



## Workshop Manual

up! 2012 ➤

up! 2017 ➤

**Removed automated 5-speed manual gearbox 0CT**

Edition 10.2016





## List 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.

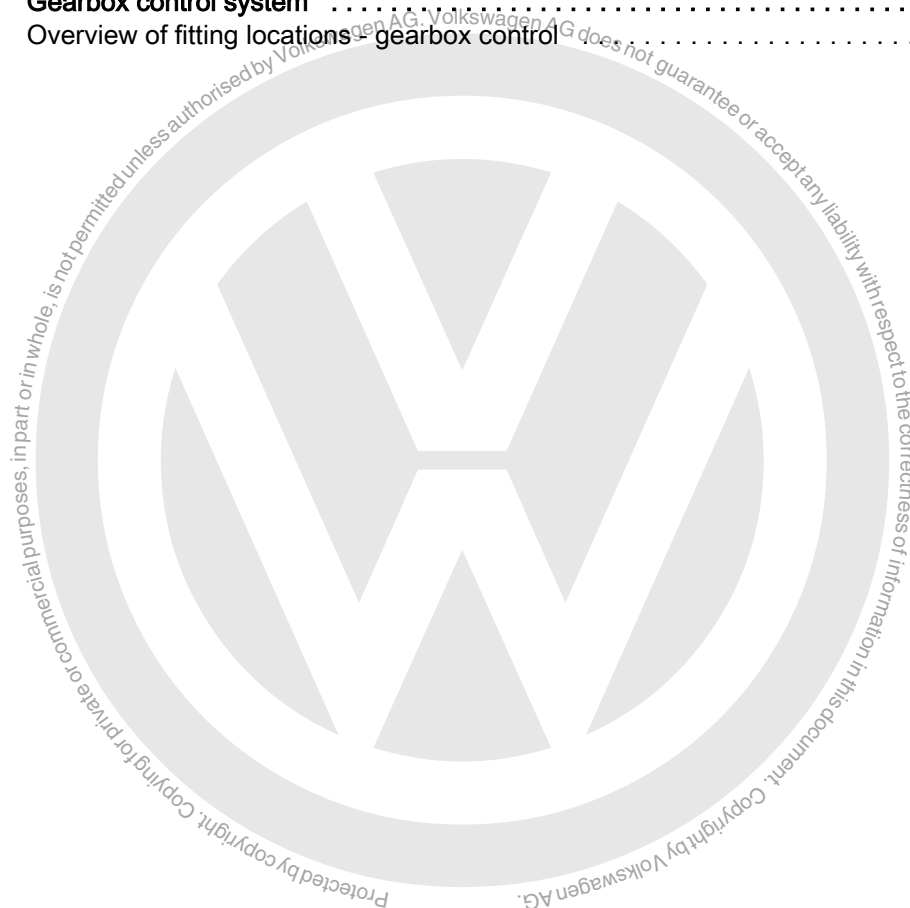


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## 00 – Technical data

### 1 Identification

(VRL009691; Edition 10.2016)

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

#### 1.1 Gearbox identification

The relevant description can be found in ⇒ Rep. gr. 00 ; Identification; Gearbox identification .



## 2 Repair notes

⇒ "2.1 General repair instructions", page 2

### 2.1 General repair instructions

To ensure flawless and successful gearbox repairs, the greatest care and cleanliness as well as the use of good and proper tools are essential. Also note the basic rules on safety when performing repair procedures.

A number of general notes on the individual repair procedures, which can otherwise be found in the relevant sections of the manual, are summarised here. They apply for this particular workshop manual.

#### Special tool

For a complete list of special tools used in this workshop manual, see ⇒ Workshop equipment and special tools .

#### Gearbox

- ◆ When installing the manual gearbox, ensure that the dowel sleeves between the engine and gearbox are correctly seated.
- ◆ The contact surfaces of waxed parts must be cleaned before the parts are installed. Contact surfaces must be free of wax and grease.
- ◆ Allocate bolts and other components using ⇒ Electronic parts catalogue (ETKA) .

#### Gaskets and seals

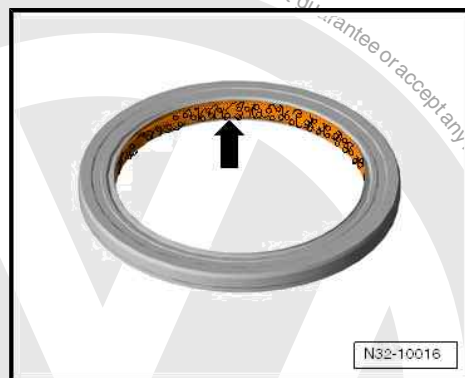
After removing gaskets and seals, always inspect contact surfaces of housing and shaft for burrs resulting from removal or for other signs of damage.

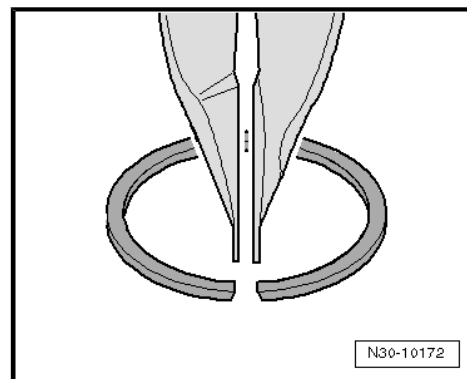
- ◆ Thoroughly clean joint surfaces and apply sealant .
- ◆ Allocation ⇒ Electronic parts catalogue (ETKA)
- ◆ Before installing radial oil seals, half-fill space between sealing lips with sealing grease -arrow-.
- ◆ Allocate grease using ⇒ Electronic parts catalogue (ETKA) .
- ◆ The open side of the oil seals faces toward the side with fluid filling.
- ◆ Lightly oil O-rings before installing; this prevents the rings being crushed when inserted.

#### Sealant

- ◆ Thoroughly clean housing joint surfaces before applying sealant .
- ◆ Apply sealant uniformly and not too thickly.
- ◆ Allocation ⇒ Electronic parts catalogue (ETKA) .
- ◆ Breather holes must remain free of sealant .

#### Locking devices

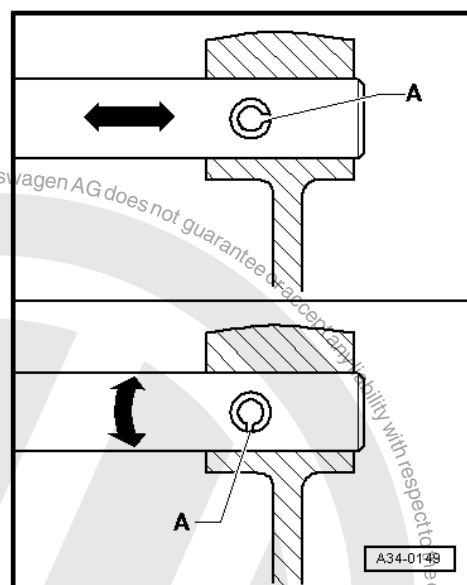




- ◆ Do not overstretch retaining rings.
- ◆ Installation position for retaining rings: At the top, the ring is »narrower« and its installation position therefore as well. This make it possible for the pliers to gain a better grip during removal and installation.
- ◆ Renew retaining rings which have been damaged or over-stretched after removal.
- ◆ Retaining rings must locate properly in grooves.
- ◆ Renew spring pins. Installation position: slit -A- should be in line with the line of force -arrow-.

#### Nuts and bolts

- ◆ Loosen and tighten securing bolts and nuts for covers and housings diagonally.
- ◆ Do not cant especially delicate parts, such as clutch pressure plates. Loosen and tighten bolts and nuts in stages in a diagonal sequence.
- ◆ Specified torques given are for unloiled nuts, bolts and screws.
- ◆ Renew self-locking bolts and nuts after each removal.
- ◆ Ensure with threaded connections that contact surfaces as well as nuts and bolts are re waxed only after assembly, if necessary.
- ◆ Use a thread chaser to clear residual locking fluid from all threaded holes into which self-locking bolts are to be screwed. Otherwise there is a danger of bolts shearing when subsequently being removed.
- ◆ Check pitch of thread, to ensure correct thread chaser is used to clean threads and to ensure the threads are not damaged.



#### Bearings

- ◆ Lubricate all bearings with gear oil before installing.
- ◆ Heat inner races of tapered roller bearings with the inductive heater - VAS 6414- to approx. 100 °C before installing. Press in to stop when installing so there is no axial clearance.
- ◆ Do not interchange outer or inner races of bearings of the same size. The bearings are matched in pairs.
- ◆ Tapered roller bearings fitted to one shaft must be replaced as a set. Use same make of bearings.
- ◆ Install needle bearings, ball sleeves and roller sleeves with lettered side (thicker metal) towards fitting tool.

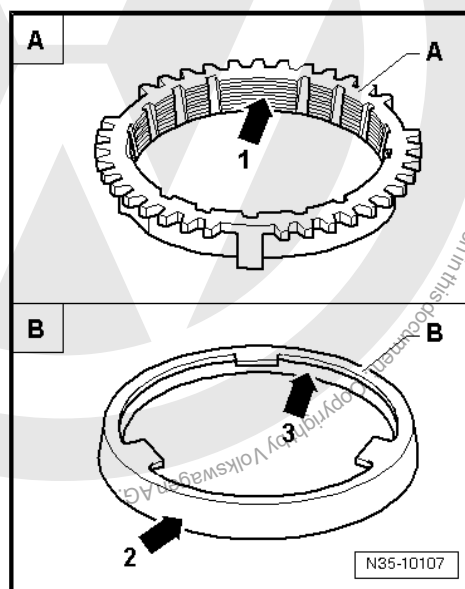
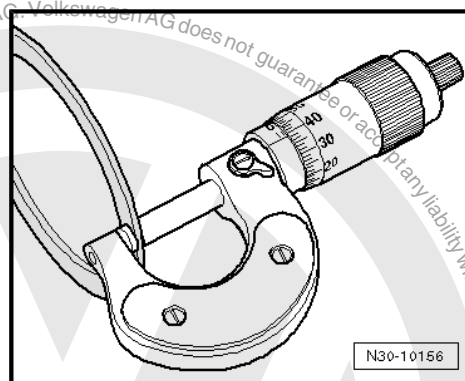


## Shims

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

## Synchro-rings

- ◆ Do not interchange them. When reusing synchro-rings, always fit to the same synchromeshed 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 the cone of the synchromeshed gear for »scoring« and »signs of abnormal wear«.
- ◆ Moisten synchromesh mechanism with gear oil before installing.



## Gears and synchro-hubs

- ◆ Heat synchro-hubs to about 100 °C with the inductive heater - VAS 6414- before installing. Press in to stop when installing so there is no axial clearance.
- ◆ Heat gears to about 100°C with the inductive heater - VAS 6414- before installing. Press in to stop when installing so there is no axial clearance.
- ◆ Note installation position.

## Synchromeshed gears

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

## Clutch

- ◆ Ensure that the pressure plate does not cant: loosen and tighten bolts diagonally and in several gradual stages.
- ◆ In order to reduce the smell of a burned clutch, the clutch housing as well as the stopping face of the flywheel must be thoroughly cleaned with a cloth.





### 3 Technical data

⇒ **"3.1 Allocation gearbox - engine", page 5** .

⇒ **"3.2 Calculation of gear ratios", page 5** .

#### 3.1 Allocation gearbox - engine

The relevant description can be found in ⇒ Rep. gr. 00 ; Technical data; Allocation gearbox - engine .

#### 3.2 Calculation of gear ratios

The relevant description can be found in ⇒ Rep. gr. 00 ; Technical data; Calculation of transmission ratio .



## 4 Electrical components

The relevant description can be found in ⇒ Rep. gr. 00 ; Electrical components; Overview of fitting locations - electrical components .





## 30 – Clutch

### 1 Clutch operation

⇒ [“1.1 Assembly overview - clutch release mechanism”, page 7](#)

⇒ [“1.2 Repairing clutch release mechanism”, page 9](#)

#### 1.1 Assembly overview - clutch release mechanism

##### 1 - Release bearing

- ☐ To remove and install, remove gearbox
- ☐ Remove and install together with clutch release lever  
 ⇒ [Item 3 \(page 7\)](#)  
 and guide sleeve  
 ⇒ [Item 5 \(page 7\)](#)
- ☐ Do not wash out bearing; wipe only
- ☐ Renew noisy bearings

Perform [Basic Setting](#) using [Guided Functions](#) in vehicle diagnostic tester.

##### 2 - Bolt

- ☐ Renew after removal
- ☐ 5 Nm and turn 90° further

##### 3 - Clutch release lever

- ☐ To remove and install, remove gearbox
- ☐ Remove and install together with release bearing  
 ⇒ [Item 1 \(page 7\)](#) and guide sleeve  
 ⇒ [Item 5 \(page 7\)](#)
- ☐ Remove old grease
- ☐ Perform [Basic Setting](#) using [Guided Functions](#) in vehicle diagnostic tester

##### 4 - Retaining spring

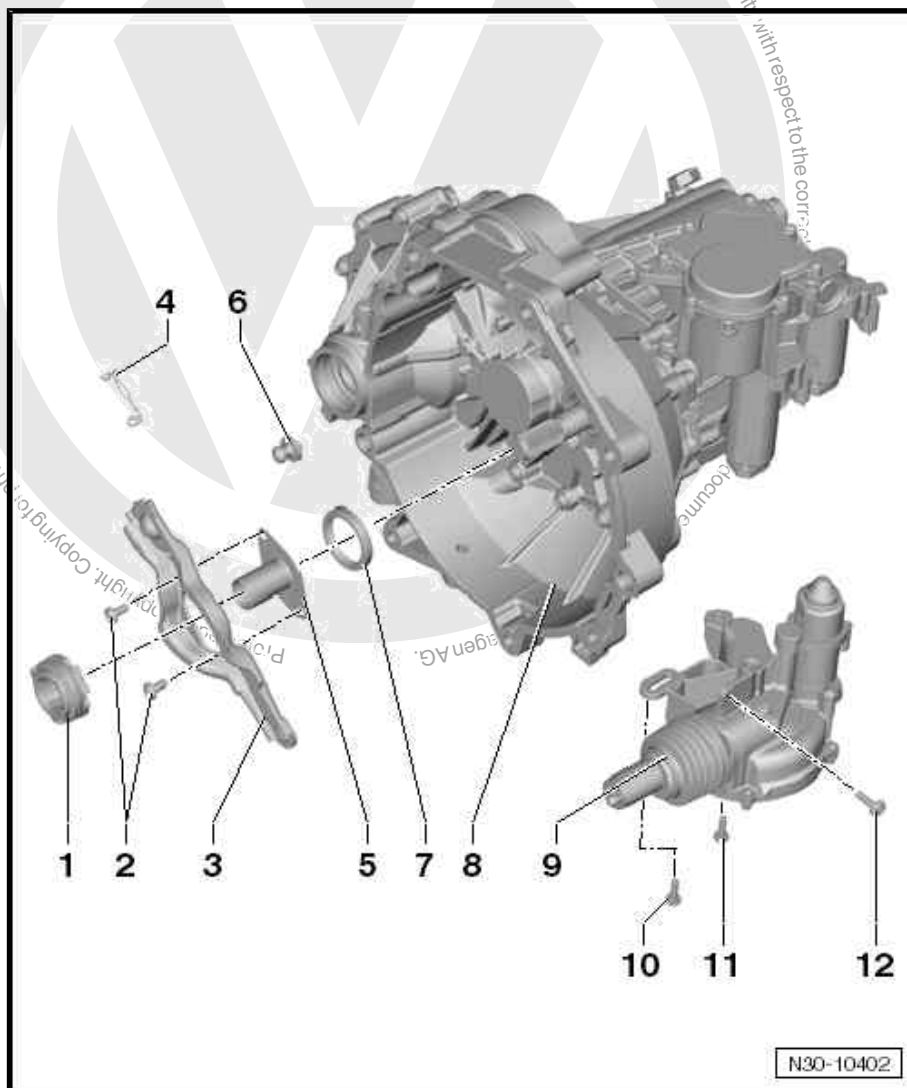
- ☐ To remove and install, remove gearbox
- ☐ Secure to clutch release lever

##### 5 - Guide sleeve

- ☐ To remove and install, remove gearbox
- ☐ Remove and install together with release bearing ⇒ [Item 1 \(page 7\)](#) and clutch release lever  
 ⇒ [Item 3 \(page 7\)](#) ⇒ [page 9](#) to ⇒ [page 10](#)

##### 6 - Ball pin

- ☐ To check or renew, remove gearbox
- ☐ Check for wear ⇒ [page 11](#)



N30-10402



- ☐ Renew after removal ⇒ [page 11](#)
- ☐ Remove old grease from contact surface of clutch release lever
- ☐ Grease contact surface of ball-head pin with grease for clutch plate splines .
- ☐ Allocate grease using ⇒ Electronic parts catalogue (ETKA) .
- ☐ Perform **Basic Setting** using **Guided Functions** in ⇒ vehicle diagnostic tester

## 7 - Input shaft seal

- ☐ Renew after removal ⇒ [page 53](#)

## 8 - Gearbox

### 9 - Clutch actuator - VX64-

- ☐ With motor for clutch actuator - V530-
- ☐ Removing and installing ⇒ Rep. gr. 30 ; Clutch mechanism; Removing and installing clutch actuator - VX64-

### 10 - Bolt

- ☐ ⇒ [“4.4 Assembly overview - shafts, differential, selector mechanism”, page 28](#)

### 11 - Bolt

- ☐ ⇒ [“4.4 Assembly overview - shafts, differential, selector mechanism”, page 28](#)

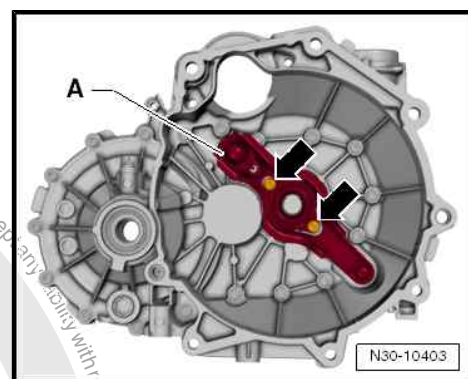
### 12 - Bolt

- ☐ ⇒ [“4.4 Assembly overview - shafts, differential, selector mechanism”, page 28](#)

## 1.2 Repairing clutch release mechanism

### Special tools and workshop equipment required

- ◆ Torque wrench - VAS 6583-



### Removing and installing clutch release lever -A- with release bearing and guide sleeve

- Gearbox has been removed.
- Unhook retaining spring on clutch release lever.
- Unscrew bolts -arrows-.
- Pull clutch release lever with release bearing and guide sleeve off input shaft and ball stud.

Install in reverse order of removal.

- Install gearbox. ⇒ Rep. gr. 34 ; Removing and installing gearbox

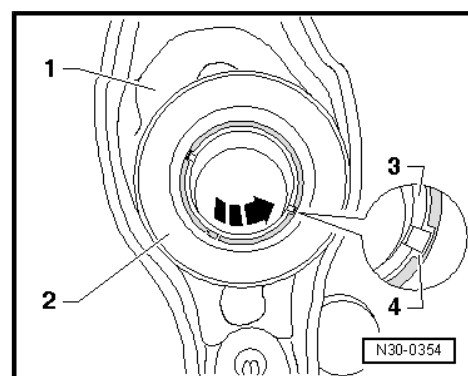
### Torque settings

- Guide sleeve to gearbox ⇒ [page 9](#)

### Removing and installing guide sleeve from/to clutch release bearing

- Push guide sleeve -3- upwards out of release bearing -2-.
- Turn guide sleeve -3- about 90° in direction of arrow relative to release bearing -2- until locking lugs of guide sleeve align with grooves -4- of release bearing.
- Pull guide sleeve out of release bearing in this position.

Install in reverse order of removal.

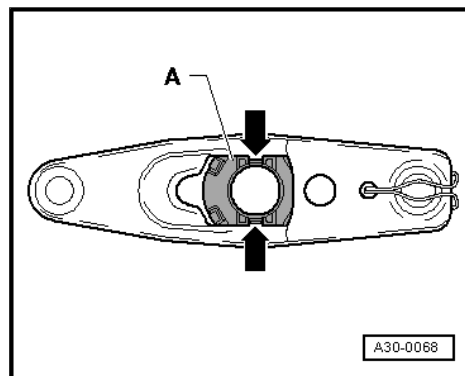




### Removing and installing release bearing

- 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 retaining lugs -arrows- engage.

Perform **Basic Setting** using **Guided Functions** in ⇒ vehicle diagnostic tester .



## 2 Clutch

⇒ ["2.1 Checking ball-head pin for wear and renewing it", page 11](#)

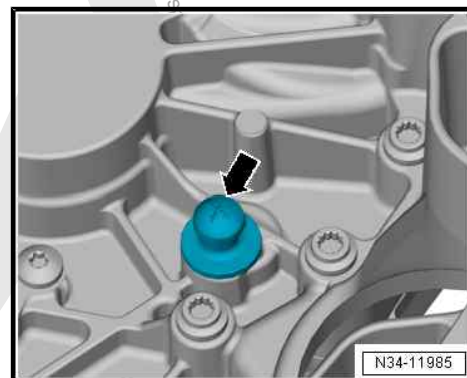
⇒ ["2.2 Assembly overview - clutch", page 12](#)

⇒ ["2.3 Removing and installing clutch", page 13](#)

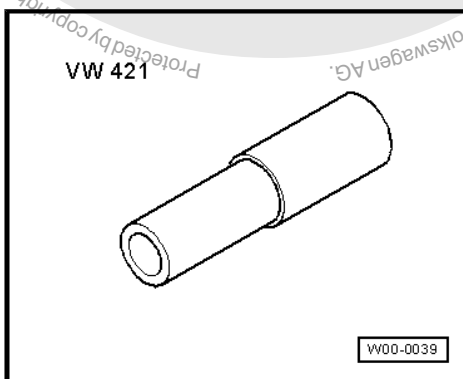
### 2.1 Checking ball-head pin for wear and renewing it

Special tools and workshop equipment required

- ◆ Valve stem seal puller - 3364-



- ◆ Tube - VW 421-

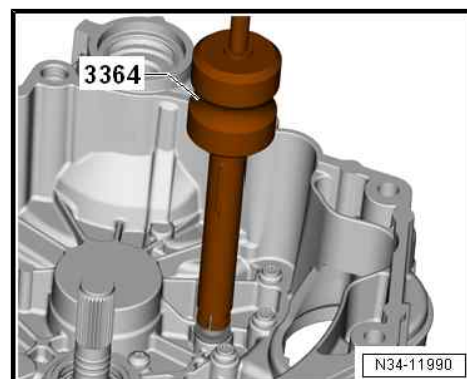


#### Checking ball pin for wear

- Renew ball pin when marking -arrow- is no longer visible.

#### Removing ball pin

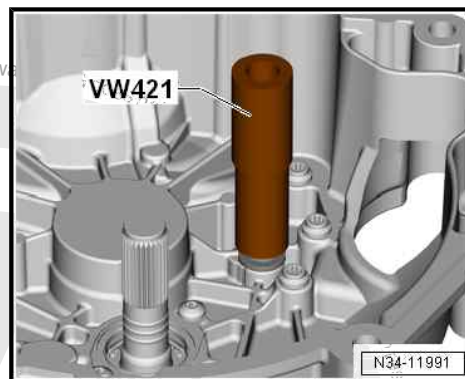
- Do not cant ball pin.





### Installing ball pin

- Clean mounting hole for ball pin and coat with D6.
- Carefully drive in new ball pin to stop.



## 2.2 Assembly overview - clutch

### 1 - Flywheel

- ☐ Removing and installing  
⇒ Rep. gr. 13 ; Cylinder  
block (gearbox end);  
Assembly overview - fly  
wheel .
- ☐ Ensure that centring  
pins fit tightly
- ☐ Keep contact surface for  
clutch lining free of  
grooves, oil and grease.
- ☐ Perform Basic Set-  
ting using Guided  
Functions in ⇒ vehicle  
diagnostic tester

### 2 - Clutch plate

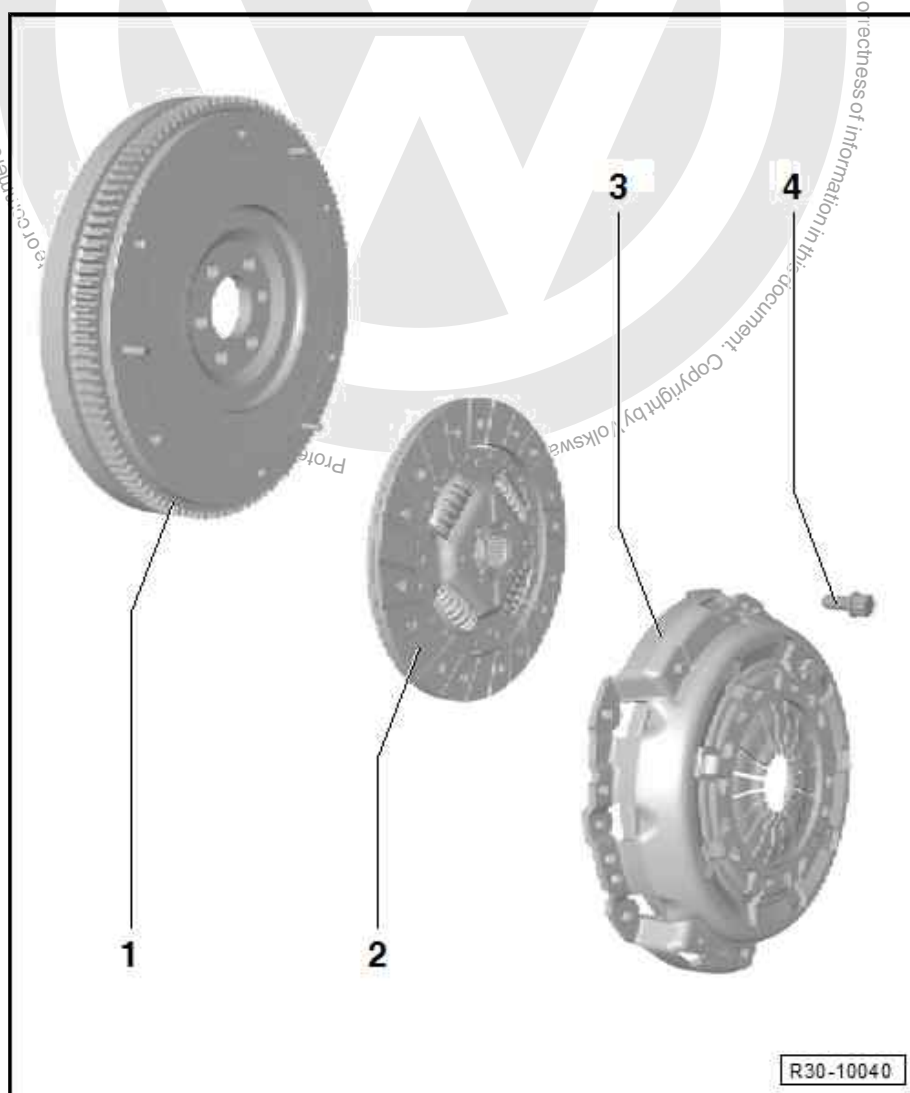
- ☐ Allocation ⇒ Electronic  
parts catalogue (ETKA)
- ☐ Centring ⇒ [page 13](#)
- ☐ Perform Basic Set-  
ting using Guided  
Functions in ⇒ vehicle  
diagnostic tester

### 3 - Pressure plate

- ☐ Removing and installing  
⇒ [page 13](#)
- ☐ Check ends of dia-  
phragm spring  
⇒ [page 15](#)
- ☐ Check spring connec-  
tions and riveted con-  
nections ⇒ [page 15](#) .
- ☐ Perform Basic Set-  
ting using Guided  
Functions in ⇒ vehicle  
diagnostic tester

### 4 - Bolt

- ☐ Allocation ⇒ Electronic parts catalogue (ETKA)
- ☐ Loosen or tighten diagonally in small steps
- ☐ M 6: 13 Nm
- ☐ M 7: 20 Nm



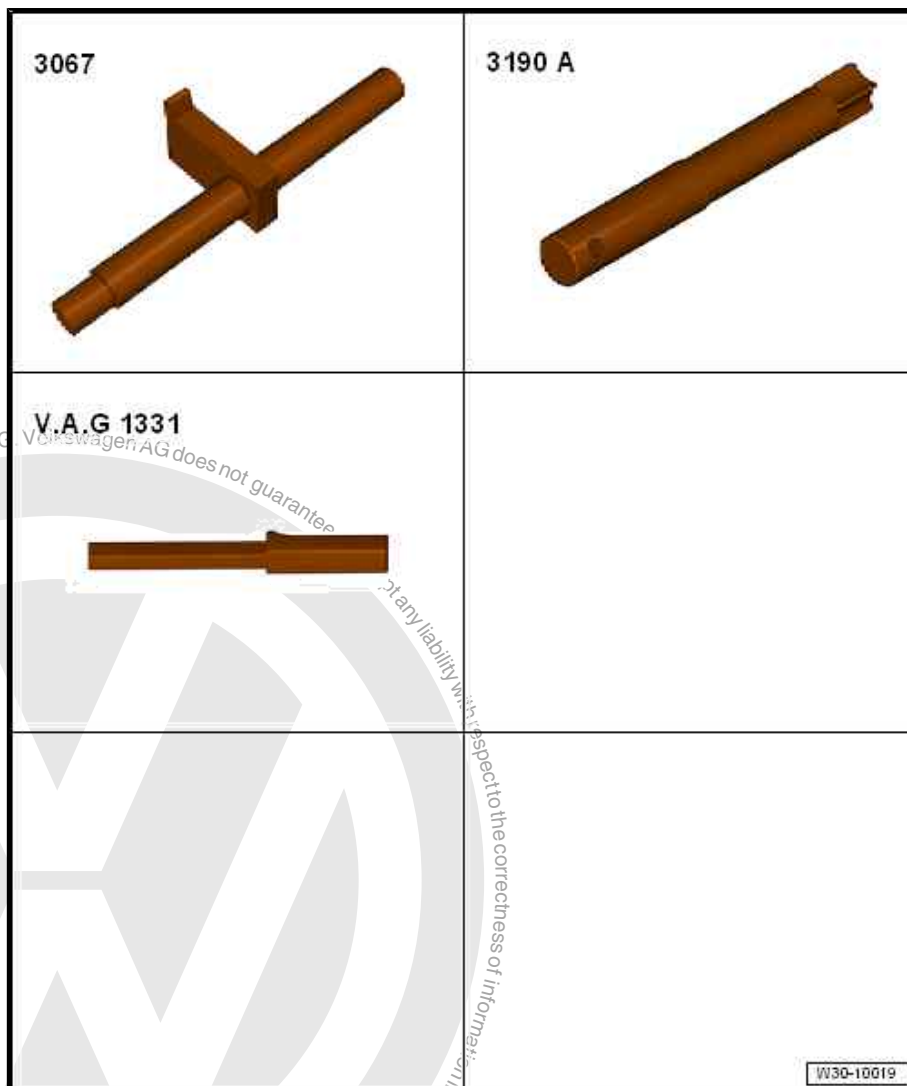




## 2.3 Removing and installing clutch

### Special tools and workshop equipment required

- ◆ Retainer - 3067-
- ◆ Centring pin - 3190 A-
- ◆ Torque wrench - V.A.G 1331-
- ◆ Grease for splines
- ◆ Allocate grease using ⇒ Electronic parts catalogue (ETKA) .



