

Audi 100 1991 ➤

5-Speed manual gearbox 01A Four-wheel drive									
Gearbox ID	AXM	AXN	CAB	CDV	CPR	CPS	CPT	CPU	CVR
	CVS	CVV	CVY	CZX	DBE	DJF	DJG	DJK	DJN
	DJT	DJV							

Edition 02.1997



Protected by copyright. Copying for private or commercial purposes, in part or in whole, is not permitted unless authorised by AUDI AG. AUDI AG does not guarantee or accept any liability with respect to the correctness of information in this document. Copyright by AUDI AG.

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

Audi 100 1991 ➤

5-Speed manual gearbox 01A Four-wheel drive
--

Repair Group

00 - Technical data

30 - Clutch

34 - Controls, Housing

35 - Gears, Shafts

39 - Final drive, Differential rear



Protected by copyright. Copying for private or commercial purposes, in part or in whole, is not permitted unless authorised by AUDI AG. AUDI AG does not guarantee or accept any liability with respect to the correctness of information in this document. Copyright by AUDI AG.

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

**All rights reserved.
No reproduction without prior agreement from publisher.**

Contents

00 - Technical data	1
1 Gearbox identification	1
1.1 Gearbox identification	1
1.2 Code letters, gearbox allocation, ratios, capacities	2
2 Identification of rear final drive	5
2.1 Identification of rear final drive	5
2.2 Code letters, allocation, ratios and capacities	6
3 Transmission layout	8
3.1 Transmission layout	8
3.2 Notes on engine output/brake test and towing/tow starting	9
4 Calculations	10
4.1 Calculations	10
4.2 Calculating transmission ratios "i"	10
5 General repair instructions	10
5.1 General repair instructions	10
Protected by copyright. Copying for private or commercial purposes, in part or in whole, is not permitted without the prior written consent of Audi AG. Audi AG does not guarantee or accept any liability with respect to the correctness of information in this document. Copyright by AUDI AG.	
30 - Clutch	14
1 Servicing clutch mechanism	14
1.1 Servicing clutch mechanism	14
1.2 Assembly overview - pedal cluster (LHD vehicles)	15
1.3 Assembly overview - pedal cluster (RHD vehicles)	22
1.4 Hydraulic system - general layout	29
1.5 Bleeding clutch system	32
2 Servicing clutch release mechanism	34
2.1 Servicing clutch release mechanism	34
3 Servicing clutch	38
3.1 Servicing clutch	38
34 - Controls, Housing	46
1 Servicing selector mechanism	46
1.1 Servicing selector mechanism	46
1.2 Adjusting gear selector mechanism	50
1.3 Checking gear stick adjustment	51
2 Removing and installing gearbox	52
2.1 Removing and installing gearbox	52
2.2 Removing	52
2.3 Securing gearbox to repair stand	61
2.4 Transporting the gearbox	62
2.5 Installing	63
3 Checking oil level in gearbox	64
3.1 Checking oil level in gearbox	64
4 Removing and installing cover with Torsen differential	65
4.1 Removing and installing cover with Torsen differential	65
5 Dismantling and assembling gearbox	68
5.1 Dismantling and assembling gearbox	68
5.2 Overview	68
5.3 Assembly overview	70
5.4 Removing and installing input shaft ball bearing and multi-function sender	71
5.5 Removing and installing input shaft, drive pinion, hollow shaft, selector rods, gearbox cover and cover with Torsen differential	74
5.6 Removing and installing input shaft ball bearing, multi-function sender, input shaft, drive pinion, selector rods, gearbox cover and cover with Torsen differential	78



6	Servicing cover for Torsen differential, removing and installing Torsen differential	87
6.1	Servicing cover for Torsen differential, removing and installing Torsen differential	87
7	Dismantling and assembling selector mechanism in gearbox	94
7.1	Dismantling and assembling selector mechanism in gearbox	94
35 - Gears, Shafts		102
1	Dismantling and assembling input shaft	102
1.1	Dismantling and assembling input shaft	102
2	Adjusting input shaft	116
2.1	Adjusting input shaft	116
3	Dismantling and assembling drive pinion and hollow shaft	118
3.1	Dismantling and assembling drive pinion and hollow shaft	118
4	Removing and installing reverse gear wheel	139
4.1	Removing and installing reverse gear wheel	139
39 - Final drive, Differential rear		141
1	Renewing seal for flange shaft	141
1.1	Renewing seal for flange shaft	141
2	Renewing oil seal for flange shaft/propshaft	144
2.1	Renewing oil seal for flange shaft/propshaft	144
3	Removing and installing speedometer sender and drive wheel	146
3.1	Removing and installing speedometer sender and drive wheel	146
3.2	Removing and installing speedometer sender -G22	147
3.3	Removing and installing speedometer drive wheel	147
4	Removing and installing differential	149
4.1	Removing and installing differential	149
5	Dismantling and assembling differential	153
5.1	Dismantling and assembling differential	153
6	Adjusting drive pinion and crown wheel	162
6.1	Adjusting drive pinion and crown wheel	162
6.2	Adjusting and marking of gear sets	163
6.3	Position of shims	165
6.4	Adjustment overview	165
6.5	Recommended sequence for readjusting final drive set	166
6.6	Adjusting drive pinion	167
6.7	Re-determining "S4" shim when fitting new gearbox cover	177
6.8	Adjusting crown wheel	178
7	Servicing propshaft	185
7.1	Servicing propshaft	185
7.2	Removing and installing propshaft	186
7.3	Measuring radial run-out at propshaft flange and marking	191
7.4	Adjusting propshaft	192
8	Checking oil level in rear final drive	196
8.1	Checking oil level in rear final drive	196
9	Renewing flange shaft oil seals	197
9.1	Renewing flange shaft oil seals	197
9.2	Renewing right flange shaft oil seal	197
9.3	Renewing left flange shaft oil seal	199
10	Replacing oil seal and grooved ball bearing for propshaft flange	204
10.1	Replacing oil seal and grooved ball bearing for propshaft flange	204
11	Removing and installing rear final drive	215
11.1	Removing and installing rear final drive	215
11.2	Securing rear final drive to repair stand	225

12	Dismantling and assembling rear final drive	.226
12.1	Dismantling and assembling rear final drive	.226
12.2	Overview	.226
12.3	Removing and installing differential together with differential lock	.229
12.4	Removing and installing differential without differential lock	.235
13	Dismantling and assembling differential	.240
13.1	Dismantling and assembling differential	.240
14	Removing and installing and dismantling and assembling drive pinion	.251
14.1	Removing and installing and dismantling and assembling drive pinion	.251
15	Servicing differential lock mechanism - vehicles > 05.94	.261
15.1	Servicing differential lock mechanism - vehicles > 05.94	.261
15.2	Removing and installing switch for differential lock	.261
15.3	Routing of pipes and hoses	.262
15.4	Removing and installing vacuum unit	.265
15.5	Dismantling and assembling differential lock	.267
15.6	Adjusting left flange shaft	.273
16	Adjusting drive pinion and crown wheel	.274
16.1	Adjusting drive pinion and crown wheel	.274
16.2	Adjusting and marking of gear sets	.275
16.3	Recommended sequence for readjusting final drive set	.276
16.4	Adjustment overview	.277
16.5	Position of shims	.278
16.6	Adjusting drive pinion	.279
16.7	Adjusting crown wheel	.286



Protected by copyright. Copying for private or commercial purposes, in part or in whole, is not permitted unless authorised by AUDI AG. AUDI AG does not guarantee or accept any liability with respect to the correctness of information in this document. Copyright by AUDI AG.



Audi 100 1991 ➤

Audi 5-Speed manual gearbox 01A Four-wheel drive - Edition 02.1997

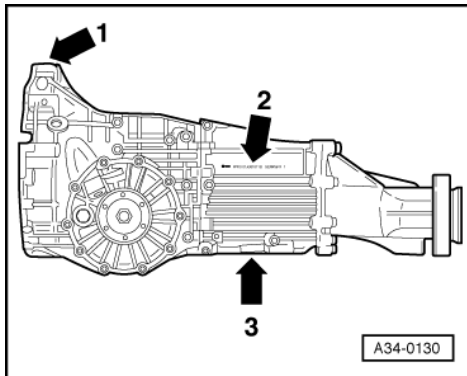


Protected by copyright. Copying for private or commercial purposes, in part or in whole, is not permitted unless authorised by AUDI AG. AUDI AG does not guarantee or accept any liability with respect to the correctness of information in this document. Copyright by AUDI AG.

00 - Technical data

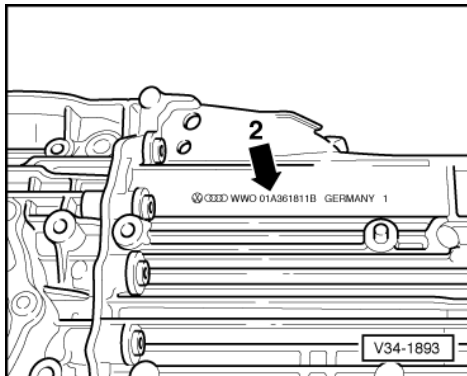
1 - Gearbox identification

1.1 - Gearbox identification

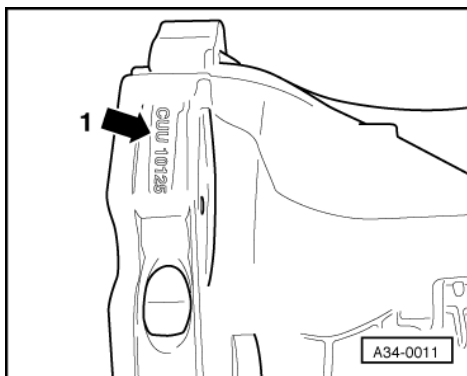


-> Location on gearbox

Code letters and date of manufacture (arrow 1)
Manual gearbox 01A (arrow 2)
Code letters (arrow 3)



-> Manual gearbox 01A (arrow 2)



Protected by copyright. Copying for private or commercial purposes, in part or in whole, is not permitted unless authorised by AUDI AG. AUDI AG does not guarantee or accept any liability with respect to the correctness of information in this document. Copyright by AUDI AG.



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

Example:	CUU	10	12	5
	Code letters Day Month			Year (1995) of manufacture

Additional data depends on manufacture.

Note:

The gearbox code letters are also stamped on the lower part of the gearbox cover and shown on the vehicle data stickers.

1.2 - Code letters, gearbox allocation, ratios, capacities

Manual gearbox		5-speed 01A four-wheel drive			
Code letters		CZX	DJV	AXN	CVV
Manufactured	from	10.95	07.96	12.90	08.94
	to	06.96		07.94	01.95
Allocation	Model Engine	Audi 100 1991 ä 1.8 ltr - 92 kW	Audi 100 1991 ä 1.8 ltr - 92 kW	Audi 100 1991 ä 2.0 ltr - 85 kW 1) 2.0 ltr - 103 kW 2)	Audi 100 1991 ä 2.0 ltr - 103 kW
Ratios Z2 :Z1=i	Final drive	41 : 9 = 4.556	41 : 9 = 4.556	41 : 9 = 4.556	41 : 9 = 4.556
	1st gear	34 : 9 = 3.778	34 : 9 = 3.778	39 : 11 = 3.545	35 : 10 = 3.500
	2nd gear	37 : 17 = 2.176	37 : 17 = 2.176	40 : 19 = 2.105	36 : 17 = 2.118
	3rd gear	40 : 28 = 1.429	40 : 28 = 1.429	39 : 30 = 1.300	39 : 30 = 1.300
	4th gear	35 : 34 = 1.029	35 : 34 = 1.029	33 : 35 = 0.943	33 : 35 = 0.943
	5th gear	30 : 38 = 0.789	30 : 38 = 0.789	30 : 38 = 0.789	30 : 38 = 0.789
	Reverse gear	31 : 9 = 3.444	31 : 9 = 3.444	35 : 10 = 3.500	31 : 9 = 3.444

1) ä 07.92

2) Italy 07.92 ä

Code letters	CZX	DJV	AXN	CVV
Speedometer	electronic			
Capacity	2.75 litres			
Specification	Gear oil G 052 911 A SAE 75 W 90 (synthetic oil)			
Clutch mechanism	hydraulic			
Clutch plate diameter	228 mm	228 mm	228 mm	228 mm
Drive shaft flange diameter	100 mm	100 mm	100 mm	100 mm
Flange shafts with polygon bearings	yes	yes	no	no 3)
Overall ratio i _{ov} in top gear	3.596	3.596	3.596	3.594

Allocation: rear final drive (code letters)	CKG	CKG	AMZ AXT 1) CDC 2) CKG	CKG
--	-----	-----	--------------------------------	-----

- 1) ä 07.92
- 2) For Italy 07.92 ä
- 3) Large-diameter differential bearings as for gearboxes with polygon bearings

Manual gearbox		5-speed 01A four-wheel drive			
Code letters		CPU	DJK	AXM	CVR
Manufactured	from	02.95	07.96	12.90	08.94
	to	06.96	-	07.94	01.95
Allocation	Model Engine	Audi 100 1991 ä 1.8 ltr - 92 kW 2.0 ltr - 103 kW	Audi 100 1991 ä 2.0 ltr - 103 kW	Audi 100 1991 ä 2.3 ltr - 98 kW 2.6 ltr - 102 kW 4)	Audi 100 1991 ä 2.3 ltr - 98 kW 2.6 ltr - 102 kW 4)
Ratios Z2 : Z1=i	Final drive	41 : 9 = 4.556	41 : 9 = 4.556	37 : 9 = 4.111	37 : 9 = 4.111
	1st gear	35 : 10 = 3.500	35 : 10 = 3.500	39 : 11 = 3.545	35 : 10 = 3.500
	2nd gear	36 : 17 = 2.118	36 : 17 = 2.118	40 : 19 = 2.105	36 : 17 = 2.118
	3rd gear	39 : 30 = 1.300	39 : 30 = 1.300	40 : 28 = 1.429	40 : 28 = 1.429
	4th gear	33 : 35 = 0.943	33 : 35 = 0.943	35 : 34 = 1.029	35 : 34 = 1.029
	5th gear	30 : 38 = 0.789	30 : 38 = 0.789	31 : 37 = 0.838	31 : 37 = 0.838
	Reverse gear	31 : 9 = 3.444	31 : 9 = 3.444	35 : 10 = 3.500	31 : 9 = 3.444

- 4) For China, CIS

Code letters	CPU	DJK	AXM	CVR
Speedometer	electronic			
Capacity	2.75 litres			
Specification	Gear oil G 052 911 A SAE 75 W 90 (synthetic oil)			
Clutch mechanism	hydraulic			
Clutch plate diameter	228 mm	228 mm	228 mm	240 mm
Drive shaft flange diameter	100 mm	100 mm	100 mm	100 mm
Flange shafts with polygon bearings	yes	yes	no	no3)
Overall ratio lov in top gear	3.596	3.596	3.444	3.444
Allocation: rear final drive (code letters)	AMZ CDC CKG	CKG	AAT AXS CKF	CKF

- 3) Large-diameter differential bearings as for gearboxes with polygon bearings

Manual gearbox		5-speed 01A four-wheel drive			
Code letters		CPS	CDV	CVY	CPR
Manufactured	from	02.95	03.92	08.94	02.95
	to	06.96	07.94	01.95	06.96
Allocation	Model Engine	Audi 100 1991 ä 2.3 ltr - 98 kW 2.6 ltr - 102 kW 4)	Audi 100 1991 ä 2.6 ltr - 110 kW	Audi 100 1991 ä 2.6 ltr - 110 kW	Audi 100 1991 ä 2.6 ltr - 110 kW
Ratios	Final drive	37 : 9 = 4.111	37 : 9 = 4.111	37 : 9 = 4.111	37 : 9 = 4.111



Manual gearbox		5-speed 01A four-wheel drive			
Z2 :Z1=i	1st gear	35 : 10 = 3.500	39 : 11 = 3.545	39 : 11 = 3.545	35 : 10 = 3.500
	2nd gear	36 : 17 = 2.118	39 : 21 = 1.857	39 : 21 = 1.857	35 : 19 = 1.842
	3rd gear	40 : 28 = 1.429	39 : 30 = 1.300	39 : 30 = 1.300	39 : 30 = 1.300
	4th gear	35 : 34 = 1.029	35 : 34 = 1.029	35 : 34 = 1.029	35 : 34 = 1.029
	5th gear	31 : 37 = 0.838	31 : 37 = 0.838	31 : 37 = 0.838	31 : 37 = 0.838
	Reverse gear	31 : 9 = 3.444	35 : 10 = 3.500	35 : 10 = 3.500	31 : 9 = 3.444

4) For China, CIS

Code letters	CPS	CDV	CVY	CPR
Speedometer	electronic			
Capacity	2.75 litres			
Specification	Gear oil G 052 911 A SAE 75 W 90 (synthetic oil)			
Clutch mechanism	hydraulic			
Clutch plate diameter	228 mm	228 or 240 mm	228 or 240 mm	228 mm
Drive shaft flange diameter	100 mm	100 mm	100 mm	100 mm
Flange shafts with polygon bearings	yes	no	no 3)	yes
Overall ratio iov in top gear	3.444	3.445	3.445	3.444
Allocation: rear final drive (code letters)	AAT CKF	AAT AXS CKF	CKF	AAT CKF

3) Large-diameter differential bearings as for gearboxes with polygon bearings

Manual gearbox		5-speed 01A four-wheel drive			
Code letters		DJF	DJN	CAB	CVS
Manufactured	from	07.96	07.96	12.90	08.94
	to	-	-	07.94	01.95
Allocation	Model	Audi 100 1991 ä	Audi 100 1991 ä	Audi 100 1991 ä	Audi 100 1991 ä
	Engine	2.6 ltr - 102 kW 4)	2.6 ltr - 110 kW	2.8 ltr - 128 kW	2.8 ltr - 128 kW
Ratios	Final drive	37 : 9 = 4.111	37 : 9 = 4.111	37 : 9 = 4.111	37 : 9 = 4.111
Z2 :Z1=i	1st gear	35 : 10 = 3.500	35 : 10 = 3.500	35 : 10 = 3.500	35 : 10 = 3.500
	2nd gear	36 : 17 = 2.118	35 : 18 = 1.944	35 : 19 = 1.842	35 : 19 = 1.842
	3rd gear	40 : 28 = 1.429	39 : 30 = 1.300	39 : 30 = 1.300	39 : 30 = 1.300
	4th gear	35 : 34 = 1.029	35 : 34 = 1.029	33 : 35 = 0.943	33 : 35 = 0.943
	5th gear	31 : 37 = 0.838	31 : 37 = 0.838	30 : 38 = 0.789	30 : 38 = 0.789
	Reverse gear	31 : 9 = 3.444	31 : 9 = 3.444	31 : 9 = 3.444	31 : 9 = 3.444

4) For China, CIS

Code letters	DJF	DJN	CAB	CVS
Speedometer	electronic			
Capacity	2.75 litres			
Specification	Gear oil G 052 911 A SAE 75 W 90 (synthetic oil)			
Clutch mechanism	hydraulic			
Clutch plate diameter	228 mm	228 mm	240 mm	240 mm
Drive shaft flange diameter	100 mm	100 mm	108 mm	108 mm

Flange shafts with polygon bearings	yes	yes	no	no 3)
Overall ratio i _{ov} in top gear	3.444	3.444	3.244	3.244
Allocation: rear final drive (code letters)	CKF	CKF	AAT CKF	CKF

3) Large-diameter differential bearings as for gearboxes with polygon bearings

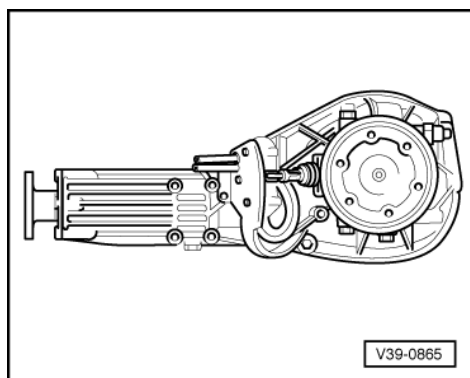
Manual gearbox		5-speed 01A four-wheel drive			
Code letters		CPT	DJG	DBE	DJT
Manufactured	from	02.95	07.96	10.95	07.96
	to	06.96	-	06.96	-
Allocation	Model	Audi 100 1991 ä	Audi 100 1991 ä	Audi 100 1991 ä	Audi 100 1991 ä
	Engine	2.8 ltr - 128 kW 2.8 ltr - 120 kW 4)	2.8 ltr - 128 kW 2.8 ltr - 120 kW 4)	2.8 ltr - 142 kW	2.8 ltr - 142 kW
Ratios Z2 : Z1 =	Final drive	37 : 9 = 4.111	37 : 9 = 4.111	37 : 9 = 4.111	37 : 9 = 4.111
	1st gear	35 : 10 = 3.500	35 : 10 = 3.500	35 : 10 = 3.500	35 : 10 = 3.500
	2nd gear	35 : 19 = 1.842	35 : 18 = 1.944	35 : 18 = 1.944	35 : 18 = 1.944
	3rd gear	39 : 30 = 1.300	39 : 30 = 1.300	39 : 30 = 1.300	39 : 30 = 1.300
	4th gear	33 : 35 = 0.943	33 : 35 = 0.943	33 : 35 = 0.943	33 : 35 = 0.943
	5th gear	30 : 38 = 0.789	30 : 38 = 0.789	30 : 38 = 0.789	30 : 38 = 0.789
	Reverse gear	31 : 9 = 3.444	31 : 9 = 3.444	31 : 9 = 3.444	31 : 9 = 3.444

4) For China, CIS

Code letters	CPT	DJG	DBE	DJT
Speedometer	electronic			
Capacity	2.75 litres			
Specification	Gear oil G 052 911 A SAE 75 W 90 (synthetic oil)			
Clutch mechanism	hydraulic			
Clutch plate diameter	240 mm	240 mm	240 mm	240 mm
Drive shaft flange diameter	108 mm	108 mm	108 mm	108 mm
Flange shafts with polygon bearings	yes	yes	yes	yes
Overall ratio i _{ov} in top gear	3.444	3.246	3.246	3.246
Allocation: rear final drive (code letters)	AAT CKF	CKF	CKF	CKF

2 - Identification of rear final drive

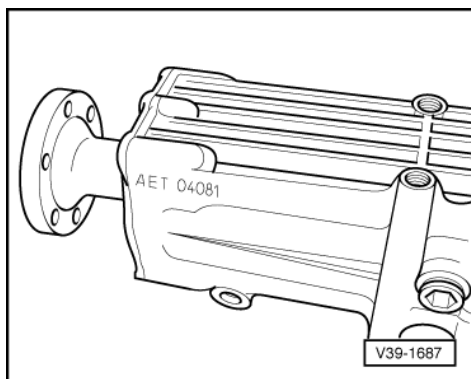
2.1 - Identification of rear final drive





-> Final drive 017 is fitted in conjunction with manual gearbox 01A (four-wheel drive).

Allocation => Page 6



-> Code letters and date of manufacture of rear final drive:

Example:	AET	04	08	1
	Code letters	Day	Month	Year (1991) of manufacture

Note:

The code letters of the rear final drive are also given on the vehicle data stickers.

2.2 - Code letters, allocation, ratios and capacities

Rear final drive		017			
Code letters		AXT	CDC 1)	AMZ	CKG
Manufactured	from	12.90	07.92	07.93	04.94
	to	07.92	07.93	07.94	-
Allocation	Model	Audi 100 1991 ä	Audi 100 1991 ä	Audi 100 1991 ä	Audi 100 1991 ä
	Engine	2.0 ltr - 85 kW	2.0 ltr - 103 kW	2.0 ltr - 103 kW 2.3 ltr - 98 kW 2.6 ltr - 110 kW	1.8 ltr - 92 kW 2.0 ltr - 103 kW
Ratios	Final drive	41 : 9 = 4.556	41 : 9 = 4.556	41 : 9 = 4.556	41 : 9 = 4.556
Capacity		1.7 litres			
Specification		Gear oil GL 5 SAE 90 (MIL-L 2105 B)			
Drive shaft flange diameter		90 mm	100 mm	108 mm	108 mm
Allocation: manual gearbox code letters		AXN	AXN CPU	AXN CPU	AXN CPU CVV CZX DJK DJV

1) For Italy 07.92 ä

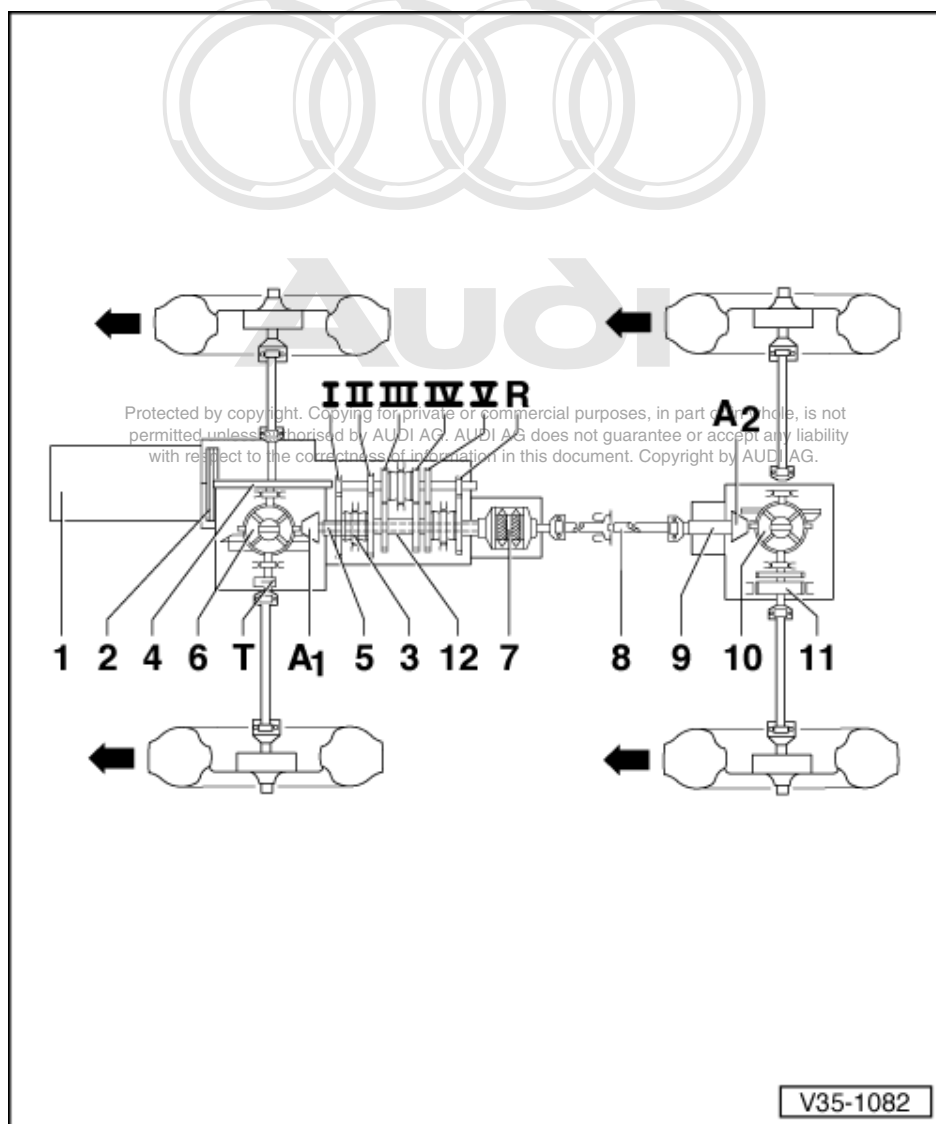
Rear final drive		017		
Code letters		AXS	AAT	CKF
Manufactured	from	12.90	12.90	04.94
	to	07.93	07.94	-
Allocation	Model	Audi 100 1991 ä	Audi 100 1991 ä	Audi 100 1991 ä
	Engine	2.3 ltr - 98 kW 2.6 ltr - 110 kW	2.3 ltr - 98 kW 2.8 ltr - 128 kW 2.6 ltr - 102 kW2) 2.6 ltr - 110 kW	2.3 ltr - 98 kW 2.6 ltr - 102 kW 2.6 ltr - 110 kW 2.8 ltr - 120 kW 2) 2.8 ltr - 128 kW 2.8 ltr - 142 kW
Ratios	Final drive	37 : 9 = 4.111	37 : 9 = 4.111	37 : 9 = 4.111
Capacity		1.7 litres		
Specification		Gear oil GL 5 SAE 90 (MIL-L 2105 B)		
Drive shaft flange diameter		100 mm	108 mm	108 mm
Allocation: manual gearbox (code letters)		AXM CDV	AXM CAB CDV CPR CPS CPT	AXM, CAB CDV, CPR CPS, CPT CVR, CVS CVY, DBE DJF, DJG DJN, DJT

Protected by copyright. Copying for private or commercial purposes, in part or in whole, is not permitted unless authorised by AUDI AG. AUDI AG does not guarantee or accept any liability with respect to the correctness of information in this document. Copyright by AUDI AG.

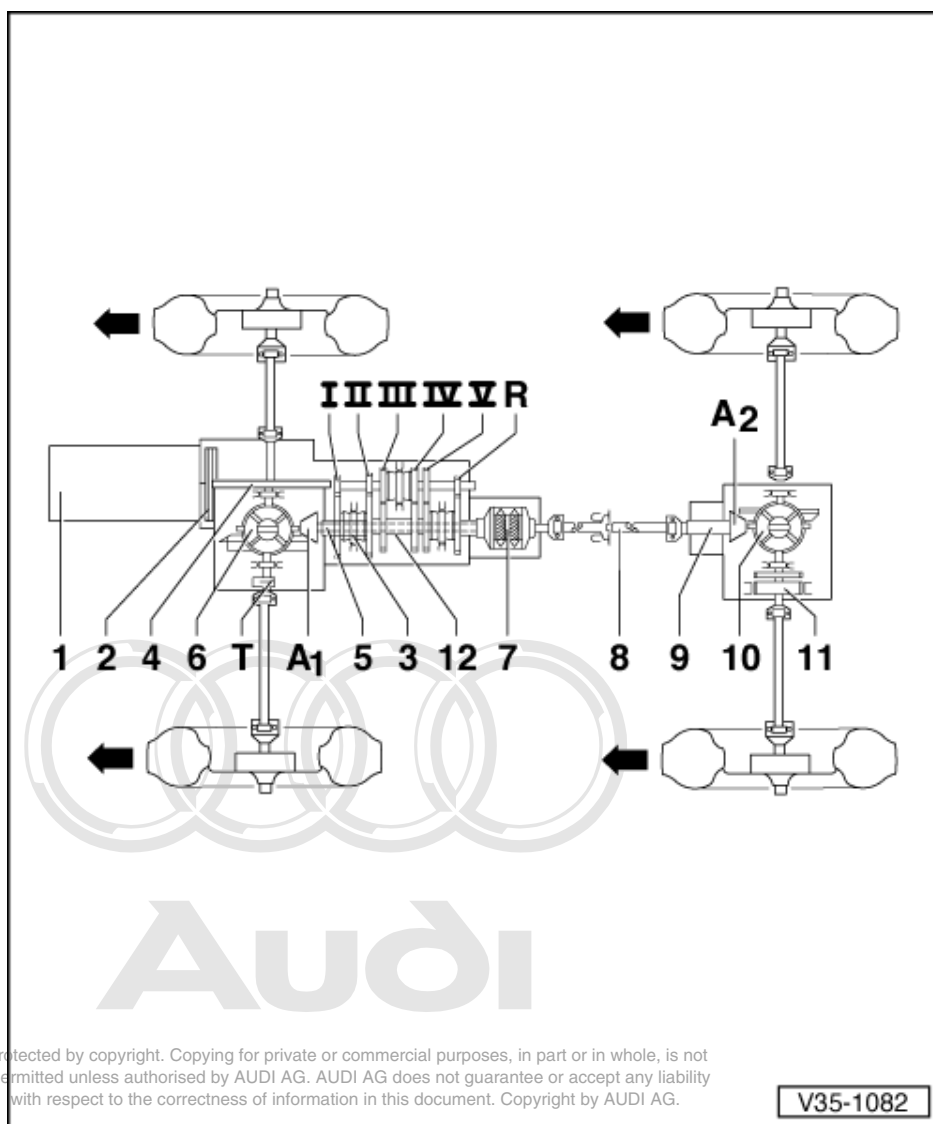
2) For China, CIS

3 - Transmission layout

3.1 - Transmission layout



- 1 Engine
- 2 Clutch
- 3 Gearbox
- 4 Input shaft (main shaft)
- 5 Front drive pinion (output shaft)
- 6 Front differential
- 7 Torsen differential
- 8 Propshaft
- 9 Rear drive pinion
- 10 Rear differential
- 11 Differential lock
- 12 Hollow shaft



Protected by copyright. Copying for private or commercial purposes, in part or in whole, is not permitted unless authorised by AUDI AG. AUDI AG does not guarantee or accept any liability with respect to the correctness of information in this document. Copyright by AUDI AG.

V35-1082

- I - 1st gear
- II - 2nd gear
- III - 3rd gear
- IV - 4th gear
- V - 5th gear
- R - Reverse gear
- A1 - Front final drive
- A2 - Rear final drive
- T - Speedometer drive

Note:

Arrows point in forward direction of travel.

3.2 - Notes on engine output/brake test and towing/tow starting

- ♦ Engine output and brake test

=> Special Information; Transmission; No. 8



- ♦ Tow-starting and towing

=> Booklet; Maintenance

4 - Calculations

4.1 - Calculations

4.2 - Calculating transmission ratios "i"

Transmission ratio

Transmission ratio	= No. of teeth driven gear	: No. of teeth drive gear
--------------------	----------------------------	---------------------------

Ratios	Formula
iG = gear ratio	ZG2 : ZG1
iA = axle ratio	ZA2 : ZA1
iov = overall ratio	iG x iA

Example:	5th gear	Final drive
Drive gear	ZG1 = 38	ZA1 = 9
Driven gear	ZG2 = 30	ZA2 = 37

Calculating:
iG = 30 : 38 = 0.789
iA = 37 : 9 = 4.111
iov = (30 : 38) x (37 : 9) = 0.789 x 4.111 = 3.246

5 - General repair instructions

5.1 - General repair instructions

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

A number of generally applicable instructions for individual repair operations, which are otherwise mentioned at various points in the Workshop Manual, are summarized here. They apply to this Workshop Manual.

Special tools

For a complete list of special tools used in this Workshop Manual

=> Booklet; Special tools, Workshop equipment

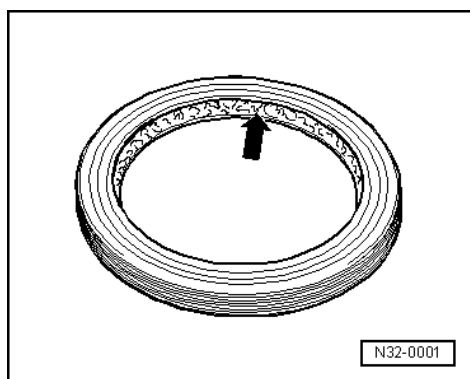
Gearbox

- ♦ When exchanging the manual gearbox or rear final drive, check oil level and top-up if necessary => Page 196 .

- ◆ Capacities and specifications => from Page 6 .
- ◆ Thoroughly clean all connections and the surrounding area before disconnecting.
- ◆ When installing gearbox, ensure dowel sleeves are correctly seated.

O-rings, seals, gaskets

- ◆ Always renew O-rings, seals and gaskets.
- ◆ After removing gaskets and seals, always inspect the contact surface on the housing or shaft for burrs resulting from removal or for other signs of damage.
- ◆ Thoroughly clean housing joint surfaces before assembling.

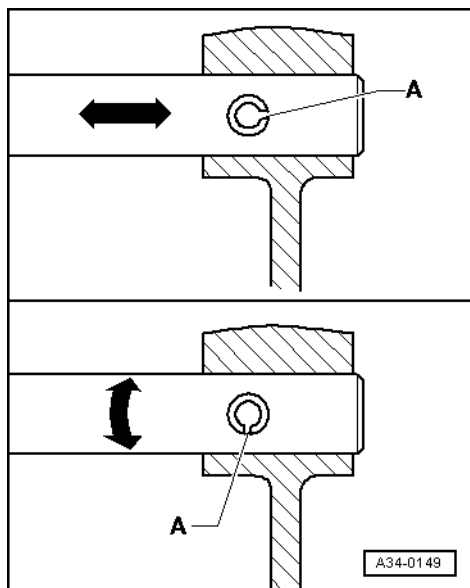


Protected by copyright. Copying for private or commercial purposes, in part or in whole, is not permitted unless authorised by AUDI AG. AUDI AG does not guarantee or accept any liability with respect to the correctness of information in this document. Copyright by AUDI AG.

- ◆ -> Before installing radial shaft oil seals, lightly oil outer edge and fill space between sealing lips -arrow- with grease.
- ◆ The open side of the oil seals faces toward the side with fluid filling.
- ◆ When replacing oil seals, always vary the point at which the sealing lips make contact (use insertion depth tolerances).
- ◆ Lightly oil O-rings before installing; this prevents the rings being crushed when inserting.
- ◆ Check oil level after renewing gaskets and seals =>Page 196 .

Sealants

- ◆ Thoroughly clean housing joint surfaces before applying sealing paste.
- ◆ Apply sealing paste AMV 188 000 02 thinly and evenly.
- ◆ Breather holes must remain free of sealing paste.





Locking elements

- ◆ Do not overstretch circlips.
- ◆ Always renew circlips which have been damaged or over-tensioned.
- ◆ Circlips must locate properly in the groove.
- ◆ -> Renew spring pins. Position: slit -A- should be in line with the line of force -arrow-.

Nuts, bolts

- ◆ Loosen nuts or bolts, opposite to tightening sequence.
- ◆ Tighten and loosen bolts and nuts for securing covers and housings in a diagonal sequence.
- ◆ Especially delicate parts, such as clutch pressure plates, must not be distorted. Loosen and tighten bolts and nuts in stages in a diagonal sequence.
- ◆ The tightening torques stated apply to non-oiled nuts and bolts.
- ◆ Renew self-locking bolts and nuts.
- ◆ The threads of bolts which are secured by a locking fluid should be cleaned with a wire brush. Then apply AMV 185 101 A1 when inserting.
- ◆ Threaded holes into which self-locking bolts or bolts coated with locking fluid are screwed, must be cleaned (e.g. tap). Otherwise there is a danger of bolts shearing when subsequently being removed.

Bearings

- ◆ Install needle bearings with the lettering on the bearing (the side with thicker metal) facing towards the drift or other tool used for installing.
- ◆ Grease needle bearing for gearbox input shaft in rear of flywheel.
- ◆ Lubricate all bearings in gearbox housing with gear oil before installing.
- ◆ Heat inner races of taper roller bearings to approx. 100 °C before installing. Press in onto stop when installing so there is no axial clearance.
- ◆ Do not interchange the outer or inner races of bearings of the same size.
- ◆ Always replace the taper roller bearings on one shaft together and use new bearings from a single manufacturer.
- ◆ The taper roller bearings for the output shaft and the differential in the gearbox are low-friction bearings. Do not additionally oil new taper roller bearings when measuring friction torque. The bearings are pre-treated at the factory with a special type of oil for this purpose.

Shims

- ◆ Use a micrometer to measure the shims at several points. Different tolerances make it possible to obtain the exact shim thickness required.
- ◆ Check for burrs and damage.
- ◆ Only install perfect, undamaged shims.

Gears, synchro-hubs, inner races for sliding gears

- ◆ Heat gears and synchro-hubs to approx. 100 °C before installing. Press in onto stop when installing so there is no axial clearance.
- ◆ Heat inner races for sliding gears to approx. 100 °C when installing.
- ◆ The temperature can be checked with Temperature tester V.A.G 1558.
- ◆ Observe installation position.

Sliding gears

- ◆ After assembling, check axial clearance of 1st to 5th sliding gears and reverse sliding gear (0.15 ... 0.35 mm) and check for freedom of movement.

Synchroniser rings

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

Clutch mechanism

- ◆ When removing gearbox, remove clutch slave cylinder without disconnecting pipes.
- ◆ If the slave cylinder is removed with the hydraulic pipe attached, do not depress clutch pedal. Otherwise the piston will be pressed out of the slave cylinder.
- ◆ Do not cant clutch pressure plate, loosen and tighten in a diagonal sequence and in stages.

- ♦ To reduce odour caused by a burnt clutch, thoroughly clean the clutch bellhousing, the flywheel and the parts of the engine facing the gearbox.



Protected by copyright. Copying for private or commercial purposes, in part or in whole, is not permitted unless authorised by AUDI AG. AUDI AG does not guarantee or accept any liability with respect to the correctness of information in this document. Copyright by AUDI AG.



30 - Clutch

1 - Servicing clutch mechanism

1.1 - Servicing clutch mechanism

Notes:

- ♦ The clutch pedal travel must not be restricted by additional floor mats etc.
- ♦ For vehicles with coded radio, obtain and note the radio code.
- ♦ Disconnect battery earth strap with the ignition switched off.
- ♦ Lubricate all bearings and contact surfaces with G 052 142 A 2 polycarbamide grease.
- ♦ Before working on pedal cluster, remove cover below dash panel:

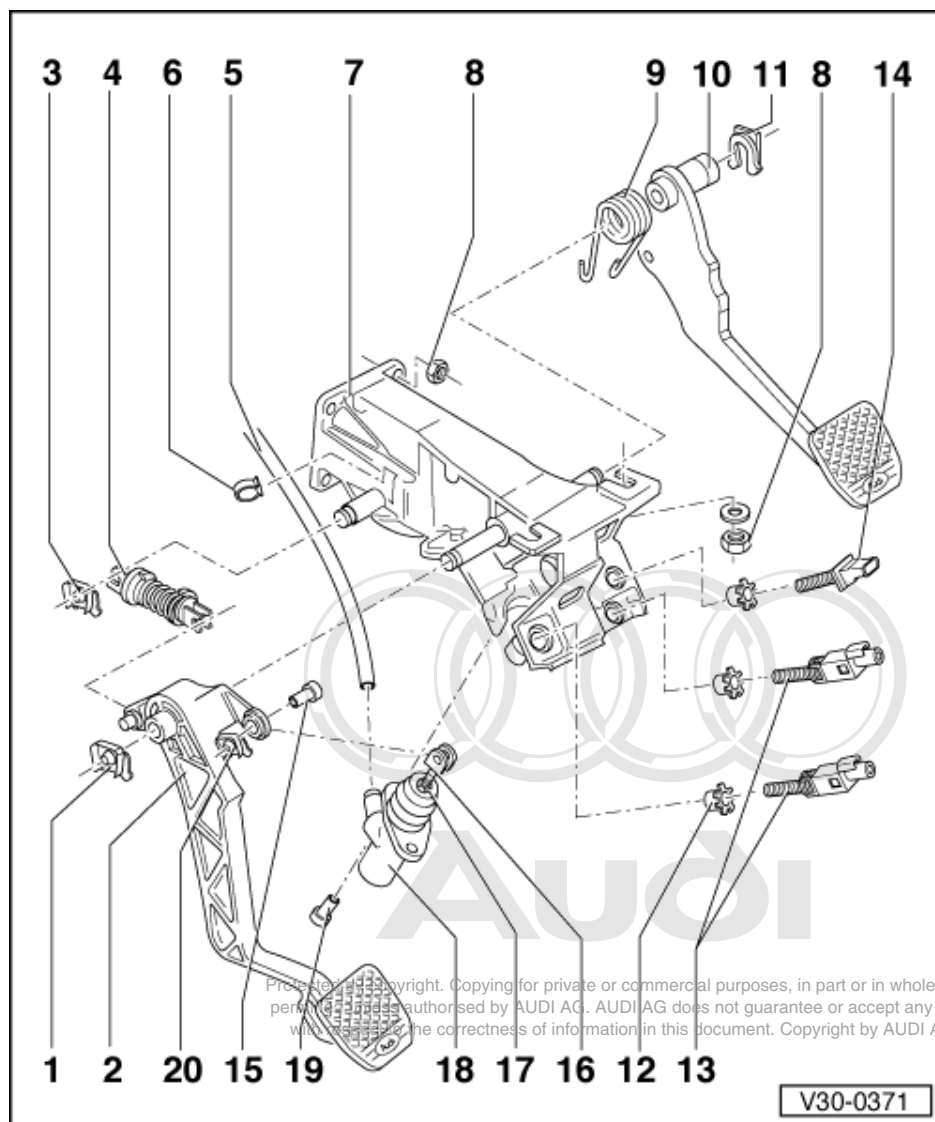
=> General body repairs; Repair group 70; Dash panel; Removing and installing storage compartment and glove compartment. Dash panel Removing and installing storage compartment and glove compartment.

- ♦ Make sure that no brake fluid escapes into the plenum chamber or onto the gearbox below. If this does happen, clean the affected areas thoroughly.
- ♦ When performing work in the footwell, put cloths on the carpet to protect it from possible brake fluid spills.



Protected by copyright. Copying for private or commercial purposes, in part or in whole, is not permitted unless authorised by AUDI AG. AUDI AG does not guarantee or accept any liability with respect to the correctness of information in this document. Copyright by AUDI AG.

1.2 - Assembly overview - pedal cluster (LHD vehicles)

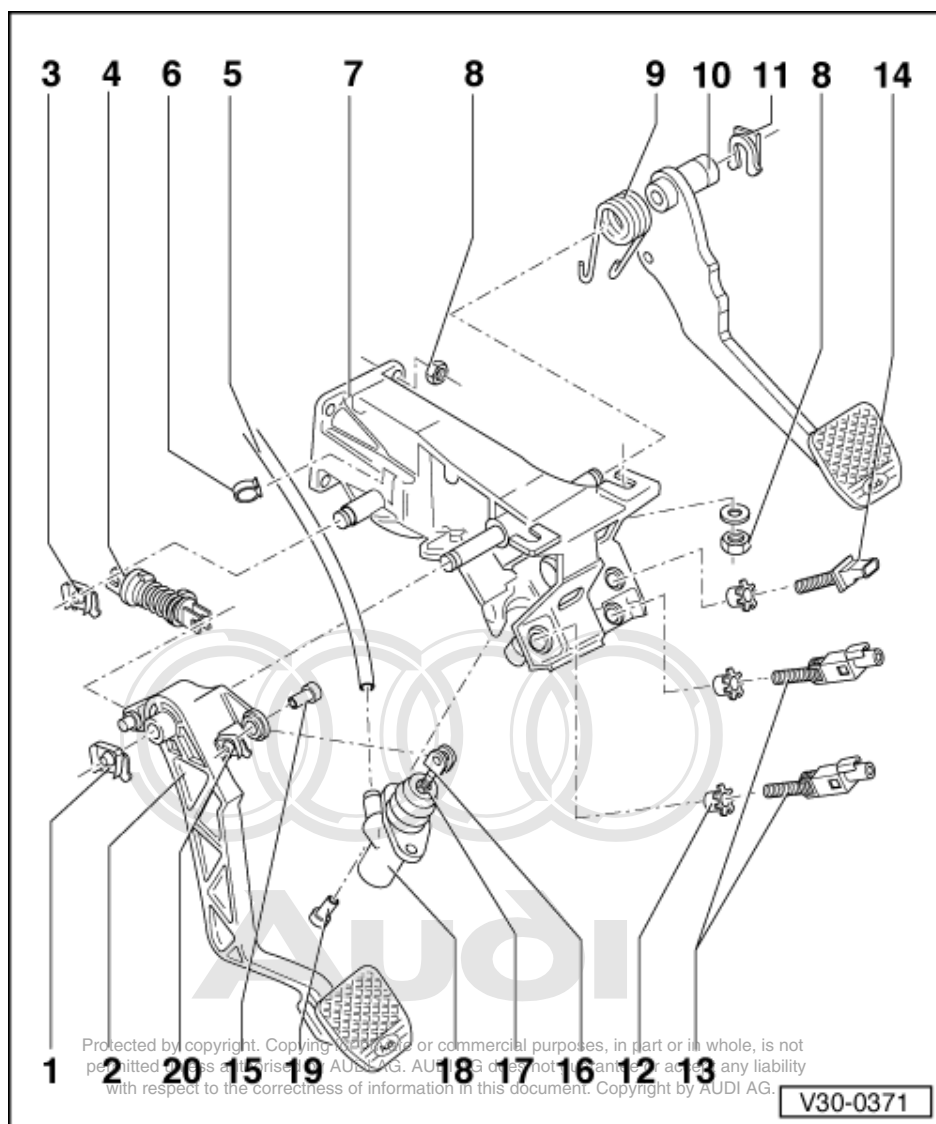


1 Securing clip

- ◆ Renew if damaged
- ◆ Fit onto pivot pin on pedal bracket

2 Clutch pedal

- ◆ Can be renewed with pedal bracket installed in vehicle
- ◆ Is located in correct position by clevis adjustment
- ◆ Fit onto pivot pin on pedal bracket
- ◆ Bearing bush cannot be replaced separately; pedal is supplied as replacement part with integral bush.



3 Securing clip

- ◆ Does not have to be removed in order to remove over-centre spring

4 Over-centre spring

- ◆ Lubricate with polycarbamide grease G 052 142 A2 before assembling
- ◆ Removing and installing => Fig. 3

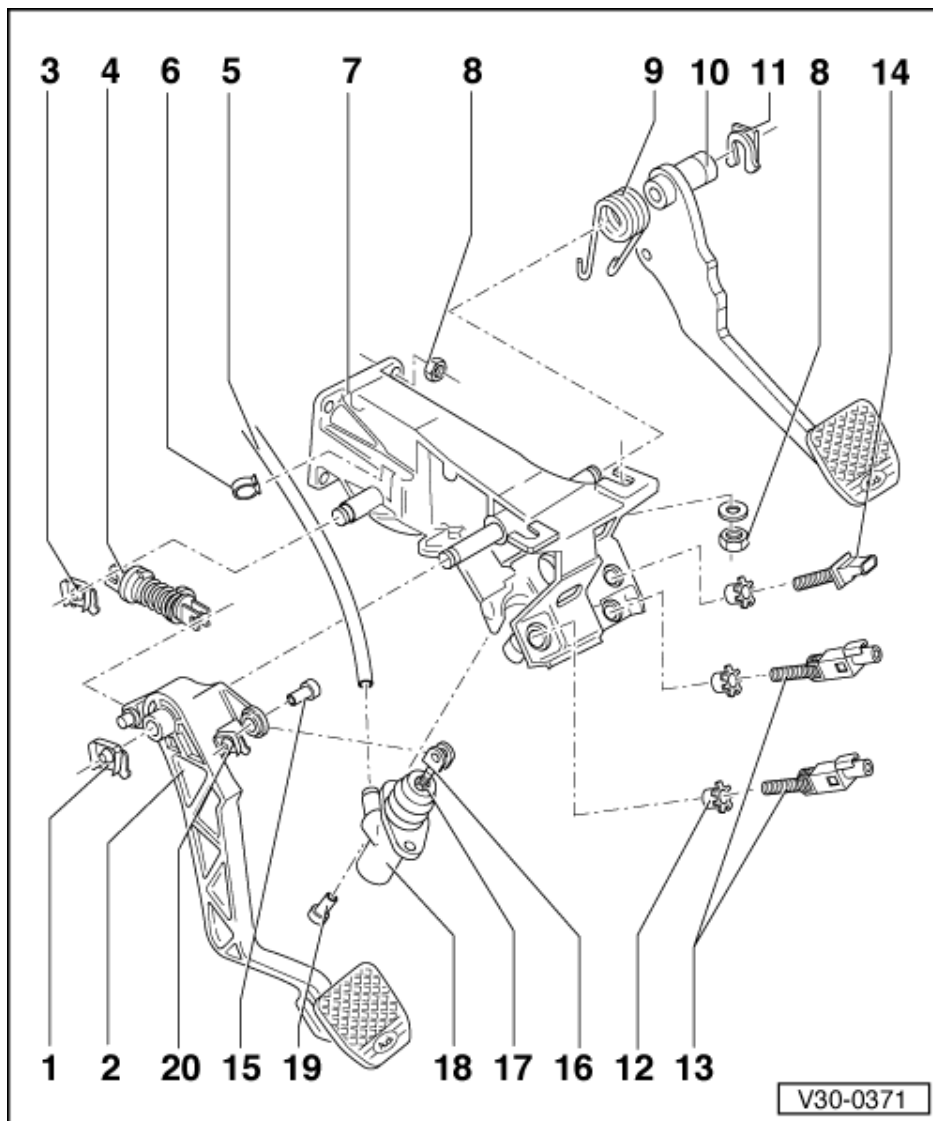
5 Supply hose

- ◆ For master cylinder
- ◆ Must not touch over-centre spring
- ◆ Locate accordingly on pedal bracket and secure with cable clip

6 Cable clip

- ◆ Secures supply hose to pedal bracket

7 Pedal bracket



8 Nut - 25 Nm

- ◆ Self-locking
- ◆ Renew

9 Torsion spring

- ◆ Fit onto brake pedal before installing
- ◆ Installation position=>Fig. 2

10 Brake pedal

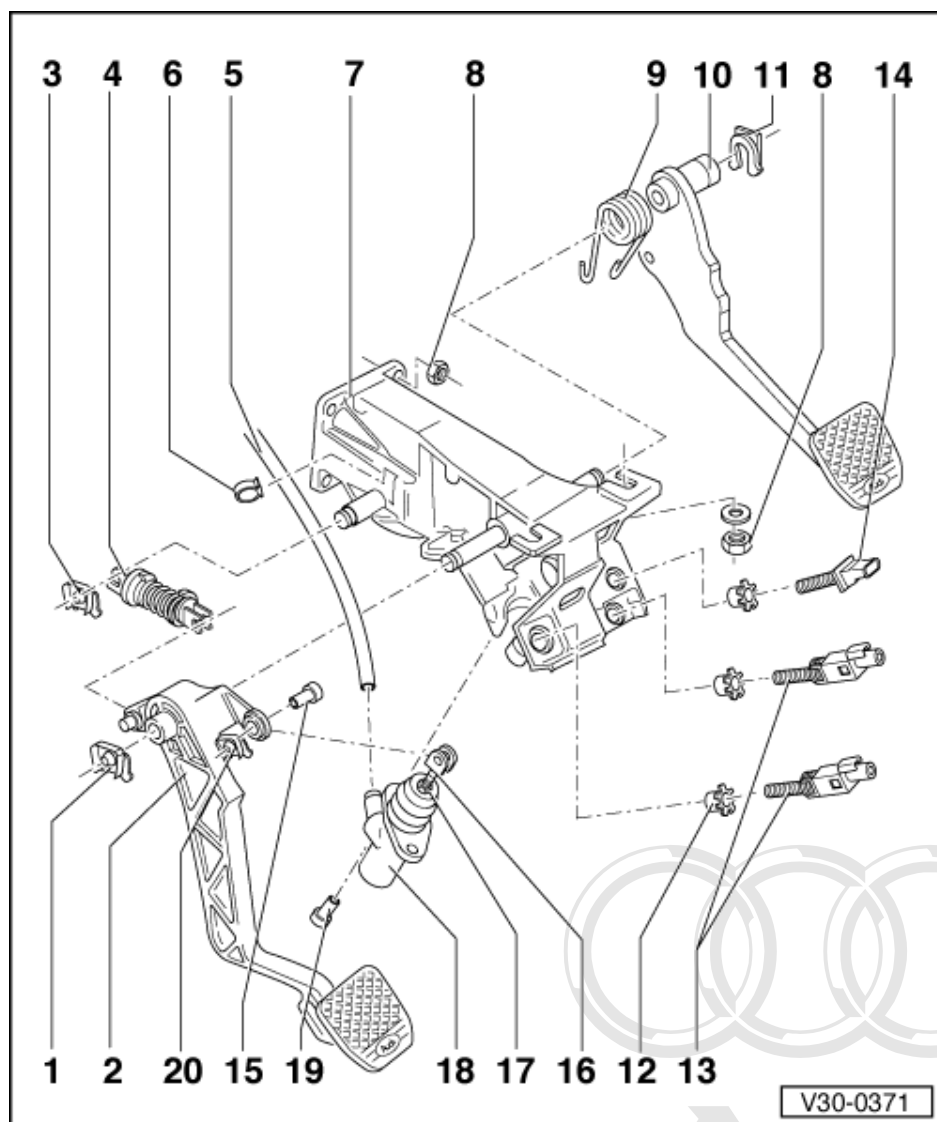
- ◆ Fit onto pivot pin on pedal bracket
- ◆ Bearing bush cannot be replaced separately; pedal is supplied as replacement part with integral bush.
- ◆ Remove/install pedal bracket before removing/installing pedal.

11 Securing clip

- ◆ Renew if damaged
- ◆ Fit onto pivot pin on pedal bracket



Protected by copyright. Copying for private or commercial purposes, in part or in whole, is not permitted unless authorised by AUDI AG. AUDI AG does not guarantee or accept any liability with respect to the correctness of information in this document. Copyright by AUDI AG.



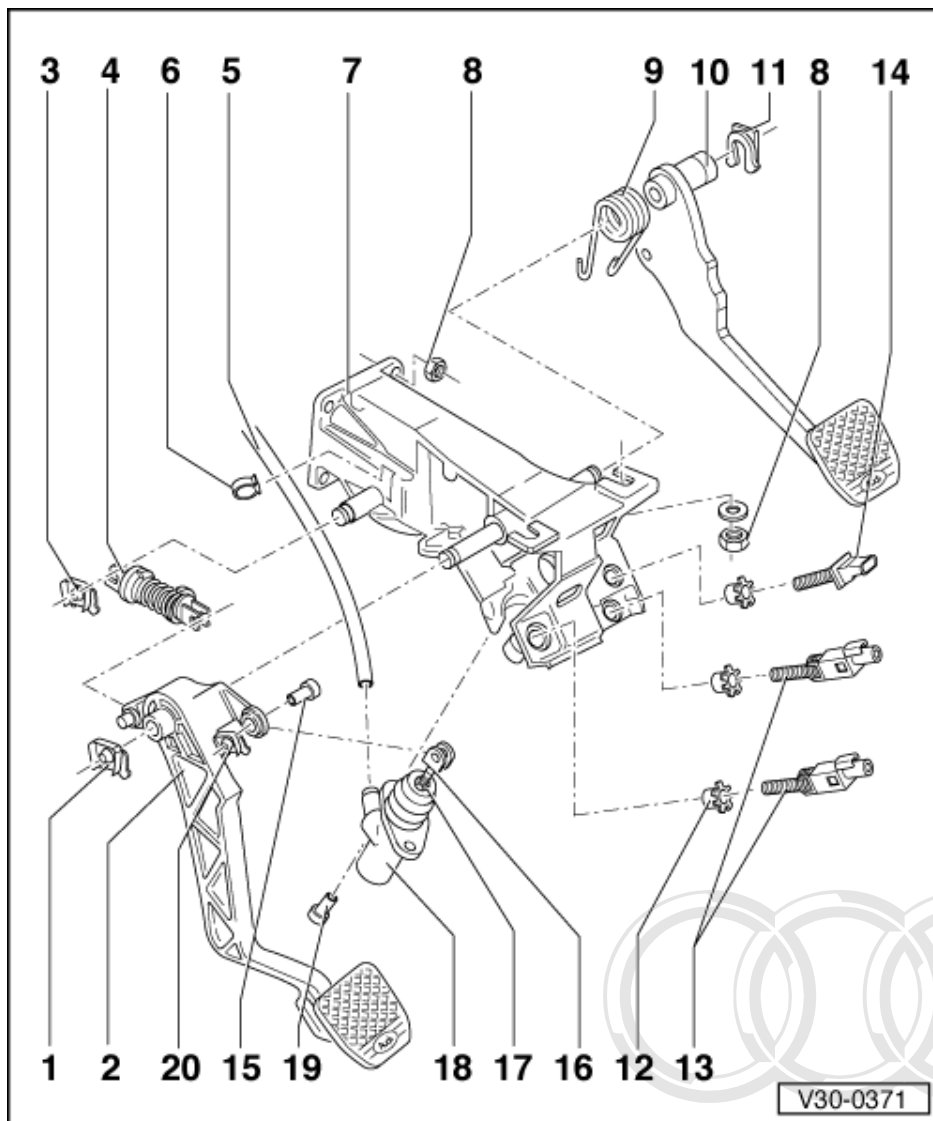
12 Clip

- ◆ For vent valves for cruise control system and for brake light switch
- ◆ Using pliers, press into holes in pedal bracket as far as stop

13 Vent valves

- ◆ For cruise control system
- ◆ Press in valve after fitting clip
- ◆ Adjust valve with clevis connected:
 - Operate clutch pedal/brake pedal
 - Press in vent valves onto stop
 - Pull clutch pedal/brake pedal all the way back by hand

Protected by copyright. Copying for private or commercial purposes, in part or in whole, is not permitted unless authorised by AUDI AG. AUDI AG does not guarantee or accept any liability with respect to the correctness of information in this document. Copyright by AUDI AG.



14 Brake light switch

- ◆ Press into clip (already fitted)
- ◆ Adjust with clevis connected:
 - Operate brake pedal
 - Press in brake light switch onto stop
 - Pull brake pedal all the way back by hand

Note:

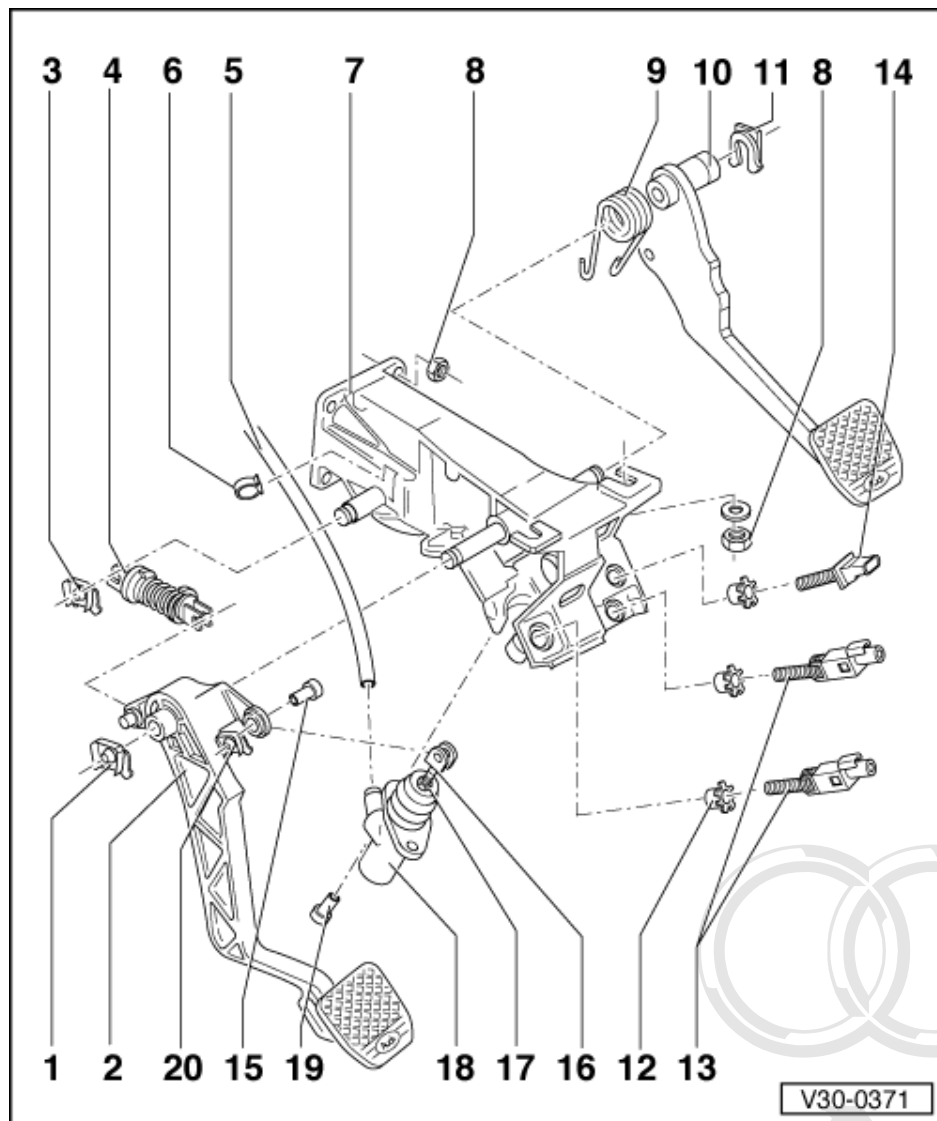
Protected by copyright. Copying for private or commercial purposes, in part or in whole, is not permitted unless authorised by AUDI AG. AUDI AG does not guarantee or accept any liability with respect to the correctness of information in this document. Copyright by AUDI AG.

Adjusting clevis for brake pedal

=> Running gear, Four-wheel drive; Repair group 47; Removing and installing brake master cylinder/vacuum brake servo unit Removing and installing brake master cylinder/vacuum brake servo unit

15 Pin

- ◆ Secure clevis to clutch pedal



16 Clevis

- ♦ Adjusting => Fig. 1

17 Lock nut - 10 Nm

- ♦ Tighten after adjusting clevis

18 Master cylinder

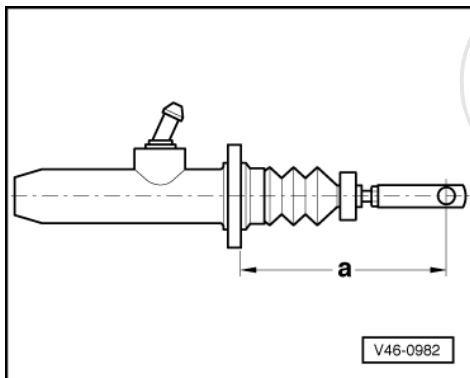
- ♦ Renew if leaking

19 Bolt - 20 Nm

20 Securing clip

- ♦ Renew if damaged
- ♦ Fit onto pin

Protected by copyright. Copying for private or commercial purposes, in part or in whole, is not permitted unless authorised by AUDI AG. AUDI AG does not guarantee or accept any liability with respect to the correctness of information in this document. Copyright by AUDI AG.



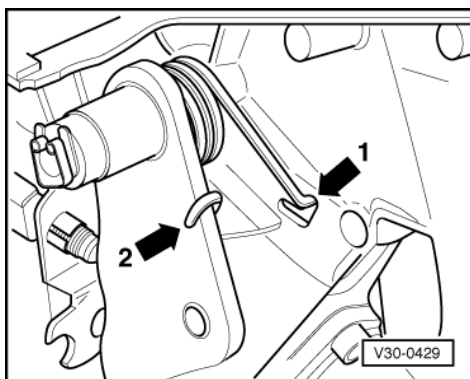
➔ Fig.1 Adjusting clevis

- Check distance -a- when replacing master cylinder. Adjust if necessary.
 - Distance $a = 109.5 \pm 0.5$ mm
 - When measuring, clevis must be at right angles to mounting surface of clutch master cylinder.

Notes:

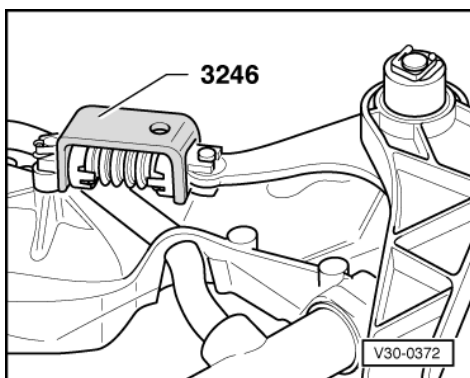
If the clevis is correctly adjusted and the clutch pedal does not return properly by itself, this can be caused by the following:

- ◆ Air in hydraulic system.
- ◆ Pedal bearing or over-centre spring not moving freely.



➔ Fig.2 Installation position of torsion spring for brake pedal

- Hook long end of spring -arrow 1- into pedal bracket and short end -arrow 2- onto brake pedal.



-> Fig.3 Removing and installing over-centre spring

Special tools, testers and auxiliary items

- ♦ Installation clamp 3246

- Remove left-hand storage compartment

=> General body repairs; Repair group 70; Dash panel; Removing and installing storage compartment and glove box Dash panel Removing and installing storage compartment and glove box

- Remove left-hand footwell vent

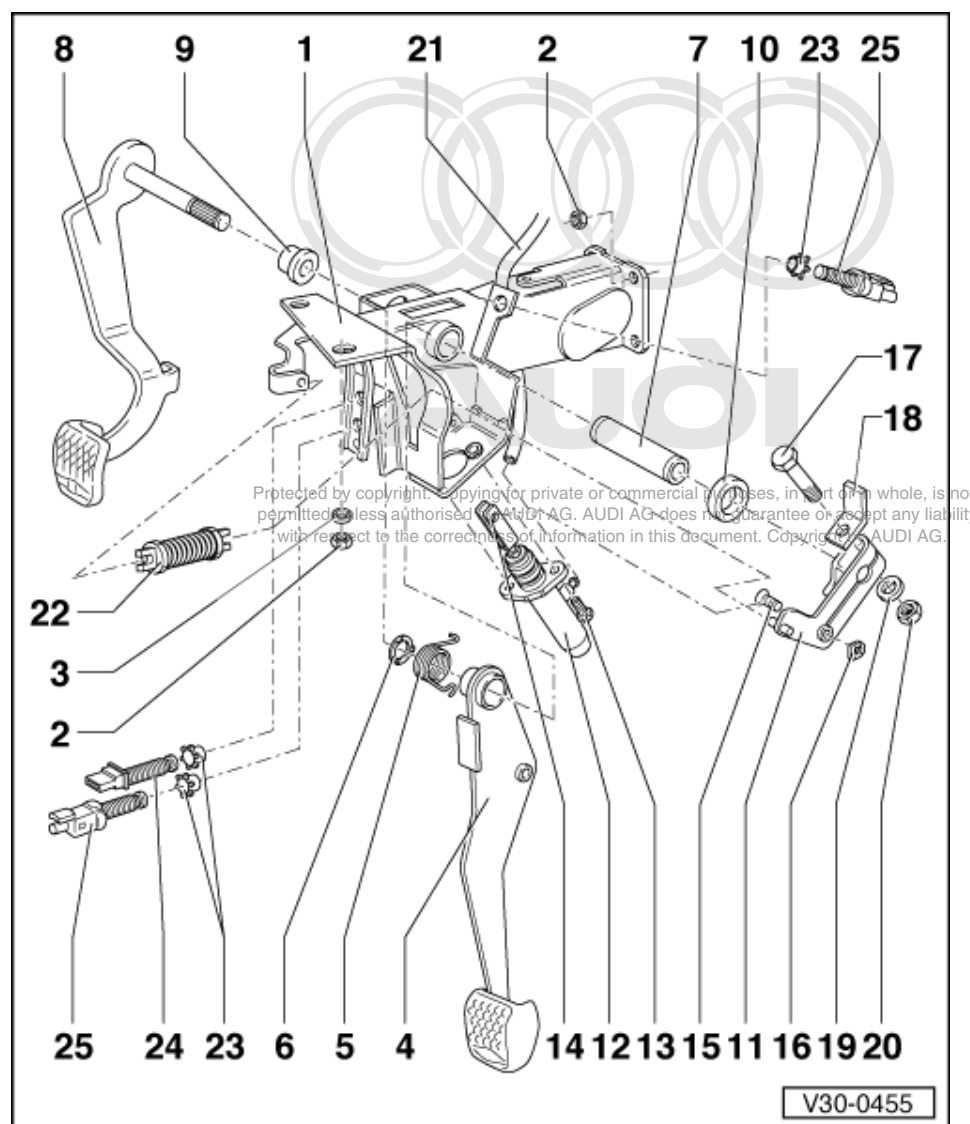
=> Heating, air conditioner; Repair group 80; Servicing heating system Servicing heating system

- Remove protective plate between connector for electrical wiring and pedal cluster.
- Push clamp 3246 sideways over the over-centre spring.
- Depress clutch pedal and remove over-centre spring together with installation clamp.

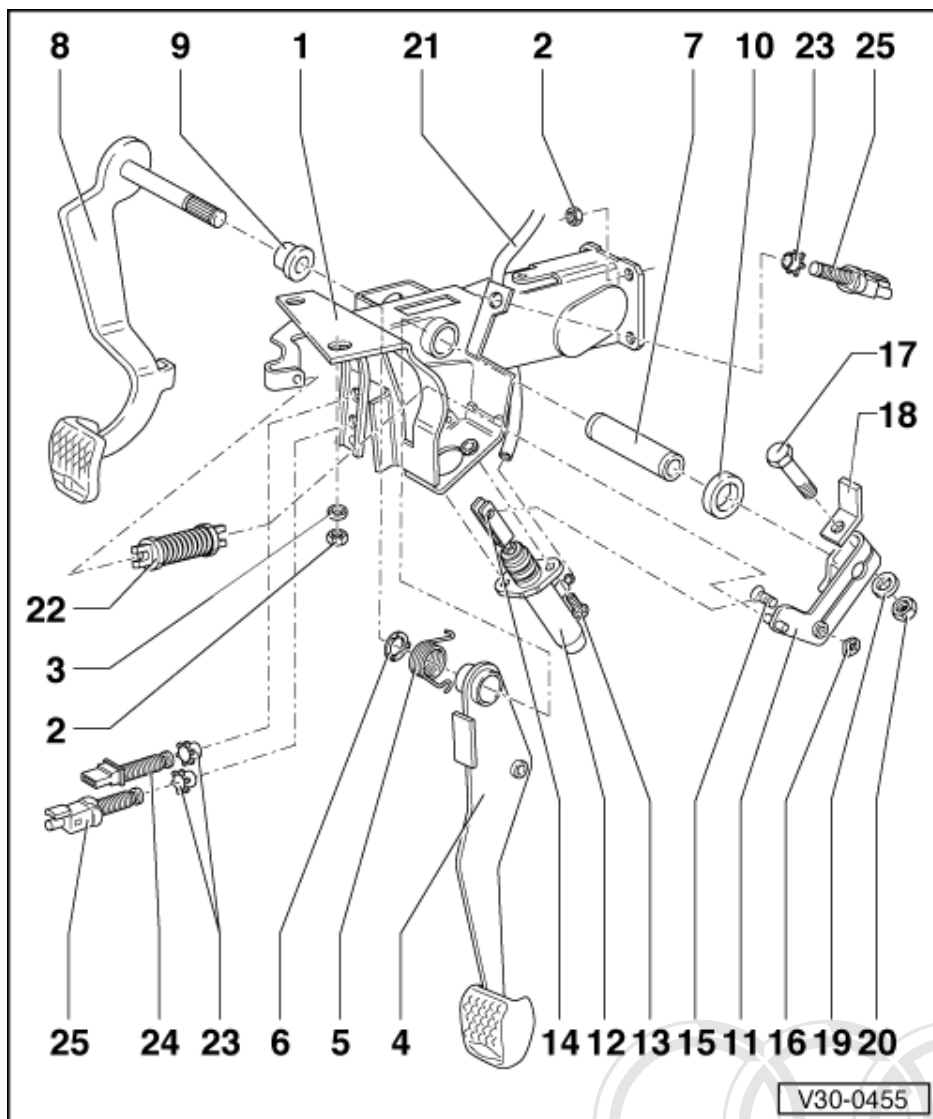
Notes:

- ♦ The illustration shows installation clamp 3246 with the pedal bracket removed.
- ♦ Before fitting, lubricate pivot pin with polycarbamide grease G 052 142 A2.

1.3 - Assembly overview - pedal cluster (RHD vehicles)



- 1 Pedal bracket
- 2 Nut - 25 Nm
 - ◆ Self-locking
 - ◆ Renew
- 3 Washer
- 4 Brake pedal
 - ◆ Bearing bush cannot be replaced separately; pedal is supplied as replacement part with integral bush.
 - ◆ Remove/install pedal bracket to remove/install pedal

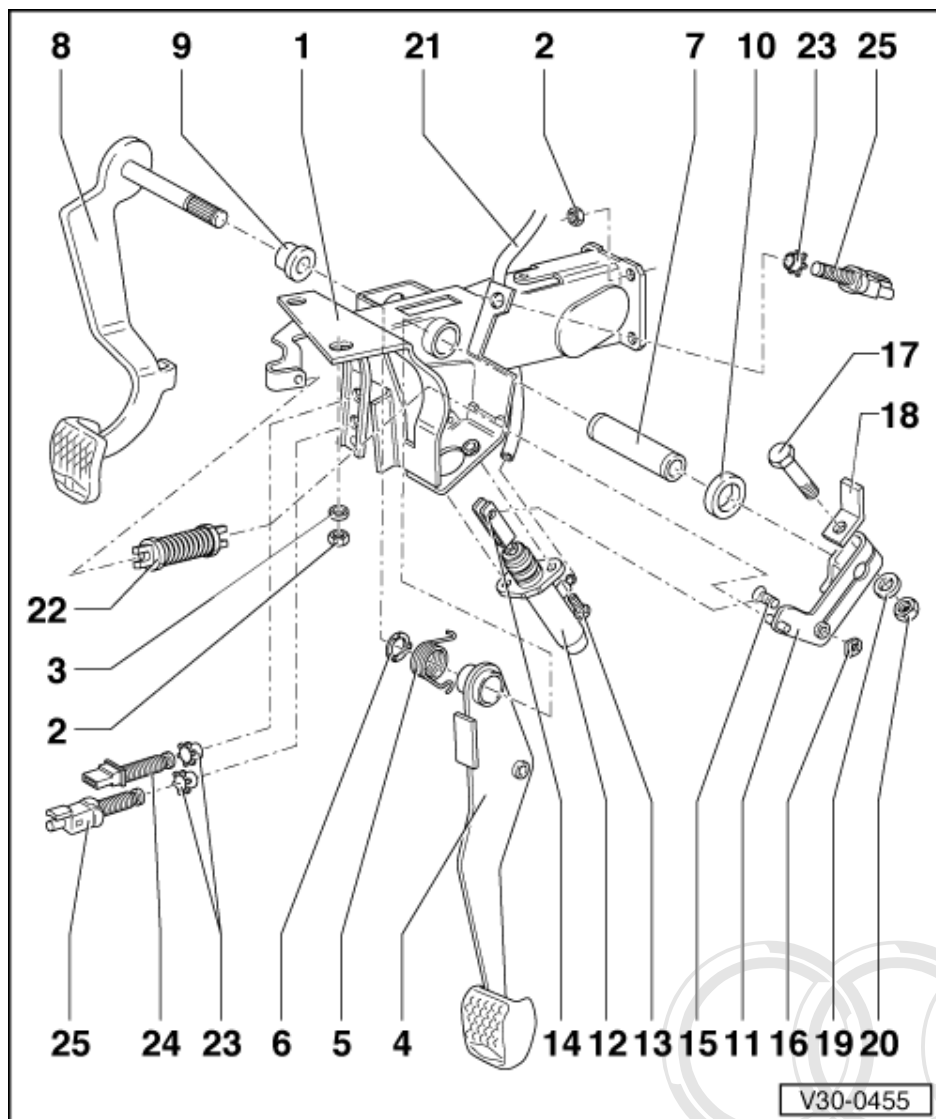


- 5 Torsion spring
 - ◆ Fit onto brake pedal before installing
 - ◆ Installation position=>Fig. 1
- 6 Shim
 - ◆ Fit onto brake pedal before installing
 - ◆ Lugs towards brake pedal
- 7 Bearing tube
 - ◆ Fitted into pedal bracket and bearing bush of brake pedal after assembling brake pedal
- 8 Clutch pedal
 - ◆ Remove/install pedal bracket to remove/install pedal
 - ◆ Insert pedal shaft into bearing tube

Copyright by copyright. Copying for private or commercial purposes, in part or in whole, is not permitted unless authorised by AUDI AG. AUDI AG does not guarantee or accept any liability with respect to the correctness of information in this document. Copyright by AUDI AG.



- ♦ Is secured by adjusting the clevis



9 Spacer bush

10 Spacer washer

11 Lever

12 Master cylinder

- ♦ Renew if leaking

13 Bolt - 20 Nm

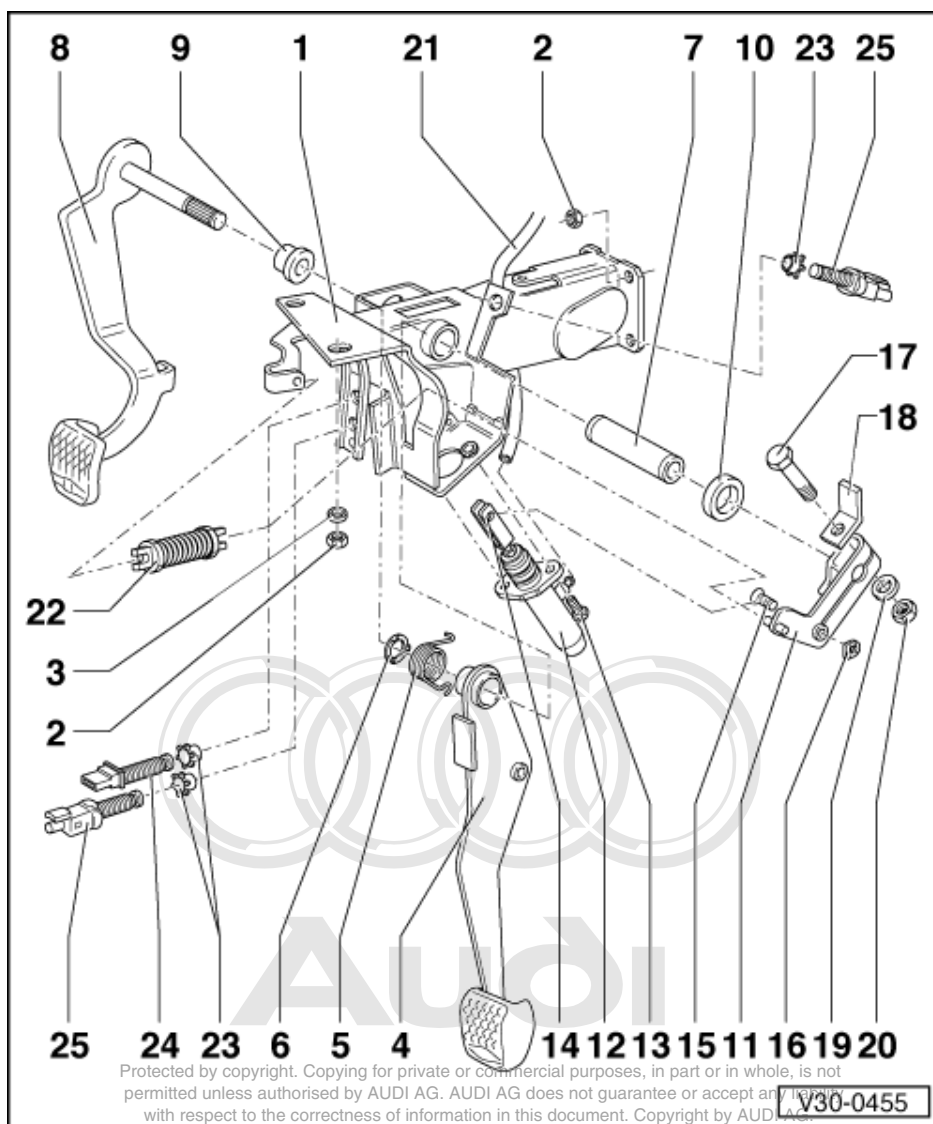
14 Clevis

- ♦ Adjusting
=>Fig 21
- ♦ Tighten lock nut to 10 Nm after adjusting clevis

15 Pin

- ♦ Secures clevis to lever

Protected by copyright. Copying for private or commercial purposes, in part or in whole, is not permitted unless authorised by AUDI AG. AUDI AG does not guarantee or accept any liability with respect to the correctness of information in this document. Copyright by AUDI AG.



16 Securing clip

- ◆ Renew if damaged
- ◆ Fit onto pin

17 Bolt

18 Angle bracket

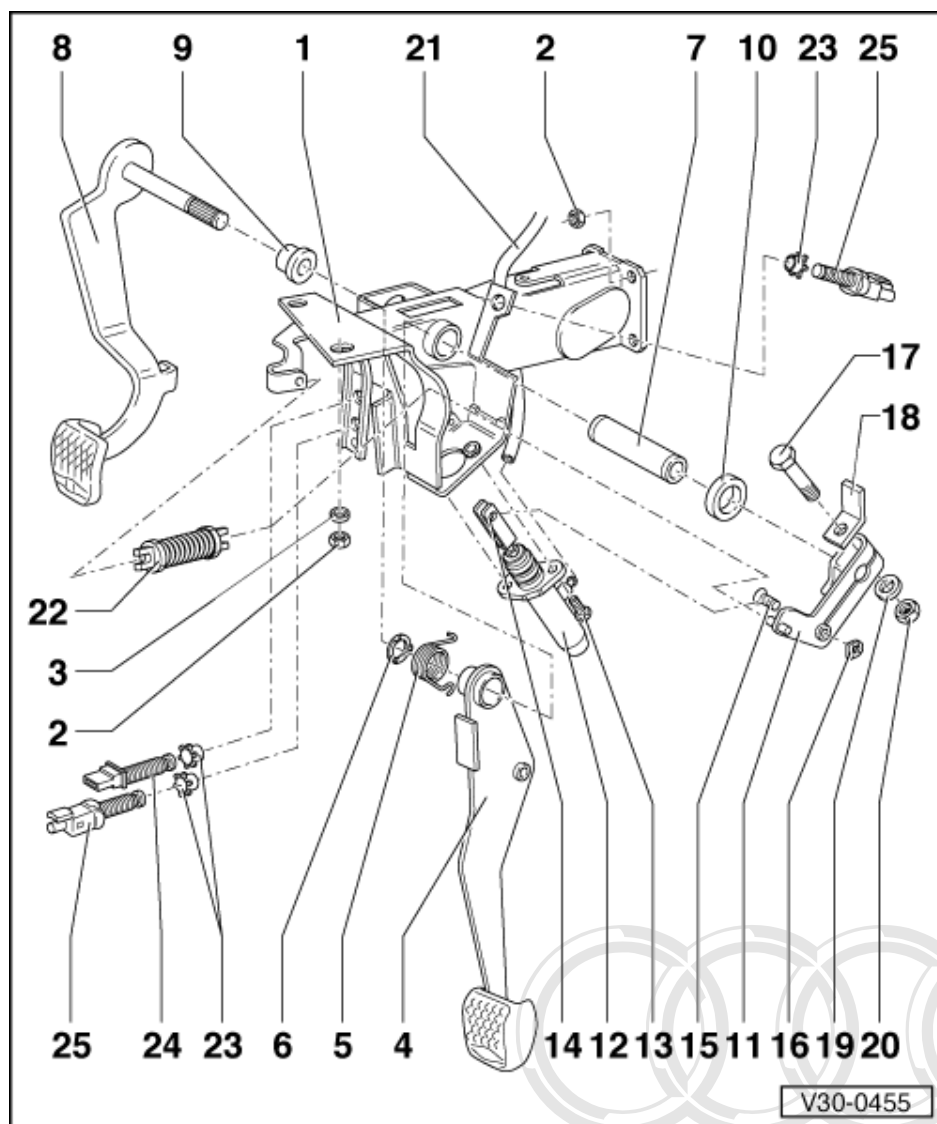
- ◆ Operates vent valve
- ◆ Only on vehicles with cruise control system

19 Washer

20 Nut - 40 Nm

21 Supply hose

- ◆ For master cylinder
- ◆ Must not contact over-centre spring
- ◆ Route along pedal bracket, as shown
- ◆ Determine length of hose needed using Parts Catalogue



22 Over-centre spring

- ◆ Lubricate with polycarbamide grease G 052 142 A2 before installing
- ◆ Removing and installing=>Fig. 2

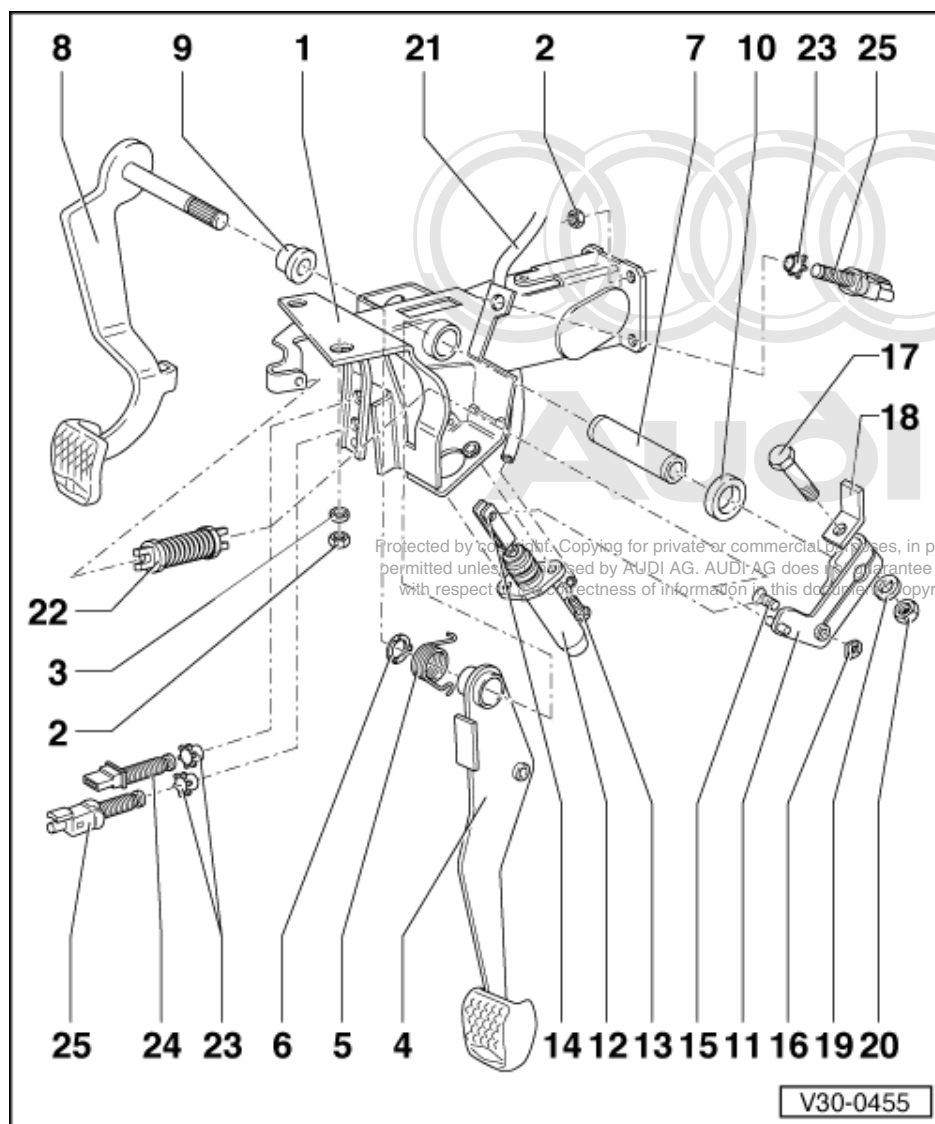
23 Clip

- ◆ For vent valves for cruise control system and for brake light switch
- ◆ Using pliers, press into holes in pedal bracket as far as stop

24 Brake light switch

- ◆ Press in after fitting clip
- ◆ Adjust with clevis connected:
 - Operate brake pedal
 - Press in brake light switch onto stop
 - Pull brake pedal all the way back by hand

Protected by copyright. Copying for private or commercial purposes, in part or in whole, is not permitted unless authorised by AUDI AG. AUDI AG does not guarantee or accept any liability with respect to the correctness of information in this document. Copyright by AUDI AG.



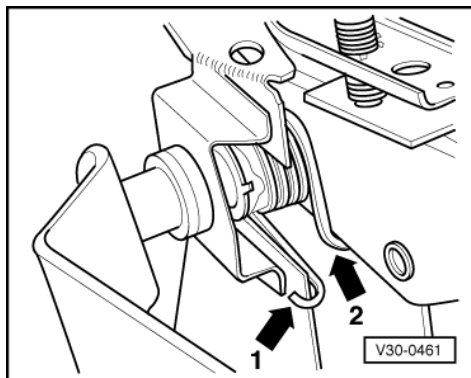
Note:

Adjusting clevis for brake pedal

=> Running gear, Four-wheel drive; Repair group 47; Removing and installing brake master cylinder/vacuum brake servo unit
Removing and installing brake master cylinder/vacuum brake servo unit

25 Vent valve

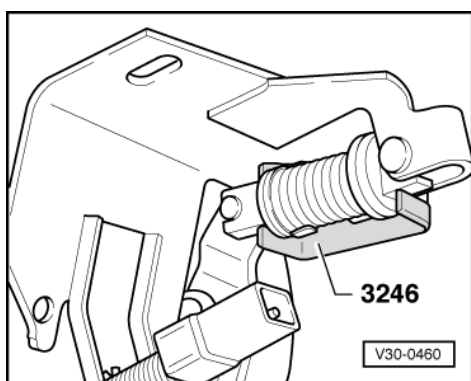
- ◆ For cruise control system
- ◆ Press in after fitting clip
- ◆ Adjust with clevis connected:
 - Operate clutch pedal/brake pedal
 - Press in vent valve onto stop
 - Pull clutch pedal/brake pedal all the way back by hand



-> Fig.1 Installation position of torsion spring for brake pedal

- Hook long end of spring -arrow 1- into pedal bracket and short end -arrow 2- onto brake pedal

Protected by copyright. Copying for private or commercial purposes, in part or in whole, is not permitted unless authorised by AUDI AG. AUDI AG does not guarantee or accept any liability with respect to the correctness of information in this document. Copyright by AUDI AG.



-> Fig.2 Removing and installing over-centre spring

Special tools, testers and auxiliary items

- ♦ Installation clamp 3246

- Remove right-hand storage compartment

=> General body repairs; Repair group 70; Dash panel; Removing and installing storage compartment and glove box Dash panel Removing and installing storage compartment and glove box

- Remove right-hand footwell vent

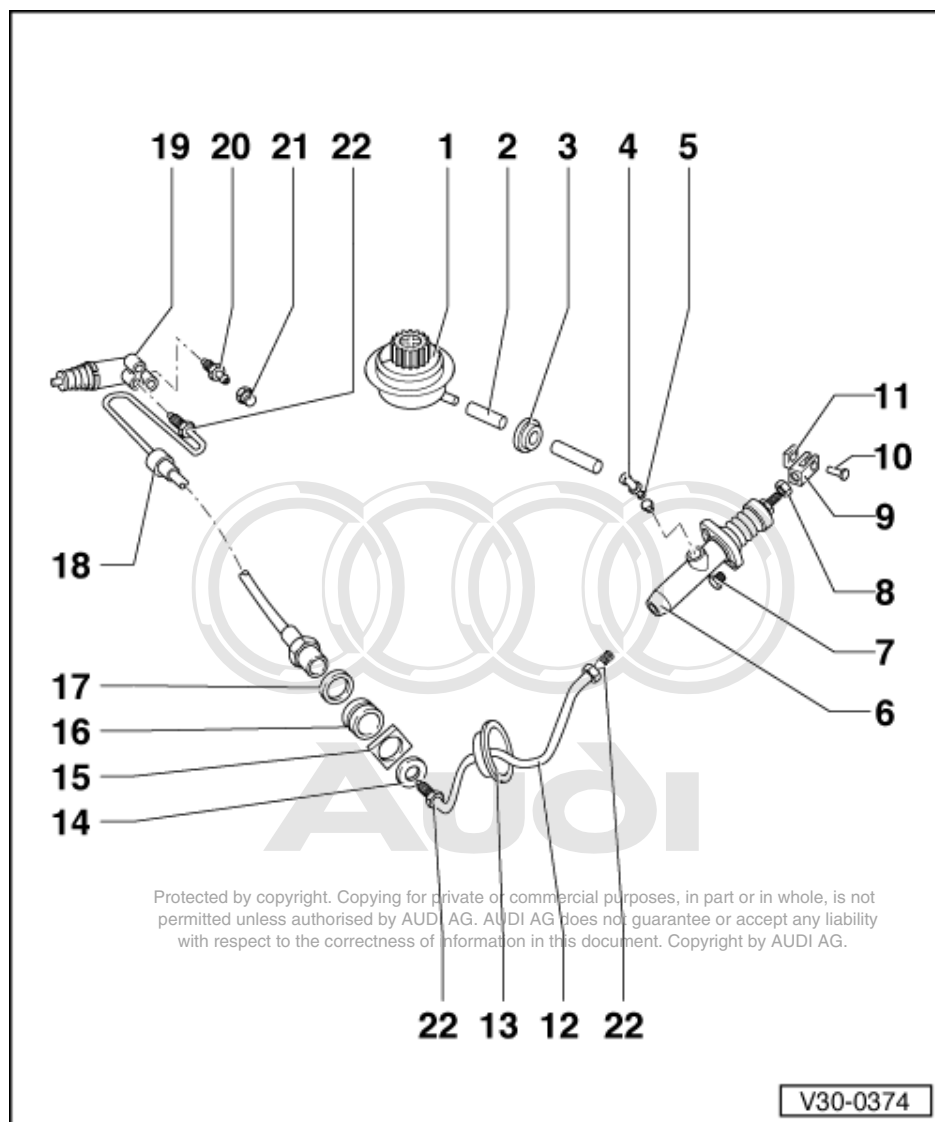
=> Heating, air conditioner; Repair group 80; Servicing heating system Servicing heating system

- Remove protective plate between connector for electrical wiring and pedal cluster.
- Push clamp 3246 sideways over the over-centre spring.
- Depress clutch pedal and remove over-centre spring together with installation clamp.

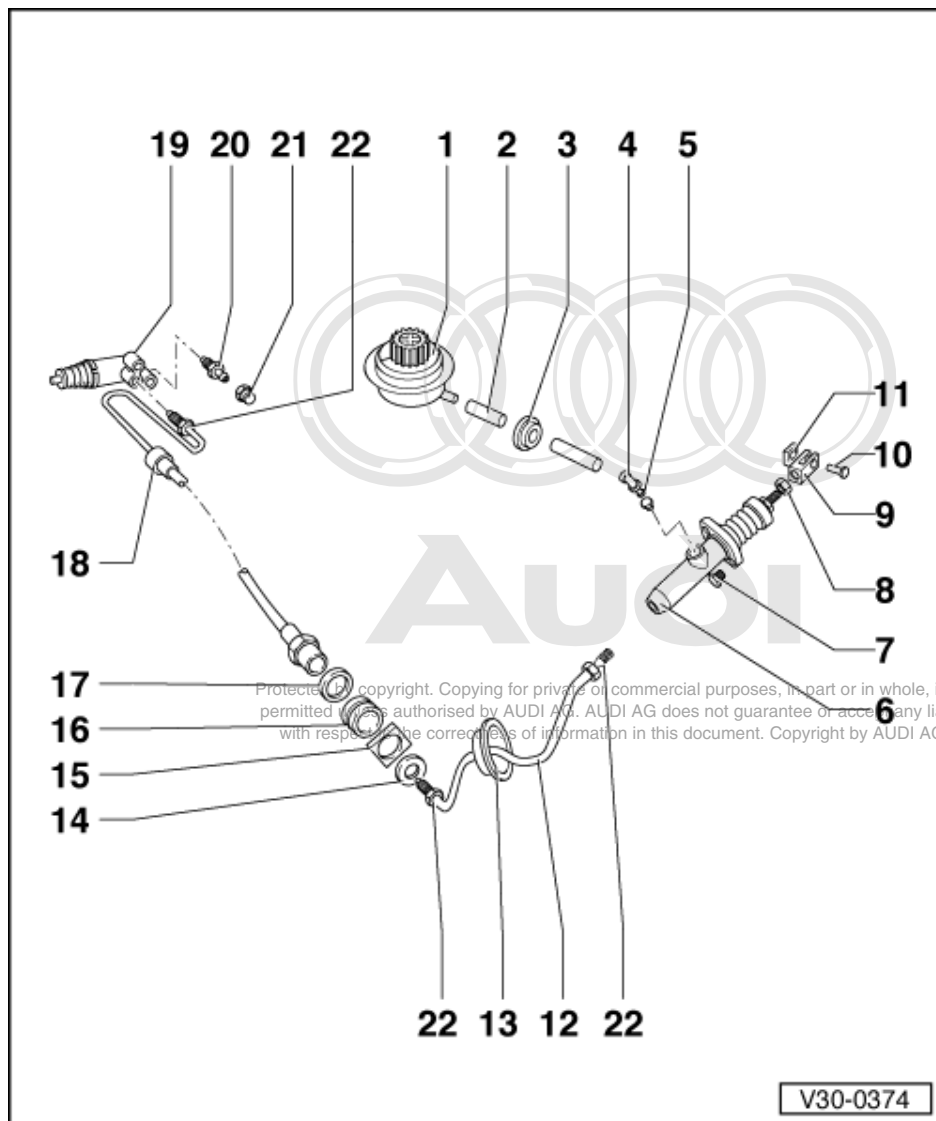
Notes:

- ♦ The illustration shows installation clamp 3246 with the pedal bracket removed.
- ♦ Before fitting, lubricate pivot pin with polycarbamide grease G 052 142 A2.

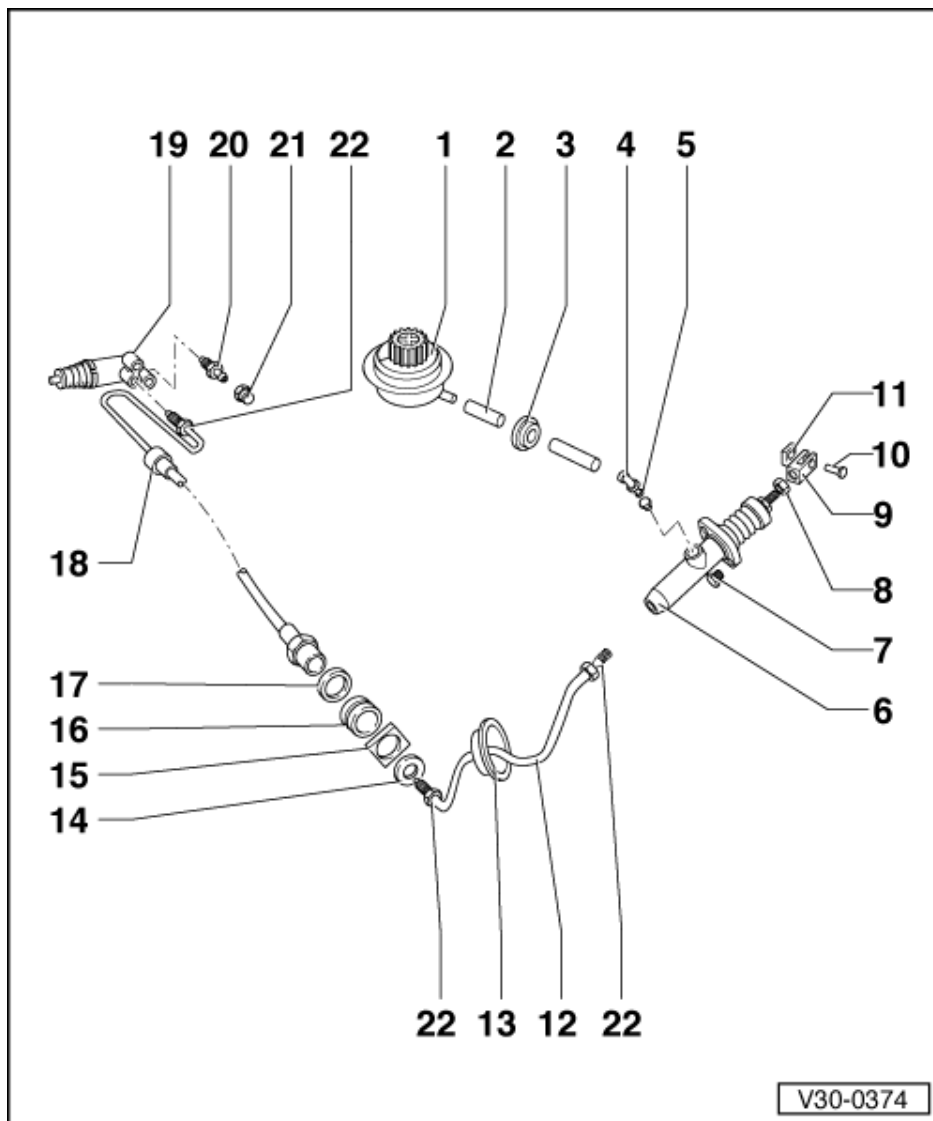
1.4 - Hydraulic system - general layout



- 1 Brake fluid reservoir
- 2 Supply hose
 - ♦ For pedal cluster on right-hand drive vehicles, determine length of hose needed using Parts Catalogue
- 3 Grommet
- 4 Angle piece
- 5 Sealing plug
 - ♦ Lubricate lightly with brake fluid before inserting
- 6 Master cylinder



- 7 Bolt - 20 Nm
- 8 Lock nut - 10 Nm
- 9 Clevis
 - ♦ Adjusting=>Fig 21
- 10 Pin
- 11 Securing clip
- 12 Pipe
 - ♦ For pedal cluster on right-hand drive vehicles, determine length of hose needed using Parts Catalogue
- 13 Grommet
- 14 Washer
 - ♦ Small inside diameter



15 Bracket

16 Bush

17 Washer

- ♦ Large inside diameter

18 Pressure hose

- ♦ Must not contact gearbox or surrounding parts
- ♦ Correct hose is determined according to engine version using Parts Catalogue

19 Slave cylinder

- ♦ Installing => Page 37
- ♦ After working on hydraulic clutch mechanism, bleed slave cylinder => Page 32
- ♦ Do not depress clutch pedal after removing slave cylinder



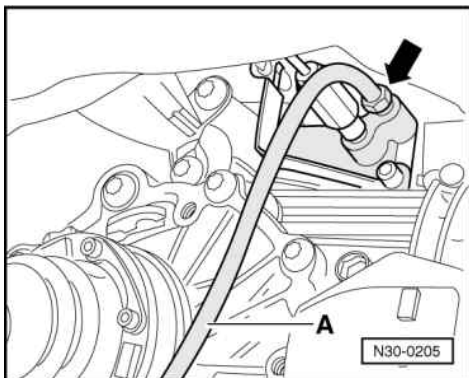
- ♦ Follow correct sequence of work when bleeding => Page 32

22 Pipe union nut - 15 Nm

Special tools, testers and auxiliary items

- Pull clutch pedal back to its normal position.
- Connect brake filling and bleeding appliance V.A.G 1238 B or V.A.G 1869, but do not switch on at this stage.

- If fitted, remove noise insulation beneath gearbox.



- -> Connect bleed hose -A- to slave cylinder (arrow) and open bleed valve.
- Connect bleeder hose to pressure hose of fluid collector bottle.
- Switch on bleeder appliance and allow about 100 cm³ of brake fluid to drain out.
 - Working pressure 2.5 bar

Note:

Ensure bleeder hose is correctly fitted during bleeding operation.

