

Workshop Manual OCTAVIA

**5-Speed Manual Gearbox 02C
4 Wheel Drive**

List of Supplements to **OCTAVIA** Workshop Manual

Edition: 08.02

5-Speed Manual Gearbox 02C 4 Wheel Drive

Replaces List of Supplements - Edition: 11.00

Supplement	Edition	Subject	Article Number
	11.99	Basic Edition of Workshop Manual	S00.5130.50.20
1	02.00	Self-Diagnosis	S00.5130.51.20
2	11.00	Modifications to 1st Gear Synchromesh	S00.5130.52.20
3	08.02	Rear final drive	S00.5130.53.20
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* ⇒ 5-Speed Manual Gearbox 02J

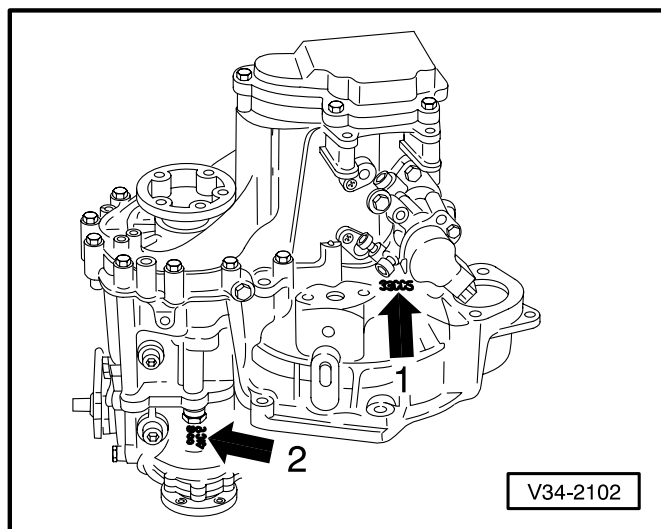
Identification of gearbox

Assignment ⇒ page 00-2.

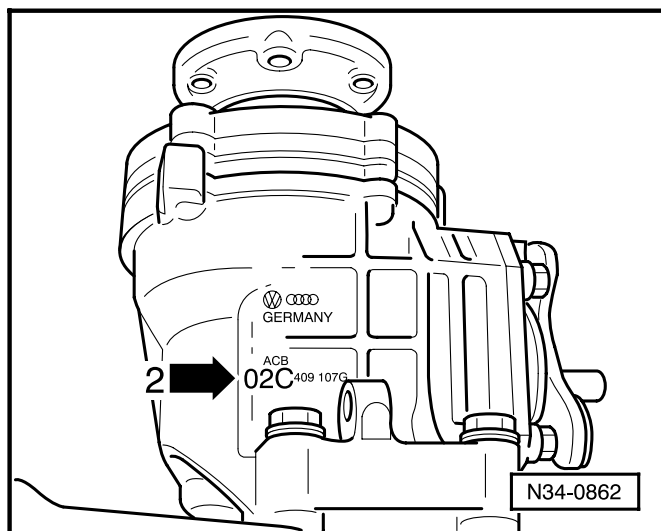
◀ Location on gearbox

Code letters and date of manufacture (arrow 1)

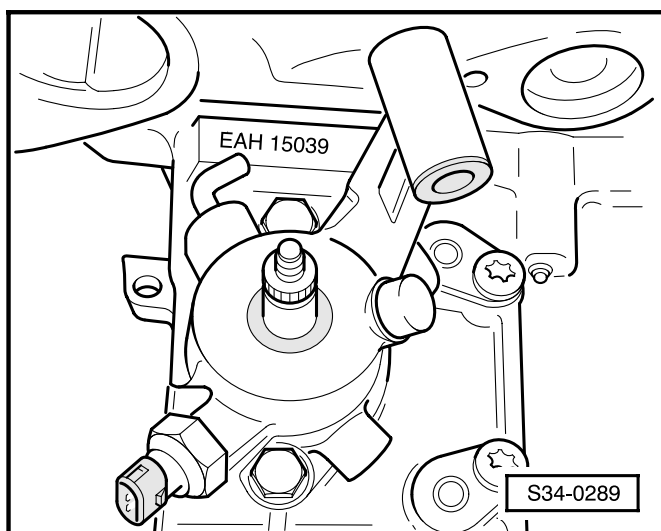
Manual gearbox 02C 4WD (arrow 2)



◀ Manual gearbox 02C 4WD (arrow 2)



◀ Code letters and date of manufacture of gearbox



Example:	EAH	15	03	9
	Code letters	Day	Month	Year (1999) of manufacture

Additional data are related to production.

Note:

The code letters of the gearbox are also listed in the data stickers of the vehicle.

Code letter, component assignment, transmission ratios, capacities

Manual gearbox		5-speed manual gearbox 02C 4x4	
Code letters		EAG	EWK ¹⁾
Manufactured	from to	05.99 07.00	08.00
Assignment	Engine	1.9-ltr./66 kW TDI	1.9-ltr./66 kW TDI
Transmission ratios:	Final drive	62 : 17 = 3.647	62 : 17 = 3.647
	1st gear	34 : 9 = 3.778	34 : 9 = 3.778
	2nd gear	33 : 16 = 2.063	33 : 16 = 2.063
	3rd gear	34 : 26 = 1.308	34 : 26 = 1.308
	4th gear	33 : 36 = 0.917	33 : 36 = 0.917
	5th gear	33 : 46 = 0.717	33 : 46 = 0.717
	Reverse	18 : 9 x 36 : 20 = 3.600	18 : 9 x 36 : 20 = 3.600
	Speedo	13 : 22 = 0.591	13 : 22 = 0.591
Capacity		2.4 ltr.	
Gear oil specification		G50 SAE 75W90 (synthetic oil)	
Gear oil change interval		filled for life	
Clutch control		hydraulic	
Clutch plate Ø		219 mm TMF ²⁾	225 mm TMF ²⁾
Drive shaft flange Ø		100 mm	
Rear final drive assignment code letters		END, EUN	EUN

1) Gearbox with modified synchromesh for 1st gear

2) TMF = Two-mass flywheel

Rear final drive		02D	
Code letters		END	EUN
Manufactured	from to	05.99 09.99	10.99
Assignment	Engine	1.9-ltr./66 kW TDI	
Ratio: $Z_2 : Z_1$ front/rear bevel gear		17 : 27 x 27 : 17 = 1.00	
Quantity in final drive		1.0 ltr.	
Gear oil specification		G50 SAE 75W90 (synthetic oil)	
Gear oil change interval		filled for life	
Quantity in Haldex clutch		0.42 ltr.	
Change quantity in Haldex clutch		0.25 ltr.	
Oil specification for Haldex clutch		G 052 175 A1	
Drive shaft flange Ø		100 mm	
Manual gearbox assignment code letters		EAG	EAG, EWK

Code letter, component assignment, transmission ratios, capacities

Manual gearbox		5-speed manual gearbox 02C 4x4	
Code letters		ERW	EWN ¹⁾
Manufactured	from to	04.00 07.00	08.00
Assignment	Engine	2.0-ltr./85 kW	2.0-ltr./85 kW
Transmission ratios:	Final drive	64 : 15 = 4.267	64 : 15 = 4.267
	1st gear	34 : 9 = 3.778	34 : 9 = 3.778
	2nd gear	33 : 16 = 2.063	33 : 16 = 2.063
	3rd gear	34 : 25 = 1.360	34 : 25 = 1.360
	4th gear	35 : 34 = 1.029	35 : 34 = 1.029
	5th gear	31 : 38 = 0.816	31 : 38 = 0.816
	Reverse	18 : 9 x 36 : 20 = 3.600	18 : 9 x 36 : 20 = 3.600
	Speedo	13 : 22 = 0.591	13 : 22 = 0.591
Capacity		2.4 ltr.	
Gear oil specification		G50 SAE 75W90 (synthetic oil)	
Gear oil change interval		filled for life	
Clutch control		hydraulic	
Clutch plate Ø		215 mm	
Drive shaft flange Ø		100 mm	
Rear final drive assignment code letters		EUL	

¹⁾ Gearbox with modified synchromesh for 1st gear

Rear final drive		02D
Code letters		EUL
Manufactured	from to	04.00
Assignment	Engine	2.0-ltr./85 kW
Ratio: $Z_2 : Z_1$ front/rear bevel gear		17 : 27 x 27 : 17 = 1.00
Quantity in final drive		1.0 ltr.
Gear oil specification		G50 SAE 75W90 (synthetic oil)
Gear oil change interval		filled for life
Quantity in Haldex clutch		0.42 ltr.
Change quantity in Haldex clutch		0.25 ltr.
Oil specification for Haldex clutch		G 052 175 A1
Drive shaft flange Ø		100 mm
Manual gearbox assignment code letters		ERW, EWN, FEX

Code letter, component assignment, transmission ratios, capacities

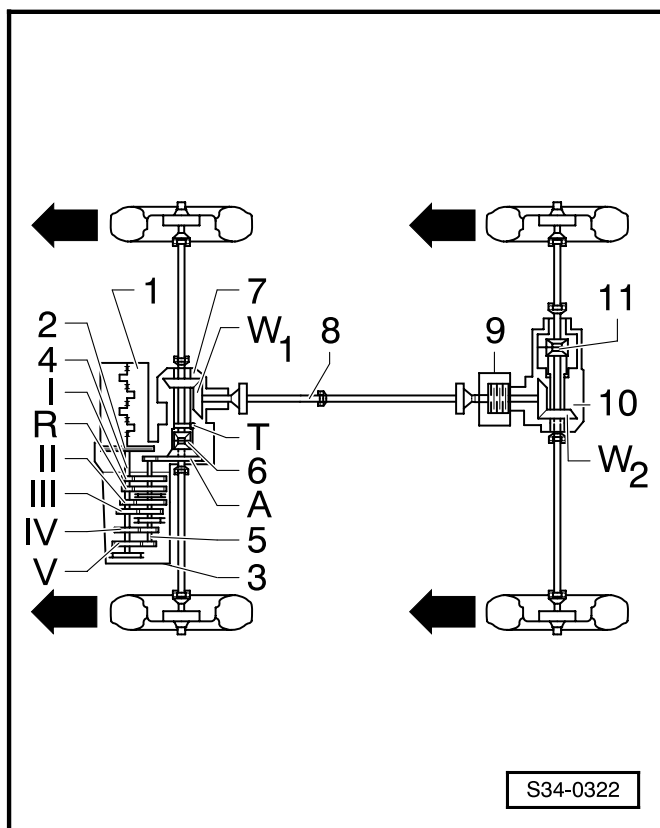
Manual gearbox		5-speed manual gearbox 02C 4x4
Code letters		FEX ¹⁾
Manufactured	from to	08.00
Assignment	Engine	1.8-ltr./110 kW
Transmission ratios:	Final drive	63 : 16 = 3.938
	1st gear	34 : 9 = 3.778
	2nd gear	33 : 16 = 2.063
	3rd gear	34 : 25 = 1.360
	4th gear	35 : 34 = 1.029
	5th gear	36 : 43 = 0.837
	Reverse	18 : 9 x 36 : 20 = 3.600
	Speedo	13 : 22 = 0.591
Capacity		2.4 ltr.
Gear oil specification		G50 SAE 75W90 (synthetic oil)
Gear oil change interval		filled for life
Clutch control		hydraulic
Clutch plate Ø		225 mm TMF ²⁾
Drive shaft flange Ø		100 mm
Rear final drive assignment code letters		EUL

1) Gearbox with modified synchromesh for 1st gear

2) TMF = Two-mass flywheel

Rear final drive		02D
Code letters		EUL
Manufactured	from to	04.00
Assignment	Engine	2.0-ltr./85 kW
Ratio: $Z_2 : Z_1$ front/rear bevel gear		17 : 27 x 27 : 17 = 1.00
Quantity in final drive		1.0 ltr.
Gear oil specification		G50 SAE 75W90 (synthetic oil)
Gear oil change interval		filled for life
Quantity in Haldex clutch		0.42 ltr.
Change quantity in Haldex clutch		0.25 ltr.
Oil specification for Haldex clutch		G 052 175 A1
Drive shaft flange Ø		100 mm
Manual gearbox assignment code letters		ERW, EWN, FEX

Overview of power flow



Designation

- 1 - Engine
- 2 - Clutch
- 3 - Manual gearbox
- 4 - Input shaft
- 5 - Output shaft/drive pinion
- 6 - Differential
- 7 - Bevel box
- 8 - Cardan shaft
- 9 - Haldex coupling
- 10 - Rear final drive
- 11 - Differential

Arrows point in direction of travel

Transmission ratios

- I - 1st gear
- II - 2nd gear
- III - 3rd gear
- IV - 4th gear
- V - 5th gear
- R - Reverse
- A - Final drive
- T - Speedo drive
- W_1 - Front bevel drive
- W_2 - Rear bevel drive

Notes on brake and performance test and on towing vehicle

Brake test on roller dynamometer

- ◆ Use only dynamometers designed for 4WD vehicles.
- ◆ If a dynamometer for a 2WD vehicle is used, 1 to 2 brake tests can be performed with the ignition switched on and the engine not running.

Warning!

Run engine for about 5 seconds between the brake test in order to build up adequate vacuum in the brake system.

Performance test on roller dynamometer

- ◆ Use only dynamometers designed for 4WD vehicles.
- ◆ On dynamometers designed for 2WD vehicles, the front part of the cardan shaft must first of all be removed. Pay attention to marking when re-assembling.

General repair information

Scrupulous care and cleanliness, as well as proper tools, are an essential requirement for carrying out proper and successful gearbox repairs. The generally usual basic rules of safety also, of course, apply to repair work.

A number of generally applicable notes for individual repair processes - which are otherwise listed several times at various points in the workshop manual - are summarized here. They apply to this workshop manual.

Gearbox

- ◆ When installing, ensure the dowel sleeves between engine and gearbox are correctly located.
- ◆ When installing bearing brackets as well as waxed components, clean the contact surfaces. Contact surfaces must be free of wax and grease.
- ◆ If the manual gearbox, bevel box or the rear final drive is replaced, pour in gear oil up to lower edge of filler hole.
- ◆ For capacities and specifications for manual gearbox with bevel box, final drive, Haldex coupling ⇒ page 00-2.

Gaskets, seals

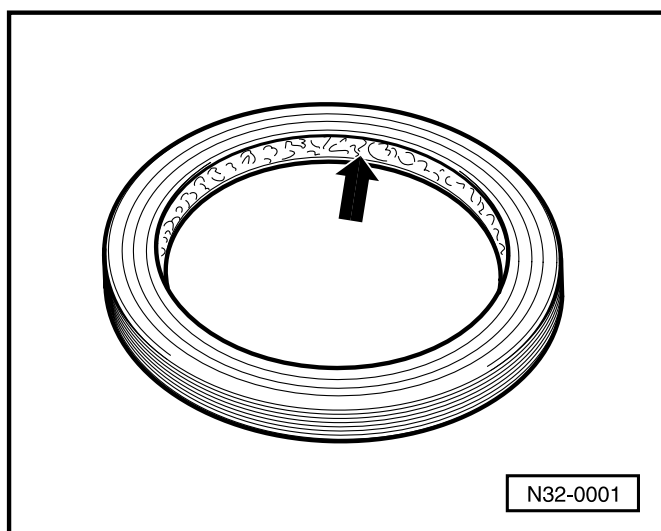
- ◆ Thoroughly clean connecting surfaces and apply sealant AMV 188 200 03.
- ◆ Apply an even film of sealant - not too thick.
- ◆ Replace O-rings.
- ◆ Radial shaft seals:

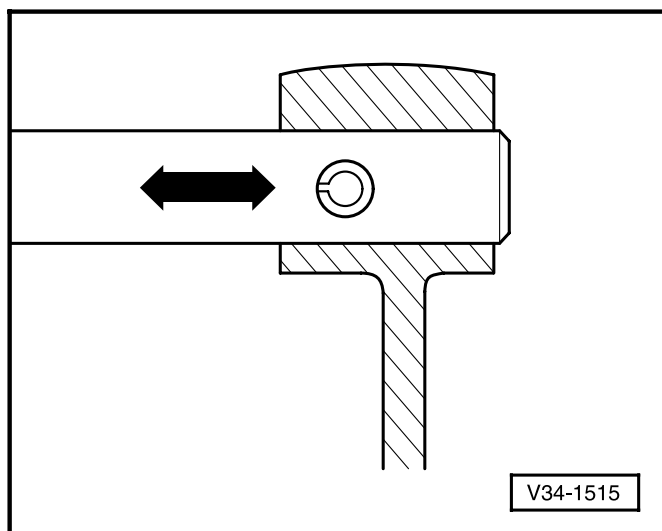
Before installing:

- ◀ Lightly oil at outer diameter, pack the space between the sealing lips (arrow) with grease.

After installing:

- ◆ Inspect gear oil level in manual gearbox with bevel box ⇒ page 34-31.
- ◆ Inspect gear oil level in rear final drive ⇒ page 39-69.
- ◆ Inspect oil level in Haldex coupling ⇒ page 39-70.





Locking elements

- ◆ Replace circlips.
- ◆ Do not over-tension circlips.
- ◆ Circlips must be installed in the base of the groove.
- ◀ ◆ Replace roll pins.
Installation position: slot longitudinal to power flow.

Nuts, bolts

- ◆ Slacken and tighten nuts and bolts for attaching covers and housings diagonally across.
- ◆ Do not twist particularly sensitive parts - such as clutch pressure plates - and slacken and tighten in stages diagonally across.
- ◆ Tightening torques apply to non-oiled nuts and bolts.
- ◆ Always replace self-locking nuts and bolts.
- ◆ At all bolted connections, it is important to ensure that contact surfaces as well as nuts and bolts are waxed, if necessary, only after being installed.

Bearings

- ◆ Install new tapered roller bearings as supplied, and do not oil additionally.
- ◆ Insert needle bearings in gearbox with gear oil.
- ◆ Always replace all the tapered roller bearings fitted to a shaft. Use the same makes, if possible!
- ◆ Heat inner races to approx. 100 °C for installing.
- ◆ Do not mix up the outer and inner races of bearings of the same size; bearings are matched.
- ◆ Position needle bearings with the inscribed side (larger metal thickness) facing the insertion drift.

Shims

- ◆ Re-gauge shims at several points with a micrometer. Different tolerances make it possible to exactly gauge the required shim thickness.
- ◆ Inspect for burrs or damage.
- ◆ Install only shims which are in proper condition.

Synchronizer rings

- ◆ Do not mix up. Assign synchronizer rings to the same gear when re-installing.
- ◆ Inspect for wear, replace if necessary.
- ◆ Insert with gear oil.

Gears

- ◆ Clean and heat on a heating plate to approx. 100 °C before pressing on.
- ◆ The temperature can be checked with the temperature measuring instrument (e.g. V.A.G 1558).

Testing operation of Haldex coupling

- Drive the front wheels of the vehicle onto a roller dynamometer.

Warning!

Keep area in front of the vehicle clear. Proceed with appropriate care when conducting the test in order to avoid any damage.

- Engage 1st gear and start off slowly.
- If the vehicle is not pushed out of the dynamometer at an engine speed of 1500 rpm, there is a fault at the Haldex coupling.

Notes:

The Haldex coupling locks as a result of the driven front wheels and the stationary rear wheels. This means that the rear wheels are also driven.

The Haldex coupling is able to briefly absorb the speed differences without locking only at engine speeds which are just above idling speed and when first gear is engaged. The vehicle is not pushed out of the dynamometer.

Self-diagnosis

Function

The central component of the four-wheel drive is the electronically-hydraulically controlled Haldex coupling.

Advantages:

- ◆ stepless distribution of force between front and rear wheels
- ◆ short response time of the Haldex coupling
- ◆ individual adaptation of the four-wheel drive to all driving situations

Overview of control units

A distinction is made between two types of control units for four-wheel drive -J492-.

- ◆ Up to 09.99 none of the control units has a diagnostic capability. On such models, perform the electrical test in full when dealing with complaints ⇒ page 01-21.
- ◆ From 10.99 all of the control units have a diagnostic capability. This new generation of control units with modified software is recognizable only from the part number of the control unit.

Assignment of control units

⇒ Parts List

Function of 4x4 control unit

In view of the interlinked control units with two databus lines, always first of all interrogate the contents of all the fault memories of the control units fitted to the vehicle when beginning fault finding.

This is done by selecting the „Automatic test sequence“ which is activated with the key function 00.

The aim here is to check whether any fault which may have an effect on the Haldex clutch, is stored.

Self-diagnosis relates to the electrical/electronic part of the Haldex clutch, in other words only faults which can be detected through the electrical connection to the control unit (e.g. supply voltage) are displayed.

The control unit detects faults when driving and stores them in a fault memory ⇒ Fault table, from page 01-13. This information is also retained even if there is no battery voltage.

Faults which occur only temporarily (sporadically), are also shown in the display, with the addition „SP“. The cause of a sporadic fault may be, for example, a loose contact or a brief open circuit in the wiring. If, however, the fault no longer occurs during 10 engine starts and starting-off operations in the case of faults relating to the databus system, or 50 engine starts and starting-off operations in the case of other faults, the fault is then deleted in the fault memory, with the exception of the fault „Control unit defective“.

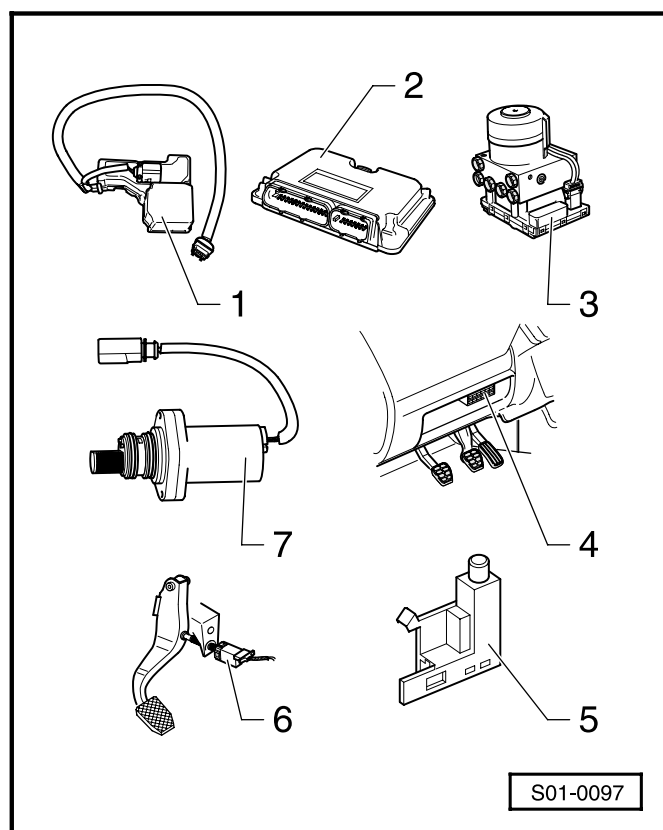
The stored faults can be read with the fault reader V.A.S 5051, V.A.G 1552 or with vehicle system tester V.A.G 1551 ⇒ page 01-12.

After rectifying all the faults, it is then necessary to erase the fault memory ⇒ page 01-15.

Notes:

- ◆ *The description which follows relates only to the vehicle system tester V.A.G 1552 using the up-to-date programme card.*
- ◆ *If fault reader V.A.S 5051 or V.A.G 1551 with integrated printer is used, the readouts which appear in the display may differ slightly.*

Electrical/electronic components and fitting locations



1 - Four-wheel drive control unit -J492-

- ◆ Fitting location ⇒ Fig. 1
- ◆ Together with the oil pressure positioning motor -V184- and the hydraulic temperature sender -G271-, forms a single unit
- ◆ From 10.99 is tested by self-diagnosis ⇒ page 01-2
- ◆ Removing and installing ⇒ page 01-7

2 - Engine control unit

- ◆ Fitting location ⇒ Fig. 3
 - ◆ The following signals are transmitted over the data BUS to the 4WD control unit -J492-:
 - Engine speed
 - Accelerator pedal position
 - Engine torque
 - ◆ Removing and installing
- ⇒ Repair Group 23; of the relevant engine code
- ⇒ Repair Group 24; of the relevant engine code

3 - ABS control unit -J104-

- ◆ Fitting location: in left of engine compartment at hydraulic unit
 - ◆ The following signals are transmitted over the data BUS to the 4WD control unit -J492-:
 - Wheel speeds
 - Longitudinal acceleration
 - Brake operation
 - ◆ Removing and installing
- ⇒ Running Gear; Repair Group 45; Electrical/Electronic Components and Fitting Locations; Removing and installing ABS/EDL/ESP hydraulic control unit and mounting bracket

4 - Diagnostic connection

- ◆ Fitting location: in storage compartment on driver side

5 - Handbrake indicator switch -F9-

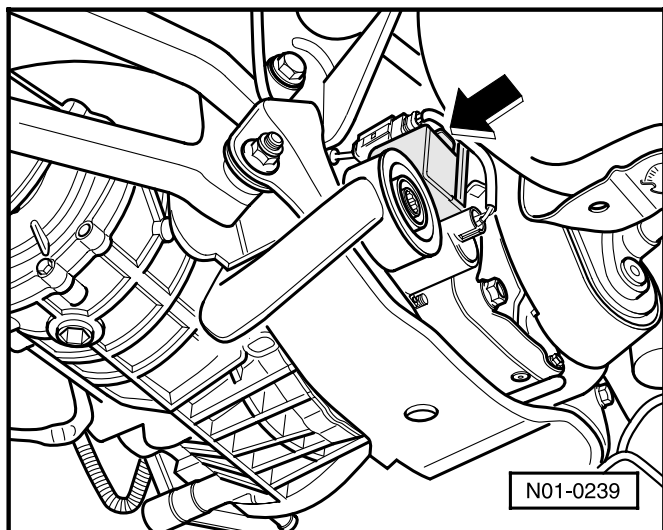
- ◆ Fitting location ⇒ Fig. 4
 - ◆ Can be tested in measured value block 001 ⇒ page 01-18 and in the Electrical test ⇒ page 01-21
 - ◆ Removing and installing
- ⇒ Running Gear; Repair Group 46; Assembly overview of handbrake lever

6 - Brake light switch -F-

- ◆ Fitting location: at brake pedal
 - ◆ Can be tested in measured value block 001 ⇒ page 01-18 and in the Electrical test ⇒ page 01-21
 - ◆ Removing and installing
- ⇒ Running Gear; Repair Group 45; Electrical/Electronic Components and Fitting Locations; Removing and installing as well as setting brake light switch

7 - Haldex coupling pump -V181-

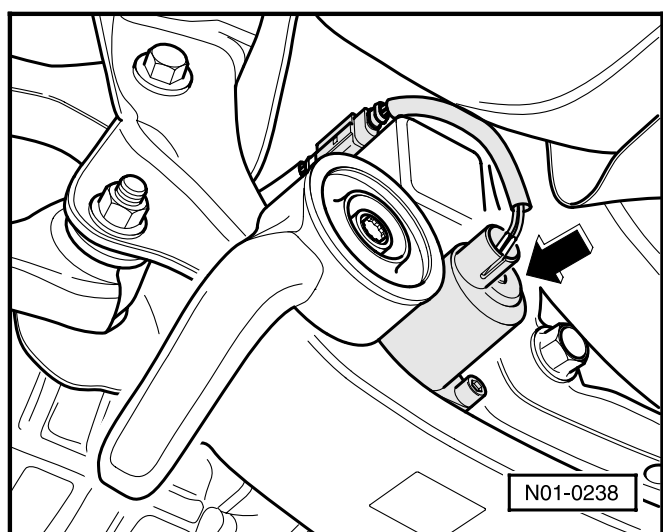
- ◆ Fitting location ⇒ Fig. 2
 - ◆ Can be tested in final control diagnosis ⇒ page 01-16 and in the Electrical test ⇒ page 01-21
 - ◆ Removing and installing
- ⇒ page 01-8



◀ Fig. 1 Four-wheel drive control unit -J492-

Fitting location: The control unit (arrow) is located at the rear final drive, in the front right area.

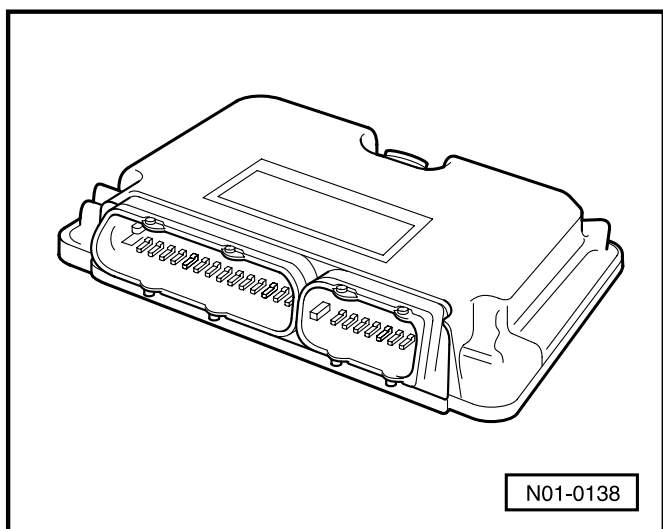
Removing and installing ⇒ page 01-7.



◀ Fig. 2 Haldex coupling pump -V181-

Fitting location: The Haldex coupling pump (arrow) is located at the rear final drive, in the front right area, below the control unit -J492-.

Removing and installing ⇒ page 01-8.

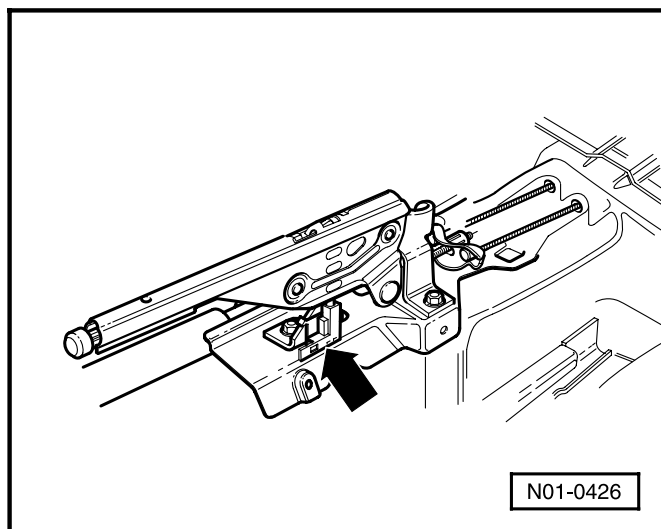


◀ Fig. 3 Engine control unit

Fitting location: The control unit is located in the plenum chamber.

Removing and installing

- ⇒ Repair Group 23; of the relevant engine code
- ⇒ Repair Group 24; of the relevant engine code



◀ Fig. 4 Handbrake indicator switch -F9-

Fitting location: The switch (arrow) is located at the handbrake lever.

Removing and installing

⇒ Running Gear; Repair Group 46; Assembly overview: handbrake lever

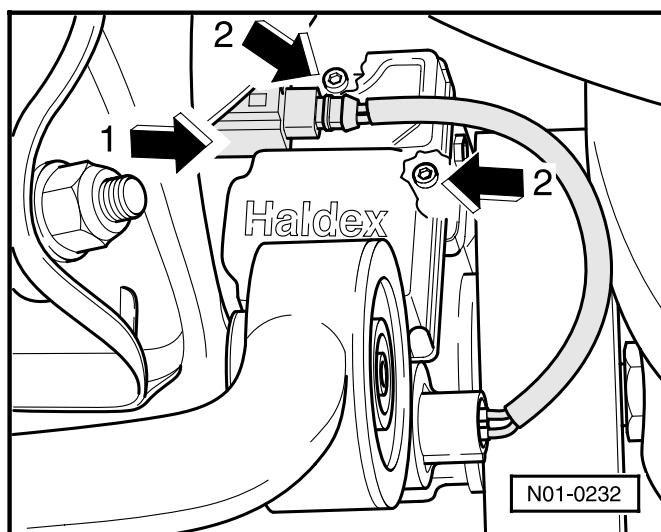
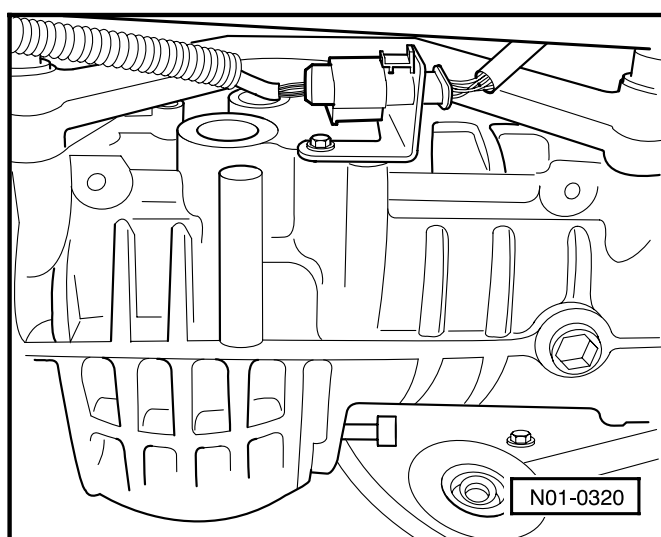
Removing and installing four-wheel drive control unit -J492-

Special tools, testers and aids required

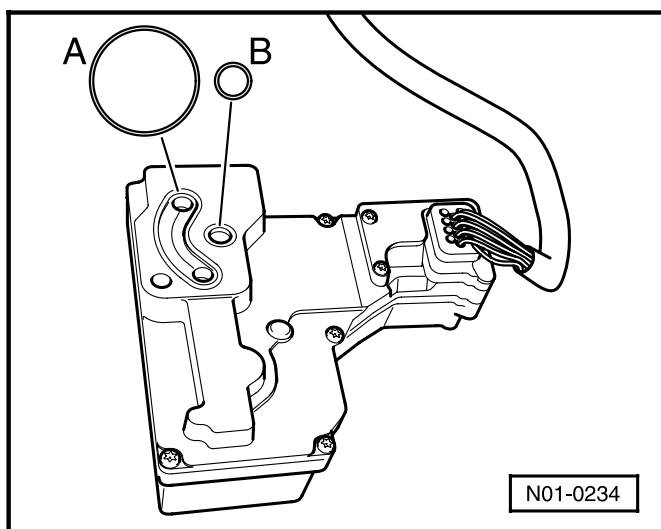
- ◆ Torque wrench, e.g. V.A.G 1331

Removing

- Switch ignition off.
- ◀ - Separate plug connection at rear final drive and pull connector out of its fixture.



- ◀ - Unplug connector for the Haldex coupling pump (arrow 1).
- Place a drip tray below the final drive.
- Remove screws (arrows 2).
- Remove control unit.



Installing

Installation is carried out in the reverse order. Pay attention to the following points:

- ◀ - Replace O-rings -A- and -B-.
- Tighten screws to 6 Nm.
- Inspect oil level in the Haldex coupling ⇒ page 39-70; change oil in the Haldex coupling if necessary ⇒ page 39-71.

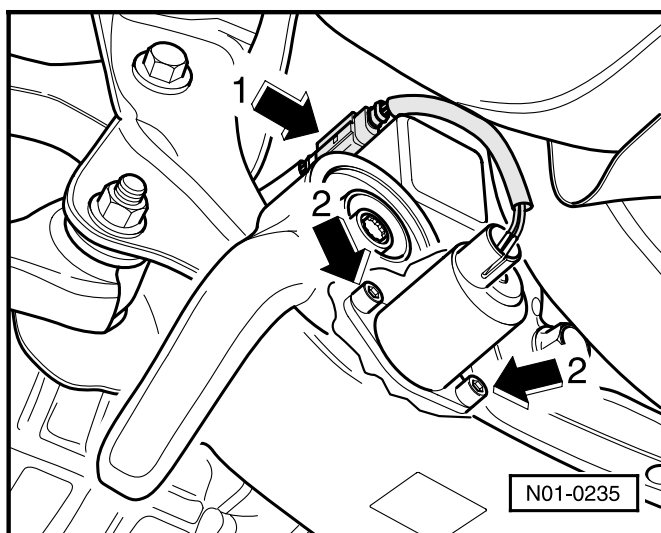
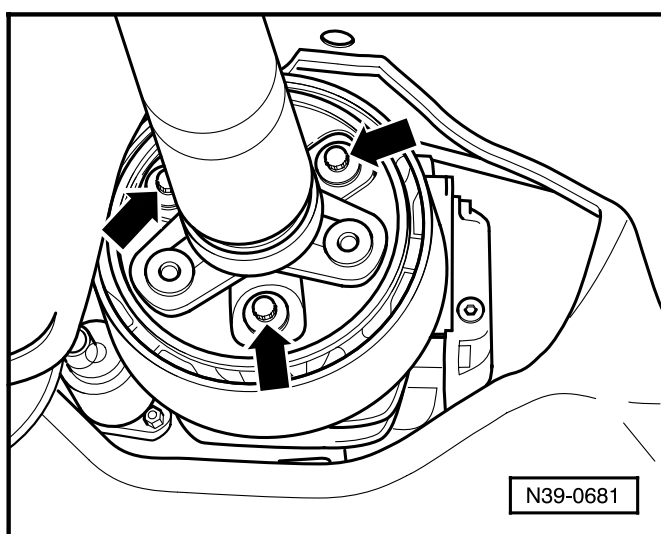
Removing and installing Haldex coupling pump -V181-

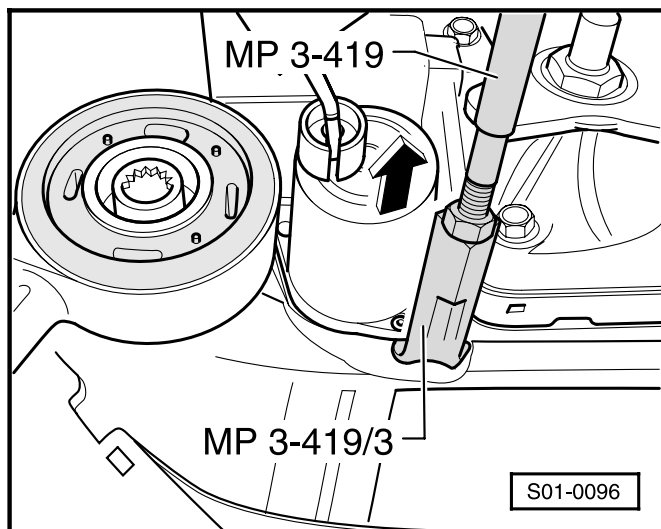
Special tools, testers and aids required

- ◆ Torque wrench, e.g. V.A.G 1331
- ◆ Universal tool MP 3-419

Removing

- Switch ignition off.
- ◀ - Unbolt rear propshaft with flexible joint and vibration damper from rear final drive (arrows) and carefully push forward ⇒ page 39-44.
- ◀ - Unplug connector for Haldex coupling pump (arrow 1).
- Place drip tray below the final drive.
- Remove screws (arrows 2).
- After this, turn the pump slightly to the right.

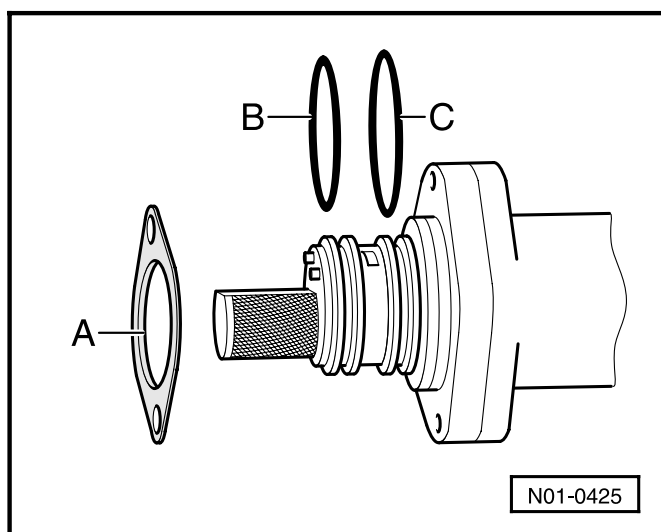




- ◀ - Pull the pump out (direction of arrow).

Installing

Installation is carried out in the reverse order. Pay attention to the following points:



- ◀ - Replace gasket -A-.
- Replace O-rings -B- and -C-.
 - Pay attention to the different diameters:
 - ◆ $\varnothing$ of O-ring -B- = 31.5 mm
 - ◆ $\varnothing$ of O-ring -C- = 33 mm
 - Press in the pump as far as the stop.
 - Tighten the screws to 6 Nm.
 - Inspect oil level in the Haldex coupling
 ⇒ page 39-70; change oil in the Haldex coupling if necessary ⇒ page 39-71.

Performing self-diagnosis

Note:

The description which follows relates only to models fitted with the new control unit generation (from 10.99) ⇒ page 01-2.

Connecting vehicle system tester V.A.G 1552 and selecting functions

Test requirements

- Haldex coupling operating properly; testing ⇒ page 01-1.
- Oil in Haldex coupling at correct level; inspecting ⇒ page 39-70.
- All fuses in correct order according to current flow diagram (to test, remove fuses from the fuse holder).
- Supply voltage correct (at least 11.0 V).
- Brake light operating.

Special tools, testers and aids required

- ◆ Vehicle system tester V.A.G 1552 with cable V.A.G 1551/3 or 1551/3 A

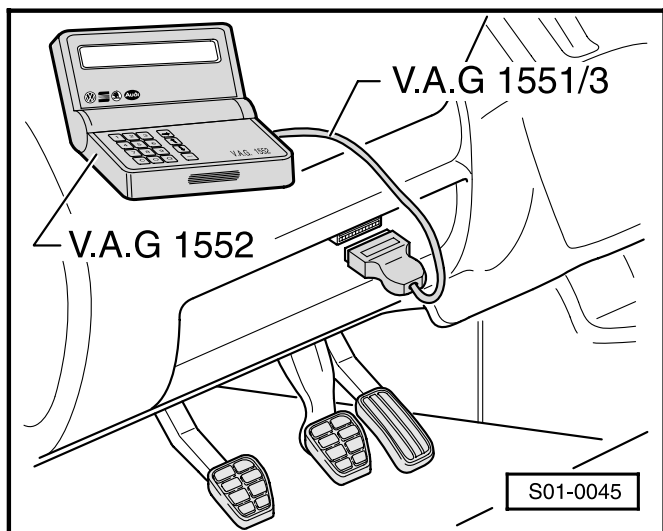
Procedure

- ◀ - Connect the vehicle system tester V.A.G 1552 with the cable V.A.G 1551/3 or V.A.G 1551/3 A.
- Operate the vehicle system tester by referring to the readout in the display:
- Switch on ignition.

◀ Readout in display:

Notes:

- ◆ If no readout appears in the display, test voltage supply for diagnostic connector according to fault finding programme:
⇒ Current Flow Diagrams, Electrical Fault Finding and Fitting Locations
- ◆ If the readouts in the display do not correspond to the procedure:
⇒ Operating instructions of vehicle system tester



Test of vehicle systems
Control unit does not answer!

HELP

02D900554B HALDEX LSC ECC 0006 →

- Select the 4WD control unit with the address word 22 and confirm the entry with the key Q.

◀ The following readout then appears in the display (example):

What is displayed is:

- ◆ the control unit identification number

Example 02D900554B

Assignment of control unit

⇒ Parts List

- ◆ the system designation (HALDEX LSC ECC)
- ◆ the software version of the control unit (0006)

Control unit does not answer!

HELP

◀ If the following readout appears in the display:

- A list of the possible causes of the fault appears after pressing the HELP key.
- After rectifying any fault, once again enter the address word 22 for 4WD electronics and confirm the entry with the key Q.

02D900554B HALDEX LSC ECC 0006 →

◀ Readout in display:

- Press → key.

Test of vehicle systems
Select function XX

HELP

◀ Readout in display:

- A list of the possible functions appears after pressing the HELP key.

The following functions are available:

	Page
01 - Interrogating control unit version	01-10
02 - Interrogating fault memory	01-12
03 - Final control diagnosis	01-16
05 - Erasing fault memory	01-15
06 - Ending output	01-15
08 - Reading measured value block	01-18

Interrogating fault memory

- Connect the vehicle system tester V.A.G 1552. Then, switch the ignition on and select the 4WD control unit with the address word 22 ⇒ page 01-10.

Test of vehicle systems
Select function XX

HELP

◀ Readout in display:

- Select function 02 "Interrogate fault memory".

X faults recognized!

◀ The number of stored faults or "no fault recognized!" appears in the display.

If no fault is stored:

- End output ⇒ page 01-15.

If one or several faults are stored:

- Press the → key.

The stored faults are displayed one after the other.

- Press the → key.

Test of vehicle systems
Select function XX

HELP

◀ Readout in display:

- End output ⇒ page 01-15.

Procedure if a fault is recognized:

1. Rectify fault by referring to the fault table page 01-13.
2. Interrogate fault memory (function 02).
3. Erase fault memory (function 05).
4. End output (function 06).
5. Conduct a road test.
6. Once again interrogate fault memory.

Fault table

Notes on the fault table:

- ◆ In view of the fact that the control units are interlinked with two data BUS lines, always initiate the "automatic test sequence" with the key function 0 and 0 at all the control units fitted to the vehicle at the commencement of fault finding. When this is done, the control units fitted to the vehicle are interrogated and the possible faults displayed.
 - ◆ Before replacing any components displayed as faulty, test all the appropriate plug connections, cables and earth connections according to the current flow diagram.
- ⇒ Current Flow Diagrams, Electrical Fault Finding and Fitting Locations binder
- ◆ After completing repairs, always once again interrogate the fault memory with the vehicle system tester V.A.G 1552 and erase it. After this, carry out a road test at a speed of more than 20 km/h. After the road test, once again interrogate the fault memory.
 - ◆ If "see info in literature" appears in the display of the vehicle system tester V.A.G 1552, look for the text required in the fault table on the basis of the fault code.
 - ◆ All the possible faults which can be detected by the four-wheel drive control unit -J492- and displayed on V.A.G 1552, are listed below according to the 5-digit fault code.

Readout on V.A.G 1552	Possible cause of fault	Rectifying fault
no fault recognized	If "no fault recognized" appears after completing repairs, self-diagnosis is ended. If the Haldex coupling still does not operate properly although "no fault recognized" is displayed, then proceed as described below: 1. Conduct a road test at a speed of more than 20 km/h. 2. Once again interrogate the fault memory. If no fault is still stored, 3. work through the Electrical Test complete ⇒ page 01-21.	
00453 Restricted function as a result of overtemperature	◆ Mechanical fault in the Haldex coupling	- Read measured value block 002 ⇒ page 01-18 - Perform final control diagnosis ⇒ page 01-16 - Perform electrical test ⇒ page 01-21, test step 5
00526 Brake light switch -F- implausible signal	◆ Open circuit in wiring or short circuit to earth or to positive between control unit -J492- and brake light switch -F- ◆ Brake light switch -F- faulty	- Test wiring and plug connections according to current flow diagram - Read measured value block 001 ⇒ page 01-18 - Replace brake light switch -F- if necessary ⇒ Running Gear; Repair Group 45; Electrical/Electronic Components and Fitting Locations; Removing and installing as well as setting brake light switch

Readout on V.A.G 1552	Possible cause of fault	Rectifying fault
00532 Supply voltage signal too small	◆ Open circuit in wiring or short circuit to positive or to earth ◆ Battery discharged ◆ Alternator faulty	- Read measured value block 002 ⇒ page 01-18 - Test wiring and plug connections according to current flow diagram - Charge battery ⇒ Electrical System; Repair Group 27; Battery; Charging battery - Test alternator ⇒ Current Flow Diagrams, Electrical Fault Finding and Fitting Locations binder
00532 Supply voltage signal too large	◆ Voltage regulator -C1- at alternator faulty	- Read measured value block 002 ⇒ page 01-18 - Test alternator ⇒ Current Flow Diagrams, Electrical Fault Finding and Fitting Locations binder
01043 Control unit: incorrect software version	◆ Incorrect control unit installed	- Replace control unit -J492- ⇒ page 01-7
01155 Coupling mechanical fault	◆ Mechanical fault in the Haldex coupling	- Perform final control diagnosis ⇒ page 01-16 - Perform electrical test ⇒ page 01-21, test step 5
01312 Drive data BUS defective	◆ Fault in the data BUS lines ◆ Databus-compatible control units faulty	- Read measured value block 125 ⇒ page 01-18 - Perform electrical test ⇒ page 01-21, test step 4 - Read fault memory of all control units connected to data BUS and rectify any faults
01314 Engine control unit no communication	◆ Fault in data BUS lines ◆ Incorrect or faulty engine control unit	- Read measured value block 125 ⇒ page 01-18 - Perform electrical test ⇒ page 01-21, test step 4 - Read fault memory of engine control unit and rectify any faults ⇒ Repair Group 01; of the relevant engine code
01314 Engine control unit read fault memory	◆ Fault entry in engine control unit	- Read fault memory of engine control unit and rectify any faults ⇒ Repair Group 01; of the relevant engine code

Readout on V.A.G 1552	Possible cause of fault	Rectifying fault
01316 Brake control unit no communication	◆ Fault in data BUS lines ◆ Incorrect or faulty control unit -J104-	- Read measured value block 125 ⇒ page 01-18 - Perform electrical test ⇒ page 01-21, test step 4 - Read fault memory of control unit -J104- and rectify any faults ⇒ Running Gear; Repair Group 45; Performing self-diagnosis
65535 Control unit defective	Four-wheel drive control unit -J492- faulty	- Replace control unit -J492- ⇒ page 01-7

Erasing fault memory

Requirements:

- Faults rectified
- Fault memory interrogated ⇒ page 01-12

After interrogating fault memory:

Test of vehicle systems
Select function XX

HELP

◀ Readout in display:

- Select function 05 "Erasing fault memory".

Test of vehicle systems
Fault memory is erased!

→

◀ Readout in display:

Note:

If the ignition was switched off between "Interrogating fault memory" and "Erasing fault memory", the fault memory is not erased.

- Press the → key.

Ending output

Test of vehicle systems
Select function XX

HELP

◀ Readout in display:

- Select function 06 "Ending output".

Test of vehicle systems
Enter address word XX

HELP

◀ Readout in display:

- Switch the ignition off.
- Separate plug connection to the vehicle system tester V.A.G 1552.

Final control diagnosis

Notes:

- ◆ *The vehicle must be raised so that the wheels rotate freely (2nd person required).*
- ◆ *Final control diagnosis can be carried out after switching on the ignition or starting the engine.*
- ◆ *The function is ended automatically for safety reasons at a vehicle speed of more than 30 km/h.*
- ◆ *It is possible to quit the test sequence at any time by pressing the key -C-.*
- ◆ *To select other functions ⇒ page 01-11 after final control diagnosis, the ignition must be switched off and on again and address word 22 - 4WD electronics then once again selected.*

Test procedure

- Connect vehicle system tester V.A.G 1552. Then, leave the engine running and select the four-wheel drive control unit with the address word 22 ⇒ page 01-10.

Test of vehicle systems
Select function XX

HELP

◀ Readout in display:

- Select function 03 "Final control diagnosis".

Final control diagnosis
Charging pump off

- →

◀ Readout in display:

- Voltage supply for pump -V181- off (pump is not operated).
- Ignore readout.
- Press → key.

Final control diagnosis
Charging pump on

- →

◀ Readout in display:

- Haldex coupling pump -V181- must run.

If the pump does not run:

- Perform electrical test ⇒ page 01-21, test step 5.
- Press → key.

Final control diagnosis
4WD coupling separated

- →

◀ Readout in display:

- Apply handbrake.
- Depress the clutch pedal and engage 1st gear.
- Drive off slowly; only the front wheels should rotate when this is done.

If a variation exists:

- Perform electrical test ⇒ page 01-21, test step 5.
- Depress clutch pedal.
- Press → key.

Final control diagnosis
4WD coupling closed

- →

◀ Readout in display:

- Once again start off slowly in 1st gear with handbrake applied; it must be possible to detect the rear wheels starting off in this case against the force of the handbrake.

Note:

This operation may result in the engine cutting out.

If a variation exists:

- Perform electrical test ⇒ page 01-21, test step 5.
- Press → key.

Final control diagnosis
Charging pump off

- →

◀ Readout in display:

- Pump -V181- stops.
- Press → key.

Final control diagnosis
END

- →

◀ Readout in display:

- Final control diagnosis is ended by pressing the → key.

Test of vehicle systems
Select function XX

HELP

◀ Readout in display:

- To repeat final control diagnosis, the ignition must be switched off and on again and after this function 03 - Final control diagnosis once again selected.
- End output ⇒ page 01-15.

Reading measured value block

The control unit is able to transmit a wide range of measured values. These measured values supply information regarding the operating state of the system or of the sensors connected. In many cases, the measured values transmitted can be used as an aid in fault finding and in rectifying faults. Because these measured values cannot all be assessed at the same time, they are combined into individual display groups which can be selected by means of display group numbers.

- Connect vehicle system tester V.A.G 1552. Then, switch the ignition on and select the four-wheel drive control unit with the address word 22 ⇒ page 01-10.

Test of vehicle systems
Select function XX

HELP

◀ Readout in display:

- Select function 08 "Reading measured value block".

Read measured value block
Enter display group number XXX

◀ Readout in display:

- Enter the desired display group number ⇒ page 01-18 and confirm the entry with the key Q.

List of available display group numbers

Display group number	Display block	Designation
001	1	Brake light switch
	2	Handbrake indicator switch
	3	not assigned
	4	not assigned
002	1	Supply voltage
	2	Oil temperature of Haldex coupling
	3	not assigned
	4	not assigned
125	1	Engine data BUS
	2	ABS data BUS
	3	not assigned
	4	not assigned

Measured value block 001

Read measured value block	1 →		◀ Readout in display:
not op.	not op.		
			not assigned
			not assigned
			Handbrake indicator switch ♦ not op. → handbrake not applied ♦ oper. → handbrake applied If a variation exists: perform electrical test ⇒ page 01-21, test step 3.
			Brake light switch ♦ not op. → brake pedal not operated ♦ oper. → brake pedal operated If a variation exists: perform electrical test ⇒ page 01-21, test step 2.

Measured value block 002

Read measured value block	2 →		◀ Readout in display:
12.5 V	25 °C		
			not assigned
			not assigned
			Oil temperature of Haldex coupling ♦ Ignition on (engine not running and cooled down): approx. ambient temperature If a temperature which varies greatly from the ambient temperature of the sensor is indicated, replace control unit -J492- ⇒ page 01-7.
			Supply voltage ♦ 11...14.5 V If a variation exists: perform electrical test ⇒ page 01-21, test step 1.

Measured value block 125

Read measured value block		125 →	◀ Readout in display:
Engine 1	ABS 1		
not assigned			
not assigned			
ABS data BUS ♦ 1 → data BUS connection exists. ♦ 0 → data BUS connection does not exist. ¹⁾			
Engine data BUS ♦ 1 → data BUS connection exists. ♦ 0 → data BUS connection does not exist. ¹⁾			

¹⁾ The following causes of the fault may exist:

- ♦ Supply voltage for control unit -J492- not o.k.
- ♦ Interruption in data BUS link to engine control unit or ABS control unit, or data BUS lines wrongly connected. Perform electrical test ⇒ page 01-21, test step 4.
- ♦ Incorrect engine control unit or ABS control unit fitted.
- ♦ Incorrect coding in engine control unit or in ABS control unit.
- ♦ Engine control unit or ABS control unit faulty.

Electrical test

Special tools, testers and aids required

- ◆ Hand-held multimeter, (e.g. V.A.G 1526 A)
- ◆ Adapter cable set, (e.g. V.A.G 1594 A)
- ◆ Vehicle system tester V.A.G 1552 with cable V.A.G 1551/3 or 1551/3 A

The test steps ⇒ from page 01-23 apply to:

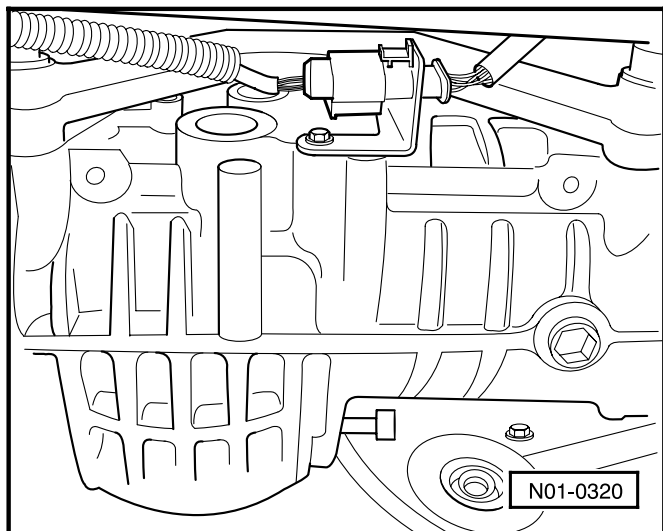
- Models (up to 09.99) on which the Haldex coupling does not operate or not fully. In this case, carry out the complete electrical test.
- Models (from 10.99) on which self-diagnosis does not provide any indication of the source of the fault. In this case, conduct the complete electrical test.
- Models (from 10.99) on which self-diagnosis provides a direct indication of the source of the fault. In this case, carry out only the recommended test steps (targeted start-off).

Test conditions

- Oil of Haldex coupling at correct level; inspecting ⇒ page 39-70.
- All the fuses in proper order according to current flow diagram (as a check, remove fuses from the fuse holder).
- Supply voltage correct (at least 11.0 V).
- Brake light in proper order.

Overview of test steps

Component to be tested	
Supply voltage to control unit -J492-	- Perform test step 1 ⇒ page 01-23
Operation of brake light switch -F-	- Perform test step 2 ⇒ page 01-23
Operation of handbrake indicator switch -F9-	- Perform test step 3 ⇒ page 01-24
Test of data BUS lines	- Perform test step 4 ⇒ page 01-24
Operation of Haldex coupling pump motor -V181- and operation of oil pressure positioning motor -V184-	- Perform test step 5 ⇒ page 01-26



Performing electrical test

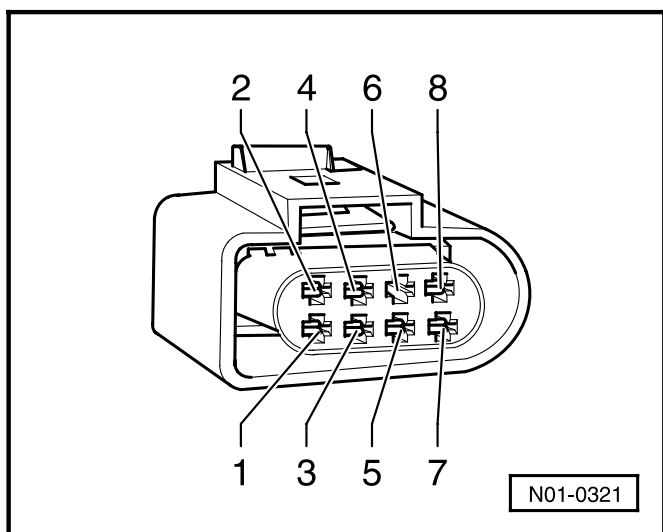
- Switch ignition off for all the test steps.
- Raise vehicle.
- ◀ - Separate the plug connection at the rear final drive.

Notes:

- ♦ *The correct range must be set at the hand-held multimeter each time before connecting the test cables. Otherwise, electronic components might be destroyed.*
- ♦ *If the measurements indicated differ only slightly from the specifications, clean the sockets and connectors of the testers and of the test cables, and repeat test. Inspect the cables and the connections before replacing any components.*

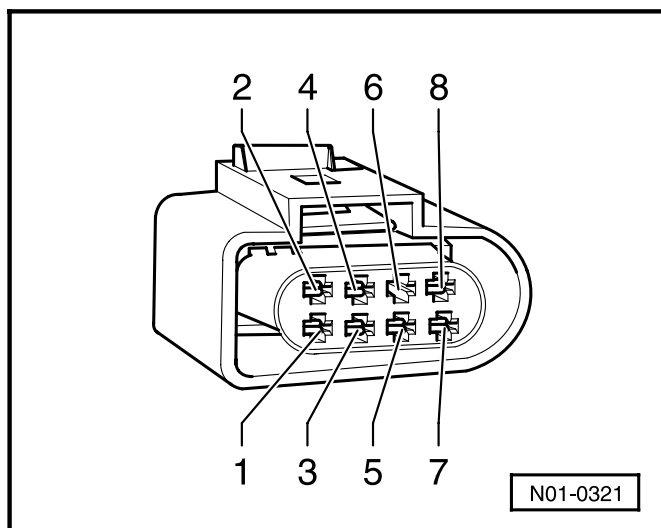
After conducting the electrical test:

- Plug in connector for control unit -J492- again.
- Interrogate fault memory of control unit -J492- ⇒ page 01-12.



◀ Contact assignment of connector

- 1 - Supply voltage (terminal 15)
- 2 - Earth (terminal 31)
- 3 - Positive connection of terminal 54 (brake light, brake light switch)
- 4 - Handbrake indicator switch -F9-
- 5 - K wire of diagnosis
- 6 - not assigned
- 7 - Data BUS link to engine control unit at ABS control unit (CAN Low)
- 8 - Data BUS link to engine control unit at ABS control unit (CAN High)

**Test step 1**

What is tested is the supply voltage of the control unit -J492-.

- Set a measuring range of 20 V.
- Switch ignition on.
- ◀ - Measure between contact 1 and contact 2 (earth) at the unplugged connector.

Specification: battery voltage

Specification is not achieved: repair wiring according to current flow diagram.

⇒ Current Flow Diagrams, Electrical Fault Finding and Fitting Locations binder

- Switch ignition off.

Test step 2

What is tested is the operation of the brake light switch -F-.

- Set a measuring range of 20 V.
- Switch ignition on.
- ◀ - Measure between contact 3 and contact 2 (earth) at the unplugged connector.

Specification: less than 0.5 V

- Depress brake pedal.

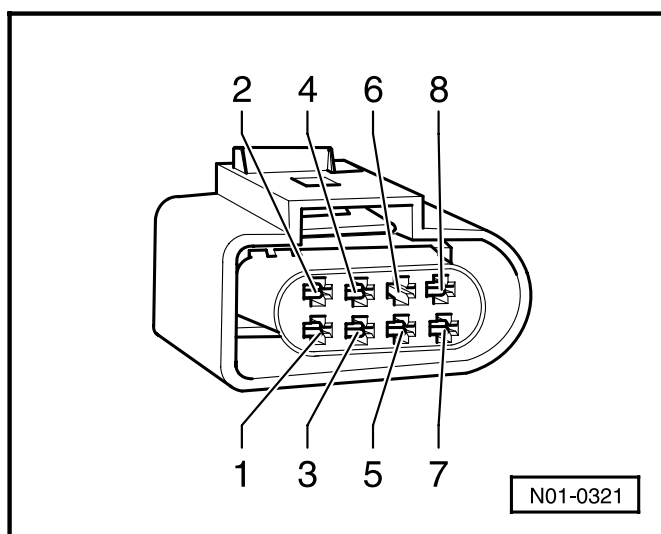
Specification: battery voltage

Specifications are not achieved: repair wiring according to current flow diagram.

⇒ Current Flow Diagrams, Electrical Fault Finding and Fitting Locations binder

Specifications are not yet achieved: replace and set brake light switch -F.

⇒ Running Gear; Repair Group 45; Electrical/Electronic Components and Fitting Locations; Removing and installing brake light switch



Test step 3

What is tested is the operation of the handbrake indicator switch -F9-.

- Set a measuring range of 20 V.
- Switch ignition on.
- ◀ - Measure between contact 4 and contact 2 (earth) at the unplugged connector.

Specification: greater than 6 V

- Apply handbrake.

Specification: less than 0.5 V

Specifications are not achieved: test wiring to dash panel insert (T32b/13) for open circuit or short circuit to positive.

⇒ Current Flow Diagrams, Electrical Fault Finding and Fitting Locations binder

Specifications are not yet achieved: test cable from contact T32a/1 (dash panel insert) through fuse 11 (5 A) to terminal 15.

If no fault is found, replace the handbrake indicator switch -F9-.