### Removing

- Gearbox is removed.



- Use counterhold tool - 3067- to loosen bolts.

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

- Loosen all bolts in small steps and diagonally.
- Remove pressure plate and clutch plate.

#### Installing

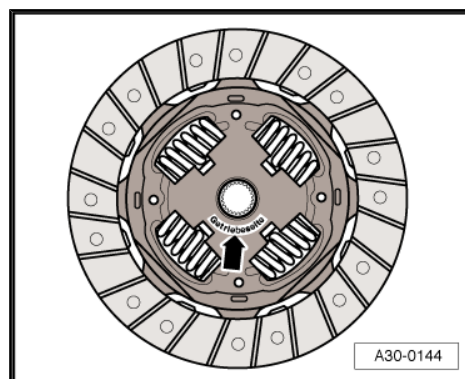
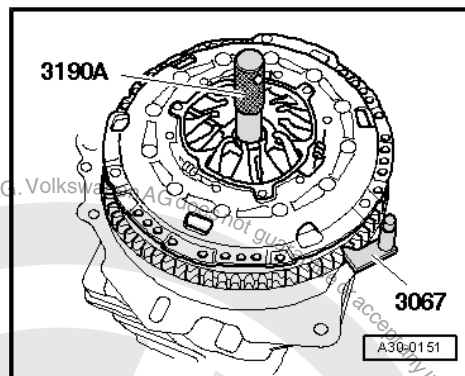


#### Note

- ◆ Allocate clutch plate and clutch pressure plate according to engine code and ➔ Electronic parts catalogue (ETKA) .
- ◆ Clean splines of drive shaft and, if the clutch plate has been used, clean the splines of the hub. Remove corrosion and apply a very thin coat of clutch plate spline grease to splines. Then, move the clutch plate back and forth on the drive shaft until the hub moves easily on the shaft. Remove excess grease.
- ◆ Clutch pressure plates are protected against corrosion and greased. With the exception of the friction surface for the clutch plate, the clutch pressure plate must not be cleaned. Service life of clutch will otherwise be shortened considerably.
- ◆ The friction surface of the clutch pressure plate and the flywheel must be cleaned (degreased) thoroughly.
- ◆ If the clutch has burnt out, thoroughly clean the gearbox housing in the clutch area and the engine facing the gearbox in order to reduce the smell of burnt linings.
- ◆ Clutch plate linings must make full contact with flywheel and friction surface of clutch pressure plate. Only then insert securing bolts.
- ◆ Tighten securing bolts in small steps diagonally in order not to damage centring holes of pressure plate and centring pins of flywheel .
- ◆ 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.

Install in reverse order of removal and observe the following:

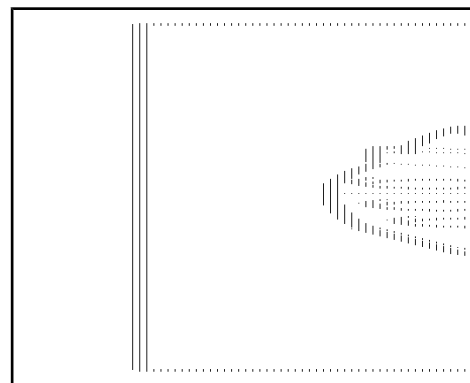
- Installation position of clutch plate: lettering "Getriebeseite" (gearbox end) or spring cage faces pressure plate.





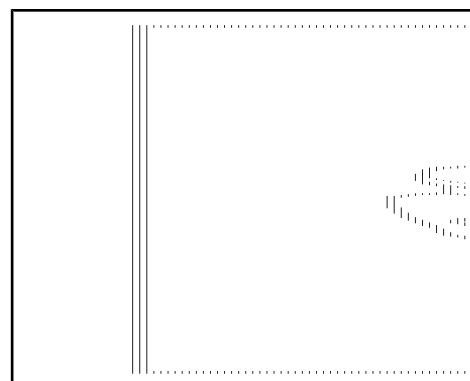
### Check ends of diaphragm spring

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



### Check spring connection and riveted fastenings.

- Check spring connection between thrust plate and cover for cracks and make sure rivet fastenings are seated tightly.
- If pressure plate has damaged springs or loose rivet connections -arrows-, it must be renewed.



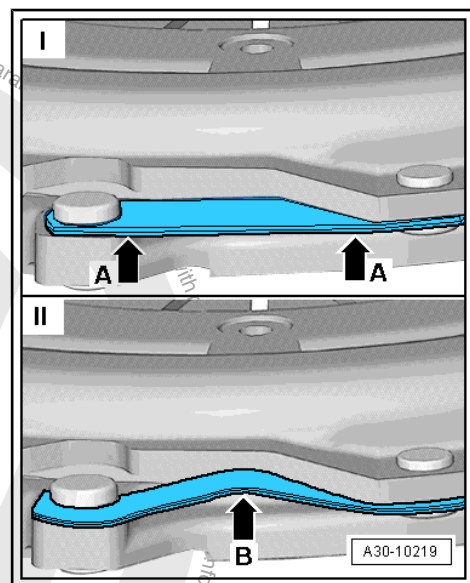
### Check extension springs and riveted connections

I - Extension springs OK.

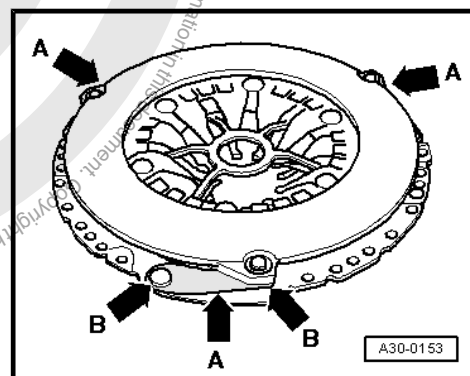
- Minor kinks on the outside area -arrows A- have series production status.

II - Extension springs damaged

- Renew clutch pressure plates if springs are broken or badly bent -arrow B-.
- Check spring connections -arrows A- for damage, and make sure that rivet joints -arrows B- are firmly seated.
- Renew clutch pressure plate if spring connections are broken or badly bent, or if riveting is loose.



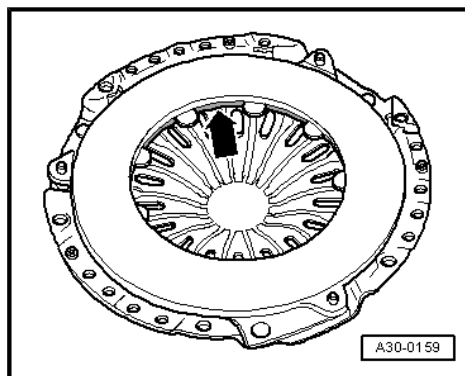
- Make sure rivet joints -arrows B- on all extension springs -arrows A- are firmly seated.
- Tighten all bolts one after another (clockwise) to final torque.
- Renew clutch pressure plate if riveting -arrow B- is loose.





### Check metal ring.

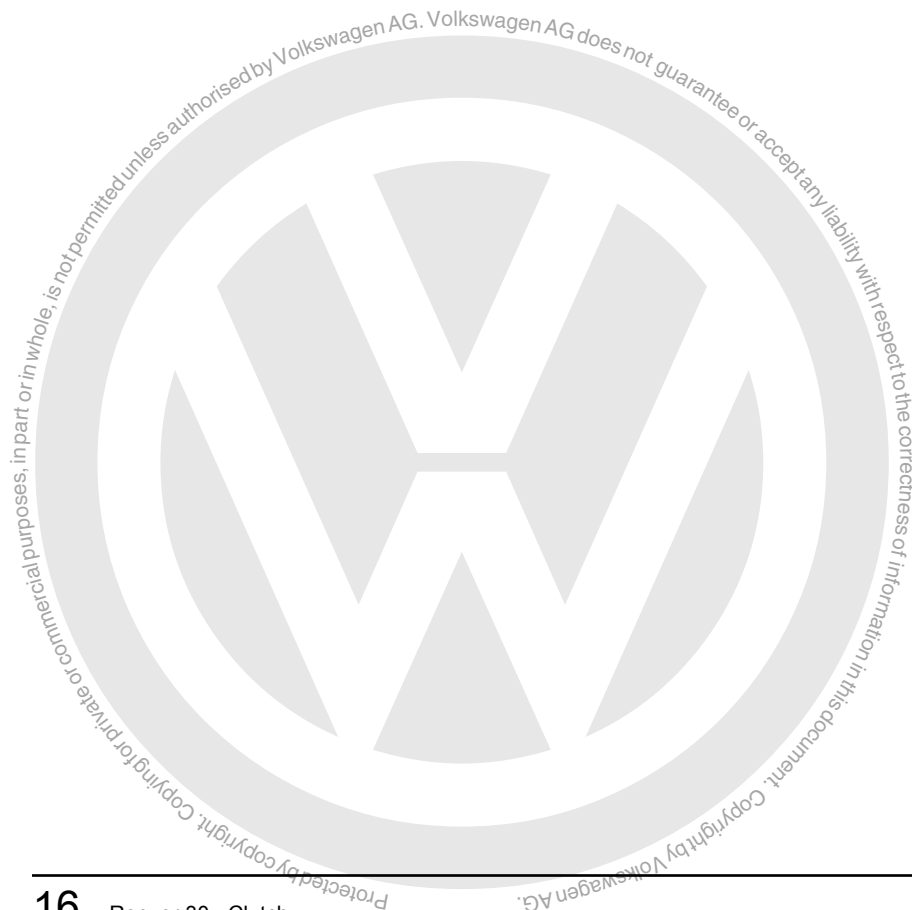
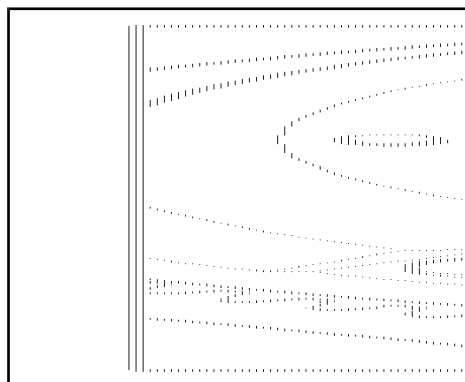
- Check that metal ring in clutch pressure plate -arrow- is not damaged.
- Renew clutch pressure plate if metal ring is broken.



- To centre clutch plate, use centring mandrel - 3190 A- .
- Tighten all bolts in small steps and diagonally.
- Install gearbox ⇒ Rep. gr. 34 ; Removing and installing gearbox .

### Torque settings

- ◆ Pressure plate to flywheel ⇒ [page 12](#) .





## 34 – Controls, housing

### 1 Selector mechanism

⇒ ["1.1 Removing and installing gear actuator VX65", page 17](#)

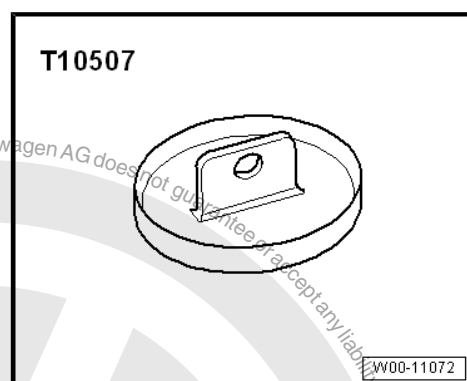
#### 1.1 Removing and installing gear actuator - VX65-

Special tools and workshop equipment required

- ◆ Torque wrench - VAS 6583-



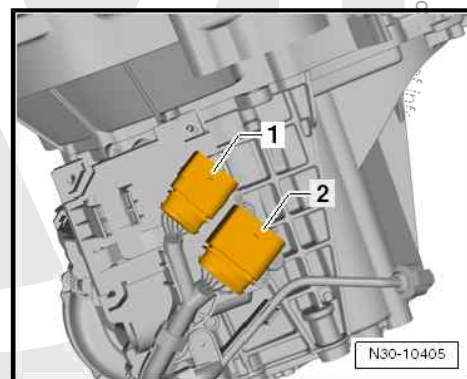
- ◆ Sealing cap - T10507-



- ◆ Sealant
- ◆ Allocation ⇒ Electronic parts catalogue (ETKA)

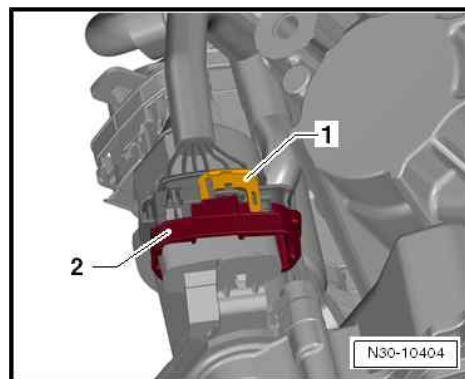
#### Removing

- Secure gearbox on gearbox support - T10484- .
- Protect connectors -1- and -2- against damage.
- The connectors must not be damaged when swivelling the gearbox.





- Disconnect connectors for gear actuator:
- Pull latch -1- towards cable and push catch -2- to side.

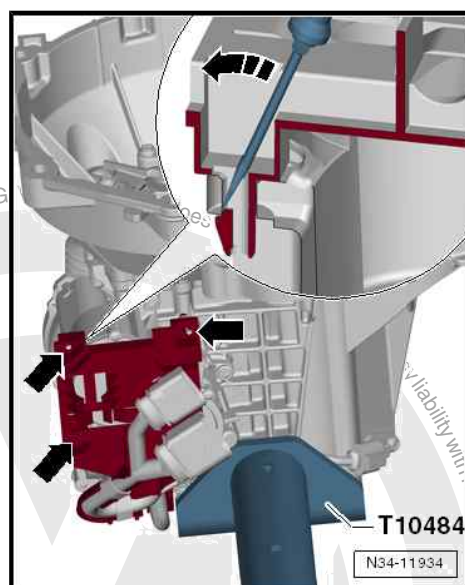


Carefully unclip retainer for wiring harness from gear actuator -arrows-.

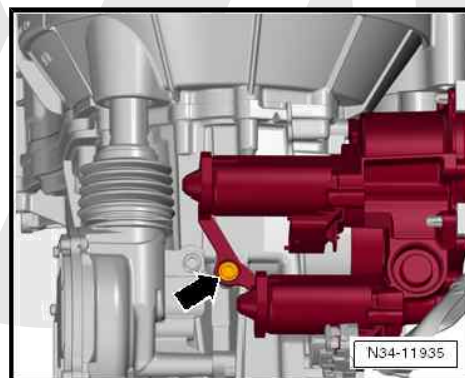


#### Note

- ♦ Risk of damage to catches on retainer.
- ♦ Press catches -arrows- by hand.
- ♦ If necessary, carefully release catches -arrows- using a screw-driver.



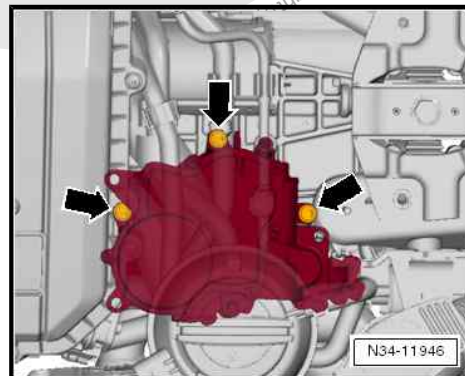
- Unscrew front securing bolt for gear actuator -arrow-.



- Unscrew upper securing bolts for gear actuator -arrows- (illustrated with gearbox installed).

The joint between the gear actuator and the gearbox is sealed with sealant .

- Pull off gear actuator forcefully, because the sealant is adhesive.







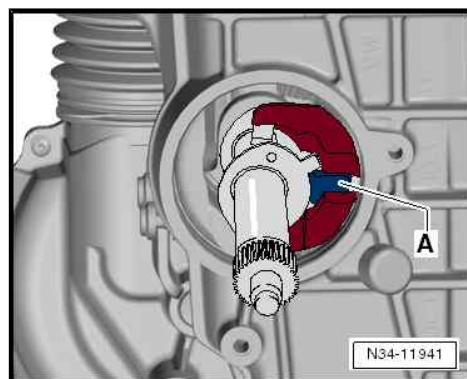
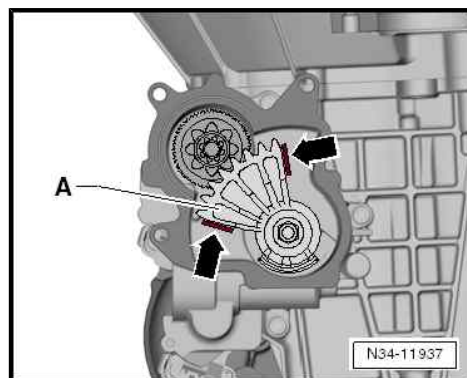
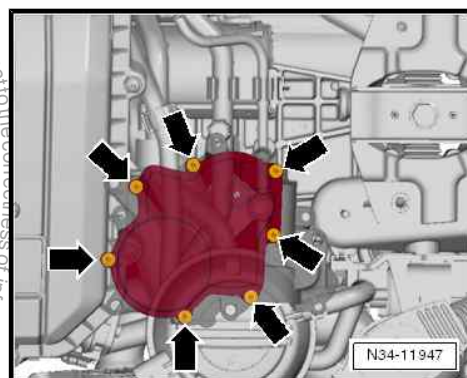
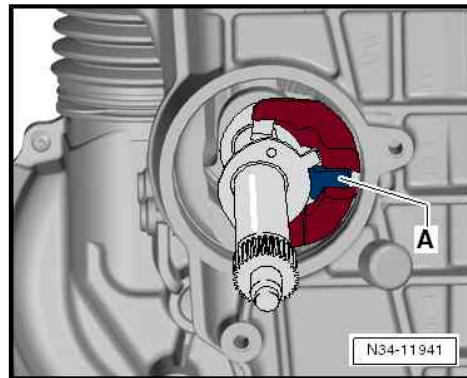
If the gear actuator cannot be pulled off completely, the selector shaft -A- is catching on the dowels in the gearbox.

The selector shaft is illustrated with gear actuator removed.

- Remove cover -arrows-.

Carefully move gearbox selector lever -A- so that it is positioned between the markings -arrows-.

- If the gearbox selector lever -A- cannot be positioned between the markings -arrows-, the gear actuator must be removed with selector shaft installed.
- To do this, unscrew securing nut for gearbox selector lever -A-.
- Pull gear actuator together with gearbox selector lever -A- off selector shaft.
- Move selector plates into neutral position via selector finger -A-.
- Remove selector shaft from gearbox.



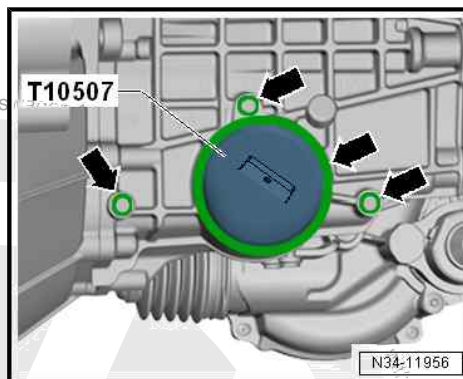


- Insert closure cap - T10507- into gearbox.
- Seal threaded holes for securing gear actuator with M6 bolt each.

- Clean all sealing surfaces on gearbox -arrows-

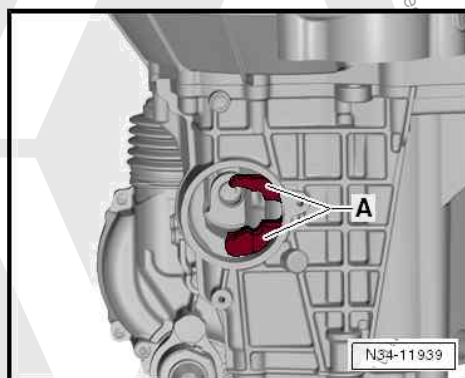
The residual material which is removed during cleaning will fall into the sealing cap .

- If the existing gear actuator can be reinstalled, clean sealing surfaces on gear actuator.



### Installing

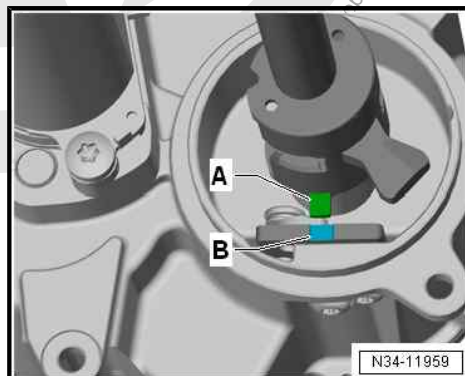
- Carefully remove closure cap - T10507- .
- Unscrew bolts from threaded holes for securing gear actuator.
- The selector rods -A- of the gearbox are in neutral position.



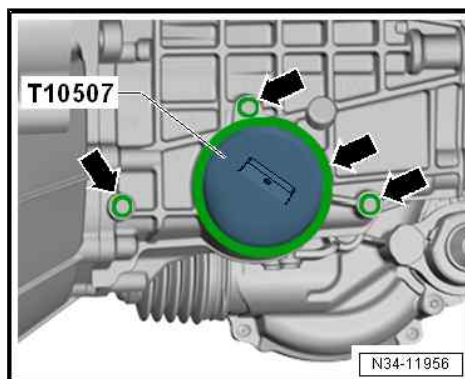
- The gear actuator is in neutral position.

Illustration shows gear actuator from below.

- The pin -A- on the selector shaft points towards recess -B-.
- Turn selector shaft accordingly, if necessary.



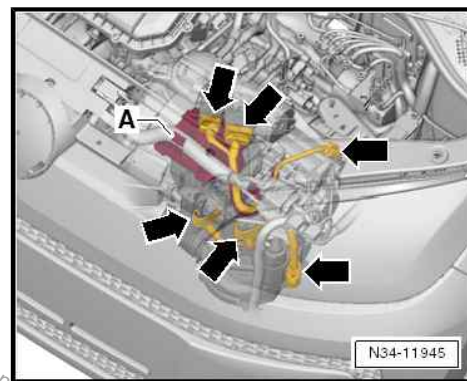
- Uniformly apply sealant at several points on the sealing surfaces of the gear actuator -arrows-.
- Insert gear actuator and bolt it on using new bolts  
⇒ [Item 5 \(page 28\)](#) .



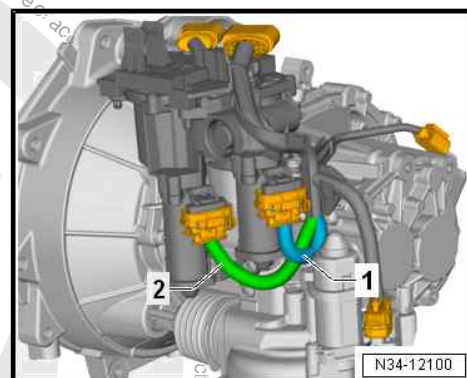




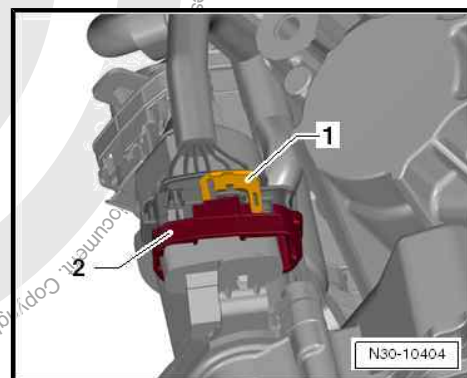
- Clip retainer for wiring harness into gear actuator.
- Connect all connectors on gear actuator, clutch actuator, speed sensor and wiring harness -arrows-.
- Press wiring harness -A- into retainer.



- Route lines without tension.
- Line -1- is located in front of line -2-.



- Connect connectors for gear actuator and clutch actuator as follows:
  - Catch -2- must engage.
  - Press latch -1- downwards.
  - Slightly pull on connector to ensure it is properly engaged.
- Install battery tray ⇒ Electrical system; Rep. gr. 27 ; Battery; Removing and installing battery .
- Install battery ⇒ Electrical system; Rep. gr. 27 ; Battery; Removing and installing battery .
- Perform **Basic Setting** using **Guided Functions** in ⇒ vehicle diagnostic tester .



#### Specified torques

- ◆ Gear actuator to gearbox ⇒ [Item 5 \(page 28\)](#)



## 2 Removing and installing gearbox

The relevant description can be found in ⇒ Rep. gr. 34 ; Removing and installing gearbox .

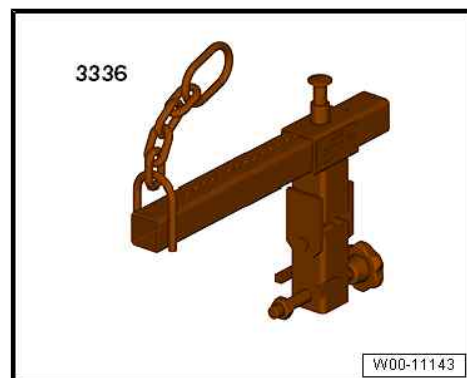




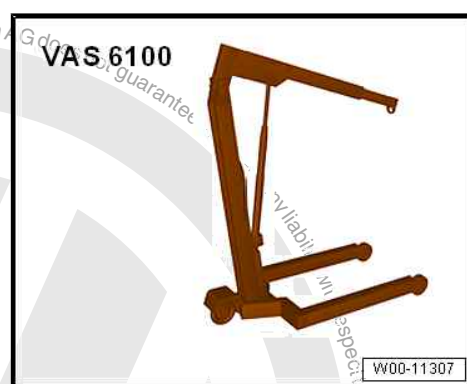
### 3 Transporting gearbox

#### Special tools and workshop equipment required

- ◆ Gearbox mounting support - 3336-



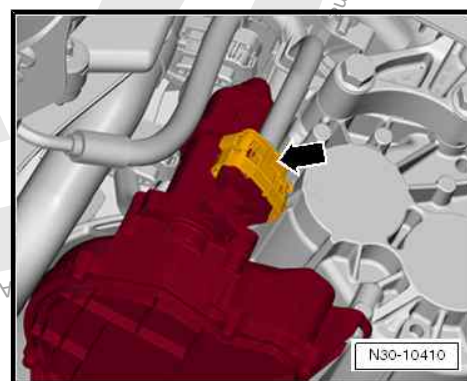
- ◆ Workshop hoist - VAS 6100-



#### Caution

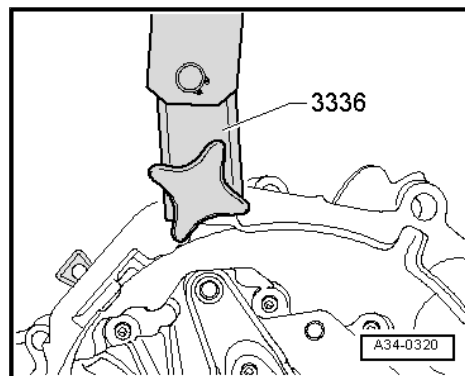
***Protect all connectors and connector housings -arrow- against damage.***

- Transport gearbox carefully.
- ◆ The connector and connector housing -arrow- may become damage or break at the slightest contact.