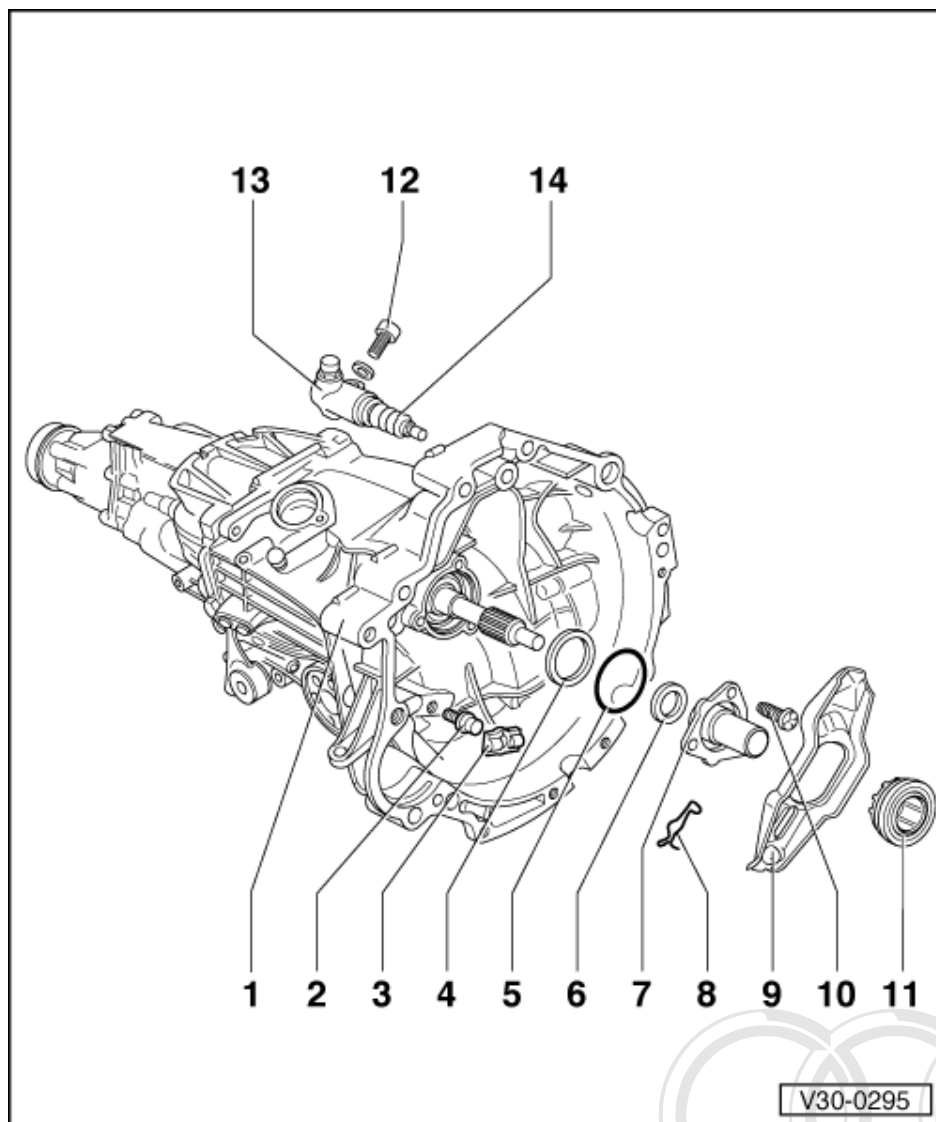
- Close bleeder screw. Tightening torque: 4.5 Nm
- Depress clutch pedal several times after completion of bleeding process.
- Bleed system again if necessary.



Protected by copyright. Copying for private or commercial purposes, in part or in whole, is not permitted unless authorised by AUDI AG. AUDI AG does not guarantee or accept any liability with respect to the correctness of information in this document. Copyright by AUDI AG.

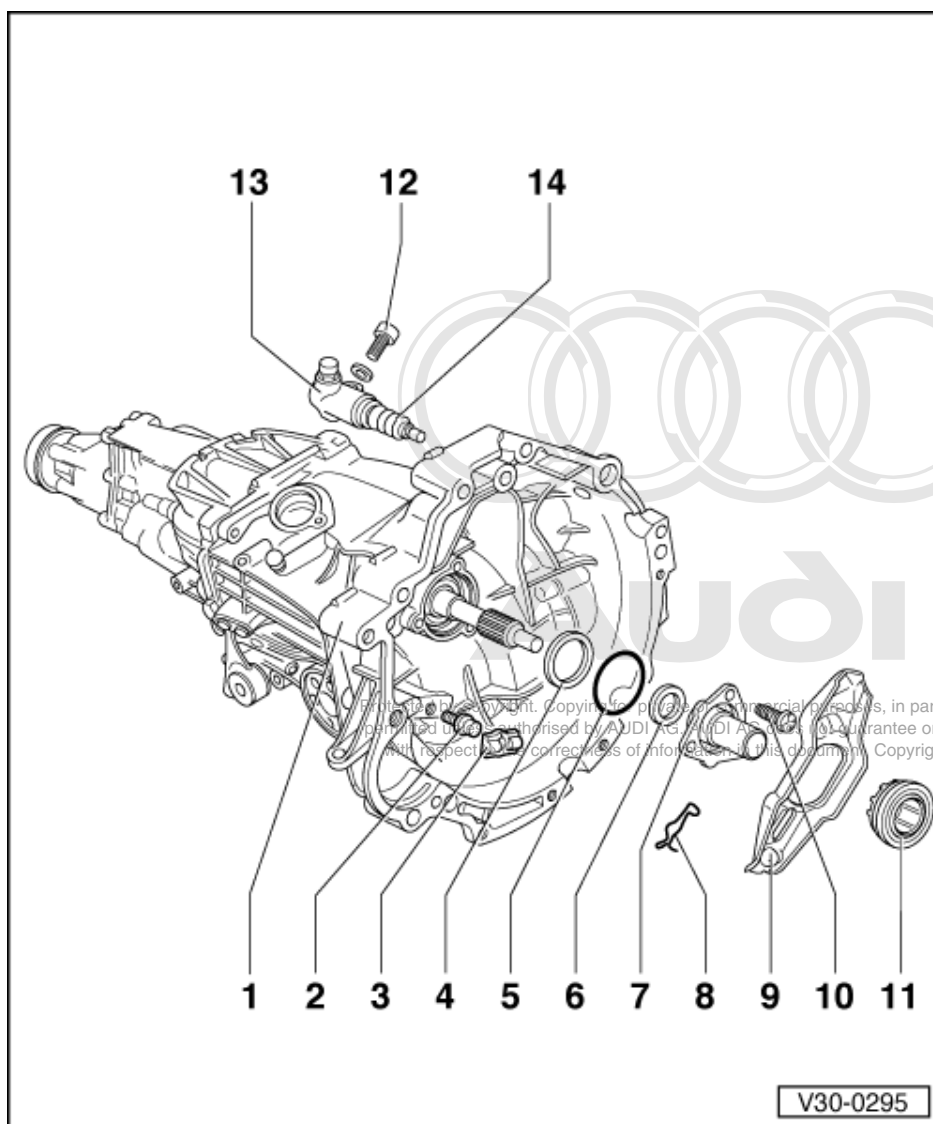
2 - Servicing clutch release mechanism

2.1 - Servicing clutch release mechanism



- 1 Gearbox
- 2 Ball stud
 - ◆ Tighten to 25 Nm
 - ◆ Lubricate with MoS2 grease
- 3 Intermediate piece
 - ◆ Renew if damaged
- 4 Dished washer
 - ◆ Smaller diameter (convex side) to guide sleeve
- 5 O-ring
 - ◆ Renew

Protected by copyright. Copying for private or commercial purposes, in part or in whole, is not permitted unless authorised by AUDI AG. AUDI AG does not guarantee or accept any liability with respect to the correctness of information in this document. Copyright by AUDI AG.



6 Input shaft oil seal

- ♦ Pull out of guide sleeve with oil seal extractor lever VW 681
- ♦ Knock in onto stop with fitting sleeve VW 192

7 Guide sleeve

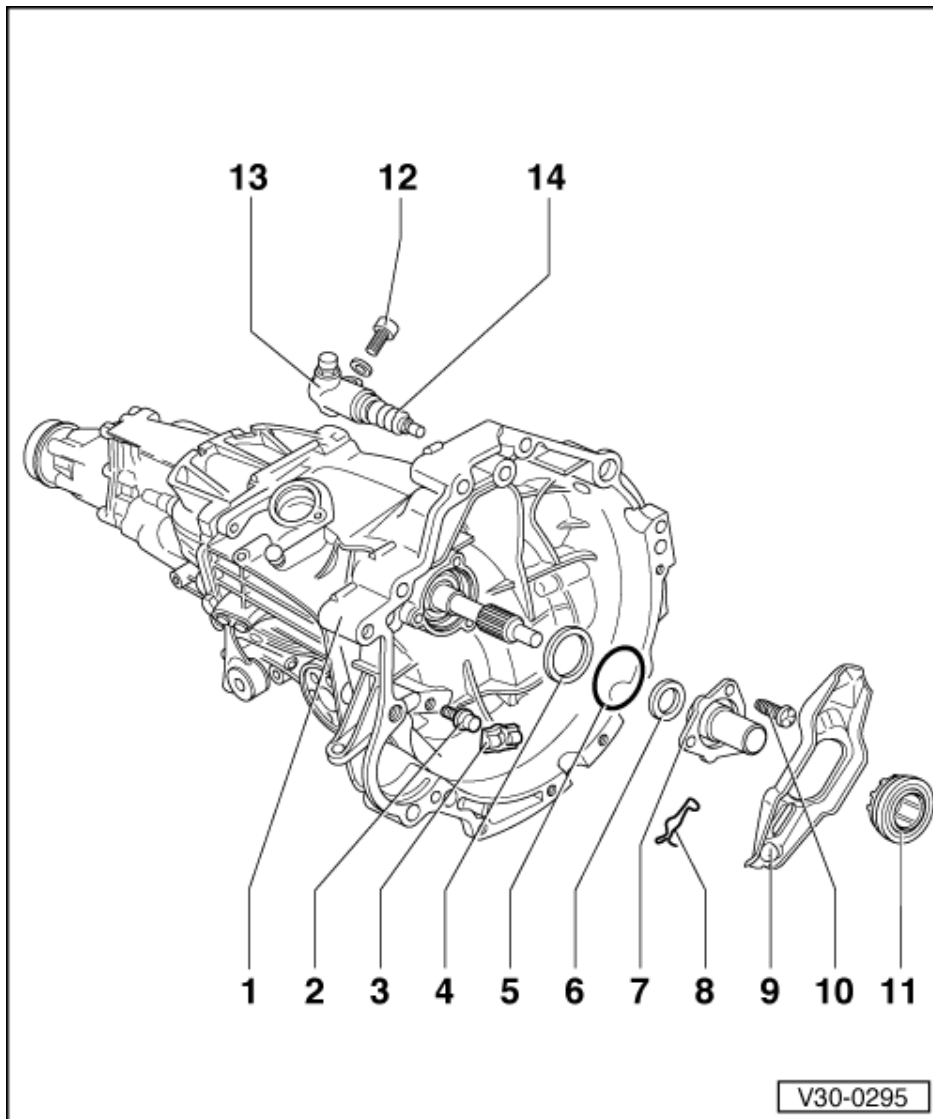
- ♦ Before removing and installing, cover input shaft splines with a shrink-fit hose to protect oil seal.

8 Retaining spring

- ♦ Secure to clutch release lever

9 Clutch release lever

- ♦ Before installing, coat contact surface of clutch slave cylinder push rod with a thin layer of copper grease, e.g. Z 381 351 TE



10 Torx socket head bolt,
35 Nm

- ◆ Self-locking
- ◆ Renew

11 Release bearing

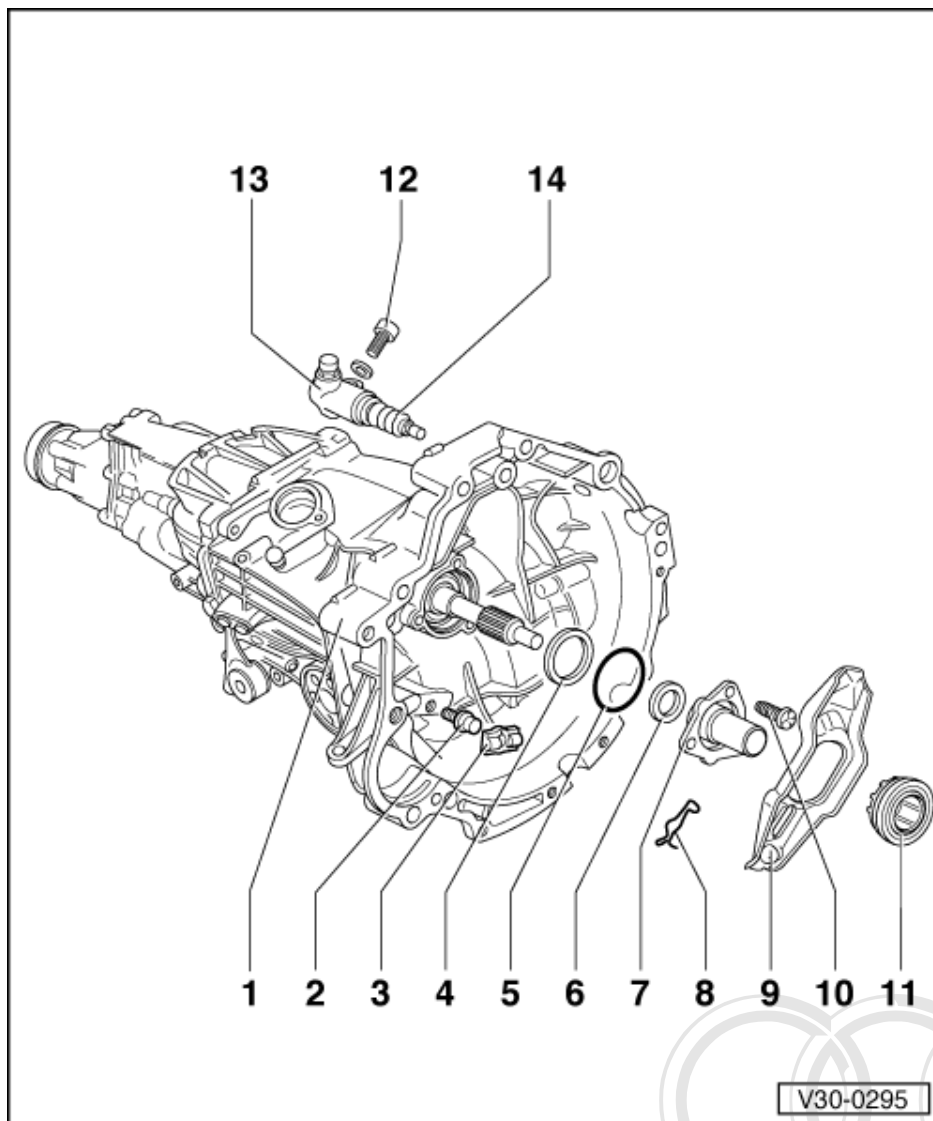
- ◆ Do not wash-out bearing, only wipe
- ◆ Renew noisy bearings

12 Bolt

- ◆ ä 1996: hexagon bolt
- ◆ Apply locking fluid
- ◆ D 185 400 A2 before inserting
- ◆ Tighten to 25 Nm
- ◆ 1997 ä: hexagon socket head bolt
- ◆ Self-locking
- ◆ Renew
- ◆ Tighten to 20 Nm



Protected by copyright. Copying for private or commercial purposes, in part or in whole, is not permitted unless authorised by AUDI AG. AUDI AG does not guarantee or accept any liability with respect to the correctness of information in this document. Copyright by AUDI AG.

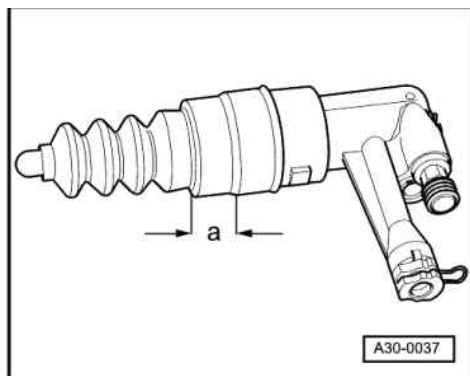


13 Slave cylinder

- ♦ When installing, press in so that securing bolt can be fitted easily.
- ♦ Do not operate clutch pedal after slave cylinder has been removed.

14 Push rod

- ♦ Coat contact surface of push rod with copper grease, e.g. Z 381 351 TE

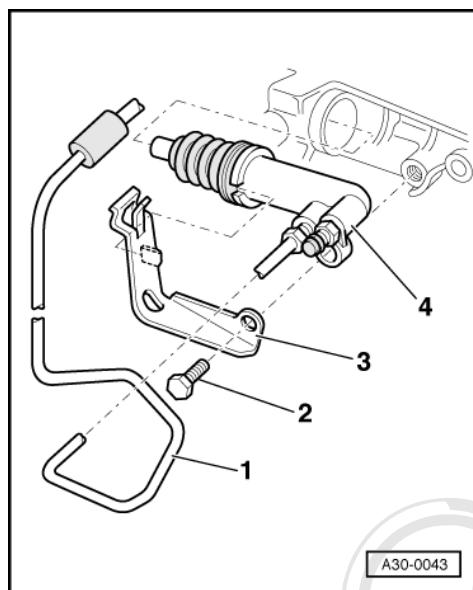


Protected by copyright. Copying for private or commercial purposes, in part or in whole, is not permitted unless authorised by AUDI AG. AUDI AG does not guarantee or accept any liability with respect to the correctness of information in this document. Copyright by AUDI AG.

-> Fig.1 Installing clutch slave cylinder

- Lightly lubricate contact surface for push rod at clutch release lever with copper grease, e.g. Z 381 351 TE.

- Before fitting slave cylinder into gearbox housing, lubricate area -a- on boot with polycarbamide grease G 052 142 A2.
- When inserting the clutch slave cylinder into the mounting hole of the gearbox housing, keep it as far as possible in line with the direction of operation of the push rod.



- -> Secure bracket -3- for pressure pipe -1- on the same mounting.

Notes:

- ♦ If the clutch slave cylinder -4- is inserted off-line there is a danger that the push rod will be guided past the clutch release lever.
- ♦ Pre-tension the clutch slave cylinder far enough for the securing bolt to be easily inserted.
- ♦ Always renew securing bolt -2-. To aid installation, the securing bolt with pointed end listed in parts catalogue may be used.

Protected by copyright. Copying for private or commercial purposes, in part or in whole, is not permitted unless authorised by AUDI AG. AUDI AG does not guarantee or accept any liability with respect to the correctness of information in this document. Copyright by AUDI AG.

3 - Servicing clutch

3.1 - Servicing clutch

Notes:

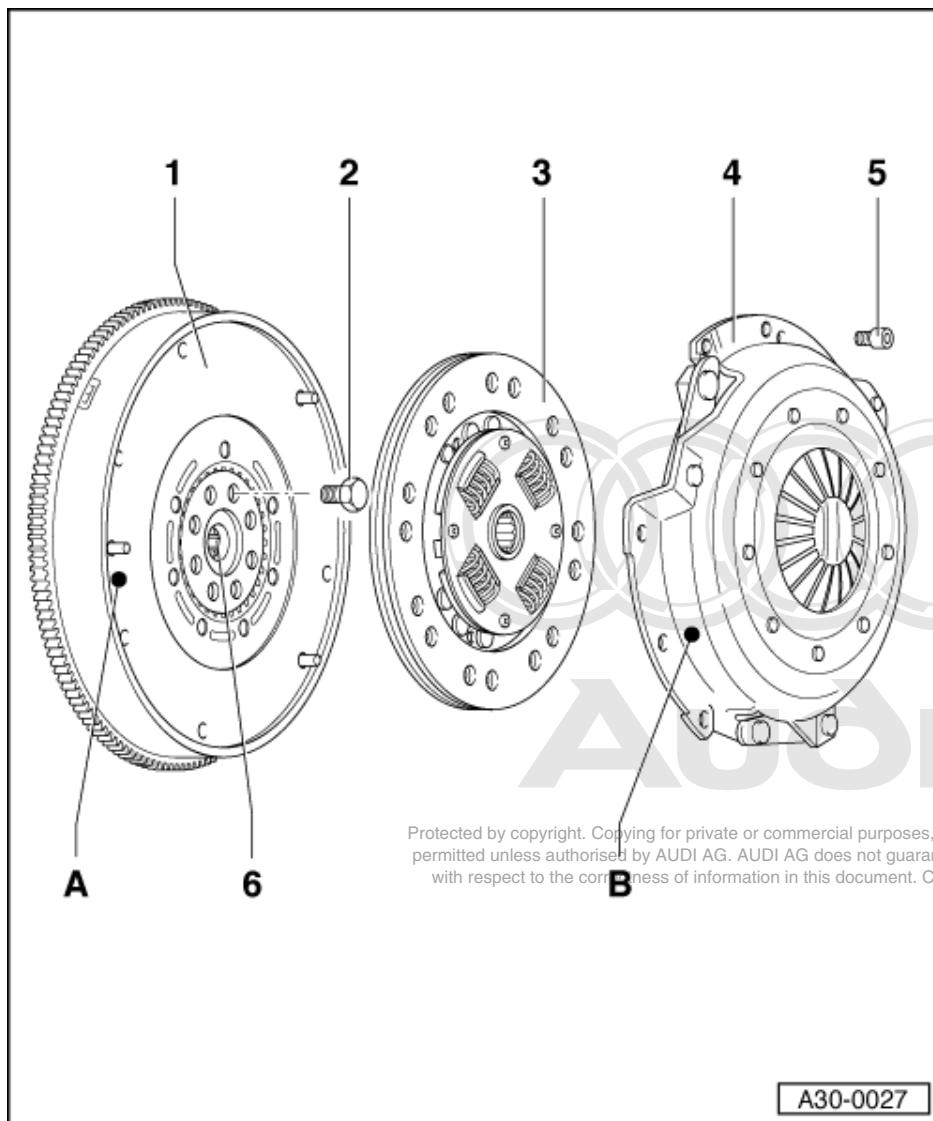
- ♦ Observe general repair instructions =>Page 10 .
- ♦ Before renewing the clutch plate and pressure plate

=> Fault-finding No. 9 - Defects on the clutch and clutch mechanism

- ♦ Replace clutch plates and pressure plates with damaged or loose rivets.
- ♦ Select the correct clutch plate and pressure plate according to engine code:

=> Parts catalogue

- ♦ Clean input shaft splines and (in the case of used clutch plates) the hub splines. Remove corrosion and apply only a very thin coating of grease G 000 100 to the splines. Then move clutch plate to and fro on input shaft until hub moves freely on shaft. Excess grease must be removed.
- ♦ Pressure plates have an anti-corrosion coating and are greased. Only the contact surface may be cleaned, otherwise the service life of the clutch will be considerably reduced.
- ♦ If the clutch has burnt out, thoroughly clean the bellhousing, flywheel and parts of the engine facing the gearbox to reduce the smell of burnt linings.



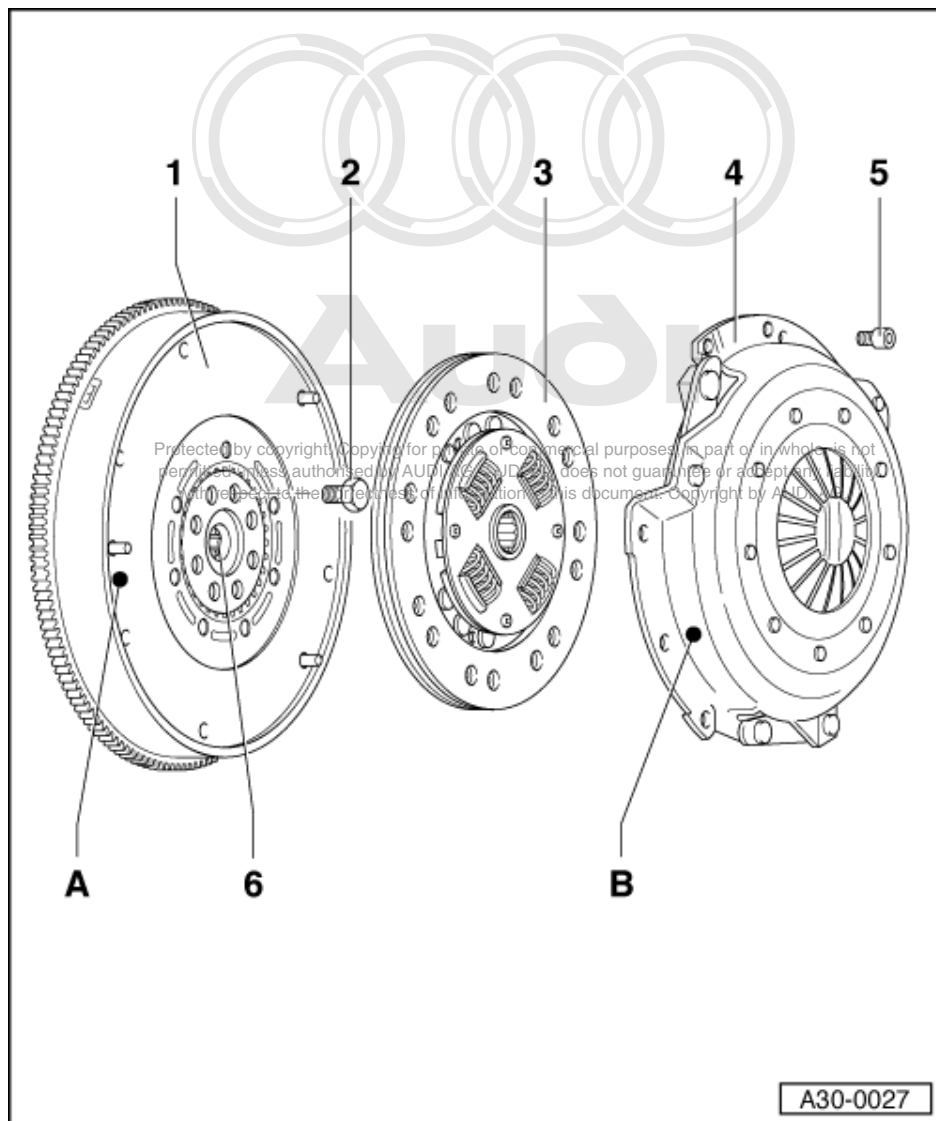
- Remove gearbox to work on the clutch=>Page 52 .

A - Coloured marking on dual-mass flywheel

- ◆ If components are marked: white marking -A- on dual-mass flywheel must coincide with white marking - B- on pressure plate.

B - Coloured marking on pressure plate

- ◆ If components are marked: white marking -A- on dual-mass flywheel must coincide with white marking - B- on pressure plate.



1 Dual mass flywheel

- ◆ Ensure centring pins are tightly seated
- ◆ Contact surface for clutch lining must be free of grooves, oil and grease
- ◆ Removing and installing

=> 4-Cylinder injection engine (2-valve), Mechanics; Repair group 13

=> 4-Cylinder injection engine (4-valve), Mechanics; Repair group 13

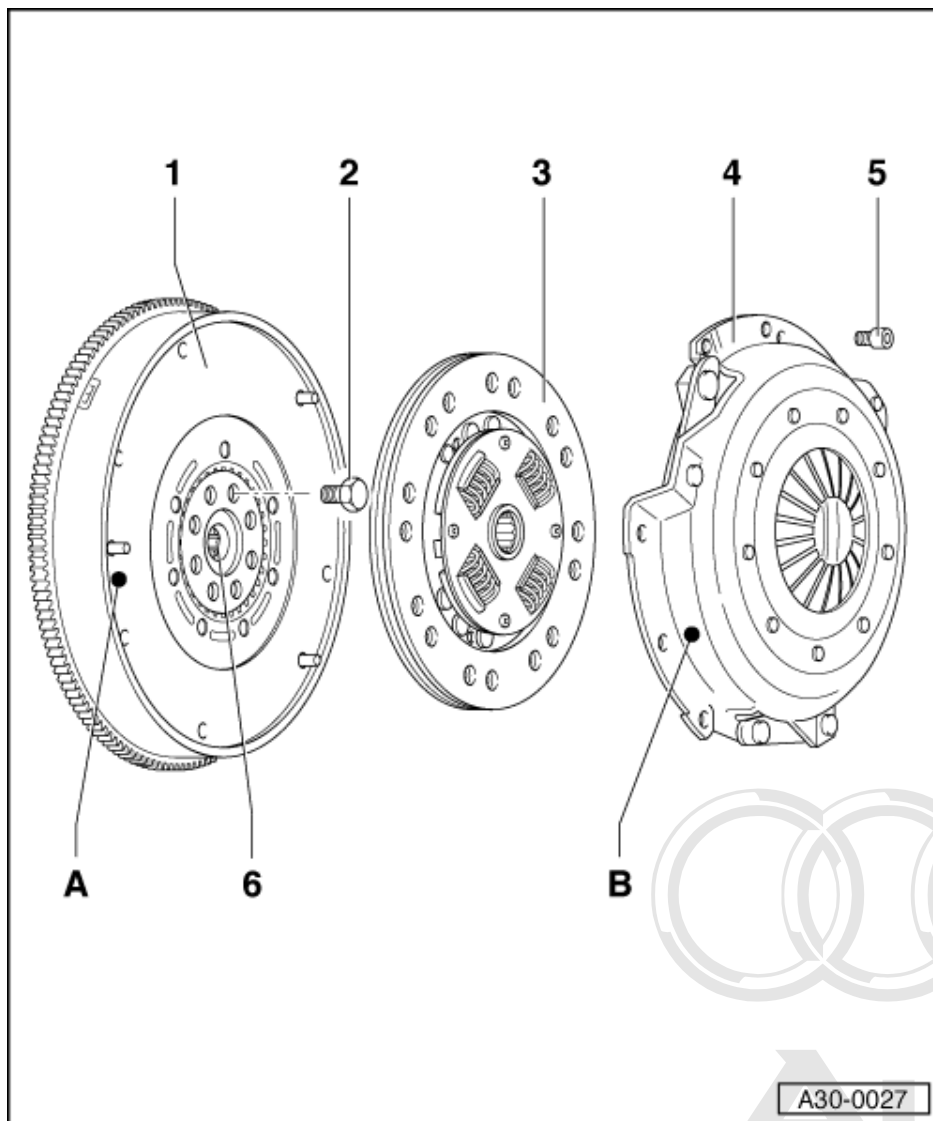
=> 4-Cylinder engine (5-valve), Mechanics; Repair group 13

=> 5-Cylinder injection engine (2-valve), Mechanics; Repair group 13

=> 6-Cylinder injection engine (2.6 ltr, 2-valve), Mechanics; Repair group 13

=> 6-Cylinder injection engine (2-valve), Mechanics; Repair group 13

=> 6-Cylinder engine (5-valve), Mechanics; Repair group 13

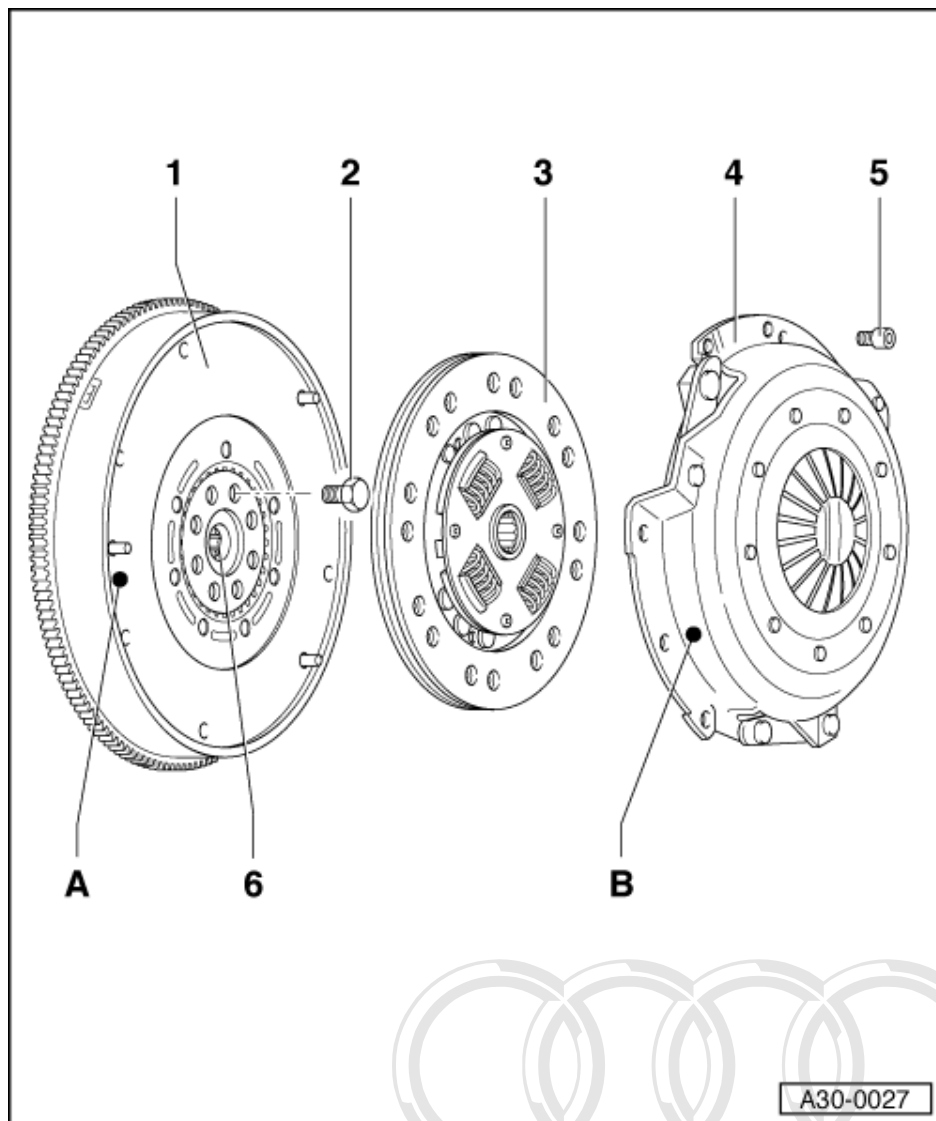


2 Bolt for flywheel

- ◆ Renew
- ◆ Vehicles without dual-mass flywheel: 60 Nm + turn 90° further
- ◆ Vehicles with dual-mass flywheel: 60 Nm + turn 180° further

3 Clutch plate

- ◆ Installation position:
 - Spring pack (coil springs) towards pressure plate and gearbox
 - Clutch lining must make full contact with flywheel.
 - Marking "Getriebeseite" (if provided) goes towards pressure plate and gearbox
- ◆ Do not grease
- ◆ Clutch plate diameter
=> from Page 2
- ◆ Centring => Fig. 1
- ◆ Lightly grease splines



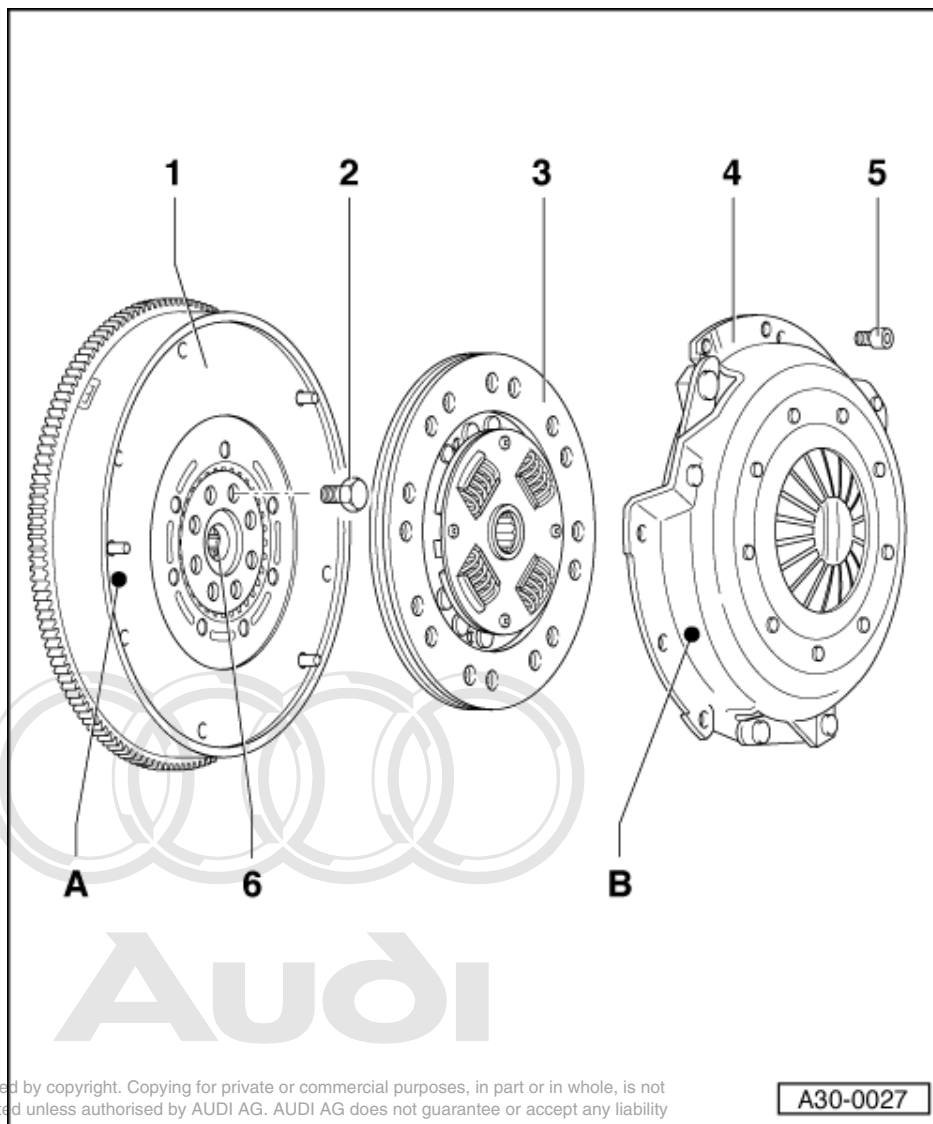
4 Pressure plate

- ◆ Removing and installing => Fig. 1
- ◆ Check ends of diaphragm spring
=> Fig. 2
- ◆ Checking spring connection and riveted fastenings => Fig. 3

5 Bolt - 25 Nm

- ◆ Loosen and tighten gradually in several stages and in diagonal sequence

Protected by copyright. Copying for private or commercial purposes, in part or in whole, is not permitted unless authorised by AUDI AG. AUDI AG does not guarantee or accept any liability with respect to the correctness of information in this document. Copyright by AUDI AG.

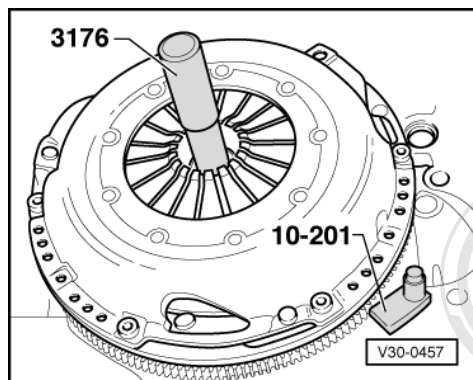


Protected by copyright. Copying for private or commercial purposes, in part or in whole, is not permitted unless authorised by AUDI AG. AUDI AG does not guarantee or accept any liability with respect to the correctness of information in this document. Copyright by AUDI AG.

6 Needle roller bearing

◆ Removing and installing

- => 4-Cylinder injection engine (2-valve), Mechanics; Repair group 13
- => 4-Cylinder injection engine (4-valve), Mechanics; Repair group 13
- => 4-Cylinder engine (5-valve), Mechanics; Repair group 13
- => 5-Cylinder injection engine (2-valve), Mechanics; Repair group 13
- => 6-Cylinder injection engine (2.6 ltr, 2-valve), Mechanics; Repair group 13
- => 6-Cylinder injection engine (2-valve), Mechanics; Repair group 13
- => 6-Cylinder engine (5-valve), Mechanics; Repair group 13



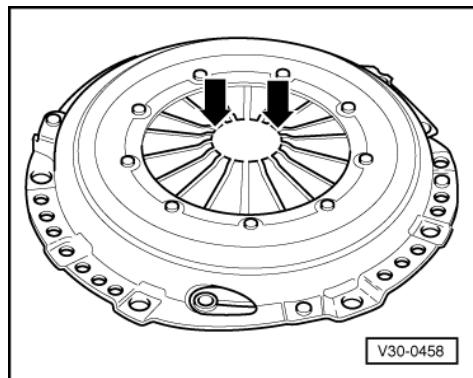
-> Fig.1 Centring clutch plate and removing and installing pressure plate

Special tools, testers and auxiliary items

- ♦ Counter-hold tool 10-201
- ♦ Mandrel 3176

Protected by copyright. Copying for private or commercial purposes, in part or in whole, is not permitted unless authorised by AUDI AG. AUDI AG does not guarantee or accept any liability with respect to the correctness of information in this document. Copyright by AUDI AG.

- Position of clutch plate: spring pack (coil springs) or marking "Getriebeseite" towards pressure plate and gearbox
- If markings are provided, ensure that white marking on dual-mass flywheel coincides with white marking on pressure plate when assembling.
- Clutch lining and contact surface of pressure plate must make full contact with flywheel before securing bolts are inserted.
- Loosen and tighten bolts gradually in several stages and in diagonal sequence. Tightening torque: 25 Nm.
- Reverse position of counter-hold tool 10-201 when removing.
- Use mandrel 3176 to centre clutch plate.

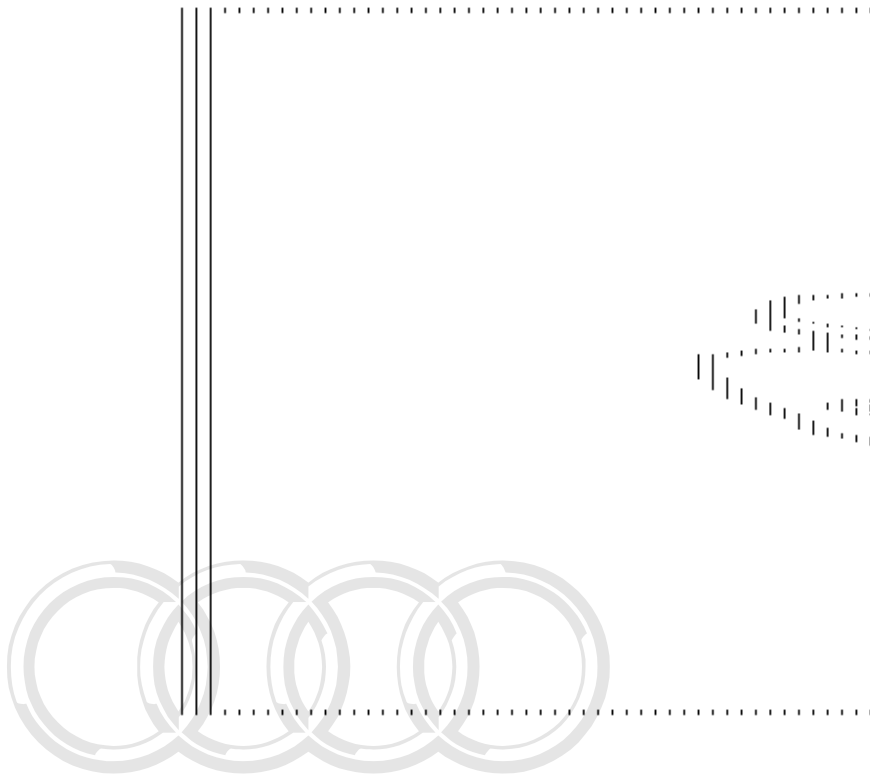


-> Fig.2 Checking ends of the diaphragm spring

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

Note:

When performing repairs always match up clutch pressure plate and clutch plate by checking engine code (see parts catalogue).



-> Fig.3 Checking spring connection and riveted fastenings

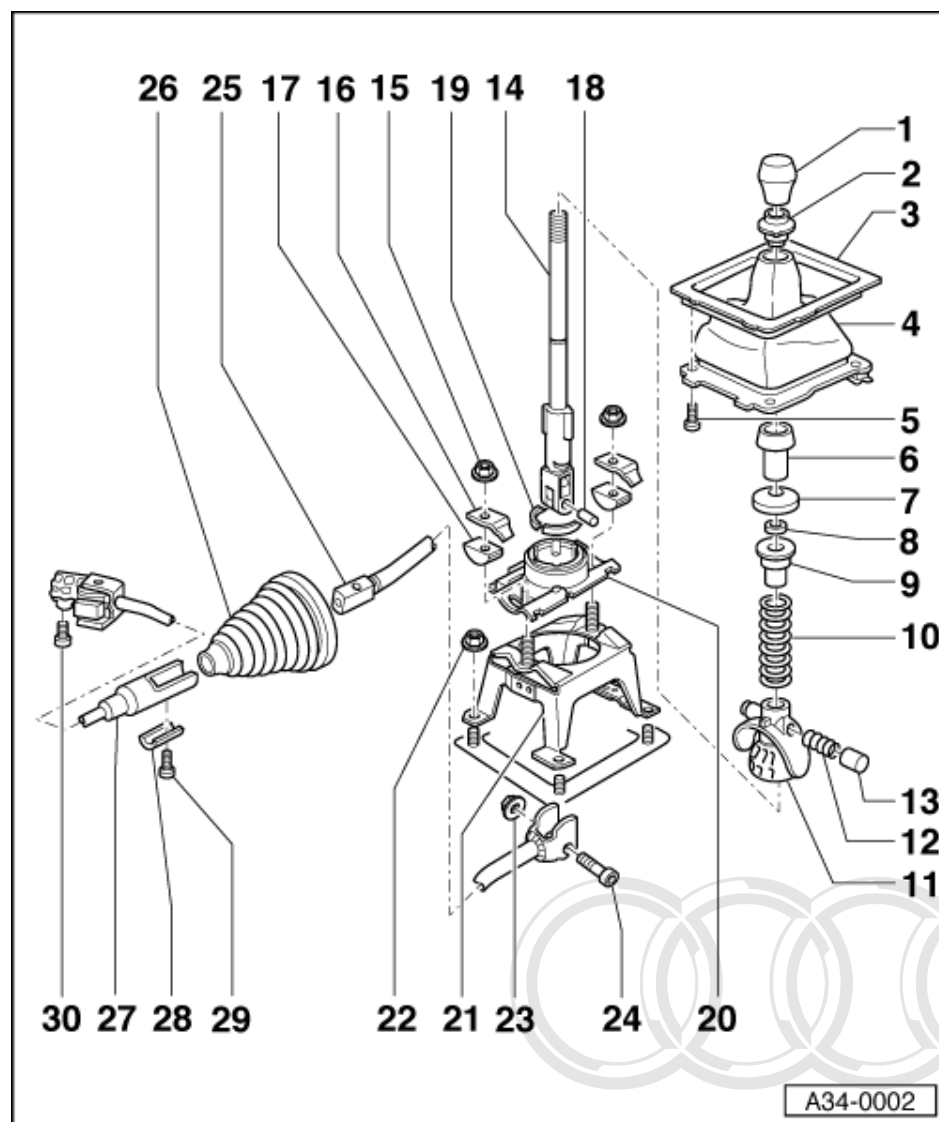
- Check spring connection between pressure plate and cover for cracks and make sure rivet fastenings are seated tightly.
- Renew clutches with damaged springs or loose riveted fastenings -arrows-.

Protected by copyright. Copying for private or commercial purposes, in part or in whole, is not permitted unless authorised by AUDI AG. AUDI AG does not guarantee or accept any liability with respect to the correctness of information in this document. Copyright by AUDI AG.

34 - Controls, Housing

1 - Servicing selector mechanism

1.1 - Servicing selector mechanism



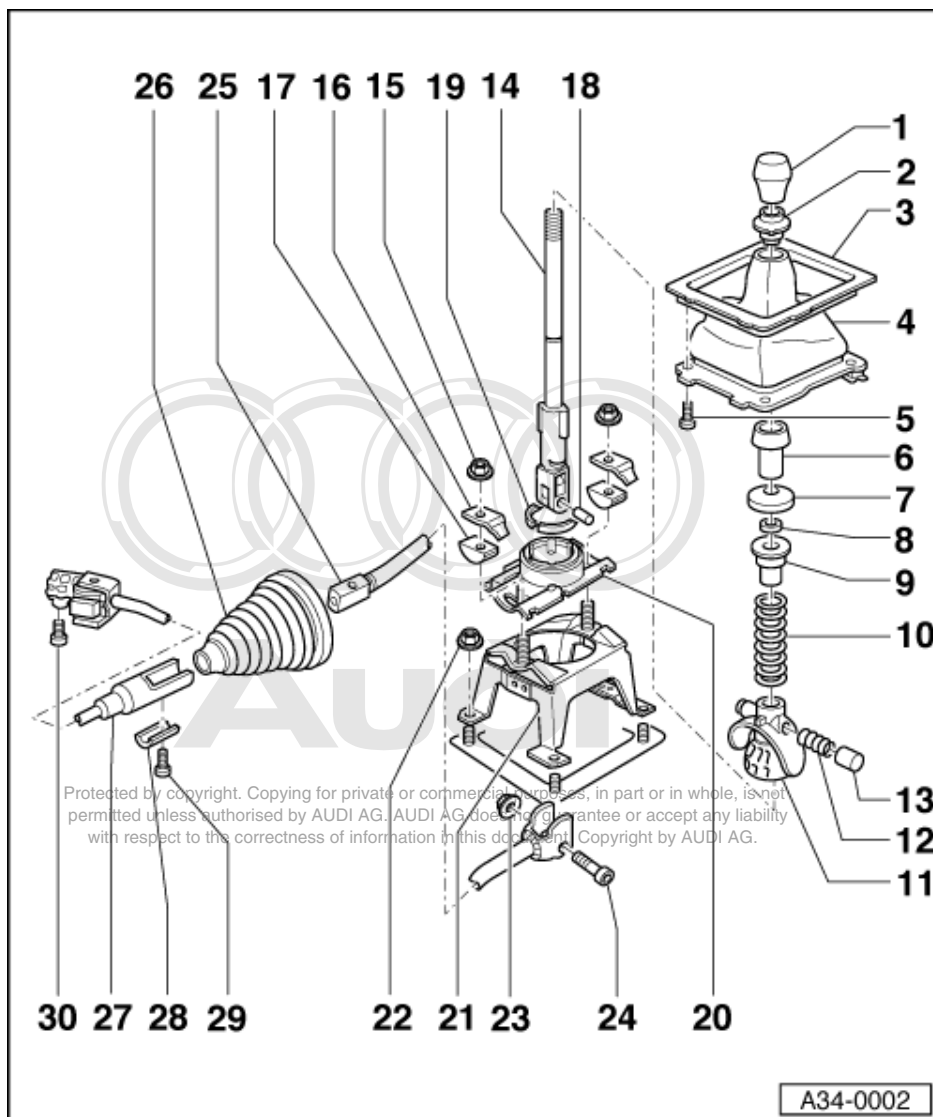
Notes:

- ♦ Adjusting gear selector mechanism
=>Page 50.
- ♦ Remove centre console before removing gear selector mechanism:

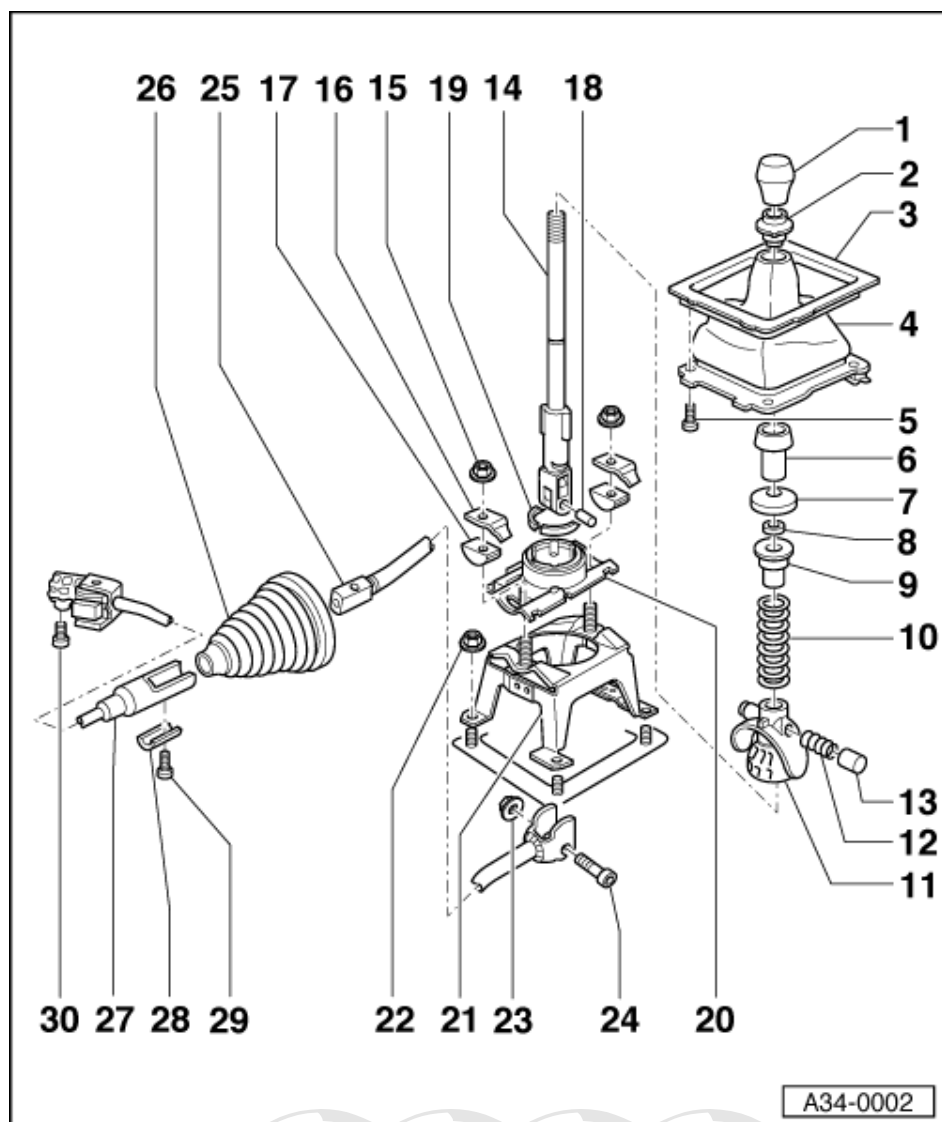
=> General body repairs; Repair group 70; Dash panel; Removing and installing centre console and handbrake lever trim Dash panel Removing and installing centre console and handbrake lever trim

- 1 Gear stick knob
- 2 Bush
- 3 Retaining frame
- 4 Cover (gaiter)

- ♦ Retainer on rear of cover; prise out carefully from centre console.



- 5 Bolt
- 6 Bush
- 7 Sealing collar
- 8 Circlip
 - ♦ Do not open out too far when fitting
- 9 Spacer bush
- 10 Spring
- 11 Ball stop
 - ♦ Insert spring and bush in the ball stop and assemble on the gear stick so that the spring and bush are on the right when looking forwards.
 - ♦ Install ball stop before fitting circlip (item 19).



12 Spring

13 Bush

- ◆ Fitting position: The rounded end faces the gear stick

14 Gear stick

- ◆ Can only be fitted into ball housing in one position

15 Nut - 25 Nm

16 Leaf spring

17 Connector

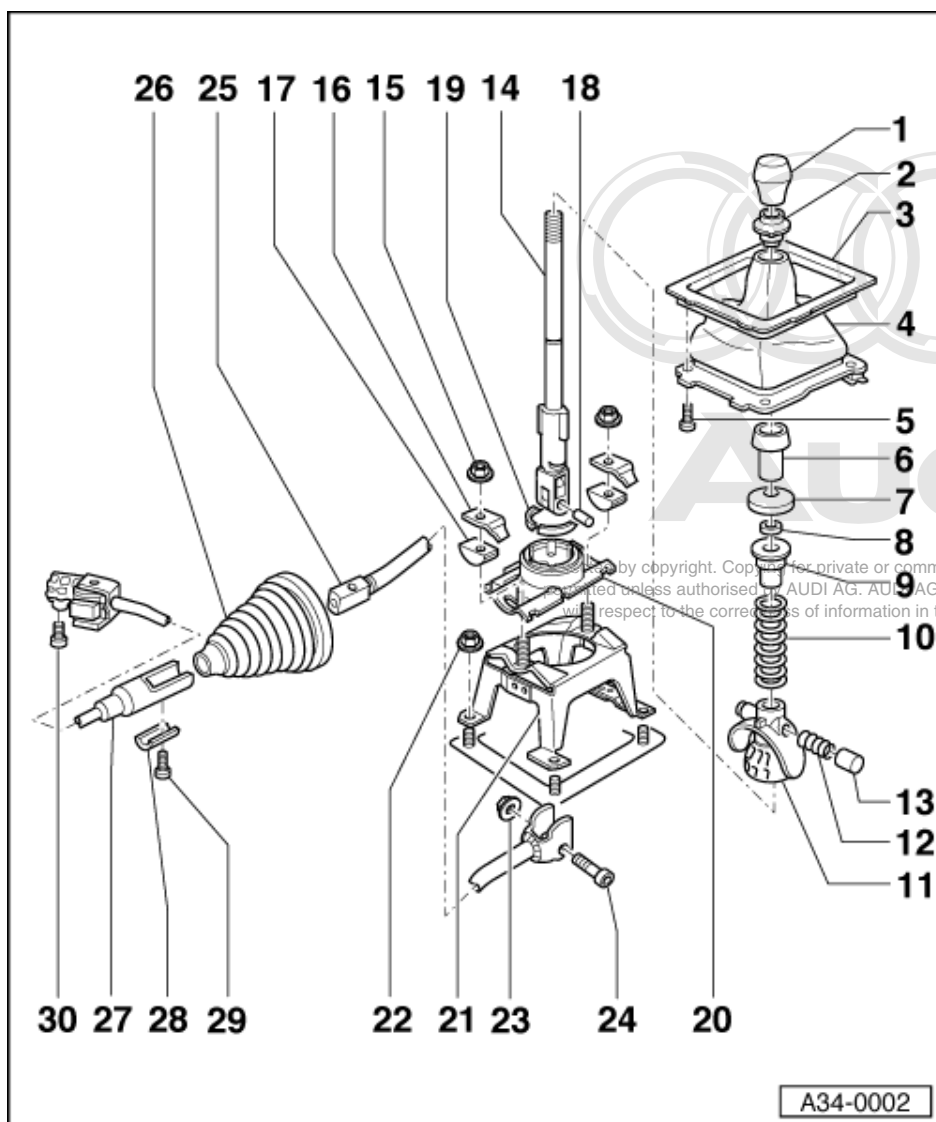
18 Spacer

19 Circlip

- ◆ Renew

- ◆ Remove before removing the ball stop

- ♦ **Fitting position: the rounded side faces to ball housing (item 20.)**



20 Ball housing

- ♦ Limit pieces for ball stop on left and right sides must be engaged
- ♦ Installation position: reverse detent faces left
- ♦ With buffer for ball stop -Item **11** -

21 Console

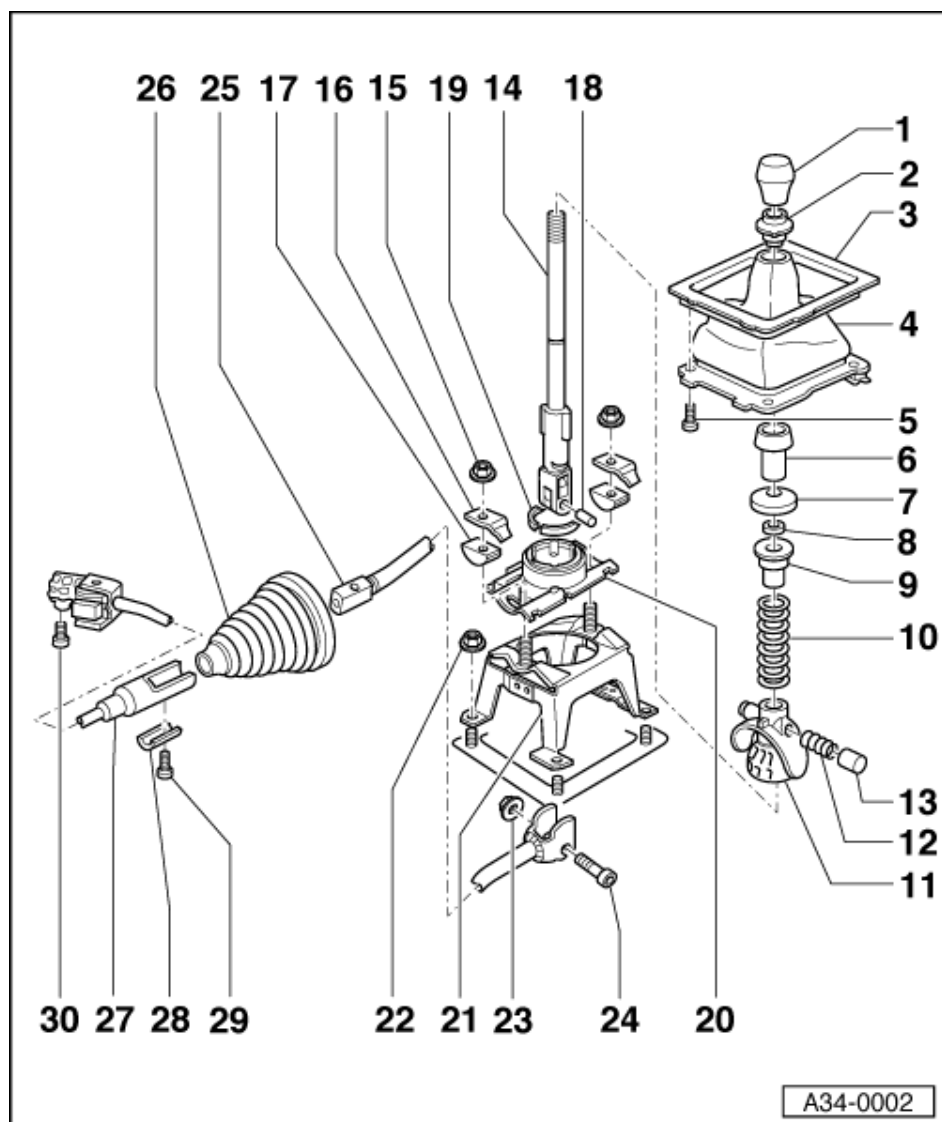
22 Nut - 10 Nm

23 Nut - 10 Nm

- ♦ Self-locking
- ♦ Renew

24 Bolt

25 Rear selector rod



26 Bellows

- ◆ Remove catalytic converter and heat shield before removing and installing
- ◆ Pull carefully over selector rod
- ◆ Can also be fitted from passenger compartment if selector mechanism is removed.

27 Selector rod

- ◆ With selector joint

28 Clamp

29 Bolt - 25 Nm

- ◆ Before slackening bolt, take off and push back heat shield

30 Bolt - 20 Nm

- ◆ Self-locking
- ◆ Renew

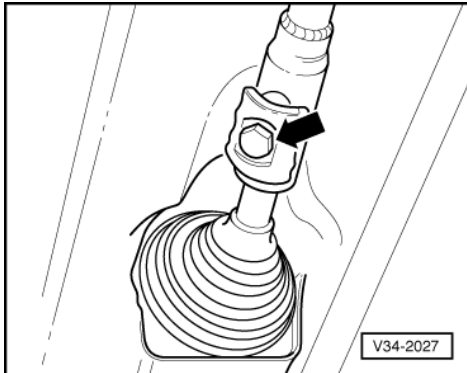
1.2 - Adjusting gear selector mechanism

Requirements:

- ◆ Moving parts of selector mechanism must be in proper condition.
- ◆ Selector mechanism must move freely.
- ◆ Gearbox, clutch and clutch mechanism must be in proper condition.

Protected by copyright. Copying for private or commercial purposes, in part or in whole, is not permitted unless authorized by AUDI AG. AUDI AG does not guarantee or accept any liability with respect to the correctness of information in this document. Copyright by AUDI AG.

- ◆ Gearbox in neutral.
- Unbolt heat shield and push it towards rear final drive, so that bolt securing selector rod is accessible.

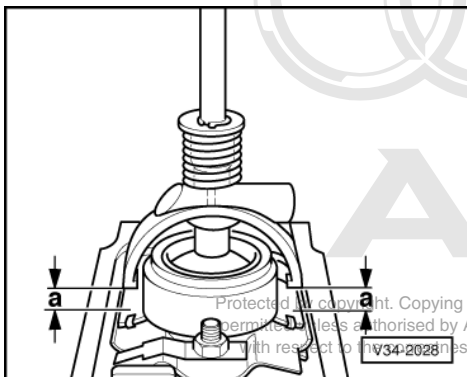


- -> Slacken bolt -arrow- for selector rod.

Note:

Shown in illustration with catalytic converter and heat shield removed.

- Remove gear stick knob and cover.
- Adjust gear stick as follows:
 - Gear stick in vertical position



- -> Distance -a- between ball stop buffers and ball housing should be equal on both sides.

Note:

The illustration shows the gear stick from behind (looking towards the front of the vehicle).

- Hold gear stick in this position (second mechanic required).
- Tighten selector rod bolt below vehicle to 25 Nm.

Note:

The gear stick must remain in the same position while the bolt is being tightened.

- Fit heat shield.

1.3 - Checking gear stick adjustment

- The gear stick lever must rest in the 3rd/4th gear gate when gearbox is in neutral.
- Operate clutch.
- Check that all gears can be engaged.
- Check operation of reverse gear lock.



- Put gear stick into the 5th/reverse gear gate and move gear stick towards reverse gear (without applying excessive pressure on the gear stick).
 - The amount of travel until contact is made with reverse gear stop should be 5 ... 10 mm (measured at gear stick knob).
- Reduce pressure on gear stick to let it move back.
 - The gear stick should return by itself from the 5th/reverse gate into the 3rd/4th gate.
- Check fine adjustment if necessary.

Fine adjustment

- If the gear stick setting is incorrect it can be adjusted as follows:
 - Slacken nuts for ball housing.
 - Move gear stick with ball housing to the right towards 5th/reverse gate as far as the stop in the gearbox, and hold in this position.
 - When doing this push the ball housing to left against the gear stick.
 - Then hold gear stick and ball housing in this position and tighten.
 - Fit covers and gear stick knob.

Note:

If only 5th gear and reverse gear cannot be engaged, the 5th and reverse gear locking unit must be checked and replaced if necessary =>Page 99 .

2 - Removing and installing gearbox

2.1 - Removing and installing gearbox

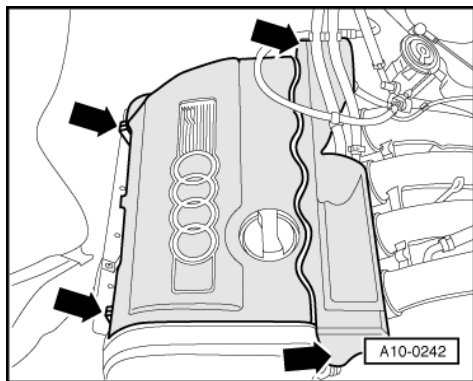
Special tools, testers and auxiliary items

- ♦ Engine support bracket 10-222A with legs 10-222A/1
- ♦ Lifting tackle 2024 A
- ♦ Bar 2024 A/2
- ♦ Assembling appliance 3139
- ♦ Gearbox support 3282
- ♦ Adjustment plate 3282/10
- ♦ Engine/gearbox jack V.A.G 1383 A

Protected by copyright. Copying for private or commercial purposes, in part or in whole, is not permitted unless authorised by AUDI AG. AUDI AG does not guarantee or accept any liability with respect to the correctness of information in this document. Copyright by AUDI AG.

2.2 - Removing

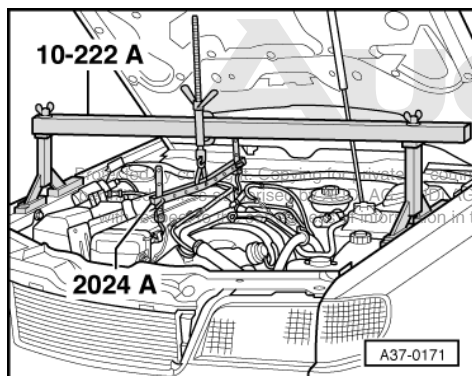
- Obtain radio code on vehicles with coded radio.



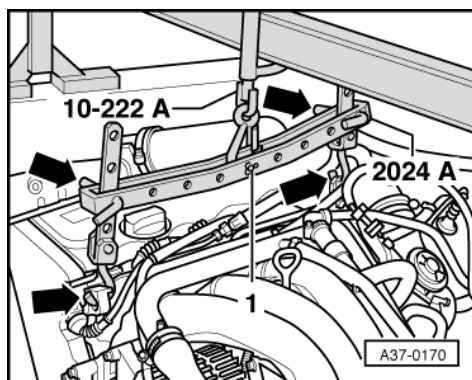
- With ignition switched off disconnect battery earth strap.
- Remove propshaft=>Page 186 .

Vehicles with 4-cylinder engine:

- -> 1.8 ltr engine: remove cover above injectors -arrows on right-
- 2.0 ltr engine: unplug connector for lambda probe and move wiring clear.



- -> Set up engine support bracket 10-222 A on wing mounting flanges.



- -> Detach lifting eye of lifting tackle 2024 A.
- Refit pin -1- in centre hole of lifting tackle 2024 A and secure with a split pin.
- 2.0 ltr engine: unbolt fuel supply pipe and fuel return pipe from bracket on cylinder head.
- Hook pin of lifting tackle 2024 A onto spindle of engine support bracket 10-222 A.
- Hook lifting tackle 2024 A into lifting eyes at front and back of engine.

Note:

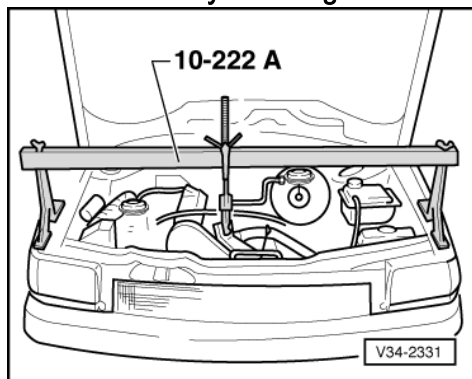
By positioning the pins accordingly, the engine can be made to tilt down at the back slightly. This will make it easier to separate and join engine and gearbox.

- Take up weight of engine on spindle.

Warning

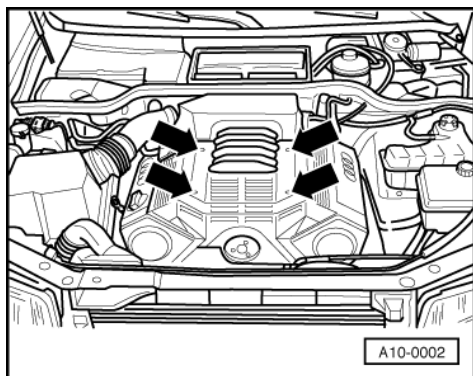
The hook attachments and locating pins on the lifting tackle must be secured with locking pins (arrows in illustration).

Vehicles with 5-cylinder engine:





- -> Set up engine support bracket 10-222 A on wing mounting flanges and take up weight of engine using spindle.

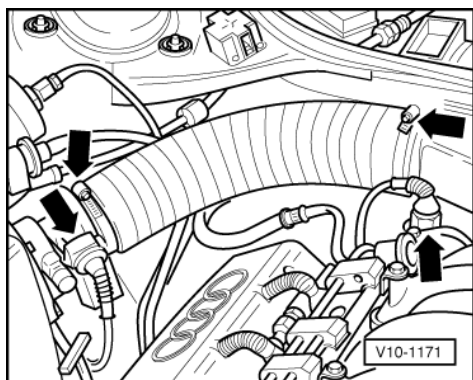


Vehicles with 6-cylinder engine:

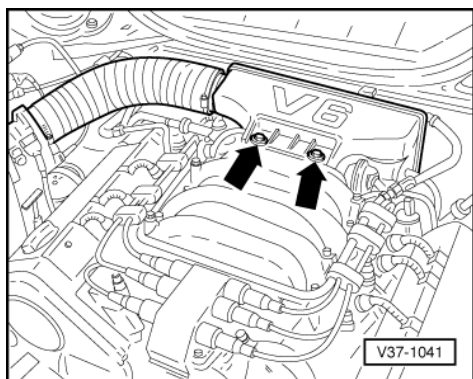
Note:

The illustrations below show the 2-valve engine.

- -> Remove engine cover panel -arrows-.



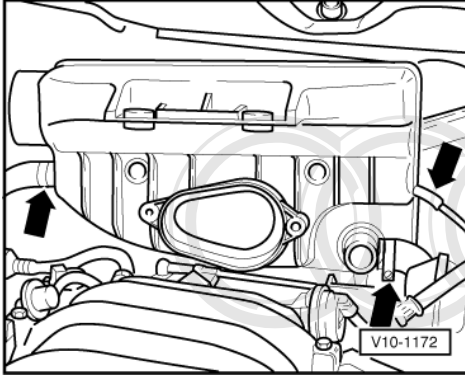
- -> Remove air duct between air mass meter and intake manifold -top arrows-.



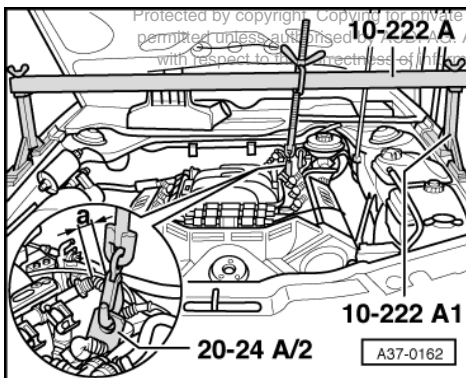
- -> Unscrew bolts securing intake silencer -arrows-.



Protected by copyright. Copying for private or commercial purposes, in part or in whole, is not permitted unless authorised by AUDI AG. AUDI AG does not guarantee or accept any liability with respect to the correctness of information in this document. Copyright by AUDI AG.



- -> Pull off the two crankcase breathers and the vacuum hose -arrows-.
- Push intake silencer to rear and then lift out.
- Pull off spark plug connector in front of rear left engine lifting point.



- -> Bolt bar 2024 A/2 onto rear left engine lifting point.
- Set up engine support bracket 10-222 A with supports 10-222 A1 on wing mounting flanges.

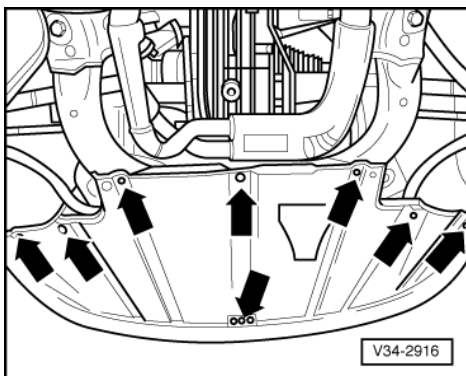
Note:

Make sure there is enough clearance -a- between the hook of the engine support bracket and the fuel rail. If necessary, remove the fuel rail.

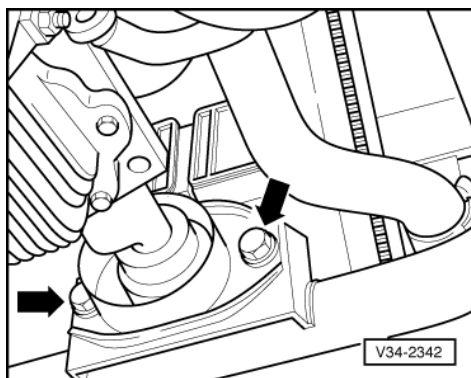
- Take up weight of engine on spindle.

All models

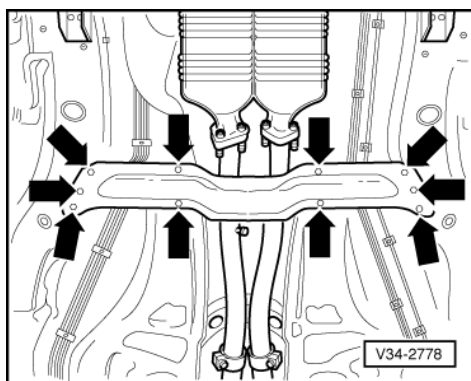
- Unscrew engine/gearbox securing bolts accessible from above.



- -> Remove noise insulation -arrows-.
- Unbolt noise insulation bracket on subframe.



- -> Remove securing bolts for torque reaction support -arrows-.

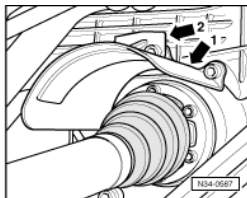


- -> Remove cross-piece below exhaust system -arrows-.

Vehicles with 4-cylinder engine:

- Unscrew nuts securing exhaust manifold to front exhaust pipe:
- => 4-Cylinder injection engine (2-valve), Mechanics; Repair group 26
- => 4-Cylinder injection engine (4-valve), Mechanics; Repair group 26
- => 4-Cylinder engine (5-valve), Mechanics; Repair group 26

Note:



Avoid excessive bending of the flexible pipe connection (decoupling element) on the front exhaust pipe. The angle between the catalytic converter and the front exhaust pipe must not exceed 10 °, otherwise the flexible connection will be damaged.

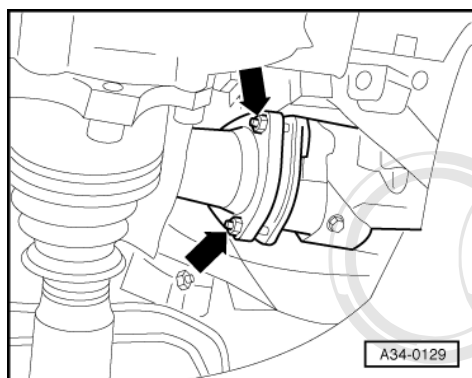
- -> Detach heat shields -arrow 1- and -arrow 2- above right-hand drive shaft.

Vehicles with 5-cylinder engine:

- Remove complete exhaust system with front exhaust pipe

Protected by copyright. Copying for private or commercial purposes, in part or in whole, is not permitted unless authorised by AUDI AG. AUDI AG does not guarantee or accept any liability with respect to the correctness of information in this document. Copyright by AUDI AG.

=> 5-Cylinder injection engine, (2-valve), Mechanics; Repair group 26



Vehicles with 6-cylinder engine:

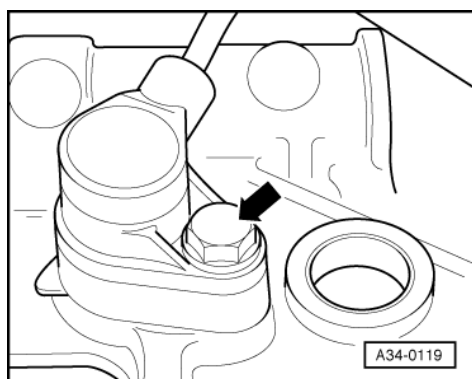
- Detach heat shields above left and right drive shafts.
- -> Unbolt front exhaust pipes with catalytic converters from left and right exhaust manifolds (3 nuts on each side) -arrows-:

Protected by copyright. Copying for private or commercial purposes, in part or in whole, is not permitted unless authorised by AUDI AG. AUDI AG does not guarantee or accept any liability

=> 6-Cylinder injection engine (2.6 ltr 2-valve engine), Mechanics; Repair group 26

=> 6-Cylinder injection engine (2-valve), Mechanics; Repair group 26

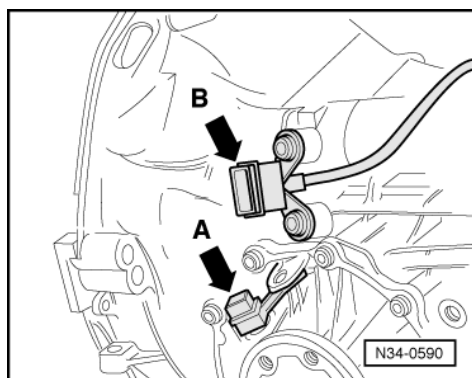
=> 6-Cylinder engine (5-valve), Mechanics; Repair group 26



- -> If installed, unbolt engine speed sender -G28 (arrow) from front left side of gearbox.

All models

- Detach drive shafts from flange shafts and rest them on suspension links.

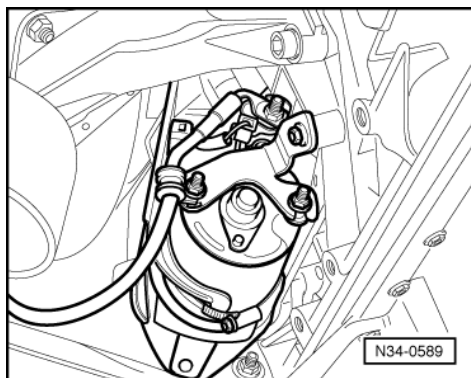




Note:

Take care not to damage protective coating on drive shafts.

- -> Pull connector off sender for speedometer -arrow A-.
- Pull off reversing light connector (multi-function sender) -arrow B-.
- Disconnect all other electrical connections and earth wires from gearbox and from bolts securing engine/gearbox.



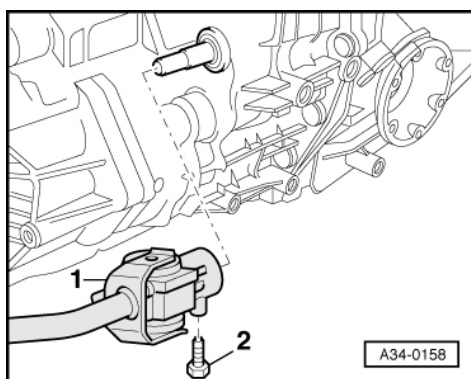
Protected by copyright. Copying for private or commercial purposes, in part or in whole, is not permitted unless authorised by AUDI AG. AUDI AG does not guarantee or accept any liability with respect to the correctness of information in this document. Copyright by AUDI AG.

- -> Unbolt starter from engine/gearbox and secure as necessary.

=> Electrical system; Repair group 27; Removing and installing starter Removing and installing starter

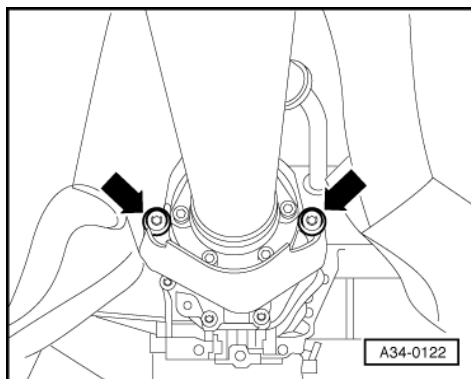
Note:

Starter cables do not have to be disconnected.

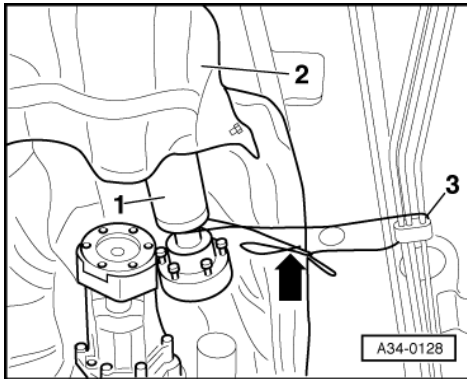


- -> Unscrew bolt -2- at selector joint -1- on selector rod.

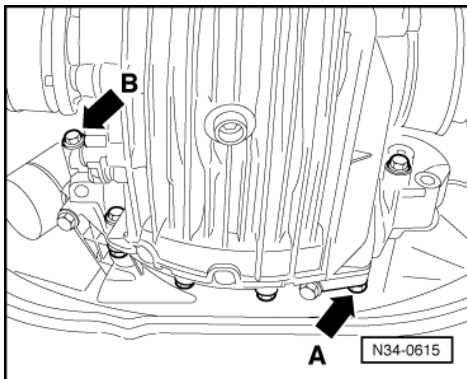
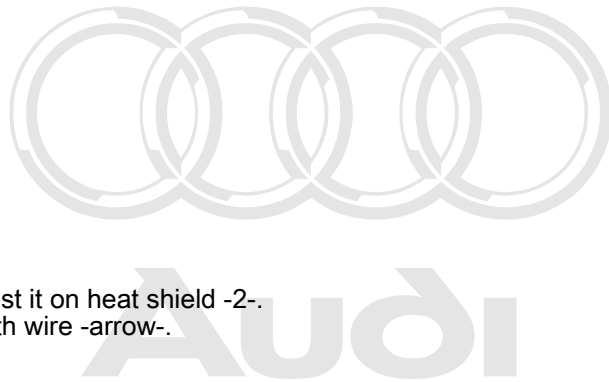
All models



- -> Remove heat shield for propshaft from cover for Torsen differential -arrows-.



- -> Unbolt propshaft -1- from gearbox and rest it on heat shield -2-.
- Secure propshaft to fuel pipe bracket -3- with wire -arrow-.

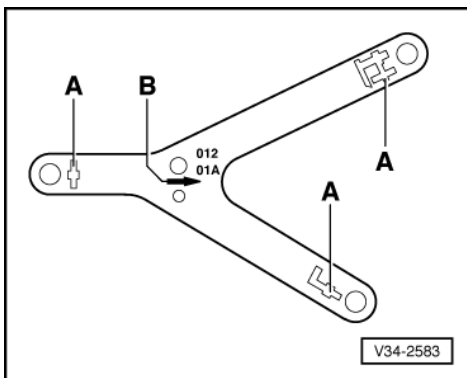


Protected by copyright. Copying for private or commercial purposes, in part or in whole, is not permitted unless authorised by AUDI AG. AUDI AG does not guarantee or accept any liability with respect to the correctness of information in this document. Copyright by AUDI AG.

- -> Unscrew bottom engine/gearbox securing bolts, except for bolts indicated by arrows -A- and -B-.

Note:

When removing the bolts, note their lengths and positions so that they can be re-fitted correctly.

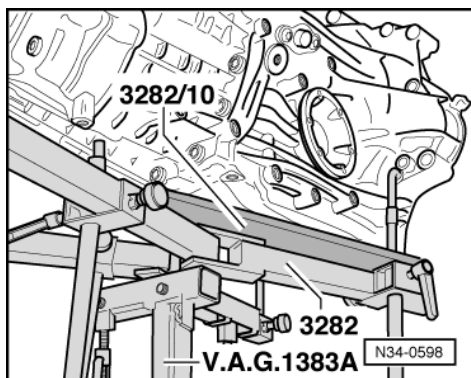


- -> Set up gear support 3282 for removing manual gearbox 01A (four-wheel drive) with adjustment plate 3282/10 and attach to gearbox jack V.A.G 1383 A.

A - Attachments

Notes:

- ◆ Attachments -A- are shown in schematic form; arrow -B- points in the direction of travel.
- ◆ Adjustment plate 3282/10 only fits in one position.

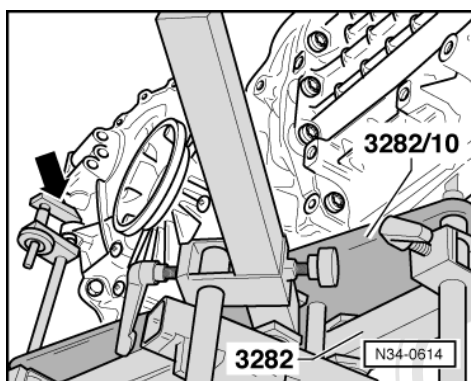


- -> Run gearbox jack V.A.G 1383 A with gearbox support 3282 in under the gearbox and take up the weight of the gearbox.

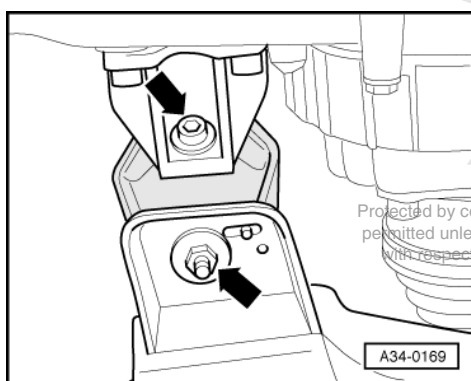
Note:

If gearbox support 3282 is not available, gearbox can be removed and installed using engine and gearbox jack V.A.G 1383 A and universal support V.A.G 1359/2.

- Support gearbox with gearbox jack V.A.G 1383 A.



- -> Align adjustment plate parallel to gearbox and lock safety support (arrow) on gearbox.

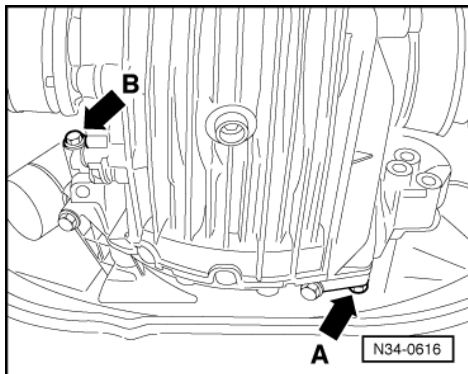


- -> Unbolt bonded rubber mountings -arrows- for gearbox.
- Remove cable holder for procon-ten system from gearbox

=> General body repairs; Repair group 68; Repairing procon-ten system, Audi 100 ä 05.94; Removing "ten" cables Repairing procon-ten system, Audi 100 ä 05.94 Removing "ten" cables

Note:

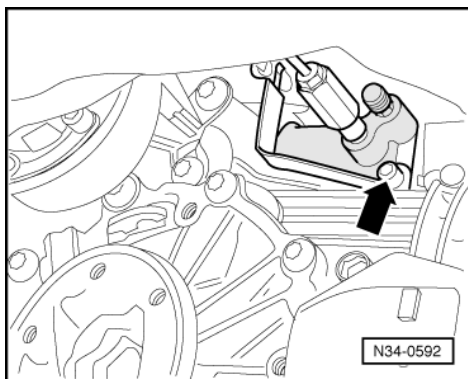
Lower the gearbox slightly in order to release the procon-ten cables from the cable guides on the gearbox.



- -> Remove remaining engine/gearbox securing bolts (arrows -A- and -B-).
- Press gearbox off dowel sleeves and lower carefully with gearbox jack V.A.G 1383 A just far enough for access to the slave cylinder.

Note:

When lowering gearbox ensure hydraulic pipe/hose to slave cylinder is not damaged.



- -> Remove clutch slave cylinder (arrow) and secure with wire, do not disconnect pipe.

Note:

Do not depress clutch pedal after removing slave cylinder.

- Lower gearbox completely.

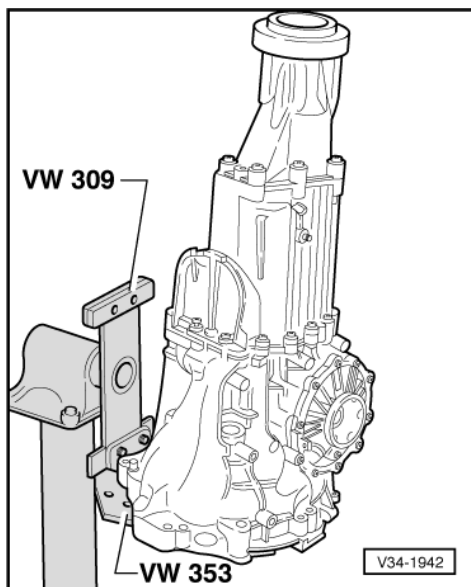
Note:

When lowering gearbox ensure there is sufficient clearance to drive shafts.

2.3 - Securing gearbox to repair stand

Special tools, testers and auxiliary items

- ◆ Retaining plate VW 309
- ◆ Gearbox support VW 353



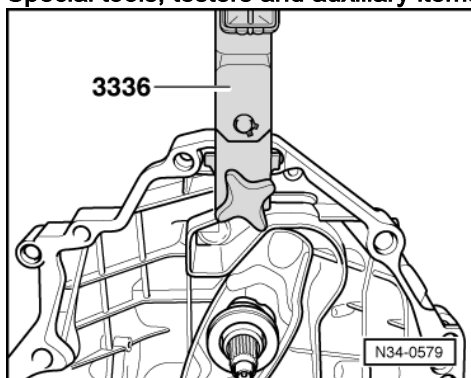
- -> Secure gearbox to repair stand with gearbox support VW 353 and holding plate VW 309 to carry out repairs.



Protected by copyright. Copying for private or commercial purposes, in part or in whole, is not permitted unless authorised by AUDI AG. AUDI AG does not guarantee or accept any liability for errors or omissions in this document. Copyright 1997 Audi AG.

2.4 - Transporting the gearbox

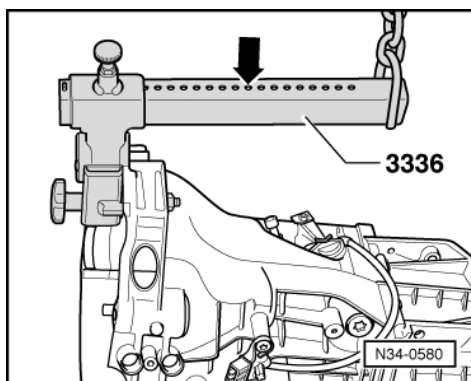
Special tools, testers and auxiliary items



- ◆ Gearbox support 3282
- ◆ Gearbox attachment appliance 3336

The gearbox attachment appliance can be used when transporting the gearbox and when setting up gearbox support 3282.

- -> Bolt gearbox lifting beam 3336 to clutch housing.

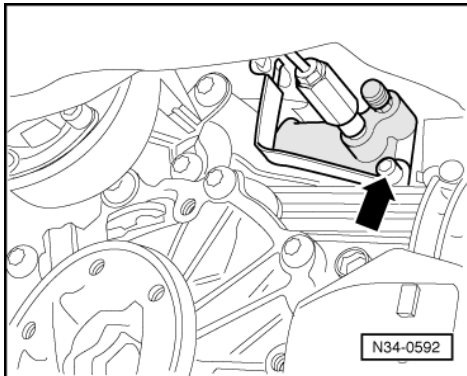


- -> Set support beam on sliding piece with locking pin (arrow).
- Number of holes visible = 17
- Lift gearbox with workshop crane and gearbox attachment appliance 3336.

2.5 - Installing

Installation is carried out in the reverse order, when doing this note the following:

- Clean input shaft splines and (in the case of used clutch plates) the hub splines. Remove corrosion and apply only a very thin coating of grease G 000 100 to the splines. Do not grease guide sleeve.
- Check clutch release bearing for wear, renew if necessary.
- Coat push rod contact surface on clutch release lever with a thin layer of copper grease, e.g. Z 381 351 TE.
- Before installing, use a tap to clean out locking fluid left in the threads of the clutch slave cylinder mounting on the gearbox and the selector lever/selector rod connection.
- Check whether dowel sleeves for aligning engine/gearbox are fitted in cylinder block, install if necessary.
- Renew all self-locking nuts.



- -> Lift gearbox until clutch slave cylinder with bracket for pipe/hose can be installed (arrow).
- If gearbox has intermediate plate, fit between gearbox and engine onto engine dowel sleeves.
- Ensure that the intermediate plate is correctly positioned on engine.
- Install lower engine/gearbox securing bolts and bolts for starter when doing this install starter.

=> Electrical system; Repair group 27; Removing and installing starter Removing and installing starter

- Before installing, use a tap to clean threads in flange shaft for propshaft on gearbox to remove traces of locking compound.
- Renew gaskets on drive shafts and on front of propshaft => Page 186 .
- Bolt on propshaft => Page 189 .
- Check setting of selector mechanism; adjust if necessary=>Page 50 .

- Align exhaust system free of stress:

=> 4-Cylinder injection engine (2-valve), Mechanics; Repair group 26

=> 4-Cylinder injection engine (4-valve), Mechanics; Repair group 26

=> 4-Cylinder engine (5-valve), Mechanics; Repair group 26

=> 5-Cylinder injection engine, (2-valve), Mechanics; Repair group 26

=> 6-Cylinder injection engine (2.6 ltr, 2-valve engine), Mechanics; Repair group 26

=> 6-Cylinder injection engine (2-valve), Mechanics; Repair group 26

=> 6-Cylinder engine (5-valve), Mechanics; Repair group 26

- Check oil level in gearbox =>Page 64 .



- After connecting battery, enter anti-theft code for radio

=> Radio operating instructions

- Set clock to correct time.

Tightening torques

Component		Nm
Bolts/nuts	M6	10
	M8	20
	M10	45
	M12	65
Except for the following:		
Drive shaft to flange shaft	M8	40
	M10	77
Engine speed sender -G28		10
Clutch slave cylinder to gearbox		
Hexagon socket head bolt 1)		20
Hexagon bolt 2)		25
Heat shields over drive shafts to gearbox		23
Selector rod to gearbox 1)		20
Propshaft to gearbox		55
Heat shield for propshaft to Torsen differential cover		25

1) Renew bolt

2) Apply locking fluid D 185 400 A2 before installing

Component	Nm
Catalytic converter to mountings	25
Front exhaust pipe to exhaust manifold	30
Clamp for exhaust pipe	40
Bracket for noise insulation to body	10
Front cross-piece below exhaust system to body	25



3 - Checking oil level in gearbox

3.1 - Checking oil level in gearbox

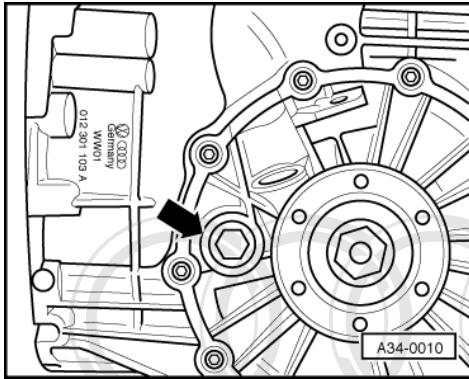
Protected by copyright. Copying for private or commercial purposes, in part or in whole, is not permitted unless authorised by AUDI AG. AUDI AG does not guarantee or accept any liability with respect to the correctness of information in this document. Copyright by AUDI AG.

Special tools, testers and auxiliary items

- ♦ Hexagon socket key (17 mm A/F) or special tool 3357

Notes:

- ♦ The oil filler plug is on the left of the gearbox below the speedometer sender; it may be concealed by the heat shield for the drive shaft.
- ♦ Depending on the version fitted, use either special tool 3357 or a 17 mm Allen key to loosen the oil filler plug.



- ◆ To loosen the oil drain plug, use special tool 3357.
- ➔ To check oil level, unscrew oil filler plug (arrow).
 - Specification: oil level up to lower edge of filler hole
- Top up gearbox oil if necessary. Specification ➔ from Page 2.
- Fit oil filler plug.

Tightening torque Copying for private or commercial purposes, in part or in whole, is not permitted unless authorised by AUDI AG. AUDI AG does not guarantee or accept any liability with respect to the correctness of information in this document. Copyright by AUDI AG.

Component	Nm
Oil filler plug	25

4 - Removing and installing cover with Torsen differential

4.1 - Removing and installing cover with Torsen differential

- Gearbox installed

Special tools, testers and auxiliary items

- ◆ Set of open ring spanners 3337 (only for vehicles with 6-cylinder engine)
- ◆ Drip tray V.A.G 1306

Removing

Vehicles with 4-cylinder engine:

- Remove rear section of exhaust system (rearward of exhaust pipe clamp):

➔ 4-Cylinder injection engine (2-valve), Mechanics; Repair group 26

➔ 4-Cylinder injection engine (4-valve), Mechanics; Repair group 26

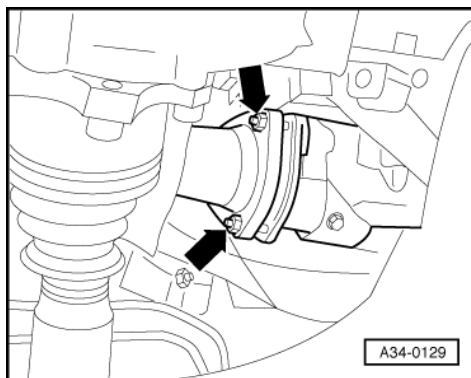
➔ 4-Cylinder engine (5-valve), Mechanics; Repair group 26

Vehicles with 5-cylinder engine:

- Remove complete exhaust system with front exhaust pipe

➔ 5-Cylinder injection engine, (2-valve), Mechanics; Repair group 26

Vehicles with 6-cylinder engine:



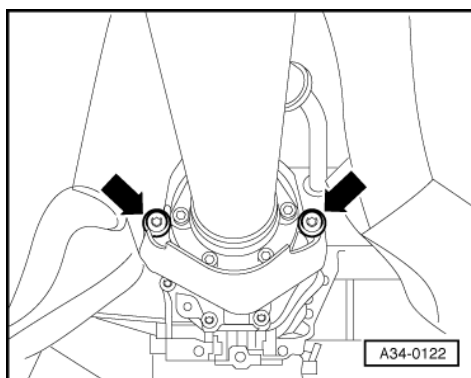
- Unscrew lambda probe from right exhaust pipe using special tool 3337, and move clear to the side.
- Remove heat shield above right-hand drive shaft.
- -> Unbolt front exhaust pipe with catalytic converter (right side) from exhaust manifold -arrows- (3 nuts):

=> 6-Cylinder injection engine (2.6 ltr, 2-valve engine), Mechanics; Repair group 26

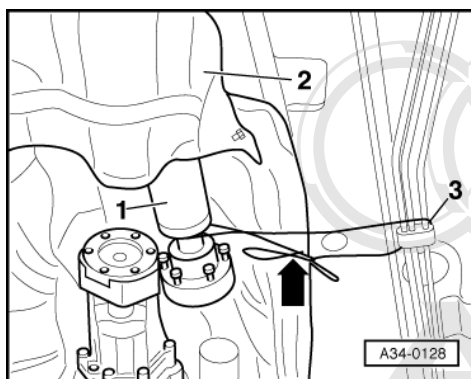
=> 6-Cylinder injection engine (2-valve), Mechanics; Repair group 26

=> 6-Cylinder engine (5-valve), Mechanics; Repair group 26

All models

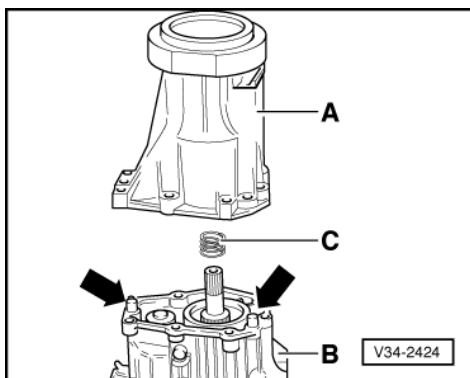


- -> Remove heat shield for propshaft from cover for Torsen differential -arrows-.



- -> Unbolt propshaft -1- from gearbox and rest it on heat shield -2-.
- Secure propshaft to fuel pipe bracket -3- with wire -arrow-.
- Place drip tray V.A.G 1306 underneath and drain gearbox oil.

Copyright © 1997 Audi AG. All rights reserved. Audi AG does not guarantee or accept any liability with respect to the correctness of information in this document. Copyright by AUDI AG.



- -> Unbolt cover -A- with Torsen differential from gearbox cover -B-.

Note:

Shown in illustration with gearbox removed.

- Remove spring -C- from drive pinion.

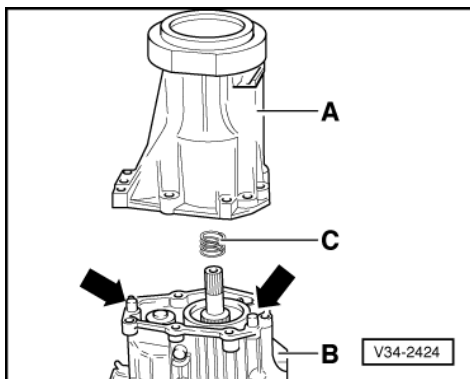
Removing and installing Torsen differential in cover => Page 87 .

Servicing cover => Page 87 .

Installing

Installation is carried out in the reverse order, when doing this note the following:

- Clean the sealing surface and coat with AMV 188 000 02.



- -> Check that dowel sleeves for cover -A- are fitted in gearbox cover -B- (arrows).
- Fit spring -C- onto hollow shaft over drive pinion.
- Renew gaskets on drive shafts and on front of propshaft => Page 186 .
- Bolt on propshaft=>Page 189 .
- Top up gearbox oil and check oil level in gearbox => Page 64 .
- Align exhaust system free of stress;

=> 4-Cylinder injection engine (2-valve), Mechanics; Repair group 26

=> 4-Cylinder injection engine (4-valve), Mechanics; Repair group 26

=> 4-Cylinder engine (5-valve), Mechanics; Repair group 26

=> 5-Cylinder injection engine, (2-valve), Mechanics; Repair group 26

=> 6-Cylinder injection engine (2.6 ltr, 2-valve engine), Mechanics; Repair group 26



=> 6-Cylinder injection engine (2-valve), Mechanics; Repair group 26

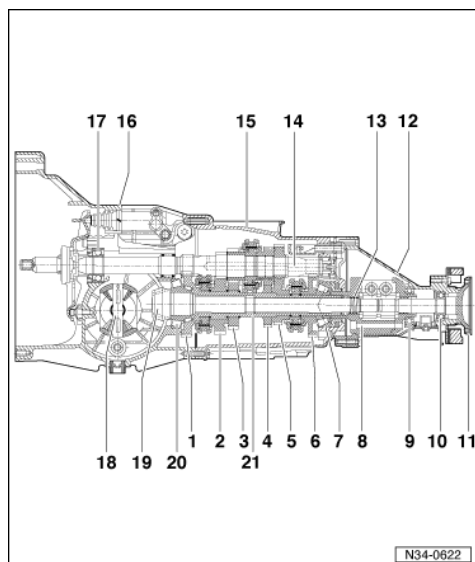
=> 6-Cylinder engine (5-valve), Mechanics; Repair group 26

Tightening torques

Component	Nm
Cover with Torsen differential to gearbox	25
Propshaft to gearbox	55
Heat shield for propshaft to Torsen differential cover	25

5 - Dismantling and assembling gearbox

5.1 - Dismantling and assembling gearbox

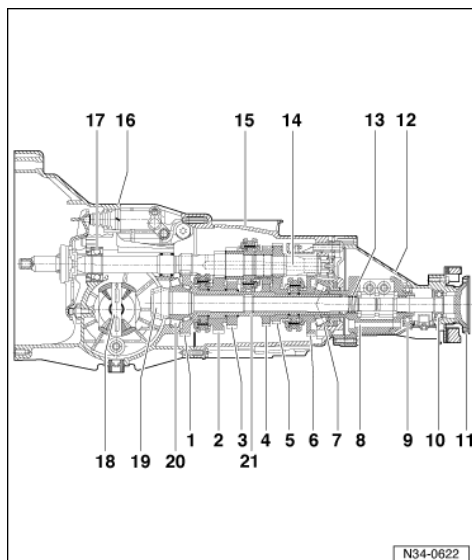


Protected by copyright. Copying for private or commercial purposes, in part or in whole, is not permitted unless authorised by AUDI AG. AUDI AG does not guarantee or accept any liability with respect to the correctness of information in this document. Copyright by AUDI AG.

