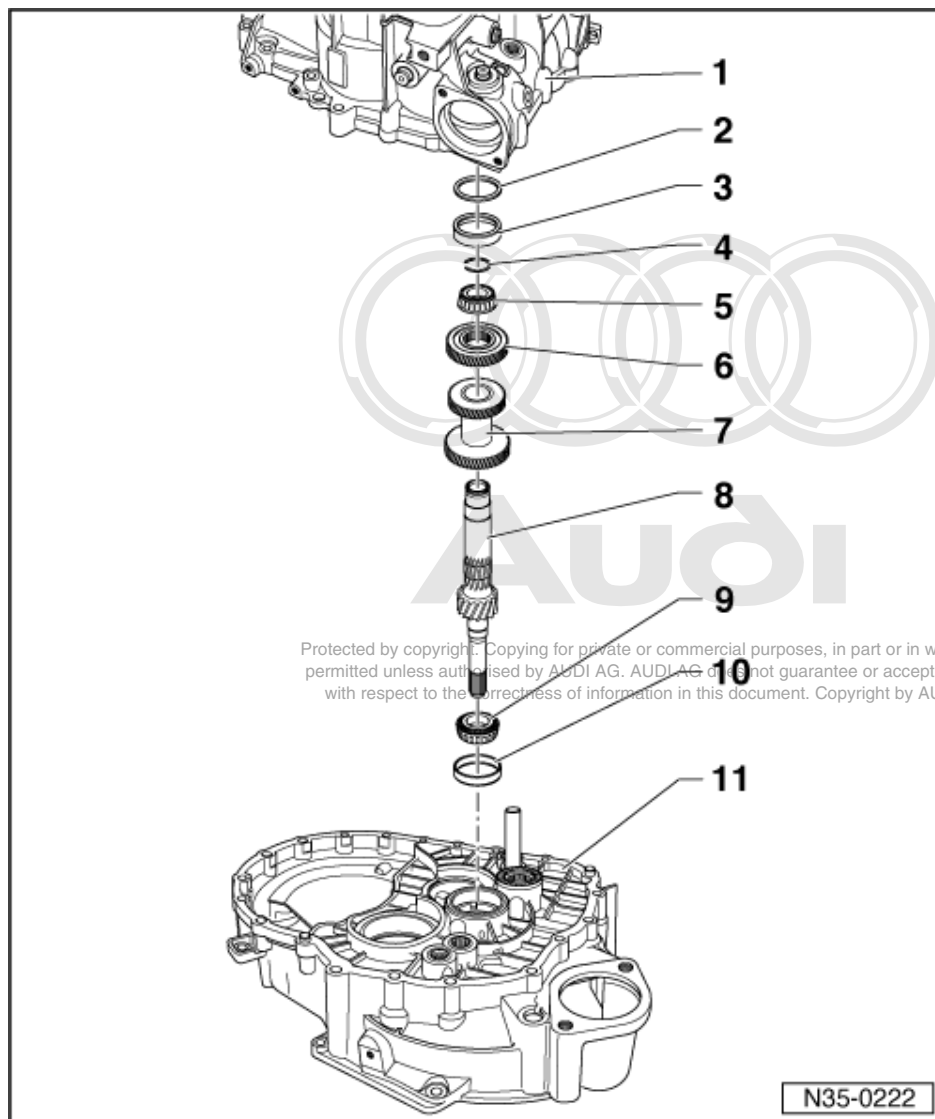


Special tools and workshop equipment required

- ◆ 3235 Pressing-in tool
- ◆ V.A.G 1582 Taper roller bearing puller
- ◆ V.A.G 1582/7 Gripper
- ◆ 1 - Kukko 21/7 Internal puller
- ◆ 3 - Kukko 17/2 Separating tool
- ◆ 4 - Kukko 22/2 Counter-support



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Notes:

- ♦ Heed technical data when fitting new gear wheels =>Page 2 .
- ♦ Input shaft must be re-adjusted if component replacement affects position of taper roller bearings. Refer to adjustment table =>Page 218 .

1 Gearbox housing

2 Shim

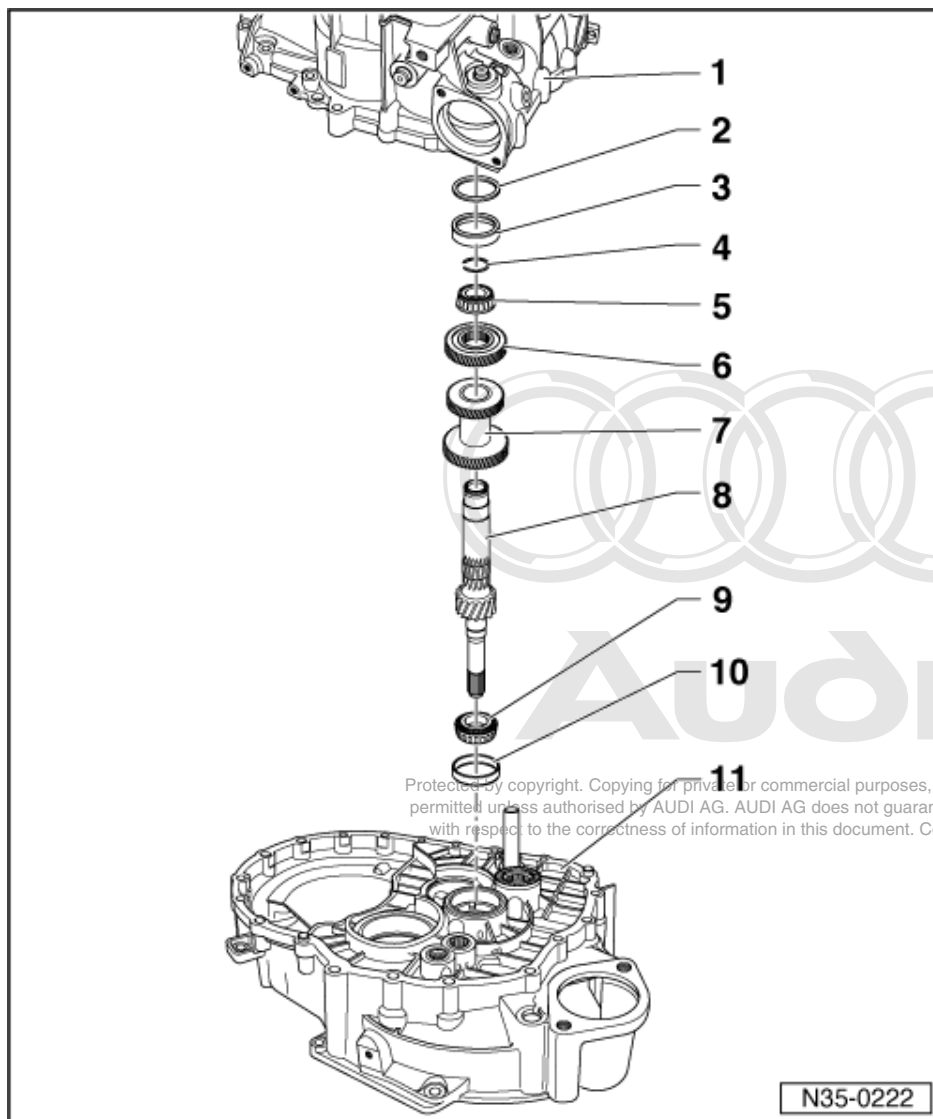
- ♦ Determining thickness
=> Page 138

3 Taper roller bearing outer race

- ♦ Extracting => Fig. 1
- ♦ Pressing in => Fig. 2

4 Circlip

- ♦ Redetermining on replacement of taper roller bearing -item 5 - and input shaft -item 8 -->Fig. 11

**5 Taper roller bearing inner race**

- ♦ Pulling off => Fig. 3
- ♦ Pressing on => Fig. 10

6 5th gear wheel

- ♦ Pressing off => Fig. 4
- ♦ Pressing on => Fig. 9

7 3rd/4th and 6th gear wheel

- ♦ Pressing off => Fig. 5
- ♦ Pressing on => Fig. 7

8 Input shaft

- ♦ Adjusting => Page 138

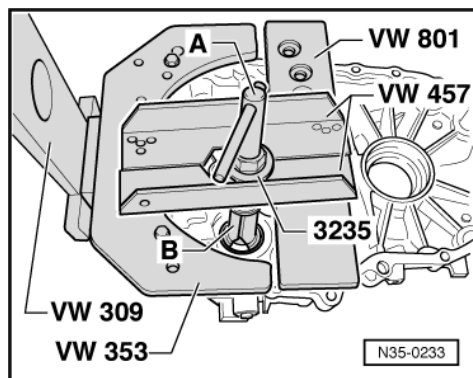
9 Taper roller bearing inner race

- ♦ Pressing off => Fig. 6
- ♦ Pressing on => Fig. 8

10 Taper roller bearing outer race

- ♦ Extracting => Fig. 12
- ♦ Pressing in => Fig. 13

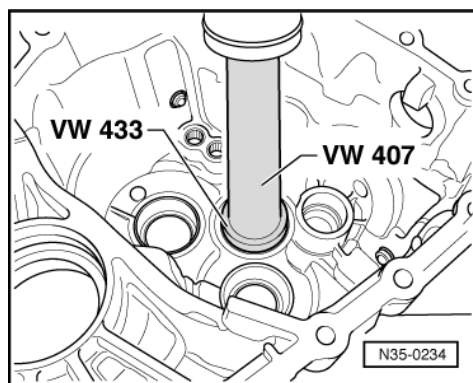
11 Clutch housing



-> Fig.1 Pulling taper roller bearing outer race out of gearbox housing

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

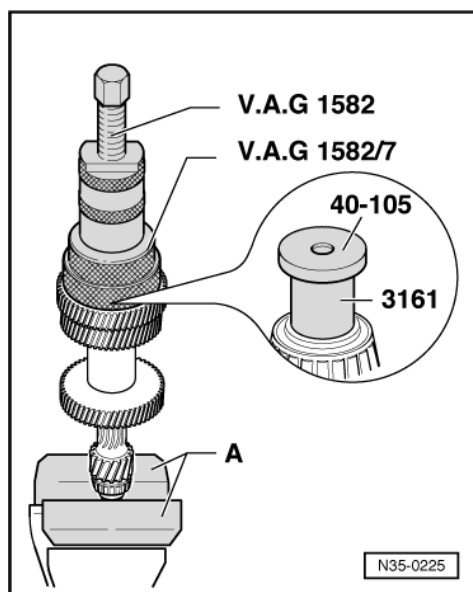
B - Internal puller 46...58 mm, e.g. Kukko 21/7



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-> Fig.2 Pressing taper roller bearing outer race into gearbox housing

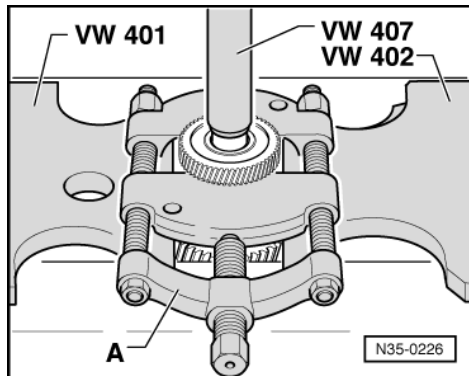
- Support gearbox housing with thrust pad 2050 directly beneath bearing support.



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

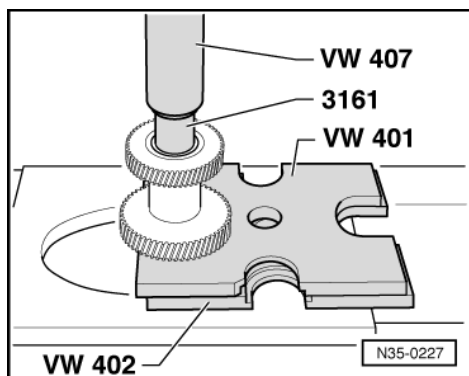
A - Soft jaws/vice

- Before setting up puller, position extension piece 3161 and thrust plate 40-105 on input shaft.



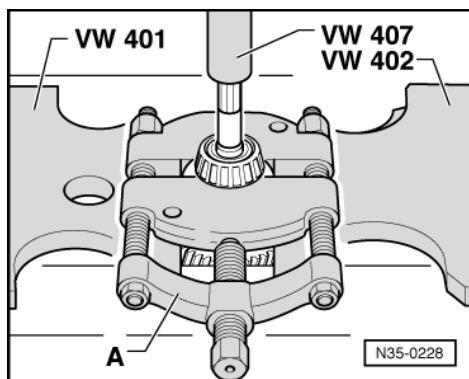
-> Fig.4 Pressing off 5th gear wheel

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



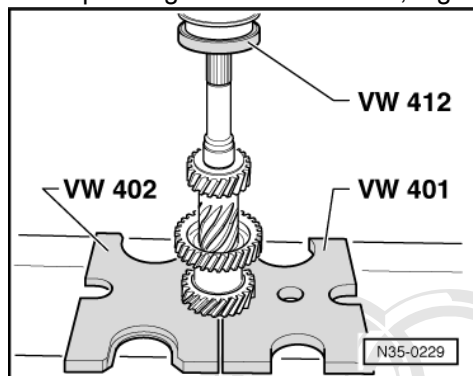
-> Fig.5 Pressing off 3rd/4th and 6th gear wheel

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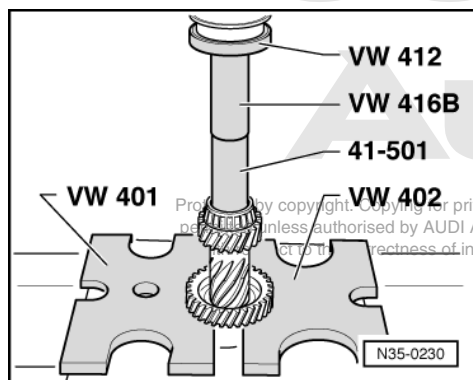
-> Fig.6 Pressing off taper roller bearing inner race

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

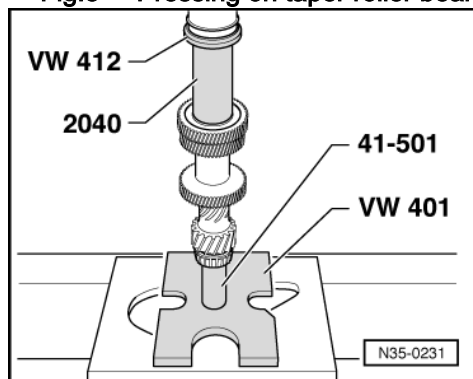


-> Fig.7 Pressing on 3rd/4th and 6th gear wheel

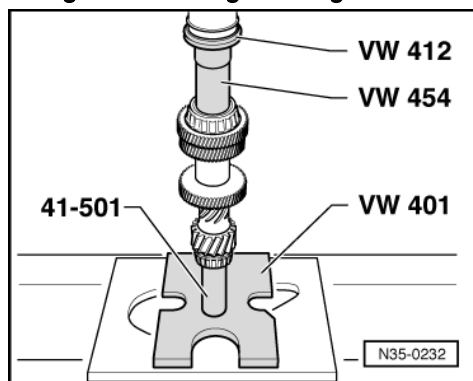
- Heat gear wheel to approx. 100 °C.
- Press on gear wheel quickly so that heat is not immediately transferred to input shaft.



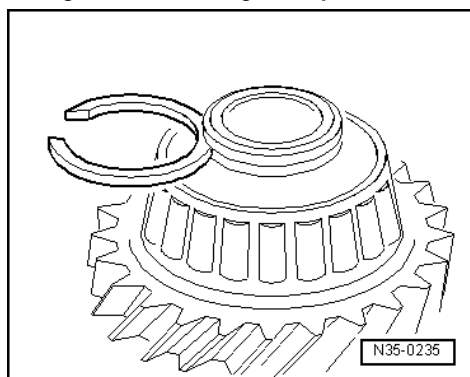
-> Fig.8 Pressing on taper roller bearing inner race



-> Fig.9 Pressing on 5th gear wheel



-> Fig.10 Pressing on taper roller bearing inner race

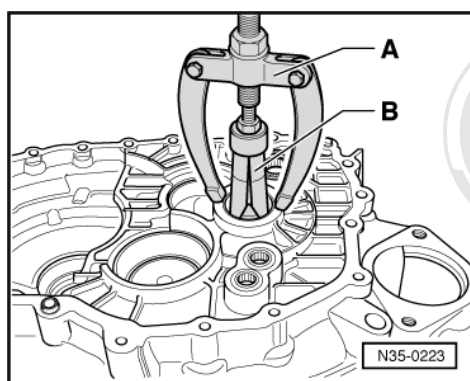


-> Fig.11 Determining circlip

- Establish and fit thickest circlip which can still be inserted.

The following circlips are available:

Thickness (mm)	Part no.
1.79	02M 311 187 G
1.83	02M 311 187 F
1.86	02M 311 187 E
1.89	02M 311 187 D
1.92	02M 311 187 C
1.95	02M 311 187 B
1.98	02M 311 187 A

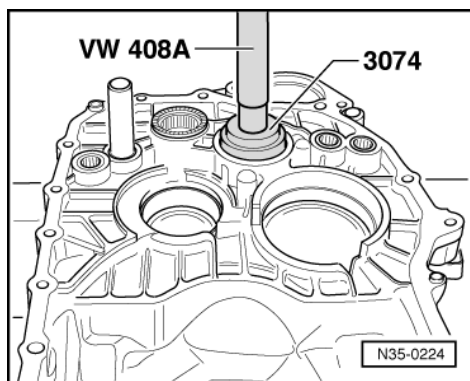


-> Fig.12 Extracting taper roller bearing outer race from clutch housing

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

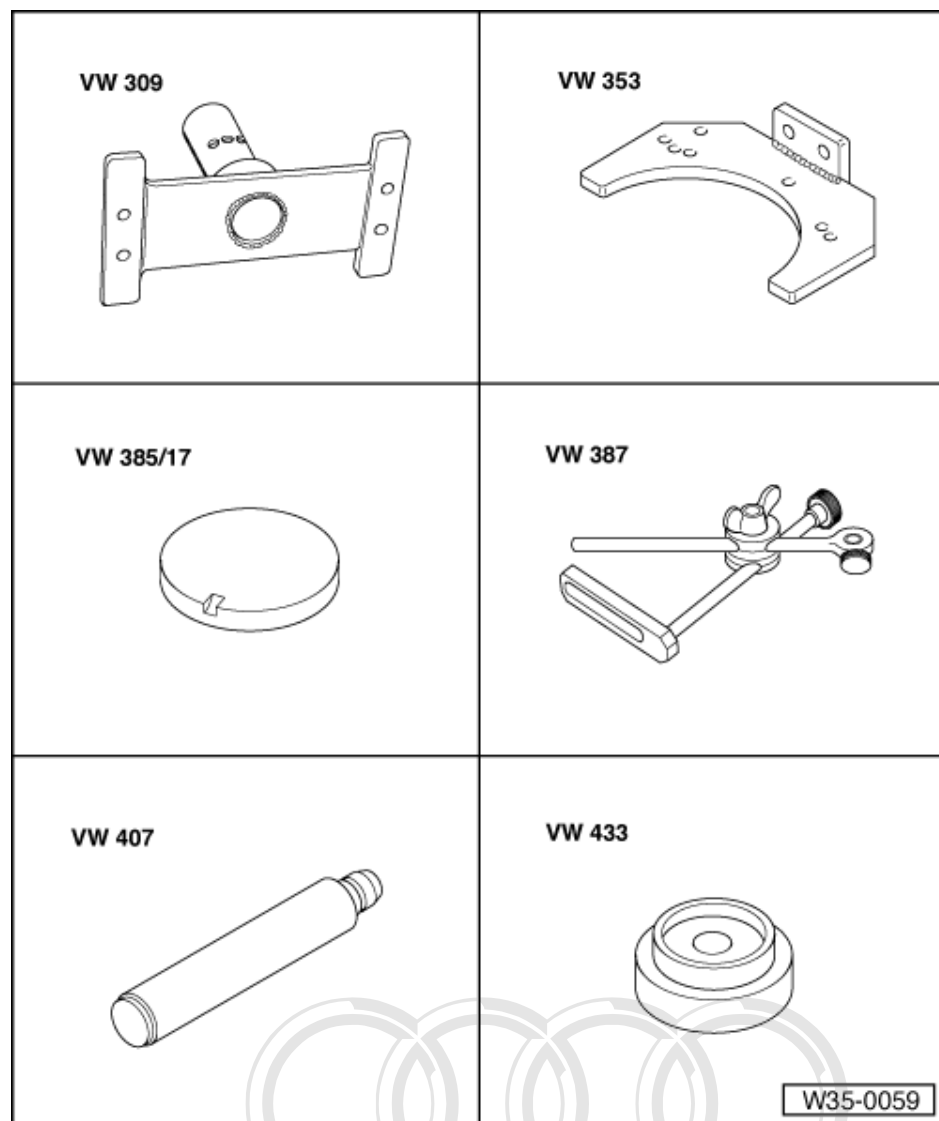
B - Internal puller 46...58 mm, e.g. Kukko 21/7



-> Fig.13 Pressing in taper roller bearing outer race

2 - Adjusting input shaft

2.1 - Adjusting input shaft

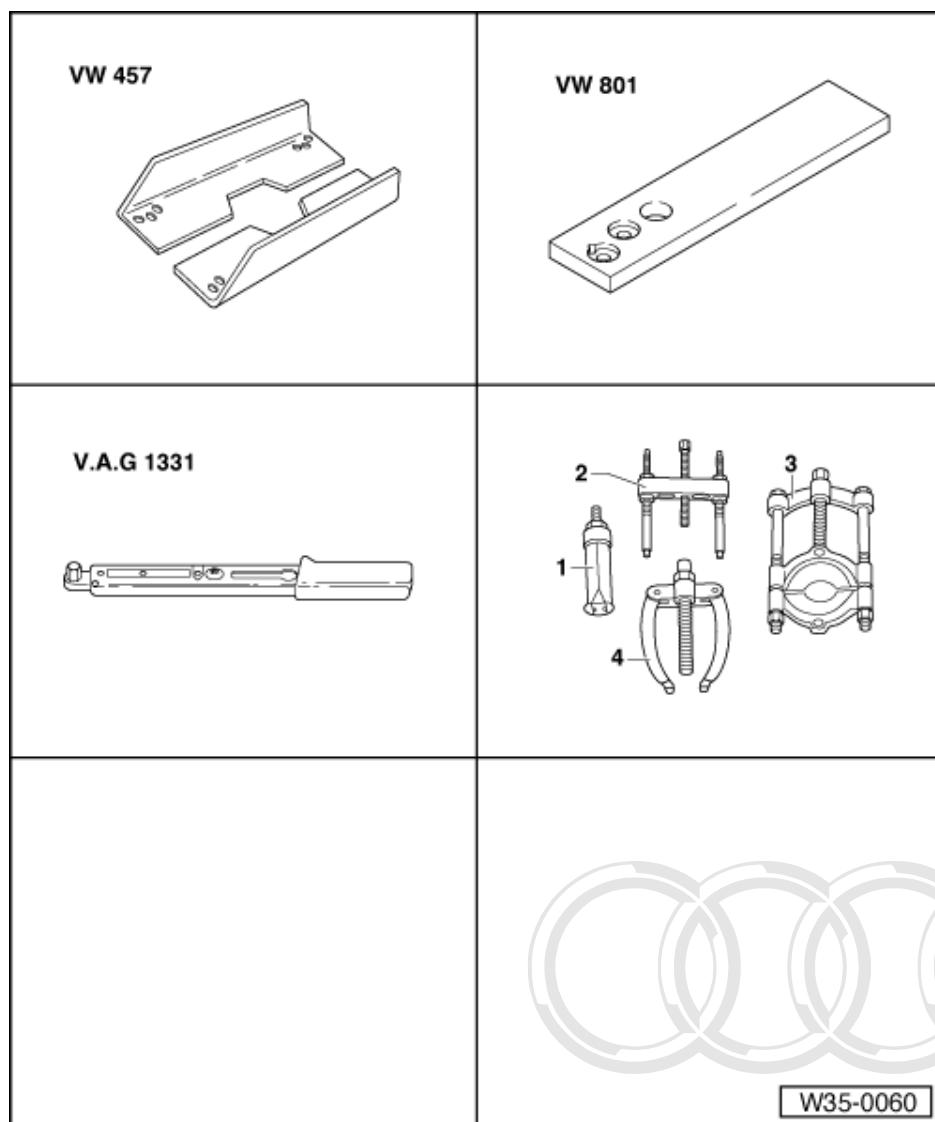


(Determining input shaft shim)

Special tools and workshop equipment required

- ♦ VW 309 Holding plate
- ♦ VW 353 Gearbox support
- ♦ VW 385/17 Gauge block plate
- ♦ VW 387 Universal dial gauge holder
- ♦ VW 407 Press tool
- ♦ VW 433 Thrust pad

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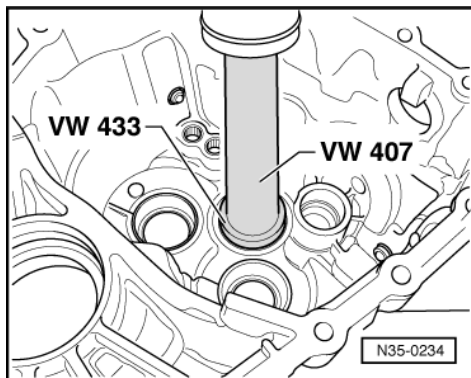
Special tools and workshop equipment required

- ◆ VW 457 Support rails
- ◆ VW 801 Holding plate
- ◆ V.A.G 1331 Torque wrench
- ◆ 1 - Kukko 21/7 Internal puller
- ◆ 4 - Kukko 22/1 Counter-support

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Input shaft has to be re-adjusted on replacing the following components:

- ◆ Gearbox housing
- ◆ Clutch housing



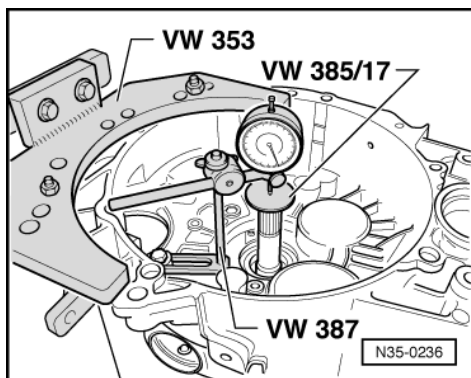
- ♦ Input shaft

or

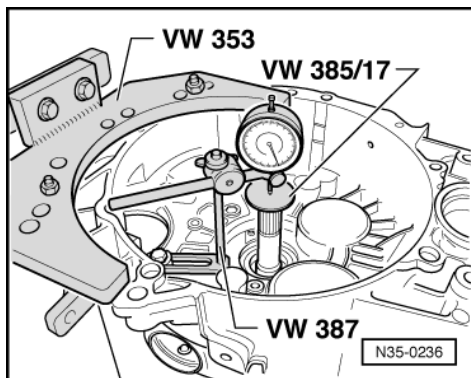
- ♦ Taper roller bearings

Adjustment table => Page **218**

- Shims of determined thickness fitted for both output shafts
- -> Press home taper roller bearing outer race without shim in gearbox housing.



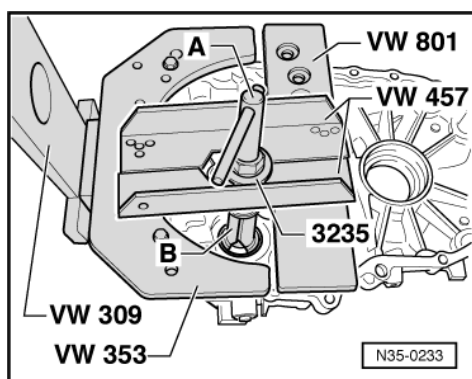
- Position the two output shafts and the input shaft in the clutch housing and mount gearbox housing. Tighten hexagon bolts to 25 Nm and give a further 45° turn.
- -> Insert measuring device and dial gauge in clutch housing.
- Before taking measurements, rotate input shaft to allow taper roller bearings to settle. Set dial gauge to "0" with 1 mm pre-load.



Note:

This procedure is to be repeated for each subsequent measurement, as otherwise dial gauge does not return to initial position.

- -> Pull input shaft in direction of dial gauge.
- Read off and note down clearance indicated on dial gauge (example 1.63).
- Determine thickness of shim from table=>Page 141 (example 1.60).



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

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

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

- Press taper roller bearing outer race together with 1.60 shim into gearbox housing.
- Mount gearbox housing, tighten hexagon bolt to 25 Nm and give a further 45° turn.

2.2 - Shim table

Bearing clearance	Shim	
Measured value (mm)	Thickness (mm)	Part no.
1.480 ... 1.524	1.45	084 409 383 AG
1.525 ... 1.574	1.50	084 409 383 AH
1.575 ... 1.624	1.55	084 409 383 AJ
1.625 ... 1.674	1.60	084 409 383 AK
1.675 ... 1.724	1.65	084 409 383 AL
1.725 ... 1.774	1.70	084 409 383 AM
1.775 ... 1.824	1.75	084 409 383 AN
1.825 ... 1.874	1.80	084 409 383 AP
1.875 ... 1.924	1.85	084 409 383 AQ
1.925 ... 1.974	1.90	084 409 383 AR
1.975 ... 2.024	1.95	084 409 383 AS
2.025 ... 2.074	2.00	084 409 383 AT

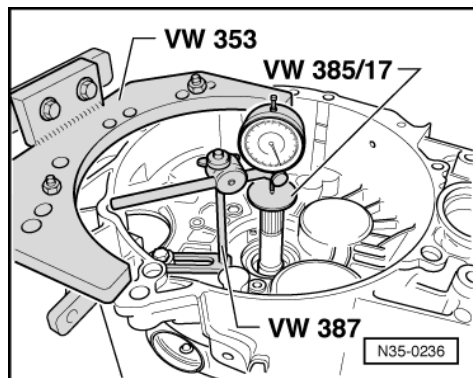
Bearing clearance	Shim	
Measured value (mm)	Thickness (mm)	Part no.
2.075 ... 2.124	2.05	084 409 383 BA
2.125 ... 2.174	2.10	084 409 383 BB
2.175 ... 2.224	2.15	084 409 383 BC

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Bearing clearance	Shim	
2.225 ... 2.274	2.20	084 409 383 BD
2.275 ... 2.324	2.25	084 409 383 BE
2.325 ... 2.374	2.30	084 409 383 BF

2.3 - Check measurement



- -> Fit measuring device and dial gauge.
- Rotate input shaft to allow taper roller bearings to settle.
- Pull input shaft in direction of dial gauge.
- Bearing clearance should be between min. 0.015 and max. 0.100 mm.

Note:

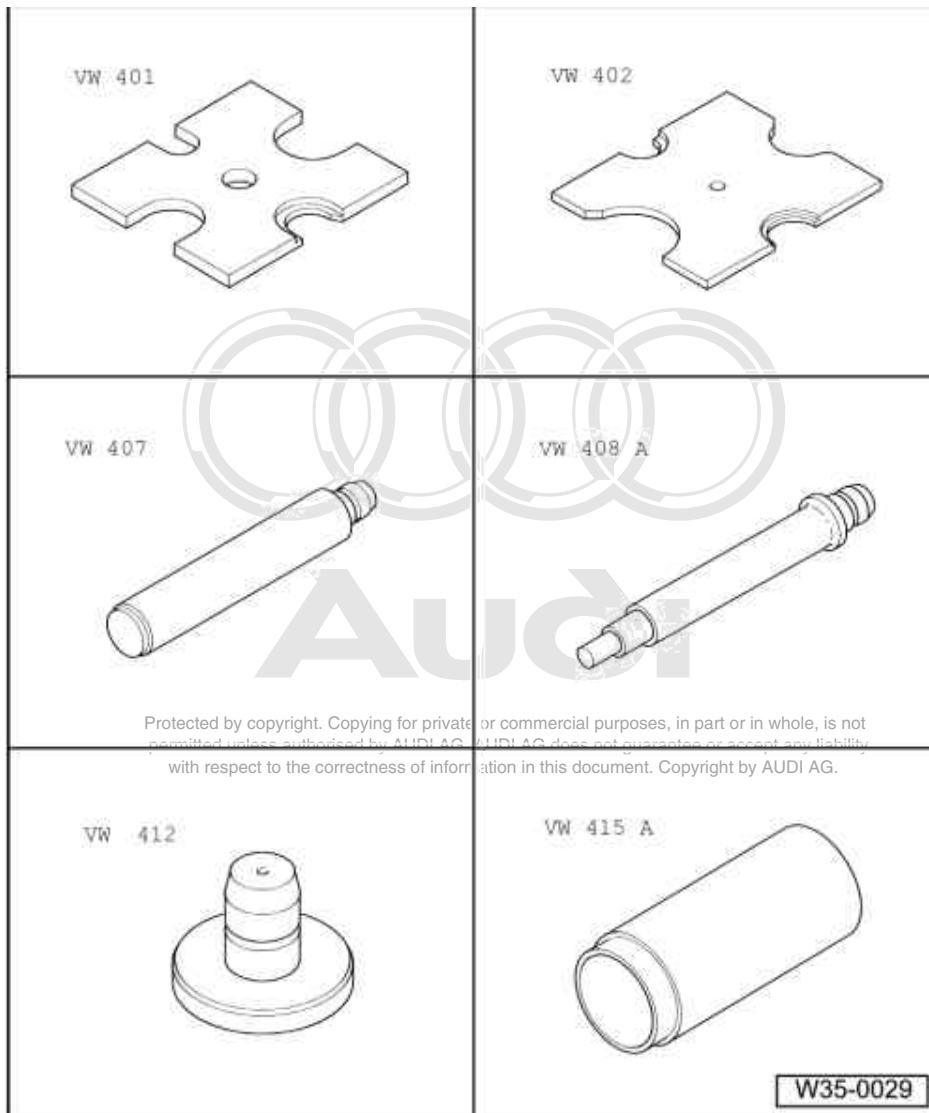
If there is no measurable bearing clearance, but input shaft sideways play is perceptible and input shaft turns freely, then adjustment is OK.