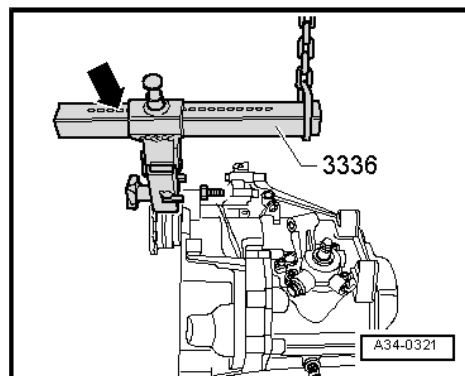
- Bolt gearbox lifting tackle - 3336- to clutch housing.



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

No. of holes visible = 5

- Lift gearbox using workshop crane and gearbox lifting tackle - 3336- .
- Set gearbox aside, for example in a transport container.





## 4 Dismantling and assembling gearbox

⇒ [“4.1 Schematic overview - gearbox”, page 25](#)

⇒ [“4.2 Assembly overview - gearbox”, page 26](#)

⇒ [“4.3 Assembly overview - clutch housing”, page 27](#)

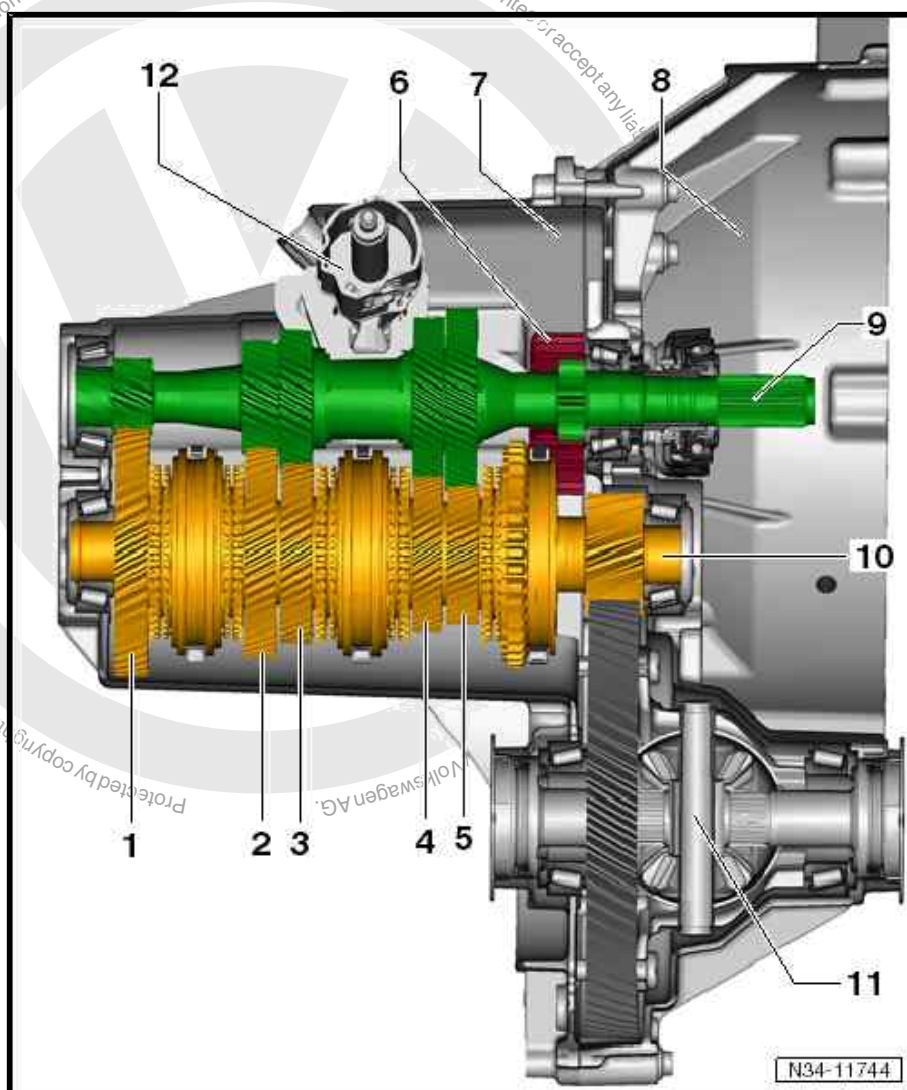
⇒ [“4.4 Assembly overview - shafts, differential, selector mechanism”, page 28](#)

⇒ [“4.5 Renewing selector shaft sleeve”, page 29](#)

⇒ [“4.6 Dismantling and assembling gearbox”, page 30](#)

### 4.1 Schematic overview - gearbox

- 1 - 1st gear
- 2 - 2nd gear
- 3 - 3rd gear
- 4 - 4th gear
- 5 - 5th gear
- 6 - Reverse gear wheel
- 7 - Gearbox housing
- 8 - Clutch housing
- 9 - Input shaft
- 10 - Output shaft
- 11 - Differential
- 12 - Selector mechanism



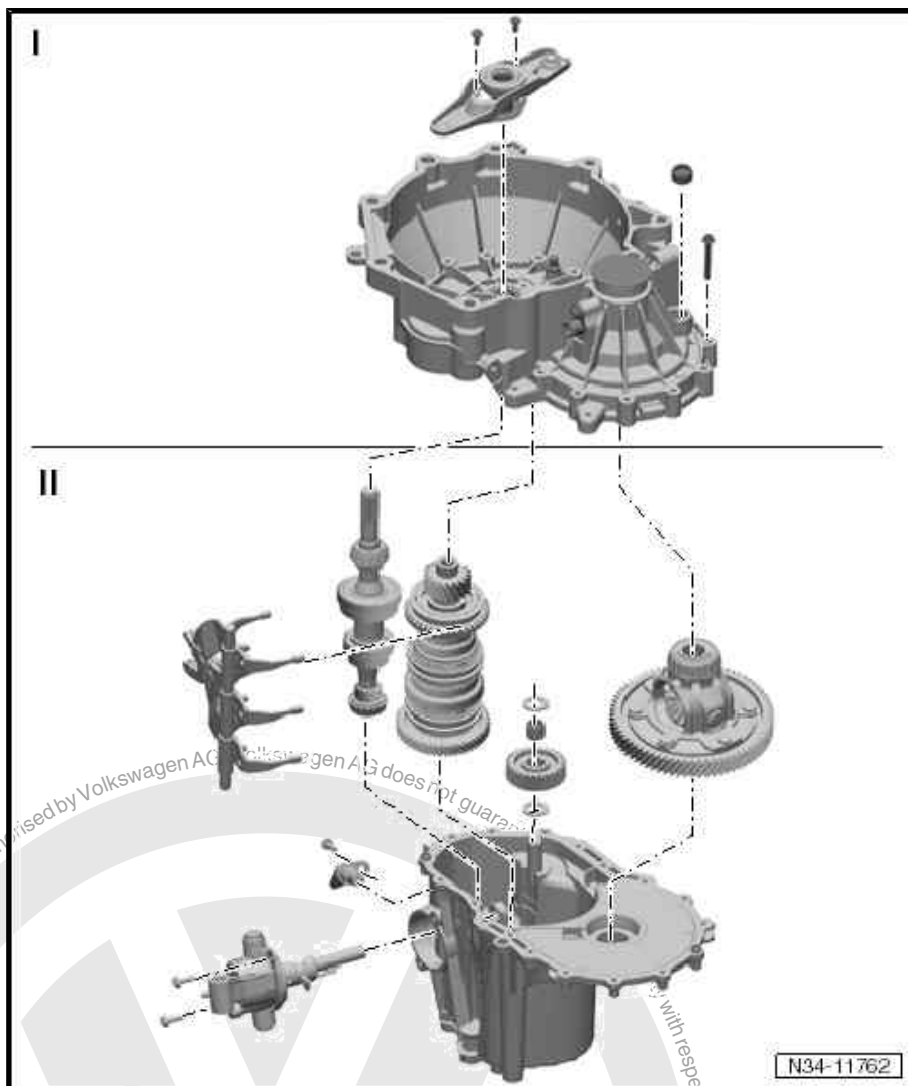


## 4.2 Assembly overview - gearbox

I -  
⇒ [“4.3 Assembly overview - clutch housing”, page 27](#)

II -  
⇒ [“4.4 Assembly overview - shafts, differential, selector mechanism”, page 28](#)

II - Assembly overview - gear actuator. The description is located in the Workshop Manual ⇒ Rep. gr. 34 ; Selector mechanism; Assembly overview - gear actuator .



## 4.3 Assembly overview - clutch housing

### 1 - Clutch housing

- ☐ Allocation ⇒ Electronic parts catalogue (ETKA)
- ☐ Repairing ⇒ [page 36](#)

### 2 - Oil drain plug

- ☐ 30 Nm

### 3 - Bolt

- ☐ Renew after removal
- ☐ 5 Nm and turn 90° further

### 4 - Gearbox housing

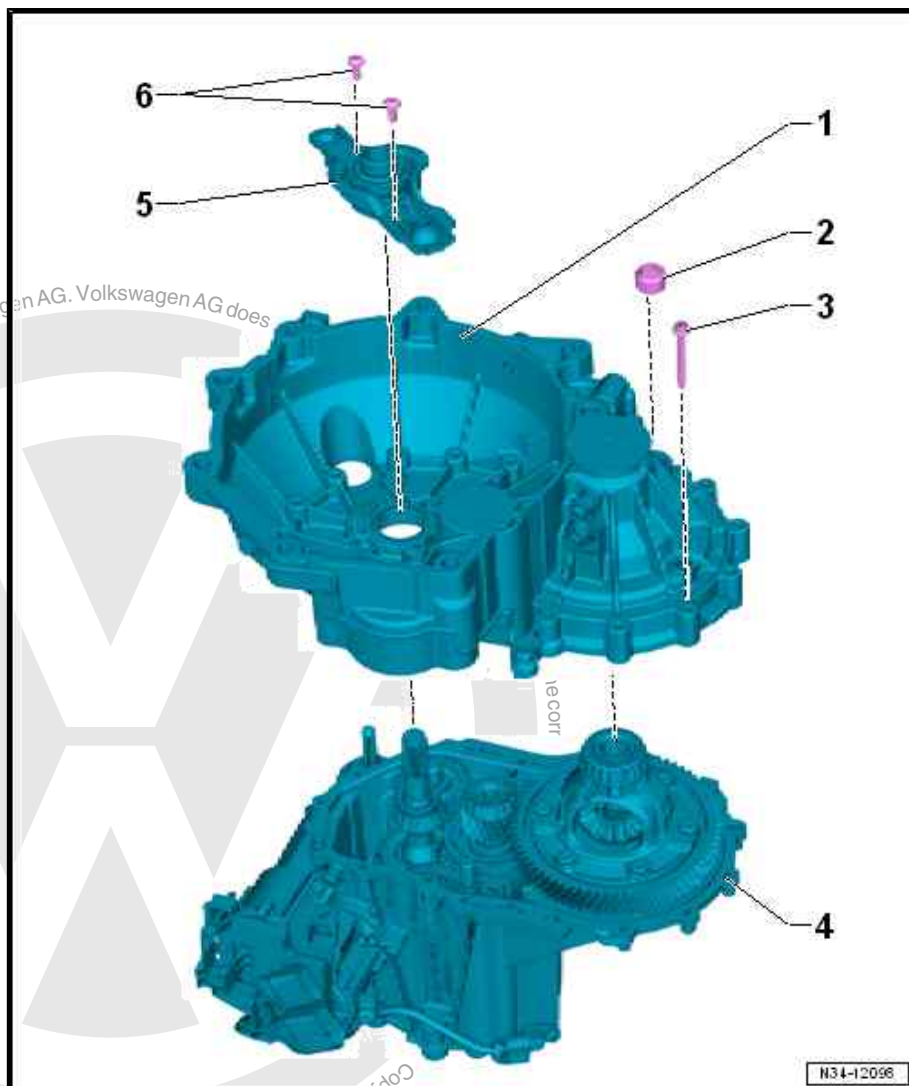
- ☐ Allocation ⇒ Electronic parts catalogue (ETKA)
- ☐ Repairing ⇒ [page 36](#)

### 5 - Clutch release lever

- ☐ With guide sleeve and release bearing
- ☐ To remove and install, remove gearbox
- ☐ Removing and installing ⇒ [page 9](#)

### 6 - Bolt

- ☐ Removing and installing ⇒ [page 9](#)





## 4.4 Assembly overview - shafts, differential, selector mechanism

### 1 - Gearbox housing

- ☐ With reverse shaft -arrow-
- ☐ It is not necessary to remove reverse shaft to allow for removal of reverse gear wheel
- ☐ Repairing gearbox housing ➔ [page 36](#)
- ☐ Allocation ➔ Electronic parts catalogue (ETKA)

### 2 - Gearbox input speed sender - G182-

- ☐ Protect against damaged.
- ☐ Removing and installing ➔ Rep. gr. 39 ; Gearbox control system

### 3 - Bolt

- ☐ Renew after removal
- ☐ 5 Nm and turn 90° further

### 4 - Wiring harness with retainer

- ☐ With connectors for clutch actuator - VX64- , gear actuator - VX65- and gearbox input speed sender - G182- .
- ☐ Do not interchange connectors.
- ☐ Protect connector and connector housing against damage.
- ☐ Removing retainer with wiring harness ➔ [page 18](#)
- ☐ The wiring harness can be removed from retainer.

### 5 - Bolt

- ☐ Qty. 4
- ☐ Gear actuator - VX65- to gearbox
- ☐ Renew after removal
- ☐ 5 Nm and turn 90° further

### 6 - Gear actuator - VX65-

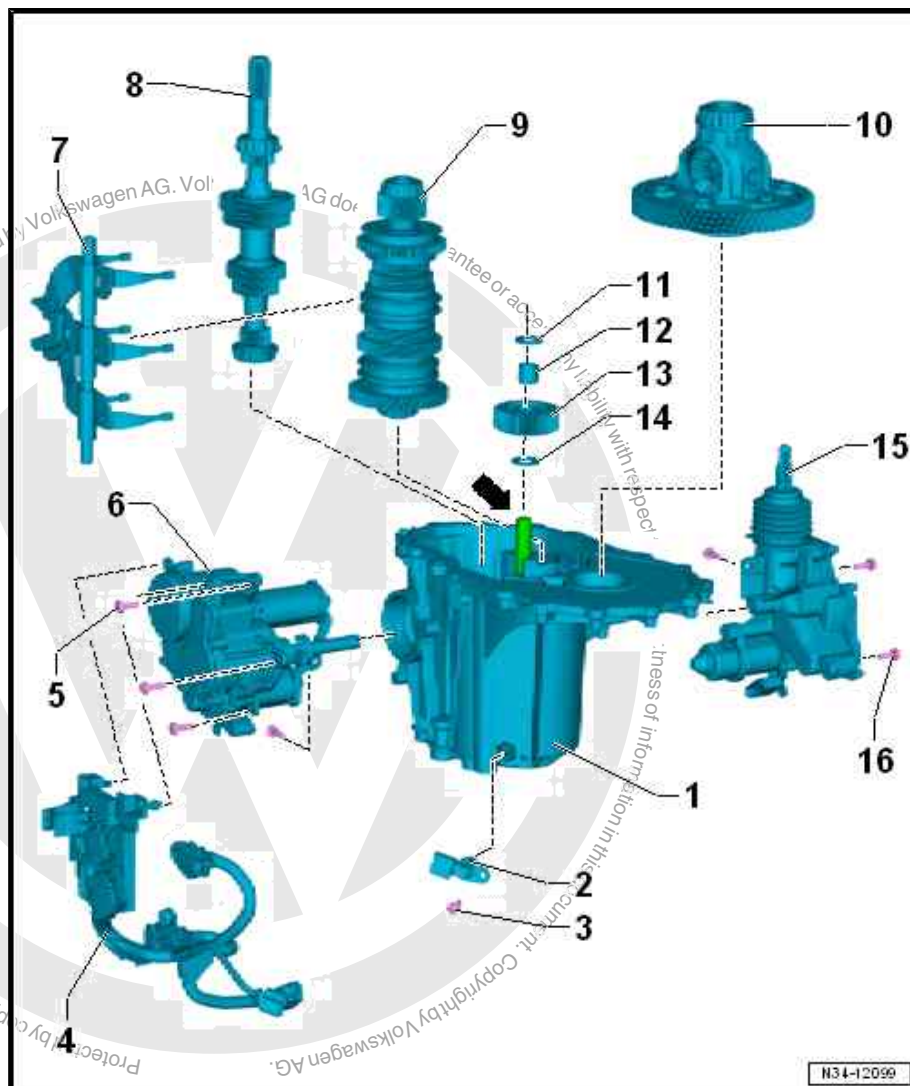
- ☐ With motor 1 for gear actuator - V528- and motor 2 for gear actuator - V529-
- ☐ Removing and installing ➔ [page 17](#)
- ☐ Protect connector and connector housing against damage.
- ☐ Perform Basic Setting using Guided Functions in ➔ vehicle diagnostic tester

### 7 - Selector mechanism

- ☐ (Selector forks)

### 8 - Input shaft

- ☐ ➔ [page 40](#)







## 9 - Output shaft

- ☐ ⇒ [page 55](#)

## 10 - Differential

- ☐ ⇒ [page 74](#)

## 11 - Thrust washer

## 12 - Needle bearing

## 13 - Reverse gear wheel

## 14 - Thrust washer

## 15 - Clutch actuator - VX64-

- ☐ With motor for clutch actuator - V530-
- ☐ Removing and installing ⇒ Rep. gr. 30 ; Clutch mechanism; Assembly overview - clutch actuator
- ☐ Protect connector and connector housing against damage.
- ☐ Perform Basic Setting using Guided Functions in ⇒ vehicle diagnostic tester

## 16 - Bolt

- ☐ Qty. 3
- ☐ Clutch actuator - VX64- to gearbox
- ☐ Renew after removal
- ☐ 5 Nm and turn 90° further

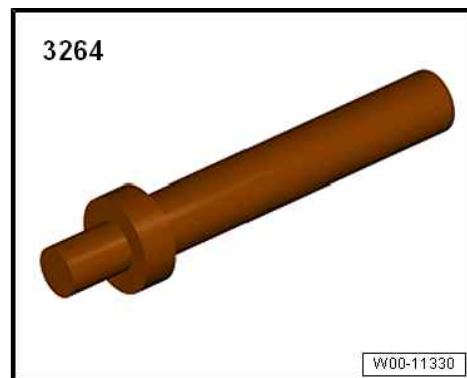
## 4.5 Renewing selector shaft sleeve

### Special tools and workshop equipment required

- ◆ Drift - VW 222 A-



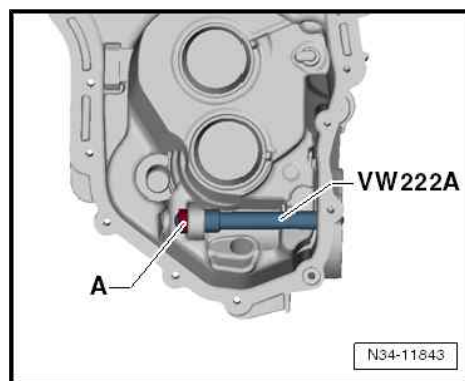
- ◆ Drift - 3264-





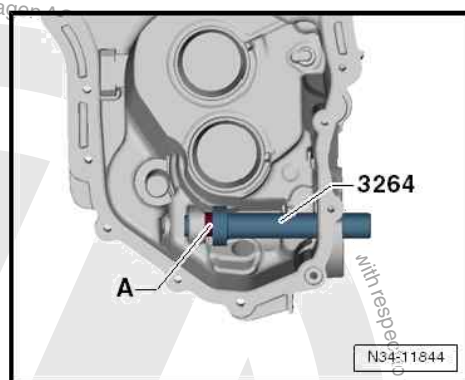
- Remove selector shaft with selector mechanism cover, input shaft, output shaft, differential and selector mechanism  
⇒ [page 30](#) .

Driving out selector shaft sleeve -A-



Driving in selector shaft sleeve -A- to stop

- Assembling gearbox ⇒ [page 30](#) .



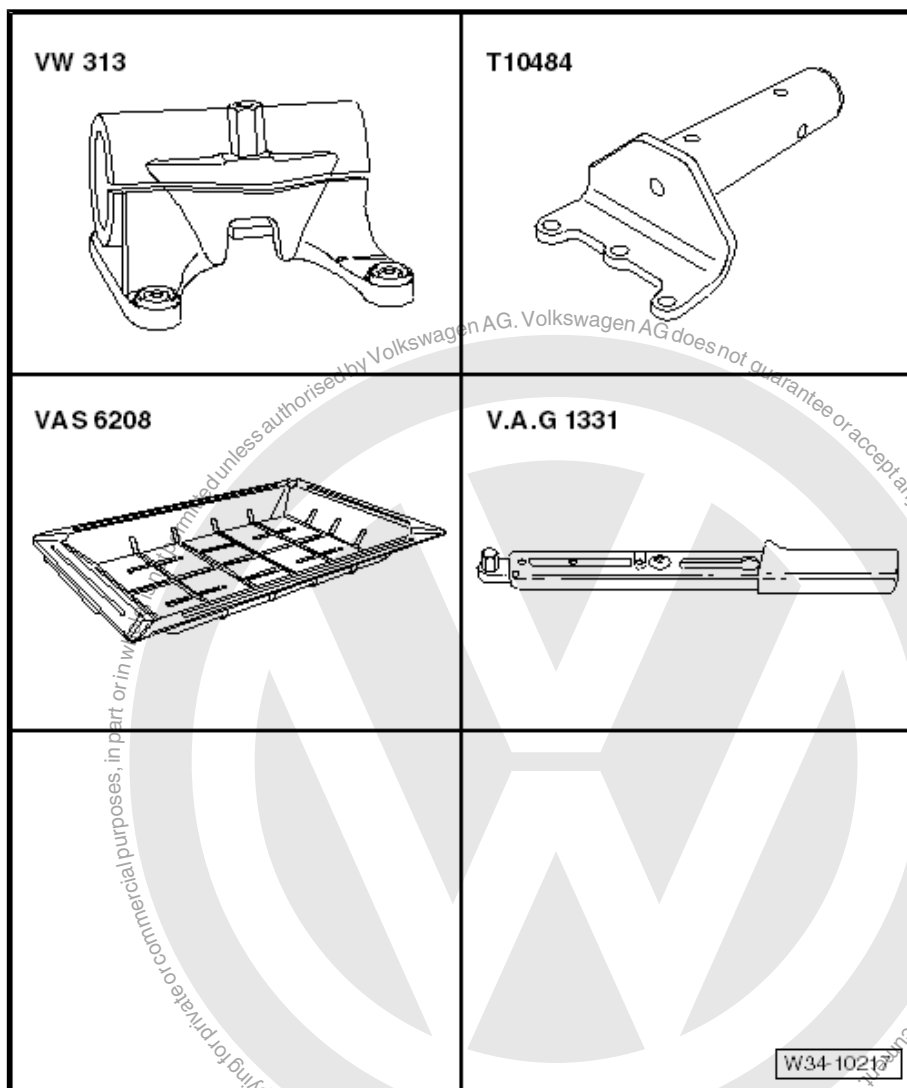
## 4.6 Dismantling and assembling gearbox

Removing and installing clutch housing, differential, gear actuator, clutch actuator, reverse gear wheel, input shaft, output shaft and selector forks



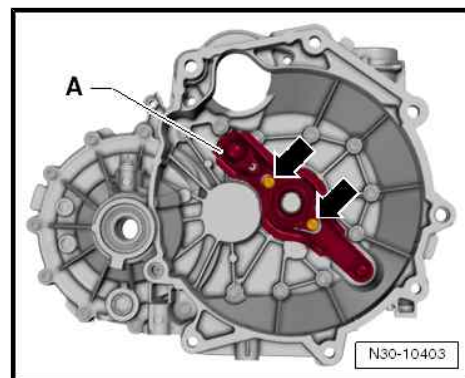
### Special tools and workshop equipment required

- ◆ Support clamp - VW 313-
- ◆ Gearbox support - T10484-
- ◆ Torque wrench - V.A.G 1331-
- ◆ Drip tray for workshop hoist - VAS 6208-
- ◆ Sealant
- ◆ Allocation ⇒ Electronic parts catalogue (ETKA)



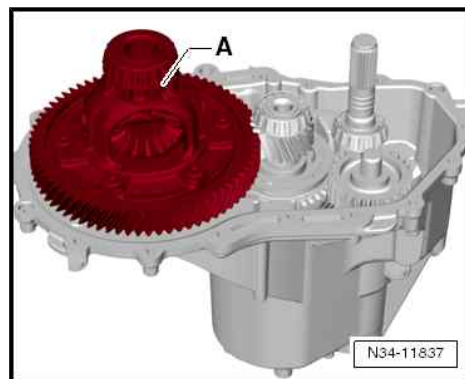
### Dismantling gearbox

- Secure gearbox on gearbox support ⇒ [page 38](#) .
- Place drip tray under gearbox.
- Remove clutch release lever -A- together with release bearing and guide sleeve -arrows-.
- Unscrew bolts securing clutch housing to gearbox housing.
- Remove clutch housing, if necessary carefully levering up all around along protruding housing flange and alternating between sides, being careful not to damage sealing surfaces.

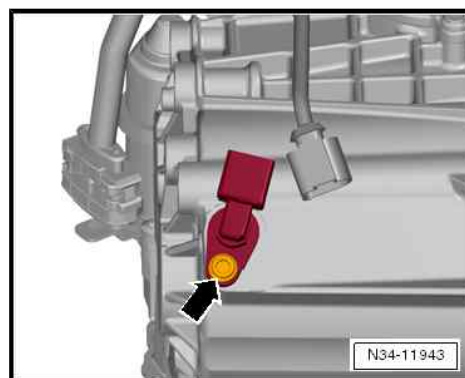




- Remove differential -A- from gearbox housing.
- Remove gear actuator - VX65- ➔ [page 17](#) .



- Remove gearbox input speed sender - G182- -arrow-.
- Remove clutch actuator - VX64- ➔ Rep. gr. 30 ; Clutch mechanism; Removing and installing clutch actuator - VX64- .

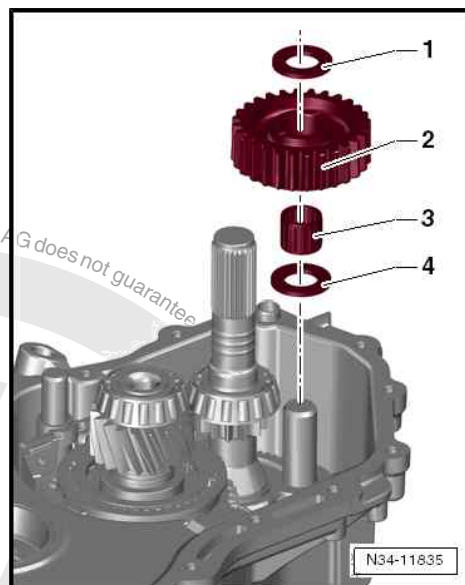


- One after other, remove thrust washer -1-, reverse gear wheel -2-, roller bearing -3- and thrust washer -4-.



#### Note

*To remove the reverse gear wheel, slightly lift the input shaft, and push it away from the reverse gear wheel.*





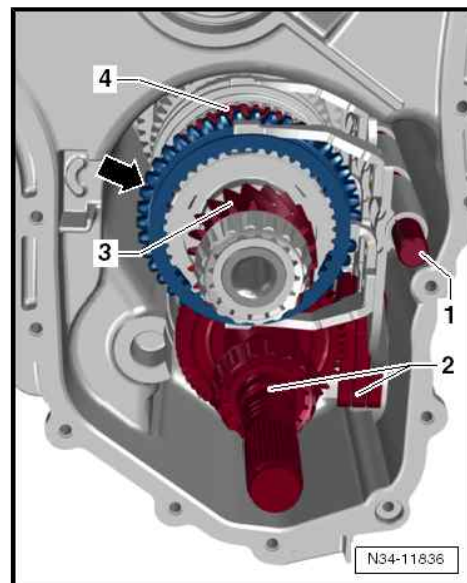
Proceed as follows to remove the input and output shafts together with selector forks from gearbox housing:

- Swivel gearbox housing in assembly stand as shown in illustration.
- Slightly pull out shaft -1- for selector forks.
- ◆ Hold the input shaft and selector forks with your right hand -2-.
- ◆ With your left hand, grasp the output shaft at the splines -3-, and pull it out.
- ◆ Then, hold output shaft in area -4- behind locking collar -arrow-.