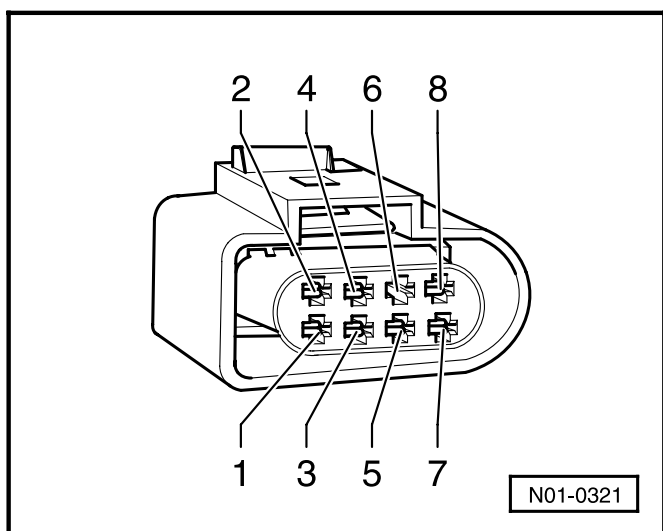
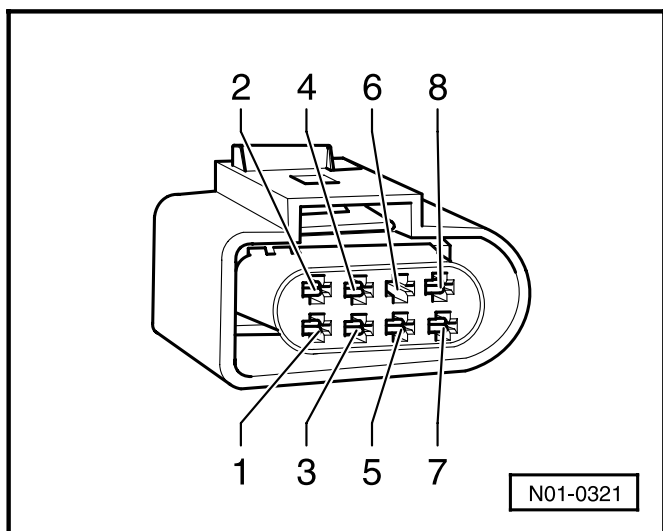
⇒ Running Gear; Repair Group 46; Assembly overview: handbrake lever

Test step 4

What is tested is the operation of the data BUS lines.

- Set a measuring range of 20 kΩ.
- ◀ - Measure at the unplugged connector between contact 7 and contact 2 (earth) and also between contact 8 and contact 2 (earth).

Specification in each case: greater than 300 Ω

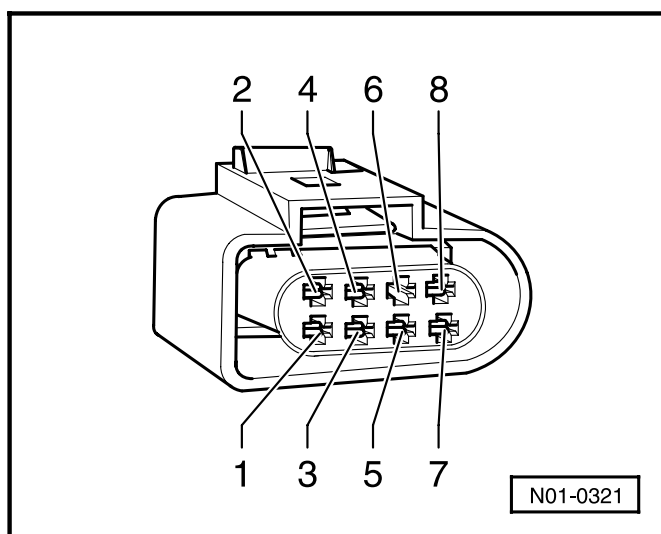


If the readouts are less than $300\ \Omega$ or $\infty\ \Omega$:

- Repair wiring according to current flow diagram.
- ⇒ Current Flow Diagrams, Electrical Fault Finding and Fitting Locations binder

Notes:

- ◆ If readout is $< 300\ \Omega$ there is a short circuit to earth.
- ◆ If readout is $\infty\ \Omega$ there is an open circuit in the wiring.



If the specifications are achieved:

- ◀ - Measure between contacts 7 + 1 and contacts 8 + 1 at the unplugged connector.

Specification in each case: greater than $300\ \Omega$

If the readouts are less than $300\ \Omega$ or $\infty\ \Omega$:

- Repair wiring according to current flow diagram.
- ⇒ Current Flow Diagrams, Electrical Fault Finding and Fitting Locations binder

Notes:

- ◆ If readout is $< 300\ \Omega$ there is a short circuit to earth.
- ◆ If readout is $\infty\ \Omega$ there is an open circuit in the wiring.

If the specifications are achieved:

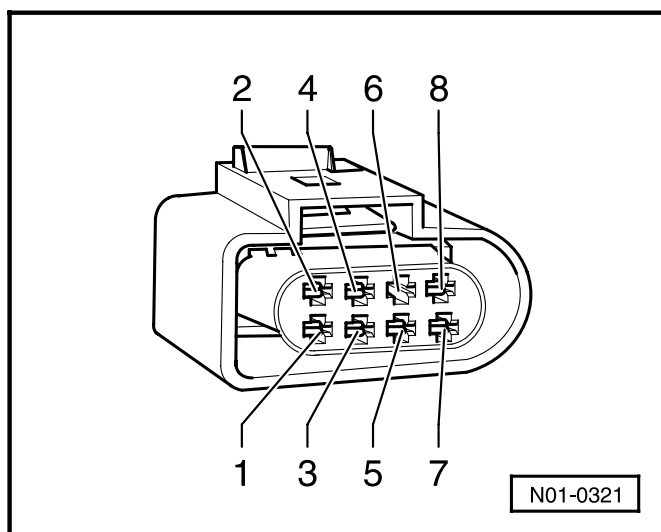
- Unplug all the connectors of the control units which are connected to the drive data BUS.
- Set measuring range of $20\ M\Omega$.

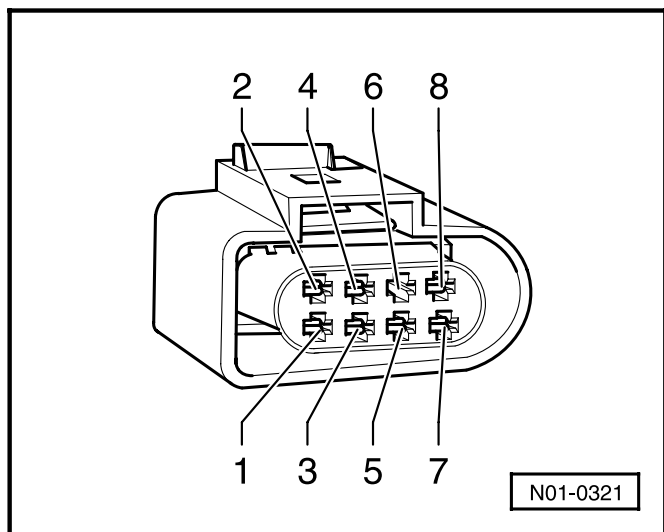
- ◀ - Measure the resistance between contacts 7 + 8.

Specification: $\infty\ \Omega$

If the specification is not achieved:

- Repair wiring according to current flow diagram.
- ⇒ Current Flow Diagrams, Electrical Fault Finding and Fitting Locations binder





If the specification is achieved:

- Connect the engine control unit again.
- Set a measuring range of 2 k Ω .
- ◀ - Measure the resistance between contacts 7 + 8.

Specification: 60...72 Ω

If the specification is not achieved:

- Replace the engine control unit.
- ⇒ Repair Group 23 and 24 of the relevant engine

If the specification is achieved:

- Unplug the multipin connectors from the engine control unit and connect the ABS control unit again.
- Repeat the measurement between contacts 7 + 8.

Specification: 2400...2800 Ω

If the specification is not achieved:

- Replace the ABS control unit.
- ⇒ Running Gear; Repair Group 45; Electrical/Electronic Components and Fitting Locations; Removing and installing ABS/EDL/ESP hydraulic control unit and mounting bracket

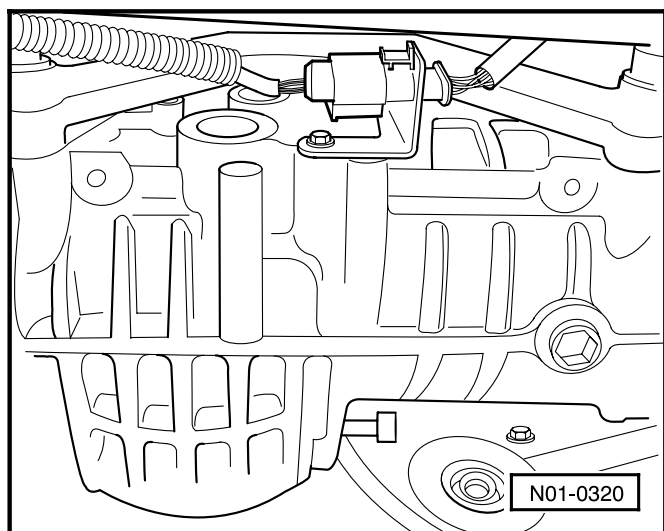
Test step 5

What is tested is the operation of the Haldex coupling pump motor -V181- and the operation of the oil pressure positioning motor -V184-.

Note:

The vehicle must be raised so that the wheels rotate freely (2nd person required).

- ◀ - Plug in connector of control unit -J492.
- Connect vehicle system tester V.A.G 1552
⇒ page 01-10.
- Apply handbrake.
- Start the vehicle.



- Depress the clutch pedal and engage 1st gear.
- Drive off slowly; the rear wheels must be felt to start off when this is done against the force of the handbrake.

Note:

If the clutch is not released slowly, the engine will cut out.

If the rear wheels do not start against the force of the handbrake:

- Test plug connection (2-pin) at the Haldex coupling pump -V181- and the wiring according to the current flow diagram.
- ⇒ Current Flow Diagrams, Electrical Fault Finding and Fitting Locations binder

If no fault was found, the oil pressure positioning motor -V184 is then faulty.

Note:

The oil pressure positioning motor -V184 is integrated in the four-wheel drive control unit.

If the rear wheels start off against the pressure of the handbrake:

- Operate the clutch pedal and select the address word 03 for "Brake electronics" at V.A.G 1552.

1J0907379 H ABS/EDL 20 IE CAN 0001 →
Coding 13504 WSC XXXXX

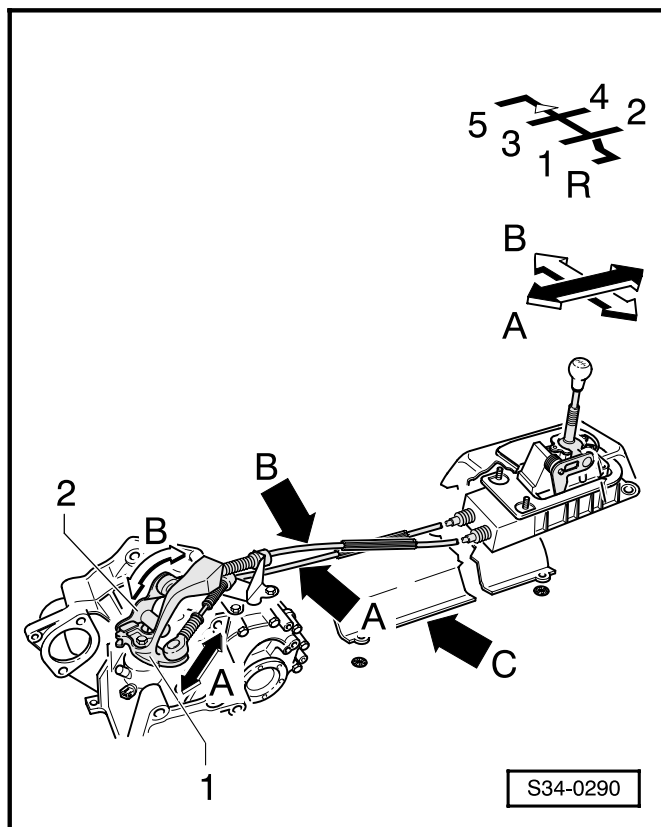
◀ The control unit identification appears in the display of the vehicle system tester V.A.G 1552 (example):

- After the control unit has answered, start off once again in 1st gear with the handbrake applied.

In this case, only the front wheels must rotate.

If it is still found that the rear wheels start off against the force of the handbrake, then replace the four-wheel drive control unit ⇒ page 01-7.

Servicing shift mechanism



Fitting location of shift mechanism

A - Shift cable for shift movement

B - Selector cable for selector movement

C - Heat shield

- ◆ Take off before removing the shift mechanism.

Arrow -A- Shift movement

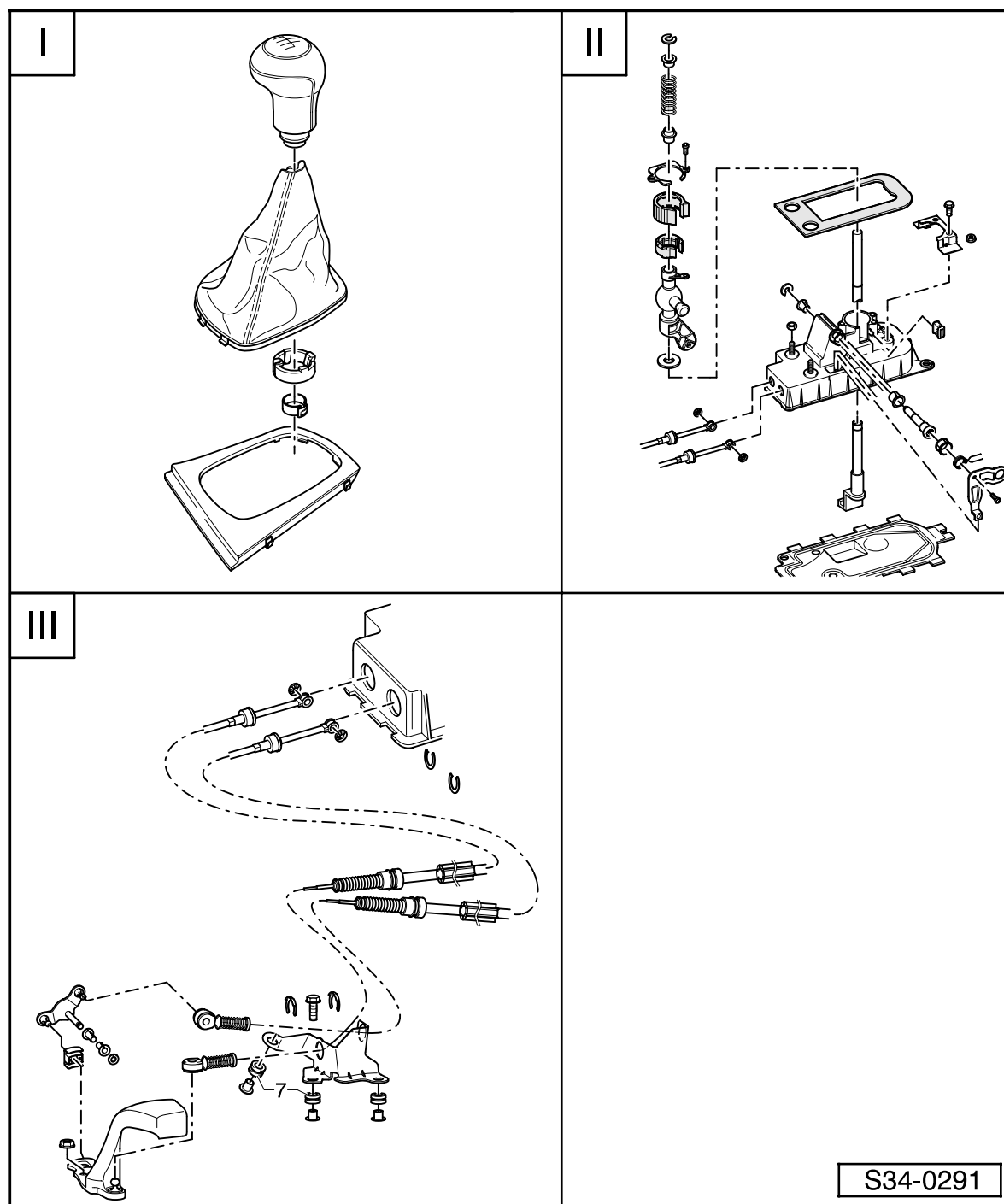
Arrow -B- Selector movement

1 - Gearbox shift lever

2 - Relay lever

Notes:

- ◆ Disconnect earth strap from the battery before carrying out work on the shift mechanism in the engine compartment.
- ◆ Before disconnecting the battery, determine the code of radio set fitted with anti-theft coding.
- ◆ When the battery is re-connected, check the vehicle equipment:
 - Perform encoding of radio
 - Re-set time
 - Initialise power windows
- ⇒ Inspection and Maintenance
- ◆ Remove shift mechanism in order to replace the shift mechanism cables ⇒ page 34-10.
- ◆ Do not bend shift mechanism cables.



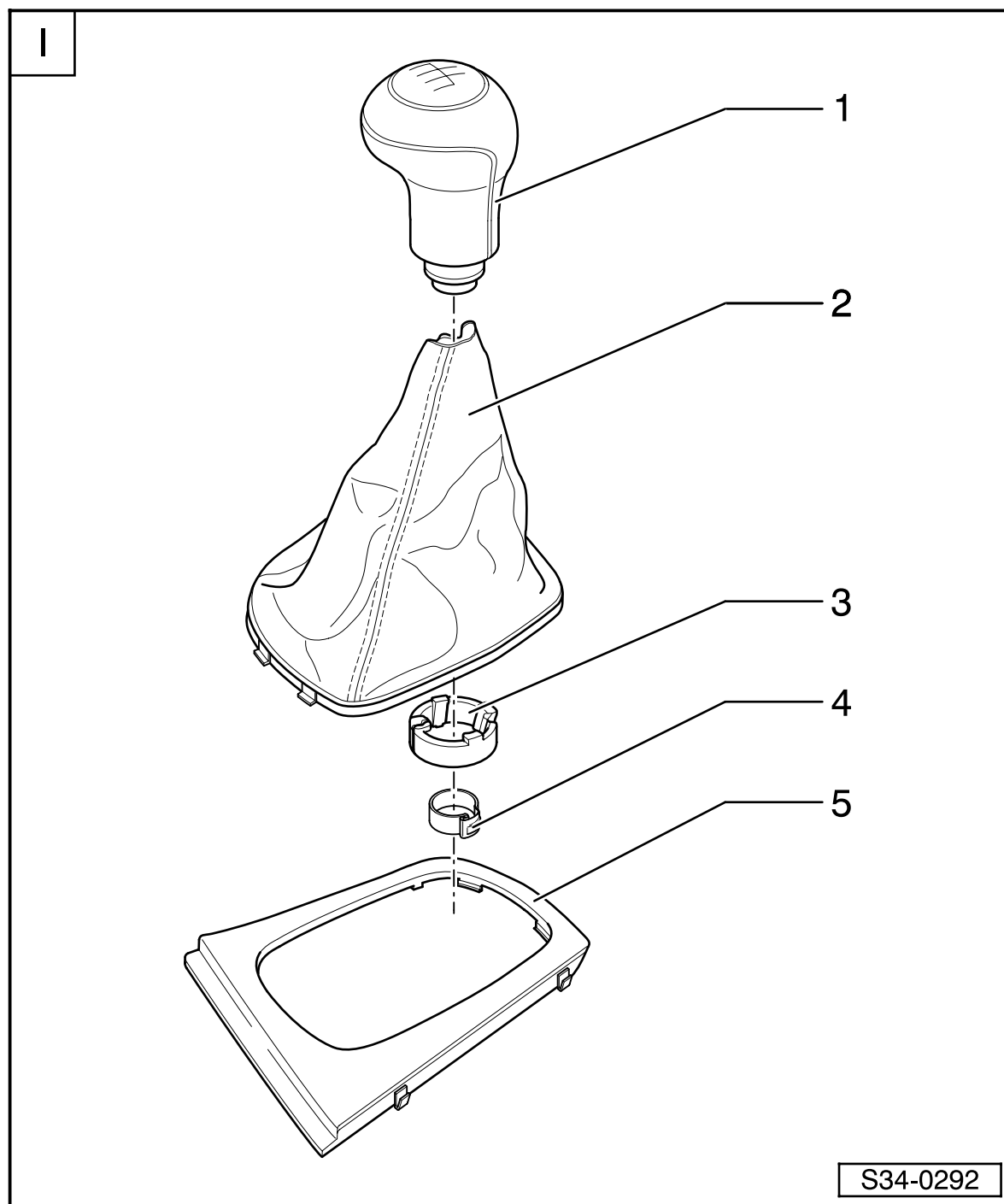
I - Assembly overview - gearshift knob and cover ⇒ page 34-3

II - Assembly overview - gearshift lever and shift housing ⇒ page 34-5

III - Assembly overview - control cables ⇒ page 34-8

Removing and installing shift mechanism
⇒ from page 34-10.

Setting shift mechanism ⇒ page 34-13.

I - Assembly overview - gearshift knob and cover**1 - Gearshift knob**

- ◆ When disassembling, also take off cover item 2
- ◆ Removing ⇒ page 34-10

2 - Cover

- ◆ When disassembling, also take off gearshift knob item 1
- ◆ Removing ⇒ page 34-10
- ◆ Separating cover from gearshift knob ⇒ page 34-4

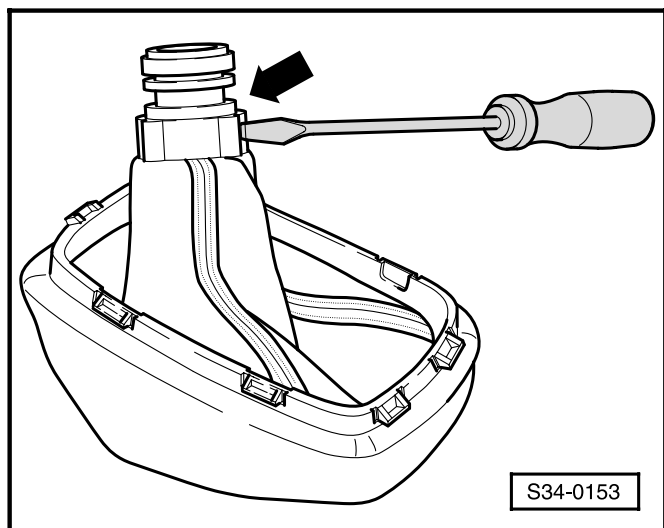
3 - Connection part

- ◆ Connects cover to gearshift knob
- ◆ Removing ⇒ page 34-4

4 - Clamp

- ◆ For attaching gearshift knob to gearshift lever

5 - Surround of centre console

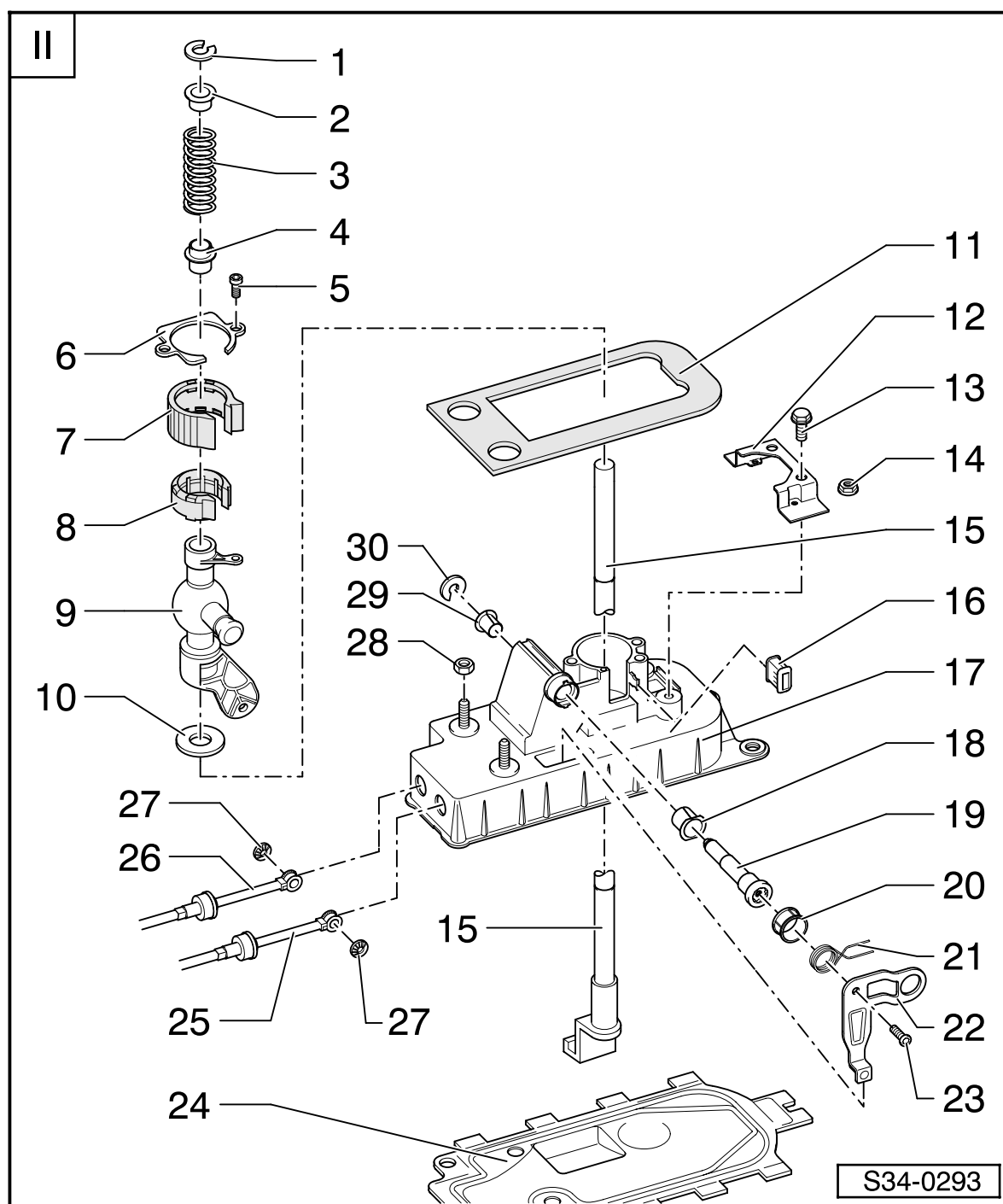
**Separating cover from gearshift knob**

- Turn the inside of the cover out.
- Use a screwdriver to lever off connection part -arrow-.
- Pull connection part off gearshift knob.
- Turn gearshift knob out and pull it off the cover.

Installing

- Turn inside of cover out.
- Insert gearshift knob into cover.
- Push connection part over gearshift knob and cover. Compress connection part until it locks in place.

II -Assembly overview - shift lever and shift housing

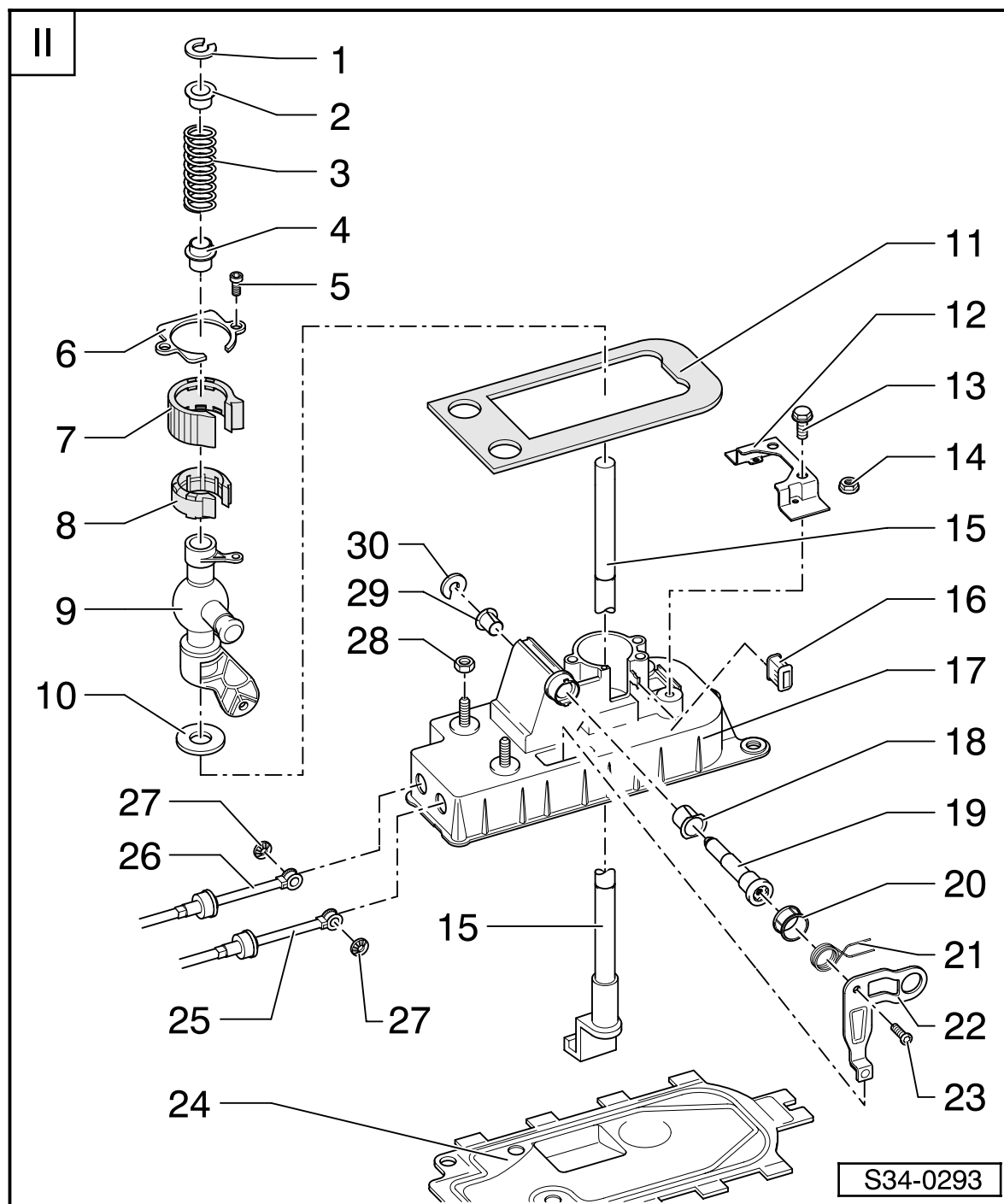
**Note:**

Grease bearing points and contact surfaces with polyresin grease Part No. G 052 142 A2.

1 - Circlip

♦ Removing and installing ⇒ Fig. 1

2 - Bush**3 - Compression spring****4 - Bush****5 - 5 Nm****6 - Cover****7 - Bearing shell****8 - Shock absorber****9 - Shift lever guide**



10 - Shock absorber washer

11 - Gasket

- ◆ Between shift housing and underfloor
- ◆ Self-adhesive
- ◆ Stick onto shift housing

12 - Bracket

- ◆ Attached to body

13 - 25 Nm

14 - 25 Nm

- ◆ For bracket to body

15 - Shift lever

16 - Shock absorber

17 - Shift housing

18 - Bearing bush

19 - Bearing pin

20 - Guide bush**21 - Compression spring**

- ◆ Installing ⇒ Fig. 2

22 - Selector lever**23 - 5 Nm****24 - Floor plate**

- ◆ Bend up tabs for removing
- ◆ Replace

25 - Selector cable

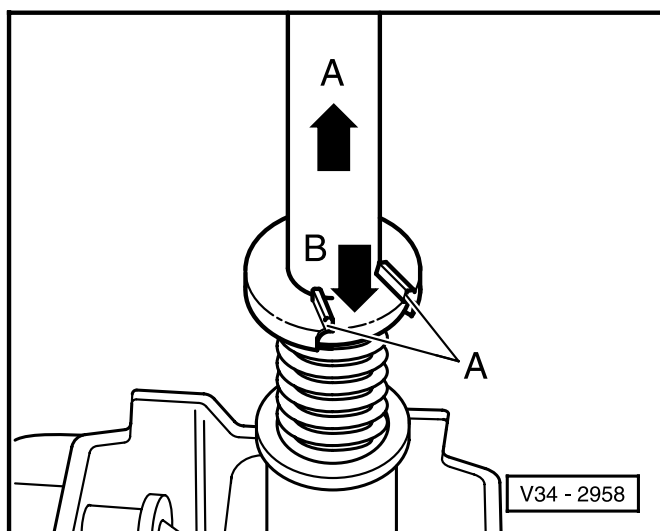
- ◆ Attached to selector angle
- ◆ Fitting location ⇒ page 34-1

26 - Shift cable

- ◆ Press onto the shift cable guide
- ◆ Fitting location ⇒ page 34-1

27 - Circlip**28 - 25 Nm****29 - Bearing bush**

- ◆ Fits only in one position

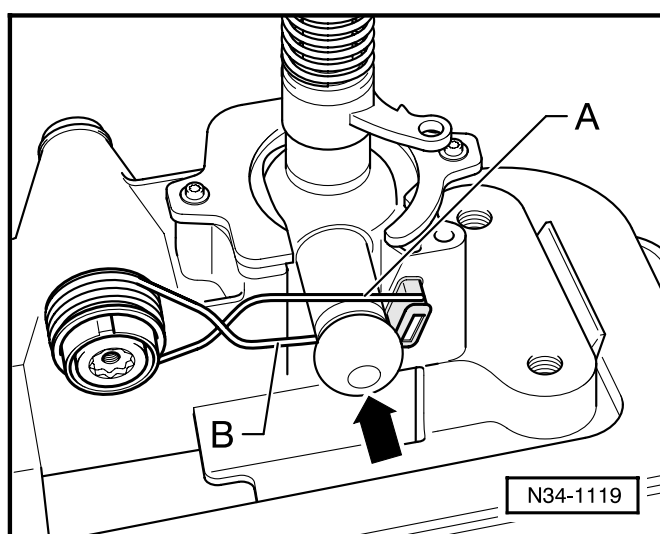
30 - Circlip

◀ Fig. 1 Removing and installing circlip

- Pull shift lever in direction of arrow -A- and at the same time press spacer bush down as far as the stop in direction of arrow -B- with a screwdriver in order to remove and install the circlip -A-.

Note:

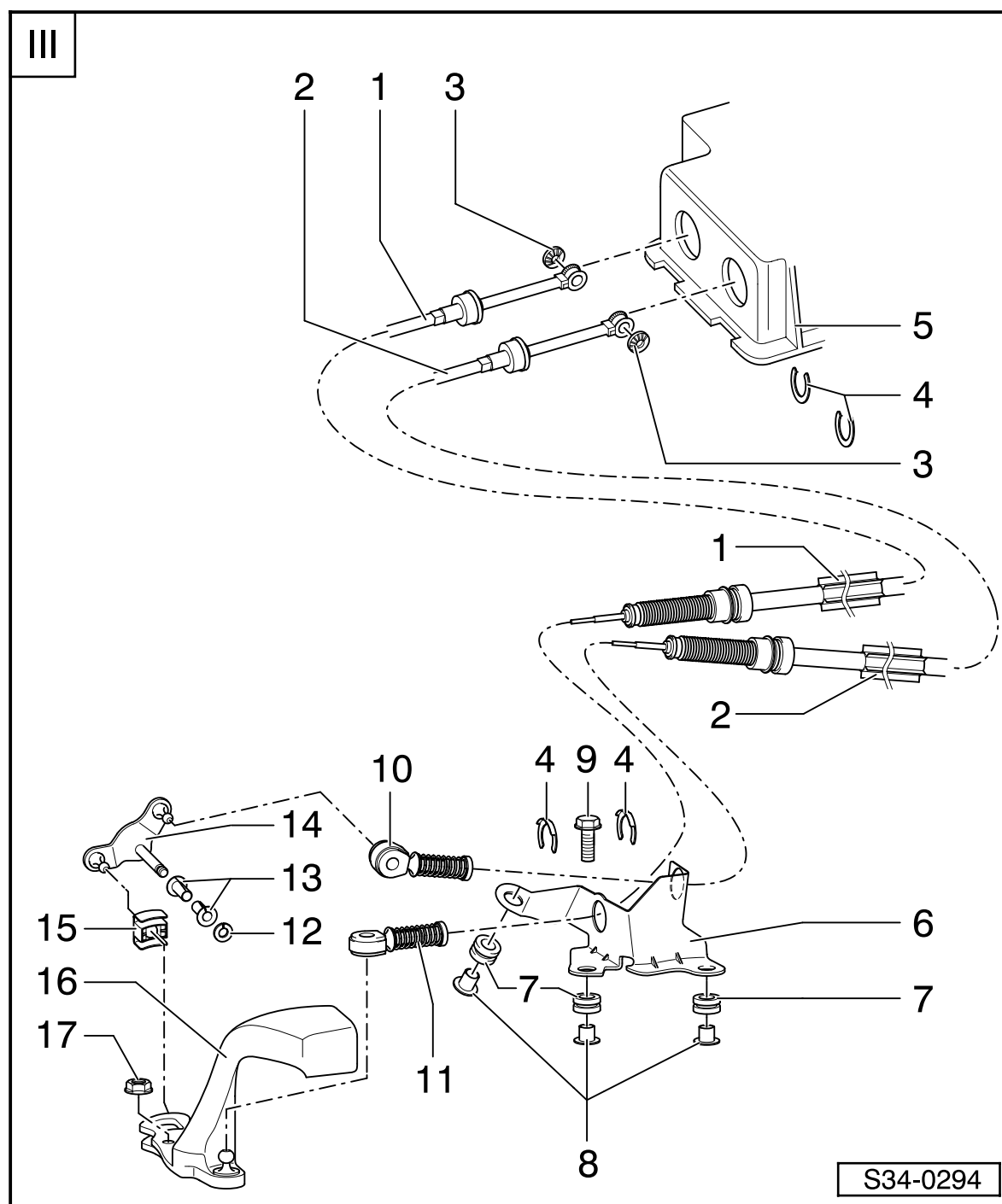
Do not twist spacer bush when pressing down. Carefully release mounting slot in shift lever for the circlip.



◀ Fig. 2 Installing the compression spring

- Insert the compression spring so that the leg -A- is positioned above the stud -arrow-.
- After this, pull the leg -B- down far enough so that it is positioned on the underside of the stud -arrow-.

III - Assembly overview - shift mechanism cables



Note:

Grease bearing points and contact surfaces with polyresin grease Part No. G 052 142 A2.

1 - Shift cable

- ◆ Press onto shift lever guide
- ◆ Fitting location ⇒ page 34-1

2 - Selector cable

- ◆ Attached to selector angle
- ◆ Fitting location ⇒ page 34-1

3 - Circlip

4 - Circlip

- ◆ Do not damage cables when removing

5 - Shift housing

6 - Support bracket

7 - Grommet

- ◆ Mounting of support bracket to gearbox

8 - Spacer bush**9 - 20 Nm****10 - Cable lock**

- ◆ For selector cable at relay lever

11 - Cable lock

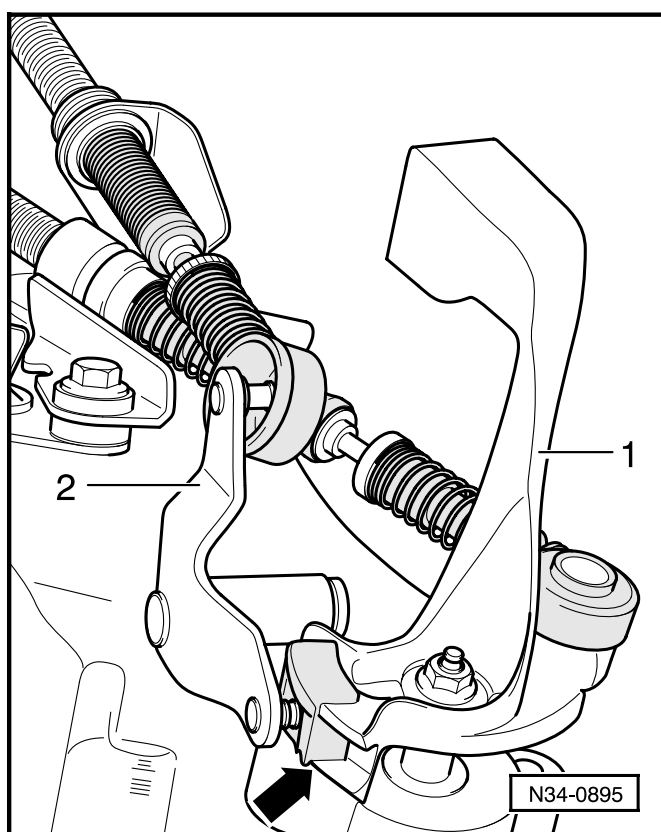
- ◆ For shift cable at shift lever

12 - Circlip**13 - Bearing bush****14 - Relay lever**

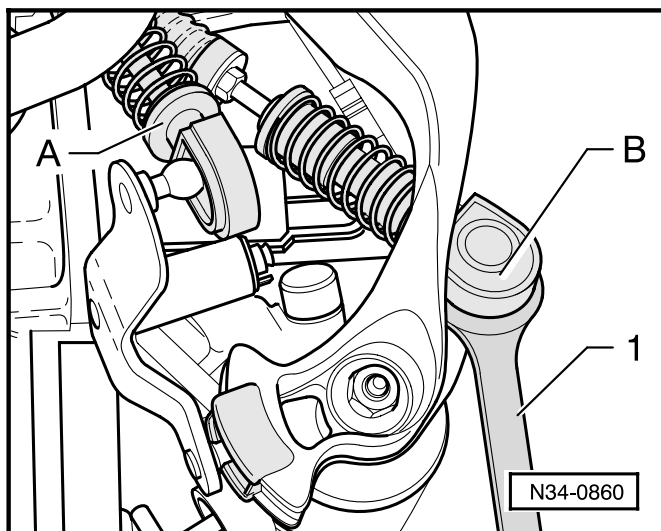
- ◆ Fitting location ⇒ page 34-9

15 - Sliding shoe**16 - Gearbox shift lever**

- ◆ With balancing weight
- ◆ Insert so that the interrupted tooth spacing matches the shift shaft
- ◆ After installing, set shift mechanism ⇒ page 34-13
- ◆ Fitting location ⇒ page 34-9

17 - 20 Nm**◀ Fitting location of gearbox shift lever/relay lever**

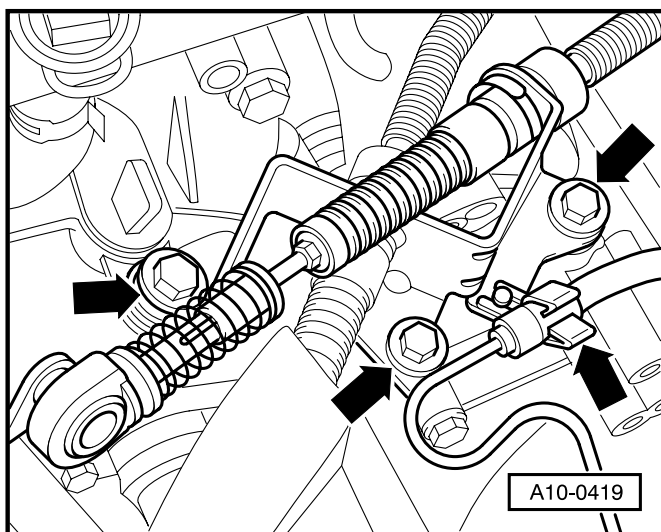
- 1 - Gearbox shift lever with balancing weight
- 2 - Relay lever meshes by means of the sliding shoe in the sliding rail of the gearbox shift lever -arrow-



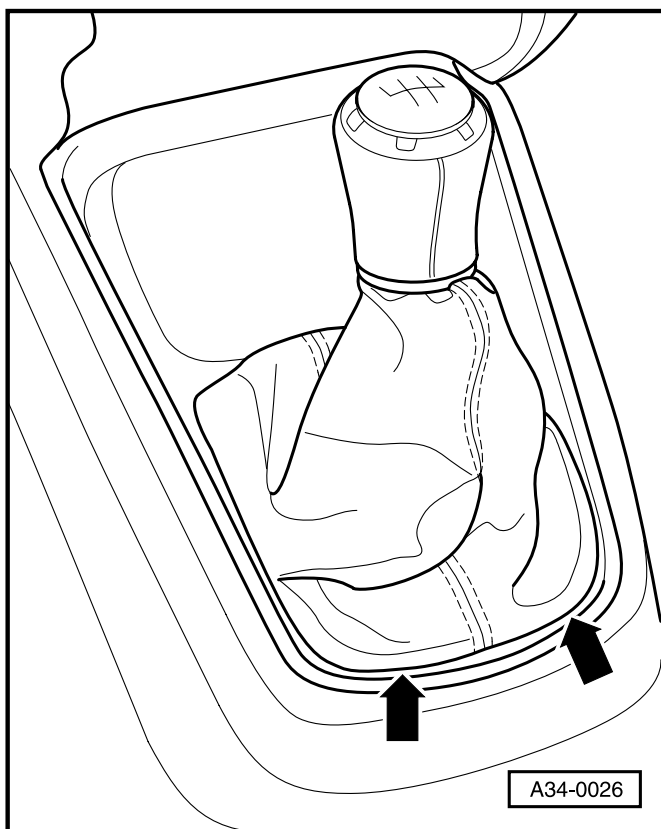
Removing and installing shift mechanism

Removing

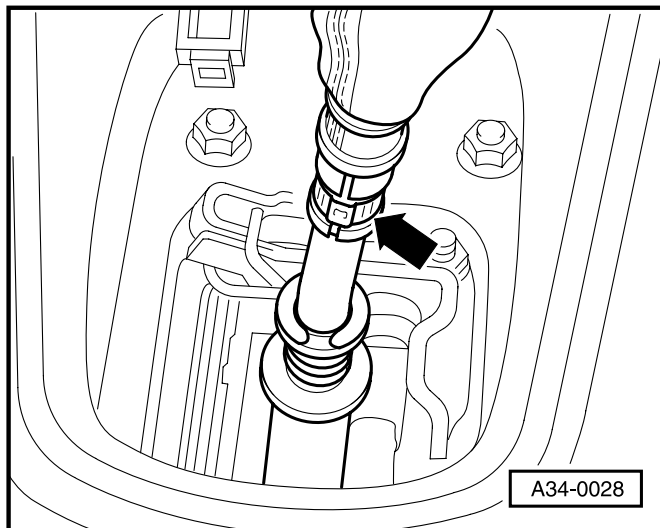
- ◀ - Use an open-end wrench to lever selector cable -A- and shift cable -B- off the gearbox.
- 1 - Commercially available size 13 open-end wrench



- ◀ - Detach cable support bracket from gearbox and unclip hose line at cable support bracket -arrows-.

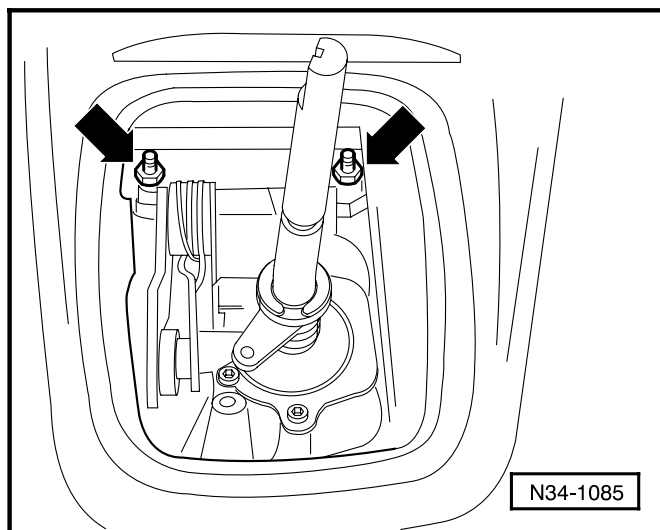


- ◀ - Lift cover together with surround up and out of the centre console.

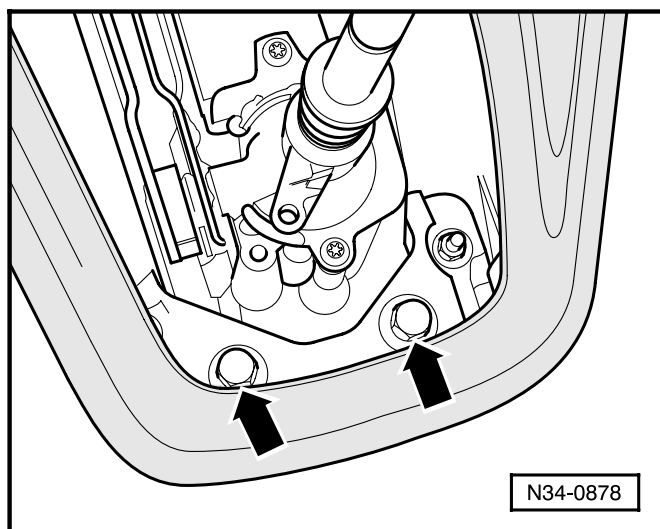


- Fold cover up over gearshift knob.

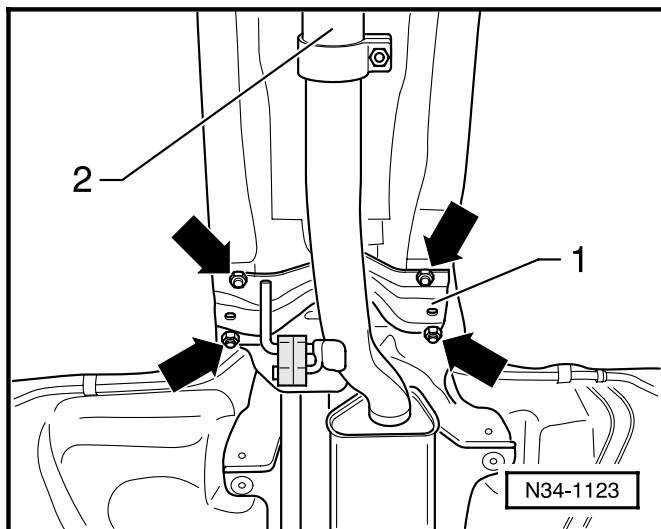
◀ - Open clamp -arrow- and pull off gearshift knob together with cover.



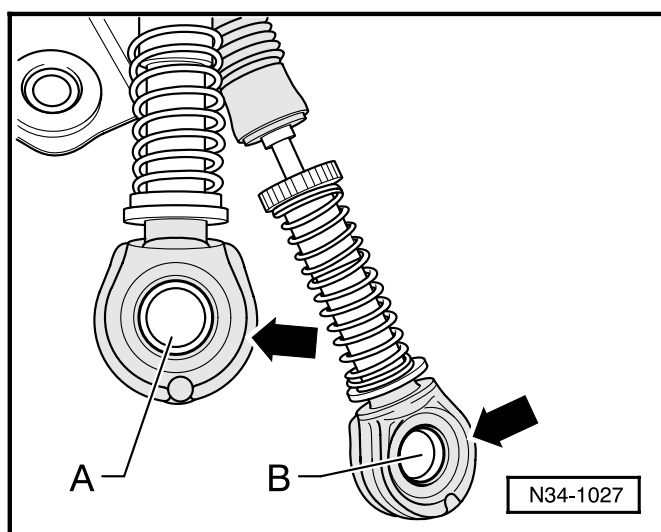
◀ - Unscrew the front nuts -arrows- attaching the shift housing.



◀ - Unscrew the rear bolts -arrows- attaching the shift housing.



- ◀ - Take off bracket -1- above the exhaust system -arrows-.
- Separate exhaust system at the double clamp -2- and remove together with catalytic converter (2nd person required).
⇒ Repair Group 26; Removing and installing parts of the exhaust system.
- Remove front and middle shields.
- Remove propshaft ⇒ page 39-44.
- Swivel shift housing down and take out together with cables.



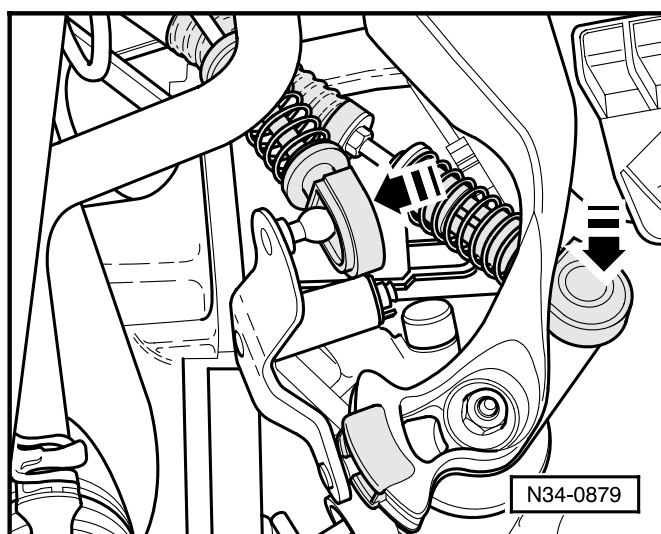
Installing

Installation is carried out in the reverse order. Pay attention to the following points:

- ◀ - Coat a small quantity of poly resin grease into the ball socket of the shift cable lock -A- and of the selector cable lock -B-.

Note:

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



- ◀ - Press the shift cable onto the gearbox shift lever and the selector cable onto the relay lever (arrows).

Set shift mechanism ⇒ page 34-13.

Tightening torques

Shift housing to body	25 Nm
Bracket to body	25 Nm
Cable support to gearbox	20 Nm

Setting shift mechanism

Special tools, testers and aids required

- ◆ Locking pin T10027

Notes:

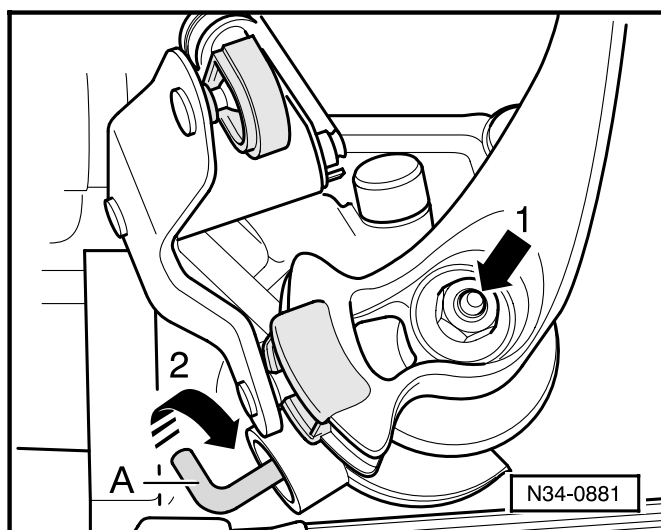
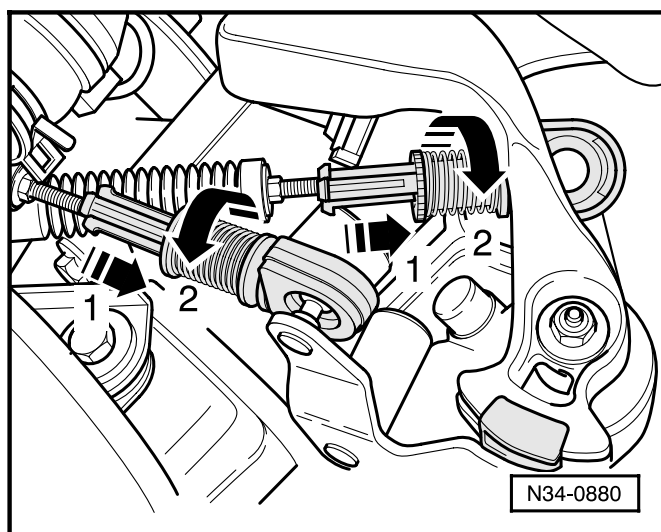
It is essential to observe the following points to ensure that the shift mechanism is correctly set:

- ◆ *The shift mechanism and transmission elements must be in proper condition.*
- ◆ *The shift mechanism must operate freely.*

In addition, gearbox, clutch and clutch control must be in proper condition.

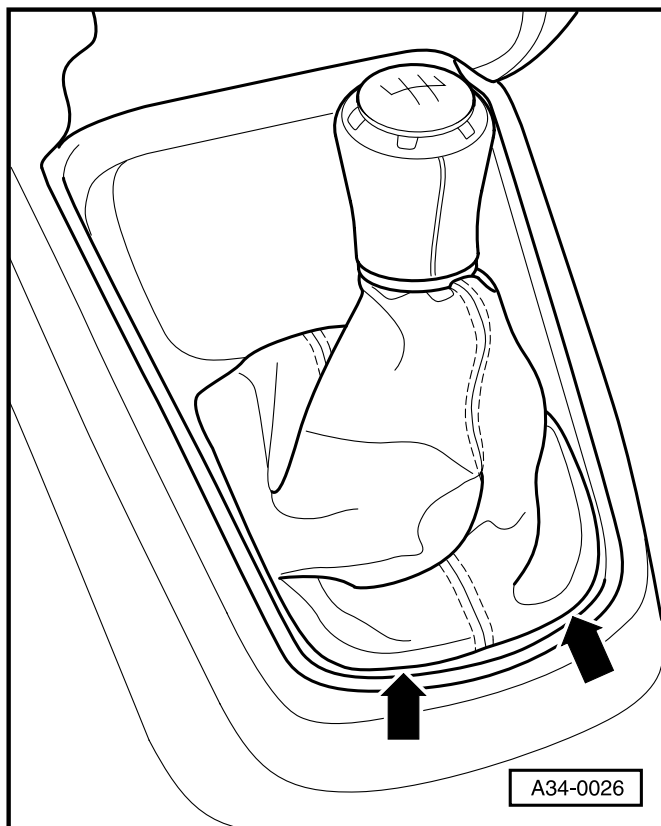
- Gearbox in Neutral.

- ◀ - Pull locking mechanism at the shift cable and at the selector cable fully forward -arrow 1- and then turn to the left and lock -arrow 2-.

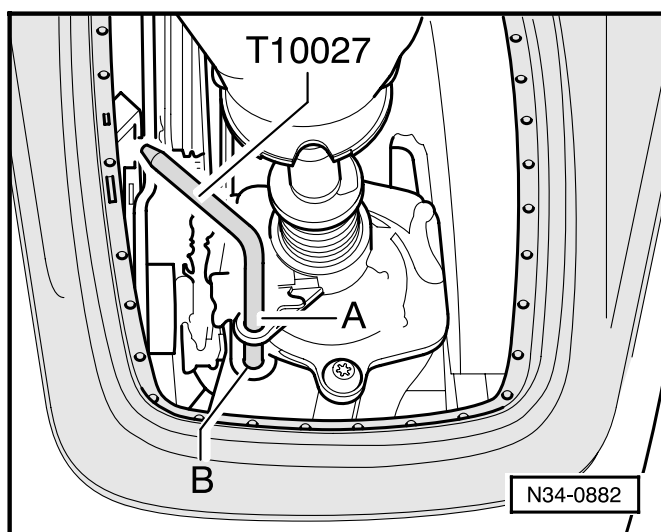


- ◀ Lock the shift shaft as follows:

- Push the shift shaft down -direction of arrow 1-.
- When pushing the shift shaft down, turn the angle lever -A- in -direction of arrow 2-.

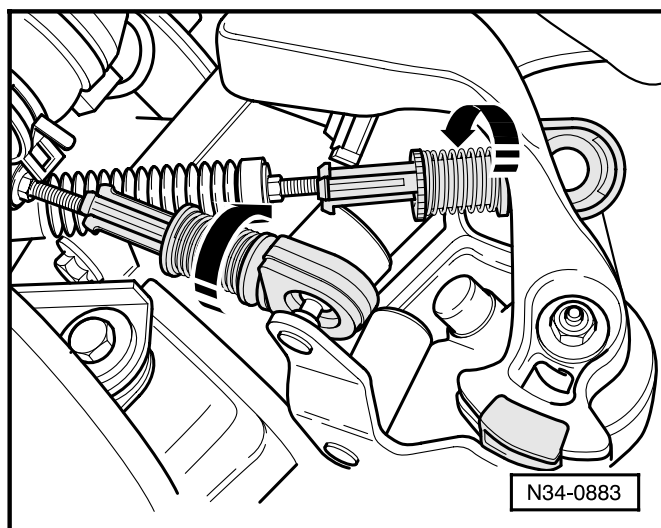


- ◀ - Lever cover together with surround up and out of the centre console.



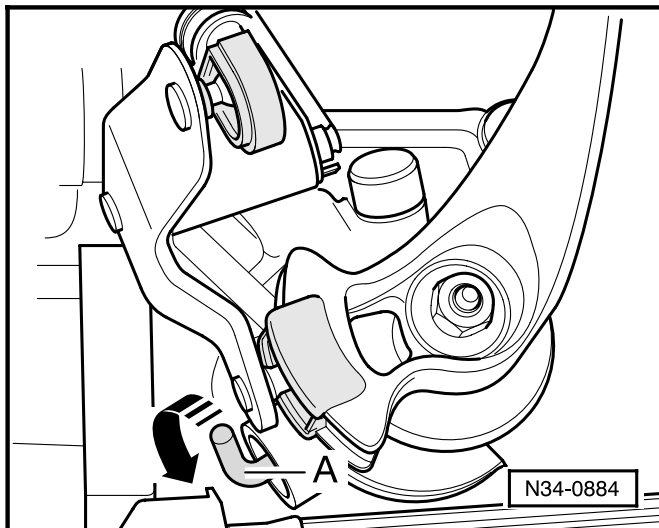
- ◀ Now, lock the shift lever as follows:

- Engage Neutral at shift lever.
- Insert locking pin T10027 through the hole -A- into the hole -B-.

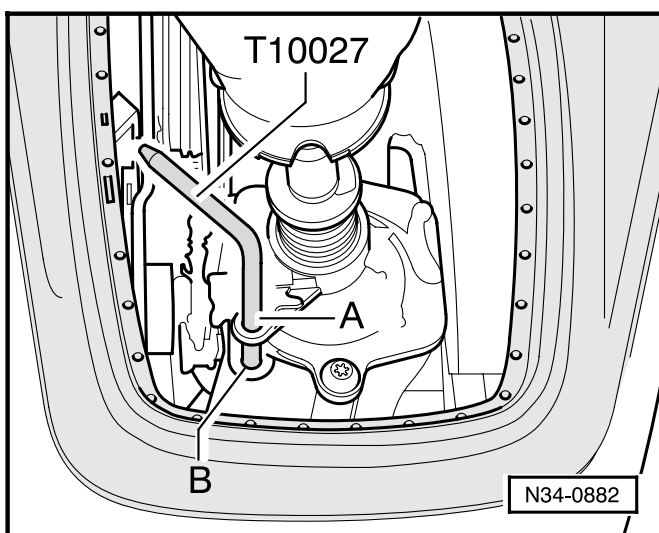


- ◀ - Now, turn the locking mechanism at the shift cable and at the selector cable fully to the right -direction of arrow-.

The spring pushes the locking mechanism into the initial position.



- ◀ - Now, turn the angled lever -A- back into the initial position -direction of arrow-.

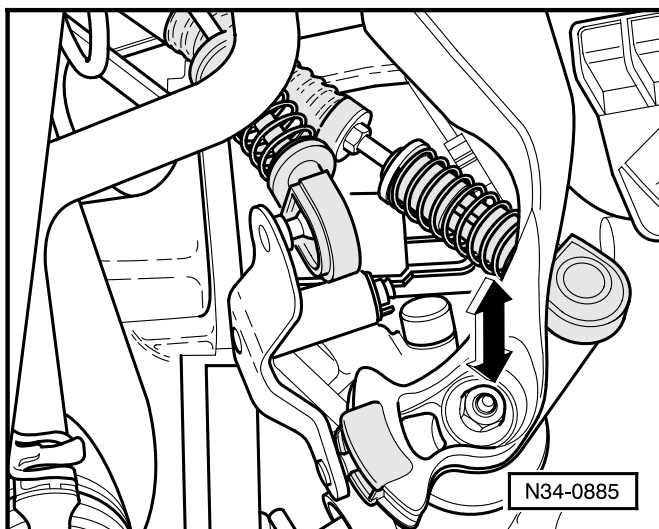


- ◀ - Take the locking pin T10027 out of the holes -A- and -B-.
- Fit cover into the surround.

Function

- Shift lever must be positioned in Neutral in the gate of 3rd/4th gear.
- Depress clutch.
- Shift through all the gears several times. Pay particular attention to ensuring that the reverse gear lock operates properly.

If a gear still catches when repeatedly engaged, inspect the play (stroke) of the shift shaft as follows:



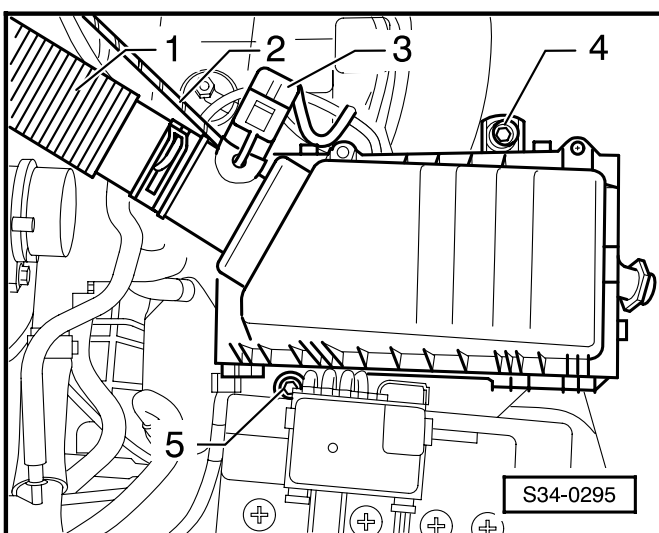
- Engage 1st gear.
- Push shift lever fully to the left and release again.
- At the same time, observe the shift shaft at the gearbox (2nd person).
- ◀ - When the shift lever is moved, the shift shaft must perform a stroke of about 1 mm (direction of arrow).
- If this is not the case, set shift mechanism ⇒ page 34-13.