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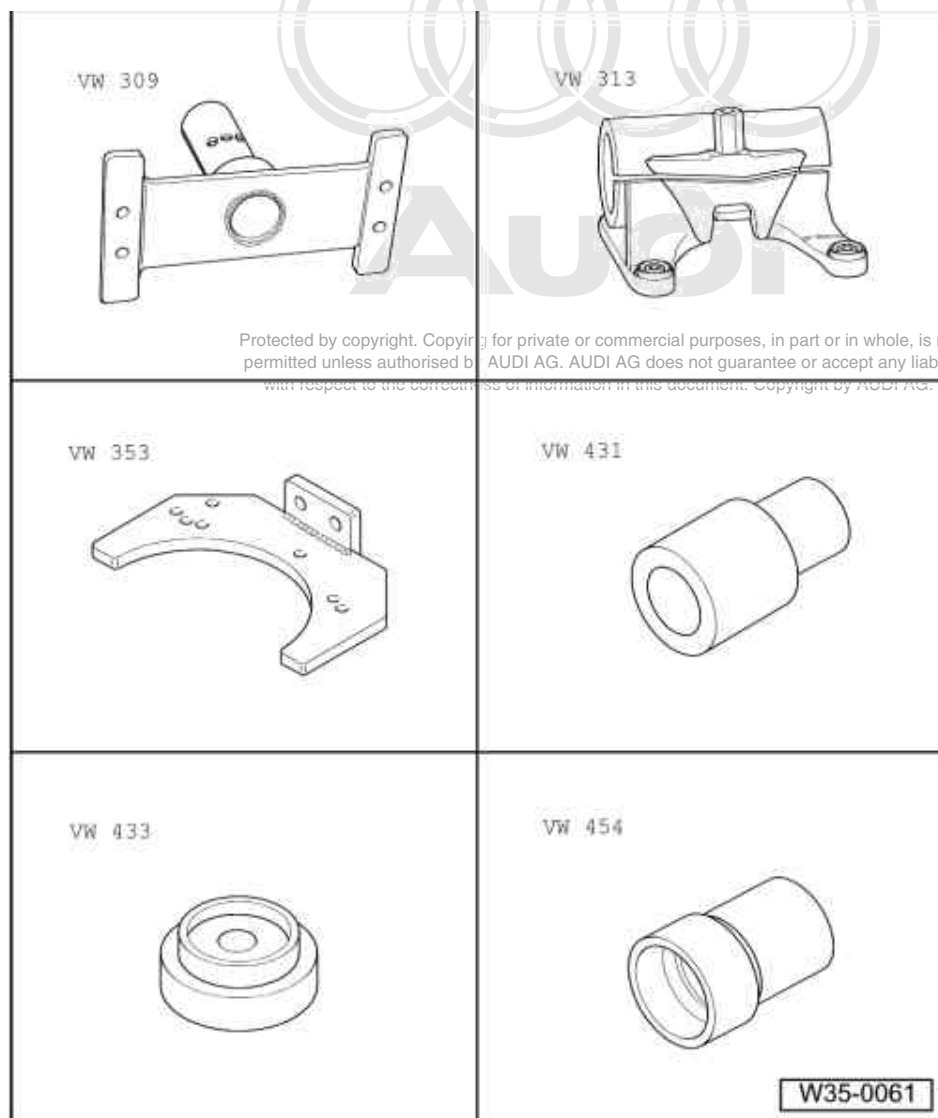
3 - Dismantling and assembling 1st - 4th gear output shaft

3.1 - Dismantling and assembling 1st - 4th gear output shaft



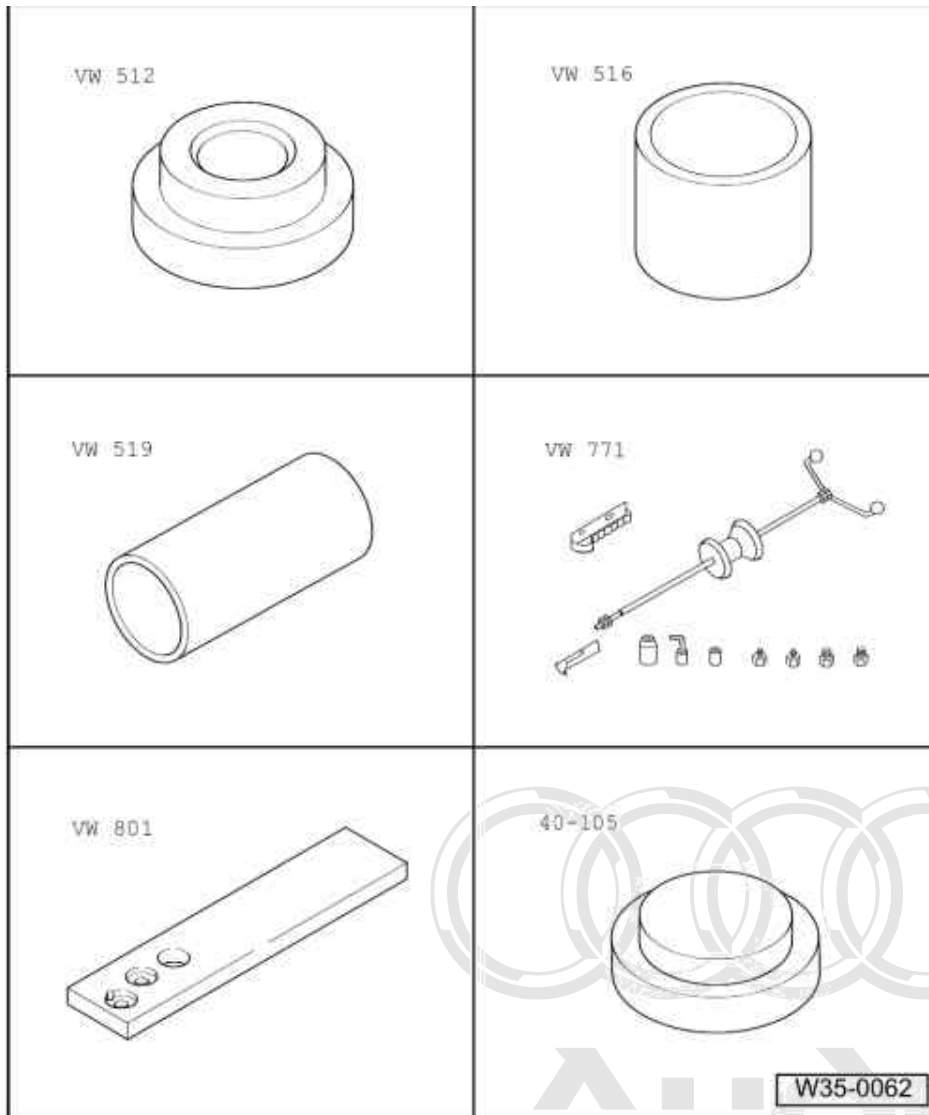
Special tools and workshop equipment required

- ◆ VW 401 Pressure plate
- ◆ VW 402 Pressure plate
- ◆ VW 407 Press tool
- ◆ VW 408 A Press tool
- ◆ VW 412 Press tool
- ◆ VW 415 A Tubular section



Special tools and workshop equipment required

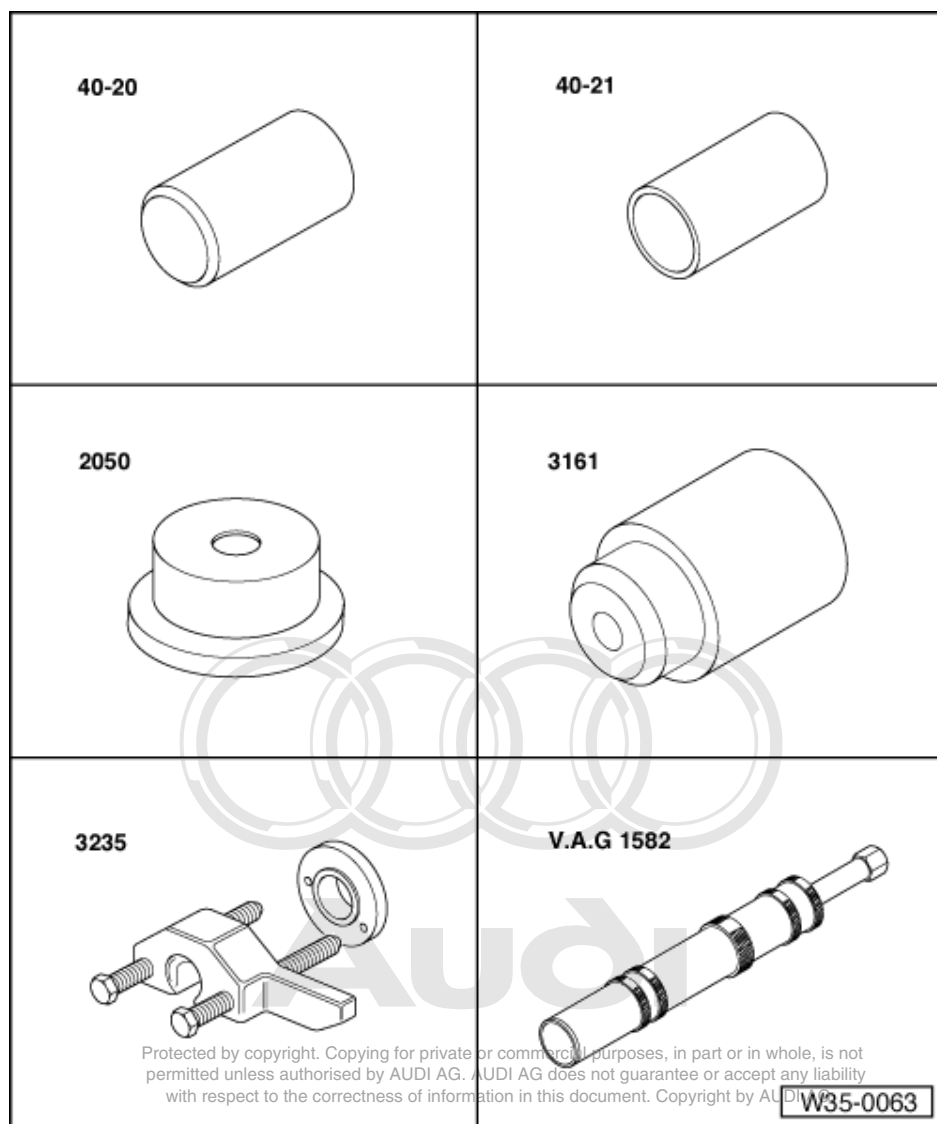
- ♦ VW 309 Holding plate
- ♦ VW 313 Support clamp
- ♦ VW 353 Gearbox support
- ♦ VW 431 Thrust pad
- ♦ VW 433 Thrust pad
- ♦ VW 454 Thrust pad



Special tools and workshop equipment required

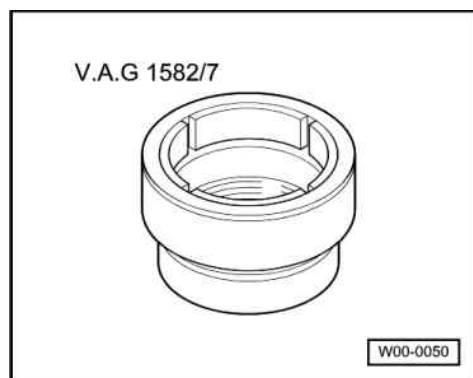
- ◆ VW 512 Thrust piece
- ◆ VW 516 Tubular section
- ◆ VW 519 Tubular section
- ◆ VW 771 Multi-purpose tool
- ◆ VW 801 Holding plate
- ◆ 40-105 Thrust plate

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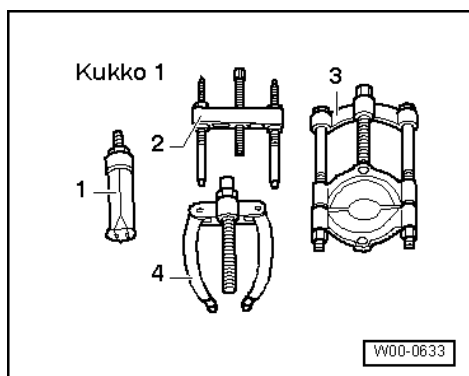
Special tools and workshop equipment required

- ♦ 40-20 Fitting sleeve
- ♦ 40-21 Fitting sleeve
- ♦ 2050 Thrust pad
- ♦ 3161 Extension piece
- ♦ 3235 Pressing-in tool
- ♦ V.A.G 1582 Taper roller bearing puller

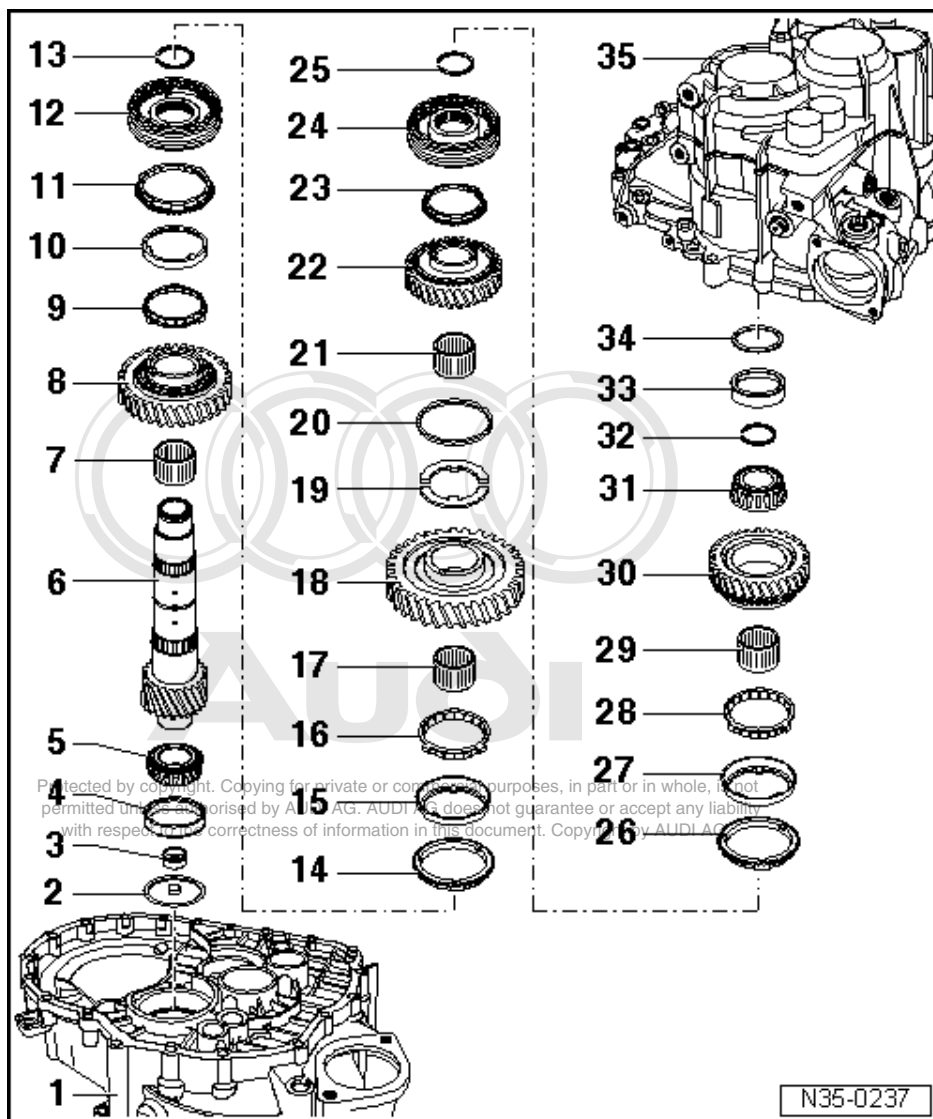


Special tools and workshop equipment required

- ♦ V.A.G 1582/7 Gripper



- ♦ 1 - Kukko 21/7 Internal puller
- ♦ 1 - Kukko 21/8 Internal puller
- ♦ 2 - Kukko 18/2 Puller
- ♦ 3 - Kukko 17/2 Separating tool
- ♦ 4 - Kukko 22/2 Counter-support



Notes:

- ♦ Heed technical data on fitting new gear wheels or a new output shaft =>Page 2 .
- ♦ Output shaft has to be adjusted on replacing output shaft or taper roller bearings => Page 164 .

1 Clutch housing

2 Oil deflector ring

3 Dished washer

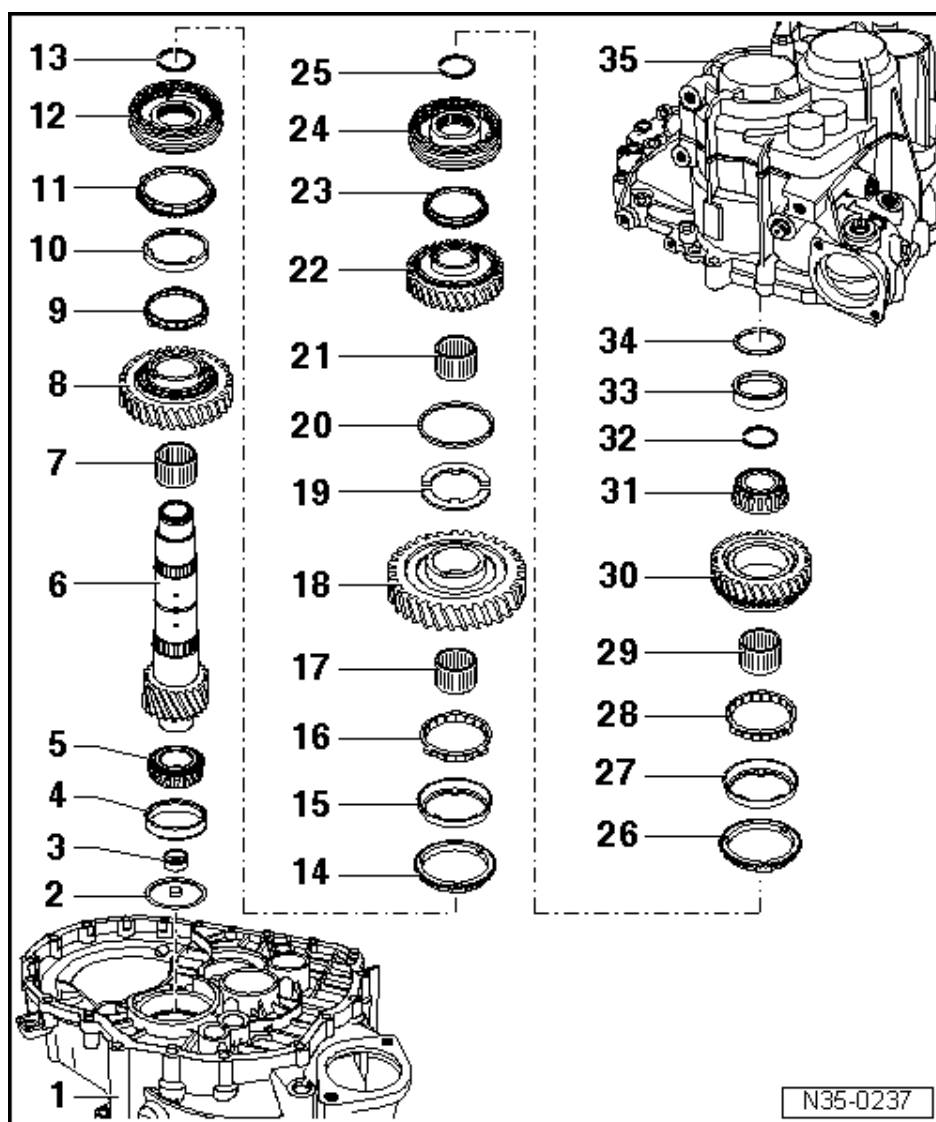
- ♦ Extracting => Fig. 1
- ♦ Pressing in => Fig. 2

4 Taper roller bearing outer race

- ♦ Extracting => Fig. 3
- ♦ Pressing in => Fig. 4

5 Taper roller bearing inner race

- ♦ Pressing off => Fig. 8
- ♦ Pressing on => Fig. 9



6 Output shaft

- ♦ For 1st to 4th gear
- ♦ Adjusting => Page 164

7 Needle bearing

- ♦ For 2nd gear

8 2nd gear sliding gear

9 Synchro-ring

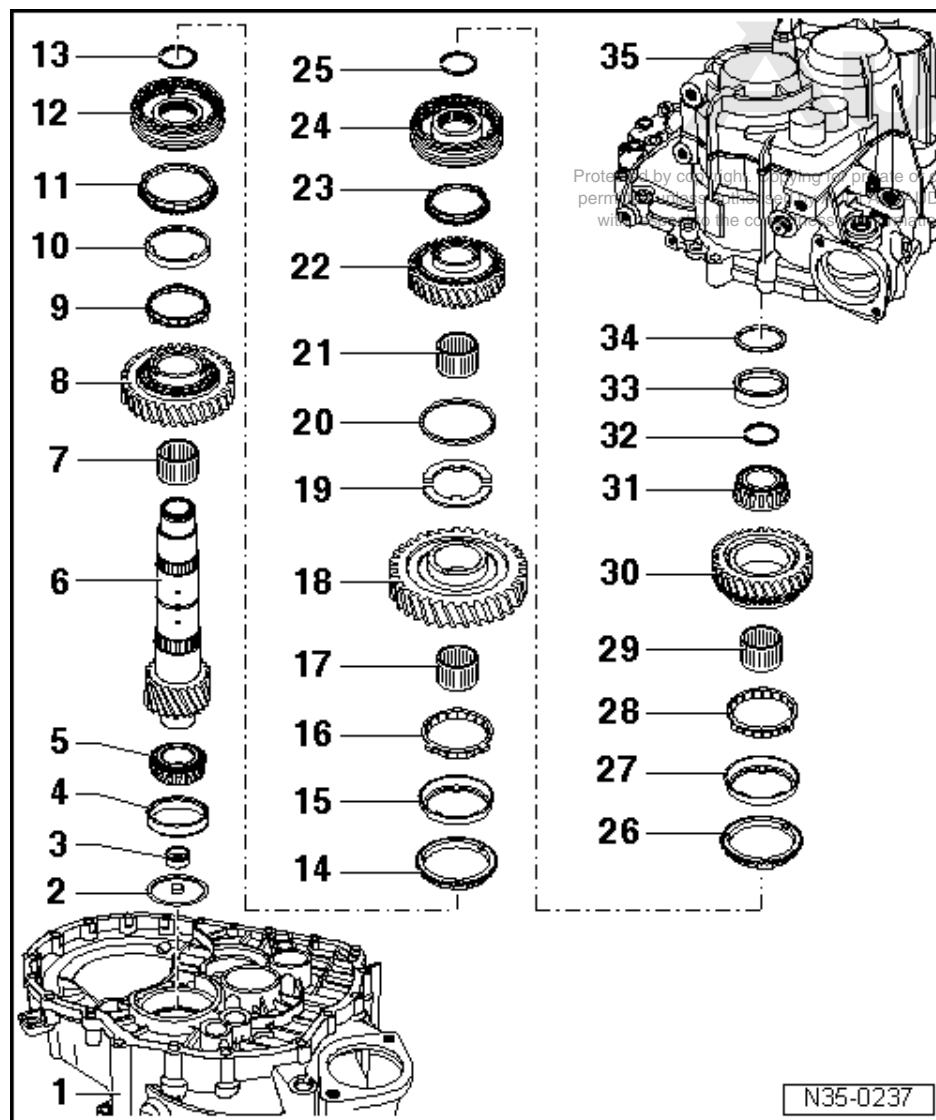
- ♦ (inner ring for 2nd gear)
- ♦ Checking for wear => Fig. 10
- ♦ Check lugs for scoring
- ♦ Installation position=> Fig. 12

10 2nd gear outer ring

- ♦ Position on synchro-ring (item 9)
- ♦ Replace if scored
- ♦ Installation position => Fig. 12

11 2nd gear synchro-ring

- ♦ Checking for wear => Fig. 11
- ♦ Installation position => Fig. 12

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

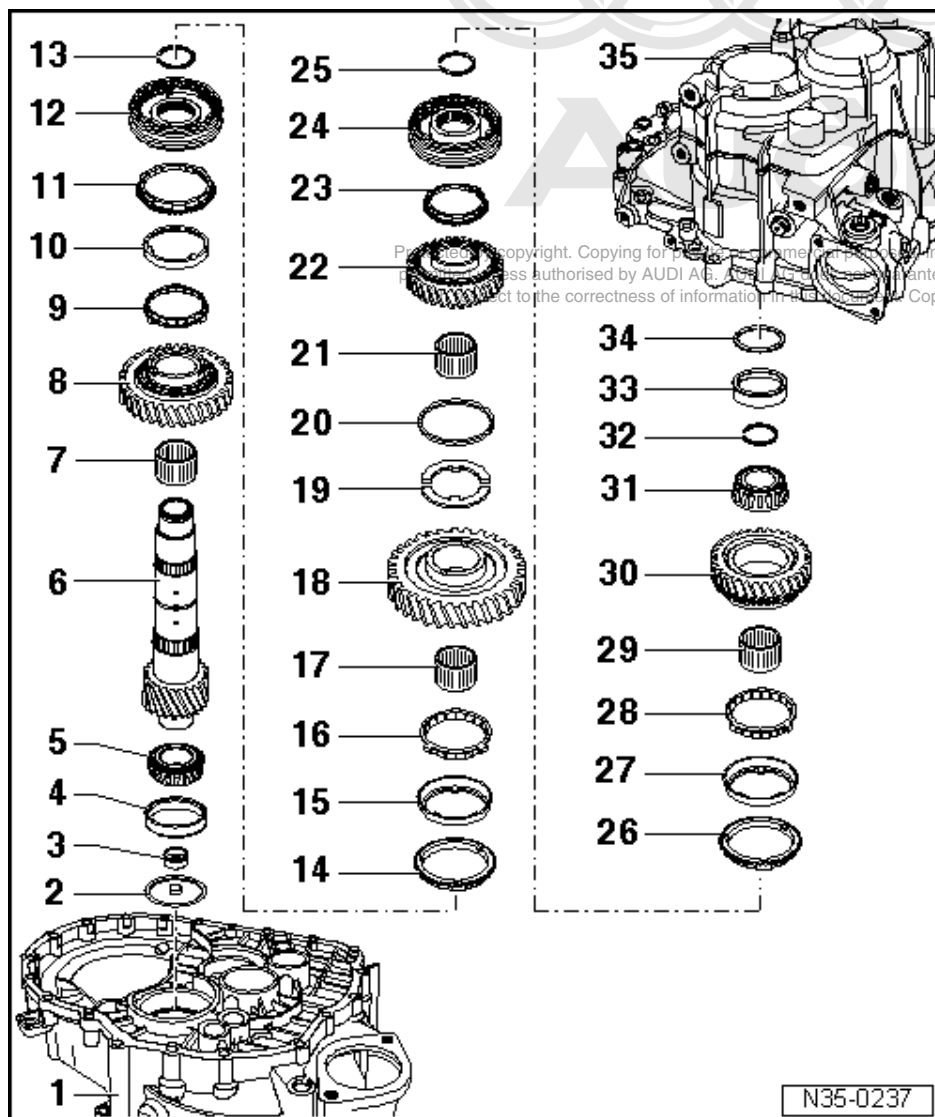
- ♦ Pressing off over bearing support after detaching circlip (item 13)=>Fig. 7
- ♦ Dismantling => Fig. 13
- ♦ Assembling locking collar/synchro-hub=>Fig. 13 and Fig. 14
- ♦ Installation position => Fig. 15
- ♦ Pressing on => Fig. 16

13 Circlip**14 1st gear synchro-ring**

- ♦ Checking for wear => Fig. 11
- ♦ Insert such that recesses engage in locking pieces of locking collar (item 12)

**15 1st gear outer ring**

- ◆ Insert in synchro-ring (item **14**), installation position=>Fig. **17**
- ◆ Replace if scored

**16 Synchro-ring**

- ◆ (1st gear inner ring)
- ◆ Checking for wear => Fig. **10**
- ◆ Check lugs for scoring
- ◆ Installation position => Fig. **18**

17 Needle bearing

- ◆ For 1st gear

18 1st gear sliding gear

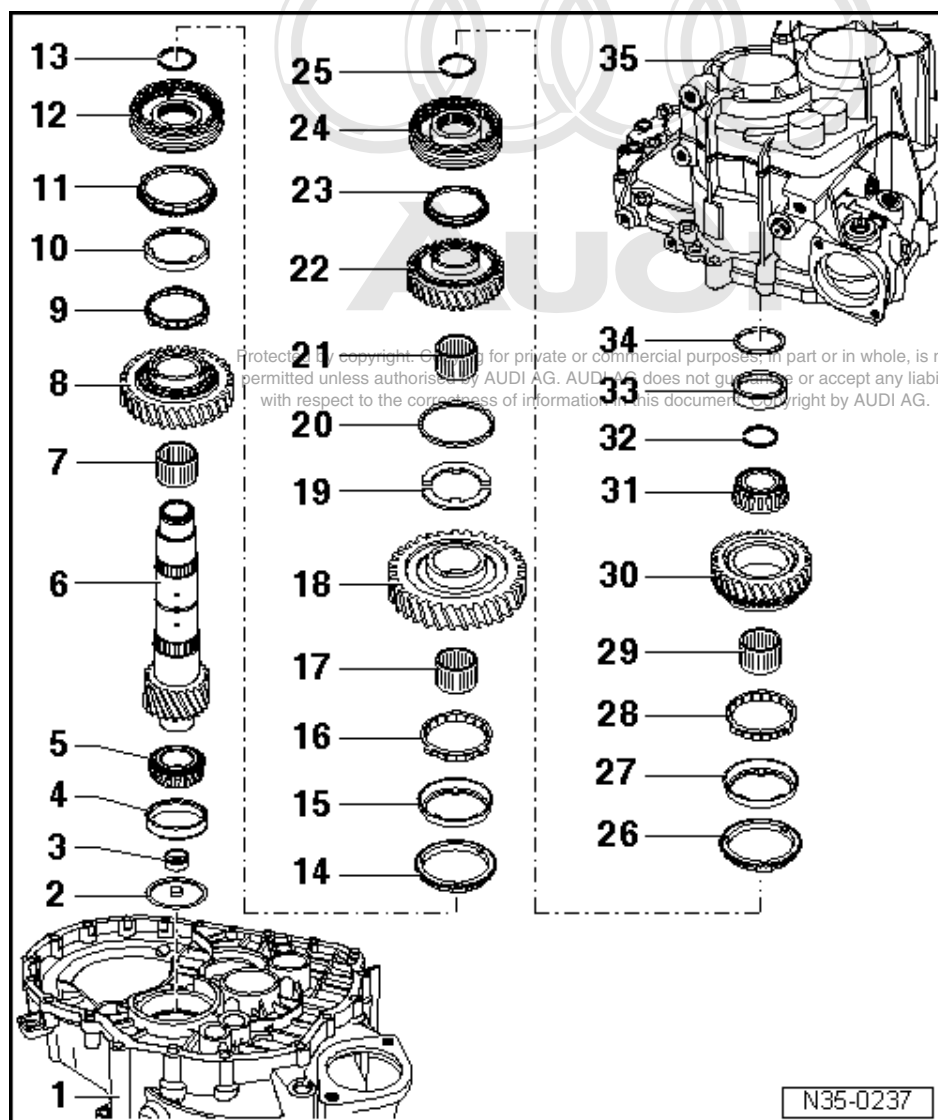
- ◆ Installation position => Fig. **19**

19 Thrust washer

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

20 Washer

- ◆ Holds thrust washers -item **19** - in position on output shaft

**21 Needle bearing**

- ♦ For 4th gear

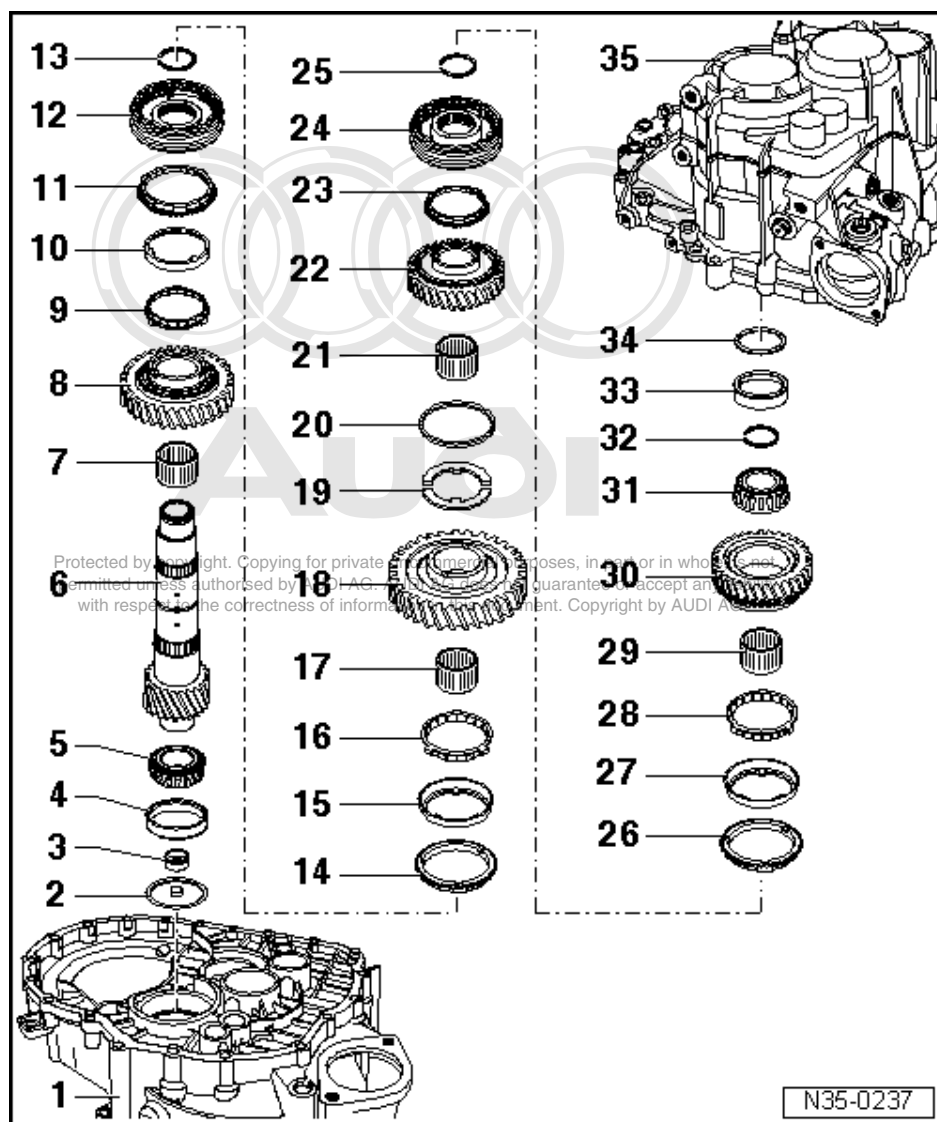
22 4th gear sliding gear**23 4th gear synchro-ring**