#### Note

*Do not press off the locking collar -arrow-. Otherwise, the locking pieces will be pushed out and might spring out uncontrolled.*

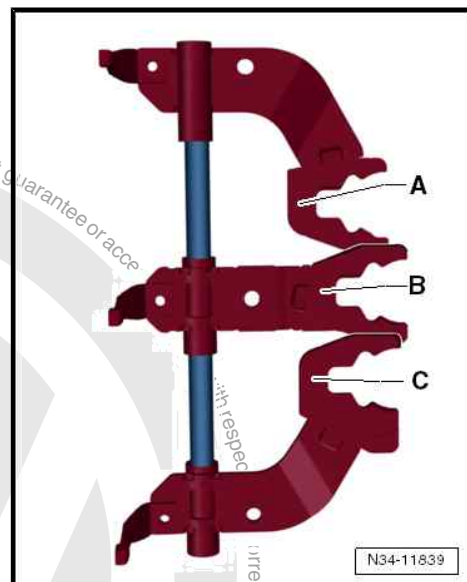


#### Assembling gearbox

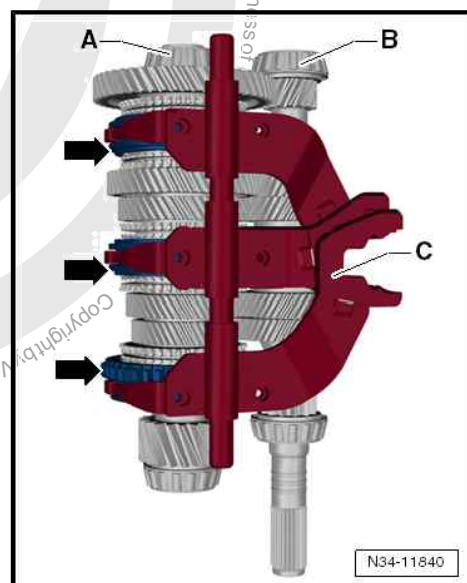
- Push selector forks -A-, -B- and -C- onto shaft.

#### Installation position:

- Position selector fork for 1st and 2nd gears -A- below selector fork for 3rd and 4th gears -B-.
- 5th gear/reverse selector fork -C- must be positioned above selector fork for 3rd and 4th gears -B-.



- Complete output shaft -A- and input shaft -B- with selector forks -C-.
- The selector forks are located in the locking collars -arrows-.







Proceed as follows to install the input and output shafts together with selector forks into gearbox housing:

- Swivel gearbox housing in assembly stand as shown in illustration.
- ◆ Hold the input shaft and selector forks with your right hand -2-.
- ◆ With your left hand, grasp the output shaft in area -4- behind locking collar -arrow-.



#### Note

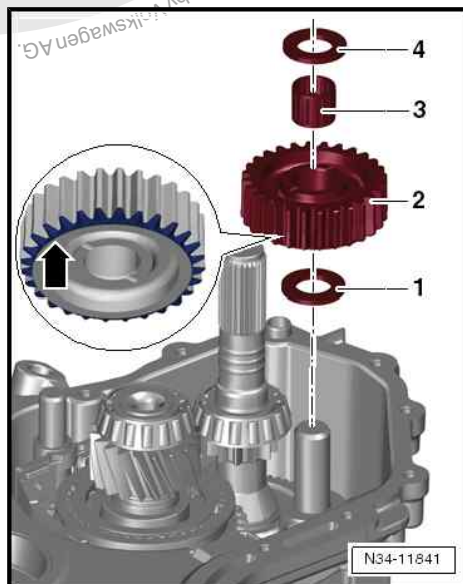
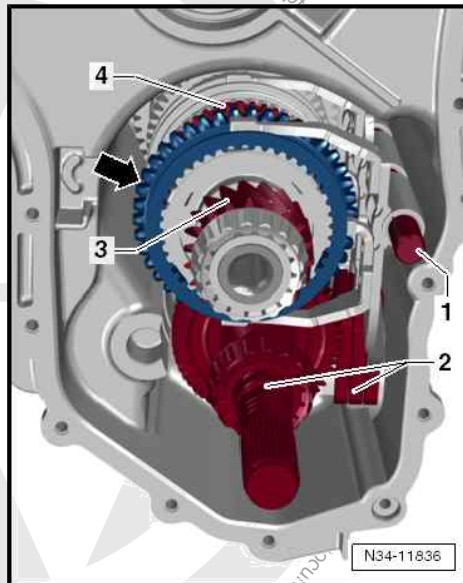
*Do not press off the locking collar -arrow-. Otherwise, the locking pieces will be pushed out and might spring out uncontrolled.*

Then, grasp the output shaft at the splines -3-.

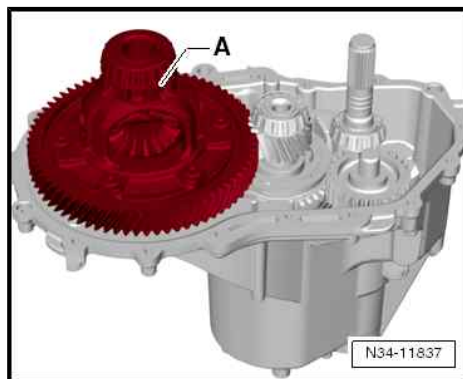
- Bring gearbox housing in assembly stand back into vertical position.
- Push input shaft, output shaft and shaft -1- for selector forks into their seats.
- One after other, fit thrust washer -1-, reverse gear wheel -2-, roller bearing -3- and thrust washer -4-.

#### Installation position of reverse gear wheel:

- ◆ Chamfer -arrow- faces towards gearbox housing.

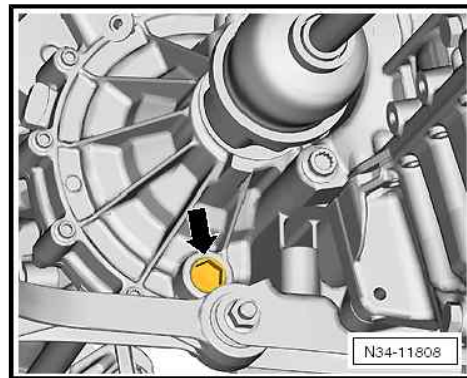


- Fit differential -A-.
- Apply sealant evenly to sealing surface for clutch housing.
- Secure clutch housing to gearbox housing.
- Install clutch release bearing and guide sleeve ⇒ [page 9](#) .
- If gearbox is not to be installed, install clutch actuator - VX64- ⇒ Rep. gr. 30 ; Clutch mechanism; Assembly overview - clutch actuator .
- If gearbox is to be installed, install clutch actuator - VX64- after installing gearbox ⇒ Rep. gr. 30 ; Clutch mechanism; Removing and installing clutch actuator .





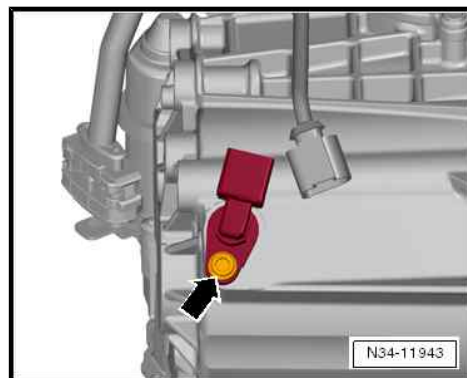
- Tighten oil drain plug -arrow-. (Shown with gearbox installed.)
- Place selector plates in neutral.
- Install gear actuator - VX65- ➔ [page 17](#) .



- Install gearbox input speed sensor - G182- -arrow- ➔ Rep. gr. 00 ; Electrical components; Overview of fitting locations - electrical components .

#### Specified torques

- ◆ ➔ ["4.4 Assembly overview - shafts, differential, selector mechanism", page 28](#)
- ◆ Gearbox housing to clutch housing  
➔ ["4.3 Assembly overview - clutch housing", page 27](#) .





## 5 Gearbox housing, clutch housing

⇒ **“5.1 Assembly overview - gearbox housing and clutch housing”,**  
**page 36**

### 5.1 Assembly overview - gearbox housing and clutch housing

#### 1 - Gearbox housing

- ☐ If renewed: adjust input shaft, output shaft and differential  
⇒ [page 85](#) .

#### 2 - Sleeve

- ☐ For selector shaft
- ☐ Renew after removal  
⇒ [page 29](#)

#### 3 - Dowel sleeve

- ☐ Qty. 2

#### 4 - Tapered roller bearing outer race

- ☐ For input shaft
- ☐ Pulling out of and pressing into clutch housing  
⇒ [page 40](#)
- ☐ If renewed: adjust input shaft  
⇒ [page 48](#)

#### 5 - Tapered roller bearing outer race

- ☐ For output shaft
- ☐ Pulling out of and pressing into clutch housing  
⇒ [page 55](#)
- ☐ If replaced: Adjust output shaft  
⇒ [page 67](#) .

#### 6 - Tapered roller bearing outer race

- ☐ For output shaft
- ☐ Pulling out of clutch housing and pressing into clutch housing  
⇒ [page 55](#)

- ☐ If replaced: Adjust output shaft  
⇒ [page 67](#) .

#### 7 - Shim

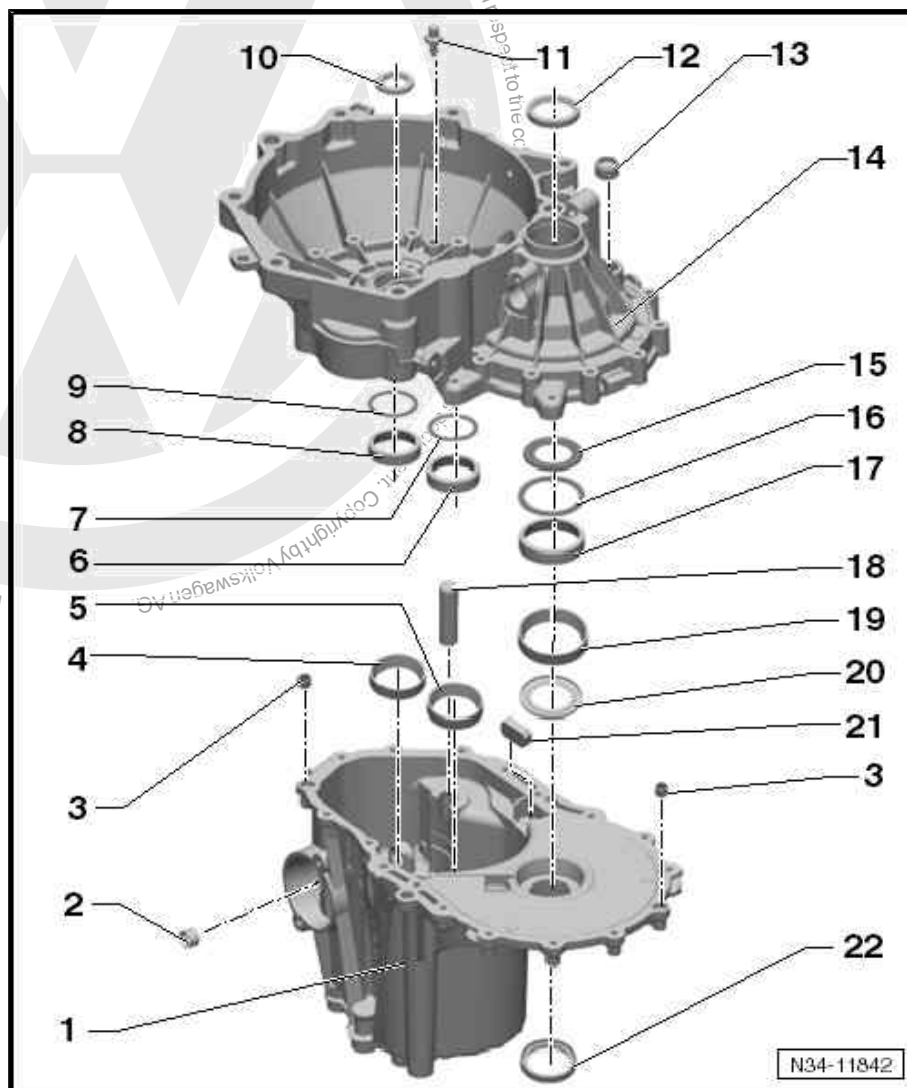
- ☐ For output shaft
- ☐ Adjustment overview ⇒ [page 85](#)

#### 8 - Tapered roller bearing outer race

- ☐ For input shaft
- ☐ Pulling out of clutch housing and pressing into clutch housing ⇒ [page 40](#)
- ☐ If renewed: adjust input shaft ⇒ [page 85](#)

#### 9 - Shim

- ☐ For input shaft
- ☐ Adjustment overview ⇒ [page 85](#)





#### 10 - Input shaft seal

- ☐ Renew after removal ⇒ [page 53](#)

#### 11 - Ball pin

- ☐ Removing and installing ⇒ [page 11](#)

#### 12 - Seal for right drive shaft

- ☐ Renew after removing ⇒ Rep. gr. 39 ; Seal; Overview of fitting locations - seals

#### 13 - Oil drain plug

- ☐ 30 Nm

#### 14 - Clutch housing

- ☐ If renewed: adjust input shaft, output shaft and differential ⇒ [page 85](#) .

#### 15 - Baffle plate

#### 16 - Shim

- ☐ For differential
- ☐ Adjustment overview ⇒ [page 85](#)

#### 17 - Tapered roller bearing outer race

- ☐ For differential
- ☐ Pulling out of clutch housing and pressing into clutch housing ⇒ [page 74](#)
- ☐ If renewed, adjust differential ⇒ [page 81](#)

#### 18 - Reverse shaft

- ☐ Renew after removal ⇒ [page 72](#)
- ☐ Is damaged during removal

#### 19 - Tapered roller bearing outer race

- ☐ For differential
- ☐ Pulling out of and pressing into clutch housing ⇒ [page 74](#)
- ☐ If renewed, adjust differential ⇒ [page 81](#)

#### 20 - Baffle plate

#### 21 - Magnet

- ☐ Held in place by housing joint surface

#### 22 - Left drive shaft seal

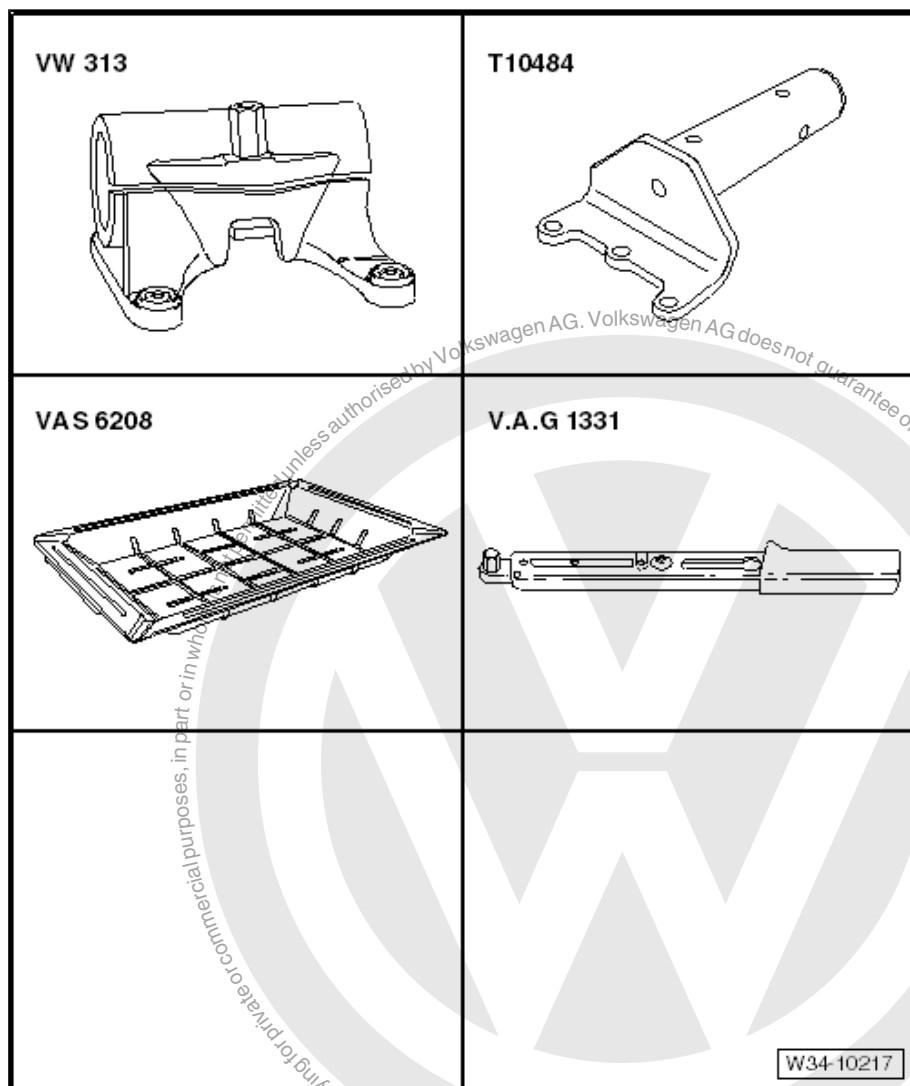
- ☐ Renew after removing ⇒ Rep. gr. 39 ; Seal; Overview of fitting locations - seals



## 6 Installing to engine and gearbox support

### Special tools and workshop equipment required

- ◆ Support clamp - VW 313-
- ◆ Gearbox support - T10484-
- ◆ Torque wrench - V.A.G 1331-
- ◆ Drip tray for workshop hoist - VAS 6208-



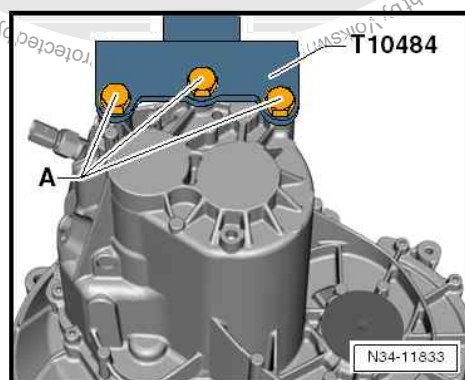
– Secure gearbox on gearbox support - T10484- -arrows-

-A- = bolts M10 x 35.



### Note

*Protect connector and connector housing against damage.*





## 7 Gear oil

The relevant description can be found in ⇒ Rep. gr. 34 ; Gear oil .





## 35 – Gears, shafts

### 1 Input shaft

⇒ [“1.1 Assembly overview - input shaft”, page 40](#)

⇒ [“1.2 Dismantling and assembling input shaft”, page 42](#) .

⇒ [“1.3 Adjusting input shaft”, page 48](#) .

⇒ [“1.4 Renewing input shaft seal”, page 53](#) .

#### 1.1 Assembly overview - input shaft



##### Note

- ◆ *When installing new gear wheels or a new input shaft, refer to technical data ⇒ [page 5](#) and the ⇒ *Electronic parts catalogue (ETKA)* .*
- ◆ *Heat gear wheels to max. 120°C.*
- ◆ *Always renew both tapered roller bearings together as a set.*
- ◆ *Install all bearings on input shaft with gear oil.*
- ◆ *Heat tapered roller bearing inner races to 100 °C before installing.*



# 1 - Gearbox housing

## 2 - Tapered roller bearing outer race

- ☐ Removing ➔ [page 45](#)
- ☐ Pressing in ➔ [page 46](#) .

## 3 - Tapered roller bearing inner race

- ☐ Pressing off ➔ [page 46](#)
- ☐ Pressing on ➔ [page 46](#)

## 4 - Input shaft

- ☐ Adjusting ➔ [page 48](#)

## 5 - Gear wheel for 3rd gear

- ☐ Pressing off ➔ [page 47](#)
- ☐ Installation position: shoulder faces 4th gear ➔ [page 47](#)
- ☐ Pressing on ➔ [page 47](#)

## 6 - Retaining ring

- ☐ Renew after removal

## 7 - Retaining ring

- ☐ Renew after removal

## 8 - Gear wheel for 4th gear

- ☐ Press off together with gear wheel for 5th gear ➔ [page 46](#)
- ☐ Installation position: shoulder faces 3rd gear ➔ [page 47](#)
- ☐ Pressing on ➔ [page 48](#)

## 9 - Gear wheel for 5th gear

- ☐ Press off together with gear wheel for 4th gear ➔ [page 46](#)
- ☐ Installation position: higher shoulder points towards 4th gear ➔ [page 48](#)
- ☐ Pressing on ➔ [page 48](#)

## 10 - Retaining ring

- ☐ Renew after removal

## 11 - Tapered roller bearing inner race

- ☐ Pressing off ➔ [page 45](#)
- ☐ Pressing on ➔ [page 45](#)

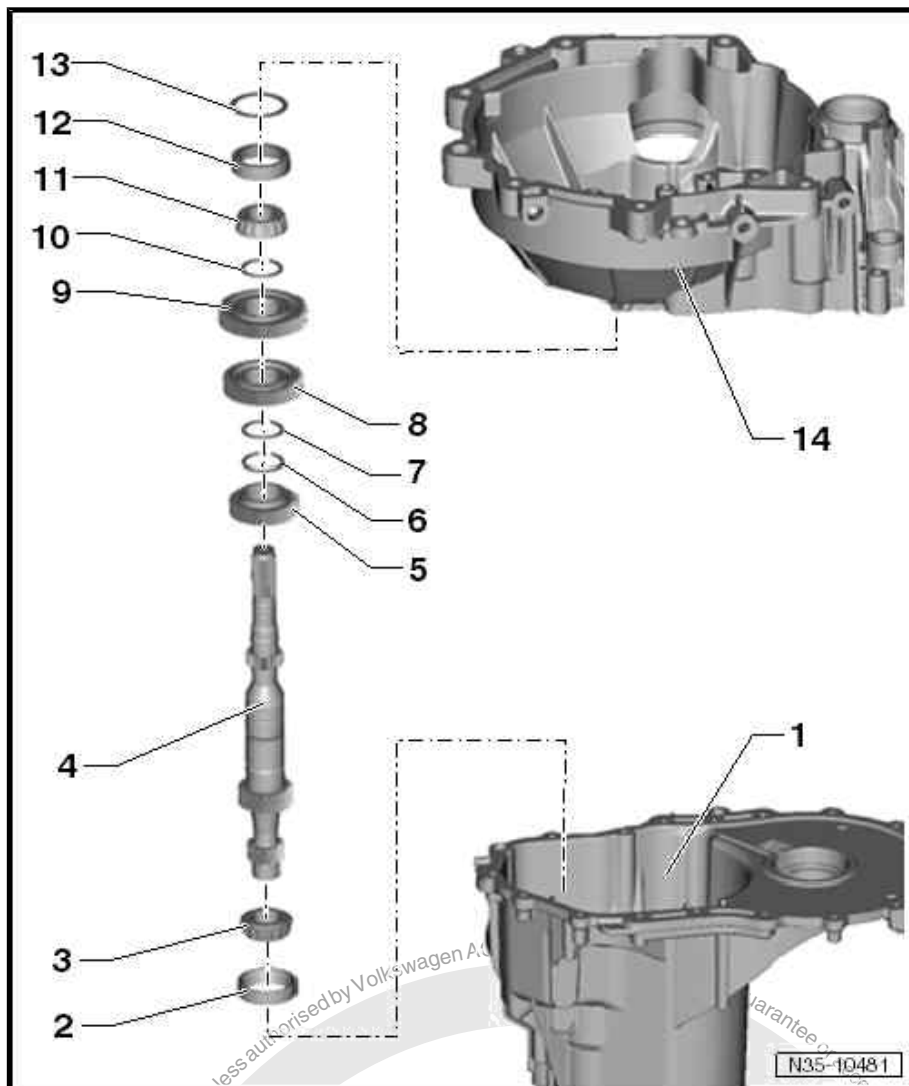
## 12 - Tapered roller bearing outer race

- ☐ Removing ➔ [page 44](#)
- ☐ Pressing in ➔ [page 45](#) .

## 13 - Shim

- ☐ Determining thickness ➔ [page 48](#)

## 14 - Clutch housing

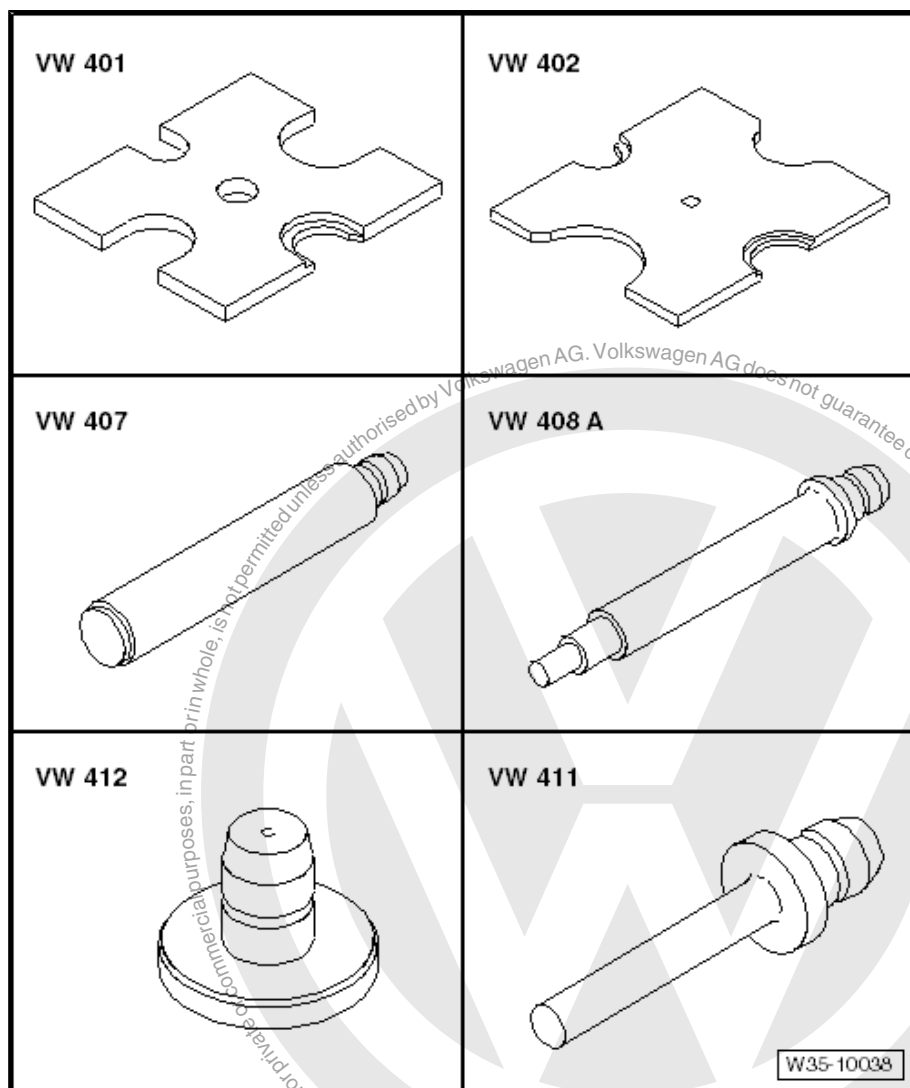




## 1.2 Dismantling and assembling input shaft

### Special tools and workshop equipment required

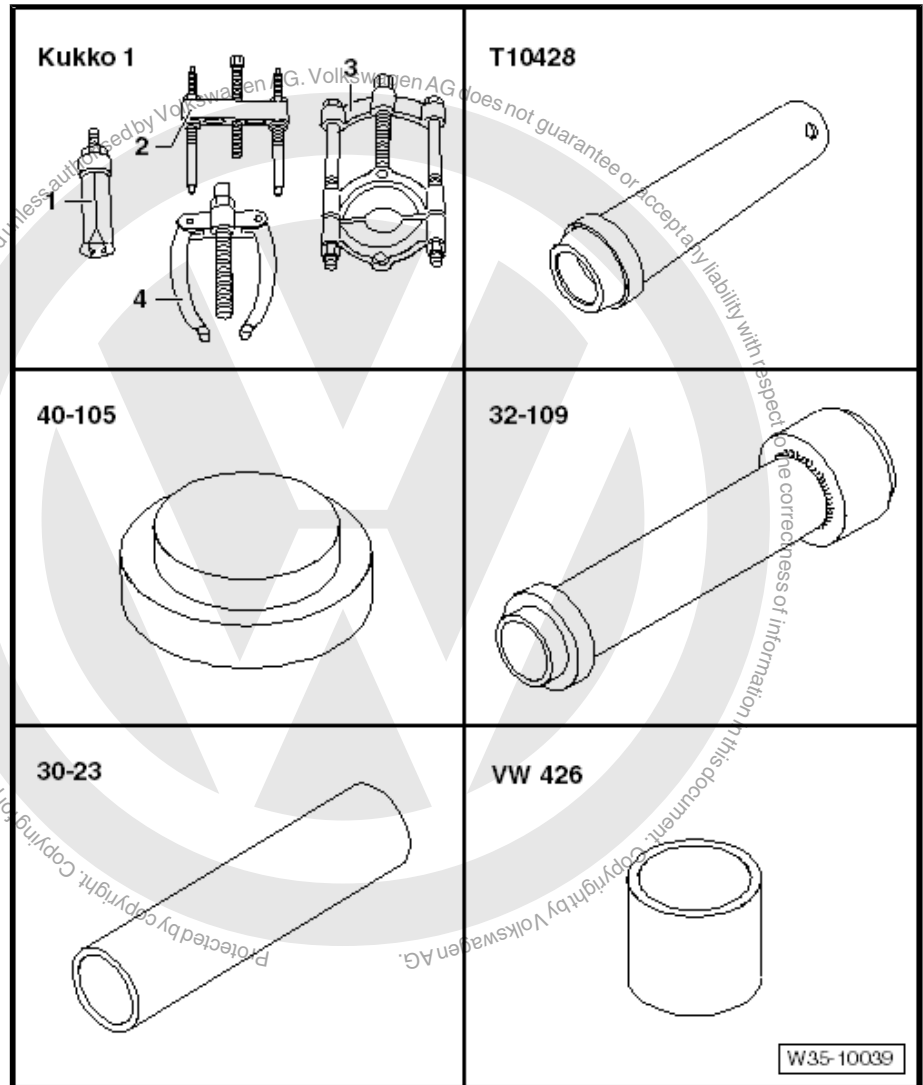
- ◆ Pressure plate - VW 401-
- ◆ Pressure plate - VW 402-
- ◆ Press piece - VW 407-
- ◆ Press piece - VW 408 A-
- ◆ Press piece - VW 411-
- ◆ Press piece - VW 412-