Removing and installing gear-box

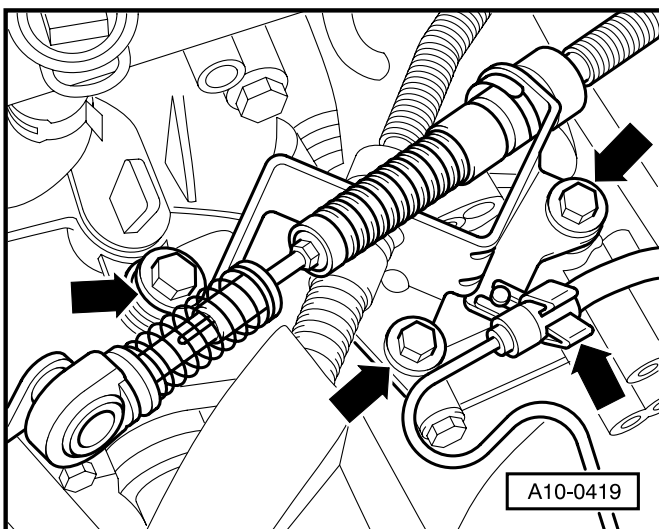
Special tools, testers and aids required

- ◆ Grease G 000 100
- ◆ Supporting device MP 9-200
- ◆ Gearbox mount 3282
- ◆ Adjustment plate 3282/18
- ◆ Transporting device MP 3-478
- ◆ Puller, e.g. Kukko 20/10
- ◆ Drip tray

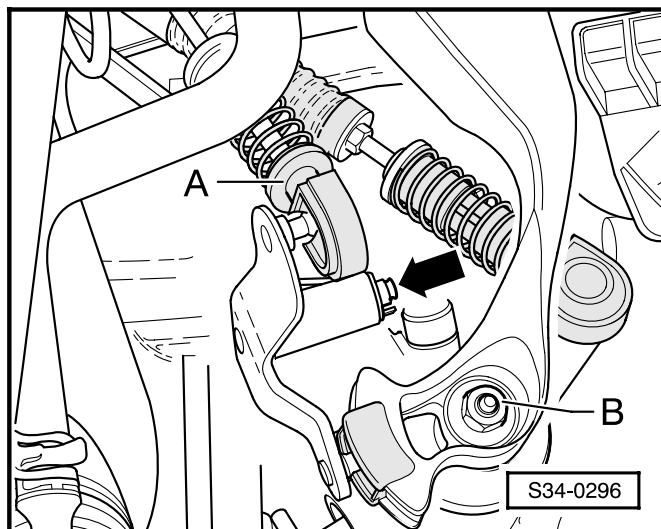
Removing



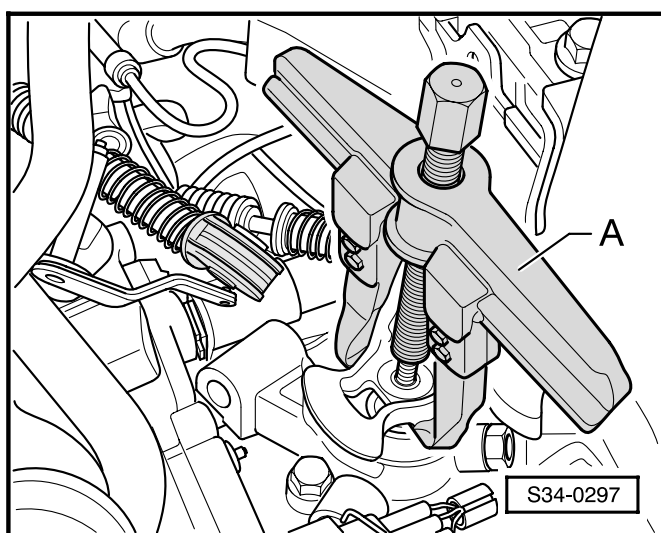
- On models fitted with a coded radio set, pay attention to coding; determine if necessary.
- Switch off ignition (if not already off) and disconnect earth strap at the battery.
- Remove engine trim panel.
- Remove battery.
- ◀ - Detach intake hose -1-.
- Detach vent hose -2- and unplug connector -3- of the air mass meter.
- Remove air filter housing complete; take out screws -4- and -5- for this step.



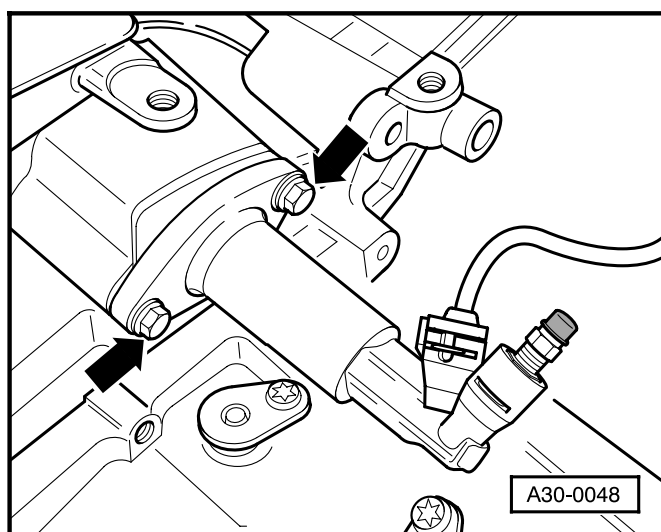
- ◀ - Detach cable support bracket from gearbox and unclip hose line at the cable support bracket -arrows-.



- ◀ - Detach selector cable -A- together with the relay lever; take off lock washer -arrow- for this step.
- Unscrew the self-locking nut -B- from the gearbox shift lever.



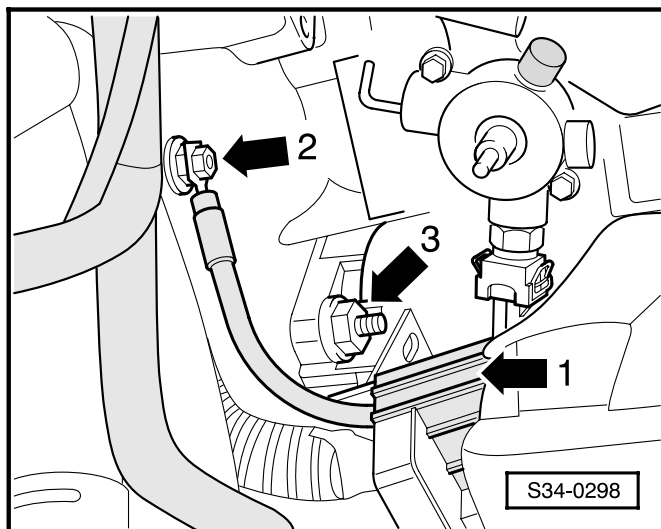
- ◀ - Use puller -A-, e.g. Kukko 20/10, to pull gearbox shift lever off the shift shaft.
- Tie up shift cable together with gearbox shift lever and selector cable together with relay lever.



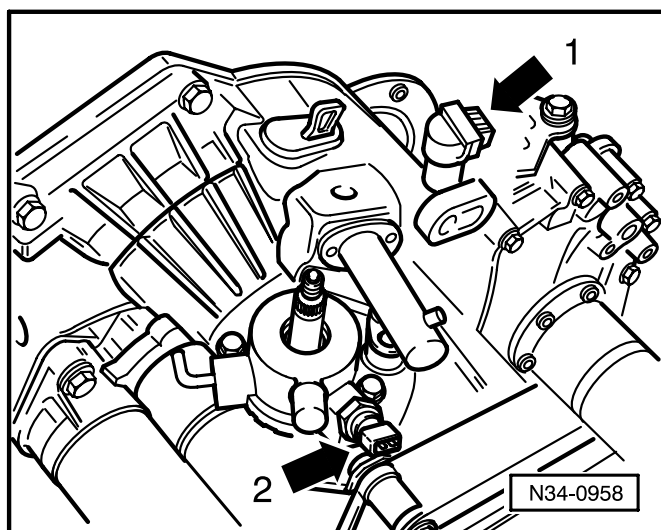
- ◀ - Remove slave cylinder, place down to the side and secure with wire. Do not open line system.

Note:

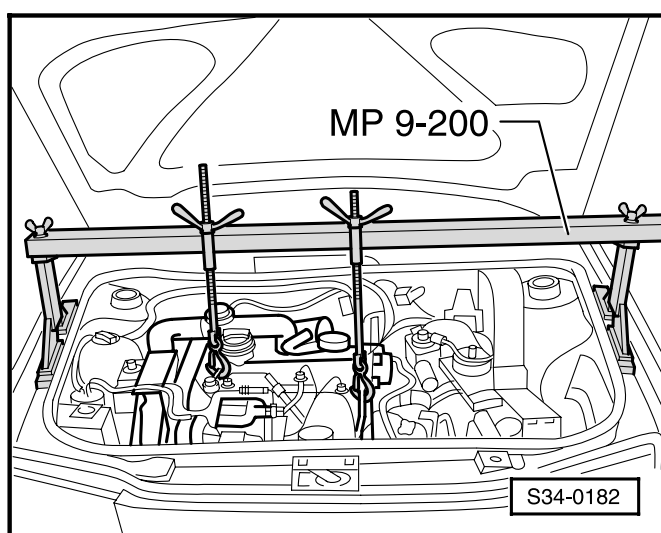
Do not depress clutch pedal.



- ◀ - Remove cable holder -arrow 1- at the starter.
- Disconnect cables and plug connections from the starter.
- Disconnect earth strap from bolt connecting engine/gearbox at top -arrow 2-.
- Then, remove the top bolt -arrow 3- attaching the starter.
- Remove the top bolts connecting engine/gearbox.



- ◀ - Unplug connector from the speedometer sender -arrow 1-.
- Unplug connector for reversing lights -arrow 2-.

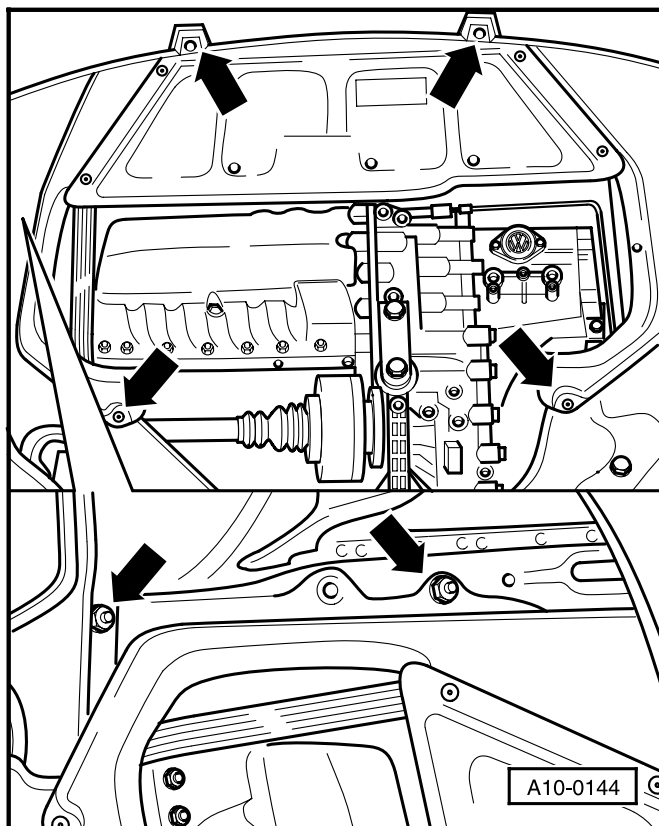


- ◀ - Install supporting device MP 9-200.

Note:

Before attaching the hooks of the supporting device, pay attention to hose and cable connections in the area of the lifting eyes of the engine to avoid these being damaged.

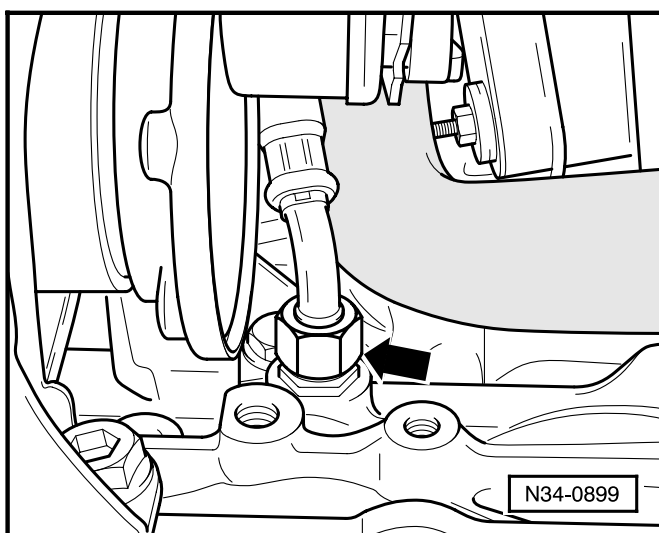
- Take up the weight of the engine/gearbox assembly at the spindles.



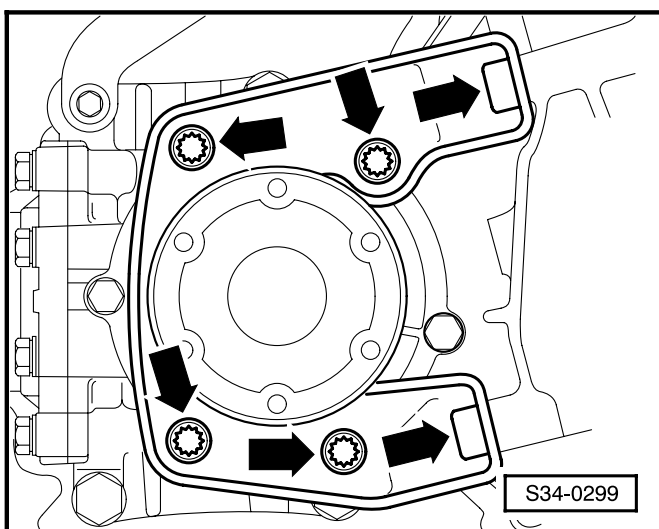
- ◀ - Remove noise insulation panel; take out bolts -arrows- for this step.
- Detach drive shafts from flange shafts, turn steering to full left lock and tie up drive shafts as far as possible. Do not damage surface protection during this step.
- Separate exhaust system at the double clamp.
⇒ Repair Group 26 of the particular engine

Note:

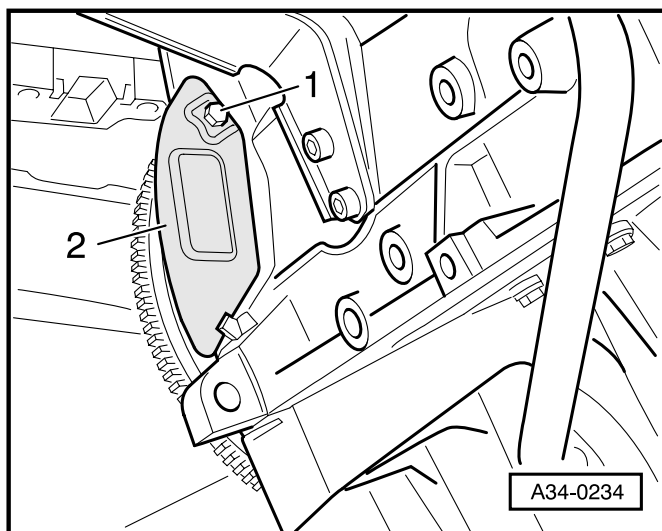
- ◆ On models fitted with TDI engine, it is also necessary to take off the exhaust pipe bracket on the subframe.



- Place drip tray below.
- ◀ - Unbolt oil return-flow line for turbocharger from engine -arrow-.
⇒ 1.9-ltr./66 kW (TDI) engine, Mechanical Components; Repair Group 21; Charge air system for turbocharger



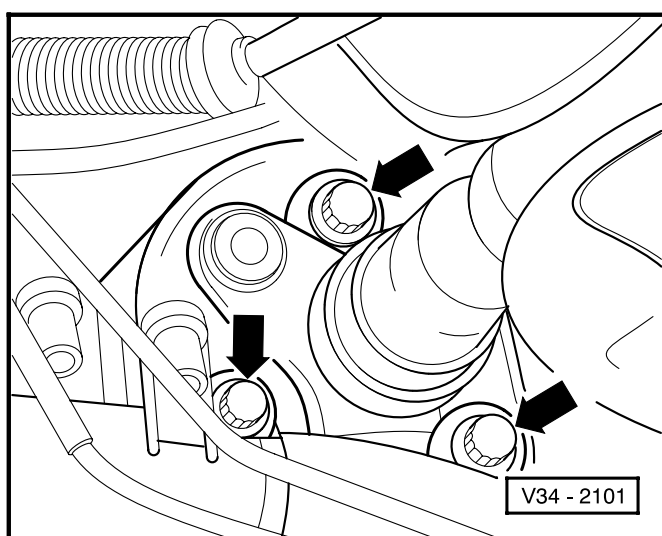
- ◀ - Unbolt gearbox support for bevel box from engine and bevel box -arrows-.



- ◀ - Unscrew bolt -1- and remove small splash guard -2- for flywheel behind the bevel box.

Note:

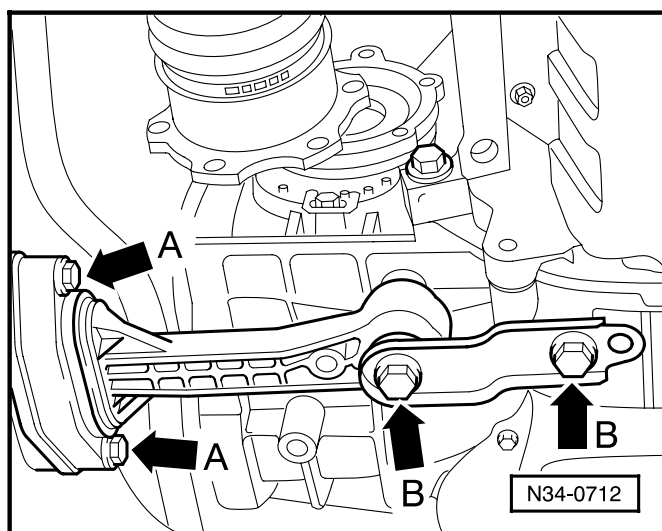
The splash guard is located behind the bevel box. The illustration shows the gearbox removed.



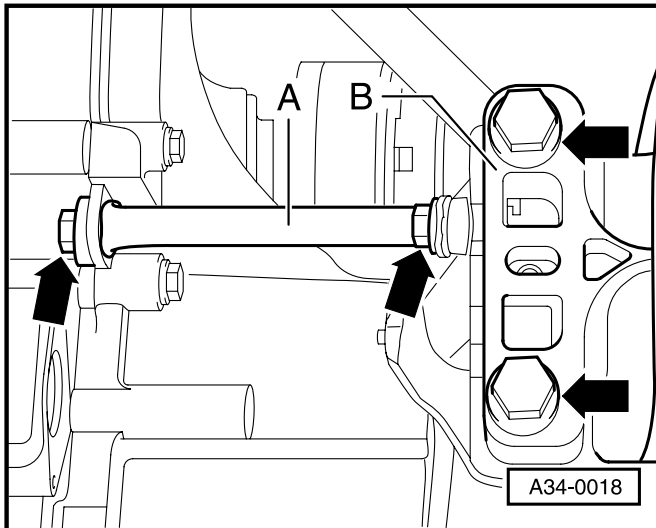
- Mark position of the propshaft with flexible joint to the flange of the bevel box.
- ◀ - Unbolt propshaft together with flexible joint from the flange of the bevel box (arrows).
- Push the front propshaft tube back slightly.

Note:

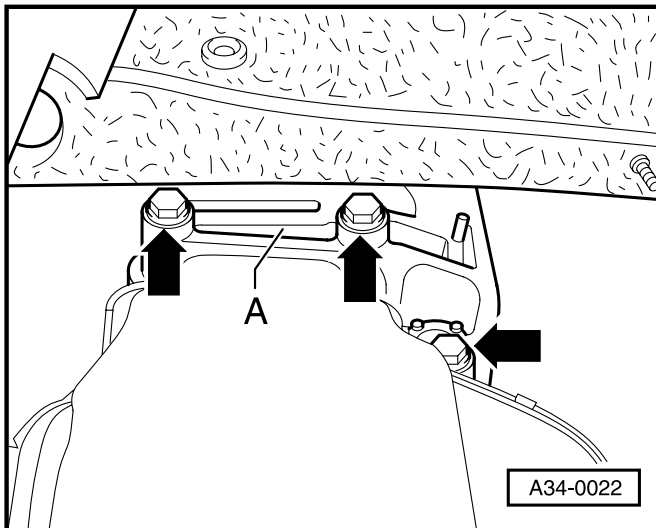
After slackening the bolts -A- (⇒ Fig. N34-0712, page 34-20) the engine/gearbox unit swings forward slightly. Ensure that the seal in the flange of the propshaft is not damaged when removing and installing.



- ◀ - Remove pendulum support -arrows A and B-.



- ◀ - Unbolt support -A-.
- Unscrew the bolts -arrows- attaching the left gearbox mount -B-.



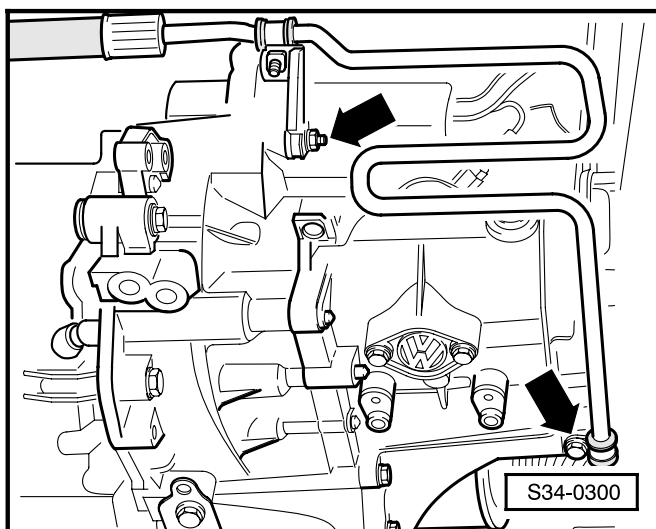
- ◀ - Detach gearbox mounting bracket -A- from the gearbox.

Remove the bolts -arrows- attaching the gearbox mounting bracket as follows:

- Lower engine/gearbox unit sufficiently at the two spindles until the bolts attaching the gearbox mounting bracket -A- are accessible from the left wheelhouse.

Notes:

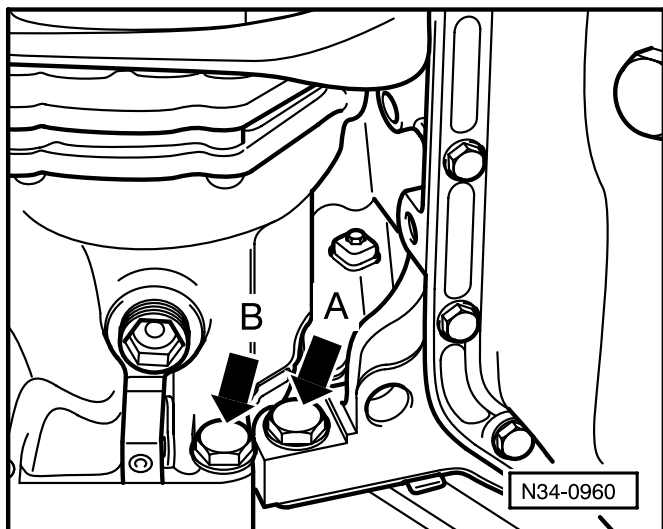
- ♦ Pay attention to power steering line when altering position of the engine/gearbox unit.
- ♦ The illustration shows the gearbox mounting bracket when viewed from the left wheelhouse.



- ◀ - Detach power steering line from starter and gearbox -arrows- and place up.
- Remove starter.
- ⇒ Electrical System; Repair Group 27; Removing and installing starter

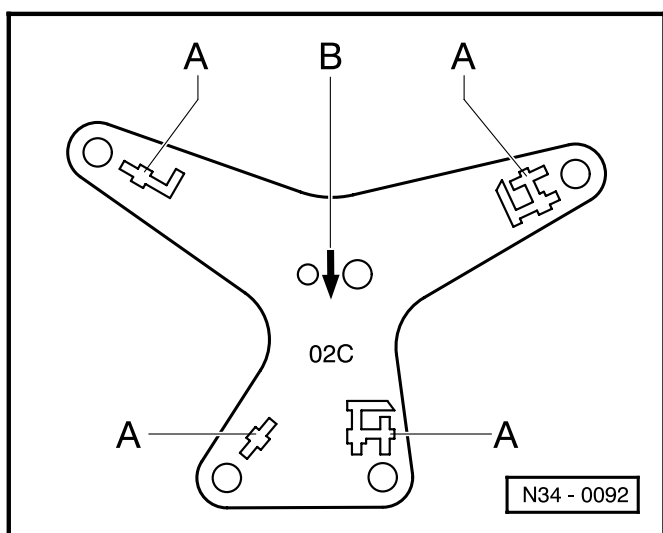
Note:

Pay attention to all connecting lines and hoses when altering position of the engine/gearbox unit.

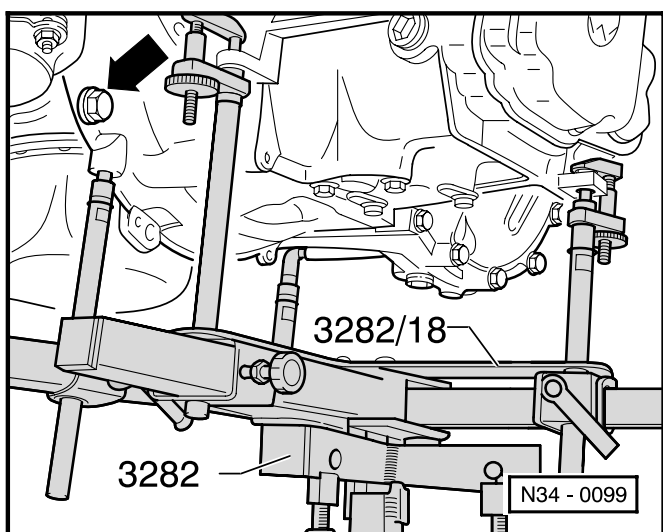


- ◀ - Remove bottom bolt connecting engine/gearbox at bottom -arrow A-.
- Unscrew bolt of bevel box -arrow B- for inserting the mounting pin 3282/49 of the gearbox mount 3282.

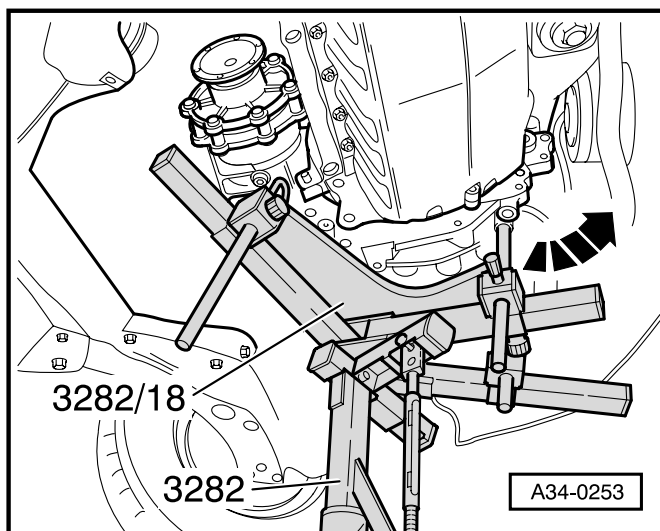
The gearbox mount 3282 is aligned with the adjustment plate 3282/18 for removing gearbox 02C with bevel box.



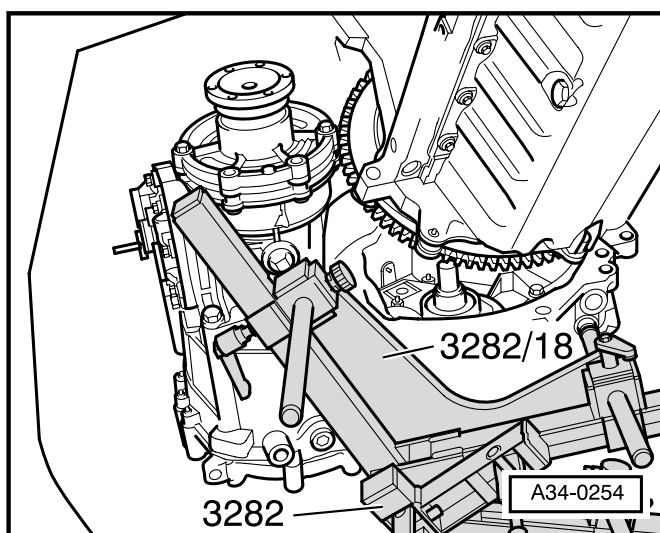
- Align the arms of the gearbox mount to match the holes in the adjustment plate.
- ◀ - Insert the mounting elements -A-, as shown on the adjustment plate.



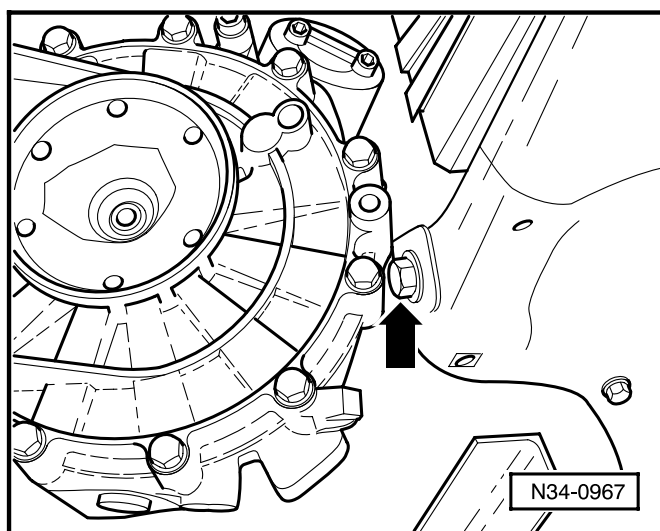
- ◀ - Place gearbox jack below vehicle, arrow symbol -B- (⇒ Fig. N34-0092) on adjustment plate points in direction of travel/vehicle.
- Align adjustment plate parallel to gearbox and lock securing mount at gearbox.
- Remove bolt connecting engine/gearbox at bottom -arrow-.
- Press gearbox off the dowel sleeves.



- Now, swivel the gearbox forward (arrow), lower it slightly and position it at an angle with the gearbox mount 3282 in order to gain access to the body and to the subframe.



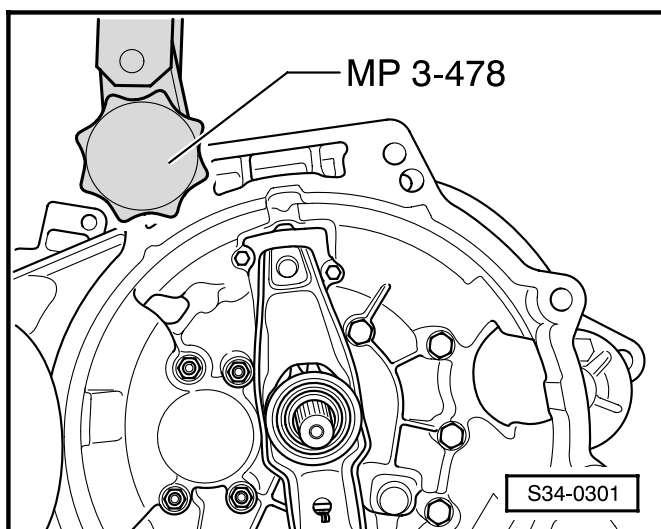
- After this, carefully lower the gearbox.



- Lower gearbox; pay attention to the subframe when doing this (arrow).
- When lowering gearbox, alter its position by means of the spindles of the gearbox mounts 3282.

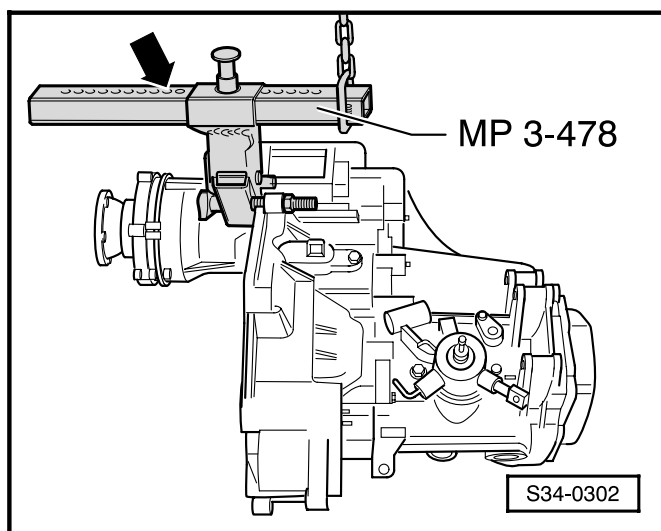
Note:

Pay attention to power steering line when lowering the gearbox.



Transporting gearbox

- ◀ - Bolt gearbox supporting device MP 3-478 to clutch housing.



- ◀ - Adjust supporting arm at slide with detent pin (arrows).

Number of visible holes = 10

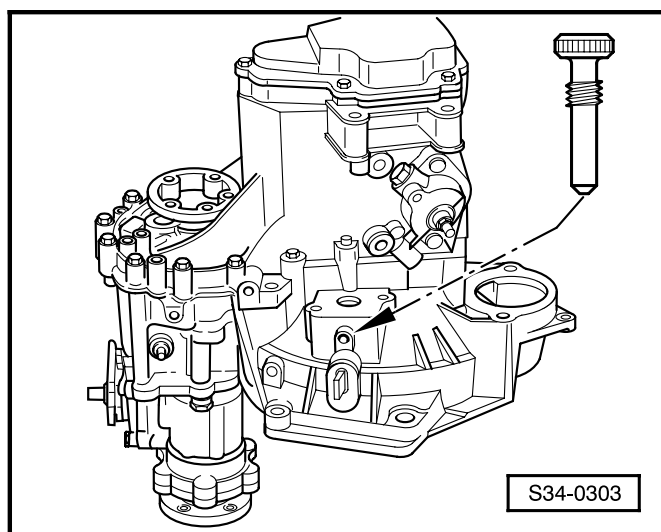
- Take up gearbox with workshop crane and gearbox supporting device MP 3-478.
- Place down gearbox, e.g. in transporting crate.

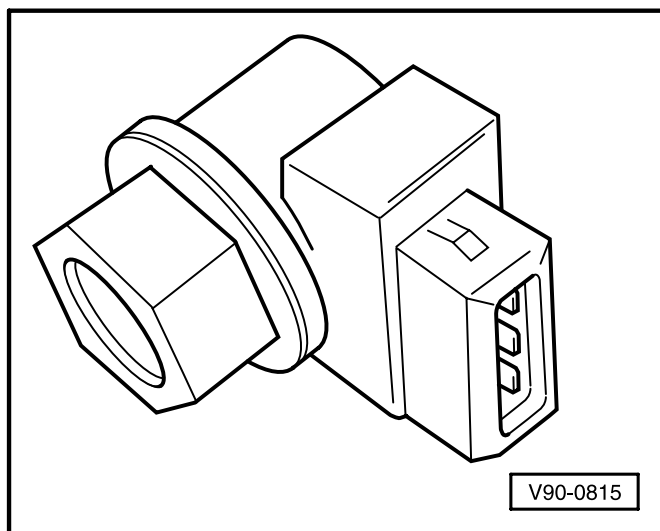
Installing

Installation is carried out in the reverse order.
Install engine/gearbox mounting free of stress:
⇒ Repair Group 10 of the particular engine

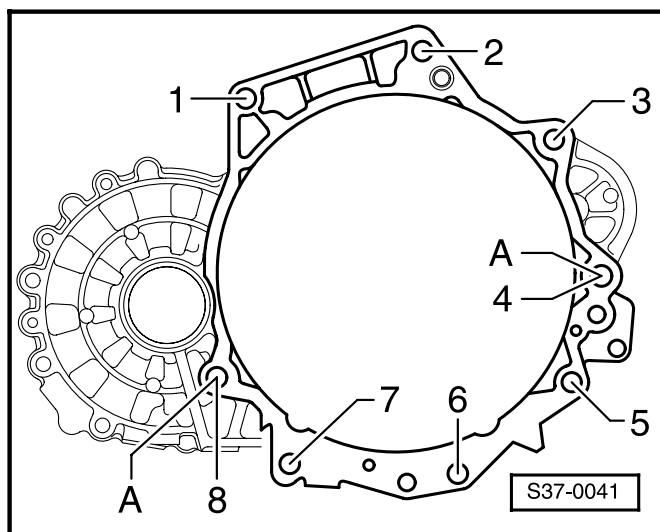
Notes:

- ◀ ♦ Press clutch release lever toward gearbox housing before installing the gearbox and secure with assembly bolt or M 8 x 35. Unscrew after installing gearbox. Hole is then sealed by the bolt which attaches the support bracket of the operating cables.
- ♦ Clean splines of input shaft and grease lightly with G 000 100 grease.





- ◆ If the gearbox has been replaced, always fit the existing speedometer sender.
- ◆ If the gearbox has been replaced, ensure that the intermediate plate is correctly located.
- ◆ Check whether dowel sleeves for centering engine/gearbox are present in the cylinder block; insert if necessary.
- ◆ Replace gasket for drive shaft:
⇒ Running Gear; Repair Group 40; Servicing drive shaft.
- ◆ Install starter/cables:
⇒ Electrical System; Repair Group 27; Removing and installing starter
- ◆ Inspect gear oil in manual gearbox with bevel gear ⇒ page 34-31.
- ◆ Set shift mechanism ⇒ page 34-13.



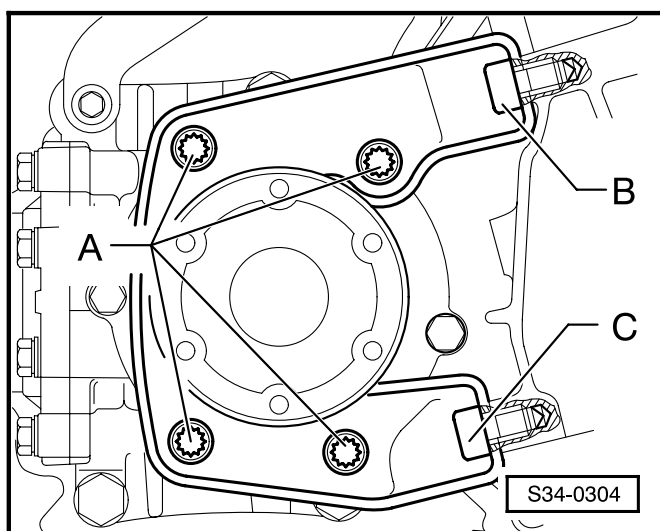
Tightening torques

◀ Gearbox to engine

Item	Bolt	Qty.	Nm
1	M 12 x 55	1	80
2 ¹⁾	M 12 x 55	1	80
3 ¹⁾	M 12 x 150	1	80
4 ¹⁾	M 12 x 150	1	80
5	M 10 x 50	1	45
6	M 10 x 50	1	45
7	M 10 x 50	1	45
8	M 12 x 55	1	80

¹⁾ M8 bolt with headless pin

A: Dowel sleeves for centering



◀ Pay attention to the following installation sequence when installing the gearbox support

- Screw in all the bolts handtight.
- Tighten bolts -B- and -C- initially to 10 Nm.
- Tighten bolts -A- fully to 25 Nm.
- Tighten bolts -B- and -C- fully to 40 Nm.

Drive shaft to flange shaft

⇒ Running Gear; Repair Group 40

Components	Tightening torque
Gearbox mounting bracket to gearbox ¹⁾ M10	50 Nm + 90°
Gearbox mounting bracket to gearbox mount ¹⁾ M12	60 Nm + 90°
Support to gearbox M8	25 Nm
Support to gearbox mounting bracket M8	25 Nm
Pendulum support to gearbox ¹⁾ M10	40 Nm + 90°
Pendulum support to subframe ¹⁾ M8	20 Nm + 90°
Cable support bracket to gearbox	20 Nm
Bevel box to gearbox ¹⁾	40 Nm + 45°
Gearbox shift lever to gearbox	20 Nm
Flexible joint/propshaft to bevel box	60 Nm
Small cover plate for flywheel to intermediate plate/engine	10 Nm

¹⁾ Always replace these bolts.

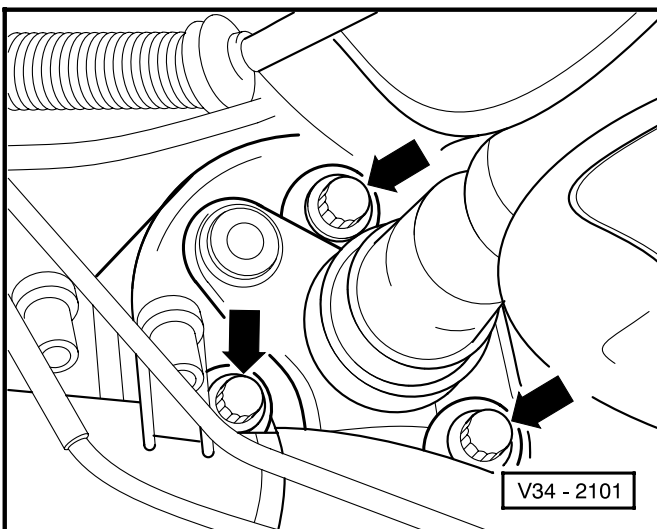
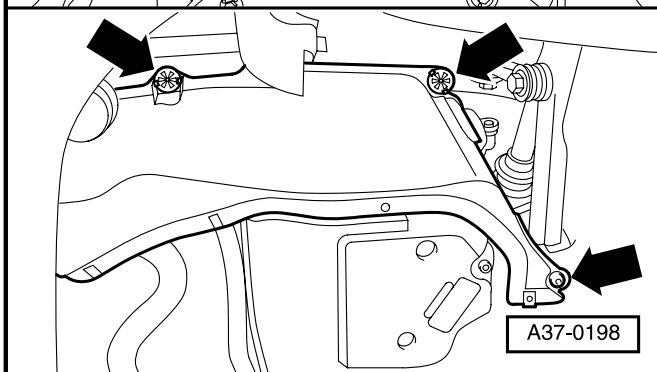
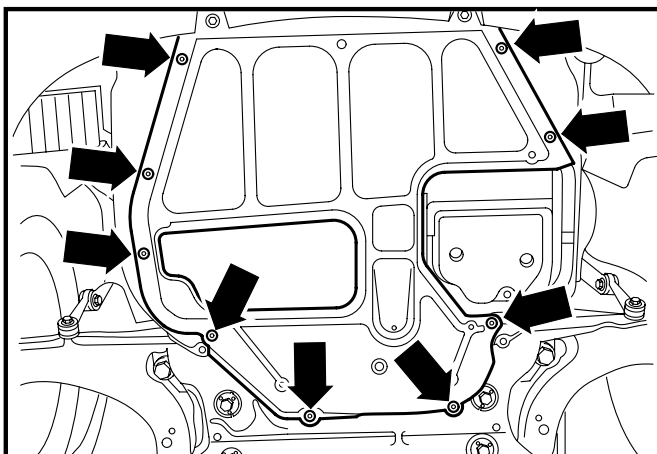
Removing and installing bevel box

Special tools, testers and aids required

- ◆ 6 mm wrench socket, at least 190 mm long, e.g. V.A.G 1669
- ◆ Drip tray
- ◆ M8 x 80 mm bolt with nut

Removing

- ◀ - Remove noise insulation panel in the middle and on the right -arrows-.



- Mark position of the propshaft with flexible joint to the flange of the bevel box.

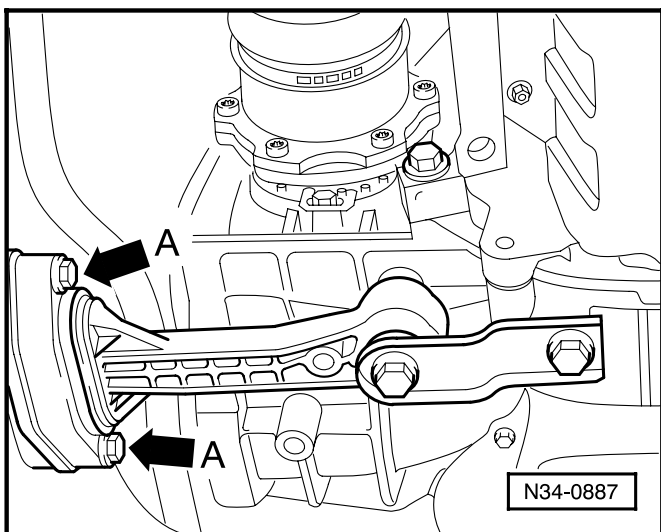
- ◀ - Unbolt propshaft with flexible joint from the flange of the bevel box (arrows).

- Push the front propshaft tube back slightly.

Note:

After slackening the bolts -A- (⇒ Fig. N34-0887, page 34-28) the engine/gearbox unit swings forward slightly. Ensure that the seal in the flange of the propshaft is not damaged when removing and installing.

- Remove right drive shaft.
⇒ Running Gear; Repair Group 40; Removing and installing drive shaft
- Lever out end cover in joint flange with a screwdriver.

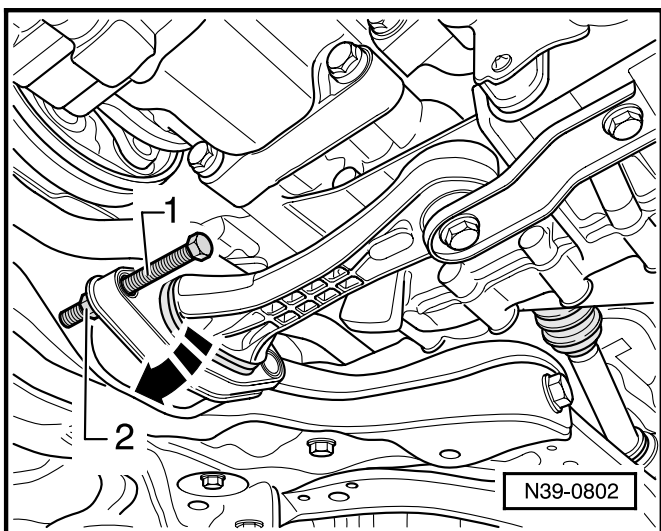


- Use 6 mm wrench socket, e.g. V.A.G 1669, to remove bolt attaching joint flange/output shaft.
- Separate exhaust system at double clamp.
⇒ Repair Group 26 of the particular engine

Note:

On models fitted with TDI engine, it is also necessary to remove the exhaust pipe bracket on the subframe.

- ◀ Take pendulum support off the subframe -arrows A-.

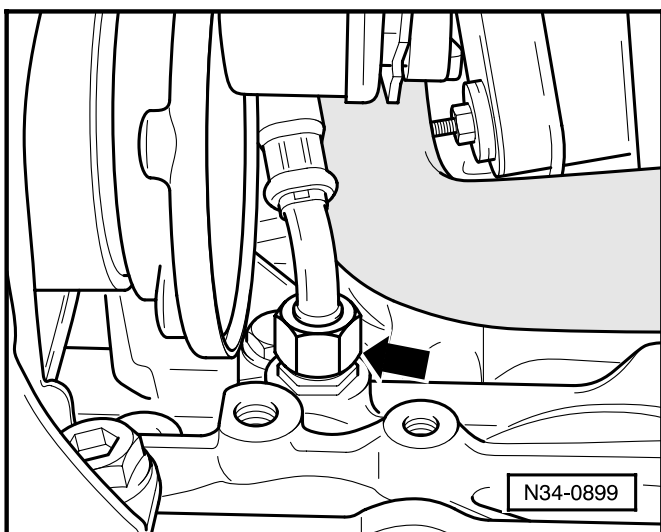


- ◀ Carefully push engine/gearbox forward and at the same time position pendulum support properly in front of the subframe -arrow-.
- Attach pendulum support to subframe with bolt -1- (M8x80 mm) and nut -2-.

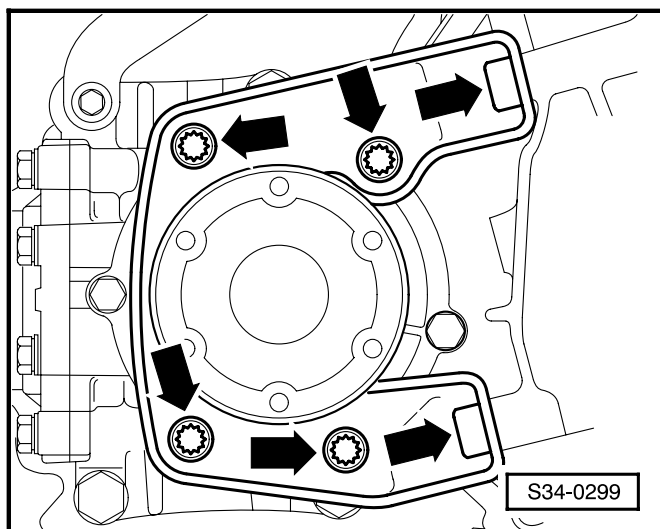
Note:

Rectify any paint damage as follows:

- Remove grease residues with Nitro thinner L001 600.
- Apply 2-component acrylic paint ALN 769 041 together with hardener ALZ 009 001.



- Place drip tray below.
- ◀ Unbolt oil return-flow line for turbocharger from engine -arrow-.
⇒ 1.9-ltr./66 kW (TDI) Engine, Mechanical Components; Repair Group 21; Charge air system for turbocharger



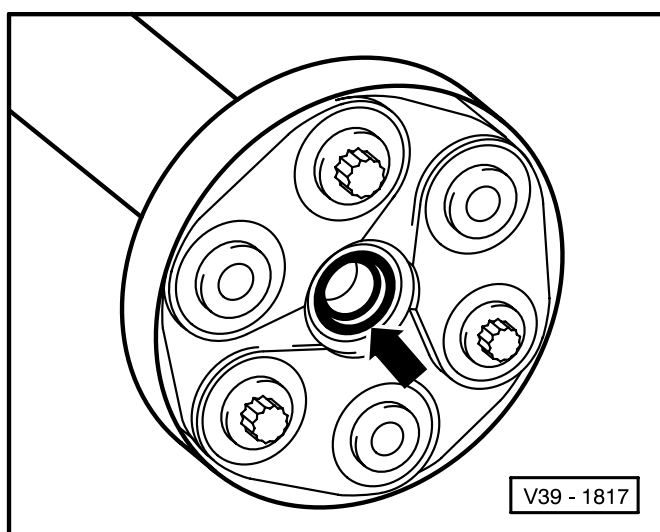
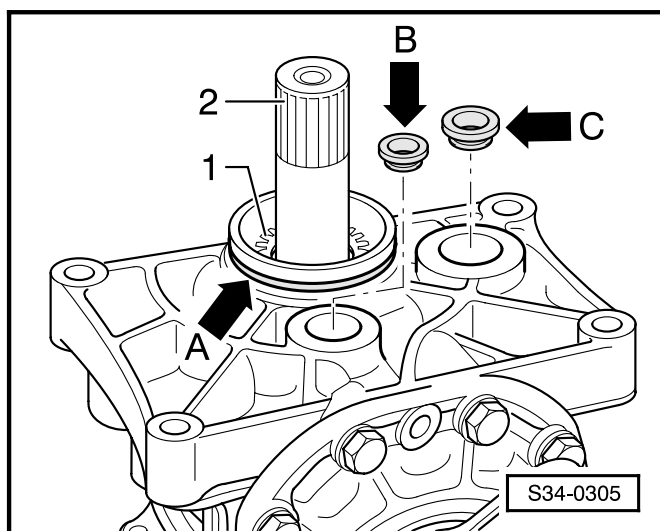
- ◀ - Unbolt gearbox support for bevel box from engine and bevel box -arrows-.
- Remove bolts connecting bevel box and gearbox.
- Press bevel box off the gearbox.
- Take out bevel box.

Installing

Installation is carried out in the reverse order; pay attention to the following points:

Notes:

- ◀ - Always replace the O-ring for sealing bevel box/gearbox -arrow A- and the seals for sealing the oil supply drillings -arrow B and C-; oil lightly.
- Push bevel box fully up against gearbox and fit together spline of input shaft/bevel box -1- with connecting sleeve of differential centrally.
- Likewise align spline of joint flange/output shaft -2- and differential bevel gear; rotate at joint flange, if necessary.
- If the teeth are correctly positioned and centred, the bevel box slips against the manual gearbox as far as the stop.
- Do not pull the bevel box against the gearbox with the securing bolts otherwise the bevel box may be twisted and the mounting eyes may shear off.



- ◀ ♦ Seals in the flanges of the propshaft must not be damaged when removing and installing. If the seals are damaged, the propshaft must be replaced.
- ♦ Push propshaft horizontally onto the guide journal.
- ♦ Replace gasket for drive shaft.
- ⇒ Running Gear; Repair Group 40; Servicing drive shaft

- ◆ *Fit front exhaust pipe onto catalytic converter.*
⇒ Repair Group 26 of the particular engine
- ◆ *Inspect gear oil in manual gearbox with bevel box* ⇒ page 34-31.

Installing gearbox support of bevel box/engine free of stress

◀ Pay attention to the following sequence of operations when installing the gearbox support:

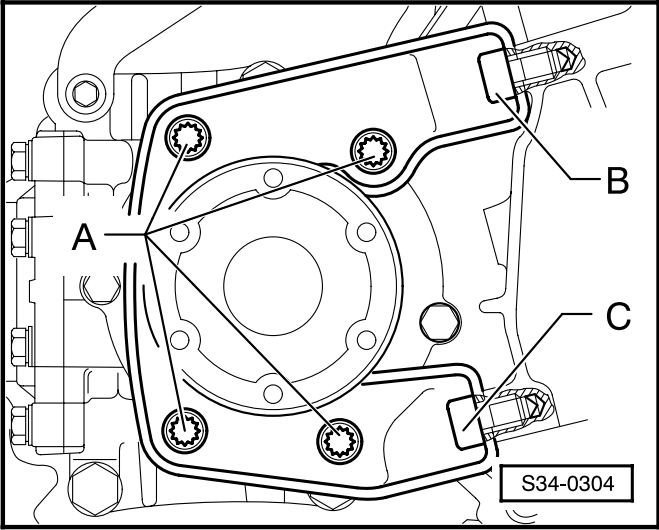
- Screw in all the bolts by hand.
- Tighten bolts -B- and -C- initially to 10 Nm.
- Tighten bolts -A- fully to 25 Nm.
- Tighten bolts -B- and -C- to 40 Nm.

Tightening torques

Drive shaft to flange shaft
⇒ Running Gear; Repair Group 40

Components	Tightening torques
Bevel box to gearbox ¹⁾	40 Nm + 45°
Flexible joint to bevel box	60 Nm
Pendulum support to subframe ¹⁾ M8	20 Nm + 90°
Flange shaft to gearbox (conical bolt)	25 Nm

1) Always replace these bolts.



Inspecting gear oil in manual gearbox with bevel box

Note:

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

Gear oil specification ⇒ page 00-2

- ◀ - Remove plug of oil inspecting hole -arrow-.

The oil is at the correct level if the gearbox is filled up to the lower edge of the oil filler hole.

- Insert oil inspection plug -arrow-.

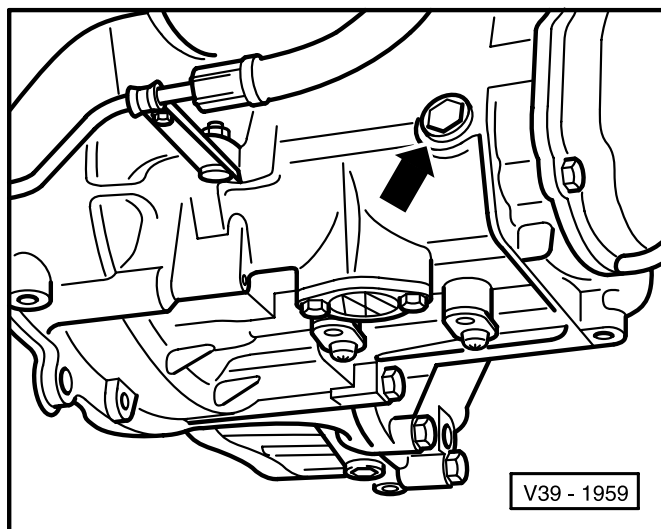
If re-filling, pay attention to the following points:

- Unscrew plug -arrow-.
- Pour in gear oil up to lower edge of filler hole.
- Screw in plug -arrow-.
- Start engine, engage gear and allow gearbox to rotate for about 2 minutes.
- Switch off engine and unscrew plug -arrow-.
- Once again, pour in gear oil up to lower edge of filler hole.
- Screw in plug -arrow-.

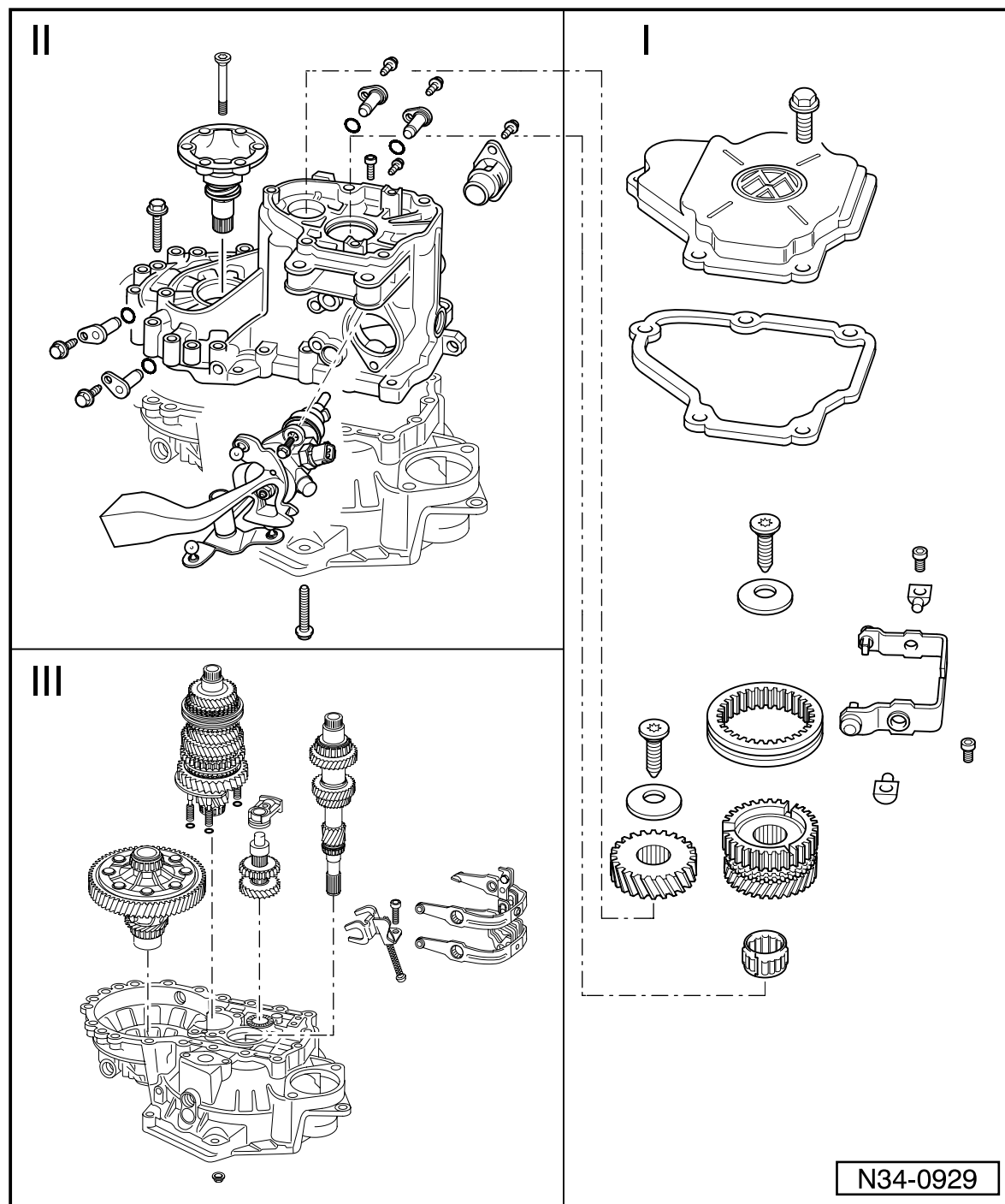
Tightening torque:

Plug for oil filler hole

25 Nm



Disassembling and assembling gearbox



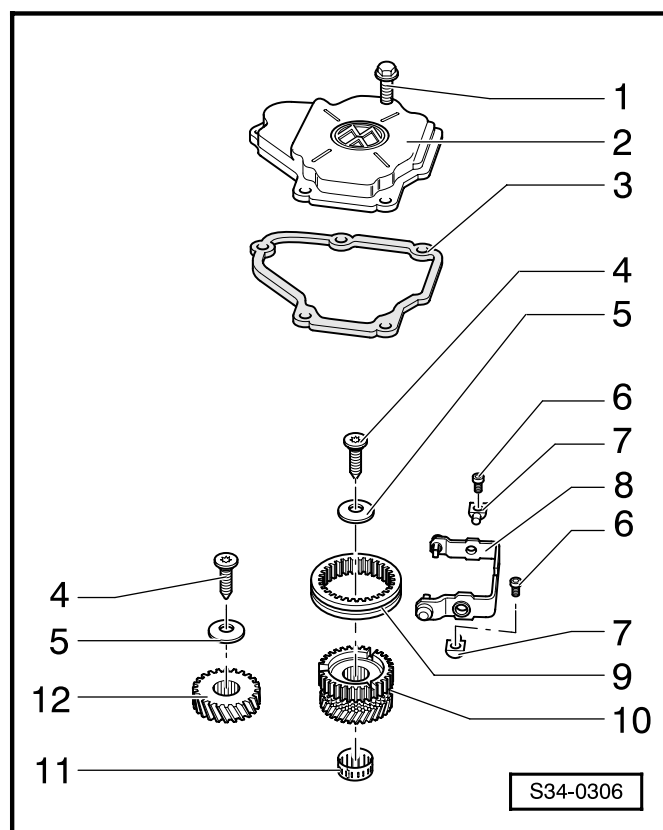
Assembly sequence ⇒ page 34-37

I - Removing and installing cover for gearbox housing and 5th speed ⇒ page 34-33

II - Removing and installing gearbox housing and shift mechanism ⇒ page 34-34

III - Removing and installing input shaft, output shaft, differential and shift forks ⇒ page 34-35

I - Removing and installing cover for gearbox housing and 5th speed



1 - 14 Nm

- ◆ For cover at gearbox housing

2 - Cover for gearbox housing

Note:

If the cover for the gearbox housing is installed when the gearbox is in place, top up gear oil and check oil level ⇒ page 34-31.