- ♦ Checking for wear => Fig. 22

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

- ♦ Pulling off over 4th gear sliding gear after detaching circlip (item 25) => Fig. 6
- ♦ Dismantling => Fig. 13
- ♦ Installation position of locking collar/synchro-hub => Fig. 20
- ♦ Assembling locking collar/synchro-hub=>Fig. 13 and Fig. 14
- ♦ Pressing on => Fig. 21

25 Circlip



26 3rd gear synchro-ring

- ◆ Checking for wear => Fig. 11

27 3rd gear outer ring

- ◆ Insert in synchro-ring (item 26), installation position=>Fig. 17
- ◆ Replace if scored

28 Synchro-ring

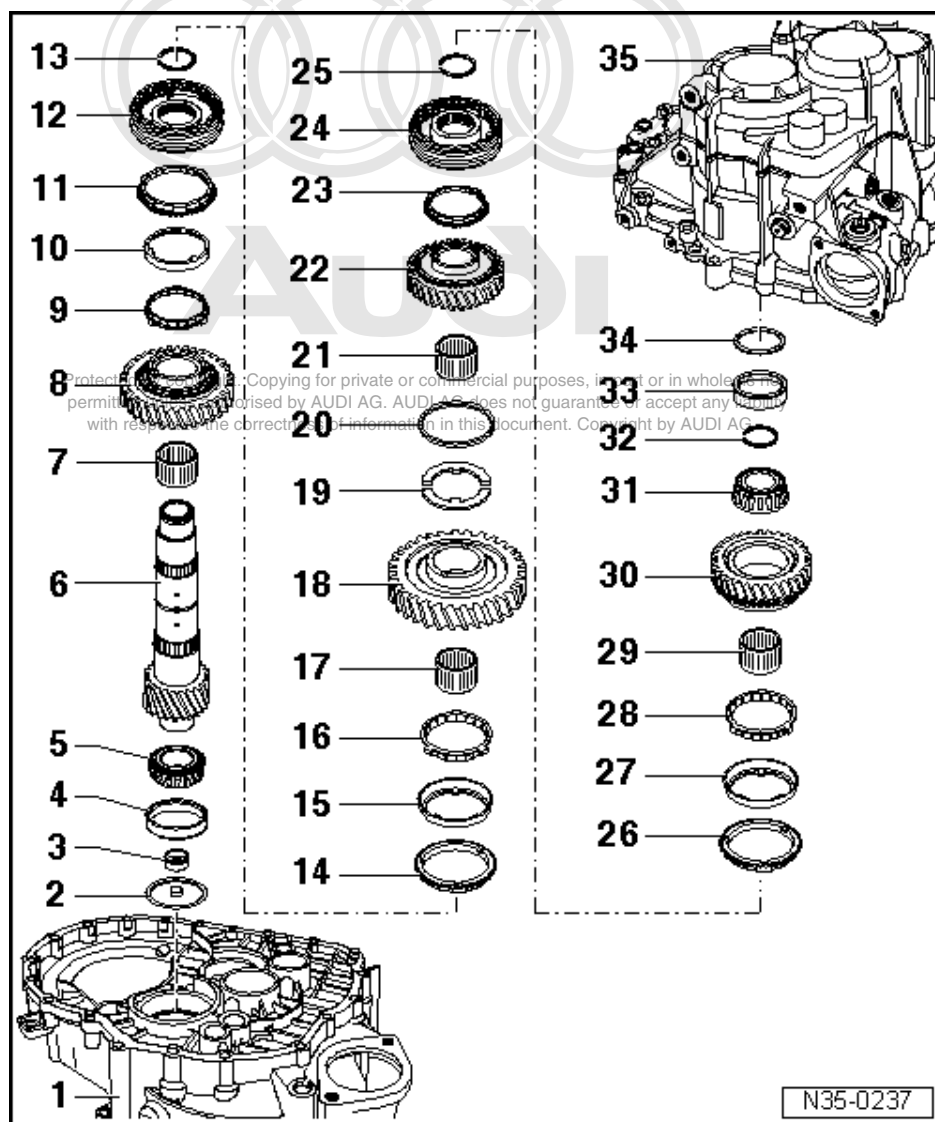
- ◆ (3rd gear inner ring)
- ◆ Checking for wear => Fig. 10
- ◆ Check lugs for scoring
- ◆ Installation position => Fig. 18

29 Needle bearing

- ◆ For 3rd gear

30 3rd gear sliding gear

- ◆ Installation position => Fig. 19

**31 Taper roller bearing inner race**

- ♦ Pulling off => Fig. 5
- ♦ Pressing on => Fig. 23

32 Circlip

- ♦ Redetermining on replacing taper roller bearing -item 31 - and output shaft -item 6 - => Fig. 24

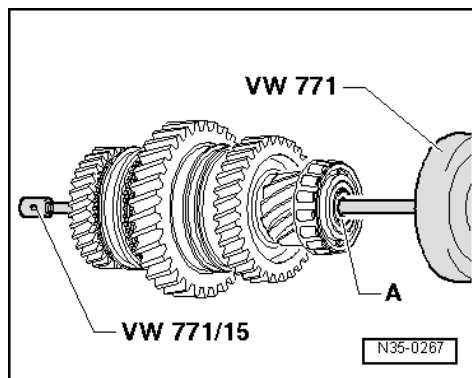
33 Taper roller bearing outer race

- ♦ Extracting => Fig. 25
- ♦ Pressing in => Fig. 26

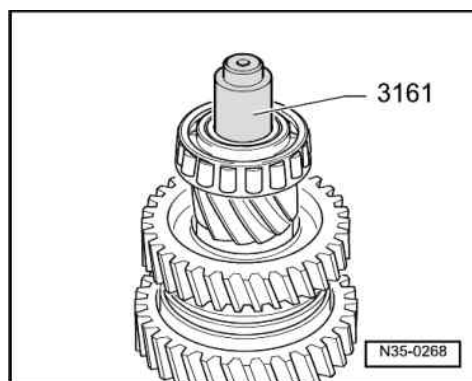
34 Shim

- ♦ Determining thickness => Page 164

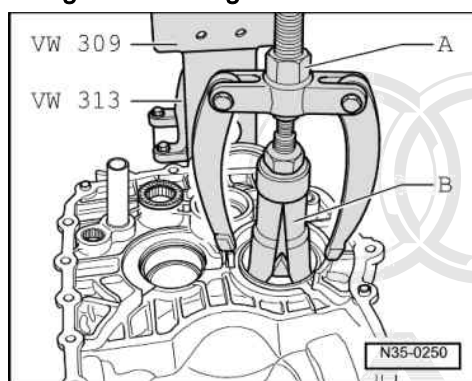
35 Gearbox housing



-> Fig.1 Pulling dished washer -A- out of output shaft



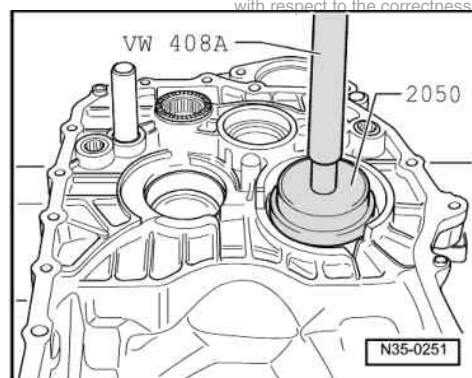
-> Fig.2 Pressing home dished washer in output shaft



-> Fig.3 Extracting taper roller bearing outer race

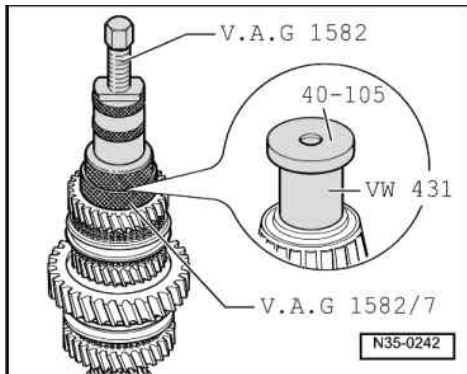
A - Counter-support, e.g. Kukko 22/2

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



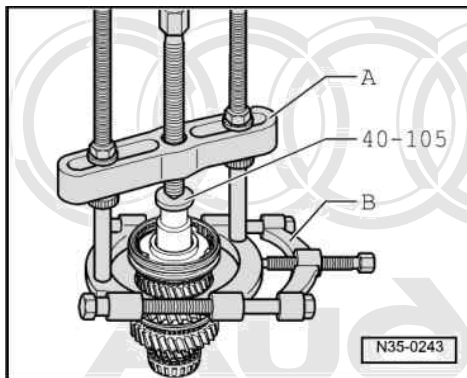
-> Fig.4 Pressing taper roller bearing outer race into clutch housing

- Support clutch housing with fitting sleeve 40-20 directly beneath bearing support.



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

- Before setting up puller, insert thrust pad VW 431 in output shaft and position thrust plate 40-105 on it.



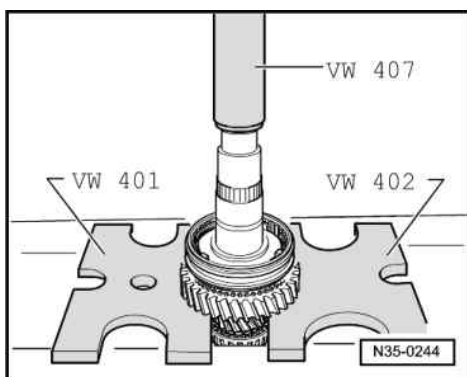
-> Fig.6 Pulling off synchro-hub/locking collar for 3rd and 4th gear over 4th gear sliding gear

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- Detach circlip beforehand.

A - Puller, e.g. Kukko 18/2

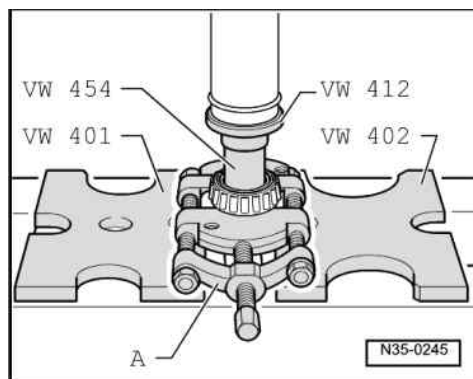
B - Separating tool 22 ... 115 mm, e.g. Kukko 17/2





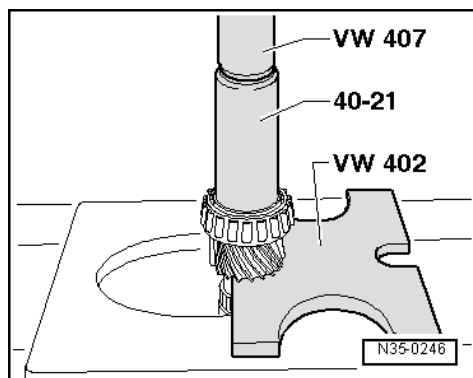
-> Fig.7 Pressing off locking collar and synchro-hub for 1st and 2nd gear

After removing circlip, jointly press off 2nd gear sliding gear and locking collar/synchro-hub.



-> Fig.8 Pressing off taper roller bearing inner race

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



-> Fig.9 Pressing on taper roller bearing inner race



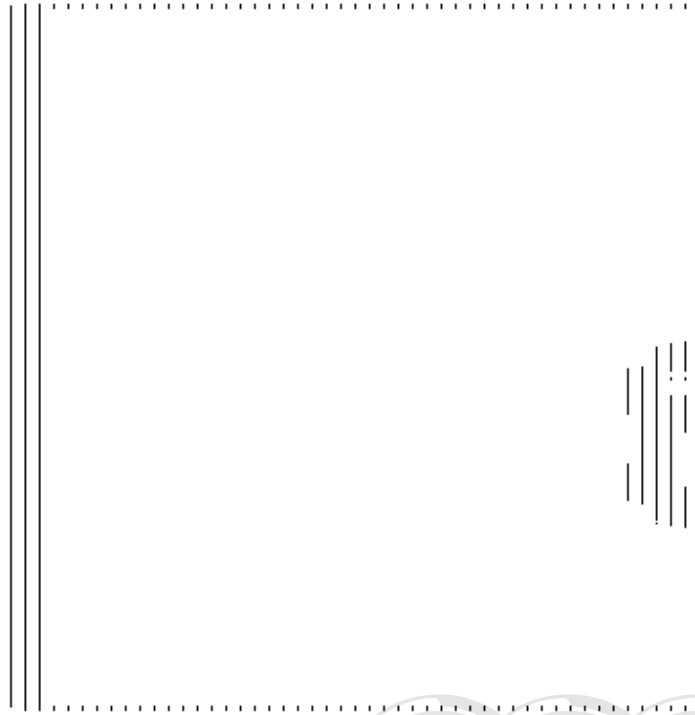
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-> Fig.10 Checking 1st, 2nd and 3rd gear inner ring for wear

- Press inner ring onto taper of sliding gear and use feeler gauge to measure gap "a".

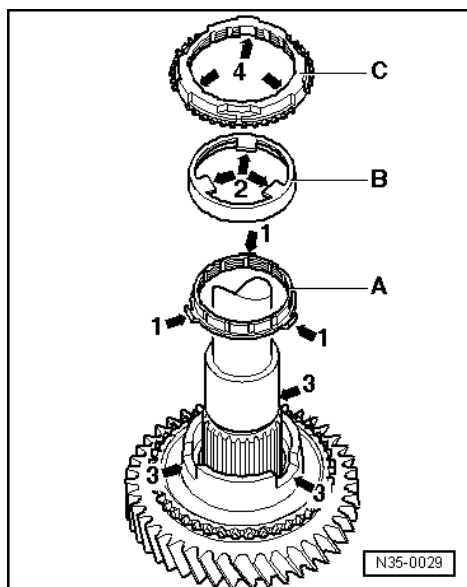
Gap "a"	New dimension	Wear limit
1st, 2nd and 3rd gear	0.75 ... 1.25 mm	0.3 mm



-> Fig.11 Checking 1st, 2nd and 3rd gear synchro-rings for wear

- Press synchro-ring, outer ring and inner ring onto taper of sliding gear and use feeler gauge to measure gap "a".

Gap "a"	New dimension	Wear limit
1st, 2nd and 3rd gear	1.2 ... 1.8 mm	0.5 mm



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-> Fig.12 Installation position of outer ring, inner ring and synchro-ring for 2nd gear

- Position inner ring -A- on 2nd gear sliding gear.

Angled webs (arrows 1) face outer ring -B-.

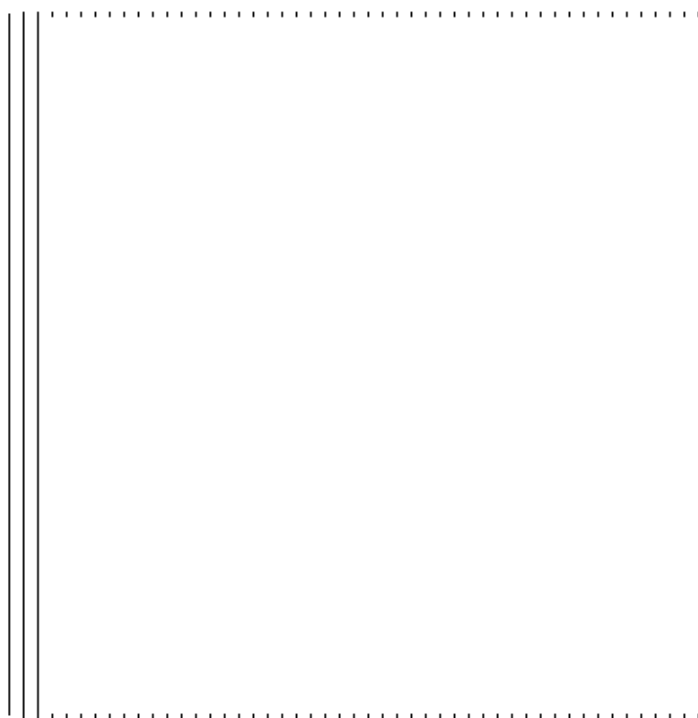
- Fit outer ring -B-.

Webs (arrows 2) engage in sliding gear recesses (arrows 3).

- Fit synchro-ring -C-.

Recesses (arrows 4) engage in webs (arrows 1) of inner ring -A-.

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-> Fig.13 Dismantling and assembling locking collar and synchro-hub for 1st and 2nd as well as 3rd and 4th gears

- 1 - Spring
- 2 - Locking piece
- 3 - Locking collar
- 4 - Synchro-hub

- Slip locking collar over synchro-hub.

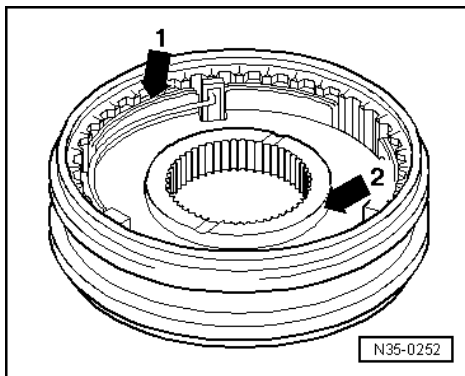
Recesses for locking pieces at synchro-hub and locking collar must be aligned.



-> Fig.14 Assembling locking collar/synchro-hub for 1st and 2nd as well as 3rd and 4th gears

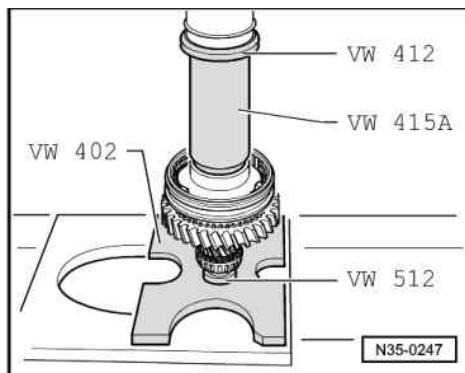
Locking collar already slipped over synchro-hub

- Insert locking pieces and fit springs with 120° offset. Angled end of spring must engage in hollow locking piece.



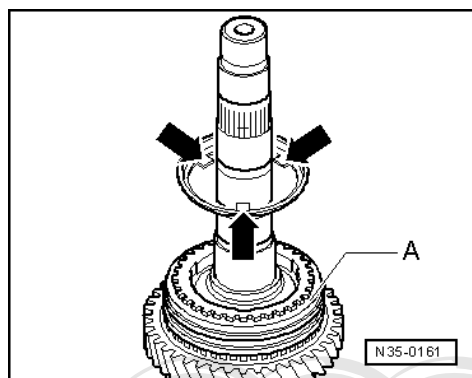
-> Fig.15 Installation position of locking collar/synchro-hub for 1st and 2nd gear

Identification groove -arrow 1- and narrow collar -arrow 2- of synchro-hub face 1st gear



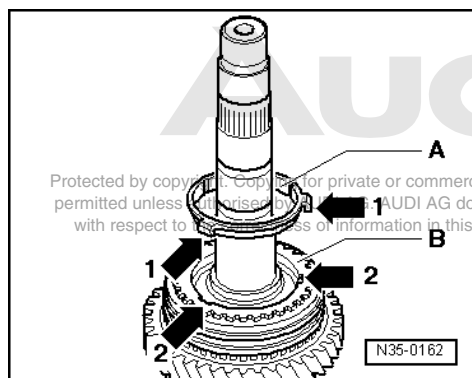
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-> Fig.16 Pressing on locking collar/synchro-hub for 1st and 2nd gear



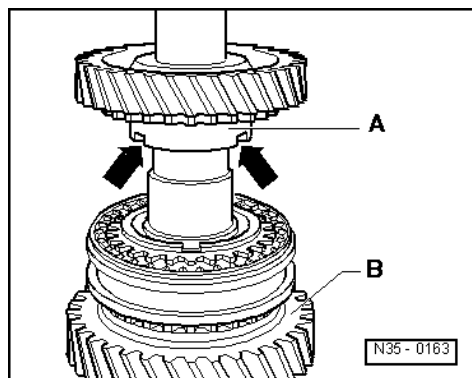
-> Fig.17 Installation position of 1st/3rd gear outer ring

Lugs (arrows) face synchro-hub/locking collar -A-.



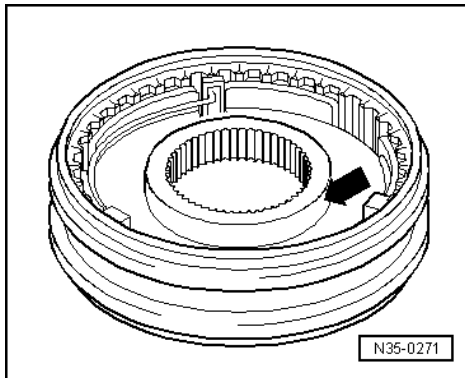
-> Fig.18 Installation position of synchro-ring -A- (1st/3rd gear inner ring)

Lugs (arrows 1) engage in recesses (arrows 2) of synchro-ring -B-.



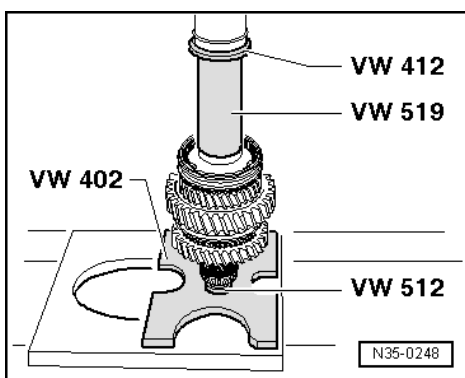
-> Fig.19 Installation position of 1st and 3rd gear sliding gear

Taller collar -A- faces 2nd/4th gear -B-. Recesses in collar (arrows) engage in lugs of outer ring (arrow => Fig. 17)



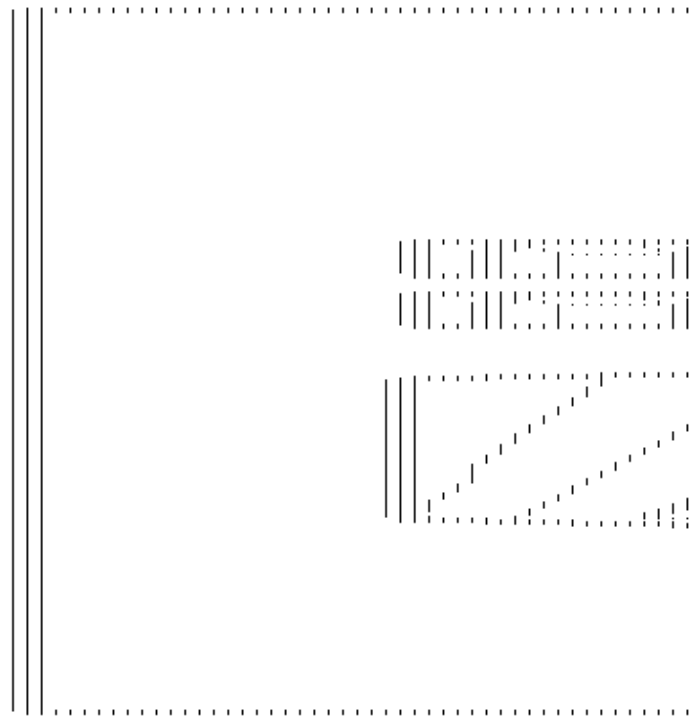
-> Fig.20 Installation position of locking sleeve/synchro-hub for 3rd and 4th gear

Wider collar of synchro-hub -arrow- faces 3rd gear.



-> Fig.21 Pressing on synchro-hub with locking collar for 3rd and 4th gear

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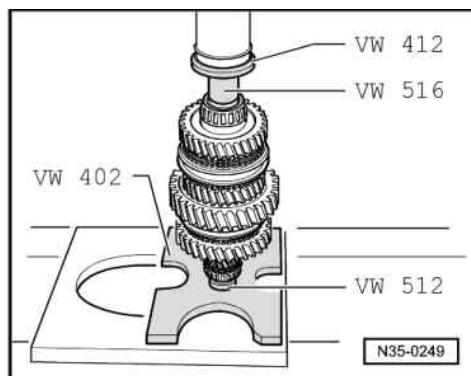




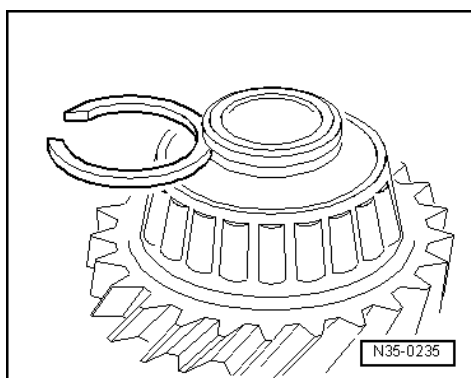
-> Fig.22 Checking 4th gear synchro-ring for wear

- Press synchro-ring onto taper of sliding gear and use feeler gauge to measure gap "a".

Gap "a"	New dimension	Wear limit
4th gear	1.0 ... 1.7 mm	0.5 mm



-> Fig.23 Pressing on taper roller bearing inner race

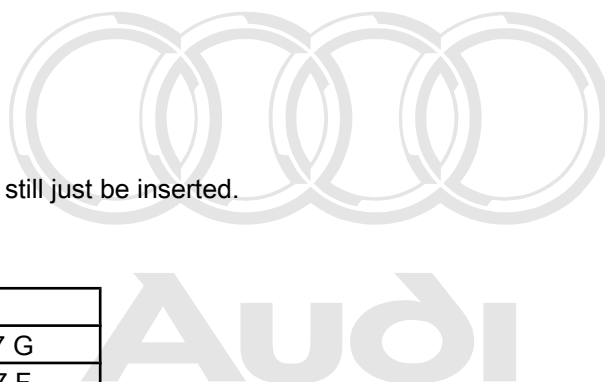


-> Fig.24 Determining circlip

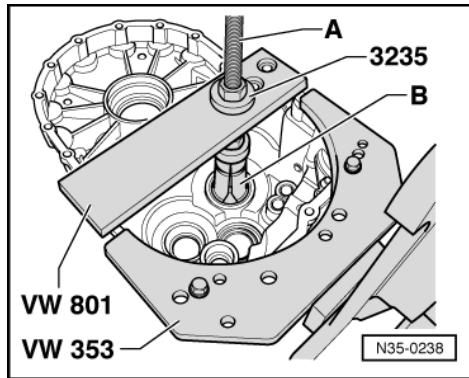
- Determine and fit thickest circlip which can still just be inserted.

The following circlips are available:

Thickness (mm)	Part no.
1.79	02M 311 187 G
1.83	02M 311 187 F
1.86	02M 311 187 E
1.89	02M 311 187 D
1.92	02M 311 187 C
1.95	02M 311 187 B
1.98	02M 311 187 A



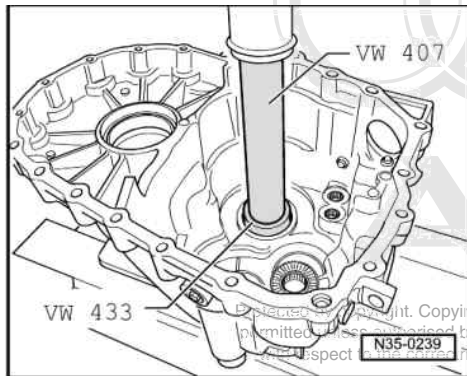
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-> Fig.25 Extracting taper roller bearing outer race from gearbox housing

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

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



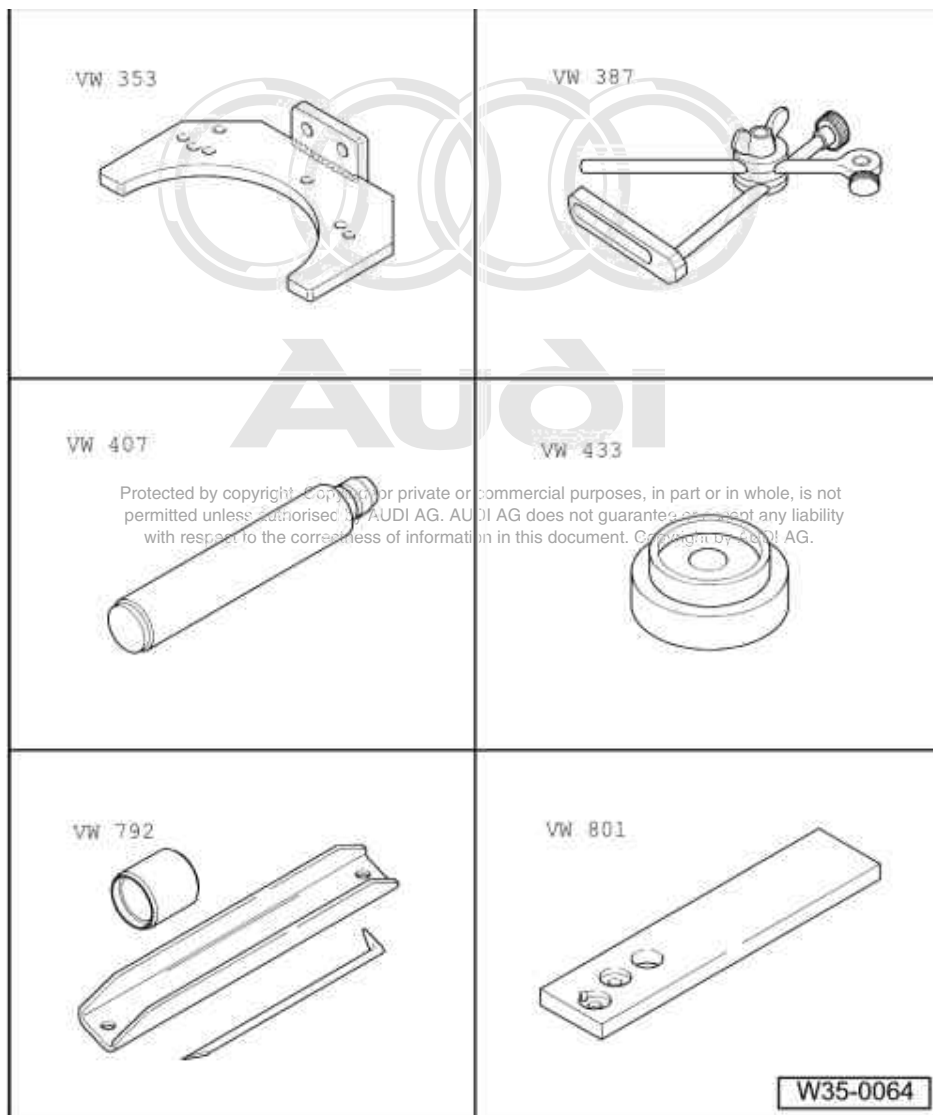
-> Fig.26 Pressing taper roller bearing outer race into gearbox housing

- Fit shim under outer race.
- Support gearbox housing with thrust pad 2050 under bearing support.



