Workshop Manual

Golf Variant 2007 ➤
Golf Variant 2010 ➤
Jetta 2005 ➤

6-speed manual gearbox 02S

Edition 07.2009

List of Workshop Manual Repair GroupsList of Workshop Manual Repair GroupsList of Workshop Manual Repair Groups

Repair Group

00 - Technical data

30 - Clutch

34 - Controls, housing

35 - Gears, shafts

39 - Final drive - differential

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

Contents

00 – Technical data

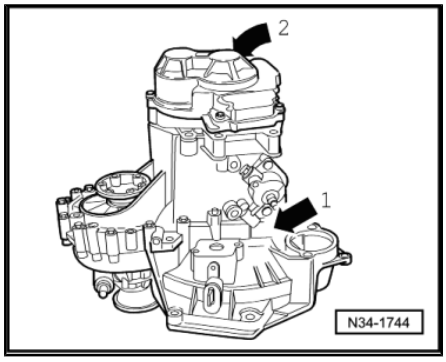
1 Gearbox identification

The 6-speed manual gearbox 02S is installed in the Jetta 2005 ‣, in the Golf Variant 2007 ‣ and in the Golf Variant 2010 ‣ in conjunction with a 4-cylinder engine.

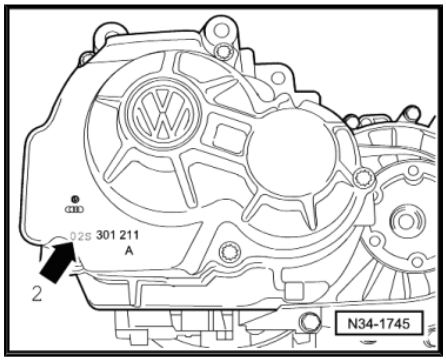
Allocation ⇒ page 1 .

1.1 Location on gearbox

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

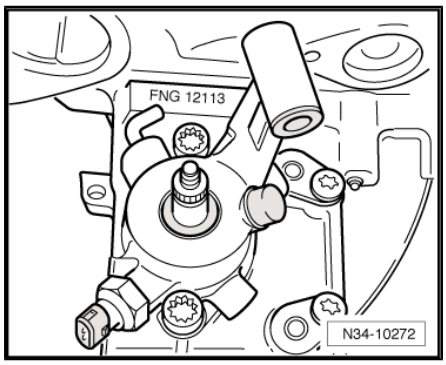


Manual gearbox 02S -arrow 2-



Identification code and date of gearbox manufacture

Example:	FNG	12	11	3
	I	I	I	I
	I	I	I	I
	Identification code	Day	Month	Year (2003) of manufacture



Additional data provide information about the production facility.

Note

The gearbox code also appears on the vehicle identification plates.

1.2 Identification code, assembly allocation and capacities

Manual gearbox		6-speed 02S		
Identification code		**FNG**	**HYG**	**GQM**
Manufactured	from to	05.05 05.05	05.06 09.06	05.05
Allocation	Model	Jetta 2005 ‣ Golf Variant 2007 ‣	Jetta 2005 ‣ Golf Variant 2007 ‣	Jetta 2005 ‣ Golf Variant 2007 ‣

Manual gearbox		6-speed 02S		
Identification code		**FNG**	**HYG**	**GQM**
	Engine	1.9 l - 74 kW turbo diesel 1.9 l - 77 kW turbo diesel	1.4 l - 103 kW	1.9 l - 74 kW turbo diesel 1.9 l - 77 kW turbo diesel
Ratio Z1 : Z2	Final drive	61 : 18 = 3.389	62 : 17 = 3.647	61 : 18 = 3.389
Capacity of manual gearbox (gearbox completely dismantled)		2.1 l	2.1 l	2.1 l
Capacity of manual gearbox ⇒ page 99 (gearbox partially dismantled)		1.9 l	1.9 l	1.9 l
Drive shaft flange ∅		100 mm	100 mm	100 mm

- The following data can be found in the ⇒ Electronic parts catalogue “ETKA” .
- ◆ Individual gear ratios
- ◆ Specification for gear oil
- ◆ Allocation of clutch plate and pressure plate

Manual gearbox		6-speed 02S		
Identification code		**GQP**	**GXV**	**JAU**
Manufactured	from to	05.05 07.05	05.05 08.06	11.05 07.06
Allocation	Model	Jetta 2005 ▸ Golf Variant 2007 ▸	Jetta 2005 ▸ Golf Variant 2007 ▸	Jetta 2005 ▸ Golf Variant 2007 ▸
	Engine	2.0 l - 110 kW	2.0 l - 110 kW	1.4 l - 125 kW
Ratio Z1 : Z2	Final drive	62 : 17 = 3.647	63 : 16 = 3.938	62 : 17 = 3.647
Capacity of manual gearbox (gearbox completely dismantled)		2.1 l	2.1 l	2.1 l
Capacity of manual gearbox ⇒ page 99 (gearbox partially dismantled)		1.9 l	1.9 l	1.9 l
Drive shaft flange ∅		100 mm	100 mm	107 mm

- The following data can be found in the ⇒ Electronic parts catalogue “ETKA” .
- ◆ Individual gear ratios
- ◆ Specification for gear oil
- ◆ Allocation of clutch plate and pressure plate

Manual gearbox		6-speed 02S		
Identification code		**JYL**	**JCL**	**JCN**
Manufactured	from to	09.06	05.06 09.06	05.06 09.06
Allocation	Model	Jetta 2005 ▸ Golf Variant 2007 ▸	Jetta 2005 ▸ Golf Variant 2007 ▸	Jetta 2005 ▸ Golf Variant 2007 ▸
	Engine	2.0 l - 110 kW	1.9 l - 77 kW turbo diesel	2.0 l - 110 kW
Ratio Z1 : Z2	Final drive	63 : 16 = 3.938	61 : 18 = 3.389	62 : 17 = 3.647

Manual gearbox	6-speed 02S		
Identification code	**JYL**	**JCL**	**JCN**
Capacity of manual gearbox (gearbox completely dismantled)	2.1 l	2.1 l	2.1 l
Capacity of manual gearbox ⇒ page 99 (gearbox partially dismantled)	1.9 l	1.9 l	1.9 l
Drive shaft flange ∅	100 mm	100 mm	100 mm
• The following data can be found in the ⇒ Electronic parts catalogue “ETKA” . ♦ Individual gear ratios ♦ Specification for gear oil ♦ Allocation of clutch plate and pressure plate			

Manual gearbox		6-speed 02S		
Identification code		**JCP**	**JCQ**	**JYG**
Manufactured	from to	05.06 09.06	05.06 09.06	09.06
Allocation	Model	Jetta 2005 ▸ Golf Variant 2007 ▸	Jetta 2005 ▸ Golf Variant 2007 ▸	Jetta 2005 ▸ Golf Variant 2007 ▸
	Engine	2.0 l - 110 kW	1.4 l - 125 kW	1.4 l - 125 kW
Ratio Z1 : Z2	Final drive	63 : 16 = 3.938	62 : 17 = 3.647	62 : 17 = 3.647
Capacity of manual gearbox (gearbox completely dismantled)		2.1 l	2.1 l	2.1 l
Capacity of manual gearbox ⇒ page 99 (gearbox partially dismantled)		1.9 l	1.9 l	1.9 l
Drive shaft flange ∅		100 mm	100 mm	100 mm
• The following data can be found in the ⇒ Electronic parts catalogue “ETKA” . ♦ Individual gear ratios ♦ Specification for gear oil ♦ Allocation of clutch plate and pressure plate				

Manual gearbox		6-speed 02S		
Identification code		**JXP**	**JXR**	**KWB**
Manufactured	from to	09.06	09.06	07.08
Allocation	Model	Jetta 2005 ▸ Golf Variant 2007 ▸	Jetta 2005 ▸ Golf Variant 2007 ▸	Jetta 2005 ▸ Golf Variant 2007 ▸ Golf Variant 2010 ▸
	Engine	1.4 l - 103 kW	2.0 l - 110 kW	1.4 l - 118 kW
Ratio Z1 : Z2	Final drive	62 : 17 = 3,647		
Capacity of manual gearbox (gearbox completely dismantled)		2.1 l		
Capacity of manual gearbox ⇒ page 99 (gearbox partially dismantled)		1.9 l		
Drive shaft flange ∅		100 mm		

Manual gearbox	6-speed 02S		
Identification code	**JXP**	**JXR**	**KWB**

- The following data can be found in the ⇒ Electronic parts catalogue “ETKA” .

♦ Individual gear ratios

♦ Specification for gear oil

♦ Allocation of clutch plate and pressure plate

2 Overview - power transmission

Designation

-Arrows- indicate direction of travel.

1 - Engine

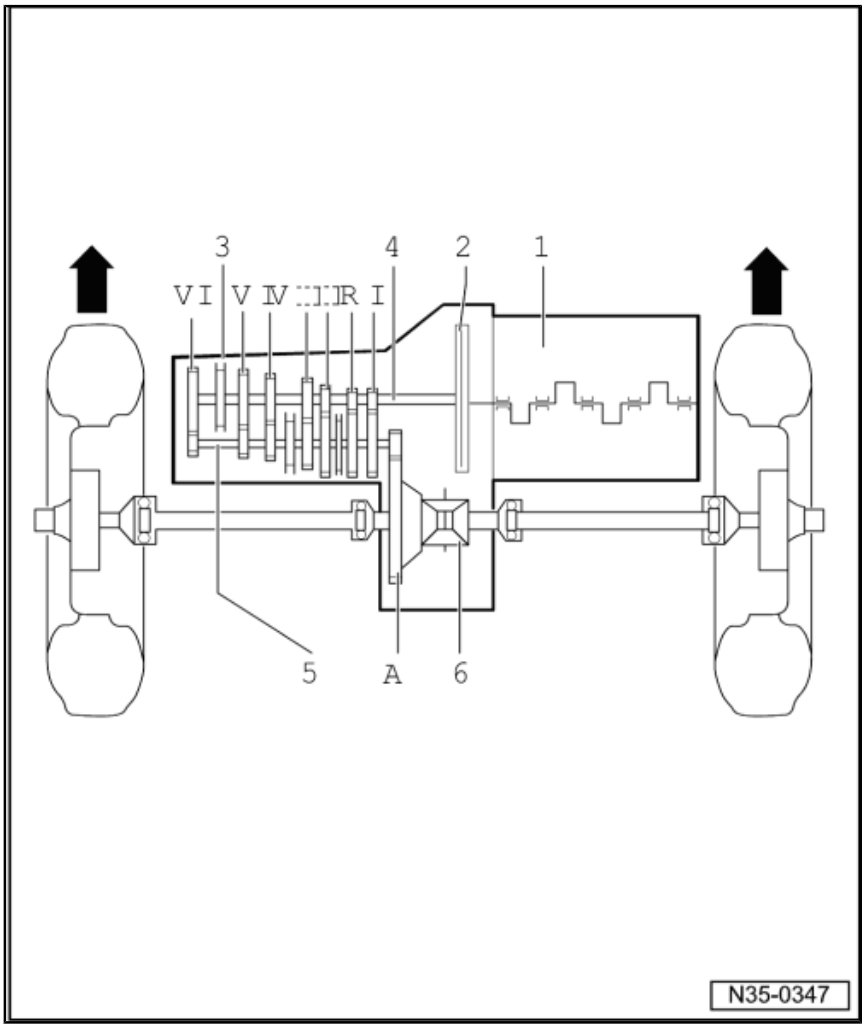
2 - Clutch

3 - Manual gearbox

4 - Input shaft

5 - Output shaft

6 - Differential



Ratio

-Arrows- indicate direction of travel.

I - 1st gear

II - 2nd gear

III - 3rd gear

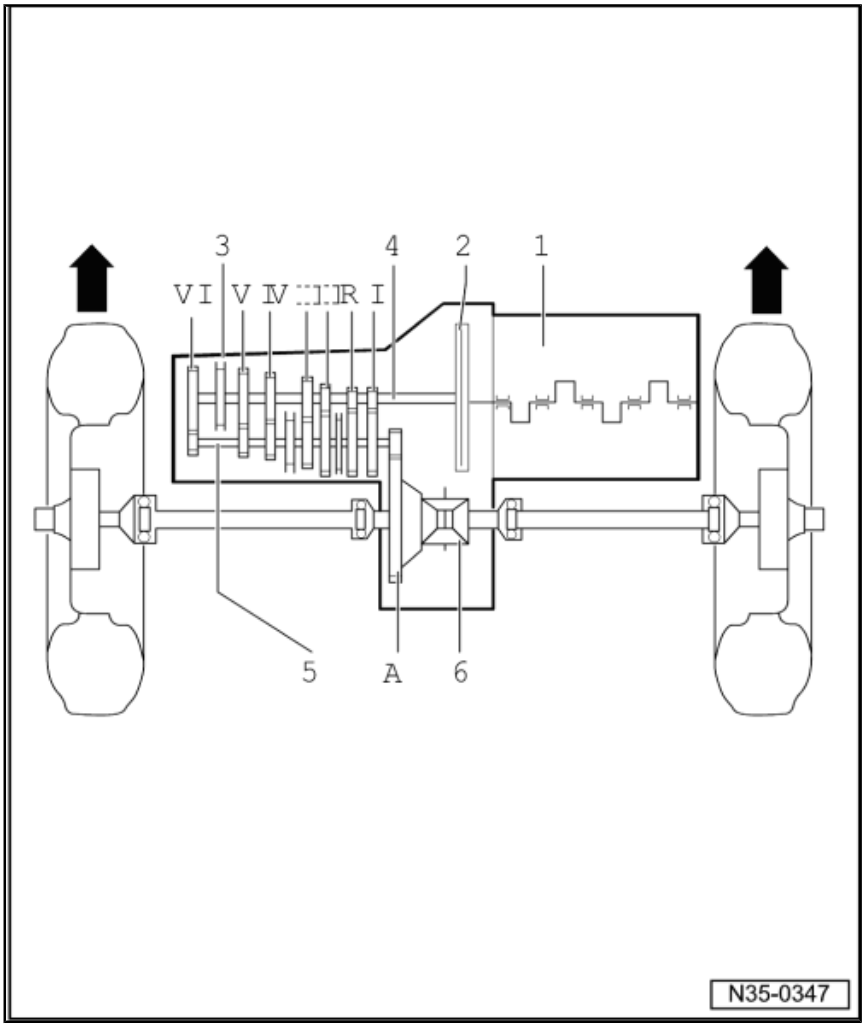
IV - 4th gear

V - 5th gear

VI - 6th gear

R - Reverse gear

A - Final drive



3 Calculating overall gear ratio “i”

Example:

	6th gear	Final drive
Drive gear	$ZG_1 = 45$	$ZA_1 = 18$
Driven gear	$ZG_2 = 34$	$ZA_2 = 60$

$i = Z_2 : Z_1$ [1)]

i_G = Gear ratio = $ZG_2 : ZG_1 = 34 : 45 = 0.756$

i_A = Final drive ratio = $ZA_2 : ZA_1 = 60 : 18 = 3.389$

i_{total} = Overall ratio = $i_G \times i_A = 0.756 \times 3.389 = 2.562$

1) Z_1 = No. of teeth on driving gear, Z_2 = No. of teeth on driven gear

4 General repair notes

To ensure flawless and successful gearbox repairs, the greatest care and cleanliness as well as the use of good and proper tools are essential. Of course, the basic rules for safety also apply during repair work.

A number of instructions generally applicable to the various repair procedures - which were previously repeated a number of times at various places in the workshop manual are summarised under the topic “components” ⇒ page 8 . They apply to this workshop manual.

4.1 Components

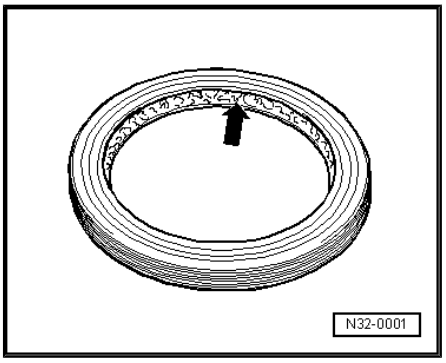
4.1.1 Gearbox

- When installing the manual gearbox, ensure that the dowel sleeves between the engine and gearbox are correctly seated.
- When installing mounting brackets or waxed components, clean the contact surfaces. Contact surfaces must be free of wax and grease.
- Allocate bolts and other components using ⇒ Electronic parts catalogue “ETKA” .
- Capacity ⇒ page 1 .
- If the gearbox is repaired, fill with gear oil.

Capacity, gearbox completely dismantled	Gearbox capacity, gearbox partially dismantled ⇒ page 99
2.1 l	1.9 l

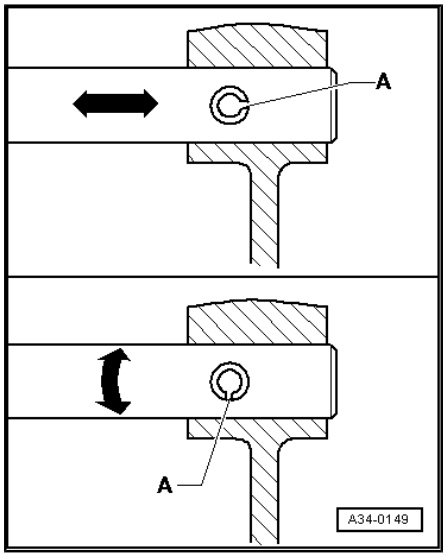
4.1.2 O-rings, seals, gaskets and sealants

- Thoroughly clean housing joint surfaces before applying sealant .
- Apply sealant -AMV 188 200 03- uniformly but not too thick.
- Always renew O-rings, seals and gaskets.
- After removing gaskets and seals, always inspect contact surface of housing or shaft for burrs resulting from removal or for other signs of damage.
- Before installing radial shaft seals, lightly oil outer diameter and half-fill space between sealing lips -arrow- with sealing grease -G 052 128 A1- .
- The open side of the oil seal faces the side with fluid filling.
- Press in new oil seals so that sealing lip does not contact the shaft in the same place as the old seal (make use of insertion depth tolerances).
- Lightly oil O-rings before installing; this prevents the rings being crushed when inserted.
- After renewing seals and gaskets, check oil level in gearbox and replenish if necessary ⇒ page 99 .



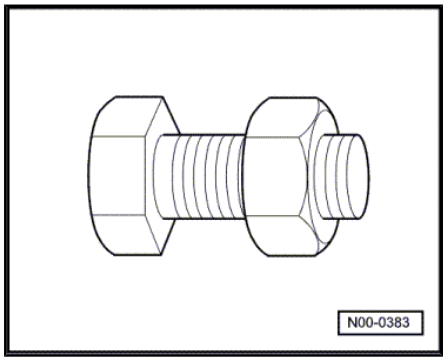
4.1.3 Locking devices

- Do not overstretch retaining rings.
- Always renew retaining rings which have been damaged or overstretched.
- Retaining rings must locate properly in grooves.
- Renew spring pins. Installation position: slit -A- should be in line with the line of force -arrow-.



4.1.4 Nuts and bolts

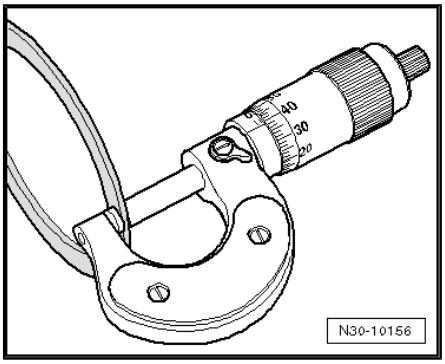
- Loosen nuts or bolts in the order opposite to the tightening sequence.
- Nuts and bolts which secure covers and housings should be loosened and tightened diagonally in stages if no tightening sequence is specified.
- Do not cant especially delicate parts, such as clutch pressure plates. Loosen and tighten bolts and nuts in stages in a diagonal sequence.
- Torque settings are specified for unoiled bolts and nuts.
- Always renew self-locking bolts and nuts.
- Threads of bolts secured with locking fluid must be cleaned with a wire brush. Then insert bolts with locking fluid - AMV 185 101 A1- .
- Clean threaded holes in which self-locking bolts or bolts with locking fluid have been inserted, e.g. with a thread chaser. Otherwise there is a danger that the bolts may shear when removed again.



4.1.5 Bearing

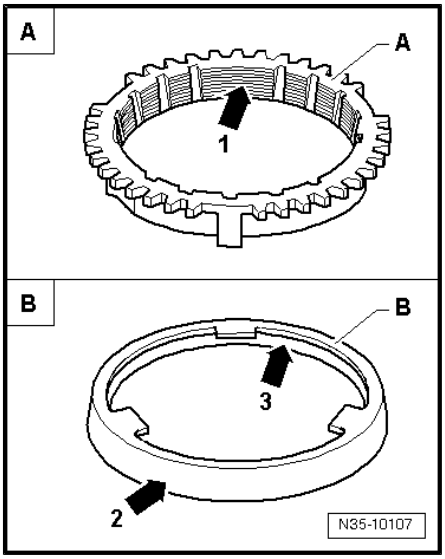
- Install needle bearings with lettered side (thicker metal) towards fitting tool.
- Lubricate all gearbox bearings with gear oil before installing.
- Tapered roller bearings fitted to one shaft must be renewed as a set. Use same make of bearings.
- Heat inner races to about 100° C with the inductive heater - VAS 6414- before installing.
- Do not interchange outer or inner races of bearings of the same size. The bearings are matched in pairs.

4.1.6 Shims



- Measure shims at several points with a micrometer. The various thicknesses make it possible to achieve the exact shim thickness required.
- Check for burrs and damage.
- Install only flawless shims.

4.1.7 Synchro-rings



- Do not interchange. When reusing synchro-rings, always fit to the same gear.
- Check for wear and renew if necessary.
- Check grooves -arrow 1- of synchro-ring -A- and inner ring for flat spots (worn grooves).
- If synchro-rings are coated, coating must not be damaged.
- If an intermediate ring -B- is installed, check the outer friction surface -arrow 2- and inner friction surface -arrow 3- of this intermediate ring for “scoring” and “signs of abnormal wear”.
- Check cone of synchromeshed gear for “scoring” and “signs of abnormal wear”.
- Moisten synchromesh mechanism with gear oil before installing.

4.1.8 Gears, synchro-hubs, inner races for synchromeshed gears

- Heat inner races for synchromeshed gear to about 100° C with the inductive heater -VAS 6414- before installing.
- Heat synchro-hub with inductive heater -VAS 6414- to approx. 100 °C before installing. Press in to stop when installing so there is no axial clearance.
- Heat gears with inductive heater -VAS 6414- to approx. 100 ° C before installing. Press in to stop when installing so there is no axial clearance.
- Observe installation position.

4.1.9 Synchromeshed gears

- After assembly, check synchromeshed gears for slight play, or for freedom of movement.

4.1.10 Clutch

- When removing gearbox, remove slave cylinder without disconnecting pipes.
- If the clutch slave cylinder is removed with the hydraulic line attached, do not depress clutch pedal. Otherwise the piston will be pressed out of the slave cylinder.

- Ensure that the pressure plate does not cant: loosen and tighten bolts diagonally and in several gradual stages.
- If the clutch has burnt out, thoroughly clean the clutch housing as well as the friction surface of flywheel with a cloth to reduce the smell of burnt linings.

30 – Clutch

1 Fault finding, power transmission

– Refer to ⇒ Fault finding, power transmission; Rep. Gr. 30 ; Complaints about clutch and clutch mechanism and ⇒ Fault finding, power transmission; Rep. Gr. 34 ; Complaints about selector mechanism

2 Repairing clutch mechanism

2.1 Overview

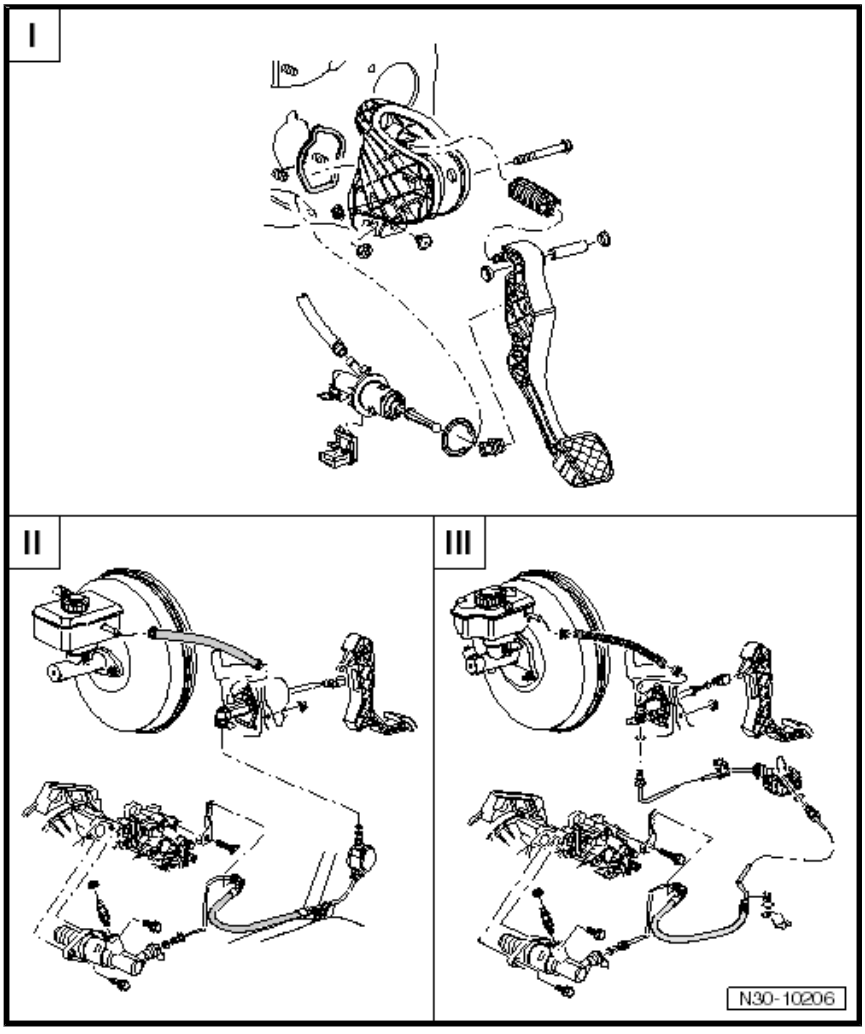
Note

- *Before disconnecting battery, obtain code for radio units having anti-theft coding.*
- *With ignition switched off, disconnect battery earth strap ⇒ Electrical system; Rep. Gr. 27 ; Disconnecting and connecting battery .*
- *When reconnecting battery, refer to ⇒ Electrical system; Rep. Gr. 27 ; Disconnecting and connecting battery .*
- *Lubricate all bearings and contact surfaces with grease -G 000 450 02- .*

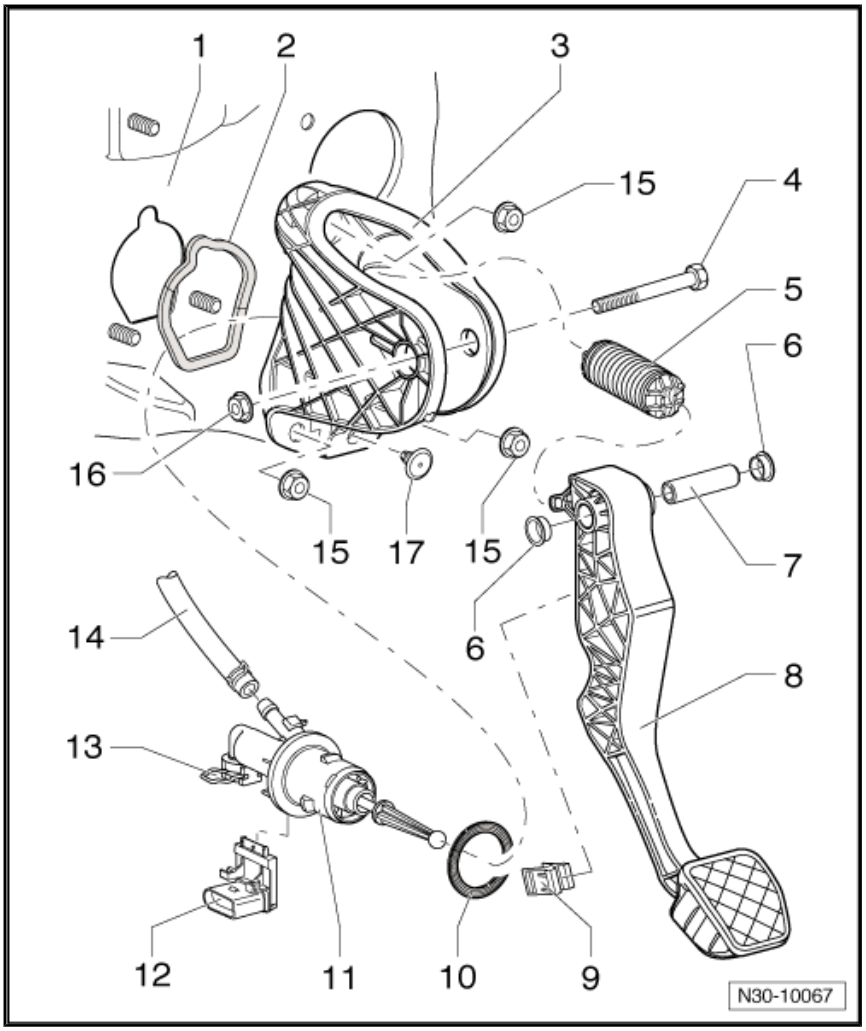
I - Assembly overview - pedal cluster ⇒ page 14

II - Assembly overview - hydraulics (LHD) ⇒ page 37

III - Assembly overview - hydraulics (RHD) ⇒ page 39



2.2 Assembly overview - pedal cluster



1 - Bulkhead

- ❑ With support for mounting bracket

2 - Seal

- ❑ Always renew
- ❑ Between mounting bracket and bulkhead
- ❑ Self-adhesive
- ❑ Bond to mounting bracket

3 - Mounting bracket

- ❑ For mounting clutch pedal
- ❑ Is provided with damping in some equipment variants ⇒ page 15
- ❑ Removing and installing ⇒ page 25

4 - Bolt

5 - Over-centre spring

- ❑ Removing and installing ⇒ page 15

6 - Bearing bush

7 - Pivot pin

8 - Clutch pedal

- ❑ Removing and installing ⇒ page 20

9 - Retainer

- ❑ To remove and install, separate master cylinder from clutch pedal ⇒ page 20

10 - Seal

- ❑ Always renew
- ❑ Between master cylinder and mounting bracket

11 - Master cylinder

- ❑ Removing and installing after removal of mounting bracket ⇒ page 25

12 - Clutch position sender -G476-

- ❑ Removing and installing ⇒ page 33
- ❑ Can be checked using “guided fault finding” of vehicle diagnostic tester
- ❑ The clutch position sender -G476- is identified as clutch pedal switch -F36- in “guided fault finding”.

13 - Clip

- ❑ Pull out clip to stop to remove and install pipe/hose line

14 - Supply hose

- ❑ Rubber
- ❑ From 12.05, plastic ⇒ page 38

15 - Hexagon nut, 25 Nm

- ❑ Self-locking

- ❑ Qty. 3
- ❑ For mounting bracket on bulkhead
- ❑ Always renew

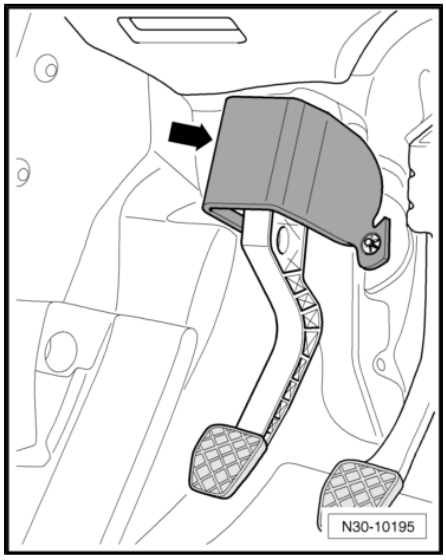
16 - Hexagon nut, 25 Nm

- ❑ Always renew

17 - Stop

- ❑ For clutch pedal

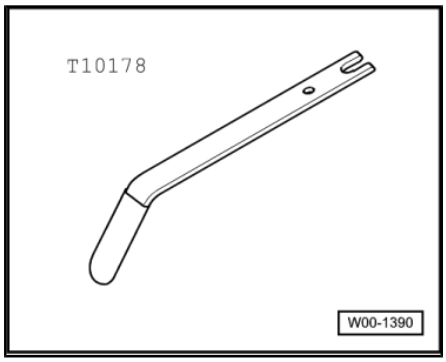
Mounting bracket with damping -arrows-



2.3 Removing and installing over-centre spring

Special tools and workshop equipment required

- ♦ Release tool -T10178-



2.3.1 Removing

Vehicles with knee airbag

Note

The installation location of the knee airbag is above the pedal cluster.

– First check whether a coded radio is fitted. If so, obtain anti-theft code.

– With ignition switched off, disconnect battery earth strap ⇒ Electrical system; Rep. Gr. 27 ; Disconnecting and connecting battery .

Continuation for all

– Push driver seat as far back as possible and put steering wheel in highest position.

– Remove trim and cover below trim on drive side ⇒ General body repairs, interior; Rep. Gr. 68 .

Vehicles with knee airbag

– Remove bracket for knee airbag together with crash bar ⇒ Interior equipment; Rep. Gr. 69 ; Airbag; Removing and installing knee airbag bracket .

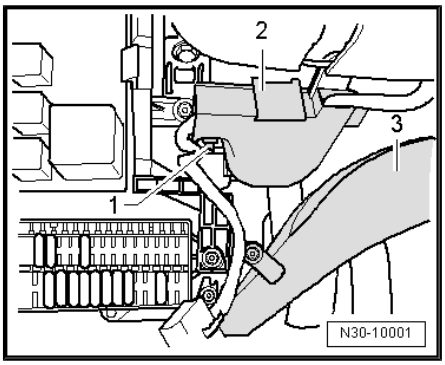
Continuation for all

– Remove cable guide -2- from steering column.

– Remove footwell vent -3- ⇒ Heating, air conditioning; Rep. Gr. 80 ; Repairing heating .

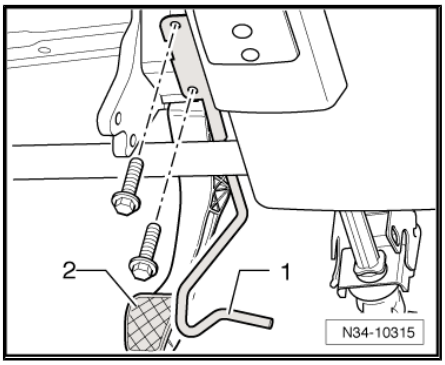
Vehicles without knee airbag

The crash bar -1- in front of clutch pedal -2- may be secured in different ways.



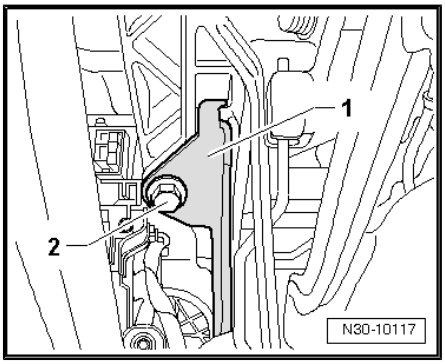
Attachment with 2 bolts

– Remove crash bar -1- (2 bolts).

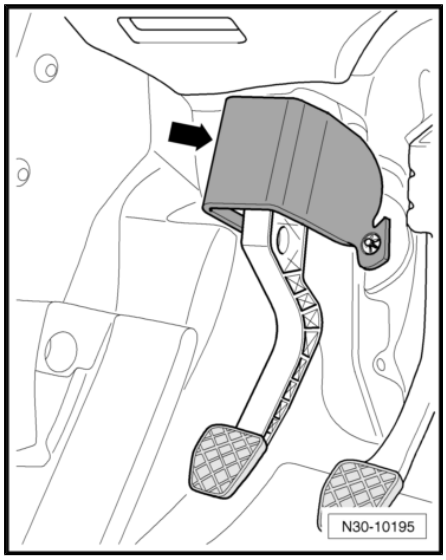


Attachment with 1 bolt

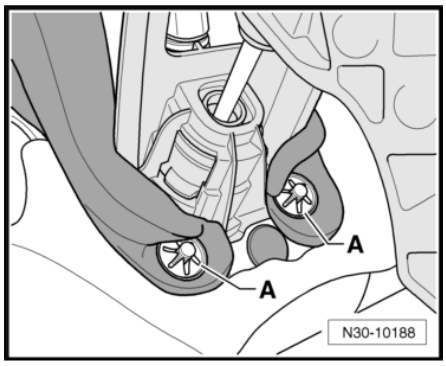
– Remove crash bar -1- (1 bolt -2-).



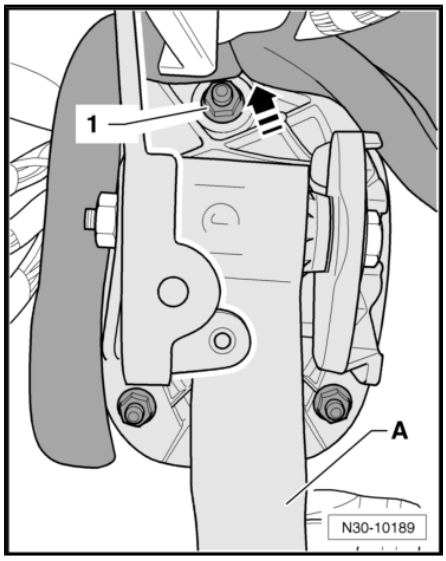
– If fitted, remove damping -arrow- from lower area of clutch pedal mounting bracket.



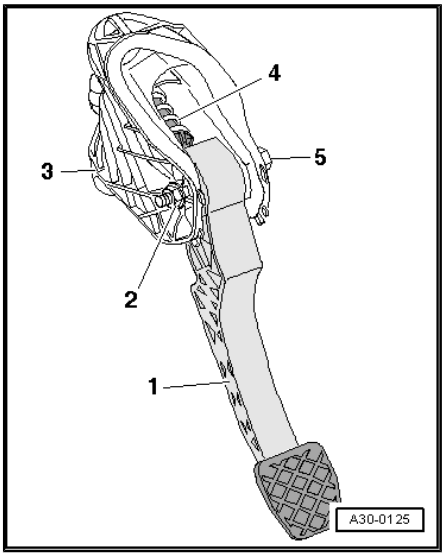
– To do this, remove lock washers -A- for damping.
– Pull off damping.



– Push damping upwards in area of upper securing nut -1- above clutch pedal -A- in -direction of arrow-.



– Unbolt clutch pedal -1- from mounting bracket -3- by removing nut -2- and pulling out bolt -5-.



Note

The clutch pedal remains hooked to operating rod of master cylinder.

– Swing clutch pedal down slightly and remove over-centre spring -4- from mounting bracket.

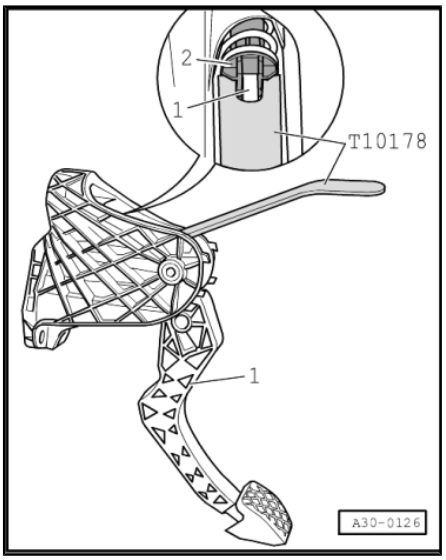
2.3.2 Installing

Install in the reverse order of removal, observing the following:

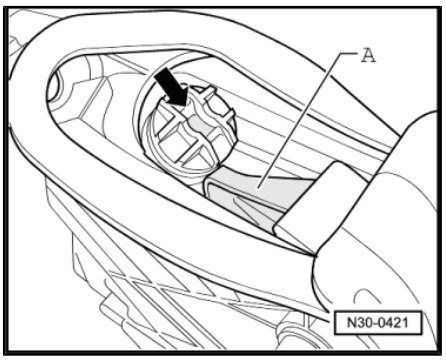
Note

Renew self-locking nuts.

– Insert over-centre spring -2- in mounting bracket from above while holding end of spring with assembly tool -T10178- in installation position.



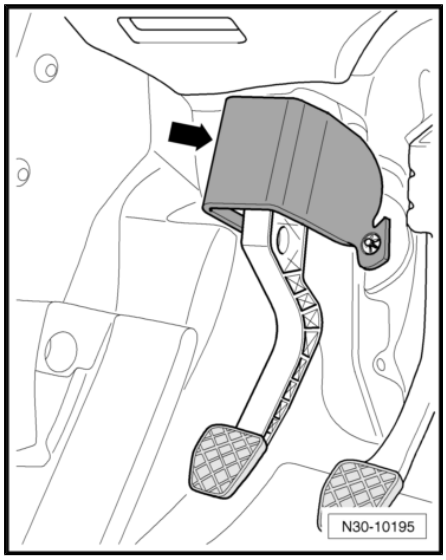
- Receptacle -arrow- for tip -A- of clutch pedal must stand vertically.
– Insert tip of clutch pedal in bearing recess of over-centre spring.
– Depress clutch pedal slightly, push bolt through and tighten self-locking nut to specified torque ⇒ page 20 .



Some cars have damping -arrow- on the clutch pedal mounting bracket.

– Return it to installation position.

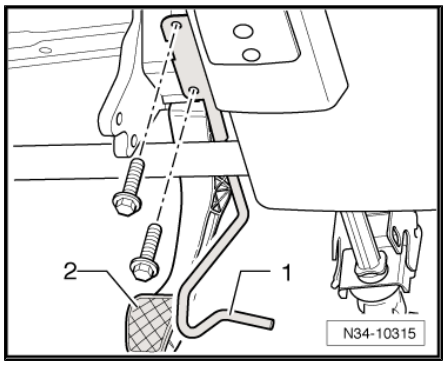
Vehicles without knee airbag



The crash bar -1- in front of clutch pedal -2- may be secured in different ways.

Attachment with 2 bolts

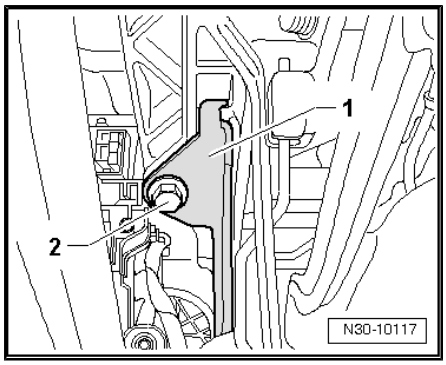
– Install crash bar -1- and tighten the 2 bolts to specified torque ⇒ page 20 .



Attachment with 1 bolt

– Install crash bar -1- and tighten bolt -2- to specified torque ⇒ page 20 .

Continuation for all



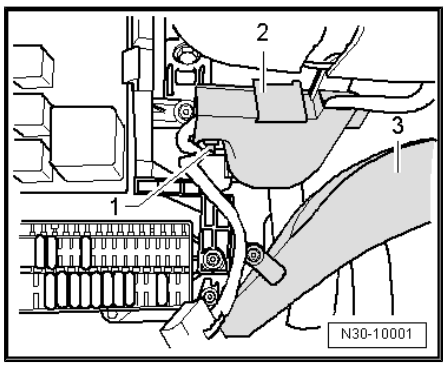
– Mount cable guide -2- on steering column.

– Install footwell vent -3- ⇒ Heating, air conditioning; Rep. Gr. 80 ; Repairing heating .

Vehicles with knee airbag

– Install bracket for knee airbag together with crash bar ⇒ Interior equipment; Rep. Gr. 69 ; Airbag; Removing and installing knee airbag bracket .

Continuation for all



– Install trim and cover below trim on drive side ⇒ General body repairs, interior; Rep. Gr. 68 .

– If disconnected, connect battery ⇒ Electrical system; Rep. Gr. 27 ; Removing and installing battery .

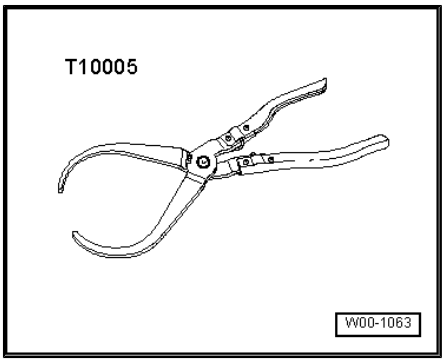
2.3.3 Specified torques

Component	Nm
Clutch pedal to mounting bracket ♦ Renew self-locking nuts	25
Crash bar to steering column mounting bracket (attachment with 2 bolts)	10
Crash bar to steering column mounting bracket (attachment with 1 bolt)	20
♦ Renew bolts for crash bar	

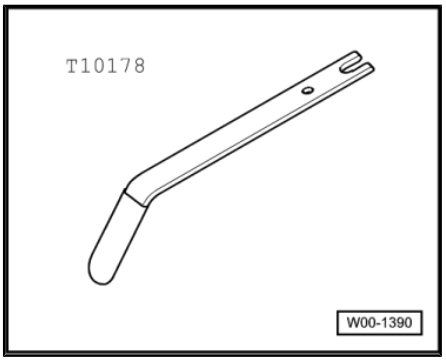
2.4 Removing and installing clutch pedal

Special tools and workshop equipment required

♦ Pliers -T10005-



♦ Release tool -T10178-



2.4.1 Removing

Vehicles with knee airbag

Note

The installation location of the knee airbag is above the pedal cluster.

– First check whether a coded radio is fitted. If so, obtain anti-theft code.

– With ignition switched off, disconnect battery earth strap ⇒ Electrical system; Rep. Gr. 27 ; Disconnecting and connecting battery .

Continuation for all

– Push driver seat as far back as possible and put steering wheel in highest position.

– Remove trim and cover below trim on drive side ⇒ General body repairs, interior; Rep. Gr. 68 .

Vehicles with knee airbag

Note

The installation location of the knee airbag is above the pedal cluster.

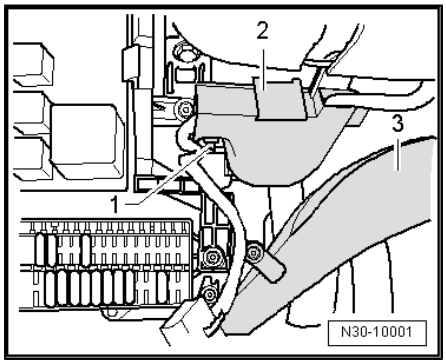
– First check whether a coded radio is fitted. If so, obtain anti-theft code.

– With ignition switched off, disconnect battery earth strap ⇒ Electrical system; Rep. Gr. 27 ; Disconnecting and connecting battery .

Continuation for all

– Remove cable guide -2- from steering column.

– Remove footwell vent -3- ⇒ Heating, air conditioning; Rep. Gr. 80 ; Repairing heating .

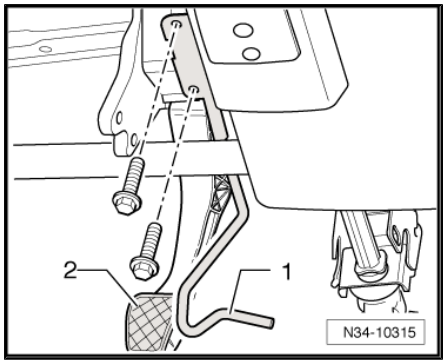


Vehicles without knee airbag

The crash bar -1- in front of clutch pedal -2- may be secured in different ways.

Attachment with 2 bolts

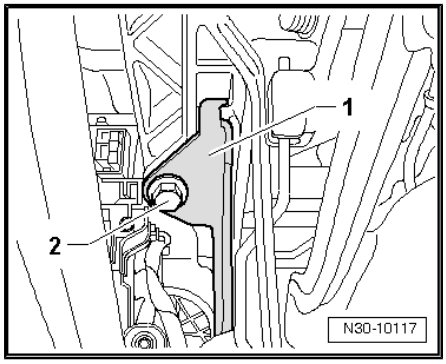
– Remove crash bar -1- (2 bolts).



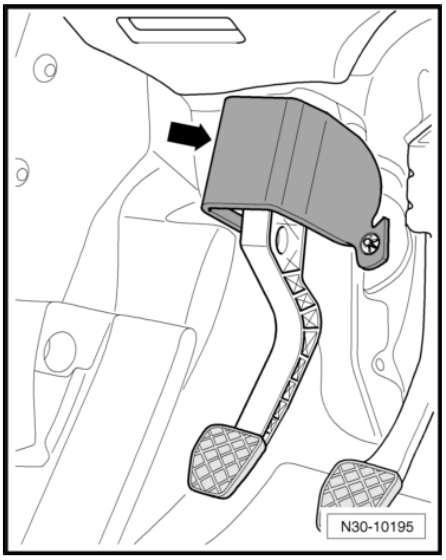
Attachment with 1 bolt

– Remove crash bar -1- (1 bolt -2-).

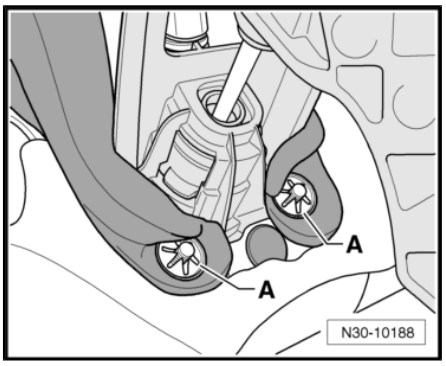
Continuation for all



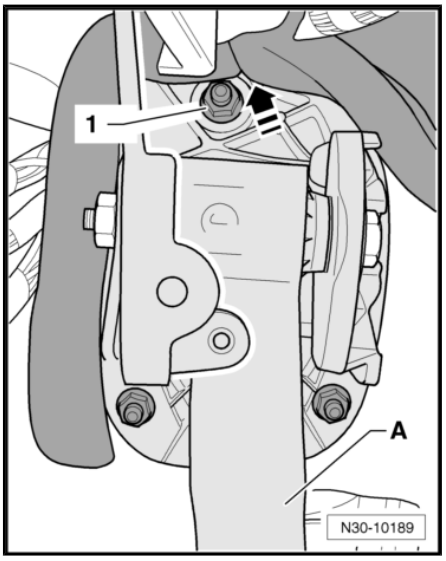
– If fitted, remove damping -arrow- from lower area of clutch pedal mounting bracket.



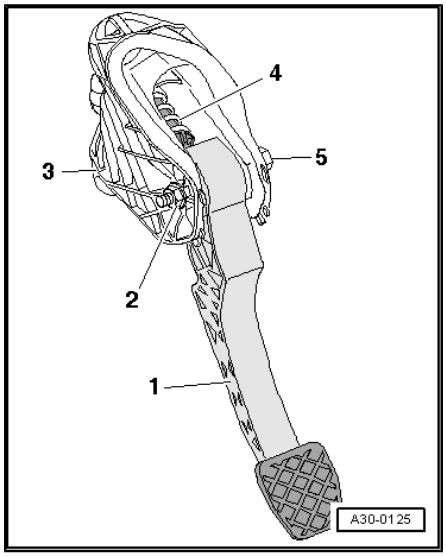
– To do this, remove lock washers -A- for damping.
– Pull off damping.



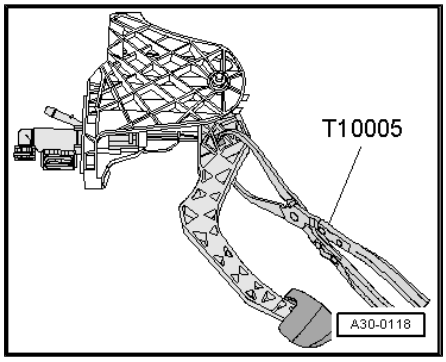
– Push damping upwards in area of upper securing nut -1- above clutch pedal -A- in -direction of arrow-.



– Unbolt clutch pedal -1- from mounting bracket -3- by removing nut -2- and pulling out bolt -5-.
– Swing clutch pedal down slightly and remove over-centre spring -4- from mounting bracket.



– Release clutch pedal from master cylinder with pliers - T10005- .
– Remove clutch pedal.



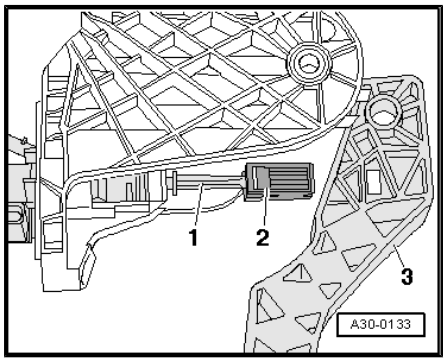
2.4.2 Installing

Install in the reverse order of removal, observing the following:

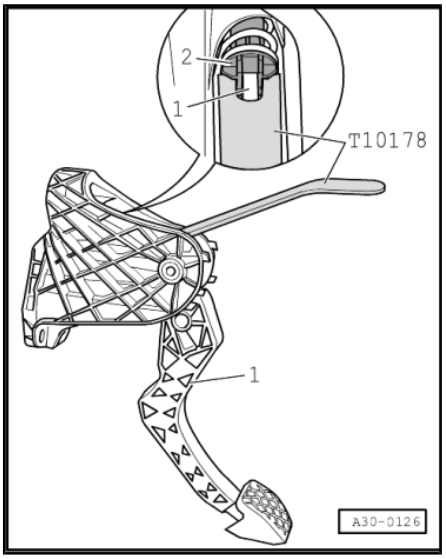
Note

Renew self-locking nuts.

– Attach retainer -2- to master cylinder operating rod -1-.
– Press retainer into notch in clutch pedal -3- until it can be heard to engage.



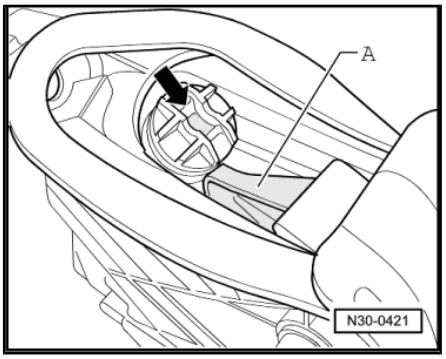
– Insert over-centre spring -2- in mounting bracket from above while holding end of spring with assembly tool -T10178- in installation position.



- Receptacle -arrow- for tip -A- of clutch pedal must stand vertically.

– Insert tip -A- of clutch pedal in bearing recess of over-centre spring.

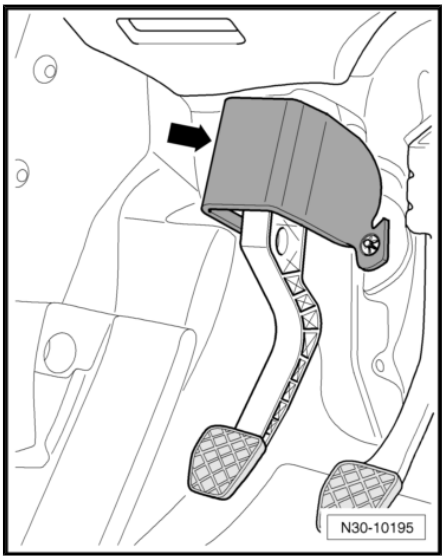
– Depress clutch pedal slightly, push bolt through and tighten self-locking nut to specified torque ⇒ page 25 .



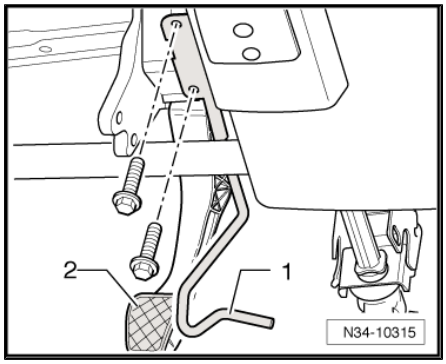
Some cars have damping -arrow- on the mounting bracket/clutch pedal.

– Return it to installation position.

Vehicles without knee airbag



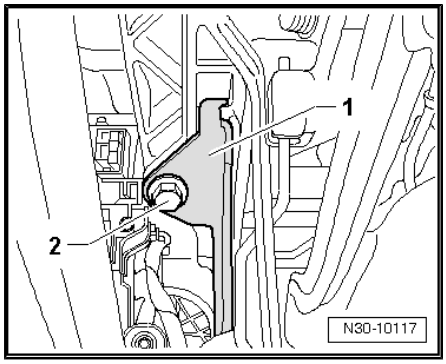
The crash bar -1- in front of clutch pedal -2- may be secured in different ways.



Attachment with 2 bolts

– Install crash bar -1- and tighten the 2 bolts to specified torque ⇒ page 25 .

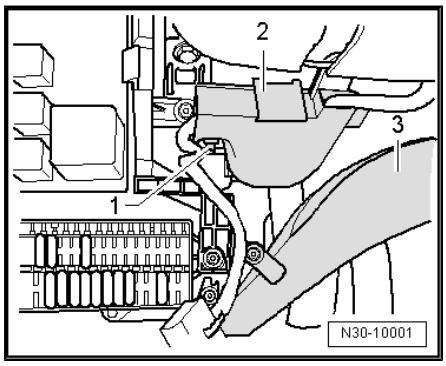
Attachment with 1 bolt



– Install crash bar -1- and tighten bolt -2- to specified torque ⇒ page 25 .

Continuation for all

– Mount cable guide -2- on steering column.



– Install footwell vent -3- ⇒ Heating, air conditioning; Rep. Gr. 80 ; Repairing heating .

Vehicles with knee airbag

– Install bracket for knee airbag together with crash bar ⇒ Interior equipment; Rep. Gr. 69 ; Airbag; Removing and installing knee airbag bracket .

Continuation for all

– Install trim and cover below trim on drive side ⇒ General body repairs, interior; Rep. Gr. 68 .

– If disconnected, connect battery ⇒ Electrical system; Rep. Gr. 27 ; Removing and installing battery .

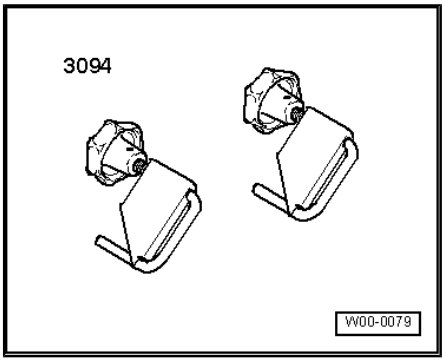
2.4.3 Specified torques

Component	Nm
Clutch pedal to mounting bracket ♦ Renew self-locking nuts	25
Crash bar to steering column mounting bracket (attachment with 2 bolts)	10
Crash bar to steering column mounting bracket (attachment with 1 bolts)	20
♦ Renew bolts for crash bar	

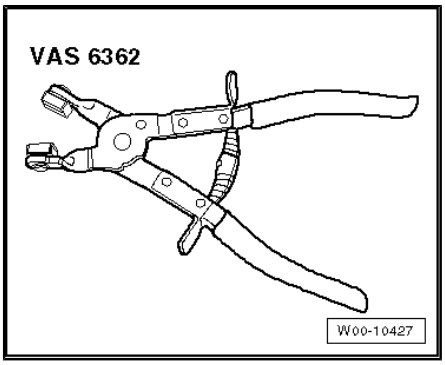
2.5 Removing and installing mounting bracket

Special tools and workshop equipment required

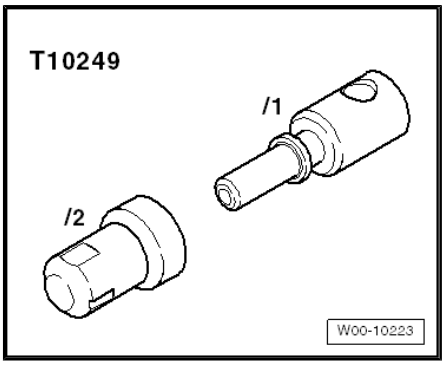
- Hose clamps to 25 mm Ø -3094-



- Hose clip pliers -VAS 6362-



- Sealing tool -T10249-



2.5.1 Removing

LHD

– First check whether a coded radio is fitted. If so, obtain anti-theft code.

– With ignition switched off, disconnect battery earth strap ⇒ Electrical system; Rep. Gr. 27 ; Disconnecting and connecting battery .

– Remove complete air filter housing if it is near battery ⇒ Rep. Gr. 23 ; Repairing diesel direct injection system or ⇒ Rep. Gr. 24 ; Repairing injection system .

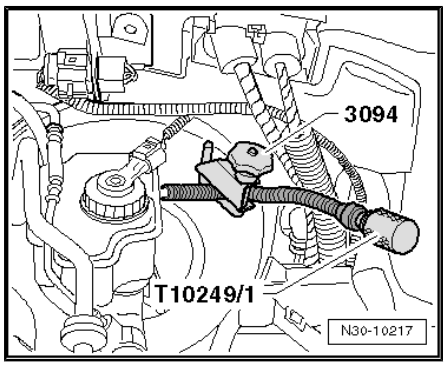
– Remove battery and battery tray ⇒ Electrical system; Rep. Gr. 27 ; Battery; Removing and installing battery .

Continuation for all

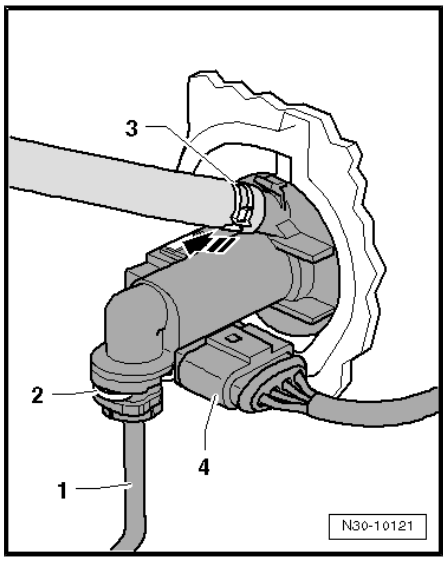
Note

- *During the following work, ensure that no brake fluid lands on longitudinal member or gearbox. If this does happen, clean the affected areas thoroughly.*
- *Place a lint-free cloth under the master cylinder.*

– Clamp off supply hose to master cylinder using hose clamp to 25 mm ∅ -3094- .



– If necessary, loosen spring-type clip -3- with hose clip pliers -VAS 6362- and pull supply hose off master cylinder.
– In addition, for disconnecting, you can close it with the sealing tool -T10249/1- (⇒ figure above).
– Release securing clip -2- using screwdriver or a pointed object and pull pipe/hose line or plastic line -1- off master cylinder.
– Unclip clutch position sender -G476- from master cylinder -arrow- and remove with electrical connector attached -4-.



Note

When performing work in the footwell, put cloths on the carpet to protect it from possible brake fluid spills.

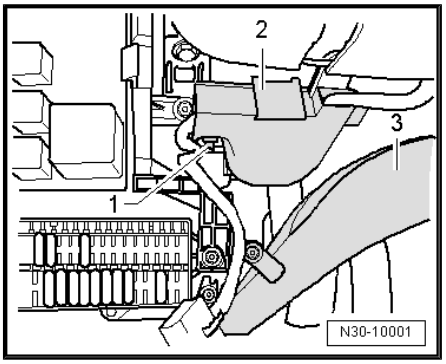
– Remove trim and cover below trim on drive side ⇒ General body repairs, interior; Rep. Gr. 68 .

Vehicles with knee airbag

Note

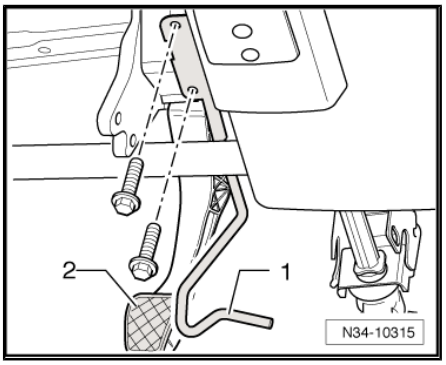
The installation location of the knee airbag is above the pedal cluster.

– Remove bracket for knee airbag together with crash bar ⇒ Interior equipment; Rep. Gr. 69 ; Airbag; Removing and installing knee airbag bracket .
– Remove cable guide -2- from steering column.
– Remove footwell vent -3- ⇒ Heating, air conditioning; Rep. Gr. 80 ; Repairing heating .



Vehicles without knee airbag

The crash bar -1- in front of clutch pedal -2- may be secured in different ways.

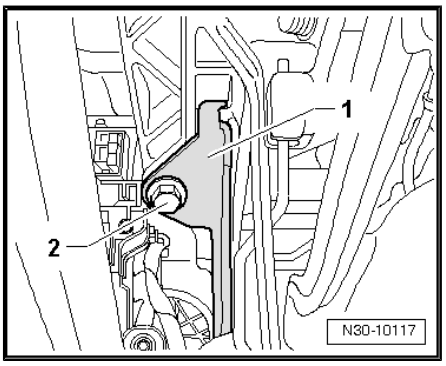


Attachment with 2 bolts

– Unbolt crash bar (2 bolts).

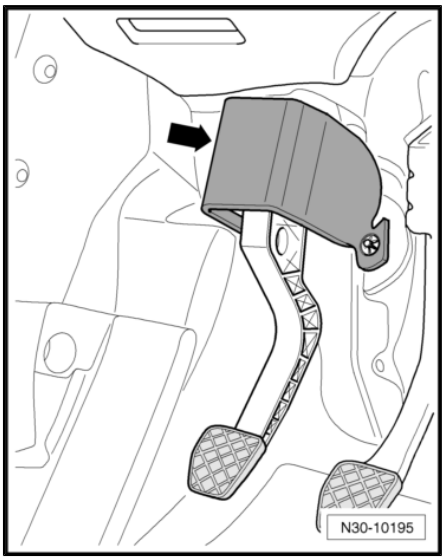
Attachment with 1 bolt

– Remove crash bar -1- (1 bolt -2-).

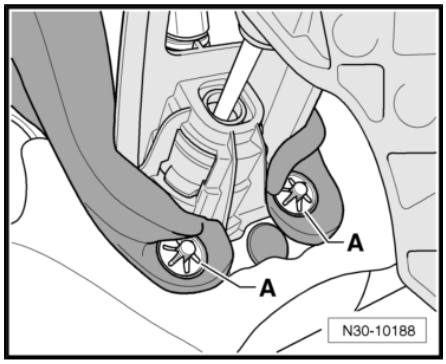


Continuation for all

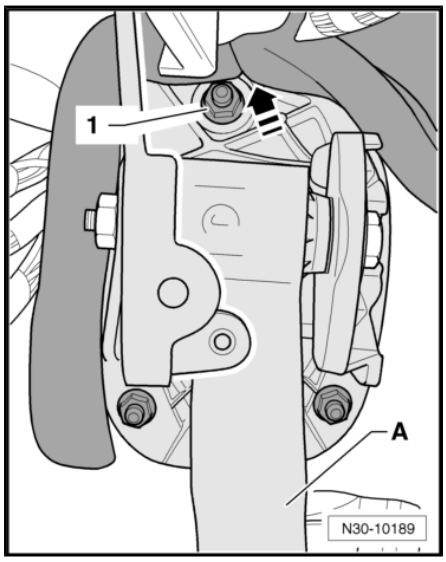
– If fitted, remove damping -arrow- from lower area of clutch pedal mounting bracket.



– To do this, remove lock washers -A- for damping.
– Pull off damping.



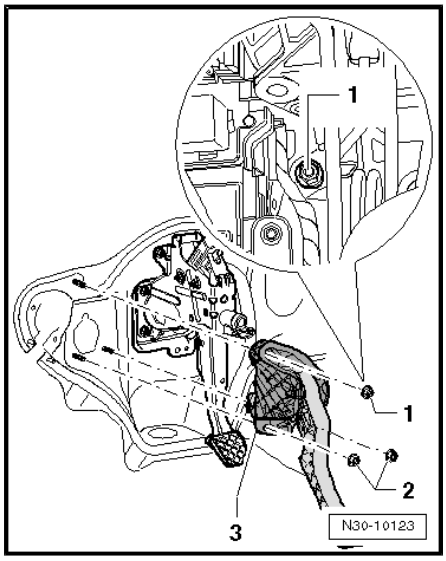
– Push damping upwards in area of upper securing nut -1- above clutch pedal -A- in -direction of arrow-.



– Remove securing nuts -1- and -2-.

The upper securing nut -1- is accessible between the relay carrier and the steering column trim.

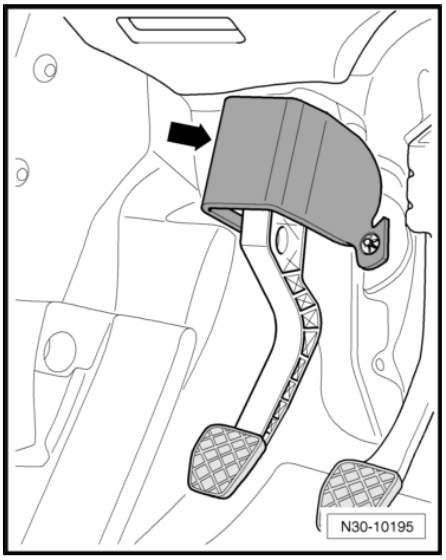
– Remove mounting bracket -3-.