3 - Gasket

4 - Torx socket bolt, 80 Nm

- ◆ Holds dished washer in position together with fit piece at bolt head

5 - Dished washer

- ◆ Installing ⇒ page 34-47

6 - Machine bolt, 25 Nm

- ◆ For bearing journal at gearbox housing

7 - Bearing journal

8 - Shift fork of 5th gear

- ◆ Disassembling and assembling
- ⇒ 5-Speed Manual Gearbox 02J; Repair Group 34; Disassembling and assembling shift forks
- ◆ Setting ⇒ page 34-47

9 - Sliding sleeve of 5th gear

- ◆ Fitting location ⇒ page 34-46
- ◆ Setting ⇒ page 34-47

10 - Synchronizer body with shift gear and synchronizer ring for 5th speed

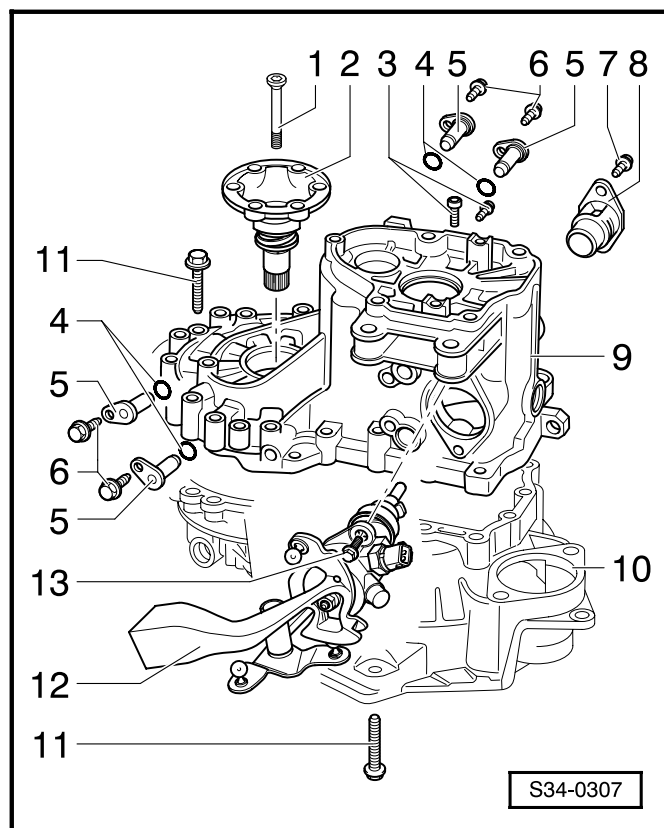
- ◆ Disassembling and assembling
- ⇒ 5-Speed Manual Gearbox 02J; Repair Group 35; Disassembling and assembling input shaft

11 - Needle bearing

12 - Gear for 5th speed

- ◆ Fitting location ⇒ page 34-45

II - Removing and installing gearbox housing and shift mechanism



Special tools, testers and aids required

- ◆ Sealant AMV188 200 03

1 - Conical bolt, 25 Nm

2 - Flange shaft with compression spring

- ◆ Removing and installing
⇒ page 39-1
- ◆ Fitting together parts ⇒ page 39-7, as
of item 2

3 - Torx socket bolt, 30 Nm

- ◆ For reverse idler shaft support
- ◆ Self-locking
- ◆ Always replace

4 - O-ring

- ◆ Always replace

5 - Bearing journal

6 - 22 Nm

7 - 22 Nm

8 - End cover

9 - Gearbox housing

- ◆ Servicing ⇒ page 34-49

10 - Clutch housing

- ◆ Servicing ⇒ page 34-49

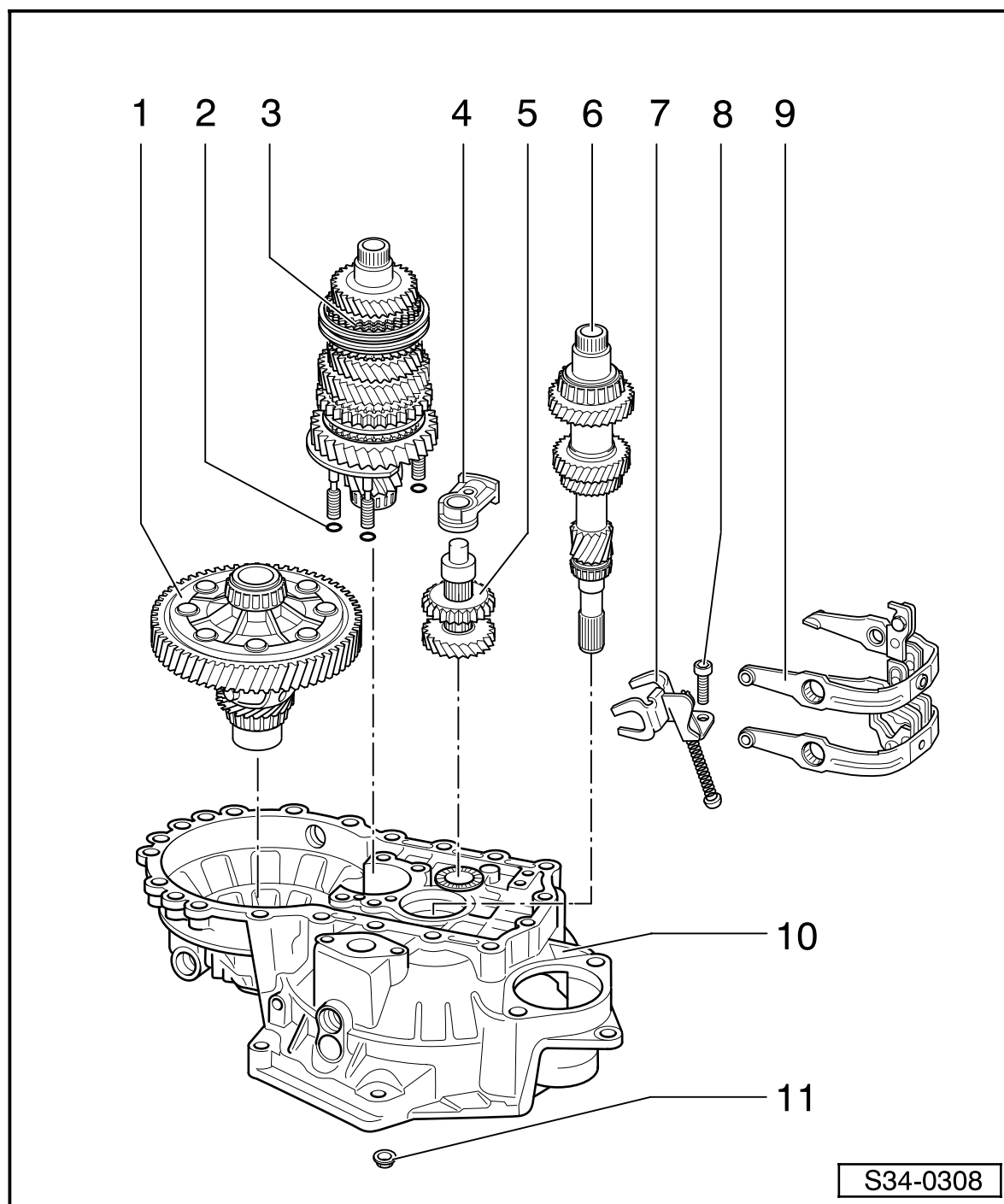
11 - 25 Nm and torque a further 90°

12 - Shift mechanism

- ◆ Disassembling and assembling
⇒ page 34-53

13 - 22 Nm

III - Removing and installing input shaft, output shaft (drive pinion), differential and shift forks



1 - Differential

- ◆ Disassembling and assembling
⇒ page 39-6

2 - Seal

- ◆ 4 in total
- ◆ Always replace

3 - Output shaft

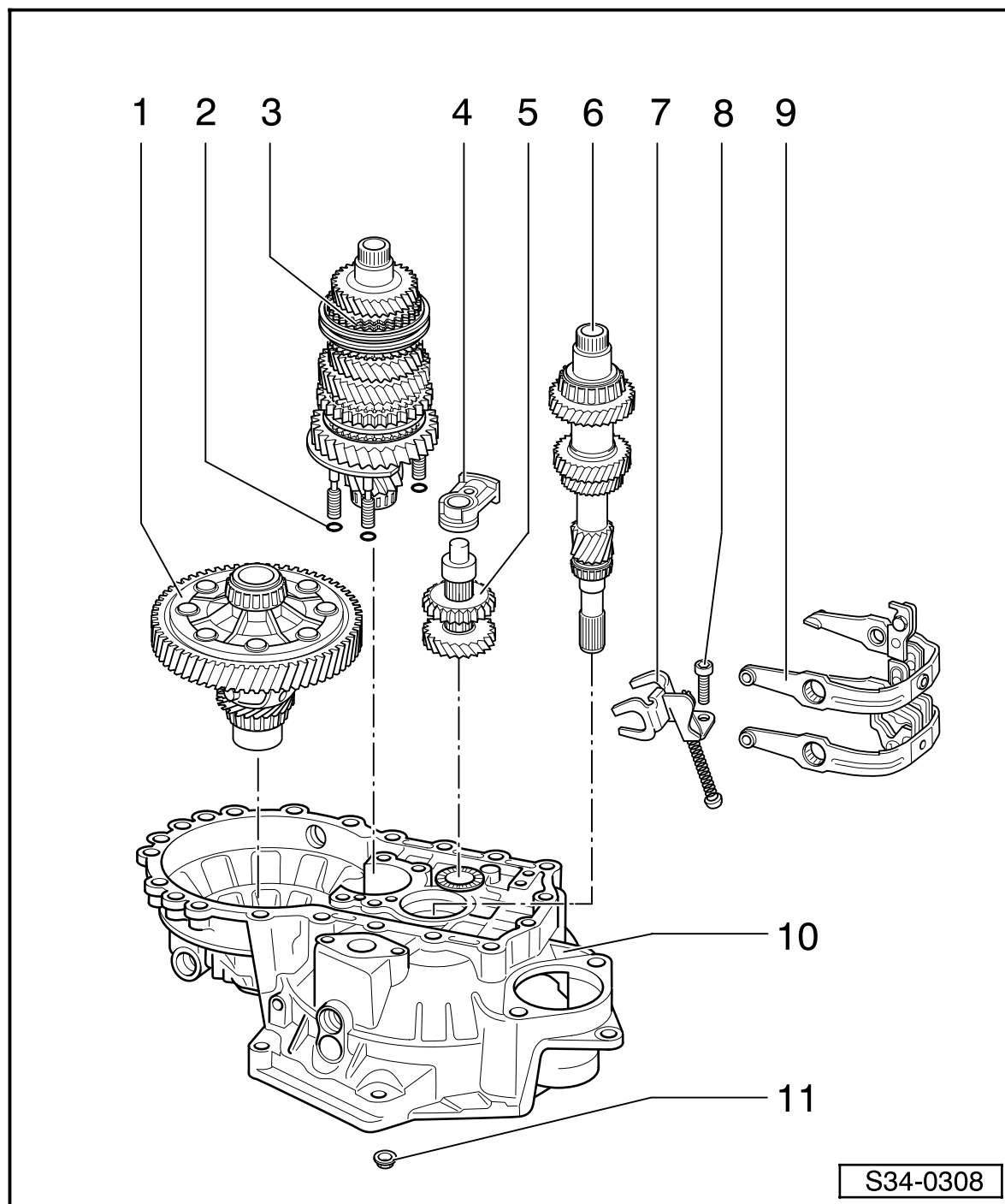
- ◆ Disassembling and assembling
⇒ page 35-2

4 - Support for reverse idler shaft

- ◆ Disassembling and assembling
⇒ 5-Speed Manual Gearbox 02J; Repair Group 35; Disassembling and assembling reverse idler shaft

5 - Reverse idler shaft

- ◆ Disassembling and assembling
⇒ 5-Speed Manual Gearbox 02J; Repair Group 35; Disassembling and assembling reverse idler shaft



S34-0308

6 - Input shaft

- ◆ Disassembling and assembling
⇒ page 35-1

7 - Reverse gear shift fork

- ◆ Disassembling and assembling
⇒ 5-Speed Manual Gearbox 02J; Repair Group 34; Disassembling and assembling shift forks
- ◆ Fitting location ⇒ page 34-43

8 - Torx socket bolt, 25 Nm**9 - Shift mechanism**

- ◆ (Shift forks)
- ◆ Disassembling and assembling
⇒ 5-Speed Manual Gearbox 02J; Repair Group 34; Disassembling and assembling shift forks

10 - Clutch housing

- ◆ Servicing ⇒ page 34-49

11 - 25 Nm and torque a further 90°

- ◆ 4 nuts for bearing mount

Sequence of operations

Removing and installing gearbox housing cover, gearbox housing, shift mechanism, input shaft, output shaft (drive pinion), differential and shift forks

Special tools, testers and aids required

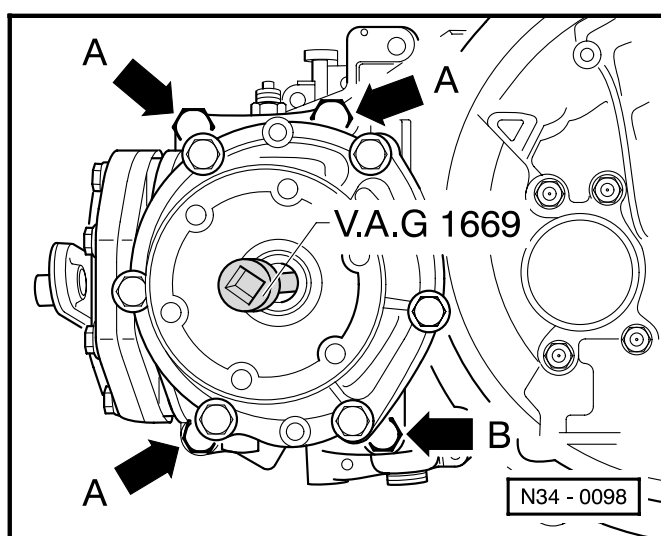
- ◆ Gearbox holder MP 3-501
- ◆ Two-legged puller Kukko 20/10
- ◆ Extraction hook Matra V/170
- ◆ Driver MP 1-304
- ◆ Insertion sleeve MP 3-402
- ◆ Repair stand MP 9-101
- ◆ (Hot air blower, e.g. V.A.G 1416)
- ◆ Wrench socket size 6 mm, at least 190 mm long, e.g. V.A.G 1669
- ◆ Stud bolt M 8 x 100
- ◆ Feeler gauge
- ◆ Sealant AMV 188 200 03

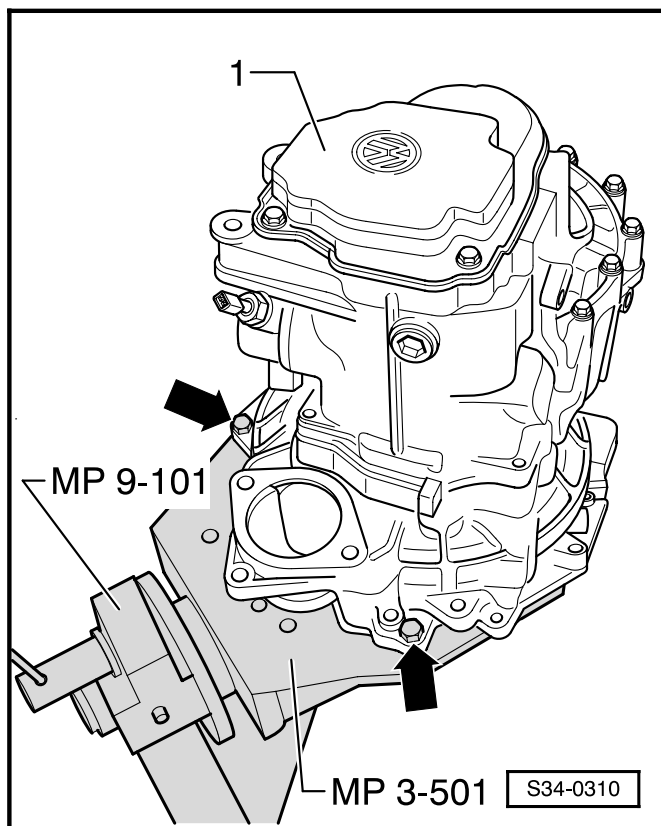
Removing

- Drain gear oil.

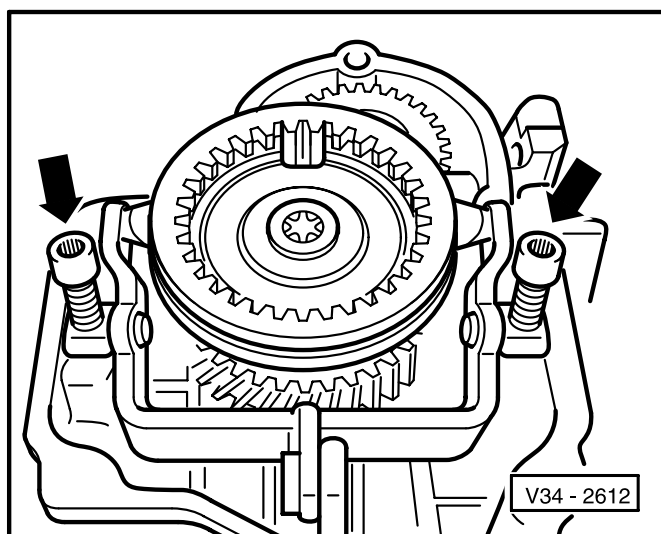
Detach bevel box as follows:

- Lever out end cap by inserting a screwdriver in the middle of the cap.
- Use wrench socket 6 mm, e.g. V.A.G 1669 to remove tapered bolt for joint flange; secure with drift to prevent it turning.
- Remove bolts attaching bevel box/manual gearbox -arrows A and B-
- Press bevel box off gearbox.





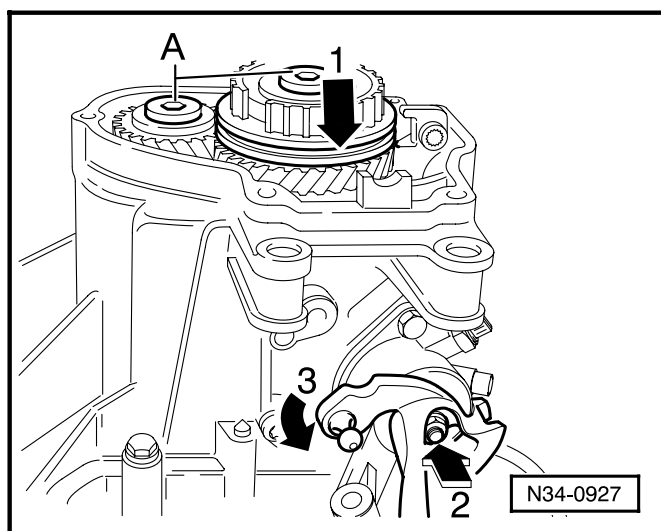
- ◀ - Attach gearbox to repair stand (arrows).
- Remove clutch release lever, release bearing and guide sleeve.
- ⇒ 5-Speed Manual Gearbox 02J; Repair Group 30; Servicing clutch release mechanism
- Unbolt cover -1- for gearbox housing.



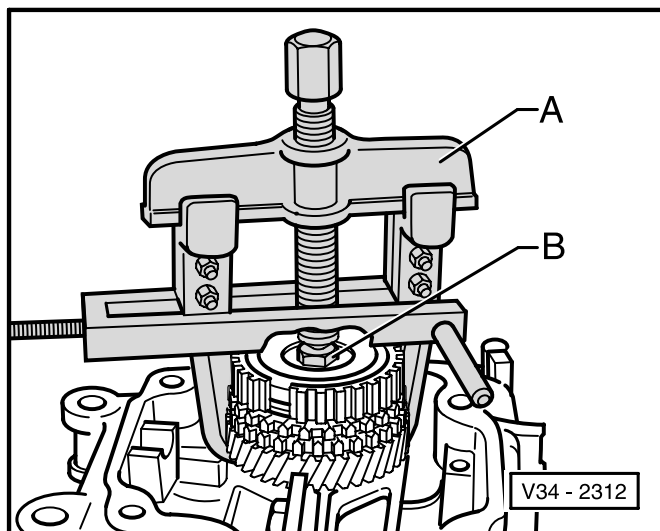
- ◀ - Detach shift fork of 5th gear -arrow-.

Note:

Take off spring and locking pieces before pulling up sliding sleeve. Then, fit sliding sleeve without shift fork onto the synchronizer body again.



- ◀ - Unscrew bolts -A- for synchronizer body and 5th speed gear; engage 1st gear -arrows 2 and 3- and 5th gear -arrow 1- for this step.
- Input and output shaft are blocked after engaging both gears. Synchronizer body and gear cannot be rotated. Both bolts can now be slackened.



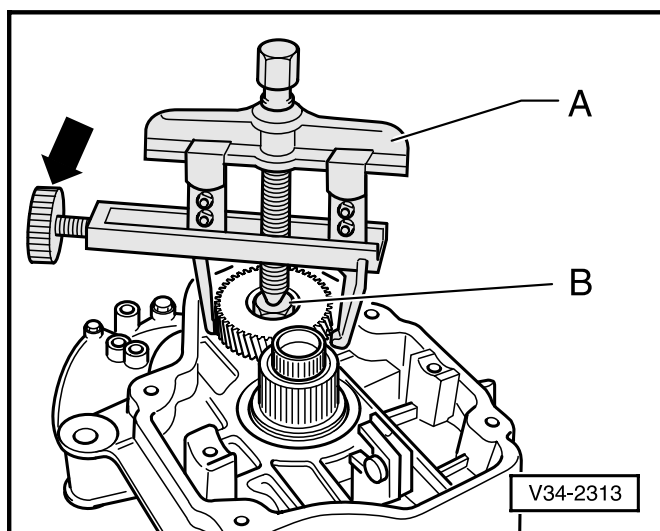
- Take off sliding sleeve of 5th gear.
- ◀ - Pull off synchronizer body and selector gear for 5th speed and take off together with needle bearing.

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

B - M10 x 20 hexagon bolt

Note:

When pulling off the gear, it is important to ensure that the hooks do not bend out; retighten bolt (arrow) if necessary. Inspect 5th gear for damage after pulling operation.



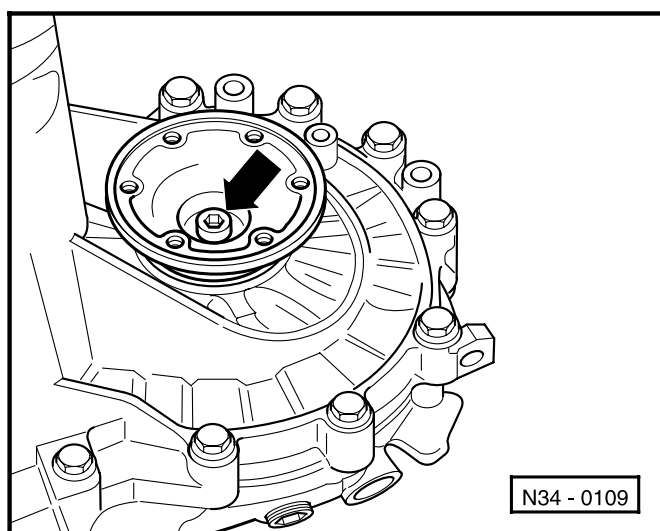
- ◀ - Pull off 5th speed gear.

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

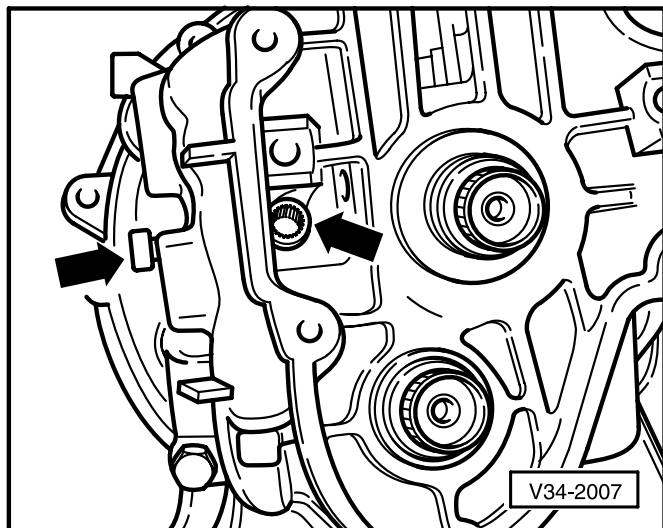
B - M10 x 20 hexagon bolt

Sequence of operations:

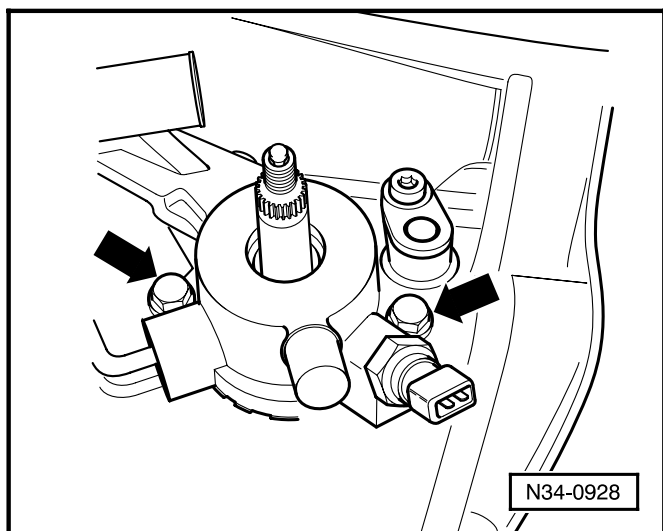
Fit on two-legged puller and centre by turning the screw (arrow). Heat gear with hot air blower (e.g. V.A.G 1416) and pull off with two-legged puller.



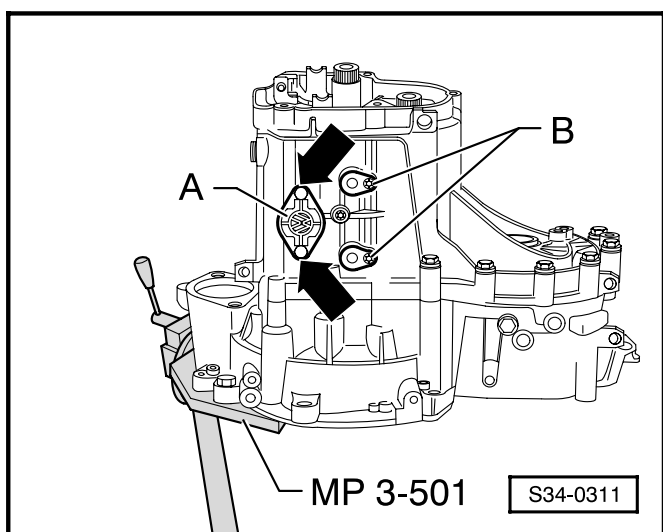
- ◀ - Remove left flange shaft; secure with drift to prevent it turning for this step and unscrew conical bolt (arrow).



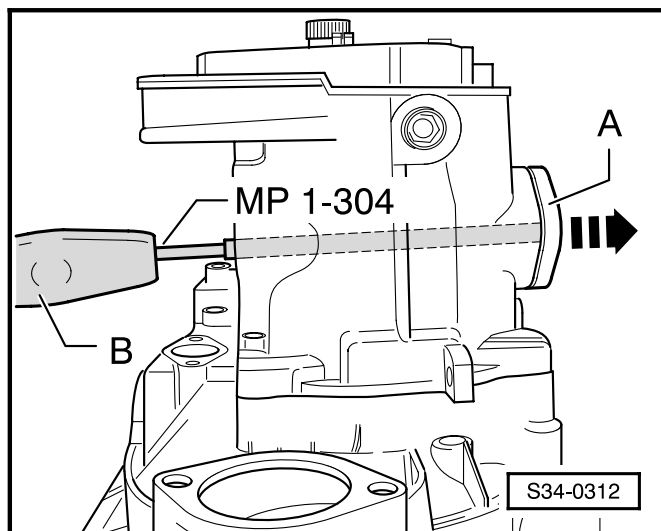
- ◀ - Unscrew both bolts (arrows) for reverse idler gear support.



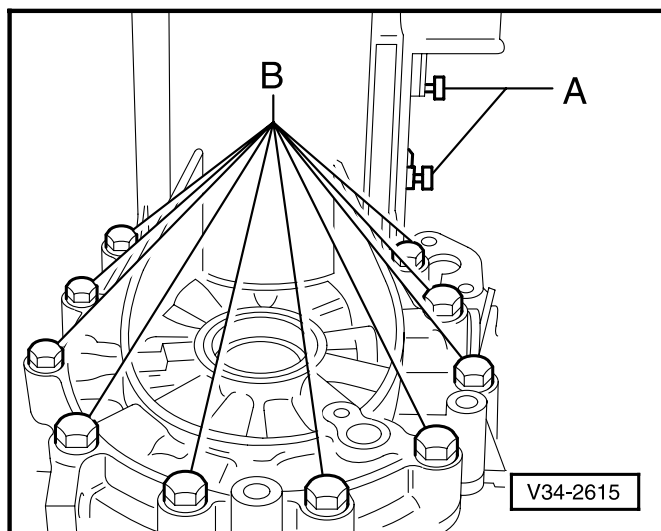
- ◀ - Remove shift shaft together with shift cover; move shift shaft into Neutral for this step. Then, unscrew bolts (arrows) and pull shift shaft out of the gearbox housing by levering off the shift cover.



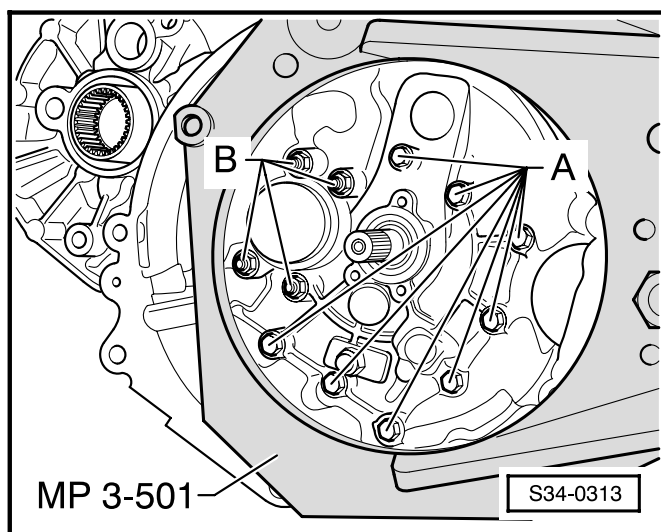
- ◀ - Remove bolts -arrows- of end cover -A- and bearing journal -B- on underside of gearbox.



- ◀ - Use driver MP 1-304 and hammer -B- to carefully knock out end cover -A-.



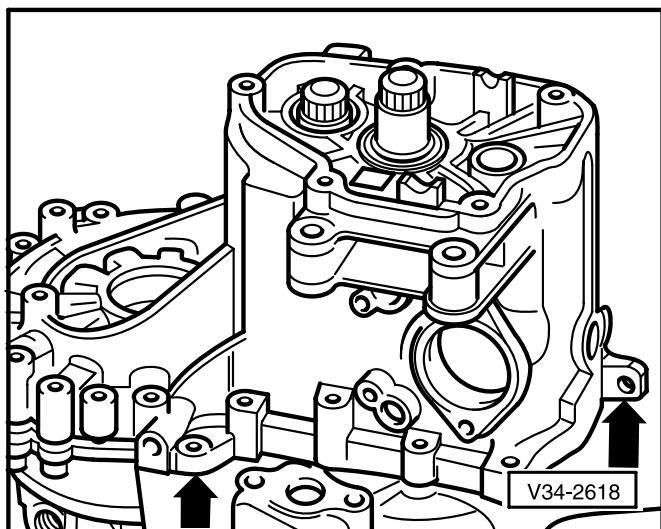
- ◀ - Take off bearing journal -A- on top of gearbox and bolts -B- attaching gearbox housing to clutch housing in the area of the differential.



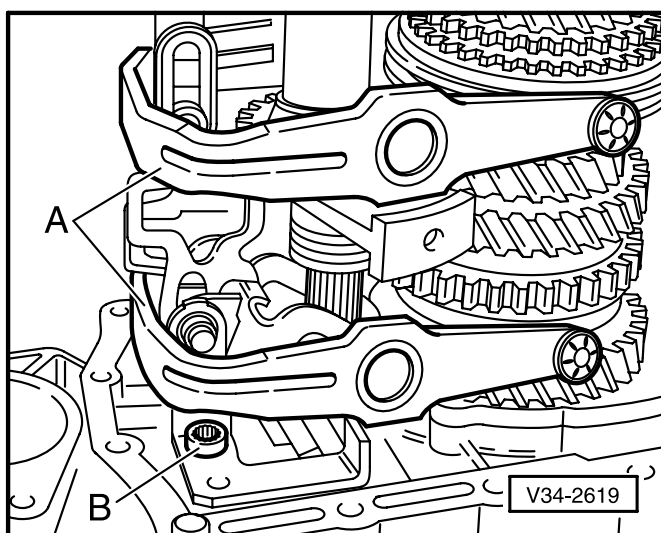
- ◀ - Unscrew bolts -A- which are used for attaching the gearbox housing, from the clutch housing.

Note:

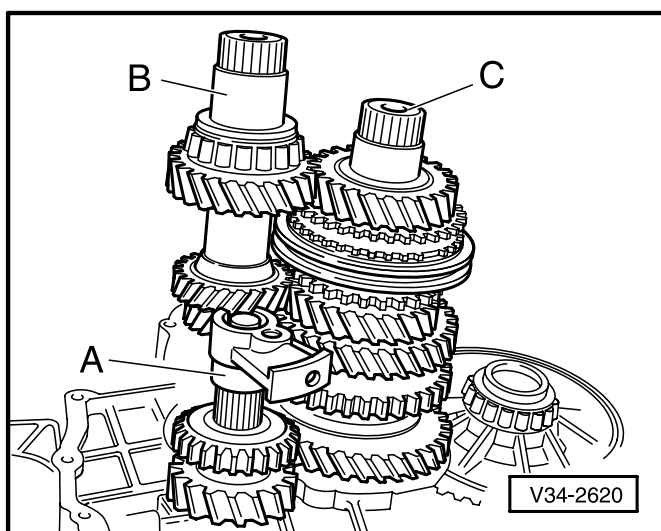
Do not unscrew nuts -B- for mounting of bearing of output shaft.



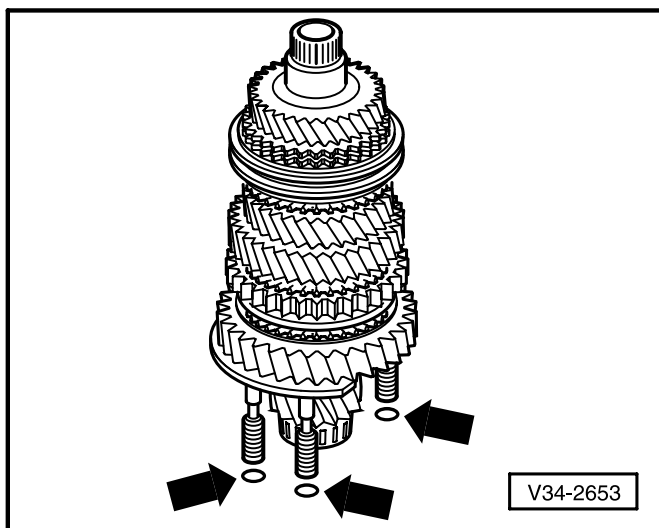
- ◀ - Lever off gearbox housing carefully at the shoulders which project all round -arrow-; do not damage sealing surfaces during this step.



- ◀ - Take off shift fork -A- together with shift rails.
- Unbolt shift mechanism/reverse gear -B-.



- Unscrew nuts for bearing mount of output shaft (item -B-, Fig. S34-0313 ⇒ page 34-41).
- ◀ - Take reverse gear -A-, input shaft -B- and output shaft -C- off the clutch housing one after the other.
- Remove differential.



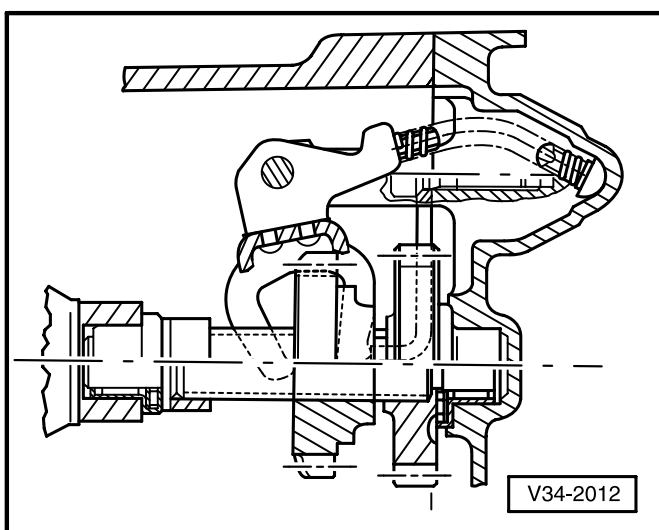
Installing

- Insert differential.
- ◀ - Always replace seals (arrows) for bearing mount of output shaft.

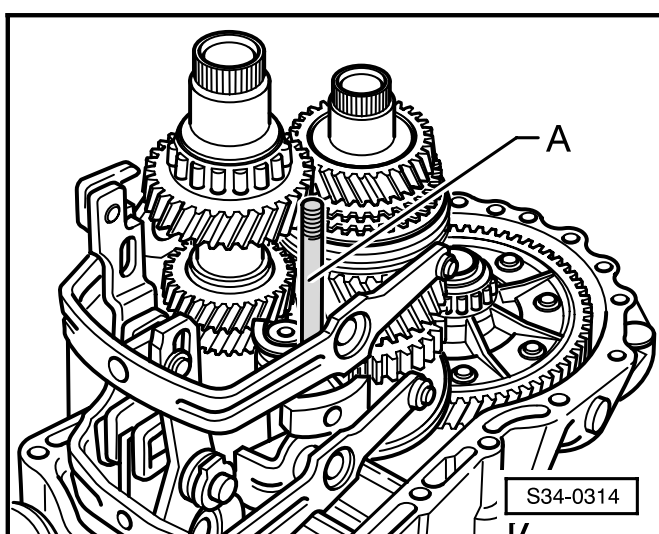
Note:

The illustration shows only 3 of the 4 seals.

- Insert input shaft, output shaft and reverse idler shaft together.
- Tighten nuts for bearing mount of output shaft.



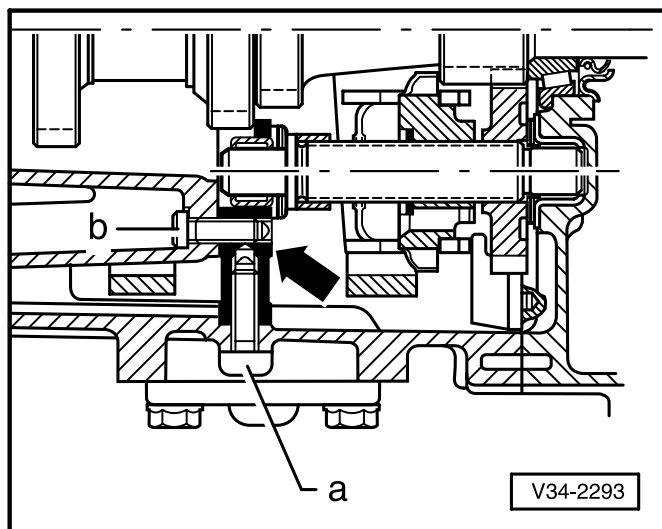
- Clean any locking fluid on the thread in the reverse idler shaft support (-arrow- Fig. V34-2293, page 34-44). A thread tap can be used for cleaning.
- Fit on support of reverse idler gear shaft.
- Install shift mechanism/reverse gear.
- ◀ Installation position of reverse gear.
- Install shift forks together with shift rails.



- ◀ - Screw M 8 x 100 mm stud bolt -A- into the reverse idler gear shaft support so that it is aligned after fitting on the gearbox housing.
- Align shift rails.

Note:

The shift segments must be located in the slots of the sliding sleeves.



- Apply an even coat of sealant AMV 188 200 03 to the sealing surface.

- Fit on gearbox housing.

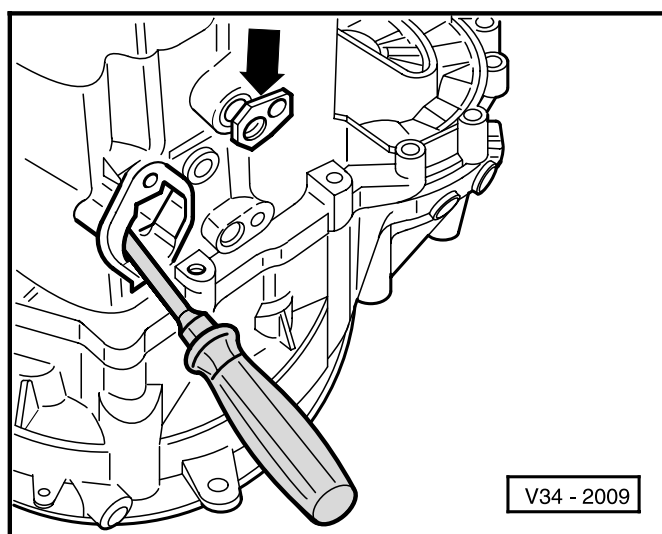
Install bolts for reverse idler gear shaft support (arrow) as follows:

- ◀ - Insert bolt -a-, unscrew stud bolt (⇒ page 34-43, Fig. S34-0314), install bolt -b- and tighten by hand.

Tightening order:

- 1 - Bolt -a- 30 Nm

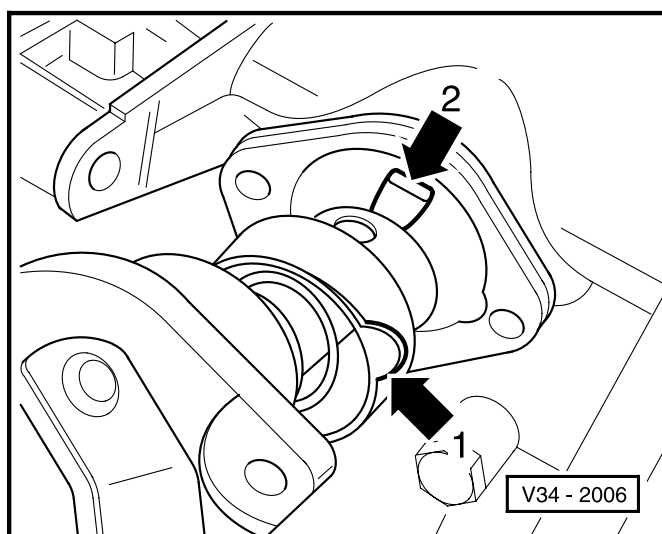
- 2 - Bolt -b- 30 Nm



- ◀ - Install bearing journal (arrow) for shift forks. Align shift mechanism with screwdriver for this step so that the relevant bearing journal can be installed.

- Apply an even coat of sealant AMV 188 200 03 to the sealing surface for the end cover.

- Install end cover for shift shaft.



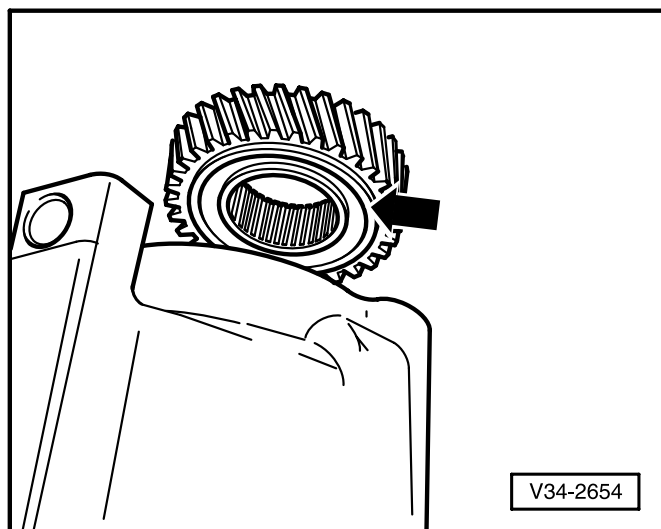
- ◀ Install shift shaft as follows:

- Move shift rails into Neutral position.

- Position lug (arrow 1) into the recess of the gearbox housing. Position shift shaft so that the shift finger (arrow 2) is inserted into the shift rails.

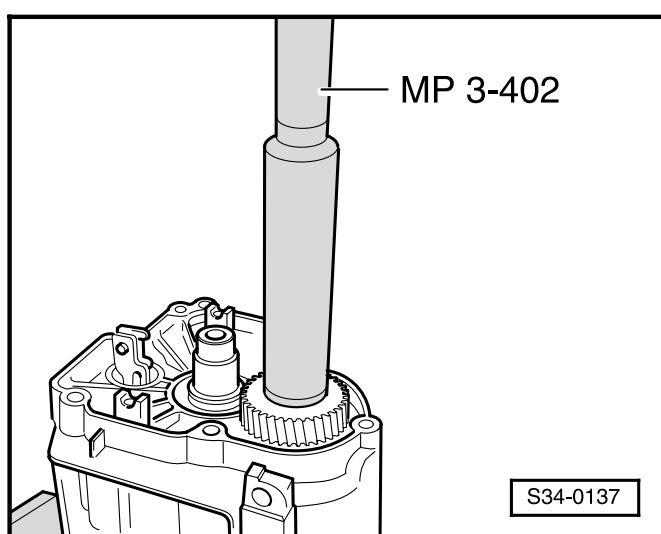
- Apply an even coat of sealant AMV 188 200 03 to the sealing surface for the shift cover.

- Install shift cover for shift shaft.

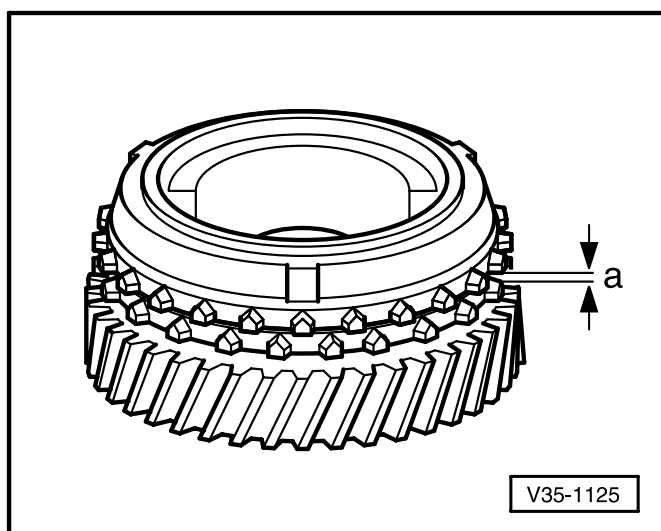


◀ Fitting location of 5th speed gear

The groove all round (arrow) points toward the gearbox housing.



◀ - Knocking on 5th speed gear.

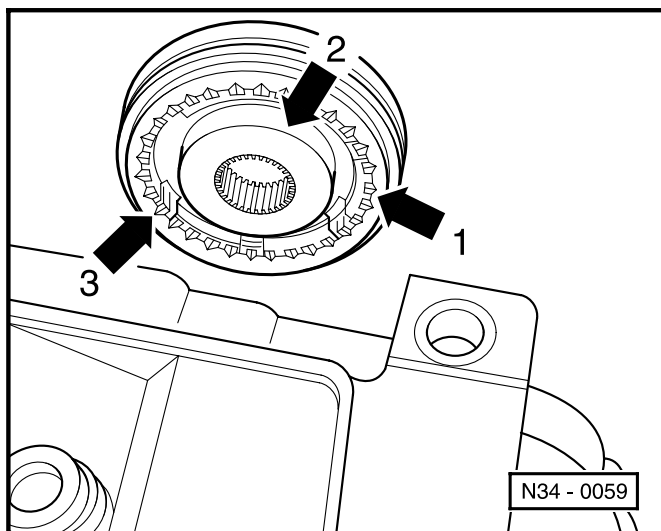


Inspecting 5th speed synchronizer ring

- ◀ - Before re-installing selector gear and synchronizer ring of 5th speed, press synchronizer ring onto the taper of the selector gear and measure size of gap -a- with a feeler gauge.

	Installed dimension	Wear limit
Size of gap -a-	1.1 ... 1.7 mm	0.5 mm

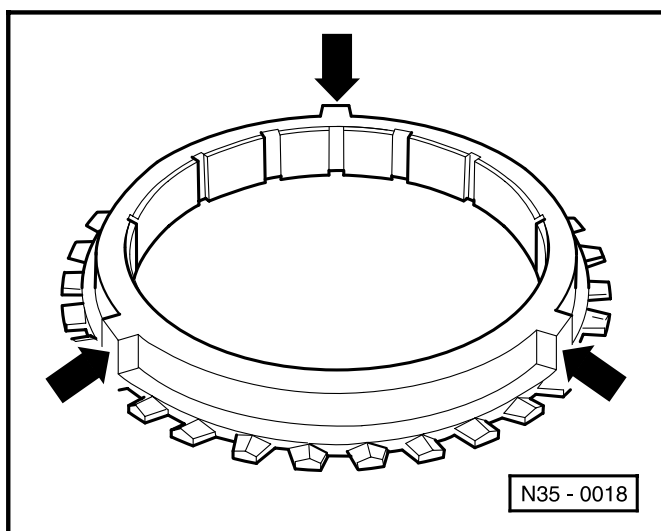
- Fit on 5th speed selector gear with needle bearing.
- Fit 5th speed synchronizer ring onto the selector gear.
- Assemble 5th speed synchronizer body/sliding sleeve before installing ⇒ page 35-1.



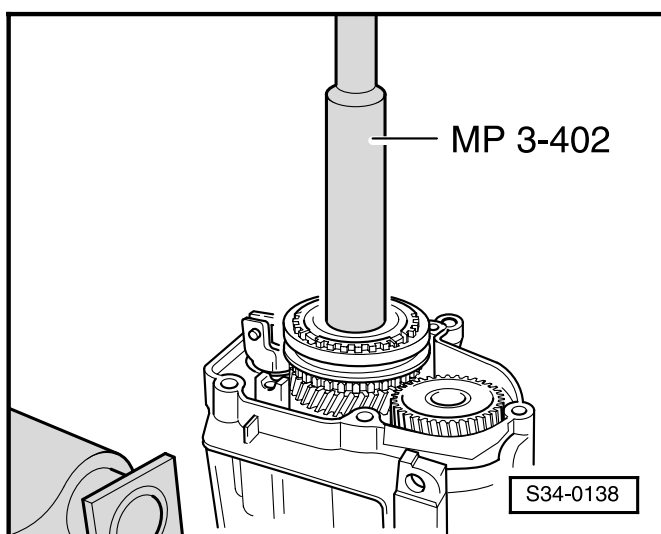
◀ **Fitting location of 5th speed synchronizer body/sliding sleeve**

The pointed teeth of the sliding sleeve (arrow 1) and the high shoulder of the synchronizer body (arrow 2) point toward the gearbox housing.

The mounts (arrow 3) of the synchronizer body are aligned with the cast locking pieces of the synchronizer ring (arrows in Fig. N35-0018 ⇒ page 34-46).



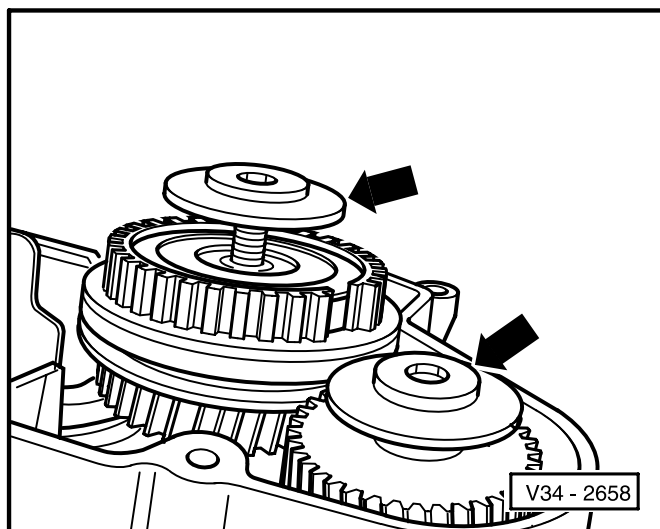
◀ **5th speed synchronizer ring with cast locking pieces (arrows).**



Note:

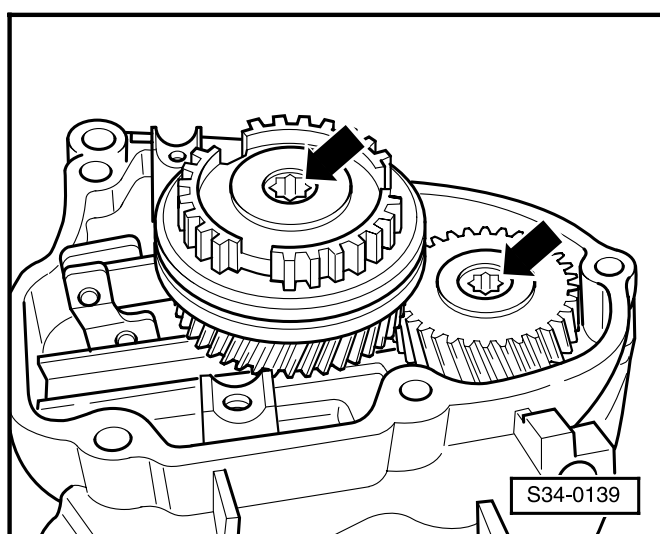
When knocking on, ensure unrestricted movement of synchronizer ring.

◀ - Knock on 5th speed synchronizer body/sliding sleeve.



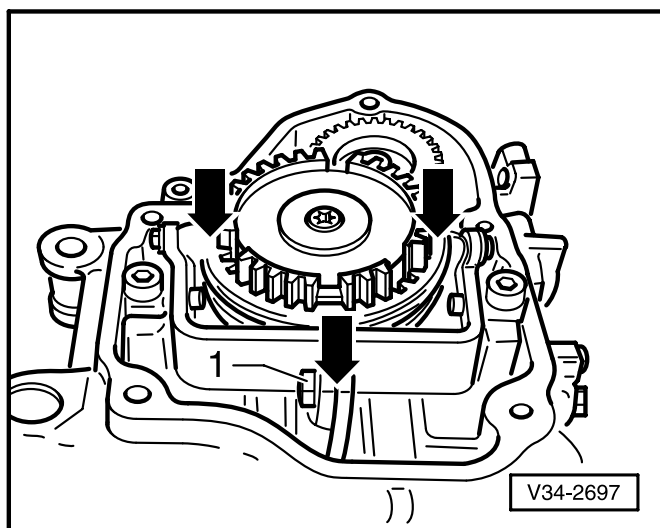
◀ Fitting location of dished washers for securing bolts

The outer diameter (concave side -arrows-) points toward 5th gear.



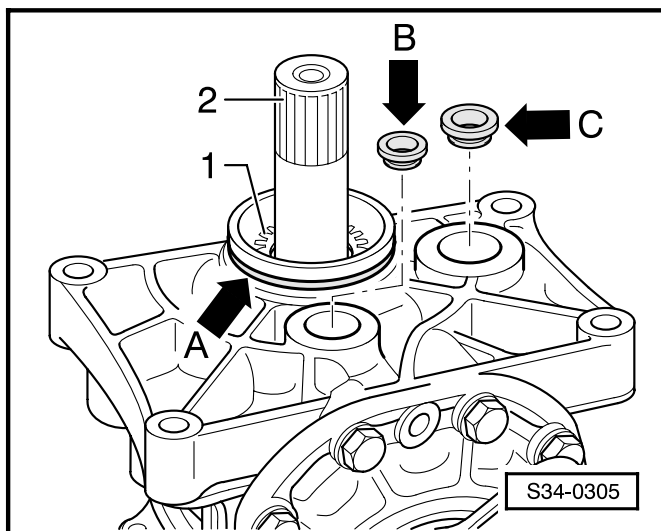
- ◀ - Engage 2 gears before tightening the bolts attaching 5th gear synchroniser body and sliding gear (arrows) ⇒ page 34-38, Fig. N34-0927.
- Install 5th gear shift fork.

Setting of 5th gear



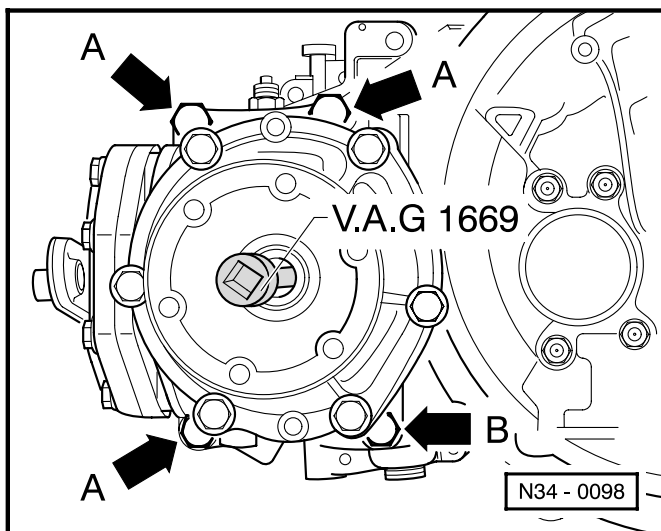
- ◀ - Engage 5th gear and slacken bolt -1-.
- Push sliding sleeve and shift jaw in direction of arrow; when doing this, ensure the segment of the shift jaw is centred in the slot of the sliding sleeve, and then tighten bolt -1- to 25 Nm.
- Inspection measurement:
It must not be possible to insert a 0.2 mm feeler gauge between sliding sleeve and sliding gear. Repeat setting, if necessary.
- Take out 5th gear. Sliding sleeve must now be in Neutral position. Synchroniser ring must move freely.
- Install cover for gearbox housing.
- Install complete flange shafts ⇒ page 39-7.

- Install guide sleeve for release bearing.
- ⇒ 5-Speed Manual Gearbox 02J; Repair Group 30; Servicing clutch release mechanism
- Install clutch release lever and release bearing.
- ⇒ 5-Speed Manual Gearbox 02J; Repair Group 30; Servicing clutch release mechanism

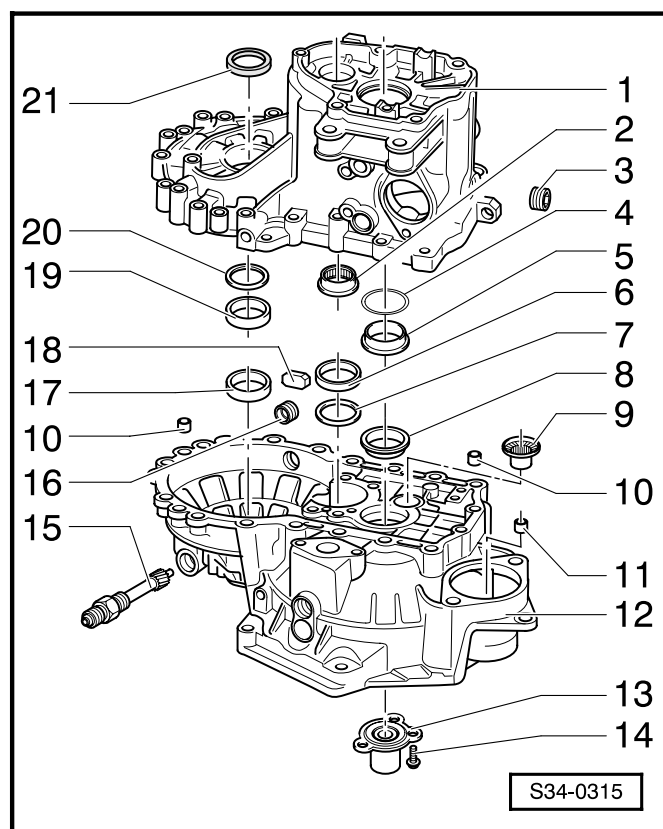


Attaching bevel box:

- ◀ Always replace the O-ring for sealing bevel box to gearbox -arrow A- and the seals for sealing off the oil supply drillings -arrow B and C-; oil lightly.
- Move complete bevel box up against gearbox; mesh splines of bevel box input shaft -1- with connecting sleeve of differential centred.
- Also align the splines of joint flange with output shaft -2- and differential bevel gear; rotate joint flange if necessary.
- If the teeth are correctly positioned and centred, the bevel box slips up against the gearbox as far as the stop.
- Do not pull bevel box against the gearbox with the securing bolts otherwise the bevel box may be twisted and the securing eyes may shear off.
- ◀ Tighten the bolts connecting bevel box and gearbox -arrows A and B-.
- Use 6 mm wrench socket, e.g. V.A.G 1669, to tighten conical bolt for output shaft joint flange; secure with drift to prevent it turning.
- Press in new end cap.



Servicing gearbox housing and clutch housing



Special tools, testers and aids required

- ◆ Sealant AMV188 200 03
- ◆ Drift MP 3-403
- ◆ Additional piece MP 3-403/1
- ◆ Thrust piece MP 3-411
- ◆ Pipe section MP 3-450
- ◆ Thrust washer MP 3-455
- ◆ Thrust washer MP 3-460
- ◆ Pipe section MP 3-486/3
- ◆ Thrust piece MP 6-420
- ◆ Internal extractor Kukko 21/1
- ◆ Countersupport Kukko 22/2

1 - Gearbox housing

- ◆ If replaced: set input shaft and differential
- ⇒ 5-Speed Manual Gearbox 02J; Repair Group 35; Setting input shaft and Repair Group 39; Setting differential

2 - Needle bearing

- ◆ For output shaft
- ◆ Removing ⇒ Fig. 1
- ◆ Installing and securing ⇒ Fig. 2

3 - Oil filler plug, 25 Nm

- ◆ Without magnet

4 - Shim

- ◆ For input shaft
- ◆ Setting
- ⇒ 5-Speed Manual Gearbox 02J; Repair Group 39; Disassembling and assembling differential; Setting overview

5 - Outer race of taper roller bearing

- ◆ For input shaft
- ◆ Removing and installing
- ⇒ 5-Speed Manual Gearbox 02J; Repair Group 35; Disassembling and assembling input shaft
- ◆ If replaced: set input shaft
- ⇒ 5-Speed Manual Gearbox 02J; Repair Group 35; Setting input shaft

6 - Outer race of taper roller bearing

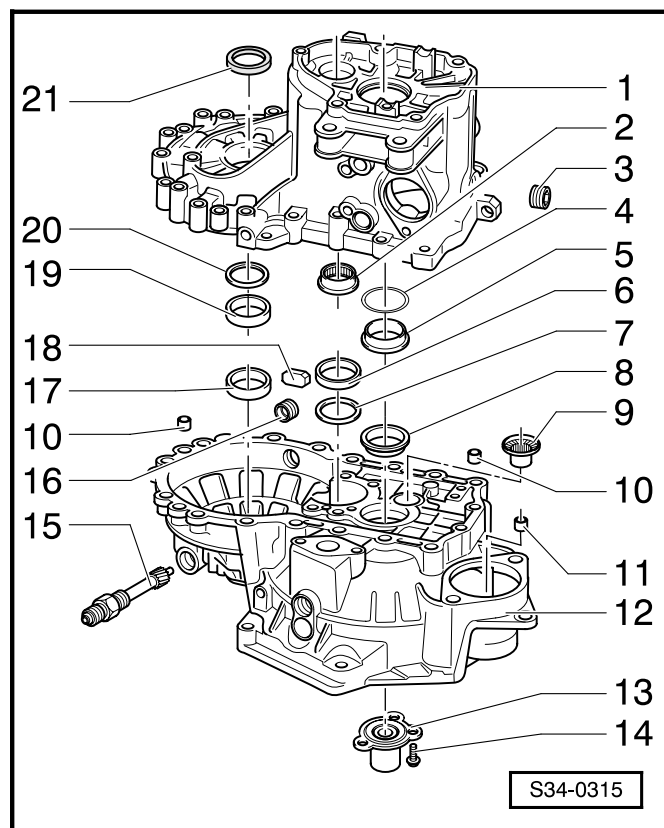
- ◆ For output shaft
- ◆ Removing and installing
- ⇒ 5-Speed Manual Gearbox 02J; Repair Group 35; Disassembling and assembling output shaft
- ◆ If replaced: set output shaft
- ⇒ 5-Speed Manual Gearbox 02J; Repair Group 35; Setting output shaft

7 - Shim

- ◆ For output shaft
- ◆ Setting
- ⇒ 5-Speed Manual Gearbox 02J; Repair Group 39; Disassembling and assembling differential; Setting overview

8 - Outer race of taper roller bearing

- ◆ For input shaft
- ◆ Removing and installing
- ⇒ 5-Speed Manual Gearbox 02J; Repair Group 35; Disassembling and assembling input shaft
- ◆ If replaced: set input shaft
- ⇒ 5-Speed Manual Gearbox 02J; Repair Group 35; Setting input shaft

**9 - Needle sleeve**

- ◆ Removing and installing
- ⇒ 5-Speed Manual Gearbox 02J;
Repair Group 35; Disassembling and assembling reverse idler shaft

10 - Dowel sleeve

- ◆ 2 in total

11 - Bush for starter

- ◆ Removing ⇒ Fig. 5
- ◆ Inserting ⇒ Fig. 6
- ◆ Can be replaced with gearbox installed

12 - Clutch housing

- ◆ If replaced ⇒ List of settings
- ⇒ 5-Speed Manual Gearbox 02J;
Repair Group 39; Disassembling and assembling differential

13 - Guide sleeve with O-ring

- ◆ O-ring attached to guide sleeve. If damaged, replace guide sleeve
- ◆ With seal
- ◆ Knocking out seal ⇒ Fig. 3
- ◆ Knocking in seal ⇒ Fig. 4
- ◆ Remove guide sleeve in order to replace seal

14 - 20 Nm**15 - Speedometer drive, 30 Nm****16 - Oil drain plug, 25 Nm**

- ◆ Without magnet

17 - Taper roller bearing outer race

- ◆ For differential
- ◆ Removing and installing ⇒ from page 39-6
- ◆ If replaced: set differential
- ⇒ 5-Speed Manual Gearbox 02J;
Repair Group 39; Setting differential

18 - Magnet

- ◆ Is held by contact surface of housing

19 - Taper roller bearing outer race

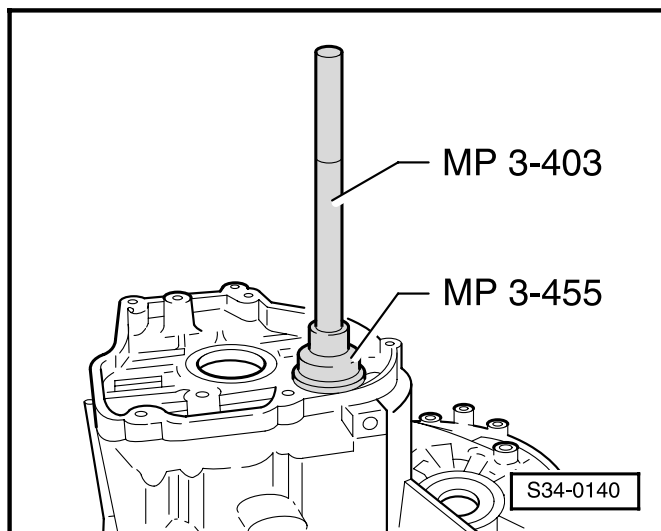
- ◆ For differential
- ◆ Removing and installing ⇒ page 39-6
- ◆ If replaced: set differential
- ⇒ 5-Speed Manual Gearbox 02J;
Repair Group 39; Setting differential

20 - Shim

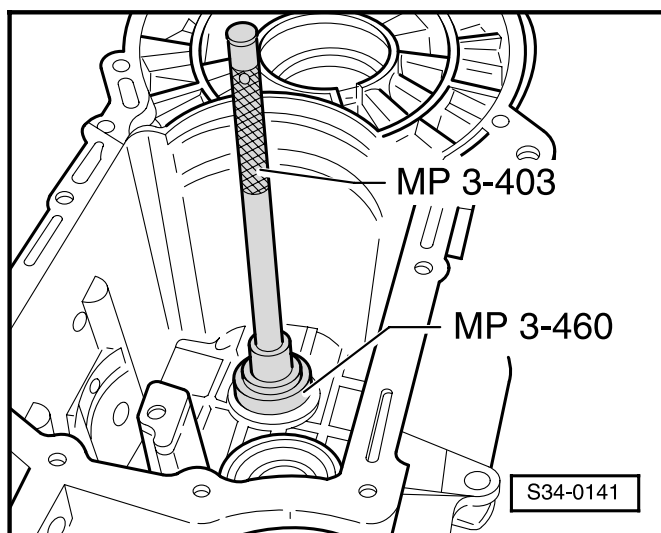
- ◆ For differential
- ⇒ 5-Speed Manual Gearbox 02J;
Repair Group 39; Disassembling and assembling differential

21 - Seal

- ◆ For left flange shaft
- ◆ Replacing ⇒ page 39-1

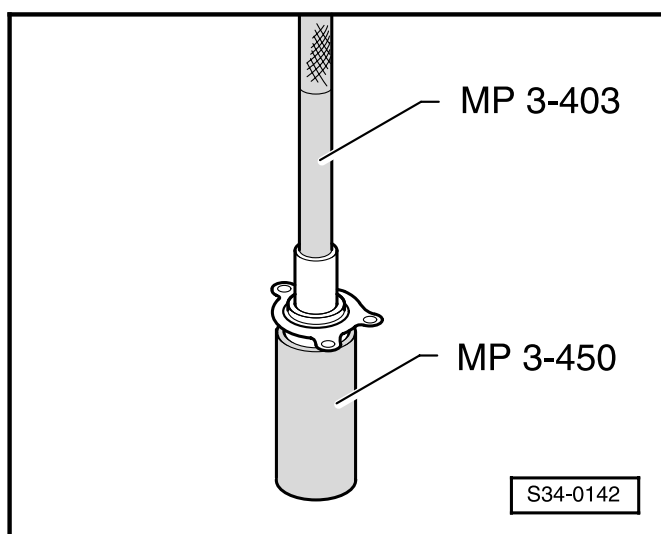


◀ Fig. 1 Knocking out needle bearing.