4 - Adjusting 1st - 4th gear output shaft

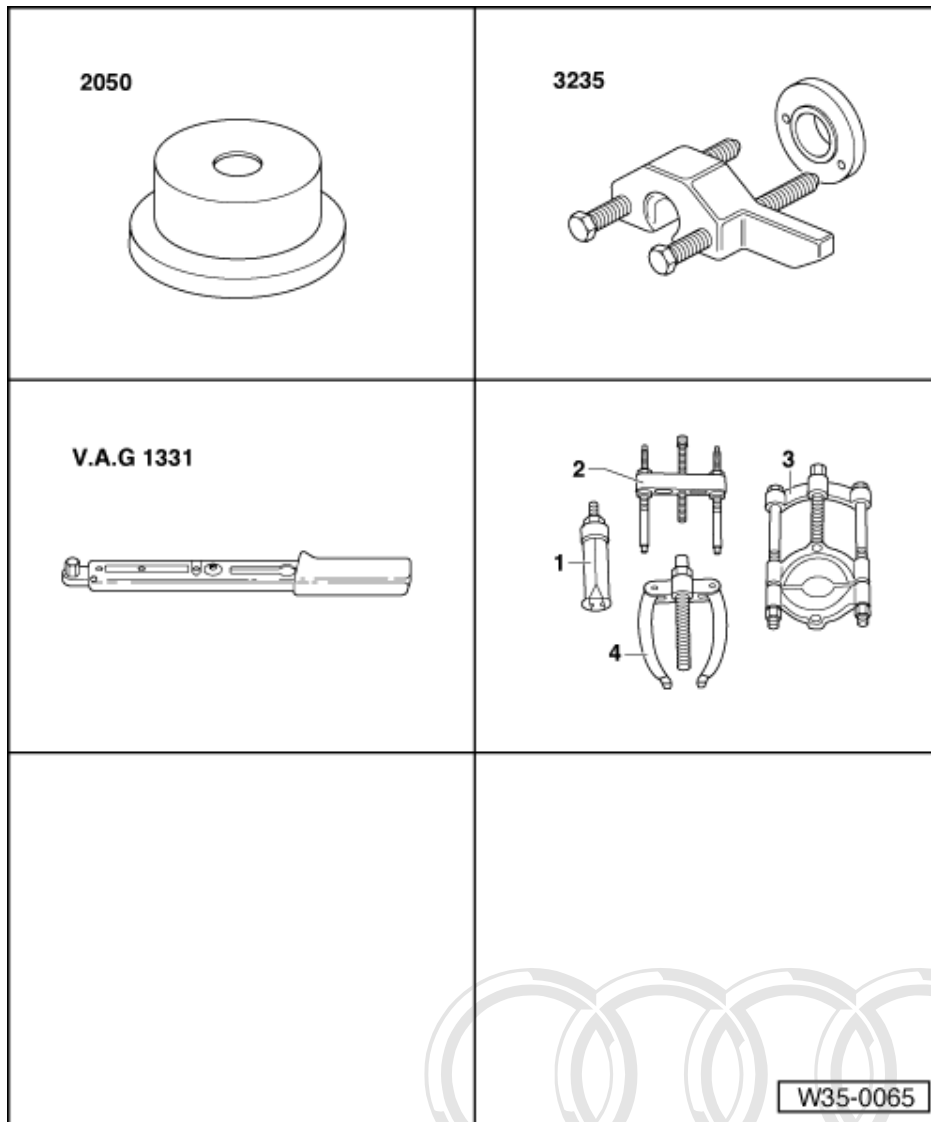
4.1 - Adjusting 1st - 4th gear output shaft



(Determining shim for output shaft)

Special tools and workshop equipment required

- ♦ VW 353 Gearbox support
- ♦ VW 387 Universal dial gauge holder
- ♦ VW 407 Press tool
- ♦ VW 433 Thrust pad
- ♦ VW 792 Assembly device
- ♦ VW 801 Holding plate



Special tools and workshop equipment required

- ◆ 2050 Thrust pad
- ◆ 3235 Pressing-in tool
- ◆ V.A.G 1331 Torque wrench
- ◆ 1 - Kukko 21/7 Internal puller
- ◆ 4 - Kukko 22/2 Counter-support

Output shaft has to be readjusted on replacing the following components:

- ◆ Gearbox housing
- ◆ Clutch housing
- ◆ 1st - 4th gear output shaft

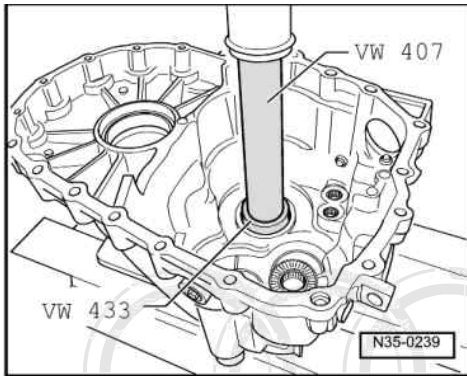
or

- ◆ Taper roller bearing

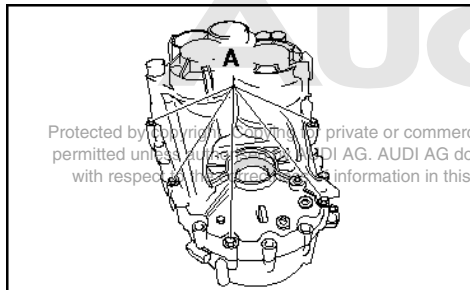
Adjustment table => Page **218**

Requirements:

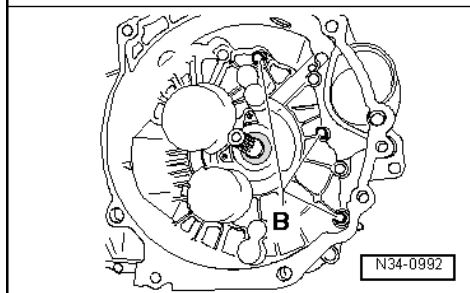
- Sealant cleaned off sealing surfaces of clutch and gearbox housing.



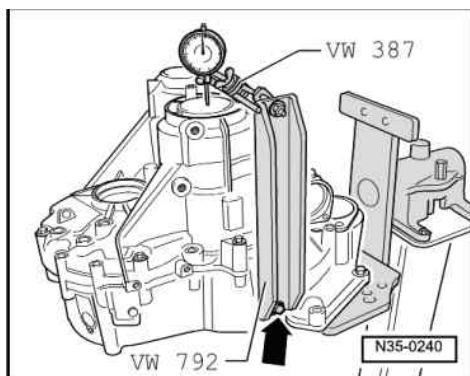
- Only install shaft to be measured when taking measurements
- -> Press taper roller bearing outer race with 1.70 mm thick shim into gearbox housing whilst supporting gearbox housing with thrust pad 2050 directly beneath bearing support.
- Insert 1st to 4th gear output shaft assembly in clutch housing.



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- -> Mount gearbox housing and tighten bolts -A- and -B- diagonally to torque.



- -> Fit measuring tools and secure with bolt -arrow- to clutch housing.
- Set dial gauge (3 mm measuring range) to zero with 1 mm pre-load.
- Slacken off clutch housing/gearbox housing bolts in diagonal sequence until bolts release gearbox housing/output shaft.
- Read off and note down measured value on dial gauge (example: 0.14 mm).

Note:

If no measured value is indicated on dial gauge on slackening off clutch housing/gearbox housing bolts, fit 1.95 mm shim (part no. 084 409 383 AS) or, if necessary, 2.20 mm shim (part no. 084 409 383 BD) for measurement purposes.

Determining shim

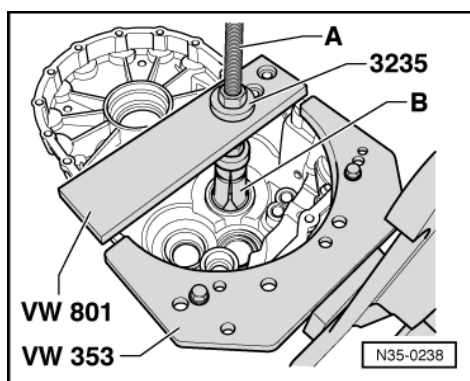
The specified bearing pre-load is attained by subtracting measured value determined (0.14 mm) from shim inserted (1.70 mm) and adding a constant compression value (0.20 mm).

Example:

Shim fitted	1.70 mm
- measured value	0.14 mm
+ compression (constant value)	0.20 mm
Thickness of shim	1.76 mm

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- Determine shim thickness in line with table => Page 167 .



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

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

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

- Take shim inserted (1.70 mm thick) out of gearbox housing.

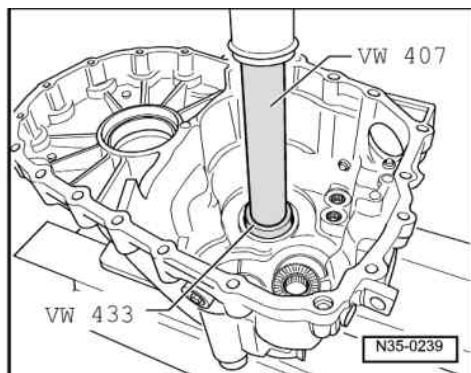
Shim table

Thickness (mm)	Part no.
1.40	084 409 383 AF
1.45	084 409 383 AG
1.50	084 409 383 AH
1.55	084 409 383 AJ
1.60	084 409 383 AK
1.65	084 409 383 AL
1.70	084 409 383 AM
1.75	084 409 383 AN
1.80	084 409 383 AP
1.85	084 409 383 AQ
1.90	084 409 383 AR
1.95	084 409 383 AS
2.00	084 409 383 AT



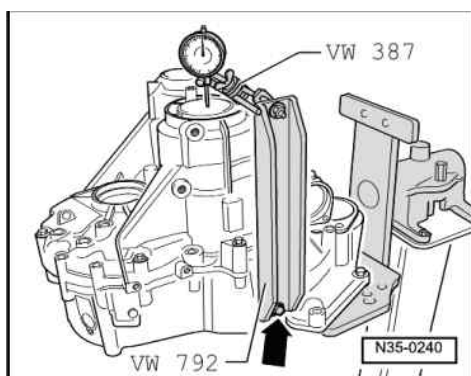
Thickness (mm)	Part no.
2.05	084 409 383 BA
2.10	084 409 383 BB
2.15	084 409 383 BC
2.20	084 409 383 BD

Different tolerances make it possible to obtain the exact shim thickness required.



- -> Press in taper roller bearing outer race with shim determined (in example 1.75 mm) whilst supporting gearbox housing with thrust pad 2050 directly beneath bearing support.

Check measurement



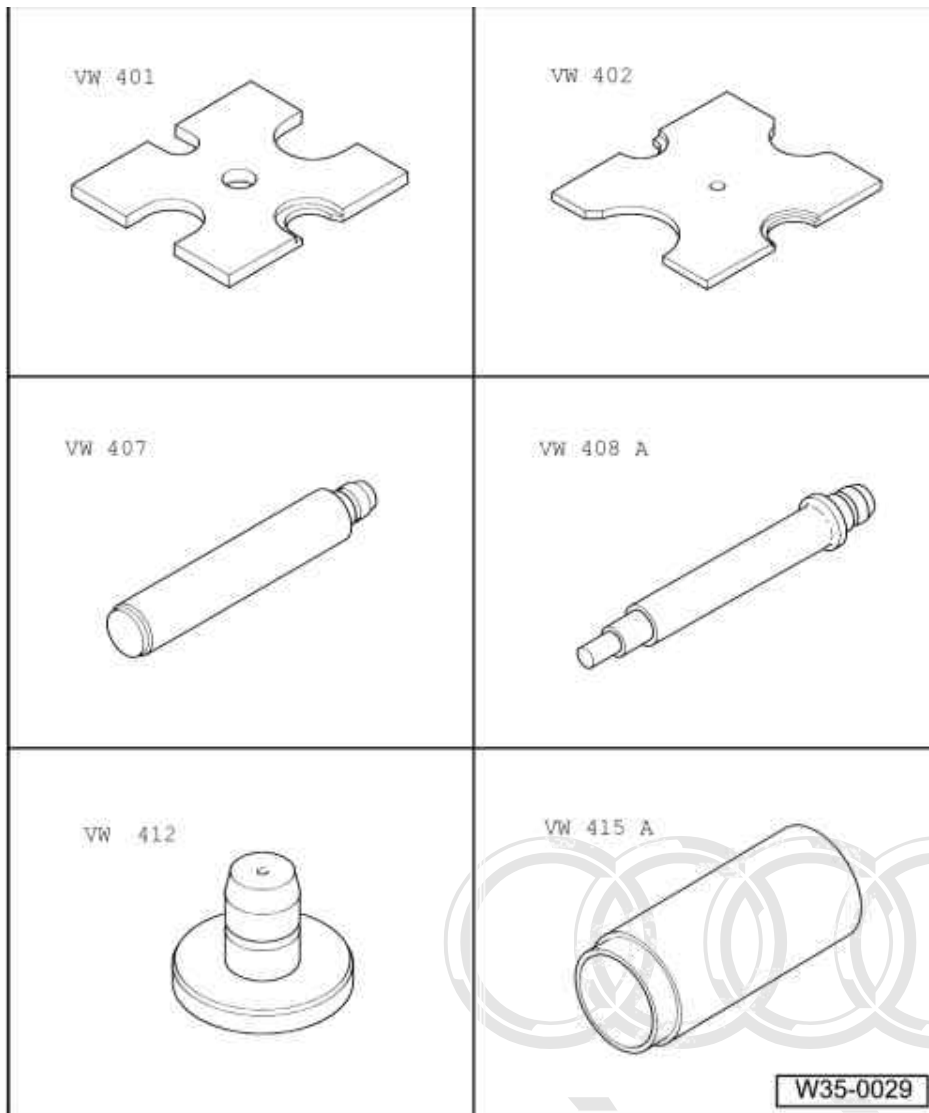
- Shim determined installed
- -> Fit measuring tools and secure with bolt (arrow) to gearbox housing.
- Set dial gauge (3 mm measuring range) to zero with 1 mm pre-load.
- Slacken off clutch housing/gearbox housing bolts in diagonal sequence until bolts release gearbox housing/output shaft.
- If correct shim has been selected, value indicated by dial gauge will now be between 0.15 mm and 0.25 mm.



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5 - Dismantling and assembling 5th/6th and reverse gear output shaft

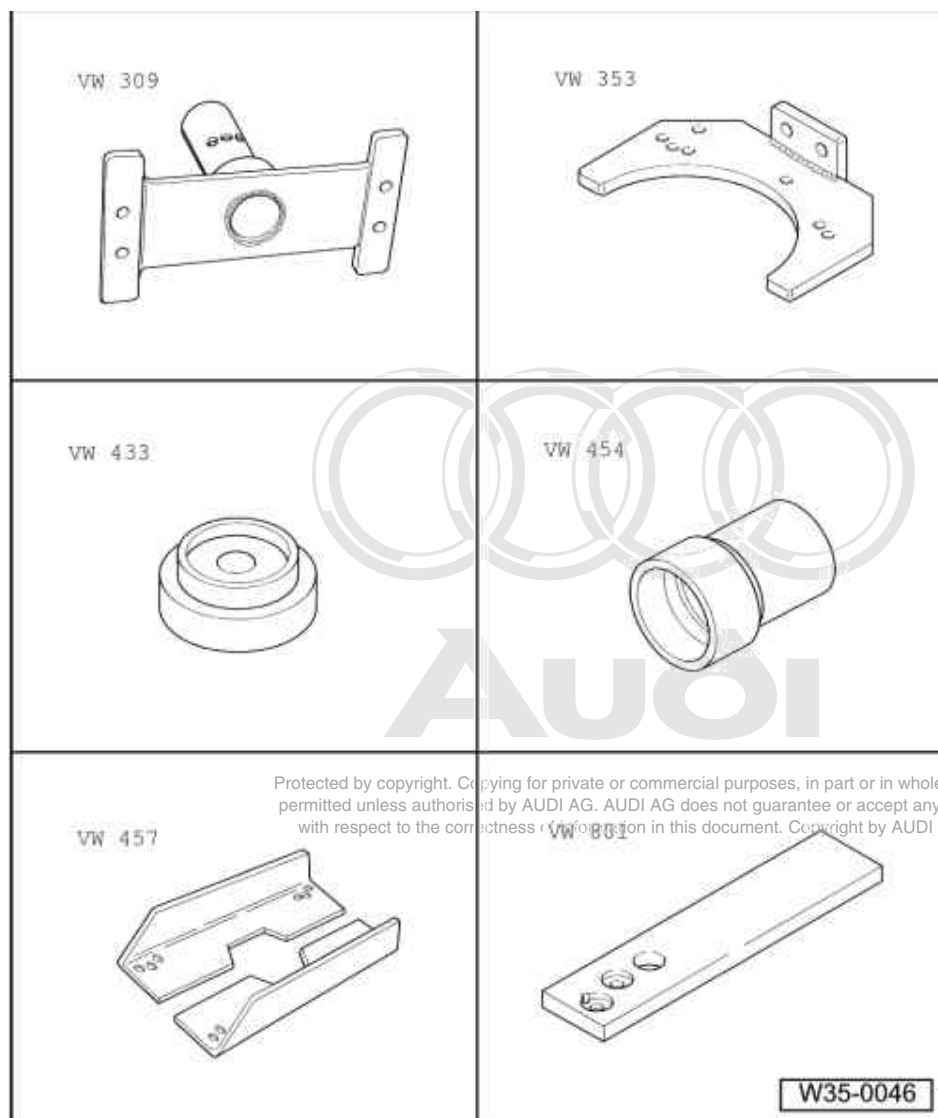
5.1 - Dismantling and assembling 5th/6th and reverse gear output shaft



Special tools and workshop equipment required

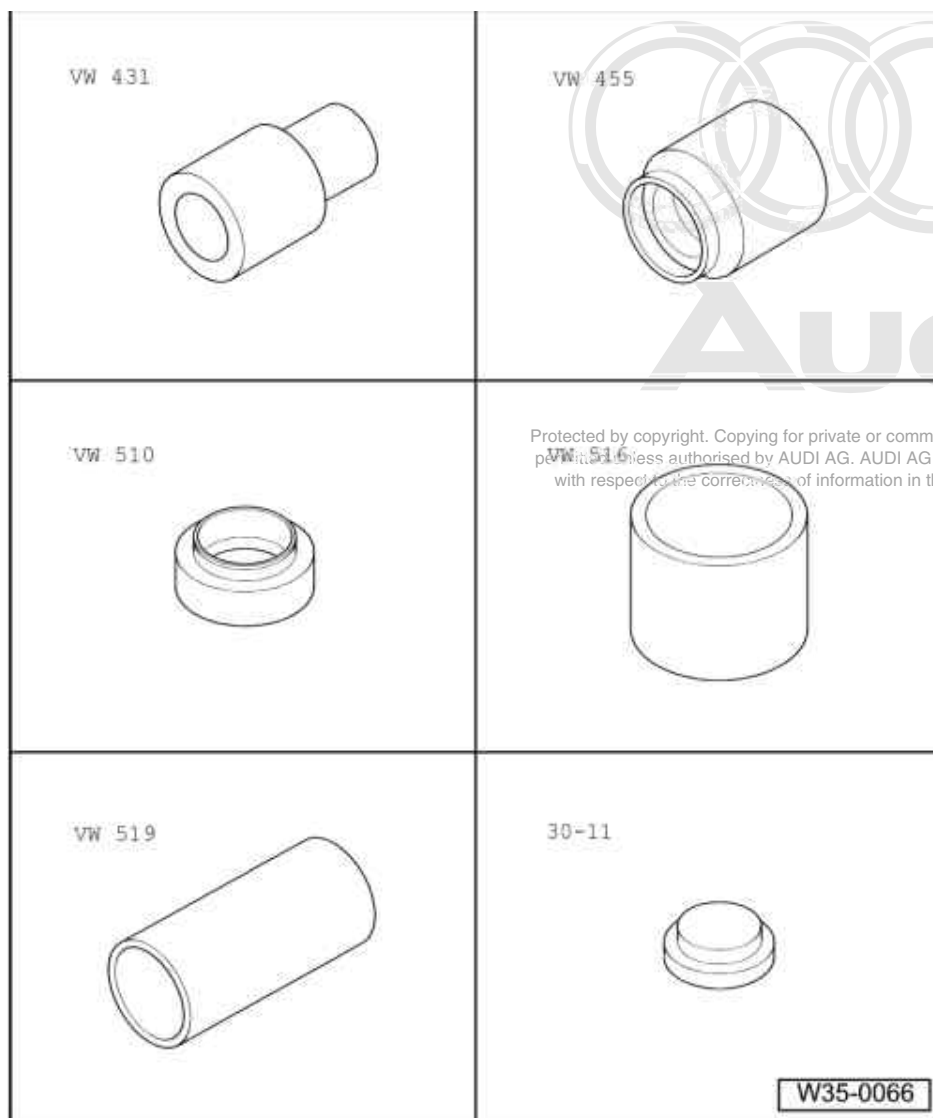
- ♦ VW 401 Pressure plate
- ♦ VW 402 Pressure plate
- ♦ VW 407 Press tool
- ♦ VW 408 A Press tool
- ♦ VW 412 Press tool
- ♦ VW 415 A Tubular section

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Special tools and workshop equipment required

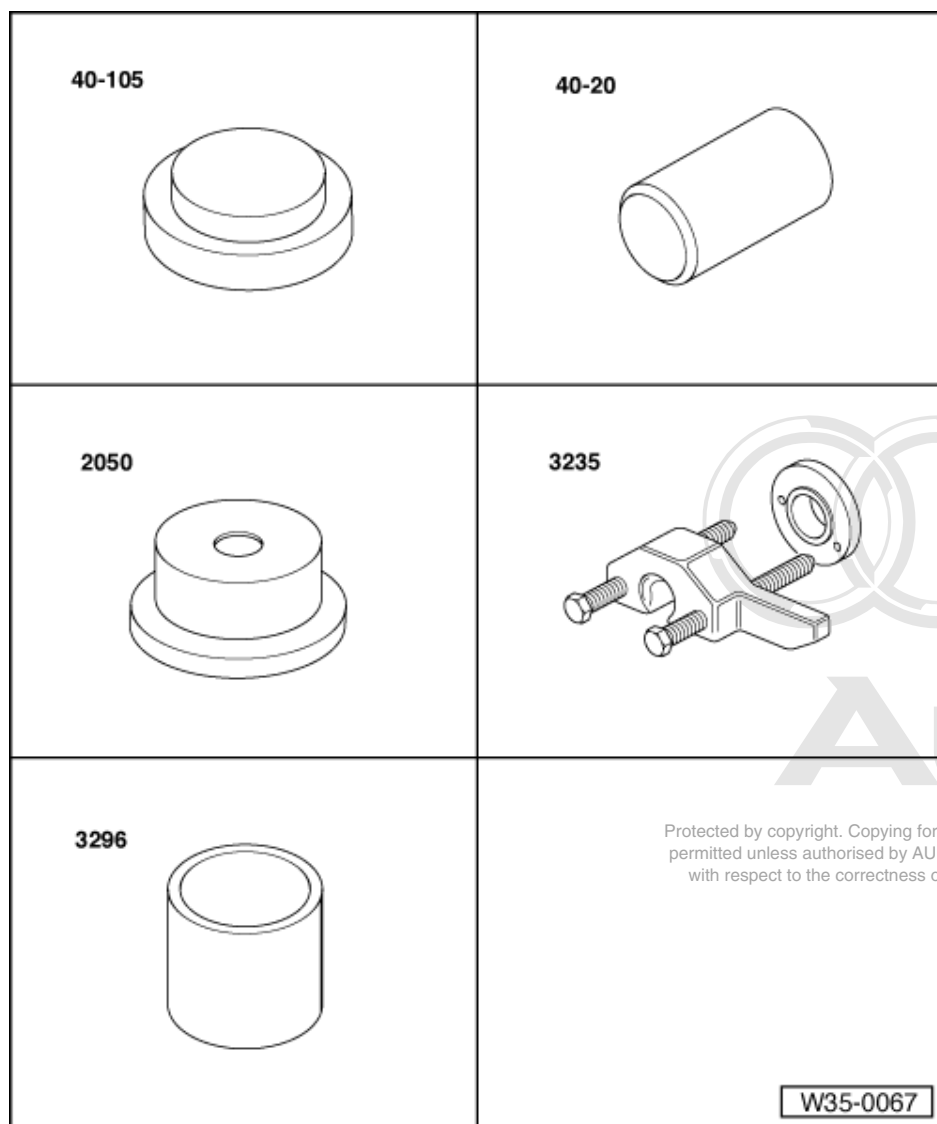
- ♦ VW 309 Holding plate
- ♦ VW 353 Gearbox support
- ♦ VW 433 Thrust pad
- ♦ VW 454 Thrust pad
- ♦ VW 457 Support rail
- ♦ VW 801 Holding plate



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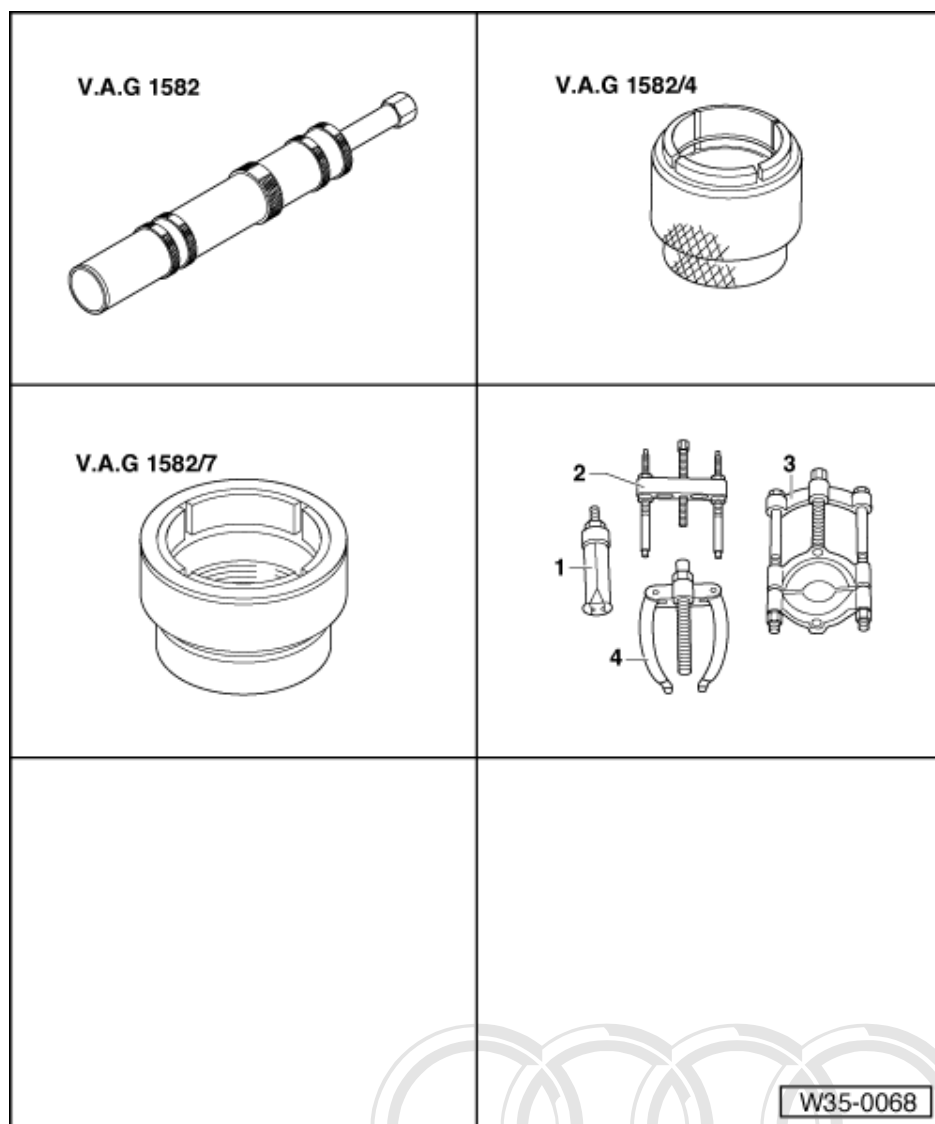
Special tools and workshop equipment required

- ◆ VW 431 Thrust pad
- ◆ VW 455 Pressing-on sleeve
- ◆ VW 510 Thrust pad
- ◆ VW 516 Tubular section
- ◆ VW 519 Tubular section
- ◆ 30-11 Thrust plate



Special tools and workshop equipment required

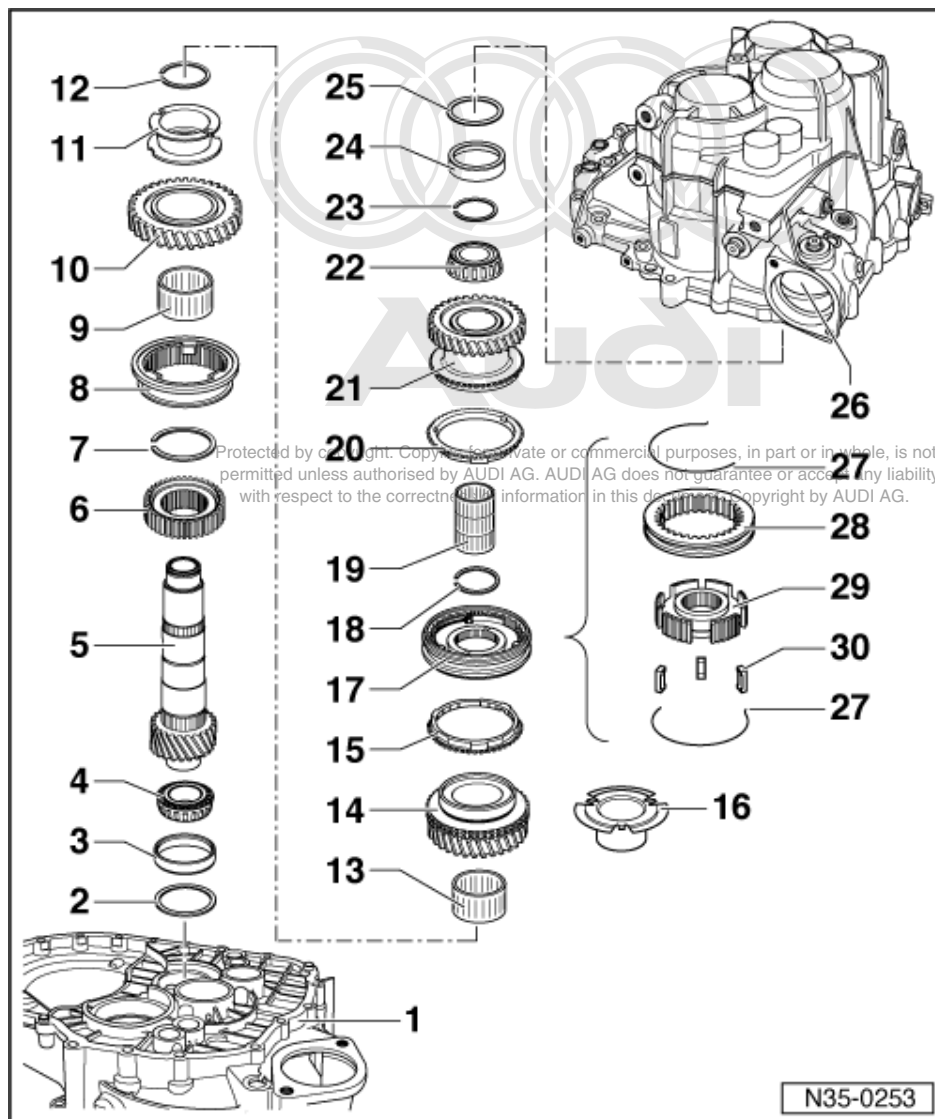
- ♦ 40-105 Thrust plate
- ♦ 40-20 Fitting sleeve
- ♦ 2050 Thrust pad
- ♦ 3235 Pressing-in tool
- ♦ 3296 Tube



Special tools and workshop equipment required

- ◆ V.A.G 1582 Taper roller bearing puller
- ◆ V.A.G 1582/4 Gripper
- ◆ V.A.G 1582/7 Gripper
- ◆ 1 - Kukko 21/7 Internal puller
- ◆ 3 - Kukko 17/2 Separating tool
- ◆ 4 - Kukko 22/2 Counter-support

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**Notes:**

- ♦ Heed technical data when installing new gear wheels or a new output shaft => Page 2.
- ♦ Output shaft has to be adjusted on replacing output shaft or taper roller bearings => Page 187.