Sequence =>Page **78** .

5.2 - Overview

- 1 1st gear
- 2 2nd gear
- 3 3rd gear
- 4 4th gear
- 5 5th gear
- 6 Reverse gear
 - ♦ Removing and installing reverse idler gear=>Page **139**
- 7 Taper roller bearing
 - ♦ Adjusting => from Page **167**



8 Torsen differential

- ♦ Can be serviced only by manufacturer
- ♦ Removing and installing with cover
=>Page 65

9 Bearing

10 Bearing

11 Flange shaft

12 Cover for Torsen differential

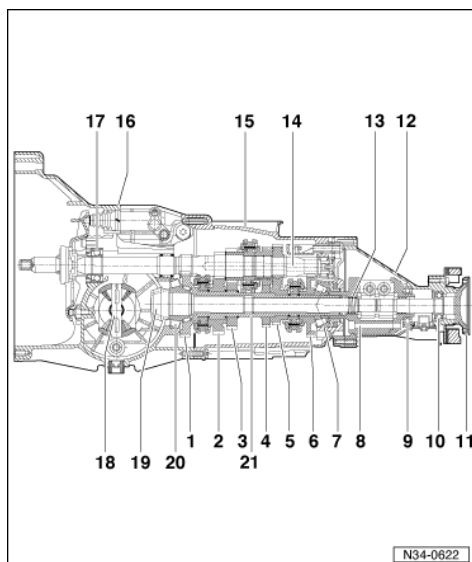
13 Spring

- ♦ Between Torsen differential and hollow shaft

14 Input shaft

- ♦ Dismantling and assembling
=> Page 102

15 Gearbox cover



16 Gearbox housing

17 Bearing

- ♦ Adjusting => adjusting input shaft, Page 116

18 Differential

- ♦ Removing and installing
=>Page 149
- ♦ Dismantling and assembling



Protected by copyright. Copying for private or commercial purposes, in part or in whole, is not permitted unless authorised by AUDI AG. AUDI AG does not guarantee or accept any liability with respect to the correctness of information in this document. Copyright by AUDI AG.

=> Page **153**

19 Drive pinion

- ◆ Dismantling and assembling hollow shaft and drive pinion => Page **118**

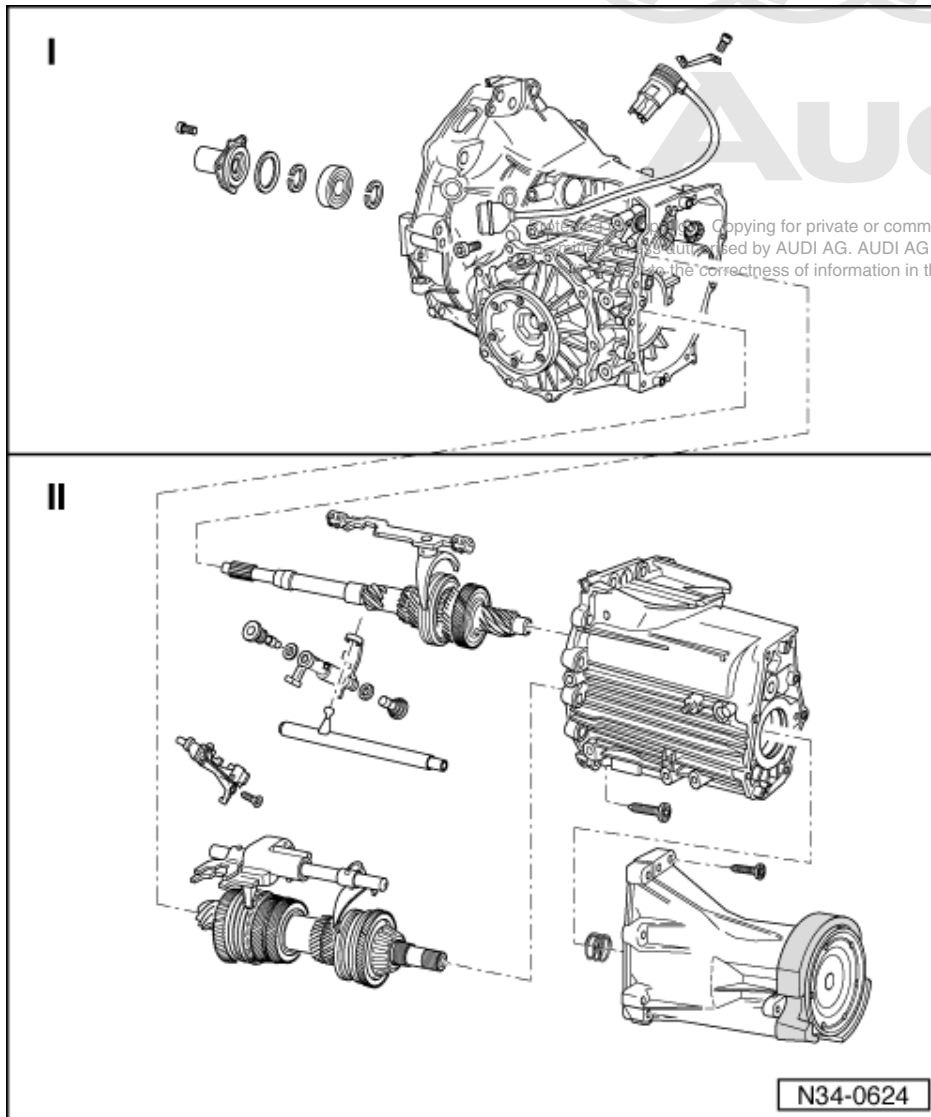
20 Radial taper roller bearing

- ◆ Adjusting => from Page **167**

21 Hollow shaft

- ◆ Dismantling and assembling hollow shaft and drive pinion=>Page **118**

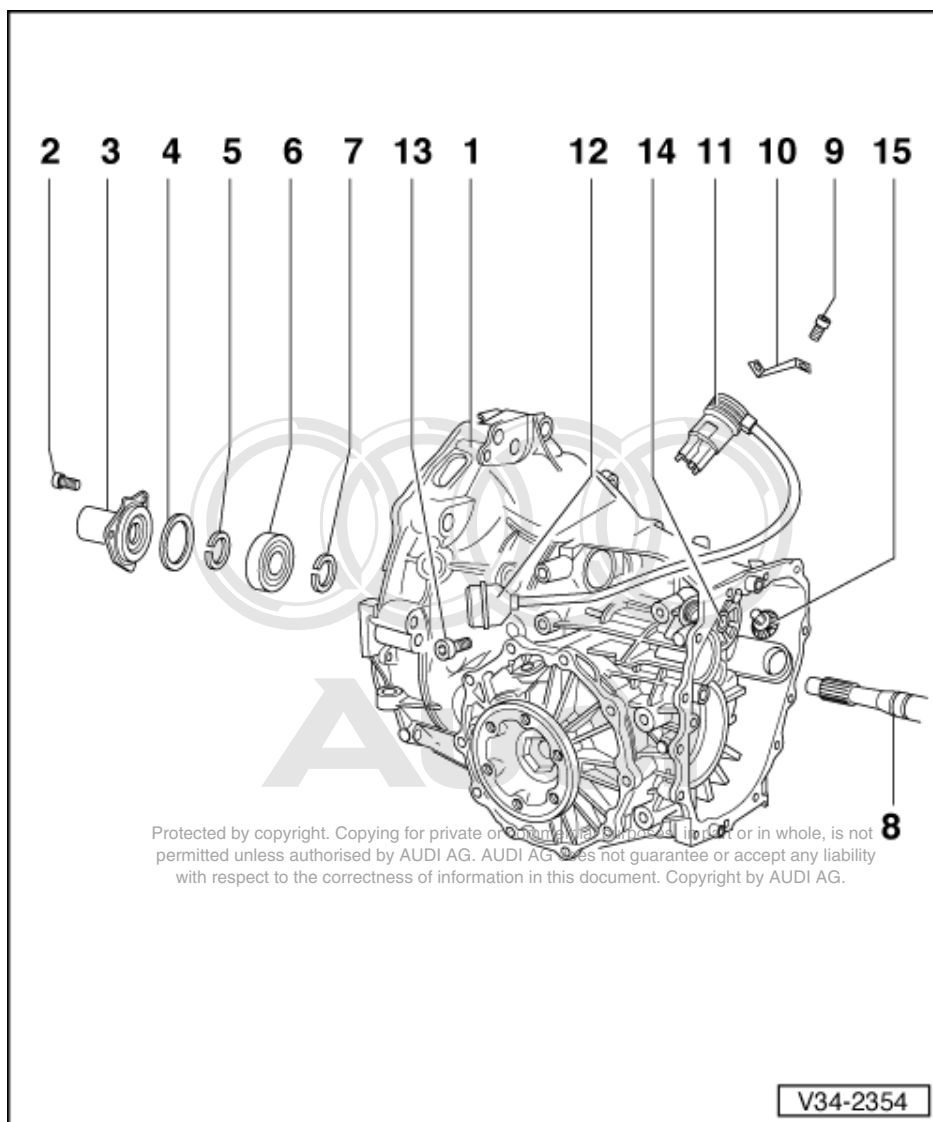
5.3 - Assembly overview



I - Removing and installing input shaft ball bearing and multi-function sender => Page **71**

II - Removing and installing input shaft, drive pinion, hollow shaft, selector rods, gearbox cover and cover with Torsen differential => Page **75**

5.4 - Removing and installing input shaft ball bearing and multi-function sender



1 Gearbox housing

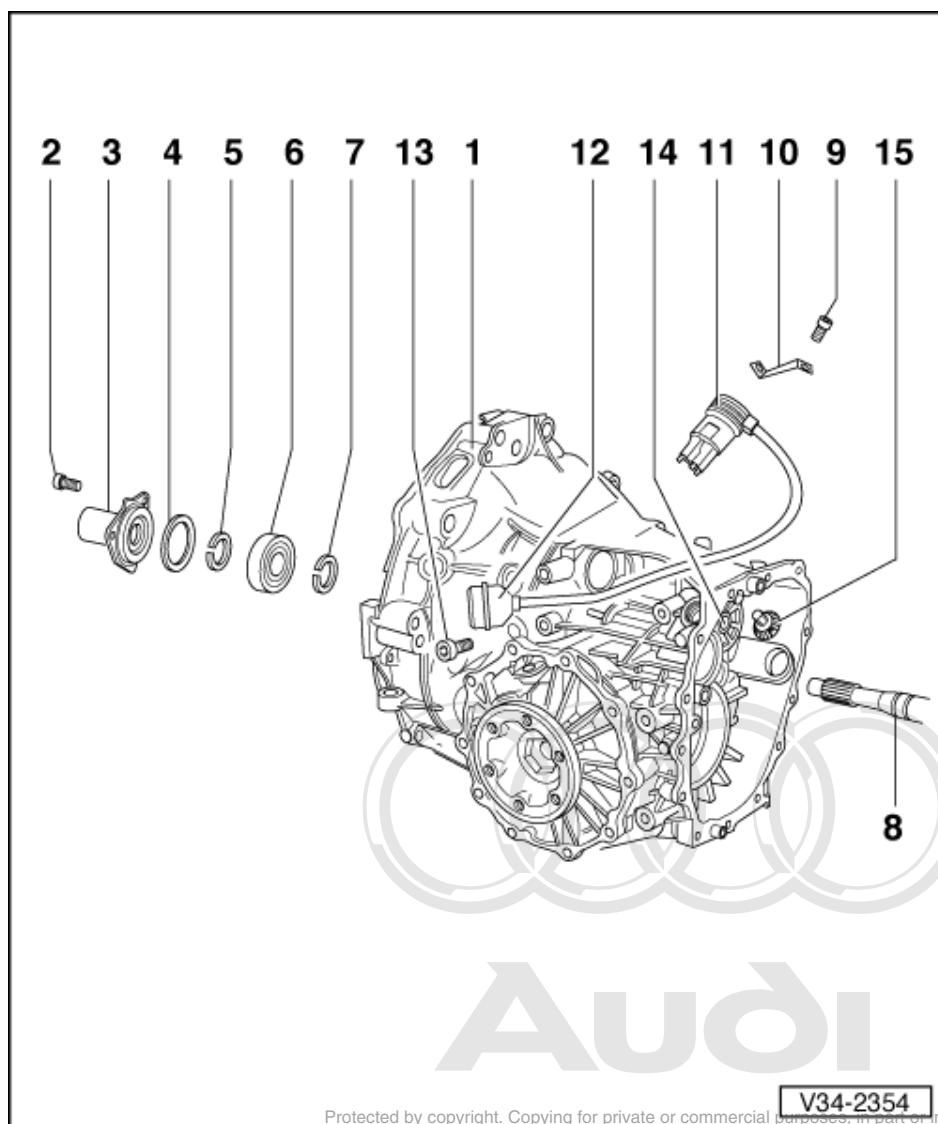
- ◆ With differential and flanged shafts
- ◆ Removing and installing flange shafts => Page 141
- ◆ Removing and installing differential => Page 149
- ◆ Removing and installing speedometer sender and drive wheel
=> Page 146
- ◆ Breather installation position
=> Fig. 1

2 Torx socket head bolt, -35 Nm

- ◆ Self-locking
- ◆ Renew

3 Guide sleeve

- ◆ With O-ring and oil seal for input shaft => Page 34



Protected by copyright. Copying for private or commercial purposes, in part or in whole, is not permitted unless authorised by AUDI AG. AUDI AG does not guarantee or accept any liability with respect to the correctness of information in this document. Copyright by AUDI AG.

4 Dished washer

- ♦ Smaller diameter (convex side) faces guide sleeve

5 Circlip

- ♦ Determining thickness => adjusting input shaft, Page 116

6 Bearing

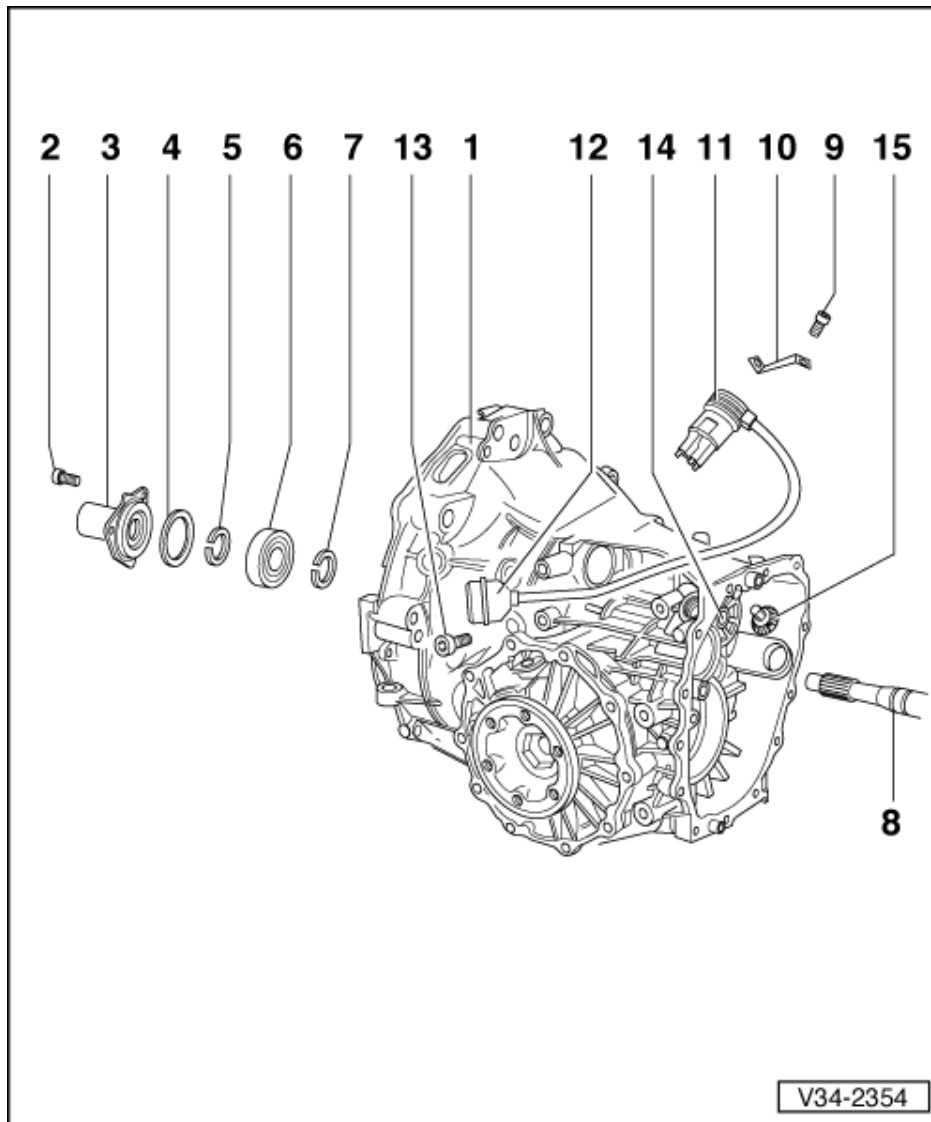
- ♦ Removing and installing
=> Page 78

7 Circlip

- ♦ Determining thickness => adjusting input shaft, Page 116

8 Input shaft

- ♦ Removing and installing
=> Page 75
- ♦ Dismantling and assembling
=> Page 102
- ♦ Adjusting => Page 116
- ♦ Servicing input shaft bearings
=> Page 102



9 Bolt - 25 Nm

10 Locking plate

- ♦ For multi-function sender

11 Multi-function sender

12 Connector

- ♦ For multi-function sender

13 Bolt - 10 Nm

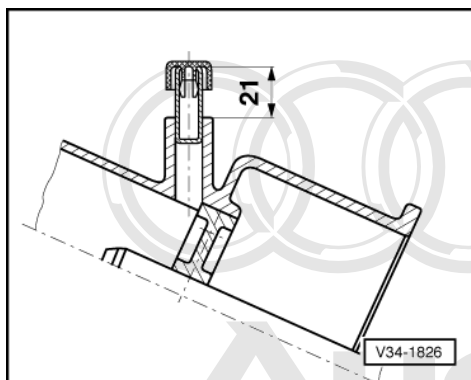
14 Cover for selector shaft

- ♦ Removing and installing
=> Page **94**

15 Locking unit for 5th gear and reverse gear

- ♦ Removing and installing
=> Page **99**

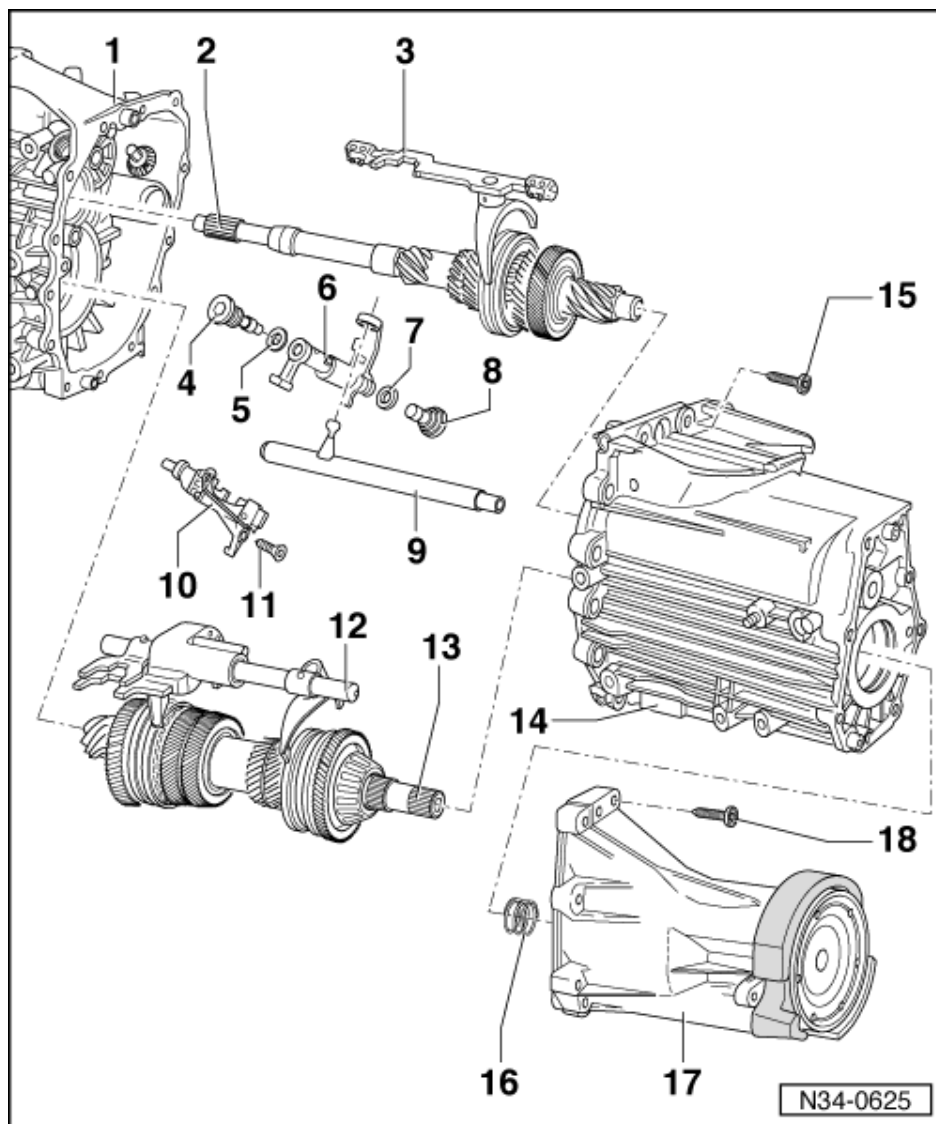
Protected by copyright. Copying for private or commercial purposes, in part or in whole, is not permitted unless authorised by AUDI AG. AUDI AG does not guarantee or accept any liability with respect to the correctness of information in this document. Copyright by AUDI AG.



-> Fig.1 Breather installation position

After pressing in, the breather must project 21 mm out of housing.

5.5 - Removing and installing input shaft, drive pinion, hollow shaft, selector rods, gearbox cover and cover with Torsen differential



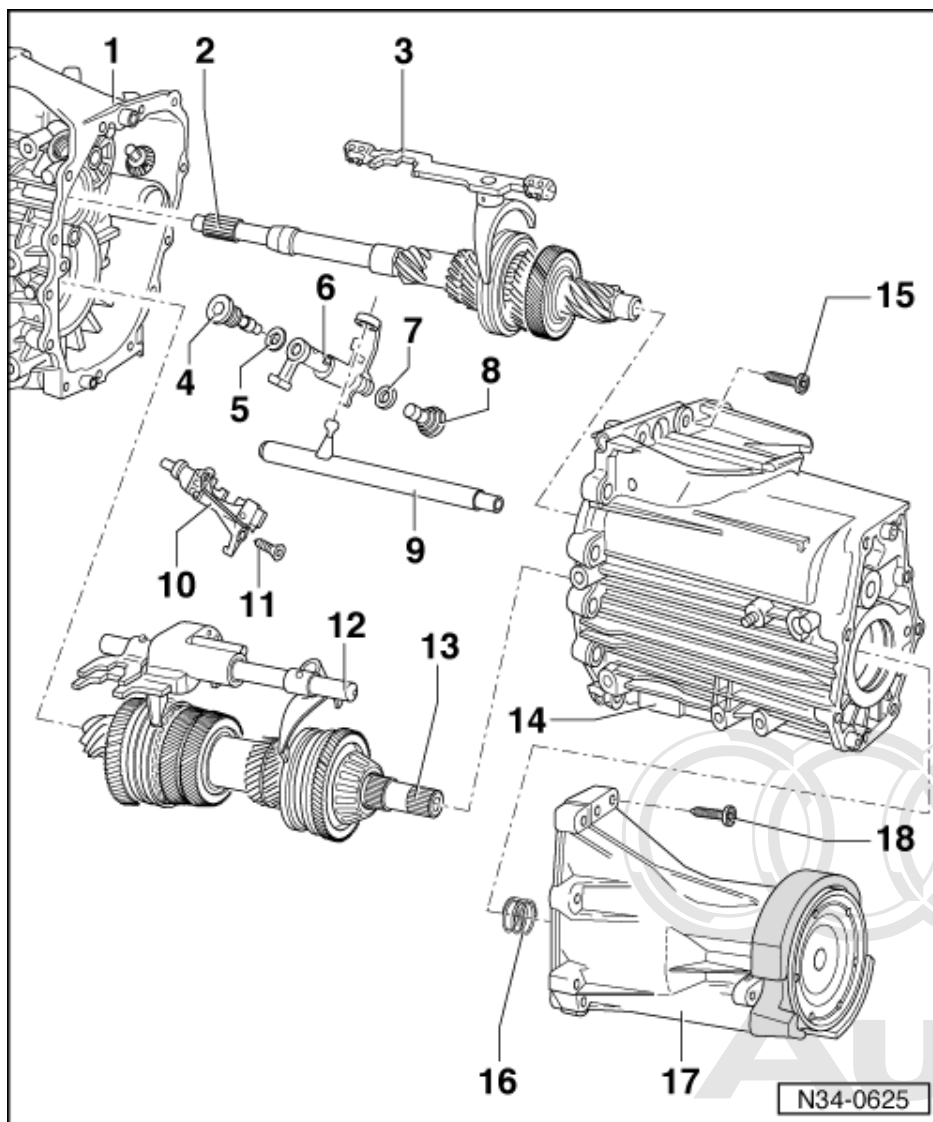
1 Gearbox housing

2 Input shaft

- ♦ Dismantling and assembling
=> Page 102
- ♦ Adjusting =>Page 116
- ♦ Servicing input shaft bearings
=> Page 102

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

- ♦ Dismantling and assembling
=> Page 94
- ♦ Replacing mounting bushes
=> Page 94



4 Left stop bolt,
40 Nm

5 Oil seal

6 Relay shaft

- ♦ Installation position => Page 95

7 Oil seal

8 Right stop bolt,
40 Nm

9 Selector shaft

- ♦ Installation position => Page 97

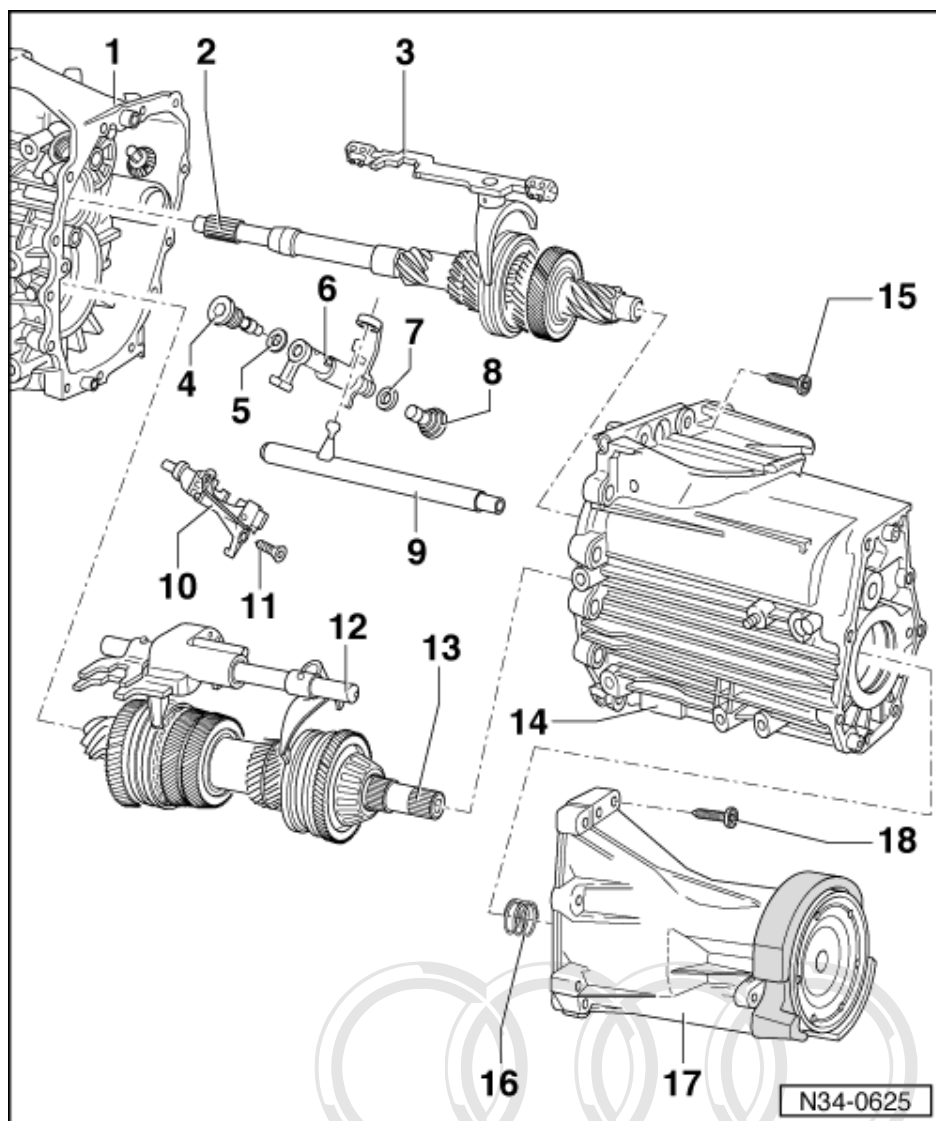
Protected by copyright. Copying for private or commercial purposes, in part or in whole, is not permitted unless authorised by AUDI AG. AUDI AG does not guarantee or accept any liability with respect to the correctness of information in this document. Copyright by AUDI AG.



- ♦ Replacing selector shaft oil seal
=> Page 97

10 Detent segment

- ♦ Installation position => Page 95



11 Torx bolt -25 Nm

- ♦ With shoulder to secure the detent element spring

12 Selector rod with 1st/2nd/5th and reverse gear selector forks

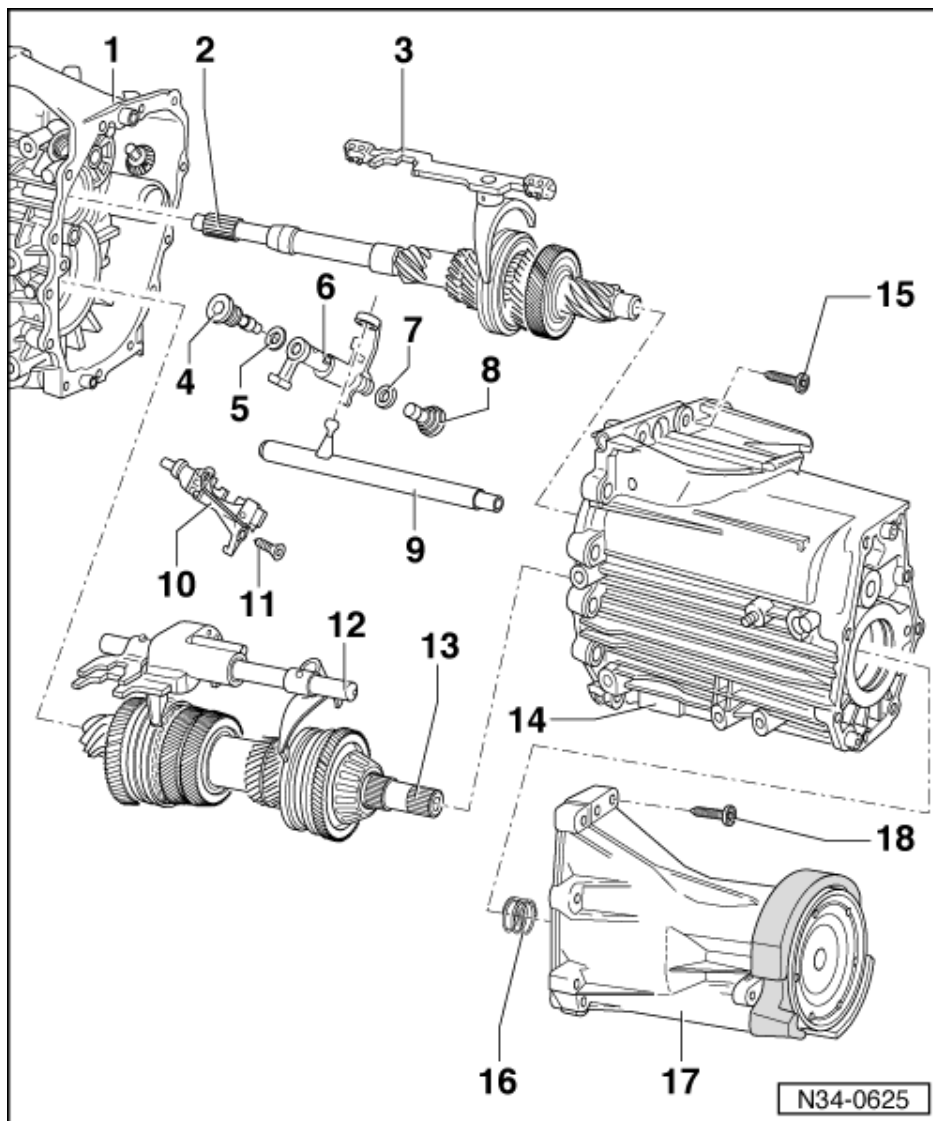
- ♦ Dismantling and assembling
=> Page 94
- ♦ Removing and installing ball sleeves => Fig. 98

13 Drive pinion with hollow shaft

- ♦ Dismantling and assembling
=> Page 118
- ♦ Adjusting => Page 162
- ♦ Servicing drive pinion and hollow shaft bearings
=> Page 118

14 Gearbox cover

- ♦ Removing and installing oil collector tray=>Fig. 1



15 Torx bolt - 22 Nm

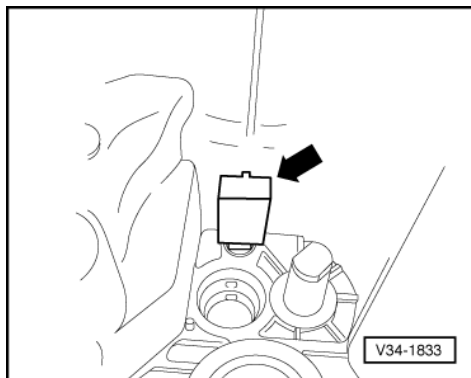
16 Spring

17 Cover with Torsen differential

- ♦ Removing and installing with gearbox installed
=>Page 65
- ♦ Removing and installing Torsen differential from cover
=>Page 87
- ♦ Servicing cover
=>Page 87

18 Torx bolt - 22 Nm

Protected by copyright. Copying for private or commercial purposes, in part or in whole, is not permitted unless authorised by AUDI AG. AUDI AG does not guarantee or accept any liability with respect to the correctness of information in this document. Copyright by AUDI AG.



-> Fig.1 Removing and installing oil collector tray

Removing

- Turn the oil collector tray -arrow- and then pull out

Installing

- Push oil collector tray into the gearbox, until it snaps in.
- Position: oil collector tray faces upwards in gearbox cover.

5.6 - Removing and installing input shaft ball bearing, multi-function sender, input shaft, drive pinion, selector rods, gearbox cover and cover with Torsen differential

Notes:

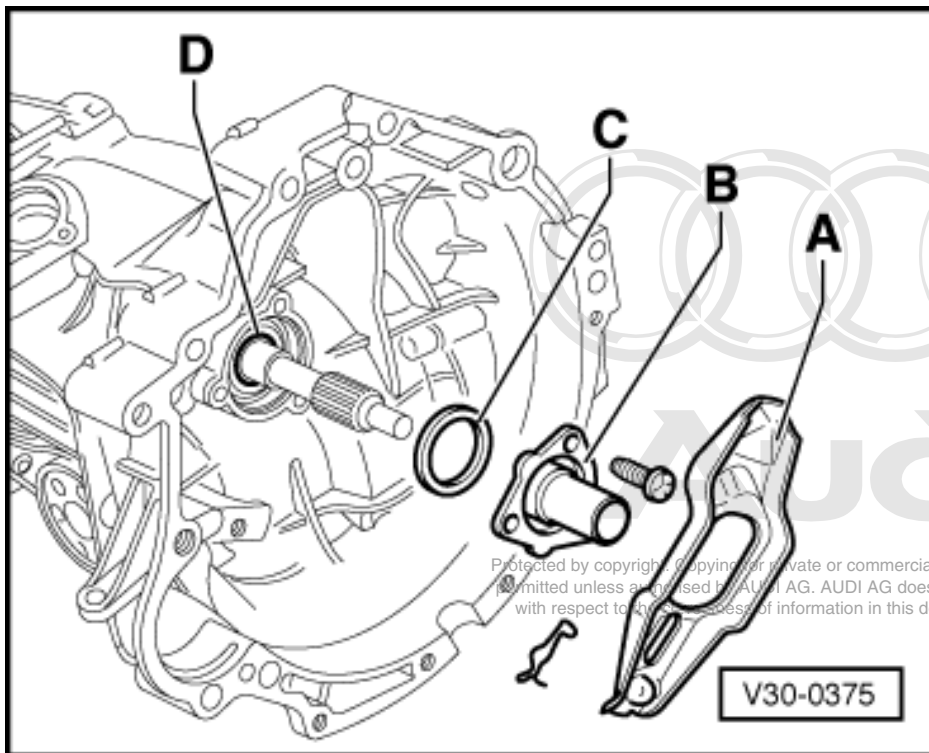
- ♦ To remove the above-mentioned components it is not necessary to remove the differential.
- ♦ Removal is only necessary when adjustments have to be carried out => adjustment overview, Page 165.

Special tools, testers and auxiliary items

- ♦ Retaining plate VW 309
- ♦ Gearbox support VW 353
- ♦ Pressing-in tool 3235
- ♦ Key 3357
- ♦ Drip tray V.A.G 1306
- ♦ Taper roller bearing extractor V.A.G 1582
- ♦ Clamping piece V. A. G. 1582/2

Removing

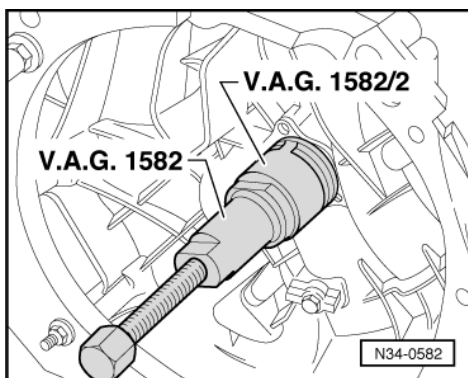
- Place drip tray VW 1306 below gearbox.
- Drain gear oil.
- Remove gearbox=>Page 52 .
- Secure gearbox to repair stand => Page 61 .



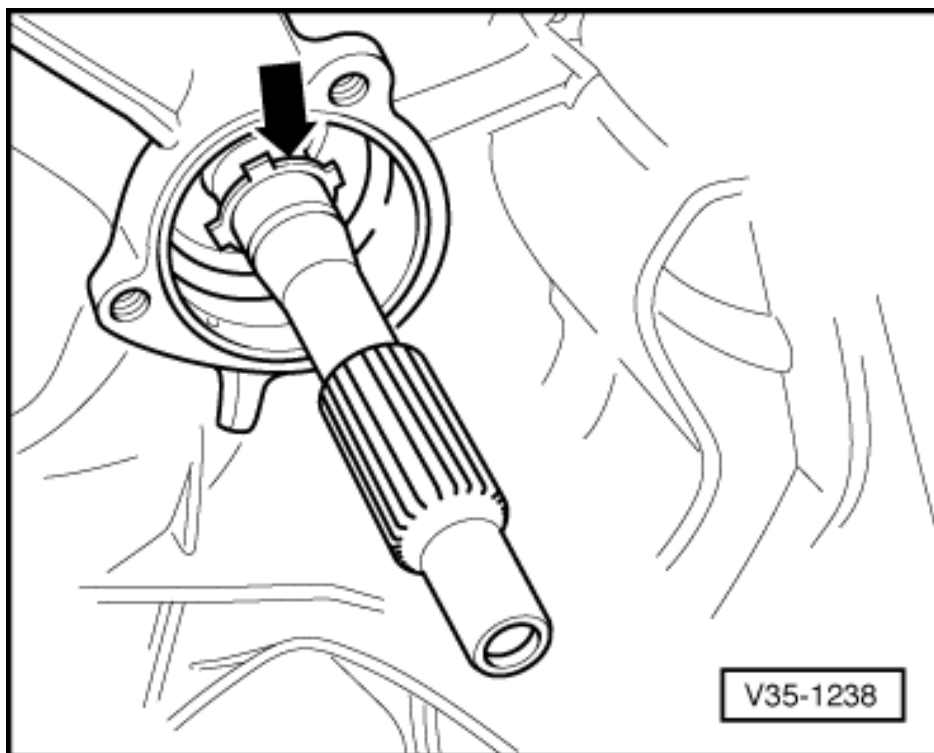
- -> Remove clutch release lever -A- with release bearing.

Notes:

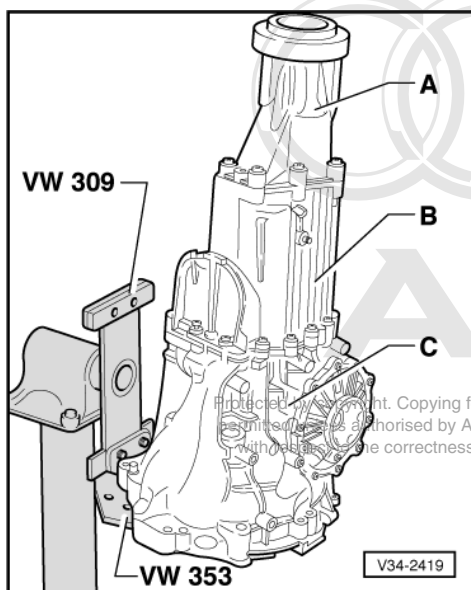
- ◆ Before pulling off guide sleeve, cover splines on input shaft with a shrink-fit hose to protect oil seal.
- ◆ Removing oil seal in guide sleeve => Page 35 .
- Remove guide sleeve -B-
- Remove dished washer -C-
- Remove circlip -D- in front of input shaft ball bearing.
- If the ball bearing, input shaft or gearbox housing is not to be replaced, note the thickness of the circlip.



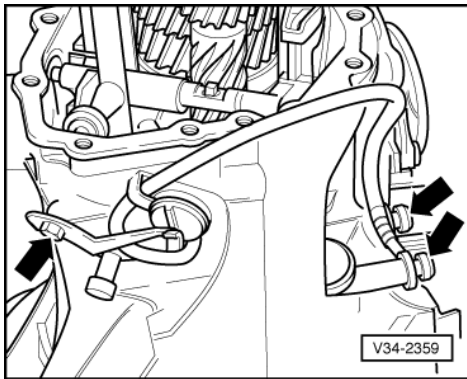
- -> Pull the input shaft ball bearing out of gearbox housing.



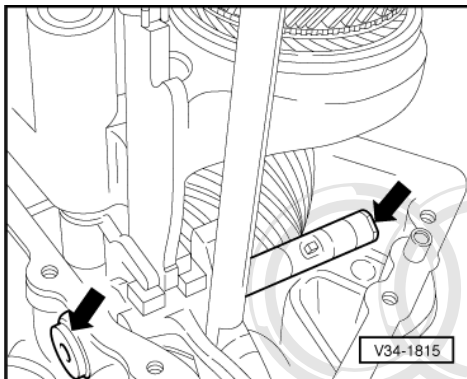
- -> Remove the circlip (arrow) behind the input shaft ball bearing.
- If the ball bearing, input shaft or gearbox housing is not to be replaced, note the thickness of the circlip.



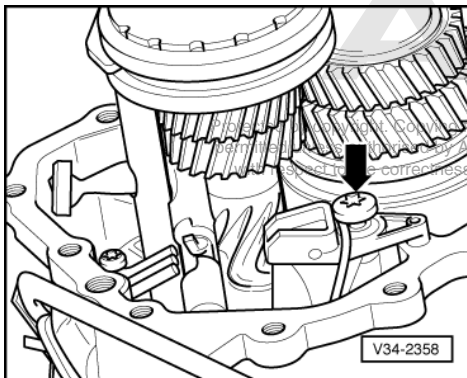
- -> Unbolt cover -A- with Torsen differential from gearbox cover -B-.
- Remove spring from drive pinion.
- Then unbolt gearbox cover -B- from gearbox housing -C-.



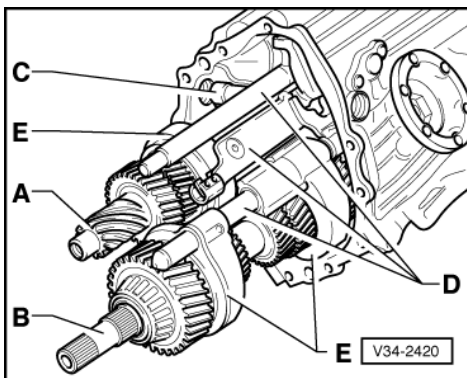
- -> Remove bolts (arrows) and pull out the multi-function sender.



- -> Remove relay shaft bolts (arrows).

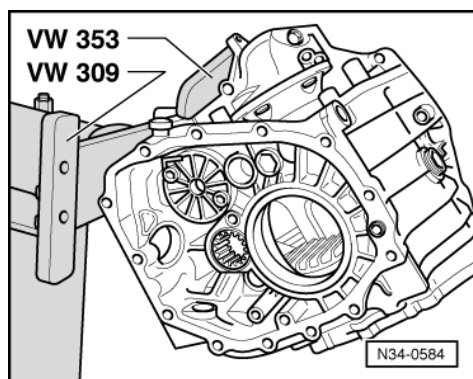


- -> Unbolt the detent segment (arrow) and swing it out.





- -> The input shaft -A-, the drive pinion -B-, the relay shaft -C-, the selector rods -D- with selector shaft and the selector forks -E- must be carefully pulled out together.

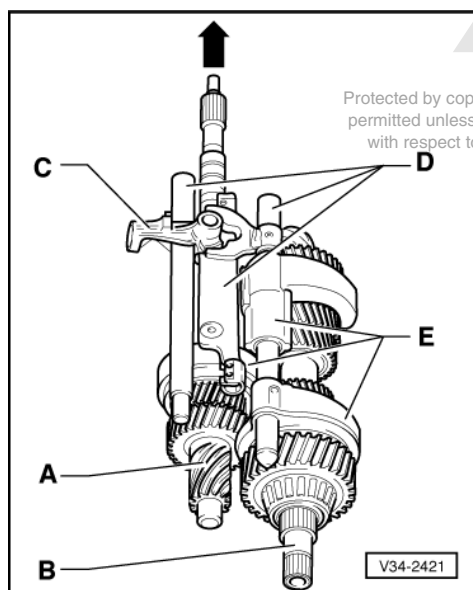


Installing

Note:

If the input shaft ball bearing, the input shaft or the gearbox housing are renewed, it is necessary to re-determine the thickness of the circlips for the input shaft =>Page 116, adjusting input shaft.

- -> Swing the gearbox housing into the position shown. The components listed below can then be fitted more easily.

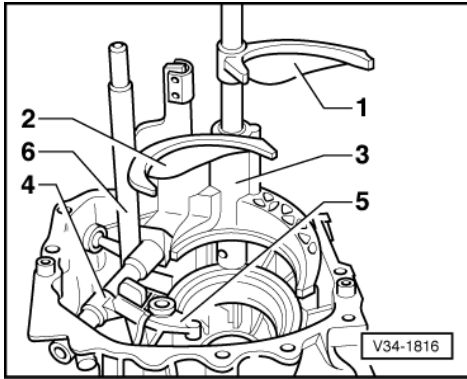


Protected by copyright. Copying for private or commercial purposes, in part or in whole, is not permitted unless authorised by AUDI AG. AUDI AG does not guarantee or accept any liability with respect to the correctness of information in this document. Copyright by AUDI AG.

- -> Assemble the input shaft -A-, the drive pinion -B-, the relay shaft -C-, the selector rods -D- with selector shaft and selector forks -E- together.
- Install these components together into the gearbox housing.

Note:

Relay shaft -C- and the selector shaft can also be fitted later if necessary =>Fig. V34-1816, Page 83.

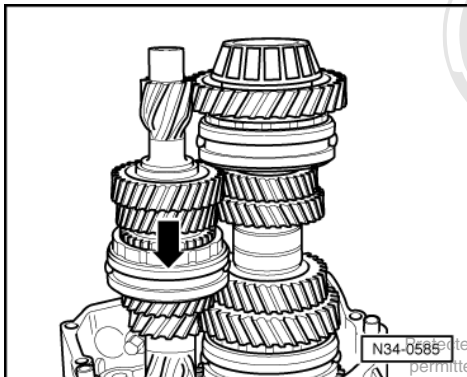


-> Location of gear selector mechanism in gearbox

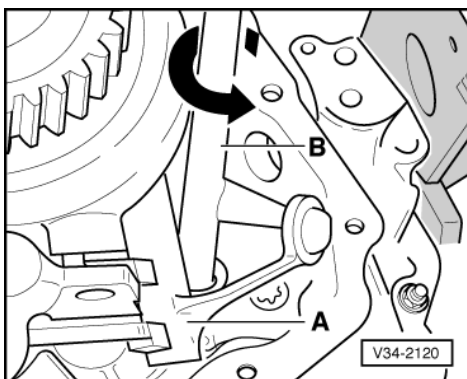
- 1 - Selector fork for 5th gear and reverse gear
- 2 - Selector fork for 3rd gear and 4th gear
- 3 - Selector fork for 1st gear and 2nd gear
- 4 - Relay shaft
- 5 - Detent mechanism
- 6 - Selector shaft

Note:

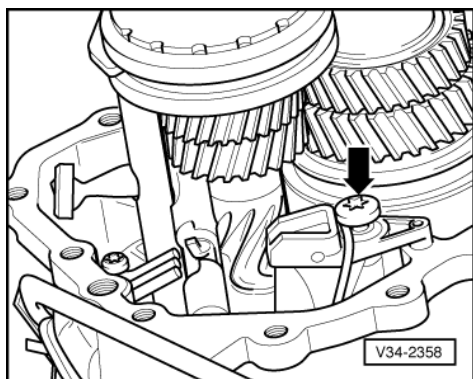
Shown in illustration with input shaft and drive pinion removed.



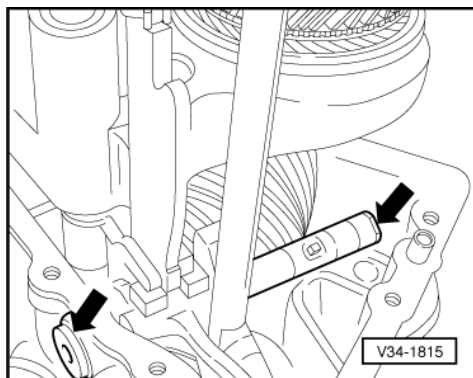
- -> Turn gearbox housing and engage 3rd gear (direction of arrow).



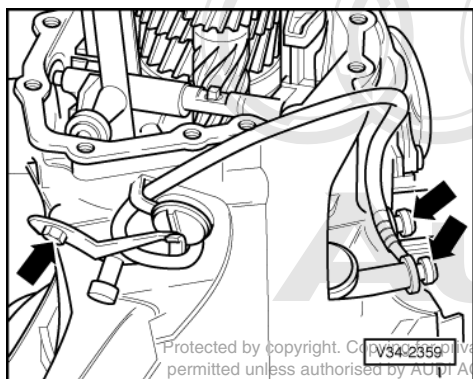
- -> Now install relay shaft -A-.
- Insert selector shaft -B- sideways onto the drilling in gearbox housing and assemble into mounting eye.
- Then turn the selector shaft carefully in direction of arrow.



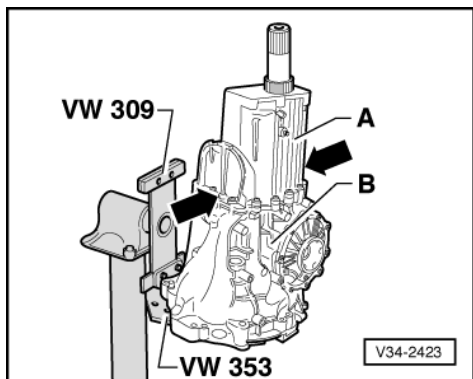
- -> Then insert the detent segment and bolt it tight (arrow).



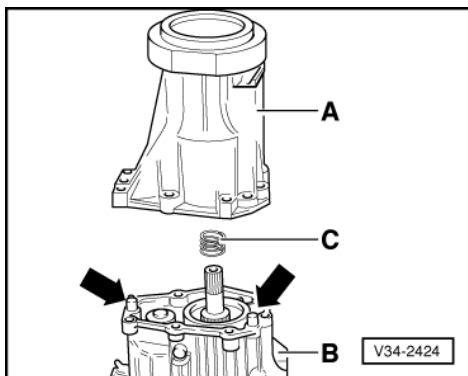
- -> Now insert the relay shaft bolts (arrows).



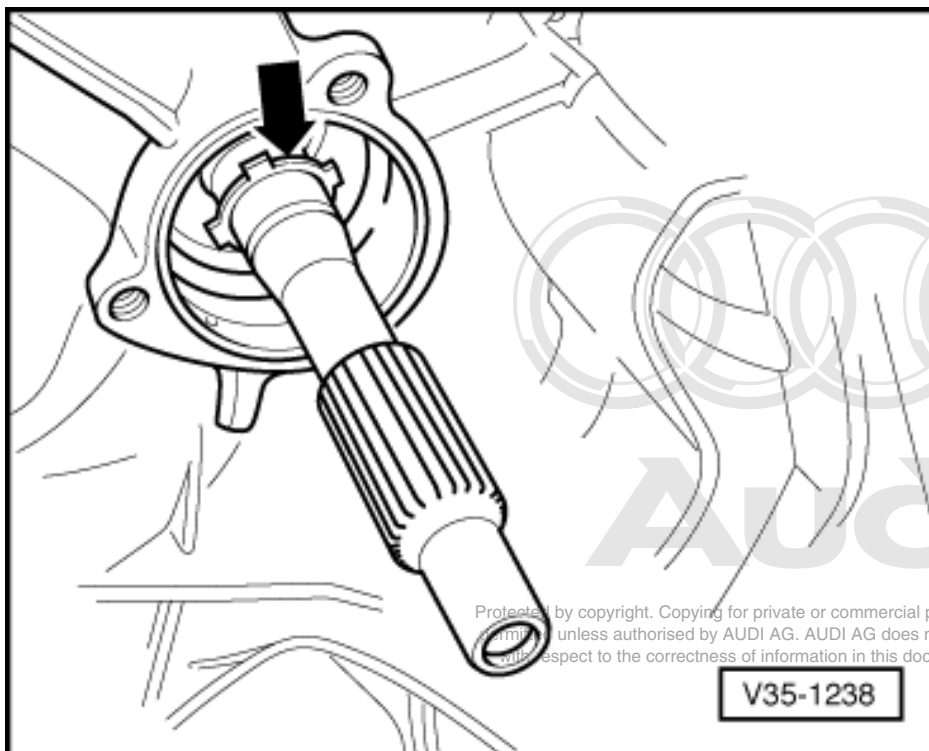
- Replace O-ring for multi-function sender.
- -> Carefully insert multi-function sender and tighten (arrows).



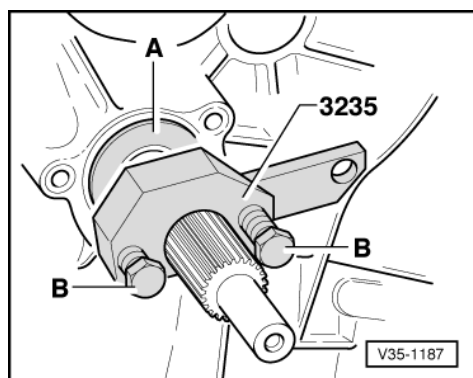
- -> Check that dowel sleeves for gearbox cover -A- are fitted in gearbox housing -B-(arrows).
- Fit gearbox cover onto gearbox housing.



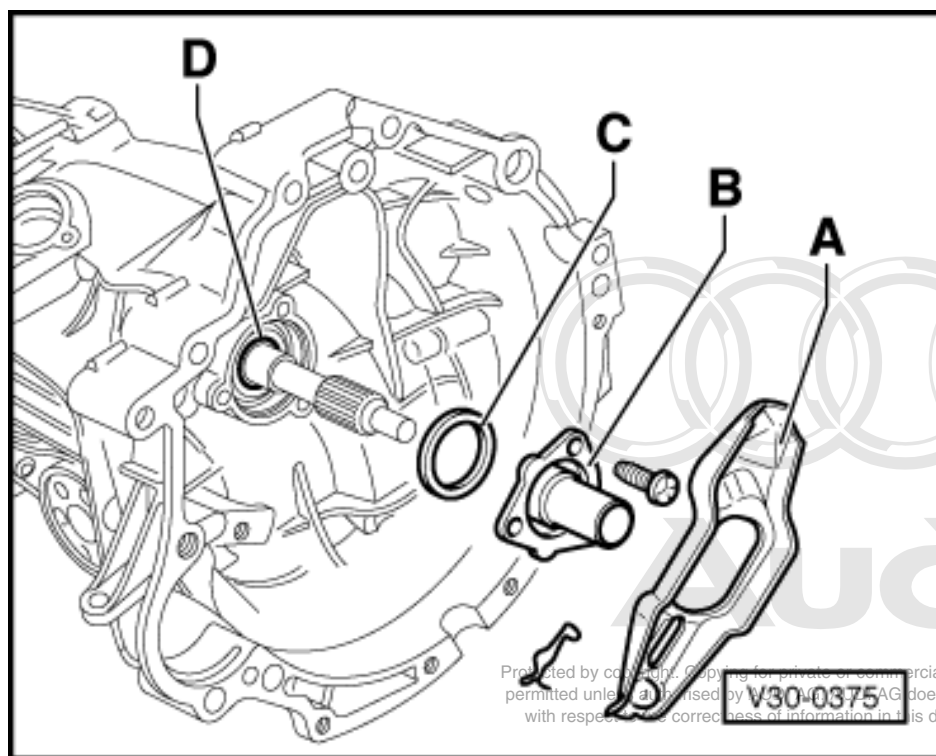
- -> Check that dowel sleeves for cover -A- are fitted in gearbox cover -B-(arrows).
- Fit spring -C-.
- Fit cover with Torsen differential -A- on gearbox cover -B-.



- -> Fit rear input shaft ball bearing circlip (arrow).
- Slide the ball bearing onto the input shaft.
 - Position: closed side of ball cage faces towards gearbox housing.



- -> Press in ball bearing:
- Slide thrust piece -A- of pressing-in tool onto input shaft.
- Position pressing-in tool behind splines for clutch plate.
- Screw in bolts -B- until they make contact.
 - The bolts bear against the indentations in thrust piece -A-.
- Press in ball bearing onto its seat by alternately tightening the bolts (1/2 turn at a time).



- -> Now fit the input shaft ball race front circlip -D-.
- Then fit dished washer -C-.
- Position: convex side towards guide sleeve -B-

Notes:

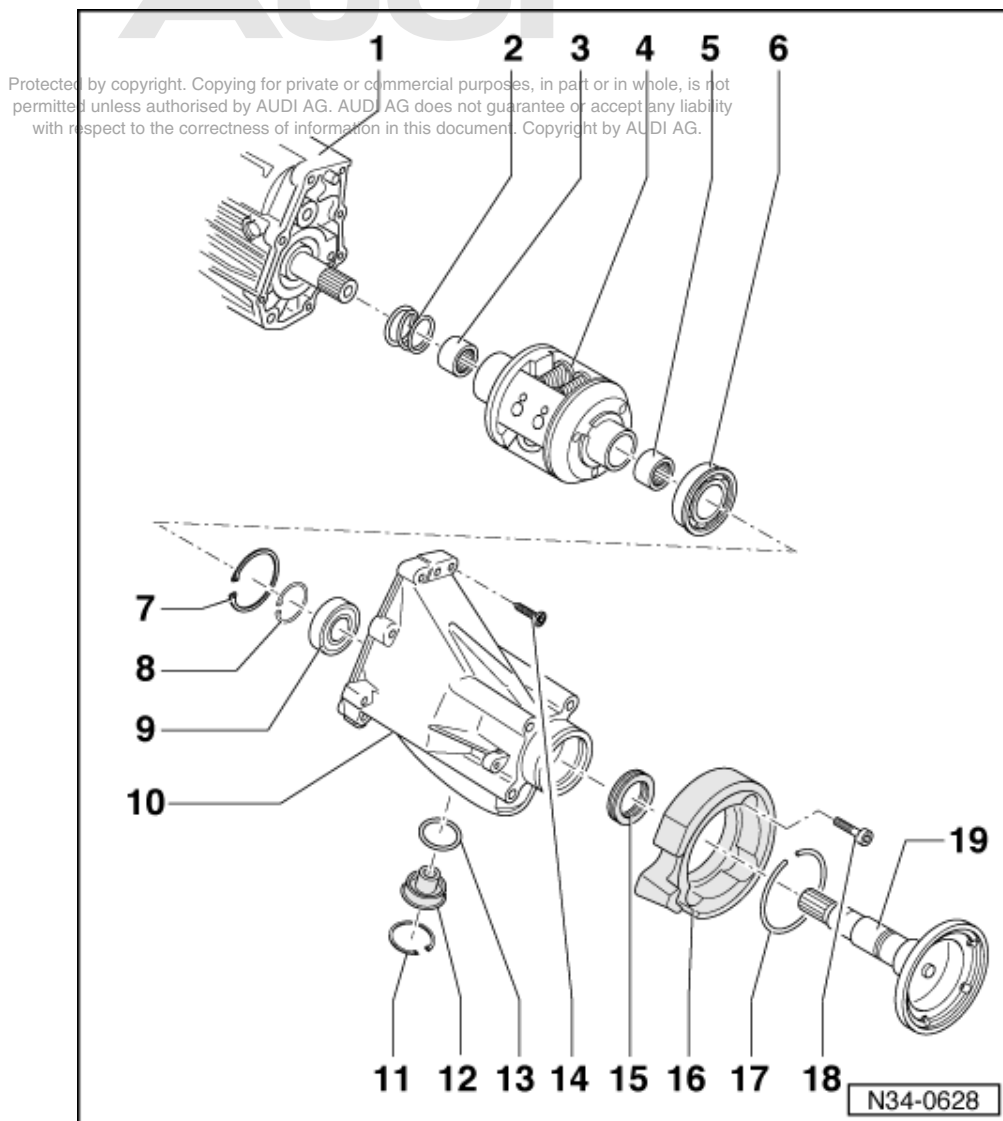
- ♦ Before fitting guide sleeve, cover splines on input shaft with a shrink-fit hose to protect oil seal.
- ♦ Installing oil seal in guide sleeve => Page 35 .
- Fit guide sleeve -B- for release bearing.
- Fit clutch release lever -A- and release bearing.

6 - Servicing cover for Torsen differential, removing and installing Torsen differential

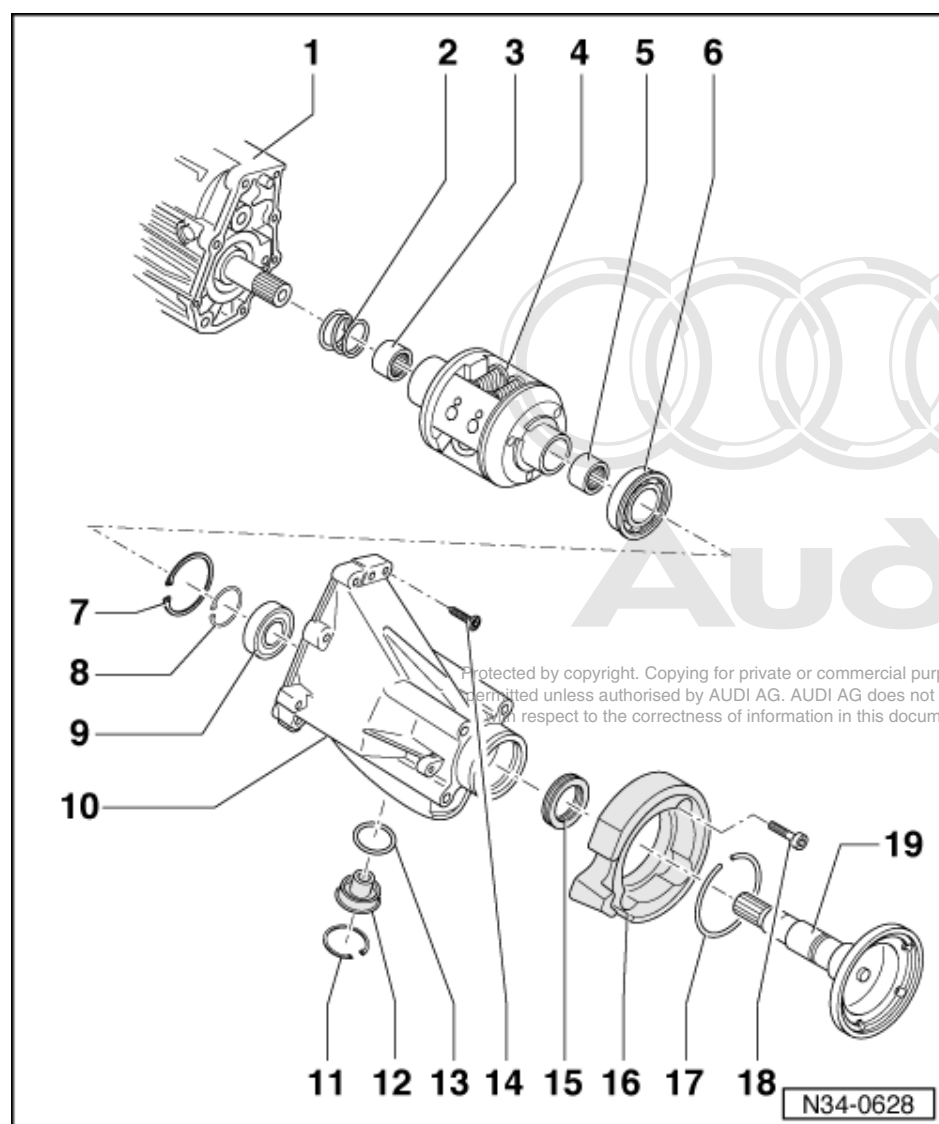
6.1 - Servicing cover for Torsen differential, removing and installing Torsen differential

Special tools, testers and auxiliary items

- ◆ Thrust plates VW 401 and VW 402
- ◆ Press tool VW 407
- ◆ Press tool VW 412
- ◆ Tube VW 416 B
- ◆ Tube VW 421
- ◆ Guide pin VW 439
- ◆ Extractor lever VW 681
- ◆ Tube VW 519
- ◆ VW 771/15 from multi-purpose tool set VW 771
- ◆ Press tool 40-21
- ◆ Tube 2040
- ◆ Press piece 3002
- ◆ Separating tool Kukko 17/2
- ◆ Internal puller Kukko 21/4



- 1 Gearbox cover
- 2 Spring
- 3 Front needle bearing
 - ◆ Removing => Fig. 8
 - ◆ Installation position => Fig. 9
 - ◆ Pressing in => Fig. 11
- 4 Torsen differential
 - ◆ Do not dismantle
 - ◆ Press out after removing flange shaft
=> Fig. 3
 - ◆ Renew if damaged
 - ◆ Pressing in => Fig. 12
- 5 Rear needle bearing
 - ◆ Removing => Fig. 8
 - ◆ Installation position => Fig. 10
 - ◆ Pressing in => Fig. 11



- 6 Ball bearing
 - ◆ For Torsen differential
 - ◆ Pressing off => Fig. 4
 - ◆ Pressing on => Fig. 5
- 7 Circlip
- 8 Circlip

- ♦ Remove and install together with flange shaft => Fig. 2

9 Bearing

- ♦ For flange shaft
- ♦ Pressing off => Fig. 6
- ♦ Pressing in => Fig. 7

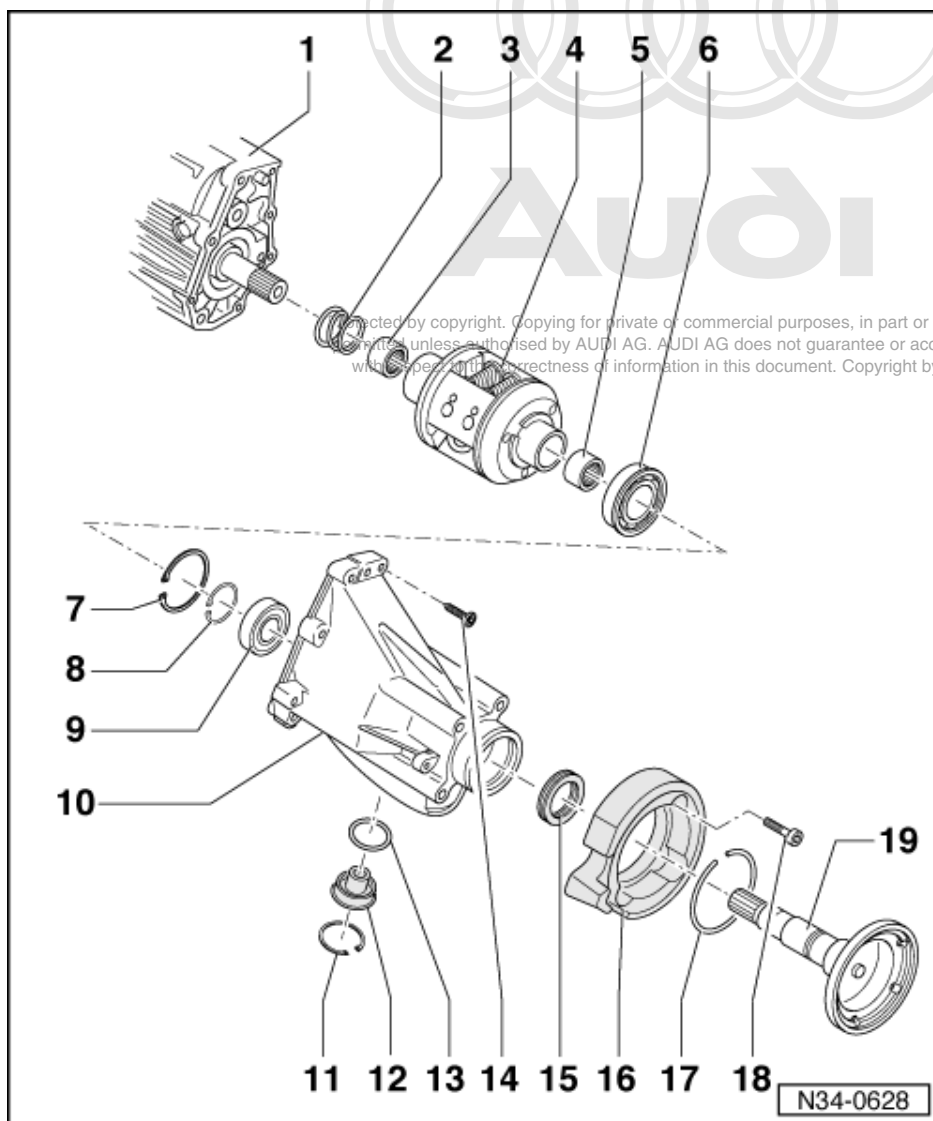
10 Cover

- ♦ For Torsen differential

11 Circlip

12 Plug

- ♦ Removing => Fig. 1



13 O-ring

- ♦ Renew
- ♦ Grease when installing

14 Torx bolt - 22 Nm

15 Oil seal

- ♦ Pull out with oil seal extractor lever VW 681
- ♦ Knocking in => Fig. 13

16 Vibration damper

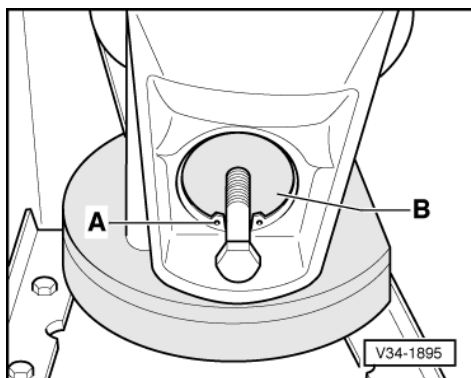
17 Circlip

18 Torx bolt - 35 Nm

- ◆ Self-locking
- ◆ Renew

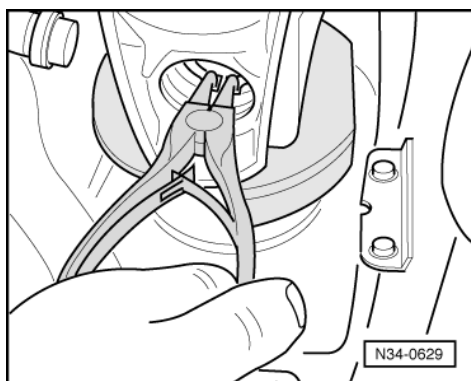
19 Flange shaft

- ◆ Removing and installing=>Fig. 2



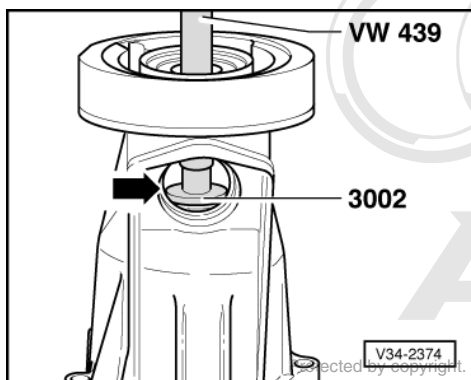
-> Fig.1 Removing plug

- Remove circlip -A-.
- Screw an M8 bolt into thread of plug -B-.
- Pull out plug -B- using bolt.



-> Fig.2 Removing and installing flange shaft

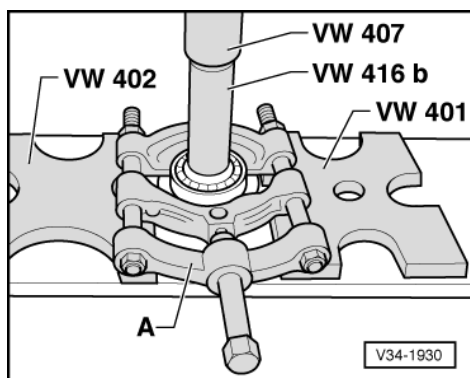
- Open out circlip and pull out flange shaft
- When inserting flange shaft, fit circlip at the same time.
 - The circlip must be seated in the base of the groove.



Copyright by Audi AG. Copying for private or commercial purposes, in part or in whole, is not permitted unless authorised by AUDI AG. AUDI AG does not guarantee or accept any liability with respect to the correctness of information in this document. Copyright by AUDI AG.

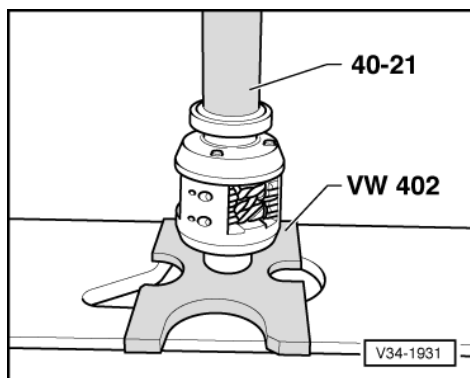
-> Fig.3 Pressing out Torsen differential

- Position thrust piece 3002 directly on Torsen differential through opening (arrow).



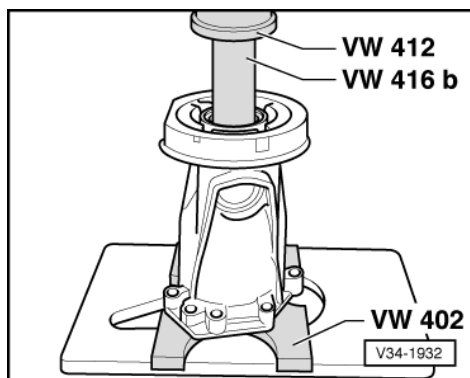
-> Fig.4 Pressing off ball bearing from Torsen differential

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



-> Fig.5 Pressing ball bearing onto Torsen differential

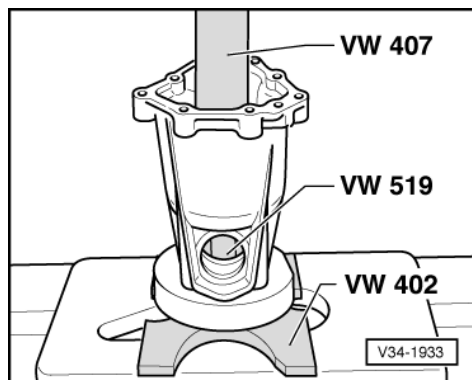
- Press ball bearing on as far as the stop.



-> Fig.6 Pressing out ball bearing for flange shaft

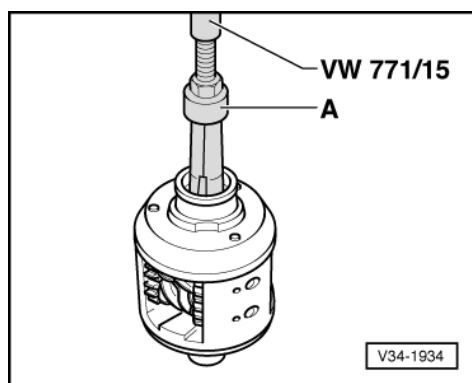
- Remove circlip before pressing out bearing.

Protected by copyright. Copying for private or commercial purposes, in part or in whole, is not permitted unless authorised by AUDI AG. AUDI AG does not guarantee or accept any liability with respect to the correctness of information in this document. Copyright by AUDI AG.



-> Fig.7 Pressing in ball bearing for flange shaft

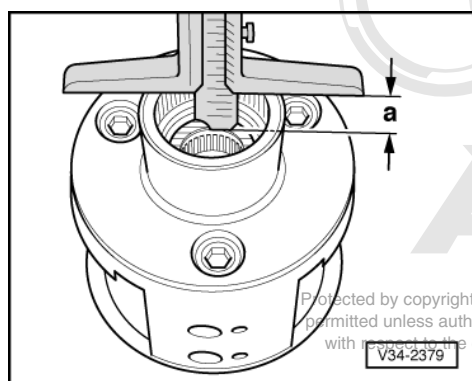
- Fit circlip after pressing in bearing.



-> Fig.8 Pulling out needle bearing.

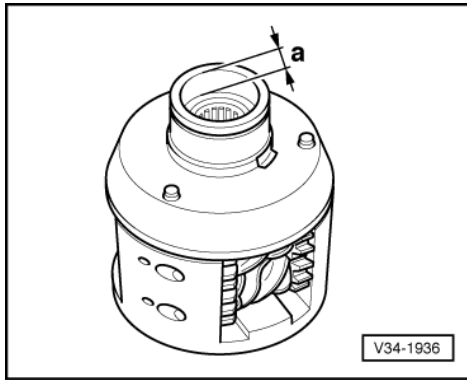
A - Internal puller 22 ... 28 mm, e.g. Kukko 21/4

- Both needle bearings in the Torsen differential are removed with the same puller.



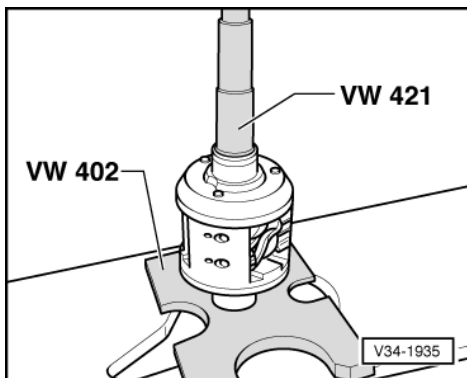
-> Fig. 9 Installation position of front needle bearing

- ♦ Distance a = 32.5 mm



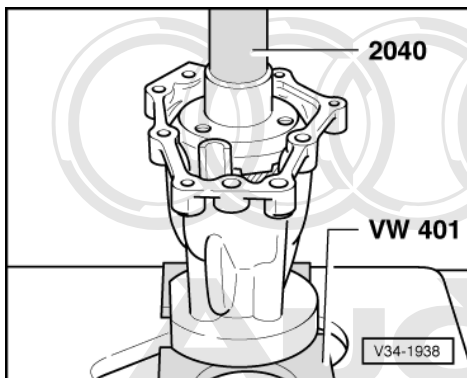
→ Fig.10 Installation position of rear needle bearing

- ◆ Distance a = 14 mm

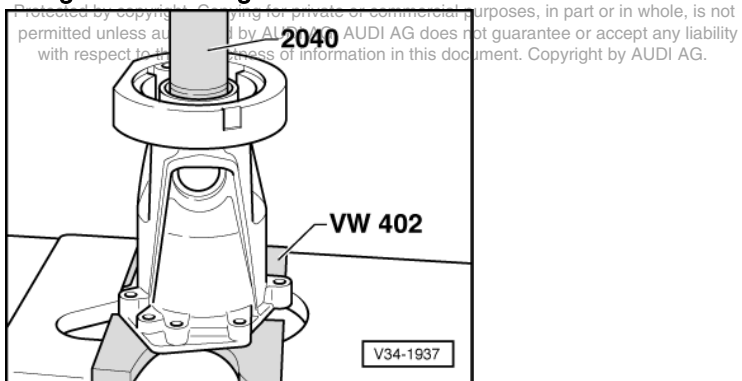


→ Fig.11 Pressing in needle bearing

- Both needle bearings in the Torsen differential are pressed in with the same special tool.



→ Fig.12 Pressing in Torsen differential



-> Fig.13 Driving in seal

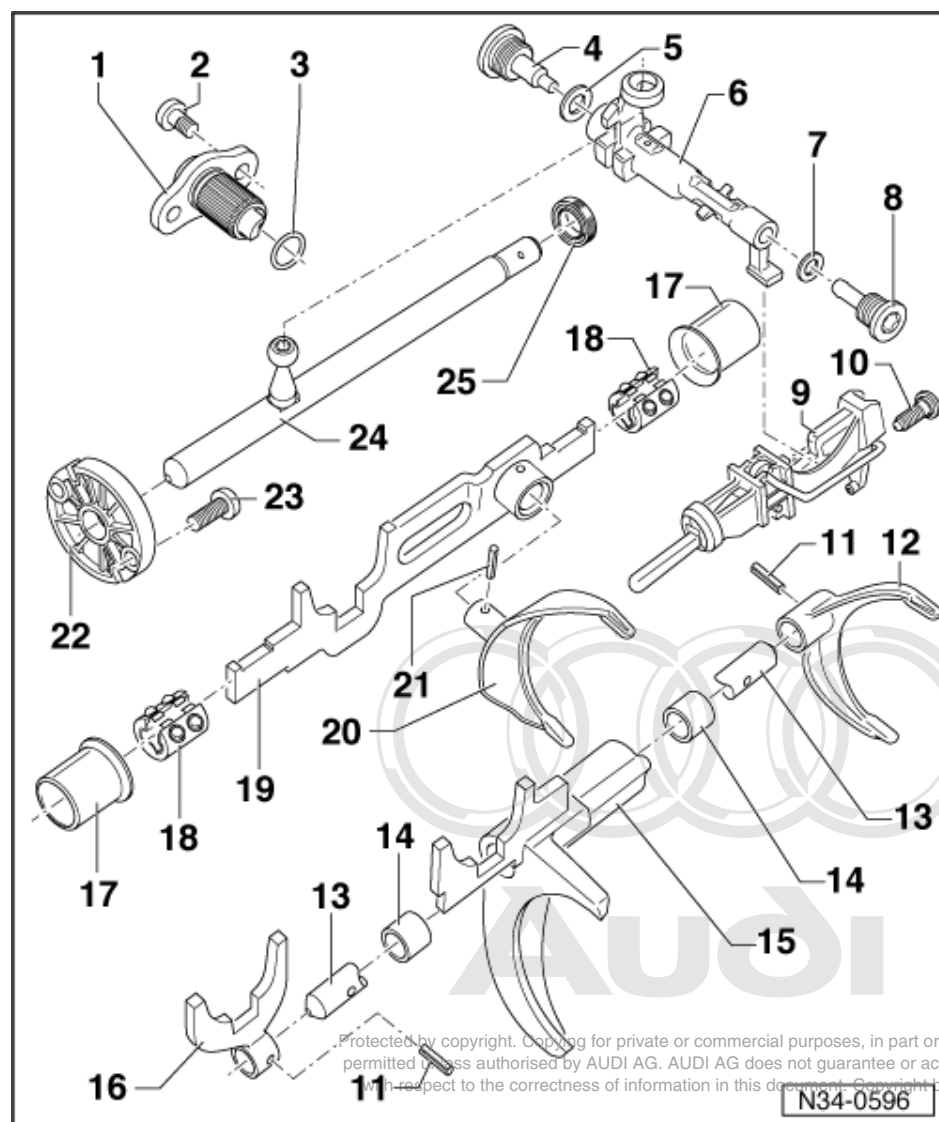
- Fill space between sealing and dust lips with multi-purpose grease.
- Lightly oil outer circumference of seal.
 - Position: 2 mm below surface of cover

7 - Dismantling and assembling selector mechanism in gearbox

7.1 - Dismantling and assembling selector mechanism in gearbox

Special tools, testers and auxiliary items

- ♦ Drift VW 295
- ♦ Adapter VW 295 A
- ♦ Press plate VW 401
- ♦ Tube VW 423
- ♦ Spacer sleeve VW 472/2
- ♦ Multi-purpose tool VW 771
- ♦ Internal puller Kukko 21/4



Note:

Installation position of the complete selector mechanism in gearbox => Fig. 6

1 Locking unit for 5th gear and reverse gear

- ♦ Removing and installing
=> Page 99

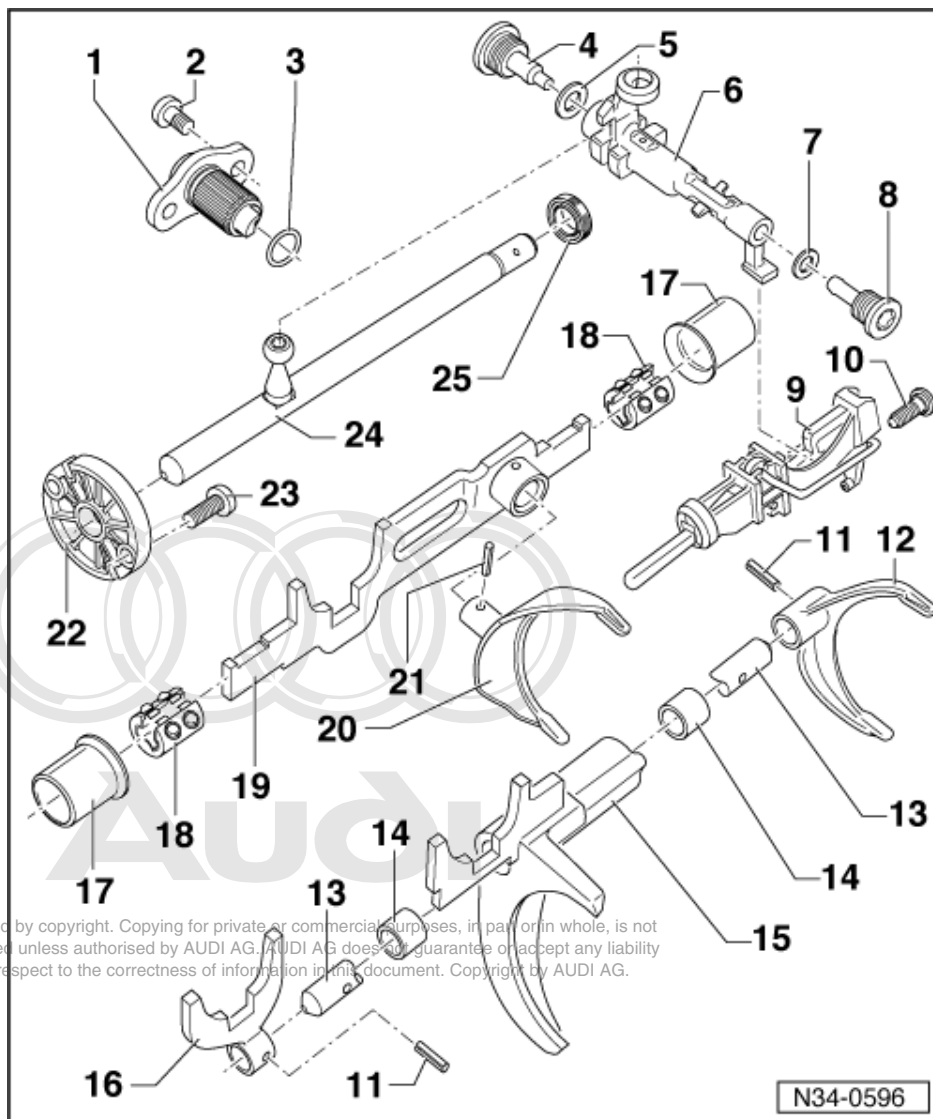
2 Torx bolt - 10 Nm

3 O-ring

- ♦ Renew

**4 Right stop bolt,
40 Nm**

5 Oil seal



6 Relay shaft

7 Oil seal

**8 Left stop bolt,
40 Nm**

9 Detent segment

10 Torx bolt - 25 Nm

11 Spring pin

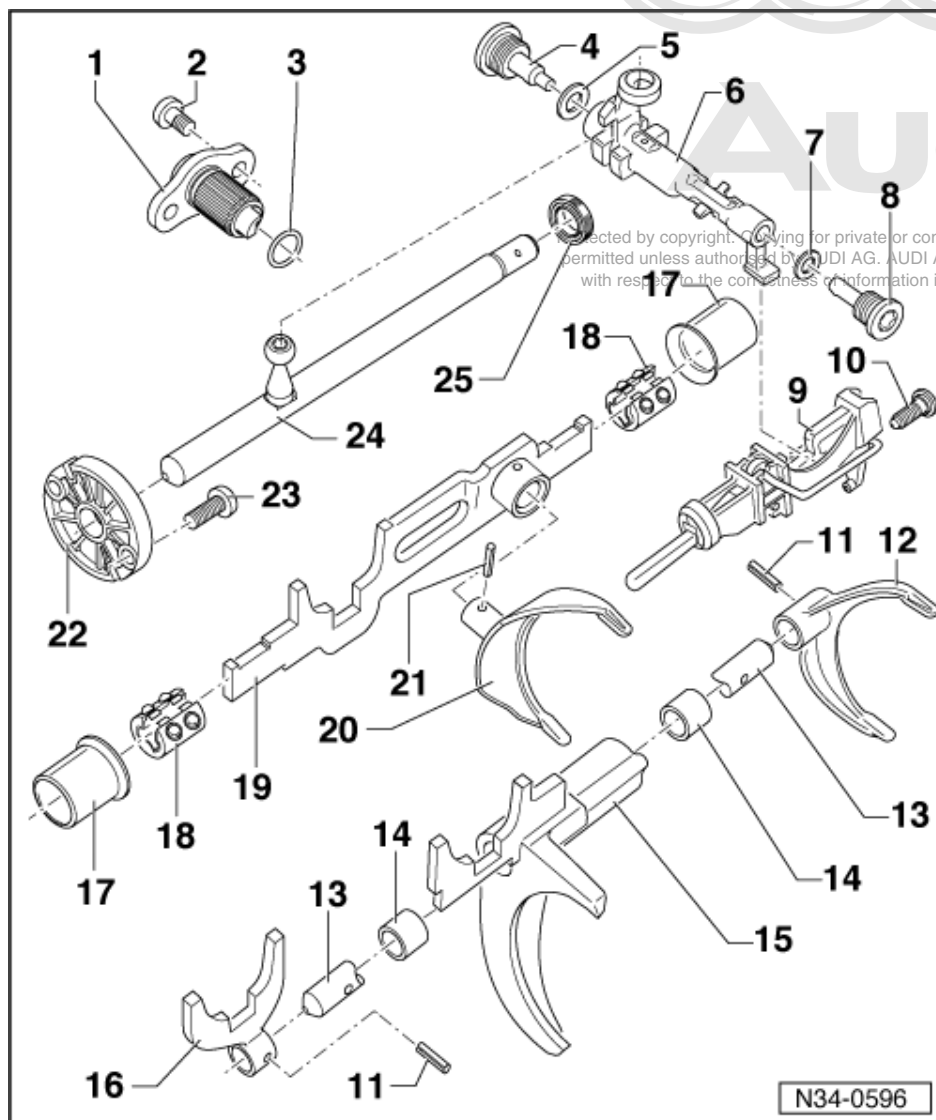
12 5th and reverse gear selector fork

Protected by copyright. Copying for private or commercial purposes, in part or in whole, is not permitted unless authorised by AUDI AG. AUDI AG does not guarantee or accept any liability with respect to the correctness of information in this document. Copyright by AUDI AG.



- ♦ Installation position => Fig. 1

13 Selector rods for 1st and 2nd gear as well as for 5th and reverse gear



14 Ball sleeve

- ♦ Removing and installing=>Fig. 2

15 Selector fork, 1st and 2nd gear

16 Coupling plate

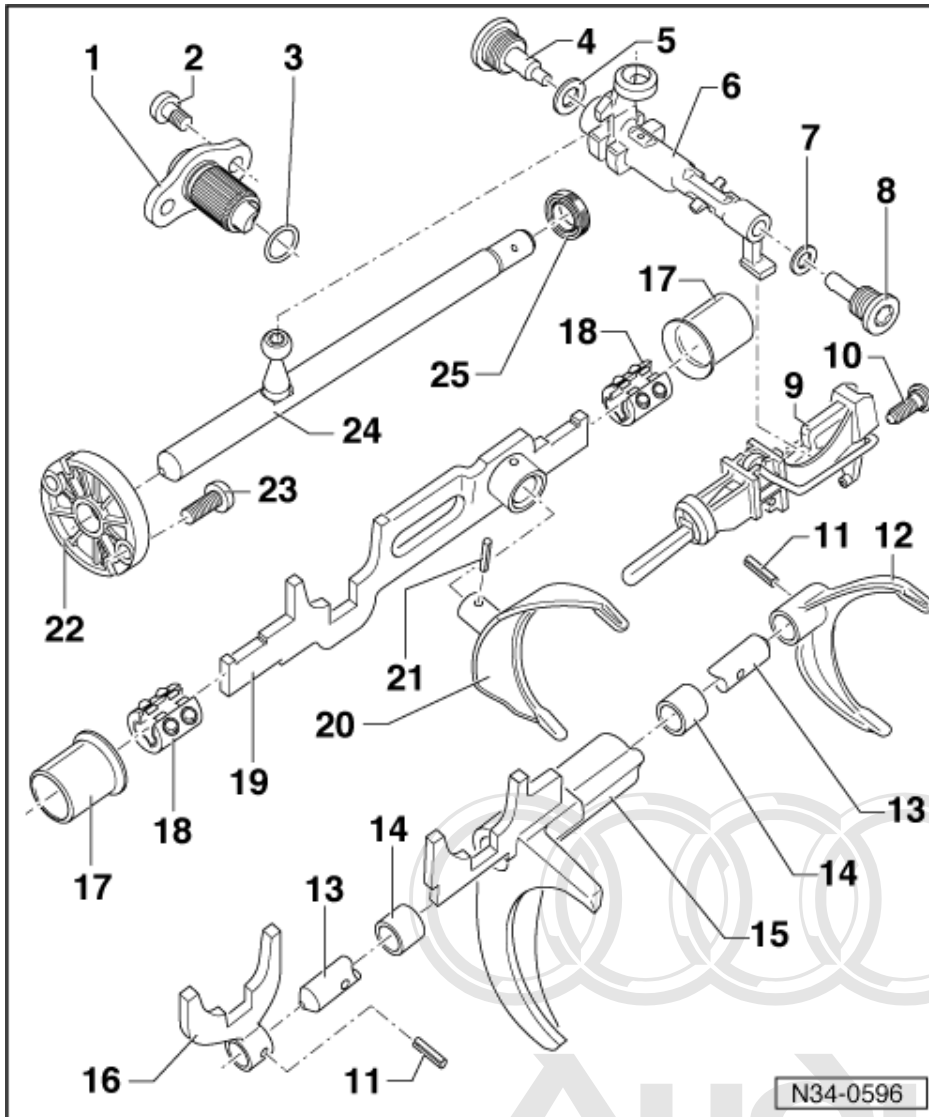
- ♦ Installation position => Fig. 1

17 Mounting bush for 3rd and 4th gears

- ♦ Removing => Fig. 3
- ♦ Installing => Fig. 4

18 Ball sleeve

- ♦ Lever off the selector rod with a screwdriver
- ♦ Press onto the selector rod



19 Selector rod for 3rd and 4th gear

20 3rd and 4th gear selector fork

21 Spring pin

22 Cover

- ♦ For selector shaft

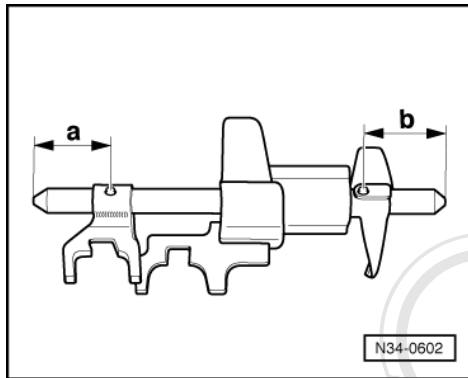
23 Torx bolt - 20 Nm

24 Selector shaft

25 Oil seal

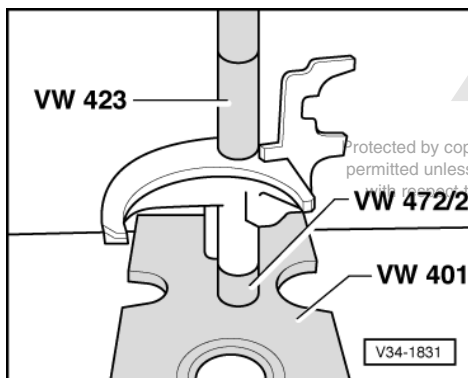
- ♦ Lever out with screwdriver
- ♦ Installation position => Fig. 5

Protected by copyright. Copying for private or commercial purposes, in part or in whole, is not permitted unless authorised by AUDI AG. AUDI AG does not guarantee or accept any liability with respect to the correctness of information in this document. Copyright by AUDI AG.

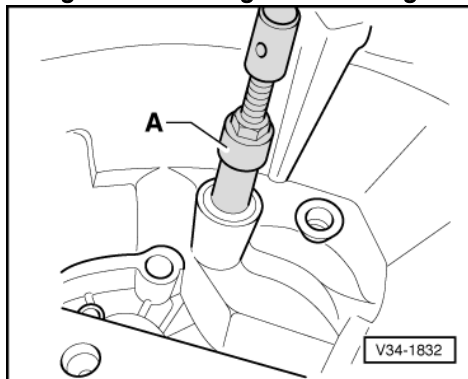


-> Fig.1 Installation position of 5th and reverse gear selector fork and coupling plate for selector rod.

- Distance a = 55 mm
- Distance b = 60 mm

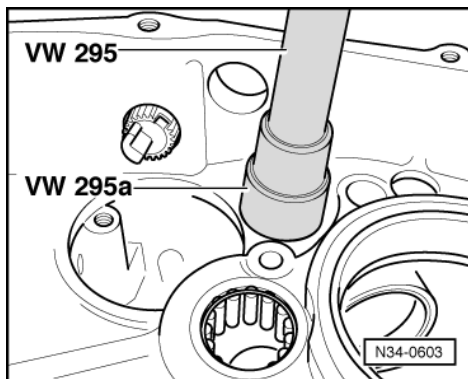


-> Fig.2 Removing and installing ball sleeve

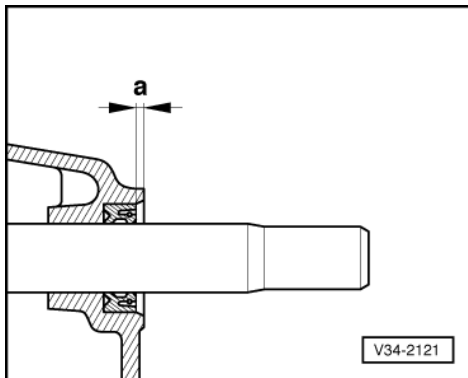


-> Fig.3 Pulling out mounting bush for 3rd and 4th gear selector rod

- A - Internal puller 22 ... 28 mm, e.g. Kukko 21/4, in conjunction with multi-purpose tool VW 771



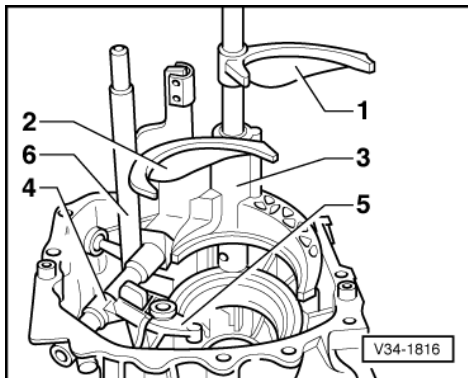
-> Fig.4 Driving in 3rd and 4th gear selector rod mounting bush onto stop



-> Fig.5 Oil seal installation position

Protected by copyright. Copying for private or commercial purposes, in part or in whole, is not permitted unless authorised by AUDI AG. AUDI AG does not guarantee or accept any liability with respect to the correctness of information in this document. Copyright by AUDI AG.

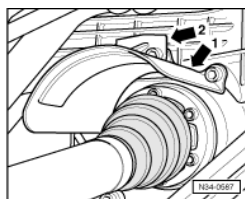
- Fill space between sealing and dust lips with multi-purpose grease.
- Lightly oil outer circumference of seal.
 - Distance a = 1 mm



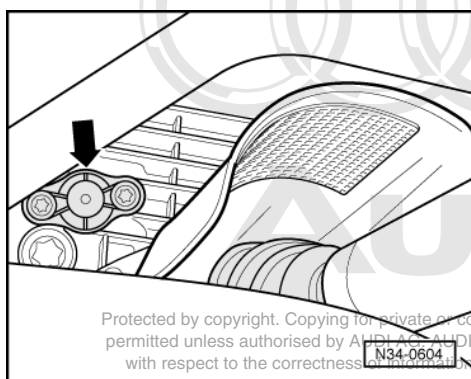
-> Fig.6 Installation position of complete selector mechanism in gearbox:

- 1 - Selector fork for 5th gear and reverse gear
- 2 - Selector fork for 3rd gear and 4th gear
- 3 - Selector fork for 1st gear and 2nd gear
- 4 - Relay shaft
- 5 - Detent mechanism
- 6 - Selector shaft

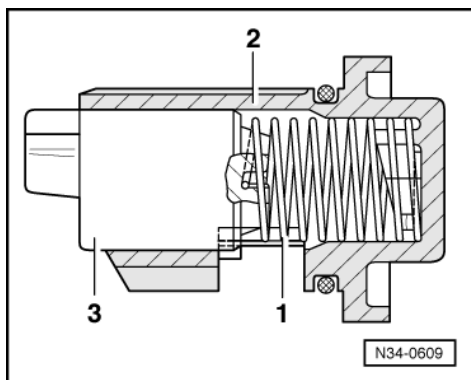
Removing and installing locking unit for 5th gear and reverse gear



- -> Remove heat shield -arrow -2- above right-hand drive shaft.
- Detach heat shield -arrow -1- above right-hand drive shaft and pivot downwards.

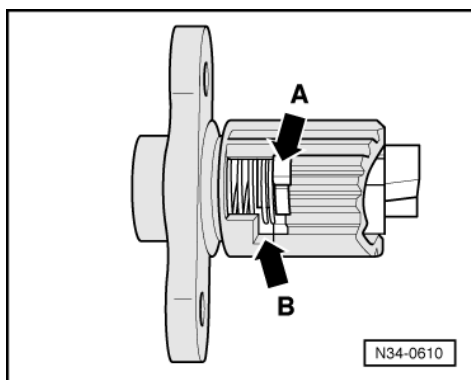


- -> Remove locking unit -arrow-.



Assembling locking unit:

- -> Insert spring -1- into housing -2- and, while exerting light pressure, turn spring to the left until it locates in the base of the housing.
- Insert bush -3- onto the spring so that the bent end of the spring locates in the groove.
- Push bush against spring and turn approx. one turn to left, until the lug on the bush aligns with the groove in the housing.
- Press lug on bush onto stop in the groove in the housing.
- Turn bush to right and release.
 - The bush will jump into the correct position



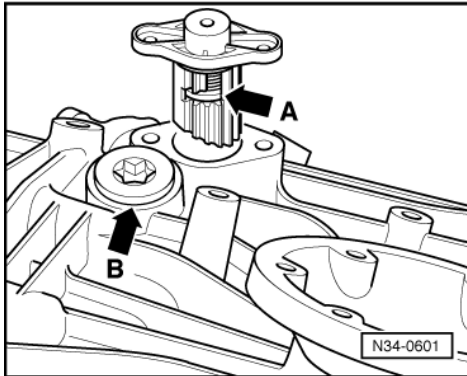
-> Installation position of bush:

- The lug (arrow -A-) on the bush must always be opposite the groove in the housing (arrow -B-).

Checking installation position:

- Turn bush to left and release.

- The bush should spring back into position; the lug must be against the stop (direction indicated by arrow -A-).



-> Installation position of complete locking unit in gearbox:

The recess (arrow -A-) faces bolt (arrow -B-)



Audi

Protected by copyright. Copying for private or commercial purposes, in part or in whole, is not permitted unless authorised by AUDI AG. AUDI AG does not guarantee or accept any liability with respect to the correctness of information in this document. Copyright by AUDI AG.