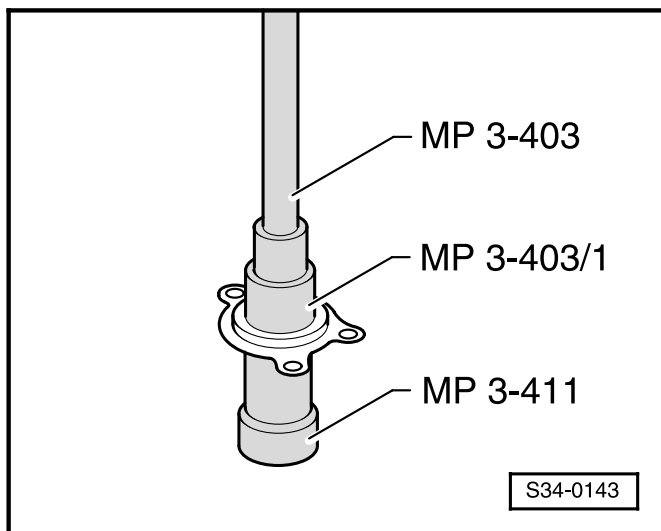


◀ Fig. 2 Inserting needle bearing as far as the stop.

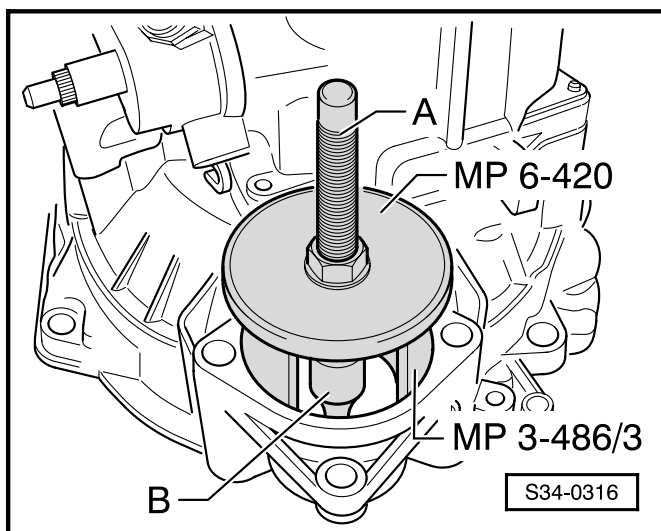
- Secure needle bearing in gearbox housing with drift, at three points offset 120°.



◀ Fig. 3 Knocking seal out of guide sleeve.



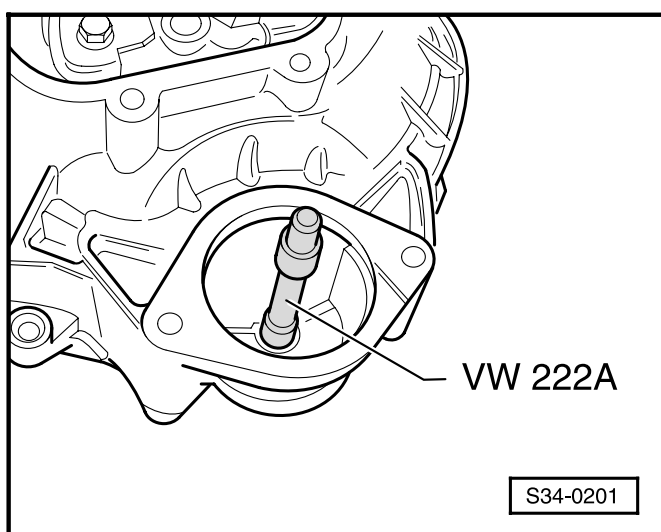
◀ Fig. 4 Inserting seal into guide sleeve as far as the stop.



◀ Fig. 5 Removing bush for starter.

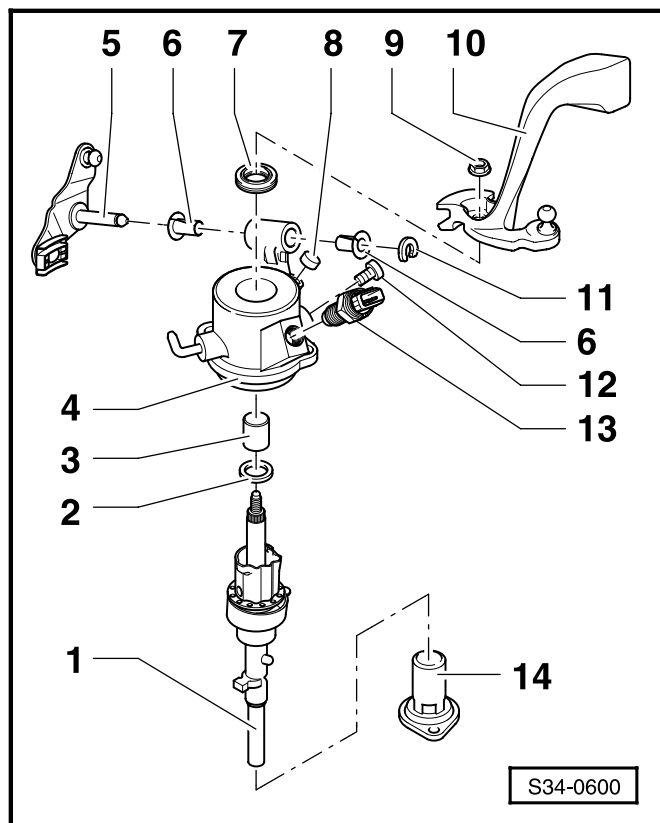
A - Spindle from countersupport Kukko 22/1

B - Internal extractor 12...14.5 mm,
e.g. Kukko 21/1



◀ Fig. 6 Inserting bush for starter.

Disassembling and assembling shift mechanism



Special tools, testers and aids required

- ◆ Tube section MP 3-479
- ◆ Thrust washer MP 3-456
- ◆ Guide piece MP 3-454
- ◆ Thrust plate MP 3-406
- ◆ Thrust plunger MP 3-448
- ◆ Internal extractor Kukko 21/3
- ◆ MoS₂ grease

1 - Shift shaft

- ◆ Pay attention to correct assignment
⇒ Parts List

2 - Stop ring

3 - Spherical sleeve

- ◆ Removing ⇒ Fig. 1
- ◆ Inserting ⇒ Fig. 2

4 - Shift cover

- ◆ With lock for shift shaft
- ◆ Pay attention to correct assignment
⇒ Parts List

5 - Relay lever

- ◆ Fitting location ⇒ page 34-9

6 - Bearing bush

7 - Seal

- ◆ Use screwdriver to lever out
- ◆ Installing ⇒ Fig. 3

8 - Cap

- ◆ For gearbox breather

9 - 20 Nm

10 - Gearbox shift lever

- ◆ Insert so that the interrupted tooth spacing matches the shift shaft
- ◆ Can be replaced with shift mechanism installed
- ◆ Fitting location ⇒ page 34-9

11 - Circlip

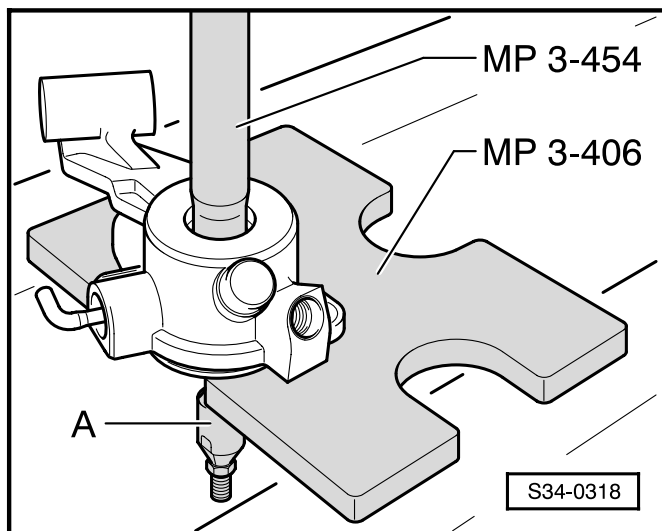
12 - 15 Nm

- ◆ Lock shift shaft

13 - Reversing light switch, 20 Nm

- ◆ Lightly coat lug with MoS₂ grease

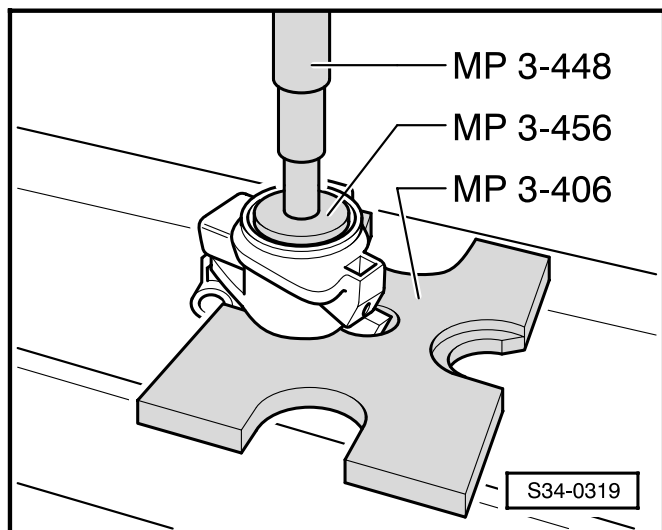
14 - Cap



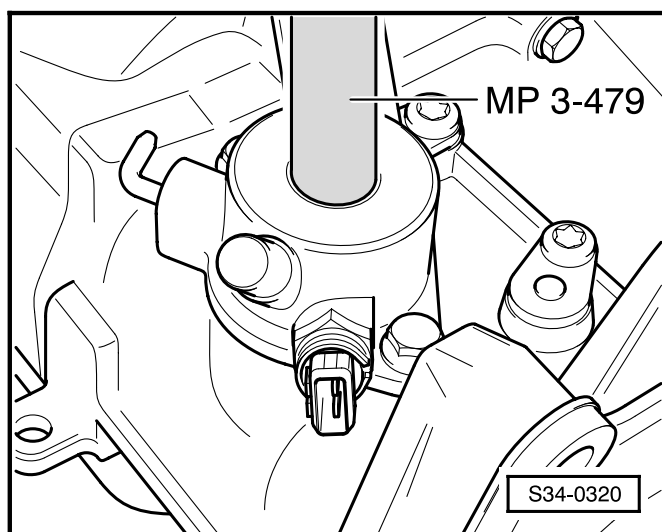
◀ Fig. 1 Removing spherical sleeve from shift cover

- Before pulling out the spherical sleeve, destroy plastic cage and take out balls.

A - Internal extractor, e.g. Kukko 21/3, 18.5 ... 23.5 mm

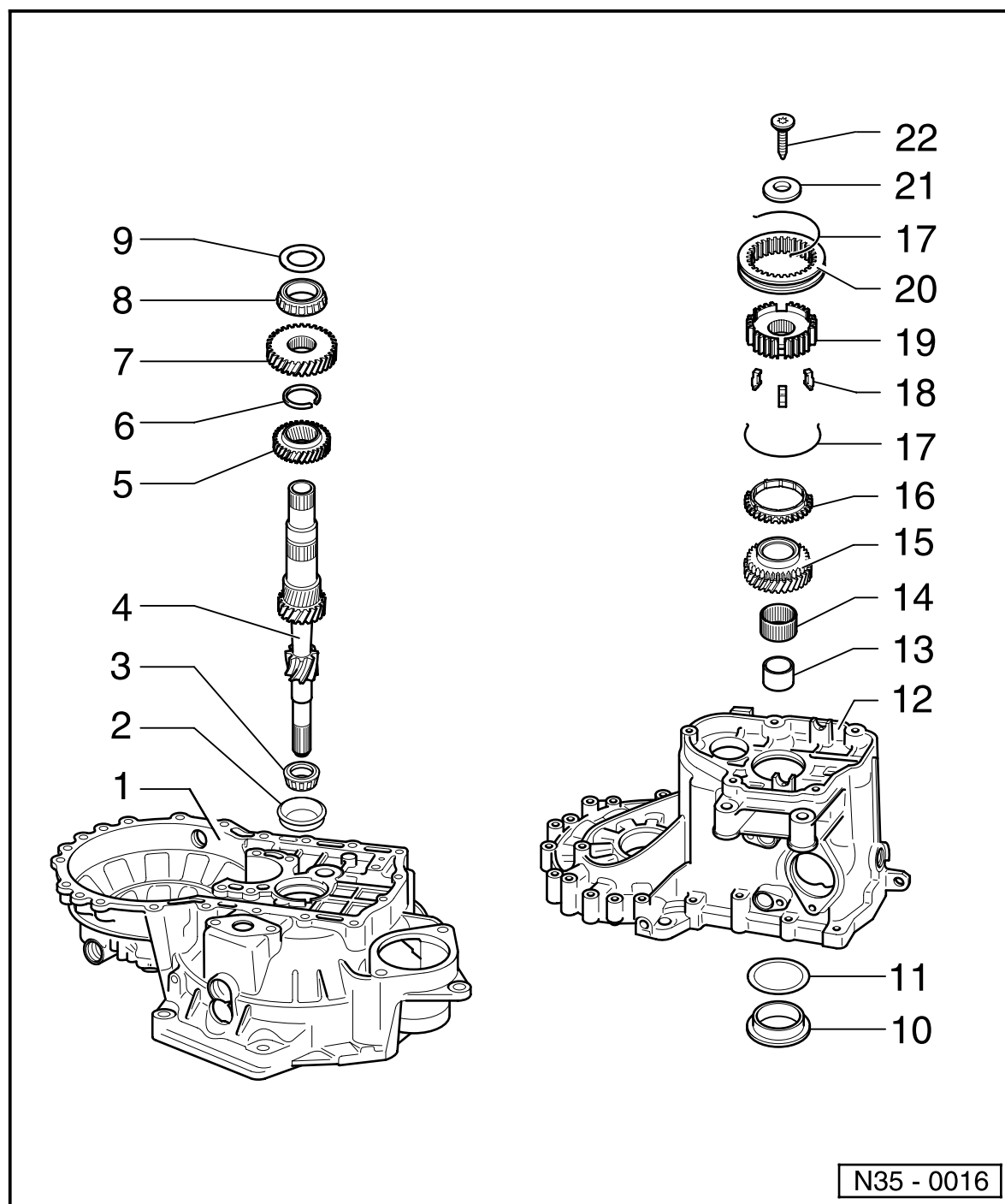


◀ Fig. 2 Inserting spherical sleeve into shift cover



◀ Fig. 3 Inserting seal as far as the stop

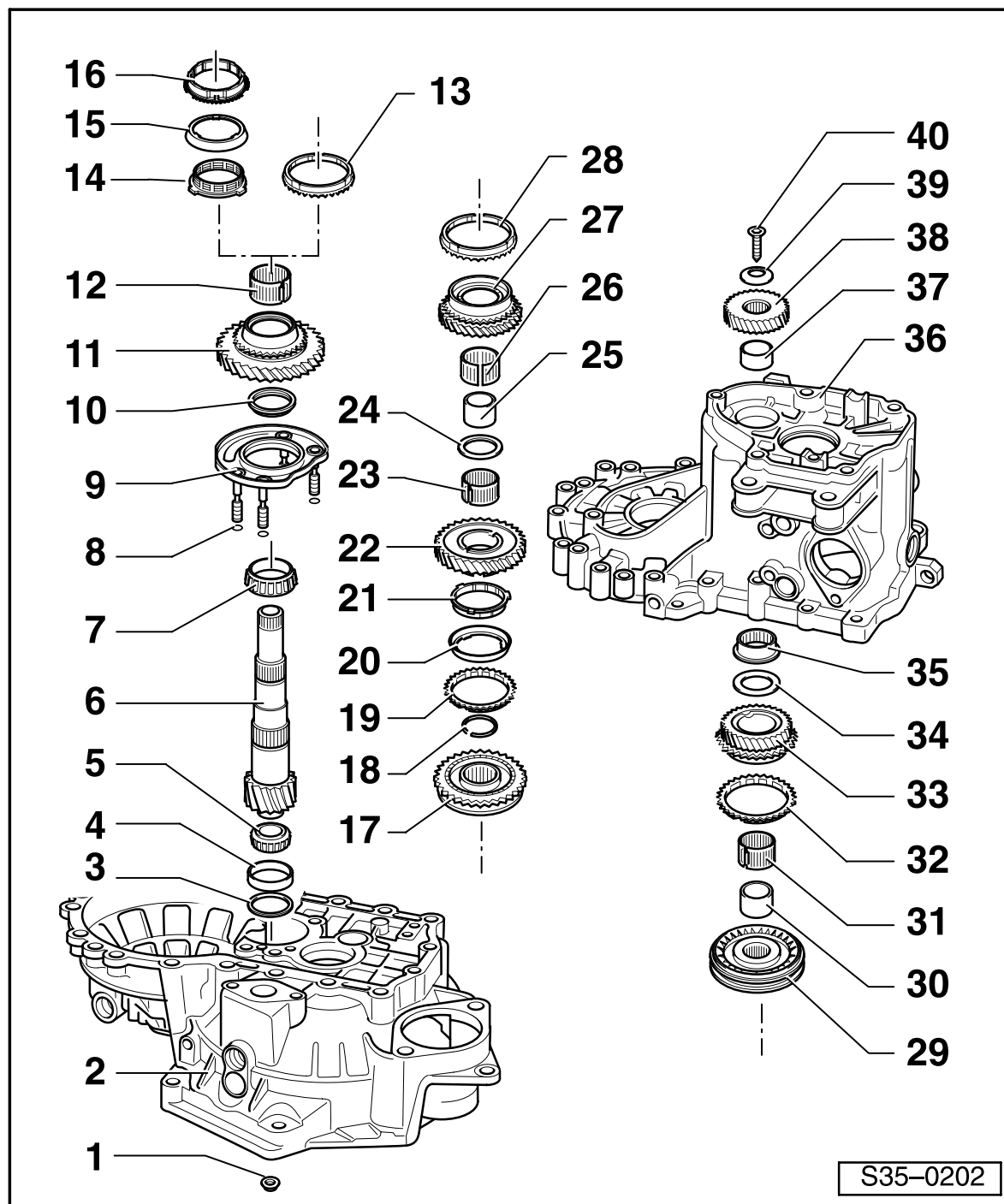
Disassembling and assembling input shaft



Notes:

- ♦ Pay attention to technical data when installing new gears ⇒ page 00-2.
- ♦ Disassembling and assembling input shaft:
⇒ 5-Speed Manual Gearbox 02J; Repair Group 35; Disassembling and assembling input shaft

Disassembling and assembling output shaft (drive pinion)



Notes:

- ♦ Pay attention to the technical data when installing new gears or a new output shaft ⇒ page 00-2.
- ♦ Removing and installing output shaft ⇒ page 34-37.
- ♦ Always replace both taper roller bearings.

- ♦ Disassembling and assembling output shaft:
⇒ 5-Speed Manual Gearbox 02J; Repair Group 35; Disassembling and assembling output shaft
- ♦ Gearboxes with modified 1st gear synchromesh have been manufactured since 08.00.

Replacing seals for flange shafts (gearbox installed)

- Pay attention to the general repair information ⇒ page 00-5.

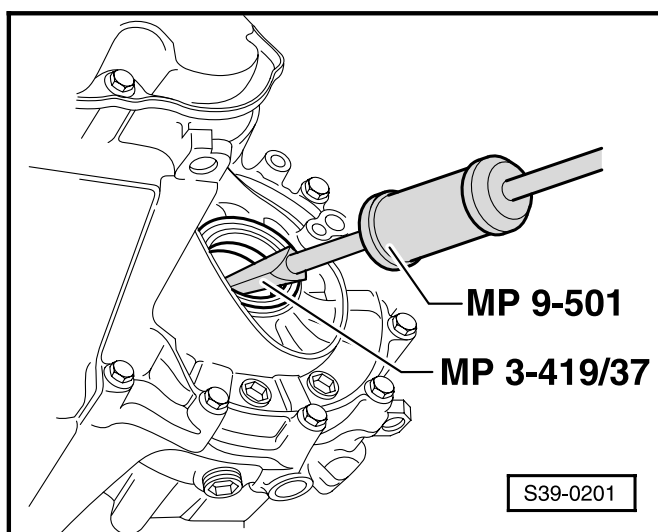
Replacing seal for left flange shaft

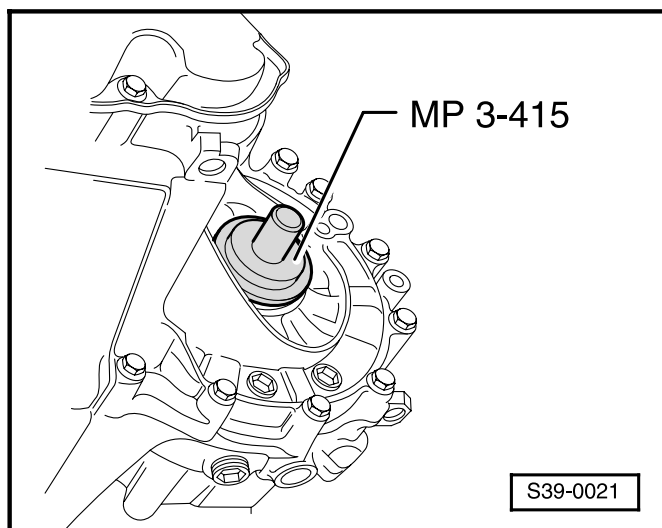
Special tools, testers and aids required

- ◆ Assembly device MP 9-501
- ◆ Extraction hook MP 3-419/37
- ◆ Insertion drift MP 3-415
- ◆ Grease G 052 128 A1

Removing

- Unbolt left drive shaft from the flange of the gearbox.
- Tie up drive shaft as far as possible. When doing this, do not damage paintwork of drive shaft.
- Place drip tray below.
- Remove bolt for flange shaft; secure with drift to prevent it also turning.
- Pull out flange shaft together with compression spring.
- ◀ - Remove seal.





Installing

Installation is performed in the reverse order; pay attention to the following points:

- ◀ - Knock in new seal as far as the stop; do not twist seal during this step.
- Pack space between sealing lip and dust lip half-full with grease G 052 128 A1.
- Inspect gear oil in manual gearbox with bevel box ⇒ page 34-31.

Tightening torques

Drive shaft to flange shaft
⇒ Running Gear; Repair Group 40

Flange shaft to gearbox 25 Nm
(conical bolt)

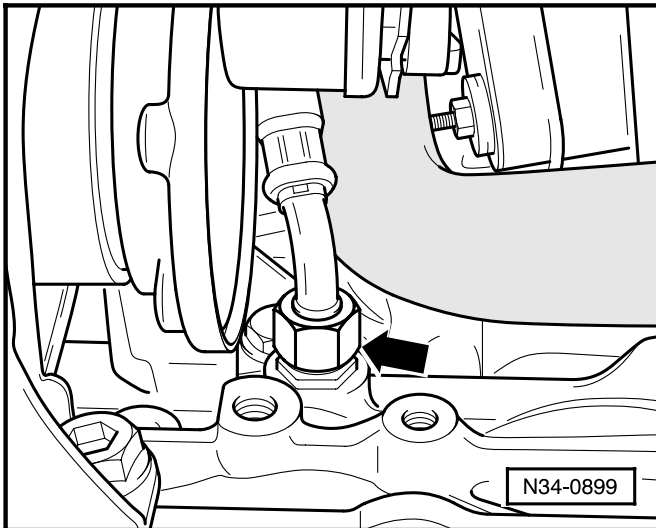
Replacing seal for right joint flange

Special tools, testers and aids required

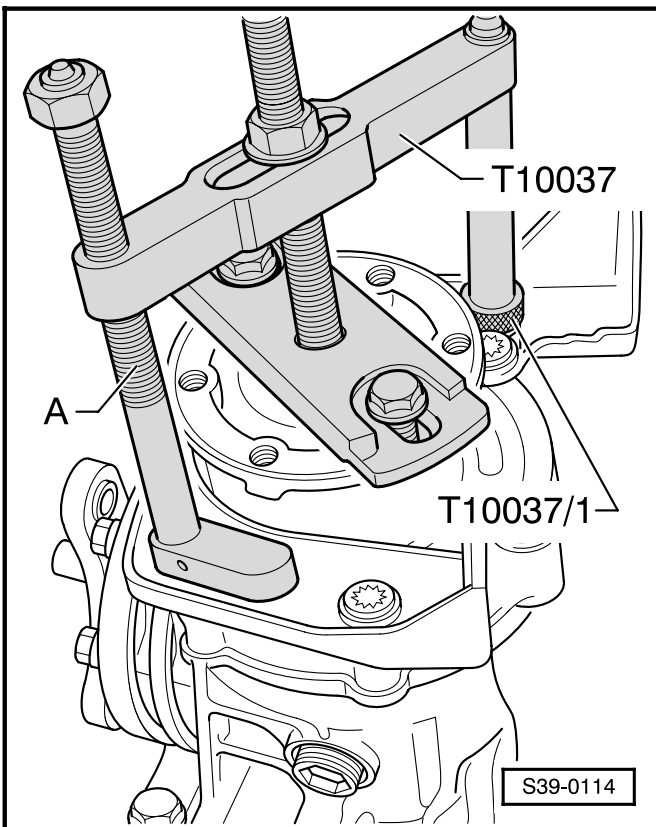
- ◆ 6 mm wrench socket, at least 190 mm long, e.g. V.A.G 1669
- ◆ Grease G 052 128 A1
- ◆ Puller T10037
- ◆ Insertion sleeve MP 3-489

Removing

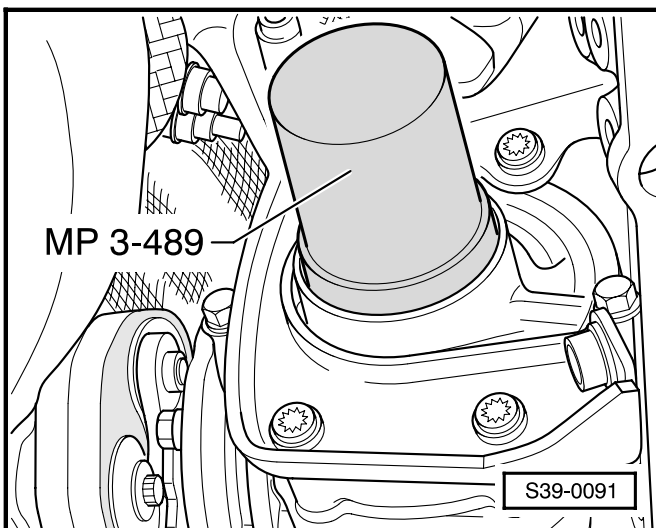
- Remove right drive shaft.
⇒ Running Gear; Repair Group 40; Removing and installing drive shaft
- Lever out cap by piercing the middle of the cap with a screwdriver.



- Place drip tray below.
- ◀ - Disconnect oil return-flow line for turbocharger from engine -arrow-.
- ⇒ 1.9-ltr./66 kW (TDI) Engine, Mechanical Components; Repair Group 21; Charge air system for turbocharger
- Use V.A.G 1669 or commercially available 6 mm wrench socket to remove screw for joint flange of right output shaft.



- ◀ - Screw the pulling device T10037 onto the right joint flange.
- Align pulling device parallel to the flange with the knurled nut T10037/1 and the bottom support -A-.
- Pull out joint flange of right output shaft.
- Use an assembly lever to lever out seal for joint flange.



Installing

- ◀ - Insert new seal as far as the stop
- Pack space between sealing lip and dust lip with universal grease.
- Carefully knock in joint flange of output shaft; rotate during this step.
- Attach joint flange of output shaft with conical bolt.
- Press in new end cap.

- Install drive shaft.
⇒ Running Gear; Repair Group 40; Removing and installing drive shaft
- Bolt oil return-flow line for turbocharger to engine.
⇒ 1.9-ltr./66 kW (TDI) Engine, Mechanical Components; Repair Group 21; Charge air system for turbocharger
- Inspect gear oil in manual gearbox with bevel box ⇒ page 34-31.

Tightening torques

Flange shaft to gearbox (conical bolt)	25 Nm
---	-------

Replacing seal for output flange of bevel box (bevel box removed)

Special tools, testers and aids required

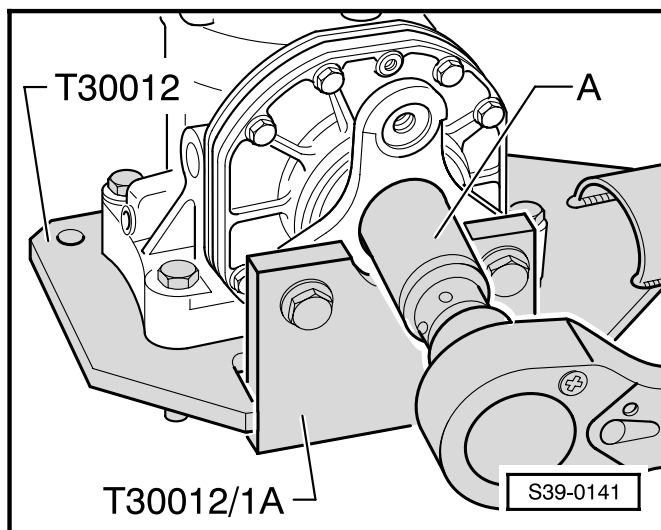
- ◆ Gearbox holder T30012
- ◆ Stop plate T30012/1A
- ◆ Insertion sleeve MP 3-402
- ◆ Removal and installation device MP 6-601

Note:

The seal for the output flange of the propshaft in the bevel box can only be replaced when the bevel box is removed.

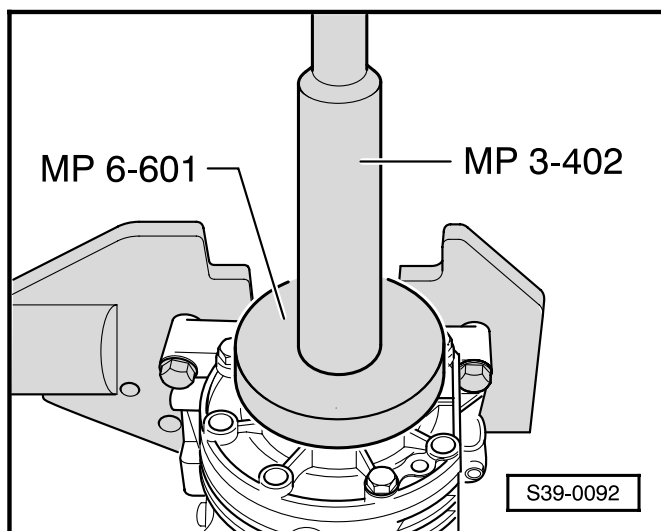
Removing

- Remove bevel box ⇒ page 34-27.
- ◀ - Attach bevel box to gearbox holder.
- Use wrench socket -A- to remove hexagon nut.
- Swivel bevel box so that the output flange is pointing up.
- Take off output flange.
- Use a screwdriver to lever out seal.

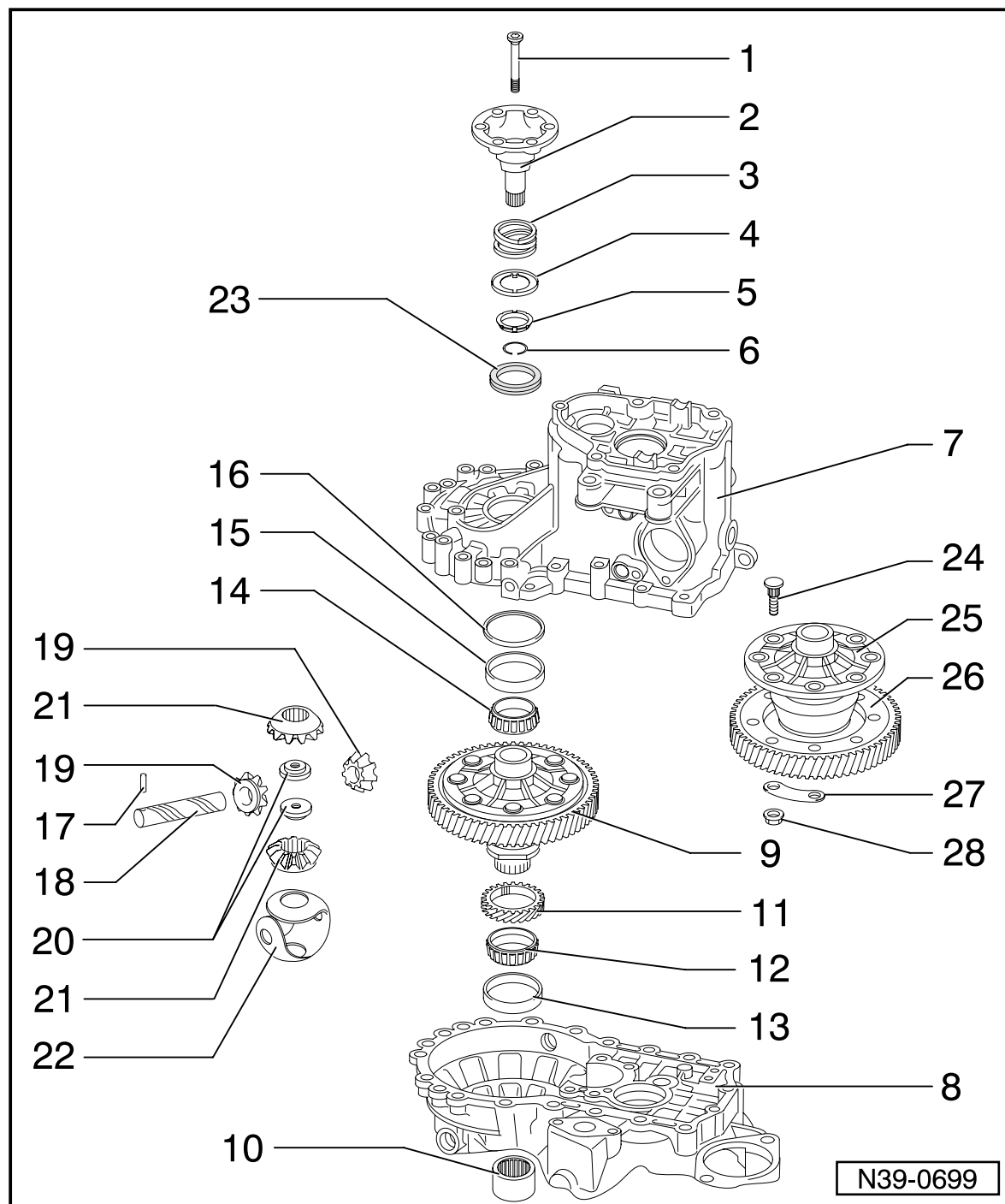


Installing

- ◀ - Knock in new seal until flush.
- Install output flange and tighten fully to 350 Nm.
- Install bevel box ⇒ page 34-27.
- Inspect gear oil in gearbox with bevel box ⇒ page 34-31.



Disassembling and assembling differential



Special tools, testers and aids required

- ◆ Sealant AMV188 200 03
- ◆ Thrust plate MP 3-406
- ◆ Thrust plate MP 3-407
- ◆ Adapter MP 3-403/1
- ◆ Thrust plunger MP 3-408
- ◆ Thrust plunger MP 3-423
- ◆ Insertion sleeve MP 3-427
- ◆ Thrust plunger MP 3-448
- ◆ Thrust washer MP 3-456
- ◆ Thrust piece MP 3-459
- ◆ Thrust plate MP 3-464

- ◆ Thrust plate MP 3-467
- ◆ Thrust piece MP 3-468
- ◆ Sleeve MP 3-474
- ◆ Drift MP 3-510
- ◆ Separating device Kukko 17/1
- ◆ Puller device, e.g. Kukko 18/1
- ◆ Internal extractor Kukko 21/7
- ◆ Countersupport Kukko 22/2

Notes:

- ◆ *Heat inner race of taper roller bearing to 100 °C before installing.*
 - ◆ *Always replace both taper roller bearings.*
 - ◆ *If the taper roller bearings, the differential housing, the gearbox housing and the clutch housing are replaced, set differential.*
- ⇒ 5-Speed Manual Gearbox 02J; Repair Group 39; Setting differential
- ◆ *Items 24, 25, 26, 27 and 28 apply only to the service sector.*

1 - Conical bolt, 25 Nm

- ◆ For attaching flange shaft to threaded piece (item 20)

2 - Flange shaft

- ◆ With hole for conical bolt
- ◆ Removing and installing
⇒ page 39-1

3 - Compression spring for flange shaft

- ◆ Installed behind flange shaft

4 - Thrust washer

- ◆ Fitting location:
Should points toward compression spring, webs toward conical ring

5 - Conical ring

- ◆ With slots for meshing with thrust washer
- ◆ Fitting location: taper points toward differential housing

6 - Circlip

- ◆ Holds conical ring, thrust washer and compression spring in position when flange shaft removed

7 - Gearbox housing**8 - Clutch housing****9 - Differential housing**

- ◆ With riveted-on final drive gear
- ◆ Drill off rivet heads for replacing final drive gear ⇒ Fig. 7
- ◆ Attach final drive gear with bolts
⇒ Fig. 11

10 - Connecting sleeve to bevel box

- ◆ Pressed onto differential housing
- ◆ Pull off and press on only if differential housing is removed
- ◆ Pulling off ⇒ Fig. 14
- ◆ Pressing on ⇒ Fig. 15

11 - Drive gear for speedometer

- ◆ Place onto differential housing before pressing on inner race as far as stop

12 - Inner race of taper roller bearing

- ◆ Pull off connecting sleeve (item 10) before removing
- ◆ Pulling off ⇒ Fig. 3
- ◆ Pressing on ⇒ Fig. 4

13 - Outer race of taper roller bearing

- ◆ Removing ⇒ Fig. 1
- ◆ Inserting ⇒ Fig. 2

14 - Inner race of taper roller bearing

- ◆ Pulling off ⇒ Fig. 3
- ◆ Pressing on ⇒ Fig. 4

15 - Outer race of taper roller bearing

- ◆ Removing ⇒ Fig. 5
- ◆ Inserting ⇒ Fig. 6

16 - Shim

- ◆ For differential
 - ◆ Determining thickness
- ⇒ 5-Speed Manual Gearbox 02J; Repair Group 39; Setting differential

17 - Roll pin

- ◆ For securing shaft of differential bevel gears
- ◆ Removing and installing ⇒ Fig. 12

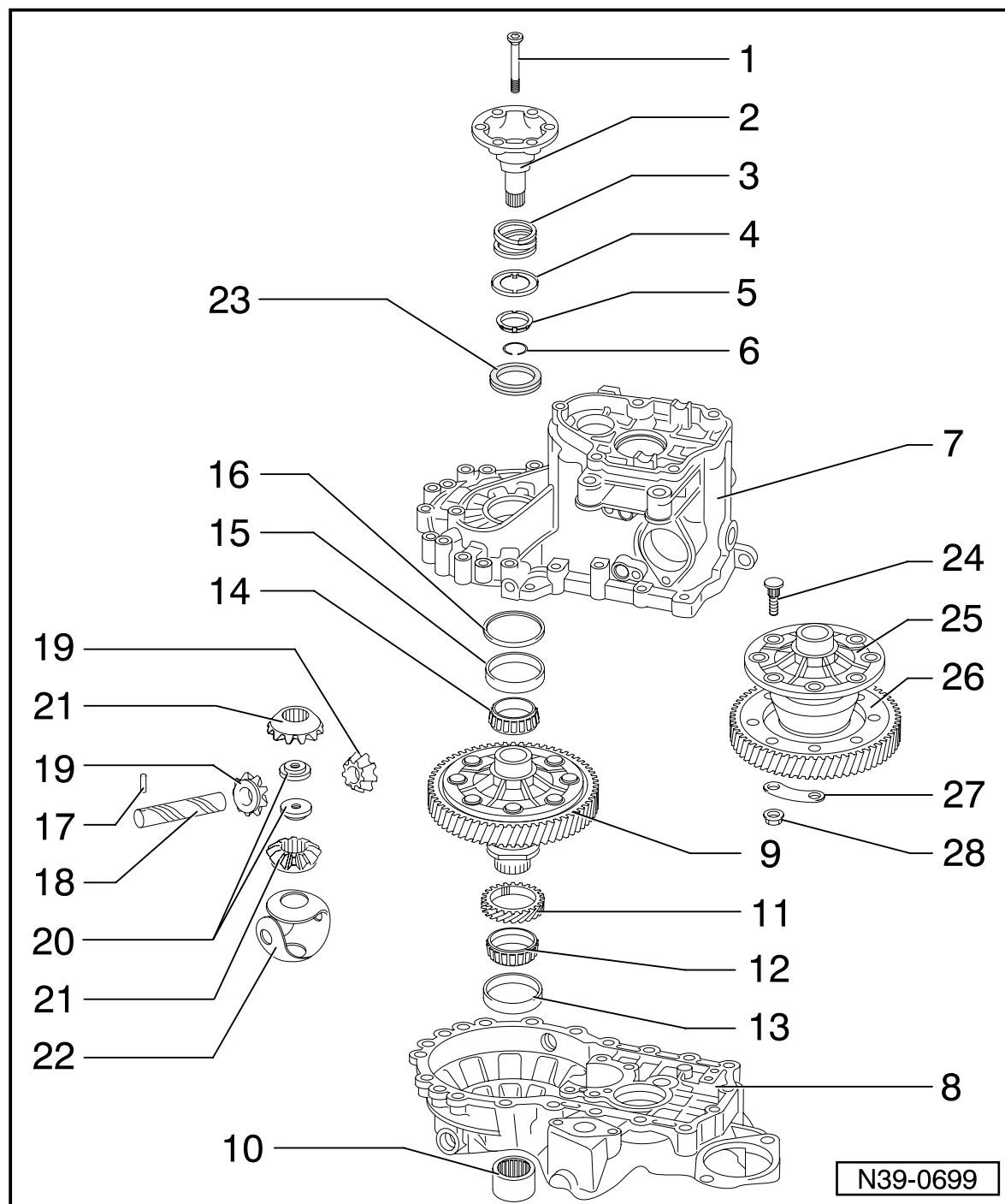
18 - Differential bevel gear shaft

- ◆ Use MP 3-510 for knocking out
- ◆ Installing ⇒ Fig. 13

19 - Small differential bevel gear

- ◆ Installing ⇒ Fig. 13

20 - Threaded piece


21 - Large differential bevel gear

- ◆ Installing ⇒ Fig. 13

22 - Thrust washer assembly

- ◆ Insert with gear oil

23 - Seal

- ◆ Replacing ⇒ page 39-1

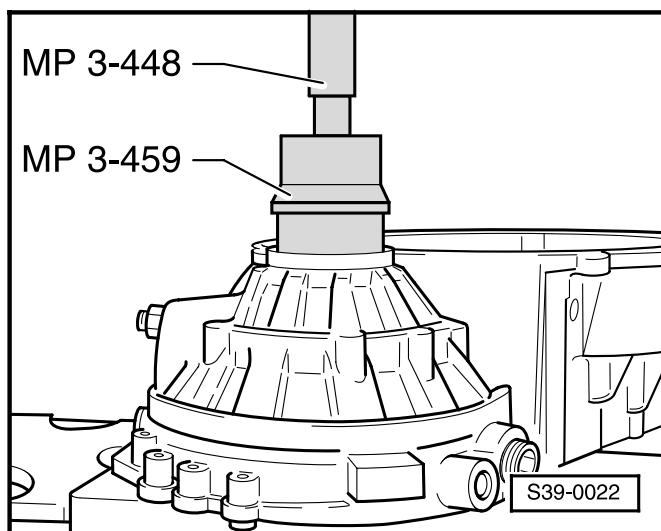
24 - Bolt
25 - Differential housing

- ◆ Bolt to final drive gear ⇒ Fig. 11

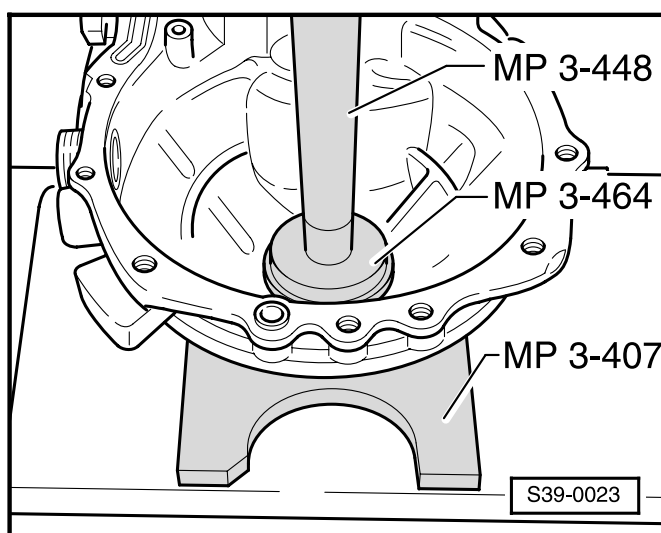
26 - Final drive gear

- ◆ Riveted in series production
- ◆ Bolted ⇒ Fig. 11
- ◆ Heat to 100 °C before installing
- ◆ Pressing off ⇒ Fig. 8
- ◆ Fitting location ⇒ Fig. 9
- ◆ Fitting onto differential housing ⇒ Fig. 10
- ◆ Is matched with output shaft; always replace together

27 - Base plate
28 - 70 Nm

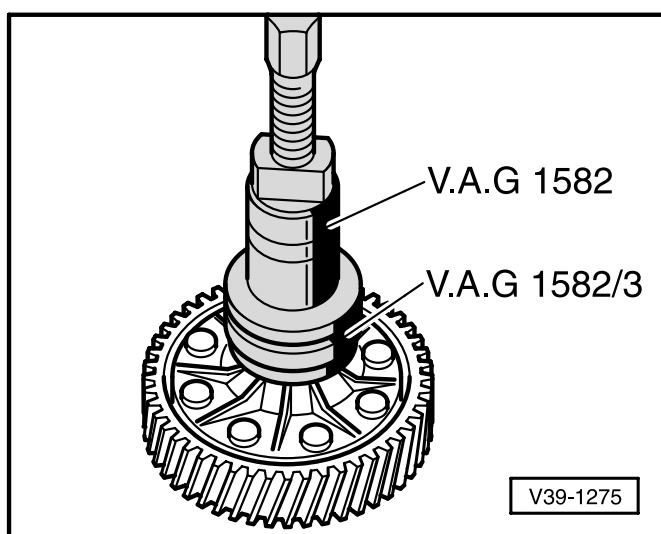


◀ Fig. 1 Knocking outer race of taper roller bearing out of clutch housing



◀ Fig. 2 Pressing outer race of taper roller bearing into clutch housing

No shim is installed on the clutch housing side.

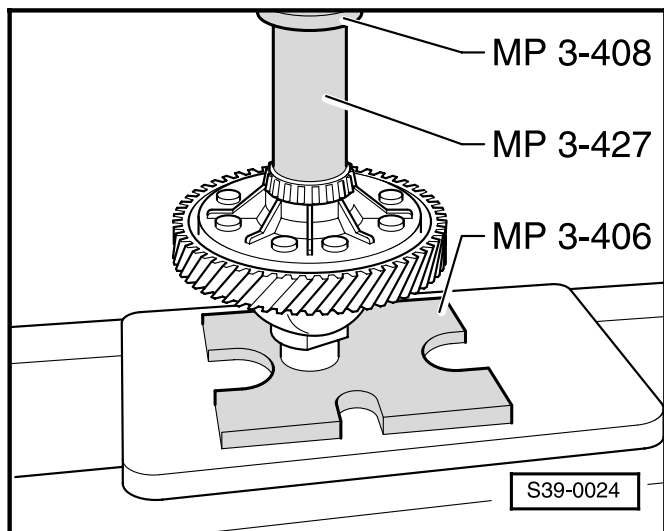


◀ Fig. 3 Pulling off inner races of taper roller bearing

- Place thrust plate MP 3-467 onto differential housing before fitting on the pulling device.

Note:

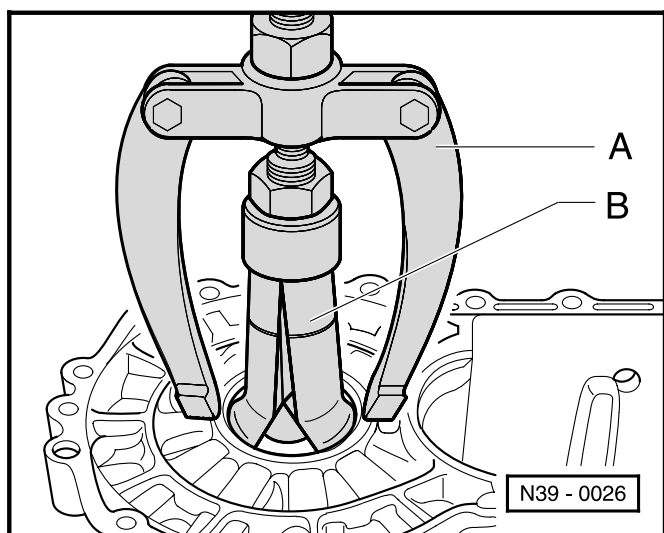
The procedure for pulling off both inner races of the taper roller bearing of the differential housing is identical.



◀ Fig. 4 Pressing on inner races of taper roller bearing

Note:

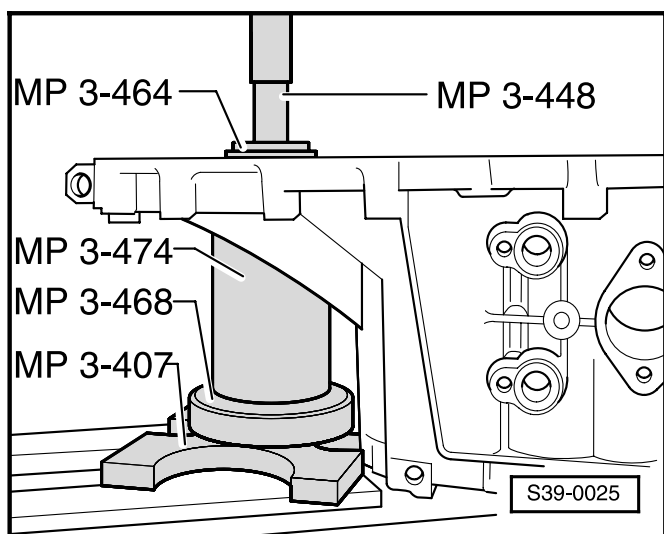
The inner races of the taper roller bearing for gearbox housing and clutch housing are pressed on with the same tools.



◀ Fig. 5 Pulling outer race of taper roller bearing out of gearbox housing

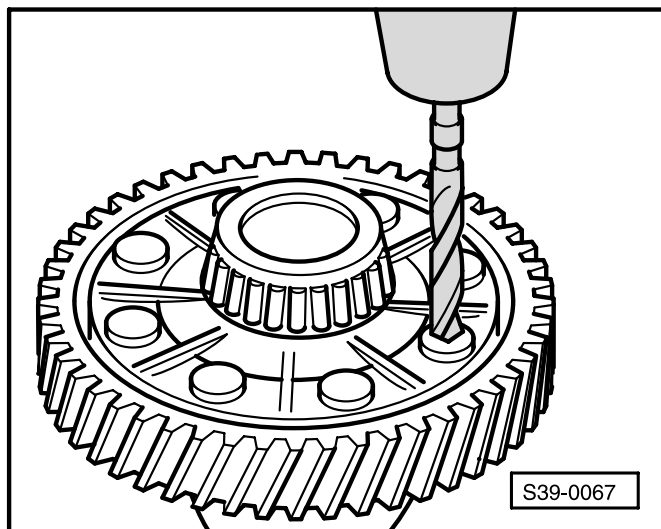
A - Countersupport, e.g. Kukko 22/2

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



◀ Fig. 6 Pressing outer race of taper roller bearing into gearbox housing

- Fit shim below outer race.
- Use sleeve MP 3-474 to support gearbox housing directly below bearing mount.

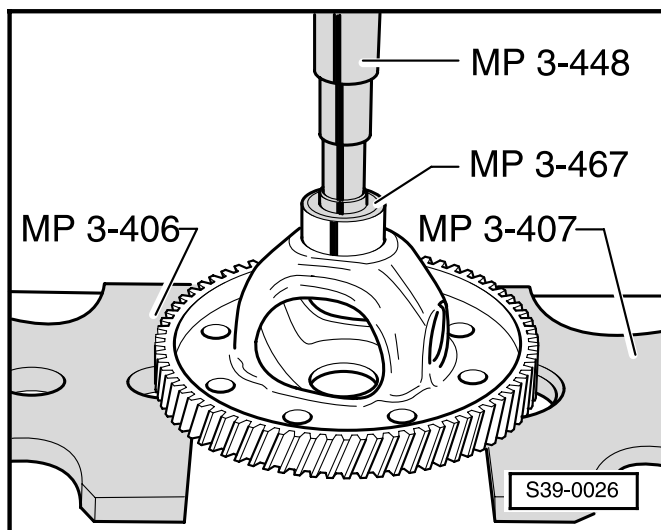


◀ Fig. 7 Drilling off rivet heads

- Use a 12 mm drill to drill off rivet heads on the recessed side and knock out rivets with a drift.

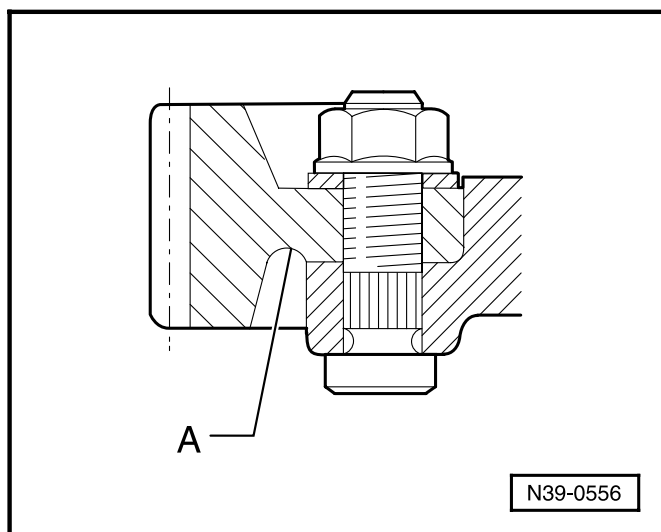
Note:

Clean differential before and after drilling operation. Protect taper roller bearings from drilling swarf.



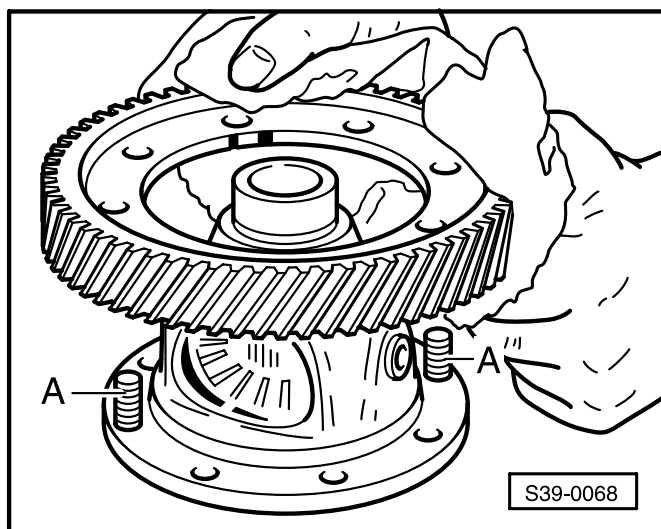
◀ Fig. 8 Pressing off final drive gear

- Place thrust plate MP 3-467 onto differential housing.



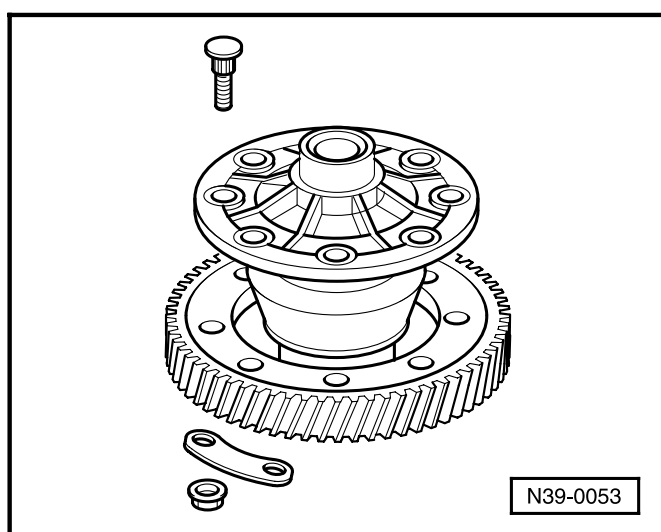
◀ Fig. 9 Fitting location of final drive gear

- The slot all round -A- points toward the old contact surface of the differential housing.



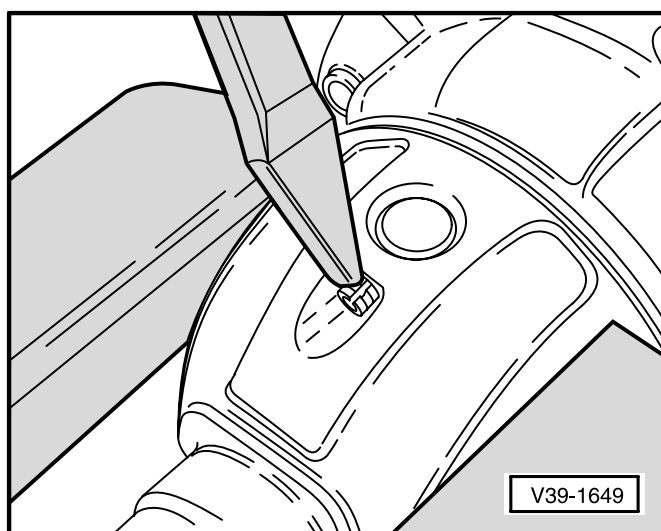
◀ **Fig. 10 Heating final drive gear to approx. 100 °C and fitting on**

- Use bolts -A- from the repair kit for guiding final drive gear when fitting it on.



◀ **Fig. 11 Bolting final drive gear and differential housing together**

Use special bolts from the repair kit for gearbox 02C.



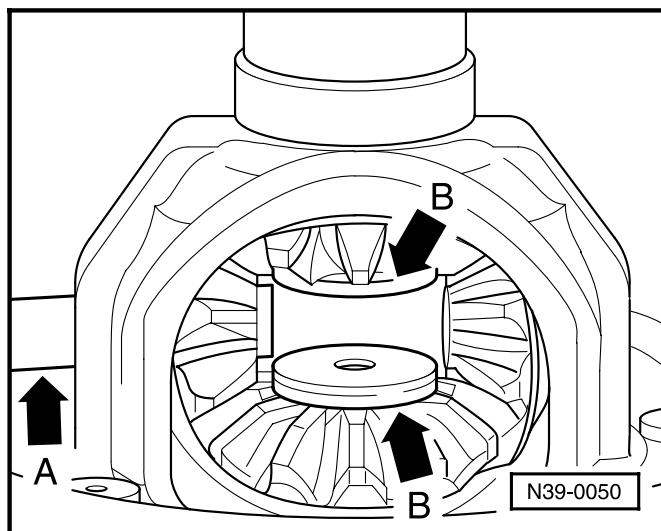
◀ **Fig. 12 Removing and installing roll pin for differential bevel gear shaft**

Removing:

- Cover over taper roller bearing inner race and drive gear for speedometer in order to avoid any damage and swarf getting into these parts.
- Use a chisel to drive out roll pin; position chisel in the groove for this step.
- Use MP 3-510 to knock out differential bevel gear shaft.

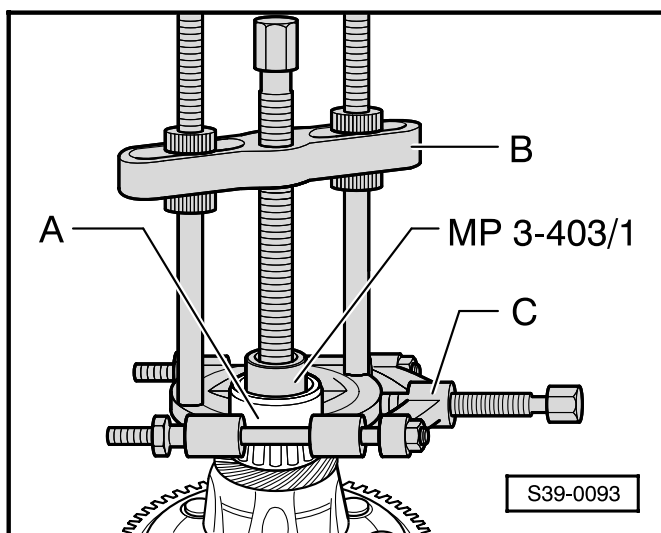
Installing:

- Replace roll pin and insert into differential housing as far as the stop.