1 Clutch housing**2 Washer**

- ♦ Always 0.65 mm thick

3 Taper roller bearing outer race

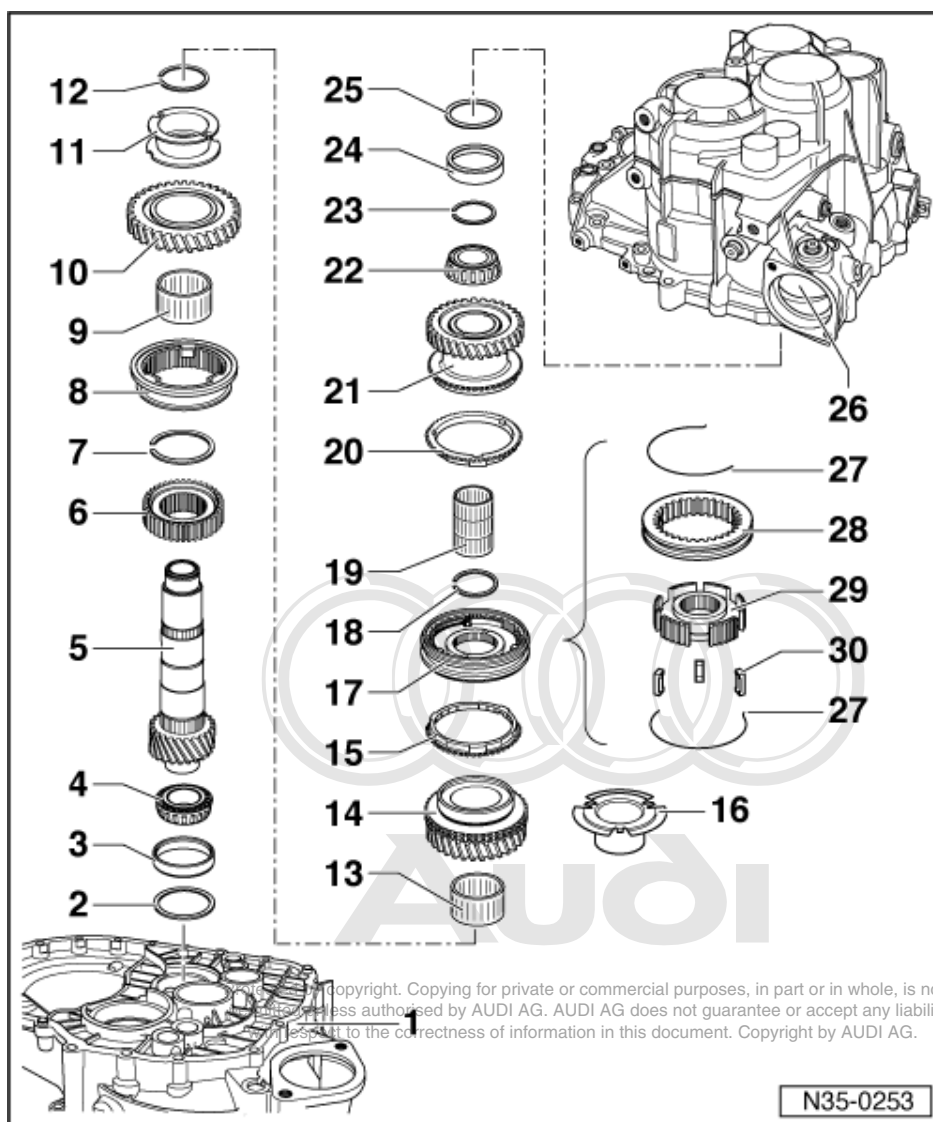
- ♦ Extracting => Fig. 1
- ♦ Pressing in => Fig. 2

4 Taper roller bearing inner race

- ♦ Pulling off => Fig. 8
- ♦ Pressing on => Fig. 20

5 Output shaft

- ♦ For 5th/6th and reverse gear
- ♦ Adjusting => Page 187

**6 Reverse gear synchro-hub**

- ◆ Pressing off => Fig. 7
- ◆ Installation position => Fig. 9
- ◆ Pressing on => Fig. 10

7 Circlip**8 Reverse gear locking collar**

- ◆ With synchro-ring

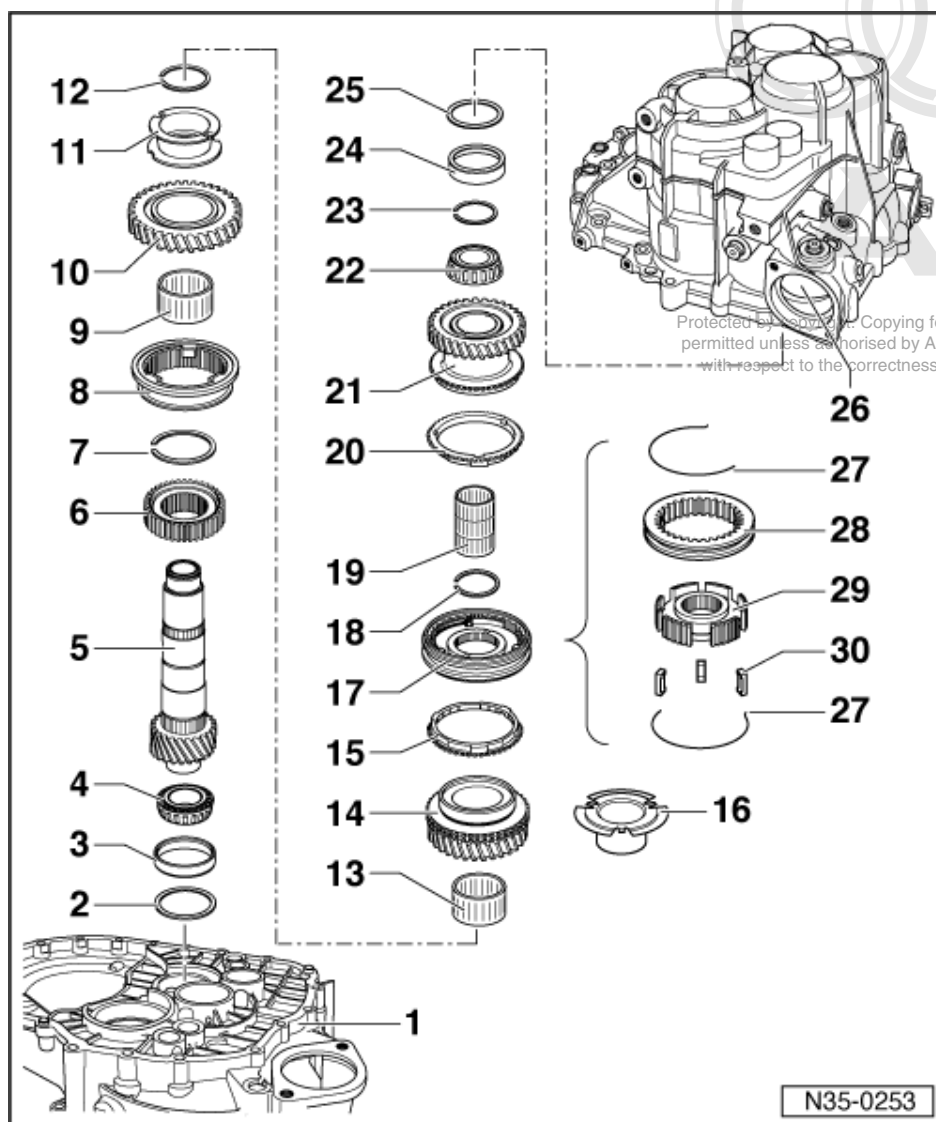
9 Needle bearing

- ◆ For reverse sliding gear

10 Reverse sliding gear**11 Sleeve**

- ◆ Pressing off over reverse sliding gear => Fig. 6
- ◆ Installation position: Wide collar of sleeve faces reverse sliding gear
- ◆ Pressing on => Fig. 11

12 Circlip

**13 Needle bearing**

- ◆ For 6th gear
- ◆ Not featured by 5-speed manual gearbox

14 6th gear sliding gear

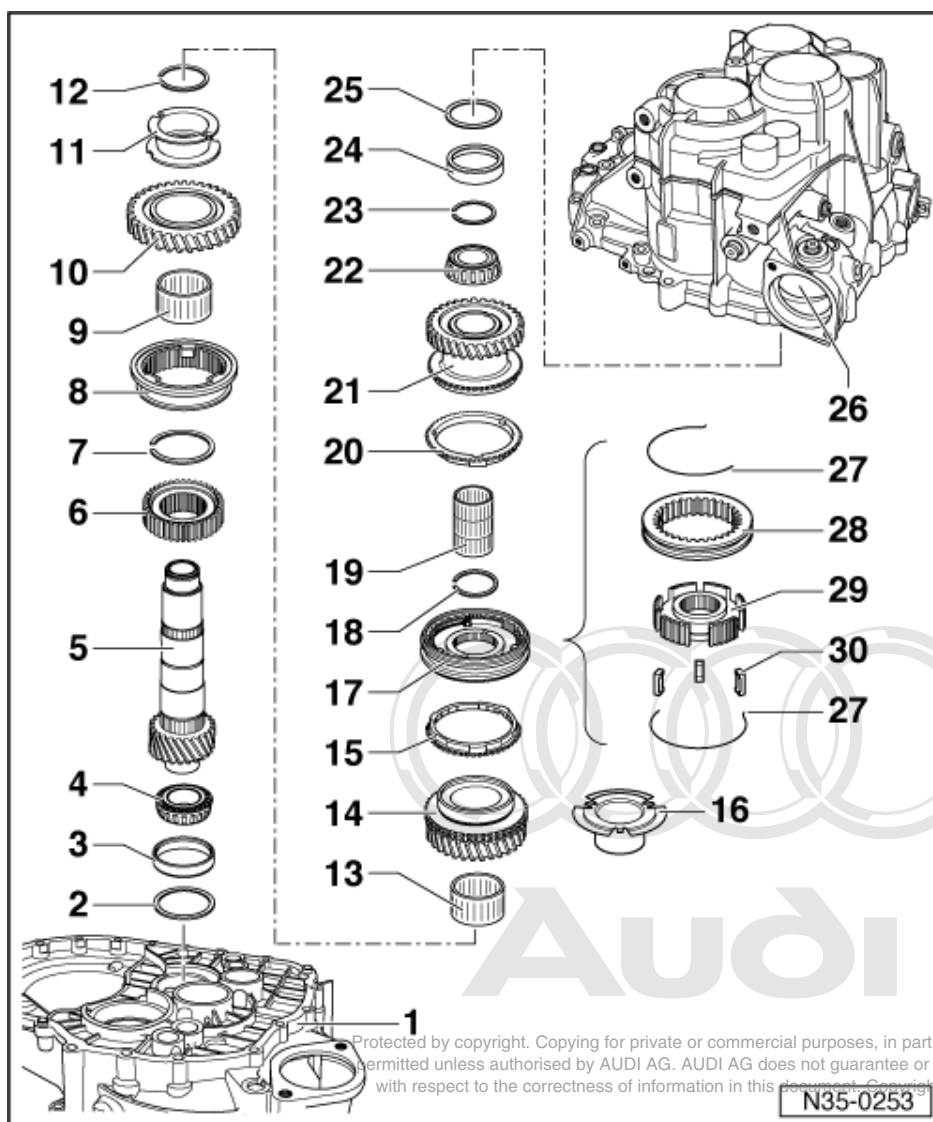
- ◆ Not featured by 5-speed manual gearbox

15 6th gear synchro-ring

- ◆ Not featured by 5-speed manual gearbox
- ◆ Checking for wear => Fig. 12

16 Spacer sleeve

- ◆ For 5-speed manual gearbox
- ◆ Pressing off with locking collar/synchro-hub for 5th gear after detaching circlip (item 18) => Fig. 5
- ◆ Positioning with respect to locking collar/synchro-hub for 5th gear => Fig. 16
- ◆ Pressing on together with locking collar/synchro-hub for 5th gear => Fig. 17



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

- ♦ Pressing off with 6th gear sliding gear after detaching circlip (item 18) => Fig. 4 /pressing off with spacer sleeve in the case of 5-speed manual gearbox => Fig. 5
- ♦ Dismantling => Fig. 13
- ♦ Assembling locking collar/synchro-hub => Fig. 13 and Fig. 14
- ♦ Pressing on (6-speed manual gearbox) => Fig. 15
- ♦ Pressing on (5-speed manual gearbox) => Fig. 17

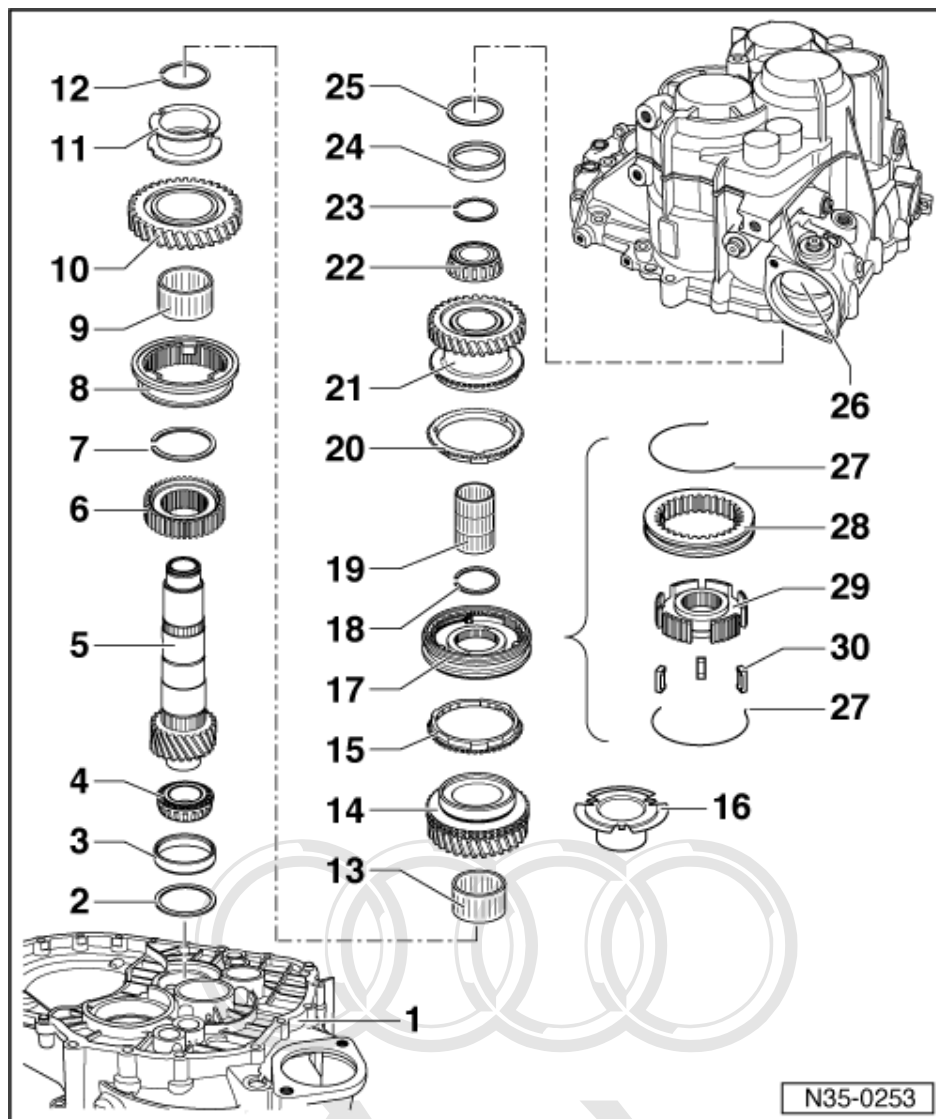
18 Circlip

19 Needle bearing

- ♦ For 5th gear

20 5th gear synchro-ring

- ♦ Checking for wear => Fig. 12



21 5th gear sliding gear

22 Taper roller bearing inner race

♦ Pulling off => Fig. 3

♦ Pressing on => Fig. 18

23 Circlip

♦ Redetermining on replacing taper roller bearing -item 22- and output shaft -item 5- => Fig. 19

24 Taper roller bearing outer race

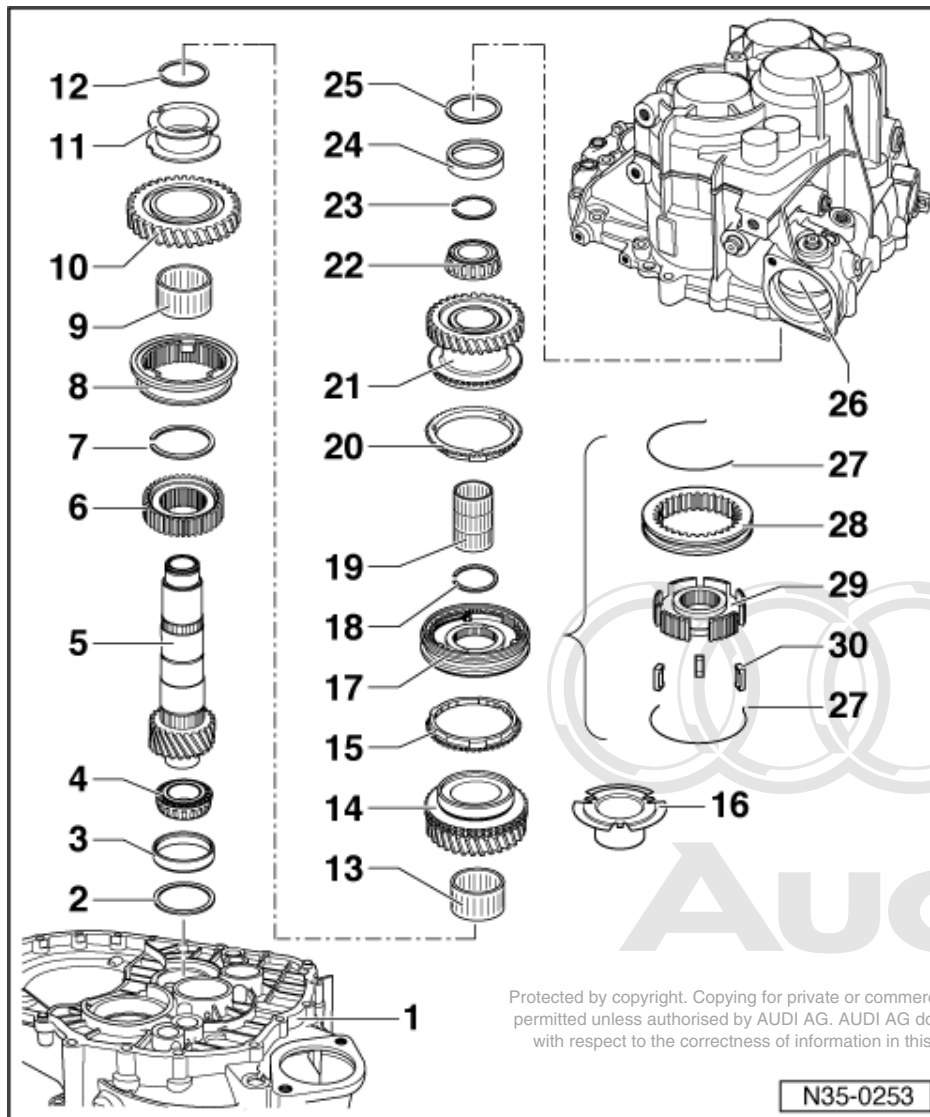
♦ Extracting => Fig. 21

♦ Pressing in => Fig. 22

25 Shim

♦ Determining thickness => Page 187

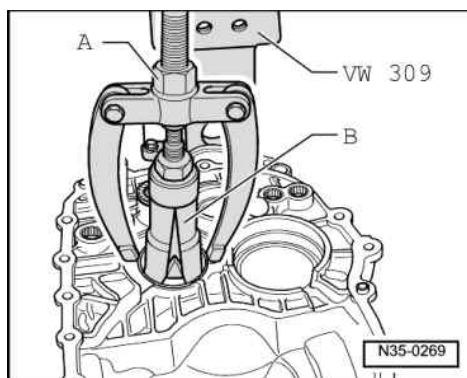
26 Gearbox housing

**27 Spring**

- ♦ Installation position => Fig. 14

28 Locking collar**29 Synchro-hub****30 Locking piece (3x)**

- ♦ Installation position => Fig. 13





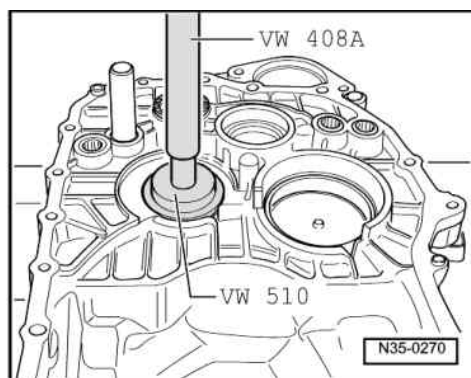
-> Fig.1 Extracting taper roller bearing outer race

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

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

Note:

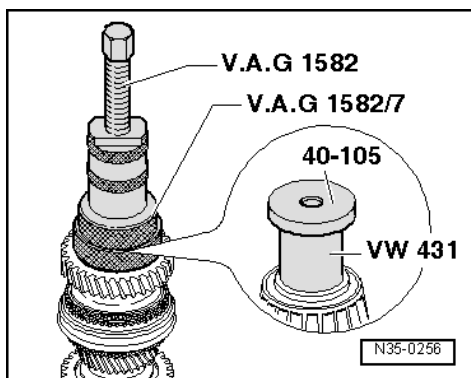
Check washer for damage after extracting and replace if necessary.



-> Fig.2 Pressing taper roller bearing outer race into clutch housing

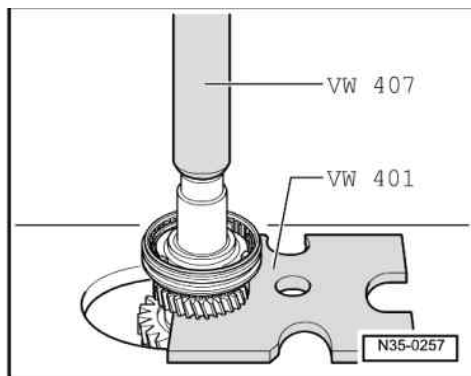
- Fit washer under outer race.
- Support clutch housing with fitting sleeve 40-20 directly beneath bearing support.

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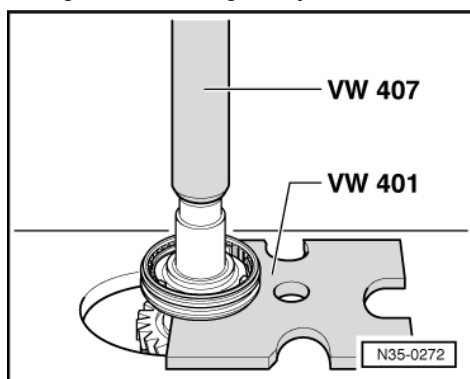


-> Fig.3 Pulling off taper roller bearing inner race

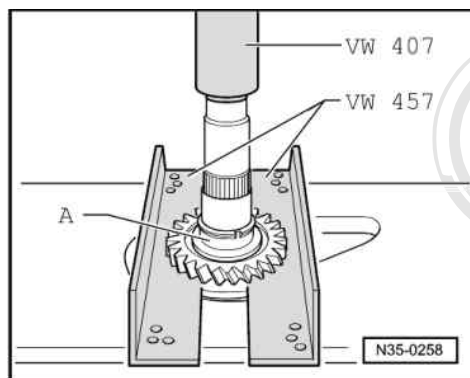
- Before setting up puller, position thrust pad VW 431 and thrust plate 40-105 on output shaft.



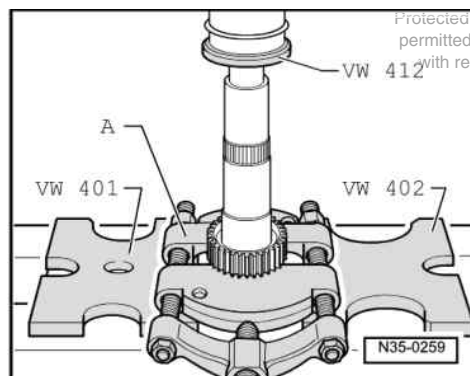
-> Fig.4 Pressing off synchro-hub/locking collar for 5th and 6th gear with 6th gear sliding gear



-> Fig.5 Pressing off synchro-hub/locking collar for 5th gear with spacer sleeve

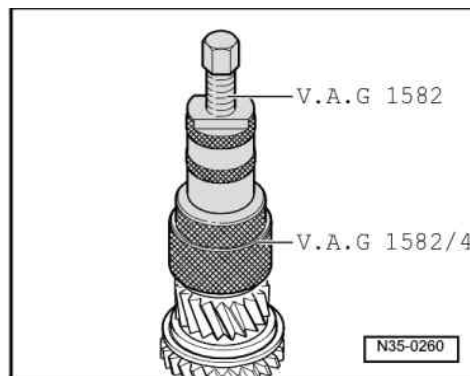


-> Fig.6 Pressing off sleeve -A- over reverse sliding gear



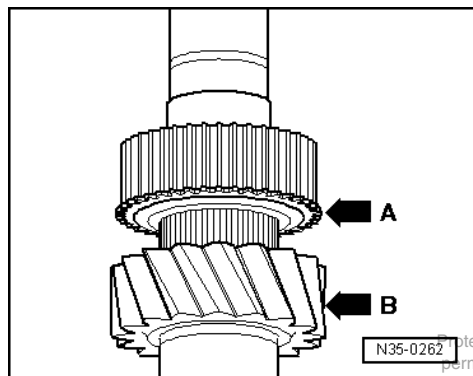
-> Fig.7 Pressing off reverse gear synchro-hub

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



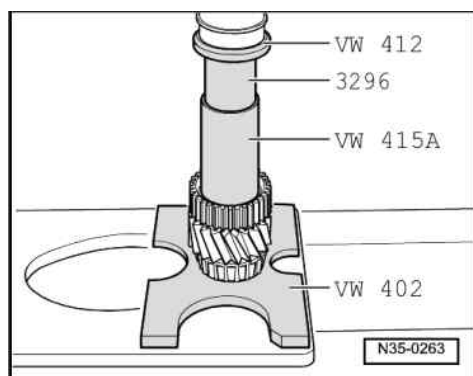
-> Fig.8 Pulling off taper roller bearing inner race

- Position thrust plate 30-11 on output shaft before setting up puller.

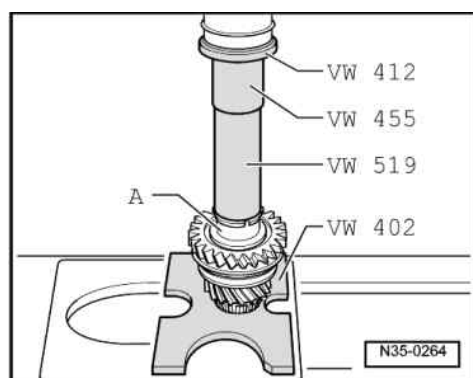


-> Fig.9 Installation position of reverse gear synchro-hub

Stop -arrow A- for reverse gear locking collar faces splines of output shaft -arrow B-.

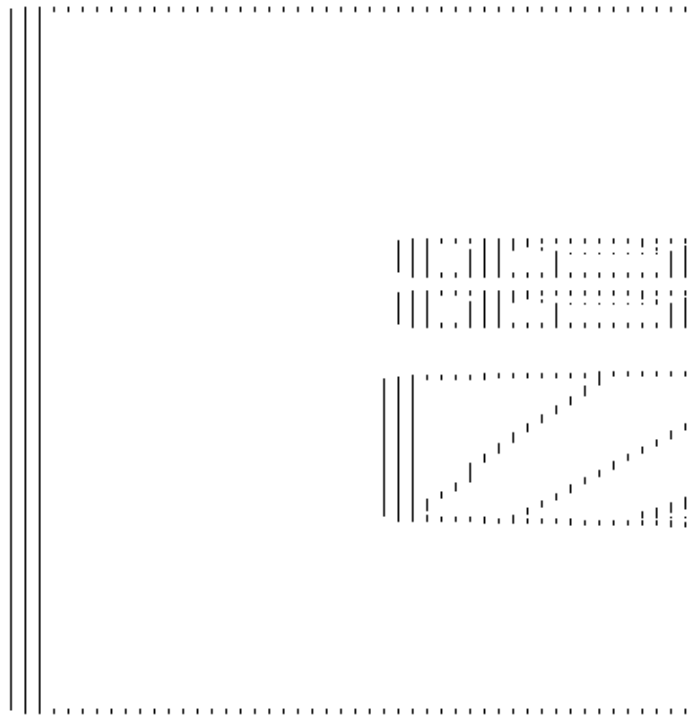


-> Fig.10 Pressing on reverse gear synchro-hub



-> Fig.11 Pressing on sleeve -A-

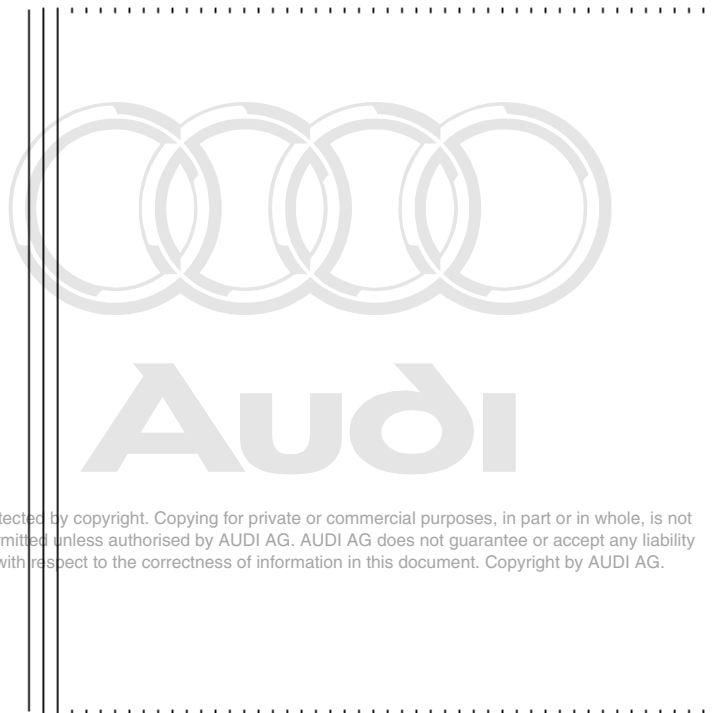
Installation position: Wide collar faces reverse sliding gear



-> Fig.12 Checking 5th and 6th gear synchro-ring for wear

- Press synchro-ring onto sliding gear taper and use feeler gauge to measure gap "a".

Gap "a"	New dimension	Wear limit
5th and 6th gear	1.0 ... 1.7 mm	0.5 mm



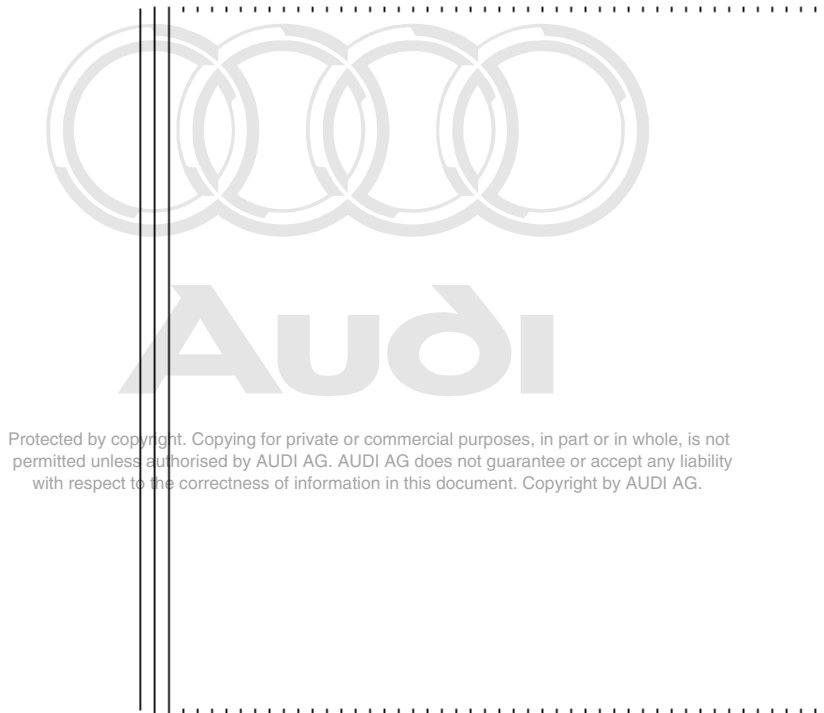
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-> Fig.13 Dismantling and assembling locking collar and synchro-hub for 5th and 6th gear

- 1 - Spring
- 2 - Locking piece
- 3 - Locking collar
- 4 - Synchro-hub

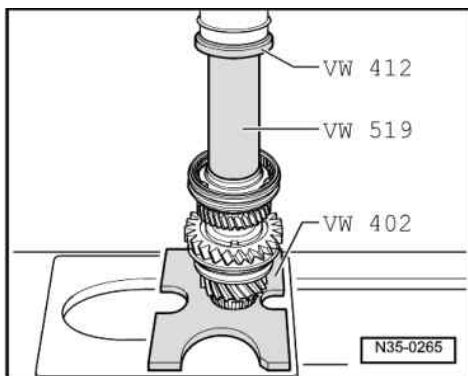
- Slip locking collar over synchro-hub.

Recesses for locking pieces at synchro-hub and locking collar must be aligned

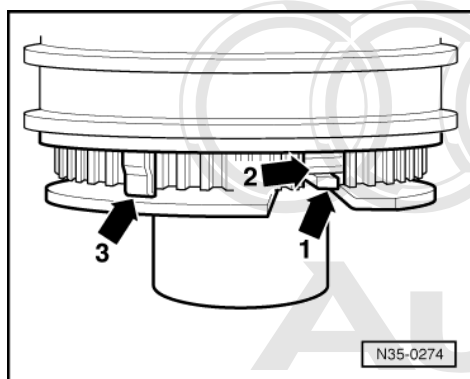
**-> Fig.14 Assembling locking collar/synchro-hub for 5th and 6th gear**

Locking collar already slipped over synchro-hub

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

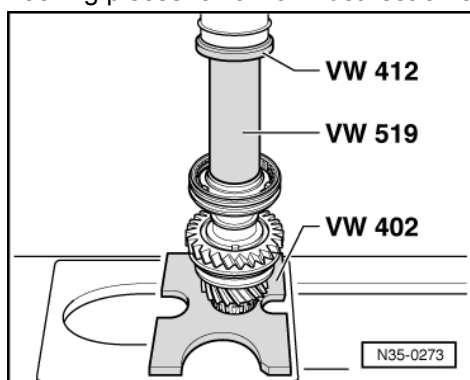


-> Fig.15 Pressing on locking sleeve/synchro-hub for 5th and 6th gear

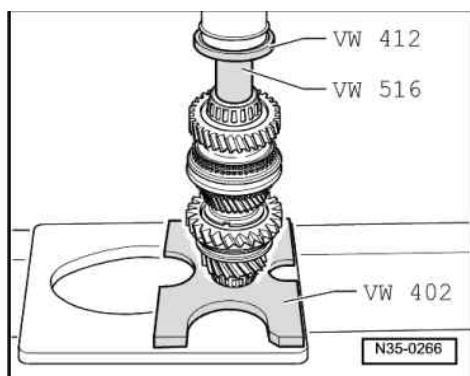


-> Fig.16 Positioning spacer sleeve with respect to locking collar/synchro-hub for 5th gear

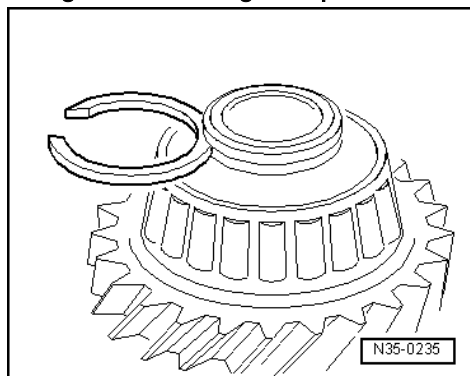
Lugs -arrow 1- of spacer sleeve must be aligned with recesses in synchro-hub -arrow 2-. Locking pieces -arrow 3- must rest on collar of spacer sleeve.



-> Fig.17 Pressing on locking collar/synchro-hub for 5th gear together with spacer sleeve



-> Fig.18 Pressing on taper roller bearing inner race



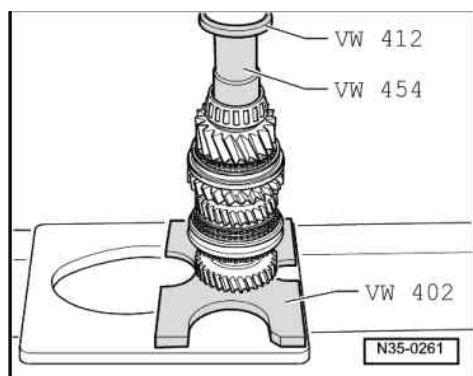


-> Fig.19 Determining circlip

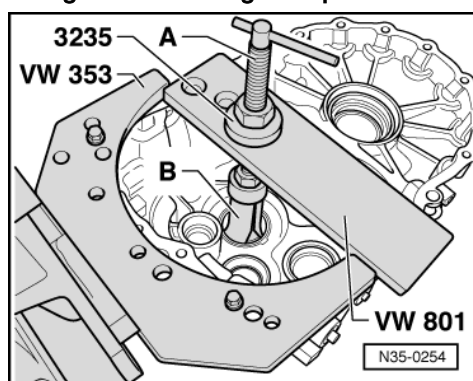
- Determine and fit thickest circlip which can still just be inserted.