- ◆ Do not apply: tools 1-4
- ◆ Press tool - T10428-
- ◆ Thrust plate - 40 - 105-
- ◆ Tube - 32 - 109-
- ◆ Extension - 30 - 23-
- ◆ Tube - VW 426-





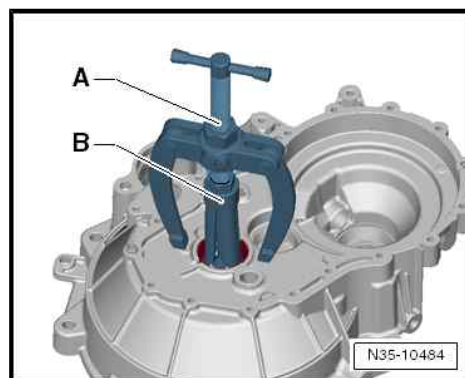
- ◆ Internal puller - VAS 251 613- , or e.g. -Kukko 21/6-
- ◆ Splitter - VAS 251 409- or e.g. splitter - Kukko 17/1-
- ◆ Splitter - VAS 251 413- or e.g. splitter - Kukko 17/3-
- ◆ Splitter - VAS 251 403- or e.g. splitter - Kukko 15/2-
- ◆ Counter support - VAS 251 623- , or e.g. counter support - Kukko 22/2-



#### Pulling tapered roller bearing outer race out of clutch housing

A - Counter support - VAS 251 623- or counter support , e.g. - Kukko 22/2-

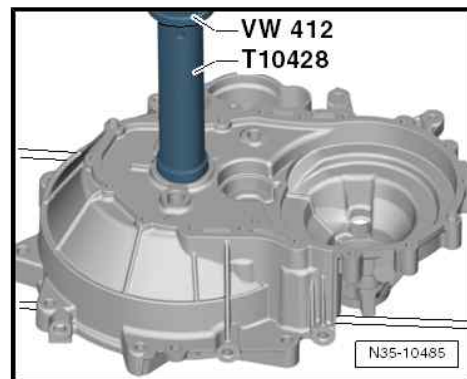
B - Internal puller - VAS 251 613- , or e.g. internal puller 37...46 mm - Kukko 21/6-





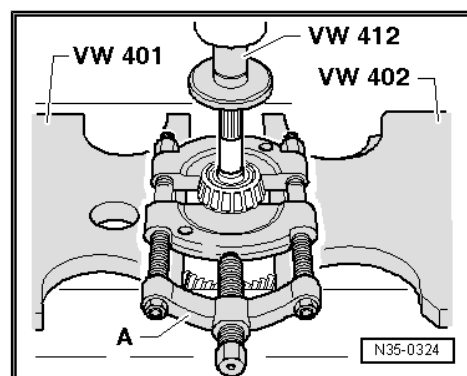
### Pressing tapered roller bearing outer race into clutch housing

- Insert shim.

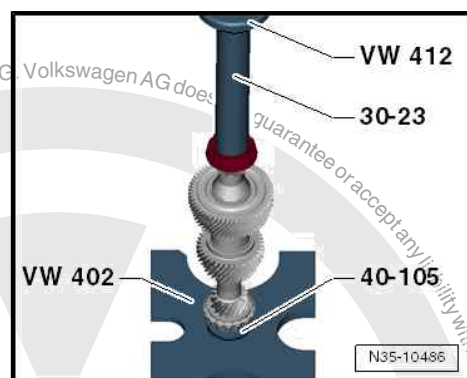


### Press off tapered roller bearing inner race on side facing clutch housing

A - Splitter - VAS 251 409- or splitter 12 ... 75 mm , e.g. -Kukko 17/1-



### Press on tapered roller bearing inner race on side facing clutch housing

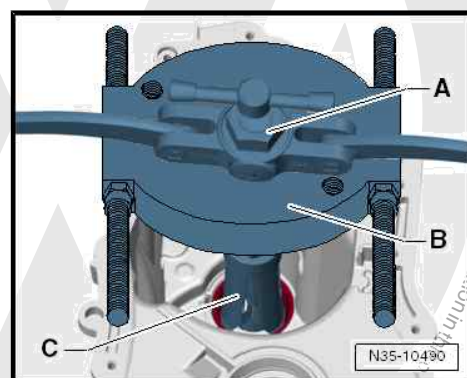


### Pulling outer race for tapered roller bearing out of gearbox housing

A - Counter support - VAS 251 623- or counter support , e.g. - Kukko 22/2-

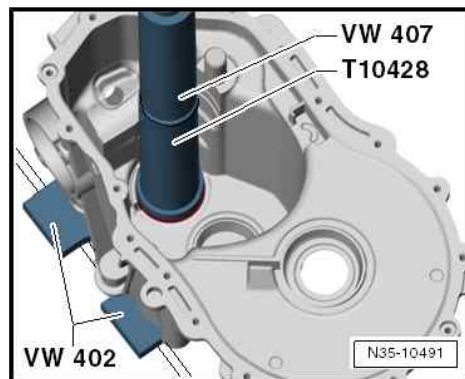
B - Splitter - VAS 251 413- or splitter 25 ... 155 mm , e.g. -Kukko 17/3-

C - Internal puller - VAS 251 613- , or e.g. internal puller 37...46 mm - Kukko 21/6-



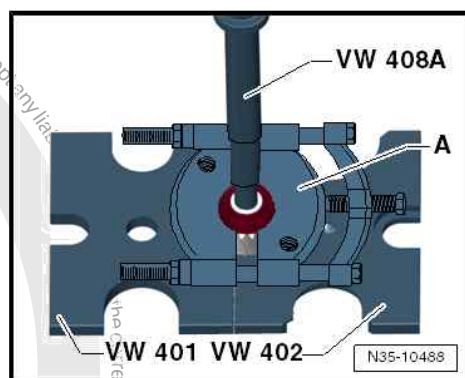


## Pressing tapered roller bearing outer race into gearbox housing



## Pressing off tapered roller bearing inner race on side facing towards gearbox housing

A - Splitter - VAS 251 409- or splitter 12 ... 75 mm , e.g. -Kukko 17/1-



## Press on tapered roller bearing inner race on side facing gearbox housing

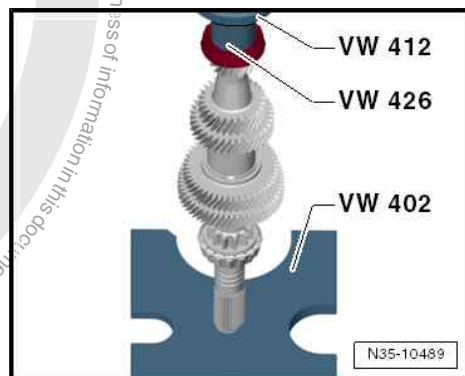
### Dismantling input shaft



#### Note

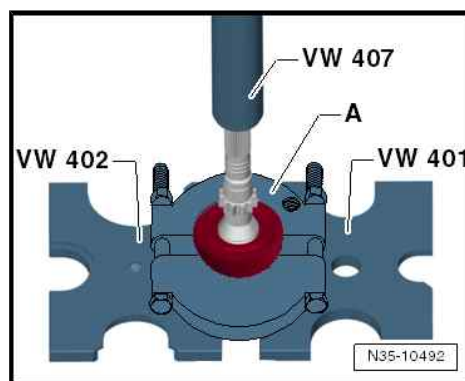
Pressing off the tapered roller bearing inner race for bearing the input shaft in the clutch housing ⇒ [page 45](#)

- Remove retaining ring.



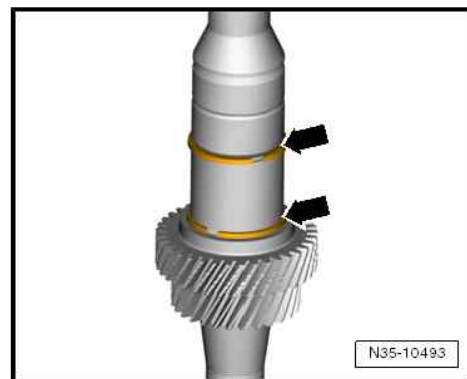
## Pressing off gear wheel for 5th gear together with gear wheel for 4th gear

A - Splitter - VAS 251 403- or splitter 30 ... 120 mm , e.g. -Kukko 15/2-

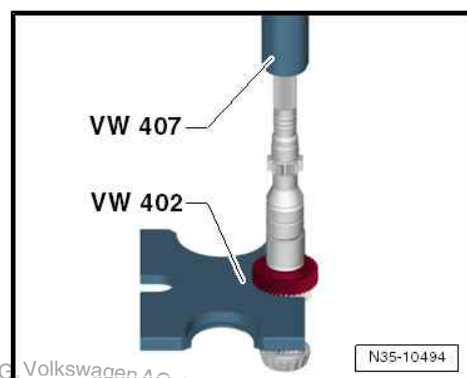




- Remove retaining rings -arrows-.



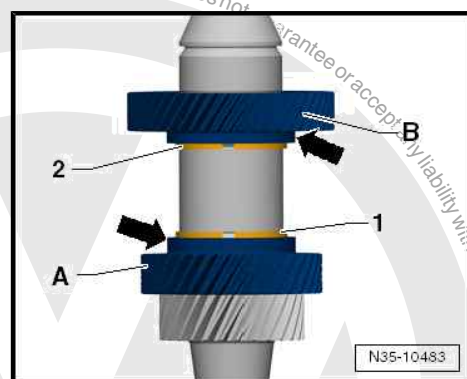
Pressing off gear wheel for 3rd gear  
Assembling input shaft



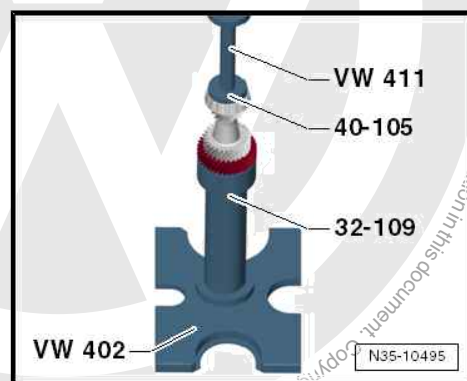
#### Installation position of 3rd gear and 4th gear

Shoulders -arrow- of gear wheels for 3rd gear -A- and 4th gear -B- face towards each other.

They are secured by means of retaining rings -1- and -2-.

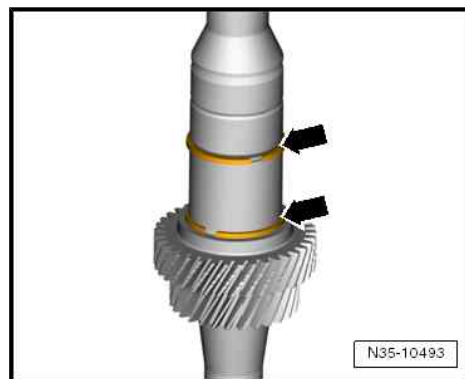


Pressing on gear wheel for 3rd gear

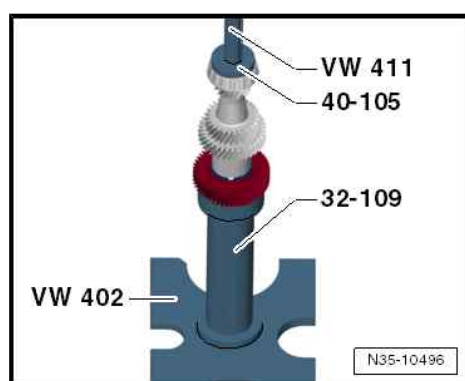




- Insert new retaining rings -arrows-.

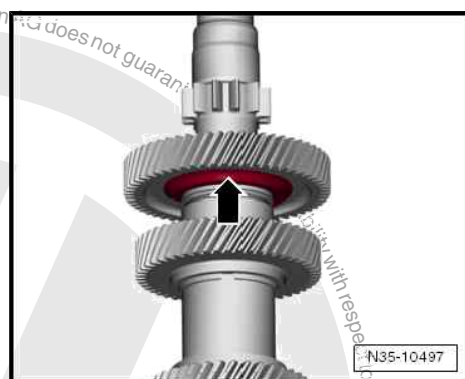


Pressing on gear wheel for 4th gear



Installation position of 5th gear wheel

Higher shoulder -arrow- faces towards gear wheel for 4th gear.



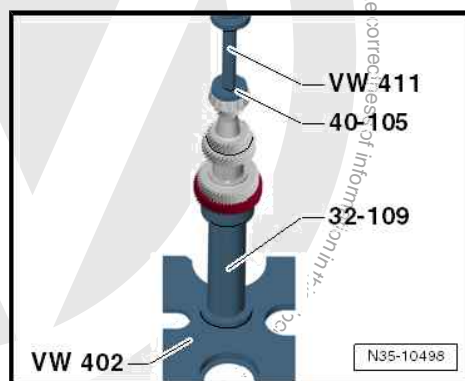
Pressing on gear wheel for 5th gear

- Insert retaining ring.



**Note**

Press on tapered roller bearing inner race for bearing in clutch housing ➔ [page 45](#).



### 1.3 Adjusting input shaft

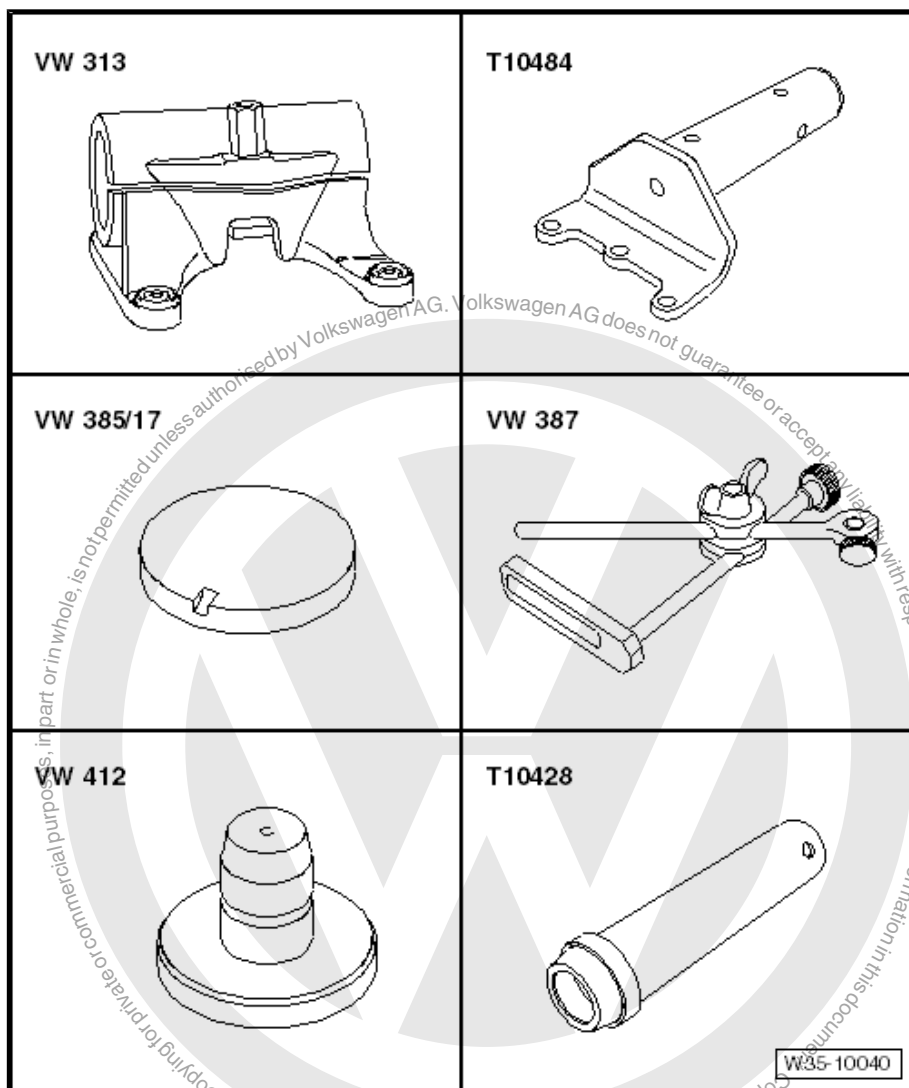
(Determining input shaft shim)





# **Special tools and workshop equipment required**

- ◆ Support clamp - VW 313-
- ◆ Gearbox support - T10484-
- ◆ End dimension plate - VW 385/17-
- ◆ Universal dial gauge bracket - VW 387-
- ◆ Press piece - VW 412-
- ◆ Press tool - T10428-
- ◆ Torque wrench - V.A.G 1331-
- ◆ Dial gauge - VAS 6080A-
- ◆ 30 mm dial gauge extension



- ◆ Internal puller - VAS 251 613- , or internal puller , e.g. -Kukko 21/6-







- ◆ Counter support - VAS 251 623- or counter support , e.g. - Kukko 22/2-



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

- ◆ Gearbox housing
- ◆ Clutch housing
- ◆ Input shaft

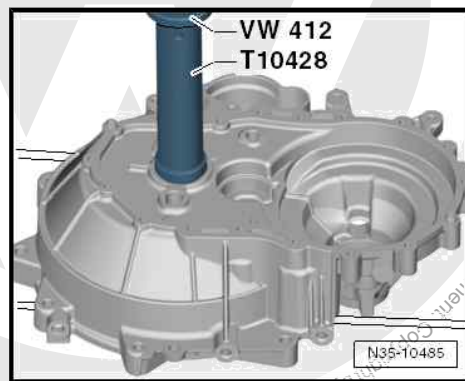
or the

- ◆ Tapered roller bearing

Adjustment overview ⇒ [page 85](#)

**Requirement:**

- Sealing surfaces of clutch and gearbox housings must be free of sealant .
- Both inner races for tapered roller bearings are pressed onto input shaft ⇒ [page 46](#) and ⇒ [page 45](#) .
- Tapered roller bearing outer race is pressed into gearbox housing ⇒ [page 46](#) .
- Press tapered roller bearing outer race without shim into gearbox housing to stop.
- Install input shaft in gearbox housing and set clutch housing in place. Tighten hexagon bolts to specified torque ⇒ [Item 3 \(page 27\)](#) .





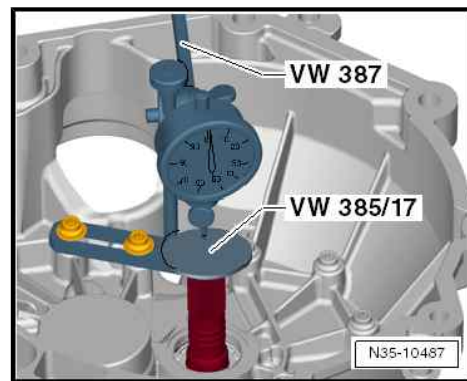
- Fit measuring appliance and dial gauge in clutch housing.
- Before taking any measurements, rotate input shaft to allow bearings to settle. Set dial gauge to "O" with 1 mm preload.



#### Note

*Repeat this step for each subsequent measurement, or the dial gauge will not return to the starting position.*

- Pull input shaft in direction of dial gauge.
- Read and note clearance indicated on dial gauge (0.930 in example).
- Determine thickness of shim according to table; (e.g. 0.930); refer to ➔ Electronic parts catalogue (ETKA) for part numbers.



**Removing gearbox housing, and pulling tapered roller bearing outer race out of clutch housing**

A - Counter support - VAS 251 623- or counter support , e.g. - Kukko 22/2-

B - Internal puller - VAS 251 613- , or e.g. internal puller 37...46 mm - Kukko 21/6-

- Fit gearbox housing, and tighten new hexagon bolts to specified torque ➔ [Item 3 \(page 27\)](#) .

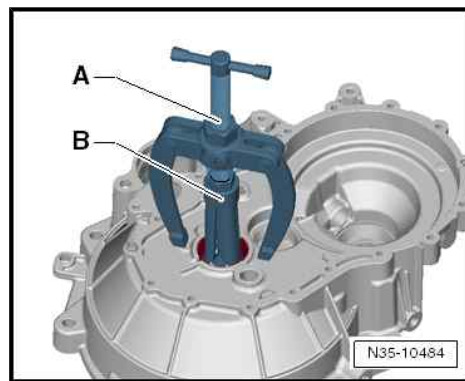
**Table of shims**

| Bearing play        | Shim           |
|---------------------|----------------|
| Measured value (mm) | Thickness (mm) |
| 0.800 ... 0.824     | 0.650          |
| 0.825 ... 0.849     | 0.675          |
| 0.850 ... 0.874     | 0.700          |
| 0.875 ... 0.899     | 0.725          |
| 0.900 ... 0.924     | 0.750          |
| 0.925 ... 0.949     | 0.775          |
| 0.950 ... 0.974     | 0.800          |

| Bearing play        | Shim           |
|---------------------|----------------|
| Measured value (mm) | Thickness (mm) |
| 0.975 ... 0.999     | 0.825          |
| 1.000 ... 1.024     | 0.850          |
| 1.025 ... 1.049     | 0.875          |
| 1.050 ... 1.074     | 0.900          |
| 1.075 ... 1.099     | 0.925          |
| 1.100 ... 1.124     | 0.950          |

| Bearing play        | Shim           |
|---------------------|----------------|
| Measured value (mm) | Thickness (mm) |
| 1.125 ... 1.149     | 0.975          |
| 1.150 ... 1.174     | 1.000          |
| 1.175 ... 1.199     | 1.025          |
| 1.200 ... 1.224     | 1.050          |
| 1.225 ... 1.249     | 1.075          |

| Bearing play        | Shim           |
|---------------------|----------------|
| Measured value (mm) | Thickness (mm) |
| 1.250 ... 1.274     | 1.100          |
| 1.275 ... 1.299     | 1.125          |
| 1.300 ... 1.324     | 1.150          |
| 1.325 ... 1.349     | 1.175          |
| 1.350 ... 1.374     | 1.200          |

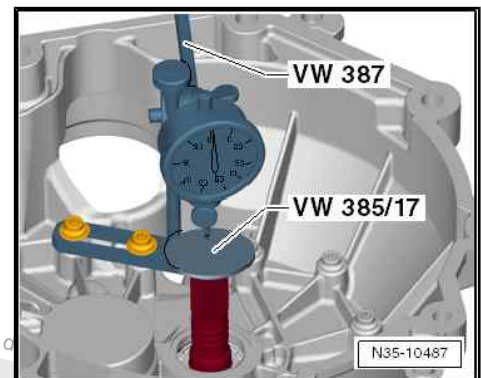




| Bearing play        | Shim           |
|---------------------|----------------|
| Measured value (mm) | Thickness (mm) |
| 1.375 ... 1.399     | 1.225          |
| 1.400 ... 1.424     | 1.250          |
| 1.425 ... 1.449     | 1.275          |
| 1.450 ... 1.474     | 1.300          |
| 1.475 ... 1.499     | 1.325          |
| 1.500 ... 1.524     | 1.350          |

### Carrying out check measurement

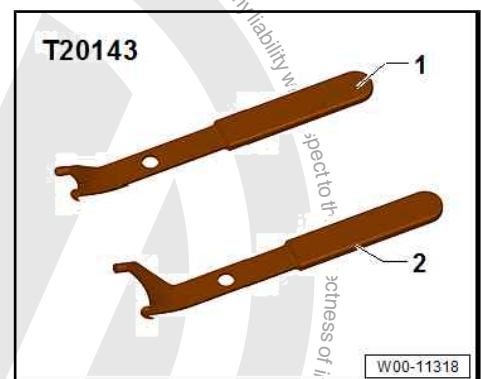
- Set up measuring appliance and dial gauge.
- Rotate input shaft so that tapered roller bearings settle.
- Pull input shaft in direction of dial gauge.
- Bearing play: min. 0.140 ... max. 0.184 mm



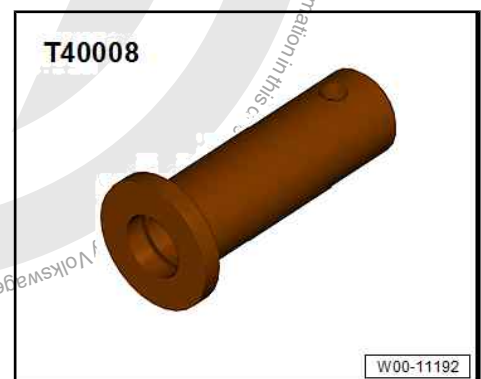
## 1.4 Renewing input shaft seal

### Special tools and workshop equipment required

- ◆ Oil seal extractor lever - T20143/2-



- ◆ Press tool - T40008



- ◆ Sealing grease
- ◆ Allocate grease using ⇒ Electronic parts catalogue (ETKA) .
- Remove manual gearbox.



- Remove clutch release lever together with release bearing and guide sleeve ⇒ Rep. gr. 30 ; Clutch mechanism; Assembly overview - clutch release mechanism .

#### Levering out input shaft seal



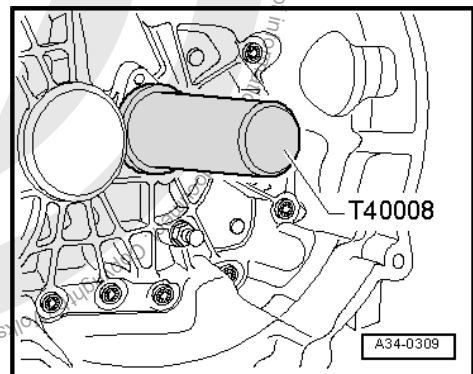
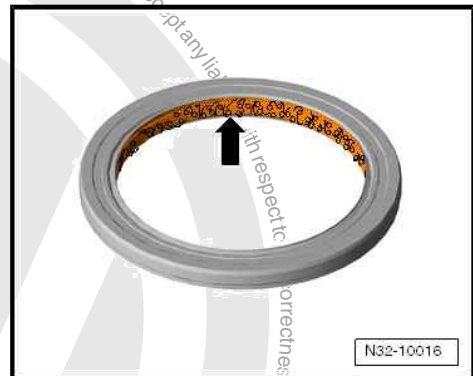
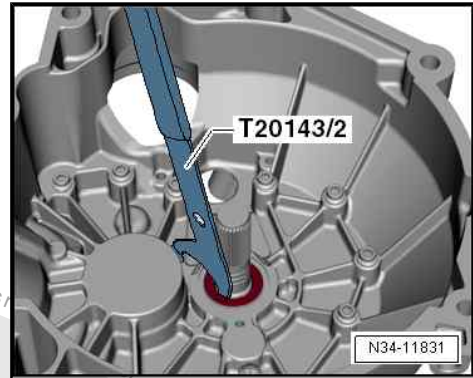
#### Note

*Do not damage oil seal running surface on input shaft.*

- Half-fill space between sealing lip and dust lip of new seal with sealing grease .
- Lightly moisten outer circumference of oil seal with gear oil.

#### Driving in input shaft oil seal flush

- Install clutch release lever together with release bearing and guide sleeve ⇒ [page 9](#) .
- Install manual gearbox.