2.5.2 Installing

Install in the reverse order of removal, observing the following:

Some cars have damping -arrow- on the clutch pedal mounting bracket.

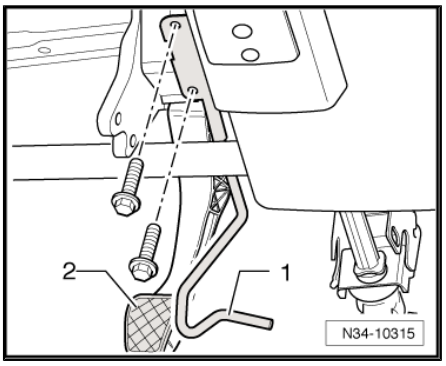


Note

- *Renew self-locking nuts.*
- *Renew hose clips.*
- *Allocate all components according to ⇒ Electronic parts catalogue "ETKA".*

Vehicles without knee airbag

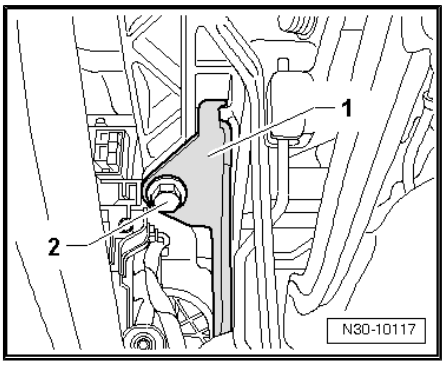
The crash bar -1- in front of clutch pedal -2- may be secured in different ways.



Attachment with 2 bolts

– Install crash bar -1- and tighten the 2 bolts to specified torque ⇒ page 31 .

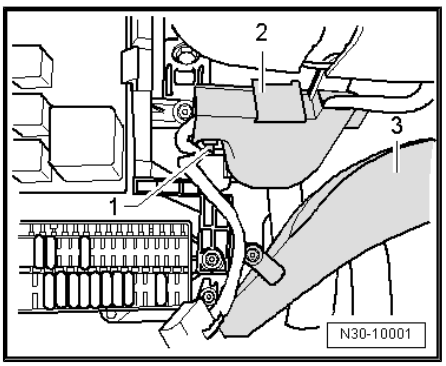
Attachment with 1 bolt



– Install crash bar -1- and tighten bolt -2- to specified torque ⇒ page 31 .

Continuation for all

– Mount cable guide -2- on steering column.



– Install footwell vent -3- ⇒ Heating, Air conditioning; Rep. Gr. 80 ; Repairing heating; Removing and installing left footwell vent .

Vehicles with knee airbag

– Install bracket for knee airbag together with crash bar ⇒ Interior equipment; Rep. Gr. 69 ; Airbag; Removing and installing knee airbag bracket .

Continuation for all

– Install trim and cover below trim on drive side ⇒ General body repairs, interior; Rep. Gr. 68 .

– Push pipe/hose line or plastic line -1- with seal -2- onto connection of master cylinder -4- until securing clip -3- engages audibly.

– Test line by tugging on it.

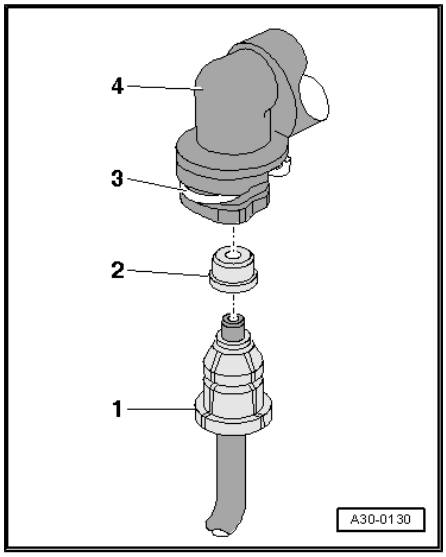
– After removing hose clamp up to 25 mm ∅ -3094- , return supply hose to its original shape, if necessary.

– Bleed clutch system ⇒ page 42 .

LHD

– Install battery ⇒ Electrical system; Rep. Gr. 27 ; Removing and installing battery .

– If complete air filter housing was removed, install it ⇒ Rep. Gr. 23 ; Repairing diesel direct injection system or ⇒ Rep. Gr. 24 ; Repairing injection system .



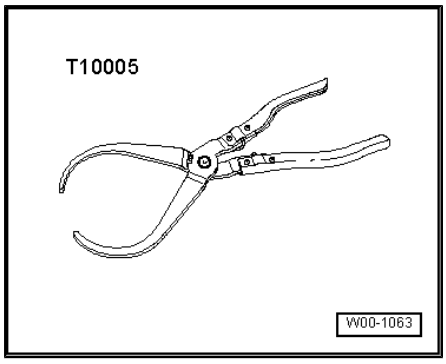
2.5.3 Specified torques

Component	Nm
Mounting bracket to bulkhead ♦ Renew self-locking nuts.	25
Crash bar to steering column mounting bracket (attachment with 2 bolts)	10
Crash bar to steering column mounting bracket (attachment with 1 bolt)	20
♦ Renew bolts for crash bar	

2.6 Removing and installing master cylinder

Special tools and workshop equipment required

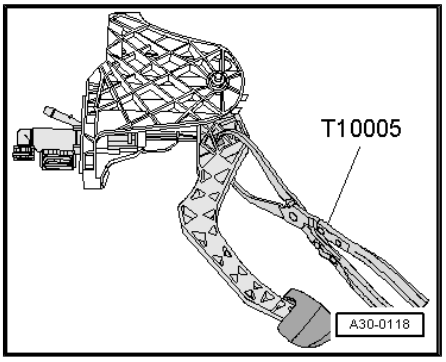
♦ Pliers -T10005-



2.6.1 Removing

– Remove mounting bracket ⇒ page 25 .

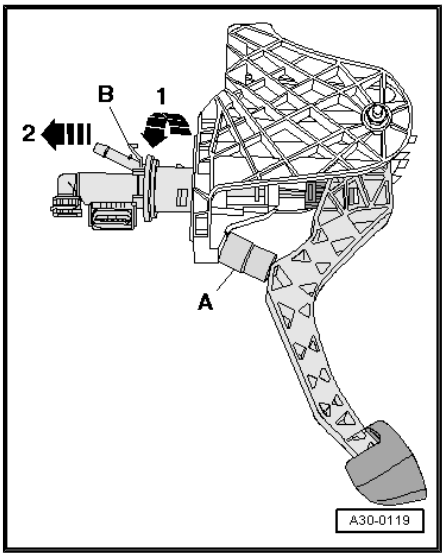
– Release retainer for master cylinder operating rod using pliers -T10005- .



– Insert spacer -A- between clutch pedal and stop and press clutch pedal to spacer.

♦ Length of spacer = about 40 mm (e.g. $^1/_2$" socket)

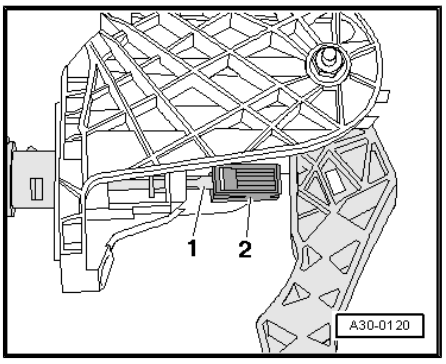
– Release securing bar -B- and pull master cylinder out of mounting bracket -arrow 1- and -arrow 2-.



2.6.2 Installing

• Move clutch pedal to rest position at stop.

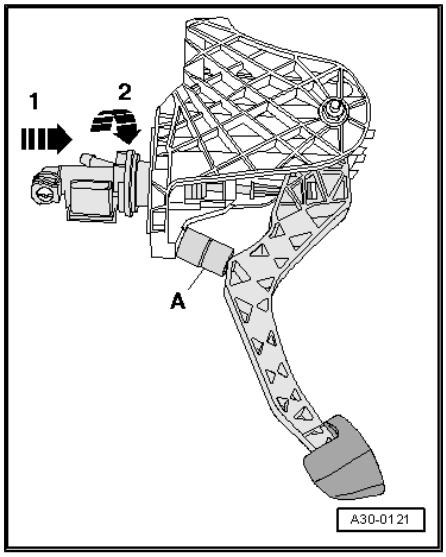
– Attach retainer -2- to master cylinder operating rod -1-.



– Insert spacer -A- between clutch pedal and stop and press clutch pedal to spacer.

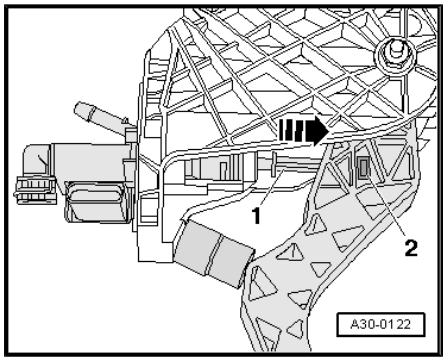
♦ Length of spacer = about 40 mm (e.g. $^1/_2$" socket)

– Engage master cylinder in mounting bracket -arrow 1- and -arrow 2-.



– Press master cylinder operating rod -1- in -direction of arrow- until retainer -2- engages audibly in clutch pedal.

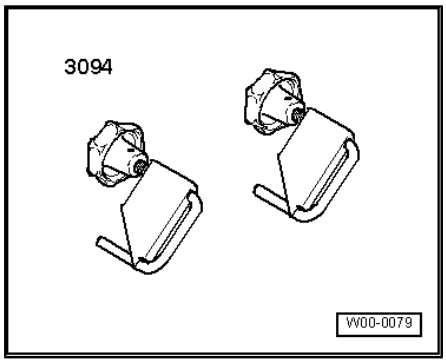
– Install mounting bracket ⇒ page 25 .



2.7 Removing and installing clutch position sender -G476-

Special tools and workshop equipment required

♦ Hose clamps -3094-



2.7.1 Removing

LHD

– First check whether a coded radio is fitted. If so, obtain anti-theft code.

– With ignition switched off, disconnect battery earth strap ⇒ Electrical system; Rep. Gr. 27 ; Disconnecting and connecting battery .

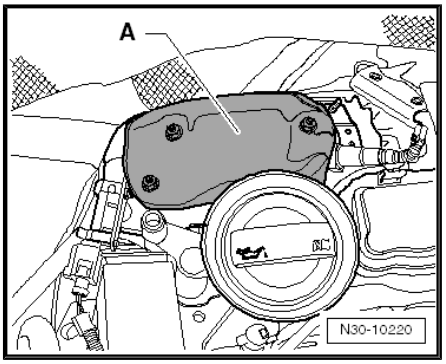
– Remove complete air filter housing if it is near battery ⇒ Rep. Gr. 23 ; Repairing diesel direct injection system or ⇒ Rep. Gr. 24 ; Repairing injection system .

– Remove battery and battery tray ⇒ Electrical system; Rep. Gr. 27 ; Battery; Removing and installing battery .

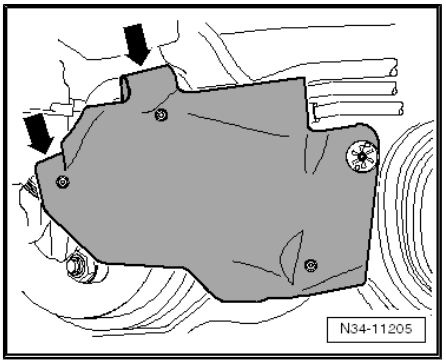
Right-hand drive

– In vehicles with particle filter, remove shielding -A- from particle filter ⇒ Rep. Gr. 26 ; Parts of exhaust system; Assembly overview - front exhaust pipe with particle filter .

An insulation mat is installed in conjunction with some engines.



– Remove heat shield from pipe/hose line -arrows-.

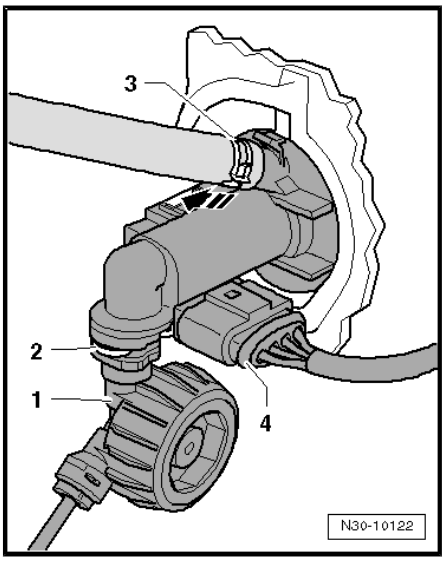


Continuation for all

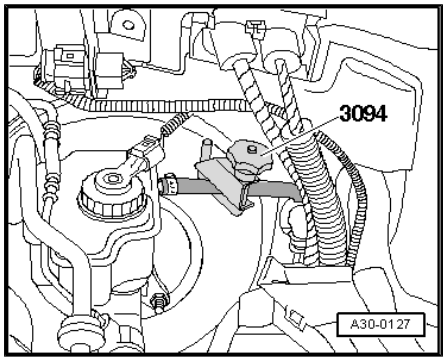
If a pipe/hose line -1- with a round component is installed directly beneath the master cylinder, the pipe/hose line must be removed.

Note

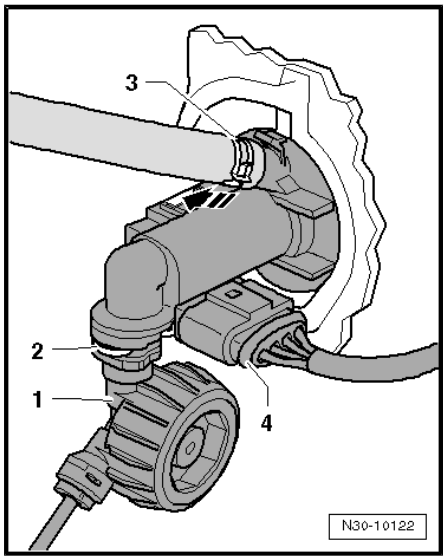
During the following work, ensure that no brake fluid lands on longitudinal member or gearbox. If this does happen, clean the affected areas thoroughly.



– Clamp off supply hose to master cylinder using hose clamp to 25 mm ∅ -3094- .



– Release securing clip -2- with a screwdriver or a pointed object and pull out of master cylinder to stop.
– Pull pipe/hose line -1- or plastic line out from master cylinder and seal.
– Disconnect electrical connector -4-.
– Unclip clutch position sender -G476- from master cylinder -arrow- and remove.



2.7.2 Installing

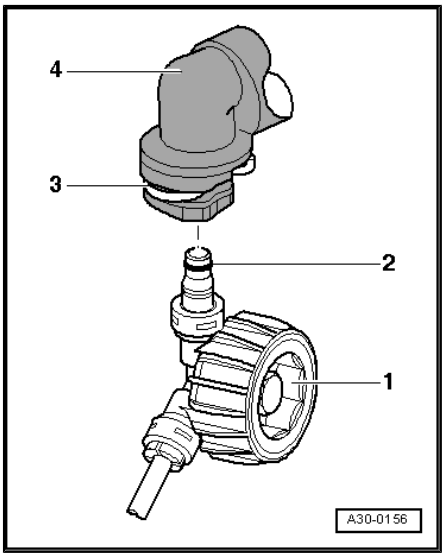
Install in the reverse order of removal, observing the following:

Note

Allocate all components according to ⇒ Electronic parts catalogue “ETKA” .

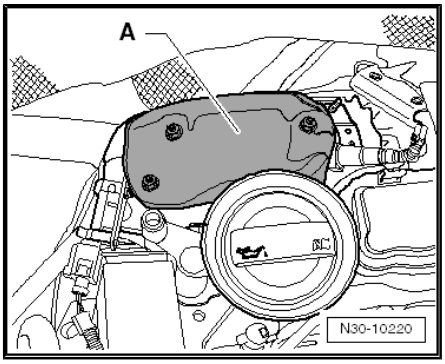
If the pipe/hose line was removed

- Push pipe/hose line -1- or plastic line with seal -2- onto connection of master cylinder -4- until securing clip -3- engages audibly.
- Test pipe/hose line by tugging on it.
- After removing hose clamp up to 25 mm ∅ -3094- , return supply hose to its original shape, if necessary.
- Bleed clutch system ⇒ page 42 .



Right-hand drive

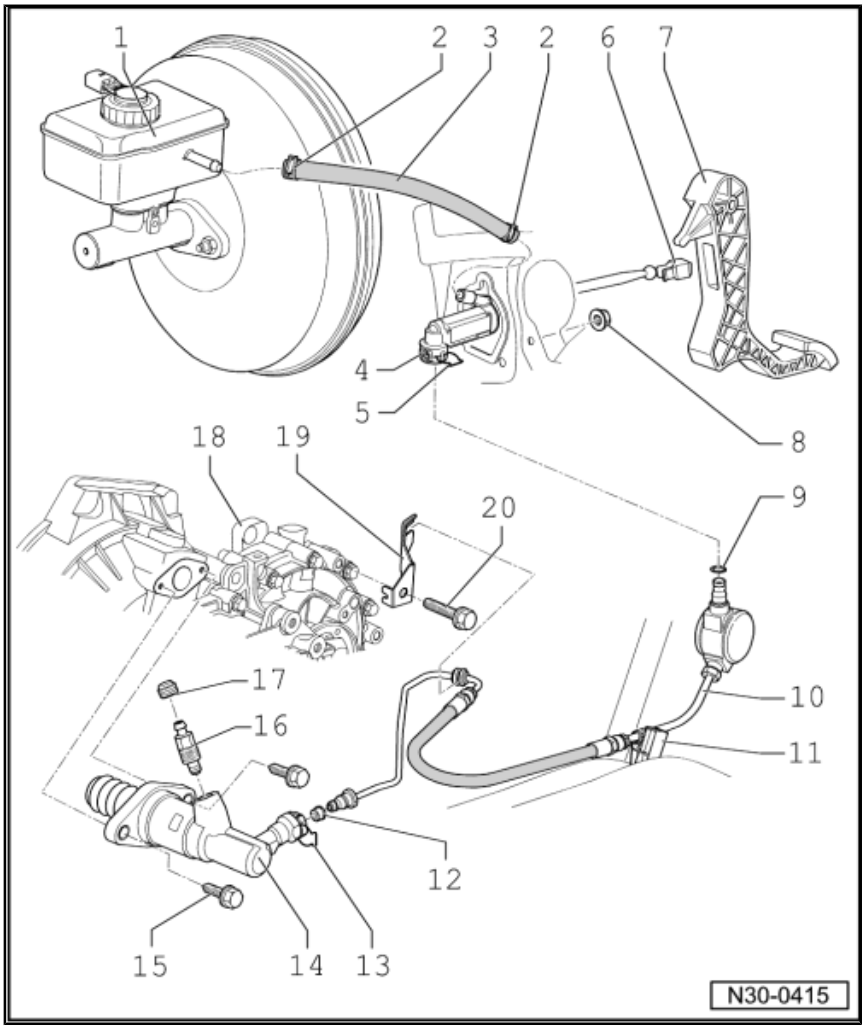
- In vehicles with particle filter, install shielding -A- on particle filter ⇒ Rep. Gr. 26 ; Parts of exhaust system; Assembly overview - front exhaust pipe with particle filter .



LHD

- Install battery tray and battery⇒ Electrical system; Rep. Gr. 27 ; Removing and installing battery .
- If complete air filter housing was removed, install it ⇒ Rep. Gr. 23 ; Repairing diesel direct injection system or ⇒ Rep. Gr. 24 ; Repairing injection system .
- Reconnect battery and perform work required after connecting battery ⇒ Electrical system; Rep. Gr. 27 ; Disconnecting and connecting battery .

2.8 Assembly overview - hydraulics (LHD vehicles)



1 - Brake fluid reservoir

2 - Spring-type clip

3 - Supply hose

- ❑ Rubber
- ❑ From 12.05, plastic in some vehicles ⇒ page 38

4 - Master cylinder

- ❑ Removing and installing ⇒ page 31

5 - Clip

- ❑ Pull out clip to stop to remove and install pipe/ hose line

6 - Retainer

- ❑ To remove and install, separate master cylinder from clutch pedal ⇒ page 20

7 - Clutch pedal

- ❑ Removing and installing ⇒ page 20

8 - Hexagon nut, 25 Nm

- ❑ Self-locking
- ❑ Qty. 3
- ❑ For mounting bracket on bulkhead
- ❑ Always renew

9 - Seal / O-ring

- ❑ Pull onto line connection
- ❑ Insert with brake fluid
- ❑ Seals/O-rings are adapted to configuration of line connection ⇒ page 38
- ❑ Allocation ⇒ Electronic parts catalogue “ETKA”

10 - Pipe/hose line

- ❑ Allocation ⇒ Electronic parts catalogue “ETKA”
- ❑ To remove, remove battery and battery tray ⇒ Electrical system; Rep. Gr. 27 ; Removing and installing battery .

11 - Bracket

- ❑ Secured to body

12 - Seal / O-ring

- ❑ Pull onto line connection
- ❑ Insert with brake fluid
- ❑ Seals/O-rings are adapted to configuration of line connection ⇒ page 38
- ❑ Allocation ⇒ Electronic parts catalogue “ETKA”

13 - Clip

- ❑ Pull out clip to stop to remove and install pipe/hose line

14 - Slave cylinder

- ❑ Removing and installing ⇒ page 40

15 - Hexagon bolt, 20 Nm

16 - Bleeder valve

- ❑ Bleeding clutch system ⇒ page 42

17 - Dust cap

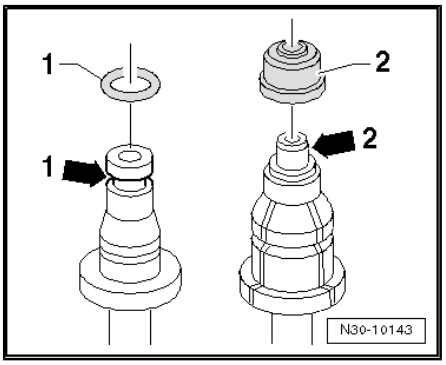
18 - Gearbox

19 - Bracket

20 - Hexagon bolt, 20 Nm

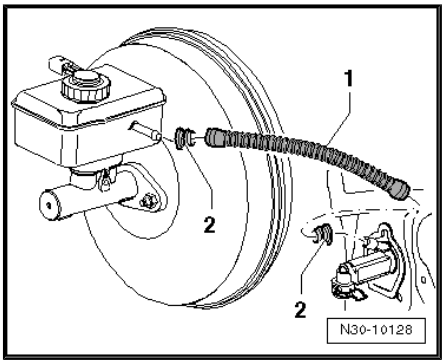
Seals and O-rings for pipe and hose lines

Item	Material of line connection
-1-	Line connection with circumferential groove -arrow 1-
-2-	Line connection with shoulder -arrow 2-

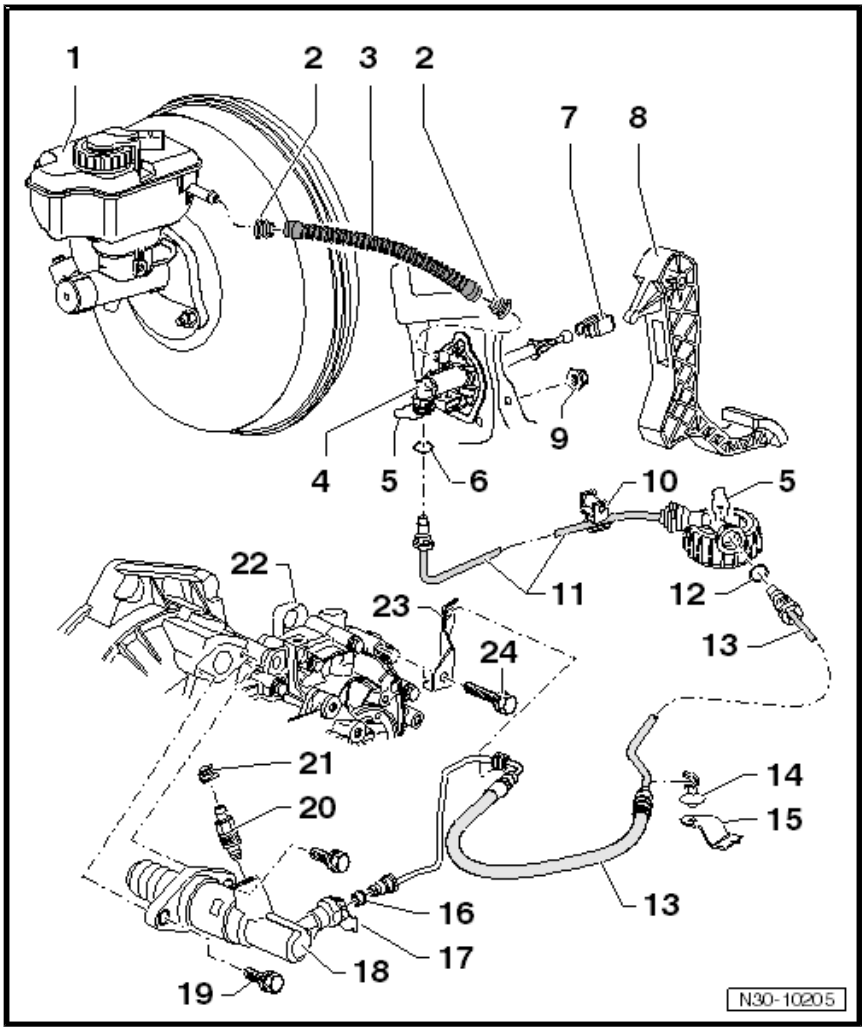


From 12.05, plastic supply hose -1- in some vehicles

- The seals -2- must be located in supply hose.



2.9 Assembly overview - hydraulics (RHD vehicles)



1 - Brake fluid reservoir

2 - Seal

- ❑ For plastic supply hose
- ❑ The seals must be located in supply hose

3 - Supply hose

- ❑ Rubber
- ❑ From 12.05, plastic in some vehicles ⇒ page 38

4 - Master cylinder

- ❑ Removing and installing ⇒ page 31

5 - Clip

- ❑ Pull clip out to stop to remove or install pipe line
- ❑ Pulled out to side on some master cylinders

6 - Seal / O-ring

- ❑ Pull onto line connection
- ❑ Insert with brake fluid
- ❑ Seals/O-rings are adapted to configuration of line connection ⇒ page 38
- ❑ Allocation ⇒ Electronic parts catalogue “ETKA”

7 - Retainer

- ❑ To remove and install, separate master cylinder from clutch pedal ⇒ page 20

8 - Clutch pedal

- ❑ Removing and installing ⇒ page 20

9 - Hexagon nut, 25 Nm

- ❑ Self-locking
- ❑ Qty. 3
- ❑ For mounting bracket on bulkhead
- ❑ Always renew

10 - Bracket

- ❑ Secured to body

11 - Pipe line

- ❑ Pipe and hose/pipe line ⇒ Item 13 (page 40) may be in one piece
- ❑ Allocation ⇒ Electronic parts catalogue “ETKA”
- ❑ To remove, remove battery and battery tray ⇒ Electrical system; Rep. Gr. 27 ; Removing and installing battery .

12 - Seal / O-ring

- ❑ Pipe ⇒ Item 11 (page 39) and hose/pipe line may be in one piece
- ❑ Pull onto line connection

- ❑ Insert with brake fluid
- ❑ Seals/O-rings are adapted to configuration of line connection ⇒ page 38
- ❑ Allocation ⇒ Electronic parts catalogue “ETKA”

13 - Pipe/hose line

- ❑ Pipe ⇒ Item 11 (page 39) and hose/pipe line may be in one piece
- ❑ Allocation ⇒ Electronic parts catalogue “ETKA”
- ❑ To remove, remove battery and battery tray ⇒ Electrical system; Rep. Gr. 27 ; Removing and installing battery .

14 - Bracket

- ❑ Secured to retainer for ABS/EDL

15 - Bracket

- ❑ For ABS/EDL

16 - Seal / O-ring

- ❑ Pull onto line connection
- ❑ Insert with brake fluid
- ❑ Seals/O-rings are adapted to configuration of line connection ⇒ page 38
- ❑ Allocation ⇒ Electronic parts catalogue “ETKA”

17 - Clip

- ❑ Pull out clip to stop to remove and install pipe/hose line

18 - Slave cylinder

- ❑ Removing and installing ⇒ page 40

19 - Flange bolt, 20 Nm

20 - Bleeder valve

- ❑ Bleeding clutch system ⇒ page 42

21 - Dust cap

22 - Gearbox

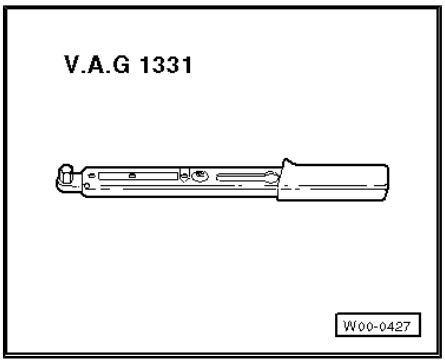
23 - Bracket

24 - Hexagon bolt, 20 Nm

2.10 Removing and installing slave cylinder

Special tools and workshop equipment required

- ♦ Torque wrench -V.A.G 1331-



2.10.1 Removing

– First check whether a coded radio is fitted. If so, obtain anti-theft code.

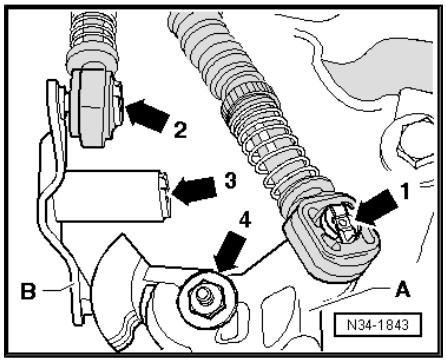
– With ignition switched off, disconnect battery earth strap ⇒ Electrical system; Rep. Gr. 27 ; Disconnecting and connecting battery .
– Remove complete air filter housing if it is over slave cylinder ⇒ Rep. Gr. 23 ; Repairing diesel direct injection system or ⇒ Rep. Gr. 24 ; Repairing injection system .
– Remove securing clip -arrow 1- for gear selector cable from gearbox selector lever -A-.
– Pull gear selector cable from pin.

Metal relay lever

– Remove securing clip -arrow 2- for gate selector cable from relay lever -B-.
– Pull gate selector cable from pin.
– Pull securing clip -arrow 3- off relay lever -B- and remove relay lever.

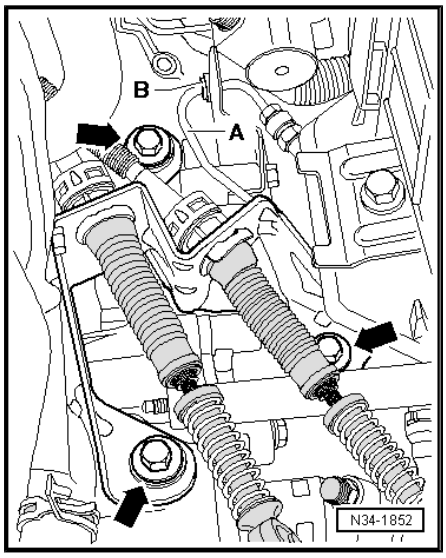
Plastic relay lever

– Remove relay lever together with cable end-piece from gearbox ⇒ page 73 .

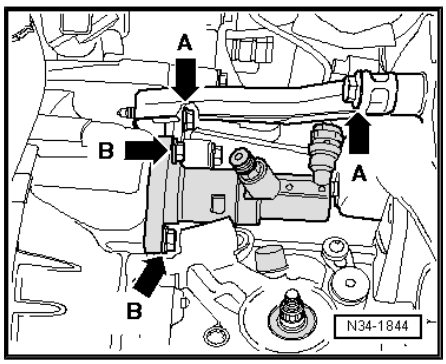


Continuation for all

– Remove gearbox selector lever -A- by removing nut -arrow 4-.
– Remove cable support bracket from gearbox -arrows-.
– Then raise and secure gear selector cable and gate selector cable.
– Remove retainer -B- from gearbox and pull it off pipe/hose line -A-.



– Then remove gearbox support -arrow A-.
– Place a lint-free cloth under slave cylinder.
– Pull clip for pipe/hose line out of slave cylinder to stop.
– Pull pipe/hose line out of slave cylinder and seal opening.
– Remove slave cylinder -arrows B-.

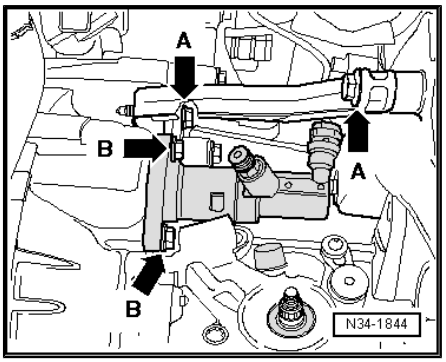


Caution

Do not operate clutch pedal any more.

2.10.2 Installing

Install in the reverse order of removal, observing the following:



- Install slave cylinder and tighten bolts -arrows B- to specified torque.
- Insert pipe/hose line into slave cylinder to stop.
- Push securing clip into pipe/hose line to stop.
- Test pipe/hose line by tugging on it.
- Then install gearbox support -arrows A-.
- Bleed clutch system after installing slave cylinder ⇒ page 44 .

Assembling selector mechanism ⇒ page 70 .

Adjust selector mechanism ⇒ page 80 .

- If complete air filter housing was removed, install it ⇒ Rep. Gr. 23 ; Repairing diesel direct injection system or ⇒ Rep. Gr. 24 ; Repairing injection system .
- Connect battery earth ⇒ Electrical system; Rep. Gr. 27 ; Disconnecting and reconnecting battery .

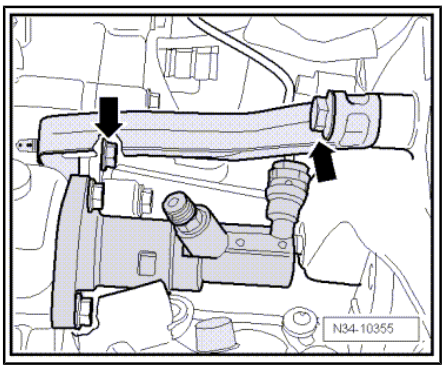
2.10.3 Specified torques

Slave cylinder to gearbox ⇒ Item 9 (page 45)

Gearbox selector lever to selector shaft ⇒ Item 18 (page 71) .

Selector cable support bracket to gearbox ⇒ Item 6 (page 70)

Gearbox support to gearbox bracket and gearbox:

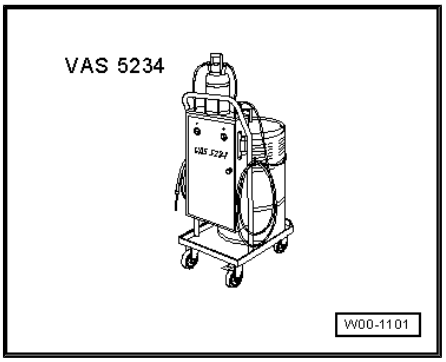


- Renew bolts.
- Screw in all bolts hand-tight.
- Tighten bolts to specified torque.

Bolts -arrows-	20 Nm + 90°

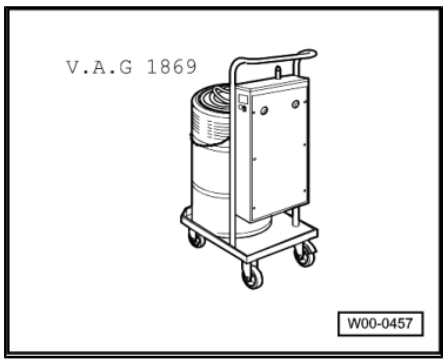
2.11 Bleeding clutch system

Special tools and workshop equipment required



- ♦ Brake filling and bleeding equipment -VAS 5234- or

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



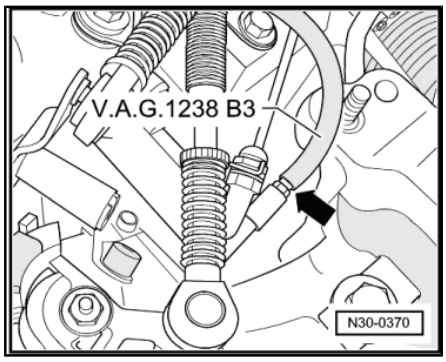
Note

Prefilling system is not necessary!

Specifications for brake fluid ⇒ Brake systems; Rep. Gr. 47 ; Bleeding brake system .

– Remove complete air filter housing if it blocks access to bleeder connection (-arrow-, figure below) ⇒ Rep. Gr. 23 ; Repairing diesel direct injection system or ⇒ Rep. Gr. 24 ; Repairing injection system
– Connect brake filling and bleeding equipment -VAS 5234- or -V.A.G 1869- .

To bleed system, use 670 mm bleeder hose -V.A.G 1238/B3- if necessary.

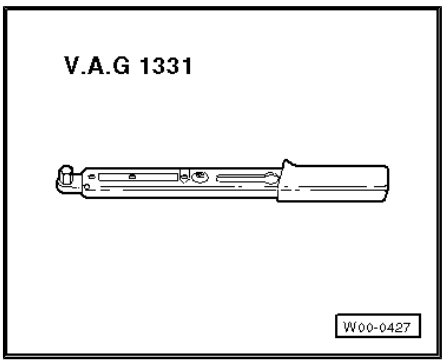


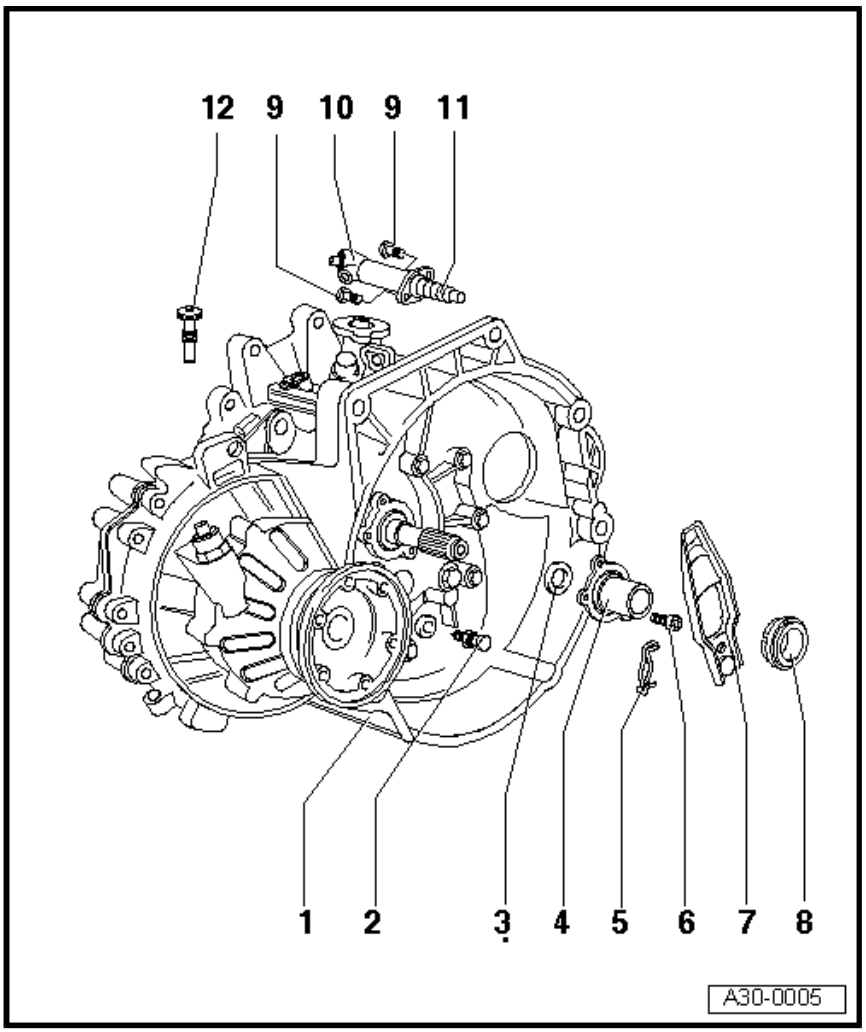
– Connect bleeder hose to collector bottle of brake bleeding equipment.
– Connect bleeder hose to bleeder -arrow-.
– Pressurise system to 2 bar.
– Open bleeder valve.
– Bleed off about 100 cm^3 brake fluid.
– Close bleeder valve.
– Rapidly operate pedal from stop to stop 10 to 15 times.
– Open bleeder valve.
– Bleed off an additional 50 cm^3 brake fluid.
– Close bleeder valve.
– Depress clutch pedal several times after completion of bleeding process.
– If complete air filter housing was removed, install it ⇒ Rep. Gr. 23 ; Repairing diesel direct injection system or ⇒ Rep. Gr. 24 ; Repairing injection system .

3 Repairing clutch release mechanism

Special tools and workshop equipment required

- Torque wrench -V.A.G 1331-





1 - Gearbox

2 - Ball stud, 25 Nm

- ❑ To remove and install, remove gearbox
- ❑ Remove old grease from contact surface of clutch release lever
- ❑ Grease with clutch plate spline grease - G 000 100- .

3 - Input shaft seal

- ❑ To remove and install, remove gearbox
- ❑ Renewing ⇒ Item 12 (page 134)

4 - Guide sleeve

- ❑ To remove and install, remove gearbox
- ❑ With vulcanised O-ring
- ❑ If O-ring is damaged, renew guide sleeve and O-ring together

5 - Retaining spring

- ❑ To remove and install, remove gearbox
- ❑ Secure to clutch release lever

6 - Socket head bolt, 20 Nm

7 - Clutch release lever

- ❑ To remove and install, remove gearbox
- ❑ Remove and install together with release bearing ⇒ page 45 .
- ❑ Remove old grease

8 - Release bearing

- ❑ To remove and install, remove gearbox
- ❑ Do not wash out bearing; wipe only

- ❑ Renew noisy bearings
- ❑ Removing from and inserting in clutch release lever ⇒ page 45
- ❑ Lubricate contact surfaces of release lever with MoS_2 grease.

9 - Flange bolt, 20 Nm

10 - Slave cylinder

- ❑ Removing and installing ⇒ page 40

11 - Plunger

12 - Assembly bolt

- ❑ Secures clutch release lever when gearbox is installed.
- ❑ Remove after gearbox has been installed.

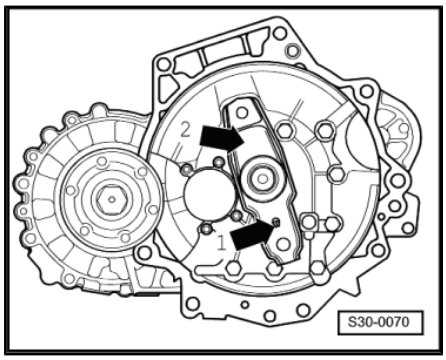
Note

Removing and installing release lever together with release bearing

– Unhook spring -arrow 1-.

– Pull off release lever -arrow 2- and release bearing.

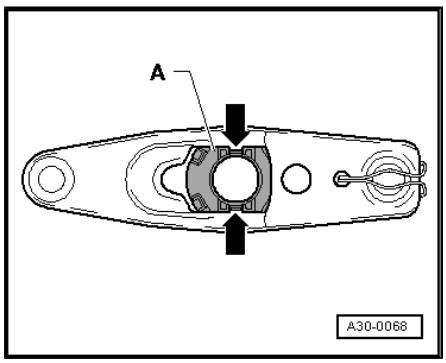
– Install in reverse order of removal.



Removing and installing release bearing

– Press together locking lugs -arrows- on back of clutch release lever and remove release bearing -A- from clutch release lever.

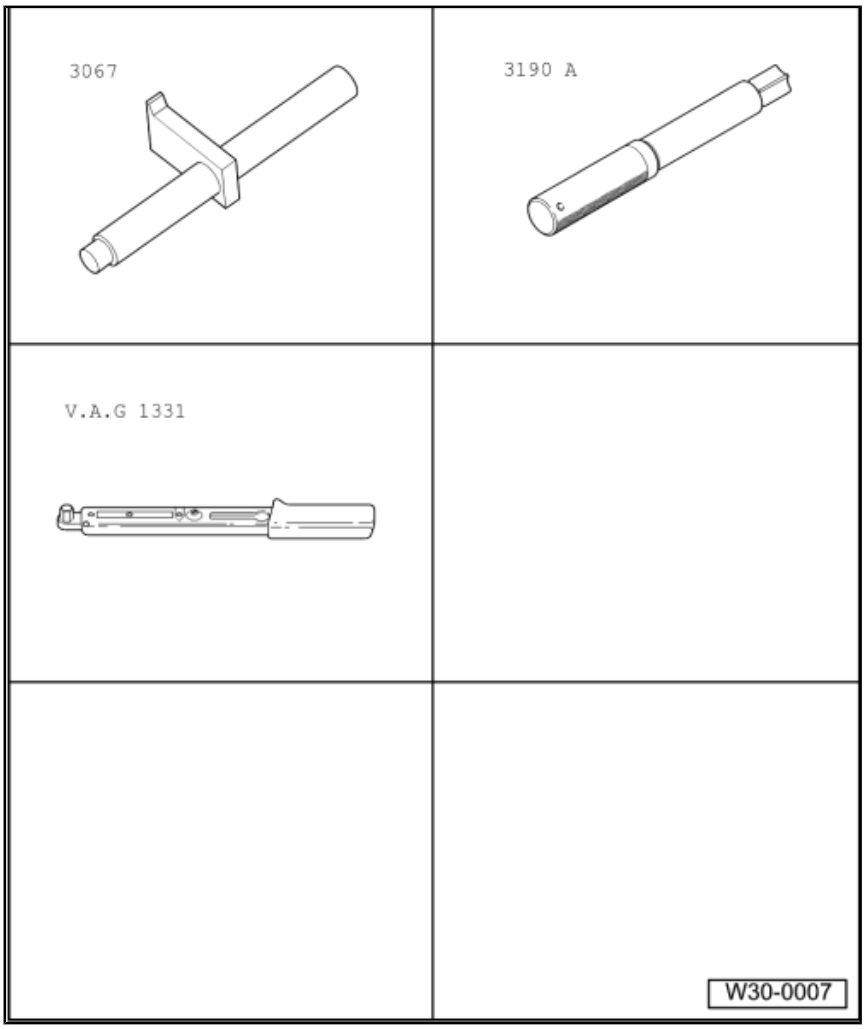
– To install, press release bearing -A- into clutch release lever until locking lugs -arrows- engage.



4 Repairing clutch, in conjunction with dual-mass flywheel

Special tools and workshop equipment required

- Counterhold -3067-
- Centring mandrel -3190 A-
- Torque wrench -V.A.G 1331-
- Grease for clutch plate splines -G 000 100-



4.1 Determining clutch manufacturer

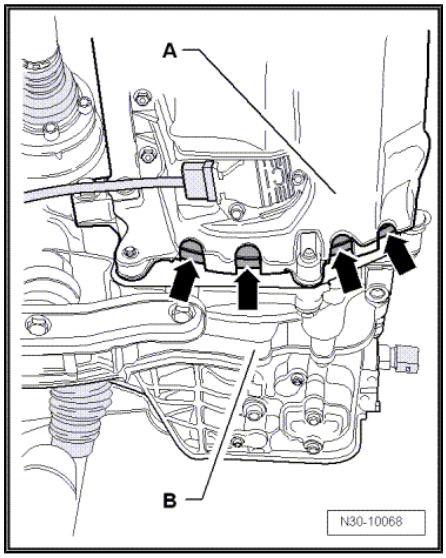
A clutch manufactured by either “Sachs” or “LuK” may be installed.

The make of the clutch can be determined as follows with the clutch installed:

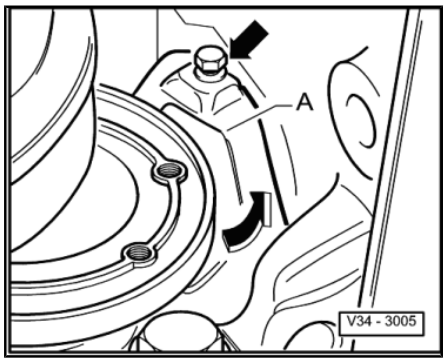
– Remove noise insulation ⇒ General body repairs, exterior; Rep. Gr. 50 ; Noise insulation .

Some notches -arrows- are located in lower region of sump between engine -A- and gearbox -B-.

– Check outer contour of flywheel through these notches.



– In addition, a small cover plate -A- can be removed to enable inspection of flywheel's outer contour.



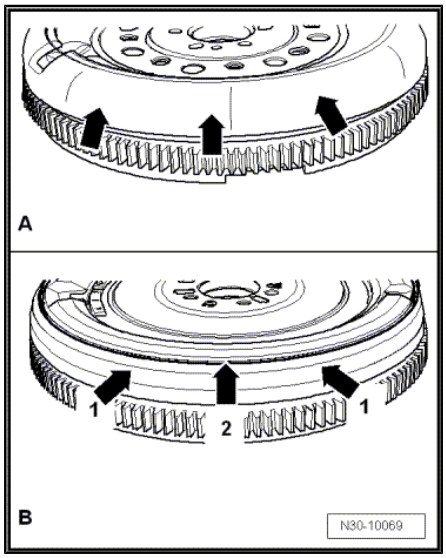
Round outer contour -arrows- = Sachs clutch = -A-

– Removing and installing Sachs clutch ⇒ page 48 .

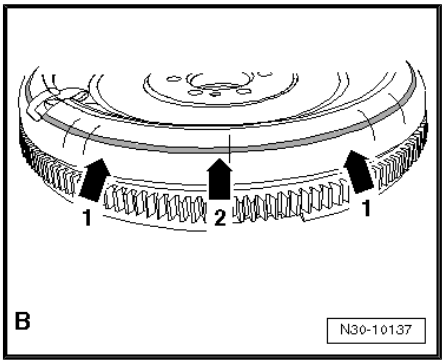
– Repairing Sachs clutch ⇒ page 50 .

Outer contour with edges -arrows 1- and, in addition, a circumferential crease -arrow 2- = LuK clutch = -B-

or



Rounded outer contour -arrows 1- and a circumferential crease -arrow 2- = LuK clutch = -B-

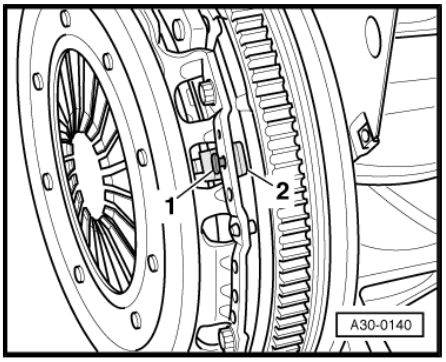


– Removing and installing LuK clutch ⇒ page 50 .
– Repairing LuK clutch ⇒ page 53 .

4.2 Removing and installing Sachs clutch

4.2.1 Removing

– Remove gearbox ⇒ page 84 .
– Use counterhold -3067- to loosen bolts.
– Loosen bolts in small steps and diagonally.
• As bolts are removed, stop -2- with pin -1- must loosen.
– If stop does not loosen, press pin towards dual-mass flywheel.
– Remove pressure plate and clutch plate.

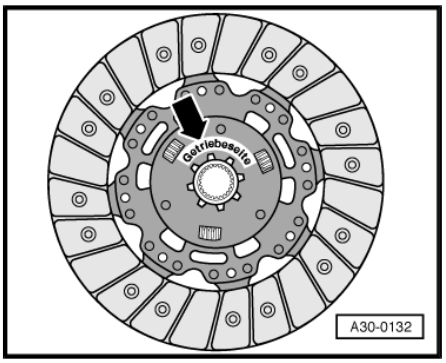


4.2.2 Installing

Install in the reverse order of removal, observing the following:

Note

- *Renew pressure plate and clutch plate together only. Select clutch plate and pressure plate according to engine code and ⇒ Electronic parts catalogue "ETKA".*
- *Check whether dowel sleeves for aligning engine and gearbox are fitted in cylinder block and install if necessary.*
- *If dowel sleeves are not fitted, difficulties shifting gears, clutch problems and possible noises from the gearbox (rattling of gears which are not engaged) could occur.*

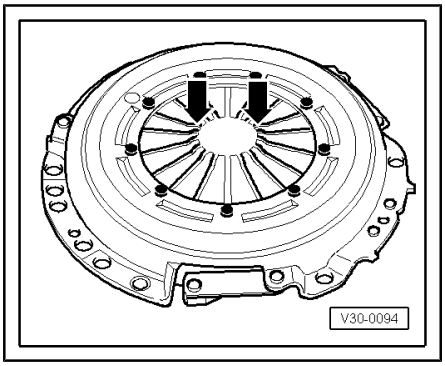


Installation position of clutch plate

• Lettering "Getriebeseite" (gearbox side) faces gearbox.

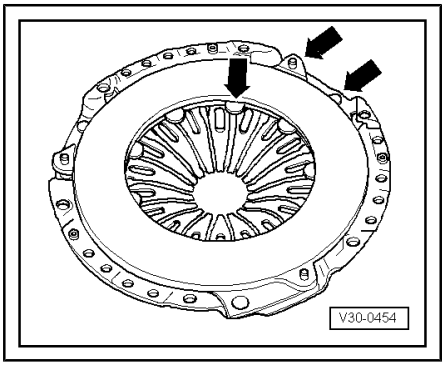
Checking ends of diaphragm spring

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



Checking spring connections and riveted connections

– Check spring connections between pressure plate and cover for cracks as well as rivet connections for secure seating.



Note

- *Renew clutch plates and pressure plates with damaged or loose rivet connections.*
- *Always renew pressure plate and clutch plate together.*
- *Select clutch plate and pressure plate according to engine code and ⇒ Electronic parts catalogue "ETKA".*
- *If clutch has burnt out, thoroughly clean clutch housing, flywheel and parts of engine facing gearbox to reduce smell of burnt linings.*
- *Clean input shaft splines and, on used clutch plates, clean hub splines; remove corrosion and apply only a very thin coat of clutch plate spline grease -G 000 100- to splines. Then move clutch plate to and fro on input shaft until hub moves freely on shaft. Remove excessive grease.*
- *Pressure plates are protected against corrosion and greased. Clean contact surface only. Otherwise, the service life of the clutch will be considerably reduced.*
- *Pressure plate contact surface and clutch plate lining must make full contact with flywheel. Only then insert securing bolts.*

– Reverse counterhold tool -3067- for installation.

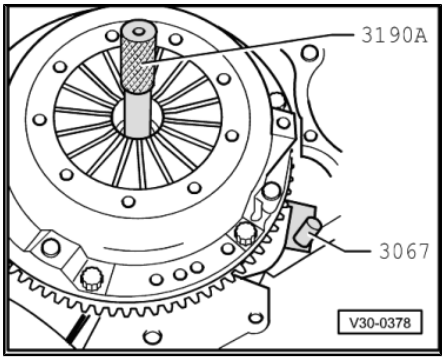
– Push pressure plate onto centralizing pins.

– To centre clutch plate, use centring mandrel -3190 A- .

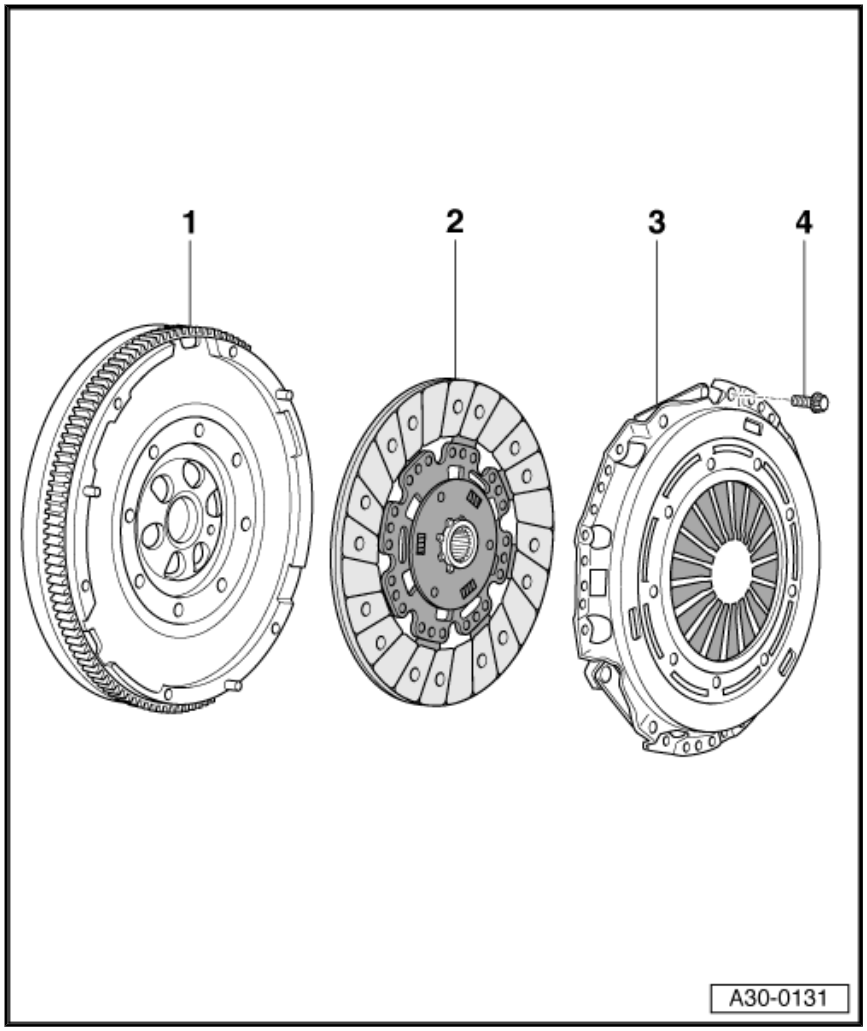
– Tighten all bolts evenly by hand until bolt heads contact pressure plate.

– Tighten bolts in small steps diagonally in order not to damage centring holes of pressure plate and centring pins of dual-mass flywheel.

– Install gearbox ⇒ page 92 .



4.3 Repairing Sachs clutch



1 - Dual-mass flywheel

- ❑ Removing and installing ⇒ Rep. Gr. 13
- ❑ Ensure that centring pins fit tightly
- ❑ Contact surface for clutch lining must be free of grooves, oil and grease

2 - Clutch plate

- ❑ Allocation ⇒ Electronic parts catalogue “ETKA”
- ❑ Removing and installing ⇒ page 48
- ❑ Renew only together with pressure plate
- ❑ Installation position ⇒ page 48

3 - Pressure plate

- ❑ Allocation ⇒ Electronic parts catalogue “ETKA”
- ❑ With adjusting mechanism
- ❑ Removing and installing ⇒ page 48
- ❑ Check ends of diaphragm spring ⇒ page 49
- ❑ Check spring connections and riveted connections ⇒ page 49 .
- ❑ Renew only together with clutch plate.

4 - Bolt M6, 13 Nm, Bolt M7, 20 Nm

- ❑ Loosen or tighten diagonally in small steps

4.4 Removing and installing LuK clutch

4.4.1 Removing

– Remove gearbox ⇒ page 84 .

– Use counterhold -3067- to loosen bolts.

– Loosen bolts in small steps and diagonally.

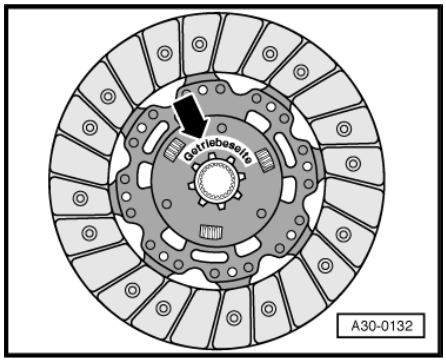
– Remove pressure plate and clutch plate.

4.4.2 Installing

Install in the reverse order of removal, observing the following:

Note

- *Renew pressure plate and clutch plate together only. Select clutch plate and pressure plate according to engine code and ⇒ Electronic parts catalogue “ETKA” .*
- *Check whether dowel sleeves for aligning engine and gearbox are fitted in cylinder block and install if necessary.*
- *If dowel sleeves are not fitted, difficulties shifting gears, clutch problems and possible noises from the gearbox (rattling of gears which are not engaged) could occur.*

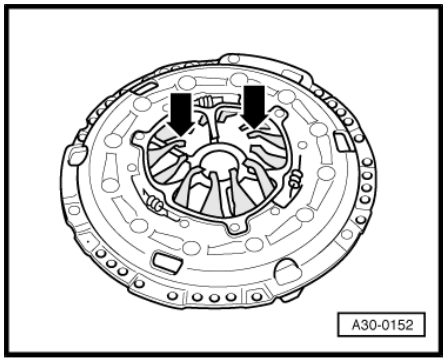


Installation position of clutch plate

- Lettering “Getriebeseite” (gearbox side) faces gearbox.

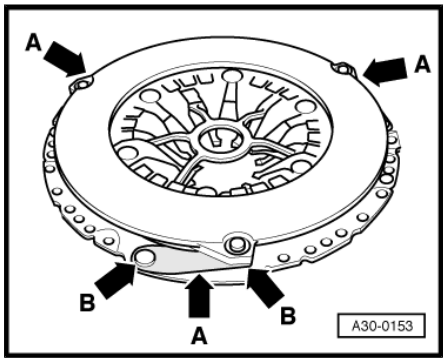
Checking ends of diaphragm spring

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

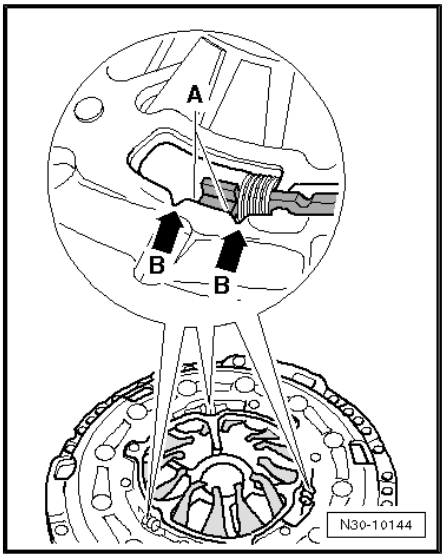


Checking spring connections and riveted connections

– Check spring connections -arrows A- for damage and riveted connections -arrows B- for secure seating.



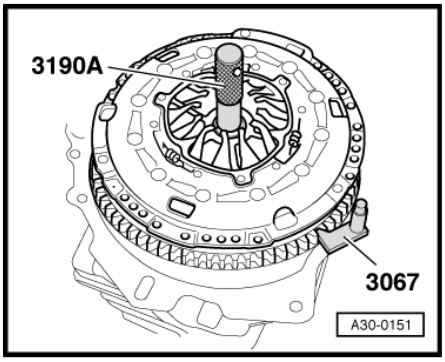
Checking position of adjusting mechanism with new pressure plates only



- Both edges -A- of the adjuster ring must be located between the two notches -arrows B-.
- If the adjuster ring takes up a different position in new pressure plates, the pressure plate and clutch plate are not allowed to be installed.
- The adjuster ring may take up a position outside the notches in used clutches.

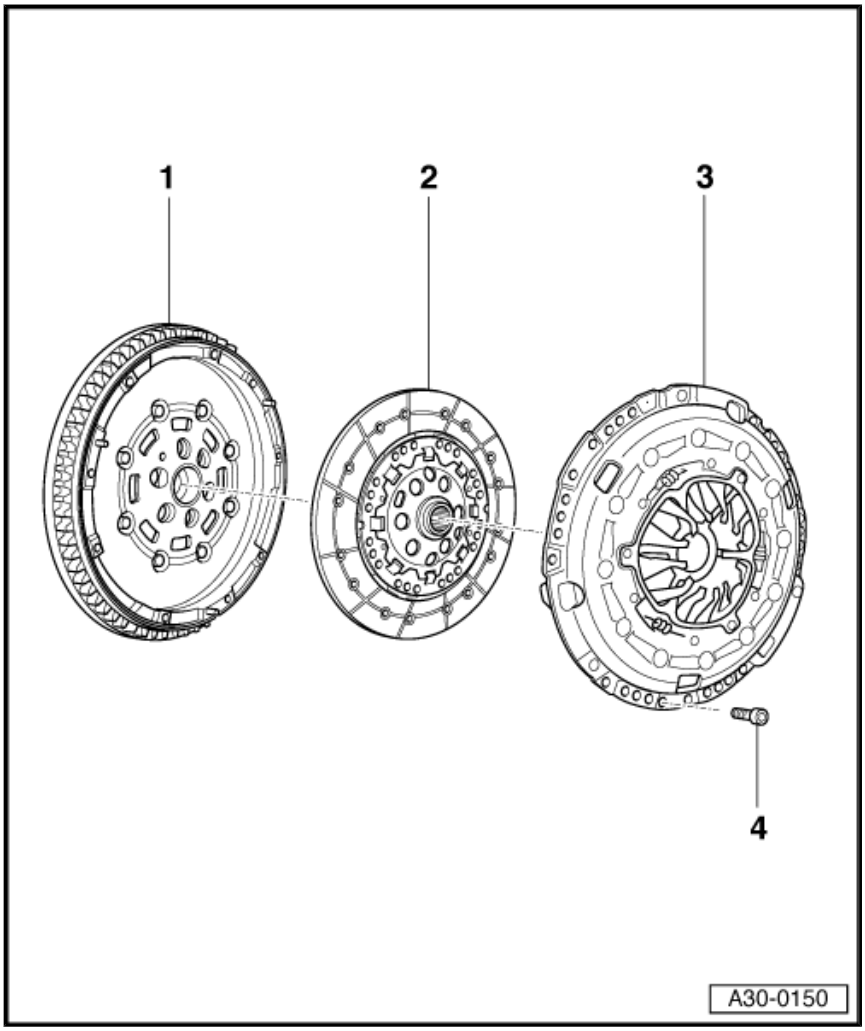
Note

- *Renew clutch plates and pressure plates with damaged or loose rivet connections.*
- *Renew pressure plate and clutch plate together only.*
- *Select clutch plate and pressure plate according to engine code and ⇒ Electronic parts catalogue "ETKA".*
- *If clutch has burnt out, thoroughly clean clutch housing, flywheel and parts of engine facing gearbox to reduce smell of burnt linings.*
- *Clean input shaft splines and, on used clutch plates, clean hub splines; remove corrosion and apply only a very thin coat of clutch plate spline grease -G 000 100- to splines. Then move clutch plate to and fro on input shaft until hub moves freely on shaft. Remove excessive grease.*
- *Pressure plates are protected against corrosion and greased. Clean contact surface only. Otherwise, the service life of the clutch will be considerably reduced.*
- *Pressure plate contact surface and clutch plate lining must make full contact with flywheel. Only then insert securing bolts.*



– Reverse counterhold tool -3067- for installation.
– Push pressure plate onto centralizing pins.
– To centre clutch plate, use centring mandrel -3190 A- .
– Tighten all bolts evenly by hand until bolt heads contact pressure plate.
– Tighten bolts in small steps diagonally in order not to damage centring holes of pressure plate and centring pins of dual-mass flywheel.
– Install gearbox ⇒ page 92 .

4.5 Repairing LuK clutch



1 - Dual-mass flywheel

- ❑ Removing and installing ⇒ Rep. Gr. 13
- ❑ Ensure that centring pins fit tightly
- ❑ Contact surface for clutch lining must be free of grooves, oil and grease

2 - Clutch plate

- ❑ Allocation ⇒ Electronic parts catalogue “ETKA”
- ❑ Removing and installing ⇒ page 50
- ❑ Renew only together with SAC pressure plate.
- ❑ Installation position: ⇒ page 51 .