35 - Gears, Shafts

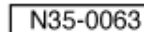
1 - Dismantling and assembling input shaft

1.1 - Dismantling and assembling input shaft

Special tools, testers and auxiliary items

- ◆ Drift VW 295
- ◆ Adapter VW 295 A
- ◆ Thrust plates VW 401 and VW 402
- ◆ Press tool VW 407
- ◆ Press tool VW 408 A
- ◆ Tube VW 415 A
- ◆ Tube VW 416 B
- ◆ Thrust plate VW 447 i
- ◆ Multi-purpose tool VW 771
- ◆ Drift sleeve 30-100
- ◆ Thrust plate 40-105
- ◆ Press tool 40-202
- ◆ Separating tool Kukko 17/2
- ◆ Internal puller Kukko 21/4

Protected by copyright. Copying for private or commercial purposes, in part or in whole, is not permitted unless authorised by AUDI AG. AUDI AG does not guarantee or accept any liability with respect to the correctness of information in this document. Copyright by AUDI AG.



ears, consult technical data

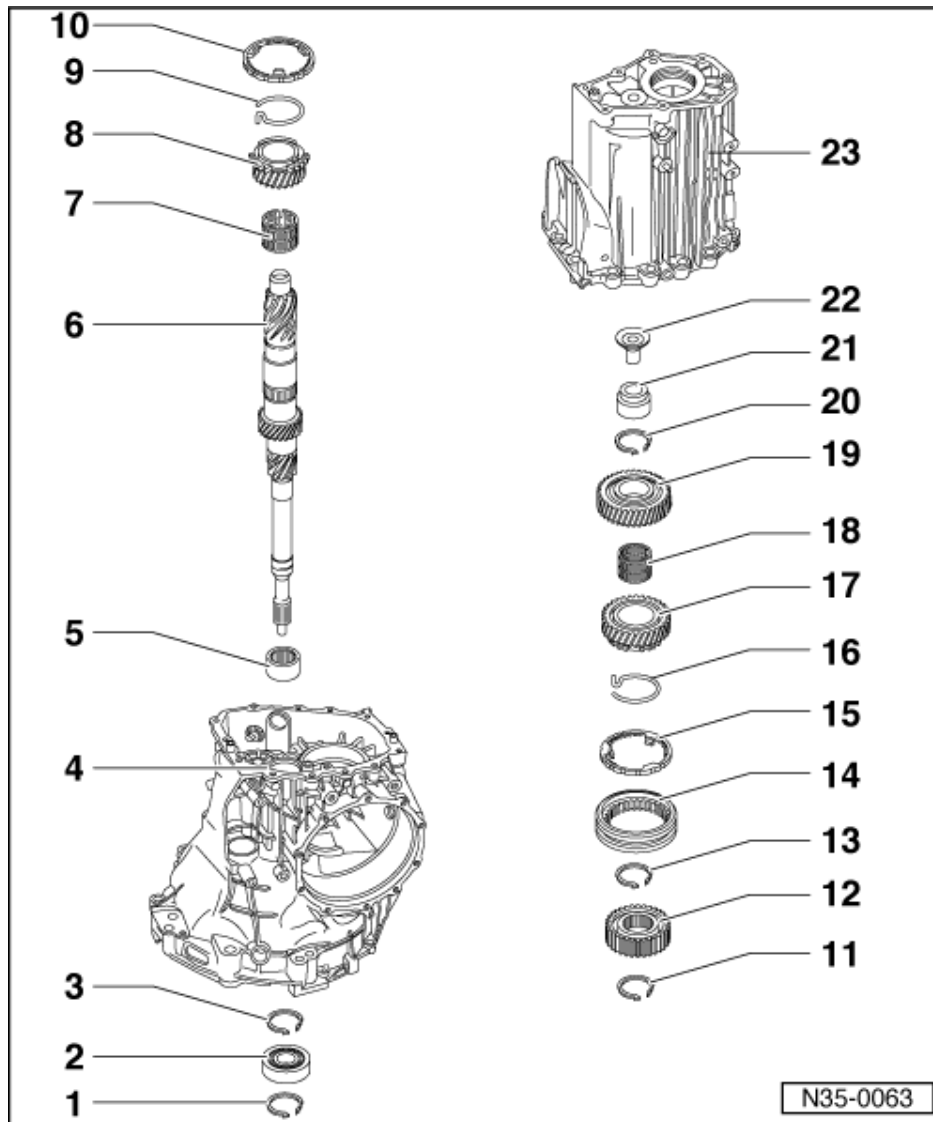
ected if Items **116**

1

input shaft, Page **116**

- ♦ Removing and installing
=> Page 78

haft, Page 116



3 Circlip

- ◆ Identification
- ◆ Installation position => Fig. 14 item 2
- ◆ Determining thickness => adjusting input shaft, Page 116

4 Gearbox housing

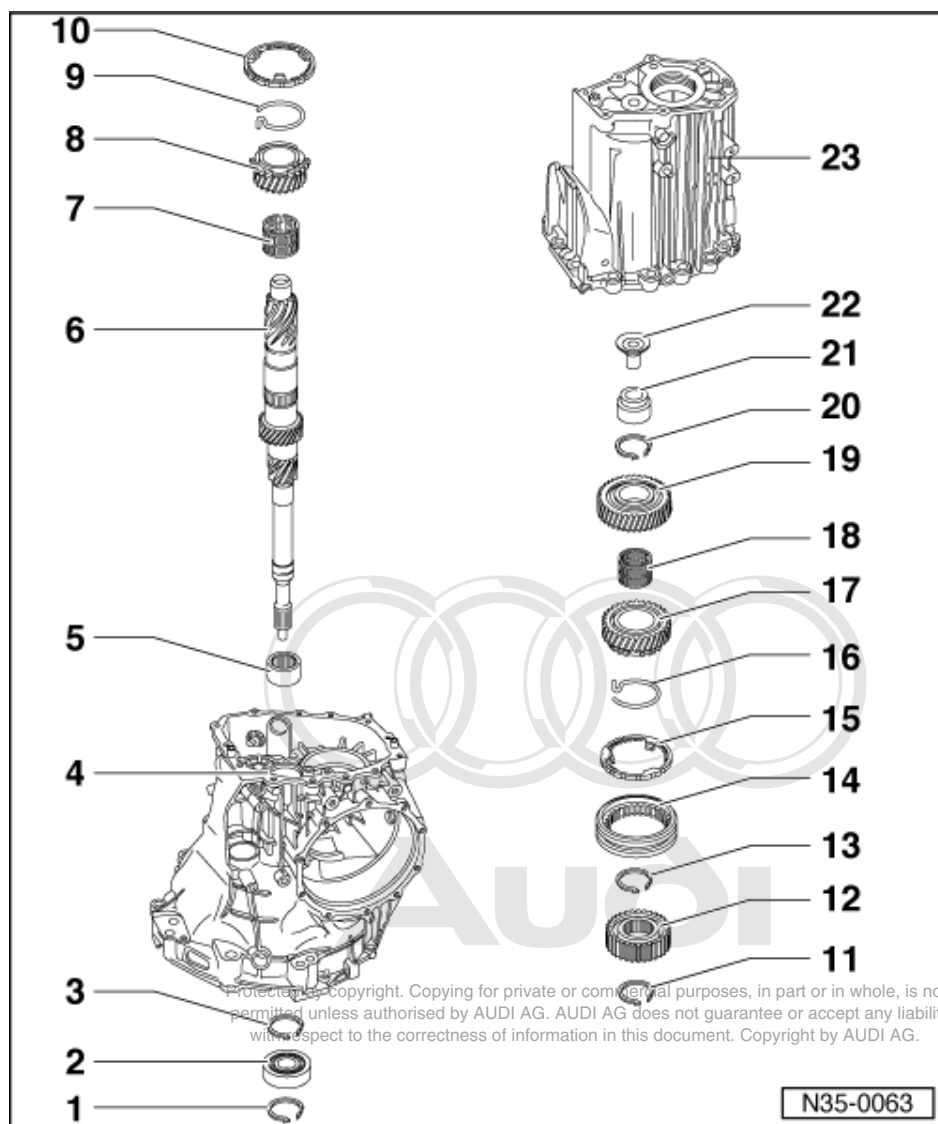
5 Needle roller bearing

- ◆ Secured with bolt
=> Fig. 1
- ◆ Removing => Fig. 2
- ◆ Selecting correct needle bearing for input shaft
=> Fig. 3
- ◆ Installation position => Fig. 4
- ◆ Pressing in => Fig. 5

6 Input shaft

- ◆ With oil feed sleeve
- ◆ Knocking in oil feed sleeve
=> Fig. 6
- ◆ Selecting correct needle bearing for input shaft
=> Fig. 3
- ◆ Adjusting => Page 116

Protected by copyright. Copying for private or commercial purposes, in part or in whole, is not permitted unless authorised by AUDI AG. AUDI AG does not guarantee or accept any liability with respect to the correctness of information in this document. Copyright by AUDI AG.



7 Needle bearing for 3rd gear

8 3rd speed sliding gear

9 Spring

- ♦ Insert in 3rd speed sliding gear
=> Fig. 12
- ♦ Allocation of spring to sliding gear

=> Parts catalogue

10 Synchro-ring for 3rd gear

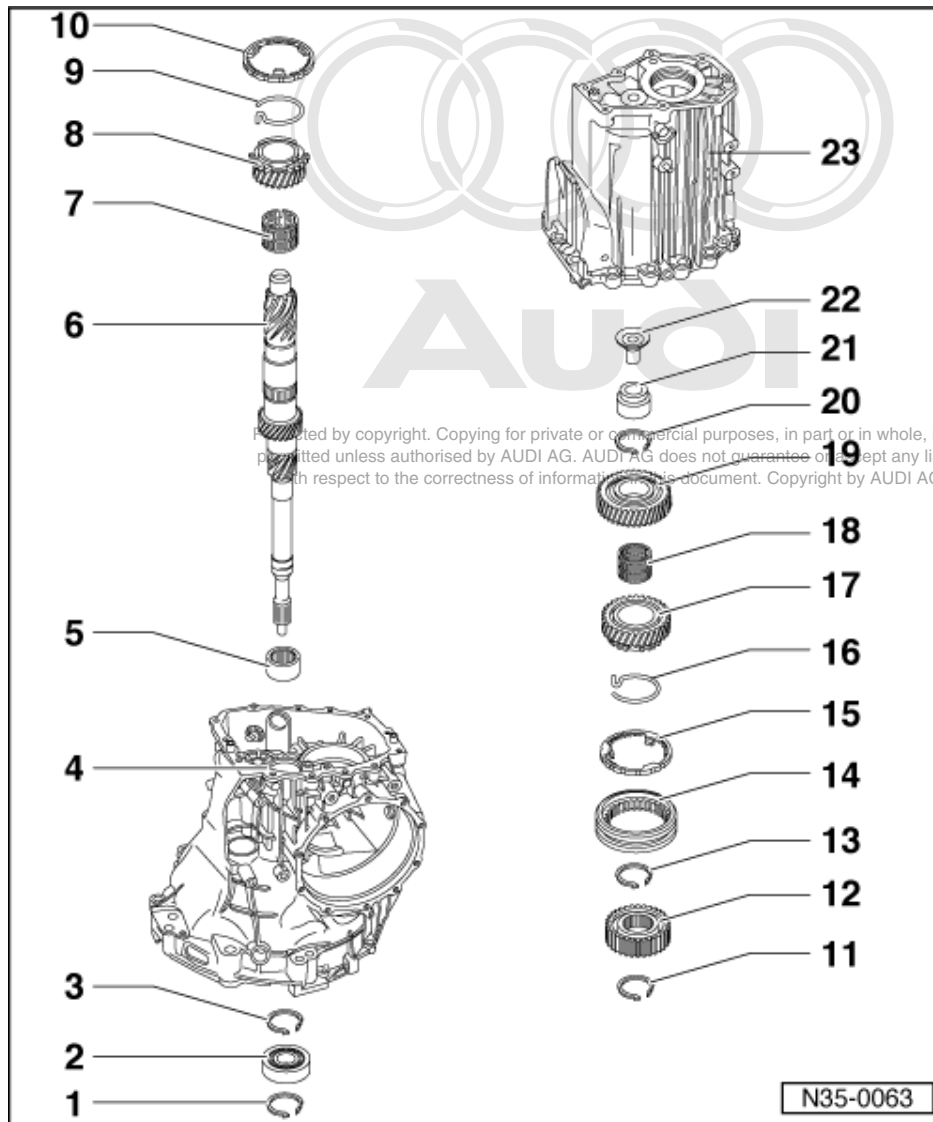
- ♦ Checking for wear
=> Fig. 13

11 Circlip

- ♦ Identification
- ♦ Installation position => Fig. 14 item 3

12 Synchro-hub for 3rd and 4th gear

- ♦ Shoulder faces to 3rd gear
- ♦ Pressing off => Fig. 11
- ♦ Pressing on => Fig. 16



13 Circlip

- ◆ Identification
- ◆ Installation position => Fig. 14 item 4
- ◆ If the synchro hub is replaced redetermine thickness
=>Fig. 15

14 3rd and 4th gear locking collar

- ◆ Installation position => Fig. 17

15 Synchro-ring for 4th gear

- ◆ Checking for wear
=> Fig. 13

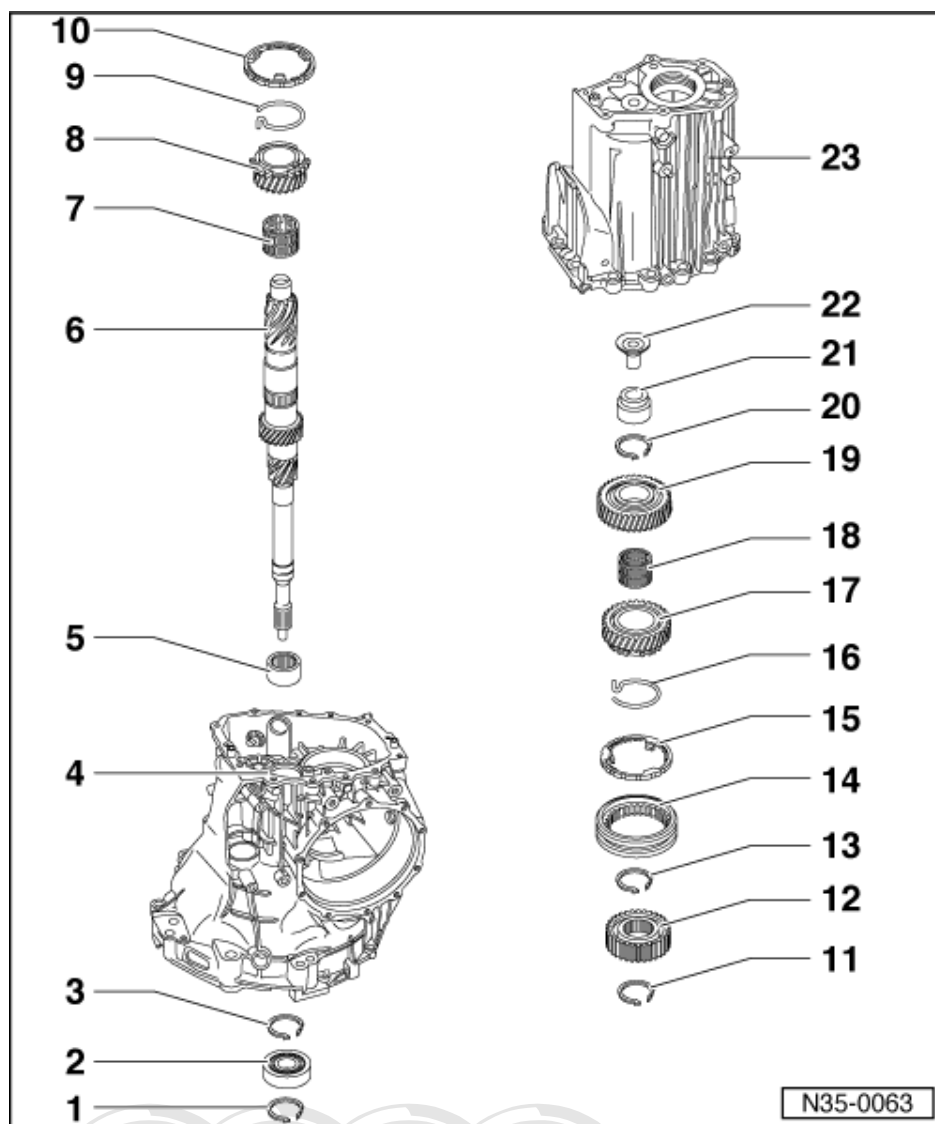
16 Spring

- ◆ Insert in 4th speed sliding gear
=> Fig. 12
- ◆ Allocation of spring to sliding gear

=> Parts catalogue

17 4th speed sliding gear

18 Needle bearing for 4th gear



19 5th gear wheel

- ◆ Pressing off => Fig. 10
- ◆ Pressing on => Fig. 18

20 Circlip

- ◆ Identification
- ◆ Installation position => Fig. 14, item 5
- ◆ If the 5th gear wheel is replaced redetermine thickness => Fig. 15

21 Roller sleeve

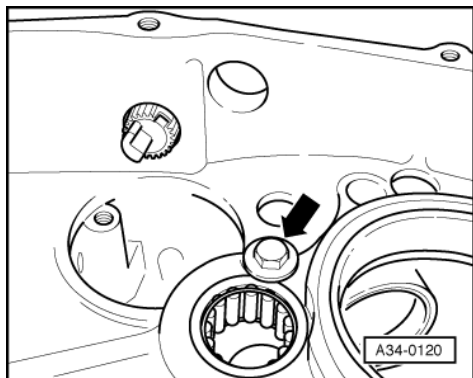
- ◆ Will be damaged when removing
- ◆ Pulling out => Fig. 7
- ◆ Installation position => Fig. 8

Protected by copyright. Copying for private or commercial purposes, in part or in whole, is not permitted without the written permission of Audi AG. Audi AG does not guarantee or accept any liability with respect to the correctness of information in this document. Copyright by Audi AG.

22 Sleeve

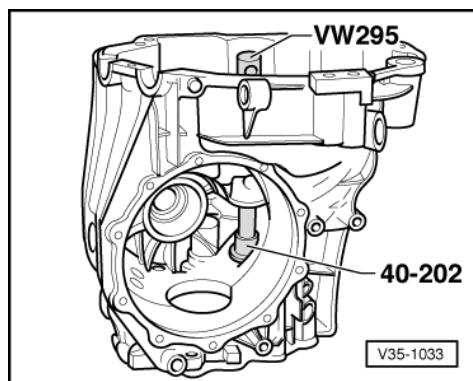
- ◆ Made of plastic

23 Gearbox cover

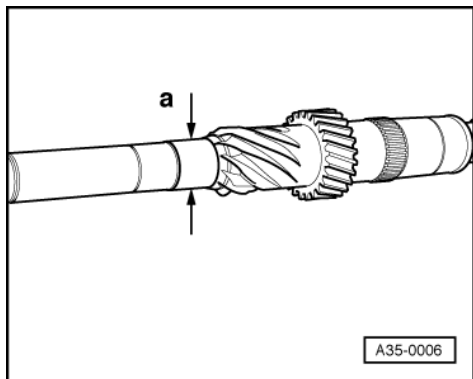


-> Fig.1 Securing bolt for needle bearing

- Unscrew securing bolt -arrow-.



-> Fig.2 Driving-out needle bearing.



-> Fig.3 Selecting correct needle bearing for input shaft

Input shaft dia.	Part No. needle bearing
a = 27 mm	012 311 123 D
a = 29 mm	012 311 123

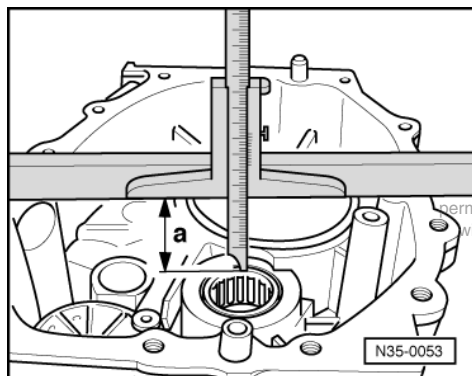
Note:

To avoid damage resulting from incorrect installation, check the following after replacing the input shaft:



Protected by copyright. Copying for private or commercial purposes, in part or in whole, is not permitted unless authorised by AUDI AG. AUDI AG does not guarantee or accept any liability with respect to the correctness of information in this document. Copyright by AUDI AG.

- ♦ It must be possible to guide input shaft into place.
- ♦ The input shaft must fit closely with no free play.

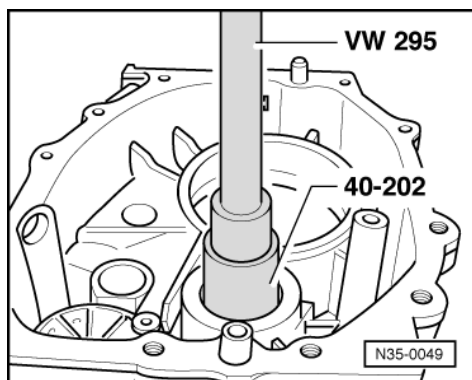


-> Fig.4 Installation position of needle bearing

Distance -a- from lower edge of straight edge to upper edge of needle bearing = 39.5 mm

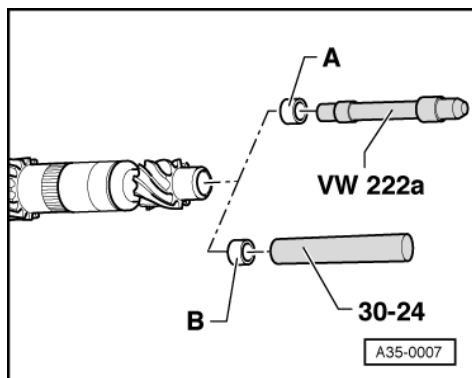
Note:

Measure distance from top edge of straight-edge and subtract the width of the straight-edge from the measured distance.



-> Fig.5 Pressing in needle bearing

- Install securing bolt and tighten to 25 Nm.



➔ Fig.6 Knocking oil feed sleeve into input shaft

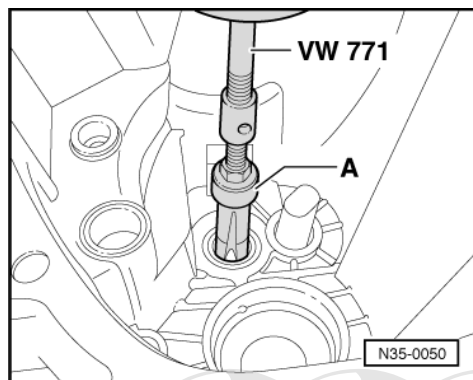
Item	Oil feed sleeve dia.	Fitting tool
A	14 mm	VW 222 A
B	16 mm	30-24

- ♦ Installation position:

Flanged edge on oil feed sleeve faces towards fitting tool.

- ♦ Installation depth:

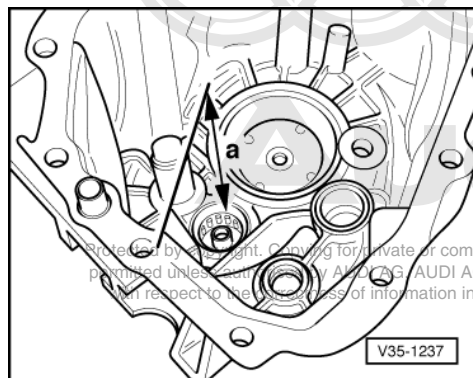
3.5 mm below end of shaft



➔ Fig.7 Pulling out roller sleeve

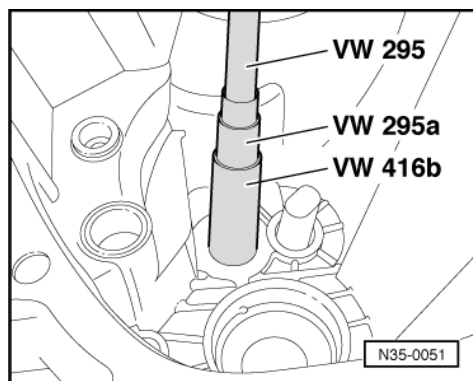
A - Internal puller 22 ... 28 mm, e.g. Kukko 21/4

- Before fitting internal extractor the plastic sleeve inside the roller sleeve must be destroyed.

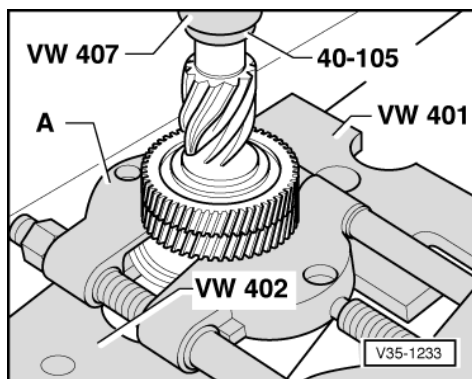


➔ Fig.8 Installation position of roller sleeve

- ♦ Distance a = 216 mm



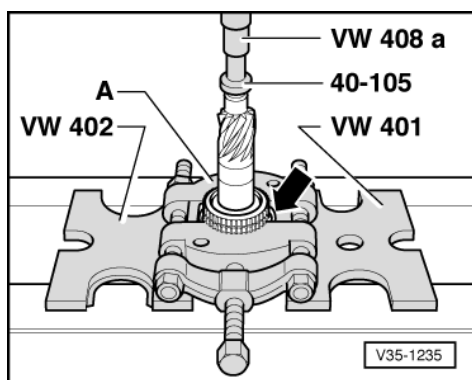
-> Fig.9 Driving in roller sleeve



-> Fig.10 Pressing off 5th gear wheel

- Remove circlip before pressing off.

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



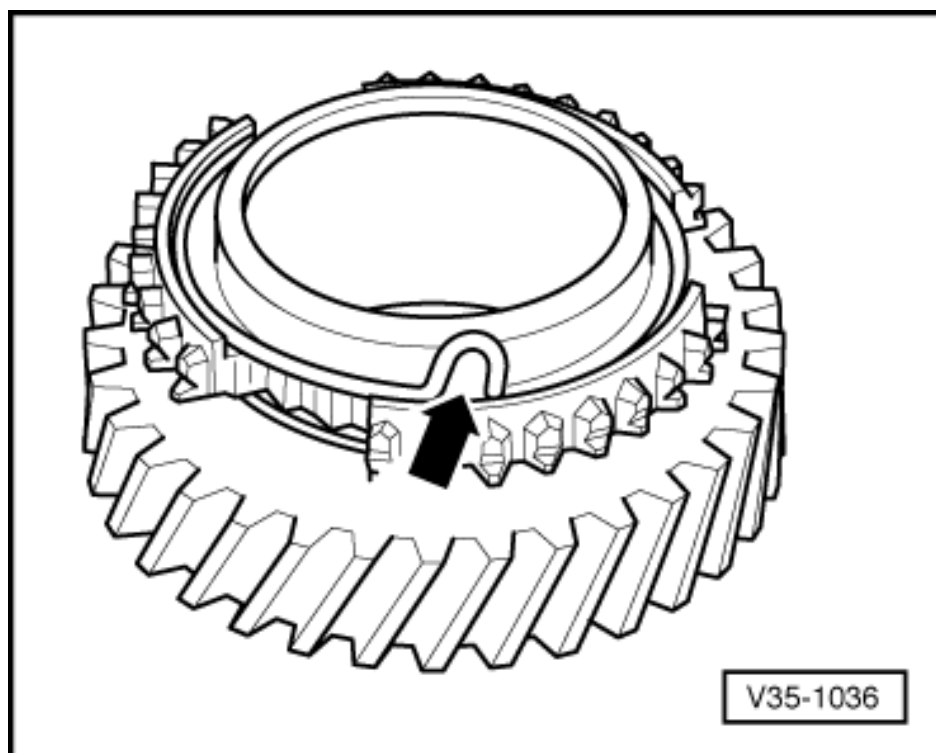
-> Fig.11 Pressing off synchro-hub for 3rd and 4th gear

- Remove circlip before pressing off.
- Press 3rd gear synchro ring (arrow) towards 3rd gear wheel, then fit separating device -A-.

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

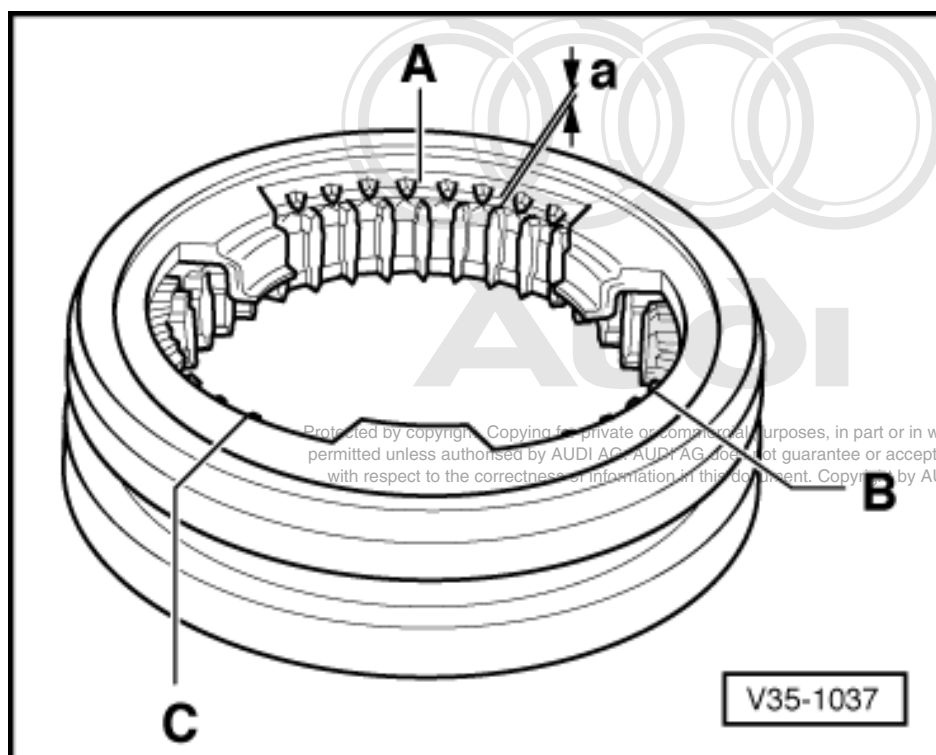


Protected by copyright. Copying for private or commercial purposes, in part or in whole, is not permitted unless authorised by AUDI AG. AUDI AG does not guarantee or accept any liability with respect to the correctness of information in this document. Copyright by AUDI AG.



-> Fig.12 Inserting spring into sliding gear

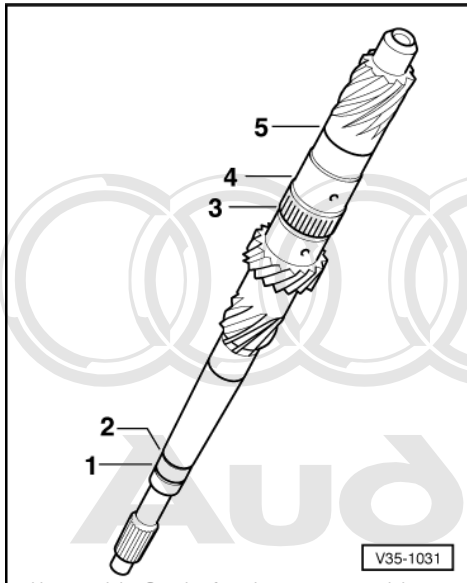
The bent end of the spring (arrow) must be hooked into the hole in the gear wheel.



➔ Fig.13 Checking synchro-ring for wear

- Press synchro-ring into locking collar and measure gap -a- with a feeler gauge at positions -A-, -B- and -C-.
- Calculate average gap.

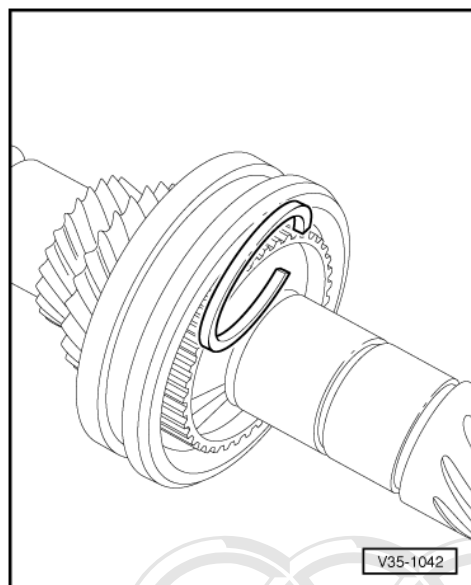
The average gap must not be less than 0.5 mm.



Protected by copyright. Copying for private or commercial purposes, in part or in whole, is not permitted unless authorised by AUDI AG. AUDI AG does not guarantee or accept any liability with respect to the correctness of information in this document. Copyright by AUDI AG.

➔ Fig.14 Position of circlips

- ◆ The circlips -1- and -2- secure the input shaft ball bearing.
Determine thickness => adjusting input shaft, Page 116 .
- ◆ The circlip -3- secures the 3rd and 4th gear synchro hub.
Thickness: 2.00 mm. Identification: brown colour
- ◆ The circlip -4- secures the 3rd and 4th gear synchro hub.
Determine thickness => table on Page 114 .
Identification: blue colour
- ◆ The circlip -5- secures the 5th gear wheel.
Determine thickness => table on Page 114 .



-> Fig.15 Determining thickness of circlip

- Determine the thickest circlip which will just fit and install it.
- Determine circlip as accurately as possible from table. Part No.

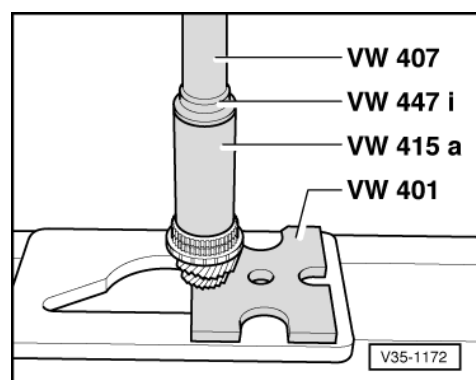
=> Parts catalogue

The following circlips are available for synchro-hub for 3rd and 4th gear

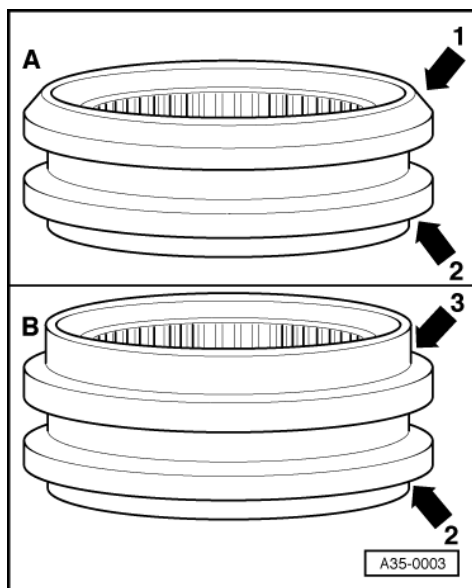
Circlip thickness (mm)		
1.90	1.96	2.02
1.93	1.99	2.05

The following circlips are available for 5th gear wheel

Circlip thickness (mm)		
1.90	1.96	2.02
1.93	1.99	



-> Fig.16 Pressing on synchro-hub for 3rd and 4th gear

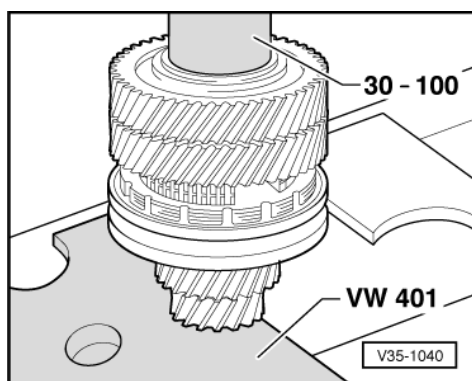


-> Fig.17 Installation position of locking collar

Different types of locking collar are installed: with chamfered surface -A- or with large shoulder -B-.

♦ Installation position:

Chamfered surface -arrow 1- faces towards 4th gear.
Small shoulder -arrow 2- faces towards 3rd gear.
Large shoulder -arrow 3- faces towards 4th gear.



-> Fig.18 Pressing on 5th gear wheel

Caution
Wear protective gloves.

- Heat 5th gear wheel to approx. 100 °C before pressing on.

♦ Installation position:

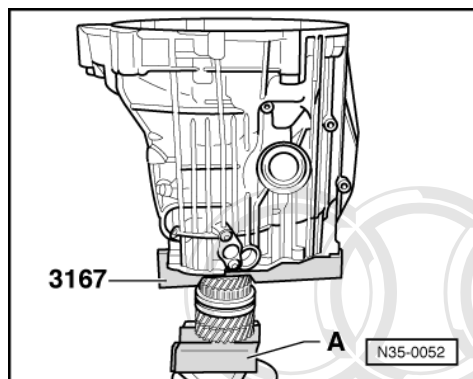
High collar faces towards reverse gear.

2 - Adjusting input shaft

2.1 - Adjusting input shaft

Note:

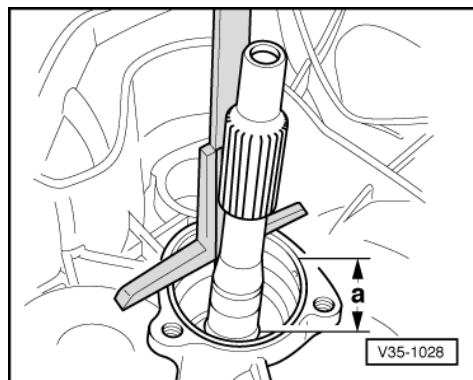
The input shaft must be readjusted if the gearbox housing, the input shaft or the ball bearing are renewed.



Special tools, testers and auxiliary items

- ♦ Drift sleeve 30-100
- ♦ Distance gauge 3167
- ♦ Depth gauge

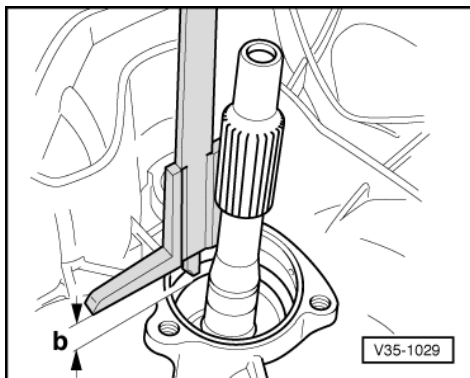
- -> Clamp input shaft in vice using vice clamps A.
- Place distance gauge 3167 onto 3rd gear wheel.



- Place gearbox housing over input shaft onto the distance gauge.

Calculating dimension "x"

- -> Place depth gauge onto gearbox housing and measure to the lower circlip groove in the input shaft.
- Measurement in the following example: -a- = 28.50 mm



- -> Place depth gauge onto gearbox housing and measure to seating surface for ball bearing.
- Measurement in the following example: -b- = 26.80 mm

Determining circlip behind the input shaft ball bearing

Formula:
"x" = "a" - "b"

Example:	
Dimension "a"	28.50 mm
- Dimension "b"	26.80 mm
= Dimension "x"	1.70 mm
(thickness of circlip)	

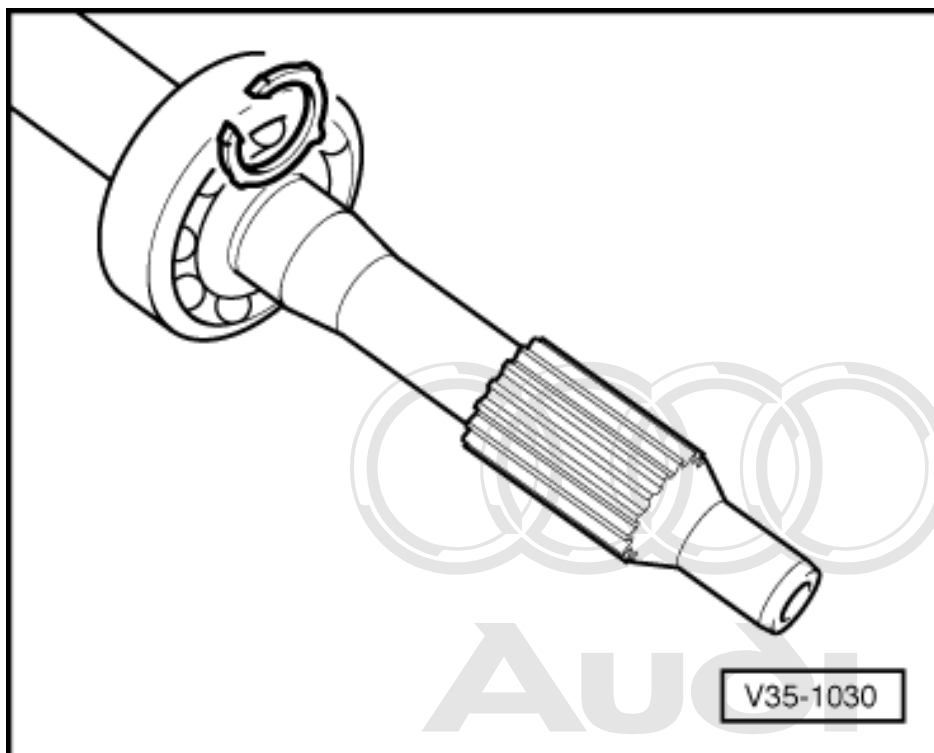
- Determine circlip from table. Part No.
- => Parts catalogue

Circlips available

Dimension "x"	Thickness (mm)
1.48 ... 1.56	1.54
1.57 ... 1.65	1.63
1.66 ... 1.74	1.72
1.75 ... 1.83	1.81
1.84 ... 1.92	1.90
1.93 ... 2.01	1.99
2.02 ... 2.10	2.08
2.11 ... 2.20	2.17

Determining the circlip in front of input shaft ball bearing

- Knock rear circlip (as calculated) and ball bearing onto input shaft with fitting sleeve 30-100.



- -> Determine the thickest circlip which will still fit.
- Determine circlip as accurately as possible from table. Part No.

=> Parts catalogue

Circlips available

Circlip thickness (mm)		
1.45	1.72	1.99
1.54	1.81	2.08
1.63	1.90	2.17

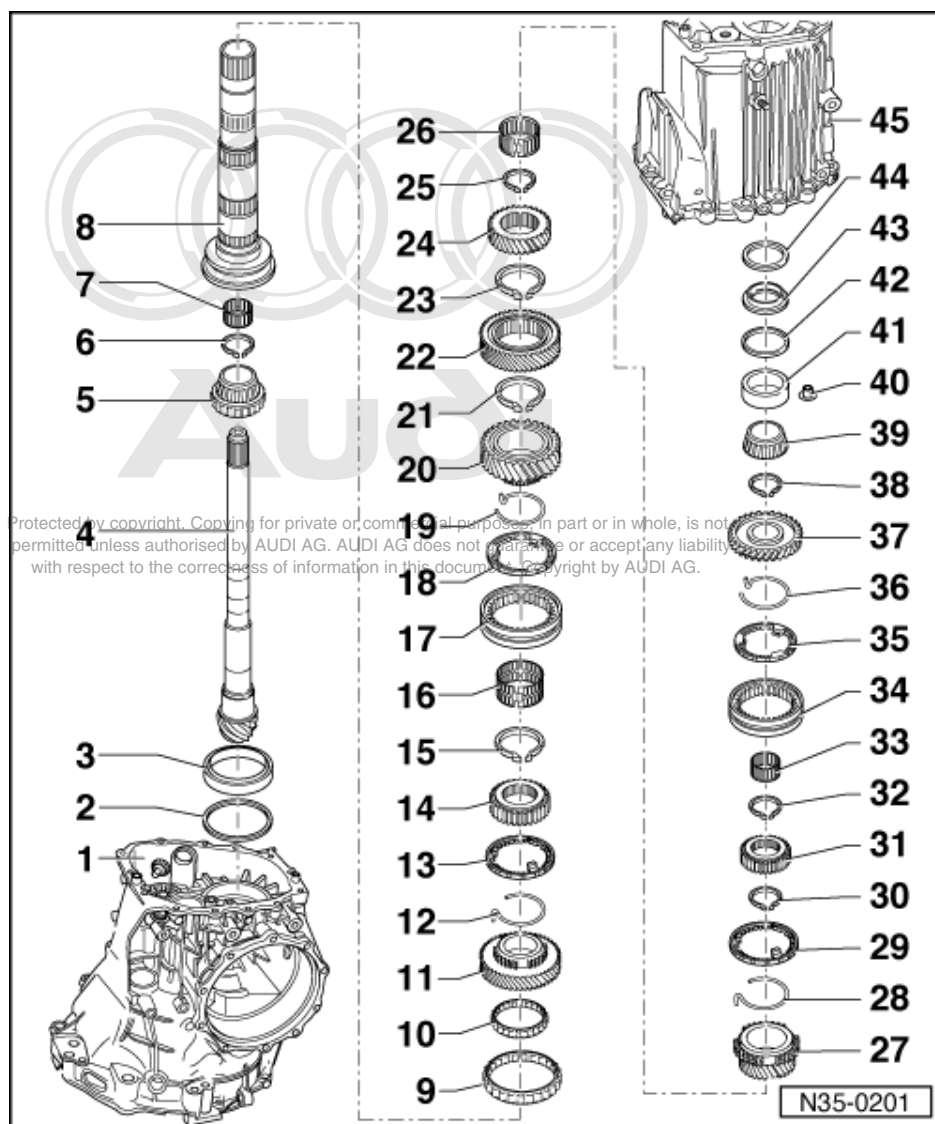
3 - Dismantling and assembling drive pinion and hollow shaft

3.1 - Dismantling and assembling drive pinion and hollow shaft

Special tools, testers and auxiliary items

- ◆ Press plate VW 401
- ◆ Press plate VW 402
- ◆ Press tool VW 407
- ◆ Press tool VW 411
- ◆ Press tool VW 412
- ◆ Tube VW 415 A
- ◆ Tube VW 416 B
- ◆ Tube VW 418 A
- ◆ Thrust ring VW 429
- ◆ Thrust plate VW 447 i
- ◆ Thrust pad VW 454
- ◆ Tube VW 519
- ◆ Multi-purpose tool VW 771
- ◆ Support 40-103
- ◆ Tube 2010

- ◆ Thrust pad 3062
- ◆ Fitting tool 3128
- ◆ Separating tool Kukko 17/2
- ◆ Internal puller Kukko 21/1



Notes:

- ◆ When installing new gear wheels or the final drive set, consult technical data => from Page 2 .
- ◆ Adjustments are required when renewing components marked 1) => Adjustment overview, Page 165 .

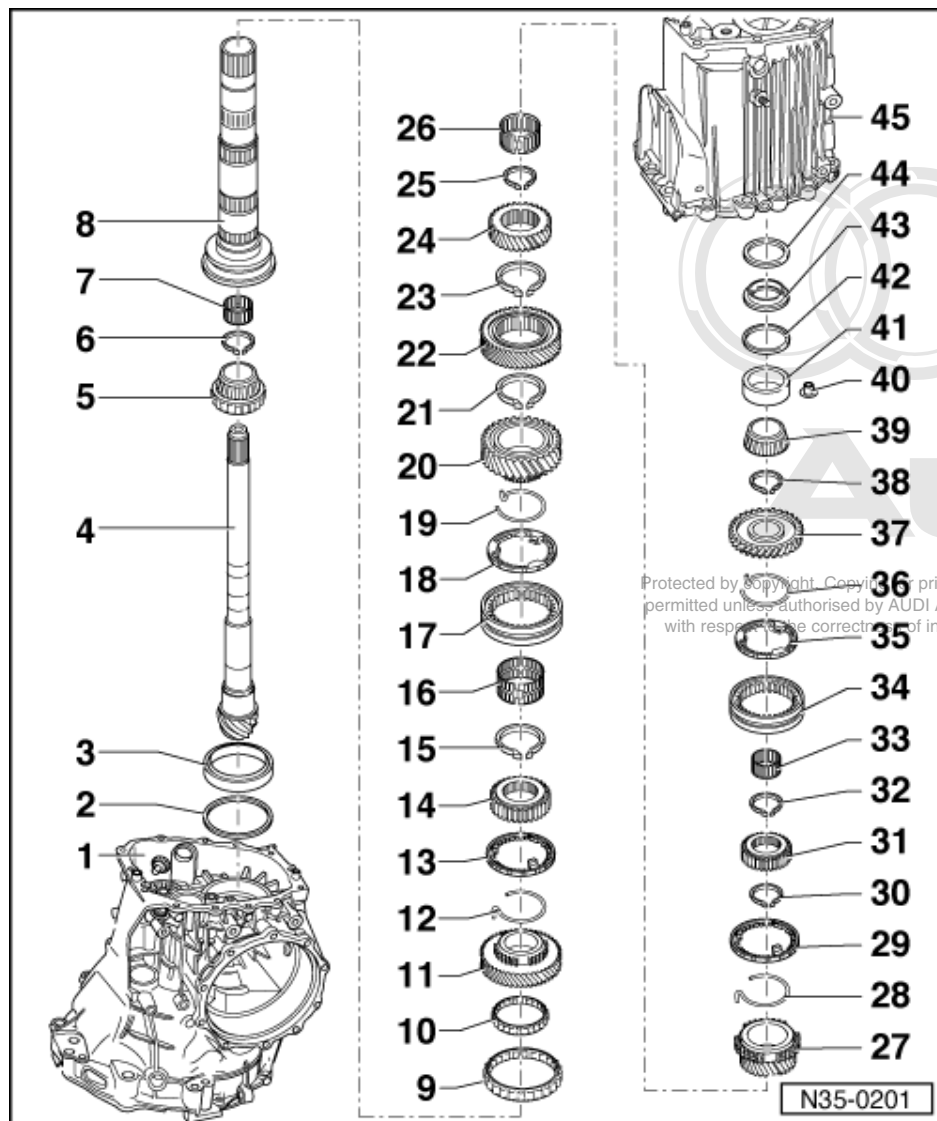
1 Gearbox housing 1)

2 Shim "S3"

- ◆ Adjustment overview
- => Page 165

3 Double taper roller bearing outer race 1)

- ◆ Renew together with -Item 5 -
- ◆ Pulling out => Fig. 1
- ◆ Pressing in => Fig. 3



4 Drive pinion 1)

- ♦ Is mated with crown wheel, always renew together as a set
- ♦ Adjusting drive pinion and crown wheel => Page 162

5 Double taper roller bearing inner race 1)

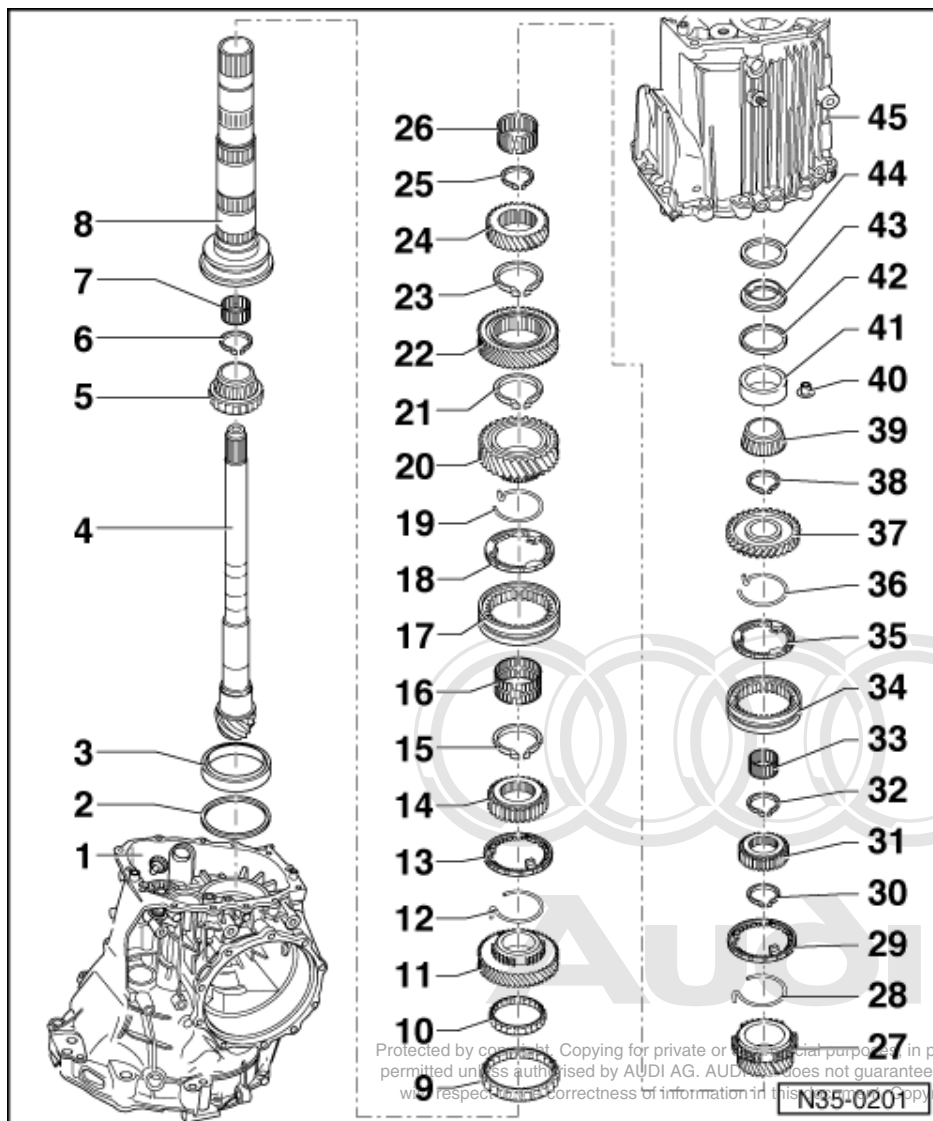
- ♦ Will be damaged when removing
- ♦ Pressing off => Fig. 2
- ♦ Pressing on => Fig. 4

6 Circlip

- ♦ Redetermine thickness if double taper roller bearing is replaced
=> Fig. 5

7 Needle roller bearing

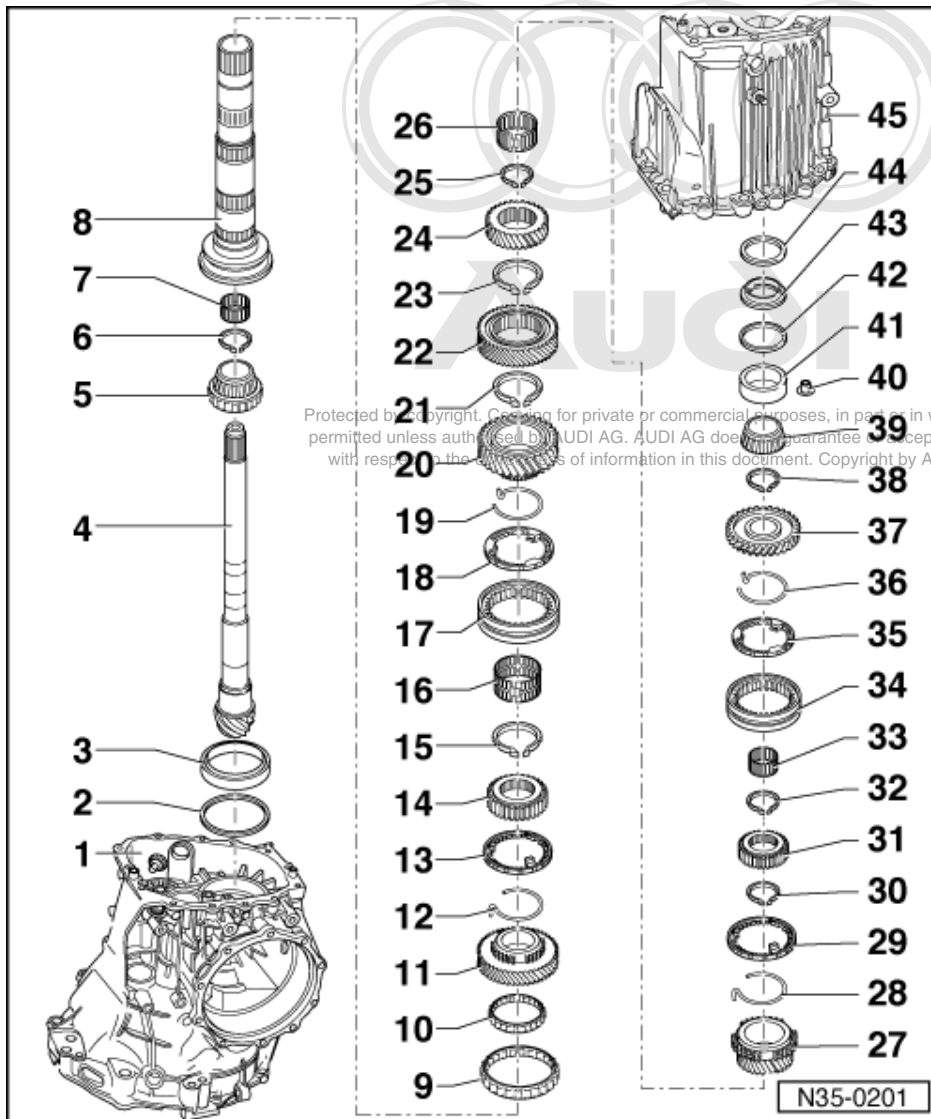
- ♦ For drive pinion in hollow shaft
- ♦ Lubricate with MoS2 grease



- 8 Hollow shaft 1)
- 9 Needle bearing for 1st gear
- 10 Needle bearing for 1st gear
- 11 1st speed sliding gear
- 12 Spring
 - ◆ Insert in 1st speed sliding gear
=> Fig. 16
 - ◆ Allocation of spring to gear

=> Parts catalogue

- 13 Synchro-ring for 1st gear
 - ◆ Checking for wear
=> Fig. 17
- 14 Synchro-hub for 1st and 2nd gear
 - ◆ Pressing off=> Fig. 14
 - ◆ Pressing on => Fig. 18



15 Circlip

- ◆ Identification
- ◆ Installation position => Fig. 15, item 1
- ◆ Redetermine thickness if synchro hub is replaced => Fig. 5

16 Needle bearing for 2nd gear

17 Locking collar for 1st and 2nd gear

- ◆ Installation position => Page 19

18 Synchro-ring for 2nd gear

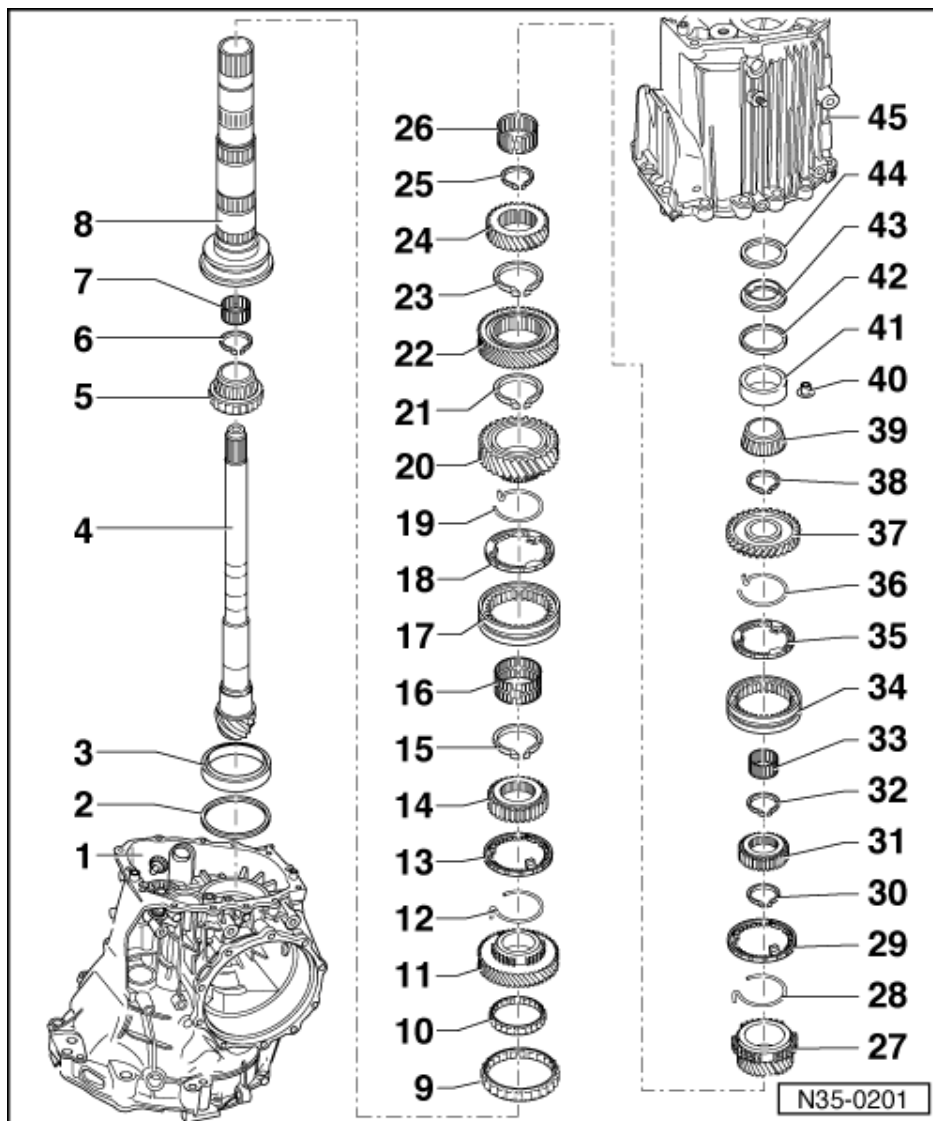
- ◆ Check for wear
=> Fig. 17

19 Spring

- ◆ Insert in 2nd speed sliding gear
=> Fig. 16
- ◆ Allocation of spring to gear

=> Parts catalogue

20 2nd speed sliding gear



21 Circlip

- ◆ Identification
- ◆ Installation position => Fig. 15, item 2

22 3rd gear wheel

- ◆ Pressing off => Fig. 13
- ◆ Pressing on => Fig. 20

23 Circlip

- ◆ Identification
- ◆ Installation position => Fig. 15, item 3
- ◆ Redetermine thickness if 3rd gear wheel is replaced
=>Fig. 5

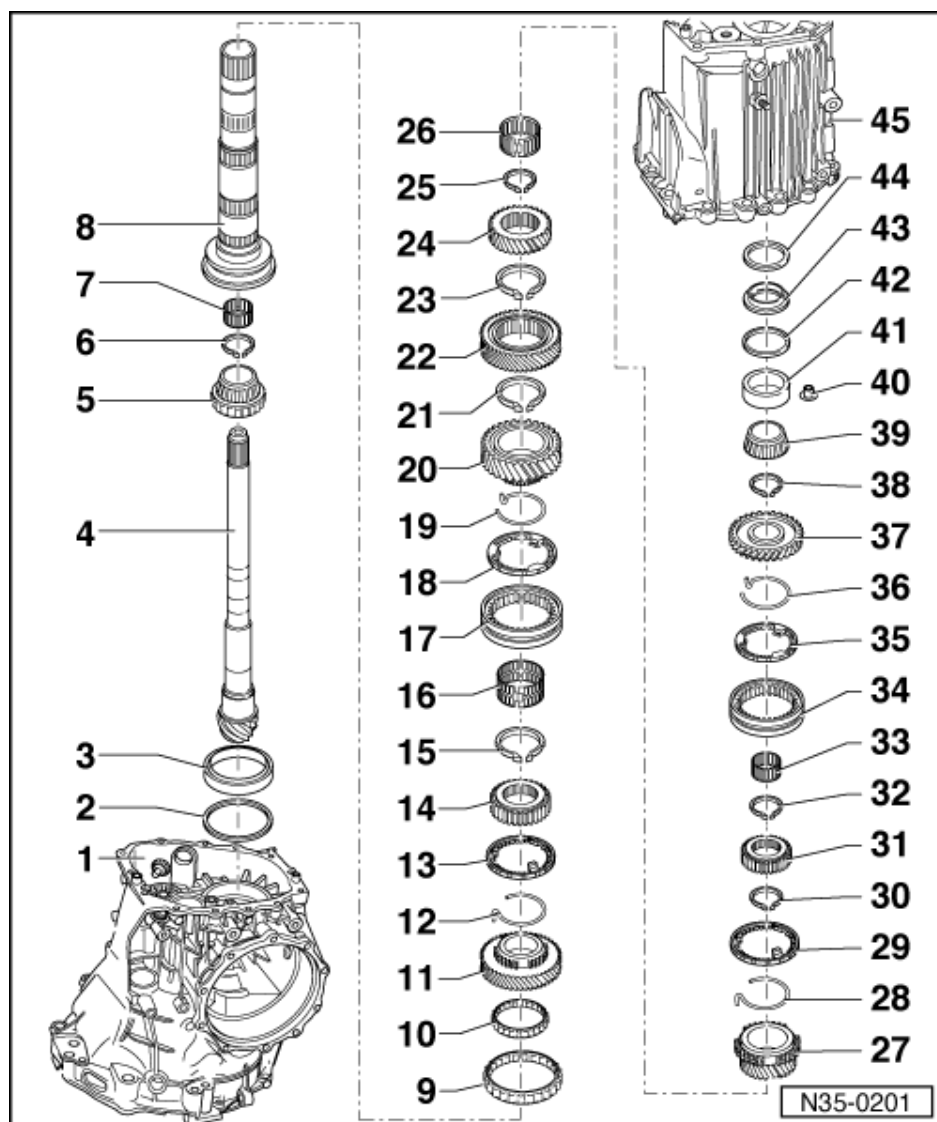
24 4th gear wheel

- ◆ Pressing off => Fig. 12
- ◆ Pressing on => Fig. 21

25 Circlip

- ◆ Identification
- ◆ Installation position => Fig. 15, item 4
- ◆ Redetermine thickness if 4th gear wheel is replaced
=>Fig. 5

This document is a technical drawing and is not intended for legal purposes, in part or in whole, is not permitted unless authorised by AUDI AG. AUDI AG does not guarantee or accept any liability with respect to the correctness of information in this document. Copyright by AUDI AG.



26 Needle roller bearing

27 5th speed sliding gear

28 Spring

- ♦ Insert in 5th speed sliding gear
=> Fig. 16
- ♦ Allocation of spring to gear

=> Parts catalogue

29 Synchro-ring for 5th gear

- ♦ Check for wear
=> Fig. 17

30 Circlip

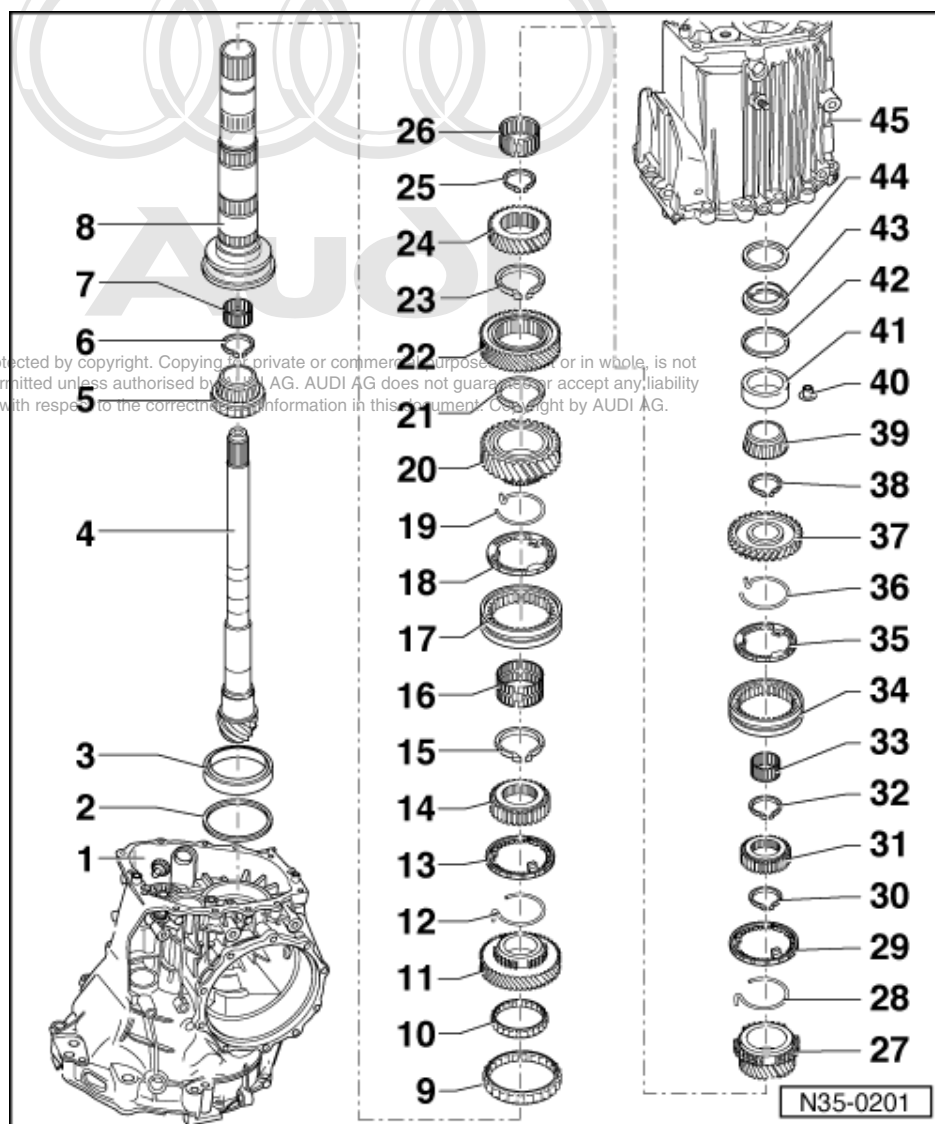
- ♦ Identification
- ♦ Installation position => Fig. 15, item 5

31 5th gear and reverse gear synchro-hub

- ♦ Pressing off => Fig. 11
- ♦ Pressing on => Fig. 22



Protected by copyright. Copying for private or commercial purposes, in part or in whole, is not permitted unless authorised by AUDI AG. AUDI AG does not guarantee or accept any liability with respect to the correctness of information in this document. Copyright by AUDI AG.

**32 Circlip**

- ◆ Identification
- ◆ Installation position => Fig. 15, item 6
- ◆ Redetermine thickness if synchro hub is replaced => Fig. 5

33 Needle roller bearing

- ◆ For reverse gear

34 5th and reverse gear locking collar

- ◆ Installation position => Fig. 23

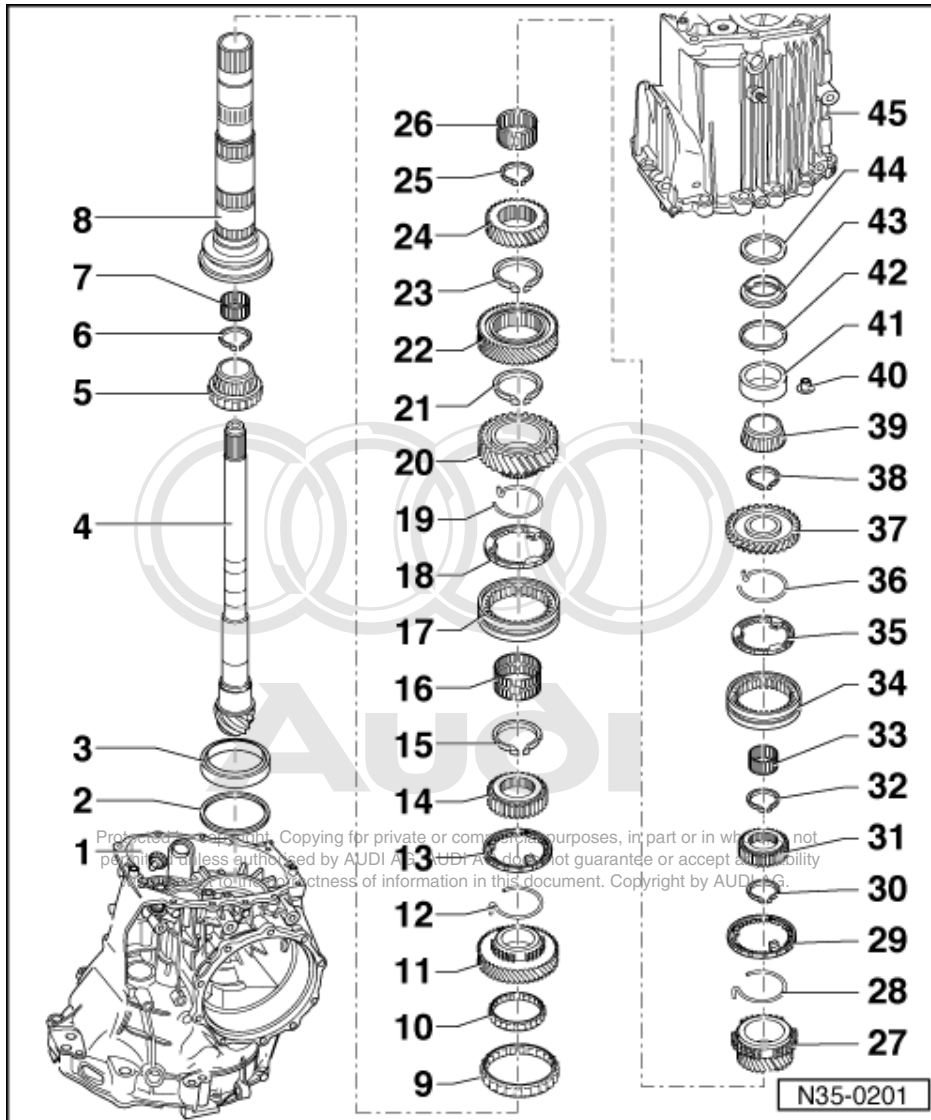
35 Reverse gear synchro-ring

- ◆ Check for wear
=> Fig. 17

36 Spring

- ◆ Insert in reverse sliding gear
=> Fig. 16
- ◆ Allocation of spring to gear

=> Parts catalogue



37 Reverse sliding gear wheel

38 Circlip

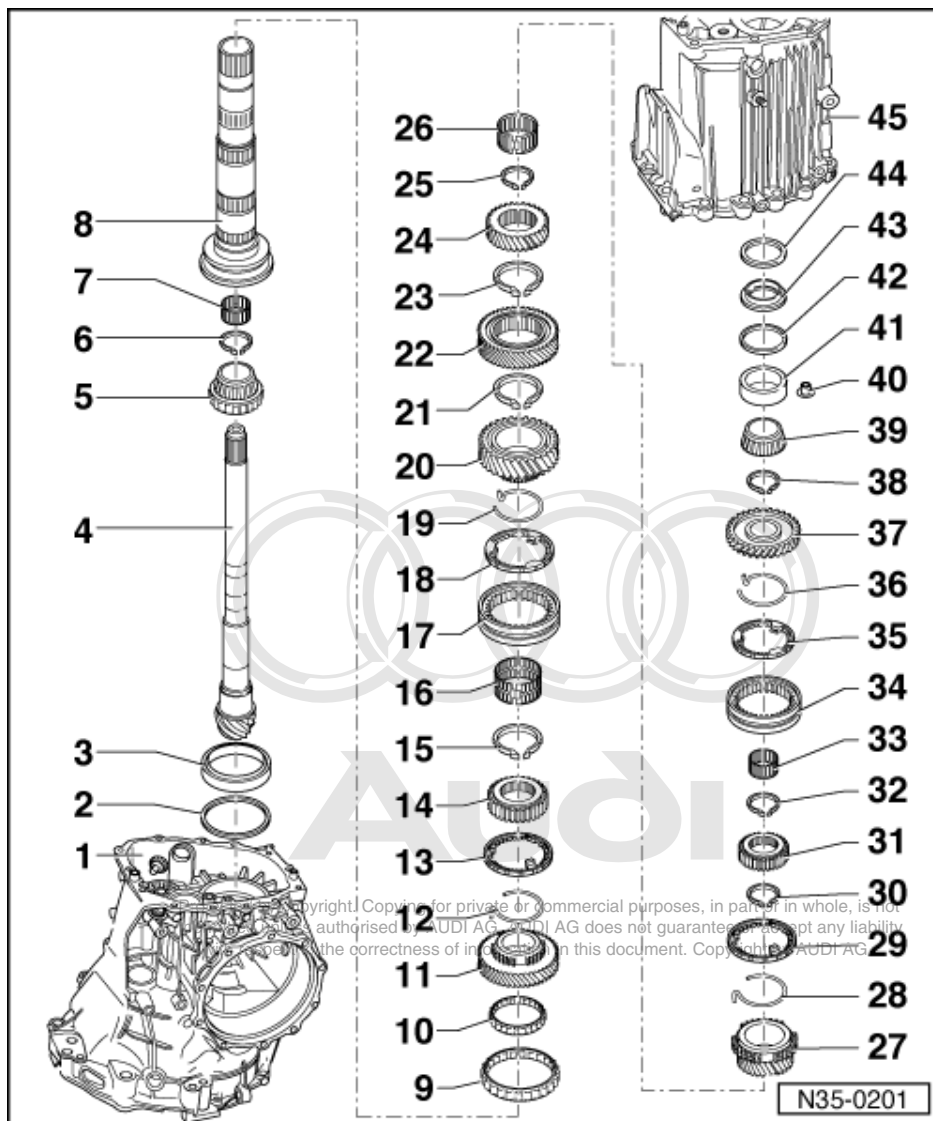
- ◆ Identification
- ◆ Installation position => Fig. 15, item 7

39 Inner race for taper roller bearing 1)

- ◆ Pressing off => Fig. 9
- ◆ Pressing on => Fig. 10

40 Bush

- ◆ To secure small taper roller bearing outer race
- ◆ Pulling out => Fig. 6
- ◆ Need not be fitted after the small taper roller bearing has been replaced



41 Outer race for taper roller bearing 1)

- ◆ Pressing out => Fig. 7
- ◆ Pressing in => Fig. 8

42 Shim "S4"

- ◆ Adjustment overview
=> Page 165

43 Ring

- ◆ Holds rubber washer
- ◆ Allocation

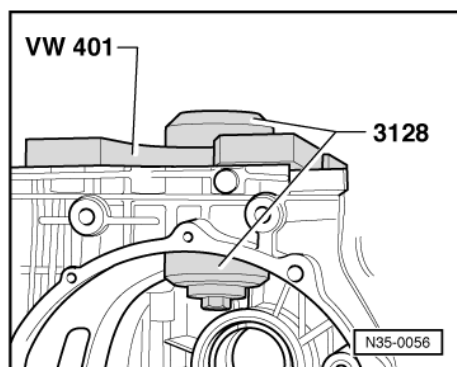
=> Parts catalogue

44 Rubber washer

- ◆ Compensates length variations
- ◆ Allocation

=> Parts catalogue

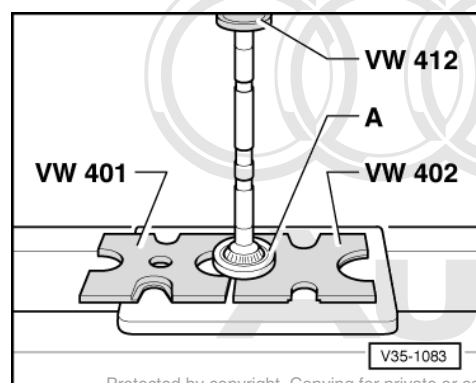
45 Gearbox cover1)



-> Fig.1 Pulling out double taper roller bearing outer race

- Remove differential => Page 149 .
- Place pressure piece of puller 3128 below the outer race.
- Fit threaded part of puller 3128 with pressure plate VW 401 onto gearbox housing.

When tightening the bolt the outer race will be pulled out of the housing.



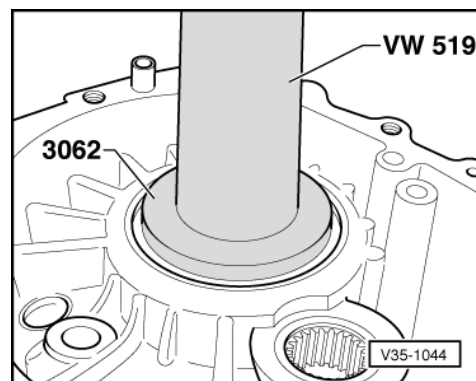
Protected by copyright. Copying for private or commercial purposes, in part or in whole, is not permitted unless authorised by AUDI AG. AUDI AG does not guarantee or accept any liability with respect to the correctness of information in this document. Copyright by AUDI AG.

-> Fig.2 Pressing off double taper roller bearing inner race

- Remove circlip before pressing off.
- The outer race -A- must be fitted to press off the inner race.

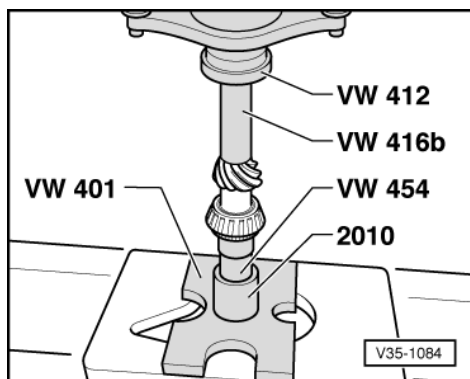
Note:

The double taper roller bearing inner race will be destroyed when it is pressed off.

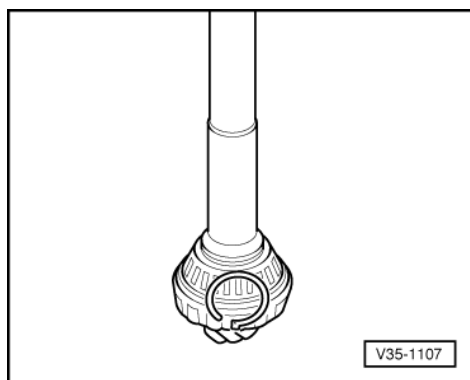


-> Fig.3 Pressing in double taper roller bearing outer race

The smaller diameter of the thrust pad 3062 faces outer race.



-> Fig.4 Pressing on double taper roller bearing inner race

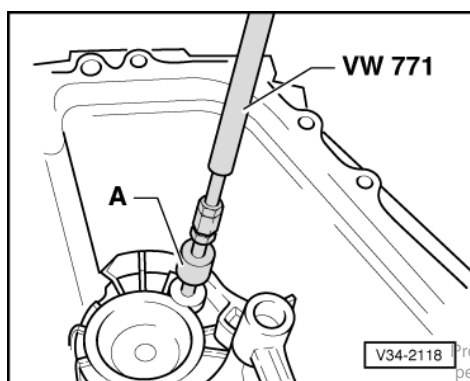


-> Fig.5 Determining thickness of circlip

- Determine the thickest circlip which will still fit and install it.
- The circlips for the synchro-hubs, needle bearings and individual gear wheels should be determined as for the double taper roller bearing shown.

Circlips available and part numbers:

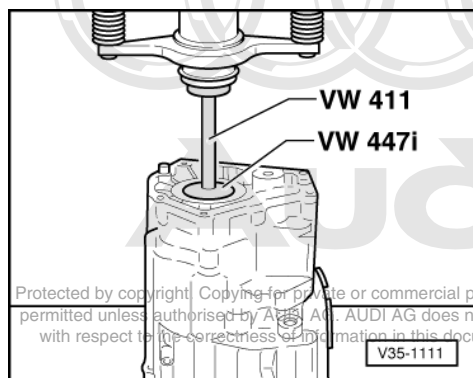
=> Parts catalogue



Protected by copyright. Copying for private or commercial purposes, in part or in whole, is not permitted unless authorised by AUDI AG. AUDI AG does not guarantee or accept any liability with respect to the correctness of information in this document. Copyright by AUDI AG.

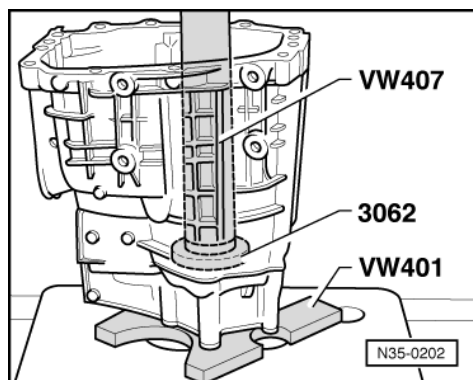
-> Fig.6 Pulling out securing bush for small taper roller bearing outer race

A - Internal puller 12 ... 14.5 mm, e.g. Kukko 21/1

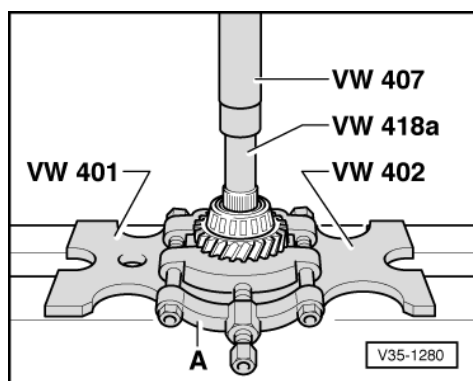


-> Fig.7 Pressing out taper roller bearing outer race

- The outer race is pressed out together with the ring -item 127 .



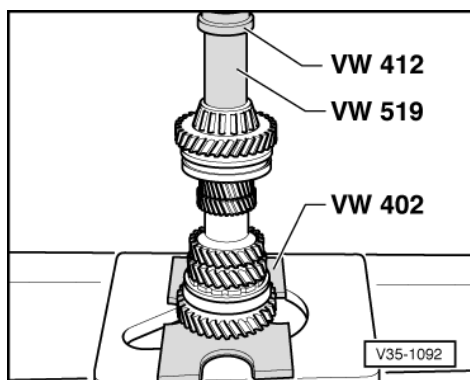
-> Fig.8 Pressing in taper roller bearing outer race



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

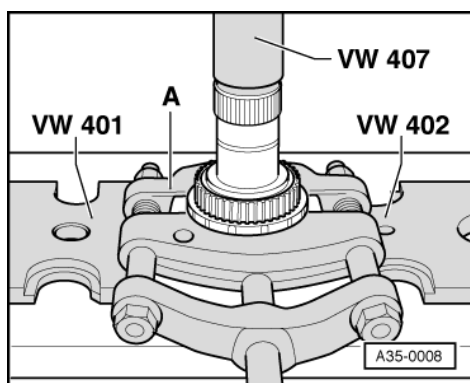
- Press off inner race with reverse gear sliding gear

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



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

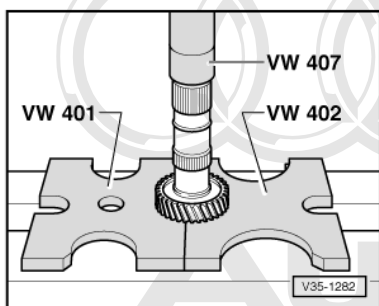
- Fit circlip before pressing on inner race.



-> Fig.11 Pressing off 5th gear and reverse gear synchro hub

- Remove circlip before pressing off.
- Press off synchro-hub with 5th speed sliding gear

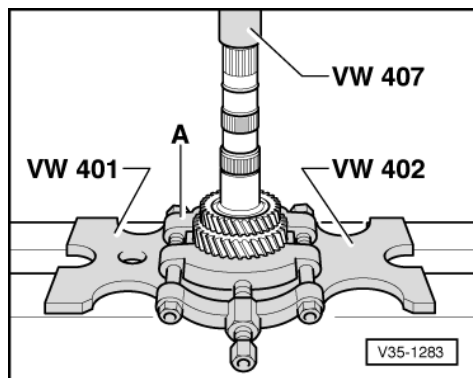
A - Separating device 22 ... 115 mm, e.g. Kukko 17/2



Protected by copyright. Copying for private or commercial purposes, in part or in whole, is not permitted unless authorised by AUDI AG. AUDI AG does not guarantee or accept any liability with respect to the correctness of information in this document. Copyright by AUDI AG.

-> Fig.12 Pressing off 4th gear wheel

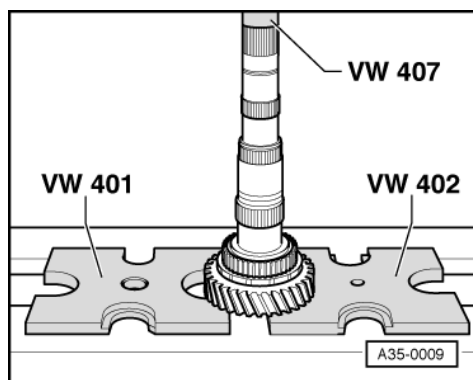
- Remove circlip before pressing off.



-> Fig.13 Pressing off 3rd gear wheel

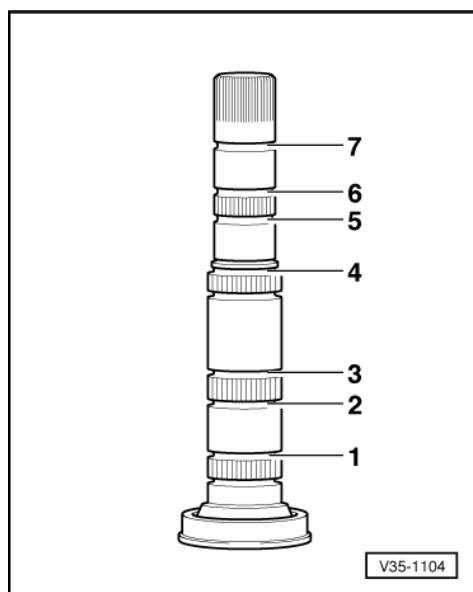
- Remove circlip before pressing off.
- Press 3rd gear wheel off with 2nd speed sliding gear

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



-> Fig.14 Pressing off 1st and 2nd gear synchro-hub

- Remove circlip before pressing off.
- Press synchro-hub off with 1st speed sliding gear



Protected by copyright. Copying for private or commercial purposes, in part or in whole, is not permitted unless authorised by AUDI AG. AUDI AG does not guarantee or accept any liability with respect to the correctness of information in this document. Copyright by AUDI AG.

➔ **Fig.15 Position of circlips**

- The circlips for the synchro-hubs, needle bearings and individual gear wheels should be determined as shown in Fig. 5 .

- ◆ Circlip -1- secures the 1st and 2nd gear synchro-hub.

Identification: colour blue

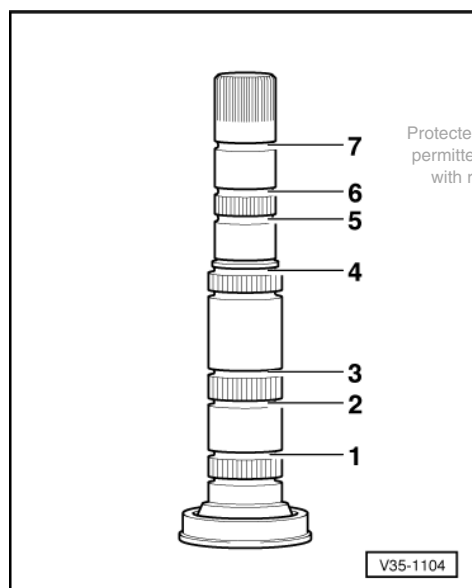
Circlip thickness (mm)		
1.90	1.96	2.02
1.93	1.99	

- ◆ Circlip -2- secures the needle bearing/ 2nd speed sliding gear.

Thickness: 2.50 mm. Identification: colour blue

- ◆ Circlip -3- secures the 3rd gear wheel.

Circlip thickness (mm)		
1.90	1.98	2.06
1.94	2.02	



Protected by copyright. Copying for private or commercial purposes, in part or in whole, is not permitted unless authorised by AUDI AG. AUDI AG does not guarantee or accept any liability with respect to the correctness of information in this document. Copyright by AUDI AG.

- ◆ Circlip -4- secures the 4th gear wheel.

Circlip thickness (mm)		
1.86	1.94	
1.90	1.98	

- ◆ ➔ Circlip -5- secures the needle bearing/ 5th speed sliding gear.

Thickness 2.00 mm. Identification: colour brown

- ◆ Circlip -6- secures the synchro-hub for 5th and reverse gear.

Identification: colour blue

Circlip thickness (mm)		
1.90	1.96	2.02

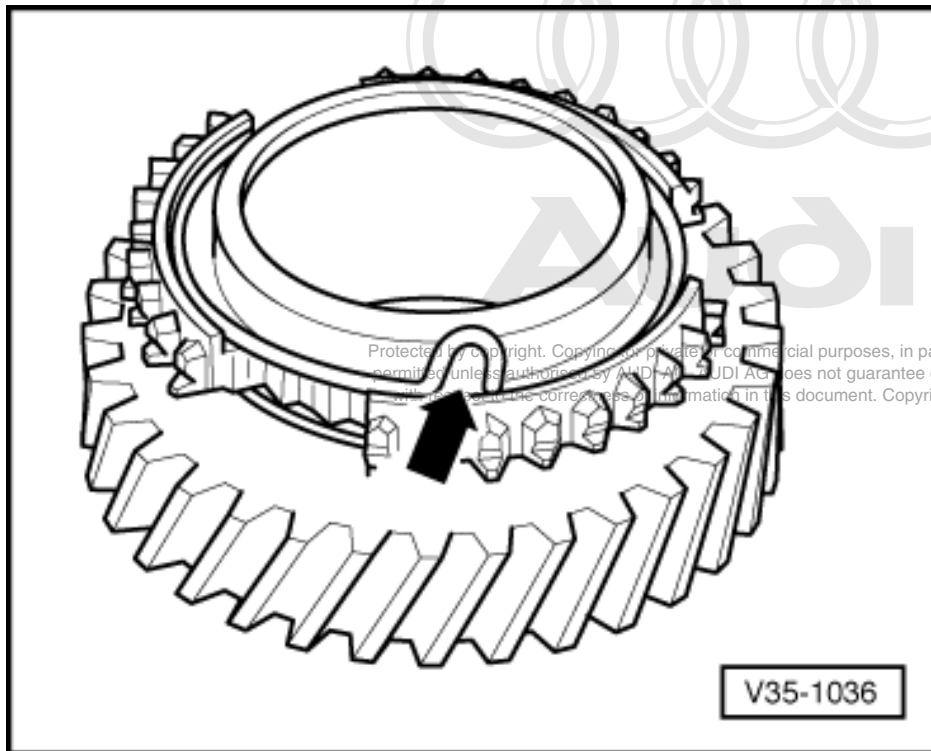
Circlip thickness (mm)		
1.93	1.99	2.05

- ♦ Circlip -7- secures needle bearing for reverse sliding gear.

Thickness 2.50 mm.

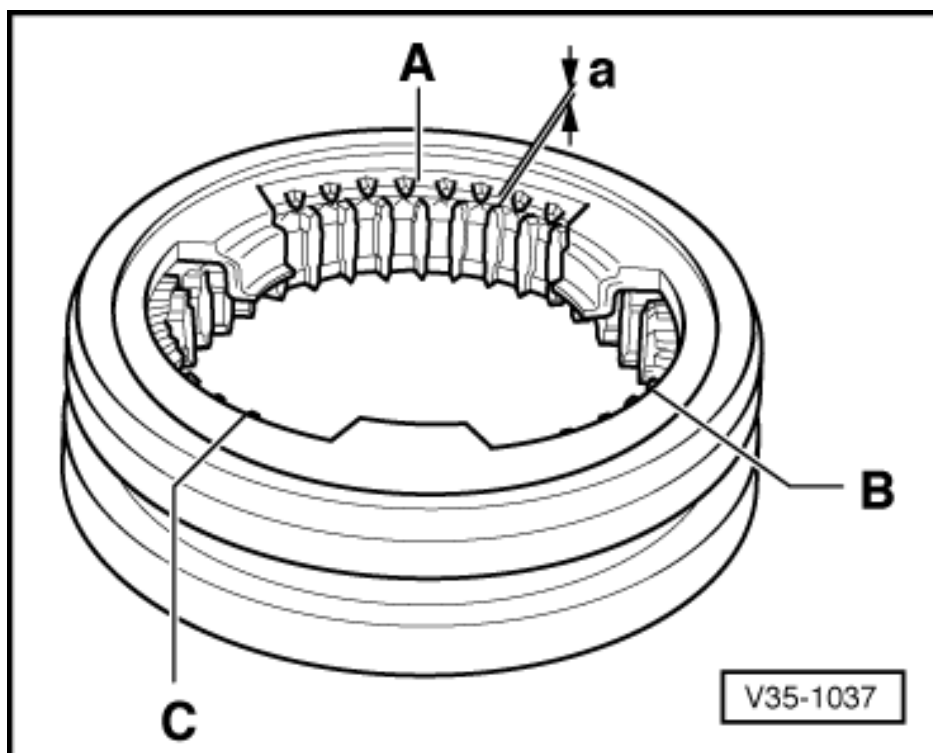
- Determine circlips according to table. Part numbers

=> Parts catalogue



-> Fig.16 Inserting spring in gear wheel

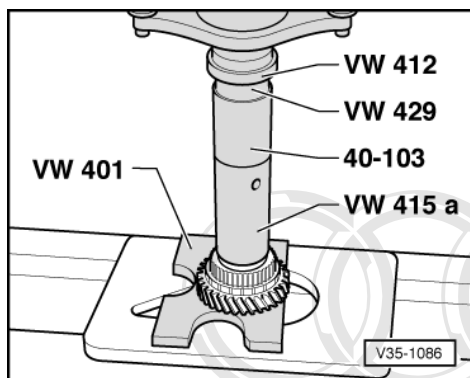
The bent end of the spring (arrow) must be hooked into the hole in the gear wheel.



→ Fig.17 Checking synchro-ring for wear

- Press synchro-ring into locking collar and measure gap -a- with a feeler gauge at positions -A-, -B- and -C-.
- Calculate average gap.

The average gap must not be less than 0.5 mm.

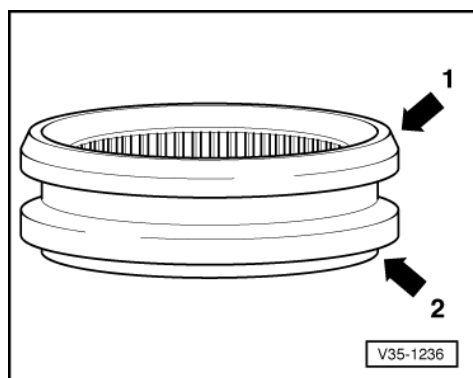


→ Fig.18 Pressing on 1st and 2nd gear synchro-hub

- ♦ Installation position:

High inside collar faces towards 2nd gear.

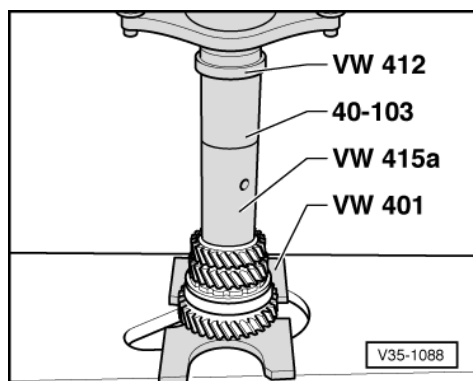
Protected by copyright. Copying for private or commercial purposes, in part or in whole, is not permitted unless authorised by AUDI AG. AUDI AG does not guarantee or accept any liability with respect to the correctness of information in this document. Copyright by AUDI AG.



-> Fig.19 Installation position of locking collar for 1st and 2nd gear

- ♦ Installation position:

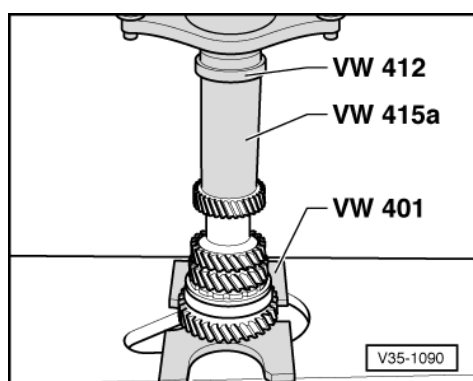
Chamfered surface -arrow 1- faces towards 2nd gear.
Shoulder -arrow 2- faces towards 1st gear.



-> Fig.20 Pressing on 3rd gear wheel

- ♦ Installation position:

Groove on gear wheel faces towards 4th gear.



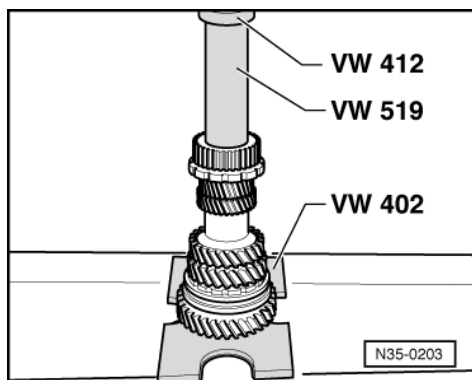
-> Fig.21 Pressing on 4th gear wheel

- ♦ Installation position:



Protected by copyright. Copying for private or commercial purposes, in part or in whole, is not permitted unless authorised by AUDI AG. AUDI AG does not guarantee or accept any liability with respect to the correctness of information in this document. Copyright by AUDI AG.

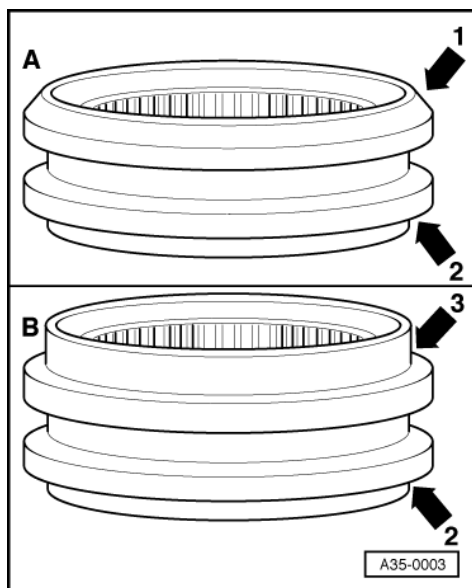
High inside collar faces towards 3rd gear.



-> Fig.22 Pressing on 5th gear and reverse gear synchro-hub

- ◆ Installation position:

High inside collar faces towards 5th gear.



-> Fig.23 Installation position of locking collar for 5th and reverse gear

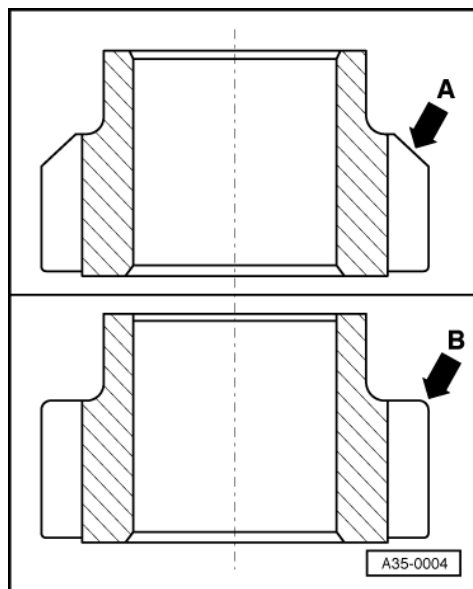
Two types of locking collar are fitted: locking collars with a chamfered surface -A-, and locking collars with a large shoulder -B-.

- ◆ Make sure locking collar is correct version for reverse gear wheel
=> Fig. 24
- ◆ Installation position:

Chamfered surface -arrow 1- faces towards reverse gear.
Small shoulder -arrow 2- faces towards 5th gear.
Large shoulder -arrow 3- faces towards reverse gear.



Protected by copyright. Copying for private or commercial purposes, in part or in whole, is not permitted unless authorised by AUDI AG. AUDI AG does not guarantee or accept any liability with respect to the correctness of information in this document. Copyright by AUDI AG.