## 2 Output shaft

⇒ ["2.1 Assembly overview - output shaft", page 55](#)

⇒ ["2.2 Dismantling and assembling output shaft", page 58](#)

⇒ ["2.3 Adjusting output shaft", page 67](#)

### 2.1 Assembly overview - output shaft



#### Note

- ◆ When installing new gear wheels or a new output shaft, consult technical data ⇒ [page 5](#) and ⇒ *Electronic parts catalogue (ETKA)*.
- ◆ Heat gear wheels to max. 120°C.
- ◆ Install all bearings, synchromeshed gears and synchro-rings on output shaft with gear oil.
- ◆ Always renew both tapered roller bearings together as a set.
- ◆ Heat tapered roller bearing inner races to 100 °C before installing.
- ◆ Do not interchange synchro-rings. When reusing always fit to the original gear.

#### 1 - Clutch housing

#### 2 - Shim

- ☐ Determining thickness  
⇒ [page 48](#)

#### 3 - Tapered roller bearing outer race

- ☐ Removing ⇒ [page 61](#)
- ☐ Pressing in  
⇒ [page 61](#).

#### 4 - Tapered roller bearing inner race

- ☐ Pressing off  
⇒ [page 61](#)
- ☐ Pressing on  
⇒ [page 62](#)

#### 5 - Output shaft

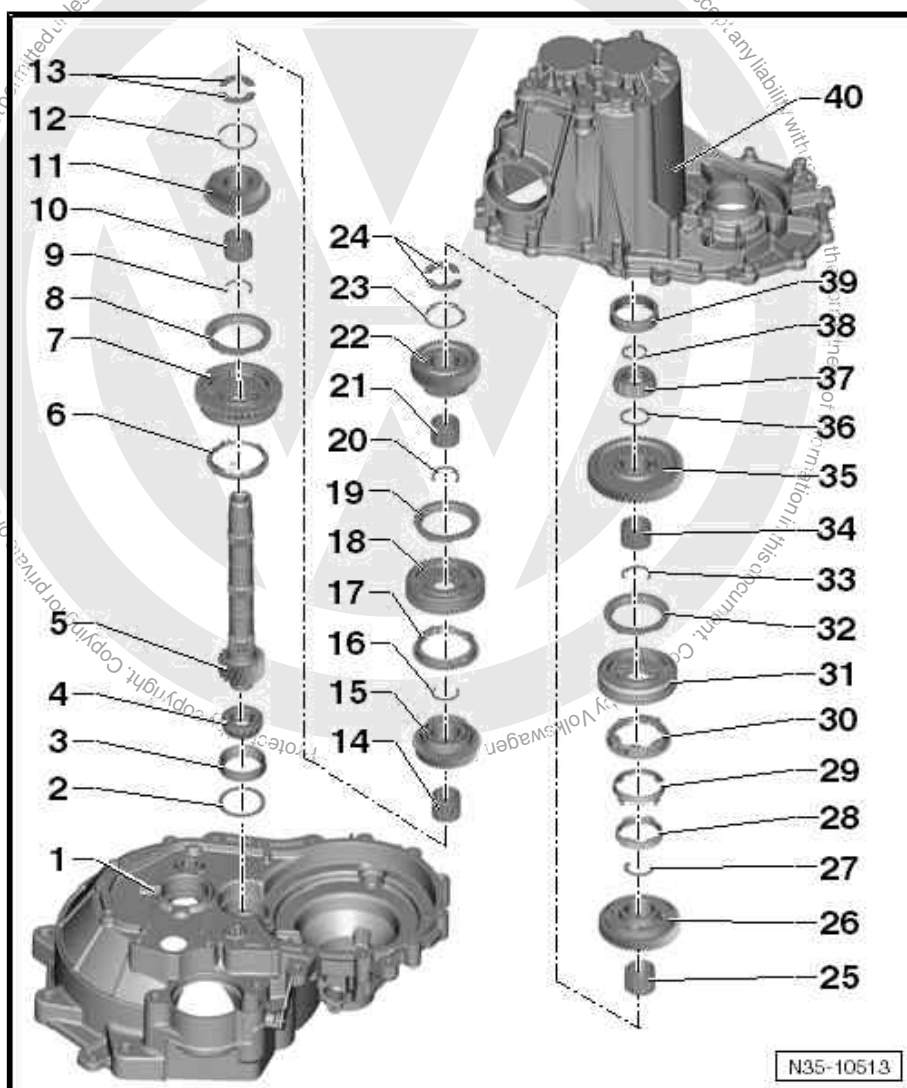
- ☐ Adjusting ⇒ [page 48](#)

#### 6 - Stop ring

- ☐ Prevents locking pieces from drifting out
- ☐ Removing ⇒ [page 65](#)
- ☐ Installing ⇒ [page 66](#)

#### 7 - Locking collar with synchro-hub for 5th and reverse gears

- ☐ To be removed after removal of retaining ring  
⇒ [Item 9 \(page 56\)](#)
- ☐ Dismantling and assembling ⇒ [page 65](#)
- ☐ Installation position and fitting onto shaft  
⇒ [page 66](#)







#### 8 - Synchro-ring for 5th gear

- ☐ Check for wear ➔ [page 64](#)

#### 9 - Retaining ring

- ☐ Renew after removal

#### 10 - Needle bearing

- ☐ For 5th gear

#### 11 - Synchromeshed gear, 5th gear

#### 12 - Washer

- ☐ Holds thrust washers ➔ [Item 13 \(page 56\)](#) in position on output shaft

#### 13 - Thrust washers

- ☐ For 4th and 5th gears
- ☐ Qty. 2
- ☐ Insert lugs of thrust washer in holes of output shaft

#### 14 - Needle bearing

- ☐ For 4th gear

#### 15 - Synchromeshed gear for 4th gear

#### 16 - Retaining ring

- ☐ Renew after removal

#### 17 - Synchro-ring for 4th gear

- ☐ Check for wear ➔ [page 64](#)

#### 18 - Locking collar with synchro-hub for 3rd and 4th gears

- ☐ To be pulled off ➔ [page 64](#) after removal of retaining ring ➔ [Item 20 \(page 56\)](#)
- ☐ Dismantling ➔ [page 65](#)
- ☐ Assembling locking collar and synchro-hub ➔ [page 65](#) and ➔ [page 65](#)
- ☐ Pressing on ➔ [page 67](#)

#### 19 - Synchro-ring for 3rd gear

- ☐ Check for wear ➔ [page 64](#)

#### 20 - Retaining ring

- ☐ Renew after removal

#### 21 - Needle bearing

- ☐ For 3rd gear

#### 22 - Synchromeshed gear for 3rd gear

#### 23 - Washer

- ☐ Holds thrust washers ➔ [Item 24 \(page 56\)](#) in position on output shaft

#### 24 - Thrust washers

- ☐ For 2nd and 3rd gears
- ☐ Qty. 2
- ☐ Insert lugs of thrust washer in holes of output shaft

#### 25 - Needle bearing

- ☐ For 2nd gear

#### 26 - Synchromeshed gear, 2nd gear

#### 27 - Retaining ring

- ☐ Renew after removal

#### 28 - Synchro-ring (inner ring for 2nd gear)

- ☐ Installation position ➔ [page 67](#)





- ☐ Checking synchro-ring, outer ring and inner ring together for wear ➔ [page 64](#)

#### 29 - Outer bearing race for 2nd gear

- ☐ Installation position ➔ [page 67](#)
- ☐ Renew if scored
- ☐ Checking synchro-ring, outer ring and inner ring together for wear ➔ [page 64](#)

#### 30 - Synchro-ring for 2nd gear

- ☐ Installation position ➔ [page 67](#)
- ☐ Checking synchro-ring, outer ring and inner ring together for wear ➔ [page 64](#)

#### 31 - Locking collar with synchro-hub for 1st and 2nd gears

- ☐ To be removed after removal of retaining ring ➔ [Item 33 \(page 57\)](#)
- ☐ Dismantling ➔ [page 65](#)
- ☐ Assembling locking collar and synchro-hub ➔ [page 65](#)
- ☐ Installation position ➔ [page 67](#)

#### 32 - Synchro-ring for 1st gear

- ☐ Check for wear ➔ [page 64](#)

#### 33 - Retaining ring

- ☐ Renew after removal

#### 34 - Needle bearing

- ☐ For 1st gear

#### 35 - Synchromeshed gear, 1st gear

- ☐ Remove together with tapered roller bearing inner race ➔ [Item 37 \(page 57\)](#) ➔ [page 62](#)

#### 36 - Thrust washer

- ☐ For 1st gear

#### 37 - Tapered roller bearing inner race

- ☐ Pressing off ➔ [page 62](#)
- ☐ Pressing on ➔ [page 63](#)

#### 38 - Retaining ring

- ☐ Renew after removal
- ☐ If tapered roller bearing and output shaft are renewed, redetermine ➔ [page 63](#)

#### 39 - Tapered roller bearing outer race

- ☐ Removing ➔ [page 62](#)
- ☐ Pressing in ➔ [page 62](#) .

#### 40 - Gearbox housing

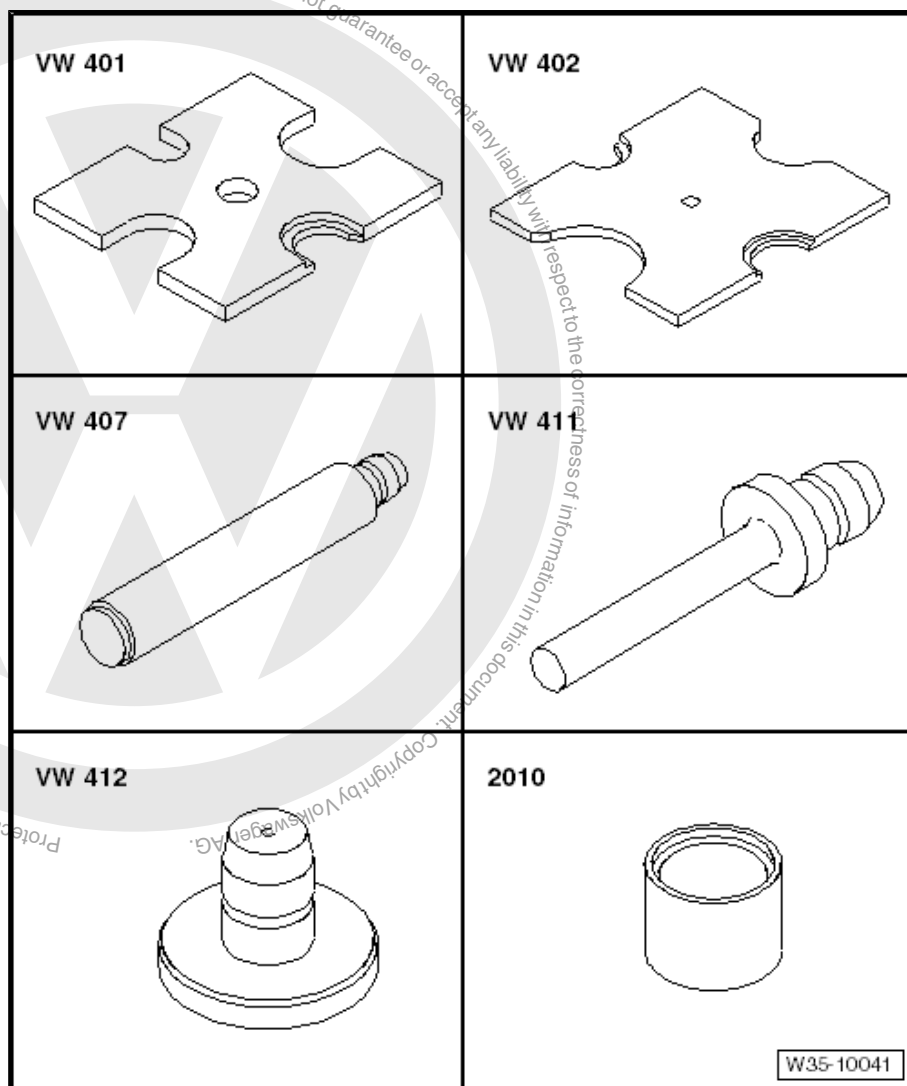




## 2.2 Dismantling and assembling output shaft

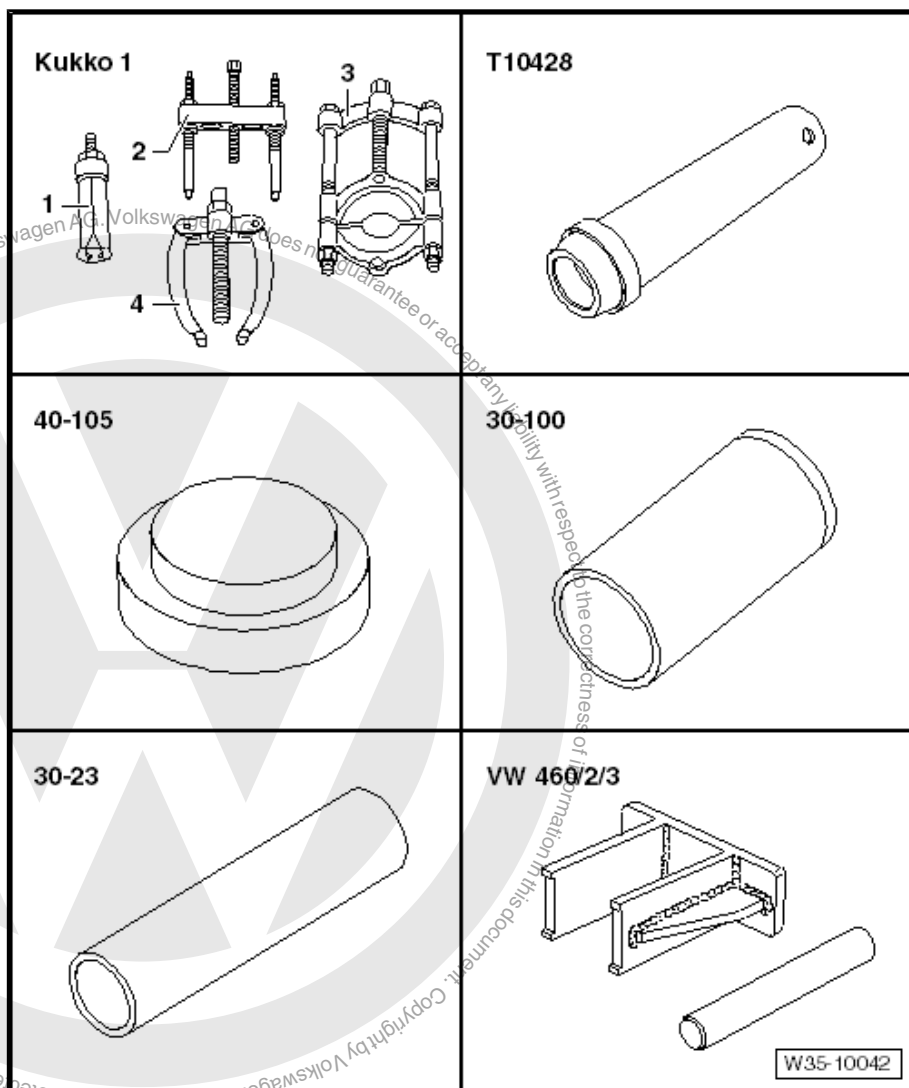
### Special tools and workshop equipment required

- ◆ Pressure plate - VW 401-
- ◆ Pressure plate - VW 402-
- ◆ Press piece - VW 407-
- ◆ Press piece - VW 411-
- ◆ Press piece - VW 412-
- ◆ Tube - 2010-





- ◆ Do not apply: tools 1-4
- ◆ Press tool - T10428-
- ◆ Thrust plate - 40 - 105-
- ◆ Drift sleeve - 30 - 100-
- ◆ Extension - 30 - 23-
- ◆ Removing tool - VW 460/2-

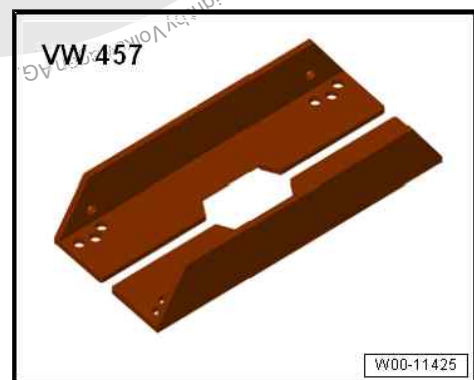




- ◆ Internal puller - VAS 251 613- , or internal puller , e.g. -Kukko 21/6-
- ◆ Counter support - VAS 251 623- or counter support , e.g. -Kukko 22/2-
- ◆ Splitter - VAS 251 411- , or e.g. splitter 22 ... 115 mm - Kukko 17/2-
- ◆ Splitter - VAS 251 409- or e.g. splitter - Kukko 17/1-

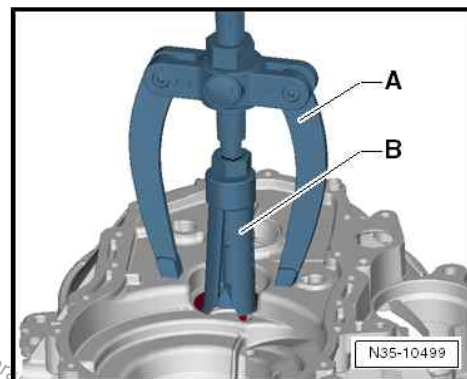
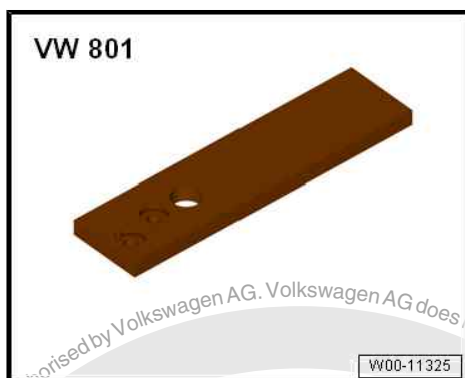


- ◆ Support rails - VW 457-





- ◆ Support plate - VW 801-

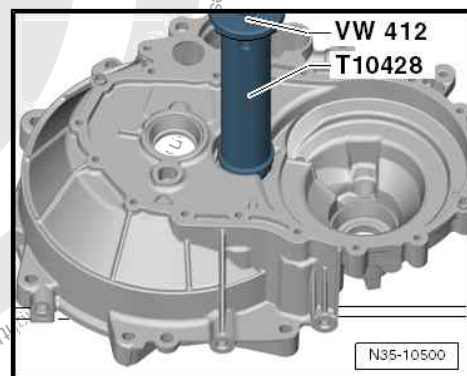


### Pulling tapered roller bearing outer race out of clutch housing

A - Counter support - VAS 251 623- or e.g. counter support , e.g. - Kukko 22/2-

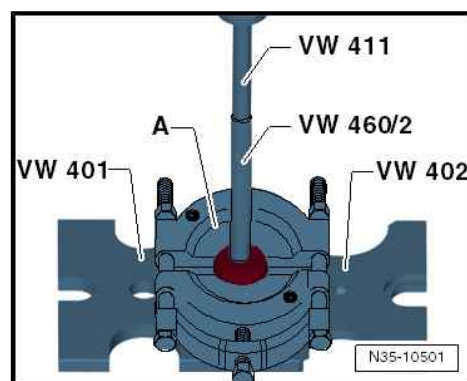
B - Internal puller - VAS 251 613- , or e.g. internal puller 37...46 mm - Kukko 21/6-

### Pressing tapered roller bearing outer race into clutch housing



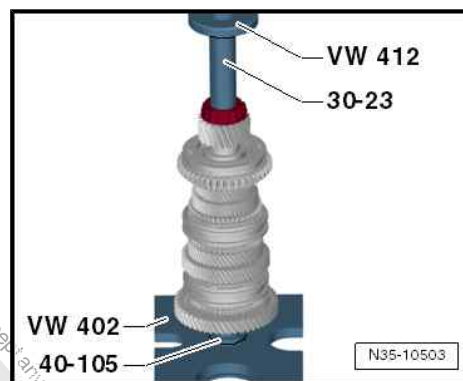
### Pressing off tapered roller bearing inner race for bearing in clutch housing

A - Splitter - VAS 251 409- or splitter 12 ... 75 mm , e.g. -Kukko 17/1-





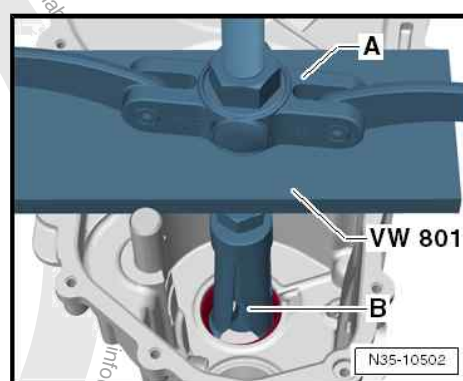
## Pressing on tapered roller bearing inner race for bearing in clutch housing



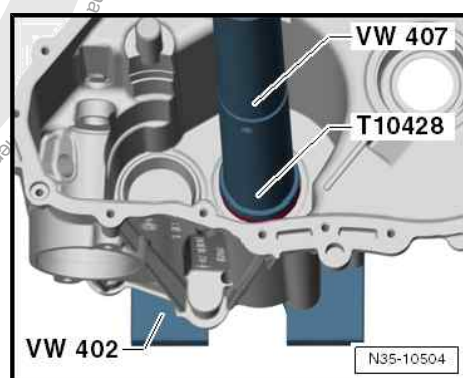
## Pulling outer race for tapered roller bearing out of gearbox housing

A - Counter support - VAS 251 623- or counter support , e.g. - Kukko 22/2-

B - Internal puller - VAS 251 613- , or e.g. internal puller 37...46 mm - Kukko 21/6-



## Pressing tapered roller bearing outer race into gearbox housing

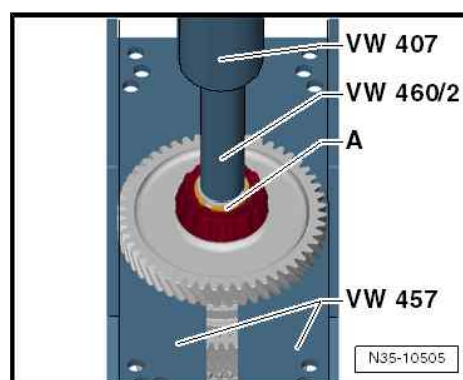


## Press off tapered roller bearing inner race on side facing towards gearbox housing together with synchromeshed gear for 1st gear:

- First, remove retaining ring -A- for tapered roller bearing inner race.
- Fit support rails - VW 457- behind constant mesh teeth of synchromeshed gear for 1st gear (not dog teeth).

Below the tapered roller bearing inner race, the thrust washer for the synchromeshed gear for 1st gear is located.

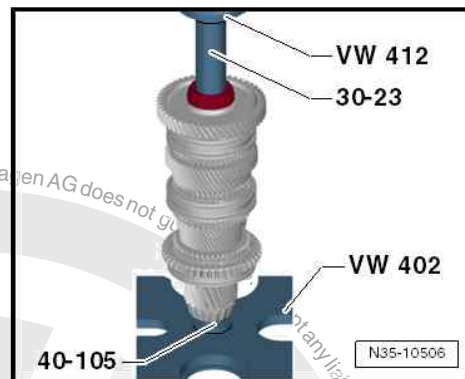
- Note thrust washer ⇒ [Item 36 \(page 57\)](#) for synchromeshed gear for 1st gear.





### Press on tapered roller bearing inner race on side facing gearbox housing

- First, fit synchromeshed gear for 1st gear with thrust washer ⇒ [Item 36 \(page 57\)](#) for synchromeshed gear for 1st gear.
- Determine retaining ring for tapered roller bearing inner race (⇒ illustration on next page) and install.

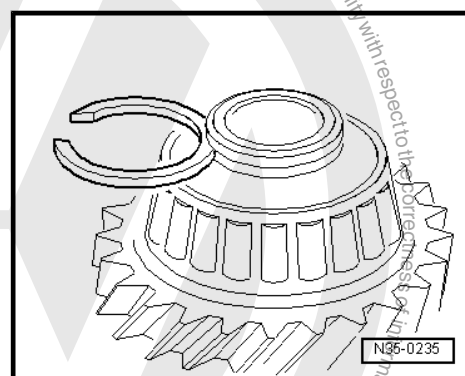


### Determining thickness of retaining ring

- Determine the thickest circlip which will just fit and install it.
- Determine retaining ring from table. Part number ⇒ Electronic parts catalogue (ETKA)

### Following retaining rings are available:

| Thickness (mm) |      |      |
|----------------|------|------|
| 2.00           | 2.20 | 2.40 |
| 2.10           | 2.30 |      |

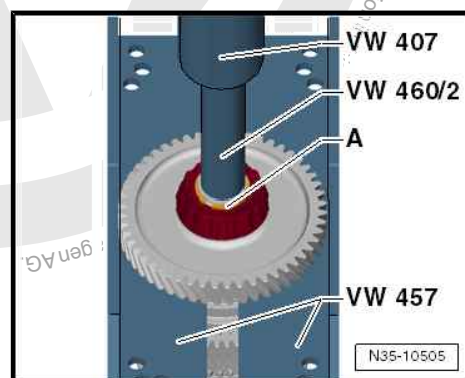


### Dismantling output shaft

- Remove retaining ring -A- for tapered roller bearing inner race.
- Fit support rails - VW 457- behind constant mesh teeth of synchromeshed gear for 1st gear (not dog teeth).
- Press off synchromeshed gear for 1st gear together with tapered roller bearing inner race.

Below the tapered roller bearing inner race, the thrust washer for the synchromeshed gear for 1st gear is located.

- Remove thrust washer ⇒ [Item 36 \(page 57\)](#) for synchromeshed gear for 1st gear.
- Remove needle bearing for synchromeshed gear for 1st gear.
- Remove synchro-ring for 1st gear.
- Remove retaining ring for synchro-hub for 1st and 2nd gears.
- Remove locking collar and synchro-hub for 1st and 2nd gears.
- Remove synchromeshed gear for 2nd gear together with synchro-rings for 2nd gear.
- Remove retaining ring for needle bearing.
- Remove synchromeshed gear for 2nd gear.
- Remove needle bearing for synchromeshed gear for 2nd gear.
- Remove thrust washers for 2nd and 3rd gears with washer ⇒ [Item 23 \(page 56\)](#) .
- Remove synchromeshed gear for 3rd gear.
- Remove synchro-ring for 3rd gear with needle bearing.
- Remove retaining ring for synchro-hub and locking collar for 3rd and 4th gears.

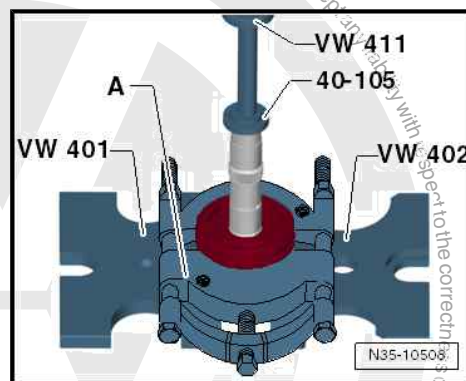




**Pressing off synchro-hub and locking collar for 3rd and 4th gears with synchro-ring for 4th gear**

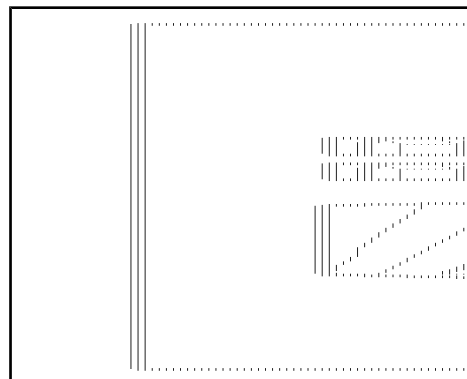
A - Splitter - VAS 251 411- , or e.g. splitter 22 ... 115 mm - Kukko 17/2-

- Apply splitter -A- below synchro-ring for 4th gear.
- Renew synchro-ring for 4th gear when assembling.
- Remove synchro-ring for 4th gear.
- Remove synchromeshed gear for 4th gear.
- Remove retaining ring located above needle bearing for synchromeshed gear for 4th gear.
- Remove needle bearing for synchromeshed gear for 4th gear.
- Remove thrust washers for 4th and 5th gears, with washer  
⇒ [Item 12 \(page 56\)](#) .
- Remove synchromeshed gear for 5th gear.
- Remove needle bearing for synchromeshed gear for 5th gear.
- Remove synchro-ring for 5th gear.
- Remove retaining ring for locking collar and synchro-hub for 5th and reverse gears.
- Remove locking collar and synchro-hub for 5th and reverse gears.