The following circlips are available:

Thickness (mm)	Part no.
1.79	02M 311 187 G
1.83	02M 311 187 F
1.86	02M 311 187 E
1.89	02M 311 187 D
1.92	02M 311 187 C
1.95	02M 311 187 B
1.98	02M 311 187 A



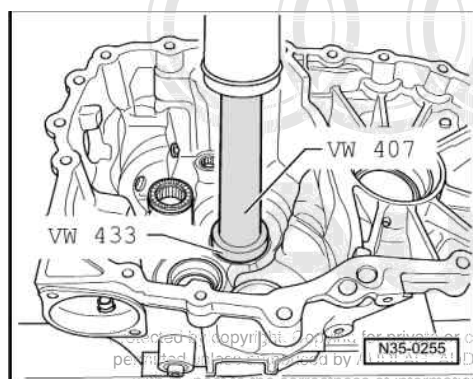
-> Fig.20 Pressing on taper roller bearing inner race



-> Fig.21 Extracting taper roller bearing outer race from gearbox housing

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

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

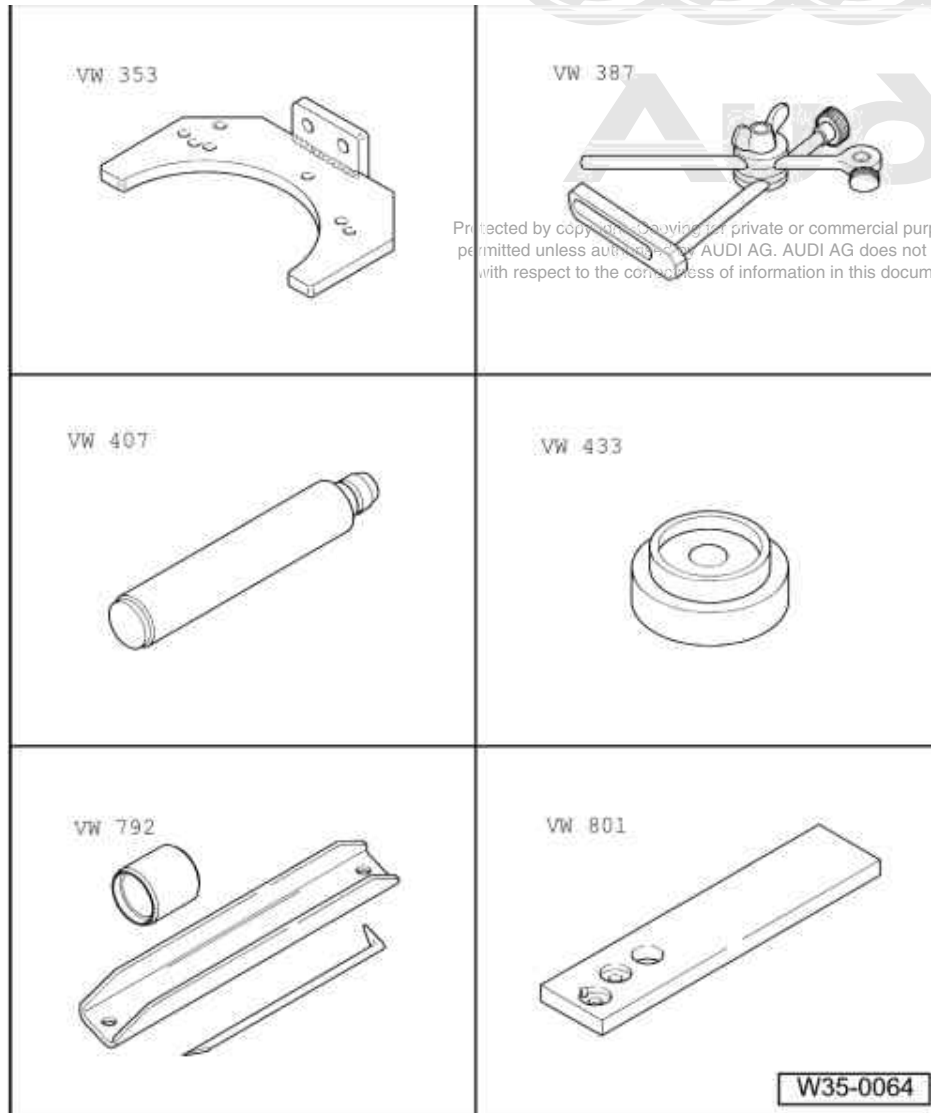


-> Fig.22 Pressing taper roller bearing outer race into gearbox housing

- Support gearbox housing with thrust pad 2050 beneath bearing support.

6 - Adjusting 5th/6th and reverse gear output shaft

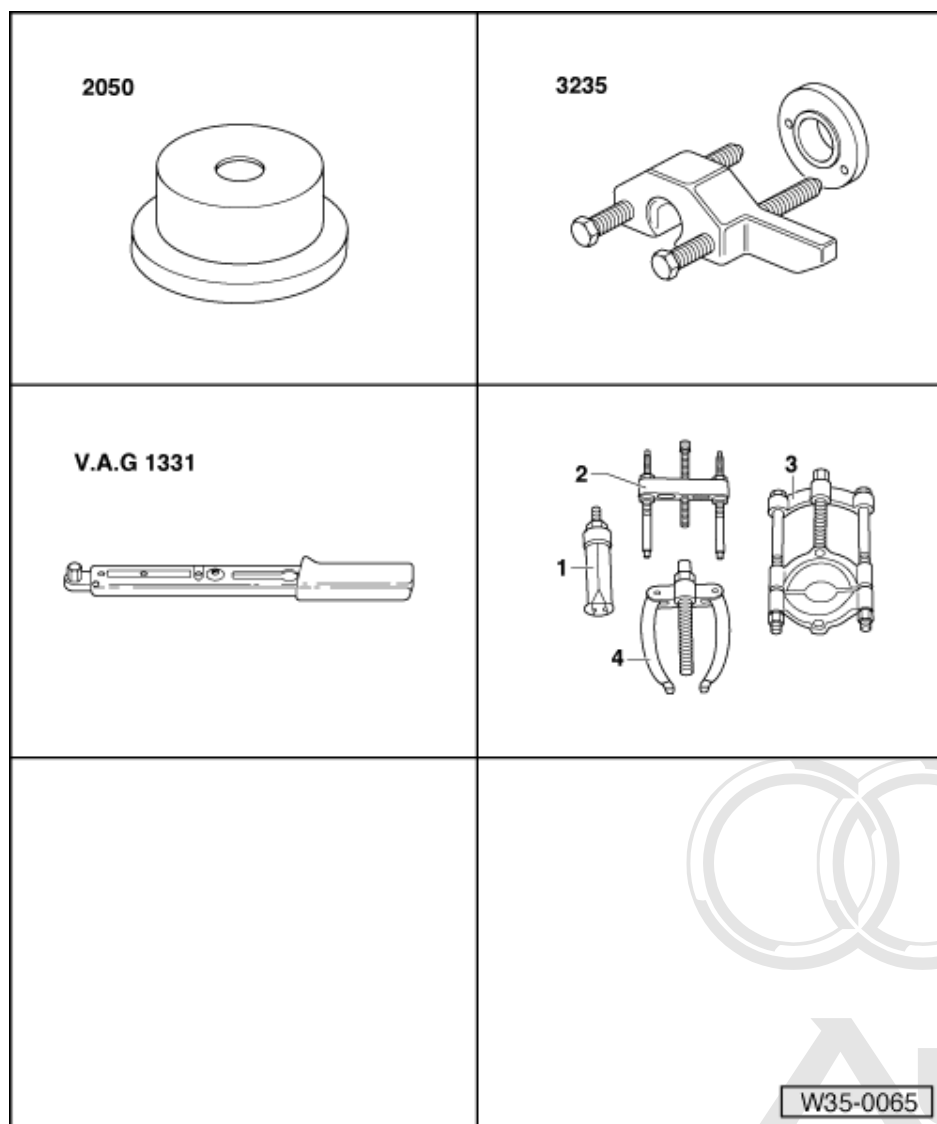
6.1 - Adjusting 5th/6th and reverse gear output shaft



(Determining shim for output shaft)

Special tools and workshop equipment required

- ◆ VW 353 Gearbox support
- ◆ VW 387 Universal dial gauge holder
- ◆ VW 407 Press tool
- ◆ VW 433 Thrust pad
- ◆ VW 792 Assembly device
- ◆ VW 801 Holding plate



Special tools and workshop equipment required

- ♦ 2050 Thrust pad
- ♦ 3235 Pressing-in tool
- ♦ V.A.G 1331 Torque wrench
- ♦ 1 - Kukko 21/7 Internal puller
- ♦ 4 - Kukko 22/2 Counter-support

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Output shaft has to be readjusted on replacing the following components:

- ♦ Gearbox housing
- ♦ Clutch housing
- ♦ 5th/6th and reverse gear output shaft

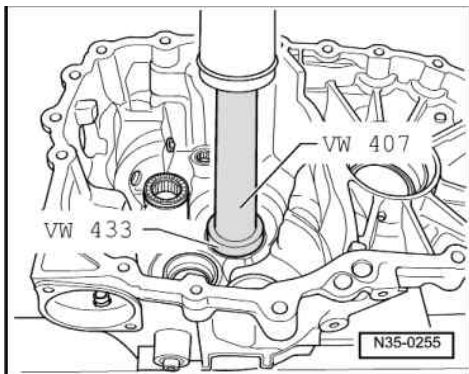
or

- ♦ Taper roller bearing

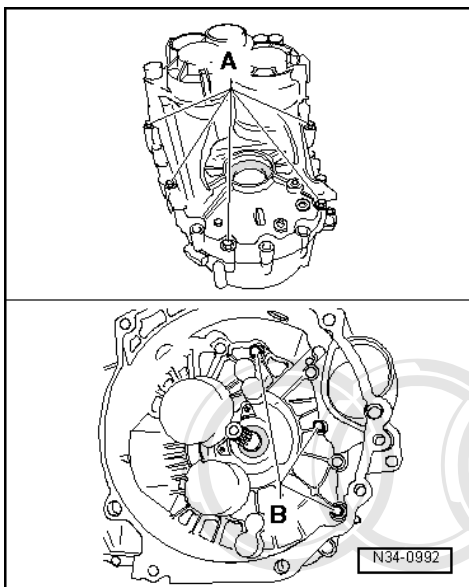
Adjustment table => Page **218**

Requirements:

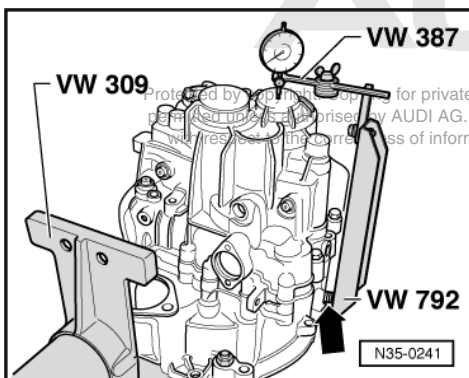
- Sealant cleaned off sealing surfaces of clutch and gearbox housing



- Only install shaft to be measured when taking measurements
- -> Press taper roller bearing outer race with 1.70 mm thick shim into gearbox housing whilst supporting gearbox housing with thrust pad 2050 directly beneath bearing support.
- Insert 5th/6th and reverse gear output shaft assembly in clutch housing.



- -> Mount gearbox housing and tighten bolts -A- and -B- diagonally to torque.



- -> Fit measuring tools. Install washers with a total thickness of 8 mm at bolt -arrow- for attaching assembly device VW 792 to clutch housing.
- Set dial gauge (3 mm measuring range) to zero with 1 mm pre-load.
- Slacken off clutch housing/gearbox housing bolts diagonally until bolts release gearbox housing/output shaft.

- Read off and note down measured value on dial gauge (example: 0.27 mm).

Note:

If no measured value is indicated by dial gauge on slackening off clutch housing/gearbox housing bolts, fit 1.95 mm shim (part no. 084 409 383 AS) or, if necessary, 2.20 mm shim (part no. 084 409 383 BD) for measurement purposes.

Determining shim

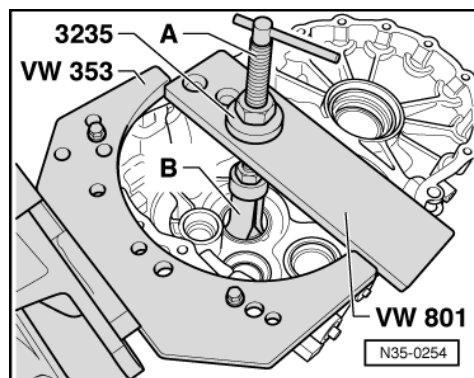
Specified bearing pre-load is attained by subtracting measured value determined (0.27 mm) from shim fitted (1.70 mm) and adding a constant compression value (0.20 mm).

Example:

Shim fitted	1.70 mm
- measured value	0.27 mm
+ compression (constant value)	0.20 mm
Thickness of shim	1.63 mm

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- Determine shim thickness in line with table => Page 190 .



- -> Detach gearbox housing and extract taper roller bearing outer race from gearbox housing.

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

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

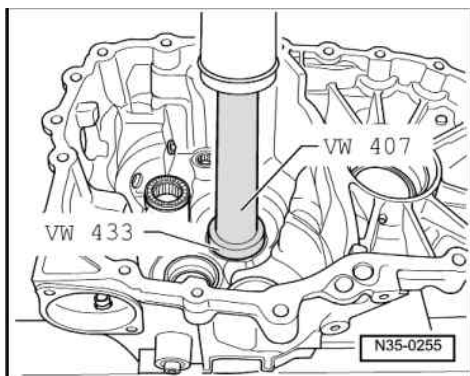
- Take shim fitted (1.70 mm thick) out of gearbox housing.

Shim table

Thickness (mm)	Part no.
1.40	084 409 383 AF
1.45	084 409 383 AG
1.50	084 409 383 AH
1.55	084 409 383 AJ
1.60	084 409 383 AK
1.65	084 409 383 AL
1.70	084 409 383 AM
1.75	084 409 383 AN
1.80	084 409 383 AP
1.85	084 409 383 AQ
1.90	084 409 383 AR
1.95	084 409 383 AS
2.00	084 409 383 AT

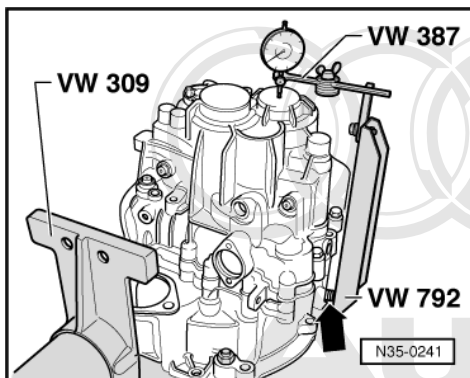
Thickness (mm)	Part no.
2.05	084 409 383 BA
2.10	084 409 383 BB
2.15	084 409 383 BC

Different tolerances make it possible to obtain the exact shim thickness required.



- -> Press in taper roller bearing outer race with shim determined (in example 1.65 mm) whilst supporting gearbox housing with thrust pad 2050 directly beneath bearing support.

Check measurement



- Shim determined installed
- -> Fit measuring tools. Install washers with a total thickness of 8 mm at bolt -arrow- for attaching assembly device VW 792 to clutch housing.
- Set dial gauge (3 mm measuring range) to zero with 1 mm pre-load.
- Slacken off clutch housing/gearbox housing bolts diagonally until bolts release gearbox housing/output shaft.
- If correct shim has been selected, dial gauge will now indicate a value of between 0.15 mm and 0.25 mm.

39 - Final drive, Differential

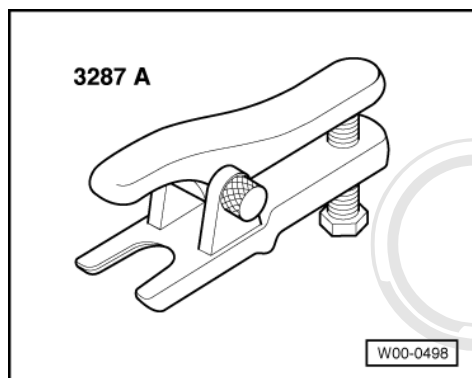
1 - Replacing oil seals for left flange shaft or right drive flange

1.1 - Replacing oil seals for left flange shaft or right drive flange

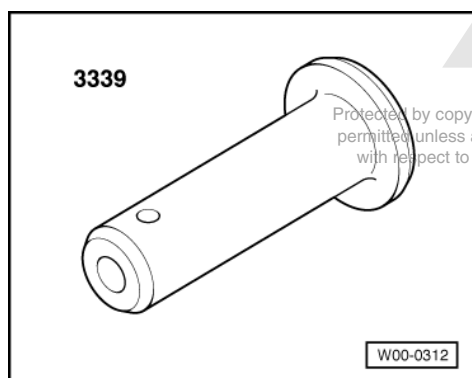
- Gearbox fitted
- Pay attention to general repair instructions=> Page **7** .

1.2 - Replacing oil seal for left flange shaft

Special tools and workshop equipment required



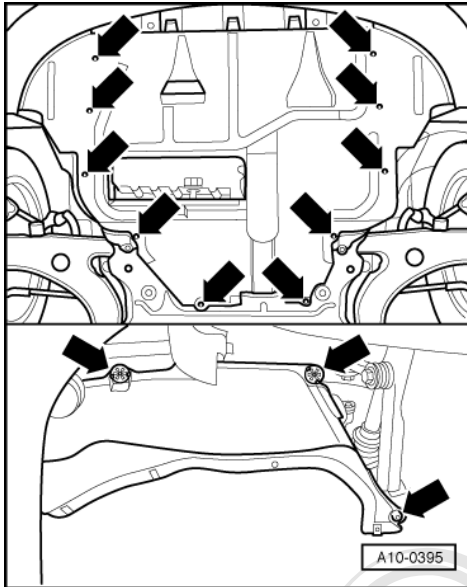
- ♦ 3287 A Ball joint puller



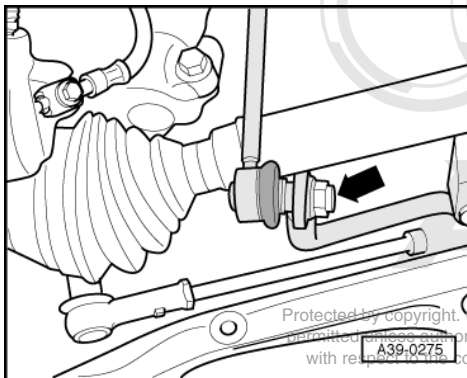
Special tools and workshop equipment required

- ♦ 3339 Thrust pad

Removing

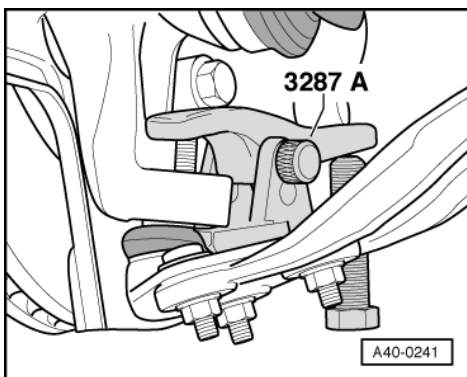


- -> Remove centre and left noise insulation -arrows-.



- -> Unscrew nut for connecting link from anti-roll bar on left.

- Unscrew upper nut from left ball joint.



- -> Apply tool as shown and press out ball joint.



Note:

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

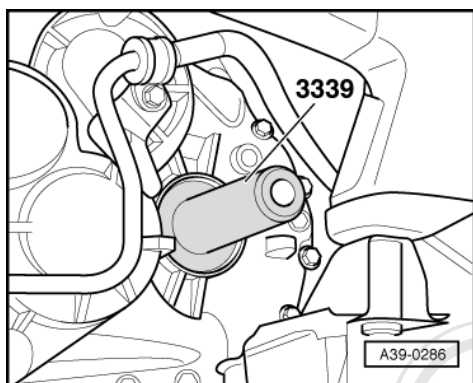
- Turn steering wheel onto right lock.
- Unscrew left drive shaft at gearbox and tie in position.

=> Running Gear, Front-wheel Drive and Four-wheel Drive; Repair Group 40; Drive Shafts; Removing and installing drive shaft Drive Shafts Removing and installing drive shaft

- Place drip tray under gearbox.
- Remove taper-head bolt for flange shaft (counterhold with mandrel).
- Pull out flange shaft with spring.
- Lever out oil seal.

Installing

Install in reverse order, paying attention to the following:



- -> Drive home new oil seal using special tool 3339, taking care not to tilt oil seal.
- Half-fill space between sealing lip and dust lip with sealing grease G52 128 A1.
- Press in flange shaft against spring force and secure with taper-head bolt.
- Install ball joint and connecting link.

=> Running Gear, Front-wheel Drive and Four-wheel Drive; Repair Group 40; Exploded View: Subframe, anti-roll bar, wishbones Exploded View: Subframe, anti-roll bar, wishbones

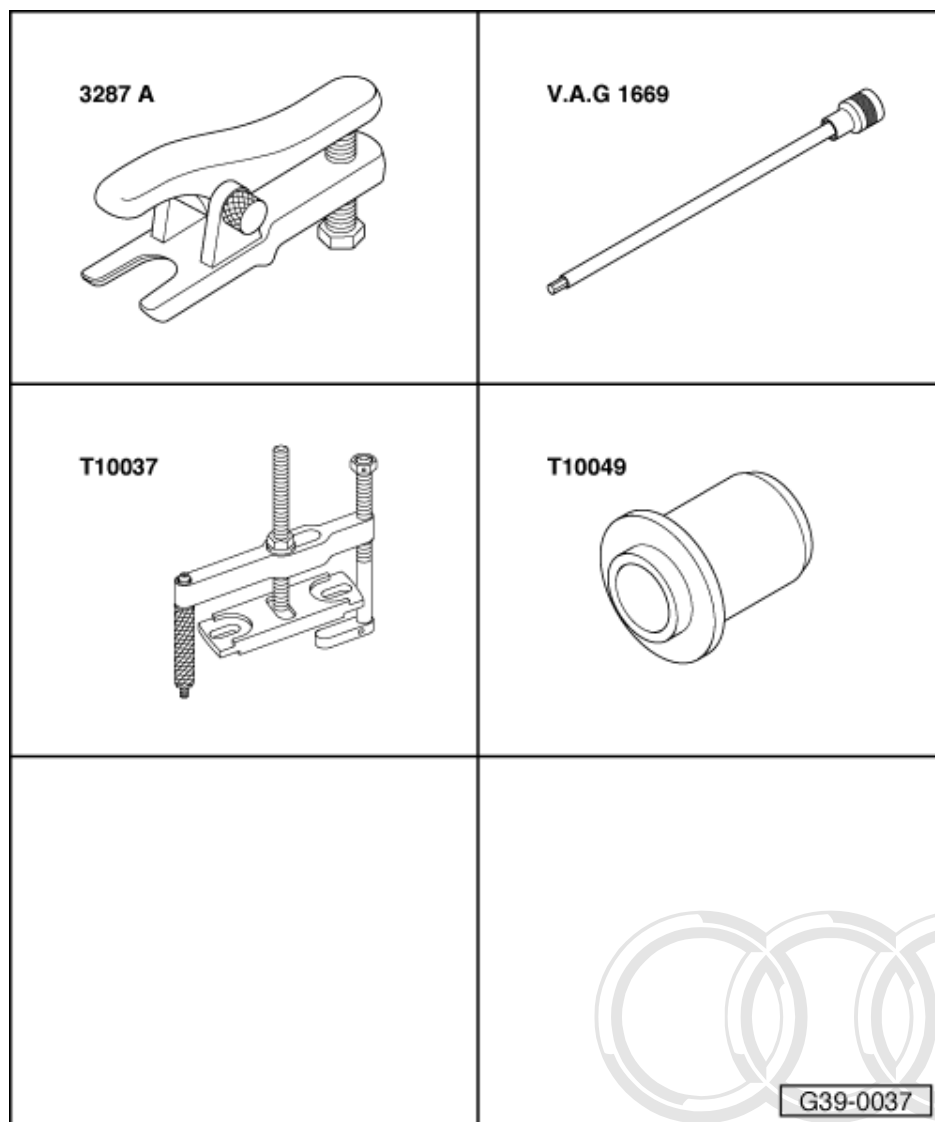
- Check oil in manual gearbox with bevel box
=> Page 83 .

Tightening torques

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Component	Nm
Drive shaft to flange shaft	77
Flange shaft to gearbox (taper-head bolt)	25

1.3 - Replacing oil seal for right drive flange

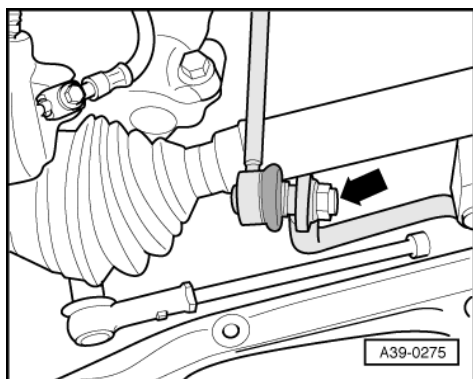


- ◆ 3287 A Ball joint puller
- ◆ V.A.G 1669
or min. 190 mm long, 6 mm socket attachment (commercially available)
- ◆ Special tool T10037
- ◆ Special tool T10049
- ◆ Drip tray

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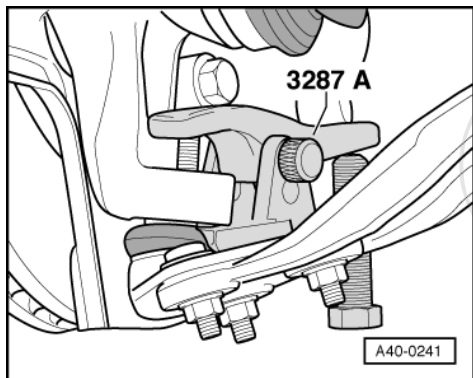


Removing



- -> Unscrew nut for connecting link from anti-roll bar on right.

- Unscrew upper nut from right ball joint.



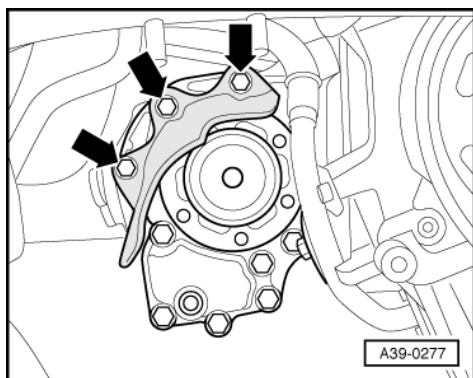
- -> Apply tool as shown and press out ball joint.

Note:

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

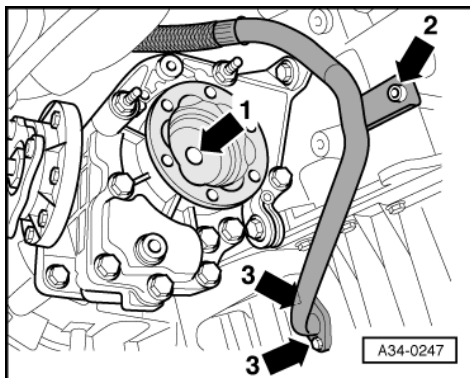
- Turn steering wheel onto left lock.



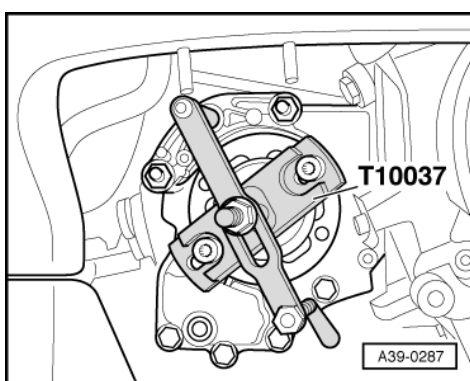
- -> Unscrew heat shield for right drive shaft from bevel box.
- Unscrew right drive shaft at gearbox and tie in place.

=> Running Gear, Front-wheel Drive and Four-wheel Drive; Repair Group 40; Drive Shafts; Removing and installing drive shaft Drive Shafts Removing and installing drive shaft

- Place drip tray under engine.



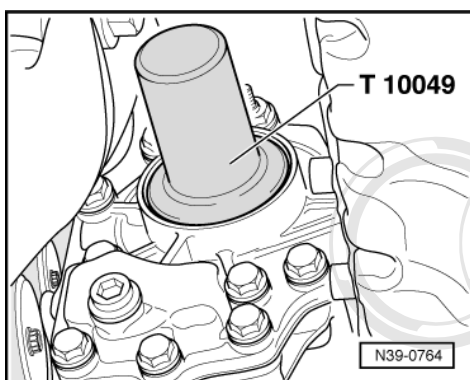
- -> Unscrew oil return pipe for turbocharger from sump and cylinder block -arrows 2 and 3-.
- Place drip tray under gearbox.
- Use V.A.G 1669 to remove bolt for right flange shaft -arrow 1-.



- -> Pull out drive flange for flange shaft using special tool T10037 .
- Lever out drive flange oil seal.

Installing

Install in reverse order, paying attention to the following:



- -> Drive home new oil seal using special tool T10049.
- Half-fill space between sealing lip and dust lip with sealing grease G52 128 A1.
- Carefully drive in flange shaft whilst turning it.
- Secure flange shaft with taper-head bolt.
- Install turbocharger oil return pipe with new gasket.
- Screw right drive shaft to flange shaft.
- Attach drive shaft shield to bevel box.
- Check oil in manual gearbox with bevel box => Page 83
- Top up engine oil:



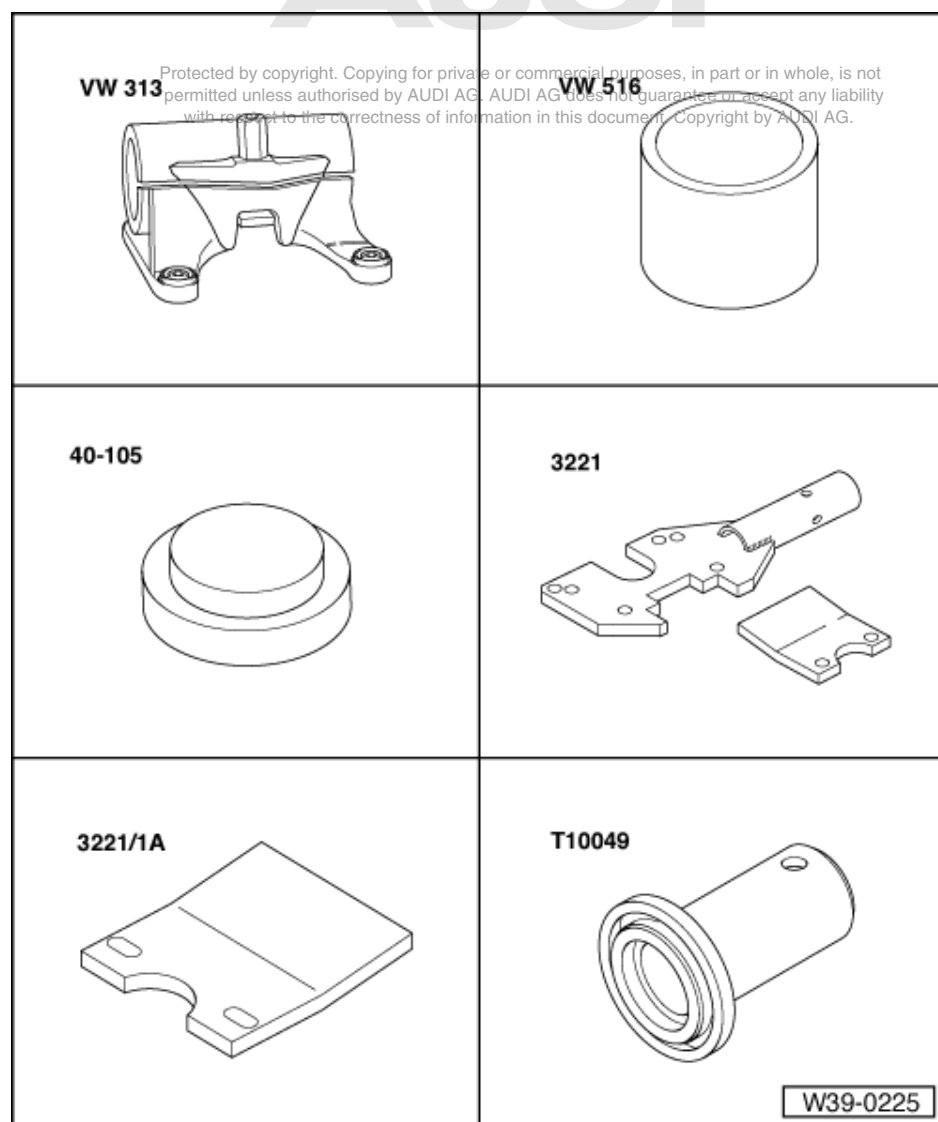
=> 4-cyl. Engine (5-valve Turbo), Mechanics; Repair Group 17; Removing and installing lubrication system components; Engine oil Removing and installing lubrication system components Engine oil

Tightening torques

Component	Nm
Flange shaft to gearbox (taper-head bolt)	25
Drive shaft to flange shaft	77
Oil return pipe to sump	10
Oil return pipe to cylinder block	10
Heat shield for drive shaft	25

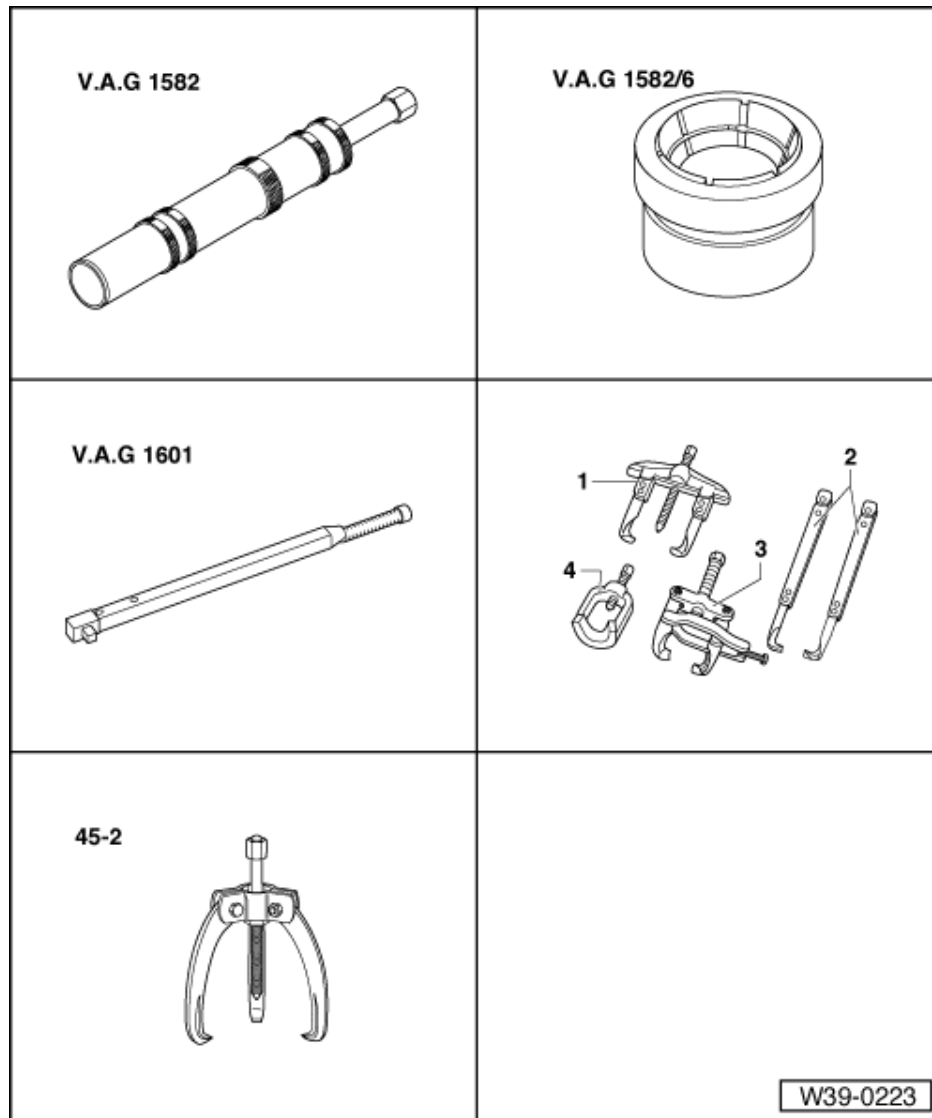
2 - Replacing oil seal for bevel box output flange

2.1 - Replacing oil seal for bevel box output flange



Special tools and workshop equipment required

- ◆ VW 313 Support clamp
- ◆ VW 516 Tubular section
- ◆ 40-105 Thrust plate
- ◆ 3221 Gearbox bracket
- ◆ 3221/1A Support plate
- ◆ T10049 Thrust pad



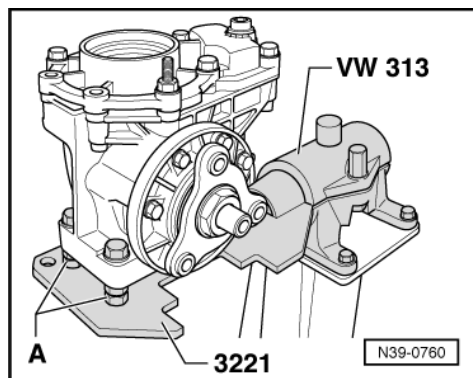
Special tools and workshop equipment required

- ◆ V.A.G 1582 Taper roller bearing puller
- ◆ V.A.G 1582/6 Gripper
- ◆ V.A.G 1601 Torque wrench
- ◆ 1 - Kukko 20/10 Two-arm puller
- ◆ Kukko 45-2 Three-arm puller

Removing

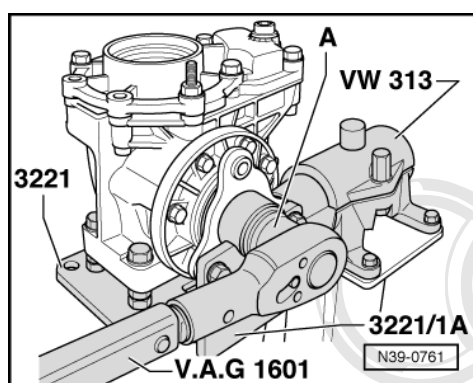
- Bevel box removed
- Remove bevel box => Page 74 .