3 - SAC pressure plate

- ❑ SAC means “self-adjusting clutch”.
- ❑ Renew only together with clutch plate.
- ❑ Allocation ⇒ Electronic parts catalogue “ETKA”
- ❑ Removing and installing ⇒ page 50
- ❑ Check ends of diaphragm spring ⇒ page 51
- ❑ Checking spring connections and riveted connections ⇒ page 51
- ❑ Checking position of adjusting mechanism with new pressure plates only ⇒ page 52

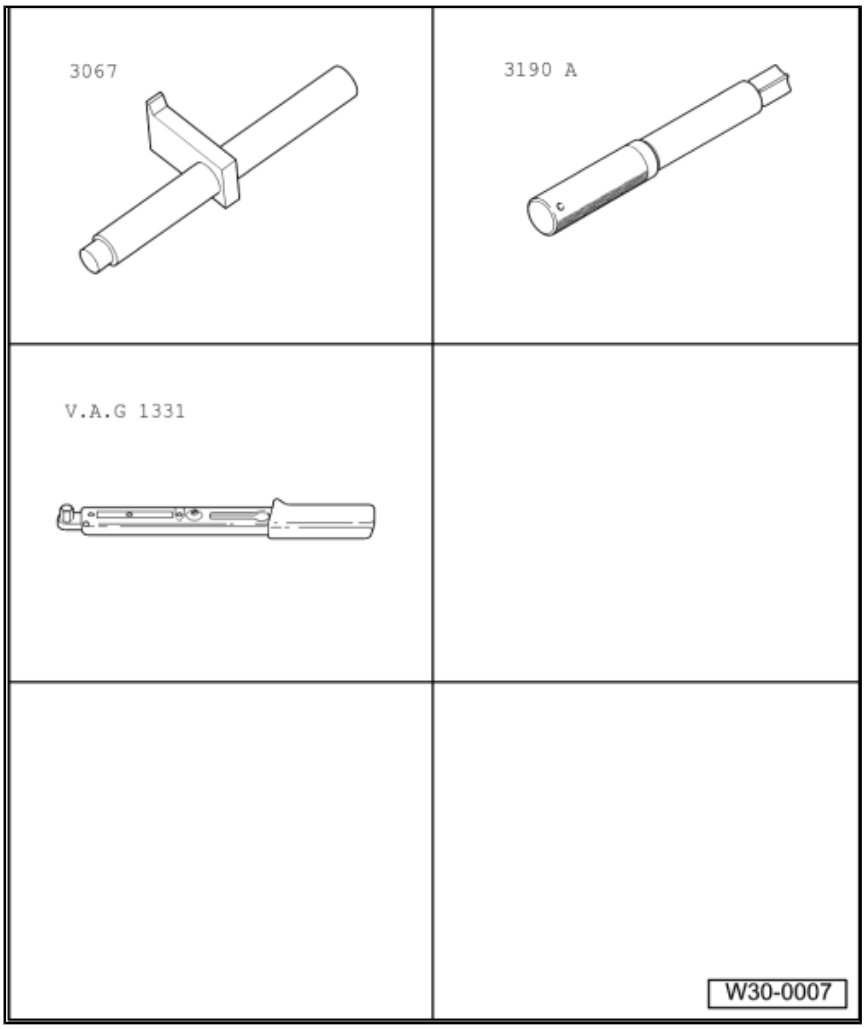
4 - Bolt M6, 13 Nm, Bolt M7, 20 Nm

- ❑ Loosen or tighten diagonally in small steps

5 Repairing clutch, in conjunction with one-piece flywheel

Special tools and workshop equipment required

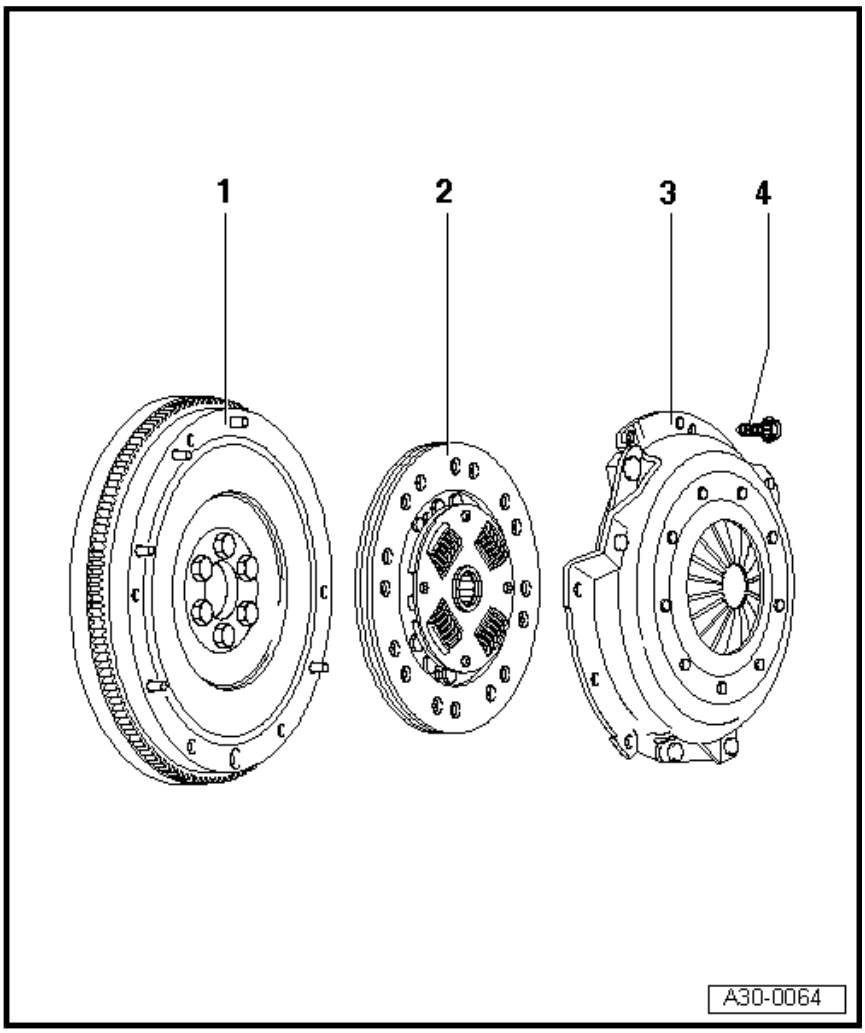
- Counterhold -3067-
- Centring mandrel -3190 A-
- Torque wrench - V.A.G 1331-
- Grease for clutch plate splines -G 000 100-



(Gearbox removed)

Note

- *Renew clutch plates and pressure plates with damaged or loose rivets.*
- *Select clutch plate and pressure plate according to ⇒ Electronic parts catalogue "ETKA" and engine codes.*
- *Check whether dowel sleeves for aligning engine and gearbox are fitted in cylinder block and install if necessary.*
- *If dowel sleeves are not fitted, difficulties shifting gears, clutch problems and possible noises from the gearbox (rattling of gears which are not engaged) could occur.*



1 - Flywheel

- ❑ Removing and installing ⇒ Rep. Gr. 13
- ❑ Ensure that centring pins fit tightly
- ❑ Keep contact surface for clutch lining free of grooves, oil and grease.

2 - Clutch plate

- ❑ Allocation ⇒ Electronic parts catalogue “ETKA”
- ❑ Installation position: spring cage faces pressure plate
- ❑ Centring ⇒ page 55
- ❑ Lightly grease splines

Note

3 - Pressure plate

- ❑ Removing and installing ⇒ page 55
- ❑ Check ends of diaphragm spring ⇒ page 56
- ❑ Check spring connections and riveted connections ⇒ page 56 .

Note

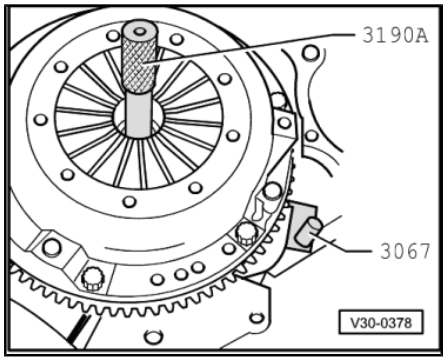
4 - Bolt M6, 13 Nm, Bolt M7, 20 Nm

- ❑ Allocate according to ⇒ Electronic parts catalogue “ETKA” .
- ❑ Loosen or tighten diagonally and in steps

Centring clutch plate and removing and installing pressure plate

– Loosen or tighten bolts diagonally in stages.

– Reverse position of counterhold -3067- when removing.

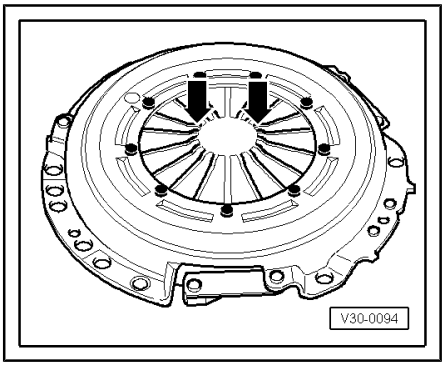


Note

Pressure plate contact surface and clutch plate lining must make full contact with flywheel. Tighten bolts diagonally and evenly to prevent damage to the centring holes in the pressure plate housing and the centring pins in the flywheel.

Checking ends of diaphragm spring

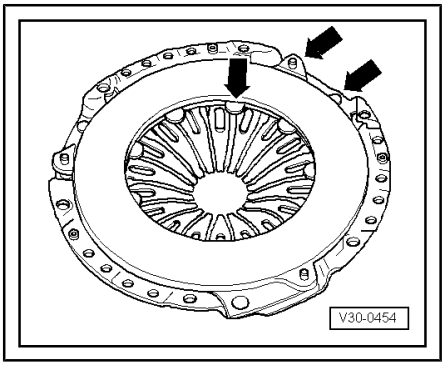
- Wear up to half the thickness of the diaphragm spring is permitted.



Checking spring connections and riveted connections

– Check spring connections between pressure plate and cover for cracks as well as rivet connections for secure seating.

- A pressure plate with damaged spring connections or with loose rivet connections -arrows- must be renewed.



34 – Controls, housing

1 Fault finding, power transmission

– Refer to ⇒ Fault finding, power transmission; Rep. Gr. 30 ; Complaints about clutch and clutch mechanism and ⇒ Fault finding, power transmission; Rep. Gr. 34 ; Complaints about selector mechanism

2 Repairing selector mechanism

2.1 Installation position of selector mechanism

Arrow -A- Gear selection movement

Arrow -B- Gate selection movement

A - Gear selector cable

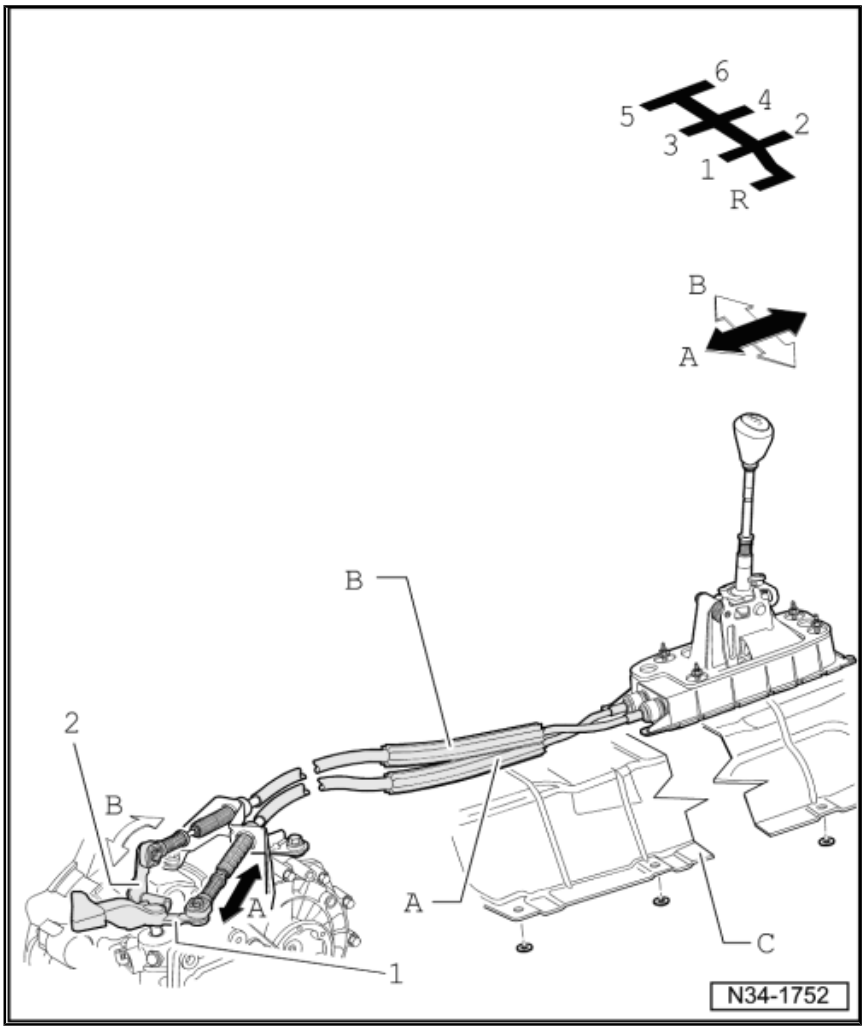
B - Gate selector cable

C - Heat shield

- ❑ Remove before removing gear selector mechanism

1 - Gearbox selector lever

2 - Relay lever



2.2 Overview of selector mechanism

Note

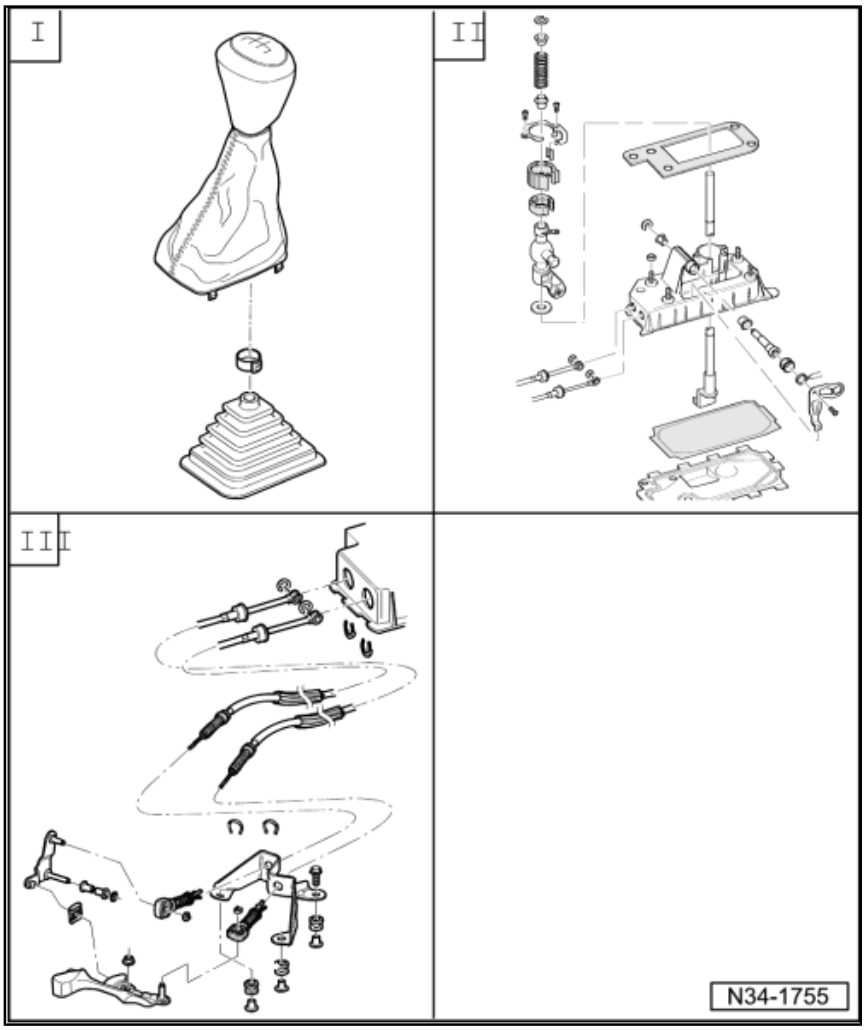
- *Note radio code for vehicles with coded radio.*
- *Before working on selector mechanism in engine compartment, disconnect earth strap from battery ⇒ Electrical system; Rep. Gr. 27 ; Disconnecting and connecting battery .*
- *When reconnecting battery, perform work required after connecting battery ⇒ Electrical system; Rep. Gr. 27 ; Disconnecting and connecting battery .*
- *To work on selector mechanism in engine compartment, remove complete air filter housing if it is located over selector mechanism ⇒ Rep. Gr. 23 ; Repairing diesel direct injection system or ⇒ Rep. Gr. 24 ; Repairing injection system .*
- *Remove selector mechanism to renew selector cables ⇒ page 75 .*
- *Do not kink selector cables.*

I - Removing and installing gear knob and frame ⇒ page 61

II - Repairing gear lever and selector housing (through 10.06) ⇒ page 63

II - Repairing gear lever and selector housing (from 11.06) ⇒ page 65

III - Assembly overview - removing and installing selector cables ⇒ page 70

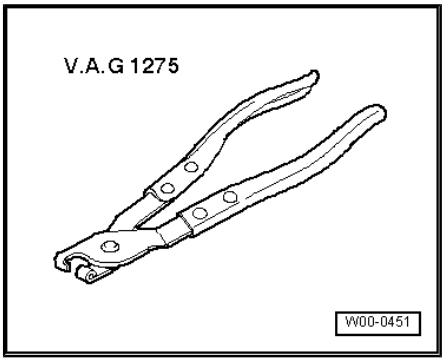


Removing and installing selector mechanism ⇒ page 75

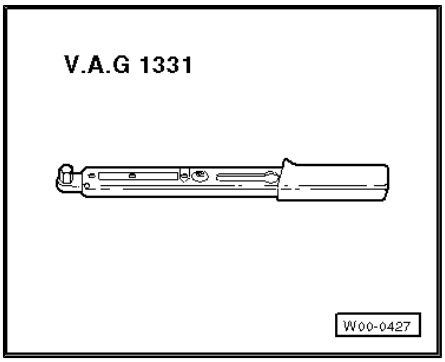
Adjust selector mechanism ⇒ page 80 .

Special tools and workshop equipment required

- Hose clip pliers -V.A.G 1275-



- Torque wrench -V.A.G 1331-



2.3 Removing and installing gear knob and frame

1 - Emblem

- ❑ Can be carefully levered off gear knob of plastic or leather

2 - Gear knob

- ❑ With gaiter
- ❑ Gear knob and gaiter cannot be separated from one another
- ❑ Always renew together
- ❑ Removing and installing ⇒ page 61

3 - Clamp

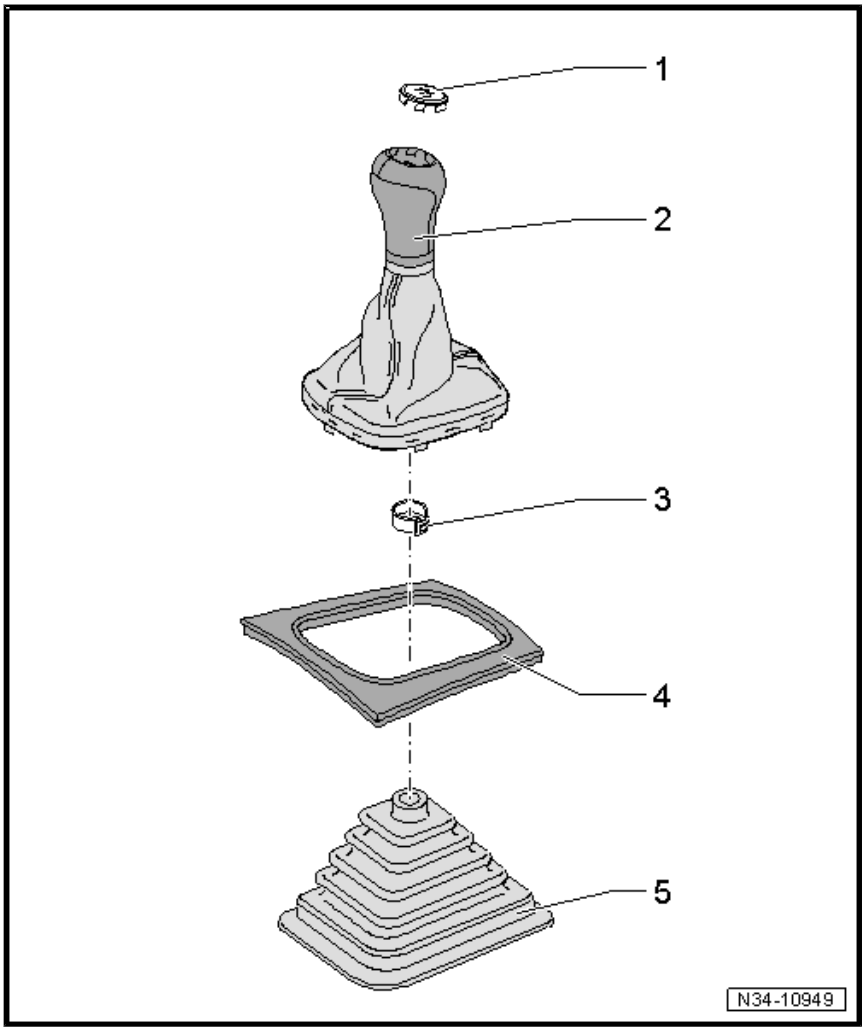
- ❑ For securing gear knob to gear lever
- ❑ Secure to gear knob ⇒ Item 2 (page 61) using hose clip pliers -V.A.G 1275-
- ❑ Always renew

4 - Frame for centre console

- ❑ In some equipment versions, forms one part together with centre console

5 - Noise insulation

- ❑ Not fitted in all vehicles
- ❑ Arrow on noise insulation points in direction of travel
- ❑ Locking lugs are arranged at varying intervals
- ❑ Therefore it can be installed in only one position

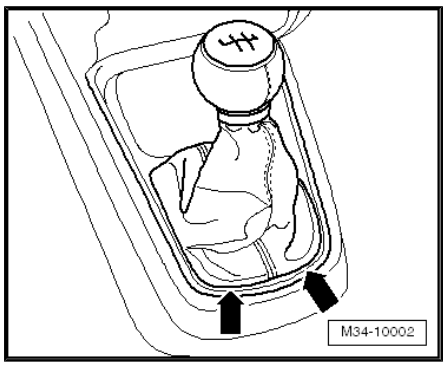


2.4 Removing and installing gaiter with gear knob and noise insulation

– Pull or carefully prise gaiter with frame for centre console upwards out of centre console -arrows-.

Note

With some equipment variations, the gaiter must be levered off along the front section.

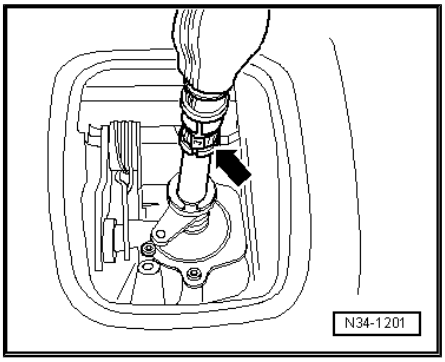


– Pull gaiter with frame for centre console upwards, inside out over gear knob.

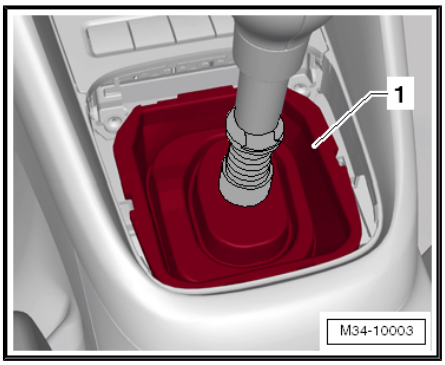
– Open clamp -arrow- and pull off gear knob together with gaiter.

In some versions, the centre console frame remains in the centre console.

– If necessary pull off, or carefully lever off, centre console frame.



– Pull off noise insulation -1-.



2.4.1 Installing

– First set noise insulation in place.

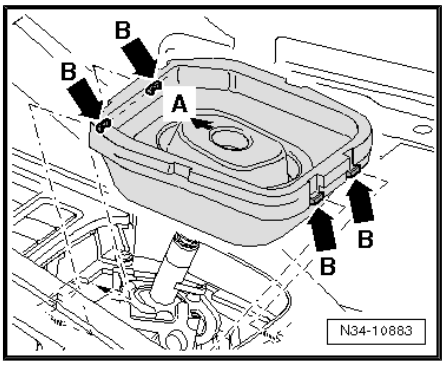
Installation position of noise insulation

- -Arrow A- points in direction of travel.
- Catches -arrows B- must engage in centre console.

– If necessary, press frame into centre console.

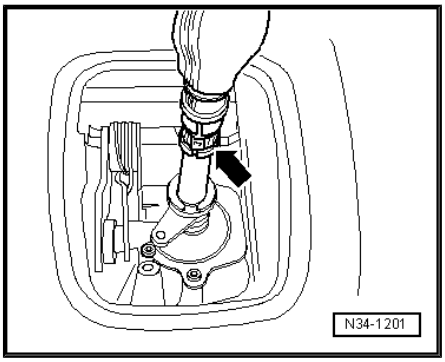
– Then turn gaiter inside out.

The gear knob must be pressed to stop.



– Install gear knob with frame and gaiter and squeeze new clamp -arrow- together.

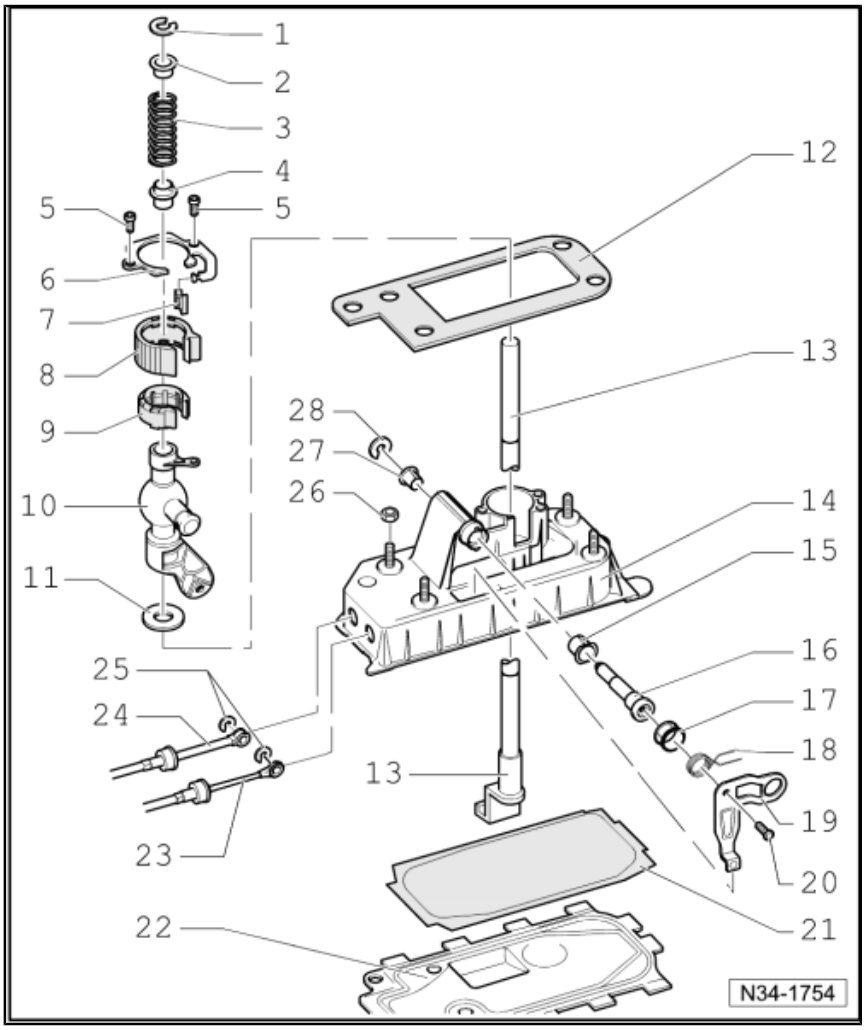
– Then press gaiter with frame into centre console or gaiter into frame.



2.5 Repairing gear lever and selector housing (through 10.06)

Note

Lubricate bearing points and sliding surfaces with grease -G 000 450 02- .



1 - Securing clip
- ❑ Removing and installing ⇒ page 64

2 - Bush

3 - Compression spring

4 - Bush

5 - Torx screw, 5 Nm

6 - Cover

7 - Damping

8 - Damping

9 - Ball socket

10 - Gear lever guide

11 - Damping washer

12 - Seal
- ❑ Between selector housing and underbody
- ❑ Self-adhesive
- ❑ Bond to selector housing

13 - Gear lever

14 - Selector lever housing

15 - Bearing bush

16 - Pivot pin

17 - Guide bush

18 - Compression spring
- ❑ Installing ⇒ page 64

19 - Gate selector lever

20 - Torx screw, 5 Nm

21 - Seal
- ❑ Always renew

22 - Base plate
- ❑ Bend open tabs to remove
- ❑ Always renew

23 - Gate selector cable
- ❑ On gate selector lever
- ❑ Removing and installing ⇒ page 64

24 - Gear selector cable
- ❑ Removing from and attaching to gear lever guide ⇒ page 64

25 - Securing clip

- ❑ Always renew

26 - Hexagon nut

- ❑ M8: 25 Nm
- ❑ M6: 8 Nm
- ❑ Qty. 4

27 - Bearing bush

- ❑ Fits in one position only

28 - Securing clip

- ❑ Always renew

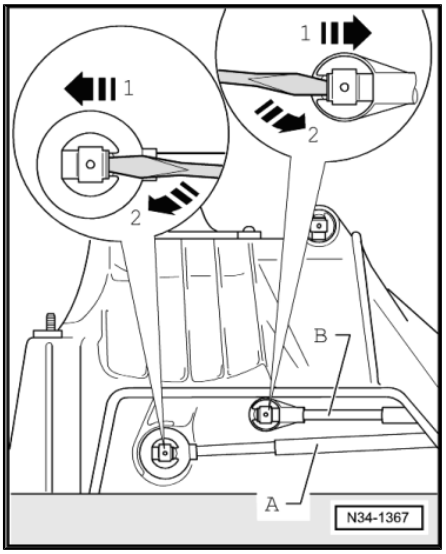
Removing and installing gate and gear selector cables

– Remove securing clip from gear selector cable -A- and gate selector cable -B-.

To do this, raise tab using screwdriver -arrow 1- and press off securing clip -arrow 2-.

– Remove gear selector cable -A- from gear lever retainer.

– Remove gate selector cable -B- from retainer of gate selector lever.

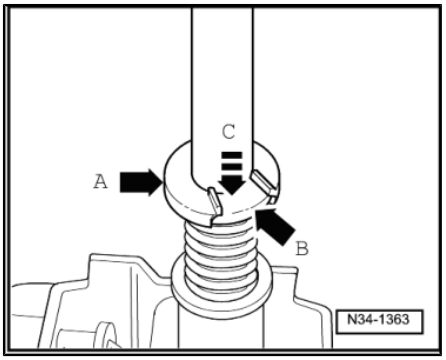


Removing and installing securing clip

– To remove or install securing clip -arrow A-, press spacer bush -arrow B- to stop in direction of arrow -arrow C- using screwdriver and pull off securing clip.

Note

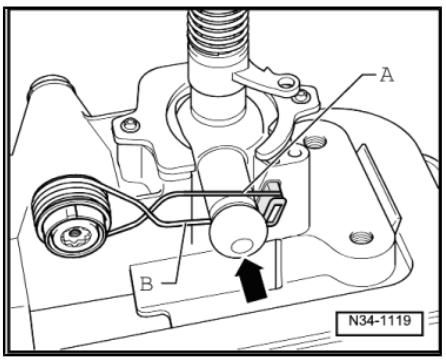
- ♦ *Do not cant spacer bush when pushing down.*
- ♦ *Slot in gear lever for securing clip must be visible.*
- ♦ *Carefully release tension from spring.*



Installing compression spring

– Insert compression spring so that extension -A- lies on top of pin -arrow-.

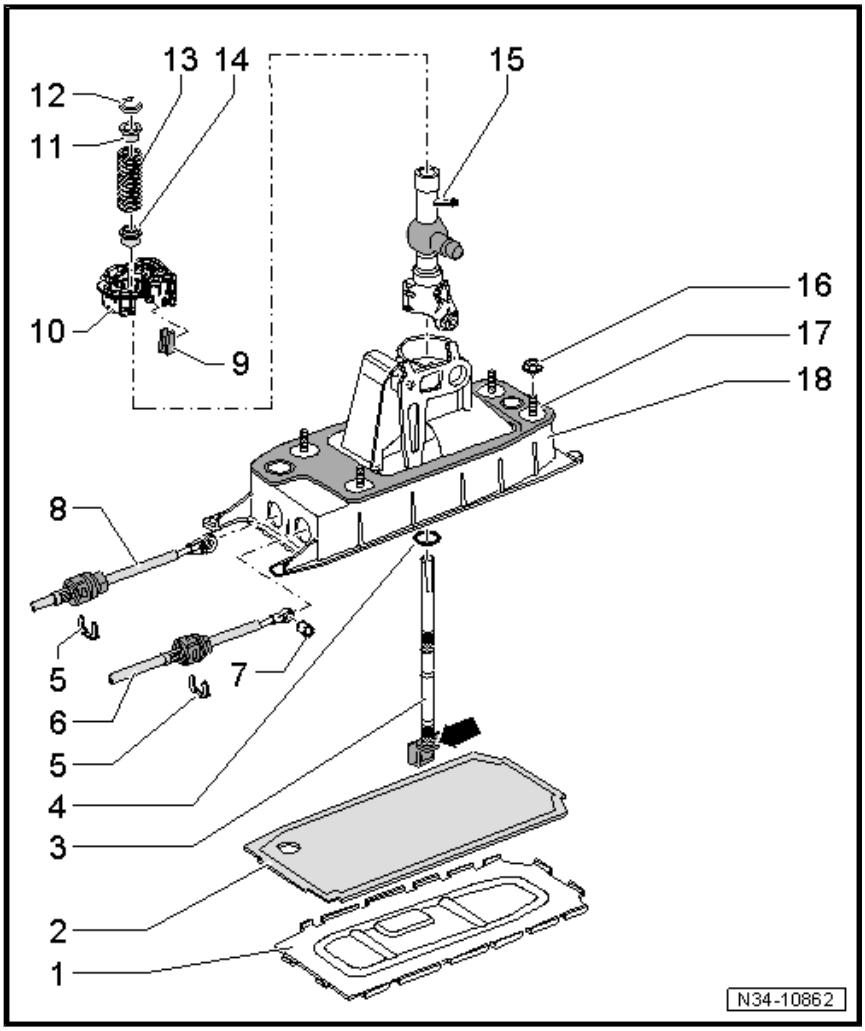
– Then pull extension -B- down so that it sits below pin -arrow-.



2.6 Repairing gear lever and selector housing (from 11.06)

Note

- *Lubricate bearing points and sliding surfaces with grease -G 000 450 02- .*
- *Dismantling and assembling selector mechanism ⇒ page 66 .*



1 - Base plate
- ❑ Bend open tabs to remove
- ❑ Always renew

2 - Seal
- ❑ Always renew

3 - Selector lever
- ❑ Can be removed and installed with gear lever guide ⇒ Item 15 (page 66) installed

4 - Damping washer
- ❑ Push onto gear lever up to stop -arrow-

5 - Securing clip
- ❑ Do not damage cables when removing
- ❑ Always renew

6 - Gate selector cable
- ❑ Lever off gate selector lever
- ❑ Press onto gate selector lever inside selector mechanism
- ❑ Installation position ⇒ page 58

7 - Bush

8 - Gear selector cable
- ❑ Lever off gear lever guide
- ❑ Press onto gear lever guide inside selector mechanism
- ❑ Installation position ⇒ page 58

9 - Damping

10 - Ball socket
- ❑ Will be damaged when removed
- ❑ Always renew

11 - Bush

12 - Securing clip
- ❑ Removing and installing ⇒ page 64

13 - Compression spring
- ❑ Removing and installing ⇒ page 64

14 - Bush

15 - Gear lever guide

16 - Hexagon nut

- ❑ M8: 25 Nm
- ❑ M6: 8 Nm
- ❑ Qty. 4

17 - Seal

- ❑ Between selector housing and underbody
- ❑ Self-adhesive
- ❑ Bond to selector housing

18 - Selector lever housing

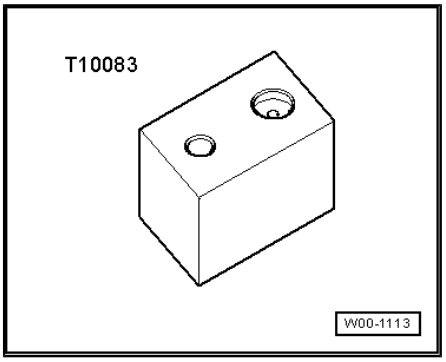
- ❑ With compression spring and gate selector lever
- ❑ Compression spring and gate selector lever cannot be removed

2.6.1 Dismantling and assembling selector mechanism

Special tools and workshop equipment required

♦

thrust piece -T10083-



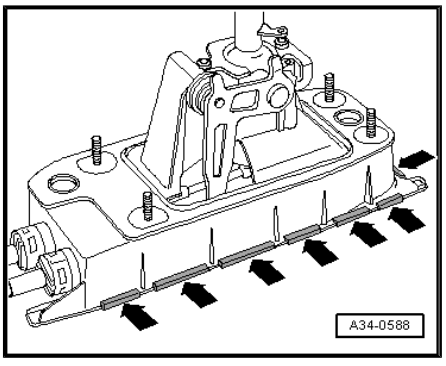
Dismantling

– Remove selector mechanism ⇒ page 75 .

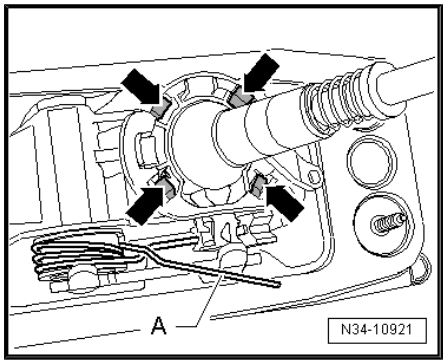
– Bend open tabs -arrows- of base plate for selector mechanism using screwdriver and remove base plate; (tabs in front area of base plate are not illustrated).

– Remove seal from selector housing.

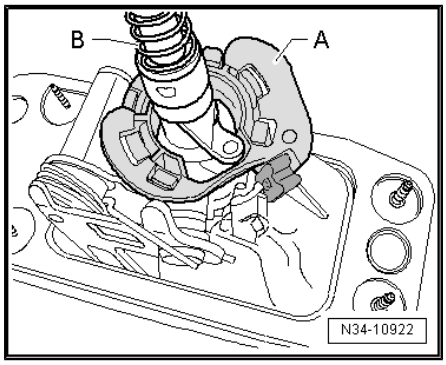
– Remove gear and gate selector cables from selector housing ⇒ page 78 .



– Lift upper end -A- of compression spring over tab of gate selector lever.
– Use screwdriver to press catches -arrows- of ball socket towards bearing ball of gear lever guide; break off catches if necessary.

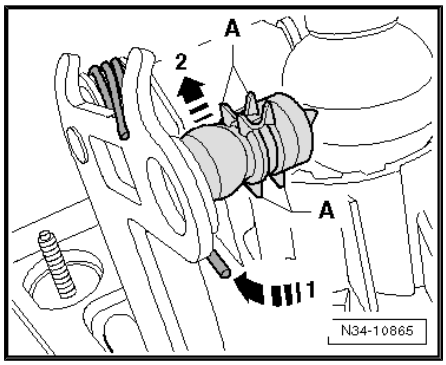


– Lever ball socket -A- with gear lever guide -B- out of selector housing.
– Then press ball socket off bearing ball of gear lever guide and remove it.

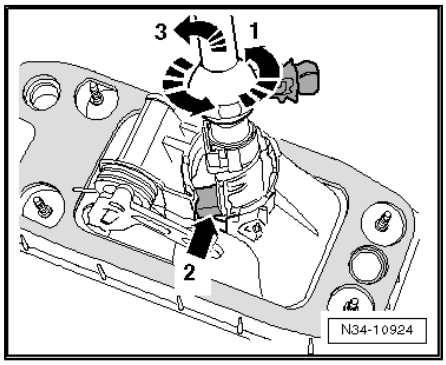


• Please pay attention to guides -A- during the further procedure.
• They must not be broken off.

– Lever lower end -arrow 1- of compression spring onto shoulder on gate selector lever as far as stop.
– Now pull gear lever guide up to stop and pull ball stud out of gate selector lever -arrow 2-.



– Then turn gear lever guide in -direction of arrow 1-.
• Pin -arrow 2- must be in notch in selector housing.
– Then swing out gear lever guide with gear lever in -direction of arrow 3-.



Assembling

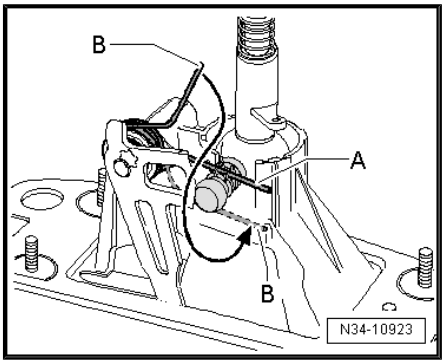
Caution

The lower end of the compression spring (-arrow 1- ⇒ figure above) can snap off the shoulder of the gate selector lever out of control during the further procedure.

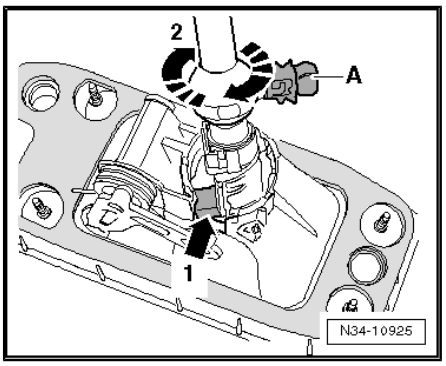
– Therefore, carefully press it down off shoulder of gate selector lever.

The ends of the compression spring then become tensioned “diagonally” with a loud noise.

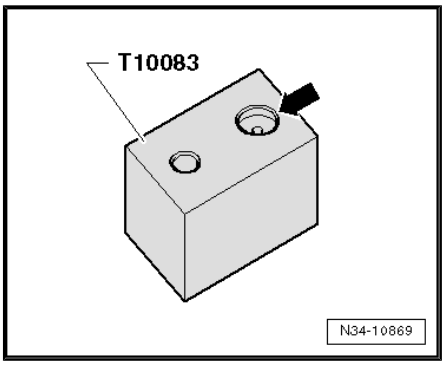
– Slacken ends -A- and -B- by turning both round to right.
• Ends -A- and -B- must point in opposite directions.



– Fit gear lever guide in selector housing.
• Pin -arrow 1- is still located in notch in selector housing.
– Turn gear lever guide in -direction of arrow 2- until ball stud -A- is located in notch in selector housing.



– Place selector housing with gear lever guide into larger recess -arrow- in thrust piece -T10083- .



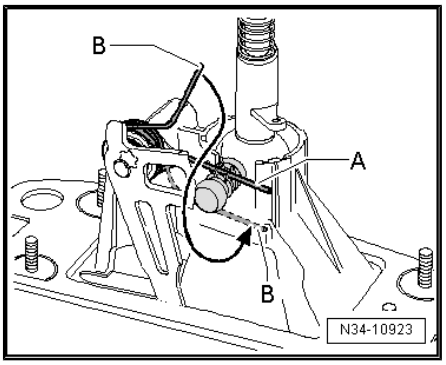
Note

To ensure that the selector housing with gear lever guide can be inserted in the thrust piece , first remove gear lever, if necessary.

• The gear lever guide must project from the selector housing up to the stop.

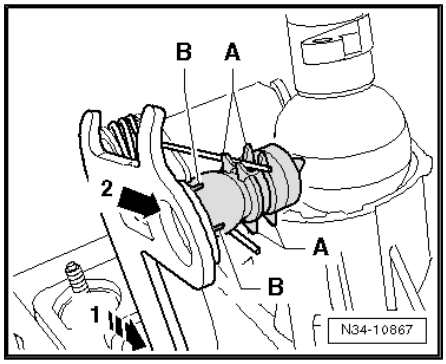
Note

For clarity of illustration, only part of the gate selector lever is shown.

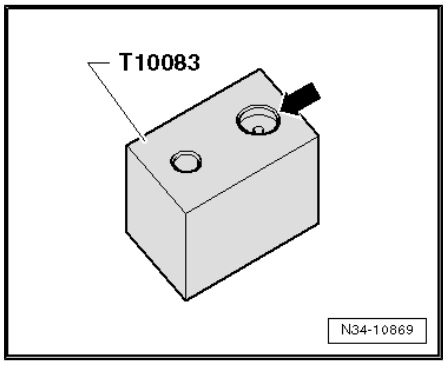


– Insert end -A- of compression spring into guide from above.
– Pull end -B- of compression spring downwards and insert it next to guide (in direction of ball joint).
• Please pay attention to guides (⇒ figure above) during the further procedure.
• They must not be broken off.
– Carefully remove selector housing with gear lever guide from thrust piece -T10083- .

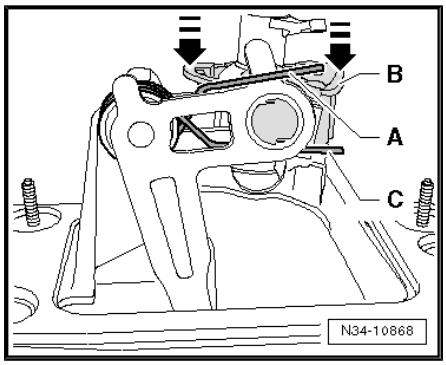
– Move gate selector lever back to stop (opposite from mounting holes for gear and gate selector cable) -arrow 1-.
– Grease ball stud.
– Press ball stud into gate selector lever -arrow 2-.
• Guides -A- and tabs -B- are not allowed to be damaged.



– Place selector housing with gear lever guide into larger recess -arrow- in thrust piece -T10083- .



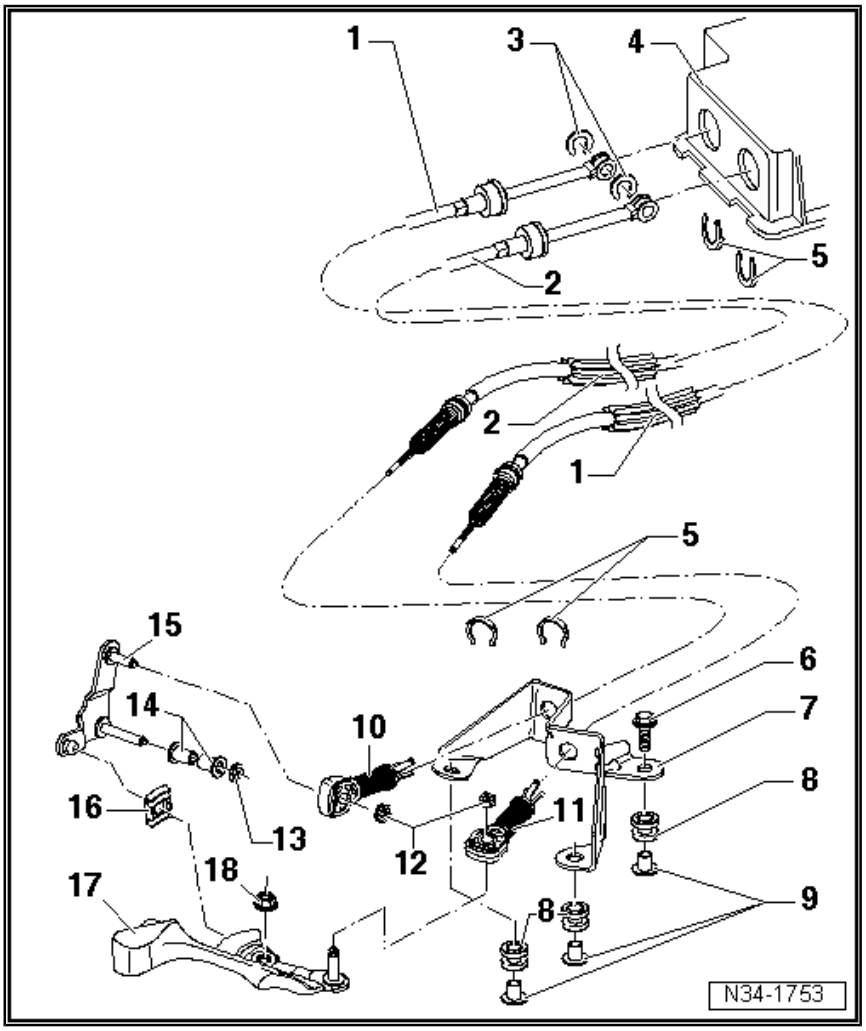
• The gear lever guide must project from the selector housing up to the stop.
– Lift upper end -A- of compression spring over pin of gate selector lever
• Use a new ball socket -B-.
– Grease ball socket and bearing ball of gear lever guide.
– Press ball socket onto bearing ball of gear lever guide up to stop.
– Remove selector housing from thrust piece -T10083- .
– Insert lower end -C- of compression spring into guide.
– Lift upper end -A- of compression spring over pin of gate selector lever into guide.
– Press ball socket into selector housing -arrows-.
• All locking lugs must clip in.
– Attach gear lever, gear selector cable, gate selector cable and base plate ⇒ page 65 .
– Install selector mechanism ⇒ page 75 .



2.7 Assembly overview - removing and installing selector cables

Note

Lubricate bearing points and sliding surfaces with grease -G 000 450 02- .



1 - Gear selector cable

- ❑ Connect to cable end-piece
  ⇒ Item 11 (page 71)
- ❑ Installation position
  ⇒ page 58
- ❑ Use cable tie to fix onto gate selector cable
  ⇒ page 73
- ❑ Removing and installing
  ⇒ page 78
- ❑ From 11.06, modified attachment to gear lever inside selector mechanism
  ⇒ Item 8 (page 65)

2 - Gate selector cable

- ❑ Connect to cable end-piece
  ⇒ Item 10 (page 71)
- ❑ Installation position
  ⇒ page 58
- ❑ Use cable tie to fix onto gear selector cable
  ⇒ page 73
- ❑ Removing and installing
  ⇒ page 78
- ❑ From 11.06, modified attachment to gate selector lever inside selector mechanism
  ⇒ Item 6 (page 65)

3 - Securing clip

- ❑ Always renew
- ❑ Discontinued in selector mechanisms from 11.06 ⇒ page 65

4 - Selector lever housing

5 - Securing clip

- ❑ Always renew
- ❑ Do not damage cables when removing

6 - Hexagon bolt, 20 Nm

- ❑ Qty. 3
- ❑ For cable support bracket

7 - Cable support bracket

- ❑ May be made from plastic or metal

8 - Grommet

- ❑ Cable support bracket mounting on gearbox

9 - Spacer

10 - Cable end-piece

- ❑ For gate selector cable to relay lever
- ❑ After installing, adjust selector mechanism ⇒ page 80
- ❑ Do not interchange; cable end-pieces for gate selector cable to relay lever and gear selector cable to gearbox selector lever are different
- ❑ For metal relay lever, secured with securing clip ⇒ Item 12 (page 71)
- ❑ From 05.07, fitted in conjunction with plastic relay lever ⇒ page 73
- ❑ Removing from plastic relay lever ⇒ page 73
- ❑ Pressing onto plastic relay lever ⇒ page 73
- ❑ Allocation ⇒ page 72

11 - Cable end-piece

- ❑ For gear selector cable to gearbox selector lever
- ❑ After installing, adjust selector mechanism ⇒ page 80
- ❑ Do not interchange; cable end-pieces for gate selector cable to relay lever and gear selector cable to gearbox selector lever are different
- ❑ Allocation ⇒ page 72

12 - Securing clip

- ❑ Always renew
- ❑ Not required for plastic relay lever

13 - Securing clip

- ❑ Always renew
- ❑ Not required for plastic relay lever

14 - Bearing bush

- ❑ Not required for plastic relay lever

15 - Relay lever

- ❑ Installation position ⇒ page 72
- ❑ After installing, adjust selector mechanism ⇒ page 80
- ❑ May be made from plastic or metal
- ❑ Metal relay lever is mounted in bearing bush ⇒ Item 14 (page 71) and secured with securing clip ⇒ Item 13 (page 71)
- ❑ From 05.07, plastic relay lever
- ❑ Remove and install plastic relay lever together with cable end-piece ⇒ page 73
- ❑ Bearing bushes and securing clip not required for plastic relay lever

16 - Shoe

17 - Gearbox selector lever

- ❑ With damper weight
- ❑ Install so that master spline aligns with selector shaft
- ❑ Installation position ⇒ page 72
- ❑ After installing, adjust selector mechanism ⇒ page 80
- ❑ From 06.06, smaller diameter of support pin for cable end-piece ⇒ page 72

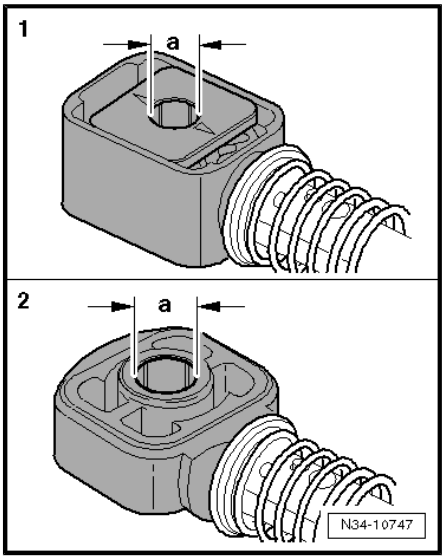
18 - Hexagon nut, 23 Nm

- ❑ Self-locking
- ❑ Always renew

Allocation of cable end-pieces

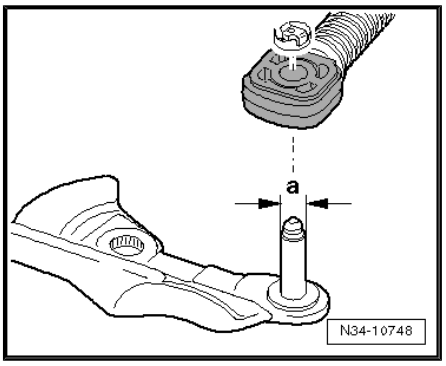
The holes in the cable end-pieces have different diameters.

Cable end-piece for	Dimension “a”
1 - Gear selector cable to gearbox selector lever from 06.06	8.5 mm
2 - Gear selector cable to gearbox selector lever through 05.06	10 mm
2. - Gate selector cable to metal relay lever	8 mm
2. - Gate selector cable to plastic relay lever ⇒ page 73	10 mm



From 06.06, smaller diameter of support pin for gear selector cable end-piece

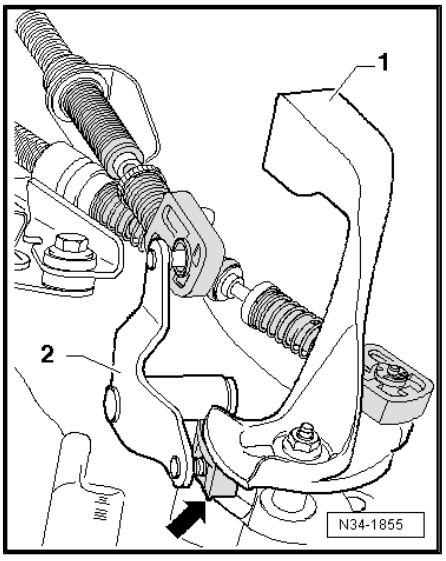
Support pin for gear selector cable end-piece	Dimension “a”
Through 05.06	10 mm
From 06.06	8.5 mm



Installation position of gearbox selector lever and relay lever

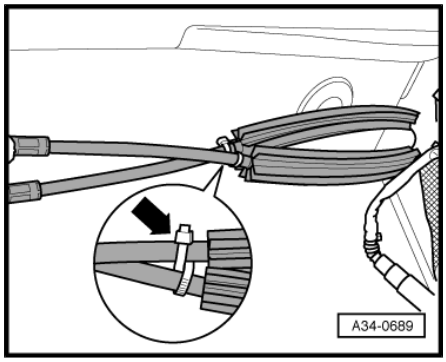
1 - Gearbox selector lever with damper weight

2 - Relay lever engages in guide rail of gearbox selector lever via shoe -arrow-.



Fitting position of cable tie for cables

– Wind cable tie -arrow- around the selector cables in a figure eight and secure them as shown in figure.



2.8 Plastic relay lever

From 05.07, relay lever is made from plastic. 2 versions may be installed.

- ♦ Relay lever with catch or
- ♦ Relay lever with clip

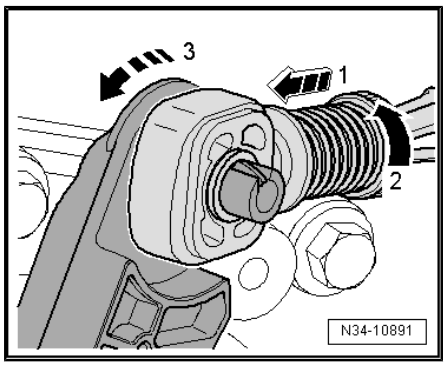
Comply with the following during removal and installation work:

- To remove relay lever, first separate cable end-piece from gate selector cable.

This will avoid damage to the gate selector cable

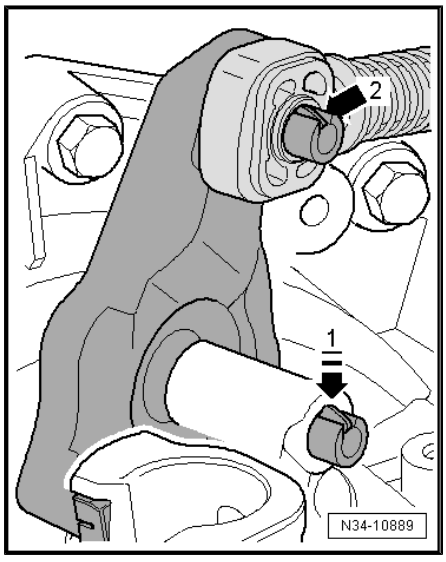
– Pull locking mechanism forward to stop in -direction of arrow 1- and then lock by turning to left in -direction of arrow 2-.

– Then push relay lever forwards (-in direction of arrow 3-).



Relay lever with catch -arrow 1-

– Press catch -arrow 1- down to stop and remove relay lever together with cable end-piece. In the process, swing it in direction of operation.



Relay lever with clip -arrow 1-

– Pull clip -arrow 1- off and remove relay lever together with cable end-piece.

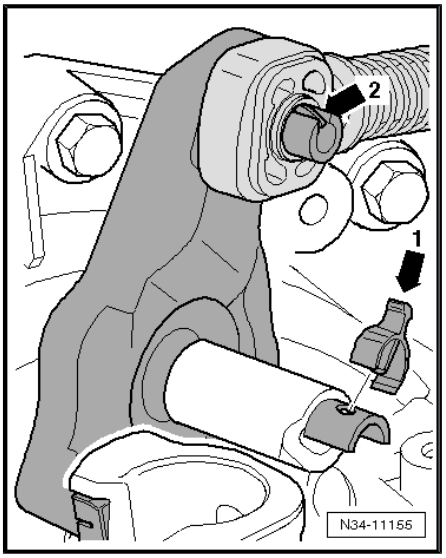
Continuation for all

- Cable end-piece must be located behind catch -arrow 2-.
- The cable end-piece can be removed only with the relay lever removed ⇒ page 75 .

Note

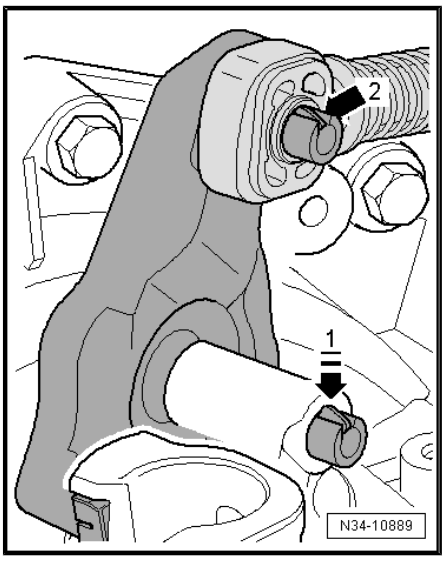
To fit, lubricate bearing points and sliding surfaces with grease - G 000 450 02- .

– Press cable end-piece onto relay lever ⇒ page 75 .
– Install relay lever together with cable end-piece to stop.



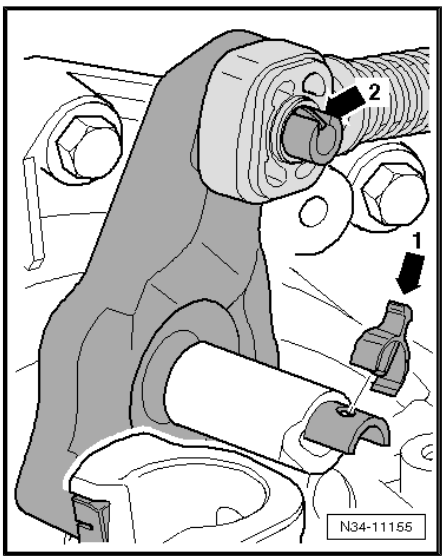
Relay lever with catch -arrow 1-

- Catch -arrow 1- secures relay lever.
- Ensure proper engagement.
- Cable end-piece must be located behind catch -arrow 2-.



Relay lever with clip -arrow 1-

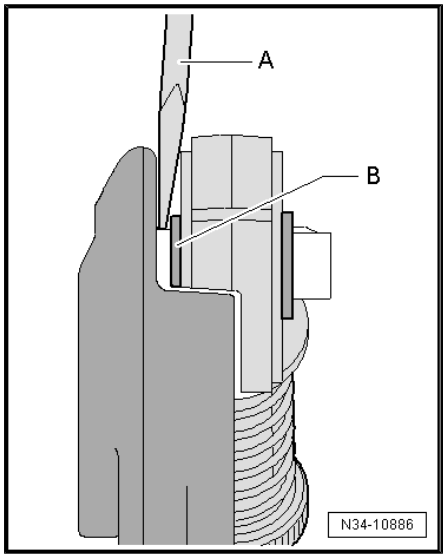
- Clip -arrow 1- secures relay lever.
- Ensure proper engagement of clip.
- Cable end-piece must be located behind catch -arrow 2-.



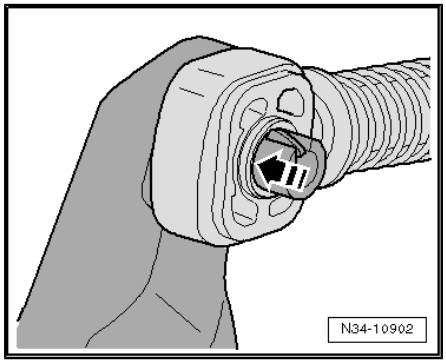
Levering gate selector cable end-piece off plastic relay lever

- Relay lever has been removed.

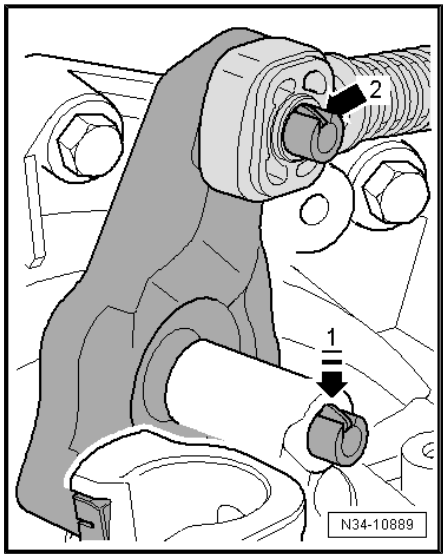
– Insert a flat-blade screwdriver -A- between bush -B- and relay lever.



Pressing on cable end-piece



- Relay lever has been removed.
- Cable end-piece may be pressed only onto bush -arrow-.
- Cable end-piece must move freely on relay lever.
- It must be located behind catch -arrow 2-.

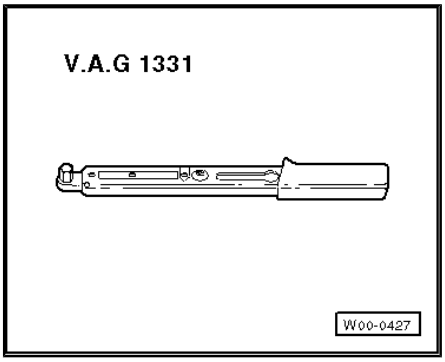


2.9 Removing and installing selector mechanism

2.9.1 Removing

Special tools and workshop equipment required

♦ Torque wrench -V.A.G 1331-



♦ Grease -G 000 450 02-

– First check whether a coded radio is fitted. If so, obtain anti-theft code.

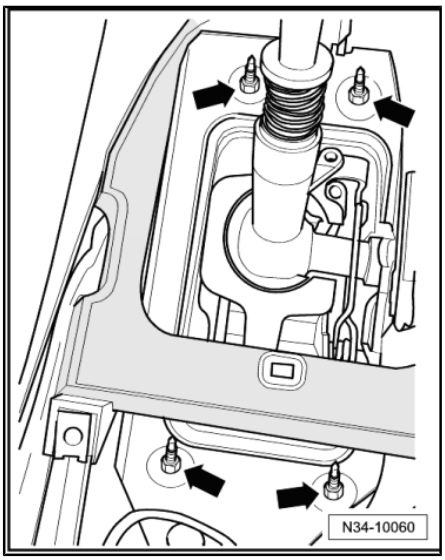
– With ignition switched off, disconnect battery earth strap ⇒ Electrical system; Rep. Gr. 27 ; Removing and installing battery .

– Remove gaiter with selector knob and noise insulation ⇒ page 61 .

– Remove centre console and securing bracket for centre console ⇒ General body repairs, interior; Rep. Gr. 68 ; Compartments, covers and trims .

– Remove selector housing nuts -arrows-.

– Remove complete air filter housing if it is over selector mechanism ⇒ Rep. Gr. 23 ; Repairing diesel direct injection system or ⇒ Rep. Gr. 24 ; Repairing injection system .



– Remove securing clip -3- for gear selector cable from gearbox selector lever -1-.

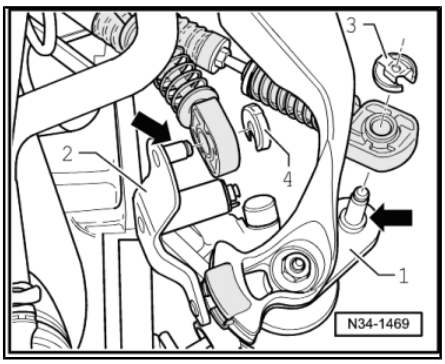
– Pull gear selector cable off pin.

Metal relay lever

– Remove securing clip -4- for gate selector cable from relay lever -2-.

– Pull gate selector cable from pin.

Plastic relay lever

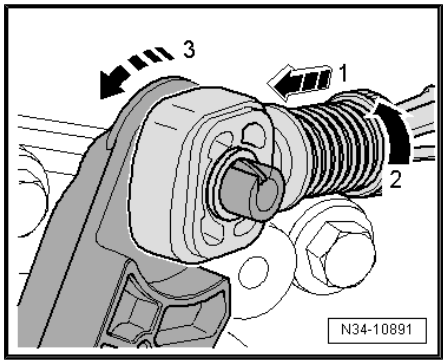


Releasing cable end-piece from gate selector cable

– Pull locking mechanism forward to stop in -direction of arrow 1- and then lock by turning to left in -direction of arrow 2-.

– Then push relay lever forwards (-in direction of arrow 3-).

Continued for all selector mechanisms



– Remove cable support bracket from gearbox -arrows-; if necessary, unclip pipe/hose -A- from bracket -B- first.

– Remove noise insulation ⇒ General body repairs, exterior; Rep. Gr. 50 ; Noise insulation .

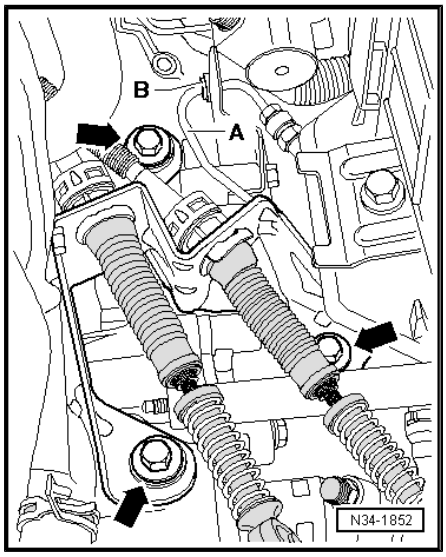
– Remove tunnel cross member ⇒ Rep. Gr. 26 ; Removing and installing parts of exhaust system .

– Separate front exhaust system at double clamp and detach from subframe ⇒ Rep. Gr. 26 ; Removing and installing parts of exhaust system .

– Remove rear exhaust system and heat shield ⇒ Rep. Gr. 26 ; Removing and installing parts of exhaust system .

– Remove underbody panels ⇒ General body repairs, exterior; Rep. Gr. 50 .

– Swing selector housing down and remove with selector cables.



2.9.2 Installing

Install in the reverse order of removal, observing the following:

– Align selector housing parallel to body.

• Distance to body must be same on both sides.

– Secure selector housing ⇒ Item 26 (page 64) or ⇒ Item 16 (page 66) .

– Route cables -1- from selector mechanism -2- to gearbox as follows:

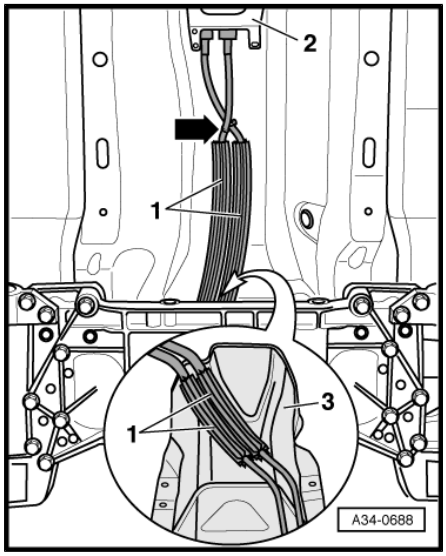
♦ After cables cross over -arrow-, they must be routed parallel to one another as far as cable support bracket on gearbox.

♦ Make sure that cable tie -arrow- for securing cables is installed correctly. Installation position ⇒ page 73 .