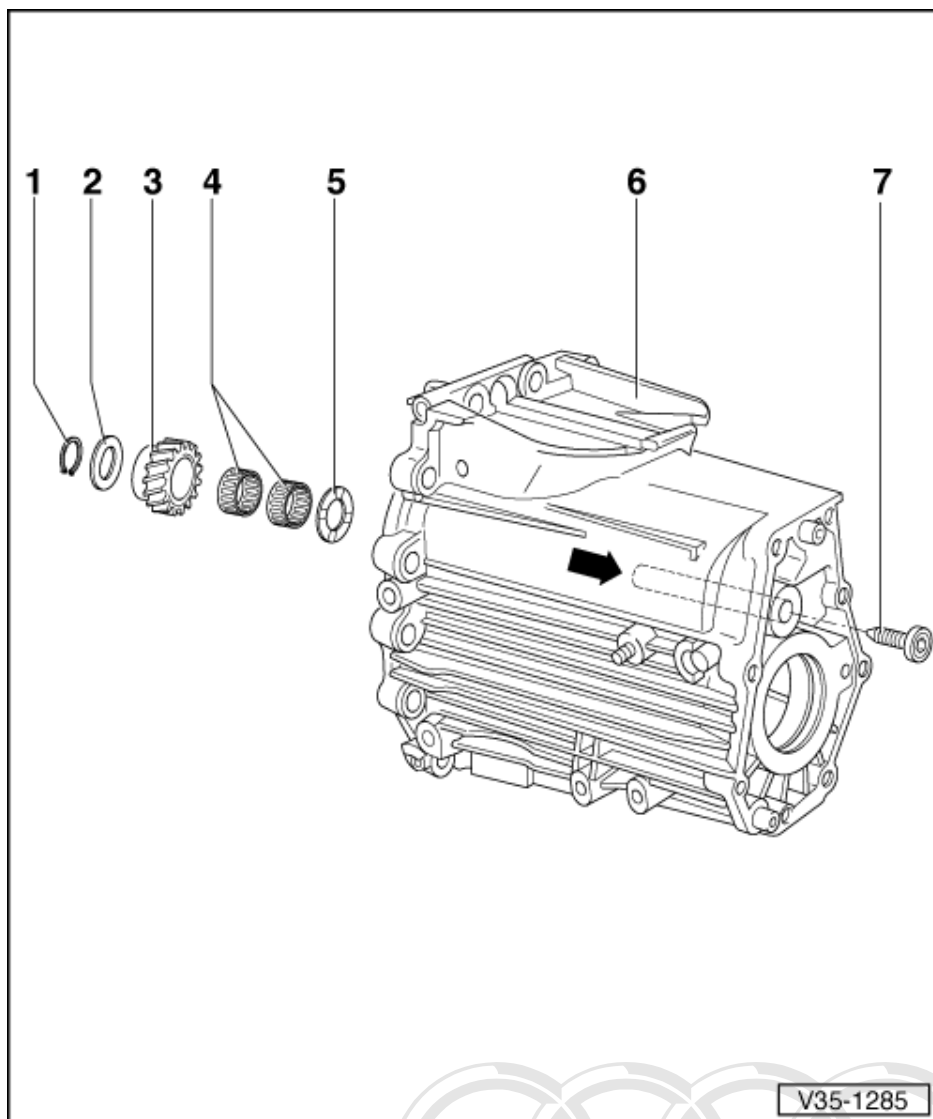


-> Fig.24 Selecting correct locking collar for reverse gear wheel

A Reverse gear wheel with chamfered surface	Both types of locking collar can be installed (with chamfered surface or with large shoulder)
B Reverse gear wheel without chamfered surface	Install only locking collar with large shoulder; not locking collar with chamfered surface

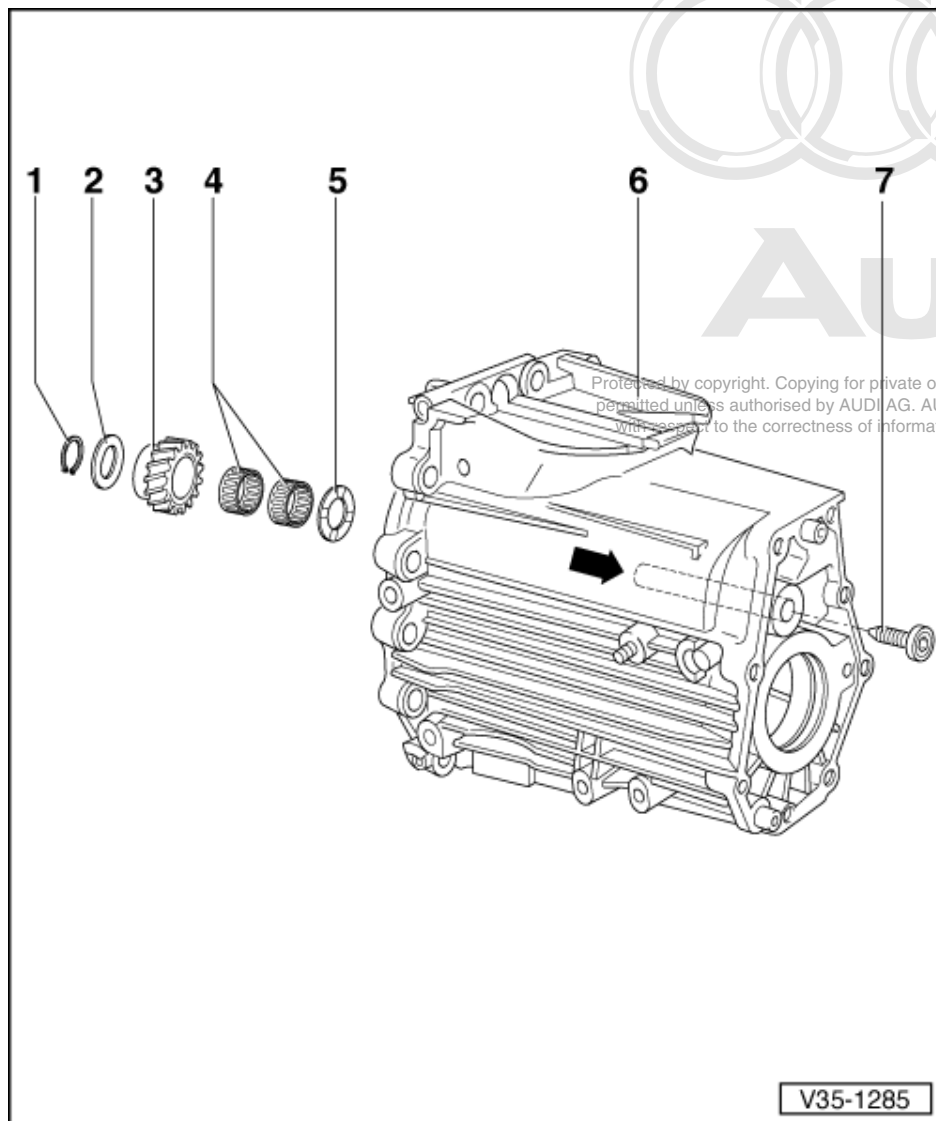
4 - Removing and installing reverse gear wheel

4.1 - Removing and installing reverse gear wheel



- 1 Circlip
- 2 Support plate
- 3 Reverse gear wheel
 - ♦ Different versions; refer to Fig. 138
- 4 Needle roller bearing
- 5 Thrust washer

Protected by copyright. Copying for private or commercial purposes, in part or in whole, is not permitted unless authorised by AUDI AG. AUDI AG does not guarantee or accept any liability with respect to the correctness of information in this document. Copyright by AUDI AG.



6 Gearbox cover

- ◆ With reverse gear shaft (arrow)
- ◆ To remove the reverse gear wheel it is not necessary to remove the reverse gear shaft.
- ◆ The reverse gear shaft is not available as a replacement part.

7 Torx bolt - 35 Nm

- ◆ Serves as an additional method of securing the reverse gear shaft

39 - Final drive, Differential rear

1 - Renewing seal for flange shaft

1.1 - Renewing seal for flange shaft

- Gearbox installed
- Observe general repair instructions
=> Page 10.

Special tools, testers and auxiliary items

- ◆ Drift VW 195
- ◆ Drift VW 295
- ◆ Extractor lever VW 681
- ◆ Drip tray V.A.G 1306

Notes:

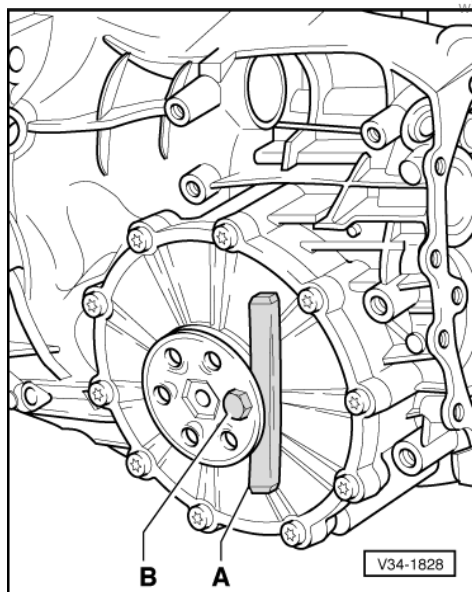
- ◆ Removing and installing oil seal on left-hand side is illustrated below.
- ◆ Procedure for removing oil seal on left and right-hand sides is identical.
- ◆ Exhaust system does not have to be removed.
- ◆ Gearbox may or may not have polygon bearings
=>from Page 2.
- ◆ A spacer ring is fitted between the polygon bearing and the differential sun wheel on flange shafts with 30 mm spline diameter => Page 142.

Removing

- Remove heat shield for drive shaft.
- Unbolt right-hand drive shaft from flange shaft

=> Running gear, Four-wheel drive; Repair group 40; Removing and installing drive shaft Removing and installing drive shaft

- Turn steering to left onto full lock stop.
- Tie-up drive shaft as high as possible. **Do not damage paint on drive shaft.**

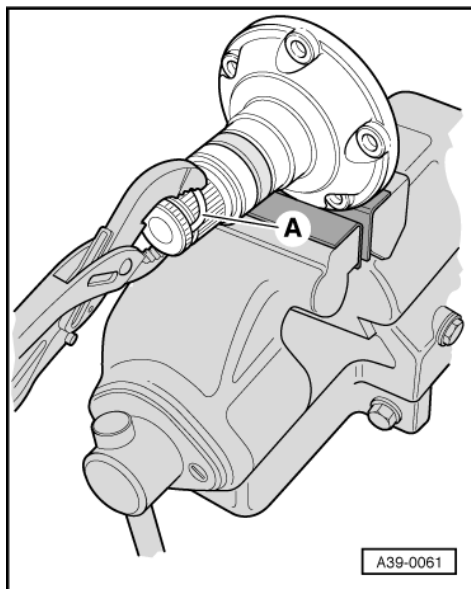




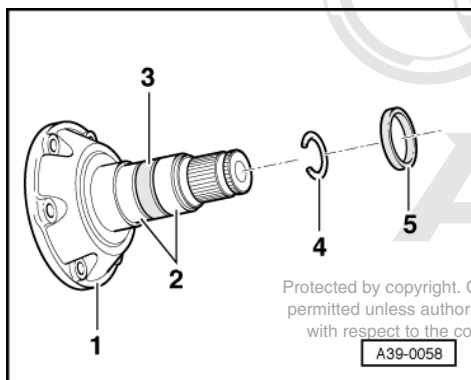
- Place drip tray VW 1306 below gearbox.
- -> Place a chisel or distance piece -A- under the flange shaft and pull flange shaft out of the sun wheel by turning bolt -B-.

Note:

If when removing the flange shaft it does not come out square, insert a bolt in the opposite hole to assist removal.



- -> Always renew flange shaft circlip.
- Clamp flange shaft in vice, using vice clamps. Use new circlip -A- to press old circlip out of groove in flange shaft.
- Pull out flange shaft oil seal with VW 681.



Protected by copyright. Copying for private or commercial purposes, in part or in whole, is not permitted unless authorised by AUDI AG. AUDI AG does not guarantee or accept any liability with respect to the correctness of information in this document. Copyright by AUDI AG.

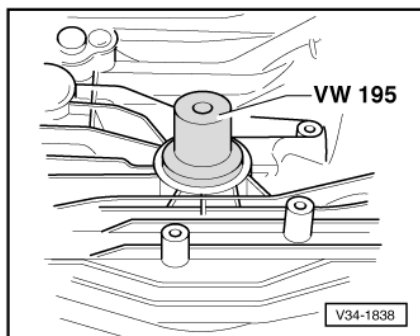
-> Assembling flange shaft with polygon bearings

- 1 - Flange shaft
- 2 - Needle bearing (polygon bearing)
- 3 - Spacer ring
- 4 - Circlip
- 5 - Spacer ring - additionally fitted on shafts with 30 mm spline diameter

Notes:

- ♦ If the polygon bearings do not run smoothly with the flange shaft removed, this does indicate that the bearings are defective. A test for noisy bearings can only be performed with the bearings installed.
- ♦ Inspect for signs of damage to polygon bearings (such as cracking in outer race).
- ♦ The polygon bearings can only be replaced together with the flange shaft.

- ♦ A spacer ring -5- is fitted between the polygon bearing and the differential sun wheel on flange shafts with 30 mm spline diameter.



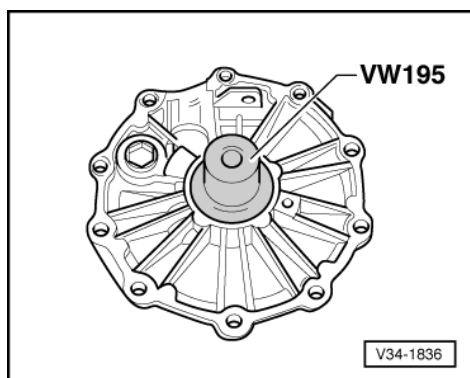
Protected by copyright. Copying for private or commercial purposes, in part or in whole, is not permitted unless authorised by AUDI AG. AUDI AG does not guarantee or accept any liability with respect to the correctness of information in this document. Copyright by AUDI AG.

Installing

- Fill space between sealing and dust lips with multi-purpose grease.
- Lightly oil outer circumference of seal.
- -> Knock new oil seal for right-hand flange shaft in 5.5 mm below outer surface of housing; keep seal straight when installing.

Note:

If the old flange shaft is reinstalled after the repair, the oil seal must be knocked in to a depth of approx 6.5 mm so that the new seal does not run on the same contact surface as the old one.



- -> Knock in new oil seal for left-hand flange shaft to a depth of 5.5 mm below outer surface of cover using VW 195; keep seal straight when installing.

Note:

If the old flange shaft is reinstalled after the repair, the oil seal must be knocked in to a depth of approx 6.5 mm so that the new seal does not run on the same contact surface as the old one.

- Knock flange shaft in with drift VW 295.
- Bolt drive shaft to flange shaft.
- Fit drive shaft heat shields.
- Check oil level in gearbox =>Page 64 .

Tightening torques

Component		Nm
Drive shaft to flange shaft	M8	40
	M10	77

2 - Renewing oil seal for flange shaft/propshaft

2.1 - Renewing oil seal for flange shaft/propshaft

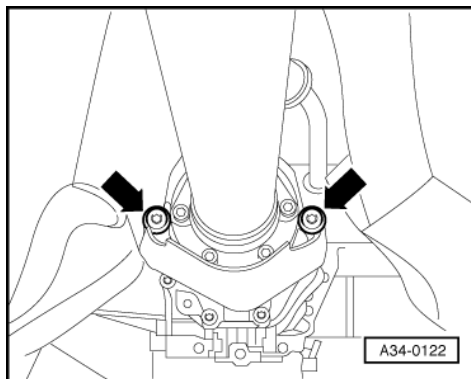
- Gearbox installed
- Observe general repair instructions
=> Page 10 .

Special tools, testers and auxiliary items

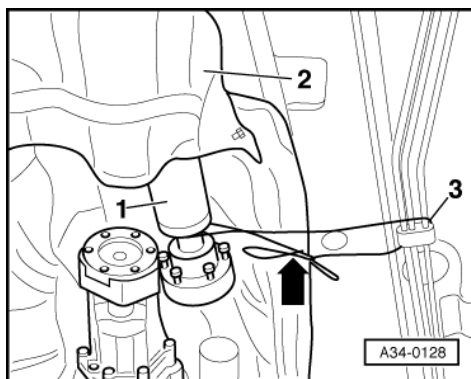
Protected by copyright. Copying for private or commercial purposes, in part or in whole, is not permitted unless authorised by AUDI AG. AUDI AG does not guarantee or accept any liability with respect to the correctness of information in this document. Copyright by AUDI AG.

- ♦ Extractor lever VW 681
- ♦ Mandrel 30-505
- ♦ Installing tool 30-506 B
- ♦ Drip tray V.A.G 1306

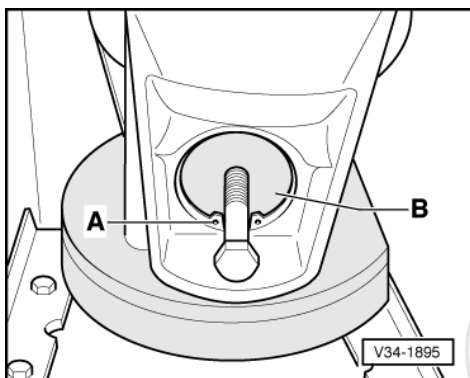
Removing



- -> Remove heat shield for propshaft from cover for Torsen differential -arrows-.



- -> Unbolt propshaft -1- from gearbox (=>Page 186) and rest it on heat shield -2-.
- Secure propshaft to fuel pipe bracket -3- with wire -arrows-.
- Place drip tray V.A.G 1306 underneath and drain gearbox oil.



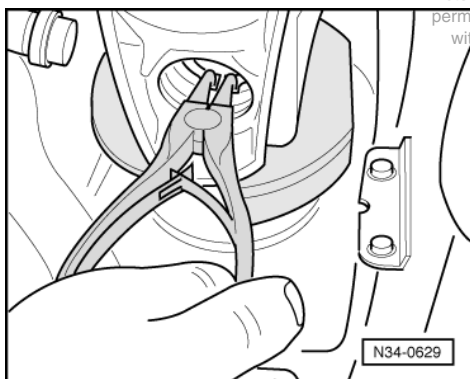
- Place drip tray V.A.G 1306 below sealing cap.

Note:

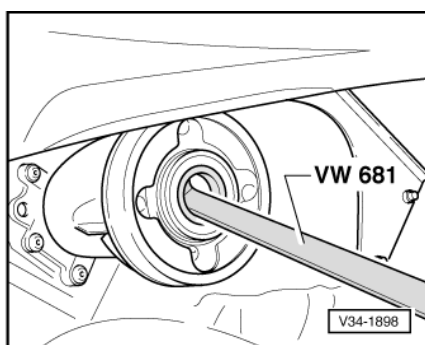
-> Oil flows out when sealing cap -B- is removed.

- Remove circlip -A-.
- Screw an M8 bolt into thread of sealing cap.
- Pull out sealing cap using bolt.

Protected by copyright. Copying for private or commercial purposes, in part or in whole, is not permitted unless authorised by AUDI AG. AUDI AG does not guarantee or accept any liability with respect to the correctness of information in this document. Copyright by AUDI AG.

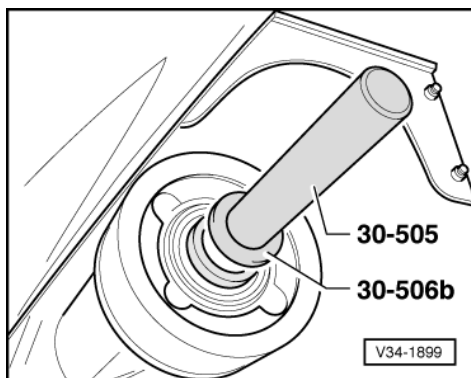


- -> Open out circlip and pull out flange shaft.



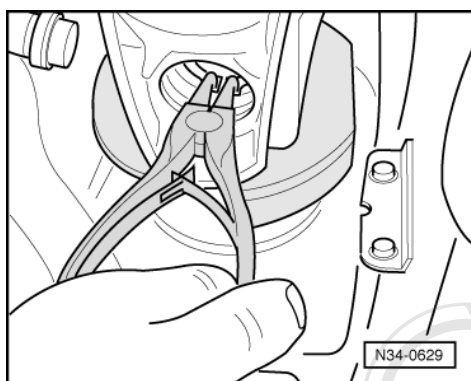
- -> Pull out flange shaft oil seal with VW 681.

Installing



Installation is carried out in the reverse order, when doing this note the following:

- Fill space between sealing and dust lips with multi-purpose grease.
- Lightly oil outer circumference of seal.
- -> Knock new flange shaft oil seal in 2 mm below housing outer surface; do not cant seal when doing this.
- Install flange shaft.



- -> When inserting flange shaft, fit circlip at the same time.
- The circlip must be seated in the base of the groove.
- Fit a new O-ring for the sealing cap.
- Fit plug and secure in position.
- Bolt on propshaft => Page 189 .
- Top up gearbox oil in gearbox and check oil level => Page 64 .

Tightening torques

Component	Nm
Propshaft to gearbox	55
Heat shield for propshaft to cover for Torsen differential	25

Protected by copyright. Copying for private or commercial purposes, in part or in whole, is not permitted unless authorised by AUDI AG. AUDI AG does not guarantee or accept any liability for errors or omissions of information in this document. Copyright by AUDI AG.

3 - Removing and installing speedometer sender and drive wheel

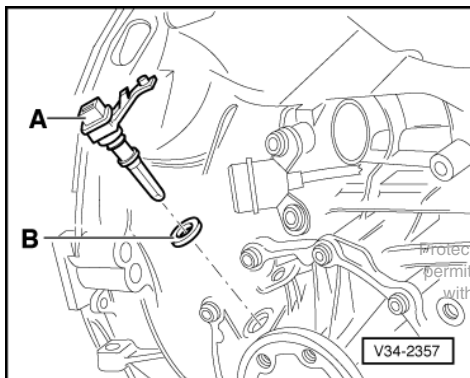
3.1 - Removing and installing speedometer sender and drive wheel

- Gearbox installed
- Observe general repair instructions

=> Page 10 .

3.2 - Removing and installing speedometer sender -G22

Removing

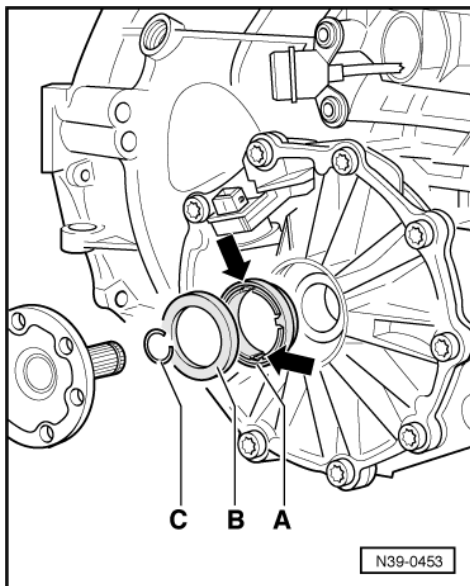


- -> Pull connector off speedometer sender-A-.
- Press retaining clip down, turn sender sideways and pull out upwards.

Installing

- When installing renew seal -B-.
- Insert sender and click into place.
- Handle sender carefully. If damaged it is possible that the speedometer will not indicate exactly.

3.3 - Removing and installing speedometer drive wheel



Special tools, testers and auxiliary items

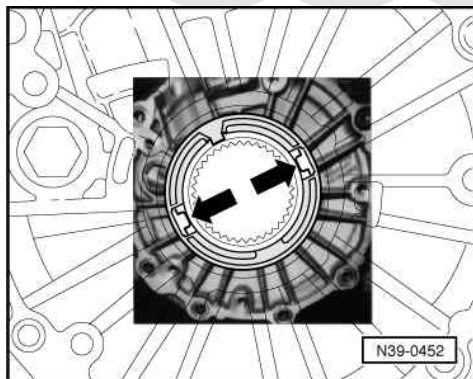
- ◆ Drift VW 195
- ◆ Drift VW 295
- ◆ Extractor lever VW 681



- ♦ Drip tray V.A.G 1306

Removing

- -> Remove flange shaft on left side and oil seal -B-
=>Renewing flange shaft seal, Page 141 .



ercial purposes, in part or in whole, is not
does not guarantee or accept any liability
his document. Copyright by AUDI AG.

- Remove speedometer sender => Page 147 .
- -> Press retaining clips in direction of arrows with a screwdriver.
- Remove drive wheel by levering out, alternating between sides.

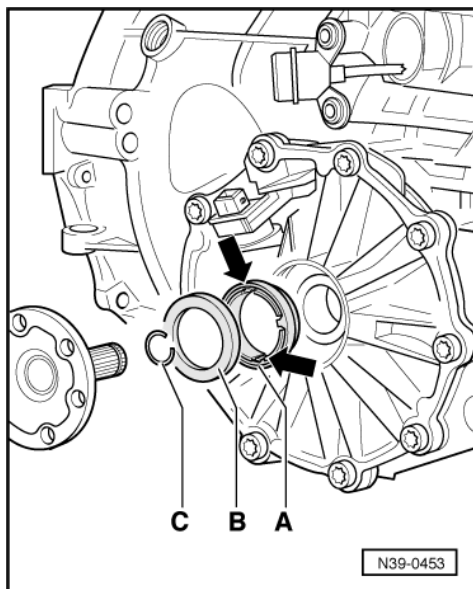
Installing

Installation is carried out in the reverse order, when doing this note the following:

Note:

Fit the drive wheel carefully onto the differential, making sure that it is kept straight. Do not use force; the drive wheel can break easily.

Installation position:



-> The drive peg of the drive wheel -A- faces to seal -B- and locates in the groove of the differential.

The retaining clips (arrows) locate in the circumferential groove in differential.

- Always renew seal -B- and circlip -C- =>Page 142 .
- Knock flange shaft in with drift VW 295.

- Top up oil in gearbox and check oil level => Page **64** .

Tightening torques

Component		Nm
Drive shaft to flange shaft	M8	40
	M10	77
Heat shields above drive shafts to gearbox		23

4 - Removing and installing differential

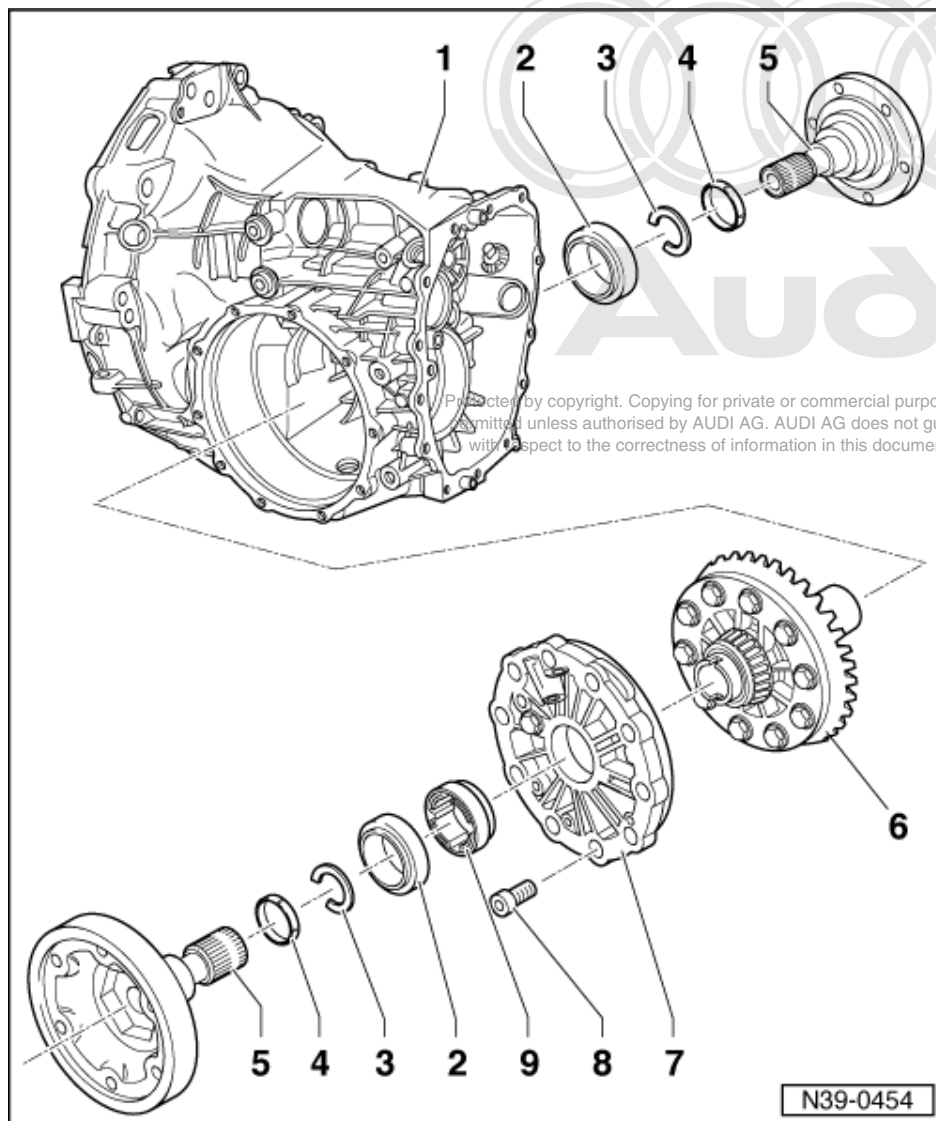
4.1 - Removing and installing differential

Special tools, testers and auxiliary items

- ◆ Multi-purpose tool VW 771
 - ◆ Socket 3257
 - ◆ Internal puller Kukko 21/3
- Copyright. Copying for private or commercial purposes, in part or in whole, is not permitted unless authorised by AUDI AG. AUDI AG does not guarantee or accept any liability with respect to the correctness of information in this document. Copyright by AUDI AG.

Notes:

- ◆ Removing and installing is possible with gearbox installed.
- ◆ The differential can be removed and installed without removing the selector mechanism, input shaft, drive pinion and gearbox cover. These components must be removed if the differential has to be adjusted.
- ◆ Gearbox may or may not have polygon bearings
=>from Page **2** .
- ◆ The polygon bearings can only be replaced together with the flange shaft.
- ◆ Inspect polygon bearings for visible damage.
- ◆ If the polygon bearings do not run smoothly with the flange shaft removed, this does indicate that the bearings are defective. A test for noisy bearings can only be performed with bearings installed.
- ◆ A spacer ring =>Fig. **4** , -Item 5- is fitted between the polygon bearing and the differential sun wheel on flange shafts with 30 mm spline diameter.
- ◆ Adjustments are required when replacing components marked 1)
=>Adjustment overview Page **165** .



1 Gearbox housing 1)

2 Oil seal

- ♦ Renew => Page 141

3 Circlip

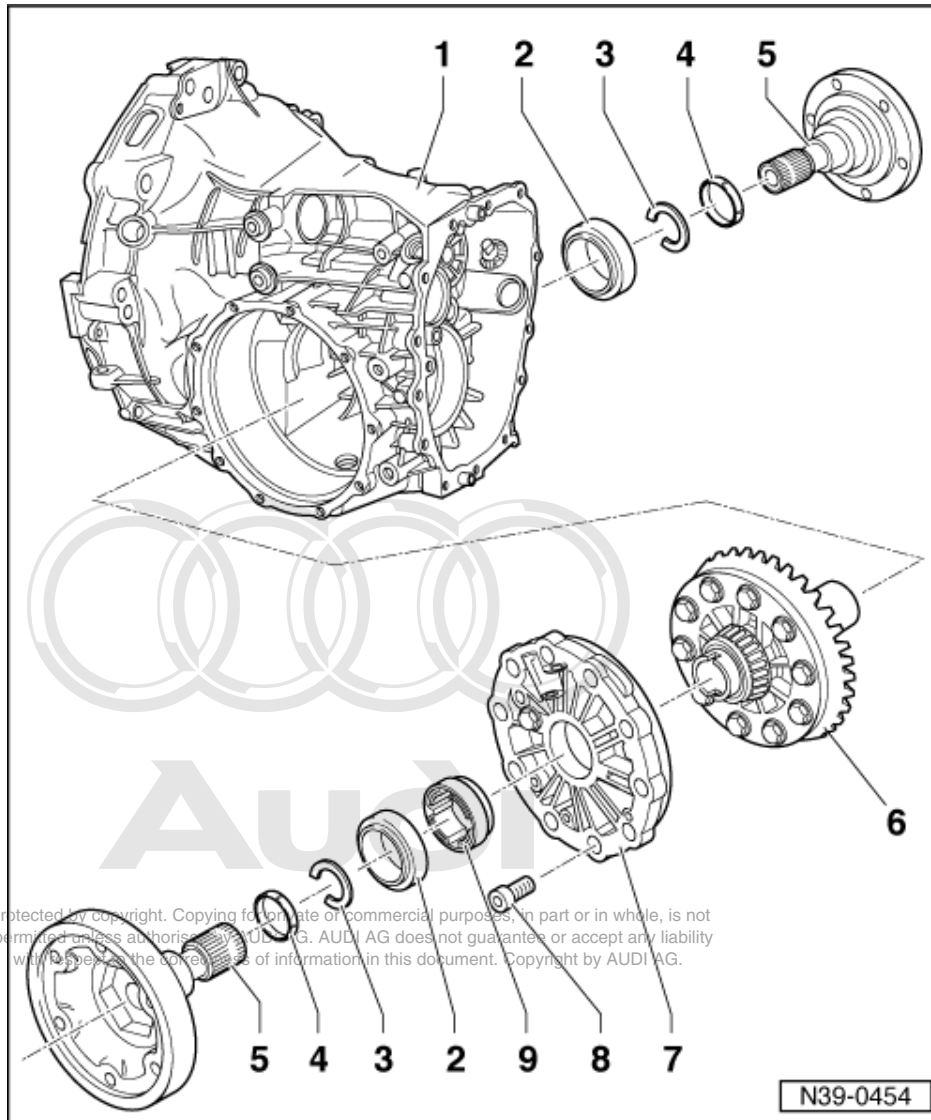
- ♦ Renew
- ♦ Removing and installing
=>Fig. 1

4 Spacer ring

- ♦ Is only fitted on flange shafts with polygon bearing which have a spline diameter of 30 mm => Page 2
- ♦ Removing => Fig. 2
- ♦ Installing => Fig. 3

5 Flange shaft

- ♦ Removing and installing
=> Page 141
- ♦ Assembling flange shaft with polygon bearing => Fig. 4



Protected by copyright. Copying for private or commercial purposes, in part or in whole, is not permitted unless authorised by AUDI AG. AUDI AG does not guarantee or accept any liability with respect to the correctness of information in this document. Copyright by AUDI AG.

6 Differential with crown wheel 1)

- ♦ Can be removed without removing gear cluster
- ♦ Dismantling and assembling => Page 153

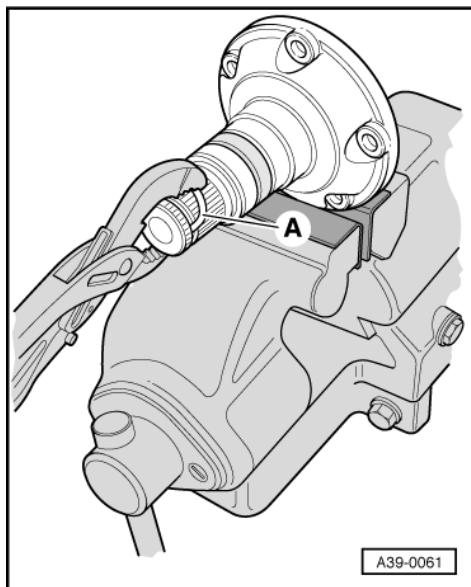
7 Cover for final drive 1)

- ♦ Seal with AMV 188 000 02

8 Torx bolt - 25 Nm

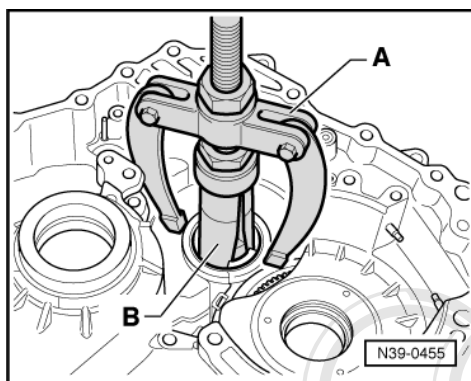
9 Speedometer drive wheel

- ♦ Removing and installing
=>Fig. 147
- ♦ Fit the drive wheel carefully onto the differential, making sure that it is kept straight. Do not use force; the drive wheel can break easily



-> Fig.1 Removing and installing circlip

- Clamp flange shaft in vice, using vice clamps. Use new circlip -A- to press old circlip out of groove in flange shaft.



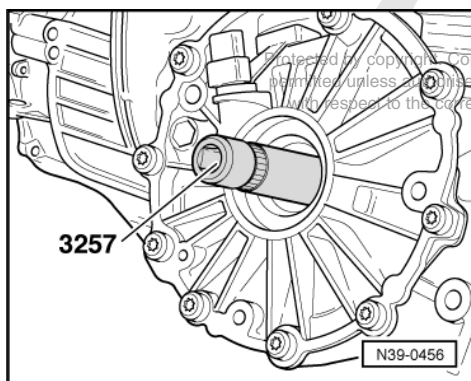
-> Fig.2 Removing spacer ring

B - Internal puller 18.5 ... 23.5 mm, e.g. Kukko 21/3

- If the spacer ring is tight pull out using the multi-purpose tool VW 771.

Note:

A spacer ring is only fitted in gearboxes with polygon bearings and 30 mm spline diameter.

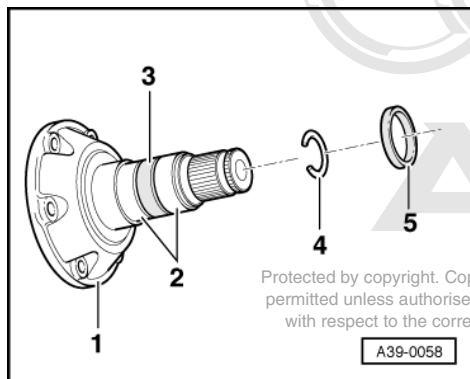


-> Fig.3 Installing spacer ring

Note:

A spacer ring is only fitted in gearboxes with polygon bearings and 30 mm spline diameter.

- Drive new spacer ring in onto stop, when doing this do not cant ring.



-> Fig.4 Assembling flange shaft and polygon bearing

- 1 - Flange shaft
- 2 - Needle bearing (polygon bearing)
- 3 - Spacer ring
- 4 - Circlip
- 5 - Spacer ring - additionally fitted on shafts with 30 mm spline diameter

Note:

The needle bearing (polygon bearing) does not turn easily when the flange shaft is removed. This does not indicate that the bearing is defective.

5 - Dismantling and assembling differential

5.1 - Dismantling and assembling differential

Special tools, testers and auxiliary items

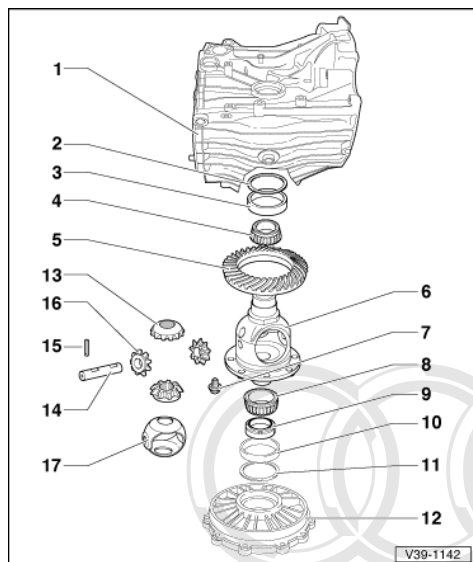
- ◆ Drift VW 295
- ◆ Press plate VW 401
- ◆ Press plate VW 402
- ◆ Press tool VW 407
- ◆ Press tool VW 408 A
- ◆ Thrust plate VW 447 H
- ◆ Thrust plate VW 447 i
- ◆ Thrust piece VW 472/1
- ◆ Thrust pad VW 511
- ◆ Thrust plate 30-11
- ◆ Thrust plate 30-205
- ◆ Press tool 40-21
- ◆ Thrust plate 40-105
- ◆ Drift 3138
- ◆ Sleeve 3144
- ◆ Tube 3296
- ◆ Sealant AMV 188 000 02



- ♦ Two-arm puller Kukko 20/10 or Kukko 44/2
- ♦ Two-arm puller Kukko 204/2

Notes:

- ♦ Removing and installing differential => Page 149 .
- ♦ Renew both taper roller bearings together.
- ♦ Adjustments are required when replacing components marked 1)
=> Adjustment overview Page 165 .



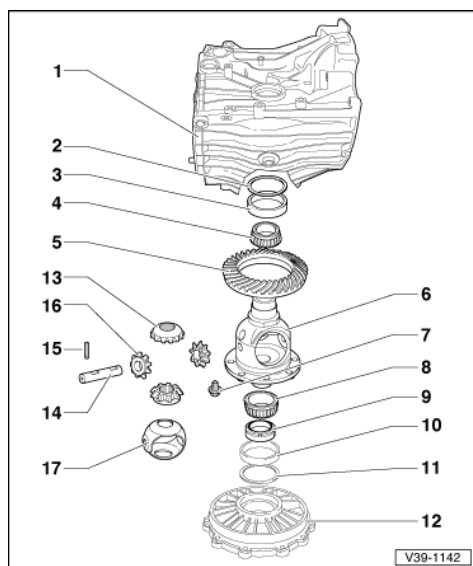
1 Gearbox housing 1)

2 Shim "S2"

- ♦ Note thickness
- ♦ Adjustment overview
=> Page 165

3 Outer race for small taper roller bearing 1)

- ♦ Taper roller bearings same on left and right (does not apply to gearboxes without polygon bearings=>from Page 2)
- ♦ Driving out => Fig. 1
- ♦ Driving in with VW 472/1 and VW 408 A => Fig. 2
- ♦ On gearboxes without polygon bearings, drive in using VW 295 and 30-205

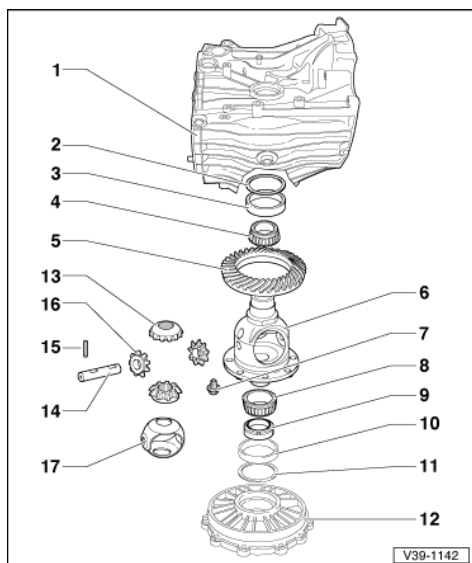


4 Inner race for small taper roller bearing 1)

- ♦ Taper roller bearings same on left and right (does not apply to gearboxes without polygon bearings =>from Page 2)
- ♦ Pull off with 3296 => Fig. 3
- ♦ Pressing on => Fig. 4
- ♦ On gearboxes without polygon bearings, drive on using press tool40-21

5 Crown wheel 1)

- ♦ Is mated to drive pinion (final drive set)
- ♦ Select according to gearbox code using Parts Catalogue =>from Page 2
- ♦ Drive off housing with a drift => Fig. 9
- ♦ Fit to differential cage => Fig. 10



6 Differential housing 1)

- ♦ Select according to gearbox code using Parts Catalogue =>from Page 2

7 Bolt - 60 Nm + turn 45°further

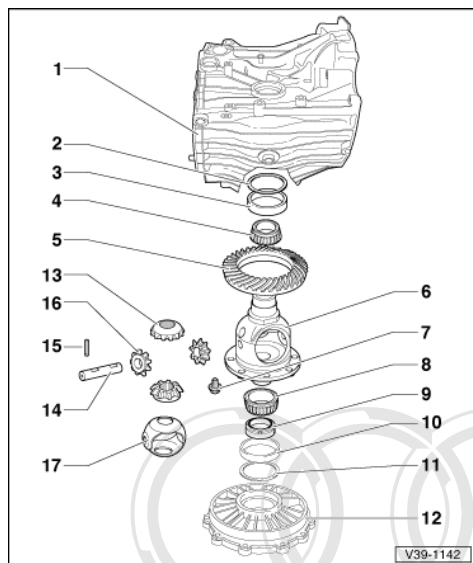
- ♦ Renew
- ♦ Lightly tighten bolts then tighten diagonally to correct torque

8 Inner race for large taper roller bearing 1)

- ♦ Taper roller bearings same on left and right (does not apply to gearboxes without polygon bearings =>fromPage 2)
- ♦ Pulling off => Fig. 5
- ♦ Press on with 3296=>Fig. 6
- ♦ On gearboxes without polygon bearings, press on using press tool40-21

 Audi

Protected by copyright. Copying for private or commercial purposes, in part or in whole, is not permitted unless authorised by AUDI AG. AUDI AG does not guarantee or accept any liability with respect to the correctness of information in this document. Copyright by AUDI AG.



9 Speedometer drive wheel

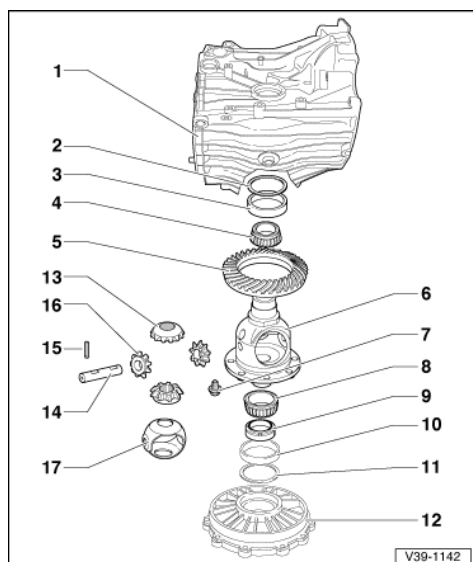
- ◆ Removing and installing
=>Page 147
- ◆ Fit the drive wheel carefully onto the differential, making sure that it is kept straight. Do not use force; the drive wheel can break easily

10 Outer race for large taper roller bearing 1)

- ◆ Taper roller bearings same on left and right (does not apply to gearboxes without polygon bearings =>fromPage 2)
- ◆ Knocking out => Fig. 7
- ◆ Driving in with VW 472/1 and VW 408 A => Fig. 8
- ◆ On gearboxes without polygon bearings (=>from Page 2), drive in using VW 511 and VW 295.

11 Shim "S1"

- ◆ Note thickness
- ◆ Adjustment overview
=>Page 165



12 Cover for final drive 1)

- ◆ Seal with AMV 188 000 02

13 Sun wheel

- ◆ Installing => Fig. 11

14 Shaft for planet wheels

- ◆ Knock out with drift after removing spring pin

15 Spring pin

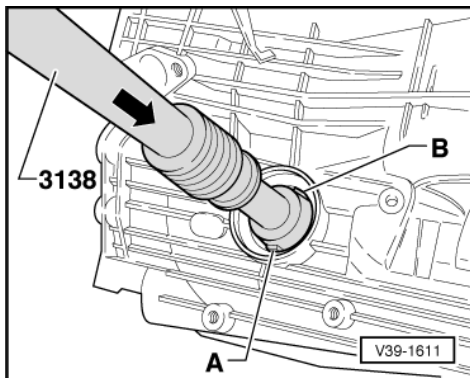
- ♦ For securing planet pinion axis shaft
- ♦ Version with annular groove:
removing and installing => Fig. 12
- ♦ Version without annular groove:
knock out with drift

16 Planet pinion

- ♦ Installing => Fig. 11

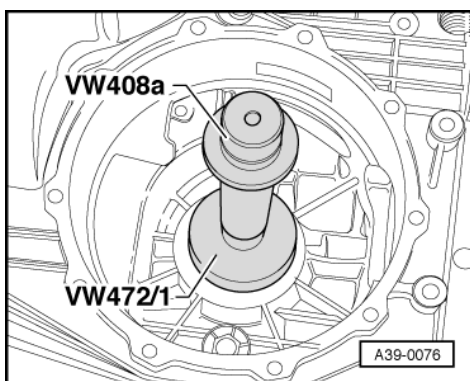
17 One-piece thrust washer

- ♦ Coat with gearbox oil when installing



-> Fig.1 Driving outer race for small taper roller bearing out of gearbox housing

- Turn webs -A- and -B- out until they sit on the outer race within the recess in gearbox.
- After removing check shims for damage.



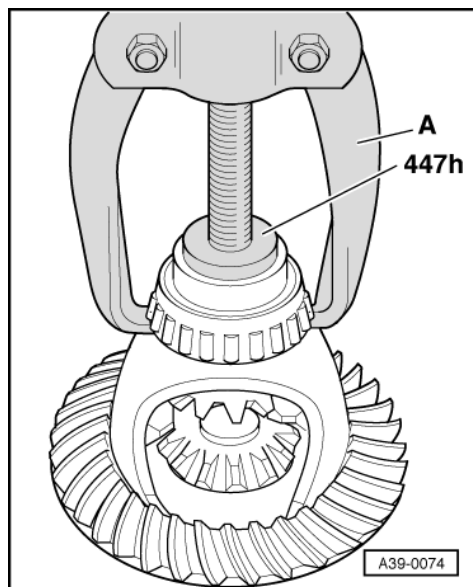
-> Fig.2 Driving small taper roller bearing outer race into gearbox housing

- Press piece VW 472/1 is fitted with the cone in the outer race.

Note:

Use thrust plate 30-205 and drift VW 295 on gearboxes which have flange shafts without polygon bearings
(=>from Page 2).

Protected by copyright. Copying for private or commercial purposes, in part or in whole, is not permitted unless authorised by AUDI AG. AUDI AG does not guarantee or accept any liability with respect to the correctness of information in this document. Copyright by AUDI AG.

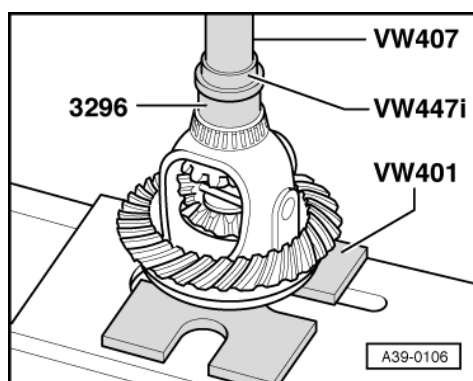


-> Fig.3 Pulling off small taper roller bearing inner race

A - Two-arm puller, e.g. Kukko 20/10 or Kukko 44/2

Notes:

- If using a puller with small-diameter spindle, also fit thrust plate 30-11 between thrust plate 447 H and puller.
- Use thrust plate 40-105 on gearboxes which have flange shafts without polygon bearings (=>from Page 2).
- There is a slot under the bearing seat in the differential housing for applying puller -A-.



-> Fig.4 Pressing on small taper roller bearing inner race

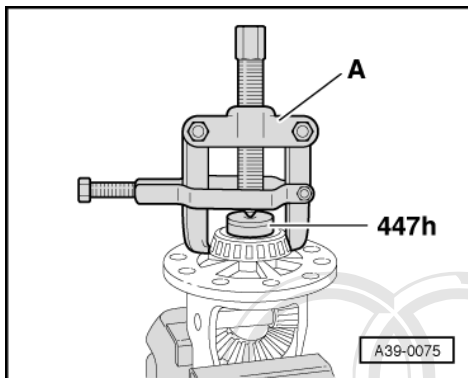
Caution
Wear protective gloves.

- Heat bearing to approx. 100 °C, fit in position and press home.

Note:

Use press tool 40-21 for gearboxes which have flange shafts without polygon bearings (=>from Page 2).

Protected by copyright. Copying for private or commercial purposes, in part or in whole, is not permitted unless authorised by AUDI AG. AUDI AG does not guarantee or accept any liability with respect to the correctness of information in this document. Copyright by AUDI AG.

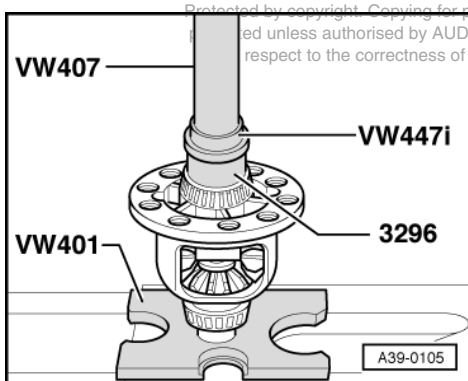


-> Fig.5 Pulling off large taper roller bearing inner race

A - Two-arm puller, e.g. Kukko 204/2

Notes:

- ◆ If using a puller with small-diameter spindle, also fit thrust plate 30-11 between thrust plate 447 H and puller.
- ◆ Use thrust plate 40-105 for gearboxes which have flange shafts without polygon bearings (=>from Page 2).
- ◆ There is a slot under the bearing seat in the differential housing for applying puller -A-.



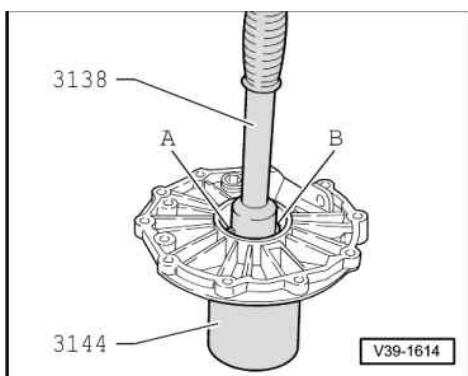
-> Fig6 Pressing on large taper roller bearing inner race

Caution
Wear protective gloves.

- Heat bearing to approx. 100 °C, fit in position and press home.

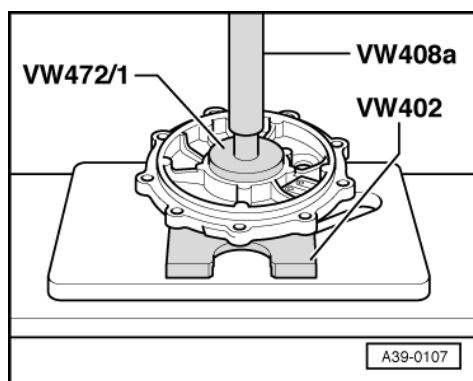
Note:

Use press tool 40-21 for gearboxes which have flange shafts without polygon bearings (=>from Page 2).



-> Fig.7 Knocking large taper roller bearing outer race out of cover

- Turn webs -A- and -B- out until they sit on the outer race within the recess in gearbox.
- After removing check shims for damage.

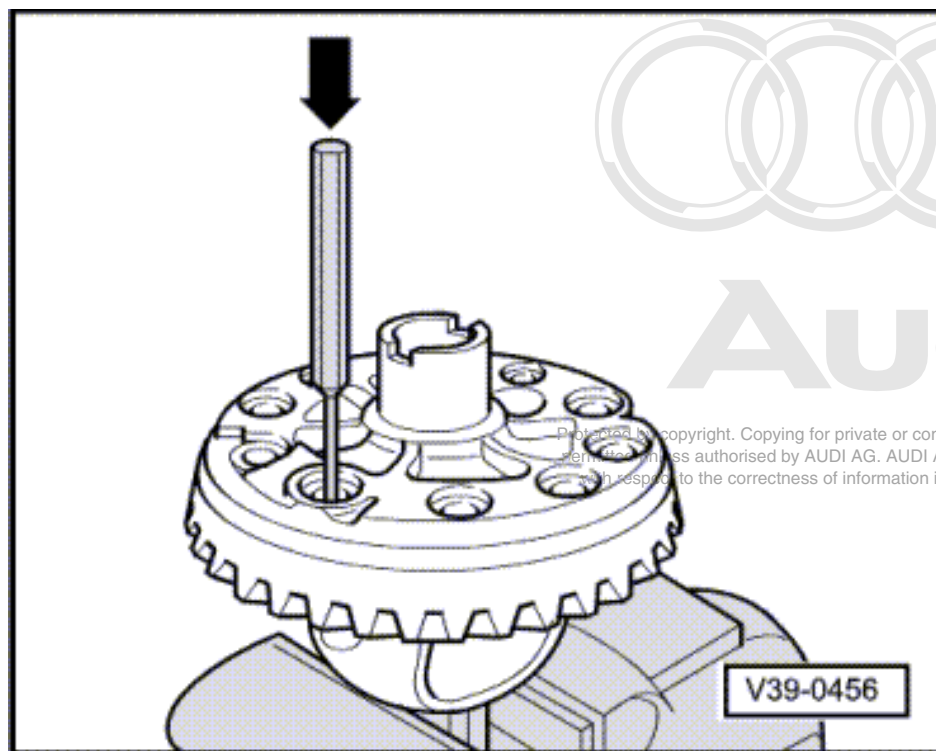


-> Fig.8 Driving large taper roller bearing outer race into cover

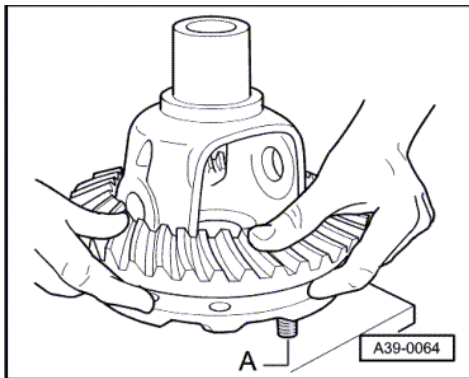
- Press piece VW 472/1 is fitted with the cone in the outer race.

Note:

Use thrust pad VW 511 and drift VW 295 for gearboxes which have flange shafts without polygon bearings
(=>from Page 2).



-> Fig.9 Driving crown wheel off housing

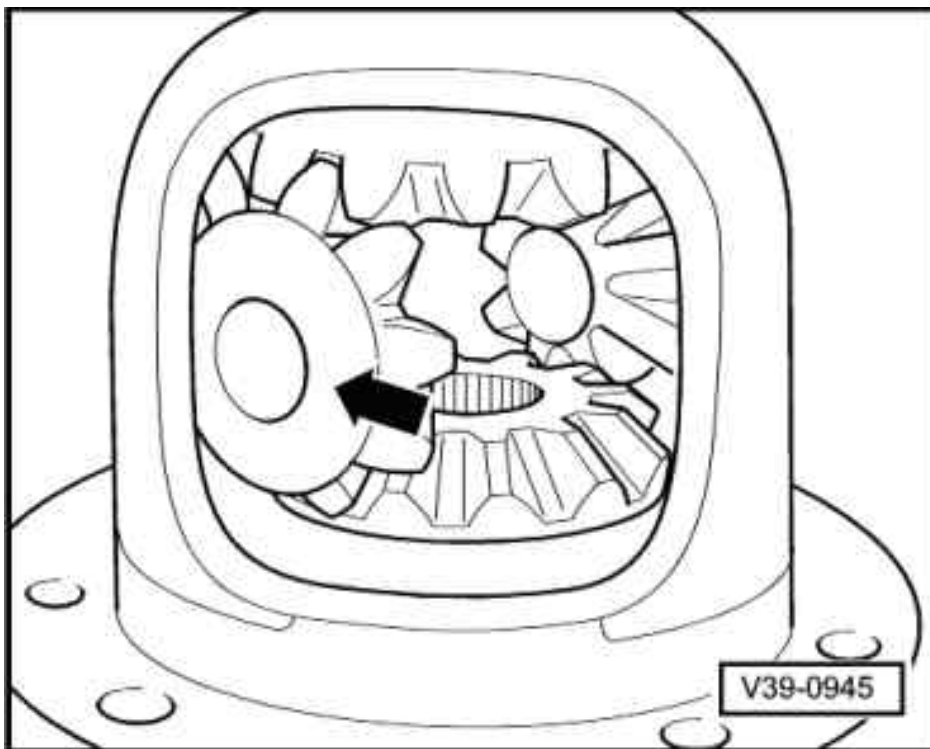


-> Fig.10 Fitting crown wheel

Protected by copyright. Copying for private or commercial purposes, in part or in whole, is not permitted unless authorised by AUDI AG. AUDI AG does not guarantee or accept any liability with respect to the correctness of information in this document. Copyright by AUDI AG.

Caution
Wear protective gloves.

- When fitting crown wheel guide centralizing pins -A- (local manufacture).
- Heat crown wheel to approx. 100 °C and install.
- Allow the crown wheel to cool off slightly before inserting the bolts. Then tighten to specified torque.

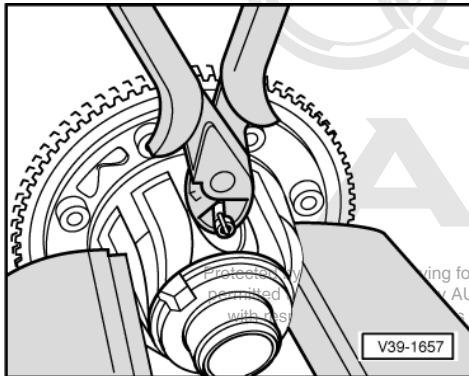


-> Fig.11 Installing sun wheels and planet pinions

- Lubricate one-piece thrust washer with gearbox oil and install.
- Insert sun wheels.
- Insert planet pinions spaced 180° apart, and then rotate into place -arrow-.



- Drive planet pinion shaft into final position and secure.



-> Fig.12 Removing and installing spring pin

Removing

- Spring pin with annular groove: pull out using side-cutting pliers.
- Spring pin without annular groove: knock out from behind using a punch.

Installing

- Drive in spring pin as far as the stop.

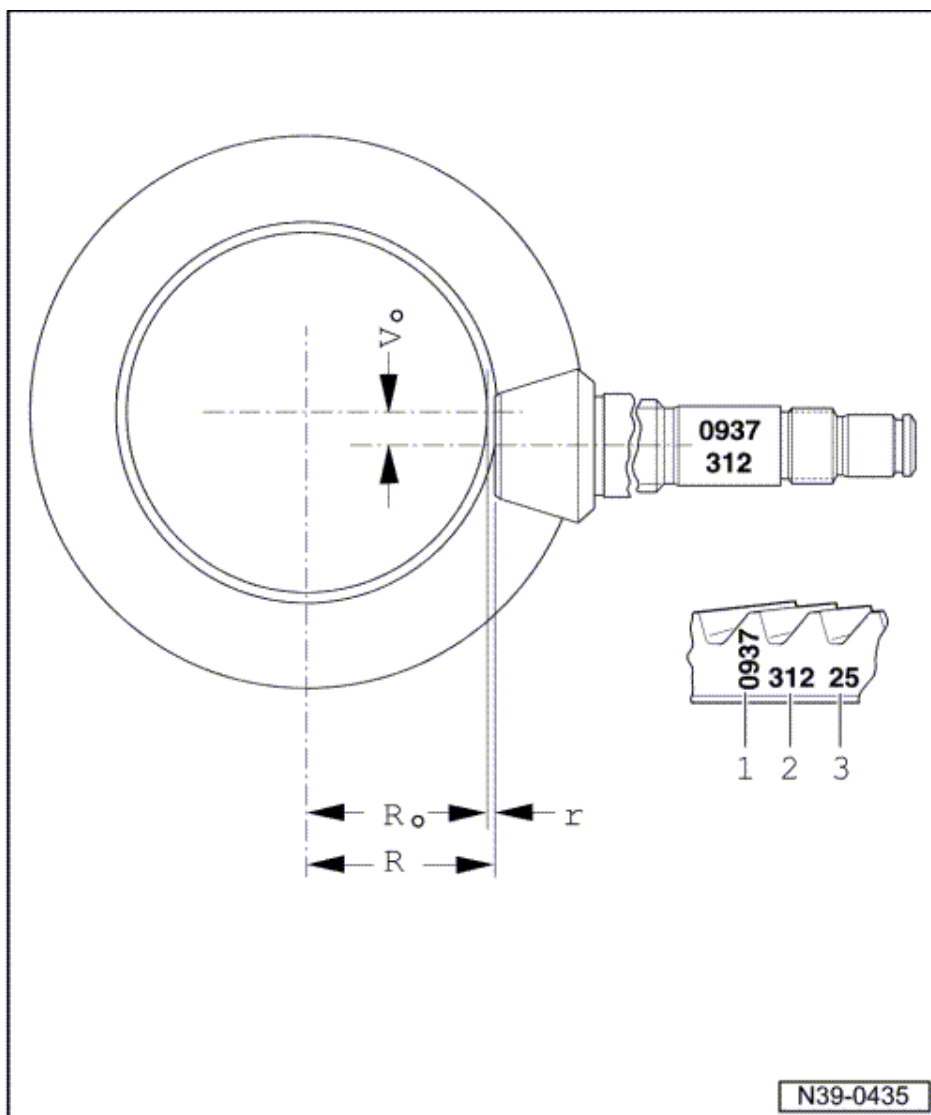
6 - Adjusting drive pinion and crown wheel

6.1 - Adjusting drive pinion and crown wheel

General notes:

- ♦ Careful adjustment of the drive pinion and crown wheel is important for the service life and smooth running of the final drive. For this reason, the drive pinion and crown wheel are matched together during manufacture, and checked to ensure a good mesh pattern and quiet running in both directions of rotation. The position of quietest running is found by moving the drive pinion in an axial direction and at the same time lifting the crown wheel out of the zero-play mesh position by the amount necessary to maintain the backlash within the specified tolerance.
- ♦ The object of the adjustment is to reproduce the setting for quietest possible running, as obtained on the test machine in production.
- ♦ The deviation (tolerance) "r", which is related to the master gauge "Ro", is measured for the final drive sets supplied as replacement parts and marked on the outer circumference of the crown wheel. The final drive set (drive pinion and crown wheel) may only be replaced together as a matched pair.
- ♦ Observe the general repair instructions for taper roller bearings and shims.
- ♦ The friction torque measurement is only used as a final check to make sure that the adjustment is correct.

6.2 - Adjusting and marking of gear sets

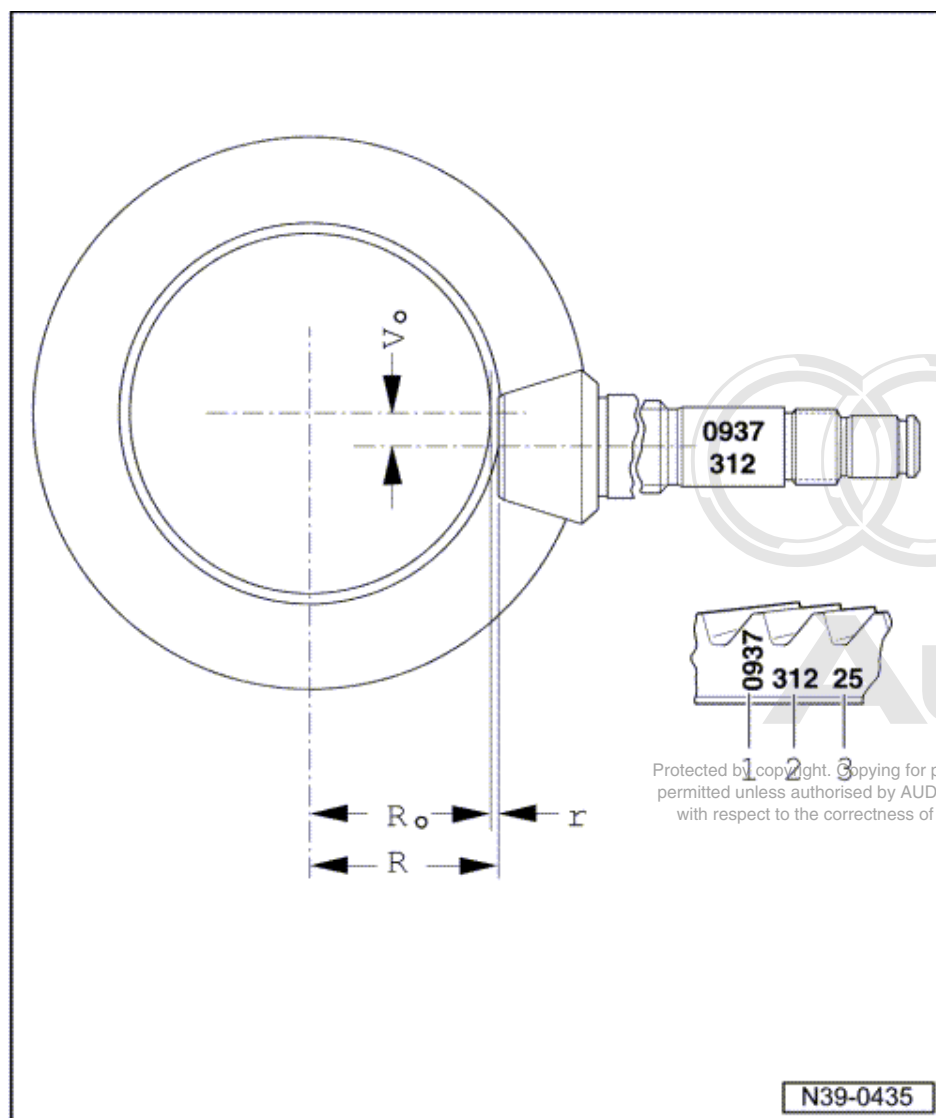


- 1 Identification "0937" signifies Oerlikon gear set with a ratio of 37:9.
- 2 Pairing number (312) of final drive set.
- 3 Deviation (tolerance) "r" is based on the test machine master gauge used in the production. The deviation "r" is always given in 1/100 mm. Example: "25" signifies $r = 0.25 \text{ mm}$

Ro - Length of test machine master gauge used.
Ro - Crown wheel $\varnothing 170 \text{ mm} = 54.95 \text{ mm}$



Protected by copyright. Copying for private or commercial purposes, in part or in whole, is not permitted unless authorised by AUDI AG. AUDI AG does not guarantee or accept any liability with respect to the correctness of information in this document. Copyright by AUDI AG.

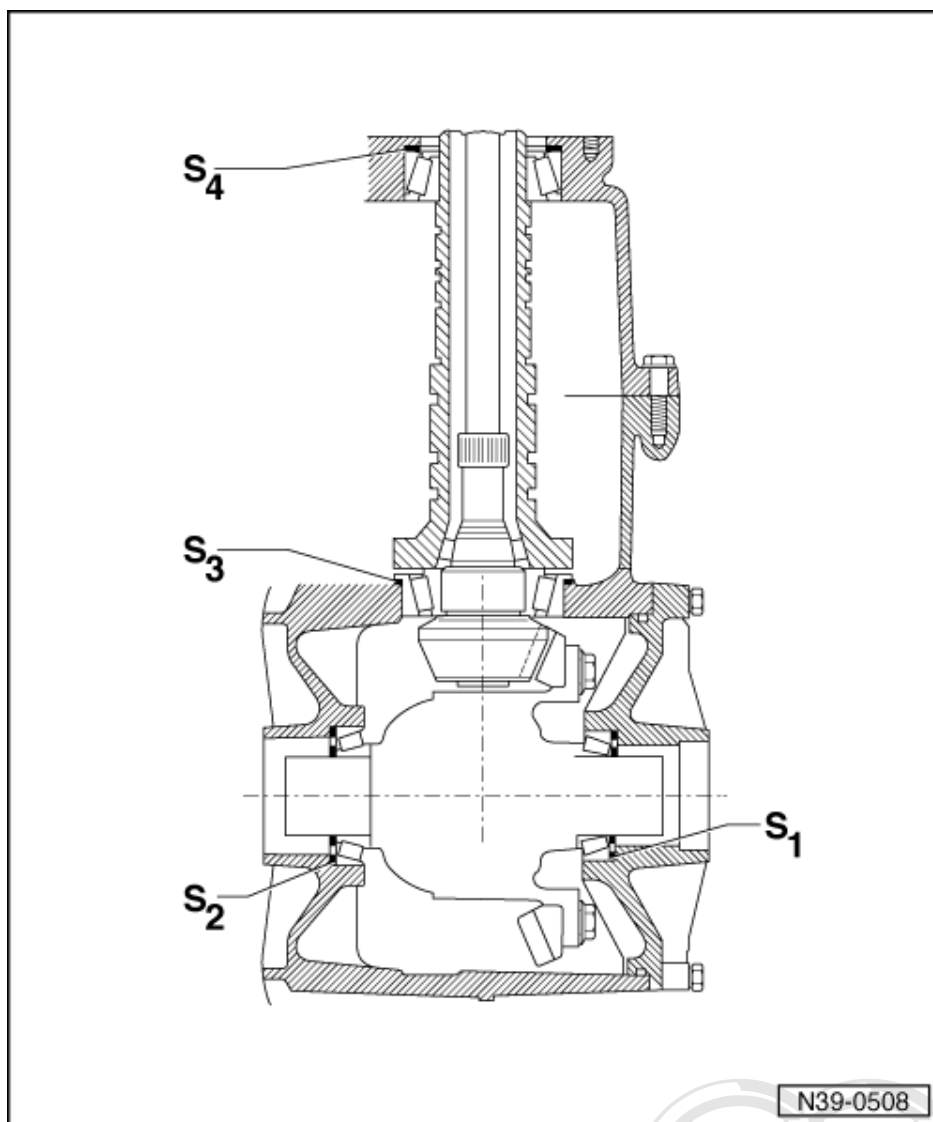


Protected by copyright. Copying for private or commercial purposes, in part or in whole, is not permitted unless authorised by AUDI AG. AUDI AG does not guarantee or accept any liability with respect to the correctness of information in this document. Copyright by AUDI AG.

R - Actual distance between crown wheel axis and face of drive pinion in position of quietest running for this gear set.

Vo - Hypoid offset

6.3 - Position of shims



Note:

Adjustment overview when renewing individual components of gearbox =>Page 165.

- S1 - Shim for crown wheel in cover for final drive
- S2 - Shim for crown wheel in gearbox housing
- S3 - Shim for drive pinion in gearbox housing
- S4 - Shim for drive pinion in gearbox cover

6.4 - Adjustment overview

Protected by copyright. Copying for private or commercial purposes, in part or in whole, is not permitted unless authorised by AUDI AG. AUDI AG does not guarantee or accept any liability with respect to the correctness of information in this document. Copyright by AUDI AG.

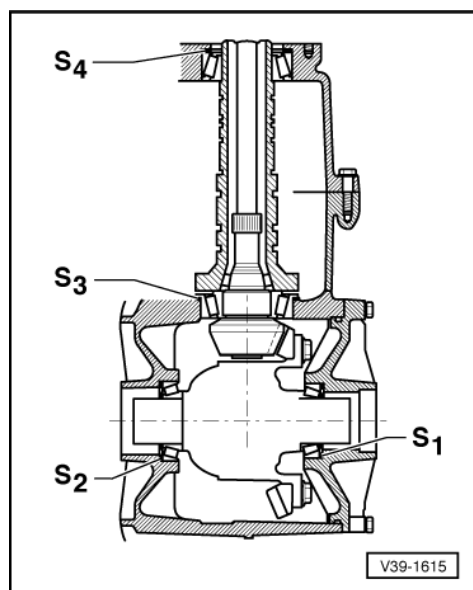
Note:

If repairs have been carried out to the gearbox, it is only necessary to adjust the drive pinion, crown wheel or final drive set if components have been renewed which have a direct effect on the adjustment of the final drive. Refer to the following table to avoid unnecessary adjustments:

Part renewed: ▼	to be adjusted:			
	Crown wheel "S1"+"S2" 1) => Page 178	Drive pinion "S3"+"S4" 1) using deviation "r" => Page 167	Drive pinion "S4" 1) => Page 177	Backlash => Page 182
Gearbox housing 3)	X	X		X
Gearbox cover			X	
Differential housing	X			X
Double taper roller bearing for drive pinion and hollow shaft		X		X
Taper roller bearing for differential	X			X
Final drive set 2)	X	X		X
Cover for differential	X			X

- 1) Shims; installation position => Page 165 .
- 2) Drive pinion and crown wheel; only renew together.
- 3) If the gearbox housing is renewed the input shaft must also be adjusted => Page 116 , adjusting input shaft.

6.5 - Recommended sequence for readjusting final drive set



-> If the drive pinion and crown wheel have to be readjusted, the following sequence is recommended for maximum efficiency:

- 1.) Determine total shim thickness "Stotal" for "S1" + "S2" (sets preload for taper roller bearings for differential) => from Page 178 .
- 2.) Determine total shim thickness "Stotal" for "S3" + "S4" (sets preload for taper roller bearings for drive pinion) => from Page 167 .

- 3.) Distribute total shim thickness "Stotal" for "S3" + "S4" so that the distance from centre of crown wheel to face of drive pinion is the same as distance "R" which was determined during production => from Page 174 .
- 4.) Distribute total shim thickness "Stotal" for "S1" + "S2" so that the specified backlash between crown wheel and drive pinion is maintained => from Page 183 .

Note:

Overview of components and shims =>Page 165 .

6.6 - Adjusting drive pinion

(Adjusting drive pinion and hollow shaft)

Repairs after which the drive pinion must be adjusted => table on Page 165

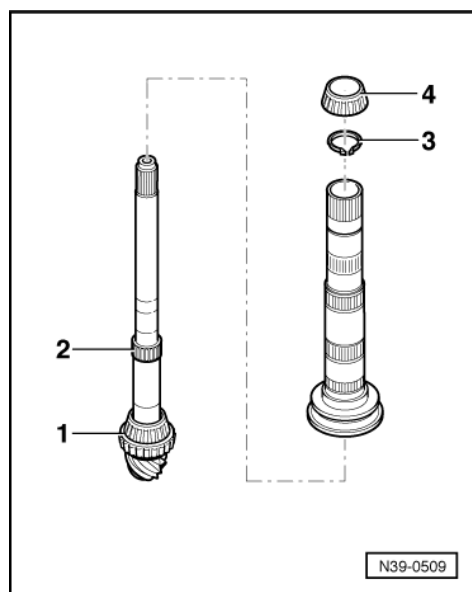
Special tools, testers and auxiliary items

- ◆ Lever VW 296
 - ◆ Universal mandrel VW 385/1
 - ◆ 2 x centring disc VW 385/3
 - ◆ Measuring plunger VW 385/14
 - ◆ Measuring plate VW 385/17
 - ◆ Master gauge VW 385/30
 - ◆ End dimension plate VW 385/33
 - ◆ Universal dial gauge bracket VW 387
 - ◆ Press plate VW 401
 - ◆ Press tool VW 407
 - ◆ Tube VW 519
-
- ◆ Fitting tool VW 792
 - ◆ Thrust pad 3062
 - ◆ Sleeve 3182
 - ◆ Torque gauge 0 ... 600 Ncm
 - ◆ Dial gauge
 - ◆ Dial gauge extension 6.5 mm
 - ◆ Dial gauge extension 30 mm

Determining total shim thickness "Stotal" for shims "S3" + "S4"

(Setting preload of taper roller bearing for drive pinion with hollow shaft)

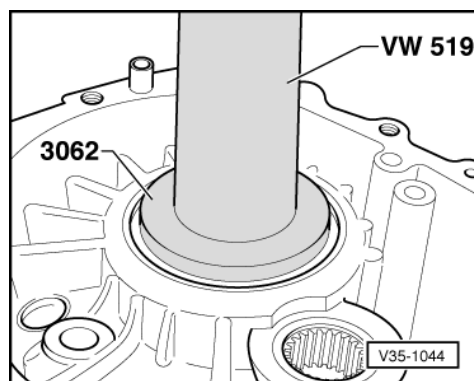
- Differential removed



- -> Press double taper roller bearing inner race -1- onto drive pinion and secure in place => from Page 118 .
- Fit needle bearing -2-.
- Fit circlip -3- onto hollow shaft and press on taper roller bearing inner race -4- => from Page 118 .
- Fit drive pinion in hollow shaft.

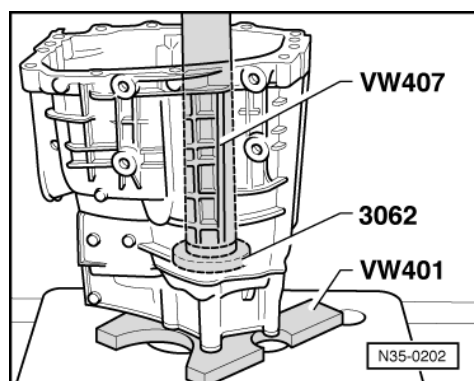
Note:

The hollow shaft is shown in the illustration without gears. The adjustment of the drive pinion can be performed either with or without the gears fitted.



- -> Fit double taper roller bearing outer race for drive pinion in gearbox housing without shims => Fig. 129 .

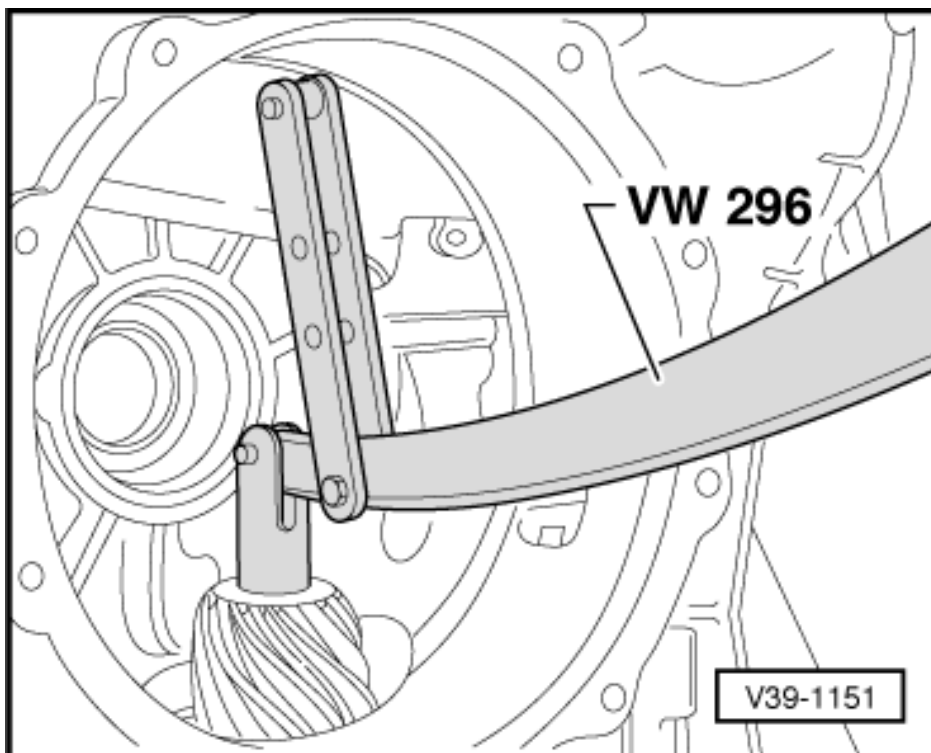
Protected by copyright. Copying for private or commercial purposes, in part or in whole, is not permitted unless authorised by AUDI AG. AUDI AG does not guarantee or accept any liability with respect to the correctness of information in this document. Copyright by AUDI AG.



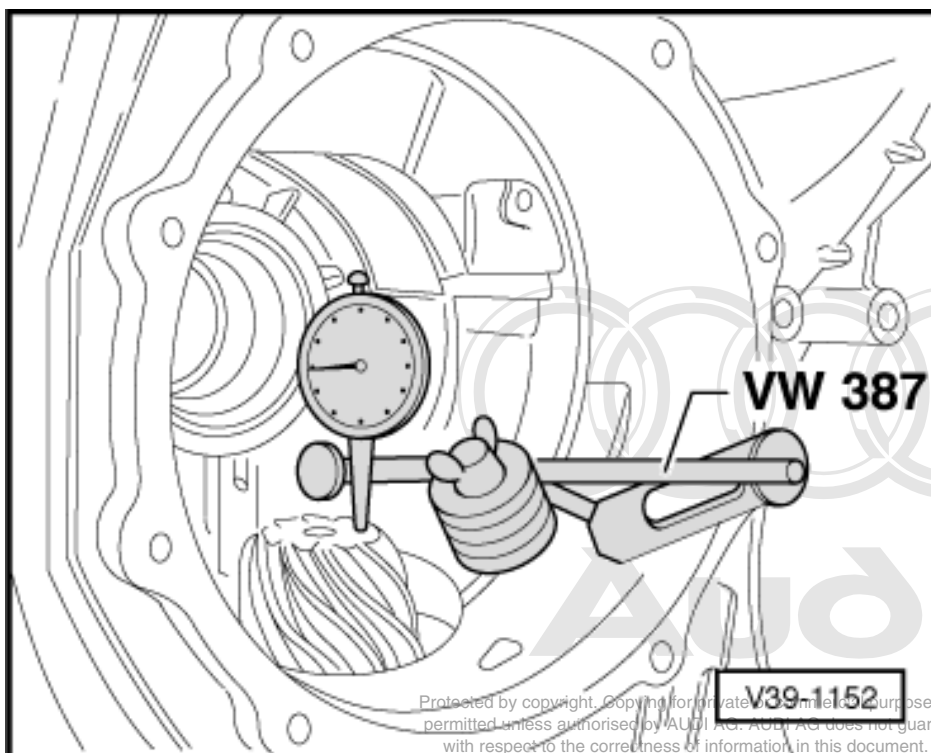
- -> Fit taper roller bearing outer race for drive pinion in gearbox cover with shim "S4*" (1.0 mm thick) => Fig. 130 .

Notes:

- ♦ A shim "S4" with a thickness of 1.0 mm is fitted for initial measurements. It is referred to below as "S4*". When measurement "e" has been determined, the correct shim "S4" with the final thickness will be installed in place of "S4*".
- ♦ When taking measurements, always fit the rubber washer together with the ring for the rubber washer => Page 127 .
- Fit fully assembled drive pinion with hollow shaft into gearbox housing.



- Fit gearbox cover and tighten bolts to 22 Nm.
- Turn gearbox so that the gearbox cover is downwards.
- -> Press down on face of drive pinion with lever VW 296 until the taper roller bearing outer race contacts gearbox cover.
- While still maintaining pressure, rotate the drive pinion 5 turns in each direction in relation to the hollow shaft to settle the double taper roller bearing.
- Then rotate the drive pinion together with the hollow shaft 5 turns in each direction to settle the taper roller bearing.



- -> Assemble measuring equipment, use a 30 mm dial gauge extension.

Protected by copyright. Copying for private or commercial purposes, in part or in whole, is not permitted unless authorised by AUDI AG. AUDI AG does not guarantee or accept any liability with respect to the correctness of information in this document. Copyright by AUDI AG.

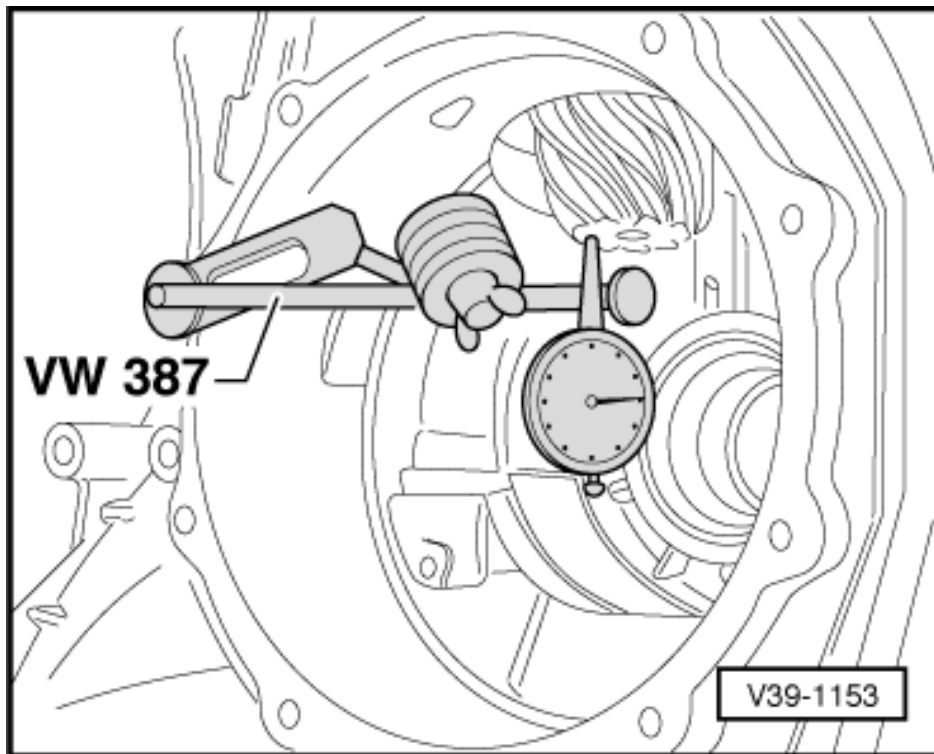


- Set dial gauge (3 mm measuring range) to "0" with 1 mm preload.

Note:

The dial gauge extension must contact the machined surface on the face of the pinion.

- Turn gearbox 180° so that the gearbox cover is upwards.



- Rotate drive pinion together with hollow shaft 5 turns in each direction to settle the taper roller bearing. The measurement will otherwise not be correct.
- -> Read off and note the play indicated on the dial gauge.
 - Measurement in example: 0.45 mm

Note:

If the measurement has to be repeated, first rotate the drive pinion with hollow shaft again 5 turns in each direction to settle the taper roller bearing. Then set the dial gauge to "0" again with 1 mm preload.

Formula:

$$\text{"Stotal"} = \text{"S4*"} + \text{measurement} + \text{bearing preload}$$

Example:

Inserted shim "S4*"	1.00 mm
+ Measurement (example)	0.45 mm
+ Bearing preload (constant)	0.15 mm
= Total shim thickness "Stotal" for "S3" + "S4"	1.60 mm

Protected by copyright. Copying for private or commercial purposes, in part or in whole, is not permitted unless authorised by AUDI AG. AUDI AG does not guarantee or accept any liability with respect to the correctness of information in this document. Copyright by AUDI AG.

Determining thickness of shim "S3*"

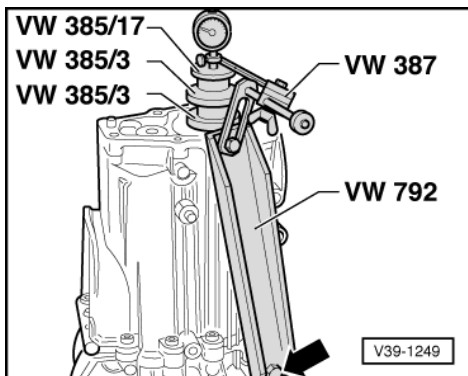
Formula:

$$\text{"S3*"} = \text{"Stotal"} - \text{"S4*"} - \text{bearing preload}$$

Example:

Total shim thickness "Stotal" for "S3" + "S4"	1.60 mm
- Inserted shim "S4"	1.00 mm
= Thickness of shim "S3"	0.60 mm

- Remove double taper roller bearing outer race, fit shim "S3" in gearbox housing and install outer race again => Fig. 129.
- Insert completely assembled drive pinion into gearbox housing again.
- Fit gearbox cover and tighten bolts to 22 Nm.
- To settle the taper roller bearings: rotate drive pinion together with hollow shaft 5 turns in each direction, then rotate drive pinion separately in relation to hollow shaft 5 turns in each direction.



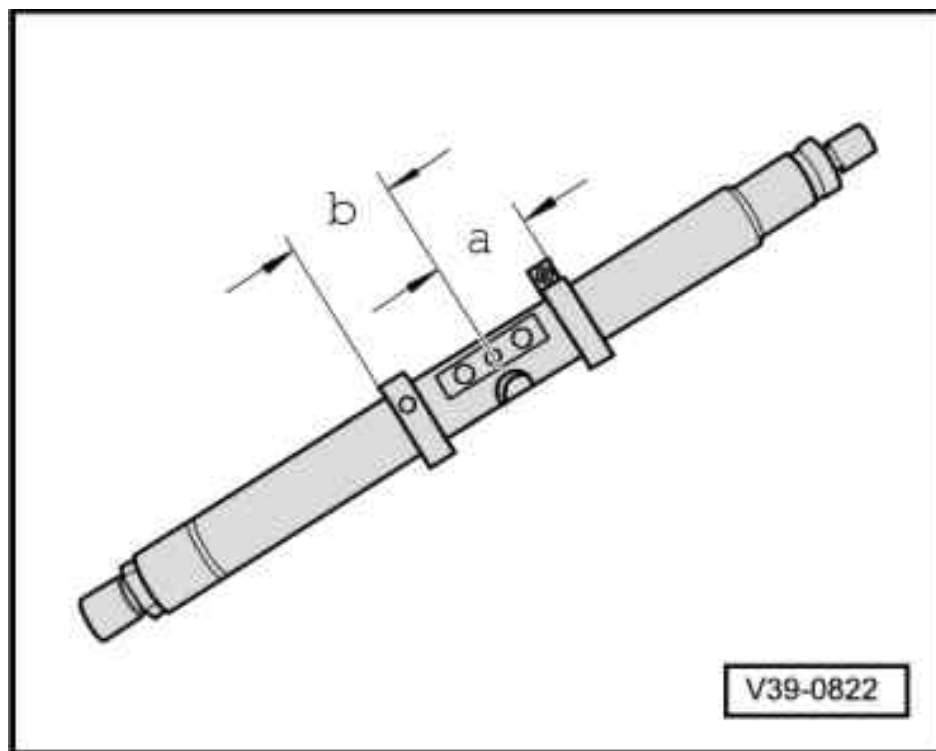
- -> Fit measuring tools and secure with bolt (arrow) to gearbox housing.
- Set dial gauge (3 mm measuring range) to "0" with 2 mm preload.
- Loosen gearbox cover bolts and turn drive pinion several times.
- If the correct shims have been selected the dial gauge will now indicate the following value:
 - 0.05 ... 0.15 mm
- Tighten gearbox cover bolts again to 22 Nm.
- Remove measuring tools.
- To settle the taper roller bearings: rotate drive pinion together with hollow shaft 5 turns in each direction, then rotate drive pinion separately in relation to hollow shaft 5 turns in each direction.



Protected by copyright. Copying for private or commercial purposes, in part or in whole, is not permitted unless authorised by AUDI AG. AUDI AG does not guarantee or accept any liability with respect to the correctness of information in this document. Copyright by AUDI AG.



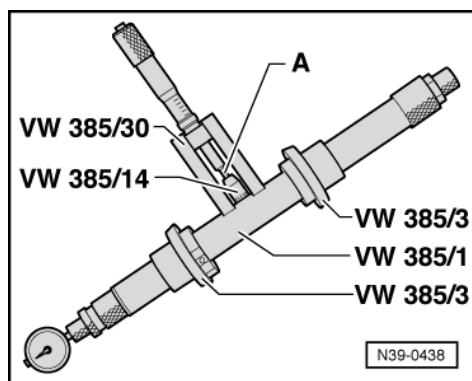
Determining measurement "e"



Note:

Measurement "e" is required to determine the final shim thickness of "S3" and "S4".

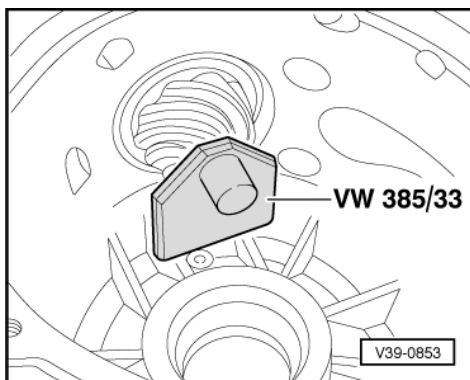
- -> Set adjustment rings of universal mandrel VW 385/1 to the following measurements:
 - Distance a = 35 mm
 - Distance b = 75 mm



- -> Assemble universal mandrel VW 385/1 as illustrated:
 - Dial gauge extension -A-, 6.5 mm long
 - Master gauge VW 385/30
- Set master gauge VW 385/30 to $R_o = 54.95$ mm (for 170 mm dia. crown wheel) and fit on universal mandrel.
- Set dial gauge (3 mm measuring range) to "0" with 2 mm preload.



Protected by copyright. Copying for private or commercial purposes, in part or in whole, is not permitted unless authorised by AUDI AG. AUDI AG does not guarantee or accept any liability with respect to the correctness of information in this document. Copyright by AUDI AG.

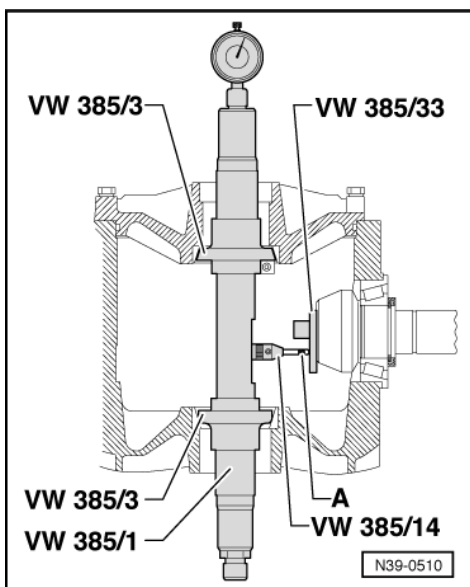


- -> Place end measuring plate on face of drive pinion.

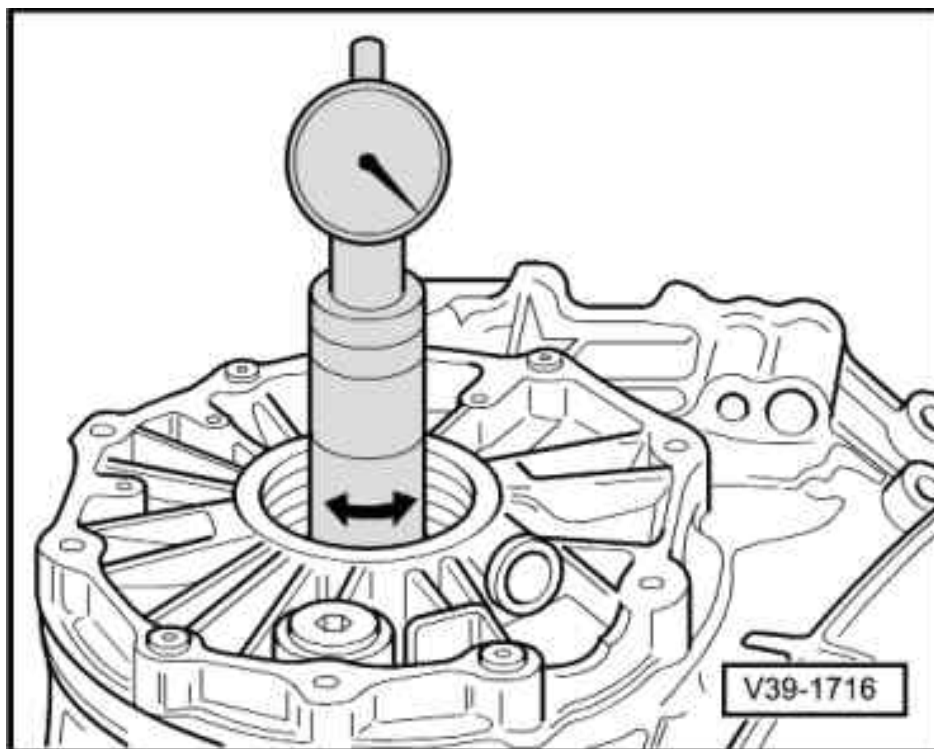
Note:

Ensure plate contact surface fits exactly and is free of oil.

protected by copyright. Copying for private or commercial purposes, in part or in whole, is not permitted unless authorised by AUDI AG. AUDI AG does not guarantee or accept any liability with respect to the correctness of information in this document. Copyright by AUDI AG.



- -> Remove master gauge and insert measuring mandrel in the housing.
- Dial gauge extension -A- = 6.5 mm long must be fitted.
- The centring disc 385/3 faces towards cover for final drive
- Fit cover for final drive and tighten 4 bolts to 22 Nm.
- Using the adjustable ring, pull 2nd centring disc VW 385/3 out as far as possible so that the mandrel can still just be turned by hand.



- -> Turn mandrel until the dial gauge plunger tip touches the end measuring plate on drive pinion head, then measure maximum deflection (return point).
- Measurement in following example "e" = 0.26 mm (in red scale on dial)

Note:

Then, (after removing universal mandrel) check again that the dial gauge, with master gauge VW 385/30 in place, indicates "0" with 2 mm preload, otherwise correct adjustments.

Determining thickness of shim "S3"

Formula:

$$\text{"S3"} = \text{"S3*"} + \text{"r"} + \text{"e"}$$

("e" in black scale)

or

$$\text{"S3"} = \text{"S3*"} + \text{"r"} - \text{"e"}$$

("e" in red scale)

Protected by copyright. Copying for private or commercial purposes, in part or in whole, is not permitted unless authorised by AUDI AG. AUDI AG does not guarantee or accept any liability with respect to the correctness of information in this document. Copyright by AUDI AG.

Notes:

- ♦ The deviation "r" related to the master gauge "Ro" is measured for the final drive sets supplied as replacement parts and marked on outer circumference of crown wheel.
- ♦ If measurements are obtained on red scale then subtract value "e".
- ♦ If measurements are obtained on black scale then add value "e".

Example:

Shim "S3*" already fitted	0.60 mm
+ Deviation "r"	0.38 mm
- Value measured for "e" (red scale)	0.26 mm
= Thickness of shim "S3"	0.72 mm

- Determine shim(s) as accurately as possible from table. Part numbers

=> Parts catalogue

The following shims are available for "S3"

Shim thickness (mm) 1)		
0.40	0.55	0.70
0.45	0.60	0.75
0.50	0.65	

1) Using the shim tolerance variations it is possible to find the exact shim thickness required, insert two shims if necessary.

Determining thickness of shim "S4"

Formula:	
"S4"	= "Stotal" - "S3"

Example:	
Total shim thickness "Stotal" for "S3" + "S4"	1.60 mm
- Thickness of shim "S3"	0.72 mm
= Thickness of shim "S4"	0.88 mm

Protected by copyright. Copying for private or commercial purposes, in part or in whole, is not permitted unless expressly permitted by AUDI AG. AUDI AG does not guarantee or accept any liability with respect to the correctness of information in this document. Copyright by AUDI AG.

- Determine shim(s) as accurately as possible from table. Part numbers

=> Parts catalogue

Available shims for "S4"

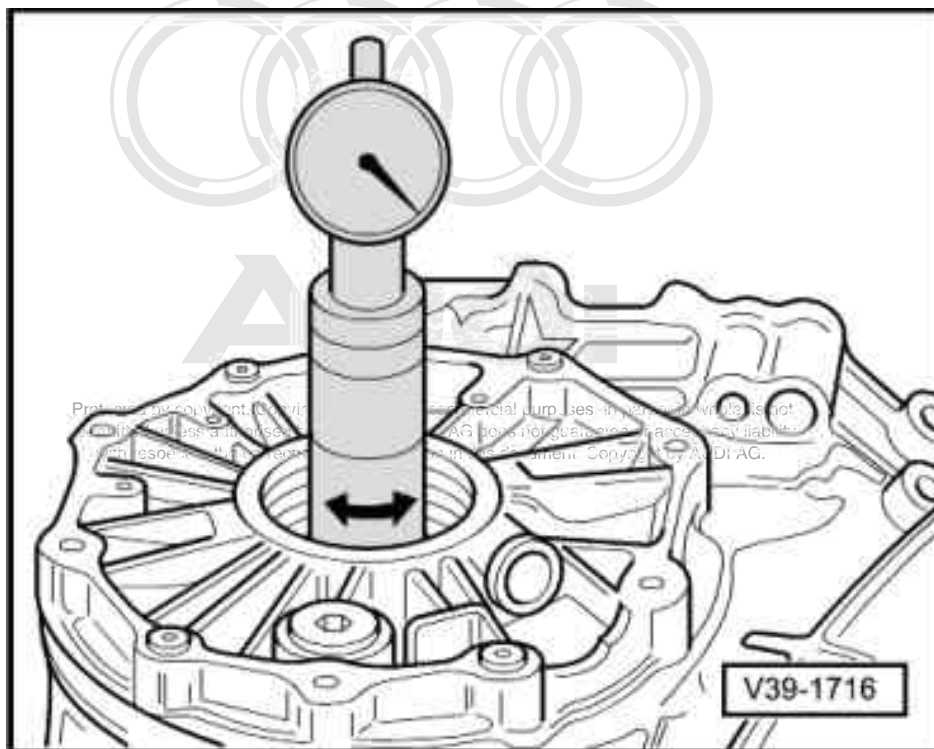
Shim thickness (mm) 1)		
0.45	0.65	0.85
0.50	0.70	0.90
0.55	0.75	
0.60	0.80	

1) Using the shim tolerance variations it is possible to find the exact shim thickness required, insert two shims if necessary.

Performing check measurement

Checking dimension "r"

- Install drive pinion and hollow shaft with shims "S3" and "S4" which have been measured.
- Turn hollow shaft against drive pinion five turns in both directions so that the taper roller bearings settle.
- Turn drive pinion with hollow shaft five turns in both directions so that the taper roller bearings settle.



- -> Insert universal mandrel, => "determining measurement 'e'" on Page 172 and perform check measurement.
- Read off dial gauge anti-clockwise (red scale).
 - If the shims have been correctly selected, the deviation "r" (marked on outer circumference of crown wheel) must be shown - within a tolerance of ± 0.04 mm

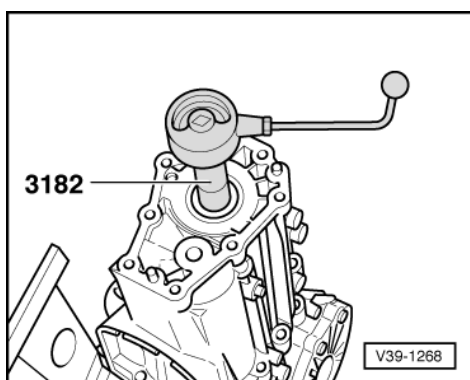
Notes:

Then, (after removing universal mandrel) check again that the dial gauge, with master gauge VW 385/30 in place, indicates "0" with 2 mm preload, otherwise correct adjustments.

Measuring friction torque (check)

Notes:

- ♦ Drive pinion/hollow shaft tapered roller bearings are low friction bearings. Therefore the friction torque has only a limited use as a check. Correct adjustment is only possible by determining the total shim thickness "Stotal".
- ♦ Do not additionally oil new tapered roller bearing to perform the friction torque measurement. These bearings have already been treated with a special oil by the manufacturer.



- -> Fit torque gauge 0 ... 600 Ncm on drive pinion.
- Read off friction torque.

Friction torque specification:

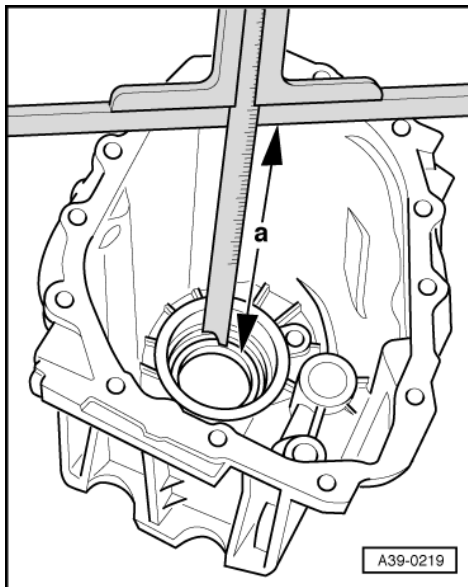
New bearings	Used bearings
150 ... 250 Ncm	30 ... 60 Ncm

6.7 - Re-determining "S4" shim when fitting new gearbox cover

Special tools, testers and auxiliary items

- ◆ 2 x centring disc VW 385/3
- ◆ Measuring plate VW 385/17
- ◆ Universal dial gauge bracket VW 387
- ◆ Fitting tool VW 792
- ◆ Dial gauge
- ◆ Dial gauge extension
- ◆ Depth gauge (accurate to within 5/100 mm or less)

Protected by copyright. Copying for private or commercial purposes, in part or in whole, is not permitted unless authorised by AUDI AG. AUDI AG does not guarantee or accept any liability with respect to the correctness of information in this document. Copyright by AUDI AG.



- Clean housing flange.
- -> Measure difference in depth "a" on old and new gearbox cover.

Example:

Depth "a" (old gearbox cover)	257.40 mm
Depth "a" (new gearbox cover)	257.55 mm
= Difference	0.15 mm

- Install thicker shim "S4" if the new gearbox cover is deeper.
- Install thinner shim "S4" if the old gearbox cover is deeper.

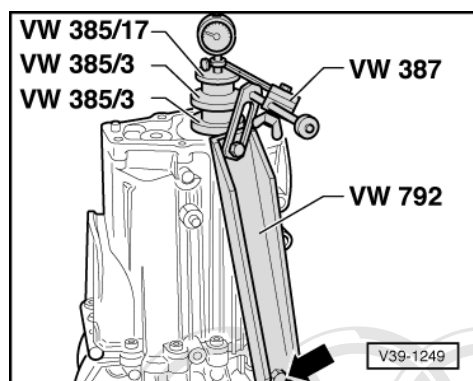
Example:

Previous "S4" shim	0.95 mm
+ Difference	0.15 mm
= New "S4" shim	1.10 mm

Available shims =>Table Page 175 .

- Install taper roller bearing outer race with "S4" shim in gearbox cover
=> Fig. 130 .

- Insert completely assembled drive pinion into gearbox housing again.
- Fit gearbox cover and tighten bolts to 22 Nm.
- To settle the taper roller bearings: rotate drive pinion together with hollow shaft 5 turns in each direction, then rotate drive pinion separately in relation to hollow shaft 5 turns in each direction.



- -> Fit measuring tools and secure with bolt (arrow) to gearbox housing.
- Set dial gauge (3 mm measuring range) to "0" with 2 mm preload.
- Loosen gearbox cover bolts and turn drive pinion several times.
- If the correct shims have been selected the dial gauge will now indicate the following value:
 - 0.05 ... 0.15 mm

If this reading is not obtained, the adjustment must be corrected.

6.8 - Adjusting crown wheel

Protected by copyright. Copying for private or commercial purposes, in part or in whole, is not permitted without the express authorisation by AUDI AG. AUDI AG does not guarantee or accept any liability with respect to the correctness of information in this document. Copyright by AUDI AG.

The table on Page 165 lists the repairs after which the crown wheel has to be adjusted.