**Assembling output shaft****Checking synchro-rings for 1st and 3rd to 5th gears for wear**

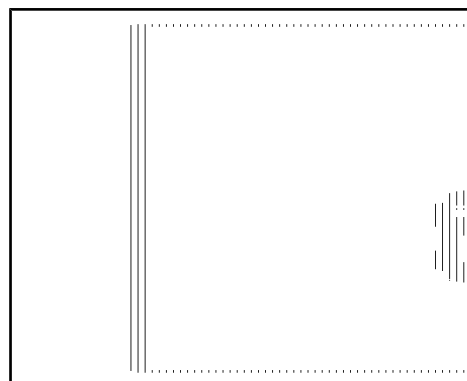
- Press synchro-ring onto cone of synchromeshed gear, and measure gap -a- at 3 points offset by 120° using a feeler gauge.
- Make a note of average value.

| Gap -a-                  | Installation dimension | Wear limit |
|--------------------------|------------------------|------------|
| 1st and 3rd to 5th gears | 1.0...1.7 mm           | 0.9 mm     |

**Checking 2nd gear synchro-ring, outer ring and inner ring together for wear**

- Press synchro-ring, outer ring and inner ring onto cone of synchromeshed gear and measure gap -a- at 3 points offset by 120° using a feeler gauge.
- Make a note of average value.

| Gap -a-  | Installation dimension | Wear limit |
|----------|------------------------|------------|
| 2nd gear | 1.0 ... 1.9 mm         | 0.9 mm     |

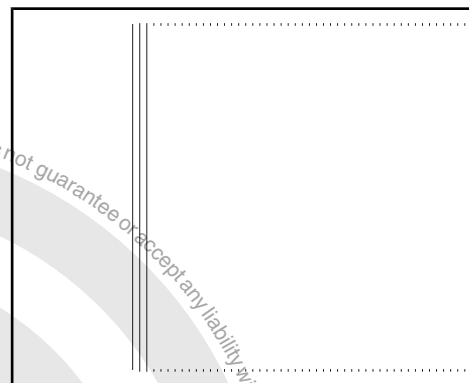
**Note**

*Always renew inner ring, outer ring and synchro-ring together.*



### Dismantling and assembling locking collar and synchro-hub for 1st, 2nd, 3rd and 4th gears

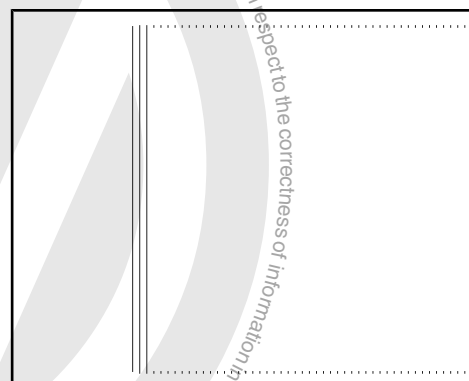
- 1 - Spring
  - 2 - Locking piece
  - 3 - Sliding sleeve
  - 4 - Synchro-hub
- Slide locking collar over synchro-hub.



### Assembling locking collar and synchro-hub for 1st, 2nd, 3rd and 4th gears

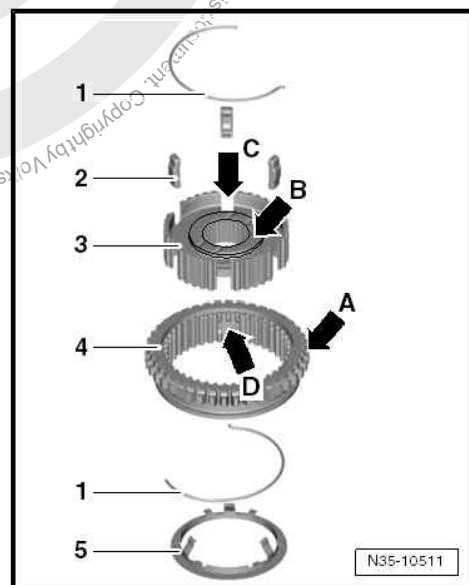
Locking collar has been pushed over synchro-hub.

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



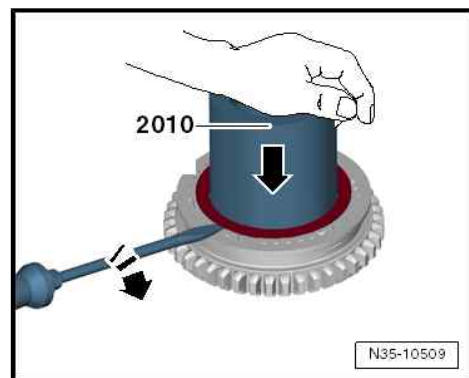
### Dismantling and assembling locking collar and synchro-hub for 5th and reverse gears

- 1 - Spring
  - 2 - Locking piece
  - 3 - Synchro-hub
  - 4 - Sliding sleeve
  - 5 - Stop ring: removing ⇒ [page 65](#) ; installing ⇒ [page 66](#)
- Slide locking collar over synchro-hub.
  - Teeth -arrow A- and flat shoulder -arrow B- are facing in same direction
  - Deeper notches -arrow C- for locking pieces in synchro-hub and notches -arrow D- in locking collar must align.
  - Insert locking pieces -2-, and install springs -1- offset by 120 degrees.
  - Angled end of spring must locate in hollow locking piece.
  - Install stop ring -5- ⇒ [page 66](#) .



### Removing stop ring for locking pieces of locking collar with synchro-hub for 5th and reverse gears

- Press tube - 2010- into stop ring of synchro-hub. In the process, lever stop ring on alternating sides out of synchro-hub.
- Stop ring must be completely on tube - 2010- ⇒ [page 66](#) .
- Remove stop ring together with tube - 2010- .

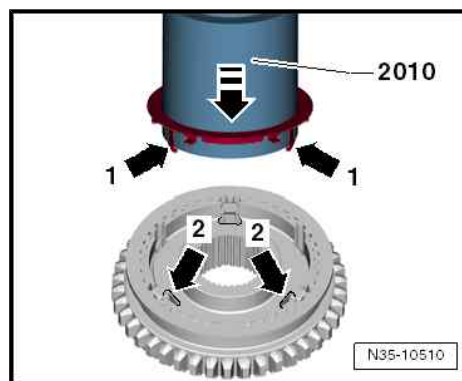




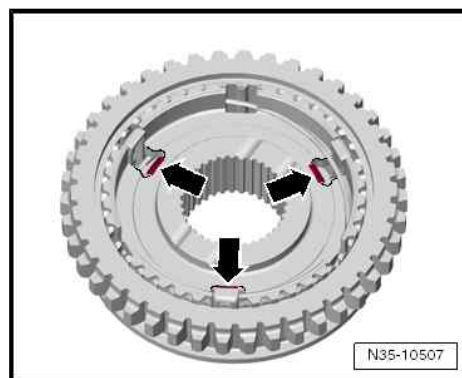
### Removing stop ring for locking pieces on locking collar with synchro-hub for 5th and reverse gears

- Insert stop ring together with tube - 2010- into synchro-hub with locking collar for 5th gear.

The 3 lugs -arrow 1- engage in the 3 recesses -arrow 2- for the synchro-hub locking pieces. (The illustration shows only 2 lugs and 2 recesses.)



- Remove tube - 2010- , making sure that the lugs -arrow- engage in the synchro-hub.

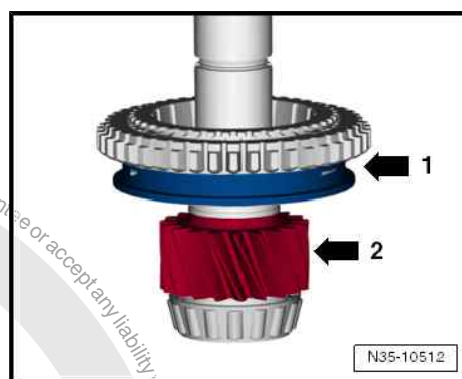


### Installation position of locking collar and synchro-hub for 5th and reverse gears

- ♦ The support -arrow 1- for the selector fork faces towards the splines -arrow 2-.

- Stop ring for locking pieces for 5th and reverse gears is installed ➔ [page 66](#) .

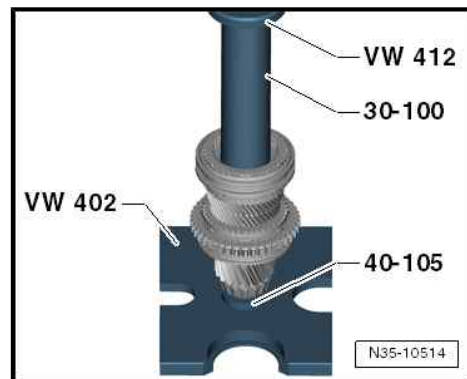
- Fit locking collar and synchro-hub for 5th and reverse gears.
- Install retaining ring.
- Insert synchro-ring for 5th gear.
- Install 5th gear synchromeshed gear with needle bearing.
- Install thrust washers for 4th and 5th gears ➔ [Item 13 \(page 56\)](#) and ➔ [Item 12 \(page 56\)](#) .
- Fit needle bearing for 4th gear synchromeshed gear.
- Install retaining ring.
- Fit synchromeshed gear for 4th gear.
- Fit synchro-ring for 4th gear.





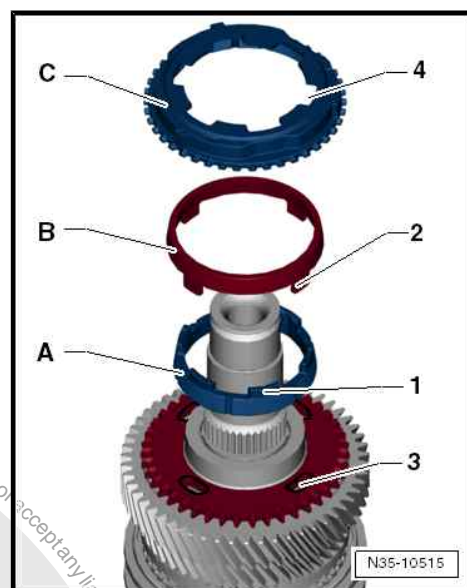
### Pressing on synchro-hub with locking collar for 3rd and 4th gears

- Install retaining ring.
- Insert synchro-ring for 3rd gear.
- Set 3rd gear synchromeshed gear with needle bearing in place.
- Install thrust washers for 2nd and 3rd gears  
⇒ [Item 24 \(page 56\)](#) and ⇒ [Item 23 \(page 56\)](#) .
- Set 2nd gear synchromeshed gear with needle bearing in place.
- Install retaining ring.



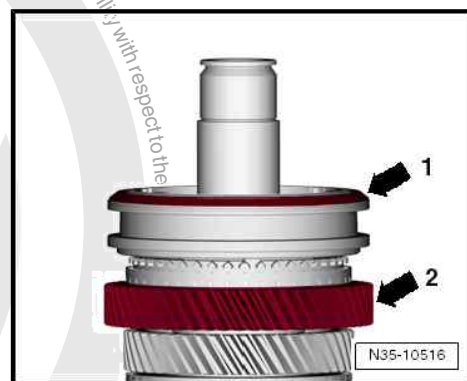
### Installation position of outer ring, inner ring and synchro-ring for 2nd gear

- Place inner ring -A- on synchromeshed gear.
- ◆ Lugs -1- point away from synchromeshed gear.
- Fit outer ring -B-.
- ◆ Lugs -2- engage in notches -3- of synchromeshed gear.
- Fit synchro-ring -C-.
- ◆ Larger notches -4- engage in lugs -1- of inner ring -A-.
- Fit synchro-ring for 2nd gear.



### Installation position of locking collar with synchro-hub for 1st and 2nd gears

- ◆ The chamfer -arrow 1- points away from synchromeshed gear for 2nd gear -arrow 2-.
- Fit locking collar and synchro-hub for 1st and 2nd gears.
- Install retaining ring.
- Insert synchro-ring for 1st gear.
- Install synchromeshed gear for 1st gear with needle bearing.
- Fit thrust washer for 1st gear ⇒ [Item 36 \(page 57\)](#) .



#### Note

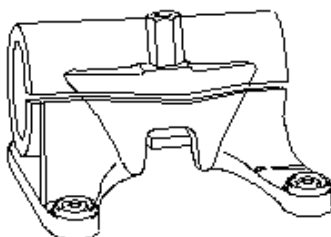
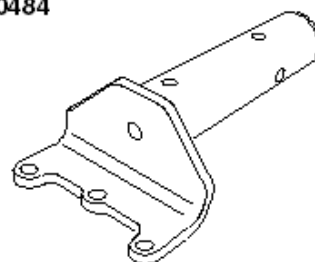
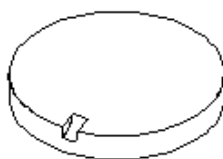
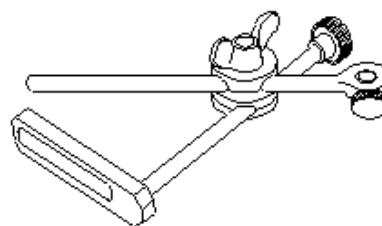
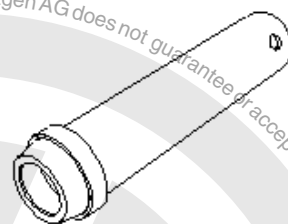
Pressing on tapered roller bearing inner race for bearing in gear-box housing ⇒ [page 63](#) .

- Install retaining ring ⇒ [page 63](#) .

## 2.3 Adjusting output shaft

**Special tools and workshop equipment required**

- ◆ Support clamp - VW 313-
- ◆ Gearbox support - T10484-
- ◆ End dimension plate - VW 385/17-
- ◆ Universal dial gauge bracket - VW 387-
- ◆ Press piece - VW 412-
- ◆ Press tool - T10428-
- ◆ Torque wrench - V.A.G 1331-
- ◆ Dial gauge
- ◆ 30 mm dial gauge extension

**VW 313****T10484****VW 385/17****VW 387****VW 412****T10428**

W35-10040

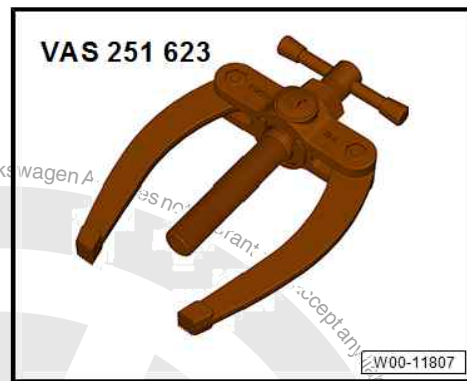
- ◆ Internal puller - VAS 251 613- , or internal puller , e.g. -Kukko 21/6-

**VAS 251 613**

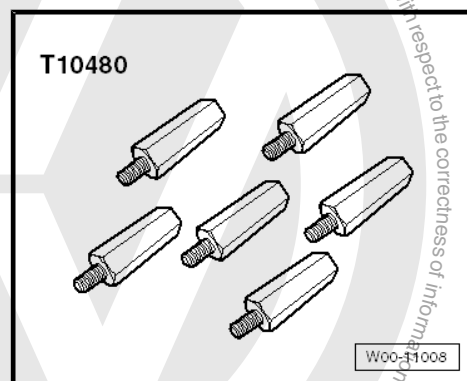
W00-11804



- ◆ Counter support - VAS 251 623- or counter support , e.g. - Kukko 22/2-



- ◆ Adapter - T10480-



(Determining shim for output shaft)

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

- ◆ Gearbox housing
- ◆ Clutch housing
- ◆ Output shaft
- ◆ Tapered roller bearing for output shaft

Adjustment overview ➔ [page 85](#)

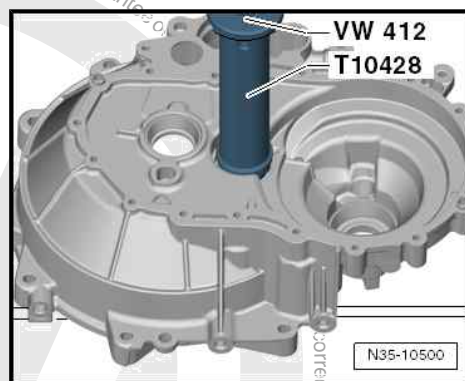
#### Requirement:

- Sealing surfaces of clutch and gearbox housings must be free of sealant .
- Both inner races for tapered roller bearings are pressed onto output shaft ➔ [page 62](#) and ➔ [page 63](#) .
- Tapered roller bearing outer race is pressed into gearbox housing ➔ [page 62](#) .
- Remove reverse shaft ➔ [page 72](#) .

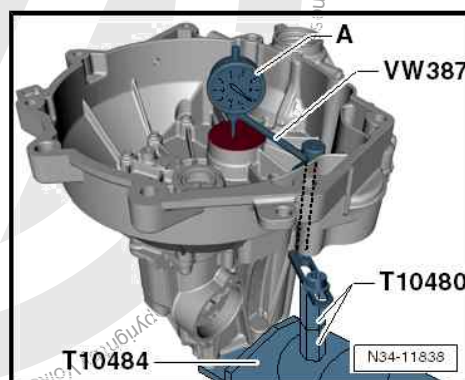




- Press tapered roller bearing outer race with 1.4 mm thick shim into clutch housing.
- Fit output shaft into gearbox housing.
- Fit clutch housing, and diagonally tighten bolts to specified torque ➔ [Item 3 \(page 27\)](#).



- Set up measuring tools.
- Set dial gauge (3 mm measuring range) to “0” with 1 mm preload.
- Loosen clutch housing/gearbox housing securing bolts diagonally until the bolts release the clutch housing or output shaft.
- Do not move the clutch housing by hand
- Read and note value on dial gauge (example: 0.6 mm).



#### Determining thickness of shim

The specified bearing preload will be attained by subtracting the measured value (0.60 mm) from the inserted shim (1.40 mm) and adding a constant value for preload (0.15 mm).

#### Example:

|                      |         |
|----------------------|---------|
| Installed shim       | 1.40 mm |
| - Measured value     | 0.60 mm |
| + Preload (constant) | 0.15 mm |
| Shim thickness       | 0.95 mm |

- Determine thickness of shim from table.
- For part number of shim, refer to ➔ Electronic parts catalogue (ETKA).





- Remove clutch housing, and pull out tapered roller bearing outer race.

A - Counter support - VAS 251 623- or counter support , e.g. - Kukko 22/2-

B - Internal puller - VAS 251 613- , or e.g. internal puller 37...46 mm - Kukko 21/6-

- Remove inserted shim (1.40 mm thick) from clutch housing.

The various thicknesses make it possible to achieve the exact shim thickness required.

If the size of shim required is larger than those listed in the table, insert two shims totalling the correct figure.

**Table of shims**

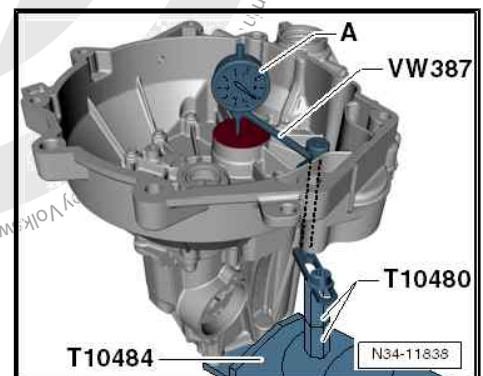
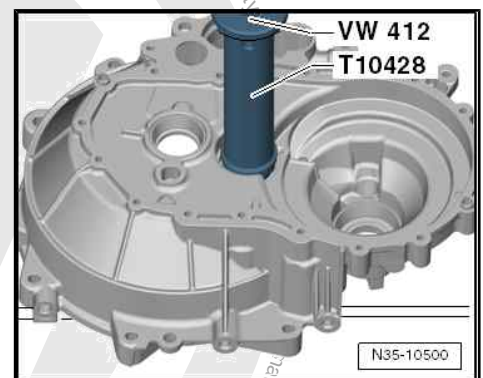
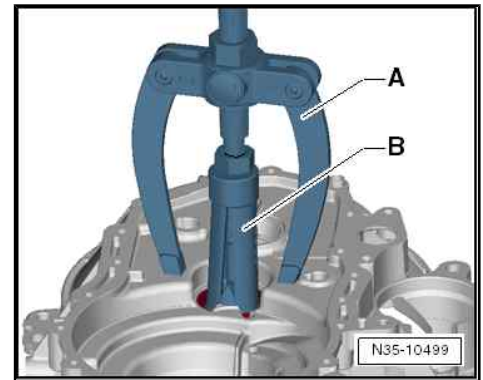
|       | Thickness (mm) |       |
|-------|----------------|-------|
| 0.650 | 0.800          | 0.950 |
| 0.675 | 0.825          | 0.975 |
| 0.700 | 0.850          | 1.000 |
| 0.725 | 0.875          | 1.025 |
| 0.750 | 0.900          | 1.050 |
| 0.775 | 0.925          | 1.075 |
|       | Thickness (mm) |       |
| 1.100 | 1.250          | 1.400 |
| 1.125 | 1.275          |       |
| 1.150 | 1.300          |       |
| 1.175 | 1.325          |       |
| 1.200 | 1.350          |       |
| 1.225 | 1.375          |       |

- Press in tapered roller bearing outer race together with correct shim (in example 1.00 mm).

#### Carrying out check measurement

- Determined shim installed.

- Set up measuring tools.
- Set dial gauge (3 mm measuring range) to "0" with 1 mm pre-load.
- Loosen clutch housing/gearbox housing securing bolts diagonally until the bolts release the clutch housing or output shaft.
- If correct shim has been selected, dial gauge will indicate a value between 0.15 mm to 0.25 mm.





### 3 Reverse shaft

⇒ **"3.1 Removing and installing reverse shaft", page 72**

#### 3.1 Removing and installing reverse shaft

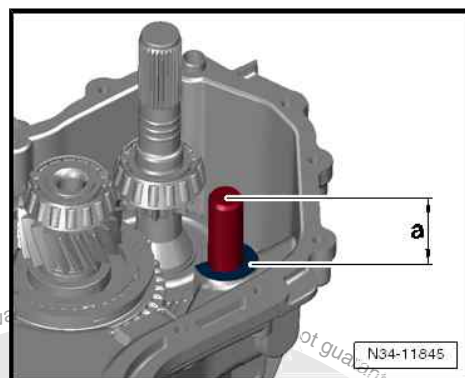
- Remove clutch housing ⇒ [page 30](#) .
- Remove reverse gear wheel with roller bearing and thrust washers ⇒ [page 30](#) .
- Using pliers, pull reverse shaft out of gearbox housing.

**The reverse shaft will be damaged when removed.**

- Using plastic hammer, carefully drive in new reverse shaft.

**Dimension - a - = 41.5 mm**

- Install reverse gear wheel, roller bearing and thrust washers ⇒ [page 30](#) .
- Install clutch housing ⇒ [page 30](#) .





## 39 – Final drive - differential

### 1 Oil seals

The relevant description can be found in ⇒ Rep. gr. 39 ; Seals;  
Overview of fitting locations - seals .



## 2 Differential

⇒ ["2.1 Assembly overview - differential", page 74](#)

⇒ ["2.2 Dismantling and assembling differential", page 75](#)

⇒ ["2.3 Adjusting differential", page 81](#)

### 2.1 Assembly overview - differential

#### 1 - Left drive shaft seal

- ☐ Renew after removing  
⇒ Rep. gr. 39 ; Seal;  
Overview of fitting locations - seals

#### 2 - Gearbox housing

- ☐ Repairing ⇒ [page 36](#)
- ☐ Allocation ⇒ Electronic parts catalogue (ETKA)

#### 3 - Baffle plate

- ☐ Renew after removal
- ☐ Shoulder points away from housing

#### 4 - Tapered roller bearing outer race

- ☐ Removing ⇒ [page 80](#)
- ☐ Pressing in  
⇒ [page 80](#) .

#### 5 - Tapered roller bearing inner race

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

#### 6 - Differential cage

- ☐ With differential bevel gears, one-piece thrust washer, differential pinion pin and final drive gear
- ☐ Removing differential bevel gears, one-piece thrust washer and differential pinion pin  
⇒ [page 81](#)
- ☐ Installing differential bevel gears, one-piece thrust washer and differential pinion pin ⇒ [page 81](#)

#### 7 - Tapered roller bearing inner race

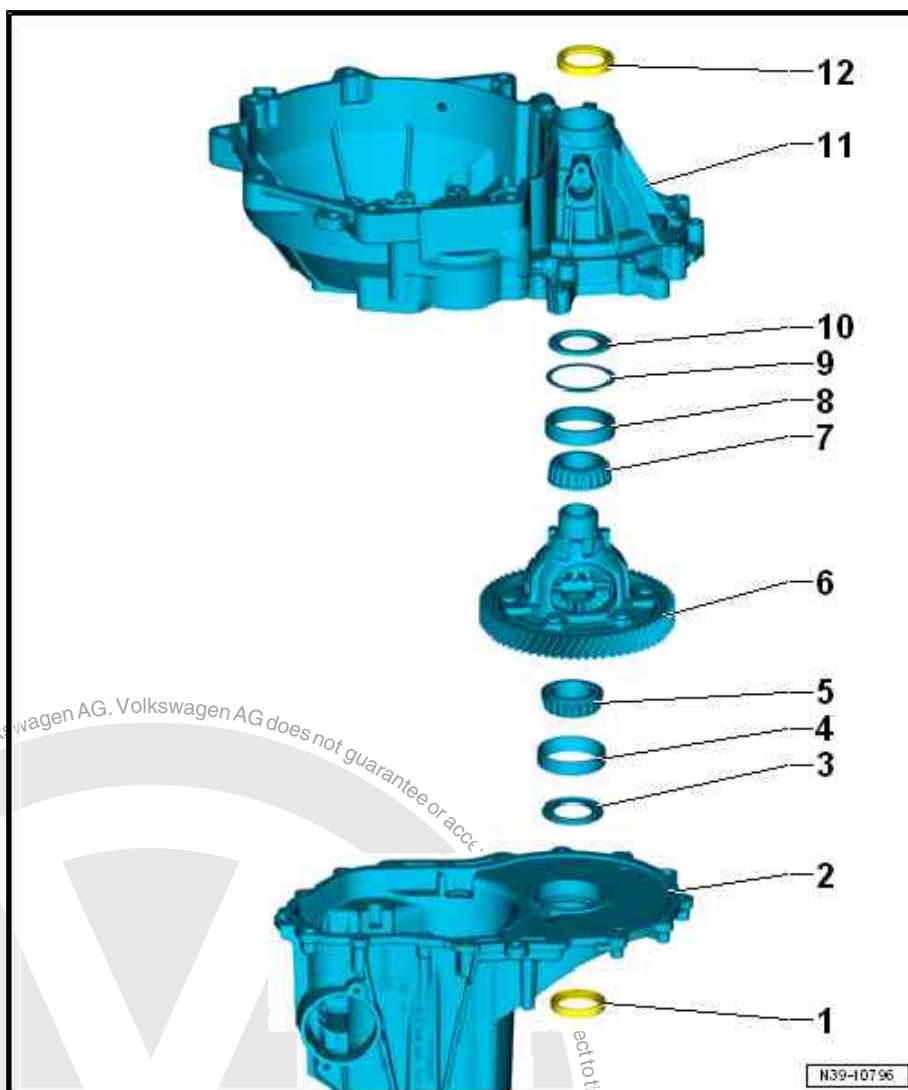
- ☐ Pulling off ⇒ [page 79](#)
- ☐ Pressing on ⇒ [page 79](#)

#### 8 - Tapered roller bearing outer race

- ☐ Pressing out ⇒ [page 78](#) .
- ☐ Pressing in ⇒ [page 79](#) .