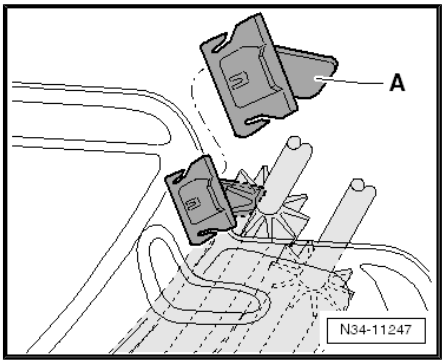
♦ Cables must be laid in the intended indentation in heat shield -3-.

Note

In the close-up, the heat shield is shown from above.



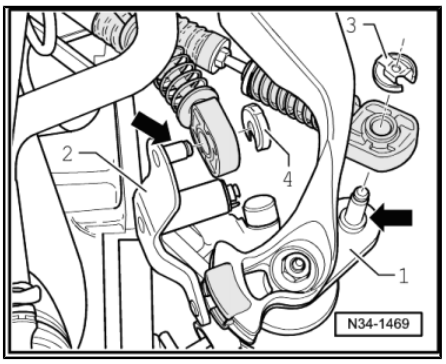
Clip -A- holds cables and heat shield together in position.



– Install cable support bracket on gearbox and tighten bolts to specified torques ⇒ Item 6 (page 70) .

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

Allocation of cable end-pieces ⇒ page 72



– Spread a small quantity of grease -G 000 450 02- on pins -arrows- of gearbox selector lever -1- and relay lever -2-.
– Renew securing clips -3- and -4- each time they are removed.
– Secure gear selector cable with securing clip -3- and gate selector cable with securing clip -4-.

Cable end-piece to plastic relay lever

– Fit relay lever and cable end-piece together ⇒ page 73 .
– Insert gate selector cable in cable end-piece.

Continued for all selector mechanisms

– Install centre console ⇒ General body repairs, interior; Rep. Gr. 68 ; Compartments, covers and trims .
– Install gaiter with selector knob and noise insulation ⇒ page 61 .
– Install heat shield.
– If removed, reinstall underbody panels ⇒ General body repairs, exterior; Rep. Gr. 50 .
– Assemble exhaust system free of tension and attach tunnel cross member ⇒ Rep. Gr. 26 ; Removing and installing parts of exhaust system .

Adjust selector mechanism ⇒ page 80 .

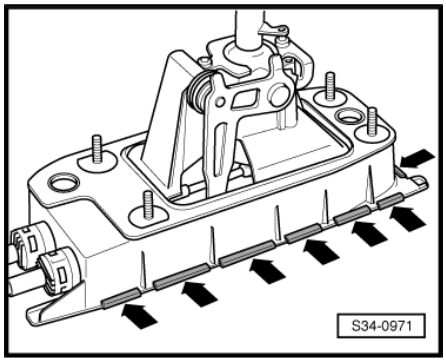
– If removed, install complete air filter housing ⇒ Rep. Gr. 23 ; Repairing diesel direct injection system or ⇒ Rep. Gr. 24 ; Repairing injection system
– Follow procedure after connecting battery ⇒ Electrical system; Rep. Gr. 27 ; Battery; Disconnecting and connecting battery .

2.10 Removing and installing gear selector cable and gate selector cable

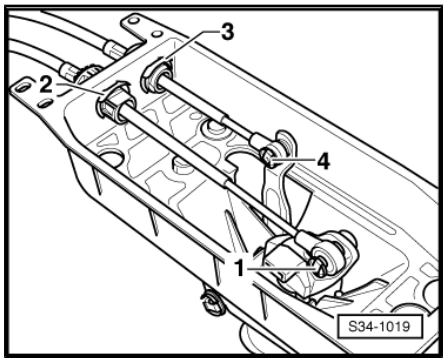
2.10.1 Removing

– Remove selector mechanism ⇒ page 75 .

– Bend open tabs -arrows- of selector mechanism cover using a screwdriver and remove cover.
– Remove gasket.

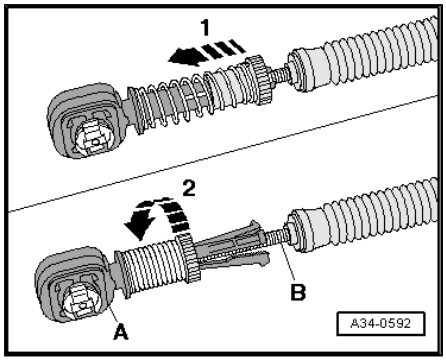


– Pull off securing clips -2 and 3-. (Securing clips -1 and 4- have been discontinued.) Lever gear selector cable off gear lever and gate selector cable off gate selector lever using a screwdriver.
– Pull gear selector cable and gate selector cable from selector housing.

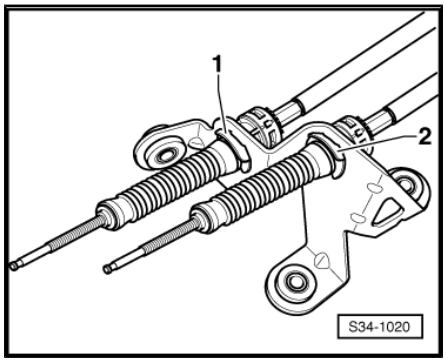


Release locks -A- for gear and gate selector cables -B- as follows:

♦ Push sliding sleeve forward to stop -arrow 1-.
♦ Turn sliding sleeve to right to stop -arrow 2- until it engages.
– Remove locking mechanism from Bowden cables.



– Pull off securing clips -1- and -2-.
– Remove cable support bracket from Bowden cables.

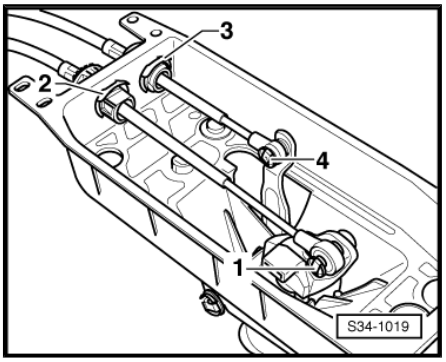


2.10.2 Installing

Install in the reverse order of removal, observing the following:

– Secure gear selector cable and gate selector cable to selector housing using securing clips -2 and 3-.

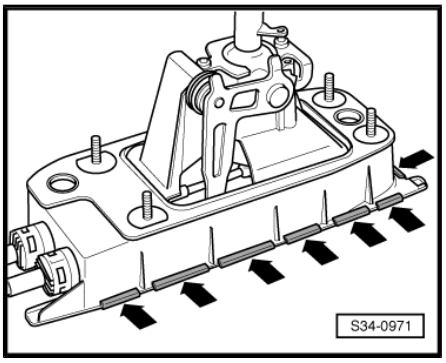
– Press gear selector cable onto gear lever and gate selector cable onto gate selector lever in selector housing. (Securing clips -1 and 4- have been discontinued.)



– Fit seal and secure selector mechanism cover by pressing down tabs -arrows-.

– Install selector mechanism ⇒ page 77 .

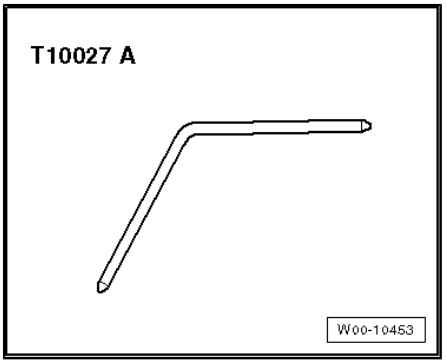
– Adjust selector mechanism ⇒ page 80 .



2.11 Adjusting selector mechanism

Special tools and workshop equipment required

♦ Locking pin -T10027 A-



Note

♦ *The following points are essential to ensure correct adjustment of selector mechanism:*

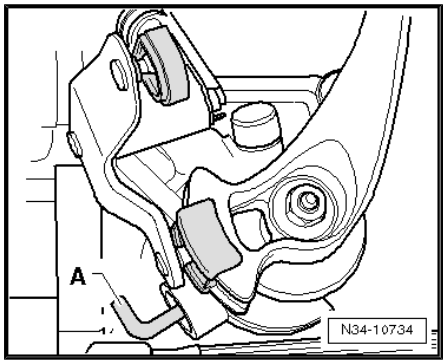
♦ *Moving parts of selector mechanism and elements transferring force must be in proper condition.*

♦ *Selector mechanism must move freely.*

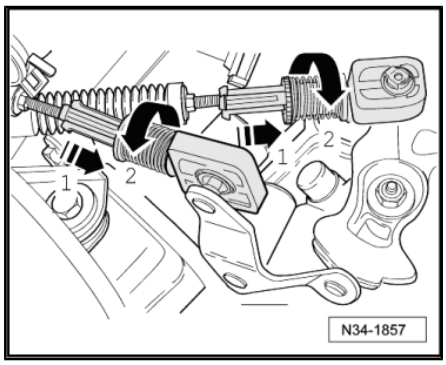
♦ *Gearbox, clutch and clutch mechanism must also be in proper condition.*

• Gearbox must be in neutral.

– Remove complete air filter housing if bracket -A- to secure gear selector cable and gate selector cable are not accessible ⇒ Rep. Gr. 23 ; Repairing diesel direct injection system or ⇒ Rep. Gr. 24 ; Repairing injection system .

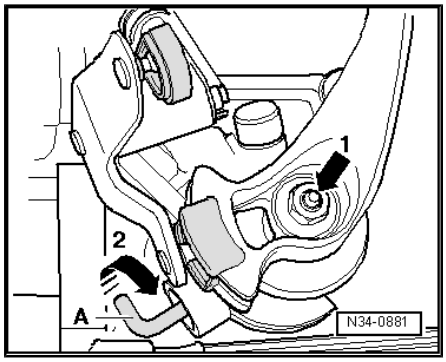


– Pull locking mechanisms on gate selector cable and gear selector cable end-pieces forward to stop -direction of arrow 1- and then turn to left to lock -direction of arrow 2-.



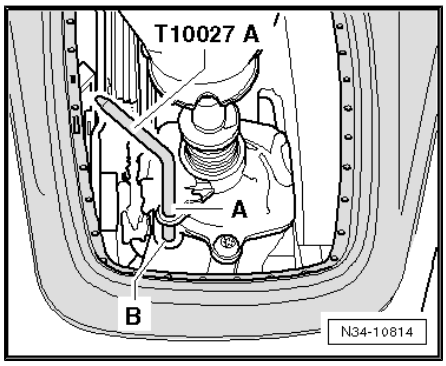
Secure selector shaft as follows:

– Press selector shaft down -direction of arrow 1-.
– While pressing down selector shaft, turn angled rod -A- in -direction of arrow 2- upwards and at the same time press it in until it engages in selector shaft.
– Remove gaiter with selector knob and frame ⇒ page 61 .
– If noise insulation is present, remove it.



Now secure gear lever as follows:

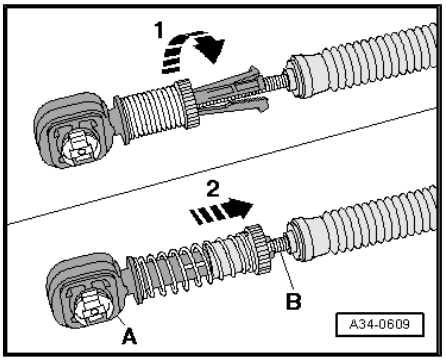
– Select neutral using gear lever.
– Guide locking pin -T10027 A- through hole -A- into hole -B-.



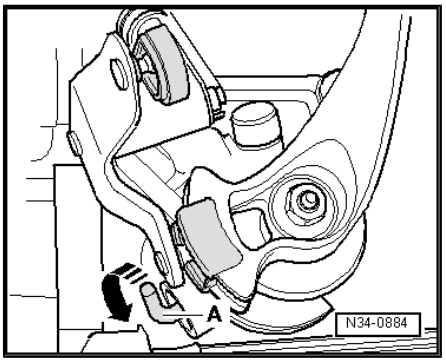
– Check that gate and selector cables -B- are inserted, free of tension, into locking devices -A-.

– Now turn locking mechanisms on gear selector cable and gate selector cable end pieces clockwise to stop -direction of arrow 1-.

The spring presses the locking mechanism into original position -direction of arrow 2-.

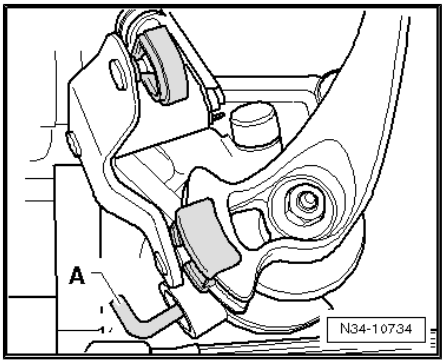


– Now turn angled rod -A- back to original position -direction of arrow-.



Note

The angled rod -A- must be pressed out of selector housing to stop and point to rear.



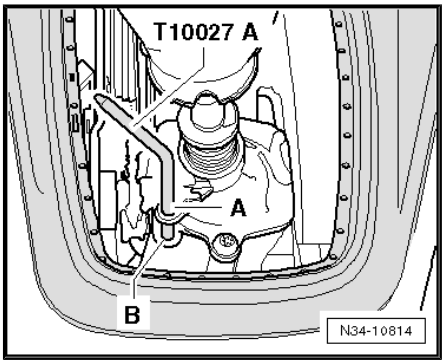
– Pull locking pin out of holes -A- and -B-.

– If noise insulation was present, install it.

– Install gaiter with selector knob and frame ⇒ page 61 .

– Check that selector shaft moves freely.

– If removed, reinstall complete air filter housing ⇒ Rep. Gr. 23 ; Repairing diesel direct injection system or ⇒ Rep. Gr. 24 ; Repairing injection system



2.11.1 Functional check

• With gearbox in neutral, gear lever must rest in gate for 3rd and 4th gear.

– Operate clutch.

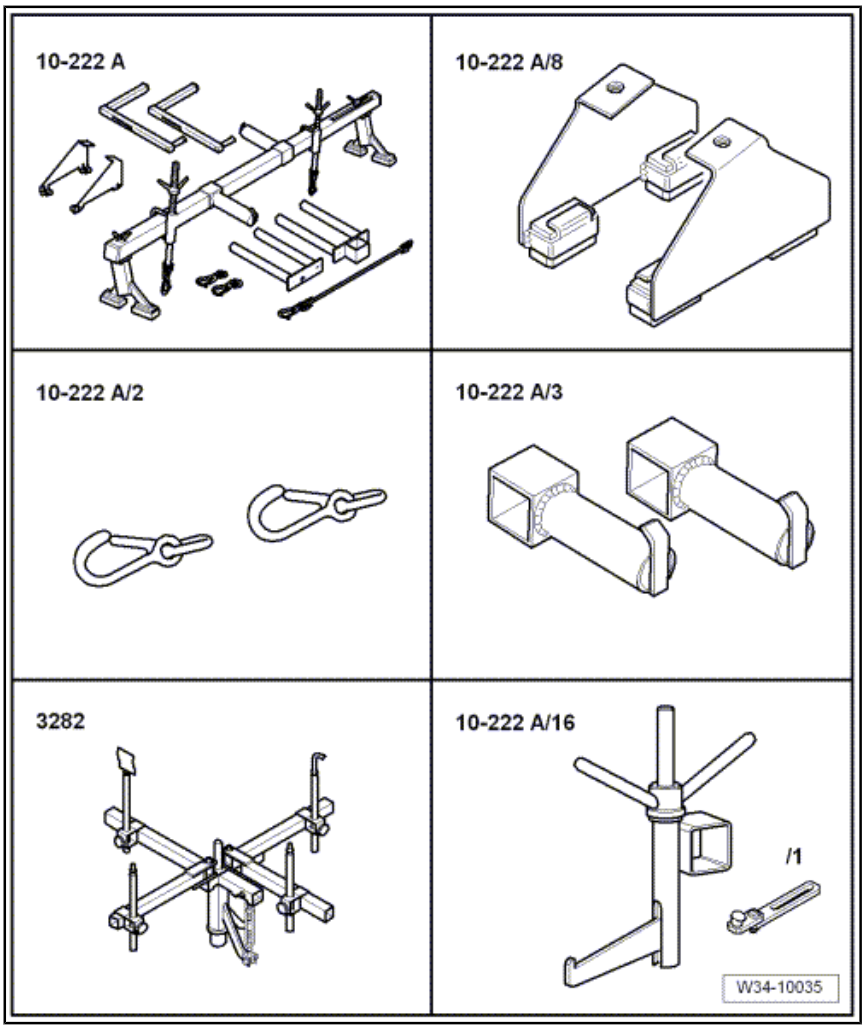
– Select all gears several times. Pay particular attention to operation of reverse gear lock.

– If it continues to be difficult to engage a gear after repeated attempts, repeat adjustment procedure of selector mechanism ⇒ page 80 .

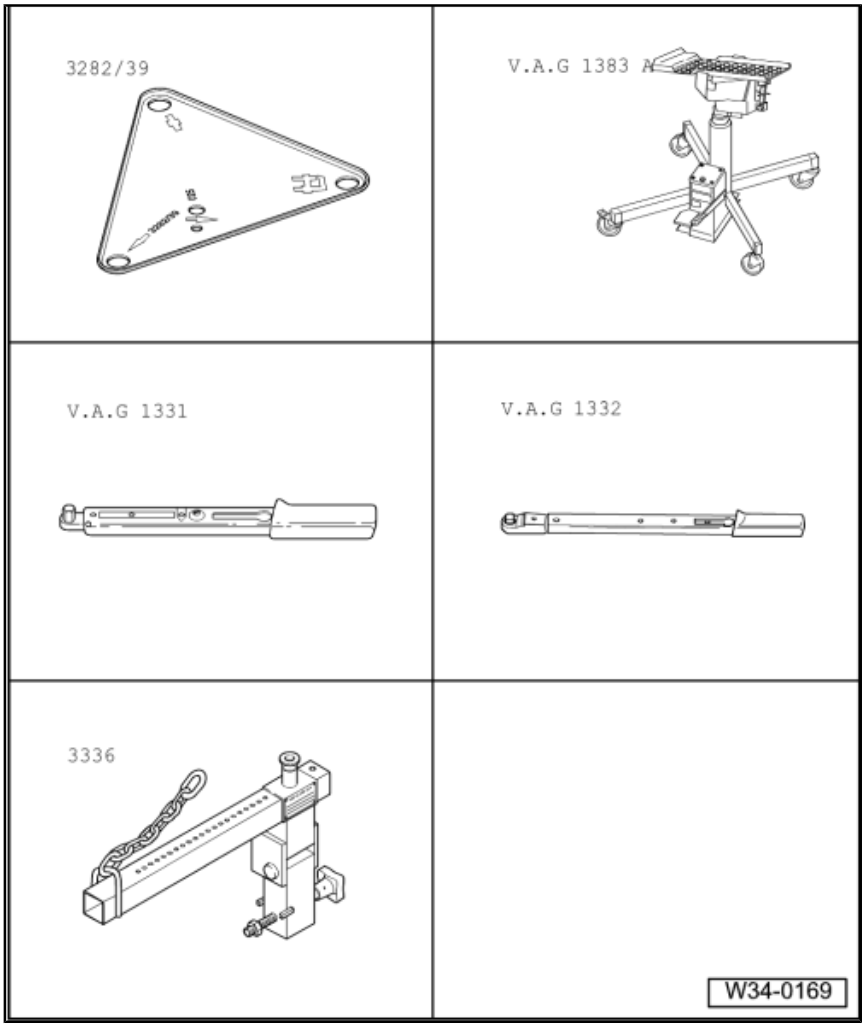
3 Removing and installing gearbox

Special tools and workshop equipment required

- Vehicles with turbo diesel engines and vehicles with 2.0l - 110 kW petrol engines
- Hook - 10 - 222 A /2-
- Adapter -10 - 222 A /3-
- Adapter -10 - 222 A /16-
- Hook -10 - 222 A /10-
- All vehicles
- Support bracket -10 - 222 A-
- Adapter -10 - 222 A /8-
- Pin -3282/29-
- Gearbox support -3282-



- Adjustment plate -3282/39-
- Engine and gearbox jack - V.A.G 1383A-
- Torque wrench -V.A.G 1331-
- Torque wrench -V.A.G 1332-
- Gearbox mounting support -3336-
- Grease -G 000 450 02-
- Grease for clutch plate splines -G 000 100-



3.1 Removing gearbox

– First check whether a coded radio is fitted. If so, obtain anti-theft code.

– With ignition switched off, disconnect battery earth strap ⇒ Electrical system; Rep. Gr. 27 ; Disconnecting and connecting battery .

– Remove engine cover if engine lifting eye arrow -10 - 222 A- is not accessible.

– Remove complete air filter housing if it is near battery ⇒ Rep. Gr. 23 ; Repairing diesel direct injection system or ⇒ Rep. Gr. 24 ; Repairing injection system .

– Remove battery and battery tray ⇒ Electrical system; Rep. Gr. 27 ; Battery; Removing and installing battery .

– Remove securing clip -arrow 1- for gear selector cable from gearbox selector lever -A-.

– Pull gear selector cable from pin.

Metal relay lever

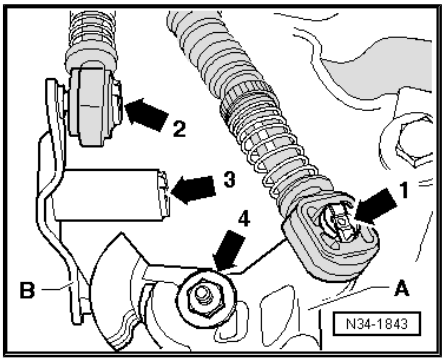
– Remove securing clip -arrow 2- for gate selector cable from relay lever -B-.

– Pull gate selector cable from pin.

– Pull securing clip -arrow 3- off relay lever -B- and remove relay lever.

Plastic relay lever

– Remove relay lever together with cable end-piece ⇒ page 73 .



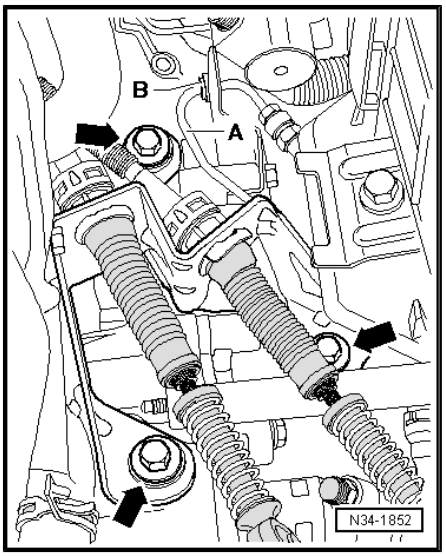
Continuation for all

– Remove gearbox selector lever -A- by removing nut -arrow 4- (⇒ previous figure).

– Remove cable support bracket from gearbox -arrows-.

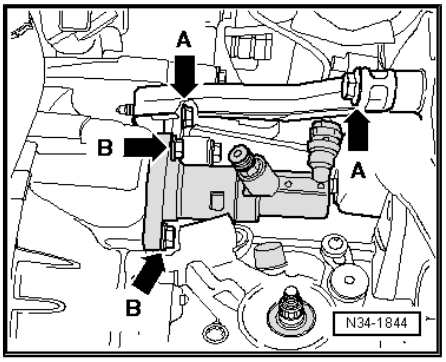
– Then raise and secure gear selector cable and gate selector cable.

– Remove retainer -B- from gearbox and pull it off pipe/hose line -A-.



– Then remove gearbox support -arrow A-.

– Remove slave cylinder -arrow B-, lay to side and secure with wire. Do not disconnect pipes.

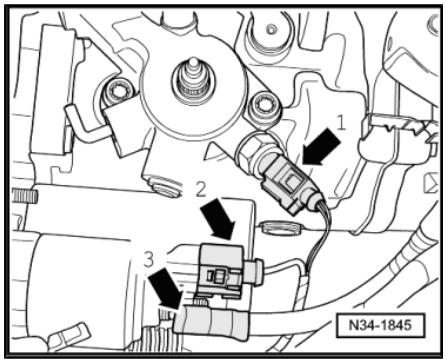


Caution

Do not operate clutch pedal any more.

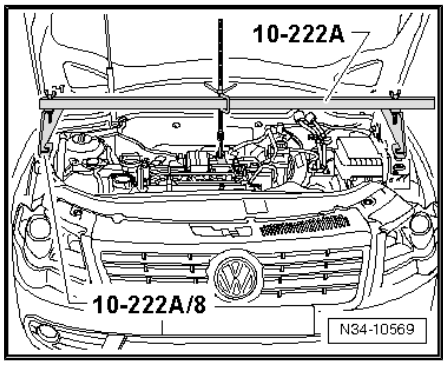
– Remove earth strap at upper engine/gearbox connecting bolt.

– Pull connector -arrow 1- off reversing light switch -F4- .
– Now remove connector -arrow 2- and wire -arrow 3- from starter.
– Then remove upper securing bolt on starter.
– Remove upper engine/gearbox connecting bolts.
– If there are hose and cable connections in area of engine support eye for support bracket -10 - 222 A- , remove these now.



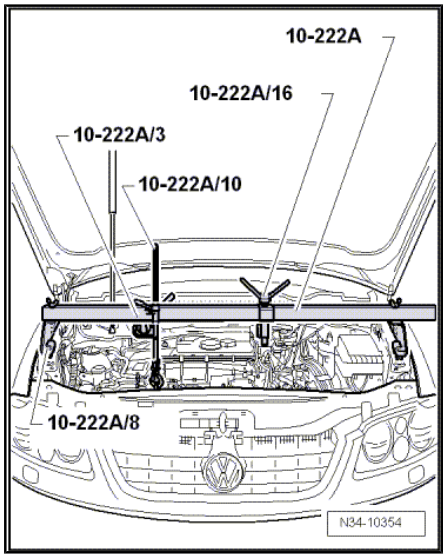
Vehicles with 1.4 l petrol engine

– Set up support bracket -10 - 222 A- together with adapters -10 - 222 A /8- in front of gas struts for bonnet.

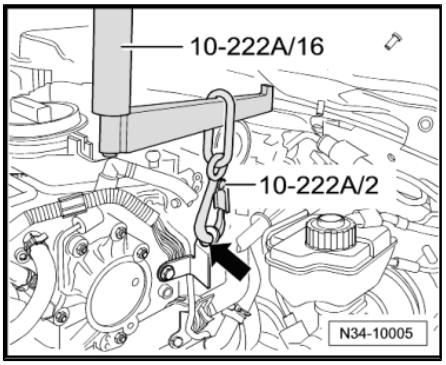


Vehicles with turbo diesel engines and vehicles with 2.0 l - 110 kW petrol engines

– Set up support bracket -10 - 222 A- together with adapters -10 - 222 A /8- , adapter -10 - 222 A /3- and adapter -10 - 222 A / 16- in front of gas struts for bonnet.
– Attach hook -10 - 222 A /10- at front right of engine.

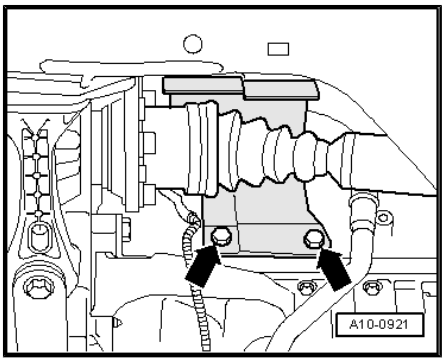


– Now attach hook -10 - 222 A /2- at rear left of engine -arrow-.
– Then connect hook -10 - 222 A /2- using adapter -10 - 222 A / 16- .



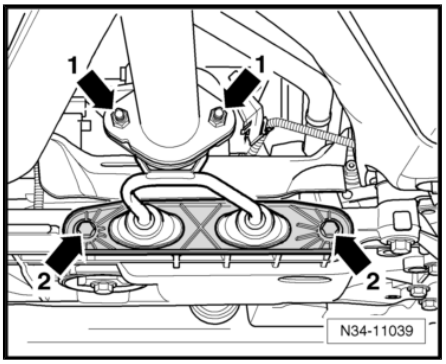
Continuation for all vehicles

– Position adapter -10 - 222 A /8- directly over wing bolting points.
– Take up weight of engine/gearbox assembly on spindles.
– Raise vehicle.
– Remove noise insulation ⇒ General body repairs, exterior; Rep. Gr. 50 ; Noise insulation .
– Remove lower part of front left wheel housing liner ⇒ General body repairs, exterior; Rep. Gr. 66 ; Wheel housing liner .
– Then remove all lines from gearbox.
– Remove drive shaft heat shield from engine -arrows-, if fitted.



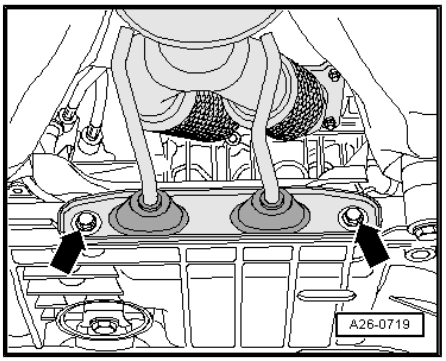
Vehicles with 1.4 l petrol engine

– Separate exhaust system -arrows 1-, remove front exhaust pipe and unscrew front exhaust pipe bracket from subframe -arrows 2- ⇒ Rep. Gr. 26 ; Parts of exhaust system .



Vehicles with turbo diesel engines and vehicles with 2.0 l - 110 kW petrol engines

– Separate exhaust system at double clamp and remove exhaust pipe bracket from subframe ⇒ Rep. Gr. 26 ; Removing and installing parts of exhaust system .

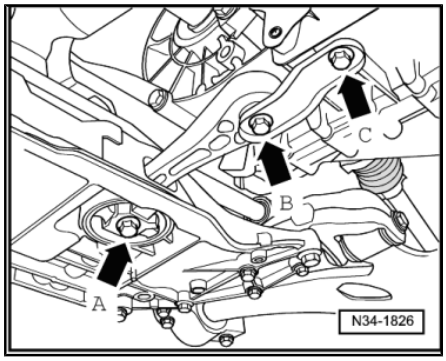


Continuation for all vehicles

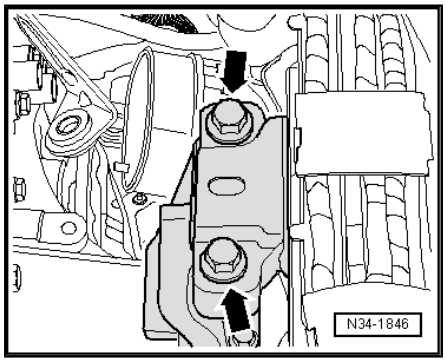
– Disconnect drive shafts from flange shafts and tie up as high as possible, being careful not to damage surface protection.

– Remove pendulum support.

  First remove bolt -arrow A- and then bolts -B- and -C-.



– Remove hexagon bolts -arrows- for left assembly mounting from gearbox mounting.

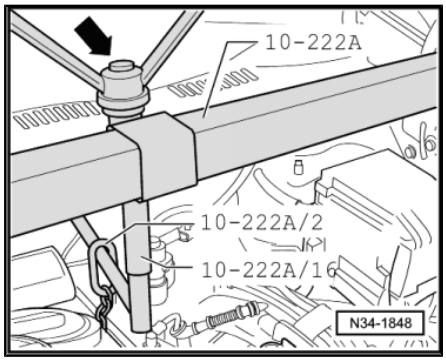


– Tilt engine/gearbox assembly by lowering it via spindles of support bracket -10 - 222 A- .

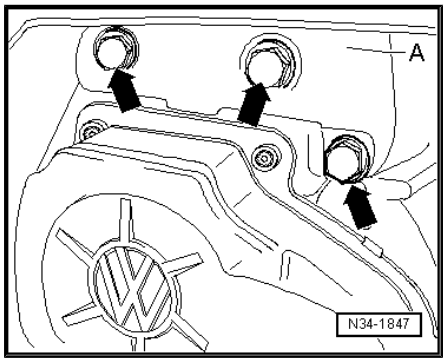
Note

- *Lower threaded spindle, shown here with adapter -10 - 222 A / 16- , using winged nut, but not more than until spindle is flush with nut -arrow-.*
- *Be careful of all lines when lowering gearbox.*

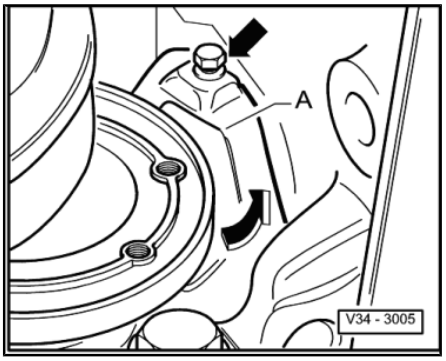
• Securing bolts -arrows- for gearbox bracket -A- must be accessible.



– Remove gearbox bracket -A- -arrows-.



– If small cover plate -A- for flywheel behind the right flange shaft -arrows- is installed, remove it.



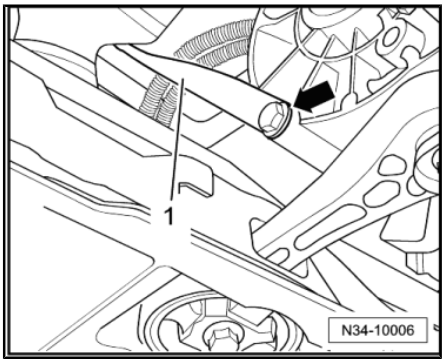
– Remove exhaust system strut -1-, if present, from gearbox -arrow-.

– Remove starter ⇒ Electrical system; Rep. Gr. 27 ; Starter .

To remove gearbox “02S”, set up gearbox support -3282- with adjustment plate -3282/39- .

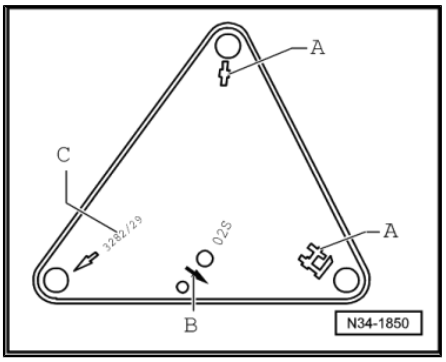
– Insert gearbox support -3282- in engine and gearbox jack -V.A.G 1383A- .

– Align arms of gearbox support according to holes in adjustment plate .



– Screw in support elements -A - and -C- on adjustment plate as shown.

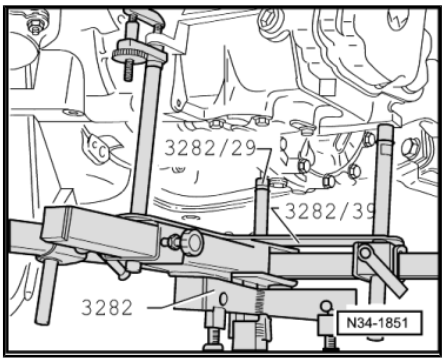
– Position engine and gearbox jack under vehicle. Arrow -B- on adjustment plate points in direction of vehicle travel.



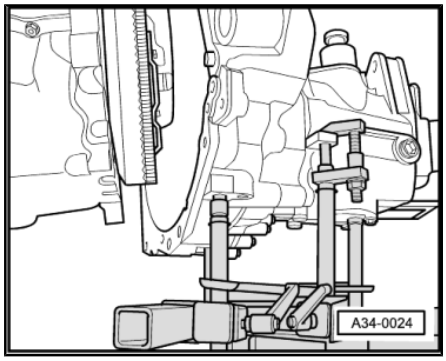
– Align adjustment plate parallel to gearbox and lock safety support on gearbox.

– Then screw pin -3282/39- into hole on gearbox for securing bolt of pendulum support.

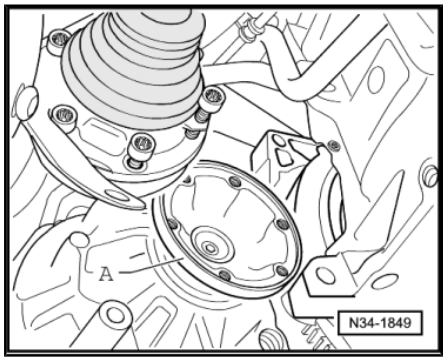
– Remove lower engine/gearbox connecting bolts.



– Press gearbox off dowel sleeves and carefully swing towards subframe.
– Turn gearbox downwards in vicinity of differential.
– Have a second mechanic push engine forwards slightly.



– Carefully lower gearbox, guiding with right flanged shaft -A- past intermediate plate of flywheel as shown.
– When lowering gearbox, change position of gearbox using spindles of gearbox support -3282- .



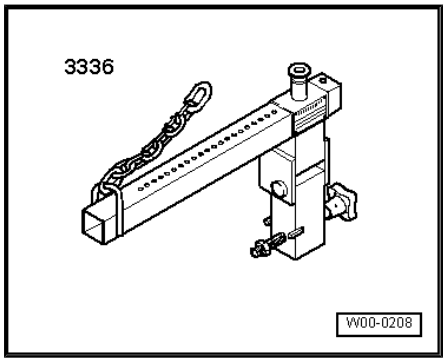
Note

Be careful of all lines when lowering gearbox.

3.1.1 Transporting gearbox

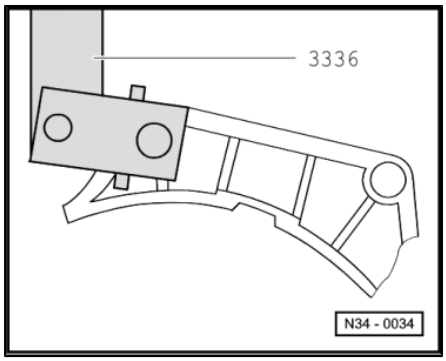
Special tools and workshop equipment required

♦ Gearbox mounting support -3336-



Procedure

– Bolt gearbox lifting tackle -3336- to clutch housing.

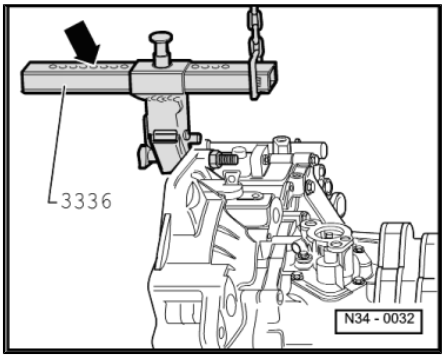


– Adjust support beam on sliding piece using locking pin -arrow-.

Number of holes visible = 5.

– Lift gearbox using workshop crane and gearbox lifting tackle -3336- .

– Set gearbox aside, for example in a transport container.



3.2 Installing gearbox

Note

Refer to procedure "Removing and installing gearbox" for required special tools ⇒ page 84 .

Observe the following table on the subject of "checking and topping up gear oil".

"Checking and topping up gear oil"				
		"No"	"Yes"	"Yes"
Gearbox	Original part	X		
	No oil loss	X		
	Completely dismantled		X Before installation ⇒ Item 3 (page 134) Oil capacity ⇒ page 1	
	Partially dismantled • (Gearbox housing and clutch housing were not separated.)			X After installation ⇒ page 99

– All threaded holes into which self-locking bolts are to be screwed must be cleaned of residual locking fluid carefully with a thread chaser.

– Always renew self-locking bolts and nuts.

– Check whether dowel sleeves for aligning engine and gearbox are fitted in cylinder block and install if necessary.

If dowel sleeves are not fitted, difficulties shifting gears, clutch problems and possible noises from the gearbox (rattling of gears which are not engaged) could occur.

– Ensure that intermediate plate is correctly seated on engine.

– Clean input shaft splines and apply thin coat of grease for clutch plate splines -G 000 100- .

The clutch plate must slide easily to and fro on the input shaft.

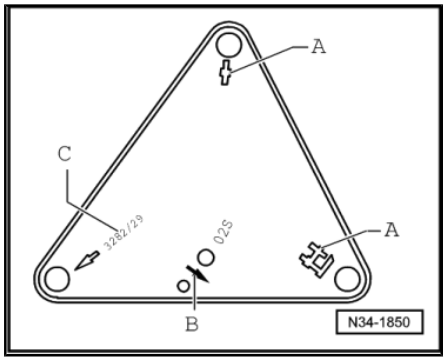
To install gearbox “02S”, set up gearbox support -3282- with adjustment plate -3282/39- .

– Align arms of gearbox support according to holes in adjustment plate .

– Screw in support elements -A - and -C- (pin -3282/29-) on adjustment plate as shown.

– Place gearbox on gearbox jack .

– Align adjustment plate and gearbox parallel to one another.

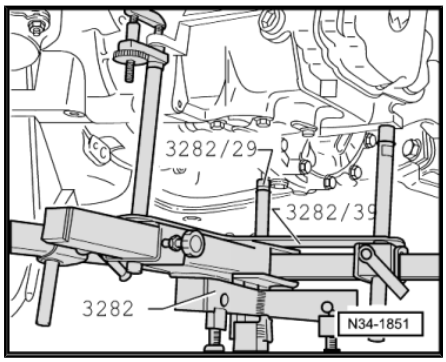


– Screw pin -3282/29- into hole on gearbox for securing bolt of pendulum support.

– Position gearbox jack under vehicle. Arrow -B- on adjustment plate points in direction of vehicle travel.

– Using spindles of gearbox support -3282- , tilt gearbox downwards in vicinity of differential.

– Have a second mechanic push engine forwards slightly.



– Then carefully raise gearbox, guiding with right flange shaft -A- past flywheel and intermediate plate as shown.

– Using spindles of gearbox support -3282- , tilt gearbox upwards in vicinity of differential.

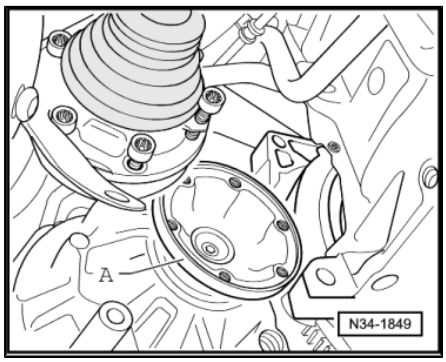
– Raise gearbox to engine.

• The engine must still be pushed forwards (2nd mechanic).

– Align gearbox to engine and join.

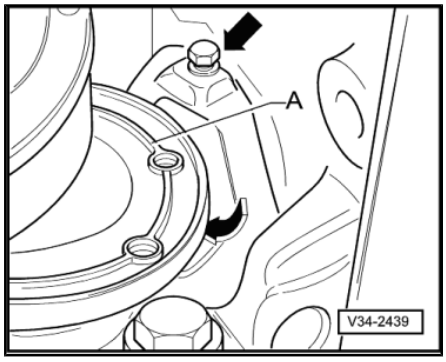
– Screw in lower engine/gearbox securing bolts and tighten to specified torque ⇒ page 96 .

– After gearbox has been bolted to engine, remove gearbox jack from gearbox.

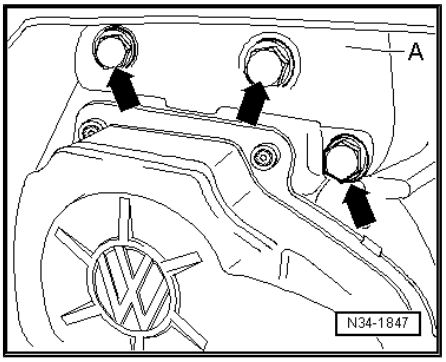


– If small cover plate -A- had been installed behind the right flange shaft -arrows-, install it.

– Screw in upper engine/gearbox securing bolts and tighten to specified torque ⇒ page 96 .

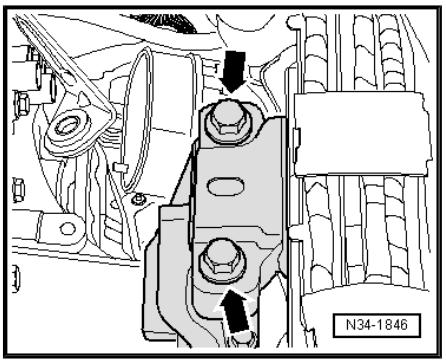


– Install bracket -A- on gearbox using new hexagonal bolts -arrows- and tighten to specified torque ⇒ page 96 .



– Align engine and gearbox in installation position using both spindles of support bracket -10-222A- .

– Install new bolts -arrows- for left assembly mounting in gearbox mounting and tighten to specified torque ⇒ page 96 .



WARNING

Do not remove support bar -10-222 A- until all bolts securing the left and right assembly mountings have been tightened to specified torque.

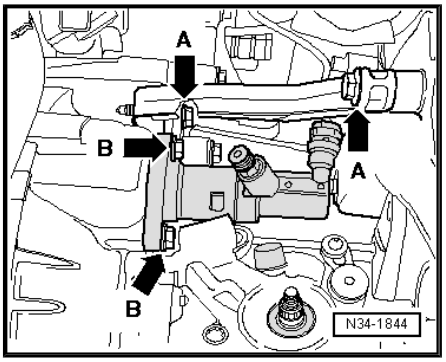
Note

Install engine and gearbox mounting free of tension ⇒ Rep. Gr. 10 ; Removing and installing engine .

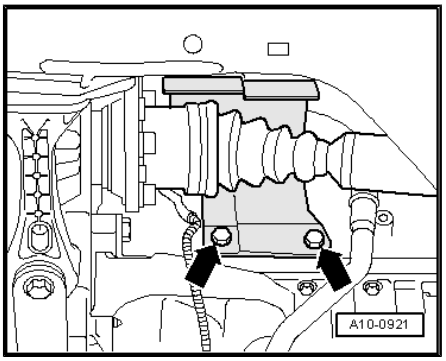
– Install slave cylinder and tighten bolts -arrows B- to specified torque ⇒ Item 9 (page 45) .

– Then install gearbox support with new bolts -arrow A- and tighten to specified torque ⇒ page 96 .

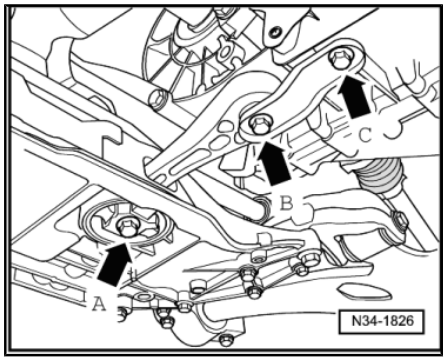
– Attach drive shafts to gearbox ⇒ Running gear, axles, steering; Rep. Gr. 40 ; Repairing drive shaft; Removing and installing drive shafts .



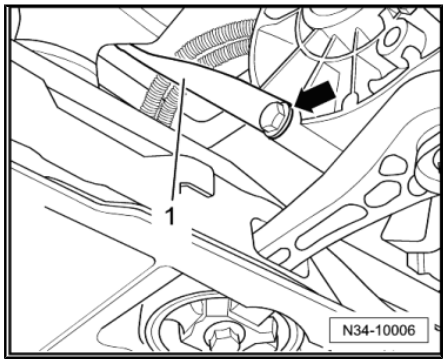
– Install drive shaft heat shield, if present, on engine -arrows- ⇒ Running gear, axles, steering; Rep. Gr. 40 ; Repairing drive shaft .



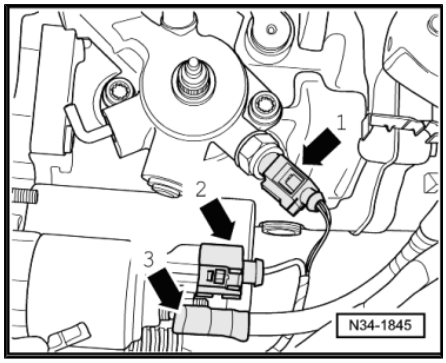
– Install pendulum support with new bolts -arrows A-, -B- and -C- ⇒ Running gear, axles, steering ; Rep. Gr. 40 ; Repairing front suspension .
– Assemble exhaust system and attach exhaust system bracket to subframe ⇒ Rep. Gr. 26 ; Removing and installing parts of exhaust system .



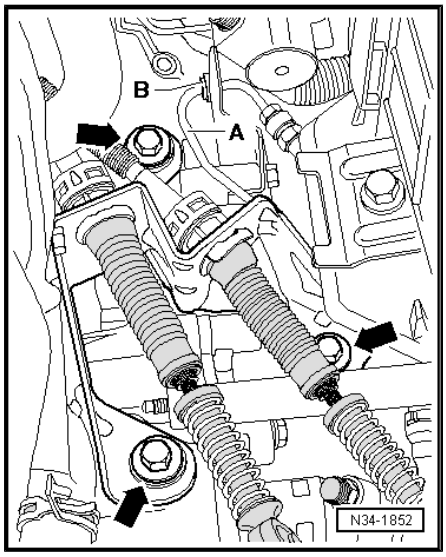
– Bolt exhaust system strut -1-, if present, to gearbox and tighten bolt -arrow- to specified torque ⇒ Rep. Gr. 26 ; Removing and installing parts of exhaust system .



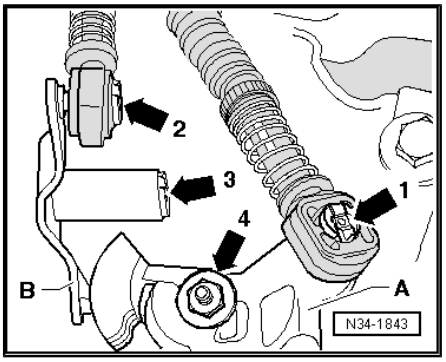
– Push connector -1- onto reversing light switch -F4- .
– Install starter, push on connector -arrow 2- and bolt on wire -arrow 3- ⇒ Electrical system; Rep. Gr. 27 ; Starter .
– Install earth strap at upper engine/gearbox connecting bolt.



– Attach support -B- to gearbox.
– Press pipe/hose line -A- into retainer -B- on gearbox.
– Install cable support bracket on gearbox and tighten bolts -arrows- to specified torque ⇒ Item 6 (page 70) .



– Install gearbox selector lever -A-.
– Tighten hexagon nut -arrow 4- to specified torque ⇒ Item 18 (page 71) .
– Spread a small amount of grease -G 000 450 02- on pin of gearbox selector lever -A-.
– Connect gear selector cable to gearbox selector lever -arrow 1-.



Metal relay lever

– Install relay lever -B- and secure with securing clip -arrow 3-.
– Spread a small amount of grease -G 000 450 02- on pin of relay lever -B-.
– Connect gate selector cable to relay lever -arrow 2-.

Plastic relay lever

– Install relay lever together with cable end-piece ⇒ page 73 .

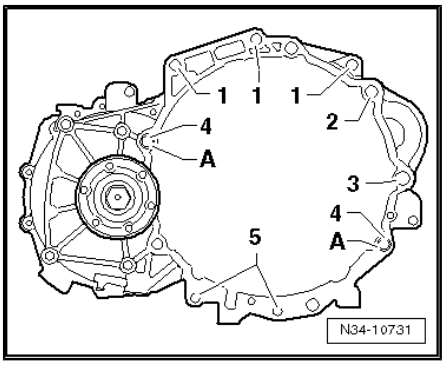
Continuation for all

– Adjust selector mechanism ⇒ page 80 .
– Install battery tray and battery⇒ Electrical system; Rep. Gr. 27 ; Removing and installing battery .
– If removed, reinstall engine cover and complete air filter housing ⇒ Rep. Gr. 23 ; Repairing diesel direct injection engine or ⇒ Rep. Gr. 24 ; Repairing injection system
– Reconnect battery and perform work required after connecting battery ⇒ Electrical system; Rep. Gr. 27 ; Disconnecting and connecting battery .
– Install lower part of front left wheel housing liner ⇒ General body repairs, exterior; Rep. Gr. 66 ; Wheel housing liner .
– Install noise insulation ⇒ General body repairs, exterior; Rep. Gr. 50 ; Noise insulation .

3.2.1 Specified torques

Gearbox to 1.4 l petrol engine

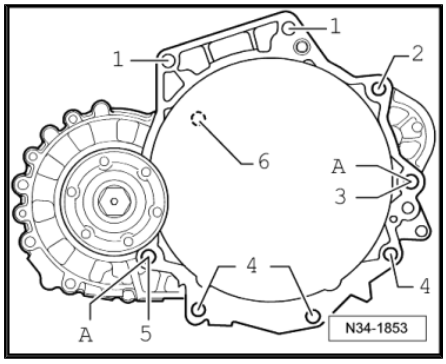
Item	Bolt	Quantity	Nm
1	M12 x 50	3	80
2	M12 x 55 ♦ With M8 stud ♦ Additionally, starter to gearbox	1	80
3	M12 x 150 ♦ With M8 stud ♦ Additionally, starter to gearbox	1	80
4	M12 x 60	2	80
5	M10 x 50	2	40



Item -A- dowel sleeves for centring

Gearbox to 2.0 l/100 kW petrol engine

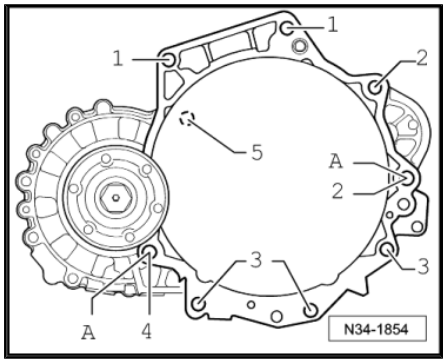
Item	Bolt	Quantity	Nm
1	M12 x 65	2	80
2	M12 x 150 ♦ Additionally, starter to gearbox	1	80
3	M12 x 165 ♦ Additionally, starter to gearbox	1	80
4	M10 x 50	3	40
5	M12 x 85	1	80
6	M6 x 8 ♦ Small cover plate for flywheel	1	10



Item -A- dowel sleeves for centring

Gearbox to turbo diesel engine

Item	Bolt	Quantity	Nm
1	M12 x 55	2	80
2	M12 x 150 ♦ Additionally, starter to gearbox	2	80
3	M10 x 50	3	40
4	M12 x 60	1	80
5	M6 x 8 ♦ Small cover plate for flywheel	1	10

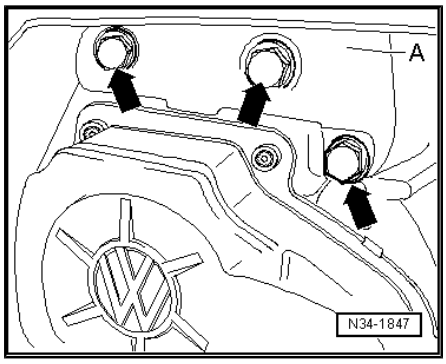


Item -A- dowel sleeves for centring

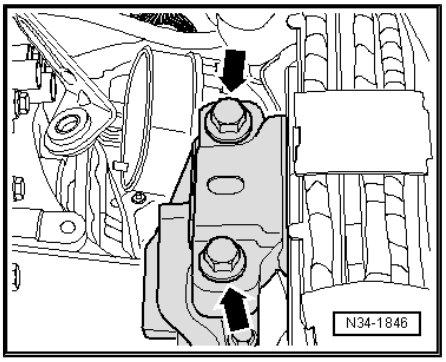
Gearbox bracket to gearbox

– Renew bolts.
– Screw in all bolts hand-tight.
– Tighten bolts to specified torque.

Bolts -arrows- 40 Nm + 90°



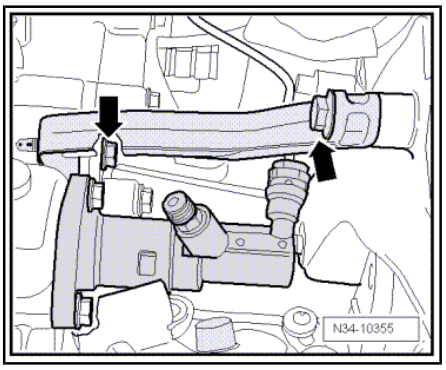
Gearbox mounting to body



- Renew bolts.
- Screw in all bolts hand-tight.
- Tighten bolts to specified torque.

Bolts -arrows-	60 Nm + 90°

Gearbox support to gearbox bracket and gearbox



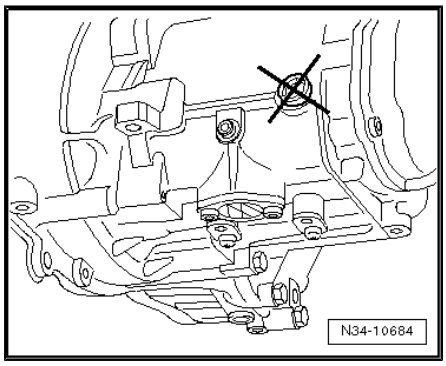
- Renew bolts.
- Screw in all bolts hand-tight.
- Tighten bolts to specified torque.

Bolts -arrows-	20 Nm + 90°

Drive shaft to flange shaft ⇒ Running gear, axles, steering; Rep. Gr. 40 ; Repairing drive shaft; Removing and installing drive shafts .

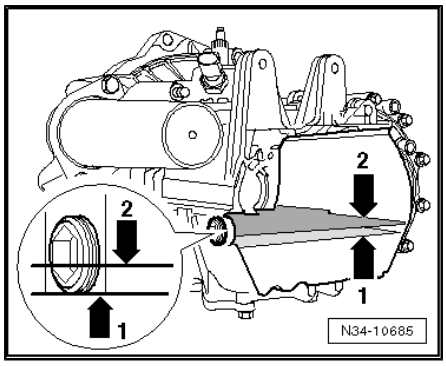
4 Checking and topping up gear oil

It is not possible to check the gear oil level by unscrewing the oil filler plug.



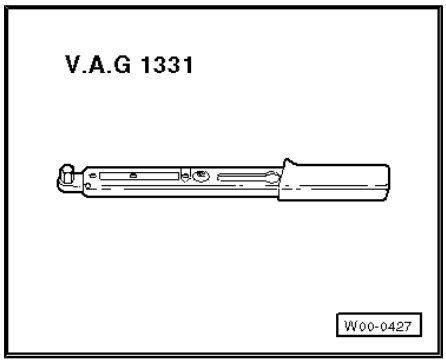
The angle of the engine/gearbox unit means the lower edge of the fill hole -arrow 1- is below the oil level -arrow 2-.

The oil level in the gearbox can only be checked by completely draining the gear oil and then refilling:



Special tools and workshop equipment required

- Torque wrench -V.A.G 1331-



- Hose (approx. 600 mm long, external diameter 10 mm) with funnel, commercially available

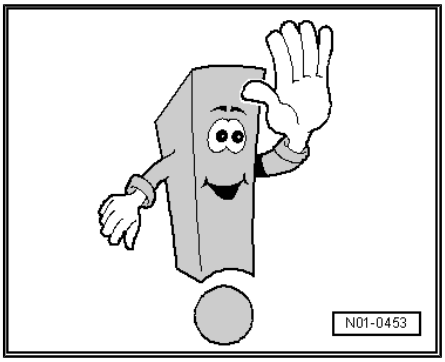
4.1 Preparation

Gear oil for manual gearboxes ⇒ Electronic parts catalogue “ET-KA” .

– Remove complete air filter housing ⇒ Rep. Gr. 23 ; Repairing diesel direct injection system or ⇒ Rep. Gr. 24 ; Repairing injection system .

– Remove noise insulation ⇒ General body repairs, exterior; Rep. Gr. 50 ; Noise insulation .

Clean gearbox.



Caution

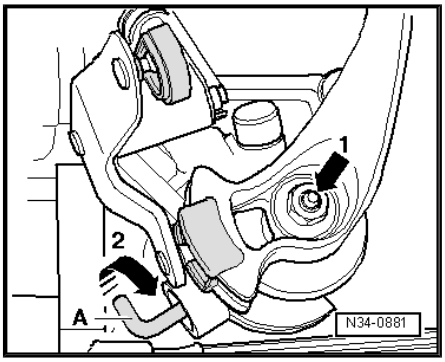
To drain gear oil, a pivot pin for the selector forks in the gearbox must be removed.

To prevent the positions of the selector forks from being changed, e.g. due to accidental operation of the selector mechanism, the selector shaft must be locked in position.

Secure selector shaft as follows:

– Press selector shaft down -direction of arrow 1-.

– While pressing down selector shaft, turn angled rod -A- in -direction of arrow 2- upwards and at the same time press it in until it engages in selector shaft.



4.2 Draining gear oil

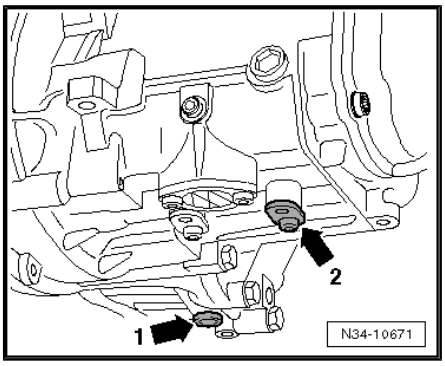
Use a clean container with a scale and a 3-litre capacity to catch the oil which runs out.

• Selector shaft is locked in place ⇒ page 100 .

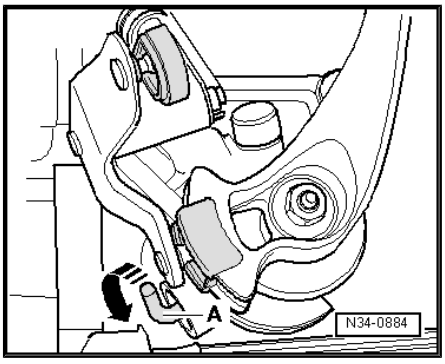
– Drain gear oil by removing oil drain plug -arrow 1- and then pivot pin -arrow 2-.

– Install pivot pin -arrow 2- with a new O-ring ⇒ Item 5 (page 107) .

– Screw in oil drain plug -arrow 1- ⇒ Item 17 (page 135) .



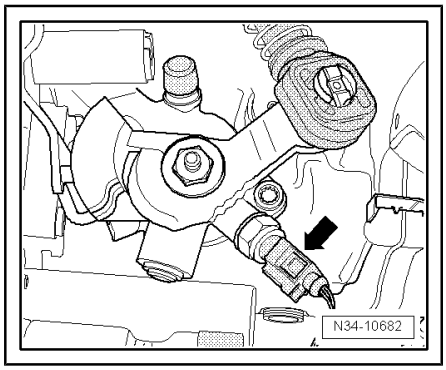
– Now turn angled rod -A- back to original position -direction of arrow- so that selector shaft can move again.



4.3 Filling with gear oil

Top up oil in container to 1.9 litres.

Gearbox oil specification ⇒ Electronic parts catalogue “ETKA” .



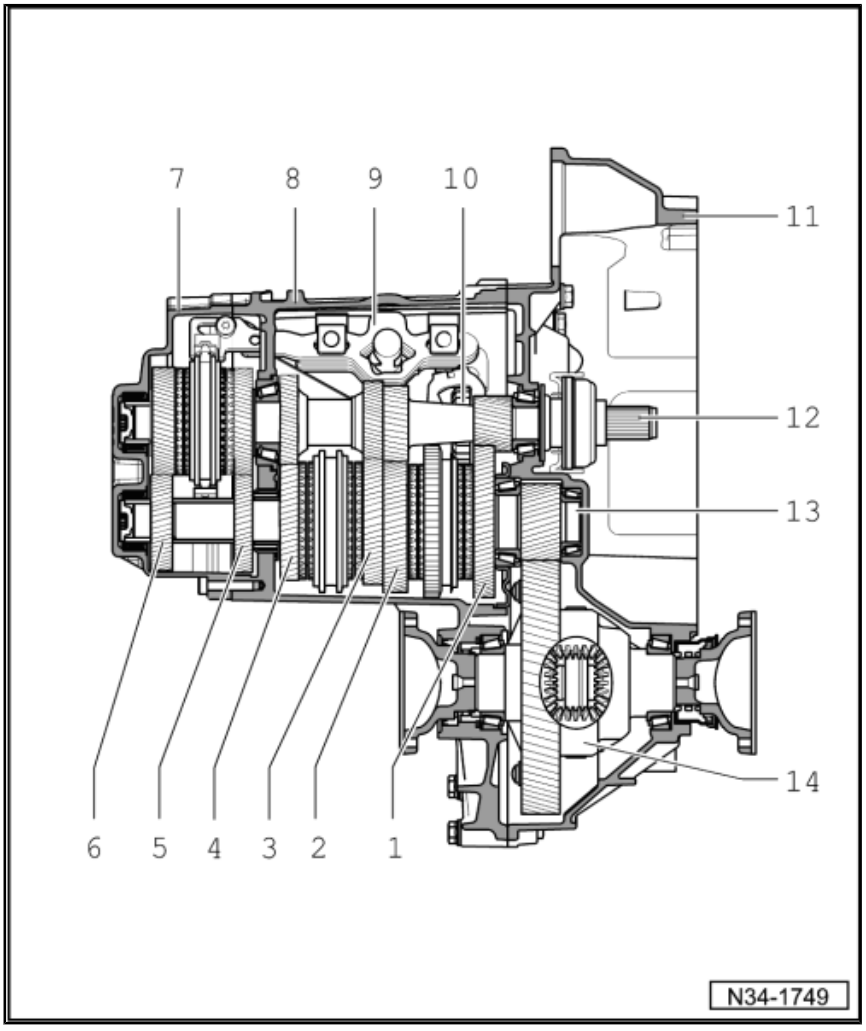
- Remove reversing light switch -F4- -arrow-.
- Connect hose (approx. 600 mm long, external diameter 10 mm) to commercially available funnel.
- Insert hose in fitting hole for reversing light switch -F4- (2nd mechanic) and fill gear oil.
- Install reversing light switch -F4- -arrow- ⇒ Item 2 (page 143) .
- Check operation of selector mechanism ⇒ page 82 .
- Install complete air filter housing ⇒ Rep. Gr. 23 ; Repairing diesel direct injection system or ⇒ Rep. Gr. 24 ; Repairing injection system
- Install noise insulation ⇒ General body repairs, exterior; Rep. Gr. 50 ; Noise insulation .

5 Dismantling and assembling gearbox

5.1 Overview - gearbox

1 - 1st gear
2 - 2nd gear
3 - 3rd gear
4 - 4th gear
5 - 5th gear
6 - 6th gear
7 - Gearbox housing cover
8 - Gearbox housing
9 - Selector mechanism
- ❑ (Selector forks)

10 - Reverse gear wheel
11 - Clutch housing
12 - Input shaft
13 - Output shaft
14 - Differential



5.2 Assembly overview

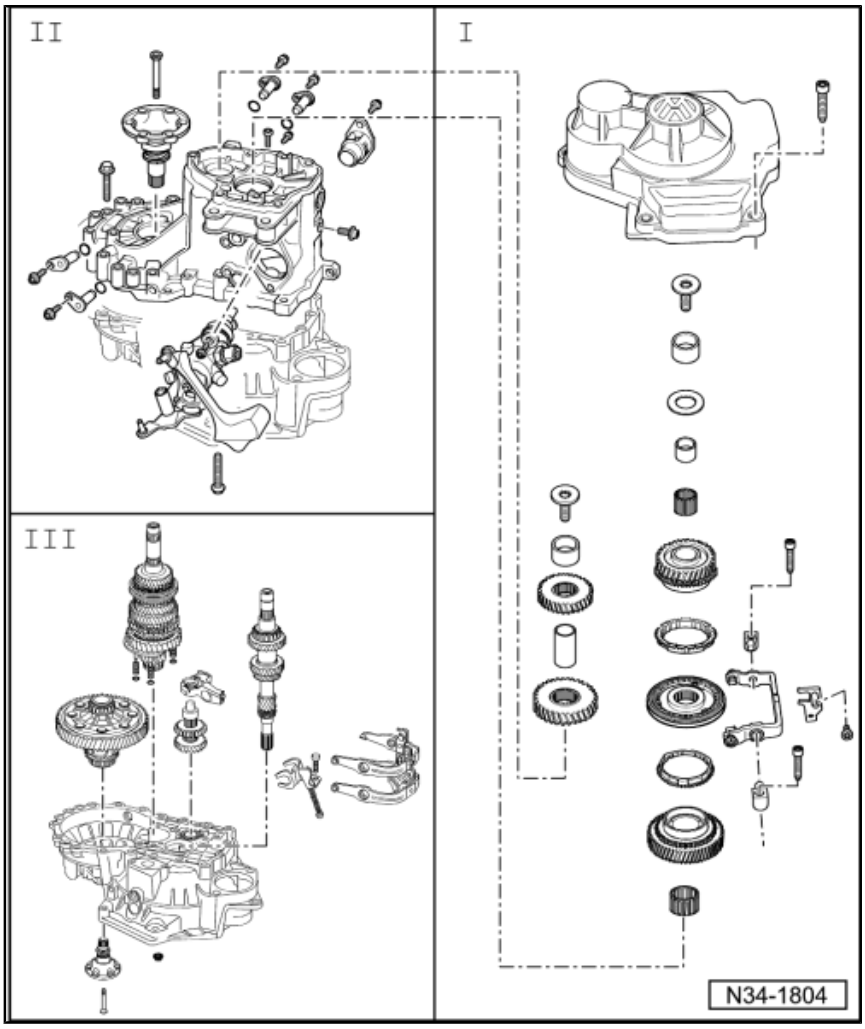
Assembly sequence - Removing and installing cover for gearbox housing and 5th and 6th gear ⇒ page 109 .

Assembly sequence - Dismantling and assembling gearbox completely ⇒ page 115 .