Special tools, testers and auxiliary items

- ♦ Dial gauge extension VW 382/10
- ♦ Measuring plate VW 385/17
- ♦ Drive pinion clamp VW 386 A
- ♦ Universal dial gauge bracket VW 387
- ♦ Measuring lever VW 388
- ♦ Press plate VW 402
- ♦ Press tool VW 408 A
- ♦ Thrust piece VW 472/1
- ♦ Crown wheel adjusting device VW 521
- ♦ Torque gauge 0 ... 600 Ncm
- ♦ Dial gauge
- ♦ Dial gauge extension 30 mm

Determining total shim thickness "Stotal" for shims "S1" + "S2"

(Setting preload of taper roller bearing for differential)

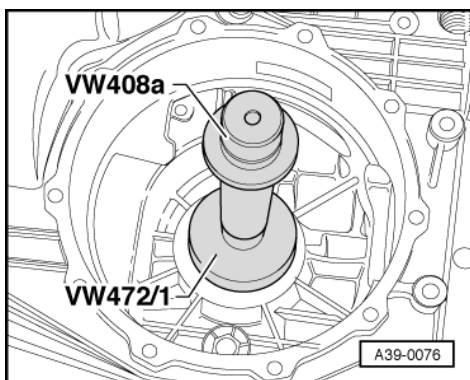
- Drive pinion removed

Note:

If only the taper roller bearings for the differential are being renewed, the crown wheel can be removed from the differential housing so the drive pinion does not have to be removed.

- Remove seal and outer races of both taper roller bearings for differential.

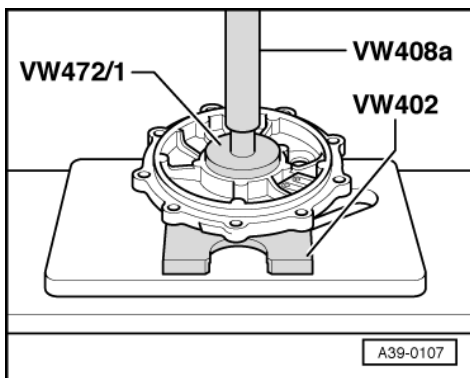
- Remove shims => Page **153** .



- -> Knock taper roller bearing outer race (small) with shim "S2" into gearbox housing =>Fig. **157** . A shim "S2*" with a thickness of 1.20 mm (two 0.60 mm shims) is used for the initial measurement.

Note:

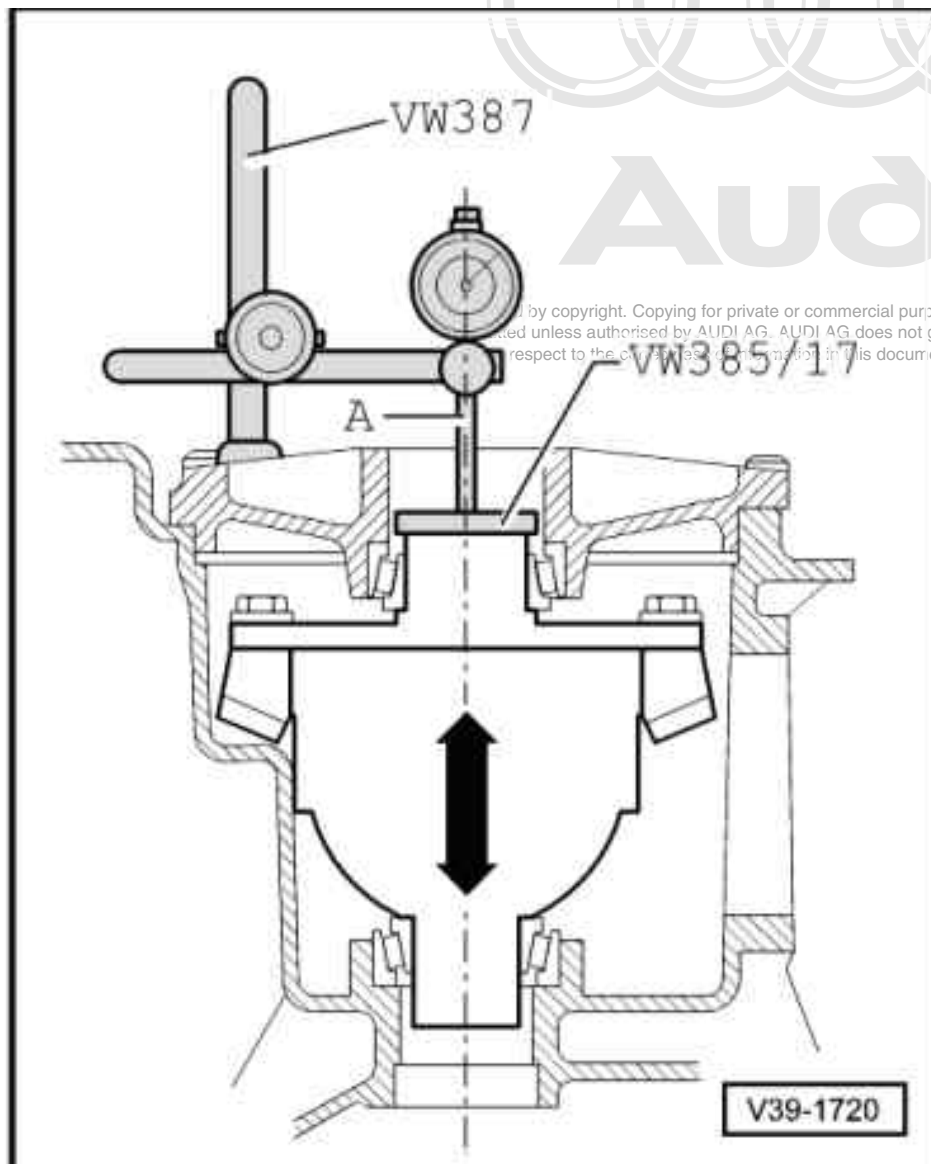
For measurement purposes a shim "S2" of 1.20 mm is initially inserted which is designated "S2" in the following. After determining backlash, "S2*" will be replaced by the correct shim "S2".*



- -> Press taper roller bearing outer race into cover for differential without shim "S1" =>Fig. **160** .
- Insert differential without drive wheel for speedometer sender -G22 into gearbox housing. The crown wheel is positioned on the left-hand side (same side as cover for final drive).
- Install cover for differential with 4 bolts (25 Nm).
- Position gearbox so that the cover for differential faces up.



Protected by copyright. Copying for private or commercial purposes, in part or in whole, is not permitted unless authorised by AUDI AG. AUDI AG does not guarantee or accept any liability with respect to the correctness of information in this document. Copyright by AUDI AG.



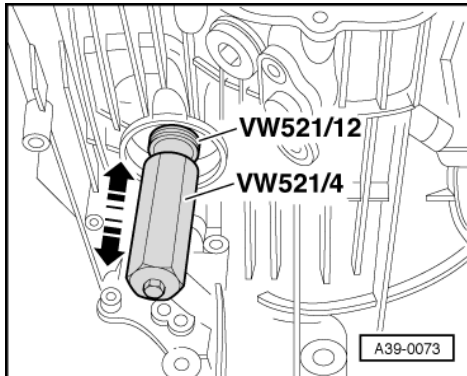
- Turn differential 5 turns in both directions so that the taper roller bearings settle.
- -> Assemble measuring equipment, use a 30 mm dial gauge extension.
- Set dial gauge (3 mm measuring range) -A- to "0" with 2 mm preload.

Note:

The tip of the dial gauge must be positioned on centre of differential.

- Lift differential, without turning, and read off play on dial gauge.
- Measurement in following example: 0.62 mm.

Notes:



- ♦ -> To lift the differential, attach special tools VW 521/4 and VW 521/8 (for gearbox without polygon bearings) or VW 521/12 (for gearbox with polygon bearings) on the right of the differential (housing side).
- ♦ If the measurement has to be repeated, the differential must be turned 5 turns in each direction first to settle the taper roller bearings.

Formula:
"Stotal" = "S2*" + measurement + bearing preload

Example:	
Inserted shim(s) "S2*"	1.20 mm
+ Measured value	0.62 mm
+ Bearing preload (constant value)	0.30 mm
= Total thickness "Stotal" for "S1" + "S2"	2.12 mm

Protected by copyright. Copying for private or commercial purposes, in part or in whole, is not permitted unless authorised by AUDI AG. AUDI AG does not guarantee or accept any liability with respect to the correctness of information in this document. Copyright by AUDI AG.

Determining thickness of shim "S1*"

Notes:

- ♦ The preliminary adjustment shim "S1*" will be replaced with the final shim "S1" after determining the backlash.
- ♦ The total shim thickness "Stotal" remains unchanged.

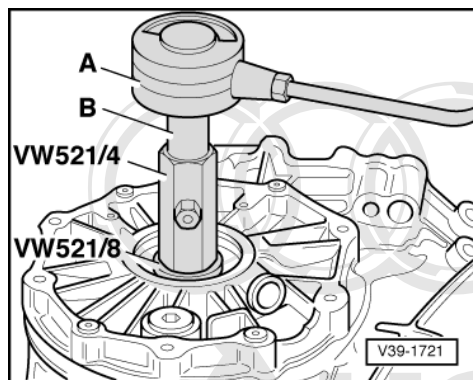
Formula:
"S1*" = "Stotal" - "S2*"

Example:	
Total thickness "Stotal" for "S1" + "S2"	2.12 mm
- Inserted shim(s) "S2*"	1.20 mm
= Thickness of shim "S1*"	0.92 mm

Measuring friction torque (check)

Notes:

- ♦ Differential tapered roller bearings are low friction bearings. Therefore the friction torque only has a limited use as a check. Correct adjustment is only possible by determining the total shim thickness "Stotal".
- ♦ Do not additionally oil new taper roller bearings for friction torque measurement. The bearings have already been treated with a special oil by the manufacturer.
- Drive pinion removed



- -> Fit torque gauge -A- (0 ... 600 Ncm) onto differential. (Use VW 521/8 for gearbox without polygon bearings, and VW 521/12 for gearbox with polygon bearings.)

B. Socket

Protected by copyright. Copying for private or commercial purposes, in part or in whole, is not permitted unless authorised by AUDI AG. AUDI AG does not guarantee or accept any liability for the correctness of the information in this document. Copyright by AUDI AG.

- Read off friction torque:

Friction torque specifications:

New bearings	Used bearings
150 ... 350 Ncm	30 ... 60 Ncm

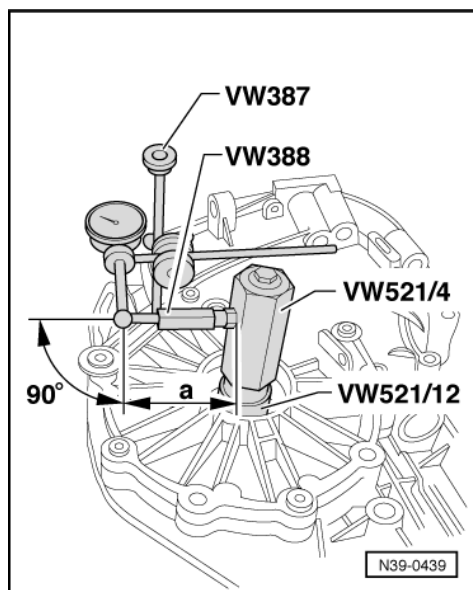
Note:

If the final drive set (drive pinion and crown wheel) is being re-adjusted, the adjustment of the drive pinion should be performed now, and the adjustment checked =>Page 167.

Measuring backlash

(Position of crown wheel in gearbox housing)

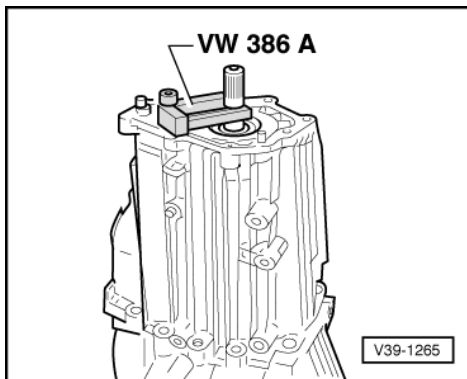
- Drive pinion with shims "S3*" and "S4*" fitted
- Install differential.
- Turn the differential 5 turns in each direction to settle the taper roller bearings.



- -> Secure dial gauge retainer VW 387 onto housing.
- Attach crown wheel adjusting device VW 521/4 and VW 521/8 (on gearbox without polygon bearings), or VW 521/12 (on gearbox with polygon bearings).

- Fit dial gauge with dial gauge extension VW 382/10 (6 mm flat).
- Adjust measuring lever VW 388 to distance "a" = 67 mm (for 170 mm dia. crown wheel).
- Determine play between the teeth flanks as follows:
 - Turn crown wheel until it makes contact with a tooth flank (end of backlash travel).
 - Set dial gauge to "0" with 2 mm preload.
 - Turn crown wheel back until lying against an opposite tooth flank (backlash).
 - Read off backlash and note value.
 - Turn crown wheel through 90° and repeat measurements a further 3 times.

Notes:



- ♦ -> If the drive pinion rotates when the differential is turned, fit clamp VW 386A so that the backlash can be measured exactly.
- ♦ Loosen the clamp in order to turn the crown wheel.

Determining average backlash

- Add the four measured values together and divide by four.

Example:	
1st measurement	0.28 mm
+ 2nd measurement	0.30 mm
+ 3rd measurement	0.30 mm
+ 4th measurement	0.28 mm
= Sum of measured values	1.16 mm

- Result: The average backlash is $1.16 / 4 = 0.29$ mm

Note:

If the individual measurements differ by more than 0.06 mm from each other, the installation of the crown wheel or the final drive set itself is not correct. Check installation, replace final drive set if necessary.

Determining thickness of shim "S2"

Formula:	
"S2"	= "S2*" - backlash + lift

Example:	
Inserted shim "S2"	1.20 mm
- Average backlash	0.29 mm
+ Lift (constant)	0.15 mm
= Thickness of shim "S2"	1.06 mm

- Determine shim(s) as accurately as possible from table. Part numbers



=> Parts catalogue

The following shims are available for "S2"

Shim thickness (mm) 1)		
0.45	0.65	0.85
0.50	0.70	0.90
0.55	0.75	
0.60	0.80	

1) Using the shim tolerance variations it is possible to find the exact shim thickness required, insert two shims if necessary.

Determining thickness of shim "S1"

Formula:

$$\text{"S1"} = \text{"Stotal"} - \text{"S2"}$$

Example:

Total shim thickness "Stotal" for "S1" + "S2" 2.12 mm

- Thickness of shim "S2" 1.06 mm

= Thickness of shim "S1" 1.06 mm

Protected by copyright. Copying for private or commercial purposes, in part or in whole, is not permitted unless authorised by AUDI AG. AUDI AG does not guarantee or accept any liability with respect to the correctness of information in this document. Copyright by AUDI AG.

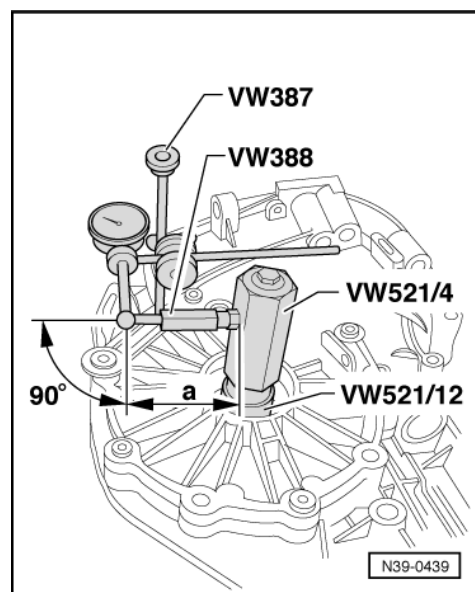
- Determine shim(s) as accurately as possible from table. Part numbers

=> Parts catalogue

The following shims are available for "S1"

Shim thickness (mm) 1)		
0.45	0.65	0.85
0.50	0.70	0.90
0.55	0.75	
0.60	0.80	

1) Using the shim tolerance variations it is possible to find the exact shim thickness required, insert two shims if necessary.



-> Performing check measurement

- After installing shims "S1" and "S2", turn differential 5 turns in both directions so that the taper roller bearings settle.
- Measure backlash four times on circumference.
 - Specifications: 0.12 ... 0.22 mm

Notes:

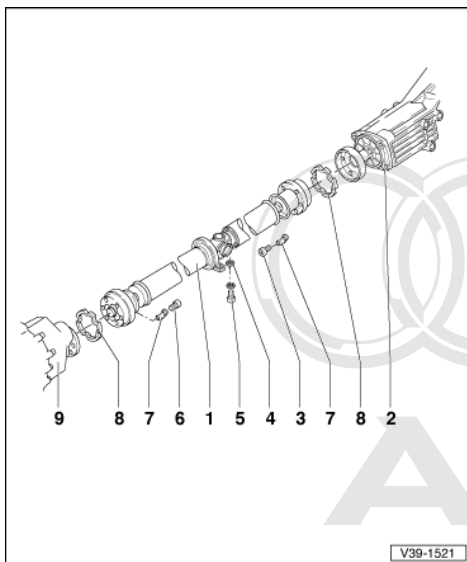
- ◆ If the backlash lies outside the tolerances, the adjustments must be repeated. But the total shim thickness "Stotal" must remain the same.
- ◆ The individual measurements must not differ by more than 0.06 mm from each other.

7 - Servicing propshaft

7.1 - Servicing propshaft

Notes:

- ◆ Observe general repair instructions => Page 10 .
- ◆ Do not bend the propshaft more than 25 ° at the central joint, otherwise the universal joint will be damaged.
- ◆ Only store and transport propshaft extended.
- ◆ No repair work can be carried out on the propshaft with the exception of removing, installing and adjusting.
- ◆ If the propshaft is only detached at the gearbox or from rear final drive then the propshaft is to be tied-up or supported at the constant velocity joint.
- ◆ Before removing, mark the position of the rear propshaft joint in relation to the flange on the rear final drive. Reinstall in the same position, otherwise this can cause excessive imbalance, bearing damage and droning noise.
- ◆ If complaints are received (noises, vibrations), it is essential to check whether correct adjustment of the propshaft rectifies the fault before replacing the propshaft.
- ◆ After removing the propshaft from the rear final drive, the additional balance disc (thick washer) that may be located between the lock plate and the bolt head must not be reinstalled.



1 Propshaft

- ◆ Adjusting => Page 192

2 Rear final drive

3 Bolt - 55 Nm

- ◆ Qty. 6
- ◆ Self-locking
- ◆ Renew
- ◆ Threads for bolts in flange shafts must always be cleaned (e.g. with a thread tap)

4 Shims

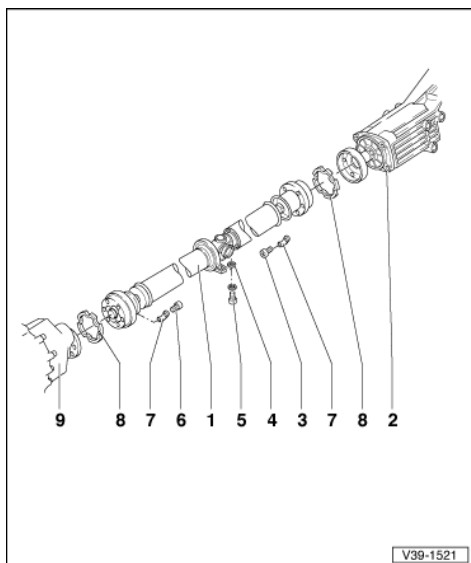
Protected by copyright. Copying for private or commercial purposes, in part or in whole, is not permitted unless authorised by AUDI AG. AUDI AG does not guarantee or accept any liability for the correctness of information in this document. Copyright by AUDI AG.



- ♦ Adjusting propshaft
=>Page 192

5 Bolt - 23 Nm

- ♦ Qty. 2



6 Bolt - 55 Nm

- ♦ Qty. 6
- ♦ Self-locking
- ♦ Renew
- ♦ Threads for bolts in flange shafts must always be cleaned (e.g. with a thread tap)

7 Lockplate

8 Gasket

- ♦ Always renew
- ♦ Pull off backing foil, and stick self-adhesive side of gasket to flange shaft.
- ♦ Remove grease from flange shaft

9 Gearbox

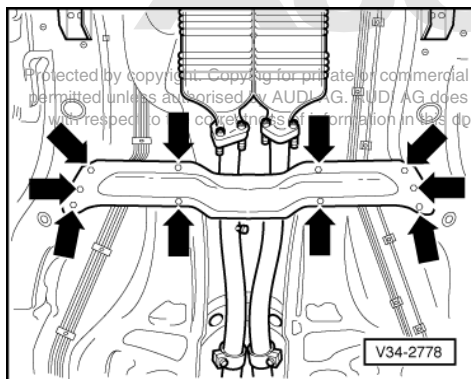
7.2 - Removing and installing propshaft

Special tools, testers and auxiliary items

- ♦ Assembly appliance3139

- Observe notes => Page 185 .

Removing



Protected by copyright. Copying for private or commercial purposes, in part or in whole, is not permitted unless authorised by AUDI AG. AUDI AG does not guarantee or accept any liability with respect to the correctness of the information in this document. Copyright by AUDI AG.

- -> Unbolt cross-piece below exhaust system -arrows-.

Vehicles with 4-cylinder engine:

- Unscrew nuts securing exhaust manifold to front exhaust pipe:

=> 4-Cylinder injection engine (2-valve), Mechanics; Repair group 26

=> 4-Cylinder injection engine (4-valve), Mechanics; Repair group 26

=> 4-Cylinder engine (5-valve), Mechanics; Repair group 26

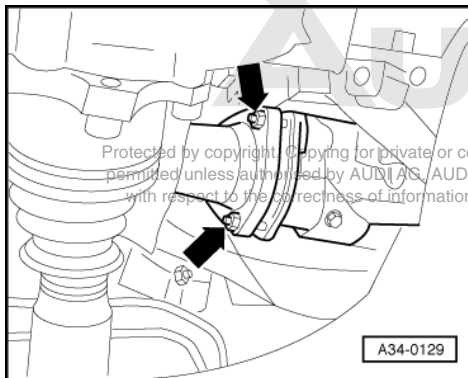
Note:

Avoid bending the flexible pipe connection too far at the front exhaust pipe. The catalytic converter must not be bent by more than 10° in relation to the front exhaust pipe, otherwise the flexible connection will be damaged.

Vehicles with 5-cylinder engine:

- Remove exhaust system (rearward of front exhaust pipe)

=> 5-Cylinder injection engine, (2-valve), Mechanics; Repair group 26



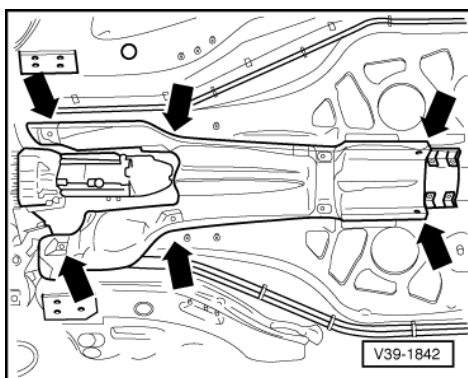
Vehicles with 6-cylinder engine:

- Detach heat shields above left and right drive shafts.
- -> Unbolt front exhaust pipes with catalytic converters from left and right exhaust manifolds (3 nuts on each side) -arrows-:

=> 6-Cylinder injection engine (2.6 ltr, 2-valve engine), Mechanics; Repair group 26

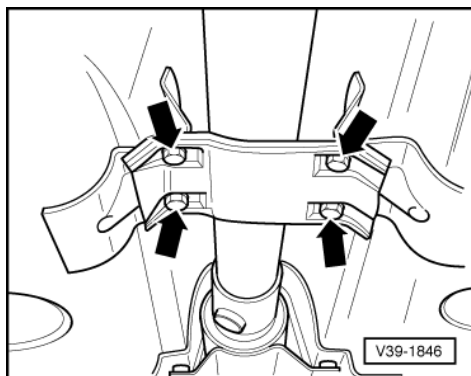
=> 5-Cylinder injection engine, (2-valve), Mechanics; Repair group 26

=> 6-Cylinder engine (5-valve), Mechanics; Repair group 26

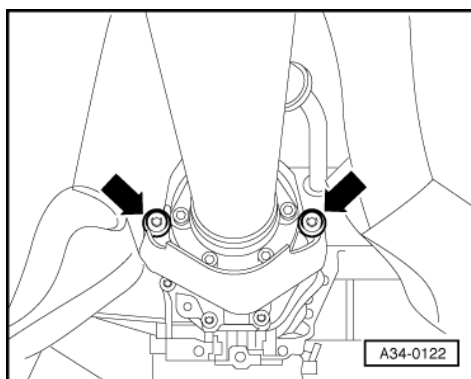


All models

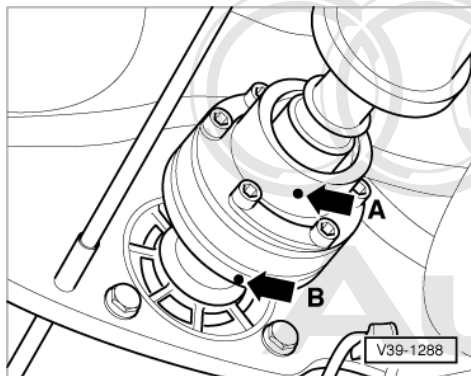
- -> Unbolt heat shield below propshaft -arrows-.



- -> Remove cross-piece (with heat shield, if fitted) below propshaft -arrows-.



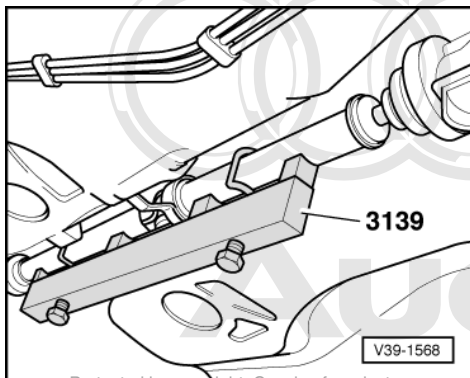
- -> Remove heat shield for propshaft from cover for Torsen differential -arrows-.



- -> Check whether there is a factory marking (paint) on the propshaft and propshaft/rear final drive flange. If not, mark position of propshaft flange -arrow A- in relation to rear final drive -arrow B- with paint.

Notes:

- ♦ Only mark the propshaft flange and rear final drive if the same propshaft is to be re-installed.
- ♦ If the propshaft has been balanced, lock plates of differing thicknesses may be installed. Mark positions before removing, and re-install in the same positions.
- Slacken securing bolts on both propshaft flanges.



- Unscrew the three upper securing bolts on each propshaft constant velocity joint.
- Loosen securing bolts of centre propshaft mounting slightly.
- -> Attach assembly appliance 3139 and tighten the plastic nuts.

Note:

Never fit assembly appliance onto balance plates.

- Remove securing bolts of flange to gearbox and to rear final drive as well as securing bolts of centre propshaft mounting.
- Slide propshaft together towards rear final drive. The constant velocity joints move along their axes.
- Guide out propshaft with assembly appliance past gearbox flange.

Note:

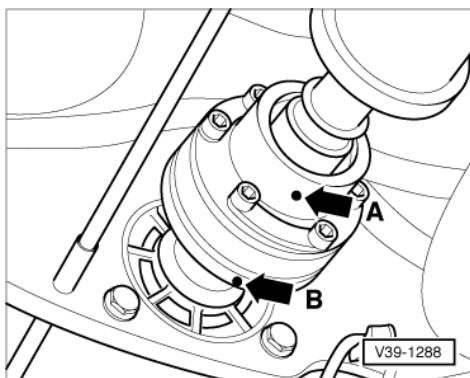
Only transport and store propshaft when extended.

Installing

Installation is carried out in the reverse order, when doing this note the following:

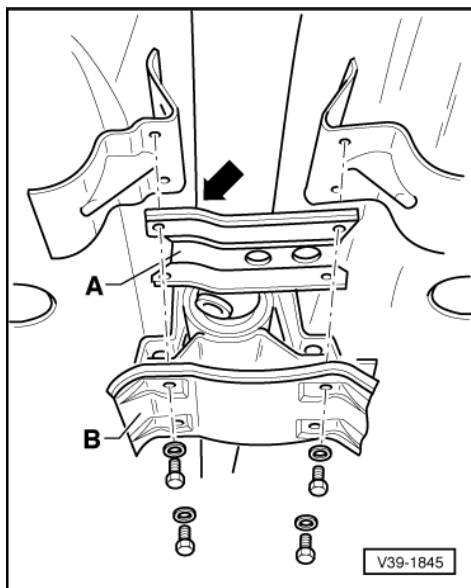
Notes:

- ◆ It is essential that the locking fluid remaining in the threads in the flange shafts on the gearbox and rear final drive is cleaned out after removing the propshaft. Otherwise there is a danger that the new bolts will seize when they are screwed in and then shear if they have to be removed later.
- ◆ The threaded holes can be cleaned with a thread tap.
- ◆ Renew the gaskets on the flange shafts (remove backing foil and stick gaskets onto flange shaft; make sure that the surfaces are free of grease).



- ◆ -> To prevent imbalance, the flanges on the propshaft -arrow A- and on the rear final drive -arrow B- must be installed so that the factory markings (or the markings made on removal) are in alignment.
- ◆ If a new propshaft is being installed and the factory paint marking on the rear final drive flange is no longer visible, the radial run-out at the flange for the propshaft must be measured => Page 191, and the paint marking on the propshaft must be aligned with the marking on the flange.
- ◆ After removing the propshaft from the rear final drive, the additional balance disk (thick washer) that may be located between the lock plate and the bolt head must not be reinstalled. Always renew all flange bolts after dismantling.

- ♦ Renew propshaft bolts (self-locking).
- Adjust propshaft after installing => Page 192 .



- -> Note installation position of cross-piece -A- (and heat shield -B-, if fitted) below propshaft.
- The stepped edge -arrow- should be on the left (seen in direction of travel).
- Install heat shield above propshaft.

- Align exhaust system free of stress

=> 4-Cylinder injection engine (2-valve), Mechanics; Repair group 26

=> 4-Cylinder injection engine (4-valve), Mechanics; Repair group 26

=> 4-Cylinder engine (5-valve), Mechanics; Repair group 26

=> 5-Cylinder engine, (2-valve), Mechanics; Repair group 26

=> 6-Cylinder engine (2.6 ltr. 2-valve engine), Mechanics; Repair group 26

=> 6-Cylinder injection engine (2-valve), Mechanics; Repair group 26

=> 6-Cylinder engine (5-valve), Mechanics; Repair group 26

Tightening torques

Component	Nm
Propshaft to gearbox (output flange)	55
Propshaft to final drive (input flange)	55
Propshaft centre mounting to body	23
Heat shield for propshaft to gearbox	23
Cross member to body	25
Clamp for exhaust pipe	40

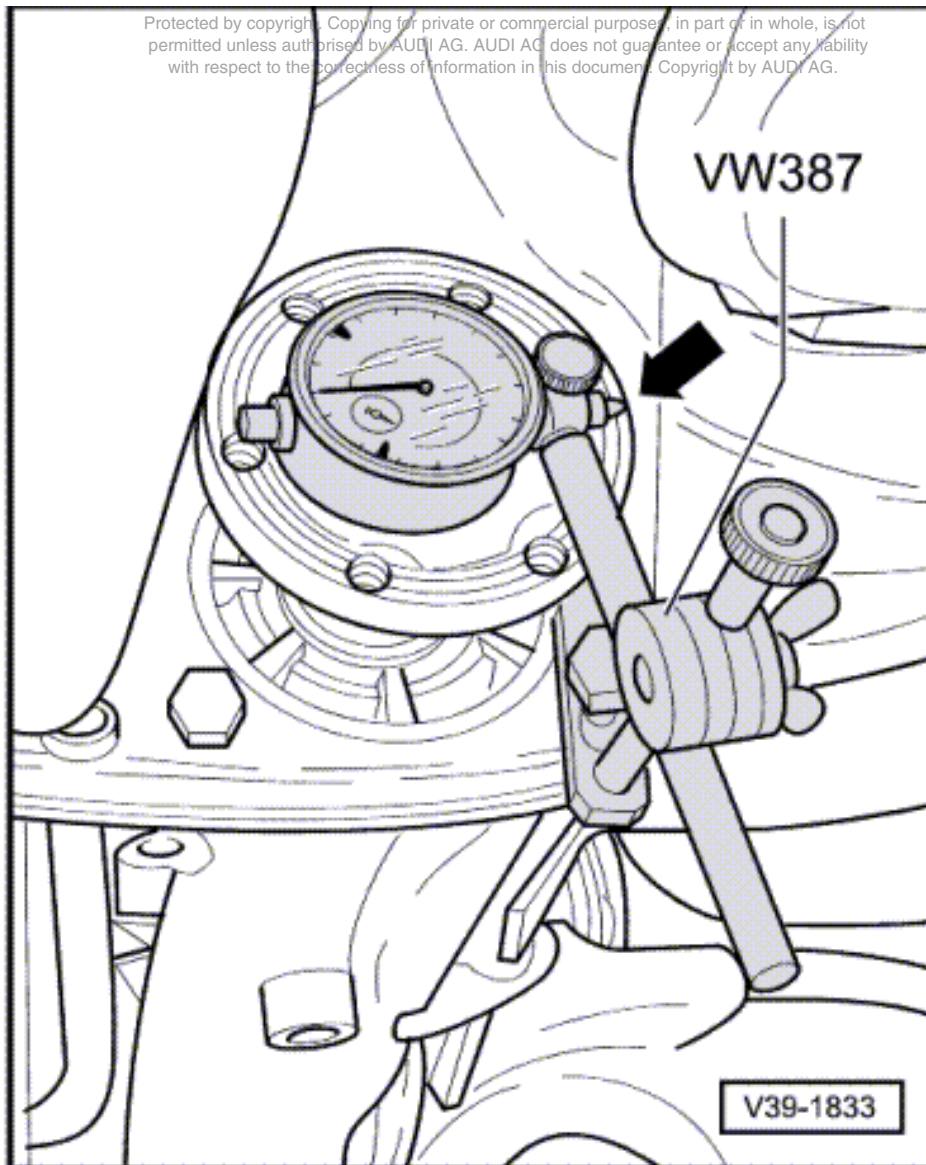
7.3 - Measuring radial run-out at propshaft flange and marking

Special tools, testers and auxiliary items

- ◆ Universal dial gauge bracket VW 387
- ◆ Dial gauge

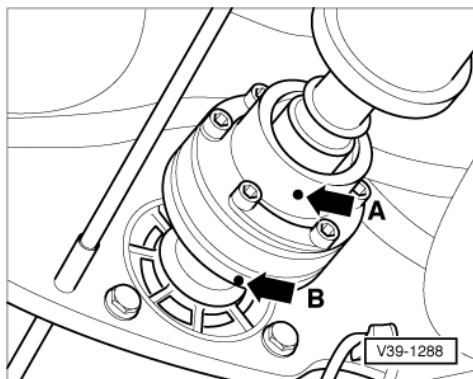
Notes:

- ◆ The radial run-out must always be measured when drive pinion or propshaft flange are removed.
- ◆ If a new propshaft is being installed and the marking on the flange shaft of the rear final drive is no longer visible, the point of maximum radial run-out must be measured with a dial gauge and marked with paint.
- ◆ The paint marking on the propshaft is then brought into alignment with this paint marking => Page 189.
- ◆ The radial run-out can be measured when rear final drive is installed but the propshaft must be disconnected at rear final drive. Observe notes => Page 185.



- -> Secure universal dial gauge retainer VW 387 with dial gauge to cross member/final drive bolted joint.
- Position dial gauge on ground circumference in propshaft flange -arrow- and set to zero with a preload of 1 mm.
- Turn differential via both rear wheels (left and right flange shaft) at same time in one direction until the propshaft flange has turned once completely.
- Make a paint marking at the point of greatest radial run-out on the outside of the flange (= greatest distance from axis of rotation).

- Remove old marks on propshaft flange.



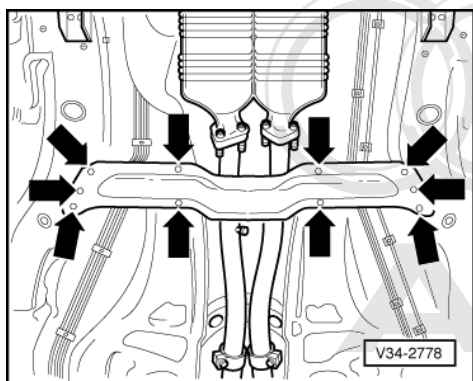
- -> When installing the propshaft, the marking on the propshaft (arrow -A-) must be aligned with the marking on the rear final drive (arrow -B-).
- Install propshaft => Page 189 .

7.4 - Adjusting propshaft

Special tools, testers and auxiliary items

- ♦ Assembly appliance3139
- Observe notes => Page 185 .

Adjustments should be carried out with care, because a badly adjusted propshaft is often the cause of vibration and droning.



- -> Unbolt front cross-piece -arrow- below exhaust system.

Vehicles with 4-cylinder engine:

- Unscrew nuts securing exhaust manifold to front exhaust pipe:
- => 4-Cylinder injection engine (2-valve), Mechanics; Repair group 26
- => 4-Cylinder injection engine (4-valve), Mechanics; Repair group 26
- => 4-Cylinder engine (5-valve), Mechanics; Repair group 26

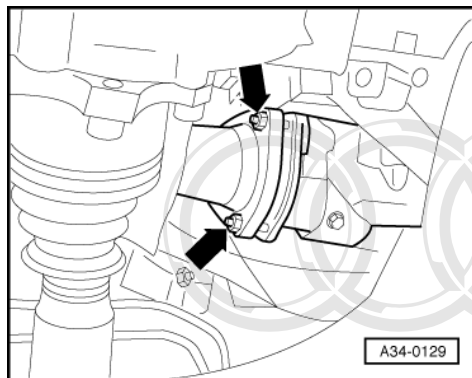
Note:

Avoid bending the flexible pipe connection too far at the front exhaust pipe. The catalytic converter must not be bent by more than 10° in relation to the front exhaust pipe, otherwise the flexible connection will be damaged.

Vehicles with 5-cylinder engine:

- Remove exhaust system (rearward of front exhaust pipe)

=> 5-Cylinder injection engine, (2-valve), Mechanics; Repair group 26



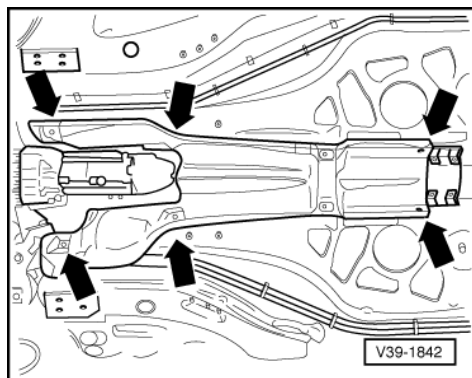
Vehicles with 6-cylinder engine:

- Detach heat shields above left and right drive shafts.
- -> Unbolt front exhaust pipes with catalytic converters from left and right exhaust manifolds (3 nuts on each side) -arrows-:

=> 6-Cylinder injection engine (2.6 ltr, 2-valve engine), Mechanics; Repair group 26

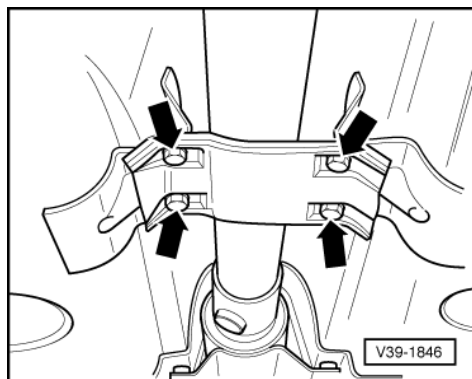
=> 6-Cylinder injection engine (2-valve), Mechanics; Repair group 26

=> 6-Cylinder engine (5-valve), Mechanics; Repair group 26



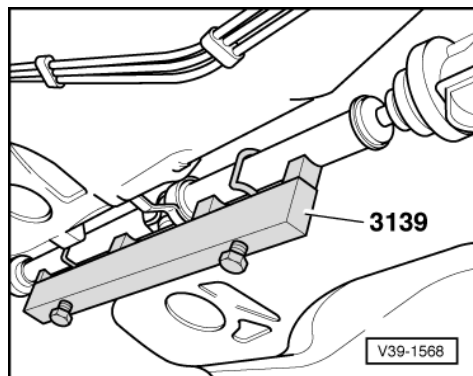
All models

- -> Unbolt heat shield below propshaft -arrows-.





- -> Remove cross-piece (with heat shield, if fitted) below propshaft -arrows-.
- Loosen securing bolts of centre propshaft mounting slightly.



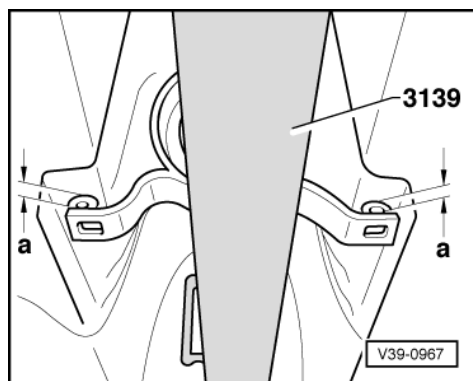
- -> Attach assembly appliance 3139 and tighten the plastic nuts.

Note:

Protected by copyright. Copying for private or commercial purposes, in part or in whole, is not permitted unless authorised by AUDI AG. AUDI AG does not guarantee or accept any liability with respect to the correctness of information in this document. Copyright by AUDI AG.

Never fit assembly appliance onto balance plates.

- Remove securing bolts and shims from centre mounting.



- -> Align centre propshaft mounting so that distance -a- is the same on left and right.
 - Measure -a- on both sides.
 - Select shims from table.
- Part numbers

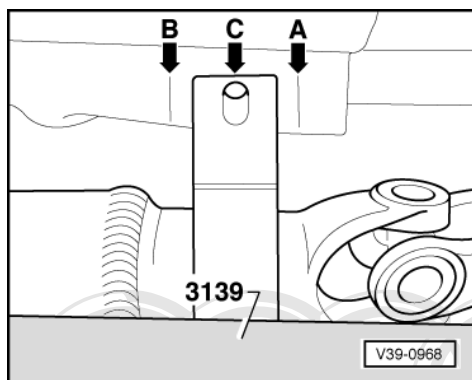
=> Parts catalogue

The following shims are available

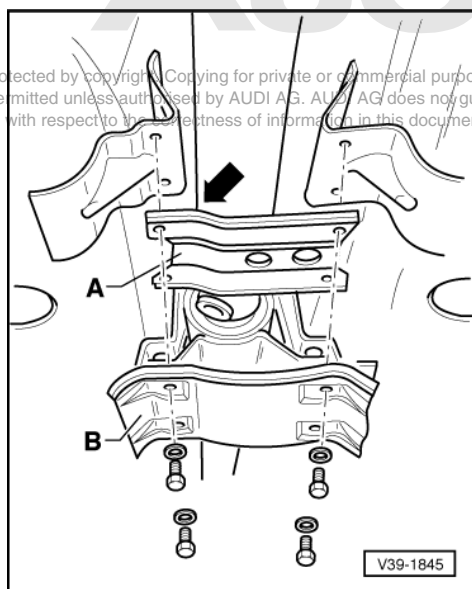
Dimension -a- (mm)	Shim thickness (mm)
0 ... 3.0	-
3.1 ... 5.0	2
5.1 ... 7.0	4
7.1 ... 9.0	6
9.1 ... 11.0	8
11.1 ... 13.0	10

- Install the correct shims on both sides.

Aligning propshaft longitudinally



- -> Using assembly appliance, push propshaft towards the rear as far as it will go.
- Mark position of centre mounting on body -arrow A-.
- Using assembly appliance, push propshaft towards the front as far as it will go.
- Mark position of centre mounting on body -arrow B-.
- Align propshaft -arrow C-.
- The centre mounting must be positioned centrally between the markings -A- and -B-.
- Install securing bolts of propshaft centre mounting and previously determined shims and tighten.
- Remove assembly appliance.



- -> Remove cross-piece -A- (with heat shield -B-, if fitted) below propshaft -arrows-.
- The stepped edge -arrow- should be on the left (seen in direction of travel).
- Install heat shield above propshaft.
- Align exhaust system free of stress

=> 4-Cylinder injection engine (2-valve), Mechanics; Repair group 26

=> 4-Cylinder injection engine (4-valve), Mechanics; Repair group 26

=> 4-Cylinder engine (5-valve), Mechanics; Repair group 26

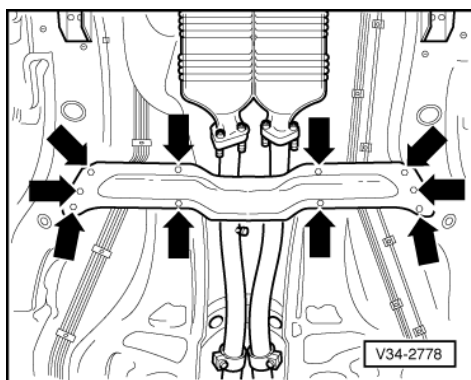
=> 5-Cylinder injection engine, (2-valve), Mechanics; Repair group 26

=> 6-Cylinder injection engine (2.6 ltr, 2-valve engine), Mechanics; Repair group 26

=> 6-Cylinder injection engine (2-valve), Mechanics; Repair group 26



=> 6-Cylinder engine (5-valve), Mechanics; Repair group 26



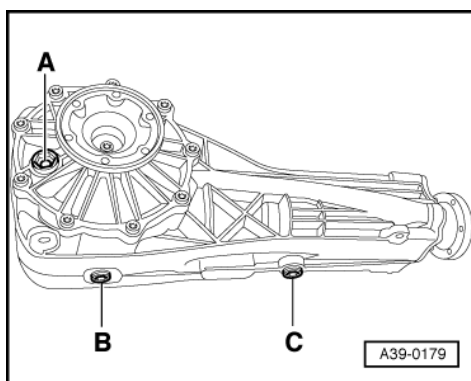
- -> Fit front cross-piece below exhaust system.

Tightening torques

Component	Nm
Propshaft centre mounting to body	23
Cross member to body	25
Front cross-piece below exhaust system to body	25
Clamp for exhaust pipe	40

8 - Checking oil level in rear final drive

8.1 - Checking oil level in rear final drive



- -> Unscrew oil filler plug -arrow A-.
- Specification: oil level up to bottom lip of filler hole.
- Top up oil if necessary. Specification=>Page 6 .
- Screw in oil filler plug.

Tightening torque

Component	Nm
Oil filler plug	25

9 - Renewing flange shaft oil seals

9.1 - Renewing flange shaft oil seals

- Observe general repair instructions
=> Page 10.

Note:

The exhaust system only needs to be removed if the left oil seal is replaced.

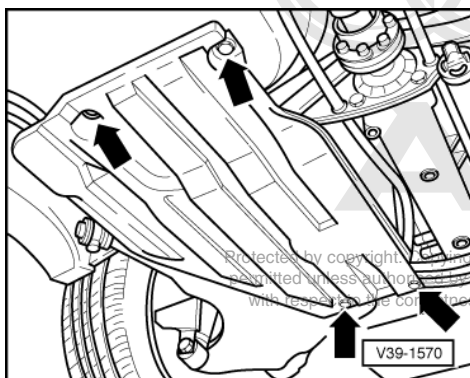
9.2 - Renewing right flange shaft oil seal

- Rear final drive installed

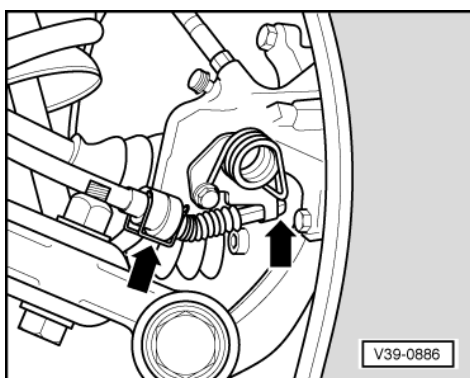
Special tools, testers and auxiliary items

- ♦ Drift 2062
- ♦ Bucket tappet compressor 2078
- ♦ Drip tray V.A.G 1306
- ♦ Universal support V.A.G 1359/2
- ♦ Engine/gearbox jack V.A.G 1383 A

Removing



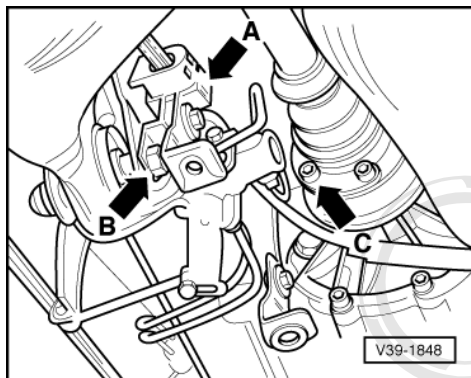
- -> Unbolt fuel tank cover panel -arrows-.



- -> Detach handbrake cable at right-hand brake caliper -arrows-.

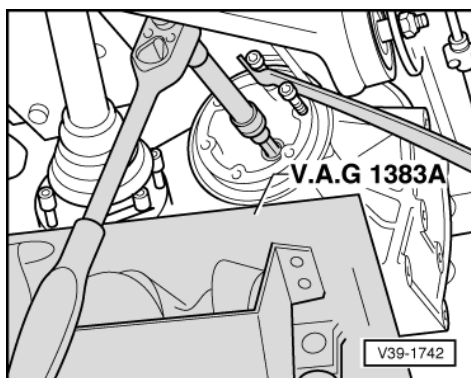
Note:

When detaching the handbrake cable, make sure the plastic sleeve on the cable is not damaged.

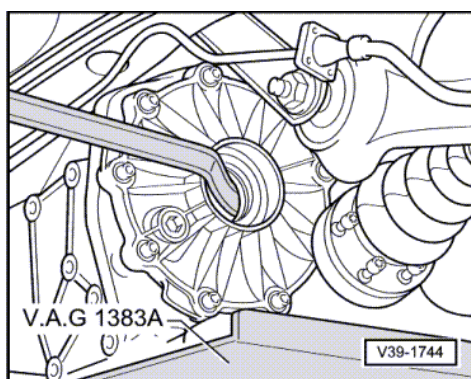


- -> Push handbrake cable out of right-hand retainer -arrow A-.
- Unbolt trapezium link from cross member -arrow B- and lower carefully using engine/gearbox jack V.A.G 1383 A.
- Unbolt right drive shaft -arrow C- from flange shaft and move down and clear.
- Unbolt left drive shaft from rear final drive, and move clear to one side:

=> Running gear, Four-wheel drive; Repair group 42; Removing and installing drive shaft, suspension strut, track control arm, wheel bearing housing, coupling link and anti-roll bar; Removing and installing drive shaft
Removing and installing drive shaft, suspension strut, track control arm, wheel bearing housing, coupling link and anti-roll bar Removing and installing drive shaft



- -> Remove flange shaft. To loosen securing bolt, screw two bolts into flange shaft and hold with bar to prevent it from turning.
- Place drip tray V.A.G 1306 underneath and drain gearbox oil.
- Pull out flange shaft using the bolts already screwed in.

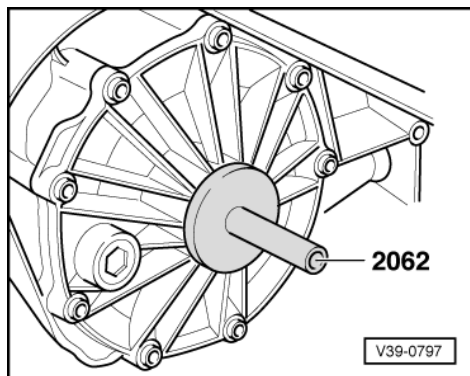


- -> Lever out oil seal for right flange shaft using a suitable lever.

Installing

Installation is carried out in the reverse order, when doing this note the following:

- Clean seat for oil seal.
- Moisten outer circumference of seal with gear oil.
- Fill space between sealing lip and dust lip with multi-purpose grease.



- ➔ Drive in oil seal for right flange shaft onto stop with mandrel 2062, ensuring that seal is kept straight.
- Insert drive shaft.
- Screw in cone-head bolt to secure flange shaft.

- Bolt on drive shaft

=> Running gear, Four-wheel drive; Repair group 42; Removing and installing drive shaft, suspension strut, track control arm, wheel bearing housing, coupling link and anti-roll bar; Removing and installing drive shaft
Removing and installing drive shaft, suspension strut, track control arm, wheel bearing housing, coupling link and anti-roll bar Removing and installing drive shaft

- Bolt trapezium link onto cross member

Protected by copyright. Copying for private or commercial purposes, in part or in whole, is not permitted unless authorised by AUDI AG. AUDI AG does not guarantee or accept any liability with respect to the correctness of information in this document. Copyright by AUDI AG.

=> Running gear, Four-wheel drive; Repair group 42; Servicing trapezium link; Removing and installing trapezium link Servicing trapezium link Removing and installing trapezium link

- Top-up gear oil in rear final drive and check oil level =>Page 196 .

Tightening torques

Component		Nm
Flange shaft to final drive		10 + 90° 1)
Drive shaft to flange shaft	M8	40
	M10	77
Trapezium link to cross member		85 2)
Fuel tank cover panel to body		20

- 1) 90° is a quarter turn
- 2) Replace self-locking nuts

9.3 - Renewing left flange shaft oil seal

- Rear final drive installed

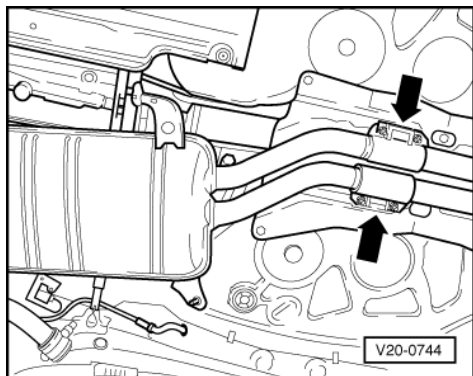
Special tools, testers and auxiliary items

- ◆ Bucket tappet compressor 2078
- ◆ Assembly tool 3066
- ◆ Thrust plate 3066/1
- ◆ Thrust plate 3066/2
- ◆ Drip tray V.A.G 1306
- ◆ Universal support V.A.G 1359/2



- ♦ Engine/gearbox jack V.A.G 1383 A

Removing



- -> Loosen the clamps -arrows- and detach exhaust system

=> 4-Cylinder injection engine (2-valve), Mechanics; Repair group 26

=> 4-Cylinder injection engine (4-valve), Mechanics; Repair group 26

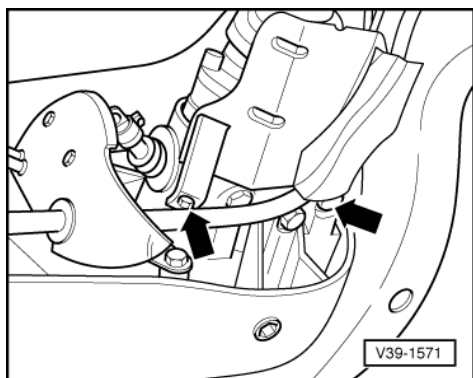
=> 4-Cylinder engine (5-valve), Mechanics; Repair group 26

=> 5-Cylinder injection engine, (2-valve), Mechanics; Repair group 26

=> 6-Cylinder injection engine (2.6 ltr, 2-valve engine), Mechanics; Repair group 26

=> 6-Cylinder injection engine (2-valve), Mechanics; Repair group 26

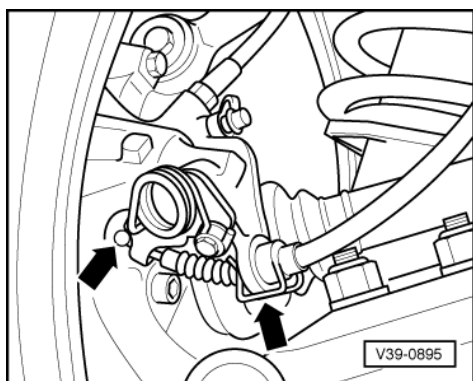
=> 6-Cylinder engine (5-valve), Mechanics; Repair group 26



- Detach main silencer and rear silencer from mounting straps

Copying for private or commercial purposes, in part or in whole, is not permitted unless authorised by AUDI AG. AUDI AG does not guarantee or accept any liability with respect to the correctness of information in this document. Copyright by AUDI AG.

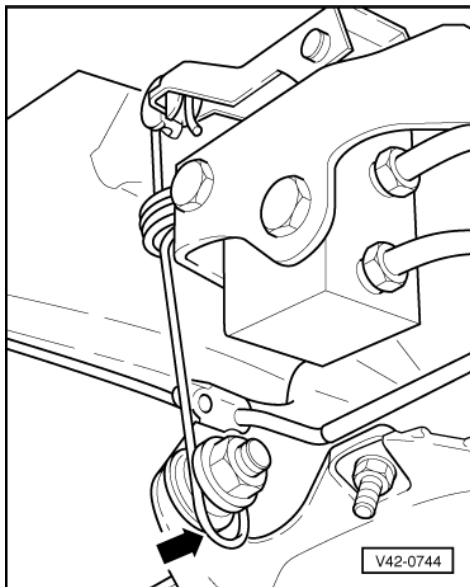
- -> Unbolt cover plate for drive shaft -arrows-.



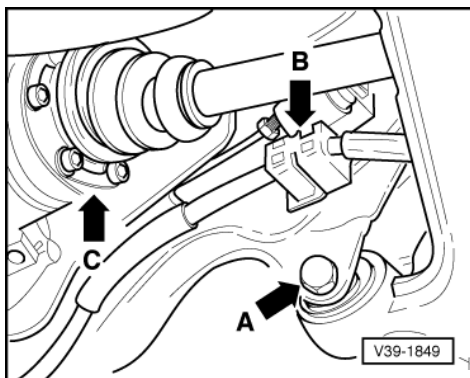
- -> Detach handbrake cable at left-hand brake caliper -arrows-.

Note:

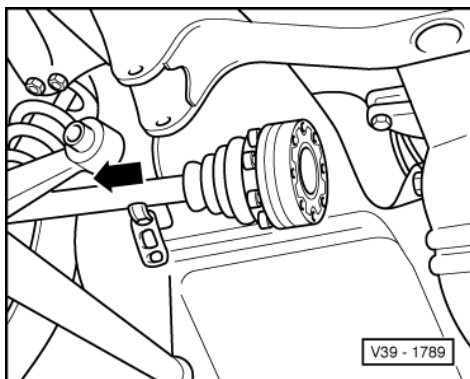
When detaching the handbrake cable, make sure the plastic sleeve on the cable is not damaged.



- -> Vehicles without self-levelling suspension: unhook spring for brake pressure regulator -arrow-.

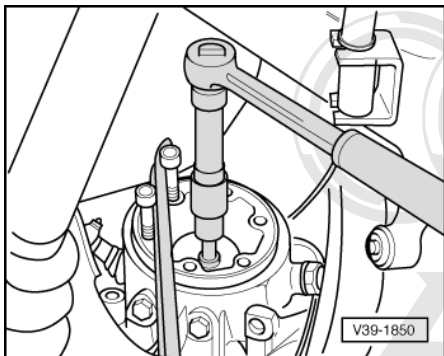


- -> Unbolt trapezium link from cross member -arrow A- and lower carefully using engine/gearbox jack V.A.G 1383 A.
- Push left handbrake cable out of retainer -arrow B-.
- Unbolt drive shaft from flange shaft -arrow C-.





- -> Press trapezium link outwards -arrow- and move drive shaft down and clear.

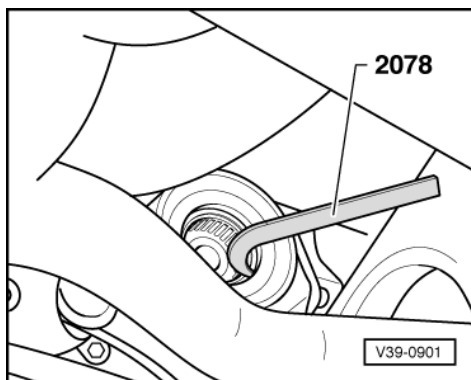


- -> Remove flange shaft. To loosen securing bolt, screw two bolts into flange shaft and hold with bar to prevent it from turning.
- Place drip tray V.A.G 1306 underneath and drain gearbox oil.
- Pull out flange shaft using the bolts already screwed in.

Protected by copyright. Copying for private or commercial purposes, in part or in whole, is not permitted unless authorised by AUDI AG. AUDI AG does not guarantee or accept any liability with respect to the correctness of information in this document. Copyright by AUDI AG.

Note:

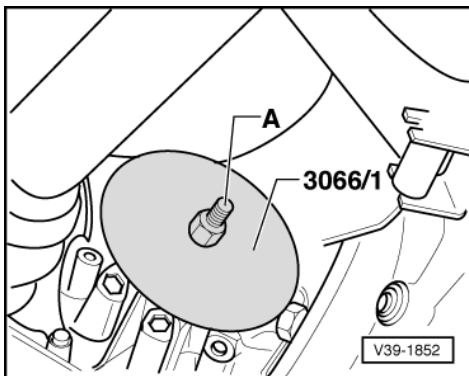
On vehicles >05.94 with mechanical differential lock, there is a shim between the flange shaft and the differential. This shim must be re-fitted when installing.



- -> Prise out flange shaft oil seal with a suitable lever.

Installing

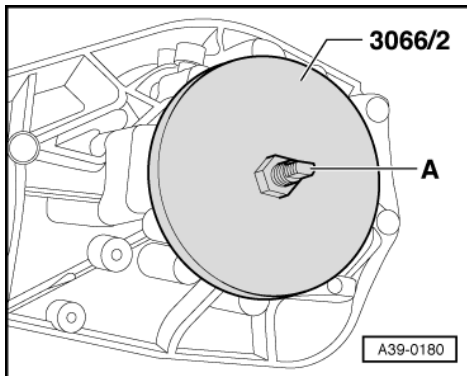
Installation is carried out in the reverse order, when doing this note the following:



- Clean seat for oil seal.
- Lubricate outer circumference of seal with gear oil.
- Fill space between sealing lip and dust lip with multi-purpose grease.
- -> Screw stud -A- of assembly tool 3066 into differential.

Vehicles with differential lock:

- Place oil seal on thrust plate 3066/1 and install as far as stop using stud and hexagon nut from 3066.



Vehicles without differential lock:

- -> Install seal as far as stop using stud and thrust plate 3066/2.

All models

- Insert drive shaft.

Note:

On vehicles > 05.94 with mechanical differential lock, there is a shim between the flange shaft and the differential. This shim must be re-fitted when installing.

- Screw in cone-head bolt to secure flange shaft.
- Bolt on drive shaft

=> Running gear, Four-wheel drive; Repair group 42; Removing and installing drive shaft, suspension strut, track control arm, wheel bearing housing, coupling link and anti-roll bar; Removing and installing drive shaft
Removing and installing drive shaft, suspension strut, track control arm, wheel bearing housing, coupling link and anti-roll bar
Removing and installing drive shaft

- Bolt trapezium link onto cross member

=> Running gear, Four-wheel drive; Repair group 42; Servicing trapezium link; Removing and installing trapezium link
Servicing trapezium link
Removing and installing trapezium link

- Vehicles without self-levelling suspension: engage spring for brake pressure regulator.
- Adjust and test brake pressure regulator

=> Running gear, Four-wheel drive; Repair group 47; Testing and adjusting brake pressure regulator
Testing and adjusting brake pressure regulator

- Top-up gear oil in rear final drive and check oil level=>Page 196 .

- Install exhaust system free of stress

=> 4-Cylinder injection engine (2-valve), Mechanics; Repair group 26
Protected by copyright. Copying for private or commercial purposes, in part or in whole, is not permitted unless authorised by AUDI AG. AUDI AG does not guarantee or accept any liability for the content of this document. Copyright by AUDI AG.

=> 4-Cylinder injection engine (4-valve), Mechanics; Repair group 26

=> 4-Cylinder engine (5-valve), Mechanics; Repair group 26

=> 5-Cylinder injection engine, (2-valve), Mechanics; Repair group 26



=> 6-Cylinder injection engine (2.6 ltr, 2-valve engine), Mechanics; Repair group 26

=> 6-Cylinder injection engine (2-valve), Mechanics; Repair group 26

=> 6-Cylinder engine (5-valve), Mechanics; Repair group 26

Tightening torques

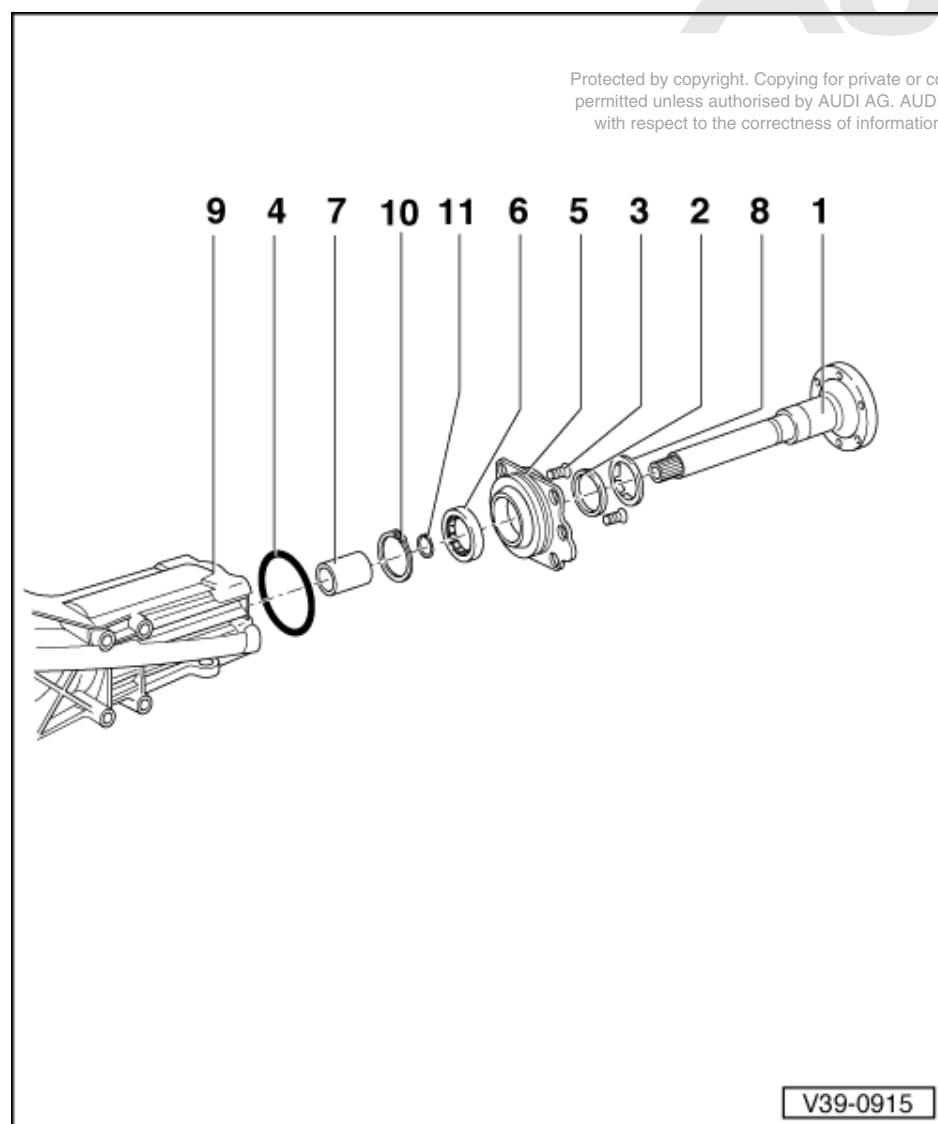
Component		Nm
Flange shaft to final drive		10 + 90° 1)
Drive shaft to flange shaft	M8	40
	M10	77
Trapezium link to cross member		85 2)
Cover plate for drive shaft		25
Clamp for exhaust pipe		40

1) 90° is a quarter turn

2) Replace self-locking nuts

10 - Replacing oil seal and grooved ball bearing for propshaft flange

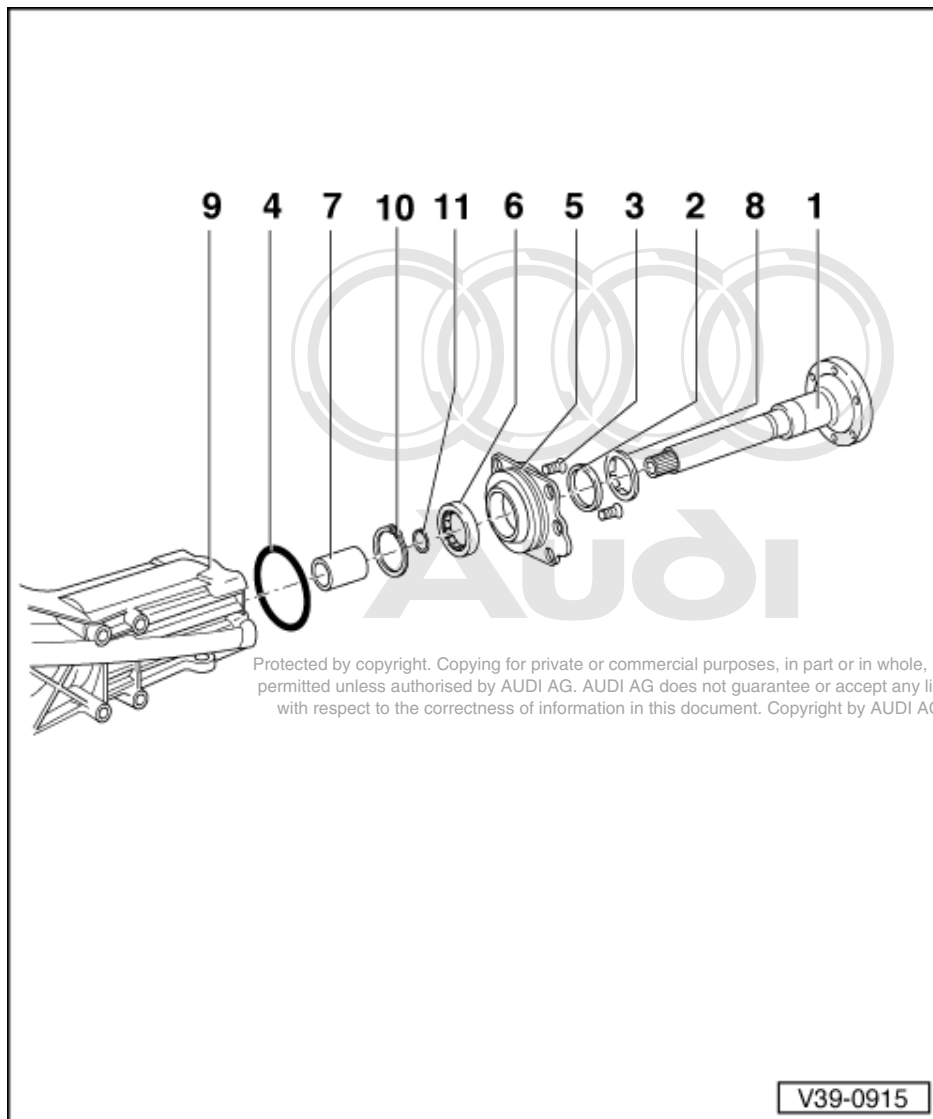
10.1 - Replacing oil seal and grooved ball bearing for propshaft flange



Note:

The oil seal and grooved ball bearing can be replaced with the rear final drive installed; just lower the final drive.

- 1 Flange shaft**
 - ♦ Note position in relation to propshaft, mark if necessary
- 2 Oil seal**
- 3 Countersunk bolt - 25 Nm**
- 4 O-ring**
 - ♦ Renew



- 5 Cover**
- 6 Grooved ball bearing**
- 7 Collar**
- 8 Plastic ring**
- 9 Rear final drive housing**
- 10 Large circlip**
- 11 Small circlip**

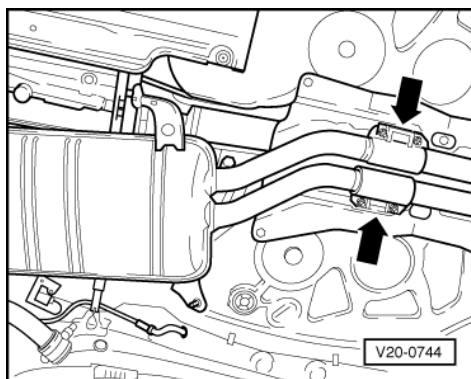


Removing

Special tools, testers and auxiliary items

- ◆ Press plate VW 401
- ◆ Press plate VW 402
- ◆ Press tool VW 407
- ◆ Press tool VW 408 A
- ◆ Press tool VW 409
- ◆ Press tool VW 412
- ◆ Extractor tool VW 459/1
- ◆ Extractor lever VW 681
- ◆ Multi-purpose tool VW 771
- ◆ VW 771/15 from multi-purpose tool set VW 771

- ◆ Tube 32-109
- ◆ Punch 2005
- ◆ Centring mandrel 3176
- ◆ Drip tray V.A.G 1306
- ◆ Universal support V.A.G 1359/2
- ◆ Engine/gearbox jack V.A.G 1383 A



- -> Loosen the clamps -arrows- and detach exhaust system

=> 4-Cylinder injection engine (2-valve), Mechanics; Repair group 26

=> 4-Cylinder injection engine (4-valve), Mechanics; Repair group 26

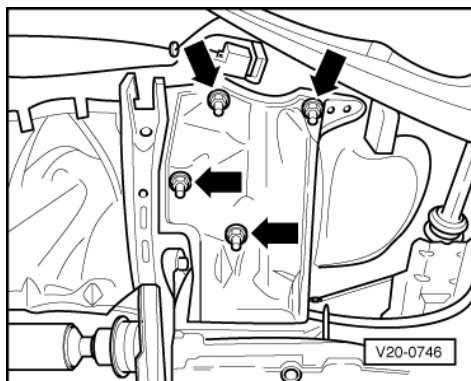
=> 4-Cylinder engine (5-valve), Mechanics; Repair group 26

=> 5-Cylinder injection engine, (2-valve), Mechanics; Repair group 26

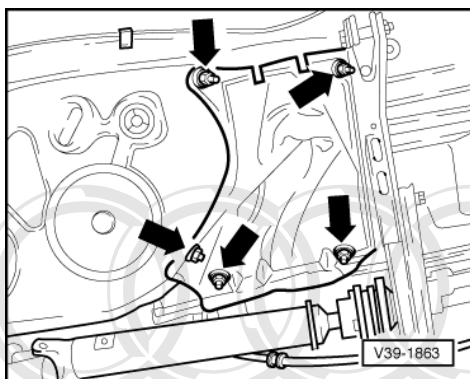
=> 6-Cylinder injection engine (2.6 ltr engine, 2-valve), Mechanics; Repair group 26

=> 6-Cylinder injection engine (2-valve), Mechanics; Repair group 26

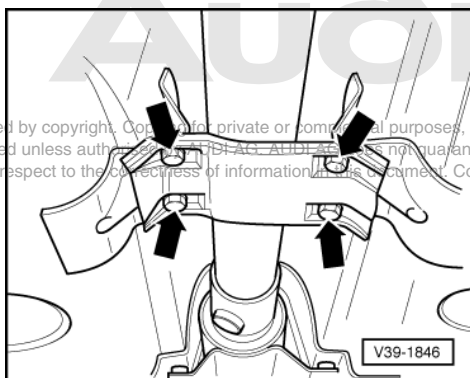
=> 6-Cylinder engine (5-valve), Mechanics; Repair group 26



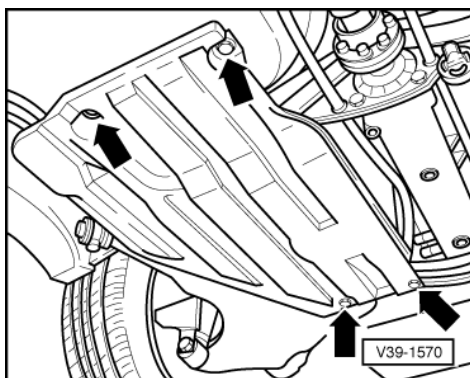
- Detach main silencer and rear silencer from retaining straps.
- -> Unbolt heat shield behind cross piece I -arrows-.



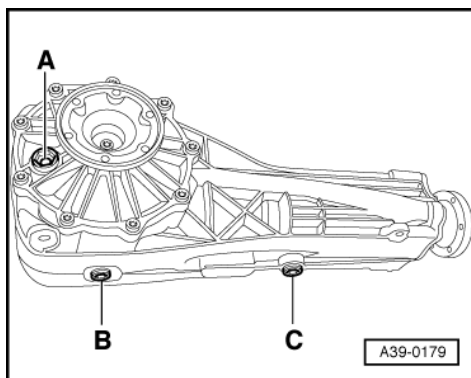
- -> Unbolt heat shield in front of cross-piece I -arrows-.



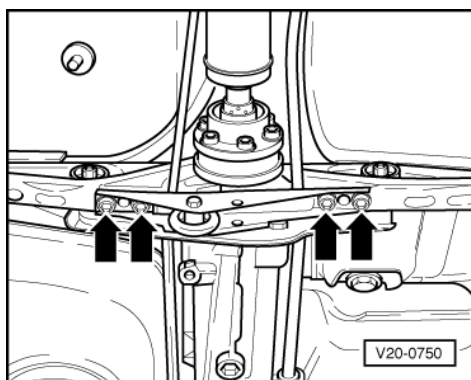
- -> Unbolt cross-piece (with heat shield, if fitted) below propshaft -arrows-.



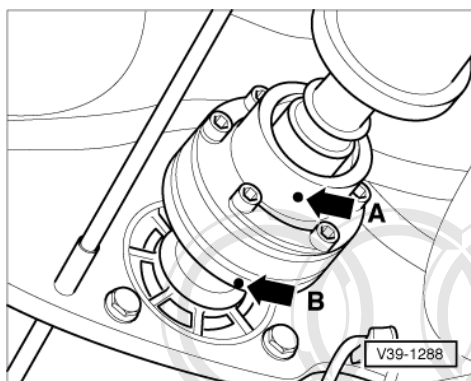
- -> Unbolt fuel tank cover panel -arrows-.



- Place drip tray V.A.G 1306 underneath.
- -> Unscrew oil drain plugs -B- and -C- and drain off gear oil.



- -> Unbolt brace -arrows-.

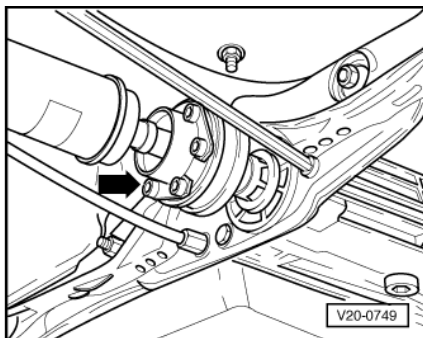


- -> Check whether there is a factory marking (paint) on the propshaft and propshaft/rear final drive flange. If not, mark position of propshaft flange -arrow A- in relation to rear final drive -arrow B- with paint.

Note:

If the propshaft has been balanced, lock plates of differing thicknesses may be installed. Mark positions before removing, and re-install in the same positions.

Protected by copyright. Copying for private or commercial purposes, in part or in whole, is not permitted unless authorised by AUDI AG. AUDI AG does not guarantee or accept any liability with respect to the correctness of information in this document. Copyright by AUDI AG.

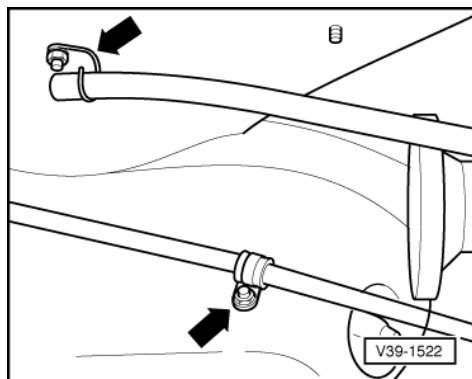


- -> Unscrew bolts securing propshaft to rear final drive.
- Lift propshaft clear and tie in place.

Note:

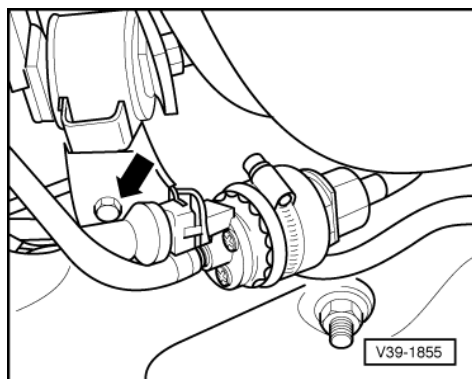
Protected by copyright. Copying for private or commercial purposes, in part or in whole, is not permitted unless authorised by AUDI AG. AUDI AG does not guarantee or accept any liability with respect to the correctness of information in this document. Copyright by AUDI AG.

Do not bend the propshaft more than 25°, otherwise the universal joint could be damaged!

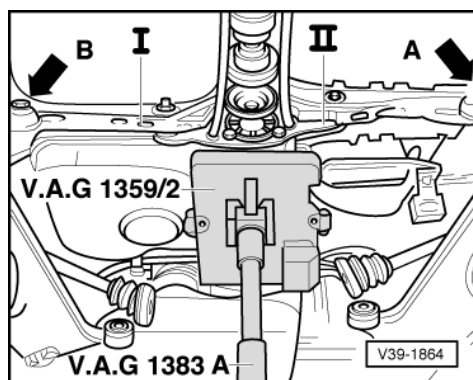


- -> Unbolt retainers for handbrake cables -arrows-.
- Slacken adjuster nut for handbrake cables and disengage cables at compensating bar

=> Running gear, Four-wheel drive; Repair group 46; Servicing handbrake Servicing handbrake



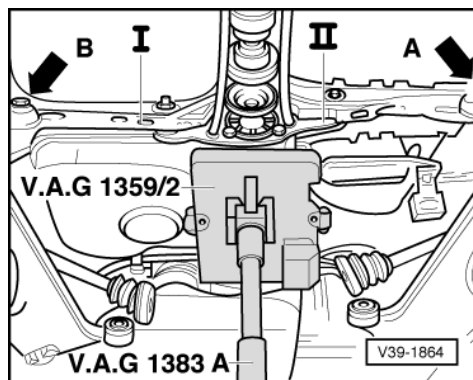
- -> Vehicles with auxiliary heater: unbolt retainer for metering pump -arrow-.



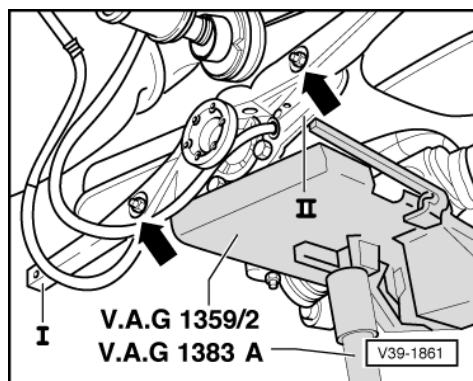
- -> Support final drive with gearbox jack V.A.G 1383 A and V.A.G 1359/2.
- Secure final drive with a strap.
- Carefully pull handbrake cables through eyes of cross-piece II to rear.
- Loosen bolt -arrow A- for cross-piece I.

Note:

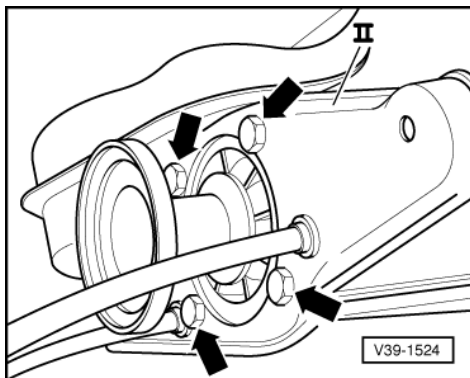
Do not slacken the bolts securing the rear final drive.



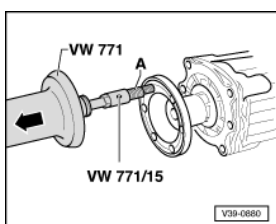
- -> Remove bolt -arrow B- for cross-piece I and lower final drive carefully using gearbox jack.
- Vehicles with mechanical differential lock ä 05.94: unclip wire for differential lock indicator switch from retainer (above the final drive).



- -> Unbolt cross-piece II from cross-piece I -arrows-.
- Lift cross-piece I clear and tie in place.

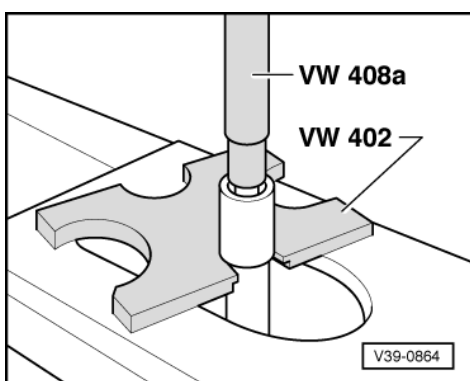


- -> Unbolt cross-piece II from final drive -arrows- and lift out over flange shaft of final drive.

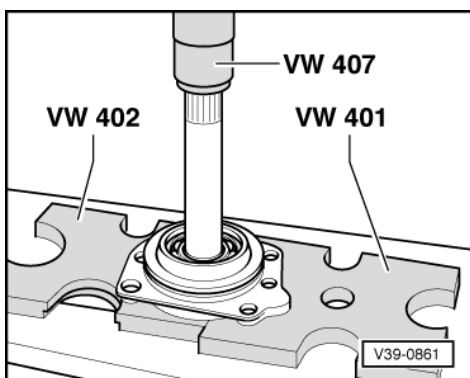


- -> Unbolt cover for final drive and pull out together with flange shaft.

A - M8/M10 stud



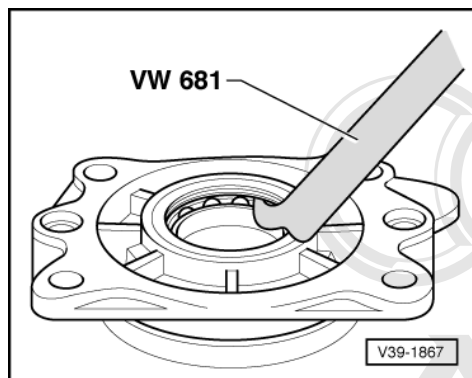
- -> Press off collar.



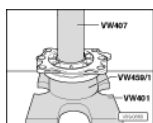
- Take off small circlip (in front of grooved ball bearing).
- -> Press out flange shaft.



Protected by copyright. Copying for private or commercial purposes, in part or in whole, is not permitted unless authorised by AUDI AG. AUDI AG does not guarantee or accept any liability respect to the correctness of information in this document. Copyright by AUDI AG.



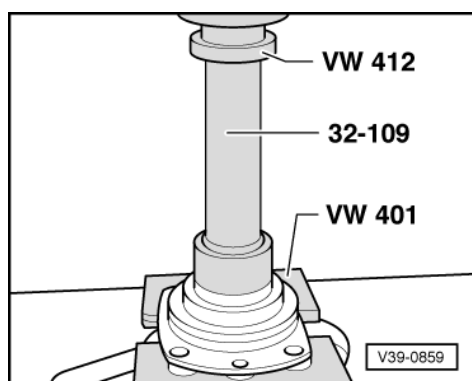
- -> Prise out oil seal.



Protected by copyright. Copying for private or commercial purposes, in part or in whole, is not permitted unless authorised by AUDI AG. AUDI AG does not guarantee or accept any liability with respect to the correctness of information in this document. Copyright by AUDI AG.

- Remove large circlip from cover.
- -> Press out grooved ball bearing.

Installing

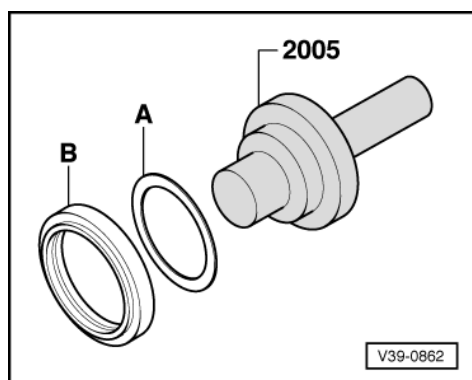


Installation is carried out in the reverse order, when doing this note the following:

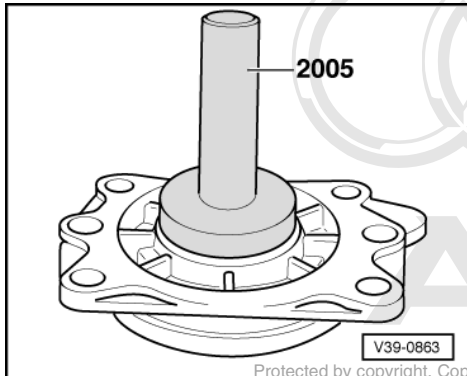
Note:

Always replace self-locking nuts and bolts.

- Clean seat for oil seal.
- -> Press in grooved ball bearing.
- Insert large circlip into cover.

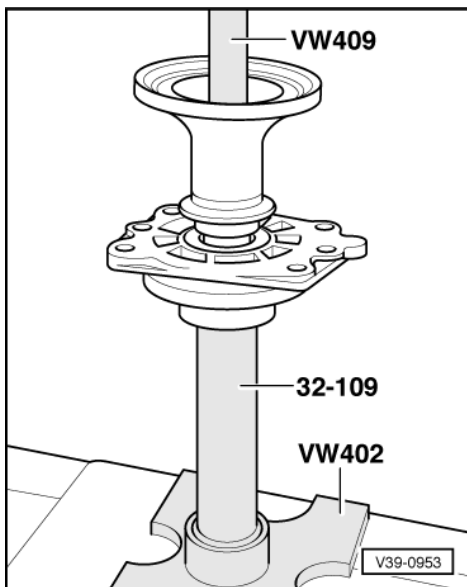


- -> Fit new seal -B- and shim -A- Part No.016 311 391 P(1.05 mm thick) onto punch2005.
- Thoroughly clean seat for oil seal in cover.
- Lubricate outer circumference of seal with gear oil.

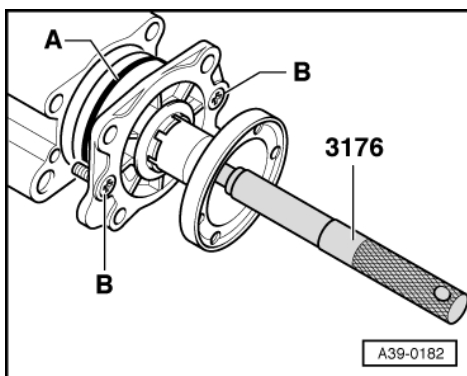


Protected by copyright. Copying for private or commercial purposes, in part or in whole, is not

- -> Drive in flange shaft seal and shim onto stop using punch 2005.
- Fill space between sealing lip and dust lip with multi-purpose grease.



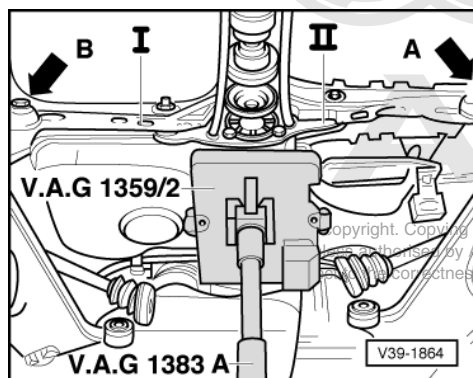
- Fit plastic ring onto flange shaft=>Page 205 , -Item 8 -.
- -> Press in flange shaft.
- Fit small circlip.
- Fit collar and drive into place using plastic-headed hammer.



- -> Always fit new O-ring -A- and lubricate lightly before inserting.
- Drive in the flange shaft and the cover using centring mandrel 3176.



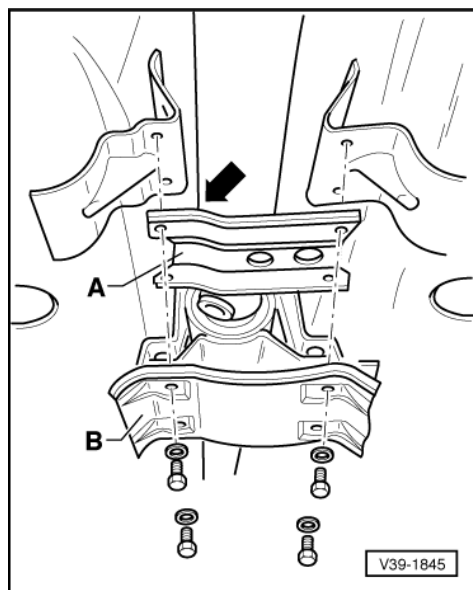
- Tighten countersunk bolts -B- to 25 Nm.



- -> Bolt cross-piece II onto final drive.
- Bolt cross-piece I onto cross-piece II and body.
- Engage handbrake cables in compensating bar and adjust handbrake

=> Running gear, Four-wheel drive; Repair group 46; Servicing handbrake. Servicing handbrake.

- Top up gear oil in rear final drive and check oil level
=>Page 196 .
- Measure radial run-out at flange shaft and mark position
=>Page 191 .
- Fit new gasket on flange shaft and tighten bolts on propshaft.
See notes on installation=>Page 189 .



- -> Fit cross-piece and heat shield below propshaft.
- The stepped edge -arrow- should be on the left (seen in direction of travel)
- Install exhaust system free of stress

=> 4-Cylinder injection engine (2-valve), Mechanics; Repair group 26

=> 4-Cylinder injection engine (4-valve), Mechanics; Repair group 26

=> 4-Cylinder engine (5-valve), Mechanics; Repair group 26

=> 5-Cylinder injection engine, (2-valve), Mechanics; Repair group 26

=> 6-Cylinder injection engine (2.6 ltr, 2-valve engine), Mechanics; Repair group 26

=> 6-Cylinder injection engine (2-valve), Mechanics; Repair group 26

=> 6-Cylinder engine (5-valve), Mechanics; Repair group 26

Tightening torques

Component	Nm
Oil drain plug/ oil filler plug	25
Cover to rear final drive	25
Cross-piece II to rear final drive	45
Cross-piece I to cross-piece II	45
Cross-piece I to body	45
Brace to cross-piece I	55
Metering pump retainer to body 1)	25
Propshaft to flange shaft M8	55
Fuel tank cover panel to body	20
Cross-piece and heat shield to body	25
Clamp for exhaust pipe	40

1) Vehicles with auxiliary heater

Protected by copyright. Copying for private or commercial purposes, in part or in whole, is not permitted unless authorised by AUDI AG. AUDI AG does not guarantee or accept any liability with respect to the correctness of information in this document. Copyright by AUDI AG.

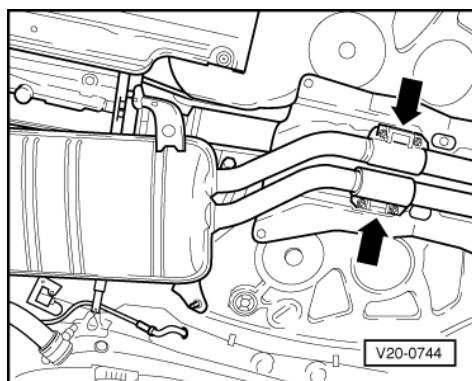
11 - Removing and installing rear final drive

11.1 - Removing and installing rear final drive

Special tools, testers and auxiliary items

- ♦ Universal support V.A.G 1359/2
- ♦ Engine/gearbox jack V.A.G 1383 A

Removing



- -> Loosen clamps -arrows- and remove rear section of exhaust system:

=> 4-Cylinder injection engine (2-valve), Mechanics; Repair group 26

=> 4-Cylinder injection engine (4-valve), Mechanics; Repair group 26



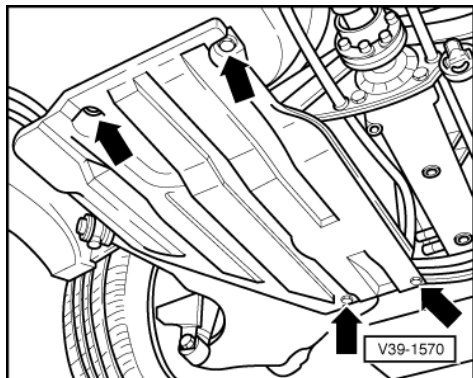
=> 4-Cylinder engine (5-valve), Mechanics; Repair group 26

=> 5-Cylinder injection engine (2-valve), Mechanics; Repair group 26

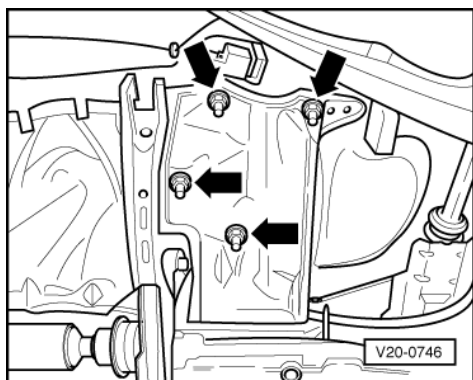
=> 6-Cylinder injection engine (2.6 ltr, 2-valve engine), Mechanics; Repair group 26

=> 6-Cylinder injection engine (2-valve), Mechanics; Repair group 26

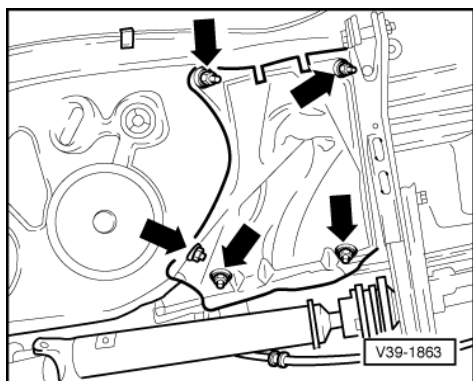
=> 6-Cylinder engine (5-valve), Mechanics; Repair group 26



- -> Unbolt cover panel for fuel tank -arrows-.



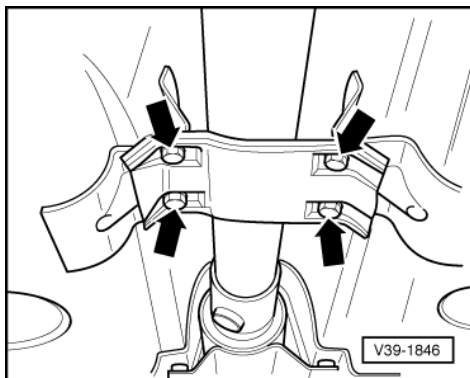
- -> Unbolt heat shield behind cross-piece I -arrows-.



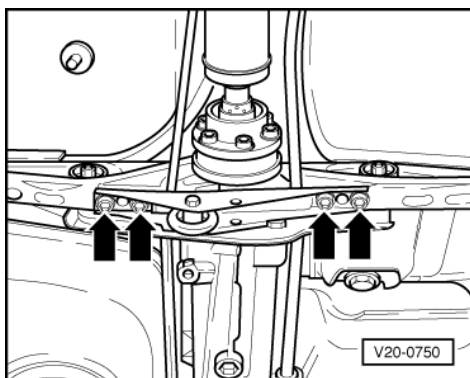
- -> Unbolt heat shield in front of cross-piece I -arrows-.



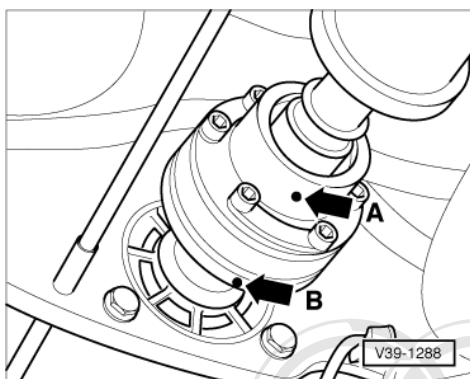
Protected by copyright. Copying for private or commercial purposes, in part or in whole, is not permitted unless authorised by AUDI AG. AUDI AG does not guarantee or accept any liability with respect to the correctness of information in this document. Copyright by AUDI AG.



- -> Unbolt cross-piece (with heat shield, if fitted) below propshaft -arrows-.



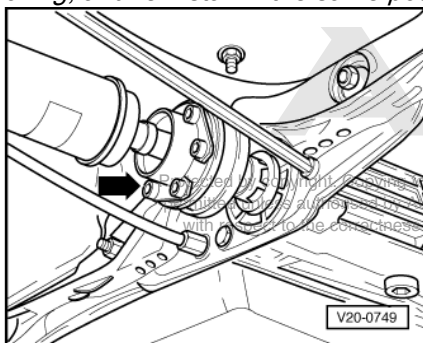
- -> Unbolt brake -arrows-.



- -> Check whether there is a factory marking (paint) on the propshaft and propshaft/rear final drive flange. If not, mark position of propshaft flange -arrow A- in relation to rear final drive -arrow B- with paint.

Note:

If the propshaft has been balanced, lock plates of differing thicknesses may be installed. Mark positions before removing, and re-install in the same positions.



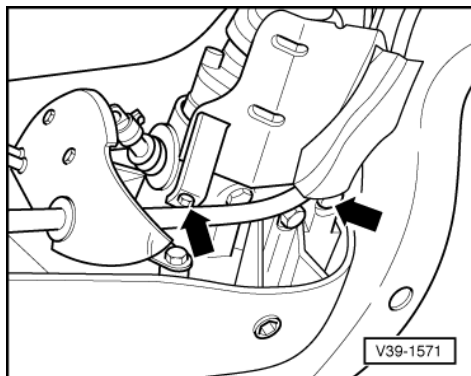
Reprinted in full or in part, for private or commercial purposes, in part or in whole, is not permitted without the written permission of AUDI AG. AUDI AG does not guarantee or accept any liability with regard to the correctness of information in this document. Copyright by AUDI AG.



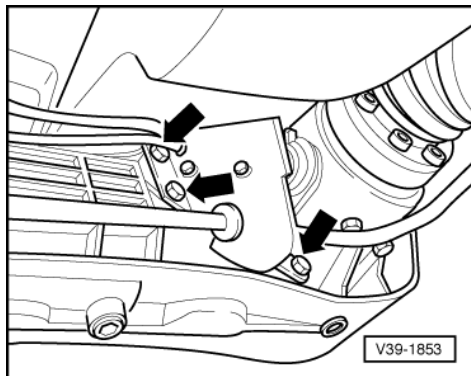
- -> Remove bolts securing propshaft to rear final drive.
- Lift propshaft clear and tie in place.

Note:

Do not bend propshaft more than 25°, otherwise the universal joint could be damaged.

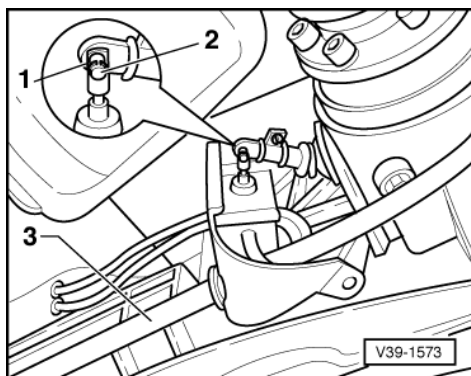


- -> Unbolt cover plate for left drive shaft -arrows-.

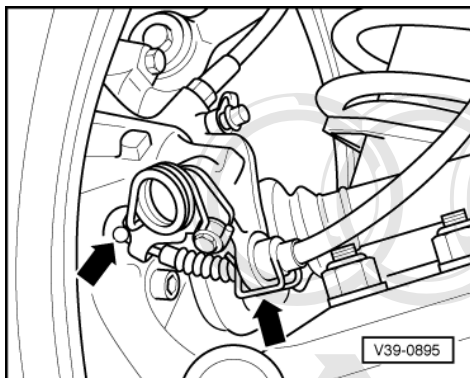


Vehicles with mechanical differential lock 05.94:

- -> Unbolt bracket for vacuum unit on rear final drive -arrows-.



- -> Release securing clip -1-.
- Push connector pin between vacuum unit and selector fork -2- upwards.
- Pull handbrake cable -3- and rubber grommet out of retainer plate.
- Detach wire for differential lock indicator switch.



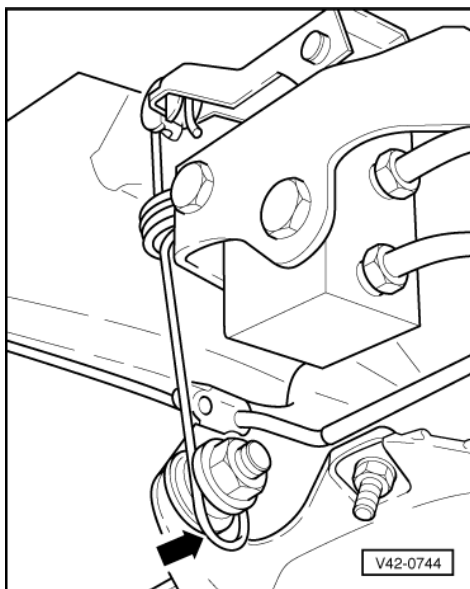
All models

- -> Disengage handbrake cable at left brake caliper -arrows-.

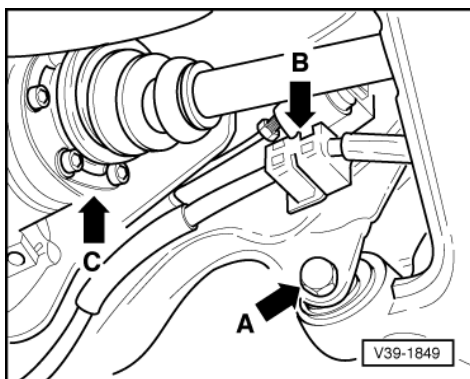
Protected by copyright. Copying for private or commercial purposes, in part or in whole, is not permitted unless authorised by AUDI AG. AUDI AG does not guarantee or accept any liability with respect to the correctness of information in this document. Copyright by AUDI AG.

Note:

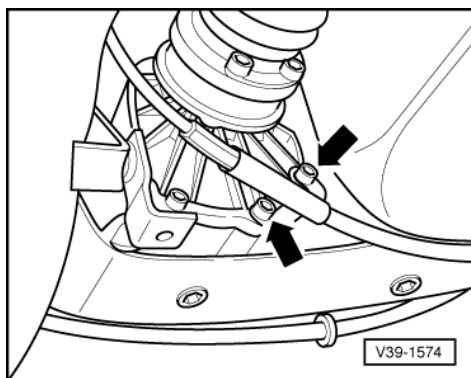
When detaching the handbrake cable, make sure the plastic sleeve on the cable is not damaged.