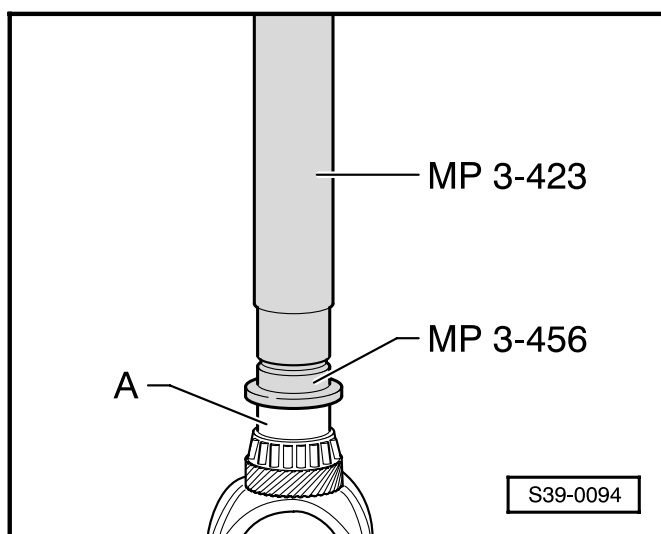
◀ Fig. 13 Installing differential bevel gears

- Insert thrust washer assembly with gear oil.
- Insert both large differential bevel gears and secure (e.g. with flange shaft).
- Insert small differential bevel gears offset 180° and swivel into place.
- Press in differential bevel gear shaft (arrow -A-) up to the first small differential bevel gear.
- Fit threaded pieces (arrows -B-) into the large differential bevel gears.
Fitting location: shoulder points toward differential bevel gear
- Knock shaft for differential bevel gears into final position and secure with a new roll pin.



◀ Fig. 14 Pulling off connecting sleeve for bevel box

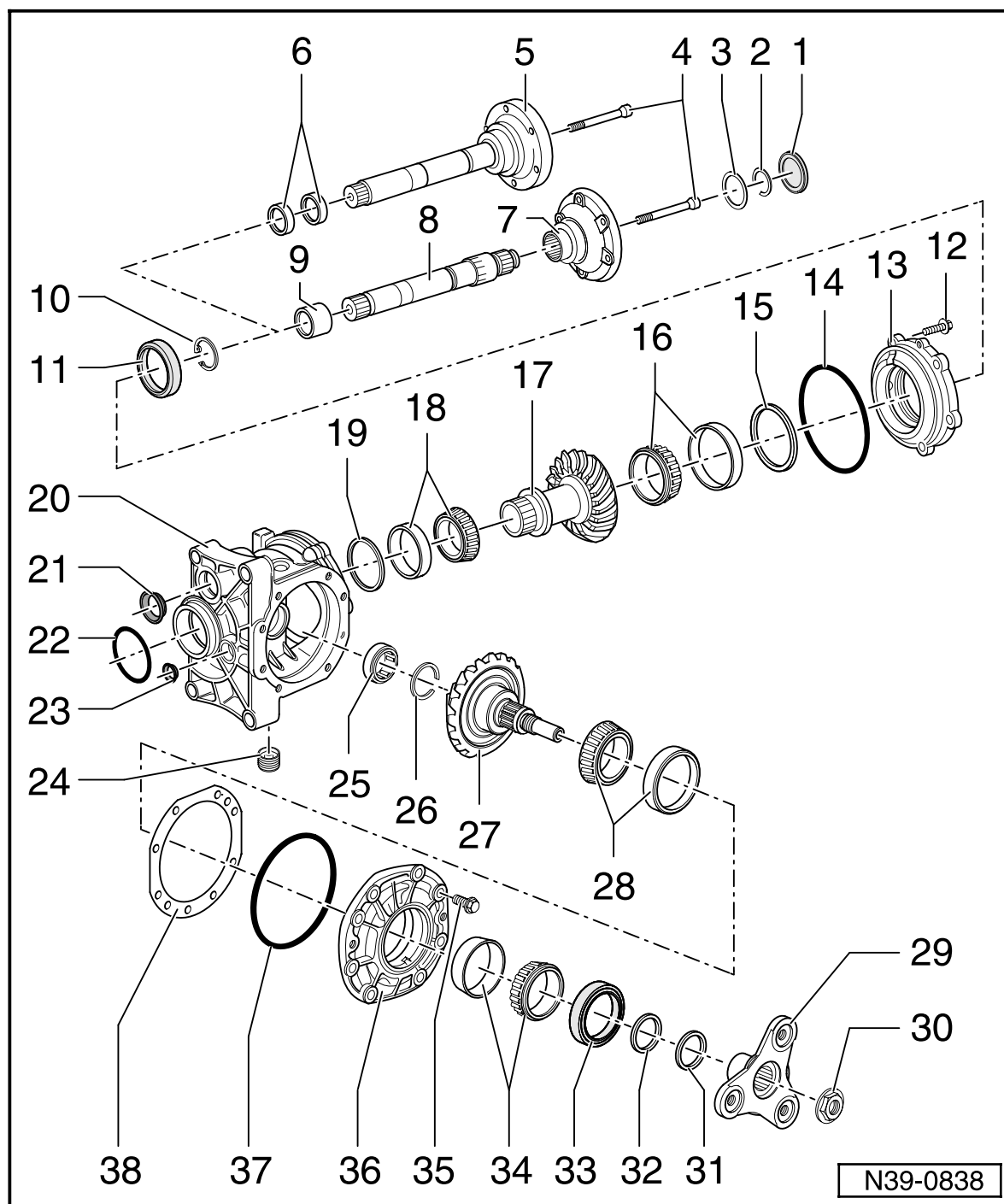
- A - Connecting sleeve
- B - Pulling device, e.g. Kukko 18/1
- C - Separating device 12...75 mm, e.g. Kukko 17/1



◀ Fig. 15 Pressing on connecting sleeve -A- for bevel box

Disassembling and assembling bevel box

Assembly overview



Removal and installation sequence ⇒ page 39-17

¹⁾ If these parts are replaced, it is necessary to carry out setting operations ⇒ page 39-17.

Note:

There are gearboxes with output shaft (item 8)/ joint flange (item 7) and gearboxes with flange shaft (item 5).

These components must not be mixed up. If they are replaced, they must again be assigned to the relevant gearbox.

1 - End cap

- ◆ Is destroyed when removed
- ◆ Always replace

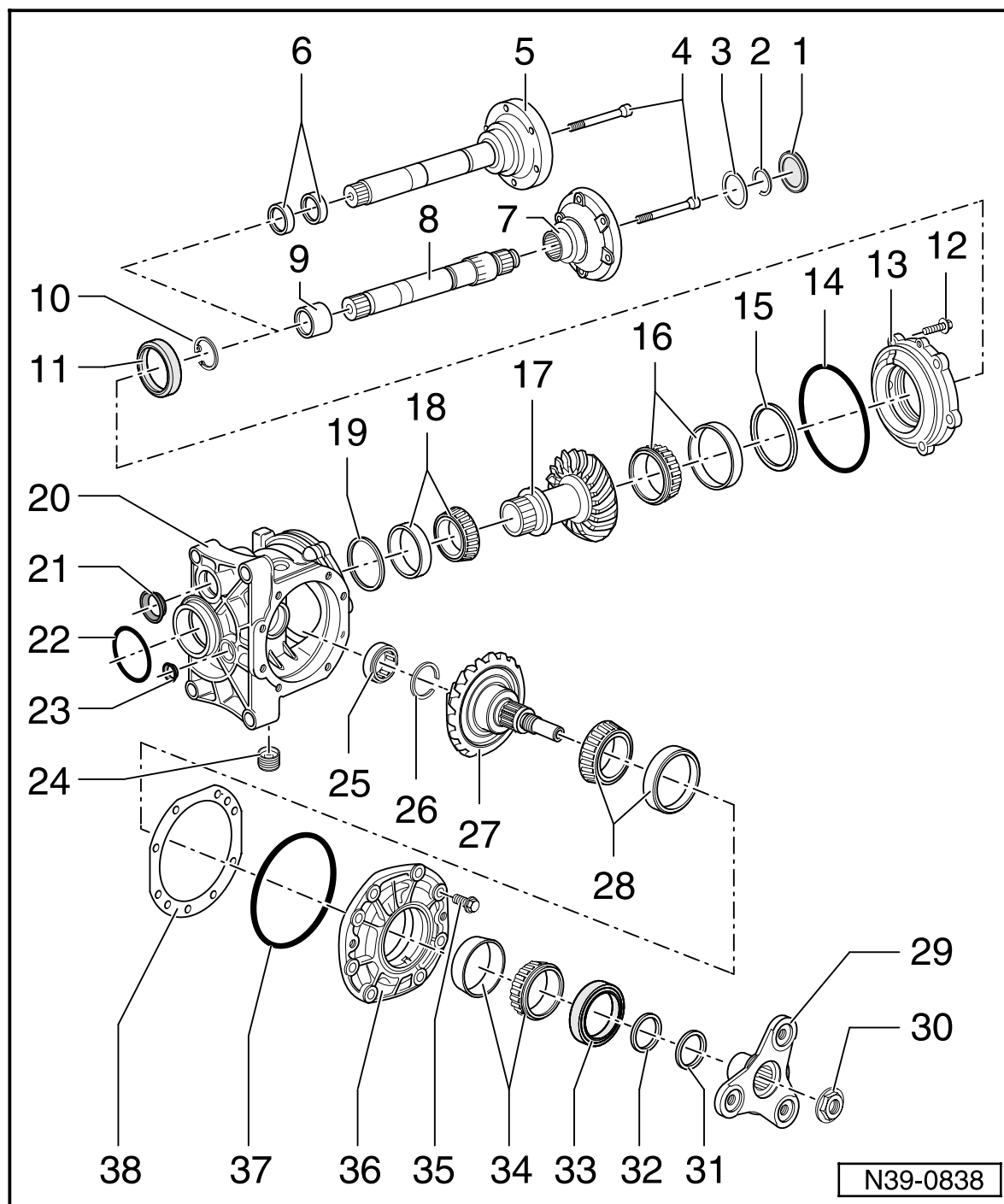
2 - Circlip

- ◆ Always replace

3 - Dished washer

- ◆ Taper points toward circlip

- 4 - Conical bolt, 25 Nm**
- ◆ For output shaft (item 8) or for flange shaft (item 5), respectively, to the differential of the gearbox
- 5 - Flange shaft**
- 6 - Needle bearing (polygon bearing)**
- ◆ 2 in total
 - ◆ Only for flange shaft (item 5)
 - ◆ Replacing ⇒ page 39-27
- 7 - Joint flange**
- ◆ Pull out together with output shaft (item 8) ⇒ page 39-3
 - ◆ Pressing off ⇒ page 39-26
 - ◆ Pressing on ⇒ page 39-26
- 8 - Output shaft**
- ◆ Pull out of bevel box together with joint flange (item 7) ⇒ page 39-3
 - ◆ Pressing off and pressing on joint flange ⇒ page 39-26
- 9 - Needle bearing (polygon bearing)**
- ◆ Replacing ⇒ page 39-27
 - ◆ Only for the output shaft
- 10 - Circlip**
- ◆ Always replace
- 11 - Seal**
- ◆ Use assembly lever for levering out
 - ◆ Use insertion sleeve MP 3-489 to knock in as far as the stop
 - ◆ Replace with gearbox installed ⇒ page 39-1
- 12 - 25 Nm**
- 13 - Cover¹⁾**
- ◆ Removing ⇒ page 39-20
 - ◆ Do not twist when installing; tighten securing bolts in stages diagonally across
- 14 - O-ring**
- ◆ Always replace
 - ◆ Must engage in all-round groove
- 15 - Shim S_1**
- ◆ Note thickness
 - ◆ Setting survey ⇒ page 39-31
- 16 - Large taper roller bearing for head bevel gear mounting¹⁾**
- Inner race:
- ◆ Pulling off ⇒ page 39-21
 - ◆ Pressing on ⇒ page 39-23
- Outer race:
- ◆ Pressing out ⇒ page 39-20
 - ◆ Pressing in ⇒ page 39-24
- 17 - Head bevel gear with input shaft¹⁾**
- ◆ Is matched with the shaft bevel gear (item 27)
 - ◆ Cannot be pressed off from the input shaft
 - ◆ Setting ⇒ page 39-39
- 18 - Small taper roller bearing for head bevel gear mounting¹⁾**
- Inner race:
- ◆ Pulling off ⇒ page 39-21
 - ◆ Pressing on ⇒ page 39-23
- Outer race:
- ◆ Pressing out ⇒ page 39-21
 - ◆ Pressing in ⇒ page 39-23
- 19 - Shim S_2**
- ◆ Note thickness
 - ◆ Setting survey ⇒ page 39-31
- 20 - Final drive housing¹⁾**
- ◆ Drain oil, then clamp bevel box in repair stand with gearbox holder ⇒ page 39-17
- 21 - Seal**
- ◆ Always replace
 - ◆ Insert into final drive housing with graduated side
- 22 - O-ring**
- ◆ Always replace
- 23 - Seal**
- ◆ Always replace
 - ◆ Insert into final drive housing with graduated side
- 24 - Oil drain plug, 20 Nm**
- ◆ With magnet
- 25 - Roller sleeve**
- ◆ Pulling out ⇒ page 39-22
 - ◆ Pressing in ⇒ page 39-22
- 26 - Circlip**
- ◆ Always replace
 - ◆ Removing ⇒ page 39-22
- 27 - Shaft bevel gear¹⁾**
- ◆ Is matched with head bevel gear
 - ◆ Setting ⇒ page 39-34
- 28 - Large taper roller bearing for shaft bevel gear¹⁾**
- Inner race:
- ◆ Pulling off ⇒ page 39-20
 - ◆ Pressing on ⇒ page 39-24
- Outer race:
- ◆ Pressing out ⇒ page 39-19
 - ◆ Pressing in ⇒ page 39-25



29 - Output flange¹⁾

30 - 350 Nm

- ◆ Unscrewing ⇒ page 39-18
- ◆ Screwing on ⇒ page 39-25
- ◆ Always replace
- ◆ Insert with gear oil

31 - Shim S_4

- ◆ Note thickness
- ◆ Setting survey ⇒ page 39-31
- ◆ Fit onto spacer ring (item 32) before installing the seal (item 33) and before inserting the inner race for the small taper roller bearing (item 34)

32 - Spacer ring

- ◆ Fitting location: chamfer points toward shaft bevel gear (item 27)
- ◆ Fit onto shaft bevel gear (item 27) before installing the seal (item 33) and before inserting the shim S_4 (item 31) and also the inner race for small taper roller bearing (item 34)

33 - Seal

- ◆ Replace only when bevel box removed ⇒ page 39-5

34 - Small taper roller bearing for shaft bevel gear¹⁾

Outer race:

- ◆ Pressing out ⇒ page 39-19
- ◆ Pressing in ⇒ page 39-24

Inner race:

- ◆ Insert into the outer race

35 - 25 Nm**36 - Drive pinion housing¹⁾**

- ◆ Removing ⇒ page 39-19
- ◆ Installing ⇒ page 39-25

- ◆ Do not twist when installing; tighten securing bolts in stages diagonally across

37 - O-ring

- ◆ Always replace
- ◆ Must be located in all-round groove

38 - Shim S_3

- ◆ Note thickness
- ◆ Setting survey ⇒ page 39-31

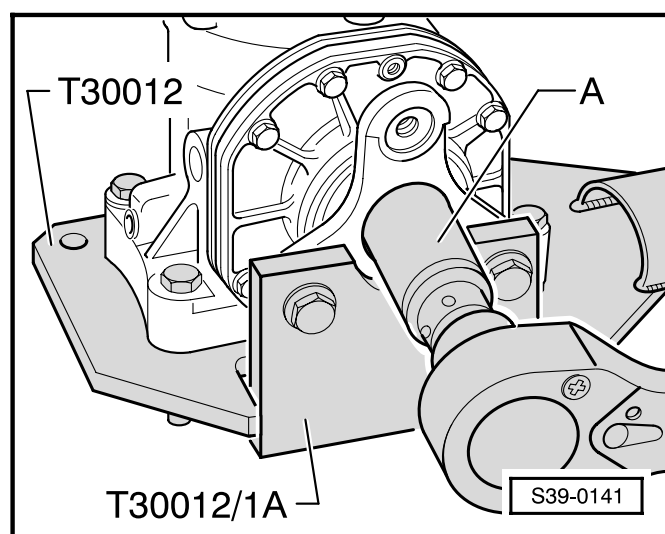
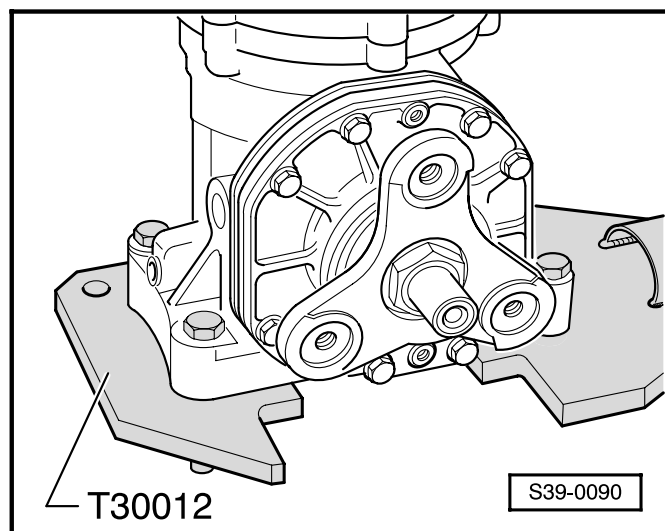
Removal and installation overview**Special tools, testers and aids required**

- ◆ Insertion sleeve MP 3-402
- ◆ Thrust plate MP 3-406
- ◆ Thrust plate MP 3-407
- ◆ Thrust plunger MP 3-408
- ◆ Thrust piece MP 3-411
- ◆ Pipe MP 3-419/33
- ◆ Thrust piece MP 3-420
- ◆ Thrust plunger MP 3-423
- ◆ Insertion sleeve MP 3-427
- ◆ Thrust plunger MP 3-448
- ◆ Pipe section MP 3-450
- ◆ Thrust washer MP 3-455
- ◆ Mounting rails MP 3-457
- ◆ Drift MP 3-481/2
- ◆ Guide ring for output shaft MP 3-527
- ◆ Thrust piece MP 6-418
- ◆ Thrust piece MP 6-420
- ◆ Assembly device MP 6-601

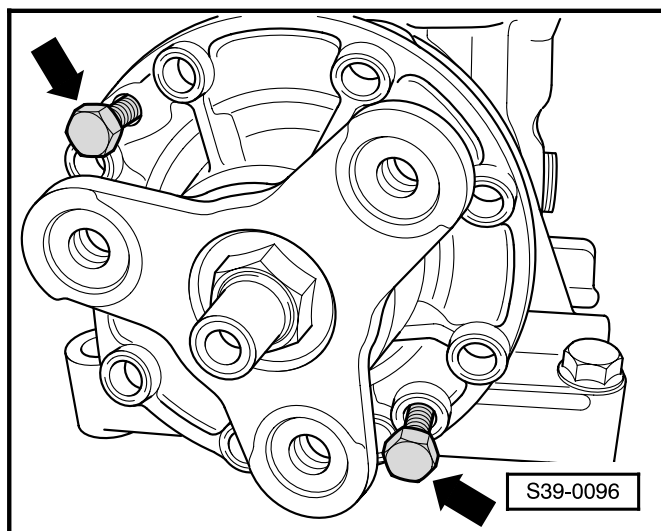
- ◆ Pipe section 3110
- ◆ Adapter piece T30015
- ◆ Gearbox holder T30012
- ◆ Stop plate T30012/1A
- ◆ (V.A.G 1582) and (V.A.G 1582/1)
- ◆ Separating device 22...115 mm,
e.g. Kukko 17/2
- ◆ Internal extractor 13...23 mm,
e.g. Kukko 21/3
- ◆ Internal extractor 46...58 mm,
e.g. Kukko 21/7
- ◆ Internal extractor 56...70 mm,
e.g. Kukko 21/8
- ◆ Countersupport, e.g. Kukko 22/1
- ◆ Countersupport, e.g. Kukko 22/2

Disassembling bevel box

- Drain gear oil.
- ◀ - Clamp bevel box in the gearbox holder.



- ◀ - Unscrew hexagon nut for output flange.
A - Wrench socket for 3/4 inch drive
- Take off output flange.
- Use a screwdriver to lever out seal.
- Take out inner race for small taper roller bearing of shaft bevel gear.



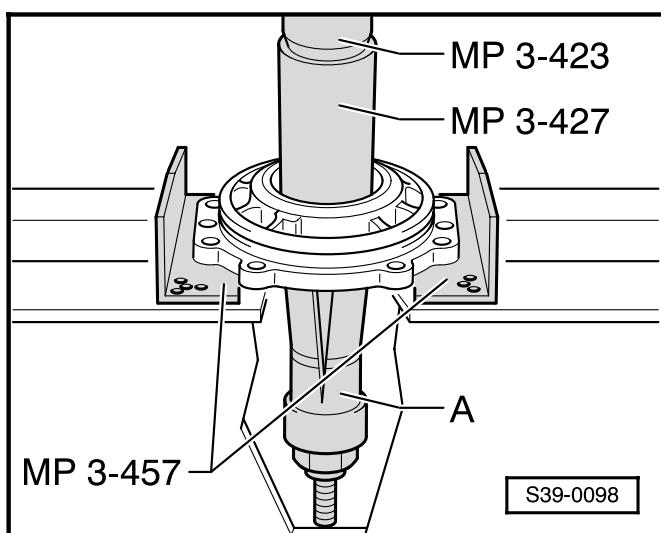
- Take off drive pinion housing.

Screw in hexagon bolts -arrows- evenly so that the drive pinion housing does not tilt.

Note:

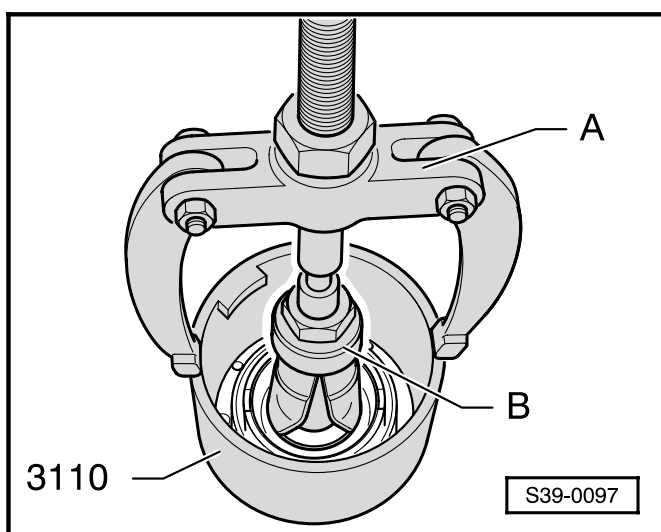
Drive pinion housing can also be removed and installed with the output flange in place.

- Take off shim S_3 .
- Take off spacer ring.



- Press outer race for small taper roller bearing out of drive pinion housing.

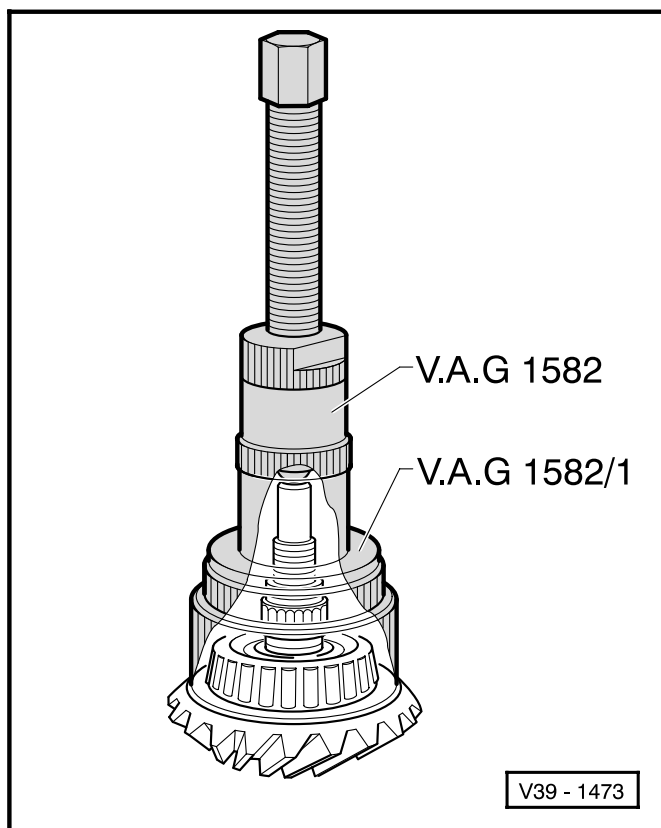
A - Internal extractor 46 ... 58 mm, e.g. Kukko 21/7



- Press outer race for large taper roller bearing out of drive pinion housing.

A - Internal extractor 46 ... 58 mm, e.g. Kukko 21/7

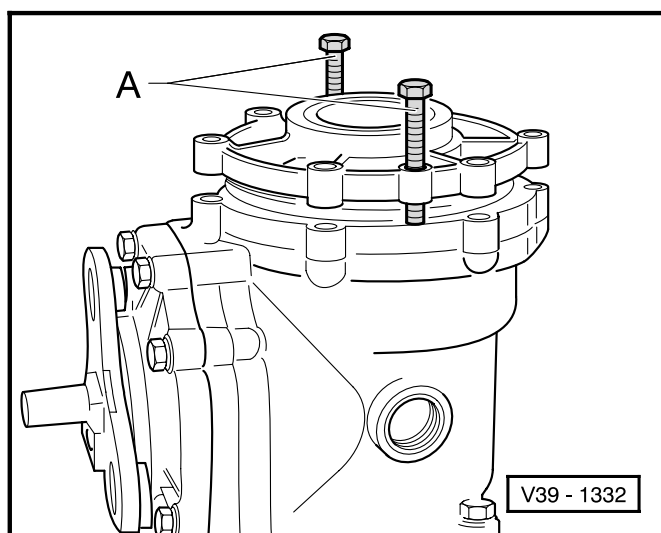
B - Countersupport, e.g. Kukko 22/2



- Remove shaft bevel gear together with shim S_4 .

- ◀ - Pull inner race for large taper roller bearing off the shaft bevel gear.

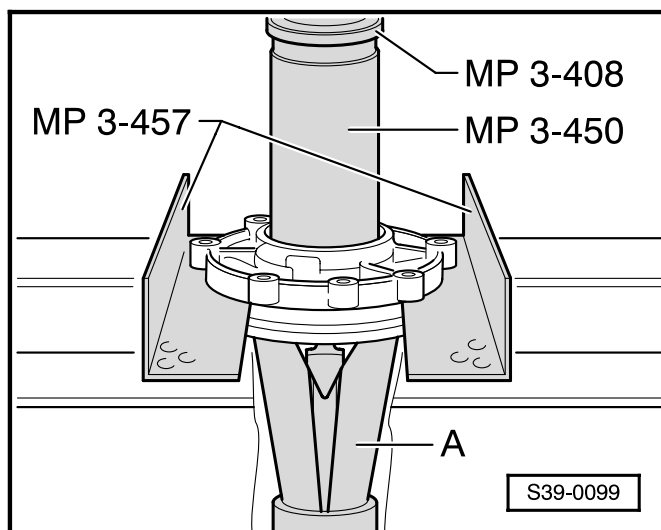
Fit on grip, e.g. V.A.G 1582/1, and tension well behind the rollers of the bearing. Then rotate bearing and re-tension grip.



- If the seal has to be replaced, lever out seal with assembly iron.

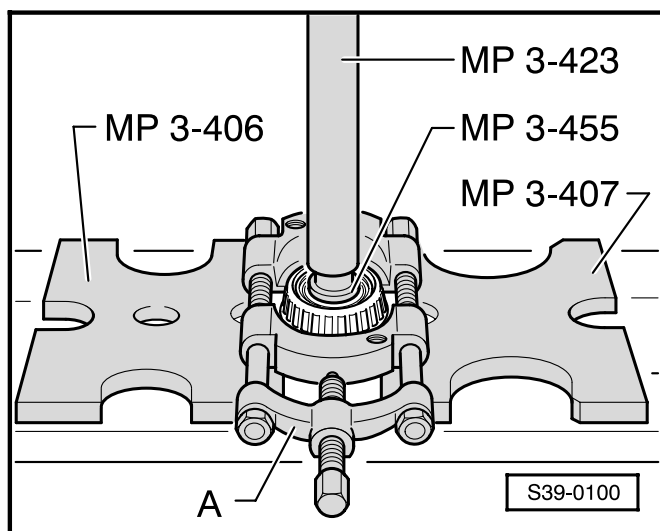
- ◀ - Remove cover.

Screw in hexagon bolts -A- evenly so that the cover does not tilt.

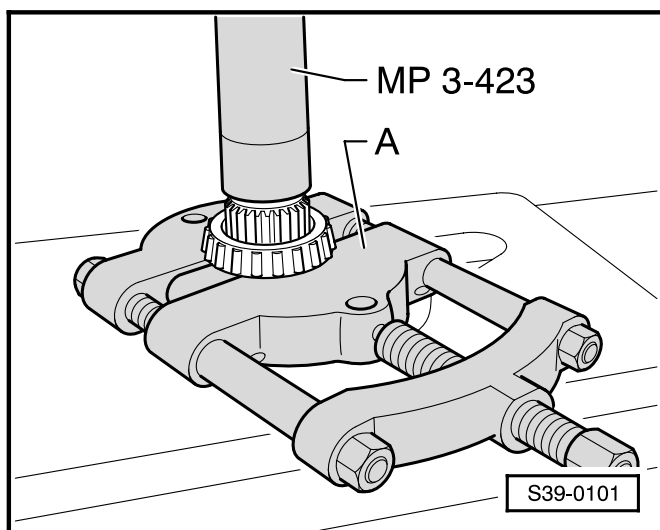


- ◀ - Press outer race for large taper roller bearing out of cover.

A - Internal extractor 56 ... 70 mm, e.g. Kukko 21/8



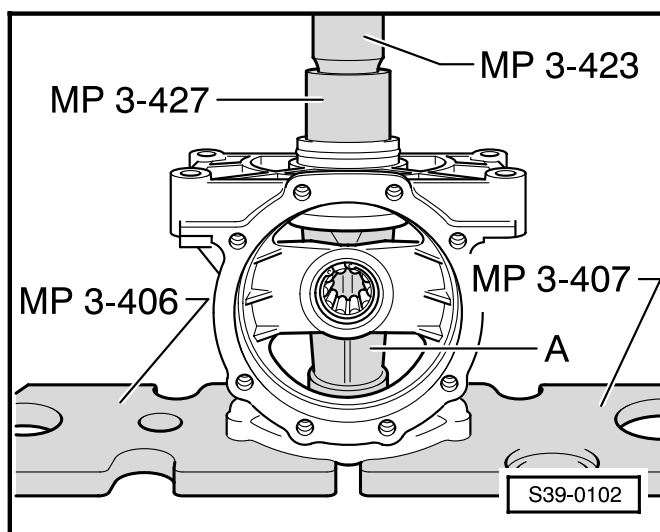
- Remove head bevel gear together with input shaft.
 - ◀ - Press inner race for large taper roller bearing off the head bevel gear.
- A - Separating device 22 ... 115 mm,
e.g. Kukko 17/2



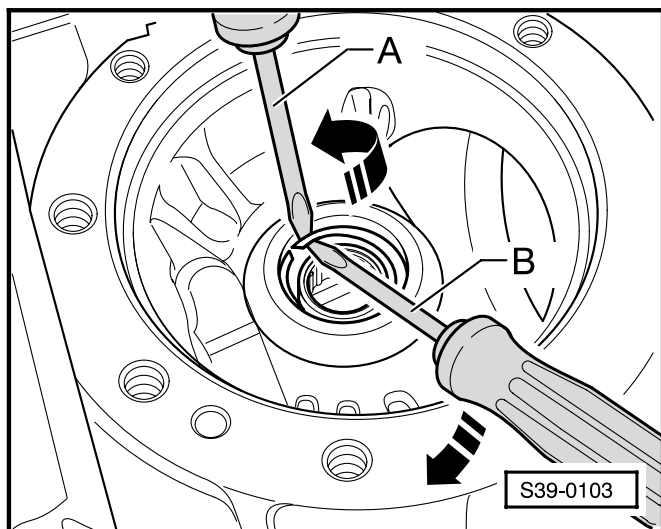
- ◀ - Press inner race for small taper roller bearing off the input shaft.
- A - Separating device 22 ... 115 mm,
e.g. Kukko 17/2

Note:

Inner race can also be pulled off with taper roller bearing puller V.A.G 1582 and grip V.A.G 1582/3; in this case, place thrust disc 40-105 onto input shaft first of all.



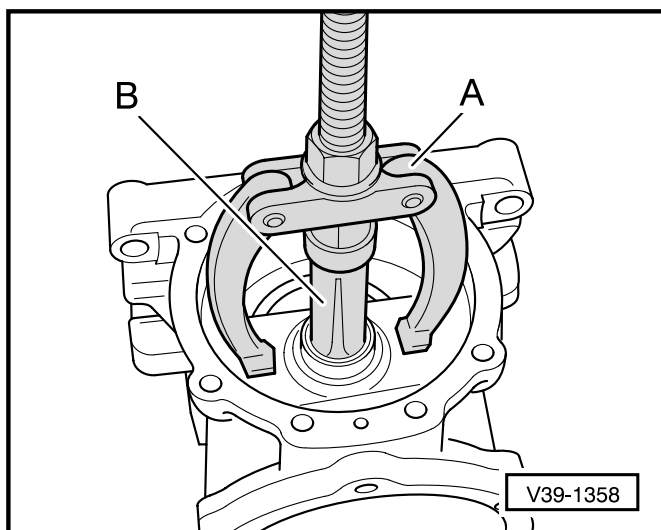
- ◀ - Press outer race for small taper roller bearing out of final drive housing.
- A - Internal extractor 46 ... 58 mm,
e.g. Kukko 21/7



- ◀ - Remove circlip for roller sleeve from final drive housing.

To do this:

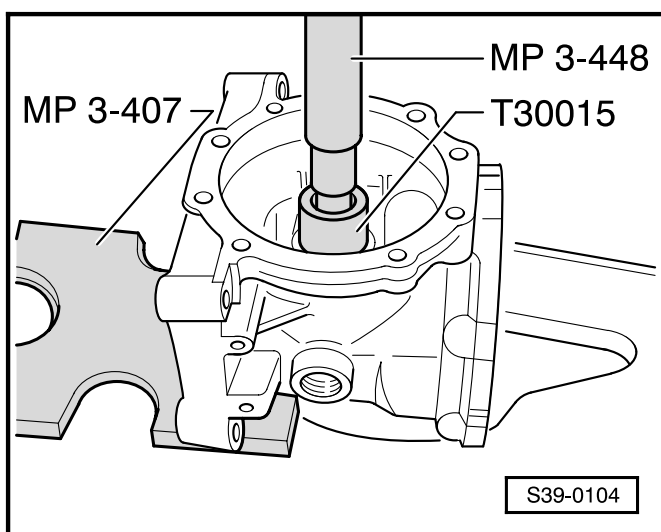
- Lift one end of the circlip out of the groove by turning with screwdriver -A-.
- Raise this end with screwdriver -B- and lever out further.



- ◀ - Pull roller sleeve out of final drive housing.

A - Countersupport, e.g. Kukko 22/1

B - Internal extractor 13 ... 23 mm,
e.g. Kukko 21/3



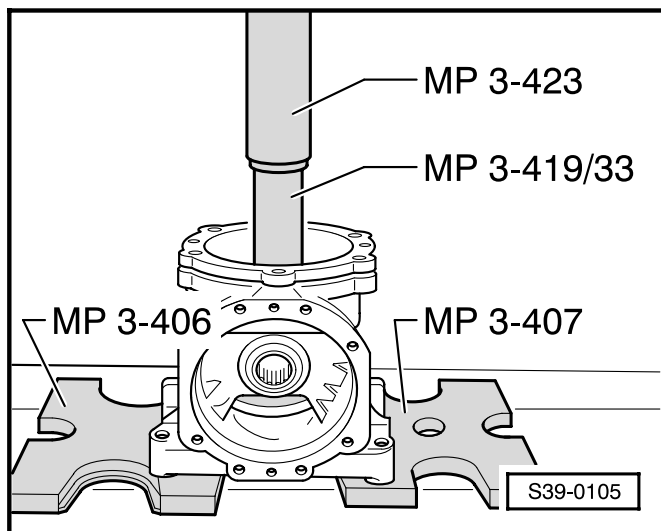
Assembling bevel box

- ◀ - Press roller sleeve into final drive housing.

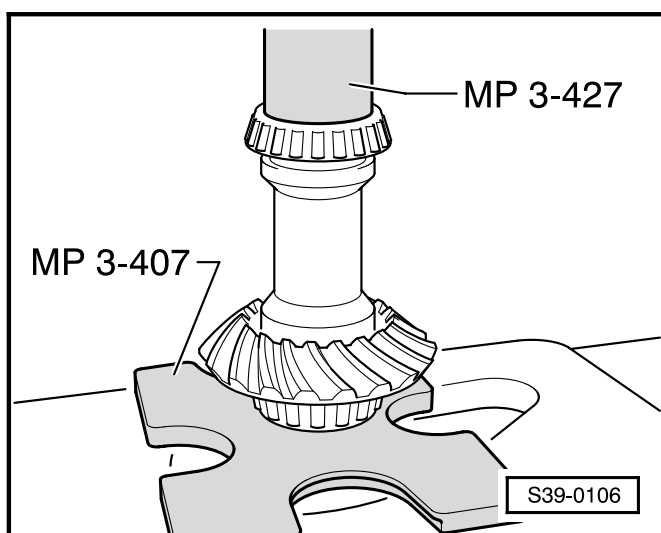
The inscription points toward the insertion tool.

Carefully press in as far as the stop.

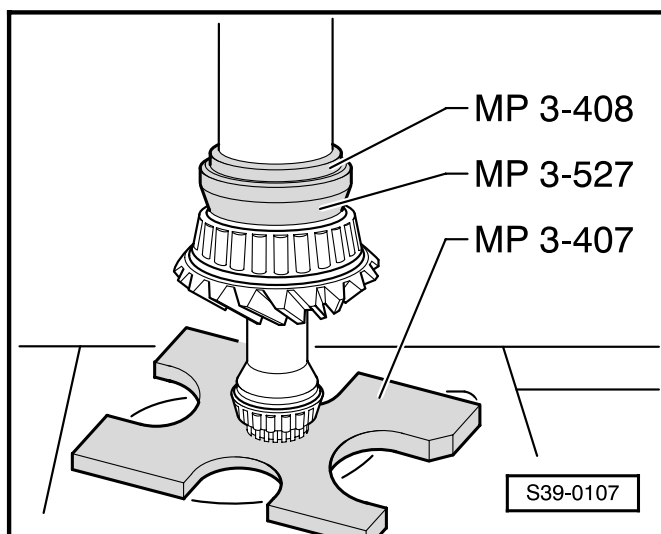
- Install new circlip in final drive housing.



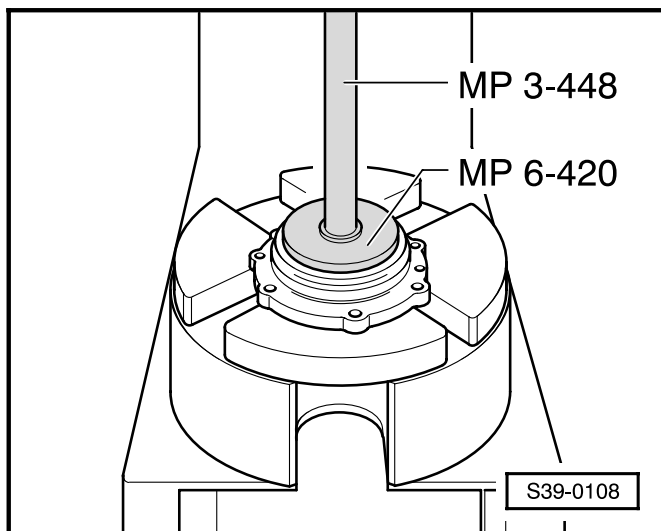
- Insert shim S_2 .
- ◀ - Press in outer race slightly.
- Then, fit the tube MP 3-419/33 onto the entire circumference of the outer race.
- Press in outer race fully.



- ◀ - Press inner race for small taper roller bearing onto input shaft.



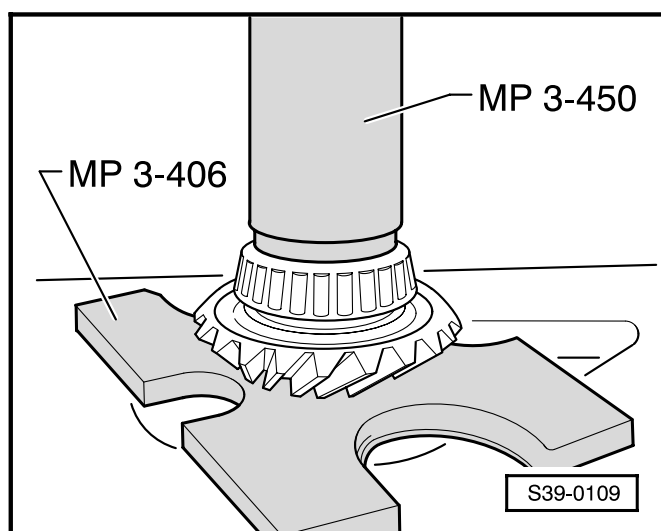
- ◀ - Press inner race for large taper roller bearing onto head bevel gear.
- Insert head bevel gear together with input shaft into final drive housing.



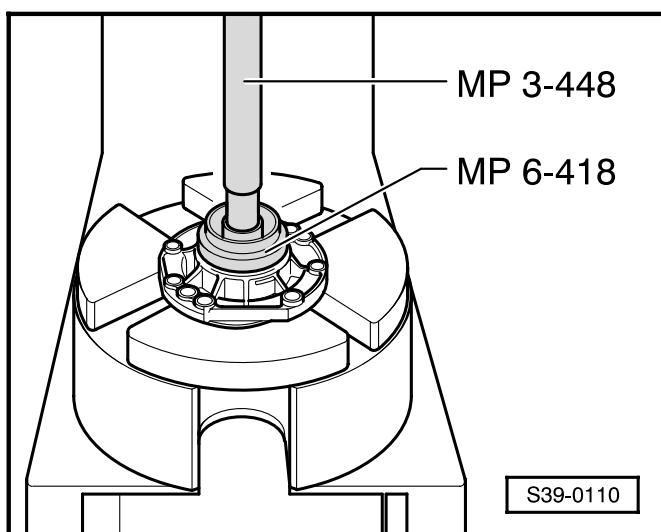
- ◀ - Place shim S_1 into the cover and press in the outer race for large taper roller bearing.
- Install cover with new O-ring.

Note:

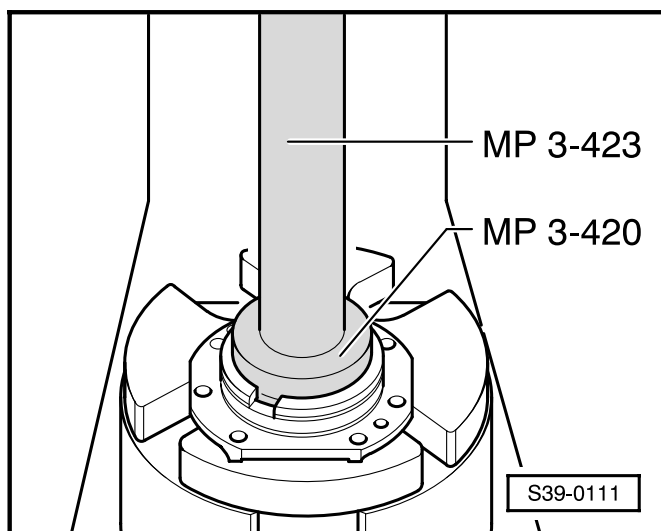
When installing, do not tilt; tighten securing bolts in stages diagonally across.



- ◀ - Press inner race for large taper roller bearing onto shaft bevel gear.
- Insert shaft bevel gear together with shim S_4 and spacer ring - chamfer of spacer ring points toward shaft bevel gear - into final drive housing.



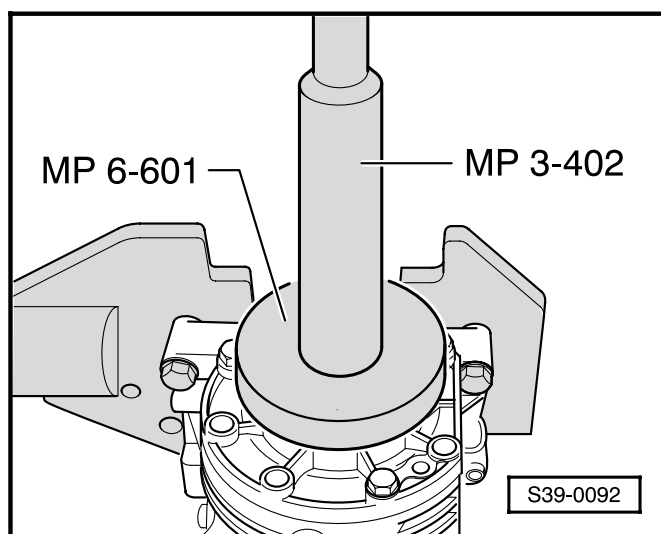
- ◀ - Press outer race for small taper roller bearing into drive pinion housing.



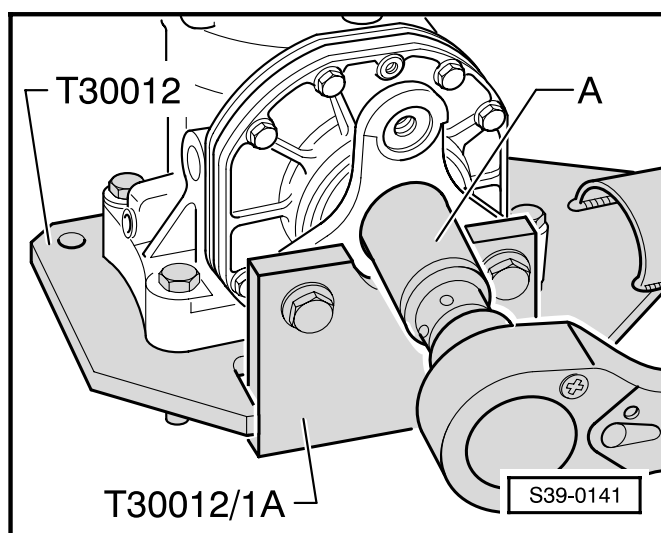
- ◀ - Press outer race for large taper roller bearing into drive pinion housing.
- Fit shim S_3 onto final drive housing.
- Install drive pinion housing with a new O-ring.

Notes:

- ♦ When installing, do not tilt; tighten securing bolts in stages diagonally across.
- ♦ Drive pinion housing can also be removed and installed with output flange in place.



- Insert inner race for small taper roller bearing for shaft bevel gear.
- ◀ - Drive a new seal for output flange until flush.



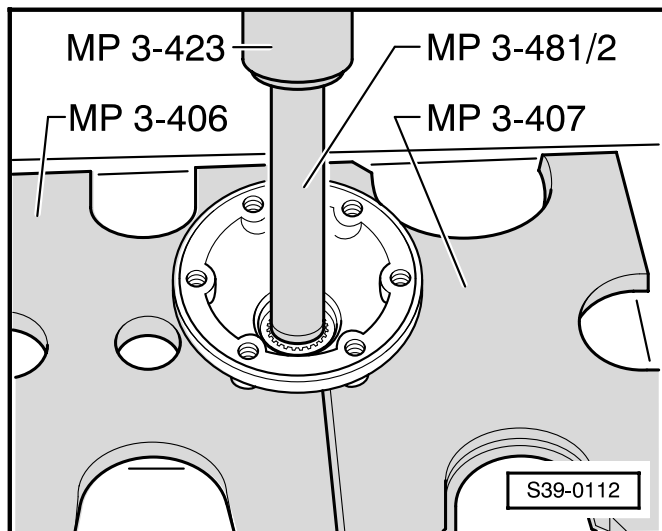
- Install output flange.

The thread of the hexagon nut for the output flange and of the shaft bevel gear must be free of dirt.

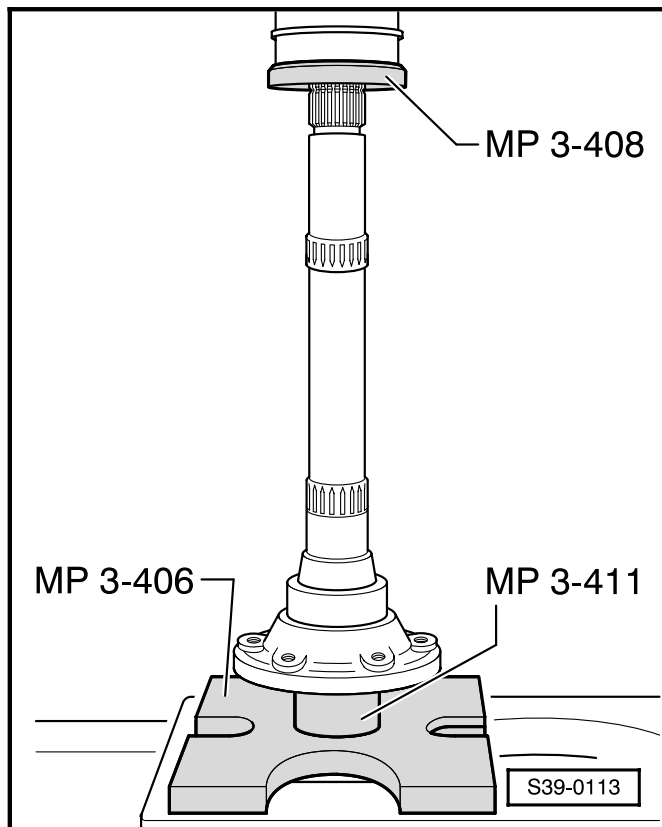
- ◀ - Screw on hexagon nut for output flange to the specified torque.

A - Wrench socket for 3/4 inch drive

- Drive a new seal for joint flange of output shaft as far as the stop ⇒ page 39-3.



◀ - Press joint flange off the output shaft.



◀ - Press joint flange onto output shaft.

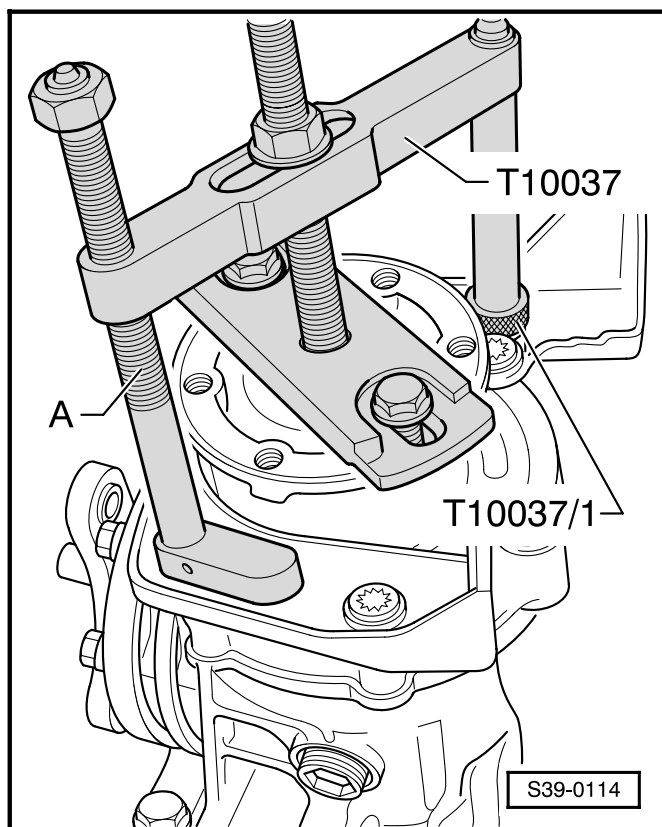
Replacing needle bearing (polygon bearing) for output shaft/right joint flange

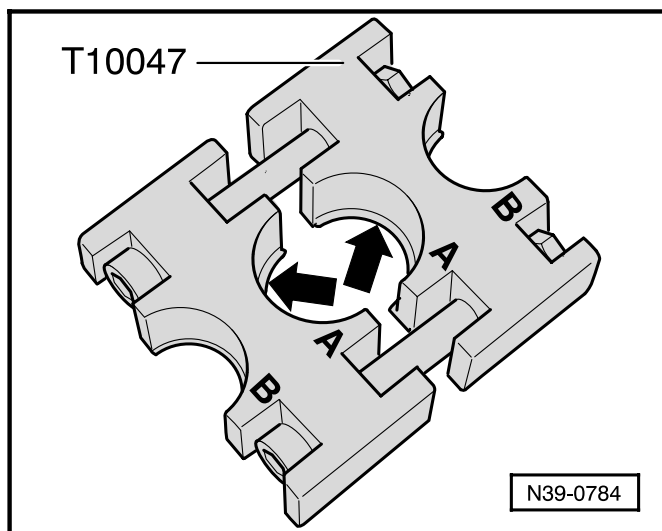
Special tools, testers and aids required

- ◆ Thrust plate MP 3-406
- ◆ Thrust plate MP 3-407
- ◆ Thrust plunger MP 3-408
- ◆ Thrust plunger MP 3-423
- ◆ Thrust bearing MP 6-414/5 from assembly device MP 6-414
- ◆ Pulling device T10037
- ◆ Assembly device T10047
- ◆ Size 6 mm socket V.A.G 1669 or 6 mm wrench socket at least 190 mm long (commercially available)

Removing

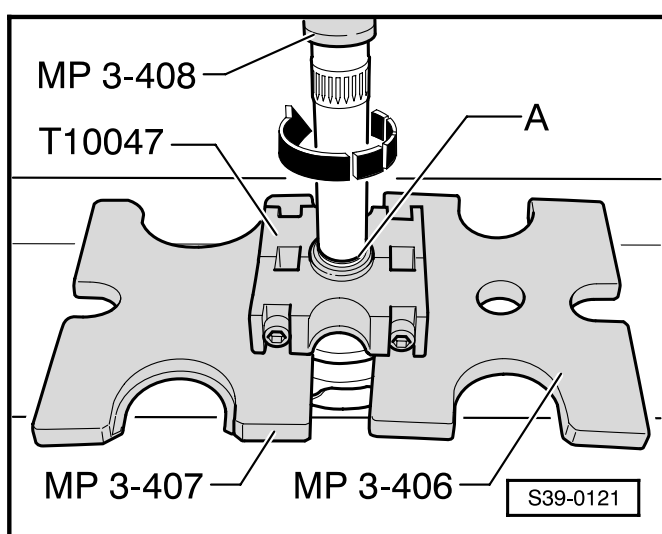
- Take off middle and right part of noise insulation below engine and gearbox.
- Remove drive shaft.
⇒ Running Gear; Repair Group 40; Servicing drive shafts; Removing and installing drive shafts
- Lever out end cap, if fitted, by inserting a screwdriver into the middle of the cap.
- Place a drip tray below the gearbox.
- Remove bolt for right output shaft or for right flange shaft, respectively, using V.A.G 1669 or 6 mm commercially available wrench socket.
- ◀ - Attach pulling device T10037 to the right joint flange.
- Align pulling device parallel to flange with the knurled nut T10037/1 and the bottom support -A-.
- Pull joint flange out together with output shaft.





◀ Now, install the assembly device T10047 as follows:

- Position the two parts of the device so that the markings "A" are pointing toward each other.
- The shoulders (arrows) must be positioned below the bearing.
- Now, bolt together the two halves as far as the stop.



◀ - Lever off circlip -A- for the bearing or bearings.

- The shaft must be rotated during the pressing operation (arrow) in order to avoid damaging the contact surface of the bearing on the shaft.

Installing

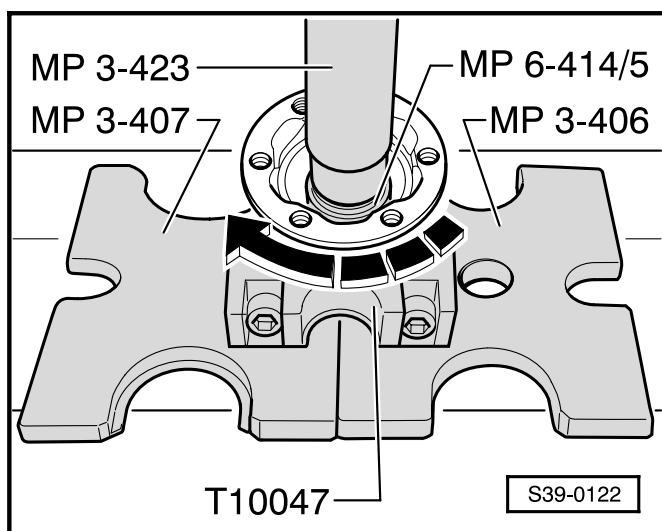
Install the assembly device T10047 ⇒ Fig. N39-0784 on page 39-28.

◀ - The shaft must be rotated during the pressing operation (arrow) in order to avoid damaging the contact surface of the bearing on the shaft.

Note:

In the case of the version with flange shaft, place the wrench for the ring nut MP 3-488 between special tool MP 6-414/5 and flange shaft.

- Secure the bearing or the bearings with a new circlip.
- Carefully knock in joint flange of output shaft or right flange shaft, respectively; rotate during this step.



- Attach joint flange of output shaft or right flange shaft with conical bolt.
- Install new cap.
- Install drive shaft.
⇒ Running Gear; Repair Group 40; Servicing drive shaft; Removing and installing drive shaft
- Inspect gear oil in manual gearbox with bevel box ⇒ page 34-31.

Tightening torques

Flange shaft to gearbox (conical bolt)	25 Nm
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Setting shaft and head bevel gear (drive pinion set)

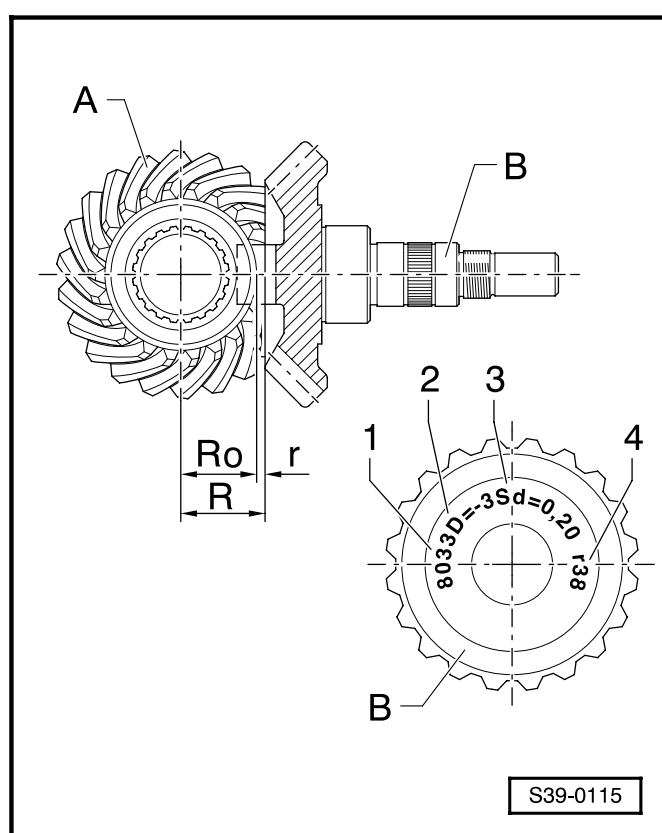
General information

Careful setting of the drive pinion set is essential for ensuring long life and quiet running of the bevel box. For this reason, shaft bevel gears and head bevel gears are matched to each other already during the manufacturing process and inspected for proper positioning of the contact pattern and quiet running with a test machine. The position offering the quietest running is determined by shifting the shaft bevel gear axially,

with the torsional backlash being moved within the specified tolerance.

The variation "r" related to the setting master "Ro" is inscribed on the head bevel gear. Always replace drive pinion set (shaft and head bevel gear) complete!

Setting and inscription of drive pinion sets



A - Head bevel gear

B - Shaft bevel gear

1 - Matching number (8033) of drive pinion set

2 - Shaft bevel gear dimension ($D = -3$)
 ♦ Setting for series production

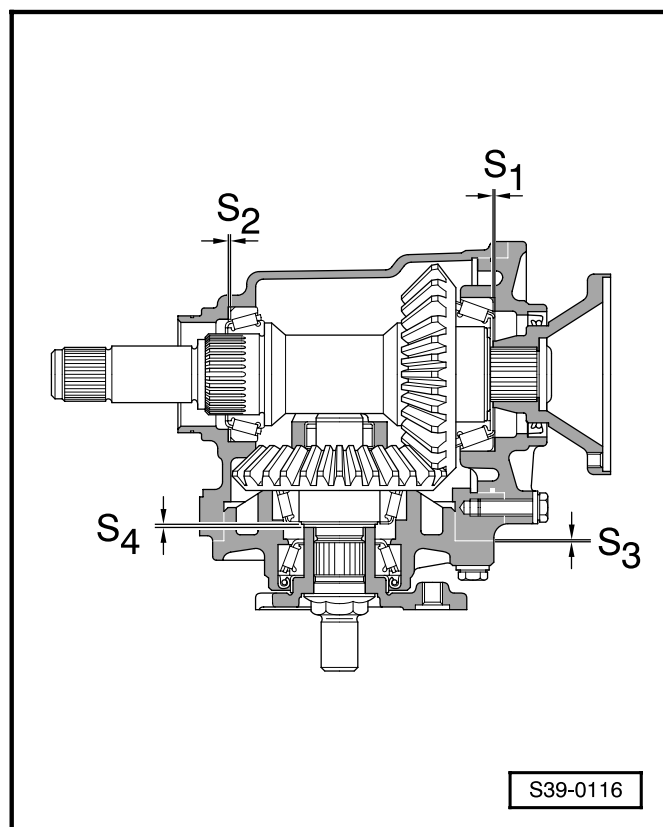
3 - Torsional backlash ($S_d = 0.15$)
 ♦ Inspection dimension

4 - Variation "r" related to the setting master of the inspection machine used in production. The variation "r" is always stated in 1/100 mm. Example: "38" means $r = 0.38$ mm

Ro - Length of setting master used on test machine "Ro" = 36.20 mm

R - Actual dimension between head bevel gear shaft and face end of shaft bevel gear at the point offering the quietest running for this one drive pinion set.

Position of shims



S₁ - Shim for friction torque of taper roller bearing/head bevel gear

S₂ - Shim for friction torque and positioning of head bevel gear

S₃ - Shim for shaft bevel gear

S₄ - Shim for friction torque of taper roller bearing of shaft bevel gear

Overview of settings (bevel box)

Note:

When carrying out removal and installation work on the gearbox, it is only necessary to re-set the shaft bevel gear, head bevel gear or the complete drive pinion set if parts are replaced which have a direct effect on the setting of the final drive. Pay attention to the table below in order to avoid carrying out unnecessary setting operations:

		Setting of the following required:	
		Shaft bevel gear (S ₃ and S ₄) by means of variation "r" ⇒ page 39-34	Head bevel gear (S ₁ and S ₂) ⇒ page 39-39
Part to be replaced:	Final drive housing	x ¹⁾	x
	Cover		x ²⁾
	Drive pinion set (shaft and head bevel gear with input shaft)	x	x
	Taper roller bearing for shaft bevel gear	x	
	Taper roller bearing for head bevel gear		x
	Drive pinion housing	x	
	Output flange	x ³⁾	

1) Only S₃ ⇒ page 39-36. The shaft bevel gear is removed together with the drive pinion housing. Shim S₄ remains unchanged in this case.

2) Only S₁ using total friction torque measured first of all.

3) Only S₄ using differential measurement ⇒ page 39-33.

Recommended sequence for re-setting drive pinion set

If it is necessary to set the shaft bevel gear and head bevel gear, observe the following sequence to ensure a rational workflow:

1. Setting shaft bevel gear (S_3 and S_4)

- Determine thickness of shim " S_4 " and insert. This sets the preload of the taper roller bearings for the shaft bevel gear.
- Determine thickness of shim " S_3 " and insert. This fixes the shaft bevel gear axially so that the dimension from the middle of the head bevel gear to the face end of the shaft bevel gear equals the installation dimension " R " determined during production
- Carry out an inspection measurement for S_3 .