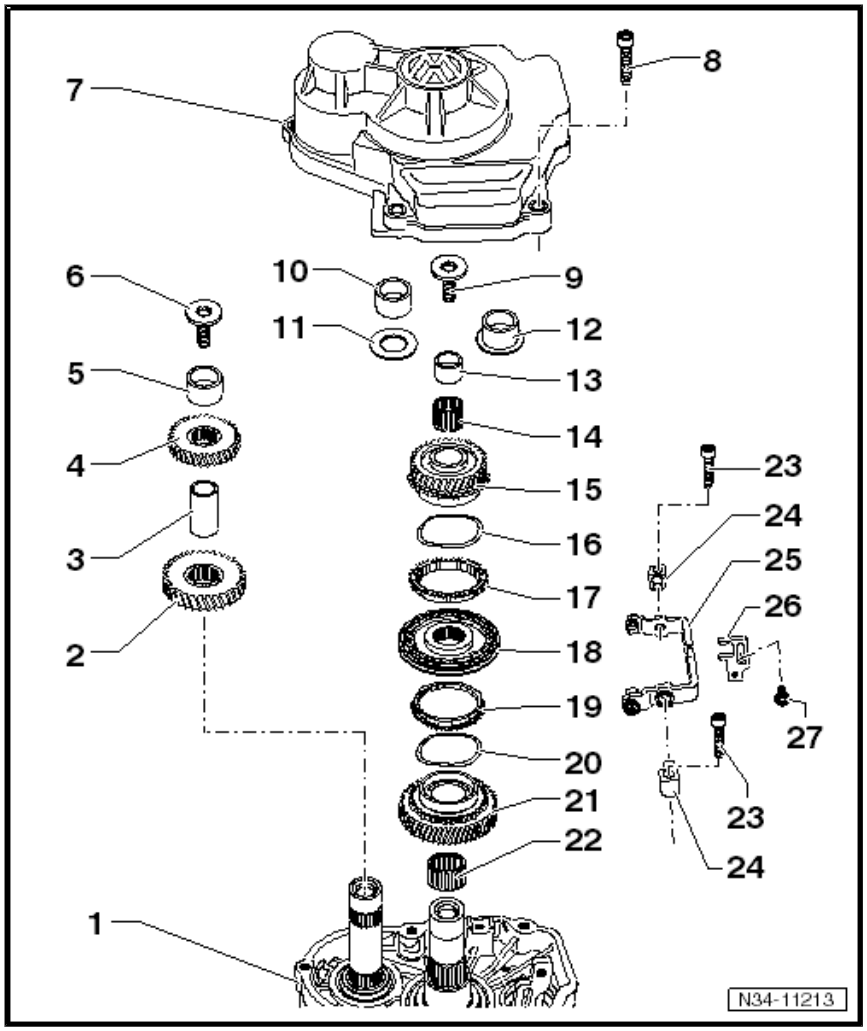
I - Removing and installing cover for gearbox housing and 5th and 6th gears
⇒ page 104

II - Removing and installing gearbox housing and shift mechanism ⇒ page 107 .

III - Removing and installing input shaft, output shaft, differential and selector forks
⇒ page 108



5.3 Removing and installing cover for gearbox housing and 5th and 6th gear



1 - Gearbox housing

- ❑ Pull off together with 5th and 6th gears ⇒ page 115 .
- ❑ Repairing ⇒ page 132 .

2 - Gear wheel for 5th gear

- ❑ Pull off individually ⇒ page 109
- ❑ Pull off together with gearbox housing ⇒ page 115

3 - Sleeve

4 - Gear wheel for 6th gear

- ❑ Pull off individually ⇒ page 109
- ❑ Pull off together with gearbox housing ⇒ page 115

5 - Cylindrical roller bearing inner race

- ❑ For output shaft
- ❑ Mark before removing
- ❑ Do not interchange with inner race for cylindrical roller bearing of input shaft
- ❑ Larger outer diameter from gearbox date 21 08 6
- ❑ Allocation ⇒ page 106

6 - Bolt

- ❑ For output shaft
- ❑ Allocation of bolts ⇒ page 106
- ❑ To gearbox date 20 08 6: 40 Nm and 180° further
- ❑ From gearbox date 21 08 6: 80 Nm and then turn 90° further
- ❑ Self-locking
- ❑ Always renew
- ❑ Clean residual locking fluid from threaded holes for securing bolts for synchro-hub for 5th and 6th gears and gear wheel for 6th gear with a thread chaser. Otherwise the bolts may shear.

7 - Gearbox housing cover

- ❑ With cylindrical roller bearings for input and output shafts
- ❑ Cylindrical roller bearings for input and output shafts from gearbox date 21 08 6 with larger outer diameter ⇒ page 140
- ❑ Repairing ⇒ page 138 .

8 - Bolt, 18 Nm

- ❑ Qty. 5
- ❑ For gearbox housing cover.

9 - Bolt

- ❑ For input shaft

- ❑ Allocation of bolts ⇒ page 106
- ❑ To gearbox date 20 08 6: 40 Nm and 180° further
- ❑ From gearbox date 21 08 6: 80 Nm and then turn 90° further
- ❑ Self-locking
- ❑ Always renew
- ❑ Clean residual locking fluid from threaded holes for securing bolts for synchro-hub for 5th and 6th gears and gear wheel for 6th gear with a thread chaser. Otherwise the bolts may shear.

10 - Cylindrical roller bearing inner race

- ❑ For input shaft
- ❑ Mark before removing
- ❑ Do not interchange with cylinder roller bearing inner race of output shaft.
- ❑ From gearbox date 21 08 6, combined with thrust washer in one component ⇒ Item 12 (page 105)
- ❑ Allocation of inner race for cylindrical roller bearing ⇒ page 106

11 - Thrust washer

- ❑ Through gearbox date 20 08 6

12 - Inner race for cylindrical roller bearing with thrust washer

- ❑ For input shaft
- ❑ From gearbox date 21 08 6
- ❑ Allocation of inner race for cylindrical roller bearing ⇒ page 106

13 - Sleeve

- ❑ For 6th gear needle bearing.
- ❑ Renew together with needle bearing
- ❑ Larger diameter from gearbox date 21 08 6
- ❑ Allocate components according to ⇒ Electronic parts catalogue “ETKA” .

14 - Needle bearing

- ❑ For 6th gear
- ❑ Renew together with sleeve
- ❑ Larger diameter from gearbox date 21 08 6
- ❑ Allocate components according to ⇒ Electronic parts catalogue “ETKA” .

15 - Synchromeshed gear for 6th gear

- ❑ Adapted to sleeve and needle bearing from gearbox date 21 08 6
- ❑ Allocate components according to ⇒ Electronic parts catalogue “ETKA” .

16 - Wave spring washer

- ❑ From gearbox date 26 05 8
- ❑ Allocate according to ⇒ Electronic parts catalogue “ETKA”

17 - Synchro-ring for 6th gear

18 - Locking collar with synchro-hub for 5th and 6th gears

- ❑ Pull off individually ⇒ page 109
- ❑ Pull off together with gearbox housing ⇒ page 115
- ❑ Dismantling and assembling ⇒ page 157 and ⇒ page 157
- ❑ From gearbox date 12 06 6, locking collar modified ⇒ page 157
- ❑ Adjusting, through gearbox date 11 06 6 ⇒ page 130
- ❑ Adjusting, from gearbox date 12 06 6 ⇒ page 131
- ❑ Installation of springs with angled ends for locking pieces ⇒ page 158

19 - Synchro-ring for 5th gear

- ❑ Will be damaged during removal of input shaft
- ❑ Always renew

20 - Wave spring washer

- ❑ From gearbox date 26 05 8
- ❑ Allocate according to ⇒ Electronic parts catalogue “ETKA”

21 - Synchromeshed gear for 5th gear

22 - Needle bearing

- ❑ For 5th gear

23 - Socket head bolt, 25 Nm

- ❑ For pivot pin to gearbox housing

24 - Pivot pin

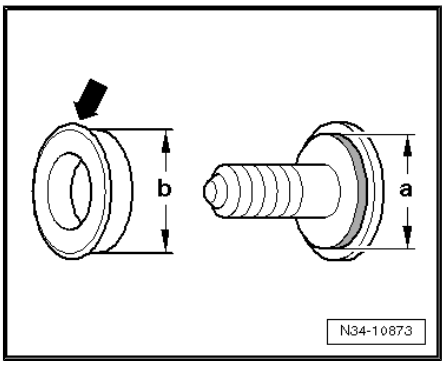
25 - Selector fork for 5th and 6th gears

26 - Selector jaw for 5th and 6th gears

27 - Bolt, 25 Nm

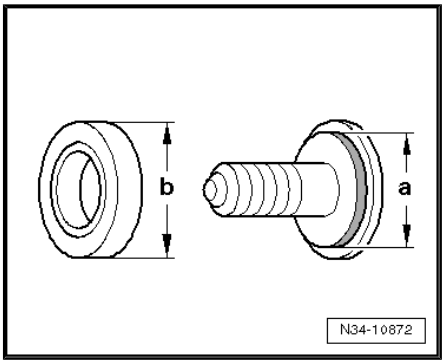
Allocation of securing bolts and cylindrical roller bearing inner races for input shaft

Gearbox manufacture date	Dim. “a” mm	Dim. “b” mm
Through 20 08 6	21	31
From 21 08 6	23.4	37 • Additionally: inner race and thrust washer combined in one component -arrow-

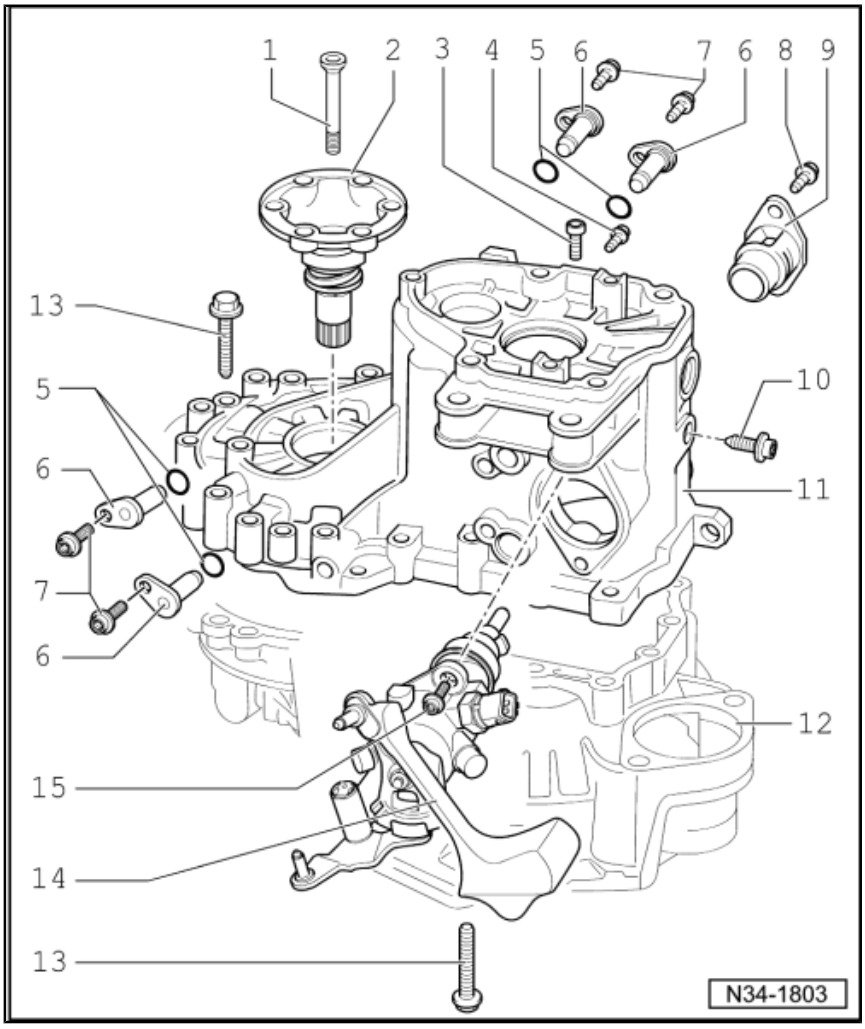


Allocation of securing bolts and cylindrical roller bearing inner races for output shaft

Gearbox manufacture date	Dim. “a” mm	Dim. “b” mm
Through 20 08 6	21	31
From 21 08 6	23.4	37



5.4 Removing and installing gearbox housing and shift mechanism



1 - Countersunk bolt, 25 Nm

2 - Flange shaft with compression spring

- ❑ Removing and installing ⇒ page 184
- ❑ Assembling ⇒ page 193

3 - Torx socket head bolt, 25 Nm

- ❑ For reverse shaft support
- ❑ Self-locking
- ❑ Always renew

4 - Torx socket head bolt, 30 Nm

- ❑ For reverse shaft support
- ❑ Self-locking
- ❑ Always renew

5 - O-ring

- ❑ Always renew

6 - Pivot pin

7 - Bolt, 25 Nm

8 - Bolt, 25 Nm

9 - Cover plate

10 - Multi-point socket head bolt 25 Nm

- ❑ For reverse shaft support
- ❑ Always renew

11 - Gearbox housing

- ❑ Pull off together with 5th and 6th gears ⇒ page 115 .
- ❑ Repairing ⇒ page 132 .

12 - Clutch housing

- ❑ Repairing ⇒ page 132 .

13 - Hexagon bolt, 25 Nm and turn 90° further

- ❑ Always renew

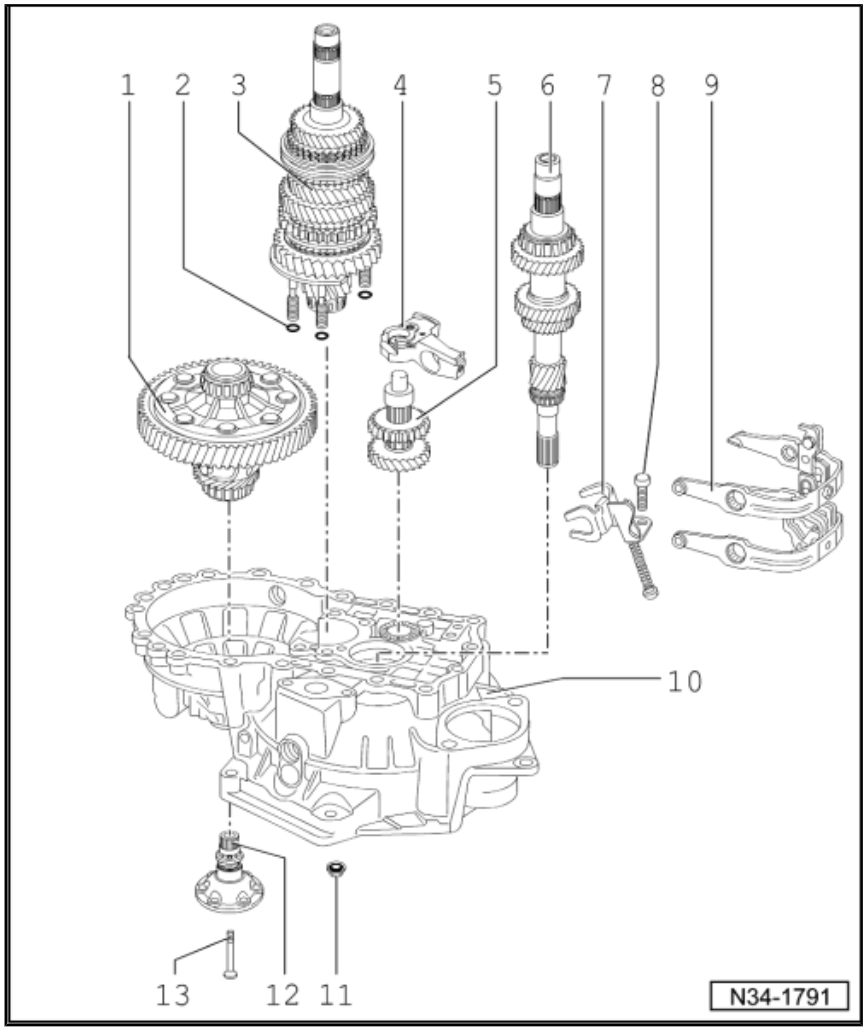
14 - Selector shaft with selector shaft cover

(Selector unit)

- ❑ Repairing ⇒ page 142 .

15 - Multi-point socket head bolt 25 Nm

5.5 Removing and installing input shaft, output shaft, differential and selector forks



1 - Differential

- ❑ Dismantling and assembling ⇒ page 193

2 - Seal

- ❑ Qty. 4
- ❑ Always renew

3 - Output shaft

- ❑ Dismantling and assembling ⇒ page 163

4 - Reverse shaft support

- ❑ Dismantling and assembling ⇒ page 181

5 - Reverse shaft

- ❑ Dismantling and assembling ⇒ page 181

6 - Input shaft

- ❑ Dismantling and assembling ⇒ page 150

7 - Selector fork for reverse gear

- ❑ Dismantling and assembling ⇒ page 145
- ❑ Installation position ⇒ page 123

8 - Torx socket head bolt, 25 Nm

9 - Selector mechanism

- ❑ (Selector forks)
- ❑ Dismantling and assembling ⇒ page 145

10 - Clutch housing

- ❑ Repairing ⇒ page 132 .

11 - Hexagon nut, 25 Nm and then turn 90° further

- ❑ 4 nuts for bearing support
- ❑ Always renew

12 - Flange shaft with compression spring

- ❑ Removing and installing ⇒ page 184
- ❑ Assembling ⇒ page 193

13 - Countersunk bolt, 25 Nm

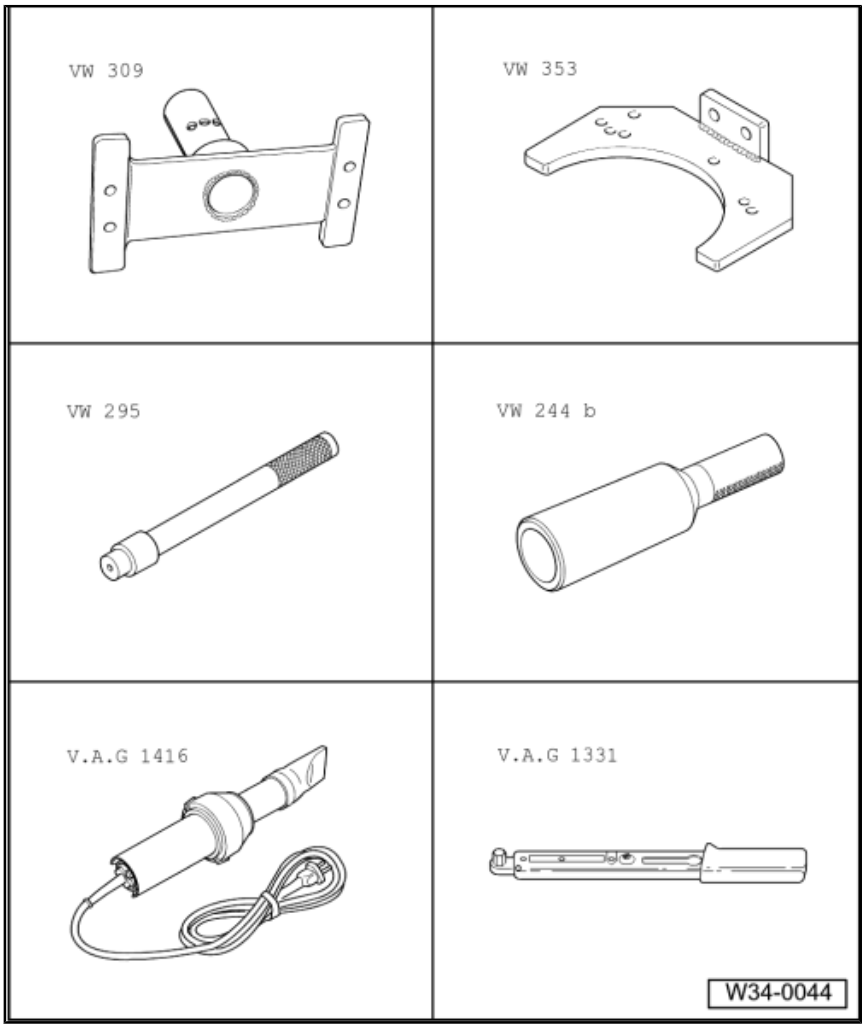
5.6 Assembly sequence - Removing and installing cover for gearbox housing and 5th and 6th gear

Note

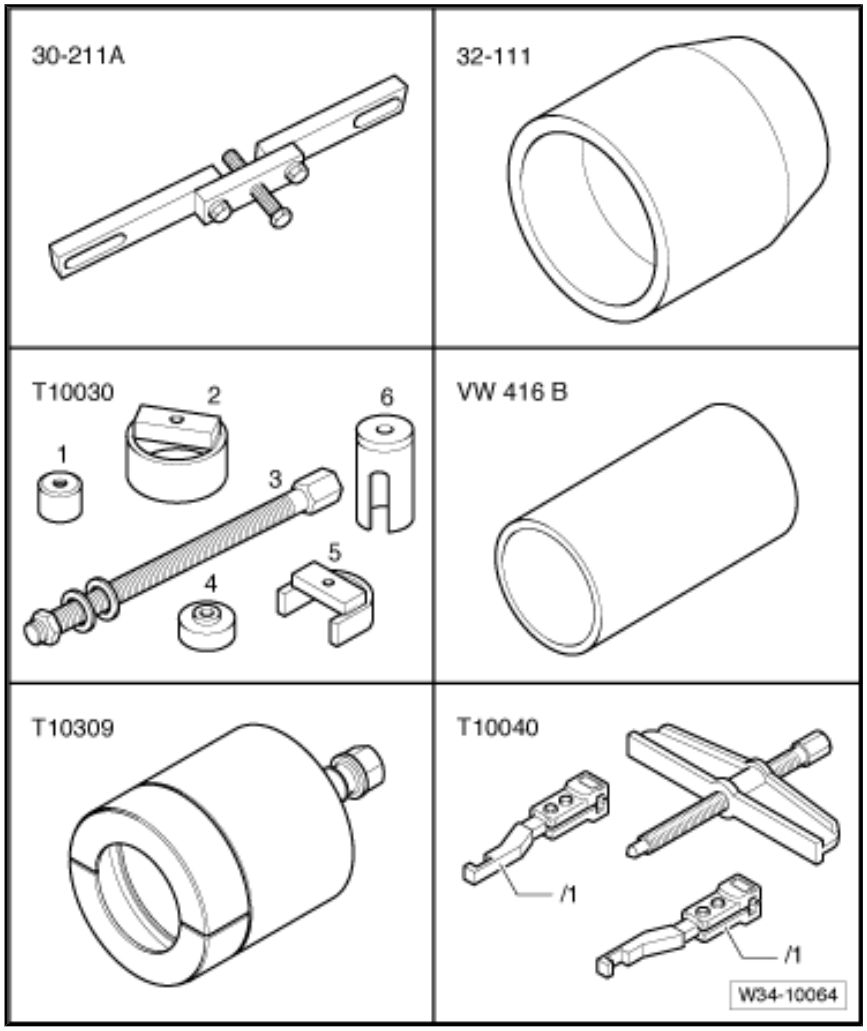
- *Follow the working procedure described below if only the 5th and 6th gears have to be removed:*
- *If the gearbox housing has to be removed, follow the working procedure: Dismantling and assembling gearbox completely* ⇒ page 115 .

Special tools and workshop equipment required

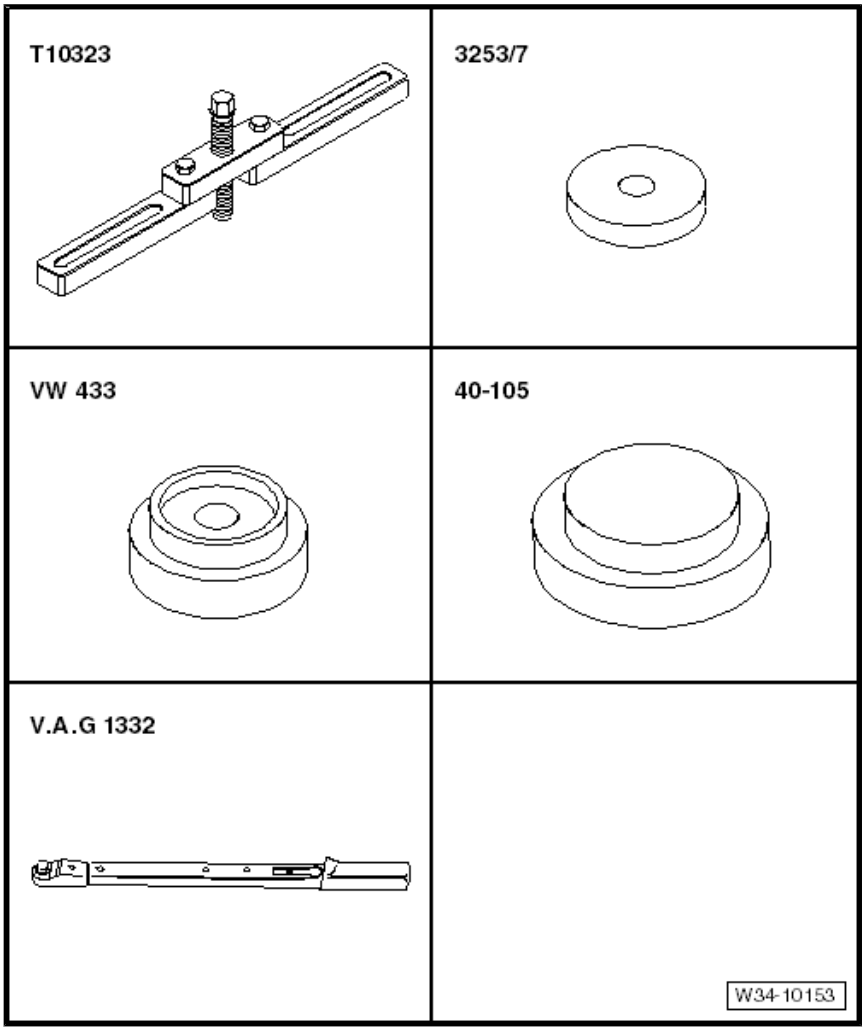
- Support plate -VW 309-
- Gearbox support -VW 353-
- Drift -VW 295-
- Drift sleeve -VW 244 B-
- Hot air blower -V.A.G 1416-
- Torque wrench -V.A.G 1331-
- -Zweiarmabzieher Kukko 210.1-
- -Stehbolzen M 8 x 100 mm-



- Support bridge -30-211A-
- Thrust piece -32 - 111-
- Thrust piece from assembly tool -T10030/4-
- Tube -VW 416 B-
- Puller -T10309-
- Two arm puller -T10040- or two arm puller -Kukko 20/10-
- With puller hooks -T10040/2A-
- Thrust piece -T10040/3-



- Support device -T10323-
- Assembly tool -3253/7-
- Thrust piece -VW 433-
- Thrust plate -40 - 105-
- Torque wrench -V.A.G 1332-



5.6.1 Removing cover for gearbox housing and 5th and 6th gears

– Remove clutch release lever and release bearing ⇒ page 44 .

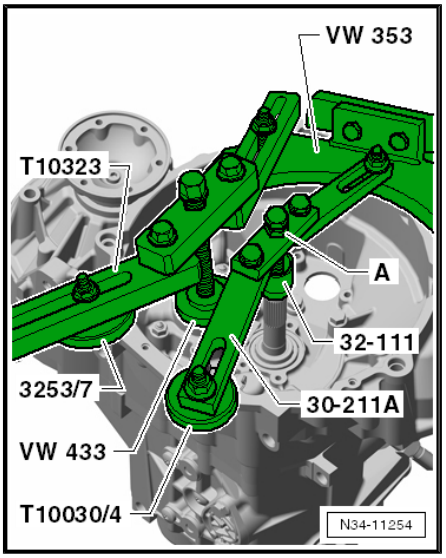
- Bearings of input shaft and output shaft must not be damaged when 5th and 6th gears are removed and installed.
- Therefore, following tools must be mounted for support at this stage during attachment of gearbox to gearbox support -VW 353- :

Underneath input shaft:

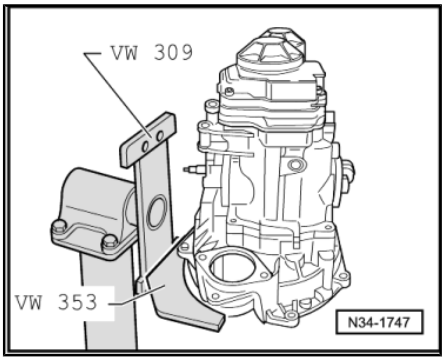
- ♦ Support bridge -30-211A-
- ♦ Thrust piece -32 - 111-
- ♦ Thrust piece -T10030/4-
- The input shaft can be supported by the thrust piece -32 - 111- only at a later point.

Underneath bearing support for output shaft:

- ♦ Support device -T10323-
- ♦ Assembly tool -3253/7-
- ♦ Thrust piece -VW 433-

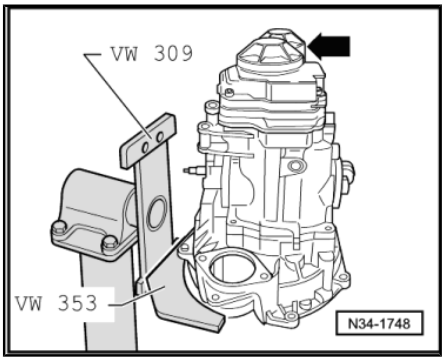


– Secure gearbox on gearbox support -VW 353- .



– Remove gearbox housing cover -arrow-.

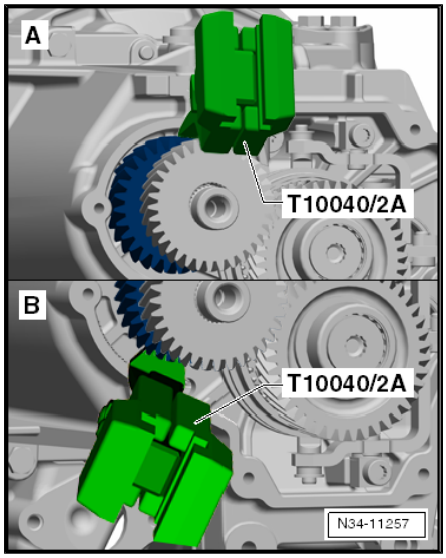
– Remove cover, if necessary carefully levering up all around along protruding housing flange and alternating between sides, being careful not to damage sealing surfaces.



– Check whether puller hooks -T10040/2A- can be inserted correctly under 5th gear wheel.

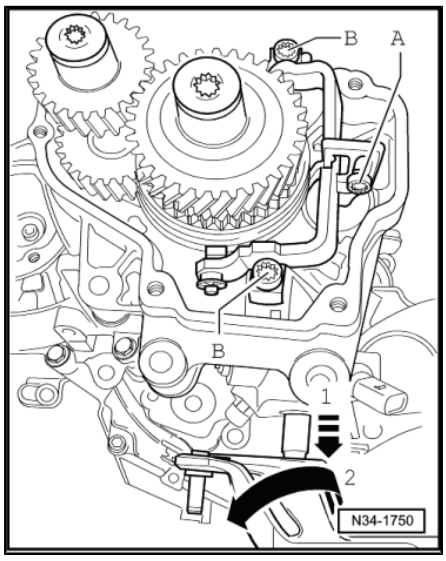
Puller hooks -T10040/2A- cannot be inserted correctly.	
-A- Puller hooks -T10040/2A- make contact too soon with: ♦ gearbox housing wall ♦ ribs in gearbox housing under 5th gear wheel	Removal of “synchro-hub 5th/6th gear”, “6th gear wheel”, “ 5th gear wheel” and “gearbox housing” together ⇒ page 115
-B- Puller hooks -T10040/2A- come into contact with ribs in gearbox housing below gear wheel.	

Puller hooks -T10040/2A- cannot be inserted correctly.
5th/6th gear can be removed individually ⇒ page 113



Remove 5th and 6th gears individually

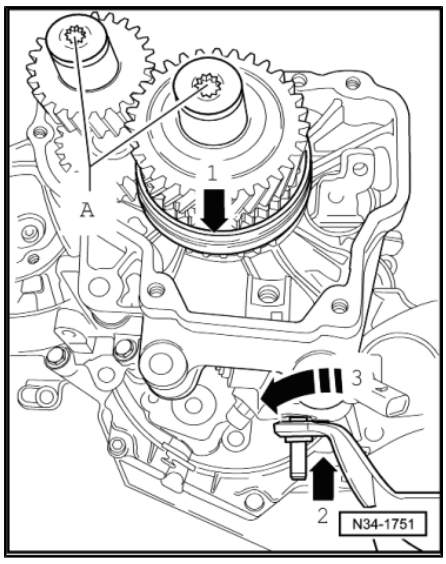
– Remove selector fork for 5th and 6th gears as follows:
– Cover openings with a cloth.
– Engage 5th gear -arrows 1- and -2-.
– Remove selector jaw for 5th and 6th gears -bolt A-.
– Then remove both bolts -B- for pivot pins.
– Pull out pivot pins.
– Remove selector fork for 5th and 6th gears.



– Remove -bolts A- for inner bearing races from input and output shafts, engaging 5th gear -arrow 1- and 1st gear -arrow 2- and -arrow 3-.
– Input shaft and output shaft are locked when both gears are engaged. Both bolts can now be loosened.

Note

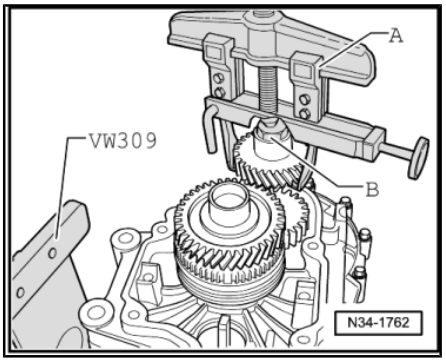
If the shafts are to be reused, clean residual locking material out of threaded holes using a thread chaser.



– Pull off gear wheel for 6th gear with inner race of cylindrical roller bearing for output shaft.

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

B - Hexagon bolt, M10 x 20, 17 mm AF



Note

6th gear wheel with cylindrical roller bearing inner race can also be pulled off using two arm puller -T10040- and puller hooks -T10040/2A- .

– Heat gear wheel slightly with hot air blower -V.A.G 1416- if necessary.

Pull off synchromeshed gear for 6th gear together with cylinder roller bearing inner race for input shaft, thrust washer and synchro-ring for 6th gear only or together with synchro-hub for 5th and 6th gears, needle bearing inner race for 6th gear and synchro-ring for 5th gear.

Note

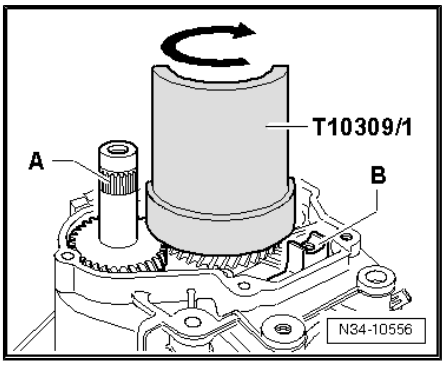
From gearbox date 26 05 8, a wave spring washer is installed below the synchro-ring for 5th gear and above the synchro-ring for 6th gear ⇒ Item 20 (page 105) and ⇒ Item 16 (page 105) .

Use puller -T10309- .

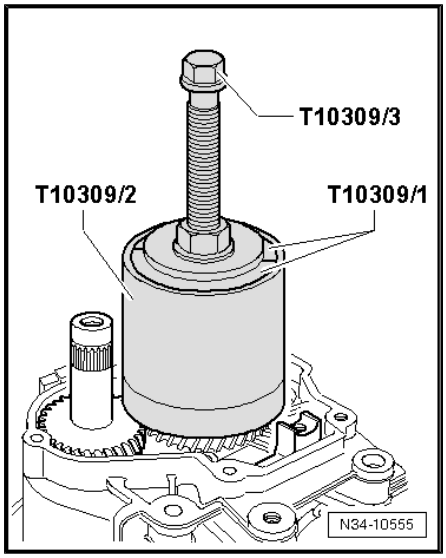
– First set half sleeve -T10309/1- between output shaft -A- and support for selector fork for 5th and 6th gear -B-.

• The half sleeve -T10309/1- must be positioned beneath the synchro-ring.

– Turn half sleeve -T10309/1- to opposite side -direction of arrow-.



– Set threaded insert -T10309/3- in half shell .
– Now fit second half shell -T10309/1- and set tube -T10309/2- over assembly.
– After parts are pulled off, check synchro-hub for damage.
– Renew synchro-ring for 5th gear.
– Now remove sleeve from gear wheel for 5th gear.

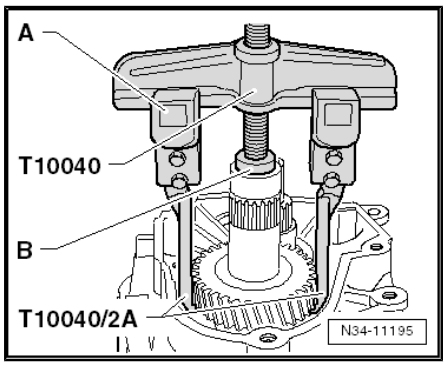


– Pull off gear wheel for 5th gear.
– First set up puller hooks -A-.

-B- = Thrust piece -T10040/3-

or

Thrust plate -40 - 105-



Note

- *When pulling off gear wheel, ensure that hooks do not bend outwards. After pulling off 5th gear wheel, examine for damage.*
- *Heat gear wheel slightly with hot air blower -V.A.G 1416- if necessary.*

5.6.2 Installing cover for gearbox housing and 5th and 6th gears

Installing 5th/6th gears ⇒ page 123 .

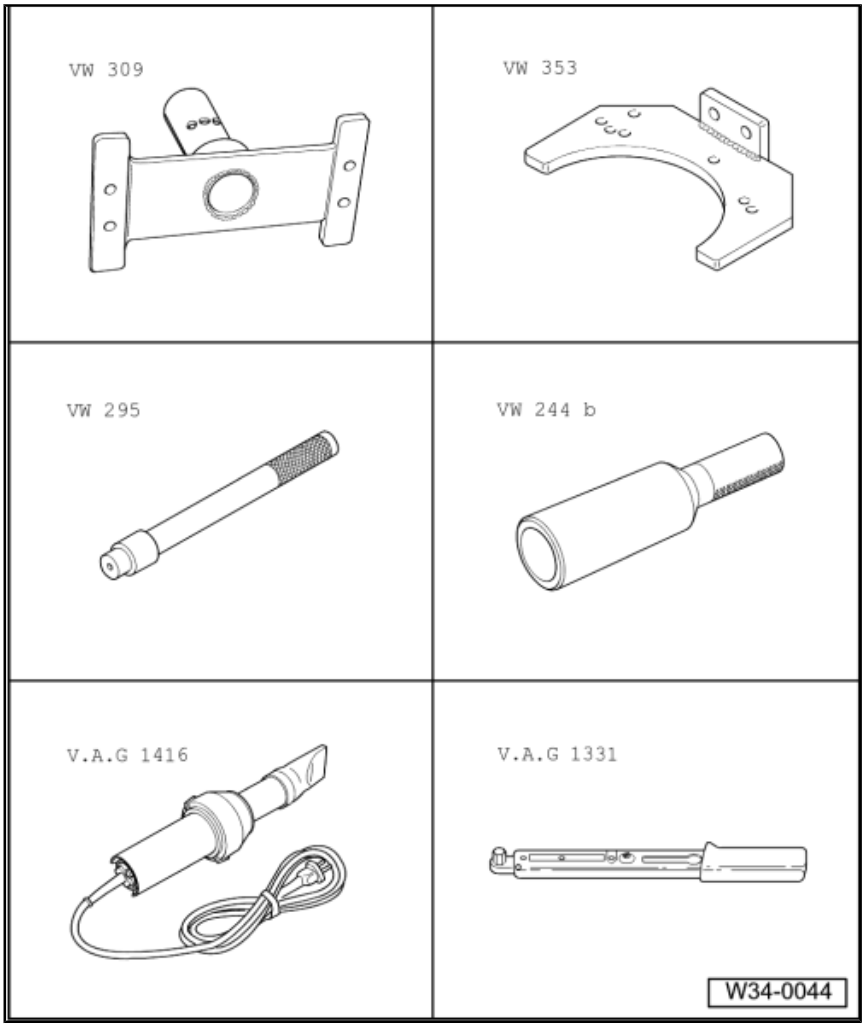
– Apply sealant -AMV 188 200 03- evenly to sealing surface of gearbox housing cover.
– Install cover for gearbox housing and tighten bolts to specified torques ⇒ page 104 .
– Fit clutch release lever and release bearing ⇒ page 44 .
– Fill with gear oil ⇒ page 92 .

5.7 Assembly sequence - Dismantling and assembling gearbox completely

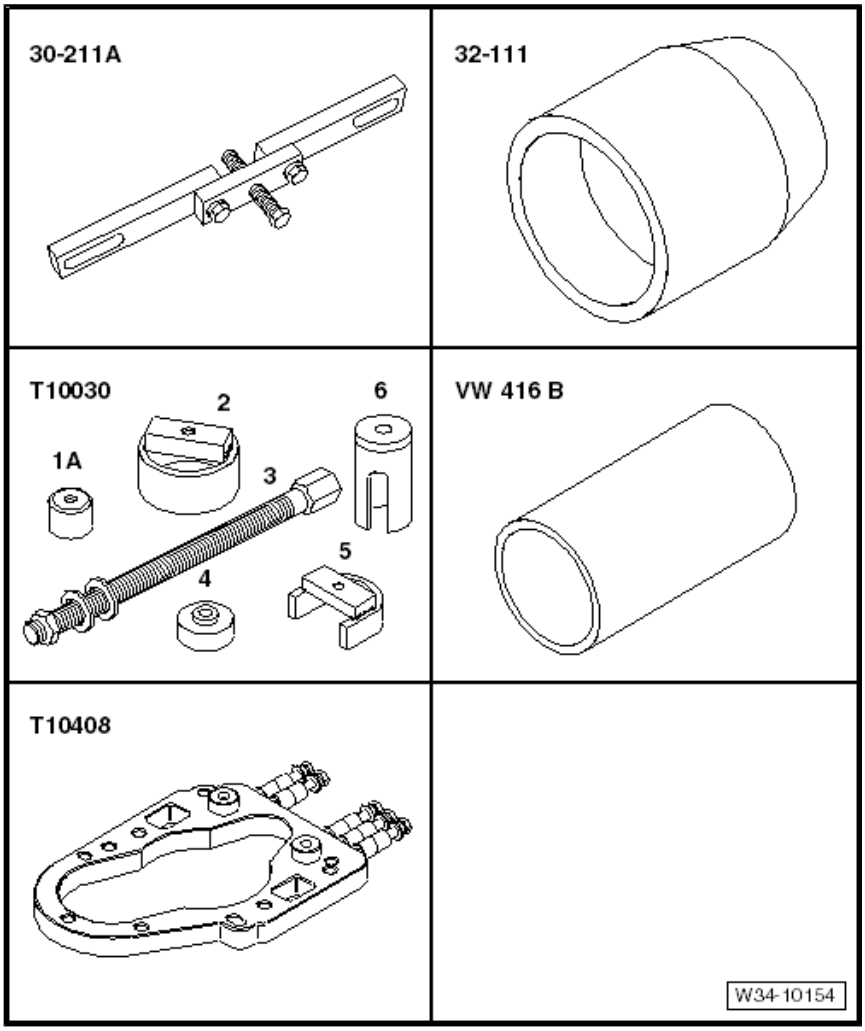
Removing and installing gearbox housing cover, clutch housing, selector shaft with selector mechanism cover, input shaft, output shaft, differential and selector mechanism.

Special tools and workshop equipment required

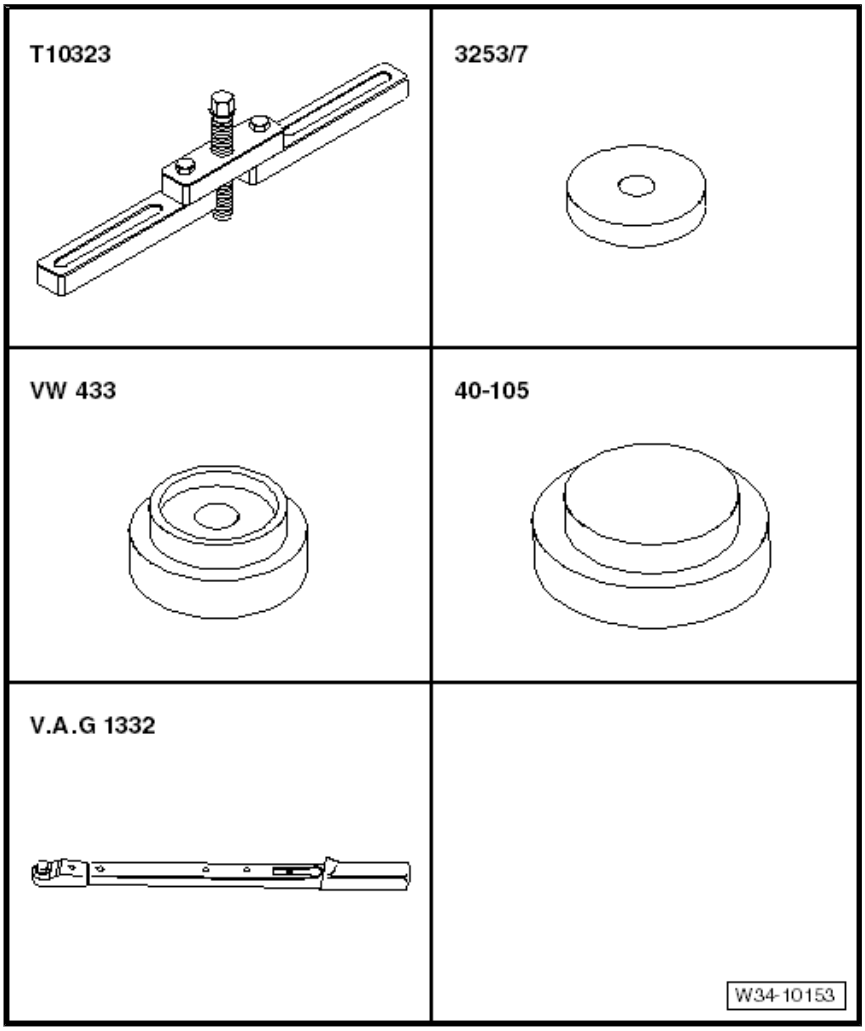
- Support plate -VW 309-
- Gearbox support -VW 353-
- Drift -VW 295-
- Drift sleeve -VW 244 B-
- Hot air blower -V.A.G 1416-
- Torque wrench -V.A.G 1331-
- -Stehbolzen M 8 x 100 mm-



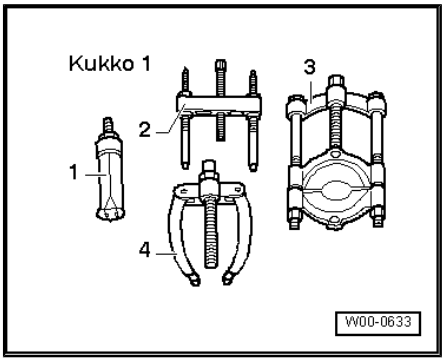
- Support bridge -30-211A-
- Thrust piece -32 - 111-
- Thrust piece from assembly tool -T10030/4-
- Tube -VW 416 B-
- Puller plate -T10408-
- Thrust pieces -T10408/2-



- Support device -T10323-
- Assembly tool -3253/7-
- Thrust piece -VW 433-
- Torque wrench -V.A.G 1332-



- Mounting -2 Kukko 18/1- (Qty. 2)



- Hexagon bolts M7 x 35 with washers

5.7.1 Dismantling gearbox

– Remove clutch release lever, release bearing and guide sleeve ⇒ page 44 .

- Bearings of input shaft and output shaft must not be damaged when 5th and 6th gears are removed and installed.
- Therefore, following tools must be mounted for support at this stage during attachment of gearbox to gearbox support -VW 353- :

Underneath input shaft:

♦ Support bridge -30-211A-

♦ Thrust piece -32 - 111-

♦ Thrust piece -T10030/4-

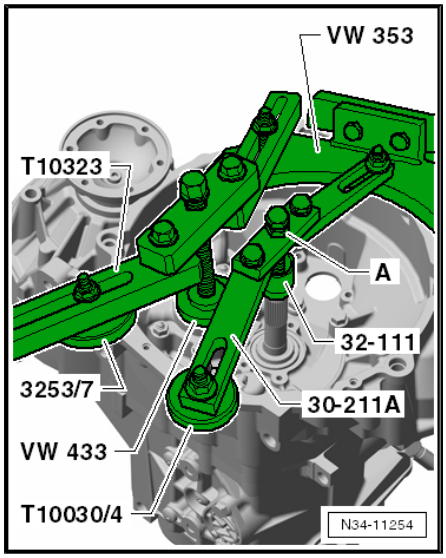
– Lock bolt of support bridge -30-211A- with nut -A-.

Underneath bearing support for output shaft:

♦ Support device -T10323-

♦ Assembly tool -3253/7-

♦ Thrust piece -VW 433-

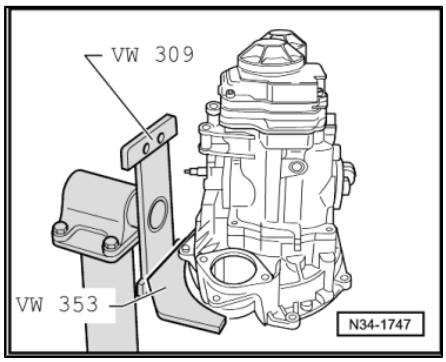


– Secure gearbox on gearbox support -VW 353- .

– Place drip tray underneath.

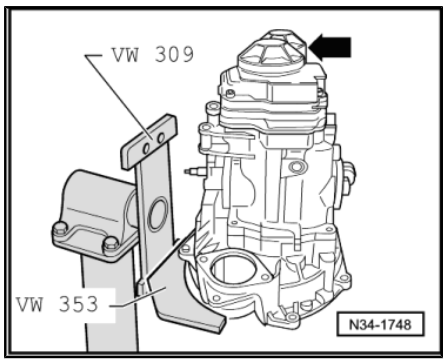
– Remove oil filler plug and oil drain plug.

– Drain gear oil.

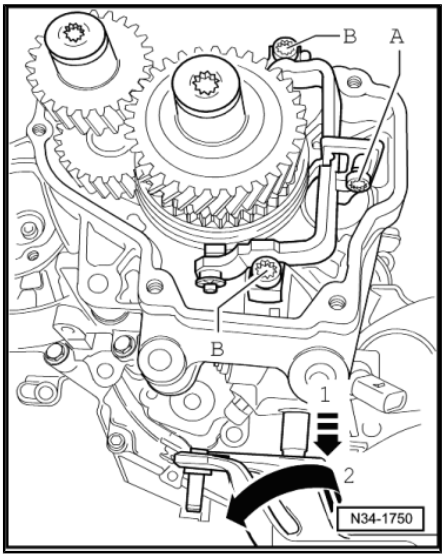


– Remove gearbox housing cover -arrow-.

– Remove cover, if necessary carefully levering up all around along protruding housing flange and alternating between sides, being careful not to damage sealing surfaces.



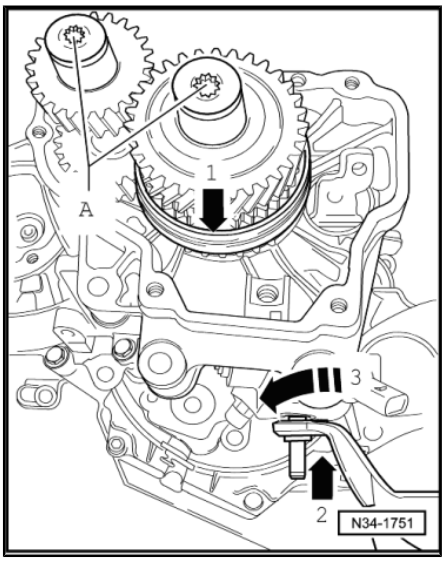
– Remove selector fork for 5th and 6th gears as follows:
– Cover openings with a cloth.
– Engage 5th gear -arrows 1- and -2-.
– Remove selector jaw for 5th and 6th gears -bolt A-.
– Then remove both bolts -B- for pivot pins.
– Pull out pivot pins.
– Remove selector fork for 5th and 6th gears.



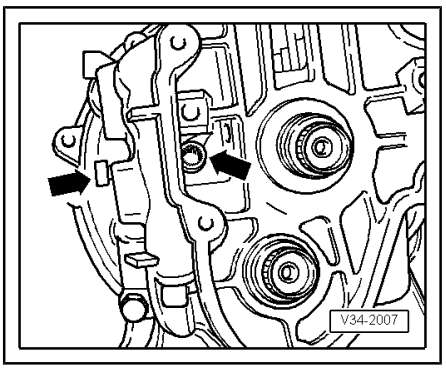
– Unscrew -bolts A- for inner bearing races from input and output shafts, engage 5th gear -arrow 1- and 1st gear -arrow 2- and -arrow 3- for this.
– Input shaft and output shaft are locked when both gears are engaged. Both bolts can now be loosened.

Note

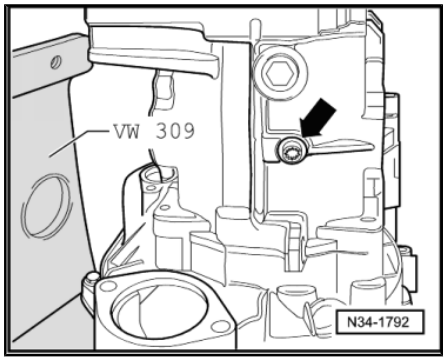
If the shafts are to be reused, clean residual locking material out of threaded holes using a thread chaser.



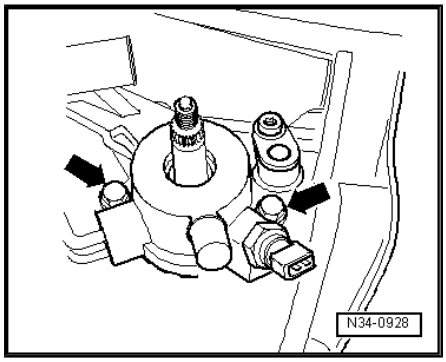
– Remove both bolts -arrows- for reverse shaft support bracket.



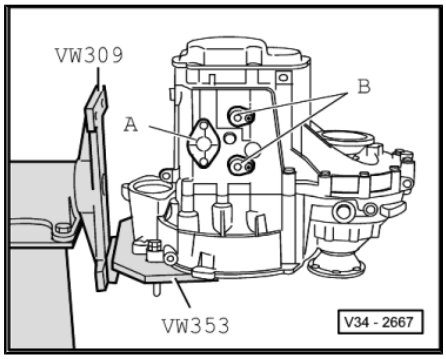
– Now remove 3rd bolt -arrow- for reverse shaft support bracket.



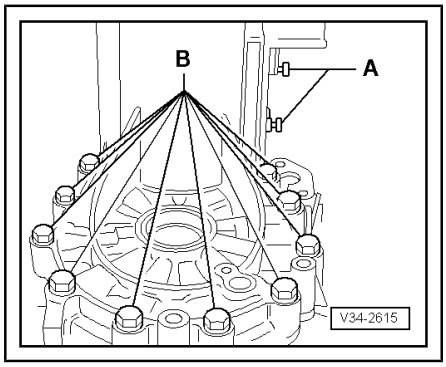
– Remove selector shaft with selector mechanism cover, placing selector shaft in neutral position. Then remove bolts -arrows- and pull selector shaft out of gearbox housing.



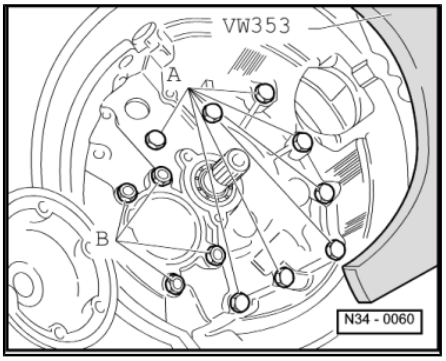
– Remove cover plate -A- and pivot pins -B- from underside of gearbox.



– Remove pivot pins -A- on top side of gearbox and securing bolts -B- for gearbox housing to clutch housing in area of differential.



– Remove bolts -A- from clutch housing side for securing clutch housing to gearbox housing.



Note

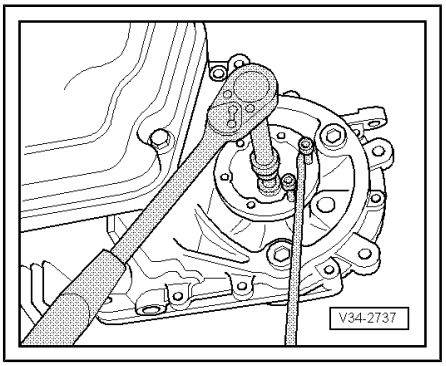
Do not remove nuts -B- for output shaft bearing support.

– Remove both flange shafts.

– Remove flange shafts together with springs, thrust washers and tapered rings.

Pull off following components together with gearbox housing:

- Synchro-hub for 5th/6th gears
- Gear wheel for 6th gear
- Gear wheel for 5th gear



Use puller plate -T10408- in conjunction with following special tools:

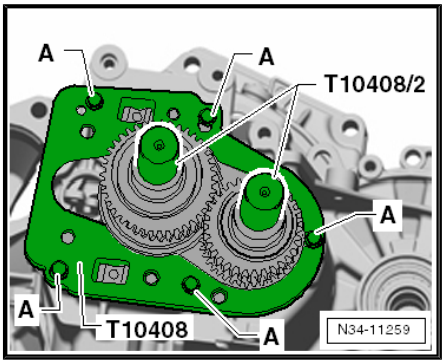
- Thrust pieces -T10408/2-
- Puller Kukko 18/1 (Qty. 2)

– Screw puller plate -T10408- firmly into threaded holes for gearbox housing cover.

A - Hexagon bolts M7 x 35 with washers

Torque setting 18 Nm

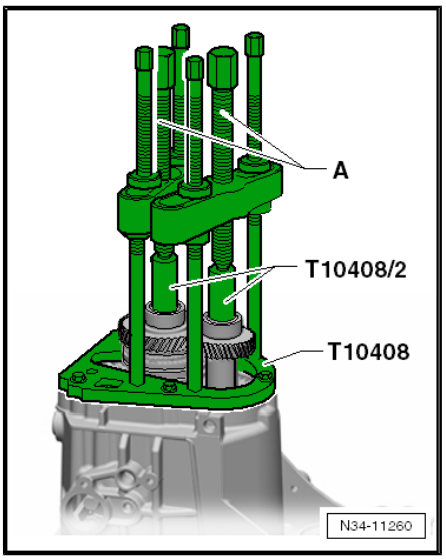
– Place thrust pieces -T10408/2- on shafts.



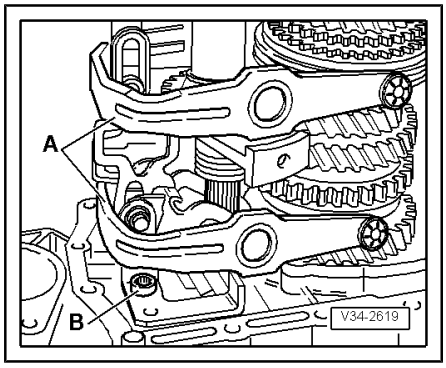
– Install puller Kukko 18/1 .

– Pull off 5th and 6th gear synchro-hub, 6th gear wheel, 5th gear wheel and gearbox housing by alternately tightening spindles -A- ($^1/_2$ rotation) of pullers Kukko 18/2 .

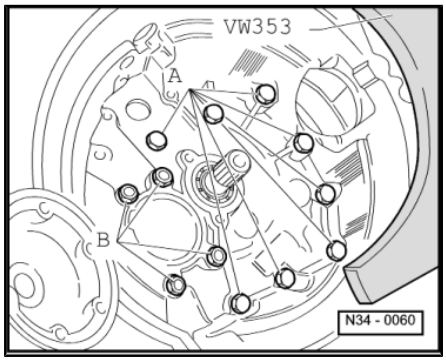
– Heat 5th and 6th gear wheels slightly with hot air blower - V.A.G 1416- if necessary.



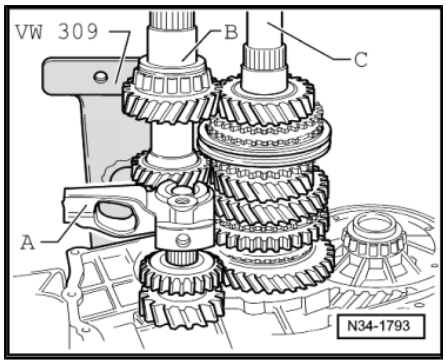
– Remove selector forks -A- together with selector plates.
– Unbolt reverse gear selector mechanism -B-.



– Remove nuts -B- for output shaft bearing support.



– Remove reverse gear -A-, input shaft -B- and output shaft -C- one after the other from clutch housing.
– Remove differential.

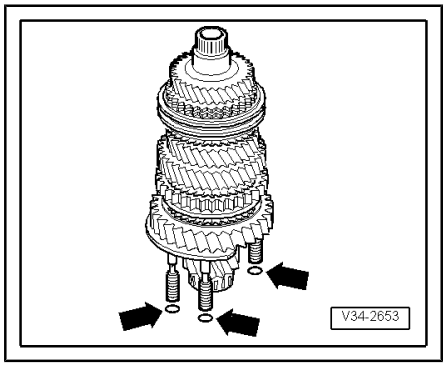


5.7.2 Assembling gearbox

– Install differential.
– Always renew sealing rings -arrows- for output shaft bearing support.

Note

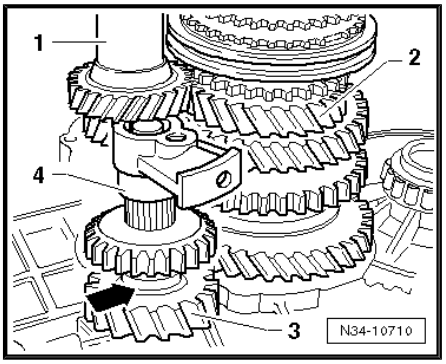
The figure shows only 3 of the 4 sealing rings.



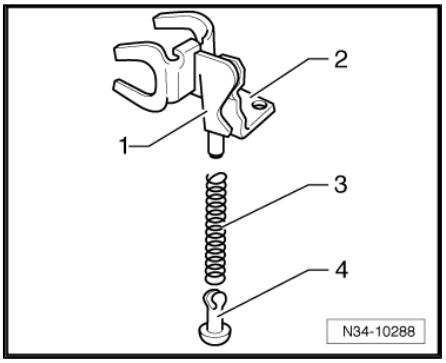
– Insert input shaft -1- and output shaft -2- together.
– Tighten nuts for output shaft bearing support to specified torque ⇒ Item 11 (page 108) .
– Set reverse gear wheel -3- on needle bearing in clutch housing.

The shoulder -arrow- faces away from the clutch housing.

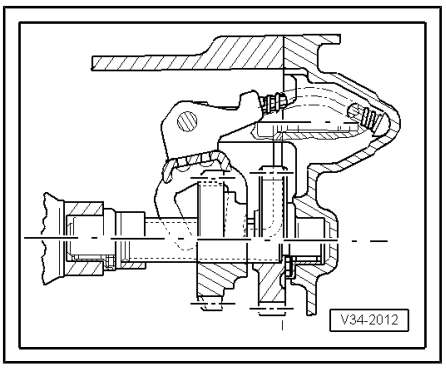
– Ensure that reverse shaft -4- is complete ⇒ page 181 ; do not yet fit reverse shaft support to reverse shaft.
– Fit reverse shaft into clutch housing.
– Clean locking fluid from all threaded holes in reverse shaft support; a thread chaser may be used.
– Place reverse shaft support on reverse shaft.



– Attach reverse gear selector fork -1- with support for reverse gear selector fork -2-, spring -3- and sliding piece -4-.

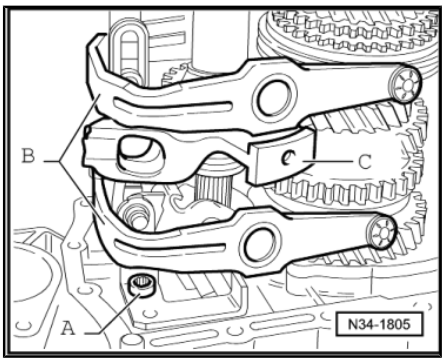


Installation position, reverse gear

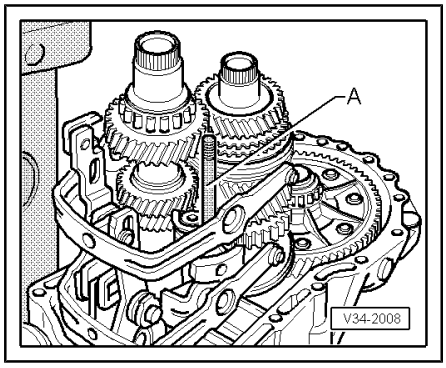


– Bolt on reverse gear selector mechanism -A-, tightening to specified torque ⇒ Item 8 (page 108) .
– Install selector forks -B- together with selector plates.

Reverse gear support pin -C- is located in front of selector plates.



– Screw M8 x 100 mm studs -A- into reverse shaft support so that shaft is aligned after gearbox housing is fitted.
– Align selector plates.

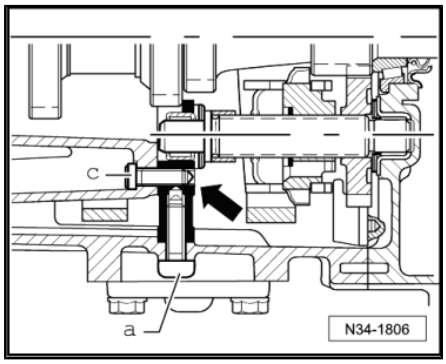


Note

The selector segments must be positioned in the grooves on the locking collars.

– Apply sealant -AMV 188 200 03- evenly to sealing surface of clutch housing.
– Fit gearbox housing.

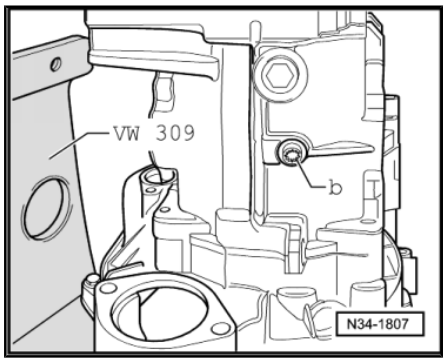
Install reverse shaft support bolts -arrow- as follows:



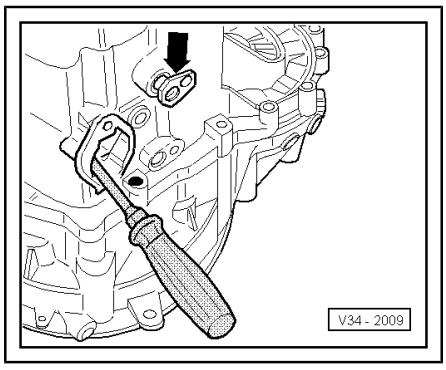
– Install bolt -a-.
– Remove stud -A- (⇒ figure above).
– Install bolt -c-.

Tightening sequence:

– Tighten bolt -a- to 30 Nm.
– Tighten bolt -b- to 25 Nm.
– Tighten bolt -c- (⇒ figure below) to 25 Nm.

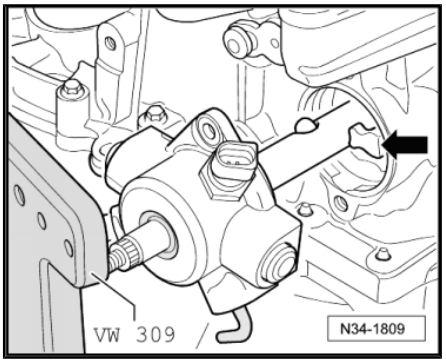


– Install pivot pin -arrow- for selector forks. Do this by aligning selector mechanism with a screwdriver so that respective pivot pin can be installed.
– Apply sealant -AMV 188 200 03- evenly to sealing surface of cover plate.
– Fit selector shaft cover.



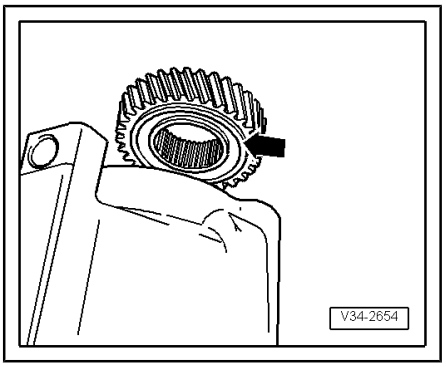
Install selector shaft with selector shaft cover plate as follows:

– Place selector plates in neutral.
– Apply sealant -AMV 188 200 03- evenly to sealing surface of selector mechanism cover.
– Move selector shaft to neutral.
– Position selector shaft so that selector finger -arrow- is inserted in selector plates.
– Bolt on selector shaft cover ⇒ Item 15 (page 107) .