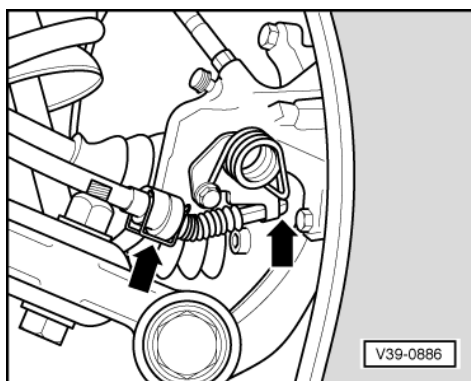
- -> Vehicles without self-levelling suspension: unhook spring for brake pressure regulator -arrow-.



- -> Push left handbrake cable out of retainer -arrow B-.
- Unbolt drive shaft from flange shaft -arrow C-, lift clear and tie in place.



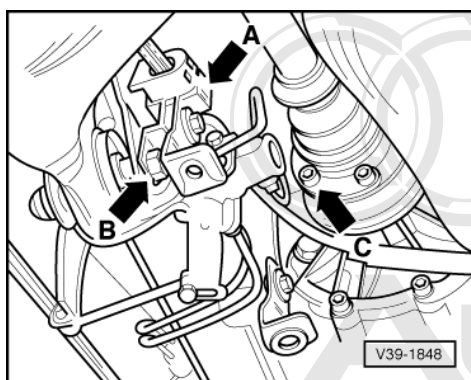
- -> Unbolt right-hand retainer for handbrake cable -arrows- from rear final drive.



- -> Disengage handbrake cable at right brake caliper -arrows-.

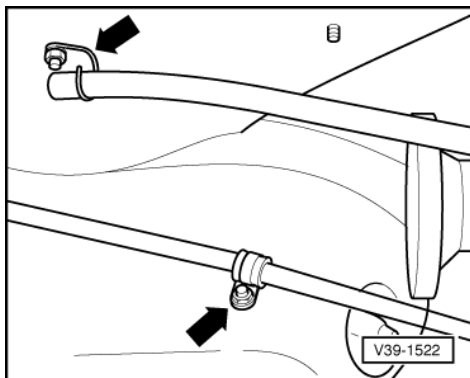
Note:

When detaching the handbrake cable, make sure the plastic sleeve on the cable is not damaged.

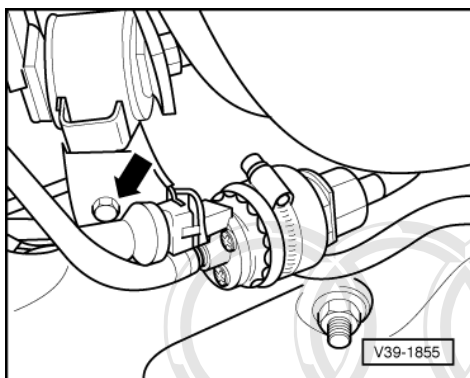


- -> Push handbrake cable out of right-hand retainer -arrow A-.
- Unbolt right drive shaft -arrow C- from flange shaft and put down.

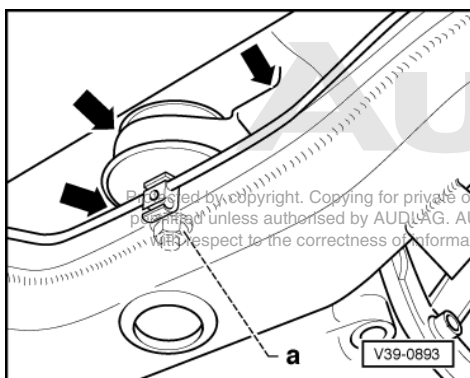
This document, in its entirety, is not permitted unless authorised by AUDI AG. AUDI AG does not guarantee or accept any liability with respect to the correctness of information in this document. Copyright by AUDI AG.



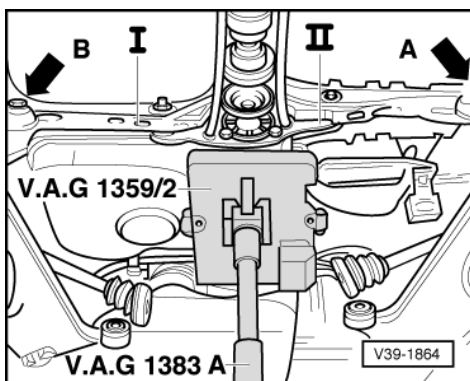
- -> Unbolt retainers for handbrake cables -arrows-.



- -> Vehicles with auxiliary heater: unbolt retainer for metering pump -arrow-.

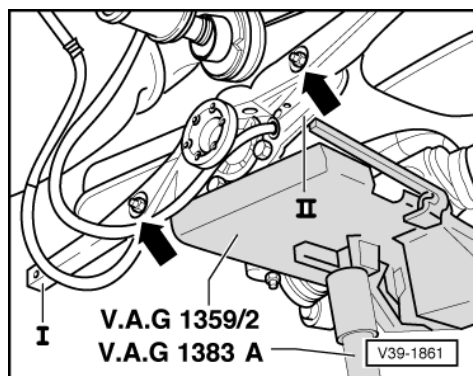


- Support final drive using engine/gearbox jack V.A.G 1383 A and universal support V.A.G 1359/2.
- Secure final drive with a strap.
- -> Loosen nut for final drive mounting -a- on rear cross-piece and remove 3 bolts -arrows-.

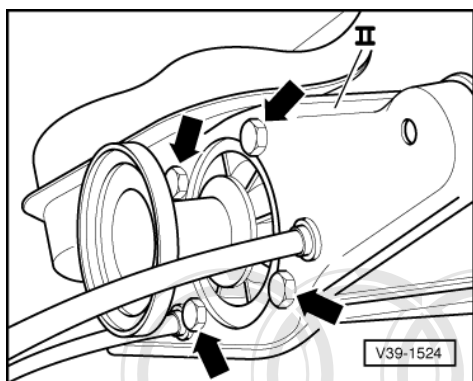




- Carefully pull handbrake cables through eyes of cross-piece II to rear.
- -> Remove bolts (arrows -A- and -B-) for cross-piece I.
- Lower final drive slightly with engine/gearbox jack V.A.G 1383 A.
- Vehicles with mechanical differential lock ä 05.94: unclip wire for differential lock indicator switch from retainer (above the final drive).



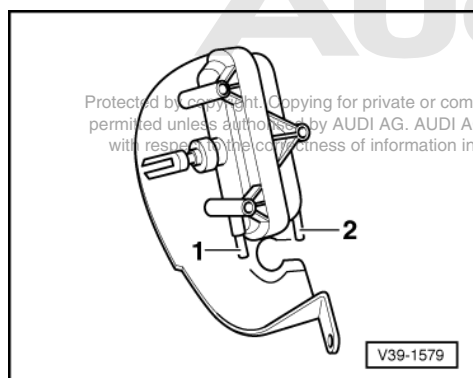
- -> Unbolt cross-piece I from cross-piece II -arrows-.
- Tie cross-piece I clear.



- -> Unbolt cross-piece II from final drive -arrows- and lift out over flange shaft of final drive.
- Pull final drive towards the front and lower slowly together with rear final drive mounting.

Note:

When lowering the final drive, pull it towards the left to clear the fuel tank.



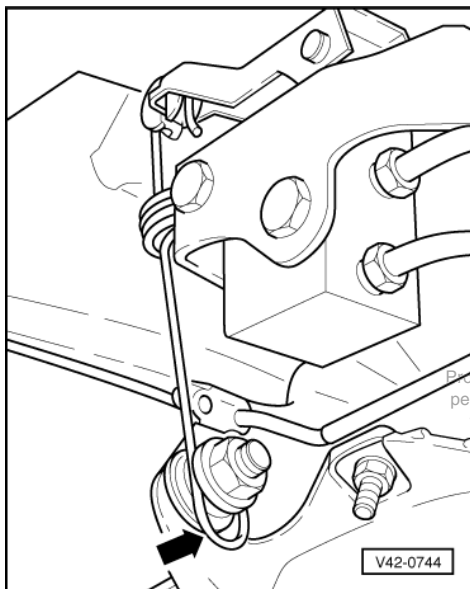
Installing

Installation is carried out in the reverse order, when doing this note the following:

Vehicles with mechanical differential lock 05.94:

- -> Colour coding of vacuum hoses:
 - Yellow hose to connection -1-
 - Blue hose to connection -2-

All models

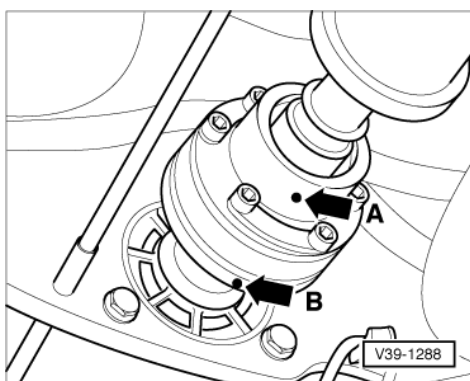


- -> Vehicles without self-levelling suspension: engage spring for brake pressure regulator -arrow-.
- Adjust and check brake pressure regulator

=> Running gear, Four-wheel drive; Repair group 47; Testing and adjusting brake pressure regulator Testing and adjusting brake pressure regulator

Notes:

- ◆ It is essential to clean out the locking fluid remaining in the threads in the flange shaft on the rear final drive after removing the propshaft. Otherwise there is a danger that the new bolts will seize when they are screwed in and then shear if they have to be removed later.



- ◆ The threaded holes can be cleaned with a thread tap.
- ◆ Renew the gaskets on the flange shafts (remove backing foil and stick gaskets onto flange shaft; make sure that the surfaces are free of grease).
- ◆ -> To prevent imbalance, the flanges on the propshaft -arrow A- and on the rear final drive -arrow B- must be installed so that the factory markings (or the markings made on removal) are in alignment.
- ◆ After removing the propshaft from the rear final drive, the additional balance disk (thick washer) that may be located between the lock plate and the bolt head must not be reinstalled. Always renew all flange bolts after dismantling.



- ♦ Renew propshaft bolts (self-locking).
- Bolt on propshaft=>Page 189 .
- Top up gear oil in rear final drive and check oil level=>Page 196 .
- Install exhaust system free of stress

=> 4-Cylinder injection engine (2-valve), Mechanics; Repair group 26

=> 4-Cylinder engine (5-valve), Mechanics; Repair group 26

=> 5-Cylinder injection engine (2-valve), Mechanics; Repair group 26

=> 6-Cylinder injection engine (2-valve), Mechanics; Repair group 26

=> 6-Cylinder engine (5-valve), Mechanics; Repair group 26

Tightening torques

Component	Nm
Cross-piece II to rear final drive	45
Cross-piece I to cross-piece II	45
Cross-piece I to body	45
Final drive support/final drive mounting to rear final drive	45
Final drive mounting to rear final drive	45
Brace to cross-piece I	55

Component	Nm
Trapezium link to cross-piece	85 1)
Flange shaft to final drive	10 + 90° 2)
Drive shaft to flange shaft M8	40
M10	77
Cross-piece and heat shield to body	25
Drive shaft cover plate to rear final drive	25
Vacuum unit bracket to rear final drive	25
Retainer for handbrake cable	25
Metering pump retainer to body 3)	25
Propshaft to rear final drive	55
Cross-piece and heat shield to body	25
Fuel tank cover panel to body	20
Clamp for exhaust pipe	40
Oil drain plug/ oil filler plug	25

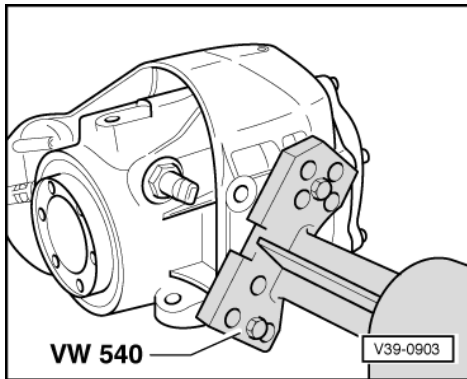
Protected by copyright. Copying for private or commercial purposes, in part or in whole, is not permitted unless authorized by AUDI AG. AUDI AG does not guarantee or accept any liability with respect to the correctness of information in this document. Copyright by AUDI AG.

- 1) Replace self-locking nuts
- 2) 90° is a quarter turn
- 3) Vehicles with auxiliary heater

11.2 - Securing rear final drive to repair stand

Special tools, testers and auxiliary items

- ♦ Engine/gearbox support VW 540



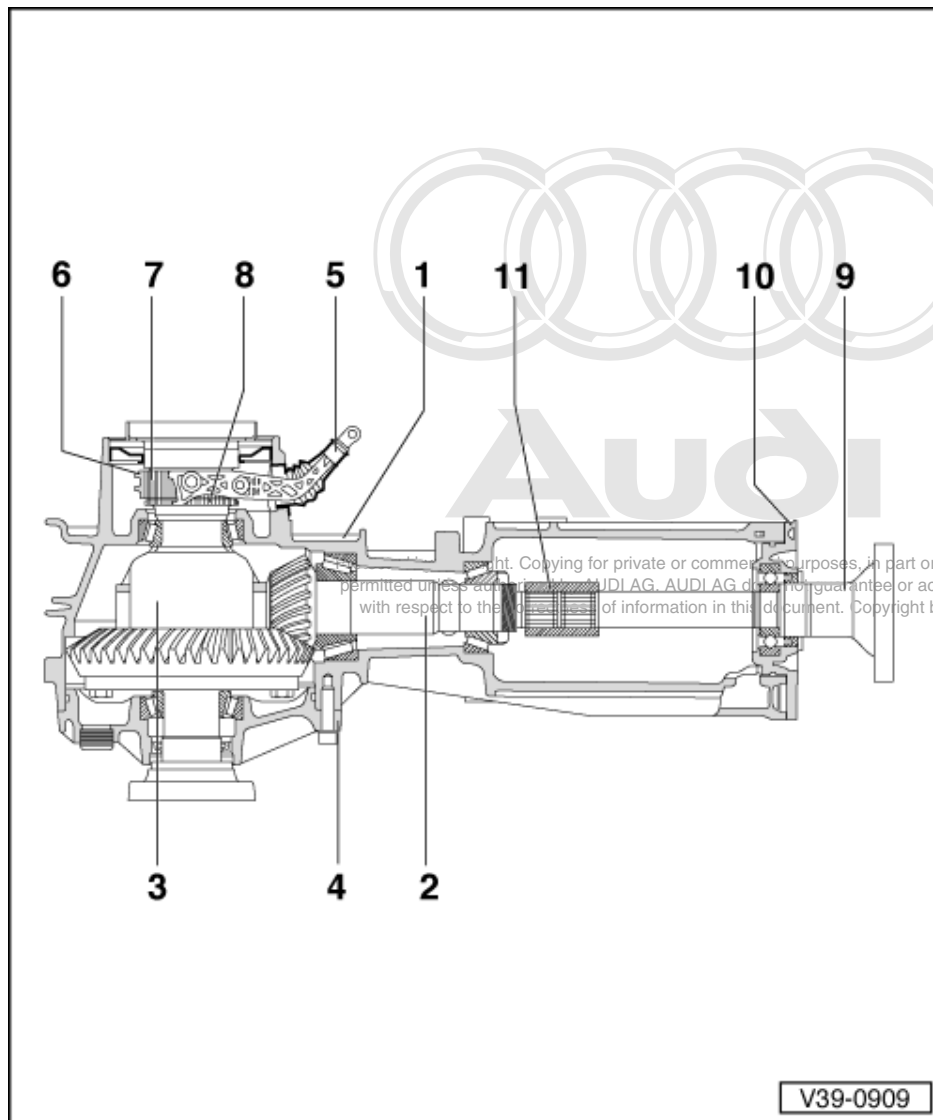
- -> Secure complete rear final drive to a repair stand with engine and gearbox support VW 540.



Protected by copyright. Copying for private or commercial purposes, in part or in whole, is not permitted unless authorised by AUDI AG. AUDI AG does not guarantee or accept any liability with respect to the correctness of information in this document. Copyright by AUDI AG.

12 - Dismantling and assembling rear final drive

12.1 - Dismantling and assembling rear final drive

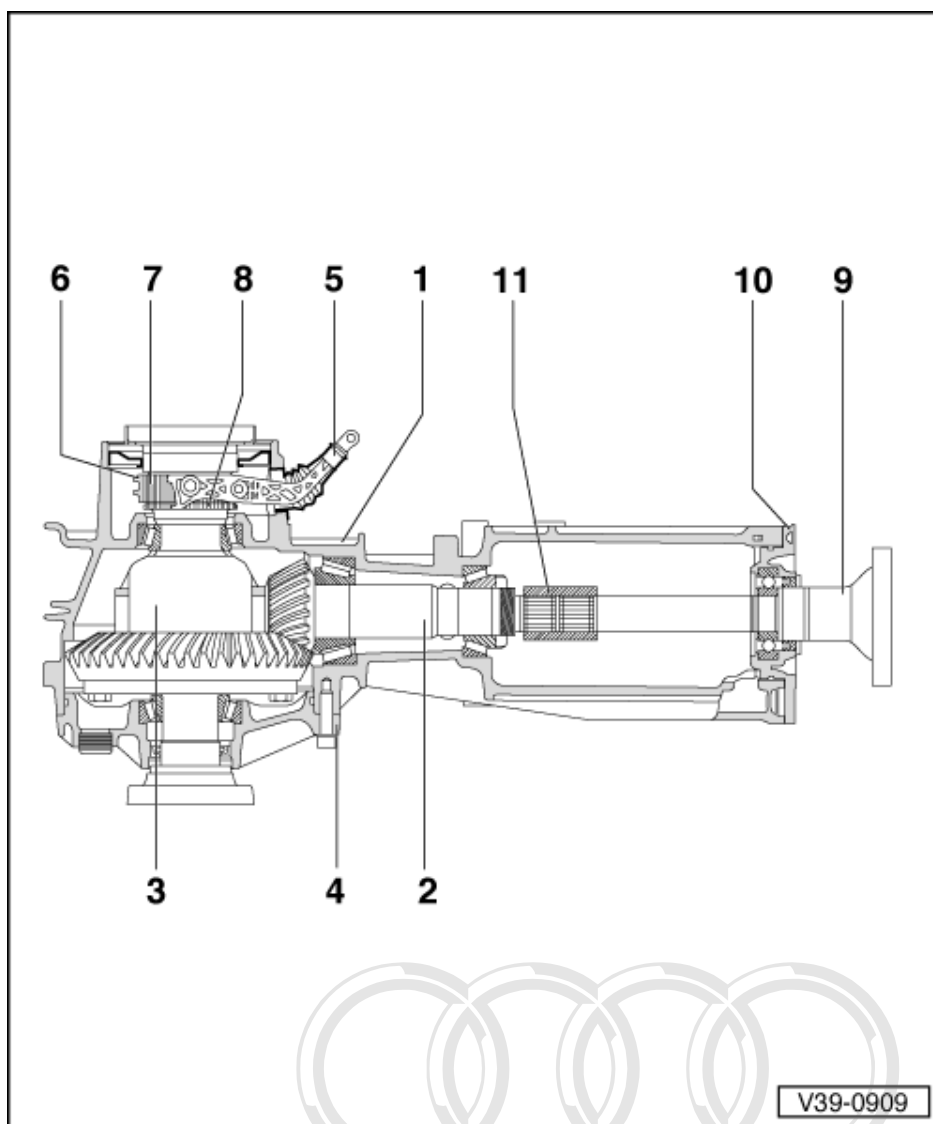


12.2 - Overview

Note:

Vehicles 06.94* do not have a mechanical differential lock for the rear final drive. The following components are therefore not fitted:

- Selector fork -Item 5 -
- Locking collar -Item 6 -
- Synchro-hub -Item 7 -
- Clutch body for differential lock -Item 8 -



1 Final drive housing

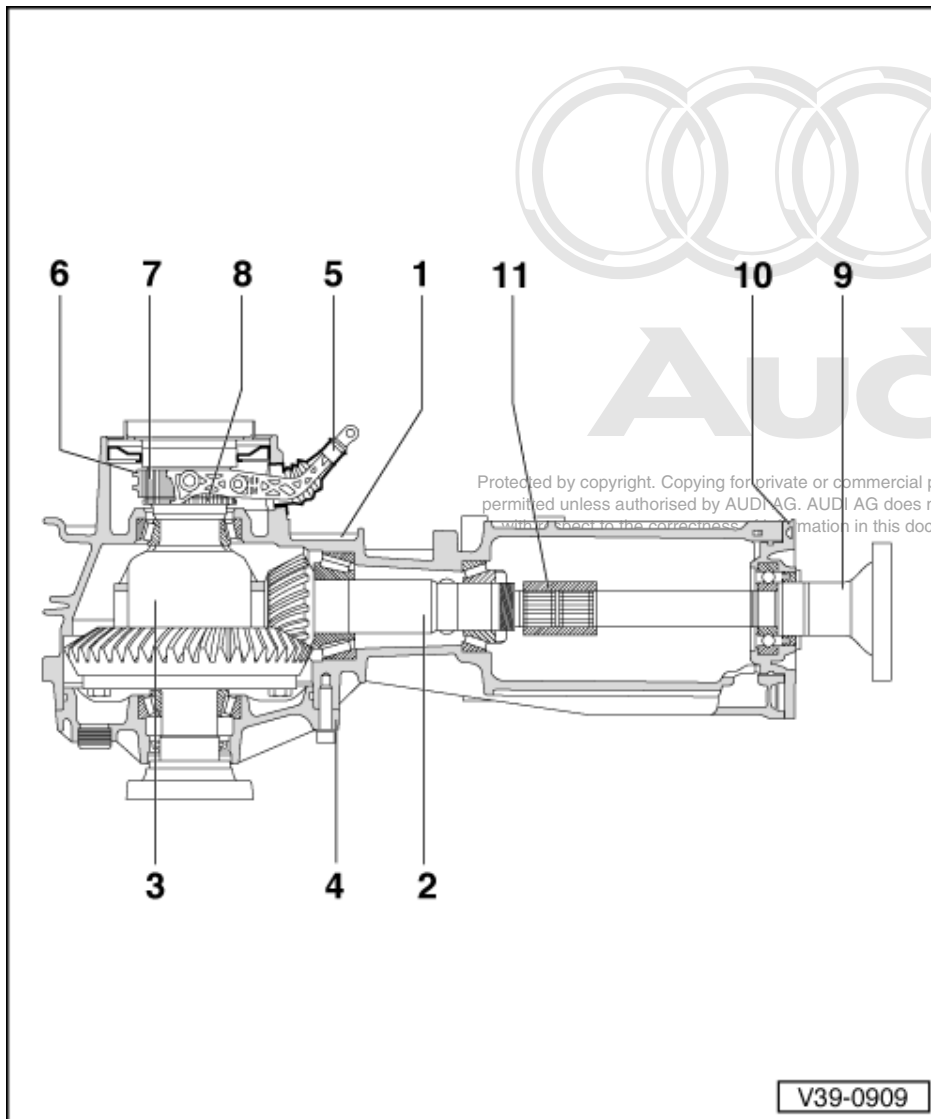
2 Drive pinion

- ♦ Is mated with crown wheel, always renew together as a set
- ♦ Removing and installing
=>Page 251

3 Differential with crown wheel

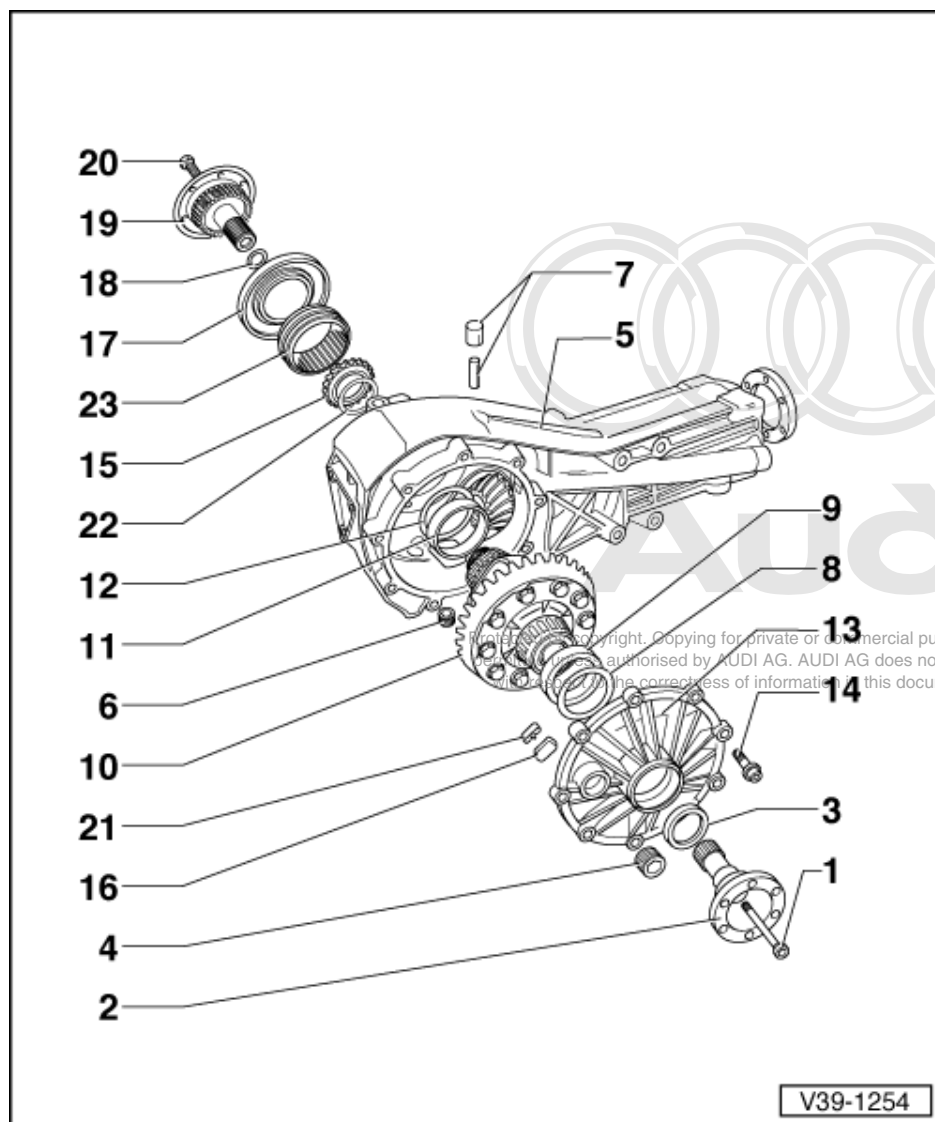
- ♦ Must be removed before dismantling drive pinion
- ♦ Crown wheel is mated to drive pinion
- ♦ Removing and installing
=>Page 239
- ♦ Dismantling and assembling
=> Page 240

4 Cover for final drive



- 5 Selector fork
- 6 Locking collar
- 7 Synchro-hub
- 8 Clutch body for differential lock
- 9 Flange for propshaft
 - ♦ Removing and installing
=>-Item **254**
- 10 Cover for final drive
- 11 Sleeve

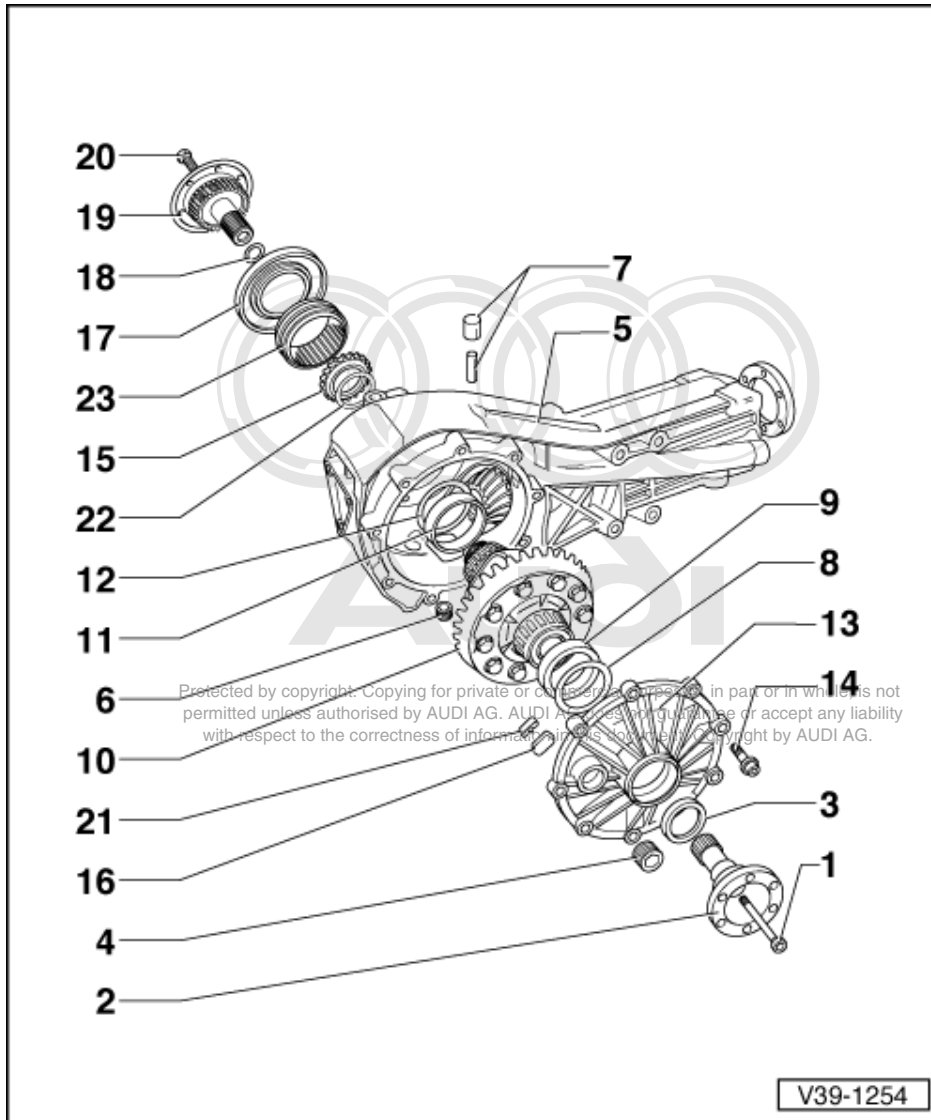
12.3 - Removing and installing differential together with differential lock



Notes:

- ◆ General repair instructions =>Page **10** .
- ◆ Secure final drive on a repair stand => Page 39-141.
- ◆ Adjustments are required when replacing components marked 1)
=> Adjustment overview Page **277** .

- 1 Taper-head bolt M8
10 Nm +1/4turn (90°) further
- 2 Flange shaft, right
 - ◆ Removing=>Page **240**
 - ◆ Installing=>Page **240**



3 Seal, right

- ♦ Prise out=>Page 198
- ♦ Drive in with 2062 as far as stop
=>Page 199

4 Oil filler plug - 25 Nm

5 Final drive housing 1)

- ♦ With drive pinion
- ♦ Removing and installing drive pinion
=>Page 251

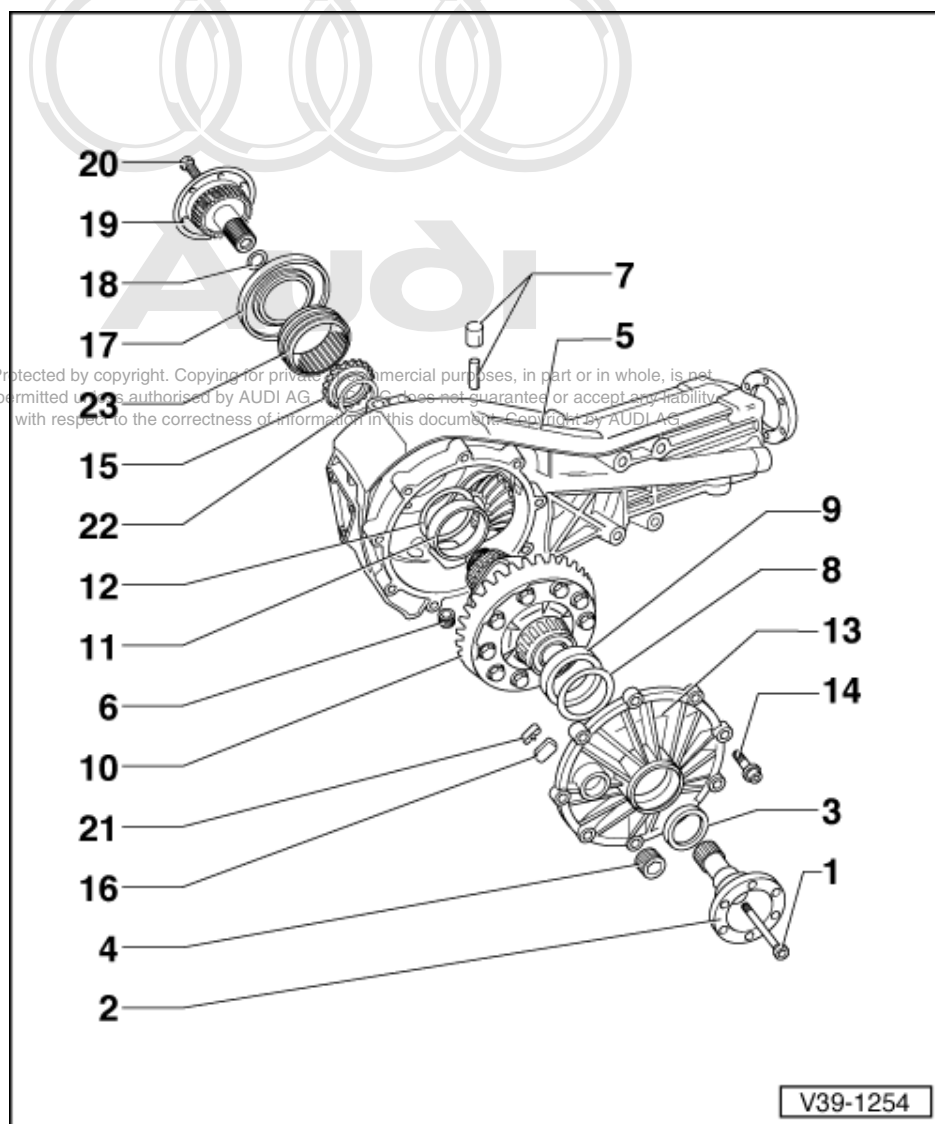
6 Oil drain plug - 25 Nm

7 Breather

- ♦ Insertion depth=>Fig. 1

8 Shim "S1"

- ♦ Note thickness
- ♦ Adjustment overview
=>Page 277



9 Outer race for small taper roller bearing 1)

- ♦ Driving out
=>Fig. 248
- ♦ Driving in
=>Fig. 249

10 Differential with crown wheel 1)

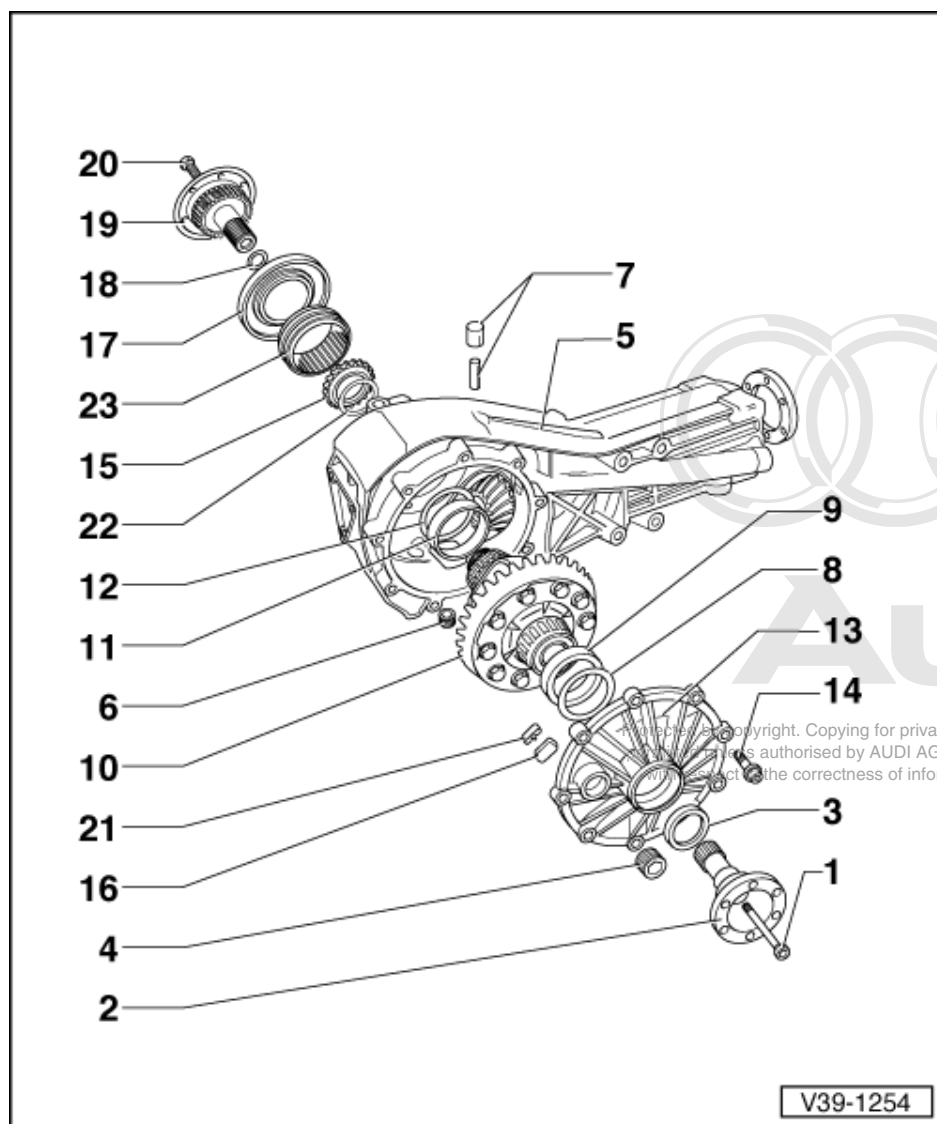
- ♦ Removing => Page 239
- ♦ Dismantling and assembling
=> Page 240

11 Outer race for large taper roller bearing 1)

- ♦ Removing and driving in => Fig. 246

12 Shim "S2"

- ♦ Note thickness
- ♦ Adjustment overview
=>Page 277


13 Cover for final drive 1)

- ◆ Seal with AMV 188 000 02
- ◆ Installation position: magnet towards the bottom

14 Bolt - 25 Nm

- ◆ Qty.8

15 Clutch body for differential lock

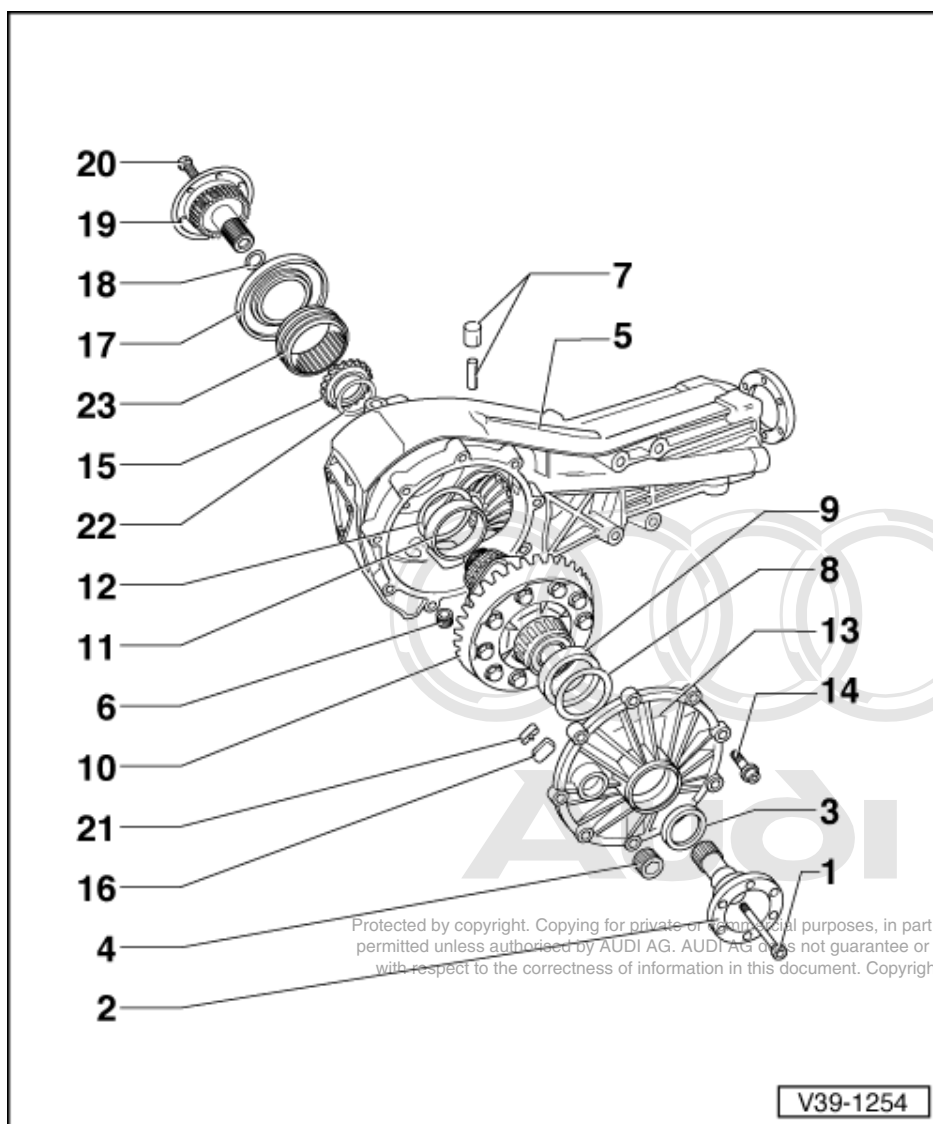
- ◆ Installation position
=>Fig. 273

16 Magnet

- ◆ Installation position => Fig. 2

17 Seal, left

- ◆ Prise out=>Page 202
- ◆ Drive in with 3066/1 as far as stop
=>Page 202



18 Shim for flange shaft

- ♦ Take care not to lose shim when dismantling
- ♦ Determining thickness
=>Page 273
- ♦ Adjustment overview
=>Page 277

19 Flange shaft, left

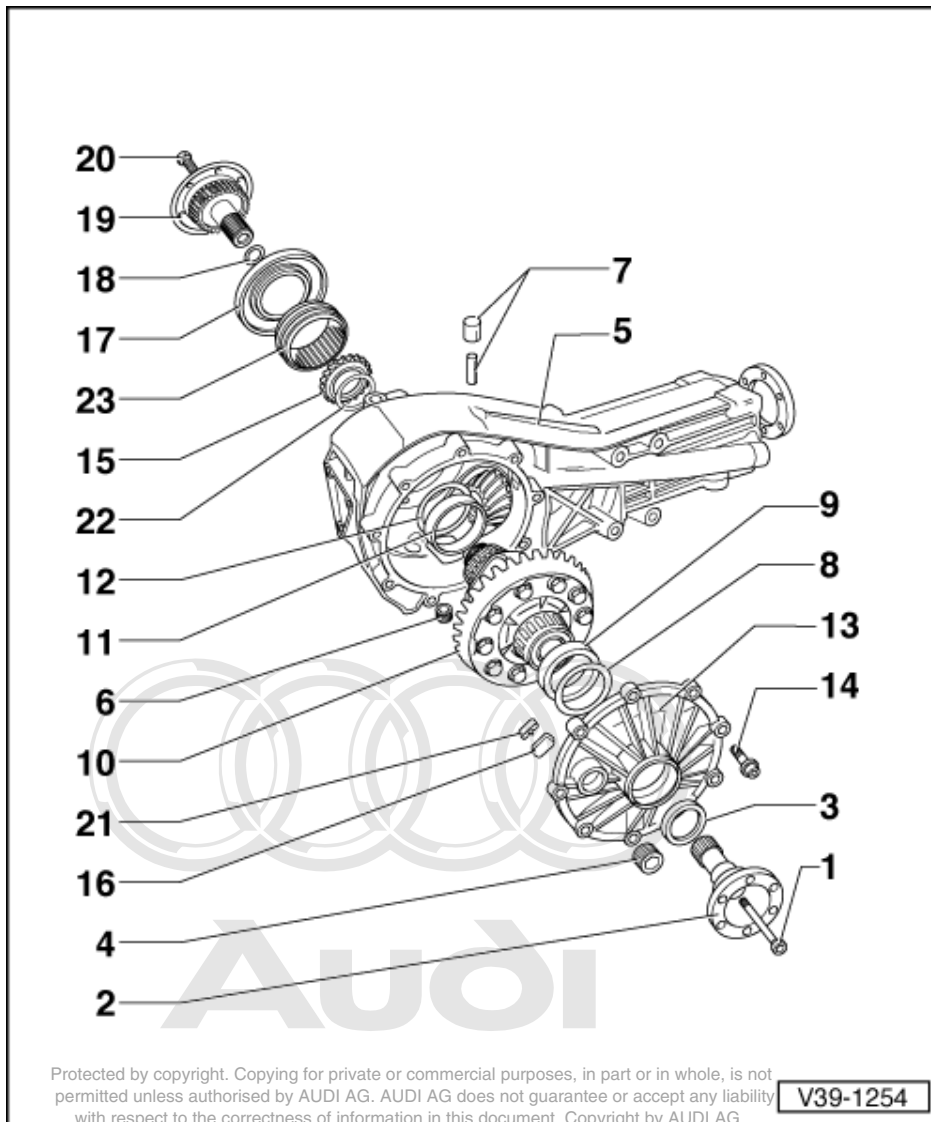
- ♦ Removing=>Page 240
- ♦ Installing=>Page 240

20 Taper-head bolt M8

10 Nm + 1/4 turn (90°) further

21 Clip for magnet

- ♦ Installation position => Fig. 2
- ♦ Renew



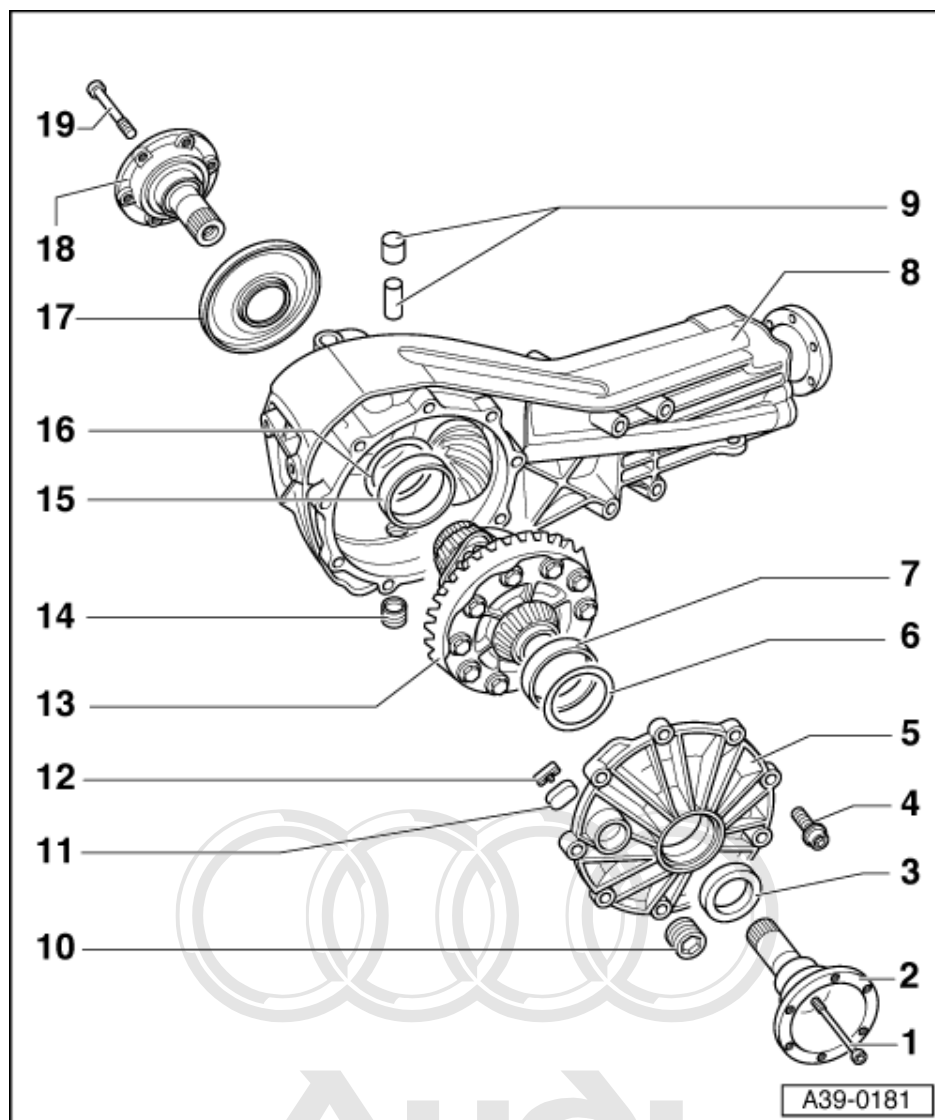
22 Shim for clutch body

- ♦ Determining thickness
=>Fig. 273

23 Locking collar

- ♦ Installation position: shoulder towards clutch body
- ♦ Remove and install together with selector fork

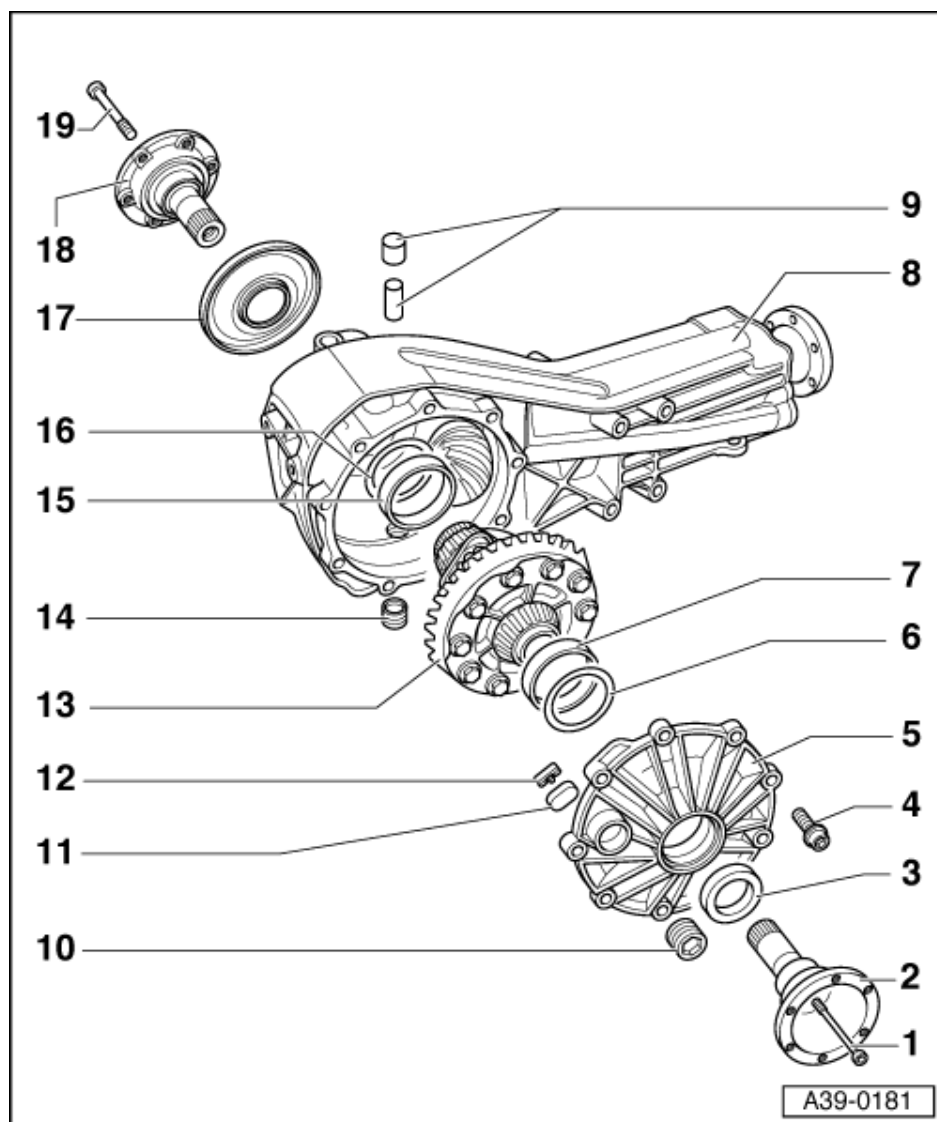
12.4 - Removing and installing differential without differential lock



Notes:

- ◆ General repair instructions => Page 10
- ◆ Secure final drive on a repair stand => Page 39-141
- ◆ Adjustments are required when replacing components marked 1)
=> Adjustment overview Page 277 .

- 1 Taper head bolt M8
10 Nm +1/4turn (90°) further
- 2 Flange shaft, right
 - ◆ Removing=>Page 240
 - ◆ Installing =>Page 240



3 Seal, right

- ◆ Prise out=>Page 198
- ◆ Drive in with 2062 as far as stop
=>Page 199

4 Bolt - 25 Nm

5 Cover for final drive1)

- ◆ Seal with AMV 188 000 02
- ◆ Installation position: magnet towards the bottom

6 Shim "S1"

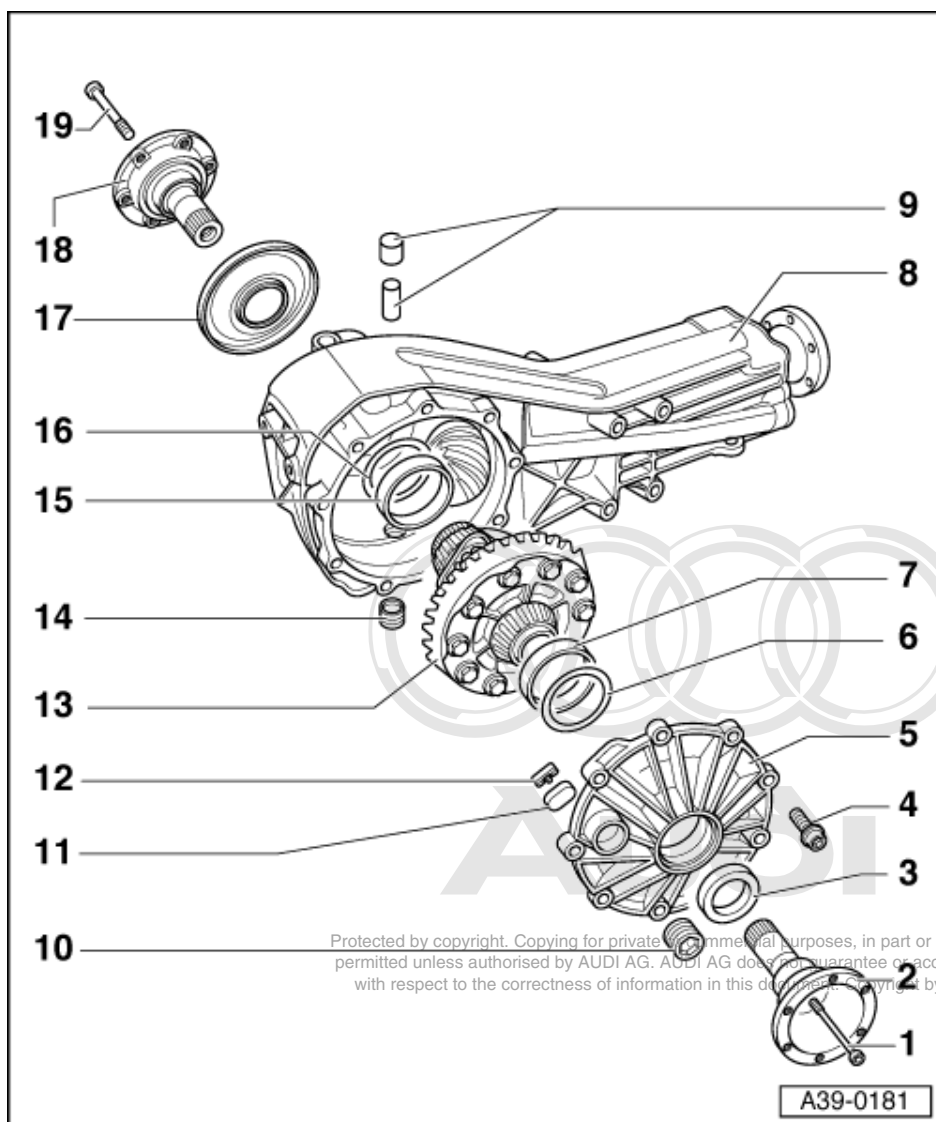
- ◆ Note thickness
- ◆ Adjustment overview
=>Page 277

7 Outer race for small taper roller bearing1)

- ◆ Driving out
=>Fig. 248
- ◆ Driving in
=>Fig. 249



Protected by copyright. Copying for private or commercial purposes, in part or in whole, is not permitted unless authorised by AUDI AG. AUDI AG does not guarantee or accept any liability with respect to the correctness of information in this document. Copyright by AUDI AG.



8 Final drive housing 1)

- ♦ With drive pinion
- ♦ Removing and installing drive pinion
=>Page 251

9 Breather

- ♦ Insertion depth=>Fig. 1

10 Oil filler plug - 25 Nm

11 Magnet

- ♦ Installation position=>Fig. 2

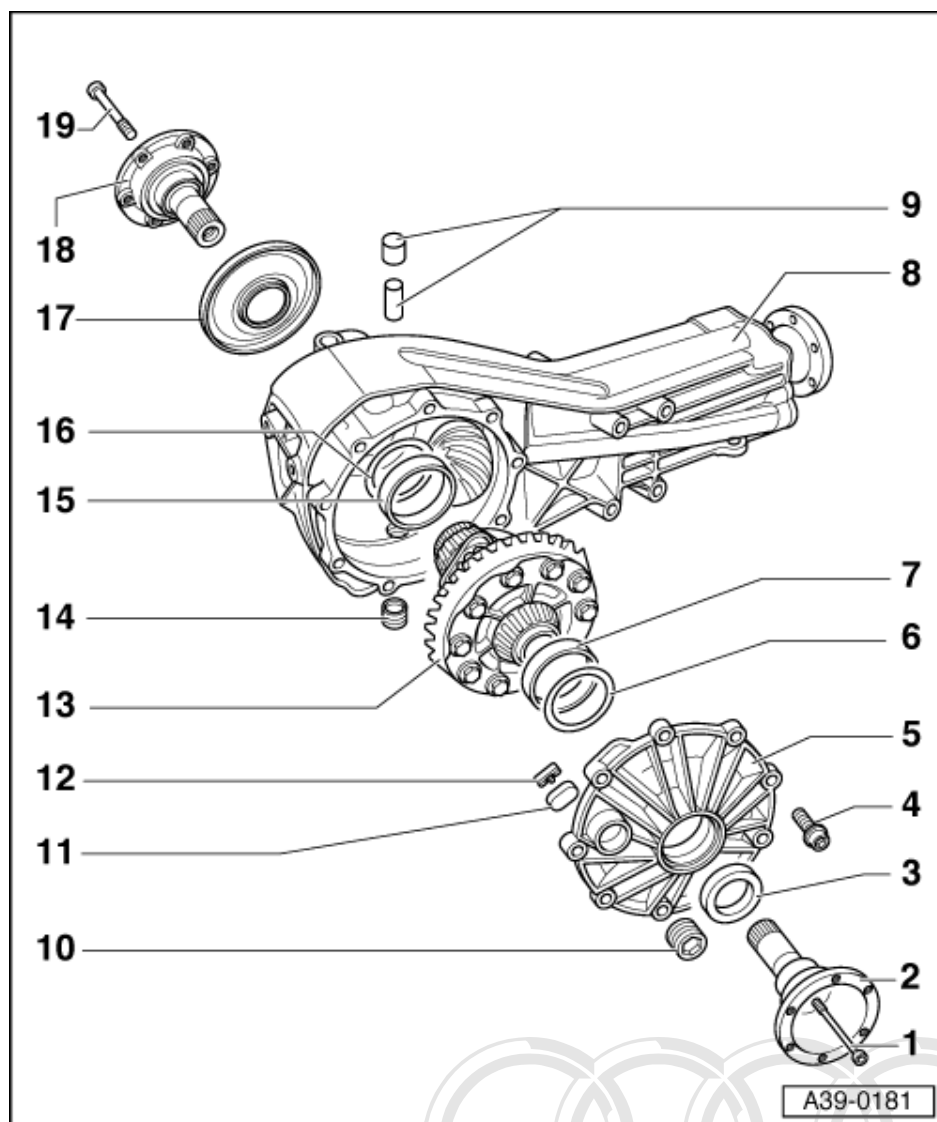
12 Clip for magnet

- ♦ Installation position=>Fig. 2
- ♦ Renew

13 Differential with crown wheel1)

- ♦ Removing=>Page 239
- ♦ Dismantling and assembling
=> Page 240

14 Oil drain plug - 25 Nm



15 Outer race for large taper roller bearing1)

- ◆ Driving out and driving in
=>Fig. 246

16 Shim "S2"

- ◆ Note thickness
- ◆ Adjustment overview
=>Page 277

17 Seal, left

- ◆ Prise out=>Page 240
- ◆ Drive in with 3066/2 as far as stop
=>Page 202

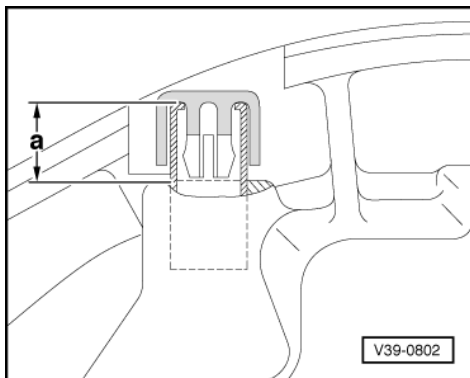
18 Flange shaft, left

- ◆ No adjustment necessary
- ◆ Removing=>Page 240
- ◆ Installing =>Page 240

19 Taper-head bolt M8

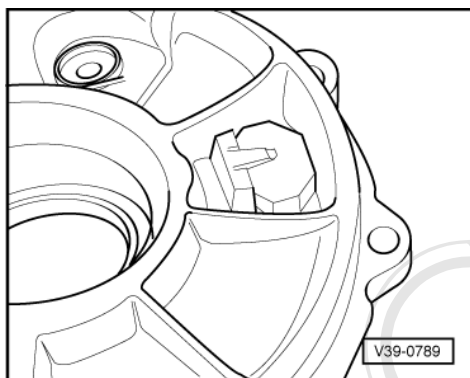
10 Nm +1/4turn (90°) further

Protected by copyright. Copying for private or commercial purposes, in part or in whole, is not permitted unless authorised by AUDI AG. AUDI AG does not guarantee or accept any liability with respect to the correctness of information in this document. Copyright by AUDI AG.



→ Fig.1 Insertion depth for breather sleeve

- ◆ Dimension a = 13 mm



→ Fig.2 Installation position of magnet

- Always fit new clip when performing repairs.

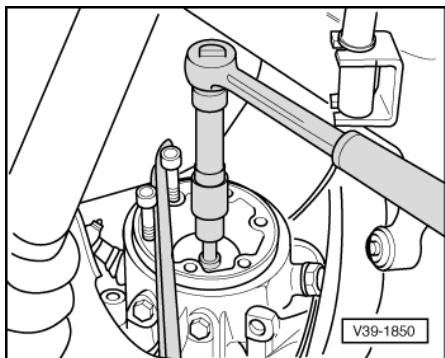
Removing and installing differential

- Rear final drive removed

Special tools, testers and auxiliary items

Removing

- ◆ Drip tray V.A.G 1306
- Secure complete rear final drive on a repair stand =>Page 225 .
- Place drip tray V.A.G 1306 underneath and drain gearbox oil.





- -> Remove left and right-hand flange shafts.
- To loosen the securing bolt, screw two bolts into the flange shaft and counter-hold with a lever.
- Mark flange shafts (for left and right sides).
- Pull out flange shaft using the bolts already screwed in.
- Remove clutch body for differential lock (if fitted)=>Page 267 . Selector fork and locking collar do not have to be removed.
- Unscrew securing bolts from cover for final drive.
- Take cover for final drive off axle housing and remove differential.

Installing

Installation is carried out in the reverse order, when doing this note the following:

- Insert differential.
- Clean sealing surface and coat with sealing paste AMV 188 000 02.
- Fit cover for final drive on final drive housing and tighten in diagonal sequence to 25 Nm.
- If applicable, install clutch body for differential lock with appropriate shim=>Page 267 .
- Fill space between sealing and dust lips with multipurpose grease.
- Install flange shafts and tighten to 10 Nm +90°.

Notes:

- ♦ On vehicles with a differential lock there is a shim between the differential and the right flange shaft=>Page 273 .
- ♦ The left flange shaft should only be adjusted if the left flange shaft, differential housing or bevel gears have been replaced.
- Top up gear oil in rear final drive and check oil level=>Page 196 .

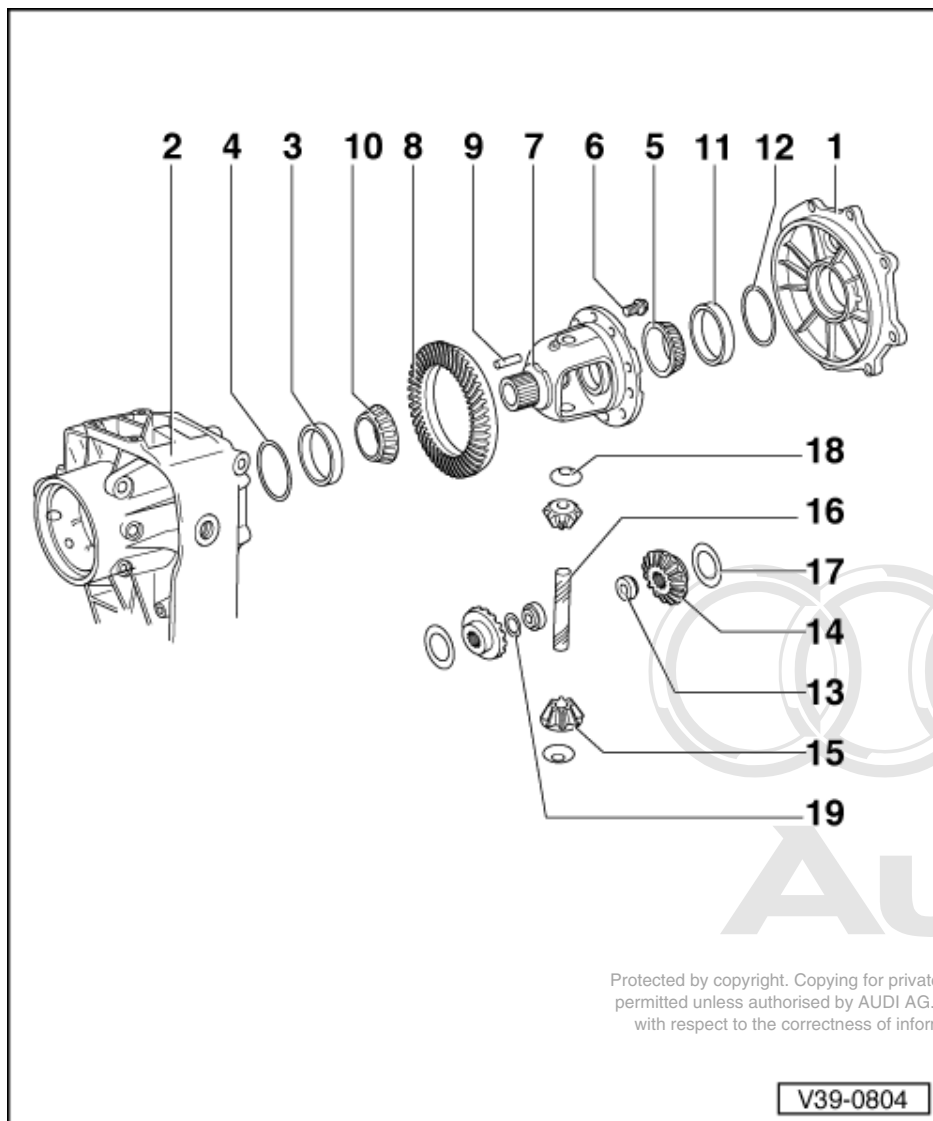
13 - Dismantling and assembling differential

13.1 - Dismantling and assembling differential

Protected by copyright. Copying for private or commercial purposes, in part or in whole, is not permitted unless authorised by AUDI AG. AUDI AG does not guarantee or accept any liability for the correctness of information in this document. Copyright by AUDI AG.

Special tools, testers and auxiliary items

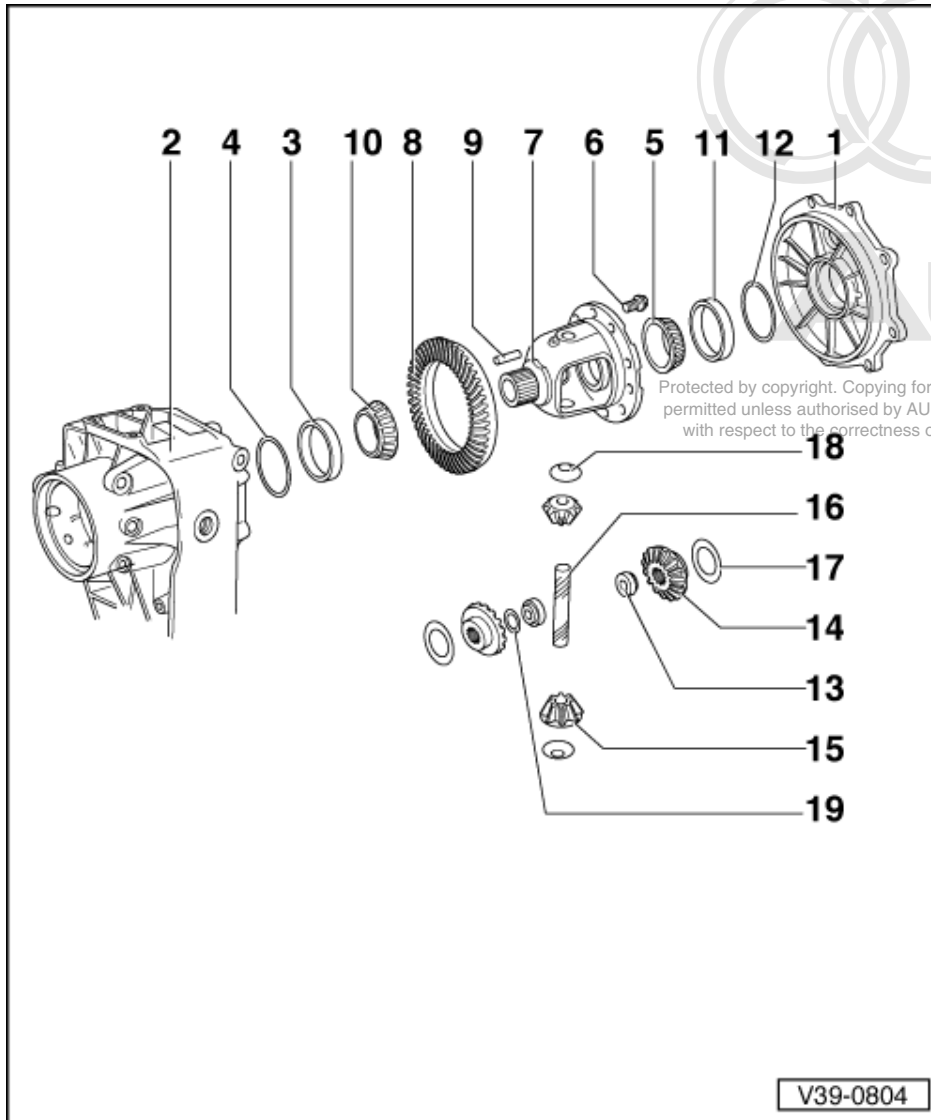
- ♦ Drift VW 295
- ♦ Press plate VW 401
- ♦ Press plate VW 402
- ♦ Press tool VW 407
- ♦ Press tool VW 433
- ♦ Thrust plate VW 447 H
- ♦ Installation and removal tool VW 459
- ♦ Thrust pad VW 511
- ♦ Press tool 40-21
- ♦ Thrust plate 40-105
- ♦ Thrust piece 3118
- ♦ Drift 3138
- ♦ Tapered roller bearing puller V.A.G 1582 and V.A.G 1582/6
- ♦ Two-arm puller Kukko 20/10



Notes:

- ◆ General repair instructions =>Page 10 .
- ◆ Replace both taper roller bearings of the differential together. Use same make if possible.
- ◆ Adjustments are required when replacing components marked 1)
=> Adjustment overview Page 277 .

- 1 Cover for final drive 1)
- 2 Final drive housing 1)
- 3 Outer race for large taper roller bearing 1)
 - ◆ Driving out => Fig. 1
 - ◆ Driving in => Fig. 2

**4 Shim "S2"**

- ◆ Note thickness
- ◆ Adjustment overview
=>Page **277**

5 Inner race for small taper roller bearing 1)

- ◆ Pulling out => Fig. **5**
- ◆ Pressing in => Fig. **6**

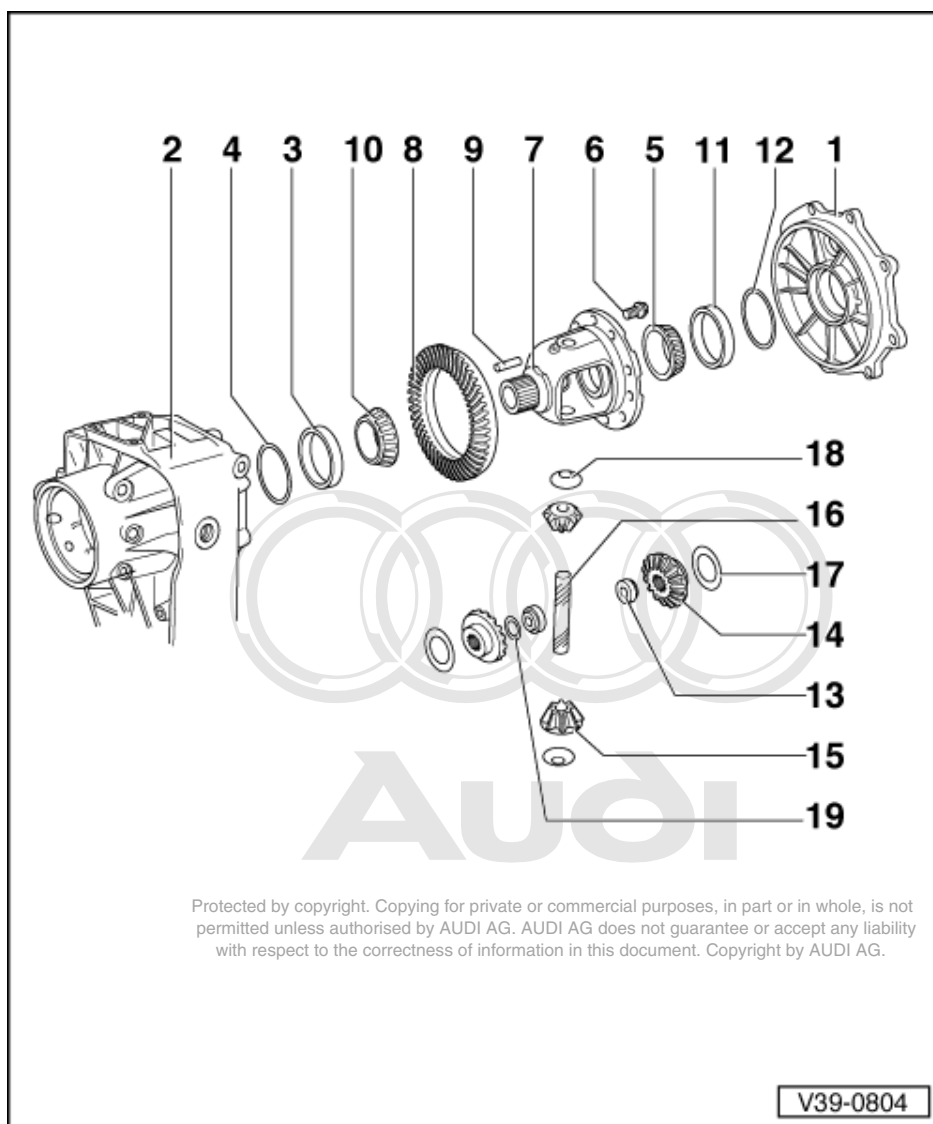
6 Bolt - 60 Nm + turn 45°further

- ◆ Renew
- ◆ Allocation

=> Parts catalogue

- ◆ Lightly tighten bolts then tighten diagonally to correct torque

7 Differential housing 1)



8 Crown wheel 1)

- ♦ Paired with drive pinion (final drive set)
- ♦ Select correct version according to code letters

=> Parts catalogue

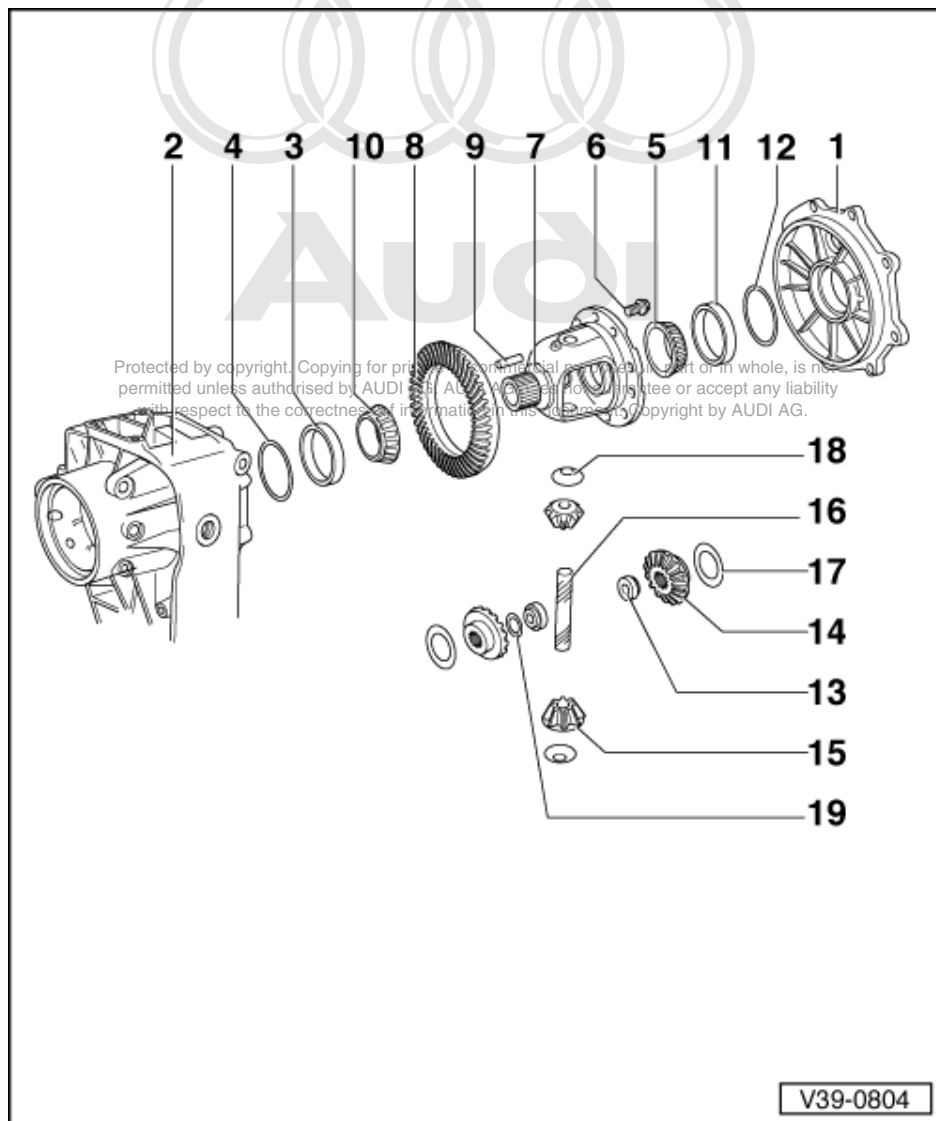
- ♦ Drive off differential housing with a drift => Fig. 9
- ♦ Installing on differential housing
=> Fig. 10

9 Spring pin

- ♦ For securing planet pinion axis shaft
- ♦ Drive in flush

10 Inner race for large taper roller bearing 1)

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



11 Outer race for small taper roller bearing 1)

- ♦ Driving out => Fig. 7
- ♦ Pressing in => Fig. 8

12 Shim "S1"

- ♦ Note thickness
- ♦ Adjustment overview
=>Page 277

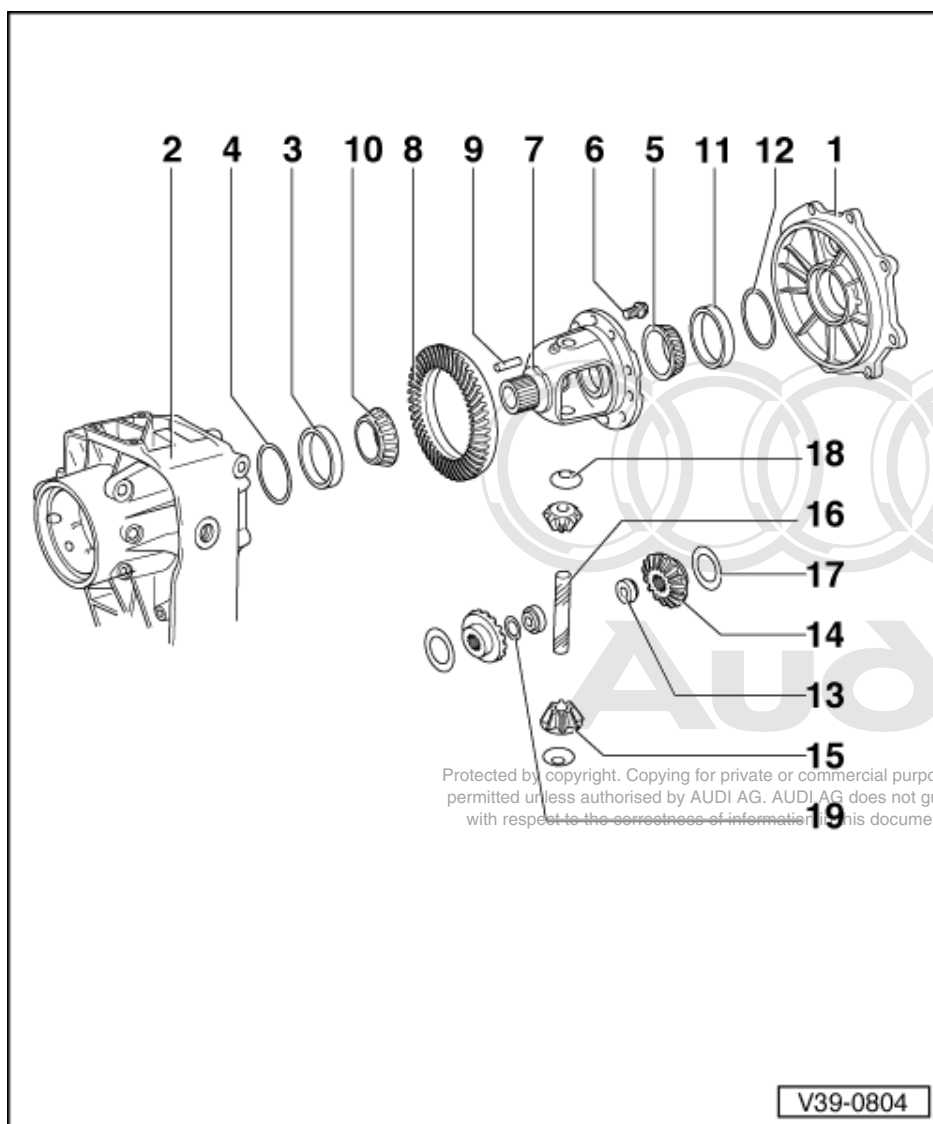
13 Threaded piece

14 Sun wheels

- ♦ Installing => Fig. 11
- ♦ Adjusting => Fig. 12

15 Planet wheels

- ♦ Installing => Fig. 11



16 Shaft for planet wheels

- ◆ Drive out with a drift
- ◆ Drive in carefully so that the thrust washers are not damaged
- ◆ Secure with spring pin

17 Shim

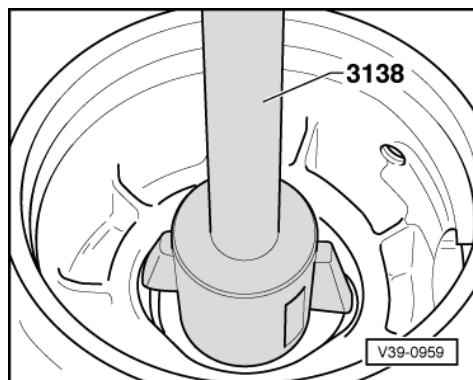
- ◆ Re-determining thickness
=>Fig. 12

18 Thrust washer

- ◆ Check for cracks and chipping

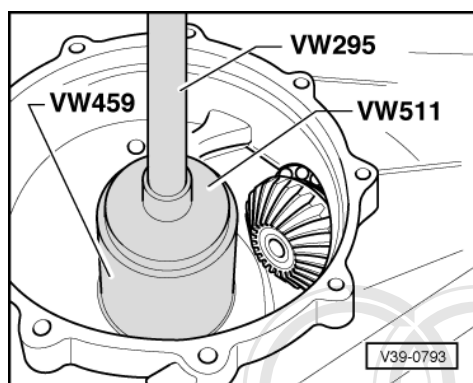
19 Shim for flange shaft

- ◆ Take care not to lose shim when dismantling
- ◆ Determining thickness
=>Page 273
- ◆ Adjustment overview
=>Page 277



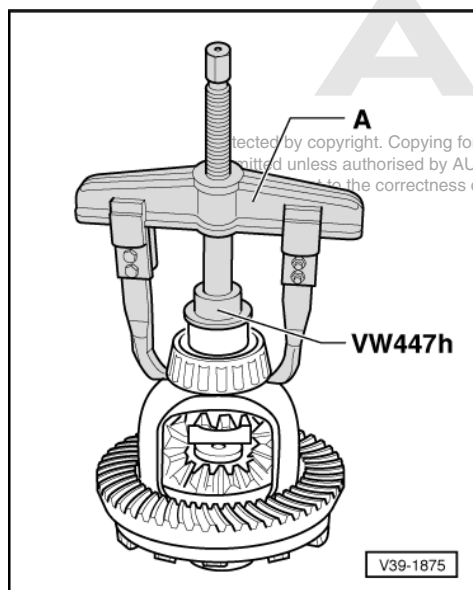
-> Fig.1 Driving outer race for large taper roller bearing out of final drive housing

- After removing check shims for damage.



-> Fig.2 Driving outer race for large taper roller bearing into final drive housing

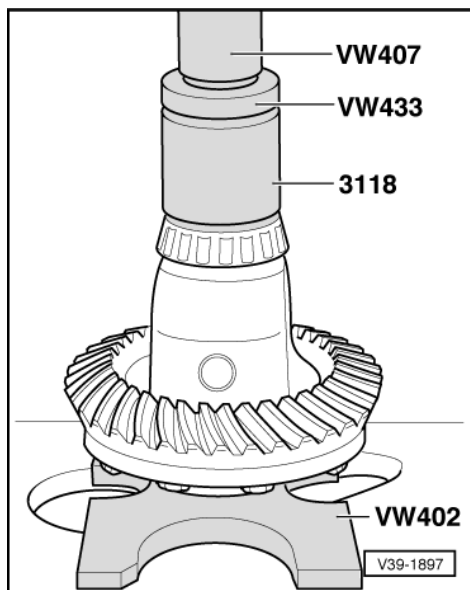
- Position outer race using VW 295 and light even blows with a hammer.
- Then drive in onto stop as shown in illustration.



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

- Before applying puller, fit thrust plate VW 447 h on differential housing.

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

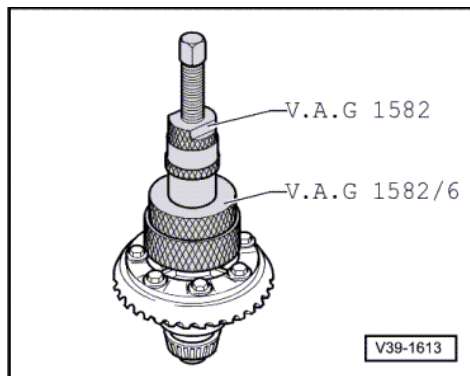


Protected by copyright. Copying for private or commercial purposes, in part or in whole, is not permitted unless authorised by AUDI AG. AUDI AG does not guarantee or accept any liability with respect to the correctness of information in this document. Copyright by AUDI AG.

-> **Fig.4 Pressing on inner race for large taper roller bearing**

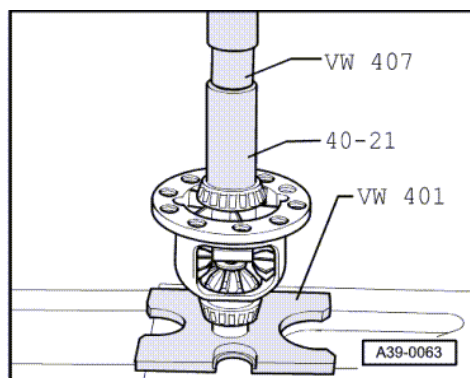
Caution
Wear protective gloves.

- Heat bearing to approx. 100 °C and press home.



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

- Fit thrust plate 40-105 onto differential housing before fitting puller.

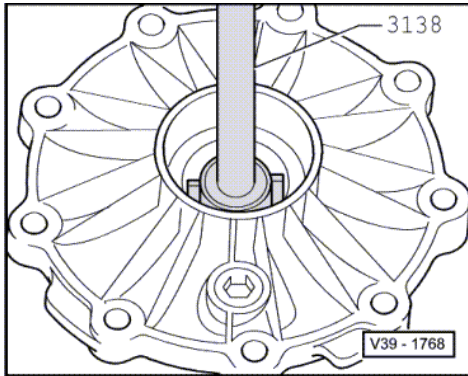




-> Fig.6 Pressing on inner race for small taper roller bearing

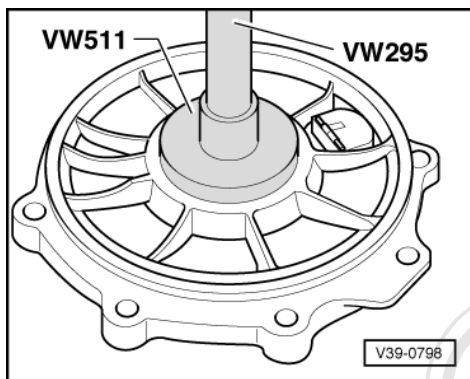
Caution
Wear protective gloves.

- Heat bearing to approx. 100 °C place on and press home.



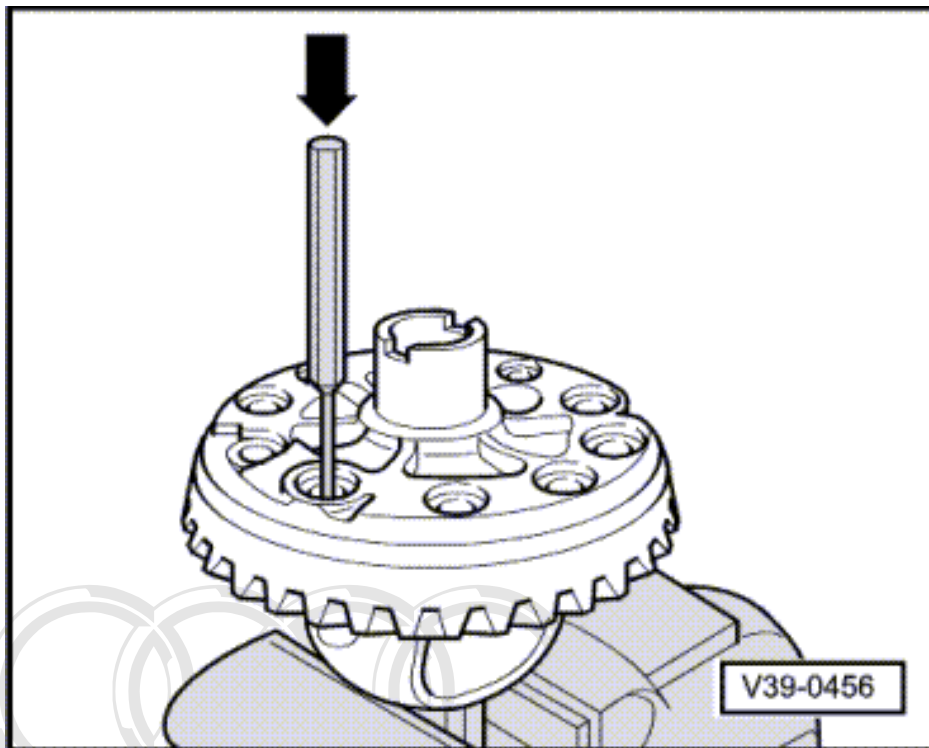
-> Fig.7 Driving outer race for small taper roller bearing out of cover

- After removing check shims for damage.

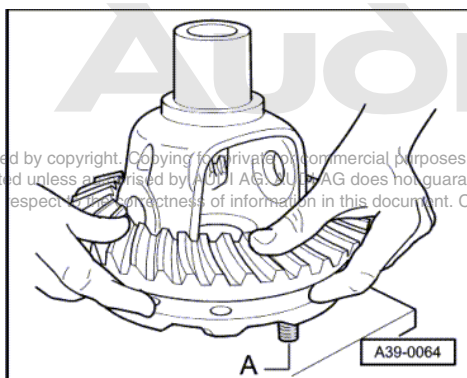


Protected by copyright. Copying for private or commercial purposes, in part or in whole, is not permitted unless authorised by AUDI AG. AUDI AG does not guarantee or accept any liability with respect to the correctness of information in this document. Copyright by AUDI AG.

-> Fig8 Pressing outer race for small taper roller bearing into cover



-> Fig.9 Driving crown wheel off housing



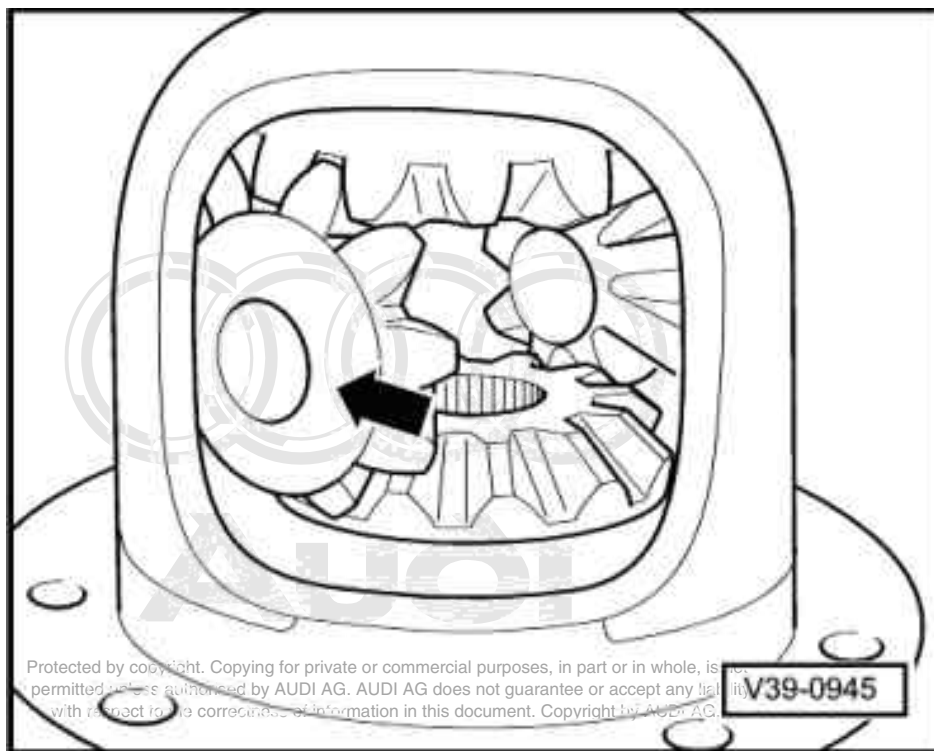
Protected by copyright. Copying for private or commercial purposes, in part or in whole, is not permitted unless authorised by AUDI AG. AUDI AG does not guarantee or accept any liability with respect to the correctness of information in this document. Copyright by AUDI AG.

-> Fig.10 Installing crown wheel

- Use 2 centring pins -A- (local manufacture) as a guide.

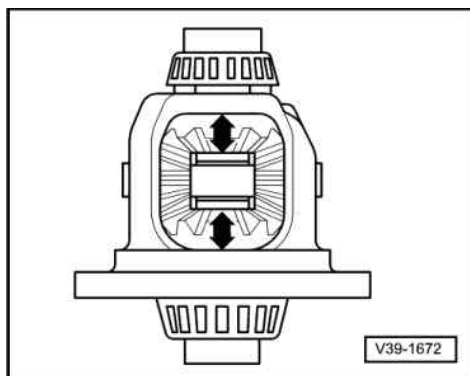
Caution
Wear protective gloves.

- Heat crown wheel to approx. 100 °C and install.



-> Fig.11 Installing differential bevel gears

- If the sun wheels have been renewed, measure and select new shims => Fig. 12 .
- Insert sun wheels with the measured shims.
- Install planet pinions spaced 180° apart, and rotate into position -arrow-.
- Fit and align thrust washers.
- Insert threaded pieces.
- Drive planet pinion shaft into final position and secure.



-> Fig.12 Adjusting differential bevel gears

- Insert sun wheels with thinnest shims (0.5 mm).
- Insert planet pinions with thrust washers spaced 180° apart.

Note:

Do not now interchange bevel gears and thrust washers.

- Drive in planet pinion axis shaft.
- Press planet pinions outwards.
- Press sun wheels in direction indicated (arrows), and check the amount of play.
- Determine the thickest shims for the sun wheels (on each side) which can still just be inserted.

- The same thickness of shim should be used on both sides.
- Identify shims according to the table.
Part numbers.

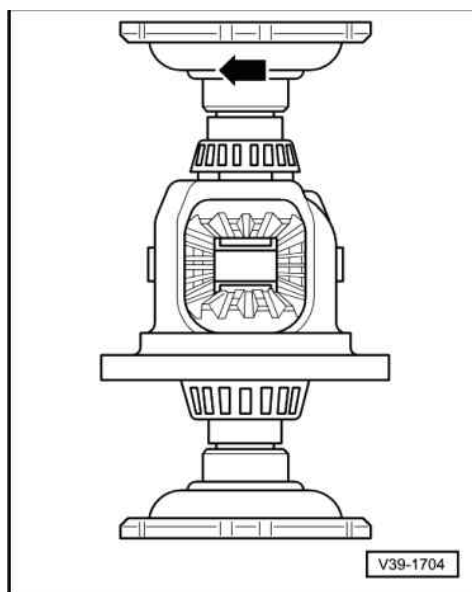
=> Parts catalogue

- Adjust play by inserting an appropriate shim.
- Specification: max. 0.10 mm

Available shims

Shim thickness (mm)		
0.50	0.70	0.90
0.60	0.80	1.00

Note:



-> The adjustment is also correct if no further play is perceptible, although it is still possible to rotate the differential bevel gears -arrow-.

Protected by copyright. Copying for private or commercial purposes, in part or in whole, is not permitted unless authorised by AUDI AG. AUDI AG does not guarantee or accept any liability with respect to the correctness of information in this document. Copyright by AUDI AG.

14 - Removing and installing and dismantling and assembling drive pinion

14.1 - Removing and installing and dismantling and assembling drive pinion

Special tools, testers and auxiliary items

- ◆ Crankshaft seal installing tool VW 204 B
- ◆ Fitting sleeve VW 244 B
- ◆ Press plate VW 401
- ◆ Press plate VW 402
- ◆ Press tool VW 411
- ◆ Press tool VW 412
- ◆ Guide pin VW 439
- ◆ Threaded spindle VW 517
- ◆ Tube VW 519
- ◆ Engine and gearbox support VW 540
- ◆ Multi-purpose tool VW 771



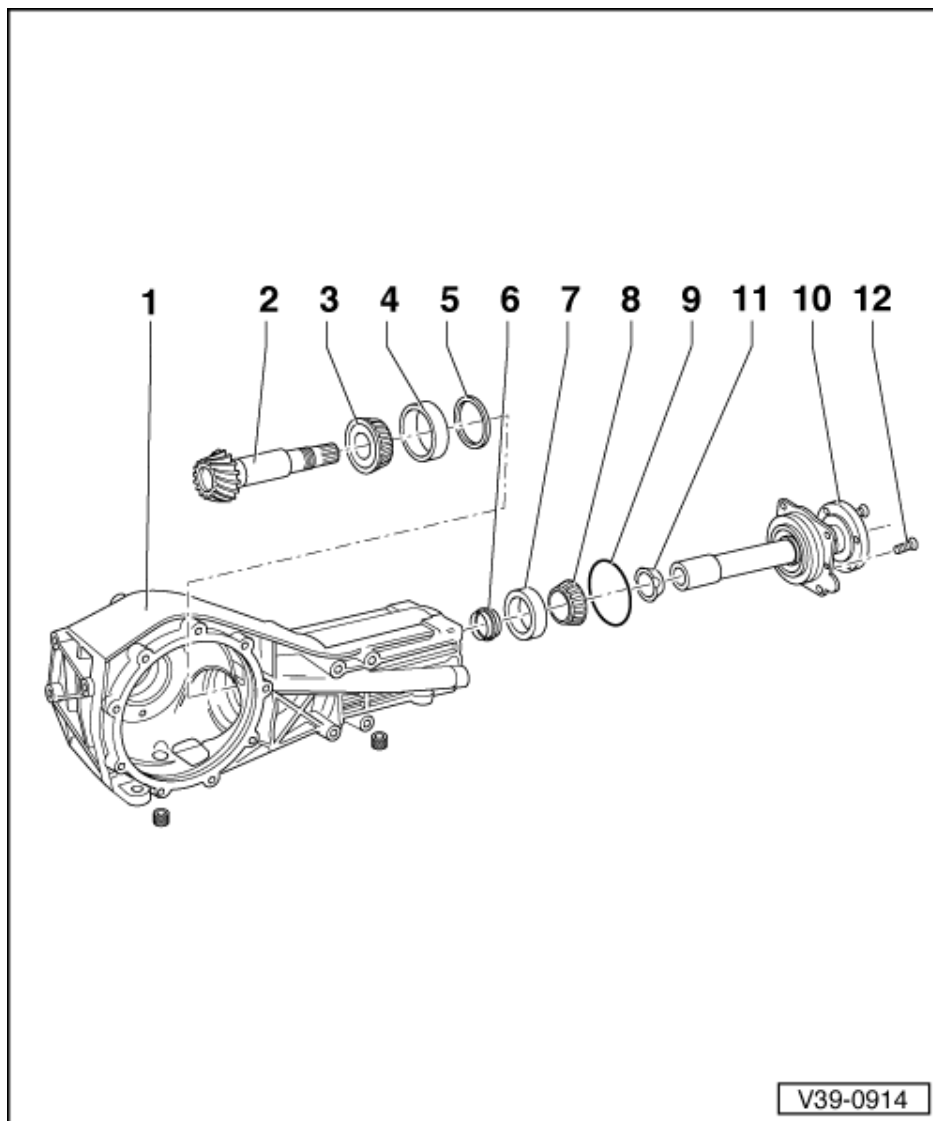
- ♦ VW 771/15 from multi-purpose tool set VW 771
- ♦ Thrust plate 30-205
- ♦ Thrust pad 2050
- ♦ Pinion assembly appliance 2052/2
- ♦ Suspension strut tensioner 2070
- ♦ Thrust pad 3062
- ♦ Straightening tool 3114
- ♦ Retainer 3132
- ♦ Drift 3138
- ♦ Centring mandrel 3176
- ♦ Engine/gearbox jack V.A.G 1383 A
- ♦ Universal support V.A.G 1359/2
- ♦ Separating tool Kukko 17/2
- ♦ Two-arm puller Kukko 21/7
- ♦ Counter support Kukko 22/1
- ♦ Torque gauge 0 ... 600 Ncm
- ♦ Socket attachment (long), 32 mm A/F

Notes:

- ♦ General repair instructions =>Page **10** .
- ♦ Securing final drive to repair stand=>Page 39-141.
- ♦ Replace both taper roller bearings together. Use same make if possible.
- ♦ Do not additionally oil new taper roller bearings for frictional torque measurement. The bearings have already been treated with a special oil by the manufacturer.
- ♦ Removing differential=>Page **239** .
- ♦ Adjustments are required when replacing components marked 1)
=>Adjustment overview Page **277** .