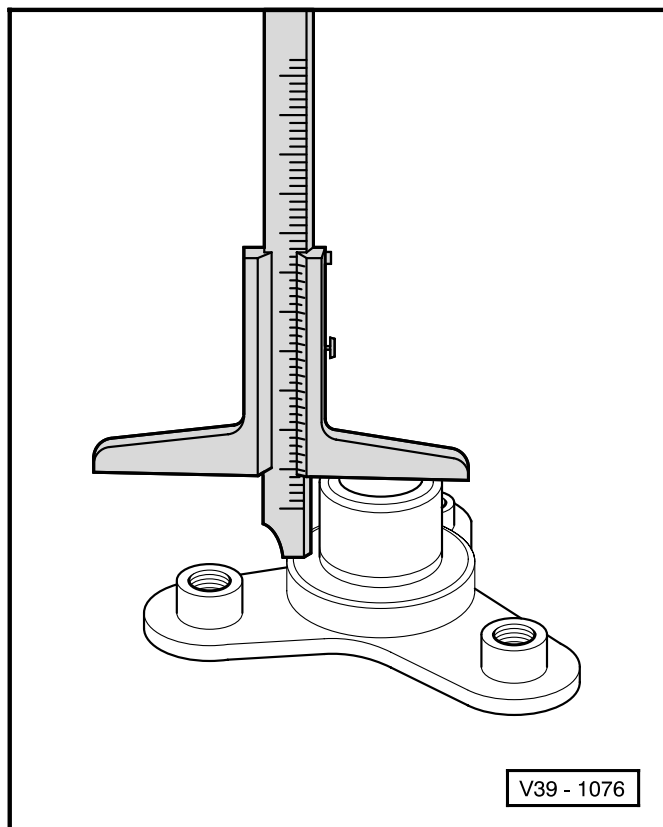
2. Setting head bevel gear (S_1 and S_2)

- Set preload of taper roller bearings for the head bevel gear using $S_{ges.}$ and the friction torque
- Set torsional backlash. Select thickness of the shims " S_1 " and " S_2 " so that specified torsional backlash exists between shaft bevel gear and head bevel gear.
- Inspection of torsional backlash

The aim of the setting is to recreate the position offering the quietest running which was determined on the test machine during production. Scrupulous care and cleanliness when carrying out all removal and installation work and measurement operations are an essential requirement for achieving a proper result.

Re-determining shim “S₄” when replacing output flange

This setting is only necessary if the output flange is replaced. The purpose of the setting is to create the preload of the taper roller bearings for the shaft bevel gear.



- ◀ - Measure length of shaft at the old and at the new output flange and determine the difference.

Example:

Old output flange	25.80 mm
New output flange	25.60 mm
Difference	0.20 mm

If the new output flange is longer - install a thinner shim S₄ equal to the difference.

If the old output flange is longer - install a thicker shim S₄ equal to the difference.

The following sizes of shims are available:

Thickness (mm)	Part No.
0.65	02C 409 280
0.70	02C 409 280A
0.75	02C 409 280B
0.80	02C 409 280C
0.85	02C 409 280D
0.90	02C 409 280E
0.95	02C 409 280F
1.00	02C 409 280G
1.05	02C 409 280H
1.10	02C 409 280J
1.15	02C 409 280K
1.20	02C 409 280L
1.25	02C 409 280M
1.30	02C 409 280N
1.35	02C 409 280P
1.40	02C 409 280Q

Setting shaft bevel gear

Special tools, testers and aids required

- ◆ Universal measuring device VW 385
- ◆ Thrust piece MP 3-420
- ◆ Pipe section MP 3-450
- ◆ Thrust piece MP 6-418
- ◆ Gearbox holder T30012
- ◆ Stop plate T30012/1A
- ◆ Commercially available torque gauge
- ◆ Dial gauge
- ◆ M 10 hexagon bolt
- ◆ $\varnothing$ 1.5 mm solder wire

It is necessary to re-set the shaft bevel gear if:

- ◆ Final drive housing
- ◆ Taper roller bearings for shaft bevel gear
- ◆ Drive pinion set

or the

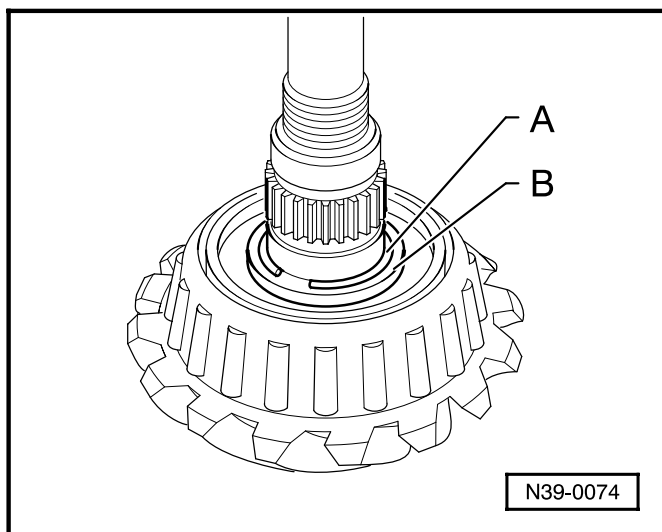
- ◆ Drive pinion housing

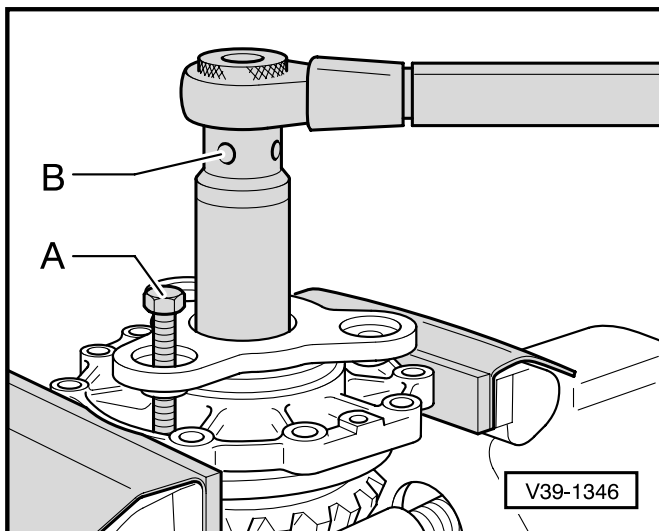
are replaced.

Overview of settings $\Rightarrow$ page 39-31

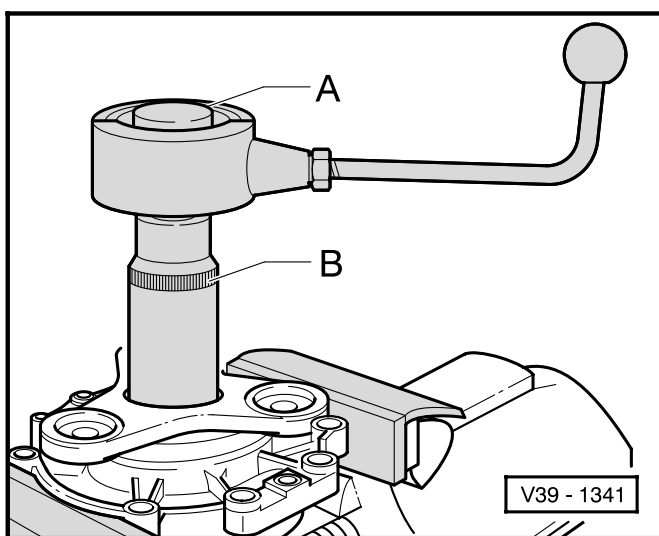
Determining thickness of shim "S₄"

- Use thrust piece MP 3-420 to press outer race of the large taper roller bearing for shaft bevel gear into the drive pinion housing.
- Use thrust piece MP 6-418 to press outer race of the small taper roller bearing for shaft bevel gear into the drive pinion housing.
- Use pipe section MP 3-450 to press inner race of the large taper roller bearing onto the shaft bevel gear.
- ◀ - A - Fit on $\varnothing$ 1.5 mm solder wire in place of the shim S₄.
- B - Fit on spacer ring with chamfer pointing toward shaft bevel gear.





- Insert shaft bevel gear.
- Insert inner race of small taper roller bearing and output flange and fit on hexagon nut.
- ◀ - A - Screw in M 10 hexagon bolt as a counter-support.
- B - Wrench socket
- Tighten hexagon nut to 20 Nm, turn back hexagon bolt -A- or turn out fully.



- ◀ - Measure friction torque.
- A - Commercially available torque gauge, 0...600 Ncm
- B - Wrench socket
- Increase the tightening torque further, if necessary, until the specified friction torque is obtained.

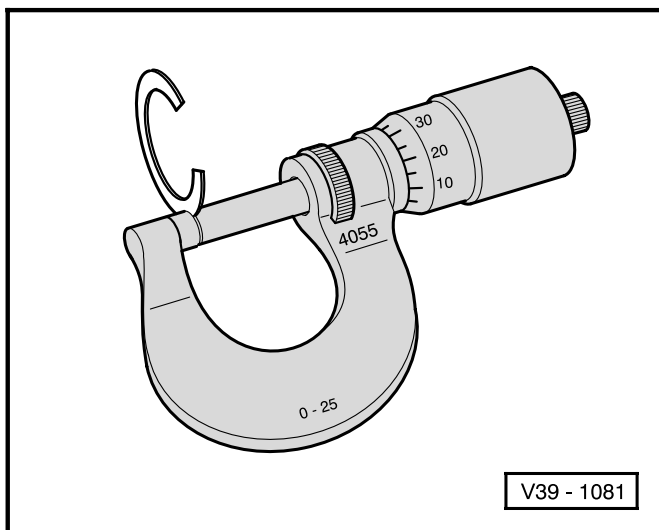
Note:

Increase tightening torque only slowly and read off the friction torque several times when doing this; if the specified friction torque is exceeded, the solder wire must be replaced and the setting repeated.

Set the following friction torques:

new bearings	used bearings ¹⁾
100 ... 240 Ncm	30 ... 50 Ncm

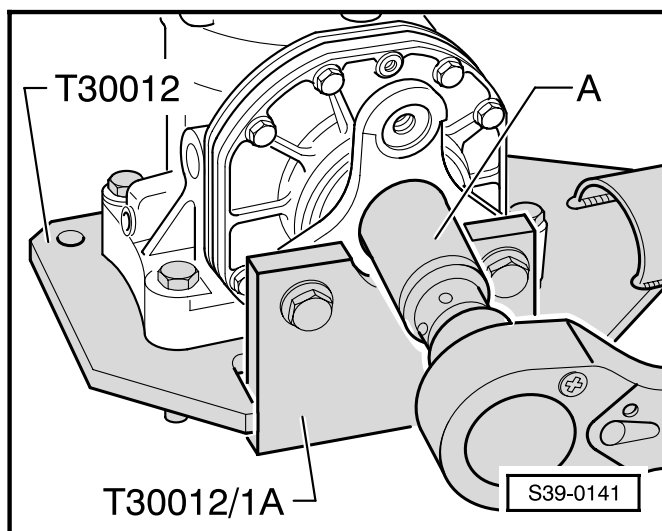
¹⁾ Distance travelled at least 50 km



- Remove shaft bevel gear and carefully take off the squeezed solder wire.
- ◀ - Measure thickness of the solder wire at a properly compressed point - without shoulder.
- Select a shim(s) of the same thickness.

The following sizes of shims are available:

Thickness (mm)	Part No.
0.65	02C 409 280
0.70	02C 409 280A
0.75	02C 409 280B
0.80	02C 409 280C
0.85	02C 409 280D
0.90	02C 409 280E
0.95	02C 409 280F
1.00	02C 409 280G
1.05	02C 409 280H
1.10	02C 409 280J
1.15	02C 409 280K
1.20	02C 409 280L
1.25	02C 409 280M
1.30	02C 409 280N
1.35	02C 409 280P
1.40	02C 409 280Q



- Insert shim S_4 and install shaft bevel gear.
- ◀ - Insert hexagon nut with gear oil and tighten fully to 350 Nm.

A - Wrench socket for 3/4 inch drive

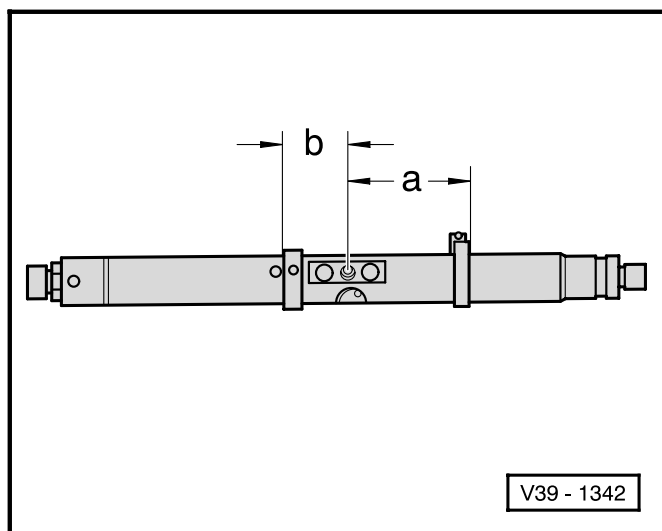
Performing inspection measurement - inspecting friction torque

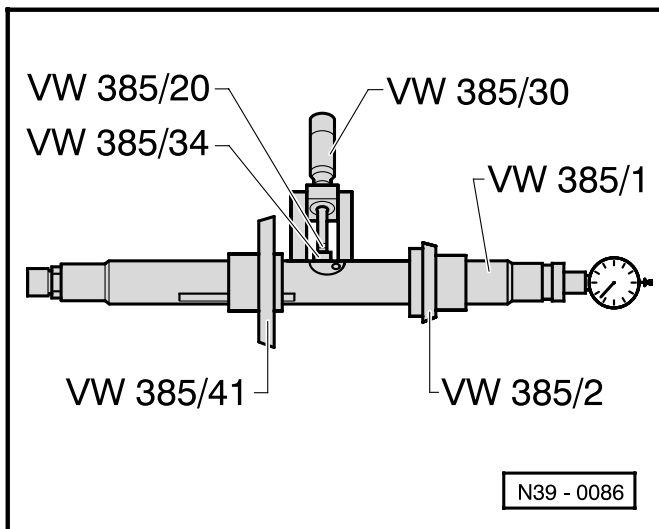
Friction torques ⇒ page 39-35

Set correct friction torque, if necessary, by inserting a thinner shim S_4 (to increase friction torque) or a thicker one (to reduce friction torque).

Determining thickness of shim S_3

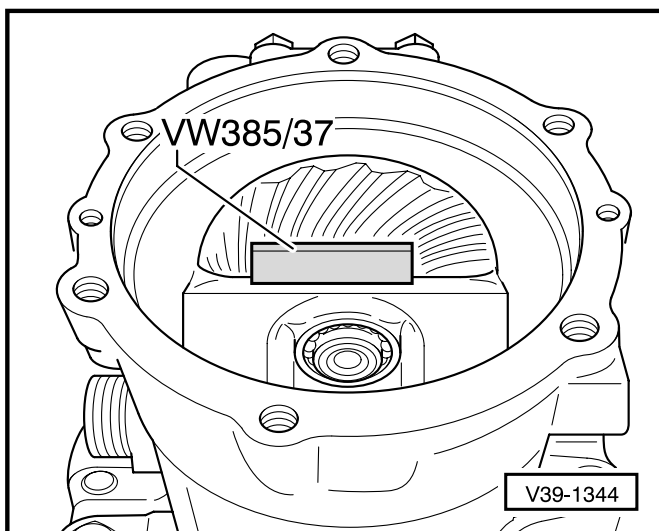
- Install drive pinion housing together with shaft bevel gear and correct size of shim S_4 .
- Do not insert O-ring.
- ◀ - Set positioning ring of universal gauge VW 385/1 to the dimension $a = 75$ mm.
- Set moving positioning ring to dimension $b = 32$ mm.



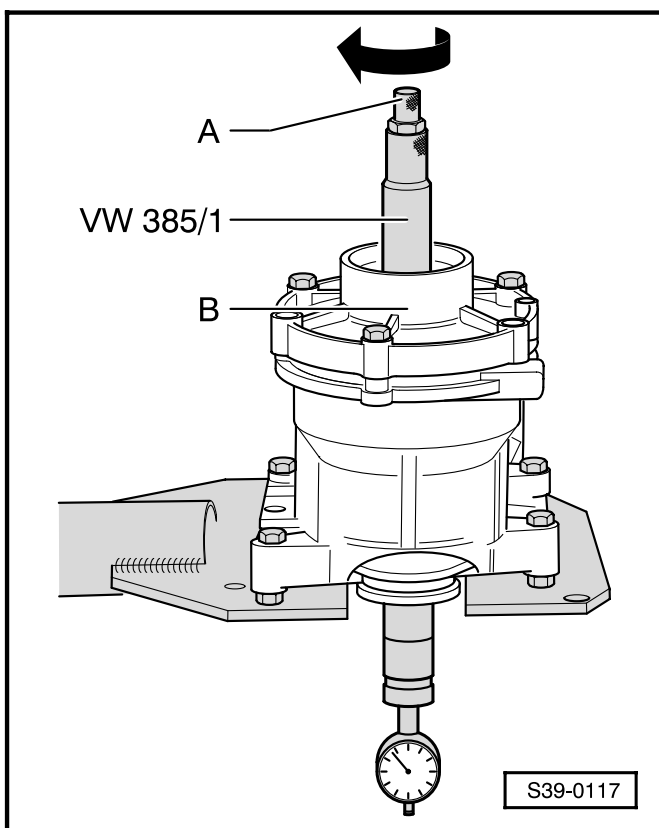


- Fit remaining parts to universal gauge as shown in illustration.
Dial gauge extension VW 385/20 = 3 mm long.

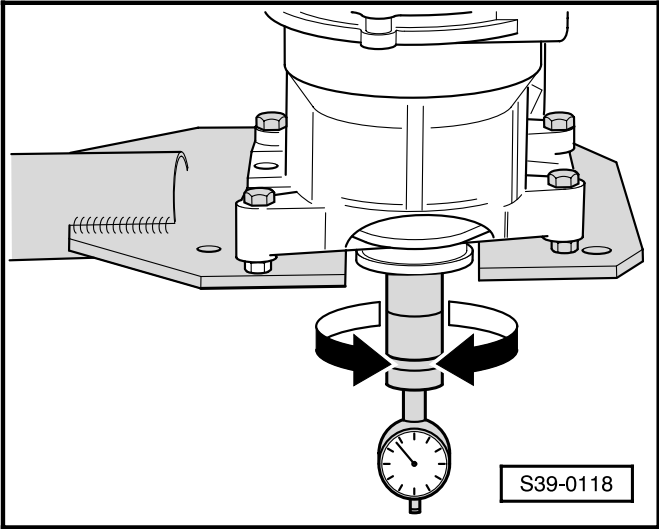
Set universal setting master VW 385/30 to $R_o = 36.20$ mm.



- Set dial gauge to zero with a preload of 3 mm.
- Fit end gauge plate onto the head of the shaft bevel gear.



- Insert universal gauge.
- Fit on cover -B- together with outer race for large taper roller bearing and tighten hexagon bolts.
- Turn bolt -A- in clockwise direction -arrow-.
- The centering plate VW 385/41 ($\Rightarrow$ Fig. N39-0086, page 39-37) is pulled into the cover by means of the moving positioning ring.
- It must still be possible to rotate the universal gauge by hand.



- ◀ - Measure dimension „e“. Rotate plug gauge until the tip of the dial gauge touches the end gauge plate and indicates the maximum deflection (reversal point). The measurement indicated is dimension „e“. Example: 0.47 mm
- Remove universal plug gauge.

Note:

After this, once again check whether the dial gauge indicates „0“ when the master gauge VW 385/30 is fitted on, and the preload is 3 mm; if not, repeat measurement.

Determining thickness of shim S₃

$S_3 = e + r$

- e - Value measured (max. deflection)
- r - Variation (indicated on head bevel gear in 1/100 mm)

Example:

Value indicated on dial gauge „e“	0.47 mm
Variation „r“ inscribed on head bevel gear	+ 0.33 mm
Thickness of shim S ₃	= 0.80 mm

The following shims are available:

Thickness (mm)	Part No.
0.65	02C 409 114L
0.70	02C 409 114M
0.75	02C 409 114N
0.80	02C 409 114P
0.85	02C 409 114Q
0.90	02C 409 114R
0.95	02C 409 114S
1.00	02C 409 114T
1.05	02C 409 114AA
1.10	02C 409 114AB
1.15	02C 409 114AC
1.20	02C 409 114AD
1.25	02C 409 114AE
1.30	02C 409 114AF
1.35	02C 409 114AG
1.40	02C 409 114AH
1.45	02C 409 114AJ
1.50	02C 409 114AK

- Remove drive pinion housing together with shaft bevel gear.
- Install calculated size of shim S_3 .

Performing inspection measurement - inspecting dimension "R"

Insert universal gauge and measure dimension "R".

If the correct sized of shims have been selected, the dial gauge must indicate the figure of the variation "r" inscribed on the head bevel gear with a tolerance of + 0.04 mm, when read off in a clockwise direction (red numerical range).

Setting head bevel gear

Special tools, testers and aids required

- ◆ End gauge plate MP 3-405/17
- ◆ Universal dial gauge holder MP 3-447
- ◆ Pipe section MP 3-462/4
- ◆ Sleeve MP 3-462/13
- ◆ Varying measuring lever T30014
- ◆ Dial gauge
- ◆ Dial gauge extension 30 mm

It is necessary to re-set the head bevel gear if:

- ◆ Final drive housing
- ◆ Cover
- ◆ Taper roller bearings for head bevel gear/input shaft

or the

- ◆ Drive pinion set

are replaced.

Overview of settings ⇒ page 39-31

Setting preload of taper roller bearings for head bevel gear (friction torque)

The shaft bevel gear is removed.

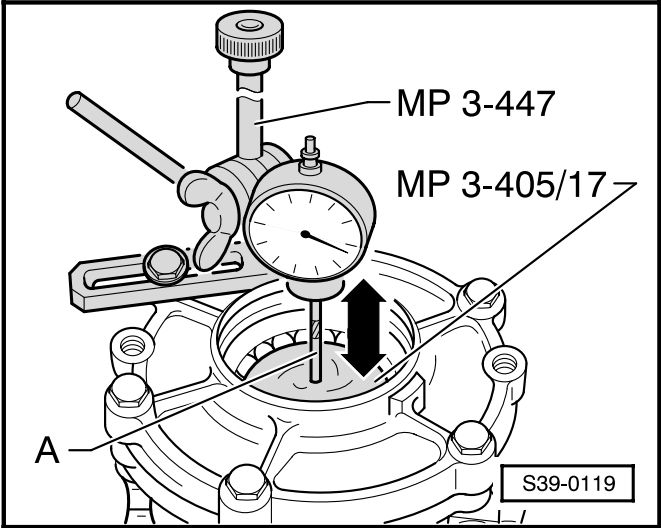
- Insert an 1.2 mm shim (Part No. 113 517 211 A) into the seat of the outer race for the small taper roller bearing (S_2 side).
- Press in outer race $\Rightarrow$ page 39-23.
- Insert head bevel gear of input shaft together with taper roller bearing.
- Install cover together with outer race for large taper roller bearing without O-ring, without seal for joint flange and without shim S_1 .
- Press head bevel gear of input shaft toward cover and turn it eight times.
- Press head bevel gear of input shaft toward outer race for small taper roller bearing and turn eight times.

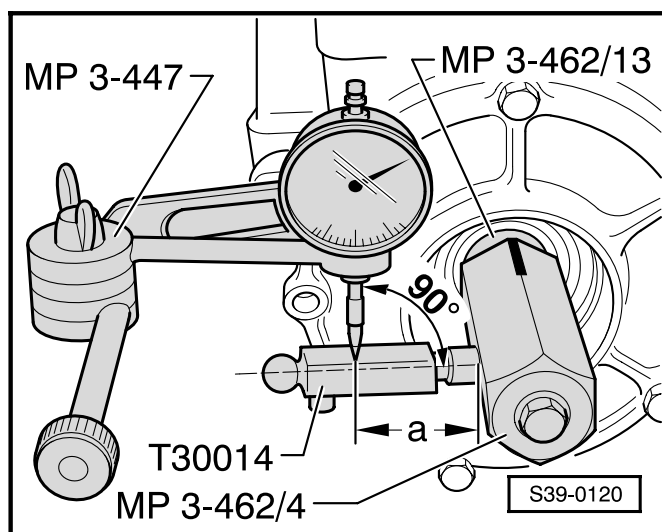
- ◀ - Fit on dial gauge (preload 2 mm)
A - Dial gauge extension 30 mm
- Move head bevel gear of input shaft up and down (in direction of arrow).
- Read off play on the dial gauge and determine $S_{tot.}$.

Example:

Shim	1.20 mm
+ Compression (constant figure)	0.30 mm
+ Play (indicated on dial gauge)	0.35 mm
$S_{tot.} =$	1.85 mm

Insert shim of $S_{tot.}$ in place of the 1.20 mm thick shim.





Determining thickness of shim S_2 (setting torsional backlash)

Drive pinion housing together with shaft bevel gear and S_3 installed.

Head bevel gear of input shaft installed on the S_2 side with S_{tot} (example: 1.85 mm). Friction torques for bearings of head bevel gear of input shaft and shaft bevel gear must be correct.

Fit on measuring tools.

- ◆ Dial gauge extension approx. 25 mm long
- ◆ Dimension "a" = 39 mm
- ◆ Screw in measuring lever T30014 so that the dial gauge extension is positioned at right angles to the measurement surface.

- Turn head bevel gear of input shaft as far as the stop. Set dial gauge to zero, turn head bevel gear of input shaft back and read off torsional backlash. Note reading.
- Slacken clamping bolt of tensioning sleeve and turn on head bevel gear of input shaft by 90° . Note reading. Carry out measurement a total of 4 times. Add together the four measurements obtained and calculate the average torsional backlash.

Calculating average torsional backlash

Example:

1st measurement	1.25 mm
+ 2nd measurement	1.24 mm
+ 3rd measurement	1.25 mm
+ 4th measurement	1.26 mm
Total	5.00 mm

Average torsional backlash = $5.00 \text{ mm} : 4 = 1.25 \text{ mm}$.

Note:

The ratio of the torsional backlash to the shift of the head bevel gear of the input shaft approximately equals the ratio 1:1. For this reason, the average torsional backlash calculated can be used directly for calculating S_2 .

Determining thickness of shim S_2

$$S_2 = \begin{array}{l} \text{Shim inserted (S}_{\text{tot.}}\text{)} \\ - \text{Average torsional backlash} \\ + \text{Lift (constant figure)} \end{array}$$

Lift = 0.20 mm

Example:

Shim inserted ($S_{\text{tot.}}$)	1.85 mm
– Average torsional backlash	1.25 mm
	0.60 mm
+ Lift (constant figure)	0.20 mm
$S_2 =$	0.80 mm

The following sizes of shims are available:

Thickness (mm)	Part No.
0.15	113 517 201A
0.20	113 517 202A
0.30	113 517 203A
0.40	113 517 204A
0.50	113 517 205A
0.60	113 517 206A
0.70	113 517 207A
0.80	113 517 208A
0.90	113 517 209A
1.00	113 517 210A
1.20	113 517 211A

- Install calculated size of shim S_2 in place of $S_{\text{tot.}}$

If the thickness of shim measured is greater than the shims listed in the table, 2 shims which correspond to the measurement, can be installed.

- Different tolerances make it possible to exactly gauge the required thickness of shim.
- Press in outer race again and insert head bevel gear of input shaft.

Determining thickness of shim S_1

$$S_1 = S_{\text{tot.}} - S_2$$

Example:

$$S_1 = 1.85 \text{ mm} - 0.80 \text{ mm}$$

$$S_1 = 1.05 \text{ mm}$$

The following sizes of shims are available:

Thickness (mm)	Part No.
0.70	02C 409 247P
0.75	02C 409 247Q
0.80	02C 409 247R
0.85	02C 409 247S
0.90	02C 409 247T
0.95	02C 409 247AA
1.00	02C 409 247AB
1.05	02C 409 247AC
1.10	02C 409 247AD
1.15	02C 409 247AE
1.20	02C 409 247AF
1.25	02C 409 247AG
1.30	02C 409 247AH
1.35	02C 409 247AJ

- Insert the calculated size of shim S_1 .

If the measured thickness of the shim is greater than that listed in the table, 2 shims which equal the measurement obtained, can be installed.

- Different tolerances make it possible to exactly determine the required thickness of shim.
- Press in outer race again.
- Fit on cover.

Performing inspection measurement - measuring torsional backlash

- This must be 0.15...0.25 mm.

Removing and installing propeller shaft

Special tools, testers and aids required

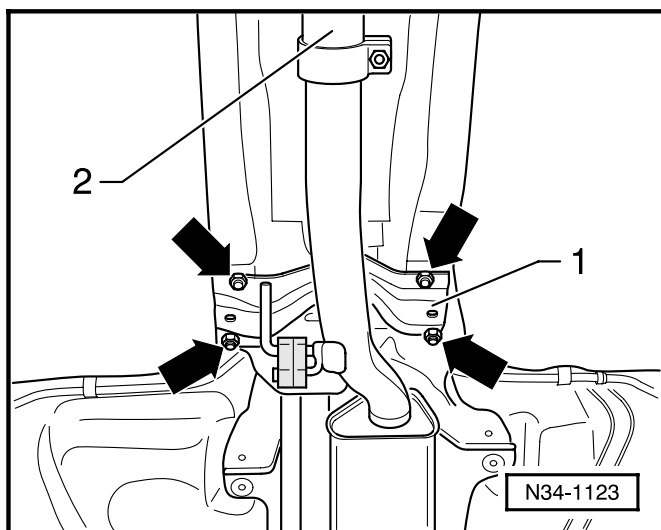
- ◆ M 8 x 80 mm bolt and nut

Notes:

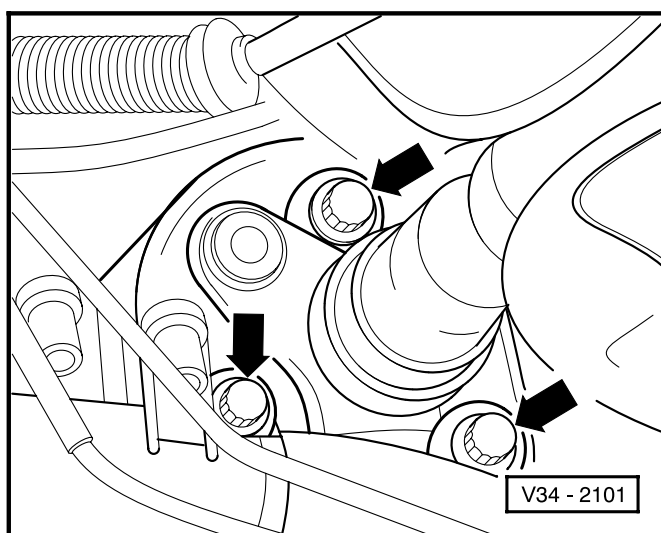
- ◆ Before removing, mark the position of all the parts to each other. Re-install in the same position, otherwise the imbalance will be excessively large. This may result in damage to the bearings and in rumbling noises.
- ◆ Do not bend the propeller shaft. Always store and transport stretched.
- ◆ The seals in the flanges of the propeller shaft must not be damaged during removal and installation.

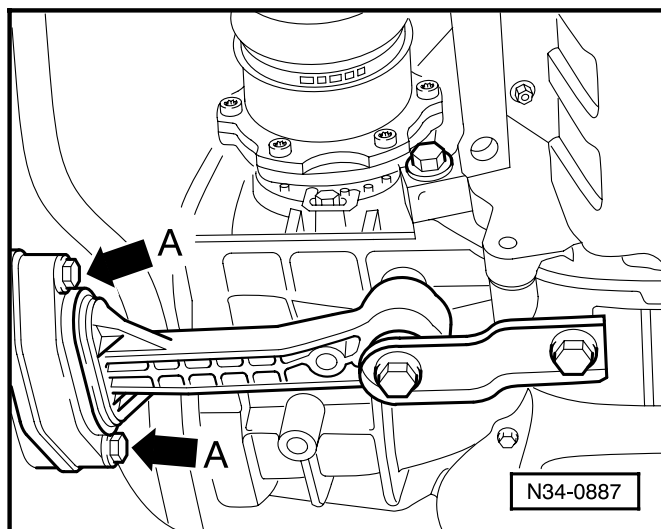
Removing

- ◀ - Take off bracket -1- above the exhaust system -arrows-.
- Separate exhaust system at the double clamp -2- and remove together with catalytic converter (2nd person required).
⇒ Repair Group 26; Removing and installing parts of the exhaust system.
- Now, remove the middle and front shields.

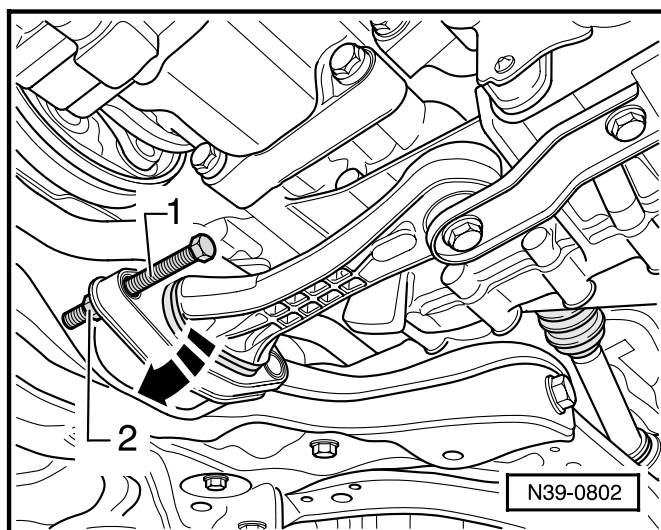


- ◀ - Unbolt propeller shaft together with flexible joint from the flange of the bevel box (arrows).





- Take pendulum support off the subframe (arrows - A -).

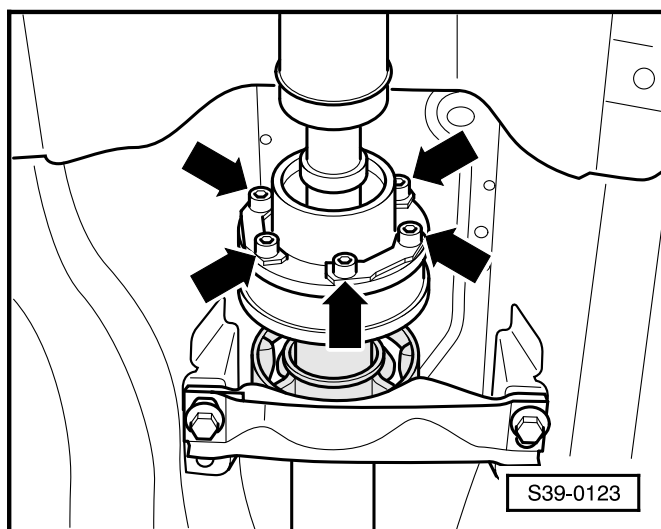


- Carefully push engine/gearbox forward and at the same time move the pendulum support up in front of the subframe -arrow-.
- Secure the pendulum support to the subframe with bolt -1- (M8x80 mm) and nut -2-.

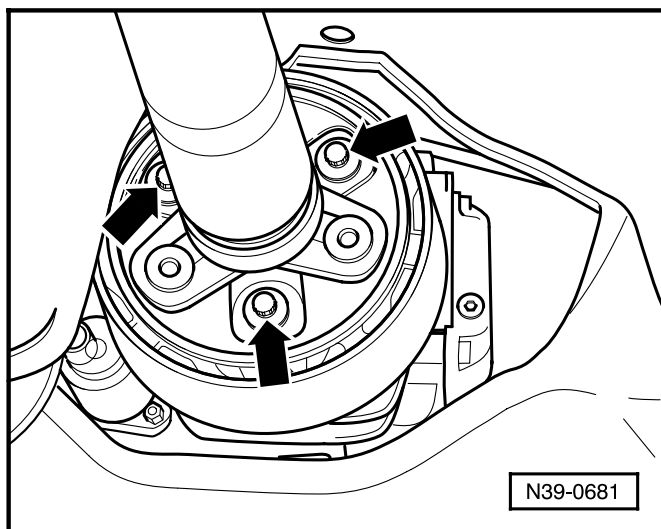
Note:

Rectify any paint damage as follows:

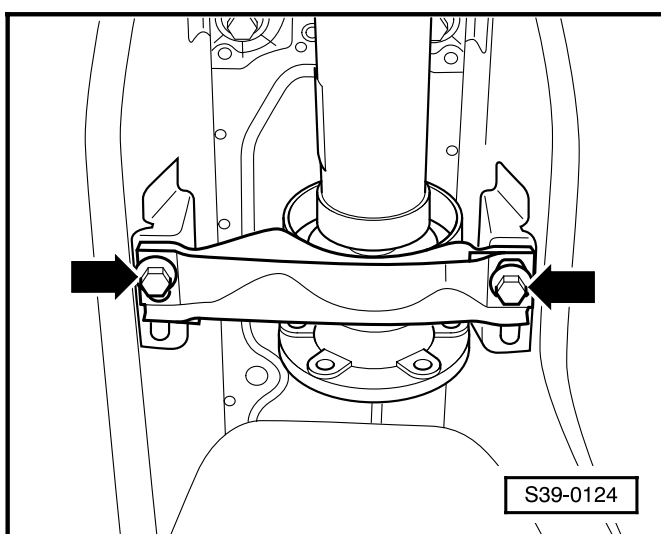
- Remove grease residues with nitro thinner L001 600.
- Apply 2-component acrylic paint ALN 769 041 with hardener ALZ 009 001.



- Detach front propshaft tube from the rear propshaft tube -arrows-.
- Carefully pull front propshaft tube off the centering stud.
- Swivel down front propshaft tube and remove.



- ◀ - Unbolt rear propshaft tube together with flexible joint and vibration damper from the rear final drive -arrows- and carefully pull them off the centering stud.



- ◀ - Unbolt middle bearing of propshaft from vehicle -arrows-.
- Carefully pull rear propshaft tube off the centering stud.

Notes:

- ◆ Flexible joint and vibration damper cannot be separated from each other.
- ◆ Do not tilt the propshaft when taking it off; pull it off the centering stud horizontally. Seal of centering sleeve (⇒ Fig. V39-1817) must not be damaged, otherwise the propshaft tube should be replaced.

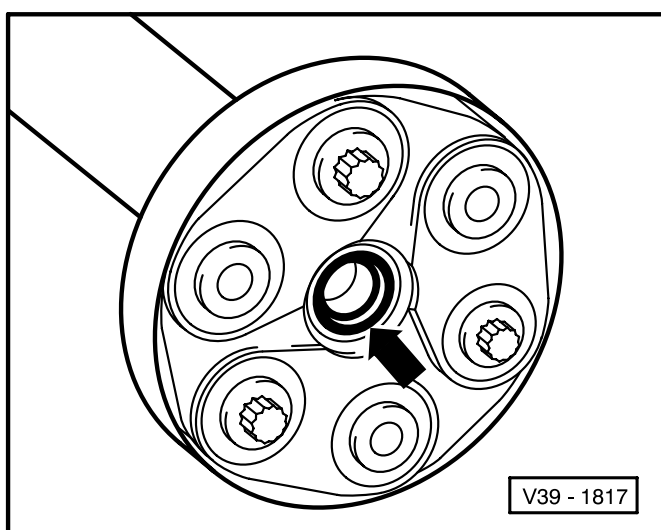
Installing

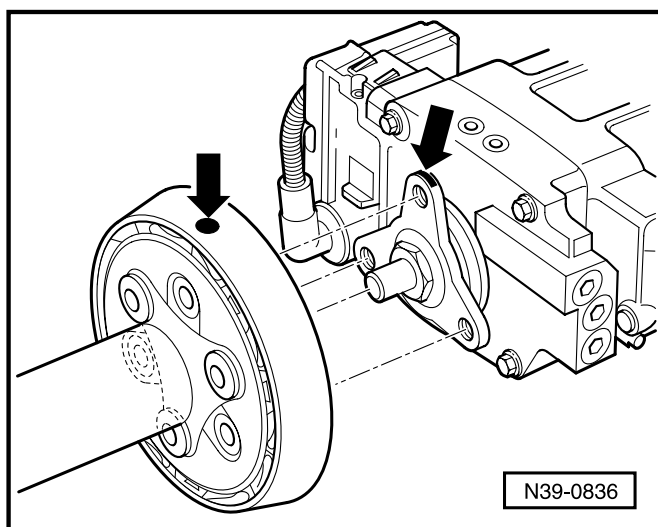
Install in the reverse order.

- Do not tighten the bolts of the middle bearing to the body fully until after installing the propshaft.

Notes:

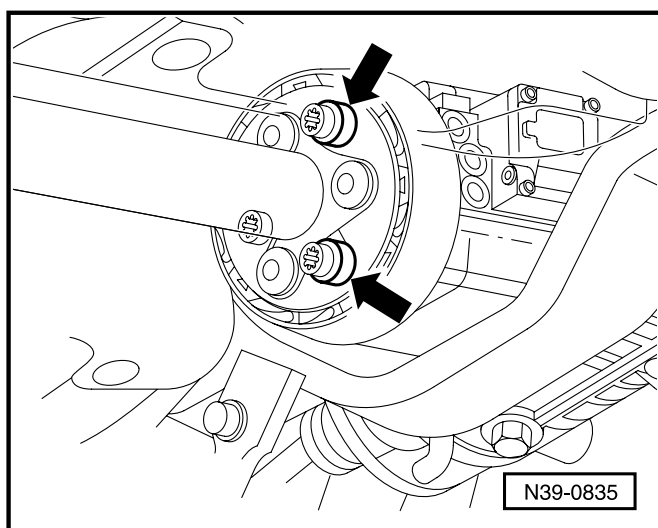
- ◀ ◆ Seals -arrow- in the flanges of the propshaft must not be damaged when carrying out removal and installation.
- ◆ Three projecting sleeves each at the gear-box flange and the flange of the rear final drive and propshaft flange mesh into the mounting holes of the flexible joints.
- ◆ If damaged, replace propshaft.
- ◆ Push propshaft horizontally onto the relevant guide studs.





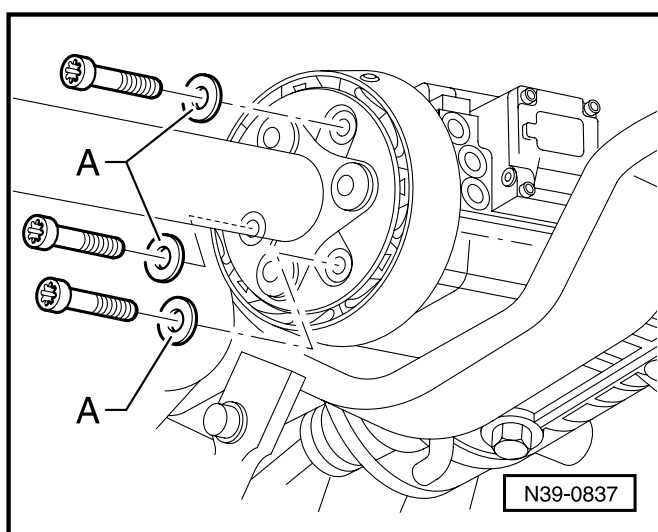
Fitting location of rear flexible joint

- ◀ - Attach the propshaft to the flange of the Haldex clutch so that the markings -arrows- are aligned.



- ◀ **Balancing plates and new bolts have been used from 04.00 for attaching the propshaft to the flange of the Haldex clutch -arrows-**

Two bolts can be attached each with a balancing plate.



- ◀ In order to avoid rumbling noises, it may be necessary, after selecting the bolts, to replace the balancing plates with washers -A-.

Assignment of washers ⇒ Parts List.

Notes:

If rumbling noises occur when driving, it is then necessary to carry out the following steps:

- ◆ *Unbolt propshaft with flexible joint from flange of Haldex clutch and bolt on again re-positioned by one hole.*
- ◆ *If the rumbling noises can still be heard, the propshaft must then be bolted on once again, offset by one hole.*

Installing centre bearing free of stress

- Align the centre bearing in its slots so that the propshaft is not twisted.

Tightening torques

Components	Tightening torque
Pendulum support to subframe ¹⁾ M8	20 Nm + 90°
Middle bearing to body	25 Nm
Front propshaft tube to rear	40 Nm
Flexible joints to propshaft	60 Nm
Flexible joint to rear final drive	60 Nm
Flexible joint to bevel box	60 Nm

¹⁾ Always replace these bolts.

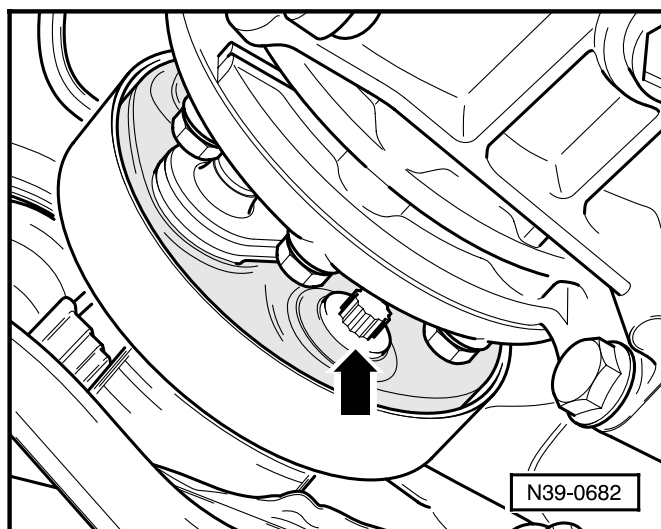
Removing and installing front flexible joint

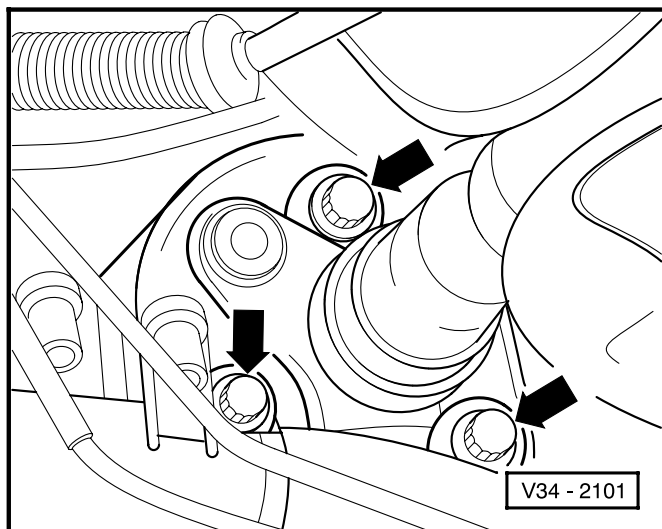
Note:

Before removing, mark the position of all the parts to each other. Re-install in the same position otherwise the imbalance will be excessively large. This might result in damage to the bearing and in rumbling noises.

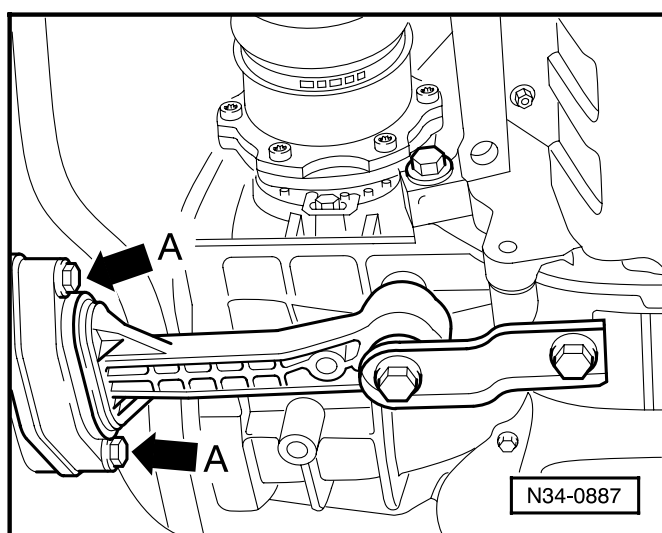
Removing

- ◀ - Unbolt flexible joint from the propshaft (only one of the three bolts is visible here -arrow-).





- ◀ - Unbolt flexible joint from the flange of the bevel box (arrows).
- Separate rear exhaust system from the front exhaust pipe.
- ⇒ Repair Group 26; Removing and installing parts of the exhaust system.



- ◀ - Detach pendulum support from the subframe (arrows -A-).
- Carefully push engine/gearbox forward.
- Carefully take out flexible joint.

Installing

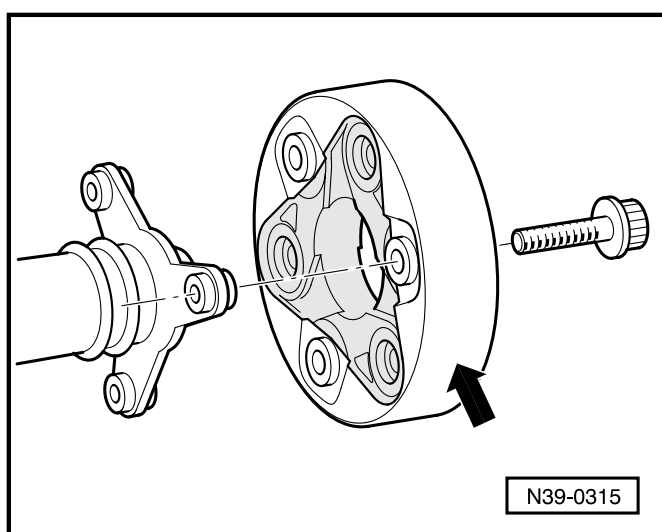
Installation is carried out in the reverse order. Pay attention to the following points:

◀ Fitting location of front flexible joint

- ◆ The shield (arrow) points toward the middle bearing.
- ◆ Three projecting sleeves each at the gear-box flange and propshaft flange mesh into the mounting holes of the flexible joint.

Notes:

- ◆ Seals in the flanges of the propshaft must not be damaged during removal and installation.
- ◆ If damaged, replace propshaft.
- ◆ Push propshaft horizontally onto the relevant guide stud.



Tightening torques

Components	Tightening torque
Pendulum support to subframe ¹⁾ M8	20 Nm + 90°
Flexible joint to propshaft	60 Nm
Flexible joint to bevel box	60 Nm

¹⁾ Always replace these bolts.

Removing and installing rear flexible joint**Special tools, testers and aids required**

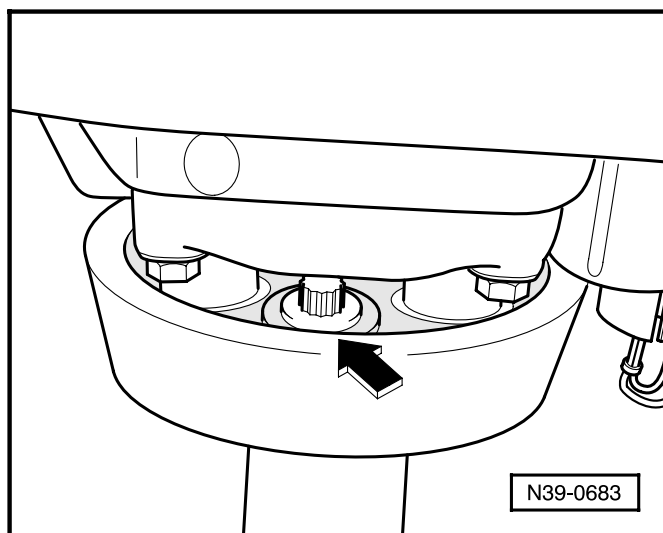
- ◆ M 8 x 80 mm bolt with nut

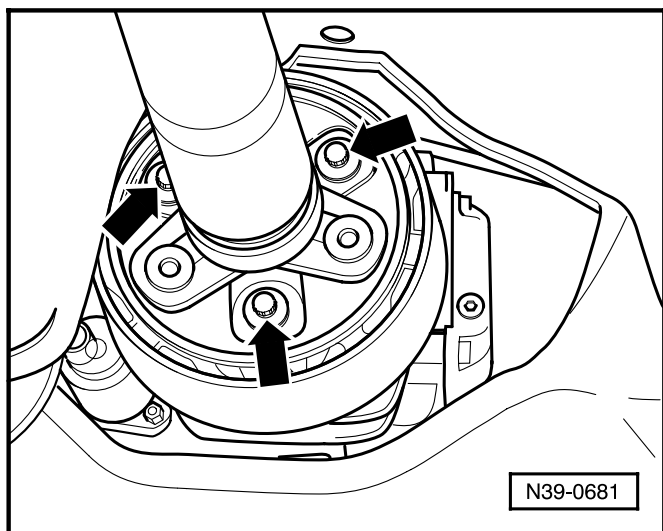
Note:

Before removing, mark the position of all the parts to each other. Re-install in the same position otherwise the imbalance will be excessively large. This might result in damage to the bearing and in rumbling noises.

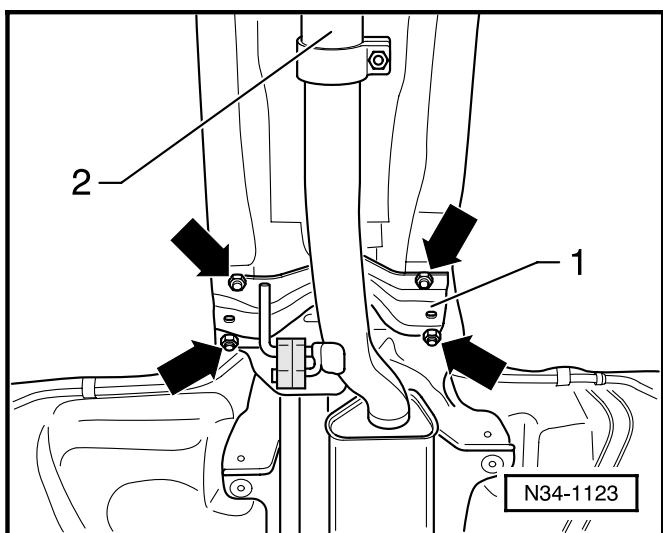
Removing

- ◀ - Unbolt flexible joint from the propshaft (only one of the three bolts is visible here -arrow-).

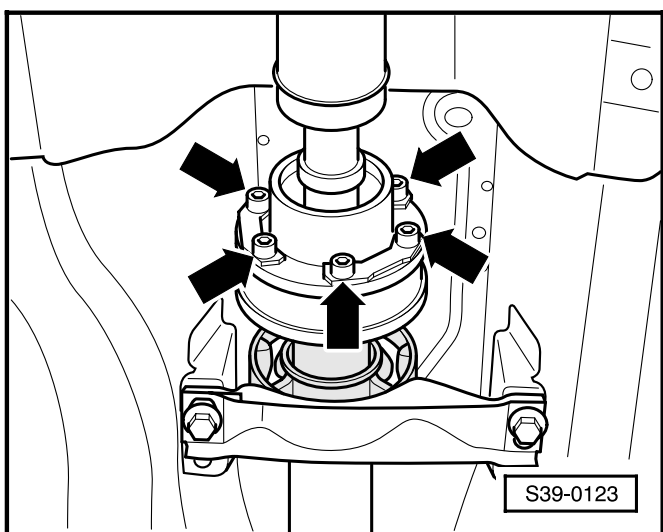




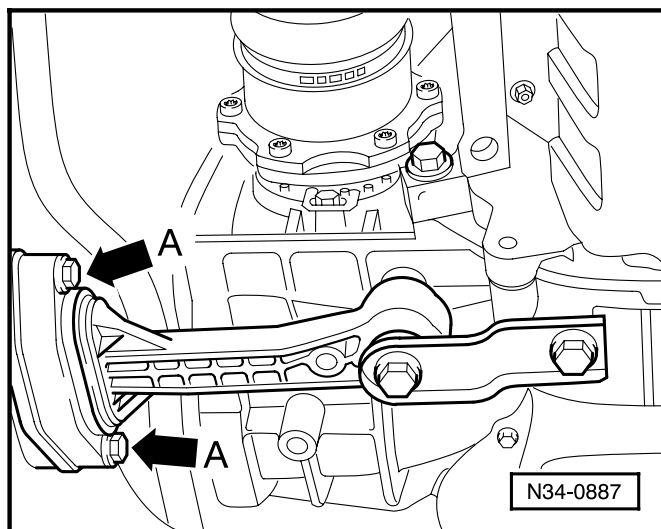
- ◀ - After this, unbolt the flexible joint from the rear final drive -arrow-.



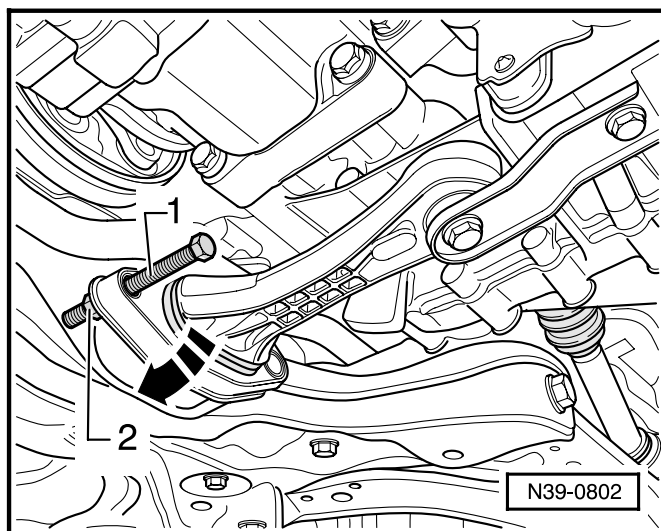
- ◀ - Take off bracket -1- above the exhaust system -arrows-.
- Separate exhaust system at the double clamp -2-.
 - ⇒ Repair Group 26 of the particular engine
 - Remove front and middle shield.



- ◀ - Detach front propshaft tube from rear propshaft tube -arrows-.



- ◀ - Detach pendulum support from the subframe (-arrows A-).

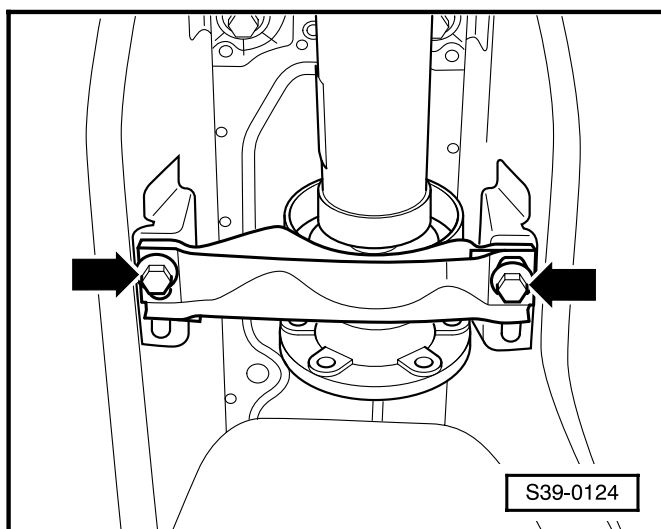


- ◀ - Carefully push engine/gearbox forward and at the same time position pendulum support up against the subframe (arrow).
- Secure the pendulum support to the subframe with the bolt -1- (M8 x 80 mm) and the nut -2-.

Note:

Rectify any paint damage as follows:

- Remove grease residues with nitro thinner L001 600.
- Apply 2-component acrylic paint ALN 769 041 with hardener ALZ 009 001.



- ◀ - Unbolt middle bearing of the propshaft from the vehicle -arrows-.
- After this, push the rear propshaft tube over the front propshaft tube only far enough to enable the flexible joint to be removed.

Installing

Installation is carried out in the reverse order.
Pay attention to the following points:

Notes:

- ◀ ♦ *Seals -arrows- in the flanges of the propshaft must not be damaged during removal and installation.*
- ♦ *If damaged, replace propshaft.*
- ♦ *Push propshaft horizontally onto the relevant guide stud.*

Fitting location of rear flexible joint

- ♦ Three projecting sleeves each at the gear-box flange and propshaft flange mesh into the mounting holes of the flexible joint.
- ♦ If the propshaft is attached to the flange of the Haldex coupling with balancing plates and twelve-point socket bolts, pay attention to the notes from page 39-44 for removing and installing propshaft.
- ◀ - Attach the propshaft to the flange of the Haldex coupling so that the markings -arrows- are in a line.

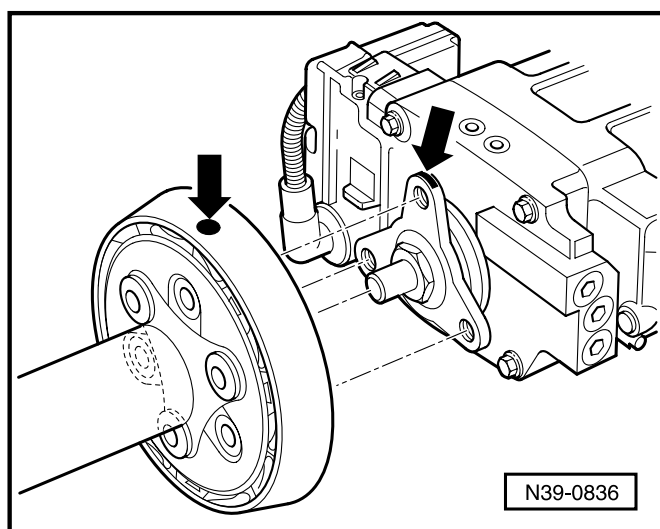
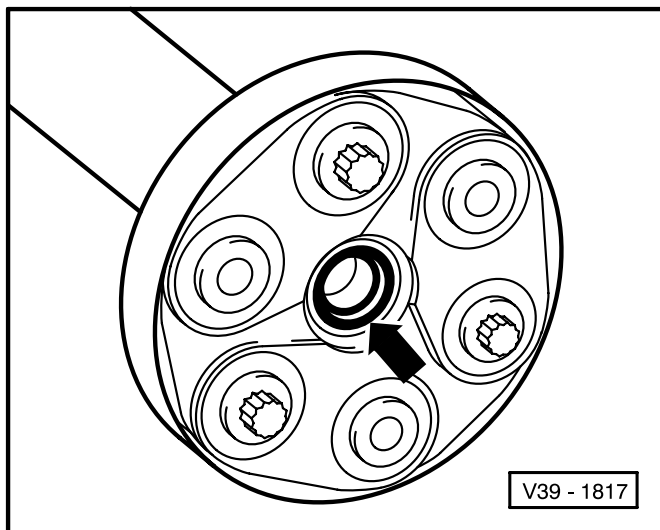
Installing middle bearing free of stress

- Align the middle bearing in its slots so that the propshaft is not twisted.
- Do not fully tighten the bolts of the middle bearing to the body until after installing the propshaft.

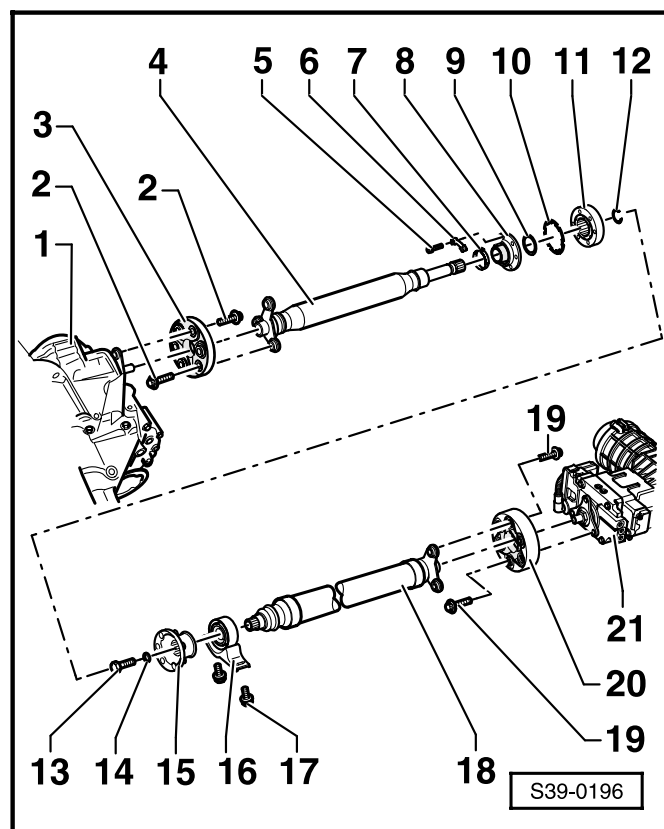
Tightening torques

Components	Tightening torque
Pendulum support to subframe ¹⁾ M8	20 Nm + 90°
Middle bearing to body	25 Nm
Front propshaft tube to rear	40 Nm
Flexible joints to propshaft	60 Nm
Flexible joint to rear final drive	60 Nm
Flexible joint to bevel box	60 Nm

¹⁾ Always replace these bolts.



Servicing propeller shaft



Special tools, testers and aids required

- ◆ Insertion sleeve MP 3-402
- ◆ Thrust plate MP 3-406
- ◆ Thrust plate MP 3-407
- ◆ Assembly device for drive shaft MP 3-422
- ◆ Thrust plunger MP 3-423
- ◆ Insertion tool MP 6-428
- ◆ Thrust plunger MP 3-448
- ◆ Tube section MP 6-429
- ◆ Separating device 12...75 mm, e.g. Kukko 17/1
- ◆ Pulling device, e.g. Kukko 18/0
- ◆ Hose strap pliers, e.g. V.A.G 1275

Notes:

- ◆ During manufacture, the entire propeller shaft is balanced in order to obtain the maximum possible smooth running. It is not possible to balance the entire propshaft or the individual propshaft tubes with workshop equipment. For this reason, if the front or rear propshaft tube is damaged, it is then always necessary to replace the entire propeller shaft.
- ◆ Do not kink propeller shaft; always store and transport extended.
- ◆ Before removing, mark the position of all the parts to each other. Re-install in the same position otherwise the imbalance will be excessive and this might result in damage to the bearings and in rumbling noises.