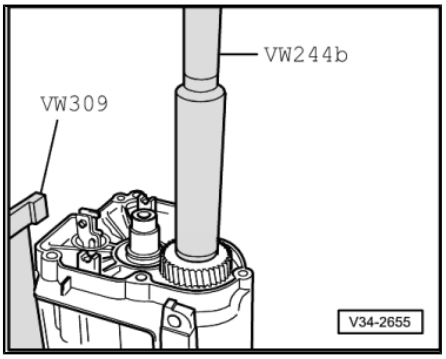


Installation position, 5th gear wheel

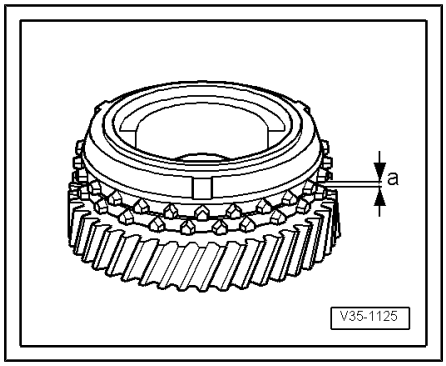
The circumferential groove -arrow- faces gearbox housing.



– Drive on gear wheel for 5th gear.



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



– Before installing synchromeshed gears and synchro-rings for 5th and 6th gear, press synchro-rings onto cones of synchro-meshed gears and measure gap -a- with a feeler gauge.

Gap -a-	Installation (new) dimension	Wear limit
5th and 6th gears	1.1 … 1.7 mm	0.5 mm

– Install 5th gear synchromeshed gear with needle bearing.

From gearbox date 26 05 8: set corrugated spring washer on synchromeshed gear for 5th gear ⇒ Item 20 (page 105)

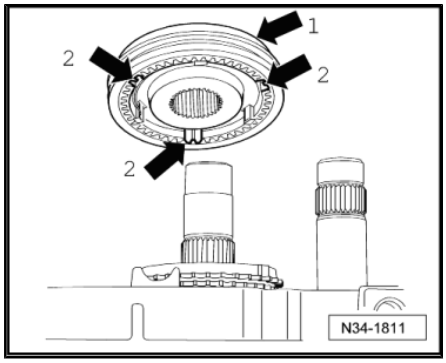
– Place 5th gear synchro-ring on synchromeshed gear.

– If synchro-hub and locking collar for 5th and 6th gears are dismantled, assemble before installing ⇒ page 157 , ⇒ page 157 and ⇒ page 158 .

– Observe other modifications to locking collar for 5th and 6th gears from gearbox date 12 06 6 ⇒ page 157 .

These modifications are very important for the later adjustment of the 5th and 6th gears.

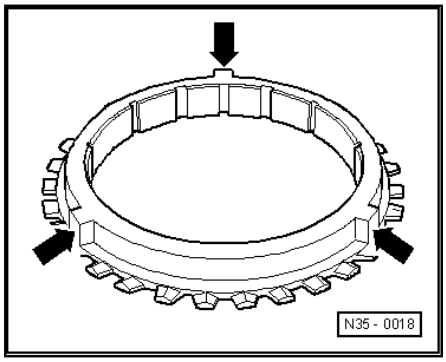
Installation position, synchro-hub and locking collar for 5th and 6th gears



Shoulder -arrow 1- faces 6th gear.

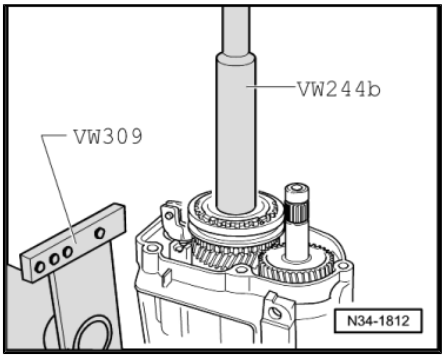
The supports -arrow 2- of the synchro-hub align with the cast locking pieces of the synchro-ring (arrows in figure below).

5th gear and 6th gear synchro-rings with cast locking pieces -arrows-



– Cover all openings in gearbox housing with a cloth to prevent foreign bodies from entering gearbox.

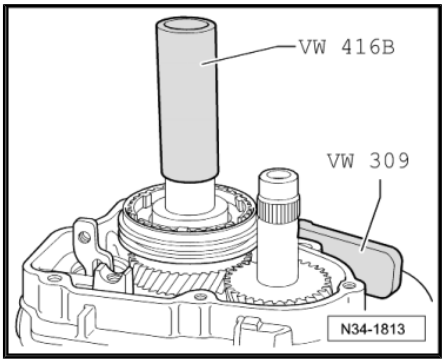
– Drive on synchro-hub for 5th and 6th gear.



Note

When driving on, ensure that synchro-ring moves freely.

– Heat inner race of cylindrical roller bearing for 6th gear synchromeshed gear to maximum 100° C and drive onto input shaft.



WARNING

Wear protective gloves!

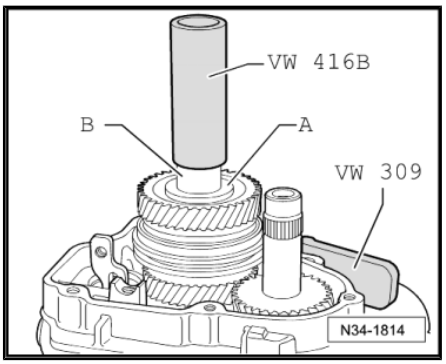
– Install synchro-ring for 6th gear.

From gearbox date 26 05 8: set corrugated spring washer on synchromeshed gear for 6th gear ⇒ Item 16 (page 105) **.**

– Install 6th gear synchromeshed gear with needle bearing.

Through gearbox date 20 08 6

– Set thrust washer -A- in place.



Note

Do not interchange inner races of cylindrical roller bearings of input and output shafts.

– Heat cylindrical roller bearing inner race -B- to maximum 100° C and drive onto input shaft.

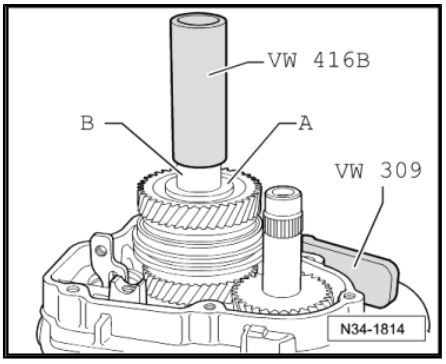
WARNING

Wear protective gloves!

From gearbox date 21 08 6

Cylindrical roller bearing inner race -B- and thrust washer -A- are combined in one component.

– Heat cylindrical roller bearing inner race to maximum 100° C and drive onto input shaft.



WARNING

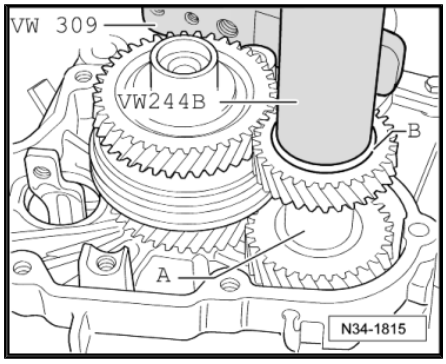
Wear protective gloves!

Continuation for all

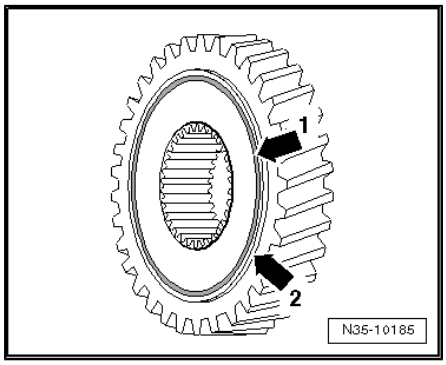
– Set sleeve -A- on gear wheel for 5th gear.

Installation position of gear wheel for 6th gear:

Groove -B- faces away from sleeve -A-.



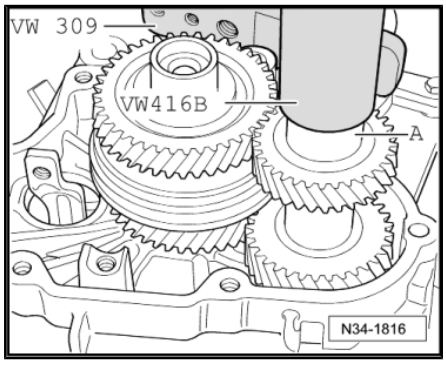
"Or" groove -arrow 1- near shoulder -arrow 2- faces away from sleeve -A- see previous figure).



WARNING

Wear protective gloves!

- Heat 6th gear wheel to maximum 100° C and press on.
- Shift locking collar for 5th and 6th gear to freewheel position to enable synchromeshed gear for 6th gear to turn while gear wheel for 6th gear is being pressed on.
- Drive on gear wheel for 6th gear, being careful that teeth of gear wheel and synchromeshed gear for 6th gear mesh.
- Heat cylindrical roller bearing inner race -A- to maximum 100° C and drive onto output shaft.



WARNING

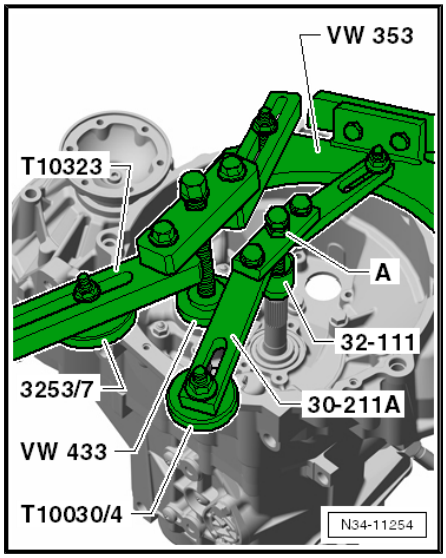
Wear protective gloves!

- Loosen support for input shaft.

Clean residual locking fluid from threaded holes for securing bolts -A- for synchro-hub for 5th and 6th gears and gear wheel for 6th gear with a thread chaser. Otherwise the bolts may shear.

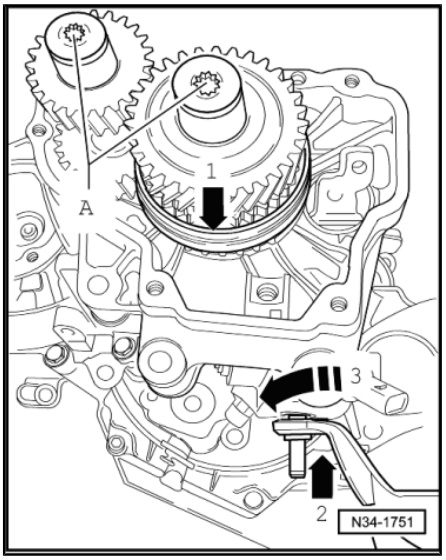
Please note allocation of securing bolts ⇒ page 106 and ⇒ page 106 .

- Tighten securing bolts for synchro-hub and gear wheels for 5th and 6th gears to specified torque ⇒ page 104 .



– To tighten securing bolts -A-, engage 2 gears -arrows 1- through -3-.

– Install selector forks for 5th and 6th gears.



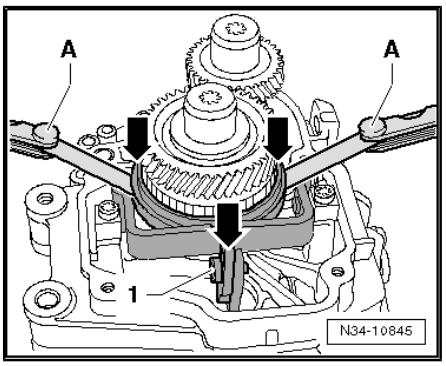
Adjusting 5th and 6th gears through gearbox manufacture date 11 06 6

– Engage 5th gear.

– Loosen bolt -1-.

– Insert two 0.5 mm feeler gauges -A- above both selector segments -arrows- (to 6th gear) into locking collar.

– Then press the selector jaw and the locking collar down -arrows- and tighten bolt -1- to 25 Nm.



• 5th gear engaged.

• Check measurement: it should be possible to insert a 0.5°mm feeler gauge without play between locking collar and each selector segment -arrow- on the side of 6th gear.

– If necessary, repeat adjustment.

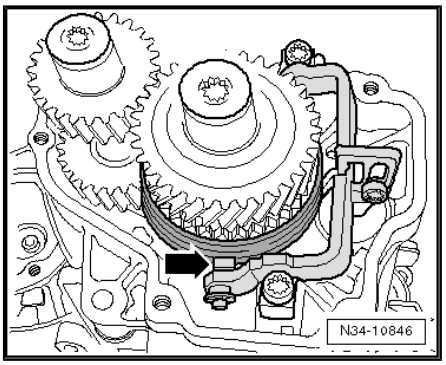
– Engage 5th gear and then 6th gear.

When 5th or 6th gear is engaged, the selector fork for 5th and 6th gear should have slight clearance in the selector jaw.

– Switch to neutral.

• Locking collar must now be in the neutral position. Synchro-ring must move freely.

– Shift through all gears.

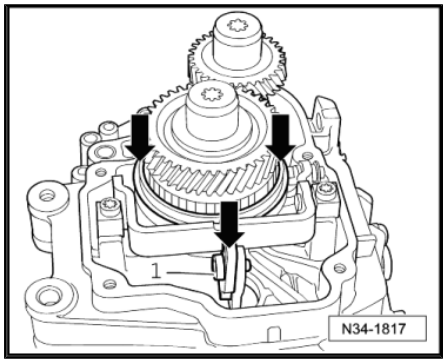


Adjusting 5th and 6th gear from gearbox manufacture date 12 06 6

– Engage 5th gear.

– Loosen bolt -1-.

– Then press the selector jaw and the locking collar down -arrows- and tighten bolt -1- to 25 Nm.

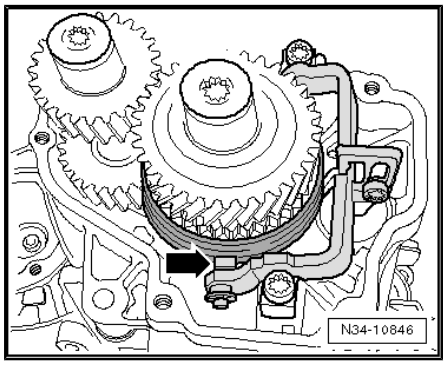


• 5th gear engaged.

• Check measurement: it should not be possible to insert a 0.2° mm feeler gauge between locking collar and each selector segment -arrow- on the side of 6th gear.

– If necessary, repeat adjustment.

– Engage 5th gear and then 6th gear.



When 5th or 6th gear is engaged, the selector fork for 5th and 6th gear should have slight clearance in the selector jaw.

– Switch to neutral.

• Locking collar must now be in the neutral position. Synchro-ring must move freely.

– Shift through all gears.

Continuation for all

– Apply sealant -AMV 188 200 03- evenly to sealing surface of gearbox housing cover.

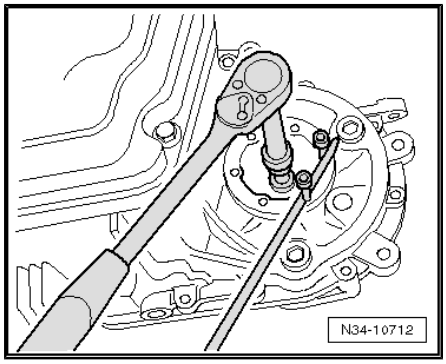
– Install gearbox housing cover ⇒ page 104 .

– Install both flange shafts with compression springs, thrust washers and tapered rings ⇒ page 184 .

– Fit release bearing guide sleeve ⇒ page 44 .

– Fit clutch release lever and release bearing ⇒ page 44 .

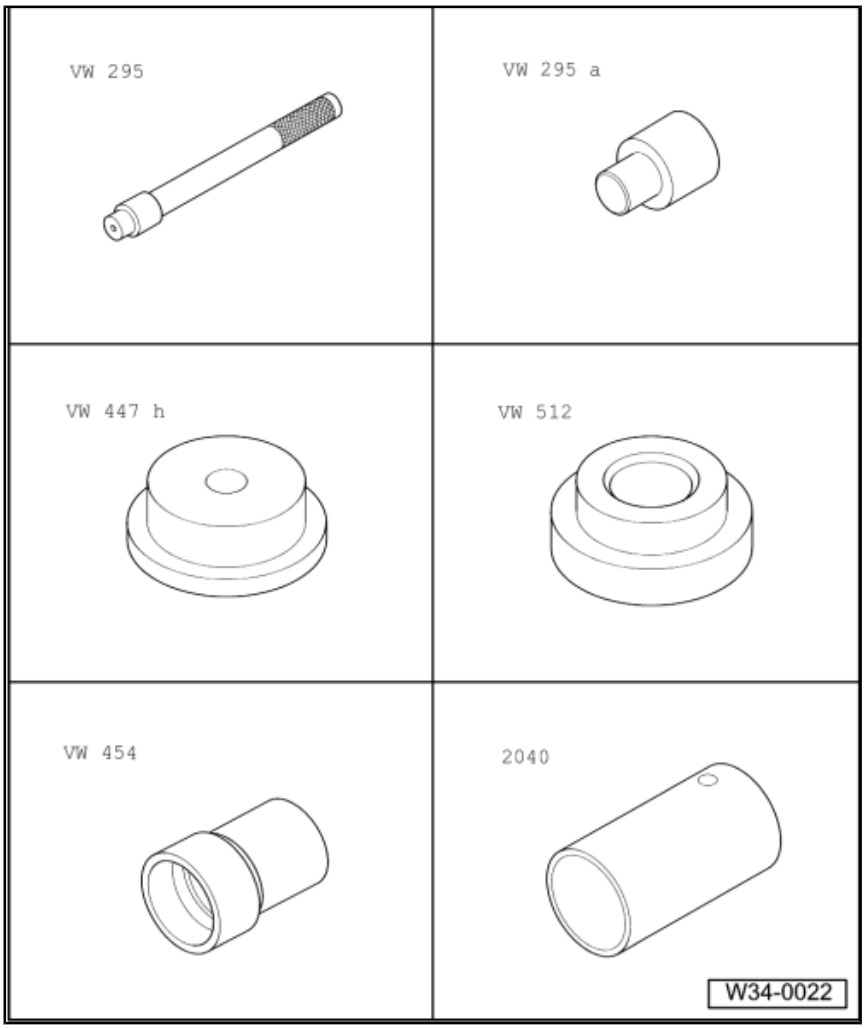
– Fill with gear oil ⇒ page 92 .



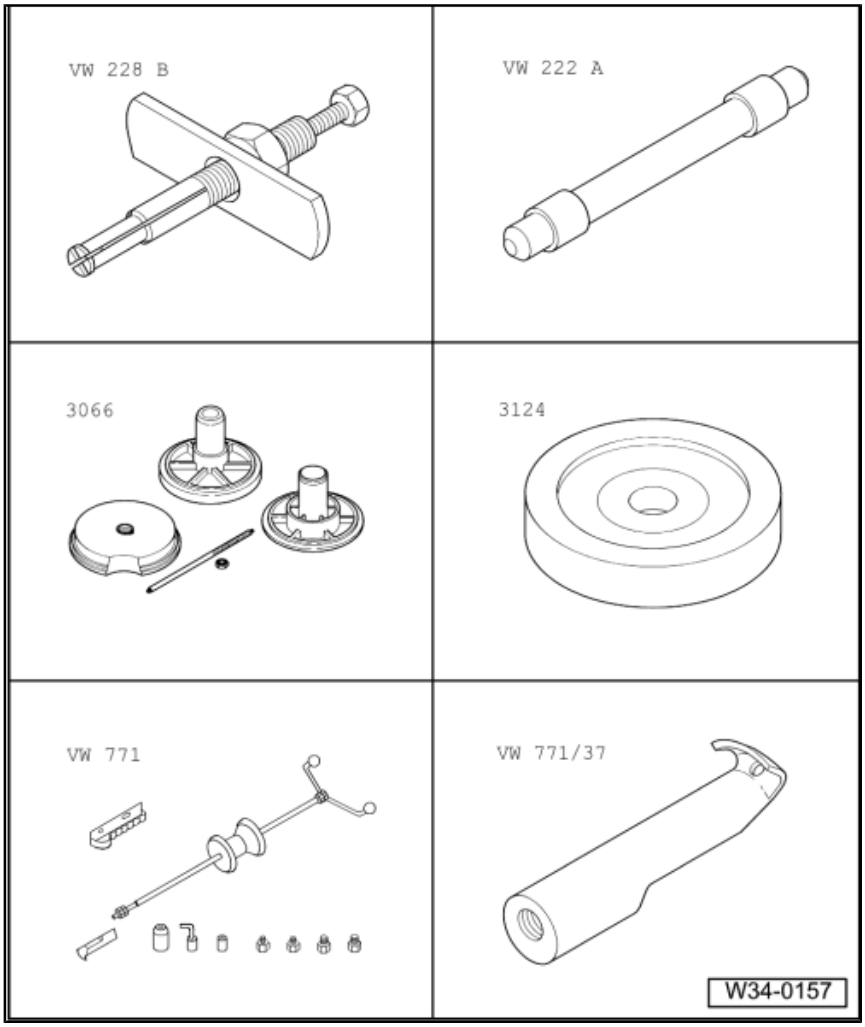
6 Repairing gearbox housing and clutch housing

Special tools and workshop equipment required

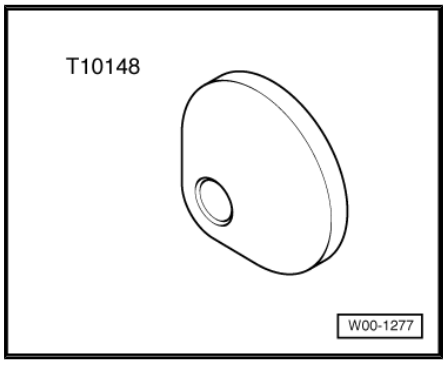
- Drift -VW 295-
- Adapter -VW 295 A-
- Thrust pad -VW 447 H-
- Thrust pad -VW 512-
- Tube -VW 415 A-
- Thrust piece -VW 454-

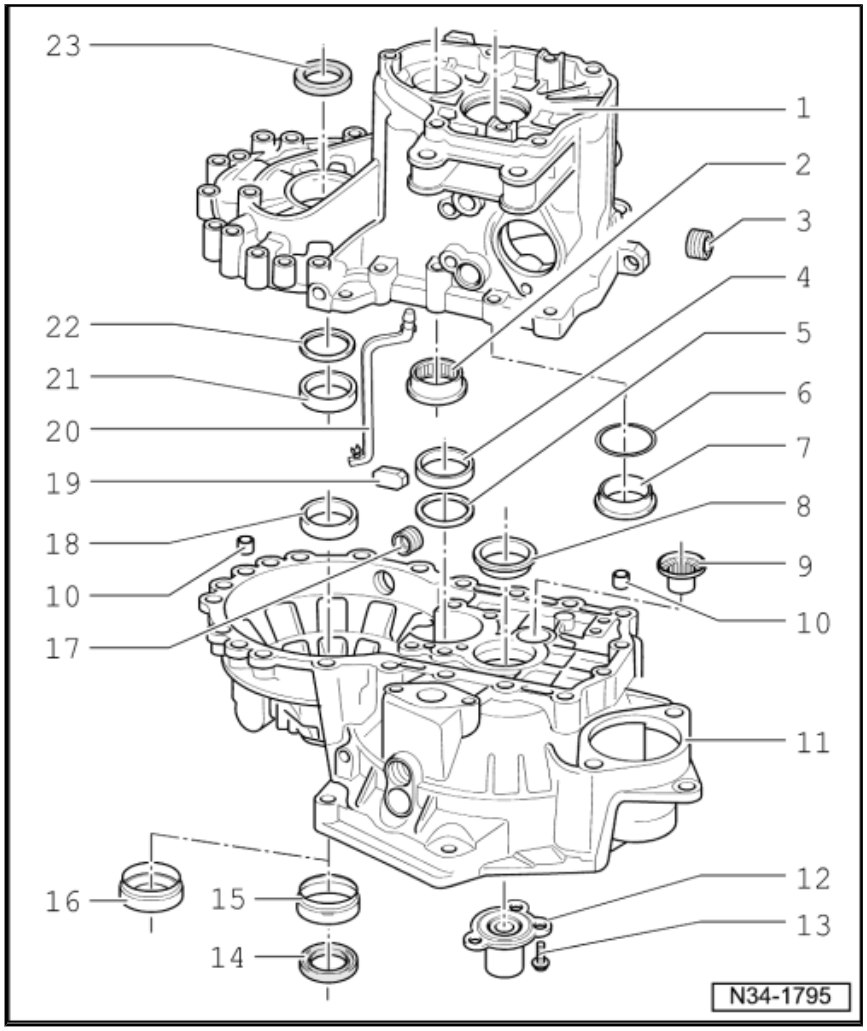


- Puller -VW 228 B- (is not required for this gearbox)
- Drift -VW 222 A- (not required with this gearbox)
- Assembly device -3066- (Spindle from assembly device)
- Thrust piece -3124- (for two-part seal and sleeve) Differentiation ⇒ page 185
- Multipurpose tool -VW 771- (for one-piece seal and sleeve) Differentiation ⇒ page 185
- Extractor hooks - VW 771/37- (for one-piece seal and sleeve) Differentiation ⇒ page 185



- Thrust piece -T10148- (for one-piece seal and sleeve) Differentiation ⇒ page 185





1 - Gearbox housing

- ❑ If renewed: adjust input shaft and differential ⇒ page 192

2 - Needle bearing

- ❑ For output shaft
- ❑ Removing ⇒ page 135
- ❑ Installing and securing ⇒ page 136 .

3 - Oil filler plug, 30 Nm

- ❑ The oil level cannot be checked by removing the oil filler plug
- ❑ If the gearbox was dismantled, it must be filled prior to installation

Capacity ⇒ page 1 .

4 - Tapered roller bearing outer race

- ❑ For output shaft
- ❑ Removing and installing ⇒ page 163
- ❑ If replaced: Adjust output shaft ⇒ page 176 .

5 - Shim

- ❑ For output shaft
- ❑ Adjustment overview ⇒ page 192

6 - Shim

- ❑ For input shaft
- ❑ Adjustment overview ⇒ page 158

7 - Tapered roller bearing outer race

- ❑ For input shaft
- ❑ Removing and installing ⇒ page 150
- ❑ If renewed: adjust input shaft ⇒ page 158

8 - Tapered roller bearing outer race

- ❑ For input shaft
- ❑ Removing and installing ⇒ page 150
- ❑ If renewed: adjust input shaft ⇒ page 158

9 - Needle bearing

- ❑ Removing and installing ⇒ page 181

10 - Dowel sleeve

- ❑ Qty. 2

11 - Clutch housing

- ❑ When renewing, ⇒ adjustment overview ⇒ page 192

12 - Guide sleeve

- ❑ With input shaft seal and vulcanised O-ring
- ❑ Driving out oil seal ⇒ page 136 .
- ❑ Driving in oil seal ⇒ page 136 .

- ❑ Remove guide sleeve to change oil seal
- ❑ If O-ring is damaged, renew guide sleeve and O-ring together

13 - Socket head bolt, 20 Nm

- ❑ Self-locking
- ❑ Always renew

14 - Seal

- ❑ Renew

15 - Sleeve

- ❑ For seal ⇒ Item 14 (page 135) .
- ❑ Removing ⇒ page 136
- ❑ Installing ⇒ page 137

16 - One-piece seal and sleeve

- ❑ If seal is damaged, renew seal and sleeve together
- ❑ Removing ⇒ page 137
- ❑ Installing ⇒ page 137

17 - Oil drain plug, 30 Nm

18 - Tapered roller bearing outer race

- ❑ For differential
- ❑ Removing and installing ⇒ page 193
- ❑ If renewed, adjust differential ⇒ page 200

19 - Magnet

- ❑ Held in place by housing joint surface

20 - Oil collector

- ❑ Installing oil collector in gearbox housing ⇒ page 137

21 - Tapered roller bearing outer race

- ❑ For differential
- ❑ Removing and installing ⇒ page 193
- ❑ If renewed, adjust differential ⇒ page 200

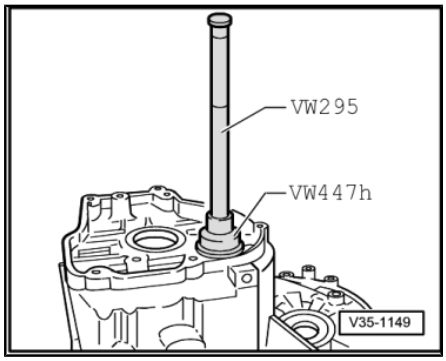
22 - Shim

- ❑ For differential
- ❑ Adjustment overview ⇒ page 192

23 - Seal

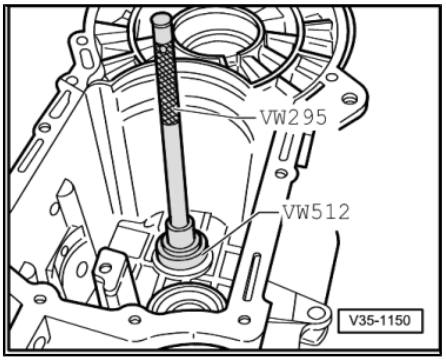
- ❑ Renewing ⇒ page 184

Driving out needle roller bearing

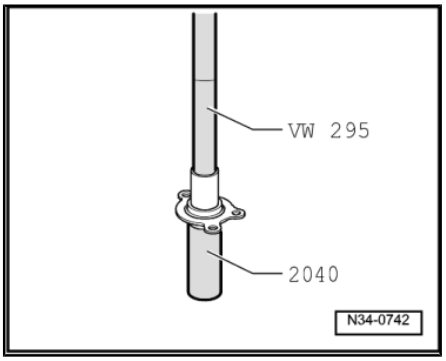


Driving needle bearing in to stop

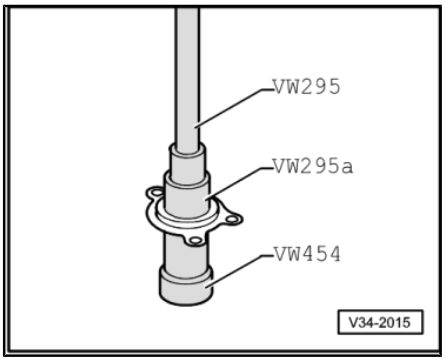
– Secure needle bearing in gearbox housing at three points (120° offset) using a punch.



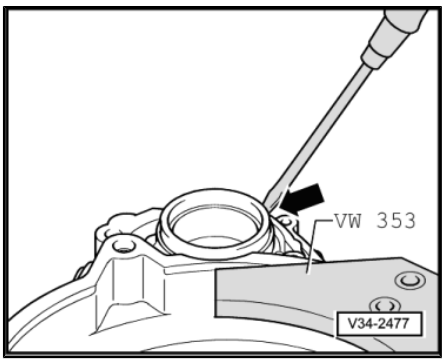
Driving oil seal out of guide sleeve



Driving oil seal into guide sleeve to stop



Levering out sleeve -arrow- using screwdriver

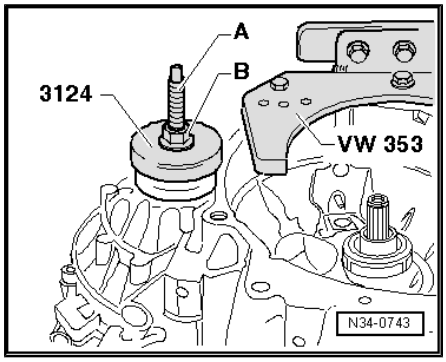


Pulling in sleeve

– Clean sleeve seat in gearbox.

– Screw spindle -A- of assembly device -3066- into threaded piece of differential.

– Pull sleeve in to stop using thrust piece -3124- by turning nut -B-.



Note

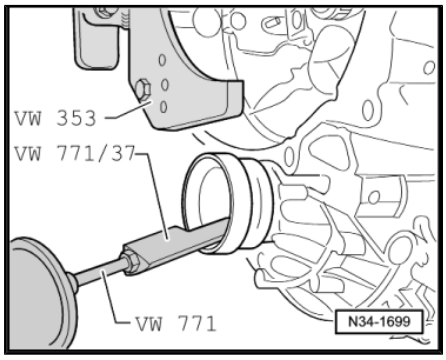
With gearbox dismantled, press sleeve in to stop using thrust piece -3124- .

Pulling out sleeve and seal

There is a shoulder in the inner diameter of the sleeve.

– To pull out seal and sleeve, apply extractor hooks -VW 771/37- behind shoulder in sleeve.

– Press extractor hooks -VW 771/37- forcefully into sleeve while pulling.

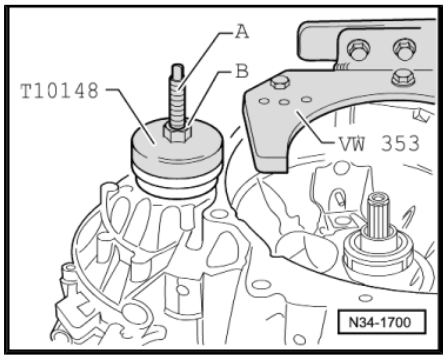


Pulling in sleeve and seal

– Clean seat for seal in gearbox.

– Screw spindle -A- of assembly device -3066- into threaded piece of differential.

– Pull sleeve in to stop using thrust piece -T10148- by turning nut -B-.

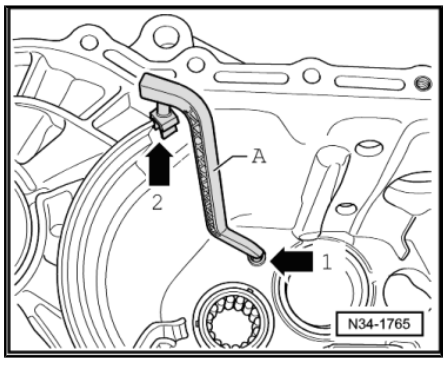


Note

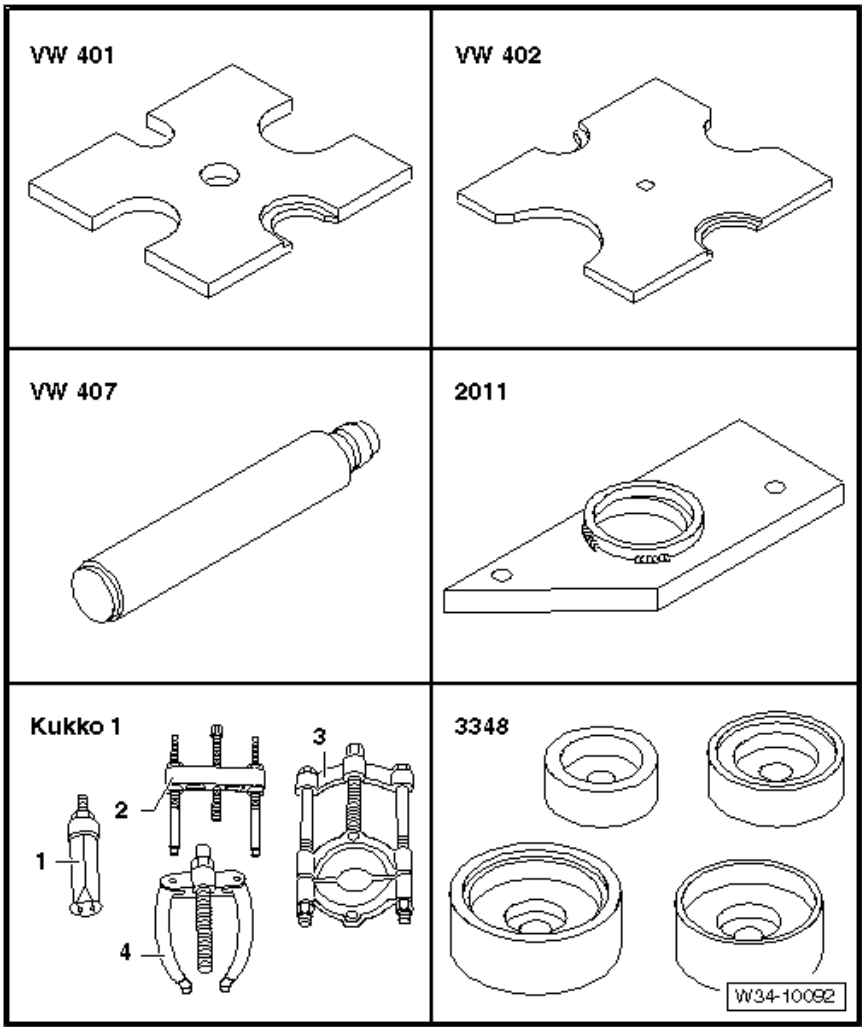
With gearbox dismantled, press sleeve in to stop using thrust piece -T10148- .

Installing oil collector -A- in gearbox housing

– Insert oil collector in hole -arrow 1- and groove -arrow 2- simultaneously.



7 Repairing gearbox housing cover



Special tools and workshop equipment required

- Pressure plate -VW 401-
- Pressure plate -VW 402-
- Press tool -VW 407-
- Support bridge -2011-
- Internal puller -1 - Kukko 21/5-
- Counter support -4 - Kukko 22/1-
- In addition from gearbox date 21 08 6, assembly tool -3348/2-

1 - Cylindrical roller bearing

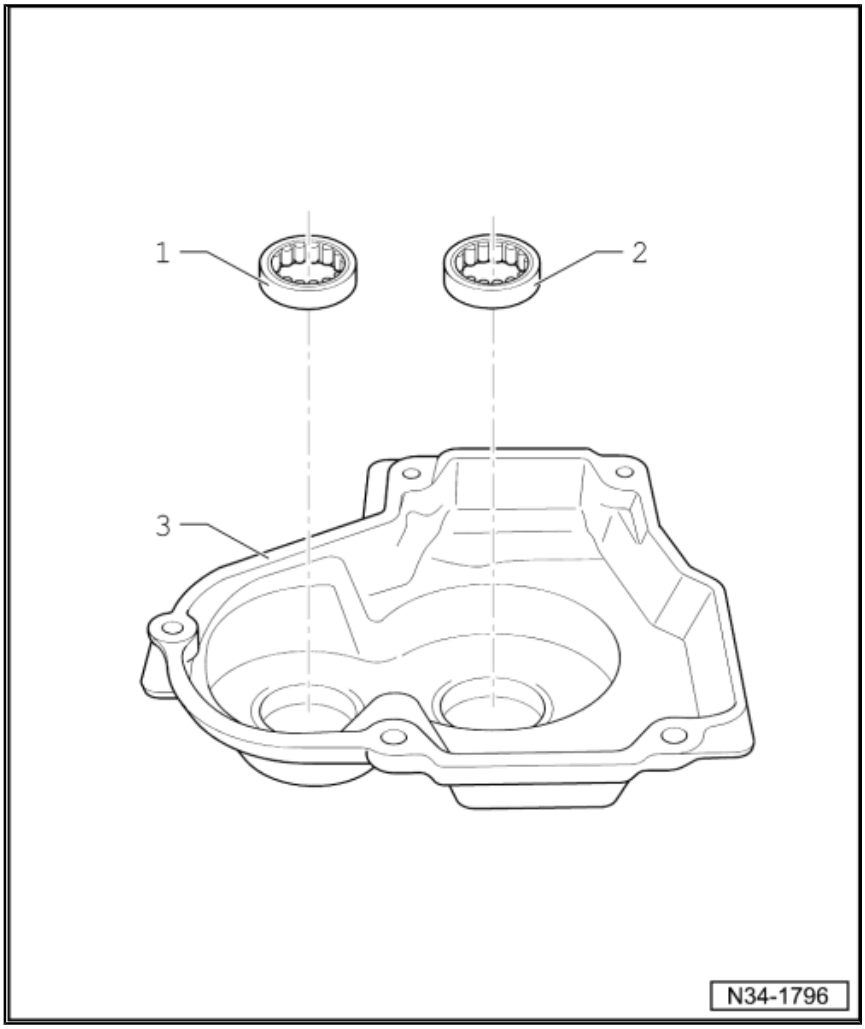
- ❑ For output shaft
- ❑ Do not interchange with cylindrical roller bearing for input shaft
- ❑ Pulling out ⇒ page 139
- ❑ Larger diameter from gearbox date 21 08 6 ⇒ page 140
- ❑ Pressing in through gearbox date 20 08 6: ⇒ page 140
- ❑ Pressing in from gearbox date 21 08 6: ⇒ page 140
- ❑ Locking ⇒ page 141

2 - Cylindrical roller bearing

- ❑ For input shaft
- ❑ Do not interchange with cylindrical roller bearing for output shaft
- ❑ Pulling out ⇒ page 140
- ❑ Larger diameter from gearbox date 21 08 6 ⇒ page 140
- ❑ Pressing in through gearbox date 20 08 6: ⇒ page 140
- ❑ Pressing in from gearbox date 21 08 6: ⇒ page 140
- ❑ Locking ⇒ page 141

3 - Gearbox housing cover

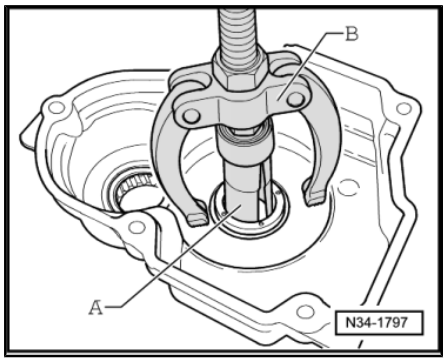
- ❑ Cylindrical roller bearings modified from gearbox date 21 08 6 ⇒ page 140



Pulling cylindrical roller bearing out of gearbox housing cover

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

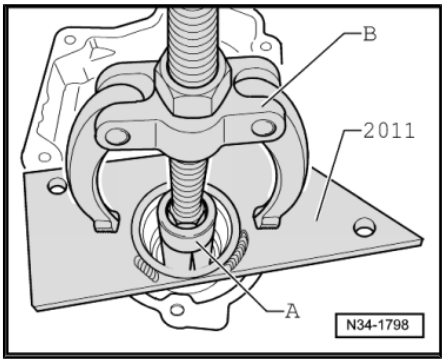
B - Counter support , e.g. -Kukko 22/1-



Pulling cylindrical roller bearing out of gearbox housing cover

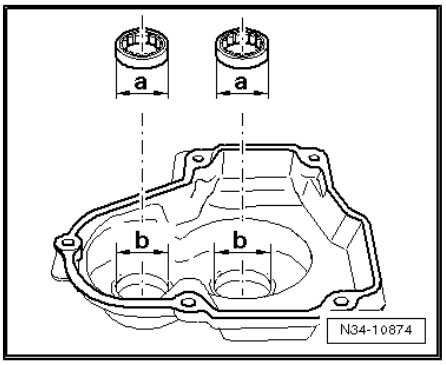
A - Internal puller, 30 … 37 mm , e.g. -Kukko 21/5-

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



Allocation of cylindrical roller bearings

Gearbox manufacture date	Dim. “a” mm	Dim. “b” mm
Through 20 08 6	43	43
From 21 08 6	47	47



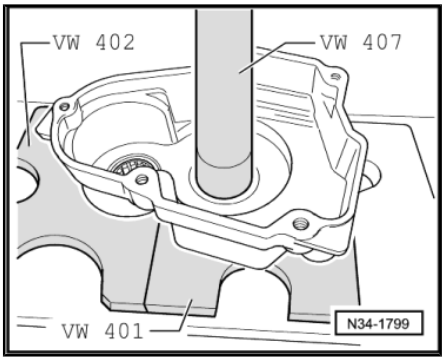
Pressing cylindrical roller bearing into gearbox housing cover - through gearbox date 20 08 6

– Heat gearbox housing cover with hot air blower -V.A.G 1416- in vicinity of bearing seat to about 100° C.

– Insert cylindrical roller bearing in heated housing and press in using workshop press until heat exchange has taken place.

Note

Cylindrical roller bearings must be pressed into cover to stop.



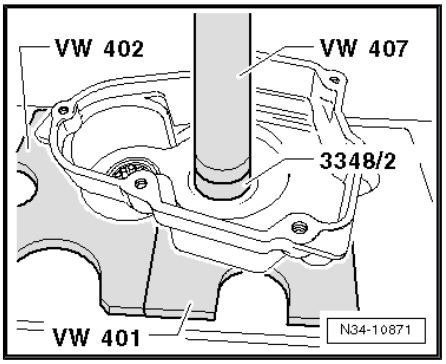
Pressing cylindrical roller bearing into gearbox housing cover - from gearbox date 21 08 6

– Heat gearbox housing cover with hot air blower -V.A.G 1416- in vicinity of bearing seat to about 100° C.

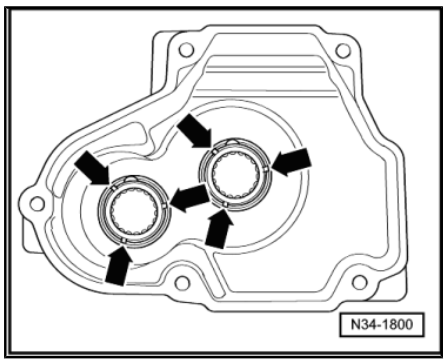
– Insert cylindrical roller bearing in heated housing and press in using workshop press until heat exchange has taken place.

Note

Cylindrical roller bearings must be pressed into cover to stop.



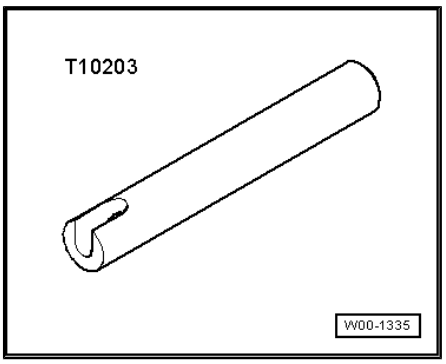
Secure cylindrical roller bearing in gearbox housing cover by peening -arrows-.



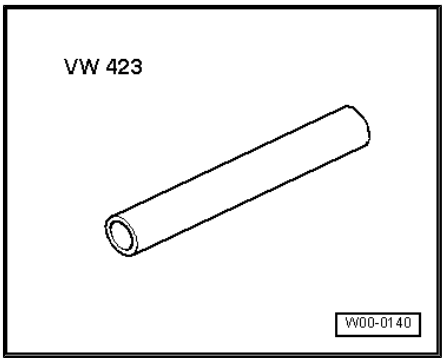
8 Repairing selector unit

Special tools and workshop equipment required

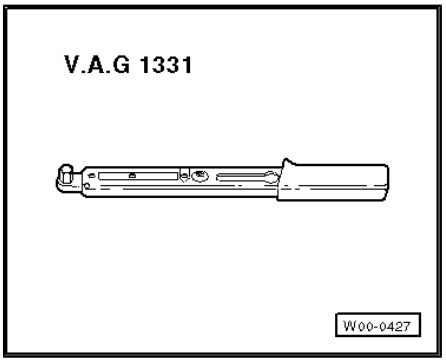
- Tube -T10203-

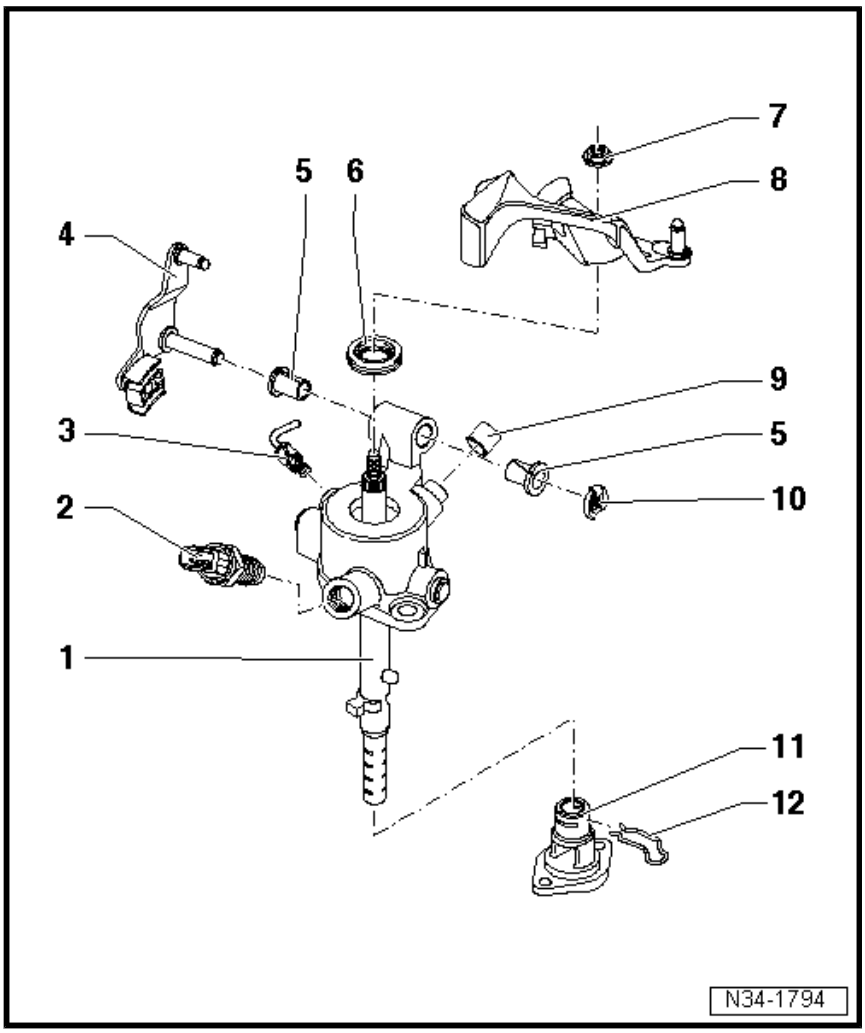


- Tube -VW 423-



- Torque wrench -V.A.G 1331-





1 - Selector unit

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

2 - -Schalter für Rückfahrleuchten- -F4-

- ❑ Tighten to 20 Nm
- ❑ Lightly coat lug with MoS_2 grease

3 - Angled rod

- ❑ For adjusting selector mechanism
- ❑ Removing ⇒ page 144
- ❑ Pressing in ⇒ page 144

4 - Relay lever

- ❑ Installation position ⇒ page 72
- ❑ From 05.07, plastic relay lever ⇒ page 73

5 - Bearing bush

- ❑ Not required for plastic relay lever

6 - Seal

- ❑ Lever out with a screwdriver
- ❑ Installing ⇒ page 144

7 - Hexagon nut, 23 Nm

- ❑ Self-locking
- ❑ Always renew

8 - Gearbox selector lever

- ❑ Install so that master spline aligns with selector shaft
- ❑ Can be renewed with the selector mechanism installed
- ❑ Installation position ⇒ page 72

9 - Cap

- ❑ For gearbox breather

10 - Securing clip

- ❑ Not required for plastic relay lever

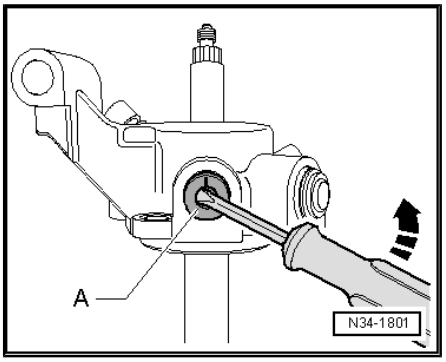
11 - Cover plate

12 - Spring

- ❑ Not fitted in all gearboxes

Removing angled rod -A- from selector shaft cover

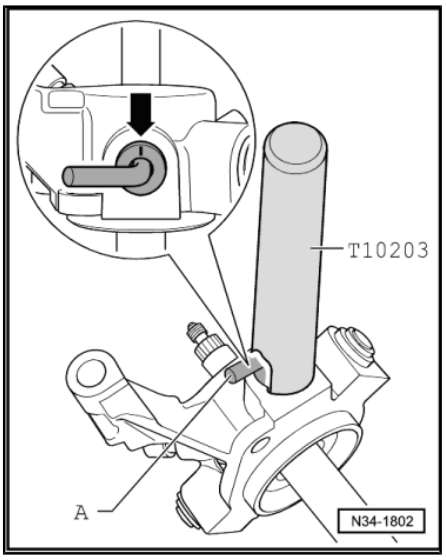
– Remove outer part of angled rod.
– Then carefully lever out angled rod using a screwdriver.



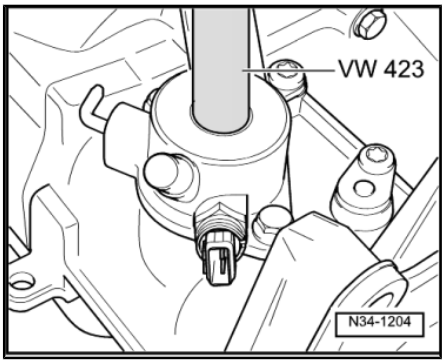
Pressing angled rod -A- into selector shaft cover

Installation position:

Marking -arrow- points to upper part of selector shaft.



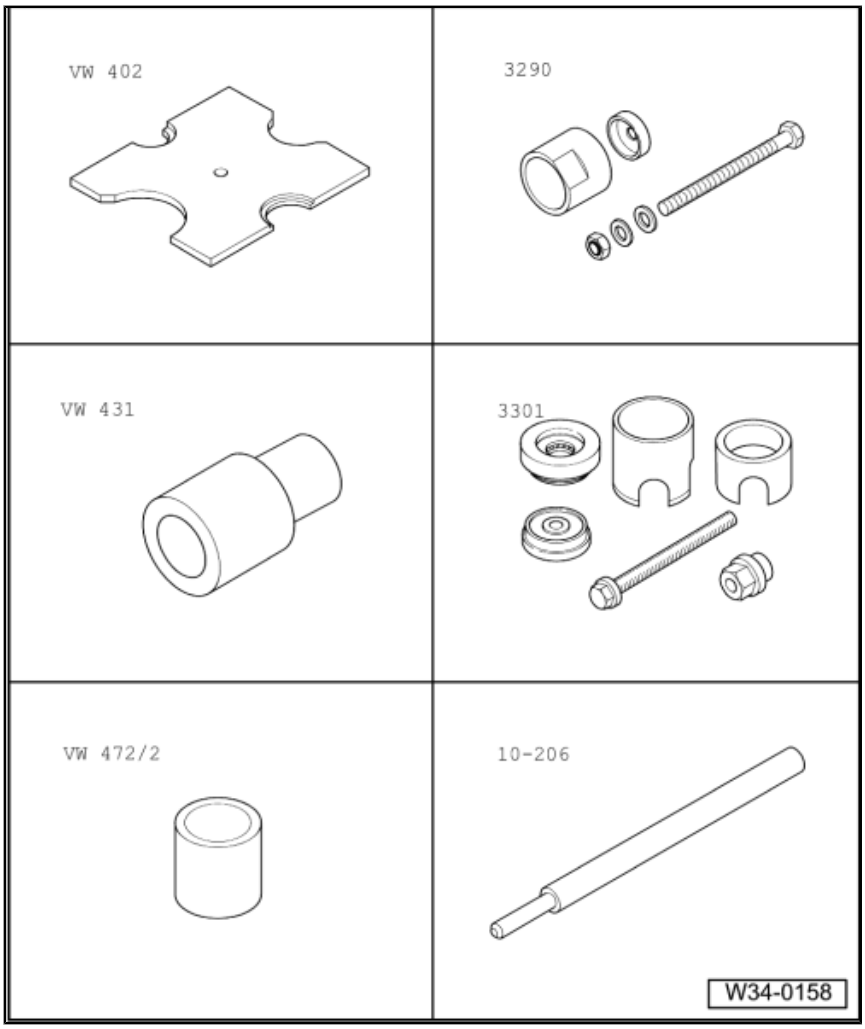
Inserting oil seal to stop



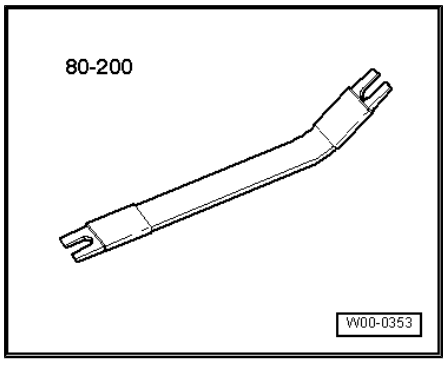
9 Dismantling and assembling selector forks

Special tools and workshop equipment required

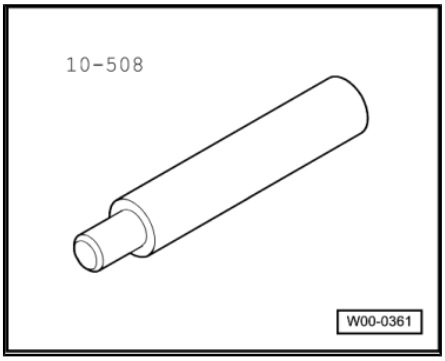
- Pressure plate -VW 402-
- Thrust piece -3290/1-
- Assembly tool -3301-
- Thrust piece -VW 431-
- Spacer sleeve -VW 472/2-
- Drift -10 - 206-



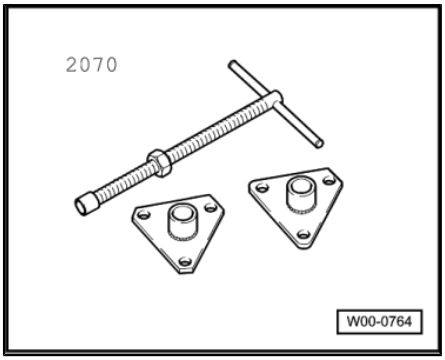
- Removal lever -80–200-



♦ Drift -10 - 508-

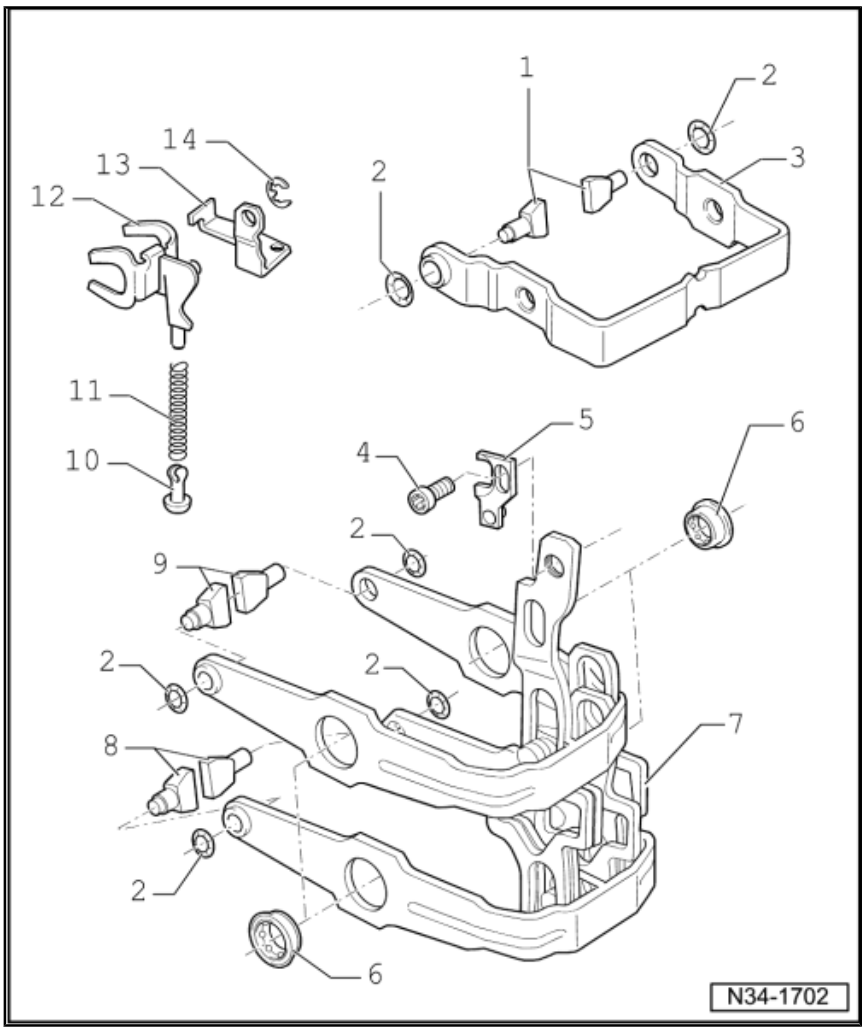


♦ Clamp -2070-



Note

It is not necessary to dismantle the selector fork group (⇒ Item 7 (page 147)) in order to remove and install selector segments, lock washers and angular contact ball bearings.



1 - Selector segment for 5th and 6th gears

- ❑ Identification ⇒ page 148
- ❑ After lock washer is installed, selector segment must still rotate freely.

2 - Lock washer

- ❑ Always renew
- ❑ Removing ⇒ page 148
- ❑ Installing ⇒ page 148

3 - Selector fork for 5th and 6th gears

- ❑ Adjusting ⇒ page 131

4 - Bolt, 25 Nm

5 - Selector jaw for 5th and 6th gears

6 - Angular contact ball bearing

- ❑ Qty. 4
- ❑ Removing ⇒ page 148
- ❑ Press inner race into outer race ⇒ page 149
- ❑ Installing ⇒ page 149

7 - Selector fork group with selector plate

8 - 1st/2nd gear selector segment

- ❑ Identification ⇒ page 148
- ❑ After lock washer is installed, segment must still rotate freely

9 - Selector segment for 3rd and 4th gear

- ❑ Identification ⇒ page 148
- ❑ After lock washer is installed, segment must still rotate freely

10 - Sliding piece

11 - Spring

12 - Selector fork for reverse gear

13 - Support for reverse gear selector fork

14 - Retaining ring

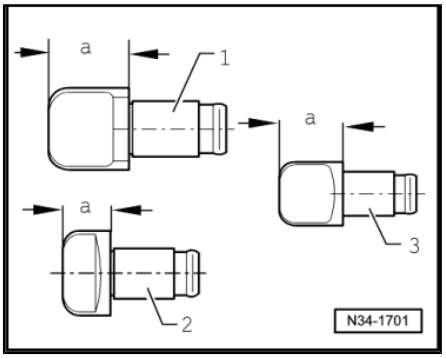
Identifying selector segments

Dimension -a-

1 - 1st and 2nd gear selector segments = 11.4 mm

2 - 3rd and 4th gear selector segments = 7.7 mm

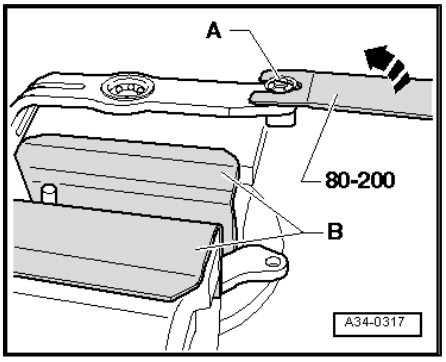
3 - 5th and 6th gear selector segments = 12.1 mm



Removing lock washer

– Clamp selector fork in vice with protective jaw covers -B-.

– Lever off lock washer -A- in -direction of arrow-.



Installing lock washer

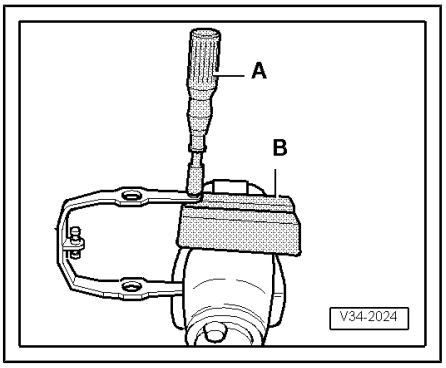
– Press lock washer into groove of selector segment using socket and spinner handle.

Note

After lock washer is installed, selector segment must still rotate freely.

-A- Spinner handle with 10 mm socket

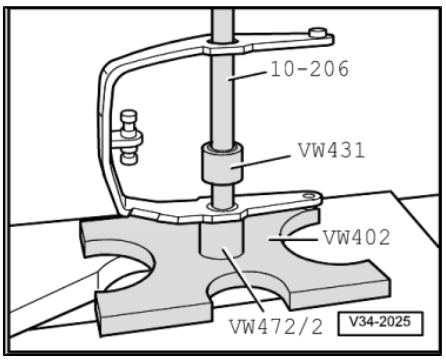
-B- Vice jaw protectors



Removing angular contact ball bearing

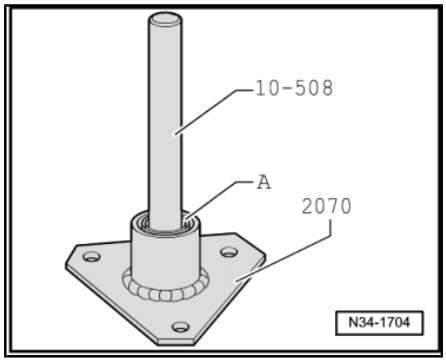
Note

When removing and installing angular contact ball bearing, do not bend selector forks.



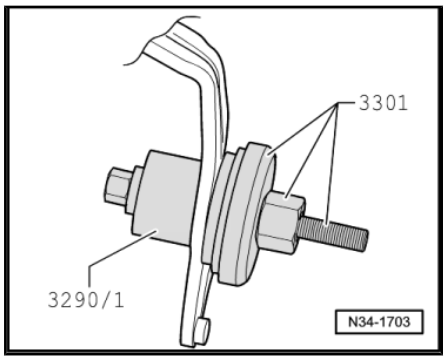
Pressing inner race -A- of angular contact ball bearing into outer race

Inner race must engage in outer race.



Pulling angular contact ball bearing into selector fork to stop

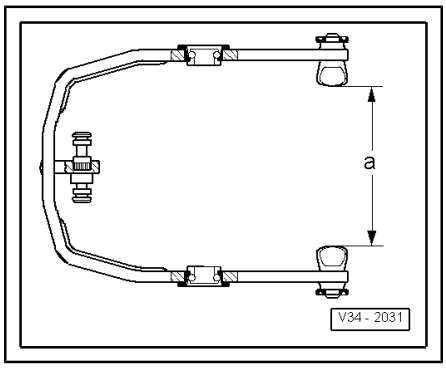
Depression in thrust piece -3290/1- faces ball bearing.



Selector fork with selector segments installed

	Dim. -a- (mm)
1st/2nd gear selector fork	87.2 … 87.4
3rd/4th gear selector fork	93.6 … 93.8

Selector segment assignment ⇒ page 148 .