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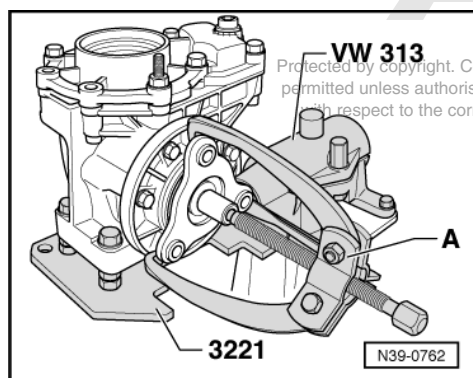
- -> Attach bevel box to gearbox bracket.

A - M12 x 10 nut (8x)



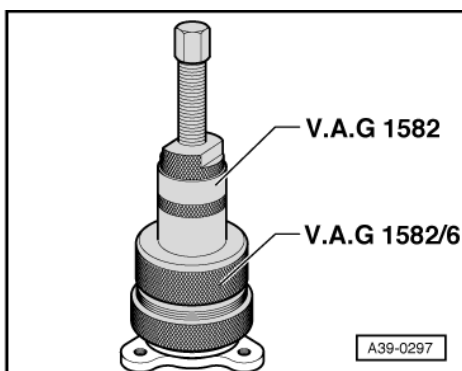
- -> Lock bevel box output flange using support plate 3221/1A.
- Use socket attachment -A- to remove hexagon nut.

A - Socket attachment for 3/4" drive



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

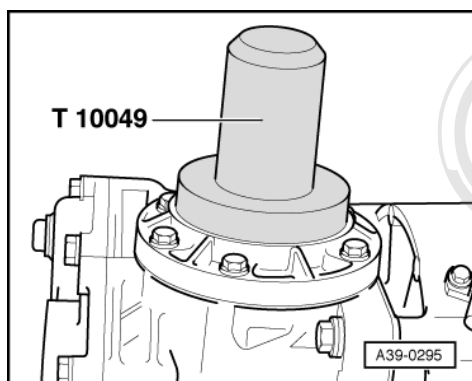
A - Three-arm puller, e.g. Kukko 45-2



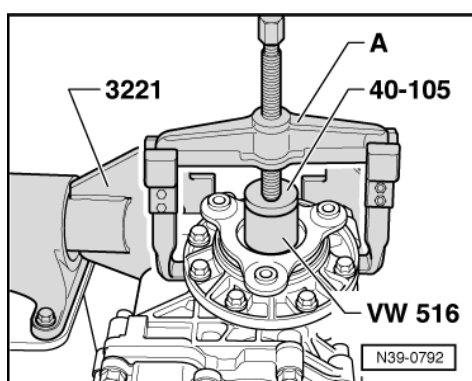
- Position thrust plate 40-105 on output flange.
- -> Pull bearing inner race off output flange.
- Detach oil seal from output flange.

Installing

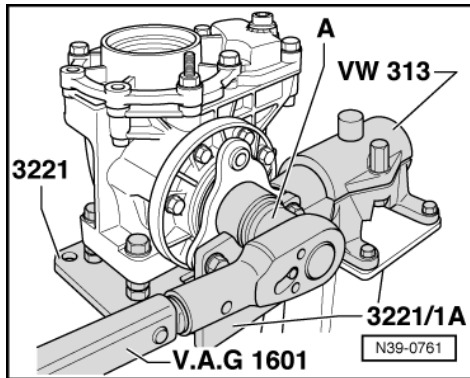
- Swivel bevel box until output flange is pointing upwards.



- Insert bearing inner race in bevel box.
 - -> Drive home new oil seal, taking care not to tilt it.
 - Half-fill space between sealing lip and dust lip with sealing grease G52 128 A1.
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- -> Fit output flange.
- A - Two-arm puller, e.g. Kukko 20/10
- Apply pulling arms to underside of drive pinion housing.



- -> Tighten new hexagon nut for output flange to 475 Nm.

A - Socket attachment for 3/4" drive

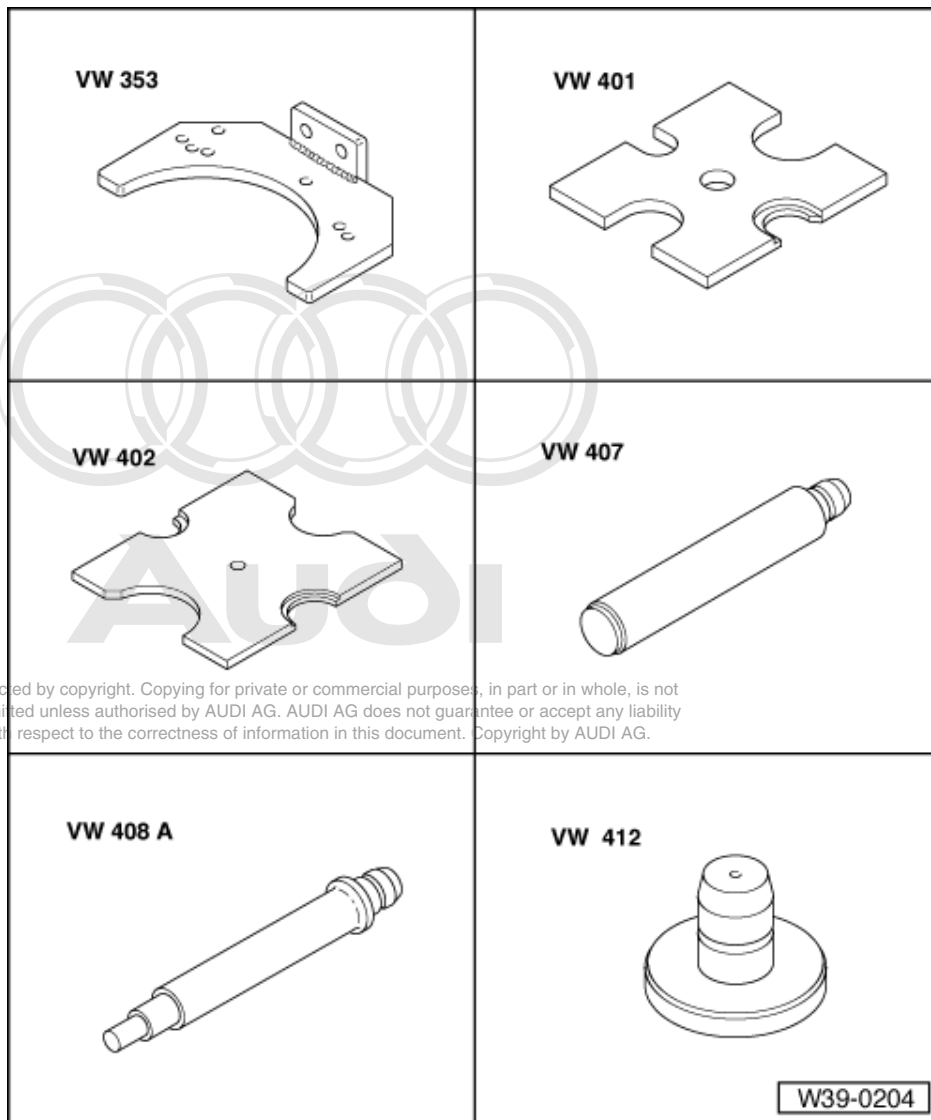
- Install bevel box => Page 80 .
- Check oil in manual gearbox with bevel box => Page 83 .



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3 - Dismantling and assembling differential

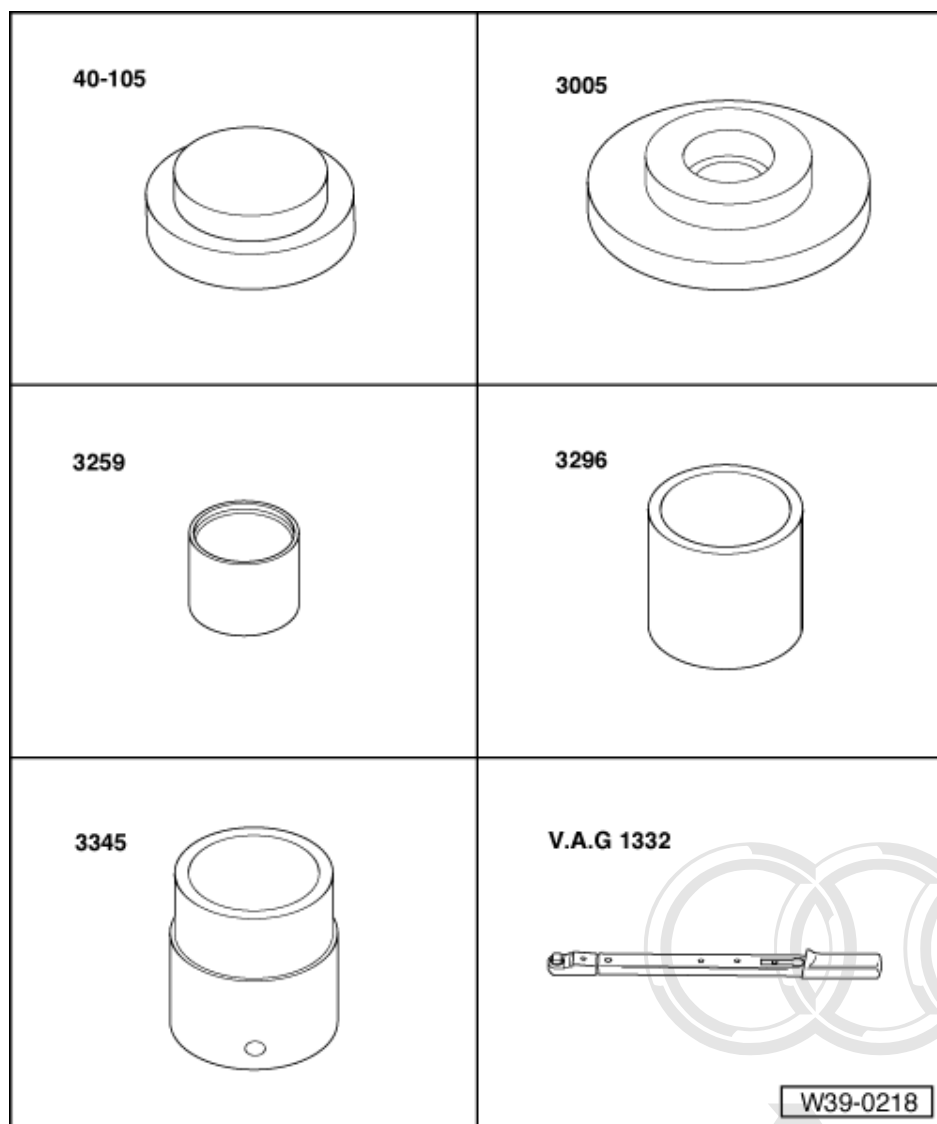
3.1 - Dismantling and assembling differential



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Special tools and workshop equipment required

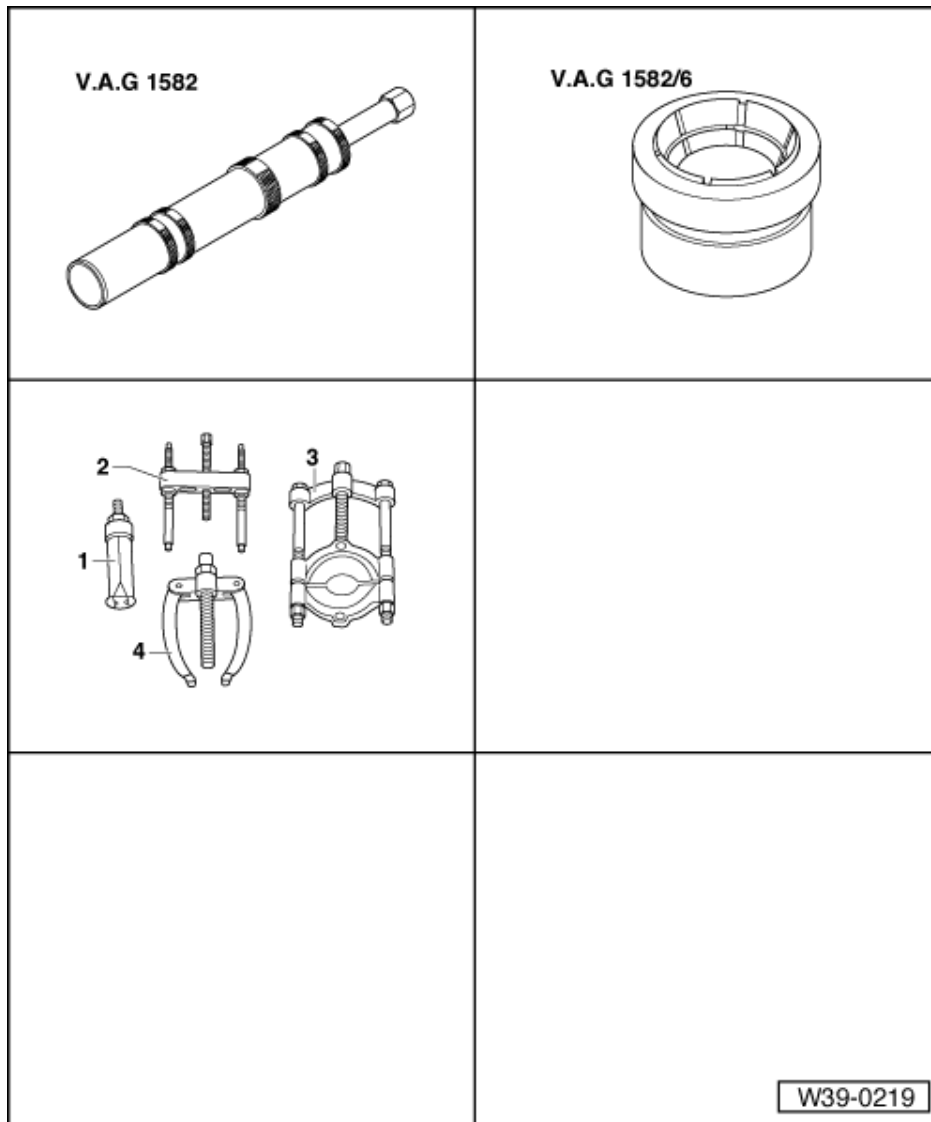
- ♦ VW 353 Gearbox support
- ♦ VW 401 Pressure plate
- ♦ VW 402 Pressure plate
- ♦ VW 407 Press tool
- ♦ VW 408 A Press tool
- ♦ VW 412 Press tool



Special tools and workshop equipment required

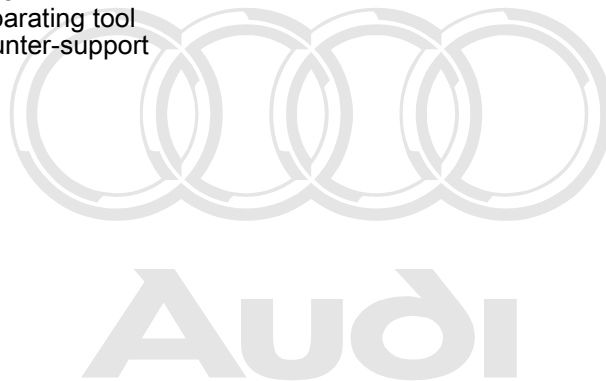
- ♦ 40-105 Thrust plate
- ♦ 3005 Thrust plate
- ♦ 3259 Tube
- ♦ 3296 Tube
- ♦ 3345 Tube
- ♦ V.A.G 1332 Torque wrench

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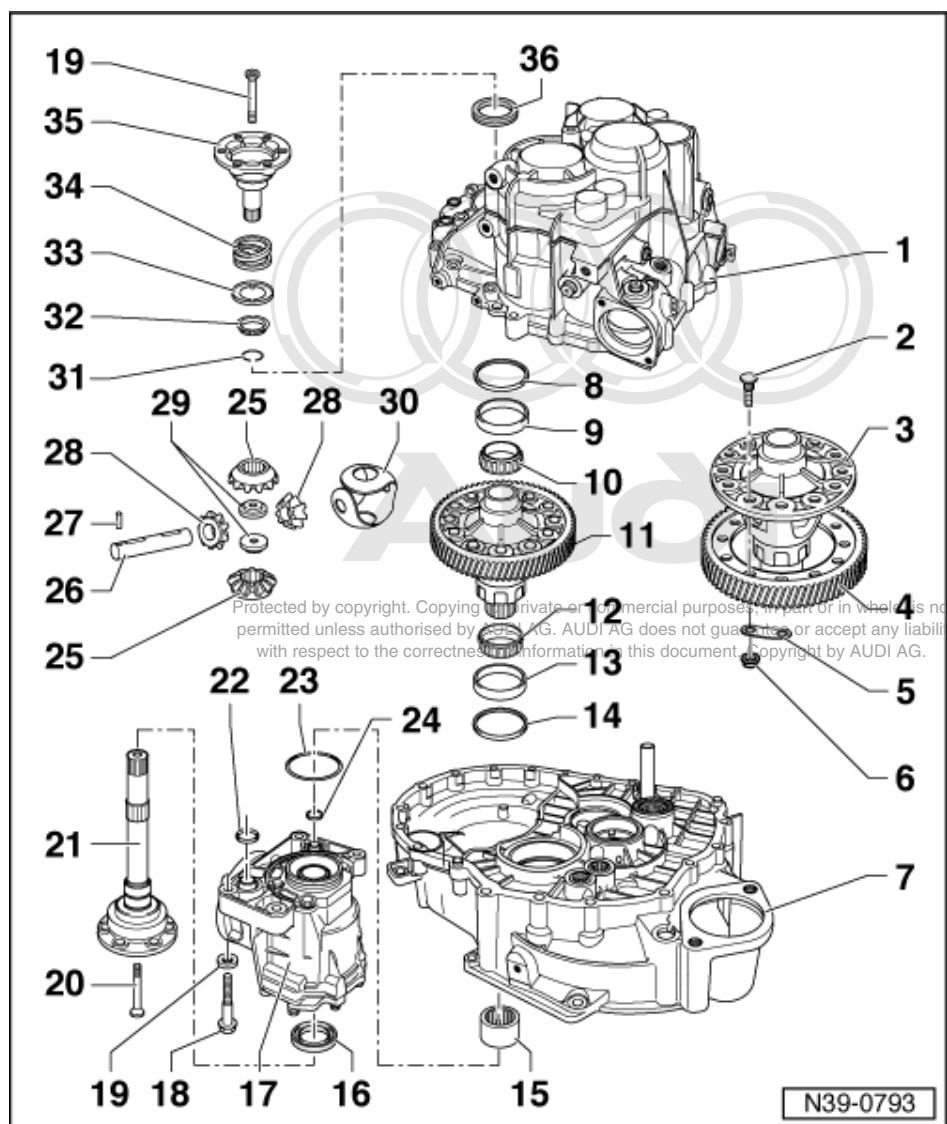


Special tools and workshop equipment required

- ◆ V.A.G 1582 Taper roller bearing puller
- ◆ V.A.G 1582/6 Gripper
- ◆ 1 - Kukko 21/7 Internal puller
- ◆ 2 - Kukko 18/0 Puller
- ◆ 3 - Kukko 17/1 Separating tool
- ◆ 4 - Kukko 22/2 Counter-support



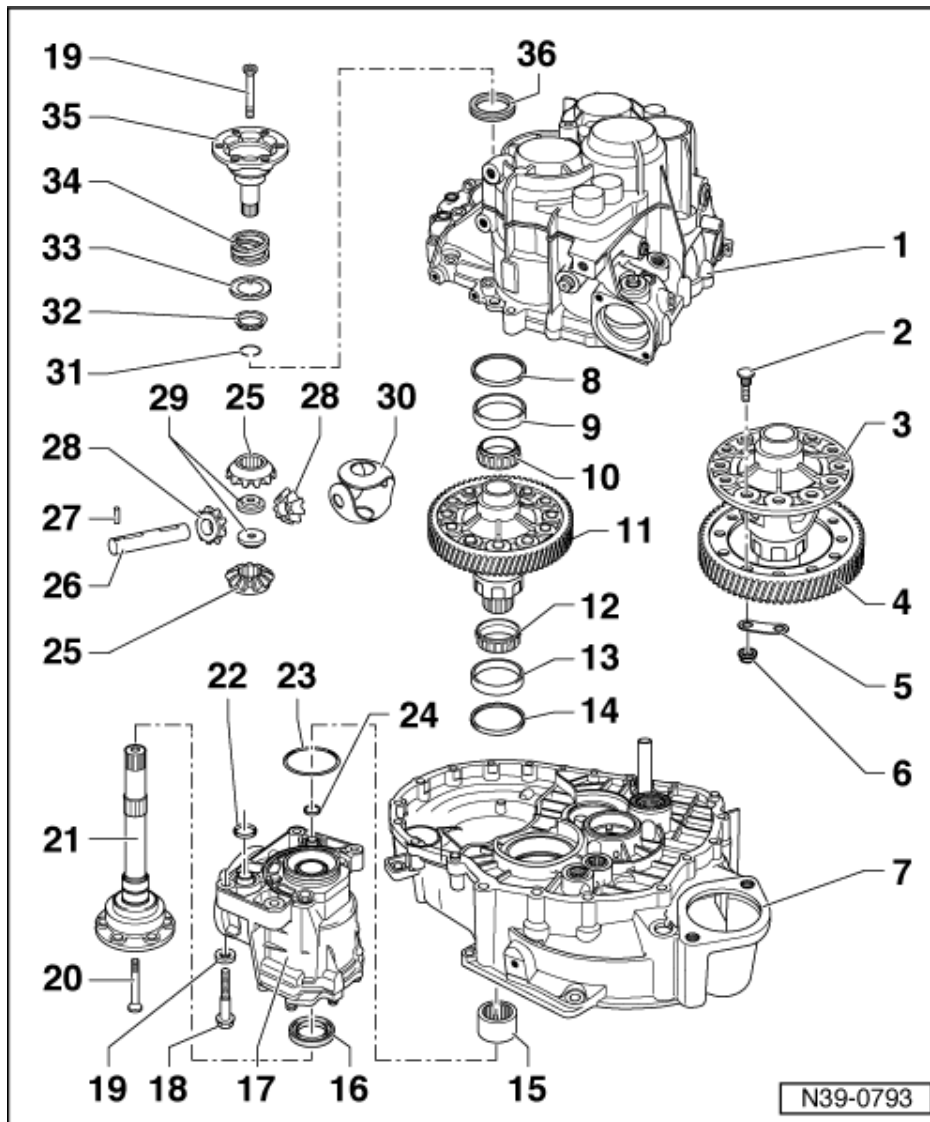
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Notes:

- ♦ Heat taper roller bearing inner race to 100°C before installing.
- ♦ Always replace both taper roller bearings jointly.
- ♦ Adjusting differential on replacing taper roller bearings, differential housing, gearbox housing and clutch housing=> Page 219 .

- 1 Gearbox housing**
- 2 Bolt**
 - ♦ Always replace
- 3 Differential housing**
 - ♦ Bolt to final drive gear

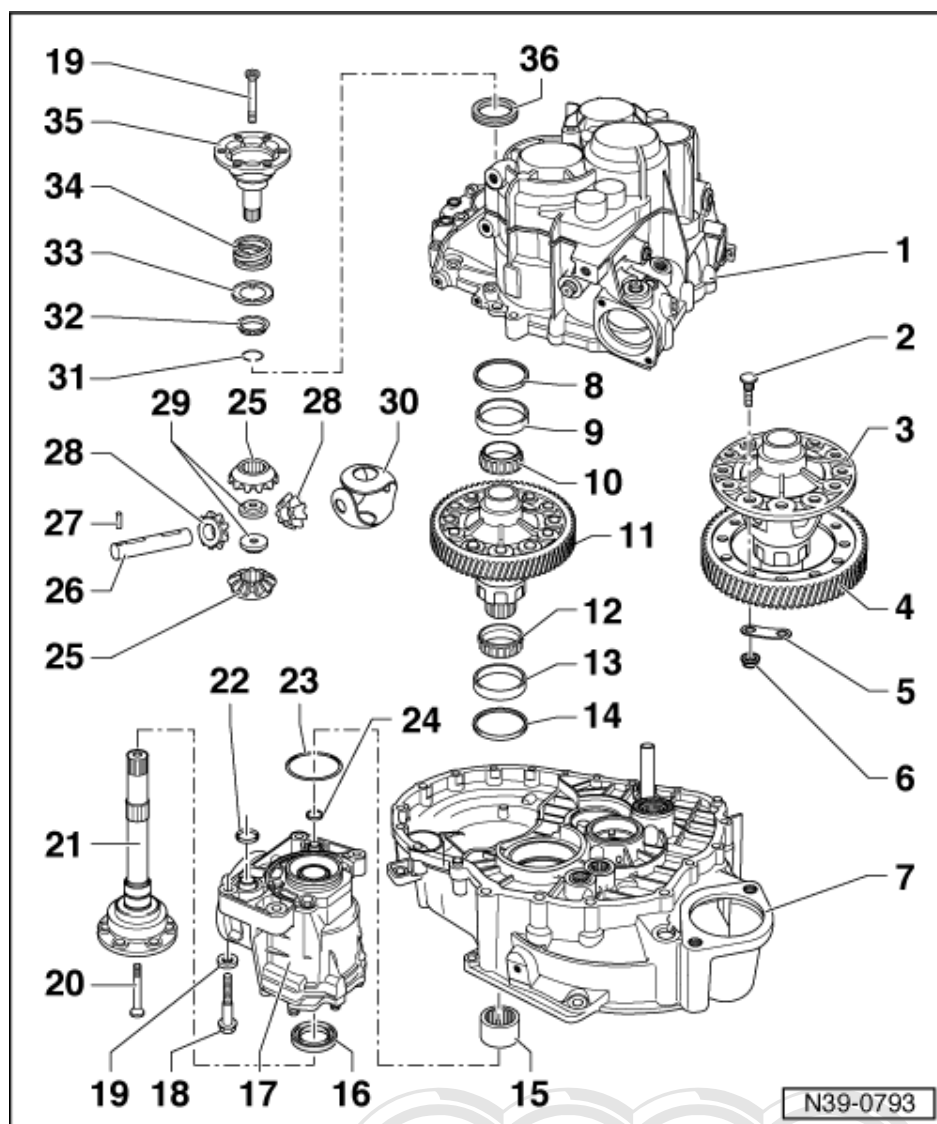
**4 Final drive gear**

- ◆ Riveted as standard
- ◆ Pressing off => Fig. 8
- ◆ Installation position: Machined side facing bolting surface of differential housing
- ◆ Heat to 100°C before installing
- ◆ Positioning on differential housing => Fig. 9
- ◆ Bolted => Fig. 10

5 Packing plate**6 Nut, 40 Nm + further 45° turn****7 Clutch housing****8 Shim**

- ◆ For differential
- ◆ Determining thickness=> Page 219

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**9 Taper roller bearing outer race**

- ♦ Extracting => Fig. 5
- ♦ Pressing in => Fig. 6

10 Taper roller bearing inner race

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

11 Differential housing

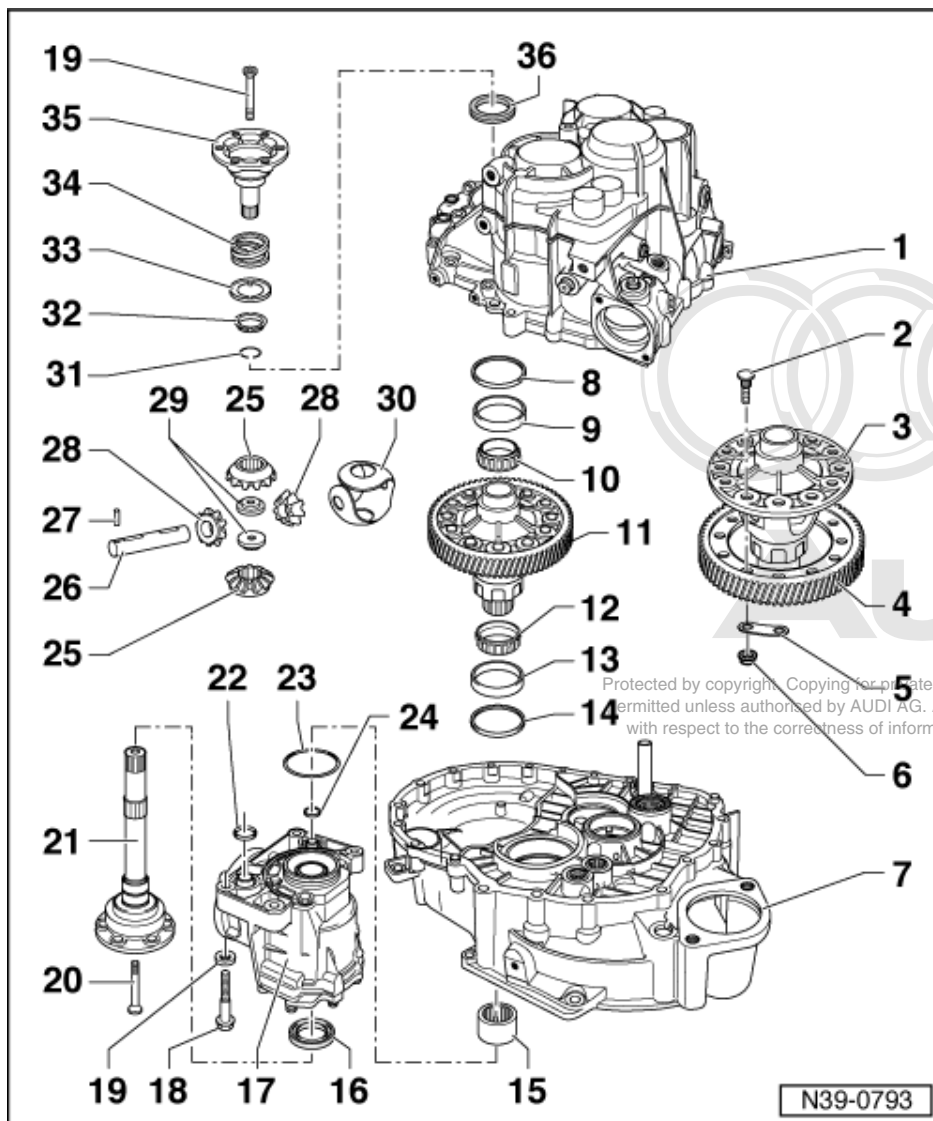
- ♦ With riveted final drive gear
- ♦ Drilling off rivet heads on replacing final drive gear=>Fig. 7
- ♦ Securing final drive gear with bolts
=> Fig. 10