1 - Manual gearbox with bevel box

2 - 60 Nm

3 - Flexible joint with heat shield

- ◆ Removing and installing
⇒ page 39-47
- ◆ Fitting location ⇒ page 39-48

4 - Front propshaft tube

- ◆ When removing and installing, do not damage centring sleeve and seal in middle of flange ⇒ page 39-46

5 - 40 Nm

6 - Base plate

7 - Collar clamp

- ◆ Tensioning ⇒ Fig. 3

8 - Joint boot for CV joint

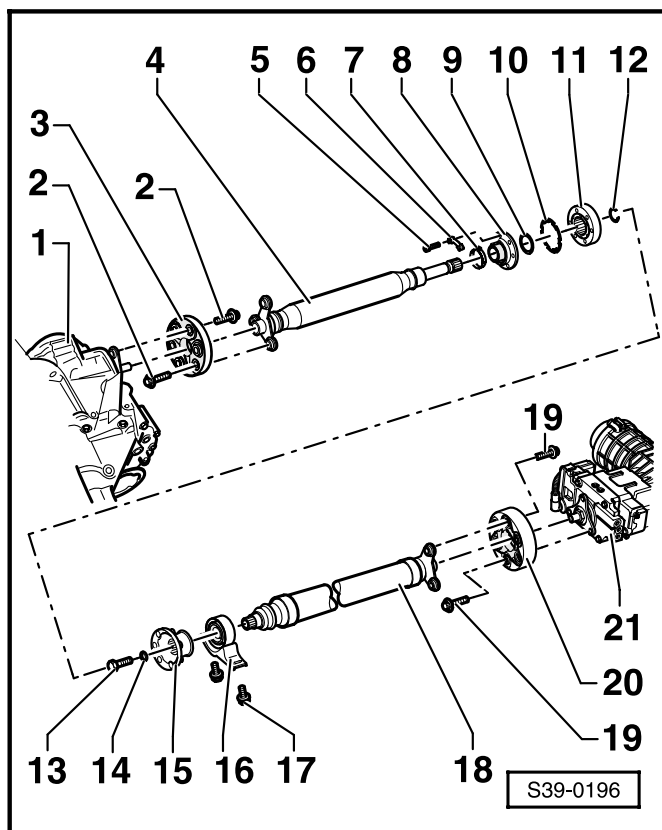
- ◆ Knock off with drift before pressing off CV joint
- ◆ Inspect for damage

9 - Dished washer

- ◆ With teeth on inner diameter
- ◆ Fitting location: large diameter rests against CV joint

10 - Gasket

- ◆ Replace, pull off protective sheet and stick into joint

**11 - Constant-velocity joint**

- ◆ Pressing off ⇒ Fig. 1
- ◆ Pressing on ⇒ Fig. 2
- ◆ Grease packing:
Press 25 g of G-6.3 grease into the joint from both sides (in total 50 g). If CV joint boot is replaced, re-grease joint if necessary

12 - Circlip

- ◆ Replace
- ◆ Use pliers for removing and installing

13 - 45 Nm**14 - Base plate**

- ◆ Always replace

15 - Flange

- ◆ Pulling off ⇒ Fig. 4
- ◆ Fitting on ⇒ Fig. 5

16 - Middle bearing

- ◆ Pulling off ⇒ Fig. 6
- ◆ Fitting location ⇒ Fig. 7
- ◆ Fitting on ⇒ Fig. 8

17 - 25 Nm**18 - Rear propshaft tube**

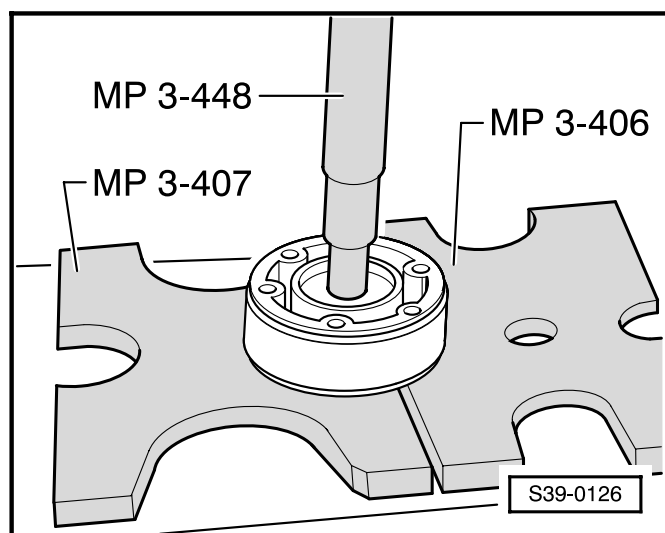
- ◆ When removing and installing, do not damage centring sleeve and seal in middle of flange ⇒ page 39-46

19 - 60 Nm

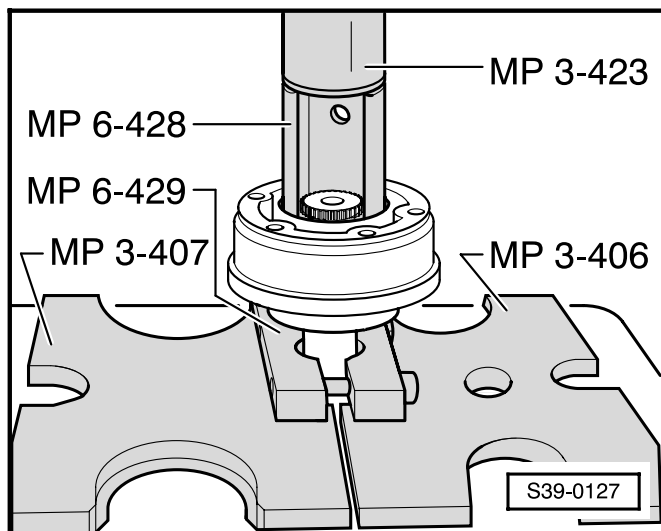
- ◆ From 04.00 two of the new securing bolts may be fitted with a balancing plate instead of a washer
- ◆ In order to avoid rumbling noises, it may be necessary after slackening the securing bolts to replace the balancing plates with the washers ⇒ Parts List

20 - Flexible joint with vibration damper

- ◆ Removing and installing
⇒ page 39-49

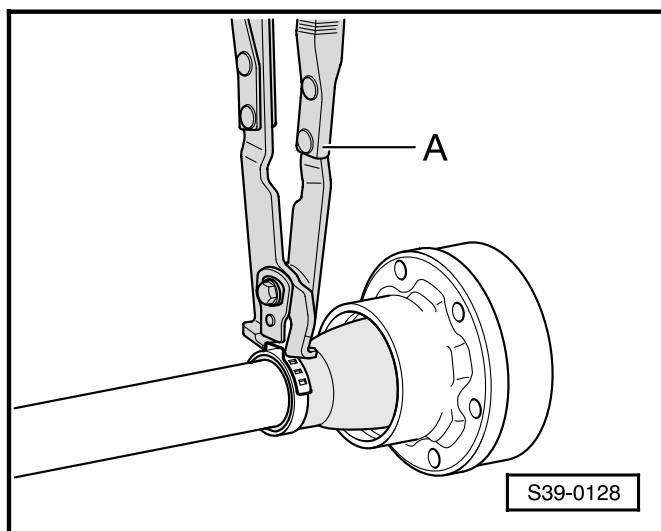
21 - Rear final drive

◀ Fig. 1 Pressing off CV joint



◀ Fig. 2 Pressing on CV joint

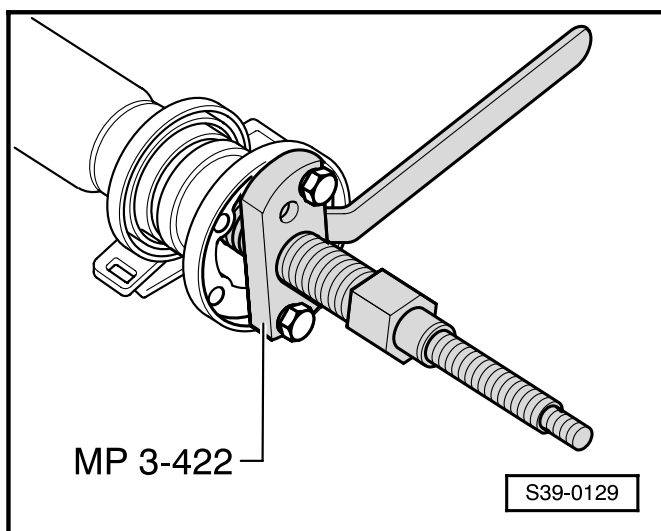
- Press on carefully.
- Tighten tensioner MP 6-429 fully, propshaft must not be pressed down in the tensioner otherwise the paint will be damaged.
- Rectify any paint damage as follows:
Remove grease residues with nitro thinner L 001 600.
Apply 2-component acrylic paint ALN 769 041 with hardener ALZ 009 001.



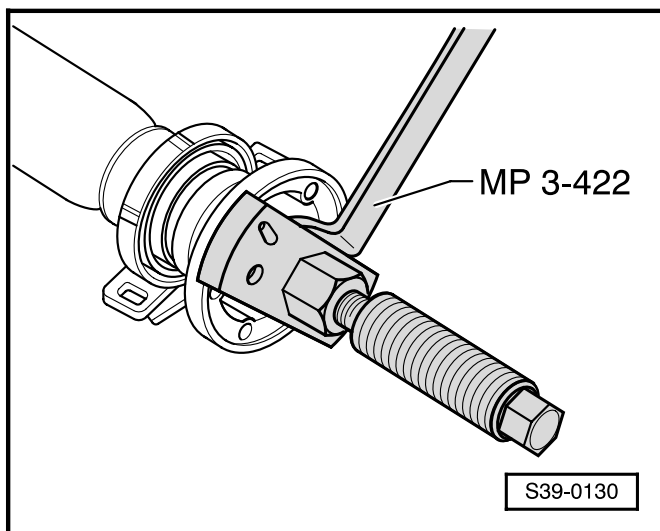
◀ Fig. 3 Tensioning collar-type clamp

A - Hose clamp pliers, e.g. V.A.G 1275

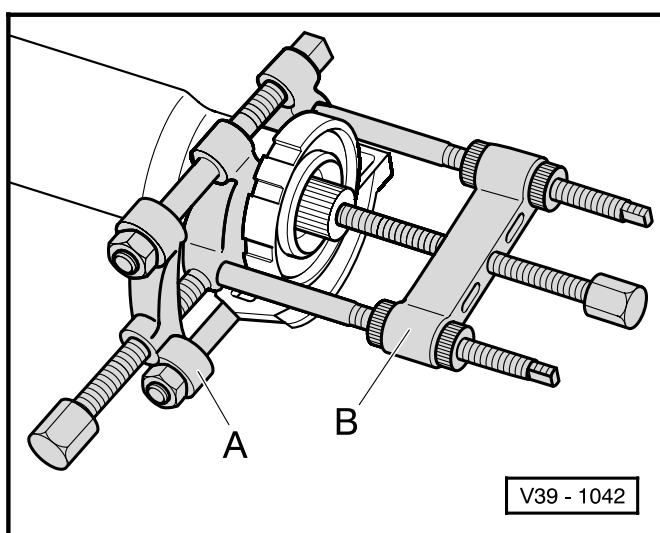
Assign collar-type clamp by referring to parts list when performing repairs.



◀ Fig. 4 Pulling off flange



◀ Fig. 5 Fitting on flange

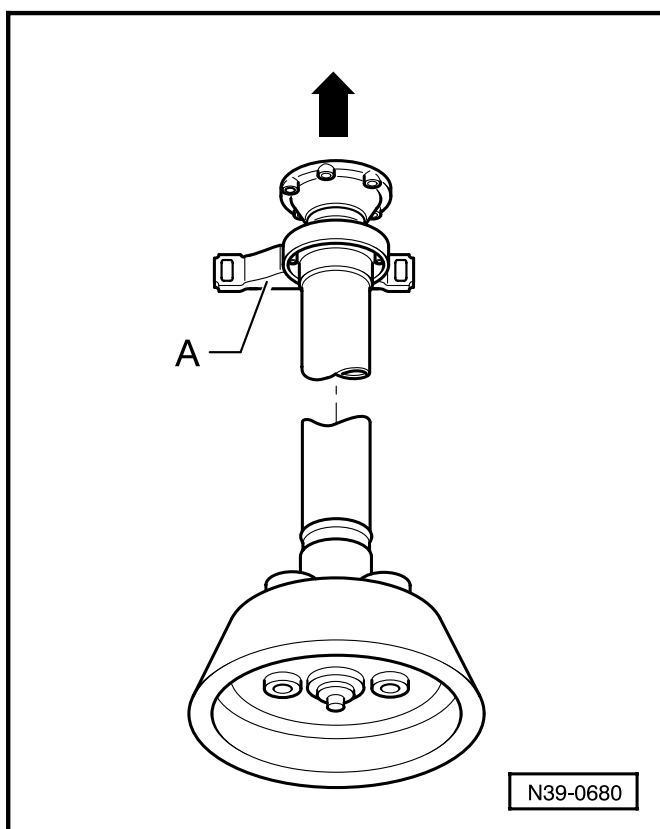


◀ Fig. 6 Pulling off middle bearing

- Cut through the rubber guide of the middle bearing and take off the metal casing.

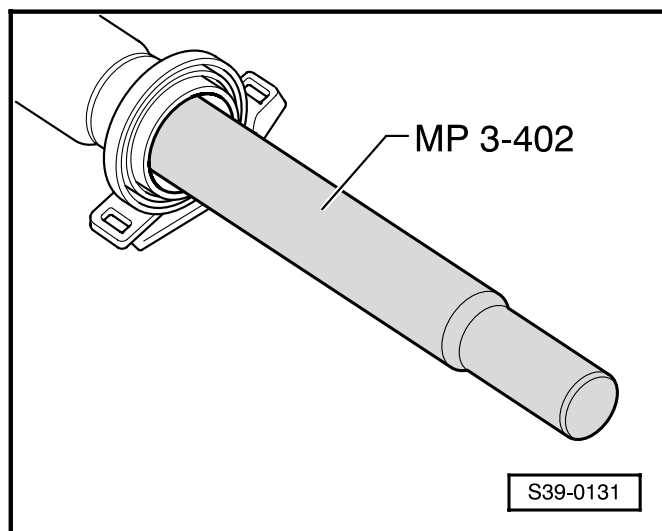
A - Separating device 12...75 mm, e.g. Kukko 17/1

B - Pulling device, e.g. Kukko 18/0



◀ Fig. 7 Fitting location of middle bearing

The longer web -A- points in direction of travel (arrow) to the left.



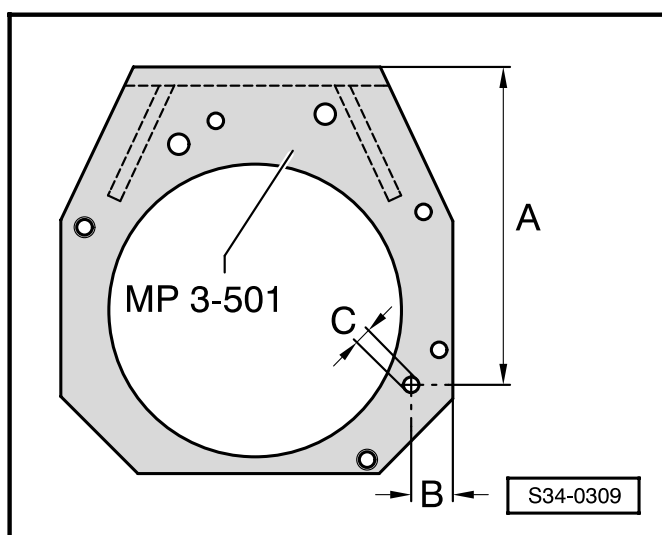
◀ Fig. 8 Fitting on middle bearing

- Knock on intermediate bearing as far as the stop.

Replacing seal for propshaft flange at rear final drive (final drive removed)

Special tools, testers and aids required

- ◆ Gearbox holder MP 3-501
- ◆ Stop plate T30012/1A
- ◆ Thrust piece T10019
- ◆ Counterholder T30004
- ◆ Three-legged puller, e.g. Kukko 45-2
- ◆ 2 bolts M8x20
- ◆ Grease G 052 128 A1
- ◆ Locking fluid D 000 600

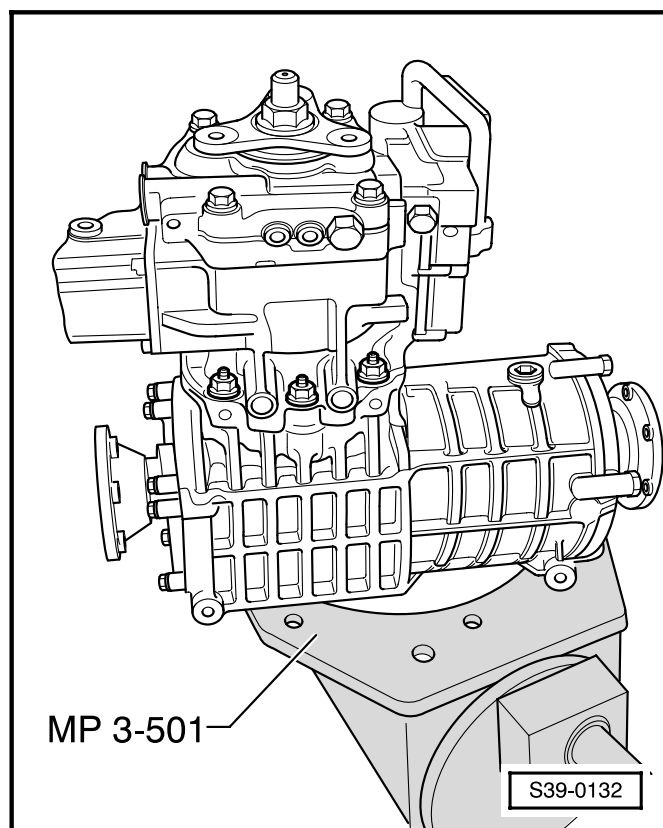


◀ Modifying gearbox holder MP 3-501

Note:

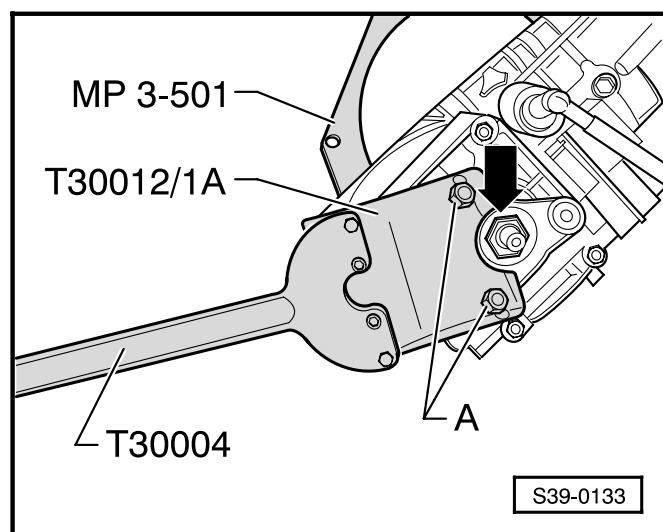
The gearbox holder should be modified in accordance with the dimension stated below before first attaching the rear final drive.

A =	259.0 mm
B =	36.0 mm
Ø C =	13.0 mm



Removing

- ◀ - Clamp the rear final drive in the repair stand.

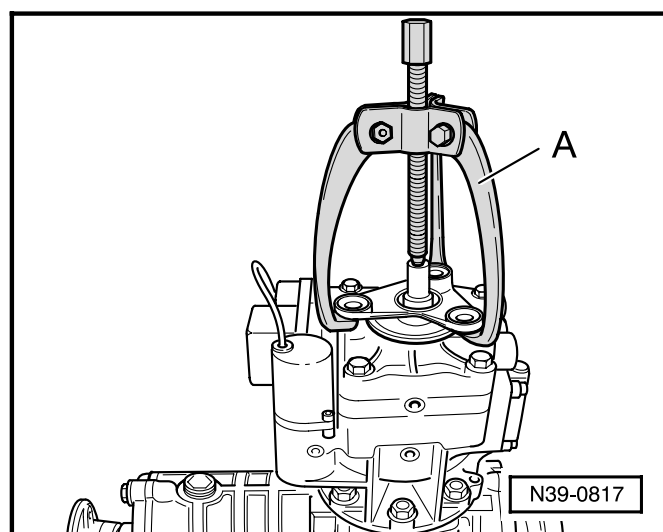


- ◀ - Unscrew hexagon nut -arrow- for the propshaft flange.

A - M 8 x 20 hexagon bolts

Note:

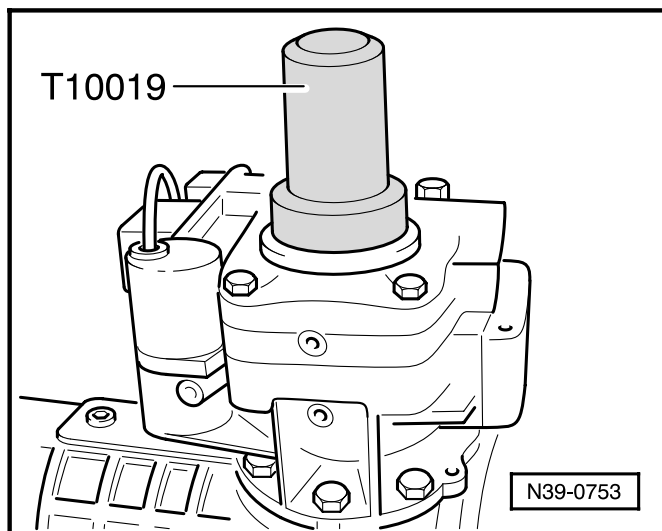
When slackening the hexagon nut, counterhold the propshaft flange by means of the stop plate T30012/1A with the bolted-on counterholder T30004.



- ◀ - Pull off the propshaft flange. If stiff, use three-legged puller -A-.

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

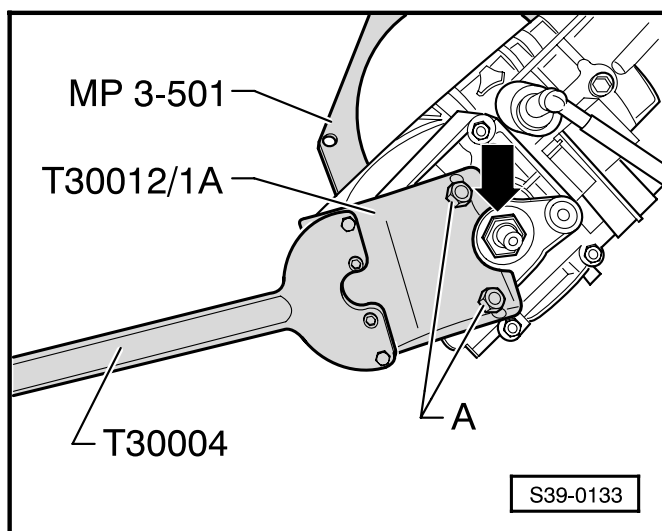
- Use the extraction lever MP 3-418 to pull out the seal.



Installing

- Lightly oil outer diameter of new seal and between the sealing lips with high-performance oil for the Haldex coupling G 052 175 A1 before installing.

◀ - Knock in the new seal until flush.



- Install propshaft flange.

◀ - Insert new hexagon nut -arrow- with locking fluid D 000 600 and tighten to 220 Nm.

A - M 8 x 20 hexagon bolts

Note:

When tightening the hexagon nut, counterhold the propshaft flange by means of the stop plate T30012/1A with bolted-on counterholder T30004.

- Install rear final drive ⇒ page 39-66.
- Inspect oil in the Haldex coupling ⇒ page 39-70; change oil in the Haldex coupling, if necessary ⇒ page 39-71.
- Specification ⇒ page 00-2.

Replacing seals for flange shafts at rear final drive (final drive installed)

Special tools, testers and aids required

- ◆ Pulling device T10037
- ◆ Insertion drift T30013
- ◆ Grease G 052 128 A1

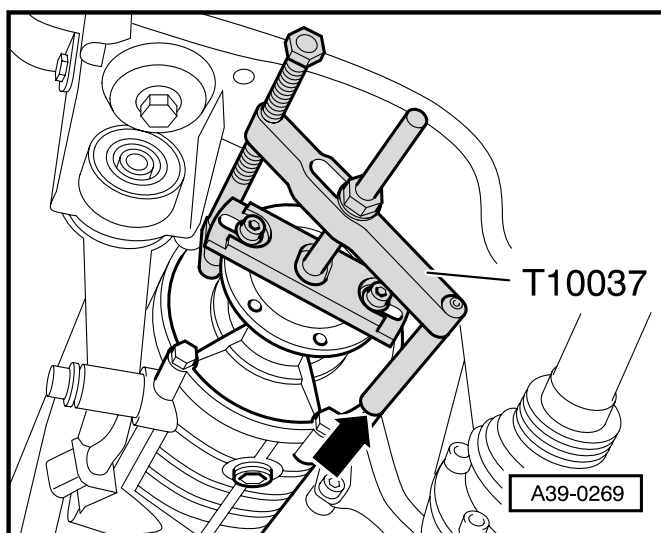
Note:

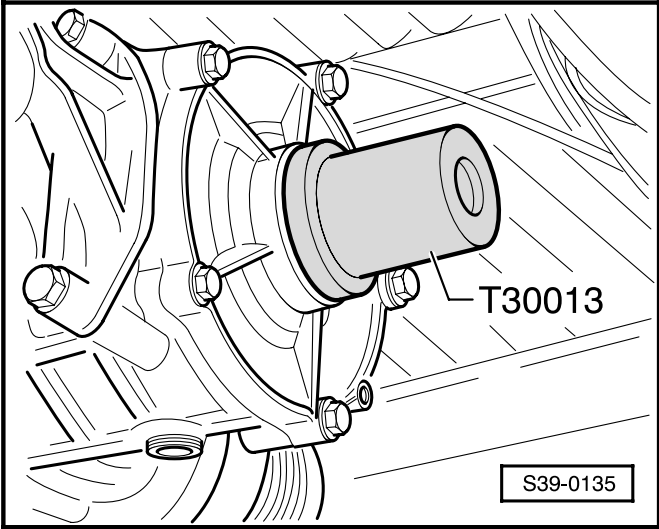
The illustrations show the procedure for replacing the seal of the right flange shaft.

The procedure for replacing the seal of the left flange shaft is identical.

Removing

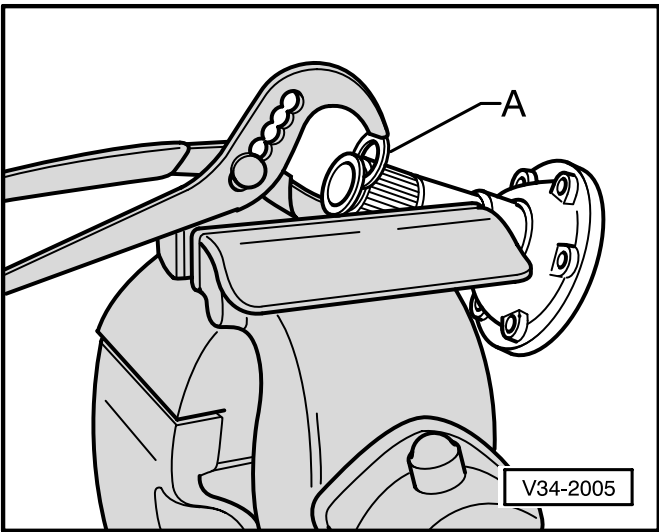
- ◆ Before replacing the left seal:
 - Detach left drive shaft and tie up at the bottom track control arm.
- ◆ Before replacing the right seal:
 - Detach right drive shaft and tie up between the top and bottom track control arms.
- ◆ Continued for both seals:
 - Place a drip tray below the gearbox.
 - ◀ - Remove flange shaft; turn the bottom support of the pulling device T10037 into the housing -arrow- for this step.
 - Use an assembly iron to lever out the seal.





Installing

- ◀ - Knock in new seal as far as the stop.
- Pack space between sealing lip and dust lip with grease G 052 128 A1.



- Clamp flange shaft in a vice using protective jaws.
- ◀ - Press new circlip -A- out of the groove of the flange shaft.
- Use a plastic-headed hammer to knock flange shaft into rear final drive.
- Replace gasket of flange shaft/drive shaft (pull off protective sheet and stick into the joint).
- Bolt on drive shaft.
- Inspect gear oil in rear final drive
⇒ page 39-69.

Tightening torques

Drive shaft to flange shaft
⇒ Running Gear; Repair Group 42

Component	Tightening torque
Oil filler plug to rear final drive	25 Nm

Replacing O-rings in rear final drive

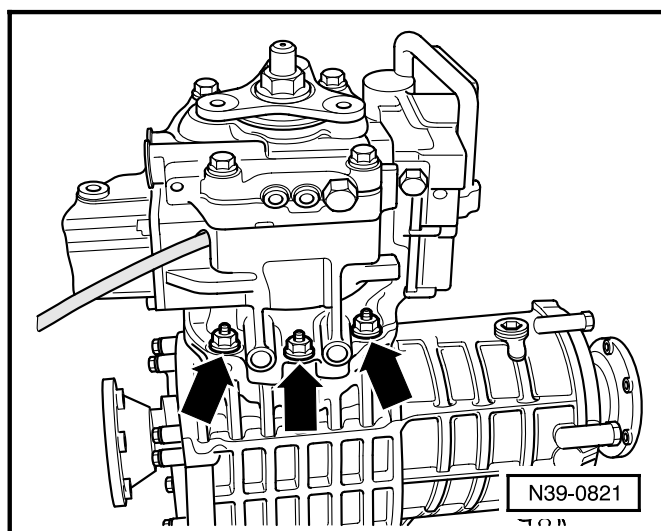
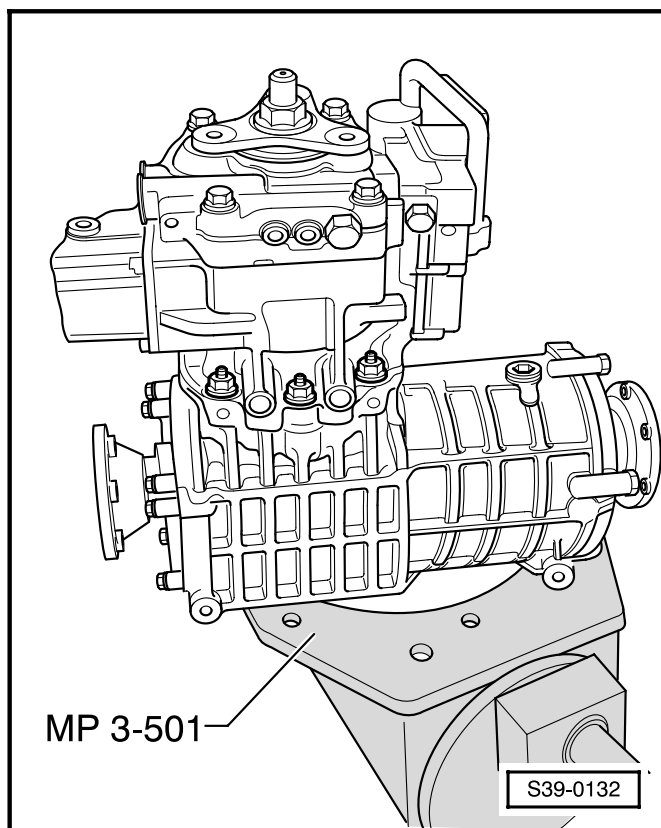
Replacing O-ring for drive pinion housing/Haldex coupling (final drive removed)

Special tools, testers and aids required

- ◆ Gearbox holder MP 3-501
- ◆ 2 bolts M8

Removing

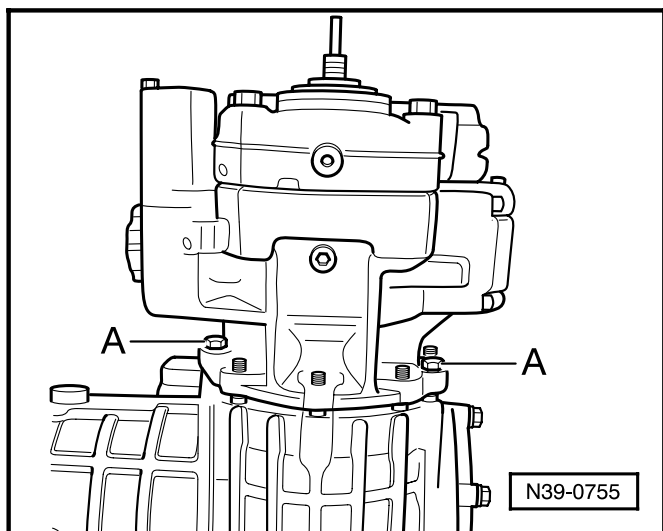
- ◀ - Clamp the rear final drive in the repair stand.



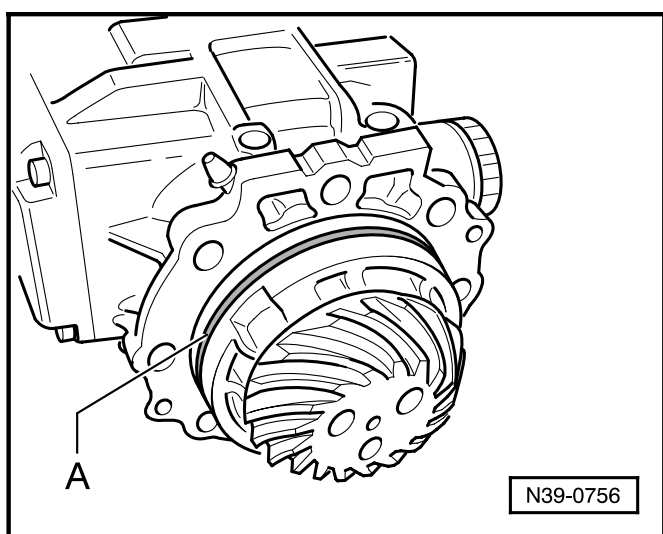
- ◀ - Unscrew all the nuts attaching the drive pinion housing (arrows).

Note:

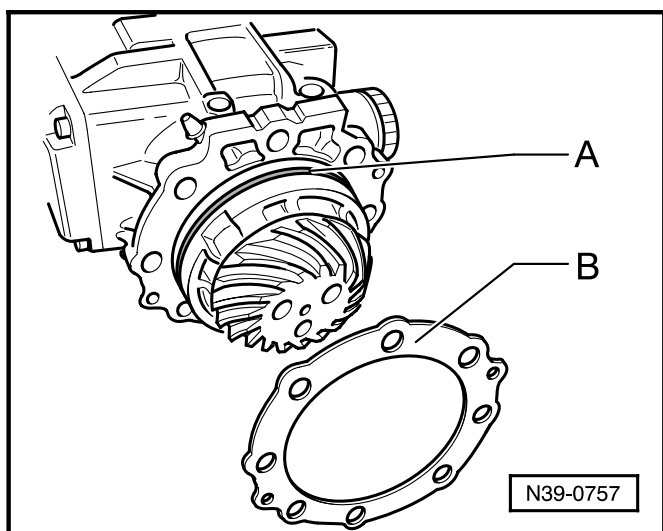
The illustration shows only 3 nuts.



- ◀ - Take off drive pinion housing by screwing in the hexagon bolts -A- evenly so that the housing is not tilted.



- ◀ - Take off O-ring -A-.



Installing

Installation is carried out in the reverse order. Pay attention to the following points:

- ◀ - Insert O-ring -A- with gear oil.
- Re-insert shim or shims -B- of the same thickness.
 - Inspect gear oil in the rear final drive ⇒ page 39-69.
 - Inspect oil in the Haldex coupling ⇒ page 39-70; change oil in Haldex coupling if necessary ⇒ page 39-71.

Tightening torque:

Drive pinion housing to rear final drive

45 Nm

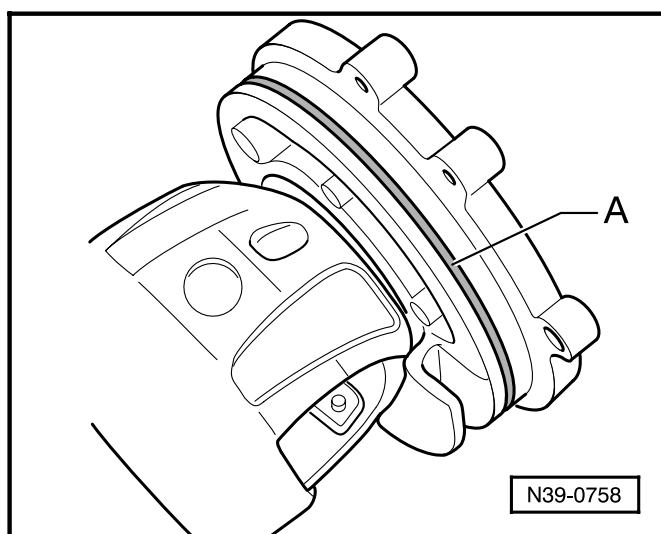
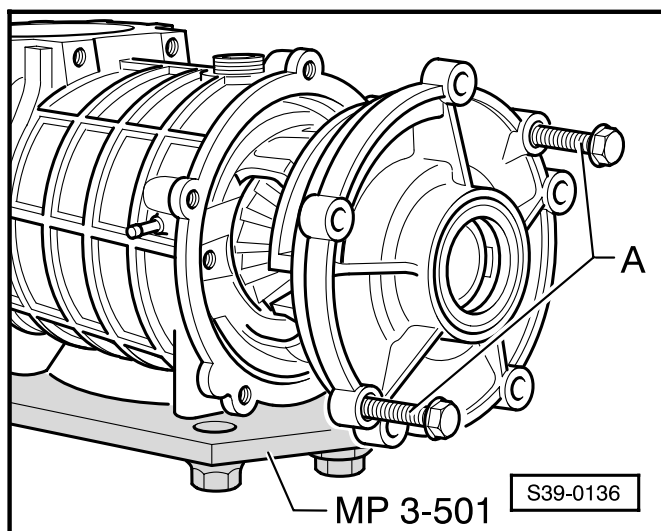
Replacing O-rings for cover of rear final drive (final drive installed)

Special tools, testers and aids required

- ◆ Gearbox holder MP 3-501

Removing

- Drain gear oil.
- Remove left or right flange shaft, respectively
⇒ page 39-61.
- ◀ - Take off left or right cover, respectively; screw in the bolts -A- evenly for this step so that the cover is not tilted.
- Remove right cover together with the differential.



- ◀ - Take off O-ring -A-.

Installing

Installation is carried out in the reverse order. Pay attention to the following points:

- Insert O-ring -A- with gear oil.
- Pour in gear oil up to the lower edge of the filler hole.
- Inspect gear oil in the rear final drive ⇒ page 39-69.

Tightening torque:

Cover to rear final drive

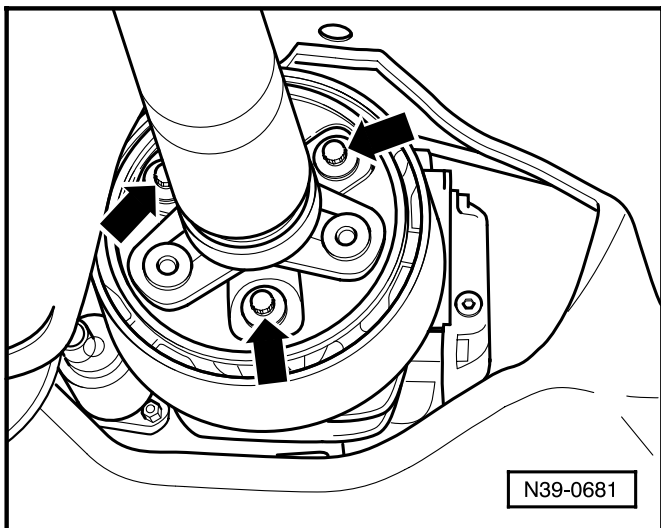
25 Nm

Removing and installing rear final drive

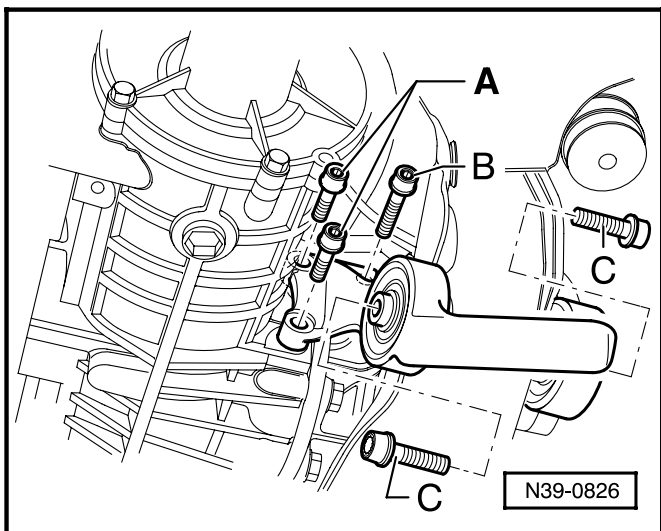
Special tools, testers and aids required

- ◆ Wrench socket T10035
- ◆ Gearbox mount 3282
- ◆ Engine/gearbox jack, e.g. V.A.G 1383 A

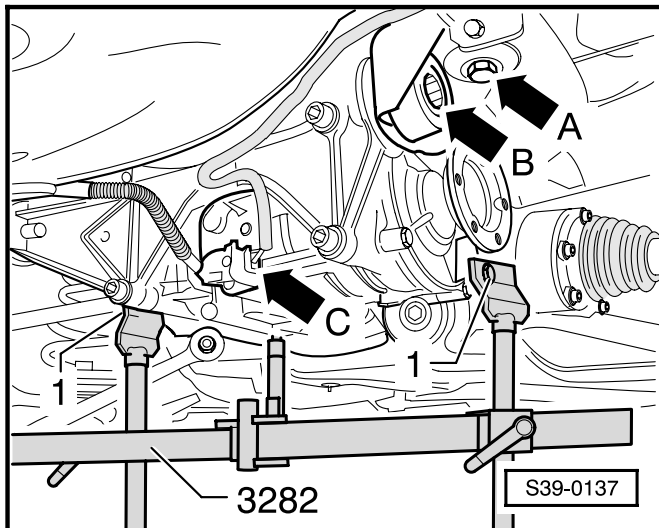
Removing



- Remove rear exhaust pipe.
⇒ Repair Group 26 of the relevant engine
- Detach heat shield from vehicle floor below luggage compartment.
- Mark position of rear propshaft to the flange of the rear final drive.
- ◀ - Unbolt rear propshaft together with flexible joint and vibration damper from the rear final drive -arrow-.
- Remove flange from the drive shaft and tie up drive shafts.



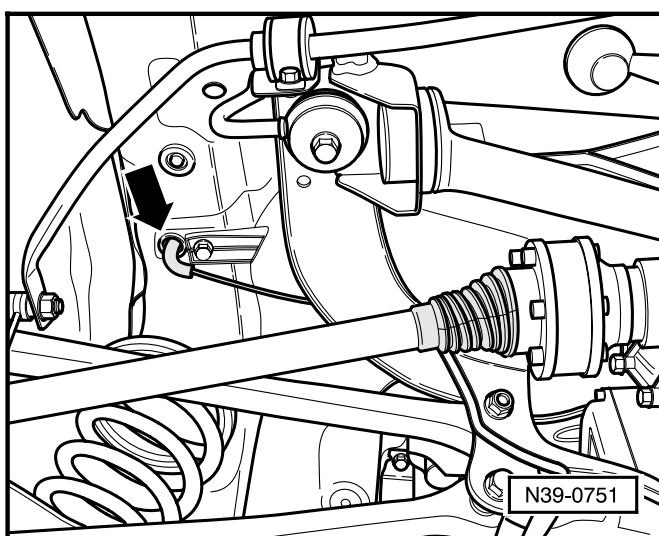
- ◀ - Unscrew bolts -A- and -B-.
- Use wrench socket T10035 to unscrew bolts -C-.



- ◀ - Position gearbox jack, e.g. V.A.G 1383 A, together with the gearbox mount 3282 below the final drive and secure final drive with M8x15 bolts -1-.
- Unscrew the bolts on right and left attaching the subframe -arrow A-.
- Then, unscrew the bolts on right and left attaching the cross member of the final drive -arrow B-.

Note:

The illustration shows only one of the two bolts in each case.

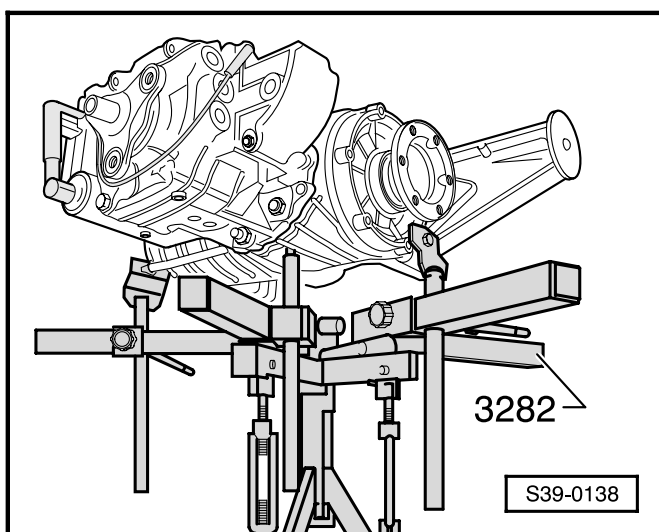


- Unplug the connector of the Haldex coupling -arrow C-.
- ◀ - Pull the ventilation pipe on the right and left out of the support (arrow).

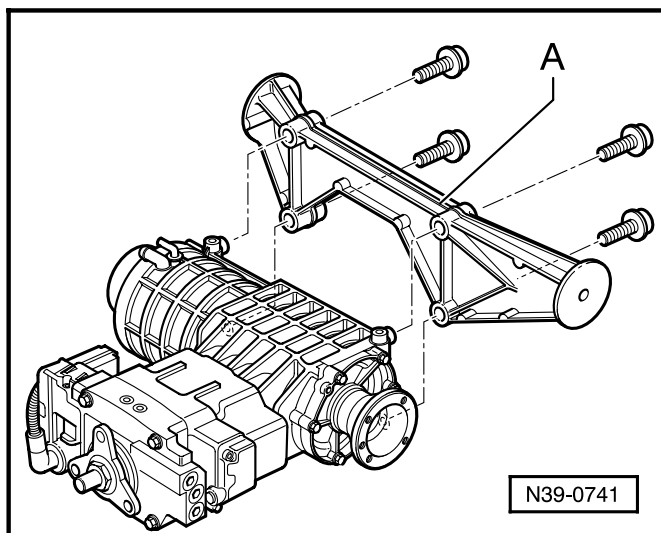
Note:

The illustration shows only the left ventilation pipe.

- Lower the final drive slightly and move into inclined position with the spindles of the gearbox mount and carefully pull final drive out of the subframe.



- ◀ - Lower final drive.

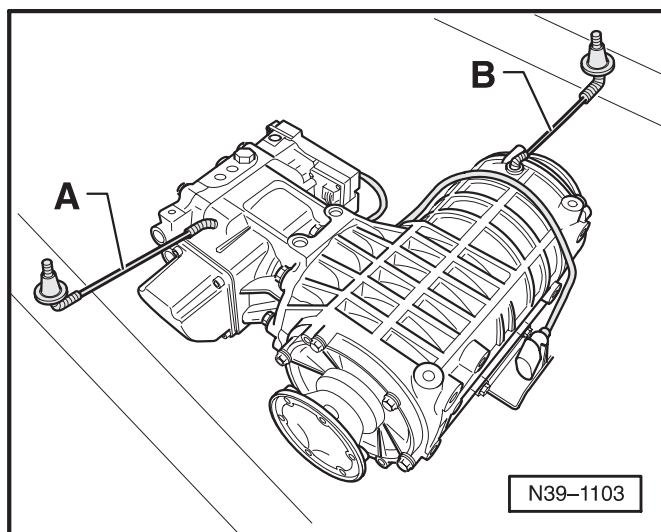


- ◀ - If the final drive is to be replaced or clamped in the repair stand, the cross member -A- must be unscrewed.

Installing

Installation is carried out in the reverse order. Pay attention to the following points:

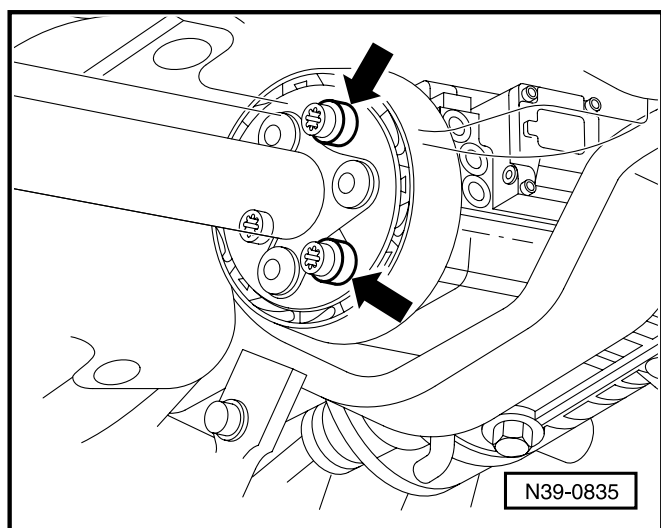
- ♦ *Seals in the flanges of the propshaft must not be damaged during removal and installation.*
- ♦ *If damaged, replace propshaft.*
- ♦ *Push propshaft horizontally onto the guide stud of the final drive.*



- ◀ - If the final drive is to be replaced, the ventilation pipes left -A- and right -B- must be modified.

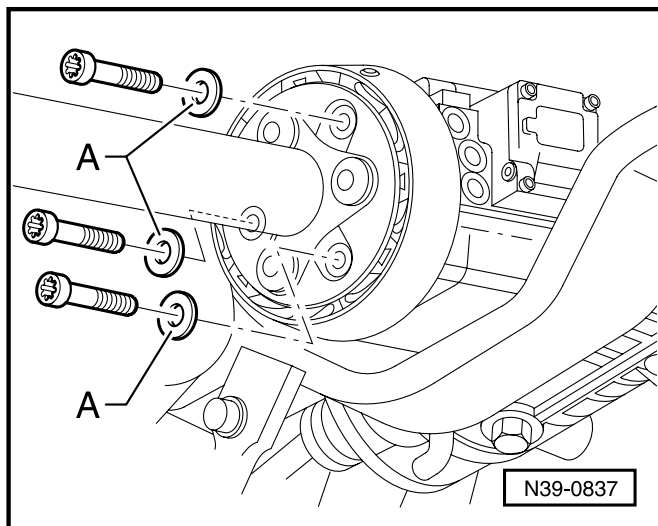
A - Ventilation pipes (Length 400 mm)

B - Ventilation pipes (Length 300 mm)



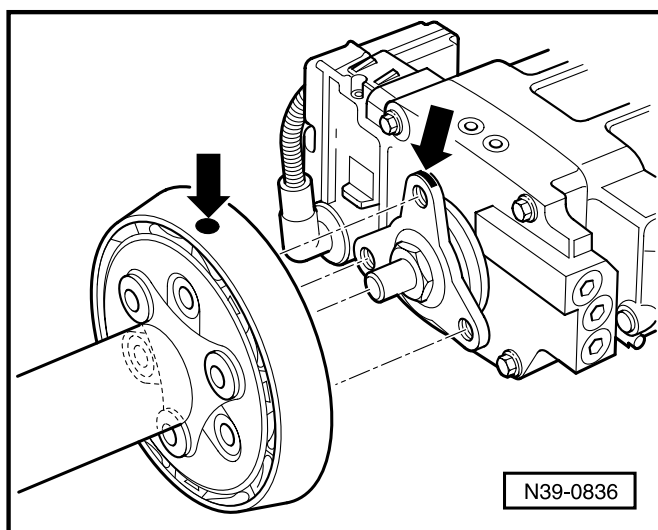
- ◀ **From 04.00 wheel washers and new bolts for the propshaft have been inserted on the flange of the Haldex coupling -arrows-.**

Two bolts are each fitted with one wheel washer.



◀ If droning noises are to be avoided, after releasing the securing bolts, the wheel washers must be replaced by washers -A-.

Assignment of washers ⇒ Spare part catalogue

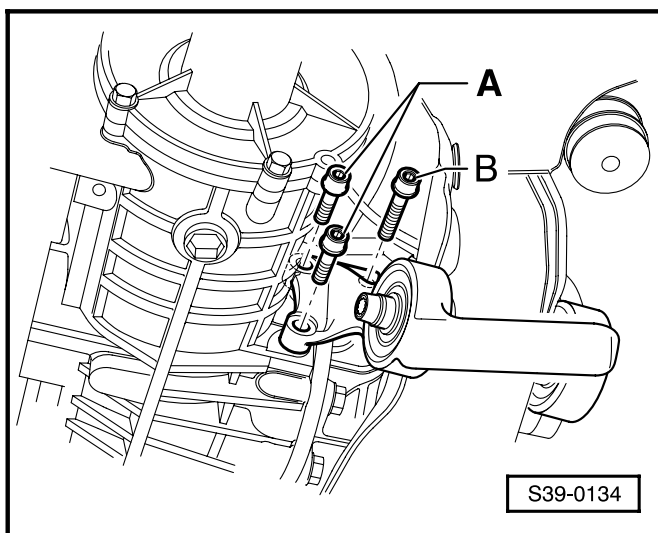


◀ - Install the propshaft on the flange of the Haldex coupling with the markings -arrows- positioned on the same line.

Notes:

If during a drive droning noises occur. Pay attention to the following points:

- ◆ Unscrew propshaft with joint washer from flange of Haldex coupling and screw on with one bore hole offset.
- ◆ If the droning noises are still audible, the propshaft must be screwed on with one more bore hole offset.
- ◆ Three projecting sleeves in each case at the rear final drive and at the propshaft flange mesh into the mounting holes of the flexible joints.
- ◆ Always use new bolts for attaching subframe to the body.
⇒ Running Gear; Repair Group 42; Servicing rear suspension



◀ - The bolts attaching the front bearing bracket of the final drive are of different lengths.

Bolts -A- M 10 x 40

Bolt -B- M 10 x 55

- Inspect the gear oil in the rear final drive
⇒ page 39-69

Tightening torques

- Drive shaft to flange shaft
- ⇒ Running Gear; Repair Group 42

Component	Tightening torque
Front bearing bracket to subframe	60 Nm
Front bearing bracket to rear final drive ¹⁾	40 Nm + 45°
Cross member to subframe	60 Nm
Cross member to rear final drive	60 Nm
Propshaft to rear final drive	60 Nm

¹⁾ Always replace these bolts.

Inspecting gear oil in final drive

Gear oil specification ⇒ page 00-2

- ◀ - Unscrew plug for inspecting gear oil (arrow).

The oil is at the correct level if the rear final drive is filled up to the lower edge of the oil filler hole.

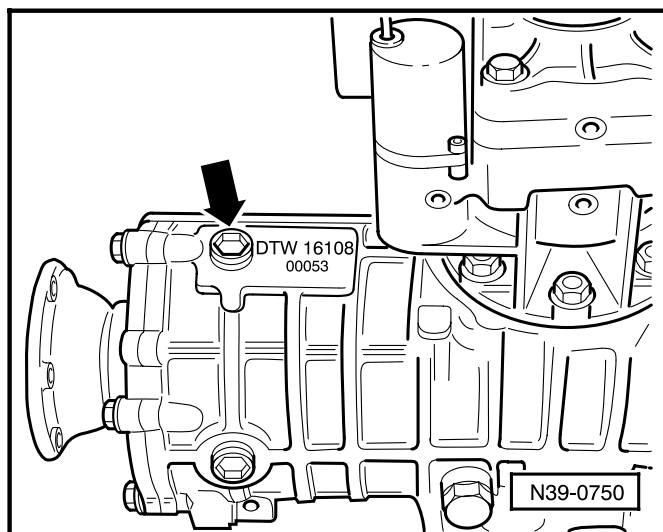
- Screw in plug -arrow-.

When refilling, pay attention to the following points:

- Unscrew plug -arrow-.
- Pour in gear oil up to the lower edge of the filler hole.
- Screw in plug -arrow-.

Tightening torque:

25 Nm



Inspecting oil level in Haldex coupling or changing oil

Special tools, testers and aids required

- ◆ Vehicle system tester V.A.G 1552 with cable V.A.G 1551/3
- ◆ Hand pressure gun, e.g. V.A.G 1628

Inspecting oil level in the Haldex coupling

- ◀ - Switch off ignition (if not already off) and connect vehicle system tester V.A.G 1552 with the diagnostic cable V.A.G 1551/3A.
- Switch on ignition and select address word 22 for "4WD electronics".
- Initiate function 08 for reading measured value block.

Gearbox up to 09.99

- Select display group number 001.

◀ Readout in display:

The third display block indicates the oil temperature.

Gearbox from 10.99

- Select display group number 002.

◀ Readout in display:

The second display block indicates oil temperature.

Continued for all gearboxes

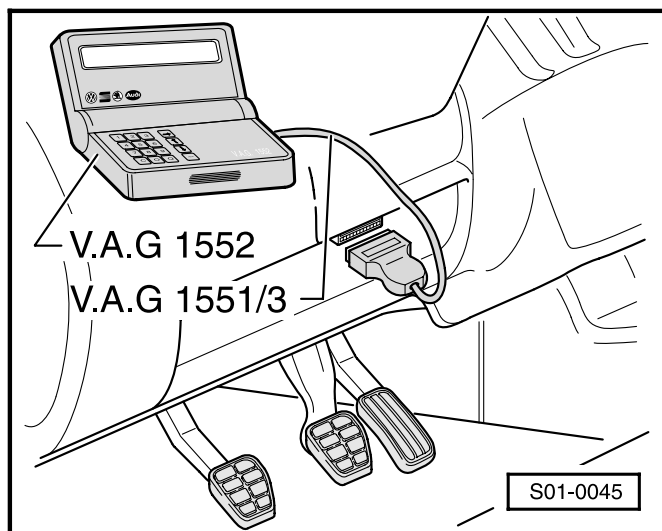
- The oil temperature must be 20...40 °C.

The oil temperature can be reached by warming up the engine.

- ◀ - Unscrew the oil inspection plug -arrow-.

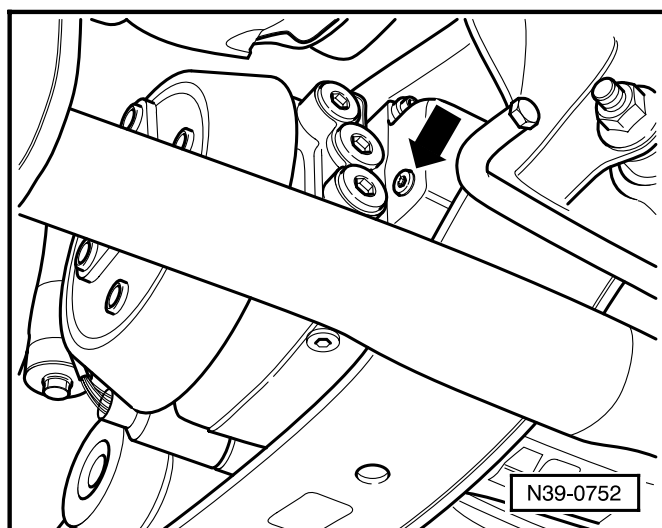
The oil is at the correct level if the Haldex coupling is filled up to the lower edge of the inspection hole or up to at least approx. 3 mm below the lower level of the inspection hole.

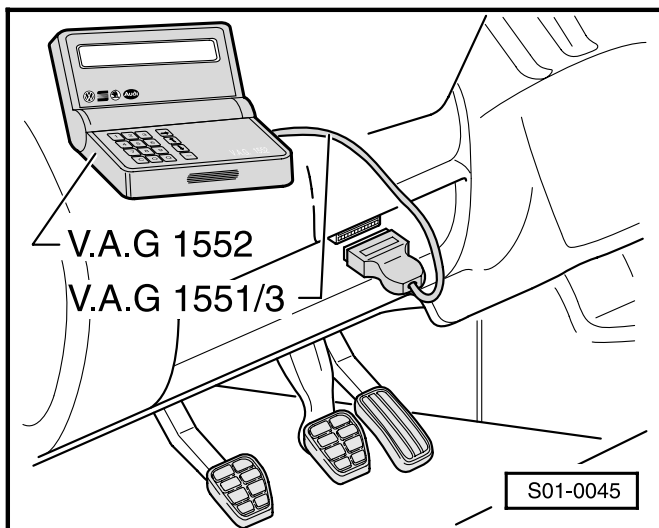
- Screw in plug -arrow-.



Read measured value block	1 →
00000000 00000000 36 °C 11.7 V	

Read measured value block	2 →
11.7 V 36 °C	





- If the oil is not at the correct level, then change the oil in the Haldex coupling ⇒ page 39-71.

Tightening torque:

Oil inspection plug 30 Nm

Changing oil in the Haldex coupling

- ◀ Switch off ignition (if not already off) and connect vehicle system tester V.A.G 1552 with the diagnostic cable V.A.G 1551/3A.
- Switch on ignition and select address word 22 for "4WD electronics".
- Initiate function 08 for reading measured value block.

Gearbox up to 09.99

- Select display group number 001.

Read measured value block				1 →
00000000	00000000	36 °C	11.7 V	

◀ Readout in display:

The third display block indicates the oil temperature.

Gearbox from 10.99

- Select display group number 002.

Read measured value block		2 →
11.7 V	36 °C	

◀ Readout in display:

The second display block indicates oil temperature.

Continued for all gearboxes

- The oil temperature must be 20...40 °C.

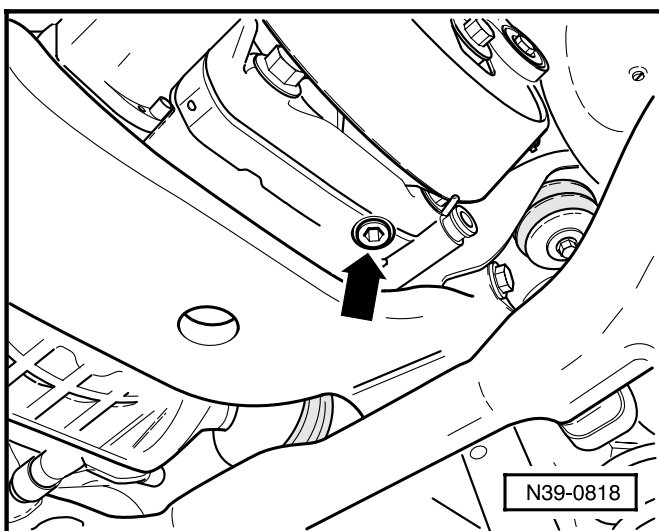
The oil temperature can be reached by warming up the engine.

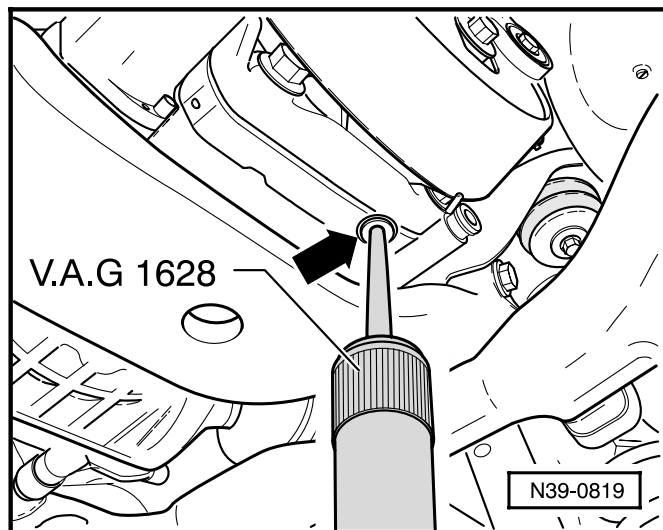
- Place collecting tray below.

◀ Unscrew drain plug -arrow- and drain oil completely.

- Insert cartridge containing 0.25 ltr. of oil into the hand pressure gun, e.g. V.A.G 1628.

- Have drain plug with new seal ready for installing.





- ◀ - Insert hand pressure gun, e.g. V.A.G 1628, vertically into the drain hole -arrow-.
- Pump all of the oil into Haldex coupling.
- Remove hand pressure gun V.A.G 1628 and immediately screw in plug with new seal.

Tightening torque:

Drain plug in housing 15 Nm

Changing oil filter for Haldex coupling

Special tools, testers and aids required

- ◆ Wrench T10066

Removing

- Place a drip tray below.
- ◀ - Use wrench T10066 to slacken oil filter and unscrew.

Fitting location: The oil filter -A- is located on the right side of the vehicle - concealed by the subframe - close to the front bearing bracket -B-.

Installing

- Moisten seal of the new oil filter with oil for Haldex coupling.
- Screw in oil filter -A- and tighten with T10066.
- Change oil in the Haldex coupling ⇒ page 39-71.