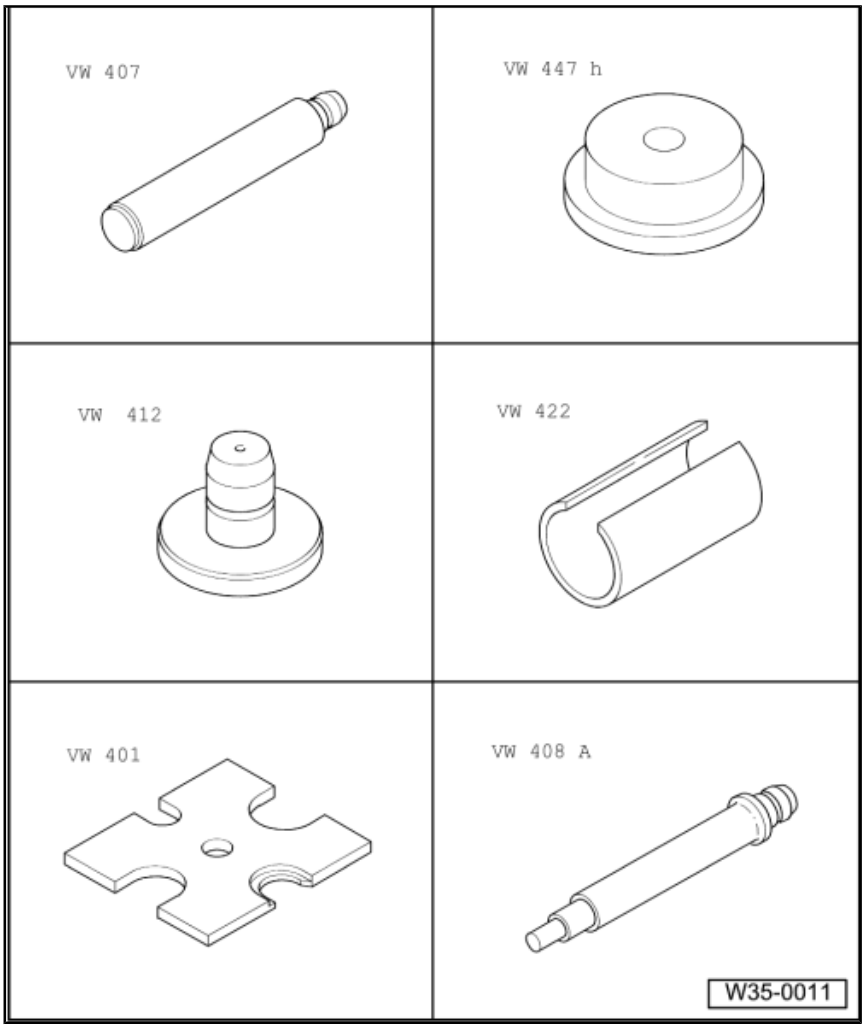
35 – Gears, shafts

1 Input shaft

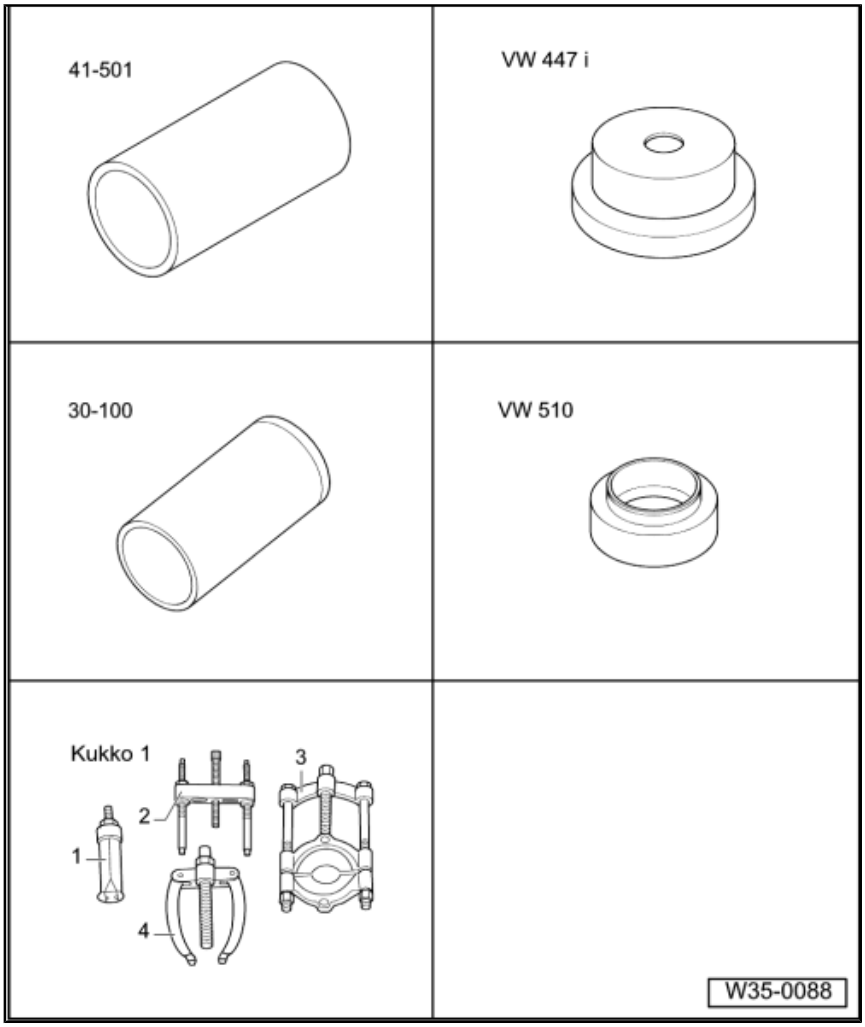
1.1 Dismantling and assembling input shaft

Special tools and workshop equipment required

- Press tool -VW 407-
- Thrust pad -VW 447 H-
- Press tool -VW 412-
- Tube -VW 422-
- Pressure plate -VW 401-
- Pressure plate -VW 402-
- Press tool -VW 408 A-

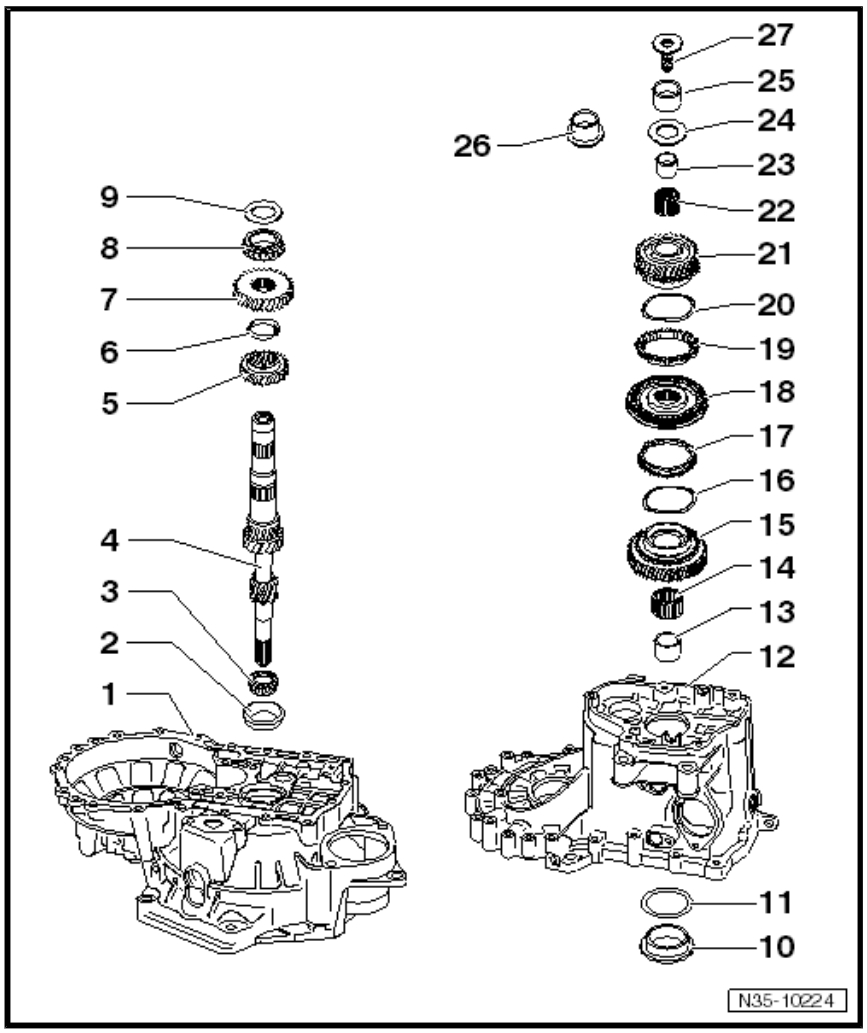


- Drift sleeve -41 - 501-
- Thrust pad -VW 447 i-
- Drift sleeve -30 - 100-
- Thrust pad -VW 510-
- Splitter -3 - Kukko 17/1-



Note

- *When installing new gears, refer to ⇒ Electronic parts catalogue "ETKA" and technical data ⇒ page 1 .*
- *If the position of the tapered roller bearings is affected when parts are exchanged, the input shaft must be readjusted. See adjustment overview ⇒ page 192 .*



1 - Clutch housing

2 - Tapered roller bearing outer race

- ❑ Pressing out ⇒ page 154
- ❑ Pressing in ⇒ page 154

3 - Tapered roller bearing inner race

- ❑ Pressing off ⇒ page 154
- ❑ Pressing on ⇒ page 154

4 - Input shaft

- ❑ Adjusting ⇒ page 158

5 - Gear wheel for 3rd gear

- ❑ Installation position: shoulder faces 4th gear
- ❑ Pressing off ⇒ page 155
- ❑ Pressing on ⇒ page 155

6 - Retaining ring

- ❑ Always renew

7 - Gear wheel for 4th gear

- ❑ Pressing off with tapered roller bearing outer race and sleeve ⇒ page 155
- ❑ Pressing on ⇒ page 155
- ❑ Collar faces 3rd gear

8 - Tapered roller bearing inner race

- ❑ Pressing off with 4th gear wheel and sleeve ⇒ page 155 .
- ❑ Pressing on ⇒ page 156

9 - Thrust washer

10 - Tapered roller bearing outer race

- ❑ Pressing out ⇒ page 156
- ❑ Pressing in ⇒ page 156

11 - Shim

- ❑ Determining thickness ⇒ page 158

12 - Gearbox housing

13 - Sleeve

- ❑ For needle bearing
- ❑ Press off with gear wheel for 4th gear and tapered roller bearing inner race ⇒ page 155
- ❑ Pressing on ⇒ page 156
- ❑ Set thrust washer ⇒ Item 9 (page 152) in place before installing

14 - Needle bearing

15 - Synchromeshed gear for 5th gear

16 - Wave spring washer

- From gearbox date 26 05 8
- Allocate according to ⇒ Electronic parts catalogue “ETKA”

17 - Synchro-ring for 5th gear

- With cast locking pieces ⇒ page 127
- Check for wear ⇒ page 127

18 - Locking collar with synchro-hub for 5th and 6th gears

- Pull off individually ⇒ page 109
- Pull off together with gearbox housing ⇒ page 115
- Dismantling and assembling ⇒ page 157 and ⇒ page 157
- From gearbox date 12 06 6, locking collar modified ⇒ Item 18 (page 105)
- Adjusting 5th and 6th gears, from gearbox date 12 06 6 ⇒ page 131
- Adjusting 5th and 6th gears, through gearbox date 11 06 6 ⇒ page 130
- Installation of springs with angled ends for locking pieces ⇒ page 158

19 - Synchro-ring for 6th gear

- With cast locking pieces ⇒ page 127
- Check for wear ⇒ page 127

20 - Wave spring washer

- From gearbox date 26 05 8
- Allocate according to ⇒ Electronic parts catalogue “ETKA”

21 - Synchromeshed gear for 6th gear ⇒ Item 15 (page 105)

22 - Needle bearing ⇒ Item 14 (page 105)

- For 6th gear
- Renew together with sleeve

23 - Sleeve ⇒ Item 13 (page 105)

- For 6th gear needle bearing.
- Renew together with needle bearing

24 - Thrust washer

- Through gearbox date 20 08 6

25 - Cylindrical roller bearing inner race

- Allocation ⇒ page 106
- Through gearbox date 20 08 6
- Mark before removing
- Do not interchange with cylinder roller bearing inner race of output shaft.

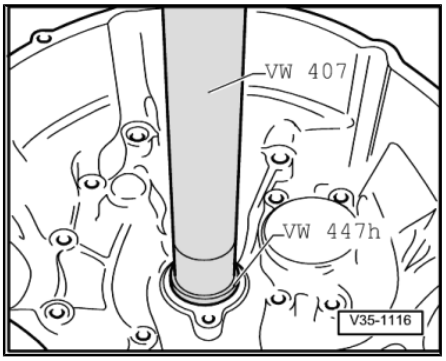
26 - Inner race for cylindrical roller bearing with thrust washer

- Allocation ⇒ page 106
- For input shaft
- From gearbox date 21 08 6

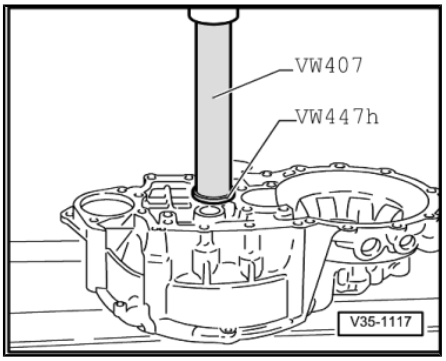
27 - Bolt ⇒ Item 9 (page 104)

- Allocation ⇒ page 106
- Self-locking
- Always renew

Pressing out tapered roller bearing outer race

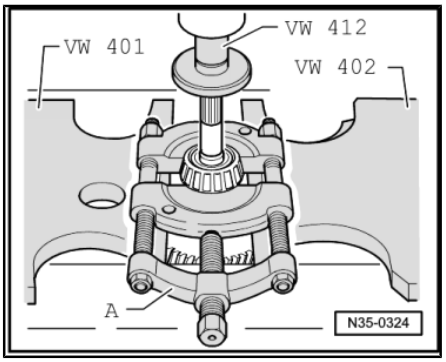


Pressing in tapered roller bearing outer race

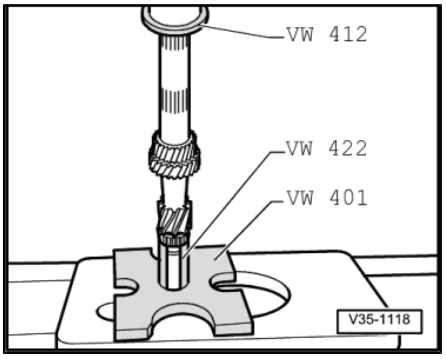


Pressing off tapered roller bearing inner race

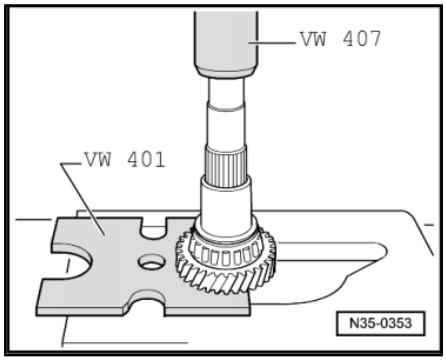
A - Splitter -Kukko 17/1-



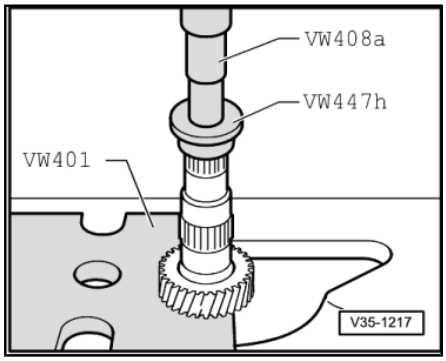
Pressing on tapered roller bearing inner race



Pressing off gear wheel for 4th gear with tapered roller bearing and sleeve

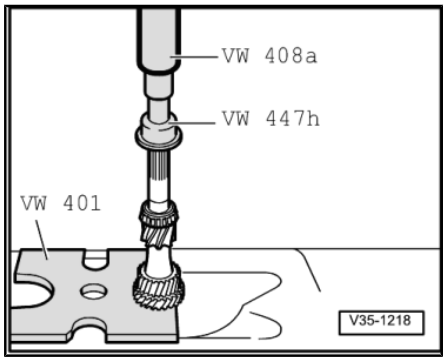


Pressing off gear wheel for 3rd gear



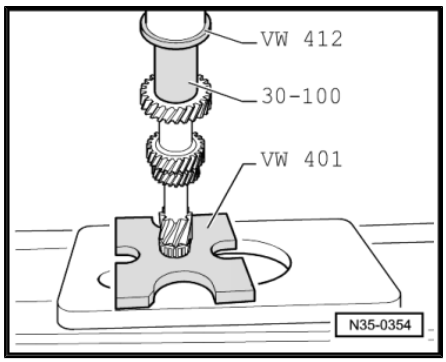
Pressing on gear wheel for 3rd gear

Shoulder faces 4th gear

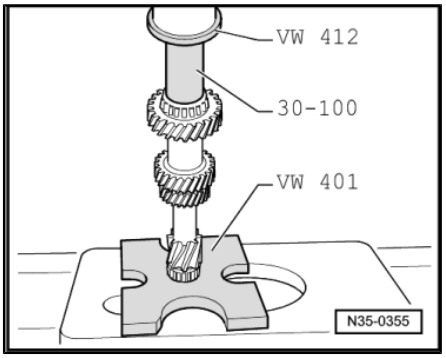


Pressing on gear wheel for 4th gear

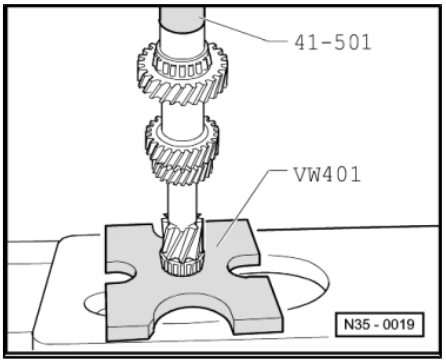
Shoulder faces 3rd gear



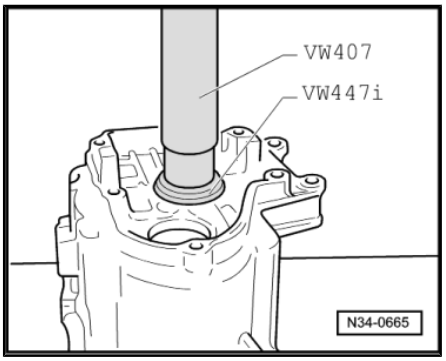
Pressing on tapered roller bearing inner race



Pressing on sleeve for needle bearing

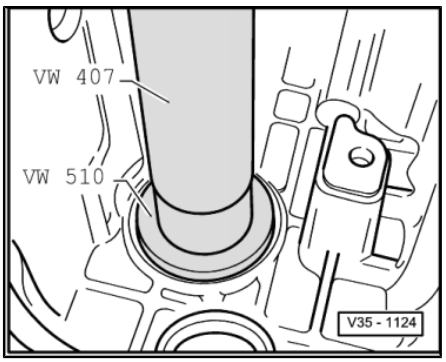


Pressing out tapered roller bearing outer race



Pressing in tapered roller bearing outer race

– Install with shim after adjusting input shaft.

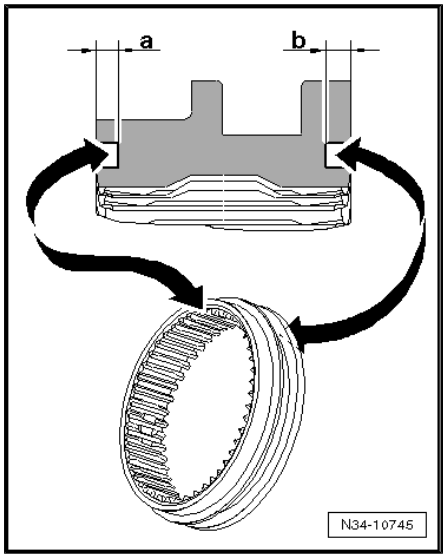


Deeper notches in both sides of locking collar for 5th and 6th gears -arrows- from gearbox date 12 06 6

Dimension -a- (6th gear side)	Through gearbox date 11 06 6	From gearbox date 12 06 6
	1.5 mm	1.8 mm

Dimension -b- (5th gear side)	Through gearbox date 11 06 6	From gearbox date 12 06 6
	1.5 mm	2.0 mm

– Allocate locking collar and synchro-hub for 5th and 6th gears according to ⇒ Electronic parts catalogue “ETKA” .



Due to the deeper notches, the adjustment procedure for 5th and 6th gears has been changed:

– Adjusting 5th and 6th gears to gearbox manufacture date 11 06 6 ⇒ page 130 .

– Adjusting 5th and 6th gears from gearbox manufacture date 12 06 6 ⇒ page 131 .

Dismantling and assembling locking collar and synchro-hub for 5th and 6th gears

1 - Spring

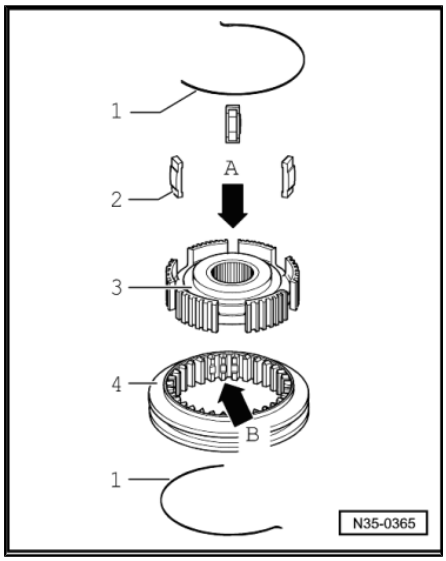
2 - Locking piece

3 - Synchro-hub

4 - Locking collar

– Slide locking collar over synchro-hub.

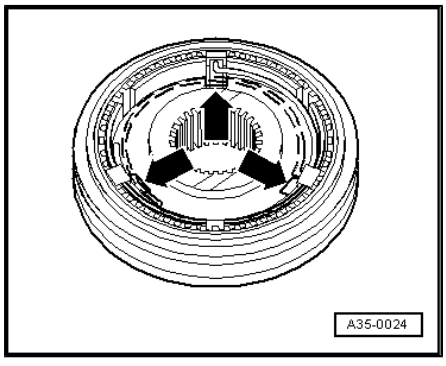
Deeper notches -arrow A- for locking pieces in synchro-hub and notches -arrow B- in locking collar must align.



Assembling locking collar and synchro-hub for 5th and 6th gears

• Locking collar has been pushed over synchro-hub.

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



Note

♦ *From gearbox date 26 05 8, a wave spring washer is installed below the synchro-ring for 5th gear and above the synchro-ring for 6th gear ⇒ Item 16 (page 152) and ⇒ Item 20 (page 153) .*

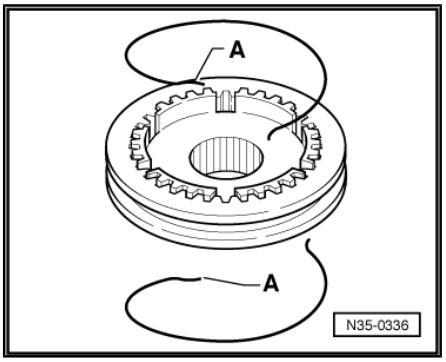
♦ *In this case, install only locking piece springs without angled ends (as shown in ⇒ page 157 - item 1).*

Installing springs with bent ends -A-

The modified springs are installed on both sides.

– Spring are installed only in conjunction with locking pieces which are hollow on the inner side.

– Insert locking pieces.



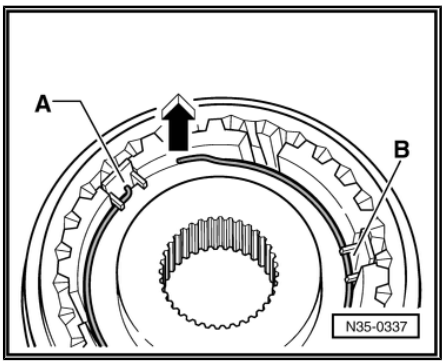
Installation position of springs

– Install springs offset 120°.

– Angled end -A- of spring must locate in hollow locking piece.

It must be located under shoulder -B- of locking piece.

Bent ends always face away from synchro-hub
-direction of arrow-.

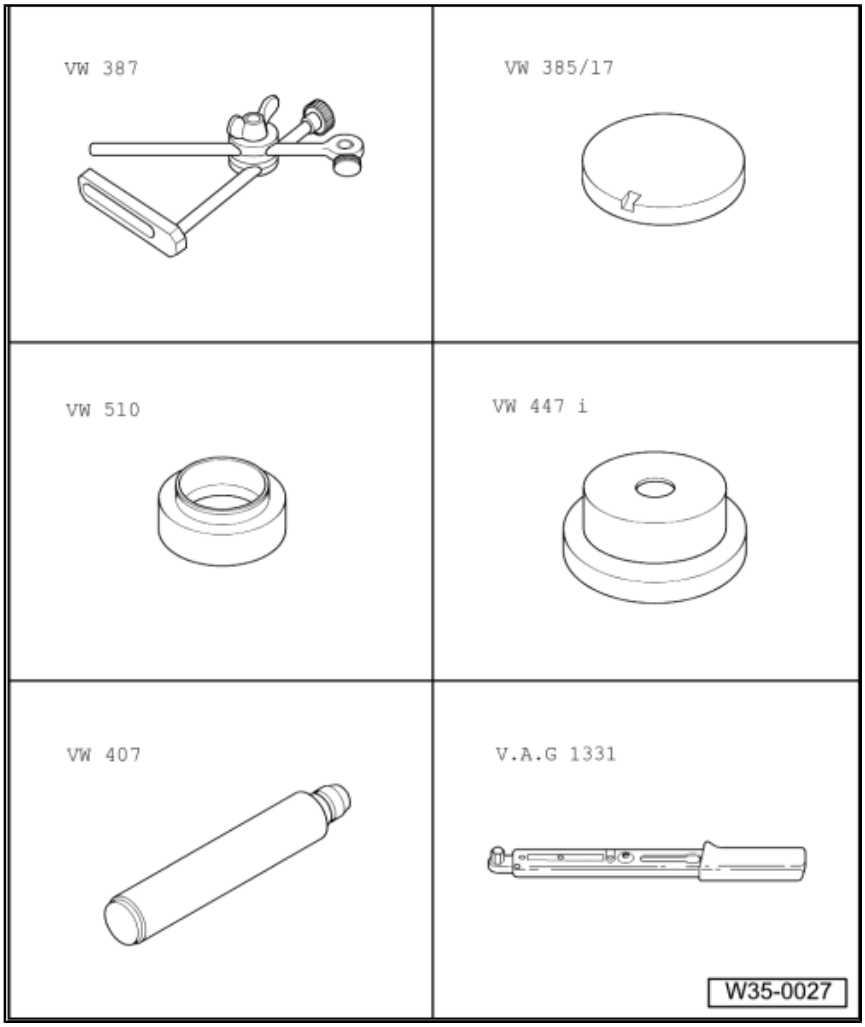


1.2 Adjusting input shaft

(Determining input shaft shim)

Special tools and workshop equipment required

- Universal dial gauge bracket -VW 387-
- End dimension plate - VW 385/17-
- Thrust pad -VW 510-
- Thrust pad -VW 447 i-
- Press tool -VW 407-
- Torque wrench -V.A.G 1331-
- Dial gauge



It is necessary to readjust the input shaft only when the following components are renewed:

- Gearbox housing
- Clutch housing
- Input shaft
- Gear wheel for 4th gear

or the

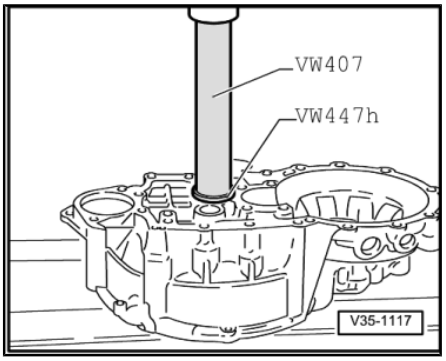
- Tapered roller bearing

Adjustment overview ⇒ page 192 .

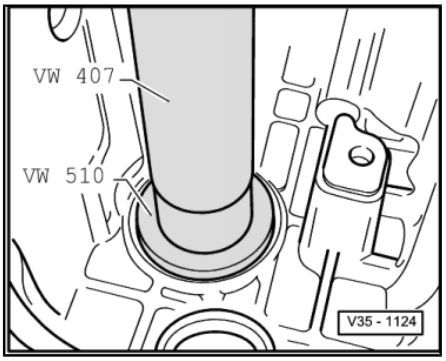
Requirement:

- Sealing surfaces of clutch and gearbox housings must be free of sealant.

– Press tapered roller bearing outer race into gearbox housing to stop.



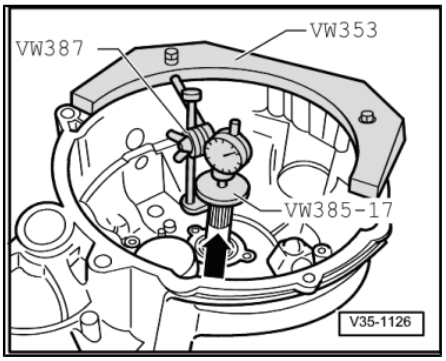
– Press tapered roller bearing outer race without shim into gearbox housing to stop.
– Install input shaft in clutch housing and set gearbox housing in place. Tighten hexagon head bolts to 25 Nm and then turn 90° further.



– Fit measuring appliance and dial gauge in clutch housing.
– Before taking any measurements, rotate input shaft to allow bearings to settle. Set dial gauge to “0” with 1 mm preload.

Note

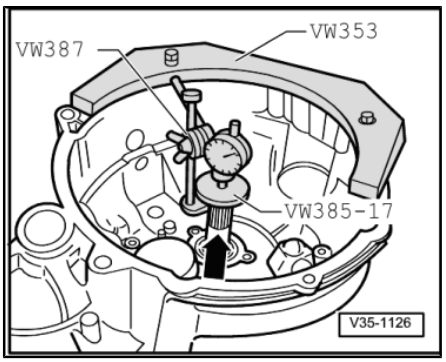
This step must be repeated for each subsequent measurement, or the dial gauge will not return to the starting position.



– Press input shaft in direction of dial gauge -direction of arrow-.
– Read and note play on dial gauge (example: 1.21 mm).

Note

Dial gauge does not return to original position.



1.2.1 Determining thickness of shim

Example:

Bearing play, measured value	Thickness of shim according to table
1.21 mm	1.175 mm

Table of shims

Bearing play	Shim
Measured value (mm)	**Thickness (mm)**
0.671…0.699	0.650
0.700…0.724	0.675
0.725…0.749	0.700
0.750…0.774	0.725
0.775…0.799	0.750
0.800…0.824	0.775
0.825…0.849	0.800
0.850…0.874	0.825
0.875…0.899	0.850
0.900…0.924	0.875
0.925…0.949	0.900
0.950…0.974	0.925
0.975…0.999	0.950
1.000…1.024	0.975
1.025…1.049	1.000
1.050…1.074	1.025
1.075…1.099	1.050
1.100…1.124	1.075
1.125…1.149	1.100
1.150…1.174	1.125
1175…1.199	1.150
1.200…1.224	1.175
1.225…1.249	1.200
1.250…1.274	1.225
1.275…1.229	1.250
1.300…1.324	1.275
1.325…1.349	1.300
1.350…1.374	1.325
1.375…1.399	1.350
1.400…1.424	1.375
1.425…1.449	1.400
1.450…1.474	1.425
1.475…1.499	1.450
1.500…1.524	1.475
1.525…1.549	1.500
1.550…1.574	1.525
1.575…1.599	1.550
1.600…1.624	1.575
1.625…1.649	1.600
1.650…1.674	1.625
1.675…1.699	1.650
1.700…1.724	1.675

Note

Allocate shims according to ⇒ Electronic parts catalogue "ETKA".

– Remove input shaft and press outer race of tapered roller bearing out of gearbox housing using thrust plate -VW 447 i- .

– Insert shims of determined thickness, thickest shim first.

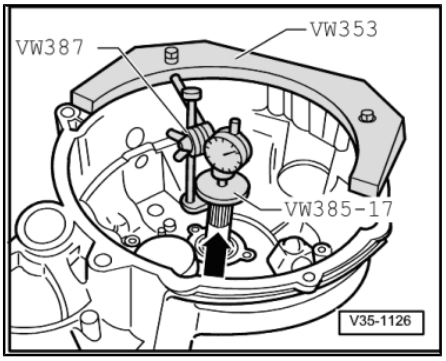
If the size of shim required is larger than those listed in the table, insert two shims totalling the correct figure.

– Press outer race of tapered roller bearing together with the shim (1.175 mm in example) into gearbox housing using thrust pad -VW 510- .

– Set gearbox housing in place and tighten hexagon head bolts to 25 Nm and then turn 90° further.

1.2.2 Carrying out check measurement

– Set up measuring appliance and dial gauge.
– Rotate input shaft so that tapered roller bearings settle.
– Press input shaft in -direction of arrow-.
– Bearing play should be min. 0.01 ... max. 0.09 mm.



Note

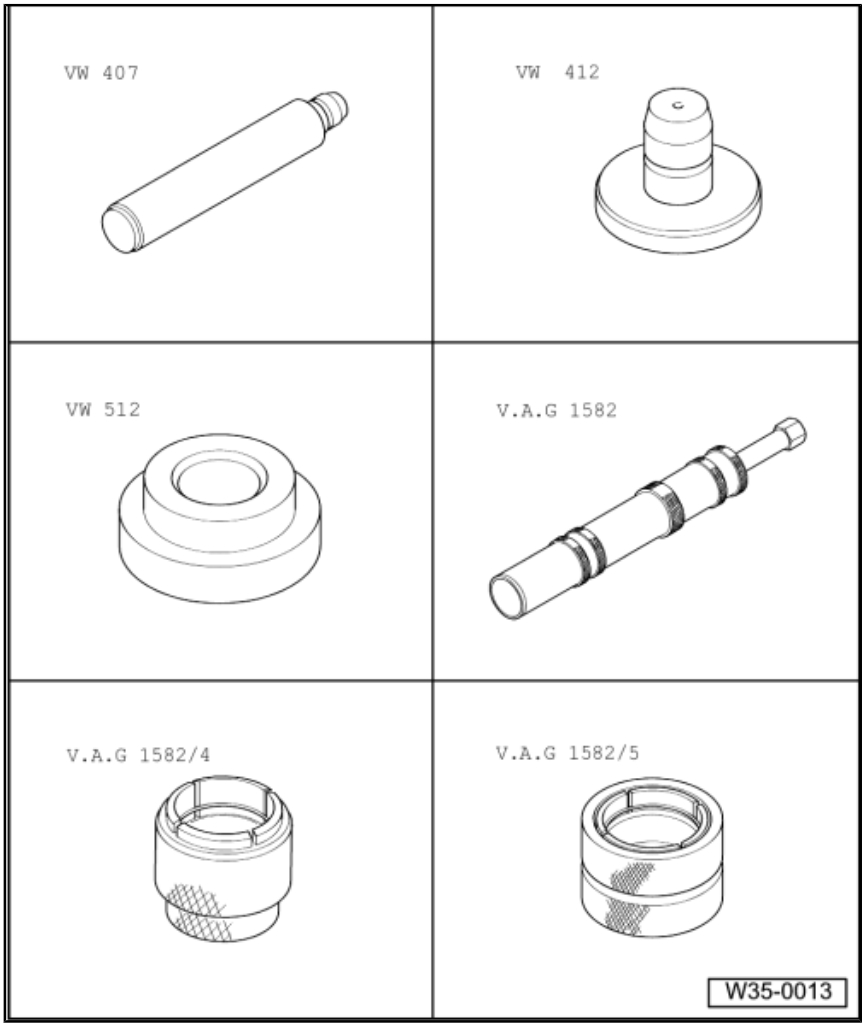
If the bearing play cannot be measured, but input shaft play is perceptible and the input shaft turns freely, the adjustment is acceptable.

2 Output shaft

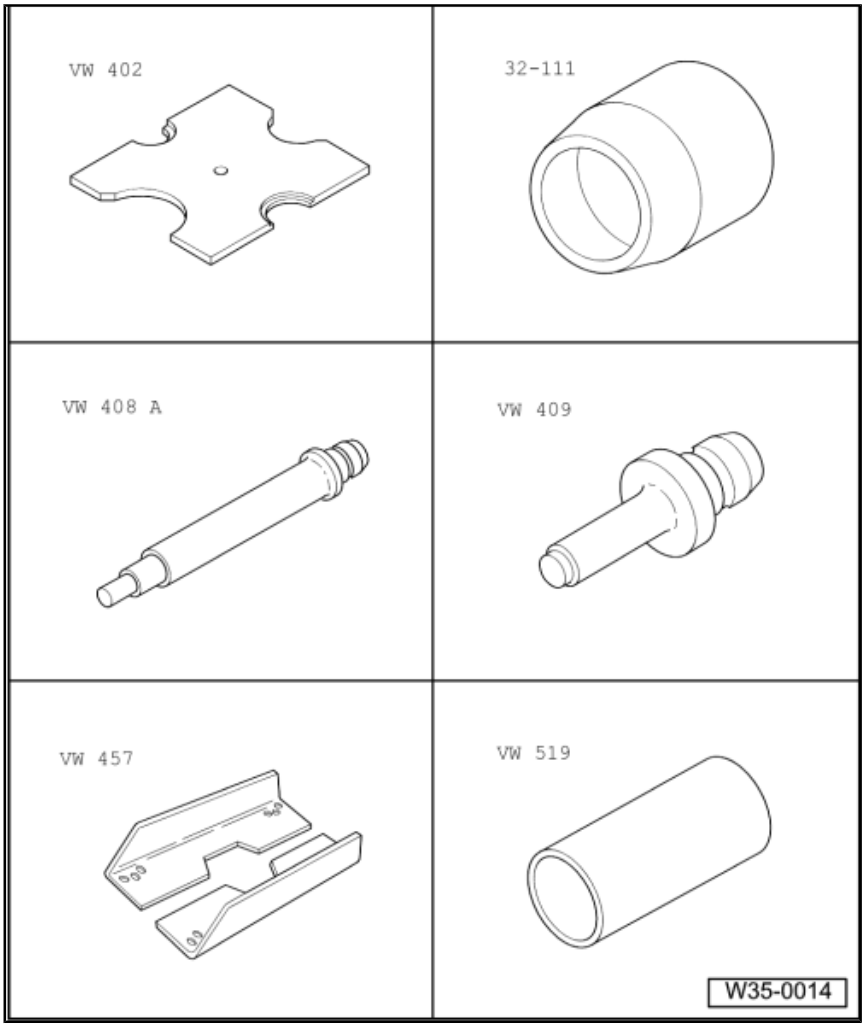
2.1 Dismantling and assembling output shaft

Special tools and workshop equipment required

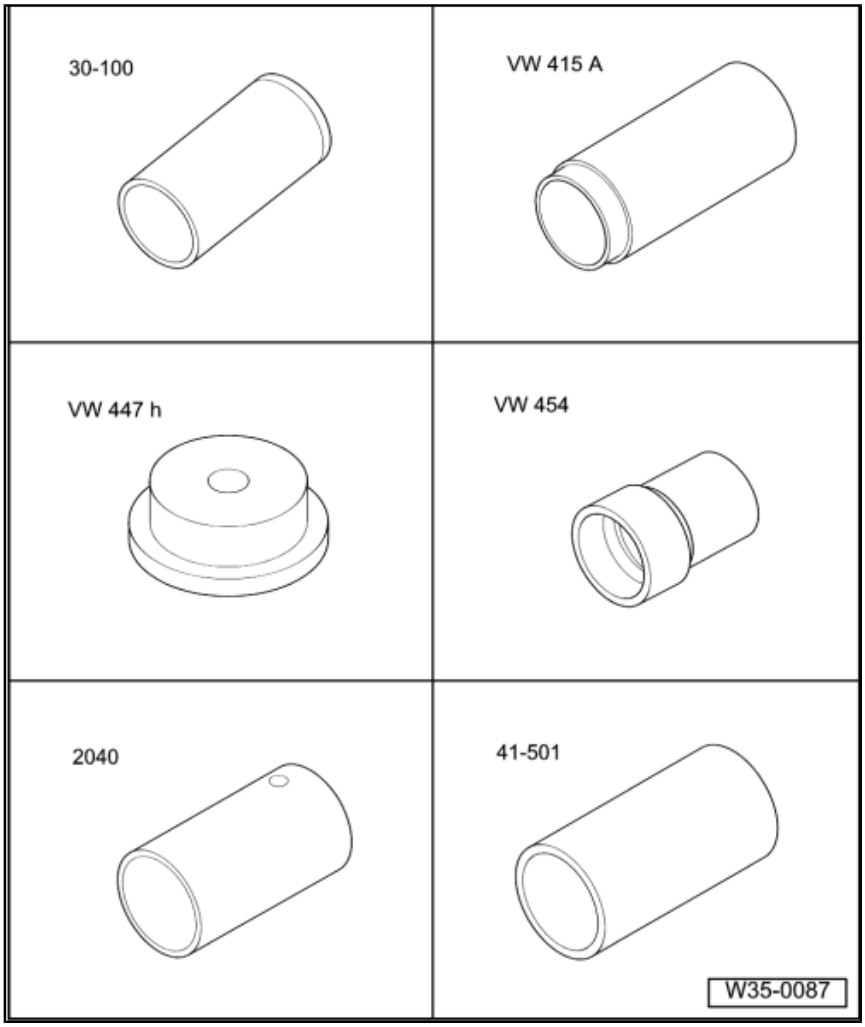
- Press tool -VW 407-
- Press tool -VW 412-
- Thrust pad -VW 512-
- Puller -V.A.G 1582-
- Adapter -V.A.G 1582/4-
- Adapter -V.A.G 1582/5-



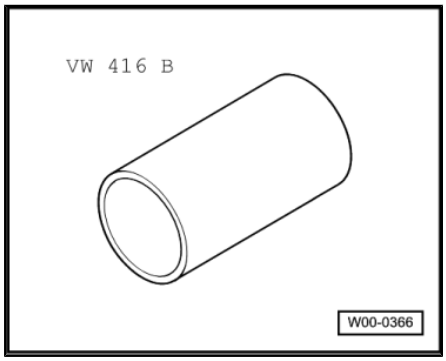
- Pressure plate -VW 402-
- Thrust piece -32 - 111-
- Press tool -VW 408 A-
- Press tool -VW 409-
- Support rails -VW 457-
- Tube -VW 519-



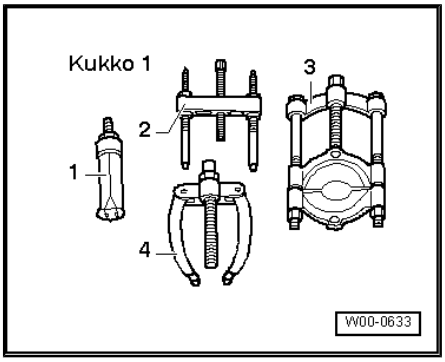
- Drift sleeve -30 - 100-
- Tube -VW 415 A-
- Thrust pad -VW 447 H-
- Thrust piece -VW 454-
- Tube -2040-
- Drift sleeve -41 - 501-



- Tube -VW 416 B-



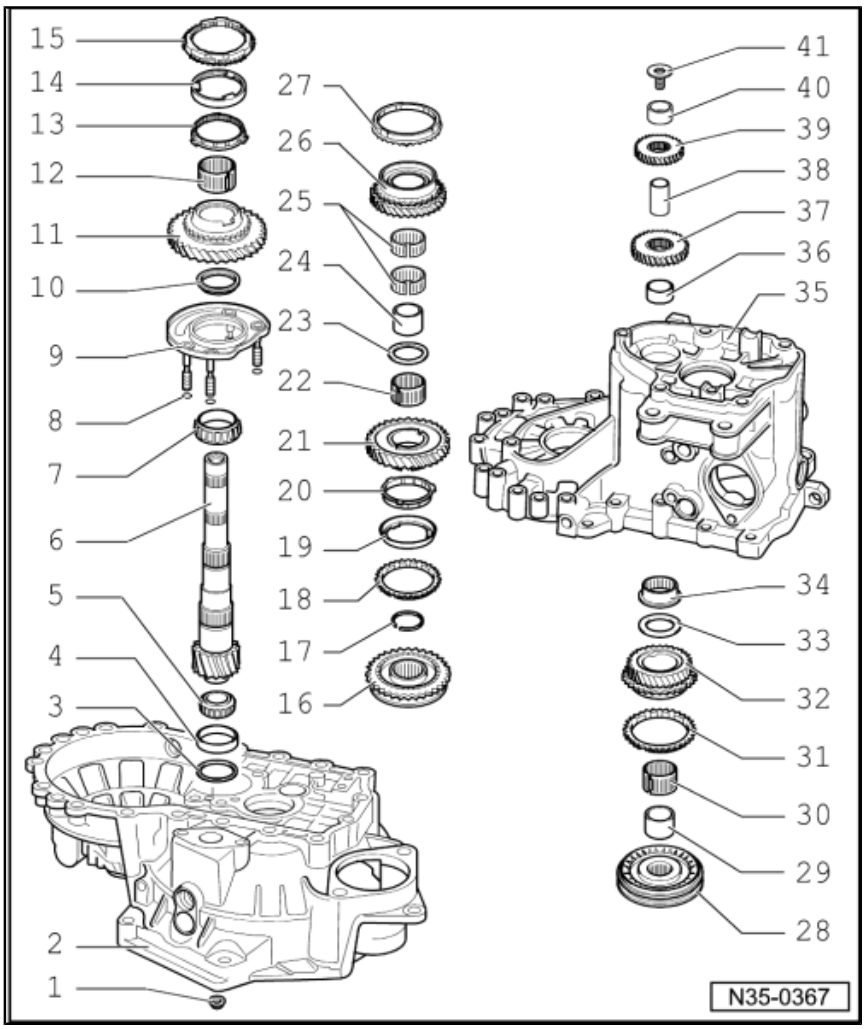
- Internal puller -1- Kukko 21/6-



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

Note

- *The output shaft is dismantled as follows: position separating device under 2nd gear synchromeshed gear ⇒ Item 21 (page 168) and press off as described in ⇒ page 170 . Remove retaining ring ⇒ Item 17 (page 168) . Then press off locking collar with synchro-hub for 1st and 2nd gear as described in ⇒ page 171 .*
- *When installing new gears or new input shaft, refer to ⇒ Electronic parts catalogue "ETKA" and technical data ⇒ page 1 .*
- *Always renew both tapered roller bearings together as a set.*



1 - Hexagon nut, 25 Nm and then turn 90° further

- ❑ 4 nuts for bearing support
- ❑ Always renew

2 - Clutch housing

3 - Shim

- ❑ For output shaft
- ❑ Adjustment overview ⇒ page 192

4 - Small tapered roller bearing outer race

- ❑ Removing ⇒ page 169
- ❑ Pressing in ⇒ page 170

5 - Small tapered roller bearing inner race

- ❑ Pulling off ⇒ page 170
- ❑ Pressing on ⇒ page 170

6 - Output shaft

- ❑ Adjusting ⇒ page 176

7 - Large tapered roller bearing inner race

- ❑ Pulling off ⇒ page 171
- ❑ Pressing on ⇒ page 171

8 - Seal

- ❑ Place sealing rings (Qty. 4) on bearing support bolts

9 - Bearing support

- ❑ With large tapered roller bearing outer race and bolts
- ❑ Change outer race only together with large tapered roller bearing and bearing support

10 - Thrust washer

- ❑ Shoulder of thrust washer faces tapered roller bearing

11 - Synchromeshed gear for 1st gear

12 - Needle bearing

- ❑ For 1st gear

13 - Synchro-ring

- ❑ (Inner ring for 1st gear)
- ❑ Installation position ⇒ page 171
- ❑ Check for wear ⇒ page 172
- ❑ Check lugs for scoring

14 - Outer ring for 1st gear

- ❑ Installation position ⇒ page 171
- ❑ Check for wear ⇒ page 172
- ❑ Renew if scored

15 - Synchro-ring for 1st gear

- ❑ Installation position ⇒ page 171

- ❑ Check for wear ⇒ page 172

16 - Locking collar with synchro-hub for 1st and 2nd gears

- ❑ After removing retaining ring ⇒ Item 17 (page 168) , pull off together with bearing support ⇒ page 171
- ❑ Dismantling ⇒ page 172
- ❑ Assembling locking collar and synchro-hub ⇒ page 172 , ⇒ page 173 and ⇒ page 173
- ❑ Installation position ⇒ page 173
- ❑ Pressing on ⇒ page 173

17 - Retaining ring

18 - Synchro-ring for 2nd gear

- ❑ Check for wear ⇒ page 172
- ❑ Assemble so that notches engage in locking pieces of locking collar ⇒ Item 16 (page 168)

19 - Outer ring for 2nd gear

- ❑ Insert in synchro-ring ⇒ Item 18 (page 168) .
- ❑ Installation position ⇒ page 174
- ❑ Renew if scored

20 - Synchro-ring

- ❑ (Inner ring for 2nd gear)
- ❑ Check for wear ⇒ page 172
- ❑ Check lugs for scoring
- ❑ Installation position ⇒ page 174

21 - Synchromeshed gear for 2nd gear

- ❑ Installation position ⇒ page 174

22 - Needle bearing

- ❑ For 2nd gear

23 - Thrust washer

24 - Sleeve for 3rd gear needle bearing.

- ❑ Pressing off with synchromeshed gear for 2nd gear ⇒ page 170
- ❑ Pressing on ⇒ page 174

25 - Needle bearing

- ❑ For 3rd gear

26 - Synchromeshed gear for 3rd gear

27 - Synchro-ring for 3rd gear

- ❑ Check for wear ⇒ page 175

28 - Locking collar with synchro-hub for 3rd and 4th gears

- ❑ Press off with 2nd gear synchromeshed gear ⇒ Item 19 (page 168) and 3rd gear ⇒ Item 24 (page 168) ⇒ page 170 .
- ❑ Dismantling ⇒ page 175
- ❑ Assembling locking collar and synchro-hub ⇒ page 175 , ⇒ page 175 and ⇒ page 175
- ❑ Installation position, locking collar and synchro-hub ⇒ page 176
- ❑ Pressing on ⇒ page 176

29 - Sleeve

- ❑ For needle bearing
- ❑ Press off with 3rd and 4th gear ⇒ Item 28 (page 168) locking collar and synchro-hub ⇒ page 170 .
- ❑ Pressing on ⇒ page 176

30 - Needle bearing

- ❑ For 4th gear

31 - Synchro-ring for 4th gear

- ❑ Check for wear ⇒ page 175

32 - Synchromeshed gear for 4th gear

33 - Thrust washer

34 - Needle bearing

- ❑ For output shaft
- ❑ Removing and installing ⇒ page 135

35 - Gearbox housing

36 - Sleeve

- ❑ For output shaft needle bearing
- ❑ Pressing off ⇒ page 170
- ❑ Pressing on ⇒ page 176

37 - Gear wheel for 5th gear

- ❑ Pull off individually ⇒ page 109
- ❑ Pull off together with gearbox housing ⇒ page 115

38 - Sleeve

39 - Gear wheel for 6th gear

- ❑ Pull off individually ⇒ page 109
- ❑ Pull off together with gearbox housing ⇒ page 115

40 - Cylindrical roller bearing inner race

- ❑ For output shaft
- ❑ Larger outer diameter from gearbox date 21 08 6
- ❑ Allocation ⇒ page 106
- ❑ Mark before removing
- ❑ Do not interchange with inner race for cylindrical roller bearing of input shaft

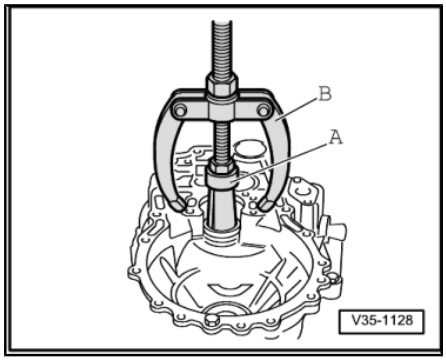
41 - Bolt ⇒ Item 6 (page 104)

- ❑ Allocation ⇒ page 106
- ❑ Self-locking
- ❑ Always renew

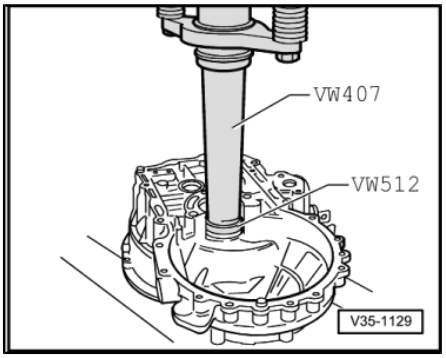
Pulling out small tapered roller bearing outer race

A - Internal puller, 37 … 46 mm , e.g. -Kukko 21/6-

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



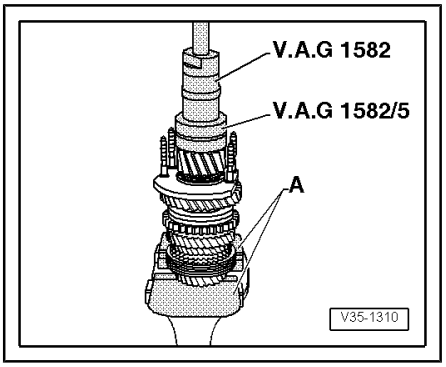
Pressing in small tapered roller bearing outer race



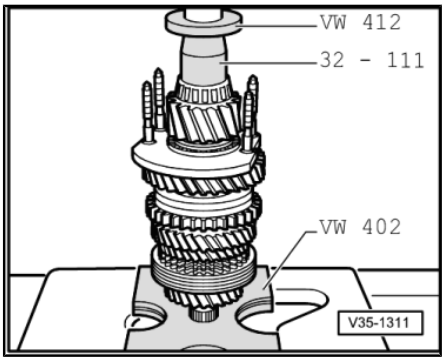
Pulling off small tapered roller bearing inner race

A - Vice with protective jaws

– Fit adapter and tighten behind bearing rollers, then turn bearing and retighten gripping device.



Pressing on small tapered roller bearing inner race



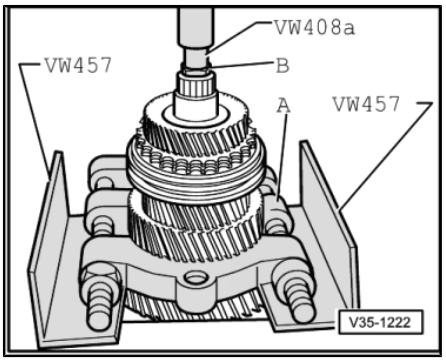
Pressing off 3rd and 4th gear synchro-hub and locking collar, 2nd, 3rd and 4th gear synchromeshed gears with sleeve for gearbox housing needle bearing

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

B - Hexagon bolt M10 x 20, 17 mm AF

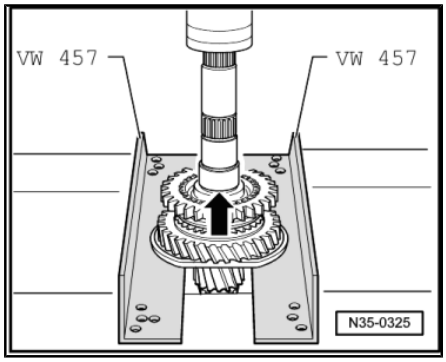
Note

Support splitter so that the 1st and 2nd gear locking collar is not pulled off at the same time.



Pressing off locking collar with synchro-hub and bearing support

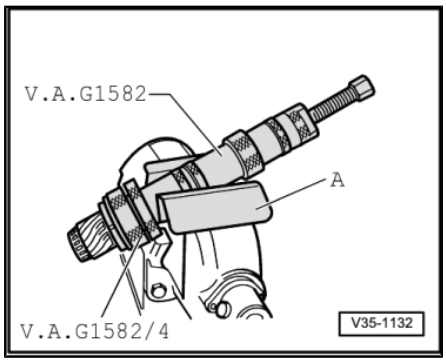
– First remove retaining ring -arrow-.



Pulling off large tapered roller bearing inner race

A - Protective jaws

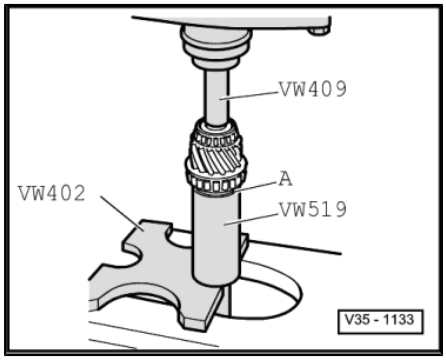
– Before fitting puller, insert a M10 × 20 hexagon bolt in the output shaft drilling.



Pressing on large tapered roller bearing inner race

-A- Thrust washer

– Fit thrust washer before pressing on inner race. Shoulder faces inner race.



Installation position of outer ring, inner ring and synchro-ring for 1st gear

– Place inner ring -A- on synchromeshed gear for 1st gear.

Angled lugs -arrow 1- face outer ring -B-.

– Fit outer ring -B-.

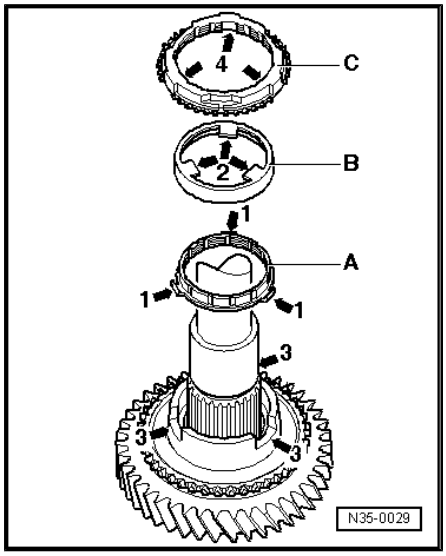
Lugs -arrow 2- engage in notches -arrow 3- of synchromeshed gear.

– Fit synchro-ring -C-.

Notches -arrow 4- engage in lugs -arrow 1- of inner ring -A-.

Note

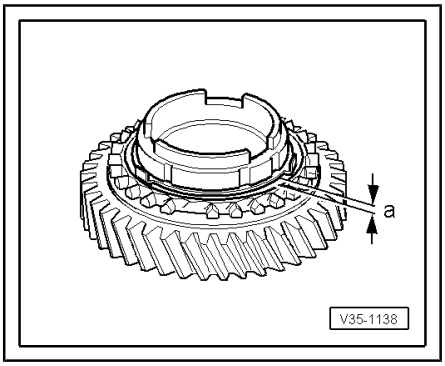
If components are not to be renewed, ensure that they are matched with their original gears.



Checking 1st and 2nd gear inner ring for wear

– Press inner ring onto cone of synchromeshed gear and measure gap -a- using a feeler gauge.

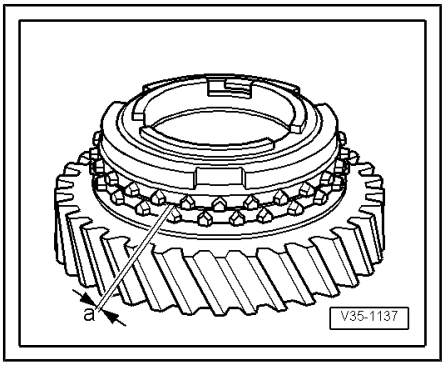
Gap -a-	Installation (new) dimension	Wear limit
1st and 2nd gears	0.75 … 1.25 mm	0.3 mm



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

– Press synchro-ring, outer ring and inner ring onto cone of synchromeshed gear and measure gap -a- using a feeler gauge.

Gap -a-	Installation (new) dimension	Wear limit
1st and 2nd gears	1.2 … 1.8 mm	0.5 mm



Dismantling and assembling locking collar and synchro-hub for 1st and 2nd gears

1 - Spring

Allocate springs according to ⇒ Electronic parts catalogue “ETKA” .

Installation with hollow locking pieces ⇒ page 173 .

Installation with solid locking pieces ⇒ page 173

2 - Locking collar

3 - Synchro-hub

4 - Locking piece

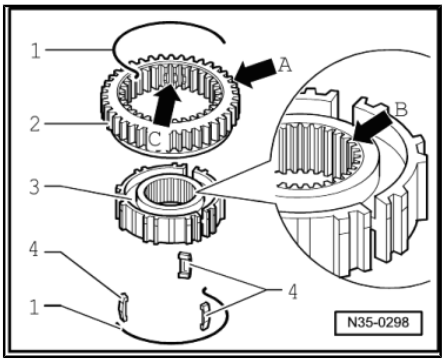
Allocate locking pieces according to ⇒ Electronic parts catalogue “ETKA” .

Collar is equally wide on both sides of synchro-hub.

The collar has a chamfer on one side -arrow B-.

Chamfer on collar of synchro-hub and outer teeth of locking collar -arrow A- face in same direction after assembly.

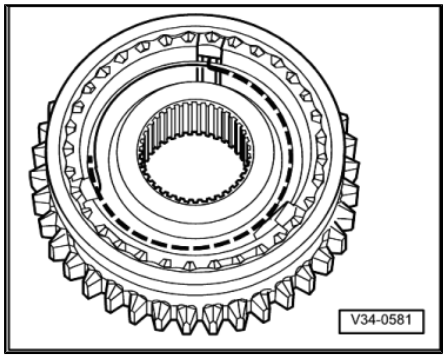
Notches -arrow C- in synchro-hub and sliding collar for locking pieces must align.



Assembly of 1st and 2nd gear locking collar and synchro-hub with hollow locking pieces

- Locking collar has been pushed over synchro-hub.

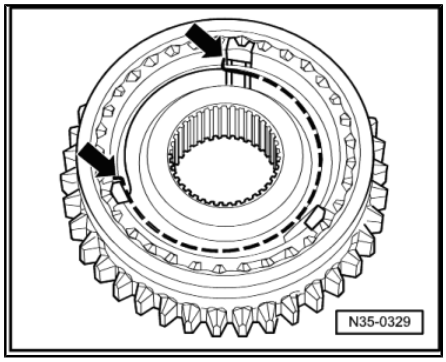
– Insert locking pieces and install springs offset 120°. Angled end of spring must locate in hollow locking piece.



Assembly of 1st and 2nd gear locking collar and synchro-hub with solid locking pieces

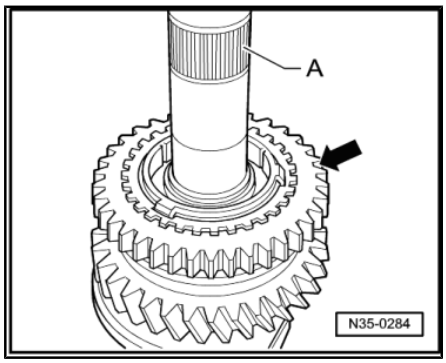
- Locking collar has been pushed over synchro-hub.

– Insert locking pieces and install springs offset 120°. Springs must seat with angled ends in front of locking pieces -arrows-.



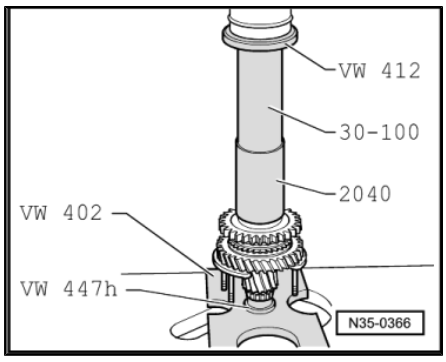
Installation position of locking collar with synchro-hub for 1st and 2nd gears

Teeth of locking collar -arrow- face splines for 3rd and 4th gear synchro-hub -A-.



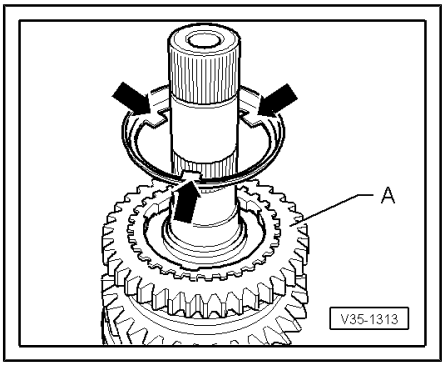
Pressing on locking collar and synchro-hub for 1st and 2nd gears

Turn synchro-ring so that grooves align with locking pieces.



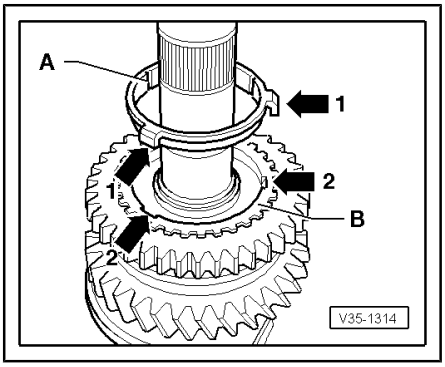
Installation position of 2nd gear outer ring

Lugs -arrows- face 1st gear -A-.



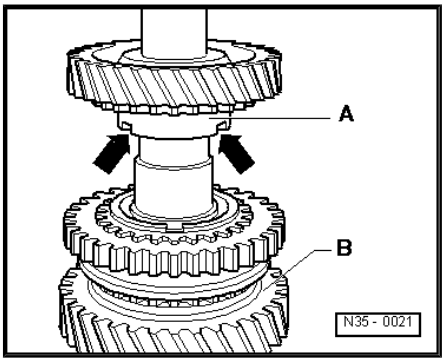
Installation position of synchro-ring (2nd gear inner ring) -A-

Lugs -arrow 1- engage in notches -arrow 2- in synchro-ring -B-.

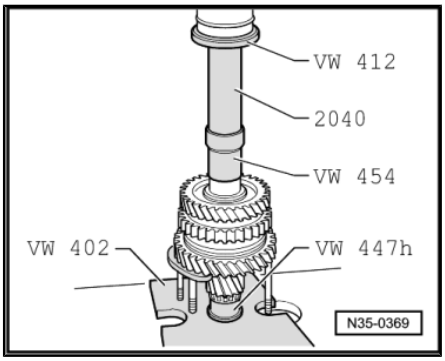


Installation position of synchromeshed gear for 2nd gear

Higher shoulder -A- faces 1st gear -B-. Notches in shoulder -arrows- engage in lugs of outer ring ⇒ page 174 .



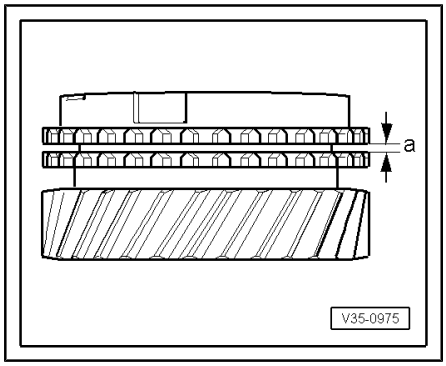
Pressing on sleeve for 3rd gear needle bearing



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

– Press synchro-ring onto cone of synchromeshed gear and measure gap -a- using feeler gauge.

Gap -a-	Installation (new) dimension	Wear limit
3rd gear 4th gear	1.0...1.7 mm 1.0...1.7 mm	0.5 mm



Dismantling and assembling 3rd and 4th gear locking collar and synchro-hub

1 - Spring

Allocate springs according to ⇒ Electronic parts catalogue “ETKA” .

Installation with hollow locking pieces ⇒ page 175 .

Installation with solid locking pieces ⇒ page 175

2 - Locking piece

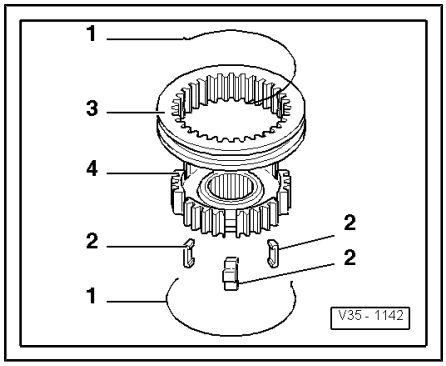
Allocate locking pieces according to ⇒ Electronic parts catalogue “ETKA” .

3 - Locking collar

4 - Synchro-hub

– Slide locking collar over synchro-hub.

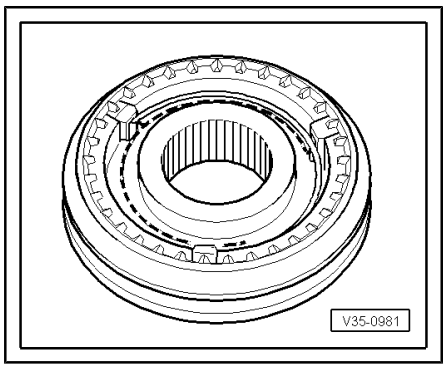
Notches for locking pieces in synchro-hub and locking collar must align.



Assembly of 3rd and 4th gear locking collar and synchro-hub with hollow locking pieces

Locking collar has been pushed over synchro-hub.

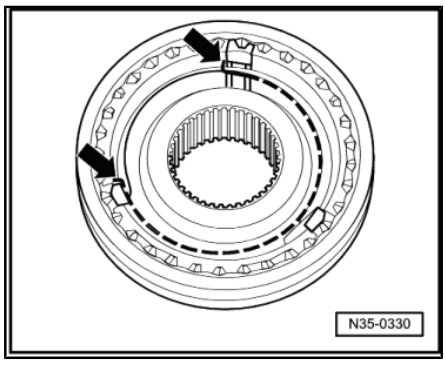
– Insert locking pieces and install springs offset 120°. Angled end of spring must locate in hollow locking piece.



Assembly of 3rd and 4th gear locking collar and synchro-hub with solid locking pieces

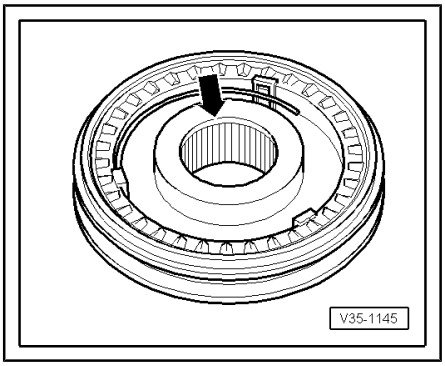
- Locking collar has been pushed over synchro-hub.

– Insert locking pieces and install springs offset 120°. Springs must seat with angled ends in front of locking pieces -arrows-.

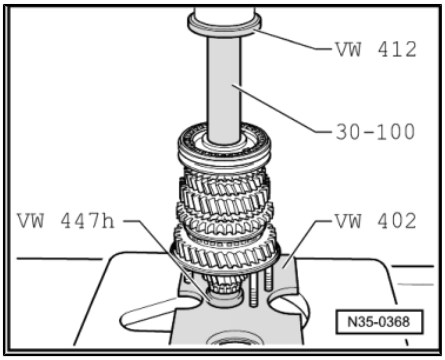


Installation position of locking collar with synchro-hub for 3rd and 4th gears

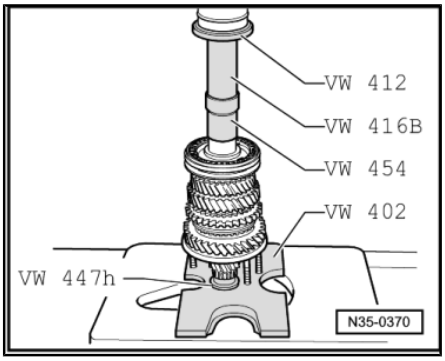
Chamfer -arrow- faces 4th gear.