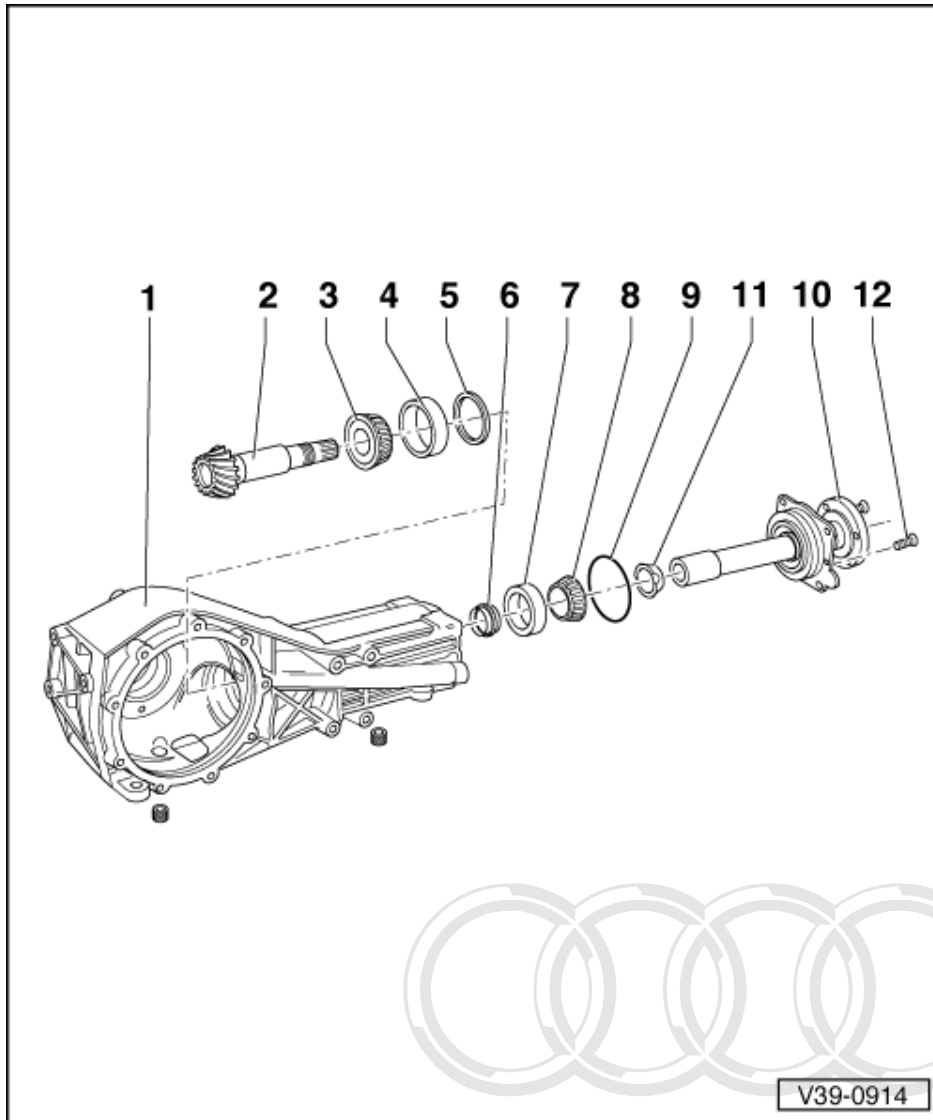
Protected by copyright. Copying for private or commercial purposes, in part or in whole, is not permitted unless authorised by AUDI AG. AUDI AG does not guarantee or accept any liability with respect to the correctness of information in this document. Copyright by AUDI AG.



- 1 Cover for final drive1)
- 2 Drive pinion 1)
 - ♦ Is mated with crown wheel, always renew together as a set
- 3 Inner race for large taper roller bearing 1)
 - ♦ Pulling off=>Fig. 7
 - ♦ Pressing on => Fig. 8
- 4 Outer race for large taper roller bearing 1)
 - ♦ Driving out => Fig. 6
 - ♦ Pulling in => Fig. 9
- 5 Shim "S3"
 - ♦ Note thickness
 - ♦ Adjustment overview
=>Page 277



Protected by copyright. Copying for private or commercial purposes, in part or in whole, is not permitted unless authorised by AUDI AG. AUDI AG does not guarantee or accept any liability with respect to the correctness of information in this document. Copyright by AUDI AG.



6 Spacer sleeve 1)

- ◆ Always renew

7 Outer race for small taper roller bearing 1)

- ◆ Pulling out => Fig. 5
- ◆ Pressing in => Fig. 10

8 Inner race for small taper roller bearing 1)

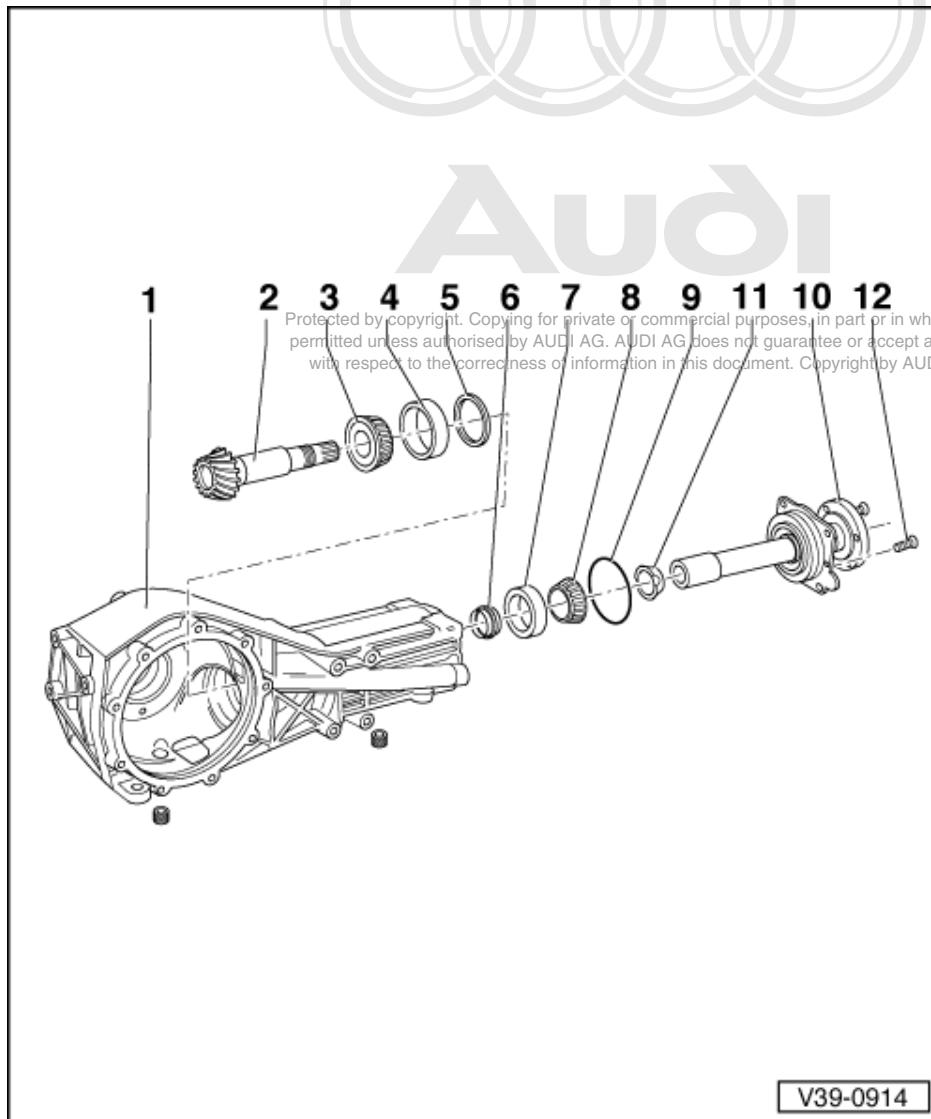
- ◆ Pressing out drive pinion => Fig. 4
- ◆ Installing => Fig. 11

9 O-ring

- ◆ Renew

10 Flange for propshaft and cover for final drive

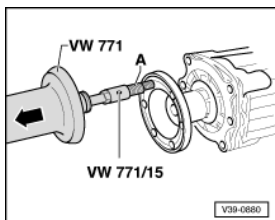
- ◆ Removing and installing
=>Fig. 1
- ◆ Installing => Fig. 16
- ◆ Measuring radial run-out
=>Page 191



11 Nut

- ◆ Renew
- ◆ Removing
=>Fig. 2 and Fig. 3
- ◆ Installing => Fig. 13
- ◆ Measuring friction torque =>Fig. 14
- ◆ Locking => Fig. 15

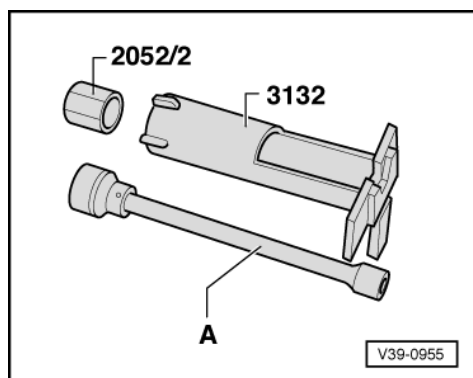
12 Countersunk bolt - 25 Nm



-> Fig1 Pulling off cover for final drive together with flange for propshaft

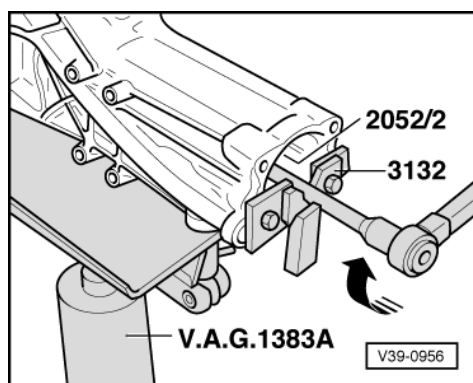
A - Bolt M8/M10

- Unscrew 2 countersunk bolts in cover.



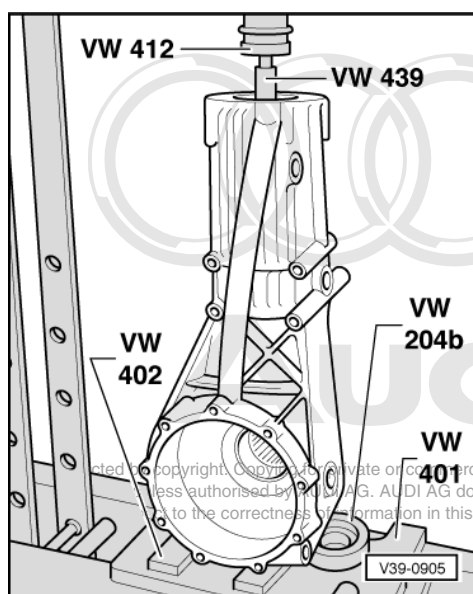
-> Fig.2 Tools for tightening and loosening drive pinion nuts

A - Extension piece and socket attachment (32 mm A/F)

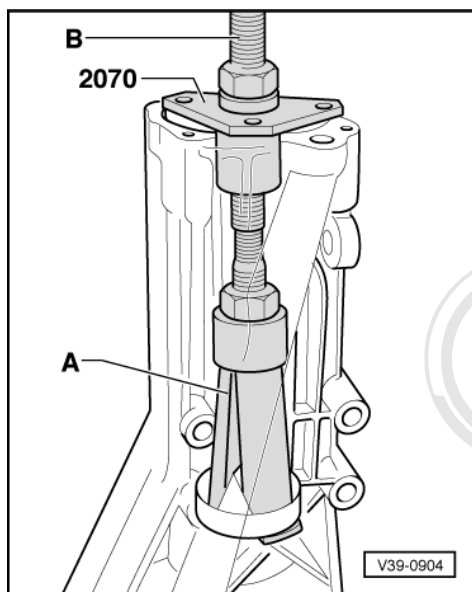


-> Fig.3 Removing nut for drive pinion

- Bolt on retainer 3132 with two M8 x 30 hexagon bolts.
- The final drive must be supported when loosening the nut (e.g. using universal support V.A.G 1359/2 in combination with gearbox jack V.A.G 1383 A).

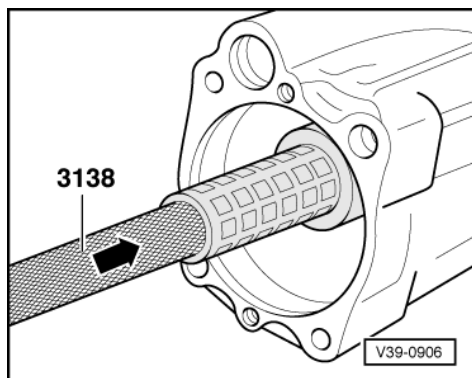


-> Fig.4 Pressing drive pinion out of inner race for small taper roller bearing



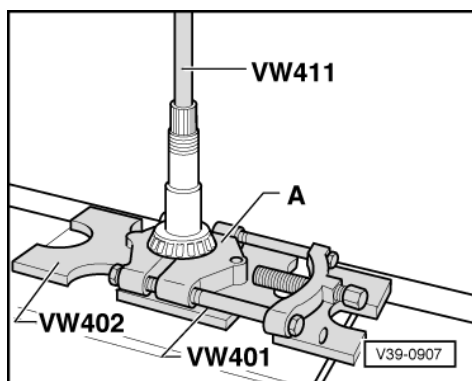
-> Fig.5 Pulling out outer race for small taper roller bearing

- Protected by copyright. Copying for private or commercial purposes, in part or in whole, is not permitted unless authorised by AUDI AG. AUDI AG does not guarantee or accept any liability for errors or omissions in this document. Copyright by AUDI AG.
- A - Internal puller 46 ... 58 mm, e.g. Kukko 21/7
 - B - Spindle from counter-hold tool Kukko 22/1



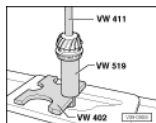
-> Fig.6 Driving out outer race for large taper roller bearing

- After removing check shims for damage.



-> Fig.7 Pressing inner race for large taper roller bearing off drive pinion

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



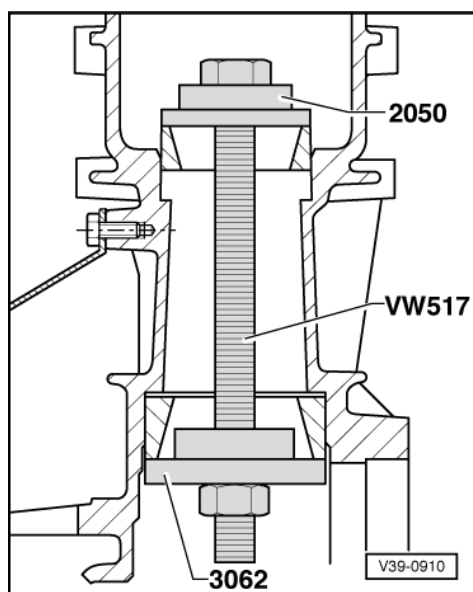
-> Fig.8 Pressing inner race for large taper roller bearing onto drive pinion

Caution

Wear protective gloves.

- Heat bearing to approx. 100 °C place on and press home.

Reproduction of this document for private or commercial purposes, in part or in whole, is not permitted unless authorised by AUDI AG. AUDI AG does not guarantee or accept any liability with respect to the correctness of information in this document. Copyright by AUDI AG.



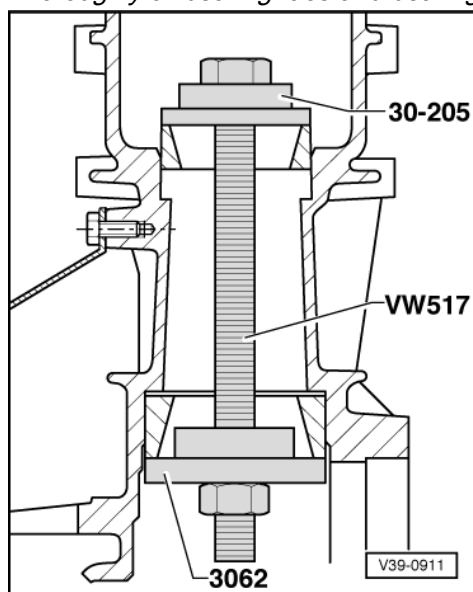
-> Fig.9 Pulling in outer race for large taper roller bearing

- Insert predetermined shim "S3" for drive pinion

=> Page 279 .

Note:

Thoroughly oil bearing race and bearing seat in housing.

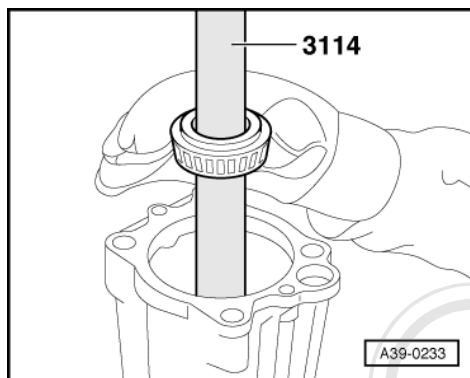


-> Fig.10 Pressing in outer race for small taper roller bearing

- Ensure that outer bearing race is level all round before pressing in.

Note:

Thoroughly oil bearing race and bearing seat in housing.



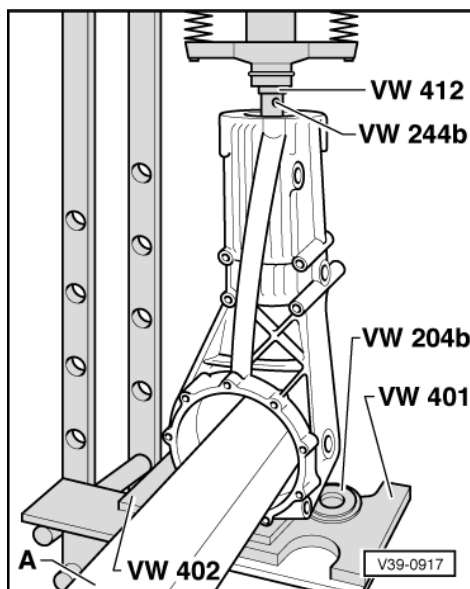
-> Fig.11 Fitting inner race for small taper roller bearing onto drive pinion

- Insert drive pinion with new spacer sleeve.
- Heat inner race for small taper roller bearing to approx. 100 °C.

Caution
Wear protective gloves.

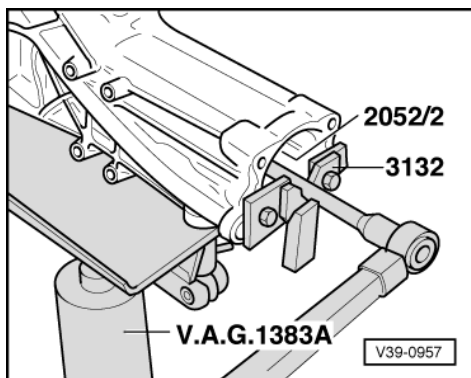
- Push drive pinion upwards, position special tool 3114 centrally on drive pinion and insert inner race for taper roller bearing.

permitted unless authorised by AUDI AG. AUDI AG does not guarantee or accept any liability with respect to the correctness of information in this document. Copyright by AUDI AG.



-> Fig.12 Pressing home taper roller bearing

- A - Wooden block to support drive pinion.

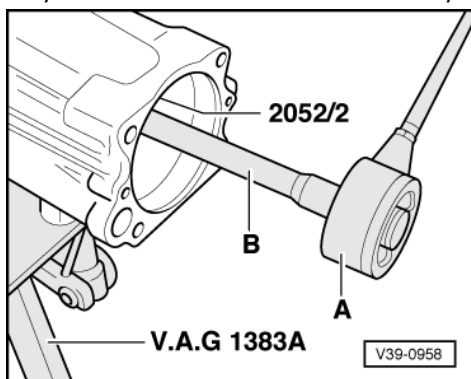


-> **Fig.13 Tightening nut for drive pinion and measuring friction torque**

- The final drive must be supported when tightening the nut (e.g. using universal support V.A.G 1359/2 in conjunction with gearbox jack V.A.G 1383 A).
- Fit a new drive pinion nut.
- Tighten drive pinion nut just far enough so that no play can be felt at drive pinion.
- Gradually increase tightening torque, checking friction torque at regular intervals, until the specified friction torque is obtained => Fig. 14 .

Note:

If the specified friction torque is exceeded, the spacer sleeve must be renewed and the adjustment repeated. A spacer sleeve which has been compressed too much cannot be reused.



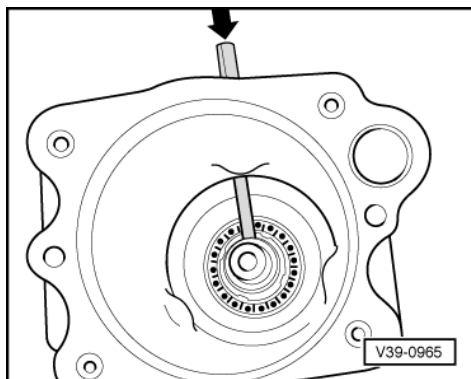
-> **Fig.14 Measuring friction torque**

- A - Torque gauge, commercially available, 0 ... 600 Ncm
- B - Extension with 32 mm socket

- The following frictional torques should be set:

New bearings	Used bearings ¹⁾
250 ... 300 Ncm	30 ... 60 Ncm

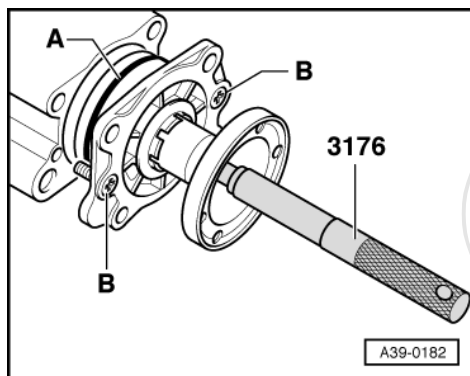
- 1) run at least 50 km (30 miles)



Protected by copyright. Copying for private or commercial purposes, in part or in whole, is not permitted unless authorised by AUDI AG. AUDI AG does not guarantee or accept any liability with respect to the correctness of information in this document. Copyright by AUDI AG.

-> Fig.15 Locking drive pinion nut

- Insert punch through oil drain hole and peen drive pinion nut.



-> Fig.16 Installing flange for propshaft with cover for final drive

- Fit new O-ring -A- in cover and lubricate lightly.
- Drive in flange shaft and the cover using centring mandrel 3176.
- Tighten countersunk bolts -B- to 25 Nm.

Protected by copyright. Copying for private or commercial purposes, in part or in whole, is not permitted unless authorised by AUDI AG. AUDI AG does not guarantee or accept any liability with respect to the correctness of information in this document. Copyright by AUDI AG.

Note:

The radial run-out at flange for propshaft must always be measured and marked =>Page 191.

15 - Servicing differential lock mechanism - vehicles > 05.94

15.1 - Servicing differential lock mechanism - vehicles > 05.94

Note:

There is no mechanical differential lock for the rear final drive in vehicles 06.94 ▶.

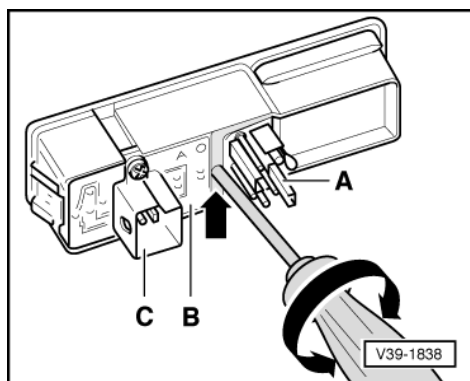
15.2 - Removing and installing switch for differential lock

Notes:

- ♦ The switch for the differential lock is in a panel in the cover on the centre console.
- ♦ Checking function of switch for differential lock

=> Current flow diagrams, Electrical fault-finding and Fitting locations; December 1990 ä 1992; Fault-finding programme No. 2

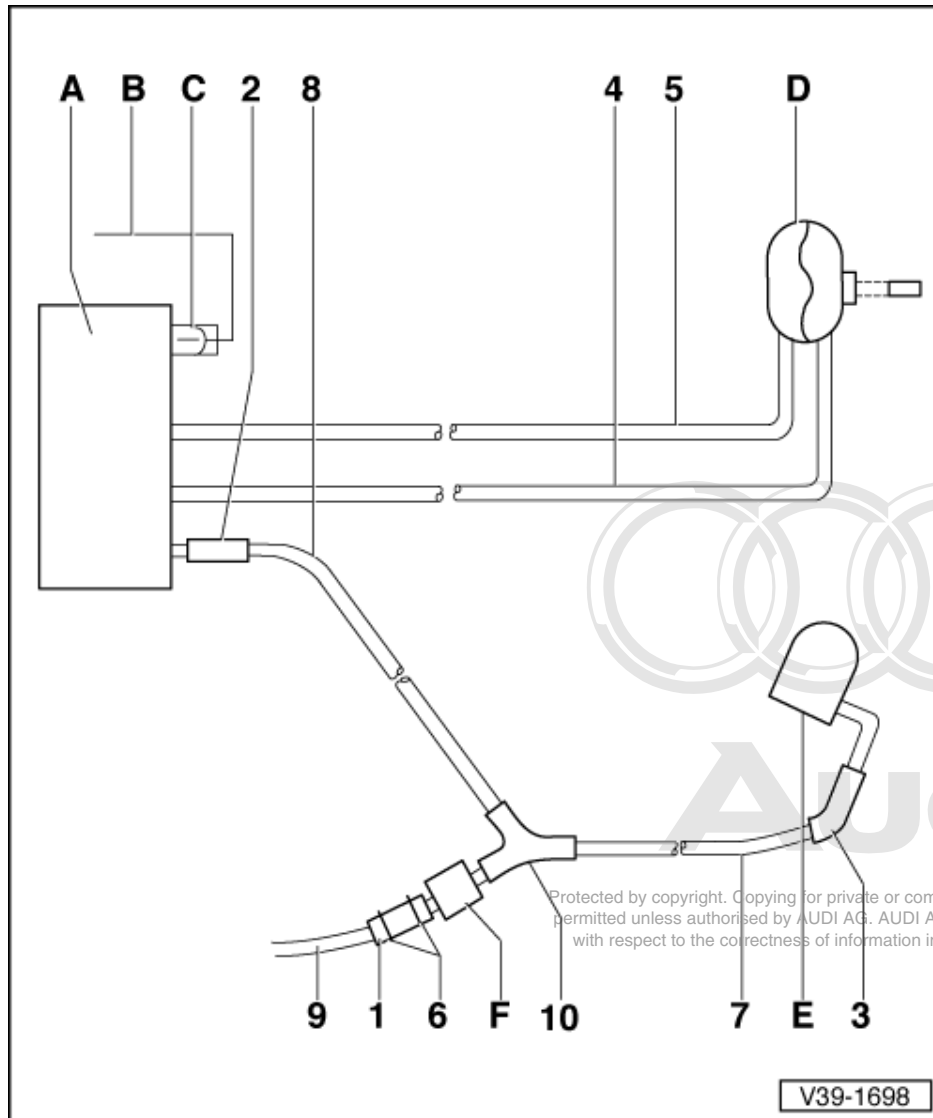
- Carefully prise switch and panel away from cover.
- Disconnect wiring.





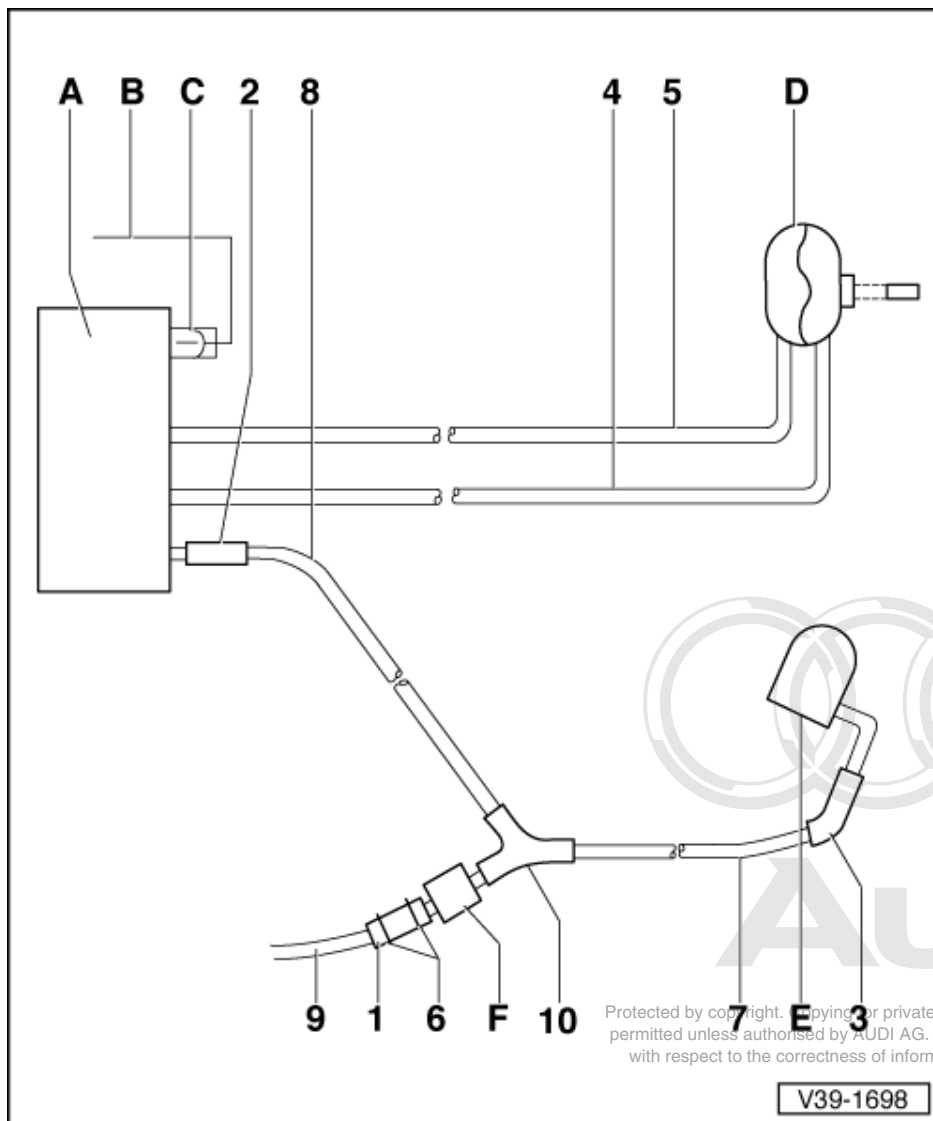
- -> Insert a small screwdriver between switch -A- and conductor plate -B- -arrow-.
- Prise switch out of front catch by turning screwdriver.
- Take switch out of trim panel.
- Conductor plate -B- can be removed from trim panel together with plug housing -C-.

15.3 - Routing of pipes and hoses



A - Differential lock control unit -J187

- ◆ Below rear seat
- B - Electrical wiring**
- ◆ To switch for differential lock mechanism and speedometer
- C - Connector**
- ◆ On control unit -J187
- D - Vacuum unit**
- ◆ On rear final drive



E - Vacuum reservoir

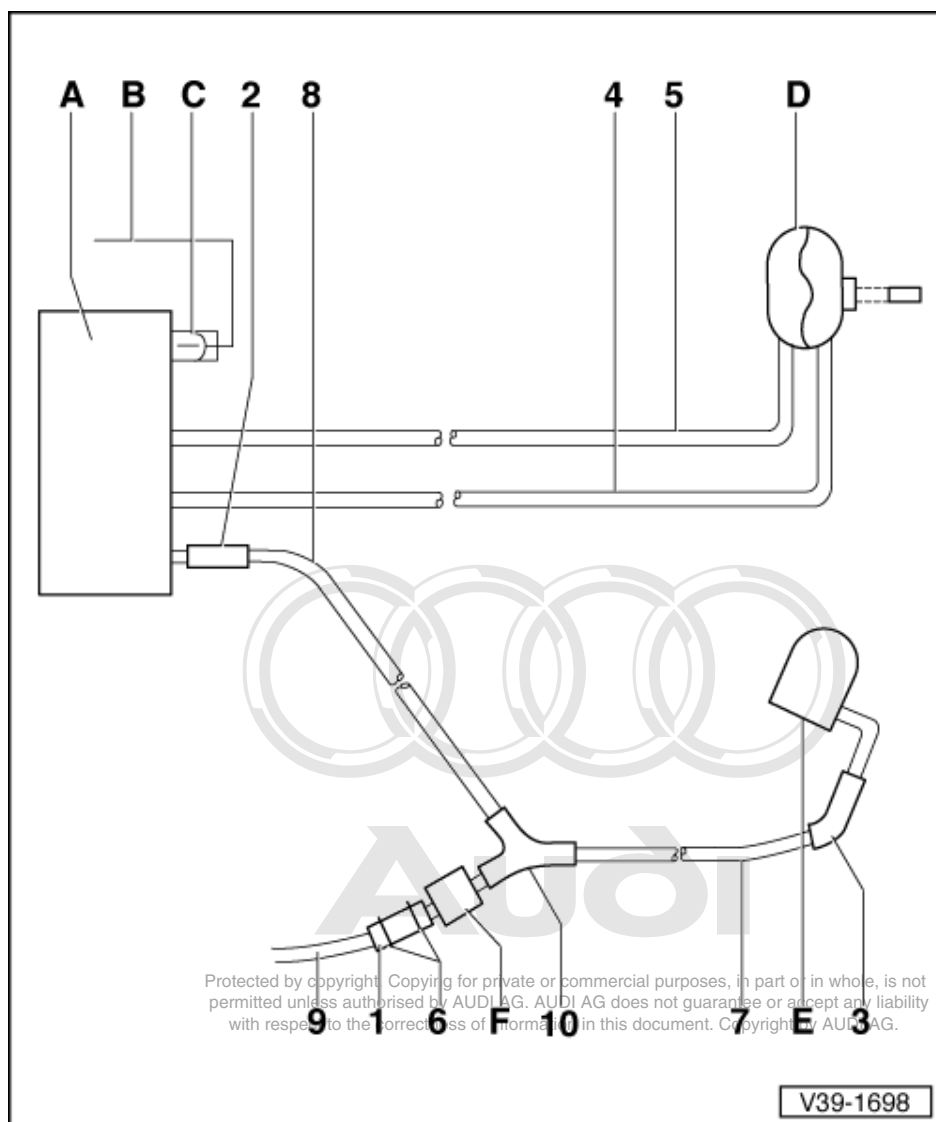
- ♦ Installation position in saloon: at top left of luggage compartment, below hinge for boot lid. To remove, detach luggage compartment trim
- ♦ Installation position in Avant: near rear left wheel housing, accessible via cover

F - Non-return valve

- ♦ Below rear seat

Note:

The hoses and pipes supplied as replacement parts are only available in one colour. When installing, cut the hose or pipe to the right length and attach adhesive tape of the appropriate colour, or mark the hose or pipe as necessary.



Hoses			
No.	Length (mm)	Colour	Qty.
1	45	black	1
2	45	black	1
3	510/350 1)	grey	1
4	850	yellow	1
5	820	blue	1
6	Hose clamps		2

Pipes 4 x 1			
No.	Length	Colour	Qty.
7	1200 mm	red	1
8	720 mm	purple	1
9 2)	2830 mm	black	1
10	Connecting piece (under rear seat)		1

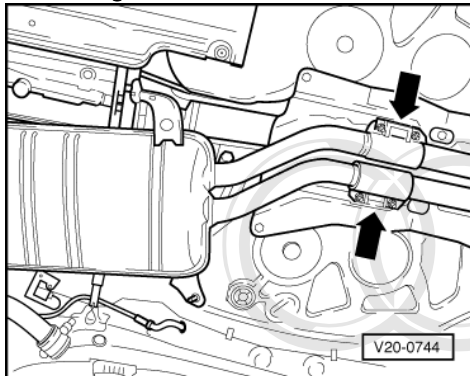
1) Avant only

2) Pipe from engine/ brake servo

15.4 - Removing and installing vacuum unit

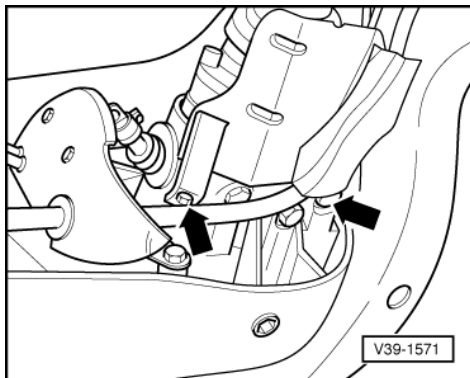
- Final drive installed

Removing

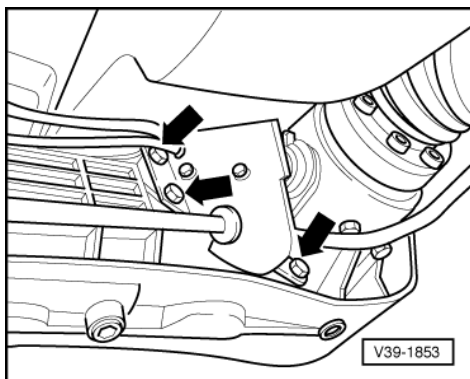


- -> Loosen clamps -arrows- and detach exhaust system

- => 4-Cylinder injection engine (2-valve), Mechanics; Repair group 26
- => 4-Cylinder injection engine (4-valve), Mechanics; Repair group 26
- => 4-Cylinder engine (5-valve), Mechanics; Repair group 26
- => 5-Cylinder injection engine (2-valve), Mechanics; Repair group 26
- => 6-Cylinder injection engine (2.6 ltr, 2-valve engine), Mechanics; Repair group 26
- => 6-Cylinder injection engine (2-valve), Mechanics; Repair group 26
- => 6-Cylinder engine (5-valve), Mechanics; Repair group 26
- Disengage main silencer and rear silencer from mountings.

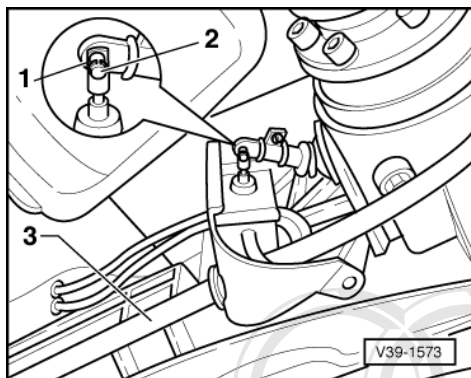


- -> Unbolt cover plate for left drive shaft -arrows-.



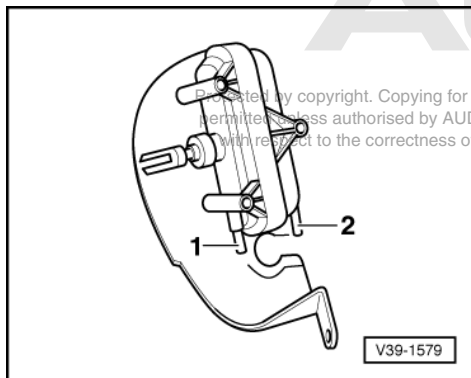


- -> Unbolt bracket with vacuum unit from rear final drive -arrows-.



- -> Release securing clip -1-.
- Push connector pin between vacuum unit and selector fork -2- upwards.
- Pull handbrake cable -3- and rubber grommet out of bracket.
- Pull vacuum hoses off vacuum unit - note colour coding.
- Unbolt vacuum unit from bracket.

Installing

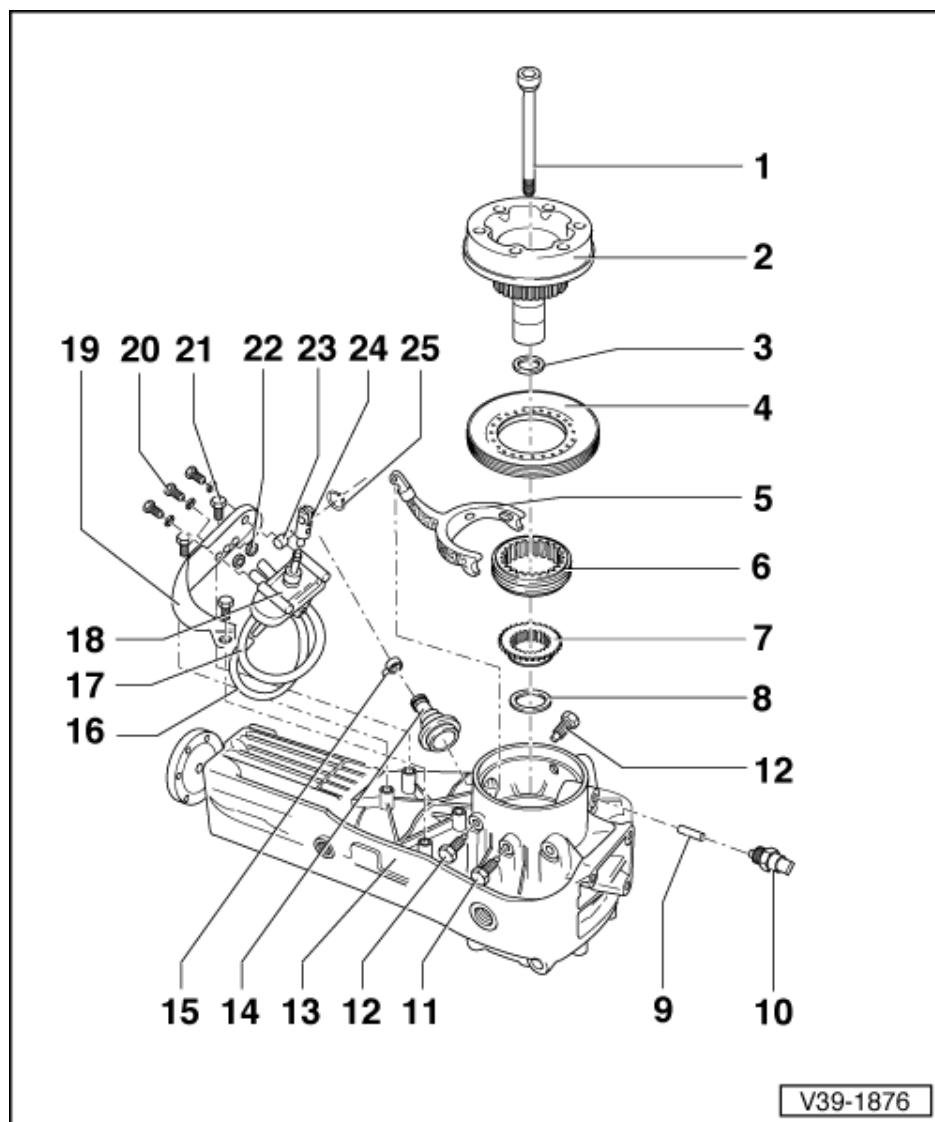


- -> Note colour coding of vacuum hoses:
 - Yellow hose to connection -1-
 - Blue hose to connection -2-
- Adjust clevis on vacuum unit
=> Page 272 .

Tightening torques

Component	Nm
Vacuum unit to bracket	3.5
Bracket to rear final drive	25
Cover plate to rear final drive	25
Clamp for exhaust pipe	40

15.5 - Dismantling and assembling differential lock



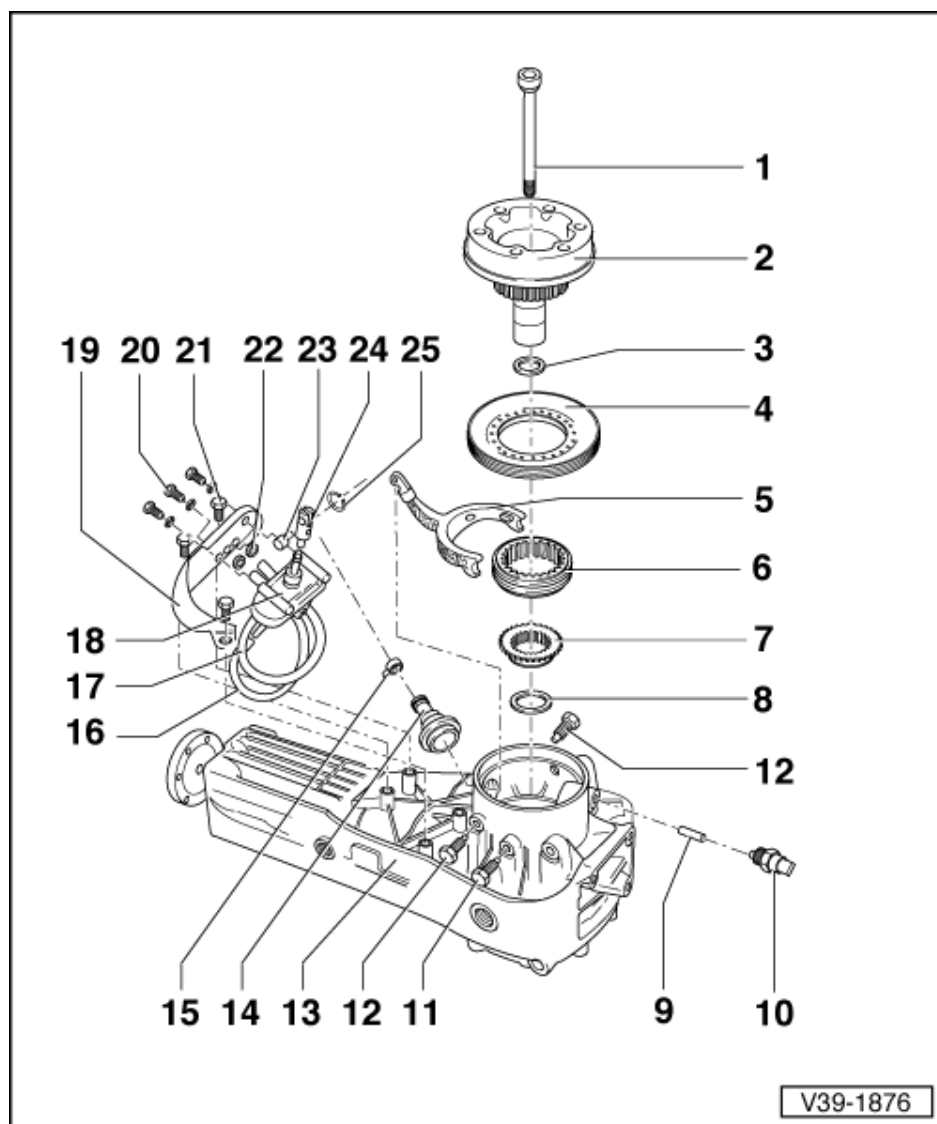
Notes:

- ◆ Can be dismantled with final drive installed
- ◆ The differential lock in the rear final drive can be engaged at speeds up to 25 km/h via a control unit. It is disengaged automatically at speeds above 25 km/h.
- ◆ Fault-finding for the differential lock

=> Current flow diagrams, Electrical fault-finding and Fitting locations; December 1990ä 1992; Fault-finding programme No. 2



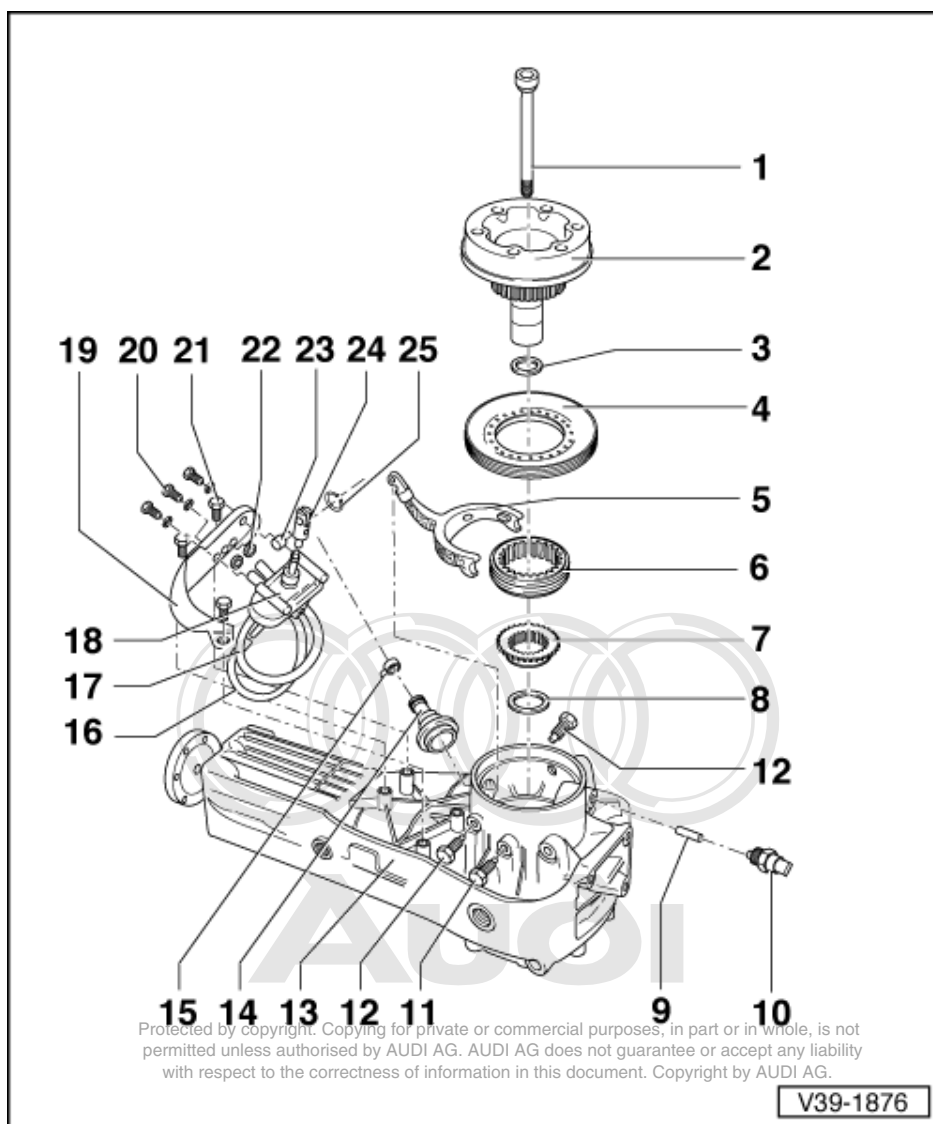
Protected by copyright. Copying for private or commercial purposes, in part or in whole, is not permitted unless authorised by AUDI AG. AUDI AG does not guarantee or accept any liability with respect to the correctness of information in this document. Copyright by AUDI AG.



- 1 Taper-head bolt M8
10 Nm +1/4turn (90°) further
- 2 Flange shaft
- 3 Shim for flange shaft
 - ♦ Take care not to lose shim when dismantling
 - ♦ Determine thickness
=>Page 273
- 4 Seal, left
 - ♦ Will be damaged when removing
- replace with new seal
 - ♦ Removing and installing
=>Page 199
- 5 Selector fork
 - ♦ Remove and install together with locking collar



Protected by copyright. Copying for private or commercial purposes, in part or in whole, is not permitted unless authorised by AUDI AG. AUDI AG does not guarantee or accept any liability with respect to the correctness of information in this document. Copyright by AUDI AG.



6 Locking collar

- ♦ Installation position: shoulder faces towards clutch body
- ♦ Remove and install together with selector fork

7 Clutch body for differential lock

- ♦ Installation position => Fig. 1

8 Shim for clutch body

- ♦ Determining thickness => Fig. 2

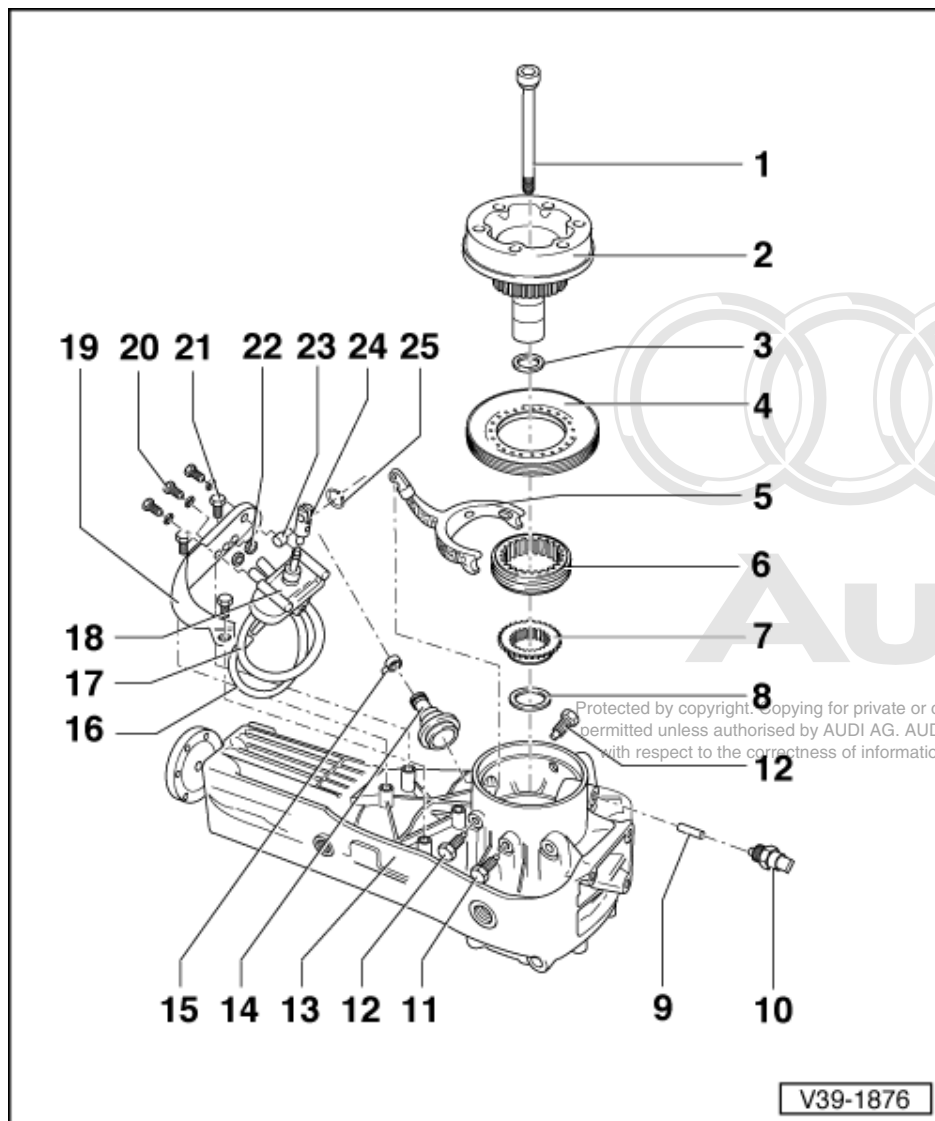
9 Extension pin

- ♦ For differential lock switch on rear final drive

10 Differential lock switch on rear final drive - 42 Nm

11 Trunnion bolt - 35 Nm

- ♦ Stop for selector fork



12 Trunnion bolt - 35 Nm

- ◆ Guide for selector fork

13 Rear final drive

14 Bellows

- ◆ To remove/install bellows, first remove bracket and vacuum unit
=>Page **266**

15 Clamp

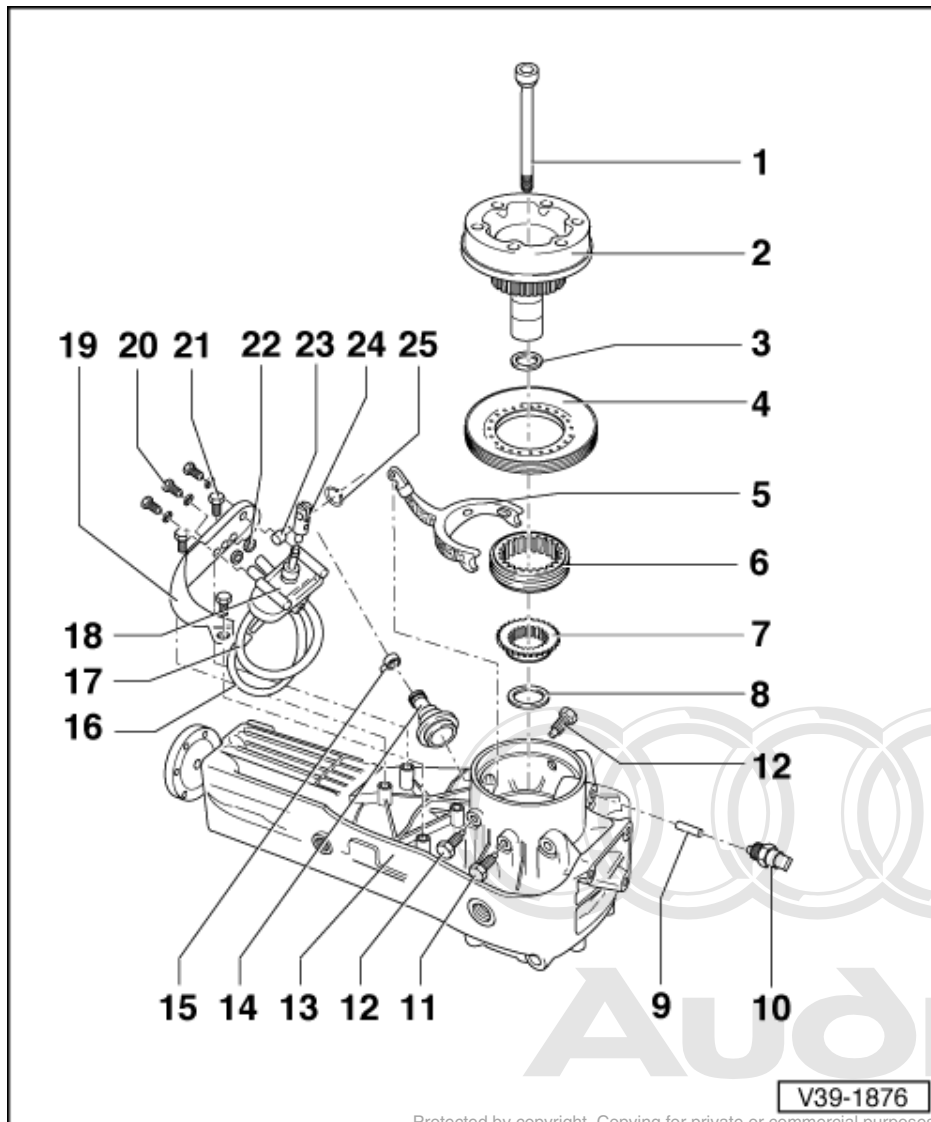
- ◆ Secures bellows to selector fork

16 Vacuum hose (blue)

- ◆ Fit onto inner connection on vacuum unit

17 Vacuum hose (yellow)

- ◆ Fit onto outer connection on vacuum unit



V39-1876

18 Vacuum unit

- ♦ Removing and installing
=>Page 265

19 Bracket

- ♦ For vacuum unit

20 Bolt - 3.5 Nm

- ♦ Qty. 3
- ♦ With corrugated washer
- ♦ Secures vacuum unit to bracket

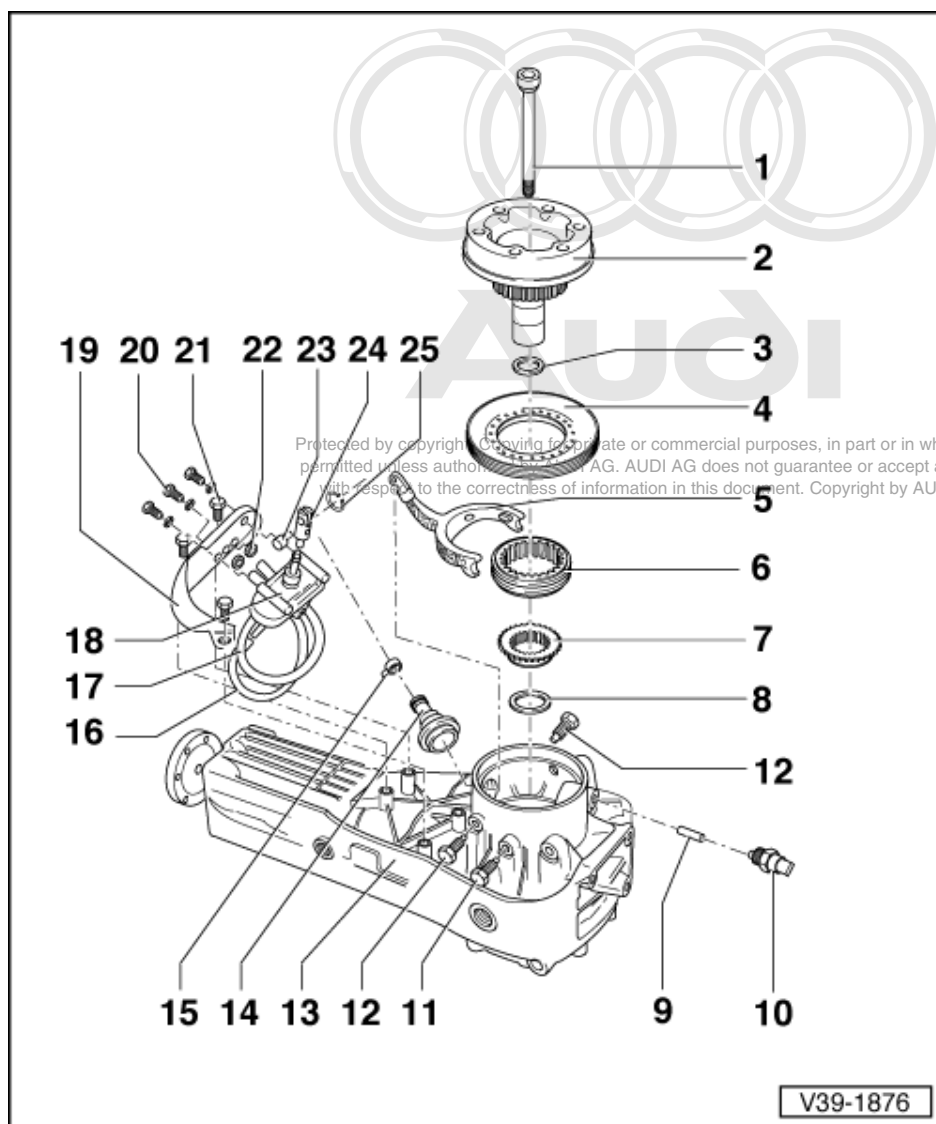
21 Bolt - 25 Nm

- ♦ Qty. 3
- ♦ Secures bracket to final drive

22 Grommet

- ♦ Qty. 2

Protected by copyright. Copying for private or commercial purposes in part or in whole, is not permitted unless authorised by AUDI AG. AUDI AG does not guarantee or accept any liability with respect to the correctness of information in this document. Copyright by AUDI AG.



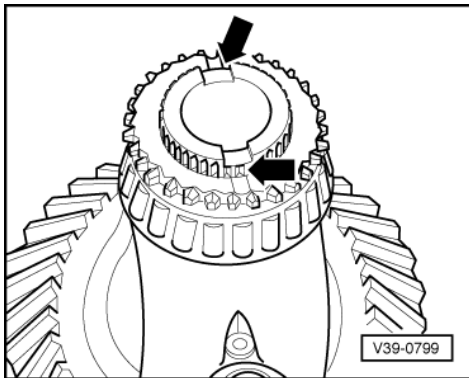
23 Pin

24 Clevis

- ◆ Adjusting
- Final drive must be fully assembled
- Remove pin from selector fork
- Turn clevis so that operating travel of vacuum element moves selector fork all the way to its two end positions (trunnion bolt -Item 11 - serves as the stop).

25 Securing clip

- ◆ Fit onto pin

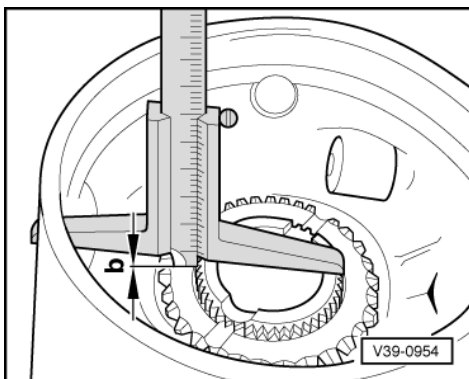


-> Fig.1 Installation position of clutch body

Note:

Shown in illustration with differential removed.

Oil grooves -arrows- on differential and clutch body must be aligned.



-> Fig.2 Determining thickness of shim

- Measure distance -b-.
- Select required shim from table. Part numbers

=> Parts catalogue

Distance -b-	Shim thickness (mm)
0.00 ... 4.10	no shim
4.11 ... 4.40	0.3
4.41 ... 4.70	0.6
4.71 ... 4.90	0.9

15.6 - Adjusting left flange shaft

Special tools, testers and auxiliary items

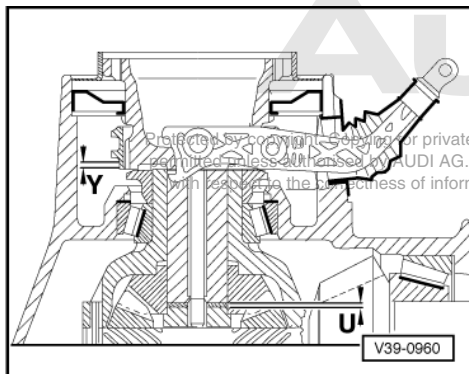
- ♦ Universal dial gauge bracket VW 387



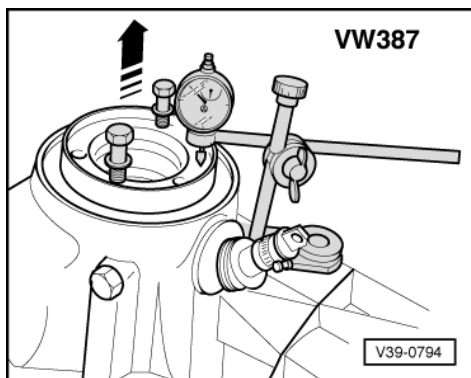
Notes:

- ♦ This adjustment is only required if the left flange shaft, the differential housing or the differential bevel gears are being replaced.
- ♦ The purpose of the adjustment is to obtain a clearance (-Y-) of 0.2 ... 0.5 mm between flange shaft and differential housing. This is necessary to ensure free running and reliable operation of the differential lock.

Determining shim "u"



- -> Measure clearance -y- between flange shaft and differential housing as follows:



- -> Secure dial gauge to rear final drive with universal dial gauge bracket VW 387.
- Press flange shaft in towards differential. Apply dial gauge to flange shaft and set to "0" with 1 mm preload.
- Pull out flange shaft in direction of arrow, and read off the clearance indicated.
 - Specification: 0.2 ... 0.5 mm
- If clearance is too small, install correspondingly thicker shims; if clearance is too large, install correspondingly thinner shims.
- Select required shims from table. Part numbers

=> Parts catalogue

Available shims

Shim thickness (mm)		
0.3	0.6	0.9

16 - Adjusting drive pinion and crown wheel

16.1 - Adjusting drive pinion and crown wheel

General notes:

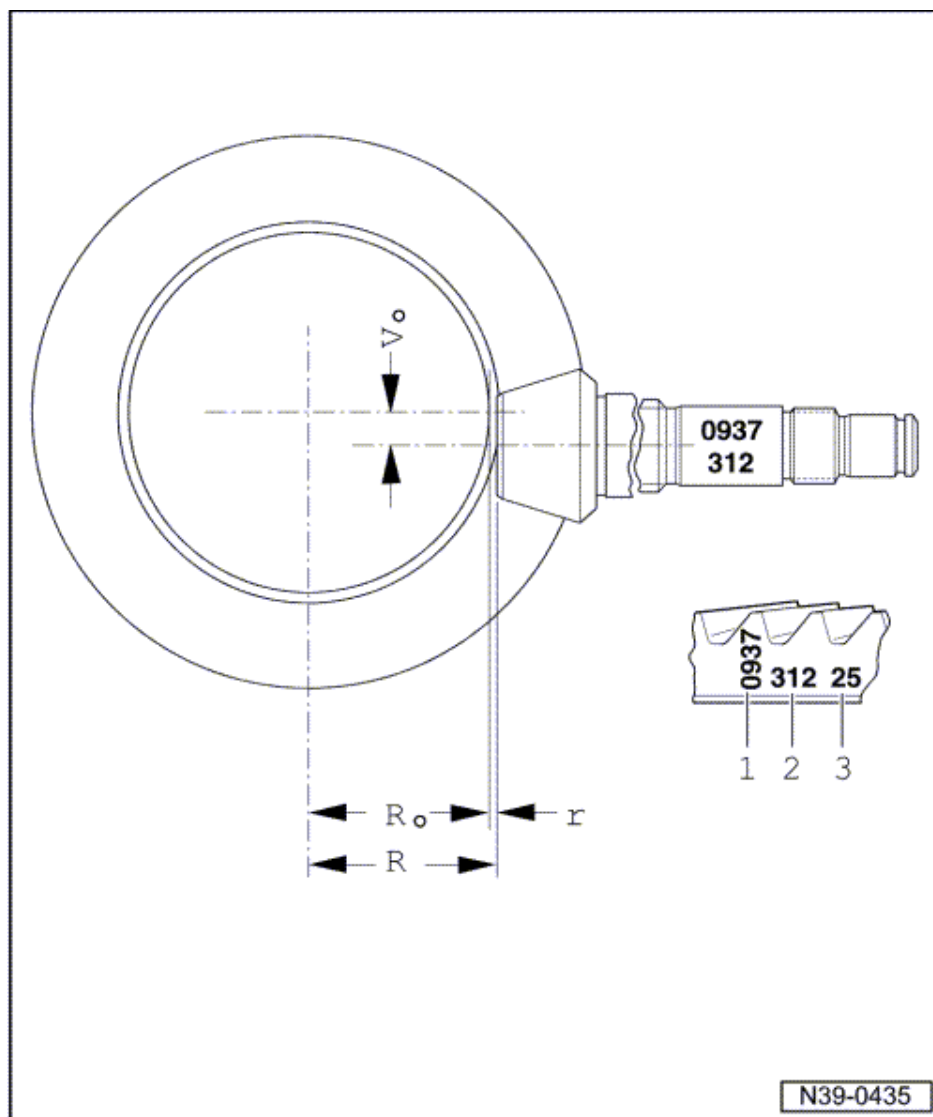
- ♦ Careful adjustment of the drive pinion and crown wheel is important for the service life and smooth running of the final drive. For this reason, the drive pinion and crown wheel are matched together during manufacture,

and checked to ensure a good mesh pattern and quiet running in both directions of rotation. The position of quietest running is found by moving the drive pinion in an axial direction and at the same time lifting the crown wheel out of the zero-play mesh position by the amount necessary to maintain the backlash within the specified tolerance.

- ◆ The object of the adjustment is to reproduce the setting for quietest possible running, as obtained on the test machine in production.
- ◆ The deviation (tolerance) "r", which is related to the master gauge "Ro" is measured for the final drive sets supplied as replacement parts and marked on the outer circumference of the crown wheel. The final drive set (drive pinion and crown wheel) may only be replaced together as a matched pair.
- ◆ Observe the general repair instructions for taper roller bearings and shims.
- ◆ Maximum care and cleanliness are essential for achieving good results when performing repairs and taking measurements.

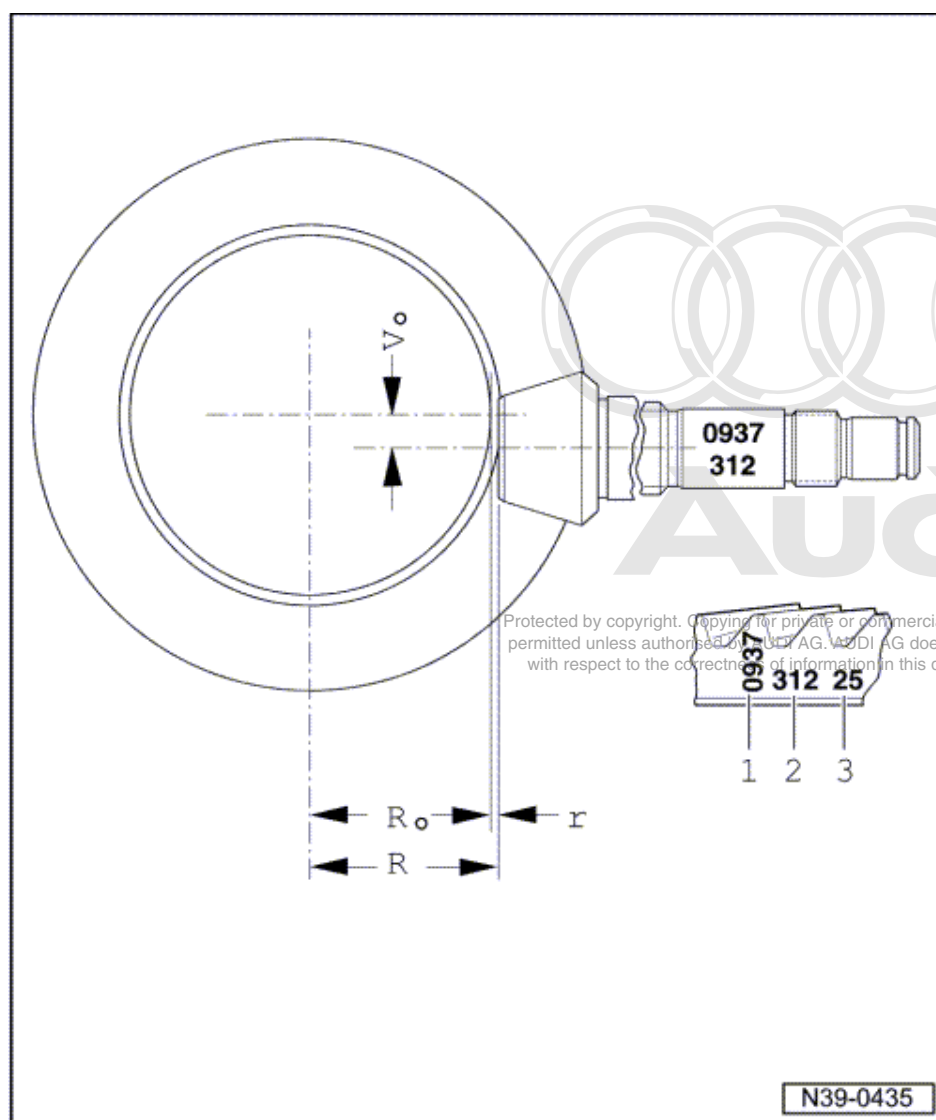
Protected by copyright. Copying for private or commercial purposes, in part or in whole, is not permitted unless authorised by AUDI AG. AUDI AG does not guarantee or accept any liability with respect to the correctness of information in this document. Copyright by AUDI AG.

16.2 - Adjusting and marking of gear sets



- 1 Identification "0937" signifies Oerlikon gear set with a ratio of 37:9.
- 2 Gear set pairing number (312).
- 3 Deviation (tolerance) "r" is based on the test machine master gauge used in the production. The deviation "r" is always given in 1/100 mm. Example: "25" signifies $r = 0.25 \text{ mm}$

Ro - Length of master gauge used for test machine "Ro".
Ro - Crown wheel = 53.15 mm



R - Actual distance between centre axis of crown wheel and face of drive pinion at point with quietest running for this gear set.
 $R = R_o + r$

V_o - Hypoid offset

16.3 - Recommended sequence for readjusting final drive set

The following work sequence is recommended to save time when the drive pinion and crown wheel have to be adjusted:

- 1.) Determine total shim thickness "Stotal" for "S1" + "S2" for the specified preload for taper roller bearings for differential.
- 2.) Determine total shim thickness "S3" to reproduce the installation position for the drive pinion determined on the test machine in production.

3.) Distribute total shim thickness "Stotal" for "S1" + "S2" so that the specified backlash exists between crown wheel and drive pinion.

Note:

Overview of components and shims =>Page 278 .

16.4 - Adjustment overview

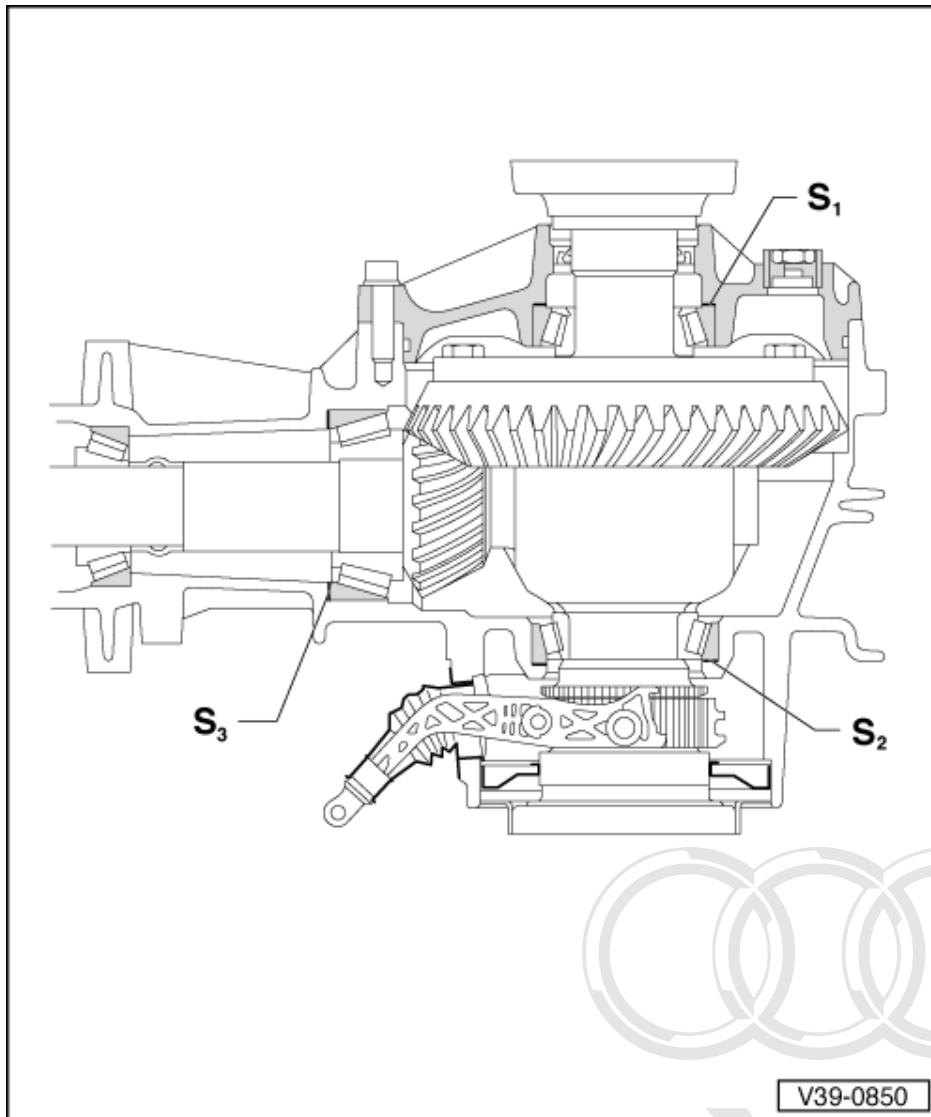
Note:

If repairs have been carried out on the final drive it is only necessary to adjust the drive pinion or final drive set if components have been renewed which have a direct effect on the adjustments of the final drive. Refer to the following table to avoid unnecessary adjustments:

to be adjusted:				
Part renewed: ▼	Crown wheel "S1" + "S2" 1) => Page 286	Drive pinion "S3" 1) via deviation "r" => Page 279	Backlash => Page 288	Left flange shaft (only if final drive has differential lock) => Page 273
Final drive housing	X	X	X	
Differential housing	X		X	X
Taper roller bearing for drive pinion		X	X	
Taper roller bearings for differential	X		X	
Final drive set 2)	X	X	X	
Cover for final drive	X		X	
Flange shaft				X
Differential bevel gears				X

- 1) Shims; installation position => Page 278 .
- 2) Drive pinion and crown wheel; only renew together.

16.5 - Position of shims



Note:

Adjustment overview when renewing individual components of final drive

=>Page 277.

- S1 - Adjustment shim for crown wheel in cover for final drive
- S2 - Adjustment shim for crown wheel in final drive housing
- S3 - Adjustment shim for drive pinion in final drive housing

Special tools, testers and auxiliary items

- ♦ Crankshaft seal installing tool VW 204 B
- ♦ Fitting sleeve VW 244 B
- ♦ Dial gauge extension VW 382/10
- ♦ Universal mandrel VW 385/1
- ♦ Centralising disc VW 385/3
- ♦ Measuring plunger VW 385/14
- ♦ Measuring plate VW 385/17
- ♦ Dial gauge extension VW 382/20
- ♦ Master gauge VW 385/30
- ♦ End dimension plate VW 385/33

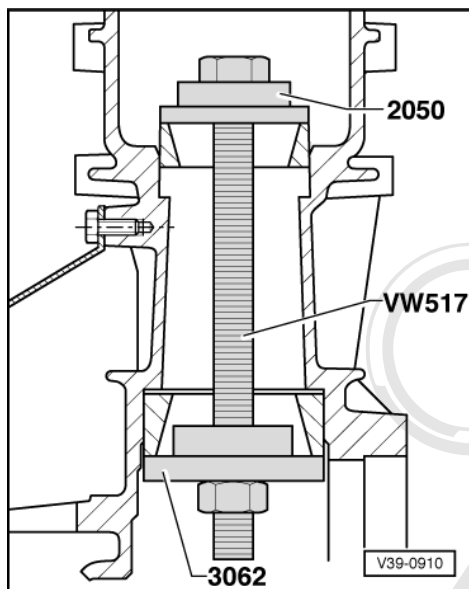
- ◆ Universal dial gauge bracket VW 387
- ◆ Measuring lever VW 388
- ◆ Press plate VW 401
- ◆ Press plate VW 402
- ◆ Press tool VW 412
- ◆ Threaded spindle VW 517
- ◆ Crown wheel adjusting appliance VW 521/4
- ◆ Crown wheel adjusting appliance VW 521/8
- ◆ Thrust plate 30-205
- ◆ Thrust pad 2050
- ◆ Pinion assembly appliance 2052/2
- ◆ Thrust pad 3062
- ◆ Retainer 3132
- ◆ Centring mandrel 3176
- ◆ Engine/gearbox jack V.A.G 1383 A
- ◆ Universal support V.A.G 1359/2
- ◆ Dial gauge extension, 30 mm
- ◆ Dial gauge
- ◆ Torque gauge 0 ... 600 Ncm
- ◆ Socket attachment (long), 32 mm A/F

16.6 - Adjusting drive pinion

Notes:

- ◆ Before adjusting drive pinion, adjust crown wheel (determine total shim thickness "Stotal" for shims "S1" + "S2") =>Page 286 .
- ◆ The drive pinion only has to be readjusted if the final drive set (crown wheel and drive pinion), the taper roller bearings for the drive pinion or the final drive housing are renewed. Adjustment overview => Page 277 .

Determining thickness of shim "S3"

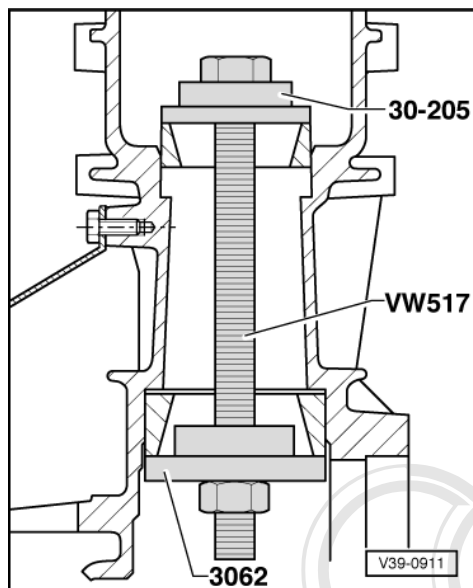


(Setting preload of taper roller bearing for drive pinion)

- Secure rear final drive to repair stand
=>Page 225 .
- -> Pull outer race of large taper roller bearing into housing (without shim).

Note:

Thoroughly oil bearing race and bearing seat in housing.



- -> Pull outer race for small taper roller bearing into housing.

Note:

Thoroughly oil bearing race and bearing seat in housing.

- Insert drive pinion without spacer sleeve.

Caution

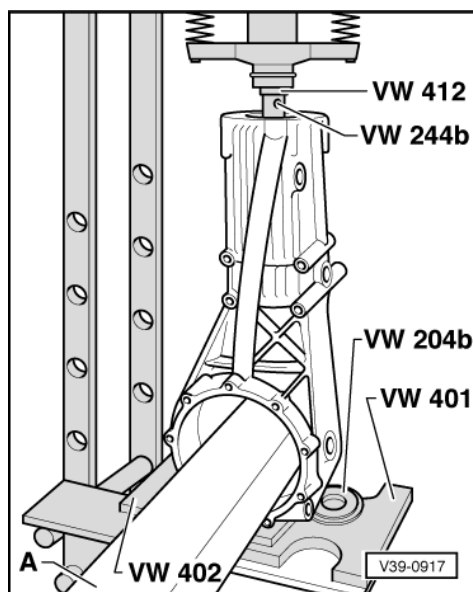
Wear protective gloves.

Protected by copyright. Copying for private or commercial purposes, in part or in whole, is not permitted unless authorised by AUDI AG. AUDI AG does not guarantee or accept any liability with respect to the correctness of information in this document. Copyright by AUDI AG.

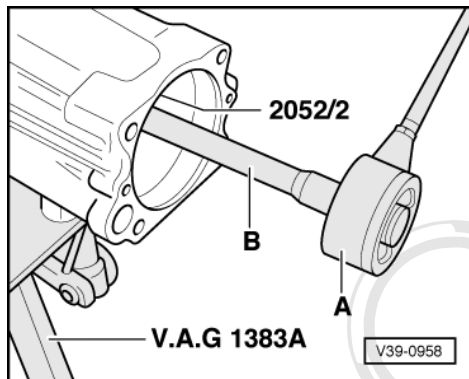
- Heat inner race for taper roller bearing to approx. 100 °C and fit onto drive pinion.

Note:

Only install spacer sleeve for final frictional torque measurement (after determining shim "S3").



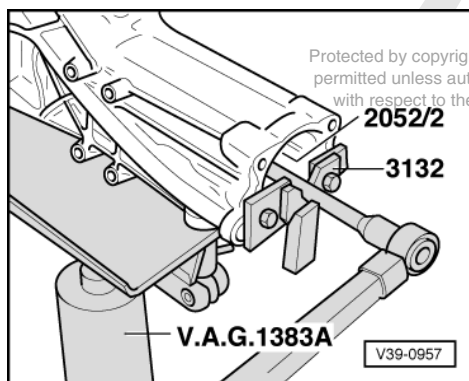
- -> Press taper roller bearing fully home.
- A - Wooden block used to support drive pinion



- A - -> Torque gauge, commercially available, 0 ... 600 Ncm
- B - Extension with 32 mm socket

Note:

Use reducer 3/4 " to 1/2 " if necessary.

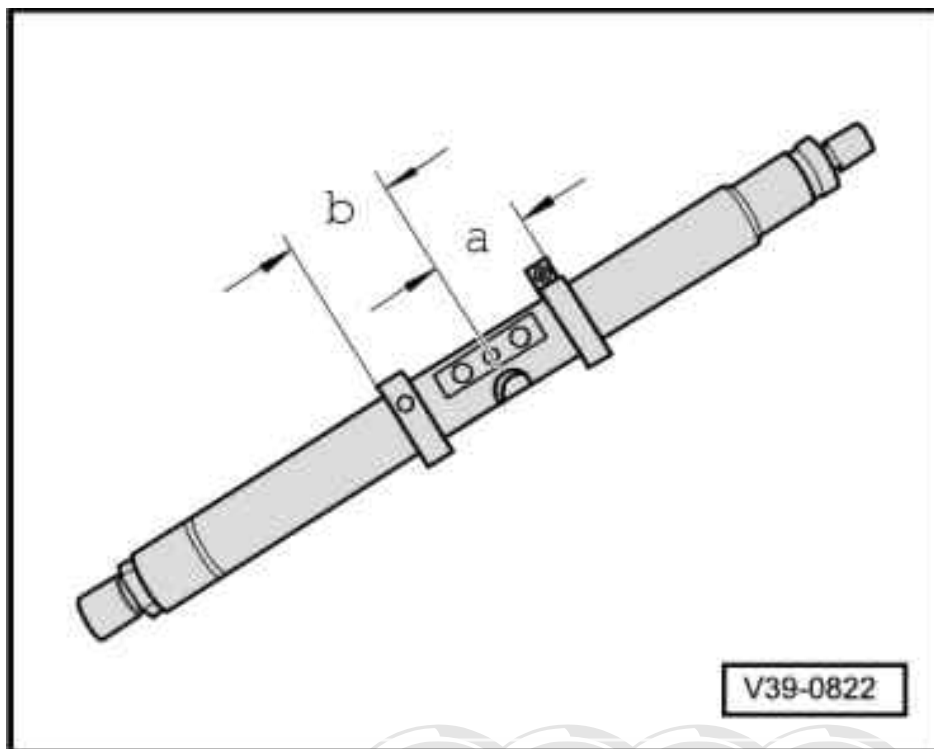


- -> Tighten drive pinion nut until the following friction torque is obtained.

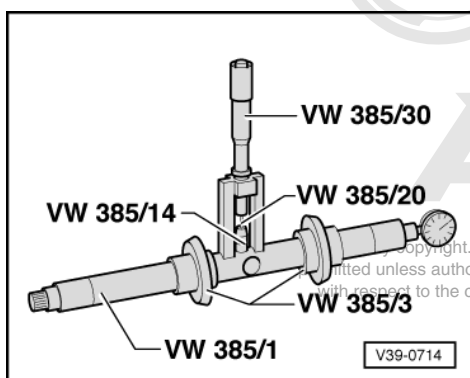
New bearings	Used bearings ¹⁾
250 ... 300 Ncm	30 ... 60 Ncm

1) run at least 50 km (30 miles)

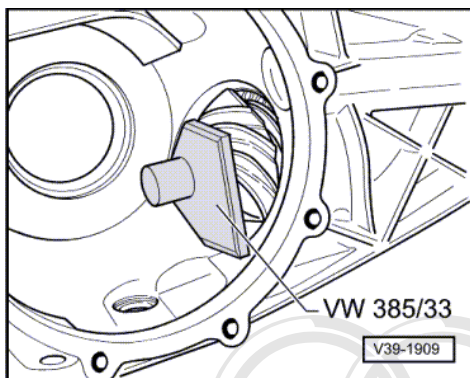
- The final drive must be supported when tightening the nut (e.g. using universal support V.A.G 1359/2 in conjunction with gearbox jack V.A.G 1383 A).
- Fit a new drive pinion nut.
- Tighten drive pinion nut just far enough so that no play can be felt at drive pinion.
- Gradually increase tightening torque, checking friction torque at regular intervals, until the specified friction torque is obtained.



- -> Set adjustment ring of universal mandrel VW 385/1.
- Distance "a" = 75 mm
- Set sliding adjustment ring.
- Distance "b" = 35 mm



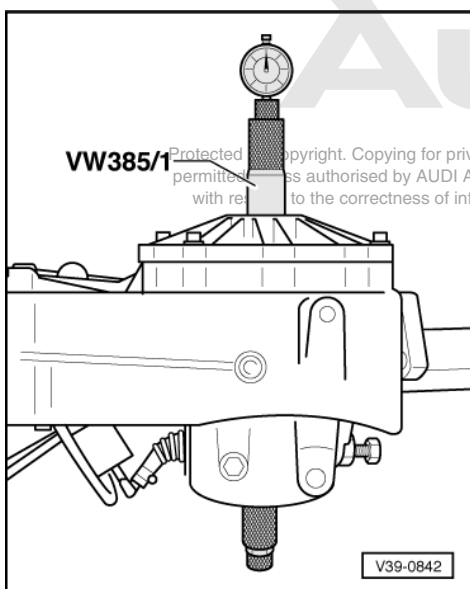
- -> Assemble universal mandrel as illustrated:
- Dial gauge extension VW 385/20 = 3 mm long
- Set universal master gauge VW 385/30.
- Ro = 53.15 mm
- Set dial gauge (3 mm measuring range) to "0" with 2 mm preload.



Note:

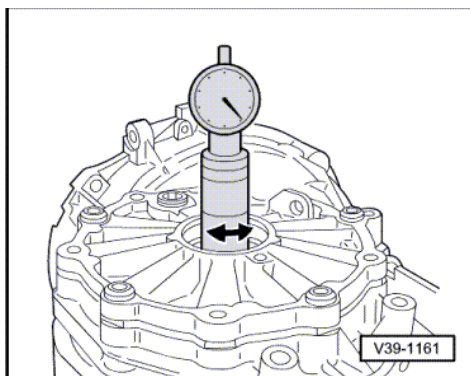
Before performing following measurements turn drive pinion at least five turns in both directions, so that the taper roller bearings settle. Otherwise a false reading will be obtained.

- -> Place end measuring plate VW 385/33 onto drive pinion head.



- -> Remove master gauge and insert measuring mandrel in the housing.
- The centring disc VW 385/3 faces towards cover for final drive
- Fit cover for final drive and tighten 4 bolts.
- Using the adjustable ring, move 2nd centring disc out as far as possible so that the mandrel can still just be turned by hand.

Determining measurement "e"





- -> Turn mandrel until the dial gauge point touches the end measuring plate on drive pinion head, then measure maximum deflection (return point). The measured value is dimension "e" (in red scale).
- Measurement in following example: "e" = 1.60 mm

Note:

Dimension "e" is required to determine thickness of shim "S3".

- After removing universal mandrel, check once again whether the dial gauge reads "0" with 2 mm preload when master gauge VW 385/30 is in place - otherwise repeat the measurement.

Determining shim thickness "S3"

Formula:	
"S3" = "e" - "r"	
e	= Measured value
r	= Deviation (tolerance): marked on crown wheel in 1/100 mm

Example:	
Determined value "e"	1.60 mm
- Deviation "r"	0.42 mm
= Thickness of shim "S3"	1.18 mm

- Determine shim(s) as accurately as possible from table. Part numbers

=> Parts catalogue

The following shims are available for "S3"

Shim thickness (mm) 1)		
0.95	1.20	1.45
1.00	1.25	1.50
1.05	1.30	1.55
1.10	1.35	
1.15	1.40	

1) Using the shim tolerance variations it is possible to find the exact shim thickness required, insert two shims if necessary.

- Remove universal mandrel.
- Remove drive pinion and outer race of large taper roller bearing and install together with measured shims "S3" and spacer sleeve
=>from Page 251 .
- Install inner race of small taper roller bearing and tighten nut for drive pinion until specified friction torque is obtained=>Page 281 .

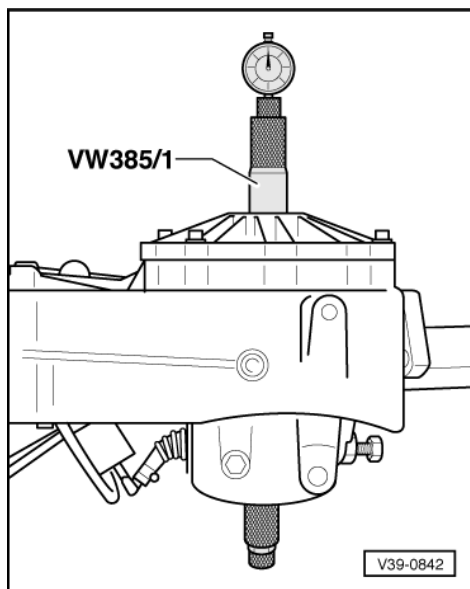
Note:

Increase tightening torque slowly and check friction torque at regular intervals, if the specified friction torque is exceeded, the spacer sleeve must be renewed and the adjustment repeated. A spacer sleeve which has been compressed too much cannot be reused.

- Set to following frictional torques:

New bearings	Used bearings1)
250 ... 300 Ncm	30 ... 60 Ncm

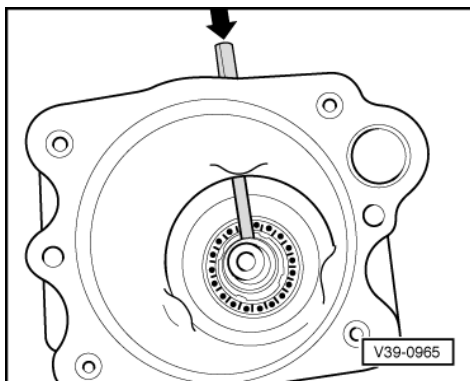
- 1) run at least 50 km (30 miles)



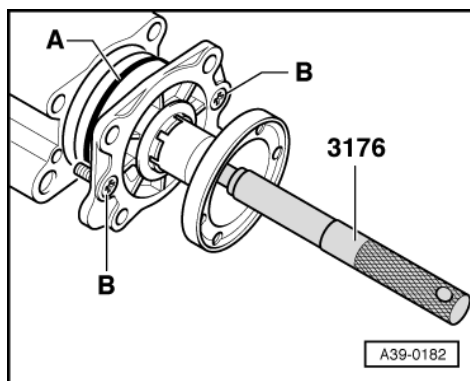
Performing check measurement

Checking dimension "r"

- Turn drive pinion at least 5 turns in both directions.
- -> Insert universal mandrel and perform check measurement.
 - If the shims have been correctly selected, the dial gauge should now show the value of "r" as marked on the crown wheel, reading anti-clockwise in the red scale, within a tolerance of ± 0.04 mm.



- -> Peen drive pinion nut by applying a punch through the oil drain hole.



Protected by copyright. Copying for private or commercial purposes, in part or in whole, is not permitted unless authorised by AUDI AG. AUDI AG does not guarantee or accept any liability with respect to the correctness of information in this document. Copyright by AUDI AG.

- -> Renew O-ring -A- in cover.
- Install flange for propshaft and cover for final drive.
- Drive in flange shaft with drift 3176.
- Tighten 2 countersunk bolts -B- for cover to 25 Nm.

Note:

The radial run-out at flange for propshaft must be measured and marked =>Page 191 .

16.7 - Adjusting crown wheel

(Adjusting differential)

Repairs after which the crown wheel has to be adjusted

=>Adjustment overview Page 277 .

Determining total shim thickness "Stotal" for shims "S1" + "S2"

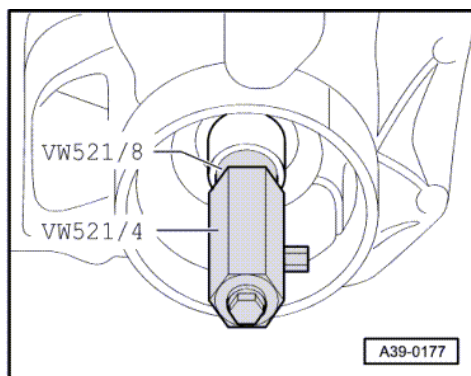
(Setting preload of taper roller bearing for differential)

- Drive pinion removed or crown wheel dismantled from differential housing
- Pull out flange shaft oil seal with lever.
- Remove differential taper roller bearing outer races and take out shims=>from Page 240 .
- Press left-hand taper roller bearing outer race for differential (housing side) with shim "S2" into housing=>from Page 240 . To perform the measurement use a shim "S2*" with a thickness of 1.00 mm (one 0.80 mm shim and one 0.20 mm shim).

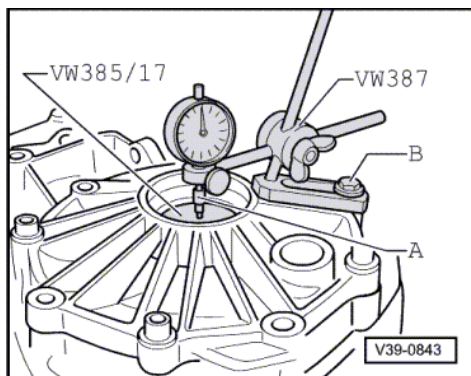
Note:

For measurement purposes a shim "S2" of 1.0 mm is initially inserted which will be designated "S2*" in the following. After determining the backlash "S2*" will be replaced by the correct "S2".

- Press in right-hand taper roller bearing outer race for differential (final drive cover side) without shims onto stop:
=>Fig. 249
- Insert differential into housing. The crown wheel is positioned on the right side (cover side).



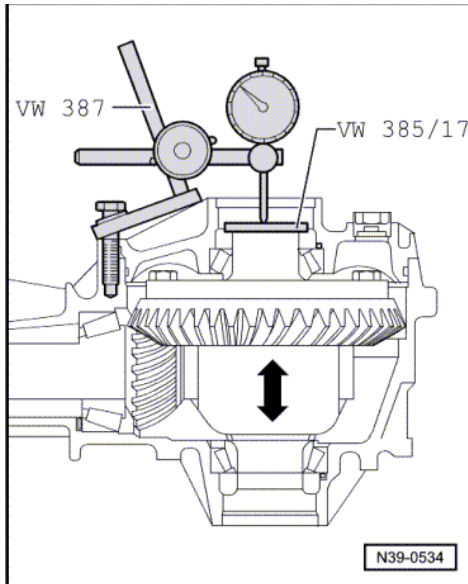
- Fit cover and tighten bolts to 25 Nm.
- -> Install special tools VW 521/4 and 521/8 onto housing side in differential housing.
- Turn cover side of differential housing upwards.



- Turn differential 5 turns in both directions to settle the taper roller bearing.
- Place measuring plate VW 385/17 onto differential.
- -> Fit measuring tools.

- A - Dial gauge extension approx. 30 mm long
- B - Hexagon bolt M8 x 45

- Place D.T.I. extension on the centre of the measuring plate VW 385/17.



- Set dial gauge (3 mm measuring range) to "0" with 2 mm preload.
- -> Lift differential without turning; read off play on dial gauge and note.
 - Measurement in following example: 0.50 mm

Note:

If the measurement has to be repeated, the differential must again be turned 5 turns in each direction to settle the taper roller bearing.

Formula:	
"Stotal" = "S2*" + measurement + bearing preload	
Example:	
Inserted shim(s) "S2*"	1.00 mm
+ Measured value	0.50 mm
+ Bearing preload (constant)	0.30 mm
= Total shim thickness "Stotal" for shims "S1" + "S2"	1.80 mm

Determining thickness of shim "S1"**

Notes:

- ♦ The preliminary adjustment shim "S1**" will be replaced with the final shim "S1" after determining the backlash.
- ♦ The total shim thickness "Stotal" remains unchanged.

Formula:	
"S1**"	= "Stotal" - "S2*"

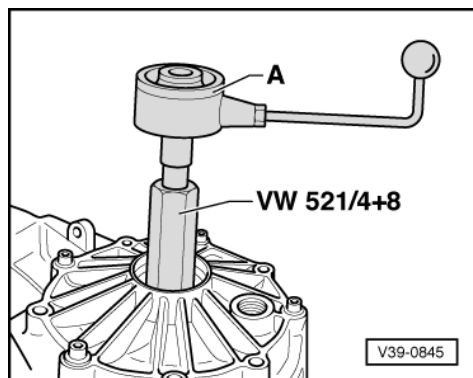
Example:

Protected by copyright. Copying for private or commercial purposes, in part or in whole, is not permitted unless authorised by AUDI AG. AUDI AG does not guarantee or accept any liability with respect to the correctness of information in this document. Copyright by AUDI AG.



Total shim thickness "Stotal" for shims "S1" + "S2"	1.80 mm
- Inserted shim(s) "S2*"	1.00 mm
= Thickness of shim "S1*"	0.80 mm

- Determine shim(s) as accurately as possible from table
=> Page 290 .



Protected by copyright. Copying for private or commercial purposes, in part or in whole, is not permitted unless authorised by AUDI AG. AUDI AG does not guarantee or accept any liability with respect to the correctness of information in this document. Copyright by AUDI AG.

Measuring frictional torque (check)

- Drive pinion removed
- Differential fitted with shims "S1*" and "S2*"
- -> Fit torque gauge 0 ... 600 Ncm -A- onto differential.
- Read off frictional torque.

Frictional torque specifications:

New bearings	Used bearings ¹⁾
250 ... 300 Ncm	30 ... 60 Ncm

- 1) run at least 50 km (30 miles)

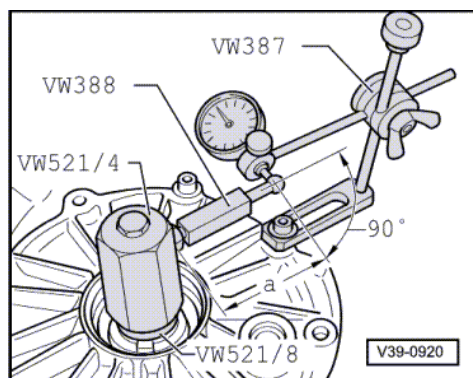
Note:

After readjusting the final drive set, adjust and check the drive pinion=>Page 279 .

Adjusting backlash

(Positioning crown wheel in final drive housing)

- Drive pinion with shim "S3" installed
- Differential with shims "S1*" + "S2*" installed
- Insert differential in final drive housing, install cover and tighten all bolts to 25 Nm.



- Turn differential 5 turns in both directions to settle the taper roller bearings.
- > Assemble measuring equipment.
- Use dial gauge extension VW 382/10 (6 mm flat).
- Set measuring lever VW 388 to dimension "a" = 60 mm.
- Determine play between the teeth flanks as follows:
 - Turn crown wheel until it makes contact with a tooth flank (end of backlash travel).
 - Set dial gauge to "0" with 1 mm preload.
- Turn crown wheel back until lying against an opposite tooth flank (backlash).
- Read off backlash and note value.
- Turn crown wheel through 90° and repeat measurements a further 3 times.

Note:

If the individual measurements differ by more than 0.06 mm from each other, the installation of the crown wheel or the final drive set itself is not correct. Check installation, replace final drive set if necessary.

Determining average backlash

Example:	
1st measurement	0.28 mm
+ 2nd measurement	0.30 mm
+ 3rd measurement	0.30 mm
+ 4th measurement	0.28 mm
= Sum of measured values	1.16 mm

- Result: The average backlash is $1.16 / 4 = 0.29$ mm

Determining thickness of shim "S2"

Formula:	
"S2"	= "S2*" - backlash + lift

Example:	
Inserted shim "S2*"	1.00 mm
- Average backlash	0.29 mm
+ Lift (constant)	0.15 mm
= Thickness of shim "S2"	0.86 mm

- Determine shim(s) as accurately as possible from table. Part numbers

=> Parts catalogue

The following shims are available for "S2"

Shim thickness (mm) 1)		
0.15	0.60	1.50
0.20	0.65	1.65
0.25	0.80	
0.55	1.35	

1) Using the shim tolerance variations it is possible to find the exact shim thickness required, insert two shims if necessary.

Determining thickness of shim "S1"

Formula:

"S1"	=	"Stotal" - "S2"
------	---	-----------------

Example:	
Total shim thickness "Stotal" for "S1" + "S2"	1.80 mm
- Thickness of shim "S2"	0.86 mm
= Thickness of shim "S1"	0.94 mm

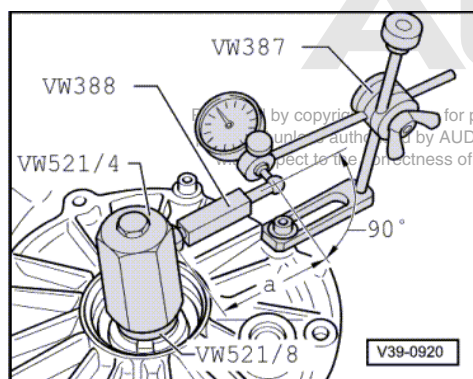
- Determine shim(s) as accurately as possible from table. Part numbers

=> Parts catalogue

The following shims are available for "S1"

Shim thickness (mm) 1)		
0.15	0.50	1.50
0.20	0.80	
0.25	1.00	

- 1) Using the shim tolerance variations it is possible to find the exact shim thickness required, insert two shims if necessary.



-> Performing check measurement

- Drive pinion with shim "S3" installed
- Differential with shims "S1" + "S2" installed
- Turn differential 5 turns in both directions so that the taper roller bearings settle.
- Measure backlash four times on circumference.
 - Specifications: 0.12 ... 0.22 mm

Notes:

- ♦ If the backlash lies outside the tolerances, the adjustments must be repeated, but the total shim thickness "Stotal" must remain unchanged.
- ♦ The individual measurements must not differ by more than 0.06 mm from each other.