#### 9 - Shim

- ☐ For differential
- ☐ Determining thickness ⇒ [page 81](#)



## 10 - Baffle plate

- ☐ Renew after removal
- ☐ Shoulder points away from housing

## 11 - Clutch housing

- ☐ Repairing ⇒ [page 36](#)

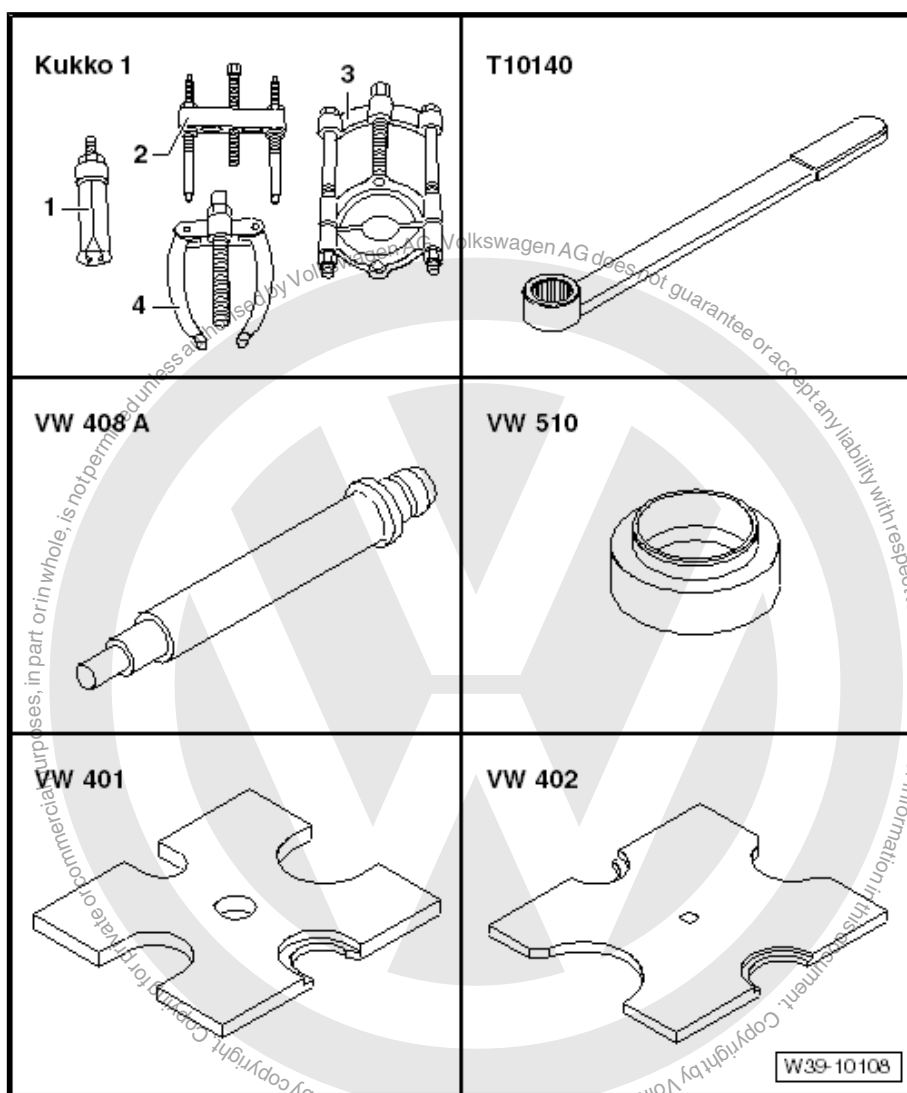
## 12 - Seal for right drive shaft

- ☐ Renew after removing ⇒ Rep. gr. 39 ; Seal; Overview of fitting locations - seals

## 2.2 Dismantling and assembling differential

### Special tools and workshop equipment required

- ◆ Do not apply: tools 1-4
- ◆ Gearbox support - T10484-
- ◆ Support clamp - VW 313-
- ◆ Counterhold tool - T10140- or 8 x 280 steel bar
- ◆ Press piece - VW 408 A-
- ◆ Thrust washer - VW 510-
- ◆ Pressure plate - VW 401-
- ◆ Pressure plate - VW 402-





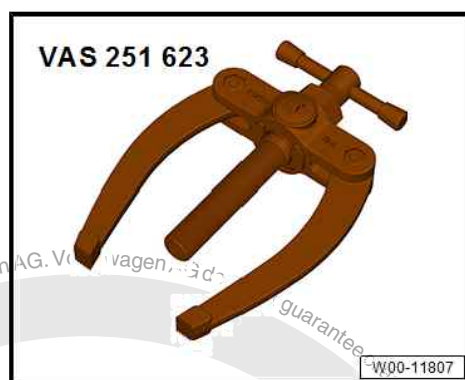
up! 2012 ➤ , up! 2017 ➤

Removed automated 5-speed manual gearbox OCT - Edition 10.2016

- ◆ Internal puller - VAS 251 615- , or internal puller 46 ... 58 mm ,  
e.g. -Kukko 21/7-

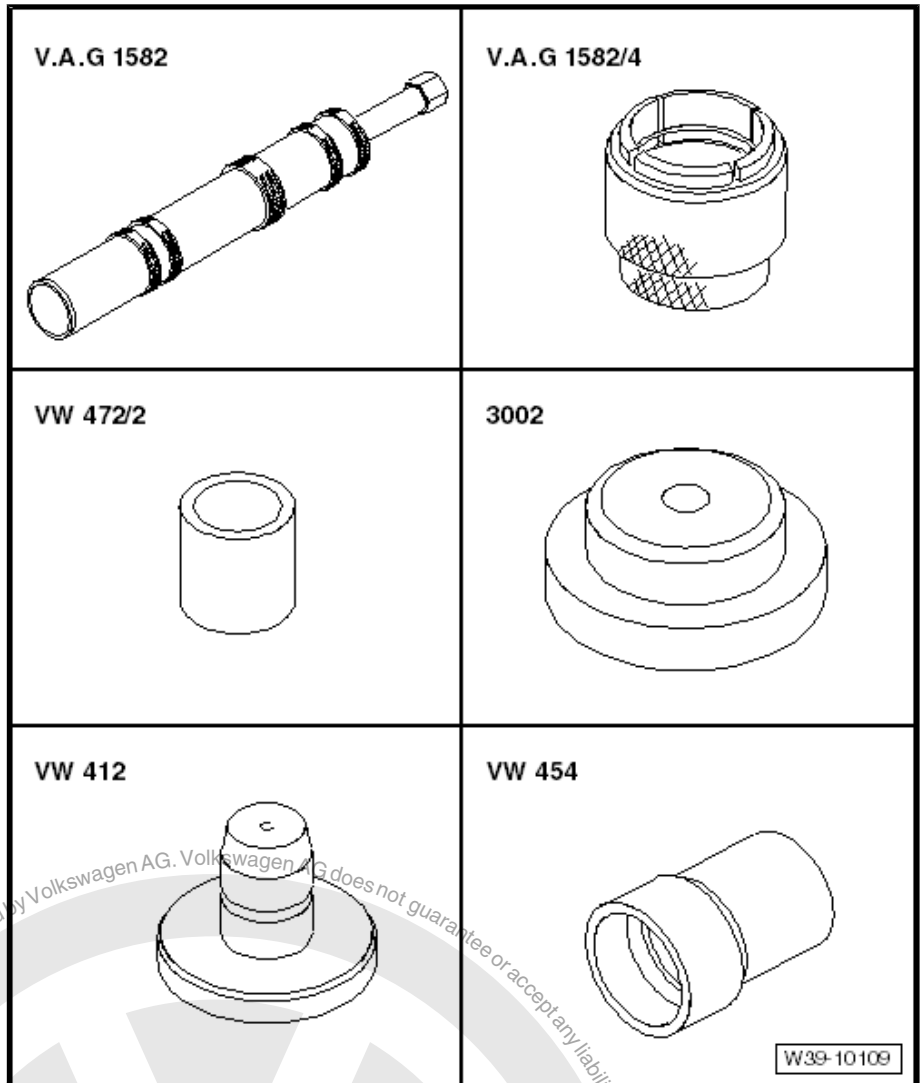


- ◆ Counter support - VAS 251 623- or counter support , e.g. -  
Kukko 22/2-





- ◆ Tapered roller bearing puller - V.A.G 1582-
- ◆ Grip tool - V.A.G 1582/4-
- ◆ Spacer sleeve - VW 472/2-
- ◆ Press tool - 3002-
- ◆ Press piece - VW 412-
- ◆ Press tool - VW 454-

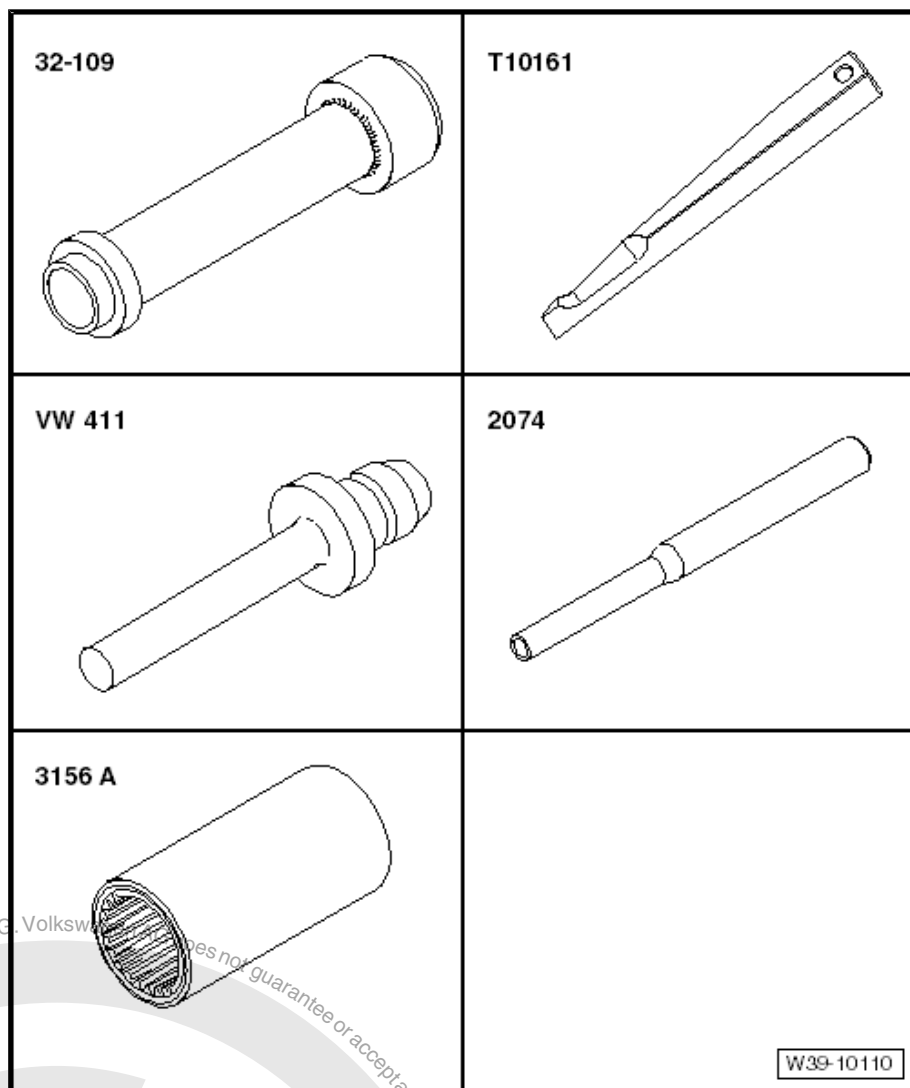


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- ◆ Tube - 32 - 109-
- ◆ Wedge - T10161- , qty. 2
- ◆ Press piece - VW 411-
- ◆ Drift - 2074-
- ◆ Torx screwdriver - 3156 A-



#### Note

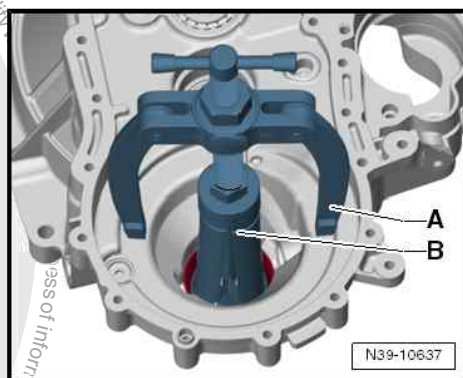
- ◆ Heat tapered roller bearing inner races to 100 °C before installing.
- ◆ Always renew both tapered roller bearings together as a set.
- ◆ If tapered roller bearings, differential cage, gearbox housing or clutch housing is renewed, adjust differential ➔ [page 81](#) .

#### Pulling tapered roller bearing outer race out of clutch housing

A - Counter support - VAS 251 623- or counter support , e.g. - Kukko 22/2-

B - Internal puller - VAS 251 615- , or internal puller 46 ... 58 mm , e.g. Kukko 21/7-

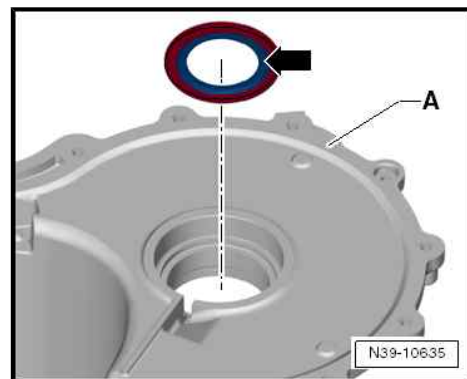
- Clamp internal puller securely behind tapered roller bearing outer race.





Insert new baffle plate (shown here in conjunction with gearbox housing)

Installation position: shoulder -arrow- faces away from housing  
-A-

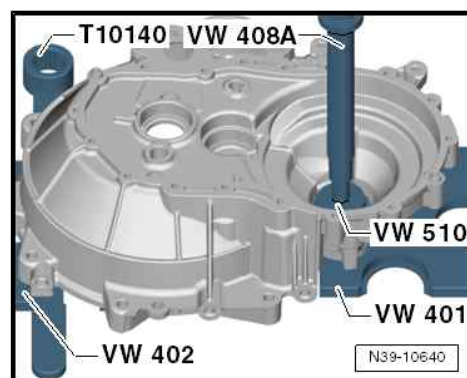


### Pressing tapered roller bearing outer race into clutch housing

- Fit counterhold tool - T10140- onto thrust plate - VW 402- .
- Use counterhold tool - T10140- to hold clutch housing in horizontal position.

Instead of counterhold tool - T10140- , an 8 x 280 steel bar can be used.

Larger shoulder of thrust plate - VW 510- faces towards press tool - VW 408 A- .



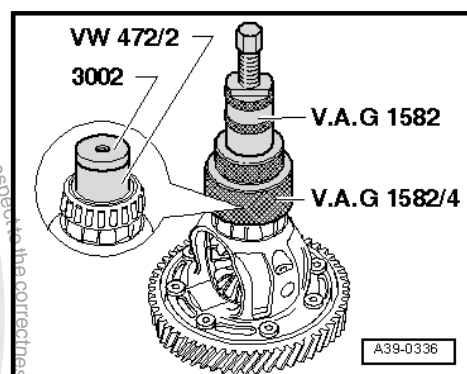
### Pulling off tapered roller bearing inner race

- Before fitting extractor, position spacer sleeve - VW 472/2- and thrust piece - 3002- on differential housing.



#### Note

*Both tapered roller bearing inner races are pulled off the differential cage in the same way.*



### Pressing on tapered roller bearing inner race



#### WARNING

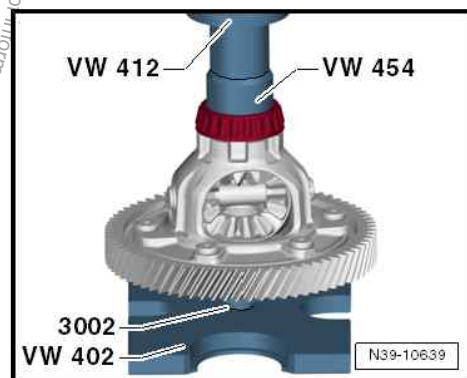
***Wear protective gloves.***

- Heat inner tapered roller bearing race to approx. 100 °C before pressing on.



#### Note

*Both tapered roller bearing inner races are pressed onto the differential cage in the same way.*



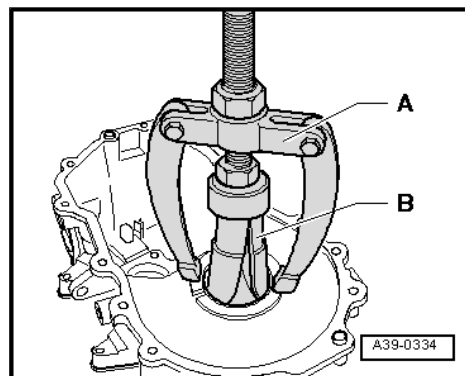


### Pulling outer race for tapered roller bearing out of gearbox housing

A - Counter support - VAS 251 623- or counter support , e.g. - Kukko 22/2-

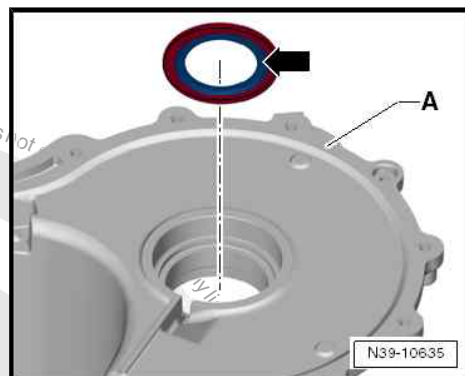
B - Internal puller - VAS 251 615- , or internal puller 46 ... 58 mm , e.g. -Kukko 21/7-

- Clamp internal puller securely behind tapered roller bearing outer race.



### Insert new baffle plate

Installation position: shoulder -arrow- faces away from housing -A-

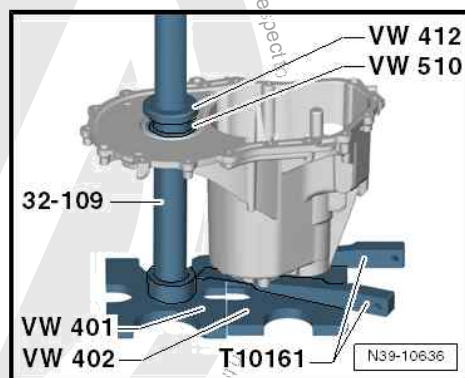


### Pressing tapered roller bearing outer race into gearbox housing

Larger shoulder of thrust plate - VW 510- faces towards press tool - VW 412- .

- Support gearbox housing with tube - 32 - 109- directly below bearing support.
- Use wedges - T10161- to hold gearbox housing in horizontal position.

Pulling off tapered roller bearing inner race ➔ [page 79](#)



**i** Note

Both tapered roller bearing inner races are pulled off the differential cage in the same way

Pressing on tapered roller bearing inner race ➔ [page 79](#)

**i** Note

Both tapered roller bearing inner races are pressed onto the differential cage in the same way.



### WARNING

*Wear protective gloves.*

- Heat inner tapered roller bearing race to approx. 100 °C before pressing on.



### Removing differential bevel gears, one-piece thrust washer and differential pinion pin

- Remove retaining ring for differential pinion pin.
- Remove differential pinion pin.
- Drive out differential pinion pin using plastic hammer and fitting drift - 2074- .

### If engagement factor is too high, press out differential pinion pin.

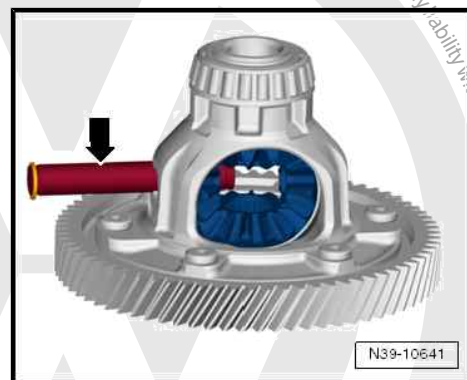
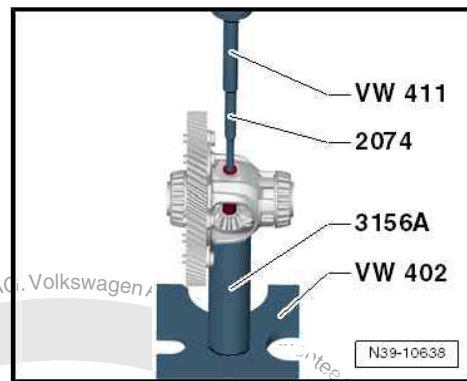
- In this case, have a second mechanic hold differential in position.

Splines of socket - 3156 A- point towards differential.

Make sure not to damage splines.

### Installing differential bevel gears, one-piece thrust washer and differential pinion pin

- Lubricate one-piece thrust washer with gear oil and install.
- Insert both sun wheels.
- Hold upper sun wheel in position.
- Insert both planet pinions offset 180° and pivot into position.
- Drive in differential pinion pin -arrow- until it reaches its final position, and secure it with retaining ring.

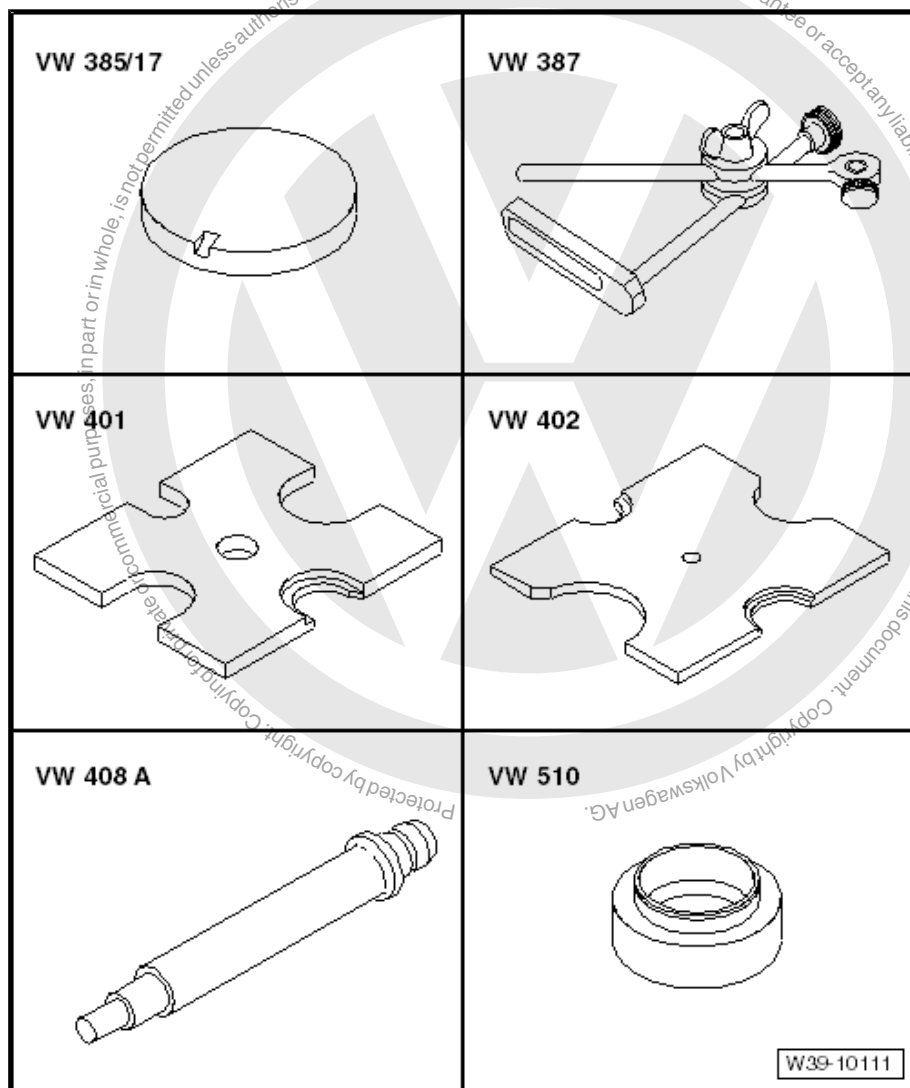


## 2.3 Adjusting differential



### Special tools and workshop equipment required

- ◆ Support clamp - VW 313-
- ◆ Gearbox support - T10484-
- ◆ End dimension plate - VW 385/17-
- ◆ Universal dial gauge bracket - VW 387-
- ◆ Pressure plate - VW 402-
- ◆ Pressure plate - VW 401-
- ◆ Press piece - VW 408-
- ◆ Thrust washer - VW 510-
- ◆ Torque wrench - V.A.G 1331-
- ◆ Dial gauge
- ◆ 30 mm dial gauge extension



- ◆ Internal puller - VAS 251 615- , or internal puller 46 ... 58 mm , e.g. -Kukko 21/7-





- ◆ Counter support - VAS 251 623- or counter support , e.g. - Kukko 22/2-



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

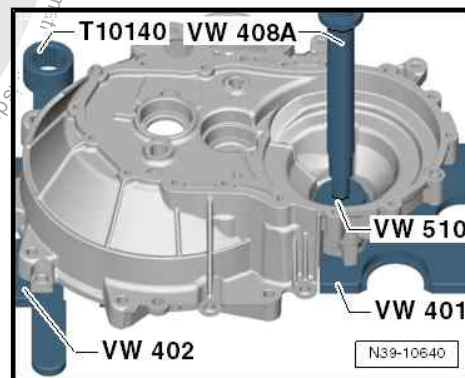
- ◆ Gearbox housing
- ◆ Clutch housing
- ◆ Differential cage
- ◆ Tapered roller bearing of differential

#### Requirement:

- Sealing surfaces of clutch and gearbox housings must be free of sealant .
- Both tapered roller bearings inner races are pressed onto differential cage ⇒ [page 79](#) .
- New baffle plate is inserted into gearbox housing ⇒ [page 80](#) .
- Tapered roller bearing outer race (gear wheel side) is pressed into gearbox housing ⇒ [page 80](#) .

#### Adjustment overview ⇒ [page 85](#)

- Press tapered roller bearing outer race (opposite side of gear wheel) without shim and without baffle plate into clutch housing ⇒ [page 79](#) .
- Insert differential in gearbox housing.
- Fit clutch housing and tighten 5 bolts to specified torque ⇒ [Item 3 \(page 27\)](#) .







- Fit dial gauge, and set it to “0” with 1 mm preload.
- A - 30 mm dial gauge extension
- Before taking any measurements, rotate differential to allow tapered roller bearings to settle. Set dial gauge to “0” with 1 mm preload.
- Move differential up and down. Read off and make a note of play indicated on dial gauge (e.g.: 1.50 mm).

### Determining thickness of shim

The specified bearing preload is obtained by adding a constant value for preload (0.20 mm) to the reading obtained.

### Example:

|                      |         |
|----------------------|---------|
| Measured value       | 1.30 mm |
| + Preload (constant) | 0.20 mm |
| Thickness of shim =  | 1.50 mm |

- Remove gearbox housing, and pull tapered roller bearing outer race out of clutch housing ⇒ [page 78](#) .

A - Counter support - VAS 251 623- or counter support , e.g. - Kukko 22/2-

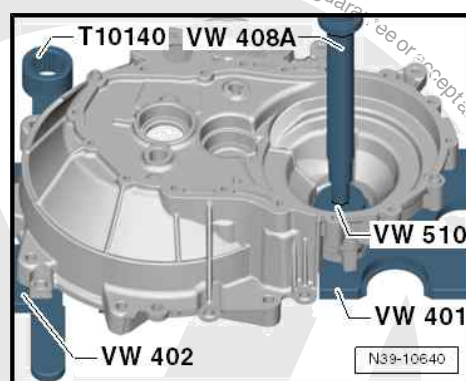
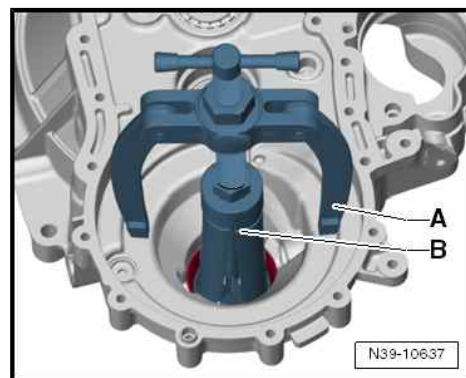
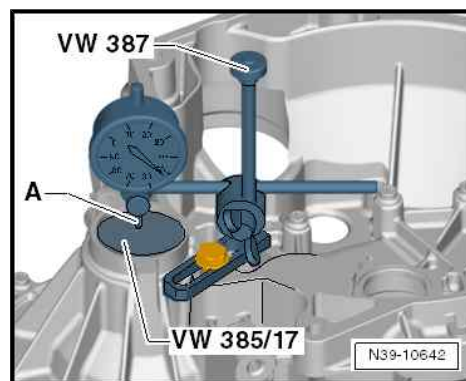
B - Internal puller - VAS 251 615- , or internal puller 46 ... 58 mm , e.g. -Kukko 21/7-

- Allocate shim(s) using ⇒ Electronic parts catalogue (ETKA) .

The various thicknesses make it possible to achieve the exact shim thickness required.

If the size of shim required is larger than those listed in the ⇒ Electronic parts catalogue (ETKA) , insert two shims totalling the correct figure.

- Insert new baffle plate ⇒ [page 80](#) .
- Insert shim of determined thickness (in example 1.50 mm), and press tapered roller bearing outer race back into clutch housing ⇒ [page 79](#) .
- Fit clutch housing and tighten bolts to specified torque setting.







### 3 Adjustment overview



#### Note

*Adjustment of the input shaft, output shaft, or differential is only necessary 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<br>⇒ <a href="#">page 48</a> | Output shaft<br>⇒ <a href="#">page 67</a> | Differential<br>⇒ <a href="#">page 81</a> |
| Parts renewed: | Gearbox housing                         | x  | 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   |



## 4 Gearbox control system

⇒ ["4.1 Overview of fitting locations - gearbox control", page 86](#)

### 4.1 Overview of fitting locations - gearbox control

The respective description can be found in ⇒ Rep. gr. 39 ; Gearbox control system; Overview of fitting locations - gearbox control system and in ⇒ Rep. gr. 00 ; Electrical components; Overview of fitting locations - electrical components .