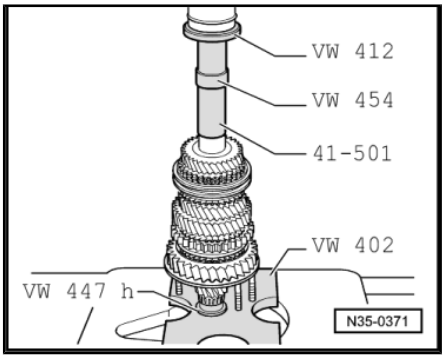
Pressing on synchro-hub with locking collar for 3rd and 4th gears



Pressing on sleeve for 4th gear needle bearing



Pressing on sleeve for output shaft needle bearing

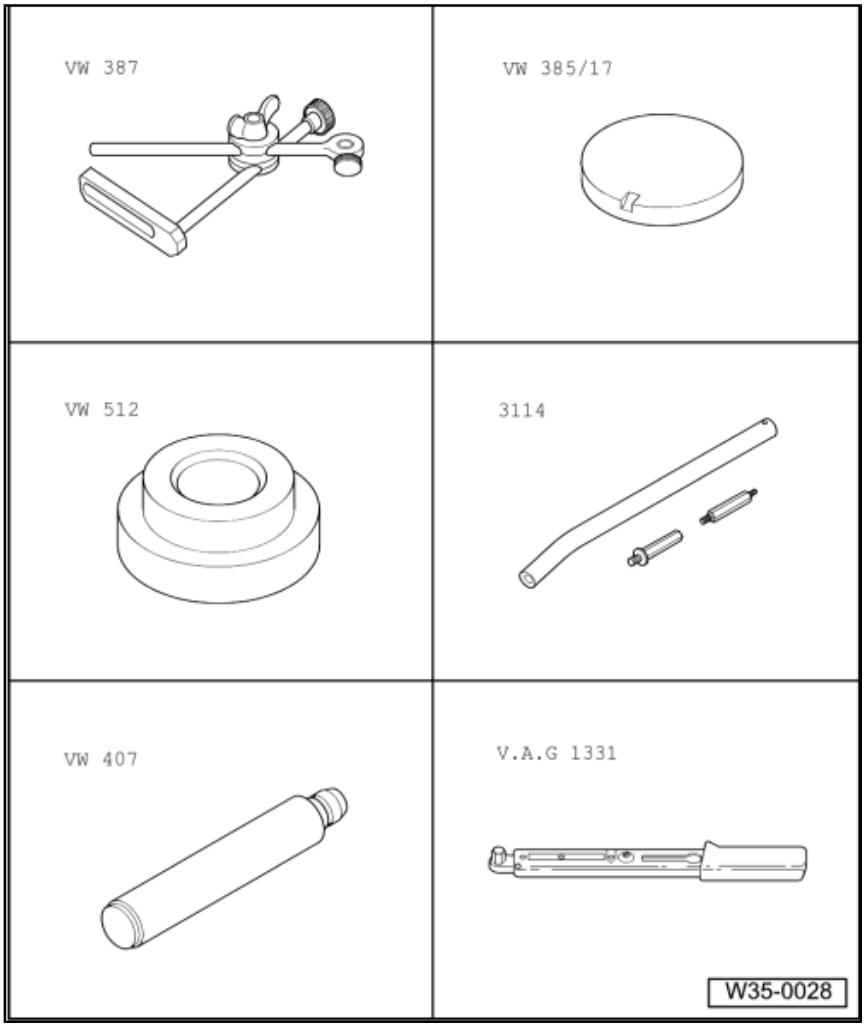


2.2 Adjusting output shaft

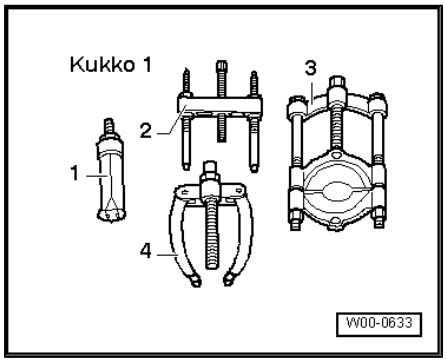
(Determining shim for output shaft)

Special tools and workshop equipment required

- Universal dial gauge bracket -VW 387-
- End dimension plate - VW 385/17-
- Thrust pad -VW 512-
- Straightening tool -3114/2-
- Press tool -VW 407-
- Torque wrench - V.A.G 1331-
- Dial gauge

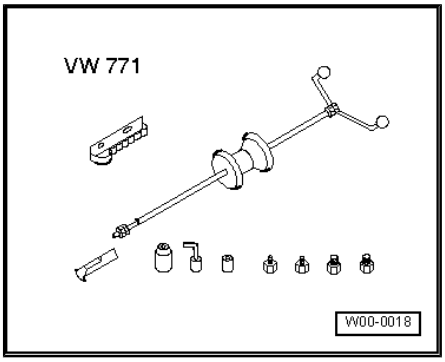


- Internal puller -1- Kukko 21/8-



- Counter support -4- Kukko 22/2-
- Puller -2- Kukko 18/0- (threaded spindle)

- Adapter -VW 771/15-



It is necessary to readjust the output shaft when the following components are renewed:

- Output shaft
- Clutch housing

or

- Tapered roller bearing

Adjustment overview ⇒ page 192 .

Requirement:

- Sealing surfaces of clutch and gearbox housings must be free of sealant.

– Press small tapered roller bearing outer race together with a 0.65 mm thick shim into clutch housing to stop ⇒ page 170 .

– Insert output shaft and tighten nuts for bearing support to 25 Nm, then turn 90° further.

– Turn output shaft 20 to 30 times in one direction.

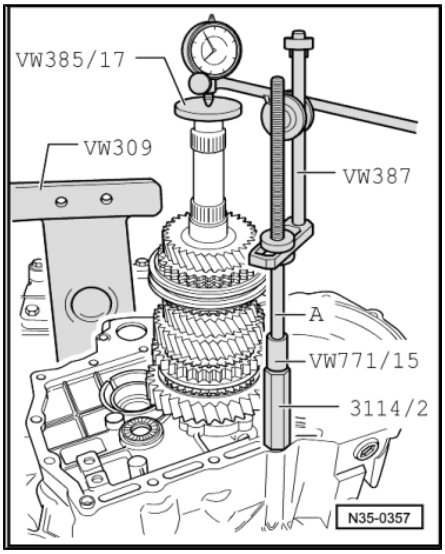
Note

- *The shaft must be turned in one direction so that the rollers of the tapered roller bearing settle in one direction.*
- *It is necessary to turn the shaft 20 to 30 times to achieve this.*
- *Otherwise the resulting reading will be incorrect.*

– Set up dial gauge (3 mm measuring range) and set to “0”with 1 mm preload.

-A- = threaded spindle from puller --Kukko 18/0- .

– Move output shaft up and down and note dial gauge reading (example: 0.20 mm).



2.2.1 Determining thickness of shim

The specified bearing preload is obtained by adding a constant preload figure (0.10 … 0.15 mm) to the reading obtained (0.20 mm) and the thickness of the shim installed (0.65 mm).

Example:

Installed shim	0.65 mm
+ Measured value	0.20 mm
+ Preload (constant)	0.15 mm
Shim thickness	1.00 mm

Example:

Bearing play = (0.65 mm shim plus determined measured value)	Thickness of shim according to table
0.850 mm	1.000 mm

– Remove output shaft and pull out small tapered roller bearing outer race ⇒ page 169 .

Table of shims

Bearing play = (0.65 mm shim plus determined measured value)	Shim thickness (mm)
0.650	0.750
0.660 … 0.689	0.800
0.690 … 0.739	0.850
0.740 … 0.789	0.900
0.790 … 0.839	0.950
0.840 … 0.889	1.000
0.890 … 0.939	1.050
0.940 … 0.989	1.100
0.990 … 1.039	1.150
1.040 … 1.089	1.200
1.090 … 1.139	1.250
1.140 … 1.189	1.300
1.190 … 1.239	1.350
1.240 … 1.289	1.400

Bearing play = (0.65 mm shim plus determined measured value)	Shim thickness (mm)
1.290 … 1.339	1.450
1.340 … 1.389	1.500
1.390 … 1.429	1.550

Note

Allocate shims according to ⇒ Electronic parts catalogue "ETKA".

– Insert shims of determined thickness, thickest shim first.

• If the previously used 0.65 mm shim is to be reinstalled, check it for damage.

If the size of shim required is larger than those listed in the table, insert two shims totalling the correct figure.

The various thicknesses make it possible to achieve the exact shim thickness required.

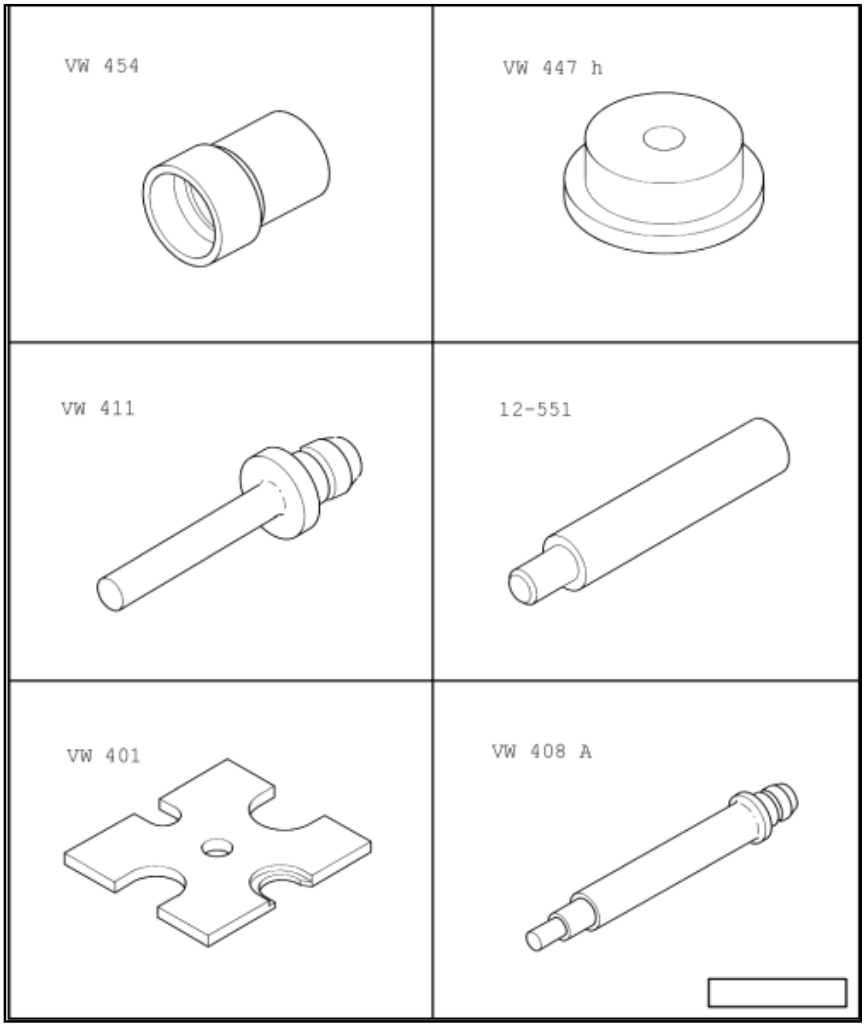
– Press in small tapered roller bearing outer race together with the correct shim (in example 1.00 mm) ⇒ page 170 and install output shaft. Tighten bearing support nuts in clutch housing to 25 Nm and then turn 90° further.

3 Reverse shaft

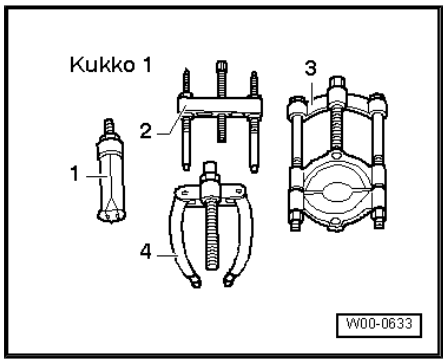
3.1 Dismantling and assembling reverse shaft

Special tools and workshop equipment required

- Thrust piece -VW 454-
- Thrust pad -VW 447 H-
- Press tool -VW 411-
- Centring mandrel -12 - 551-
- Pressure plate -VW 401-
- Press tool -VW 408 A-



- Internal puller -1- Kukko 21/2-



- Counter support -4- Kukko 22/1-

Note

After dismantling, always renew needle bearing in clutch housing and reverse shaft support.

1 - Clutch housing

2 - Needle bearing

- ❑ Pulling out ⇒ page 182
- ❑ Pressing in ⇒ page 183

3 - Reverse gear wheel

4 - Retaining ring

- ❑ Always renew after removing.
- ❑ Carefully fit new retaining ring
- ❑ Do not overstretch

5 - Synchromeshed gear for reverse gear

- ❑ Remove retaining ring before renewing.
- ❑ Shoulder faces reverse gear wheel

6 - Reverse shaft

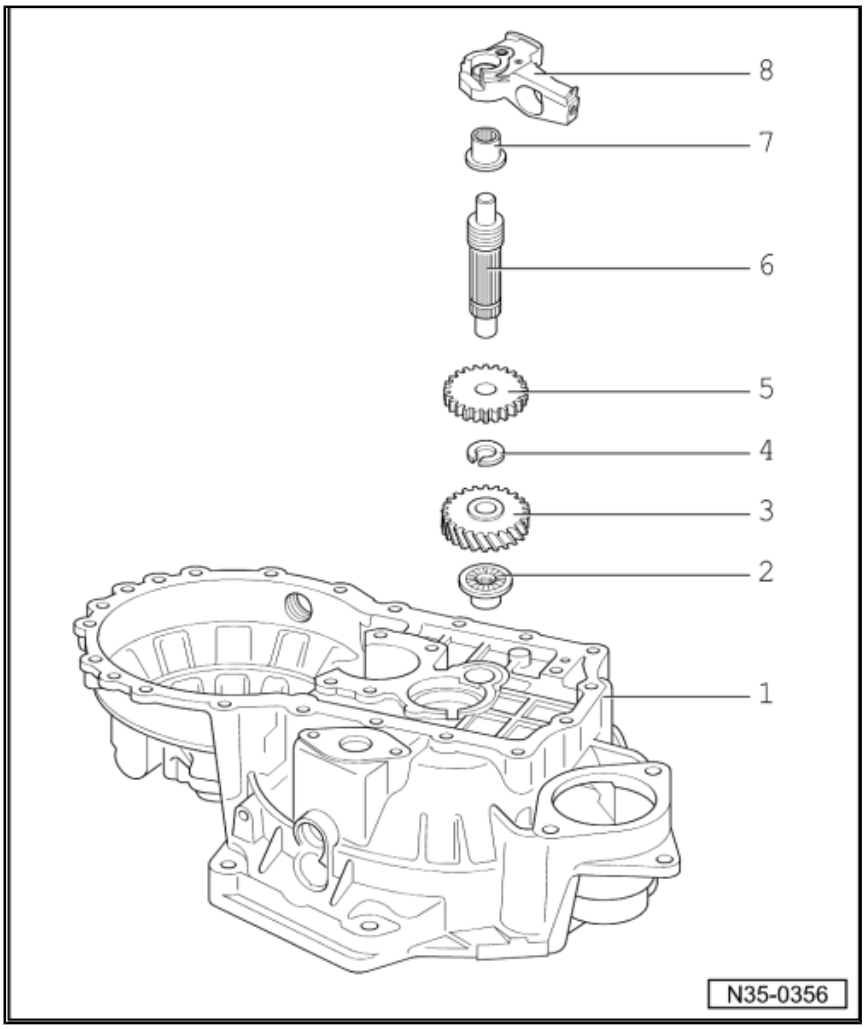
- ❑ Removing ⇒ page 115

7 - Needle bearing

- ❑ Pressing out ⇒ page 183
- ❑ Pressing in ⇒ page 183

8 - Reverse shaft support

- ❑ Removing and installing ⇒ page 115



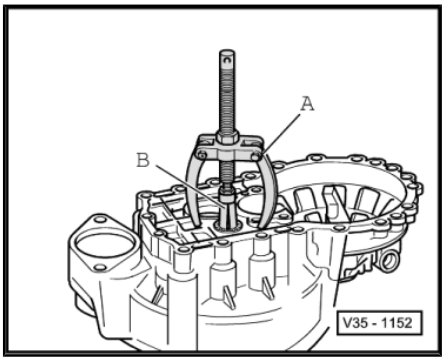
Pulling needle bearing out of clutch housing

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

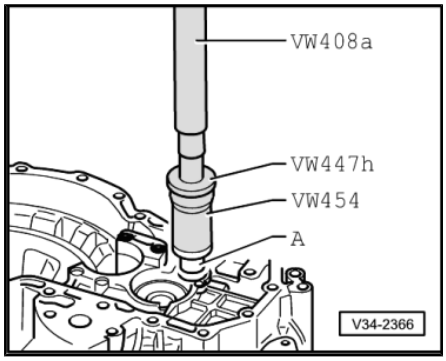
B - Internal puller, 14.5 … 18.5 mm , e.g. -Kukko 21/2-

Note

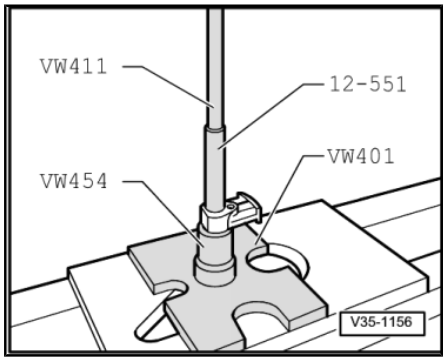
The needle bearing is destroyed during removal and must be renewed.



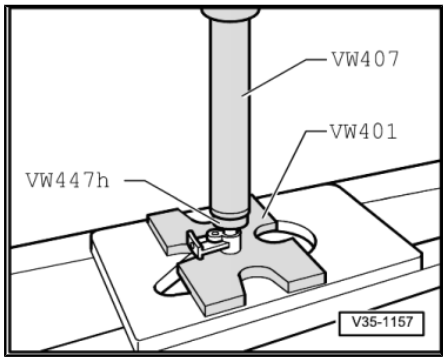
Pressing needle bearing -A- into clutch housing



Pressing needle bearing out of reverse shaft support



Pressing needle bearing into reverse shaft support



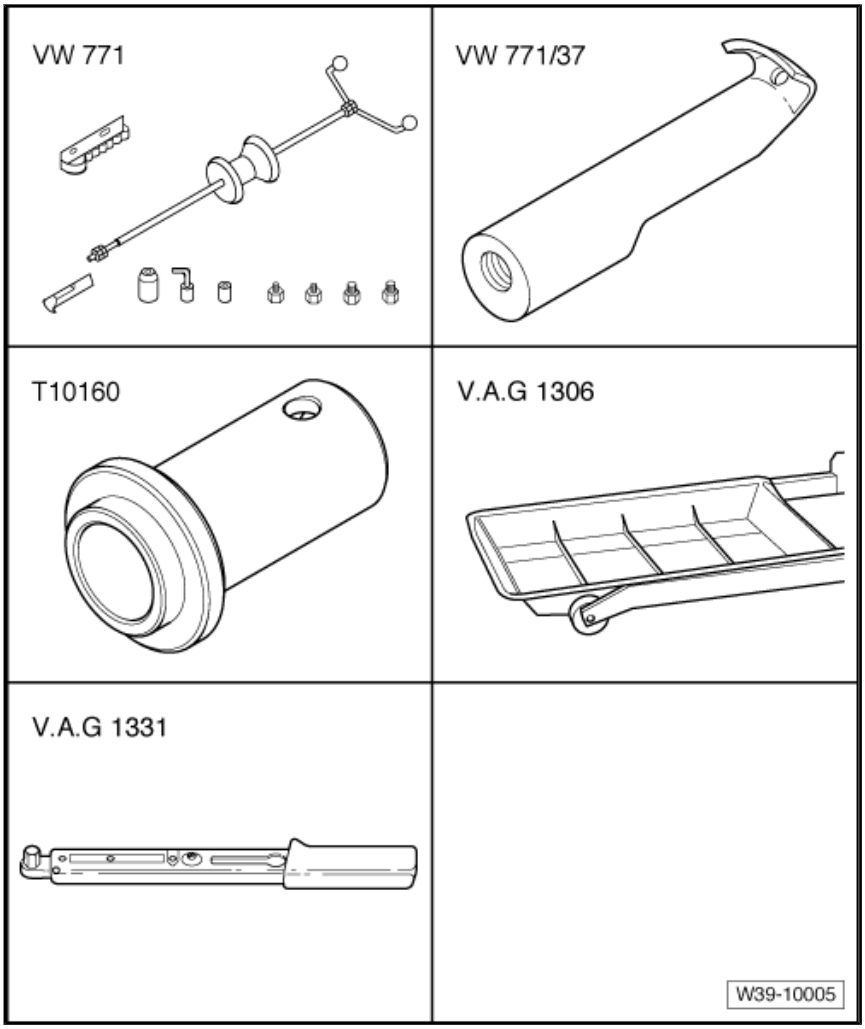
39 – Final drive - differential

1 Renewing flange shaft oil seals with gearbox installed

1.1 Renewing oil seal for left flange shaft

Special tools and workshop equipment required

- Multipurpose tool -VW 771-
- Puller hooks -VW 771/37-
- Thrust piece -T10160-
- Drip tray -V.A.G 1306- or drip tray for workshop hoist -VAS 6208-
- Torque wrench - V.A.G 1331-



1.1.1 Removing

– Remove left wheel.

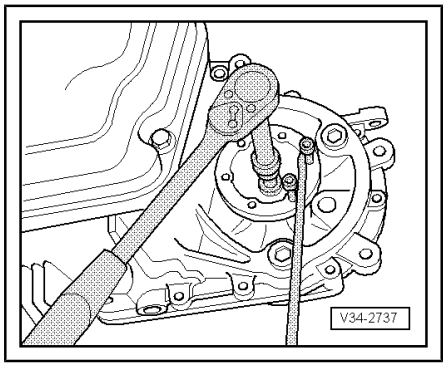
– Remove noise insulation ⇒ General body repairs, exterior; Rep. Gr. 50 ; Noise insulation .

– Remove lower part of front left wheel housing liner ⇒ General body repairs, exterior; Rep. Gr. 66 ; Wheel housing liner .

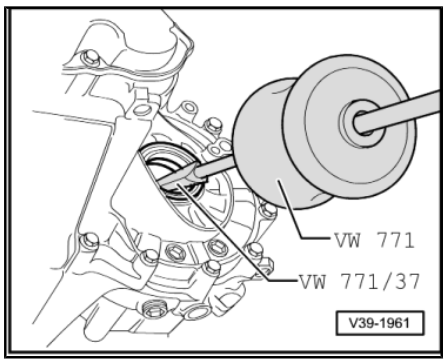
– Turn steering to left lock.

– Disconnect drive shaft from flange shaft ⇒ Running gear, axles, steering; Rep. Gr. 40 ; Repairing drive shaft; Removing and installing drive shafts .

– Raise drive shaft as high as possible and secure. Take care not to damage paint on drive shaft in the process.
– Place drip tray under gearbox.
– Remove flange shaft securing bolt by screwing two bolts into flange and counterholding flange shaft with a lever.
– Pull out flange shaft with compression spring.

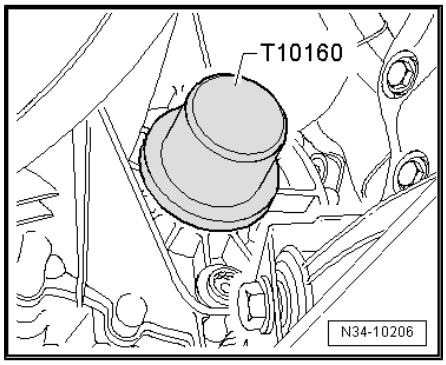


– Pull out flange shaft oil seal using multipurpose tool -VW 771- and puller hooks -VW 771/37- .



1.1.2 Installing

– Drive in new seal to stop, being careful not to cant seal.
– Half-fill space between sealing lip and dust lip with sealing grease -G 052 128 A1- .
– Insert flange shaft.
– Secure flange shaft with countersunk bolt.
– Attach drive shaft to gearbox ⇒ Running gear, axles, steering; Rep. Gr. 40 ; Repairing drive shaft; Removing and installing drive shafts .
– Check gear oil ⇒ page 99 .
– Install lower part of front left wheel housing liner ⇒ General body repairs, exterior; Rep. Gr. 66 ; Wheel housing liner .
– Install noise insulation ⇒ General body repairs, exterior; Rep. Gr. 50 ; Noise insulation .
– Install wheel ⇒ Running gear, axles, steering; Rep. Gr. 44 ; Torque settings for mounting wheels .



1.1.3 Torque setting

Flange shaft to gearbox (countersunk bolt)
⇒ Item 12 (page 195)

1.2 Distinguishing seals for right flange shaft

The seal -1- for the right flange shaft is located in a sleeve -2-.

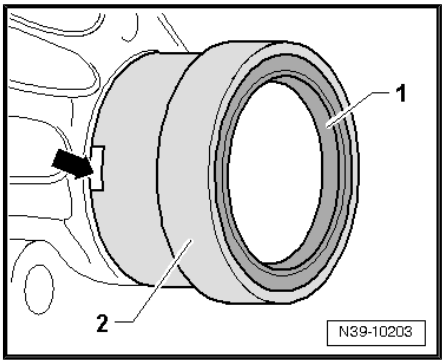
There are different versions.

Seal -1- and sleeve -2- are two parts. Identification: notches along circumference of sleeve -arrow-.

Renew seal ⇒ page 186 .

Seal -1- and sleeve -2- are one piece. Identification: no notches in sleeve.

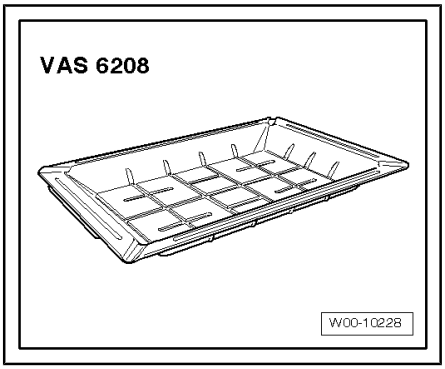
Renew seal and sleeve together ⇒ page 189 .



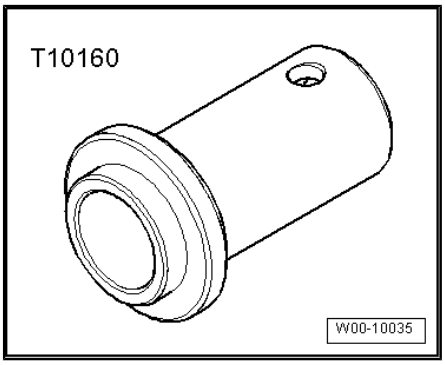
1.3 Renewing seal (two-part seal and sleeve for right flange shaft)

Special tools and workshop equipment required

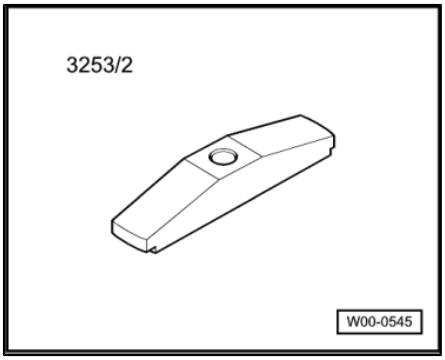
- Drip tray for workshop hoist -VAS 6208-



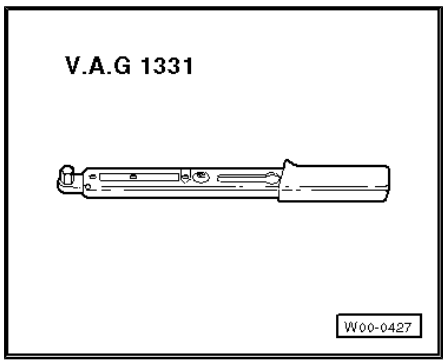
- Thrust piece -T10160-



- Assembly tool -3253/2-



♦ Torque wrench -V.A.G 1331-



1.3.1 Removing

– Remove noise insulation ⇒ General body repairs, exterior; Rep. Gr. 50 ; Noise insulation .

– Turn steering to right to full lock.

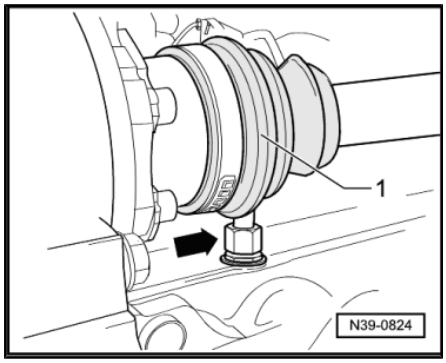
– Remove drive shaft heat shield from engine, if fitted.

– Disconnect drive shaft -1- from flange shaft.

– Raise drive shaft as high as possible and secure. Take care not to damage paint on drive shaft in the process.

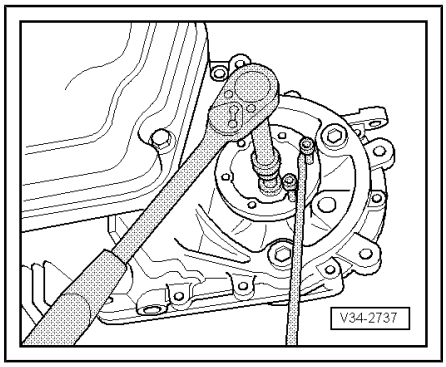
– Place drip tray under gearbox and engine.

– Unbolt turbocharger oil return line from engine -arrow- ⇒ Rep. Gr. 21 ; Charge air system for turbocharger; Removing and installing turbocharger with ancillaries .



– Remove flange shaft securing bolt by screwing two bolts into flange and counterholding flange shaft with a lever.

– Pull out flange shaft with compression spring.

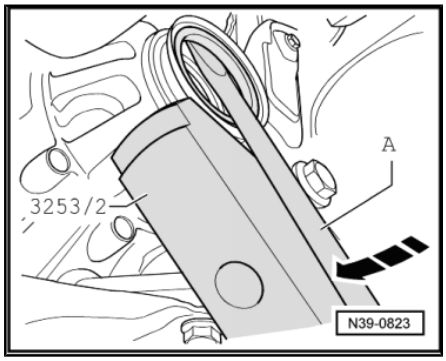


– Lever out seal using screwdriver -A- supporting screwdriver on assembly tool -3253/2- .

Note

♦ *Do not damage sleeve. Otherwise, leaks will occur.*

♦ *Replace sleeve if damaged ⇒ page 136 .*



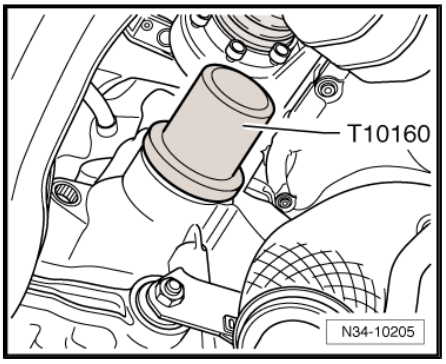
1.3.2 Installing

– Drive in new seal to stop, being careful not to cant seal.

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

– Insert flange shaft.

– Secure flange shaft with countersunk bolt.



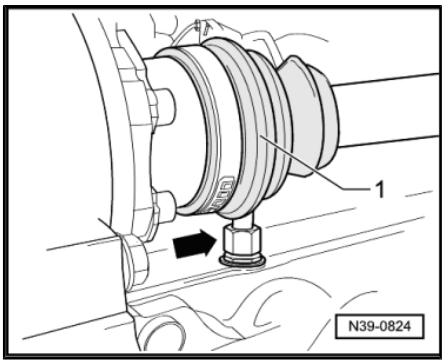
– If turbocharger oil return line was unbolted from engine, bolt it on again now -arrow- ⇒ Rep. Gr. 21 ; Charge air system for turbocharger; Removing and installing turbocharger with ancillaries .

– Bolt drive shaft -1- to flange shaft ⇒ Running gear, axles, steering; Rep. Gr. 40 ; Repairing drive shaft; Removing and installing drive shafts .

– Install drive shaft heat shield, if present, on engine ⇒ Running gear, axles, steering; Rep. Gr. 40 ; Repairing drive shafts .

– Check gear oil ⇒ page 99 .

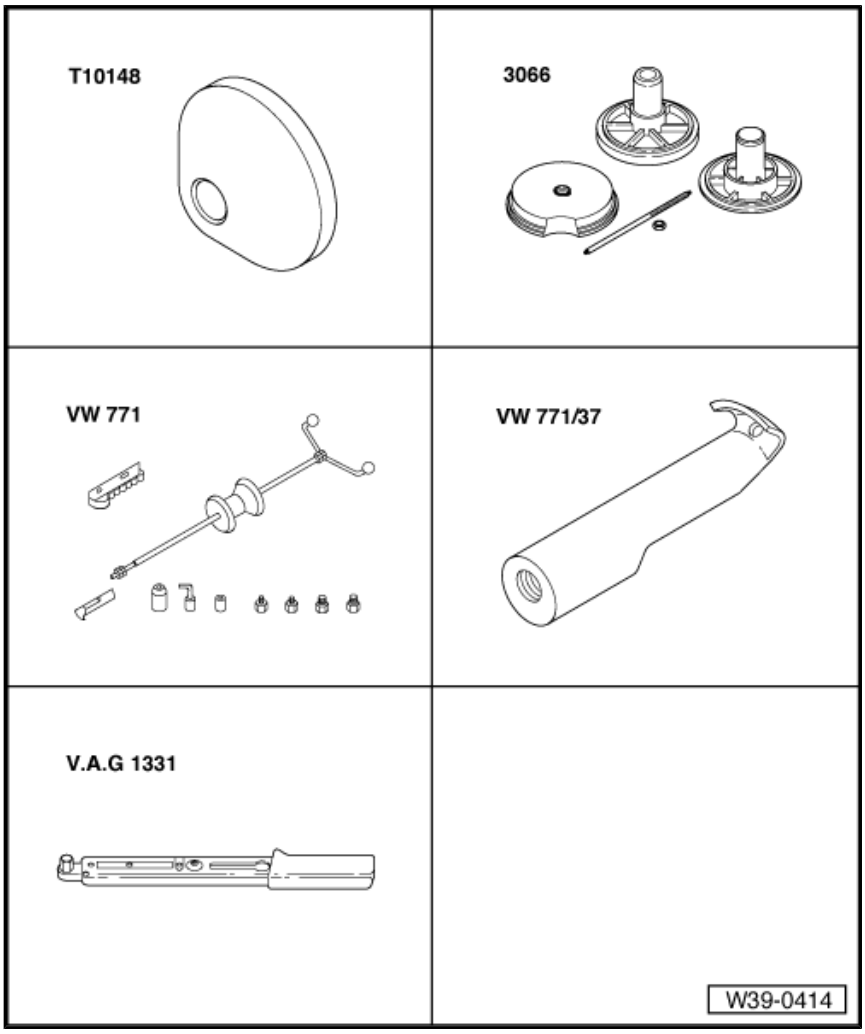
– Install noise insulation ⇒ General body repairs, exterior; Rep. Gr. 50 ; Noise insulation .



1.3.3 Torque setting

Flange shaft to gearbox (countersunk bolt)
⇒ Item 12 (page 195)

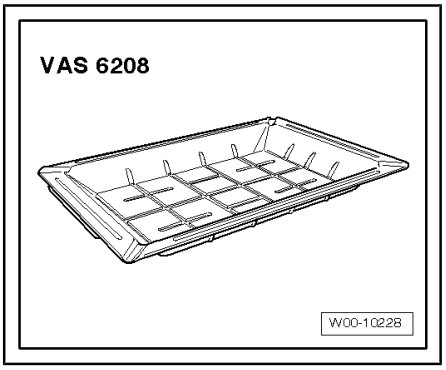
1.4 Renewing seal and sleeve together (one-piece seal and sleeve for right flange shaft)



Special tools and workshop equipment required

- Thrust piece -T10148-
- Spindle from assembly tool -3066-
- Multipurpose tool -VW 771-
- Puller hooks -VW 771/37-
- Torque wrench -V.A.G 1331-

♦ Drip tray for workshop hoist -VAS 6208-



1.4.1 Removing

– Remove noise insulation ⇒ General body repairs, exterior; Rep. Gr. 50 ; Noise insulation .

– Turn steering to right to full lock.

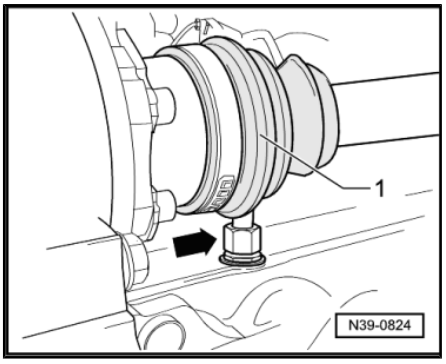
– Remove drive shaft heat shield from engine, if fitted.

– Disconnect drive shaft -1- from flange shaft.

– Raise drive shaft as high as possible and secure. Take care not to damage paint on drive shaft in the process.

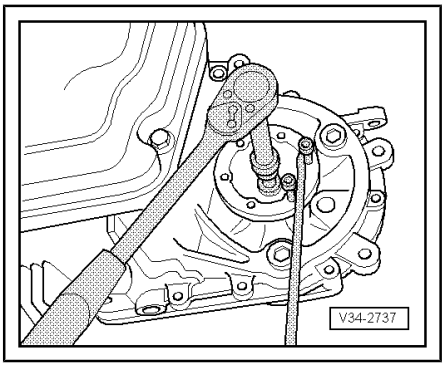
– Place drip tray under gearbox and engine.

– Unbolt turbocharger oil return line from engine -arrow- ⇒ Rep. Gr. 21 ; Charge air system for turbocharger; Removing and installing turbocharger with ancillaries .



– Remove flange shaft securing bolt by screwing two bolts into flange and counterholding flange shaft with a lever.

– Pull out flange shaft with compression spring.

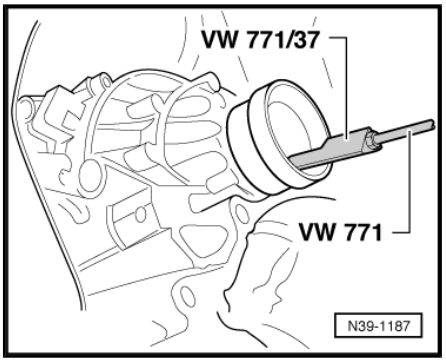


– Pull out seal and sleeve together.

There is a shoulder in the inner circumference of the sleeve.

– Apply puller hooks -VW 771/37- directly behind shoulder in sleeve.

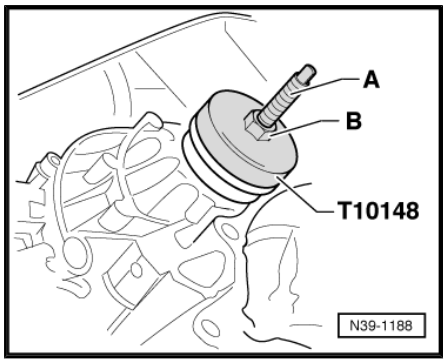
– Press extractor hooks -VW 771/37- forcefully into sleeve while pulling.



1.4.2 Installing

– Clean seat for seal in gearbox.

– Pull in seal and sleeve together.



A - Screw spindle of assembly tool -3066- into threaded piece of differential.

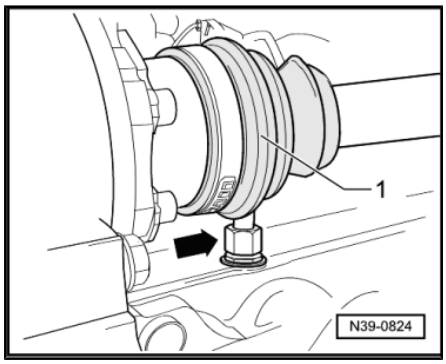
B - Nut M12

– Pull in seal with sleeve to stop using thrust piece -T10148- by turning nut -B-.

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

– Insert flange shaft.

– Secure flange shaft with countersunk bolt.



– If turbocharger oil return line was unbolted from engine, bolt it on again now -arrow- ⇒ Rep. Gr. 21 ; Charge air system for turbocharger; Removing and installing turbocharger with ancillaries .

– Bolt drive shaft -1- to flange shaft ⇒ Running gear, axles, steering; Rep. Gr. 40 ; Repairing drive shaft; Removing and installing drive shafts .

– Install drive shaft heat shield, if present, on engine ⇒ Running gear, axles, steering; Rep. Gr. 40 ; Repairing drive shafts .

– Check gear oil ⇒ page 99 .

– Install noise insulation ⇒ General body repairs, exterior; Rep. Gr. 50 ; Noise insulation .

1.4.3 Torque setting

Flange shaft to gearbox (countersunk bolt)
⇒ Item 12 (page 195)

2 Adjustment overview

Note

If repairs have been carried out to the gearbox, it is necessary to adjust the input shaft, output shaft or differential only if components have been renewed which have a direct effect on the adjustment of the gearbox. To prevent unnecessary adjustments, refer to the following table:

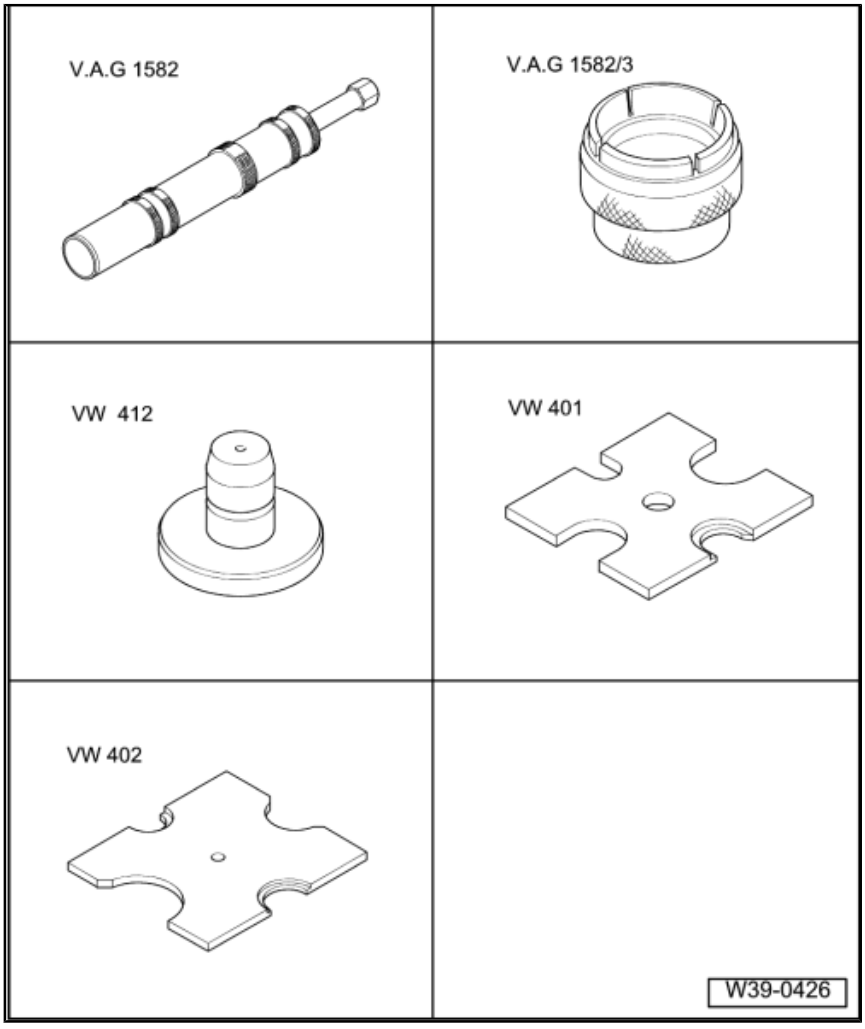
		To be adjusted:		
		Input shaft ⇒ page 158	Output shaft ⇒ page 176	Differential ⇒ page 200
Parts renewed:	Gearbox housing	x		x
	Clutch housing	x	x	x
	Input shaft	x		
	Output shaft		x	
	Differential cage			x
	Input shaft tapered roller bearing	x		
	Tapered roller bearing for output shaft		x	
	Tapered roller bearing for differential			x
	Gear wheel for 4th gear	x		

3 Differential

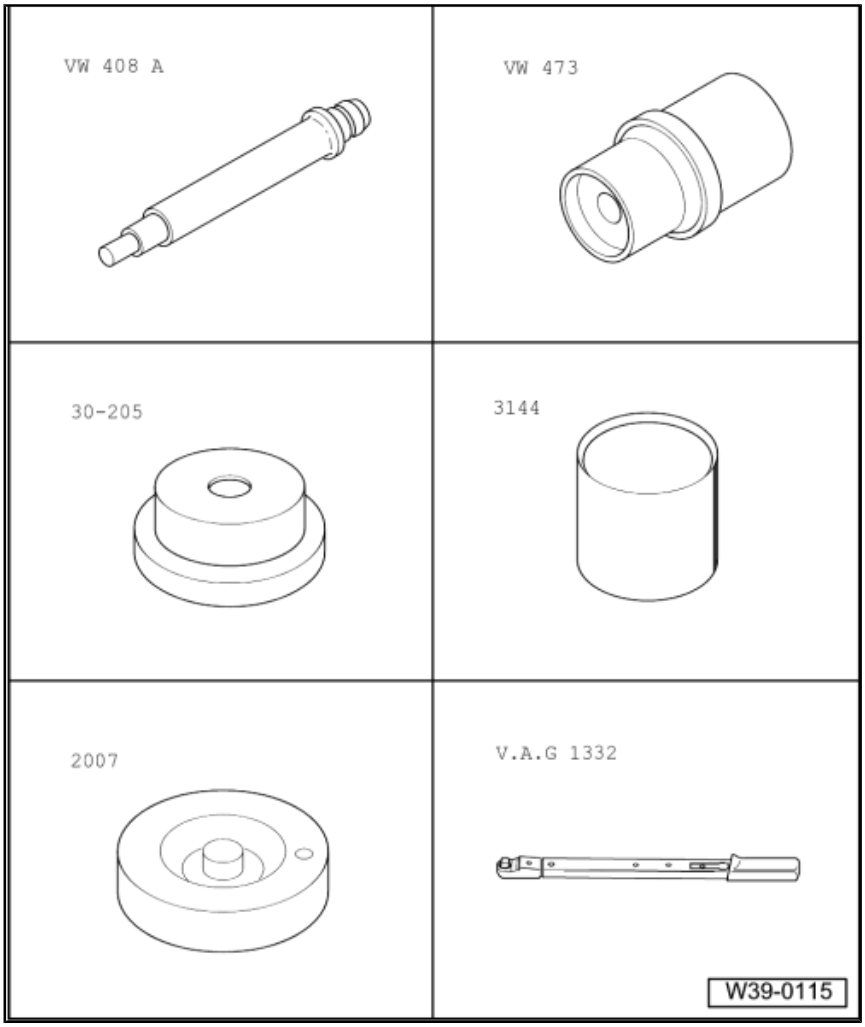
3.1 Dismantling and assembling differential

Special tools and workshop equipment required

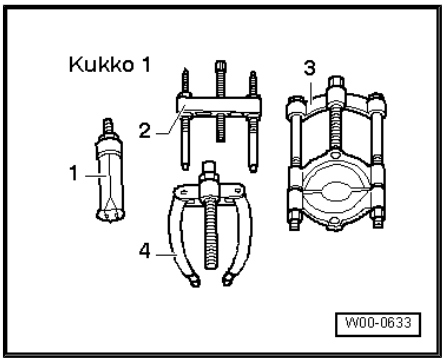
- Tapered roller bearing puller -V.A.G 1582-
- Adapter -V.A.G 1582/3-
- Press tool -VW 412-
- Pressure plate -VW 401-
- Pressure plate -VW 402-



- Press tool -VW 408 A-
- Thrust piece -VW 473-
- Thrust plate -30 - 205-
- Sleeve -3144-
- Thrust piece -2007-
- Torque wrench -V.A.G 1332-



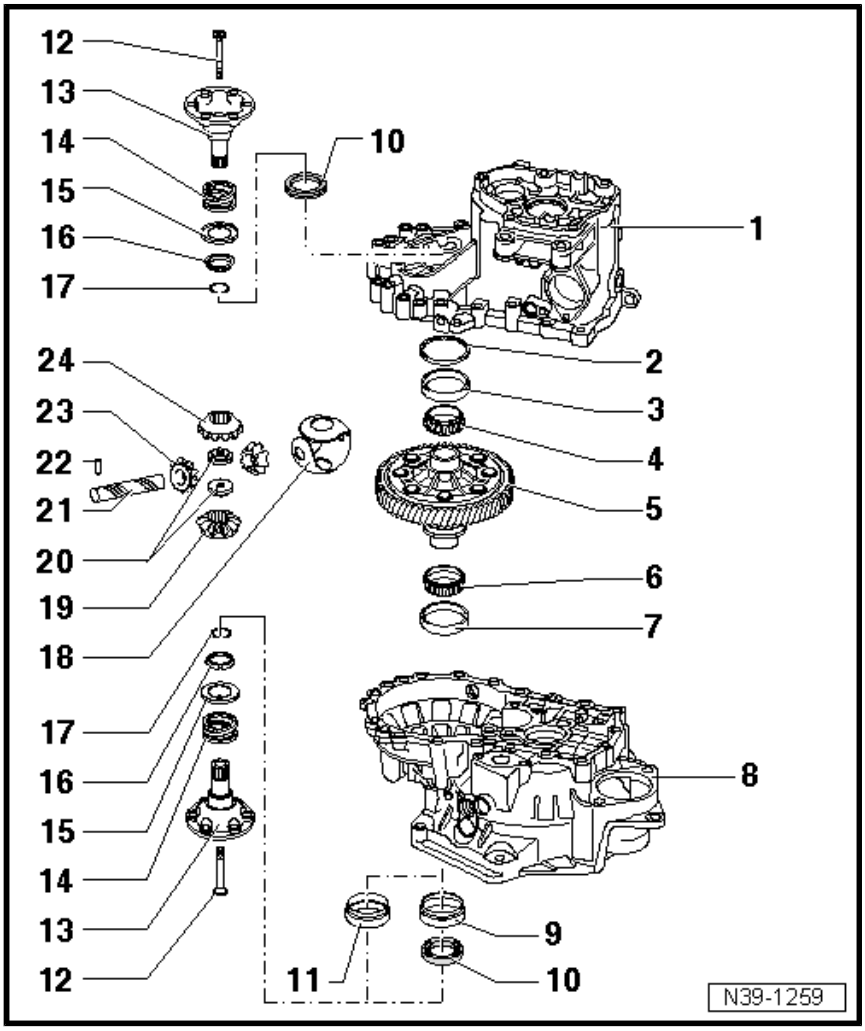
- Internal puller -1- Kukko 21/7-



- Counter support -4- Kukko 22/2-

Note

- *Heat tapered roller bearing inner race to 100° C before installing.*
- *Always renew both tapered roller bearings together as a set.*
- *If tapered roller bearings, differential cage, gearbox housing or clutch housing are renewed, adjust differential ⇒ page 192 .*



1 - Gearbox housing

2 - Shim

- For differential
- Determining thickness ⇒ page 200

3 - Tapered roller bearing outer race

- Pulling out ⇒ page 197
- Pressing in ⇒ page 198

4 - Tapered roller bearing inner race

- Pulling off ⇒ page 197
- Pressing on ⇒ page 197

5 - Differential cage

- With final drive gear
- Differential cage adapted to one-piece thrust washer ⇒ page 199
- Allocation ⇒ Electronic parts catalogue “ETKA”

6 - Tapered roller bearing inner race

- Pulling off ⇒ page 197
- Pressing on ⇒ page 197

7 - Tapered roller bearing outer race

- Pressing out ⇒ page 196
- Pressing in ⇒ page 197

8 - Clutch housing

9 - Sleeve

- To support oil seal ⇒ Item 10 (page 195) .
- Removing and installing ⇒ page 132

10 - Seal

- Renewing oil seal for left flange shaft with gearbox installed ⇒ page 184
- Renewing seal for right flange shaft with gearbox installed (two-part seal and sleeve for right flange shaft) ⇒ page 186

11 - One-piece seal and sleeve

- If seal is damaged, renew seal and sleeve together ⇒ page 189

12 - Countersunk bolt, 25 Nm

- ❑ Screw into threaded piece ⇒ Item 20 (page 196)

13 - Flange shaft

- ❑ Removing and installing ⇒ page 184

14 - Compression spring for flange shaft

15 - Thrust washer

- ❑ Installation position ⇒ page 200

16 - Tapered ring

- ❑ With grooves to engage in thrust washer
- ❑ Installation position: taper towards differential cage

17 - Retaining ring

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

18 - One-piece thrust washer

- ❑ Coat with gear oil when installing
- ❑ One-piece thrust washer has shoulder in some gearboxes ⇒ page 199

19 - Sun wheel

- ❑ Installing ⇒ page 199

20 - Threaded piece

- ❑ Installing ⇒ page 199

21 - Differential pinion pin

- ❑ Drive out using drift
- ❑ Installing ⇒ page 199

22 - Spring pin

- ❑ For securing differential pinion pin
- ❑ Spring pins of different lengths have been installed
- ❑ Spring pin identification ⇒ page 198
- ❑ Removing and installing short spring pin ⇒ page 198
- ❑ Long spring pin is sheared off when removed ⇒ page 199
- ❑ Installing long spring pin ⇒ page 199

23 - Planet pinion

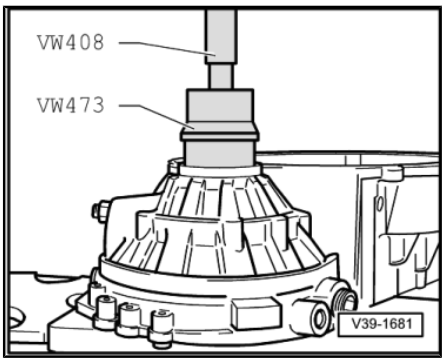
- ❑ Installing ⇒ page 199

24 - Sun wheel

- ❑ Installing ⇒ page 199

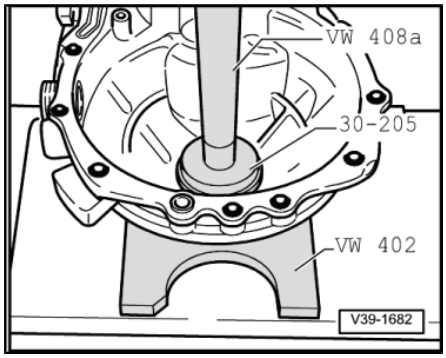
Pressing tapered roller bearing outer race out of clutch housing

– First remove seating sleeve for flange shaft seal.



Pressing tapered roller bearing outer race into clutch housing

No shim is installed in the clutch housing end.

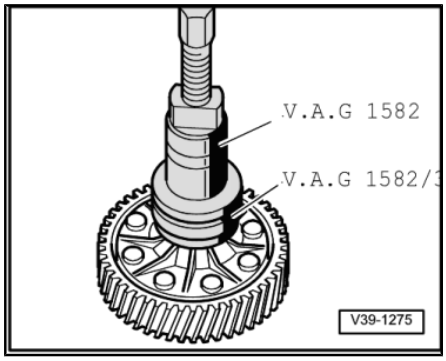


Pulling off tapered roller bearing inner races

– Before fitting extractor, position thrust plate -40 - 105- on differential cage.

Note

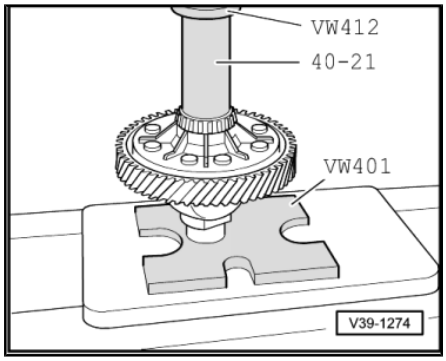
Both tapered roller bearing inner races are pulled off the differential cage in the same way.



Pressing on tapered roller bearing inner race

Note

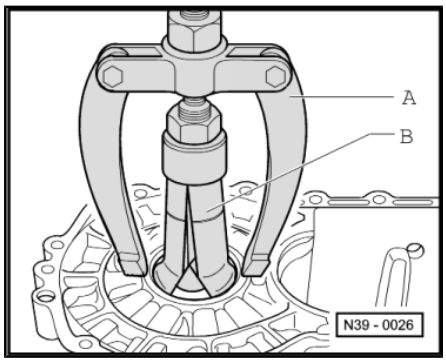
The inner races of tapered roller bearings for gearbox housing and clutch housing are pressed on with the same press tools.



Pulling outer race for tapered roller bearing out of gearbox housing

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

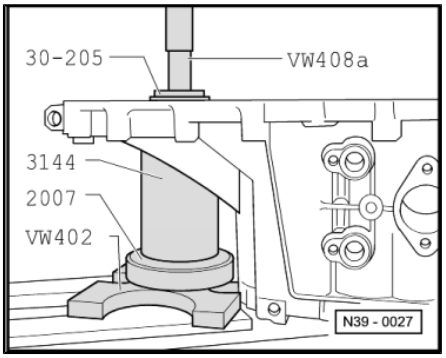
B - Internal puller, 46 … 58 mm , e.g. -Kukko 21/7-



Pressing tapered roller bearing outer race into gearbox housing

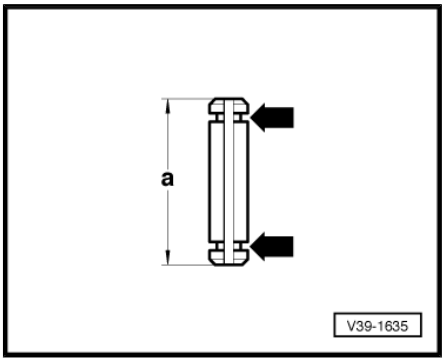
– Fit shim under outer race.

– Support gearbox housing directly below bearing mounting using sleeve -3144- .



Spring pin identification

Dim. “a” mm	Identification
28.5 (short spring pin) Removing and installing ⇒ page 198	Circumferential groove -arrows-
36.0 (long spring pin), Removing ⇒ page 199 , Installing ⇒ page 199	No circumferential groove

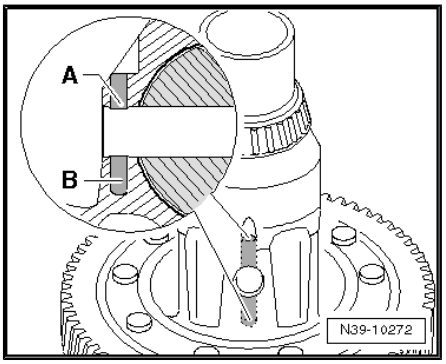


Allocation of differential cages

– Check hole for spring pin in differential cage.

The hole in the differential cage was modified for the longer spring pin.

Hole	Length of spring pin (mm)
-A-	28.5 (short spring pin)
-A- and -B-	36.0 (long spring pin)



Removing and installing spring pin with circumferential groove (short spring pin)

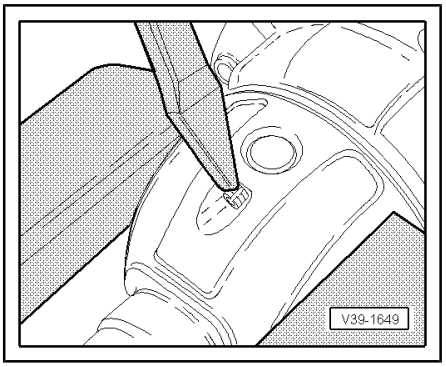
Removing

– Cover tapered roller bearing inner race and speedometer drive gear to avoid possible damage and ingress of metal particles.

– Drive out spring pin with chisel, inserting chisel into circumferential groove.

Installing

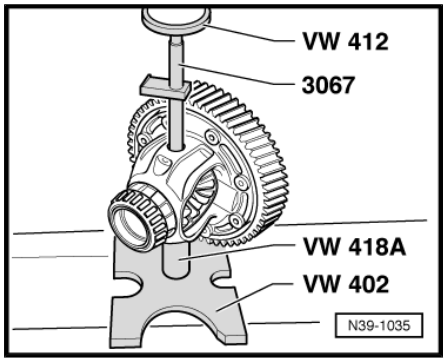
– Drive into differential cage to stop.



Removing spring pin without circumferential groove (long spring pin); pressing out differential pinion pin

When pressed out, spring pin will be sheared off.

– Drive remainder of spring pin out of differential cage and differential pinion pin.

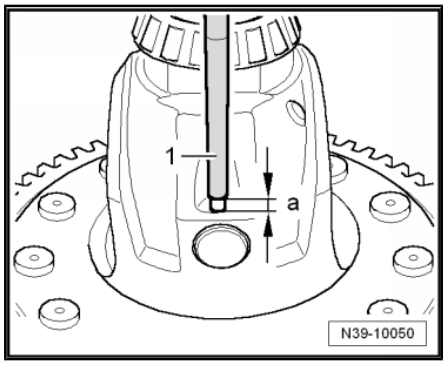


Installing spring pin without circumferential groove (long spring pin)

– Align hole in differential pinion pin with hole in differential cage.

– Drive in new spring pin with drift -1- until dimension -a- = 3.0 mm is attained.

• The spring pin must not come in contact with gears with differential cage installed.

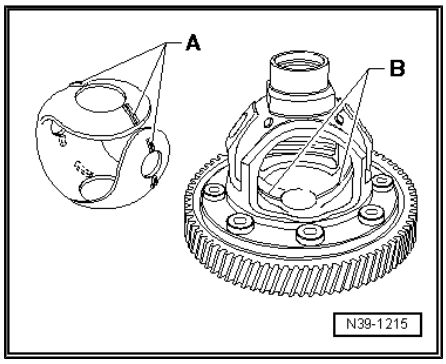


In some gearboxes, the one-piece thrust washer has a shoulder -A- near the holes.

In this case, the differential cage has a circumferential groove -B-.

– Lubricate one-piece thrust washer with gear oil and install.

– Install one-piece thrust washer so that it engages in groove -B- in differential cage.



Installing differential bevel gears and differential pinion pin

– Lubricate one-piece thrust washer with gear oil and install.

– Install both sun wheels and secure (e.g. with flange shaft).

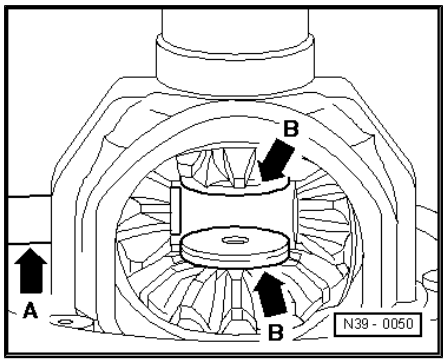
– Insert planet pinions offset 180° and pivot into position.

– Press in differential pinion pin (-arrow A-) to first planet pinion.

– Place threaded pieces -arrows B- in sun gears.

Installation position: shoulder to sun gear

– Drive differential pinion pin into final position and secure with spring pin.

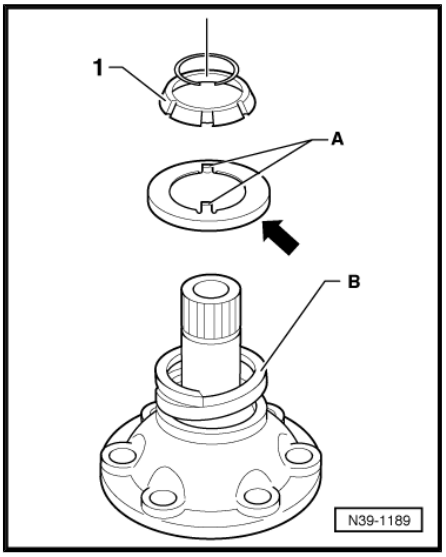


Installation position of thrust washer for tapered ring -1-.

The shoulder -arrow- points towards spring -B-.

Some gearboxes have lugs -A-.

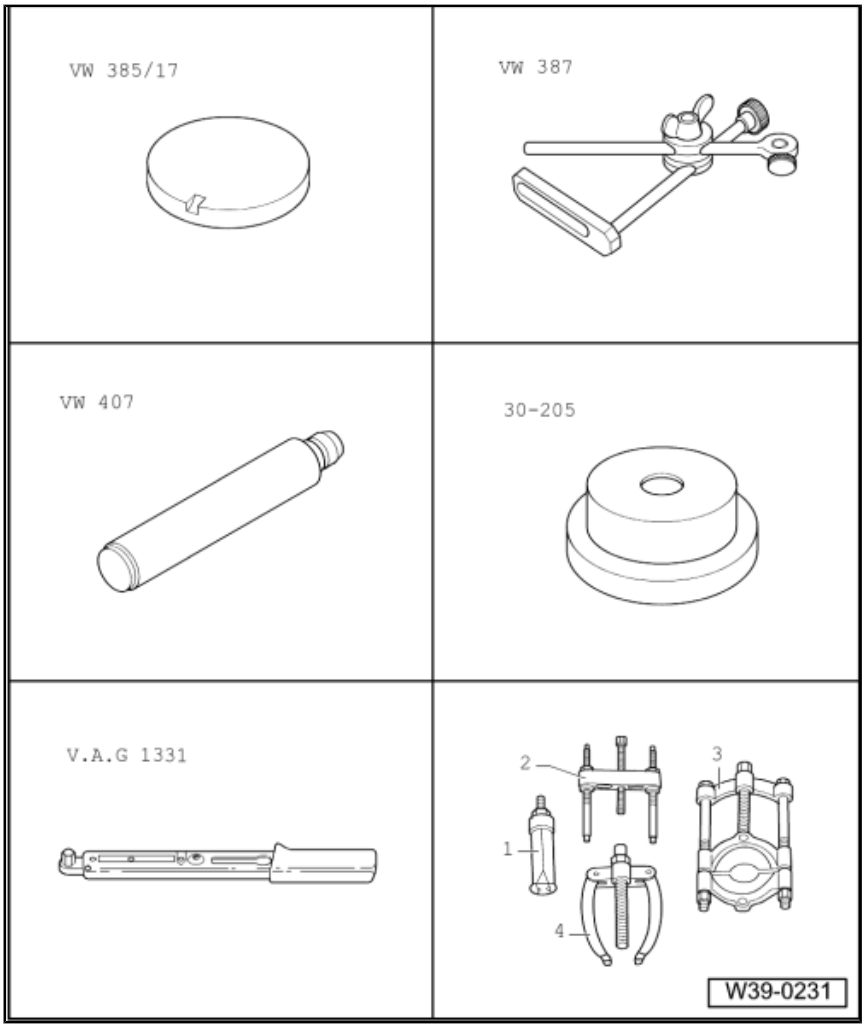
Lugs -A- face tapered ring -1-.



3.2 Adjusting differential

Special tools and workshop equipment required

- Universal dial gauge bracket -VW 387-
- End dimension plate - VW 385/17-
- Press tool -VW 407-
- Thrust plate -30 - 205-
- Torque wrench - V.A.G 1331-
- Internal puller -1 - Kukko 21/7-
- Counter support -4 - Kukko 22/2-
- Dial gauge



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

- Gearbox housing
- Clutch housing
- Differential cage

or the

- Tapered roller bearing of differential

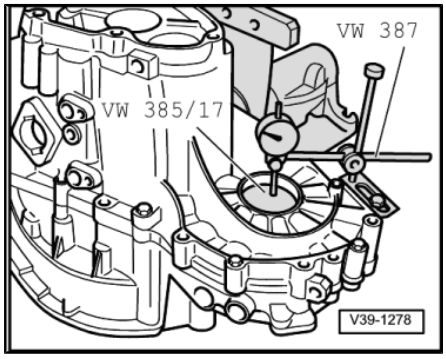
Adjustment overview ⇒ page 192 .

– Press tapered roller bearing outer race without shim into gearbox housing using thrust piece -30 - 205- ⇒ page 198 .

Note

Inner and outer tapered roller bearing races are paired. Do not interchange!

– Press outer race of tapered roller bearing into clutch housing using thrust plate -30 - 205- ⇒ page 197 .
– Fit differential into clutch housing.
– Set gearbox housing in place and tighten 5 bolts to 25 Nm.
– Attach dial gauge and set to “0” with 1 mm preload.
– Move differential up and down. Read and note play indicated on dial gauge. (Example: 0.70 mm)



3.2.1 Determining thickness of shim

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

Example:

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

Example:

Bearing play, measured value	Thickness of shim according to table
0.70 mm	0.95 mm

Table of shims

Bearing play	Shim
bearing clearance (mm)	Thickness (mm)

Bearing play	Shim
0.303 … 0.449	0.650
0.450 … 0.499	0.700
0.500 … 0.549	0.750
0.550 … 0.599	0.800
0.600 … 0.649	0.850
0.650 … 0.699	0.900
0.700 … 0.749	0.950
0.750 … 0.799	1.000
0.800 … 0.849	1.050
0.850 … 0.899	1.100
0.900 … 0.949	1.150
0.950 … 0.999	1.200
1.000 … 1.049	1.250
1.050 … 1.099	1.300
1.100 … 1.149	1.350
1.150 … 1.199	1.400

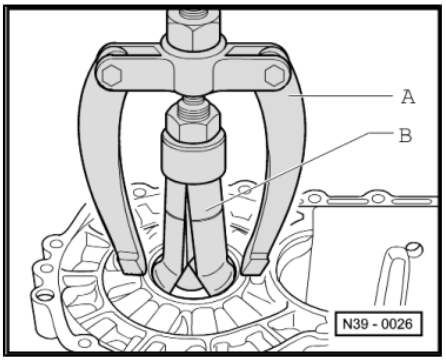
Note

Allocate shims according to ⇒ Electronic parts catalogue "ETKA".

– Remove gearbox housing and pull tapered 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-



– Insert shims of determined thickness, thickest shim first.

If the size of shim required is larger than those listed in the table, insert two shims totalling the correct figure.

The various thicknesses make it possible to achieve the exact shim thickness required.

– Press in tapered roller bearing outer race together with the correct shim (in example 0.95 mm) again ⇒ page 198 and bolt gearbox housing tight.