12 Taper roller bearing inner race

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

13 Taper roller bearing outer race

- ♦ Extracting => Fig. 1
- ♦ Pressing in => Fig. 2

**14 Washer**

- ◆ Always 0.65 mm thick

15 Bevel box connecting sleeve

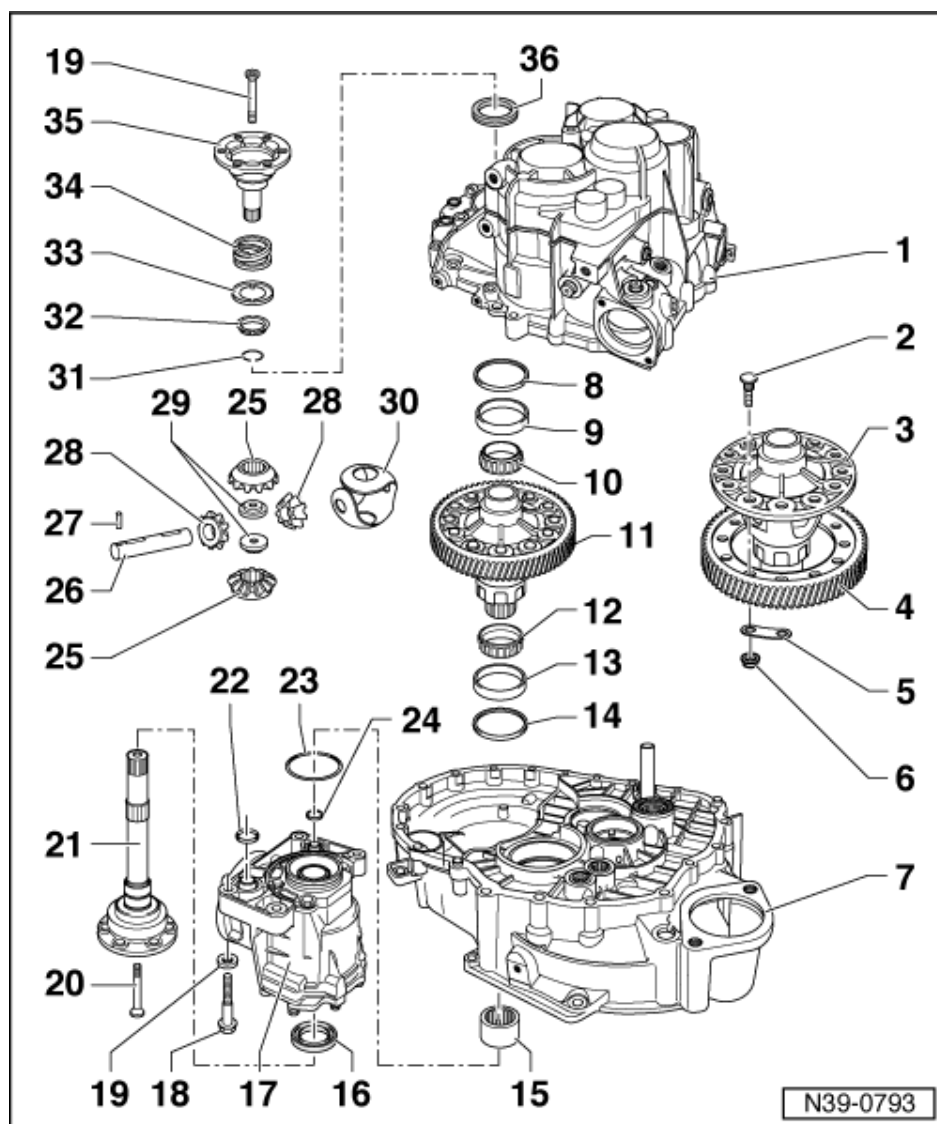
- ◆ Pressed onto differential housing
- ◆ Only pull off and press on after removing differential housing
- ◆ Pulling off => Fig. 13
- ◆ Pressing on => Fig. 14

16 Oil seal

- ◆ For right flange shaft
- ◆ Different diameter on left and right
- ◆ Replacing with gearbox installed
=>Page 192

17 Bevel box

- ◆ Removing and installing with gearbox fitted => Page 74
- ◆ Removing and installing with gearbox removed=>Page 98



18 Hexagon bolt, 40 Nm + further 45° turn

- ♦ Always replace

19 Washer

20 Taper-head bolt, 25 Nm

- ♦ Screw to threaded piece (item 29)

21 Right flange shaft

22 O-ring

- ♦ Always replace

23 O-ring

- ♦ Always replace

24 O-ring

- ♦ Always replace

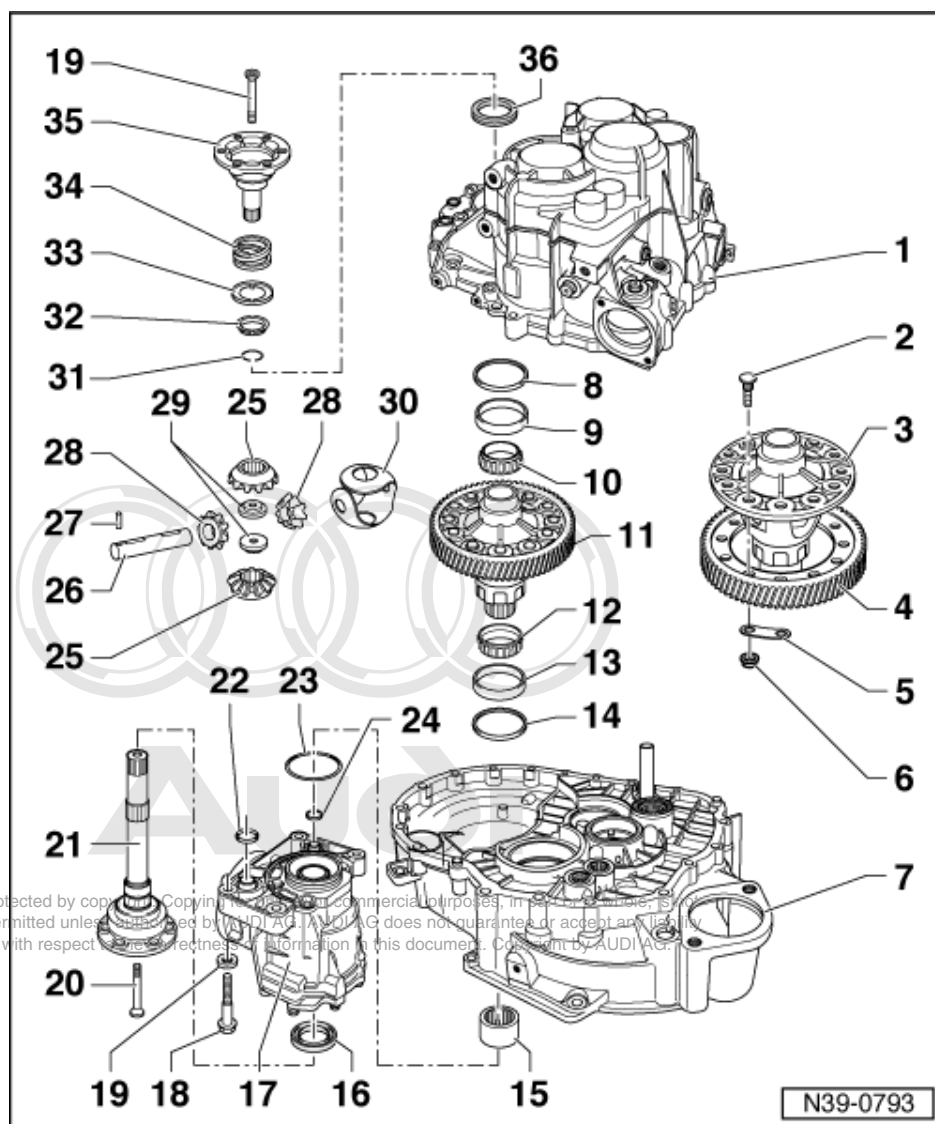
25 Sun wheel

- ♦ Installing => Fig. 12

26 Planet pinion shaft

- ♦ Drive out with mandrel
- ♦ Installing => Fig. 12

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**27 Spring pin**

- ♦ For securing planet pinion shaft
- ♦ Removing and installing => Fig. 11

28 Planet pinion

- ♦ Installing => Fig. 12

29 Threaded piece

- ♦ Installing => Fig. 12

30 One-piece thrust washer

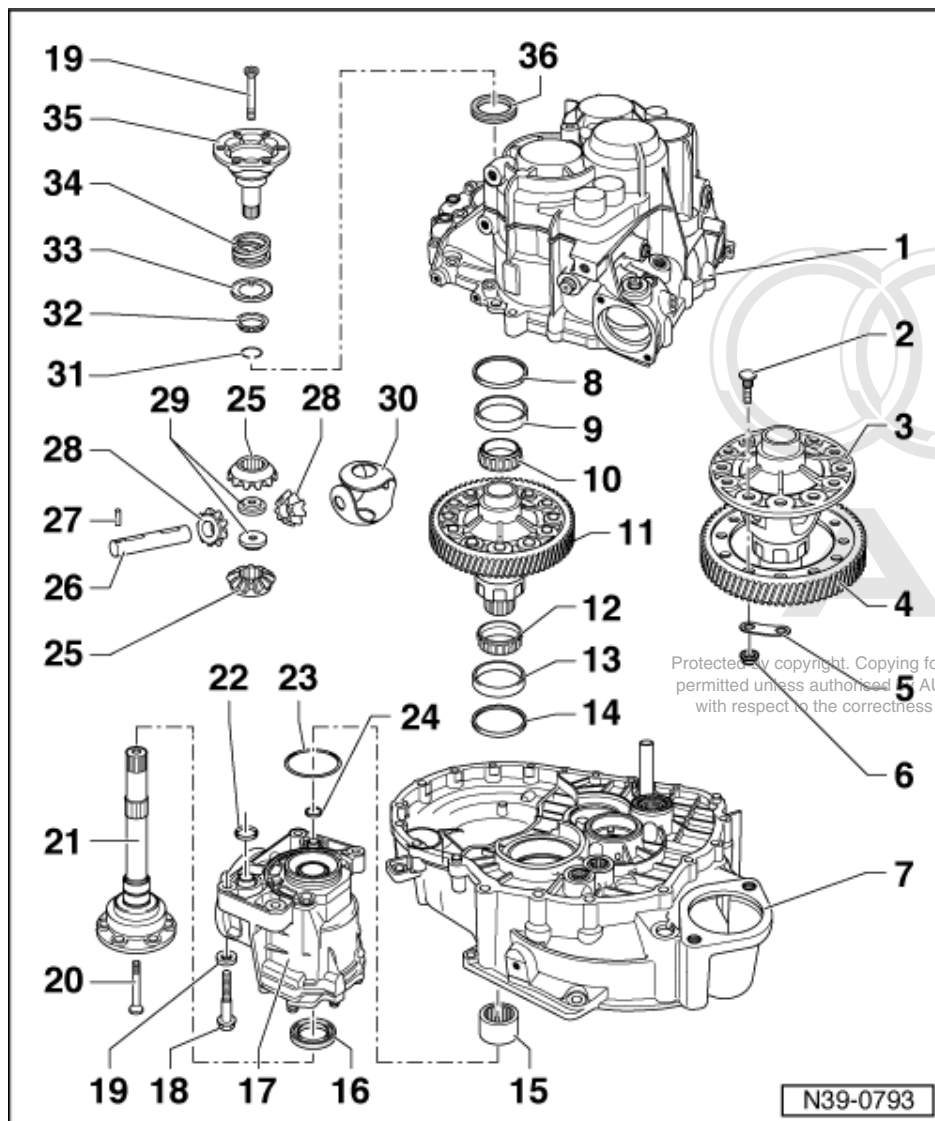
- ♦ Apply gear oil when fitting

31 Circlip

- ♦ Holds tapered ring, thrust washer and spring in position with flange shaft removed

32 Tapered ring

- ♦ With grooves for engaging thrust washer
- ♦ Installation position: Taper facing differential housing

**33 Thrust washer**

- ♦ Installation position:
Collar facing spring, webs facing tapered ring

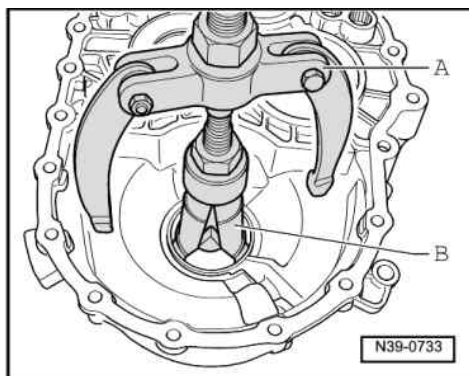
34 Flange shaft spring

- ♦ Installed behind flange shafts

35 Left flange shaft**36 Oil seal**

- ♦ For left flange shaft
- ♦ Different diameter on left and right
- ♦ Replacing with gearbox installed

=> Page **192**



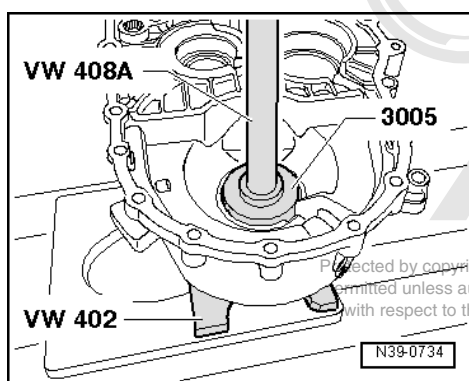
-> Fig.1 Extracting taper roller bearing outer race from clutch housing

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

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

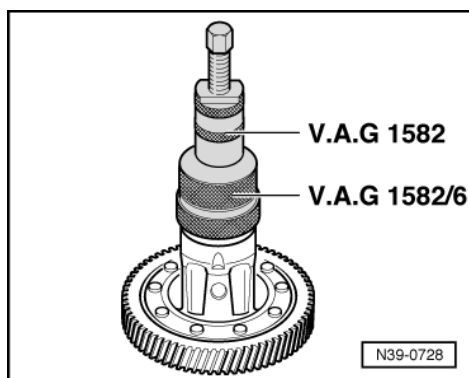
Note:

Check washer for damage and replace if necessary following extraction.



-> Fig.2 Pressing taper roller bearing outer race into clutch housing

- Insert washer first.



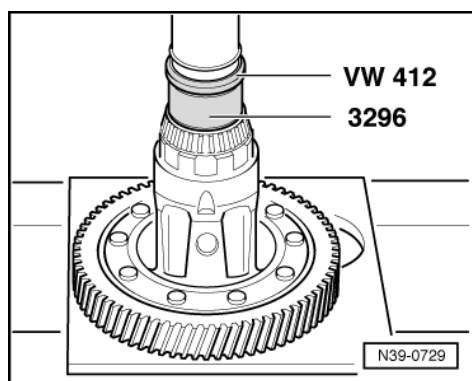
-> Fig.3 Pulling off taper roller bearing inner races

- Position thrust plate 40-105 on differential housing before setting up puller.



Note:

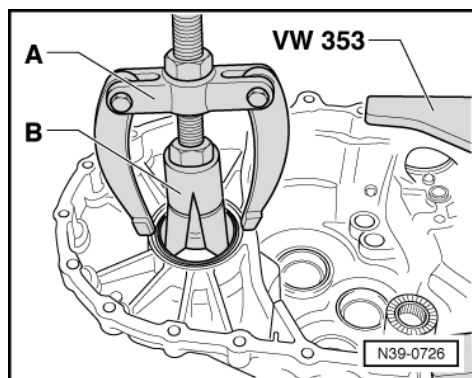
The pulling-off process for the two taper roller bearing inner races of the differential housing is identical.



-> Fig.4 Pressing on taper roller bearing inner races

Note:

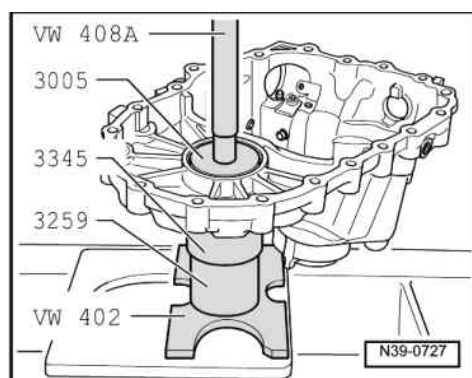
Same pressing tools are used to press on taper roller bearing inner races for gearbox housing and clutch housing.



-> Fig.5 Extracting taper roller bearing outer race from gearbox housing

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

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

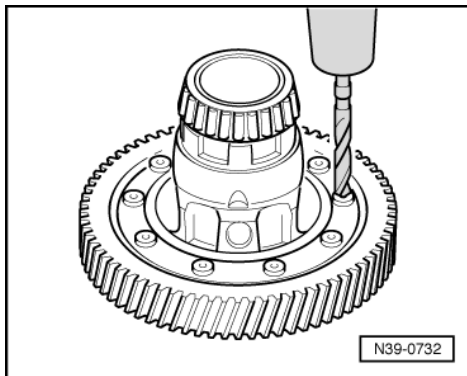


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-> Fig.6 Pressing taper roller bearing outer race into gearbox housing

- Support gearbox housing with tube 3345 directly beneath bearing support.



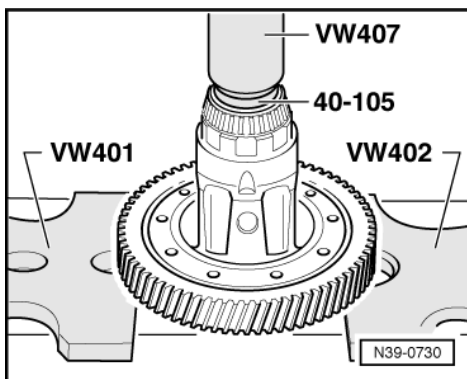
-> Fig.7 Drilling off rivet heads

- Use 12 mm bit to drill off rivet heads on countersunk side and drive out rivets with a mandrel.

Note:

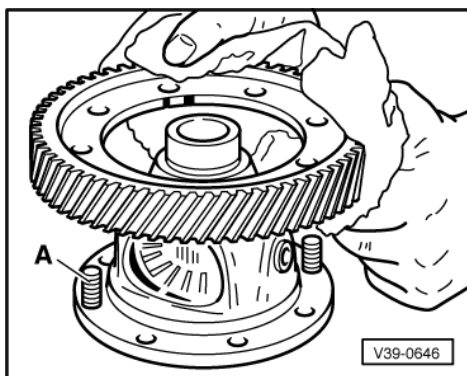
Clean differential before and after drilling and protect taper roller bearing against drillings.

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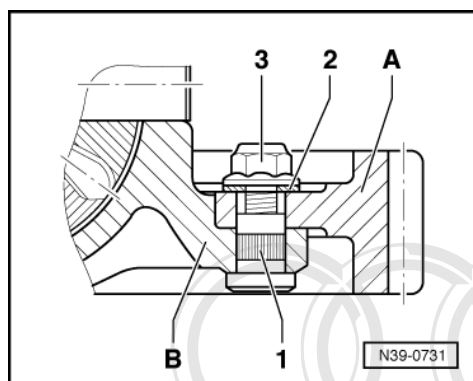
-> Fig.8 Pressing off final drive gear

- Position thrust plate 40-105 on differential housing.



-> Fig.9 Heating final drive gear to approx. 100 °C and fitting

- When fitting, use bolts -A- from repair set to guide final drive gear.



-> Fig.10 Bolting on final drive gear -A- and differential housing -B-

Use special bolts -1- with packing plates -2- and nuts -3- as per Parts List.

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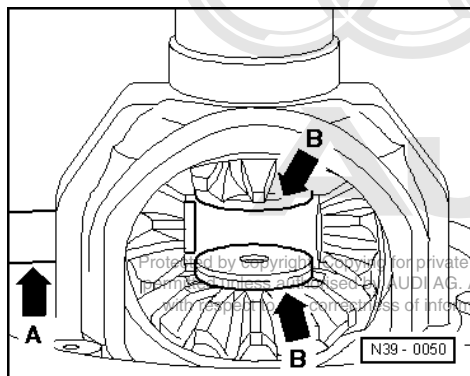
-> Fig.11 Removing and installing spring pin for planet pinion shaft

Removing

- Cover taper roller bearing inner race to avoid possible damage and ingress of chips.
- Use chisel to drive out spring pin (apply chisel in all-round groove).

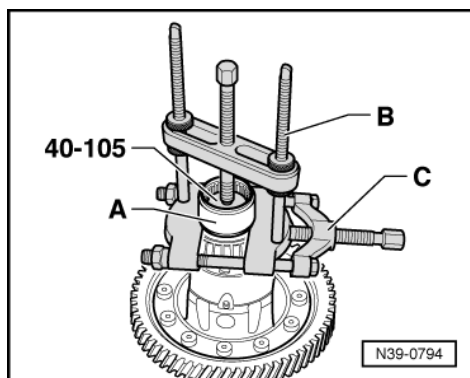
Installing

- Drive home in differential housing.



-> Fig.12 Installing bevel gears

- Lubricate one-piece thrust washer with gear oil and insert.
- Insert both sun wheels and secure (e.g. with flange shaft).
- Insert planet pinions with 180° offset and swivel in.
- Press in planet pinion shaft (arrow -A-) as far as first planet pinion.
- Position threaded pieces (arrows -B-) in sun wheels.
- Installation position: Shoulder facing sun wheel
- Drive planet pinion shaft into final position and secure with spring pin.

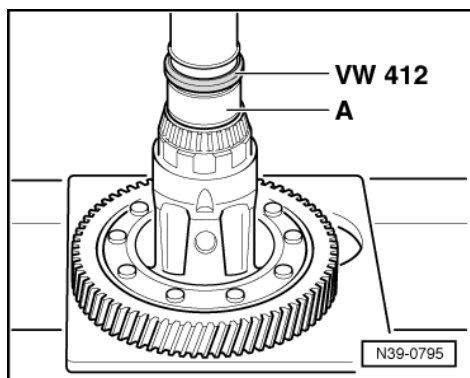


-> Fig.13 Pulling off connecting sleeve

A - Connecting sleeve

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

C - Separating tool 12...75 mm, e.g. Kukko 17/1





-> Fig.14 Pressing on connecting sleeve -A- for bevel box

4 - Adjustment table

4.1 - Adjustment table

Note:

After performing gearbox repair work, it is only necessary to re-adjust input shaft, 1st to 4th gear output shaft, 5th/6th and reverse gear output shaft or differential if components have been replaced which have a direct influence on the gearbox adjustment. Refer to the following table so as to avoid unnecessary adjustment.

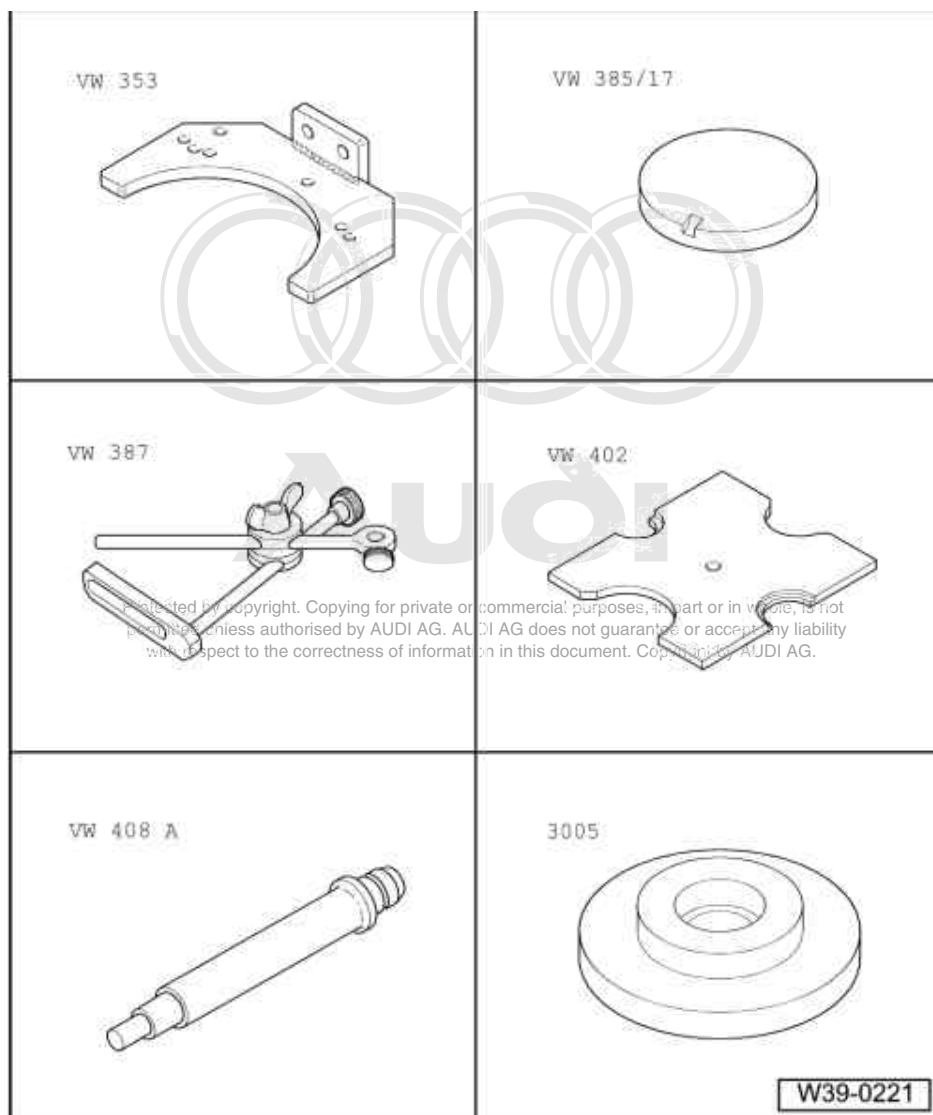
	To be adjusted:			
	Input shaft => Page 138	Output shaft 1st to 4th gear => Page 164	Output shaft 5th/6th and reverse gear => Page 187	Differential => Page 219
Component replaced: Gearbox housing	x	x	x	x
Clutch housing	x	x	x	x
Input shaft	x			
Output shaft for 1st to 4th gear		x		
Output shaft for 5th/6th and reverse gear			x	
Differential housing				x
Input shaft taper roller bearing	x			
Taper roller bearing/output shaft for 1st to 4th gear		x		
Taper roller bearing/output shaft for 5th/6th and reverse gear			x	
Differential taper roller bearing				x



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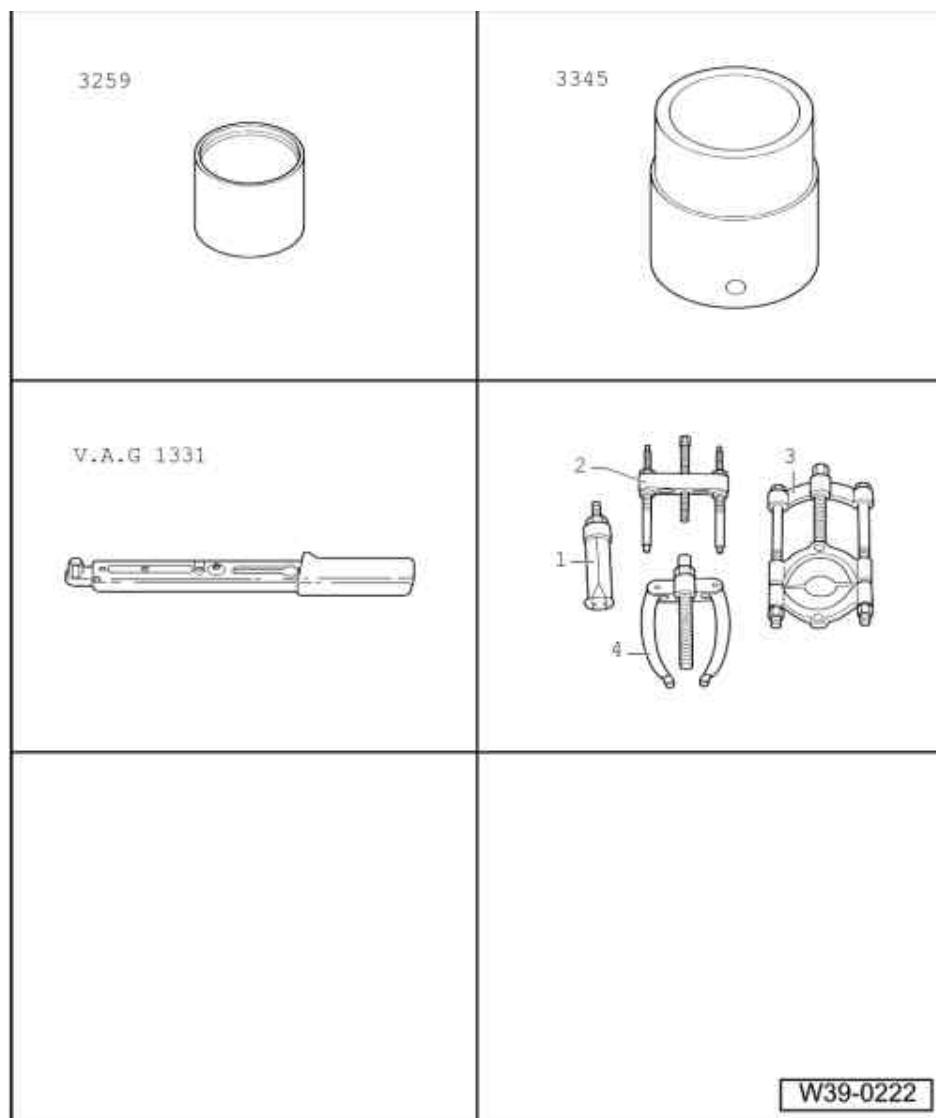
5 - Adjusting differential

5.1 - Adjusting differential



Special tools and workshop equipment required

- ♦ VW 353 Gearbox support
- ♦ VW 385/17 Gauge block plate
- ♦ VW 387 Universal dial gauge holder
- ♦ VW 402 Pressure plate
- ♦ VW 408 A Press tool
- ♦ 3005 Thrust plate

**Special tools and workshop equipment required**

- ♦ 3259 Tube
- ♦ 3345 Tube
- ♦ V.A.G 1331 Torque wrench
- ♦ 1 - Kukko 21/7 Internal puller
- ♦ 4 - Kukko 22/2 Counter-support

Differential only has to be re-adjusted if

- ♦ Gearbox housing
- ♦ Clutch housing
- ♦ Differential housing

or

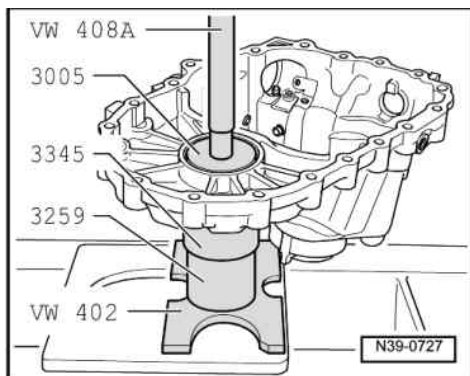
- ♦ Differential taper roller bearings

is/are replaced.

Adjustment table => Page 218

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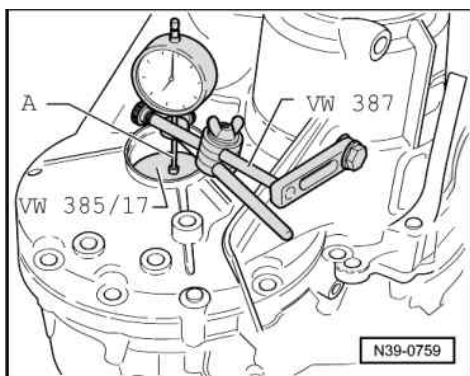
- Press taper roller bearing outer race with shim (thickness 0.65 mm) into clutch housing=>Page 213 .



Note:

Inner and outer taper roller bearing races are paired and are never to be interchanged.

- -> Press taper roller bearing outer race without shim into gearbox housing.
- Insert differential in clutch housing.
- Mount gearbox housing and tighten the 5 bolts to torque.



- Press differential in direction of clutch housing and turn eight times whilst doing so.
- Press differential in direction of gearbox housing and turn eight times whilst doing so.
- -> Fit dial gauge and set to "0" with 1 mm pre-load.

A - Dial gauge extension 30 mm

- Move differential up and down; read off and note down clearance indicated on dial gauge (example: 0.70 mm).

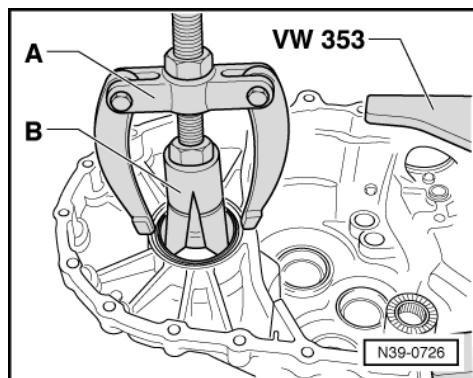
Determining shim

Specified bearing pre-load is attained by adding a constant compression value (0.30 mm) to the measured value determined.

Example:

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

- Detach gearbox housing.



- -> Pull taper roller bearing outer race out of gearbox housing.

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

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

- Insert shims of thickness determined, starting with thickest shim.

The following shims are available:

Thickness (mm)	Part no.
0.65	02B 409 210
0.70	02B 409 210 A
0.75	02B 409 210 B
0.80	02B 409 210 C
0.85	02B 409 210 D
0.90	02B 409 210 E
0.95	02B 409 210 F
1.00	02B 409 210 G
1.05	02B 409 210 H
1.10	02B 409 210 J
1.15	02B 409 210 K
1.20	02B 409 210 L
1.25	02B 409 210 M
1.30	02B 409 210 N
1.35	02B 409 210 P
1.40	02B 409 210 Q
0.70+0.75=1.45	02B 409 210 A/B
0.75+0.75=1.50	02B 409 210 B/B
0.75+0.80=1.55	02B 409 210 B/C
0.80+0.80=1.60	02B 409 210 C/C
0.80+0.85=1.65	02B 409 210 C/D

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

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